

# INSTALLATION AND SERVICE MANUAL

## electric unit heaters

### models VE and PTE

Model VE



Model PTE



### **! WARNING**

**Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death, and could cause exposure to substances which have been determined by various state agencies to cause cancer, birth defects or other reproductive harm. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.**

### **IMPORTANT**

**The use of this manual is specifically intended for a qualified installation and service agency. A qualified installation and service agency must perform all installation and service of these appliances.**

### **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.**

#### Inspection On Arrival

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

#### General Information

Installation and wiring of these electric unit heaters must conform to all applicable local codes and the National Electric Code. Wiring of these electric unit heaters should only be performed by a qualified electrician.

These electric unit heaters are Listed by Underwriters Laboratories, Inc. Representative samples of this product have been evaluated by UL and meet the applicable U.S. and Canadian safety standards with components as furnished.

All replacement parts and controls are proprietary in that they have all been designed, tested, and approved for the particular application to insure both physical fit and electrical performance. Any substitution of parts or controls not approved by Modine will be at installer's risk. For replacement parts, submit the unit heater model number, power code, control code and serial number shown on the rating plate attached to the unit.

Do not remove outlet fan guard from vertical electric unit heaters except to service the unit.

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# SPECIAL PRECAUTIONS / IMPORTANT INSTRUCTIONS

## SPECIAL PRECAUTIONS / IMPORTANT INSTRUCTIONS

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

### HAZARD INTENSITY LEVELS

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

## DANGER

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

## WARNING

1. Disconnect power supply before making wiring connections to prevent electrical shock and equipment damage.
2. All appliances must be wired strictly in accordance with wiring diagram furnished with the appliance. Any wiring different from the wiring diagram could result in a hazard to persons and property.
3. Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not 5% greater than the rated voltage.
4. When servicing or repairing this equipment, use only factory-approved service replacement parts. A complete replacement parts list may be obtained by contacting Modine Manufacturing Company. Refer to the rating plate on the appliance for complete appliance model number, serial number, and company address. Any substitution of parts or controls not approved by the factory will be at the owner's risk.
5. Do not operate any heater if it malfunctions. Disconnect power at service panel and have heater inspected by a qualified installation and service agency.

## CAUTION

1. All literature shipped with this unit should be kept for future use for servicing or service diagnostics. Do not discard any literature shipped with this unit.
2. Be sure no obstructions block air intake or discharge of the appliance.
3. Do not install appliance outdoors.
4. Do not install VE type unit heaters closer than 18 inches from ceiling and 24 inches horizontally from combustible materials in any direction. PTE units must be at least 24 inches from ceiling and 18 inches horizontally from nearest enclosure. The bottom of the unit must be at least 8 feet above the floor.
5. The bottom of the appliance must be at least 8 feet above the floor.
6. Do not attach duct work, air filters, or polytubes to any appliance.
7. Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not 5% less than the rated voltage.
8. Do not reuse any electrical component which has been wet. Such component must be replaced.

## 9. SAVE THESE INSTRUCTIONS

## IMPORTANT

To check most of the Possible Remedies in the troubleshooting guide listed in Table 9.1, refer to the applicable sections of the manual.

### SI (METRIC) CONVERSION FACTORS

| To Convert                 | Multiply By   | To Obtain           |
|----------------------------|---------------|---------------------|
| "W.C.                      | 0.249         | kPa                 |
| °F                         | (°F-32) x 5/9 | °C                  |
| Btu                        | 1.06          | kJ                  |
| Btu/ft <sup>3</sup>        | 37.3          | kJ/m <sup>3</sup>   |
| Btu/hr                     | 0.000293      | kW                  |
| CFH (ft <sup>3</sup> /hr)  | 0.000472      | m <sup>3</sup> /min |
| CFH (ft <sup>3</sup> /hr)  | 0.0000787     | m <sup>3</sup> /s   |
| CFM (ft <sup>3</sup> /min) | 0.0283        | m <sup>3</sup> /min |
| CFM (ft <sup>3</sup> /min) | 0.000472      | m <sup>3</sup> /s   |

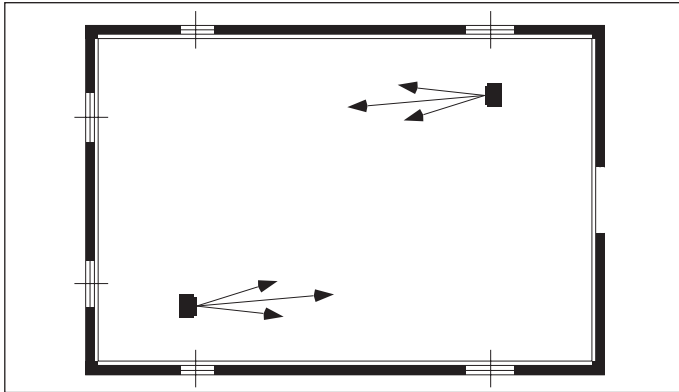
| To Convert | Multiply By | To Obtain          |
|------------|-------------|--------------------|
| feet       | 0.305       | m                  |
| Gal/Hr.    | 0.00379     | m <sup>3</sup> /hr |
| Gal/Hr.    | 3.79        | l/hr               |
| gallons    | 3.79        | l                  |
| Horsepower | 746         | W                  |
| inches     | 25.4        | mm                 |
| pound      | 0.454       | kg                 |
| psig       | 6.89        | kPa                |
| psig       | 27.7        | "W.C.              |

# INSTALLATION

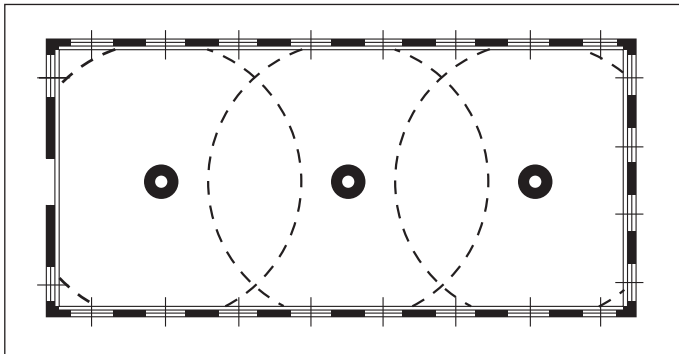
## Locating Unit Heaters

In locating heaters, consider general space-heating requirements of the area. Unit heaters should be located so that exposed walls are blanketed with warm air. In multiple unit installations, arrange units so that the air discharge pattern of one unit overlaps the next unit thus encompassing the area (See Fig. 3.1 & 3.2). Interference of air streams by columns, beams, partitions or other obstructions should be avoided as much as possible.

**Figure 3.1 - Typical Unit Locations for Horizontal Air Delivery**



**Figure 3.2 - Typical Unit Locations for Vertical Delivery**



## Unit Mounting

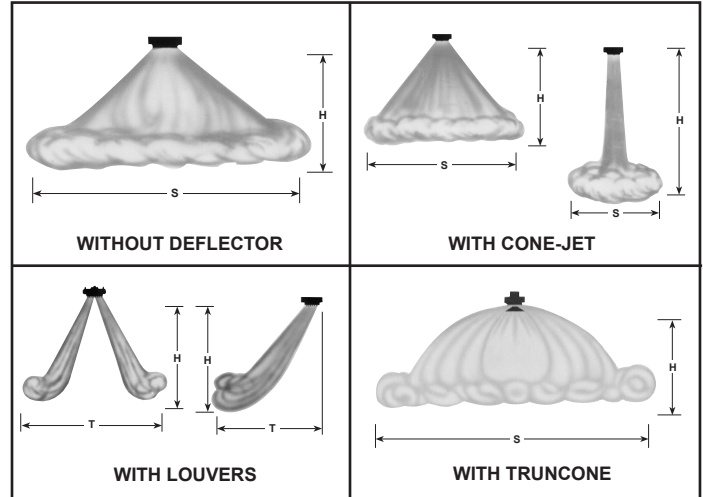
### ⚠ CAUTION

1. Do not install VE type unit heaters closer than 18 inches from ceiling and 24 inches horizontally from combustible materials in any direction. PTE units must be at least 24 inches from ceiling and 18 inches horizontally from nearest enclosure. The bottom of the unit must be be at least 8 feet above the floor.
2. The bottom of the appliance must be at least 8 feet above the floor.
3. Do not attach duct work, air filters, or polytubes to any appliance.

Height at which unit heaters are installed is critical. Maximum mounting heights for vertical units are listed in Table 3.1. Maximum mounting heights for PTE units are listed in Figure 4.2. The maximum mounting height for any unit is that height above which the unit will not deliver heated air to the floor. The maximum mounting heights must not be exceeded in order to assure maximum comfort.

If necessary, select the correct deflector assembly to accommodate the area being covered. Note the louver deflector data in the table is listed with louvers fully open and with adjusting vanes set at a 45-degree angle. For these deflectors, vane adjustment provides a greater spread but requires a lower mounting height. As indicated, truncone deflectors allow the lowest mounting height and provide the widest heat spread.

**Figure 3.3 - Vertical Delivery Heat Spread/Throw**



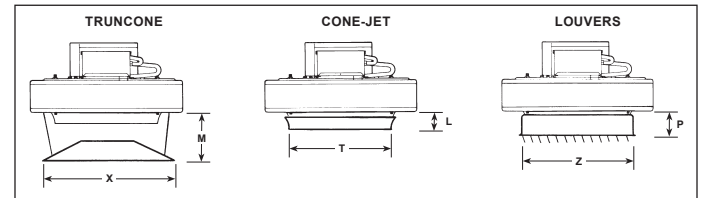
**Table 3.1 - Maximum Mounting Heights/Spreads (feet) ①**

| Model | Vertical Delivery |    |          |    |             |            |         |    |    |    |
|-------|-------------------|----|----------|----|-------------|------------|---------|----|----|----|
|       | No Deflector      |    | Truncone |    | Cone Jet    |            | Louvers |    |    |    |
|       | H                 | S  | H        | S  | Blades Open | Blades 45° | H       | S  |    |    |
| VE50  | 13                | 20 | 9        | 24 | 18          | 23         | 15      | 13 | 8  | 23 |
| VE75  | 11                | 17 | 8        | 20 | 15          | 20         | 13      | 11 | 8  | 20 |
| VE100 | 12                | 18 | 8        | 22 | 17          | 22         | 14      | 12 | 8  | 22 |
| VE150 | 17                | 26 | 11       | 30 | 23          | 30         | 20      | 17 | 10 | 30 |
| VE200 | 20                | 30 | 13       | 36 | 27          | 35         | 23      | 20 | 12 | 35 |
| VE250 | 17                | 26 | 11       | 31 | 23          | 31         | 20      | 18 | 10 | 31 |
| VE300 | 20                | 31 | 15       | 36 | 28          | 36         | 24      | 21 | 12 | 36 |
| VE400 | 18                | 27 | 13       | 32 | 24          | 32         | 21      | 18 | 11 | 32 |
| VE500 | 16                | 24 | 12       | 29 | 22          | 29         | 19      | 16 | 10 | 29 |

① The maximum mounting heights consider air delivery to be from the bottom of the unit to the floor based on conditions in Table 6.2. Refer to Figure 3.3.

It is recommended that adequate service access in excess of 18 inches be provided for the motor and fan.

**Figure 3.4 - Vertical Deflector Dimensions**



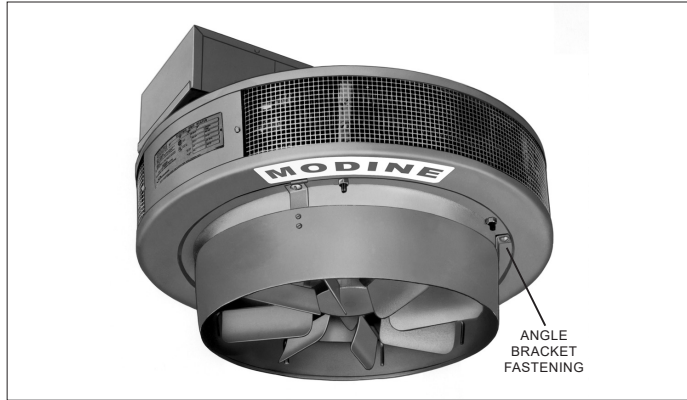
If an optional air deflector has been furnished for vertical units it is always shipped separately and may be attached to the unit before suspension. Louvers on horizontal units may also be added and positioned before installation. Refer to the latest revision of 75-550 for installation instructions for the optional air deflector assemblies.

**Table 3.2 - Vertical Deflector Dimensions (inches)**

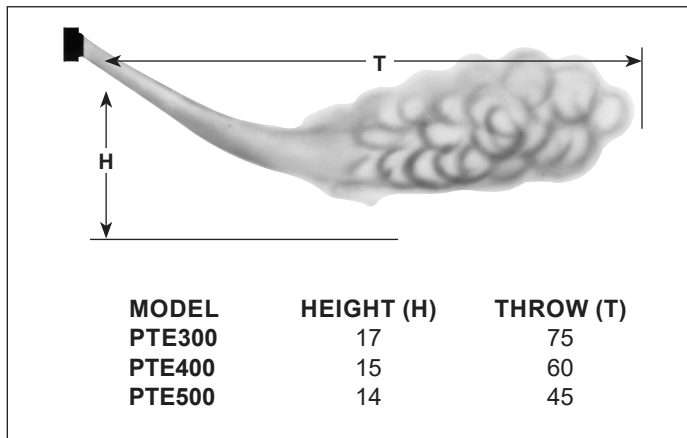
| Model No.    | Truncone |    | Cone-Jet |        | Louvers |        |
|--------------|----------|----|----------|--------|---------|--------|
|              | M        | X  | L        | T      | P       | Z      |
| VE50-VE250   | 12 1/2   | 22 | 6 1/2    | 18 7/8 | 6 1/2   | 16 7/8 |
| VE300-VE-500 | 12 1/2   | 27 | 7 1/2    | 24 3/4 | 7 1/2   | 19 3/4 |

# INSTALLATION

**Figure 4.1 - Vertical Model VE with Cone Jet Accessory Installed**



**Figure 4.2 - Horizontal Delivery with Louver Deflectors (Models PTE300, PTE400, PTE500)**

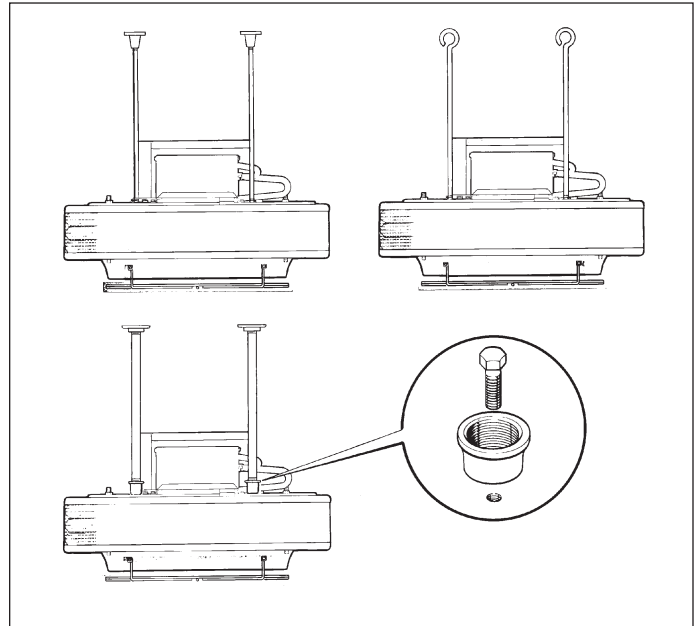


Be sure the means of suspension is adequate to support the weight of the unit. For proper operation, the unit must be installed in a level horizontal position. Clearances to combustibles as specified above must be strictly maintained. Do not install unit heater above the maximum mounting height shown in Table 3.1 for VE models or Figure 3.4 for PTE models or below eight feet.

## Model VE Unit Suspension

There are four tapped holes (1/2"-13) in the top of the unit for unit suspension. Unit suspension can be made with threaded rods, pipes, or ceiling hanger brackets furnished by others. See Figure 4.3.

**Figure 4.3 - Unit Suspension Method of Vertical Delivery Units**



**NOTE:** A pipe hanger adapter kit is available as an accessory from Modine. The kit consists of two drilled 3/4" I.P.S. pipe caps and two 1/2"-13 x 1 3/4" cap screws to facilitate threaded-pipe suspension. Two kits are required to pipe-mount a vertical unit.

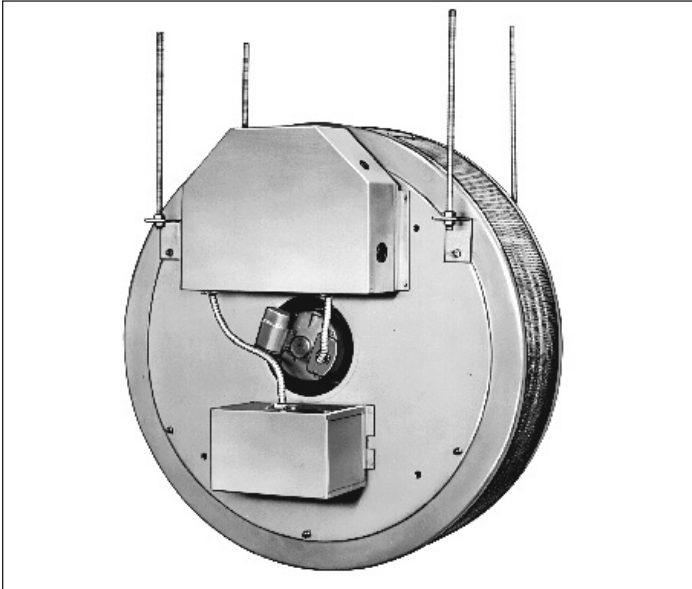
## Model PTE Unit Suspension

Model PTE electric heaters are provided with four hanger brackets for installation with four ceiling suspension rods (5/8-inch diameter), furnished by others. Refer to Figures 4.4 and 5.1.

**Figure 4.4 - Ceiling-mounted Model PTE**

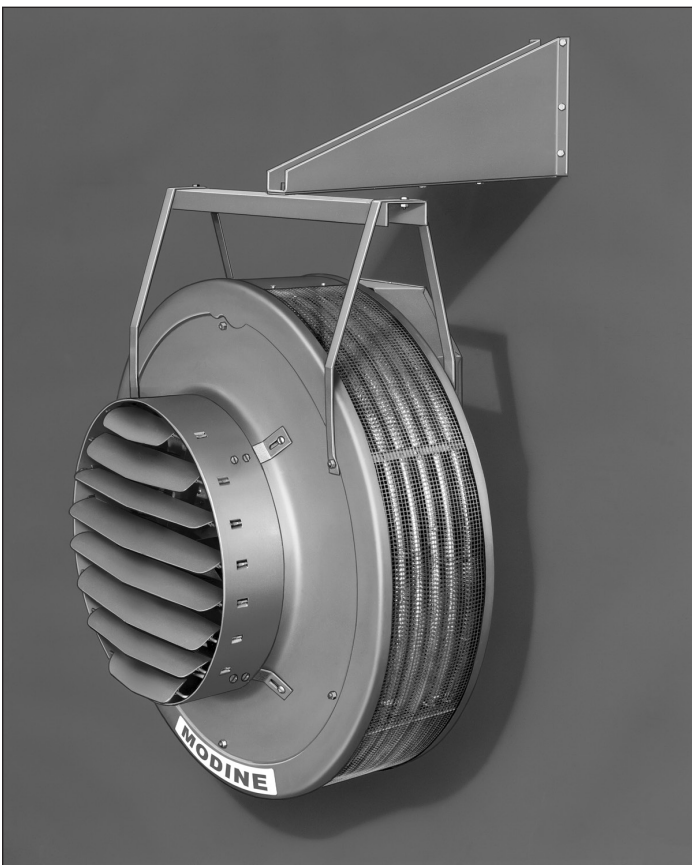


**Figure 5.1 - Rear view of Model PTE**



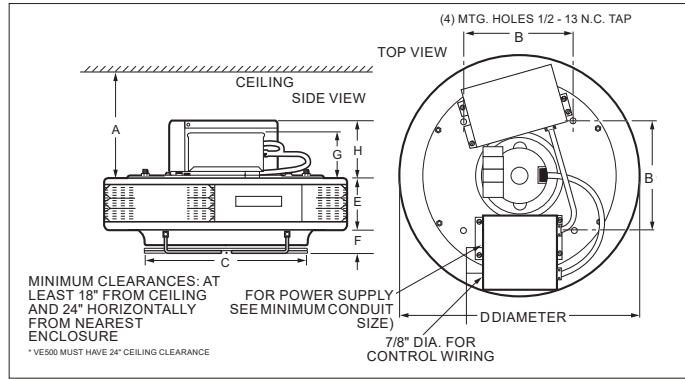
For easier installation of PTE model electric unit heaters, where ceiling suspension is not feasible, a wall-mounting bracket kit is available. The bracket saves installation time, has a built-in wall clearance, and provides an inexpensive and convenient wall-mounting method. The one-point suspension, shown above, permits swiveling the unit 180 degrees horizontally for most effective air direction. Refer to separate bulletin included in the kit for bracket assembly and installation. Refer to Figure 4.2 for maximum mounting heights. Minimum mounting height is eight feet.

**Figure 5.2 - Wall-mounted Model PTE**

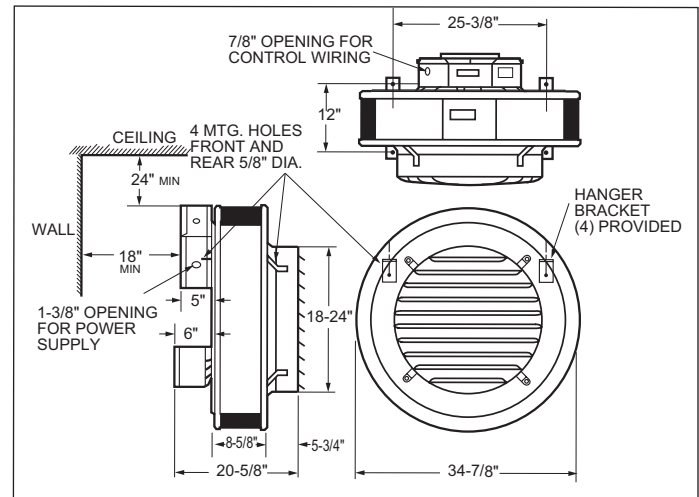


# DIMENSIONAL/PERFORMANCE DATA

**Figure 6.1 - Outline Dimensions, VE Models  
(models VE50 thru 250 shown)**



**Figure 6.2 - Outline Dimensions, PTE Models**



**Table 6.1 - Outline Dimensions (inches)**

| Model | A  | B      | C      | D      | E     | F     | G     | H     | Fan Dia | Approx. Shipping Wt. - lbs. |
|-------|----|--------|--------|--------|-------|-------|-------|-------|---------|-----------------------------|
| VE50  | 18 | 11 3/8 | 14 1/2 | 24 7/8 | 4 1/4 | 3 1/2 | 4 3/4 | 6 1/4 | 14      | 62                          |
| VE75  | 18 | 11 3/8 | 14 1/2 | 24 7/8 | 4 1/4 | 3 1/2 | 4 3/4 | 6 1/4 | 14      | 64                          |
| VE100 | 18 | 11 3/8 | 14 1/2 | 24 7/8 | 5     | 3 1/2 | 4 3/4 | 6 1/4 | 14      | 66                          |
| VE150 | 18 | 11 3/8 | 14 1/2 | 24 7/8 | 5     | 3 1/2 | 4 3/4 | 6 1/4 | 14      | 70                          |
| VE200 | 18 | 11 3/8 | 14 1/2 | 24 7/8 | 5     | 3 1/2 | 4 3/4 | 6 1/4 | 14      | 72                          |
| VE250 | 18 | 11 3/8 | 14 1/2 | 24 7/8 | 5     | 3 1/2 | 4 3/4 | 6 1/4 | 14      | 73                          |
| VE300 | 18 | 18 3/8 | 19 1/2 | 34 7/8 | 8 5/8 | 2 1/4 | 4 3/4 | 6 1/4 | 19      | 122                         |
| VE400 | 18 | 18 3/8 | 19 1/2 | 34 7/8 | 8 5/8 | 2 1/4 | 4 3/4 | 6 1/4 | 19      | 125                         |
| VE500 | 18 | 18 3/8 | 19 1/2 | 34 7/8 | 8 5/8 | 2 1/4 | 4 3/4 | 6 1/4 | 19      | 129                         |

**Table 6.2 - Performance Data (Models VE, PTE)**

| Model             | Heating Capacity |         | Air Delivery Data (No Deflector) ① |                   |               |                  |                    |
|-------------------|------------------|---------|------------------------------------|-------------------|---------------|------------------|--------------------|
|                   | KW               | BTU/HR  | Outlet CFM                         | Outlet Vel. (FPM) | Temp. Rise °F | Heat Spread (Ft) | Max. Mtg. Ht. (Ft) |
| VE50              | 5.0              | 17,100  | 800                                | 700               | 21            | 20               | 13                 |
| VE75              | 7.5              | 25,600  | 800                                | 700               | 31            | 17               | 11                 |
| VE100             | 10               | 34,100  | 940                                | 820               | 36            | 18               | 12                 |
| VE150             | 15               | 51,200  | 1340                               | 1170              | 38            | 26               | 17                 |
| VE200             | 19               | 64,900  | 1600                               | 1400              | 41            | 30               | 20                 |
| VE250             | 25               | 85,400  | 1600                               | 1400              | 55            | 26               | 17                 |
| PTE/VE300 2-stage | 30               | 102,000 | 2575                               | 1240              | 40            | 31②              | 20②                |
| PTE/VE400 2-stage | 40               | 137,000 | 2575                               | 1240              | 54            | 27②              | 18②                |
| PTE/VE500 2-stage | 50               | 171,000 | 2575                               | 1240              | 70            | 24②              | 16②                |

① With 70°F ambient air and heating at full capacity  
② See Figure 4.2 for PTE mounting height and heat throw

**Table 6.3 - Motor Specifications**

| Model         | HP   | Voltage | Phase | Hertz | RPM  | Type W/TOL                   | Bearing Type |
|---------------|------|---------|-------|-------|------|------------------------------|--------------|
| VE50-100      | 1/15 | 208-230 | 1     | 60    | 1050 | Totally Enclosed Shaded Pole | Sleeve       |
| VE150-250     | 1/8  | 208-230 | 1     | 60    | 1725 | Enclosed Air Over            | Ball         |
| VE/PTE300-500 | 1/6  | 208-230 | 1     | 60    | 1075 | Enclosed Air Over            | Ball         |

# INSTALLATION-ELECTRICAL CONNECTIONS

## Wiring

### ⚠ WARNING

1. Disconnect power supply before making wiring connections to prevent electrical shock and equipment damage.
2. All appliances must be wired strictly in accordance with wiring diagram furnished with the appliance. Any wiring different from the wiring diagram could result in a hazard to persons and property.
3. Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not 5% greater than rated voltage.

### ⚠ CAUTION

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

All wiring must be done in accordance with the National Electric Code, latest edition, (NFPA No. 70). Canadian electrical code C22.1 applies in Canada. All internal wiring has been completed at the factory. Provide electric service from a fused disconnect switch to the power terminal block in the power junction box on the unit heater. Wiring must be Type TW insulation for 60°C (140°F) or better for Models VE50 thru VE250. Use type THW insulation for 75°C (167°F) for Models VE and PTE 300, 400 500. Appliance wiring diagrams are located inside the power junction box cover.

**Make connections strictly in accordance with wiring diagram furnished with unit. Any wiring differing from this diagram may be hazardous to persons and property.**

**Any damage to, or failure of Modine units caused by incorrect wiring of the units is not covered by Modine's standard warranty.**

The location of a remote thermostat should be determined by the heating requirements and mounted on an inside wall approximately 5 feet above the floor. It must not be located where it would be affected by direct heat from the unit or other sources, or drafts from frequently opened doors or windows. See instructions packed with thermostat. The unit may also be controlled by a remote, manual on-off switch.

Control wiring should be No. 14 AWG (American Wire Gauge.)

All 480 volt and 600 volt, three-phase units have built-in transformers and fuses to stepdown voltage and protect motor and control circuit.

Fuse blocks with fuses are factory-installed on all 480 volt and 600 volt, 3-phase units to protect motor control and motor transformer.

All contactor coils are rated at 208-240 volts.

Models VE and PTE 300,400, 500 with 480 volt and 600 volt, 3-phase power supply are wired for two-stage control as standard equipment and have two contactors.

Figure 7.1 - Power junction box, Models VE50 thru VE250

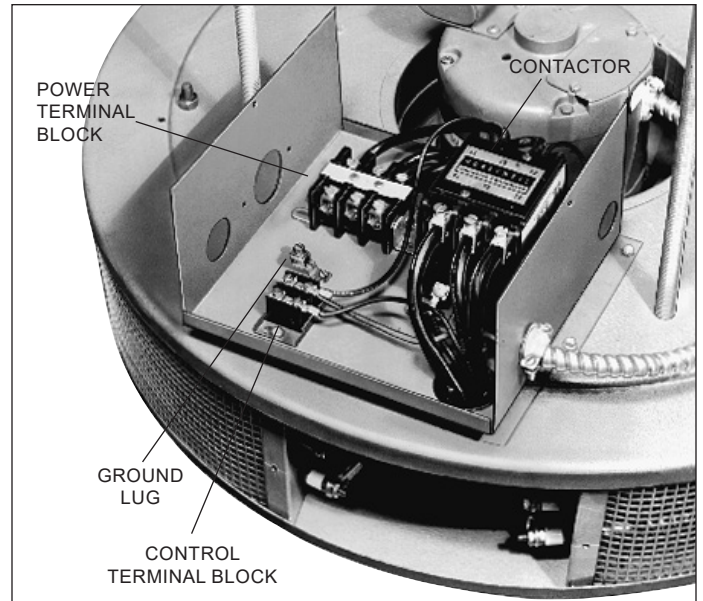
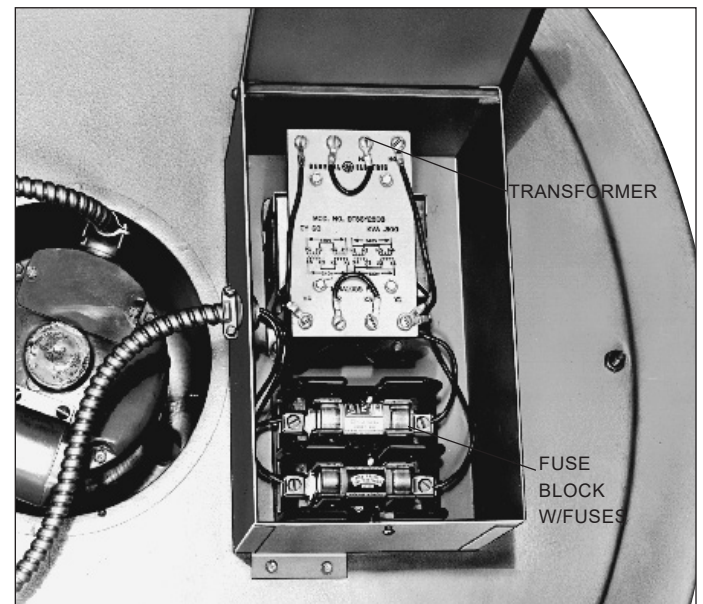


Figure 7.2 - Transformer and Fuse Box



# INSTALLATION

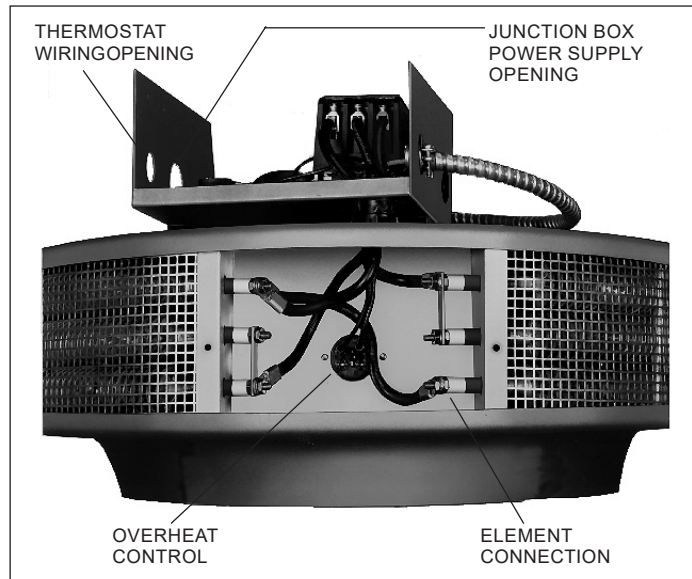
**Table 8.1 - Wiring Data, Vertical Units**

| Model No.        | Power Code | Power Supply |
|------------------|------------|--------------|
| <b>VE50</b>      | 12         | 240/1        |
|                  | 31         | 208/3        |
|                  | 32         | 240/3        |
|                  | 33         | 480/3        |
|                  | 34         | 600/3        |
| <b>VE75</b>      | 12         | 240/1        |
|                  | 31         | 208/3        |
|                  | 32         | 240/3        |
|                  | 33         | 480/3        |
|                  | 34         | 600/3        |
| <b>VE100</b>     | 12         | 240/1        |
|                  | 31         | 208/3        |
|                  | 32         | 240/3        |
|                  | 33         | 480/3        |
|                  | 34         | 600/3        |
| <b>VE150</b>     | 31         | 208/3        |
|                  | 32         | 240/3        |
|                  | 33         | 480/3        |
|                  | 34         | 600/3        |
| <b>VE200</b>     | 32         | 240/3        |
|                  | 33         | 480/3        |
|                  | 34         | 600/3        |
| <b>VE250</b>     | 33         | 480/3        |
|                  | 34         | 600/3        |
| <b>PTE/VE300</b> | 33         | 480/3        |
|                  | 34         | 600/3        |
| <b>PTE/VE400</b> | 33         | 480/3        |
|                  | 34         | 600/3        |
| <b>PTE/VE500</b> | 33         | 480/3        |
|                  | 34         | 600/3        |

**Table 8.2 - Power Junction Box Useful Volumes**

| Model              | Volume                |
|--------------------|-----------------------|
| VE50 thru 100      | 3,029 cm <sup>3</sup> |
| VE150 thru 250     | 2,883 cm <sup>3</sup> |
| VE/PTE300 thru 500 | 9,570 cm <sup>3</sup> |

**Figure 8.3 - Side terminal Box, Models VE50 thru VE250**



## Summer/Winter Switch

To allow a choice of fan operation of the electric unit heater for heating and/or ventilation, a summer/winter toggle switch kit is available for field installation. In the winter position the thermostat will cycle the fan on and off with the heating elements. In the summer position the fan runs continuously for ventilation while the heating elements are controlled by the thermostat. This position can also be used in winter to reduce ceiling air stratification and reduce ceiling heat loss. Refer to separate bulletin included in the kit for installation and wiring.

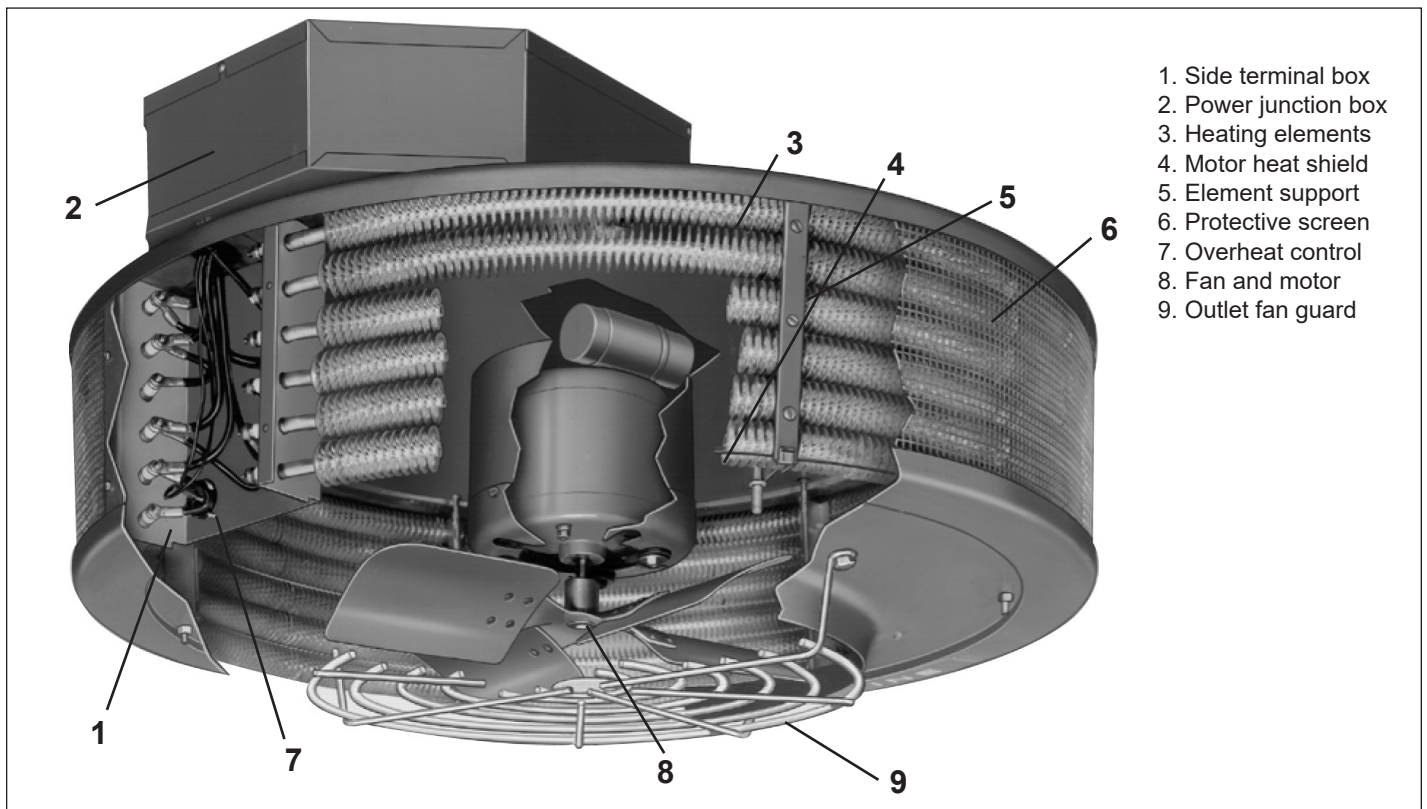
## Low-Voltage Control

Low-voltage control is available for field installation on vertical electric unit heaters. The control permits use of a low-voltage thermostat that can also provide closer temperature control. Models VE and PTE 300, 400, 500 cannot operate in two stages with this control and a low-voltage thermostat, but will respond with full operation of all elements.



# OPERATION

Figure 9.1 - Cutaway of Electric Unit Heater



## Operating Sequence

The operation of Modine electric unit heaters is governed by an electrical contactor which is controlled by a thermostat. The contactor completes the electric circuit to the heating elements when the thermostat “calls” for heat. The fan motor is also activated when the thermostat “calls” for heat.

When the thermostat is satisfied, the fan motor stops and the contactor opens the circuit to the heating elements.

## Prior to Operation

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

1. Check fan clearance. Fan should not contact casing or fan guard when spun by hand.
2. Check all electrical connections to be sure they are secure, and in accordance with the wiring diagram.
3. Check firmness of unit suspension. Tighten all fasteners, if necessary.
4. Make sure fuses are installed in units that require them.

## Safety Devices

The overheat control, (See Figure 9.1), will interrupt power to the unit contactor in the event of overheating. It is a single-pole single-throw switch, with an automatic reset. The switch will permit the motor to continue operation and cool the heater while power to the elements is interrupted. **This overheat control should operate only when something is seriously wrong with the unit. When this control operates, correct the difficulty immediately or serious and permanent damage may result.**

The motor for the circulating air fan has internal thermal overload protection. If for any reason, the motor overheats, the thermal protector will shut it off. The motor will re-start automatically when it has cooled.

## Initial Start-Up

1. Adjust room thermostat above room temperatures.
2. Turn on power to the unit.
3. Adjust the air deflector (if provided) for desired heat distribution.
4. Run the unit through several cycles by raising and lowering the thermostat setting to assure proper sequence of operation. For Models VE and PTE300, 400, 500 with two-stage thermostats, check operation on both states. Three elements should heat up during first stage operation when temperature falls. As additional heat is required the remaining three elements will be energized until the thermostat high-stage setting is satisfied. The unit will automatically shut off when the low-stage thermostat setting is satisfied.

## GENERAL MAINTENANCE

### WARNING

1. When servicing or repairing this equipment, use only factory approved service replacement parts. A complete replacement parts list may be obtained by contacting Modine Manufacturing Company. Refer to the rating plate on the unit for complete unit substitution of parts or controls not approved by the factory will be at the owner's risk.
2. Do not operate any heater if it malfunctions. Disconnect power at service panel and have heater inspected by a qualified installation and service agency.

### General Maintenance

Unit heaters, like other electrical and mechanical equipment, will give lasting trouble-free service if properly cared for. Observance of a few simple periodic procedures will insure their satisfactory operation.

Under average conditions, it is recommended that unit heaters be inspected before every heating season.. more often in locations where air is contaminated with corrosive fumes, dust, soot, or oil spray. To perform routine maintenance:

1. Disconnect power supply to the unit.
2. Open junction box doors at top of unit and inspect unit contactors, fuses, transformer, and tighten connections if necessary.
3. Open side terminal box by removing panel at side of unit and check element connections and the over-heat control switch.
4. Check motor mounting from bottom of unit. Check fan for proper clearance, free rotation, and firm connection to motor shaft. Remove air deflectors (if provided) for acces

### CAUTION

Do not reuse any electrical component which has been wet. Such component must be replaced.

**NOTE:** To check most of the Possible Remedies in the trouble-shooting guide listed in Table 11.1, refer to the applicable sections of the manual.

5. Lubricate motor according to manufacturer's instructions on motor. When no instructions are on motor, oil every two thousand hours of operation with SAE20 oil for normal applications. Adjust oiling according to usage and atmosphere. Some motors do not have oil fitting. These are lubricated for long life and do not require further lubrication.
6. Routine cleaning of the outer unit casing and protective screen is recommended to remove dirt, grease, or corrosive material that may damage finish. Rusted or corroded spots on top or bottom casing should be sanded and repainted.
7. Clean fan blades, elements, and inside casing with either a detergent solution or compressed air. Do not scrape elements.
8. For better element access or for more extensive cleaning of the elements and screen, the screen can be easily removed. Detach side terminal box cover and casing bottom before removing protective screen.

# TROUBLESHOOTING

Table 11.1 – Troubleshooting

| Problem                                | Possible cause(s)   | Remedy   |
|--|---|--|
| Unit does not operate                  | <ol style="list-style-type: none"> <li>1. Electric circuit in open position</li> <li>2. Blown fuses in control compartment.</li> <li>3. Defective or incorrect wiring</li> <li>4. Defective thermostat or switch</li> <li>5. Defective or burned out control transformer</li> </ol> | <ol style="list-style-type: none"> <li>1.               <ol style="list-style-type: none"> <li>a. Turn on switch or move thermostat to higher setting.</li> <li>b. Replace fuse or reset disconnect switch</li> </ol> </li> <li>2. Replace fuses</li> <li>3. Check wiring and connections. Refer to diagram inside junction box</li> <li>4. Check continuity with volt-ohmmeter. Replace defective part if necessary</li> <li>5. Check secondary voltage with voltmeter. Replace if necessary</li> </ol>   |
| Fan operates but element does not heat | <ol style="list-style-type: none"> <li>1. Power interrupted by overheat control</li> <li>2. Summer-winter switch in summer position</li> <li>3. Defective or incorrect wiring</li> <li>4. Blown element fuses</li> </ol>  | <ol style="list-style-type: none"> <li>1.               <ol style="list-style-type: none"> <li>a. Not enough air volume over elements. Louvers must be opened at least 45°. Clean element screen and spiral fins.</li> <li>b. Check motor rpm against nameplate rating. Replace motor if speed too slow.</li> <li>c. Defective limit control. Check wiring and connections. check continuity through control. Replace if necessary.</li> </ol> </li> <li>2. Change switch position</li> <li>3. Check all wiring and connections. See diagram inside junction box.</li> <li>4. Replace element fuses</li> </ol> |
| Elements heat but fan does not operate | <ol style="list-style-type: none"> <li>1. Fan motor failure</li> <li>2. Summer-winter switch defective or improperly wired</li> <li>3. Defective or incorrect wiring</li> </ol>   | <ol style="list-style-type: none"> <li>1.               <ol style="list-style-type: none"> <li>a. Check for loose electrical connections. Check wiring with diagram in control compartment</li> <li>b. Repair or replace defective motor.</li> <li>c. Voltage too high or too low. Check voltage with volt-meter.</li> </ol> </li> <li>2. Check for continuity with volt-ohmmeter. Replace if necessary.</li> <li>3. Check all wiring and connections. See diagram inside junction box</li> </ol>  |
| Insufficient heat                      | <ol style="list-style-type: none"> <li>1. Too few units for heat loss</li> <li>2. Unit mounted too high</li> <li>3. Fan operates backwards</li> <li>4. Burned out (elements)</li> </ol>   | <ol style="list-style-type: none"> <li>1. Add more units or increase size of units</li> <li>2. Lower mounting height</li> <li>3. Repair or replace motor or reverse fan rotation</li> <li>4. Disconnect internal wiring and check element resistance with ohmmeter</li> </ol>  |

# COMMERCIAL WARRANTY

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

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

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

BUYER'S REMEDY FOR BREACH OF WARRANTY, EXCLUSIVE OF ALL OTHER REMEDIES PROVIDED BY LAW, IS LIMITED TO REPAIR OR REPLACEMENT AT THE FACTORY OF SELLER, ANY COMPONENT WHICH

SHALL, WITHIN THE APPLICABLE WARRANTY PERIOD DEFINED HEREIN AND UPON PRIOR WRITTEN APPROVAL, BE RETURNED TO SELLER WITH TRANSPORTATION CHARGES PREPAID AND WHICH THE EXAMINATION OF SELLER SHALL DISCLOSE TO HAVE BEEN DEFECTIVE; EXCEPT THAT WHEN THE PRODUCT IS TO BE USED BY BUYER AS A COMPONENT PART OF EQUIPMENT MANUFACTURED BY BUYER, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO ONE YEAR FROM DATE OF SHIPMENT FROM SELLER. FOR GAS-FIRED PRODUCTS INSTALLED IN HIGH HUMIDITY APPLICATIONS AND UTILIZING STAINLESS STEEL HEAT EXCHANGERS, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO TEN YEARS FROM DATE OF SHIPMENT FROM SELLER.

These warranties are issued only to the original owner-user and cannot be transferred or assigned. No provision is made in these warranties for any labor allowance or field labor participation. Seller will not honor any expenses incurred in its behalf with regard to repairs to any of Seller's products. No credit shall be issued for any defective part returned without proper written authorization (including, but not limited to, model number, serial number, date of failure, etc.) and freight prepaid.

#### OPTIONAL SUPPLEMENTAL WARRANTY

Provided a supplemental warranty has been purchased, Seller extends the warranty herein for an additional four (4) years on certain compressors. Provided a supplemental warranty has been purchased, Seller extends the warranty herein for an additional four (4) years or nine (9) years on certain heat exchangers.

#### EXCLUSION OF CONSUMABLES & CONDITIONS BEYOND SELLER'S CONTROL

The above referenced warranty shall not be applicable to any of the following items: refrigerant gas, belts, filters, fuses and other items consumed or worn out by normal wear and tear or conditions beyond Seller's control, including (without limitation as to generality) polluted or contaminated or foreign matter contained in the air or water utilized for heat exchanger (condenser) cooling or if the failure of the part is caused by improper air or water supply, or improper or incorrect sizing of power supply.

| <b>Component</b><br>Applicable Models  | <b>"APPLICABLE WARRANTY PERIOD"</b>  |
|--|--|
| <b><u>Heat Exchangers</u></b><br>Gas-Fired Units except PSH/BSH  | TEN YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN TEN YEARS FROM DATE OF RESALE BY BUYER OR ANY OTHER USER, WITHIN TEN YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN ONE HUNDRED TWENTY-SIX MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST |
| <b><u>Heat Exchangers</u></b><br>Low Intensity Infrared Units<br><b><u>Compressors</u></b><br>Condensing Units for Cassettes   | FIVE YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN FIVE YEARS FROM DATE OF RESALE BY BUYER OR ANY OTHER USER, WITHIN FIVE YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN SIXTY-SIX MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST           |
| <b><u>Burners</u></b><br>Low Intensity Infrared Units<br><b><u>Other</u></b><br>Components excluding Heat Exchangers, Coils, Condensers, Burners, Sheet Metal  | TWO YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN TWO YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN THIRTY MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST  |
| <b><u>Heat Exchangers/Coils</u></b><br>Indoor and Outdoor Duct Furnaces and System Units, PSH/BSH, Steam/Hot Water Units, Oil-Fired Units, Electric Units, Cassettes, Vertical Unit Ventilators<br><b><u>Compressors</u></b><br>Vertical Unit Ventilators<br><b><u>Burners</u></b><br>High Intensity Infrared Units<br><b><u>Sheet Metal Parts</u></b><br>All Products | ONE YEAR FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN ONE YEAR FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN EIGHTEEN MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST  |

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



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