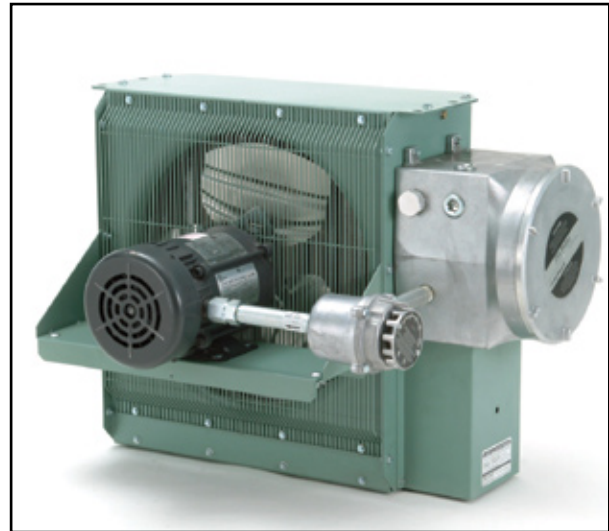


INSTALLATION, PARTS, SERVICE AND MAINTENANCE MANUAL
HEX5 series, electric unit heaters for hazardous locations



This manual covers the installation, maintenance, repairs and parts for Modine 60Hz.

APPROVED LOCATIONS

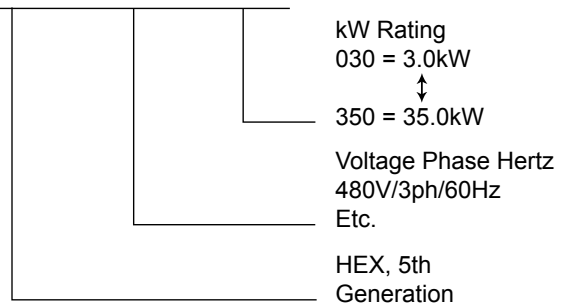
The Electric Forced Air Heaters are ^cUL_{US} listed for the following locations:

- Class I, Divisions 1 & 2, Groups C & D;
- Class II, Division 1, Groups E, F, & G;
- Class II, Division 2, Groups F & G;
- Class I, Zones 1 & 2, Groups IIA & IIB;
- Temperature Code T3B 165°C (329°F)

For details of hazardous locations with potential for explosion, refer to the Canadian Electrical Code, Part 1, Section 18 or National Electrical Code articles 500-516.

MODEL CODING

HEX5 - 480360 - 350



WARNING!
READ ALL IMPORTANT NOTICES ON PAGE 3.

Part No. 4510-5

Printed in Canada



HEATER MAINTENANCE CHECKLIST

For Electric Forced Air Heaters

Heater Model: _____ Serial No.: _____
Date of Maintenance: _____ Maintenance Done By: _____
Comments: _____

WARNING

Disconnect heater from power supply at integral disconnect or fuse box before opening enclosures or servicing heater.
Lock the switch in the "OFF" (open) position and/or tag the switch to prevent unexpected power application.
IF INTEGRAL DISCONNECT IS BEING SERVICED, verify that power has been disconnected at fuse box or main panel.
Lock the switch in the "OFF" (open) position and/or tag the switch to prevent unexpected power application.
This heater should only be serviced by personnel with heating and hazardous location equipment experience.

PERIODIC (before and as required during heating season)

- | | |
|---|---|
| <p>1. CLEAN</p> <ul style="list-style-type: none"><input type="checkbox"/> Finned Tubes<input type="checkbox"/> Fan<input type="checkbox"/> Fan Guard<input type="checkbox"/> Motor<input type="checkbox"/> Louvers | <p>2. CHECK</p> <ul style="list-style-type: none"><input type="checkbox"/> Motor for smooth, quiet operation<input type="checkbox"/> Louvers for proper angle and tightness<input type="checkbox"/> All explosion-proof covers for tightness<input type="checkbox"/> Pressure relief device for signs of leakage. See Figure 1 and refer to the ANNUAL Section (see below) item 2 for further instructions |
|---|---|

**Remove dust using compressed air. Do not spray with water or solvents.
Do not immerse in water or solvents.**

ANNUAL (before heating season)

1. ELECTRICAL
- Check all terminal connections and conductors.** Tighten loose connections. Conductors with damaged insulation must be replaced.
 - Inspect contactor contacts.** If badly pitted, burned or welded shut, replace with factory supplied contactor. For severe duty conditions such as arctic duty or drilling rigs, Modine recommends the contactor be replaced every two years.
 - Check fuses.** Fuse rating and type are on printed circuit board. Correct fuse must be in the active fuse clip. It is recommended that a spare fuse be stored in the spare fuse clip.
 - Check all explosion-proof conduits.** Replace damaged conduits. All threaded conduit connections must have a minimum 5 turns engagement. Straight threaded conduit must protrude a minimum of 1/16" (1.6mm) inside enclosures. Taper threaded connections must be at least hand tight.
 - Check electrical resistance on all load side legs.** Reading should be balanced ($\pm 5\%$).
2. MECHANICAL
- Check for fluid leakage.** The heater core is vacuum charged and contains propylene glycol. Inspect the Pressure Relief Valve label indicator for signs of rupture and degradation. If the paper is torn, disintegrated or otherwise compromised this is an indication that fluid has leaked from the core. If any fluid leakage occurs from the heater, disconnect it from the power supply and have the core replaced. A factory supplied exchange core can be shipped immediately from stock. Refer to the "Repair and Replacement" section for details.
 - Check all enclosures.** Interior of enclosures must be clean, dry and free of foreign materials. Threaded covers must be installed and hand tight.
Note: Enclosure joints are metal to metal. Do not use gasket material or sealant in joints. A grease is applied to the joints at the factory and should be left intact.
 - Check motor shaft bearing play.** Replace motor if play is excessive, or if motor does not run quietly and smoothly. Motor bearings are permanently lubricated.

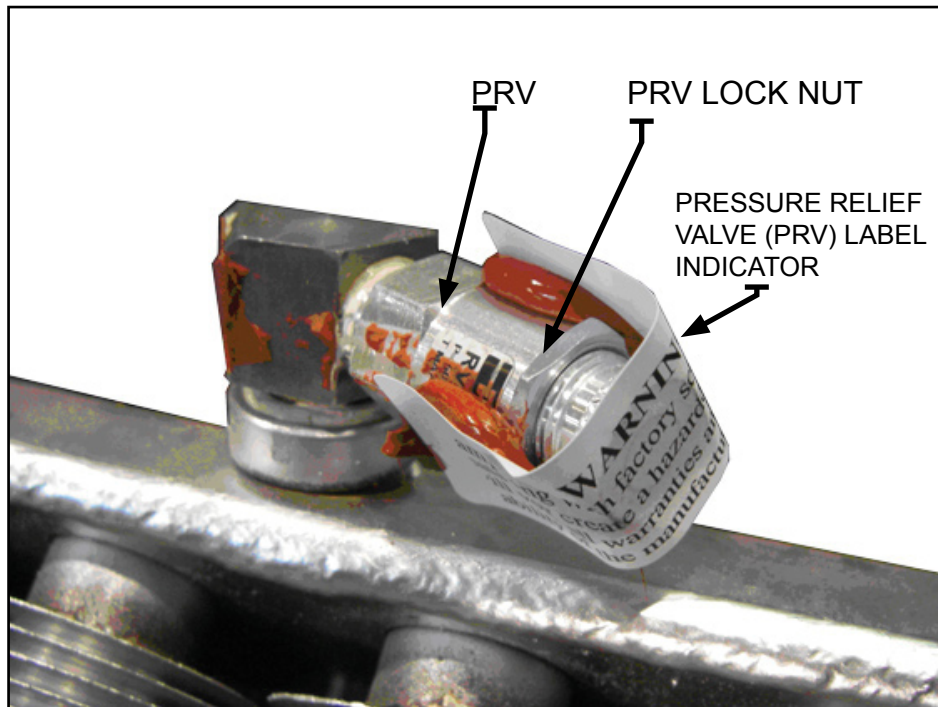
- **Turn heater on for a minimum of five minutes.** Check for warm air exiting heater through louvers. Crackling or pinging noises within heater during start-up are normal.

IMPORTANT NOTICES

WARNING

Read and adhere to the following. Failure to do so may result in severe or fatal injury.

1. Read and follow all instructions in this manual.
2. Heater is to be used only in atmospheres having an ignition temperature higher than the heater's maximum rated operating temperature as shown on the heater data plate. Refer to applicable electrical codes for additional information.
3. Heater to be used only in the hazardous locations indicated on the heater's data plate.
4. Heater is for dry indoor use only. Do not immerse in water. Do not store or use in areas exposed to rain or snow.
5. Heater is to be connected and serviced only by a qualified electrician experienced with hazardous location equipment.
6. Installation and wiring of the heater must adhere to all applicable codes.
7. Disconnect heater from power supply at integral disconnect or fuse box before opening enclosures or servicing heater. Lock the switch in the "OFF" (open) position and/or tag the switch to prevent unexpected power application.
8. This heater is equipped with a single bimetal overtemperature high-limit. It is of the automatic reset type and therefore the heater may restart without warning. The heater is not to be operated with the high-limit disabled or disconnected from the control circuit.
9. Venting pressure of the pressure relief valve is factory set. Do not tamper with lock nut.
10. Do not tamper or remove warning label indicator on the PRV (figure 1).
11. Operate the heater only while it is permanently mounted in an upright position. Refer to the "Installation - Mechanical" section for details.
12. Heater must be kept clean. When operating in a dirty environment, regularly clean the finned tubes, fan, and fan guard. Follow the recommended maintenance procedures. Refer to the "Heater Maintenance Checklist" section for details.
13. The heater core is vacuum charged and contains propylene glycol. **If any fluid leakage occurs from the heater, disconnect it from the power supply and have the core replaced with a factory supplied core. Refer to the "Repair and Replacement" section for details.**
14. Do not operate the heater with any of the louvers fully closed or overriding their stops.
15. Do not operate the heater in atmospheres corrosive to steel or aluminum.
16. Do not operate heater in ambient temperatures above 40°C (104°F).
17. Use factory approved replacement parts only.
18. See applicable electrical codes for seal requirements in field installed conduits. Factory installed conduits require no further sealing.
19. Crackling or pinging noises within the heater core during start up may occur. This is normal.
20. Air discharge near the bottom of the heater may be warmer than the top. This is normal.
21. If there are any questions or concerns regarding the heater, contact the factory. Refer to the last page of this manual for details.



TROUBLESHOOTING TIPS

- 1.0 **Heater is not operating**
 - 1.1 Check all fuses in heater control box.
 - 1.2 Check remote disconnect switch and circuit breaker.
 - 1.3 Check voltage supplied to the heater – refer to the heater data plate for voltage requirements.
 - 1.4 Check thermostat by turning it and check continuity with a multimeter.
 - 1.5 Check the condition of the disconnect switch if the heater is so equipped. Measure continuity through the disconnect by engaging the switch.
 - 1.6 Verify that there is a jumper wire present between terminals 5 and 6 on the terminal block located in the control box.
- 2.0 **Contactor is chattering**
 - 2.1 Check supply voltage.
 - 2.2 Check wiring connections. Tighten all loose electrical connections.
 - 2.3 Check thermostat for continuity (See 1.4). If thermostat does not break continuity replace thermostat.
- 3.0 **Contactor is burned or welded**
 - 3.1 Check the contactor for burn marks and blackening. Replace the contactor.
 - 3.2 Check incoming power to the heater to ensure there are no voltage fluctuations.
- 4.0 **Heat exchanger is dirty**
 - 4.1 Clean the heat exchanger using compressed air.
- 5.0 **PRV has released**
 - 5.1 If there are signs that the PRV has released fluid, PRV indicator is broken, blackening around the PRV exit hole, or there are fluid stains visible on the top louver, shut the unit down immediately.
 - 5.2 Check for restricted air flow, bad motor, broken thermostat or malfunctioned high limit.
- 6.0 **Heater is cold on top and warm on bottom**
 - 6.1 The core may have lost its vacuum. Check the PRV for signs of loss of fluid and verify that the PRV label indicator is not broken. If PRV has released, send the unit in for repair or replace the core.
 - 6.2 If the PRV does not indicate loss of fluid, the heater should operate normally. Check for loss of fluid on a weekly basis as a minimum.
 - 6.3 The ambient temperature may be too low. If the ambient temperature is very cold the top of the core will be colder than the bottom – this is normal.
- 7.0 **Unit cycles on high limit – unit turns on and turns off within less than 5 minutes.**
 - 7.1 Check and see if the PRV has released fluid. Core may have lost most or all of its fluid. If PRV has released, send the unit in for repair or replace core.
 - 7.2 The core may be dirty, fan may not be working or may be turning the wrong way (the fan must rotate clockwise as seen from the front of the unit) objects may be stuck in the heat exchanger for drying or warming up – remove any items from the exchanger.
- 8.0 **The Ground Fault Interrupter (GFI) trips on the main panel, or heater blows fuses.**
 - 8.1 Check that you have a fuse of the proper amperage rating.
 - 8.2 Check for loose or frayed wiring.
 - 8.3 If condition is not observable, send heater in for repair.
 - 8.4 Change sensitivity of GFI.
- 9.0 **The fan is turning but very little air comes from the front of the heater.**
 - 9.1 Check fan rotation and ensure that the fan turns clockwise as seen from the front of the heater. Refer to the Installation section below for more information.
 - 9.2 Check motor winding resistance and verify that they are balanced.
 - 9.3 Check fan blade set screws to ensure fan blade is not loose on the motor shaft.

INSTALLATION

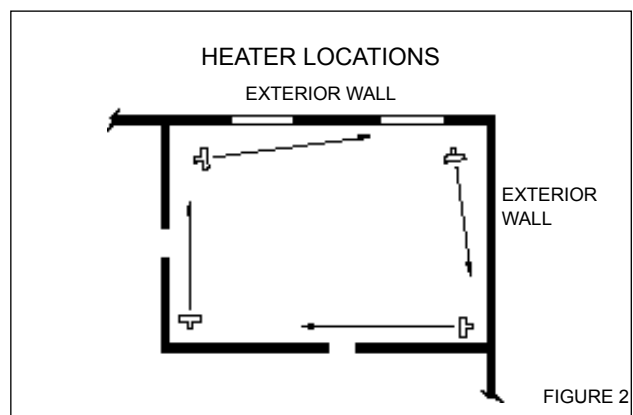
The installation instructions provide a general guideline for the installation and wiring of the heater.
All applicable codes must be adhered to.

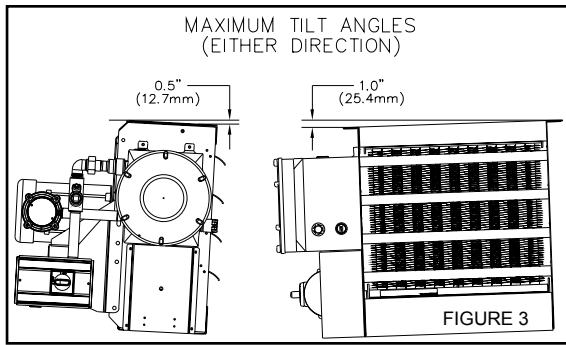
MECHANICAL

LOCATION

For optimum heating, the heater should be installed as follows:

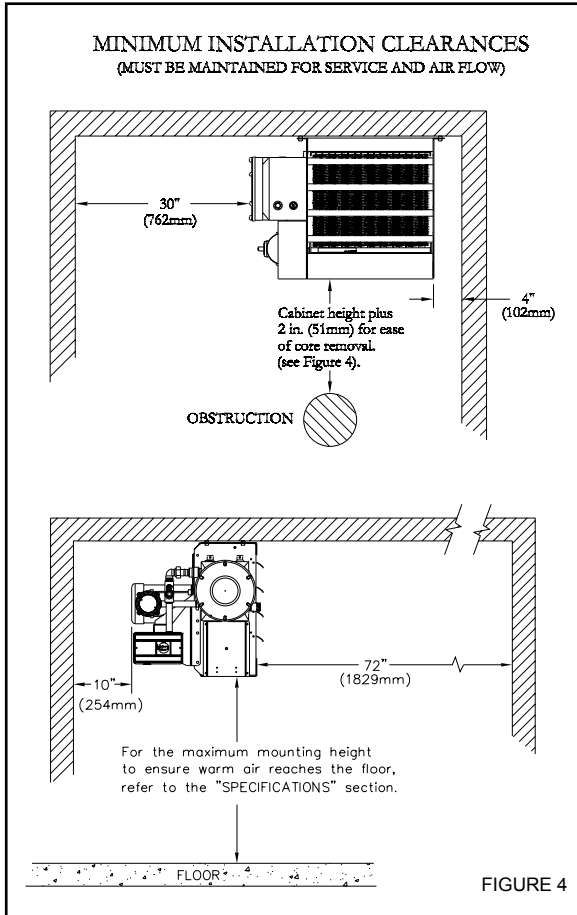
1. There are no obstructions that may impede the heater's air inlet or discharge.
2. The air discharge is directed into open areas and not at occupants.
3. The air discharge is not directed at a thermostat.
4. The air discharge is directed across areas of heat loss, such as doors and windows (see Figure 2).
5. The air discharge is directed along and at a slight angle toward exterior walls (see Figure 2).
6. If equipment freeze protection is important, direct air discharge at equipment.
7. Air discharge streams support each other and create a circular air flow. It is not required that the heater's air throw reaches the next heater (see Figure 2).





MOUNTING

- The heater must be permanently mounted in a level, upright position for operation. See Figures 3, 4, and 5 for maximum tilt angles, installation clearances, and physical dimensions. For ease of installation, a variety of mounting kits are available from the factory.
- The mounting structure must be strong enough to:
 - support the heater's weight, refer to the "Specifications" section,
 - provide sufficient stiffness to prevent excessive vibration, and
 - withstand harsh situations such as transportable installations.



DIM.	kW	DIM. TOL. ±		
		2.5-10	12.5-20	20.9-35
A	in.	8-7/16	8-7/16	8-7/16
	mm	215	215	215
B	in.	18-3/16	22-5/16	26-1/4
	mm	462	566	667
C	in.	27	31	35
	mm	686	787	889
D	in.	18-1/2	22-1/2	26-1/2
	mm	470	572	674
E	in.	19-7/16	23-7/16	27-7/16
	mm	494	596	697
F	in.	17-1/2	19-1/2	21-13/16
	mm	444	495	554

DIMENSIONAL TOLERANCES $\pm 1/8"$ [$\pm 3\text{mm}$] UNLESS OTHERWISE SPECIFIED.

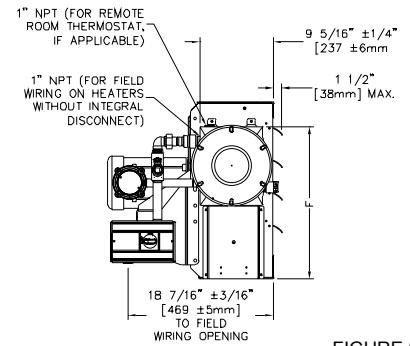
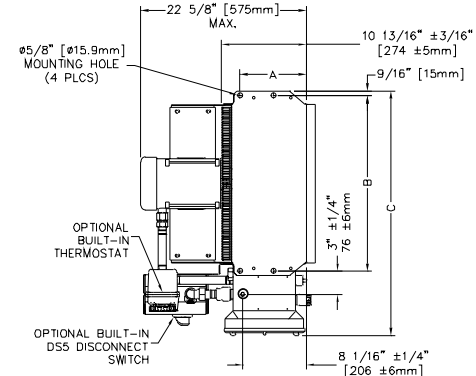
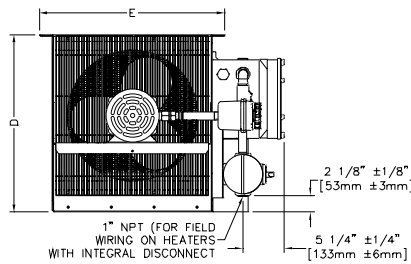


FIGURE 5

ELECTRICAL

WARNING

Disconnect heater from power supply at integral disconnect or fuse box before opening enclosures or servicing heater. Lock the switch in the "OFF" (open) position and/or tag the switch to prevent unexpected power application. IF INTEGRAL DISCONNECT IS BEING SERVICED, verify that power has been disconnected at fuse box or main panel. Lock the switch in the "OFF" (open) position and/or tag the switch to prevent unexpected power application. Installation and wiring of the heater must adhere to all application codes.

GENERAL

- Use only copper conductors and approved explosion-proof wiring methods during installation. Refer to the "Technical Data" table and heater data plate for conductor rating.
- External overcurrent protection is required. Refer to the "Technical Data" table and heater data plate for voltage, frequency amperage, and phase. Supply voltage is to be within 10% of the data plate voltage.
- The heater must be installed by qualified personnel in strict compliance with electrical codes.
- All heaters come factory prewired and ready for direct connection to the power supply leads.
- The heater must be individually fused, preferably with Class J time-delay fuses for maximum safety. Unless stated otherwise in your local code, fuse size shall be 125% of line current or next size larger.

FIELD WIRING

- The supply conductors, ground conductor, and room thermostat conductors (see point 2, page 5) all pass through the 1" NPT opening (see Figure 6) and are to be wired into the control enclosure (see Figure 7A).
- Heater may be supplied with a factory installed built-in room thermostat (see Figure 8). On heaters not supplied with this option, it is recommended that a remote room thermostat be used. Connect the remote room thermostat conductors to the printed circuit board terminal block marked "TSTAT". Any thermostat used with this heater must:
 - be of an explosion-proof type,
 - be rated 125 V minimum,
 - have a minimum 2 amp capacity, and
 - open on temperature rise.

- Heater may be supplied with a factory installed built-in integral disconnect. (See Figure 7B)

Field Wiring for Integral Disconnect:

- Power Supply conductors and Ground conductor pass through 1"NPT opening of Disconnect Enclosure (see Figure 7B). Supply conductors to be wired to Disconnect Switch inside. Ground conductor to be wired to Ground Lug fastened to inside of Disconnect Enclosure.
- If applicable, Remote Room Thermostat conductors pass through 3/4"NPT opening (see Figure 7b) and are to be wired to printed circuit board terminals marked "T'STAT".
- To reduce risk of ignition of hazardous atmospheres, conduit runs must have a sealing fitting connected within 18 inches (457 mm).

Factory installed conduits require no further sealing. Integral Disconnect is sealed at factory.

- The internal grounding terminal in the control enclosure (or in the integral disconnect enclosure when this option is provided) shall be used as the equipment grounding means. An external bonding terminal is provided for a supplementary bonding connection where local authorities permit or require such a connection.

FINAL INSPECTION

- Before application of electrical power:
 - Check that all connections are secured and comply with the applicable wiring diagram (see Figure 9) and code requirements,
 - Confirm that the power supply is compatible with the data plate rating of the heater,
 - Remove any foreign objects from the heater,
 - Install all covers and verify that all enclosures are well secured, and
 - Ensure that the fan rotates freely. See Figure 6 for proper direction of fan rotation.

Control Enclosure & Field Wiring

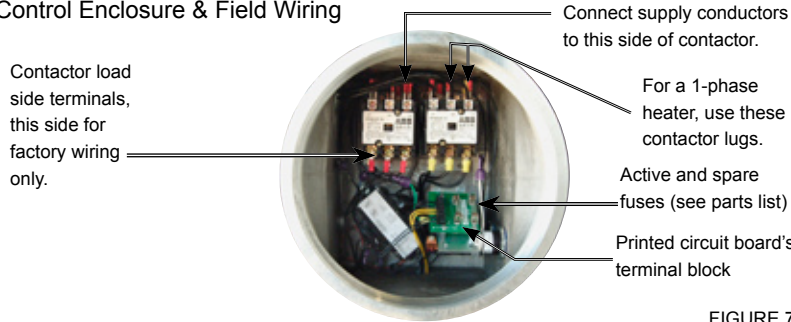
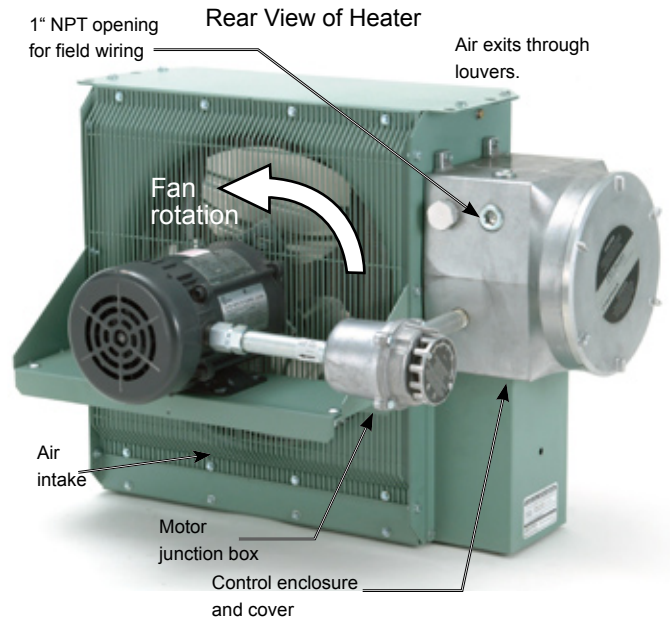


FIGURE 7A



Do not install conduit below heater (see Figure 3).

FIGURE 6



FIGURE 8

Optional Built-in Disconnect & Field Wiring

Sealed at Factory

Switch load side terminals, this side for factory wiring only.

1" NPT (Power Supply)



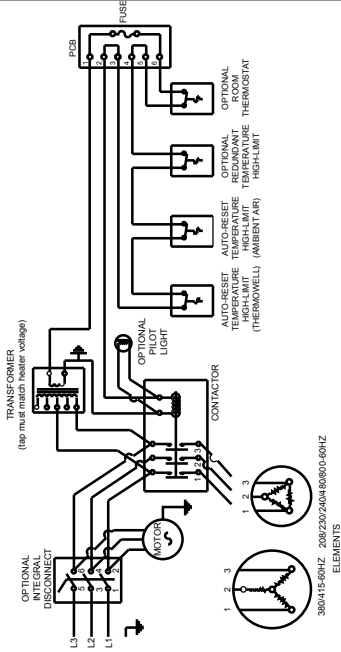
3/4" NPT (Remote Room Thermostat if applicable)

Terminals marked "T'STAT"

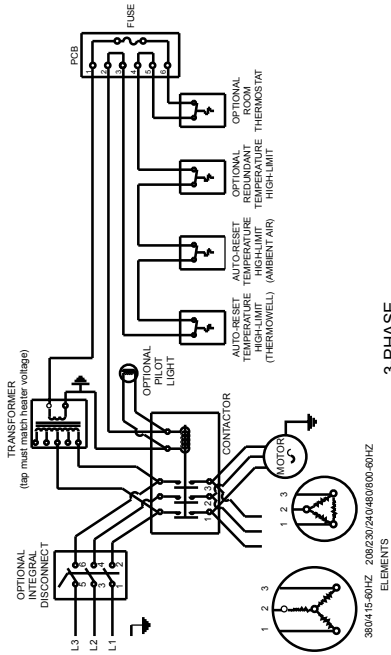
For a 1-phase heater use these Switch terminals

Connect Supply Conductors to this side of Switch

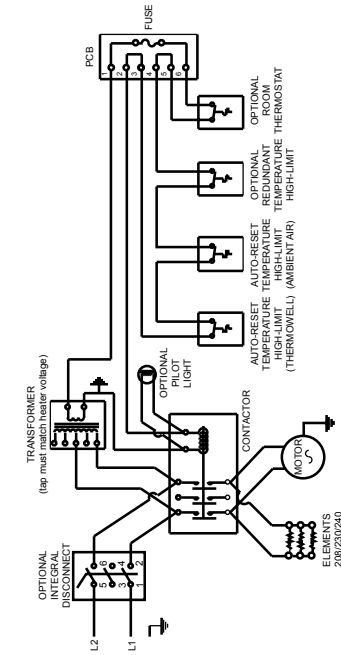
FIGURE 7B



3-PHASE WIRING SCHEMATIC CONTINUOUS FAN OPTION



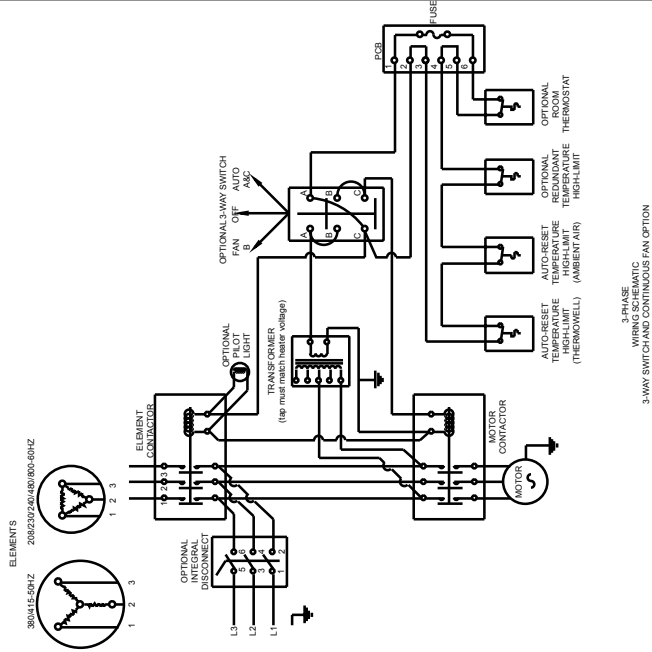
3-PHASE WIRING SCHEMATIC 3-WAY SWITCH



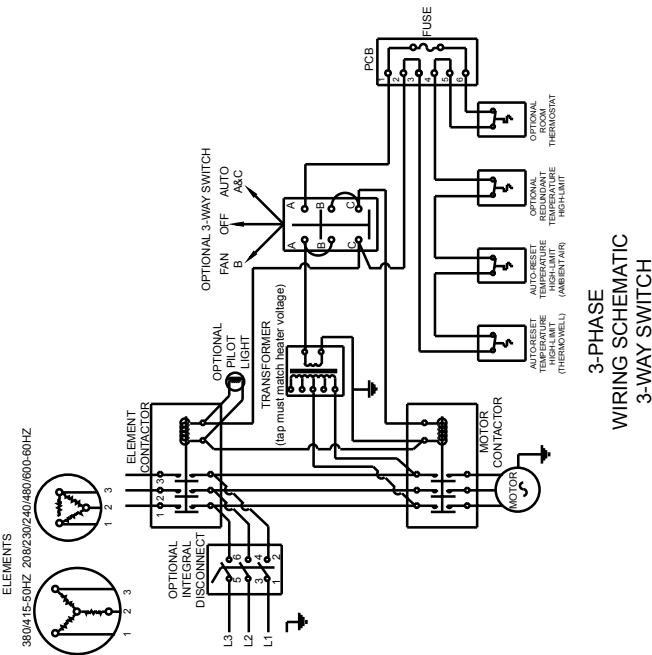
1-PHASE WIRING SCHEMATIC CONTINUOUS FAN OPTION



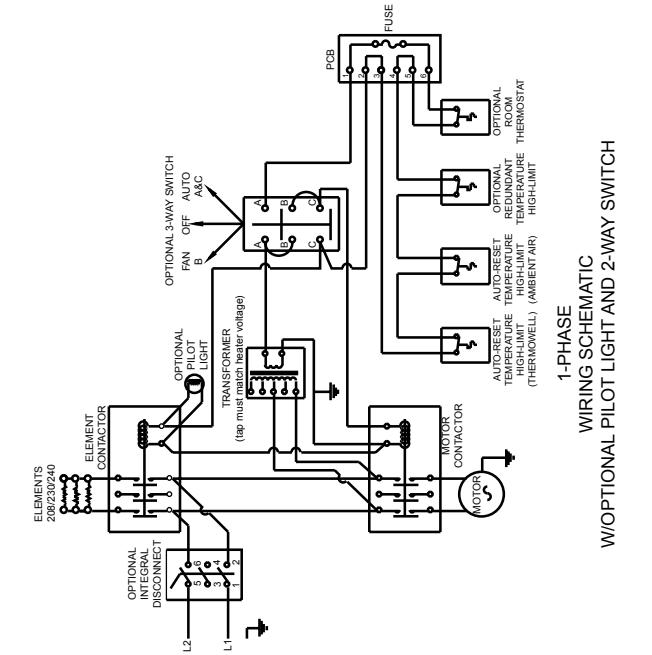
1-PHASE WIRING SCHEMATIC 3-WAY SWITCH



3-PHASE WIRING SCHEMATIC 3-WAY SWITCH



3-PHASE WIRING SCHEMATIC 3-WAY SWITCH



1-PHASE WIRING SCHEMATIC 3-WAY SWITCH

HEX5 TECHNICAL DATA FOR 60 HZ ELECTRIC AIR HEATERS



MODEL	NOTE	VOLTAGE (V)	NOMINAL WATTAGE (kW)	PHASE	MAX. MOTOR NAMEPLATE CURRENT (A)	HEATER WATTAGE (W)	TOTAL CURRENT (A)	MINIMUM CIRCUIT AMPACITY (A)	SUPPLY WIRE SIZE (AWG)	MAXIMUM FUSE SIZE (A)	TEMPERATURE RISE		CORE PART NUMBER	CONTACTOR PART NUMBER
											°F	°C		
HEX5-208160-030		208	3.0	1	2.7	2,700	14.4	18.0	12	20	11.2	6.2	10406	10557
HEX5-208160-050		208	5.0	1	2.7	4,700	24.0	30.0	10	30	18.6	10.3	10407	10557
HEX5-208160-075	*	208	7.5	1	2.7	7,200	36.1	45.1	6	50	27.9	15.5	10408	10557
HEX5-208160-100	*	208	10.0	1	2.7	9,690	48.1	60.1	4	70	37.2	20.7	10409	10558
HEX5-208360-030		208	3.0	3	1.4	2,700	8.3	10.4	14	15	11.2	6.2	10406	10557
HEX5-208360-050		208	5.0	3	1.4	4,700	13.9	17.4	12	20	18.6	10.3	10407	10557
HEX5-208360-075		208	7.5	3	1.4	7,200	20.8	26.0	10	30	27.9	15.5	10408	10557
HEX5-208360-100		208	10.0	3	1.4	9,700	27.8	34.8	8	35	37.2	20.7	10409	10557
HEX5-240160-030		240	3.0	1	2.7	2,700	12.5	15.6	12	20	11.2	6.2	10410	10557
HEX5-240160-050		240	5.0	1	2.7	4,700	20.8	26.0	10	30	18.6	10.3	10411	10557
HEX5-240160-075		240	7.5	1	2.7	7,200	31.3	39.1	8	40	27.9	15.5	10412	10557
HEX5-240160-100	*	240	10.0	1	2.7	9,700	41.7	52.1	6	60	37.2	20.7	10413	10558
HEX5-240160-150	*	240	15.0	1	1.4	14,400	62.5	78.1	2	80	27.1	15.1	10424	10558
HEX5-240360-030		240	3.0	3	1.4	2,700	7.2	9.0	14	15	11.2	6.2	10410	10557
HEX5-240360-050		240	5.0	3	1.4	4,700	12.0	15.0	14	15	18.6	10.3	10411	10557
HEX5-240360-075		240	7.5	3	1.4	7,200	18.0	22.5	10	25	27.9	15.5	10412	10557
HEX5-240360-100		240	10.0	3	1.4	9,700	24.1	30.1	8	35	37.2	20.7	10413	10557
HEX5-240360-150		240	15.0	3	1.4	14,400	36.1	45.1	6	50	27.1	15.1	10424	10558
HEX5-480160-030	°	480	3.0	1	1.3	2,700	6.3	7.9	14	15	11.2	6.2	10414	10557
HEX5-480160-050	°	480	5.0	1	1.3	4,700	10.4	13.0	14	15	18.6	10.3	10415	10557
HEX5-480160-075	°	480	7.5	1	1.3	7,200	15.6	19.5	12	20	27.9	15.5	10416	10557
HEX5-480160-100	°	480	10.0	1	1.3	9,700	20.8	26.0	10	30	37.2	20.7	10417	10557
HEX5-480160-150	°	480	15.0	1	1.3	14,400	31.3	39.1	8	40	27.1	15.1	10426	10557
HEX5-480160-200	°	480	20.0	1	1.3	19,400	41.7	52.1	6	60	36.1	20.1	10218	10558
HEX5-480360-030		480	3.0	3	0.7	2,700	3.6	4.5	14	15	11.2	6.2	10414	10557
HEX5-480360-050		480	5.0	3	0.7	4,700	6.0	7.5	14	15	18.6	10.3	10415	10557
HEX5-480360-075		480	7.5	3	0.7	7,200	9.0	11.3	14	15	27.9	15.5	10416	10557
HEX5-480360-100		480	10.0	3	0.7	9,700	12.0	15.0	14	15	37.2	20.7	10417	10557
HEX5-480360-150		480	15.0	3	0.7	14,400	18.0	22.5	10	25	27.1	15.1	10426	10557
HEX5-480360-200		480	20.0	3	0.7	19,400	24.1	30.1	8	35	36.1	20.1	10218	10557
HEX5-480360-250		480	25.0	3	1.0	24,200	30.1	37.6	8	40	45.2	25.1	10430	10557
HEX5-480360-300		480	30.0	3	1.0	29,200	36.1	45.1	6	50	26.4	14.6	10431	10558
HEX5-480360-350		480	35.0	3	1.0	34,200	42.1	52.6	6	60	30.7	17.1	10432	10558

NOTES:

* Exceeds the 48 Amp Circuit limit of NEC 424-22. DS5 not available for these units.

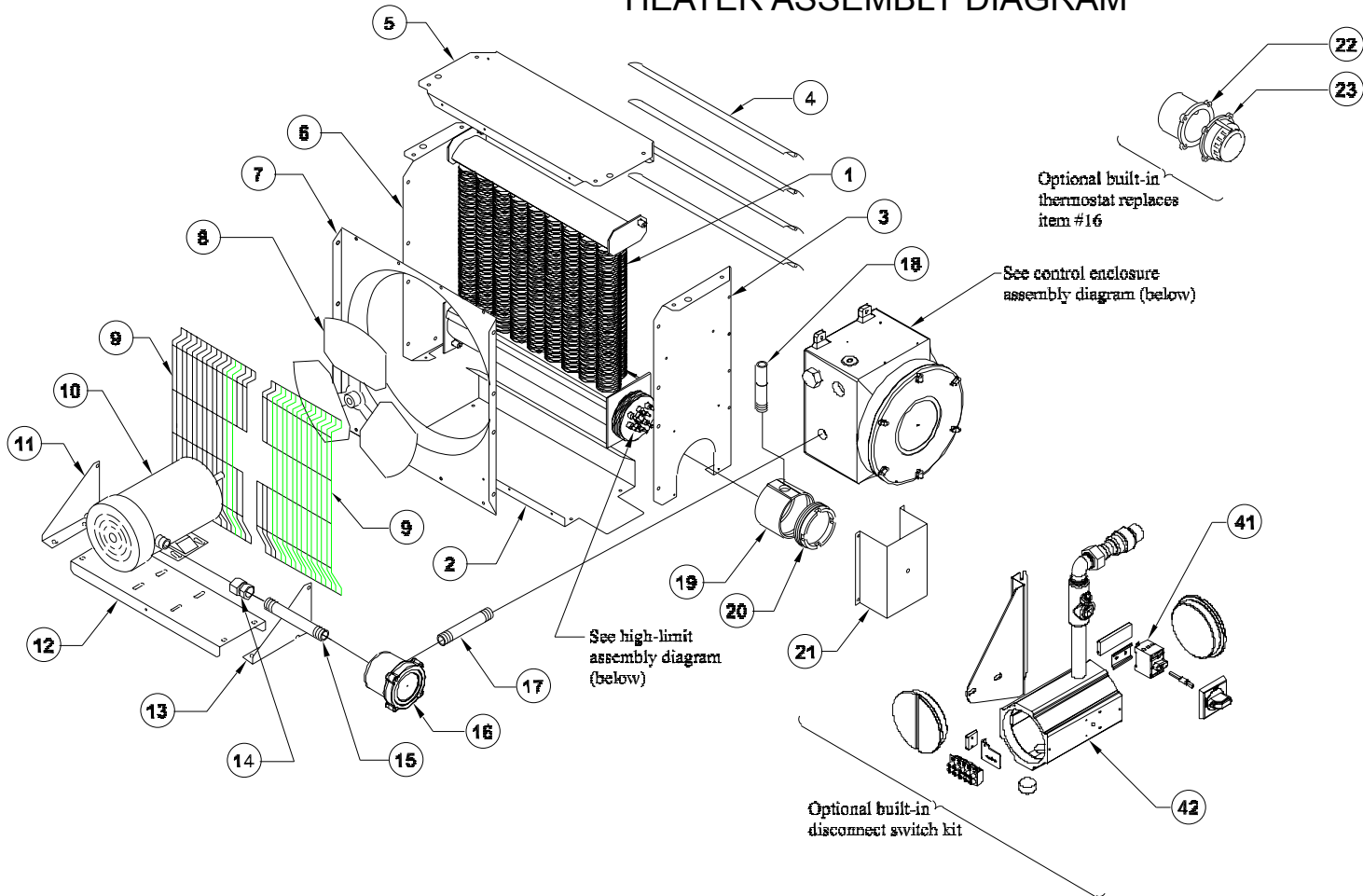
° 480 1 phase units

1. Minimum conductor size for 30°C (86°F) ambient. Derate conductor for ambient temperature. Use minimum 90°C (194°F) insulation.
2. Heater is functioning normally if at rated voltage the amp draw is within 10% of the value in this table.
3. Operation at lower voltages will result in reduced heat output and amp draw
4. Add "T" to model number when adding a built-in thermostat
5. Add "D" to model number when adding a built-in disconnect switch
6. Add "P" to model number when adding a built-in pilot light
7. Add "S" to model number when adding a 3-way switch
8. Add "H" to model number for units with high "off" (deenergized) ambient temperatures
9. Add "U" to model number for units with continuous fan option
10. Add "A" to model number for units with stainless steel cabinet.

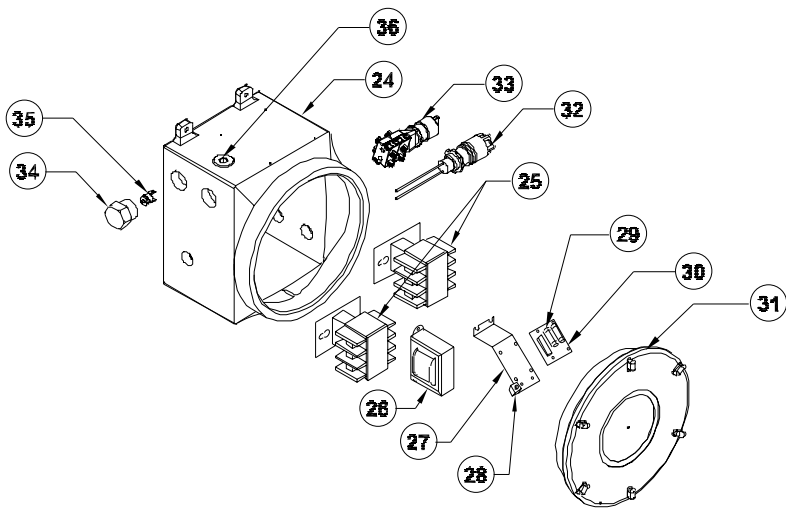
SPECIFICATIONS FOR ALL 60 HZ MODEL

		Nominal kW	3	5	7.5	10	15	20	25	30	35
Max. Altitude		(ft.)	12,000	8,000	10,000	7,000	10,000	7,000	10,000	7,000	6,000
		(m)	3,658	2,438	3,048	2,134	3,048	2,134	3,048	2,134	1,829
Air Flow	@ 70°F	(CFM)	850				1750		3600		
	@ 21°C	(m ³ /hr.)	1444				2973		6116		
Horizontal Air Throw		(ft.)	30				40		70		
		(m)	9.1				12.2		21.3		
Max. Mounting Height		(ft.)	10				10		20		
(to underside)		(m)	3.0				3.0		6.1		
Motor Power		(HP)	1/2				1/2		1/2		
(min)		(kW)	0.373				0.373		0.373		
Fan Diameter		(in.)	12				16		20		
		(mm)	305				406		508		
Net Weight	without	(lbs.)	140				168		201		
	DS5	(kg)	63.5				76.2		91.2		
	with	(lbs.)	152				180		213		
	DS5	(kg)	78.9				81.6		96.6		
Shipping Weight	without	(lbs.)	194				218		252		
	DS5	(kg)	88				98.9		114.3		
	with	(lbs.)	206				230		264		
	DS5	(kg)	93.4				104.3		119.7		
Temperature Code Rating		T3B 165°C (329°F) Class I & II.									
Enclosures		NEMA Type 7 & 9. For dry, indoor use only. Do not immerse in water. Do not store or use in areas exposed to rain or snow.									
Motor Type		Explosion-proof. Thermally protected. Permanently lubricated ball bearings. 1725 RPM									
Fan		Aluminum blade. Steel spider and hub with 5/8 in. (15.875 mm) bore.									
Fan Guard		Split design with close wire spacing. 1/4 in. (6.3 mm) dia. probe will not enter.									
Mounting Holes		Four 9/16 in. (14.3 mm) diameter holes at top of heater.									
Heating Elements		Three long-life, low watt-density, high grade metal-sheathed elements.									
Temperature High-Limit		Automatic reset type, snap-action bimetal, open on temperature rise. Rated 100,000 cycles at 10 amps, handles 0.128 amps.									
Control Circuit		120 Volts, 0.128 amps, 15VA. (Grounded)									
Optional Built-in Thermostat		Explosion-proof. 2°C to 28°C (36°F to 82°F)									
Optional Built-in Disconnect Switch		DS5 for use only on heaters with total current not exceeding 48-Amps. Lockout bar accepts 1/4" diameter padlock shackle.									
Optional Three Way Switch		Fan only, Off, Auto									
Optional Pilot Light		Indicates heat-on cycle									
Control Transformer		Multi-tap primary, 120 V secondary, 50 VA.									
Contactor		60 or 80 amp. Rated for 1,000,000 mechanical operations. 120 Volts, 15VA coil (separately fuse-protected).									
Heat Transfer Fluid		Long life formulated propylene glycol and water, freeze protected to -45°C (-49°F).									
Cabinet Material		14 ga. (0.075 in.) (1.90 mm) steel. Epoxy coated with five-stage pretreatment, including iron phosphate. Optional stainless steel.									
Core		Steel with integral aluminum fins, vacuum charged and hermetically sealed.									
Conduit Material		Heavy walled, 0.122 in. (3.1 mm) steel.									
Overpressure Protection		Preset 100 psig (690 kPa) pressure relief valve, aluminum body, no field serviceable parts.									
Operational Temperature Limitations		-45°C to 40°C (-49°F to 104°F)									
Storage Limitations		-45°C to 80°C (-49°F to 176°F), short term to 120°C (248°F). Do not immerse in water. Do not exposed to rain or snow.									

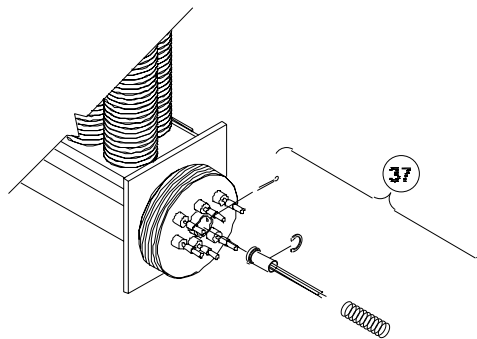
HEATER ASSEMBLY DIAGRAM



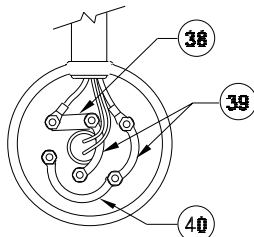
CONTROL ENCLOSURE ASSEMBLY DIAGRAM



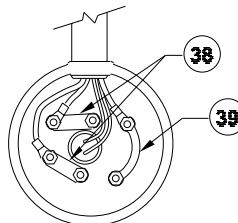
HIGH LIMIT ASSEMBLY DIAGRAM



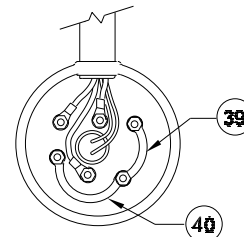
US-BAR CONFIGURATION ALL 1-PHASE MODELS



BUS-BAR CONFIGURATION FOR ALL 3-PHASE (EXCEPT 380 50 HERTZ)



BUS-BAR CONFIGURATION 3-PHASE 380 VOLT 50 HERTZ MODELS ONLY



PARTS LIST
FORCED AIR ELECTRIC HEATERS

PART NUMBERS				Please have model and serial number available before calling
ITEM	2.5 - 10 kW	12.5 - 20 kW	20.9 - 35 kW	DESCRIPTION
1	**	**	**	Core
2	Painted: 9203 S.S.: 9507	Painted: 9204 S.S.:9508	Painted: 9205 S.S.: 9509	Panel, Bottom
3	Painted: 9191 S.S.: 9192	Painted: 9193 S.S.: 9194	Painted: 9195 S.S.: 9196	Panel, Left
4	4075	4076	4077	Louver Kit, c/w Screws
5	Painted: 9200 S.S.: 9513	Painted: 9201 S.S.: 9514	Painted: 9202 S.S.: 9505	Panel, Top
6	Painted: 9197 S.S.: 9510	Painted: 9198 S.S.: 9511	Painted: 9199 S.S.: 9512	Panel, Right
7	Painted: 3782 S.S.: 9212	Painted: 3783 S.S.: 9213	Painted: 3784 S.S.: 9214	Panel, Fan Shroud
8	4023	4024	4025	Fan Blade
9	Painted: 4078 S.S.: 9504	Painted: 4079 S.S.: 9505	Painted: 4080 S.S.: 9506	Fan Guard Kit
10	1979 (Emerson)	10387 (Marathon)		208/240V 60HZ 1 PH 220 V 50 HZ 1 PH
	9896 (Baldor)		N/A	480V 60 HZ 1 PH
	1699 (Emerson)	10387 (Marathon)		208/240/480V 60 HZ 3 PH 380/415V 50 HZ 3 PH
	2433 (Emersion)	10387 (Marathon)		600V 60 HZ 3 PH
11	Painted: 3789 S.S.: 9112	Painted: 3789 S.S.: 9112	Painted: 3789 S.S.: 9112	Bracket, Motor Mount Right
12	Painted: 3785 S.S.: 9206	Painted: 3786 S.S.: 9207	Painted: 3787 S.S.: 9208	Channel, Motor Mount
13	Painted: 3788 S.S.: 9111	Painted: 3788 S.S.: 9111	Painted: 3788 S.S.: 9111	Bracket, Motor Mount Left
14	3737 (Emersion Motors)	4590 (Baldor & Marathon Motors)		Coupling, Motor Mount
15	9500	3813	10389	Conduit, Motor
16	5371	5371	5371	Cover, Thermostat Enclosure
17	3813	3812	3813	Conduit, Control Enclosure
18	9314	9315	9316	Conduit, Element Enclosure
19	9679	9679	9679	Enclosure, Element
20	3510	3510	3510	Cover, Element Enclosure
21	Painted: 9354 S.S.: 9516	Painted: 9355 S.S.: 9517	Painted: 9356 S.S.: 9518	Panel, Element Enclosure Guard
22	4983	4983	4983	Enclosure, Thermostat
23	5032	5032	5032	Thermostat, Built-in Kit
24	-	-	-	Enclosure, Control
25	**	**	**	Contactors
26	10556 (60HZ)	11295 (50HZ)		Transformer
27	3809	3809	3819	Bracket, Printed Circuit Board
28	1876	1876	1876	Terminal, 6-14 Ga. Screw Lug
29	9357	9357	9357	Fuse, Buss MDQ - 1/2 Amp
30	3514	3514	3514	Printed Circuit Board Assembly
31	9158	9158	9158	Cover, Control Enclosure
32	9279	9279	9279	Bulb, Pilot Light
33	9775	9775	9775	Switch, Explosion-proof 3-way
34	9267	9267	9267	Thermowell, Ambient High-Limit
35	-	-	-	High Limit Ambient Temperature
36	9289	9289	9289	Plug, 1" NPT Explosion-Proof
37	-	-	-	Temperature High Limit Kit
38	Provided with Core Kits**			Bus-Bar, Straight
39				Bus-Bar, Small Curved
40				Bus-Bar, Large Curved
41				Kit, DS5 Assembly

**See technical data table for part numbers. NOTE: For items not shown, please contact factory.

REPAIR & REPLACEMENT

WARNING

Disconnect heater from power supply at integral disconnect or fuse box before opening enclosures or servicing heater. Lock the switch in the "OFF" (open) position and/or tag the switch to prevent unexpected power application. IF INTEGRAL DISCONNECT IS BEING SERVICED, verify that power has been disconnected at fuse box or main panel. Lock the switch in the "OFF" (open) position and/or tag the switch to prevent unexpected power application. Heater surfaces may be hot.

- After repairing any component:
 - check that electrical connections are correct and secure (see Figure 9),
 - remove any foreign material from enclosures,
 - install and secure all covers,
 - ensure that all fasteners are tight,
 - remove all foreign objects from heater, and
 - ensure air exits through louvers and fan rotates counterclockwise when viewed from rear of heater (see Figure 14).

CORE

The heater core is vacuum charged and not field repairable.

For core removal:

- Remove cabinet bottom and element enclosure cover.
- Disconnect all wires entering element enclosure (see Figure 10).
- Slightly loosen all cabinet bolts shown in Figure 10, to prevent the core from binding.
- With an assistant supporting the weight of the core, remove the 3 core mounting bolts. Carefully lower the core out of the cabinet (see Figure 11).
- To return core to factory, use crate supplied with exchange core to protect the element terminals and plate threads.
- To reinstall, lift the core up into cabinet while an assistant guides the element wires into the element enclosure conduit.
- Position the core and tighten the 3 core mounting bolts. Tighten the remaining cabinet bolts.

TEMPERATURE HIGH-LIMIT

- Remove temperature high-limit assembly and clean the inside of the thermowell (see Figure 12). A clean thermowell will ensure good thermal contact.
- Use only a factory supplied temperature high-limit to ensure safe operation. (refer to the instructions that accompany the replacement Temperature High-Limit Kit).
- Reinstall the temperature high-limit assembly with the snap ring and spring into the thermowell without damaging the insulating tube. Secure in place with the cotter pin (see Figure 13).

MOTOR, FAN & FAN GUARD

- Remove bolts holding the motor to the motor mount. On units with a built in thermostat, remove the bolts on the back of the thermostat enclosure.
- Remove conduit #1 located between motor junction box and control enclosure by turning it in the direction illustrated (see Figure 14). Note conduits #1 and #2 are not interchangeable and have left hand threads on one end, this end is indicated by a machined groove.
- Remove the 2 piece fan guard assembly (see Figure 15).
- Lift the motor assembly off the motor mount.
- Before removing the fan, measure and record the location of the fan hub on the motor shaft (see Figure 16). If difficult to remove, use a gear puller on the fan hub.
- To reassemble, place motor assembly onto motor mount and fasten the fan guard to cabinet.
- Simultaneously engage and tighten both ends of conduit #1 into enclosures. Leave a 1/16" to 3/16" (1.6 to 4.8 mm) gap between the motor and fan guard (see Figure 16). Adjust conduit #2 to center the fan in the shroud.
- To ensure a minimum 5 thread engagement, threaded ends of conduits must protrude a minimum of 1/16" (1.6mm) into enclosures. The groove on conduit #2 must not be more than 7/8" (22mm) from motor coupling (see Figure 14).
- Bolt motor to motor mount. Manually spin the fan blade to ensure fan rotates freely.
- Air must exit through louvers and fan must rotate counterclockwise when viewed from rear of heater (see Figure 14).

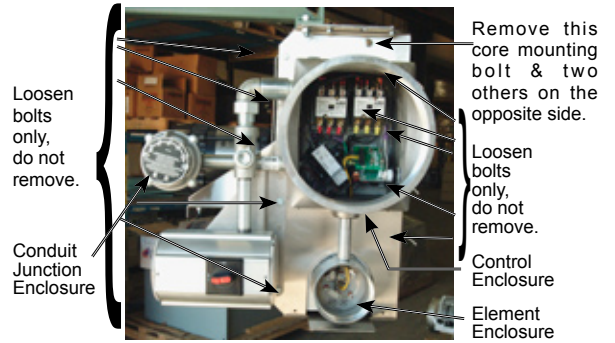


FIGURE 10



FIGURE 11



FIGURE 12



FIGURE 13

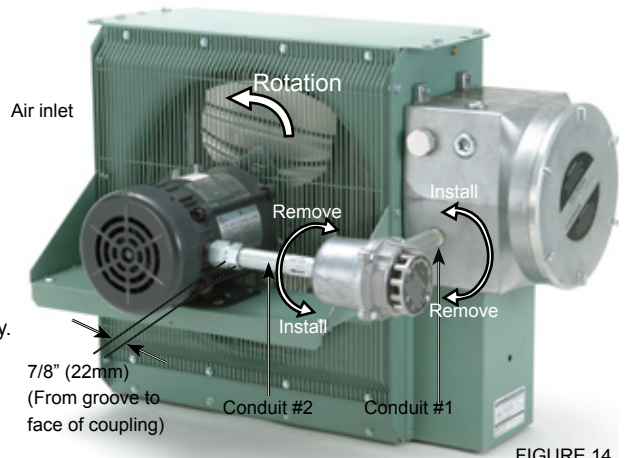


FIGURE 14



FIGURE 15



FIGURE 16

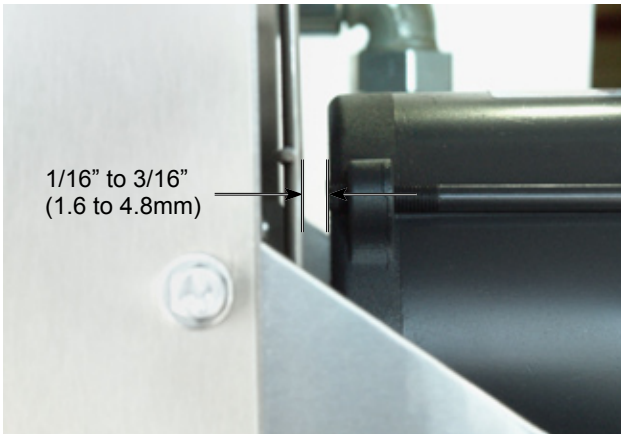


FIGURE 17

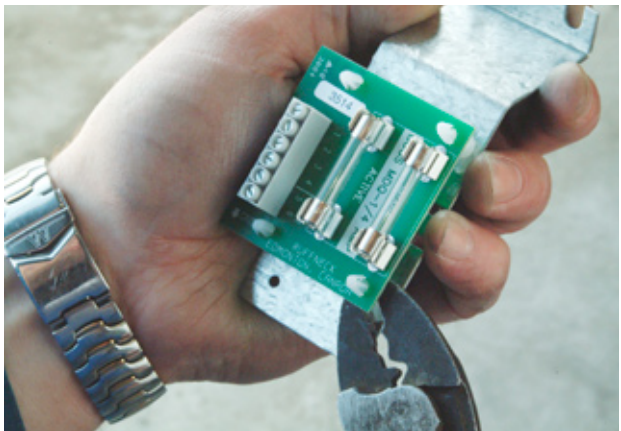


FIGURE 18

PRINTED CIRCUIT BOARD

1. After removing the printed circuit board (P.C. Board) bracket assembly from the control enclosure, separate the P.C. Board from the bracket by cutting off the plastic spacers (see Figure 18).
2. Reinstall a new factory supplied P.C. Board onto the mounting bracket using new non-conducting spacers of the same length. Spacers are supplied with a new P.C. Board. Reinstall the control circuit ground wire to the printed circuit board bracket (see Figure 9).

CONTACTOR

1. Loosen, but do not remove contactor mounting screws. Slide contactor off mounting screws.
2. Replace with a factory supplied contactor of the same rating.

TRANSFORMER

1. Replace with a factory supplied transformer of the same rating.
2. On the new transformer, select primary wires to match heater voltage. Ensure that the correct transformer secondary lead is grounded (see Figure 9). Individually terminate all unused wires using closed end connectors.

FUSE

Replace fuse with one of the same type and rating as indicated on P.C. Board or refer to parts list. An extra fuse should be stored in the clips marked "SPARE".

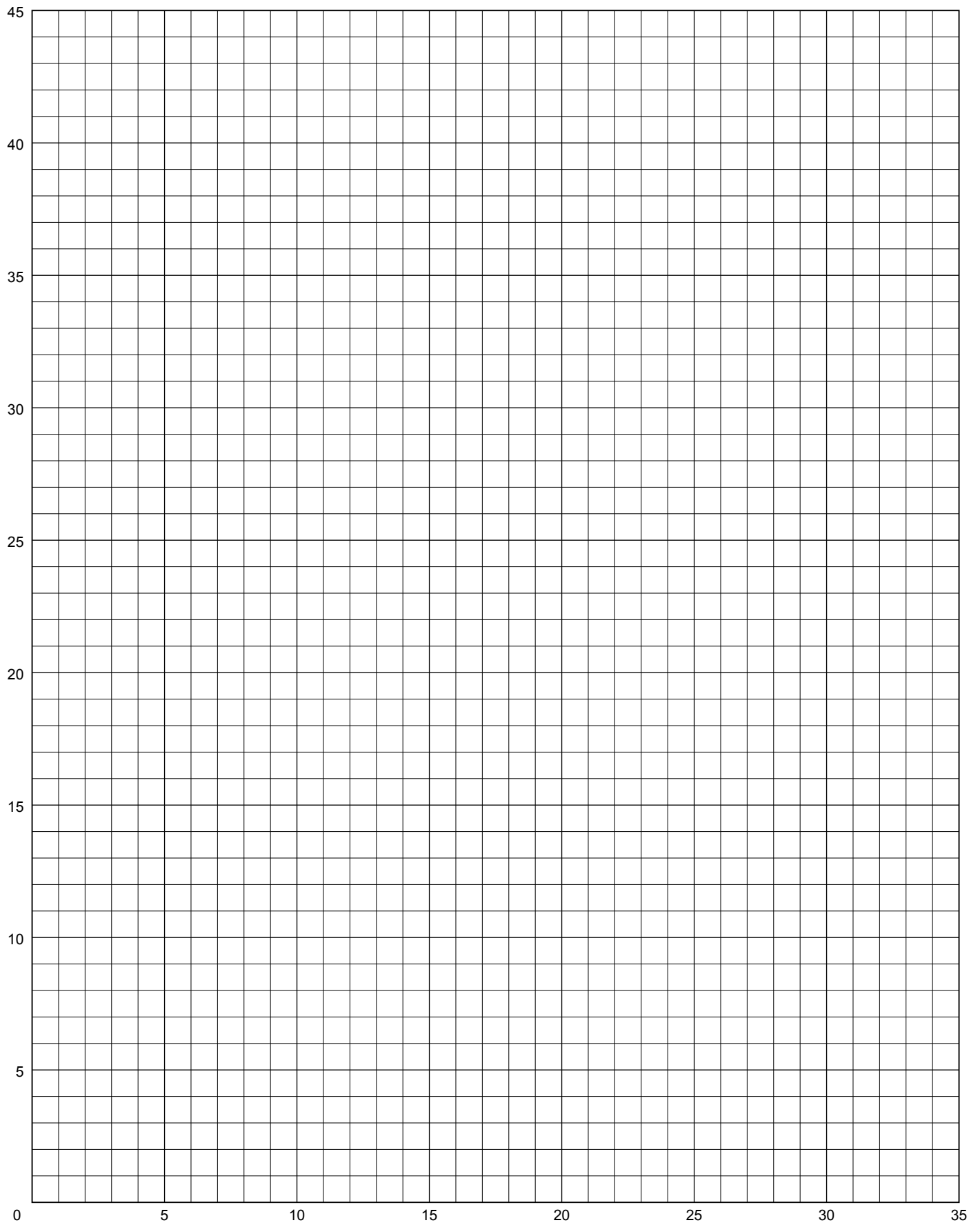
HEATING ELEMENTS

Heating elements are an integral part of the vacuum charged core. A factory exchange core can be shipped immediately from stock. Refer to "Core" section for details.

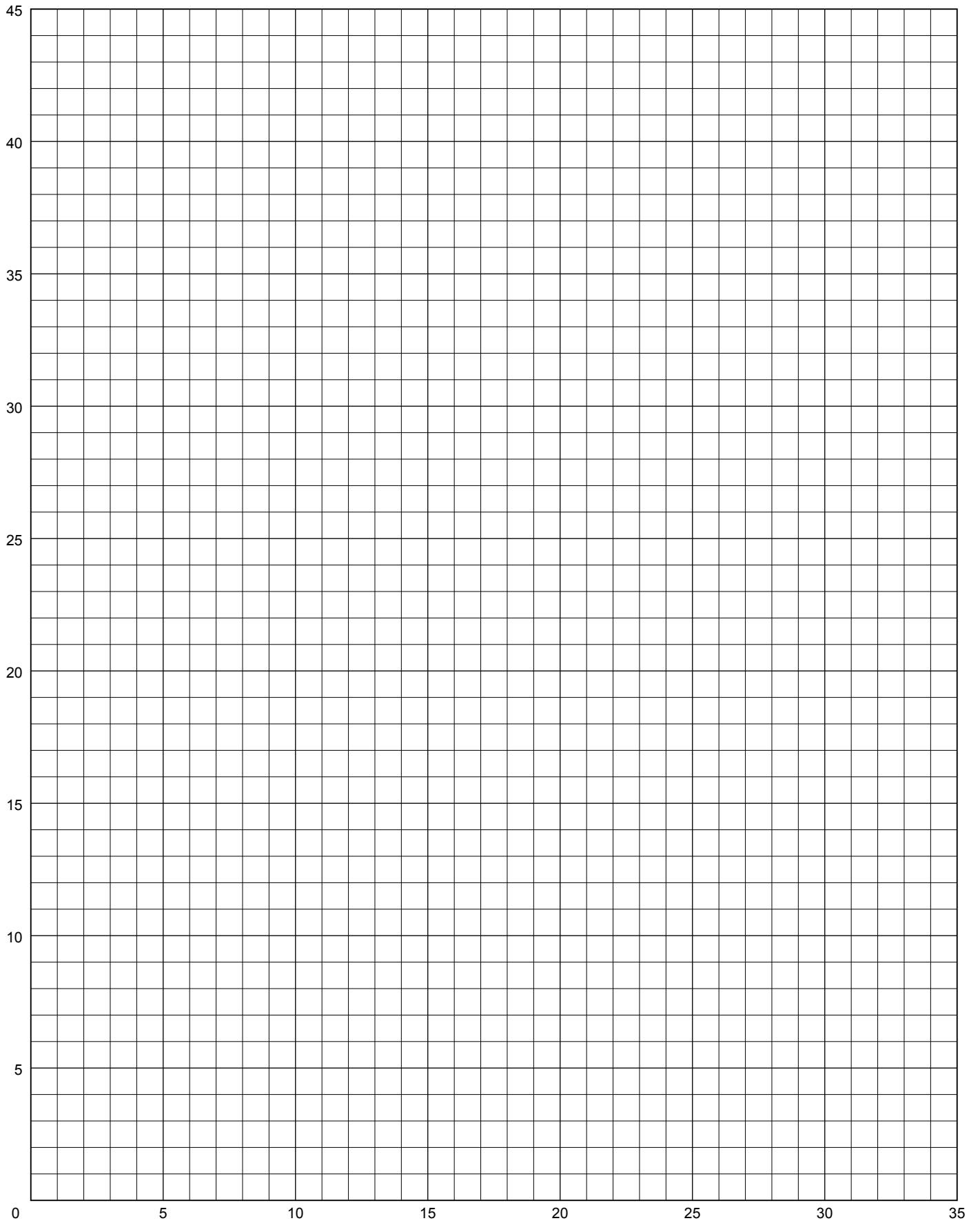
CABINET PANELS

Bolt-on cabinet panels are individually replaceable.

NOTES



NOTES



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.

Component Applicable Models	"APPLICABLE WARRANTY PERIOD"
Heat Exchangers Gas-Fired Unit Heaters	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
Heat Exchangers Low Intensity Infrared Units Compressors 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
Burners Low Intensity Infrared Units Other 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
Heat Exchangers/Coils Indoor and Outdoor Duct Furnaces and System Units, PSH/BSH, Steam/Hot Water Units, Oil-Fired Units, Electric Units, Cassettes, Vertical Unit Ventilators Compressors Vertical Unit Ventilators Burners High Intensity Infrared Units Sheet Metal Parts 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

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



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