



# TWO STAGE CONDENSING GAS FURNACE INSTALLATION AND OPERATION MANUAL

## MODELS:

FOR USE WITH NATURAL GAS OR LP GAS (PROPANE)

CHX1-75N	CDX1-75N
CHX1-100N	CDX1-100N
CHX1-125N	CDX1-125N

**⚠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.

THERMO PRODUCTS, LLC.  
BOX 217  
NORTH JUDSON, IN 46366  
PHONE: (574) 896-2133

MADE IN USA



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

**I. SAFETY INFORMATION**

This and the following page contain reproductions of the various warning and instruction labels placed on the Thermo Pride Two Stage Condensing Gas Furnaces. Please read and comply with the contents of these labels.

MODEL NO.   
 SERIAL NO.

DIRECT VENT FORCED AIR FURNACE  
 FOR INDOOR INSTALLATION IN BUILDING  
 CONSTRUCTED ON SITE.

CONFORMS TO  
 ANS Z21.47b · CSA 2.3b-2000 CENTRAL FURN  
 CATEGORY IV TYPE FSP

115V 1PH 60CY MAX. TOTAL INPUT AMPS  
 INPUT BTUH HIGH FIRE NAT GAS  
 LOW FIRE

NORMAL MANIFOLD PRESSURE HIGH FIRE INCHES W.C.  
 LOW FIRE

MIN. GAS SUPPLY PRESSURE FOR INPUT ADJUSTMENT IN. W.C.  
 MAX. GAS SUPPLY PRESSURE 14.0 INCHES W.C.  
 AIR TEMPERATURE RISE HIGH FIRE 55°F TO 85°F  
 LOW FIRE 45°F TO 75°F

MAX. EXTERNAL STATIC PRESSURE INCHES W.C.  
 MAXIMUM OUTLET AIR TEMPERATURE °F

CERTIFIED FOR CLOSET INSTALLATION AT MINIMUM CLEARANCES  
 TO COMBUSTIBLE CONSTRUCTION AS SHOWN.

	TOP	FRONT	BACK	LS/RS	FLUE PIPE
(INCHES)	1	6	0	0	0

FOR INSTALLATION ON COMBUSTIBLE FLOORING.



MODEL NO.   
 SERIAL NO.

DIRECT VENT FORCED AIR FURNACE  
 FOR INDOOR INSTALLATION IN BUILDING  
 CONSTRUCTED ON SITE.

CONFORMS TO  
 ANS Z21.47b · CSA 2.3b-2000 CENTRAL FURN  
 CATEGORY IV TYPE FSP

115V 1PH 60CY MAX. TOTAL INPUT AMPS  
 INPUT BTUH HIGH FIRE NAT GAS  
 LOW FIRE

NORMAL MANIFOLD PRESSURE HIGH FIRE INCHES W.C.  
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 MAX. GAS SUPPLY PRESSURE 14.0 INCHES W.C.  
 AIR TEMPERATURE RISE HIGH FIRE 55°F TO 85°F  
 LOW FIRE 45°F TO 75°F

MAX. EXTERNAL STATIC PRESSURE INCHES W.C.  
 MAXIMUM OUTLET AIR TEMPERATURE °F

CERTIFIED FOR CLOSET INSTALLATION AT MINIMUM CLEARANCES  
 TO COMBUSTIBLE CONSTRUCTION AS SHOWN.

	TOP	FRONT	BACK	LS/RS	FLUE PIPE
(INCHES)	1	6	0	0	0

FOR INSTALLATION ON NON-COMBUSTIBLE FLOORS ONLY.  
 FOR INSTALLATION ON COMBUSTIBLE FLOORING ONLY WHEN  
 INSTALLED ON SPECIAL BASE PART NO. 100CA-BASE.



THIS FURNACE REQUIRES A SPECIAL VENTING SYSTEM. REFER TO  
 INSTALLATION INSTRUCTIONS NO. MG-1010 FOR PARTS LIST AND  
 METHOD OF INSTALLATION.

MAX. VENT LENGTH 35 FEET. MIN. VENT LENGTH 8 FEET.  
 MIN. WALL THICKNESS THROUGH WHICH THE VENT/AIR INTAKE  
 PIPES MAY PASS IS 2 INCHES AND THE MAX. IS 18 INCHES.

FILTERS MUST BE INSTALLED EXTERNAL TO THE FURNACE CASING.

THIS FURNACE MUST BE INSTALLED IN ACCORDANCE WITH  
 THERMO PRODUCTS INSTRUCTIONS AND LOCAL CODES. IN  
 ABSENCE OF LOCAL CODES, FOLLOW THE NATIONAL FUEL  
 GAS CODE - ANSI Z223.1

THERMO PRODUCTS, LLC.  
 P.O. BOX 217 - NORTH JUDSON, IN 46366

390425-N-4456-MA  
 1002-WT 4456-MA

THIS FURNACE REQUIRES A SPECIAL VENTING SYSTEM. REFER TO  
 INSTALLATION INSTRUCTIONS NO. MG-1010 FOR PARTS LIST AND  
 METHOD OF INSTALLATION.

MAX. VENT LENGTH 35 FEET. MIN. VENT LENGTH 8 FEET.  
 MIN. WALL THICKNESS THROUGH WHICH THE VENT/AIR INTAKE  
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THERMO PRODUCTS, LLC.  
 P.O. BOX 217 - NORTH JUDSON, IN 46366

390425-N-4456-MA  
 1002-WT 4456-MA

# ⚠ WARNING

Hazardous flue gas.  
Can cause personal injury or loss of life.

Inspect rubber hose connecting inducer outlet to PVC tee and all vent system joints for leak free connections before furnace operation.

390411

# WARNING

THIS COMPARTMENT MUST BE  
CLOSED EXCEPT WHEN SERVICING

THIS FURNACE MUST BE INSTALLED SO THERE ARE PROVISIONS FOR VENTILATING AIR.

390410

**REMOVE THIS PANEL FIRST IN ORDER  
TO REMOVE BLOWER DOOR.**

INSTALLATION AND USERS MANUALS  
ARE LOCATED BEHIND BLOWER DOOR.

390289

**OUTSIDE POWER SOURCE  
CONNECT 115v 60Hz TO  
L1 HOT AND L2 COMMON.**

390229

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

This and the previous page contain reproductions of the various warning and instruction labels placed on the Thermo Pride Two Stage Condensing Gas Furnaces. Please read and comply with the contents of these labels.

The following safety information should be read, understood, and followed by the installer.

**FOR YOUR SAFETY READ BEFORE OPERATING**

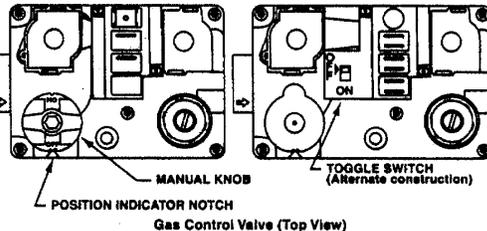
**WARNING:** If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- A. This appliance does not have a pilot. It is equipped with a hot surface igniter that automatically lights the burner. Do **not** try to light the burner by hand.
- B. **BEFORE OPERATING** smell all around the appliance area for gas. Be sure to smell next to the base of unit because some gas is heavier than air and will settle on the floor or 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.
- C. Use only your hand to push in or turn the gas control knob, or move the gas control switch. Never use tools. If the knob will not push in or turn, or the switch will not move by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

**OPERATING INSTRUCTIONS**

1. **STOP!** Read the safety information above on this label.
2. Set the thermostat to the lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with a hot surface igniter that automatically lights the burner. Do **not** try to light the burner by hand.
5. Turn gas control knob clockwise to "OFF" position. (For gas valves with a switch, move the switch to the "OFF" position.)
6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor or ground. If you smell gas, **STOP!** Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
7. Turn gas control knob counterclockwise to "ON" position. (For gas valves with a switch, move the switch to the "ON" position.)
8. Turn on all electric power to unit.
9. Set thermostat to desired setting, and, if equipped, set the operating mode to "HEAT".
10. If 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**

1. Set thermostat to lowest setting, and, if equipped, set the set the operating mode to "COOL" or "OFF".
2. If service is to be performed, turn off all electric power to the appliance.
3. To turn off gas control valve, remove the burner compartment cover.
4. Turn gas control knob clockwise to "OFF" position. (For gas valves with a switch, move the switch to the "OFF" position.)
5. Replace the burner compartment cover.

390469

⚠ WARNING

**SPECIAL HOMEOWNERS INSTRUCTIONS**

- **IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.**
- **FOR SAFE OPERATION** IT IS THE RESPONSIBILITY OF THE OWNER AND/OR USER THAT THE BURNER, CHIMNEY/VENT PIPE, HEAT EXCHANGER AND CONTROLS SHOULD BE INSPECTED EVERY YEAR BY A QUALIFIED HEATING CONTRACTOR.
- THE OWNER AND/OR USER SHOULD ALSO CONDUCT PERIODIC VISUAL INSPECTIONS. REFER TO THE USERS INFORMATION MANUAL PROVIDED WITH THIS FURNACE FOR DETAILS.
- ANY DEFICIENCIES NOTED MUST BE CORRECTED AT ONCE BY A QUALIFIED HEATING CONTRACTOR. DO NOT ATTEMPT TO MAKE REPAIRS YOURSELF!
- FOR ASSISTANCE OR ADDITIONAL INFORMATION CONSULT A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER.

CAUTION

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY SHUT OFF FURNACE BEFORE REMOVING THIS PANEL.

FILTER MAINTENANCE: WHEN IT BECOMES NECESSARY TO REPLACE OR WASH FILTER REMOVE THE DIRTY FILTER FROM THE RACKS PROVIDED AND WASH OR REPLACE WITH IDENTICAL NEW FILTERS.

DO NOT REMOVE THIS LABEL

FOR YOUR SAFETY

WHAT TO DO IF YOU SMELL GAS:

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

FOR YOUR SAFETY

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE. THIS UNIT MUST BE INSTALLED AND SERVICED BY A QUALIFIED CONTRACTOR ONLY. OPERATING INSTRUCTIONS ARE LOCATED INSIDE APPLIANCE NEAR BURNER ASSEMBLY.

390231

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

1. Use only with type of gas approved for this furnace. Refer to furnace rating plate.
2. Connect this furnace to an approved vent system only. Combustion products must be carried outdoors. Refer to Section III, D thru H, of this manual.

The following pages contain various warnings and cautions found throughout the Thermo Pride Highboy and Dual Poise Two Stage Condensing Gas Furnace Manual. Please read and comply with the statements below.

**⚠WARNING:** *This furnace is not to be used for temporary heating of buildings or structures under construction.*

**⚠CAUTION:** *These high efficiency condensing furnaces are not certified for and shall not be vented into a standard or any type of chimney.*

**⚠WARNING:** *These furnaces may not be common vented with any other appliance.*

**⚠CAUTION:** *The vent and air intake elbows must be kept away from bushes, shrubs or any vegetation that may restrict the flow of flue products. It must also be kept clear of any leaves, weeds or other combustible materials. Keep the vent hood clear of snow. Avoid locating the terminals in areas where standing water or condensate drippage may be a problem.*

**⚠CAUTION:** *Outside combustion air must not come from an area that is directly adjacent to a pool, hot tub or spa. Measures should be taken to prevent the entry of corrosive chemicals or vapors to the combustion and ventilation air supply. Such chemicals include but are not limited to chlorinated and/or fluorinated hydrocarbons such as found in refrigerants, aerosol propellants, dry cleaning fluids, degreasers and removers. Other harmful compounds may come from bleaches, air fresheners or mastics. Vapors from such products can form acid compounds when burned in a gas flame. Should acid compounds form in your furnace; it may reduce the life of the furnace.*

**⚠WARNING:** *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.*

**⚠WARNING:** *Turn off power to furnace before it is placed into service. The gas piping system must have been leak tested by a qualified heating contractor.*

**⚠WARNING:** *It may be necessary to purge the air out of the gas line for initial start-up of the furnace after installation. This should be done by a qualified heating contractor. If excessive gas escapes when purging the gas supply at the union, allow the area to ventilate for at least 15 minutes before attempting to start the furnace. LP gas is especially dangerous because the specific gravity of LP gas allows it to accumulate at floor level at a dangerous concentration. For remainder of operating instructions, reference Users Information Manual.*

**⚠WARNING:** *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 that:*

1. *A window(s) be opened.*
2. *The thermostat set at highest setting.*
3. *The furnace remain running at conditions 1&2 for 30 minutes or until odor has dissipated.*

**⚠CAUTION:** *The CHX1/CDX1 furnace models are sealed combustion design, which does not require an air shutter adjustment (air shutters are not used) for proper flame characteristics. Burner box access cover must always be secured with all screws in place and tightened before operating furnace.*

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

***⚠WARNING:*** *Personal injury or property damage could result from repair or service of this furnace by anyone other than a qualified heating contractor. Only the homeowner/user routine maintenance described in the Users Information Manual may be performed by the user.*

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

**INDEX**

<b><u>SECTION</u></b>	<b><u>BEGINNING PAGE</u></b>
I. SAFETY INFORMATION	i
II. FURNACE SPECIFICATIONS	1
III. GENERAL INSTALLATION	6
A. CODES AND CLEARANCES	6
B. FURNACE LOCATION	7
B1. CDX1 HORIZONTAL APPLICATION	7
C. REPLACING EXISTING FURNACE FROM A COMMON VENT	9
D. GENERAL REQUIREMENTS FOR VENTING CHX1/CDX1	9
E. SIDEWALL VENTING	10
E1. SINGLE PIPE (SIDEWALL) VENTING OPTION	12
F. INSTALLATION OF OUTSIDE VENT/AIR INTAKE TERMS.	13
G. CONNECTING FURNACE TO VENT/AIR INTAKE TERMS.	14
H. CONNECTING FURNACE TO ROOF VENT/AIR TERMS.	19
I. CONDENSATE DRAIN LINE & TRAP ASSY.	20
J. GENERAL GAS PIPING	22
K. FILTERS	23
L. WIRING	25
IV. STARTING THE UNIT	29
A. SEQUENCE OF OPERATIONS	29
B. INITIAL START-UP	32
C. FURNACE CHECKOUT PROCEDURE	40
V. INSTALLER'S INSTRUCTIONS TO USER	40
VI. TROUBLESHOOTING	41
APPENDIX – A           REPLACEMENT PARTS LIST	48
APPENDIX – B           WIRING DIAGRAMS	52

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

II. FURNACE SPECIFICATIONS

CHX1 SERIES

MODEL NO.	CHX1-75	CHX1-100	CHX1-125
BTU/HR INPUT (High fire/ Low fire)	75,000 / 52,000	100,000 / 70,000	125,000 / 87,500
BTU/HR OUTPUT (High fire/ Low fire)	70,875 / 49,612	94,500 / 66,150	117,500 / 82,250
HEIGHT OF CASING	44-1/4"	44-1/4"	44-1/4"
WIDTH OF CASING	17"	21"	24"
DEPTH OF CASING	27-1/2"	27-1/2"	27-1/2"
WARM AIR OUTLET	15 x 18	19 x 18	22 x 18
RETURN AIR INLET	25 x 16	25 x 16	25 x 16
DIA. OF FLUE	2"	3"	3"
DIA. OF COMBUSTION AIR INTAKE	2"	3"	3"
CFM from .2" & .5" w.c. EXTERNAL STATIC PRESSURE	COOLING	COOLING	COOLING
@COOLING TAP A	1000	1200	1400
@COOLING TAP B	800	1000	1200
@COOLING TAP C	1200	1400	1600
@COOLING TAP D	1400	1600	2000
@HEATING TAP A (High fire/Low fire)	HEATING 931 / 760	HEATING 1243 / 1015	HEATING 1556 / 1270
TEMPERATURE RISE	70 / 60	70 / 60	70 / 60
BLOWER MOTOR HP	.5	.75	1
POWER CHOKES	-	2.65 Mh	2.1 Mh
LARGEST RECOMMENDED AIR CONDITIONER	3.5 Ton	4 Ton	5 Ton
SIZE OF FILTERS	24-3/4" x 15-3/4"	24-3/4" x 15-3/4"	24-3/4" x 19-3/4"

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. To permit largest recommended air conditioning (at .5 static pressure), selection of the highest motor speed is required.

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

**CDX1 SERIES**

<b>MODEL NO.</b>	<b>CDX1-75</b>	<b>CDX1-100</b>	<b>CDX1-125</b>
<b>BTU/HR INPUT (High fire / Low fire)</b>	75,000 / 56,250	100,000 / 75,000	125,000 / 93,750
<b>BTU/HR OUTPUT (High fire / Low fire)</b>	69,750 / 52,312	93,000 / 69,750	116,250 / 87,187
<b>HEIGHT OF CASING</b>	46-1/4"	46-1/4"	46-1/4"
<b>WIDTH OF CASING</b>	17"	21"	24"
<b>DEPTH OF CASING</b>	27-1/2"	27-1/2"	27-1/2"
<b>WARM AIR OUTLET</b>	15 x 18	19 x 18	22 x 18
<b>RETURN AIR INLET</b>	15 x 22	19 x 22	22 x 22
<b>DIA. OF FLUE</b>	2"	3"	3"
<b>DIA. OF COMBUSTION AIR INTAKE</b>	2"	3"	3"
<b>CFM from .2" &amp; .5" w.c. EXTERNAL STATIC PRESSURE</b>	COOLING	COOLING	COOLING
<b>@COOLING TAP A</b>	1000	1200	1400
<b>@COOLING TAP B</b>	800	1000	1200
<b>@COOLING TAP C</b>	1200	1400	1600
<b>@COOLING TAP D</b>	1400	1600	2000
<b>@HEATING TAP C (High fire / Low fire)</b>	HEATING 1012 / 826	HEATING 1340 / 1094	HEATING 1673 / 1366
<b>TEMPERATURE RISE</b>	65 / 60	65 / 60	65 / 60
<b>BLOWER MOTOR HP</b>	.5	.75	1
<b>POWER CHOKES</b>	-	2.65Mh	2.1Mh
<b>LARGEST RECOMMENDED AIR CONDITIONER</b>	3.5 Ton	4 Ton	5 Ton
<b>SIZE OF FILTERS</b>	21-3/4" x 14"(2)	21-3/4" x 14"(2)	21-3/4" x 14"(2)

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. To permit largest recommended air conditioning (at .5 static pressure), selection of the highest motor speed is required.
4. Electrical characteristics at 115 volts, 60 Hz., 1 phase (less than 15 amps. for all models).
5. All specifications are subject to change without notice.

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

**INSTALLATION PARTS PACKAGES – CHX1-75**

<b>PARTS PACKAGE #S00S4378</b>	<b>DESCRIPTION</b>	<b>PART #</b>	<b>QUANTITY</b>
	2-3/8" ID radiator hose	410017	1
	Thermostat lead bushing	350750	1
	PVC trap assembly	320816	1
	#8 x 3/4 coated TEK screws for mounting trap & inlet/outlet collars	300283	4
	11/16" OD x 1/2" ID vinyl tubing	410060	24"
	2 x 4 electrical J-box	350024	1
	2 x 4 electrical J-box cover	350020	1
	#8 x 1/2 TEK screws for mounting 2 x 4 J-box	300208	2
	#10-32 x 1/2 green ground screw	300109	1
	#10-32 hex nut	300110	1
	3/16" dia. star washer	300270	1
	Grounding instructions	MG-966	1
	Wire nut	300132	2
	3" stainless steel hose clamp	300276	2
	J-box wire bushing	350016	1
	Drain hose grommet	350446	1
	Spring clamp, 11/16"	300299	3
	Installation notice	MG-987	1
	PVC tee assembly, 2" dia.	320818	1

**INSTALLATION PARTS PACKAGES – CHX1-100-125**

<b>PARTS PACKAGE #S00S4379</b>	<b>DESCRIPTION</b>	<b>PART #</b>	<b>QUANTITY</b>
	2-3/8" ID radiator hose	410017	1
	Thermostat lead bushing	350750	1
	PVC trap assembly	320816	1
	#8 x 3/4 coated TEK screws for mounting trap & inlet/outlet collars	300283	4
	11/16" OD x 1/2" ID vinyl tubing	410060	24"
	2 x 4 electrical J-box	350024	1
	2 x 4 electrical J-box cover	350020	1
	#8 x 1/2 TEK screws for mounting 2 x 4 J-box	300208	2
	#10-32 x 1/2 green ground screw	300109	1
	#10-32 hex nut	300110	1
	3/16" dia. star washer	300270	1
	Grounding instructions	MG-966	1
	Wire nut	300132	2
	3" stainless steel hose clamp	300276	2
	J-box wire bushing	350016	1
	Drain hose grommet	350446	1
	Spring clamp, 11/16"	300299	3
	Installation notice	MG-987	1
	PVC tee assembly, 2 x 3" dia.	320817	1

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

**INSTALLATION PARTS PACKAGES – CDX1-75**

<b>PARTS PACKAGE #S00S4380</b>	<b>DESCRIPTION</b>	<b>PART #</b>	<b>QUANTITY</b>
	2-3/8" ID radiator hose	410017	1
	Thermostat lead bushing	350750	1
	PVC trap assembly	320816	1
	#8 x 3/4 coated TEK screws for mounting trap & inlet/outlet collars	300283	6
	11/16" OD x 1/2" ID vinyl tubing	410060	24"
	2 x 4 electrical J-box	350024	1
	2 x 4 electrical J-box cover	350020	1
	#8 x 1/2 TEK screws for mounting 2 x 4 J-box	300208	2
	#10-32 x 1/2 green ground screw	300109	1
	#10-32 hex nut	300110	1
	3/16" dia. star washer	300270	1
	Grounding instructions	MG-966	1
	Wire nut	300132	2
	3" stainless steel hose clamp	300276	2
	J-box wire bushing	350016	1
	Drain hose grommet	350446	1
	Spring clamp, 11/16"	300299	3
	Installation notice	MG-987	1
	PVC tee assembly, 2" dia.	320819	1
	Pipe 2" dia. PVC 15"	14401	1
	Bracket	14406	1

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

**INSTALLATION PARTS PACKAGES – CDX1-100-125**

<b>PARTS PACKAGE #S00S4381</b>	<b>DESCRIPTION</b>	<b>PART #</b>	<b>QUANTITY</b>
	2-3/8" ID radiator hose	410017	1
	Thermostat lead bushing	350750	1
	PVC trap assembly	320816	1
	#8 x 3/4 coated TEK screws for mounting trap & inlet/outlet collars	300283	4
	11/16" OD x 1/2" ID vinyl tubing	410060	24"
	2 x 4 electrical J-box	350024	1
	2 x 4 electrical J-box cover	350020	1
	#8 x 1/2 TEK screws for mounting 2 x 4 J-box	300208	2
	#10-32 x 1/2 green ground screw	300109	1
	#10-32 hex nut	300110	1
	3/16" dia. star washer	300270	1
	Grounding instructions	MG-966	1
	Wire nut	300132	2
	3" stainless steel hose clamp	300276	2
	J-box wire bushing	350016	1
	Drain hose grommet	350446	1
	Spring clamp, 11/16"	300299	3
	Installation notice	MG-987	1
	PVC tee assembly, 2 x 3" dia.	320817	1
	PVC tee assembly, 2" dia.	320819	1
	Pipe 2" dia. PVC 15"	14401	1
	Bracket	14406	1
	Reducer 2" x 3" PVC	320067	1

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

**III. GENERAL INSTALLATION**

These Category Type IV furnaces are shipped completely assembled and wired (internally). See the Dealer Receiving and Freight Claim Procedure Section of the price guide for parts shortage or damage. The furnace and duct system must be adjusted to obtain a temperature rise of 55°F to 85°F through the furnace after installation. (See rating label located on side panel inside the furnace vestibule). The installation must conform with local codes, or in the absence of local codes, with the National Fuel Gas Codes (ANSI Z223.1 or latest edition) and with these instructions.

**⚠WARNING:** *This furnace is not to be used for temporary heating of buildings or structures under construction.*

Many of the chemicals used during construction, when burned, form acid bearing condensate that can substantially reduce the life of the heat exchanger.

**A. CODES AND CLEARANCES**

The following items must be considered when choosing the size and location of the furnace.

1. 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 with these instructions, regulations of the National Fire Protection Association, provisions of National Electrical Code (ANSI/NFPA70 or latest edition), and the National Fuel Gas Code (ANSI Z223.1 or latest edition).
2. The BTU output capacity of the furnace proposed for installation should be based on a heat loss calculation made according to the manuals provided by the Air Conditioning Contractors of America (ACCA) or ASHRAE.

**3. MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS**

**TABLE 1**

<b>MODEL NO.</b>	<b>FROM SIDES OF FURNACE &amp; REAR</b>	<b>FRONT</b>	<b>TOP OF PLENUM</b>	<b>FROM THE FLUE OR VENT</b>	<b>SIDE OF PLENUM</b>
<b>CHX1-75</b>	0 IN.	6 IN.	0 IN.	0 IN.	1 IN.
<b>CHX1-100</b>	0 IN.	6 IN.	0 IN.	0 IN.	1 IN.
<b>CHX1-125</b>	0 IN.	6 IN.	0 IN.	0 IN.	1 IN.
<b>CDX1-75</b>	0 IN.	6 IN.	0 IN.	0 IN.	1 IN.
<b>CDX1-100</b>	0 IN.	6 IN.	0 IN.	0 IN.	1 IN.
<b>CDX1-125</b>	0 IN.	6 IN.	0 IN.	0 IN.	1 IN.

The CHX1-75, 100 and 125 furnaces may be installed on combustible flooring. The furnace shall not be installed directly on carpeting, tile or other combustible material other than wood flooring.

The CDX1-75, 100 and 125 furnaces are to be installed on non-combustible flooring only. The non-combustible floor bases model no. 50 CA base for CDX1-75 model no. 100 CA base for the model no. CDX1-100 and model no. 125 CA base for CDX1-125 are available for the counterflow furnaces to allow their installations on combustible flooring.

These furnaces may be installed in an alcove or in a closet if the minimum clearances to combustible construction (listed previously) are met. The CDX1 series furnaces may be installed in an attic or crawl space. Refer to section III, B1 of this installation manual.

The minimum clearances are listed for fire protection. Clearance for servicing the front of the furnaces and to all points on the furnace requiring access must be 24"\*.

\*For horizontal furnace installation, refer to section III, B1 of this installation manual.

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

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

## **B. FURNACE LOCATION**

**⚠CAUTION:** *These high efficiency condensing furnaces are not certified for and shall not be vented into a standard or any type of chimney.*

The following shall be considered for locating the furnace:

1. For best performance locate the furnace so that it is centralized with respect to the duct system and as near as possible to a floor drain since condensate drainage must be provided.
2. Place the unit so that proper venting can be achieved, with a minimum number of elbows, in accord with the instructions in this manual.
3. The furnace must be located on a level, dry surface. 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.

**NOTICE: Ensure furnace is level after installation to ensure proper drainage and operation.**

4. This furnace must be connected to a drain in accordance with these instructions. If it is not practical to connect the unit to a drain, a condensate pump must be used and can be ordered as an accessory, part number 350225. If an acid neutralizer kit is required by local code or the customer, it is available under part number 320095.

## **B1. CDX1 HORIZONTAL APPLICATION**

The CDX1-75, 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).

For left or right horizontal applications of the CDX1 series units, the rollout switch located on the burner box must be moved to the pre-punched mounting holes on the side of the burner box. Screws are provided in pre-punched holes at the required limit location. Remove these screws and use them to mount the limit to new location. Utilize previously removed limit mounting screws to fill voided holes at previous limit location (See Figure 1).

For a right side horizontal application of the CDX1 series units, the hose from the single tap pressure switch (top switch) is already connected correctly (See Figure 1).

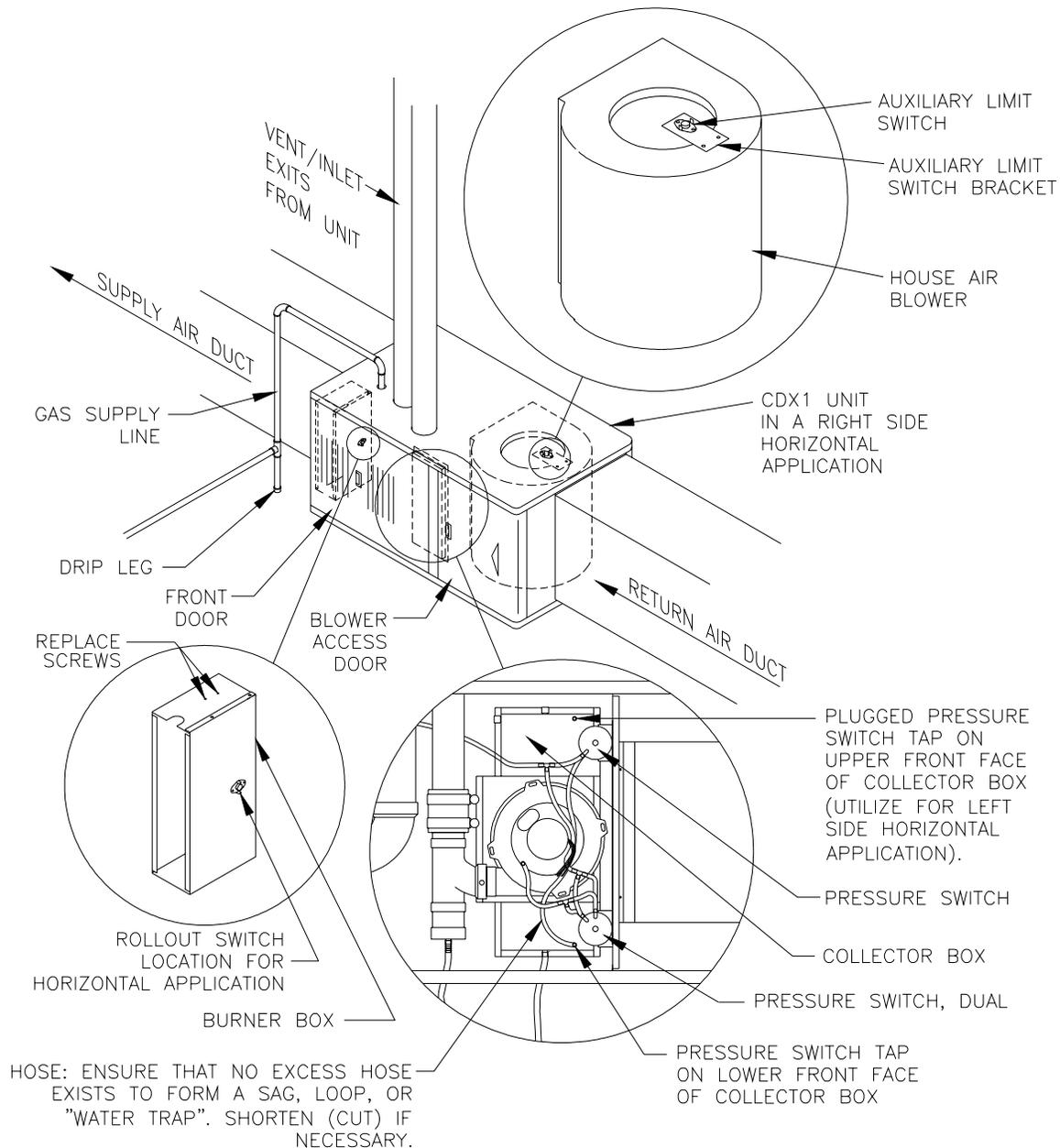
For a left side horizontal application of the CDX1 series units, the hose from the single tap pressure switch (bottom switch) must be moved to the lower front tap on the face of the collector box. Use the black cap removed from this tap to plug the original pressure switch tap.

**NOTE:** The hose, when moved, must be shortened (cut) to ensure that no excess hose exists to cause a sag, loop, or "water trap".

For a right side horizontal application of the CDX1 series units, the auxiliary limit switch located on the right side of the house air blower must be moved to the bracket on the opposite (left) side of the blower (See Figure 1).

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

**NOTE:** When the CDX1 is installed as horizontal unit, it is imperative that the auxiliary limit switch and bracket be located on the upper side of the house air blower; the burner rollout switch located on the side of the burner box; and that the hose from the single tap pressure switch be connected to the lower tap on the front of the collector box (See Figure 1).



CDX1 UNIT SHOWN IN A RIGHT SIDE HORIZONTAL APPLICATION

**Figure 1**

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 (See 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. Gas supply 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 (See Figure 1).

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

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.

**C. REPLACING AN EXISTING FURNACE FROM A COMMON VENT**

**⚠WARNING:** *These furnaces may not be common vented with any other appliance.*

**D. GENERAL REQUIREMENTS FOR VENTING CHX1/CDX1**

The CHX1/CDX1 furnace venting system must be installed by a qualified service person in accordance with local codes, the National Fuel Gas Code (NFPA 54/ANSI Z223.1 or latest edition) and these instructions.

The following items and local code requirements must be followed:

1. The vent/air intake terminations outlined by Thermo Products in this manual must be used.
2. The entire vent/air intake system must be made of PVC Schedule 40 pipe.  
**NOTE:** All CHX1/CDX1 furnaces recommended to be installed with outside combustion air.
3. The flue vent pipe and combustion air pipe must be at least as large as the exhaust vent/air intake pipe specified by Thermo Products. No reduction in size is permissible. The CHX1, CDX1-75 requires 2" Schedule 40 PVC pipe. The (CHX1, CDX1)-100 and 125 require 3" Schedule 40 PVC pipe.
4. This CHX1/CDX1 furnace shall not be common vented with any other appliance including those burning solid fuels.
5. Horizontal runs of exhaust vent pipe shall slope upward at least 1/4" per foot from the outlet of the furnace (CHX1's) or the outlet of the drain tee (CDX1's) to the vent termination at the outside wall. This will permit proper drainage of the condensate. Horizontal runs of inlet vent pipe shall slope downward at least 1/4" per foot from the outlet of the last elbow or last horizontal run, before exiting the wall, to the vent termination at the outside wall.
6. The vent pipe must be supported every 4 feet and at every joint to prevent pipe blockage caused by condensate trapped by a sag in the vent.
7. The maximum permissible vent length of straight pipe and number of elbows permitted for the exhaust vent and combustion air inlet is shown in Table 2. The elbows shown are in addition to the length of straight pipe permitted. When counting elbows, all elbows used in the exhaust vent or combustion air intake must be counted. This includes elbows used inside the furnace jacket and termination elbows. In addition, up to three elbows may be dropped and the vent length extended five feet for each elbow dropped.

**MAXIMUM VENT LENGTH  
TABLE 2**

VENT SIZE FURNACE MODEL	2 IN. PVC			3 IN. PVC		
	VENT LENGTH (FT.)	EXHAUST VENT ELBOWS (NO.)	COMBUSTION AIR INTAKE ELBOWS (NO.)	VENT LENGTH (FT.)	EXHAUST VENT ELBOWS (NO.)	COMBUSTION AIR INTAKE ELBOWS (NO.)
CHX1/CDX1-75	35	8 <sup>1,2</sup>	7 <sup>2</sup>	-	-	-
CHX1/CDX1-100	NOT PERMITTED			35	8 <sup>1,2</sup>	7 <sup>2</sup>
CHX1/CDX1-125	NOT PERMITTED			35	8 <sup>1,2</sup>	7 <sup>2</sup>

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

NOTES:

<sup>1</sup> The drain tee supplied with CHX1/CDX1 furnaces count as 1 elbow.

<sup>2</sup> (2) 45° elbows can be substituted for (1) 90° elbow.

Care should be taken to plan out the vent system to be as short as possible (but not shorter than 8 ft.) and to contain as few elbows as possible to insure the best possible operation of the furnace.

8. A hack saw may be used to cut the PVC pipe. It must be cut smoothly at right angles with all burrs removed. All joints must use standard PVC Schedule 40 elbows and couplings. Joints are not to be made by gluing and butting together the cut or raw edges of the vent pipe. The joints inside the vestibule should be sealed with a silicone caulk to allow for maintenance.

**Note: Do not use silicone caulk to seal the PVC sleeve or coupling to the metal air intake collar on the burner box. The screw securing the sleeve or coupling to the collar is sufficient.**

9. Vent connections shall be checked for leakage with the furnace induced draft blower running and with the vent termination blocked. A mild soap and water solution may be used to check for leaks.

10. Vent pipe passing through an unheated space must be insulated with 1.0" thick foil faced fiberglass insulation or it's equivalent to prevent freezing of any condensate within the pipe.

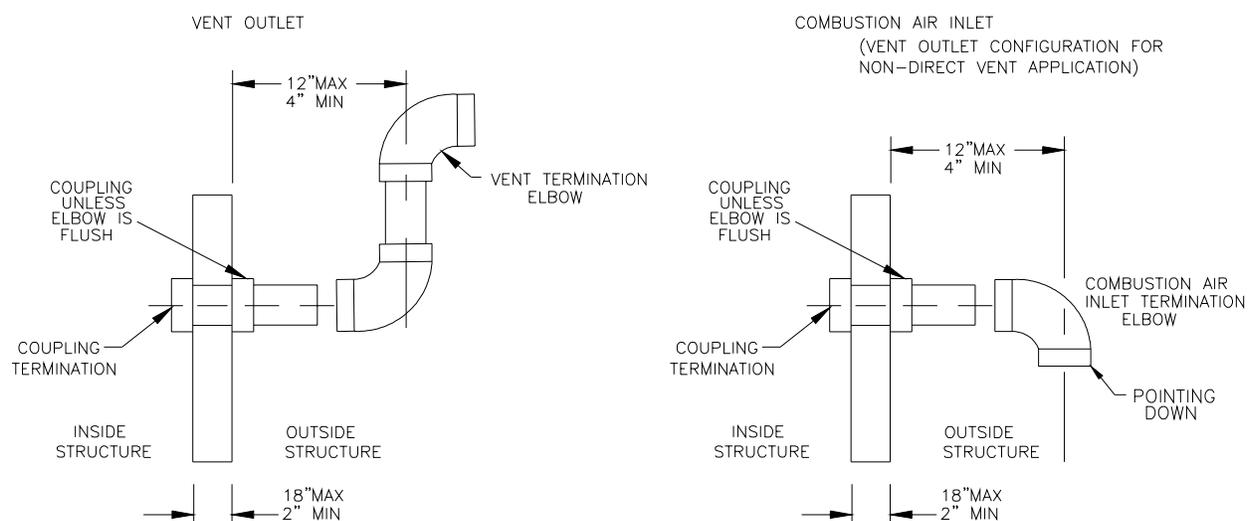
11. Minimum clearance from the PVC pipe to combustible material is zero inches.

12. Screens are not required by Thermo Products for the vent and intake. However, optional stainless steel screens are available from Thermo Products, should the homeowner request them.

**IMPORTANT:** The CHX1/CDX1 furnace models may be vented either through the sidewall or roof. For sidewall instructions continue reading the following section. For roof venting refer to Section III, H, of this manual.

**E. SIDEWALL VENTING**

1. The maximum wall thickness through which the vent and combustion air pipes may pass is 18" and the minimum is 2". The maximum distance from the outer wall to the center of the elbow is 12" (See Figure 2).

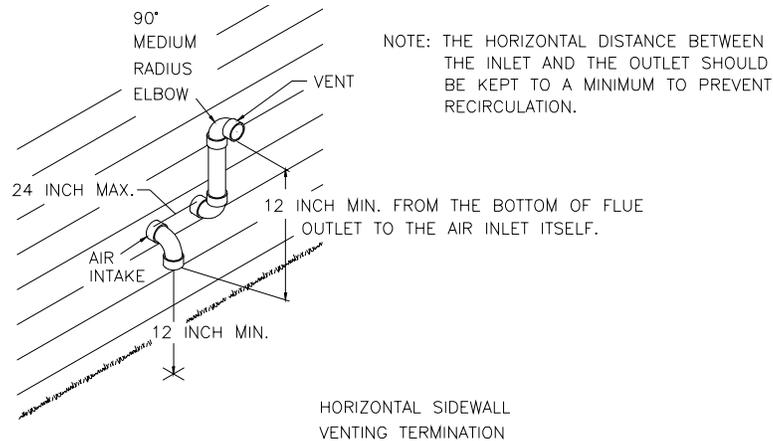


**Figure 2**

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

**NOTICE:** If exterior sidewall building materials are subject to degradation from flue gases or moisture, a minimum 12" diameter shield made from stainless steel or high density plastic shall be used for protection.

2. The PVC vent termination elbow must be installed in accord with local codes and these instructions. The bottom edge of the vent termination elbow must be installed at least 12 in. above the outlet of the combustion air intake termination elbow and must be installed in the same atmospheric pressure zone (i.e. on the same wall). It is recommended that the horizontal distance between the inlet and flue termination be kept to a minimum when possible and not exceed 24 in. apart. The vent and air intake should utilize the same numbers of elbows and approximately the same length of straight pipe to reach the outside termination elbows. (See Figures 2 & 3).

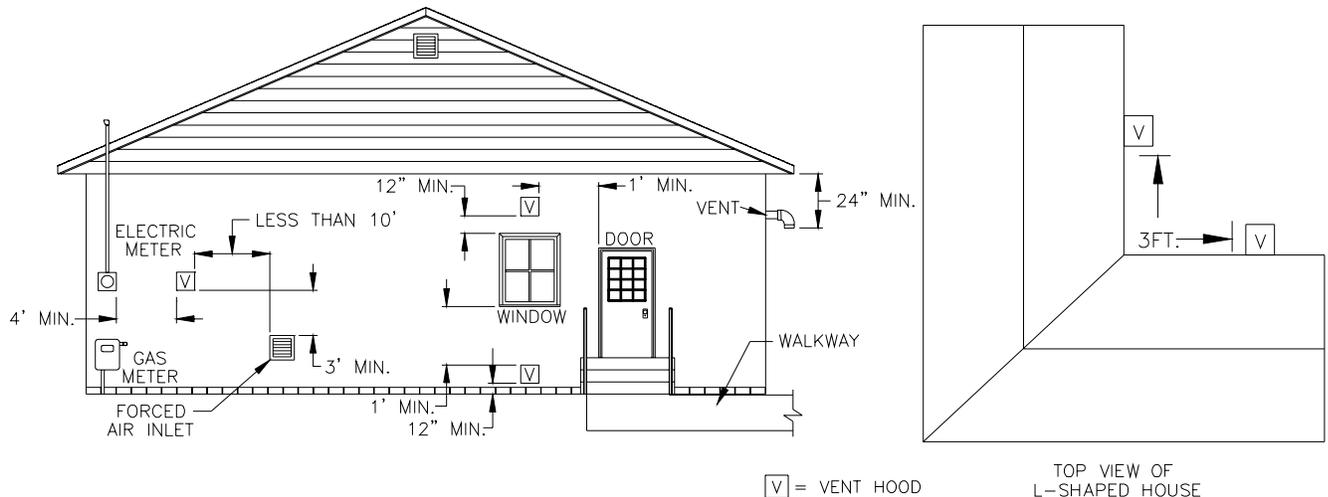


**Figure 3**

**3. VENT TERMINAL LOCATION REQUIREMENTS**

- a. The vent terminal shall be located at least 3 ft. above any forced air inlet located within 10 ft.
- b. The terminal shall be at least 1 ft. below, 1 ft. horizontally from or 1 foot above any door, window or gravity air inlet into any building. The bottom of the vent terminal shall be located at least 18 in. above grade.
- c. The terminal shall not be located over public walkways or over an area where condensate or vapor could create a nuisance or hazard or could be detrimental to the operation of regulators, relief valves or other equipment.
- d. A minimum horizontal clearance of 4 ft. must be maintained from electric meters, gas meters, regulators and relief equipment. The vent terminal shall not be installed over these or any other equipment where condensate or vapor could be detrimental to the operation of this equipment and/or controls.
- e. The unit shall be located so a minimum of 1/4" per foot upward slope can be maintained from the furnace to the terminal outlet and 1/4" per foot downward slope for the last horizontal run of inlet, to the outside inlet terminal.
- f. The vent discharge must be installed a minimum of 12" above grade, 14" from any obstruction and three feet from an inside corner of an L-shaped structure.

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



**Figure 4**

**⚠CAUTION:** *The vent and air intake elbows must be kept away from bushes, shrubs or any vegetation that may restrict the flow of flue products. It must also be kept clear of any leaves, weeds or other combustible materials. Keep the vent hood clear of snow. Avoid locating the terminals in areas where standing water or condensate drippage may be a problem.*

#### **VENT TERMINAL LOCATION GUIDELINES**

In addition to following the requirements outlined by local codes, utilizing the guidelines below when possible in locating the vent terminal will help insure the trouble-free operation of your horizontally vented furnace:

- Avoid locating the vent terminal on a wall facing the prevailing winds and wide open areas.
- When this is not practical, choose locations that protect the vent from strong winds such as behind a fence or hedge. **NOTICE:** The vent terminal must be located a sufficient distance from bushes, shrubs, and vegetation so as not to have the flue products restricted or blocked from such vegetation.
- In areas with considerable snowfall, it is advisable to locate the vent terminal higher than the minimum 12 in. above the ground as to prevent blockage by snow accumulation or drifting.

Measures should be taken to prevent the entry of corrosive chemicals or vapors to the combustion and ventilation air supply. Such chemicals include but are not limited to chlorinated and/or fluorinated hydrocarbons such as found in refrigerants, aerosol propellants, dry cleaning fluids, degreasers and removers. Other harmful compounds may come from bleaches, air fresheners or mastics. Vapors from such products can form acid compounds when burned in a gas flame. The life of the furnace could be reduced should acid compounds form within your furnace.

**NOTICE:** Heat exchanger failure caused from contaminated air will void its limited lifetime warranty.

**NOTICE:** The vent termination and air inlet elbow shall be checked periodically, at least at the start of each heating season, for restriction or blockage from foreign material in the vent pipe or in the air inlet. The air inlet and vent pipe should be cleaned when necessary.

#### **E1. SINGLE PIPE (SIDEWALL) VENTING OPTION**

This furnace may be **horizontally vented** with a single exhaust pipe. This will be a non-direct vent installation. The same exhaust venting guidelines apply except the exhaust termination will be similar to the air intake of the "2 pipe" direct vent installation. Refer to intake terminal instructions Figure 3 and Figure 5. Termination will consist of one 90° elbow pointed downward. (See figure 2)

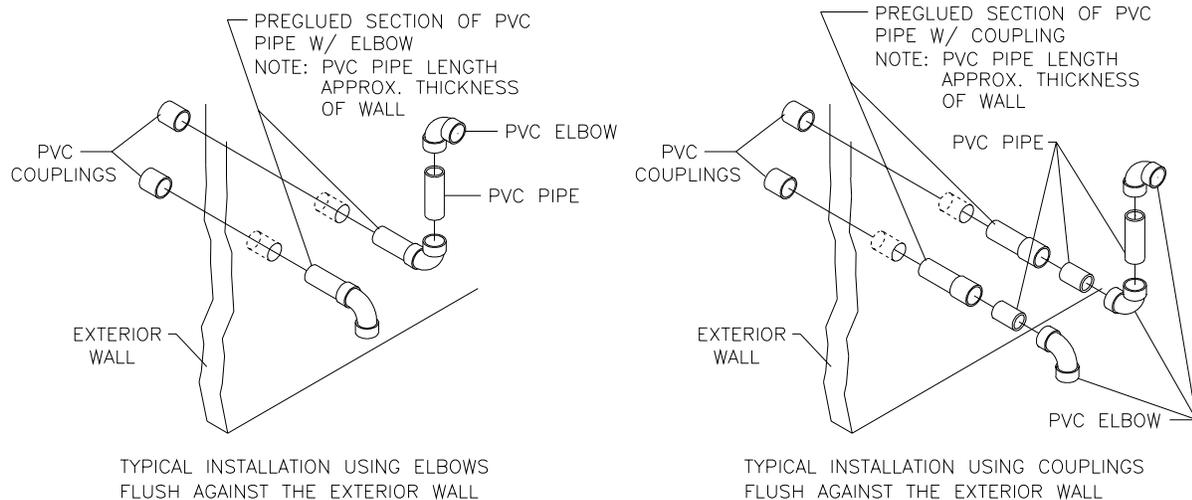
**All installations and services must be performed by qualified service personnel.**

## F. INSTALLATION OF OUTSIDE VENT/AIR INTAKE TERMINATIONS

**NOTICE:** Installation of the outside exhaust and combustion air vents must be performed by a qualified installer or service person in accord with local codes, the National Fuel Gas Code (NFPA 54, ANSI Z223.1 or latest edition) and the sections on venting in this manual.

1. Observing all clearances specified in this manual, cut two 2-3/8" diameter holes in the outside wall for CHX1/CDX1-75 and two 3-1/2" diameter holes for the CHX1/CDX1-100 and 125.
2. Cut two 2" diameter PVC pipes 1-1/2" longer than the depth of the wall. This allows for 3/4" connection on both ends of the pipe. (For 3" PVC pipe, leave 3" for connection). Using PVC pipe cement, cement a PVC elbow or coupler to one end of each pipe.

Mark the pipe before inserting into the wall so the elbow orientation can be determined. Also, if a protective shield will be used on the exterior surface of the wall, it should be installed at this time. Glue a coupling or elbow to each pipe, depending on your installation with the PVC pipe cement being careful to maintain the proper orientation of the elbows. Complete the assembly of the outlet and inlet as shown in Figure 5, making sure that the spacing between the inlet and outlet complies with that shown in Figure 3.



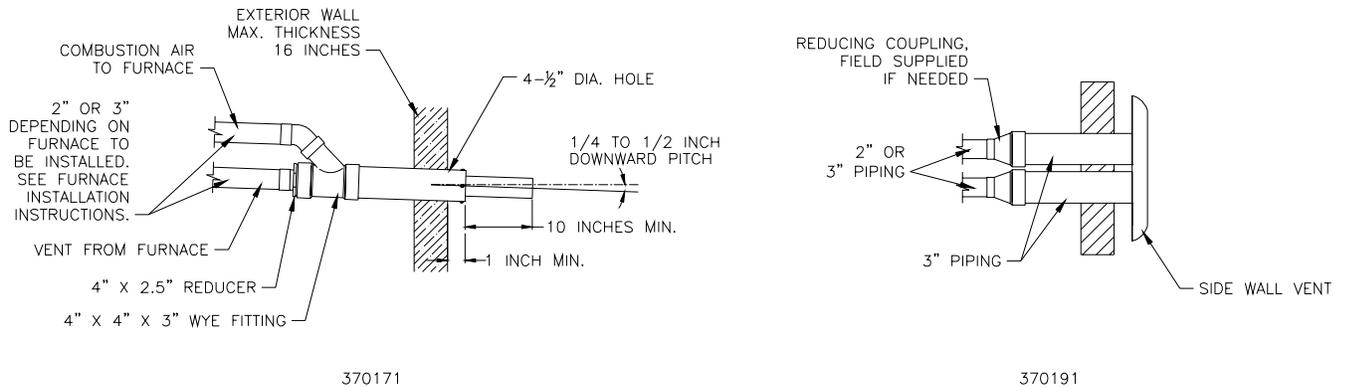
**Figure 5**

3. Finish the vent installation by caulking around the two holes where the PVC pipes pass through the wall.
4. An optional vent or intake terminal (stainless steel) screen is available under part no. 320226.

### Optional Terminations

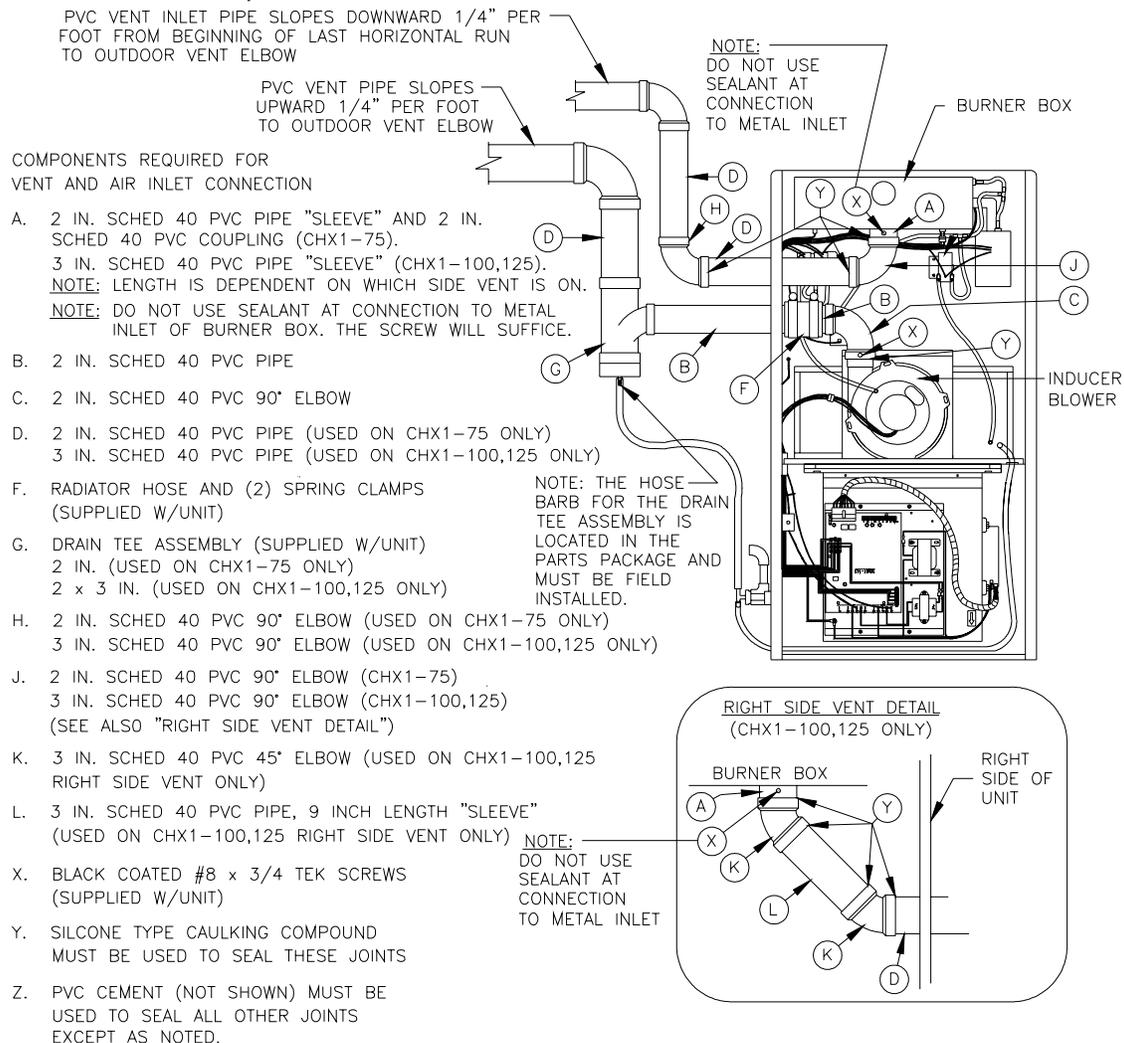
Two optional vent kits are available for vent terminations on horizontal vent applications. The concentric vent kit (part no. 370171) allows for the vent and intake to be installed through one 4.5-inch diameter hole. The side wall vent cap (part no. 370191) is a cover to be installed over the vent and intake pipe as they exit the exterior of the building. These optional kits shall be installed according to the instructions provided with each kit. The locations and clearances are identical to the requirements of the standard vent terminations described in this manual. These vent kits may be used on any size of the CHX1/CDX1 furnace series.

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



**G. CONNECTING FURNACE TO THE VENT/AIR INTAKE TERMINATION AND DRAIN**

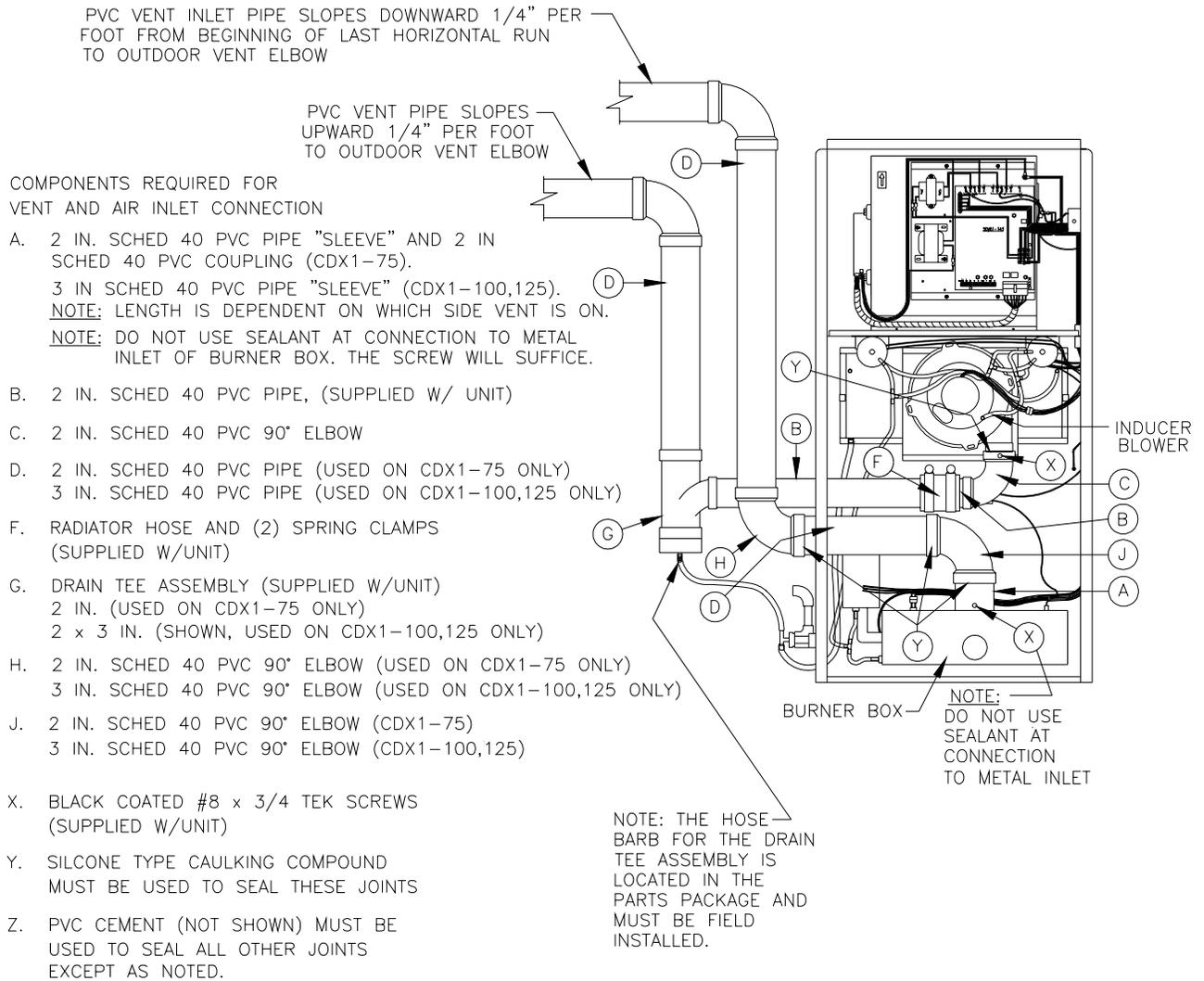
- The following diagrams show the typical vent and air inlet connection for a CHX1 and CDX1 furnace as well as a list of the parts that will be needed to install each.



BASIC VENT CONNECTION (CHX1 SERIES)

**Figure 6**

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



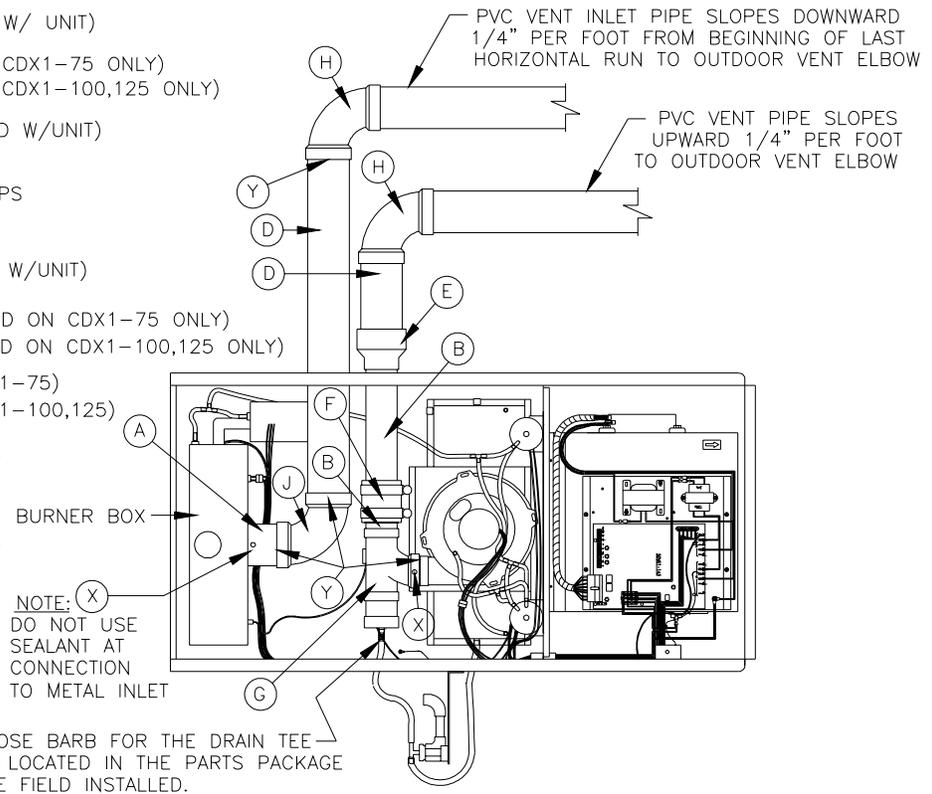
BASIC VENT CONNECTION (CDX1 SERIES)

**Figure 7**

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

COMPONENTS REQUIRED FOR  
VENT AND AIR INLET CONNECTION

- A. 2 IN. SCHED 40 PVC PIPE "SLEEVE" AND 2 IN SCHED 40 PVC COUPLING (CDX1-75).  
3 IN SCHED 40 PVC PIPE "SLEEVE" (CDX1-100,125).  
NOTE: LENGTH IS DEPENDENT ON WHICH SIDE VENT IS ON.  
NOTE: DO NOT USE SEALANT AT CONNECTION TO METAL INLET OF BURNER BOX. THE SCREW WILL SUFFICE.
- B. 2 IN. SCHED 40 PVC PIPE (SUPPLIED W/ UNIT)
- D. 2 IN. SCHED 40 PVC PIPE (USED ON CDX1-75 ONLY)  
3 IN. SCHED 40 PVC PIPE (USED ON CDX1-100,125 ONLY)
- E. 2 IN. X 3 IN. PVC REDUCER (SUPPLIED W/UNIT)  
(USED ON CDX1-100,125 ONLY)
- F. RADIATOR HOSE AND (2) SPRING CLAMPS  
(SUPPLIED W/UNIT)
- G. 2 IN. DRAIN TEE ASSEMBLY (SUPPLIED W/UNIT)
- H. 2 IN. SCHED 40 PVC 90° ELBOW (USED ON CDX1-75 ONLY)  
3 IN. SCHED 40 PVC 90° ELBOW (USED ON CDX1-100,125 ONLY)
- J. 2 IN. SCHED 40 PVC 90° ELBOW (CDX1-75)  
3 IN. SCHED 40 PVC 90° ELBOW (CDX1-100,125)
- X. BLACK COATED #8 x 3/4 TEK SCREWS  
(SUPPLIED W/UNIT)
- Y. SILICONE TYPE CAULKING COMPOUND  
MUST BE USED TO SEAL THESE JOINTS
- Z. PVC CEMENT (NOT SHOWN) MUST BE  
USED TO SEAL ALL OTHER JOINTS  
EXCEPT AS NOTED.



BASIC VENT CONNECTION  
(CDX1 SERIES SHOWN IN A RIGHT SIDE HORIZONTAL APPLICATION)

**Figure 8**

**2. CONNECTING THE EXHAUST VENT TO THE INDUCER**

- a. Insert the end of the 2" dia. PVC elbow (2" dia. PVC tee assembly for CDX1 horizontal installations) onto the outlet of the inducer blower assembly. Measure the length of 2" dia. PVC pipe needed to clear the furnace side casing, while allowing for the 2-3/8" rubber radiator hose to be installed within the casing of the furnace. Cut the 2" dia. PVC measured lengths and be sure to allow sufficient length of pipe for connections. Refer to Figures 9, 10 and 11.

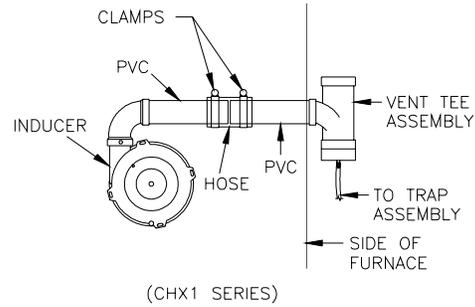
**NOTE:** For CDX1 series units, a length of 2" dia. PVC pipe and a 2" dia PVC tee assembly are supplied with the unit. For the CDX1-100 and CDX1-125 units, a 2" x 3" dia. PVC reducer is also supplied.

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

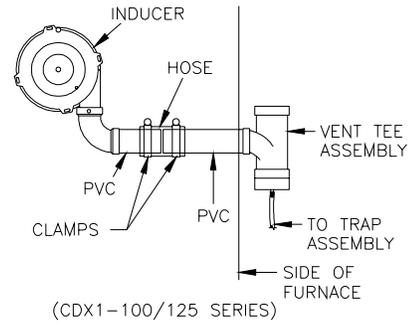
**IMPORTANT:** Horizontal installations of CDX1-100 and CDX1-125 units must utilize the 2" x 3" dia. PVC reducer as soon as the vent inlet exits the side casing of the unit. The CDX1-100 and CDX1-125 series units must be vented with 3" dia. PVC. Refer to Figure 8.

- b. After preparation of the 2" PVC pipe, use silicone type sealant on the 2" dia. PVC elbow (2" dia. PVC tee for CDX1 horizontal applications) before inserting it onto the outlet of the inducer. Install a black coated #8x3/4" sheet metal screw through the elbow and on the outlet flange of the inducer to secure the elbow in place.

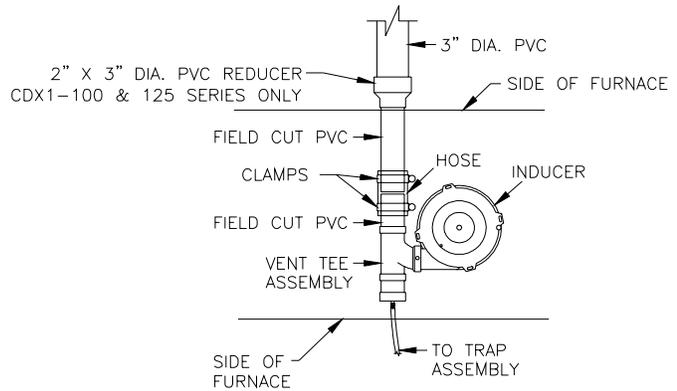
**Figure 9**



**Figure 10**



**Figure 11**



(CDX1-100/125 SERIES IN A RIGHT HAND HORIZONTAL APPLICATION)

- c. PVC cement the pre-cut 2" dia. PVC from step a. to the 2" dia. PVC elbow (2" dia. PVC tee for CDX1 horizontal applications). Attach to the drain tee assembly using the radiator hose and the 2 clamps (supplied).

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

**NOTICE:** The exhaust vent piping must slope upward at least 1/4" per foot from the furnace to outdoor vent terminal. The inlet vent piping must slope downward at least 1/4" per foot from the beginning of the last horizontal run of pipe to the outdoor vent terminal. The PVC pipe must be supported directly over the vent tee assembly (CDX1) or (CHX1), every four feet thereafter and at every joint. After making sure the slope and length of the piping are correct, glue the furnace tee and vent terminal connections in place.

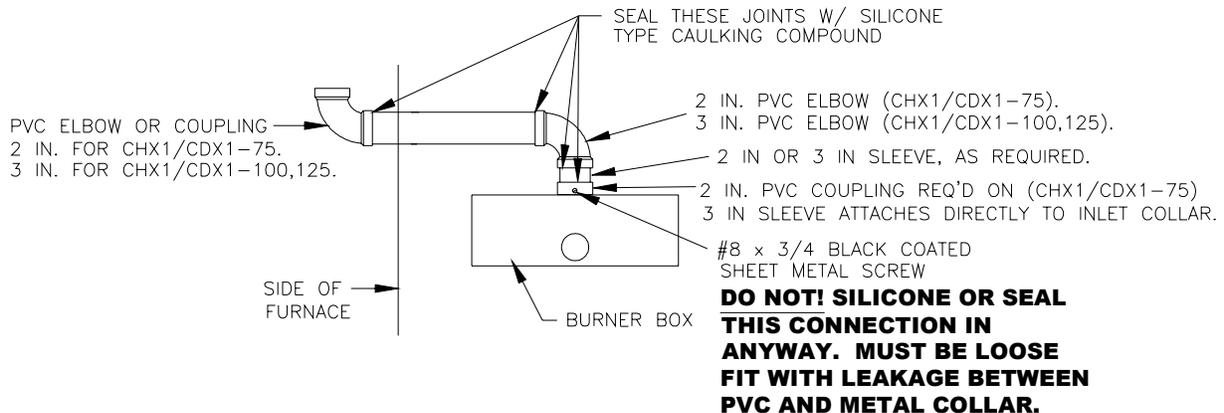
**3. CONNECTING THE COMBUSTION AIR INLET**

- a. Install a 2" PVC elbow with sleeve and coupling (CHX1/CDX1-75 series) or 3" PVC elbow with sleeve (CHX1/CDX1-100, 125 series) on the inlet of the burner box. Using a tape measure, measure the length of 2" or 3" PVC pipe needed to clear the casing. Be sure to allow sufficient length for insertion to the elbow at the burner box and the elbow or coupling on the end. Cut the 2" or 3" PVC to the measured length.
- b. After preparation of the PVC pipe, secure the coupling or sleeve in place using a black-coated #8x3/4 sheet metal screw through the PVC into the metal collar of the burner box.

**Note:** The PVC connection to the metal burner box collar does not require silicone sealant or PVC cement. Attach the PVC elbow to the sleeve and then to the coupling where required, using silicone type sealant (see figure 12).

- c. Install the precut 2" or 3" PVC pipe into the elbow at the burner box and to the elbow or coupler just outside the furnace using silicone type sealant. To make these seals, run a bead of silicone type sealant around the PVC pipe 3/8" from either end, insert into the appropriate couplings and elbows and rotate 1/4" turn. This will allow for easy disconnection in case the burner assembly must be removed at a later date (see figure 12).

**Note:** When applying silicone sealant, ensure that no excess sealant is pushed into the vent opening. This may cause flow restriction within the vent.



**Figure 12**

**NOTICE:** The air intake pipe must be supported every 4 feet. After making sure the length of the piping is correct, glue all connections in place except the length of pipe between the combustion air fitting on the burner box and the first fitting.

If the combustion air piping is installed in a warm humid place, such as a laundry room or above a suspended ceiling, it must be insulated with a 1.0" foil faced insulation or its equivalent.

If the vent piping is run through an unconditioned space, it must be insulated with a 1.0" foil faced insulation or its equivalent.

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

**⚠CAUTION:** *Outside combustion air must not come from an area that is directly adjacent to a pool, hot tub or spa. Measures should be taken to prevent the entry of corrosive chemicals or vapors to the combustion and ventilation air supply. Such chemicals include but are not limited to chlorinated and/or fluorinated hydrocarbons such as found in refrigerants, aerosol propellants, dry cleaning fluids, degreasers and removers. Other harmful compounds may come from bleaches, air fresheners or mastics. Vapors from such products can form acid compounds when burned in a gas flame. Should acid compounds form in your furnace; it may reduce the life of the furnace.*

#### H. CONNECTING THE FURNACE TO ROOF VENT/AIR TERMINATIONS

The furnace may be vented vertically through the roof if it is not possible to vent the furnaces through the sidewall. The outlet/inlet of the vent and air intake terminations shall be a minimum of 12 inches above highest anticipated snow level. The vent outlet must be installed a minimum of 12 in. above the air intake inlet. The combustion air intake shall be installed upwind of the vent outlet when exposed to prevailing winds. The exhaust vent and combustion air intake can be a minimum of 3 in. and a max. of 24 in. apart (see Figure 13). **NOTE:** When the vent termination is installed correctly, no draft should be present in the system during the furnace off cycle.

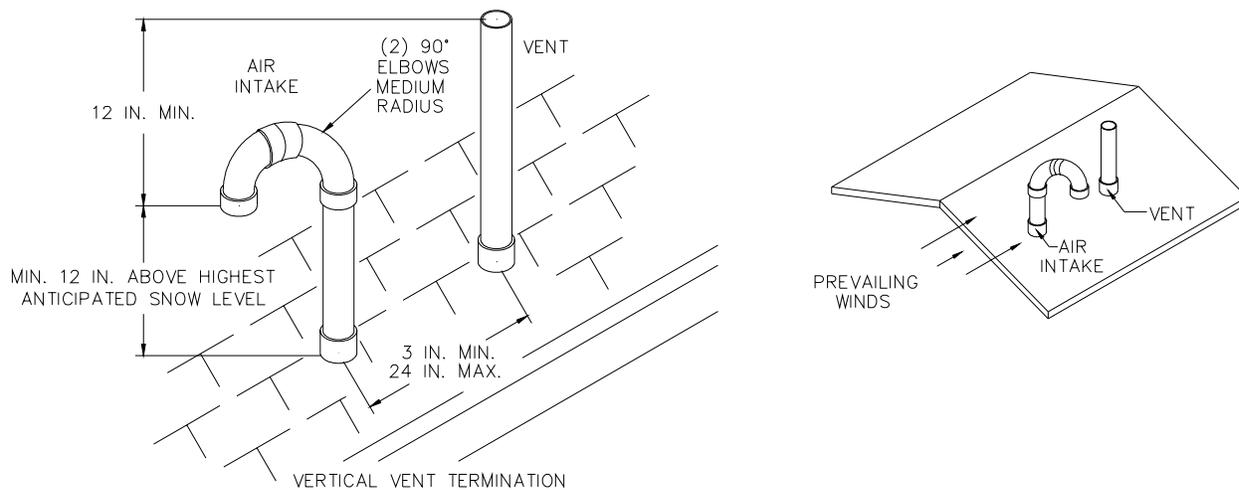
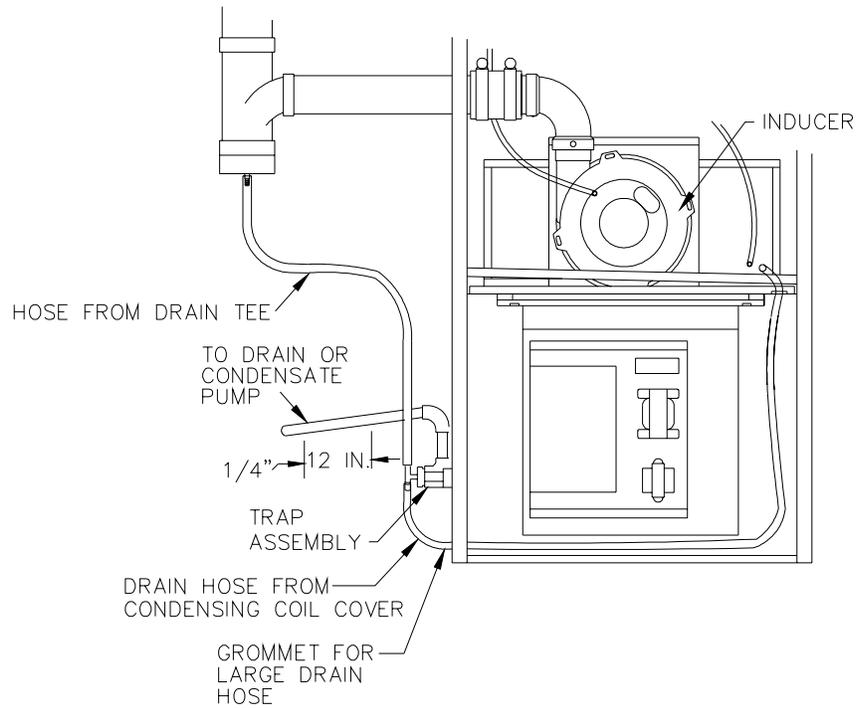


Figure 13

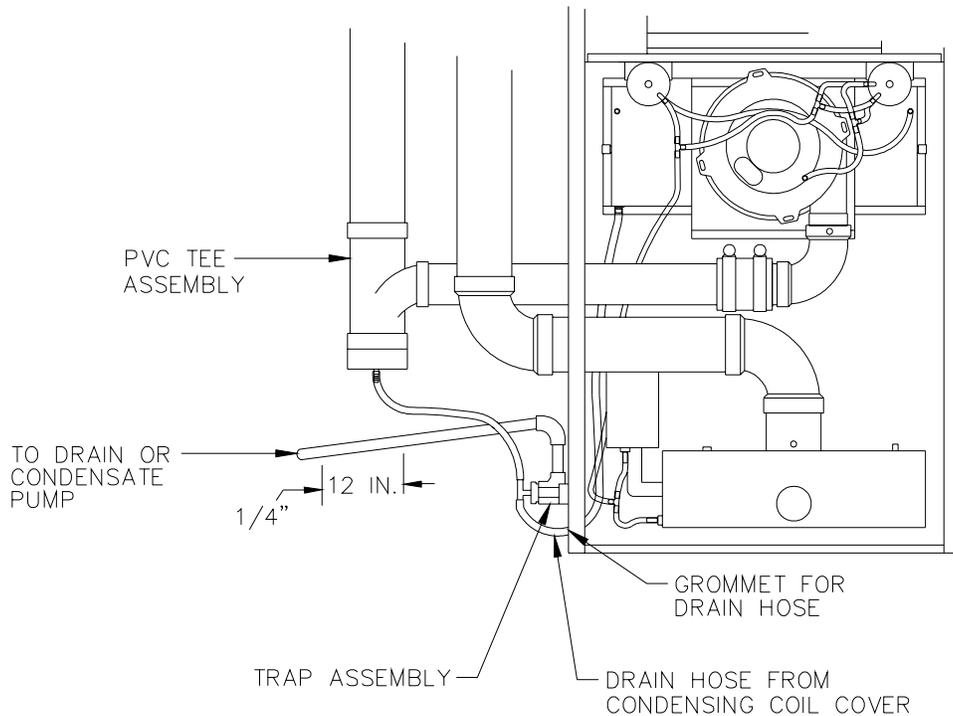
**All installations and services must be performed by qualified service personnel.**

**I. CONDENSATE DRAIN LINE AND TRAP ASSEMBLY**

1. The following diagrams show the typical drain and trap connection for a CHX1 and CDX1 furnace.

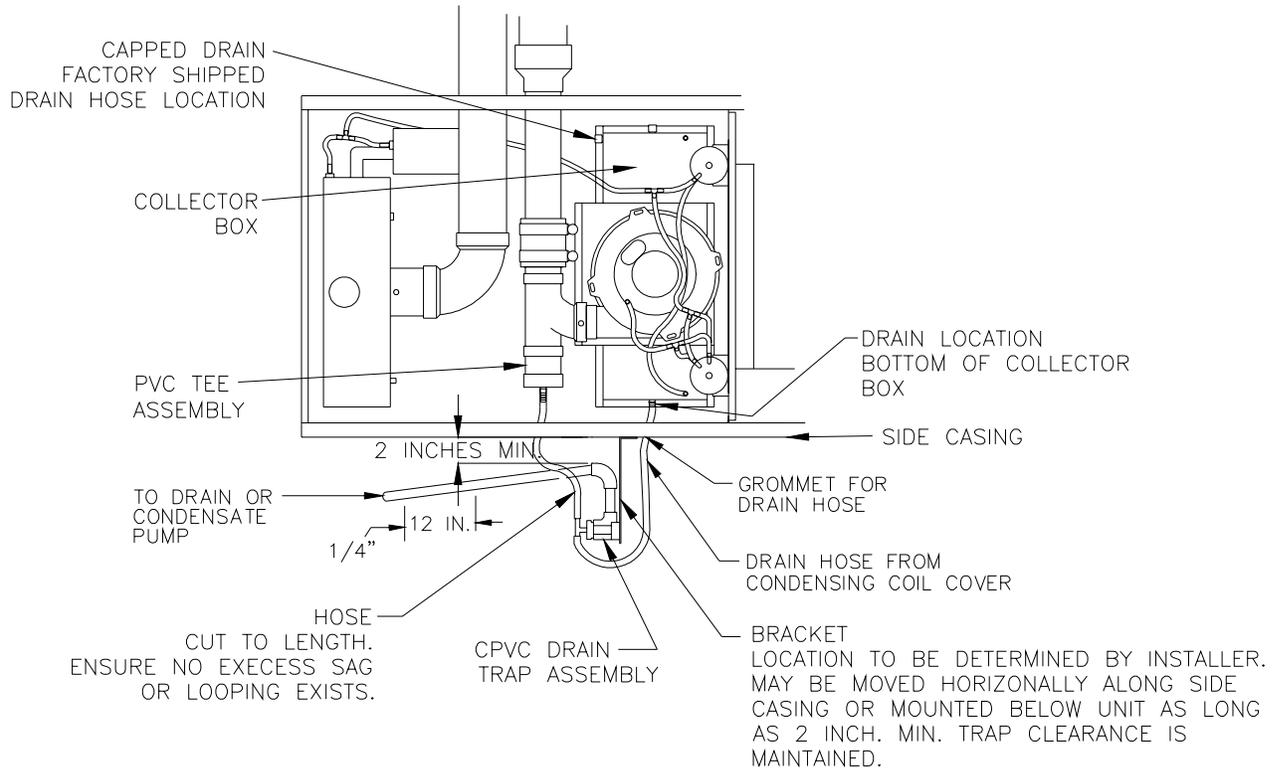


**Figure 14. TRAP ASSEMBLY MOUNTED ON CHX1**



**Figure 15. TRAP ASSEMBLY MOUNTED ON CDX1**

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



**Figure 16. TRAP ASSEMBLY MOUNTED ON CDX1 RIGHT SIDE HORIZONTAL INSTALLATION**

- Determine on which side of furnace the condensate disposal line is to be run (NOTICE: On CHX1/CDX1's this must be the same side as the flue outlet or bottom of unit). Attach the condensate trap to the furnace casing using the #8x3/4" sheet metal screws provided in the parts package. Pilot holes are provided on both sides of the casing for mounting.

**NOTE:** When the CDX1 series unit is used in a horizontal application, the drain hose from the collector box will require a location change from its factory shipped connection. A knockout has been provided in the unit side casing for the drain hose to exit. The connection change can be accomplished as follows: Refer to Figure 16.

- Locate and disconnect the drain hose at the collector box from its factory shipped connection location.
  - Locate and uncap the drain at the bottom (as it is oriented) of the collector box.
  - Connect the drain hose from **step a** to the uncapped bottom drain from **step b**.
  - Cap the previous drain connection from **step a** with the existing cap removed in **step b**.
- Attach the drain hose (11/16" diameter clear tubing) from the front (CHX1) or bottom (CDX1) of the condensing coil cover plate to one side of the PVC tee provided in the trap assembly. Secure the drain hose (11/16" o.d. tubing) with the silver clamp provided in the parts package. Be careful to route the tubing through the proper hole in the furnace casing using the Heyco bushing provided. While making all connections with the clear tubing, be careful to route the tubing in a manner to prevent kinking or abrasion of the tubing.

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

4. Measure the drain hose (11/16" o.d. clear tubing) provided and remove any extra length, making sure that the hose has sufficient length not to kink or otherwise be restricted once installed. Attach the drain hose (11/16" o.d. clear tubing) to the other side of the condensate trap tee. On CHX1/CDX1's, this hose is shipped in the parts package and it will be necessary to attach the other end to the PVC drain tee assembly (see Figure 15). Use the silver clamp(s) provided in the parts package to secure all connections.
5. Install field supplied 1/2" CPVC drain pipe and elbows using CPVC cement to reach a nearby drain. A minimum 1/4" per foot downward slope toward the drain must be maintained. The drain line must be water tight, supported and secured so that it can't be moved. The length of the drain must be kept as short as possible.

**IMPORTANT:** If an air conditioning condensate drain line is combined with the furnace condensate drain line, it must have a separate trap ahead of the joint connection.

6. If a drain is not readily available or is above the trap outlet level on the furnace or the drain line cannot be sloped downward its full length to the drain, then a condensate pump (part #350225) can be ordered from the factory. Follow the pump manufacturers installation instructions.
7. The furnace condensate is slightly acidic with a pH of 3.5. Cola drinks with a pH of 3.1 are actually more acidic. If local codes require a neutralizing kit, the kit may be ordered using part no. 320095. Instructions included with the neutralizing kit must be followed for its proper installation.
8. The condensate piping in the furnace and the drain system must be flushed out at the start of every heating season. This will assure trouble free operation and will keep the acidity level well above 3.4 pH.

To flush the condensate drain system, turn off power to the furnace at the electrical disconnect switch and turn the thermostat to the lowest setting.

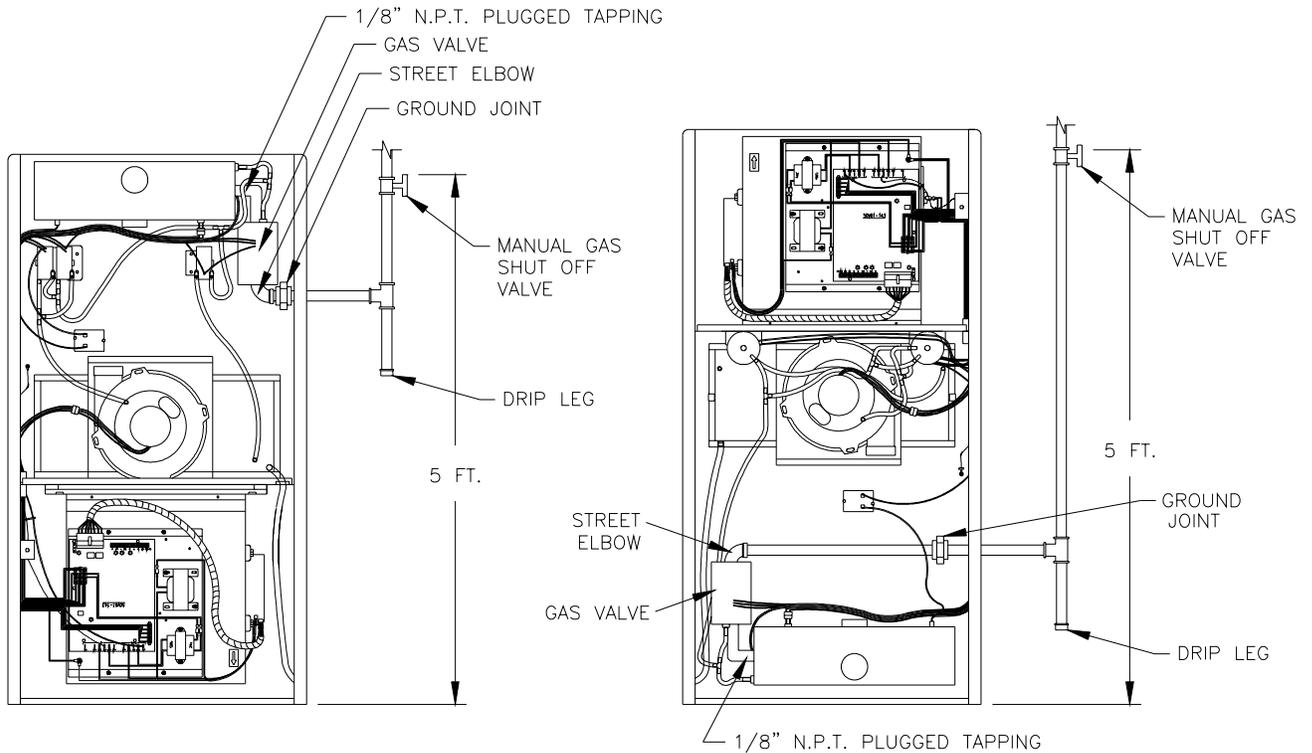
Remove the 11/16" diameter clear tubing from the coil drain nipple and run tap water into the open end of the tubing. This should keep the drain system clean. Replace the tubing by pushing it firmly onto the nipple. Make sure the spring clamp is returned to the original position to prevent leaks. If any of the electrical controls are exposed to water, dry with a soft cloth and wait 24 hours before operating the furnace. Set the room thermostat to the desired temperature and restore electrical power to the furnace.

## J. GENERAL GAS PIPING

**⚠WARNING:** *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.*

1. Left and right gas supply piping - These furnaces are set-up to be gas piped through either the left or right side by using a street elbow and a straight pipe. For the purposes of service, it is recommended that the gas union be located inside the furnace, when possible.

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



**Figure 18**

2. A drip leg must be used on both LP and natural gas installations prior to the furnace in order to trap oil, condensate and other impurities which might otherwise lodge in the gas valve or plug the burner orifice. A drip leg shall be provided at the outlet of the gas meter when there is excessive condensation between the gas meter and the furnace. Failure to install a drip leg may void the limited warranty on the furnace.

**⚠WARNING:** All gas piping must be leak tested using a soap and water solution (when the gas is turned on) following the procedure outlined in Section III, J, of this manual. A final test for gas leakage must be made after purging the gas line (refer to Section IV, B, 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 primary ignition module may damage its circuitry and cause a hazardous situation. Dry moisture from all leads and terminals if wetting occurs. Wait at least 24 hours for the circuit to fully dry before energizing the burner circuit.

## K. FILTERS

### 1. CHX1 MODELS: HIGHBOYS

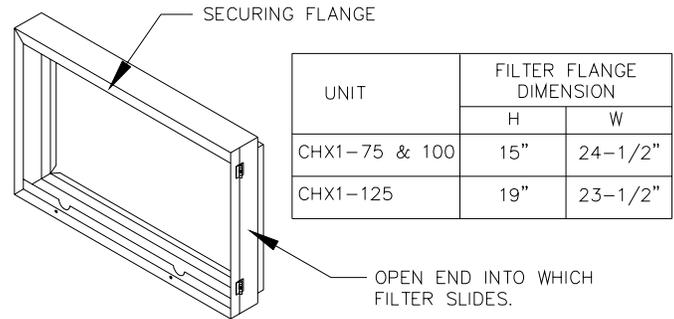
It is necessary to cut the return air opening in the bottom or side casing depending upon the needs of the specific installation.

**NOTICE:** If your CHX1 will require air delivery above 1800 CFM, it is advisable that both sides, a combination of 1 side and the bottom, or the bottom only be used for return air. (If a return is cut in the bottom, it should be as large as the return opening in the equivalent CDX1 model. (See specification sheet in beginning of this manual).

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

This CHX1 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 CHX1-75 thru 100 and AOPS7375 for CHX1-125) is available which is sized for the filter provided.

If an optional Thermo Pride filter rack AOPS7547 (figure 19) is used with the furnace, it will serve as a template to scribe a mark for the return air opening on the casing. Place the filter rack on the casing one inch up from the bottom of the furnace and centered from side to side. Place the securing flange against the casing for locating the return air opening.



**Figure 19**

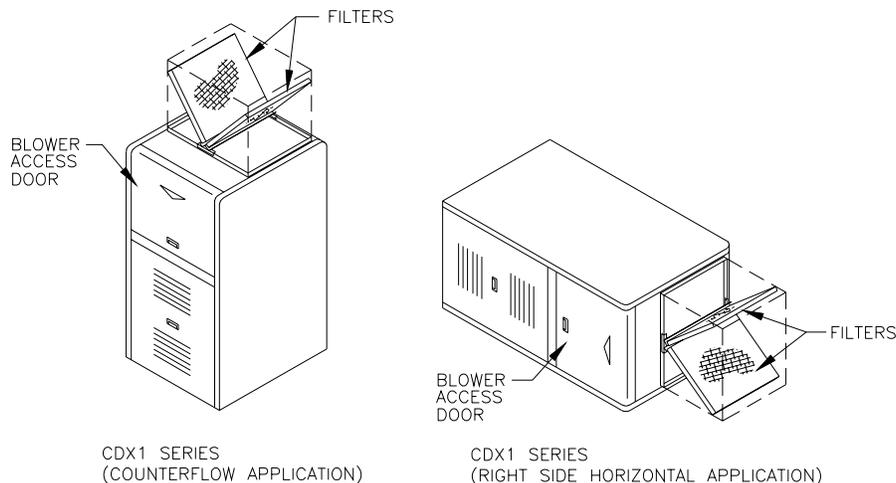
**PLEASE NOTE:** While scribing the return air opening, the filter rack can be held into position by tape or similar means.

Position the open end of the filter rack so that it is accessible for filter replacement. Once the filter rack is positioned correctly, scribe a line along the inside of the securing flange of the filter rack on three of the sides. To scribe a line on the fourth side, on the open end, use the open end support for a guide. Remove the filter rack and cut the return air opening in the casing. Now the filter rack can be permanently attached 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.

**2. CDX1 MODELS: COUNTERFLOWS**

This CDX1 furnace has been factory supplied with two high quality reusable filters rated at 600 ft/min. These filters are designed to be mounted on the return air plenum opening on the top of the furnace in the double "vee" style rack provided (see Figure 20). If feasible, it is recommended that slits be cut in the return front to allow for easier access of the filters.



**Figure 20**

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

**3. USE OF NON-THERMO PRIDE FILTER RETENTION MEANS**

If a method other than the Thermo Pride filter rack is selected for retention of the filter and/or use of a different filter type is desired, see Table 3 for minimum size guidelines for selecting a filter system for the CHX1 or CDX1 furnaces.

**MINIMUM FILTER AREA REQUIRED (LENGTH X WIDTH, SQ. IN.)  
TABLE 3**

FILTER TYPE	MAXIMUM RATE AIR VELOCITY	Required CFM / (Filter Velocity Rating x 144) = min. filter (in <sup>2</sup> )		
		FURNACE MODEL		
		CHX1,CDX1-75	CHX1,CDX1-100	CHX1,CDX1-125
*THERMO PRODUCTS SUPPLIED PERMANENT FILTER	600 FT./MIN.	254 IN. <sup>2</sup>	328 IN. <sup>2</sup>	402 IN. <sup>2</sup>
STANDARD PERMANENT FILTER	500 FT./MIN.	304 IN. <sup>2</sup>	394 IN. <sup>2</sup>	484 IN. <sup>2</sup>
DISPOSABLE TYPE FILTER	300 FT./MIN.	506 IN. <sup>2</sup>	656 IN. <sup>2</sup>	804 IN. <sup>2</sup>

\* 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: Any internal stiffeners used in the filter must not be removed, although they can be cut to size as needed.

**NOTICE:** The filter areas in table 3 are the **minimum** areas required based on the CFM 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 3 and the larger of the two should then be used for determining the minimum filter area required for that installation.

FORMULA:

$$\frac{(\text{tons of cooling}) \times (400 \text{ CFM per ton}) (144 \text{ square inches per foot})}{(\text{max. air velocity of filter from table 3 for the filter type})} = \text{filter area sq.inches}$$

= length x width of filter in inches

EXAMPLE: If you had a CHX1-100 furnace and 4 tons of cooling and a standard permanent filter.

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

For heating a CHX1-100 needs 394 square inches of filter. The filter system must be designed for the larger CFM 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.

**L. WIRING**

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).

1. The following items are guidelines to complete the wiring portion of the installations.

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

- a. A separate power supply circuit with over current protection and a disconnect switch must be provided. The minimum fuse or circuit breaker size is 20 amp.
- b. All CHX1 and CDX1 Series furnaces are supplied with a fuse disconnect switch box to be mounted on the outside surface of the right or left side casing so a fuse disconnect can be mounted on the furnace. Make the 115 volt supply connection in this junction box. A green screw and a strain relief are provided in order to connect the power supply ground wire and provide strain relief for the 115 volt power leads from the furnace in the fuse disconnect box. 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 pass through the disconnect switch in all cases to prevent the hazard of electrical shock when servicing.

**IMPORTANT:** The furnace must be grounded in accordance with local codes and with the National Electrical Code (ANSI/NFPA NO. 70 or latest edition) when an external electrical source is utilized.

## 2. ELECTRONIC AIR CLEANER (EAC) AND HUMIDIFIER INSTALLATION

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 (110-20VAC) for the control of these accessories. (See Figure 21). **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 instructions.

## 3. THERMOSTAT CONNECTIONS AND ANTICIPATOR SETTING

**NOTICE:** For two-stage thermostat wire connectors see wire diagram page 44. For single-stage thermostat with two-stage operation connect W from thermostat to W1 on control. W2 on control board is not used. Thermostat shunt on control board (Fig. 21) will need to be moved to single t'stat. In this configuration the furnace will light and burn on low fire for 10 minutes (5 minutes optional). If thermostat has not been satisfied in 10 minutes the control will step up to high fire until thermostat is satisfied. If the 5 minutes option is desired turn dip switch S1-3 (Fig. 21) off.

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.

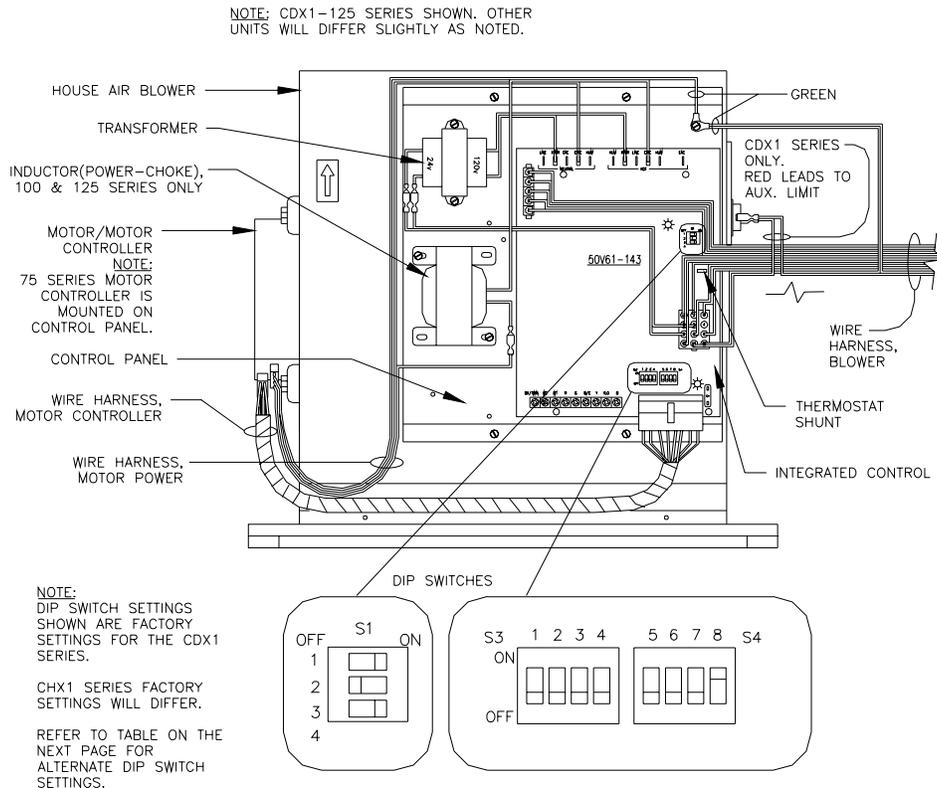
The proper thermostat heat anticipator setting is 0.4 AMPS for furnace operation only. To increase length of cycle, increase setting of heat scale; to decrease length of cycle, decrease setting of heat scale.

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

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.**

**4. BLOWER AND CONTROL PANEL WIRING**



**Figure 21**

**⚠WARNING: TURN OFF THE ELECTRICAL POWER to the furnace before attempting to disconnect blower wiring.**

DIP SWITCH (S1):  
HEAT "OFF" DELAY

SW1	SW2	SECS.
ON	ON	60 SEC.
OFF	ON	90 SEC.
*ON	OFF	120 SEC.
OFF	OFF	180 SEC.
2 <sup>ND</sup> STAGE DELAY FOR SINGLE STAGE THERMOSTATS		
SW3	MINUTES	
OFF	5 MIN.	
*ON	10 MIN.	

\*Factory Setting

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

Modifications to ECM blower speed settings are done using the S3 and S4 dip switch controls. (Labeled 1 to 8 in Figure 21). Thermo Pride two-stage furnaces are factory shipped at the CFM settings listed below in Table 4.

**2-Stage Blower Settings (from factory)**

**Table 4**

<b>Unit</b>	<b>Control Board Dip Switch Settings</b>	<b>Heating CFM (low fire)</b>	<b>Heating CFM (high fire)</b>	<b>Constant Fan CFM</b>	<b>Cooling CFM</b>
<b>CDX1-75</b>	1-7 Off 8 On	885	1012	500	1000
<b>CHX1-75</b>	1-8 Off	760	931	500	1000
<b>CDX1-100</b>	1-7 Off 8 On	1094	1340	600	1200
<b>CHX1-100</b>	1-8 Off	1015	1243	600	1200
<b>CDX1-125</b>	1-7 Off 8 On	1366	1673	700	1400
<b>CHX1-125</b>	1-8 Off	1270	1556	700	1400

For adjustments to the Cooling CFM settings, as well as all additional CFM changes, please reference the dip switch tables listed in the ECM operation manual. (Included with every furnace.)

**5. FIELD WIRING AND REPLACING WIRING**

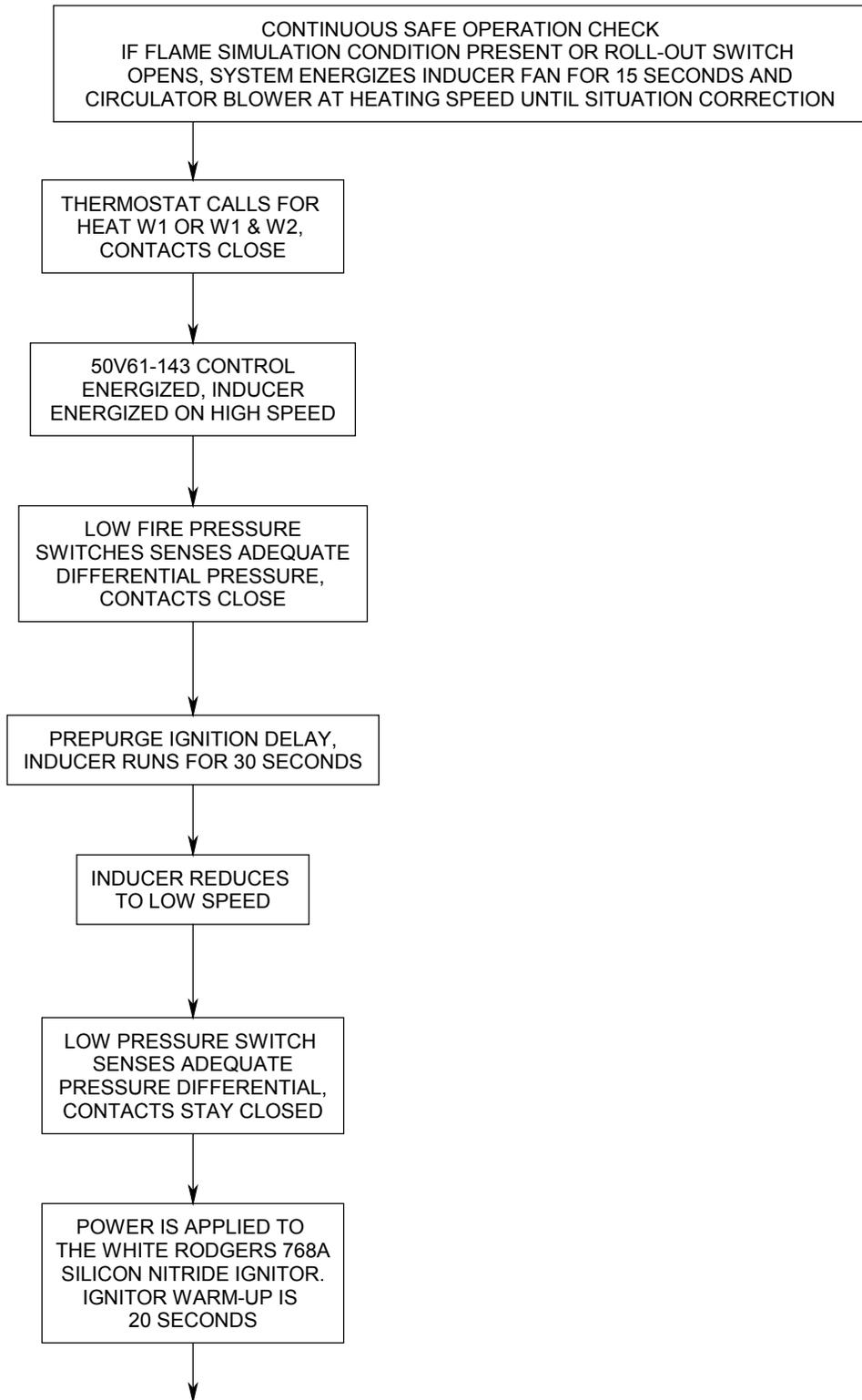
Field wiring between the furnace and devices not attached to the furnace shall conform with the temperature limitation for Type T wire[63°F rise (35°C)] when installed in accordance with the manufacturer's instructions. If any of the original factory supplied furnace wiring is replaced or a separate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

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

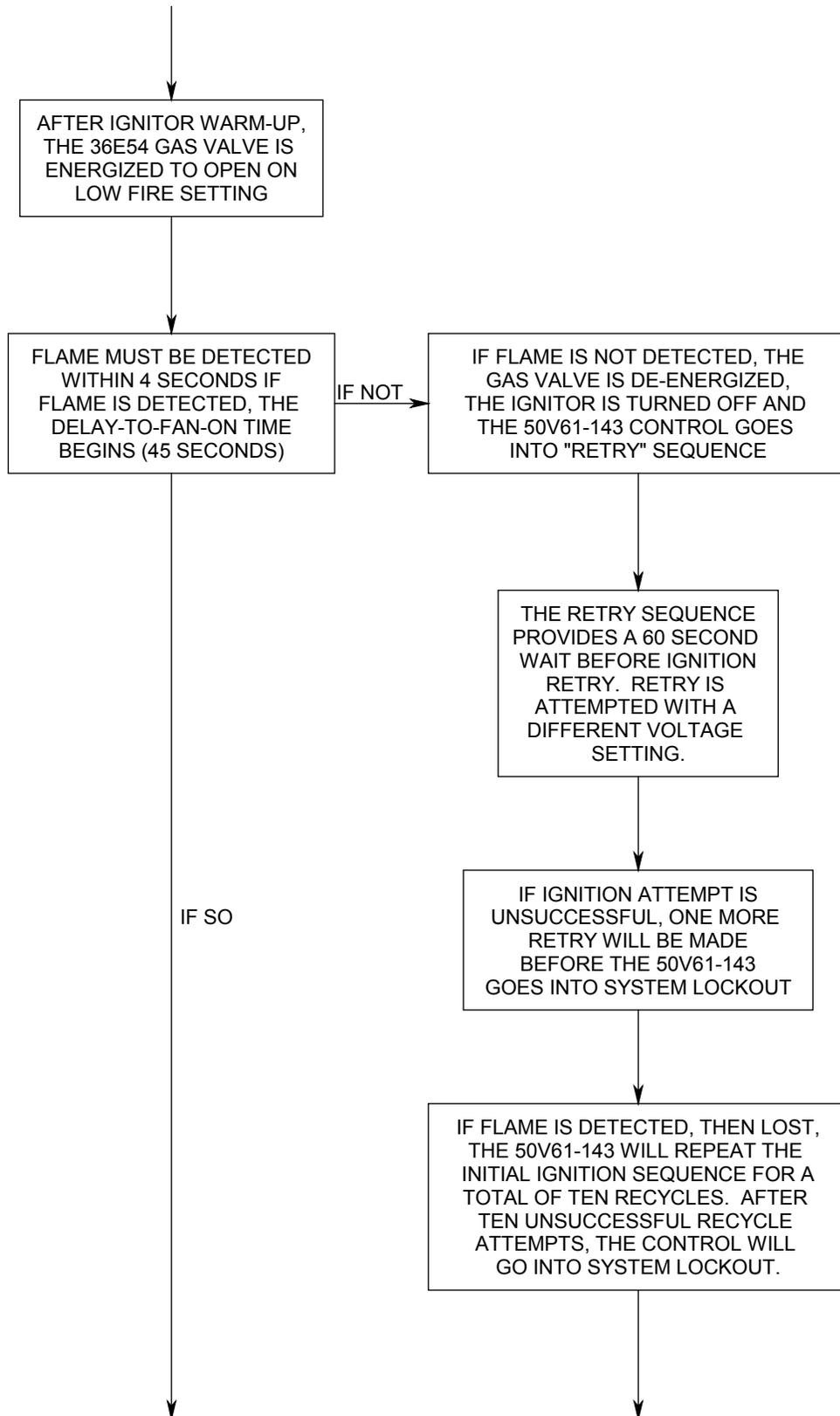
IV. STARTING THE UNIT

A. SEQUENCE OF OPERATIONS

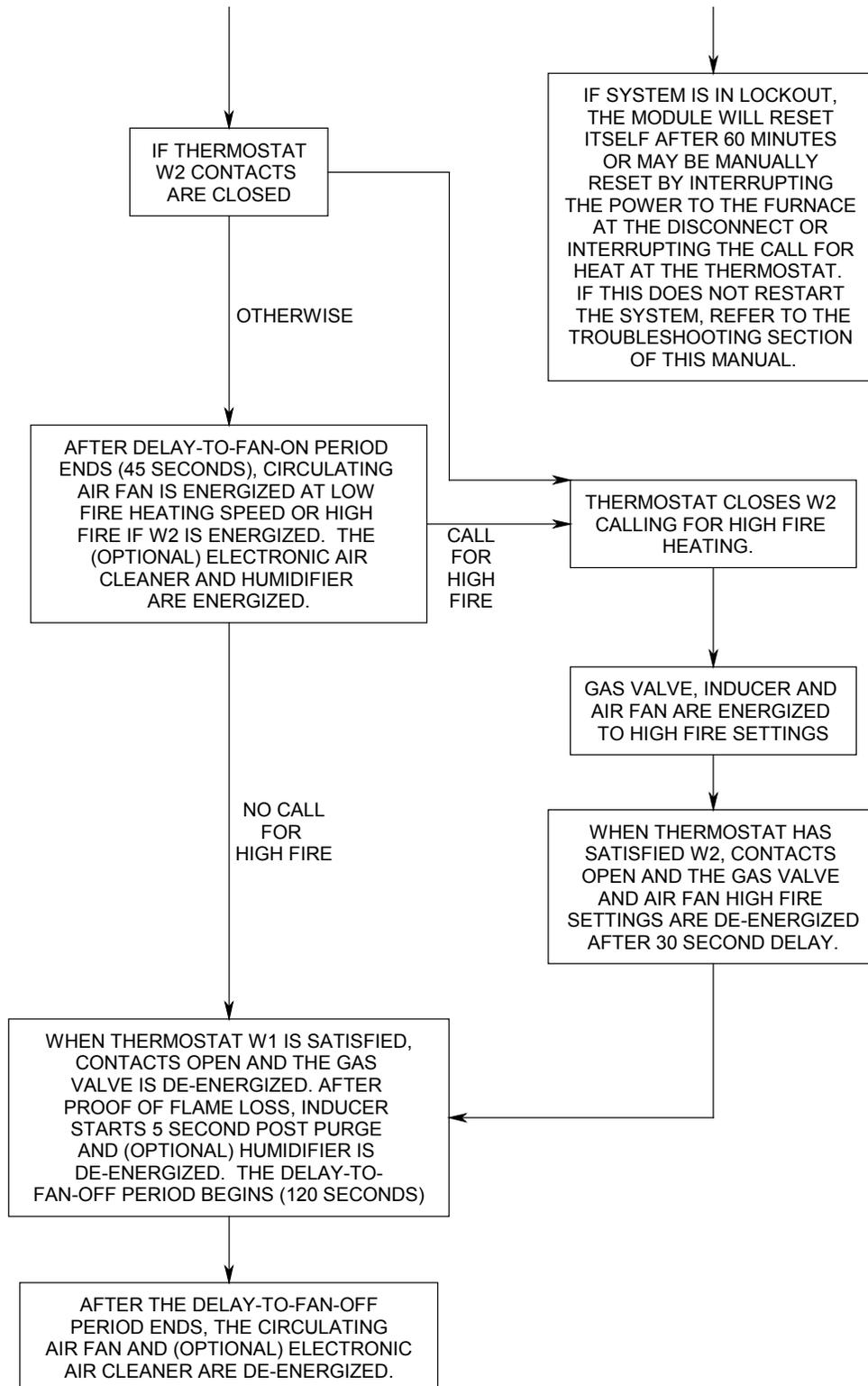
AT ANY TIME THE  
GAS VALVE IS  
NOT ENERGIZED



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.**

### **B. INITIAL START UP:**

This furnace does not have a pilot. It is equipped with a hot surface igniter, which automatically lights the burner. Do not attempt to light the burner by hand. Check the following items before the initial start-up.

1. Check all wiring for loose connections and proper hook up.
2. Leak test gas piping connections.
3. Check all tubing to the pressure switch and drains to make sure they are connected firmly at all their connection points.
4. Check flue pipe, combustion air inlet and all PVC connections for tightness and to make sure there is no blockage.
5. Make sure air filter is in place.
6. Make sure the outside vent and air intakes are installed according to instructions and that they are free from blockage.
7. Make sure that the drain trap is properly connected to the furnace and to the buildings drain system.

### **OPERATING INSTRUCTIONS:**

**⚠WARNING:** *Turn off power to furnace before it is placed into service. The gas piping system must have been leak tested by a qualified heating contractor. (See Section III, J, of these instructions on the installation of gas piping).*

**⚠WARNING:** *It may be necessary to purge the air out of the gas line for initial start-up of the furnace after installation. This should be done by a qualified heating contractor. If excessive gas escapes when purging the gas supply at the union, allow the area to ventilate for at least 15 minutes before attempting to start the furnace. LP gas is especially dangerous because the specific gravity of LP gas allows it to accumulate at floor level at a dangerous concentration. For remainder of operating instructions, reference Users Information Manual.*

**⚠WARNING:** *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 that:*

1. *A window(s) be opened.*
2. *The thermostat be set at highest setting.*
3. *The furnace remain running at conditions 1&2 for 30 minutes or until odor has dissipated.*

Check for the model number of this furnace, its input, the type of gas and the manifold pressure on the information plate located on the vestibule panel behind the upper front panel. If using the above example, the furnace was a CHX1-100 model and the 98,663 BTU input would be acceptable because it was within 2% of the listed high fire input of 100,000.

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

## Measuring And Adjusting Heat Input Rate

# CAUTION

**DO NOT** exceed input rating stamped on furnace nameplate or manufacturer's recommended burner manifold pressure for orifice size used.

Observe the following precautions when measuring:

### A. Burner manifold pressure with a pressure gauge.

1. Close the gas valve (turn the gas control knob to the OFF position) **BEFORE** removing the:
  - a. burner manifold pressure tap plug to connect the manometer (or calibrated pressure gauge)
  - b. manometer, or gauge, and replacing the pressure tap plug.
2. Shut off the gas supply at the appliance service (manual gas shutoff) valve (or for LP gases, shut off the gas at the storage tank service valve) **BEFORE** removing the:
  - a. gas valve inlet pressure tap plug
  - b. manometer, or gauge and replacing the inlet pressure tap plug.
3. Perform a gas leakage test at the gas valve inlet and burner manifold pressure tap plugs.

### B. Gas flowrate by clocking gas meter.

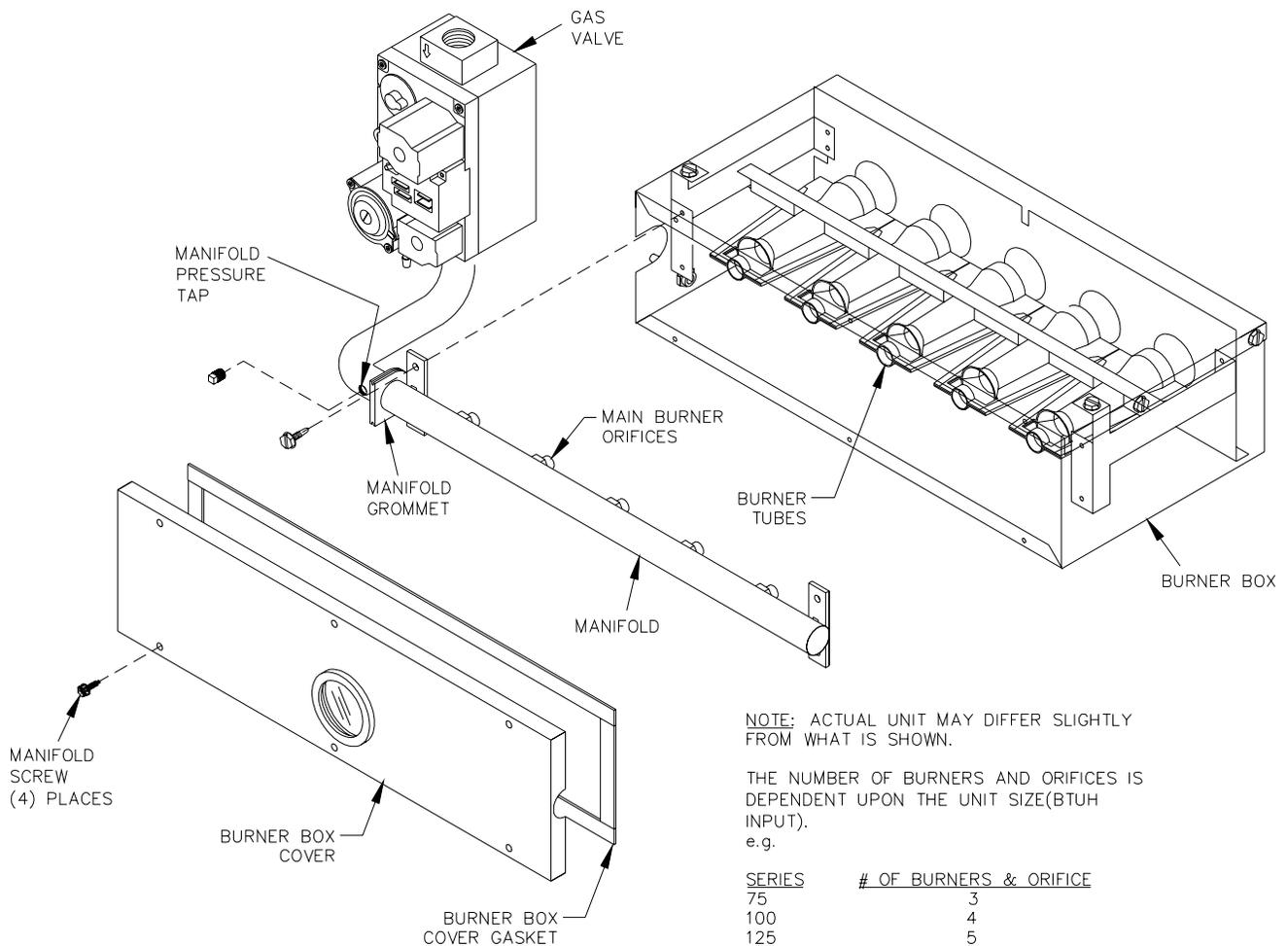
1. To determine the amount of flow, through the gas meter, due to the operation of the furnace.
  - a. Turn off all other appliances and extinguish their pilot flames, if equipped, or
  - b. Deduct the gas consumption of all other operating appliances from the total meter reading.
2. Convert the gas flowrate to the heat input rate (in BTUH) as described in step 10 (in the following section) and compare the value to the heat input rating on the furnace nameplate.

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

**NOTICE: A U-tube manometer**, measuring pressure in inches of water column, **is recommended** for all gas pressure measurements. However, **an aneroid pressure gauge**, in good working condition, capable of reading pressure changes of 0.05 in. W.G., or less, that was **recently calibrated** (within the last year), **is a satisfactory alternate**. These two (2) devices will be considered as equivalent and interchangeable. Either device is referred to below as a “pressure gauge”

**NOTICE: This 2-stage gas valve has two separate gas pressure regulators.** Checks and adjustments must be made at both high fire (high adjustment) and low fire (low adjustment).

1. **Shut off the gas** at the automatic gas control valve (turn gas control knob to the OFF position).
2. Remove the outlet pressure tap plug from gas burner manifold and connect a pressure gauge. Refer to Figure 22, below.



**Figure 22: Exploded View of CDX/CHX Gas Control System**

3. Turn on the gas at the automatic gas control valve (turn gas control knob to the ON position).
4. Adjust the room thermostat so the furnace will **operate on low fire only**.

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

5. To obtain an accurate manifold gas pressure reading, the main burner must be cycled on and off several times to stabilize the gas control valve pressure regulator diaphragm.
6. Allow the burner to **operate for at least 3 minutes** before taking gas pressure readings.
7. Using a pressure gauge, measure the burner manifold gas pressure.
8. If checking the **input rate by measuring burner manifold pressure, skip to step 12.** If measuring the **input rate using a gas meter, proceed to step 9.**
9. Using a clock (or watch) capable of measuring time in seconds, carefully clock the gas meter to determine the time for one (1) complete revolution of the gas meter dial or reel. At least one (1) cubic foot of gas flow should be measured. Use Table 6 to determine the main burner gas flow rate in cubic feet per hour (CFH).

**NOTICE:** Some gas meters will require more than one (1) cubic foot of gas pass through the meter for reasons of accuracy. When more than one (1) cubic foot of gas is consumed, divide the total time by the number of cubic feet for comparison to the figures in Table 6.

10. Compare actual heat input rate with our recommended input (printed on the furnace rating label). To convert the rating label input rate (given in BTUH) to the equivalent gas flowrate (in CFH), use the following formula:

*Heat input rate (in BTUH) =*

$$Fuel\ gas\ higher\ heating\ value\left(in\ \frac{BTU}{ft^3}\right) \times Fuel\ gas\ flowrate\ (in\ CFH)$$

or,

$$Fuel\ gas\ flowrate\ (in\ CFH) = \frac{Heat\ input\ rate\ (in\ BTUH)}{Fuel\ gas\ higher\ heating\ value\left(in\ \frac{BTU}{ft^3}\right)}$$

11. If the measured input rate is above, or below, the rating label value by more than 2%, adjust the manifold gas pressure using the gas control valve pressure regulator to obtain the input rating within a  $\pm 2\%$  range. Refer to steps 12(a) through 12(d).
12. **If the gas pressure is not within the specified low fire manifold pressure range (refer to Table 5),** use the following procedure to adjust the low fire, gas pressure regulator to match the specified low fire manifold pressure.
  - a. Remove the gas pressure regulator adjustment cap screw from the automatic gas control valve. The cap screw is located on the outlet side of the valve. Refer to Figure 23.

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

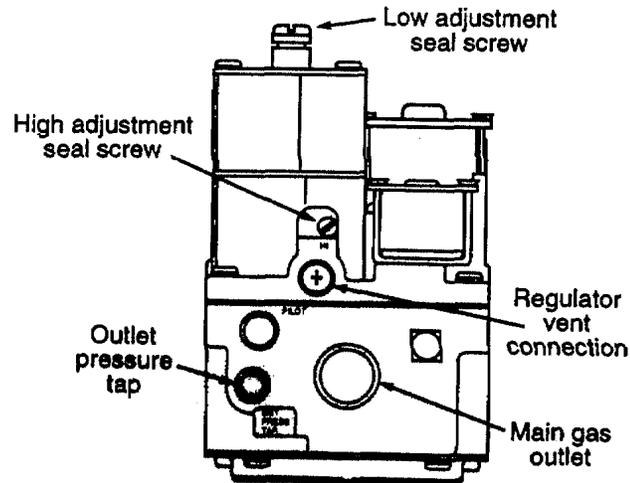


Figure 23: Outlet view of two-stage, automatic gas control valve

- b. Using a 3/32-in. hex key (or Allen wrench), turn the inner adjustment screw clockwise to increase, or counterclockwise to decrease, the gas pressure (and gas flow) to the main burner.
- c. Replace the cap screw and tighten it firmly to prevent gas leakage.
- d. Referring to Table 5, measure the gas pressure and to confirm it has been adjusted to within the allowable range. Repeat adjustments (a) through (c), as required.

Table 5 Design Gas Pressures for each Furnace Model Series, Operating Mode, and Type of Fuel.

Fuel Gas Type	Propane			Natural		
	High Fire	CHX Low Fire	CDX Low Fire	High Fire	CHX Low Fire	CDX Low Fire
Normal Manifold Pressure (in. W.G.)	10.0 ± 0.3	4.8 ± 0.3	5.6 ± 0.3	3.5 ± 0.3	1.8 ± 0.3	2.0 ± 0.3
Maximum Gas Supply Pressure (in. W.G.)	14.0			14.0		
Minimum Gas Supply Pressure (in. W.G.)	11.0			4.5		

13. Adjust the room thermostat so the burner will **operate on high fire only**.

**NOTICE: There is a 30 second delay before the gas control will step up to high fire.**

14. To obtain an accurate manifold gas pressure reading, the main burner must be cycled on and off several times to stabilize the gas control valve pressure regulator diaphragm.
15. Allow the burner to **operate for at least 3 minutes** before taking gas pressure readings.
16. Using a pressure gauge, measure the burner manifold gas pressure.

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

17. If checking the **input rate by measuring burner manifold pressure, proceed to step 18.** If measuring the **input rate by clocking the gas meter, repeat steps 9 through 11, above.**
18. **If the gas pressure is not within the specified high fire manifold pressure range (refer to Table 5),** repeat steps 12(a) through 12(d), above, adjusting the high fire gas pressure regulator.

If the manifold pressure remains low and it cannot be adjusted into the proper range, **the supply pressure may be too low.** Follow these steps.

- a. **Turn off the gas** at the manual gas shutoff valve.
- b. Remove the automatic gas control valve inlet pressure tap and attach another pressure gauge to the inlet tap.
- c. Turn on the gas and repeat steps 14 and 15, above.
- d. Adjust the upstream (inlet) gas pressure to 14.0 in. W.G., or as close as possible.
- e. Using a pressure gauge, measure and adjust the burner manifold gas pressure.

If it is still not possible increase the manifold gas pressure to within the required range, there is too little gas supply to operate the furnace at full (high fire) input rate under present conditions. If necessary, consult your gas supplier or qualified heating contractor for recommendations to alleviate the problem.

19. **Turn off the gas** at the manual gas shutoff valve (turn handle to the OFF position).
20. Remove all pressure gauges and replace all pressure tap plugs.
21. Go to **Checkout Procedure** below.

### Adjusting Burner Input For Altitudes Above 2000 Feet

Ratings of gas utilization equipment are based on sea level operation and **shall not be changed for operation at elevations up to 2,000 feet (600 m.).** For operation at elevations above 2,000 feet (600 m), equipment ratings shall be reduced at the rate of 4 percent for each 1,000 feet (300 m) above sea level.

For additional information, refer to the latest edition of the National Fuel Gas Code.

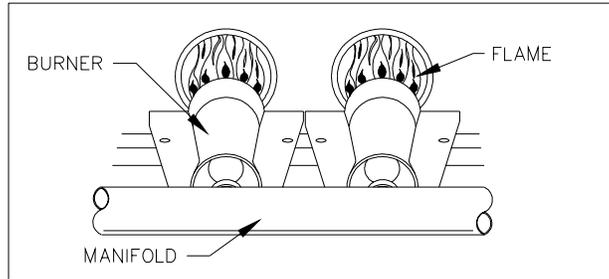
### Checking The Burner Flame

**⚠ CAUTION:** The furnace model series CDX1 and CHX1 are sealed combustion designs that do **not** require an air shutter adjustment (air shutters are not used) for proper flame characteristics. The burner box access cover must always be secured with all screws in place and tightened before operating furnace.

Once the input rate has been confirmed correct for a specific application, the burner flames should be checked for proper adjustment.

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

This furnace is designed **not** to require any burner adjustment. Burner aeration is fixed in this design. Burner flames can be seen by looking through the sight glass located on the burner box. Burner flames should be well-defined, light to medium blue in color, and almost transparent. (refer to Figure 24).



**Figure 24: Sketch of Typical Main Burner Flames During Operation**

**NOTICE:** When operating on propane gas, it is not unusual for flames to have yellow or orange colored tips.

If combustion problems are evident, it may indicate problems with either the furnace air supply or the vent system. Refer to the installation and maintenance sections of this manual, or contact Thermo Products at (574) 896-2133.

**Checkout Procedure**

1. Confirm the furnace exhaust vent and combustion air intake are constructed as outlined in the installation and service manual. They must not be blocked or otherwise obstructed.
2. Place system in operation and observe at least one (1) complete cycle to ensure all controls are operating properly. **The main burner must light reliably under all conditions.**
3. Perform gas leakage test on all gas pipe connections and pressure tap plugs.

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

TIME (sec.)	FLOW (cfh)
40	90
41	88
42	86
44	82
45	80
46	78
47	77
48	75
49	73
50	72
51	71
52	69
53	68
54	67
55	65
56	64
57	63
58	62
59	61
60	60
62	58
64	56
66	54
68	53
70	51
72	50
74	49
76	47
78	46
80	45
84	43
88	41
92	39
96	38
100	36
105	34
110	33
115	31
120	30
125	29
130	28
135	27
140	26
150	24
160	23
170	21
180	20

**TABLE 6 - CONVERTING GAS FLOW RATE**

- \* For one cubic foot per revolution gas meter dials, use Table directly.
- \* For 1/2 cubic foot per revolution gas meter dials:
  1. Determine time for two dial revolutions
  2. Use Table directly
- \* For two cubic foot per revolution gas meter dials:
  1. Determine time for one complete dial revolutions
  2. Divide time by two
  3. Use Table directly

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

### **C. FURNACE 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 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:

With furnace in normal heating operation, check to make certain blower will start and stop automatically under control of integrated fan control.

1. Check safety limit control as follows:
  - a. Shut off incoming power.
  - b. Disconnect blower motor leads.
  - c. Restore power to furnace.
  - d. Set thermostat above room temperature calling for heat.
  - e. When temperatures are reached in furnace at limit control setting with blower out of operation, burner should shut off.
  - f. Shut off electrical power.

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

2. Make certain thermostat will automatically start and stop furnace.
3. Block the flue pipe gradually with a flat piece of metal, until the pressure switch functions shutting off the main burners. Note: If the burner was initially operating in high fire, the burner will first reduce rate to the low fire setting. As the flue becomes more blocked, the pressure switch will function and completely shut off the main burners.
4. Block the PVC pipe inlet gradually with a flat piece of metal until pressure switch functions shutting off the main burners. Note: If the burner was initially operating in high fire, the burner will first reduce rate to the low fire setting. As the flue becomes more blocked, the pressure switch will function and completely shut off the main burners.

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

5. Remove the blower compartment access door with the furnace operating. The door interrupt switch is in the 120 volt circuit and will shut down the entire system. Replace the blower door and the furnace start-up cycle will begin.

### **V. INSTALLER'S INSTRUCTIONS TO USER:**

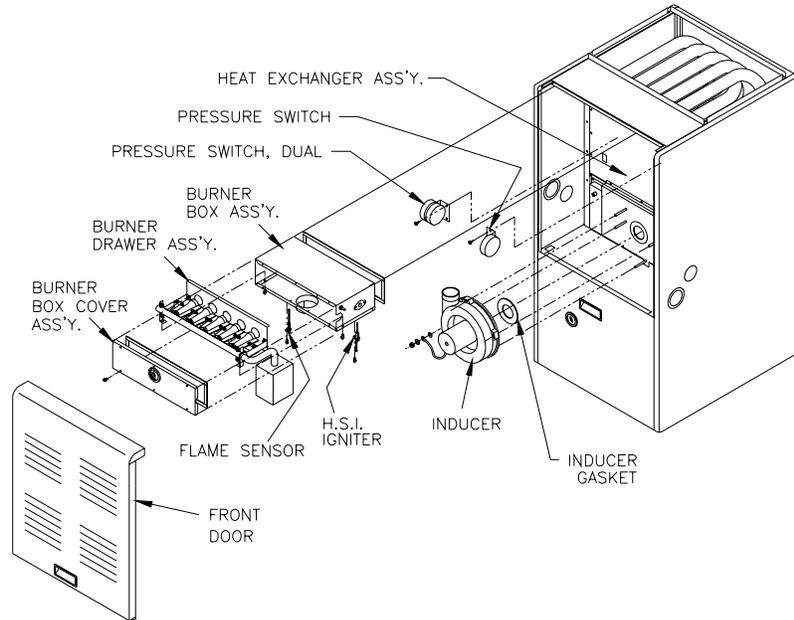
After completing the installation, the installer shall inform and/or demonstrate to the homeowner:

1. The location of all the 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.

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

5. That failure to maintain and operate this furnace in accordance with these instructions could result in hazardous conditions, bodily injury, property damage and may void the limited warranty on the furnace.
6. Review with and encourage the user to read the label reproductions and all warnings and instructions outlined on the front cover and in sections I, II and III of this manual and in the Users Information Manual.
7. 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 reach item in Section III of the Users Manual.

**Figure 25**



**VI. 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 will activate a flashing light on the control in different sequences to help pinpoint the failure which has occurred.

**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 when turning off power or removing the blower door which is equipped with door interlock switch, which will reset the control. Should this occur, it will be necessary to restart the furnace and have the failure occur again.

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

## **DIAGNOSTIC FEATURES**

The 50V61 control used on this furnace continuously monitors its operation and the operation of the system.

If the sensed failure is in the system (external to the control), the red 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 (retries or recycles exceeded)
2 flashes, then pause	low pressure switch stuck closed
3 flashes, then pause	low pressure switch stuck open
4 flashes, then pause	open high temperature limit switch
5 flashes, then pause	not used
6 flashes, then pause	115 V AC power reversed
7 flashes, then pause	low flame sense signal
8 flashes, then pause	check igniter or improper ground
9 flashes, then pause	high pressure switch stuck open
Continuous flash	flame sensed with gas valve de-energized

The LED will also flash once at power-up.

A green LED indicator is also present to obtain an estimate of the air flowrate (in CFM) produced by the house air blower. This LED cycles regularly by providing a constant light, followed by a sequence of flashes. Each flash can be translated to programmed CFM by using the following:

1 flash per 100(programmed) CFM

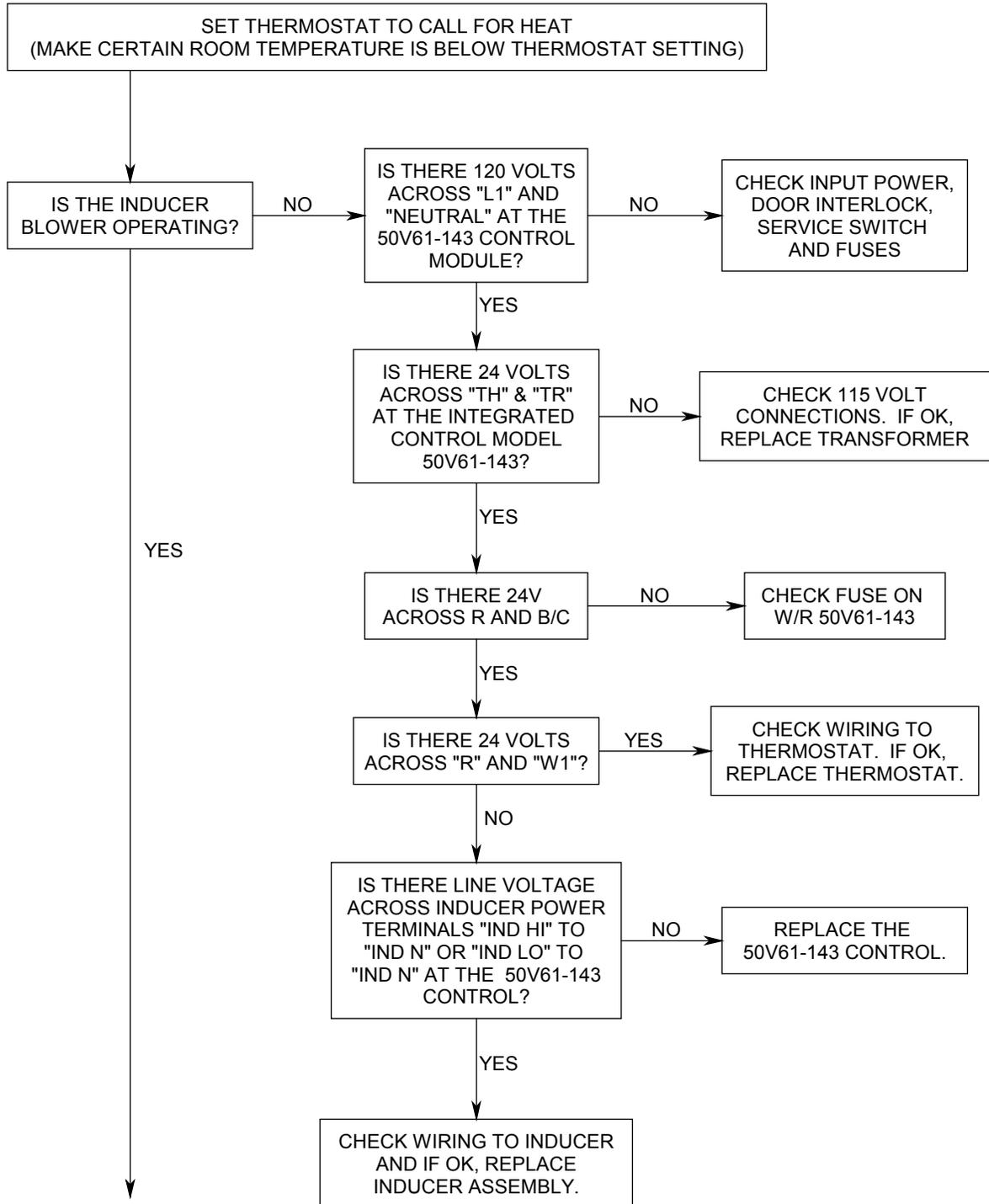
**⚠WARNING:** *Power must be disconnected before servicing.*

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

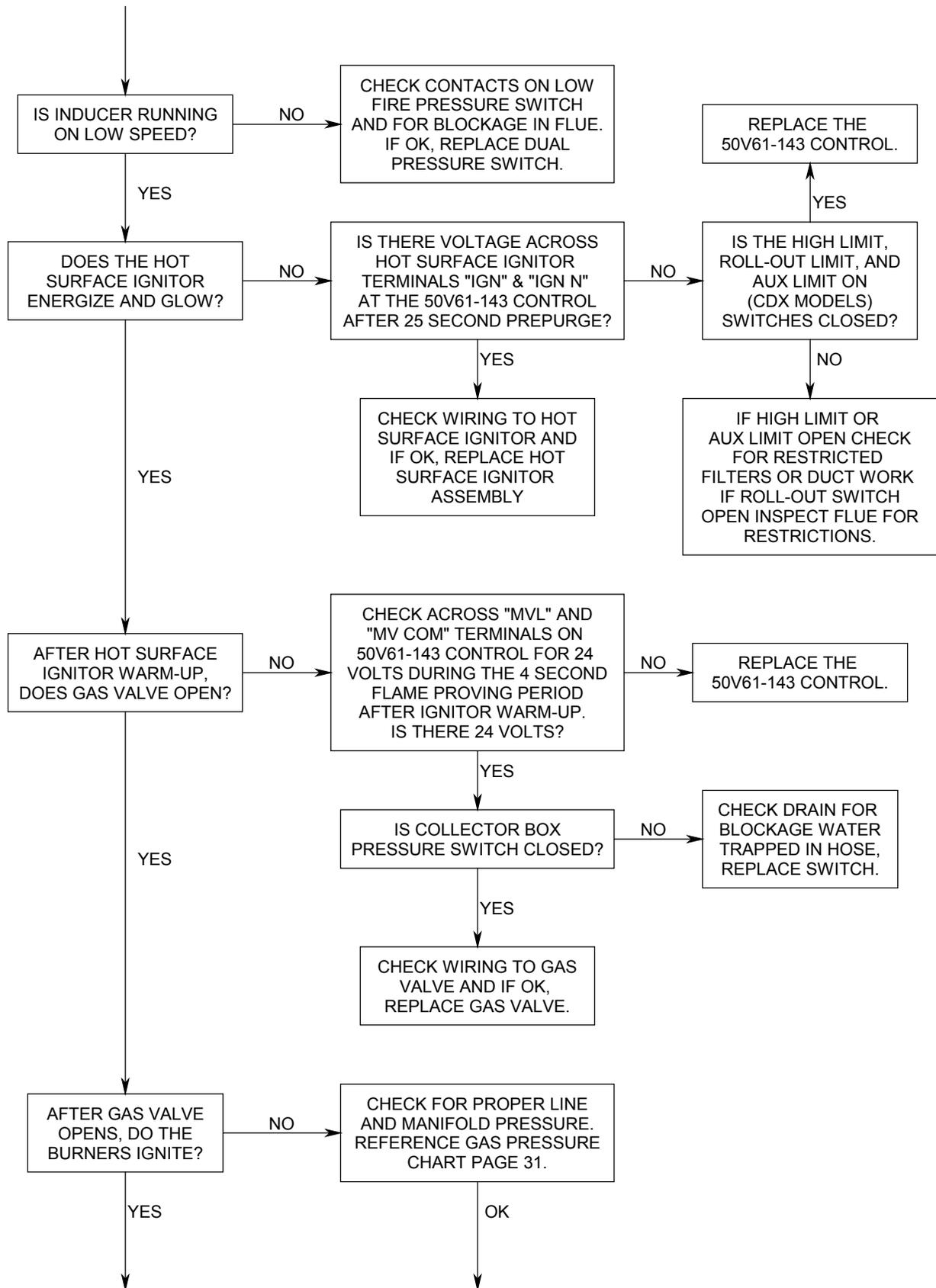
TROUBLESHOOTING GUIDE  
THE SYSTEM IS STARTED BY SETTING THE THERMOSTAT TO CALL FOR HEAT. THE FOLLOWING SHOULD HELP ESTABLISH THE TYPE OF MALFUNCTION OR DEVIATION FROM THE NORMAL OPERATION.

NOTE: IF LED LIGHT IS FLASHING, REFER TO PAGE 34 FOR A QUICK TROUBLESHOOTING GUIDE.

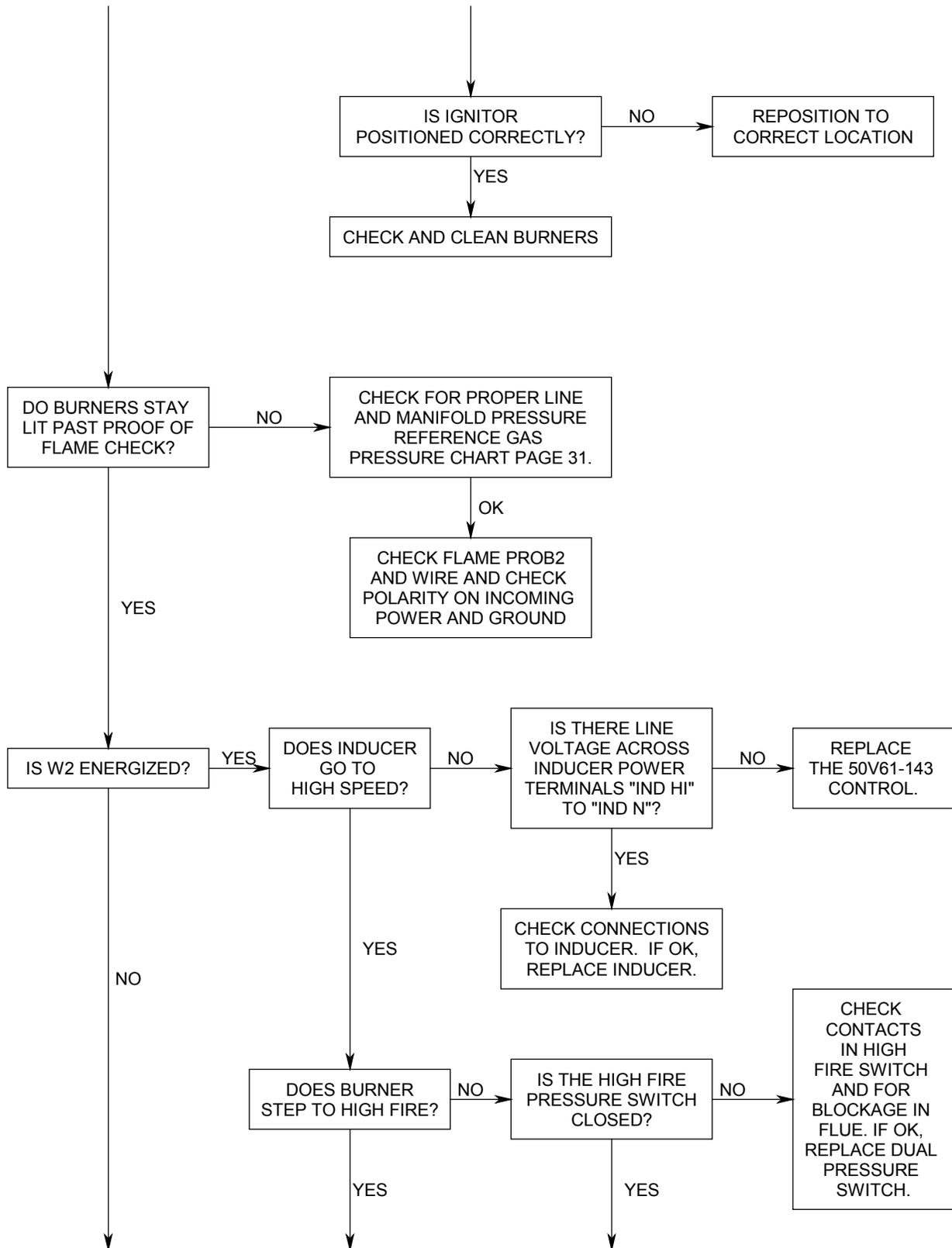
TO USE THIS DIAGRAM, YOU JUST NEED TO FOLLOW THE INSTRUCTIONS IN THE BOXES.



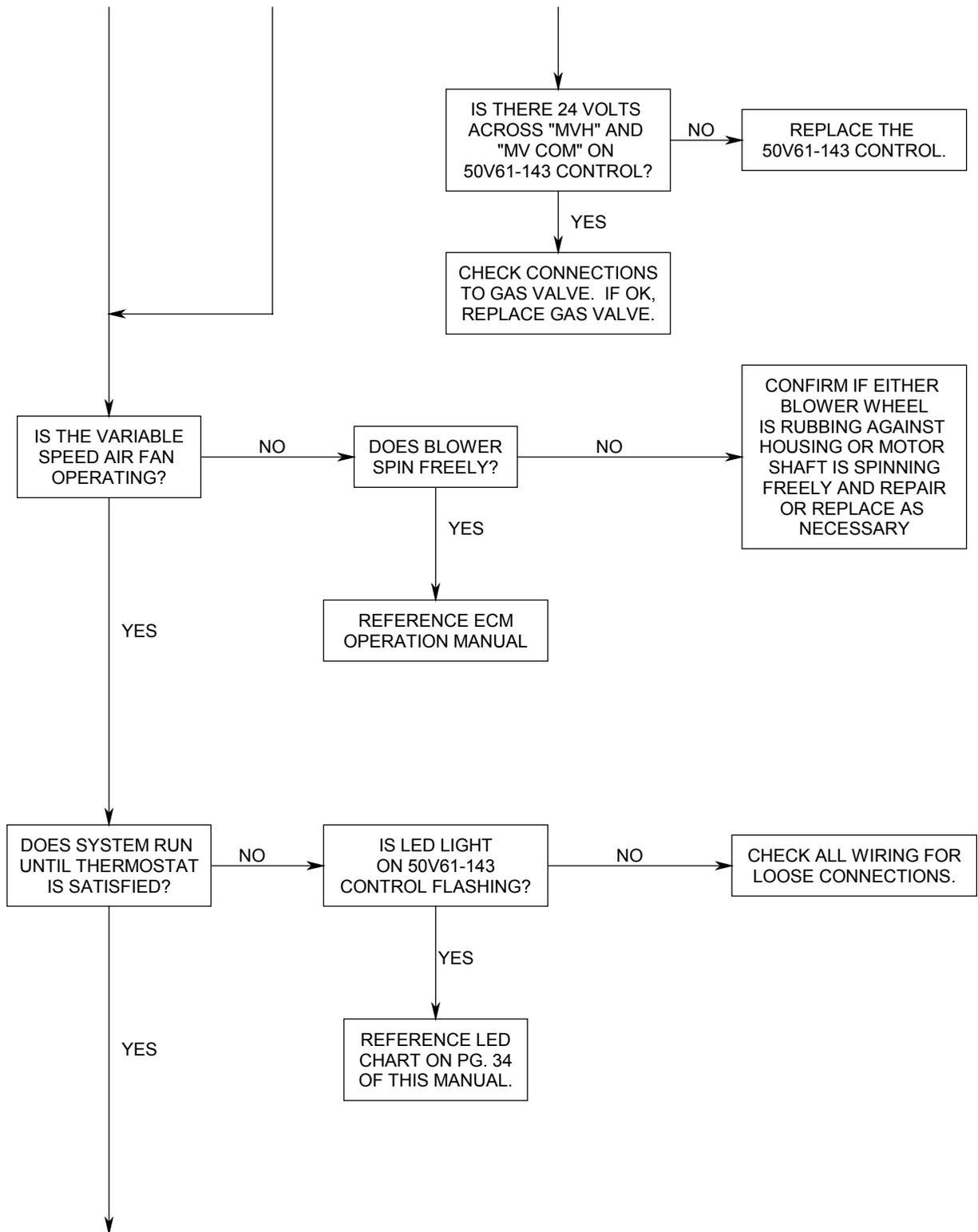
**All installations and services must be performed by qualified service personnel.**



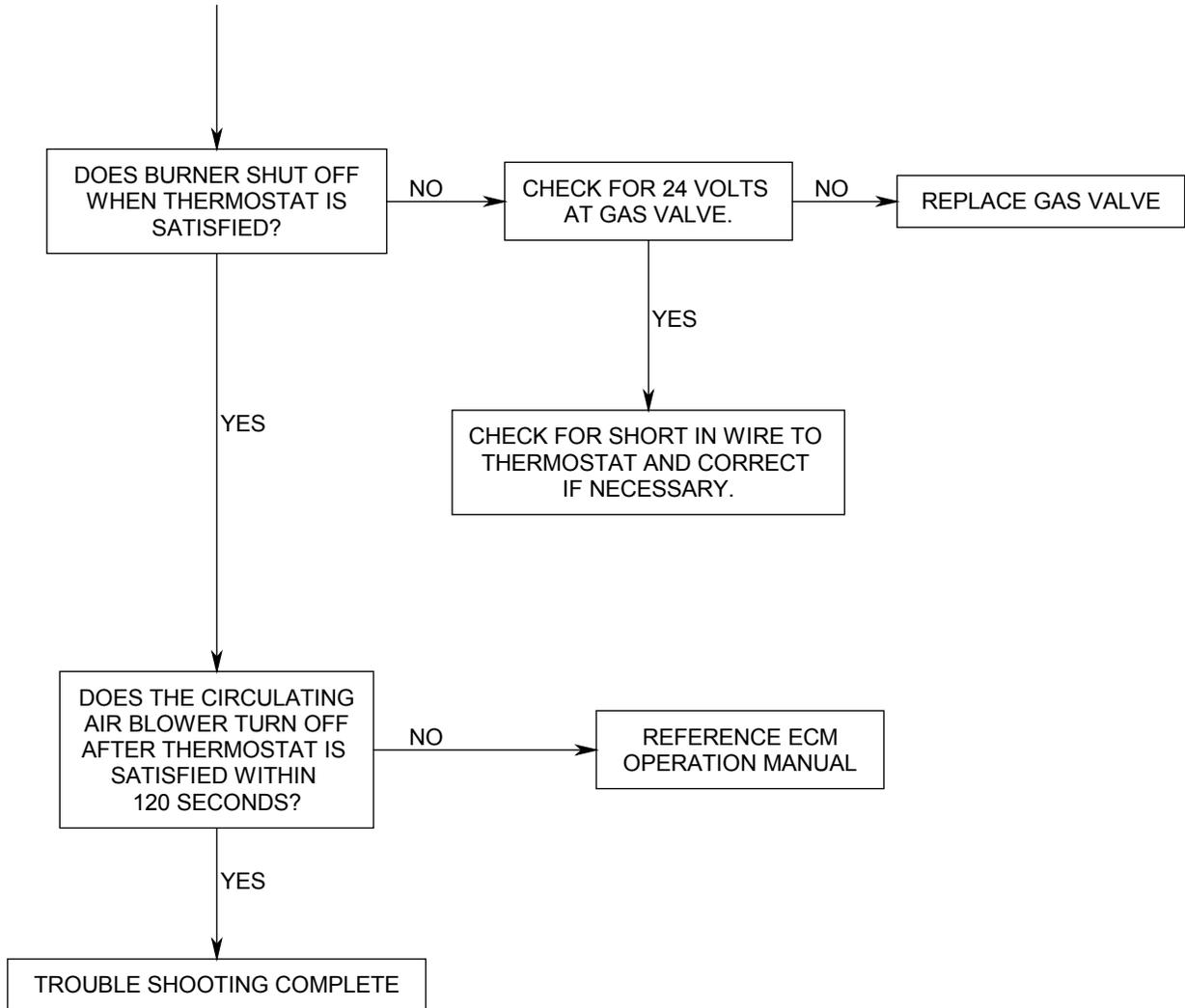
**All installations and services must be performed by qualified service personnel.**



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



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

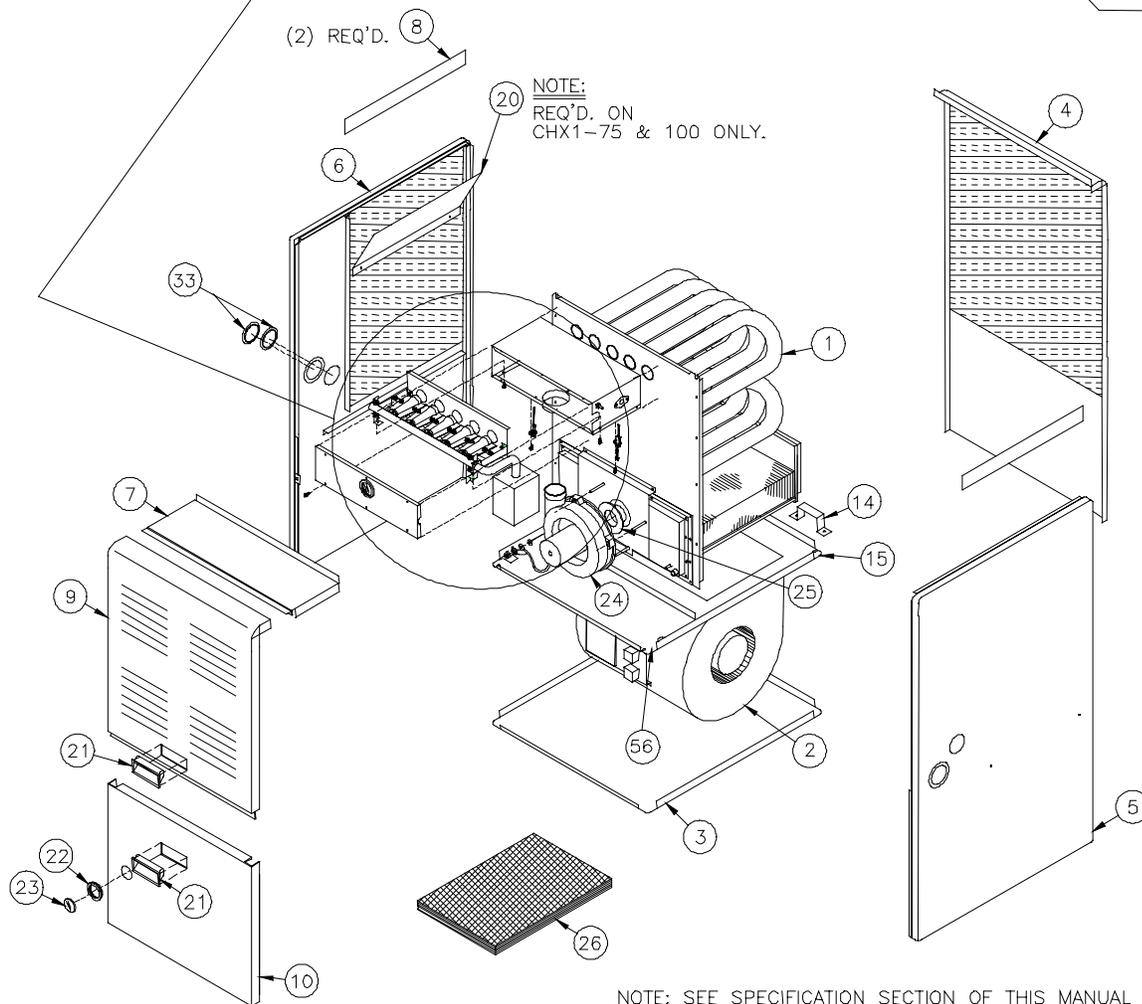
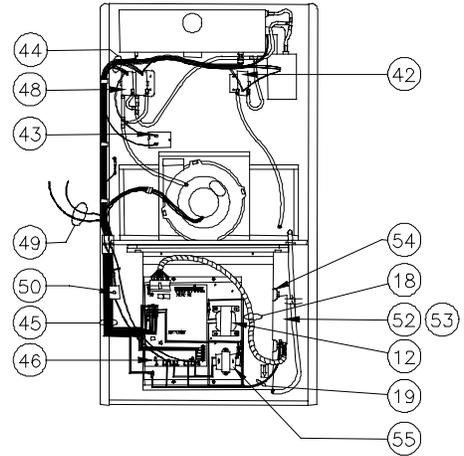
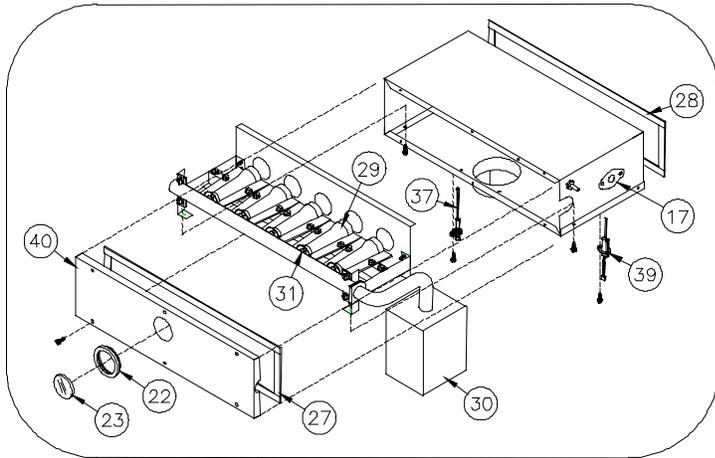


All installations and services must be performed by qualified service personnel.

Appendix –A Replacement Parts List

1. Replacement parts list for CHX1-75, CHX1-100 and CHX1-125.

CHX1-75N, CHX1-100N, & CHX1-125N REPLACEMENT PARTS



NOTE: SEE SPECIFICATION SECTION OF THIS MANUAL FOR PART NUMBERS RELATED TO PARTS PACKAGE COMPONENTS.

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

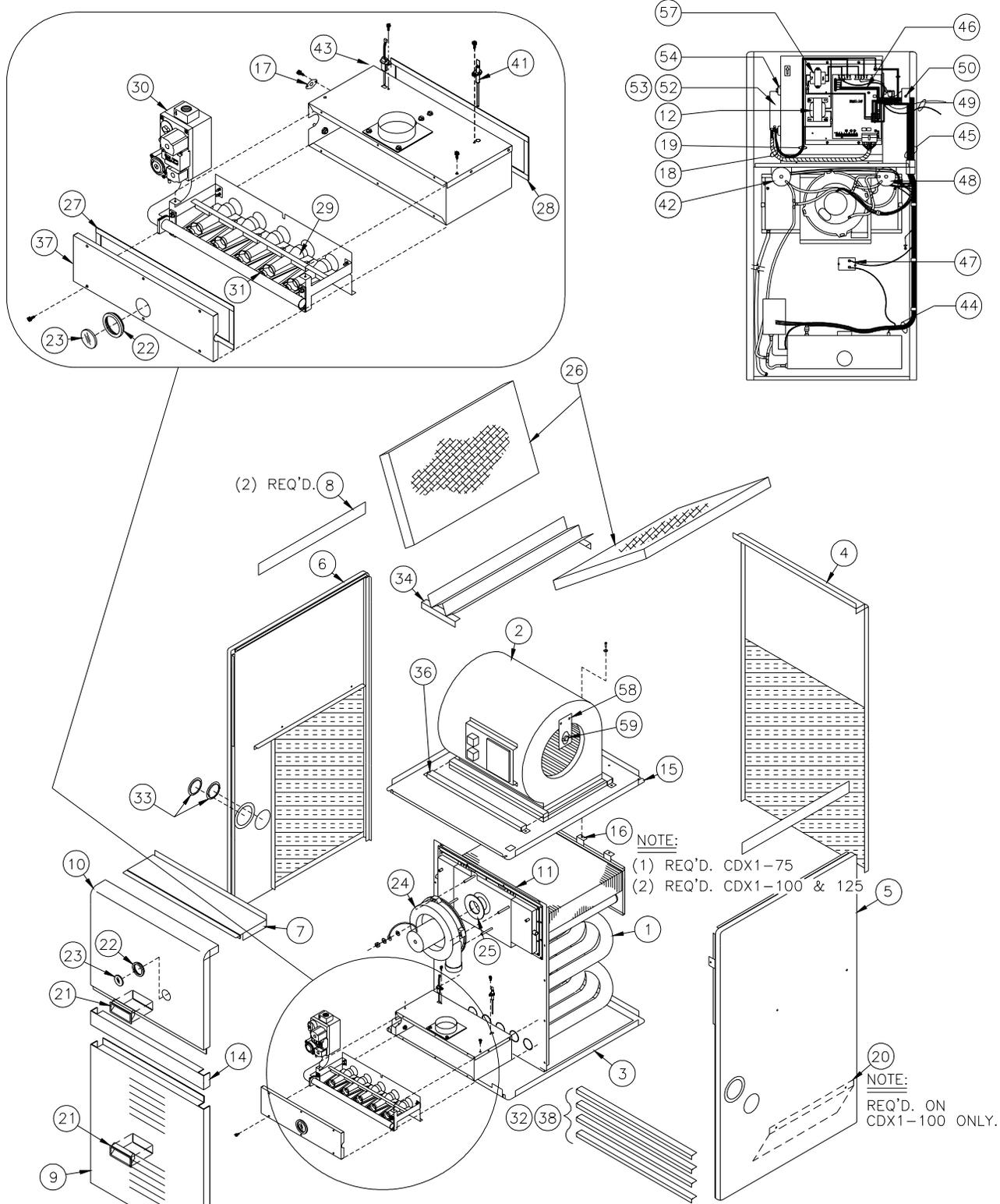
ITEM	UNITS	CHX1-75N		CHX1-100N		CHX1-125N	
		PART NO.	QTY.	PART NO.	QTY.	PART NO.	QTY.
1	HEAT EXCHANGER	38116	1	38128	1	38129	1
2	BLOWER ASSEMBLY	50054111	1	50054112	1	50054113	1
3	BASE	10926	1	10720	1	10721	1
4	CASING BACK	10925	1	10772	1	10773	1
5	SIDE CASING (RIGHT)	20105	1	20105	1	20105	1
6	SIDE CASING (LEFT)	20104	1	20104	1	20104	1
7	TOP CENTER PANEL	10929	1	10952	1	10953	1
8	PLENUM STRIPS	13382	2	13382	2	13382	2
9	FRONT DOOR	10933	1	10769	1	10770	1
10	BLOWER ACCESS DOOR	20927	1	20717	1	20718	1
11							
12	INDUCTOR (POWER CHOKE)	—		350855	1	350856	1
13							
14	HEAT EXCHANGER SUPPORT	12394	1	12394	1	12394	1
15	BLOWER PAN	28119	1	28176	1	28177	1
16							
17	LIMIT SWITCH (ROLLOUT)	350485	1	350485	1	350485	1
18	WIRE HARNESS, (MOTOR CONTROL)	350849	1	350849	1	350849	1
19	WIRE HARNESS, (MOTOR POWER)	350850	1	350850	1	350850	1
20	SIDE CASING (ANGLE) BAFFLE	14329	1	14329	1	—	
21	DOOR PULL	320157	2	320157	2	320157	2
22	SIGHT GLASS GASKET	330135	1	330135	1	330135	1
23	SIGHT GLASS	15887	1	15887	1	15887	1
24	INDUCER	340336	1	340336	1	340336	1
25	INDUCER GASKET	330148	1	330148	1	330148	1
26	FILTER	(16x25x1) 370023	1	(16x25x1) 370023	1	(20x25x1) 370051	1
27	SILICONE SPONGE GASKET (1/2 IN. WIDE)	330141	28.50"	330141	33.75"	330141	39.50"
28	SILICONE GASKET TAPE (1" WIDE)	330140	26.50"	330140	32.25"	330140	38"
29	BURNER TUBE	380595	3	380595	4	380595	5
30	GAS VALVE, NAT.	380659	1	380659	1	380659	1
31	ORIFICE	380600	3	380600	4	380600	5
32							
33	BUTTON PLUG	350046	2	350046	2	350046	2
34							
35							
36							
37	SENSOR	350759	1	350759	1	350759	1
38							
39	IGNITER	380650	1	380650	1	380650	1
40	COVER	15923	1	15924	1	15925	1
41							
42	PRESSURE SWITCH	350860	1	350860	1	350860	1
43	LIMIT SWITCH	350473	1	350473	1	350473	1
44	HARNESS (VESTIBULE)	350853	1	350853	1	350853	1
45	HARNESS (BLOWER COMPARTMENT)	350851	1	350851	1	350851	1
46	CONTROL, INTEGRATED FAN	350847	1	350847	1	350847	1
47							
48	PRESSURE SWITCH, DUAL	350861	1	350864	1	350861	1
49	HARNESS (SUPPLY)	350704	1	350704	1	350704	1
50	DOOR INTERLOCK SWITCH	350139	1	350139	1	350139	1
51							
52	MOTOR, PROGRAMMED REPLACEMENT KIT	AOPS7424	1	AOPS7425	1	AOPS7426	1
53	MOTOR MOUNTING BAND	350818	3	350818	3	350818	3
54	MOTOR MOUNTING LEG	350819	3	350819	3	350819	3
55	TRANSFORMER 24v	350464	1	350464	1	350464	1
56	HEYCO BUSHING (SR34-2)	350016	1	350016	1	350016	1
57	GROMMET GRO-7/8	350446	1	350446	1	350446	1
58	FILTER RACK KIT	AOPS7547	1	AOPS7547	1	AOPS7375	1
59	CONCENTRIC VENT KIT	370171	1	370171	1	370171	1
60	L.P. CONVERSION KIT	AOPS7419	1	AOPS7419	1	AOPS7419	1
61	SIDEWALL VENT KIT	370191	1	370191	1	370191	1

OPTIONAL ITEMS (NOT SHOWN)

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

**2. Replacement parts list for CDX1-75, CDX1-100 and CDX1-125.**

CDX1-75N, CDX1-100N, & CDX1-125N REPLACEMENT PARTS



(2) REQ'D. 8

NOTE:  
 (1) REQ'D. CDX1-75  
 (2) REQ'D. CDX1-100 & 125

NOTE:  
 REQ'D. ON  
 CDX1-100 ONLY.

NOTE: SEE SPECIFICATION SECTION OF THIS MANUAL FOR PART NUMBERS RELATED TO PARTS PACKAGE COMPONENTS.

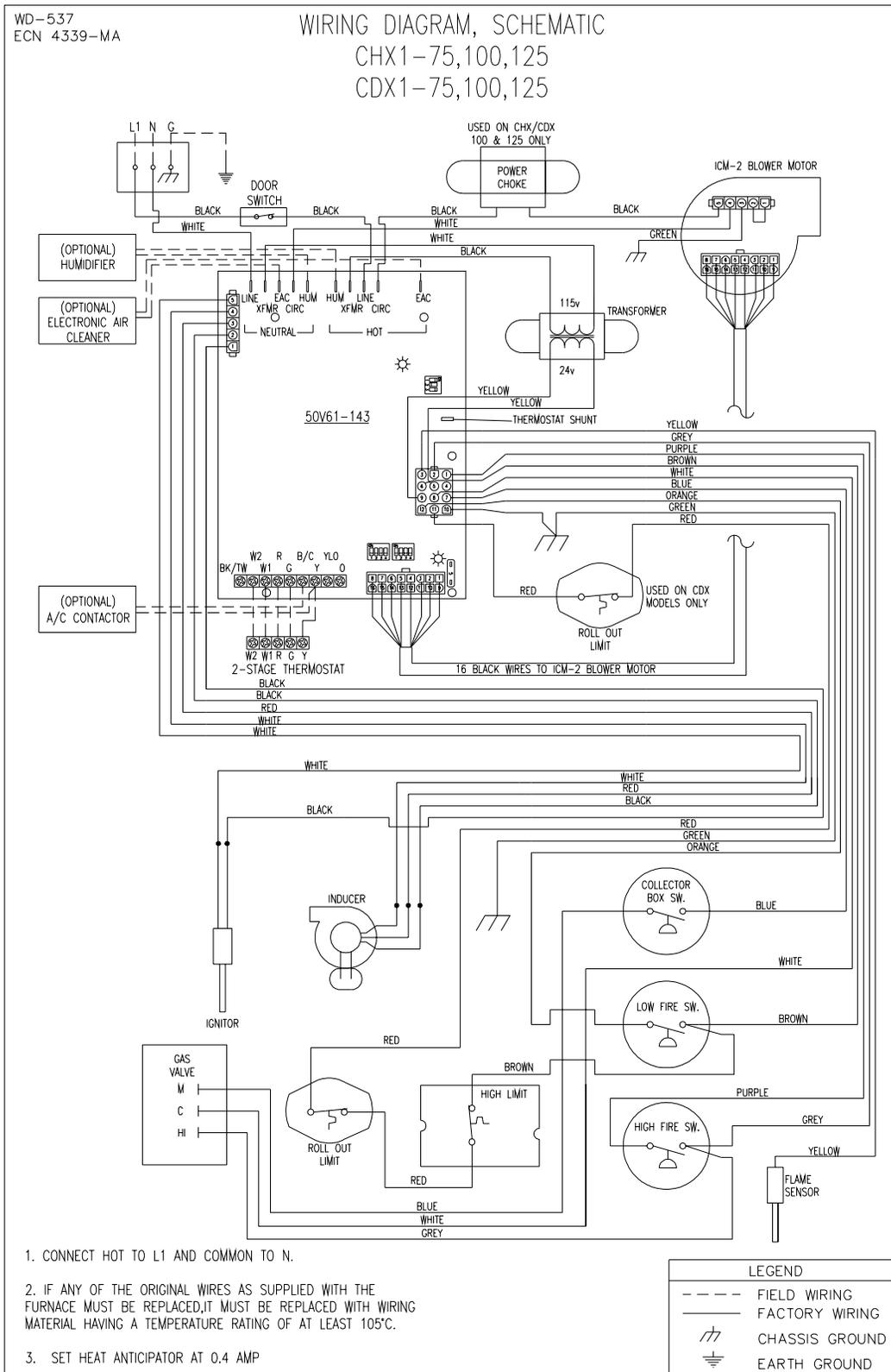
**All installations and services must be performed by qualified service personnel.**

ITEM	UNIT PARTS DESCRIPTION	CDX1-75N		CDX1-100N		CDX1-125N	
		PART NO.	QTY.	PART NO.	QTY.	PART NO.	QTY.
1	HEAT EXCHANGER	38118	1	38126	1	38127	1
2	BLOWER ASSEMBLY	SOOS4115	1	SOOS4116	1	SOOS4117	1
3	BASE	18121	1	10775	1	10776	1
4	CASING BACK	10931	1	10732	1	10733	1
5	SIDE CASING (RIGHT)	20107	1	20107	1	20107	1
6	SIDE CASING (LEFT)	20106	1	20106	1	20106	1
7	TOP CENTER PANEL	18124	1	10737	1	10738	1
8	PLENUM STRIPS	13403	2	13403	2	13403	2
9	FRONT DOOR	20932	1	20728	1	20730	1
10	BLOWER ACCESS DOOR	10930	1	10727	1	10729	1
11	TRIM PLATE (TOP)	18172	1	18174	1	18175	1
12	INDUCTOR (POWER CHOKE)	—		350855	1	350856	1
13							
14	FRONT CENTER PANEL	10928	1	10753	1	10754	1
15	BLOWER PAN	28120	1	28178	1	28179	1
16	COIL SUPPORT	22385	1	22385	2	22385	2
17	LIMIT SWITCH (ROLLOUT)	350485	1	350485	1	350485	1
18	WIRE HARNESS, (MOTOR CONTROL)	350849	1	350849	1	350849	1
19	WIRE HARNESS, (MOTOR POWER)	350850	1	350850	1	350850	1
20	SIDE CASING (ANGLE) BAFFLE	—		14329	1	—	
21	DOOR PULL	320157	2	320157	2	320157	2
22	SIGHT GLASS GASKET	330135	1	330135	1	330135	1
23	SIGHT GLASS	15887	1	15887	1	15887	1
24	INDUCER	340336	1	340336	1	340336	1
25	INDUCER GASKET	330148	1	330148	1	330148	1
26	FILTER	(14x22x1) 370052	2	(14x22x1) 370052	2	(14x22x1) 370052	2
27	SILICONE SPONGE GASKET (1/2 IN. WIDE)	330141	28.50"	330141	33.75"	330141	39.50"
28	SILICONE GASKET TAPE (1" WIDE)	330140	26.50"	330140	32.25"	330140	38"
29	BURNER TUBE	380595	3	380595	4	380595	5
30	GAS VALVE, NAT.	380659	1	380659	1	380659	1
31	ORIFICE	380600	3	380600	4	380600	5
32	PLENUM STRIP	18122	2	13412	4	13412	4
33	BUTTON PLUG	350046	2	350046	2	350046	2
34	FILTER RACK	24803	1	24803	1	24803	1
35							
36	BLOWER HOLD DOWN	14325	2	14326	2	14327	2
37	COVER	15923	1	15924	1	15925	1
38	PLENUM STRIP	18123	2	—		13413	2
39							
40							
41	SENSOR	350759	1	350759	1	350759	1
42	PRESSURE SWITCH	350860	1	350860	1	350860	1
43	IGNITER	380650	1	380650	1	380650	1
44	HARNESS (VESTIBULE)	350854	1	350854	1	350854	1
46	HARNESS (BLOWER COMPARTMENT)	350852	1	350852	1	350852	1
46	CONTROL, INTEGRATED FAN	350847	1	350847	1	350847	1
47	LIMIT SWITCH	350473	1	350473	1	350473	1
48	PRESSURE SWITCH, DUAL	350861	1	350864	1	350861	1
49	HARNESS (SUPPLY)	350705	1	350705	1	350705	1
50	DOOR INTERLOCK SWITCH	350139	1	350139	1	350139	1
51							
52	MOTOR, PROGRAMMED REPLACEMENT KIT	AOPS7424	1	AOPS7425	1	AOPS7426	1
53	MOTOR MOUNTING BAND	350818	3	350818	3	350818	3
54	MOTOR MOUNTING LEG	350819	3	350819	3	350819	3
55							
56							
57	TRANSFORMER 24v	350464	1	350464	1	350464	1
58	LIMIT BRACKET	14149	1	14149	1	14149	1
59	AUX. LIMIT SWITCH	350472	1	350472	1	350472	1
60	SIDEWALL VENT KIT	370191	1	370191	1	370191	1
61	CONCENTRIC VENT KIT	370171	1	370171	1	370171	1
62	L.P. CONVERSION KIT	AOPS7419	1	AOPS7419	1	AOPS7419	1

OPTIONAL ITEMS (NOT SHOWN)

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

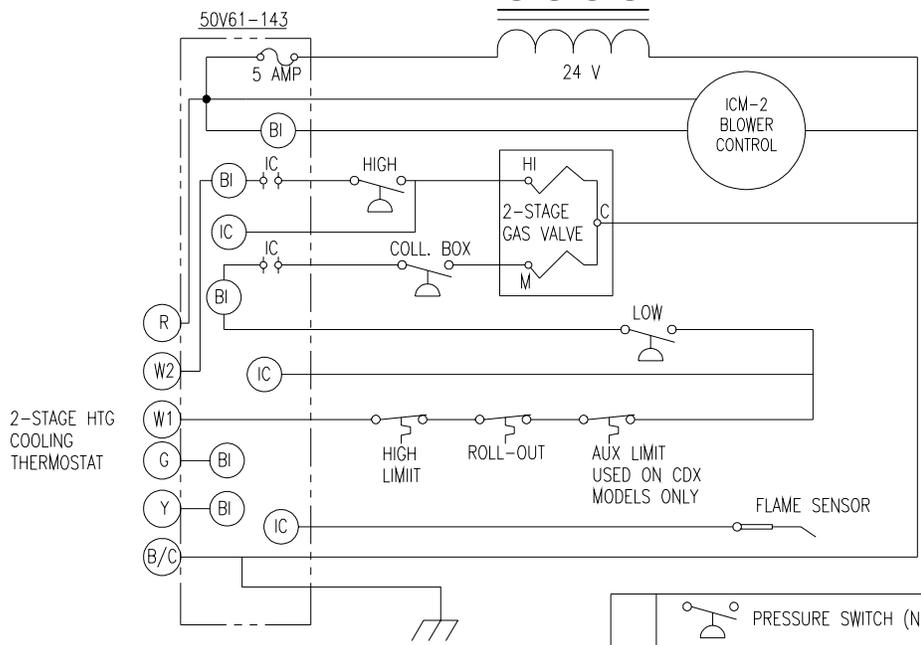
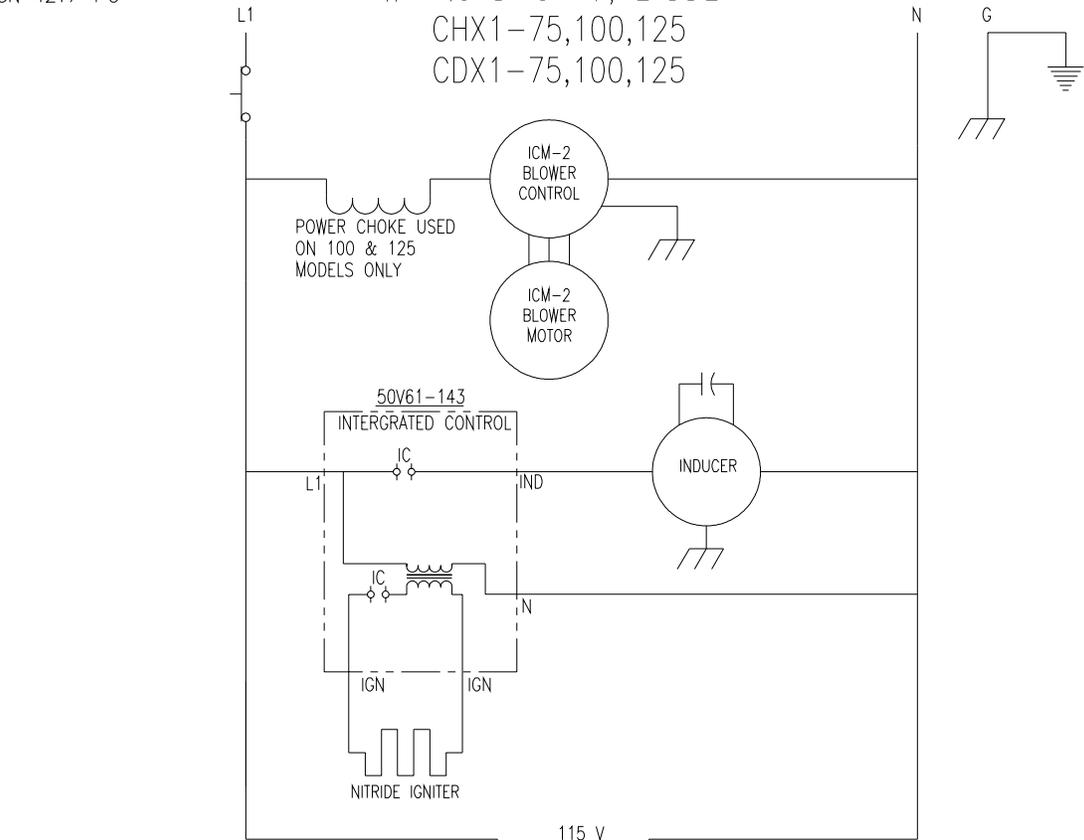
**Appendix – B Wiring Diagrams**



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

WD-538  
ECN 4217-PC

WIRING DIAGRAM, LADDER  
CHX1-75,100,125  
CDX1-75,100,125



1. CONNECT HOT TO L1 AND COMMON TO N.
2. IF ANY OF THE ORIGINAL WIRES AS SUPPLIED WITH THE FURNACE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMPERATURE RATING OF AT LEAST 105°C.
3. SET HEAT ANTICIPATOR AT 0.4 AMP

LEGEND	
	PRESSURE SWITCH (N.O.)
	TEMPERATURE SWITCH (OPEN ON TEMP. RISE)
	CHASSIS GROUND
	EARTH GROUND
BI	BLOWER INTERFACE (W/R 50V61-143)
IC	INTERGRATED CONTROL (W/R 50V61-143)