

Smart Heating Solutions

RH Series

Installation Manual

Overhead Short Wave Electric Infrared Heater

1, 2, and 3 Lamp Units





WARNING



All persons involved with the installation, operation, and maintenance of the heater system must read and understand all the information in this manual.

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

INSTALLER: Present this manual to the end user. Keep these instructions in a clean and dry place for future reference.

Model#:

Serial #: _____

(located on rating label)

LIOSW2-Rev. 24418 Print: XM-06/19 (XXX)

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▲ WARNING

California Proposition 65

This product can expose you to chemicals including lead and carbon monoxide, which are known to the State of California to cause birth defects or other reproductive harm.

For more information, go to www.P65Warnings.ca.gov.





Improper installation, adjustment, alteration, service, or maintenance can cause property damage, serious injury, or death. Read and understand the installation, operating, and maintenance instructions thoroughly before installing or servicing this equipment. Only trained, qualified personnel with proper electrical experience may install or service this equipment.

Safety Symbols

Safety is the most important consideration during installation, operation, and maintenance of the infrared heater. You will see the following symbols and signal words when there is a hazard related to safety or property damage.

A CAUTION

NOTICE

Warning indicates a potentially hazardous situation which, if not avoided, could result in death or injury.

Caution indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

Notice indicates a potentially hazardous situation which, if not avoided, could result in property damage.

Applications

Commercial / Industrial (Indoors & Outdoors)

Infrared heaters are designed and certified for use in industrial and commercial buildings such as warehouses, manufacturing plants, aircraft hangars, and vehicle maintenance shops. For maximum safety, the building must be evaluated for potential hazards before installing the heater system. A critical safety factor to consider before installation is the clearances to combustibles.

Outdoor Residential Only

This heater is **NOT** approved for use in an indoor residential application. This includes, but is not limited to, attached garages, living quarters, solariums, etcetera. Consult the local fire marshal and/or insurance provider if unsure of your application.

A WARNING



Not For Residential Use.

Installation of this infrared heater system in residential indoor spaces, RVs, mobile homes, etc. may result in property damage, fire, serious injury, or death.

Chart 1.1 • Model Number Designation Chart

Series	Material	Lamp	Voltage	Lamp Wattage	Lamp Type
	Type	Qty.	Code	Code	(Color)
RH-24 RH-33 RH-46	B = Black Powder Coat or S = Stainless Steel	1 2 3	A = 120 VAC B = 208 VAC C = 240 VAC D = 277 VAC G = 480 VAC H = 575 VAC	16 = 1,600 $25 = 2,500$ $32 = 3,200$ $36 = 3,650$ $38 = 3,800$	R= Ruby Lamp or W= Standard Lamp

Model Configuration Examples: SW2-24B1-C16R or SW2-33S2-G25W

Chart 1.2 • Available Models and Operational Specifications

Series	Lamp Qty.	Voltage; Phase	Amperes	Watts	BTU/h
		120; 1 ph	13.33		5,459
		208; 1 ph	7.69	-	
	1	240; 1 ph	6.67	1,600	
		277; 1 ph	5.77	-	
		480; 1 ph	3.33	-	
		208; 1 ph	15.38		
RH-24	2	240; 1 ph	13.33	2 200	10,919
	2	277; 1 ph	11.54	3,200	10,919
		480; 1 ph	6.67		
		208; 1 or 3 ph	23.08		
	3	240; 1 or 3ph	20.00	4,800	16,378
	3	277; 1 or 3 ph	17.31	4,800	
		480; 1 or 3ph	10.00		
	1	208; 1 ph	12.02		8,530
		240; 1 ph	10.42	2,500	
		277; 1 ph	9.02	2,500	
		480; 1 ph	5.21		
RH-33		208; 1 ph	24.04		17,065 25,590
кп-33		240; 1 ph	20.83	5,000	
		277; 1 ph	18.04	5,000	
		480; 1 ph	10.42		
	3	277; 1 or 3 ph	27.06	7,500	
	5	480; 1 or 3 ph	15.625	7,500	23,390
		277; 1 ph	11.55	3,200	10,919
	1	480; 1 ph	7.60	3,650	12,454
		575; 1 ph	6.60	3,800	12,978
RH-46		277; 1 ph	23.10	6,400	21,838
NU-40	2	480; 1 ph	15.21	7,300	24,909
		575; 1 ph	13.22	7,600	25,955
	3	480; 1 or 3 ph	22.81	10,950	37,636
	3	575; 1 or 3 ph	19.83	11,400	38,933

Clearances to Combustibles



Placement of explosive objects, flammable objects, liquids, and vapors close to the heater may result in explosion, fire, property damage, serious injury, or death. Do not store or use explosive objects, liquids, or vapors in the vicinity of the heater.

Failure to comply with the published clearances to combustibles could result in personal injury, death, and/or property damage.

The outside surfaces of the heater are hot during operation and after operation. If contact is made, permanent skin damage may occur. Do not move, handle, or service the unit during operation or while hot.

A CAUTION



Signs shall be posted specifying the maximum permissible stacking height in order to maintain clearances to combustibles.

Hazards Include:

For maximum safety the building must be evaluated for hazards before installing the heater system. Examples include, but are not limited to:

- Gas and electrical lines
- Combustible and explosive materials
- Chemical storage areas
- Areas of high chemical fume concentrations
- Provisions for accessibility to the heater
- Adequate clearances around air openings
- Vehicle parking areas

- Vehicles with lifts or cranes
- Storage areas with stacked materials
- Lights
- Sprinkler heads
- Overhead doors and tracks
- Dirty, contaminated environment

A critical safety factor to consider before installation is the clearances to combustibles. **Clearance to combustibles** is defined as *the minimum distance you must have between the indicated surface and the combustible item*. Considerations must also be made for moving objects around the infrared heater. The following is a partial list of items to maintain clearances from:

Combustible Items Include:

- Wood
- Paper
- Fabric
- Chemicals
- Wall or roof insulation
- Plastics

Moving Objects Include:

- Overhead doors
- Vehicles on lifts
- Cranes
- Hoists
- Car wash equipment

When installing the infrared heater system, the minimum clearances to combustibles must be maintained. These distances are shown in Chart 1.3 and on the heater. If you are unsure of the potential hazards, consult your local fire marshal, fire insurance carrier, or other qualified authorities on the installation of infrared heaters for approval of the proposed installation.

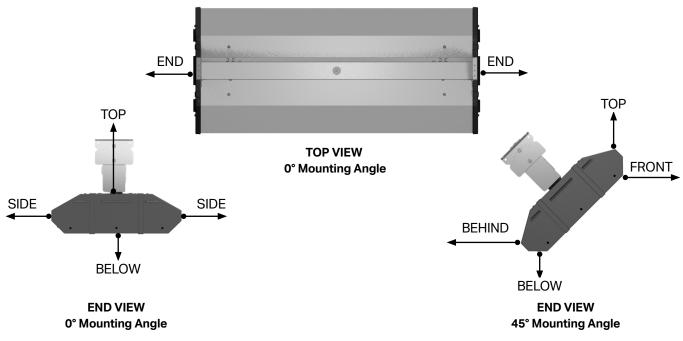
Chart 1.3 • Clearances to Combustibles in Inches (Millimeters) - see Figure 1.1

	Mounting	⊢ Sie	de			
Length	Angle	Front	Behind	End	Тор	Below
Single Eleme	nt					
24'' 33''	0°	16 (407)	16 (407)	12 (305)	6 (153)	56 (1423)
33 46″	45°	47 (1194)	4 (102)	12 (305)	10 (254)	40 (1016)
Double Eleme	ent					
24" 33"	0°	28 (712)	28 (712)	26 (661)	6 (153)	86 (2185)
46"	45°	86 (2185)	4 (102)	26 (661)	10 (254)	86 (2185)
Triple Elemen	Triple Element					
24" 33"	0°	31 (788)	31 (788)	34 (864)	9 (229)	105 (2667)
46"	45°	105 (2667)	4 (102)	34 (864)	10 (254)	105 (2667)

* Heaters mounted on an angle between 0° and 45° must maintain clearances posted for 0° or 45°, whichever is greater.

NOTE: Ensure that building materials with a low heat tolerance (i.e, awnings, fabrics, plastics, sprinklers, insulation, etc.) are protected against degradation. This may require the heater to be mounted at a distance in excess of the published clearances to combustibles. Contact the material manufacturer for specific details.

Figure 1.1 • Clearances to Combustibles

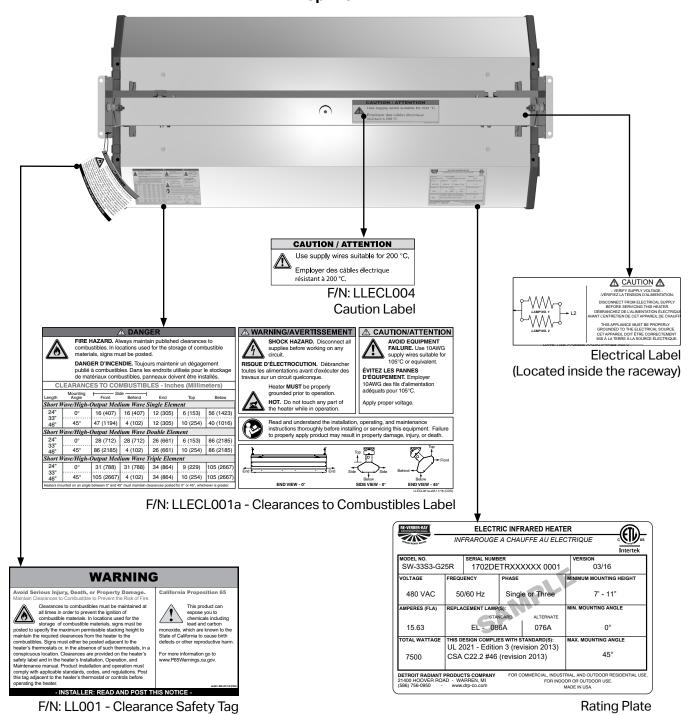


Safety Labels and Their Locations

(Affix adjacent to heater's controller)

It is important to provide warnings to alert individuals to potential hazards and safety actions. Signs should state the hazards for the particular application and be legible to the building occupants. Consult the factory or a factory representative for additional information on signage compliance.

Safety warning labels must be maintained on the infrared heater. Illustrations of the safety labels and their locations are pictured below. When no longer legible, they must be replaced. Contact either your local distributor or the product manufacturer for obtaining replacement signs or labels.



Top View

Standards, Certifications, and Government Regulations

Installation of this infrared heater must comply with all applicable local, state, and national specifications, regulations, and building codes. Contact the local building inspector and/or fire marshal for guidance.

The heater must be electrically grounded in accordance with the following codes:

United States: Refer to National Electrical Code [°], ANSI/NFPA 70 (latest edition). Wiring must conform to the latest edition of National Electrical Code [°], local ordinances, and any special diagrams from the manufacturer.

Canada: Refer to Canadian Electrical Code CSA C22.1 Part 1 (latest edition).

King Products units comply with or are certified by one or more of the

following organizations or standards:

- CSA 22.2 #46 M1988
- UL 2021

2.0 Installation



Read and understand the installation, operating, and maintenance instructions thoroughly before installing or servicing this equipment.

Design

To ensure a safe, properly designed heating system, a layout should be developed for the correct placement of the infrared heater(s).

Aside from safety factors such as clearances to combustibles (see Chart 1.3 on page 6), consideration should also be given to factors such as the environment (e.g., cold/drafty, average, protected), heat coverage (sq. ft.) needed, heater centers, the distance behind a person or work station(s), etcetera. Also, the effective infrared surface temperature of a person or object may be diminished with wind above 5 mph. Wind barrier(s) may be required. Most importantly, clearances to combustibles **must** always be maintained! Refer to hazards on page 5.

When positioning the heaters, keep in mind combustible materials, lights, sprinkler heads, overhead doors, storage area with stacked materials, gas and electrical lines, parked vehicles, cranes, etcetera. Refer to Page 6 for minimum clearances to verify that a safe installation exists.

This installation manual, along with national, state, provincial, and local codes, address these issues. It is critical that you read, understand, and follow all guidelines and instructions. Always inspect and evaluate the mounting conditions, application, and wiring.

When heated, materials high in hydrocarbons (solvents, paint thinner, mineral spirits, formaldehydes, etc.) can evaporate and/or degrade. This may result in odors or fumes being emitted into the environment. To correct this problem, clean the area and/or introduce additional ventilation. Heaters installed and serviced in accordance with the installation manual do not emit foul odors into the environment.

IMPORTANT: Fire sprinkler heads must be located at an appropriate distance from the heater to avoid an inadvertent discharge. This distance may exceed the published clearances to combustibles. Certain applications may require the use of high temperature sprinkler heads or relocation of the heaters.

A CAUTION

Fire sprinkler systems containing propylene glycol, antifreeze, or other potentially flammable substances shall not be used in conjunction with this heater without careful consideration for and avoidance of inadvertent discharge hazards. For further information consult applicable NFPA codes. Always observe applicable state and local codes.

Chart 2.1 • SW2 Series Basic Heating Application Chart						
		_		_		_

Series	Lamp Qty.	Recommended Mounting Height (Ft.)* [Dim. A]	Recommended Distance Between Heaters (Ft.) [Dim. B]	Approximate Square Foot Coverage	Approximate Watts per Square Foot
	1	10 to 12	5 to 10	400	4
RH-24	2	10 to 12	6 to 12	400	8
	3	12 to 14	7 to 14	600	8
	1	10 to 12	6 to 12	400	6
RH-33	2	12 to 14	7 to 14	600	8
	3	12 to 14	8 to 16	600	12
	1	12 to 14	7 to 14	600	6
RH-46	2	14 to 16	8 to 16	850	8 to 9
	3	14 to 16	9 to 18	850	12 to 13

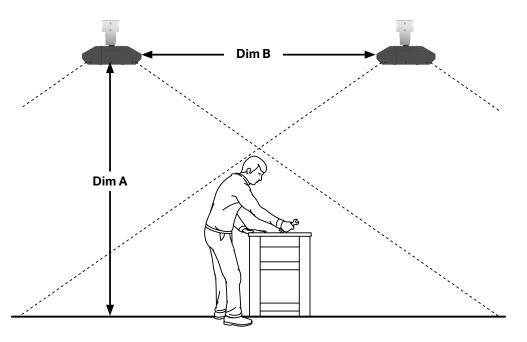
* Clearances to combustibles published in this manual and on safety labels must be maintained at all times. Factory recommended mounting heights are listed as a guideline. If infrared heaters are mounted too low or too high, they may result in discomfort or lack of heat.

Chart 2.2 • Estimating Required Load

Type of Building	Watts Req. per Square Foot at Floor Level
Insulated	10
Uninsulated	16
Outdoor Sheltered	25 to 30
Outdoor Unsheltered	30 to 45

When comfort heating people, two heaters should be used to heat both sides of the individual. Heater installation shall comply with all IOPM, NEC, ANSI/NFPA-70, CEC, and local restrictions.

Figure 2.1 • Heating Application



Heater Mounting



Improper suspension of the infrared heater may result in collapse and being crushed. Always suspend from a permanent part of the building structure that can support the total force and weight of the heater.

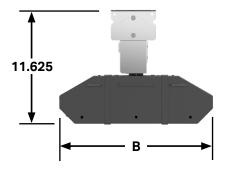


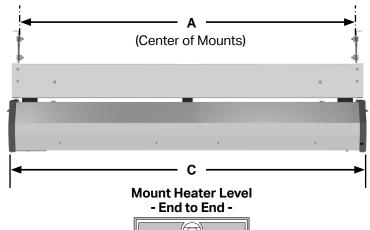
Failure to maintain minimum clearance to combustibles may result in fire and/or explosion, property damage, serious injury, or death. Always maintain minimum clearances and post signs or provided tags (F/N: LL001) adjacent to heater's controller. Signs should state the hazards for the particular application and be legible to the building occupants. Consult the factory or a factory representative for additional information on signage compliance.

The heater can be suspended with chains or rigid threaded rod. Local codes, or conditions that would cause the unit to move (e.g., wind drafts, blowers, crane rails, etc.), may require rigid threaded rod. Consult all applicable codes before installation.

The heater must be level from end to end and may be 0° to 45° on horizontal. Refer to Figures 2.2 and 2.3.







Model No.	Α	В	С
RH-24X1	23.50	9.625	24.50
RH-24X2	23.50	15.25	24.50
RH-24X3	23.50	21.00	24.50
RH-33X1	32.50	9.625	33.50
RH-33X2	32.50	15.25	33.50
RH-33X3	32.50	21.00	33.50
RH-46X1	45.50	9.625	46.50
RH-46X2	45.50	15.25	46.50
rh-46X3	45.50	21.00	46.50

Figure 2.3 • Mounting Centers



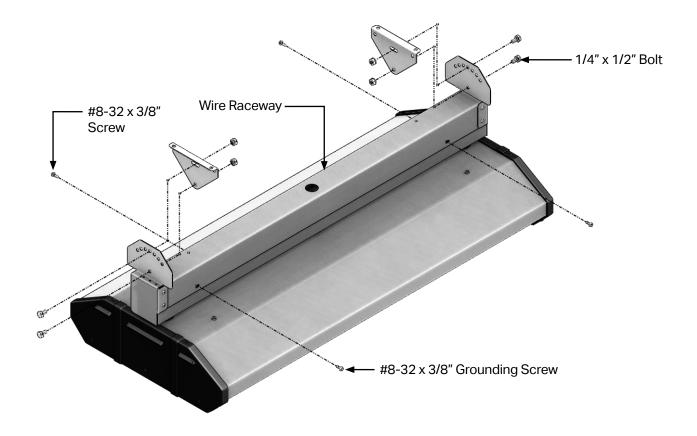
Top Channel Assembly

● Attach the mounting brackets to the top wire raceway. On each end, place (1) 1/4" x 1/2" bolt through the bottom hole of the mounting bracket and through the bottom hole of the top wire raceway. Place (1) 1/4" lock nut on each bolt. Do not tighten completely. Refer to Figure 2.4.

NOTE: The mounting brackets are **NOT** required for chain suspension.

- Adjust wire raceway to desired mounting angle.
- On each side, place (1) 1/4" x 1/2" bolt through slot in the mounting bracket and the hole in the top wire raceway. Place (1) 1/4" lock nut on each bolt and tighten.
- Tighten lock nuts from Step 1.
- 6 Hook heater body into mounted wire raceway. Unit will hang freely by the "T" hinge, leaving both hands free to wire unit. Refer to Figure 2.4.
- 6 Run supplied high temperature wires out to field supplied junction box. **DO NOT** make connections inside the wire raceway.
- Close wire raceway using the (4) #8-32 x 3/8" grounding screws provided in hardware pack.

Figure 2.4 • Top Channel Assembly



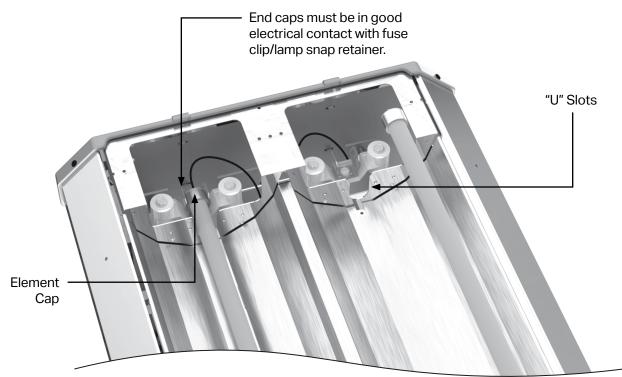
Lamp Installation

A CAUTION

Disconnect power prior to installing or replacing supplied quartz lamp(s). The elements can and should be installed prior to mounting the heater.

- Ensure appliance is OFF and is cool to the touch.
- **2** Remove both service access panels using a 1/4" nut driver.
- 3 Open lamp retains by firmly rotating the retainers on both sides of the unit (see Figure 2.5).
- Position heating elements in "U" slots and firmly press the connector end into the clip(s), one end at a time. Avoid handling the quartz glass as much as possible.
- 6 Rotate the lamp retainer into closed position.
- 6 Repeat steps 3 through 5 until all heating elements have been installed.
- After heating elements have been installed, the quartz glass should be wiped off with alcohol using a clean cloth.
- 8 Reinstall the service access panels.

Figure 2.5 • Lamp Installation

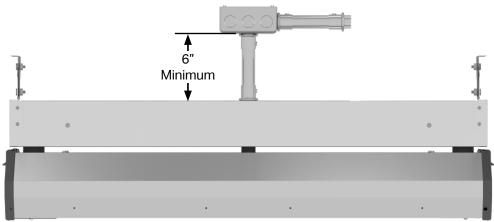


NOTE: RH series heaters are designed for use with quartz lamp infrared heating elements only. **They** are **NOT intended to be used with straight metal rod heating elements. Replace lamps with parts** from Detroit Radiant Products Company only!

Totally Exposed Outdoor Applications

For totally exposed outdoor applications (not ceiling protected) ensure connections are made as illustrated in Figure 2.6.

Figure 2.6 • Exposed Outdoor Application



NOTE: All conduit, conduit fittings, and junction boxes are field supplied. Must be NEMA Type 4X or equivalent. Heater must be suspended from mounting brackets.

Electrical



Electric Shock

Field wiring to the heater must be connected and grounded in accordance with national, state, provincial, and local codes, and to the guidelines in the this manual. In the United States, refer to the most current revisions to the ANSI/NFPA 70 Standard and in Canada, refer to the most current revisions the CSA C22.1 Part I Standard.

Disconnect power to heater before servicing.

Failure to follow these instructions can result in death or electrical shock.

This fixture is equipped with high temperature silicone lead wires to make connections to branch circuit. Remove the wire-ties prior to making electrical connections.

Wiring connections should always be through one of the knockouts in the top wire raceway. Wire connections must also be made outside of the top of the wire raceway. Consult the factory or a qualified electrician for details on staging.

Supply wires must be a copper conductor type with a minimum size of 10 AWG.

The heater must be connected to the earthing conductor (green wire) installed by the factory.

Reference top of page 14 for use in totally exposed outdoor applications.

Wiring Diagrams

Figure 2.7 • Wiring Diagram for Units with 1 Lamp

Figure 2.8 • Wiring Diagram for Units with 2 Lamps

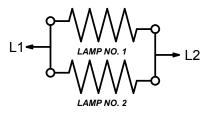
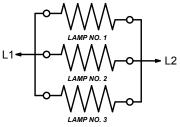


Figure 2.9 • Wiring Diagram for Units with 3 Lamps



Field Wiring

Figure 2.10 • Single Phase Service

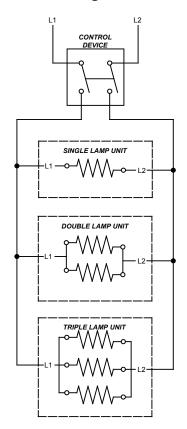
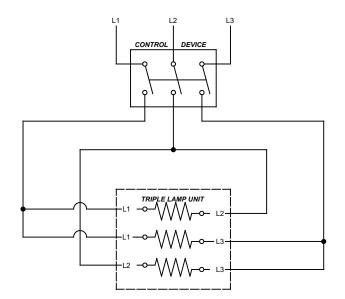


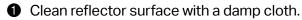
Figure 2.11 • Three Phase Service

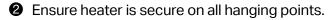


3.0 Maintenance

It is recommended that the following become a standard yearly procedure to obtain maximum operating efficiency and trouble free operation.

During long periods of non-usage, remove or cover heater with a polyethylene bag and disconnect from power supply. If further service to the heater is desired, contact your representative or the factory.





- Maintain clearances to combustibles at all times. Immediately remove objects in violations of the published clearances to combustibles.
- **4** Check electrical wires and connections for wear or any kind of damage.

Maintenance Log

Date	Maintenance Performed	Replacement Parts Required

No

Troubleshooting ends.

Corrective

Action

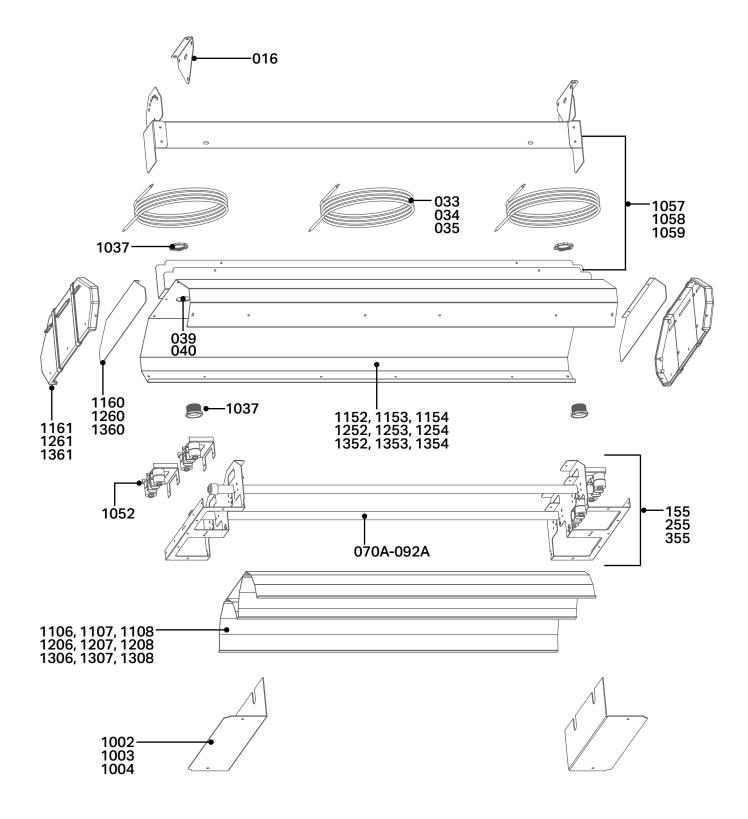
Troubleshooting Guide Key Start Process Question Question Turn Heater on from power source. Does the heating Are the heating lamps No Yes Replace heating lamp(s). physically damaged? lamps turn on? 0 Are the heating lamps Rewire lamps as indicated wired as indicated in No in this manual. the manual? Yes 29 Find the source of the electrical problem between panel and heater. Is there a sufficient No Is the supply voltage correct for the amount of heat? No Supply correct voltage. model type on the rating label? Heater size and/or quantity of **íes** Is the heater mounted within the heaters, may be incorrect for application. **íes** recommended height? es Is there too much heat?

Mount heater within the recommended mounting heights.

17

Heater Assembly Components

Figure 3.1 • Components



Parts List

Chart 3.1 • General Parts List

Part No.	Description	Part No.	Description
EL-016 ¹	Mounting Brackets	EL-1002	Single Lamp Service Access Panel
EL-033	12 Gauge Wire Length for 33" (specify color)	EL-1106	Single Lamp Reflector, 24" Model
EL-034	12 Gauge Wire Length for 24" (specify color)	EL-1107	Single Lamp Reflector, 33" Model
EL-035	12 Gauge Wire Length for 46" (specify color)	EL-1108	Single Lamp Reflector, 46" Model
EL-039	Rubber Spacer, LG, End (2 per heater) (not shown)	EL-1152 ¹	Single Lamp Shell Assembly, 24" Model
EL-040	Rubber Spacer, SM, Center (not shown)	EL-1153 ¹	Single Lamp Shell Assembly, 33" Model
EL-070A	Lamp; 1600 W, 120 V, 24", Clear	EL-1154 ¹	Single Lamp Shell Assembly, 46" Model
EL-071A	Lamp; 1600 W, 208 V, 24", Clear	EL-1160	Single Lamp Shield
EL-072A	Lamp; 2500 W, 208 V, 33", Clear	EL-1161	Single Lamp Nylon End Panel
EL-073A	Lamp; 1600 W, 240 V, 24", Clear		Double Lamp Model Parts List
EL-074A	Lamp; 2500 W, 240 V, 33", Clear	EL-255	Double Lamp Chassis Assembly
EL-075A	Lamp; 1600 W, 480 V, 24", Clear	EL-1003	Double Lamp Service Access Panel
EL-076A	Lamp; 2500 W, 480 V, 33", Clear	EL-1206	Double Lamp Reflector, 24" Model
EL-077A	Lamp; 3650 W, 480 V, 46", Clear	EL-1207	Double Lamp Reflector, 33" Model
EL-078A	Lamp; 3800 W, 575 V, 46", Clear	EL-1208	Double Lamp Reflector, 46" Model
EL-080A	Lamp; 1600 W, 120 V, 24", Ruby	EL-1252 ¹	Double Lamp Shell Assembly, 24" Model
EL-081A	Lamp; 1600 W, 208 V, 24", Ruby	EL-1253 ¹	Double Lamp Shell Assembly, 33" Model
EL-082A	Lamp; 2500 W, 208 V, 33″, Ruby	EL-1254 ¹	Double Lamp Shell Assembly, 46" Model
EL-083A	Lamp; 1600 W, 240 V, 24", Ruby	EL-1260	Double Lamp Shield
EL-084A	Lamp; 2500 W, 240 V, 33″, Ruby	EL-1261	Double Lamp Nylon End Panel
EL-085A	Lamp; 1600 W, 480 V, 24", Ruby		Triple Lamp Model Parts List
EL-086A	Lamp; 2500 W, 480 V, 33", Ruby	EL-355	Triple Lamp Chassis Assembly
EL-087A	Lamp; 3650 W, 480 V, 46", Ruby	EL-1004	Triple Lamp Service Access Panel
EL-088A	Lamp; 3800 W, 575 V, 46″, Ruby	EL-1306	Triple Lamp Reflector, 24" Model
EL-1037	Wire Bushing	EL-1307	Triple Lamp Reflector, 33" Model
EL-1052	Busbar Assembly	EL-1308	Triple Lamp Reflector, 46" Model
EL-1057 ¹	Wire Raceway Assembly, 24" Model	EL-1352 ¹	Triple Lamp Shell Assembly, 24" Model
EL-1058 ¹	Wire Raceway Assembly, 33" Model	EL-1353 ¹	Triple Lamp Shell Assembly, 33" Model
EL-1059 ¹	Wire Raceway Assembly, 46" Model	EL-1354 ¹	Triple Lamp Shell Assembly, 46" Model
	Single Lamp Model Parts List	EL-1360	Triple Lamp Shield
EL-155	Single Lamp Chassis Assembly	EL-1361	Triple Lamp Nylon End Panel
	,		

¹ partden mber as is for black finish or add -SS for stainless steel finish. Ex: EL-016 for black mounting brackets and EL-016-SS for stainless steel mounting brackets.

Visit our online parts reference library at <u>www.reverberray.com/shop</u> for further technical data related to parts.

King Electrical Manufacturing Company 9131 10th Avenue South Seattle, WA 98108