

powrmatic



DHM SL Range

Commissioning and Servicing Instructions

TESTED		
STAGE 1	Full mechanical, construction, assembly and electrical sequence check	<input type="checkbox"/>
STAGE 2	Full functional test in accordance with Quality System Procedures	<input type="checkbox"/>
Heater Model	_____	Final
Heater Serial No.	_____	
Type of Gas	_____	

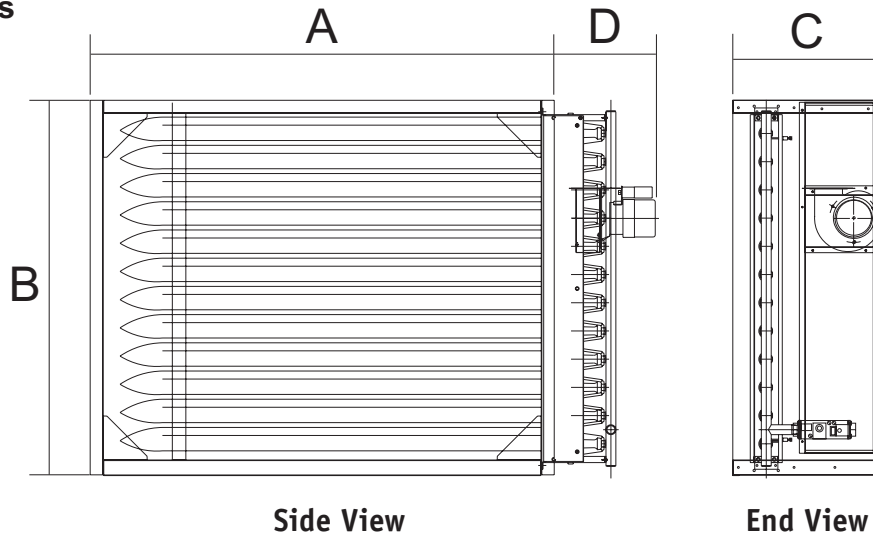
WARNING: THIS APPLIANCE MUST BE EARTHED

1. Introduction

The DHM SL Range comprises gas-fired in-line heaters covering a range of heat outputs from 30.0kW to 100.0kW in 6 sizes. The heaters are based on aluminised mild steel tube heat exchanger elements with each tube having a dedicated inshot type burner, and a closed combustion circuit, that is fan assisted, with fully automatic controls. Units are available as On/Off, High/Low or fully Modulating with a low fire rate for the latter two options of 30%. Units are supplied less controls housing for insertion into air handling units and similar. Each unit is fitted with a condense drain point and solenoid valve. Optional items include a controls housing and 316 stainless steel heat exchanger tubes. DHM SL units are certified for use on Natural Gas, Group H - G20 and Propane - G31 and are Cat I_{2H} or Cat I_{3P} respectively. (Note: Conversion from one gas to another is factory completed.)

2. TECHNICAL DATA

2.1 Dimensions



Model	A	B	C	D
DHM SL 30	1250	555	400	390
DHM SL 45	1250	783	400	390
DHM SL 50	1850	590	400	390
DHM SL 60	1250	1011	400	390
DHM SL 75	1850	839	400	390
DHM SL 100	1850	1088	400	390

Note: Models 75 and 100 require, in the burner section, an additional 60mm to the right of the unit as seen in the end view to allow for the width of the exhaust fan.

2.2 Performance Data

Model	No of Burners	Output High kW	Input High kW	Gas Rate High m ³ /h	Min Air Flow m ³ /s	Output Low kW	Input Low kW	Gas Rate Low m ³ /h	Flue Ø mm
DHM SL 30	6	30	32.97	3.49	1.052	9.0	10.7	1.13	100
DHM SL 45	9	45	49.45	5.23	1.578	13.5	16.1	1.70	100
DHM SL 50	6	50	54.95	5.81	1.753	15.0	17.9	1.89	100
DHM SL 60	12	60	65.93	6.98	2.104	18.0	21.4	2.26	130
DHM SL 75	9	75	82.42	8.72	2.630	22.5	26.8	2.83	130
DHM SL 100	12	100	109.9	11.63	3.506	30.0	35.7	3.77	130

Table 1
Injector Sizes & Burner Pressure Natural Gas - Group H - G20 Net CV (Hi) = 34.02MJ/m³

		30	45	50	60	75	100
Gas Rate (Max)	m ³ /h	3.43	5.21	5.78	6.95	8.69	11.59
Burner Pressure	mbar	13.2	13.0	12.9	13.6	13.4	13.6
Gas Rate (Min)	m ³ /h	1.1	1.69	1.89	2.24	3.04	3.98
Burner Pressure	mbar	1.5	1.5	1.5	1.5	1.7	1.7
Injector size	mm	1.94	1.94	2.46	1.94	2.46	2.46
Marked		500	500	700	500	700	700

**Inlet pressure
20mbar**

Table 2
Injector Sizes & Burner Pressure Propane -G31 Net CV (Hi) = 88.00MJ/m³

		30	45	50	60	75	100
Gas Rate (Max)	m ³ /h	1.33	2.01	2.23	2.69	3.36	4.48
Burner Pressure	mbar	21.5	21.5	19.5	21.5	20.5	20.5
Gas Rate (Min)	m ³ /h	0.7	1.08	1.18	1.44	1.79	2.36
Burner Pressure	mbar	6.0	6.5	5.5	6.0	5.4	5.3
Injector size	mm	1.36	1.36	1.79	1.36	1.79	1.79
Marked		240	240	440	240	440	440

**Inlet Pressure
37mbar**

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 m³ /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 270cm² plus 2.25 cm² 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 cm² plus 4.5 cm² 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 cm² plus 2.25 cm² per kilowatt in excess of 60kW total rated input.

4. Commissioning & Testing

Gas Safety (Installation & Use) Regulations (Current Issue)

It is law that all gas appliances are installed, adjusted (converted if necessary) and serviced by qualified persons* in accordance with the current issue of 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:-
 - a) Connect pressure gauge to the inlet pressure test point on the gas valve.
 - 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. Switch on the electrical supply at the isolator and the ignition sequence will commence. After a delay of approximately 45 seconds the ignition spark will be generated and the main gas valves energized. The burners will then light.
4. If the burners fail to light the control box will go to lockout and the lockout light on the internal pcb will be illuminated. To restart the ignition sequence depress the reset button adjacent to the lockout light for about 5 seconds.

Note: A secondary red LED mounted on the pcb surface signals as follows

- a) 1 flash at power up as voltage is stabilising
- b) 1 Hz flash signals safety shut down or over voltage greater than 260V. If the heater is running and the air pressure signal is lost the LED will flash at 1Hz. If the air pressure signal then re-establishes the unit will restart after approximately six minutes. If, when the air pressure signal is lost, the unit is turned off and then back on the normal startup sequence will take place.
- c) 2Hz flash signals undervoltage, less than 200V

5. SHUT OFF

Switch OFF the electrical supply to the heater or set the clock control to OFF or set the room thermostat to MIN.

4.3.3 Final Adjustment

4.3.3.1 Burner Gas Pressure

This is set for the required heat input before despatch. In the case of Hi/Lo and Modulating units both high and low pressures are set. Pressures should be checked in the following manner.

4.3.3.2 Standard Units

1. Set external controls to ensure that the main burner is off. Open the side access door. Connect a pressure gauge to the burner pressure test point on the multifunctional control.
2. Set external controls so as to turn on the main burner. Compare the measured burner gas pressure to that stated on the data plate. If necessary adjust the burner gas pressure by turning the regulator screw anticlockwise to decrease the pressure, or clockwise to increase the pressure.

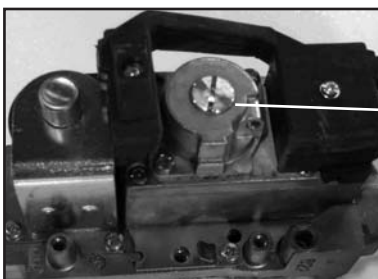


Figure 1
Governor adjustment screw under cover cap (Honeywell VR4605A B1027)

Model	30	45	50	60	75	100
Natural Gas (G20)						
High Fire						
CO ₂ %	7.7	7.7	9.0	8.2	6.6	8.1
Low Fire						
CO ₂ %	1.7	1.6	1.6	1.6	1.5	1.6
Propane (G31)						
High Fire						
CO ₂ %	9.8	9.4	11.0	9.0	9.0	9.1
Low Fire						
CO ₂ %	4.0	3.6	4.0	3.7	3.2	3.3

3. In addition it is advisable to check the gas rate using the gas meter dial pointer. Ensure that no other appliances supplied through the meter are in operation.

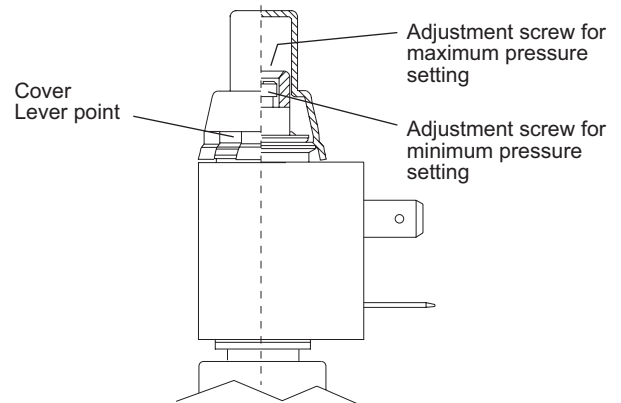
If required, after checking or setting the burner pressures, the CO₂ content in the flue gases can be checked by sampling in the first section of flue fitted to the flue outlet of the unit. Nominal CO₂ values are given for guidance in the Table at the end of this section.

5. Turn off the main burner as in 6.5.1. and disconnect the pressure gauge and replace the sealing screw. Turn on the main burner as above and test for gas soundness around pressure test joint using a leak detection fluid e.g. soap solution.

4.3.3.3 High/Lo Regulator

1. Set external controls to ensure the main burner is off. Remove the side access panel. Connect a pressure gauge to the burner pressure test point on the multifunctional control.
2. Set external controls to turn on the main burner and maintain high fire. Compare the measured burner gas pressure to that stated on the data plate. In addition it is advisable to check the gas rate using the gas meter dial pointer ensuring that no other appliances supplied through the meter are in operation.
3. Repeat 2 above with external controls set to maintain low fire.
4. If it is necessary to adjust either the high fire or low fire pressures proceed as follows after levering off the plastic cover from the Hi/Lo regulator.

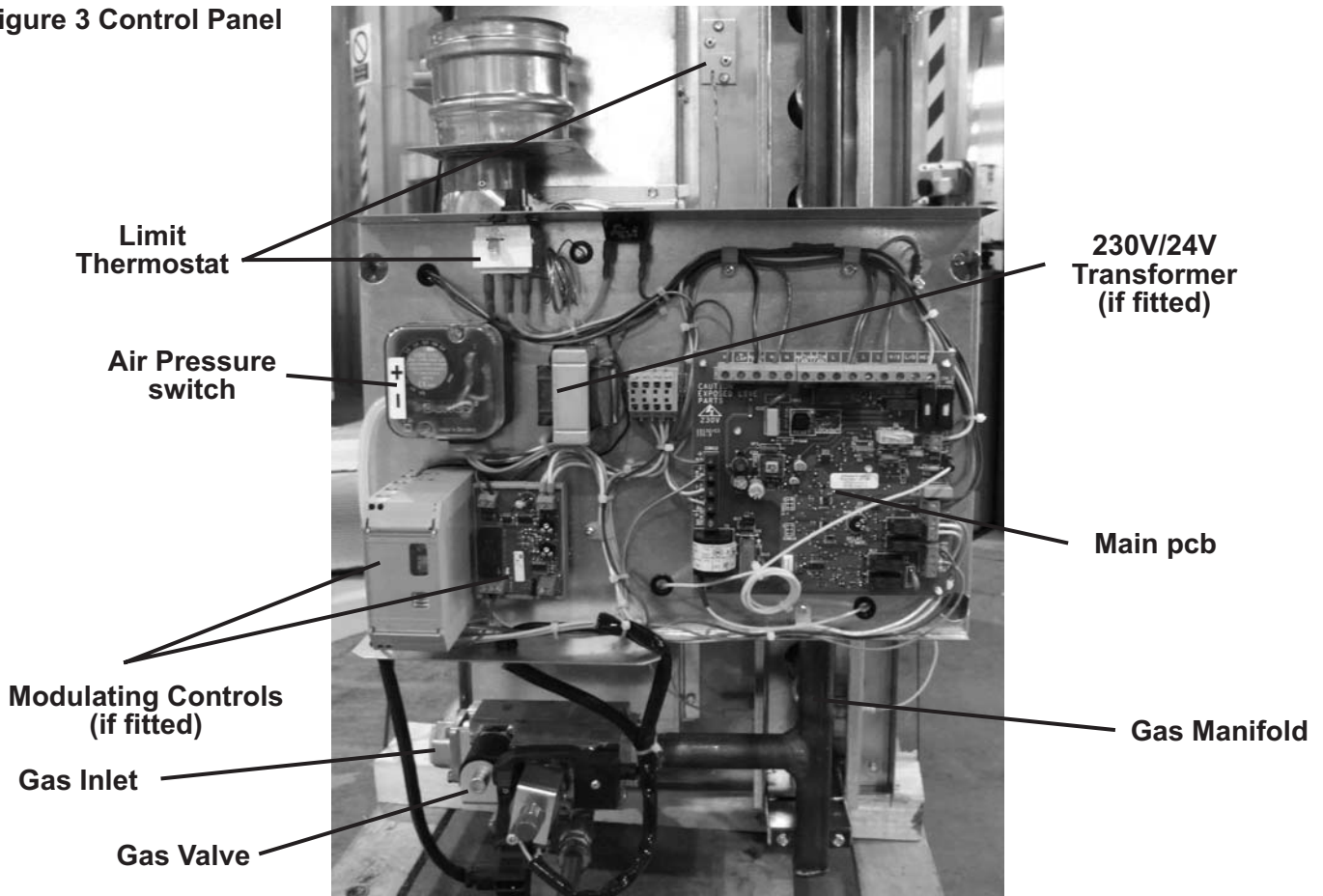
Fig 2 High/Low Regulator



Note: High fire setting must be adjusted first after which the low fire setting can be set. Any adjustment of the high fire setting alters the minimum setting. If it is only necessary to adjust the low fire pressure setting proceed from step ii).

- i) With the controls set to high fire use a 6mm hexagon wrench or 10mm screwdriver to turn adjustment screw for high fire pressure clockwise to increase and counter-clockwise to decrease until the required pressure is obtained. Turn the burner On and OFF several times to check the pressure setting and then turn off.
- ii) Disconnect electrical connection of high/low regulator and turn burners back on and wait until the burner pressure has stabilised. Use a 3.5mm screwdriver to turn adjustment screw for low fire pressure clockwise to increase and counter-clockwise to decrease until the required pressure is obtained.
- iii) Reconnect high/low regulator and check high fire pressure.
- iv) Repeat from step i) if necessary.
- v) Replace cover cap.

Figure 3 Control Panel

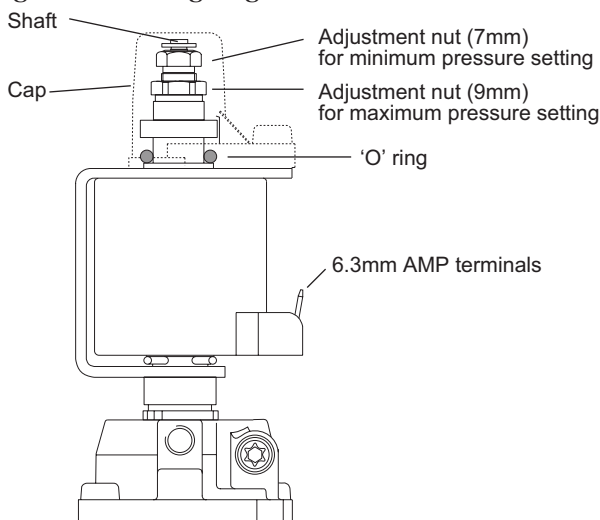


5. Turn off the main burner as in 6.5.1 disconnect the pressure gauge and replace the sealing screw. Turn on the main burner as in 6.5.1 and test for gas soundness around pressure test joint using a leak detection fluid. Replace access panel.

4.3.3.4 Modulating Regulator

1. Set external controls to ensure that the main burner is off. Remove the side access panel. Connect a pressure gauge to the burner pressure test point on the multifunctional control.
2. Set external controls so as to turn on the main burner and maintain high fire. Compare the measured burner gas pressure to that stated on the data plate. In addition it is advisable to check the gas rate using the gas meter dial pointer ensuring that no other appliances supplied through the meter are in operation.
3. Repeat 2 above with external controls set to maintain low fire.
4. If it is necessary to adjust either the high fire or low fire

Fig 4 Modulating Regulator



pressures proceed as follows after removing the plastic cover from the Modulating regulator.

Note: High fire setting must be adjusted first after which the low fire setting can be set. Any adjustment of the high fire setting alters the minimum setting. If it is only necessary to adjust the low fire pressure setting proceed from step 4.ii.

- i) With the controls set to high fire turn adjustment screw for high fire pressure clockwise to increase and counter-clockwise to decrease until the required pressure is obtained. Turn the burner On and OFF several times to check the pressure setting and then turn off.
- ii) Disconnect electrical connection of modulating regulator and turn burners back on and wait until the burner pressure has stabilised. Turn adjustment screw for low fire pressure clockwise to increase and counter-clockwise to decrease until the required pressure is obtained.
- iii) Reconnect modulating regulator and check high fire pressure.
- iv) Repeat from step i) if necessary.
- v) Replace cover cap.

5. Turn off the main burner as in 6.5.1 disconnect the pressure gauge and replace the sealing screw. Turn on the main burner as in 6.5.1 and test for gas soundness around pressure test joint using a leak detection fluid. Replace access panel.

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 SL 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.

5.1.1 MAIN BURNER ASSEMBLY REMOVAL

1. Ensure that the gas service valve is turned off and then unscrew the union nut situated immediately down stream of it.
2. Disconnect the spark and rectification leads from the electrodes and remove the electrical plug connections from the gas control valve assembly.
3. Loosen the four screws holding the main control panel , lift the panel up and clear of the fixing position (taking care not to snag the wiring) and move to one side.
4. If required remove the manifold by removing the four screws securing it to the burner assembly.
5. Remove the four screws that secure the burner assembly to the bulkhead and lift out burner assembly.
6. Using a stiff brush, not a wire brush, brush the burners to dislodge accumulated deposits. Inspect the burners both internally and externally to ensure that they are clean. Examine the injectors and if damaged or deteriorated, replace with new ones of the correct size and marking. If deemed necessary, clean the injectors. Do not broach out with wire.
7. Reassemble the injectors, manifold and burners in reverse order to that above.

5.1.2 IGNITION & RECTIFICATION ELECTRODES

Inspect the electrodes, making sure that they are in sound and clean condition. In particular check that the ignition electrode is clean and undamaged. Check that the spark gap is 2.5mm and that the rectification probe is 10-12mm forward of the burner.

5.1.3 HEAT EXCHANGER

Whilst the main burner assembly is removed from the unit check that the primary sections that the burners fire into are clean.

6. REPLACEMENT OF COMPONENTS

6.1 MULTIFUNCTIONAL CONTROL

1. Remove the burner manifold as previously described
2. Release the flanged connections at the inlet and outlet of the multifunctional control and remove the multifunctional control.
3. Reconnect the new valve in the reverse order to that above ensuring that the valve is correctly orientated. Renew the sealing 'O' rings if necessary.
4. Re-commission the appliance.

6.3 BURNERS

1. Remove the burner assembly as previously described.
2. Remove the end plates of the burner assembly and the central burner support plate.
3. Exchange burners as required and reassemble components in reverse order.
4. Re-commission the appliance.

6.4 ELECTRODE ASSEMBLY

1. Disconnect the electrode leads from the control box or pcb terminal as appropriate.
 2. Remove the screw securing the electrode assembly to the burner assembly side plate and withdraw the assembly.
 3. Fit replacement and reassemble in reverse order.
- NOTE:** Check that the spark gap is 2.5mm and the rectification is 10-12mm forward of the burner.
4. Re-commission the unit.

6.5 LIMIT THERMOSTAT

N.B Ensure that the thermostats are set correctly before fitment. The limit stat setting is 110 °c

1. Remove the screws that secure the thermostat phial mounting plate to the inner bulkhead, withdraw assembly and unclip the phial.
2. Remove the electrical connections from the limit thermostat. Remove the securing nut and remove thermostat from the electrical panel.
3. Fit replacement thermostat in reverse order.
4. Re-commission the unit.

6.6 EXHAUST FAN

1. Disconnect the fan electrical connections from the terminals on the pcb and the the air pressure sensing tube from the fan.
2. If required loosen the four screws holding the main control panel , lift the control panel up and clear of the fixing position (taking care not to snag the wiring) and move to one side.
3. Remove the four screws holding the exhaust fan assembly to the smoke box and remove the exhaust fan assembly.
4. If needed transfer the fan mounting box and air pressure sensing fitting to the replacement fan.
5. Fit the replacement exhaust fan, using new gaskets and silicon sealant as necessary, and reassemble in reverse order.
6. Re-commission the unit.

6.7 CONTROL BOX

1. Squeeze in the retaining lugs that secure the control box and ease the box forwards, lift the box up and clear of the pcb panel.
2. Fit replacement in reverse order.
3. Re-commission the unit.

6.8 AIR PRESSURE SWITCH

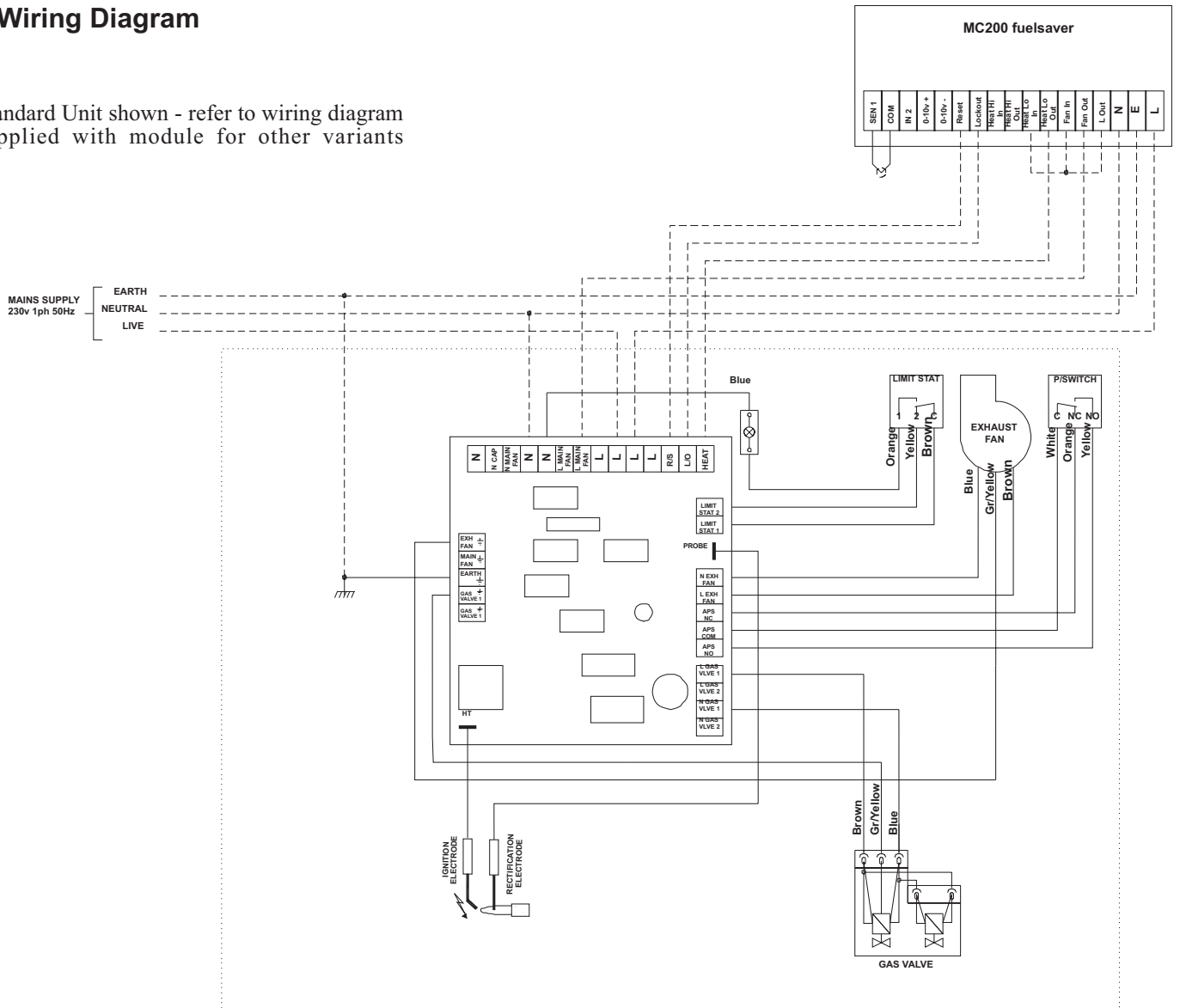
1. Remove screw in centre of pressure switch and remove pressure switch cover.
2. Remove electrical connections.
3. Pull off the sensing tube from the air pressure switch.
4. Remove the screws fixing the pressure switch and remove switch.
5. Fit replacement in reverse order refitting the sensing tube to the negative (- or L) tapping on the pressure switch.
6. Re-commission the unit.

6.9 PRINTED CIRCUIT BOARD (PCB)

1. Disconnect all electrical connections.
2. Squeeze in the lugs that secure the pcb board and ease the board forwards and downwards.
3. Fit replacement in reverse order.
4. Re-commission the unit.

7 Wiring Diagram

Standard Unit shown - refer to wiring diagram supplied with module for other variants



8. Fault Finding

Fault	Cause	Action
Exhaust fan does not run	Electrical 2. 3. reset. 4.	1. Check that there is a main electrical supply present. Check that all external control circuits are completed. Check that high limit thermostat has not tripped - Check that mains voltage is present at fan motor - change fan if faulty.
No spark ignition	Electrical 2. 3. 4.	1. Check full sequence is not at lockout - reset. Check full sequence controls for mains supply - change if necessary. Check that exhaust fan and burner air pressure switches are activated. Check spark electrode and spark gap.
Burner will not light	Electrical	1. Check rectification electrode/lead/signal. 2. Check gas supply is ON.
Exhaust fan runs continuously	Electrical	1. Check overrun thermostat.

9. Short List of Parts

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

ITEM	PART NUMBER
Gas Valve - SIT Nova 822 (112) - 1/2" BSP.	142400450
Burner - Bray P51 AB 19001 (30, 45, 60)	142400240
Burner - Bray P51 AB 19002 (50, 75, 100)	142400241
Ignition Electrode (30, 45 60)	142423002
Ignition Electrode (50, 75 100)	142423004
Rectification Electrode (30, 45 60)	142423001
Rectification Electrode (50, 75 100)	142423003
Full Sequence Control - Pactrol P16B-FI (CE)	142400430
Thermostat - Limit - Imit LS1 - 90/110°C	142403609
Exhaust Fan - Sifan WFFB 0223-006 (30 - 45)	140210499
Exhaust Fan - AD 45CTFR-HT (60 - 50)	140201505
Exhaust Fan - AD 71BTXL (75 - 100)	140201503
Pressure Switch - Kromschroder DL5K 3W30	145604643
Hi/Lo Governor Head - Anglo Nordic MD20003	142466410
Modulating Governor Head - Anglo Nordic MD1003/MD	142466421
Amplifier board - Johnsons PIB-24	142400304

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FM 414
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