

Installation & Maintenance Manual

Series NG fully automatic gas burner Model NG2

Gas Burner

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IMPORTANT - SAFETY

It is essential that the following instructions and adjustments are carried out by qualified engineers that are experienced in blown gas burner commissioning. In the U.K. it is a legal requirement that these engineers should also be CORGI registered. 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 misuse.

EUROPEAN BOILER EFFICIENCY DIRECTIVE (B.E.D.)

All burners and boiler bodies marked separately should comply with EN267 (oil burners) or EN676 (gas burners) and EN303-1 (boiler bodies).

Burner adjustments must be made in accordance with boiler manufacturer's instructions, and these must include flue gas temperatures, average water temperature, and CO₂ or O₂ concentration.

FEATURES

Burner Capacity

NGN2

14kW to 62 kW

(Based on the following gross C. V.

Natural Gas 38.56 MJ/M³

Liquid Petroleum Gas 92.60 MJ/M³)

The NG Series

Developed from field experiences in the UK and overseas markets, the NG series sets new standards in efficient and reliable operation, developed to current and future test authority requirements in UK and overseas markets, and delivered ready to install with prepared packaged control system and simple plug in gas train arrangements.

Construction

A monobloc metric design, using fastenings to ISO standards. Suitable for flange mounting. The burner can be easily removed for servicing, the fan and inner assembly are accessible by removing the cover plate.

Air Regulation

Air for combustion can be adjusted to give maximum efficiency. A patented air control device produces smooth start conditions.

Controls

Flame supervision is by ionisation probe and automatic sequence control.

Operation

Single stage (On/Off) operation only.

Fuel

Natural Gas at 17.5 mbar.

Liquid Petroleum Gas at 20.0 mbar.

Approx. Weight

9 kg.

GENERAL

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 adjustments 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, Spares Parts identification and Wiring Diagrams complete the manual; literature on proprietary components is available on request.

Check and identify that the burner type is appropriate for the appliance rating and fuel type. Detailed burner performance data is given in the technical specifications section at the back of this handbook. Under no circumstances attempt to install or commission a burner of the incorrect fuel type. If in doubt please contact the manufacturer for assistance.

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.

Plant Room Ventilation

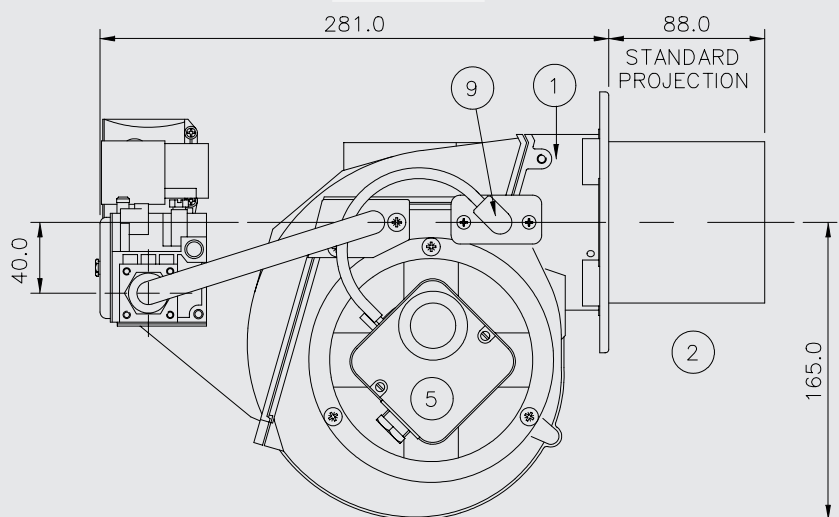
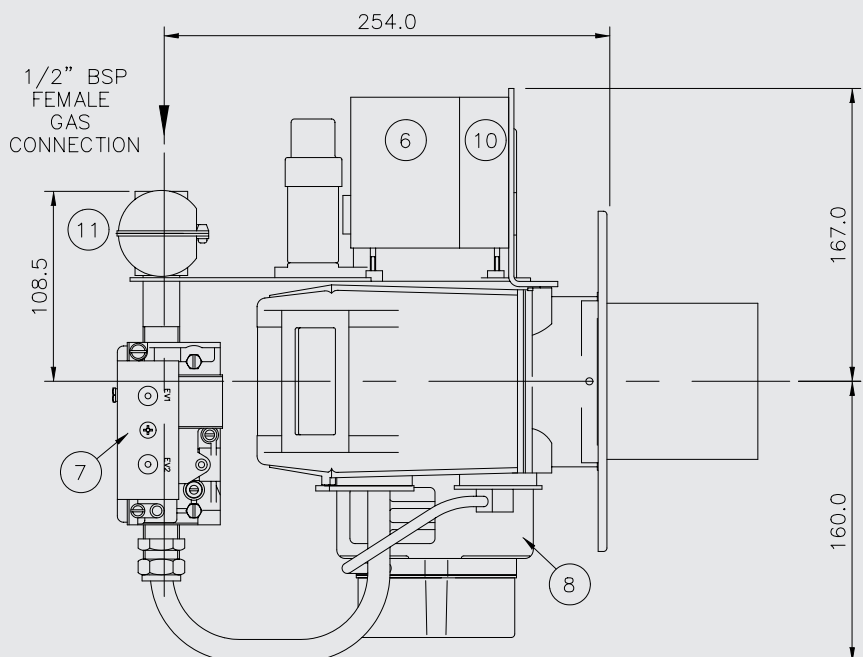
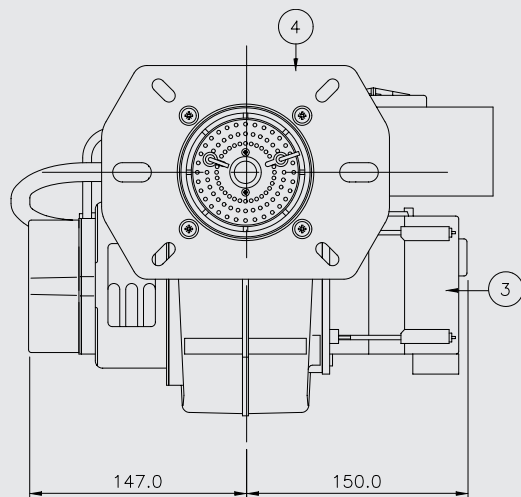
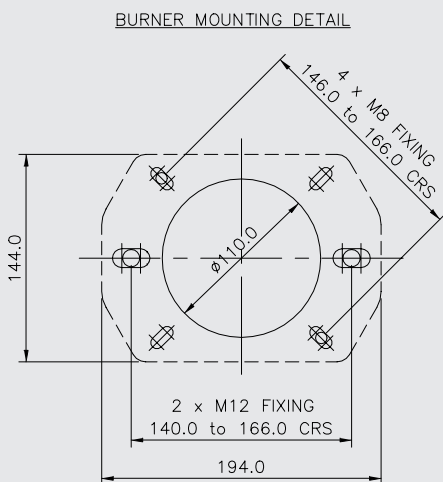
An adequate dust free supply of fresh air is required for the burner at both high and low level in accordance with the appropriate standards.

Existing Appliances

In preparing the appliance to receive the NG 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.

BURNER & COMPONENT IDENTIFICATION

Item	Description
1	Burner Body
2	Draught Tube
3	Fan Motor
4	Mounting Flange
5	Air Pressure Switch
6	Sequence Control Box
7	Gas Multibloc Valve
8	Adjustable Air Inlet
9	Air Sensing Probe
10	Ignition Unit
11	Gas Inlet Pressure Switch



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 0.25 mbar.

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

SERVICE & SITE CONDITIONS

Gas Supply

The piped gas supply to the burner must be constructed and installed to comply with local conditions and appropriate codes and standards. All pipework must be firmly supported. It should be of sufficient size to satisfy the pressure/volume requirements of the burner to ensure its operation.

It is essential that a 90° manual shut-off is fitted upstream of the burner connection for the isolation of the burner during servicing and maintenance.

The valve size must not be less than the NG burner valve train or create restriction to gas flow.

Pressure Required at Burner Governor

Natural Gas	17.5 mb
Liquid Petroleum Gas	20.0 mb
Max. allowable inlet pressure	34.8 mb

Electrical Power Supply

A single phase electrical supply to all applicable codes and standards is required for the burner.

PACKAGING FOR TRANSIT

To safeguard against transit damage and for Export shipment, the NG2 burner is despatched in a carton.

Assembly

Remove the burner from the carton, it is necessary to turn the double magnetic valve and governor unit so that the magnetic coils are in the vertical position, then tighten the pipe coupling at the end of the valve. Two spanners should be used to avoid straining the pipework. The burner is now completely assembled and ready for fitting to the appliance.

INSTALLATION

General

Check and identify the burner type is appropriate for the appliance rating. Detailed burner performance data is given in the *Technical Specifications* section at the back of this handbook.

Fitting To Appliance

If the burner is to be fitted to a new packaged unit, refer to the manufacturers recommendations. The appliance should be prepared for mounting the burner, using the flange provided (refer to the Burner Fixing Details in the *Burner & Component Identification* section on page 4). The draught tube should be flush with the inner combustion chamber wall face, or in accordance with the appliance manufacturers requirements. If the burner is to be used with an existing appliance, prepare the burner mounting plate. Ensure that the joint between the appliance and the burner is effectively sealed by using the gasket provided.

Connecting The Electrical Supply

NG2 burners are currently available for use with a 220V (-10%) 240V (+15%) / 1ph / 50Hz or 110-120V / 1ph / 50Hz supply.

Connect the electrical supply to the burner observing all applicable IEE Regulations. The incoming live supply must be fused, not exceeding 5 amps.

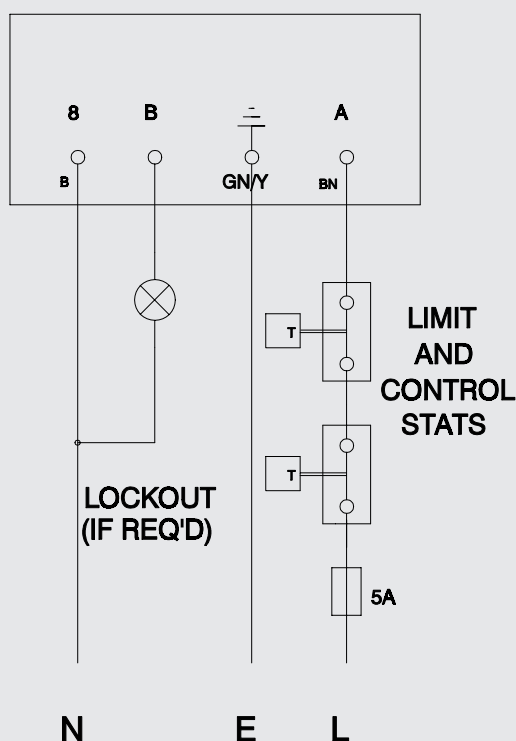
Connect L, N, E and external auxiliary control circuits with reference to the connection diagram on page 6.

Connecting The Gas Supply

Connect the gas supply to the gas valve inlet, observing all relevant regulations and standards.

The connection for NG2 is 1/2" BSP female.

SATRONIC MMI810



IMPORTANT

CHECK THAT THE LINK BETWEEN
TERMINALS '3' AND 'A' IN THE
SATRONIC BASE HAS BEEN
REMOVED

LANDIS & GYR LGB21

Connection Diagram

BURNER AIR CONTROLS & ADJUSTMENTS

Air Controls

The air control is by means of a rotary air strap located on the right hand side of the burner viewed from the rear. Its purpose is to regulate the volume of combustion air flowing through the burner. To increase the flow of combustion air turn the rotary strap anticlockwise, viewed from the right hand side of the burner. To decrease the flow of combustion air, turn the rotary air strap clockwise viewed from the same side.

Air Diffuser

The air diffuser is fitted to the front end of the inner assembly and located within the flame tube. The function of the air diffuser is to control the volume of combustion air and create a pressure drop over the burner head to ensure good fuel/air mixing.

Air Proving Switch

The air pressure switch is located on the air inlet box on the right hand side of the burner casing, viewed from the rear. It is required to prove adequate air flow throughout the burner operating cycle. Air flow failure at any stage will result in safety shutdown of the burner. Final adjustment of this switch is described in the section *Commissioning The Burner*.

BURNER GAS CONTROLS & ADJUSTMENTS

Gas Nozzle

The eight hole gas nozzle is fitted to the front end 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 the particular burner model and gas type being used.

Low Gas Pressure Switch

The low gas pressure switch is located on the inlet side of the gas valve block on the left hand side of the burner, viewed from the rear. It is required to monitor inlet gas pressure during the burner operating cycle. Gas pressure failure at any stage will result in safety shutdown of the burner. Final adjustment of this switch is described in the section *Commissioning The Burner*.

Gas Valve Multibloc

The gas valve is of the multibloc type incorporating safety and main valves and pressure governor. Valve adjustments are detailed in the diagram *Valve Adjustment Diagram*.

COMMISSIONING THE BURNER

Pre-commissioning checks

Before proceeding further, check that the appliance is in a proper state to be fired, e.g. is there water in the boiler?. Re-check that both gas and electrical supplies to the burner are turned off.

IMPORTANT - SAFETY

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EMERGENCY INSTRUCTIONS

This product has been designed and constructed to meet all of the essential requirements of the GAS APPLIANCE DIRECTIVE 90/396/EEC and under normal circumstances should not give occasion to any hazardous conditions. If such a condition should occur during commissioning or subsequent use of this product, be it a fault of the burner, the appliance or of any instrument, machine or service in the proximity of the burner, then the GAS and ELECTRICITY supply to the burner should be **IMMEDIATELY ISOLATED** until such time that the fault has been investigated and rectified.

Valve Adjustment Diagram

WARNING
BEFORE TURNING ON GAS SUPPLY TO THE BURNER, AND PRIOR TO COMMISSIONING, CHECK THAT THE BLANKING PLUG SHOWN IS FITTED (ON OUTLET SIDE OF VALVE).

Model	kW	MJ	Kcal/h	BTU/h	Strap Setting
A	27	97	23000	92000	5
B	31	111	26000	105000	5
C	41	147	35000	139000	5
E	54	194	46000	184000	5
F	62	223	53000	211000	5

Initial Setting Table

Pre-Commissioning (Dry Run)

The NG2 burner is supplied for single stage (On/Off) operation only. Flame supervision is by rectification probe. The operating sequence begins with an air pre-purge followed by start rate gas flame followed by main flame, then to the 'OFF' position when the appliance has reached operating temperature/pressure.

Air Control

Unlock the rotary air strap, set it to the position shown in the *Initial Setting Table* for the burner rating. Relock the air strap.

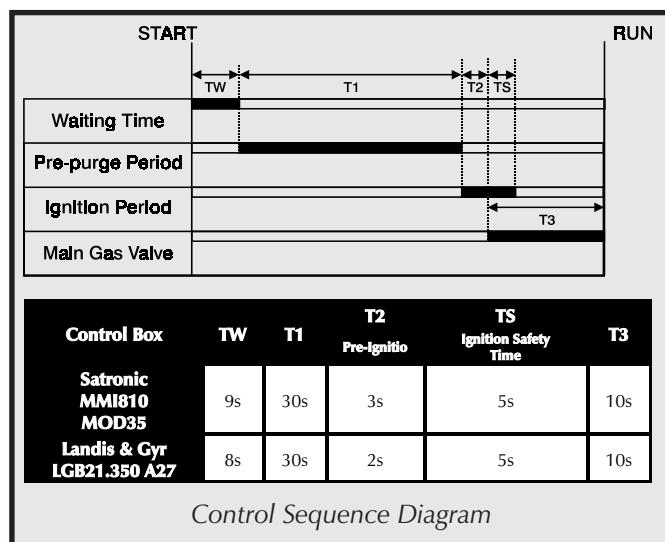
Note: The initial settings are for guidance at this stage. Certain adjustments may be required later to suit appliance requirements and site conditions.

Control

The control box is fixed on the left side viewed from the rear of the burner. A light indicating burner "lockout" is an integral part of the control box. Set control and limit instruments to "Call for Heat" condition. Momentarily switch on electrical supply to the burner. Check for clockwise rotation of burner motor, viewed from the air inlet side of the burner. If the direction of rotation is wrong see *Fault Finding* for procedure to correct it.

Switch On Electricity Supply

Depending on the control box fitted, the burner will go through its operating sequence: (a) immediately, if it has been switched off during its normal sequence of operation, (b) on pressing the 'Reset' button if the burner is at lockout. Check that ignition spark is present. For the actual times refer to the *Control Sequence Diagram*. The ignition spark ceases and burner goes to lockout.



If at this stage the burner locks out without an ignition spark, then the air pressure switch is not changing over (see *Fault Finding*). If all is well, then the safety lockout is proved, and the burner is in a safe condition to proceed.

Main Gas Pressure Governor

With a screwdriver, turn the adjusting screw fully anticlockwise to give a minimum gas flow rate. Maximum allowable gas inlet pressure is 34.8 mb.

Commissioning - Live Run

The capacity of NG burners using natural gas has been determined at a supply pressure of 17.5 mb, and for LPG the supply pressure is 20.0 mb.

NG burners will operate satisfactorily on a gas supply pressure lower than those quoted above, but the burner capacity will be reduced accordingly. Fit a manometer or other approved pressure measuring instrument at the pressure test point on the upstream side of the burner governor. Turn on the gas supply, and check the gas pressure. Check the gas supply pipework for external leaks using a soap solution.

Burner Model	Main Gas Governor Setting			
	Natural Gas		L. P. G.	
	mb	kPa	mb	kPa
NG2A	7.8	0.8	9.5	0.96
NG2B	4.8	0.49	9	0.91
NG2C	7.7	0.79	9.5	0.96
NG2E	12.5	1.27	9.7	0.99
NG2F	9.6	0.98	7.5	0.76

Gas Governor Settings

Check For Valve Closure

Fit a manometer to the downstream pressure test point on the gas valve body. If the reading indicates positive pressure the gas valve is not closing correctly and must be replaced. If the reading remains at zero the valve is closed correctly.

Testing Main Flame

The NG2 burner is configured for main gas ignition using a step-start valve to ensure a smooth light up.

Check that the Low Gas Pressure switch is set to minimum. Fit a manometer or other approved pressure measuring instrument to the test point on the downstream side of the gas valve. Open the upstream manual isolating valve approximately 15 to 20 deg and switch on the burner. With the fan running, make a mental note of the pressure and look for an increase in pressure during the ignition stage. If no increase in pressure is detected then increase the governor setting and restart the burner.

Gas Type	%CO ₂		%O ₂	
	Min	Max	Min	Max
Natural	9	9.5	3.5	5
L.P.G.	10.5	11	3.5	5

Allowable Combustion Analysis

Note that it may be necessary to re-cycle the burner a few times to purge air from the pipework. When the flame is established, the flame relay is energised by the flame detection circuit and the burner continues to run on main flame.

Make a quick visual check on the flame stability and if it is O.K. then slowly open the manual gas valve to the fully open position whilst checking for excessive CO. Adjust the combustion air setting if necessary to maintain the combustion figures within acceptable limits.

Setting Main Flame Gas Rate

With the manometer still attached, the main flame gas rate can be set. Adjust the governed pressure to that shown in the *Gas Governor Settings* table. Check the gas flow rate at the meter. Ensure that other appliances served by the same meter are isolated when the flow tests are carried out. Adjustments to the governor setting can now be made to obtain the required flow rate.

Combustion Air Settings

With the gas flow rate set and the burner running with stable flame, the flue gases can be checked for CO₂ and O₂ with suitable combustion testing instruments. Acceptable figures are given in the *Allowable Combustion Analysis* table. For safety reasons, the CO should not exceed 93 ppm. To achieve good combustion efficiency, or if the CO content is exceeded, adjustments to air and gas can be made whilst the burner is on main flame.

To adjust the air flow, loosen the retaining screw on the rotary air strap situated on the right hand side of the burner. To increase the flow of air, turn the air strap anti-clockwise as viewed from the right hand side. To decrease combustion air flow, turn the rotary strap clockwise. Tighten the retaining screw after each adjustment.

Setting The Step Start Facility

The step start is used to reduce the gas rate during the ignition period, therefore ensuring a smooth quiet light up. Re-start the burner and note the quality of ignition. If the light up is heavy, reduce the amount of start rate gas by turning the adjusting screw anti-clockwise. If the light up is weak, then increase the amount of start rate gas by turning the adjusting screw clockwise. Repeat until a satisfactory setting is achieved.

Important

After each adjustment, gas flow rate and flue gas analysis should be re-checked.

Always

Use approved test equipment (Continually monitoring electronic equipment is recommended).

Never

Rely on a visual inspection of the flame as a guide to combustion quality.

Air Pressure Switch Setting

Isolate the burner and remove the air pressure switch cover. Switch on the electrical supply and allow the burner to establish main flame. Slowly turn the adjustment dial on the air pressure switch clockwise until the flame is extinguished and the burner locks out. Turn the dial one division anti-clockwise and reset the burner control. The burner will restart and continue its cycle to the main flame condition or lock out. If the burner locks out repeat the adjustment procedure once per burner cycle until main flame is established. Recheck the performance and then turn the dial a further two divisions anticlockwise. Switch off the burner and replace the air pressure switch cover.

Low Gas Pressure Switch Setting

The low gas pressure switch is wired in series with the appliance controlling instruments and will cause the burner to effect a 'safety shut down' if a loss of inlet gas pressure is detected.

Isolate the burner and remove the gas pressure switch cover. Switch on the electrical supply and allow the burner to establish main flame. Slowly turn the adjustment dial on the gas pressure switch clockwise until the flame is extinguished and the burner shuts down. Turn the dial slowly anticlockwise one division at a time until the burner restarts and establishes main flame. Recheck the performance and then turn the dial a further two divisions anticlockwise. Switch off the burner and replace the gas pressure switch cover.

Final Check

Check that all covers to components have been replaced and locking devices are properly secured, in particular the rotary air strap. Check that appliance control instruments are set to safe limits.

Commissioning Is Now Complete

Switch on the electrical supply. Burner will now operate until switched off: (a) by controlling instruments of the appliance, (b) manually, (c) by power failure. Upon restoration of power, burner will restart automatically and follow sequence.

COMMISSIONING & 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.

Flame Detection System

Flame probe (flame rectification rod).

Switch off electrical supply at the mains isolator. Remove burner lid and disconnect lead to flame probe. Replace burner lid and secure. Switch on electrical supply to the burner. Check that burner locks out at the end of the ignition cycle. Switch off electrical supply. Remove burner lid, reconnect lead to flame probe, replace lid and secure. Switch on electrical supply. Reset lockout.

Routine Maintenance

Switch off electrical and gas supply to the burner.

Combustion Air Fan

Clean blades regularly with a stiff brush. Access is obtained via the burner lid. Care should be taken to avoid damaging the fan blades. Check that the air inlet into the fan is clean.

Inner Assembly

To remove the inner assembly, remove the burner lid. Disconnect inner assembly pipe from the valve unit by loosening the pipe coupling, the two screws securing the assembly to the burner body. Carefully withdraw the inner assembly from the body.

Air Diffuser And Gas Nozzle

Clean using a stiff brush.

Ignition Electrode and Probe

Clean and check that they are not cracked or worn. Check settings of the ignition electrode and probe. See the *Technical Specifications* section.

Draught Tube and Swirler

Remove the burner from the appliance by loosening the socket head grub screw, and remove from the mounting bracket. Remove the draught tube by unscrewing the two pozidrive screws. Check the draught tube for distortion/damage. Renew if necessary. Clean the air swirler (to be found in the draught tube) with a stiff brush. Check the air swirler for distortion/damage. Renew if necessary. Replace all the components and covers and secure all the fittings. The burner is now ready for operation. Switch on the electrical and gas supply to the burner.

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.

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 the control box is not locked out (e.g. signal lamp may be faulty). If the control box is locked out press the reset button. Check that the burner probe is not grounded to earth. Check the motor capacitor .

Fan Starts And Burner Goes To Lockout

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 flame rectification probe.

COMMISSIONING SHEET

The details below are to be completed by the Commissioning Engineer

Installer's Name : _____

Address : _____

Site Address : _____

Appliance : Type : _____ Size : _____ Serial No. : _____

Burner : Type : _____ Size : _____ Serial No. : _____

Commissioning date : _____

Guarantee Expiry date : _____

Gas type : _____

Gas Pressure upstream of main gas governor :

a) Standing : _____ mbar b) Running : _____ mbar

Gas pressure at burner head _____ mbar _____ in.w.g.

Gas rate _____ m³ _____ ft³/ht

Heat input _____ MJ/hr _____ Btu/h

CO _____ % _____ %

CO₂ _____ % _____ %

Gross flue gas temperature _____ °C _____ °F

Ambient temperature _____ °C _____ °F

Nett flue gas temperature _____ °C _____ °F

Efficiency _____ % _____ %



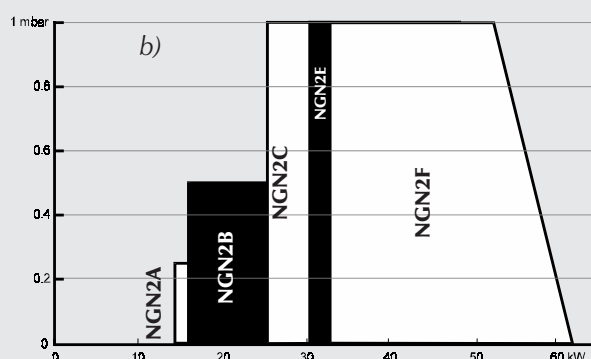
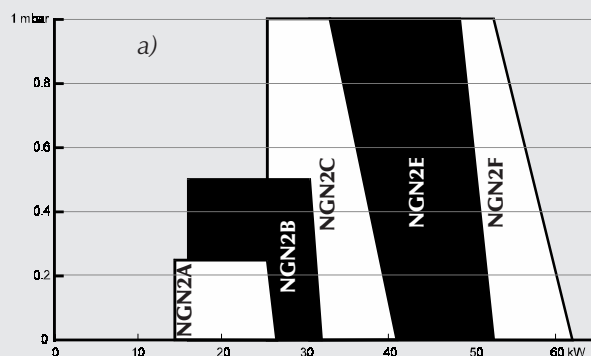
BURNER MODIFICATION RECORD

Date	Details of Modification



APPENDIX

Technical Specifications



Burner Performance Range - a) Ascending Range Overlap, b) Descending Range Overlap

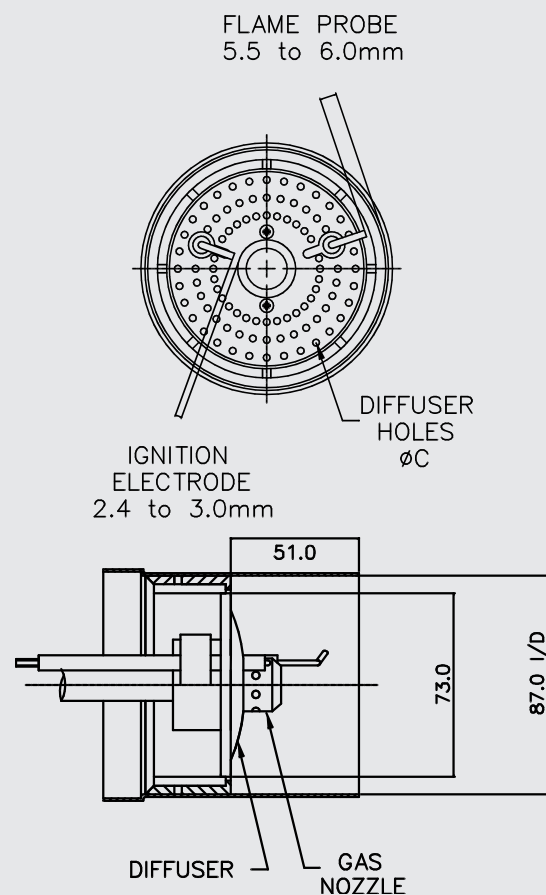
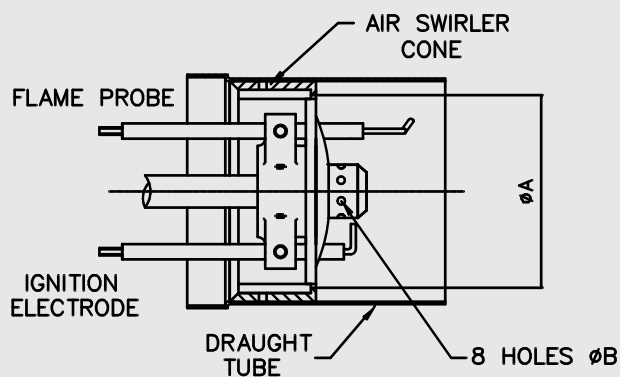
Burner Model	Maximum Burner Capacities (Gross)			
	kW	MJ	kCal/hr	BTU/hr
NG2A	26.6	95.5	22650	90640
NG2B	32	114.5	26800	108380
NG2C	41	147	35000	139000
NG2E	52.5	188.5	44700	178880
NG2F	62	223	53000	211000

Burner Model	Minimum Burner Capacities (Gross)			
	kW	MJ	kCal/hr	BTU/hr
NG2A	14.5	52	12350	49400
NG2B	16	57	13400	54200
NG2C	25.5	91.5	21750	86450
NG2E	30.5	109.5	26000	103900
NG2F	33	118.7	28200	112300

Burner Selection Chart, based on a gross C.V. for Natural Gas of 38.56 MJ/m³ and Liquid Petroleum Gas of 92.6 MJ/m³. Outputs quoted are achieved @ 500 Mtr A.S.L. within an ambient air temperature of 20°C

Combustion Head Details

Burner Model	Fuel Type	Swirler Cone øA	Gas Nozzle øB	Diffuser Holes øC
NGN2A	Natural	74.2	1.95	2
NGL2A	L.P.G.	74.2	1.4	2
NGN2B	Natural	75.6	2.5	2
NGL2B	L.P.G.	75.6	1.6	2
NGN2C	Natural	77	2.5	2
NGL2C	L.P.G.	77	1.8	2
NGN2E	Natural	79.9	2.5	2
NGL2E	L.P.G.	79.9	1.9	2
NGN2F	Natural	79.9	3	2.5
NGL2F	L.P.G.	79.9	2.25	2



NOTES





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