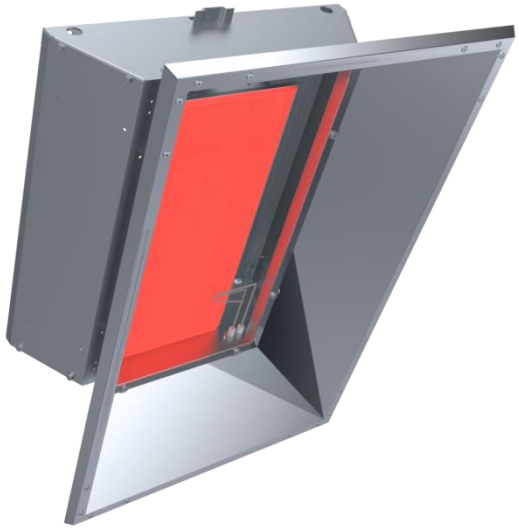
INFRARED HEATER

SUPERIOR RADIANT PRODUCTS

SERIES SDE

CE 0085



WARNING

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

FOR YOUR SAFETY

Do not store or use flammable vapors and liquids in the vicinity of this or any other appliance.
If you smell gas:
1. Open windows
2. Don't touch electrical switches
3. Extinguish any open flame
4. Immediately call your gas supplier

OWNER

Retain this Manual & ensure available for service.
Improper installation, adjustment, alteration, service, or maintenance can cause injury, death, or property damage.
Read the installation, operation, and service instructions thoroughly before installing or servicing this equipment.

INSTALLER

Provide Manual to Owner upon completion of installation!

Read and thoroughly understand these Instructions before attempting any installation

563 Barton Street, Stoney Creek, Ontario L8E 5S1, CANADA
www.superiorradiant.com

CAUTION: FIRE OR EXPLOSION HAZARD

Maintain clearance to combustible constructions as further specified in this manual. Failure to do so could result in a serious fire hazard. Heaters should not be located in hazardous atmospheres containing flammable vapors or combustible dusts. Signs should be provided in storage areas specifying maximum safe stacking height.

CAUTION: MECHANICAL HAZARD

This equipment is designed and approved for indoor use only.

CAUTION: FIRE OR EXPLOSION HAZARD

This heater is equipped with an automatic ignition device. Do not attempt to light the burner by hand. Failure to comply could result in a serious fire and personal injury hazard.

CAUTION: MECHANICAL HAZARD

Do not use high pressure (above 60 mbar) to test the gas supply system with the burners connected. Failure to do so could result in damage to the burner and its control components requiring replacement.

CAUTION: SERVICE LIFE RISK

Do not install equipment in atmospheres containing halogenated hydrocarbons or other corrosive chemicals. High intensity heaters are not recommended for installation in enclosed swimming pool areas. Failure to do so may lead to premature equipment failure and will invalidate the warranty.

CONTENTS

INTRODUCTION

Superior Radiant Products is a company in the infrared heating industry founded on the principles of product quality and customer commitment.

Quality commitments are evidenced by superior design, a regard for design detail, and an upgrade of materials wherever justifiable.

Customer commitment is apparent through our ready responses to market demands and a never ending training and service support program for and through our distributor network.

Superior Radiant offers more than 20 years of infrared expertise in a cost effective radiant heater design as culmination of that commitment.

Series SDE model is a high intensity infrared heater.

Important

The manufacturer's instructions, the layout drawing, national and local codes and ordinances, and all applicable standards which apply to gas piping and electrical wiring comprise the basic information needed to complete the installation. These criteria must be thoroughly understood before proceeding.

Only personnel who have been trained and understand all applicable codes should undertake the installation.

Codes and Regulations

SDE Series radiant heater is designed and manufactured according to EN 419-1 "Non-domestic gas-fired overhead luminous radiant heaters".

This appliance must be installed in accordance with the rules in force. It shall be used in a space ventilated in accordance with the requirements of EN 13410 "Gas-fired overhead radiant heaters - Ventilation requirements for non-domestic premises". Consult the instructions before installation and use of this appliance.

Every heater is subjected to a function test prior to leaving the factory and is pre-set for the relevant type of gas.

The following regulations and directives are to be considered for the installation and operation of radiant heating systems.

EN 60335-1, Household and similar electrical appliances - Safety - Part 1: General requirements

EN 60335-2-102: Household and similar electrical appliances - Safety - Part 2-102: Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections.

EN 12831, Heating systems in Buildings.

This heater is **NOT** approved for use in residential dwellings.

GENERAL SPECIFICATIONS

Gas Supply

Supply Pressure

	Minimum	Nominal	Maximum
Natural Gas:	17.5 mbar	20 mbar	25 mbar
Propane:	28 mbar	37 mbar	50 mbar

Manifold Pressure

Natural Gas:	15 mbar
Propane:	25 mbar

Inlet Connection

1/2” female BSP

Electric Supply

Alternating current Voltage 230 V, 50 HZ with L, N and PE
Power consumption 12 W

CONFIGURATION

Model #		SDE10	SDE20	SDE30	SDE40	SDE45
Nominal Input (kW gross)	Natural Gas	10.5	20	31	41	45
	Propane	9	17	26.5	33.5	n/a

DIMENSIONAL CHARTS

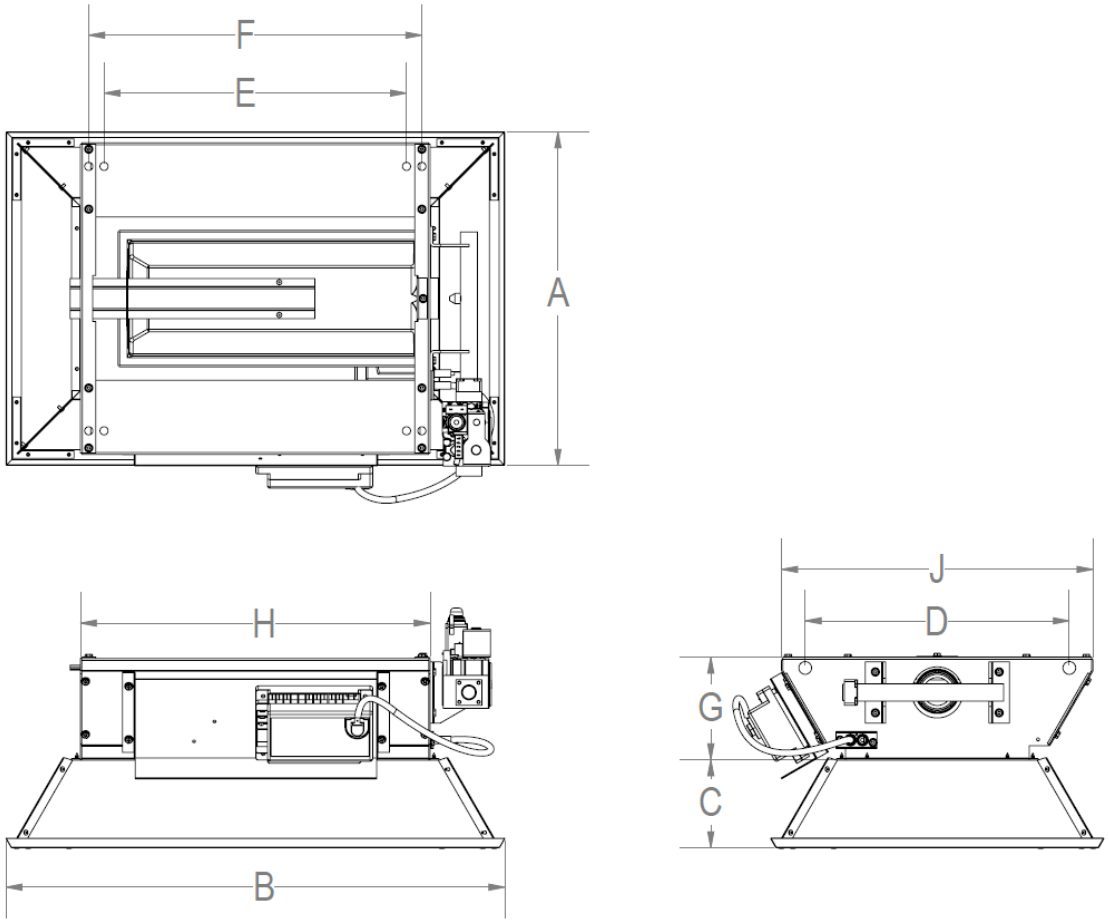


Figure 1: Overall Dimensional Information

Model #		SDE10	SDE20	SDE30	SDE40	SDE45
DIMENSION (mm)	A	414	587	762	937	937
	B	620	620	620	620	620
	C	107	107	107	107	107
	D	328	503	678	854	854
	E	376	376	376	376	376
	F	414	414	414	414	414
	G	127	127	127	127	127
	H	434	434	434	434	434
	J	386	561	737	912	912
Injector Size (mm)	Natural Gas	2.44	2.44	2.44	2.44	2.58
	Propane Gas	1.61	1.61	1.61	1.61	n/a
Burner Quantity		1	2	3	4	4
Shipping Weight (kg)		13.2	18.2	21.8	26.8	26.8

Table 1: Configuration Information

CLEARANCE TO COMBUSTIBLES

A general clearance of 500 mm (20”) in every direction is recommended for servicing. In addition to this, it is very important to observe the minimum clearances to combustibles at all times to avoid any possibility of property damage or personal injury.

WARNING

- Maximum allowable stacking height in storage areas should be identified with signs or appropriate markings adjacent to the thermostat or in a conspicuous location.
- Clearances to combustibles DO NOT indicate acceptable distances from PVC paneling. Refer to panel manufacturers recommendations.

Combustible materials are considered to be wood, compressed paper, plant fibers, plastics, Plexiglas, or other materials capable of being ignited and burned. Such materials shall be considered combustible even though flame-proofed, fire-retardant treated, or plastered.

Adequate clearance to sprinkler heads must be maintained.

The stated clearance to combustibles represents a surface temperature of 50°C above room temperature.
It is the installer’s responsibility to ensure that adjacent materials are protected from deterioration.

Model Number	Top	Sides	Rear	Below
	mm	mm	mm	mm
SDE10	890	710	510	1780
SDE20	1020	890	510	2030
SDE30	1270	1070	710	2540
SDE40	1370	1170	710	2800
SDE45	1530	1220	870	3410

Table 2: Minimum clearance to combustible materials

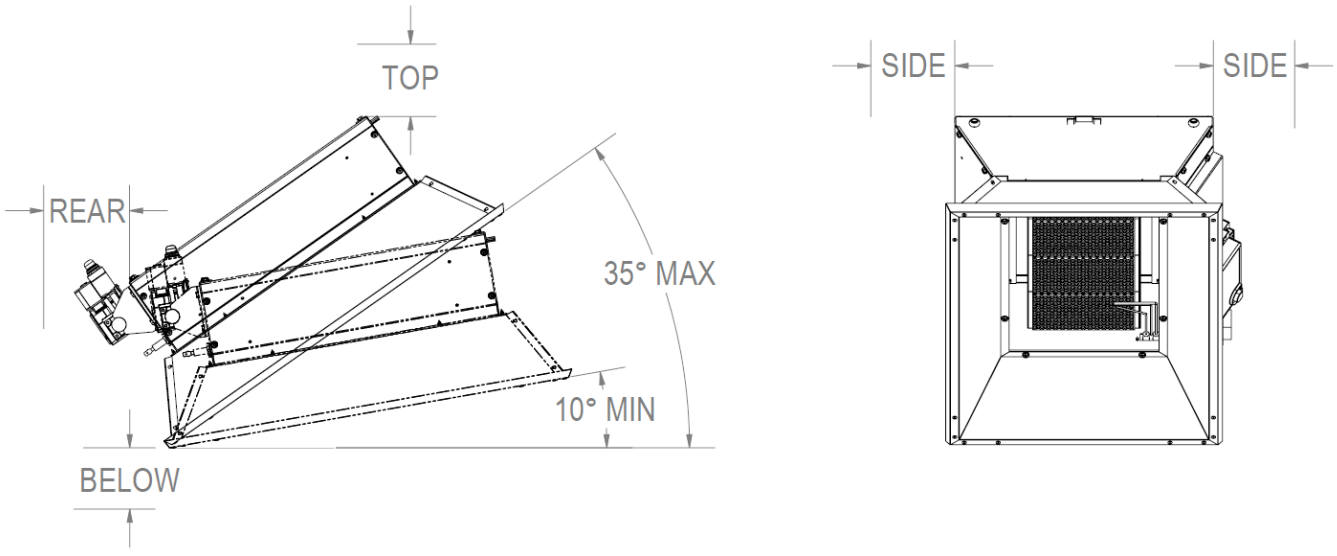


Figure 2: Clearance to Combustibles

LAYOUT RECOMMENDATIONS

Layout Considerations

1. Because high intensity heaters are un-vented, verify local codes for guidance on air supply and dilution air. Also see section on Ventilation.
2. Check local codes for mounting requirements and the requirement for flexible gas connectors or rigid mounting.
3. Do not locate heaters near windy locations such as door openings.
4. Do not locate heaters in very dusty environments.
5. Avoid placing heaters below sprinkler heads or provide more than adequate clearance.

Spot Heating

High intensity heaters are ideal for spot heating applications. The following are key considerations to the success of the application:

1. Minimize any wind in order to maximize the effect of the radiant heat.
2. Placing two smaller heaters opposing each other will be more comfortable than placing one large heater.
3. Hang the heaters back and at an oblique angle (rather than directly overhead) in order to maximize the exposure of the peoples' bodies to radiant heat.

The following charts are intended for guidance only. Specific applications may require other parameters.

Suggested Minimum Mounting Heights		
Model	Mounting Angle	
	10°	**35°**
	m	m
SDE10	3.4 – 4.0	3.1 – 3.6
SDE20	4.5 – 5.0	4.0 – 4.5
SDE30	4.9 – 5.6	4.5 – 5.2
SDE40	5.4 – 6.4	4.7 – 5.6
SDE45	5.8 – 7.0	5.2 – 6.4

Table 3. Suggested Minimum Mounting Heights

Suggested heat loading for indoor spot heating under stated conditions:

Ambient Air Temperature	W per m^2 of Floor Area to be Heated	
	At 1 km/h of wind	At 2 km/h of wind
4°C	475 - 525	525 - 575
13°C	240 - 280	270 - 315

Example:
Work counter for light assembly, space is 4.5 m x 7.6 m, ambient air temperature 4°C, located near shipping doors.
Approximately 540 W/m^2 x (4.5 x 7.6) m^2 = 18.5 kW
Two heaters at opposing locations would be preferred.

Full Building Heat

Calculate the total heat input required, ensuring the inclusion of any unheated make-up air due to exhaust fans. Use the following chart as guidance to heater placement.

Model/kW		SDE10	SDE20	SDE30	SDE40	SDE45
Heater Mounting Height, (m)	Mounting Angle 10°	3.4 – 4.6	4.6 – 6.1	6.1 – 7.6	7.6 – 9.2	9.2 – 11.6
	Mounting Angle 35°	3.1 – 3.6	4.0 – 4.9	4.9 – 6.7	5.5 – 7.9	7.3 – 9.4
Distance of first heater row from outside wall, (m)		1.9	3.1	3.7	4.3	4.9
Distance between heaters along outside wall*, (m)		2.5 – 6.1	4.6 – 9.2	6.1 – 12.2	9.2 – 15.2	12.2 – 18.3
Distance between rows – out-side wall row to next interior row, (m)		9.2 – 18.3	15.2 – 24.4	22.9 – 33.5	27.5 – 35.0	30.5 – 38.1
* Distance between heaters along interior rows should be up to twice the indicated number						

INSTALLATION

Heater Mounting

- Figure 3 illustrates typical rigid and chain mounting configurations for the Series SDE heaters; verify which is permissible by local codes.
- Heaters must be hung at an angle between 10° and 35°. Typically, at the walls they are at 35° facing into the building. The gas manifold must always be at the lower side of the heater.
- Minimum 5 mm (3/16") diameter S hooks and chain (90 kg working load) are recommended. Close S hooks after installation.
- Never use a gas line as a hanging support and never locate gas or electric lines over the heaters.
- Maintain clearance to combustibles.

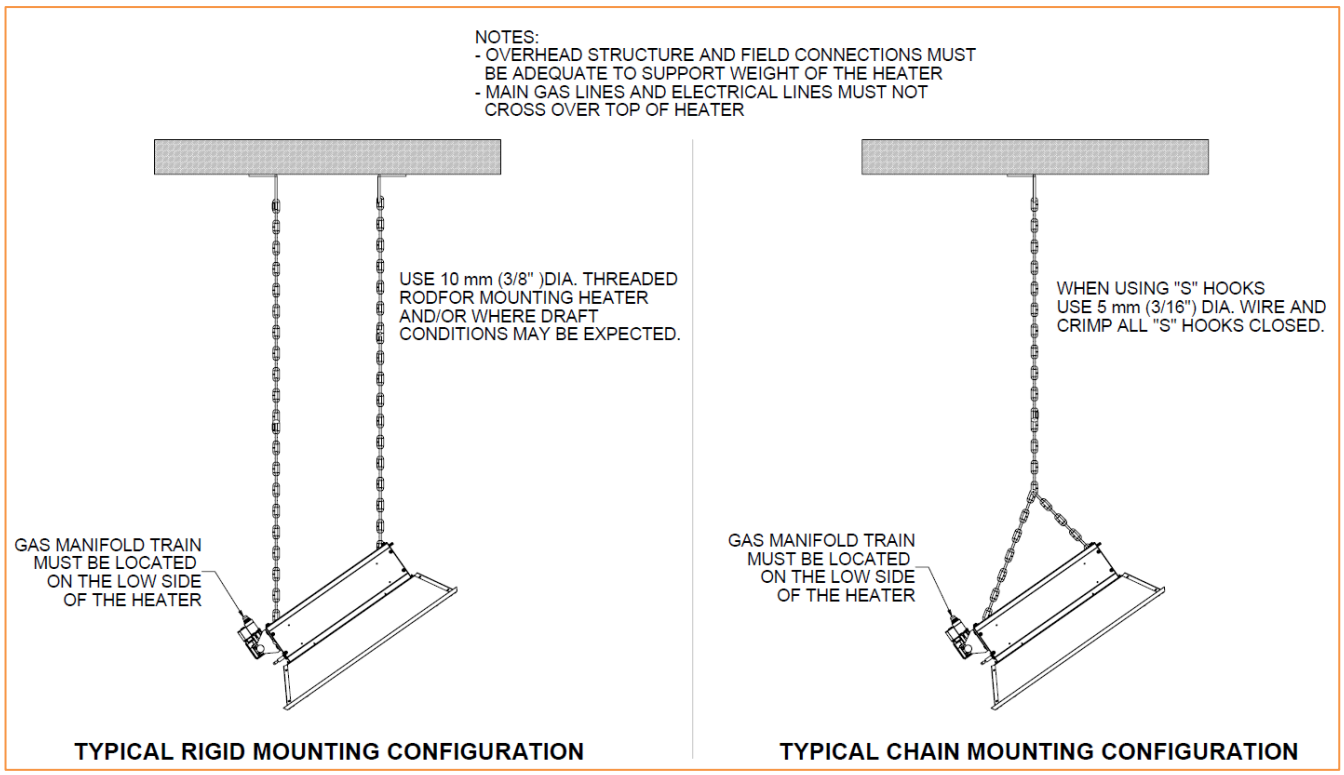


Figure 3: Mounting Configurations

Gas supply

Only personnel who have been trained and understand all applicable codes should undertake the installation.

- An isolation valve, or valves, has to be fitted immediately adjacent to the appliance which, when closed, allow(s) the complete burner and control assembly to be disconnected for maintenance or repair.
- The gas meter and service must be sufficiently large to supply gas to the connected building's gas load, including the heating equipment and any other gas fired equipment. Additionally, the gas distribution piping must be designed according to local and national ordinances.

- Before connecting burners to the gas supply system, verify that high pressure testing of the system has been completed. Failure to do so may expose the burner components to damaging high pressure, requiring replacement of key components.

- Ensure that there is a plugged tap upstream of the heater or a fitting on the valve itself to verify incoming pipeline pressure.

- Do not leave the heater connected when pressure testing the pipeline. The high pressure will damage the equipment.

- Test and confirm that inlet pressures are correct. Refer to the heater data plate and packaging to verify fuel type.

Electric

Figure 4 illustrates typical wiring arrangements for the Series SDE heater.

- A 230Volt, 50Hz, single-phase supply is required.
- All wiring must comply with I.E.E. and local authority recommendations.
- Ensure the heaters are properly grounded.
- Perform all electrical work in accordance with local codes.
- More than one heater may be operated from one thermostat. Verify thermostat electrical capacity.
- If mechanical exhaust is used in the building, it is typical to interconnect these in the heater circuit.

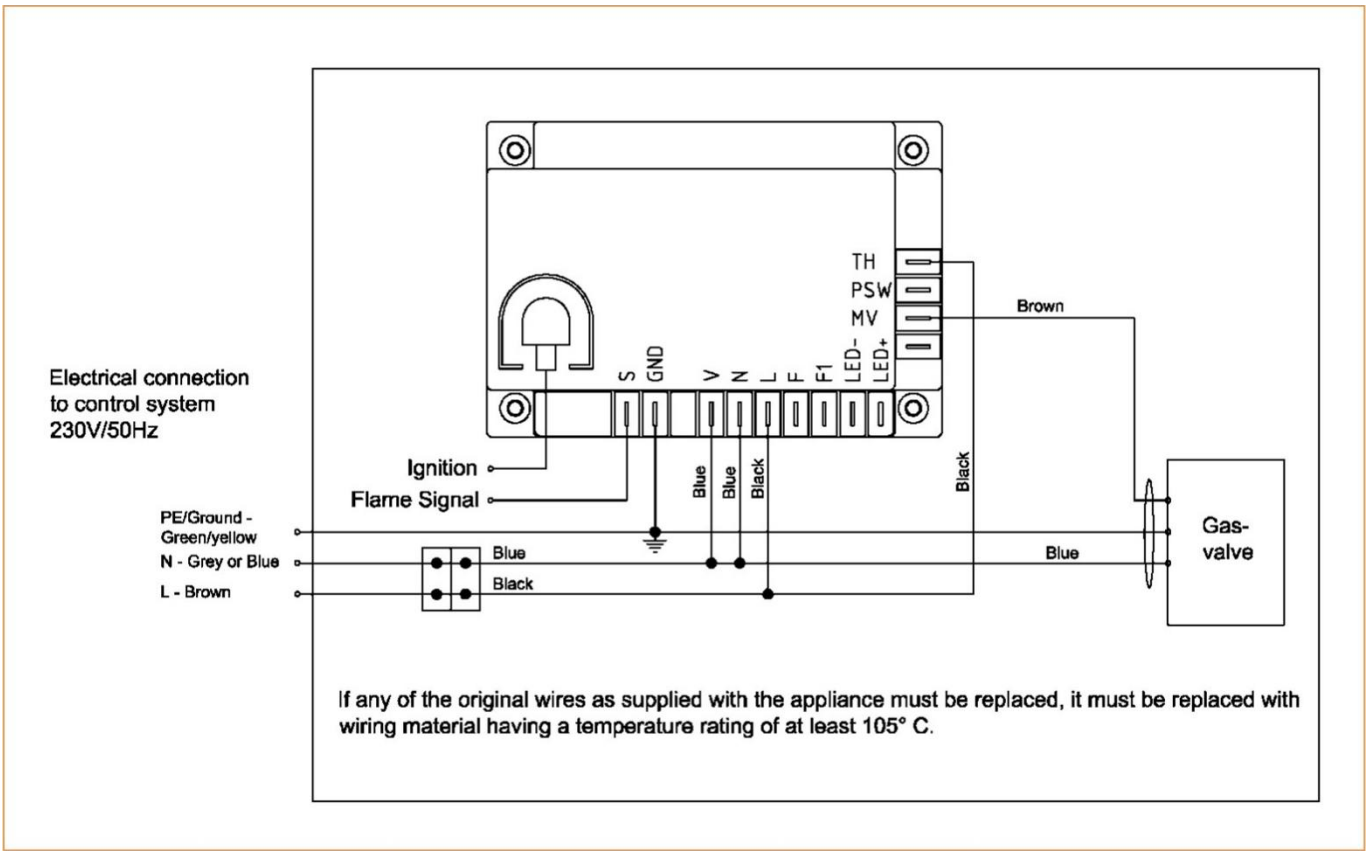


Figure 4: Wiring diagram

VENTILATION / CONDENSATION

General Requirements

The heater should be installed in accordance with the relevant provisions of National Standards and Codes of Practice in the destination country.

Heaters can be operated according to the appliance Type A, Gas appliance without flue gas system. The combustion air is taken from the installation space.

High Intensity type heaters are considered un-vented gas fired appliances, requiring ventilation to supply combustion air and dilute/remove the products of combustion.

The installation room should have a volume of at least 10m³/kw of installed nominal heat input of the radiant heater.

The ventilation requirements and calculation methods for unvented appliances are set out in the European Standards EN 13410:2001 and must be applied. The following is guidance to the standard:

Ventilation may be achieved by any of the three following different means:

a) Thermal evacuation of the products of combustion/air mixture;
b) Mechanical evacuation of the products of combustion/air mixture;
c) Natural air change.

Ventilation by Thermal Evacuation

a) The air of the room mixed with the products of combustion shall be evacuated above the radiant heaters, if possible near the ridge by means of exhaust air openings.
b) Shut down devices and restrictors at exhaust air openings are permissible if an automatic safety device ensures opening of the devices/restrictors for the safe operation of the appliances. Otherwise exhaust air openings shall not be restricted or closed.
c) The horizontal distance between a radiant heater and an exhaust air opening shall not exceed six times the exhaust air opening height (measured to the center of the opening) for wall openings and three times the exhaust air opening height (measured to the center of the opening) for roof openings.
d) Ventilation by thermal evacuation is sufficient if 10 m³/h of exhaust air per kW of operating heat input are ventilated out of the installation room.

Ventilation by Mechanical Evacuation

a) The products of combustion mixed with room air shall be evacuated from above the radiant heaters using fans.
b) It shall only be possible to operate the radiant heaters when the exhaust air evacuation is assured.
c) The number and arrangement of the fans depend on radiant heater arrangement and room geometry. The horizontal distance between a radiant heater and a fan shall not exceed six times the fan mounting height (measured to the axis of the fan) for wall mounted fans and three times the fan mounting height (measured to the axis of the fan) for roof mounted fans. The fans shall be installed above the radiant heaters, if possible near the ridge.
d) Ventilation by mechanical evacuation is sufficient if 10 m³/h of exhaust air per kW of operating heat input are ventilated out of the installation room.
e) When applicable, the exhaust air flow rate shall take into account any exhaust air flow rate required for other purposes. The fan capacity is then computed based on the higher of these air flow rates.

Ventilation by Natural Air Change

Gas-fired radiant heaters may be operated without any special exhaust system if the exhaust gases are discharged to the outside atmosphere by a sufficient natural air change in the installation room.
No provision for thermal or mechanical ventilation is required in the following particular cases:

Buildings with natural air change greater than 1.5 volumes per hour
Buildings with a density of operating heat input not greater than 5W/m³

Air Supply

Air supply openings are required to admit air and shall be located below the radiant heaters.
Exceptions are possible if the air supply openings are between the individual heaters and their location has been planned after proper evaluation of the air flow.
The sum of the unobstructed cross-sections of all air supply openings shall not be smaller than the sum of the unobstructed cross-sections of all exhaust openings.
Slits and gaps of fixed cross-section can also be used as air supply openings.
Where the air supply openings can be closed, it shall only be possible to operate the radiant heaters when they are open.

Mechanical exhaust should be electrically interconnected with the heaters and should always be installed in conjunction with inlet air openings.

Condensation

The products of combustion for natural gas and propane contain these amounts of condensation:

Type of gas	Water volume in flue gas
G 20	0.164 kg / kWh
G 31	0.123 kg / kWh

This may add substantial amounts of moisture to the building air environment and may cause some condensation on cold surfaces within the building. This is particularly true for poorly insulated metal roof decks or structural steel framing.

- To decrease condensation, increase mechanical ventilation.
- Ensure that continuous waterproof barriers are used on the inside of all insulated surfaces.
- Ensure that exhausters pull air from the entire space and across the condensing surface.
- Humidistat controls may be integrated into the electrical control circuit of the heaters.

COMMISSIONING / OPERATION / MAINTENENCE

Commissioning

1. Ensure that the service cock to the heater is OFF.
2. Purge air from gas supply.
3. Connect pressure gauge on the test point screw (located on the gas valve).
4. Open the service cock and check supply line from cock to combination valve for leak-tightness.
5. Check gas supply pressure in accordance with relevant standards. If supply pressure is not in the specified range, stop commissioning.
6. Check all electrical connections and that the unit has a sound earth connection.
7. Switch on the power to the heater.
8. The combination gas valve opens and the heater will come into operation.
9. Check heater operating manifold pressure (15 mbar for natural gas or 25 mbar for propane).
10. If the manifold pressure is not correct, then it may be necessary to re-adjust (see setting manifold pressure).
11. When the correct pressure is measured, switch off the heater.
12. Remove pressure gauge. Replace and ensure test screw is tight and leak tested.
13. Check to ensure that the thermostat starts and shuts down the system.

Operation

Open all gas cocks to the heaters and electrically energize the system.

Follow the instructions on the heater's Lighting Instructions Label.

Control Operating Sequence—Direct Spark Ignition

1. The thermostat calls for heat.
2. The combination gas valve opens and the spark igniter sparks in an attempt to light the fuel at the face of the ceramic. The spark will continue for 10 seconds
3. Once flame is established, (prior to complete steady-state conditions), the flame sensor signals the module and sparking stops. If the burner does not light in 10 seconds, the system will lockout, i.e. electric energy to the gas valve and electronic module is cut. Number of trials for ignitions – three. The lighting sequence may be reset by an interruption of the electric power supply.
4. Once operating, the heater will continue to do so until the thermostat is satisfied; shutting off the gas valve.

Annual Maintenance

1. Close the fuel gas valve and de-energize electrical power to the heater.
2. With an air hose regulated to no more than 100 kPa blow away accumulated dust. Blow across the face of the ceramic tiles, not directly at them. Blow into each venturi for about one minute.
3. Verify that there are no cracked tiles.
4. Review the wiring for any loose connections.

Conversion heater to another gas

1. Disconnect electrical supply to the heater.
2. Turn off gas supply to the heater.
3. Check for correct injector size.
4. Remove old injector from heater.
5. Install and tighten new injectors supplied. Use suitable pipe sealant for injectors.
6. Convert the gas valve.
7. Turn on gas supply.
8. Check for gas leaks.
9. Connect electrical supply to the heater.
10. Check heater input and manifold pressure to meet specifications.
11. Amend the heater rating plate to show that the heater has been adjusted to another gas.

Injector Sizes

Model #		SDE10	SDE20	SDE30	SDE40	SDE45
Nominal Input (kW)	Natural Gas	10.5	20	31	41	45
	Propane Gas	9	17	26.5	33.5	n/a
Injector Size (mm) (#)	Natural Gas	2.44 (#41)	2.44 (#41)	2.44 (#41)	2.44 (#41)	2.58 (#38)
	Propane Gas	1.61 (#52)	1.61 (#52)	1.61 (#52)	1.61 (#52)	n/a
Burner Quantity		1	2	3	4	4

Conversion from Natural Gas to Propane

1. Remove the injector and replace it with the alternative injector supplied with conversion kit. Check that the size reference marked on the injector agrees with that listed in the Specifications table for the heater model.
2. Adjust the manifold pressure, check supply and manifold pressure in accordance with specs.
3. Affix the gas adjustment label (Propane 37mbar) supplied with conversion kit onto the rating Plate, adjacent to the headings "Adjusted For" and "Setting Pressure", to cover the original gas adjustment label (Natural Gas, 20mbar).
4. Remove the burner head No1, closest to the igniter. Replace with burner head PN SG061 supplied with the kit.

Conversion from Propane to Natural Gas

1. Remove the injector and replace it with the alternative injector supplied with conversion kit. Check that the size reference marked on the injector agrees with that listed in the Specifications table for the heater model.
2. Adjust the manifold pressure, check supply and manifold pressure in accordance with specs.
3. Affix the gas adjustment label (Natural Gas, 20mbar) supplied with conversion kit onto the Data Label adjacent to the headings, "Adjusted For" and "Setting Pressure" to cover the original gas adjustment label (Propane, 37mbar).
4. No need to change the first burner head.

Adjusting the manifold pressure

S.I.T gas valve

Check inlet and outlet pressure using the pressure test points provided. After testing, carefully seal test points with the provided screw.

1. Remove the protective plug A.
2. Screw in the screw B to increase the pressure and screw it out to decrease it.
3. After setting put back the protective plug.

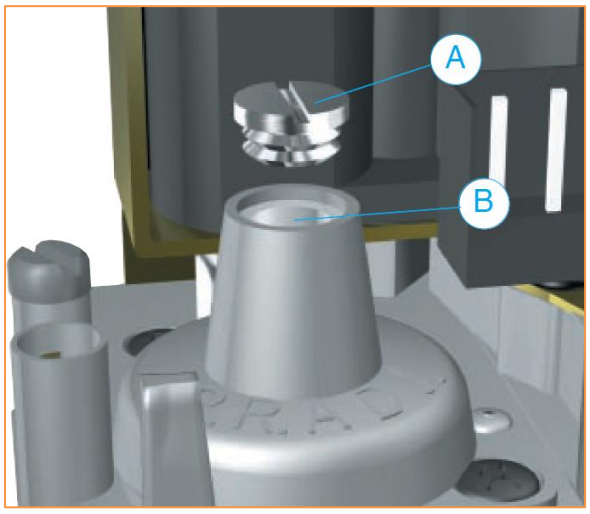


Figure 5: Pressure adjustment

Honeywell gas valve

1. Open manifold pressure test screw, connect measuring device
2. Take off cap from pressure controller
3. Switch on heater
4. Turn pressure controller screw
5. Turn right - pressure increases / turn left - pressure decreases
6. Set the specified manifold pressure
7. Cover pressure controller with cap
8. Close test screw

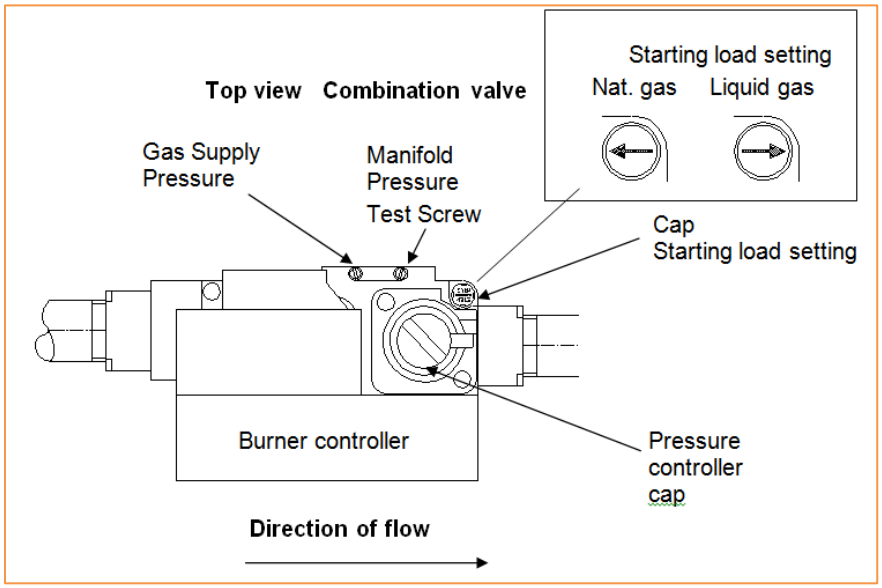
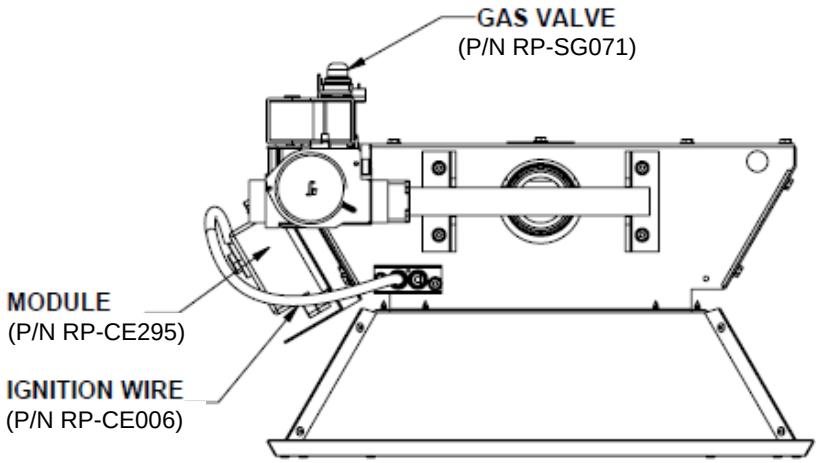


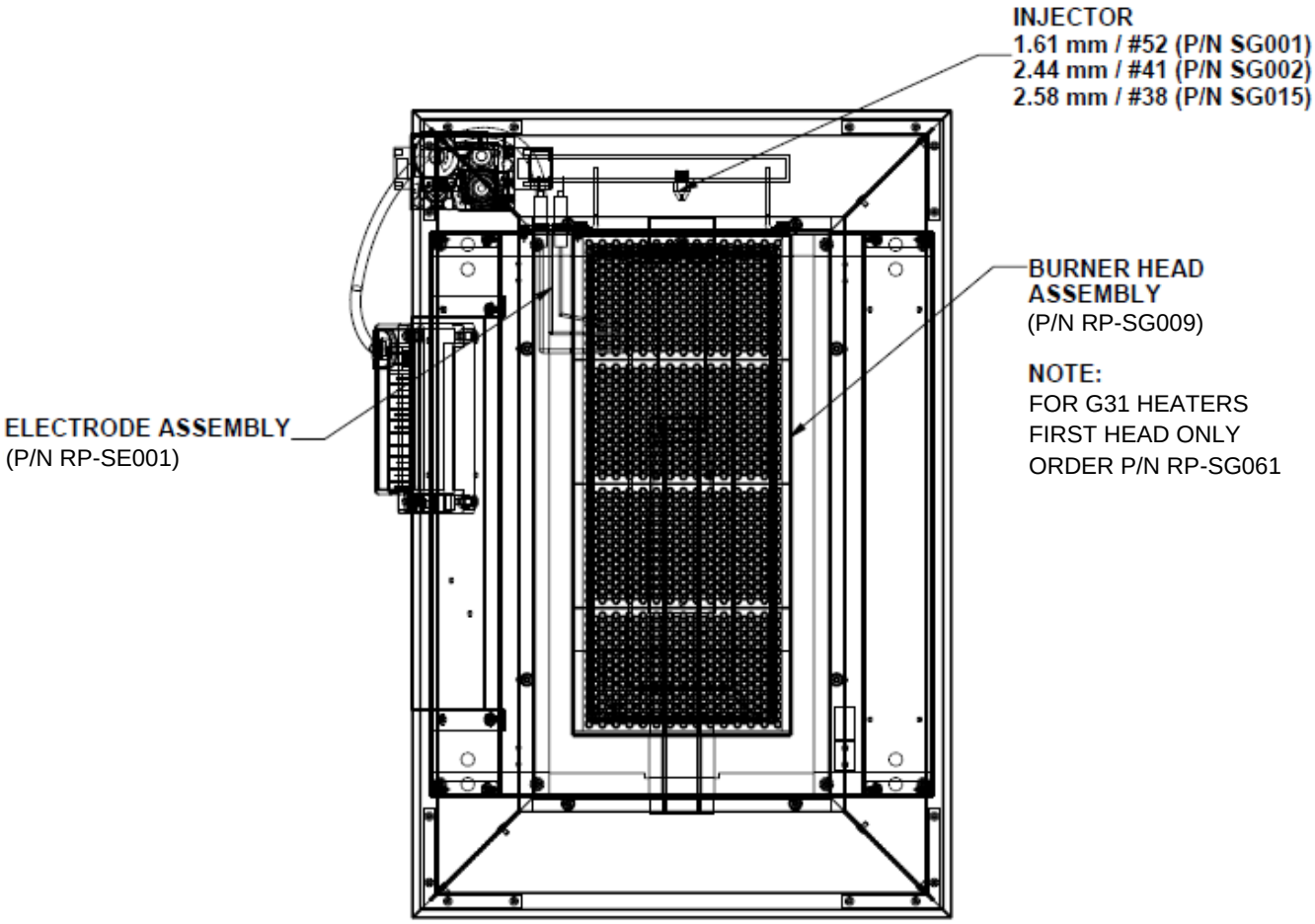
Figure 6

SERVICING - TROUBLESHOOTING

Symptom	Possible Cause	Corrective Action
Heater will not turn off	Defective thermostat Stuck solenoid valve	Repair or replace Repair or replace
Gas Odor	Loose pipe connection	Verify all connections are sealed by using an appropriate leak test
Burning of gas/air mixture inside venturi (flashback)	Cracks between or across ceramic grids Excessive drafts	Replace burner head assembly Shield or relocate heater
Heater Cycles on/off	Excessive drafts Flame sense not grounded Low gas pressure	Shield or relocate heater Verify wiring and correct Verify and correct
Low surface temperature on ceramic surface	Dirty or plugged ceramics Low inlet gas pressure Misaligned manifold/orifice Insufficient gas supply	See cleaning maintenance Verify and correct Replace manifold Verify capacity of fuel supply lines
No spark, no ignition	No power to control module Control module defective No power to spark electrode No equipment ground	Verify and correct/replace
Heater sparks, but will not light	No gas supply Defective gas valve solenoid Defective electronic control	Check shut off valve and combination gas valve Verify and correct/replace
Heater lights, but 'locks out' after about 10 seconds	Poor ground Reversed polarity on electric supply Sense electrode not sensing flame Defective electronic control	Verify and correct/replace Check continuity of sense electrode Verify and/or replace

REPLACEMENT PARTS





TECHNICAL DETAILS

	Heat Input (kW)		Injector	Weight	Dimensions (mm)		
Model	Gross	Net	mm (#)	kg	L	W	H
Natural Gas							
SDE10	10.5	9.5	2.44 (#41)	13.2	620	414	234
SDE20	20.0	18.0	2.44 (#41)	18.2	620	587	234
SDE30	31.0	28.0	2.44 (#41)	21.8	620	762	234
SDE40	41.0	37.0	2.44 (#41)	26.8	620	937	234
SDE45	45.0	40.5	2.58 (#38)	26.8	620	937	234
Propane							
SDE10	9.0	8.0	1.61 (#52)	13.2	620	414	234
SDE20	17.0	15.0	1.61 (#52)	18.2	620	587	234
SDE30	26.5	24.0	1.61 (#52)	21.8	620	762	234
SDE40	33.5	30.0	1.61 (#52)	26.8	620	937	234

TECHNICAL DETAILS – ErP Directive

Information required for eco-design (ErP) Directive 2009/125

Model			SDE10	SDE20	SDE30	SDE40	SDE45

Natural Gas

Heat Input (Net)	P_{nom}	kW	9.5	18.0	28.0	37.0	40.5
Heat Input (Gross)	P_{nom}	kW	10.5	20.0	31.0	41.0	45.0
Useful Efficiency (GCV)	$\eta_{th,nom}$	%	85.6	85.6	85.6	85.6	85.6
Envelope Loss Factor	F_{env}	%	n/a	n/a	n/a	n/a	n/a
Control type			Single Stage				
Electrical Power Consumption	el_{max}	kW	0.012	0.012	0.012	0.012	0.012
	el_{sb}	kW	0	0	0	0	0
Ignition losses	P_{pilot}	kW	n/a	n/a	n/a	n/a	n/a
NOx seasonal (GCV)		(mg/kWh)	18	11	15	22	22
Seasonal Space Heating Energy Efficiency (minimum Eco-design requirements)	η_s	%	85%	85%	85%	85%	85%

Propane

Heat Input (Net)	P_{nom}	kW	8.0	15.0	24.0	30.0	
Heat Input (Gross)	P_{nom}	kW	9.0	17.0	26.5	33.5	
Useful Efficiency (GCV)	$\eta_{th,nom}$	%	85.6	85.6	85.6	85.6	
Envelope Loss Factor	F_{env}	%	n/a	n/a	n/a	n/a	
Control type			Single Stage				
Electrical Power Consumption	el_{max}	kW	0.012	0.012	0.012	0.012	
	el_{sb}	kW	0	0	0	0	
Ignition losses	P_{pilot}	kW	n/a	n/a	n/a	n/a	
NOx seasonal (GCV)		(mg/kWh)	29	14	14	20	
Seasonal Space Heating Energy Efficiency (minimum Eco-design requirements)	η_s	%	85%	85%	85%	85%	