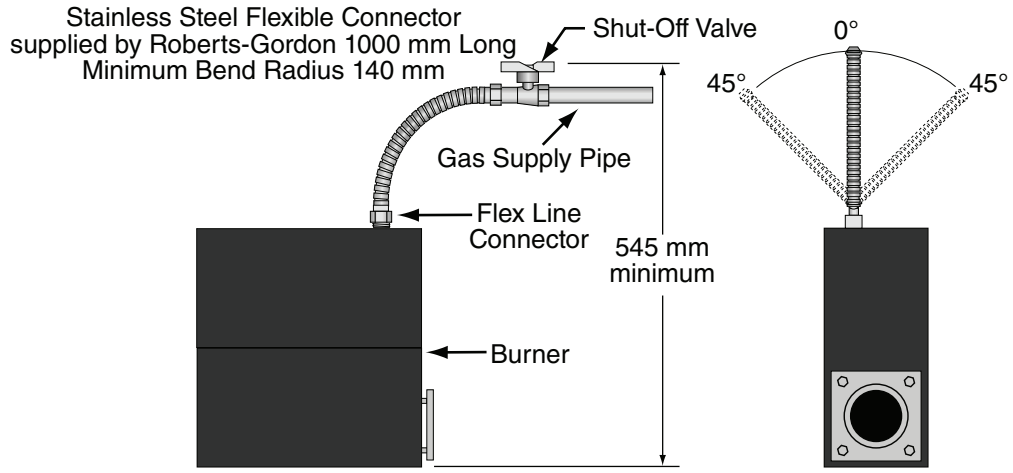
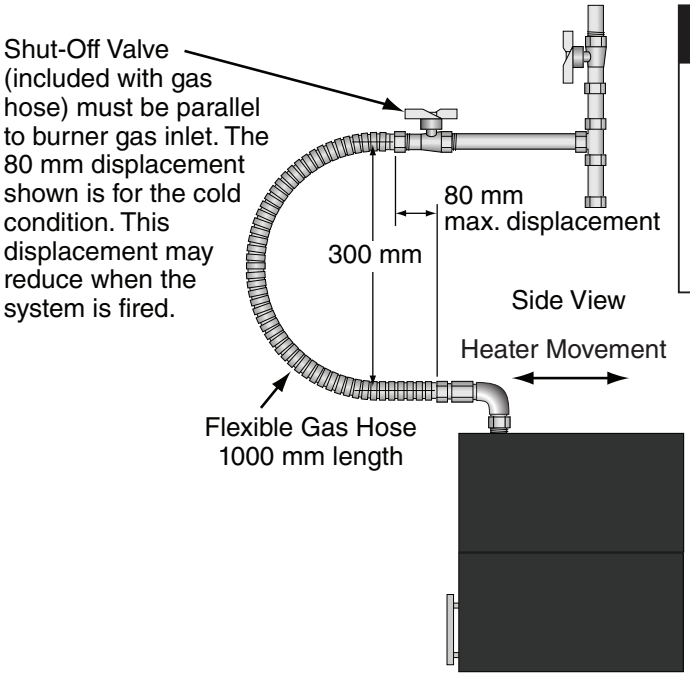
Figure 34: Gas Connection with Stainless Steel Flex Connector

CORRECT POSITIONS





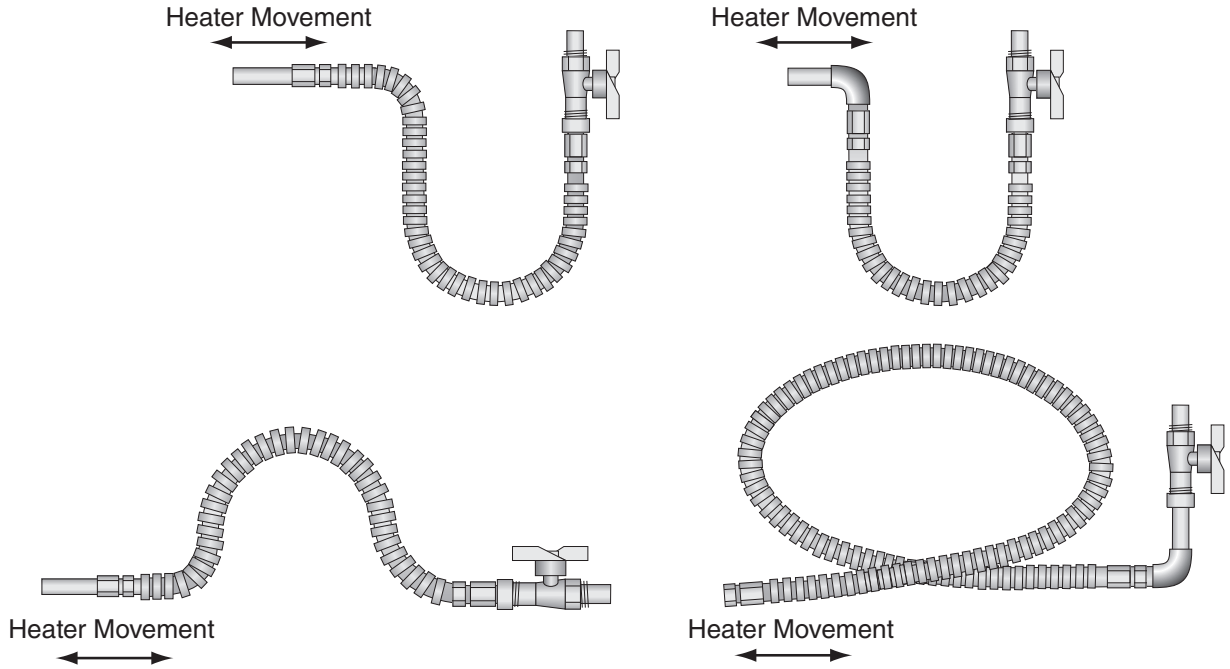
⚠ CAUTION

Product Damage Hazard

Hold gas nipple securely with pipe wrench when attaching gas hose.

Failure to follow these instructions can result in product damage.

INCORRECT POSITIONS (WRONG INSTALLATION)

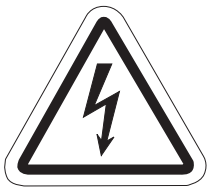


SECTION 13: WIRING

All electrical wiring must be carried out an accordance with AS/NZS 3000-2007 as amended.

Basic appliance wiring installation is detailed in the following page.

⚠ DANGER



Electrical Shock Hazard

Disconnect electric before service.

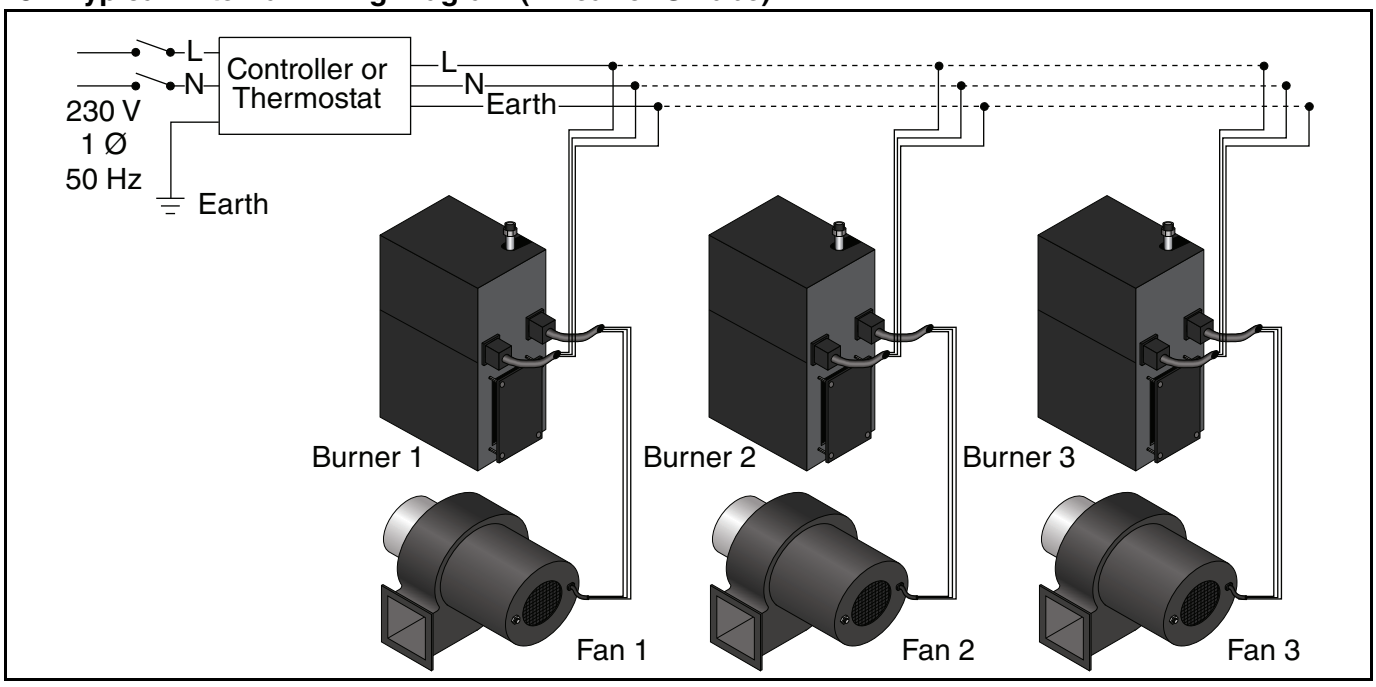
Heater must be properly grounded.

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

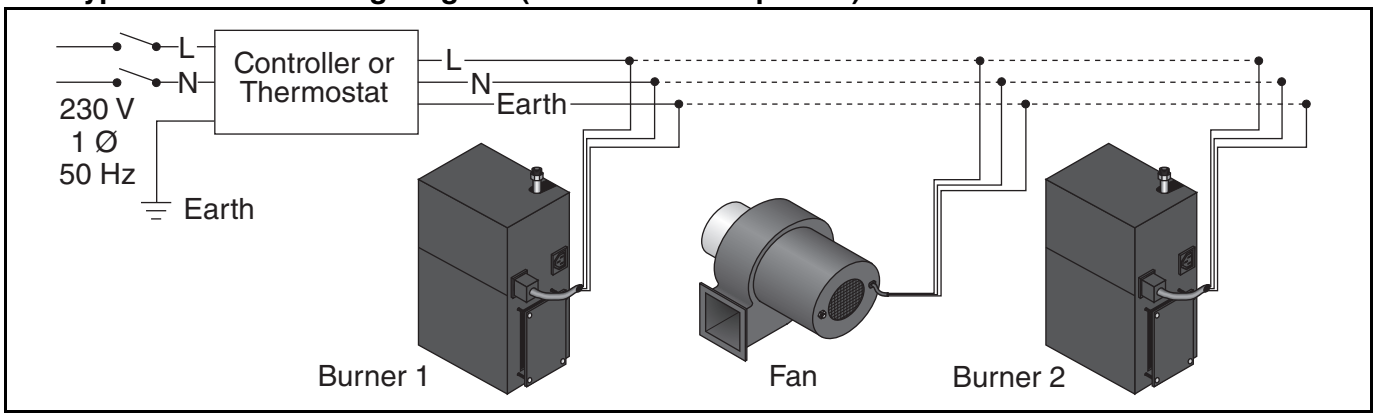
Connect to the electrical supply using a 3 pin plug via a locally mounted double pole fused switch having a minimum disconnection of 3 mm on each pole. This switch should be fused to 3 amps. The burner is fused at 2 amps. There are no control connections in the standard burner. Control is affected by interruption of the main power inlet. *See Page 55, Section 13.1 through Page 56, Section 13.4* for the external wiring details for the single-burner, double linear and multiburner heater systems.

All wiring must comply with current wiring regulations and any local regulations which may apply. Always switch off the supply to the burner and disconnect by removing the plug before removing the burner side panel.

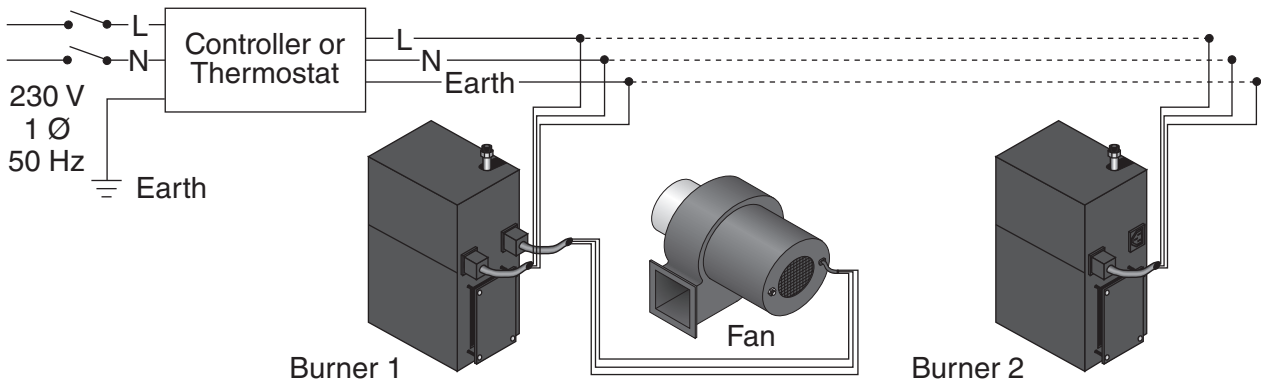
13.1 Typical External Wiring Diagram (Linear or U-Tube)



13.2 Typical External Wiring Diagram (Double Linear Option 1)



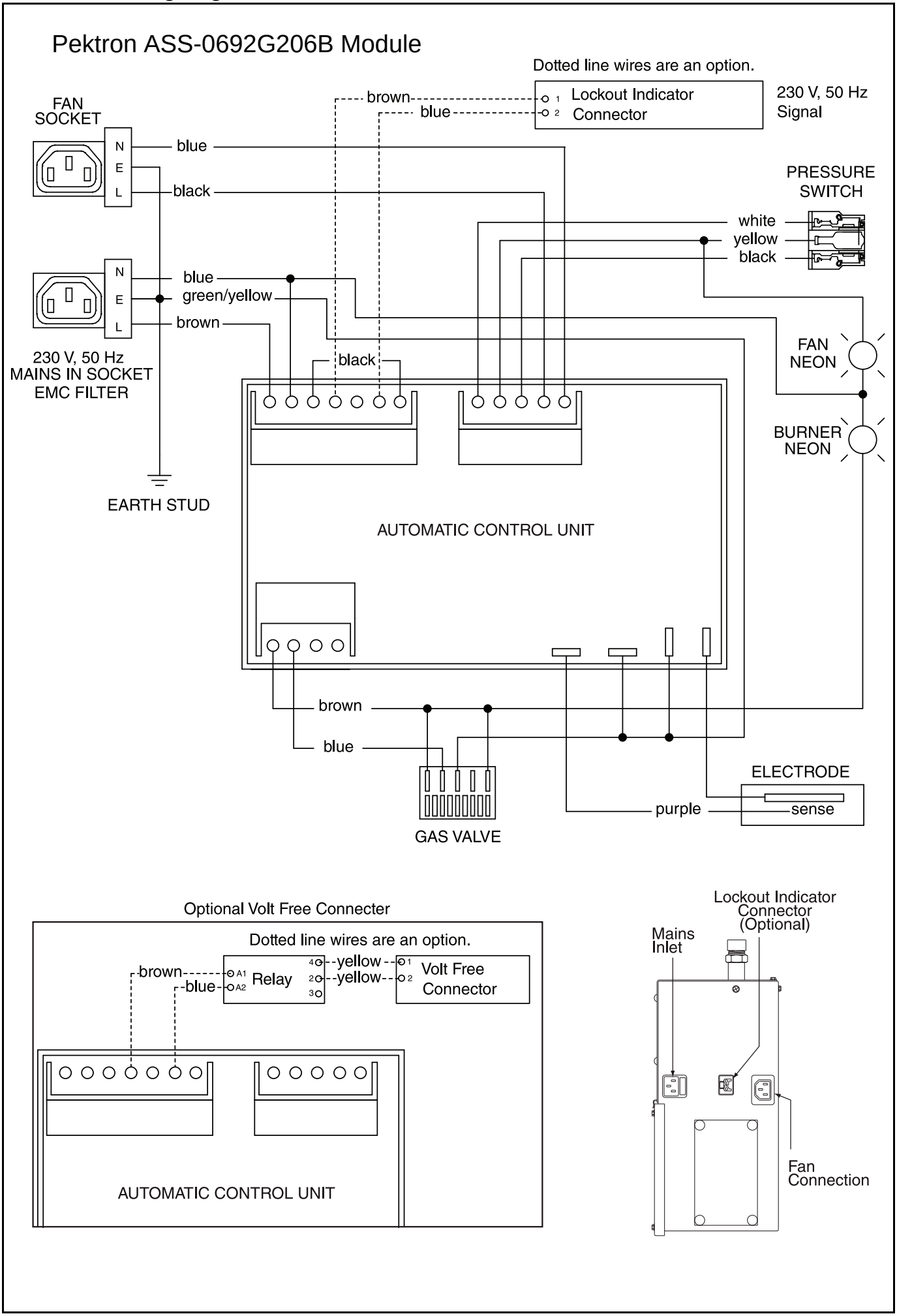
13.3 Typical External Wiring Diagram (Double Linear Option 2)



Wiring Note [Interconnecting Cable - Burner to Fan]:-

For 'U' Tube heaters, fan will plug directly into burner pack. For Linear and double linear heaters, an interconnecting cable will be required between the fan plug and burner socket. This cable shall be three core suitable for current load of 10A and shall be installed clear of appliance in accordance with 'Clearances to Combustibles' data. The required plug and socket for this cable are supplied with the appliance; cable is not included.

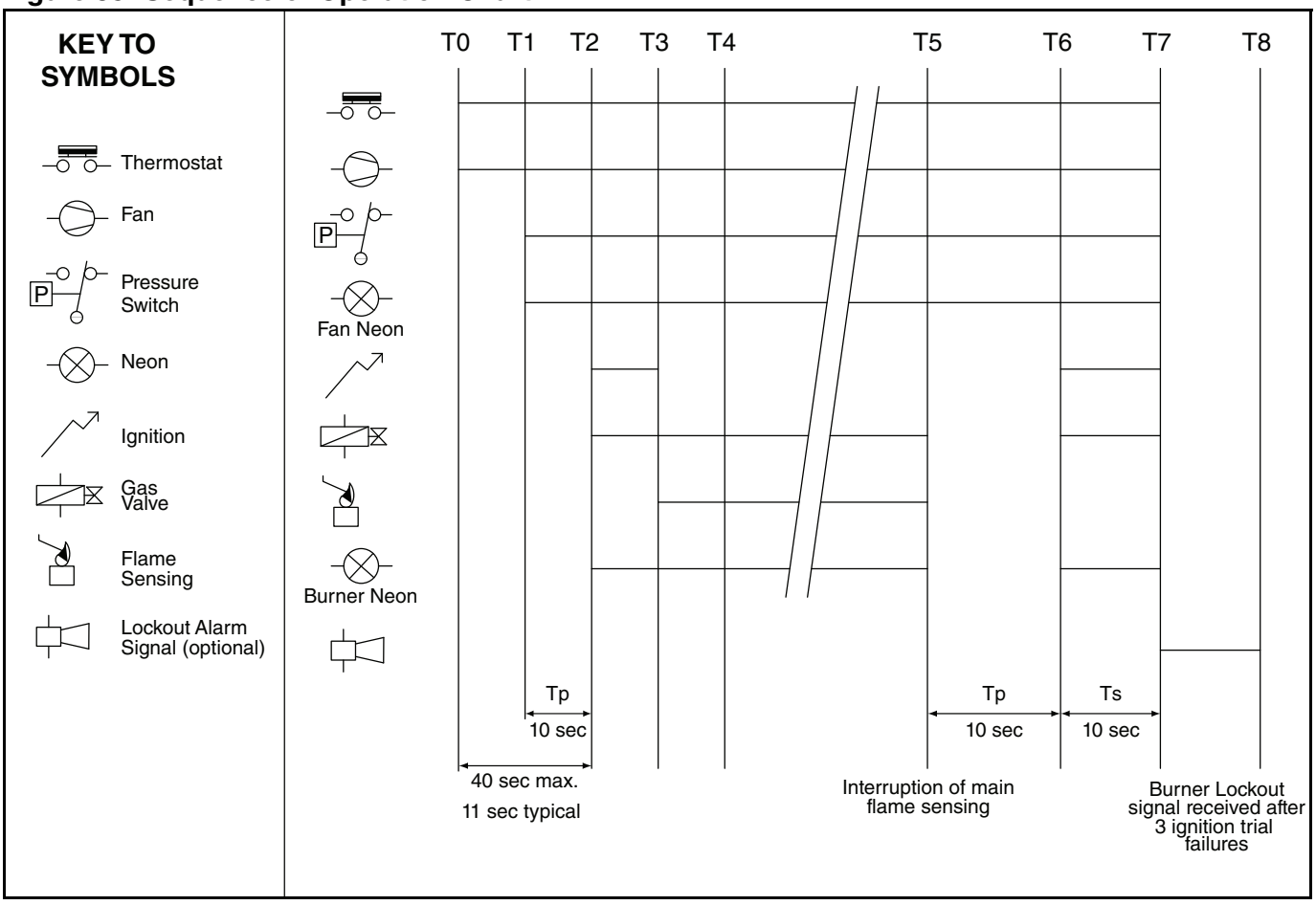
13.5 Internal Wiring Diagram



SECTION 14: OPERATION

⚠ DANGER	⚠ WARNING		
			
Electrical Shock Hazard **Disconnect electric before service.** **More than one disconnect switch may be required to disconnect electric from heater.** **Heater must be connected to a properly grounded electrical source.**	**Explosion Hazard** **Turn off gas supply to heater before service.**	**Burn Hazard** **Allow heater to cool before service.** **Tubing may still be hot after operation.**	**Cut/Pinch Hazard** **Wear protective gear during installation, operation and service.** **Edges are sharp.**
Failure to follow these instructions can result in death, electric shock, injury or property damage.			

Figure 35: Sequence of Operation Chart



NOTE: If the heater operates for more than 24 hours continuously, the ignition module will automatically recycle the burner to ensure that all safety functions are still in working condition.

14.1 Heater Lockout Indication (Optional)

In case of flame loss during operation of the heater, the burner control unit goes to lockout mode after three ignition trials. At this stage a signal or closed relay will enable the ROBERTS GORDON® controller, BMS system, etc. to indicate precisely which heater has failed. This can be done by two options.

14.1.1 Heater Lockout Indicator by Connector

A 230 V signal is provided which enables the ROBERTS GORDON® controller, BMS system, etc. to indicate the heater that has failed. An additional wire has to be installed from the heater lockout indicator connector to the monitoring computer. *See Page 57, Section 13.5*.

Description	Part Number
Connector male - Lockout Indicator	91324000
Connector female - Lockout Indicator	91324001
Wire Blue 12"	91300011
Wire Brown 12"	91300012

14.1.2 Heater Lockout Indicator by Volt Free Connector

A volt free contact relay is closed which enables the ROBERTS GORDON® controller, BMS system, etc. to indicate the heater that has failed. An additional wire has to be installed from the heater volt free connector to the monitoring computer. *See Page 57, Section 13.5*.

Description	Part Number
Connector male - Volt Free	91324000
Connector female - Volt Free	91324001
Wire Blue 7"	91300004
Wire Brown 7"	91300005
Wire Yellow 12"	91300003
Screw #8 x 3/8 Hex Wshr PHH Type 23	94961406
Base relay P2RF05E	C1050B
Relay G2R1-SN IMO 220 V 10 A	C1049B

14.2 Testing

Establish that a satisfactory purged gas supply and an electrical supply is available to the heater. Ensure that all time clocks and thermostats are set to call for heat.

With the gas supply cut off at the appliance isolating cock and the electrical supply isolated by switching off at the local switch and removing the appliance inlet plug, open the control chamber secured by the two screws. Loosen the sealing screw from the pressure test point and remove the cover cap from the governor.

Turn on the gas supply and connect appliance electrical plug. Ensure that the timer or thermostat, if fitted, are set to call for full gas rate. Switch on at the local switch. The sequence as described should take place. If not, refer to detailed fault finding sequence. When flame is established, check the gas pressure reading and adjust if necessary. Refer to burner data label.

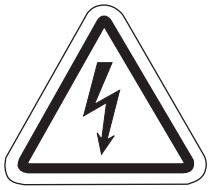
Check the gas pressure at the outlet of the gas valve. *See Page 74, Section 18.9.1* or *See Page 75, Section 18.9.2* for pressure settings or refer to the data plate.

Switch off the electrical supply (shutting down the heater), remove pressure gauge - tighten pressure test point screw, ensuring a tight gas seal. Replace governor cover cap. Close burner side cover.

14.5 User Instructions.
After satisfactory testing, ensure the client is fully aware of the operation of the heaters and system. Bring this manual to the attention of the user and / or purchaser; instruct them in the safe operation of the heater/s. Advise the user that if the system is unflued, any reduction in the ventilation of the building may require a flue to be fitted, or additional ventilation grilles will be required.

ALL SERVICING AND MAINTENANCE OF THESE APPLIANCES, AS DETAILED IN THE FOLLOWING SECTIONS, SHALL BE CARRIED OUT BY SUITABLY AUTHORISED AND QUALIFIED PERSONNEL AND SHALL BE IN ACCORDANCE WITH THE INSTRUCTIONS IN THIS MANUAL.

SECTION 15: SERVICING INSTRUCTIONS

⚠ DANGER	⚠ WARNING		
			
Electrical Shock Hazard **Disconnect electric before service.** **More than one disconnect switch may be required to disconnect electric from heater.** **Heater must be connected to a properly grounded electrical source.**	**Explosion Hazard** **Turn off gas supply to heater before service.**	**Burn Hazard** **Allow heater to cool before service.** **Tubing may still be hot after operation.**	**Cut/Pinch Hazard** **Wear protective gear during installation, operation and service.** **Edges are sharp.**
Failure to follow these instructions can result in death, electric shock, injury or property damage.			

IMPORTANT: Never use the heater as a support for ladders or other access equipment. Always test for gas soundness with a suitable detection fluid after completing any servicing or exchange of gas carrying component. On completion of any service/fault finding tasks which require the breaking and remaking of electrical connections, the checks:- A:Earth Continuity, B:Polarity and C:Resistance to Earth must then be repeated.

15.1 Annual Procedure

Carry out the following procedure annually. The preferred time would be immediately before the winter heating period. If very dirty conditions arise, it may be necessary to carry out this procedure more often. If the unit takes in air through an air duct or filter assembly, more frequent service may be necessary.

15.1.1 Burner and Fan Removal

Isolate the heater from the gas and electrical supplies. Remove the fan plug from the burner. Unscrew the securing screws on the burner flange. The burner can now be removed. Take care not to disturb the gasket on the flanged burner tube. Unscrew the securing screw on the fan flange spigot. The fan can now be removed.

15.1.2 Burner and Fan Removal Maintenance

Remove the fan and burner independently to floor level and clean both items internally using a soft brush and compressed air, if available. Take care not to damage the internal parts of the burner. Check fan impeller for cleanliness and free rotation.

The electrodes are an integral part of the burner. To check spark gap, remove the securing screws on the electrode and withdraw it ensuring the gasket is not damaged. Spark gap on electrode should be approximately 3 mm.

15.1.3 Tube and Reflector Maintenance

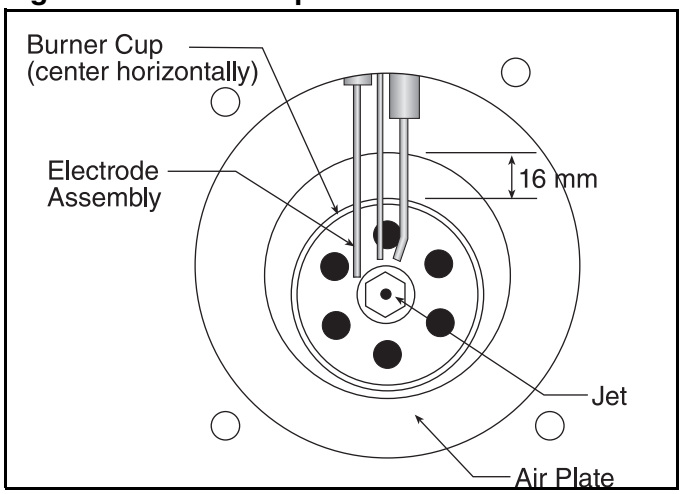
With burner and fan removed, clean the outer surfaces of the tubes using a brush and wipe the inner surface of the reflector with a soft damp cloth - use a household detergent if necessary. Never use abrasive cleaners on the reflectors. Reassemble the burner and fan in reverse order. Carry out the Testing Procedure. *See Page 59, Section 14.2*.

15.2 Component Removal

First, isolate the heater from the gas and electrical supplies. Entry to the burner assembly is gained by removing the door screws and opening the hinged side cover. Entry to the combustion chamber is gained by removing the combustion chamber cover.

15.2.1 Electrode

Figure 36: Burner Cup Position



15.2.2 Burner Head/Injector Jet

When the cover is removed completely, the burner assembly is exposed. Unscrew the burner cup. Remove brass injector jet (orifice). Replace in reverse sequence.

15.2.3 Solenoid Valve/Governor

Remove burner head. Remove screws securing the solenoid/governor body bracket. Withdraw the four wires between the solenoids. The solenoid/governor and fittings can now be withdrawn from the compartment. The solenoid(s) can be removed from the body by unscrewing central screw. Replace in reverse sequence. Note: Earth is green/yellow.

[Note page 60 has been deleted].

15.2.4 Automatic Flame Control Unit

Remove black ignition lead. Withdraw the connectors. Remove two screws from the cover. Replace if faulty. Refit in reverse sequence.

15.2.5 Pressure Switch

Disconnect the two silicone tubes. Remove wires from the three blades. Remove two screws which secure the pressure switch to the burner. Remove pressure switch. Replace pressure switch, if faulty, and refit in reverse sequence ensuring that the rubber tubes are reconnected to the switch correctly.

Note: Wires fitted as follows:

NO - Yellow

NC - White

Common - Black

15.2.6 Neons

Remove the two push on connectors and remove the neons by pushing downwards. Replace in reverse sequence.

15.3 Maintenance Checklist

Installation Code and Annual Inspections:

All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service and operation of the equipment. To help facilitate optimum performance and safety, Roberts-Gordon recommends that a qualified contractor conduct, at a minimum, annual inspections of your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplied by Roberts-Gordon.

The Vicinity of the Heater	Do not store or use flammable objects, liquids or vapours near the heater. Immediately remove these items if they are present. *See Page 5, Section 3*.
Vehicles and Other Objects	Maintain the clearances to combustibles. Do not hang anything from, or place anything on, the heater. Make sure nothing is lodged underneath the reflector, in between the tubes or in the decorative or protective grilles (included with select models). Immediately remove objects in violation of the clearances to combustibles. *See Page 5, Section 3*.
Reflector	Support reflector with hanger and support strap. Reflector must not touch tube. Make sure there is no dirt, sagging, cracking or distortion. Do not operate if there is sagging, cracking or distortion. Make sure reflectors are correctly overlapped. *See Page 23, Section 6.6.1*. *or Page 34, Section 7.8.1*. Clean outside surface with a damp cloth.
Vent Pipe	Venting must be intact. Using a flashlight, look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion. The area must be free of dirt and dust. Remove any carbon deposits or scale using a wire brush. *See Page 50, Section 11*.
Outside Air Inlet	Inlet must be intact. Look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion. The area must be free of dirt and dust. Clean and reinstall as required.

Tubes	Make sure there are no cracks. Make sure tubes are connected and suspended securely. *See Page 11, Section 5*. Make sure there is no sagging, bending or distortion.
Gas Line	Check for gas leaks. *See Page 53, Section 12*.
Burner Observation Window	Make sure it is clean and free of cracks or holes. Clean and replace as required.
Blower Scroll, Wheel and Motor	Compressed air or a vacuum cleaner may be used to clean dust and dirt.
Burner Cup and Orifice	Clear of obstructions (even spider webs will cause problems). Carefully remove any dust and debris from the burner.
Electrode	Replace if there are cracked ceramics, excessive carbon residue, or erosion of the electrode. The electrode gap should be 3 mm.
Thermostat	There should be no exposed wire or damage to the thermostat. *See Page 55, Section 13*.
Suspension Points	Make sure the heater is hanging securely. Look for signs of wear on the chain or ceiling. *See Page 11, Section 5*.
Sports Hall Guard, Decorative and Protective Grilles (optional)	The grille must be securely attached. If the grille is loose or off, contact a contractor qualified in the installation and service of gas-fired heating equipment for repair. Check that side reflector extensions are installed correctly and secured in place if necessary (decorative grille only). *See Page 42, Section 10.1 and Page 45, Section 10.4*. Make sure shield is installed correctly and secured in place if necessary. (Decorative grille only.) *See Page 44, Section 10.3.2*.
Wall Tag	If a wall tag is present, make sure it is legible and accurate. Please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor if you need a wall tag. *See Page 4, Section 2.1*.

SECTION 16: TROUBLESHOOTING

⚠ DANGER

Electrical Shock Hazard

Disconnect electric before service.

Heater must be properly grounded.

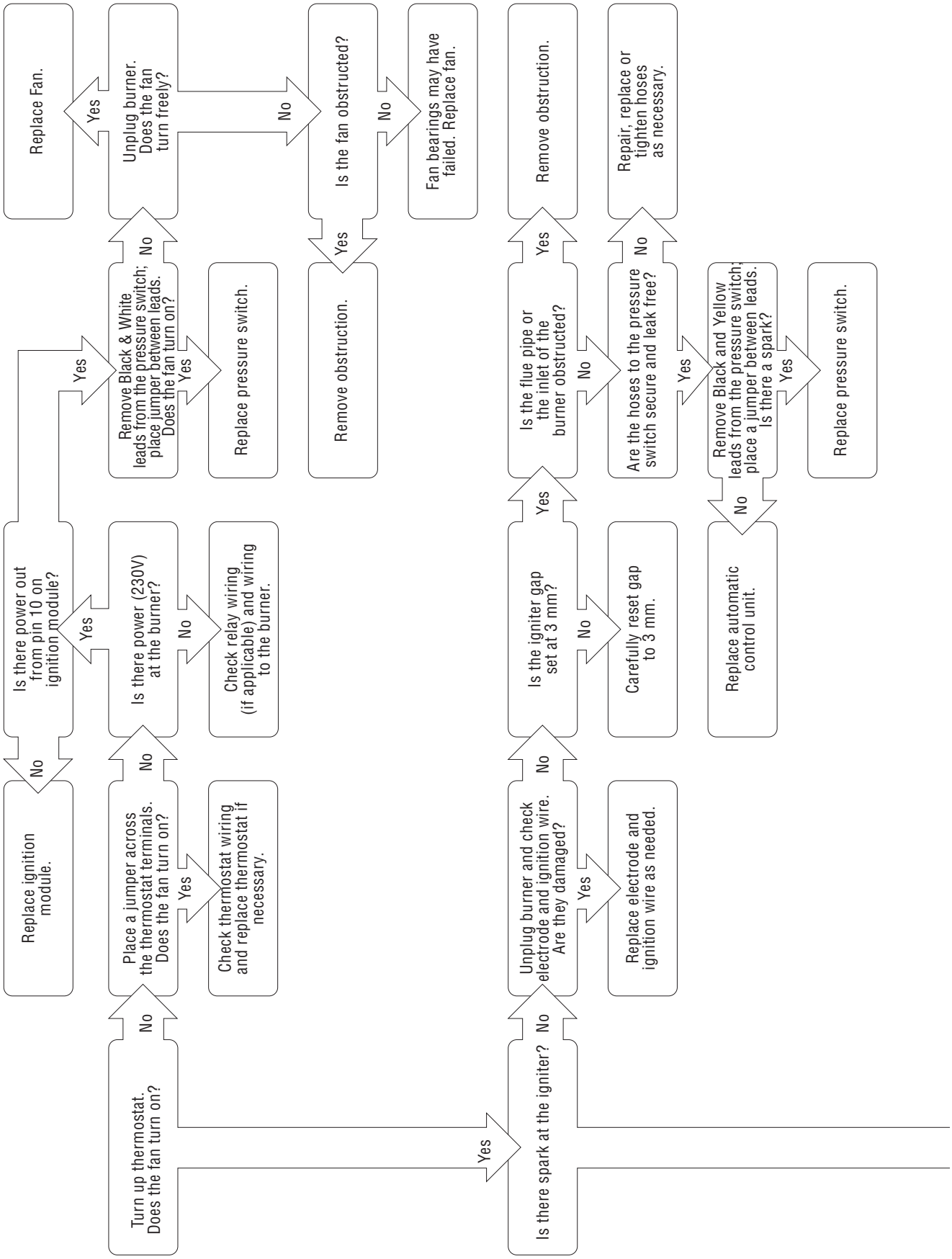
Failure to follow these instructions can result in death or electrical shock.

⚠ WARNING

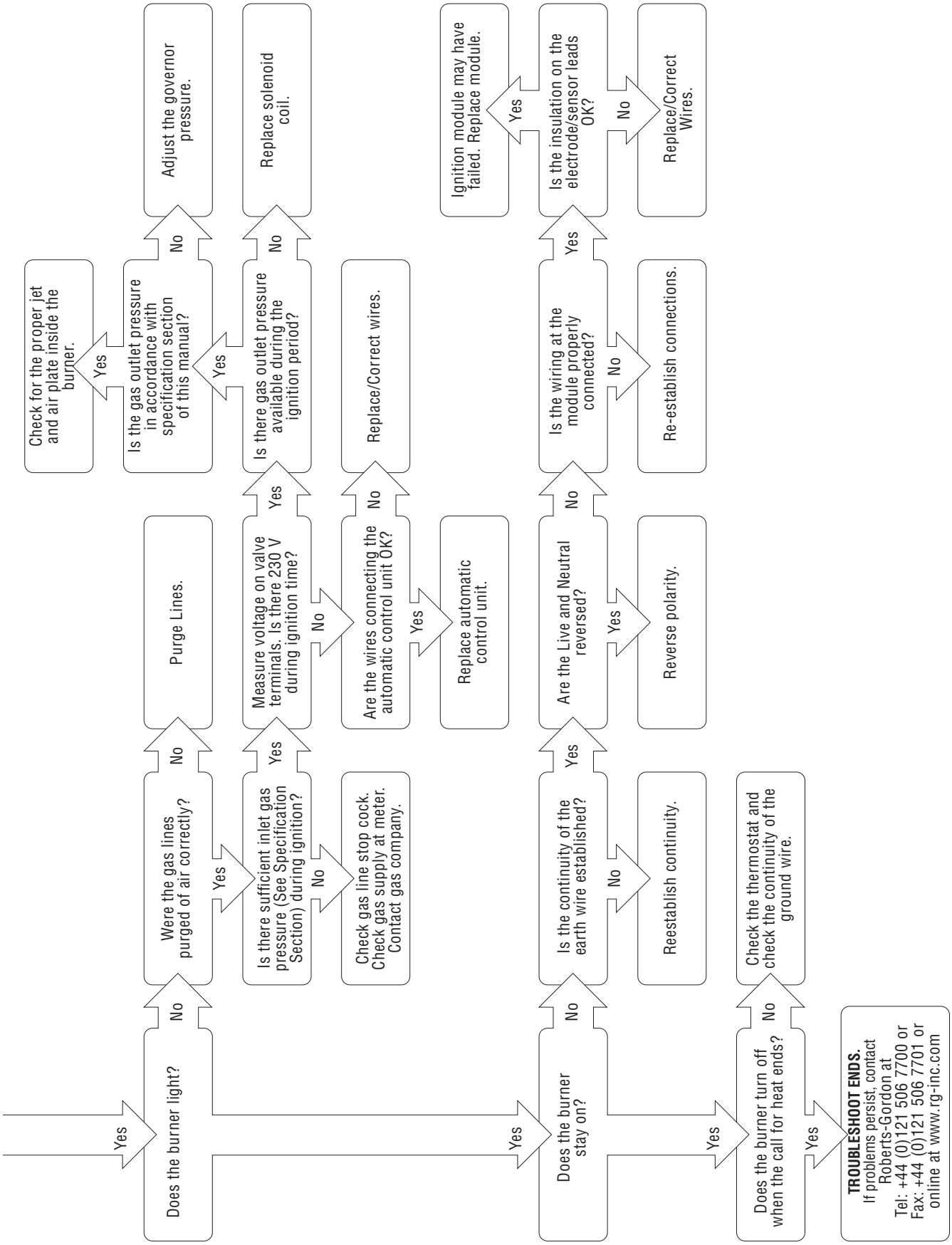
			
Fire Hazard	**Explosion Hazard**	**Burn Hazard**	**Cut/Pinch Hazard**
Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from heater. **Some objects will catch fire or explode when placed close to heater.**	**Turn off gas supply to heater before service.**	**Allow heater to cool before service.** **Tubing may still be hot after operation.**	**Wear protective gear during installation, operation and service.** **Edges are sharp.**

Failure to follow these instructions can result in death, injury or property damage.

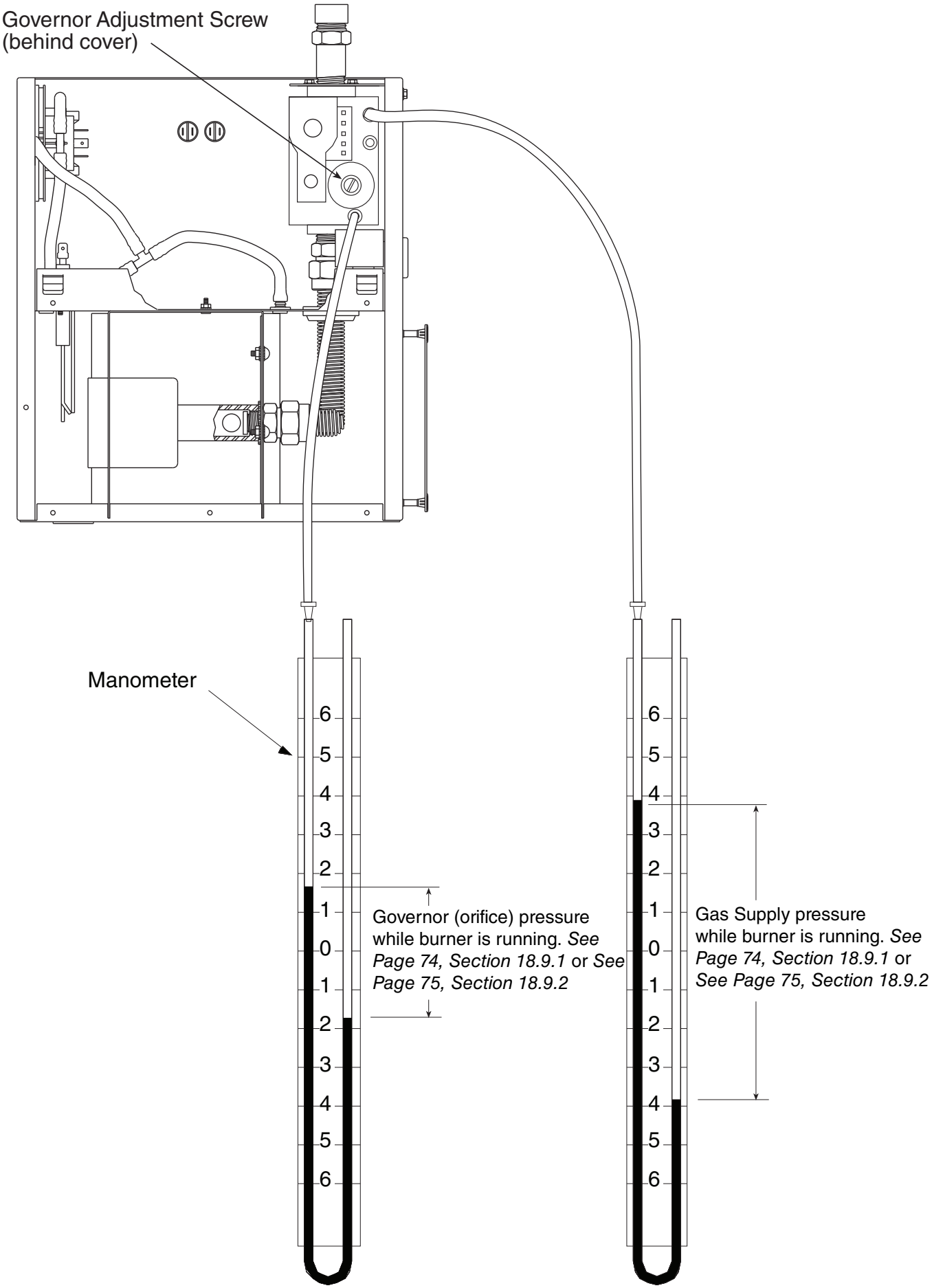
16.1 Troubleshooting Flow Chart (Linear, Double Linear and U-Tube)



Troubleshooting Flow Chart (Linear, Double Linear and U-Tube)



16.3 Manifold Gas Pressure Setting

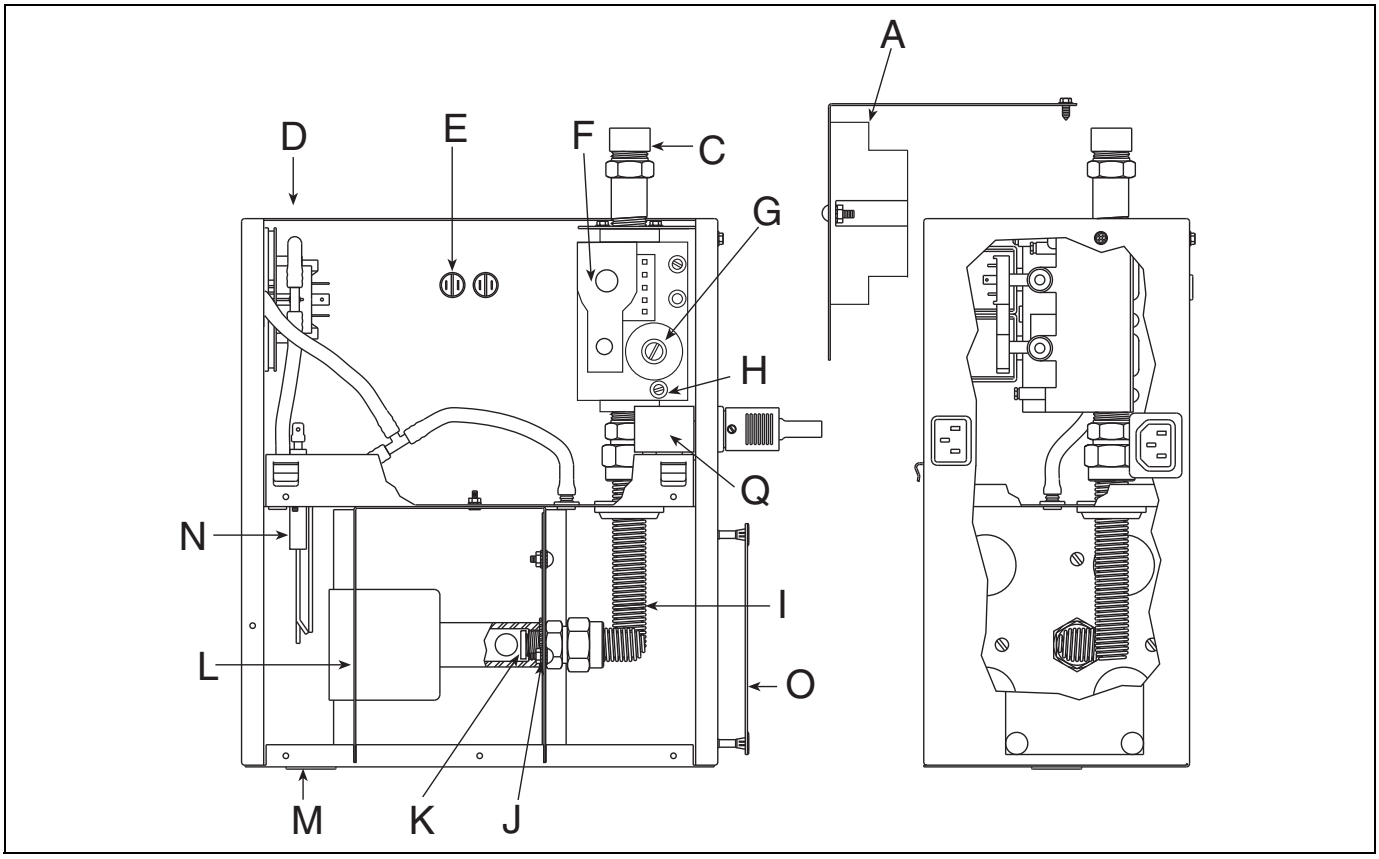


SECTION 17: REPLACEMENT PARTS

⚠ DANGER	⚠ WARNING		
			
Electrical Shock Hazard	**Explosion Hazard**	**Fire Hazard**	**Carbon Monoxide Hazard**

Use only genuine ROBERTS GORDON® replacement parts per this installation, operation and service manual.

Failure to follow these instructions can result in death, electric shock, injury or property damage.



Item	Description	Part Number
A	Automatic Control Unit	90438702
C	Flex Line Adapter	91220700
D	Pressure Switch for BH25 - BH55, BH50EF, (0.23" w.c.) BH15 and BH20 (0.32" w.c.) BH30EF and BH35EF (0.41" w.c.) BH45EF (0.47" w.c.) BH40EF (0.79" w.c.) BH25EF (0.59" w.c.)	 90439801 90439802 90439803 90439804 90439808 90439809
E	Amber Neon Lamp	91320602
F	Gas Valve	90033101
G	Governor Screw	N/A
H	Outlet Pressure Tap	N/A
I	Flex Manifold	03090702T
J	Star Washer	96212100
K	Jet Orifice (*See Page 74, Section 18.9.1*)	N/A
L	Burner Cup Assembly	03020100
M	Mica Window Assembly	02552303
N	Electrode Assembly	90427403
N/S	Electrode Gasket	02558501

Item	Description	Part Number
O	Dust Arrest Baffle Plate	07230000
Q	Mains in socket with EMC Filter	90438902
N/S	Ignition Wire	90427704
N/S	Outside Air Kit	07260000
N/S	Flue Collar 100 mm	91911700
N/S	Outside Air Mounting Plate	07261000
N/S	#8 x 3/8 Washer Head Screw	94118106
N/S	Burner Tube Gasket	02568200
N/S	Wire Purple 12.5"	07250007
N/S	Wire Harness BH Gas Valve	07250006
N/S	Wire Harness BH Pressure Switch	07250005
N/S	Wire Harness BH Main Power	07250004
N/S	Lockout Indicator Connector (male)	91324000
N/S	Lockout Indicator Connector (female)	91324001

Notes:

SECTION 18: SPECIFICATIONS

18.1 Material Specifications

18.1.1 Combustion and Tubes

100 mm dia. 16 gauge heat treated aluminised mild steel.

18.1.2 Reflectors

NS3 H14 aluminium or 1.4016 2R stainless steel (option).

18.2 Heater Specifications

18.2.1 Sequence Controller

Fully automatic, three try, direct spark, 100% shut off ignition flame rectification module.

18.2.2 Electrical

Rating: 230V, 50 Hz, 1 Ø, 1 A

Connection: 3 pin moulded plug

18.2.3 Gas Supply

Connection: Rc 1/2 [1/2" BSP]

Pressures:-
Natural Gas:-
Minimum Inlet 1.13 kPa
Maximum Inlet 5.0 kPa

ULPG
Minimum Inlet 2.75 kPa
Maximum Inlet 5.0 kPa

18.3 Venting Specifications

18.3.1 Fans

BH-15, 20, 25, 30..... Model: Torin DSF 133-42

BH-35, 40, 45 ..... Model: Torin DSA 524-202

BH-50 ..... Model: Magnetek JF1G

BH30DL, 40DL, BH50DL
60DL, 70DL, ... Model: Magnetek JF1G

18.3.2 Flue

When fitted, the flue must be 100 mm, or greater in diameter, and must conform to National Codes. The flue must be self supporting. Inlet must be 100 mm diameter.

18.4 Suspension Specifications

Hang heater with materials with a minimum working load of 33 kg.

18.5 Controls Specifications

Time switches, thermostats, etc. can be wired into the electrical supply. External controls supplied as an optional extra.

18.6 Linear Heater	BH15ST	BH20ST	BH25ST	BH30ST	BH35ST	BH40ST	BH45ST	BH50ST
Input - Gross (kW)	15	20	25	30	35	40	45	50/51
Input - MJ/hr	54	72	90	110	125	138	162	180
Tube Length (mm)	6096	9144	9144	12192	12192	12192	15240	15240
Overall Heater Length (mm)	6661	9709	9709	12757	12767	12767	15815	15850
Weight (kg)	39	55	55	68	68	68	81	81
Heated Area (m^2)	20-160	30-210	40-265	50-315	55-370	65-420	70-475	80-525
Minimum Installation Height(mm)	3500	3500	3500	3500	4600	5000	5000	5000
Recommended Installation Height (mm)	3500	3600	3900	4200	4800	5500	6700	7600

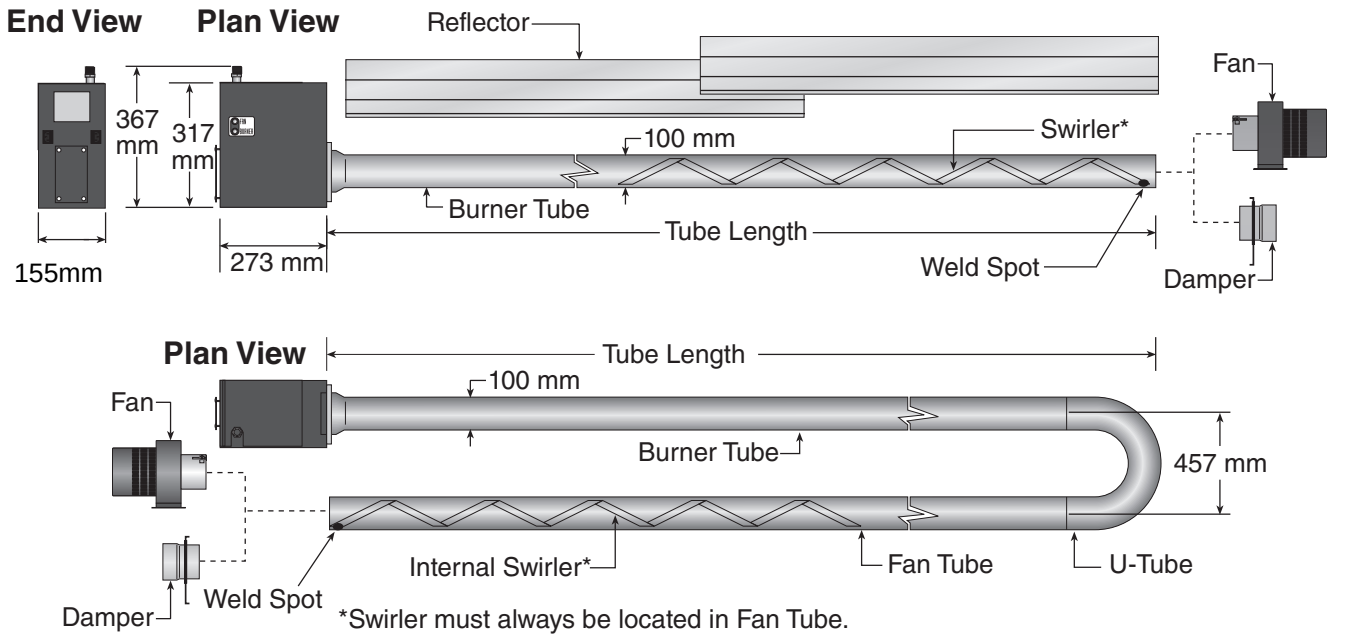
18.7 Double Linear Heater	BH30DL	BH40DL	BH50DL	BH60DL	BH70DL
Input - Gross (kW)	30	40	50	60	70
Input - MJ/hr	108	144	180	220	250
Tube Length (mm)	12802	18898	18898	24994	24994
Overall Heater Length (mm)	13462	19558	19558	25654	25654
Weight (kg)	82	110	110	136	136
Heated Area (m^2)	50-315	65-420	80-525	100-630	110-740
Minimum Installation Height (mm)	3500	3500	3500	3500	4600
Recommended Installation Height (mm)	3500	3600	3900	4200	4800

18.8 U-Tube Heater	BH15UT	BH20UT	BH25UT	BH30UT	BH35UT	BH40UT	BH45UT	BH50UT
Input - Gross (kW)	15	20	25	30	35	40	45	50
Input - MJ/hr	54	72	90	110	125	138	162	180
Tube Length (mm)	3531	5055	5055	6579	6579	6579	8103	8103
Overall Heater Length (mm)	3822	5346	5346	6870	6870	6870	8394	8394
Weight (kg)	41	54	54	65	65	66	96	96
Heated Area (m^2)	20-160	30-210	40-265	50-315	55-370	65-420	70-475	80-525
Minimum Installation Height (mm)	3500	3500	4000	4700	5000	5000	5000	5000
Recommended Installation Height (mm)	3500	3600	4000	4700	5000	5500	6700	7600

NOTE: Factory recommended and minimum installation heights are listed as a guideline. If Infra-red heaters are mounted too low, they may result in heat discomfort. It is generally recommended to observe the recommended mounting heights to optimize comfort conditions.
Howerver, certain applications such as spot heating, freeze protection, outdoor patio heating* or very high ceilings may result in the heaters being mounted outside of the factory recommended and minimum mounting heights. Clearances to combustibles must always be maintained.

18.9 Burner Specifications

Figure 37: Linear and U-Tube Specifications



18.9.1 Standard Burner Specifications	BH15	BH20	BH25	BH30	BH35	BH40	BH45	BH50
Burner Airplate ID Number	20	15	12	6	7	9	10	11
Jet Numbers - Natural	#30	3.8 mm	#19	4.7 mm	#9	#3	#2	B
Jet Numbers - ULPG	#46	2.3 mm	#37	#33	3.1 mm	3.3 mm	#29	#25
Gas Consumption** Natural (m^3/h)	1.43	1.91	2.38	2.86	3.36	3.81	4.29	4.77
Gas Consumption** ULPG (m^3/h) [kg/h]	0.56 [1.07]	0.75 [1.43]	0.94 [1.79]	1.13 [2.15]	1.32 [2.50]	1.51 [2.86]	1.69 [3.22]	1.88 [3.58]

GAS SUPPLY & TEST POINT PRESSURES:-
Inlet supply pressure to supplied flexible gas hose:-
Natural Gas = 1.13 kPa
ULPG = 2.75 kPa
Maximum supply line pressure; All Models, all gases = 5.0 kPa

Inlet [Valve inlet TP] Pressure:-
Natural Gas All Models 1.13 kPa
ULPG All Models 2.62 kPa

Manifold [Valve outlet TP] Pressure:-
Natural Gas All Models 0.75 kPa
ULPG All Models 2.49 kPa

[TP = Test Point]

Optional laminated plastic wall plate - Available on request

Attach this information to a wall near the ROBERTS GORDON® heater.

ROBERTS GORDON®
Infrared Heating

Read the Installation, Operation, and Service Manual thoroughly before installation, operation, or service.

Know your model number and installed configuration.

Model number and installed configuration are found on the burner and in the Installation, Operation and Service Manual.

Write the largest clearance dimensions with permanent ink according to your model number and configuration in the open spaces below.

OPERATING INSTRUCTIONS

1. STOP! Read all safety instructions on this information sheet.
2. Open the manual gas valve in the heater supply line.
3. Turn on electric power to the heater.
4. Set the thermostat to desired setting.

TO TURN OFF THE HEATER

1. Set the thermostat to off or the lowest setting.

IF THE HEATER WILL NOT OPERATE, TO ENSURE YOUR SAFETY, FOLLOW THESE INSTRUCTIONS TO SHUT DOWN YOUR HEATER

1. Set the thermostat to off or the lowest setting.
2. Turn off electric power to the heater.
3. Turn off the manual gas valve in the heater supply line.
4. Call your registered installer/contractor qualified in the installation and service of gas-fired heating equipment.

⚠WARNING

Fire Hazard

Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from heater.

Some objects will catch fire or explode when placed close to heater.

Failure to follow these instructions can result in death, injury or property damage.

Maintain_____clearance to the side and _____ clearance below the heater from vehicles and combustible materials.

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Installation Code and Annual Inspections:
All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service and operation of the equipment. To help facilitate optimum performance and safety, Roberts-Gordon recommends that a qualified contractor conduct, at a minimum, annual inspections of your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplied by Roberts-Gordon.

Further Information: Applications, engineering and detailed guidance on systems design, installation and equipment performance is available through ROBERTS GORDON® representatives. Please contact us for any further information you may require, including the Installation, Operation and Service Manual.

This product is not for residential use.

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