



# INDUCED DRAFT HIGHBOY AND COUNTERFLOW/HORIZONTAL GAS FURNACE

## INSTALLATION AND SERVICE MANUAL MODELS

<b>MHA1-50N</b>	<b>MDA1-50N</b>
<b>MHA1-75N</b>	<b>MDA1-75N</b>
<b>MHA1-100N</b>	<b>MDA1-100N</b>
<b>MHA1-125N</b>	<b>MDA1-125N</b>

**⚠WARNING:** IF YOU DO NOT FOLLOW THE SAFETY PRECAUTIONS BELOW AND IN THIS MANUAL, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY, OR LOSS OF LIFE.

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

WHAT TO DO IF YOU SMELL GAS:

- DO NOT TRY TO LIGHT ANY APPLIANCE.
- DO NOT TOUCH ANY ELECTRICAL SWITCH; DO NOT USE ANY PHONE IN YOUR BUILDING.
- LEAVE THE BUILDING IMMEDIATELY.
- IMMEDIATELY CALL YOUR GAS SUPPLIER FROM A NEIGHBOR'S PHONE. FOLLOW THE GAS SUPPLIER'S INSTRUCTIONS.
- IF YOU CANNOT REACH YOUR GAS SUPPLIER; CALL THE FIRE DEPARTMENT.

INSTALLATION AND SERVICE MUST BE PERFORMED BY A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER. (REFERRED TO IN THESE INSTRUCTIONS AS A QUALIFIED HEATING CONTRACTOR).

PLEASE READ THESE INSTRUCTIONS PRIOR TO INSTALLATION, INITIAL FIRING, AND BEFORE PERFORMING ANY SERVICE OR MAINTENANCE. THESE INSTRUCTIONS MUST BE LEFT WITH THE HOMEOWNER AND SHOULD BE RETAINED FOR FUTURE REFERENCE BY QUALIFIED SERVICE PERSONNEL.

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**All installations and services must be performed by qualified service personnel.**

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All installations and services must be performed by qualified service personnel.

## Notice to the Installer

Installation of this gas-fired furnace **must** be performed by a qualified installer in accordance with all local codes and authorities having jurisdiction. In the absence of local governing codes, installation shall conform to these instructions and to the regulations of the National Fuel Gas Code, ANSI Z223.1/NFPA 54-2002 and/or, National Gas and Propane Installation Codes CSA B149.1, or the latest editions thereof.

A qualified installer, also referred to in this instruction manual as a “qualified heating contractor”, is an individual, or agency, that is responsible for the installation and adjustment of the equipment. **A qualified installer is properly licensed and experienced to install gas-burning equipment** in accordance with all local codes and ordinances.

**Any reference to L.P. or propane gas in this manual, any other label, or markings on the furnace is to be construed to be propane HD-5, a commercial grade of liquefied petroleum gases composed of a minimum of 90 percent liquid propane (C<sub>3</sub>H<sub>8</sub>).**

### Material and Workmanship

This furnace was built with the highest quality materials and attention to workmanship. However, omissions and defects occasionally occur. Before installing the furnace, inspect the furnace thoroughly. If missing parts, defective material, or poor workmanship are evident, report the **model** and **serial numbers** imprinted on the furnace rating label to the seller.

### Packaging

This is a complete, factory-assembled furnace contained within one package. However, certain parts, including, air filter(s), air filter rack(s), the venting system must be assembled to the furnace, in the field.

### Shipping Damage

If this furnace was damaged during transit, please immediately request the transportation company inspect the furnace and issue a **concealed damage report**. The party receiving the furnace should file the claim for shipping damage. **Report any shipping damage immediately.**

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It is absolutely essential that a damage report be obtained. If a concealed damage report is not obtained, we cannot provide assistance in recovering your claim against the transportation company.

## Warranties

### **⚠WARNING:**

**The manufacturer of this equipment assumes no liability for any damages resulting from unauthorized modifications made to the furnace, or components thereof, or improper installation of the furnace in the field. Furthermore, any such field modifications VOID THE WARRANTY and place the responsibility for safe and reliable operation of the furnace on those who performed the modification(s).**

Make certain the warranty cards are returned. These must be on file to verify installation dates for replacement of any warranted part(s).

## I. Safety

### **⚠WARNING:**

**The following guidelines and warnings should be read and understood before continuing with the installation of this furnace. Failure to follow these guidelines can result in improper and unsafe operation of this appliance, which can cause substantial property damage, severe personal injury, or death.**

These instructions must be read in their entirety before installing the furnace. It is the installer's responsibility to do the following:

1. Use only with the type of gas approved for this furnace. Refer to the furnace marking plate.
2. Install this furnace only in a location and position as specified in Section II, B of this manual.
3. Provide adequate combustion and ventilation air to the furnace space. Refer to Sections II, E of this manual.
4. Connect this furnace to an approved vent system only. Combustion products must be vented outdoors. Refer to Section II, J of this manual for vertical vented units.

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5. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. Refer to Section II, L of this manual.
6. Always adjust the furnace to operate within the furnace's temperature-rise range with a duct system, which has an external static pressure within the allowable range. Refer to Section III, D of this manual.
7. Make sure supply and return air ducts are completely sealed to the furnace casing. Ductwork must run to an area outside the air space where the furnace is located and be sealed where it runs through walls, ceilings, and floors. Refer to Section II, G of this manual.
8. This furnace is not to be used for temporary heating of buildings or structures under construction
9. Refer to MDA1 horizontal application Section II, F of this manual for safety switch relocation associated with horizontal installation of the MDA1.
10. Inform and demonstrate to the user, the correct operation and maintenance of the appliance as explained in the Users Information Manual.
11. Inform the user of the hazards of flammable liquids and vapors and to remove such liquids and vapors from the vicinity of the appliance.
12. Inform the user of warnings and cautions as well as user information in the sidewall venting manufacturer's manual when sidewall venting is applied.

## **II. Installation Guidelines**

### **A. Codes**

All local codes and/or regulations take precedence over the instructions in this manual and should be followed accordingly. In the absence of local codes, installation must conform to the instructions and the regulations of the National Fire Protection Association National Electrical Code, ANSI/NFPA70-2002, and the National Fuel Gas Code, NFPA 54/ANSI Z223.1-2002, or the latest editions thereof.

The heating capacity of the furnace proposed for installation should be based on a rate of heat loss calculation made according to the manuals provided by the Air Conditioning Contractors of America (ACCA) or ASHRAE.

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## B. Installation Location

### **⚠WARNING:**

- These furnaces are designed for indoor installation only.
- These furnaces are **NOT** to be used as construction heaters.
- The return air duct of the furnace must be sealed air tight to prevent starvation of the combustion air, especially if the furnace is located in a closet or confined area.

For best performance locate the furnace so that it is centralized with respect to the duct system.

Place the unit so that proper venting can be achieved, with a minimum number of elbows, in accord with the instructions in this manual. The furnace should be located as close to the chimney (vertical venting) or to the outside vent wall (horizontal venting) as practical.

The furnace must be located on a level, dry surface in an area, which is free from and protected from excessive drafts. The furnace must be installed so that the electrical components are protected from water. If the area becomes wet or damp at times, the furnace should be raised above the floor using a concrete base, bricks, patio blocks, etc.

When installing this furnace, provisions must be made to insure the supply of adequate combustion and ventilation air in accordance with the air for combustion and ventilation section of the National Fuel Gas Code, NFPA 54/ANSI Z223.1-2002, or latest edition, or applicable provisions of the local building code. See Section II, E, of this manual

A furnace installed in a residential garage must be installed so the burners and ignition source are located 18 inches or higher above the floor. Also, the furnace must be located or protected to avoid physical damage by vehicles.

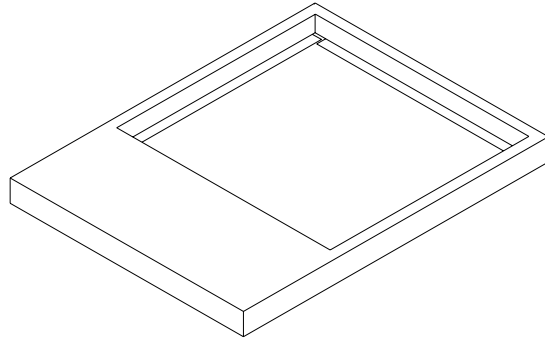
If this furnace is to be installed horizontally, see Section II, F, of this manual.

## C. Closet and Alcove Installation

All furnace models may be installed in a closet or alcove on combustible flooring with specified (standard) clearances to combustible construction. The furnace shall not be installed directly on carpeting, tile or other combustible material other than wood flooring. **The MDA1-50, 75, 100, and 125, horizontal / counterflow furnace, models requires an optional combustible surface-mounting base for counterflow installation directly on combustible materials.** The combustible floor base model numbers are as follows: 50DA-BASE for MDA1-50

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and MDA1-75; 100CA-BASE for MDA1-100; and 125CA-BASE for MDA1-125. refer to **Figure 1**.



**Figure 1: Counter flow Furnace Combustibile Surface-Mounting Base**

## D. Standard Clearances

Definitions of **combustible material** and **non-combustible** as issued by the National Fuel Gas Code are as follows:

### **Combustible Material:**

Materials made of or surfaced with wood, compressed paper, plant fibers, plastics or other material that will ignite and burn whether flameproof or not or whether plastered or not plastered.

### **Non-combustible Material:**

Material which will not ignite and burn; such materials consisting entirely of steel, iron, brick, concrete, slate, glass, plaster or combination thereof.

**Table 1: Minimum Clearances to Combustibile Materials**

<b>Model No.</b>	<b>Sides &amp; Rear of Furnace (in.)</b>	<b>Front of Furnace (in.)</b>	<b>Top of Plenum (in.)</b>	<b>Flue or Vent (in.)</b>	<b>Sides of Plenum (in.)</b>
All Models Covered by This Manual	0	6	1	*6	1

\*6 in. clearance may be reduced to 1 in. with UL Recognized type B1 vent.

The minimum clearances are listed for fire protection. Clearances for servicing and proper operation, the front of the furnaces and to all points on the furnace requiring access must be 24 in.



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## E. Air for Combustion and Ventilation

### **⚠CAUTION:**

**Relief openings in the front or top of the furnace casing should not be obstructed or blocked. These openings supply combustion and ventilation air to the furnace.**

Chloride, fluoride, iodide, and bromide bearing compounds when present, even in low concentrations, in air supplied for combustion to the furnace, can result in accelerated and severe corrosion of the heat exchanger and/or the venting systems. This condition can occur with less efficient furnaces, but is accelerated on furnaces with efficiencies of 80% or greater.

Many, household chemicals contain chloride-bearing compounds. There are many compounds representative of this classification of chemicals. A few common examples are listed below.

- Cleaning solvents
- Varnish and paint removers
- Bleaches
- Fabric softeners
- Water softener salt
- Tile adhesives

Avoid installing the furnace in areas where it is evident these chemicals are being stored, or used, within close proximity to the furnace. In addition, avoid storing or using any chemicals of an unknown nature in close proximity to the furnace. If it is necessary to store or use these chemicals in the same space as the furnace, all containers should be sealed when not in use. If possible, keep these chemicals in a separate, well-ventilated, room that is closed off, from the furnace, with a door.

The furnace shall be installed in a location within the building that permits a satisfactory supply of air for combustion, ventilation, and proper operation of the venting system. While all forms of building construction cannot be covered in detail in this manual, this requirement may usually be met by application of one of the following methods in ordinary building construction. Consult the National Fuel Gas Code, NFPA 54/ANSI Z223.1 – 2002, or the latest edition, for special cases and further details. However, local installation codes always take precedence and must be followed, if applicable.

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1. Utility Room (example of a confined space)

In buildings of unusually tight construction, such as those wherein weather stripping and storm sash windows are used, two (2) permanent openings connecting to a well-ventilated crawl space, attic, or with the outdoors shall be provided. Each opening shall have a minimum free area of one (1) square inch per 1000 BTUH of total input rating of all appliances to be installed in the utility room. One opening should be located near, or in, the ceiling of the room and the other should be located near, or in, the floor.

2. Full Basement (example of an unconfined space)

Where a furnace is installed in a full basement, infiltration is normally adequate to provide air for combustion and ventilation.

When an opening in the outside wall must be provided, it should be furnished with properly screened metal sleeves.

If an exhaust fan, or additional fuel burning appliances, are present in the furnace room, there should be increased concern about providing adequate airflow to the furnace. Additional efforts may be required to assure an adequate supply of combustion and ventilation air is available to the furnace under all conditions.

## F. MDA1 Horizontal Installation

### **⚠WARNING:**

**The auxiliary limit switch must be relocated in accordance with the following instructions when installing this furnace horizontally.**

### **⚠CAUTION:**

**DO NOT hang the horizontal / counterflow furnace from a structure or surface by any integral part or fastener of the furnace. The furnace was not designed to support itself in this manner.**

The MDA1-50, 75, 100, and 125 furnaces may be installed in a horizontal position by placing the furnace on the left or right side (as viewed from the front in the upright position).

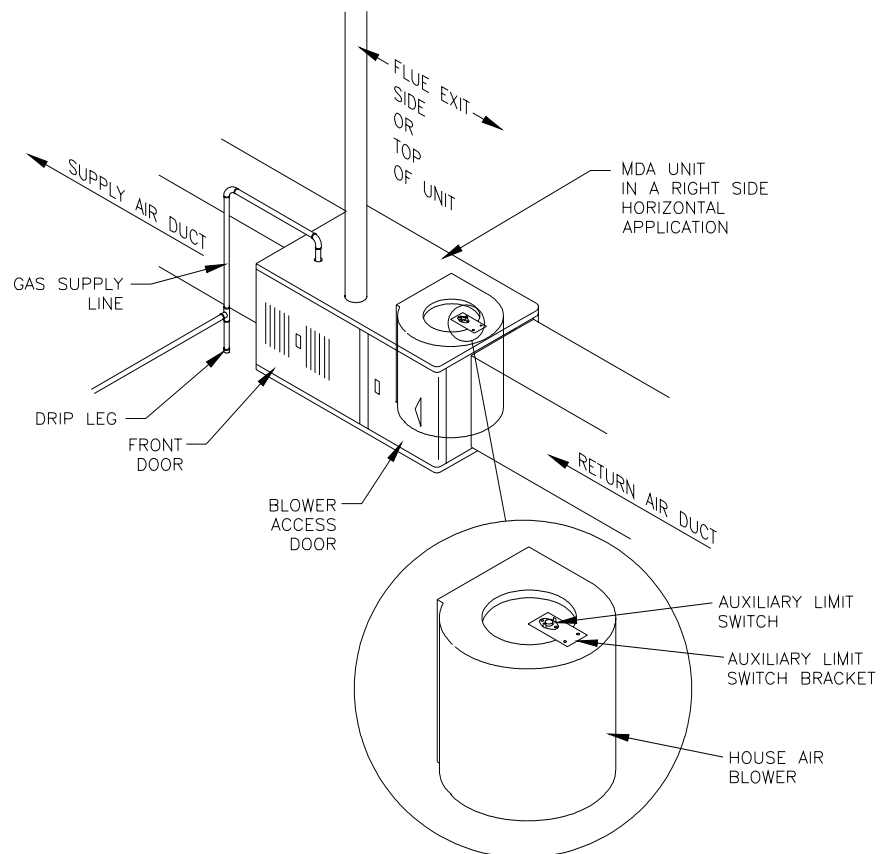
If the unit is placed on its right side the auxiliary limit switch located on the right side of the house air blower **must** be moved to the opposite (left) side of the blower (refer to Figure 2).

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A plenum angles kit, (AOPS4942) is available for connecting the supply plenum to the furnace. The kit consists of four angles that are to be screwed to into the predrilled holes in the base of the furnace using # 8 screws.

The horizontal furnace installation should be on a service platform large enough to allow for proper clearances on all sides and service access to the front of the furnace (refer to Table 1). If the furnace is suspended, it must be supported at both ends and in the middle with clearance allowed for removal of both access doors. Line contact is only permissible between lines formed by the intersection of the top and two sides of the furnaces casing and the building joists, studs, or framing.

**Equipment must be installed in accordance with regulations of the National Board of Fire Underwriters and the National Fuel Gas Code. Authorities having jurisdiction should be consulted before installations are made.**



**Figure 2: MDA1 Installed Horizontal**

All installations and services must be performed by qualified service personnel.

## G. Duct Work and Air Conditioning

Design and installation of the duct system should follow the current guidelines of the Air Conditioning Contractors of America (ACCA) or the American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE).

All furnaces are tested over a range of external static pressure that simulates the airflow resistance of the ductwork, fittings, and diffusers connected to the furnace for a typical (average) duct system. The furnace blower and blower motor have been selected to work successfully against the following range of duct system resistance.

**Recommended range of duct system resistance for all models: 0.2 to 0.5 in. W.G. external static pressure.**

When the furnace is installed in a small room, and no return air ducts are used, the return openings to the unit should extend full size to a location outside the furnace room.

If the furnace is used in connection with summer air conditioning (cooling), the air conditioner's evaporator coil must be installed on the air outlet side of the furnace to avoid water vapor condensation in the furnace heat exchanger.

**NOTICE:** Return air grilles and supply registers in the air distribution system should not be obstructed.

## H. Filters/ Filter Installation

Filters must be installed external to the furnace casing.

It is necessary to cut the return air opening in one or both side(s) of the MHA1 models depending upon the needs of the specific installation.

This MHA furnace has been factory supplied with a high quality re-usable filter rated for air velocities up to 600 ft/min. An optional Thermo Products filter rack assembly (part no. AOPS7547 for MHA50, 75, 100 and AOPS7375 for the MHA125) is available which, is sized for the filter provided.

If an optional Thermo Pride filter rack (Figure 3) is used with the furnace, square knock outs have been provided on each side casing to act as a template for the cut out. Scribe lines connecting the outside corners of each knockout, cut side casing along lines. Position the open end of the filter rack so that it is accessible for filter replacement. Attach the filter rack to the furnace with screws or pop-rivets along the securing flange. Connect the return plenum to the filter rack and slide the filter into place.

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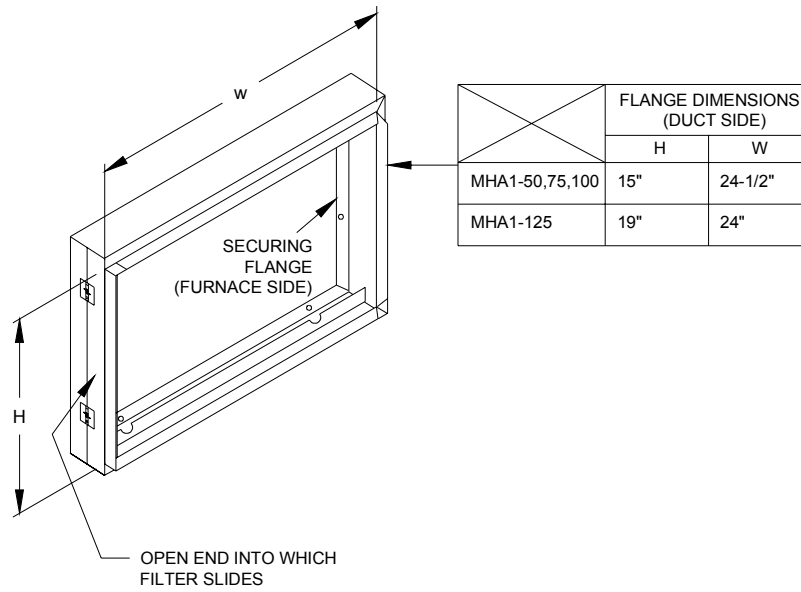


Figure 3: Optional Thermo Pride Filter Rack

## I. Use of Non-Thermo Pride Filter Retention Means

### **⚠ CAUTION:**

Failure to comply with minimum filter installation requirements may affect the performance and/or void the warranty on this furnace.

If a method other than a Thermo Pride filter rack is selected for retention of the filter and/or use of a different filter type is desired, see Table 2 for minimum size guidelines for selecting a filter system for the MHA1/MDA1 furnaces.

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**Table 2: Minimum Filter Area Required (Sq. in.)**

Filter Type	Maximum Rate of Velocity (FPM)	Furnace Model			
		MHA1-50 MDA1-50	MHA1-75 MDA1-75	MHA1-100 MDA1-100	MHA1-125 MDA1-125
*THERMO PRODUCTS SUPPLIED PERMANENT FILTER	600	172	254	328	402
STANDARD PERMANENT FILTER	500	208	304	394	484
DISPOSABLE TYPE FILTER	300	344	506	656	804

\* The Thermo Products supplied filter can be cut to size to fit other filter retention systems as long as the minimum size requirement is met.

**NOTICE:** The filter areas in Table 2 are the **minimum** areas required based on the flowrate generated by the furnace for standard heating speeds only. The following formula can be used to determine the minimum filter area required for cooling, if the unit is equipped with cooling. This value should then be compared to the value shown in table 2 and the larger of the two should then be used for determining the minimum filter area required for that installation.

**FORMULA:**

$$\frac{(\text{tons of cooling})(400 \text{ CFM per ton})(144 \text{ sq. in. per foot})}{(\text{max. air velocity of filter from table 5 for the filter type})} = \text{filter area sq. inches}$$

**EXAMPLE:** If you had an MHA1/MDA1-100 furnace and 4 tons of cooling and a standard reusable filter.

$$\frac{4 \text{ tons} \times 400 \text{ CFM} \times 144}{500} = 460 \text{ square inches for cooling}$$

For heating an MHA/MDA-100 needs 328 square inches of standard reusable filter. The filter system must be designed for the larger flow requirement determined for cooling of 460 square inches. A filter would have to be sized so that the area (length x width) was at least 460 sq. in.

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## J. Venting

### 1. Vertical Venting

#### **⚠WARNING**

- The vent installation of this Category I furnace must be in accordance with National Fuel Gas Code, NFPA 54/ANSI Z223.1-2002 or latest edition, and/or local building codes and these instructions.
- A furnace or any other gas utilization equipment must not be connected to a chimney flue serving a separate appliance designed to burn solid fuel.
- When venting two or more appliances into a common vent, the smallest appliance must be vented into the top opening.
- The maximum gross stack temperature must not exceed 480°F (249°C) under any circumstances

**NOTICE:** This section does not apply to units, which are sidewall vented. For sidewall venting, see Section II, K, of this manual.

The following requirements must be followed when connecting this furnace to a vent system.

The MHA1/MDA1 (induced draft gas highboy and counterflow/horizontal) series furnace must be vented in accordance with these instructions into a factory built chimney or vent complying with a recognized standard. Type B1 or double wall vent as well as masonry chimneys lined with a lining material acceptable to the authority having jurisdiction are acceptable as described in the venting tables included in the appendix of the National Fuel Gas Code, NFPA 54/ANSI Z223.1-2002, or latest edition.

A good vent is one that is sealed and has the capability of producing a -0.04 in. W.G. draft with the capacity of handling the amount of flue gas that is introduced to it.

The vent must be vertical or nearly vertical in design, unless equipped with a UL listed mechanical venter.

This furnace must not be connected into any portion of a mechanical draft system operating under a positive pressure.

This furnace shall not be vented into an unlined masonry or concrete chimney.

PVC piping is not an acceptable substitute for a chimney or a flue connector. A chimney with an internal construction of stainless steel or some other material that will withstand a gross flue gas temperature of 480°F is required.

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These venting tables also include venting combinations, which apply to common venting arrangements of two or more appliances. These requirements as well as all the installation requirements outlined in this manual for an MHA1/MDA1 series furnace must be followed when an MHA1/MDA1 furnace is common vented with another Category I gas appliance.

See also Section II, J, 2, of this manual, "Replacing an Existing Furnace From a Common Vent" for information on testing the proper operation of appliances in a common vent.

The minimum allowable chimney height is determined by the height of the surrounding trees, roof, buildings and terrain. The chimney should extend 24" above any surrounding obstructions. In cases where the chimney flue extends to the basement floor, the draft can usually be improved by filling the base of the chimney with sand to within 12" of the flue pipe after relocating the cleanout cover.

All joints of the vent must be tightly sealed. The inside of the vent should be free of all obstructions.

## **2. Replacing An Existing Furnace From a Common Vent**

### **⚠WARNING:**

#### **CARBON MONOXIDE POISONING HAZARD**

**Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death.**

When an existing furnace is replaced or removed from a common vent serving other appliances, the vent system may now be too large to properly vent the remaining appliances only and must be modified accordingly. Failure to correct an oversized vent can cause the formation of condensate, leakage or spillage of combustion byproducts, which may cause property damage, personal injury, or loss of life.

The steps below must be followed with each appliance, which is still connected, to the common venting system. Each appliance should be placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

1. Seal any unused opening(s) in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code, NFPA 54/ANSI Z223.1 – 2002, or the latest edition. Determine there is no blockage or



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restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.

3. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building.
4. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan.
5. Close fireplace dampers.
6. Follow the lighting instructions. Place the appliance being inspected in operation. Adjust thermostat so appliance will operate continuously.
7. Test draft hood equipped appliances for spillage of flue gases at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or use a draft gauge.
8. If the improper venting is observed on any of the appliances during the above testing, the common vent system must be corrected. Follow the steps outlined in the National Fuel Gas Code, NFPA 54/ANSI Z223.1 - 2002 or the latest edition thereof, to resize the vent system to approach the minimum size using the appropriate tables in the appendix of the Code.
9. Return doors, windows, exhaust fans, fireplace dampers and the remaining appliances to their previous conditions of use after determining that each appliance remaining connected to the common venting system is venting properly when tested as outlined above and the vent system is properly sized.

**NOTICE:** Common vent sizing of two Category I appliances may be done as referenced in the National Fuel Gas Code, NFPA 54/ANSI Z223.1 - 2002 or the latest edition thereof.

### **3. Condensing in the Chimney**

Due to the improved designs, resulting in increasing thermal efficiencies of our furnaces, more heat is being placed into the home instead of up the chimney. This means the stack temperature will be lowered, which may result in

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condensing within the chimney under certain conditions. The following is an explanation on why and what to do if condensing occurs in a chimney or vent.

Moisture (in the form of water vapor) occurs in flue gases when hydrogen is combined with oxygen during the chemical reaction produced by combustion.

The flue gas water vapor will do one of two things as it escapes up the chimney:

1. Remain in a vapor state, if the internal chimney wall temperature is above the dew point, or
2. Condense on the chimney walls, if they are chilled below the dew point.

Condensing will always occur on chimney walls whose temperatures are below the dew point of the flue gas. However, the water may evaporate once the walls are warmer than the dew point. If the chimney walls do not reach the dew point during the cycle of the furnace, the moisture may accumulate in large enough quantities to cause problems such as corrosion of the chimney or corrosion of the furnace heat exchanger.

This condensation most likely will not occur at the bottom of the chimney, because the flue gas is heating the chimney walls as it rises and the bottom will be heated first. This heating of the walls will cause the flue gas temperature to drop, which in turn may reduce the wall temperature below the dew point causing condensation to appear on the upper part of the chimney first. This condensation may drip back as far as the flue pipe and heat exchanger, where corrosion may occur if not corrected.

To prevent condensation, it is necessary that the internal chimney wall temperature always be kept above the dew point. The chimney may have to be lined with a flue liner if the temperature loss is too great for the furnace. A liner will act as an insulator and reduce the flue gas temperature loss. Insulation may be added around the liner for further temperature stability. If the chimney is on the exterior of the home and condensing occurs, the chimney may be insulated around its exterior to help the flue hold its temperature. Also, check to see if the chimney is too large for the flue gases to heat, if so reduce to proper size by lining. Be sure to use steel liners such as stainless types 430, 304, 316, or for the toughest against corrosion type 29-4C.

More detailed information on condensing may be obtained from the 2000 ASHRAE systems and Equipment Handbook Chapter 30. Refer to National Fuel Gas Code, NFPA 54/ANSI Z223.1-2002, or latest edition, Category I venting tables, for proper vent sizing.

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#### 4. Flue/Vent Connector

##### **⚠WARNING:**

- **Either drill a starter hole in the inducer or use a self-tapping screw to mount the flue pipe to the inducer. Failure to follow these instructions may damage the inducer.**
- **All vents and vent connectors must fit tightly to avoid air leaks.**
- **The MHA1/MDA1 series furnaces must not be installed with vent damper.**

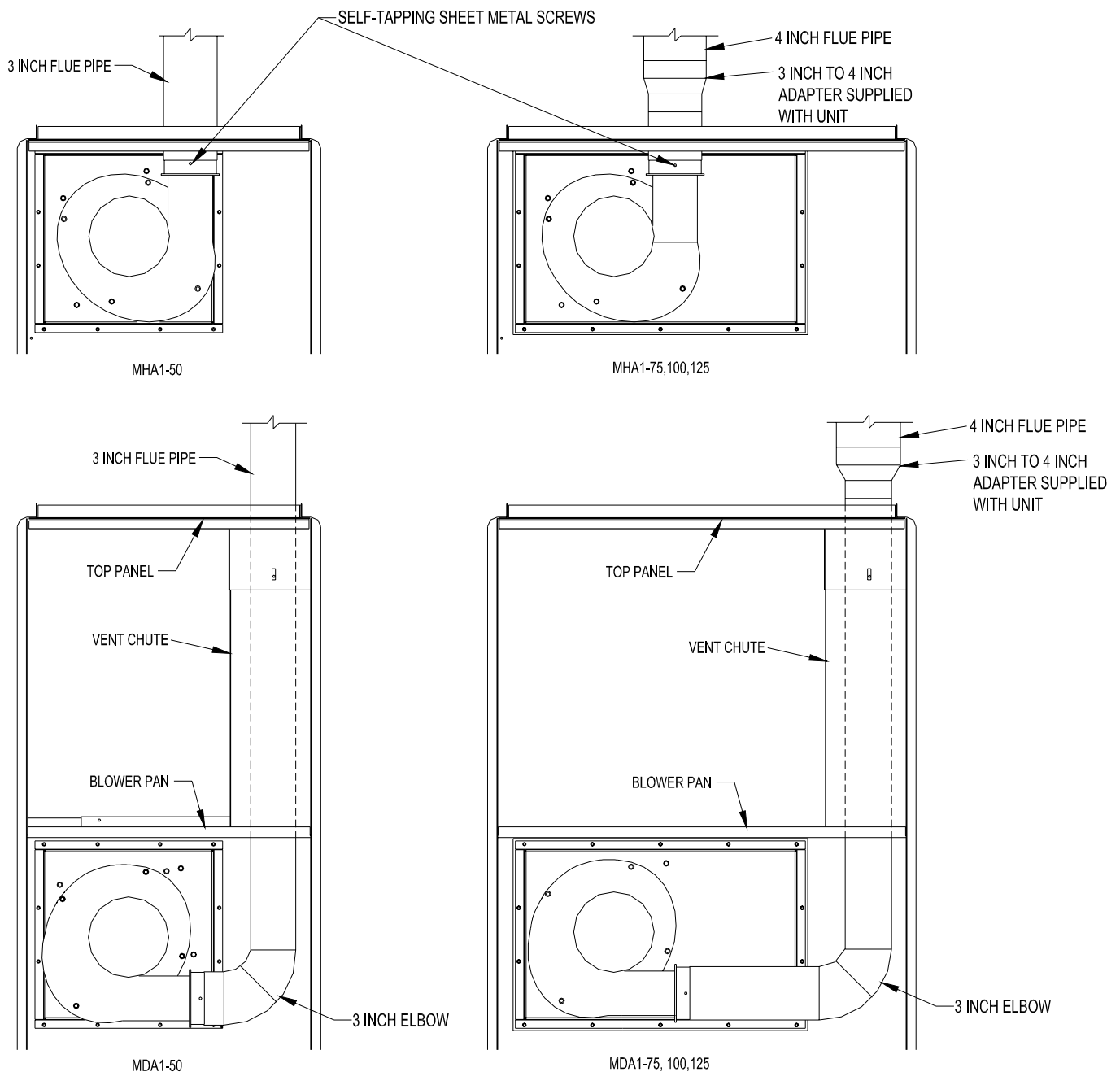
The connection of this furnace to the vent system, shall be in accordance with the local building codes, the vent manufacturers instructions and part 10, "Venting of Equipment", of the National Fuel Gas Code, NFPA 54/ANSI Z223.1-2002, or latest edition.

These venting tables also include venting combinations, which apply to common venting arrangements of two or more appliances. These requirements as well as all the installation requirements outlined in this manual for an MHA1/MDA1 series furnace must be followed when an MHA1/MDA1 furnace is common vented with another Category I gas appliance.

See also Section II, J, 2, of this manual "Replacing an Existing Furnace from a Common Vent" for information on testing the proper operation of appliances in a common vent.

The vent connector must be galvanized or stainless steel metal pipe and must be a 3 in. in diameter for the MHA1/MDA1-50 and 4 in. in diameter for the MHA1/MDA1-75, MHA1/MDA1-100 and MHA1/MDA1-125. The MHA1/MDA1-75, MHA1/MDA1-100 and MHA1/MDA1-125 are supplied with a 3 in. to 4 in. adapter as a transition from the inducer to the 4 in. vent size (see figure 4). No size reduction is permissible. For minimum and maximum vent lengths, see Venting Tables for Category I appliances in the National Fuel Gas Code, NFPA 54/ANSI Z223.1-2002, or latest edition.

All installations and services must be performed by qualified service personnel.



**Figure 4: Vent Connection to Inducer**

A self-tapping sheet metal screw and high temperature sealant such as Dow Corning 736 or General Electric RTV106 (temperature rating 480°F minimum) should be used to secure both the flue pipe (MHA1/MDA1-50), and the Thermo Products supplied 4 in. adapter (MHA1/MDA1-75, MHA1/MDA1-100, MHA1/MDA1-125) to the outlet of the inducer. If using other than a self-tapping sheet metal screw to secure the flue pipe to the inducer, a starter hole **must** be drilled in the inducer before inserting the screw (refer to Figure 4) to avoid damage to the inducer housing.

All installations and services must be performed by qualified service personnel.

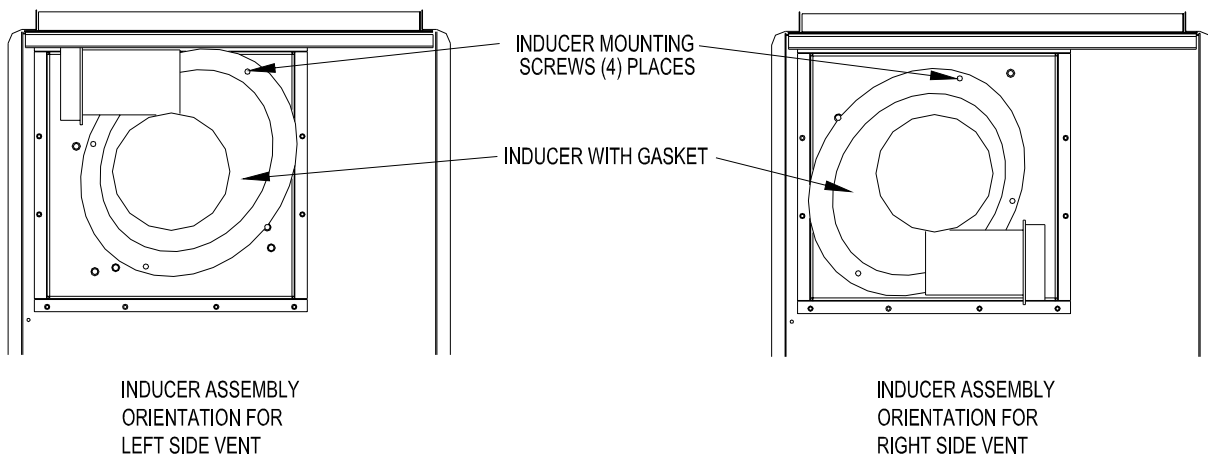
When venting the MDA1 series through the blower compartment a vent chute (AOPS4941) **must** be used. Refer to Figure 4. This option requires the removal of the two 4-inch diameter plastic plug from the blower pan and the top panel of the unit. After removing the plastic plugs, run the 3-inch diameter vent through the vent chute and the top and bottom openings.

The MDA1-75, MDA1-100 and MDA1-125 will require the use of the 3-inch to 4-inch adapter provided. This adapter is to be installed after the 3-inch vent exits the furnace.

The 3-inch diameter vent running through the vent chute must be a continuous section. No connections should be within the vent chute.

If this venting option is not utilized, the 4-inch diameter plastic plug in the blower pan and the 3 1/2 inch diameter plastic plug in the top panel of the unit should be left in place for proper furnace operation.

The flue may exit the unit through the top, left side, or right side of the unit, refer to Figure 5. The inducer can be rotated by removing the four (4) inducer mounting screws and rotating the inducer housing. Ensure that inducer gasket is in place before reinstalling inducer.



**Figure 5: Inducer Mounting**

All vent connectors connecting the furnace to the vent must be rigidly supported with hangers and straps in order to prevent sagging and movement after installation. The vent connector must be supported at a maximum of every four feet depending on the design and weight of the material used, to maintain clearances, and to prevent physical damage. The vent pipe must slope upward a minimum of 1/4" for each foot of horizontal run away from the furnace.

Vent connectors used in connecting the furnace to the vent cannot be channeled through floors, ceilings, and walls without the proper protective construction. This construction must be in accordance with the requirements of the National Fuel Gas Code, NFPA 54/ANSI Z223.1-2002 or the latest edition thereof.

**All installations and services must be performed by qualified service personnel.**

It is recommended that all single wall vent connectors connected to the MHA1/MDA1 Series furnaces have all seams and joints sealed with high temperature pressure sensitive aluminum tape or high temperature silicone rubber sealant as noted below.

1. High temperature, aluminum tape, having a temperature rating of 480°F or greater.
2. Dow Corning 736, General Electric RTV106 sealant, or equivalent, having a temperature rating of 480°F, or greater.

**It is recommended** that all vent connectors be insulated with 1.0" thick foil fiberglass or its equivalent to reduce the chance of condensation and prolong the life of the venting system. It is mandatory that vent connectors installed in or passing through an unheated space must be insulated in this manner to prevent condensate from forming in the connector or vent.

## **K. Sidewall Venting**

### **⚠WARNING:**

- **The MHA1/MDA1 Series furnaces SHALL NOT BE COMMON VENTED IF SIDEWALL VENTING IS EMPLOYED.**
- **Before sidewall venting the MHA1/MDA1 furnace, read and understand this section as well as the sidewall vent manufacturers instructions, which accompany the venting product. Failure to follow these instructions may cause unsafe conditions resulting in property damage, personal injury, or loss of life.**
- **The sidewall venting system must be installed so as to avoid possible contact with concealed plumbing or electrical wiring.**
- **All joints between sections or fittings of the vent system must be sealed as recommended by the vent manufacturer.**
- **The proper operation of the vent system and appliance requires part specified by the vent or appliance manufacturer with no deletions or substitutions.**

The MHA1/MDA1 series furnaces are approved for sidewall venting using **only** Field Controls SWGII Power Venter Kit specified below:

Model: SWGII-4HD Power Venter and CK-43F Control Kit

FIELD CONTROLS  
2630 AIRPORT ROAD  
KINSTON, NC 28504  
(252) 522-3031  
AUTOMATED LITERATURE FAX: 1-800-385-9460

**All installations and services must be performed by qualified service personnel.**

Installation, setup, and operation must be in accordance with the instruction provided by the manufacture of the power venter. Thermo Products has provided in the following section maximum and minimum vent lengths guidelines that must also be followed.

Contact Field Controls for instructions for installing the SWGII vent system

**IMPORTANT:** No warranty will be made on behalf of the appliance manufacturer with respect to the sidewall venting system installation or replacement. The appliance manufacturer shall not be liable for any special, incidental, indirect, or consequential damages. (Some jurisdictions do not allow exclusion or limitation of incidental or consequential damages. The above limitations or exclusions may not apply to you).

**IMPORTANT:** It is the installer's responsibility to inform and demonstrate to the user the correct operation and maintenance of the appliances explained in this manual, the user's information manual, and the sidewall vent manufacturer's manual.

### **1. Horizontal Size and Lengths for Horizontal Vents**

The minimum sidewall vent length is two (2) feet of straight vent pipe with one (1) elbow and one (1) adapter or transition to inducer. The maximum vent length and permitted number of elbows are shown in the following table.

**Table 3: Horizontal Size and Length for Sidewall Venting**

MODEL NUMBER OF FURNACE	SIZE OF VENT (In.)	Max. Length of Vent Pipe (in Feet) With			EQUIVALENT LENGTH OF VENT* (Ft)
		1 ELBOW	2 ELBOWS	3 ELBOWS	
MHA1/MDA1-50	3	45	40	35	50
MHA1/MDA1-75 MHA1/MDA1-100 MHA1/MDA1-125	4	45	40	35	50

\* Each elbow used is considered to be equivalent to 5 feet of straight vent pipe.

All installations and services must be performed by qualified service personnel.

## L. GAS PIPING

### GENERAL GAS PIPING

#### **⚠WARNING:**

#### **FIRE OR EXPLOSION HAZARD**

- Failure to follow the safety warnings exactly could result in serious injury, death or property damage.
- Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections.
- Because of the potential of odorant fade, a gas leak may not be detected by smell. If this furnace is installed below grade, contact your gas supplier for a gas detector.
- All gas piping must be leak tested using a soap and water solution (when the gas is turned on) following the procedure outlined in this section. A final test for gas leakage must be made after purging the gas line (Refer to Section III, E, of this manual). This test must be conducted with the unit operating and should include the furnace piping and gas valve. Never use an open flame to check for a gas leak.

#### **⚠CAUTION:**

- Care must be taken not to wet electronic components during leak test. Wetting the electronic components may damage circuitry and cause a hazardous situation. Dry moisture from all leads and terminals if minor wetting occurs. Wait at least 24 hours for the circuit to fully dry before energizing the burner circuit.
- The furnace and its individual gas shutoff valve must be disconnected from the gas supply during pressure testing of the gas supply system at pressures in excess of 1/2 PSIG or 14.0 in. W.C. The furnace must be isolated from the gas supply by closing its manual shut off valve at test pressures equal to or less than 1/2 PSIG or 14.0 in. W.C.
- Do not use a connector, which has previously served another gas appliance.

All gas piping and testing must be performed by a qualified installer or service person. The installation must comply with local codes, these instructions and the National Fuel Gas Code, NFPA 54/ANSI Z223.1-2002 or the latest edition thereof.



**All installations and services must be performed by qualified service personnel.**

Piping from the natural gas meter to the furnace shall be in accordance with requirements of the local utility. Piping from the propane tank to the furnace must follow the recommendations of the gas supplier.

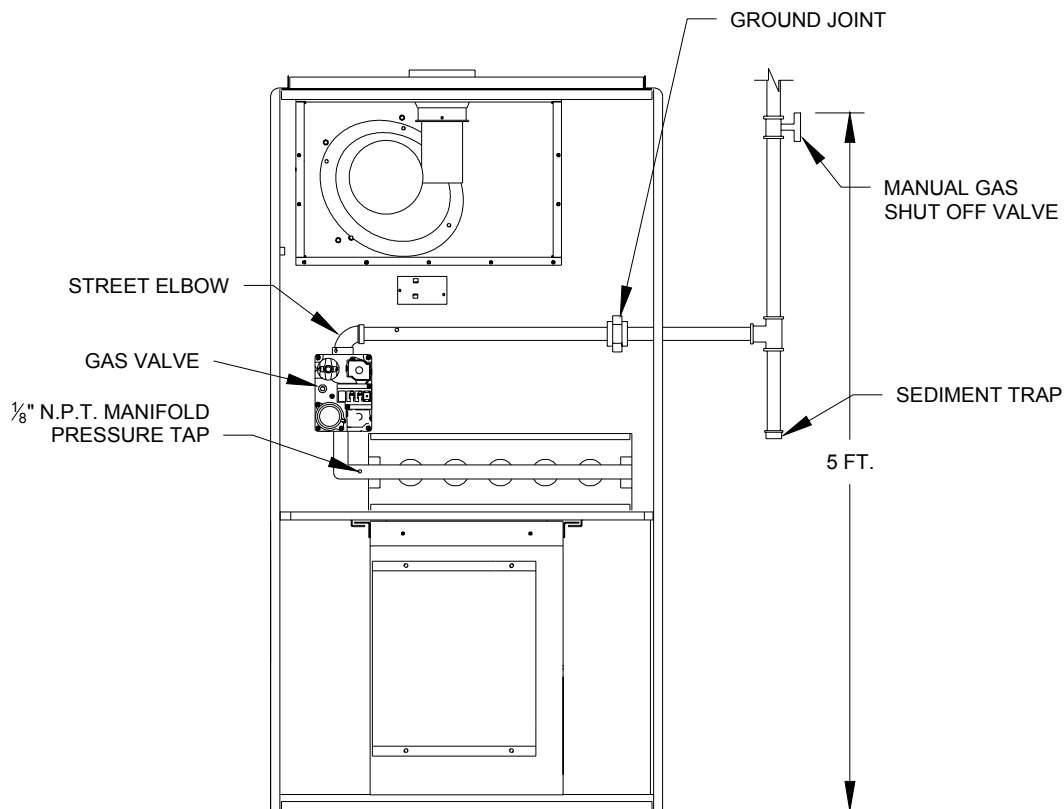
A readily accessible, design certified manual shut off valve with a non-displaceable rotor member shall be installed within six feet of the gas equipment it serves. A union or flanged connection shall be provided downstream from the manual valve to permit removal of controls. A 1/8" N.P.T. plugged tapping is provided at the inlet of the gas control for connection of a test gage to check gas supply pressure to the furnace. Unions must be of a ground joint type or flanged-jointed using a gasket resistant to LP gas. Pipe dope or sealant certified to be resistant to the action of liquefied petroleum gases shall be used on all threaded joints.

**Left and Right Gas Supply Piping** - This furnace is set up to accept either left or right side gas piping using a street elbow and a straight pipe.

A sediment trap (drip leg) must be used on both propane and natural gas installations, to trap oil, condensate and other impurities, which might otherwise lodge in the gas, valve or plug the burner orifice. The sediment trap shall be installed as close to the furnace inlet as possible. When there is excessive condensation between the gas meter and the furnace, a sediment trap shall be provided at the outlet of the gas meter. Failure to install a sediment trap may void the limited warranty on the furnace, refer to Fig. 6.

If local codes permit the use of a flexible gas appliance connector, always use a new listed connector. Do not use a connector, which has previously served another gas appliance.

All installations and services must be performed by qualified service personnel.



## MHA1 SERIES

NOTE:  
ACTUAL UNIT MAY  
DIFFER SLIGHTLY  
FROM WHAT IS SHOWN.

**Figure 6: Typical Gas Piping**

### 1. INSTALLATION OF NATURAL GAS PIPING

The installation of the gas piping and the following test procedures must be performed by a qualified installer or service person.

The following chart may be used as a guide in sizing natural gas supply piping. The input loading of all gas appliances installed on any main or trunk line must be totaled to determine its required carrying capacity.

**EXAMPLE:** A line must supply a furnace of 100,000 BTU/hr input, a hot water heater of 40,000 BTU/hr input and gas range with a 30,000 BTU/hr input capacity. The total BTU/hr input loading on the line is 170,000 BTU/hr. The 200,000 BTU/hr column on the chart must be used in sizing the pipe.

All installations and services must be performed by qualified service personnel.

**TABLE 4: Steel Pipe Size for Natural Gas (IPS)**

Burner Firing Rate, BTU/Hr	Feet of Pipe From Meter to Burner				
	10	20	30	40	50
50,000	1/2	1/2	3/4	3/4	3/4
100,000	3/4	3/4	3/4	3/4	1
150,000	3/4	1	1	1	1-1/4
200,000	1	1	1-1/4	1-1/4	1-1/4
250,000	1	1	1-1/4	1-1/4	1-1/4
300,000	1	1	1-1/4	1-1/4	1-1/4

All black pipe sizes shown are nominal iron pipe sizes.

Use black iron steel pipe and malleable iron fittings for natural gas service lines. Provide rigid supports for the pipe. If the pipe size must be reduced, use reducing couplings when possible. Avoid the use of reducing bushings. Remove all burrs and inspect the pipe for dirt or other foreign material prior to connecting.

Maximum supply pressure for natural gas is 14.0 in. W.C. and minimum supply for purpose of input adjustment is 4.5 in. W.C.

## 2. INSTALLATION OF PROPANE GAS PIPING

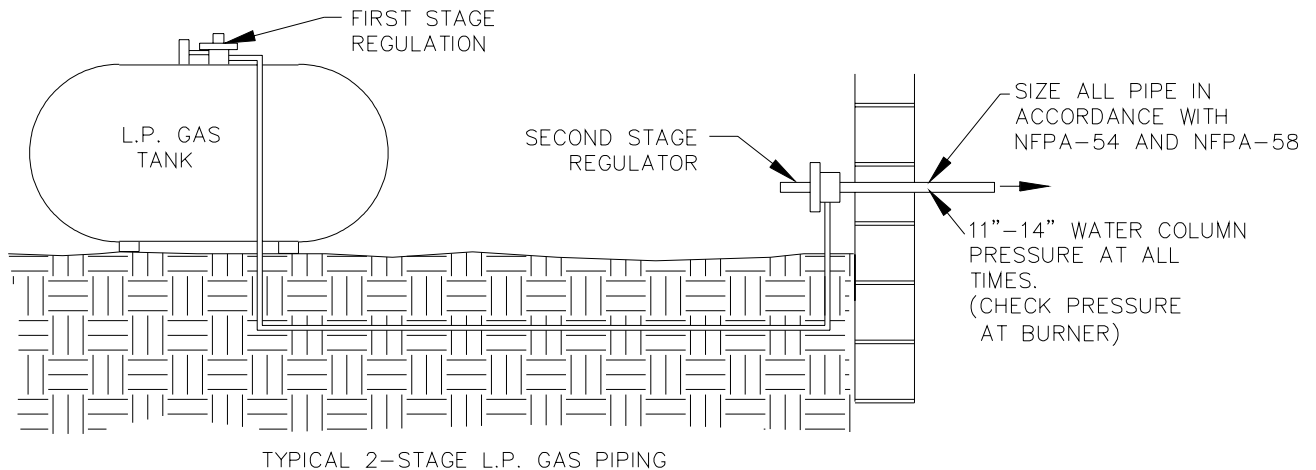
### **⚠WARNING:**

- **Copper and brass tubing and fittings (except tin lined) shall not be used if the gas contains more than a trace (0.3 grains per 100 cubic ft.) of hydrogen sulfide gas. Check with your gas supplier.**

Maximum supply pressure for propane gas is 14.0 in. W.C. and the minimum supply for purpose of input adjustment is 11.0 in. W.C.

Experience has proven that the pressure drop in the gas line running from the outside propane gas tank to the gas appliances in a home is the most frequent cause of equipment malfunctions. A single pressure regulator, located at the tank, will not reliably regulate the high tank pressures (up to 200 PSIG.) down to 11.0 in. W.C. Varying pressures will occur at the appliances as outside temperatures and usage demands vary. Two-stage regulation is the only effective method of controlling gas pressure (refer Figure 7).

**All installations and services must be performed by qualified service personnel.**



**Figure 7: Typical Piping For Two-Stage Regulation**

**NOTICE:** Two-stage regulation must be installed for propane gas when used with any Thermo Pride propane furnace. See illustration above of a typical two stage piping system.

**Table 5: COPPER TUBING SIZE FOR PROPANE GASES**

TABLE I					TABLE II								
IF THE LENGTH OF LINE BETWEEN REGULATORS (TANK TO BUILDING) IS THIS LONG ---					IF LENGTH OF LINE BETWEEN SECOND STAGE REGULATOR AND FURNACE IS THIS LONG ---								
USE THIS SIZE TUBING TO KEEP PRESSURE DROP BELOW .2 LBS. FOR MAXIMUM FLOW SHOWN.	TOTAL INPUT LOAD(BTU) ON LINE	25'	50'	75'	100'	USE THIS TUBING OR PIPE TO KEEP PRESSURE DROP BELOW 1/2" WATER COLUMN FOR MAXIMUM FLOW SHOWN.	TOTAL INPUT LOAD(BTU) ON LINE	10'	20'	30'	40'	50'	
	125,000	3/8" O.D. COPPER					75,000	5/8" O.D. COPPER					
	250,000	3/8" O.D. COPPER			1/2" O.D. COPPER		125,000	5/8" O.D. COPPER	3/4" BLACK PIPE				
	375,000	1/2" O.D. COPPER					187,500	3/4" BLACK PIPE					
	500,000	1/2" O.D. COPPER					250,000	3/4" BLACK PIPE					
					375,000	3/4" BLACK PIPE	1" BLACK PIPE						
					500,000	1" BLACK PIPE							

All black pipe sizes shown are nominal iron pipe sizes.

Seamless copper tubing may only be used with gases that are not corrosive to it. See note below and check with your LP gas supplier before using. Seamless copper tubing must comply with standard type K or L for seamless copper water tube, ASTM B 88; or seamless copper tube for air conditioning field service, ASTM B 280. Copper tubing sizes for indicated BTU input rates are given above in Table 5.

All installations and services must be performed by qualified service personnel.

## M. Electrical

### 1. Wiring

#### **⚠WARNING:**

The furnace must be grounded in accordance with local codes or in the absence of local codes with the National Electrical Code, ANSI/NFPA 70-2002, or latest edition.

All wiring shall be performed by a qualified electrician or service person. The wiring must comply with local codes, the instructions in this manual, and in the absence of codes with the National Electrical Code, ANSI/NFPA-70, or latest edition.

**Follow these guidelines to complete the wiring portion of the installations.**

A separate power supply circuit with over current protection and a disconnect switch must be provided. The minimum fuse or circuit breaker size is 15 amp.

All electrical components and junction boxes shall be installed in such that they are protected from water.

All MHA1/MDA1 series furnaces are supplied with a switch box to be mounted on the outside surface of the right or left side casing. A strain relief bushing is provided for support of the supply wire harness. Make the 115 volt supply connection in this junction box. A green screw is provided in order to connect the power supply ground wire. A disconnect switch can be field mounted on the 2x4 box provided. If not, the disconnect switch must be located reasonably close to and within sight of the furnace.

**NOTICE:** The hot surface igniter and operation of this furnace depends on correct polarity. The hot leg of the supply circuit must be connected to the **black** line lead and the common leg to the white line lead in the field mounted junction box. The hot leg must be connected through the disconnect switch in all cases to prevent the hazard of electrical shock when servicing.

### 2. Field Wiring and Replacing Wiring

Field wiring between the furnace and devices not attached to the furnace shall conform to the temperature limitation for Type T wire [63°F (35°C) rise] when installed with the manufacturers instructions. If any of the original factory supplied furnace wiring is replaced, or a separate device other than the thermostat is wired internal to the unit, 105°C temperature rated thermoplastic insulated wire or equivalent wire must be used.

All installations and services must be performed by qualified service personnel.

### 3. Electronic Air Cleaner and Humidifier Connections

The ignition module on this furnace has designated terminals to control the operation of an electronic air cleaner and/or humidifier. These terminals provide line voltage for the control of these accessories (See Figure 8).

**NOTICE:** It is important to confirm that the operating voltage of the humidifier or EAC being installed matches the output of this control. If not, a field supplied relay or transformer may be necessary to provide the proper control and supply voltage for the accessory being installed. See the manufacturers instructions for the humidifier or EAC for additional requirements.

### 4. Room Thermostat

A room thermostat is **not** furnished with this furnace. However, a thermostat is required to properly operate the furnace control system.

The room thermostat should be located in the natural circulating path of the room air. The thermostat should not be placed where exposed to cold air infiltration, i.e. drafts from outside openings such as windows and doors, or where exposed to air currents from supply or return air registers, or such that natural circulation of air is blocked, such as behind doors, in shelves, or in corners. It should always be located on an interior wall.

In addition, the room thermostat should not be exposed to heat from a nearby fireplace, electrical appliances, lamps, rays from the sun, or mounted directly on a wall containing warm air ducts, a chimney, or a gas vent. These sources of heat could adversely affect the operation of the thermostat, preventing it from properly controlling the room temperature.

Generally, a room thermostat should be set at the lowest temperature that is comfortable to the building occupants. This will result in the lowest cost to heat the building.

Proper control of the indoor temperature can only be achieved if the thermostat is calibrated to the heating and/or cooling cycle. A vital consideration of this calibration is related to the thermostat heat anticipator.

The proper thermostat heat anticipator setting is 0.8 AMPS for furnace operation only. To increase length of the heating cycles, increase setting of heat scale; to decrease length of cycle, decrease setting of heat scale.

Anticipators for the heating operation are of two types, pre-set and adjustable. Those that are pre-set will not have an adjustment scale and are generally marked accordingly.

All installations and services must be performed by qualified service personnel.

Anticipators for the cooling operation are generally pre-set by the thermostat manufacturer and require no adjustment.

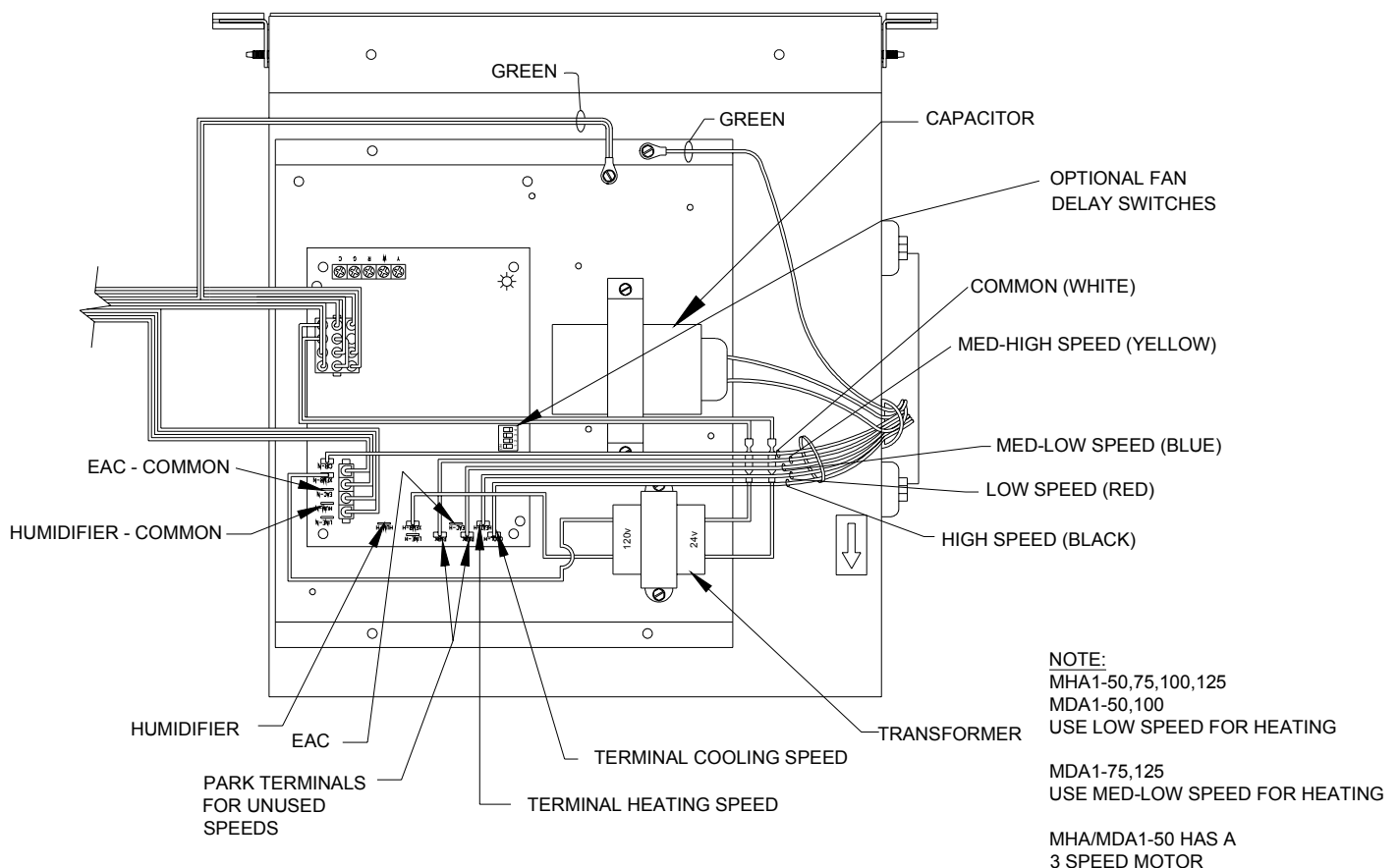
## 5. Blower Motor Speed Wiring

### **⚠WARNING:**

- **TURN OFF THE ELECTRICAL POWER to the furnace before attempting to change blower speed wiring.**

The blower motor is factory wired to the ignition control with standard heating and cooling speeds pre-selected.

When changing motor speeds, simply switch the wire from the needed speed to either the heating or cooling terminal as applicable on the module to obtain the desired airflow. The wires for the unused speeds should then be reconnected to the module in the "park" positions.



**Figure 8: Blower and Control Panel**

The option switches on the W/R integrated control are used to determine the length of the heat delay-to-fan-on and delay -to-fan-off periods. The following tables show the time periods that will result from the various switch positions.

All installations and services must be performed by qualified service personnel.

**Table 6: Blower delay settings for heating cycles**

To delay fan turn-on by:	Set Switch	
	#1	#2
15 sec.	Off	Off
30 sec.	Off	On
*45 sec.	On	Off
60 sec,	On	On

To delay fan turn-off by:	Set Switch	
	#3	#4
60 sec.	On	On
90 sec.	Off	On
120 sec.	On	Off
*180 sec.	Off	Off

\*Factory settings for optimal performance

### III. Initial Operation of the Furnace:

#### A. Initial Startup:

##### **⚠WARNING:**

- **Turn off power to furnace. Before the gas piping system is placed into service, it must have been leak tested by a qualified heating contractor. (Refer to the General Gas Piping Requirements section of this manual regarding the installation and leak testing of gas piping).**
- **For initial start-up of the appliance after installation, it may be necessary to purge the air out of the gas line. A qualified heating contractor should do this. If excessive gas escapes when purging the gas supply at a pipe union joint, allow the gas to disperse for at least 15 minutes before attempting to start the appliance. LP gases are especially dangerous because the specific gravity of LP gases allows them to accumulate at ground level at possibly explosive concentrations.**

Review the following items before the initial startup. It may be helpful to review the **Sequence of Operations** in **Appendix B** of this manual, also.

- a. Check all wiring for loose connections and proper hook-up. Refer to the connection diagram.



**All installations and services must be performed by qualified service personnel.**

- b. Leak test all field gas piping connections.
- c. Check the tubing to the pressure switch to make sure it is snug and completely seated on the pressure tap.
- d. Check to see that the vent terminal is correctly installed and the terminal openings are clear and free from blockage.
- e. Make sure the air filter is in place and relatively clean of dirt and debris.
- f. Make sure the thermostat is set in the heating mode of operation.

### **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.**

This appliance does not have a pilot light. It is equipped with a hot surface igniter that automatically lights the burner. Do not attempt to light the burner by hand.

BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the ground because some gas is heavier than air and will settle on the ground.

#### **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 neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Use only your hand to operate the gas control valve knob or, if equipped, the gas control valve switch. Never use tools. If the knob or lever will not move, don't try to repair it, call a qualified service technician. Forced or attempted repair may result in a fire or explosion.

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 of the control system and any gas control that has been under water.

All installations and services must be performed by qualified service personnel.

### Operating Instructions:

**STOP! Read the safety information above.**

Set the thermostat to the lowest setting.

Turn off all electric power to the appliance.

This appliance is equipped with a hot surface igniter that automatically lights the burner. **Do not try to light the burner by hand.**

The burner compartment cover must first be removed before the gas control valve can be manually operated.

Rotate the gas control valve knob or switch lever to the "OFF" position.

Wait five (5) minutes to clear out any gas. Then smell for gas near the ground. If you smell gas, **STOP! Follow section "h" in the safety information above.** If you don't smell gas, go to the next step.

Rotate the gas control valve knob or switch lever to the "ON" position.

Replace the burner compartment cover.

Turn on the electric power to the appliance.

Set the thermostat to the desired setting.

If the appliance will not operate, follow the instructions "**To Turn Off Gas To Appliance**" and call your service technician or gas supplier.

### To Turn Off Gas To Appliance:

Set the thermostat to the lowest setting and set the operating mode switch to "OFF".

If service is to be performed, turn off the electrical power to the appliance.

To turn off the gas control valve, remove the burner compartment cover. Rotate the gas control valve knob or switch lever to the "OFF" position.

Replace the burner compartment cover.

All installations and services must be performed by qualified service personnel.

## B. Adjustment Of Heat Input Rate

The main burner gas orifices for this unit were selected based upon the following assumed characteristic values of the two fuel gases suitable for use with this appliance design:

- a. For natural gas having a higher heating value of 1025 BTU per standard cubic foot and a specific gravity of 0.60, or
- b. For commercial propane gas with a higher heating value of 2500 BTU per standard cubic foot and a specific gravity of 1.53.

The appliance rating plate inside the burner compartment will specify for which gas the main burner orifices were selected. If the appliance is installed at an altitude that is more than 2,000 feet above sea level, it is mandatory that the input to the burner be reduced 4.0% for every 1,000 feet that it is above sea level. Example: A furnace installed at an elevation of 5,000 feet, its input must be reduced 20.0%. At 5000 ft, a total reduction of 5000 ft x 4% per 1000 ft or 20% is required. This equates to a reduced firing rate of 80,000 BTUH (100,000 BTUH x 0.80 = 80,000 BTUH) at an elevation of 5,000 feet. (If the furnace is installed at an elevation of 2,000 feet or less, no reduction in input rate is required.)

For high altitude installations, your local gas supplier may assist in determining the correct main burner orifice size for the elevation at which the appliance is installed. Our Engineering Department will gladly assist in sizing the orifice if the lower heating value, in BTU per cubic foot, the specific gravity of the fuel gas, and the altitude where the appliance will be installed are provided.

To check the input rate of the furnace, allow the unit to operate for 15 minutes and proceed as follows:

1. Contact your gas supplier and ask for the BTU content (higher heating value) of one standard cubic foot of the fuel gas supplied to the appliance at the installation site. If the higher heating values are unavailable, it is reasonable to assume values of 1025 BTU/cu ft, for natural gas, or 2500 BTU/cu ft, for commercial propane gas.
2. With all other gas consuming appliances turned off and using a stopwatch, clock the time required for the (small) dial on the gas meter to make one full revolution. The meter dial will indicate how many cubic feet pass through the meter during one revolution, usually one, two or five. The unit must have been in operation at least 15 minutes before clocking.

All installations and services must be performed by qualified service personnel.

3. The following formula may be used to calculate the heat input rate for the appliance:

$$\frac{\text{Gas heating value} \times \text{Amount of gas consumed}}{\text{Amount of time required to consume the gas}} = \text{Heat input rate, or}$$

$$\frac{\text{BTU/cu ft} \times \text{Number of cu ft} \times 3600 \text{ seconds}}{\text{Seconds for one revolution} \times 1 \text{ hour}} = \text{Input rate (BTU/hr).}$$

In cases where a gas meter is not installed on the fuel gas supply line, the input rate can be assumed to be approximately correct if the burner manifold pressure is the same as that shown on the rating label.

Make sure the gas supply pressure at the appliance falls within the allowable range for the type of fuel gas. See table 8. The pressure to the furnace must be checked while the burner, and any other gas appliances, on the same supply system are operating. Measure the pressure using a pressure gauge, or manometer, at the 1/8 in. NPT plugged tap on the inlet side of the appliance gas control valve, shown in the **General Gas Piping Requirements** section of this manual. An Allen wrench is normally required to remove the plug from the valve. **Make sure the fuel gas is shut off before removing this plug and installing a pressure test gage.**

**Table 8: Allowable Gas Pressures for All MHA1/MDA1 Models**

Type of Fuel Gas	Range of Supply Pressure (in. W.G.)	Manifold Pressure (in. W.G.)
Natural	14.0 - 4.5	3.5 (± .3)
Propane	14.0 - 11.0	10.0 (± .3)

This appliance is equipped with multiple, identical, fixed, main burner orifices sized for the fuel gas and manifold pressure shown on the rating label. The input rate can only be increased, or decreased, by adjusting the manifold pressure.

To adjust the manifold gas pressure to the main burners:

- a. With the gas shutoff, remove the 1/8 in. NPT threaded pipe plug located on the front side of the main burner gas manifold. Use a U-tube manometer or pressure gage, capable of measuring pressure in inches of water column, to measure the gas pressure at this point.

**All installations and services must be performed by qualified service personnel.**

- b. Turn on the fuel gas and cause the appliance to activate the heating section by answering a “call for heat”.
- c. Allow the heating section to operate for 15 minutes.
- d. Note the manifold gas pressure.
- e. To adjust the pressure, remove the brass screw from the regulator on the outlet side of the gas control valve. Using a common screwdriver, increase the manifold pressure by turning the screw inward (clockwise), or decrease it by turning the screw outward (counterclockwise).  
**Adjustments to the listed pressure must not exceed 0.3 in. W.G.** A 0.3 in. W.G. adjustment will change the input approximately 4.0%.
- f. Measure the heat input rate by counting the number of seconds required for the appliance to consume a specified quantity of gas. Refer to the preceding procedure to calculate the heat-input rate.
- g. If required, repeat the manifold pressure adjustment again. Repeat the input rate measurement.
- h. When the input rate adjustment has been completed, shut off the fuel gas to the appliance. Remove the pressure gage. Reinstall the manifold pipe plug using a thread compound resistant to the action of LP gases. Replace the regulator screw (cap) in the gas valve.

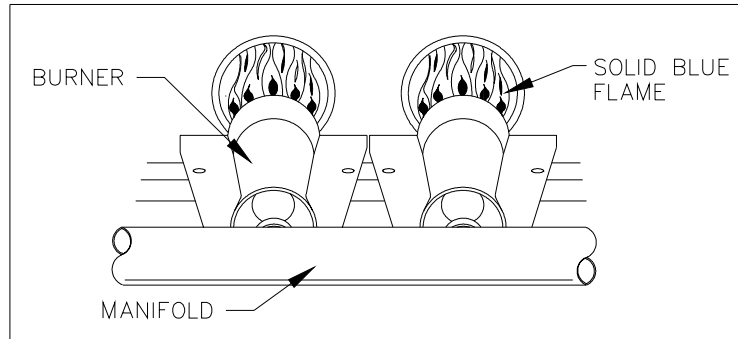
If an input rate within the allowable range cannot be obtained with the present orifice over the range of manifold pressures given, **make sure the gas supply pressure is within the specified range**. If the supply pressure is less than required, the upstream supply pressure regulator may have to be adjusted to increase the pressure. If increasing the gas supply pressure fails to provide adequate gas pressure at the unit, the supply piping may have to be modified to reduce pressure drop.

### **C. Burner Adjustment**

There are no manual adjustments to the main burners. With the burner compartment door removed, the flames can be observed. Natural gas flames should be relatively short in length, have well defined shapes, and are bright light to deep blue in color, refer to Figure 10.

**NOTICE: For appliance operation with propane gas, it is not unusual to observe mostly blue flames having yellow or yellow-orange tips.**

All installations and services must be performed by qualified service personnel.



**Figure 10: Typical Observation of Main Burner Flames**

If long, rather poorly defined, mostly yellow in color, and nearly opaque burner flames are observed, this is an indication the quality of combustion is poor. (Under adverse conditions, black smoke and some sooting may be noticeable as well.) Some of the causes of poor combustion are, too high an input rate (“over-firing”), too little or a contaminated supply of combustion air, or a partially blocked heat exchanger or vent terminal. **Should any of these conditions occur, they must be corrected immediately.** Call your qualified heating contractor for assistance.

#### **D. Setting Supply Air Temperature Rise**

All MHA1/MDA1 models are designed and wired at the factory for a blower speed during heating that should result in an approximate temperature rise of 70°F. The temperature rise through the heating section, for any given blower speed may vary depending on a number of factors. A few of these factors are, changes in the actual resistance of the duct system to airflow at any time, de-rating of the appliance due to elevation, fouling of the heat exchanger surfaces, and changes in the fuel gas heating value. In general, a lower temperature rise through the heating section will result in higher heating efficiency.

Temperature rise = supply air temperature - return air temperature.

After 15 to 20 minutes of continuous operation, the temperature rise through the furnace must fall within a range of 55° to 85° F. If the outlet or supply duct temperature is too high, check to make sure the return air filter is clean, the return air registers are free from obstruction, the outlet registers are properly adjusted and clear, and the supply and return air ducts are open.

The circulating air blower is not moving enough air if the supply air temperature is still too high. Before proceeding further, turn off the power supply to the appliance and remove the blower access door. The speed of the blower must be increased by changing the speed tap from the motor to the next higher tap, refer to Figure 8.

All installations and services must be performed by qualified service personnel.

## E. Checkout Procedure

Before any system of gas piping is finally put into service, it shall be carefully tested to assure that it is “gas-tight”, as indicated in the **General Gas Piping Requirements** section of this manual.

**NOTICE: All controls on the unit should be checked for proper functioning prior to the qualified service personnel leaving the job site. Specifically the following should be checked:**

1. With heating system in normal heating operation, check to make certain blower will start and stop automatically under control of integrated furnace control.
2. Check safety limit control as follows:
  - a. Shut off incoming power.
  - b. Block return air opening or disconnect blower motor leads.
  - c. Restore power to appliance.
  - d. In the heating mode, set the thermostat above room temperature producing “a call for heat”.
  - e. When high air temperatures are reached within the furnace, the high limit control should act to shutdown the main burners.
  - f. Shut off the electrical power.

**IMPORTANT: Remove blockage or reconnect blower motor and restore power.**

3. Make certain the thermostat will automatically start and stop the appliance.
4. Block the vent terminal outlet gradually with a flat piece of metal, until the pressure switch functions shutting off the main burners.

**IMPORTANT: Remove flue blockage when done.**

**NOTICE: Heat exchanger oil will burn off on initial firing creating an unpleasant odor. To prevent this odor from occurring more than once, it is suggested the furnace be allowed to run for 30 minutes, or until odor has dissipated.**

All installations and services must be performed by qualified service personnel.

## IV. Troubleshooting

**NOTICE:** BEFORE TROUBLESHOOTING, FAMILIARIZE YOURSELF WITH THE START UP AND CHECKOUT PROCEDURE.

ALL INSTALLATION AND SERVICES MUST BE PERFORMED BY QUALIFIED HEATING CONTRACTORS.

To assist you in troubleshooting this furnace, it is equipped with an integrated ignition control with diagnostics. These diagnostics evaluate what control system has experienced a failure and activate a flashing light on the control in different sequences to help pinpoint the failure which has occurred. Also provided in appendix C is a troubleshooting flow chart located in the back of this manual.

**IMPORTANT:** For your convenience, Thermo Products has installed a sight glass in the blower door of this furnace. The number of flashes in groups should be observed through this sight glass and recorded before turning off power to the furnace. Otherwise power to the furnace will be interrupted upon or removing the blower turning off power or removing the necessary to restart the furnace and have the failure occur again.

### DIAGNOSTIC FEATURES

The 50A65 control used on this furnace continuously monitors its operation and the operation of the system. If a failure occurs, the LED light on the control will failure code. **If the failure is internal to the control, the light will stay on continuously. In this case, the entire control should be replaced, as the control is not field-repairable.**

If the sensed failure is in the system (external to the control), the LED will flash in the following flash-pause sequences to indicate failure status (each flash will last approximately 0.25 seconds and each pause will last approximately 2 seconds).

1 flash, then pause	System lockout
2 flashes, then pause	Pressure switch stuck closed
3 flashes, then pause	Pressure switch stuck open
4 flashes, then pause	Open high limit, aux. limit, or roll-out switch
6 flashes, then pause	115 Volt AC power reversed
7 flashes, then pause	Low flame sense signal
8 flashes, then pause	Check ignitor or improper grounding
Continuous flashing (no pause)	Flame has been sensed when no flame should be present (no call for heat)

**The LED will also flash once at power-up.**



All installations and services must be performed by qualified service personnel.

## V. Dealer Maintenance

### SAFETY DURING SERVICING AND INSPECTION

#### **⚠WARNING:**

#### **ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD**

- Failure to follow safety warnings exactly could result in dangerous operation, serious injury, death or property damage.
- Improper servicing could result in dangerous operation, serious injury, death or property damage.
- Before servicing, disconnect all electrical power to furnace.
- When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.
- Verify proper operation after servicing.

#### **Notice: Homeowner/user routine maintenance**

Complete instructions for the homeowner including maintenance procedures, which must be performed by the homeowner/user, can be found in the "Users Information Manual."

The following maintenance procedures should be performed at the beginning of each heating season by a qualified heating contractor. Correct any deficiencies at once.

#### **A. Electrical**

1. Check all wiring for loose connections and any signs of damage or unusual wear.
2. Check for correct voltage at the furnace when operating.
3. Check amp-draw on blower motor and inducer motor to assure they are not exceeding nameplate amp rating.
4. Check for correct operation and proper settings (if manually adjustable) of all controls.

**Shut off gas and disconnect power before continuing.**

#### **B. General Inspection**

1. Inspect the heat exchanger for evidence of corrosion, pitting, warpage, deterioration, and carbon build-up. Also, look for loose gaskets in the flue pipe, burner box and accessible areas of the heat exchanger.

**All installations and services must be performed by qualified service personnel.**

2. Chimney/vent pipe - Vertically vented units - Remove flue pipe from inducer and inspect for restriction, loose joints, carbon build-up and condensation. Clean vent and chimney if necessary and replace or repair any degraded vent, vent connector or chimney damage found. For sidewall vented units refer to the manufacturer's maintenance instructions for the sidewall venter.

3. Burners - If it appears that material is accumulating in the burner box the box and burners can be vacuumed. If necessary, the burners box assembly can be removed from the separator panel, by removing the screws behind the 1" holes near the top of the burner box, and the one screw in the flange under the burner box.

4. Inducer Blower Assembly - Inspect pressure switch tubing connections and inspect inducer blower/assembly for corrosion, warpage, deterioration and carbon build-up. If necessary, clean housing and blower wheel with a damp cloth. Vacuum to remove any lint or dust from motor assembly. The inducer gasket and the collector box gasket must be replaced if they show any sign of having been damaged.

5. Clean all furnace markings as necessary and verify that all are still legible. Any illegible or missing markings must be replaced. Replacements can be obtained by contacting Thermo Products.

Once all components are cleaned, they must be re-installed to their factory-produced state. Any seals or joints in the flue system, which have been removed or loosened, must be reconnected and sealed if necessary. Do this in accordance with the installation instructions. (Section II, J, of this manual for vertically vented units, or Section II, K, of this manual for sidewall vented units).

**NOTICE:** After cleaning the furnace, reference the burner adjustment section of this manual. Check for operation, proper combustion and no gas leakage according to the procedure outlined in Section III, of this manual, Burner and Adjustment. Observe the burner flame illustrations and follow the adjustment procedures if proper flame(s) are not present.

## **C. House Air Blower**

Check and clean the blower wheel, housing, and compartment with a vacuum. Check the motor nameplate and follow motor manufacturer instructions for lubrication, if required.

**IMPORTANT:** Some motors are permanently lubricated **and should not be oiled.** See motor nameplate for specific instructions.

All installations and services must be performed by qualified service personnel.

## D. Return Air Filter

The Return Air Filter(s): Provided with this unit is a permanent type filter. This filter(s) should be inspected and when dirty, cleaned or replaced, if necessary to assure proper furnace operation. Follow the cleaning, removal and replacement procedure below.

### Filter Maintenance Procedure:

The filter rack will be located between the return air plenum and the return air opening of the furnace. See Figure 11 for MHA1/MDA1 series units. Slide dirty filter out of the filter rack. Clean the filter by vacuuming, rinsing with tap water, hosing or dipping in an ordinary detergent solution. After cleaning, replace the completely dry filter in the rack. If the filter has a mesh, the mesh side of the filter must be towards the furnace.

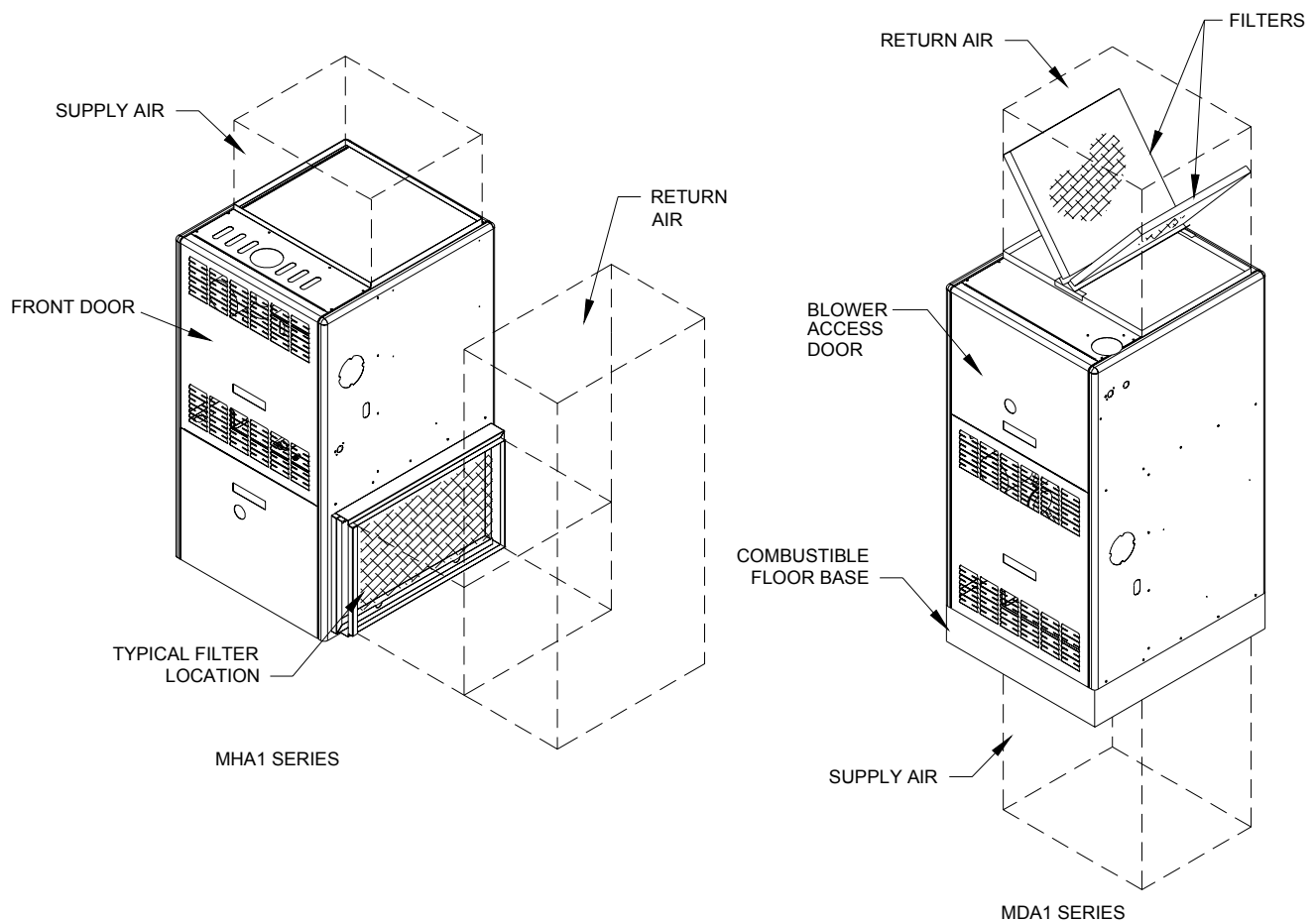


Figure 11: Filter Location

### FILTER REPLACEMENT

Should the filter used require replacement, see Table 2 in Section II, I, of this manual for minimum filter areas required for the different types of filters available to ensure an adequate replacement is selected.

**All installations and services must be performed by qualified service personnel.**

**IMPORTANT:** Remind homeowner of the importance of monthly filter inspections during operation to ensure maximum efficiency.

## **VI. Installers Instructions to User**

After completing the installation, the installer shall inform and/or demonstrate to the homeowner:

1. The location of these instructions in the furnace and that these instructions and the users information manual must be kept along with instructions for any accessories in the plastic pouch on the inside of the furnace.
2. The location and use of the manual gas shut off valve and furnace electrical disconnect switch. Instruct user to always shut off gas before shutting off electric power.
3. The sequence of operation of the furnace.
4. The correct operation and maintenance of the appliance as outlined in the users information manual.
5. That failure to maintain and operate this furnace in accordance with these instructions could result in hazardous conditions, bodily injury, and property damage and may void the limited warranty on the furnace.
6. Review with and encourage the user to read the warnings and instructions outlined on the front cover and the Safety section of this manual and in the Users Information Manual.
7. Recommend to the user that a CO detector be installed in the living space with the use of any fossil fuel burning appliance. The CO Detector should be one that is design certified by a nationally recognized testing agency.
8. Recommend that the user have a qualified heating contractor inspect the furnace at the start of each heating season. Inform the user of the frequency of inspection required for each item in Section IV of the Users Manual.
9. Inform the user to maintain adequate clearances around air openings into the furnace and not to block or restrict the entrance of air into the furnace area or the furnace air opening.

All installations and services must be performed by qualified service personnel.

## APPENDIX A: SOURCES FOR REFERENCE STANDARDS

1. Air Conditioning Contractors of America  
1712 New Hampshire Avenue, NW  
Washington, D.C. 20009  
(202) 483-9370
2. American Gas Association  
Distribution Center  
P.O. Box 79230  
Baltimore, Maryland 21279-0230  
(301) 617-7819
3. American National Standards Institute, Inc.  
Attn: Customer Service  
11 West 42<sup>nd</sup> Street  
New York, New York 10036  
(212) 642-4900
4. American Society for Testing and Materials  
100 Burr Harbor Drive  
West Conshohoken, Pennsylvania 19428-2959  
(610) 832-9585
5. American Society of Heating, Refrigeration, and Air-Conditioning Engineers, Inc.  
1791 Tullie Circle N.E..  
Atlanta, Georgia 30329  
(404) 636-8400
6. National Fire Protection Association  
1 Batterymarch Park  
Quincy, Massachusetts 02269  
(800) 344-3555

All installations and services must be performed by qualified service personnel.

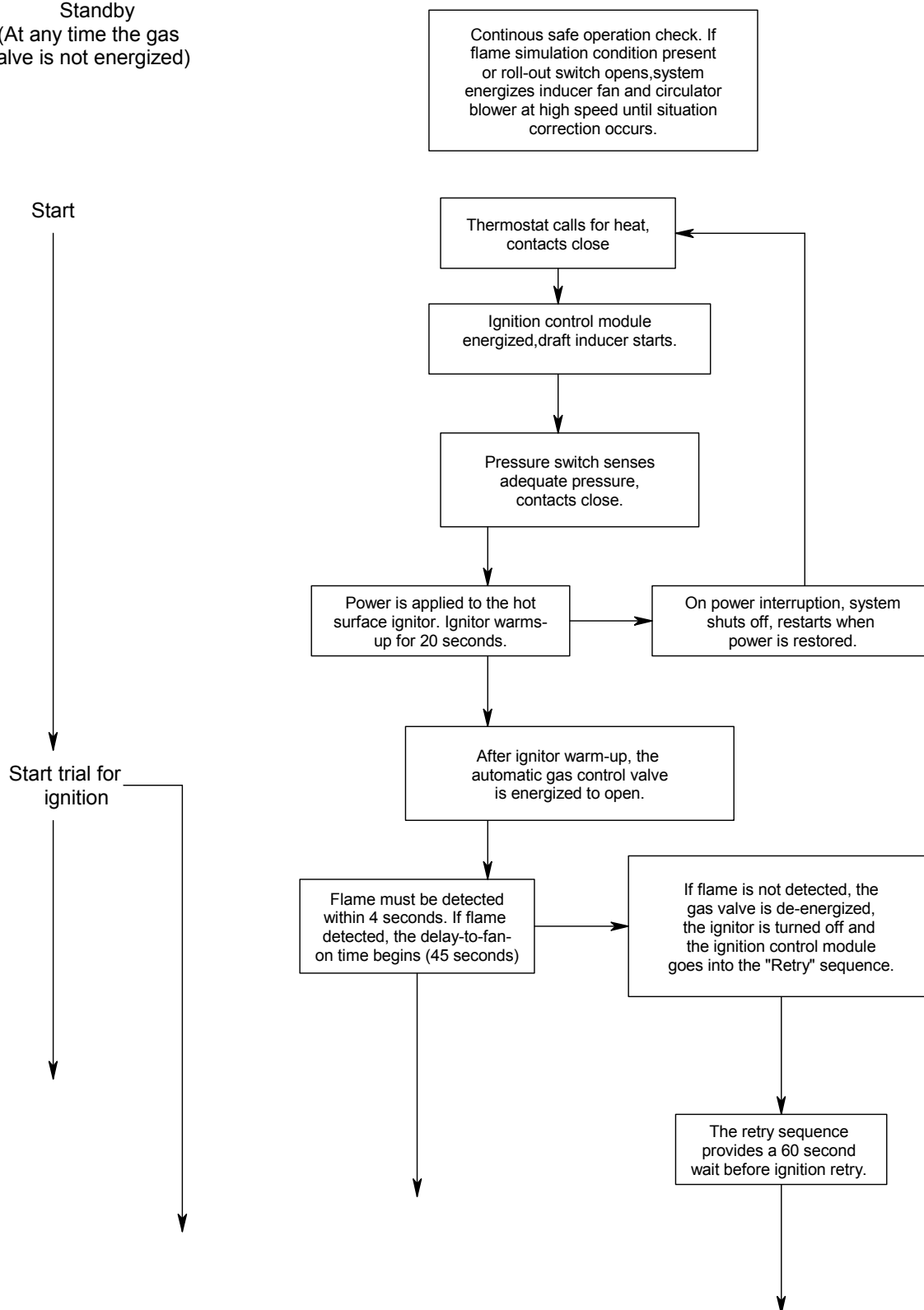
## APPENDIX B: SEQUENCE OF OPERATIONS

### A. Sequence of Operations for Heating System

#### Mode of Operation

Standby  
(At any time the gas valve is not energized)

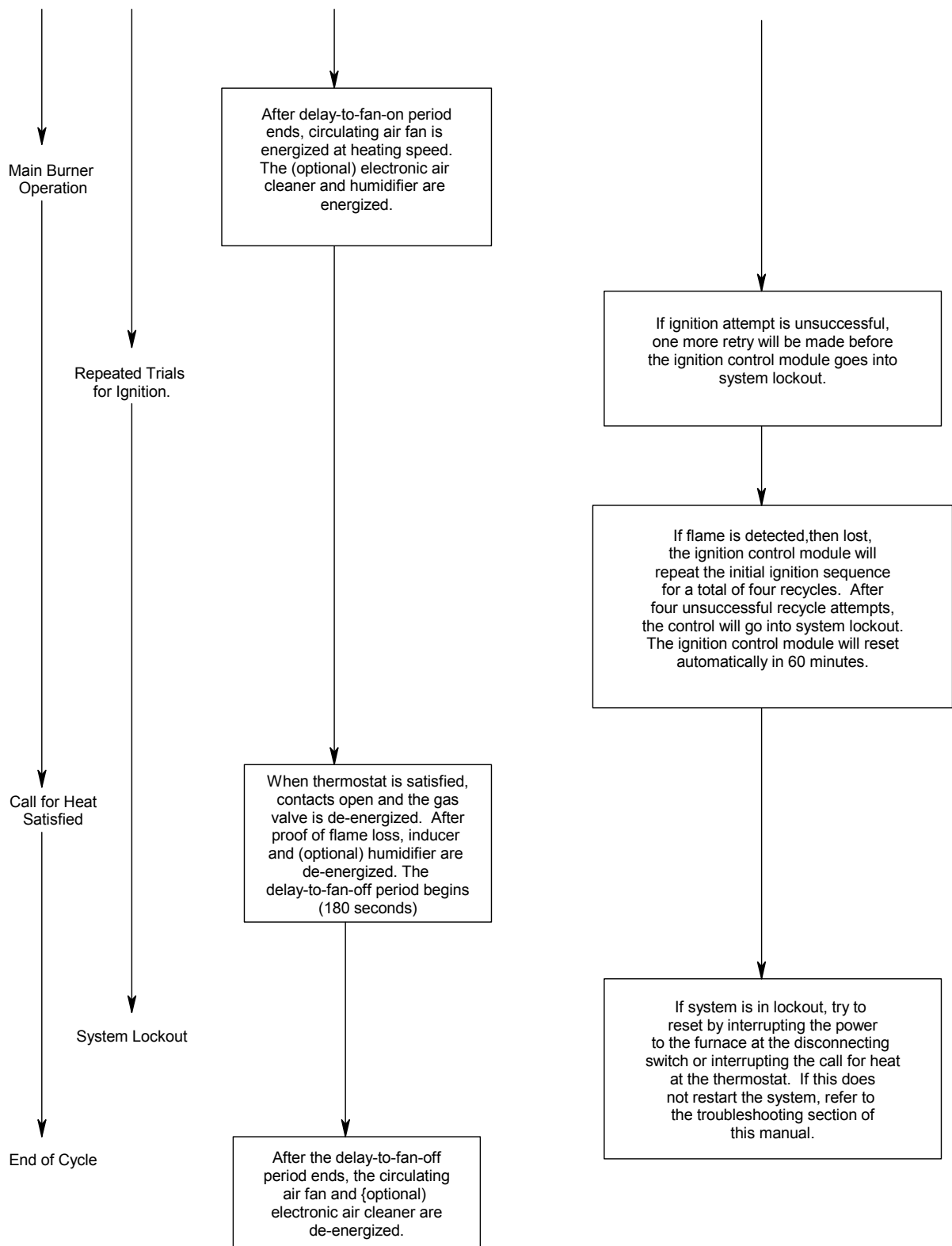
#### Control System Action



All installations and services must be performed by qualified service personnel.

Mode of Operation

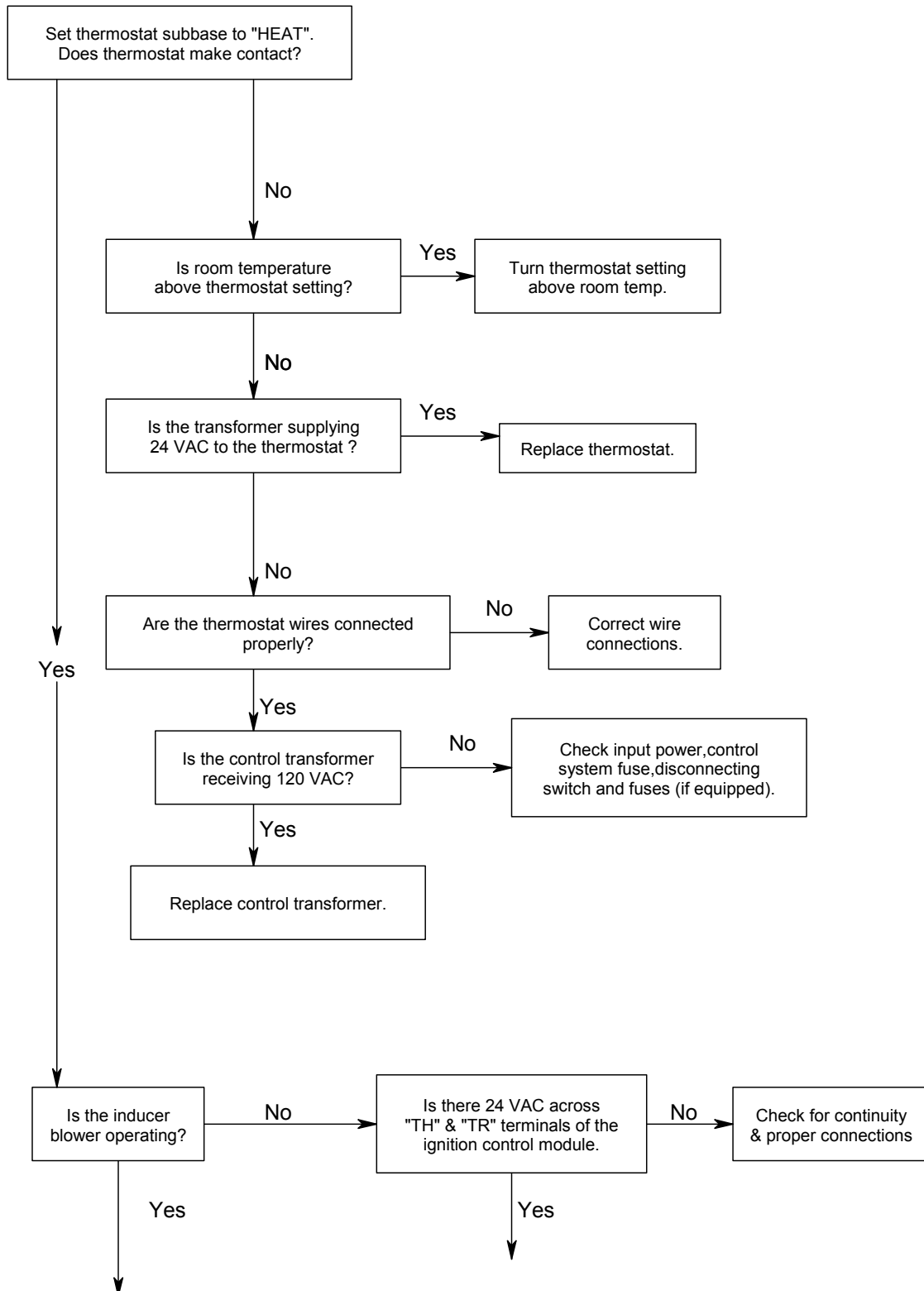
Control System Action



All installations and services must be performed by qualified service personnel.

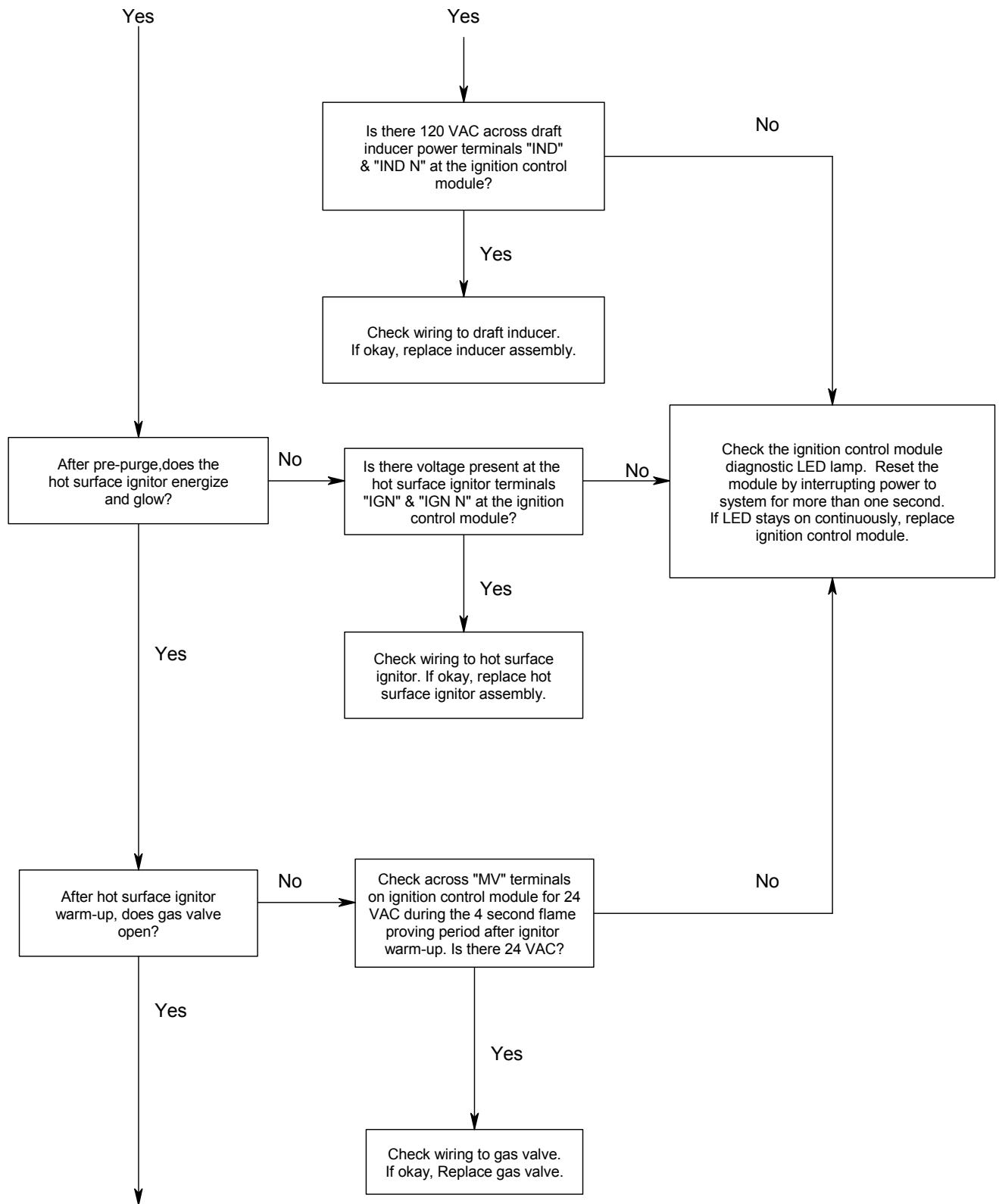
## APPENDIX C: TROUBLESHOOTING FLOWCHARTS

### A. Heating System

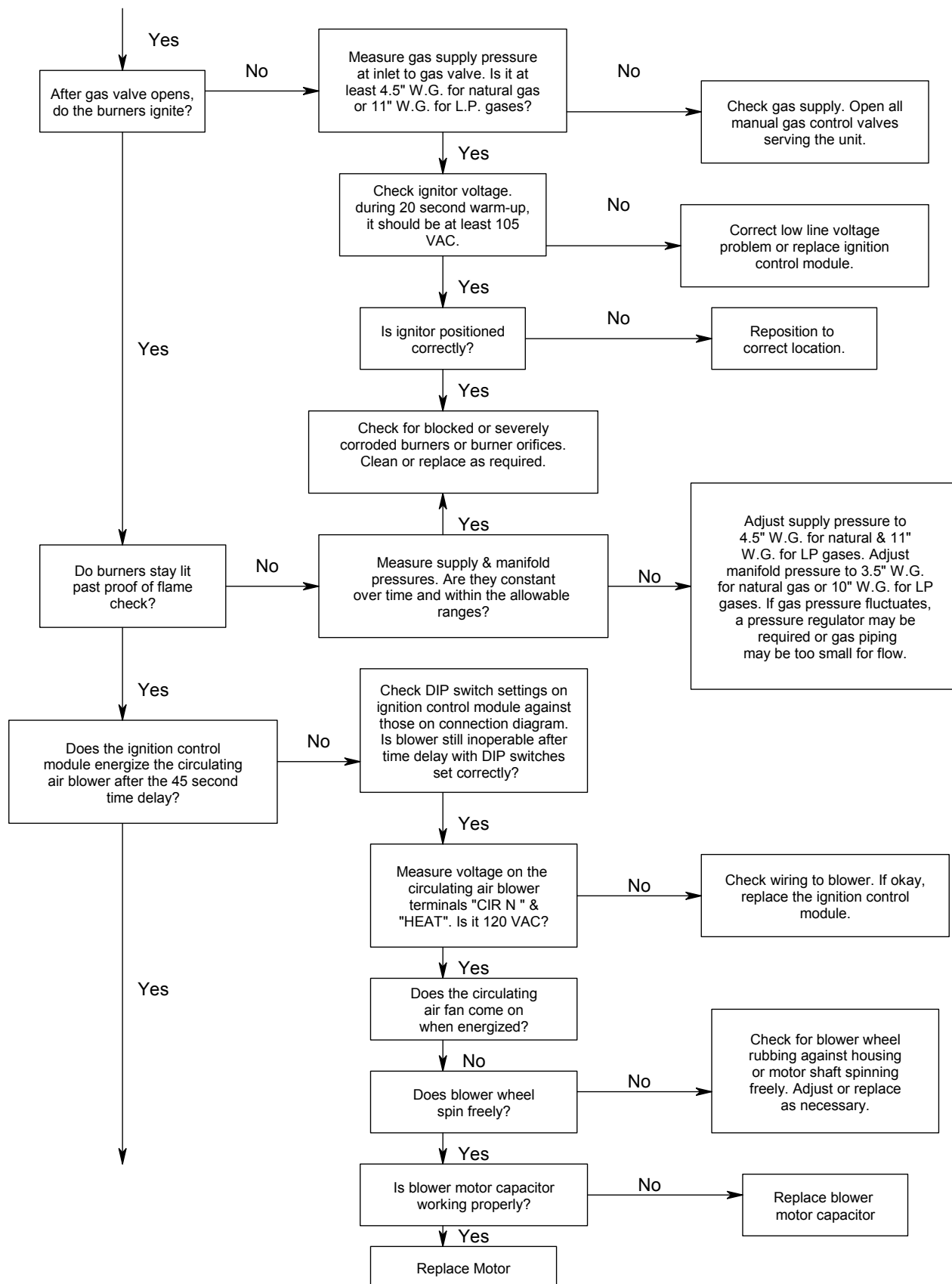




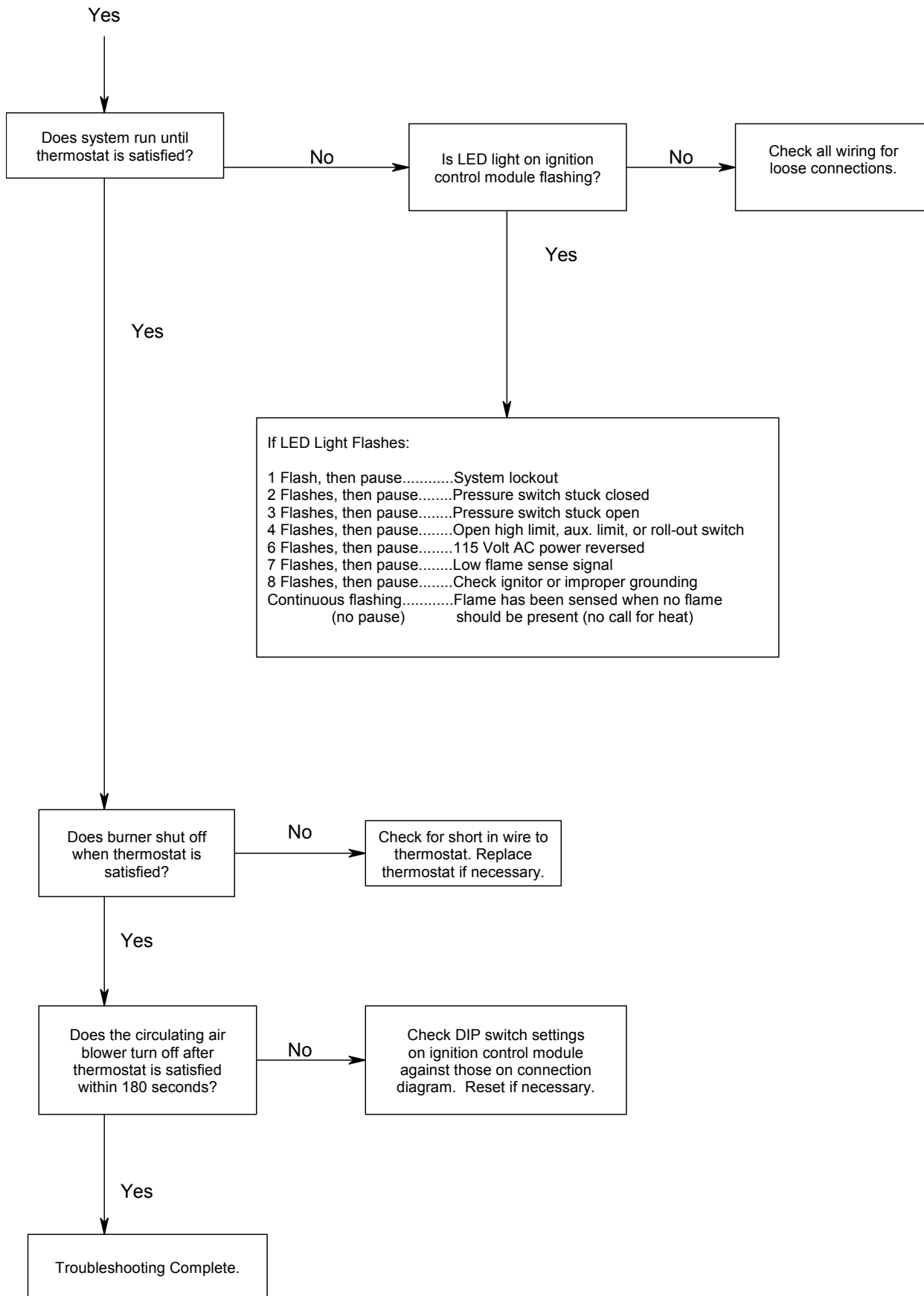
All installations and services must be performed by qualified service personnel.



All installations and services must be performed by qualified service personnel.



All installations and services must be performed by qualified service personnel.



All installations and services must be performed by qualified service personnel.

## APPENDIX D: PARTS PACKAGE COMPONENTS

### INSTALLATION PARTS PACKAGE MDA1/MHA1-50(S00S4426)

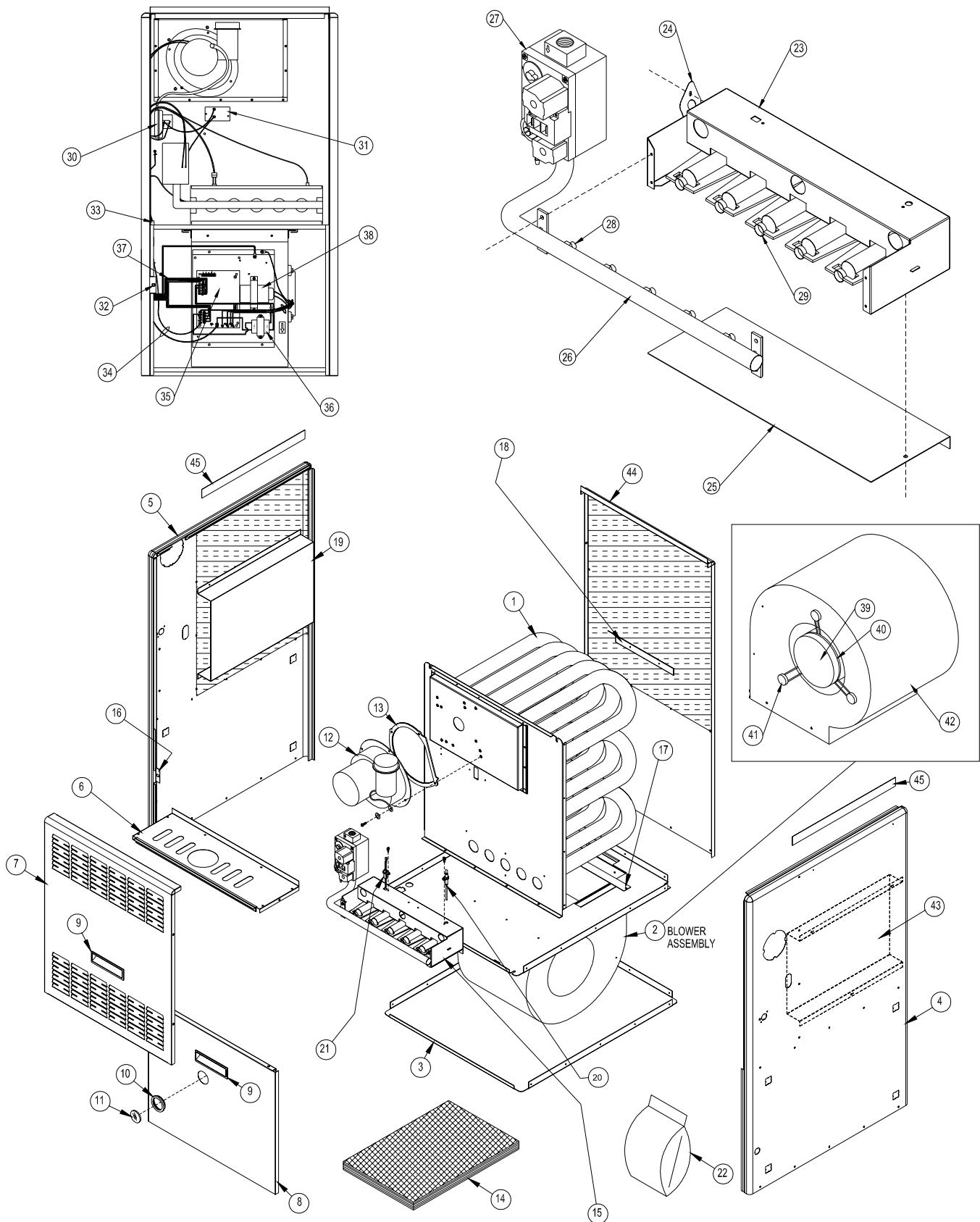
<b>DESCRIPTION</b>	<b>PART NUMBER</b>	<b>QTY.</b>
WIRE NUT	300132	2
#8X1/2 TEK SCREWS for mounting 2X4 J-box	300208	2
#10-32X1/2 GND SCREW	300109	1
#10-32 HEX NUT	300110	1
3/16" DIA. STAR WASHER	300270	1
2X4 J- BOX	350024	1
2X4 J- BOX COVER	350020	1
GROUNDING INSTRUCTIONS	MG-966	1
HEYCO SR 34-2	350016	1
HEYCO UB-875	350750	1

### INSTALLATION PARTS PACKAGE MHA1/MDA1-75(S00S4427)/MDA1/MHA1-100 (S00S4428) / MDA1/MHA1-125 (S00S4429)

<b>DESCRIPTION</b>	<b>PART NUMBER</b>	<b>QTY.</b>
WIRE NUT	300132	2
#8X1/2 TEK SCREWS for mounting 2X4 J-box	300208	2
#10-32X1/2 GND SCREW	300109	1
#10-32 HEX NUT	300110	1
3/16" DIA. STAR WASHER	300270	1
2X4 J- BOX	350024	1
2X4 J- BOX COVER	350020	1
GROUNDING INSTRUCTIONS	MG-966	1
HEYCO SR 34-2	350016	1
HEYCO UB-875	350750	1
3" X 4" TAPERED TRANSITION	14310	1

All installations and services must be performed by qualified service personnel.

### APPENDIX E: REPLACEMENT PARTS LIST - MHA1



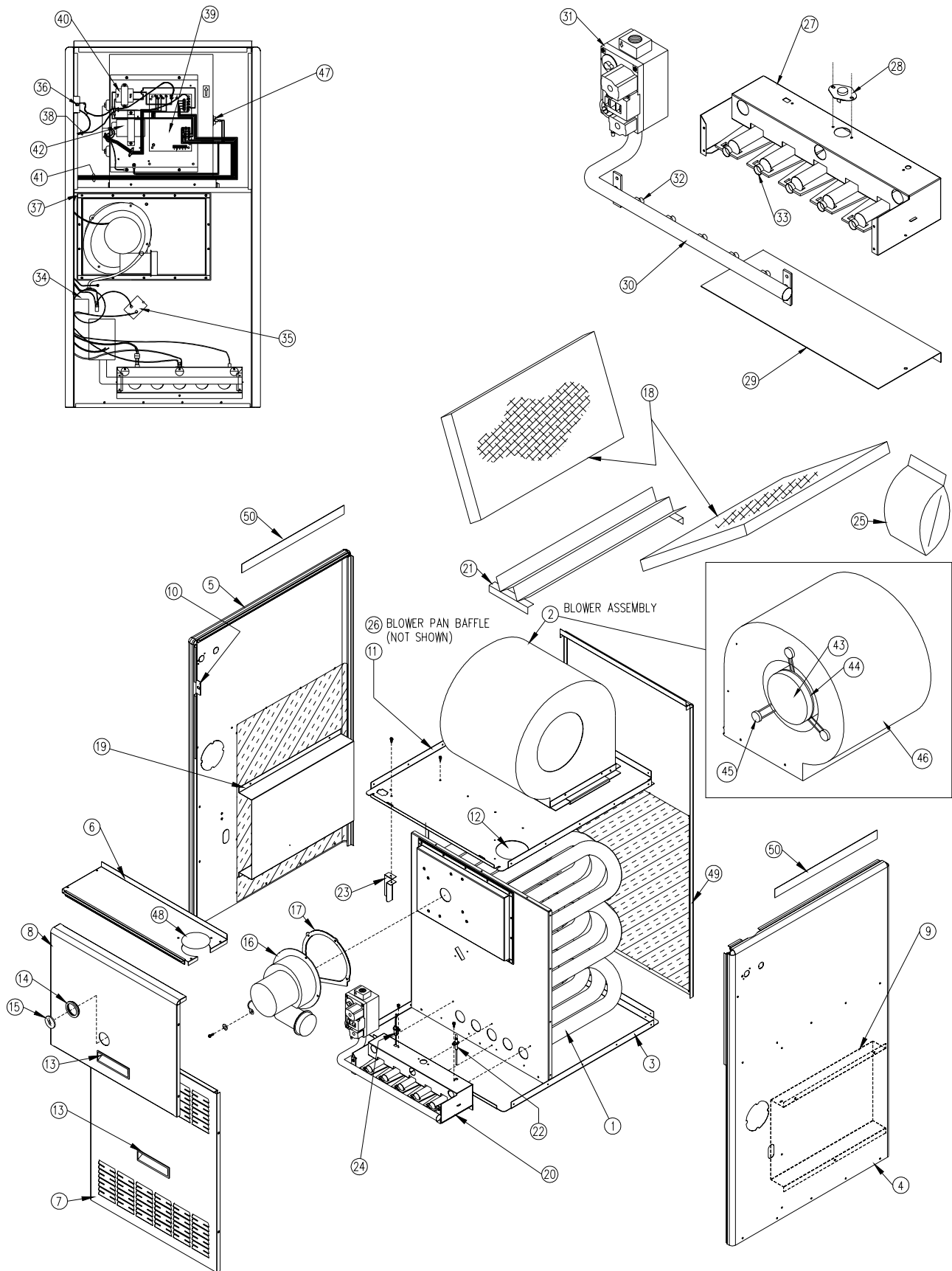
**All installations and services must be performed by qualified service personnel.**

ITEM	PARTS DESCRIPTION	MHA1-50N		MHA1-75N		MHA1-100N		MHA1-125N	
		PART NO.	QTY	PART NO.	QTY	PART NO.	QTY	PART NO.	QTY
1	HEAT EXCHANGER	38413	1	38414	1	38415	1	38419	1
2	BLOWER ASSEMBLY	S00S4129	1	S00S4130	1	S00S4131	1	S00S4132	1
3	BASE	18395	1	18395	1	18396	1	18397	1
4	SIDE CASING (RIGHT)	10115	1	10115	1	10115	1	10115	1
5	SIDE CASING (LEFT)	10114	1	10114	1	10114	1	10114	1
6	TOP CENTER PANEL	18410	1	18410	1	18411	1	18412	1
7	FRONT DOOR	18404	1	18404	1	18405	1	18406	1
8	BLOWER ACCESS DOOR	28398	1	28398	1	28399	1	28400	1
9	DOOR PULL	320157	2	320157	2	320157	2	320157	2
10	SIGHT GLASS GASKET	330135	1	330135	1	330135	1	330135	1
11	SIGHT GLASS	15887	1	15887	1	15887	1	15887	1
12	INDUCER	340337	1	340337	1	340337	1	340337	1
13	GASKET	330181	1	330181	1	330181	1	330181	1
14	FILTER	370050	1	370050	1	370050	1	370051	1
15	BURNER BOX ASSEMBLY	S00S8197	1	S00S8198	1	S00S8199	1	S00S8200	1
16	DIS BRACKET	18442	1	18442	1	18442	1	18442	1
17	BAFFLE, BLOWER PAN	18362	1	18443	1	11249	1	-	
18	BAFFLE, REAR CASING	11247	1	-		-		-	
19	BAFFLE, LEFT SIDE CASING	18417	1	11241	1	11241	1	11241	1
20	SENSOR	350759	1	350759	1	350759	1	350759	1
21	IGNITER	380650	1	380650	1	380650	1	380650	1
22	PARTS PACKAGE	S00S4426	1	S00S4427	1	S00S4428	1	S00S4429	1
23	BURNER BOX	15992	1	15993	1	15994	1	15995	1
24	LIMIT SWITCH	350484	1	350484	1	350484	1	350484	1
25	BURNER BOX BOTTOM	15831	1	15830	1	15832	1	15833	1
26	MANIFOLD	380596	1	380597	1	380598	1	380599	1
27	GAS VALVE	380639	1	380639	1	380639	1	380639	1
28	ORIFICE	380600	2	380600	3	380600	4	380600	5
29	BURNER TUBE	380595	2	380595	3	380595	4	380595	5
30	PRESSURE SWITCH	350491	1	350491	1	350491	1	350491	1
31	LIMIT SWITCH	350495	1	350495	1	350495	1	350495	1
32	DOOR INTERLOCK SWITCH	350139	1	350139	1	350139	1	350139	1
33	HARNESS (VESTIBULE)	350488	1	350488	1	350488	1	350488	1
34	HARNESS (SUPPLY)	350704	1	350704	1	350704	1	350704	1
35	CONTROL, INTEGRATED FAN	350836	1	350836	1	350836	1	350836	1
36	TRANSFORMER	350464	1	350464	1	350464	1	350464	1
37	HARNESS (BLOWER)	350466	1	350466	1	350466	1	350466	1
38	CAPACITOR	350073	1	350073	1	350073	1	350077	1
39	MOTOR	350571	1	350346	1	350337	1	350342	1
40	MOTOR MOUNT BAND	350818	1	350818	1	350818	1	350818	1
41	MOTOR MOUNT LEG	350819	3	350819	3	350819	3	350819	3
42	BLOWER	S00S4142	1	S00S4143	1	S00S4143	1	S00S4143	1
43	BAFFLE, RIGHT SIDE CASING	18416	1	11241	1	11241	1	11241	1
44	CASING BACK	18407	1	18407	1	18408	1	18409	1
45	PLENUM STRIP	13382	2	13382	2	13382	2	13382	2
46									
47									
48	L.P. CONVERSION KIT	AOPS7664		AOPS7664	1	AOPS7664	1	AOPS7664	1

← OPTIONAL KIT (NOT SHOWN)

All installations and services must be performed by qualified service personnel.

### REPLACEMENT PARTS LIST - MDA1



**All installations and services must be performed by qualified service personnel.**

ITEM	UNITS PARTS DESCRIPTION	MDA1-50N		MDA1-75N		MDA1-100N		MDA1-125N	
		PART NO.	QTY	PART NO.	QTY	PART NO.	QTY	PART NO.	QTY
1	HEAT EXCHANGER	31240	1	30949	1	32412	1	32413	1
2	BLOWER ASSEMBLY	S00S4133	1	S00S4134	1	S00S4135	1	S00S4136	1
3	BASE	18421	1	18421	1	18422	1	18423	1
4	SIDE CASING (RIGHT)	10117	1	10117	1	10117	1	10117	1
5	SIDE CASING (LEFT)	10116	1	10116	1	10116	1	10116	1
6	TOP CENTER PANEL	18433	1	18433	1	18434	1	18435	1
7	FRONT DOOR	28436	1	28436	1	28437	1	28438	1
8	BLOWER ACCESS DOOR	18439	1	18439	1	18440	1	18441	1
9	BAFFLE, RIGHT SIDE CASING	11241	1	11241	1	11241	1	11241	1
10	DIS BRACKET	18442	1	18442	1	18442	1	18442	1
11	BLOWER PAN	18424	1	18424	1	18425	1	18426	1
12	BUTTON PLUG	350045	1	350045	1	350045	1	350045	1
13	DOOR PULL	320157	2	320157	2	320157	2	320157	2
14	SIGHT GLASS GASKET	330135	1	330135	1	330135	1	330135	1
15	SIGHT GLASS	15887	1	15887	1	15887	1	15887	1
16	INDUCER	340337	1	340337	1	340337	1	340337	1
17	GASKET	330181	1	330181	1	330181	1	330181	1
18	FILTER	370043	2	370043	2	370045	2	370177	2
19	BAFFLE, LEFT SIDE CASING	18429	1	18428	1	11241	1	11241	1
20	BURNER BOX ASSEMBLY	S00S8201	1	S00S8202	1	S00S8203	1	S00S8204	1
21	FILTER RACK	24810	1	24810	1	24810	1	24810	1
22	SENSOR	350759	1	350759	1	350759	1	350759	1
23	BRACKET, HEAT SHIELD	11251	1	11251	1	11251	1	11251	1
24	IGNITER	380650	1	380650	1	380650	1	380650	1
25	PARTS PACKAGE	S00S4426	1	S00S4427	1	S00S4428	1	S00S4429	1
26	BAFFLE, BLOWER PAN	11250	1	18427	1	11252	1	11253	1
27	BURNER BOX	11259	1	11260	1	11261	1	11262	1
28	LIMIT SWITCH	350913	1	350913	1	350913	1	350432	1
29	BURNER BOX BOTTOM	15831	1	15830	1	15832	1	15833	1
30	MANIFOLD	380596	1	380597	1	380598	1	380599	1
31	GAS VALVE	380639	1	380639	1	380639	1	380639	1
32	ORIFICE	380600	2	380600	3	380600	4	380600	5
33	BURNER TUBE	380595	2	380595	3	380595	4	380595	5
34	PRESSURE SWITCH	350491	1	350491	1	350491	1	350491	1
35	LIMIT SWITCH	350495	1	350495	1	350495	1	350495	1
36	DOOR INTERLOCK SWITCH	350139	1	350139	1	350139	1	350139	1
37	HARNESS (VESTIBULE)	350489	1	350489	1	350489	1	350489	1
38	HARNESS (SUPPLY)	350705	1	350705	1	350705	1	350705	1
39	CONTROL, INTEGRATED FAN	350836	1	350836	1	350836	1	350836	1
40	TRANSFORMER	350464	1	350464	1	350464	1	350464	1
41	HARNESS (BLOWER)	350781	1	350781	1	350781	1	350781	1
42	CAPACITOR	350073	1	350073	1	350073	1	350077	1
43	MOTOR	350571	1	350346	1	350337	1	350342	1
44	MOTOR MOUNT BAND	350818	1	350818	1	350818	1	350818	1
45	MOTOR MOUNT LEG	350819	3	350819	3	350819	3	350819	3
46	BLOWER	S00S4143	1	S00S4143	1	S00S4144	1	S00S4144	1
47	AUX LIMIT	350424	1	350424	1	350424	1	350424	1
48	BUTTON PLUG	350060	1	350060	1	350060	1	350060	1
49	CASING BACK	18430	1	18430	1	18431	1	18432	1
50	PLENUM STRIP	13382	2	13382	2	13382	2	13382	2
51									
52	L.P. CONVERSION KIT	AOPS7664	1	AOPS7664	1	AOPS7664	1	AOPS7664	1
53	VENT CHUTE KIT	AOPS4941	1	AOPS4941	1	AOPS4941	1	AOPS4941	1
54	PLENUM ANGLE KIT	AOPS4942	1	AOPS4942	1	AOPS4942	1	AOPS4942	1

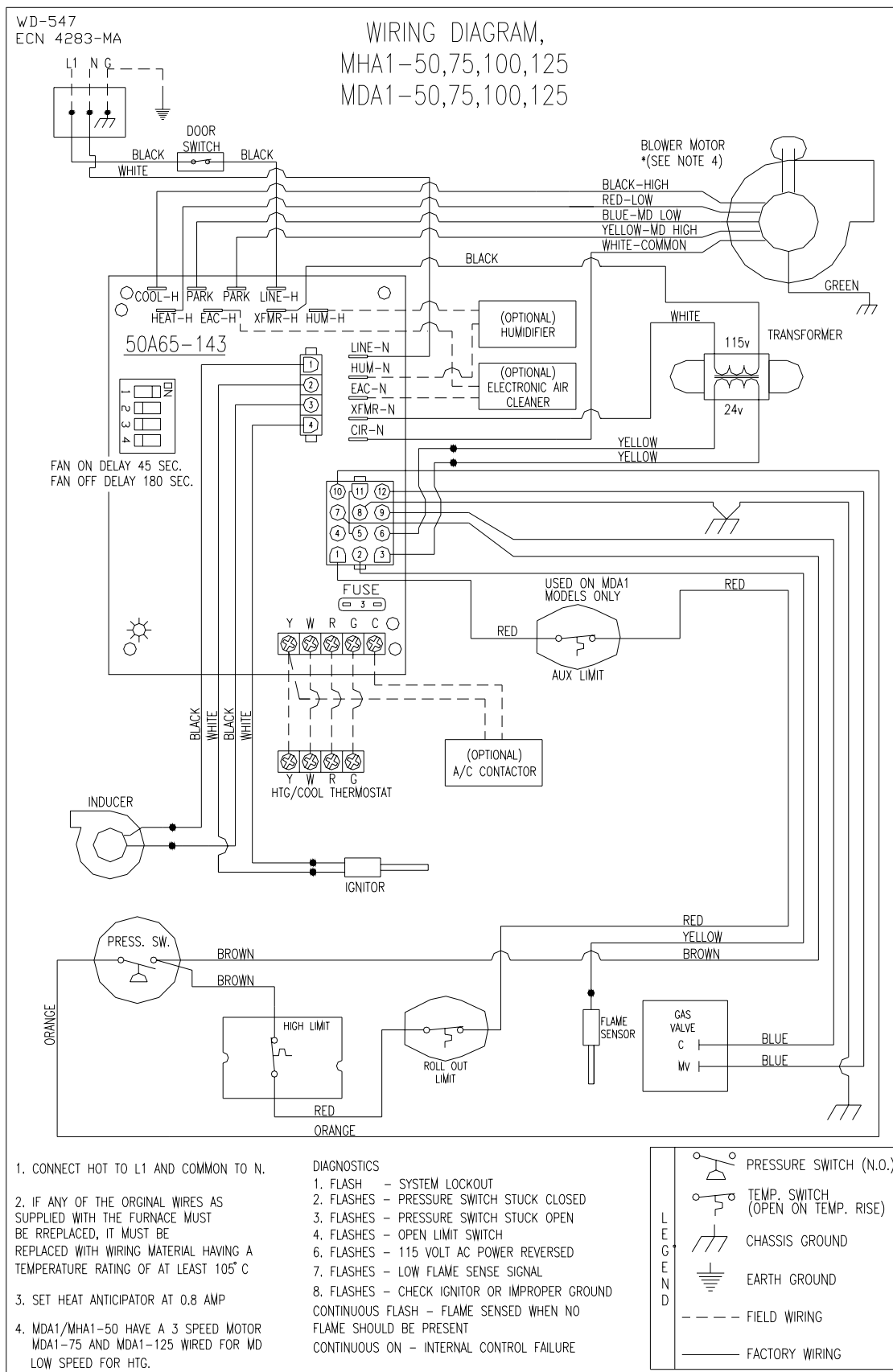
(NOT SHOWN)

OPTIONAL KITS  
(NOT SHOWN)



All installations and services must be performed by qualified service personnel.

## APPENDIX F: WIRING DIAGRAM





All installations and services must be performed by qualified service personnel.

## APPENDIX G: MID-EFFICIENCY FURNACE SPECIFICATIONS

### MID-EFFICIENCY HIGHBOY GAS FURNACE SPECIFICATIONS<sup>5</sup>

<b>Model NO.</b>	<b>MHA1-50</b>		<b>MHA1-75</b>		<b>MHA1-100</b>		<b>MHA1-125</b>	
<b>Heat input rate (BTUH)</b>	50,000		75,000		100,000		125,000	
<b>Heating capacity (BTUH)<sup>1</sup></b>	40,000		59,000		79,000		99,000	
<b>Nominal temp. rise</b>	70°F							
<b>Heating fan speed</b>	LOW		LOW		LOW		LOW	
<b>Burner orifice size for nat. gas</b>	0.0935" (#42)							
<b>Burner orifice size for L.P. gas</b>	0.0591" (1.5 mm)							
<b>AFUE %</b>	80.0		80.0		80.0		80.0	
<b>Height of casing</b>	44-1/4"							
<b>Width of casing</b>	17"		17"		21"		24"	
<b>Depth of casing</b>	27 1/2"							
<b>Warm air outlet<sup>2</sup></b>	15" x 18"		15" x 18"		19" x 18"		22" x 18"	
<b>Return air inlet<sup>2</sup></b>	25" x 16"		25" x 16"		25" x 16"		25" x 16"	
<b>Approx. shipping weight</b>	131 LBS		143 LBS		170 LBS		186 LBS	
<b>Dia. of flue (vertical vent)</b>	3"		4"		4"		4"	
<b>Dia. of flue (sidewall vent)<sup>3</sup></b>	3"		4"		4"		4"	
<b>CFM @ .2" &amp; .5" W.C. external static pressure</b>								
	.2"	.5"	.2"	.5"	.2"	.5"	.2"	.5"
<b>@HI speed</b>	950	830	1495	1335	1795	1560	2245	1970
<b>@MH speed</b>	860	740	1205	1125	1590	1410	1885	1710
<b>@ML speed</b>	-	-	920	865	1410	1290	1605	1510
<b>@LO speed</b>	580	440	750	700	1240	1160	1350	1300
<b>Blower motor type &amp; frame</b>	Permanent split capacitor, air over, 48 Y							
<b>Blower motor nominal HP</b>	1/5		1/3		1/2		3/4	
<b>Blower motor full load amps</b>	3.25		6.0		8.0		11.0	
<b>Motor shaft diameter</b>	1/2"							
<b>Direction of rotation (shaft end)</b>	Clockwise							
<b>No. of speeds</b>	3		4		4		4	
<b>Run capacitor</b>	10 mfd 370 VAC		10 mfd 370 VAC		10 mfd 370 VAC		15 mfd 440 VAC	
<b>Blower size</b>	10-7 R DD		10-9 R DD		10-9 R DD		10-9 R DD	
<b>Size of filters</b>	(1) – 1" x 24 3/4" x 15 3/4"		(1) – 1" x 24 3/4" x 15 3/4"		(1) – 1" x 24 3/4" x 15 3/4"		(1) – 1" x 24 3/4" x 19 3/4"	
<b>Largest recommended air conditioner<sup>4</sup></b>	2 Ton		3.5 Ton		4 Ton		5 Ton	
<b>Electrical power requirements</b>	115 volts, 60 Hz., 1 phase							
<b>Min. Fuse size</b>	15 AMP		15 AMP		15 AMP		20 AMP	
<b>ACCESSORY ITEMS</b>								
<b>Filter Rack Flange dimensions<sup>2</sup></b>	AOPS 7547 24-1/2" X 15"		AOPS 7547 24-1/2" X 15"		AOPS 7547 24-1/2" X 15"		AOPS 7375 24" X 19"	

**NOTES:**

1. BTU output based on annual fuel utilization efficiency rated by manufacturer.
2. On all outlet and inlet dimensions, the first dimension is width.
3. The MHA1/MDA1 furnaces are approved for sidewall venting using only an approved sidewall power venter. Refer to Side Wall Venting section of the *Installation and service manual* provided with the furnace for additional information.
4. To permit largest recommended air conditioning (at .5 static pressure), selection of the highest motor speed is required.
5. All specifications are subject to change without notice.

All installations and services must be performed by qualified service personnel.

**MID-EFFICIENCY COUNTERFLOW / HORIZONTAL GAS FURNACE SPECIFICATIONS<sup>5</sup>**

Model NO.	MDA1-50		MDA1-75		MDA1-100		MDA1-125	
Heat input rate (BTUH)	50,000		75,000		100,000		125,000	
Heating capacity (BTUH) <sup>1</sup>	40,000		60,000		81,000		101,000	
Nominal temp. rise	70° F.							
Heating fan speed	LOW		MD LOW		LOW		MD LOW	
Burner orifice size for nat. gas	0.0935" (#42)							
Burner orifice size for L.P. gas	0.0591" (1.5 mm)							
AFUE %	81.0		80.0		81.0		81.0	
Height of casing	44-1/4"							
Width of casing	17"		17"		17"		17"	
Depth of casing	27 1/2"							
Warm air outlet <sup>2</sup>	15" x 18"		15" x 18"		19" x 18"		22" x 18"	
Return air inlet <sup>2</sup>	15" x 18"		15" x 18"		19" x 18"		22" x 18"	
Approx. shipping weight	131 LBS		143 LBS		170 LBS		186 LBS	
Dia. of flue (vertical vent)	3"		4"		4"		4"	
Dia. of flue (sidewall vent) <sup>3</sup>	3"		4"		4"		4"	
CFM @ .2" & .5" W.C. external static pressure	.2"	.5"	.2"	.5"	.2"	.5"	.2"	.5"
@HI speed	900	730	1400	1220	1595	1370	2075	1790
@MH speed	835	680	1200	1075	1460	1260	1830	1605
@ML speed	-	-	926	850	1360	1170	1620	1430
@LO speed	580	425	765	700	1220	1075	1345	1265
Blower motor type & frame	Permanent split capacitor, air over, 48 Y							
Blower motor nominal HP	1/5		1/3		1/2		3/4	
Blower motor full load amps	3.25		6.0		8.0		11.0	
Motor shaft diameter	1/2"							
Direction of rotation (shaft end)	Clockwise							
No. of speeds	3		4		4		4	
Run capacitor	10 mfd 370 VAC		10 mfd 370 VAC		10 mfd 370 VAC		15 mfd 440 VAC	
Blower size	10-9 R DD		10-9 R DD		10-10 R DD		10-10 R DD	
Size of filters	(2) -1" x 17 3/4" x 11 3/4"		(2) -1" x 17 3/4" x 11 3/4"		(2) -1" x 17 3/4" x 13 3/4"		(2) -1" x 17 3/4" x 17 3/4"	
Largest recommended air conditioner <sup>4</sup>	2 Ton		3 Ton		3.5 Ton		4 Ton	
Electrical power requirements	115 volts, 60 Hz., 1 phase							
Min. Fuse size	15 AMP		15 AMP		15 AMP		20 AMP	
ACCESSORY ITEMS								
Combustible Floor Base	50DA-BASE		50DA-BASE		100CA-BASE		125CA-BASE	
Horizontal Plenum Angles	AOPS4942							
Vent Kit (top vent option)	AOPS4941							

NOTES:

1. BTU output based on annual fuel utilization efficiency rated by manufacturer.
2. On all outlet and inlet dimensions, the first dimension is width.
3. The MHA1/MDA1 furnaces are approved for sidewall venting using only an approved sidewall power venter. Refer to Side Wall Venting section of the *Installation and service manual* provided with the furnace for additional information.
4. To permit largest recommended air conditioning (at .5 static pressure), selection of the highest motor speed is required.
5. All specifications are subject to change without notice.

## Thermo Products, LLC "PEACE OF MIND PLUS" Warranty (Limited) Five Year Parts and Transportation Lifetime on Heat Exchanger

Thermo Products, LLC, an Indiana corporation, hereby warrants the Thermo Pride gas fired warm air furnaces manufactured by it to be free from defects in material and workmanship. The warranty is extended to the original owner(s) whose name(s) appear on this certificate, on the Warranty Registration Card returned to Thermo Products, LLC and also to any subsequent owner(s).

**1ST-5TH YEAR PARTS:** During the first 60 months after installation, all parts of the furnace are warranted with the exception of maintenance items which require periodic replacement (i.e. filters, belts, electrodes, etc.). The owner may arrange with the original installing dealer or any other qualified dealer of the owner's choice to replace a defective part. Any labor costs involved in furnace diagnosis, service or the removal and replacement of a defective part are the responsibility of the owner. Warranted replacement parts will be shipped by prepaid freight with instructions to the dealer on disposition of the defective part. Beyond the fifth year, only the furnace heat exchanger is covered.

**1ST-10TH YEAR HEAT EXCHANGER:** The heat exchanger carries a Limited Lifetime Warranty. If at any time during the first through tenth year after installation the heat exchanger becomes defective, Thermo Products, LLC will provide a comparable replacement furnace, or at the installing dealer's request, a replacement heat exchanger or the necessary repair parts on a no charge basis. Any labor costs involved in the diagnosis, repair or the removal and replacement of the furnace or heat exchanger are the responsibility of the owner. The owner may arrange with an approved, qualified HVAC dealer for the necessary labor. The warranted replacement furnace, heat exchanger or repair parts will be shipped by prepaid freight with instructions to the dealer on disposition of the defective furnace or part. Validation of the heat exchanger failure under warranted conditions must be verified by the Thermo Products, LLC Technical Service Department.

**BEYOND THE 10TH YEAR:** The heat exchanger carries a Limited Lifetime Warranty. If at any time beyond the tenth year after installation yet during the warranty period the heat exchanger becomes defective, Thermo Products, LLC will provide at its option either a replacement heat exchanger or the necessary repair parts on a no charge basis. Any labor costs involved in the diagnosis, repair or the removal and replacement of a heat exchanger are the responsibility of the owner. The owner may arrange with any qualified HVAC dealer for the necessary labor. Beyond the tenth year, any transportation costs associated with the replacement of the complete heat exchanger or the repair parts are the responsibility of the owner. If Thermo Products, LLC requests the return of the defective heat exchanger after the tenth year, it must be returned by prepaid transportation at the expense of the owner.

### THE CONDITIONS OF THIS WARRANTY ARE:

- A. The owner should complete and return the WARRANTY REGISTRATION CARD within ninety (90) days of installation to activate Warranty Coverage. If the completed WARRANTY REGISTRATION CARD is not returned after the ninety (90) day period, the date of installation will be considered the ninetieth (90th) day after the date the unit was sold to the dealer.
- B. The unit must be operated within its rated capacity as indicated on the rating label and fired with the fuel for which it was designed.
- C. The unit must operate with a duct system designed in accordance with ACCA (Air Conditioning Contractors of America) Manual D (current edition) recommendations and a vent system designed in accordance with current industry venting code(s).
- D. The unit must be installed, set up and maintained in accordance with local and state codes and/or THERMO PRODUCTS, LLC installation and operation instructions.
- E. The unit must not be installed in any structure where a corrosive atmosphere exists such as may be found in dry cleaning establishments, laundromats, beauty salons or industrial buildings without first contacting Thermo Products, LLC concerning proper application. A corrosive atmosphere is one contaminated by chlorine or fluorine, or any of the halogen group which when entering the combustion area of a furnace cause rapid deterioration of the inner surfaces ultimately leading to heat exchanger failure.
- F. Limit controls which are supplied with the unit and having pre-set maximums must not be modified, altered, or by-passed.
- G. The unit must not be modified and/or operated in any manner other than its design configuration.
- H. No air conditioning or heat pump coil may be installed on the return air side of the furnace.
- I. The unit must remain at its original installation address.
- J. Thermo Products, LLC shall not be responsible for any failure due to water damage and/or acts of God.

**FAILURE TO COMPLY WITH ANY OF ABOVE CONDITIONS WILL VOID ANY AND ALL WARRANTIES LISTED ABOVE.**

THIS WARRANTY EXPRESSLY SUPERSEDES ALL OTHER WARRANTIES AND OBLIGATIONS OF THERMO PRODUCTS, LLC NO PERSON HAS AUTHORITY TO ALTER OR MODIFY THE TERMS OF THIS WARRANTY IN ANY MANNER. THERMO PRODUCTS, LLC ASSUMES NO LIABILITY FOR CONSEQUENT DAMAGE OF ANY KIND, AND THE PURCHASER BY ACCEPTANCE OF THIS EQUIPMENT ASSUMES ALL LIABILITY FOR THE CONSEQUENCE OF ITS USE OR MISUSE BY THE PURCHASER, HIS EMPLOYEE, OR OTHERS.

## Thermo Products, LLC

P. O. Box 217  
North Judson, Indiana 46366  
PH-574-896-2133

Dealers Name \_\_\_\_\_

Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Date of Installation \_\_\_\_\_

Model No. \_\_\_\_\_ Serial No. \_\_\_\_\_

Owner(s) \_\_\_\_\_

Installation Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_

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