INDUSTRIAL
COMMERCIAL
EQUIPMENT
MANUFACTURING LTD.

51 Aikins Street
Winnipeg, Manitoba
Canada, R2W 4E3

MTI SERIES
INSTALLATION, OPERATION AND MAINTENANCE MANUAL

ATTENTION: Read this manual, unit submittal sheets and all labels attached to the unit carefully before attempting to install, operate or service these units! Check unit data plates for type of gas, model number and serial numbers. Retain this document for future reference.

FOR YOUR SAFETY, IF YOU SMELL GAS, FOLLOW THESE INSTRUCTIONS,

1) **OPEN WINDOWS**
2) **DO NOT TOUCH ELECTRICAL SWITCHES**
3) **EXTINGUISH ANY OPEN FLAMES**
4) **CALL THE GAS SUPPLIER IMMEDIATELY**

FOR YOUR SAFETY, THE USE OF GASOLINE OR OTHER FLAMMABLE VAPOURS AND LIQUIDS IN OPEN CONTAINERS IN THE VICINITY OF THIS APPLIANCE IS HAZARDOUS.

Model:_____ Serial Number:_____

Job:_____ Date of Installation:_____

WARNING
IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE PROPERTY DAMAGE OR DEATH. PLEASE READ THIS INSTALLATION, OPERATION AND MAINTENANCE MANUAL THOROUGHLY BEFORE INSTALLING OR SERVICING THIS EQUIPMENT

INSTALLERS RESPONSIBILITY

Installer please note: This equipment has been test fired and inspected. It has been shipped free from defects from our factory. However, during shipment and installation, problems such as loose wires, leaks or loose fasteners may occur. It is the installer's responsibility to inspect and correct any problems that may be found.

INSTALLER/SERVICE CONTRACTOR

NAME:_____
ADDRESS:_____
TELEPHONE:_____
CONTACT:_____

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RECEIVING AND WAREHOUSING

Inspect the unit upon arrival for any shipping damage. If any part is missing or damaged, mark the bill of lading as to damage and notify the carrier and factory at once.

If the unit cannot be installed immediately, store the unit in a clean and dry place.

GENERAL HANDLING INSTRUCTIONS

A qualified and experienced crane operator must do all rigging. General rigging methods should be followed in all cases:

a) Spreader bars must be used when lifting equipment.
b) Equipment must be lifted simultaneously by all "eye" bolts or channel slots provided on each section at the same time to distribute the loading properly. Damage or injury may result if all provisions for lifting are not utilized at time of lift. When multiple lifting eyes are furnished they are to share the weight of the lift evenly via spreader bar(s).
c) Lifting eyes and channel slots are designed to be lifted vertically. The **MAXIMUM** angle from a vertical lift, which is permitted, is 30 degrees. Single sections only are to be lifted at one time and stacked from the lowest section upward. Sections are designed to be self-supporting in compression only. Do not attempt to hang multiple sections from any structure. The total perimeter base and all frame structure must be supported, and levelled, on high-density concrete or sufficient I-beam steel.
d) For some models the heating and blower sections may be shipped separately. Assemble the sections by aligning the base frames and/or the pre-drilled flanges and secure the assembly with the fasteners provided. Use gasketing material to prevent infiltration at the joints.

WARNING
FAILURE TO COMPLY WITH THE GENERAL REQUIREMENTS MAY RESULT IN EXTENSIVE PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH.

GENERAL INSTALLATION NOTES

a) In Canada the installation must conform with local building codes or, in the absence of local building codes, with the current CAN/CGA -BI49.1 or B149.2 "Installation Codes for Gas Burning Appliances and Equipment". Indoor duct furnaces have been designed for, and certified to comply with, CAN/CGA2.8.
b) Installation must be made in accordance with local codes or in absence of local codes with ANSI Standard Z223.1-1992 (N.F.P.A. No.54) "National Fuel Gas Code" or the latest edition of all ANSI and NFPA standards. Standards referred to in these installation instructions are in effect at the time of certification. ANSI Standards are available from the American Gas Association 1515 Wilson Boulevard, Arlington, Virginia 22209. NFPA standards are available from the National Fire Protection Association, Battery March Par, Quincy, Massachusetts 02269. Heaters referred to in this manual are designed for use in airplane hangers when installed in accordance with ANSI/NFPA No.409 and in public garages when installed in accordance with the NFPA No. 88a and NFPA No.88b.

c) No alterations are to be made on this equipment.
d) For suspended appliances that are installed in aircraft hangers, parking structures, and repair garages must be installed in accordance with the standard on aircraft hangers, ANSI/NFPA 409, the standard for parking structures. ANSI/NFPA 88a, the standard for repair garages, ANSI/NFPA 88b, and with the CAN I-B149 codes,

CLEARANCE TO COMBUSTIBLE MATERIALS in inches (mm)

TOP	FRONT	BACK	FLOOR	SIDES	ACCESS SIDE
6(152)	6(152)	6(152)	3(76)	6(152)	18(457)

All units installed on the floor have a minimum clearance of 3" (76mm) provided by the base frame of each individual unit.

For service it is advisable to maintain a minimum 24" clearance on the side opposite the controls side. If this unit is to be operated within a confined space or within a building of unusually tight construction, air for combustion and ventilation must be obtained from outdoors or other spaces freely communicating with the outdoors. Refer to current United States and Canadian Fuel Codes.

Ducts connected to the furnace shall have removable access panels on both the upstream and downstream sides of the furnace. These openings shall be accessible when the furnace is installed and shall be sized to allow for the observation of smoke or reflected light inside the casing to indicate the presence of leaks in the heat exchanger. The covers for the openings shall be attached in such manner as to prevent leaks.

WARNINGS

- The furnace must not be operated in the presence of hazardous atmospheres containing flammable vapours or combustible dust, chlorinated vapours or halogenated hydrocarbons, or in applications with airborne substances containing silicone. When such vapours mix with products of combustion, highly corrosive compounds result, which will result in the premature failure of the heat exchanger and other components. In such an event the warranty is void.

- The duct furnace is not certified or suitable for use in drying process applications. Use in such application voids any warranty and as the manufacturer disclaims any responsibility for the duct furnace and/or application.

- The use and storage of gasoline or other flammable liquids in the vicinity of the appliance is hazardous.

CONNECTING THE FLUE (VENTING)

OUTDOORS INSTALLATIONS

AIR FOR COMBUSTION

Openings for combustion air must be provided in a panel (door) with direct access to the vestibule area where the burners and draft inducer are located. This air opening must be of sufficient size to provide a suitable supply of air for combustion to the burner compartment, but not less than one (1) square inch free area per every 8000 Btu per hour of the specified maximum input rate. The minimum dimension of any air opening should not be less than 3 inches. Heating appliance must be installed so that air access to inlet opening is unobstructed.

VENTING

The vent termination must be located in accordance with the National Fuel Codes (ANSI Z223.1) in the US or CAN/CGA-B149 Installation code in Canada.
The venting system for outdoor units is a Category 111, with vent products at positive pressure and up to 500 °F. The cross-section area of the vent duct or pipe must be at least equal to the discharge area of the draft inducer.

The discharge opening must always be located in the same pressure zone as the combustion air inlet.

- For horizontal discharge, the outlet should be located on the same side of the unit as the combustion air inlet. Never locate the vent outlet on the opposite side from the combustion air inlet opening.
- For Horizontal discharge where the flue gases need to be vented vertically, the preferred flue gas discharge should terminate in an exterior flue riser that extends at least to the top of the cabinet and is open at the top and bottom. This riser must be located on the same side of the appliance as the combustion air opening.

INDOOR INSTALLATIONS

AIR FOR COMBUSTION

The furnace must be installed in a location with adequate clearances to provide for an adequate combustion air space, service and inspection, and proper clearance for combustible construction. The furnace shall be located in such a manor that it does not interfere with the circulation of air in the heated space.

All fuel burning equipment must be supplied with air that enters into the combustion process and is then vented outdoors. Sufficient air must enter the appliance location to replace the air exhausted through the vent system. Do not install appliances in a confined space without providing wall opening to and from this space, if building construction is such that the normal infiltration does not provide sufficient air for combustion and venting, outside air must be introduced in accordance with ANSI Z223.1 (Sect. 1.3.4.2 and 1.3.4.3). Install air openings that provide a total free area in accordance with the following:

1. Air from inside the building – Opening of 1 square inch (sq. in.) per 1000 Btuh of input, but never less than 100 sq. in.
2. Air from outside (ducted) – Opening of 1 sq. in. per 2000 Btuh
3. Air from outside (direct opening) – Opening of 1 sq. in. per 4000 Btuh

VENTING

All duct furnaces must be vented outside of the heated space. All venting installations shall be in accordance with the latest editions of ANSI Z223.1 The National Fuel Gas Codes, part 7, Venting of Equipment, or applicable provisions of local codes and ordinances.

The duct furnace must be connected to a factory built chimney or vent complying with a recognized standard or a masonry or concrete chimney lined with a lining material acceptable to the authority having jurisdiction.

The duct furnace will be classified in accordance with ANSI standards as follows:

- Category I – Non- condensing appliance with negative vent pressure
- Category III – Non-condensing appliance with positive vent pressure

VERTICALLY VENTED FURNACE – Category I (see figure 1 in appendix C)

1. Use single wall or double wall (type B) vent pipe of diameters listed in the following table for the appropriate models:
2. Maximize the height of the vertical run of vent pipe. A minimum of five (5) feet (1.5m) of vertical pipe is required. The top of the vent must extend at least two (2) feet (0.61m) above highest point on the roof. (Use Listed Type B vent for external runs). A weatherproof vent cap must be installed to the vent termination.
3. Horizontal runs must not exceed 75% of the vertical height of the vent pipe, up to a maximum of ten (10) feet (3m). Horizontal runs should be pitched upward ¼" per foot (21 mm) and should be supported at 3 foot (1m) maximum intervals.
4. Design vent pipe to minimize the use of elbows. Each 90 is equivalent to 5 feet (1.5m) of straight vent pipe run.
5. Vent pipe should not be run through unheated spaces. If such runs cannot be avoided, insulate vent pipe to prevent condensation inside vent pipe. Insulation should be a minimum of ½" (12.7mm) thick foil faced fibreglass, minimum 1 ½lb density.
6. Dampers must not be used in vent piping runs. Spillage of flue gases into the occupied space could result.
7. Vent connectors serving Category 1 heaters must be connected into any portions of a mechanical draft system operating under positive pressure.

HORIZONTALLY VENTED FURNACES – Category III (see figure 2 in appendix C)

Pressures in Category III venting systems are positive and therefore care must be taken to avoid flue products form entering the heated space. Use only vent material and components that are UL listed and approved for Category III venting systems.

WARNING: Do not use Type B vent within a building on horizontally vented units.

All vent pipe joints must be sealed to prevent leakage into the heated space. Follow instructions provided with approved venting material used. The proper vent pipe diameter must be used, to insure proper venting of combustion products, as follows:

- Input rating of 200 000 Btuh to 400 000 Btuh – 6" diameter (152 mm)
- Input rating of 75 000 Btuh to 199 999 Btuh – 5" diameter (127 mm)

The total equivalent length of vent pipe must not exceed 50 ft (15.25m). Equivalent length is the total length of straight sections, plus 5 ft (1.52m) for each 90 elbow and 2.5 ft (0.76m) for each 45 elbow.

The vent system must also be installed to prevent collection of condensate. Pitch horizontal pipe runs downward ¼ in. per foot (21 mm per meter) toward the outlet to permit condensate drainage. Insulate vent pipe exposed to cold air or routed through unheated areas. Insulate pipe runs longer than 10 ft (3m). Insulation should be a minimum of ½ in thick foil face fibreglass, 1 ½ lb density. Maintain 6 in (152 mm) clearance between vent pipe and combustible materials.

An approved Breident Type L, Field Starkap or equivalent vent cap must be provided. Vent cap diameter must be the same as the required vent pipe diameter. The vent terminal must be at least 12 in (305mm) from the exterior wall that it passes through to prevent degradation of building material by flue gases. The vent terminal must be located at least 1ft (305mm) above grade, or in snow areas, at least 3ft (1m) above snow line to prevent blockage. Additionally, the vent terminals must be installed with a minimum horizontal clearance of 4 ft (1.2m) from electrical meters, gas meters, regulators or relief equipment.

Through the wall, vents shall not terminate over public walkways, or over an area where condensate or vapour could create a nuisance or hazard. Provide vent termination clearances to building or structure features as follows:

Structure	Minimum clearance
Door, Window or gravity inlet	4 ft below
	4 ft horizontally
	1 ft above
Forced air inlet within 10 ft	3 ft above
Adjoining building or parapet	6 ft
Adjacent public walkway	7 ft above grade

EACH APPLIANCE MUST HAVE IT'S OWN INDIVIDUAL VENT PIPE AND TERMINAL. Do not connect vent system from horizontally vented units to other vent systems or chimney.

SEPARATE COMBUSTION SYSTEMS

MTI duct furnace modules may be applied to appliances for operation in separated combustion systems. The module must be mounted with the burner section in a reasonably airtight vestibule compartment, as these systems provide combustion air from outside the

heated space and vent products of combustion outdoors. No air openings are to be provided in the vestibule access door or panel and sealing grommets or gaskets should be provided for gas and electrical entry points into the vestibule to provide a reasonably airtight seal.

1. A suitable airtight gasket on the vestibule door or access door.
2. An observation window in the door to permit observation of ignition and main burner flame during operation and servicing.
3. A door or panel interlock switch to insure that door or panel is closed or in place during operation.
4. Openings in the vestibule space for attachments of inlet air supply pipe and vent pipe, sized for the Btuh input rating.
5. Approved vent terminal on both the supply air inlet and flue gas exhaust. NOTE: **The inlet and outlet terminals must be located in the same pressure zone to provide safe appliance operation.**

Proper installation of air inlet, and flue gas exhaust piping are essential to the proper operation of the furnace. (See Figure 3 and Figure 4 in appendix C)

ELECTRICAL CONNECTIONS

a) This unit has been examined and tested for compliance with CSA C22.2 no.0, CSA C22.2 no.3 and the NEC code.
b) All electrical work must conform to the requirements of the current NEC and CSA standard C22.1, Canadian Electric Code part I, and local ordinances.
c) Control voltage is as indicted on the rating plate.
d) Follow the wiring diagram supplied with the unit.
e) If a space thermostat is used with the furnace, locate the thermostat so the cold drafts and hot discharge air streams do not affect the performance of the unit. Do no mount the thermostat on the casing of the unit, as it will be affected by radiated and conducted heat. Refer to the instruction furnished with the thermostat for further details.
f) If any of the original wires as supplied with the unit must be replaced, it must be replaced with type TEW 105 degrees or its equivalent except where noted.
g) Temperature controllers, limit controllers, remote selector switches, door switches or any other auxiliary electrical items must be connected to the terminals provided as shown on the wiring diagram.
h) For units shipped in multiple sections, electrical connections between sections are to be made by the installer in the field.
i) Field wiring to be done by the installer is denoted by doted lines on the wiring diagram. Solid lines on the wiring diagram indicate factory wiring by the manufacturer.
j) The unit must be electrically grounded in accordance with local codes, or in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70, and/or the CSA.C22.1 Canadian Electrical code.

NOTE: Due to the nature of transport, check all bolts and fasteners for tightness.

GAS PIPING

All gas piping should be in accordance with National Fuel Gas Code ANSI Z223.1, and CAN 1-B149 with the regulation of local authorities having jurisdiction. An emergency manual shut down valve shall be provided upstream of the piping to unit and should be labelled for quick identification. Colour coding of gas piping is also recommended.

In addition:

a) Carefully check the unit rating plate for fuel type and supply pressure.
b) If required, locate the high-pressure regulator at least five feet from the unit.
c) Gas lines must not be located in such a way as to hinder access to the unit.
d) A minimum 1/8" NPT plugged tapping, accessible for test gauge connection, must be installed immediately upstream of the gas supply connection to the appliance.

GAS VENT

High gas pressure regulator (if required), low pressure regulator, pilot pressure regulator, gas pressure switch (if supplied), and normally open vent valve (if supplied) must be vented outside of building for an indoor unit (check with authorities having jurisdiction).

DUCT FURNACES

a) A duct furnace shall be installed with an inlet duct, which will provide air distribution equivalent to a straight run of duct having the same cross-section area as the inlet connection and not less than two equivalent diameters in length.
b) The ducts connected to the duct furnace must have removable access panels on both upstream and downstream sides of the duct. The opening must be accessible, and shall be of such size, that smoke or reflected light may be observed inside the casing to indicate the presence of leaks in the heating element. The cover for the opening shall be attached in such a manner as to prevent leaks.
c) The installation of the duct furnace must be adjusted to obtain an air throughout within the range specified on the appliance rating plate.
d) If a duct furnace is connected to a return air duct or any other inlet air restoration; the duct furnace shall be installed on the positive pressure side of the air-circulating blower.

COOLING

When installed downstream from a refrigeration system, condensation will form and provisions shall be made to dispose of condensate.

HIGH ALTITUDE

Inputs are derated 4% for each 1000 ft (305m) elevation above 2000 ft (610m).

INDOOR UNITS

Install an indoor unit such that the gas ignition control system is not directly exposed to water spray, rain or dripping water.

GENERAL OPERATING INSTRUCTION

a) Refer to the rating plate for fuel input and supply pressures.
b) Do not attempt to start the burner if the unit is full of vapour gas, or if the combustion chamber is very hot.
c) Do not leave combustible material near the unit.
d) Shut off the manual fuel supply valve if the burner has been shut down for an extended period of time.
e) Ensure access doors are in place before starting the burner.
f) Do not start the burner unless the blower access doors are securely in place.
g) Refer to literature regarding controls, gas valves and other components.

START-UP PROCEDURES

PRECAUTIONS

a) Ensure the main disconnect switch is in the “off” position.
b) Ensure the burner on-off switch is in the “off” position.
c) Check all electrical and gas connections and tighten if necessary
d) Check main fans (by rotating fan shaft by hand), bearing setscrews, and pulley set screws. Ensure blowers are free to turn, vibration isolation shipping blocks are removed (if equipped), shipped loose items (if supplied), are removed from inside blower sections.
e) Lubricate (if necessary) the burner and main fan motors. The specification on the motors for grease and oil shall be adhered to.
f) Check heater outlets for obstruction.
g) Check all fuse blocks to determine that all fusing is installed.
h) Set the operating controls (e.g. thermostat, remote panel switches) so as to allow heating operation of the unit.
i) Reset the motor starter by pushing the reset button, if so equipped. Ensure all blowers are rotating in the correct rotation.
j) Check building system gas supplies and be sure all lines are purged of air.
k) Check building system gas supply pressure.

CAUTION-GAS UNITS

- At maximum input the supply gas pressure must fall within the range specified on the unit rating plate.
- Check all piping for tightness and correct any signs of leaks.

START-UP

a) Refer to start-up checklist and field report for correct settings that are to be checked on the unit.
b) Check the supply fan motor thermal overload setting against the rating plate figure.
c) Ensure burner on-off switch is in the “off”
d) Verify unit’s sequence of operation corresponds to sequence provided in the supplied literature.
e) Check supply fan motor amps against rating plate figure. If actual figure varies by +/-20% from rating plate value, take corrective actions with respect to ductwork and accessories external to the unit or blower/motor drive adjustments making sure to follow manufactures rating for blower rotational speeds.
f) The thermal overloads must be set to appropriate motor performance after all adjustments have been made.
g) Follow sequence and perform necessary steps to initiate burner activation.
h) Once flame is detected the controller goes into "Power" and “Heat” mode.
i) Check unit performance as described on the factory test report, (include items such as stack temperature. CO-2 level, flame signals etc.) Readings obtained in the field should not deviate significantly from those obtained at the factory.

SHUT DOWN

1. EMERGENCY SHUT DOWN

a) Set disconnect switch to "off” position.
b) Close the manual main fuel valve.
c) Set the burner on-off switch to "off”.

2. SERVICE SHUT DOWN

a) Set the burner toggle switch to "off” position.
b) Close the manual main fuel valve.
c) Set the operating controls, (e.g. thermostat, remote panel switches), so as to prevent heating operation.

MAINTENANCE

Regular maintenance is necessary to ensure the efficient operation and long life of this unit. This maintenance should be preformed by, or supervised by, qualified service personnel. A maintenance schedule should be prepared for the unit based on its application and location.

1. RECOMMENDED QUARTERLY MAINTENANCE

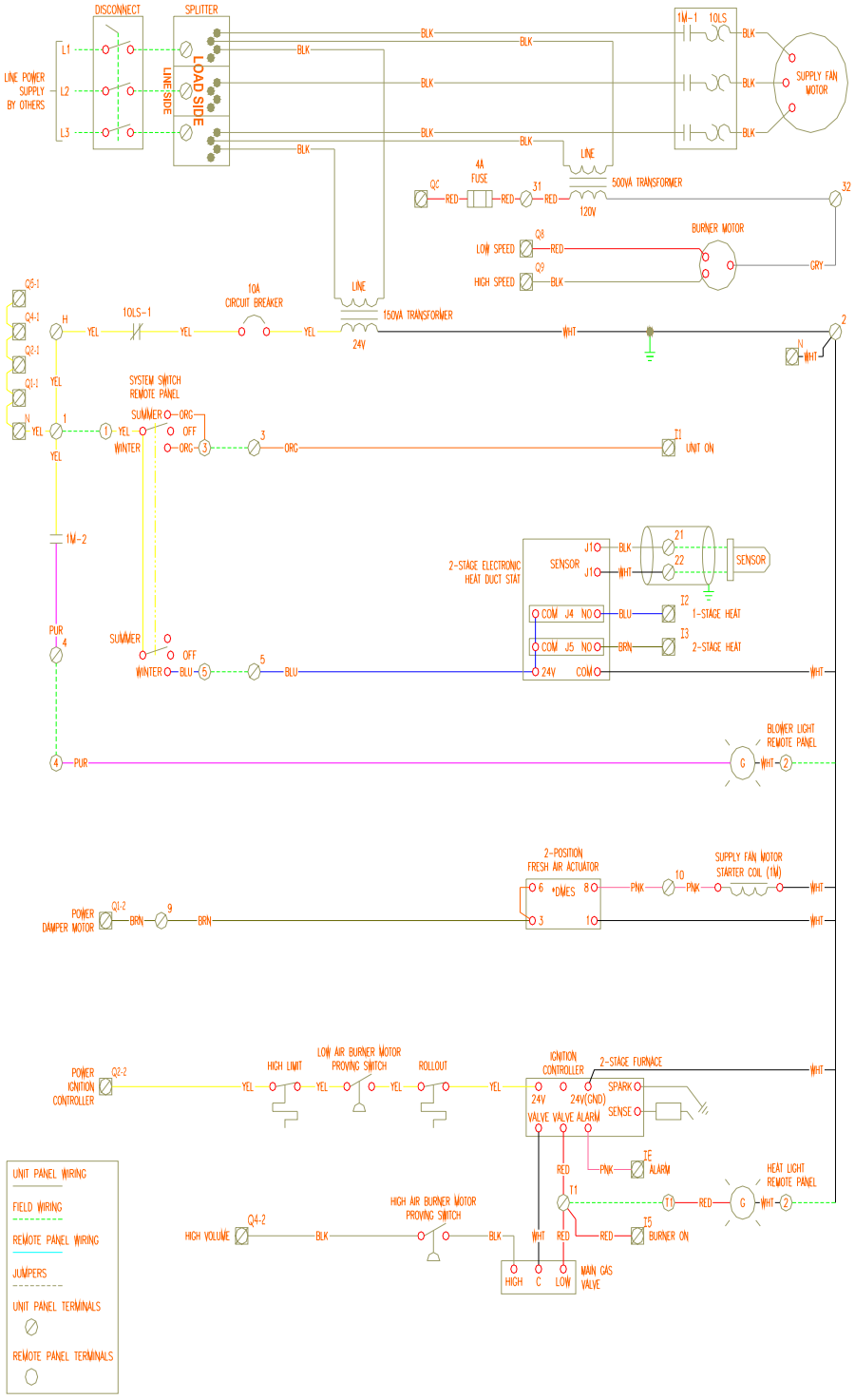
a) Check for loose connections in the wiring.
b) Check the voltage at the unit while it is in operation.
c) Check motor amperage draws against rating plate values.
d) Inspect all contactors to ensure that they are clean and making good contact.
e) Check all fittings, valves and lines for leaks.
f) Check for proper combustion. Adjust if necessary.
g) Check the flame sensor signal (1.5-6.0 mA), clean if necessary.
h) Check the fuel supply pressure to the unit.
i) On gas fired units check the manifold pressure.
j) Clean or replace air filters if necessary. Replace filters only with type equivalent to those supplied with the unit by the factory.
k) Check all dampers, linkages and damper actuators; adjust and tighten as required.
l) Check all belts. Adjust or replace as necessary.
m) Check all bearings and lubricate if necessary.
n) Check operation of all safety controls.
o) Oil burner fan.
p) Check all bearings to ensure tightness on shaft and lubricate if necessary.
q) Check ignition spark and adjust gap if necessary.

2. RECOMMENDED YEARLY MAINTENANCE

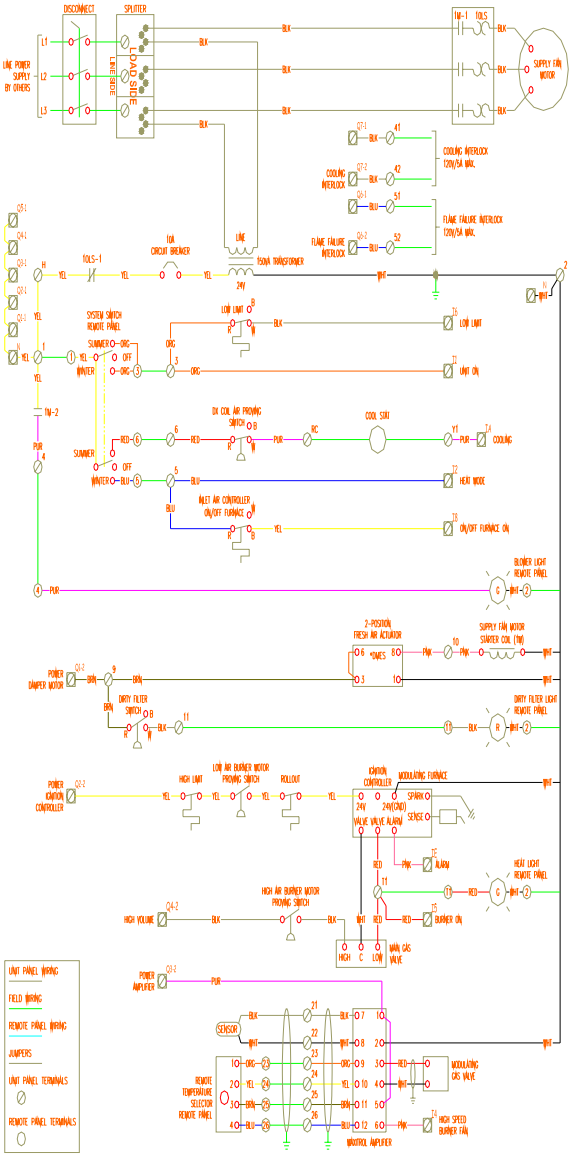
a) Perform the monthly quarterly maintenance recommended.
b) Inspect blower wheels and housing, clean if necessary.
c) Inspect all set screws on blower wheels and pulleys to ensure that they are secured to their respective shafts
d) Check flame supervisor controller.
e) Inspect all operating and safety controls. Clean and replace if necessary.
f) Inspect and clean the collection and disposal systems to ensure proper drainage.

NOTE: If ignition controller is replaced, ensure the control system is not exposed to water spray, rain or dripping water. Refer to individual manufacturer's literature provided for maintenance requirements of optional equipment.

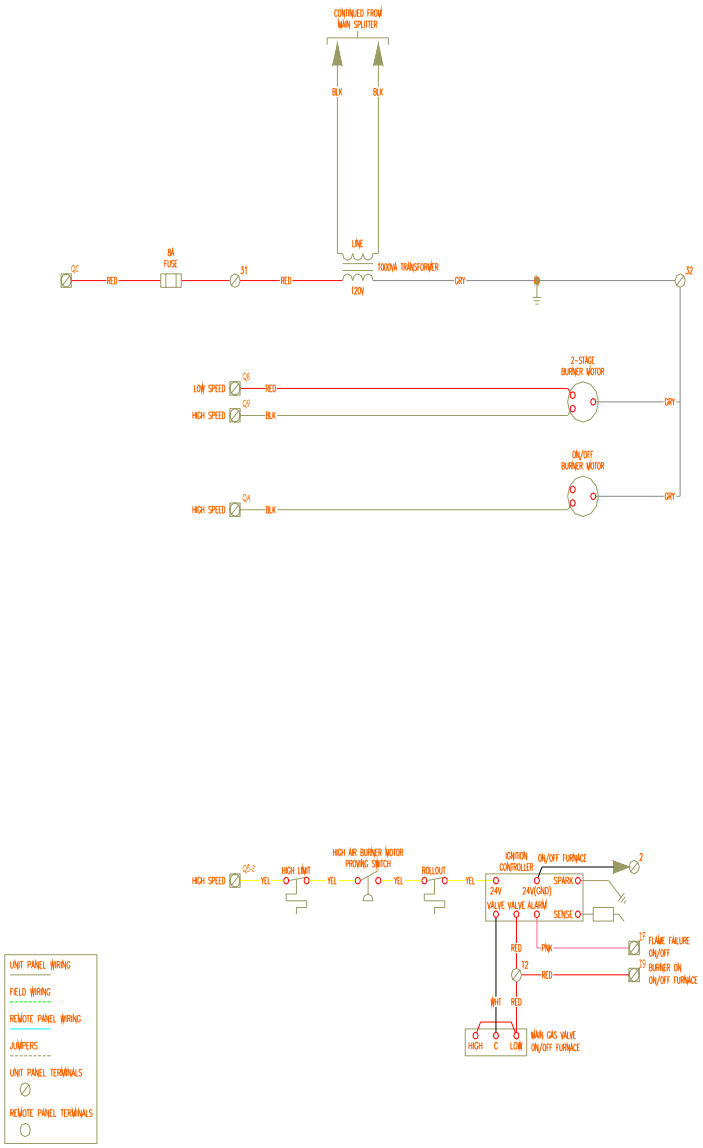
STANDARD WIRING DIAGRAMS



Standard Wire diagram – 2-stage, single furnace (subject to change without notice)



Standard Wire diagram – 24 volt, 1 stage modulating, 1 stage on-off, drawing 1/2 (subject to change without notice)



Standard Wire diagram – 120 volt, 1 stage modulating, 1 stage on-off, drawing 2/2 (subject to change without notice)

MARKINGS

FOR YOUR SAFETY

If you smell gas:

1. Open Windows.
2. Don't touch electrical switches.
3. Extinguish any open flame.
4. Immediately call your gas supplier.

WARNING:

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the instructions thoroughly before installing or servicing this equipment.

FOR YOUR SAFETY	**POUR VOTRE SECURITE**
If you smell gas: 1. Open Windows. 2. Don't touch electrical switches. 3. Extinguish any open flame. 4. Immediately call your gas supplier.	Si vous sentez une odeur de gaz: 1. Ouvrez les fenetres. 2. Ne touchez a aucun interrupteur. 3. Eteignez toute flamme nue. 4. Avertissez immediatement votre fournisseur de gaz.

WARNING:	**AVERTISSEMENT:**
Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the instructions thoroughly before installing or servicing this equipment.	Une installation, un reglage, une modification, une reparation ou un entretien incorrect peut entrainer des dommages materiels, des blessures ou la mort. Lisez attentivement et d'entretien avant de proceder a l'installation ou a l'entretien de cet equipment.

FOR YOUR SAFETY

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

General Information to include in Installation and Operating Instructions

Outdoor Installations

Air for Combustion

Openings for combustion air must be provided in a panel(door) with direct access to the vestibule area where the burners and draft inducer are located. This **air opening** must be of sufficient size to provide a suitable supply of air for combustion to the burner compartment, but not less than the equivalent of one (1) square inch free area per every 8,000 Btu per hour of the specified maximum input rating. The minimum dimension of any air opening should not be less than 3 inches. Heating appliance must be installed so that air access to inlet openings is unobstructed.

Venting

The vent termination must be located in accordance with the National Fuel Gas Code (ANSI Z223.1) in the US or CAN/CGA-B149 Installation code in Canada.

The venting system for outdoor units is a Category III, with vent products at positive pressure and up to 550 oF. The cross-sectional area of the vent duct or pipe must be at least equal to the discharge area of the draft inducer.

The discharge opening must always be located in the same pressure zone as the combustion air inlet.

- For horizontal discharge, the outlet should be located on the same side of the unit as the combustion air inlet opening. **Never** locate the vent outlet on the opposite side from the combustion air inlet opening.
- For horizontal discharge where flue gases need to be vented vertically, the preferred flue gas discharge should terminate in an exterior flue riser that extends at least to the top of the cabinet and is open at top and bottom. This riser must be located on the same side of the appliance as the combustion air inlet opening. An open riser should never be located in the appliance vestibule as this could result in recirculation of flue gases into the combustion air supply for the burners.
- For vertical discharge, the vent must terminate above the cabinet and should incorporate an approved rainproof vent cap.

Indoor Installations

Air for Combustion

The furnace must be installed in a location with adequate clearances to provide for an adequate combustion air space, service and inspection, and proper clearances from combustible construction. The furnace shall be located in such a manner that it does not interfere with the circulation of air in the heated space.

All fuel burning equipment must be supplied with air that enters into the combustion process and is then vented outdoors. Sufficient air must enter the appliance location to replace the air exhausted through the vent system. Do not install appliance in a confined space without providing wall openings to and from this space. If building construction is such that the normal infiltration does not provide sufficient air for combustion and venting, outside air must be introduced in accordance with ANSI Z223.1 (Sect. 1.3.4.2 and 1.3.4.3). Install air openings that provides a total free area in accordance with the following:

1. Air from inside the building – Opening of 1 square inch (sq. in.) per 1,000 Btuh of input, but never less than 100 sq. in.
2. Air from outside (ducted) – Opening of 1 sq. in. per 2,000 Btuh
3. Air from outside (direct opening) – Opening of 1 sq. in. per 4,000 Btuh

Venting

All duct furnaces must be vented outside of the heated space. All venting installations shall be in accordance with that latest edition of ANSI Z223.1 the National Fuel Gas Code, Part 7, Venting of Equipment, or applicable provisions of local codes and ordinances.

The duct furnace must be connected to a factory built chimney or vent complying with a recognized standard or a masonry or concrete chimney lined with a lining material acceptable to the authority having jurisdiction.

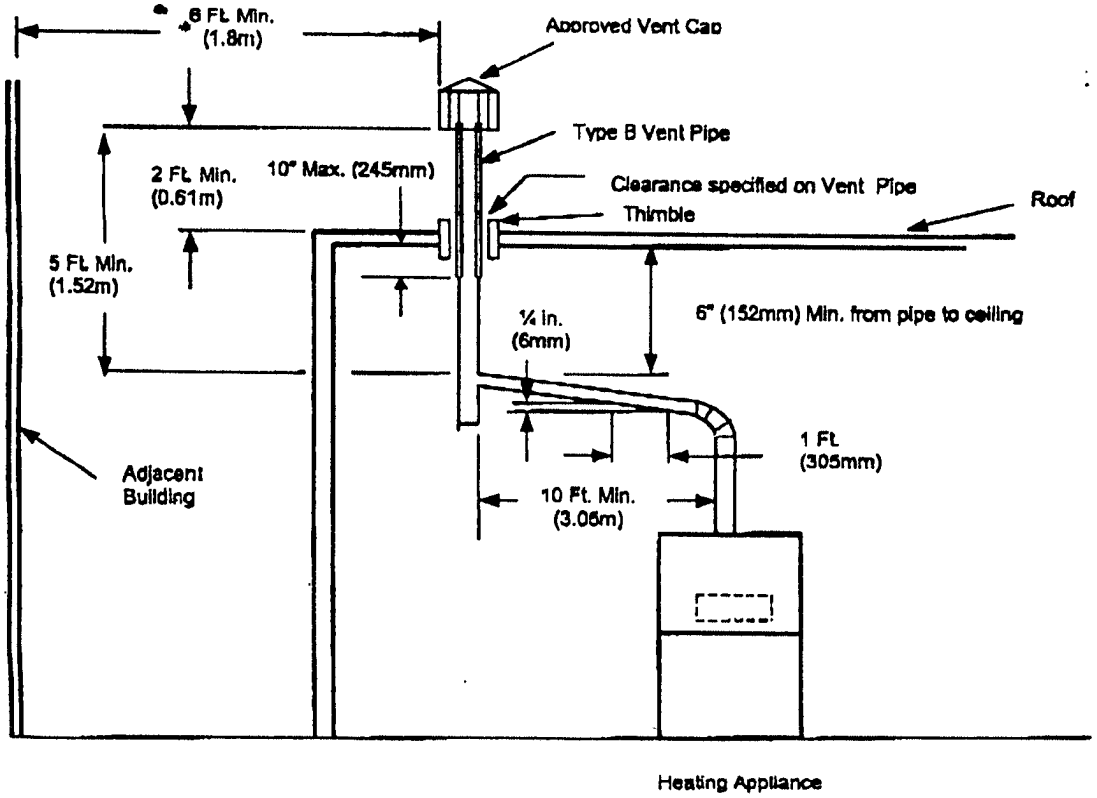
The duct furnaces will be classified in accordance with ANSI standards as follows:

- Category 1 - Non-condensing appliance with negative vent pressure
- Category 3 - Non-condensing appliance with positive vent pressure

Vertically Vented Furnaces - Category I (See Figure 1)

1. Use single wall or double wall (Type B) vent pipe of diameters listed in the following table for the appropriate models:
2. Maximize the height of the vertical run of vent pipe. A minimum of five (5) feet (1.5m) of vertical pipe is required. The top of the vent pipe must extend at least two (2) feet (0.61m) above the highest point on the roof. (Use Listed Type B vent for external runs). A weather-proof vent cap must be installed to the vent termination.
3. Horizontal runs must not exceed 75% of the vertical height of the vent pipe, up to a maximum of ten (10) feet (3m). Horizontal runs should be pitched upward ¼" per foot (21mm/m) and should be supported at 3 foot (1m) maximum intervals.
4. Design vent pipe runs to minimize the use of elbows. Each 90o elbow is equivalent to 5 feet (1.5m) of straight vent pipe run.
5. Vent pipe should not be run through unheated spaces. If such runs cannot be avoided, insulate vent pipe to prevent condensation inside vent pipe. Insulation should be a minimum of ½" (12.7mm) thick foil faced fiberglass, minimum 1½ # density.
6. Dampers must not be used in vent piping runs. Spillage of flue gases into the occupied space could result.
7. Vent connectors serving Category 1 heaters must not be connected into any portion of a mechanical draft system operating under positive pressure.

Figure 1
Vertical Venting



Horizontally Vented Furnaces -Category III (See Figure 2)

Pressures in Category III venting systems are positive and therefore care must be taken to avoid flue products from entering the heated space. **Use only vent materials and components that are UL listed and approved for Category III venting systems.**

WARNING: Do not use Type B vent within a building on horizontally vented units.

All vent pipe joints must be sealed to prevent leakage into the heated space. Follow instruction provided with approved venting materials used. The proper vent pipe diameter must be used, to insure proper venting of combustion products, as follows:

- Input ratings of 200,000 Btuh to 400,000 Btuh - 6 in. diameter (152mm)
- Input ratings of 75,000 Btuh to 199,999 Btuh – 5 in. diameter

The total equivalent length of vent pipe must not exceed 50 ft. (15.25m). Equivalent length is the total length of straight sections, plus 5 ft. (1.52m) for each 90o elbow and 2.5 ft (0.76m) for each 45o elbow.

The vent system must also be installed to prevent collection of condensate. Pitch horizontal pipe runs downward ¼ in. per foot (21mm per meter) toward the outlet to permit condensate drainage. Insulate vent pipe exposed to cold air or routed through unheated areas. Insulate vent pipe runs longer than 10 ft. (3m). Insulation should be a minimum of ½ in. thick foil faced fiberglass, 1 ½ lb density. Maintain 6in. (152mm) clearance between vent pipe and combustible materials.

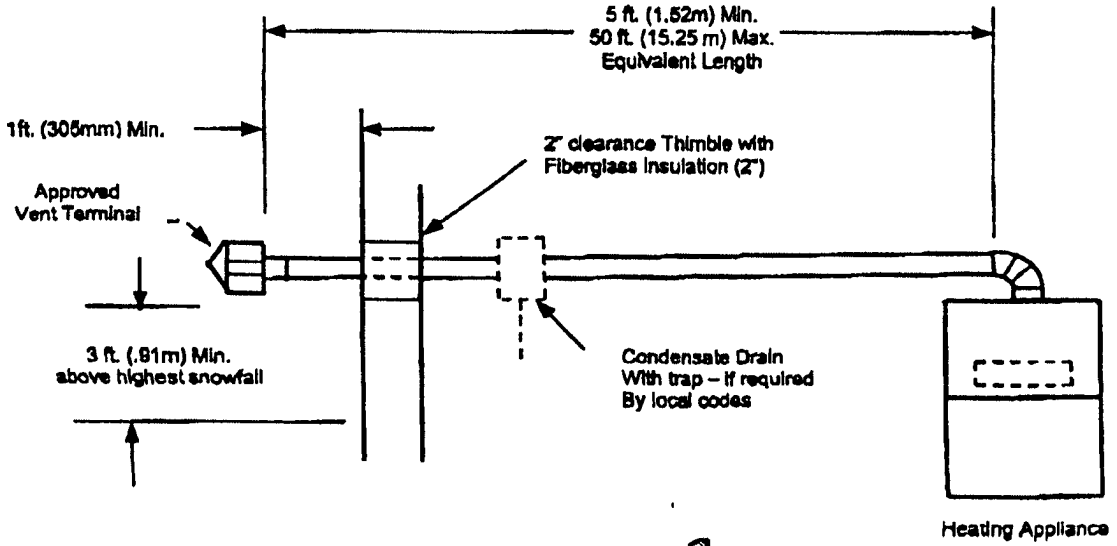
An approved Breidert Type L, Field Starkap or equivalent vent cap must be provided. Vent cap inlet diameter must be same as the required vent pipe diameter. The vent terminal must be at least 12 in. (305mm) from the exterior wall that it passes through to prevent degradation of building material by flue gases. The vent terminal must be located at least 1 ft. (305mm) above grade, or in snow areas, at least 3 ft. (1m) above snow line to prevent blockage. Additionally, the vent terminal must be installed with a minimum horizontal clearance of 4 ft.(1.2m) from electric meters, gas meters, regulators or relief equipment.

Through the wall vents shall not terminate over public walkways, or over an area where condensate or vapor could create a nuisance or hazard. Provide Vent termination clearances to building or structure features as follows:

Structure	Minimum Clearance
Door, Window or gravity inlet	4 ft. below
	4 ft. horizontally
	1 ft. above
Forced air inlet within 10 ft.	3 ft. above
Adjoining building or parapet	6 ft.
Adjacent public walkways	7 ft. above grade

EACH APPLIANCE MUST HAVE IT'S OWN INDIVIDUAL VENT PIPE AND TERMINAL. Do not connect vent system from horizontally vented units to other vent systems or a chimney.

Figure 2
Horizontal Venting



Separated Combustion Systems

HM duct furnace modules may be applied to appliances for operation in separated combustion systems. The module must be mounted with the burner section in a reasonably airtight vestibule compartment, as these systems provide combustion air from outside the heated space and vent the products of combustion outdoors. No air openings are to be provided in the vestibule access door or panel and sealing grommets or gaskets should be provided for gas and electrical entry points into the vestibule to provide a reasonably airtight seal.

1.) A suitable airtight gasket on the vestibule door or access panel.
2.) An observation window in the door to permit observation of ignition and main burner flame during operation and servicing.
3.) A door or panel interlock switch to insure that door or panel is closed or in place during operation.
4.) Openings into the vestibule space for attachment of inlet air supply pipe and vent pipe, sized for the Btuh input rating.
5.) Approved vent terminals on both the supply air inlet and flue gas exhaust. **NOTE: The inlet and outlet terminals must be located in the same pressure zone to provide for safe appliance operation.**
6.) Instructions covering installation and operation for the separated combustion system must be included in the appliance manufacturer's Installation and Operation Manual.

Proper installation of air inlet and flue gas exhaust piping are essential to proper operation of the appliance. See Figures 3 and 4 for recommended installation.

Figure 3
Separated Combustion
Vertical Venting

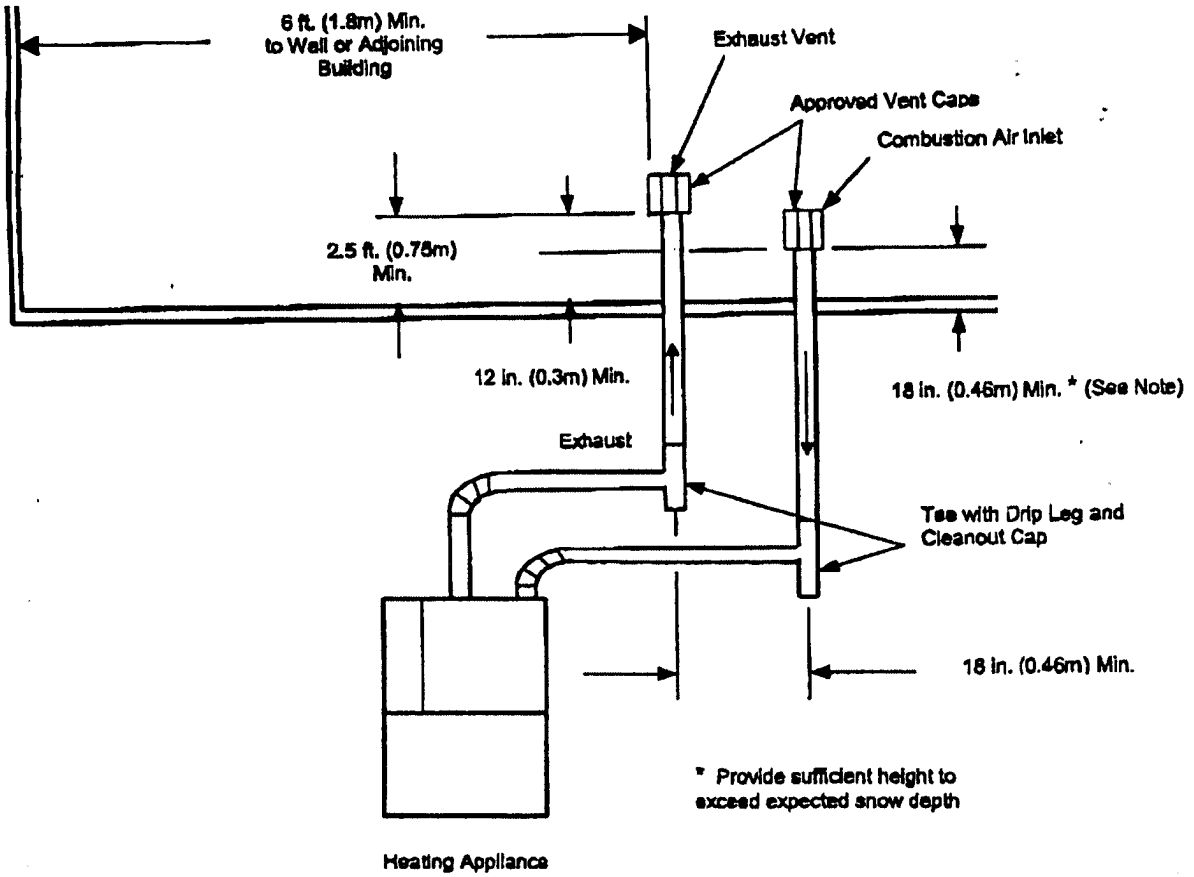
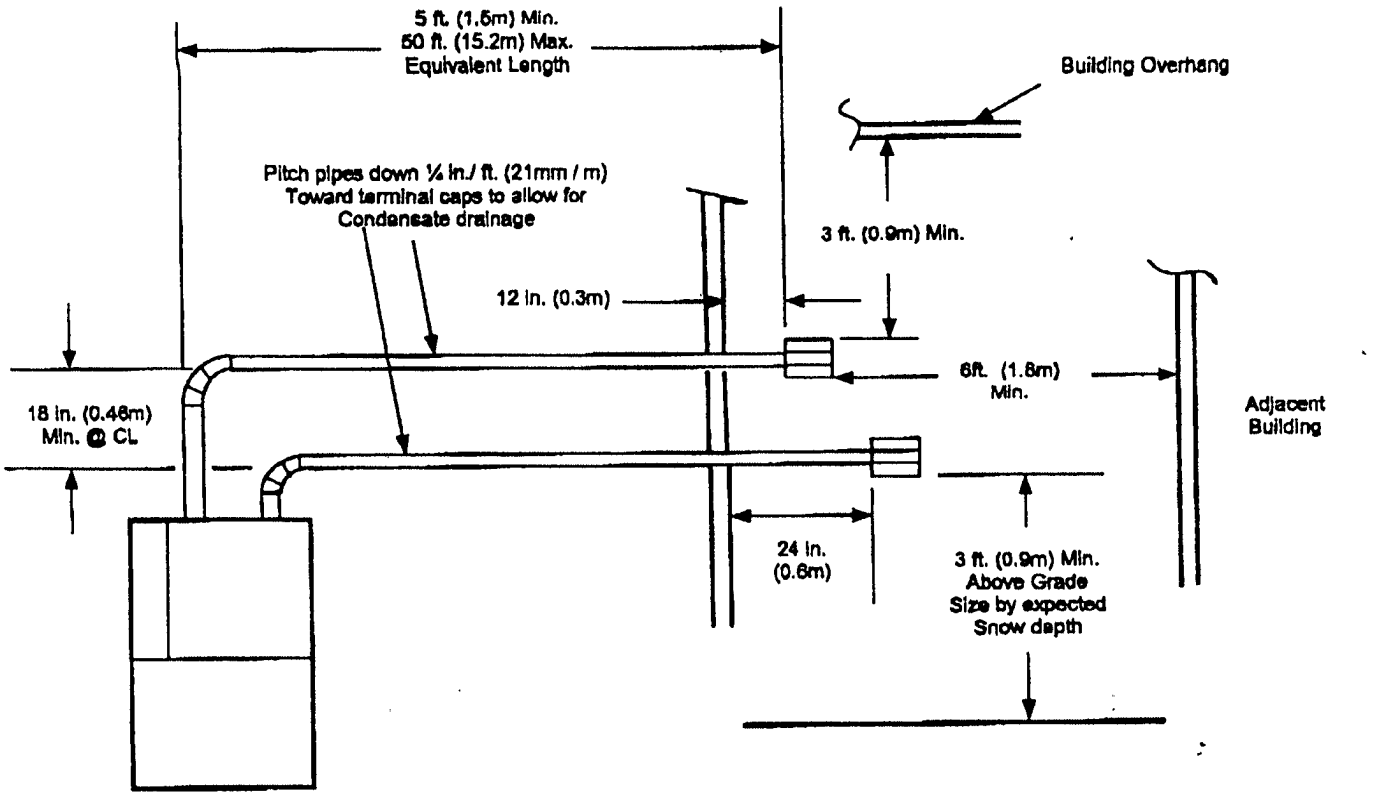


Figure 4
Separated Combustion
Horizontal Venting



Reference to the following information must be included in the instructions which the OEM provides with the finished product in which the duct furnace module is installed.

- the US units incorporating these duct furnaces modules must be installed in accordance with the National Fuel Gas Code ANSI Z223.1, applicable NFPA standards and any local codes or ordinances that apply to the ticular product class.
- **A statement to cover replacement wiring " If any original wire as supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 90 oC (194 oF).**
- A **WARNING** that the duct furnace is not certified or suitable for use in drying or process applications. Use in such applications voids any warranty and manufacturer disclaims any responsibility for the duct furnace and/or application
- A **WARNING** that the Gas-fired duct furnaces are not designed for use in hazardous atmospheres containing, flammable vapors or combustible dust, in atmospheres containing chlorinated or halogenated hydrocarbons, or in applications with airborne substances containing silicone.
- A **WARNING** that the presence of chlorine vapors in the combustion air supply to gas fired heaters presents a substantial corrosion hazard.
- **WARNING:** The use and storage of gasoline or other flammable vapors and liquids in the vicinity of this appliance is hazardous.
- **WARNING labels attached to exterior of cabinet as required by Z83.8 Sections 1.32.4 and 1.32.5**
- **Safety, lighting, operating and shutdown instructions**

NEW MTI 600/800

Overview

The standard MTI 11-600 and 11-800 are manufactured with a tubular style heat exchanger, two burner racks and a two-speed combustion fan. The heat exchanger is under negative pressure and operates at a minimum of 81% efficient on both natural and propane gases. Natural gas has a tested turndown of 15:1 while Propane has a 10:1 turndown.

Burner and Manifold

The new 11-600 and 11-800 models have an upper and lower burner rack comprised of individual in-shot burners. The top burner rack is the main burner. Both units have a split manifold using a solenoid valve as well as a fully modulating control valve and a Honeywell combination valve. The secondary rack uses a Honeywell two stage combination valve and is used only when the demand is required.

Controls

The main primary control is the Zelio Smart Relay that works in conjunction with the ICECON controller. As well each burner rack uses its own Ignition controller.

Built in Options

- Adjustable low limit
- Automatic season change over
- Low fire cut-out

Standard Sequence of Operation

On a call for heat the system initializes. The combustion fan starts and once airflow is proven the system conducts a thirty second purge cycle. The main rack then lights the first half of the burner tubes. Once the ignition controller is satisfied the system will modulate around the desired set point. If the heat demand is too great the ICE controller will turn on the remaining in-shots on the top rack. As the demand for more heat increases the ICECON system will turn on the bottom rack first stage and then second stage accordingly.

On low demanded the system will only operate with half the main burner rack on and the modulating gas valve will be at its lowest setting. At this point to maintain efficiencies and emissions the combustion air blower will drop down to **its low**

speed. If at this point the temperature rises five degrees above set point the system will automatically shut down the main burner. The system goes into standby mode until the temperature drops below its set point. The system will then automatically react (turn on and modulate and turn off) to maintain the desired discharge temperature while insuring that the temperature set point is not exceeded.

Summary of Specifications:

Number/Size Of modules	Model # MTI/RC	Rated Input BTU/hr (1000)	CFM Range	Temperature rise	Turn-Down
600	11-600	480-600	3313-22778	20-110	15:1
800	11-800	640-800	4417-30370	20-110	15:1
2-600	12-1200	960-1200	6626-45555	20-110	30:1
600, 800	12-1400	1120-1400	7730-53148	20-110	30:1
2-800	12-1600	1280-1600	8835-60740	20-110	30:1

Configurations

The new MTI 600 and 800 are designed for horizontal configurations, with discharge options of top, bottom and horizontal. They are listed at a maximum external static of two inches water.

Standard Sequence of operation MTI with ICE control board and Zelio

Initializing System

1. Cabinet Switch is turn "**ON**"
2. Zelio module initializes. ICE controller initializes, "**LED L2, L3 ON**", duration is ten seconds.
3. ICE controller "**FLASHES L2**", which means **standby mode.**

Summer mode

4. System switch is in "**Summer**"
5. ICE controller initializes "**LED L1, L2, L5, L7 ON**". "**L5**" drops out when 2.2 VDC is measured on terminal J21 on the ICE board. This indicates the gas valve is in it minimum position. "**L7**" drops out after the exhaust proving switch is made (OPTIONAL), "**J38**".
6. "**LED L4**" is turned on to indicate the system is in **RUNNING MODE.**
7. Terminal "**J23**" on the ICE board powers the damper actuator. The supply fan starts after the damper end switch is made.

8. "**LED L1, L2, L4**" are illuminated when the system is operating in standard **SUMMER MODE.**

Winter Mode Basic

9. System switch is in "**Winter**"
10. ICE controller initializes "**LED L1, L2, L5, L7 ON**". "**L5**" drops out when 2.2 VDC is measured on terminal J21 on the ICE board. This indicates the gas valve is in it minimum position. "**L7**" drops out after the exhaust proving switch is made (OPTIONAL), "**J38**".
11. "**LED L4**" is turned on to indicate the system is in **RUNNING MODE.**
12. "**J40**" powers input **I1** on the Zelio controller. The Zelio starts the combustion fan on high speed through output **Q1**. The high speed combustion fan air switch closes and provides **I6** input on the Zelio, (this input is also monitored by the ICE controller).
13. "**LED L5**" is turn on and a 30 second purge time starts. After completion "**LED L5**" drops out and the modulation gas valve goes to its starting position.
14. "**J26**" powers input **I4**. The low speed air proving switch powers input **I7**. Both inputs need to be made to allow the Zelio controller to close **Q6**, which power the first ignition controller circuit.
15. The first ignition controller circuit has in series the low air-proving switch, high-limit 1 and the first burner-rack roll-out switches. All safeties in this circuit need to be satisfied before the ignition controller will be powered.
16. Once the ignition controller is satisfied and a 24 VAC signal is received at "**J16**" the system will then modulate around the discharge set-point. If the burner will not light the system will re-cycle the purge time and will have one re-trail for ignition. If the unit doesn't light the board will go into a **"FLAME DETECT ERROR"** and shut down the system.

Winter Mode Staging High load

17. The furnace starts on half of the in-shots on the main top burner and it will modulate to maintain the set-point. Based on the load if more heat is required the remaining in-shot burners will be turned on. The board will output **24V** from "**J32**". This powers **I3** on the Zelio which will close **Q3** and **Q4**. **Q3** turns on the solenoid which splits the top manifold and **Q4** switches flame rods to prove the entire rack is operating.
18. If more capacity is required to maintain temperature the bottom rack is turned on through '**J28**' and input **I5**. This lights the bottom burner on low on the two stage gas valve. If high stage is required '**J42**" powers the high stage.

Winter Mode Low Load

19. On low demand the system will be running on half of the top rack and the modulating valve will be at its lowest setting. To maintain combustion '**J27**" is powered. This switches the output from **Q1** to **Q2**, (high fan speed to low fan speed)
20. If this is still too much capacity and the discharge temperature rise five degrees above the desired temperature the system will shut down and go into standard by mode, until heat is required. "**LED L2, L4, ON**"

SET-UP AND LOW FIRE ADJUSTMENT

- **Set-up and low-fire adjustment can only be done when the ICECON controller is in standby mode.**
- Using a multi-meter set to DC voltage, monitor the voltages on terminal **J33** (-) and **J17** (+) on the ICECON board.
- All adjustment are done using "**POT 1**", located on the bottom of the ICECON controller.

Initializing System

21. Cabinet Switch is turn "**ON**"
22. Zelio module initializes. ICE controller initializes, "**LED L2, L3 ON**", duration is ten seconds.
23. ICE controller "**FLASHES L2**", which means **standby mode.**

Service Mode

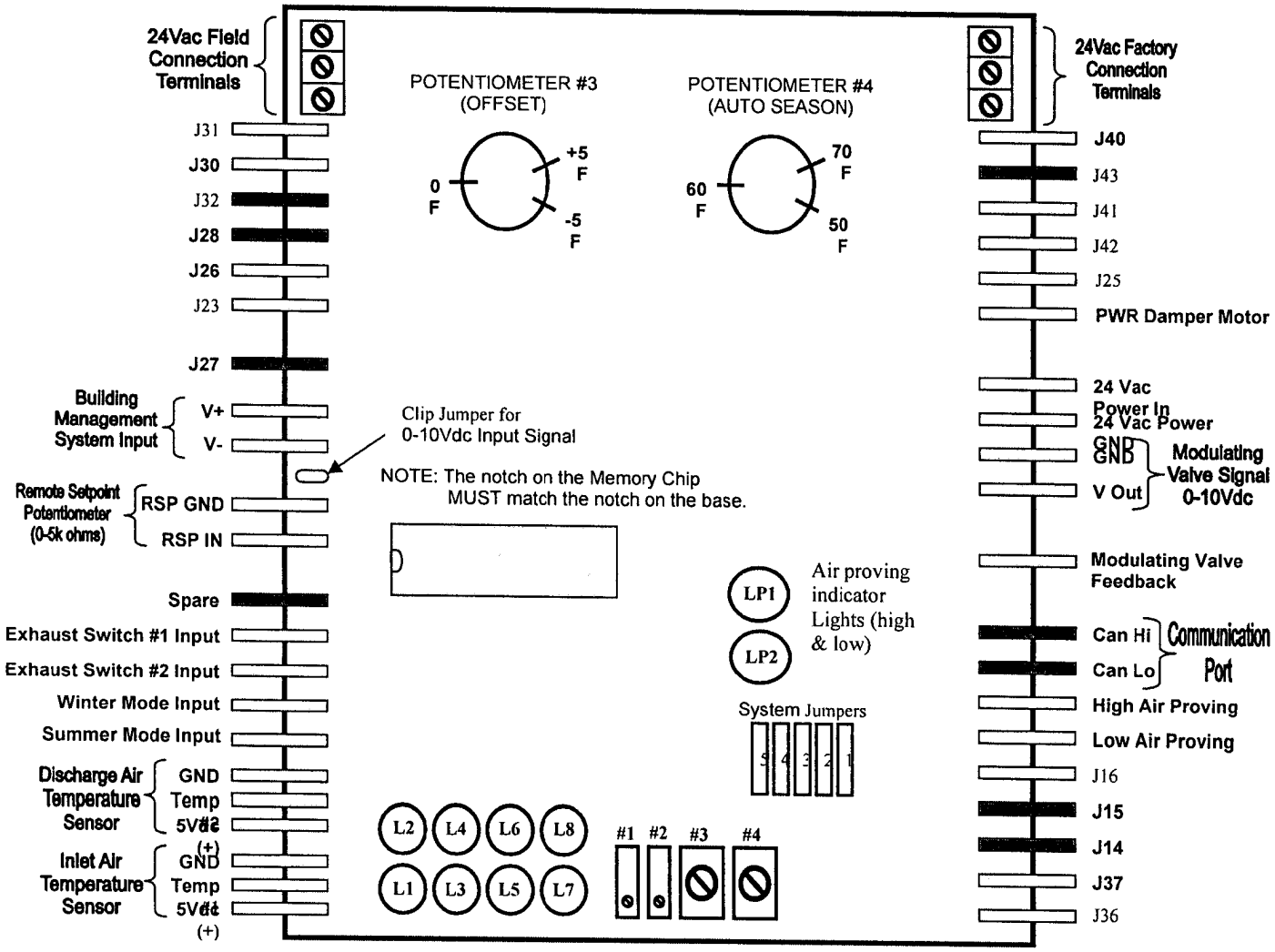
24. Press the service button and hold until "**LED L8, L1 ON**", duration 5 seconds.
25. Press the service button, "**LED L8, L1 ON**", L1 indicates low-fire 3 burners setting. Adjust as required.
26. Press the service button, "**LED L8, L2 ON**", L2 indicates high-fire 3 burners setting. Adjust as required.
27. Press the service button, "**LED L8, L3 ON**", L3 indicates low-fire 6 burners setting. Adjust as required.
28. Press the service button, "**LED L8, L4 ON**", L4 indicates ignition setting. Adjust as required.
29. Press the service button, "**LED L8, L5 ON**", L5 indicates high-fire 6 burners setting. Adjust as required.
30. Press the service button, the board will flash the last 10 error codes.
31. Press the service button again and the system goes back into **standby mode.**

Summary of Set-up

Heat exchanger size	Type of gas	Low-Fire 3 burners	High-fire 3 burners	Low-Fire 6 burners	Lighting position	High-fire 6 burners
600	Natural	3.4156	8.5	4.697	6.254	8.5
600	Propane	3.4573	8.5	4.34	6.094	8.5
800	Natural	3.3816	8.5	4.3	6.0	8.5
800	Propane	3.4667	8.5	4.239	6.0	8.5

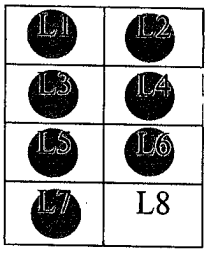
POTENTIOMETER CONFIGURATION	
POT 1	Adjusts LOW FIRE
POT 2	--- For Future Expansion, not currently used ---
POT 3	Adjusts Discharge Offset
POT 4	Adjusts the Summer/Winter Transition Set Point

MTI CIRCUIT BOARD



Error Codes MTI control Board

Status LEDS



Hi/Open
Lo/Short
Error
Service

Error Codes:

- Flame loss Ign#1 (J16) error, unable to relight in required time
  L1 + L6

- Watchdog Timer has timed out
  L3 + L6

- Exhaust_1(J38) and Air_Ok (J39) not activated within 3 minute window
  L5 + L6

- Interlock open (J14) requires 24 Vac input
  L7 + L6

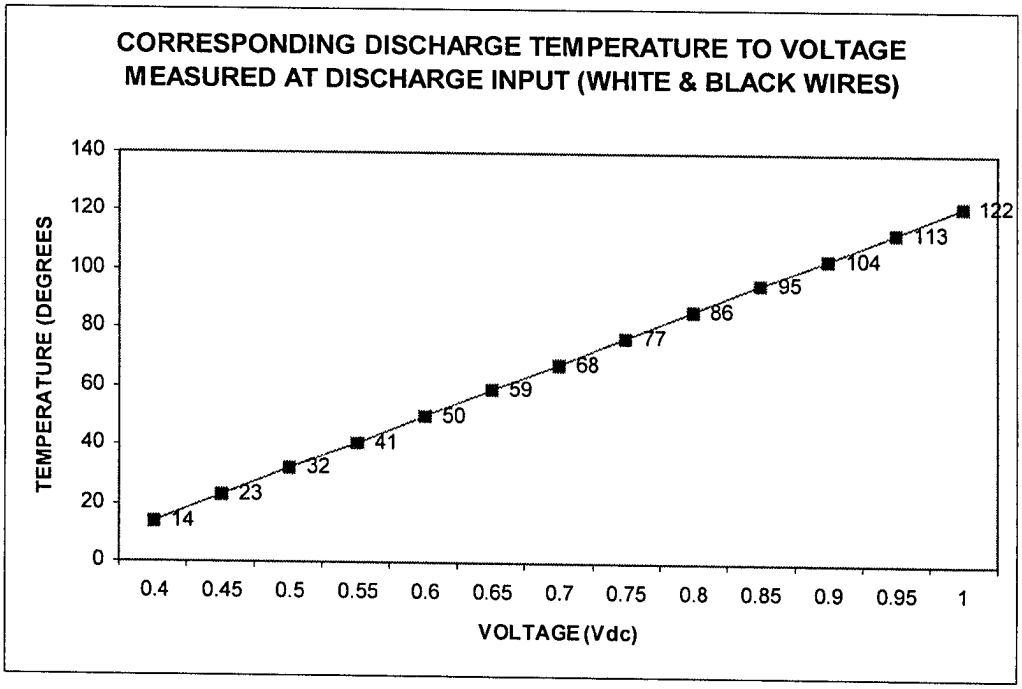
- Error Unknown
  L3 + L2 + L6 Fault flag Hi
  L3 + L4 + L6 Fault Flag Lo

- Modulating Gas Valve(J21), 0 Vdc or jammed above 2.1 Vdc
  L5 + L2 + L6 valve jammed or faulty sense voltage above 2.1 Vdc
  L5 + L4 +L6 valve faulty sense voltage below 1.9 Vdc
- Pressure Switches, Hi(J35) and LO(J34) indicators,
  L7 + L2 + L6 Failure on Hi pressure input
  L7 + L4 + L6 Failure on Lo pressure input
  L7 + L2 + L4 + L6 Failure on both pressure inputs
- Temperature Limits, Hi limit of 150 deg. F or Lo Limit of 32 deg.F
  L1 + L3 + L2 + L6 Hi Temp Limit
  L1 + L3 + L4 + L6 Lo Temp Limit
- Inlet Sensor(J8) Error Condition, 2 possible error conditions shorted or open
  L1 + L5 + L2 + L6 Sensor Open
  L1 + L5 + L4 + L6 Sensor shorted
- Discharge Sensor(J11) Error Condition, shorted or open
  L1 + L7 + L2 + L6 Sensor Open
  L1 + L7 + L4 + L6 Sensor shorted

MTI CIRCUIT BOARD

Inlet and Discharge Temperature sensors

To measure the temperatures the MTI Circuit board is reading from the inlet and discharge temperature sensors. Set a multi-meter to VDC and measure the voltages from **J12** and **J11** for discharge temperature and **J9** and **J8** for inlet temperature. Compare results to the graph below for corresponding temperatures.

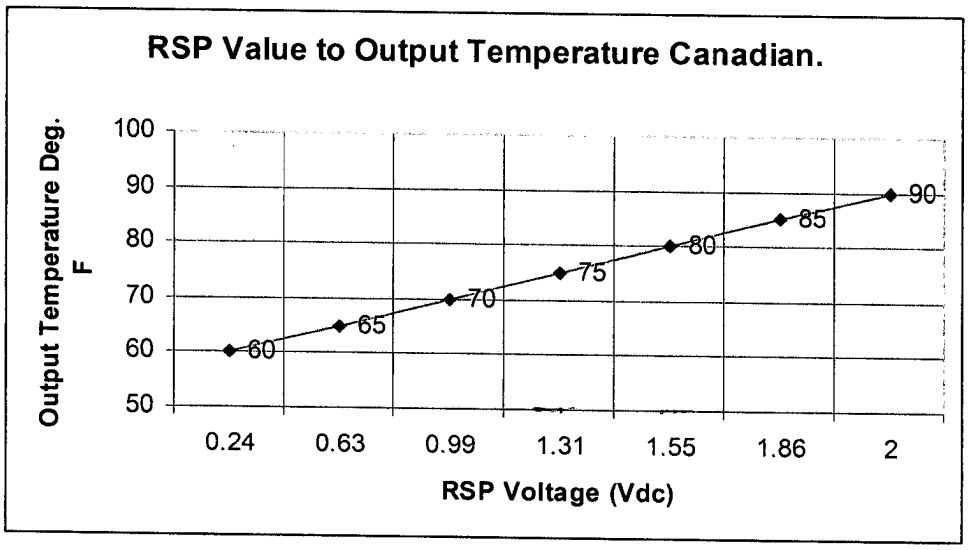


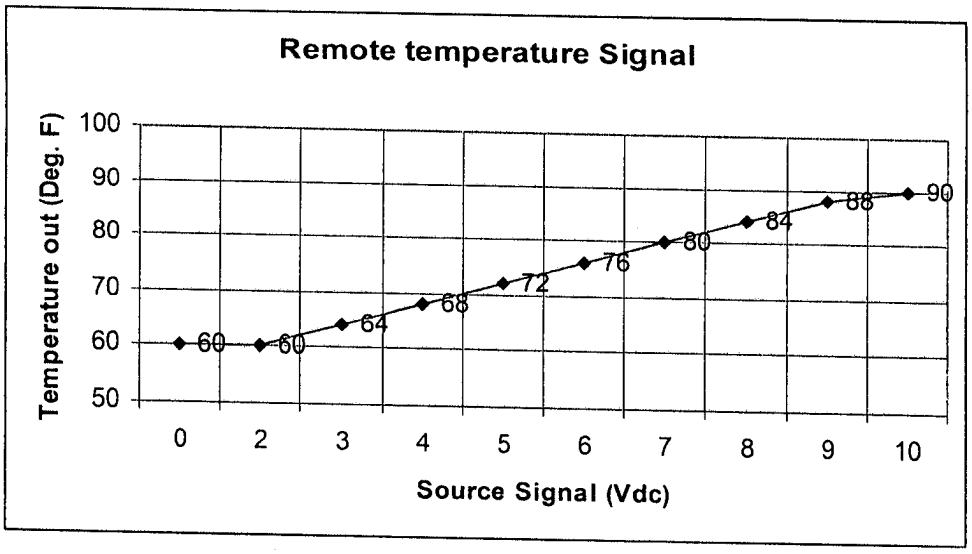
RSP

Output Temperatures Correspond to existing ICE overlay to potentiometer

Data for Chart Simplified

Temp Deg. F	RSP Voltage (Vdc)
60	0.24
65	0.63
70	0.99
75	1.31
80	1.55
85	1.86
90	2



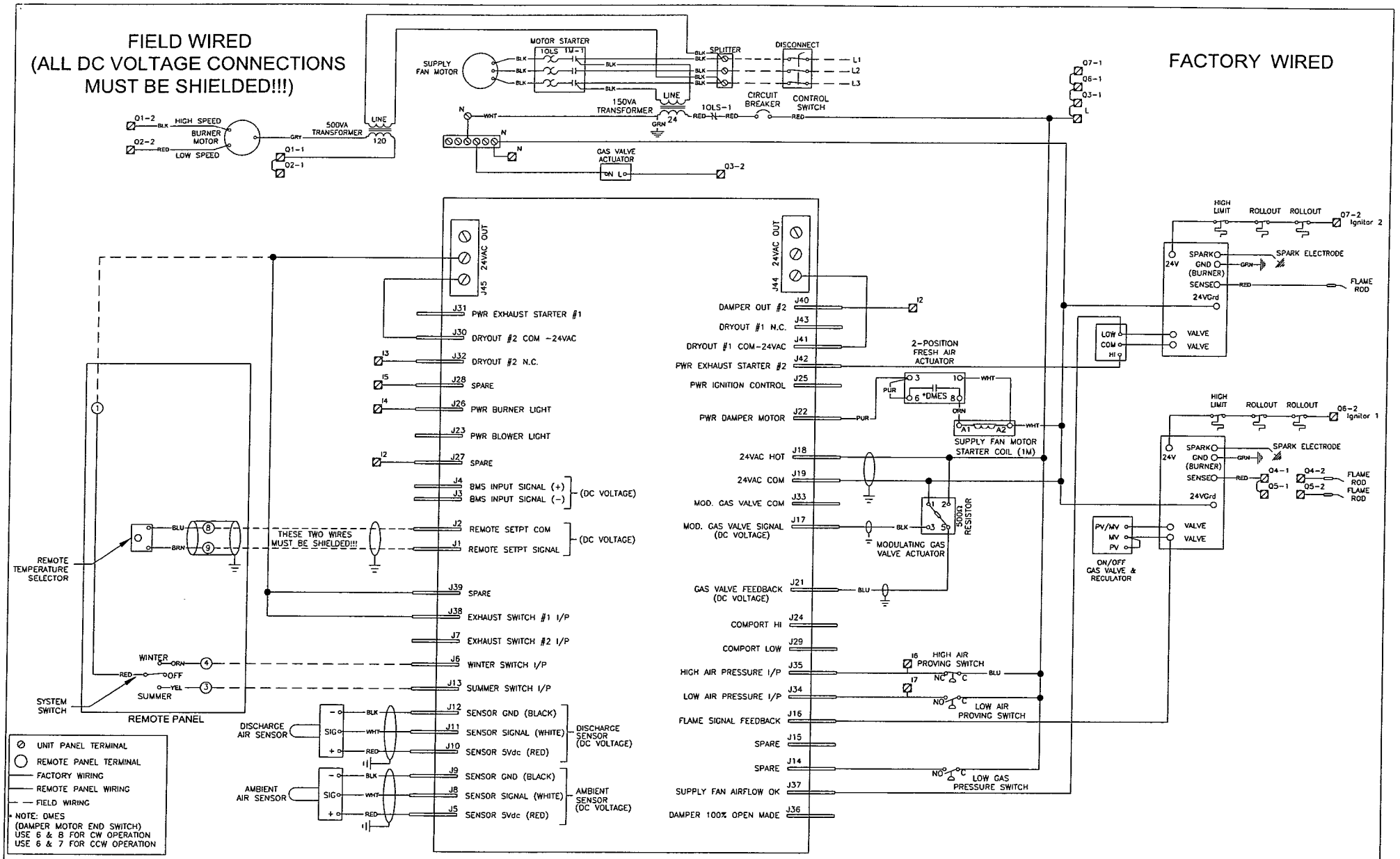


Remote Temperature Signal Input (BMS)
(0-10 Vdc) or (4-20 mA)

4-20 mA signal is equivalent to Vdc/500. ex. 5/500 = 10mA

Chart Values Simplified

Vin	deg F Ouput Temp
0	60
2	60
3	64
4	68
5	72
6	76
7	80
8	84
9	88
10	90



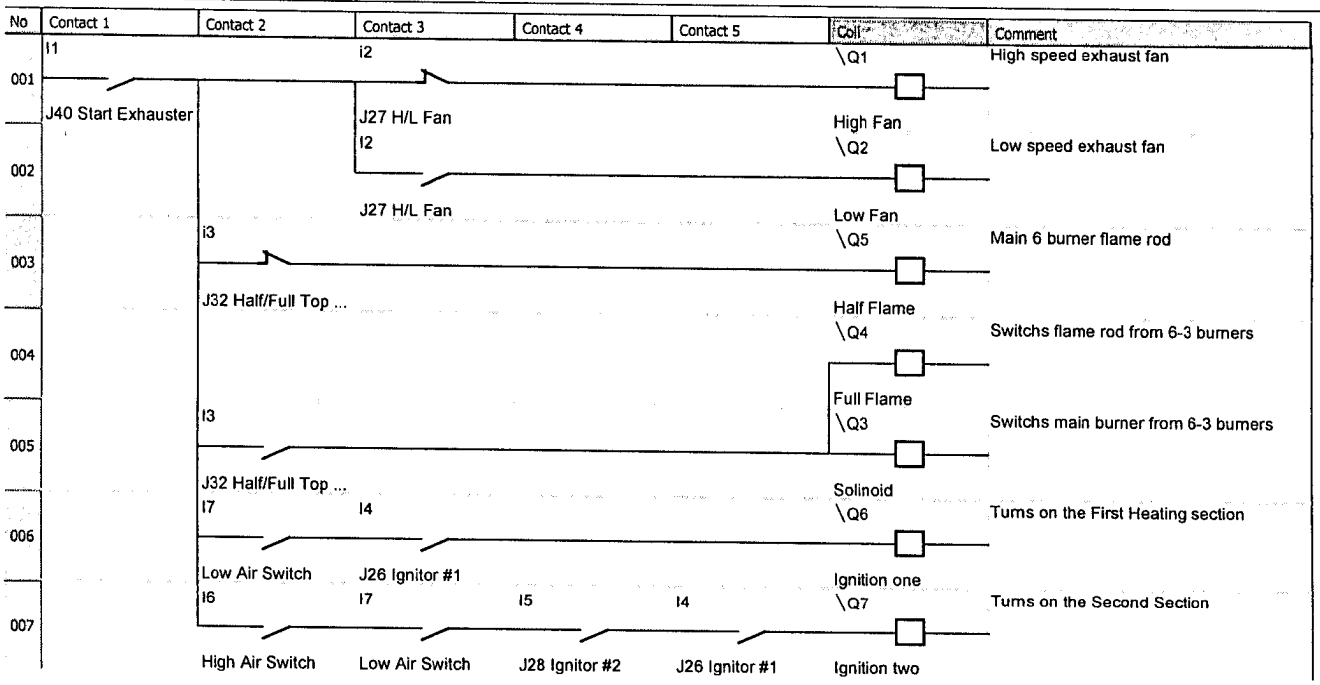
Rev	By	Revision Description	Date

ICG
MTI SERIES

TITLE
Indirect Fired Circuit Board Layout
Wiring Connection Diagram, Remote
Start/Stop Panel c/w Temperature Selector,
2 Position Damper Actuator.

DRAWN BY	ISSUED BY	SCALE	DRW. NO.
G.G.		N/A	Rev. C
CHK. BY	DATE	JOB NO.	REV
	Aug. 11/09		C

Program diagram

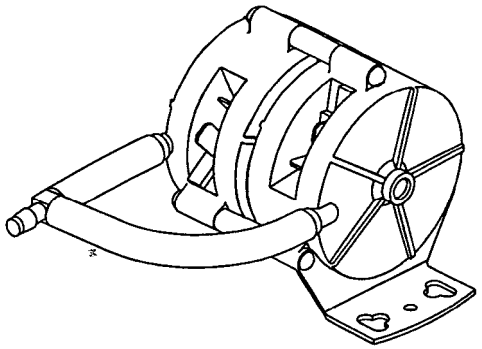


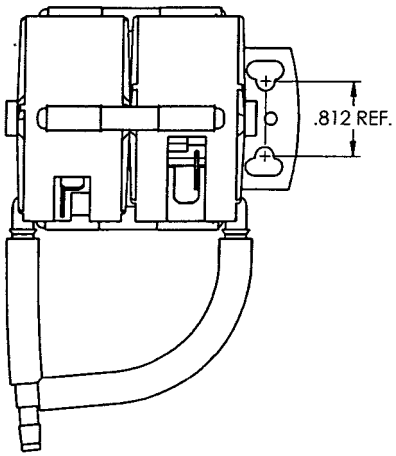
Physical inputs

No	Symbol	Function	Lock	Parameters	Location of (L/C)	Comment
I1		Discrete inputs	---	No parameters	(1/1)	J40 Start Exhauster
I2		Discrete inputs	---	No parameters	(1/3) (2/3)	J27 H/L Fan
I3		Discrete inputs	---	No parameters	(3/2) (5/2)	J32 Half/Full Top Rack
I4		Discrete inputs	---	No parameters	(6/3) (7/5)	J26 Ignitor #1
I5		Discrete inputs	---	No parameters	(7/4)	J28 Ignitor #2
I6		Discrete inputs	---	No parameters	(7/2)	High Air Switch
I7		Discrete inputs	---	No parameters	(6/2) (7/3)	Low Air Switch

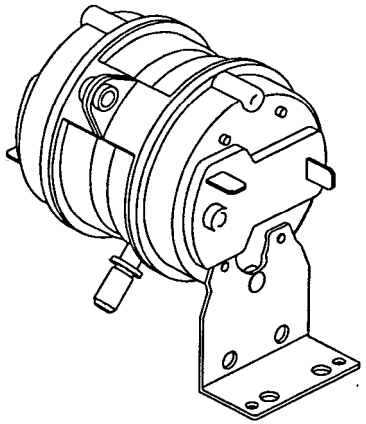
Physical outputs

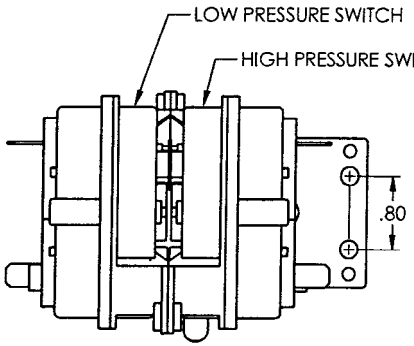
No	Symbol	Function	Latching	Location of (L/C)	Comment
Q1		Discrete outputs	No	(1/6)	High Fan
Q2		Discrete outputs	No	(2/6)	Low Fan
Q3		Discrete outputs	No	(5/6)	Solinoid
Q4		Discrete outputs	No	(4/6)	Full Flame
Q5		Discrete outputs	No	(3/6)	Half Flame
Q6		Discrete outputs	No	(6/6)	Ignition one
Q7		Discrete outputs	No	(7/6)	Ignition two



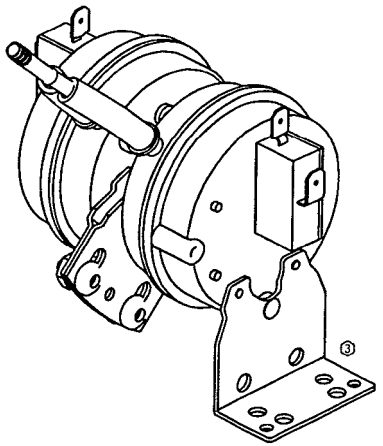


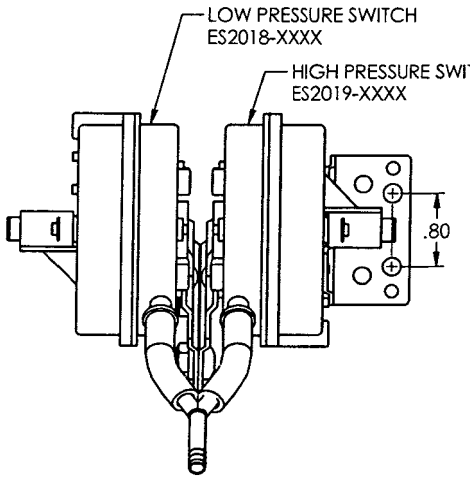
MPL-9300-V-1.10/0.40-DEACT-N/0-VS





HONEYWELL BA20119 (REV. A) OR EQUAL
LOW SWITCH = -.35" W.C.
HIGH SWITCH = -1.10" W.C.





ENDURA PLASTICS ESA2017
LOW SWITCH = -0.35" W.C. (±.05") SET ON RISE
HIGH SWITCH = -1.10" W.C. (±.05") SET ON FALL

②

REV	ECN	REMARKS	DATE
3	EC-T01976	REVISE BRKT LOCATION ON ENDURA	3/17/05
2	EC-T01768	REVISE P/N, ADD ENDURA SWITCH	8/19/04
1	EC-T01147	RELEASE FOR PRODUCTION	11/22/02

Beckett GAS INC.

CUSTOMER: BGI

DESCRIPTION: SWITCH - AIR PRESSURE

DRW BY: JG | DATE: 10/15/02 | DO NOT SCALE PRINTED DRAWING | A

CHK BY: | MAT'L: | THK: | DWG NO: 11972 | REV:3

TOLERANCES: .XX= ± .03, .XXX= ±.015, XXXX= ±.0005, ANGLE= ± 2°

HOLES: DIA < Ø.250= ± .003, Ø.250 - Ø.500= ±.005, DIA > Ø.500= ±.010

MOTOR SPEC:
PERFORMANCE @115 VOLTS 60Hz.
MOTOR SPEED:
HIGH: 3435 RPM, 1.89 AMP, 207 WATT

LOW: 2285 RPM, 1.95 AMP, 205 WATT

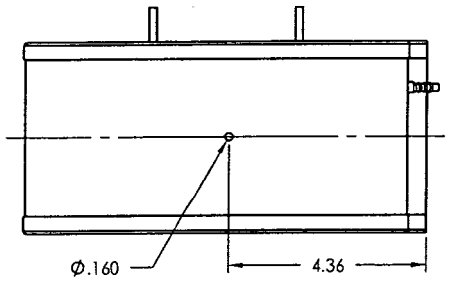
CAP: 10 MFD 370 VAC

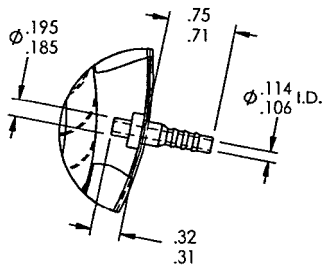
THERMALLY PROTECTED CLASS "B" INSULATION
SEALED BALL BEARING

LEAD MATERIAL:
18 GA. 125°C 2/64 INS
X-LINKED POLY. (1) BLACK,
(1) WHITE, AND (1) RED
28.00/26.00 IN. LONG
W/ FSPADE TERMS. 8903-4011
AMP #2-520183-2

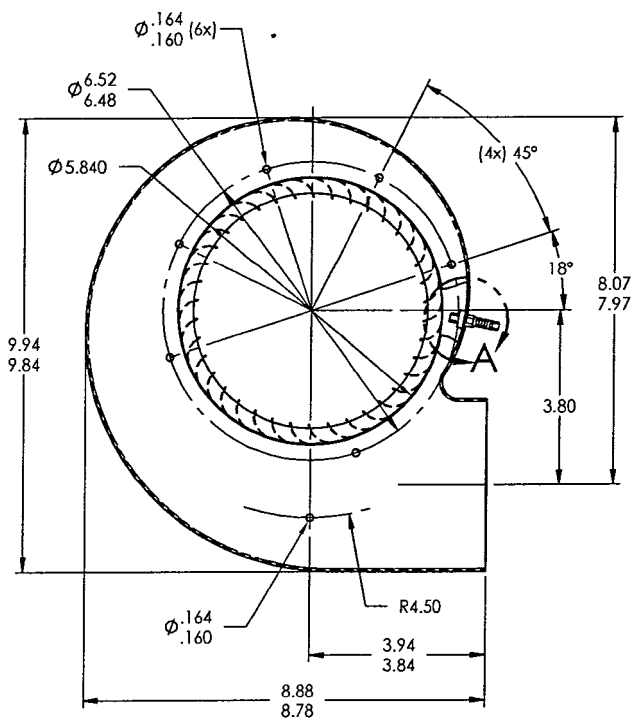
GROUND LEAD MATERIAL:
18 GA. 125°C 2/64 INS
X-LINKED POLY. GRN/YEL

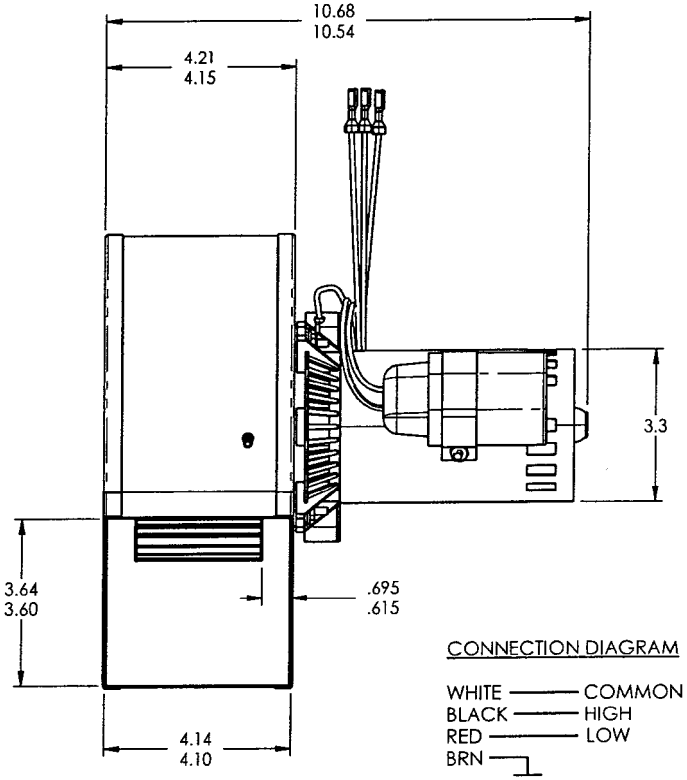
CAPACITOR LEAD MATERIAL:
18 GA. 125°C 2/64 INS
X-LINKED POLY. (2) BROWN

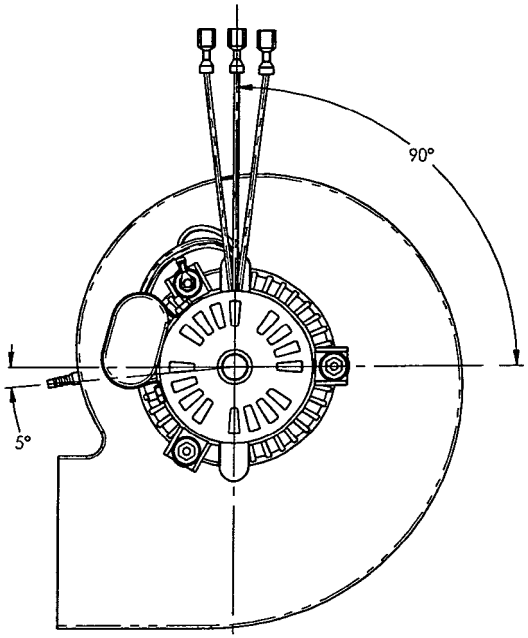




DETAIL A







CONNECTION DIAGRAM

WHITE — COMMON
BLACK — HIGH
RED — LOW
BRN
BRN
GRN/YEL — GRD

NOTE:
FASCO PART NO. 7062-6071

REV	ECN	REMARKS	DATE
1	EC-T02694	RELEASE FOR PRODUCTION	7/22/09

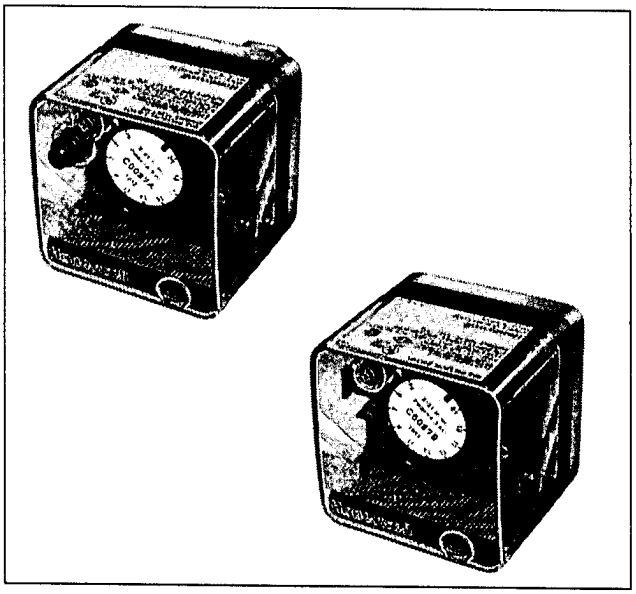
Beckett GAS INC.

CUSTOMER: BGI			TOLERANCES: .XX= ± .03, .XXX= ± .015, XXXX= ± .0005, ANGLE= ± 2°	HOLES: DIA < Ø.250= ± .003, Ø.250 - Ø.500= ± .005, DIA > Ø.500= ± .010
DESCRIPTION: DRAFT INDUCER - 115V / 2S				
DRW BY: CLR	DATE: 7/22/09	DO NOT SCALE PRINTED DRAWING	A	
CHK BY:	MATL:	THK:	DWG NO: 13970	REV:1

Honeywell

C6097A,B Pressure Switches

PRODUCT DATA



APPLICATION

The C6097 Pressure Switches are safety devices used in positive-pressure or differential-pressure systems to sense gas or air pressure changes.

FEATURES

- For use with natural gas, liquid propane (LP) gas, or air.
- Diaphragm-actuated safety-limit switch.
- Switch can be wired to turn on alarm.
- C6097A models break control circuit at setpoint on pressure fall.
- C6097B models break control circuit at setpoint on pressure rise.
- Lockout with manual reset and recycle options.
- Lockout models have external manual reset button.
- Removable transparent cover protects scaleplate and adjusting knob.
- Pipe tappings allow selection of positive pressure, differential pressure (air only) or venting connections (NPT mount only).
- 1/4 in. NPT or flange mount models for direct mounting to Honeywell Integrated Valve Train.
- Optional switch position indicator lamp available.
- IP54 enclosure standard.
- Ranges: 0.4 to 5 in. wc, 3 to 21 in. wc, 12 to 60 in. wc or 1.5 to 7 psi.
- Surge orifice.

Contents

65-0237-2

SPECIFICATIONS

Models:
C6097A Pressure Switch: Breaks a circuit when pressure falls to scale setting. See Table 1.
C6097B Pressure Switch: Breaks a circuit when pressure rises to scale setting. See Table 1.
Table 2 shows switch ratings and Table 3 shows alternate electrical ratings when used with Honeywell Flame Safeguard Programmers.

Minimum Ambient Temperature: -40°F (-40°C).

Maximum Ambient Temperature: 140°F (60°C).

Connections (Depending on Model):
1/4-18 NPT tapping for main or high-pressure connection.
1/8-27 NPT tapping for vent or low-pressure connection (air only).
Flange mount for connection to Honeywell Integrated Valve Train (internal vent only, no external connections).

Scale Range:
0.4 to 5 in. wc (0.10 kPa to 1.25 kPa).
3 to 21 in. wc (0.75 to 5.23 kPa).
12 to 60 in. wc (3.0 kPa to 15 kPa).
1.5 to 7 psi (10.3 kPa to 48 kPa).

Approvals:
Underwriters Laboratories Inc. listed.
Canadian Standards Association listed.
Factory Mutual: Approved.
Industrial Risk Insurers: Acceptable.
CSD-1 AFB: Acceptable.

Accessories:
32003041-001 C6097 Cover for manual reset models.
32003040-001 C6097 Cover for recycle models.
32003039-001 Position Indication Lamp Kit.

Dimensions: See Fig. 1 and 2.

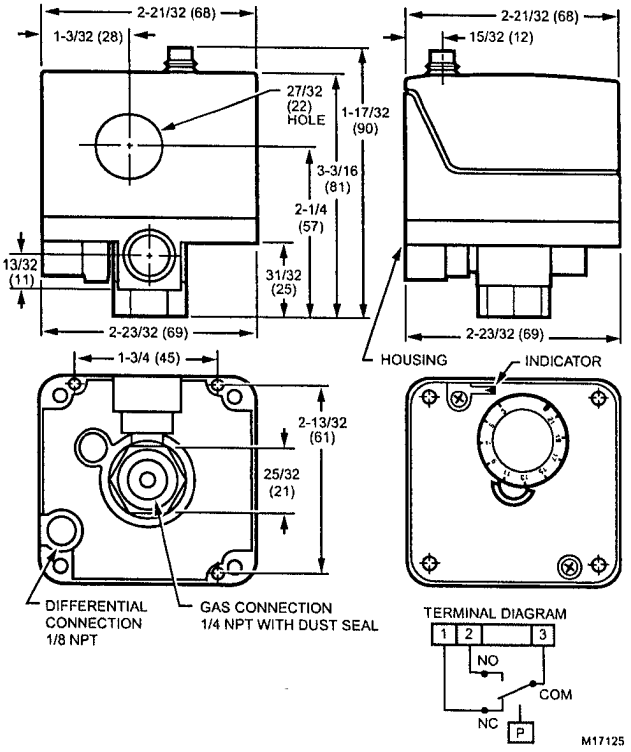


Fig. 1. C6097 1/4 in. NPT Mount dimensions in in. (mm).

ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number.

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Home and Building Control Sales Office (check white pages of your phone directory).
2. Home and Building Control Customer Relations
   Honeywell, 1885 Douglas Drive North
   Minneapolis, Minnesota 55422-4386 (800) 328-5111

In Canada—Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Scarborough, Ontario M1V 4Z9.
International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

Table 1. Pressure Switch Model Selection.

Model	Operating Pressure Range	Manual Reset Differential		Non-Manual Reset Differential		Differential Type	Maximum Rated Pressure (continuous) (psi)	Manual Reset	Media[a]	Switch Action at Setpoint	Comments
		Maximum at Minimum Setpoint	Maximum at Maximum Setpoint	Nominal	Maximum						
C6097A1004	0.4 to 5 in. wc	—	—	0.16 in. wc	0.24 in. wc	Additive	2.9	No	Air/Gas	Breaks N.O. to C. connection on pressure fall.	1/4 in. NPT Mount
C6097A1012	3 to 21 in. wc	2.4 in. wc	4.2 in. wc	—	—		5.0	Yes	Air/Gas		1/4 in. NPT Mount
C6097A1020	3 to 21 in. wc	2.4 in. wc	4.2 in. wc	—	—		5.0	Yes	Air/Gas		Flange Mount
C6097A1038	12 to 60 in. wc	10 in. wc	12 in. wc	—	—		5.0	Yes	Air/Gas		1/4 in. NPT Mount
C6097A1046	12 to 60 in. wc	10 in. wc	12 in. wc	—	—		5.0	Yes	Air/Gas		Flange Mount
C6097A1053	3 to 21 in. wc	—		0.24 in. wc	0.48 in. wc		5.0	No	Air/Gas		1/4 in. NPT Mount
C6097A1061	3 to 21 in. wc	—	—	0.24 in. wc	0.48 in. wc		5.0	No	Air/Gas		Flange Mount
C6097A1079	12 to 60 in. wc	—	—	1.1 in. wc	2.4 in. wc		5.0	No	Air/Gas		1/4 in. NPT Mount
C6097A1087	12 to 60 in. wc	—	—	1.1 in. wc	2.4 in. wc		5.0	No	Air/Gas		Flange Mount
C6097A1095	0.4 to 5 in. wc	0.6 in. wc	1.0 in. wc	—	—		2.9	Yes	Air/Gas		1/4 in. NPT Mount
C6097A1103	1.5 to 7 psi	1.1 psi	1.4 psi	—	—		9.3	Yes	Air/Gas		Flange Mount
C6097A1111	1.5 to 7 psi	1.1 psi	1.4 psi	—	—		9.3	Yes	Air/Gas		14 in. NPT Mount
C6097A1129	1.5 to 7 psi	—	—	0.1 psi	0.3		9.3	No	Air/Gas		Flange Mount
C6097A1137	1.5 to 7 psi	—	—	0.1 psi	0.3		9.3	No	Air/Gas		1/4 in. NPT Mount
C6097A1210	0.4 to 5 in. wc	—	—	0.16 in. wc	0.24 in. wc		2.9	No	Air/Gas		Flange Mount
C6097A1228	0.4 to 5 in. wc	—	—	—	—		2.9	Yes	Air/Gas		Flange Mount
C6097B1002	12 to 60 in. wc	10 in. wc	12 in. wc	—	—	Subtractive	5.0	Yes	Air/Gas	Breaks N.C. to C. connection on pressure rise.	1/4 in. NPT Mount
C6097B1010	12 to 60 in. wc	10 in. wc	12 in. wc	—	—		5.0	Yes	Air/Gas		Flange Mount
C6097B1028	3 to 21 in. wc	2.4 in. wc	4.2 in. wc	—	—		5.0	Yes	Air/Gas		1/4 in. NPT Mount
C6097B1036	3 to 21 in. wc	2.4 in. wc	4.2 in. wc	—	—		5.0	Yes	Air/Gas		Flange Mount
C6097B1044	1.5 to 7 psi	1.1 psi	1.4 psi	—	—		9.3	Yes	Air/Gas		Flange Mount
C6097B1051	1.5 to 7 psi	1.1 psi	1.4 psi	—	—		9.3	Yes	Air/Gas		1/4 in. NPT Mount
C6097B1069	3 to 21 in. wc	—	—	0.24 in. wc	0.48 in. wc		5.0	No	Air/Gas		Flange Mount
C6097B1077	12 to 60 in. wc	—	—	1.1 in. wc	2.4 in. wc		5.0	No	Air/Gas		Flange Mount
C6097B1085	12 to 60 in. wc	—	—	1.1 in. wc	2.4 in. wc		5.0	No	Air/Gas		1/4 in. NPT Mount
C6097B1093	1.5 to 7 psi	—	—	0.1 psi	0.3 psi		9.3	No	Air/Gas		Flange Mount
C6097B1101	1.5 to 7 psi	—	—	0.1 psi	0.3 psi		9.3	No	Air/Gas		1/4 in. NPT Mount
C6097B1119	3 to 21 in. wc	—	—	0.24 in. wc	0.48 in. wc		5.0	No	Air/Gas		1/4 in. NPT Mount

[a] Acceptable media: Natural gas, liquid propane (LP) gas, and air.

Table 2. Switch Ratings (Amperes).

120/240 Vac, 50/60 Hz		
Inductive	Full Load	3.0
	Locked Rotor	18.0
Resistive		5.0

Table 3. Alternate Electrical Ratings when used with Honeywell Flame Safeguard Programmers.

Device	Rating
Ignition Transformer	540 VA
Pilot Valve	50 VA
Main Valve	400 VA with 2-1/2 times inrush.

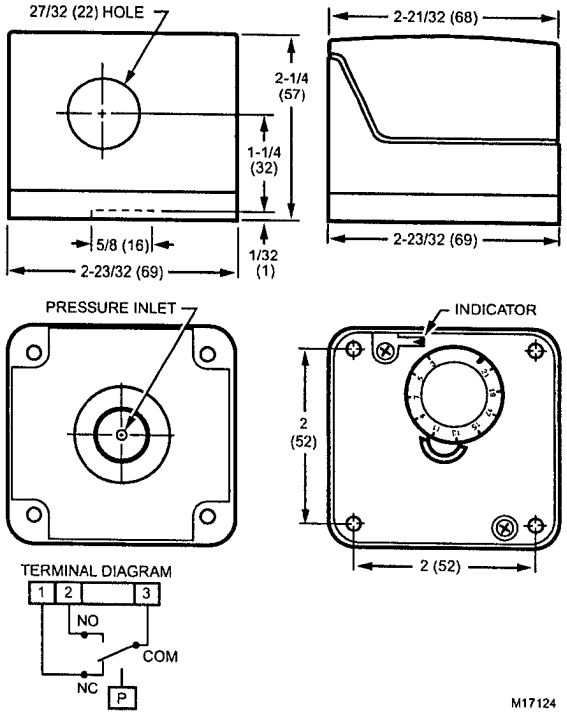


Fig. 2. C6097 Flange Mount dimensions in in. (mm).

INSTALLATION

⚠ WARNING

Explosion or Fire Hazard.
Can cause severe personal injury, death or property damage.
Observe all safety requirements each time a control is installed on a burner.

When Installing this Product...

1. Read these instructions carefully. Failure to follow them can damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure that the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is completed, check out product operation as provided in these instructions.

⚠ WARNING

Electrical Shock Hazard.
Can cause serious personal injury or death.
Disconnect power supply before beginning installation. More than one disconnection can be involved.

Mounting

NOTE: On flange models, remove the label holding the O-ring in place and make sure O-ring seal is in place before mounting the pressure switch on the valve.

The C6097 models allow NPT or flange (directly to valve) mounting. The NPT models have a hexagonal fitting with a 1/4 in. NPT tapping, which is the high pressure connection, in differential applications. The bleed fitting is 1/8 in. NPT tapped. In differential pressure control applications using air only, connect the lower pressure to the bleed fitting. See Fig. 1 and Table 1. In applications using combustible gases, vent the bleed tapping according to applicable standard code or jurisdictional authority.

C6097 models with flange mount can be fitted directly to Honeywell Integrated Valve Train (model specific). See Fig. 2 and Table 1. The flange mount models vent internally, with no external tap.

Mount the C6097A,B in any position.

Leak Check

After installation, perform a leak check on the pressure switch:

1. Turn on main gas. Make sure gas has reached the pressure switch (e.g., high gas pressure switch)
2. Check installation for gas leaks using a gas leak detector or a soap solution.

WIRING

⚠ WARNING

Electrical Shock Hazard.
Can cause serious personal injury or death.
Disconnect power supply before beginning installation. More than one disconnection can be involved.

Make sure that all wiring agrees with all applicable local codes, ordinances and regulations. An opening is provided to accommodate rigid conduit or armored cable for line voltage operation (see Fig. 3 and 4). Do not overload the switch contacts (see Switch Ratings in the Specifications section). The switching schematic is shown in Fig. 5.

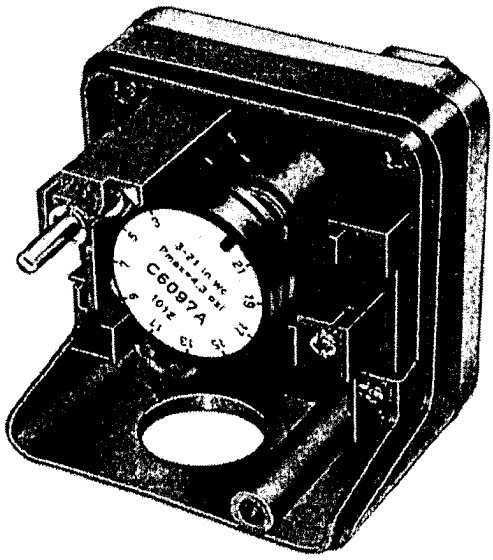


Fig. 3. C6097 (manual reset switch model) with cover removed.

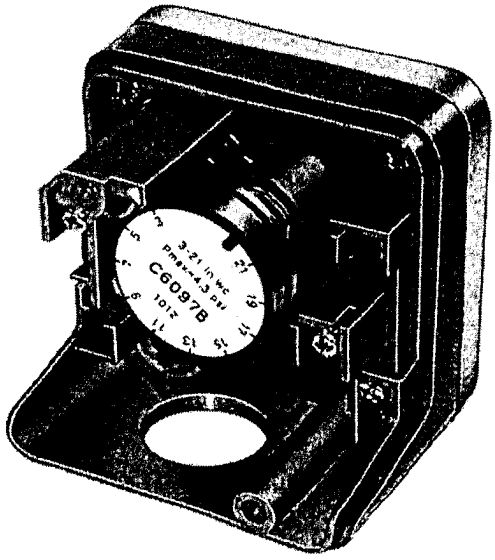
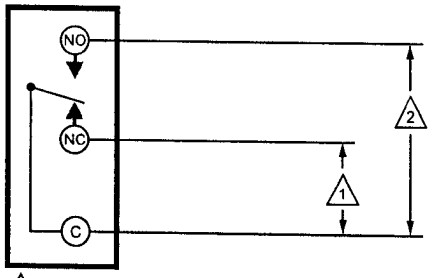


Fig. 4. C6097 (recycle model) with cover removed.

SETTINGS AND ADJUSTMENTS

Pressure Setpoint Adjustment

To adjust the pressure setting, turn the setpoint adjustment dial (Fig. 3, 4 and 5) clockwise ↷ to increase the pressure setting and counterclockwise ↶ to decrease the pressure setting.



1 C6097A BREAKS C-NO, MAKES C-NC ON PRESSURE FALL. MANUAL RESET MODELS LOCK OUT.

2 C6097B BREAKS C-NC, MAKES C-NO ON PRESSURE RISE AND LOCKS OUT.

M17123

Fig. 5. C6097 schematic.

OPERATION AND CHECKOUT

Operation

The manual reset C6097A diaphragm actuates the snap-acting switch to break a control circuit and lock out when pressure falls to the scale setting. The recycle C6097A models recycle automatically when the control circuit returns to scale setting plus differential.

The manual reset C6097B diaphragm actuates the snap-acting switch that breaks a control circuit and locks out when the pressure rises to the scale setting. The recycle C6097B models recycle automatically when the control pressure falls to the scale setting minus differential.

Manual Resetting

The C6097A manual reset models lock out when pressure falls to the scale setting and require manual resetting after the pressure rises to scale setting plus differential to resume normal operation.

The C6097B manual reset models lock out when pressure rises to the scale setting and require manual resetting after the pressure falls to scale setting minus the differential to resume normal operation.

To reset, once normal operating pressure is restored, push the reset button in as far as it goes, then release.

IMPORTANT

Lockout models cannot be made to recycle automatically by permanently holding in the reset lever.

Checkout

C6097 Gas Fuel Application

1. Set cutoff pressure.
2. Open main supply line. Depress reset lever on lockout models until switch makes control circuit.
3. Set controller and limit switch to call for heat.
4. For C6097A: Close the manual gas shutoff valve. C6097 should open control circuit when pressure reaches cutoff point.
   For C6097B: Open the manual gas shutoff valve, wait a few minutes for the pressure to rise; then lower the scale setting until the switch breaks control circuit and locks out.
5. For C6097A: Open the shutoff valve, return the pressure switch to its original setting and press the reset button (if necessary).
   For C6097B: raise setting to normal and press reset button (if necessary).
6. Allow system to operate through at least one complete cycle to make sure all components are functioning properly.

C6097A Air Application

1. Set cutoff pressure.
2. Turn on fan.
3. Block fan inlet or filter area. Switch should break control circuit when pressure drops to cutoff point. Manual reset models lock out.
4. Remove obstruction. Press reset lever (manual reset models) and allow system to operate through at least one complete cycle to be sure all components are functioning properly.

MTI WARRANTY

I.C.E. warrants that it will supply to or repair for the purchaser of this package unit heater the heat exchanger free of charge F.O.B. factory if said heat exchanger wears out or fails under normal use of heating (with a maximum of 10% fresh air), and service due to a defect in material and workmanship during five years from date of shipment from the factory. Heat exchangers with more than 10% fresh air are under warrantee for 1 year or 15 months from date of shipment.

All mechanical components, motors, blowers, valves, and controls are covered by a one-year limited warranty.

This warranty does not include any freight, labour, or sales taxes that may be incurred by the purchasers and is subject to the following conditions. The unit shall be/have:

a) Installed by a qualified heating contractor in accordance with provisions of the installation manual, national state, provincial and local code.
b) Subject to normal use in service and shall not have been misused, neglected, altered or otherwise damaged.
c) Operating within its published capacity and with the prescribed fuel.
d) Operating with all automatic controls at all times.
e) Has not been allowed to exceed its proper temperature limits due to control malfunction or inadequate air circulation.
f) There is no evidence of tampering or deliberate destruction.
g) Has not been subject to air for combustion contaminated with fluorides, dry cleaning fluid vapors, hairdressing fluid vapors, or any vapors found to have adverse effect on metals.

No representative of I.C.E. nor any of its distributors of dealers is authorized to assume for I.C.E. any other obligations or liability in connection with this product, nor alter the terms of this warranty in anyway. This warranty is limited to the express provisions contained here in and does not extend to liability for labour costs incurred in replacing defective parts.

Authorization to return any alleged defective parts must be obtained from the factory before the part is transported and the owner shall prepay the transportation charges for any alleged defective parts.