

## Handbook

### Series SG Fully Automatic Gas Burners Model SG 22B

#### BURNER CAPACITY

##### SG 22B

410 kW (1,400,000Btu/h) Min.

733 kW (2,500,000Btu/h) Max.

#### THE SELECTOS RANGE

The Selectos SG 22 range of fully automatic gas burners are designed to meet the requirements of BS 5885.

The range is suitable for modern boilers, air heaters and process applications.

#### CONSTRUCTION

A monobloc metric design, the burners are suitable for flange mounting to the boiler/air heater frontplate.

The burners are delivered with a pre-wired packaged control system and simple plug in gas train arrangement for 2" gas inlet connection.

#### AIR REGULATION

Air for combustion can be adjusted to give maximum efficiency.

#### CONTROLS

Flame supervision is by U.V. (Ultra Violet) cell and automatic sequence control.

#### OPERATION

Two Stage (High/Low).

Single Stage (On/Off) and Modulating operation are available on request.



#### FUEL

Natural Gas at 178mm (7"Wg)

Special requirements on request  
i.e. Liquid Petroleum Gas/Towns Gas.

## INTRODUCTION

The SG22 is a fully automatic gas burner, designed to meet the requirements of BS 5885, and to be suitable for modern boilers, air heaters and process applications.

The burner should be installed and commissioned in accordance with these instructions by an experienced qualified engineer. Attention is also drawn to the Gas Safety Regulations.

These instructions cover standard burners and general applications. Where the burner is supplied as part of a matched tested unit the appliance manufacturers recommendations, regarding any specific combustion head settings, etc, should be followed. The burner and gas line are supplied disconnected, they are reconnected by means of a gas union and non-interchangeable electrical plugs and sockets. The burner is supplied complete with pre-wired controls and an assembled and pre-wired gas line. Electrical connections to the burner should be carried out in accordance with the wiring diagram supplied with the burner.

## TECHNICAL DATA

Capacity		
SG 22B with GL 251 Gas Line		
Firing Rate	kW	Btu/h
Min.	410	1,400,000
Max.	733	2,500,000

Fuel : Natural Gas or L.P.G.

### Burner Inlet Pressure

mbar (in w.g.) min. 17.5 (7.0)  
max. 40.0 (16.0)

### Electricity Supply

240V 1ph 50Hz or 415V 3ph 50Hz

Max. power demand, during ignition, approx 1.2K VA

### Ambient Temperature

Maximum 60°C

### Inlet Gas Connection

Gas line GL 251 2" BSP

## INSTALLATION

### Burner Mounting

The burner should be securely mounted on the appliance by means of the fixing flange, and using the gasket provided.

The size of the burner entry hole, and location of

studs or bolts required is shown on the back cover of this handbook.

### Gas Control Line

The gas control valve line assembly, Figs 1 & 2, should be connected to the burner extension manifold by means of the union nut. The gas line may be fitted on the left or right hand side of the burner and the plugs on the end of the flexible leads should be plugged in to the non-interchangeable sockets provided on the junction box.

### Gas Supply

The gas supply pipe must be of adequate size to meet the pressure requirements specified in the Technical Data section.

The supply should have a main service cock fitted as close to the burner as possible and be adequately supported to avoid undue strain on the burner gas line.

### Electrical Supply

An isolating switch should be fitted as close as possible to the appliance, and the supply protected by a fuse as specified in the Technical Data section. At least the last 450mm (18") of the supply to the burner, and also any connections to a thermostat should be run in flexible conduit to permit burner removal.

The supply must be properly earthed and wired to the wiring diagram provided.

### Air Supply

To ensure an adequate supply of air for combustion, the room in which the burner is installed must be permanently ventilated from a fresh air inlet at least 40 sq.mm per kW (1 sq.in. per 5000 btu/h). This in addition to any air requirements for other appliances.

### Combustion Chamber Pressure

Check that the operating combustion chamber pressure is within the range for the burner, see burner selection chart.

## COMMISSIONING

### Test Safety Shut Off Valves

Using a 0-30 mbar (0-12in w.g.) manometer, and referring to Fig.3, carry out the following sequence. Check that the electrical isolation switch is **OFF**. Close gas cocks C1, C2 and C3.

### Main valve No.1

Link test points A and B (by removing the test nipple screws and connecting the nipples using rubber or plastic tube)

Connect manometer to test point C  
Open main gas cock C1

After at least one minute (it takes time for pressure to either side of the pressure regulator to equalise because of the small orifices in the test nipples), check that there is no increase in pressure at the manometer, thus checking that the valve is not letting by.

#### **Main valve No.2**

Close gas cock C1  
Link test points A and C  
Connect manometer to test point D  
Replace nipple screw B  
Open gas cock C1  
After one minute check that there is no pressure at the manometer.

#### **Start gas valve No.1**

Close gas cock C1  
Link test points A and E  
Connect manometer to test point F  
Replace nipple screws C and D  
Open gas cock C1  
After one minute check manometer as before

#### **Start gas valve No.2 (when fitted)**

Close gas cock C1  
Link test points A and F  
Connect manometer to test point G  
Replace nipple screw E  
Open gas cock C1  
After one minute check manometer as before

On completion of these checks close gas cock C1, disconnect the link and manometer and replace nipple screws.

#### **Calculate Gas Rate**

If the required gas rate is not specified it may be calculated approximately from the following formula, which assumes a typical calorific value of 34.7 MJ/m<sup>3</sup> and an efficiency of 86% nett:-

$$\text{Gas Rate (dm}^3\text{/S)} = \frac{\text{Appliance Output (kW)}}{30}$$

$$\text{or Gas Rate (ft}^3\text{/h)} = 17 \frac{\text{Appliance Output (kW)}}{4}$$

It should be noted that gas rates are quoted in this document at standard conditions of 15°C and 1013 mbar. If the temperature and pressure differ significantly from these figures, it will be necessary to make corrections to obtain the actual gas rate to be set.

#### **Set Combustion Head**

The burner head assembly is factory set but may be adjusted longitudinally.

#### **Method of adjustment**

Undo the two safety bolts of the hinged extension.

Remove one hinge pin on the opposite side to that which it is required to swing the burner.

Unplug the flexible leads from the junction box.

Swing burner body away slowly, at the same time unclipping the ignition and flame detector leads.

#### **Referring to fig.1**

Undo lock nutted clamping bolt.

Lift out burner head assembly assembly.

Undo socket set screw.

Adjust the position of the assembly in the socket of the supporting elbow.

Secure set screw and replace assembly in reverse order taking care that the assembly sits squarely on the gas inlet spigot and is securely locked in position by its clamping bolt, and that as the burner is swung back into position the ignition and flame detector leads are carefully clipped back on to their respective electrodes (the terminal ends are dissimilar so that they cannot be wrongly connected).

#### **Start Up**

With the air intake damper still fully open the procedure for starting up should be as follows.

#### **Check Lockout Function (Refer to fig.1)**

With both cocks C2 and C3 closed, but the gas service cock C1 open, switch on the electricity. After about 10 seconds delay the burner should start and run for about 45 seconds then lockout as indicated by illumination of the re-set button on the control box.

#### **Set Start Gas Rate**

Open the start gas cock C3 and press the re-set button to restart the burner. This time, after 45 seconds, the burner should ignite and run, on start gas flame only.

Check the start gas rate on the gas meter. As a guide, the rate can be estimated by measuring the start gas governor outlet pressure at test nipple E and referring to Fig. 5.

If necessary alter the rate by removing the start gas governor cap and adjusting the exposed screw; clockwise to increase and anticlockwise to decrease.

The rate should be 12% of the intended maximum firing rate. This is equivalent to 10% of the stoichiometric gas rate corresponding to the proved air purge rate, as stipulated in BS 5885.

### Set Main Gas Rate

With the burner still operating, slowly open the main gas cock C2 allowing the gas rate to increase.

Check the total gas rate on the gas meter. As a guide, the rate can be estimated by measuring the main gas governor outlet pressure at test nipple B and referring to Fig. 5.

If necessary alter the rate by removing the main gas governor cap and adjusting the exposed screw; clockwise to increase and anticlockwise to decrease.

### Check Combustion

Using recognised testing instruments check the CO<sub>2</sub> (carbon dioxide) and the O<sub>2</sub> (oxygen) percentage in the flue gases at the appliance flue outlet.

The CO<sub>2</sub> should be set as close as possible to the optimum of 9% (4.5% Oxygen) by adjustment of the air intake flap and damper motor. This flap should be tightened securely when final settings have been reached.

**Note :** In the interest of safety measure the CO (carbon monoxide) percentage. The ratio of CO/CO<sub>2</sub> should not exceed 0.02.

### Setting The Damper Motor

The damper motor has been factory set, but may need adjusting during commissioning. The cams on the SQN motor are exposed by removing the two retaining screws. They are set approximately as follows (No.1 cam is closest to the damper).

No1	High fire air	70
No2	Low fire air	30
No3	Not used	0
No4	High fire gas	50

### Set Air Proving Switch

Remove the cover from the pressure switch (taking care to avoid touching live terminals) and turn the dial to increase the reading on the scale until the burner stops. Reverse the rotation of the dial by 3 stops and the burner should restart.

### Check Ancillary Controls

Before leaving the site check that any thermostats or other safety limit controls are working correctly and are capable of switching the burner off.

### Advice to User

Make sure that the user knows how to switch the burner off and where to close the main gas supply in the event of an emergency.

### SERVICING

Very little attention is required except for cleaning any deposits from the burner fan and combustion head. The interval between service depends on the frequency of use but it is recommended that the burner should be checked two or three times a year.

#### Clean Burner

Switch off electricity and close the service cock.

#### Combustion Head

Swing aside burner housing and remove combustion head assembly.

Clean any deposits from the assembly and from the draught tube.

Inspect, and if necessary, adjust the ignition and flame detection electrodes. Replace if eroded.

#### Fan and Housing

Undo screw and remove access cover and clean the fan. If necessary undo motor retaining bolts and withdraw the motor and fan unit sufficiently to clean the fan properly and remove deposits from the housing. When replacing, make sure that the motor spigot is correctly located in the housing.

Carefully re-assemble the burner and restore gas and electricity.

#### Re-operating the Burner

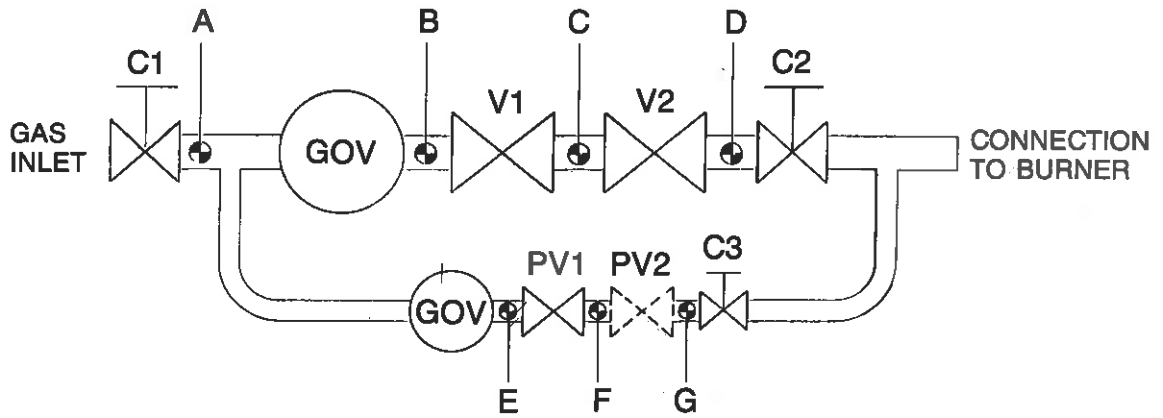
Test the shut off valves for leakage, check the lockout function and when the burner has operated for at least ten minutes, check the combustion as detailed in the Commissioning section.

## FAULT FINDING

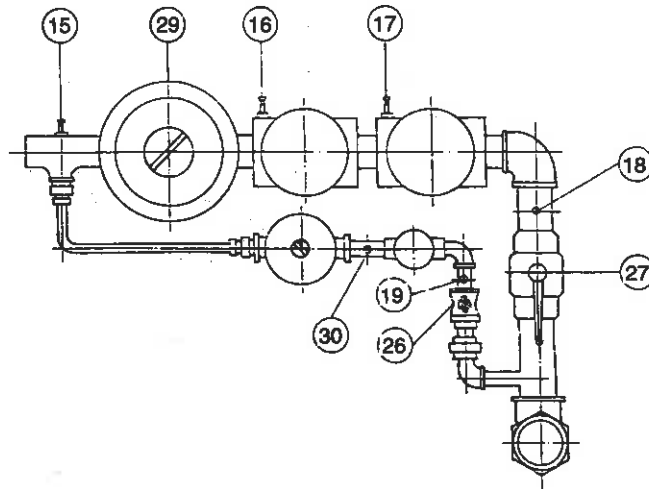
The burner incorporates well tried and tested components but faults do sometimes arise and this simple guide covers the more likely eventualities.

Symptom & Possible Cause	Remedy
<b>Does not start</b>  No electricity	Check that thermostats and time switches are in the energised position Check that there is a live supply to the appropriate terminal(s) of the control box. Check fuses.
Flame detector electrode or lead shorting to earth	Switch off and inspect leads and electrodes and check for open or short circuits.
Air pressure switch	Check that the pressure switch has been set correctly. (see Commissioning Instructions). Check for blockage of the ports and tube. Check that the switch contacts have returned to the 'No Air' state.
<b>Starts and Locks Out</b>  No gas	Check that all gas cocks are open. Check that the gas valve leads are correctly plugged into the junction box. Check presence of gas with a manometer on the test point on the outlet of the start gas governor.
Air pressure switch	Check that the air pressure switch is not set too high. Adjust if necessary.
No ignition	Switch off and check the ignition lead and electrode for open or short circuit
Start gas rate	Increase start gas rate governor pressure and adjust to the correct rate
Flame signal	Check that the burner is properly earthed. Check flame signal with micrometer. If less than 5 (A), check location and condition of the U.V. cell. Check polarity of the transformer leads. If necessary, reverse live and neutral connections of the transformer at the control box.
Main gas rate	This may be too high. Adjust the main governor to a lower setting. When the burner operates, set it to give the correct input.
Combustion head	Check settings and adjust if necessary.
Air/Fuel ratio	Check combustion.

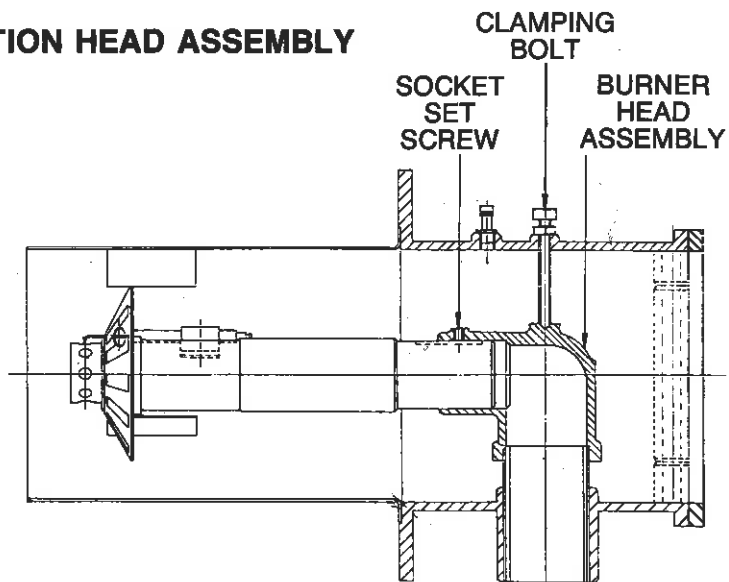
**FIG. 1**



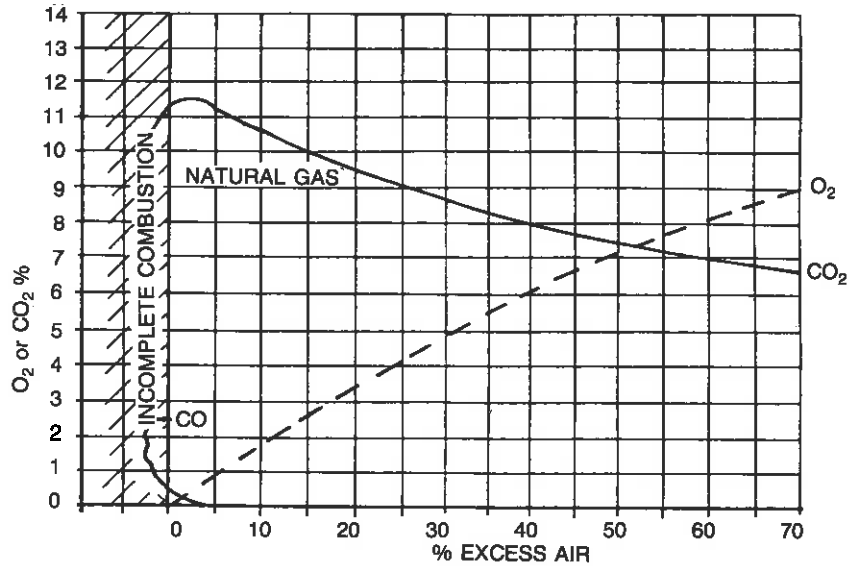
**FIG. 2. GAS CONTROL LINE**



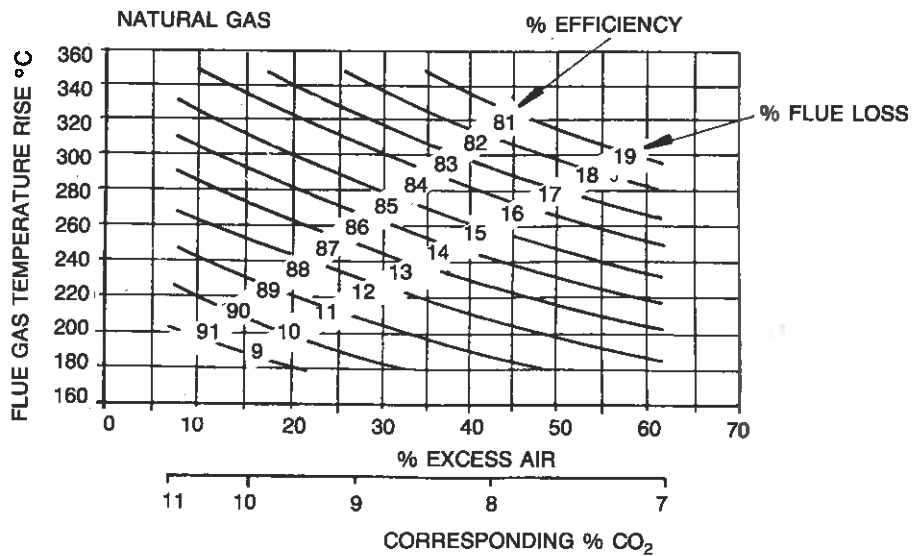
**FIG. 3. COMBUSTION HEAD ASSEMBLY**



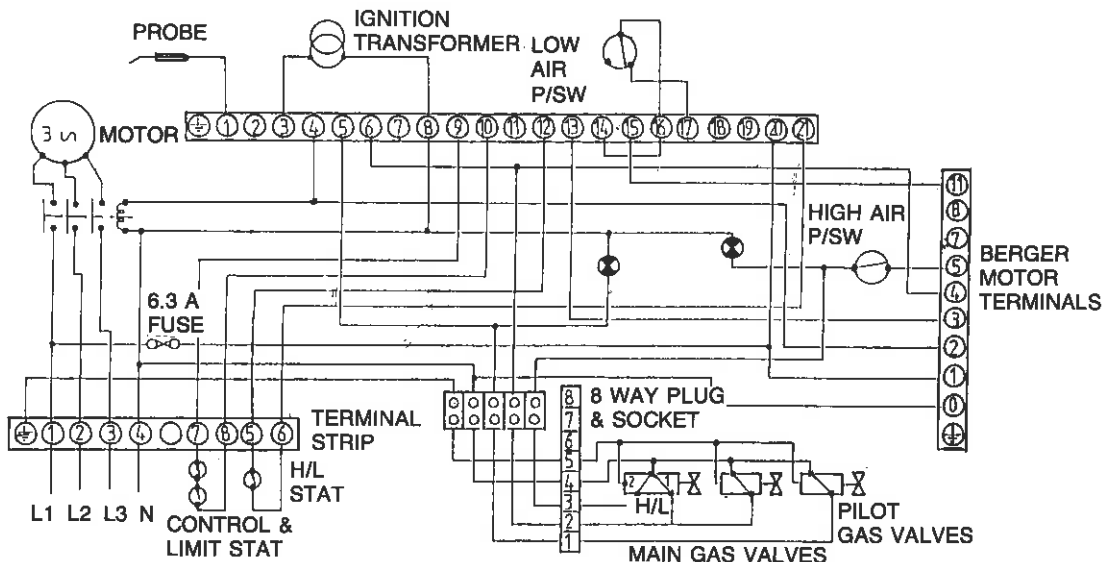
**FIG. 4. RELATIONSHIP BETWEEN CO<sub>2</sub> & EXCESS AIR**



**FIG. 5. CHART FOR ESTIMATION OF NET FLUE LOSS**



**FIG. 6. WIRING DIAGRAM SATRONIC TMG 720-1, 3 PHASE, HIGH LOW, FCAD**



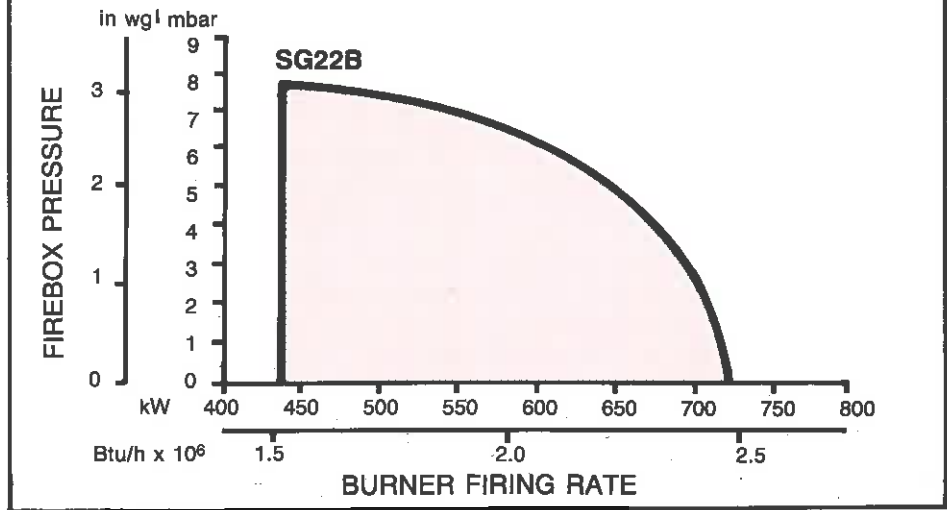
## MODEL

# SG 22B

### ELECTRICAL DATA

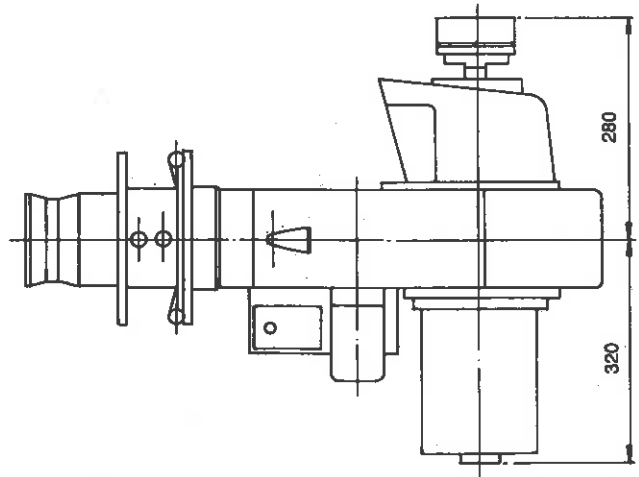
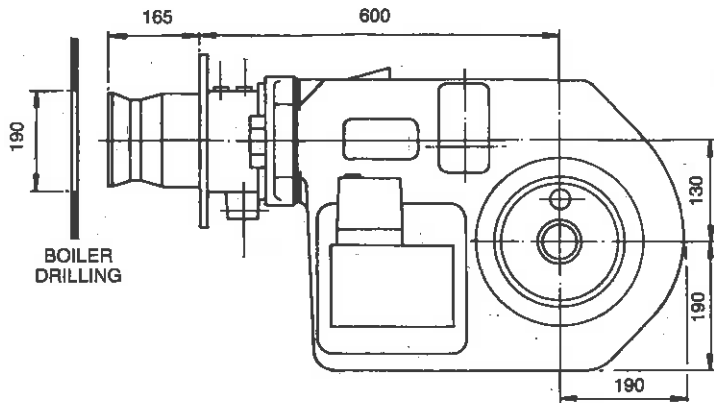
240V 1ph 50Hz or 415 3ph 50Hz  
 Max. power demand, during ignition, approx 1.2KVA.

### BURNER SELECTION CHART

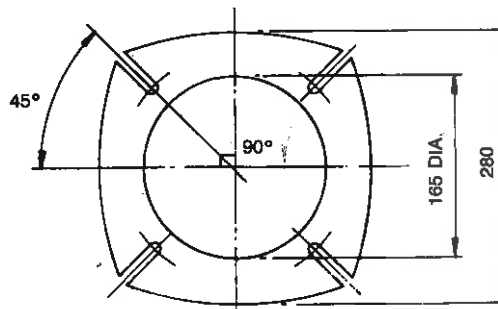


### DIMENSIONS

All dimensions are in mm's



### BURNER FIXING DETAILS



FLANGE SLOTTED TO SUIT FOUR M12 x 45 LONG STUDS ON A 230min TO 290max P.C.D.