58VMR
Multipoise Oil Furnace
For Input Capacities of 70,000–154,000, Series 110

Carrier®
Turn to the Experts℠

Installation, Start–Up, and Operating Instructions

NOTE: Read the entire instruction manual before starting the installation.

TABLE OF CONTENTS

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Fig. 1 - 58VMR Multipoise Oil Furnace

SAFETY CONSIDERATIONS

Recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the furnace and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies a hazard which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

EFFICIENCY RATING CERTIFIED Gama

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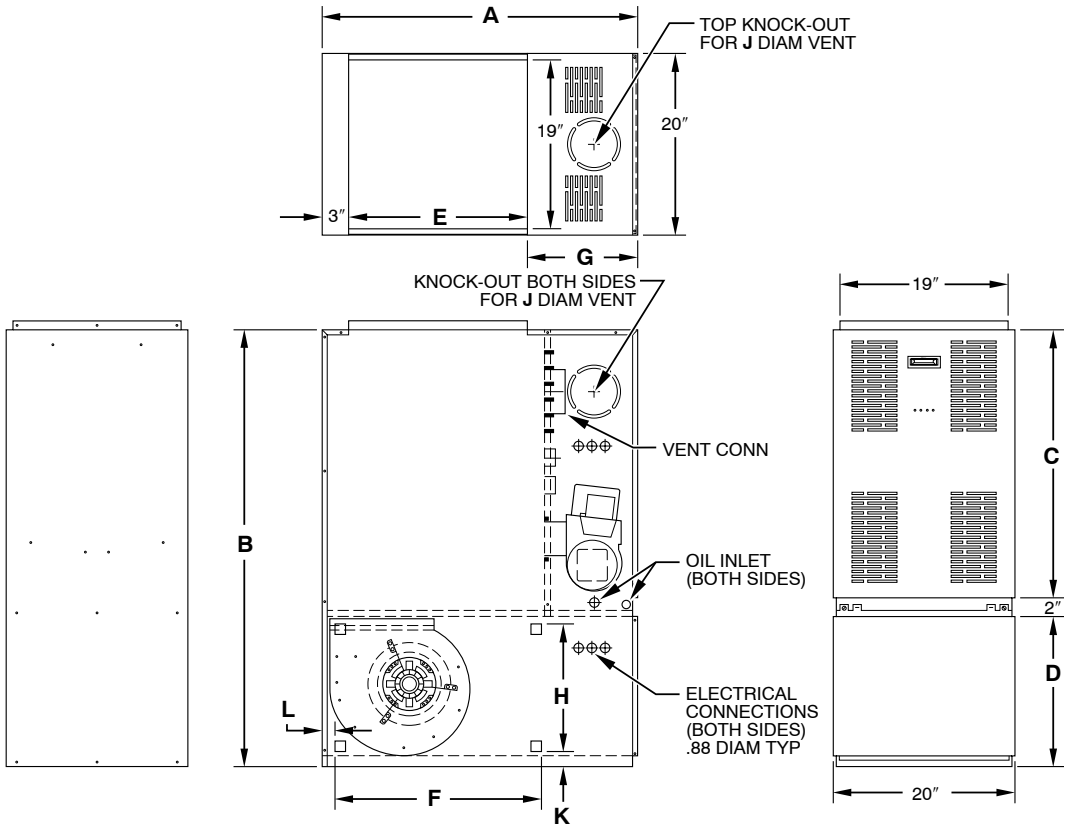

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Fig. 2 - Dimensional Drawing

DIMENSIONS (in.)

UNIT SIZE	A	B	C	D	E	F	G	H	J	K	L
105–12	35	48–3/4	30–1/4	16–5/8	20	22	12	14	5	1–1/2	1–3/4
120–20	39–1/2	53	32–1/4	18–3/4	24	28	12–3/8	16	6	1–5/8	1–1/2

⚠ WARNING

FIRE, EXPLOSION, ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury, death, and/or property damage.

These instructions are intended to be used by qualified personnel who have been trained in installing this type of furnace.

⚠ WARNING

FIRE, EXPLOSION HAZARD

Failure to follow this warning could result in personal injury, death, and/or property damage.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Do not attempt to start the burner when excess oil has accumulated, when the furnace is full of vapor, or when the combustion chamber is very hot.

For use with grade 1 or 2 fuel oil. Do not use gasoline, crankcase oil, or any oil containing gasoline!

Never burn garbage or paper in the heating system and never leave rags, paper, or any flammable items around the unit.

All local and national code requirements governing installation of oil burning equipment, wiring, and flue connections must be followed. Some of the codes (issued by the Canadian Standards Association, the National Fire Protection Agency, and/or the American National Standards Institute) that may be applicable are:

ANSI/NFPA 31: INSTALLATION OF OIL BURNING EQUIPMENT

ANSI/NFPA 211: CHIMNEYS, FIREPLACES, VENTS, AND SOLID FUEL BURNING APPLIANCES

ANSI/NFPA 90B: WARM AIR HEATING AND AIR CONDITIONING SYSTEMS

ANSI/NFPA 70: NATIONAL ELECTRIC CODE

CSA B139: INSTALLATION CODE FOR OIL BURNING EQUIPMENT

CAS C22.1: CANADIAN ELECTRICAL CODE

US and CANADA: Current edition of SMACNA and NFPA 90B as tested by UL Standard 181 for Class I Rigid Air Ducts

Only the latest issues of these codes should be used, and are available from either: The National Fire Protection Agency, Batterymarch Park, Quincy, MA 02269, or The Canadian Standards Association, 178 Rexdale Blvd., Rexdale, Ontario M9W1R3.

This furnace is designed for continuous return-air minimum temperature of 60°F/15°C db or intermittent operation down to 55°F/13°C db such as when used with a night setback thermostat. Return-air temperature must not exceed 80°F/27°C db. Failure to follow these return air limits may affect reliability of heat exchangers, motors and controls. (See Fig. 3.)

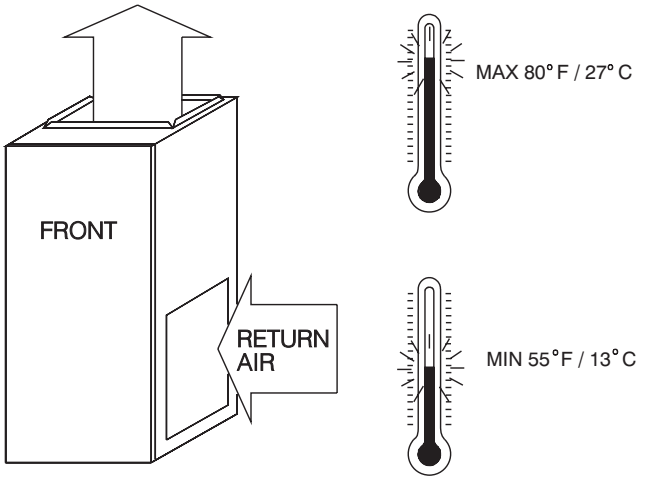


Fig. 3 - Return Air Temperature

INTRODUCTION

The model 58VMR Furnace is available in two sizes. Each size unit is capable of 3 heat/airflow combinations by a simple nozzle change. Unit 105-12 covers inputs of 70,000, 91,000, and 105,000 Btu, and unit 120-20 covers inputs of 119,000, 140,000, and 154,000 Btuh.

This furnace is a multipoise unit. It may be installed in the upflow, downflow, or horizontal configuration. This furnace is **not** approved for installation in mobile homes, recreational vehicles, or outdoors.

The furnace is shipped in the upflow configuration, complete with burner and controls. It requires a line voltage (115 vac) connection to control box, a thermostat hook-up as shown on wiring diagram, oil line connection(s), adequate duct work, and connection to a properly sized vent.

The air handling capacity of this furnace is designed for cooling airflow. Refer to Table 13 for expected airflows at various external duct static pressures.

LOCATION

Step 1 — General

⚠ WARNING

ELECTRICAL SHOCK OR UNIT DAMAGE HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

This furnace is not watertight and is not designed for outdoor installation. This furnace shall be installed in such a manner as to protect electrical components from water. Outdoor installation would lead to a hazardous electrical condition and to premature furnace damage.

⚠ WARNING

FIRE, EXPLOSION HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

For attic installation, it is important to keep insulation 12 in. or more away from any furnace openings. Some types of insulating materials may be combustibles.

⚠ CAUTION

PERSONAL INJURY AND UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

This oil furnace may be used for construction heat provided that:

-The furnace is permanently installed with all electrical wiring, piping, venting and ducting installed according to these installation instructions. A return air duct is provided, sealed to the furnace casing, and terminated outside the space containing the furnace. This prevents a negative pressure condition as created by the circulating air blower, causing a flame roll-out and/or drawing combustion products into the structure.

-The furnace is controlled by a thermostat. It may not be "hot wired" to provide heat continuously to the structure without thermostatic control.

-Clean outside air is provided for combustion. This is to minimize the corrosive effects of adhesives, sealers and other construction materials. It also prevents the entrainment of drywall dust into combustion air, which can cause fouling and plugging of furnace components.

-The temperature of the return air to the furnace is maintained between 55°F (13°C) and 80°F (27°C) with no evening setback or shutdown. The use of the furnace while the structure is under construction is deemed to be intermittent operation per our installation instructions.

-The air temperature rise is within the rated rise range on the furnace rating plate, and the firing rate has been set to the nameplate value.

-The filters used to clean the circulating air during the construction process must be either changed or thoroughly cleaned prior to occupancy.

-The furnace, ductwork and filters are cleaned, as necessary, to remove drywall dust and construction debris from all HVAC system components after construction is completed.

-After construction is complete, verify furnace operating conditions including ignition, input rate, temperature rise, and venting, according to the manufacturer's instructions.

This furnace is approved for reduced clearances to combustible construction, therefore, it may be installed in a closet or similar enclosure. Since this unit may be installed in an upflow, downflow, or horizontal position, it may be located in a basement or on the same level as area to be heated. In any case, unit should always be installed level.

In a basement, or when installed on floor (as in a crawl space), it is recommended that unit be installed on a concrete pad that is 1 in. to 2 in. thick.

When installed in downflow position, furnace must not be installed on combustible flooring unless approved subbase is used. Also, since flue pipe is in a downflow position, Downflow Conversion/Vent Guard Kit **MUST** be used.

When installed in a horizontal position, furnace may be suspended by using an angle iron frame, as long as total weight of both furnace and frame are allowed for in support calculations. (Other methods of suspending are acceptable.) When installed in the horizontal position, this furnace must not be installed on combustible flooring unless the approved horizontal subbase is used.

The required minimum clearances for furnace are specified in Table 1.

Table 1 – Minimum Clearances to Combustible Materials (in.)

UNIT APPLICATION		UPFLOW	DOWNFLOW	HORIZONTAL
Sides	Furnace	0	2	2
	Supply Plenum and Warm–Air Duct Within 6 ft of Furnace	1	2	1
Back	Service Clearance	0	1	4
Top	Furnace Casing or Plenum	2	2	2
	Horizontal Warm–Air Duct Within 6 ft of Furnace	2	2	3
Flue Pipe	Horizontally or Below Pipe	4	4	4
	Vertically Above Pipe	9	9	9
Front		8	8	8
Bottom*		0	0	0

* For combustible floor, use approved subbase.

Note: Adequate service clearances should be provided over and above these dimensions as required.

The furnace should be located as close as possible to chimney or vent in order to keep vent connections short and direct. The furnace should also be located as near as possible to center of air distribution system.

Step 2 — Location Relative to Cooling Equipment

When installing furnace with cooling equipment for year-round operation, the following recommendations must be followed for series or parallel airflow:

1. In series-airflow applications, coil is mounted after furnace in an enclosure in supply-air stream. The furnace blower is used for both heating and cooling airflow.
2. In parallel-airflow applications, dampers must be provided to direct air over furnace heat exchanger when heat is desired and over cooling coil when cooling is desired.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may reduce the life of this unit.

The coil MUST be installed on air-discharge side of furnace. Under no circumstances should airflow be such that cooled, conditioned air can pass over furnace heat exchanger. This will cause condensation in heat exchanger and possible failure of heat exchanger. Heat exchanger failure due to improper installation may not be covered by warranty.

IMPORTANT: The dampers should be adequate to prevent cooled air from entering furnace. If manually operated, dampers must be equipped with a means to prevent operation of either cooling unit or furnace unless damper is in full cool or heat position.

INSTALLATION

Step 1 — Air for Combustion and Ventilation

⚠ WARNING

CARBON MONOXIDE, UNIT RELIABILITY HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

Installation of this furnace in an area where it will receive contaminated combustion air must be avoided. Such contamination would include the following: ammonia, chlorine, hydrogen sulfide, halogenated hydrocarbons, carbon tetrachloride, cleaning solvents, hydrochloric acid, water softening chemicals, and similar chemicals.

⚠ WARNING

CARBON MONOXIDE, FIRE HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

Do not block combustion-air openings in the furnace. Any blockage could result in improper combustion.

Step 2 — General

This furnace should be installed in a location in which facilities for ventilation permit satisfactory combustion of oil, proper venting, and maintenance of ambient temperature at safe limits under normal conditions of use. The location should not interfere with proper circulation of air within the confined space. (See NFPA-31 or B139.)

In addition to air needed for combustion, process air shall be provided as required for: cooling of equipment or material, controlling dew point, heating, drying, oxidation or dilution, safety exhaust, and odor control.

In addition to air needed for combustion, air shall be supplied for ventilation, including all air required for comfort and proper working conditions for personnel.

The barometric draft regulator (included with furnace) shall be installed in same room or enclosure as furnace in such a manner as to prevent any difference in pressure between regulator and combustion-air supply.

Air requirements for operation of exhaust fans, kitchen ventilation systems, clothes dryers, and fireplaces shall be considered in determining the adequacy of a space to provide combustion-air requirements.

The lack of a proper amount of combustion air can lead to serious furnace operational problems. Some of these problems are:

1. Excessive oil burner after-drip and oil fumes.
2. Sooting.
3. Melted oil burner igniter/relay control.
4. Air band or air turbulator settings more open than normal.
5. Lockouts on start-up.

The requirements for combustion and ventilation air depend upon whether furnace is located in a CONFINED or UNCONFINED space.

Unconfined Space

An unconfined space must have at least 50 cu ft for each 1,000 BTUH of total input for all the appliances (such as furnaces, clothes dryers, water heaters, etc.) in the space.

In unconfined spaces in buildings of conventional frame, brick, or stone construction, infiltration MAY be adequate to provide air for combustion, ventilation, and dilution of flue gases. This determination must be made on an individual installation basis and must take into consideration the overall volume of unconfined space, the number of windows and ventilation openings, the

number of doors to the outside, internal doors which can close off unconfined space, and overall tightness of building construction. Consideration must also be given to the amount of storage items (furniture, boxes, etc.) within the unconfined space which take away from the air volume. (Refer to Table 2.)

Table 2 – Minimum Floor Area For Unconfined Space

FURNACE INPUT BTUH	MINIMUM SQ FT WITH 7–1/2 FT CEILING
70,000	467
91,000	607
105,000	700
119,000	793
140,000	933
154,000	1026

Many new buildings and homes (and older ones that have been weatherized) MUST BE considered as being of tight construction, therefore infiltration will not be sufficient to supply necessary air for combustion and ventilation.

A building can be considered as being of tight construction when:

1. Walls and ceilings exposed to outside atmosphere have a continuous water vapor retarder with a rating of 1 perm or less with openings gasketed or sealed; and/or
2. Weatherstripping has been added on operable windows and doors, and/or caulking or sealants are applied to areas such as joints around windows and door frames; between sole plates and floors; between wall-ceiling joints; between wall panels; at penetrations for plumbing, electrical, and fuel lines; and at other openings.

If combustion and ventilation air must be supplied to an unconfined space from outside, an opening with a FREE AREA of not less than 1 sq in. per 5,000 BTUH of total input of all appliances within unconfined space (but not less than 100 sq in.) must be provided. This opening must be located such that it cannot be blocked at any time.

Confined Space

A confined space has a volume of less than 50 cu ft per 1,000 BTUH of the total input rating for all appliances installed in that space.

NOTE: In calculating free area, consideration shall be given to blocking effect of louvers, grilles, or screens protecting openings. Screens used shall not be smaller than 1/4-in. mesh and shall be readily accessible for cleaning. If free area through a louver or grille is known, it shall be used in calculating size and free area specified. If design and free area are not known, it may be assumed that wood louvers have 20% free area and metal louvers and grilles have 60% free area. Louvers shall be fixed in open position or interlocked with furnace so they open automatically at furnace start-up and remain open during furnace operation.

The size of the openings depends upon whether the air comes from outside of the structure or an unconfined space inside the structure.

All Air From Inside the Structure

For a confined space, where air is taken from an interior space, 2 permanent openings of equal area are required. One opening must be within 12 in. of ceiling and the other within 12 in. of floor.

All Air From Outside of Structure

If outside air is supplied to a confined space, then the 2 openings must be equal and located as above.

1. If combustion air is taken through a permanent opening directly communicating with the outdoors, the opening shall have a minimum free area of 1 sq in. per 4,000 BTUH of total input rating for all equipment in the enclosure.
2. If combustion air is taken from outdoors through vertical ducts, the openings and ducts MUST have at least 1 sq in. of free area per 4,000 BTUH of the total input for all equipment within the confined space. (See Fig. 4 and 5.)
3. If combustion air is taken from outdoors through horizontal ducts, the openings and ducts MUST have at least 1 sq in. of free area per 2,000 BTUH of the total input for all equipment within the confined space. (See Fig. 6.)

When ducts are used to supply air, they must be of the same cross sectional area as free area of openings to which they connect. (See Fig. 7.)

The minimum dimension of rectangular air ducts must not be less than 3 in.

Step 3 — Ductwork Recommendations

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury or death.

When supply ducts carry air circulated by furnace to areas outside spaces containing furnace, return air MUST also be handled by a duct sealed to furnace casing and terminating outside space containing furnace.

⚠ CAUTION

UNIT MAY NOT OPERATE

Failure to follow this caution may result in intermittent unit operation.

Return-air grilles and warm air registers MUST NOT be obstructed.

The proper sizing of warm air ducts is necessary to ensure satisfactory furnace operation. Ductwork should be in accordance with the latest editions of NFPA-90A (Installation of Air Conditioning and Ventilating Systems) and NFPA-90B (Warm Air Heating and Air Conditioning Systems) or Canadian equivalent.

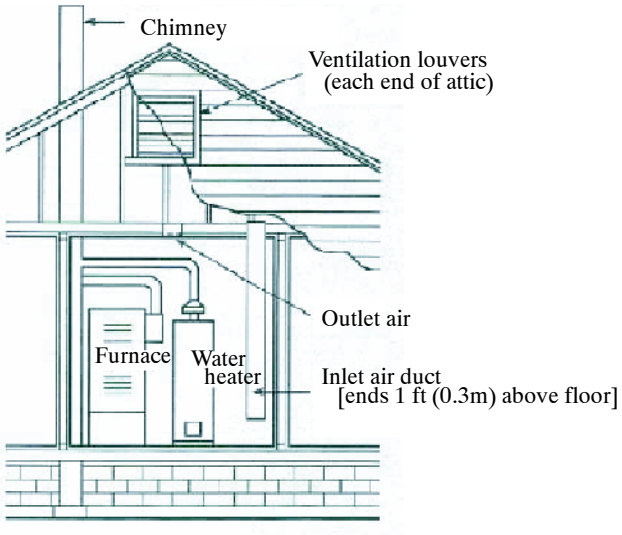
The supply ductwork should be attached to flanged front opening provided at discharge end of furnace. The return-air ductwork should be attached to flanged rear opening of furnace. See Fig. 2 for dimensions of these openings.

NOTE: The blower access opening should not be used for return air.

The following recommendations should be followed when installing ductwork:

1. Install locking-type dampers in all branches of individual ducts to balance out system. Dampers should be adjusted to impose proper static at outlet of furnace.
2. A flexible duct connector of noncombustible material should be installed at unit on both supply- and return-air systems. In applications where extremely quiet operation is necessary, the first 10 ft (if possible) of supply and return ducts should be internally lined with acoustical material.
3. In cases where return-air grille is located close to fan inlet, there should be at least one 90° air turn between fan inlet and grille. Further reduction in sound level can be accomplished by installing acoustical air-turning vanes or lining duct as described in item 2 above.
4. When a single air grille is used, duct between grille and furnace must be the same size as return opening in furnace.

NOTE: Both acoustical lining and fibrous ductwork shall comply with NFPA 90B as tested by UL Standard 181 for Class 1 Rigid air Ducts.



The Outlet air duct and Inlet air duct must have free area of not less than 1 square inch per 4000 BTUH based on the total input rating of all appliances in the space. The total free area or the ventilation louvers must have a free area of not less than 1 square inch per 5000 BTUH based on the total input rating of all appliances in the space.

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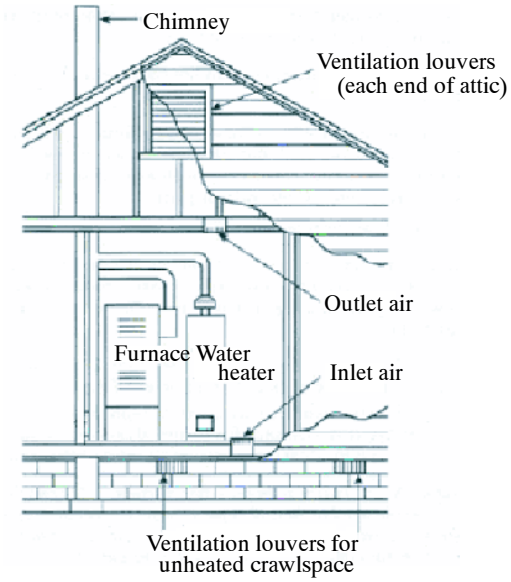
Fig. 4 – Combustion Air Taken From Outdoors Through Vertical Ducts (without louvers in foundation)



The Outlet air duct and Inlet air duct must have a free area of not less than 1 square inch per 4000 BTUH based on the total input rating of all appliances in the space. The total free area or the ventilation louvers must have a free area of not less than 1 square inch per 5000 BTUH based on the total input rating of all applinaces in the space.

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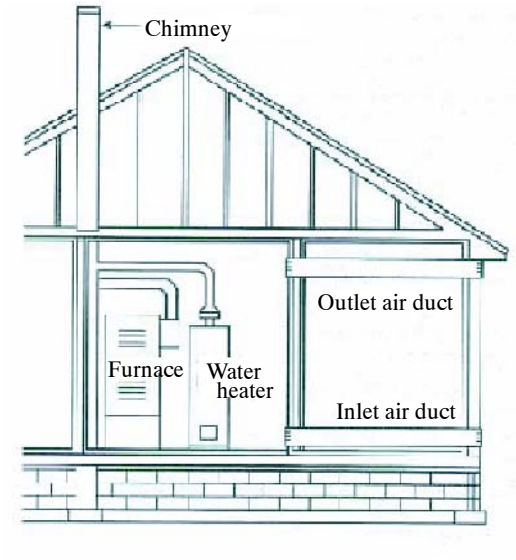
Fig. 5 – Combustion Air Taken From Outdoors Through Vertical Ducts (with crawlspace louvers)



The Outlet air duct and Inlet air duct must have a free area of not less than 1 square inch per 2000 BTUH based on the total input rating of all appliances in the space.

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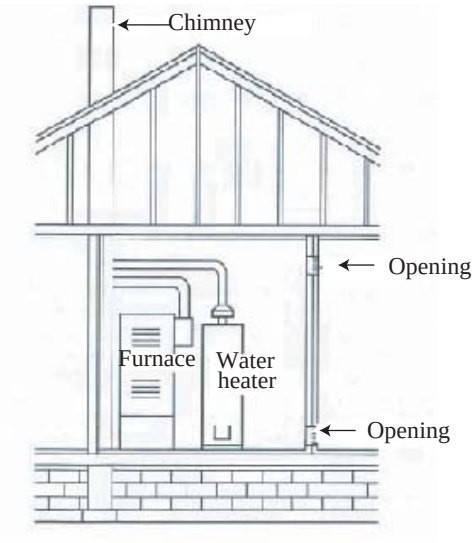
Fig. 6 - Combustion Air Taken From Outdoors Through Horizontal Ducts



The top opening and the bottom opening must each be 8-in x 18-in when a 105 size furnace is installed. The top opening and the bottom opening must each be 10-in x 20-in when a 120 size furnace is installed.

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Fig. 7 - Free Area Openings

Step 4 — Venting

Venting of furnace should be to the outside and in accordance with local codes or requirements of local utility.

OIL-FIRED APPLIANCES SHALL BE CONNECTED TO FLUES HAVING SUFFICIENT DRAFT AT ALL TIMES TO ENSURE SAFE AND PROPER OPERATION OF APPLIANCE.

For additional venting information, refer to ANSI/NFPA 211 Chimney, Fireplaces, Vents, and Solid Fuel Burning Appliances and/or CSA B139 Installation Code.

This furnace is certified for use with Type "L" vent (maximum flue gas temperature 575°F/302°C).

Vent System Inspection

Before furnace is installed, it is highly recommended that any existing vent system be completely inspected.

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury or death.

The following steps shall be followed for each appliance connected to the venting system being placed into operation, while all other appliances connected to the venting system are not in operation:

1. Seal any unused openings in venting system.

2. Inspect the venting system for proper size and horizontal pitch, as required in the NFPA31, Installation of Oil Burning Equipment and the Canadian Standard B140.4 Oil Fired Warm Air Furnaces. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.

3. As far as practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building.

4. Close fireplace dampers.

5. Turn on clothes dryers and any appliance not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they are operating at maximum speed. Do not operate a summer exhaust fan.

6. Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so appliance is operating continuously.

7. Test for spillage from draft-hood equipped appliances at the draft-hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.

8. If improper venting is observed during any of the above tests, the venting system must be corrected in accordance with the NFPA31, Installation of Oil Burning Equipment and the Canadian Standard B140.4 Oil Fired Warm Air Furnaces.

9. After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers, and any other gas-fired burning appliance to their previous conditions of use.

For any chimney or vent, this should include the following:

1. Inspection for any deterioration in chimney or vent. If deterioration is discovered, chimney must be repaired or vent must be replaced.
2. Inspection to ascertain that vent system is clear and free of obstructions. Any blockage must be cleared before installing furnace.
3. Cleaning chimney or vent if previously used for venting a solid fuel burning appliance or fireplace.
4. Confirming that all unused chimney or vent connections are properly sealed.
5. Verification that chimney is properly lined and sized per the applicable codes. (Refer to list of codes in Safety Considerations section.)

Masonry Chimneys

This furnace can be vented into an existing masonry chimney. This furnace must not be vented into a chimney servicing a solid fuel burning appliance. Before venting furnace into a chimney, the chimney MUST be checked for deterioration and repaired if necessary. The chimney must be properly lined and sized per local or national codes.

If furnace is vented into a common chimney, the chimney must be of sufficient area to accommodate the total flue products of all appliances vented into chimney.

The following requirements are provided for a safe venting system:

1. Be sure that chimney flue is clear of any dirt or debris.
2. Be sure that chimney is not servicing an open fireplace.
3. Never reduce pipe size below the outlet size of furnace. (See Fig. 2.)
4. All pipe should be supported using proper clamps and/or straps. These supports should be at least every 4 ft.
5. All horizontal runs of pipe should have at least 1/4 in. per ft of upward slope.
6. All runs of pipe should be as short as possible with as few turns as possible.
7. Seams should be tightly joined and checked for leaks.
8. The flue pipe must not extend into chimney but be flush with inside wall.
9. The chimney must extend 3 ft above highest point where it passes through the roof of a building and at least 2 ft higher than any portion of a building within a horizontal distance of 10 ft. It shall also be extended at least 5 ft above highest connected equipment flue collar.
10. Check local codes for any variance.

Step 5 — Factory-Built Chimneys

Listed factory-built chimneys may be used. Refer to chimney manufacturer's instructions for proper installation.

⚠ CAUTION

UNIT COMPONENT HAZARD

Failure to follow this caution may result in unit component damage.

This burner is shipped with the oil pump set to operate on a **single** line system. To operate on a **two-line** system the by-pass plug must be installed. Do not operate a **single** line system with the by-pass plug installed. Operating a **single** line system with the by-pass plug installed will result in damage to the pump shaft seal. Pump pressure must be set at time of burner start-up. A pressure gauge is attached to the **PRESSURE PORT** for pressure readings. Two **PIPE CONNECTORS** are supplied with the burner for connection lines to burner pipe connectors. All pump port threads are **British Parallel Thread** design. Direct connection of NPT threads to the pump **will damage** the pump body. Riello manometers and vacuum gauges **do not** require any adapters, and can be safely connected to the pump ports. An NPT (metric) adapter (Part no. N05F017) must be used when connecting other gauge models.

Step 6 — Oil Burner

This furnace is supplied with a high-pressure atomizing retention head-type burner (for use with grade 1 or 2 Fuel Oil). The mounting flange is fixed to burner air tube and no adjustment is required for insertion length. The oil pump is set to operate on a single line system. To operate on a two-line system the by-pass plug must be installed.

Step 7 — Oil Connections

Complete instructions for installing fuel oil piping can be found in oil burner Installation Instructions included with furnace.

Oil line entry holes are provided in side panels. Two holes are provided in each location so that a 2-pipe system may be used if desired.

An oil filter should be used with all oil burners and should be installed as close to burner as possible.

Step 8 — Barometric Draft Control

The barometric draft control shipped with furnace MUST be used with furnace to ensure proper operation. Instructions for installing control are packed with control.

Step 9 — Blocked Vent Shut-Off (BVSO) For Chimney Venting

All oil furnaces installed in Canada must have a Blocked Vent Shut-Off.

Refer to Fig. 8-13 and the installation instructions supplied with the Blocked Vent Shut-Off for installation and wiring procedures.

The Blocked Vent Shut-Off must be installed in the flue between 2 in and 12 in from the furnace outlet and between the furnace outlet and draft regulator. (See Fig. 9.)

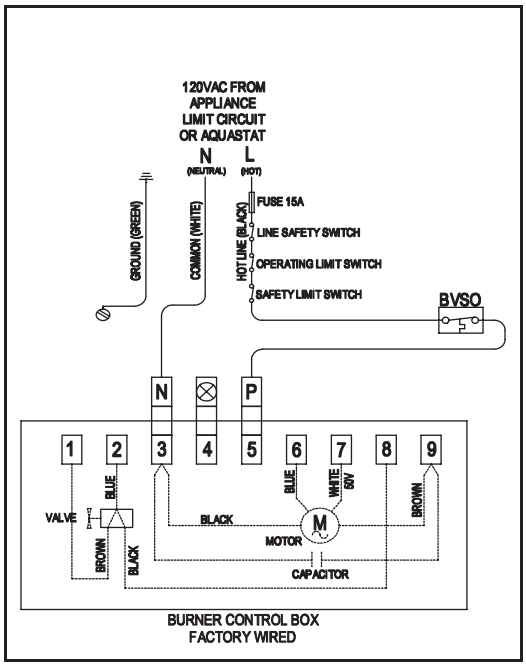

Diagram B
Riello

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Fig. 8 - Wiring Diagram for Riello Burner

⚠ WARNING

FIRE, CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury or death.

Do not dent or scratch the surface of the thermal switch. The thermal switch MUST be replaced if it is damaged.

⚠ WARNING

FIRE, CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury, death, and/or property damage.

DO NOT reset the device or restart the furnace unless the cause of the interruption has been identified and corrected by a qualified agency. Ensure that the Blocked Vent Shut-Off has been cleaned by a qualified agency before placing into service. Annual inspection and cleaning of the Blocked Vent Shut-Off by a qualified agency is required.

⚠ WARNING

FIRE, CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury, death, and/or property damage.

The Blocked Vent Shut-Off **MUST** be inspected and maintained annually by a qualified agency.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

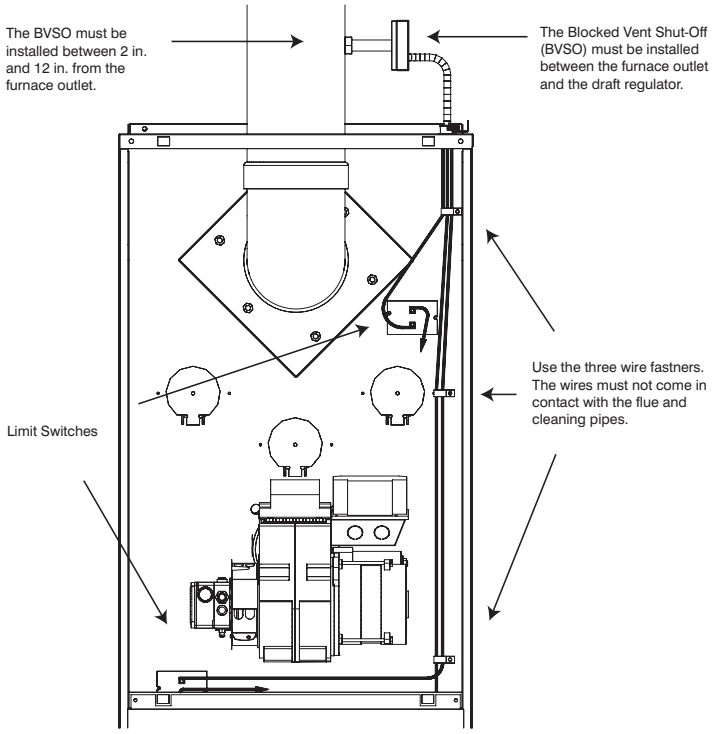
Disconnect electrical power supply to the furnace before wiring the Blocked Vent Shut-Off.

⚠ CAUTION

CUT HAZARD

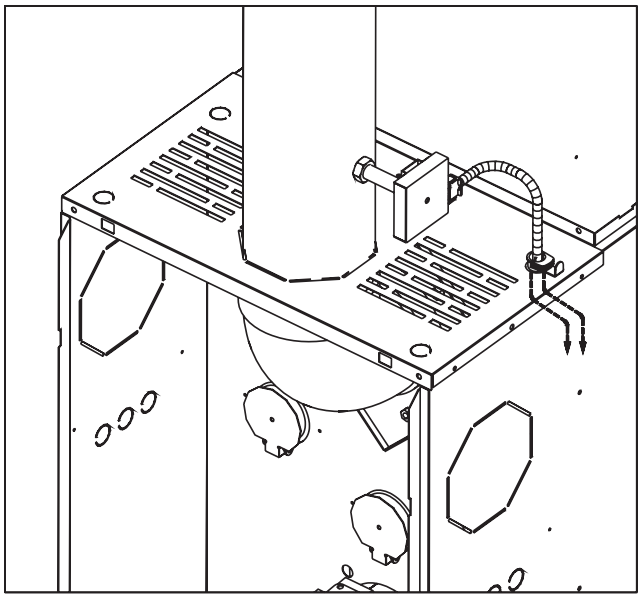
Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses, and gloves when handling parts and servicing furnaces.



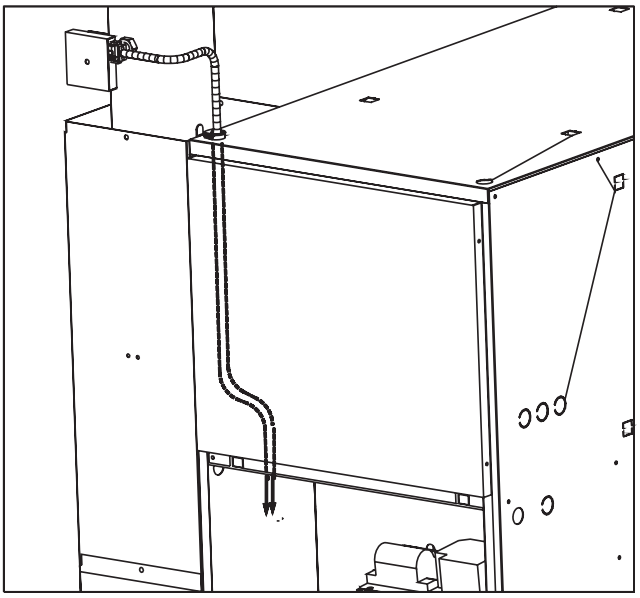
A06614

Fig. 9 - Blocked Vent Shut-Off Device Wiring (Installation shown: Upflow with vertical exhaust)



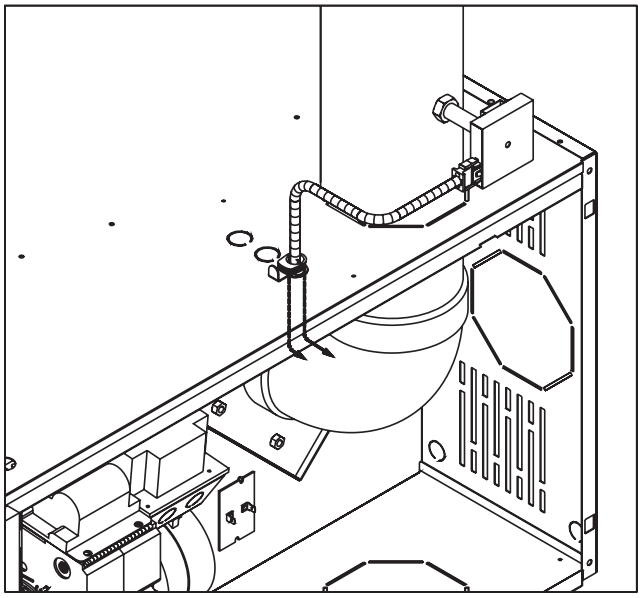
A06615

Fig. 10 - Blocked Vent Shut-Off Device Wiring (Installation: Upflow with vertical exhaust)



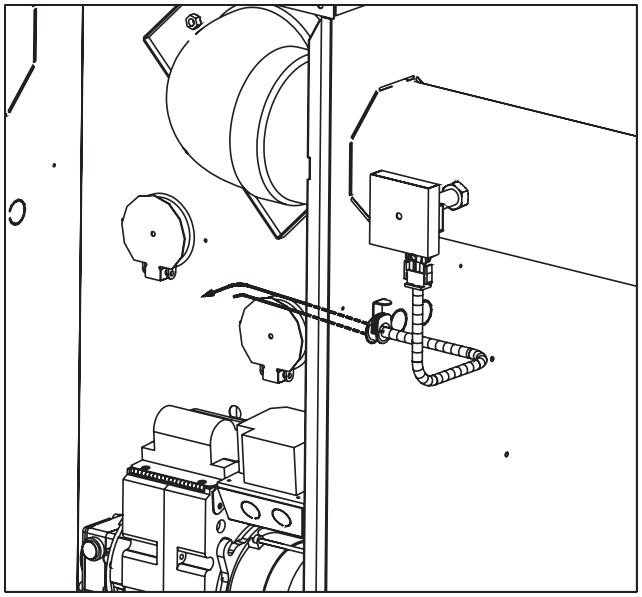
A06616

Fig. 11 - Blocked Vent Shut-Off Device Wiring (Installation: Downflow)



A06617

Fig. 12 - Blocked Vent Shut-Off Device Wiring (Installation: Horizontal with vertical exhaust)



A06618

Fig. 13 - Blocked Vent Shut-Off Device Wiring (Installation: Horizontal with horizontal exhaust)

Step 10 — Electrical Connections

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

The unit cabinet must have an uninterrupted or unbroken electrical ground. A green ground screw is provided in control box for this connection.

115-V Wiring

Before proceeding with electrical connections, make certain that voltage, frequency, and phase correspond to that specified on unit rating plate. Also, check to be sure that service provided by utility is sufficient to handle load imposed by this equipment. Refer to rating plate or Table 3 for equipment electrical specifications.

Make all electrical connections in accordance with National Electrical Code (NEC) ANSI/NFPA 70-2005 and any local codes or ordinances that might apply. For Canadian installations, all electrical connections must be made in accordance with Canadian Electrical Code CSA C22.1 or sub-authorities having jurisdiction.

⚠ WARNING

FIRE HAZARD

Failure to follow this warning could result in personal injury, death, or property damage.

Do not connect aluminum wire between disconnect switch and furnace. Use only copper wire.

The control system depends on correct polarity of power supply. Connect HOT wire (H) and NEUTRAL wire (N) as shown in Fig. 14.

A separate line voltage supply MUST be used with a fused disconnect switch or circuit breaker between main power panel and unit. (See Fig. 14.)

Metallic conduit (where required/used) may terminate at side panel of unit. It is not necessary to extend conduit inside unit from side panel to control box.

When replacing any original furnace wiring, use only 105°C No. 14 AWG copper wire.

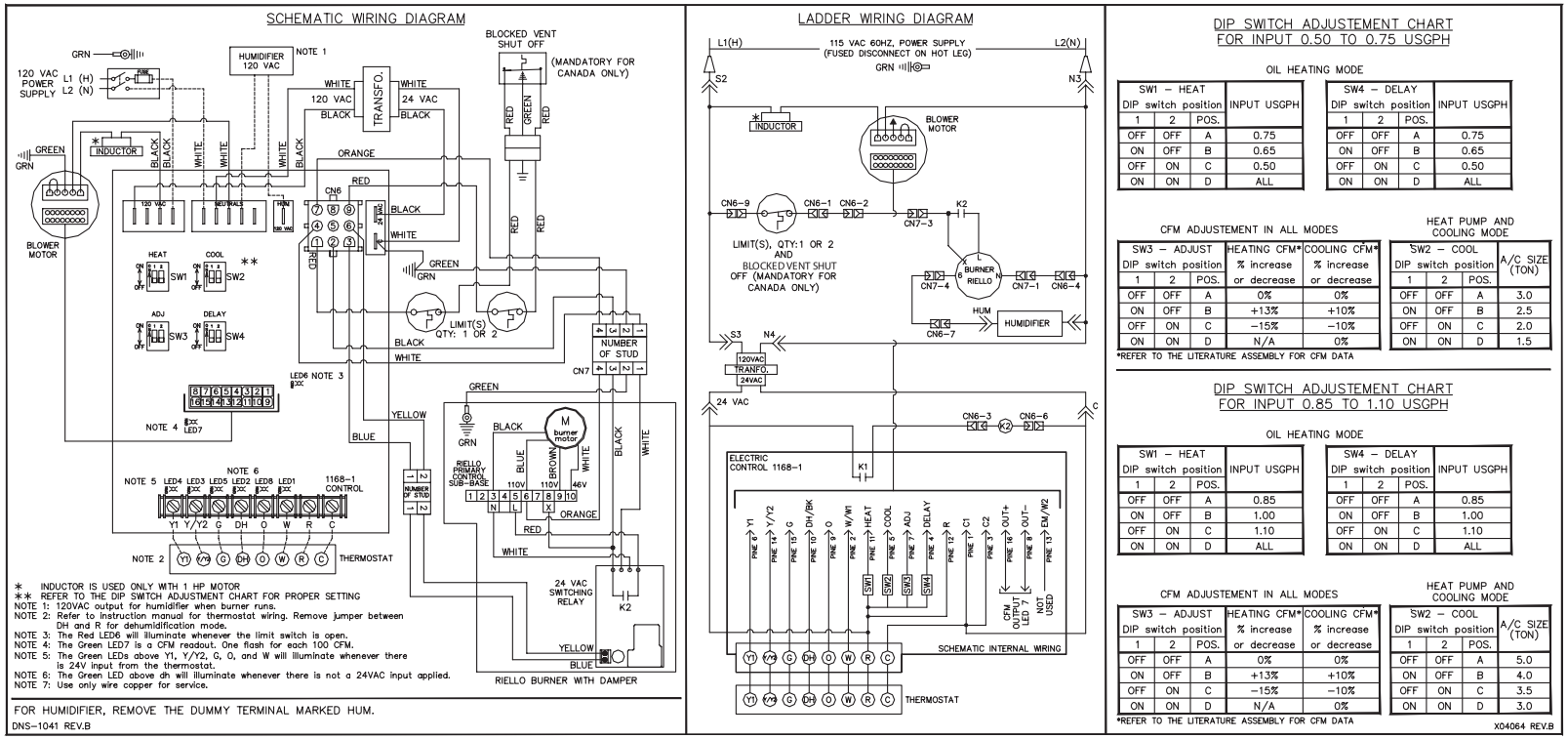
24-V Wiring

Instructions for wiring thermostat (field-supplied) are packed in thermostat box. Make thermostat connections as shown in Fig. 14 at 24-v terminal board on electronic control board. Thermostat wire connections at R and W are the minimum required for oil heating operation.

Table 3 – Electric Data

UNIT SIZE	VOLTS PHASE HERTZ	OPERATING VOLTAGE RANGE		MAX UNIT AMPS	MIN. WIRE GAUGE	MAX WIRE LENGTH (FT.)†	MAX FUSE OR CKT BKR AMPS‡
		Max.*	Min.*				
105–12	115–1–60	132	104	12.2	14	26	15
120–20	115–1–60	132	104	15.7	12	26	20

* Permissible limits of voltage range at which unit will operate satisfactorily.
† Length shown is as measured 1 way along wire path between unit and service panel for maximum 2% voltage drop.
‡ Time–delay fuse is recommended



A06627

Fig. 14 - Wiring Diagram

Accessory Installation

1. General
   When installing optional accessories to this appliance, follow manufacturer's Installation Instructions included with accessory. Other than wiring for thermostat, wire with a minimum of type "T"insulation (63°F/17°C rise) must be used for accessories.
2. Auxiliary Terminals
   The HUM 120 VAC terminals on the electronic control board are tied directly to the #8 pin of the 9 pin connector and provide a 120 VAC signal whenever the burner is energized. (See Fig. 14.) Supplementary 120 VAC and neutral terminals can be used for accessory wiring. See Electronic Air Cleaner and Humidifier sections for further information.
3. Electronic Air Cleaner Connections
   When using an electronic air cleaner with variable-speed oil-fired furnaces, use an Airflow Sensor kit. As the air cleaner is connected to constant 120 VAC power, the airflow sensor turns on the electronic air cleaner when the furnace blower is operating.
4. Humidifier/Humidistat Connections
   To ensure humidifier will operate properly, use HUM output of Humidistat Control to control humidifier operation. A 24-VAC signal can be connected from the W and C on terminal block connections on the electronic board or a 120 VAC signal from the "HUM 120 VAC" terminal when primary heating source is used. (See Fig. 15-18.)
5. Dehumidify Capability with Standard Humidistat Connection
   Latent capabilities for systems using the variable-speed oil-fired furnaces are better than average systems. If increased latent capacity is an application requirement, the field wiring terminal block provides connection terminals for use of a standard humidistat.
   The variable-speed oil-fired unit will detect the humidistat contacts opening on increasing humidity and reduce its airflow to approximately 85% of nominal cooling mode airflow. This reduction will increase the system latent capacity until the humidity falls to a level which causes the humidistat contacts to close. When the contacts close, the airflow will return to 100% of the selected cooling airflow. To activate this mode, remove the Jumper between DH and R of the electronic board and wire in a standard humidistat.

Filters

⚠ WARNING

FIRE, CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

Never operate unit without a filter or with filter access door removed.

An internal filter rack is provided as standard equipment with furnace and is located in blower compartment. A sufficient clearance should be provided for air filter access. Refer to Table 4 for filter rack flange dimensions for return air duct.

Table 4 – Filter Size (in.) and Quantity

UNIT SIZE	AIR FILTER SIZE	FLANGE OPENING SIZE
105–12	16 x 24 x 1 or 16 x 25 x 1	15 x 23
120–20	20 x 30 x 1	19 x 29

Step 11 — Horizontal or Downflow Installation

For horizontal installation, determine which "side" will become the "top" when the unit is laid down. Remove the flue pipe clearance knock-out from the top of that side panel. Install the flue elbow so that it exits the cabinet of the furnace through that opening.

For counterflow installation, the flue pipe must exit the cabinet through 1 of the side panel openings (as above), then extended up the side of the furnace. Insure that adequate clearances to combustibles are observed. Downflow Conversion/Vent Guard Kit MUST be used.

Remove burner by loosening mounting nuts and turn oil burner slightly counter-clockwise to unlock the keyhole burner flange. Prevent putting undue strain on burner wiring. (It may be necessary to disconnect burner wiring in some cases.)

To reinstall burner, insert on the four burner studs on keyhole burner flange and turn it clockwise to lock it and tighten nuts.

IMPORTANT: Burner must always be installed in the upright position with ignition control on top.

START-UP, ADJUSTMENT, AND SAFETY CHECKOUT

Step 1 — Operational Checkout

Installation of furnace is now complete. Perform the following checkout procedures.

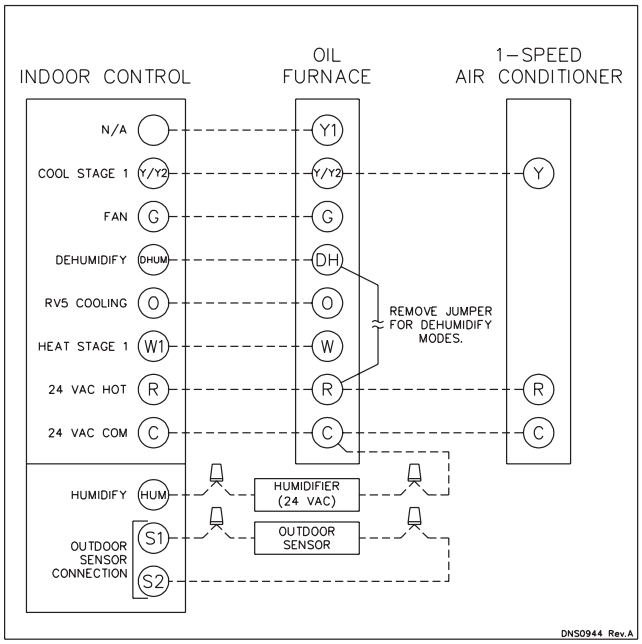
1. Correct nozzle size has been selected for desired input rate.
2. Electrical wiring is completed according to Fig. 14.
3. Blower wheel support is removed.
4. Blower access door is secured in place.
5. Valve on oil supply line is open.
6. RESET BUTTON on primary control is pushed down.
7. Flame observation door is closed.
8. Thermostat is set for heating mode and set above room temperature.

If all of the above items have been performed, set main electrical switch to ON position and burner should start. When burner starts, proceed to Combustion Check section.

Step 2 — Sequence of Operation

Using schematic diagram in Fig. 14 follow the sequence of operation through the different modes. Read and follow diagram very carefully.

NOTE: The GE ICM2+ blower motor speeds are infinitely-variable control-airflow rate (CFM). The ICM2+ motor ramps to speed at a controlled rate to reduce start-up noise perception. The ICM2+ motor ramps down slowly to a stop in the same time as ramp-up time. ICM2+ ramp-up and ramp-down times are additive to blower-on and -off delays, respectively. The ICM2+ is 115-v energized whenever power is available at furnace control, but operates only when 24-v motor control input(s) are on.



A04183

Fig. 15 - 24-VAC Oil Furnace Wiring with 1-Speed Air Conditioner

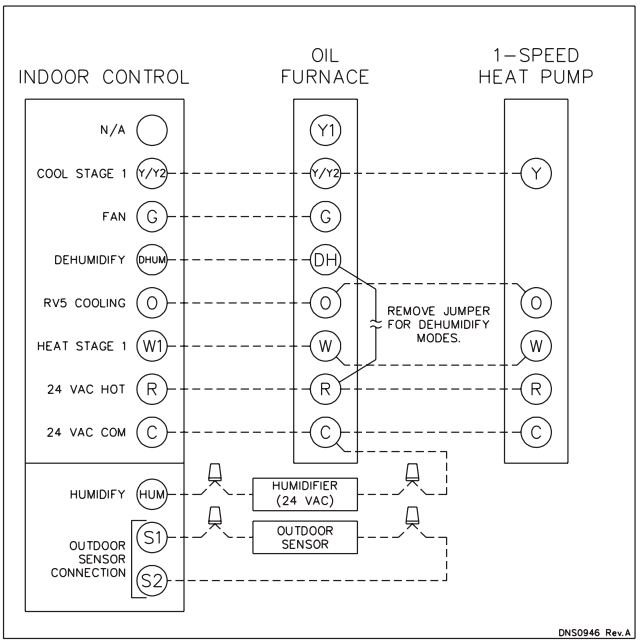


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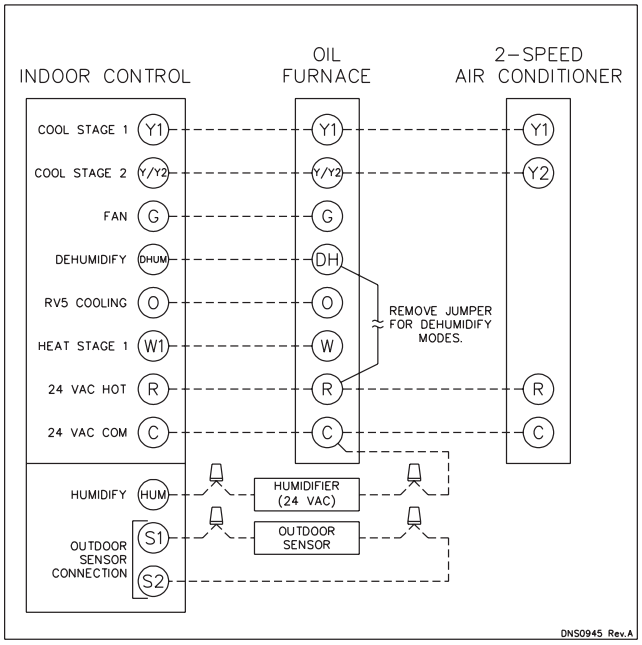
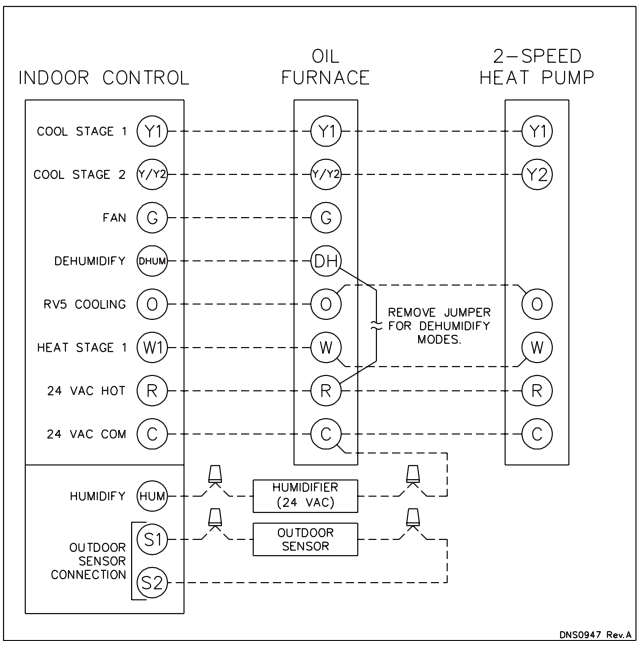
Fig. 17 - 24-VAC Oil Furnace with 1-Speed Heat Pump



A04184

Fig. 16 - 24-VAC Oil Furnace Wiring with 2-Speed Air Conditioner



A04186

Fig. 18 - 24-VAC Oil Furnace Wiring with 2-Speed Heat Pump

Oil Fired Heating Mode

1. The thermostat closes R to W.
2. Burner motor starts. The burner motor fan pre-purges the combustion chamber and vent for 10 seconds, establishing the combustion air pattern. During this time the solenoid valve holding oil pressure will be approximately 100 psig. Solenoid valve opens, allowing oil to flow through nozzle. At the same time, the burner motor's ignition coil produces spark.
3. Spark ignites oil droplets.
4. Cad cell senses flame and burner continues to fire. Ignition transformer ceases sparking.
5. After the "Pre-Run" ON-delay time, the circulating air blower starts.
6. The circulating-air blower and burner motor remain ON until the thermostat is satisfied. The solenoid valve remains open (R40-F).
7. Thermostat is satisfied.
8. The solenoid valve closes and the burner fan motor shuts down.
9. The furnace blower motor continues operating at 38 percent of the heating airflow for an additional 3 min.

Cooling Mode

1. Single-Speed Cooling Outdoor Unit (See Fig. 15 for thermostat connections.)
   a. The thermostat closes R to G-and-Y circuits. The R-Y/Y2 circuit starts outdoor unit, and R to G-and-Y/Y2 circuits start the furnace BLWM on cooling speed.
   b. When thermostat is satisfied, the R to G-and-Y/Y2 circuits are opened. The outdoor unit stops, and furnace BLWM continues operating at 50% of the cooling airflow for an additional 180 sec.
2. Two-Speed Cooling Outdoor Unit (See Fig. 16 for thermostat connections.)
   a. The thermostat closes the R to G-and-Y1 circuits for low cooling or closes the R to G-and Y1-and-Y/Y2 circuits for high cooling. The R to Y1 circuit operates the outdoor unit on low-cooling speed. The R to G-and-Y1 circuit operates the furnace BLWM at low-cooling airflow 55% of single-speed cooling airflow. The R to Y1-and-Y2 circuits operate the outdoor unit on high-cooling speed, and the R to G-and-Y/Y2-and-Y1 circuits operate furnace BLWM at high-cooling airflow.

NOTE: Y1 is found in the furnace and in the outdoor unit. The furnace control CPU controls BLWM airflow by sensing only G-and-Y1 for low-cooling airflow and-and-Y1-and-Y/Y2-for high-cooling airflow.

   b. When the thermostat is satisfied, the R to G-and-Y1 or R to G-and-Y1-andY/Y2 circuits open. The outdoor unit stops, the furnace blower continues operating at 50% of the cooling airflow for an additional 3 min.

Continuous-Blower Mode

1. When R to G circuit is closed by the thermostat, BLWM operates at 64%, 75%, or 86% of single-speed cooling airflow; depending on dipswitch setting. (See Table 13 and Fig. 19.)
2. During a call for heat, the BLWM will keep continuous blower speed until the end of "Short run" delay period, after which the BLWM operates at the appropriate oil heating airflow. The BLWM reverts to continuous blower airflow after the heating cycle is completed.
3. When thermostat "calls for low-cooling", the BLWM keeps continuous-blower speed until the end of "Short run" delay period. After which the BLWM operates at the appropriate low-cooling airflow. When the thermostat is satisfied, the BLWM switches to continuous-blower airflow.
4. When the thermostat calls for high cooling, the BLWM keeps continuous-blower speed until the end of "Short run" delay period, after which the BLWM operates at the appropriate high-cooling airflow.
5. When R-G circuit is opened, the BLWM stops immediately.

Heat Pump

NOTE: A dual-fuel thermostat is required when variable-speed furnaces are used with heat pumps. See dual-fuel thermostat Installation Instructions for interface connections. The interface prevents simultaneous operation of both furnace and heat pump, and prevents direct transition from heat pump to furnace operation.

1. Single-Speed Heat Pump Cooling (See Fig. 17 for thermostat connections.)
   a. The thermostats close the R to Y/Y2-and-G-and-O circuits to operate the furnace BLWM at cooling airflow. The Y/Y2 input to the furnace control is necessary to provide adequate cooling airflow.
   b. When thermostat is satisfied, furnace BLWM continues operating at 50% of the cooling airflow for an additional 3 min.
2. Two-Speed Heat Pump Cooling (See Fig. 18 for thermostat connections.)
   a. The thermostat closes the R to G-and-Y1-and-O circuits to operate the furnace BLWM at low-cool airflow. The thermostat R to G-and-Y/Y2-and-Y1-and-O circuits operate the furnace BLWM at high-cool airflow.

NOTE: The furnace control CPU controls blower airflow by sensing G, Y1, and O for low-cool airflow and G, Y1, Y/Y2, and O for 2-speed high-cool airflow.

   b. When the thermostat is satisfied, the furnace BLWM continues operating at 50%of the additional 3 min.
3. Single-Speed Heat Pump Heating (See Fig. 17 for thermostat connections.)
   a. The thermostats close R to G-and-Y/Y2 circuits to operate the furnace BLWM at heat pump heating airflow. Heating airflow is the same as cooling airflow.
   b. When thermostat is satisfied, the furnace BLWM continues operating at 50% of the heat pump heating airflow for an additional 3 min.
4. Two-Speed Heat Pump Heating (See Fig. 18 for thermostat connections.)
   a. The thermostat closes the R to Y1-and-G circuits for low heat and operates the furnace BLWM at heat pump low-heat airflow. Closing R-Y/Y2, Y1 and G circuit to furnace provides BLWM heat pump high-heat airflow.

NOTE: The furnace control CPU controls BLWM airflow by sensing G and Y1 for heat pump low-heat airflow, and G, Y1, and Y/Y2 for heat pump high-heat airflow.

   b. When the thermostat is satisfied, the furnace BLWM continues operating at 50% heating airflow for an additional 3 min.
   c. Opening only R-Y/Y2 circuit switches BLWM to heat pump low-heat airflow.

Defrost

When furnace controls R to W/W1-and-Y/Y2 circuits are closed, furnace control CPU starts and burner and BLWM operation is at oil-heating airflow during defrost.

Step 3 — Combustion Check

In order to obtain optimum performance from oil burner, the following setup procedures must be followed:

1. A test kit to measure smoke, stack draft, over-fire draft, CO2, oil-pump pressure, and stack temperatures MUST be used in order to obtain proper air band setting. Although all of the above measurements are required for optimum setup and efficiency data, the most important readings that must be taken are smoke number, over-fire draft, stack draft, and oil pump pressure.
2. The proper smoke number has been established by engineering tests to be between 0 and 1. This degree of smoke emission is commonly referred to as a "trace" of smoke. It is recommended to use a Bacharach true-spot smoke test set or equivalent.
3. In order to ensure proper draft through furnace, a barometric draft regulator (supplied with furnace) must be installed.

In order for this device to function properly, barometric damper must be mounted with hinge pins horizontal and face of damper vertical. (See instructions included with damper.) The draft regulator should be adjusted after furnace has been firing for at least 5 min., and set between -0.025 and -0.035 in. wc. (See Table 5.)

Table 5 – Furnace Draft Conditions (in wc)

FURNACE INPUT (BTUH)	FLUE DRAFT MINIMUM	OVER–FIRE DRAFT MAXIMUM	TOTAL RESTRICTION THROUGH HEAT EXCHANGER
70,000	–0.025	0.010	0.020 to 0.035
91,000	–0.025	0.020	0.030 to 0.045
105,000	–0.025	0.025	0.035 to 0.050
119,000	–0.025	0.025	0.035 to 0.050
140,000	–0.025	0.025	0.035 to 0.050
154,000	–0.025	0.025	0.035 to 0.050

4. The over-fire draft, which is taken through observation door (located in center line above burner in front panel of furnace), is a measurement necessary to determine if there is a blockage between oil burner and flue outlet.
   There should be a total pressure drop of between 0.020 and 0.05 in. wc. through furnace as shown in Table 5. The over-fire draft must be set within the range shown in Table 5.
   A reading outside the range shown in Table 5 (for example +0.1 in. wc.) would indicate that furnace is in an extremely high-pressure condition in primary section. This condition may be caused by any of the following problems:
   a. Excessive combustion air due to air band being too wide open.
   b. A lack of flue draft (chimney effect) or some other blockage, such as soot, in secondary section of heat exchanger.
   c. Use of an oversized nozzle input.
   d. Pump pressure over the values listed in Table 6.

Table 6 – Burner Input and Nozzle Size

FURNACE INPUT (BTUH)	FIRING RATE GAL/HR (US)*	RIELLO OIL BURNER		PUMP PRESSURE (PSIG)
		NO. 40 SERIES MODEL	DELAVAN NOZZLE	
70,000	0.50	F3	0.40 - 70A	160
91,000	0.65	F3	0.50 - 70W	170
105,000	0.75	F3	0.65 - 70W	135
119,000	0.85	F5	0.75 - 70B	130
140,000	1.00	F5	0.85 - 70W	140
154,000	1.10	F5	1.00 - 70W	125

* For rating purposes only.

5. The CO_2 and stack-temperature instruments enable you to obtain data required to determine thermal efficiency of furnace.
6. An oil filter should be installed as close to burner as possible with ALL oil burners and is essential on lower firing rate burners. We recommend the use of a low-pressure-drop oil filter such as the General Filter, Inc. model #1A-25A or equivalent.
7. The oil pressure regulator is factory set to give oil pressure of 135 psig for the model having 105,000 BTUH input and 130 psig for the model having 119,000 BTUH input. The firing rate noted on nameplate may be obtained using the nozzles and pump pressures indicated in Table 6. The proper oil burner turbulator setting for all the firing rates is 0 (zero).
8. On a new installation, air entrapped in oil line leading from tank to nozzle must be thoroughly purged in order to prevent excessive after drip. The oil pump is provided with a special fitting which allows purging of any air between tank and oil pump. The proper procedure for performing this operation is as follows:
   a. Place a piece of clear plastic 1/4-in. diameter tubing over purge fitting on oil pump.
   b. Start oil burner, then open purge fitting and allow burner to run until purge tube is completely free of air bubbles.
   c. Tighten purge fitting. Allow oil to run to nozzle and fire burner.
   d. If purging takes longer than 15 sec. and no flame has been established, burner stops. Push reset button on front of primary control to restart burner.
   e. For detailed information on operation of primary control, refer to instructions included with furnace.

After all the setup procedures mentioned above have been completed, the burner should be allowed to operate and an inspection mirror should be used to observe the flame pattern at tip of nozzle. Any irregularities such as burning to 1 side or pulsating flame patterns should be corrected by changing nozzle.

Step 4 — Fan Adjustment Check

This furnace is equipped with a variable-speed motor. The blower is factory set to deliver the required airflow for 0.75GAL/HR(US) INPUT and 3.0 tons air conditioning for the 58VMR105 (See Tables 7, 8, and 9 and Fig. 19.). The blower is factory set to deliver the required airflow for 0.85GAL/HR (US) INPUT and 5 tons air conditioning for the 58VMR120. (See Tables 10, 11 and 12 and Fig. 19.) The blower is field adjustable to deliver the required airflow for other capacities.

Table 7 – 58VMR105 Dip Switch Adjustment for Oil Heating Mode

SW1–HEAT DIP SWITCH POSITION		INPUT USGPH	SW4–DELAY DIP SWITCH POSITION		INPUT USGPH
1	2		1	2	
Off	Off	0.75	Off	Off	0.75
On	Off	0.65	On	Off	0.65
Off	On	0.5	Off	On	0.5
On	On	N/A	On	On	NA

Table 8 – 58VMR105 Size Dip Switch Adjustments for Heat Pump and Cooling Mode

SW2–COOL DIP SWITCH POSITION		A/C SIZE (TONS)
1	2	
Off	Off	3.0
On	Off	2.5
Off	On	2.0
On	On	1.5

Table 9 – 58VMR105 Size Dip Switch CFM Adjustments in All Modes

SW3–ADJUST DIP SWITCH POSITION		HEATING CFM % INCREASE OR DECREASE	COOLING CFM % INCREASE OR DECREASE
1	2		
Off	Off	0	0
On	Off	+13	+10
Off	On	–15	–10
On	On	N/A	0

Table 10 – 58VMR120 Size Dip Switch Adjustment for Oil Heating Mode

SW1–HEAT DIP SWITCH POSITION		INPUT USGPH	SW4–DELAY DIP SWITCH POSITION		INPUT USGPH
1	2		1	2	
Off	Off	0.85	Off	Off	0.85
On	Off	1.00	On	Off	1.0
Off	On	1.10	Off	On	1.10
On	On	N/A	On	On	NA

Table 11 – 58VMR120 Size Dip Switch Adjustments for Heat Pump and Cooling Mode

SW2–COOL DIP SWITCH POSITION		A/C SIZE (TONS)
1	2	
Off	Off	5.0
On	Off	4.0
Off	On	3.5
On	On	3.0

Table 12 – 58VMR120 Size Dip Switch CFM Adjustments in All Modes

SW3–ADJUST DIP SWITCH POSITION		HEATING CFM % INCREASE OR DECREASE	COOLING CFM % INCREASE OR DECREASE
1	2		
Off	Off	0	0
On	Off	+13	+10
Off	On	–15	–10
On	On	N/A	0

⚠ WARNING

FIRE HAZARD AND UNIT RELIABILITY

Failure to follow this warning could result in property damage, personal injury, or death.

When operating furnace in heating mode, static pressure and temperature rise (supply-air temperature minus return-air temperature) must be within those limits specified on rating label.

Step 5 — Limit-Control Check

After furnace has been in operation for at least 15 minutes, restrict return-air supply by blocking filters or closing return registers and allow furnace to shut down on high limit. The burner should shut off and main blower should continue to run.

Step 6 — For Year-Round Air Conditioning

This furnace is designed for use in conjunction with cooling equipment to provide year-round air conditioning. The blower has been sized for both heating and cooling, however fan-motor setting may need to be changed to obtain necessary cooling airflow.

CARE AND MAINTENANCE

⚠ WARNING

ELECTRICAL SHOCK, FIRE, EXPLOSION HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

The ability to properly perform maintenance on this equipment requires certain expertise, mechanical skills, tools, and equipment. If you do not possess these, do not attempt to perform any maintenance on this equipment other than those procedures recommended in the User's Manual.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before performing any service functions, unless operations specifically require power to be on, make sure all utilities are turned off upstream of appliance.

Step 1 — General

In order to keep this furnace in good operating condition and to maintain its warranty, the furnace MUST be serviced on an annual basis. This servicing includes a nozzle change, a burner inspection, a visual check of tube passages through flue outlet and clean-out ports, and a visual inspection of combustion chamber when burner is removed.

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury or death.

Failure to replace any heat exchanger gaskets with new gaskets when any heat exchanger plates or covers are removed could lead to heat exchanger leakage or sooting.

Depending on above inspection, service could also include a cleaning and vacuuming of heat exchanger tubes and possibly the heat exchanger drum section.

Removal of any heat exchanger components which are sealed by gaskets requires replacement of gasket.

This furnace should never be operated without an air filter. Disposable filters should be replaced at least once a year. If equipped to provide cooling, filters should be replaced a minimum of twice a year. Permanent filters should be cleaned at least twice a year.

ALWAYS KEEP MAIN OIL VALVE TURNED OFF IF BURNER IS SHUT DOWN FOR AN EXTENDED PERIOD OF TIME.

Step 2 — Oil Burner

For optimum performance, oil-burner nozzle should be replaced once a year. Contact your service technician if you are unsure of this procedure.

The procedure for nozzle installation and/or replacement is outlined in oil burner instruction manual which came with furnace.

After replacement of nozzle, burner should be adjusted in accordance with Combustion Check section of this instruction.

Step 3 — Heat Exchanger and Flue Pipe

Ordinarily, it is not necessary to clean heat exchanger or flue pipe every year, but it is necessary to have your service technician check unit before each heating season to determine whether cleaning or replacement of parts is required.

If cleaning is necessary, the following steps should be performed:

⚠ CAUTION

BURN HAZARD

Failure to follow this caution may result in personal injury.

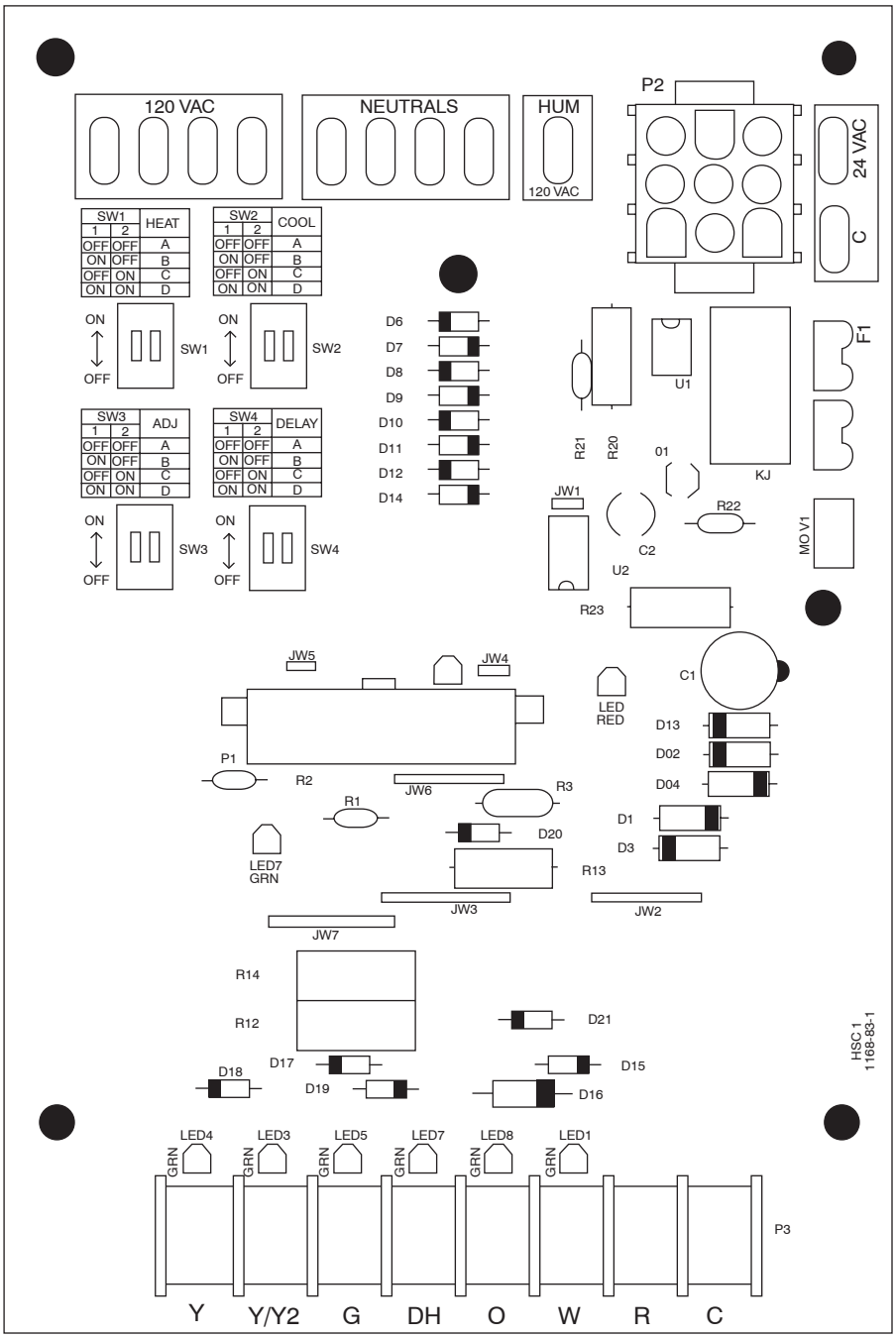
If furnace has been in operation, some surfaces may be hot. Allow time for unit to cool down.

1. Turn off all oil and electrical supplies upstream of furnace.
2. Disconnect flue pipe.
3. Remove flue collar panel located in front part of furnace.
4. Remove baffle from secondary heat exchanger.
5. Disconnect oil line and remove oil burner from furnace.
6. Open 2 cleanout doors located in upper part of front panel of furnace.
7. Clean secondary tubes, and primary cylinder with stiff brush and vacuum cleaner.
8. Before re-assembly, the heat exchanger and combustion chamber should be inspected to determine if replacement is required.
9. After cleaning, replace baffle, flue-collar plate, oil burner, and close the 2 cleanout access doors. Reconnect flue pipe and oil line.
10. Re-adjust burner for proper operation.

Step 4 — Blower Removal

To remove blower from furnace:

1. Turn off all oil and electrical supplies upstream of furnace.
2. Remove burner access and blower door.
3. Remove blower retaining screw (on blower shelf).
4. Remove cover from control box and disconnect thermostat and power wires from the board.
5. Slide blower forward on rails toward front of unit.
6. Reverse items 1 through 5 to re-install blower. Refer to wiring diagram (See Fig. 14) of these instructions or diagram located on inside of blower door to properly rewire unit.



NOTES
1. The Red LED to the right of P-1 will illuminate whenever the limit switch is open.
2. The Green LED below the left end of P-1 will flash when the blower motor is operating. The LED will flash one time for each 100 RPM.
3. The Green LEDs above Y1, Y/Y2, G, O, and W will illuminate whenever there is a 24V input from the thermostat.
4. The Green LED above DH will illuminate whenever there is not a 24VAC input applied.

A04194

Fig. 19 - Control Board

Table 13 – 58VMR105

OIL HEATING MODE					
24 VAC INPUT (R) ON W ONLY					
SW1–HEAT DIP SWITCH POSITION	**HEAT INPUT (USGPH)**	**AIRFLOW (CFM) EXTERNAL STATIC PRESSURE**			
		0.2	**0.5**	**0.7**	**0.9**
A (1=OFF, 2=OFF)*	0.75	1128	1146	1146	842
A (1=OFF, 2=OFF)**		1275	1295	1295	951
A (1=OFF, 2=OFF)***		959	974	974	716
B (1=ON, 2=OFF)*	0.65	894	951	969	823
B (1=ON, 2=OFF)**		1010	1075	1095	930
B (1=ON, 2=OFF)***		760	808	824	700
C (1=OFF, 2=ON)*	0.50	733	779	769	757
C (1=OFF, 2=ON)**		858	880	869	855
C (1=OFF, 2=ON)**		623	662	654	643
D (1=ON, 2=ON)	SAME VALUE AS A DIP SWITCH POSITION				
CONTINUOUS FAN					
24 VAC INPUT (R) ON G ONLY					
SW2–COOL DIP SWITCH POSITION	**A/C SIZE (TON)**	**AIRFLOW (CFM) EXTERNAL STATIC PRESSURE**			
		0.2	**0.5**	**0.7**	**0.9**
A (1=OFF, 2=OFF)*	3.0	690	739	729	711
A (1=OFF, 2=OFF)**		759	813	802	782
A (1=OFF, 2=OFF)***		621	665	656	640
B (1=ON, 2=OFF)*	2.5	600	613	609	592
B (1=ON, 2=OFF)**		660	674	670	651
B (1=ON, 2=OFF)***		540	552	548	533
C (1=OFF, 2=ON)*	2.0	505	513	505	483
C (1=OFF, 2=ON)**		556	564	556	531
C (1=OFF, 2=ON)**		455	462	455	435
D (1=ON, 2=ON)*	1.5	441	434	417	410
D (1=ON, 2=ON)**		485	477	459	451
D (1=ON, 2=ON)***		397	391	375	369
COOLING OR HEAT PUMP HEATING MODE – SINGLE SPEED OR 2–SPEED HIGH					
24 VAC INPUT (R) ON Y/Y2 AND O (FOR COOLING)					
SW2–COOL DIP SWITCH POSITION	**A/C SIZE (TON)**	**AIRFLOW (CFM) EXTERNAL STATIC PRESSURE**			
		0.2	**0.5**	**0.7**	**0.9**
A (1=OFF, 2=OFF)*	3.0	918	973	973	827
A (1=OFF, 2=OFF)**		1010	1070	1070	910
A (1=OFF, 2=OFF)***		826	876	876	744
B (1=ON, 2=OFF)*	2.5	752	798	798	795
B (1=ON, 2=OFF)**		827	878	878	875
B (1=ON, 2=OFF)***		677	718	718	716
C (1=OFF, 2=ON)*	2.0	620	658	650	631
C (1=OFF, 2=ON)**		682	724	715	694
C (1=OFF, 2=ON)**		558	592	585	568
D (1=ON, 2=ON)*	1.5	509	520	506	497
D (1=ON, 2=ON)**		560	572	557	547
D (1=ON, 2=ON)***		458	468	455	447
NOTE: In cooling–dehumidification mode, with no 24VAC input to DH, the CFM is reduced 15%					
COOLING OR HEAT PUMP HEATING MODE – 2–SPEED LOW					
24 VAC INPUT (R) ON Y1 AND O (FOR COOLING)					
SW2–COOL DIP SWITCH POSITION	**A/C SIZE (TON)**	**AIRFLOW (CFM) EXTERNAL STATIC PRESSURE**			
		0.2	**0.5**	**0.7**	**0.9**
A (1=OFF, 2=OFF)*	3.0	546	552	544	530
A (1=OFF, 2=OFF)**		601	607	598	583
A (1=OFF, 2=OFF)***		491	497	490	477
B (1=ON, 2=OFF)*	2.5	485	488	482	463
B (1=ON, 2=OFF)**		534	537	530	509
B (1=ON, 2=OFF)***		437	439	434	417
C (1=OFF, 2=ON)*	2.0	434	421	413	404
C (1=OFF, 2=ON)**		477	463	454	444
C (1=OFF, 2=ON)**		391	379	372	364
D (1=ON, 2=ON)*	1.5	372	370	364	339
D (1=ON, 2=ON)**		409	407	400	373
D (1=ON, 2=ON)***		335	333	328	305
NOTE: In cooling–dehumidification mode, with no 24VAC input to DH, the CFM is reduced 15%					

*CFM with SW3–ADJ Dip Switch A Position

**CFM with SW3–ADJ Dip Switch B Position

***CFM with SW3–ADJ Dip Switch C Position

Table 13 - 58VMR120 (cont)

OIL HEATING MODE					
24 VAC INPUT (R) ON W ONLY					
SW1–HEAT DIP SWITCH POSITION	**HEAT INPUT (USGPH)**	**AIRFLOW (CFM) EXTERNAL STATIC PRESSURE**			
		0.2	**0.5**	**0.7**	**0.9**
A (1=OFF, 2=OFF)*	0.85	1417	1417	1417	1407
A (1=OFF, 2=OFF)**		1601	1601	1601	1590
A (1=OFF, 2=OFF)***		1204	1204	1204	1196
B (1=ON, 2=OFF)*	1.00	1674	1666	1658	1658
B (1=ON, 2=OFF)**		1892	1883	1874	1874
B (1=ON, 2=OFF)***		1423	1416	1409	1409
C (1=OFF, 2=ON)*	1.10	1826	1826	1826	1813
C (1=OFF, 2=ON)**		2063	2063	2063	2049
C (1=OFF, 2=ON)**		1552	1552	1552	1541
D (1=ON, 2=ON)	SAME VALUE AS A DIP SWITCH POSITION				
CONTINUOUS FAN					
24 VAC INPUT (R) ON G ONLY					
SW2–COOL DIP SWITCH POSITION	**A/C SIZE (TON)**	**AIRFLOW (CFM) EXTERNAL STATIC PRESSURE**			
		0.2	**0.5**	**0.7**	**0.9**
A (1=OFF, 2=OFF)*	5.0	1243	1259	1259	1251
A (1=OFF, 2=OFF)**		1367	1385	1385	1376
A (1=OFF, 2=OFF)***		1119	1133	1133	1126
B (1=ON, 2=OFF)*	4.0	989	995	977	959
B (1=ON, 2=OFF)**		1088	1095	1075	1055
B (1=ON, 2=OFF)***		890	896	879	863
C (1=OFF, 2=ON)*	3.5	871	871	843	831
C (1=OFF, 2=ON)**		958	958	927	914
C (1=OFF, 2=ON)**		784	784	759	748
D (1=ON, 2=ON)*	3.0	773	741	741	705
D (1=ON, 2=ON)**		850	815	815	776
D (1=ON, 2=ON)***		696	667	667	635
COOLING OR HEAT PUMP HEATING MODE – SINGLE SPEED OR 2–SPEED HIGH					
24 VAC INPUT (R) ON Y/Y2 AND O (FOR COOLING)					
SW2–COOL DIP SWITCH POSITION	**A/C SIZE (TON)**	**AIRFLOW (CFM) EXTERNAL STATIC PRESSURE**			
		0.2	**0.5**	**0.7**	**0.9**
A (1=OFF, 2=OFF)*	5.0	1738	1738	1738	1725
A (1=OFF, 2=OFF)**		1912	1912	1912	1898
A (1=OFF, 2=OFF)***		1564	1564	1564	1553
B (1=ON, 2=OFF)*	4.0	1333	1352	1352	1342
B (1=ON, 2=OFF)**		1466	1487	1487	1476
B (1=ON, 2=OFF)***		1200	1217	1217	1208
C (1=OFF, 2=ON)*	3.5	1154	1154	1145	1118
C (1=OFF, 2=ON)**		1269	1269	1260	1230
C (1=OFF, 2=ON)**		1039	1039	1031	1006
D (1=ON, 2=ON)*	3.0	992	997	974	974
D (1=ON, 2=ON)**		1091	1097	1071	1071
D (1=ON, 2=ON)***		893	897	877	877
NOTE: In cooling–dehumidification mode, with no 24VAC input to DH, the CFM is reduced 15%					
COOLING OR HEAT PUMP HEATING MODE – 2–SPEED LOW					
24 VAC INPUT (R) ON Y1 AND O (FOR COOLING)					
SW2–COOL DIP SWITCH POSITION	**A/C SIZE (TON)**	**AIRFLOW (CFM) EXTERNAL STATIC PRESSURE**			
		0.2	**0.5**	**0.7**	**0.9**
A (1=OFF, 2=OFF)*	5.0	900	900	881	860
A (1=OFF, 2=OFF)**		990	990	969	946
A (1=OFF, 2=OFF)***		810	810	793	774
B (1=ON, 2=OFF)*	4.0	749	723	717	695
B (1=ON, 2=OFF)**		824	795	789	765
B (1=ON, 2=OFF)***		674	651	645	626
C (1=OFF, 2=ON)*	3.5	680	643	617	599
C (1=OFF, 2=ON)**		748	707	679	659
C (1=OFF, 2=ON)**		612	579	555	539
D (1=ON, 2=ON)*	3.0	595	576	539	511
D (1=ON, 2=ON)**		655	634	593	562
D (1=ON, 2=ON)***		536	518	485	460
NOTE: In cooling–dehumidification mode, with no 24VAC input to DH, the CFM is reduced 15%					

*CFM with SW3–ADJ Dip Switch A Position
**CFM with SW3–ADJ Dip Switch B Position
***CFM with SW3–ADJ Dip Switch C Position

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