

**“Do business in the
right atmosphere”**

Powrmatic Limited

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PC/GS3 & 5 ISSUE 3 2/96

**Burner
Supplement**

**Models PC/GS3 & PC/GS5
PC/GS fully automatic gas burners**

 powrmatic
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Introduction

PC/GS3 & 5

The Powmatic PC/GS3 & 5 fully automatic forced draught burners with ON/OFF gas control. The burners are supplied complete with a gas controls assembly to the latest specification which provides for control of both the start gas and main gas supply through a main gas governor and safety shut-off valves. A separate pilot is not fitted, the start-gas expanding to the main gas rate after the start-gas flame is established.

Flame safeguard based on a rectification system, is provided by the integral full sequence control box:- in the event of flame failure the safety shut-off valves are de-energised and the gas supply is shut-off within one second.

The burner as supplied by Powmatic will perform the following functions:

- a) Providing that the air switch is proved in the 'no-air' position prior to start-up, the combustion air fan will run.
- b) Providing that adequate air flow is proved there will be a pre-purge period.
- c) At the end of this time the ignition transformer and start-gas valves will be simultaneously energised and the start-gas flame established.
- d) Providing that the start-gas flame presence is proved within 3 seconds the main gas safety shut-off valve will be energised and the start gas will expand to the main gas.

Failure to establish a flame in (c) or loss of flame signal thereafter will result in the burner going to lockout. This state requires a manual reset to once again initiate the start sequence.

Technical Data/Components

Burner

Type No. PC/GS 3-5

Operation:
Single Stage, On/Off PC/GS3S
PC/GS5S

Two Stage, High/Low PC/GS3T
PC/GS5T

Modulating PC/GS3M
PC/GS5M

For High/Low and Modulating Burners, refer to relevant supplement.

Output range kW 60-183kW
Btu/h 200,000-625,000

Voltage 230V

Ph Single

Frequency 50Hz

Current Consumption:

Motor 0.7A
Ignition Ignitor 50VA

Control Box

Type Satronic MMI 810, Mod 43

Electrical Consumption — 10VA

Pre-purge Time — 40 seconds

Pre-ignition Time — Nil

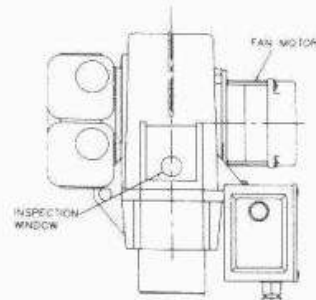
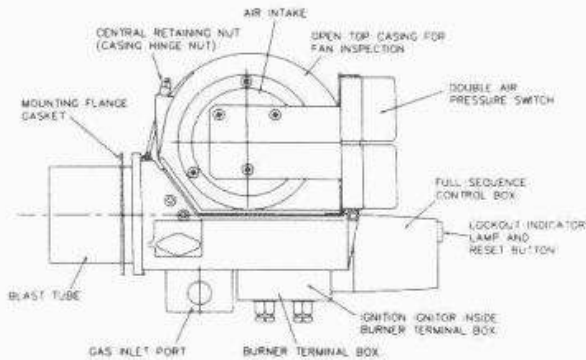
Start-gas safety time (before main flame) —
3 secs. max.

Total Start-up Cycle — 50 seconds

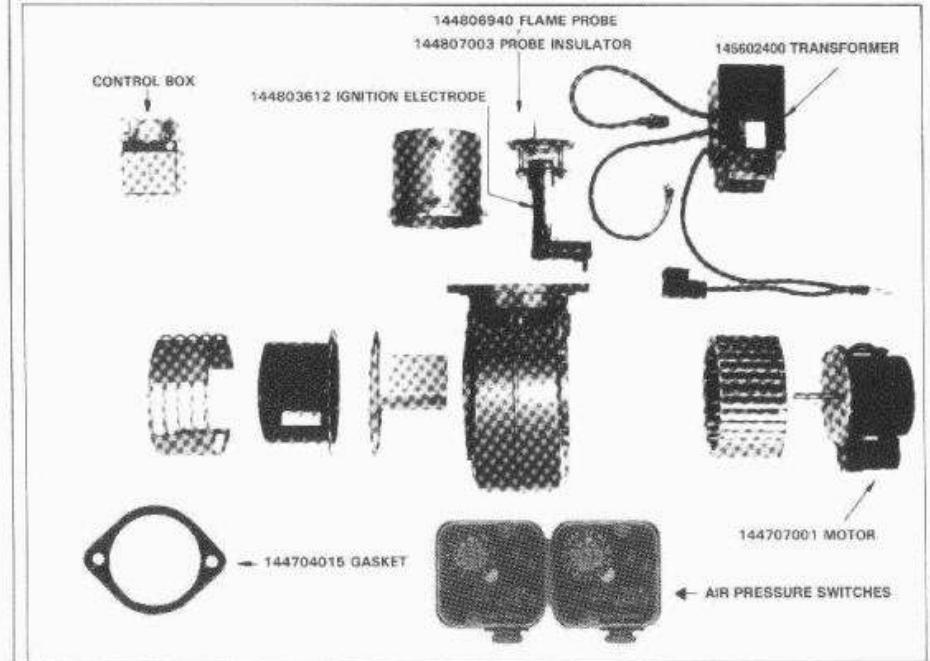
Minimum Normal Ionisation current — 1.0 μ A

External Fuse — 10A (rapid) 6A (slow)

Fig. 1 Principal Components of the PC/GS 3-5



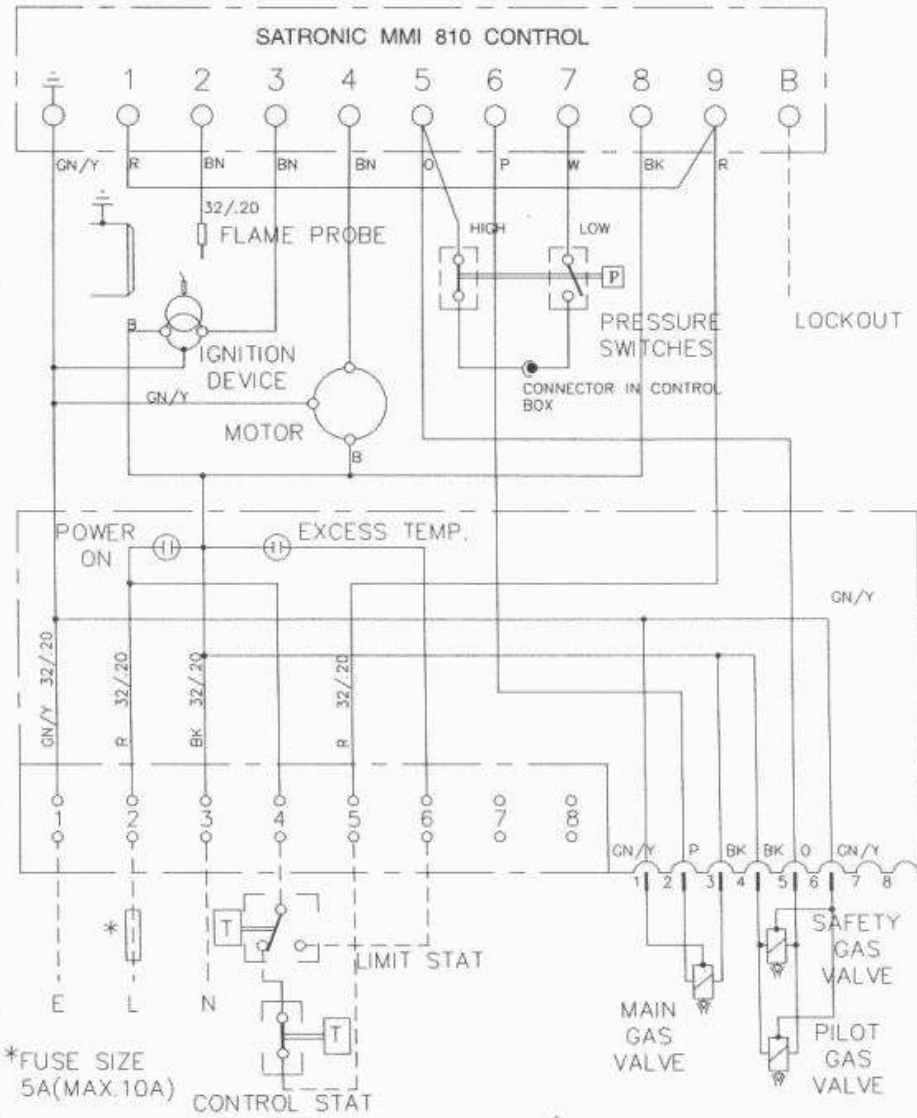
Short List of Parts



Fault Finding

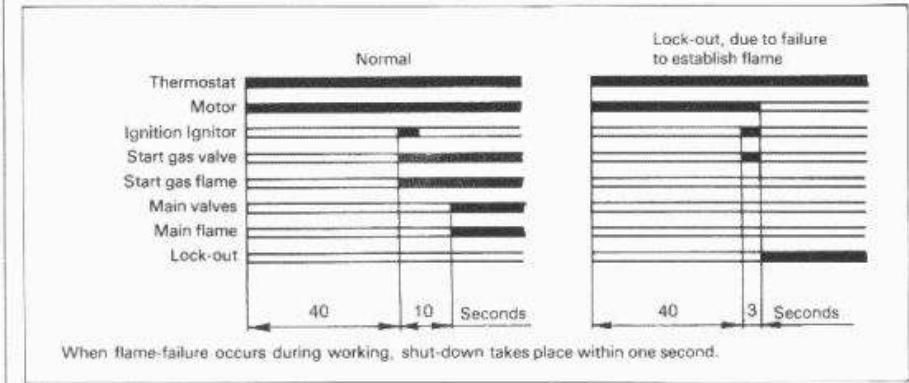
Symptom	Check that:-	Symptom	Check that:-
Burner will not start	<ul style="list-style-type: none"> - External controls are calling for heat. - Limit thermostat has not tripped. - Burner is not at lockout. - Electrical supply fuse is intact - Burner fan motor is operative 	Burner goes through pre-purge period, but start gas fails to establish	<ul style="list-style-type: none"> - Electrodes are in good condition. - Flame signal is present (see below) - The burner head is correctly set.
Burner goes through pre-purge period, but fails to establish flame	<ul style="list-style-type: none"> - Gas supply is present - Live and neutral leads are not inverted - Earth connection is sound - The air over pressure switch is operative ie. not to low - The ignition spark is present at the required time 	<p>To check the Flame Current:</p> <ol style="list-style-type: none"> 1. Remove the control box as detailed (page 6) 2. Release the screw of terminal 2 in control box base and remove the rectification cable to outside of the base. Connect the negative lead of a multimeter to this cable. 3. Using a short length of insulated wire (0.5mm²) connect the positive probe of the multimeter to terminal 2 and replace the control box. 4. Set the meter to d.c. micro-amps. 5. Start the burner and read the flame current obtained. A value of 1μA or over is sufficient to energise the control box. 6. Remove the meter and additional lead, replace rectification cable to terminal 2 and replace control box. 	

Wiring Diagram



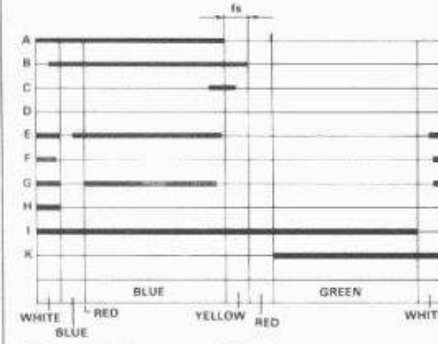
TITLE: CONN.'S. FOR PCGS3/5 O/O ON SATRONIC MMI 810 CONTROL

Burner Start-up Cycle



When flame-failure occurs during working, shut-down takes place within one second.

Control Box Cam Function



Note: 1. Cam switches are shown on the diagram in their relaxed position, indicated by the thin line on cam development sketch above.

COLOURED PROGRAMME INDICATOR

A coloured programme indicator is incorporated on the cam assembly, and the approximate colour positions indicate the following steps in the sequence.

- Blue line on White — Start position
- Start of Blue sector — Start of pre-purge
- Line in Blue sector — Air supply proved.
- Blue sector — Pre-purge
- End of Blue — End of pre-purge
- End of Blue/Start of Yellow — Start of ignition safety time, and initial fuel release
- End of Yellow/Start of Red — Lockout position, due to ignition or detection failure
- Red sector — Start flame proving period
- End of Red/Start of Yellow — Main flame stage
- End of Yellow/Start of Green — End of main flame establishment
- End of Green/Start of White — Run position

Coloured Programme Indicator

CAM SWITCHES

- A Initial fuel release, start of Ignition safety time
- B Air proving period, and termination on safety time
- C Ignition
- E Start of flame simulation, whilst 'B' is on
- F Contact position proving at start of programme
- G Lockout, during pre-purge
- H Programme "start"
- I Programme "stop"
- K Main Gas Valve V2

Mounting the Burner

NOTE: The following procedures only apply when the burner has not been fitted to the appliance in the factory.

Burner with fitted gas controls assembly

1. Remove the nuts and washers from the burner mounting studs on the appliance.
2. Fit mounting flange gasket over mounting studs on the appliance.

3. Offer the complete burner and gas controls assembly up to the appliance and locate the blast tube in the burner port at the same time engaging the burner flange over the studs.
4. Push fully home and secure with the nuts and washers.

Electrical Connections

Burners not fitted to the appliance in the factory are provided with 5A 5 core cable tails. Refer to the appliance installation Commissioning and Servicing instructions for details of the interconnection between the burner and the appliance.

Handing Over To The User

Refer to Appliance Installation, Commissioning and Servicing Instructions.

Burner Servicing

WARNING: ALWAYS switch off and disconnect electricity supply and close the gas service valve before carrying out any servicing work or replacement of failed Components.

General

Full maintenance should be undertaken not less than once per year. After any servicing work has been completed or any component replaced the burner must be fully commissioned and tested for soundness.

Firing Head Assembly

1. Release the central retaining nut and hinge open top half of burner casing.

2. With a 4mm allen key release and remove the cap head screw securing the burner head to the burner body, pull away inner assembly to reveal electrode and rectification probe connections. Disconnect electrode and probe leads and carefully withdraw the inner assembly complete from the burner body.

3. Using a stiff brush clean-off any accumulative deposits from the firing head, paying particular attention to the nozzle ports.

4. Before the firing head is re-assembled into the burner head casting check that the electrode is not damaged or dirty.

If either electrode or rectification probe requires replacing remove the 3mm fixing screw and slide out electrode. Replace with the new electrode ensuring that it is repositioned correctly.

NOTE:

The rectification probe has a flanged insulating bush where it passes through the diffuser plate. When replacing the rectification probe ensure that this insulating bush locates in the diffuser plate from burner port side.

5. Re-assemble in reverse order. Remembering to re-connect the electrode & rectification probe leads, also earth connection under inner assembly fixing screw before closing the burner top casing.

Burner Fan and Motor

1. Hinge open top half of burner casing.

2. Clean the fan blades with a brush to remove any accumulated deposits.

3. Check that the fan is rigidly fixed to the motor shaft and that the assembly turns freely. To carry out this remove complete fan intake assembly, remove air inlet scoop, thus exposing grub screw fixing fan motor shaft. Any adjustment is through fan using extended allen key.

Note

Please refer to the following for setting pressure switches:-

Combustion Air Pressure Switch (GW3 A4 0.4 - 3.0mbar)

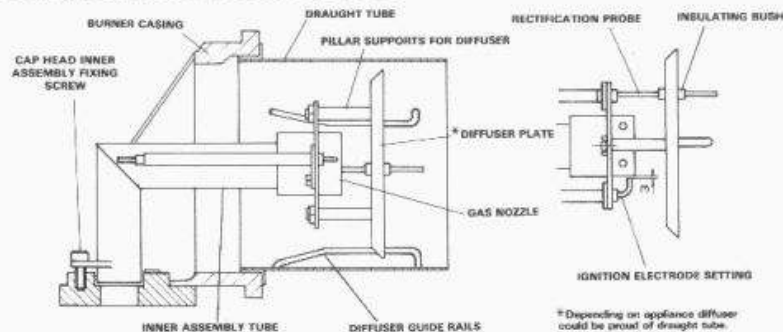
The combustion air pressure switch is set after all other adjustments have been made. Set the dial to 0.4mbar and then with the burner working at the minimum rated output of the heater adjust the dial clockwise increasing its value until the burner locks out. Now reduce the value by one set point turning the dial anti-clockwise, Restart burner. If burner does not light reduce the valve by a further set point and repeat.

Over Pressure Switch (GW10A4 1.0 - 10.0mbar)

The over pressure switch is set after the combustion air pressure switch. Its purpose is to shut down the burner if the combustion chamber pressure increases significantly. Turn the dial to 10.0mbar and then with the burner working at the maximum rated output of the heater adjust the dial anti-clockwise decreasing its value until the burner locks out. Increase value by 1 point and restart the burner.

If the burner shuts down due to the slight pressure surge in the combustion chamber during burner ignition increase the value on the over pressure switch by a further set point and repeat.

Fig. 2 Firing Head Assembly of the PC/GS3 & 5



Replacement of Faulty Components

WARNING: Inadvertent substitution or replacement of similar components, particularly those with plug in bases, could cause a hazard.

Firing Head

1. Remove the firing head assembly as described.
2. Slacken the 3mm fixing screws and slide out the electrode and rectification probe.
3. Release the 4mm screws on the end of the assembly, to remove the diffuser plate.
4. Take the replacement firing head and re-attach the diffuser plate and electrodes, taking care to align them correctly.

NOTE:-

Mark inner assembly tube before removal of nozzle to ensure same is re-fitted in correct position.

5. Take the replacement firing head and re-attach the diffuser plate and electrodes, taking care to align them correctly.

NOTE: The rectification electrode has a flanged insulating bush where it passes through the diffuser plate. When replacing the rectification electrode ensure that this insulating bush locates in the diffuser plate from the burner port side.

6. Re-position firing head assembly inside the burner head casting, hold in position with locking screw and re-assemble in reverse order.

Control Box

1. Undo the single securing screw and pull off the faulty control box.
2. Push-on new control box.

Burner Fan

1. To gain access to the fan follow appropriate steps.
2. To remove fan insert a 3mm allen key through the appropriate fan blade and locate the allen screw in the centre boss. Slacken screw and remove fan from motor shaft.
3. Slacken off motor fixing screws to allow fan to be removed from casing.
4. Replace fan and re-assemble in reverse order.

Burner Fan Motor

1. To gain access to the motor follow appropriate steps.
2. Remove fan as appropriate.
3. Release the motor wiring from the control box terminals and the earth block.
4. Remove 5mm motor fixing screws - remove motor.
5. Replace the motor and re-assemble in reverse order.

NOTE: If the motor capacitor fails, refer to appropriate section.

Ignition Ignitor

1. Undo screws securing terminal box lid and remove.
2. Undo securing screw and pull off control box.
3. Undo screws on right hand side of terminal box, thus releasing ignitor and terminal strip.

4. Release ignitor from the control box wiring terminals and the earthing block.

5. Pull away ignitor together with ignition lead from the inside of the body.

6. Commence fitting replacement ignitor by inserting ignition lead through grommet in burner side and then re-assemble in reverse order.

Capacitor

1. If it is possible to use a soldering iron at the location of the burner then the capacitor can be replaced with the burner motor remaining in situ. In which case proceed as follows:

1. Release screw holding capacitor locating bracket to the end of the motor and gently pull capacitor out of its socket to reveal wiring.
2. Snip through wiring at capacitor terminals or alternatively, using a soldering iron, melt through wiring connections to free.
3. Replace capacitor, resolder terminal connections and resecure mounting bracket to end of motor.

2. When a soldering iron is only available at the workbench then proceed thus:

1. Remove motor/fan assembly as described
2. At the workbench, remove and replace the capacitor.
3. Refit motor/fan assembly to burner in reverse order.

Electrodes

The ignition electrode and/or rectification probe can be replaced by following the appropriate steps.

Air pressure switches

1. Slacken the screws securing the pressure switch covers and remove. Release the wiring from the switches terminals, noting orientation.

2. Slacken the cable clamping nuts on side of pressure switches and pull out cables.

3. Remove air pick up pipe from switch rear, remove union and remove switches from bracket base. Replace switches in reverse order.

4. Re-connect wiring.

5. Re-set Air Pressure Switches as described under Burner Servicing.

Safety Shut-Off Valves

NOTE: Plugs have been used to facilitate electrical connection of the safety shut-off valves to the burner.

1. Remove all plugs from coils of safety shut-off valves.

2. Undo the union of the gas service valve.

3. Undo the union situated at the junction of the gas train with the burner blast tube and remove gas control assembly complete.

4. Disconnect pipework as appropriate to allow exchange of the faulty valve noting the orientation of fittings and components.

5. Fit replacement valve and re-assemble in reverse order.