NG35 – NG100 Automatic Gas Modulating Burner

Installation Maintenance

NU-WAY

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NU-WAY NG MODULATING BURNER

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1. GENERAL

NG Burners for Modulation are supplied only for use with a three phase electrical supply.

This manual is structured to enable the user to proceed from the delivery of the burner to its commissioning and use.

The conditions to be fulfilled and the controls and adjustmants to be used are dealt with in the sequence that should be followed for the correct assembly installation and use. Pre-commissioning (Dry Run) and Live Run are described and the location of necessary controls and adjustments to undertake these runs are illustrated and supported by appropriate tabular matter and graphs.

Routine Maintenance, Fault Finding, Spare Parts identification and Wiring Diagrams complete the manual; literature on proprietary components is available on request.

1.1 SAFETY

BEFORE ATTEMPTING TO ASSEMBLE, INSTALL OR COMMISSION THE BURNER, IT IS ESSENTIAL THAT THE FOLLOWING INSTRUCTIONS ARE CAREFULLY READ AND UNDERSTOOD. IT IS ALSO ESSENTIAL THAT SUCH WORK IS CARRIED OUT ONLY BY EXPERIENCED AND QUALIFIED GAS BURNER COMMISSIONING ENGINEERS.

THE MANUFACTURER CANNOT BE HELD RESPONSIBLE FOR ANY CONSEQUENTIAL DAMAGE, LOSS OR PERSONAL INJURY AS A RESULT OF CUSTOMERS FAILING TO FOLLOW THESE INSTRUCTIONS, OR AS A RESULT OF MIS-USE.

1.2 FLUE AND CHIMNEY REQUIREMENTS

The top of the Chimney/Flue should be above all roofs within a radius of 10 metres.

Check that it is suitable for use with Gas fired appliances.
Reference should be made to Local Authority and other regulations governing such installations.
Ensure that the flue pipe from the Appliance does not protrude into the chimney beyond the wall thickness.

If more than one Appliance is connected to a common flue/chimney, ensure that the cross section of the flue/chimney is adequate for the total volume of flue gases from all the appliances.

1.3 PLANT ROOM VENTILATION

An adequate dust free supply of fresh air is required for the burner at both high and low level in accordance with the appropriate standards.

1.4 EXISTING APPLIANCES

In preparing the Appliance to receive the NG modulating gas burner a careful inspection should be made of its condition. If in doubt as to its suitability for gas firing refer to the Appliance manufacturer. In preparing the Appliance for gas firing it should be cleaned thoroughly removing all adhering Tars, Scale and Dirt.

1.5 COMBUSTION CHAMBER CONDITIONS

When the burner is fitted to an Appliance designed to work under balanced or negative combustion chamber conditions, the over-fire draught must not exceed 0.025 kPa (0.1 inches w.g., 0.25 mBar, 2.5 mm w.g.).

Should the over-fire draught exceed this figure, then steps should be taken to reduce it to this level.

2. SERVICES

2.1 GAS SUPPLY

The piped gas supply must be constructed and installed to comply with local conditions and appropriate Codes and Standards. It must be of sufficient size to satisfy the pressure/volume requirements of the burner to ensure its operation. It is recommended that a 90^{o} manual shut-off valve is fitted upstream of the burner gas train for the isolation of the burner during servicing and maintenance. The valve size must not be less than the NG burner valve train size or create a restriction to gas flow.

2.2 GAS BOOSTERS

When a gas booster is used, the gas pressure at the booster inlet must not fall below 25mm Wg (1" Wg) under all conditions. It is recommended that the booster is installed as near to the burner equipment as possible. The booster should be positioned on a firm flat horizontal surface using anti-vibration mountings for support. All connecting pipework should be well supported and accurately positioned to prevent strain on the fan chamber. It is strongly recommended that flexible pipe nipples be used between the inlet and outlet parts of the booster pipework. The nipples will serve to reduce the strain on the fan chamber and reduce noise transmitted in the pipework. The supply authority should be asked to recommend the size of the pipework between the meter and the burner to guarantee the pressure required.

3. DESPATCH

The NG Modualting Burner is despatched with Control Panel and Gas Valve Train mounted and prewired to it.

A Temperature/Pressure Detector is supplied separately and must be installed and connected electrically in accordance with the appropriate wiring diagrams.

A separate piece of tube 8 mm internal diameter is supplied loose to connect between the appliance combustion chamber and the water separator (trap) fitted to the combined regulator and safety shut off valve.

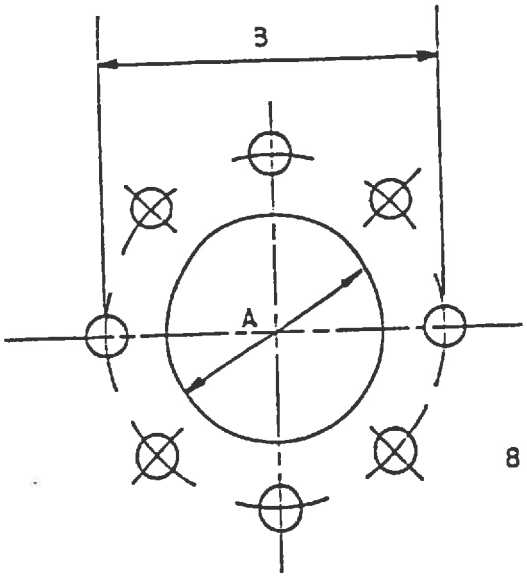
See Fig. 4.

3.1 FITTING TO THE APPLIANCE

If the Burner is fitted to a new packaged Appliance refer to the manufacturers instructions.

If the Burner is to be used with an existing Appliance prepare the mounting Flange as Fig. 1. Ensure the joint between Appliance and Burner is effectively sealed with the Gasket provided.

The Flame Tube should not extend beyond the inner face of the Appliance combustion chamber except where extensions are specified by the Appliance manufacturer.



MODEL	A	B-PCD
NG35	200	254
NG45-85	234	305

ALL DIMENSIONS IN MM

8 Studs M10 x 35mm Long.

Fig. 1. Boiler Frontplate Drilling.

3.2 ELECTRICAL POWER SUPPLY

Connect a 3 Phase 50 Hz electrical supply to the Burner observing all applicable Codes and Standards. Refer to the specific wiring diagram in this Manual or Instruction Pack attached to the Burners.

If supplied as a Packaged Appliance Burner unit refer to the Manufacturers Instructions.

Connect external auxilliary controls by reference to the appropriate wiring diagram.

4. BURNER AIR CONTROLS

4.1 The air for combustion is controlled by an adjustable Air Flap located inside the Air Inlet on the right hand side of the Burner viewed from the rear.

Its purpose is to regulate and control the volume of combustion air flowin through the Burner.

4.2 A reversable Air Damper motor with seven cams switches is located on the rear of the Air Inlet casing. The motor gearing can be disengaged by mean of a lever so that the main drive spindle is easy to adjust in either direction of rotation.

Only Cams No 1 - 2 and 3 are used with this burner model. See Fig. 11.

4.3 AIR DIFFUSER

The Air Diffuser is fitted to the front end of the Inner Assembly and located within the Flame Tube. (Fig. 2).

Its function is to control the volume of combustion air and create a pressure drop over the Burner Head to ensure good fuel/air mixing.

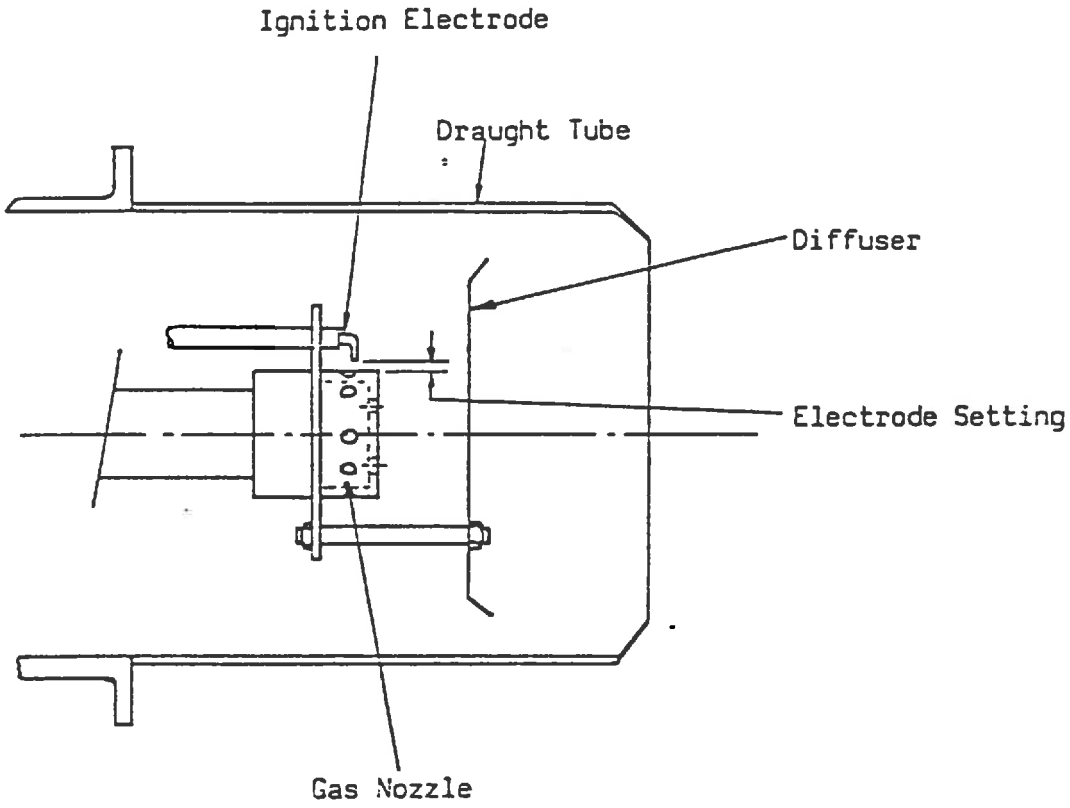


Fig. 2. Burner Head Arrangement.

4.4 AIR PRESSURE SWITCH

The Air Pressure Switch is located on the right side of the Burner Casing viewed from the rear. It is required to prove adequate air flow through the Burner during the whole of its operating cycle.

Air flow failure will result in safety shut down.

5. BURNER GAS COMPONENTS

5.1 GAS NOZZLE

The Gas Nozzle is fitted to the front of the Inner Assembly and located in the Flame Tube. The holes in the Gas Nozzle are of a size to suit the output of a particular Burner Model depending on the type of fuel used and its pressure.

BURNER TYPE	FUEL	GAS NOZZLE		AIR DIFFUSER DIA (MM)
		SIDE HOLES	END HOLES	
NG35	NATURAL	8 x 9.5 mm	12 x 6.4 mm	152
NG45	NATURAL	8 x 9.5 mm	12 x 6.4 mm	190
NG55	NATURAL	8 x 11.0mm	12 x 7.0 mm	178
NG65	NATURAL	8 x 11.0mm	12 x 7.0 mm	178
NG75	NATURAL	8 x 11.0mm	12 x 7.0 mm	165
NG85	NATURAL	8 x 12.7mm	12 x 8.0 mm	165

Fig. 3. Gas Nozzle and Diffuser Details.

5.2 GAS VALVE TRAIN

The Gas Valve Train is illustrated in Fig. 4. The system includes an Air/Gas Ratio Controller, Safety Shut-Off Valves, Manual Shut-Off Valves and Regulator in both Main and Start Rate Gas Lines.

Closed Position Indicator Switches (CPI) are fitted as standard to all down stream Safety Shut-Off Valves.

Three Impulse Pipes are connected to the Air/Gas Ratio Controller. All are factory fitted. An extra piece of 8 mm diameter pipe is supplied loose with the Burner to connect between the Appliance combustion chamber and the Water Separator as shown in Fig. 4.

One pipe is connected to the Burner Hinged extension and supplies a stream of air to the Ratio Controller.

A second pipe is connected on the inlet side of the downstream S.S.O.V. and supplies a stream of gas to the ratio controller.

The third pipe is connected to the water separator (trap) and the appliance combustion chamber. Fig. 4.

CPI Switches are also fitted as standard to the Air/Gas Ratio Controller on Burners with a capacity between 1 and 2 mW (3.4 to 6.8 million Btu).

Other optional and mandatory Gas Train extras include Pressure or Vacuun proving systems. When these systems are supplied they are mounted and pre-wired to the Gas Train at the Factory.

STANDARD GAS TRAIN NG MODULATING BURNER.

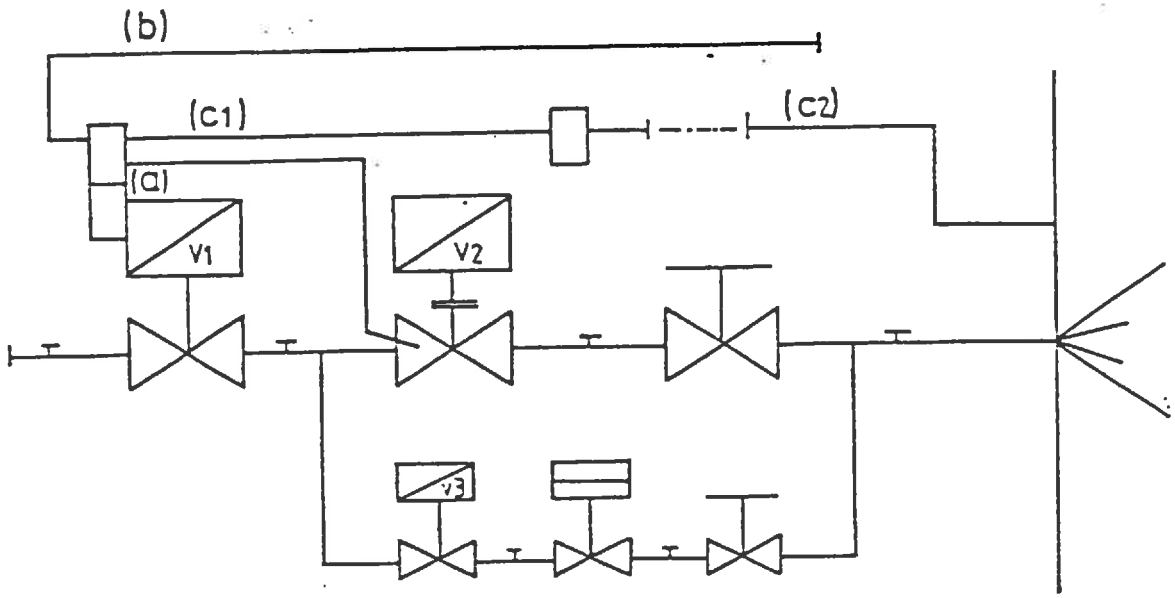


Fig. 4. Impulse Pipe Connections (All Modulating NG Burner Gas Valve Trains).

(a) Regulator to 2nd S.S.O.V. (Factory fitted).

(b) Regulator to Burner Air Supply (Factory fitted).

(c) Regulator to Appliance Combustion Chamber.

1. Regulator to Water Separator (Trap) (Factory fitted).

2. Water Separator to Appliance Combustion (Supplied loose for on site fitting).

5.2.2 VACUUM PROVING SYSTEM FIG. 6.

When the appliance "calls for heat" a signal via the sequence control box energises the Vacuum Proving System which then carries out a series of checks before the burner can start.

The normally open Vent Valve V1 closes.

The vacuum pump within the Vacuum Proving System is energised for 22 seconds and creates a vacuum between valves V1, V2, V3 and V4.

Burner motor runs at this time.

Proving of vacuum for 28 seconds.

If vacuum is not proved, check the Gas Valve Train for leaks, valves V1, V2, V3 and V4 may be leaking and the seats may need cleaning and/or the valves renewed.

Vacuum Proving System will lock out.

If the vacuum is proved, the system is leak proof and the Vacuum Proving System will allow the burner to continue on NORMAL OPERATION.

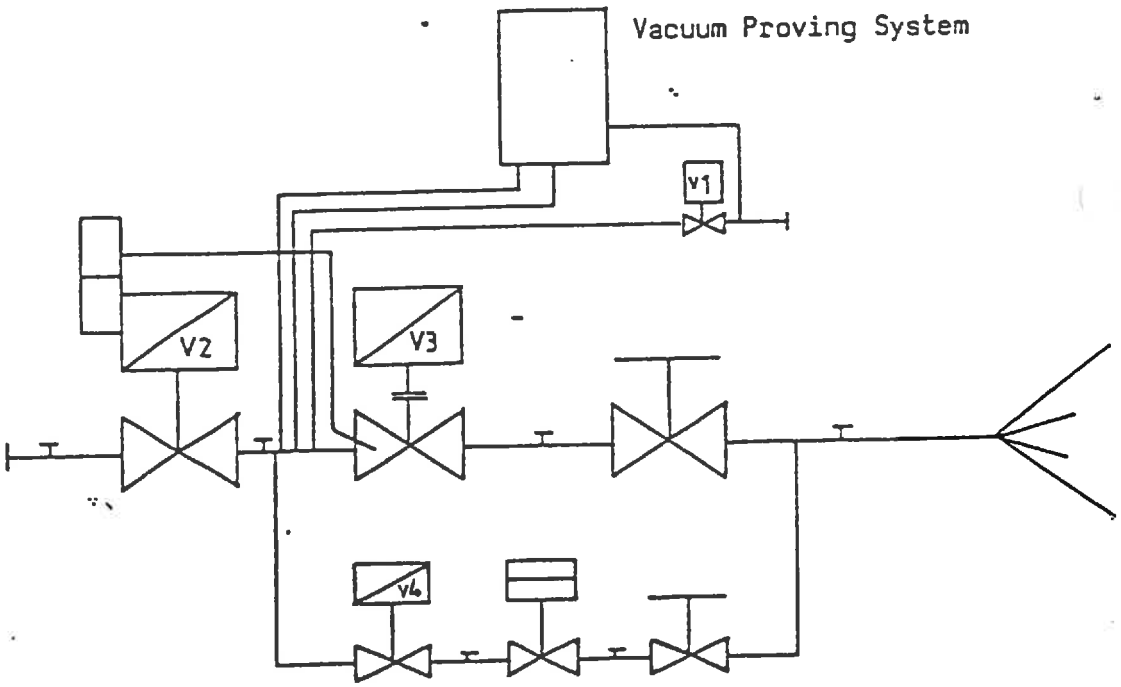


Fig. 6.

NG35-85 Modulating Burner with Vaccum Proving System.

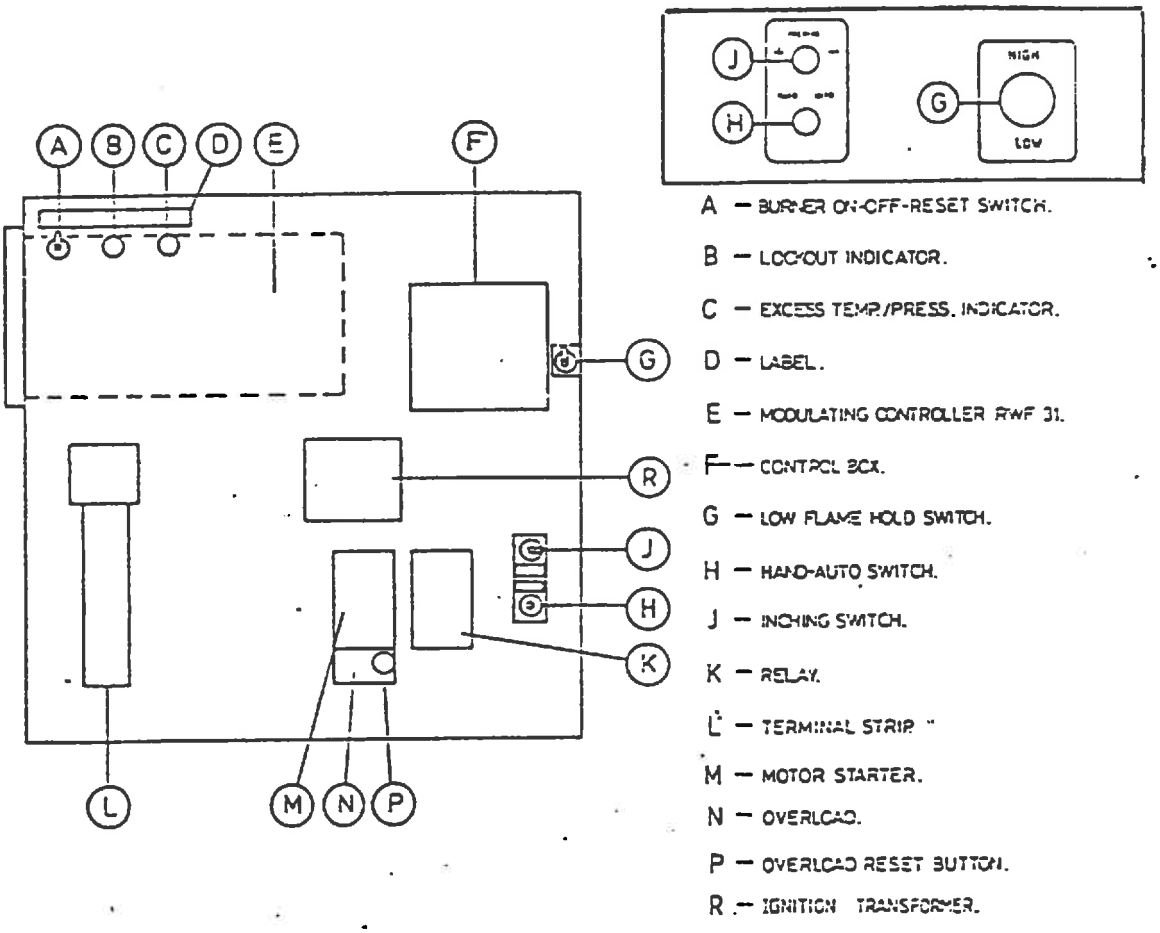
Note: Impulse Pipe requirements as Fig. 4.

6.0 BURNER CONTROLS

The Burner Control Panel is located on the right side of the Burner viewed from the rear.

It includes the Temperature/Pressure Controller. The Burner Sequence Control. Ignition Transformer. Motor Contactors and Overload. High/Low Switch. Hand-Auto Switch and Inching Switch. Electrical terminals and multi-pin socket.

External Indicator Lights include the Burner On/Off switch, Lockout Warning and Excess Temperature/Pressure Warning. Fig. 7.



A — BURNER ON-OFF-RESET SWITCH.
B — LOCKOUT INDICATOR.
C — EXCESS TEMP/PRESS. INDICATOR.
D — LABEL.
E — MODULATING CONTROLLER RWF 31.
F — CONTROL BOX.
G — LOW FLAME HOLD SWITCH.
H — HAND-AUTO SWITCH.
J — INCHING SWITCH.
K — RELAY.
L — TERMINAL STRIP.
M — MOTOR STARTER.
N — OVERLOAD.
P — OVERLOAD RESET BUTTON.
R — IGNITION TRANSFORMER.

7.0 TEMPERATURE/PRESSURE DETECTOR

A Temperature or Pressure Detector for installation in the Appliance is supplied as a loose item with the Burner.

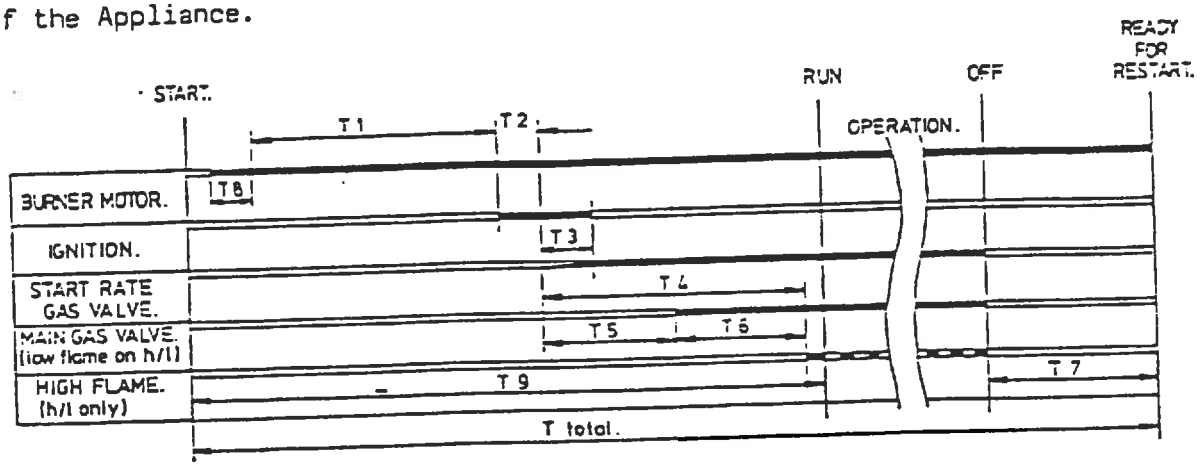
When the NG Modulating Burner is supplied as an Appliance package the Temperature or Pressure Detector may be fitted and electrically connected.

If the Burner is a conversion or replacement the Temperature or Pressure Detector must be fitted and wired in accordance with the manufacturers recommendations and wiring diagrams included in this manual.

The Ultra Violet (UV) Flame monitor is located on the Burner Body and is required to supervise the safe operation of the Burner under all working conditions.

8.0 BURNER OPERATING SEQUENCE

The NG Modulating Burner Sequence begins with an air pre-purge followed by start rate gas flame which when proved allows the Burner to operate on the modulating principle determined by the pressure/temperature requirements of the Appliance.



TIME (SECS)	CONTROL TYPE		DESIGNATION
	LFL 1.335	LFL 1.635	
T1	32.5	62.5	Pre-Purge.
T2	5	5	Pre-Ignition.
T3	2.5	2.5	Safety Lockout Time.
T4	30	30	Delay Start Rate to Main Flame.
T5	-	-	Delay Start Rate to Main Flame.
T6	-	-	Delay Low Flame to Modulation.
T7	15	15	Post-Purge.
T8	10	10	Air Pressure Switch Interlock.
T9	78	19.5	Total Start Time.
TOTAL	93	120	Total Cycle Time of Controller.

Fig. 8. Timing Chart. (Control Box Only).

8.1 The pre-purge times shown above refers to the Control Box only. The Air Damper Control will extend the total Burner purge time up to a maximum of 127 seconds depending upon the firing rate and air requirements of the Appliance.

9.0 COMMISSIONING

Re-check Electrical Wiring is complete and complies with all Codes and Standards.

Re-check Gas pipework is correctly installed and leakproof.

Check the Appliance is in a proper and safe state to be fired. (For instance is there water in the Boiler).

Set Appliance controls to call for heat.

Momentarily switch on power to the Burner and check the motor rotation which should be anti-clockwise viewed from the motor end.

9.1 INITIAL BURNER SETTING

The following settings are suggested for initial firing. Further adjustments will be necessary before commissioning is complete.

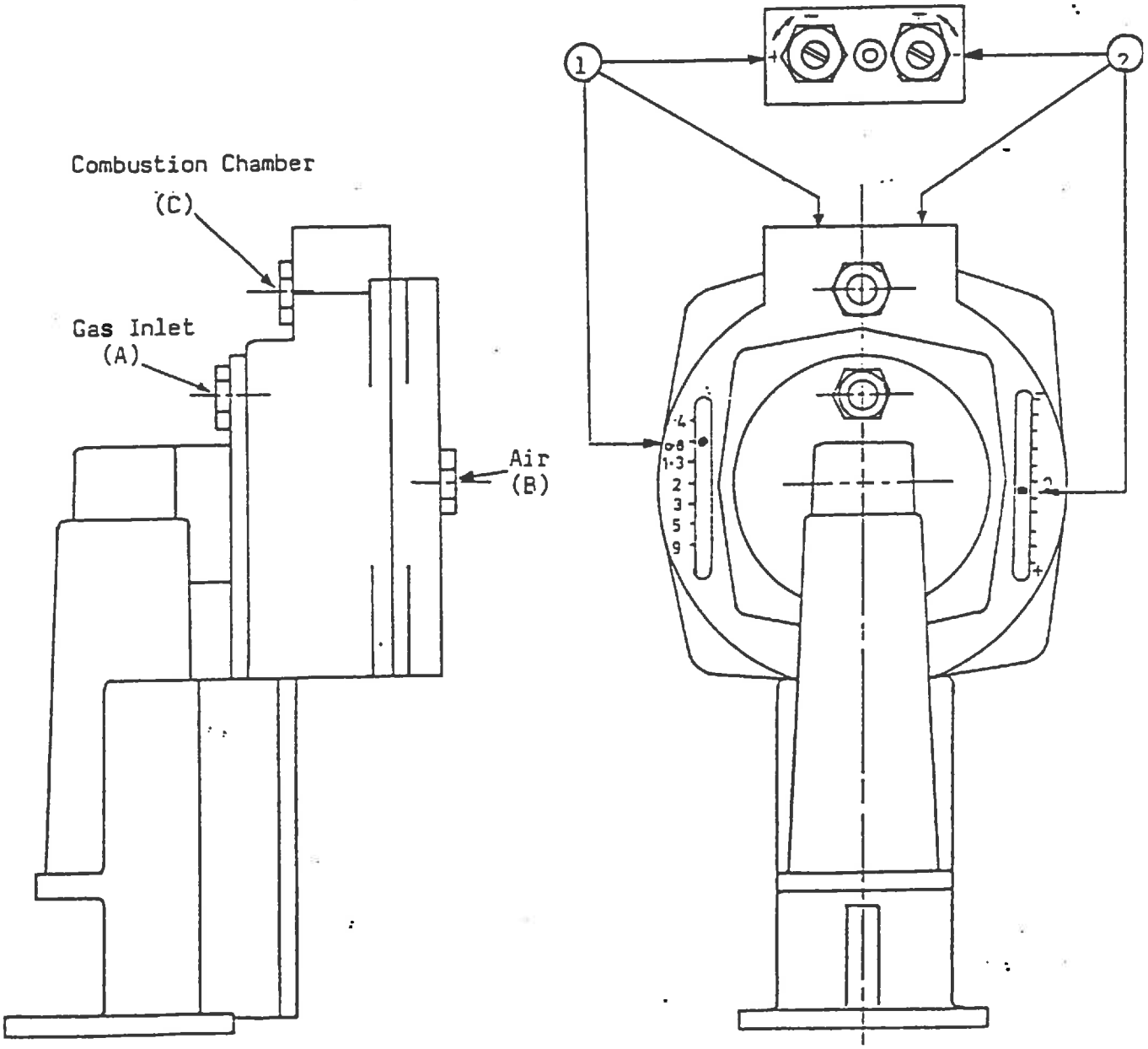
9.2 GAS

(a) Combined Governor/Safety Shut-Off Valve (S.S.O.V. Fig.9).

Remove the small plate on top of the Regulator and keep it in a safe place.

Set the Air to Gas ratio at 0.8 on the visual scale by adjusting the screw (1). Anti-Clockwise to increase. Clockwise to decrease.

Set the Air Gas ratio on the visual scale (2) to half a division on the "+" side of "0". Turn the adjusting screw clockwise to decrease. Anti-clockwise to increase.



Refer to Fig. 4 for Line Diagram.

Fig. 9. Combined Governor/Safety Shut-off Valve.

10.0 AIR

Remove the cover from the Air Control driving motor at the lower rear end of the Air Inlet Casing.

Check the settings and positions of the cams as illustrated. Adjust if necessary.

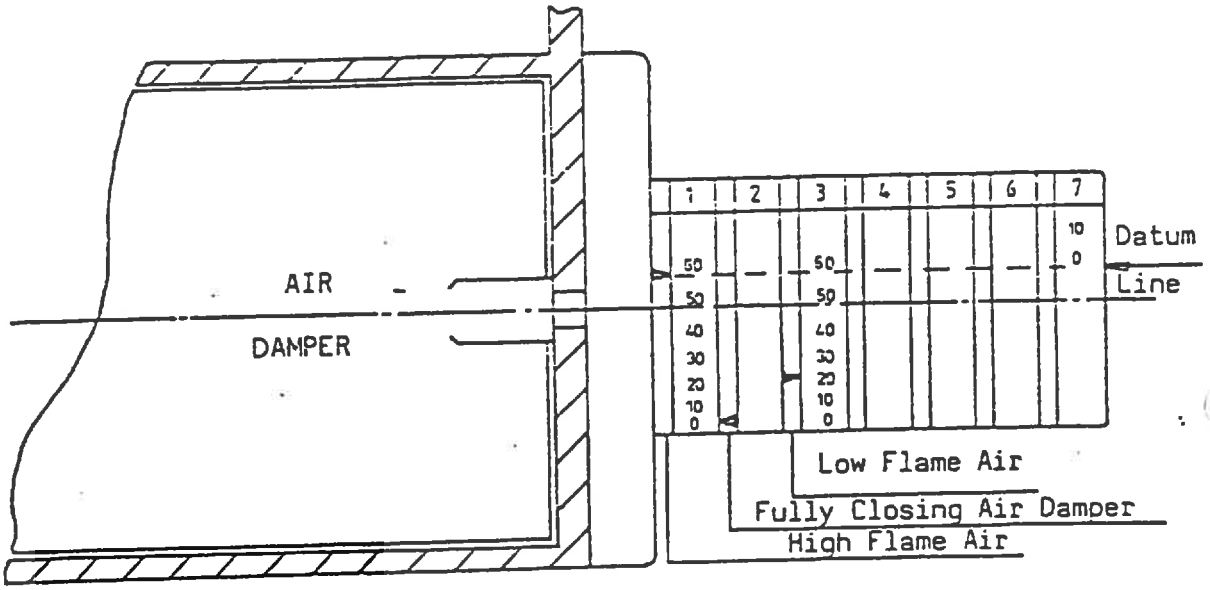


Fig. 11. Air Damper Cam Arrangement.

11.0 BURNER DRY RUN

Check gas supply to the Burner is TURNED OFF.

Check both Manual Gas Valves on the Burner are CLOSED.

Open the Control Panel and turn the HAND-AUTO switch to HAND.

Set the High/Low flame switch to the Low flame position.

Close the Control Panel.

Switch on the power supply to the Burner.

Switch on the Burner.

Depending on the type of Control Box fitted the Burner will go through its operating sequence.

(a) Immediately if it has previously been working but switched off during a normal operating cycle.

(b) On pressing the reset button on the Control Box inside the Control Panel.

Burner motor will run.

Check that ignition spark is present. For actual timing refer to Sequence Diagram Fig. 8.

If at this stage there is no ignition spark and the Burner goes to Lock-out the Air Pressure Switch may require adjustment. See Para.18. Ignition spark ceases and Burner goes to Lockout.

SAFETY SYSTEM PROVED. BURNER COMMISSIONING CAN PROCEED.

SWITCH OFF POWER TO THE BURNER.

(b) Start Rate Gas Governor.

Remove the metal cap from the top and turn the Adjusting Screw until it is approximately halfway between maximum and minimum setting. Clockwise to increase. Anti-clockwise to decrease. Never adjust to its maximum limit.

(c) Down Stream Safety Shut Off Valve.

The opening speed of the initial lift is adjustable.

To adjust the speed of the initial lift first remove the Cap (1). Invert it and use as a key on the Adjusting Spindle (3) under the Cap.

If the Appliance has high overpressure characteristics turn the key fully clockwise to slow down the speed of the initial lift.

If the Appliance is of low or negative resistance turn the key fully anti-clockwise to accelerate the speed of the initial lift.

It may be necessary to make further adjustments between the extremes before commissioning is complete.

Replace plastic cap.

(d) Down Stream S.S.O.V.

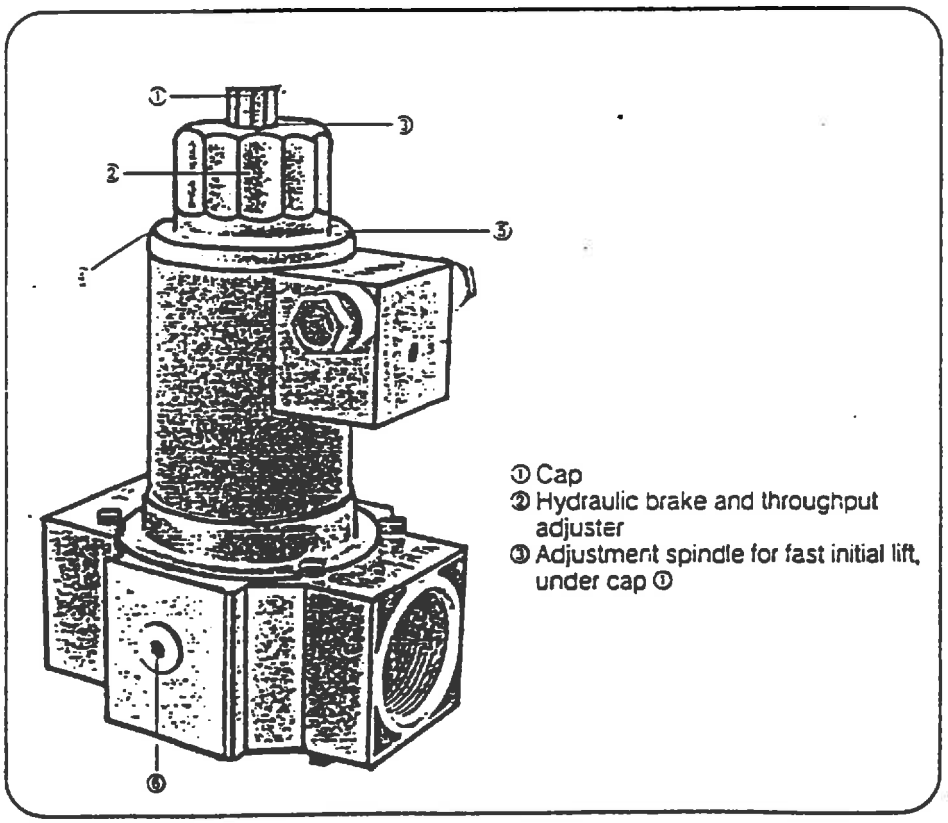


Fig. 10. Second Safety Shut-Off Valve.

12.0 BURNER LIVE RUN

12.1 GAS SUPPLY PRESSURES

A supply pressure of not less than 44.8 mBar (4.5 Kpa, 457 mm Wg, 18'' Wg) and not more than 300 mBar (30 Kpa, 3048 mm Wg, 120" Wg) is required at the inlet to the Burner combined Governor/S.S.O.V.

The exception to these conditions is the NG35 with a capacity limited to 850 kW (2,900,000 Btu).

12.2 When a Gas Booster is required certain regulations and recommendations must be followed (see Para. 2.2). A low gas pressure switch must be fitted on the upstream side of the Booster to prevent it starting unless there is adequate pressure.

A further pressure switch is fitted on the delivery side of the booster to monitor the gas pressure. The pressure switch is wired into the Burner Control System and prevents High Flame operation in the event of low gas pressure.

12.3 Turn the Main Manual Gas Valve downstream of the second S.S.O.V. to the CLOSED position. Fit a manometer or other approved pressure measuring instrument at the test point on the upstream side of the Governor (Regulato: on the combined Governor/S.S.O.V.

Open the Manual Gas Valve upstream of the Combined Governor/S.S.O.V.

Check there is sufficient static gas pressure to enable commissioning to proceed.

13.0 ESTABLISHING START RATE GAS FLAME

Open Start Rate Manual Gas Valve.

Switch on the power supply to the Burner.

Switch on the Burner.

Burner motor will run - ignition spark will be established - Start Rate Gas Valve will open.

With the Start Rate Flame established the UV cell monitor will take over. The Burner will now operate continuously on Start Rate Flame. For timing see Sequence Diagram Fig. 8.

Should the Burner fail to light refer to 9.2 (a), (b), (d) and adjust accordingly.

Switch off the Burner.

14.0 ESTABLISHING MAIN FLAME

Leave Hand Auto Switch in the Control Panel set at "Hand".

Leave High/Low Flame Switch in the Low Flame position.

Open Main Manual Gas Valve.

Switch on the Burner.

Burner will operate to Start Gas Rate (See Para. 13). The downstream S.S.O.V. will open and the Air Control will be in the Low Flame position.

Low Flame is established.

15.0 SETTING LOW FLAME

Leave the High/Low switch on the Low Flame position.

Leave HAND-AUTO Switch in the Control Panel set at HAND.

Move the Inching Switch to the position marked "-" and hold until the Burner is in the Low Flame position.

Release the Inching Switch and allow it to return to the neutral position.

The Burner will remain on Low Flame until switched off manually or by the Appliance Control Instruments.

Check the gas flow rate. If adjustments are required they can be made on the Adjustment Screw marked (2) on the top of the Governor.

Turn Adjusting Screw (2) anti-clockwise to increase and clockwise to decrease.

Following adjustments to the gas rate it may be necessary to increase or decrease the air flow through the Burner. This can be done by adjusting Cam No. 3 on the Air Control driving motor. When increasing Low Flame air the Air Control driving motor will automatically follow the Adjustment down. To recheck the Low Flame setting drive the Burner fully to the High Flame position and back to Low Flame on the Inching Switch.

After each adjustment to gas or air a further check on combustion condition should be carried out.

16.0 FINAL COMBUSTION CHECKS

Using the Inching Switch operate the Burner to both High and Low Flame and check the combustion performance.

The final setting of Air/Gas ratios may now be made on the Adjusting Screws (1) and (2). Fig. 9 Adjustments between High and Low Fire are unnecessary due to the compensating operation of the Gas/Air Ratio Control on receiving signals from the three Impulse Pipes.

17.0 START RATE GAS

Leave Hand/Auto Switch in the Control Panel set at "Hand".

Leave the High/Low Switch in the Low Flame Position.

Close the Main Manual Gas Valve.

Switch on the Burner and allow it to run to Start Gas Flame with Low Flame air.

Adjust to the required volume on the Start Gas Governor. A maximum start rate of not more than 10% of Main Flame flow rate is adequate.

To increase rate turn Adjusting Screw clockwise and anti-clockwise to decrease.

NEVER adjust the start rate Gas Governor to its maximum setting.

17.1 Maximum start gas rate is determined as "flow measured to a maximum of 25% Stoichoimetric gas rate for the proved air flow at the time of ignition' See Fig. 13.

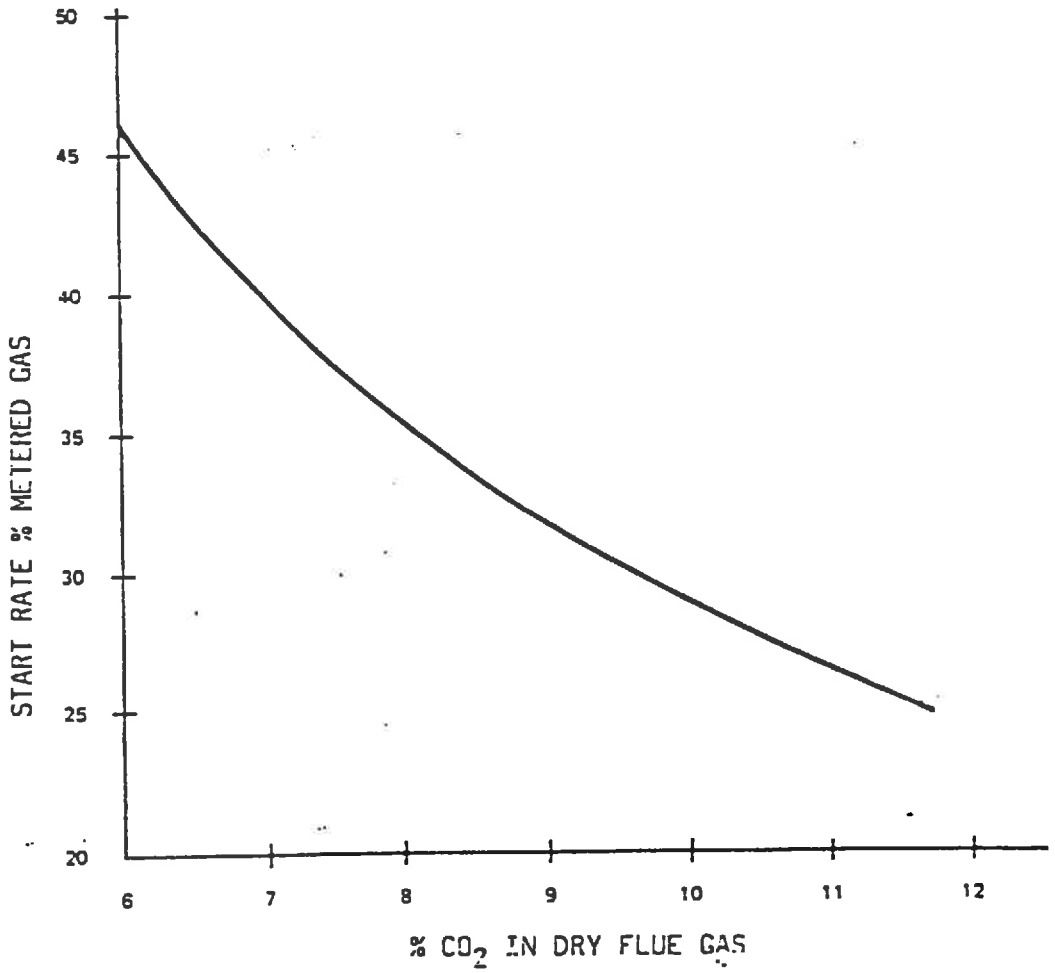


Fig. 13. Maximum Start Rate Graph.

Applying the Low fire CO_2 content to Fig. 13 will establish maximum permissible start rate, e.g. at 10% CO_2 a metered start gas rate of 29% of the Low Flame gas rate is permissible.

18.0 AIR PRESSURE SWITCH

Switch off the Burner.

Open Main Manual Gas Valve.

Leave Hand/Auto Switch set to HAND.

Leave High/Low Flame Switch set Low.

Remove the Air Pressure Switch Cover.

Switch on the Burner and allow it to operate continuously on Low Flame.

Slowly turn the adjustment dial on the Air Pressure Switch anti-clockwise until the flame is extinguished and the Burner LOCKS OUT.

Turn the dial one division and reset the Burner Control.

The Burner will restart and continue its cycle to the Low Flame condition or Locks Out. If the Burner Locks Out repeat the adjustment procedure once per Burner cycle until the Low Flame condition is established.

Recheck the performance then turn the adjustment dial a further two divisions clockwise.

Switch off the Burner and replace the Air Pressure Switch cover.

19.0 FLAME SIGNAL STRENGTH

Open the Control Panel.

Connect a D.C. micro-ammeter (0-500 uA) as shown on the appropriate wiring diagram in this manual.

Switch on the Burner.

Once a flame is established the micro-ammeter will record the signal strength. Check both High and Low Flame. A minimum reading of about 7 uA will give reliable operating conditions.

Readings below this figure may arise from poor Burner adjustment. Check and reset if found to be necessary or refer to section on Fault Finding.

Switch off Power to the Burner, and remove micro-ammeter.

Reconnect U.V. Detector.

20.0 TEMPERATURE/PRESSURE CONTROLLER (SEE FIG. 7 (E).)

The unit is factory set according to the operating Temperature or Pressure requirements of the customer.

Changes to the Temperature or Pressure response time can be made using the Setpoint Adjustment (Item A) shown on Page 6 of the enclosed leaflet illustrating the RWF31 Controller.

Light signals marked Y1 and Y2 indicate the operating condition of the Burner. Y1 indicates the Burner is modulating towards maximum. Y2 indicates the Burner is modulating towards minimum.

21.0 FINAL CHECK.

Check that all covers to components have been replaced and locking devices properly secured (check particularly the small cover plate from the top of the combined Regulator/Safety Shut Off Valve).

Check that all Appliance Control Instruments are set to safe limits.

COMMISSIONING IS NOW COMPLETE.

Switch on Power to the Burner.

Set the High/Low Switch to High.

Set the Hand/Auto Switch to Auto.

Switch on the Burner.

The Burner will now operate until switched off:

(a) By the Controlling Instruments of the Appliance.

(b) Manually.

(c) By Power Failure upon restoration of power the Burner will restart automatically and follow the sequence.

22. ROUTINE SAFETY CHECKS

TO BE CARRIED OUT ONLY BY QUALIFIED AND EXPERIENCED PERSONNEL.

Check that the Plant Room is well ventilated at all times.

Frequently inspect air inlet of the Burner and ensure there are no obstructions to air flow.

23. FLAME DETECTION SYSTEM

U.V. (Ultra Violet) Cell.

Switch off the Power supply to the Burner. Remove UV Cell from the Burner casing and cover the quartz glass envelope to exclude any light. Do not touch the quartz glass with fingers.

Switch on the Power supply. Check that the Burner locks out at the end of the ignition cycle.

Switch off the Power supply. Replace UV Cell switch on the Power supply. Reset lockout.

24. ROUTINE MAINTENANCE

Switch off Power supply and gas supply to the Burner.

24.1 COMBUSTION AIR FAN

Clean blades regularly with stiff brush. Access is obtained through the Burner top cover. Care should be taken to avoid damaging fan blades. Check that the air inlet into the fan is clean.

24.2 INNER ASSEMBLY

NOTE: TO OPEN THE HINGED EXTENSION FIRST REMOVE THE GAS TRAIN MULTI PIN PLUG FROM ITS SOCKET ON THE CONTROL PACKAGE.

REMOVE THE LOCKING NUT SECURING THE HINGED EXTENSION.

Open hinged extension, discon nect ignition electrode lead.

Remove cap head screw securing the inner assembly gas pipe to the inside of the hinged extension. Carefully withdraw the inner assembly from the hinged extension.

24.3 AIR DIFFUSER AND GAS NOZZLE

Clean using a stiff brush.

24.4 IGNITION ELECTRODE

Clean and check the electrode is not cracked or worn. Renew if necessary.

Check settings of ignition electrode, reset if necessary. Refer to Fig.2.

24.0 UV (ULTRA VIOLET) CELL

Clean the UV Cell with a clean dry cloth. Do not touch the glass envelope of the cell with fingers. Replace the UV cell making sure the glass envelope faces direction of flame.

Replace all components and covers, secure all fittings.

Burner is now ready for operation.

Switch on the Power and gas supply to the Burner.

25.0 FAULT FINDING

Any modifications to the installation or component settings resulting from actions suggested below may require the re-establishment of the various settings as indicated earlier in this manual.

25.1 BURNER MOTOR FAILS TO START

Check electrical supply is available and burner is correctly wired.

Check all fuses for continuity and size.

Check that all control instruments are 'calling for heat'.

Check that gas train is electrically connected.

Check that the control box is not locked out (e.g. signal lamp may be faulty). If the control box is locked out press reset button.

Check motor capacitor.

Check that the CPI switch is in the 'start' position. (Check wiring).

Check leak detection system (if fitted) is not locked out. If the leak detection system is locked out press reset button.

25.2 Check that the air pressure switch is in the 'start' position.

The following procedures will assist in this check. Switch off Power supply.

25.2.1 Remove the plug-in assembly from control box base.

Using a suitable instrument, check for continuity between the following terminals.:

Landis & Gyr LFL1.335	Terminals 13 & 14
Landis & Gyr LFL1.635	Terminals

If the air pressure switch is not in the start position, turn the setting dial fully clockwise to minimum setting. Check again between appropriate terminals for continuity. If this condition is fulfilled the air pressure switch is in order.

However, if no continuity is obtained, the air pressure switch is faulty and must be renewed.

5.2.1 PRESSURE PROVING SYSTEM FIG. 5.

When the appliance 'calls for heat', a signal via the Burner sequence control box energises the Pressure Proving System, which then carries out a series of checks before the Burner can start.

Valves V1, V2 and V3 are closed.

The Pressure Proving Sequence first opens V3 in the pilot line and after eight seconds closes again.

Valves V1. V2 and V3 all remain closed for 20 seconds whilst the minimum side of the Gas Pressure Switch, factory set at 50 mm Wg (2.0" Wg, 50 mBar, 0.5 KPA) now checks for rise in gas pressure between the three valves.

If there is no rise in gas pressure, V1 is leak proof and the Pressure Proving System will continue to sequence to the next stage.

V1 opens for six seconds and pressurises the line between V1, V2 and V3.

Valve V1 closes.

Valves V1, V2 and V3 remain closed for 28 seconds, whilst the maximum side of the gas pressure switch, factory set at 175mm Wg (7.0" Wg, 17.5 mBar, 1.75 KPA) now checks for a fall in pressure between the three valves.

If there is a fall in gas pressure, check the Gas Train for leaks. Valves V2 and V3 may be leaking and the seats may need cleaning and/ or the valves should be renewed.

The Pressure Proving System will lockout.

If there is no fall in the gas presure, the system is leak proof and the Pressure Proving System will allow the burner to continue on NORMAL OPERATION.

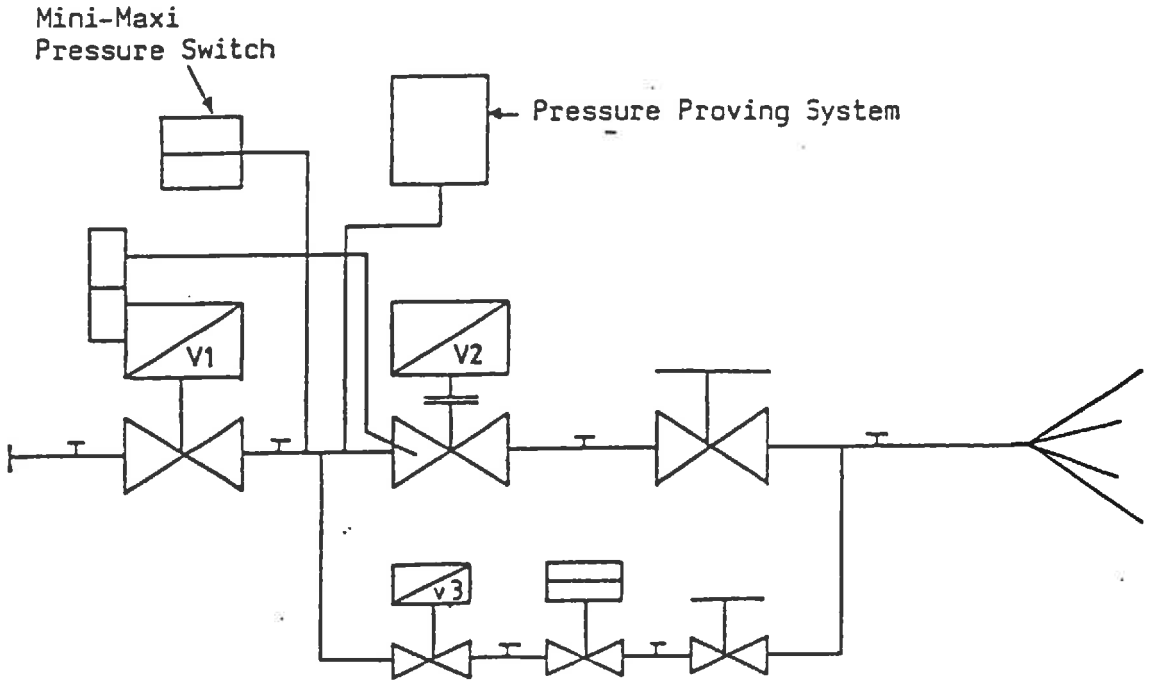


Fig. 5.
NG 35-85 Modulating Burner with Pressure Proving System.

NOTE: Impulse Pipe requirements as Fig. 4.

25.3 FAN STARTS AND BURNER GOES TO LOCKOUT

SYMPTOM	POSSIBLE REASON	REMEDY
No Ignition.	Air Pressure Switch. Electrode Setting Incorrect. Cracked Electrode Porcelain. HT Lead disconnect/damaged. Transformer Faulty. Control Box Faulty.	See Para.18. Re-Set. Re-New. Re-Connect/Re-New. Re-New.
No Flame	Gas Supply Interrupted) Gas Pressure too Low) Valves Fail to Open Manual Shut-Off Valve Closed.	See 2:1 Check Coils and Associated Wiring. Open.

25.4 STARTING FLAME FAILURE

If the start rate flame is not properly established, the safety circuit of the Sequence Controller will cause lockout in one second.

The cause may be insufficient signal to the flame detection device which is the UV cell. Alternatively the flame signal check link has been removed.

TYPE OF DEVICE	POSSIBLE REASON	REMEDY
U V Cell	Glass envelope dirty, cell wrongly positioned. Faulty UV Cell. Faulty Wiring.	Clean the glass - should face towar the flame. Re-New. Re-Wire.

Insufficient gas to allow the flame monitoring device to take over and signal the sequence controller to continue its cycle. This may be remedied by adjusting the fast initial lift of the down-strem S.S.O.V (see Para. 9.2(C).

25.5 BURNER RUNS AND FAILS TO ESTABLISH MAIN FLAME

SYMPTOM	POSSIBLE REASON	REMEDY
No Main Flame	Gas Pressure/Volume too Low Main Flame Gas Valves Fail to Open. Control Box Faulty. Gas Train Plug Disconnected. Main Manual Gas Valve Closed. Low Flame Hold Link Removed. Cam Bank Loose (H/L Only) Gas Train Gasket incorrectly Positioned.	See 2:1. Check Coils & Associated Wiring. Check/Re-New. Re-Connect. Open. Re-Fit. Re-Tighten. Re-Position.

25.6 BURNER MOTOR ONLY RUNS CONTINUOUSLY

POSSIBLE REASON	REMEDY
Failure of Air Control Damper Motor.	Re-New.
Micro Switch Fails to Change Over.	Re-New.
Damper Motor Incorrectly Wired.	Re-Wire.

25.7 INCORRECT ROTATION OF BURNER MOTOR

Burner motor rotates clockwise viewed from shaft end. If Burner motor rotation is incorrect :

3 Phase Motor, first interchange any two phases, then if rotation is not corrected the motor should be renewed.

26.0 SPARE PARTS IDENTIFICATION

Separate illustrated lists, containing an Item Number. Description and Code Number, are included in this Section for the NG35-NG85 Burners.

The variations on a component are included and care must be taken when making any reference to a component to use the correct description and Code Number.

27.0 NOTE: Should the motor or combustion air fan need replacing the following procedure can be followed.

Disconnect the Gas Valve Train multi-pin plug from the socket on the Control Package.

Remove the retaining screw securing the Control Package to its mounting bracket.

Lift the complete Control Package from the mounting bracket and rest it on the Gas Valve Train.

All securing studs and fixing nuts and bolts on the motor mounting flange are readily and easily accessible.