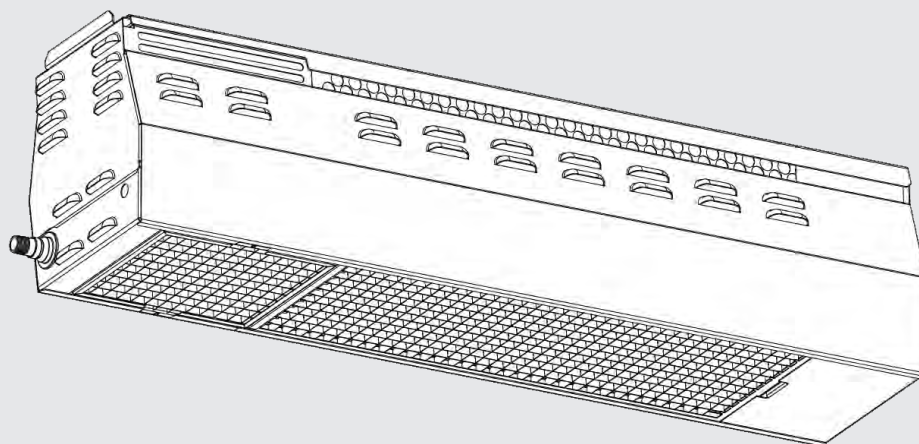


MODELS:

RSE1S35BP	RSE1S50BN
RSE1S35BN	RSE1S50SP
RSE1S35SP	RSE1S50SN
RSE1S35SN	RSE2S50BN
RSE1S50BP	RSE2S50SN



# Super High-Efficiency (SE) Series Infrared Gas Heater

## Installation and Operation Manual

**Rinnai**®

All models constructed with Marine Grade Stainless Steel Cabinet

\* Two-stage Model SE Series is natural gas only


Approval: Patio Heater for Outdoor Commercial / Residential Application

And/or: Gas-Fired High Intensity Infrared Heater for Commercial /Industrial  
Non-Residential Indoor Spaces

**NOTICE:**

*Rinnai reserves the right to make changes to equipment and specifications without obligation or notification.*

*This publication, or parts thereof, may not be reproduced in any form, without prior written consent from Rinnai. Unauthorized use or distribution of this publication is strictly prohibited.*

	<p><b>WARNING</b> Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death.</p> <p>Read the installation and operating and maintenance instructions thoroughly before installing or servicing this equipment.</p>
---	---

**SAFETY ALERT:**



This heater must be installed and serviced only by a trained gas service technician. Failure to comply could result in personal injury, death, fire and/or property damage.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other gas fired appliance.



**Indoor Applications: The heater cannot be used indoors in a residence.**

**IF YOU SMELL GAS:**

- Extinguish any open flame
- Do not attempt to light this or any other appliance
- Don't touch any electrical switch, or telephone
- Immediately leave the area and call your gas supplier from a neighbor's phone
- Follow any and all instruction from your gas supplier
- If your gas supplier is not available, call the fire department



**FIELD CONVERTIBILITY:**

This appliance is field convertible to LP gas (except RSE2S50BN NG only).

Only use kit available from Rinnai.

Follow kit instructions and all local and national codes.

<p><b>INSTALLER: PRESENT THIS MANUAL TO THE END USER.</b>  <b>Keep this manual in a secure place.</b>  Record for future reference:</p>
---

Model #: \_\_\_\_\_

Serial #: \_\_\_\_\_

*(located on heater rating label)*



# Patio Heater for Outdoor Commercial/Residential Application and Gas-Fired Luminous (High Intensity) Infrared Heater for Commercial / Industrial Non-Residential Indoor Spaces

This heater model is approved to two different heater standards:

- A **“Patio Heater”** for **Outdoor Use** in Residential and Commercial/Industrial Applications
- And as a **“Gas-Fired High Intensity Infrared Heater”** for **Indoor Spaces** of Commercial/Industrial Applications. The heater cannot be used **indoors** in a residence.

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**IMPORTANT** **Installer:** Present this manual to the end user. Acquaint the end user with Important Information: Cover & pages 4 to 7.

**END USER:** In particular you must be aware of ‘Clearances to Combustible’ requirements and the limitations of stacking or placing material near the heaters. Inform your safety personnel and staff of this information.



## WARNING



Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read and understand this installation and operation manual thoroughly prior to assembly, installation, operation or service to this appliance.

This heater must be installed and serviced only by a trained gas service technician.



Do not store or use gasoline or other flammable vapours and liquids in the vicinity of this or any other gas fired appliance.

Failure to comply to these warnings could result in personal injury, death, fire and/or property damage.



This appliance may have sharp edges and corners. Wear protective clothing such as gloves and protective eye wear when servicing this or any other appliance.

### California Proposition 65:



**WARNING:** This product can expose you to chemicals including carbon monoxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information, go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)



## WARNING

**DO NOT INSTALL THIS APPLIANCE IN A RECESS, ALCOVE, OR ENCLOSURE.**

While minimum clearances to combustibles are stipulated to ensure safe installation, adequate free space must be provided to allow the products of combustion to escape from the heater to atmosphere when installed outdoors, or to mechanical exhaust withdrawal when installed indoors. Also refer to “Outdoor” and “Indoor” definitions and requirements on page 9. Do not allow the products of combustion to accumulate in any space or enclosure.



## WARNING

Due to the effects of radiant heat upon certain materials it is not recommended to store or place items that could be damaged or distorted, directly under this heater....i.e. combustible patio furniture etc.

- Clothing or other flammable materials should not be hung from, or placed near to the heater
- Children and Adults should be alerted to the hazards of high surface temperatures and should be careful to avoid burns or clothing ignition
- Young children should be carefully supervised when in the area of a heater



## WARNING

This heater is not for installation in a Class 1 or Class 2 explosive environment, nor for any residential application. If installation of this equipment is in question, consult with local authorities having jurisdiction (Fire Marshal, labor department, insurance underwriter, or others).

Revisions to codes and/or standards, may require revision to equipment and installation procedures. In case of discrepancy, the latest codes, standards, and installation manual will take priority over prior releases.

**IMPORTANT: DO NOT INSTALL THIS HEATER INDOORS IN A STRUCTURE WITH NO INSULATION IN THE ROOF—CONDENSATION WILL OCCUR.**



## WARNING

### Heater Expansion



It is a normal condition that during heat-up and cool-down a radiant heater will expand and contract. Allowances for heater expansion must be made in the gas connection and heater suspension. Improper installation, alteration, or adjustment can result in property damage, injury or death.



## WARNING

### Gas Connection



Improper installation, connection, or adjustment can result in property damage, toxic gases, asphyxiation, injury or death. Use an approved stainless steel flexible gas connector (field supplied) to connect to the gas supply to the heater in accordance with all local, state, provincial, and national codes (ANSI Z223.1/NFPA 54 in USA) and as indicated in this manual.



## WARNING

### Venting



Inadequate venting of a heater may result in asphyxiation, carbon monoxide poisoning, injury or death. When used indoors, this heater is indirectly vented from the space. Venting must be in accordance with all local, state, provincial, and national codes (ANSI Z223.1/NFPA 54 in USA) and as indicated in this manual. **Refer to Section 14**



## WARNING

### Start-up 'Smoke' & Discoloration Condition

During start-up, the heating of material coatings used in the production process of the heater may create a small amount of smoke during the initial period of operation. This condition is normal and temporary .

Ensure that there is sufficient ventilation to adequately clear any 'smoke' from the space.

*Notify site management and safety personnel to ensure that alarm systems are not unduly activated.*

## WARNING

### Heater Discoloration / Staining

**Stainless Steel & Painted Finishes:** Surface discoloration or staining will occur on any heater body due to heat. Surface finish discoloration due to heat is a normal occurrence. Surface discoloration does not affect the operation or performance of the heater nor Rinnai's component warranties. (Refer to Section 12: Heater Finish & Appearance, page 22)

Some discoloration can result from the deposit of ambient air-borne particulate or gases from within the space that have passed through combustion to create 'smoke'. The combustion of fuel gas in a clean environment will not cause smoke discoloration deposits.

## INSTALLATION AS AN OUTDOOR PATIO HEATER

### What is “Outdoor”?:

An appliance approved for “outdoor use” may be installed with shelter no more inclusive than:

- With walls on all sides, but with no overhead cover, (overhead permanently open) *or*
- Within a partial enclosure which includes an overhead cover and no more than two side walls. These side walls may be parallel, as in a breezeway, or at right angle to each other. The open sides must be permanently open *or*
- Within a partial enclosure which includes an overhead cover and three side walls, as long as 30 percent or more of the horizontal periphery of the enclosure is permanently open.

**If these “outdoor” conditions are not met, the appliance is approved for “indoor use” and ventilation requirements of local codes apply.**

- See pages 9 - 10 for Indoor installation, and Ventilation Requirements Section 14



### WARNING

**DO NOT INSTALL THIS APPLIANCE IN A RECESS, ALCOVE, OR ENCLOSURE.**

Provide adequate free space to allow the products of combustion to escape from the heater to atmosphere when installed outdoors, or to mechanical exhaust withdrawal when installed indoors. Do not allow the products of combustion to accumulate in any space or enclosure.



### WARNING

Certain materials or items, when stored under the heater, will be subjected to radiant heat and could be seriously damaged.



Location of flammable or explosive objects, liquids or vapors close to the heater may cause fire or explosion and result in property damage, injury or death. Do not use, store or locate flammable or explosive materials in proximity to the heater.



**The clearance to combustible material represents the minimum distance that must be maintained between the outer heater surface and a nearby surface. The stated clearance to combustibles represents a surface temperature of 117F° (65C°) above ambient temperature when installed outdoors.**



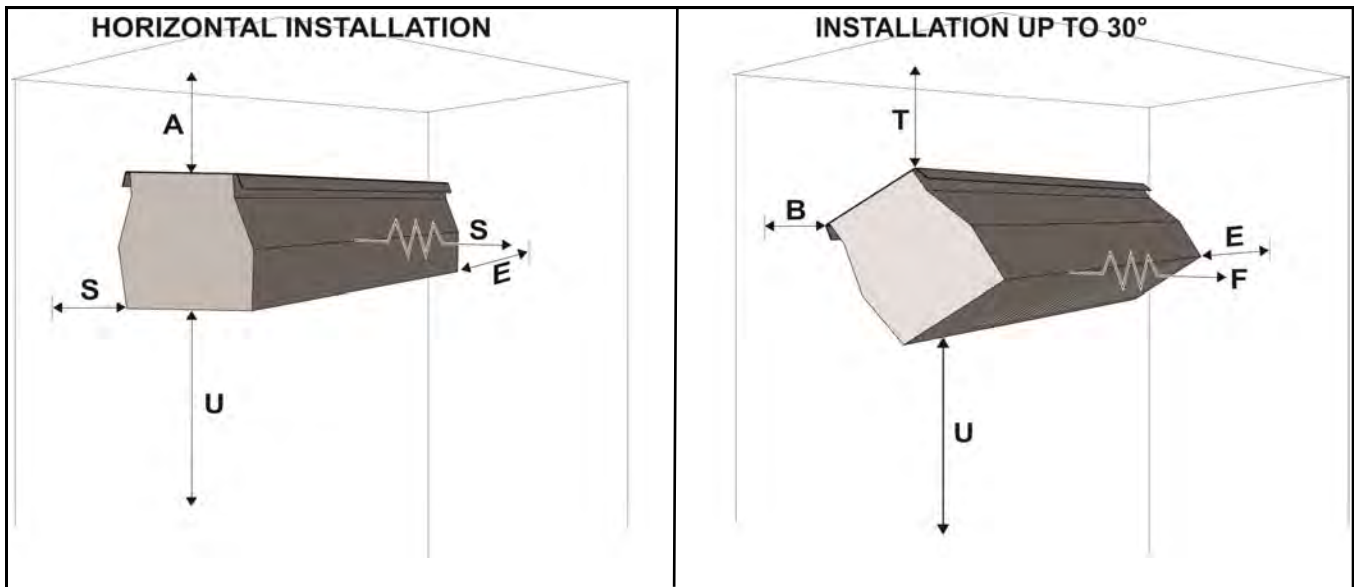
**It is the installer’s responsibility to ensure that building materials with a low heat tolerance which may degrade at lower temperatures are protected to prevent degradation. Examples of low heat tolerance materials include vinyl siding, fabrics, some plastics, filmy materials, etc.**

It is beyond the scope of these instructions to consider all conditions that may be encountered. Consult local authorities such as the Fire Marshall, insurance carrier, or safety authorities if you are uncertain as to the safety or applicability of the proposed installation.

**Refer to Table 1 & Figure 1 Next Page for the minimum mounting and clearances to combustibles for Outdoor Patio application.**

**Figure 1: OUTDOOR - MOUNTING CLEARANCES** (Indoor Clearances Page 10)

**NOTE: MAXIMUM HEATER ANGLE IS 30° TO AVOID DAMAGE**



Note: Ensure mounting height in any location is sufficient to prevent patrons from coming in contact with heater, and clearance to combustible material is maintained.

**Table 1: OUTDOOR - MINIMUM MOUNTING & CLEARANCES TO COMBUSTIBLES**

QTY	Application	MODEL NO	Ends	Under	Horizontal		30° Angle		
			E	U	A	S	T	B	F
	<b>OUTDOOR</b>	RSE1S35XX (NG/LP)	14"	45"	13"	14"	17"	9"	60"
	<b>OUTDOOR</b>	RSE1S50XX (NG/LP)	14"	60"	16"	19"	20"	8"	62"
	<b>OUTDOOR</b>	RSE2S50BN (NG)	14"	60"	16"	19"	20"	8"	62"

**Do not mount less than 8 ft [2438 mm] above floor.**

**Do not store or place anything directly under heater**

See Table 2 Next Page for "Suggested Mounting Height for Comfort"

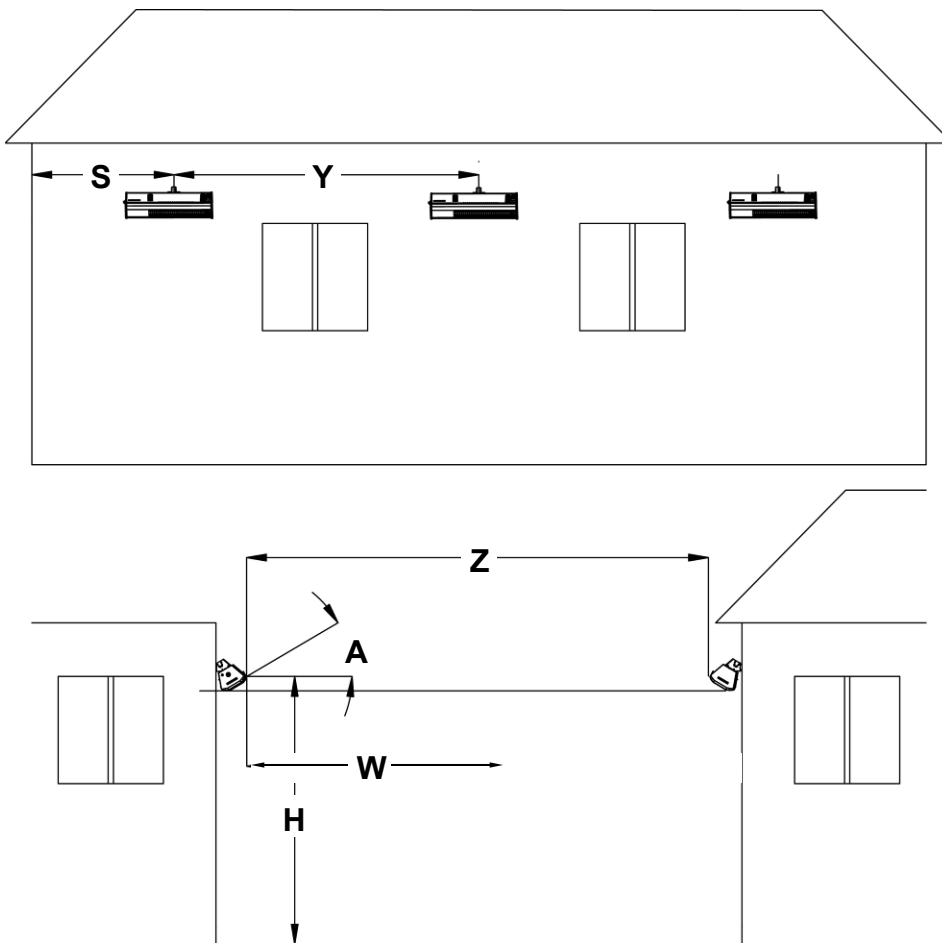
The clearance to combustible material represents the minimum distance that must be maintained between the outer heater surface and a nearby surface. In an OUTDOOR application the stated clearance to combustibles represents a surface temperature of 117F° (65C°) above ambient temperature.

It is the installer's responsibility to ensure that building materials with a low heat tolerance which may degrade at lower temperatures are protected to prevent degradation. Examples of low heat tolerance materials include awnings, vinyl siding, fabrics, some plastics, filmy materials, etc.

**Table 2: SUGGESTED MOUNTING DISTANCES FOR COMFORT**

<u>MOUNTING PARAMETERS</u> ***	MODEL RSE1S35XX 35,000 Btuh		MODELS RSE1S50XX / RSE2S50XX 50,000 Btuh	
	Horizontal	30°	Horizontal	30°
<b>A - Mounting angle</b>	Horizontal	30°	Horizontal	30°
<b>H - Suggested height above deck</b>	8' to 10'	8' to 10'	9' to 12'	8'-6" to 12'
<b>S - Side distance to patio edge</b>	4' 0"	4' 0"	5' 0"	5' 0"
<b>Y - Side distance between heaters</b>	8' 0"	8' 0"	10' 0"	10' 0"
<b>W - Distance effective coverage</b>	7' 0"	8' 0"	8' 0"	10' 0"
<b>Z - Front distance between heaters</b>	14' 0"	16' 0"	15' 0"	18' 0"

**Figure 2: MOUNTING PARAMETER DISTANCES**



\*\*\* Note: Mounting angles and distances are suggested to ensure comfort, and are subject to site and design conditions.

If in doubt, please contact your Rinnai distributor.

Ensure mounting height in any location is sufficient to prevent patio patrons from coming in contact with the heater



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## WHEN INSTALLED INDOORS FOR COMFORT OR SPACE HEAT

- Also refer to “Outdoor” definition and requirements on page 16
- And refer to Indoor Ventilation Requirements Section 14



### WARNING

#### Clearance to Combustibles

Location of flammable or explosive objects, liquids or vapors close to the heater may cause fire or explosion and result in property damage, injury or death. Do not use, store or locate flammable or explosive objects, liquids or vapors in proximity of the heater.



**The clearance to combustible material represents the minimum distance that must be maintained between the outer heater surface and a nearby surface. The stated clearance to combustibles represents a surface temperature of 90F° (50C°) above room temperature.**



**It is the installer’s responsibility to ensure that building materials with a low heat tolerance which may degrade at lower temperatures are protected to prevent degradation. Examples of low heat tolerance materials include vinyl siding, fabrics, some plastics, filmy materials, etc.**

In locations used for the storage of combustible materials, signs must be posted to specify the maximum permissible stacking height to maintain the required clearances from the heater to the combustibles. Such signs must either be posted adjacent to the heater thermostats or in the absence of such thermostats in a conspicuous location.

In addition to stored or stationary material, consideration must also be given to moveable objects such as cranes, vehicles, and overhead doors, and structural objects such as electrical and gas lines, electrical fixtures, and sprinkler heads.

Heaters must be located an appropriate distance from sprinkler heads. This distance may be greater than the certified clearance to combustibles. Check the temperature rating of the sprinkler heads and locate heaters at a safe distance - in some instances the sprinkler heads may need to be replaced by higher temperature heads.

It is beyond the scope of these instructions to consider all conditions that may be encountered. Consult local authorities such as the Fire Marshall, insurance carrier, or safety authorities if you are uncertain as to the safety or applicability of the proposed installation.

**Refer to Figure 3 and Table 3 NEXT PAGE for the mounting requirements and certified clearances to combustibles for indoor installation.** Also refer to ventilation requirements for indoor installations on page 19.



### WARNING

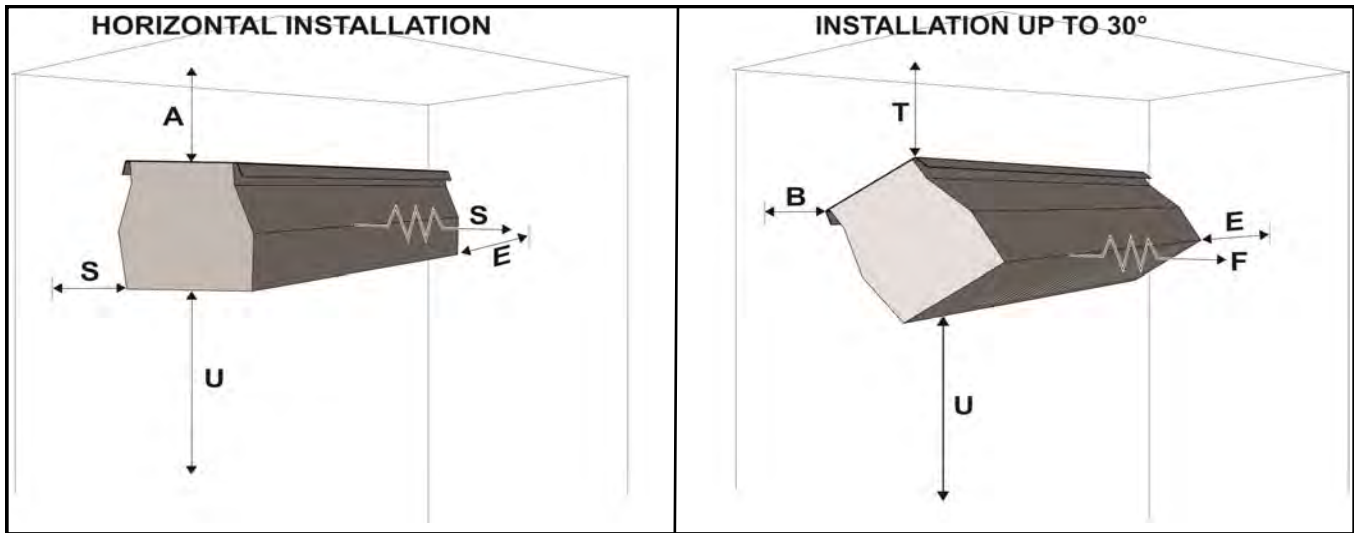
#### DO NOT INSTALL THIS APPLIANCE IN A RECESS, ALCOVE, OR ENCLOSURE.

Adequate free space must be provided to allow the products of combustion to escape from the heater to atmosphere when installed outdoors, or to mechanical exhaust withdrawal when installed indoors. Also refer to “Outdoor” and “Indoor” definitions and requirements on page 11.

Do not allow the products of combustion to accumulate in any space or enclosure.

Figure 3: **INDOOR - MOUNTING CLEARANCES** (Outdoor Clearances Page 7)

**NOTE: MAXIMUM HEATER ANGLE IS 30° TO AVOID DAMAGE**



**Table 3: INDOOR - MINIMUM MOUNTING & CLEARANCES TO COMBUSTIBLES**

MODEL NO	Ends	Under	HORIZONTAL		UP TO MAXIMUM 30° ANGLE		
	E	U	A	S	T	B	F
RSE1S35XX (NG/LP)	14"	45"	18"	18"	20"	11"	60"
RSE1S50XX (NG/LP) RSE2S50XX (NG)	14"	60"	21"	23"	25"	10"	62"

The clearance to combustible material represents the minimum distance that must be maintained between the outer heater surface and a nearby surface. The stated clearance to combustibles represents a surface temperature of 90F° (50C°) above indoor room temperature.

It is the installer's responsibility to ensure that building materials with a low heat tolerance which may degrade at lower temperatures are protected to prevent degradation. Examples of low heat tolerance materials include awnings, vinyl siding, fabrics, some plastics, filmy materials, etc.

**Note: Do not store or place anything directly under heater**

Ensure mounting height in any location is sufficient to prevent patrons from coming in contact with heater, and clearance to combustibles is maintained.

**Table 4: INDOOR - SUGGESTED MOUNTING HEIGHT FOR COMFORT**

MOUNTING PARAMETERS ***	MODEL RSE1S35XX 35,000 Btuh		MODELS RSE1S50XX / RSE2S50XX 50,000 Btuh	
	Mounting angle	Horizontal	30°	Horizontal
Suggested height above deck/floor	9' 6"	9' 0"	10' 6"	10' 0"

## HEATER DIMENSIONS & CONFIGURATIONS

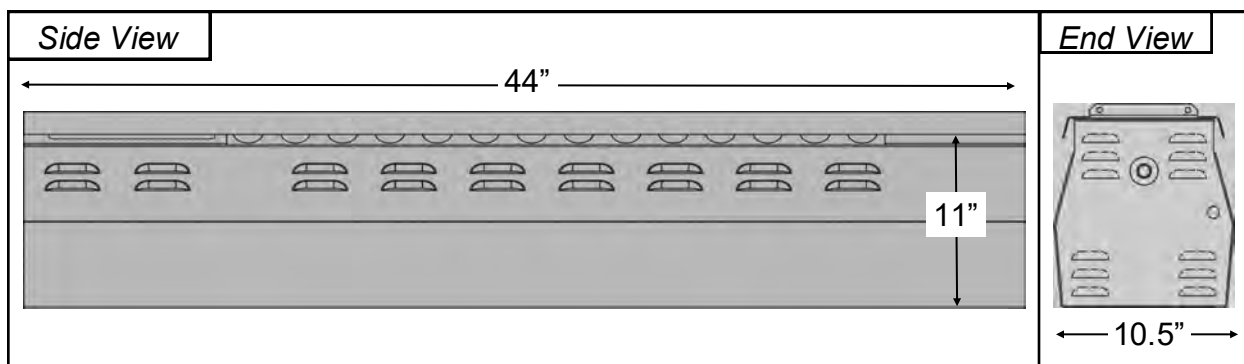
**Table 3: CAPACITIES & CONFIGURATIONS**

MODEL*	Voltage VAC	Current amps	Btu/hr input	Total Weight lbs. [kg]	Length Inches [mm]
RSE1S35XX	24	40 VA**	35,000	53 [24]	44" [ 1118]
RSE1S50XX	24	40 VA**	50,000	57 [26]	44" [ 1118]
RSE2S50XX	24	40 VA**	50,000 / 36,500	57 [26]	44" [ 1118]

- Add fuel gas designation to model number: -N for natural gas; -L for
- The enclosure cabinet of all models is constructed of marine grade stainless steel with the finish appearance option of stainless steel, or high temperature flat black coating.
- Model RSE2S50XX is a two-stage heater.

\*\* Transformer Capacity: For multiple heater installation, the first heater requires 40VA and each consecutive heater requires 20VA. The sum total will be the required Transformer capacity. If total VA exceeds one transformer capacity select the next higher VA rated transformer.

**Figure 3: DIMENSIONS**



### **MOUNTING KIT OPTIONS** see illustrations next page

ITEM NO	PART NUMBER	DESCRIPTION
1	903000009	CEILING MOUNT BRACKET
2	903000022	WALL MOUNT BRACKET
3	903000028	ARM MOUNT BRACKET
4	903000026	POST BRACKET

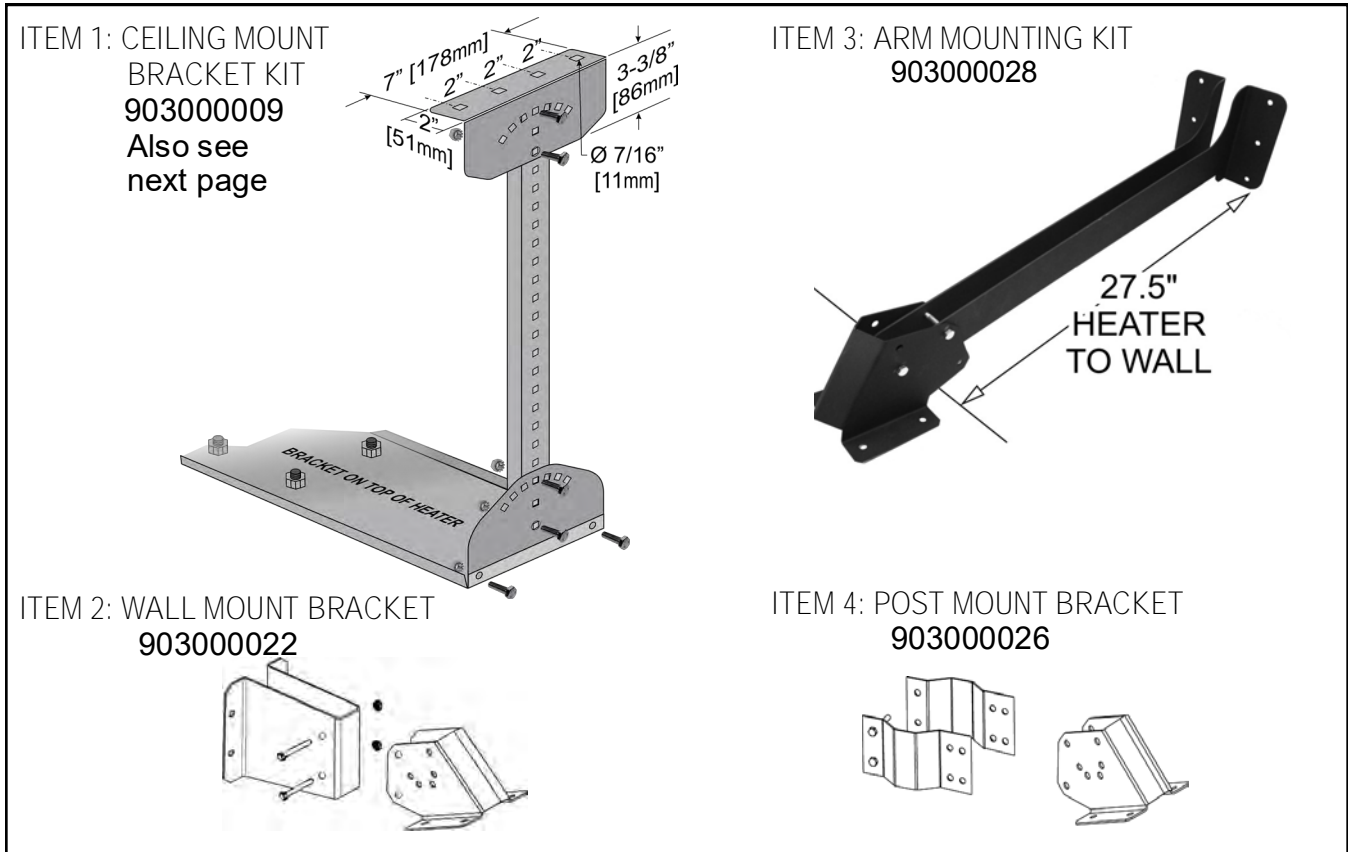
### **CAUTION: This heater must be rigidly mounted to prevent movement from wind force.**

Mounting Brackets: Ensure that anchor to the structure is of sufficient strength, integrity and workmanship, to adequately support the weight of the heater and any other potential loads such as snow build up, and wind force.

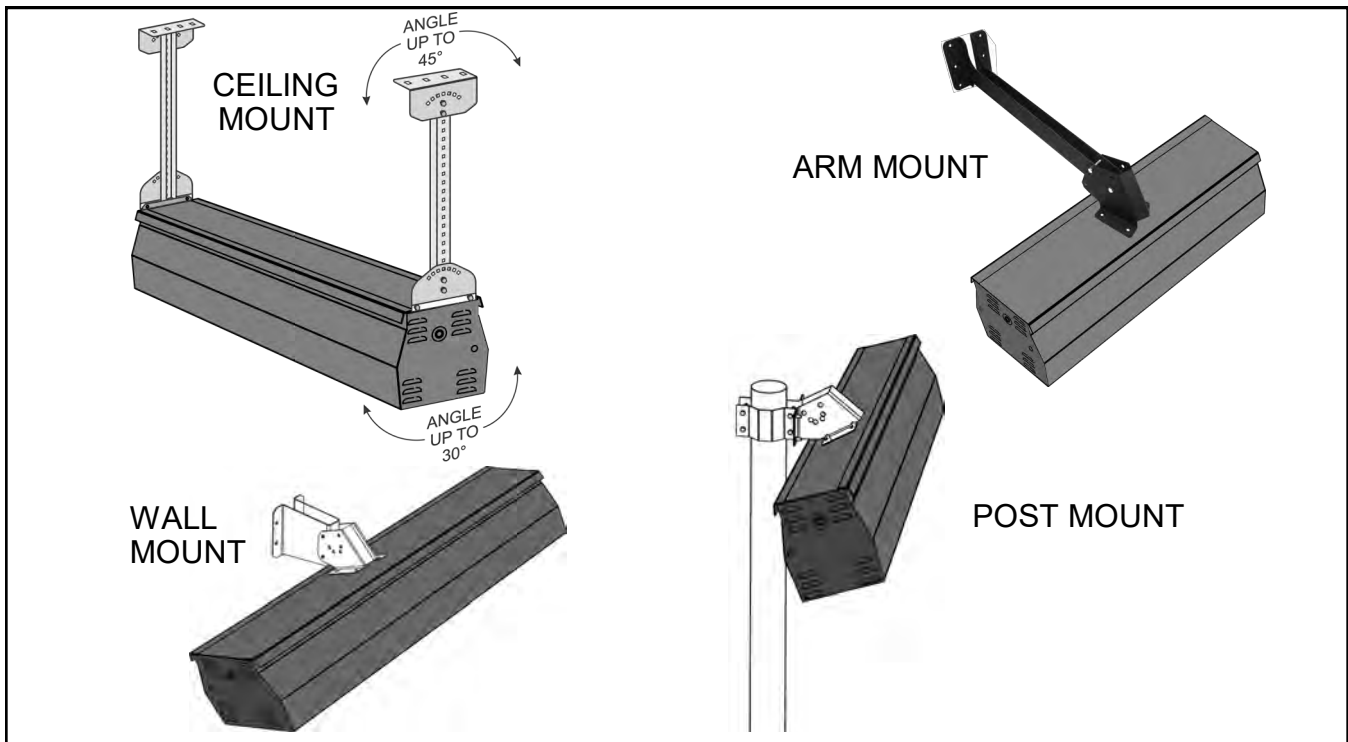
**Mount heater up to maximum 30° angle.**

**Figure 4: MOUNTING KIT OPTIONS**

**NOTE: MOUNT HEATER AT MAXIMUM 30° ANGLE TO AVOID DAMAGE**



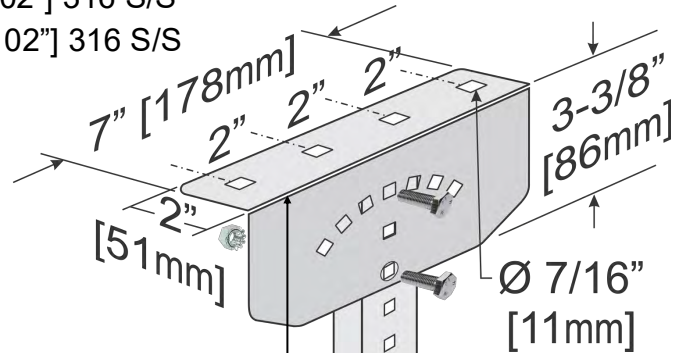
**Figure 5: MOUNTING OPTIONS**



## 903000009: Stainless Steel Ceiling Mount Kit for Patio Heaters

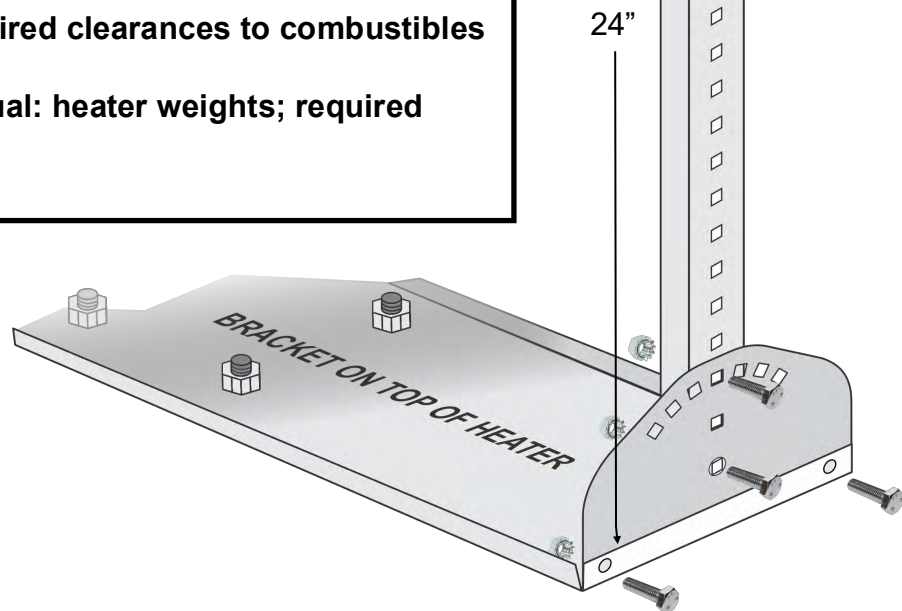
### Component Quantities and Material Specifications each Kit

- 2 x Ceiling Bracket - 12 ga. [0.102"] 316 S/S
- 2 x 24" [610 MM] Channel Leg - 12 ga. [0.102"] 316 S/S
- 2 x Heater Attachment Bracket - 12 ga. [0.102"] 316 S/S
- 12 x 1/4" x 3/4" Stainless Steel Bolts
- 12 x 1/4" Stainless Steel KEP Nuts [lock washer attached]



#### Note: It is the installer's responsibility to ensure:

- Adequate mounting strength and integrity to the structure using field supplied 3/8" lag screws or bolts
- Maintain required clearances to combustibles from heater
- Refer to manual: heater weights; required clearances



### Assembly:

The 24" [610 mm] Channel Leg can be cut to a shorter length

- Ensure required clearances to combustibles from heater are maintained

Fasten the Ceiling Bracket and Heater Attachment Bracket to the Channel Leg using two supplied 1/4" bolts at each connection as illustrated.

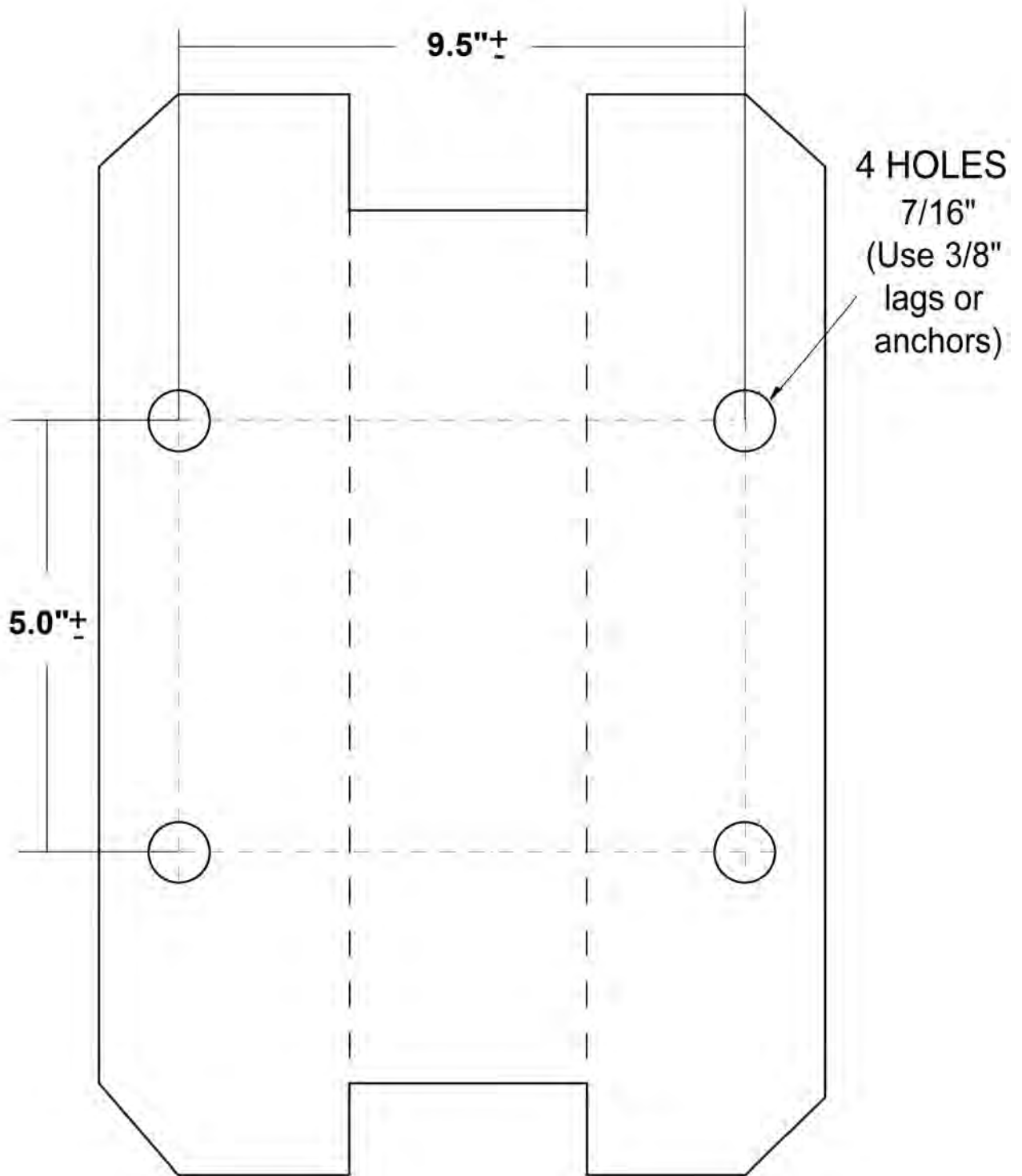
The arc of holes in the Ceiling Bracket allows angling of the Channel Leg from the bracket up to 45°, and/or mounting the bracket to a sloped ceiling.

The arc of holes in the Heater Attachment Bracket allows angle mount of the heater.

- **NOTE: Maximum allowed heater angle is 30°**

Fasten an assembled mounting bracket to each end of the Heater Support Bracket [supplied on heater] using two 1/4" bolts supplied.

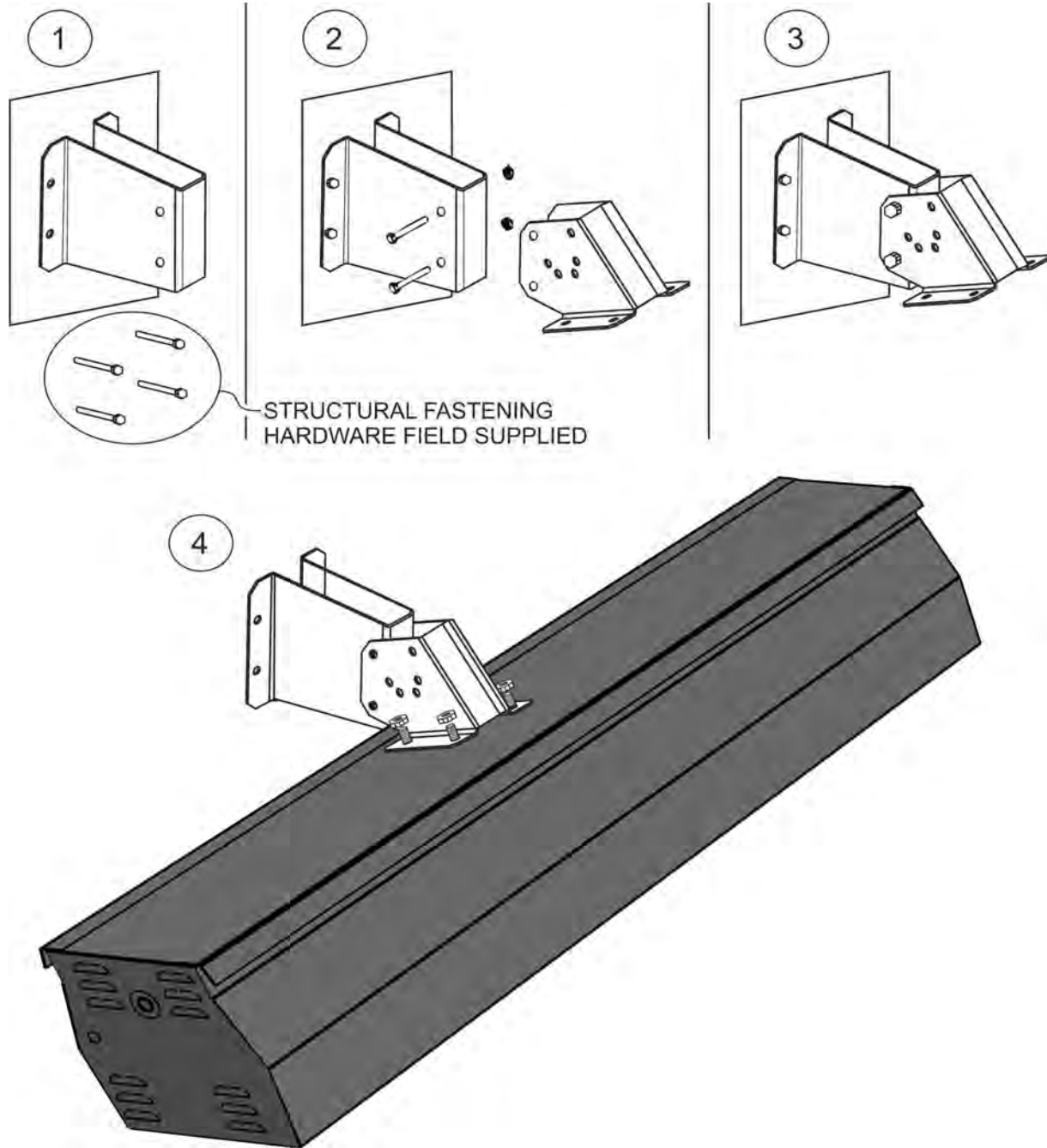
Figure 7: WALL MOUNT BRACKET 903000022



Not to Scale  
Manufacturer recommends using  
the actual plate as a template

**Figure 8: HEATER INSTALLATION: WALL MOUNT BRACKET**

**NOTE: MOUNT AT MAXIMUM 30° ANGLE TO AVOID DAMAGING HEATER**



1. Install the Wall Mount Bracket to the structure using field supplied hardware. Ensure strength and integrity of mechanical fastening to structure for the weight of the heater and any potential snow load.
2. Install the heater bracket on the heater using four nuts.
3. Install the heater bracket to the wall mount bracket, and remove the lifting chains from the top of the heater.

**1. APPLICATION:** This gas-fired infrared heater is suitable for installation for heating of outdoor commercial / industrial / residential areas, and indoor commercial / industrial / non-residential spaces.

It is beyond the scope of these instructions to consider all conditions that may be encountered. Installation in the USA must conform to all local and national code requirements including the current National Fuel Gas code ANSI Z223.1, and the National Electrical Code ANSI/NFPA No 70 (latest edition). In case of discrepancy due to revisions to standards and codes, the latest standards, codes, and installation manual are in effect and take priority.

**DO NOT INSTALL THIS APPLIANCE IN A RECESS, ALCOVE, OR ENCLOSURE.**

Adequate free space must be provided to allow the products of combustion to escape from the heater to atmosphere when installed outdoors, or to mechanical exhaust withdrawal when installed indoors. Also refer to “Outdoor” and “Indoor” definitions and requirements below.

Do not allow the products of combustion to accumulate in any space or enclosure.

**OUTDOOR / PATIO Installation:**

**This heater is certified for use on outdoor patio’s in accordance with ANSI Z83.26 / CSA 2.37 . Rinnai warrants that the heater will operate as designed in mild wind conditions up to 10 MPH. Note this unit is not designed to operate in adverse weather conditions including higher wind speeds exceeding the certification requirement of 10 MPH.**

**The heater must be rigidly mounted to the structure to prevent wind force movement.**

**What is “Outdoor”?:**

An appliance approved for “outdoor use” may be installed with shelter no more inclusive than:

- With walls on all sides, but with no overhead cover, (overhead permanently open) *or*
- Within a partial enclosure which includes an overhead cover and no more than two side walls. These side walls may be parallel, as in a breezeway, or at right angle to each other. The open sides must be permanently open *or*
- Within a partial enclosure which includes an overhead cover and three side walls, as long as 30 percent or more of the horizontal periphery of the enclosure is permanently open.

**If these “outdoor” conditions are not met, the appliance is approved for “indoor use” and ventilation requirements of local codes apply. See “Indoor Application” below.**

**INDOOR Installation:**

**This heater is certified for space or spot heating of commercial / industrial non-residential indoor spaces in accordance with ANSI Z83.19b / CSA 2.35b.**



**WARNING**

Inadequate venting of a heater may result in asphyxiation, carbon monoxide poisoning, injury or death. Heating system venting must be in accordance with all local, state, provincial, and national codes (ANSI Z223.1/NFPA 54 in USA). Refer also to Section 14.

**INSTALLATION IN A STRUCTURE THAT HAS NO INSULATION IN THE ROOF CAN RESULT IN THE FORMATION OF CONDENSATION ON COLD SURFACES.**



## **2. INSTALLATION IN COMMERCIAL AIRCRAFT HANGARS**

Luminous (high intensity) radiant tube heaters are suitable for use in aircraft hangars when installed in accordance with the latest edition of the Standard for *Aircraft Hangars*, ANSI/NFPA No 409 in the USA.

- A. A minimum clearance of 8 ft (2.4 m) must be maintained from the bottom of the heater to the floor in other sections of the aircraft hangar, such as offices and shops, which communicate with areas for servicing or storage. Refer to Table 1 for clearances to combustibles.
- B. Heaters must be located so as to be protected from damage by aircraft and other objects, such as cranes and movable scaffolding.
- C. Heaters must be located so as to be accessible for servicing and adjustment.

## **3. INSTALLATION IN COMMERCIAL GARAGES AND PARKING STRUCTURES**

Luminous (high intensity) radiant heaters are suitable for use in commercial garages when installed in accordance with the latest edition of the Standard for *Parking Structures*, ANSI/NFPA 88A, or the Standard for *Repair Garages*, ANSI/NFPA No. 88B.



### **WARNING**

An overhead heater shall be located to maintain the minimum distance to combustibles, as shown on the heater rating plate, from the heater to any vehicles parked below the heater. Overhead heaters shall be installed at least 8 ft (2.4 m) above the floor.

## **4. INSTALLATIONS OTHER THAN SPACE HEATING**

Use for process or other applications that are not space heating will void the C.S.A. certification and product warranty. Process application requires field inspection and/or certification by local authorities having jurisdiction. Process application design should be provided by local experienced process design experts.

## **5. PRE INSTALLATION SURVEY**

It is recommended that a full heating design including heat loss calculation be conducted on the structure or area to be heated. Heater sizing and placement must consider available mounting height, sources of greatest heat loss, and obstructions on the site. The certified clearances to combustibles with respect to stored material, moveable objects (cranes, vehicles, lifts, overhead doors, etc), structural components, and sprinkler system heads. Consideration must also be given to ventilation fan placement (outdoor heaters do not require ventilation). Carefully survey the area to be heated, and for best results place heaters in the coldest area(s) and at sufficient spacing to provide uniform radiant heat coverage.

Installation must conform with all local, state, provincial and national code requirements including the current latest edition ANSI Z223.1 (NFPA 54) in the U.S.A. The latest edition Electrical Code ANSI/NFPA N0 70 in the U.S.A. must also be observed.

The heating system must have gas piping of the correct diameter, length, and arrangement to provide for and satisfy the total system input. A layout drawing is necessary to calculate properly sized gas supply piping.

## **6. INSTALLATION REQUIREMENTS**

**Handle heater with care during installation and service to avoid scratching or damaging the surface finish.**

**NOTE: MOUNT HEATER AT MAXIMUM 30° ANGLE TO AVOID DAMAGE  
THE HEATER MUST BE RIGIDLY MOUNTED TO THE STRUCTURE TO  
PREVENT WIND FORCE MOVEMENT.**

### **6.1 MOUNTING CLEARANCES**

SE Series Heaters must be mounted with minimum clearances to combustible materials. Refer to the introductory section “Clearance to Combustibles” page 6 and to Table 1 and Figure 1 page 7.

**THIS HEATER HAS HOT SURFACES:** Minimum mounting height is to be no less than 96” [244 cm] above the floor / deck to the bottom of the heater. Do not locate heater where patrons can come into contact with heater. Do not store or place items directly underneath heater. Maintain clearance to combustibles.

The heater must be located with respect to building construction and equipment so as to provide sufficient clearance and accessibility for servicing of burner and ignition control and cleaning . Provide adequate clearance around air openings into the combustion chamber.

### **6.2 HEATER MOUNTING**

**Refer to Table 2 and Figure 2.** SE Series Heaters are approved for both horizontal and angle mounting on the short axis. **A maximum 30° mounting angle is allowed to prevent damage to the heater. Improper angle mounting can result in damage to the heater or unsafe operation, and will void warranty.**

**IMPORTANT:** For either horizontal or angle mounting, the long axis of the heater must be level. Use only non-combustible mounting hardware and maintain at least the minimum clearances to combustibles. Also see Pages 11 to 15 and Figures 4 & 5 on Page 12 that illustrate typical suspension hardware that may be used. Mounting kits can be provided by Rinnai as an optional component.

## 7. GAS SUPPLY PIPING

- All piping must be installed according to applicable local and national codes
- A listed flexible connector (field supplied) must be installed between the heater and gas supply piping. For outdoor installation the connector must be in compliance with ANSI Z21.75 / CSA 6.27. A 3/8" x 24" black finish flexible gas connector (903000012 - approved Indoor/Outdoor) is available as an option from Rinnai.
- A drip-pocket must be provided at the inlet connection
- Provide a 1/8" NPT plugged tapping, accessible for test gage connection, immediately upstream of the gas supply connection to the heater.
- On propane-fired units, a main line filter is recommended (field supplied)
  - Piping joint compounds must be resistant to the action of liquefied petroleum gases
- All piping connections must be tested for leaks with a soap and water solution.

**CAUTION:** DO NOT INSTALL ANY GAS PIPING IN HEAT ZONES

### 7.1 GAS PRESSURE

The maximum supply pressure must be limited to 14" w.c. (0.5 psi). If the line pressure is above 14" w.c., then a separate pressure reducing regulator must be installed in the gas supply. The minimum pressure at the inlet to the heater regulator (gas valve) must be equal to or greater than 6.0" w.c. for natural gas and 11.0" w.c. for propane gas.

Proper manifold pressure must be adjusted during commissioning, and will be maintained when the main burner is operating under the following supply pressure:

MODELS	GAS TYPE	LINE PRESSURE "w.c.		MANIFOLD PRESSURE "w.c. AT GAS VALVE TEST PORT
		MINIMUM	MAXIMUM	
RSE1S35XX / SE1S50XX	NATURAL GAS	6.0	14.0	5.0
RSE2S50XX (2-Stage)	NATURAL GAS ONLY)	6.0	14.0	5.0 High; 3.0 Low
RSE1S35XX / SE1S50XX	PROPANE GAS	11.0	14.0	10.0

Natural Gas: Orifice sized for 1000 BTU/CU.FT. Propane Gas: Orifice sized for 2500 BTU/CU.FT.

## 8. ELECTRICAL REQUIREMENTS - see also Wiring Diagrams pages 31 - 32

All electrical installations must meet local codes and the latest edition ANSI/NFPA N0 70 in the U.S.A.

### TRANSFORMER SPECIFICATIONS (field supplied)

**Single heater** requires 24 Volt, 60 Hz electrical transformer sized at 40 VA.

**Multiple heaters** in a zone are powered by a single transformer (field supplied). The proper transformer is 24 Volt AC, 60 Hz, sized at 40VA for the first heater plus 20VA for each additional heater in the zone - round up the calculated value to the next higher available sized transformer. For example, four heaters in a zone require a transformer of : 1 x 40VA + 3 x 20 VA = 100 VA .

RINNAI P/N	Transformer Description	Capacity
903000034	120V/24V 100 VA	Up to 4 heaters
903000035	120V/24V 150 VA	Up to 6 heaters
903000036	120V/24V 200 VA	Up to 9 heaters
903000037	120V/24V 250 VA	Up to 11 heaters
903000038	120V/24V 350 VA	Up to 16 heaters

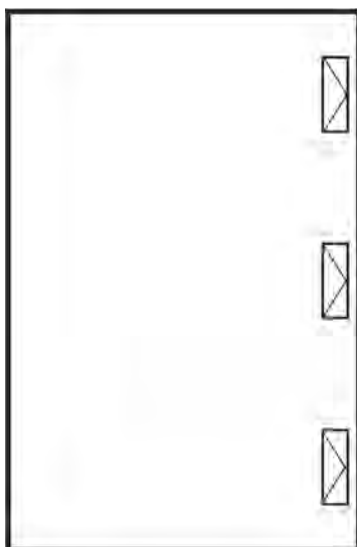
PROPER WIRING POLARITY MUST BE MAINTAINED, particularly when grouping the heaters in a zone. Total wiring distances of up to 200' must use minimum 16 gauge electrical wire, and wiring distances of over 200' must use minimum 14 gauge electrical wire. The heater must be electrically grounded in accordance with local and national electrical codes. Malfunction of the heating system will result if the voltage varies by more than  $\pm 10\%$ .

The heater can be controlled by a line voltage thermostat, a 24 volt thermostat or "off-on" switch. Total load of all heaters must be considered in determining the required contact rating of the controlling thermostat or switch.

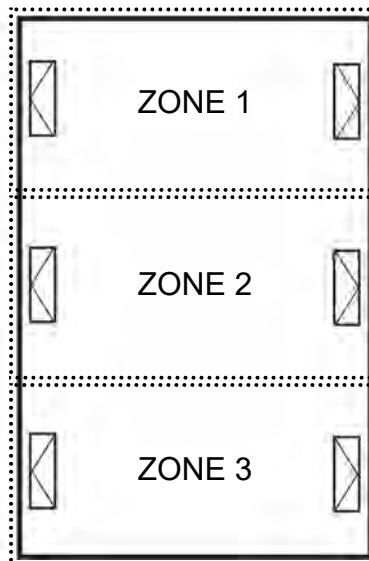
## 9. LAYOUT, COMFORT & CONTROL

### NOTE: MOUNT HEATER AT MAXIMUM 30° ANGLE TO AVOID DAMAGE

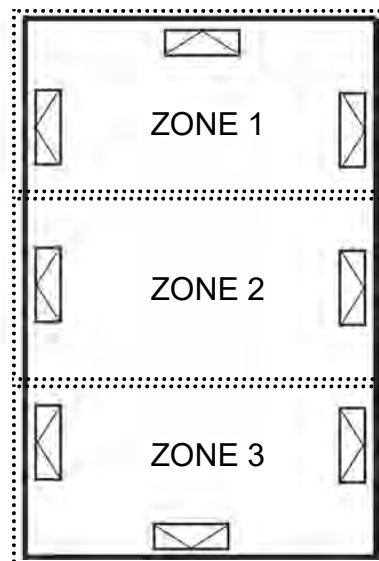
Every patio heater layout is unique. Where possible it is recommended that heaters on opposing sides (two or more sides) of a patron or heating zone be activated simultaneously to accomplish highest comfort level.



One Side Heating -  
Limited Comfort  
Coverage



Better:  
Two Sides Heating  
- Improved Comfort



Best:  
Multi-Side Heating -  
Most Uniform  
Comfort

**Heater/Zone Control Options:** Locate controls in a secure staff area.

**Single-Stage Models: RSE1S35XX / RSE1S50XX**

- On/Off power switch
- Patio Control Panel: Manual control by staff; 903000001 up to 4 heater zones; 903000002 up to 8 heater zones; 903000003 up to 12 heater zones
- Wireless remote control: *refer to section 15 page 23*
- ThermoControl Plus: Radiant temperature control of the zone system

**Two-Stage Model: RSE2S50XX**

- Two-Stage patio Control Panel: Manual control by staff; 903000001 up to 2 two-stage heaters; 903000002 up to 4 two-stage heaters; 903000003 up to 6 two-stage heaters.
- ThermoControl Plus: Radiant temperature & staging control of the zone system

## 10. INSTALLATION PROCEDURES

- Install gas and electrical supplies according to all local and national codes
- Mount heater **up to a maximum of 30° angle on short axis** using non-combustible mounting hardware. Refer to pages 9 to 13 in this manual for information on mounting options.
- Observe all minimum clearances as indicated in Table 1 and Figure 1
- Suggested mounting distances for comfort in Table 2 and Figure 2 are guidelines based on experience. Site conditions can allow for some deviation from these distances.

**WARNING:** The heater must be rigidly mounted to the structure to prevent wind force movement.



Mounting Bracket anchoring to the structure must be of sufficient strength, integrity and workmanship, to support the weight of the heater and any additional loads such as wind force and snow. **Mount heater up to a maximum 30° angle.**

- If possible heat from two or more sides of control zones to provide most uniform comfort
- Connect heater to the main gas line. An approved 1/2" flexible connector (field supplied - available as an option from Rinnai) may be used to absorb heater and gas line expansion and any vibration - check local code requirements.
- Check gas line for leaks by using soap test or gas meter test. Ensure gas pressure meets the requirements outlined in Section 7.1 (above).



**WARNING:** When testing the main gas line pressure up to 0.5 psig, ensure that the isolation valve and combination gas valve are "OFF", otherwise damage to the combination gas valve will result. When testing main gas line in excess of 0.5 psig the appliance and shut off valve must be disconnected or isolated from the gas supply piping system during any such pressure testing. Gas supply to the heater must be regulated to be maximum 0.5 psig (14" w.c.) and minimum values listed in Table 3 above in Section 7.1

- All wiring must comply to local and national codes. The heater requires 24Vac power supply. The heater system zone requires a field supplied 120/24Vac transformer rated at 40VA for the first heater *plus* 20VA for each additional heater in the zone. Ensure proper electrical rating in the system by checking voltage at ignition module terminals. To avoid system malfunction, the voltage must be within 10% of required 24Vac (21.6 Volts to 26.4 Volts), and correct polarity must be maintained throughout the system.
- Test-fire heating system - follow lighting instructions listed below and/or on the heater label.

## 11. LIGHTING INSTRUCTIONS

1. Ensure the correct voltage is supplied, gas supply lines have been properly purged, and gas valve is switched to the ON position.
2. Turn on power to heater (high or low rate for 2-stage heater), set thermostat (if applicable) to above ambient temperature, the heater will light.
3. If heater does not light: Turn off power to heater, turn gas valve to OFF position.
4. Wait for five minutes and repeat steps above. If heater does not light after three attempts, call a qualified service technician.

### 11.1 SHUT DOWN INSTRUCTIONS

- a) For temporary shutdown, turn off the electrical supply circuit.
- b) For complete shutdown, turn off the electrical circuit and turn gas control knob to the "OFF" position.

## 12. HEATER FINISH AND APPEARANCE

All models are constructed with a marine grade stainless steel enclosure cabinet, with optional finish of stainless steel, or high temperature black coating.

**Stainless Steel Enclosure Heater:** ALL stainless steel heaters will discolor or stain to some extent due to the impact of heat. This is a normal occurrence and does not effect heater performance or the warranty of components.

**High Temperature Coating Finish Heater:** Exterior heater surfaces, including any stainless steel components, are coated with a black high emissive coating that helps preserve the aesthetic appearance of the heater and improves the radiant heat output.

Handle the heater with care during installation and service to avoid scratching or damaging the finish.

With extended use, the finish coat will discolor and deteriorate to some extent due to the impact of heat, the deposit of ambient air born particles, and environmental factors.

These are normal occurrences caused by heat, products of combustion, and the environment, and in no way affect the operation / performance of the heater or Rinnai's warranty.

### OCCASIONAL PAINT FINISH MAINTENANCE:

Wear protective gloves, eyewear, and breathing mask. Ensure that power to the heater is disconnected prior to maintenance and the application of any finish coating. Use a fine steel wool to remove blemishes or unsightly deposit, and smooth the outer surface. The heater finish coat can be touched up using a high temperature coating such as Thurmalox Stove Paint - Flat Black-1200°F (650°C) or similar high temperature stove paint that is compatible with the original finish. **No other coating or non-high-temperature paint finish may be applied to the heater – use of an incompatible finish coating will create a hazardous condition such as fire or noxious fumes, damage the heater, and void the warranty.**

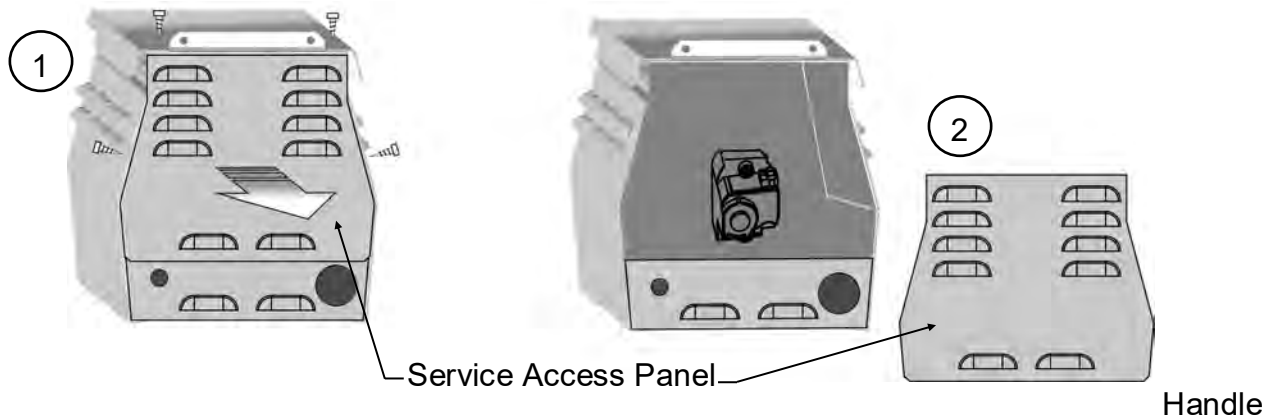
Apply the touch up finish with the heater in its operating orientation (facing down). Ensure that overspray does not reach or effect the egg crate grilles and the burner tile surface - mask the heater grilles during any re-finishing. Remove the masking immediately after re-finish and prior to operation of the heater.

### 13. **SERVICING GUIDE** (Also refer to Troubleshooting Guide on page 30)

Servicing of heater is essential for continued efficient operation. Servicing should be carried out annually by a qualified gas service technician as follows:

- Clean the ceramic tiles with compressed air. Avoid directing air stream at gasket material between tile and heater body. The air pressure **must be lower than 20 psig.**
- Clean venturi tube with compressed air. The air pressure **must be lower than 20 psig.**
- Ensure gas orifice is clean and the heater cabinet is free of any debris

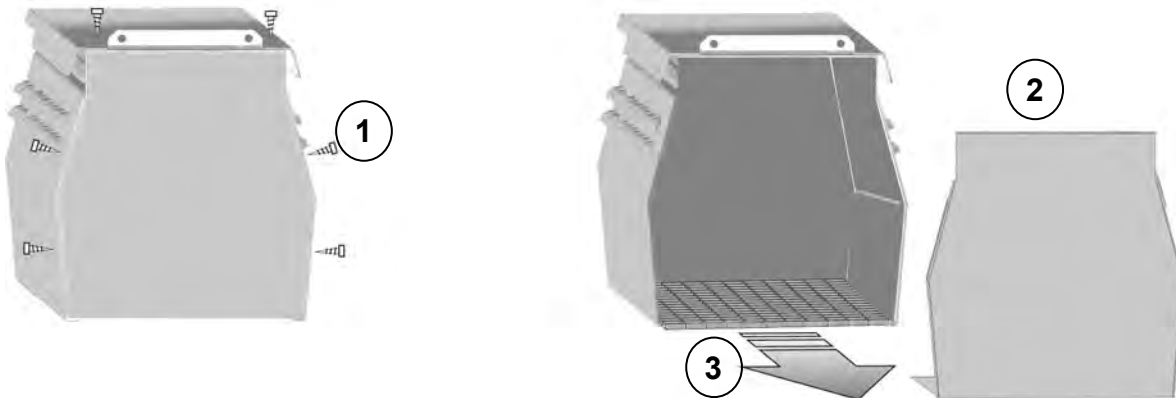
#### Service Access - Electrical & Gas Components



parts carefully to avoid scratching or damaging the surface finish:

1. Remove four sheet metal screws that hold the service access panel in place
2. Remove service from heater assembly
3. Component parts are accessible for service
4. Reassemble access panel to heater after service

#### Service Access - Burner & Ceramic Tiles



Handle parts carefully to avoid scratching or damaging the surface finish:

1. Remove six sheet metal screws that hold burner end plate in place
2. Remove end plate from heater assembly
3. Slide screen frame from heater assembly
4. Burner assembly is accessible for service
5. Reassemble after service

### Indication of back firing:



- Loud ignition noise, followed by distinct hissing sound.
- Little or no visible burning on the ceramic tile surface.
- Combustion is taking place inside the burner body.

**WARNING:** If heater backfires during operation, it **must** be turned off **immediately**.

### Cause & remedy of back firing:

- Improper gas pressure entering the venturi tube: check gas supply pressure.
- Damage of a ceramic tile and or gasket: - replace damaged part.
- Faulty sealing of the ceramic tile to the burner body, caused by damaged gasket material: contact your local distributor or contractor.

## 14. VENTILATION REQUIREMENTS FOR INDOOR APPLICATION

	<b>WARNING</b>	Inadequate venting of a heater may result in asphyxiation, carbon monoxide poisoning, injury or death. Heating system ventilation must be in accordance with all local, state, provincial, and national codes (ANSI Z223.1/NFPA 54 in USA).
		

This heater is approved for unvented (indirect venting) application. Ensure that there is adequate ventilation to supply combustion air and to dilute the products of combustion in accordance with all local, state, provincial, and national codes. A balanced exhaust / inlet air system is required to ensure that a negative air condition is not created. See below for a summary of exhaust capacity requirements by the national codes in the U.S.A.

**Air Supply:** A “loose” building may not require any additional air supply if infiltration rates are sufficient to offset exhaust volume. However, for “tighter” buildings, or if air movement is stagnant in an area, air can typically be supplied via inlet(s) with an area of 1 sq. in. per 1,000 Btuh input (22 sq cm per kW). Locate air inlet(s) up at the level of the heaters to avoid cold drafts at work level, and effectively supply combustion and dilution air to the heaters and balance the system.

**Heater Zoning:** Exhausters are sized according to the input requirements of each controlled zone of heaters. Multiple smaller zones are usually more effective in both comfort and ventilation control than one large zone. Maximum zone size is limited by the total input that can be handled by the capacity of an exhauster, and by the proximity of the exhauster to heaters in the zone.

**Exhauster Location & Proximity:** Exhaust must be located as high as practicable in the structure above the level of the heater(s) to effectively dilute and remove the warm (rising) products of combustion. The exhauster should be as centrally located as practicable in the zone of heaters. Rinnai recommends a maximum 6:1 ratio of the horizontal distance between the exhauster and the furthest heater in a zone, to the height the heaters are mounted above the floor. For example, if heaters are mounted 20 ft above the floor, then the exhaust fan



should be located no more than 120 ft from the furthest heater in the zone. Sufficient air supply must be provided.

### **Exhauster Capacity:**

**USA:** Natural or mechanical means shall be provided to supply and exhaust at least 4ft<sup>3</sup>/min/1000Btuh (0.38m<sup>3</sup>/min/kW) Natural Gas input of installed heaters [4.5ft<sup>3</sup>/min/1000Btuh (0.43m<sup>3</sup>/min/kW) Propane input]. Some local codes may require an interlock to a dedicated exhaust fan. Consult your local code and ANSI Z223.1 latest edition for all venting requirements and practices.

## **15. REMOTE CONTROL OPTION (*Single-Stage Models ONLY*)**

Patio Heaters can be operated using a portable Remote Control Option:

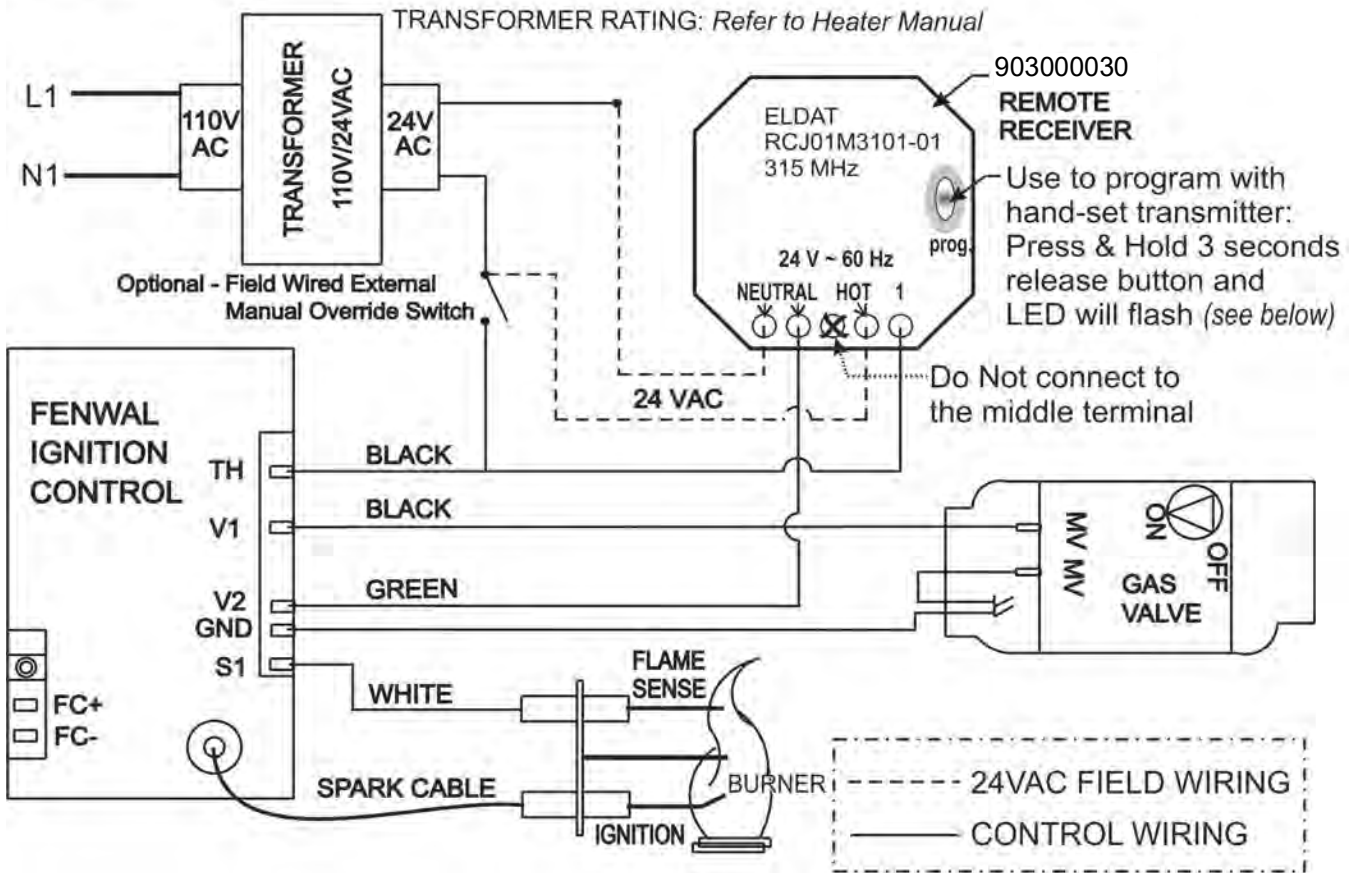
- 903000030 Remote Receiver Kit (field installed in the heater)
- 903000031 Remote 4-Button Handset Transmitter
  - The Handset Transmitter is the master component for system setup and operation. It is recommended to have a backup/spare “twin” handset transmitter in case one is misplaced
  - Handsets plug together to “twin” a backup handset with the same codes as master
  - In the event of any concern for breach of control security (lost handset), master codes can easily be changed in existing handset(s) on site
  - Unique random signal codes ensures no interference with any neighboring systems
- 903000032 Wireless Keypad Transmitter (wall mounted at patio)
  - Control up to four heater zones using unique PIN's
  - Requires a Handset Transmitter as master code controller
- Quick Setup instruction sheets accompany the Remote Receiver Kit and the Handset Transmitter for installation and programming of the system.

### **Layout and Control:**

- Each heater requires its own receiver (903000030)
- Each handset transmitter has 4 channels and can control up to 4 individual heat zones
- Multiple receivers can be programmed to one common transmitter channel (button)
  - Multiple heaters can be simultaneously activated in one heating zone with one transmitter button
- If more than 4 heating zones are required, then more than one master handset transmitter is required; two master handsets can control up to 8 heating zones,

# 903000030 REMOTE CONTROL RECEIVER KIT

## Quick Setup & Installation (Single-Stage Models ONLY)



- Hand-set transmitter has 4 buttons to control up to 4 heat zones
- Any number of receivers can be programmed to operate with the same transmitter button
- The number of heaters in any individual zone (one transmitter button) will depend on the comfort zoning requirements of the particular patio
- Refer to section **13: Servicing Guide** for access to heater control compartment
- Connect Green lead from **V2 GND** terminal at Ignition Control to **Neutral** terminal at receiver
- Connect Black lead from **TH** terminal at Ignition Control to terminal marked "1" at receiver
- Connect 24 Vac power supply to other **Neutral** and the **Hot** terminal (beside 1) of the receiver
- Turn on 24 Vac power supply to receiver
- Program receiver to hand-set transmitter:
  - Each hand-set transmitter button controls both "ON" and "OFF" functions
  - Press and hold the receiver "**prog.**" button for 3 seconds
  - Release the "**prog.**" button - LED will begin to flash for a period of about 10 seconds
  - Within the 10 second flash period press and hold the appropriate transmitter button (1 of 4)
  - As soon as the transmitter button code is transferred the receiver LED light will remain lit
  - Release the transmitter button and wait a couple of seconds until "**prog.**" LED light turns off
  - Test receiver operation "ON" & "OFF" - only a quick push of transmitter button is required
  - Repeat set up of other receivers to the hand-set transmitter button(s)
- Install Velcro patch (supplied) to the back of the receiver - mount to an inside surface of control enclosure

# Handset Transmitter *Single-Stage Models only*

## Instructions | Part Number: 903000031

### FEATURES

This state-of-the-art 4-channel hand-set transmitter is custom encoded to be an integral part of your patio heating control system.

#### 1. Hand-set Transmitter Overview

- The transmitter has 4 buttons, each with a unique random code to control up to 4 heating zones.
- Each heater must have it's receiver that is programmed to one of the transmitter buttons.
- Multiple receivers can be programmed to the same transmitter button, so any number of heaters can be in a heating zone.
- If a master transmitter is lost: For security reasons, any back-up transmitter can have the random codes changed for each button, and then reprogram the heater receivers.
- The hand-set transmitter comes with the battery installed.
- Also supplied are a belt clip, clip compartment cover, and a programming connector (see section 5 below)



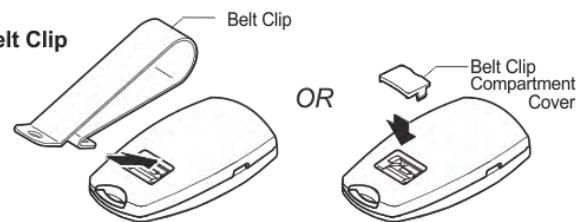
#### 2. Transmitter Belt Clip

The belt clip allows for easy carrying of the transmitter and/or enables clipping of the transmitter in a storage location.

- Snap belt clip into back of transmitter as shown in Figure 1.

*Note: If you do not need the belt clip, install the belt clip compartment cover.*

Figure 1. Belt Clip



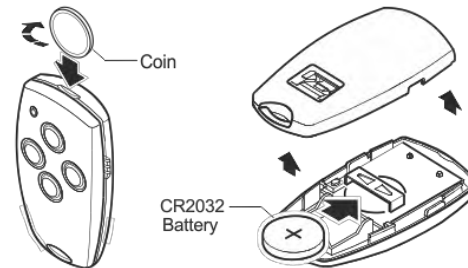
#### 3. Battery Replacement

When replacing batteries follow the steps below:

- Open the transmitter case using small coin.
- Insert a 3V battery (type CR2032) as shown.
- Close the transmitter.

*Note: Replace batteries with same type CR2032 only.*

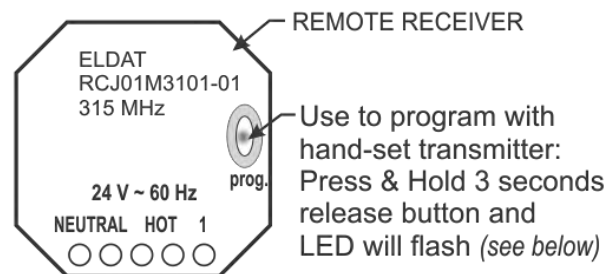
Figure 2. Battery Compartment



#### 4. Programming a Receiver

- NOTE: Receiver must be installed in heater and 24Vac power supplied for programming to occur
- Press and hold the **prog.** button on receiver for 3 seconds
- Release the **prog.** button - LED will flash for about 10 seconds
- During the 10 second flash period, press and hold the desired control button on the hand-set transmitter
- As soon as the transmitter button code is transferred the receiver LED light will remain lit
- Release the transmitter button and wait a couple of seconds until "**prog.**" LED light turns off
- Test receiver operation "ON" & "OFF" - only a quick push of transmitter button is required
- Repeat set up of other receivers to the hand-set transmitter button(s)

Figure 3. Programming a Receiver



# Handset Transmitter *Single-Stage Models only*

## Instructions (continued)

### 5. Multiple Transmitters

Each transmitter comes factory programmed with 4 random codes, one per button.

Any other transmitter has 4 different unique random codes.

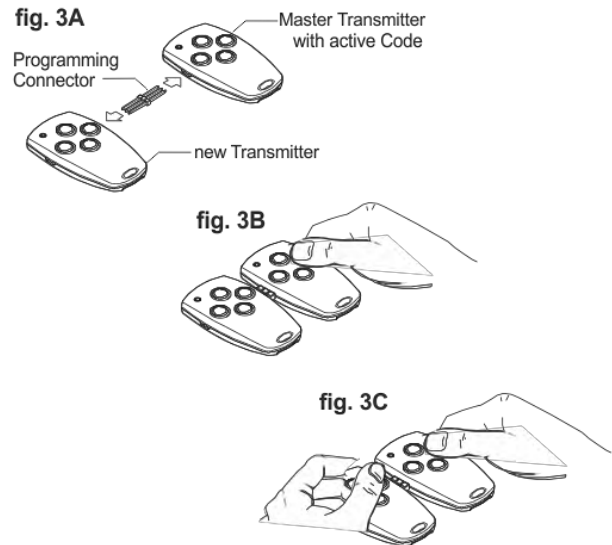
The first transmitter that is used to program the active codes into heater receivers acts as the "master" transmitter.

Any additional transmitter that is purchased to operate the same heaters (receivers) must have the master codes transferred from each button on the master transmitter to the respective button on the new/additional transmitter.

It's a simple and straightforward procedure:

- Connect the master transmitter with active code to the new transmitter using the programming connector (fig. 3A).
- Press and hold a selected channel button on the master transmitter with the active code (fig. 3B). The light on the transmitter illuminates.
- Press and hold the respective channel button on the new transmitter (fig. 3C). The light on the transmitter initially starts blinking and then illuminates continuously after 1-2 sec. Code transfer is completed between those buttons.
- Repeat above procedure for each active button.
- Programming connector can be removed and both transmitters are now active masters that can operate the heaters.

Figure 3. Multiple Transmitters-Code Transfer



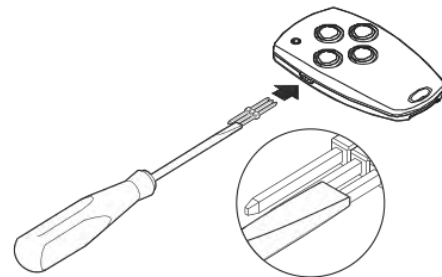
### 5. Changing the Code on a Transmitter

If you lose a transmitter, there may be concern that an unauthorized person who finds it could now activate your system.

To create a new 'master' transmitter using an existing back-up transmitter, the factory preset codes can be changed as follows:

- Connect the programming connector into one of the side sockets of the transmitter.
- Short one of the outer pins of the programming connector with the middle pin.
- Press and hold the respective channel button. The light will blink rapidly for approx. 3 to 5 seconds. Release the button after the light illuminates continuously.
- Repeat the process for each active channel button. Then remove the programming connector.
- The heater receivers will now need to be reprogrammed to the new master transmitter codes.

Figure 4. Code Changing



FCC Certified: This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.


# Wireless Keypad Control *Single-Stage Models only*

Note: Refer to Receiver & Handset Instructions for programming the system

**A Handset Transmitter is the "master control" in the remote control system, first required to establish codes that operate the remote receivers installed in heaters. System control codes must be transferred to the Keypad Control from the master Handset Transmitter. Remote Receivers and Handset Transmitters are purchased separately.**

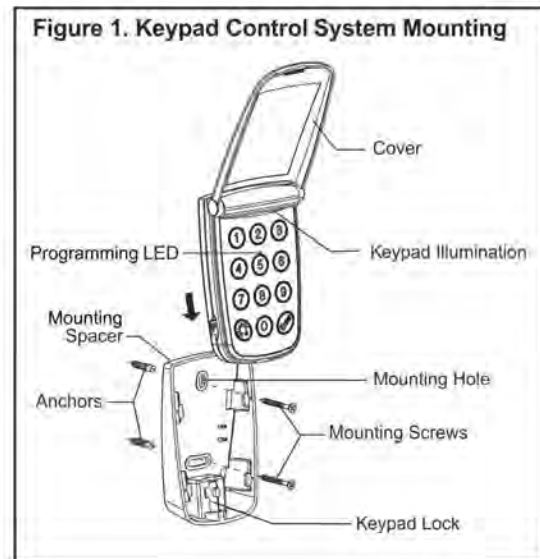
## FEATURES

The Wireless Keypad Control System offers the convenience of remotely controlling the operation of patio heaters by entering unique 4-digit Private Identification Numbers (PIN) via the keypad. It can be programmed to control up to 3 heating zones by programming a unique PIN code for each zone.

A fourth heater zone can also be programmed for simple control without a PIN using the "Light" key. 

### Other Features Include:

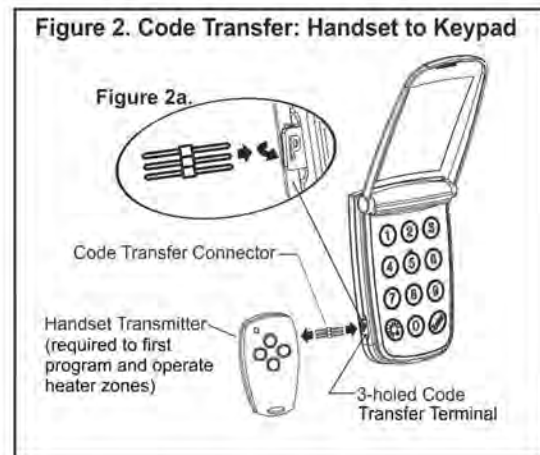
Wireless Installation, Code Security, Anti-Tampering, and Weather Resistant Design for outdoor (or indoor) installation. Familiarize yourself with the parts shown in Figure 1.




## Step 1: Setting Up Your Private Identification Numbers (PIN) and Transferring Codes (Fig. 2)

### To Transfer Control Codes to the Keypad from a Handset Transmitter:

- The Keypad Control can control 3 heater zones using 4-digit PINs, and a 4th zone using the "Light" key. Simple PINs that relate to the heater zones are recommended for staff to remember easily. Record the list of heater zones and associated PIN/Light key, and keep it in a secure place.
- Open the code transfer terminal area (Fig. 2a - lower left side) and connect the Handset Transmitter to the Keypad Control using the 3-pronged Code Transfer Connector.
- Press and hold one of the transmitter buttons on the Handset.
- On the Keypad Control press the ENTER key - keypad illuminates
- Input any new 4-digit PIN of your choice. Press ENTER again.
- Continue holding the Handset button until the LED (above the "5" key) on the Keypad blinks rapidly, then release the Handset Button.



- The Keypad Control has now learned the code from that Handset button and stored it under the PIN that you entered.
- Repeat the above procedure for up to two more handset buttons, programming each with a unique PIN.

To transfer a Handset Code to the "Light" key  (Handset remains connected to Keypad with Code Transfer Connector)

- Press and hold the Handset button (heater zone) you choose to assign to the "Light" key.
- Press the ENTER Key on the Keypad. The keypad illuminates.
- Press the "Light" key. Press the ENTER key again.
- Continue holding the Handset button until the LED on the Keypad blinks rapidly.
- The Keyless Entry System has now learned the new code for the "Light" key from the transmitter.
- Close the Keypad cover, remove the Code Transfer Connector, store in a secure place along with a list of heater zones and PIN's.
- **REFER TO STEP 3 BELOW FOR KEYPAD CONTROL OPERATION - NOTE: To activate a heater zone, PIN entry must be followed by the ENTER key**

# Wireless Keypad Control

## Instructions (Continued)

### Single-Stage Models only

#### Step 2: Mount the Keypad (Figure 1)

- Choose location for mounting your Keypad Control.
- Using mounting holes at top and bottom of the mounting spacer as a guide, mark hole locations and then drill two 1/8" pilot holes.
- Secure spacer to the mounting surface with the (2) 1/8" x 1-3/8" screws provided. For mounting surfaces that are not made of wood, alternate anchoring means may be needed.
- Snap the Keypad Control into the spacer.
- Turn the Keypad Lock on the bottom of the spacer clockwise using a coin to lock the Keypad into the mounting spacer.

**Remember to unlock the Keypad to remove it in future.**

#### Step 3: Using Keypad Control

**Familiarize all staff members with these procedures**

##### Switching On the Keypad Illumination

- Press the LIGHT key. The keypad illumination turns on for 5 seconds.

##### Turning a Heater Zone "ON/OFF": PIN + Enter key

*PLEASE NOTE: High intensity (ceramic burner) type heaters will ignite in seconds, and reach full IR output within 5 minutes.*

*Tube type heaters, have a built in pre-purge that delays ignition for 30 seconds after turning 'On'. A tube heater reaches full IR output in 15 to 20 minutes.*

- **Enter a 4-digit PIN** (programmed in Step 1) **then press the ENTER key.** Heater ignition sequence will begin in the zone associated with that PIN.
- Keypad Control will remain active and LED will flash for approximately 18 seconds after pressing the ENTER key. During this time, the heaters can be stopped by pressing any button (except the LIGHT button).
- **IMPORTANT: Wait 18 seconds until the LED stops flashing before entering the PIN to activate another zone of heaters.** When the LED is no longer flashing, enter the unique PIN + ENTER for the next heater zone.
- Repeat the PIN + ENTER key sequence to turn "Off" a heater zone. Wait 18 seconds between zone shut-downs.

##### Note:

*If an invalid PIN is entered 3 times in a row, the Keypad Control automatically shuts off to prevent tampering or unauthorized use. After 2 minutes, the Keypad Control is active again.*

##### "Light" function to switch a heater zone "ON/OFF"

- To turn a heater zone "On", **press the "Light" key followed by the ENTER key.**
- Repeat the key sequence to turn "Off" a heater zone

*For protection of keypad, keep cover closed when not in use.*

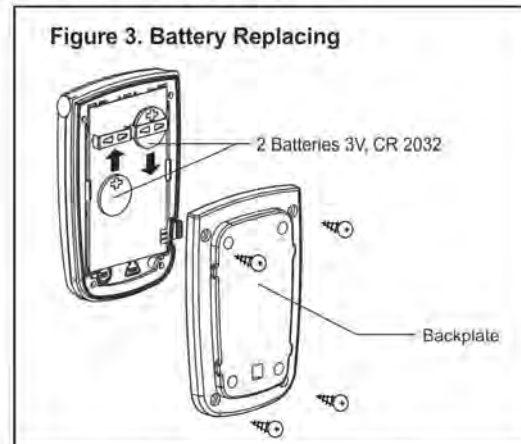
#### Changing a PIN

- Press and hold "key 0" on the keypad for 3 seconds until the LED on the keypad blinks rapidly.
- Enter the PIN which is to be changed (erased) followed by the ENTER key.
- Enter the new 4-digit PIN followed by the ENTER key. The LED on the keypad will turn on (not flash) for 2 seconds.
- The Keypad Control is now ready for use again with the new pin (Old PIN is erased and no longer valid).

#### Clearing the Memory

- This procedure is required if a new master handset and codes are set up for system control.
- Press and hold the LIGHT key on the keypad for 3 seconds until the LED on the keypad blinks rapidly.
- Enter the PIN 9-9-9-9.
- Release LIGHT key. The code memory is cleared. The LED on the keypad will illuminate for 2 seconds.

#### Battery Replacement (Figure 3)



- Always replace BOTH CR 2032 batteries.
- During battery replacement, the Keypad will remember the programmed codes and PINs.
- Use a coin to turn the lock key on the bottom of the spacer counterclockwise and remove the Keypad from the spacer.
- Release the backplate of the Keypad (4 Phillips screws).
- Remove old batteries.
- Install 2 new 3V batteries, CR 2032. Match polarity designation. Test operation.
- Reinstall the backplate on Keypad, and Keypad to spacer.

FCC Certified: This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## 16. SEQUENCE OF OPERATION FOR FENWAL 35-60 DSI CONTROL

### Start up - Heat Mode:

On a call for heat the Fenwal 35-60 control will reset, perform a self check routine, flash the diagnostic LED for up to four seconds. The gas valve and spark are energized commencing the trial for ignition period. When flame is detected during the trial for ignition, spark is shutoff immediately and the gas valve remains energized. The thermostat and main burner flame are constantly monitored to assure the system continues to operate properly. When the thermostat is satisfied and the demand for heat ends, the gas valve is de-energized.

### Flame Failure - Multi Trial Model:

Should the main burner fail to light, or the flame is not detected during the first trial for ignition period, the gas valve is de-energized and the control goes through an interpurge delay before another ignition attempt. The control will attempt two additional ignition trials before going into lockout and the valve relay is de-energized.

Recovery from lockout requires a manual reset by either resetting the thermostat or removing 24 volts for a period of 5 seconds. If the thermostat is still calling for heat after one hour the control will automatically reset and attempt to ignite the burner again.

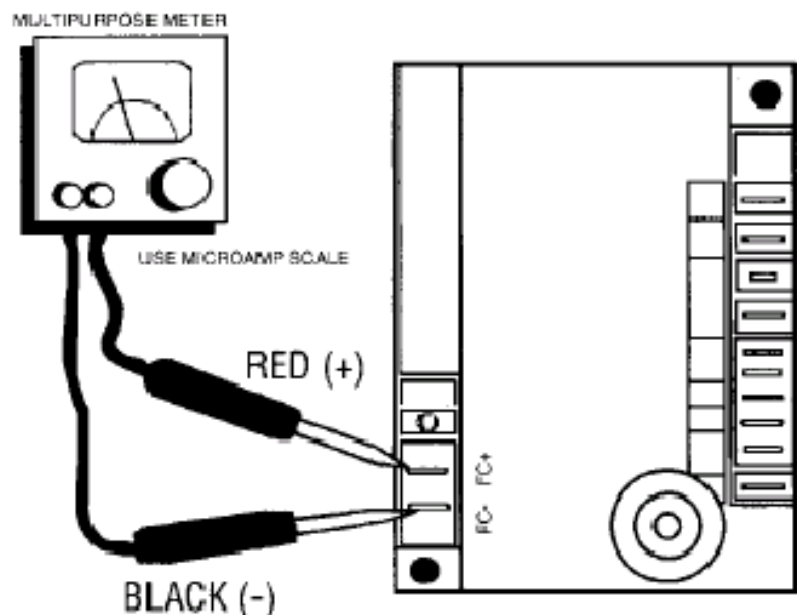
### Flame Failure - Re-Ignition:

If the established flame signal is lost while the burner is operating, the control will respond within 0.8 seconds. The HV spark will be energized for a trial ignition period in an attempt to relight the burner.

If the burner does not light the control will make two more attempts to relight the burner before de-energizing the gas valve. If the burner does not relight, the control will go into lockout as noted above in "Failure to light". If flame is re-established, normal operation resumes. Multi-try models will allow three trials for ignition including interpurge delay between trials.

**Flame current** is the current which passes through the flame from the sensor to ground. The minimum flame current necessary to keep the Fenwal 35-60 system from lockout is 0.7 microamps ( $\mu\text{A}$ ). To measure the flame current, connect analog DC microammeter to the FC-FC+ terminals.

Meter should read 0.7  $\mu\text{A}$  or higher. If the meter reads below "0" on scale, meter leads are reversed. Disconnect power and reconnect meter leads for proper polarity.



### **Cautions:**

1. The ceramic insulator of the igniter assembly should not be in or close to the flame.
2. The electrode assembly should not be disassembled and care must be used in making minor gap adjustment. The spark electrode should have a gap spacing of 1/8" - 3/16" (3.12± 0.81 mm). If this spacing is not correct, the assembly must be carefully adjusted.
3. Exceeding the temperature limits can cause nuisance lockouts and premature electrode failure.

The control must be secured in an area that will experience a minimum of vibration and remain below the maximum operating temperature of 160°F.

## **17. SPARK IGNITION CIRCUIT**

The step-up transformer in the ignition control provides spark ignition at 30,000 volts (open circuit). To check the spark ignition circuit, proceed as follows.

- 1 Shut off gas supply to the gas control
- 2 Disconnect the ignition cable at the ignition control stud terminal to isolate the circuit from the spark igniter or igniter/sensor
- 3 Prepare a short jumper lead, using heavily insulated wire such as ignition cable

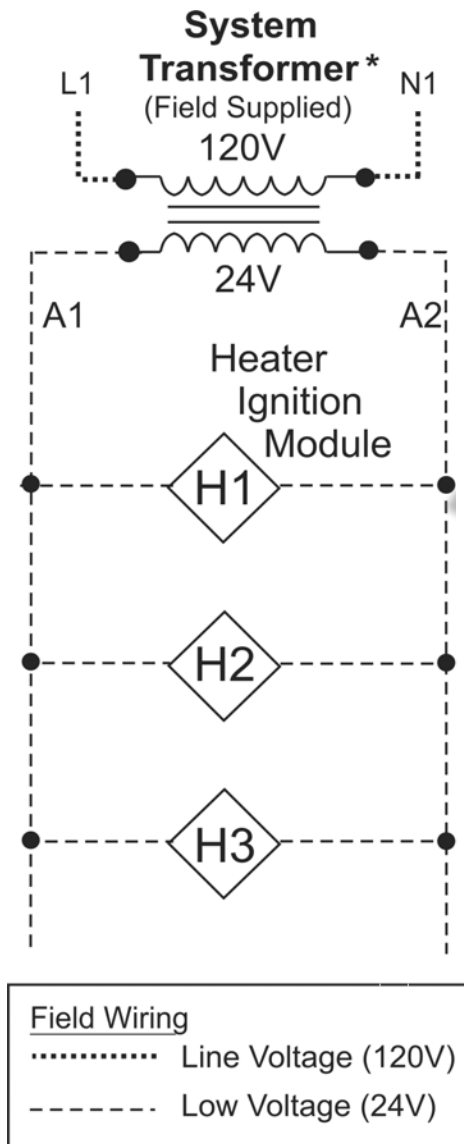
### **CAUTION**

**In the next steps, DO NOT allow fingers to touch either the stripped end of the jumper or the stud terminal. This is a very high voltage circuit and electrical shock can result.**

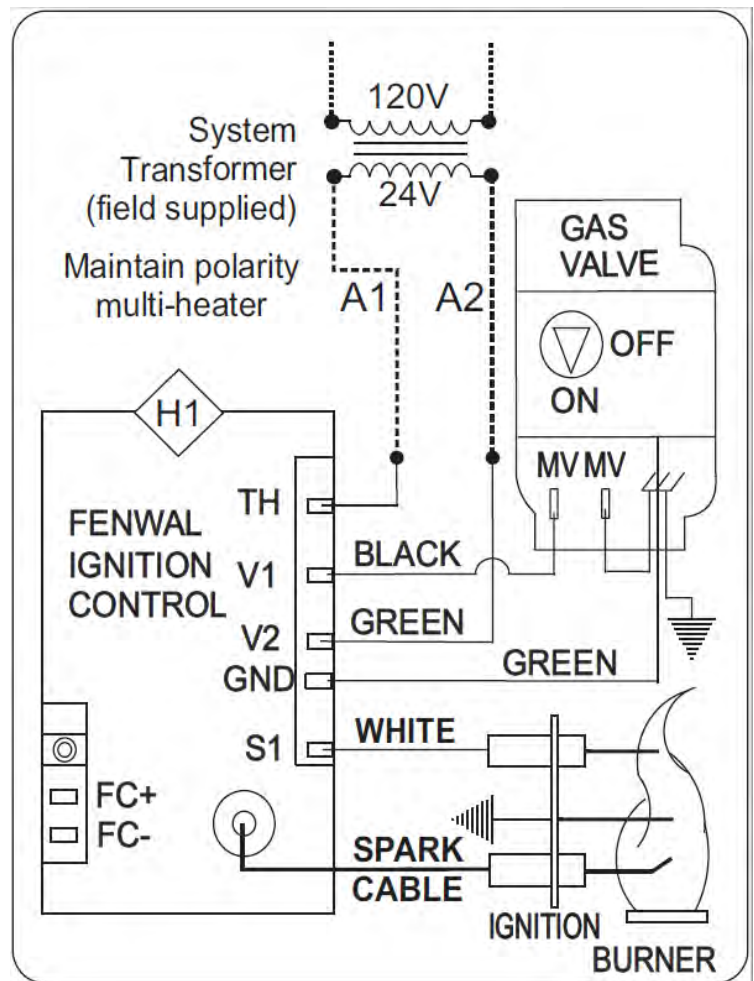
- 1 Perform this test immediately upon energizing the system before the ignition control goes into safety lockout and interrupts the spark circuit. Touch one end of the jumper firmly to the ignition control GND terminal. (DO NOT remove the existing ground lead.) Slowly move the other end of the jumper wire toward the stud terminal on the ignition control to establish a spark.
- 2 Pull the wire away from the stud and note the length of gap at which spark discontinues.
- 3 A spark length of 1/8 in. (3mm) or more indicates satisfactory voltage output. If no arc can be established, or the maximum spark is less than 1/8 in. (3mm), and power to the ignition control input terminals was proved, replace the ignition control.



# 18-A. WIRING DIAGRAM: Single-Stage: Fenwal 35-60 DSI



\* System transformer rating:  
 40VA first heater  
 + 20VA each additional heater



### Fenwal Control Terminal Designation

TH	Thermostat / 24V Supply Input
GND	System Ground
V1	Valve Power
V2	24V Supply Neutral
NC	Alarm
S1	Remote Flame Sensor

### Error Mode

Internal Control Failure
Flame with No Call for heat
Ignition Lockout

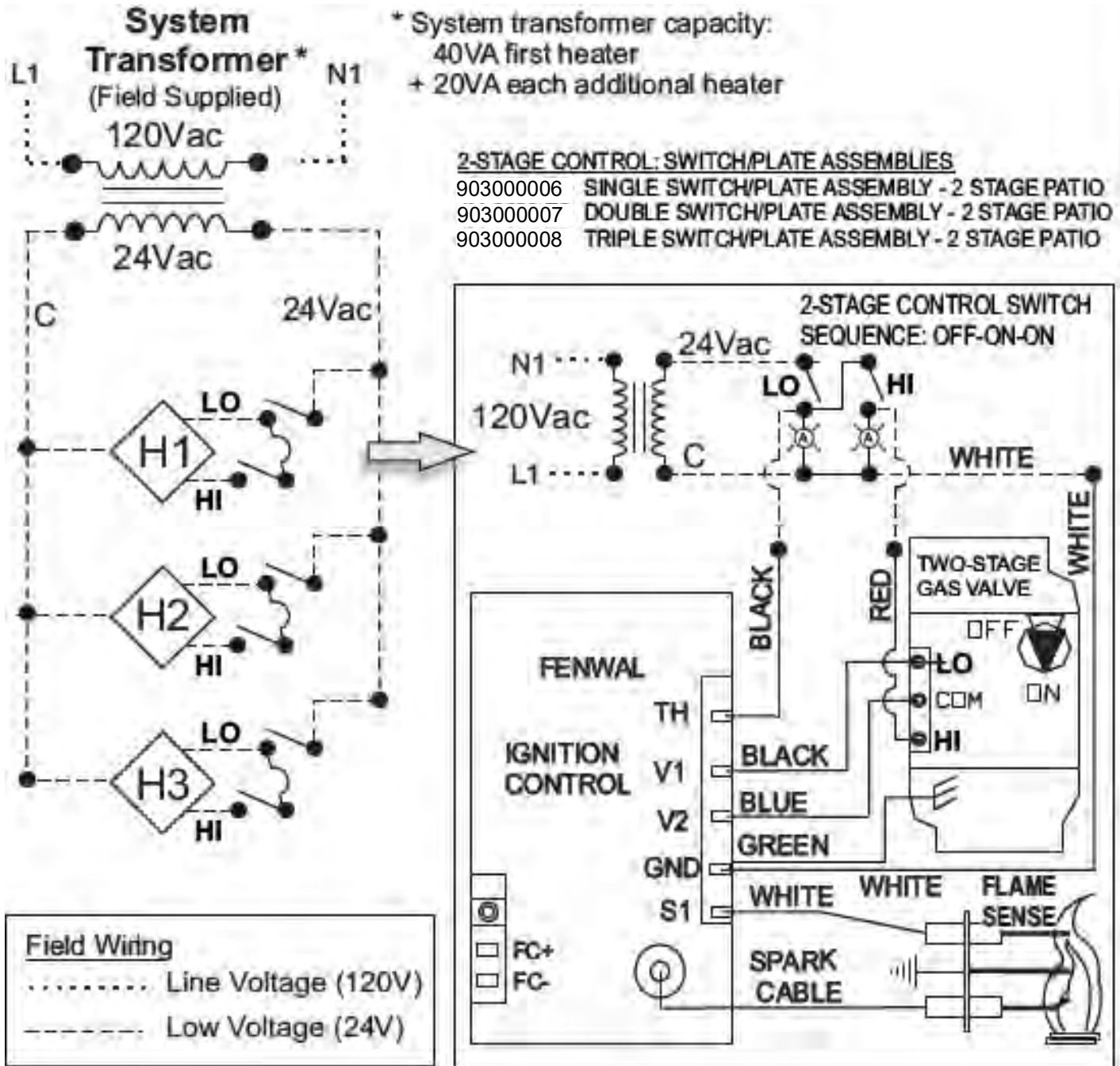
### LED Indication

Steady on
2 flashes
3 flashes

### Fault Conditions:

The LED will flash on for 1/4 second, then off for 1/4 second during a fault condition. The pause between fault codes is 3 seconds.

# 18-B. WIRING DIAGRAM: RSE2S50XX Two-Stage: Fenwal 35-60 DSI



### Fenwal Control Terminal Designation

TH	Thermostat / 24V Supply Input
GND	System Ground
V1	Valve Power
V2	24V Supply Neutral
NC	Alarm
S1	Remote Flame Sensor

### Error Mode

Internal Control Failure
Flame with No Call for heat
Ignition Lockout

### LED Indication

Steady on
2 flashes
3 flashes

### Fault Conditions:

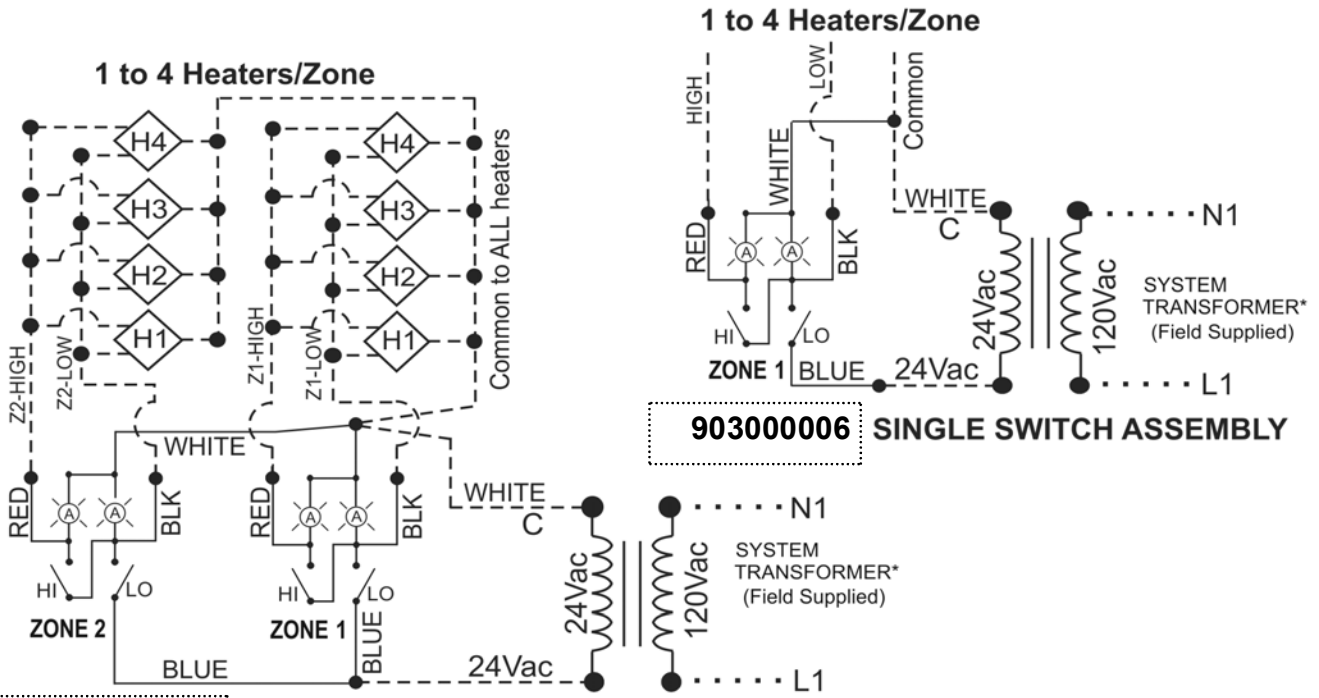
The LED will flash on for 1/4 second, then off for 1/4 second during a fault condition. The pause between fault codes is 3 seconds.

# 18-C. WIRING DIAGRAM: Two-Stage Switch Control

## 2-STAGE PATIO CONTROL SWITCH ASSEMBLY WIRING

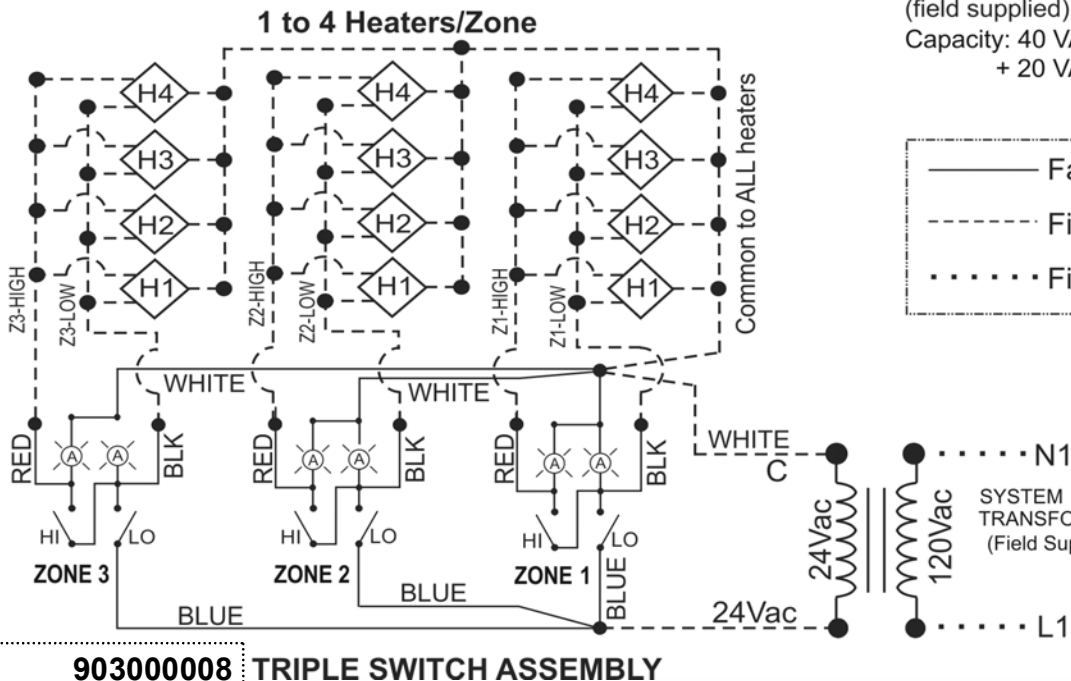
- Control from 1 to 4 heaters in a zone with each switch
- 2-Stage switch sequence required: OFF-ON-ON
- LOW STAGE SWITCH MUST BE ACTIVATED FOR HIGH STAGE OPERATION
- 3-Wire from first switch provides common (24Vac) to all heaters
- 2-Wire from additional switches provides low/high stage control

*Further information on 2-Stage Control Switches - Page 41*

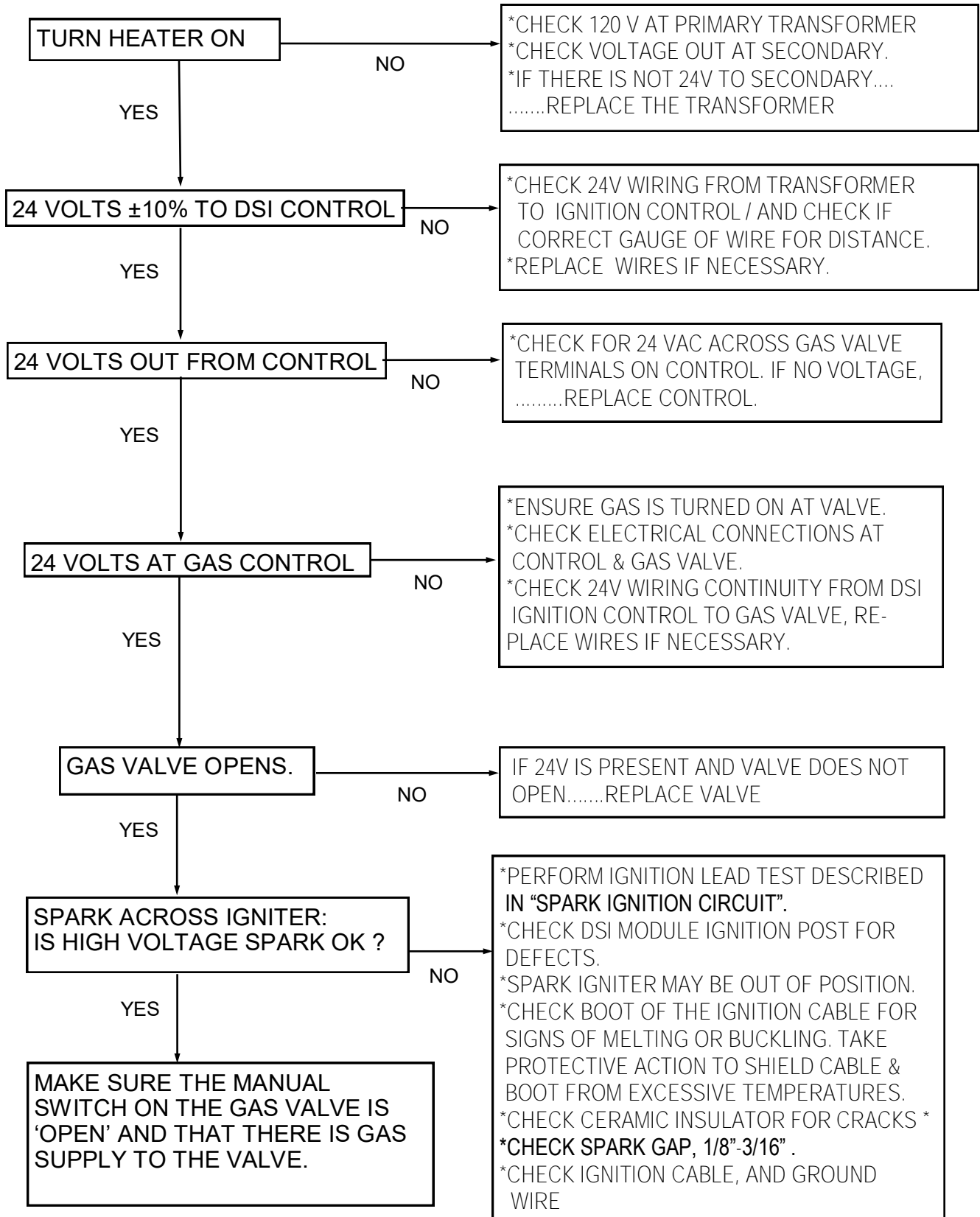


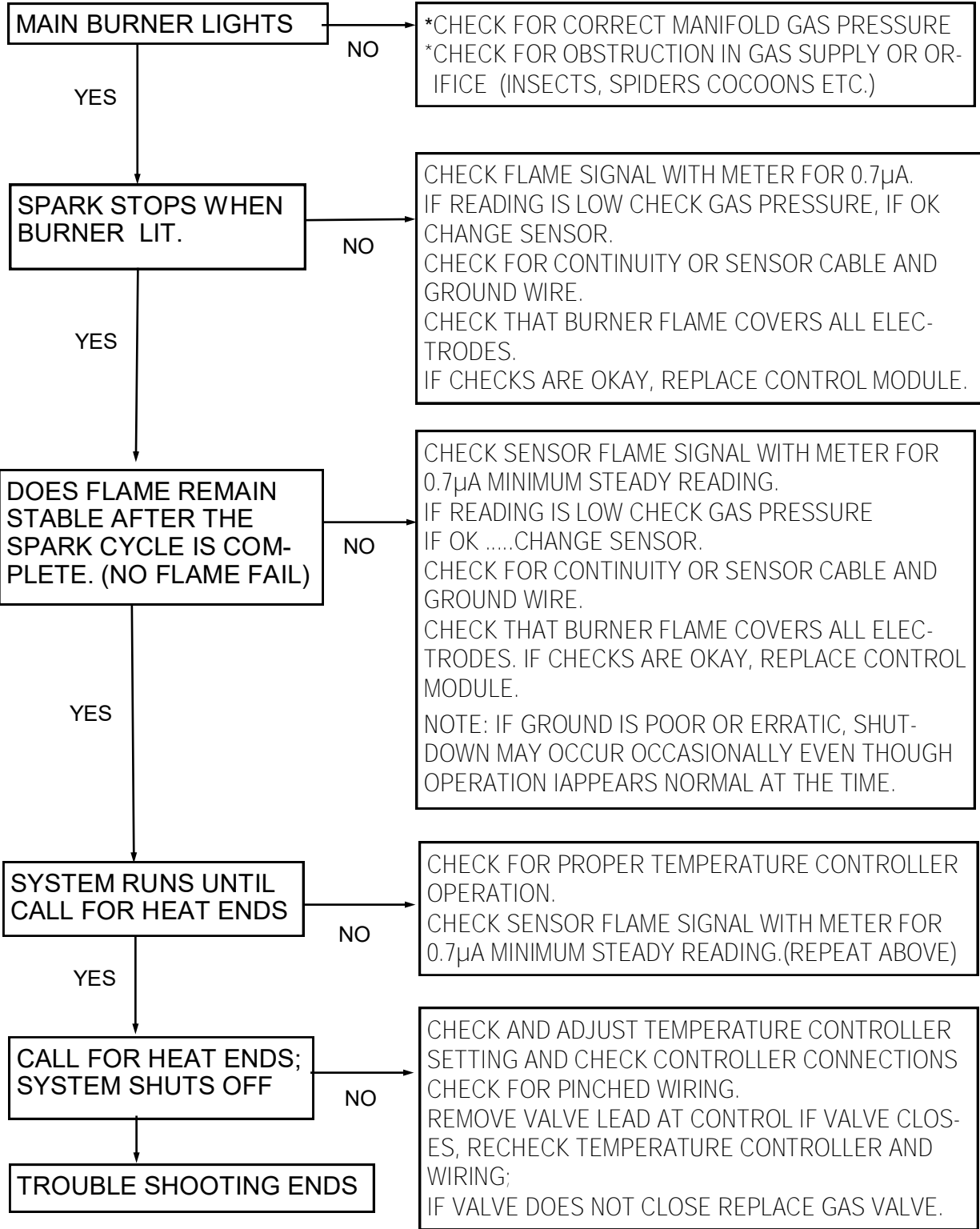
**\*SYSTEM TRANSFORMER**  
(field supplied)  
Capacity: 40 VA for first heater  
+ 20 VA each additional heater

— Factory Wired  
- - - Field Wiring 24Vac  
..... Field Wiring 120Vac



# 19. TROUBLESHOOTING GUIDE





**NOTE: IF CONTROL GOES INTO LOCKOUT, THE SYSTEM CAN BE RESET BY INTERRUPTING THE POWER SOURCE**

## 20. COMMISSIONING REPORT

This heater has been factory fired and tested prior to shipment. However, it is not a 'Plug-in' appliance. **Commissioning and field adjustment to correct settings is required.**

**COMPLETE THIS COMMISSIONING REPORT AND  
FILE THIS MANUAL AT SITE FOR FUTURE REFERENCE**

**INSTRUCT THE END USER THAT THIS MANUAL MUST BE KEPT SECURE**

### COMMISSIONING REPORT AS PER I&O MANUAL AND LOCAL/NATIONAL CODES

CONTRACTOR: \_\_\_\_\_

STREET: \_\_\_\_\_

CITY: \_\_\_\_\_ STATE/PROV: \_\_\_\_\_ ZIP: \_\_\_\_\_

PHONE: \_\_\_\_\_ CELL: \_\_\_\_\_

JOB NAME: \_\_\_\_\_

CITY: \_\_\_\_\_ STATE/PROV: \_\_\_\_\_

HEATER MODEL NUMBER : \_\_\_\_\_  
*Located on burner rating plate*

HEATER SERIAL NUMBER : \_\_\_\_\_  
*Located on burner rating plate*

*Technical commissioning report continues next page ....*

# HEATER COMMISSIONING TECHNICAL REPORT

TYPE OF GAS	NG	<input type="checkbox"/>	LP	<input type="checkbox"/>
HEATER IS EXPOSED TO CHEMICAL OR CORROSIVE ATMOSPHERE	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>
OPEN COMBUSTION IS COMPATIBLE WITH THE INSTALLED LOCATION	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>
MINIMUM CLEARANCES CONFORM TO REQUIREMENTS OF THIS MANUAL	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>
WHAT IS THE ALTITUDE OF THIS PROJECT LOCATION ABOVE SEA LEVEL	<input type="text"/>		FEET	
■ IS ALTITUDE ADJUSTMENT REQUIRED? (See Section 21 next page)	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>
THE HEATER IS INSTALLED LEVEL ON THE LONG AXIS	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>
THE GAS SUPPLY PIPING IS ADEQUATELY SIZED FOR SYSTEM VOLUME	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>
GAS SUPPLY LINES AND BRANCHES HAVE BEEN PURGED OF AIR	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>
INLET GAS SUPPLY PRESSURE WITH ALL HEATERS OPERATING	<input type="text"/>		" WC	
MANIFOLD PRESSURE WITH HEATER OPERATING	<input type="text"/>		" WC	
WIRING POLARITY IS MAINTAINED AT EACH IGNITION MODULE IN SYSTEM	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>
VOLTAGE READING AT IGNITION MODULE	<input type="text"/>		VOLTS	
FLAME SIGNAL STRENGTH FROM SENSOR ( $\mu$ A microamps)	<input type="text"/>		$\mu$ A	
IS THE HEATER CONTROLLED BY A THERMOSTAT	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>
IS THE THERMOSTAT STRATEGICALLY LOCATED	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>
QUANTITY OF HEATERS IN ZONE SUPPLIED BY SINGLE TRANSFORMER	<input type="text"/>		Total	
RATING OF THE ZONE TRANSFORMER (VA Volt-Amps)	<input type="text"/>		VA	
TOTAL LENGTH OF LOW VOLTAGE WIRING	<input type="text"/>		FEET	
GAUGE OF THE LOW VOLTAGE WIRING	<input type="text"/>		GAUGE	
IS THE HEATER ELECTRICALLY GROUNDED	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>
THIS HEATER TEST FIRED WITHOUT MALFUNCTION	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>

- **COMPLETE THIS COMMISSIONING REPORT AND FILE THIS MANUAL AT SITE FOR FUTURE REFERENCE**
- **INSTRUCT THE END USER THAT THIS MANUAL MUST BE KEPT SECURE**

## 21. HIGH ALTITUDE INSTALLATION / DERATION

***This heater not to be installed at altitude above 6,800 feet.***

**USA:** The factory installed orifice for this appliance is approved for altitudes **zero to 2000 feet** above sea level. When installed **above 2000 feet**, refer to information below.

When this appliance is installed above the standard altitude stipulated the input must be de-rated by 4% for each 1000 ft above sea level. The orifice must be changed according to the chart below - confirm the correct model. Check with your local utility regarding the gas supply and the de-rating of this appliance.

MODEL	USA: FOR USE AT ALTITUDES ABOVE (FEET) Gas Orifice Drill Size <sup>1</sup> / Part #						
	Supplied	USA ORIFICE DERATION					
	0	> 2000	> 3000	> 4000	> 5000	> 6000	DO NOT INSTALL AT ALTITUDE ABOVE 6,800 FEET
RSE1S35XX (NG)	38 DMS	41 DMS	42 DMS	42 DMS	43 DMS	43 DMS	
	906000025	906000159	906000160	906000160	906000161	906000161	
RSE1S35XX (LPG)	50 DMS	52 DMS	53 DMS	53 DMS	53 DMS	53 DMS	
	906000026	906000167	906000143	906000143	906000143	906000143	
RSE1S50XX (NG)	31 DMS	32 DMS	32 DMS	32 DMS	33 DMS	34 DMS	
	906000137	906000154	906000154	906000154	906000155	906000156	
RSE1S50XX (LPG)	46 DMS	48 DMS	48 DMS	49 DMS	49 DMS	49 DMS	
	906000141	906000164	906000164	906000165	906000165	906000165	
RSE2S50XX (NG)	31 DMS	32 DMS	32 DMS	32 DMS	33 DMS	34 DMS	
	906000137	906000154	906000154	906000154	906000155	906000156	

<sup>1</sup> Per ANSI Z223.1 (NFPA 54)



## 22. CONTROL ACCESSORIES

### Two-Stage Illuminated Switch Gang Assemblies (24Vac capacity):

- One or a combination of these switch gangs is required to control 2-stage heaters

**NOTE: Required Switch Sequence Off-On-On is not readily available in the market**

- Illuminated switches indicate low or high stage operation at a glance
- Each switch gang controls from 1 to 4 two-stage heaters in a zone
- Combine switch gang assemblies/sizes to achieve optimum control
- Brushed stainless steel switch plates
- Standard electrical box supplied to suit each size
- Factory wired
- *Heater & switch control wiring diagrams - Pages 34 & 35*
- *Field supplied 120/24Vac transformer required upstream of switch gang assembly*



903000006 Single Switch Gang Assembly: Control from 1 to 4 Two-Stage Heaters in one Zone



903000007 Double Switch Gang Assembly:

- Control 2 to 8 Two-Stage Heaters
- 2 Zones with up to 4 heaters/zone



903000008 Triple Switch Gang Assembly:

- Control 3 to 12 Two-Stage Heaters
- 3 Zones with up to 4 heaters/zone

### Remote Control Options: Single-Stage Heaters only - See details pages 23 to 28

Order items separately



903000030 Remote Receiver Kit (field installed in heater)



903000031 4-Button Remote Handset Transmitter



903000032 Wireless Keypad Transmitter  
(wall mounted at patio)

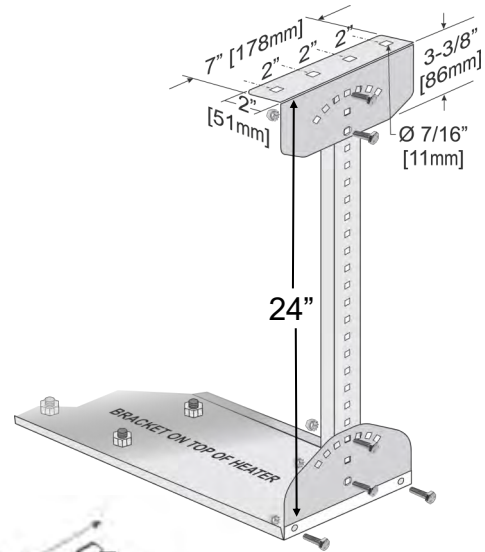


## Heater Mounting Hardware Options - Refer to pages 11 to 15 for details

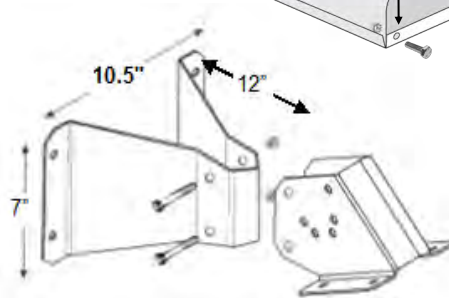
**NOTE: MOUNT HEATER AT MAXIMUM 30° ANGLE TO AVOID DAMAGE**

### 903000009 CEILING MOUNT BRACKET KIT

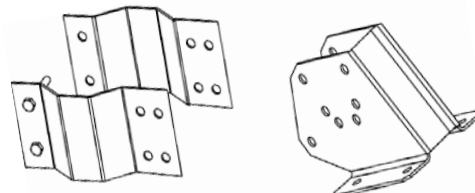
- Mounts directly to top of the heater.
- Allows rotation of the channel arm up to 45° from ceiling bracket, and/or mounting to a sloped ceiling.
- Allows angle mount of heater up to 30°



### 903000022 WALL MOUNTING BRACKET



### 903000026 POST MOUNTING BRACKET (includes nuts/bolts hardware for post clamp)



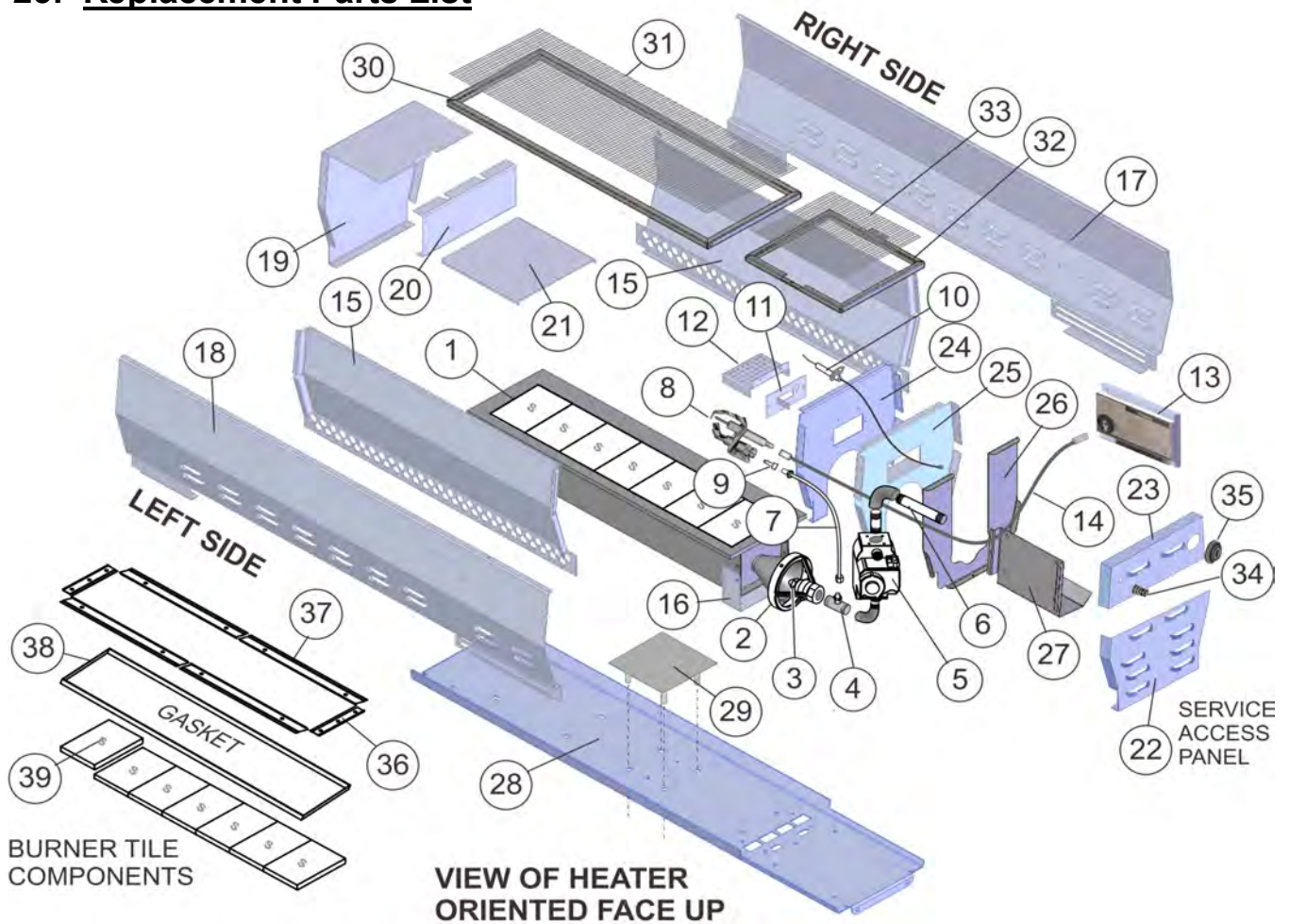
### 903000028 WALL MOUNTING ARM KIT



### 903000012 3/8" X 24" BLACK OUTDOOR FLEXIBLE GAS CONNECTOR



## 23. Replacement Parts List



REPLACEMENT PARTS LIST		ORDER QUANTITY	RSE1S35XX	RSE1S50XX, RSE2S50XX
#	PART NAME		PART #	PART #
1	Burner Body with Tiles Mounted	1	906000023	906000146
2	Orifice holder	1	906000024	906000024
3	Orifice - NG	1	906000025	906000137
	Orifice - LPG	1	906000026	906000141
4	1/2" x 3" Pipe Nipple with Pilot Nipple	1	906000027	906000027
5	Gas valve - Single-Stage - Natural Gas	1	906000028	906000028
	Gas valve - Single-Stage - LP Gas	1	906000029	906000029
	Gas valve - Two-Stage - Natural Gas Only	1	Not Applicable	906000149
6	1/2" x 6" Pipe Nipple	1	906000030	906000030
7	Pilot Gas Tube Assembly with Ferrules	1	906000031	906000031
8	Pilot/Igniter Assembly (NG Pilot Orifice)	1	906000032	906000032
9	LP Pilot Orifice	1	906000033	906000033
10	Flame Sensor with 30" lead	1	906000034	906000034
11	Pilot/Igniter/Sensor Bracket	1	906000035	906000035

REPLACEMENT PARTS LIST		ORDER QUANTITY	RSE1S35XX	RSE1S50XX, RSE2S50XX
#	PART NAME		PART #	PART #
12	Pilot Flame Shield	1	906000036	906000036
13	DSI control FENWAL	1	905000015	905000015
14	Spark Wire - High Voltage	1	905000016	905000016
15*	Interior Heat Shield (one each side)	Each	909000043	909000043
16*	Burner Mounting Saddle (one each end)	Each	906000037	906000037
20	Interior Burner End Plate	1	906000038	906000038
21	Horizontal Spacer Plate 2135	1	909000044	Not Applicable
24	Interior Component End Heat Shield	1	909000045	909000045
25	Burner Side Divider	1	906000039	906000039
26	Control Heat Shield Divider	1	909000046	909000046
27	Control Bracket / Weather Shield	1	909000047	909000047
28	Hanging Support Bracket (316 Marine Grade S/S)	1	909000048	909000048
29	Mounting Bracket Adapter	1	909000049	909000049
31	Burner Screen	1	906000040	906000150
33	Control Screen	1	909000050	909000050
34	Wire Grommet	1	909000051	909000051
35	Gas Supply Grommet	1	906000041	906000041
36*	End Tile retainer - One Each End	Each	909000052	909000052
37*	Side Tile retainer - Two Each Side	Each	909000053	Not Applicable
38	Gasket Set	1	906000042	Not Applicable
39*	Ceramic tile	Each	906000043	906000043

\* SOLD INDIVIDUALLY: Order Quantity Required

STANDARD BLACK FINISH - ENCLOSURE PARTS			RSE1S35XX	RSE1S50XX, RSE2S50XX
17	Right Exterior Panel (316 Marine Grade S/S)	1	909000054	909000054
18	Left Exterior Panel (316 Marine Grade S/S)	1	909000055	909000055
19	Burner End Plate (316 Marine Grade S/S)	1	906000044	906000044
22	Component End Access Plate (316 Marine Grade S/S)	1	909000056	909000056
23	Component End Fixed Plate (316 Marine Grade S/S)	1	909000057	909000057
30	Burner Screen Frame Kit (Frame + Rivets)	1	906000045	906000151
32	Control Screen Frame Kit (Frame + Rivets)	1	909000058	909000058

STAINLESS STEEL FINISH - ENCLOSURE PARTS			RSE1S35XX	RSE1S50XX, RSE2S50XX
17	Right Exterior Panel (316 Marine Grade S/S)	1	909000059	909000059
18	Left Exterior Panel (316 Marine Grade S/S)	1	909000060	909000060
19	Burner End Plate (316 Marine Grade S/S)	1	906000046	906000046
22	Component End Access Plate (316 Marine Grade S/S)	1	909000061	909000061
23	Component End Fixed Plate (316 Marine Grade S/S)	1	909000062	909000062
30	Burner Screen Frame Kit (Frame + Rivets)	1	906000047	906000047
32	Control Screen Frame Kit (Frame + Rivets)	1	906000048	906000048

## NOTES

# NOTES

# NOTES

# Rinnai America Corporation

103 International Drive  
Peachtree City, GA 30269  
Tel. 1-800-621-9419  
Web. [www.rinnai.us](http://www.rinnai.us)  
[www.rinnai.ca](http://www.rinnai.ca)

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2/2021