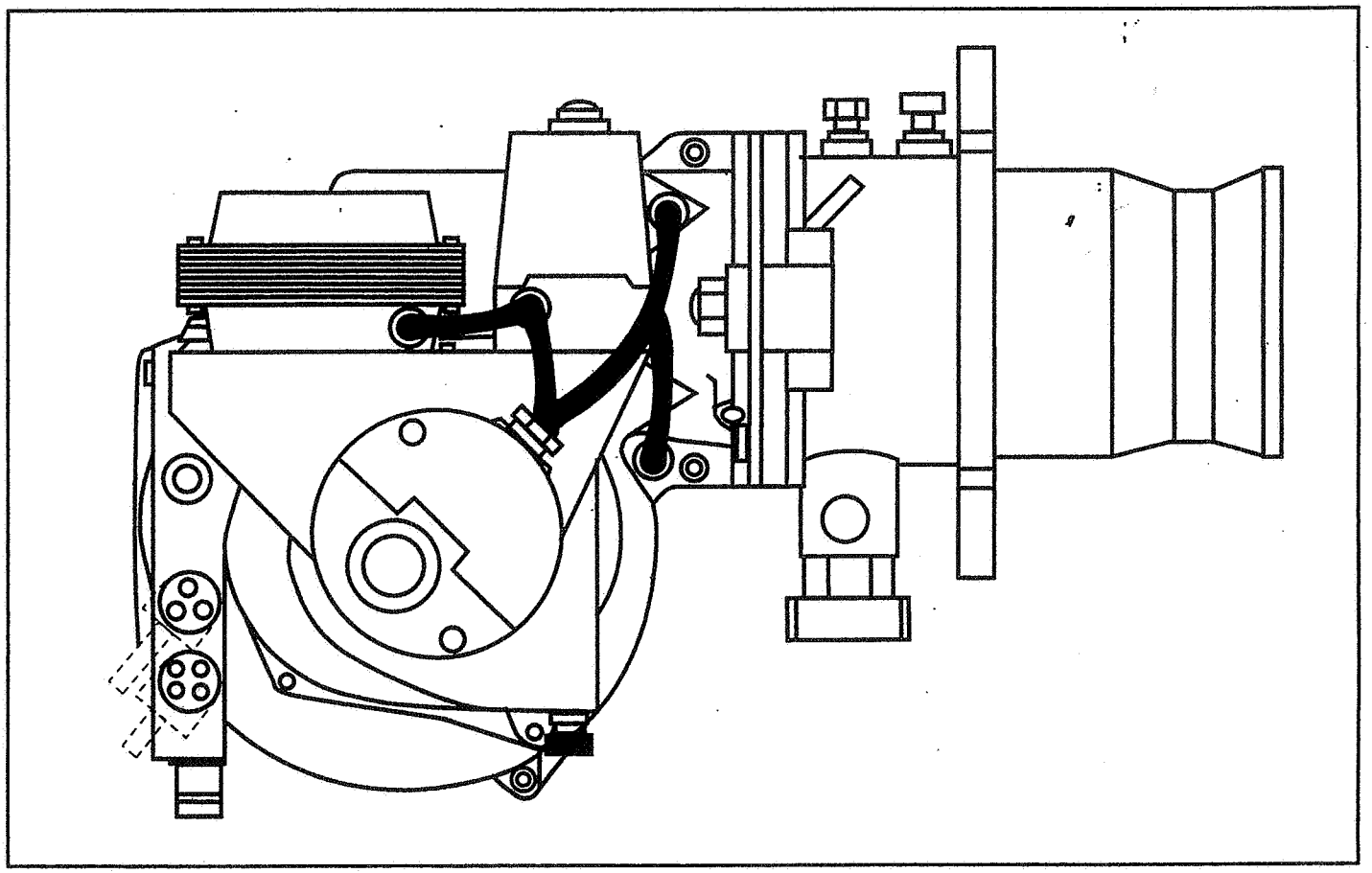
SELECTOS

HANDBOOK

Series SG Fully Automatic Gas Burners
Models SG 13A, SG 13B



BURNER CAPACITY
SG13A
60 Kw to 120 Kw.
SG13B 60 Kw to 135 Kw.
(Based on a gross C.V. for Natural Gas 38.56 MJ/ Cu M.)

THE SELECTOS RANGE
The Selectos SG13 range of fully automatic burners are designed to meet the requirements of prEN 676.
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.

AIR REGULATION
Air for combustion can be adjusted to give maximum efficiency.

CONTROLS
Flame supervision is by ionisation probe and automatic sequence control.

OPERATION
SG13A Single stage (on/off) only.
SG13B Single stage, Two stage (high/low) and Modulating.

FUEL Natural Gas at 17.5 mbar. Special requirements on request i.e. Liquid Petroleum Gas / Towns Gas.

OPTIONAL EXTRAS
Fully Closing Air Damper.

INTRODUCTION

The SG13 is a fully automatic gas burner, designed to meet the requirements of prEN 676, 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 three and four pin gas train plugs. 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

Fuel: Natural gas or L.P.G.

Burner Inlet Pressure: min 17.5 mb. max 40.0 mb.

Electricity Supply
230V (+10% -15%) 50Hz single phase a.c.
(max. power demand during ignition, approx 600 VA)

Ambient Temperature
Maximum 60 Deg C.

Inlet Gas Connection
SG13A = 1/2" BSP. SG13 = 1" BSP.

INSTALLATION

IMPORTANT - SAFETY It is essential that the following instructions and adjustments are carried out by CORGI registered engineers who are qualified and experienced in blown gas burner commissioning 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.

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.

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

GAS CONTROL LINE
The gas valve line assembly should be connected to the burner extension manifold by means of the union nut Gas lines are available for left or right hand fitting and this should be checked before final fitting. Connect the plugs on the end of the control pack flying leads into the corresponding sockets on the gas valve block.

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 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. This is 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

Check Fan 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.

Calculate Gas Rate
If the required gas rate is not specified it may be calculated from the following formula, which assumes a typical gross calorific value of 38.56Mj CuM and a gross efficiency of 80%.

Gas Rate (CuM/Hr) = Appliance Output (Kw) 8.57

or

Gas Rate (CuFt/Hr) = Appliance Output (Kw) X 3.956

It should be noted that gas rates are quoted in this document at standard atmospheric conditions of 15 Deg. 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.

Check Fan (OFIN) Setting
Undo screw and remove access cover. Note whether the embossed arrow on the inside of the housing side wall is aligned against "H" (indicating high setting) or "L" (low setting) of the OFIN (offset fan intake nozzle).
Burners are normally factory set in the High position which is suitable for most applications. If it is required to change the setting to low, remove screw (1) and rotate the OFIN from "H" to "L" (see burner dimensions on the back cover of this handbook).
Replace the screw through the alternative hole (2) which now aligns with the tapped hole in the housing wall, and tighten securely.

Set Combustion Head
The Venturi flame ring assembly is adjustable longitudinally so that the restriction between the name ring and the throat of the flame tube effectively meters the combustion air and therefore the assembly should be set to approximately the position corresponding to the required gas rate, in accordance with fig.5.

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.

Undo the lock nutted clamping bolt.

Lift out the Venturi flame ring assembly.

Undo the socket set screw.

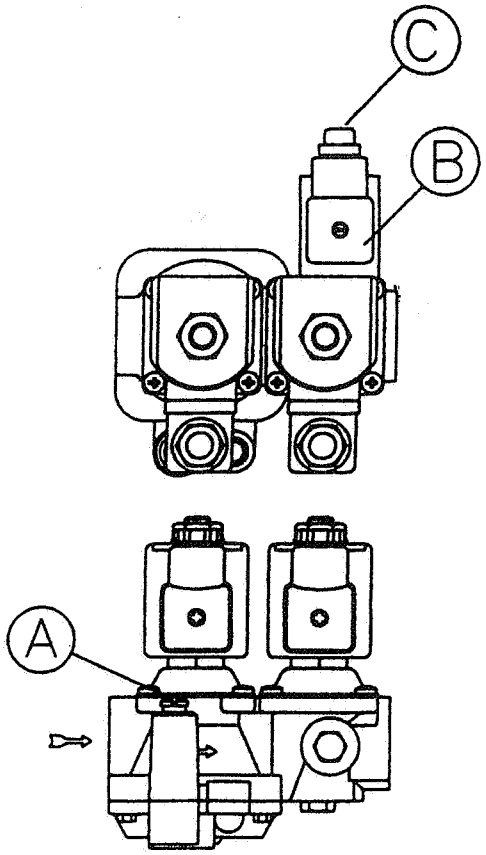
Adjust the position of the assembly in the socket of the supporting elbow, aligning the required scribed 'ring no.' against the end of the socket.

Secure the assembly and replace 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 onto their respective electrodes (the terminal ends are dissimilar so they cannot be wrongly connected).

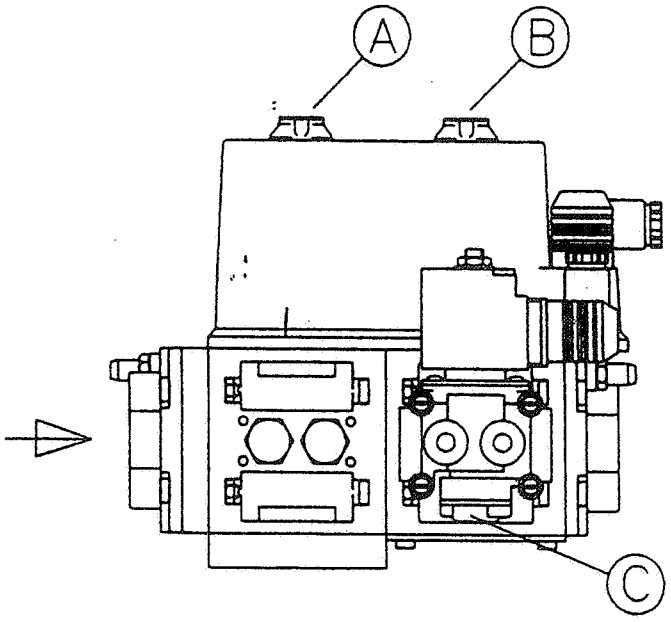
Start Up
With the air intake damper still fully open the procedure for starting up should be as follows.

Check Lockout Function
Ensure that the gas supply to the burner is switched off and switch on the electricity. After about 10 secs delay the burner should start and run for about 45 secs before locking out as indicated by illumination of the reset button on the control box.

Gas Valves



Johnsons G96 Trio Valve Multibloc
A/ Main Gas Regulator.
B/ Start Gas Valve.
C/ Start Rate Gas Adjuster.



Johnsons GM2 Valve Multibloc
A/ Main Gas Regulator.
B/ Main Valve Flow Adjuster.
C/ Start Rate Gas Adjuster.

Set Start Rate Gas

Wth the electricity supply to the burner isolated, remove the link between terminals 3 & 4 on the burner terminal strip. Reinstate the electricity and gas supplies to the burner, press the re-set button and restart the burner. This time, after 45 secs. the burner should ignite and run on start rate gas flame only.
Check the start rate gas on the gas meter and if necessary alter the rate by removing the cap and adjusting the exposed screw clockwise to increase and anticlockwise to decrease (refer to valve diagrams opposite). The rate should be 12% of the intended maximum firing rate. This is equivalent to 10% of the stoichimetric gas rate corresponding to the proved air purge rate.

Set Main Gas

Swich off the burner, reinstate the link between terminals 3 & 4 and restart the burner. Once the burner has established flame the gas rate should increase to full fire gas rate. Check the total gas rate at the meter and if neccessay adjust the main gas regulator accordingly, Clockwise to increase and anticlockwise to decrease.

Check Combustion

Using recognised testing instruments check the CO_2 (carbon dioxide) and O_2 (oxygen) percentage in the flue gases at the appliance flue outlet. To increase or reduce the CO2 adjust the air inlet band accordingly.
Figures of 9 - 10% CO2 / 3 - 5% O_2 are acceptable. For reasons of safety the CO (carbon monoxide) should be checked and should not exceed 93 ppm.
To achieve good combustion efficiency or if the CO / CO_2 ratio is exceeded, adjustments to air and gas can now be made while the burner is running on main flame.

Set Air Proving Switch

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

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 anticlockwise until the flame is extinguished and the burner SHUTS DOWN.

Turn the dial slowly clockwise 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 clockwise.
Switch off the burner and replace the gas pressure switch cover.

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 is recommended that the burner should be checked two or three times a year.

Clean Burner
Switch off the electricity and close the service gas cock.

Combustion Head
Swing aside the burner housing and remove the Venturi flame ring.
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 the motor retaining bolts and withdraw the motor and fan assembly 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 reassemble 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.

Control Box
The following information may be useful in following the operation of the burner.

A coloured diagram indicator on the control box shows each step of the start up and shut down sequences.

These are as follows:

Blue line on White.	Start position.
Start of Blue sector.	Pre-purge start.
Red line in Blue sector.	Air supply proved.
Blue sector.	Pre-purge.
End of Blue sector / start of Yellow.	End of pre-purge, start of ignition safety time and initial firing.
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 Green.	Main flame stage.
End of Green / start of White.	Run position.

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
Does not start	
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.
Starts and Locks Out	
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 micro-ammeter. If less than 5 (A), check location and condition of the flame detection probe. 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.

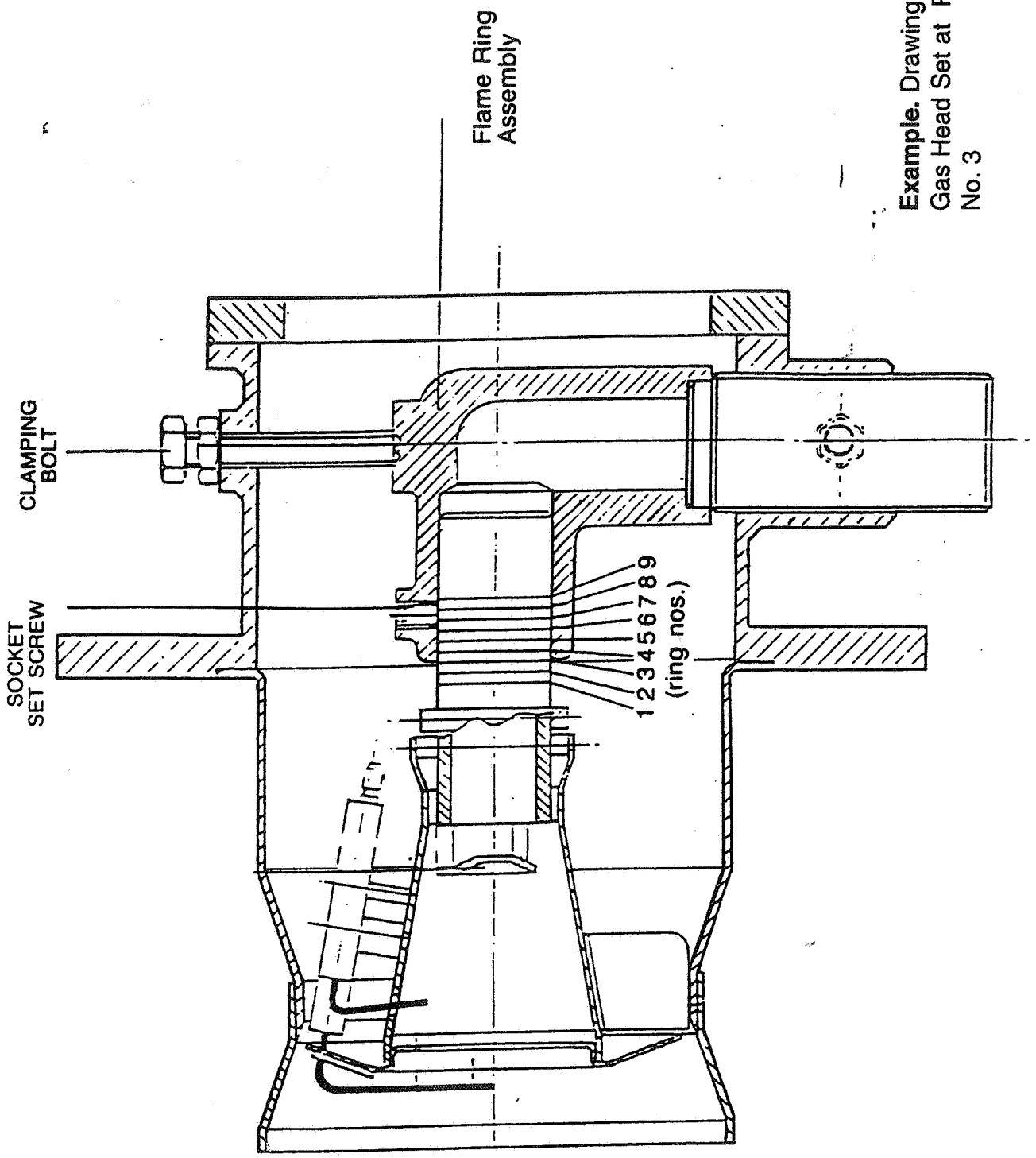
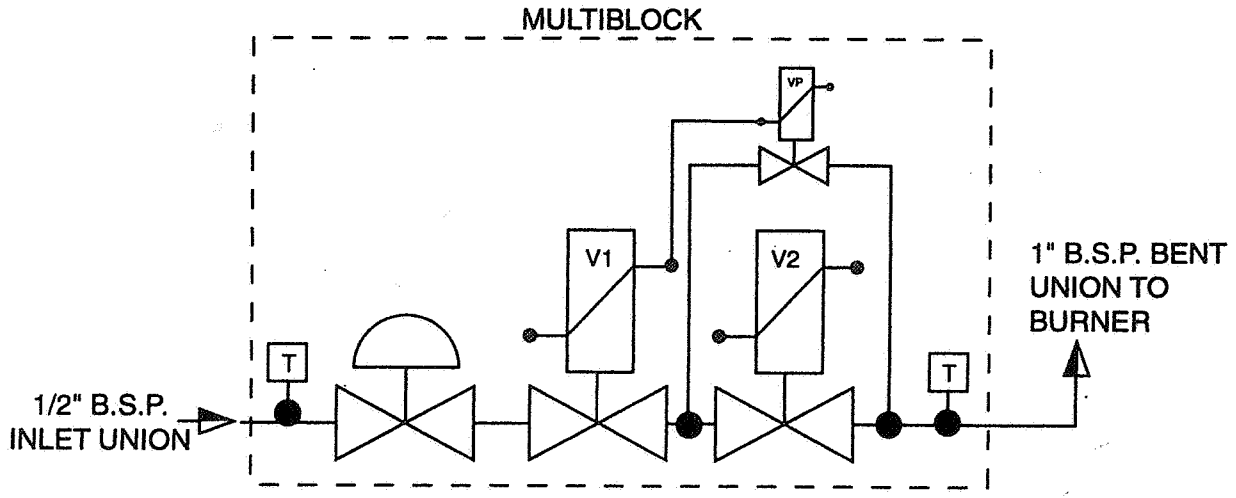


FIG. 1. COMBUSTION HEAD

DRG No:
SGL647JS

THIRD ANGLE PROJECTION

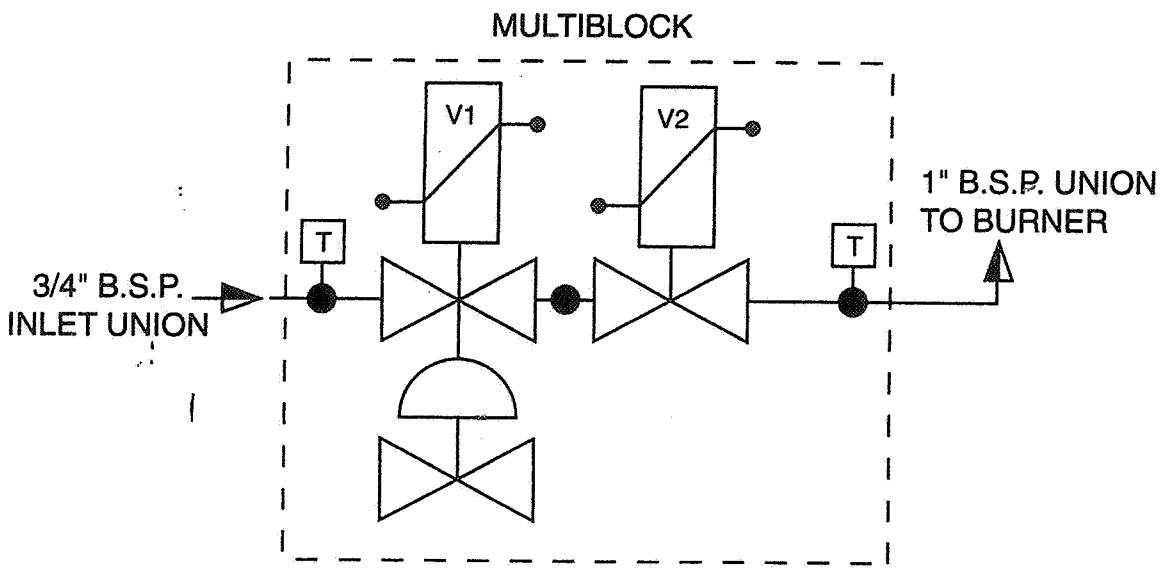


NOTES:
T = TEST POINT. V = VALVE

DRG No: **J. IRELAND**	PROTECTIVE FINISH	TOLERANCES 0-150mm ±0.5mm 150mm & OVER ±.1.0mm DRILLED HOLES ± 0.1mm THREAD. BSP TAPER TO BS.21 BSP PARALLEL TO BS.2779 CLASS B ISO METRIC TO BS. 3643 MED FIT SPECIAL LIMITS AS STATED	NU - WAY LIMITED DROITWICH ENGLAND	ISSUED TO: DATE:	MATL. CODE
DATE: **10.07.95**	M/C FINISH				
SCALE: **1:1**	ROUGH ▽ FINISHED 3.2 ▽ FINE FINISHED 0.8 ▽		TITLE GAS TRAIN SCHEMATIC. FOR SG13A BURNERS.	THIS DRAWING IS A COPY. IT WILL NOT BE KEPT UP TO DATE AND SHOULD BE RETURNED TO:- **NU-WAY DRAWING OFFICE.**	FIN. CODE **SGL647JS**

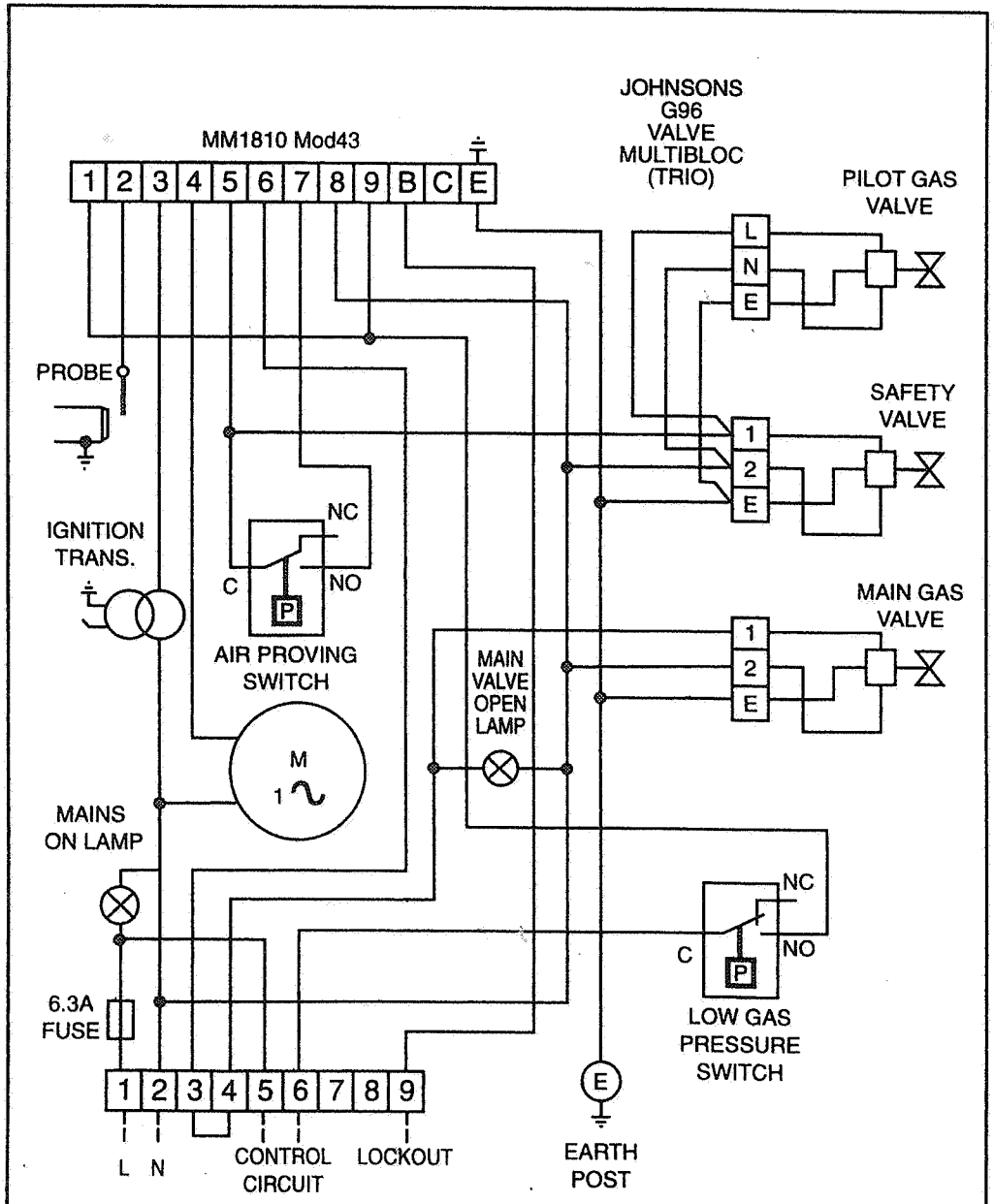
DRG No:
SGL648JS

THIRD ANGLE PROJECTION

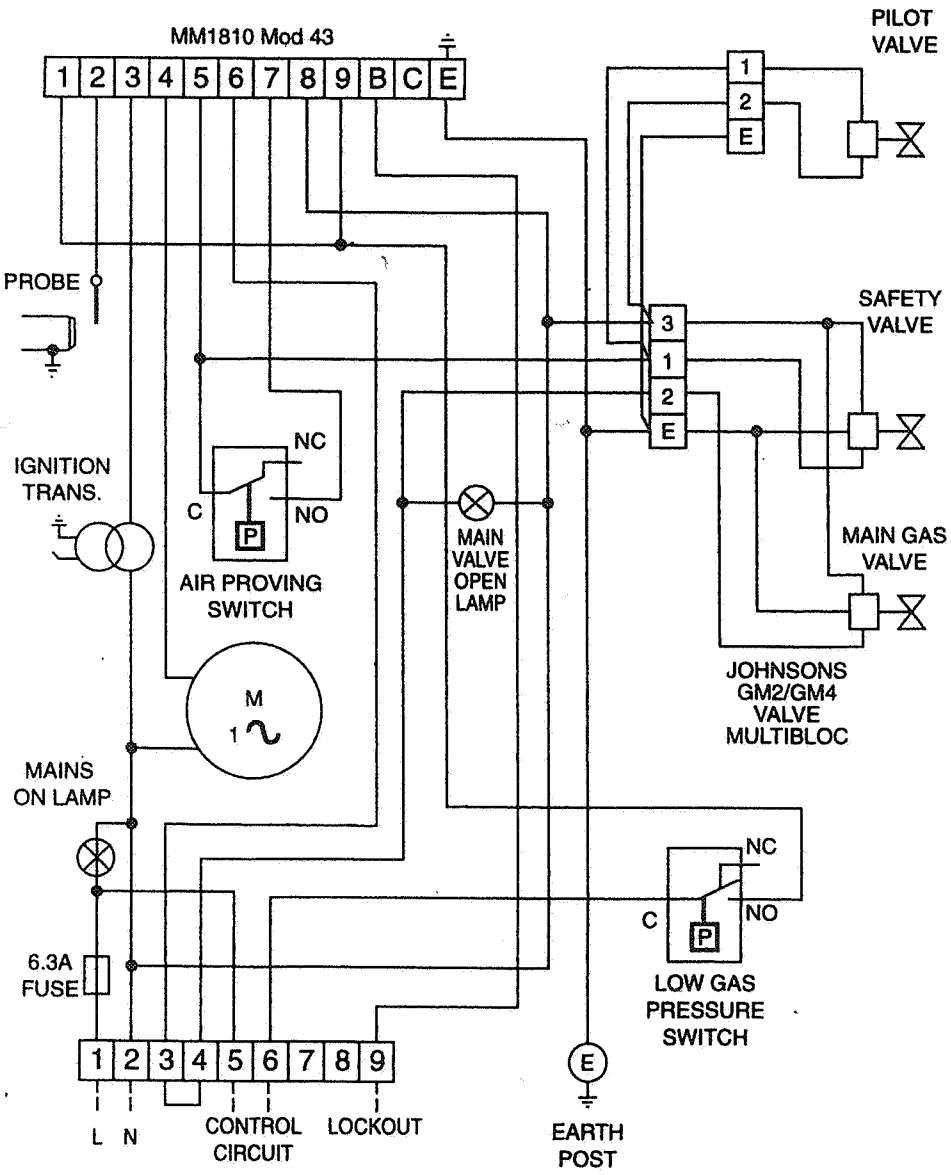


NOTES:
V2 MUST BE SLOW OPEN TYPE
T = TEST POINT. V = VALVE

DRG No: **J. IRELAND**	PROTECTIVE FINISH	TOLERANCES 0-150mm ±0.5mm 150mm & OVER ± 1.0mm DRILLED HOLES ± 0.1mm THREAD. BSP TAPER TO BS.21 BSP PARALLEL TO BS.2779 CLASS B ISO METRIC TO BS. 3643 MED FIT SPECIAL LIMITS AS STATED	NU - WAY LIMITED DROITWICH ENGLAND	ISSUED TO: DATE:	MATL. CODE
DATE: **10.07.95**	M/C FINISH				
SCALE: **1:1**	ROUGH ▽ FINISHED 3.2 ▽ FINE FINISHED 0.8 ▽		TITLE GAS TRAIN SCHEMATIC. FOR SG13B BURNERS.	THIS DRAWING IS A COPY. IT WILL NOT BE KEPT UP TO DATE AND SHOULD BE RETURNED TO:- **NU-WAY DRAWING OFFICE.**	FIN. CODE **SGL648JS**



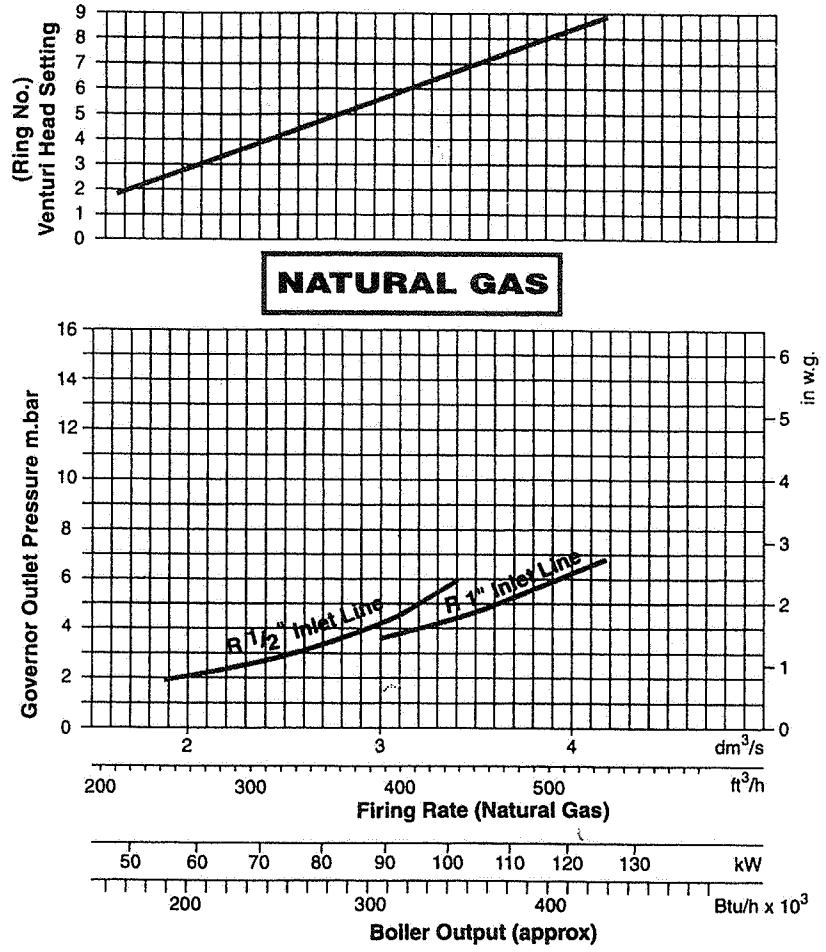
A.M.H. 12/3/96	SELECTOS BURNER PRODUCTS DIVISION	MM1810 SINGLE PHASE ON/OFF (EN676)	MM1 201
SG13A	Nu-way Ltd. Droitwich, Worcestershire		



A.M.H. 12/3/96	SELECTOS BURNER PRODUCTS DIVISION	MM1810 SINGLE PHASE ON/OFF (EN676)	MM1 202
SG13A SG16	Nu-way Ltd. Droitwich, Worcestershire		

Note: Gas rates should be checked by meter wherever possible.

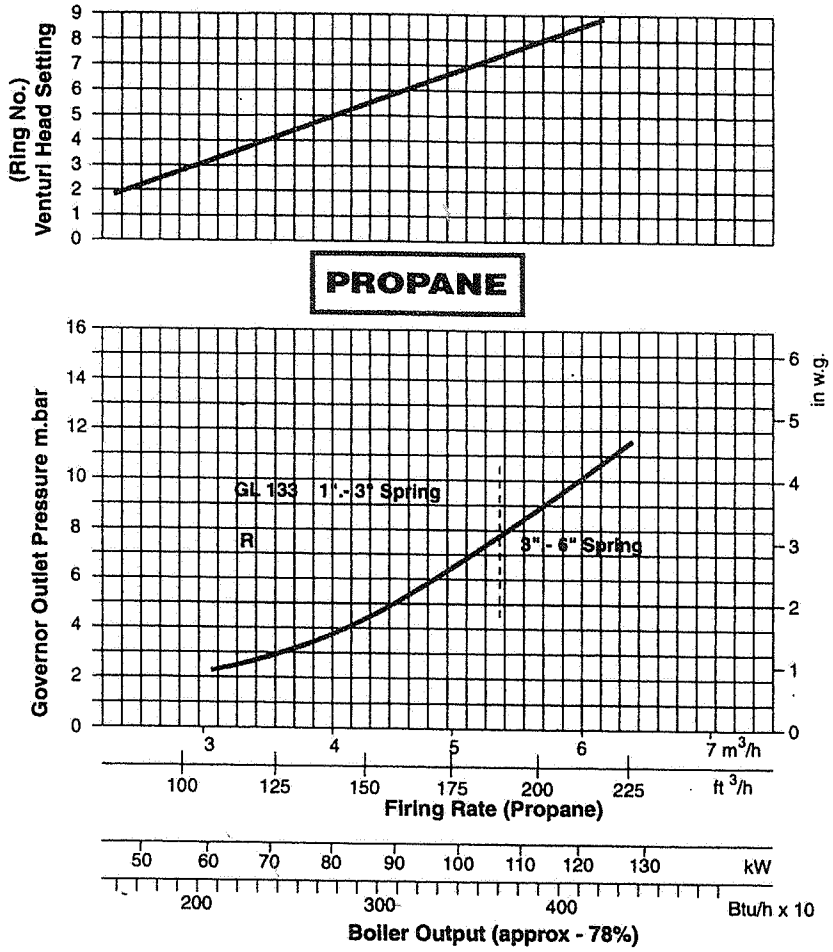
The settings below are approximate and for near zero firebox pressure. Where there is positive pressure in the firebox the governer outlet pres sure required will be higher and also it may be necessary to set the venturi head one or two ring nos. higher than shown.



SELECTOS BURNER PRODUCTS DIVISION Nu-way Ltd. Droitwich, Worcestershire	Gas Valve Gas Rate/Governor Output Pressure	Fig. 5

Note: Gas rates should be checked by meter wherever possible.

The settings below are approximate and for near zero firebox pressure. Where there is positive pressure in the firebox the governer outlet pres sure required will be higher and also it may be necessary to set the venturi head one or two ring nos. higher than shown.



SELECTOS BURNER PRODUCTS DIVISION Nu-way Ltd. Droitwich, Worcestershire	SG13 Gas Rate / Governor Output Pressure	Fig. a

SELECTOS TUBE FIRED BURNERS

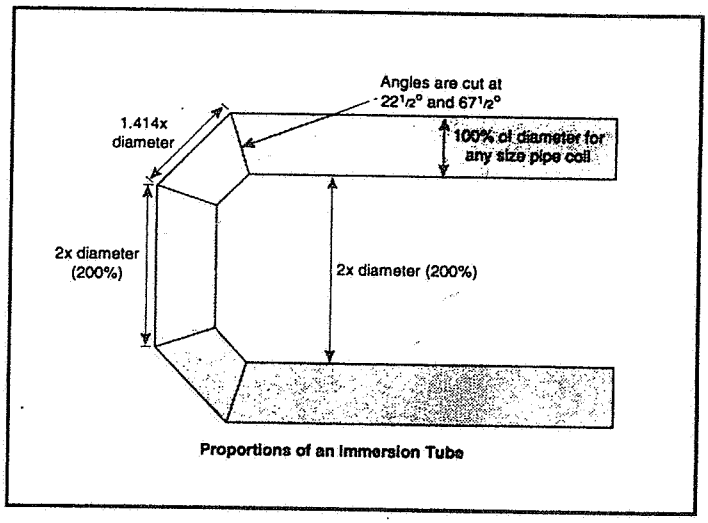
Selectos Tube Fired Gas Burners are designed for firing long, single or multi-pass immersion tubes. Applications cover all immersion heating processes including cleaning tanks, spray washers, salt baths, quenching and tempering tanks, up to a rate of 318kW.

Immersion tubes may be fitted with sweep or mitre bends without affecting the burner operation.

RECOMMENDED TUBE LENGTH

For systems with more than five 90° bends, a high pressure burner head is to be fitted. The immersion tube must be of an adequate length to permit completion of combustion before fluing to stack. The first elbow must be a minimum of ten tube diameters from the burner face.

The tube size and number of bends in the system must be sent, with the site data, to Nu-Way for matching of the burner.



Proportions of an Immersion Tube

MOUNTING THE BURNER

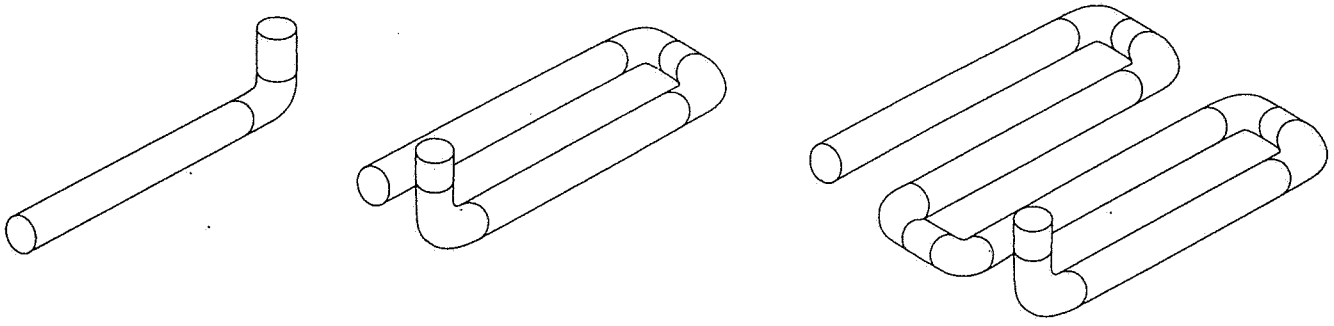
Each burner includes a mounting flange as part of the burner. A flange gasket is supplied with the burner.

A companion flange must be welded to the immersion tube. Place the flange gasket between the mounting flanges, bolting the burner to the tank, to give an airtight seal.

GAS PRESSURE TO BURNER

The burner should have a steady gas pressure of 178mm to the gas line.

A Single -Pass, Double Pass and Multi-Pass Immersion Tube



TANK

For maximum rated input, the firing tube discharge end must be under neutral pressure.

BURNER CONSTRUCTION

The burner is a monobloc metric design. It is suitable for flange mounting. The burners are delivered with a prewired packaged control system and plug-in gas line arrangement. The burner control is on/off or high/low, gas only, i.e. it has a constant start rate for holding temperature.

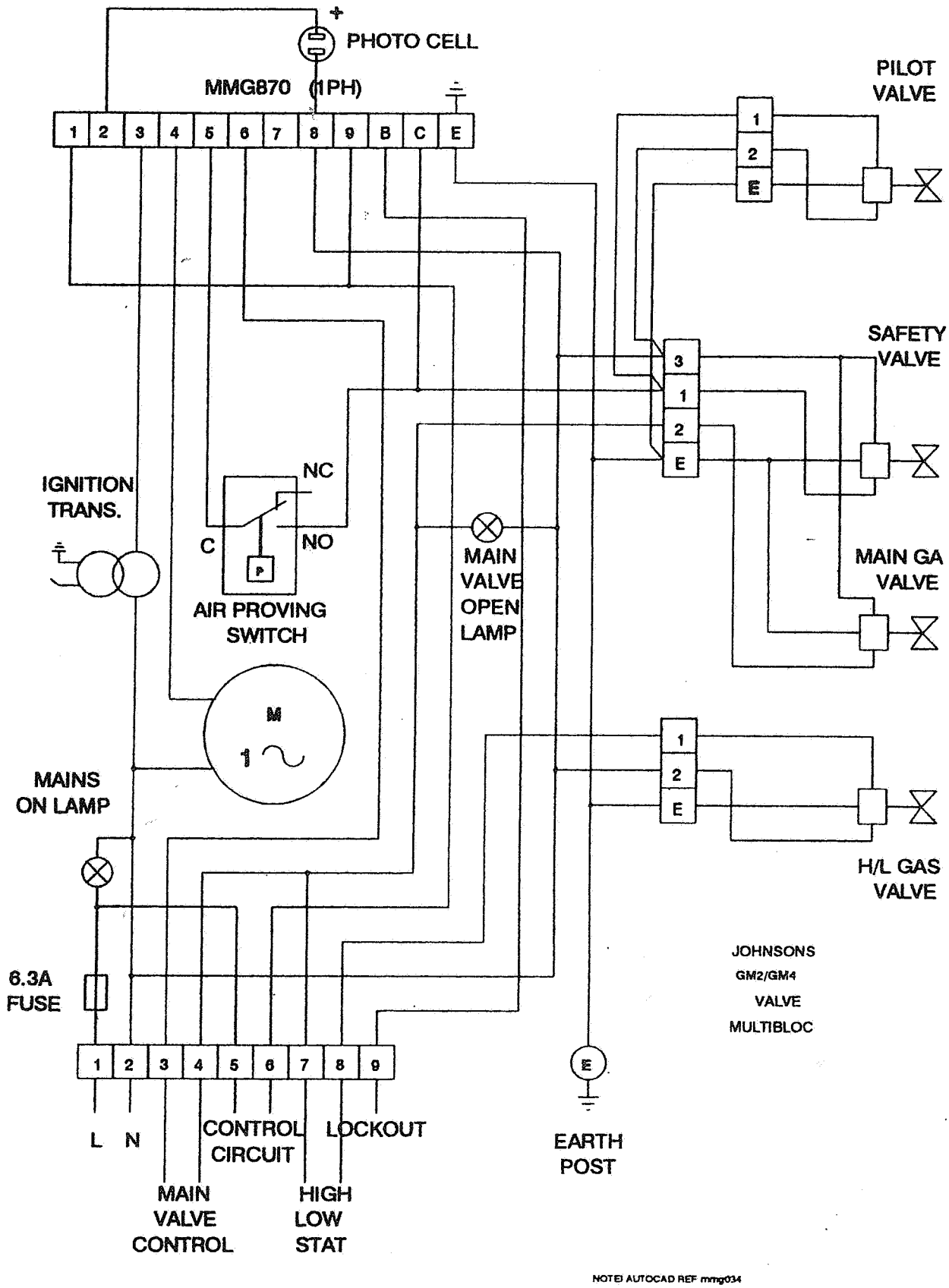
Burner Type	D/Tube O/Diameter	Rating (min/max, kW)	Minimum Tube Diameter (mm)
SG11 FD 36	95	13	100
		28	100
SG11 FD 60	95	27	100
		47	100
SG13 A	98.5	60	120
		120	120
SG13 B	98.5	114	120
		183	120
SG16 A	98.5	117	120
		249	120
SG16 B	98.5	176	120
		293	120
SG16 CB	98.5	220	150
		293	150
SG16 C	98.5	264	150
		381	150

Suggested Tube Diameter for Selectos Gas Burners on Tube Firing Applications

GENERAL WIRING DIAGRAM

Please Note:

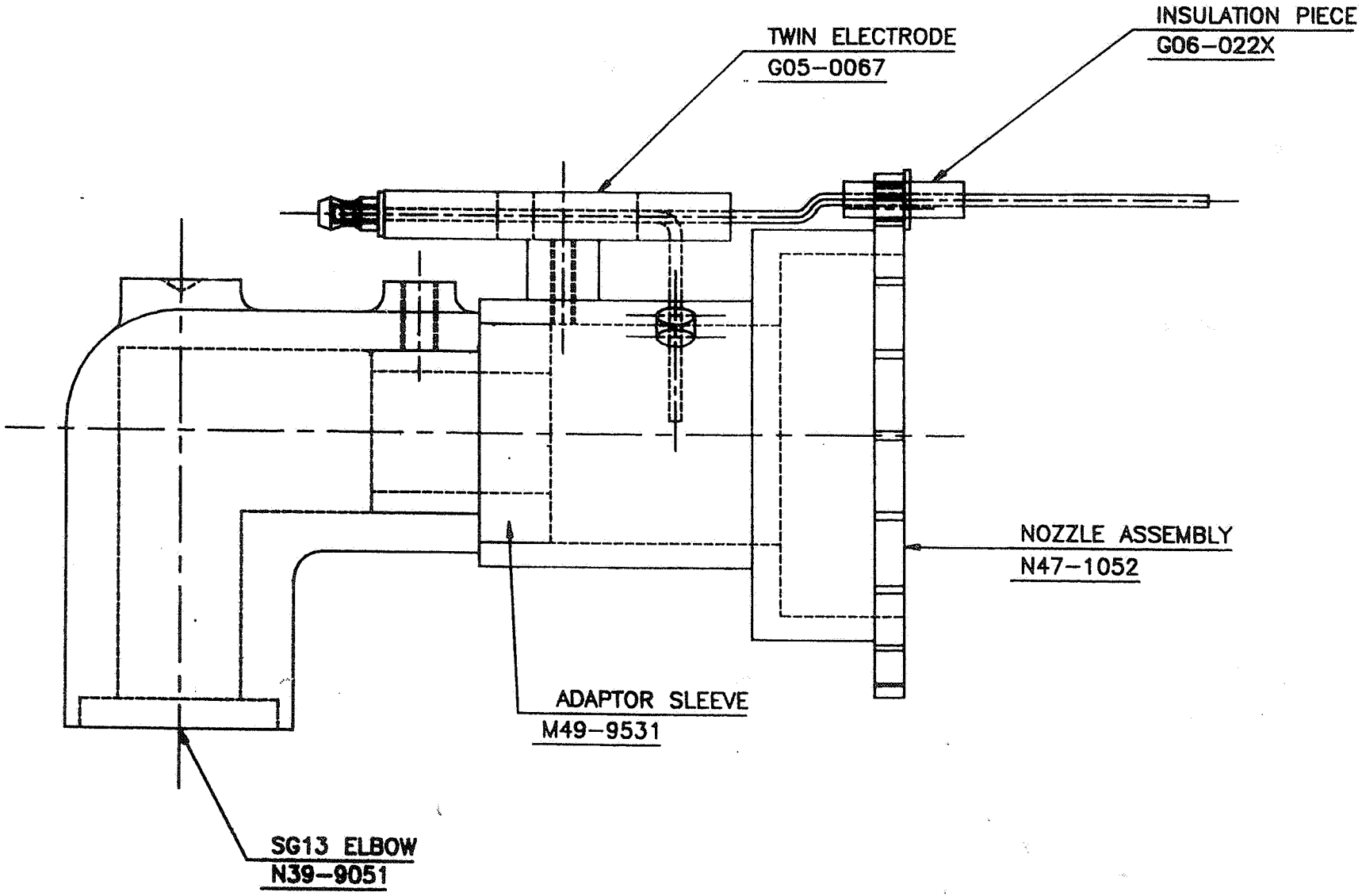
This is a General Wiring Diagram, and may not be totally representative of any one burner.



DRG No:
621761

THIRD ANGLE PROJECTION

MODS.:



DRG No: M.C.	PROTECTIVE FINISH	TOLERANCES 0-150mm ±0.5mm 150mm & OVER ± 1.0mm DRILLED HOLES ± 0.1mm THREAD. BSP TAPER TO BS.21 BSP PARALLEL TO BS.2779 CLASS B ISO METRIC TO BS. 3643 MED FIT SPECIAL LIMITS AS STATED	NU - WAY LIMITED DROITWICH ENGLAND	ISSUED TO: DATE:	MATL. CODE
DATE: 22.10.96	M/C FINISH ROUGH 6.3 FINISHED 3.2 FINE FINISHED 0.8		TITLE INNER GAS LINE ASSEMBLY SG13 TUBEFIRE	THIS DRAWING IS A COPY. IT WILL NOT BE KEPT UP TO DATE AND SHOULD BE RETURNED TO:- NU-WAY DRAWING OFFICE.	FIN. CODE N62 – 1761
SCALE: 1:1					

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: _____

Guaranteed Expiry Date: _____

Gas Type: _____

Gas Pressure upstream of main gas governor:

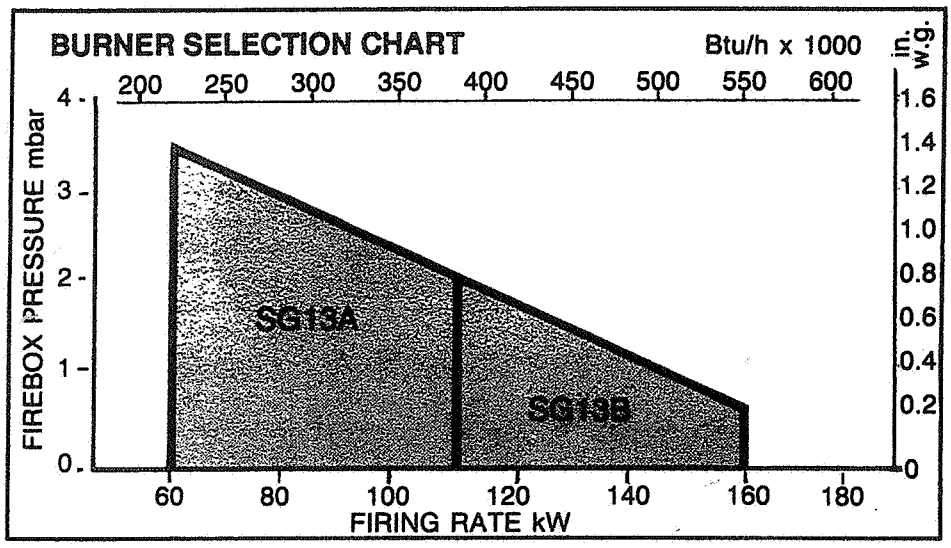
a) Standing: _____ mbar b) Running: _____ mbar

Gas pressure at burner head	_____	mbar	_____	in.w.g.
Gas Rate	_____	m^3	_____	ft^3/ht
Heat Input	_____	MJ/hr	_____	Btu/h
CO	_____	%	_____	%
CO_2	_____	%	_____	%
Gross Flue Gas Temperature	_____	°C	_____	°F
Ambient Temperature	_____	°C	_____	°F
Nett Flue Gas Temperature	_____	°C	_____	°F
Efficiency	_____	%	_____	%

SELECTOS

MODELS

SG 13A
SG 13B



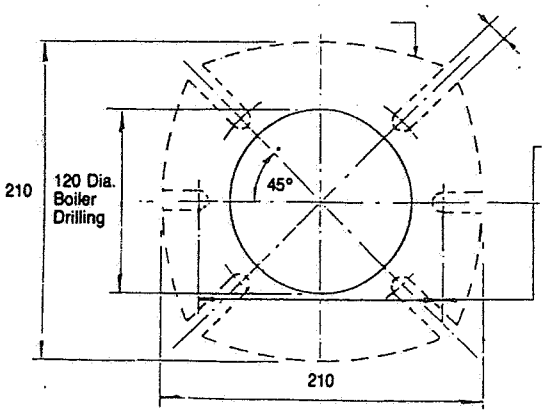
ELECTRICAL DATA

230v (+10% - 15%) 50Hz single phase a.c.(max. power demand, during ignition, approx 600 VA).

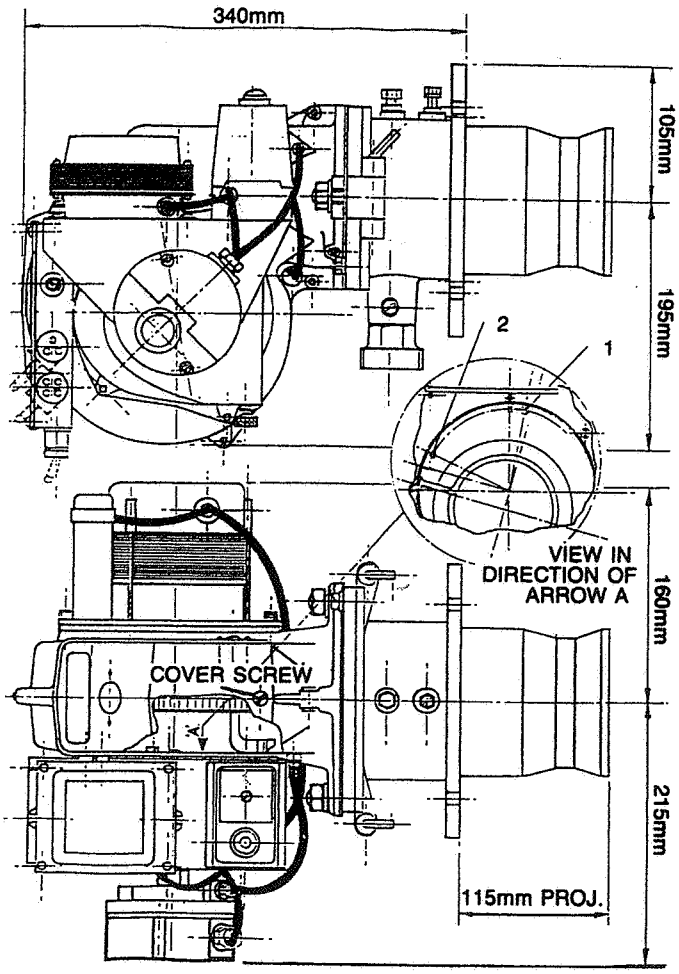
DIMENSIONS

All dimensions are in mm's

BURNER MOUNTING FLANGE



4 Slots 12mm Wide for M10 Mounting Studs On Minimum 155 maximum 220 PCD or 2 Horizontal Slots 140 Min. To 180 Max – Centres. Flange Thickness 10mm



SELECTOS
Gas and Oil Burners
Selectos Burner Products Division.
Nu-way Limited, P.O. Box 1 Vines Lane, Droitwich, Worcestershire. WR9 8NA, England.
Tel: Droitwich (01905) 794242 (Direct Dial) & 794331
Facsimile: (01905) 794017 & Spares (01905) 795829
Email: info@nu-way.co.uk

WOLSELEY plc
A member of the Wolseley plc Group

Nu-way policy is one of continuous improvement. The right to change prices and specifications without notice is reserved

BS EN ISO 9001
CERT No. FM00921

Issue CE| - 96