

**Model 4554
High Density Pyropanel
Instruction Manual**

Publication No. 098424-001 Rev. A

***Panel* IIRTM**
Infrared Heaters

September 1998

Another quality product from:



RESEARCH INC.

6425 Flying Cloud Drive
Eden Prairie, MN 55344 USA
(612) 941-3300 Fax (612) 941-3628
www.researchinc.com

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The absorption/emission characteristics of the ceramic reflector surfaces in the heater module maintain a high surface temperature that continually vaporizes organic contaminants. The reflector material also serves as a re-emitter of medium wave (3 to 4 micron) infrared energy. This can be beneficial in many processes depending on the absorptive properties of the material being heated.

An electrical bus bar terminal strip is located in each end of the Model 4554 for easy lamp wiring connection. This configuration allows for either individual lamp wiring or for specific 'zones' to be generated by wiring multiple lamps together.

A thermostat is mounted to the backside of the Model 4554 heater module that can be wired directly to the power source or to an external failure indicator (i.e. an alarm, failure light, etc.). The thermostat will either remove power from the unit or trip the external indicator if the heater exceeds the thermostat trip temperature.

The back of the Model 4554 heater module contains four 1/4-20 inch Phillips head screws installed for mounting the heater in nearly any application.

The Model 4554 is available in heated lengths of 5, 10, 16, 25, and 38 inches (127, 254, 406, 635, and 965 mm) and heated widths of 3, 6, or 12 inches (76, 152, and 305 mm). Model 4554 heaters with 3 inch heated widths use 4 lamps installed on 0.75 inch (19 mm) centers. All other models use either 6 or 12 lamps installed on 1 inch (25 mm) centers. Heated length and width are specified within the heater model number.

Forced Air Blowers

Heater- and remote-mounted forced air blowers are available for the Model 4554. These assemblies include 120V and 230V versions (both operable at either 50 Hz or 60 Hz). Air from the blowers is directed through holes in the heater reflector along the full length of each lamp. This air cools the reflector and lamps while providing a preheated convection air flow to improve the heating rate and power efficiency in most applications. Air flow rates required to operate the various Model 4554 heaters are listed in Specifications. Blowers for most Model 4554 heaters are specified within the model number or can be ordered separately from the heater. The 3 inch (76 mm) wide heaters require remote-mounted blowers that are ordered separately from the heater.

Edge Reflectors

The edge reflectors are constructed from the same materials used in the heater modules. Edge reflectors can also be specified within the heater model number or can be ordered separately from the heater.

Lamps

A variety of high intensity, short wave, tubular quartz, 'T-3 style,' halogen lamps are available for the different heated lengths of the Model 4554. The tungsten emitter in these lamps has an operating temperature of approximately 4000 °F (2205 °C) with a spectral energy peak wavelength of 1.15 microns. The numbers of lamps required to operate the various Model 4554 heaters are listed in Specifications. The lamps are ordered and sold separately from the Model 4554 heaters.

HEATER PERFORMANCE

Product Temperatures

Depending on the particular model, the Model 4554 heater can generate extremely high energy levels. The maximum target work piece temperature depends upon the voltage applied to the heater lamps, the ability of the work piece to absorb radiant energy, and the amount of heat loss. For most continuous heating processes, the maximum work piece temperature should not exceed 800°F (427°C).

Product Sizes

Areas of up to 38 X 12 inches (965 x 305 mm) can be heated with a single heater. Larger heated areas can be created by mounting two or more Model 4554 heaters side-by-side.

Heat Flux Densities

There are two basic lamps types readily available for the Model 4554: 100 or 200 watts per inch (3.9 or 7.9 watts per millimeter) of lighted length. Dissipated power for the Model 4554 is either 100 or 200 watts per square inch (155 or 310 kilowatts per square meter). The three inch wide Model 4554 heater has a 0.75 inch (19mm) lamp spacing and dissipates 133 or 269 watts per square inch (206 or 414 kilowatts per square meter).

Safety

GENERAL

GeneralThe Model 4554 Heater is designed for safe operation in all installations. However, the installation, maintenance, and operation of the heater can be dangerous if proper installation and operating procedures are not followed. All of the instructions in this manual should be followed to ensure proper heater installation and operation in order to prevent accidental injury to operating personnel and/or surrounding equipment.

INFRARED RADIATION

CAUTION!

Exposure to high intensity infrared radiation will cause severe burns to skin and can be extremely harmful to eyes.

Appropriate protective eyewear must be worn when directly observing powered, radiant energy lamps.

HEATER TEMPERATURES

Certain areas of the Model 4554 heater may exceed 500°F (260°C) while the heater is in operation. Exercise extreme care when working in close proximity to an operating heater.

⚠ WARNING!

NEVER place any part of the body under or near any part of the heater while power is applied.

Always allow the heater to cool sufficiently (at least 5 minutes with blower operating, longer if the blower is not operating) before servicing any part of the heater, including lamps or adjacent parts.

ELECTRICAL SAFETY

Due to the high voltages present in typical Model 4554 installations there is danger of electrical shock when installing, operating, or servicing the heater. Exercise extreme caution when handling or working with these high voltages.

CAUTION!

All applicable local and national electrical codes should be followed to ensure proper installation and operation of the Model 4554. A safe electrical ground must also be provided and properly installed on the heater before attempting to operate the unit

⚠ WARNING!

Power lines and any other affiliated heater circuitry (i.e., blowers, thermostat, etc.) must be disconnected prior to any servicing issue including lamp installation and change-out.

The Model 4554 heater should never be operated with the end covers of the heater removed.

The presence of open load-to-ground must be verified after lamp installation into the Model 4554 and before system power is applied.

Installation

Tools Required:

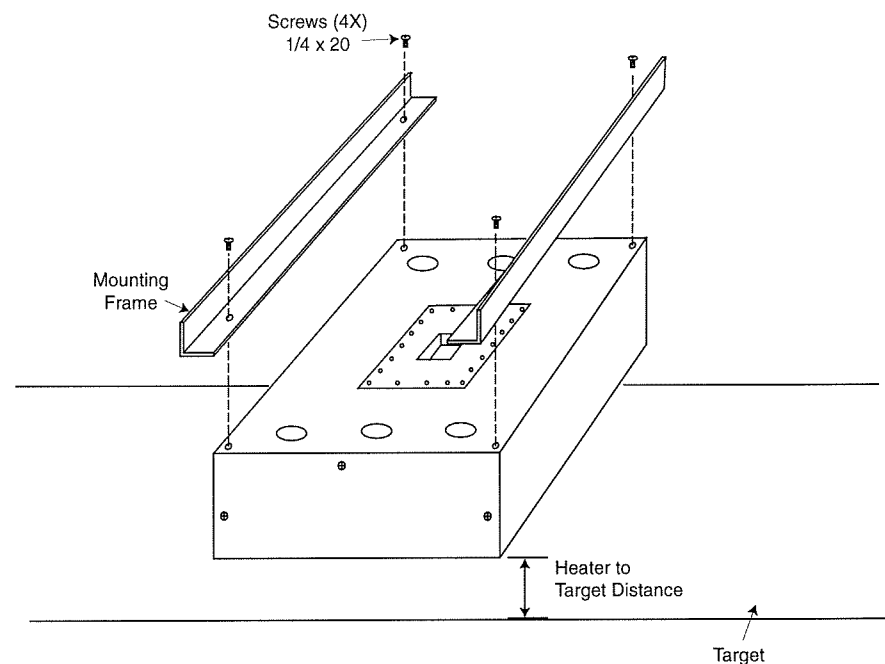
- Phillips Screwdriver
- Slotted Screwdriver
- Hammer
- Metal Punch
- Pliers
- Tape Measure
- Tin snips/metal cutting scissors

MECHANICAL INSTALLATION

As shown in Figure 3-1, four 1/4 X 20 screws are provided on the top of the Model 4554 heater for mounting purposes. The heater can be attached directly to a suitable frame structure or mounting brackets using these four screws. The distance between the heater and target should be determined before mounting the heater. The heater should be mounted so that each end cover may easily be removed for lamp installation.

Multiple Model 4554 heaters can be mounted side-by-side to form large heating arrays.

Figure 3-1 Typical installation drawing for Model 4554 heater.



CAUTION!

The back and end covers of Model 4554 heaters should not be exposed to temperatures exceeding 425°F (218°C). The heater should not be surrounded or enclosed by any type of insulating material.

ELECTRICAL INSTALLATION

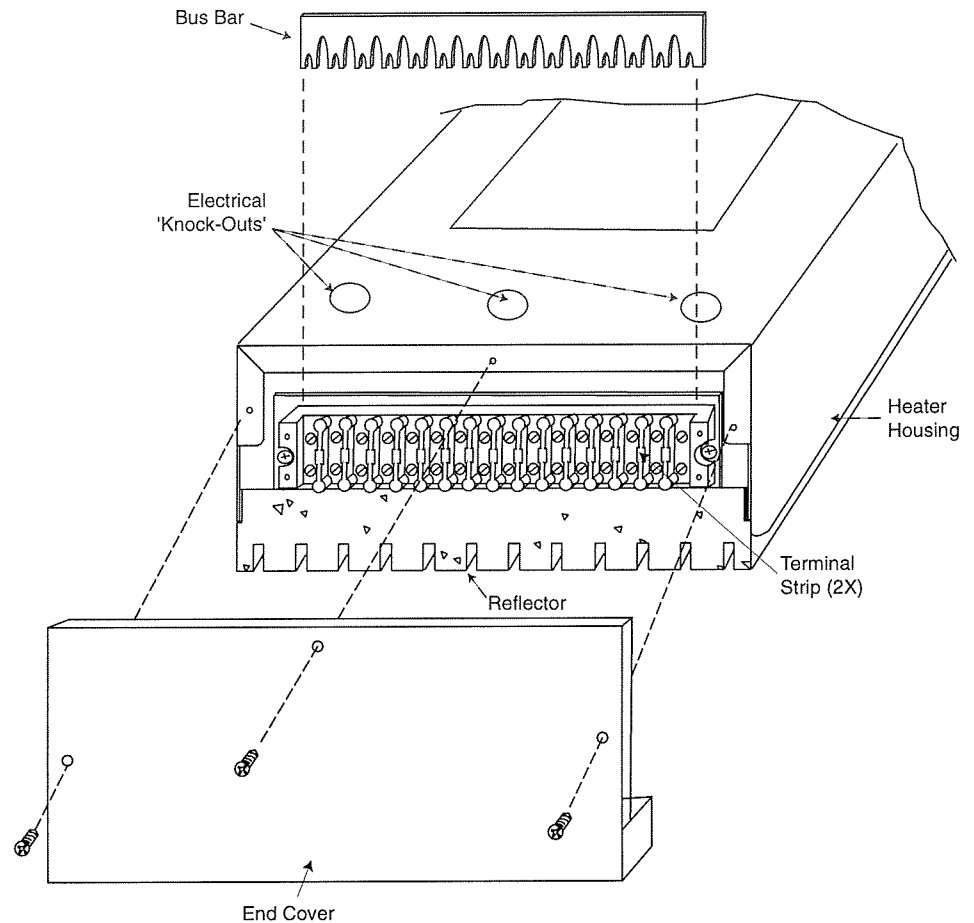
CAUTION!

All internal wiring of the Model 4554 PanellIR should be high temperature insulated wire as specified below or of an equivalent type:

- Lead wire type PFAH or TFE, 600V maximum, 250.°C maximum, UL listed.
- Ampacity based on National Electrical Code Table 310.

As shown in Figure 3-2, the Model 4554 contains two electrical terminal strips, one each mounted on the internal heater housing, under each heater end cover. These terminal strips each contain contact points for electrical connection of each lamp of the heater. In addition, each terminal strip contains a 'bus bar' that provides electrical connection between all contact points on the terminal strip (Figure 3-2).

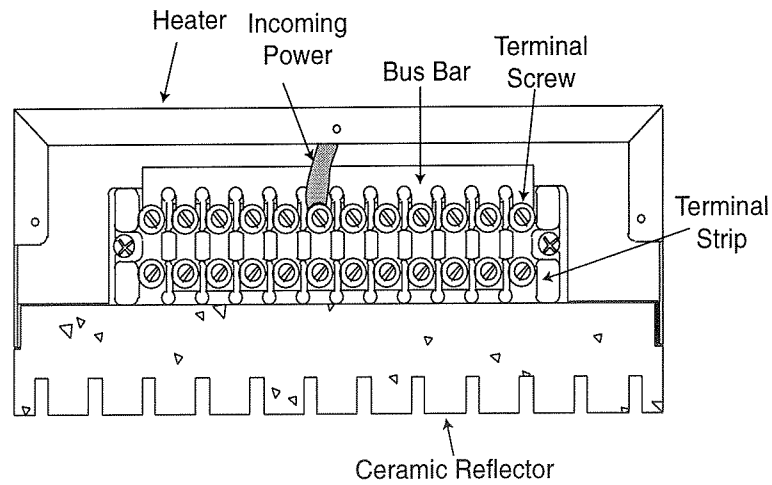
Figure 3-2 Terminal Strip and Bus Bar



Single-zone Wiring

The presence of the bus bars on each terminal strip allows the heater to be easily wired in different configurations. A Model 4554 heater wired in a single-zone configuration is shown in Figure 3-3. In this configuration, the lamps mounted in the Model 4554 all simultaneously receive the same voltage from the power source. In this case, electrical connection from each terminal strip to the power source is made by a single, high temperature grade, electrical wire as follows:

Figure 3-3 Single-Zone Wiring



⚠ WARNING!
 The electrical power required to operate the Model 4554 is extremely dangerous. Make sure all electrical power that is to be provided to the Model 4554 is adequately turned off prior to making any electrical connection to the heater.

NOTE:
 The following instructions are for single-phase electrical wiring of the Model 4554. See Appendix A for three-phase wiring.

Prepare heater unit for wiring

1. Remove the three screws from each of the end covers on each end of the heater using the Phillips screwdriver.
2. Carefully remove each of the end covers and set them aside so that the attached reflector material is not damaged.

Remove electrical connection 'knock-outs'

1. Using the hammer and punch, remove one circular 'knock-out' from each end of the top of the heater by placing the metal punch on the knock-out outline and striking the punch with the hammer until the knock-out slug protrudes into the heater.
2. Using the pliers, remove both knock-out slugs from the heater body.
3. Discard the knock-out slugs.

Install high temperature wire

1. On each end, use the tape measure to measure the distance from the center of each terminal strip to the point at which the supply power and the high temperature wire are to be joined.
2. Include additional length to account for wire travel through the knock-out hole and enough to perform adequate wire stripping prior to attachment to the heater and power supply wiring.
3. Cut two lengths of high temperature wire corresponding to the measured lengths.

4. Strip the insulation from each end of each wire to expose the conductor material (approximately 1/2 inch).
5. Feed one wire (each) into the heater through each end of the heater between the terminal strip and the back of the heater and up through the knock-out hole.
6. Attach one end of each stripped wire end to each terminal strip by partially backing out one of the center-most screws holding the bus bar to the terminal strip and wrapping the stripped portion of the wire around the screw. Retighten the screw on each terminal strip back to its original position.

Wiring Power to Heater

1. Attach the unconnected end of each high temperature wire to the power supply wiring using appropriate wire joining techniques (as specified by local electrical codes and standards).

Multi-zone wiring

The Model 4554 can also be wired so that multiple heating zones are produced within the heater. When configured for multi-zone operation, each 'zone' of lamps is electrically controlled by its own power control device. Wiring the Model 4554 for multi-zone operation is as follows:

Prepare heater unit for wiring

1. Remove the three screws from each of the end covers on each end of the heater using the Phillips screwdriver.
2. Carefully remove each of the end covers and set them aside so that the attached reflector material is not damaged.

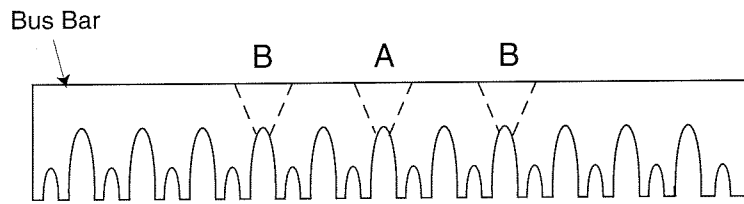
Remove electrical connection 'knock-outs'

1. Three knock-outs are provided on each end of the Model 4554. Multiple knock-outs can be removed on each end of the heater so that an individual knock-out does not have to accommodate more than three or four wires. It is left up to the installer to determine the number of knock-outs to remove to simplify the wiring procedure.
2. Using the hammer and punch, remove one circular 'knock-out' from each end of the top of the heater by placing the metal punch on the knock-out outline and striking the punch with the hammer until the knock-out slug protrudes into the heater.
3. Using the pliers, remove the knock-out slugs from the heater body.
4. Discard the knock-out slugs.

Prepare bus bar to accommodate multiple zones

1. Using the slotted screwdriver, loosen the screws holding the bus bar to the terminal strip.
2. Lift the bus bar out of the terminal strip.
3. As shown in Figure 3-4, the bus bar can be cut to produce shorter, individual bus bars corresponding to the number of desired heating zones. Using the tin snips/metal cutting scissors, cut the bus bar apart into shorter, individual bus bars corresponding to the number of lamps to be 'bussed' together to form each heating zone.
4. Place each individual bus bar back on the terminal strip corresponding to its 'zone' location.
5. Tighten each of the screws into the bus bar/terminal strip assembly.

Figure 3-4 Multi-Zone Bus Bar Preparation



- A: Removal of this bus bar segment results in two separate '6-lamp' bus bars.
- B: Removal of these bus bar segment results in three separate '4-lamp' bus bars.

Install high temperature wire

1. On each end, use the tape measure to measure the distance from the center of each terminal strip 'zone' to the point at which the supply power and the high temperature wire are to be joined.
2. Include additional length to account for wire travel through the knock-out hole and enough to perform adequate wire stripping prior to attachment to the heater and power supply wiring.
3. Cut lengths of high temperature wire corresponding to the measured lengths.
4. Strip the insulation from each end of each wire to expose the conductor material (approximately 1/2 inch).
5. Feed the wires into the heater through each end of the heater between the terminal strip and the back of the heater and up through the knock-out holes.
6. Attach one end of each stripped wire end to each terminal strip 'zone' by partially backing out one of the center-most screws holding each bus bar to the terminal strip 'zone' and wrapping the stripped portion of the wire around the screw. Retighten each screw on each terminal strip back to its original position.

Wiring Power to Heater

Attach the unconnected end of each high temperature wire to the power supply wiring using appropriate wire joining techniques (as specified by local electrical codes and standards).

LAMP INSTALLATION

CAUTION!

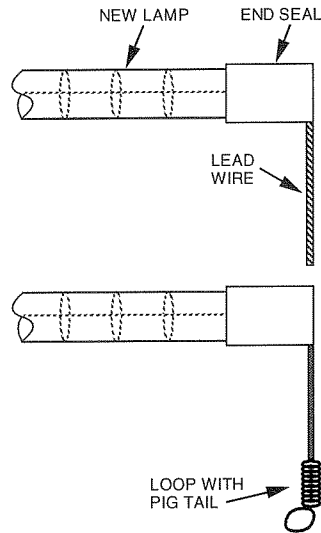
Wear soft, clean, oil-free flannel or plastic gloves when handling halogen, quartz lamps. Oils and contaminants are readily transmitted to the quartz by unprotected hands and can cause premature lamp failure.

Lamp wire preparation

As shown in Figure 3-5, new lamps are shipped with straight, ‘unbent’ wires. Each lamp wire must be configured before installation into the heater as follows:

1. Make a small loop in the wire at a point far enough from the lamp end seal to allow the lamp to be installed in the heater without putting tension in the wire. Wind the remaining wire (beyond the loop) around the portion of the wire between the loop and the lamp end seal.

Figure 3-5 Lamp Wire Preparation

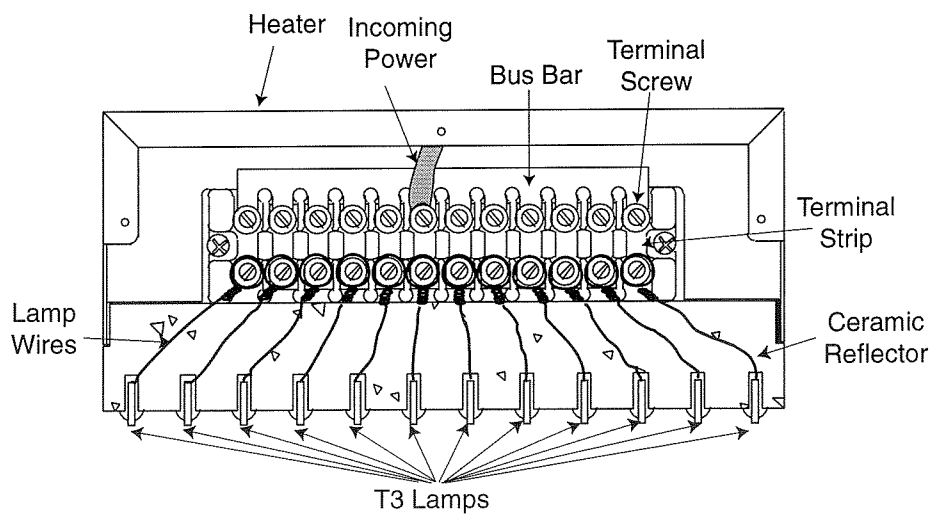


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Mounting lamps

1. Place the ends of the lamps into the slots in the ceramic reflector material.
2. Using the slotted screwdriver, loosen the lower row of screws from the terminal strip.
3. Place one screw through each wire loop from each lamp and reinsert the screws into the terminal strip locations they came from.
4. ‘Hand tighten’ each screw into the terminal strip using the slotted screwdriver.
5. Verify that there is no tension in each wire between the lamp and the terminal strip (each wire should be able to move a small distance when so attempted by hand).

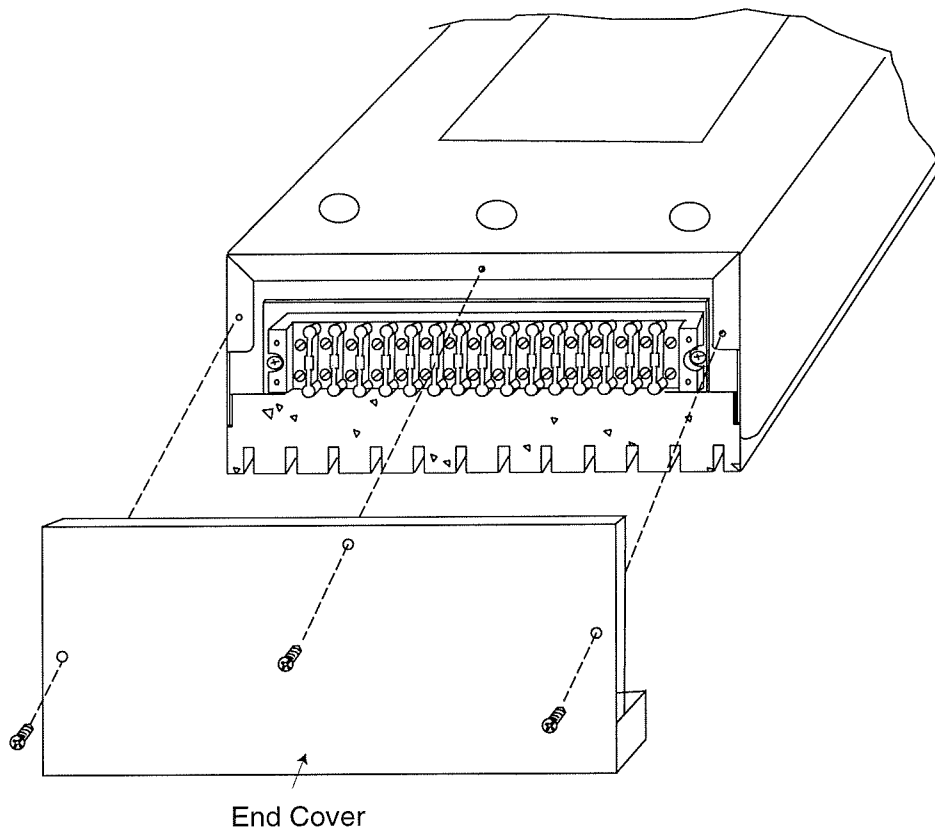
Figure 3-6 Mounting Lamps



Reinstall end covers

1. Carefully replace each end cover in its proper location on the heater body.
2. Insert the three screws that hold the end cover in place into their respective holes and tighten them into the heater using the Phillips screwdriver.

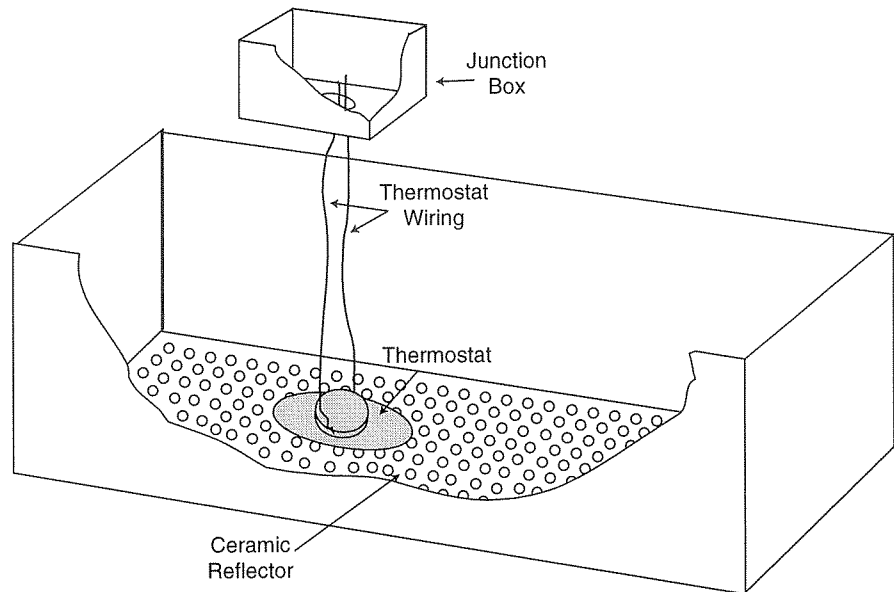
Figure 3-7 End Cover Replacement



WIRING THERMOSTAT

A thermostat is mounted to the back side of the Model 4554 ceramic reflector inside the heater body (Figure 3-8). The thermostat is a feature of the Model 4554 that safe guards the heater from overheating. The thermostat is rated for 120 volt, 15 amp service. When properly wired to the heater power control system, the thermostat will 'trip' if it reaches a temperature of (180°F [82°C]) resulting in loss of power to the heater if wired to operate in this configuration. The thermostat will reset after it cools below a temperature of 150°F (66°C).

Figure 3-8 Thermostat Wiring

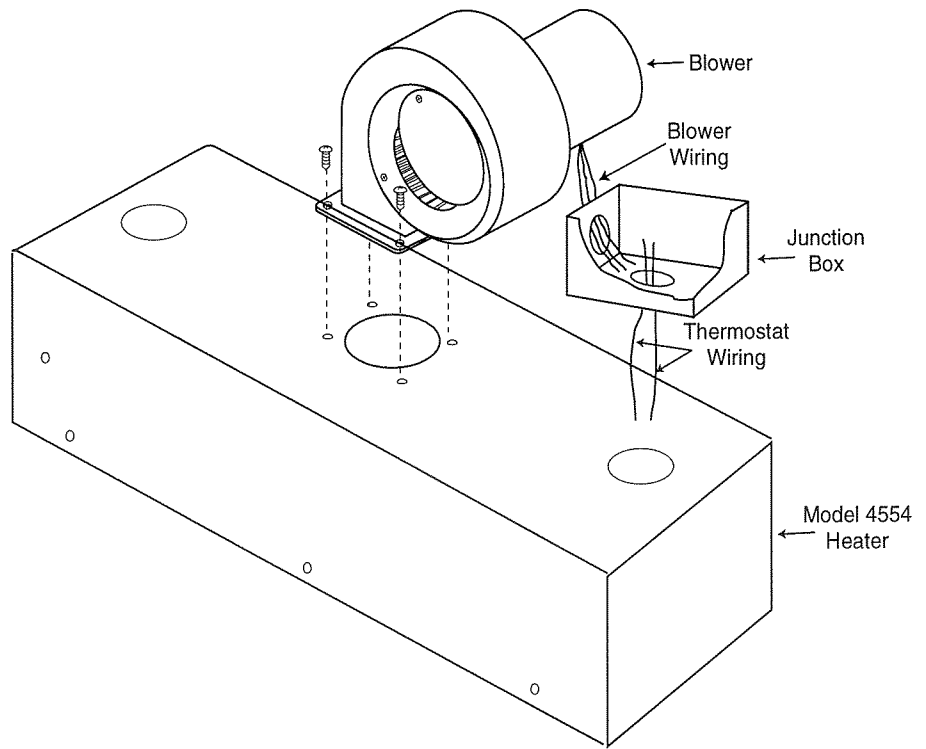


WIRING FORCED-AIR BLOWER

The Model 4554 is typically ordered with the forced-air blower system mounted to the heater. (The 3 inch (76 mm) versions can only be ordered with the remote mount blower system kit as an accessory). The blowers are ordered in one of two versions: 115 volt/60 Hz or 230 volt/50 Hz.

The wires of the blower(s) mounted to the back of the Model 4554 run from the blower to the electrical junction box mounted to the back side of the heater (Figure 3-9). These wires must be properly joined to the appropriate circuitry before the blower can operate. All applicable electrical standards and codes must be followed when wiring the forced-air blower.

Figure 3-9 Blower Kit Installation



REMOTE-MOUNT BLOWER KIT

Installing the Remote-Mount Blower Kit to the Model 4554 heater is a straight-forward, easy procedure. The kit itself contains the following components (Figure 3-10):

- Blower (one for most kits, two in kits for 38 inch (965 mm) length heaters)
- Blower Collar (one per blower)
- Flexible Duct (one per blower)
- Heater Collar (one per blower)
- Hose Clamps (two per blower)
- Mounting screws to attach the blower collar to the blower and the heater collar to the heater

In most cases, it is recommended to install the Model 4554 heater prior to installing the remote-mount blower kit. Prior to installing the blower, determine the location and support structure that the blower will be mounted to. Make sure there is adequate room around this structure or framework that allows the blower to reside unencumbered by any structure, wiring, or other apparatus.

Once the heater is installed, the remote-mount blower kit is installed as follows:

1. Attach the heater collar to the Model 4554 heater using the existing four 10-32 UNF screws on the heater.
2. Attach the blower collar to the blower using the four 10-32 UNF screws provided with the kit.
3. Mount the blower collar/blower assembly to the chosen support structure (see Figure 3-11 for the blower collar mounting hole dimensions and locations).

NOTE:

Mounting hardware such as screws or bolts and nuts are not provided with this kit.

NOTE:

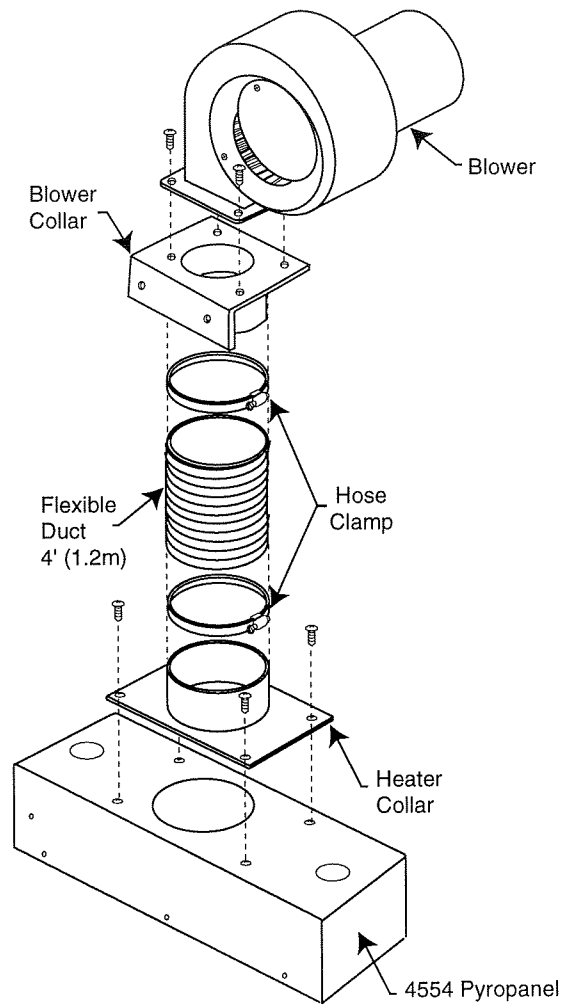
The flexible duct provided with the remote-mount blower kit is 4 feet long (1.2 m). The blower should be mounted close enough to the heater so the flexible duct can adequately connect the blower to the Model 4554.

4. Place the hose clamps over the flexible duct – one at each end of the duct.
5. Fit each end of the flexible duct over the corresponding blower and heater collars.
6. Move each hose clamp over the hose to a point approximately half-way on to the heater collar.
7. Hand-tighten both hose clamps using an appropriate wrench or screwdriver.

NOTE:

The flex duct can be cut as necessary to fit between the heater and the blower. A duct longer than 4 feet is not recommended.

Figure 3-10 Remote-Mount Blower Installation



Maintenance

Periodic inspection for dirt and contaminants on the heater, blower mechanism, and lamps, and removal of such, will ensure that the Model 4554 continues to operate efficiently and will extend lamp life.

In dirty environments or heating operations the lamps may become contaminated by smoke, dust, fingerprints or other foreign matter. When this occurs it is recommended that they be cleaned using the following procedure:

⚠ WARNING

Disconnect all power running to the Model 4554 from the power source and allow the heater to cool at least five minutes before continuing.

CAUTION

Wear soft, clean, oil-free flannel or plastic gloves when handling quartz lamps. Skin oils and other contaminants can cause premature lamp failure if they are allowed to reside on the quartz lamp.

Using a soft, dry cloth or tissue, wipe the residue from contaminated lamps. A solution of household strength ammonia and water can be used as a solvent.

The ceramic reflector is made of a high temperature, ceramic material and is essentially self-cleaning. Surface heat normally prevents contaminant condensation on the reflector. Increasing power to the lamp for short time periods will increase the heater temperature resulting in the removal of most contaminants.

Operating Instructions

Operation of the Model 4554 is relatively straight-forward once installed and properly (electrically) wired to an appropriate power control source. In addition, the forced-air blower system and heater thermostat must be connected to an appropriate power supply in order to operate.

The intensity of the infrared energy generated by the lamps is directly proportional to the amount of electrical power supplied to the lamps. Determining the amount of electrical power supplied to the lamps in the Model 4554 depends on a variety of parameters including (but not limited to):

- Infrared absorptivity of target product (eg. Target material properties including: color, surface condition, and temperature)
- Desired product heating rate
- Minimum/maximum target product temperature
- Distance from heater to target product
- Speed of target product moving through the heating area

In general, a limited number of experimental tests to determine the optimal settings (i.e. heater-to-target distance, applied power to the lamps, product target speed through the heating area, etc.) should be performed for any Model 4554 installation. Following this approach will yield the best operational settings for a given application.

Depending on the application (and if feasible), a temperature control feed back system may be used to control the energy output of the Model 4554. A typical control system includes power control system, temperature measurement capability (ies), target product tachometer feedback (moving target applications), and alarm/emergency shut down capability (ies). Employing such a system allows for continuous monitoring of the heating process and ensures continuous, steady state infrared energy output from the heater.

Beyond routine, periodic maintenance (See Section 4 – Maintenance) and following all safety practices (See Section 2 – Safety) the Model 4554 requires no additional care or handling for correct, efficient operation.

Dimensions and Specifications

Specifications

Model Number	Number of Lamps	Lamp Type	Lamp Power (Watts)	Lamp Rated Voltage (Volts)	Applied Lamp Voltage (Volts)	Current Per Lamp at Applied Lamp Voltage (Amps)	Total Power Per Lamp (kW)
4554-B-05-03	4	500T3, 500T3/CL,500T3/CL/HT	500	120	120	4.2	0.5
		1200T3/CL, 1200T3/CL/HT	1200	144	120	6.3	0.9
4554-B-10-03		1000T3	1000	240	240	4.2	1.0
		2000T3/CL/HT	2000		240	8.3	2.0
4554-B-16-03		1600T3, 1600T3/CL	1600	240	240	6.7	1.6
		3000T3/CL	3000		240	12.5	3.0
4554-B-25-03		2500T3, 2500T3/CL, 2500T3/VB/CL	2500	480	480	5.2	2.5
		5MT3/1CL/HT	5000	600	480	7.5	3.6
4554-B-38-03		3800T3, 3800T3/CL, 3800T3/VB 3800T3/VB/CL			3800	570	570
		3800T3/CL/HT/420	480	6.1			2.9
	570		6.7	3.8			
4554-A-05-06	6	500T3, 500T3/CL,500T3/CL/HT	500	120	120	4.2	0.5
4554-A-05-12	12	1200T3/CL, 1200T3/CL/HT	1200	144	120	7.5	0.9
					144	8.3	1.2
4554-A-10-06	6	1000T3	1000	240	240	4.2	1.0
4554-A-10-12	12	2000T3/CL/HT	2000	240	240	8.3	2.0
4554-A-16-06	6	1600T3, 1600T3/CL	1600	240	240	6.7	1.6
4554-A-16-12	12	3000T3/CL	3000	240	240	12.5	3.0
4554-A-25-06	6	2500T3, 2500T3/CL, 2500T3/VB/CL	2500	480	480	5.2	2.5
4554-A-25-12	12	5MT3/1CL/HT	5000	600	480	7.5	3.6
					600	8.3	5.0
4554-A-38-06	6	3800T3, 3800T3/CL, 3800T3/VB 3800T3/VB/CL	3800	570	480	6.1	2.9
					570	6.7	3.8
4554-A-38-12	12	3800T3/CL/HT/420		420	420	9.1	3.8

Ordering Information – Model 4554

Model	Product Description
4554	High Density, Area Infrared Heater
Code	Lamp Spacing
A	1 inch (25 mm) on center
B ⁽¹⁾	0.75 inch (19 mm) on center
Code	Length
05	5 Inches (127 mm)
10	10 Inches (254 mm)
16	16 Inches (406 mm)
25	25 Inches (635 mm)
38	38 Inches (965 mm)
Code	Width
03 ⁽¹⁾	3 Inches (76 mm)
06	6 Inches (152 mm)
12	12 Inches (254 mm)
Code	Blower Kit
HB115 ⁽²⁾	Heater-mounted blower, 115V, 50/60 Hz
HB230 ⁽²⁾	Heater-mounted blower, 230V, 50/60 Hz
NB	No Blower
Code	Additional Options
ER	Edge Reflectors
<p>(1) 3 inch (76 mm) width models use four lamps located on 0.75 inch (19 mm) centers. (2) Heater-mounted blower kits are only available on 6 inch (152 mm) and 12 inch (304 mm) width heaters. Order Remote-mounted Blower kit for 3 inch (76 mm) wide heaters from 'Accessories/Spare Parts' list."</p>	

Ordering Example–Model 4554

	Model	Lamp Spacing	Length	Width	Blower Kit	Additional Options
Typical Model Number	4554	A	25	06	HB115	ER

Accessories, Spare & Replacement Parts—Model 4554

Model	Description
	Set of two edge reflectors for:
ER-4553/4-05	5 Inch (127 mm) length
ER-4553/4-10	10 Inch (254 mm) length
ER-4553/4-16	16 Inch (406 mm) length
ER-4553/4-25	25 Inch (635 mm) length
ER-4553/4-38	38 Inch (965 mm) length
	Heater-mounted Blower Kit for:
HB115-5-25	5 Inch (127 mm) to 25 inch (635 mm) lengths, 115V, 50/60 Hz
HB115-38	38 Inch (965 mm) length, 115V, 50/60 Hz
HB230-5-25	5 Inch (127 mm) to 25 inch (635 mm) lengths, 230V, 50/60 Hz
HB230-38	38 Inch (965 mm) length, 230V, 50/60 Hz
	Remote-mounted Blower Kit for:
R3B115	3 Inch (76 mm) Width, 5 inch (127 mm) to 38 inch (965 mm) lengths, 115V, 50/60 Hz
R3B230	3 Inch (76 mm) Width, 5 inch (127 mm) to 38 inch (965 mm) lengths, 230V, 50/60 Hz
RB115-5-25	6 Inch (152 mm) or 12 inch (304 mm) Widths, 5 Inch (127 mm) to 25 inch (635 mm) lengths, 115V, 50/60 Hz
RB115-38	6 Inch (152 mm) or 12 inch (304 mm) Widths, 38 Inch (965 mm) length, 115V, 50/60 Hz
RB230-5-25	6 Inch (152 mm) or 12 inch (304 mm) Widths, 5 Inch (127 mm) to 25 inch (635 mm) lengths, 230V, 50/60 Hz
RB230-38	6 Inch (152 mm) or 12 inch (304 mm) Widths, 38 Inch (965 mm) length, 230V, 50/60 Hz

Lamps – 4554

Model	Heater Length	Watts	Lamp Description
057540-002	5 Inches (127 mm)	500	500T3
057541-001	5 Inches (127 mm)	500	500T3/CL
094312-002	5 Inches (127 mm)	500	500T3/CL ⁽²⁾
057541-003	5 Inches (127 mm)	1200	1200T3/CL
057544-003	5 Inches (127 mm)	1200	1200T3/CL/HT
057540-003	10 Inches (254 mm)	1000	1000T3 ⁽¹⁾
057544-002	10 Inches (254 mm)	1000	1000/T3/2CL/HT ⁽¹⁾
057544-005	10 Inches (254 mm)	2000	2000/T3/CL/HT ⁽¹⁾
057540-004	16 Inches (406 mm)	1600	1600T3 ⁽¹⁾
057541-004	16 Inches (406 mm)	1600	1600T3/CL ⁽¹⁾
057541-008	16 Inches (406 mm)	3000	3000T3/CL ⁽¹⁾
094312-001	16 Inches (406 mm)	3000	3000T3/CL ⁽²⁾
057541-005	25 Inches (635 mm)	2500	2500T3/CL ⁽¹⁾
057549-001	25 Inches (635 mm)	2500	2500T3/VB/CL
057544-008	25 Inches (635 mm)	5000	5MT3/1CL/HT ⁽¹⁾
057540-006	38 Inches (965 mm)	3800	3800T3 ⁽¹⁾
057541-006	38 Inches (965 mm)	3800	3800T3/CL ⁽¹⁾
057549-002	38 Inches (965 mm)	3800	3800T3/VB/CL
057540-007	38 Inches (965 mm)	3800	3800T3/420 ⁽¹⁾

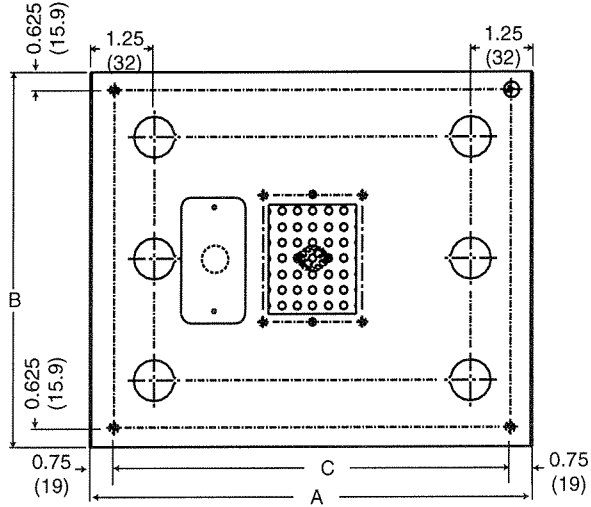
(1) These lamps are for horizontal operation only.
(2) HeLeN-coated, glare reduction lamp.

Dimensions – Model 4554

Model	Lighted Length (LL) Inches (mm)	Overall Length (A) Inches (mm)	Overall Width (B) Inches (mm)
4554-B-05-03	5-6 (127-152)	9.38 (238)	3.0 (76)
4554-B-10-03	10 (254)	14.38 (365)	3.0 (76)
4554-B-16-03	16 (406)	20.39 (518)	3.0 (76)
4554-B-25-03	25 (635)	29.38 (746)	3.0 (76)
4554-B-38-03	38 (965)	42.38 (1076)	3.0 (76)
4554-A-05-06	5-6 (127-152)	9.38 (238)	6.0 (152)
4554-A-10-06	10 (254)	14.38 (365)	6.0 (152)
4554-A-16-06	16 (406)	20.39 (518)	6.0 (152)
4554-A-25-06	25 (635)	29.38 (746)	6.0 (152)
4554-A-38-06	38 (965)	42.38 (1076)	6.0 (152)
4554-A-05-12	5-6 (127-152)	9.38 (238)	12.0 (3.5)
4554-A-10-12	10 (254)	14.38 (365)	12.0 (3.5)
4554-A-16-12	16 (406)	20.39 (518)	12.0 (3.5)
4554-A-25-12	25 (635)	29.38 (746)	12.0 (3.5)
4554-A-38-12	38 (965)	42.38 (1076)	12.0 (3.5)

Figure 6-1 Model 4554 Dimensions
All Dimensions in
Inches (mm)

6 & 12 Inch (152 & 305 mm) Wide Model 4554



3 Inch (76 mm) Wide Model 4554

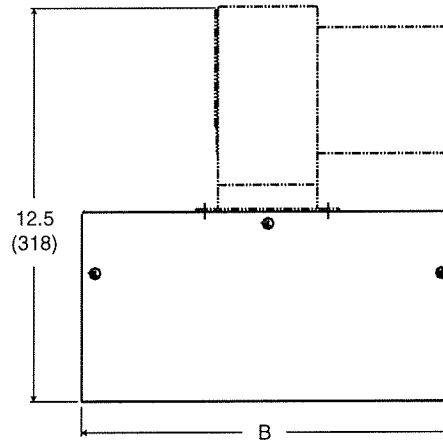
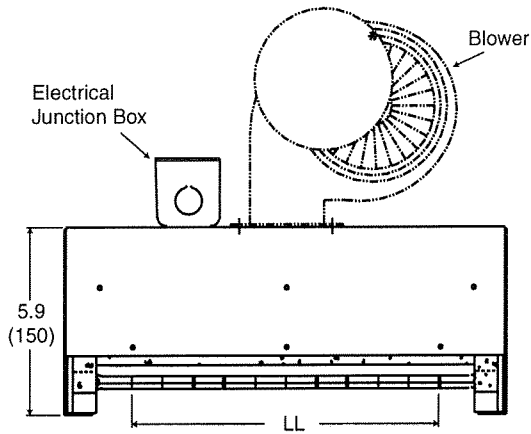
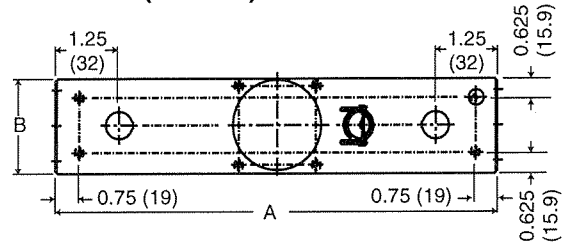
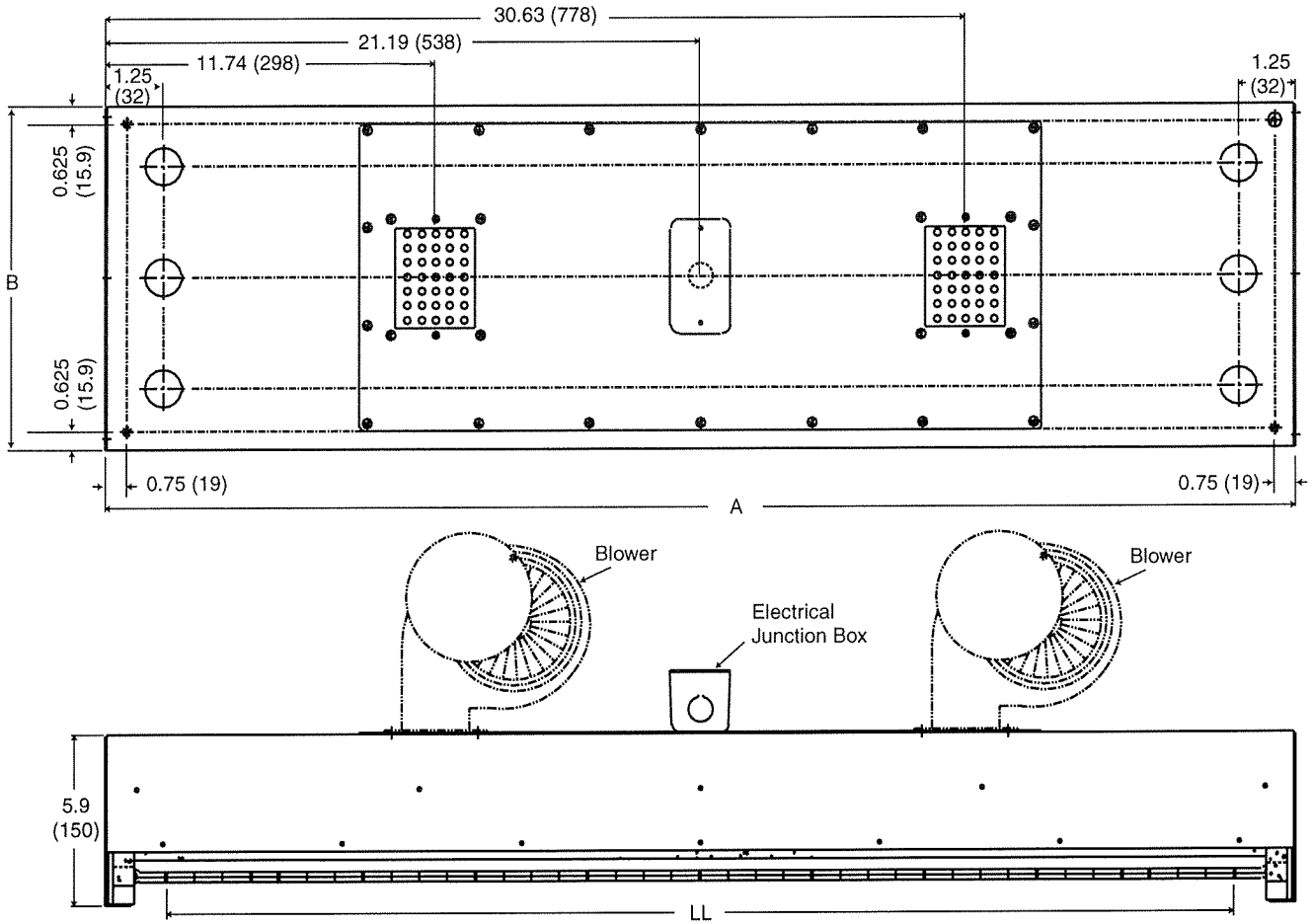


Figure 6-2 Model 4554 Dimensions
All Dimensions in
Inches (mm)

38 Inch (965 mm) Length Model 4554



DETERMINING THE CURRENT PER LAMP

1. Calculate the percentage of the applied voltage to the lamp's rated voltage:

$$\text{Percent Voltage} = \frac{\text{Applied Voltage} \times 100}{\text{Rated Voltage of Lamp}}$$

2. Use Fig A-1 to determine the percent of power dissipated by the lamps at that percent voltage. Or for greater accuracy, calculate the percent of power dissipated:

$$\text{Percent of Power Dissipated} = (\text{Percent Voltage})^{1.54}$$

3. Determine the power dissipated:

$$\text{Dissipated Power} = \text{Percent of Power Dissipated} \times \text{Rated Power}$$

4. Calculate the lamp current:

$$\text{Lamp Current} = \frac{\text{Dissipated Power}}{\text{Applied Voltage}}$$

Example: Assume a 3800T3, 3800 watt, 570 volt lamp is to operate in a 440 volt line.

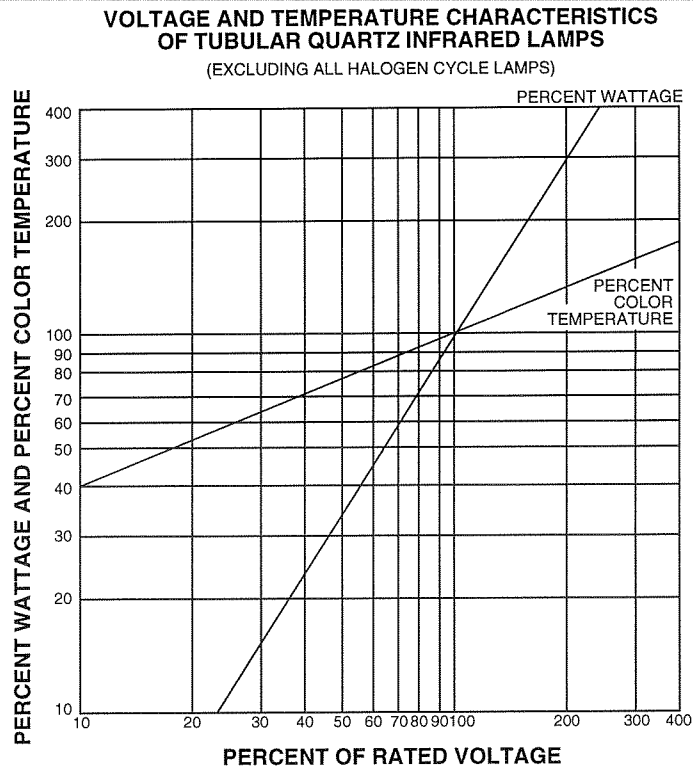
1. $\text{Percent Voltage} = \frac{440 \text{ Applied Voltage} \times 100}{570 \text{ Rated Voltage}} = 77\%$

2. The percent dissipated power at 77% of rated voltage is about 67%. Or to calculate:
 $\text{Percent of Power Dissipated} = (.77)^{1.54} = 66.8\% \text{ or } 67\%$

3. $\text{Dissipated Power} = 67\% \text{ Percent of Power Dissipated} \times 3800 \text{ Watts} = 2546 \text{ Watts}$

4. $\text{Lamp Current} = \frac{2546 \text{ Watts Dissipated Power}}{440 \text{ Volts Applied Voltage}} = 5.78 \text{ Amperes}$

Figure A-1 Voltage And Temperature



POWER DISSIPATION VS. VOLTAGE FORMULA

$$\frac{W_A}{W_R} = \left(\frac{V_A}{V_R}\right)^{1.54}$$

W_A = Actual Power Dissipated, Watts
 W_R = Rated Power, Watts
 V_A = Lamp Voltage, Actual
 V_R = Lamp Voltage, Rated

$$W_A = W_R \left(\frac{V_A}{V_R}\right)^{1.54}$$

Single-Phase Loads

The line current for single-phase loads can be calculated using one of the following methods:

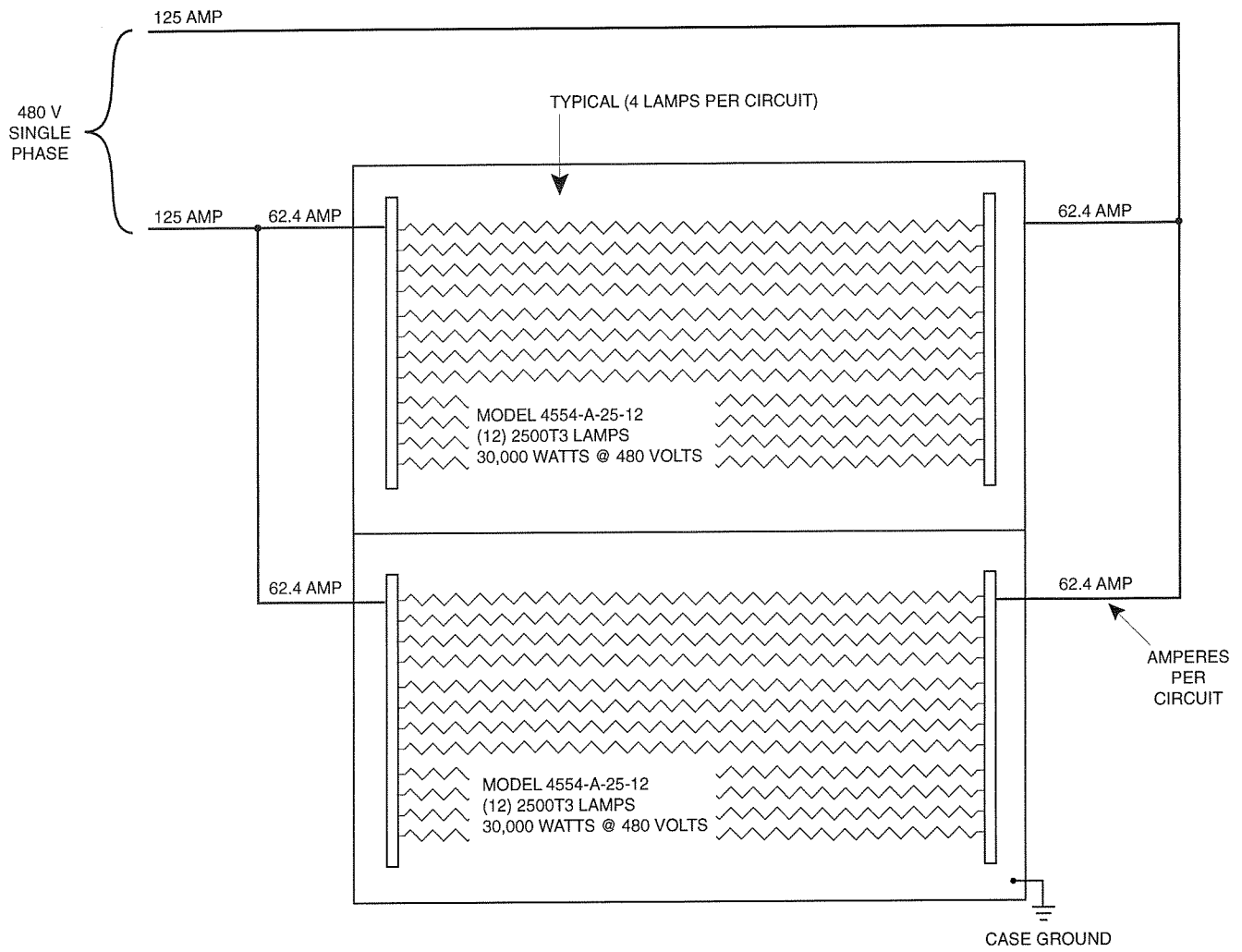
1. Determine the current per lamp. If the applied voltage to the lamps is different, calculate the lamp current as explained on page A-1.
2. Determine the number of lamps.
3. Calculate the line current:

Line Current = Lamp Current × Number of Lamps

Example: Assume quantity 2 Model 4554-A-25-12 using 2500T3 lamps connected to a 480 volt source.

1. The current per 2500T3 lamp connected to a 480 volt source is 5.2 amperes.
2. The number of lamps in each Model 4554-A-25-12 is 12. Quantity 2 Pyropanels x 12 lamps = 24 lamps total.
3. Line Current = 5.2 Amperes x 24 Lamps = 125 Amperes

Figure A-2 Single-Phase or DC Input Wiring Diagram



Three-Phase Balanced Loads

A three-phase load is one where the load for all three phases dissipates the same power. In the case of the Model 4554, there should be an equal number of the same wattage lamps connected to each phase.

The line current for three-phase loads can be calculated using one of the following methods:

1. Determine the power dissipated per lamp.
2. Determine the number of lamps.
3. Calculate the total power dissipated in the load:

$$\text{Load Power} = \text{Power Dissipated per Lamp} \times \text{Number of Lamps}$$

4. Calculate the line current:

$$\text{Line Current} = \frac{\text{Load Power}}{\text{Applied Voltage} \times 1.73}$$

Example: Assume quantity 3 Model 4554-A-25-12 using 2500T3 lamps connected to a 480 volt source.

1. The power dissipated by a 2500T3 lamp is 2.5 kW, or 2500 watts, when connected to a 480 volt source.
2. The number of lamps in each Model 4554-A-25-12 is 12. Quantity 3 Pyropanels x 12 lamps = 36 lamps total.
3. Load Power = 2500 Watts Dissipated per Lamp x 36 Lamps = 90,000 Watts
4. Line Current = $\frac{90,000 \text{ Watts Load Power}}{480 \text{ Volts Applied} \times 1.73} = 108 \text{ Amperes}$

Figure A-3 Balanced Three-phase Load Wiring Diagram

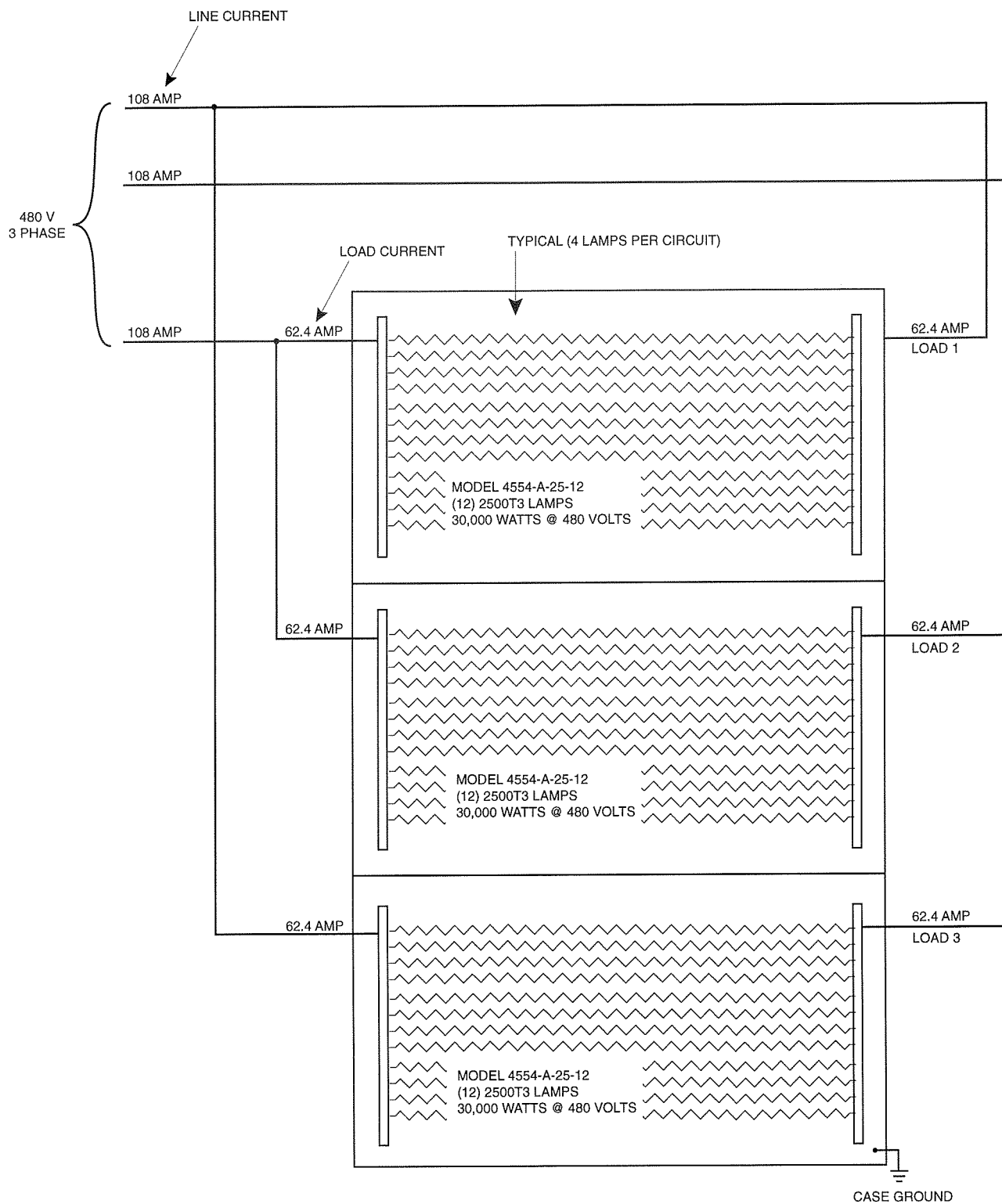
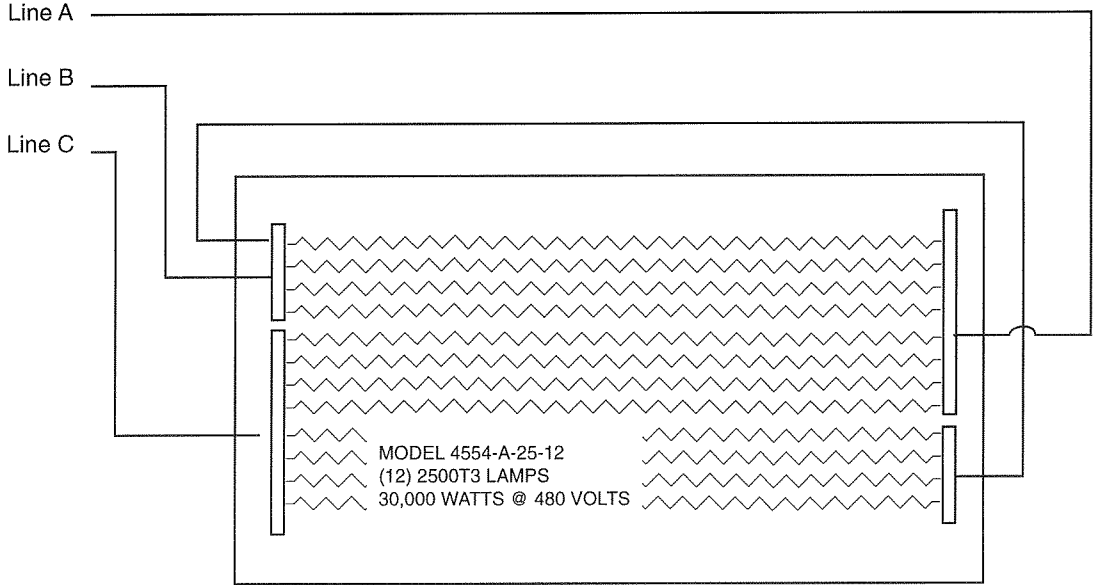


Figure A-4 Balanced Three-phase Load Wiring Diagram (Single Heater)



Three-Phase Unbalanced Loads

Often it is not possible to connect the lamps in the Model 4554 to make a balanced load. In this case, the three line currents supplying the heater lamps can be calculated as follows:

1. Determine the number of lamps in each load.
2. Determine the current per lamp.
3. Calculate the load current for each of the three loads based on the number of lamps in each load and the current per lamp.

$$\text{Load Current} = \text{Lamp Current} \times \text{Number of Lamps in Load}$$

4. Calculate the line current based on the current of the two loads connected to the line:

$$\text{Line Current} = \sqrt{\text{FLC}^2 + (\text{FLC} \times \text{SLC}) + \text{SLC}^2}$$

NOTE:

FLC = First Load Current

SLC = Second Load Current

Example: Assume quantity 2 Model 4554-A-25-12 and quantity 1 Model 4554-A-25-06 using 2500T3 lamps connected to a 480 volt source (see Fig. A-5).

1. Number of Lamps in Each Load:
 Load 1 = 12 Lamps
 Load 2 = 12 Lamps
 Load 3 = 6 Lamps
2. The current per 2500T3 lamp connected to a 480 volt source is 5.2 amperes.
3. Load Current 1 = 5.2 Amperes x 12 Lamps = 62.4 Amperes
 Load Current 2 = 5.2 Amperes x 12 Lamps = 62.4 Amperes
 Load Current 3 = 5.2 Amperes x 6 Lamps = 31.2 Amperes
4. Line Current 1 = Square Root of [(Load Current 1 of 62.4 Amperes x Load Current 1 of 62.4 Amperes) + (Load Current 1 of 62.4 Amperes x Load Current 3 of 31.2 Amperes) + (Load Current 3 of 31.2 Amperes x Load Current 3 of 31.2 Amperes)] = 82.3 Amperes

$$\text{Line Current 2} = \text{Square Root of } [(\text{Load Current 2 of 62.4 Amperes} \times \text{Load Current 2 of 62.4 Amperes}) + (\text{Load Current 2 of 62.4 Amperes} \times \text{Load Current 3 of 31.2 Amperes}) + (\text{Load Current 3 of 31.2 Amperes} \times \text{Load Current 3 of 31.2 Amperes})] = 82.3 \text{ Amperes}$$

$$\text{Line Current 3} = \text{Square Root of } [(\text{Load Current 1 of 62.4 Amperes} \times \text{Load Current 1 of 62.4 Amperes}) + (\text{Load Current 1 of 62.4 Amperes} \times \text{Load Current 2 of 62.4 Amperes}) + (\text{Load Current 2 of 62.4 Amperes} \times \text{Load Current 2 of 62.4 Amperes})] = 108 \text{ Amperes}$$

Figure A-5 Unbalanced Three-phase Load Wiring Diagram

