

## Owner's Manual

# FX5 Series

Electric Forced Air Heaters for Hazardous Locations



This manual covers the installation, maintenance, repair and replacement parts.

### APPROVED LOCATIONS

The Electric Forced Air Heaters are cULus listed certified 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 329°F (165°C)  
(50 Hz & 60 Hz Models)

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.

FX5	- 480	3	60 - 350	- W	T, D, P, S, H, C, A, U, SL, B
	HEATER VOLTAGE		HEATER KILOWATTS ÷ 10		
5th GENERATION		HERTZ			
MODEL SERIES		PHASE		WELDED CORE	
					<b>OPTIONS</b>
					T - Built-in thermostat
					D - Built-in disconnect switch
					P - Built-in pilot light
					S - 3-way switch
					H - Unit with high "off" (deenergized) ambient temperatures
					C - Heresite® coating
					A - Stainless-steel cabinet
					U - Continuous fan
					SL - Slim junction box
					B - Arctic Duty

# WARNING!

READ ALL IMPORTANT INFORMATION NOTICES ON PAGES 2, 3 & 4.

Part No. 9714.Rev.11.00

Issue Date: February 2015

Printed in Canada



# HEATER MAINTENANCE CHECKLIST

For Electric Forced Air Heaters

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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.

## PREVENTATIVE MAINTENANCE GRID

		Regular Service				Severe Service			
		Annual Start Up	1 Month	3 Month	12 Month	Annual Start Up	1 Month	3 Month	12 Month
<b>Clean:</b>									
<ul style="list-style-type: none"> <li>Finned Tubes</li> <li>Fan</li> <li>Fan Guard</li> <li>Motor</li> <li>Louvers</li> </ul>	Remove dust using compressed air. <b>Do not Spray with water or solvents.</b> <b>Do not immerse in water or solvents.</b>	X				X		X	
<b>Electrical</b>									
Check all terminal connections and conductors.	Tighten loose connections. Replace conductors with damaged insulation & frayed wiring. <b>For drilling rigs, this should be done with every rig re-location.</b>	X			X	X		X	
Inspect contactor contacts.	If badly pitted, burned or welded shut, replace with factory supplied contactor. <b>For drilling rigs, this should be done with every rig re-location.</b>	X				X		X	
Check Fuses	The Correct fuse rating and type are printed on the circuit board. Always ensure a backup fuse is available on the PCB. <b>For drilling rigs, this should be done with every rig re-location.</b>	X				X			
<b>Mechanical</b>									
Check for fluid leakage	Inspect the Pressure Release Valve label indicator for signs of rupture and degradation. If any fluid leakage occurs from the heater, disconnect it from the power supply and have the core replaced immediately. <b>For drilling rigs, this should be done with every rig re-location.</b>	X				X		X	
Check all enclosures	The interiors of each enclosure must be clean, dry and free of foreign materials. <b>For drilling rigs, this should be done with every rig re-location.</b>	X				X		X	
Check motor shaft bearing play	If the motor does not run quietly and smoothly and has excessive play replace the motor. <b>For drilling rigs, this should be done with every rig re-location.</b>	X				X		X	

## PERIODIC (before and as required during heating season)

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- |                 |   |                 |  |
|-----------------|---|-----------------|--|
| <b>1. CLEAN</b> | <input type="checkbox"/> Finned Tubes<br><input type="checkbox"/> Fan<br><input type="checkbox"/> Fan Guard<br><input type="checkbox"/> Motor<br><input type="checkbox"/> Louvers | <b>2. CHECK</b> | <input type="checkbox"/> Motor for smooth, quiet operation<br><input type="checkbox"/> Louvers for proper angle and tightness<br><input type="checkbox"/> All explosion-proof covers for tightness<br><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, CCI Thermal 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.
- ☐ **Check fan.** Replace immediately if cracked or damaged.
- ☐ **Check louvers.** Louver screws should be tight. Louvers shall not be fully closed or override stops.
- ☐ **Check the tightness of all hardware.** All nuts and bolts, including mounting hardware, must be tight.
- ☐ **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.

## WARNING

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

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. 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.
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.
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 104°F (40°C).
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.

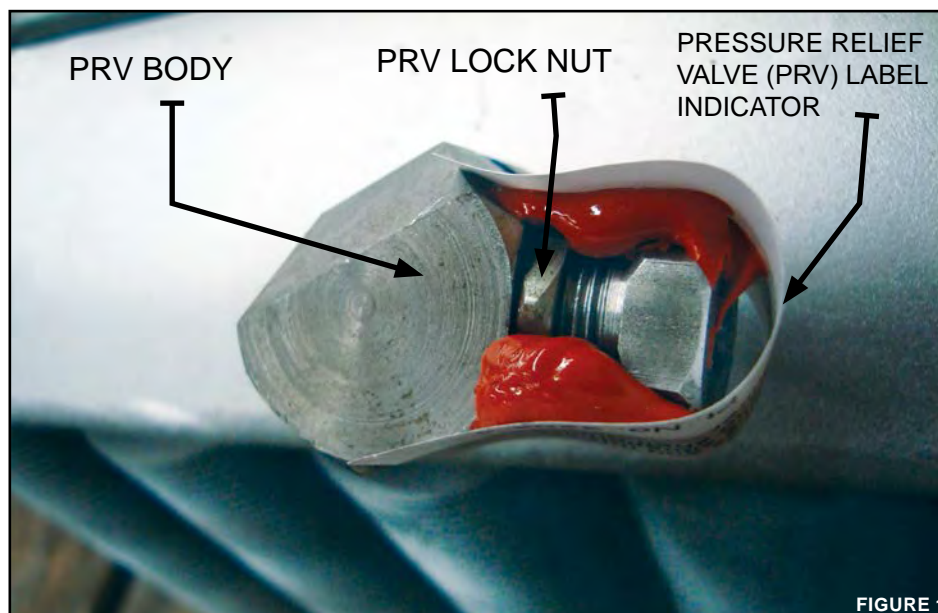


FIGURE 1

# 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

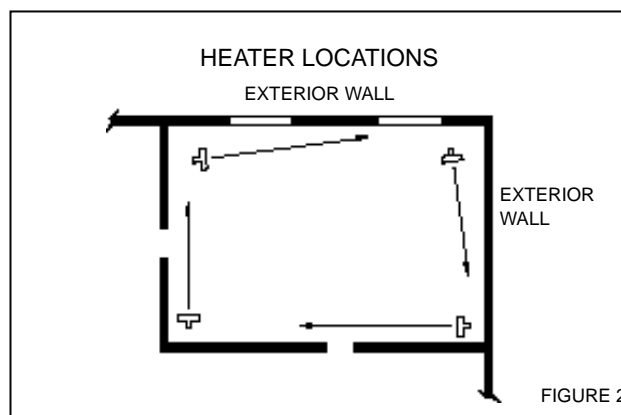
The installation instructions provide a general guideline for the installation and wiring of the heater.  
All applicable codes must be adhered to.

### 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).



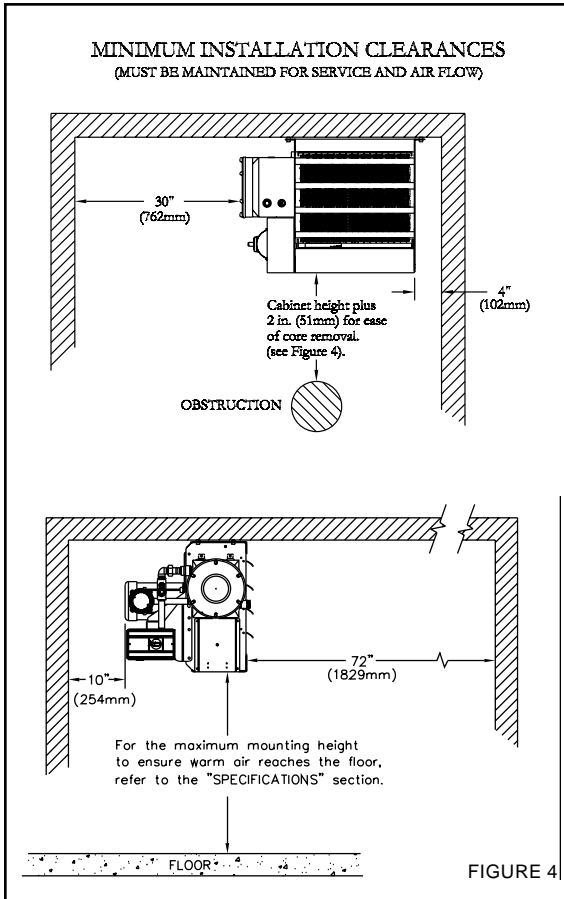
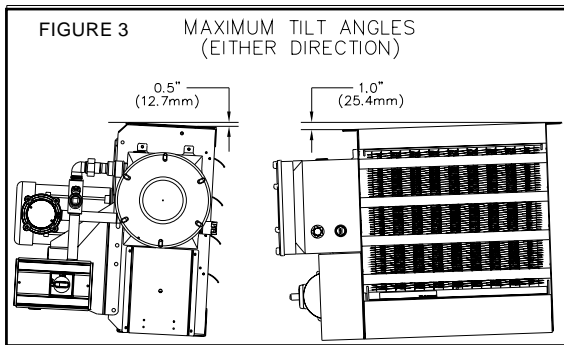


FIGURE 4

## 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.	2.5-10	12.5-20	20.9-35	DIM. TOL. ±
A	in. 7	7	7	1/8
	mm 178	178	178	3
B	in. 18-3/16	22-5/16	26-1/4	1/8
	mm 462	566	667	3
C	in. 27	31	35	3/16
	mm 686	787	889	4
D	in. 19	23	27	1/8
	mm 484	586	688	3
E	in. 19-7/16	23-7/16	27-7/16	3/8
	mm 492	596	697	10
F	in. 17-1/2	19-1/2	21-13/16	5/16
	mm 444	495	554	8
G	in. 24-5/8	28-5/8	32-5/8	3/16
	mm 625	727	828	4

DIMENSIONAL TOLERANCES ±1/8" [±3mm]  
UNLESS OTHERWISE SPECIFIED.

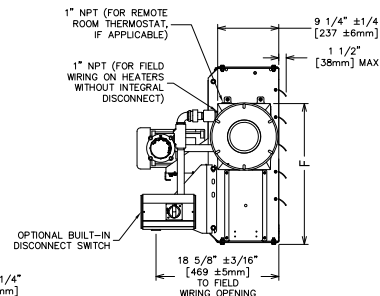
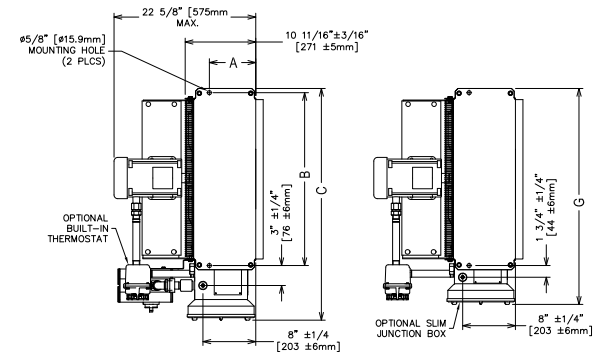
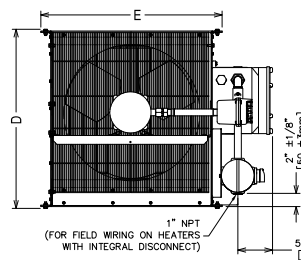


FIGURE 5

## 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.



3. Heater may be supplied with a factory installed built-in integral disconnect. (See Figure 7B)  
 Field Wiring for Integral Disconnect:
  - a. 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.
  - b. 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".
  - c. 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.
4. 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

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

### Control Enclosure & Field Wiring

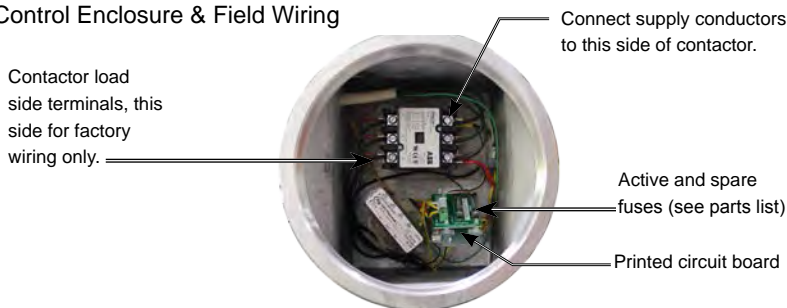
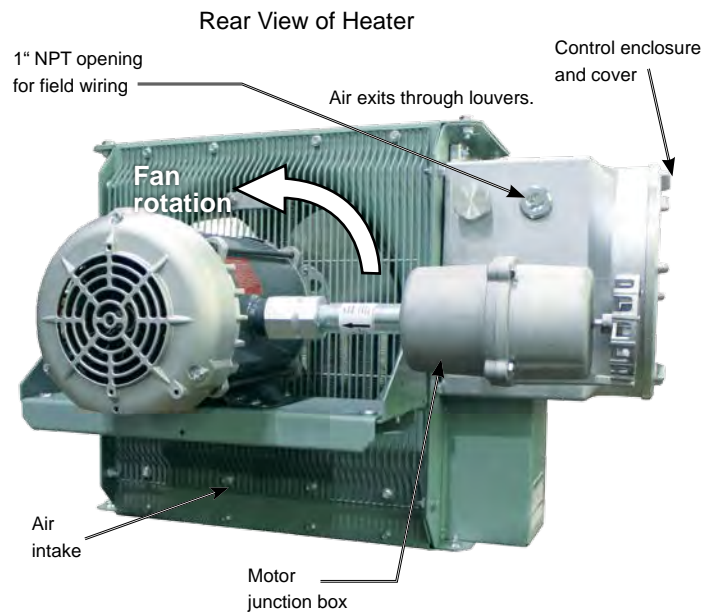


FIGURE 7A



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

FIGURE 6

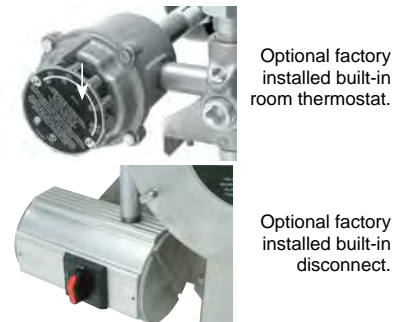


FIGURE 8

### Optional Built-in Disconnect & Field Wiring

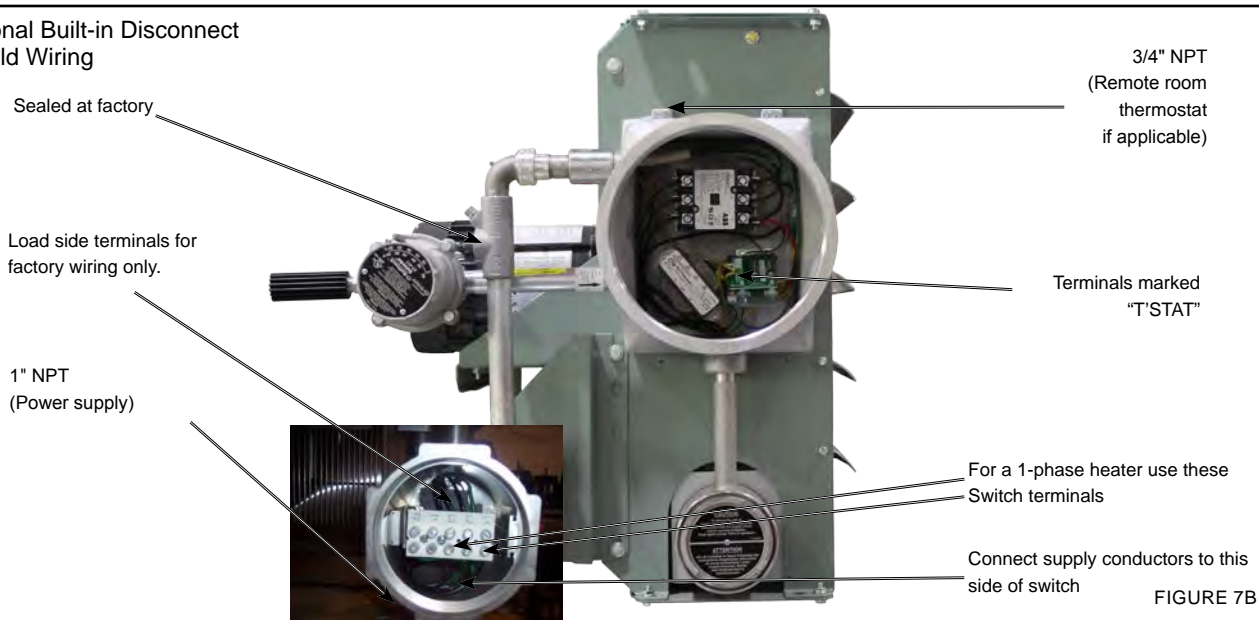


FIGURE 7B

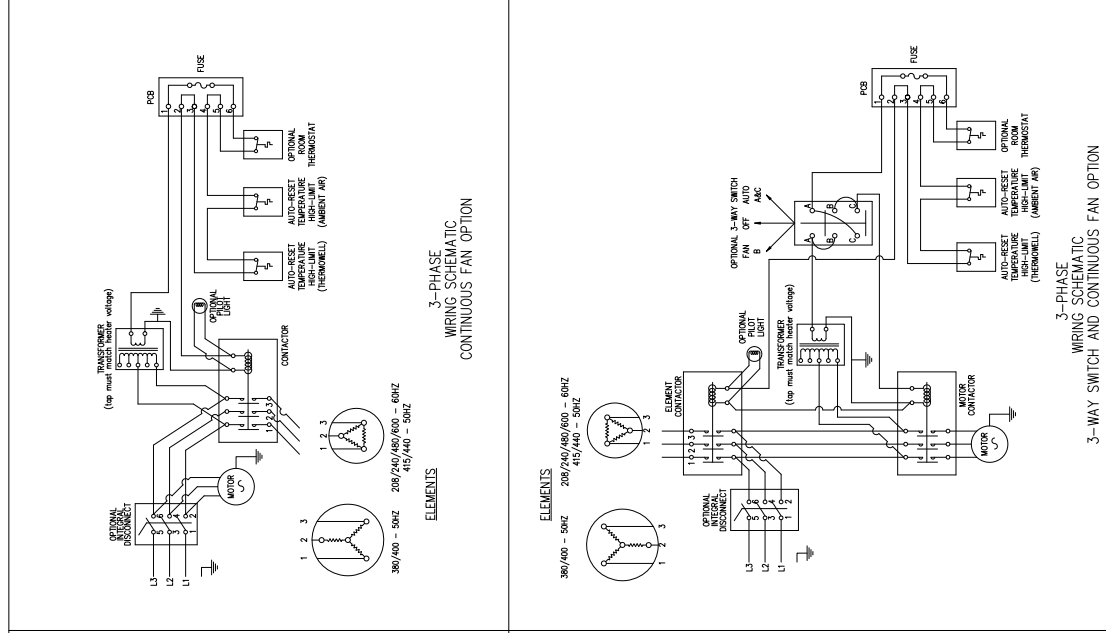
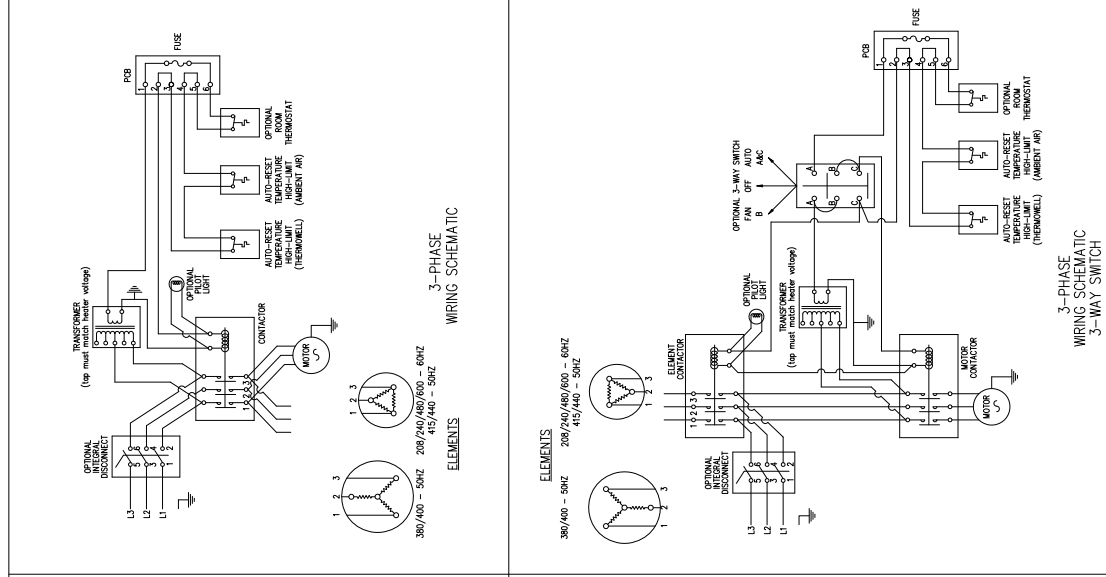
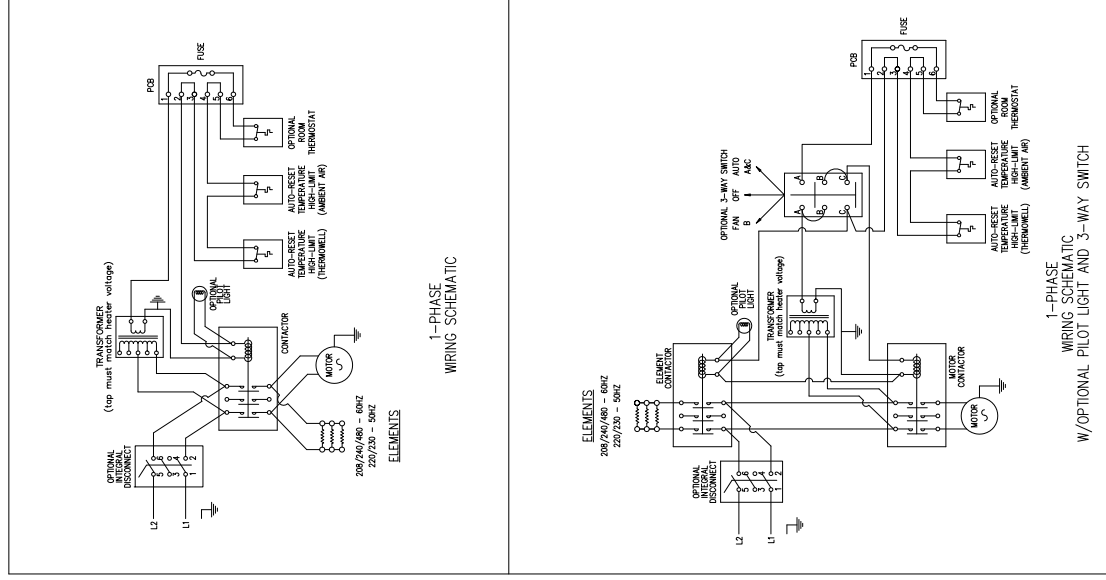


FIGURE 9



# FX5 TECHNICAL DATA FOR 50 HZ ELECTRIC HEATERS



Model	Note	Air Flow	Voltage	Nominal Wattage	Phase	Max. Motor Nameplate Current	Heater Wattage	Total Current	Minimum Circuit Ampacity	Supply Wire	Maximum Fuse Size	Temperature Rise		Core Kit Part Number	Contactor Part Number
		(CFM)	(V)	(kW)			(W)	(A)	(A)	(AWG)	(A)	°F	°C		
FX5-220150-025		400	220	2.5	1	2.7	2270	11.4	14.3	14	15	19.8	11.0	12122	3619
FX5-220150-042		400	220	4.2	1	2.7	3950	19.1	23.9	10	25	33.2	18.4	12123	3619
FX5-220150-063		700	220	6.3	1	2.7	6050	28.6	35.8	8	40	28.5	15.8	12124	3619
FX5-220150-084		700	220	8.4	1	2.7	8140	38.2	47.8	6	50	37.9	21.1	12125	3619
FX5-220150-126	*	1450	220	12.6	1	1.4	12100	57.3	71.6	2	75	27.5	15.3	12126	3619
FX5-230150-028		400	230	2.8	1	2.7	2480	12.2	15.3	12	20	22.1	12.3	12122	3619
FX5-230150-046		400	230	4.6	1	2.7	4310	20.0	25.0	10	25	36.4	20.2	12123	3619
FX5-230150-069		700	230	6.9	1	2.7	6610	30.0	37.5	8	40	31.2	17.3	12124	3619
FX5-230150-138	*	1450	230	13.8	1	1.4	13200	59.9	74.9	2	80	30.1	16.7	12126	3619
FX5-380350-025		400	380	2.5	3	0.7	2270	3.8	4.8	16	5	19.8	11.0	12122	3619
FX5-380350-042		400	380	4.2	3	0.7	3950	6.4	8.0	16	10	33.2	18.4	12123	3619
FX5-380350-063		700	380	6.3	3	0.7	6050	9.6	12.0	14	15	28.5	15.8	12124	3619
FX5-380350-084		700	380	8.4	3	0.7	8140	12.8	16.0	12	20	37.9	21.1	12125	3619
FX5-380350-125		1450	380	12.5	3	0.7	12100	19.0	23.8	10	25	27.3	15.1	12126	3619
FX5-380350-209		3000	380	20.9	3	1.0	20300	31.8	39.8	8	40	22.0	12.2	12128	3619
FX5-400350-028		400	400	2.8	3	0.7	2480	4.0	5.0	16	5	22.1	12.3	12122	3619
FX5-400350-046		400	400	4.6	3	0.7	4310	6.6	8.3	16	10	36.4	20.2	12123	3619
FX5-400350-069		700	400	6.9	3	0.7	6610	10.0	12.5	14	15	31.2	17.3	12124	3619
FX5-400350-093		700	400	9.3	3	0.7	8900	13.4	16.8	12	20	42.0	23.3	12125	3619
FX5-400350-139		1450	400	13.9	3	0.7	13200	20.1	25.1	10	30	30.3	16.8	12126	3619
FX5-400350-185		1450	400	18.5	3	0.7	17800	26.7	33.4	8	35	40.3	22.4	12127	3619
FX5-400350-231		3000	400	23.1	3	1.0	22200	33.3	41.6	8	45	24.3	13.5	12128	3619
FX5-415350-037		400	415	3.7	3	0.7	3510	5.1	6.4	16	10	29.3	16.3	12130	3619
FX5-415350-075		700	415	7.5	3	0.7	7240	10.4	13.0	14	15	33.9	18.8	12132	3619
FX5-415350-149		1450	415	14.9	3	0.7	14500	20.7	25.9	10	30	32.5	18.1	12134	3619
FX5-415350-224		3000	415	22.4	3	1.0	21800	31.2	39.0	8	40	23.6	13.1	12136	3619
FX5-440350-042		400	440	4.2	3	0.7	3950	5.5	6.9	16	10	33.2	18.4	12130	3619
FX5-440350-084		700	440	8.4	3	0.7	8140	11.0	13.8	14	15	37.9	21.1	12132	3619
FX5-440350-168		1450	440	16.8	3	0.7	16300	27.5	34.4	8	35	36.6	20.4	12134	3619
FX5-440350-210		3000	440	21.0	3	1.0	20300	27.5	34.4	8	35	22.1	12.3	12135	3619

## NOTES:

- \* Exceeds the 48 Amp Circuit Limit of NEC 424-22. DS5 not available for these units.
- 1. Minimum conductor size for 86°F (30°C) ambient. Derate conductor for ambient temperature. Use minimum 194°F (90°C) 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.
- 11. Add "SL" to model number for units with slim junction box. Option not available with disconnect switch, 3-way switch, or built-in pilot light.
- 12. Add "B" to model number for units with Arctic Duty design.

# FX5 TECHNICAL DATA FOR 60 HZ ELECTRIC HEATERS



Model	Note	Voltage	Nominal Wattage	Phase	Max. Motor Nameplate Current	Heater Wattage	Total Current	Minimum Circuit Ampacity	Supply Wire	Maximum Fuse Size	Temperature Rise		Core Kit Part Number	Contactor Part Number
		(V)	(kW)			(W)	(A)	(A)	(AWG)	(A)	°F	°C		
FX5-208160-030	*	208	3.0	1	2.7	2700	14.4	18.0	12	20	19.0	10.5	12116	3619
FX5-208160-050		208	5.0	1	2.7	4700	24.0	30.0	10	30	31.6	17.6	12117	3619
FX5-208160-075		208	7.5	1	2.7	7200	36.1	45.1	6	50	27.9	15.5	12118	3619
FX5-208160-100		208	10.0	1	2.7	9690	48.1	60.1	4	70	37.2	20.7	12119	3619
FX5-208360-030		208	3.0	3	1.4	2700	8.3	10.4	14	15	11.2	6.2	12116	3619
FX5-208360-050		208	5.0	3	1.4	4700	13.9	17.4	12	20	18.6	10.3	12117	3619
FX5-208360-075		208	7.5	3	1.4	7200	20.8	26.0	10	30	27.9	15.5	12118	3619
FX5-208360-100		208	10.0	3	1.4	9700	27.8	34.8	8	35	37.2	20.7	12119	3619
FX5-208360-150		208	15	3	1.4	14400	41.6	52.0	6	60	27.1	15.1	12120	3619
FX5-240160-030	*	240	3.0	1	2.7	2700	12.5	15.6	12	20	19.0	10.5	12122	3619
FX5-240160-050		240	5.0	1	2.7	4700	20.8	26.0	10	30	31.6	17.6	12123	3619
FX5-240160-075		240	7.5	1	2.7	7200	31.3	39.1	8	40	27.9	15.5	12124	3619
FX5-240160-100		240	10.0	1	2.7	9700	41.7	52.1	6	60	37.2	20.7	12125	3619
FX5-240160-150		240	15.0	1	1.4	14400	62.5	78.1	2	80	27.1	15.1	12126	3619
FX5-240360-030		240	3.0	3	1.4	2700	7.2	9.0	14	15	19.0	10.5	12122	3619
FX5-240360-050		240	5.0	3	1.4	4700	12.0	15.0	14	15	31.6	17.6	12123	3619
FX5-240360-075		240	7.5	3	1.4	7200	18.0	22.5	10	25	27.9	15.5	12124	3619
FX5-240360-100		240	10.0	3	1.4	9700	24.1	30.1	8	35	37.2	20.7	12125	3619
FX5-240360-150	*	240	15.0	3	1.4	14400	36.1	45.1	6	50	27.1	15.1	12126	3619
FX5-240360-200		240	20.0	3	1.4	19400	48.1	60.1	4	70	36.1	20.1	12127	3619
FX5-480160-030	°	480	3.0	1	1.3	2700	6.3	7.9	14	15	19.0	10.5	12129	3619
FX5-480160-050		480	5.0	1	1.3	4700	10.4	13.0	14	15	31.6	17.6	12130	3619
FX5-480160-075		480	7.5	1	1.3	7200	15.6	19.5	12	20	27.9	15.5	12131	3619
FX5-480160-100		480	10.0	1	1.3	9700	20.8	26.0	10	30	37.2	20.7	12132	3619
FX5-480160-150		480	15.0	1	1.3	14400	31.3	39.1	8	40	27.1	15.1	12133	3619
FX5-480160-200		480	20.0	1	1.3	19400	41.7	52.1	6	60	36.1	20.1	12134	3619
FX5-480360-030		480	3.0	3	0.7	2700	3.6	4.5	14	15	19.0	10.5	12129	3619
FX5-480360-050		480	5.0	3	0.7	4700	6.0	7.5	14	15	31.6	17.6	12130	3619
FX5-480360-075		480	7.5	3	0.7	7200	9.0	11.3	14	15	27.9	15.5	12131	3619
FX5-480360-100		480	10.0	3	0.7	9700	12.0	15.0	14	15	37.2	20.7	12132	3619
FX5-480360-150		480	15.0	3	0.7	14400	18.0	22.5	10	25	27.1	15.1	12133	3619
FX5-480360-200		480	20.0	3	0.7	19400	24.1	30.1	8	35	36.1	20.1	12134	3619
FX5-480360-250		480	25.0	3	1.0	24200	30.1	37.6	8	40	22.0	12.2	12135	3619
FX5-480360-300		480	30.0	3	1.0	29200	36.1	45.1	6	50	26.4	14.6	12136	3619
FX5-480360-350		480	35.0	3	1.0	34200	42.1	52.6	6	60	30.7	17.1	12137	3619
FX5-600360-030		600	3.0	3	0.6	2700	2.9	3.6	14	15	19.0	10.5	12138	3619
FX5-600360-050		600	5.0	3	0.6	4700	4.8	6.0	14	15	31.6	17.6	12139	3619
FX5-600360-075		600	7.5	3	0.6	7200	7.2	9.0	14	15	27.9	15.5	12140	3619
FX5-600360-100		600	10.0	3	0.6	9700	9.6	12.0	14	15	18.1	20.7	12141	3619
FX5-600360-150		600	15.0	3	0.6	14400	14.4	18.0	12	20	27.1	15.1	12142	3619
FX5-600360-200		600	20.0	3	0.6	19400	19.2	24.0	10	25	36.1	20.1	12143	3619
FX5-600360-250		600	25.0	3	0.8	24200	24.1	30.1	8	35	45.2	25.1	12144	3619
FX5-600360-300		600	30.0	3	0.8	29200	28.9	36.1	8	40	26.4	14.6	12145	3619
FX5-600360-350		600	35.0	3	0.8	34200	33.7	42.1	8	45	30.7	17.1	12126	3619

## NOTES:

- \* Exceeds the 48 Amp Curcuit limit of NEC 424-22. DS5 not available for these units.
- ° 480 - 1 phase units are certified Class I, Div. 1, Group D and Class II, Div. 1 Groups F & G.
- 1. Minimum conductor size for 86°F (30°C) ambient. Derate conductor for ambient temperature. Use minimum 194°F (90°C) 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.
- 11. Add "SL" to model number for units with slim junction box. Option not available with disconnect switch, 3-way switch, or built-in pilot light.
- 12. Add "B" to model number for units with Arctic Duty design.

# — SPECIFICATIONS FOR ALL 50 HZ MODEL —

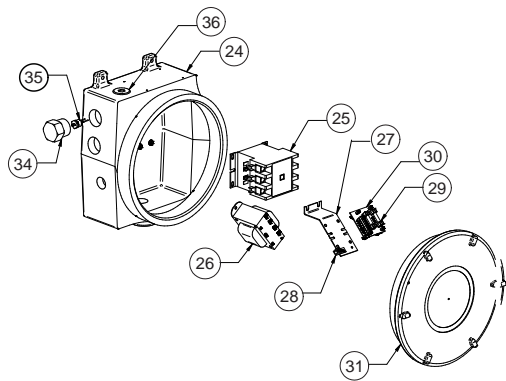
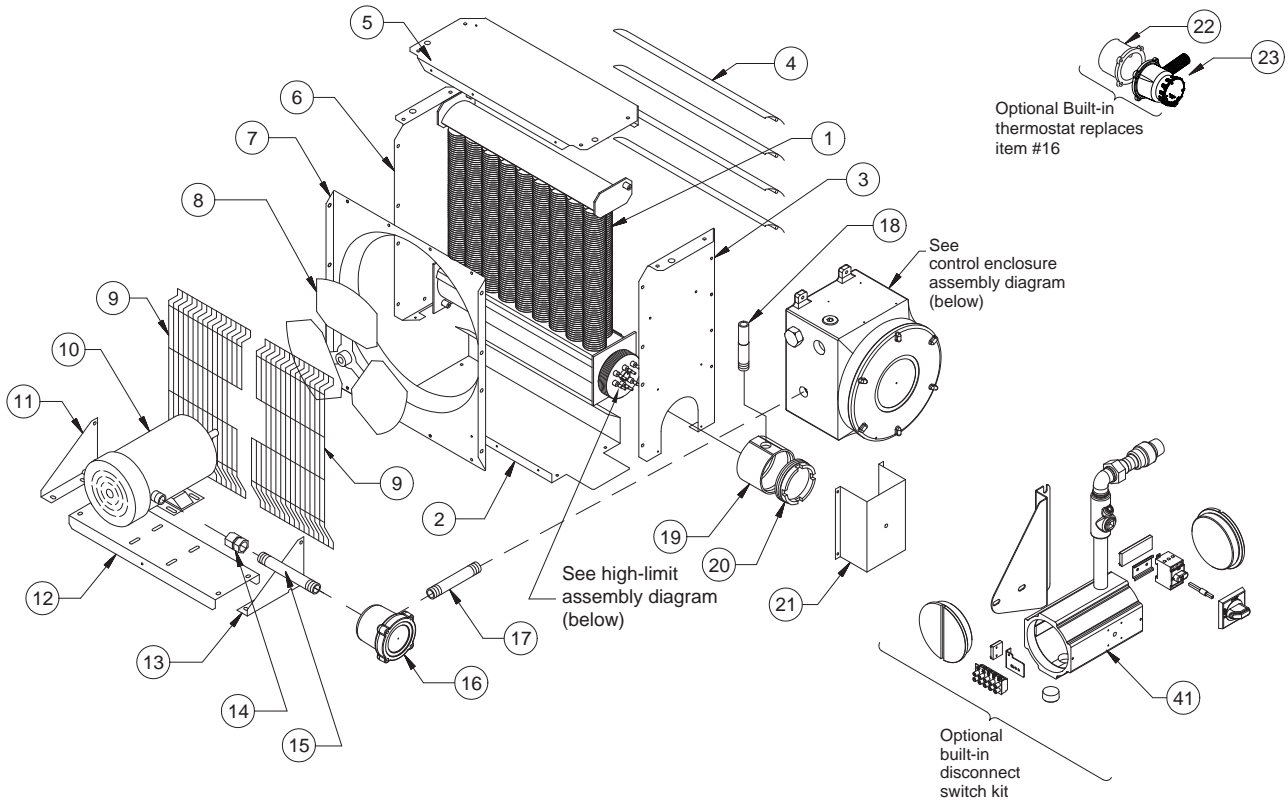
	Nominal kW	2.5	3.7 & 4.6	6.3 & 7.5	8.4	12.5 & 12.6	14.9 & 16.7	20.9	22.4
Max. Altitude	(ft.)	12,000	8,000	10,000	7,000	10,000	7,000	10,000	7,000
	(m)	3,658	2,438	3,048	2,134	3,048	2,134	3,048	2,134
Air Flow	@ 70°F (CFM)	400		700		1450		3000	
	@ 21°C (m³/hr.)	679		1189		2463		5096	
Horizontal Air Throw	(ft.)	13		25		35		60	
	(m)	4.0		7.6		10.7		18.2	
Max. Mounting Height (to underside)	(ft.)	7		10		10		20	
	(m)	2.1		3.0		3.0		6.1	
Motor Power (min)	(HP)	1/2				1/2		1/2	
	(kW)	0.373				0.373		0.373	
Fan Diameter	(in.)	12				16		20	
	(mm)	305				406		508	
Net Weight	without (lbs.)	148				177		212	
	DS5 (kg)	67.1				80.2		96.2	
	with (lbs.)	160				189		224	
	DS5 (kg)	82.5				95.6		101.6	
Shipping Weight	without (lbs.)	202				227		263	
	DS5 (kg)	91.6				202.9		119.3	
	with (lbs.)	214				239		275	
	DS5 (kg)	97				108.3		124.7	
Hazardous Location Rating		Class I, Groups C and D; Class II, Groups E, F and G; Temperature Code T3B [329°F (165°C)]*							
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		Two 9/16 in. (14.3 mm) diameter holes at top							
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 Slim Junction Box		10.25" (230 mm) x 8.00" (180 mm) x 6.75" (172 mm)							
Optional Built-in Thermostat		Explosion-proof. 36°F to 82°F (2°C to 28°C)							
Optional Built-in Disconnect Switch		DS5 for use only on heaters with total current not exceeding 48-Amps Lockout handle 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		75 amps. Rated for 1,000,000 mechanical operations. 120 Volts, 15VA coil (separately fuse-protected)							
Heat Transfer Fluid		Long life formulated propylene glycol and water							
Cabinet Material		12 ga. (0.104 in.) (2.60 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		-4°F to 104°F (-20°C to 40°C); for "B" units -58°F to 104°F(-50°C to 40°C)							
Storage Limitations		-49°F to 176°F (-45°C to 80°C), short term to 248°F (120°C). Do not immerse in water. Do not expose to rain or snow.							

\*Some units may be Class I, Groups C and D. Please check with factory for clarification

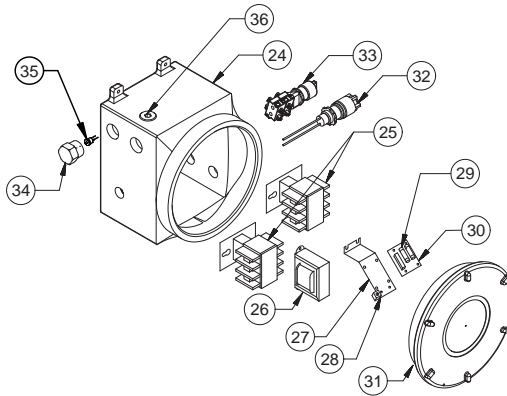
# SPECIFICATIONS FOR ALL 60 HZ MODEL

		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	10,000	7,000	6,000
	(m)	3,658	2,438	3,048	2,134	3,048	2,134	3,048	2,134	3,048	2,134	1,829
Air Flow	@ 70°F (CFM)	500		850		1750		3600				
	@ 21°C (m³/hr.)	850		1444		2973		6116				
Horizontal Air Throw	(ft.)	15		30		40		70				
	(m)	4.6		9.1		12.2		21.3				
Max. Mounting Height (to underside)	(ft.)	7		10		10		20				
	(m)	2.1		3.0		3.0		6.1				
Motor Power (min)	(HP)	1/2					1/2		1/2			
	(kW)	0.373					0.373		0.373			
Fan Diameter	(in.)	12					16		20			
	(mm)	305					406		508			
Net Weight	without (lbs.)	148					177		212			
	DS5 (kg)	67.1					80.2		96.2			
	with (lbs.)	160					189		224			
	DS5 (kg)	82.5					95.6		101.6			
Shipping Weight	without (lbs.)	202					227		263			
	DS5 (kg)	91.6					103.9		119.3			
	with (lbs.)	214					239		275			
	DS5 (kg)	97					108.3		124.7			
Hazardous Location Rating		Class I, Groups C and D; Class II, Groups E, F and G; Temperature Code T3B [329°F (165°C)]*										
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		Two 9/16 in. (14.3 mm) diameter holes at top										
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 Slim Junction Box		10.25" (230 mm) x 8.00" (180 mm) x 6.75" (172 mm)										
Optional Built-in Thermostat		Explosion-proof. 36°F to 82°F (2°C to 28°C)										
Optional Built-in Disconnect Switch		DS5 for use only on heaters with total current not exceeding 48-Amps Lockout handle 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		75 amps. Rated for 1,000,000 mechanical operations. 120 Volts, 15VA coil (separately fuse-protected)										
Heat Transfer Fluid		Long life formulated propylene glycol and water										
Cabinet Material		12 ga. (0.104 in.) (2.60 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		-4°F to 104°F (-20°C to 40°C); for "B" units -58°F to 104°F(-50°C to 40°C)										
Storage Limitations		-49°F to 176°F (-45°C to 80°C), short term to 248°F (120°C). Do not immerse in water. Do not expose to rain or snow.										

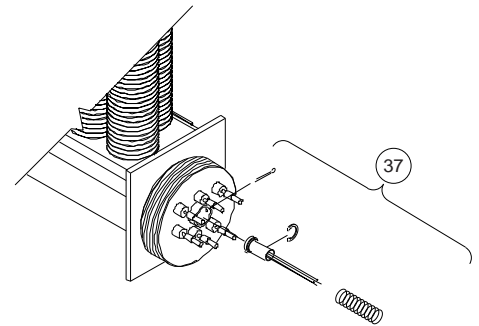
# HEATER ASSEMBLY DIAGRAM



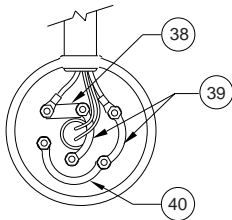
SLIM CONTROL ENCLOSURE  
ASSEMBLY DIAGRAM



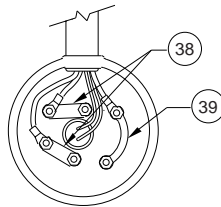
CONTROL ENCLOSURE  
ASSEMBLY DIAGRAM



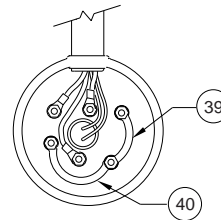
HIGH LIMIT  
ASSEMBLY DIAGRAM



BUS-BAR CONFIGURATION  
ALL 1-PHASE MODELS



BUS-BAR CONFIGURATION  
FOR ALL 3-PHASE  
(EXCEPT 380 50 HERTZ & 400 50 HERTZ)



BUS-BAR CONFIGURATION  
FOR ALL 3-PHASE 380 V & 400 V 50 HERTZ MODELS

# PARTS LIST

## FORCED AIR ELECTRIC HEATERS

	FX5 PART NUMBERS				Please have model and serial number available before calling
ITEM	2.5 - 4.6 kW	6.3 - 10 kW	12.5 - 20 kW	20.9 - 35 kW	Description
1	**	**	**	**	Core
2	Painted: 12694-02 S.S.: 12694-03		Painted: 12699-02 S.S.: 12699-03	Painted: 12704-02 S.S.: 12704-03	Panel, Bottom
3	Painted: 12691-02 S.S.: 12691-03		Painted: 12696-02 S.S.: 12696-03	Painted: 12701-02 S.S.: 12701-03	Panel, Left Side
4	4075		4076	4077	Louver Kit, c/w screws
5	Painted: 12693-02 S.S.: 12693-03		Painted: 12698-02 S.S.: 12698-03	Painted: 12703-02 S.S.: 12703-03	Panel, Top
6	Painted: 12692-02 S.S.: 12692-03		Painted: 12697-02 S.S.: 12697-03	Painted: 12702-02 S.S.: 12702-03	Panel, Right
7	Painted: 3782 S.S.: 9212		Painted: 3783 S.S.: 9213	Painted: 3784 S.S.: 9214	Panel, Fan Shroud
8	4022	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)		10388 (Marathon)		208/240V 1PH 60HZ
					220V 1PH 50HZ
	9896 (Baldor)		N/A		480V 1PH 60HZ
	1699 (Emerson)		10387 (Marathon)		208/240/480V 3PH 60HZ
					380/415V 3PH 50HZ
11	2433 (Emerson)		10672 (Marathon)		600V 3PH 60HZ
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 (Emerson Motors) 4590 (Baldor & Marathon Motors)				Coupling, Motor
15	9500		3813	10389	Conduit, Motor
16	5371		5371	5371	Cover, Thermostat Enclosure
17	3813		3813	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: 12695-02 S.S.: 12695-03		Painted: 12700-02 S.S.: 12700-03	Painted: 12705-02 S.S.: 12705-03	Panel, Element Enclosure Guard
22	4983		4983	4983	Enclosure, Thermostat
23	-	-	-	-	Thermostat, Built-in-kit
24	-	-	-	-	Enclosure, Control
25	3619		3619	3619	Contacto
26	12290 (60HZ)		11295 (50HZ)		Transformer
27	3809	3809	3809	3809	Bracket, Printed Circuit Board
28	1876	1876	1876	1876	Terminal, 6-14 Ga. Screw Lug
29	9357	9357	9357	9357	Fuse, Buss MDQ - 1/2 Amp
30	3514	3514	3514	3514	Assembly, Printed Circuit Board
31	9158	9158	9158	9158	Cover, Control Enclosure
32	9279	9279	9279	9279	Bulb, Pilot Light
33	9775	9775	9775	9775	Switch, Explosion Proof 3-Way
34	9267	9267	9267	9267	Thermowell, Ambient High-Limit
35	-	-	-	-	High Limit, Ambient Temperature
36	12169	12169	12169	12169	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, 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).

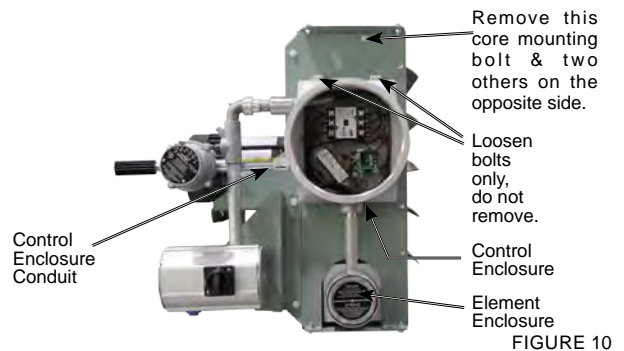


FIGURE 10



FIGURE 11



FIGURE 12



FIGURE 13

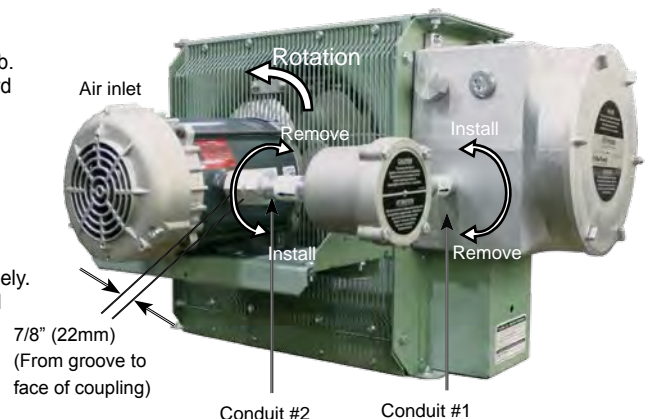


FIGURE 14



FIGURE 15



FIGURE 16

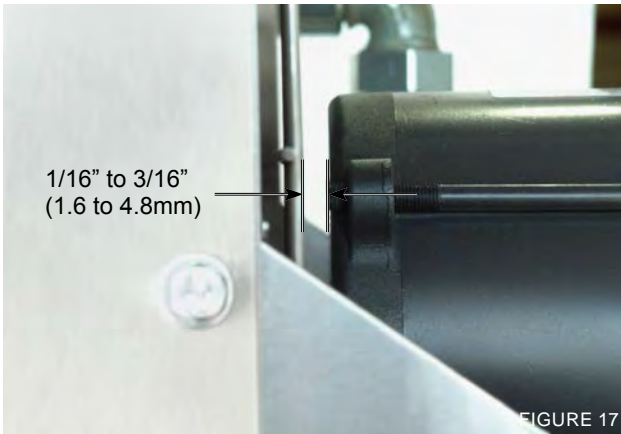


FIGURE 17

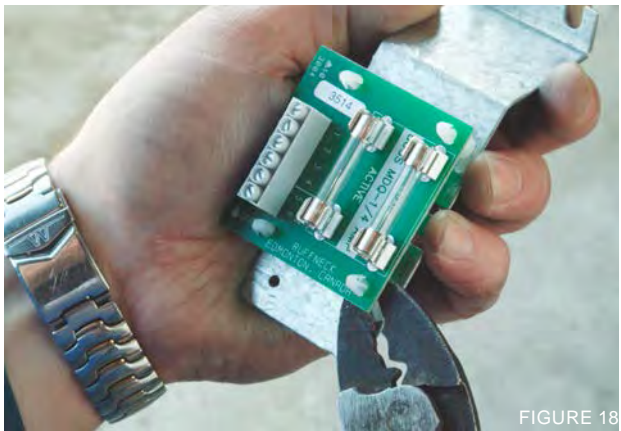


FIGURE 18

## 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

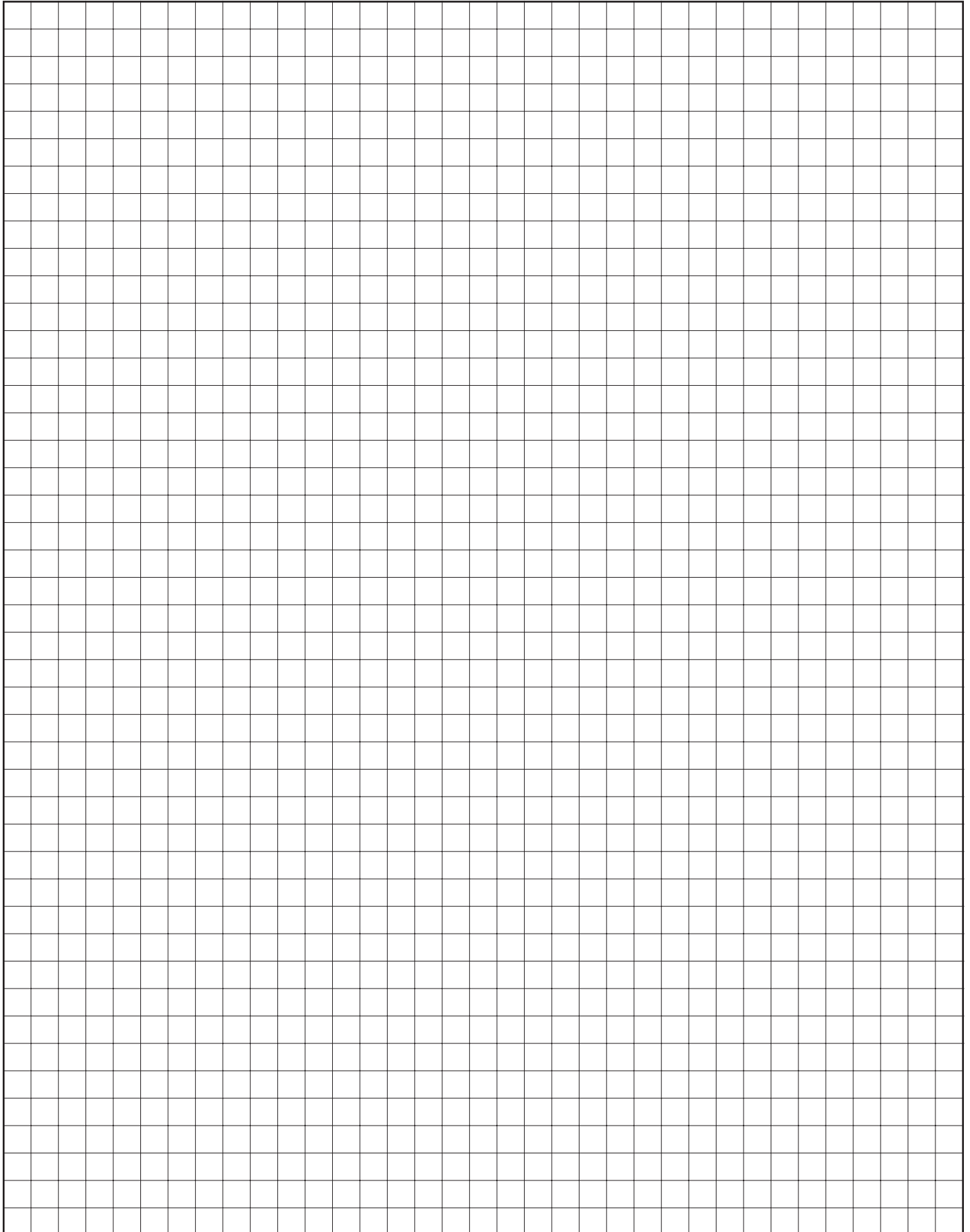
Heating elements are an integral part of the vacuum charged core. A factory exchange core can be shipped immediately from stock. Refer to "Core" section for details.

## CABINET PANELS

Bolt-on cabinet panels are individually replaceable.



## NOTES



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Subject to State or Provincial law to the contrary, the Company will not be responsible for any expense for installation, removal from service, transportation, or damages of any type whatsoever, including damages arising from lack of use, business interruptions, or incidental or consequential damages.

The Company cannot anticipate or control the conditions of product usage and therefore accepts no responsibility for the safe application and suitability of its products when used alone or in combination with other products. Tests for the safe application and suitability of the products are the sole responsibility of the user.

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- any act or omission by the Purchaser, its agents, servants or independent contractors which for greater certainty, but not so as to limit the generality of the foregoing, includes physical, chemical or mechanical abuse, accident, improper installation of the product, improper storage and handling of the product, improper application or the misalignment of parts.

No warranty applies to paint finishes except for manufacturing defects apparent within 30 days from the date of installation.

The Company neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with the product(s).

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