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# CE

## DHM Range

### Commissioning And Servicing Instructions

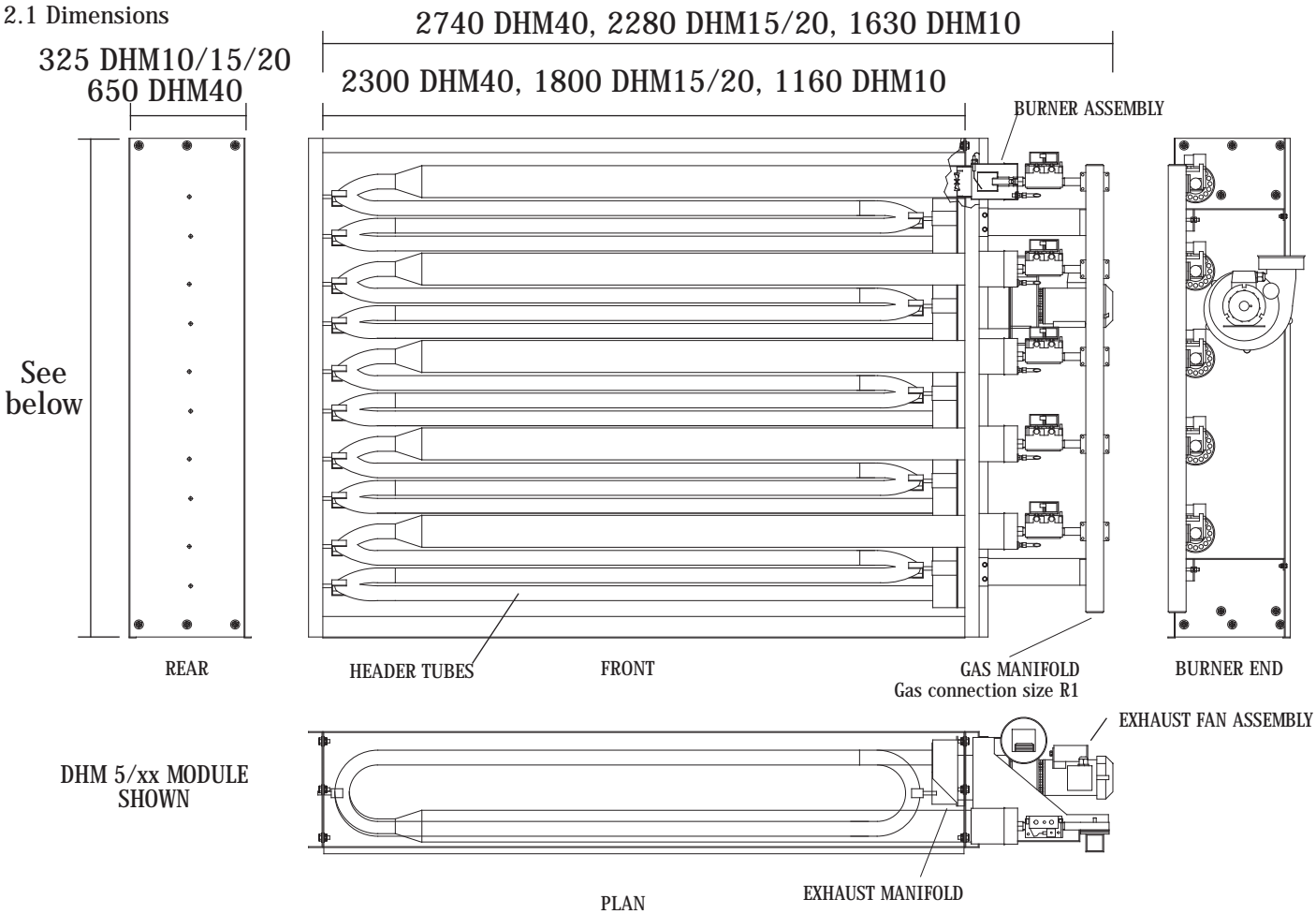
**WARNING: THIS APPLIANCE MUST BE EARTHED**

1. INTRODUCTION

The Powrmatic DHM range are multiple tube heating modules designed for insertion into duct heaters, air conditioning plant and similar units. Each module comprises a number of gas fired forced draught burners and a single exhaust gas fan venting into a closed flue system. Each burner/tube assembly in a module is rated at 40 kW, 20kW, 15kW or 10kW output. DHM X/20 units are certified for use on Natural Gas, Group H - G20 and Propane - G31 and are Cat II<sub>2H3P</sub>. (Note: Conversion from one gas to another is factory completed.) DHM X/10, DHM X/15 and DHM X/40 units are certified for use only on Natural Gas, Group H - G20 and are Cat I<sub>2H</sub>.

2. Technical Data

2.1 Dimensions



Module	3/xx	4/xx	5/xx	6/xx	7/xx
Height	910	1155	1400	1645	1890

- Notes:
- 1 Low fire is with only one of the five burner modules running.
  - 2 Maximum Ambient Temperature - 25°C
  - 3 Maximum Gas Inlet Pressure - 60mbar

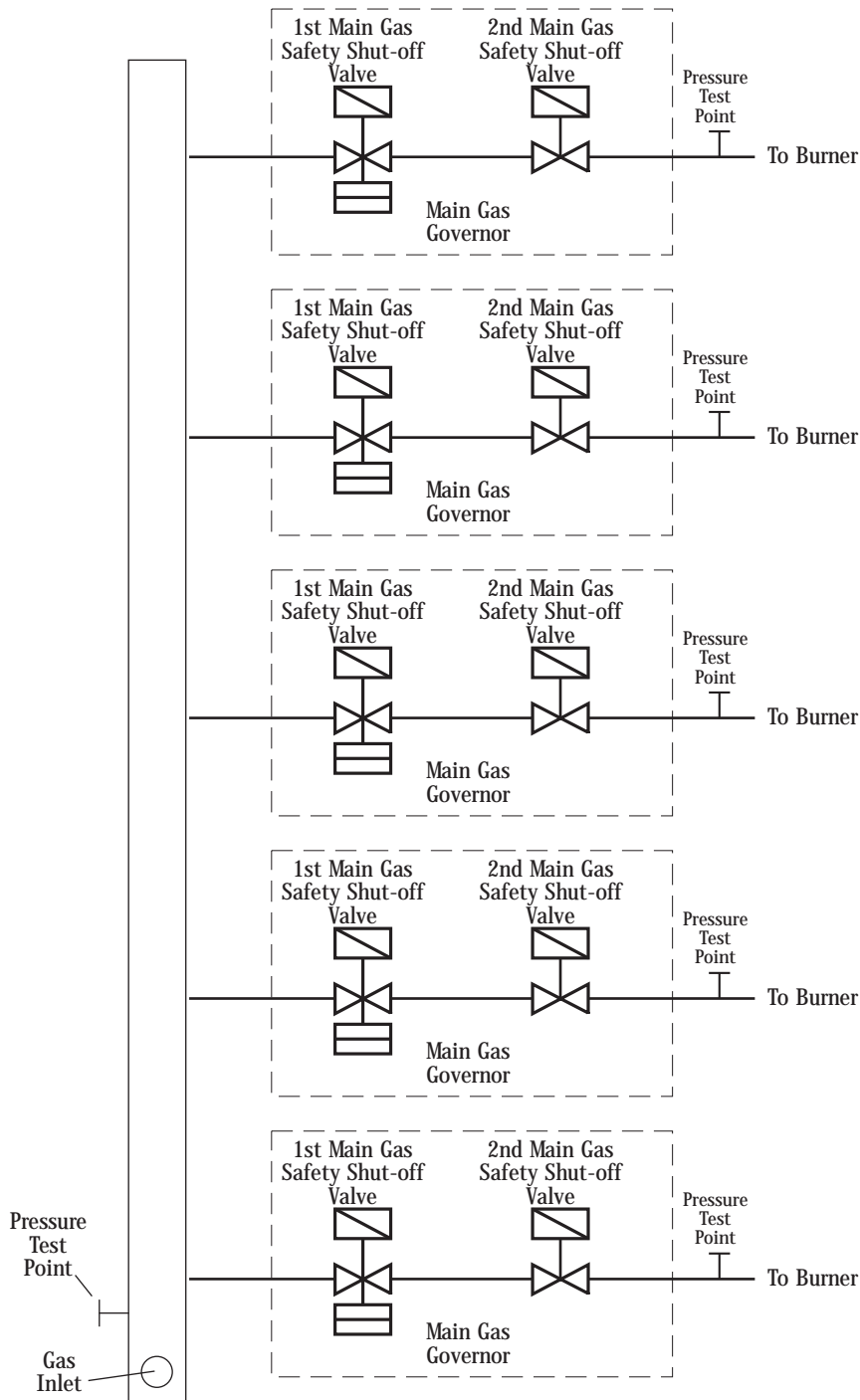
2.2 Performance Data

		3/10	4/10	5/10	6/10	7/10	3/15	4/15	5/15	6/15	7/15
Heat Input (Max)	kW	33.3	44.4	55.5	66.6	77.7	48.9	65.2	81.5	97.8	114.1
Heat Output (Max)	kW	30.0	40.0	50.0	60.0	70.0	45.0	60.0	75.0	90.0	105.0
Heat Input (Min)	kW	11.1					16.3				
Heat Output (Min)	kW	10.0					15.0				
Power Input	kW	0.11					0.11				
Start Current	Amps	0.63					0.63				
Run Current	Amps	0.5					0.48				
Min air flow rate	m <sup>3</sup> /s	0.86	1.14	1.43	1.72	2.0	1.215	1.62	2.025	2.43	2.83
Weight	kg	64	85	106	128	150	98	131	164	197	230

		3/20	4/20	5/20	6/20	7/20	3/40	4/40	5/40	6/40	7/40
Heat Input (Max)	kW	66.0	88.0	110.0	132.0	154.0	131.8	175.8	219.8	263.7	307.7
Heat Output (Max)	kW	60.0	80.0	100.0	120.0	140.0	120.0	160.0	200.0	240.0	280.0
Heat Input (Min)	kW	22.0					44.0				
Heat Output (Min)	kW	20.0					38.0				
Power Input	kW	0.21					0.6				
Start Current	Amps	2.8					10.0				
Run Current	Amps	0.9					4.0				
Min air flow rate	m <sup>3</sup> /s	1.62	2.16	2.7	3.24	3.78	3.24	4.32	5.4	6.48	7.56
Weight	kg	98	131	164	197	230	196	262	328	394	460

## 2.3 Gas Controls Schematic

Fig 1



**Table 1**  
**Injector Sizes & Burner Pressure Natural Gas - Group H - G20 Net CV (Hi) = 34.02MJ/m<sup>3</sup>**

		3/10	4/10	5/10	6/10	7/10	3/15	4/15	5/15	6/15	7/15
Gas Rate (Max)	m <sup>3</sup> /h	3.52	4.69	5.87	7.07	8.22	5.17	6.89	8.62	10.33	12.06
Burner Pressure	mbar	12.0 at each burner					10.0 at each burner				
Injector size	mm	2.8					3.59				
		3/20	4/20	5/20	6/20	7/20	3/40	4/40	5/40	6/40	7/40
Gas Rate (Max)	m <sup>3</sup> /h	6.98	9.3	11.63	13.96	16.28	13.96	18.6	23.26	27.92	32.56
Burner Pressure	mbar	10.6 at each burner					10.0 at each burner				
Injector size	mm	4.1									

**Table 2**  
**Injector Sizes & Burner Pressure Propane -G31 Net CV (Hi) = 88.00MJ/m<sup>3</sup>**

		3/20	4/20	5/20	6/20	7/20
Gas Rate (Max)	m <sup>3</sup> /h	2.70	3.60	4.50	5.40	6.30
Burner Pressure	mbar	24.0 at each burner				
Injector size	mm	2.6				

### 3. General Requirements

#### 3.1 Related Documents

The installation of the module must be in accordance with the rules in force and the relevant requirements of the Gas Safety Regulations and the I.E.E. Regulations for Electrical Installations.

#### 3.2 Electrical Supply

The module requires 230V - 1ph, 50Hz fused at 5A. The method of connection to the main electricity supply must facilitate the complete electrical isolation of the module.

The isolator must have a contact separation of at least 3mm in all poles.

See the accompanying wiring diagram for the module electrical connections.

#### 3.3 Gas Connection

A servicing valve and downstream union must be fitted at the inlet to the module gas controls assembly to facilitate servicing. The gas supply to the module must be completed in solid pipework and be adequately supported.

Warning: When completing the final gas connection to the module do not place undue strain on the gas pipework of the module.

#### 3.4 Combustion Air Supply

If the duct heater or air handling unit is installed internally in buildings having a design air change

rate of less than 0.5/h, and in heated spaces having a volume less than 4.7 m<sup>3</sup> /kW of total rated heat input, grilles shall be provided at low level as follows:-

The total minimum free area shall not be less than 270cm<sup>2</sup> plus 2.25 cm<sup>2</sup> per kilowatt in excess of 60 kW rated heat input.

The air vent(s) should have negligible resistance and must not be sited in any position where it is likely to be easily blocked or flooded or in any position adjacent to an extraction system which is carrying flammable vapour.

Where the duct heater or air handling unit is to be installed in a plant room there must be permanent air vents communicating directly with the outside air, at high level and at low level. Where communication with the outside air is possible only by means of high level air vents, ducting down to floor level for the lower vents should be used. Air vents should have negligible resistance and must not be sited in any position where they are likely to be easily blocked or flooded or in any position adjacent to an extraction system which is carrying flammable vapour.

Grilles or louvres should be so designed that high velocity air streams do not occur within the plant room.

The basic minimum effective area requirements of the air vents are as follows:

#### (a) Low Level (inlet)

For heaters of total rated heat input 60 kW or more: 540 cm<sup>2</sup> plus 4.5 cm<sup>2</sup> per kilowatt in excess of 60kW total rated input.

#### (b) High Level (outlet)

For heaters of total rated heat input 60 kW or more: 270 cm<sup>2</sup> plus 2.25 cm<sup>2</sup> per kilowatt in excess of 60kW total rated input.

### 4. Commissioning & Testing

#### Gas Safety (Installation & Use) Regulations 1994

It is law that all gas appliances are installed, adjusted and, if necessary, converted by qualified persons\* in accordance with the above regulations. Failure to install appliances correctly can lead to prosecution. It is in your own interests and that of safety to ensure that the law is complied with.

\* e.g. Corgi Registered

#### 4.1 Electrical Installation

Checks to ensure electrical safety must be carried out by a competent person.

#### 4.2 Gas Installation

The whole of the gas installation, including the meter, should be inspected and tested for soundness and purged in accordance with the recommendations of IM/16:1988.

#### 4.3 Lighting the Module

##### 4.3.1 Gas Controls Assembly - Soundness Check

1. Ensure the gas service valve at the inlet to the gas controls assembly is shut.
2. To prove soundness up to the first main safety shut-off valve of each burner:-
  - a) Connect pressure gauge to the inlet pressure test point on the gas manifold.
  - b) Open gas service valve and allow pressure to stabilise before shutting it again. The valves are sound if no pressure drop is observed. If a pressure drop is observed do not proceed until the fault has been rectified. Remove pressure gauge and refit sealing screw in pressure test point.

##### 4.3.2 Sequence Check

1. Ensure that the gas service valve is closed and that the main electrical supply to the module is switched off.
2. Check that all external controls are calling for heat.
3. Turn "ON" the main electrical supply and check that the following sequence of events occurs.
  - i) Exhaust fan runsThen for each module:-
  - i) Ignition spark is heard
  - ii) Main gas valves open.
  - iii) Burner goes to lockout as there is no gas supply. Reset from lockout
4. Switch off main electricity supply.

##### 4.3.3 Final Adjustment

1. Remove the sealing screw from the pressure test point located on the gas valve of the first burner and attach a pressure gauge. Remove the sample point cover plug from the outlet flue length and insert a CO<sub>2</sub> measuring instrument.
2. Turn "ON" the main electricity supply via the duct heater/air handler controls and check that the following sequence of events occur.
  - i) Exhaust fan runs.
  - ii) Ignition spark is heard
  - iii) Main gas valves open
  - iv) Main gas flame is established.
3. Check that the burner gas pressure agrees with that in Section 2. If necessary adjust the burner gas pressure by turning the adjustment screw on the side of the valve. *See Fig 2*
5. Turn "OFF" the main electricity supply, remove pressure gauge and refit sealing screw in pressure test point.
6. Repeat for the remaining burners in the module.
7. With all burners running check the CO<sub>2</sub> content of the flue gases which should be in the range of 7.5 - 8.5%.
7. Turn "OFF" the main electricity supply and refit flue sample point cover plug.

##### 4.4 Final Soundness Test

1. After making final gas rate checks all joints on the gas controls assembly must be tested for soundness using leak detection fluid.

##### 4.5 Flame Safeguard

1. Whilst the burner is in operation close the gas service valve. The burners should go to lockout within 1 second.

##### 4.6 User Instructions

The Users instruction supplied with the module are for the end customer and must be supplied with the module.

##### 5. Servicing

The DHM unit should be serviced once per year.

**WARNING:** Always switch off and isolate the incoming electrical supply and close the gas service valve before carrying out any servicing work.

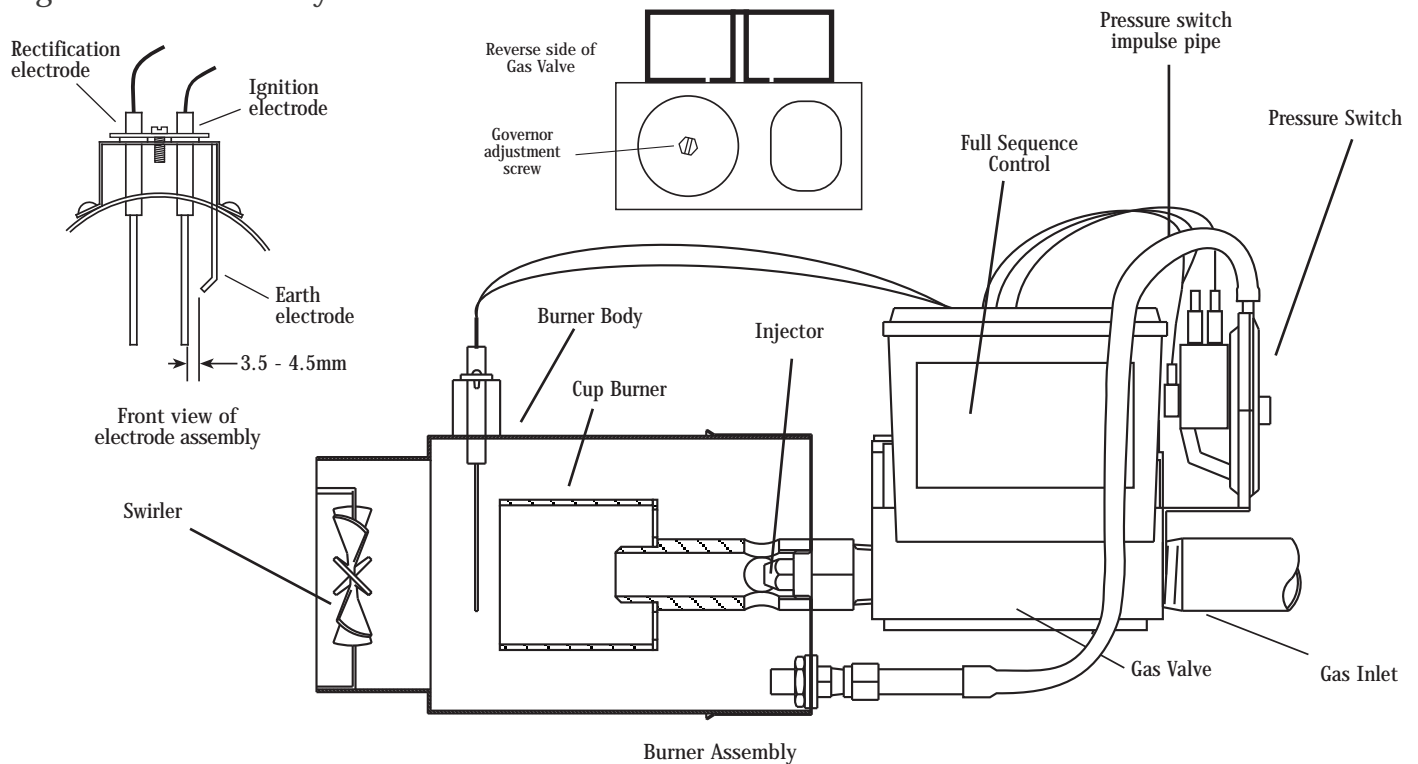
##### 5.1 General

Full maintenance should be undertaken not less than once per year. After any service work has been completed, or any component replaced the unit should be recommissioned as detailed in *Section 4*.

##### 5.2 Burners

1. Remove the heat shield (*if fitted*) situated between the exhaust fan and burners/controls section.

Fig 2 Burner Assembly



2. Release the single securing screw retaining the full sequence control to the gas valve assembly and pull off the full sequence control.
3. Pull off the electrical leads to the pressure switch on the burner concerned.
4. Remove the screws securing the gas inlet flange to the gas manifold.
5. Pull the burner out from the primary tube and clear of the gas manifold.
6. Check that the electrodes and swirler plate are in good condition. Replace if necessary.
7. Check that the primary tube is clear internally.
9. Access is available, if required, to the outlet end of the secondary tube. Remove the cover plates at the right hand side of the bulkhead and then remove the appropriate access plate from the internal manifold.
8. Reassemble burner in reverse order and a new cork gasket on the manifold flange.
9. Repeat for the remaining burners in the module.
10. Replace heat shield *(if fitted)*.

### 5.3 Exhaust Fan

1. Remove the heat shield *(if fitted)* situated between the exhaust fan and burners/controllers section.
2. Remove electrical connections to the exhaust fan overrun thermostat situated on the fan casing.
3. Remove the electrical connections from the exhaust fan motor.
4. Remove the pressure switch impulse pipe.
5. Disconnect flue system from exhaust fan outlet.
6. Remove the four set screws securing the fan inlet tube to the fan and the two screws securing the fan support bracket to the bulk head.

7. Inspect the fan blades and, if necessary, remove any deposit build up using a stiff brush.
8. Reassemble in reverse order.

## 5.4 Replacement of Faulty Components

### 5.4.1 Full Sequence Control

1. Remove the single screw retaining the control to the gas valve.
2. Remove the top of the control and pull off the electrical connection plugs and the spark and rectification leads.
3. Remove the control from the gas valve by pulling upwards.
4. Refit replacement in reverse order.

### 5.4.2 Electrode Assembly

1. Release the screw retaining the top cover of the associated gas control.
2. Remove the top of the control and pull off the spark and rectification leads.
3. Remove the screw on the front face of the electrode assembly and remove assembly.
4. Refit replacement in reverse order.

### 5.4.3 Gas Control Valve/Burner/Injector

1. Complete steps 5.2.1 to 5.2.5
2. Remove the screws securing the pressure switch bracket to the gas valve
3. Separate the burner end cap/injector holder from the body of the burner
4. Unscrew the cup burner and remove the burner end cap from the injector
5. Remove the injector from the gas valve
6. Remove the inlet pipe from the gas valve
7. Reassemble in reverse order using new items as required and a new cork gasket on the



- manifold flange.
- Replace heat shield *(if fitted)*.
- #### 5.4.4 Exhaust Fan
- Complete steps 5.3.1. to 5.3.7
  - Reassemble in reverse order using replacement fan.
- #### 5.4.5 Exhaust Fan Overrun Thermostat
- Pull off the electrical connections from the thermostat
  - Remove the two securing screws
  - Reassemble in reverse order using new thermostat.
- #### 5.4.6 Exhaust Fan Pressure Switch
- Remove the impulse pipe from the pressure switch
  - Remove the pressure switch cover and disconnect the wiring
  - Remove the screws securing the pressure switch mounting bracket to the controls panel
  - Remove the bracket from the pressure switch
  - Reassemble in reverse order using replacement pressure switch
- NOTE: Impulse pipe is connected to suction (-) tapping. Pressure switch set point is 2.0mb

## 6. Fault Finding

Fault	Cause	Action
Exhaust fan does not run	Electrical	<ol style="list-style-type: none"> <li>Check that there is a main electrical supply present.</li> <li>Check that all external control circuits are completed.</li> <li>Check that high limit thermostat has not tripped - reset.</li> <li>Check that mains voltage is present at fan motor - change fan if faulty.</li> </ol>
No spark ignition	Electrical	<ol style="list-style-type: none"> <li>Check full sequence is not at lockout - reset.</li> <li>Check full sequence controls for mains supply - change if necessary.</li> <li>Check that exhaust fan and burner air pressure switches are activated.</li> <li>Check spark electrode and spark gap.</li> </ol>
Burner will not light	Electrical	<ol style="list-style-type: none"> <li>Check rectification electrode/lead/signal.</li> <li>Check gas supply is ON.</li> </ol>
Exhaust fan runs continuously	Electrical	<ol style="list-style-type: none"> <li>Check overrun thermostat.</li> </ol>

## 7. Short List of Parts

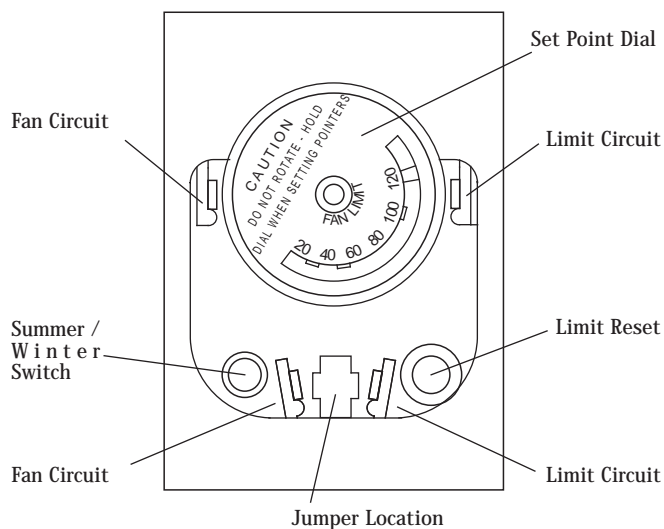
Refer to Powrmatic Ltd for the details of any parts not listed here.

ITEM	PART NUMBER
Gas Valve - SIT 830 Tandem 0833033 - 1/2" BSP.	142400444
Full Sequence Control - SIT 503EFD	145601045
Thermostat - Limit - Honeywell L4064N.	143000303
Thermostat - Exhaust Fan - RS 331-540	147600001
Exhaust Fan - AD 90BWTG90 (x/40 modules)	140201504
Exhaust Fan - AD 71DTXL (x/20 modules)	140201502
Exhaust Fan - AD 52BTXL (x/10 & x/15 modules)	140210500
Pressure Switch - Kromschroder DL5K	145604643
Pressure Switch - Honeywell C6065A1028:2	146522170
Electrode - Rectification - Johnston Controls	142400625
Electrode - Ignition - Johnston Controls	142400625
Relay - Finder 60128230	143000813

### 5.4.7 Limit Thermostat

- Remove the single screw securing the thermostat cover
- Remove the electrical connections
- Remove the screws securing the thermostat to the bulkhead and withdraw the thermostat
- Reassemble in reverse order using replacement thermostat. NOTE: Only the limit circuit is used and the limit set point is 100°C.

Fig 3 Honeywell L4064N Limit Thermostat





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