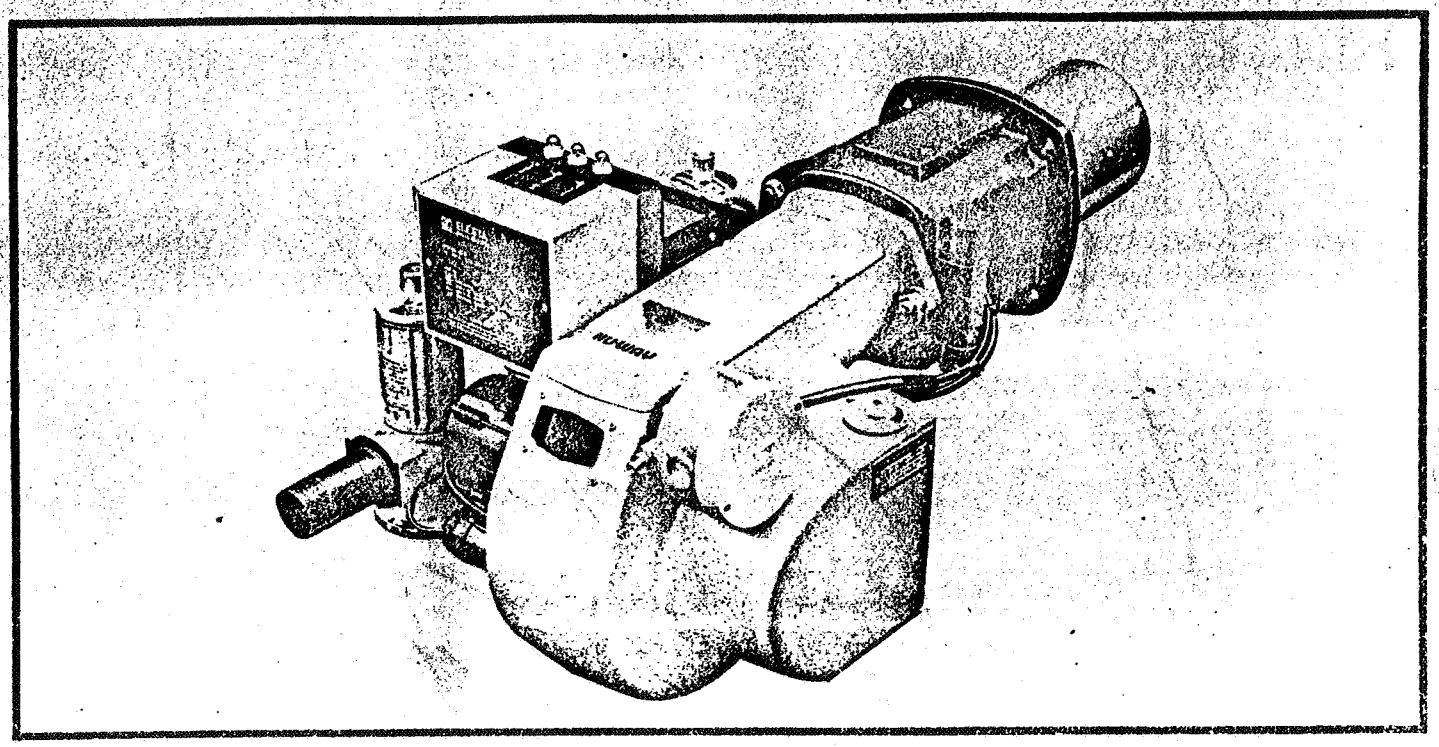
NU·WAY

Technical data

automatic gas burners | CG3



The Nu-Way model CG3 blown gas burner is marketed to meet the requirements of international markets, and has rated outputs in the range 88–381 kW (3·0–13·0 therm/h: 75,600–328,000 kcal/h: 300,000–1,300,000 Btu/h). Built to comply with relevant standards, the burner will fire pressurised systems having resistances as listed under burner selection. Units are available for both on/off and high/low/off operation.

FUEL

The CG3 burner is supplied for use on natural gas. Versions for manufactured gas and L.P.G. (liquified petroleum gas) are also available; details upon request.

GAS SUPPLY SYSTEMS

The burner comes complete with a gas train, which consists of main and pilot line gas governors, control valves and stop cocks. The main gas governor and gas stop cock are assembled and supplied loose; these may be installed separately from the burner if necessary. Gas inlet designed for left or right connection depending on position of gas governor and stop cock.

CONSTRUCTION

Monobloc metric design using fastenings to ISO standards. Suitable for flange mounting. Access to the inner assembly is by hinging away the fan casing from the gas muff. A patented adjustable, combustion head, enabled the burner characteristics to be carefully matched to those of the appliance, in order to achieve optimum combustion efficiency.

AIR REGULATION

The combustion air is controlled by a fixed damper which is adjustable. (Motorised damper for high/low operation.)

CONTROLS

Flame supervision is by ionization probe or photo-electric (UV) cell and automatic sequence controller. The CG3 burner may be controlled by suitable thermostats, pressure switches, time switches, frost-stats, etc. An adjustable air pressure switch gives protection if combustion air is, or becomes, insufficient.

Micro switch is fitted to the gas muff, to switch off the burner circuit when the inner assembly is removed for service or attention.

OPTIONAL EXTRAS

High/low operation.
Safety shut-off proving system and vent valve.

APPROX. WEIGHT

45 kg

ELECTRICAL DATA

	1 phase	3 phase
Mains supply (V) ±10%	230	415
Frequency (Hz)	50	50
Motor (W)	250	250
(hp)	⅓	⅓
	2850 rev/min	
Burner start current (A)	22	3·5
Burner run current (A)	2·4	0·75

Ignition by direct spark from double-wound and suppressed transformer secondary 5 kV-18mA, earth return.

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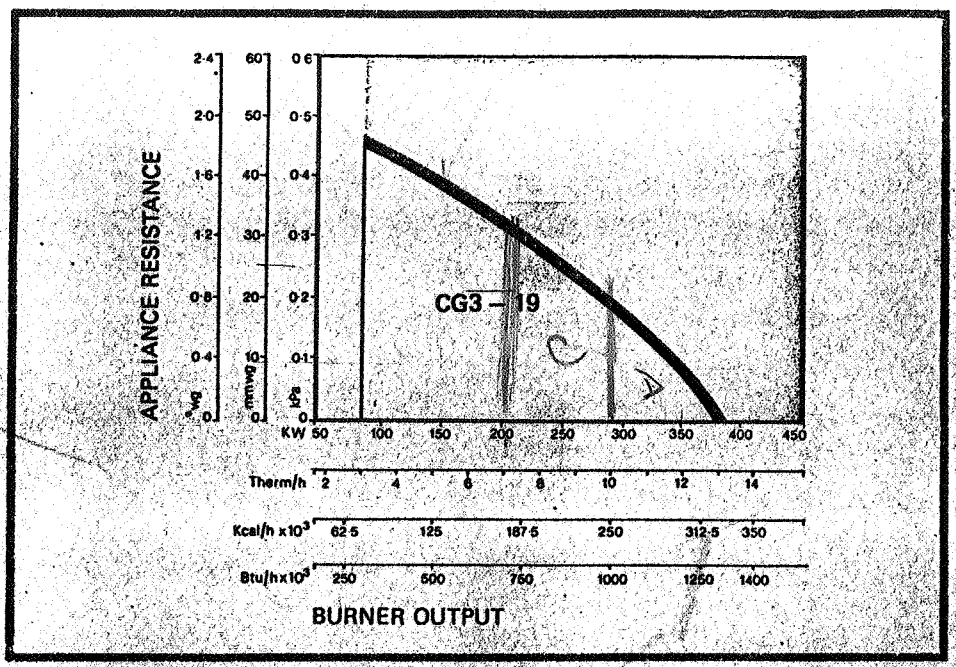
BURNER SELECTION



ORDERING INFORMATION

When ordering a Nu-Way CG3 burner please specify the following information in order to expedite your order.

Type of appliance and serial number, if known, with which the burner is to be used.

Appliance rating and resistance.

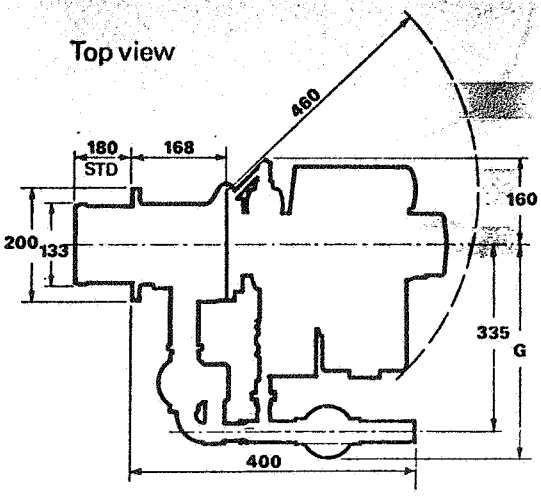
Specification of electricity supply locally available, i.e. voltage, frequency and whether single or three phase (3 or 4 wire).

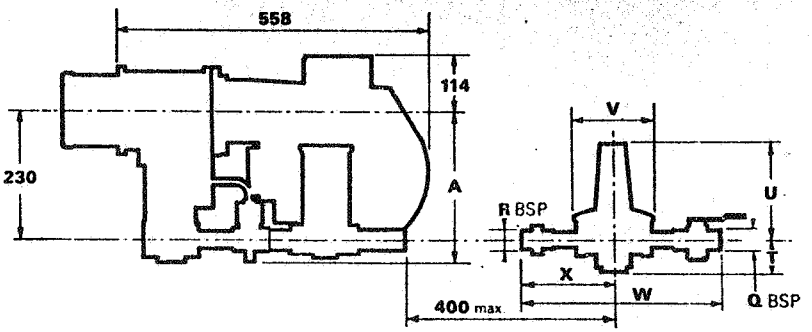
Type of gas.

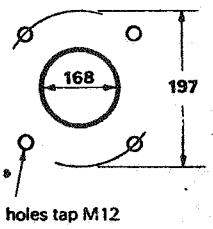
Burner selection graph is for CG3 burners only. For details of other burners see relevant data.

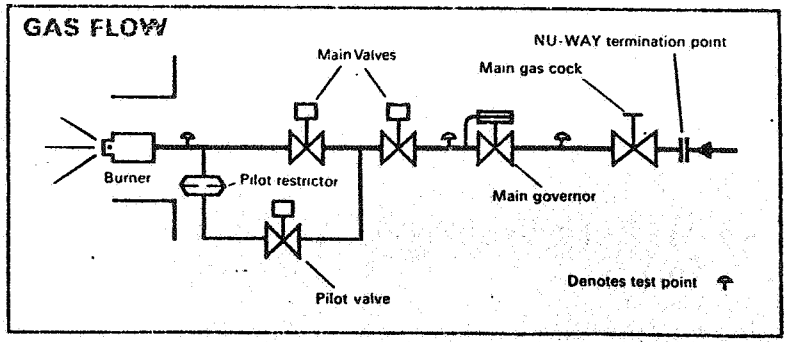
DIMENSIONS

Rating	A	G	Q	R	T	U	V	W	X
Up to 205 kW (7·0 therm/h)	345	380	1"	1"	57	175	146	353	162
Above 205 kW (7·0 therm/h)	350 max.	390 max.	1½"	1½"	64	206	172	426	183









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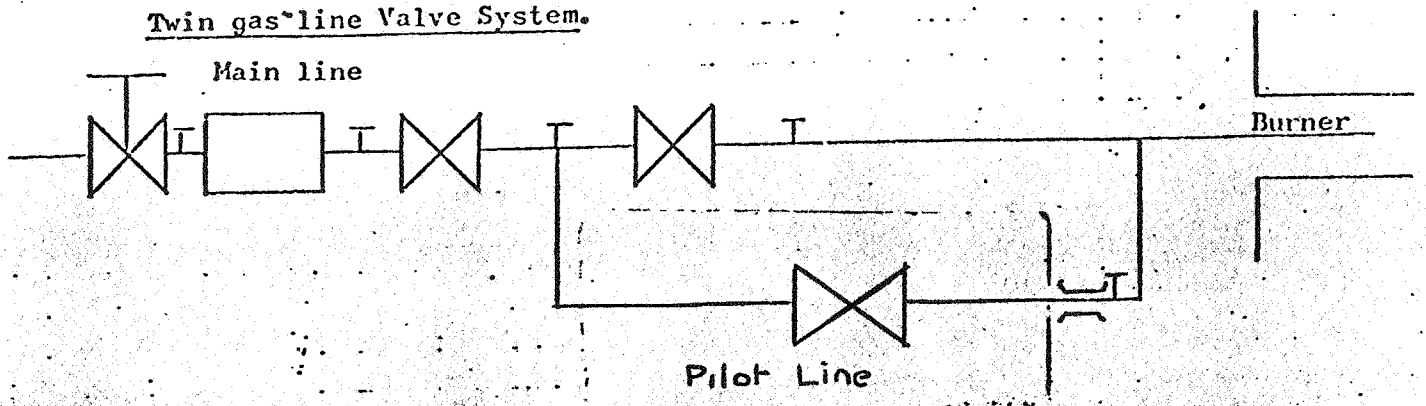
CG3 Pilot Restrictor Natural & LPG Gases

The pilot restrictor must always be retained and pressure set to pressures as shown in tables below, restrictor must never be removed.

Twin gas line Valve System.



Key

Governor — Control Valve — Gas Valve — Test points — Gas restrictor

On/off Burner — Natural

Burner	A Pilot restrictor		Rate Th/hr	Press
	Ins	mm		
CG3 B	3/16"	4.7	5.1-7.0	5.0"
CG3 C	13/64"	5.2	7.1-10.0	5.0"
CG3 D	1/4"	6.4	10.1-13.0	5.0"

H/L Burner

CG3 B	9/64"	3.6	5.1-7.0	5.0"
CG3 C	11/64"	4.4	7.1-10.0	5.0"
CG3 D	13/64"	5.2	10.1-13.0	5.0"

On/off Burner — L.P.G.

Burner	A		Rate	Press
	Ins	mm		
CG3 B	9/64"	3.6	5.1-7.0	5.0" wg
CG3 C	11/64"	4.4	7.1-10.0	5.0" wg
CG3 D	13/64"	5.2	10.1-13.0	5.0" wg

H/L Burner

CG3 B	7/64"	2.8	5.1-7.0	5.0"
CG3 C	9/64"	3.6	7.1-10.0	5.0"
CG3 D	11/64"	4.4	10.1-13.0	5.0"

'A' = The orifice size of the Restrictor.

Pressure setting apply to burner operating at full rate only. At reduced rates the press is controlled by main governor to a lower level and pilot governor remains fully open. Pressure setting to be measured at first test point after pilot governor.

CG3 DATA SHEET ISSUE A

RATING TH / HR	GAS	NOZZLES	DIFFUSER	DRAUGHT TUBE I/D	MAIN VALVE	SAFETY SHUT/OFF VALVE	MAIN GOVERNOR SINGLE LINE	MAIN GOVERNOR TWIN LINE	PILOT VALVE	PILOT GOVERNOR
3.1-5.0 CG3A	T	A2-400 8x8.0(5/16")	3½" x 1⅜" x 1/16"	4"	1" SOL	1½" HYD	1½"	1½"	½"	½"
CONVERSION PARTS ONLY	N		3½" x 1⅜" x 1/16"	4"						
5.1-7.0 CG3B	T	A2-400 8x9.6(⅜)	4½" x 1⅜" x 3/32"	5⅛"	1½" HYD	1½" HYD	1½"	2"	½"	½"
	N	A2-400 5x6.0(15/64)	4½" x 1⅜" x 3/32"	5⅛"	1" HYD	1" HYD	1"	1"	½"	½"
	L	A2-400 8x2.4(3/32")	4½" x 1⅜" x 3/32"	5⅛"					½"	½"
7.1-10.0 CG3C	T	E9800 8x12.7(½")	4" x 1¾" x 3/32"	5⅛"	1½" HYD	2" HYD	2"	2"	½"	½"
	N	A2-400 5x7.2(9/32")	4" x 1⅜" x 3/32"	5⅛"	1" HYD	1½" HYD	1½"	1½"	½"	½"
	L	A2-400 8x4.0(5/32")	4" x 1⅜" x 3/32"	5⅛"					½"	½"
10.1-13.0 CG3D	T	E10182 16x9.5(⅜)	4" x 1⅜" x 3/32"	5⅛"	2" HYD	2" HYD	2½"	2½"	½"	½"
	N	E9800 5x8.3(21/64")	4" x 1⅜" x 3/32"	5⅛"	1½" HYD	1½" HYD	1½"	1½"	½"	½"
	L	8x4.0(5/32")	4" x 1⅜" x 3/32"	5⅛"	1" HYD	1" HYD	1" GOV		½"	½"

A fresh air ventilator is required for the room housing the appliance. The minimum area should be calculated on the basis of 0.16 sq ft (142 sq cm) per 100 000 Btu/h (26.5 Kcal/h). Further high and low level ventilation may be required should the temperature in the boilerhouse exceed 45°C - (110°F).

The gas supply lines

Sized to British Gas recommendations, and made up in accordance with BS1937: or to local gas installation standards.
A manual gas shut-off valve should be fitted upstream of the burner/gas line assembly to permit burner maintenance.

Purge air from the gas supply main.

Electrical supply.

Connect the electrical supply, from the stats, time switches, etc. as appropriate (see appropriate wiring diagram).

OPERATION

To start the burner turn the gas supply valve, the main electrical isolating switch, and where fitted. the separate burner switch to ON.

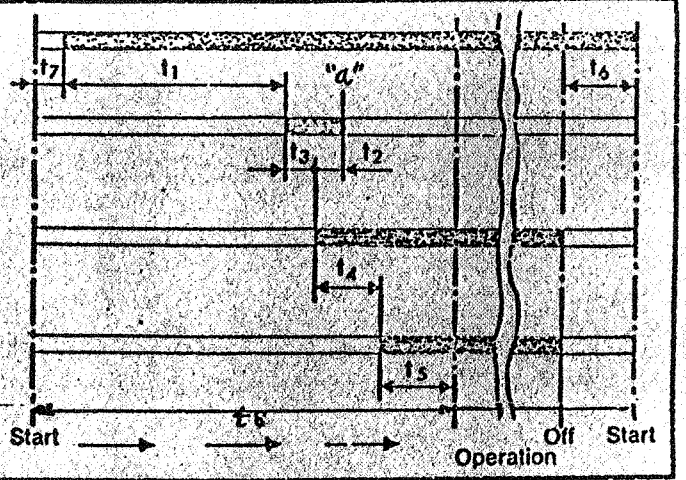
The burner can be stopped in an emergency by opening either of the electrical switches, or by turning off the gas supply.

Ensure that the control box is not in the open "lock-out" condition.

When the burner starts, the switching programme cycle is as follows:-

Switching programme

Burner element.	Symbol	switching programme
Burner motor	M	
Ignition transformer		
Pilot gas valve		
Main gas valve		



	FW46	LFA1.33	LFA1.63
t1	30 secs	30 secs	60 secs
t2	4	3	3
t3	3	3	3
t4	19	12	12

	FW46	LFA 1.33	LFA 1.63
t5	22 secs	28.5 secs	28.5 secs
t6	38	10.5	10.5
t7	5.5	6	6
t8	82	79.5	109.5

The burner continues to run until switched off by:

a) The control thermostat contacts opening, upon the room or water temperature being reached.

or

b) Safety, limit thermostat and time switch contacts opening,

or

c) The burner being switched off manually,

or

d) Power failure (upon power restoration, burner will restart automatically in the normal way, after the post-purge period).

If the flame fails to be established, the lock-out safety circuit causes the magnetic valves to shut and the lock-out lamp to be illuminated. The lamp is situated on the top of the Elesta FW46A21 control box and behind the reset button on the Landis & Gyr LFA1.33 and 1.63 control boxes.

The control box and motor will both continue to run until the end of the programme cycle (total cycle time - 120 secs. for FW46A21 and LFA1.63: and 90 secs. for LFA1.33). The red reset button should then be pressed to enable the controlbox to attempt to restart.

If during normal burner operation the flame is extinguished, the flame detection circuit reacts within 1 second shutting the magnetic valves and illuminating the lock-out lamp.

The control box and motor will both continue to run .....etc. (as above).

COMMISSIONING

Release the spring pressure on the main gas governor and open the air damper.
Set the air pressure switch to the minimum figure.
Check that all controlling instruments are calling for heat.
Close manual shut-off valves downstream of magnetic valves.
Switch on electrical supply and if necessary, press red lock-out button.
Check that programme runs to position "a" on the switching programme chart, goes to lock-out and then completes the programme cycle.
Open the manual pilot shut-off valve. Press the red lock-out button, check that the burner starts and runs on pilot flame.
Open the manual main shut-off valve. Check that the burner starts and runs on main flame.
Using a manometer, connected to the pressure test nipple downstream of the main gas governor, set the main gas governor to a pressure

suitable for the output required. (an approximate setting is shown on Data Sheet).

Adjust the air inlet damper to give the correct gas flue analysis, using a flue gas sampling kit to determine this.

Finally, increase the air pressure switch setting until the burner shuts down and completes the programme cycle. Turn back the setting knob slightly and allow the burner to restart. (Note: The setting knob may have to be turned back several times until the burner starts up and fires normally).

FAULT FINDING

NOTE

It may be necessary, when rectifying a fault, to check whether the air pressure switch is in the "burner start" or "burner run" position. The following procedure will assist in this check:

Ensure that all thermostats are in the shut, "calling for heat", position.

Remove the control box.

"Burner start" position - continuity between terminals 19 and 7 on the Elesta FW46A21 and terminals 8 and 10 on the LFA1.33 and 1.63 control boxes.

"Burner run" position - continuity between terminals 5 and 7 on the Elesta FW46A21 and terminals 3 and 10 on the LFA 1.33 and 1.63 control boxes.

If the air pressure switch is found to be in the "burner run" position turn the setting knob to zero. If continuity is not broken the pressure switch is faulty and should be replaced.

Motor fails to start

Check that power is available and that the burner has been correctly wired. Check all fuses in the supply to the burner. Check that the contacts of the time clock and both the control and safety limit thermostats on the appliance or in the room are closed and therefore calling for heat, if these thermostats are not closed, check thermostat settings.

NOTE

(The safety limit thermostat should be set at least 11°C (20°F) above the control thermostat.)

Check that the air pressure switch is in the "burner start" position (see above).

Check that the control box is not in the "lock-out" position (the signal lamp may be faulty).

Check that a flame is not present - the gas valves may not be totally shut off.

Check the probe setting, that the probe is not being short circuited, also that the insulator is not cracked or dirty.

If the "lock-out" condition cannot be reset, the control box may be faulty and should be replaced.

Fan and control box run continuously. Burner does not start.

Air pressure switch is continually in "burner start" position.

Reset air pressure switch (page 7) and check operation (page 7).

Fan starts, but burner goes to "lock-out".

If the flame fails to be established the "lock-out" safety circuit causes the magnetic valves to shut and the "lock-out" lamp to light. This lamp is situated on top of the Elesta FW46A21 control box and behind the reset button on the Landis & Gyr LFA1.33 and 1.63 control boxes.

The control box and the motor will both continue to run until the end of the programme cycle (total cycle time - 120 seconds for FW46A21 and LFA1.63 and 90 seconds for LFA1.33). The red reset button should then be pressed to enable the control box to attempt a restart.

Ascertain that gas is reaching the appliance, and that the two (3) magnetic valves are in working order.

Check electrode and probe settings, that neither are being short circuited and that the insulators are not cracked or dirty.

Check operation of the transformer, and high tension leads for continuity.

Check that the mains live and ne utral connections are correct and that there is a good earth to the burner.

Check that the pilot gas governor is set at a nominal pressure of, 5" for natural gas and $2\frac{1}{2}$" for town's gas. (The actual figure may differ if the probe electrical signal is insufficient, not less than $8\mu A$).

Flame unstable

Check that the burner gas governor has been set at the correct pressure.

Check for blockage in the nozzle and diffuser drillings.

Burner stops after satisfactory running period

If, during normal burner operation, the flame is extinguished, the probe signal reacts within one second, shutting the magnetic valves and illuminating the lock-out lamp. The control box and motor will both continued to run until the end of the programme cycle. The red reset button should now be pressed to enable the control box to attempt a restart.

Check gas supply and pressure.

Check air entry for blockages.

Check that the probe is correctly set and that the insulator is not cracked.

Smell of gas

Check all pipeline joints with soap solution, and tightness of the gas valves. DO NOT SEARCH FOR LEAKS WITH NAKED FLAMES.

Combustion

If there is excessive combustion noise or the flame appears more yellow than usual, contact your installer or service engineer.

Maintenance

Before carrying out any work on the burner, ensure that the electricity and gas supplies are OFF.

No maintenance is required on the pressure switch, control box, magnetic valves or governor unit, apart from checking all cable connections.

The motor bearings are lubricated for life.

If the fan is damaged, or becomes loose on the motor shaft, it should be repositioned approx. central between the faces of the body casting, taking care that it does not foul any of the air adjustment components.

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SPARE PARTS LIST

BURNER SERIES: CG3 (On/Off & High/Low)			Category (see Note below)		
ITEM	CODE NO	DESCRIPTION	A	B	
1	G09-016C	Gasket	*		
2	G06-010F	Electrode Assy. - Kanthol	*		
3		Nozzle - State Burner Serial No.		*	
4		Air Diffuser - State Burner Serial No.	*		
5		Draught Tube - State Burner Serial No.		*	
6		Probe Lead - State Burner Serial No.	*		
7	U90-406S	HT Lead Complete (State Length)	*		
8	C01-002E	Transformer Parmeko P70399L (Obsolete) Superseded by -		*	
-	C01-021Z	Transformer Parmeko P726000		*	
9	C21-026Q	Control Box - Landis & Gyr LFA 1.33) Obsolete		*	
-	C21-037K	Control Box - Landis & Gyr LFB 1.33) Superseded by -		*	
-	C21-101Z	Control Box - Landis & Gyr LFL 1.335		*	
-	C21-055V	Control Box - Elesta FW46 A21		*	
-	C21-065X	Control Box - Petercem GE236 AIP		*	
-	C21-064W	Control Box - Satronic TMG720		*	
10	C31-010W	Photocell - Landis & Gyr UV QRA2 (For LFB)	*		
-	C31-022N	Photocell - Elesta UV FW141D (For FW46)	*		
-	C31-024Q	Photocell - Satronic UVZ721 (For TMG)	*		
11	A06-013M	Electric Motor .33 HP - 1 Ph		*	
-	A06-014N	Electric Motor .33 HP - 3 Ph		*	
-	A06-001S	Electric Motor .33 HP - 3 Ph		*	

N.B. 1. Code numbers and types of electrical items listed are based on standard electrical supplies of 220-240V, 1-phase, 50 Hz., or 415V, 3-phase, 50 Hz. only.
2. When ordering spare parts it is essential to quote the serial and specification numbers shown on the burner or burners.
3. Categories: A - Short-Term Spares. B - Long-Term Spares.

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HEATING PLANTS LIMITED

SPARE PARTS LIST

BURNER SERIES: CG3 (On/Off & High/Low) (Continued)			Category (see Note below)		
ITEM	CODE NO	DESCRIPTION	A	B	
11	A06-003U	Electric Motor .33 HP - 1 Ph		*	
12	B05-002E	Capacitor for Item 16	*		
13	D07-005U	Fan Impellor		*	
14	G06-010F	Probe Electrode	*		
15	G16-008B	Inspection Window	*		
16	A30-006S	Torque Motor G4-K70 (H/L only)		*	
17	C50-034H	Pressure Switch LDK2 (Obsolete) Superseded by -		*	
-	C50-045L	Pressure Switch DSP-01V		*	
18	C56-017S	Contactor K6-A62 B & J		*	
-	C56-003D	Contactor Danfoss CU10		*	
19	C51-031T	Relay K6-A44		*	
-	C51-005A	Relay Danfoss 37B0152		*	
-	C51-006B	Relay Danfoss 37B0164		*	
20	B04-001C	Neon Indicator SL80 c/w Lead	*		
21	E01-040G	Solenoid Valve - ACS/GB4 .5" BSP (Pilot)		*	
-	E01-007U	Solenoid Valve - ACS/GB7		*	
-	E08-001D	Hydramotor Valve SH111NVS25 1.0" BSP		*	
-	E08-002E	Hydramotor Valve SH111NVS40 On/Off 1.5"BSP		*	
-	E08-003F	Hydramotor Valve SH211NVS50 2.0" BSP		*	
-	E08-008L	Hydramotor Valve SH131NVS25 1.0" BSP		*	
-	E08-004G	Hydramotor Valve SH131NVS40 1.5" BSP		*	

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HEATING PLANTS LIMITED

SPARE PARTS LIST

BURNER SERIES: CG3 (On/Off & H/L) (Continued)			Category (see Note below)		
ITEM	CODE NO	DESCRIPTION	A	B	
21	E08-005H	Hydramotor Valve SH231NVS50 2.0" BSP		*	
-	E01-042W	Solenoid Valve - Kromschroder MLA25		*	
-	E01-043X	Solenoid Valve - Kromschroder MNB25		*	
-	E01-044Y	Solenoid Valve - Kromschroder MNB40		*	
-	E01-037R	Solenoid Valve - FT803025 - ½"BSP(Vent Valve)		*	
22	G03-023V	Flexible Coupling (Insert)			
		(H/L Burner Only) For Item 16	*		

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2. When ordering spare parts it is essential to quote the serial and specification numbers shown on the burner or burners.
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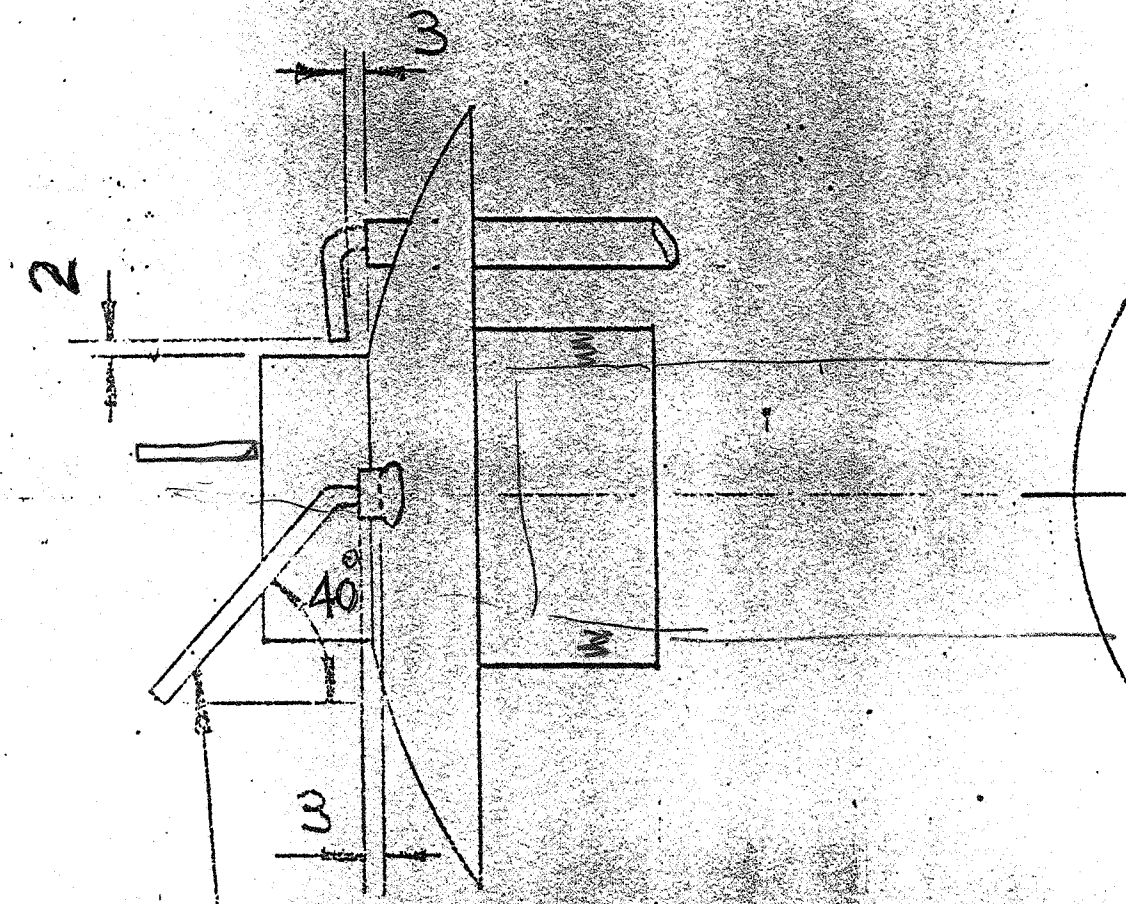
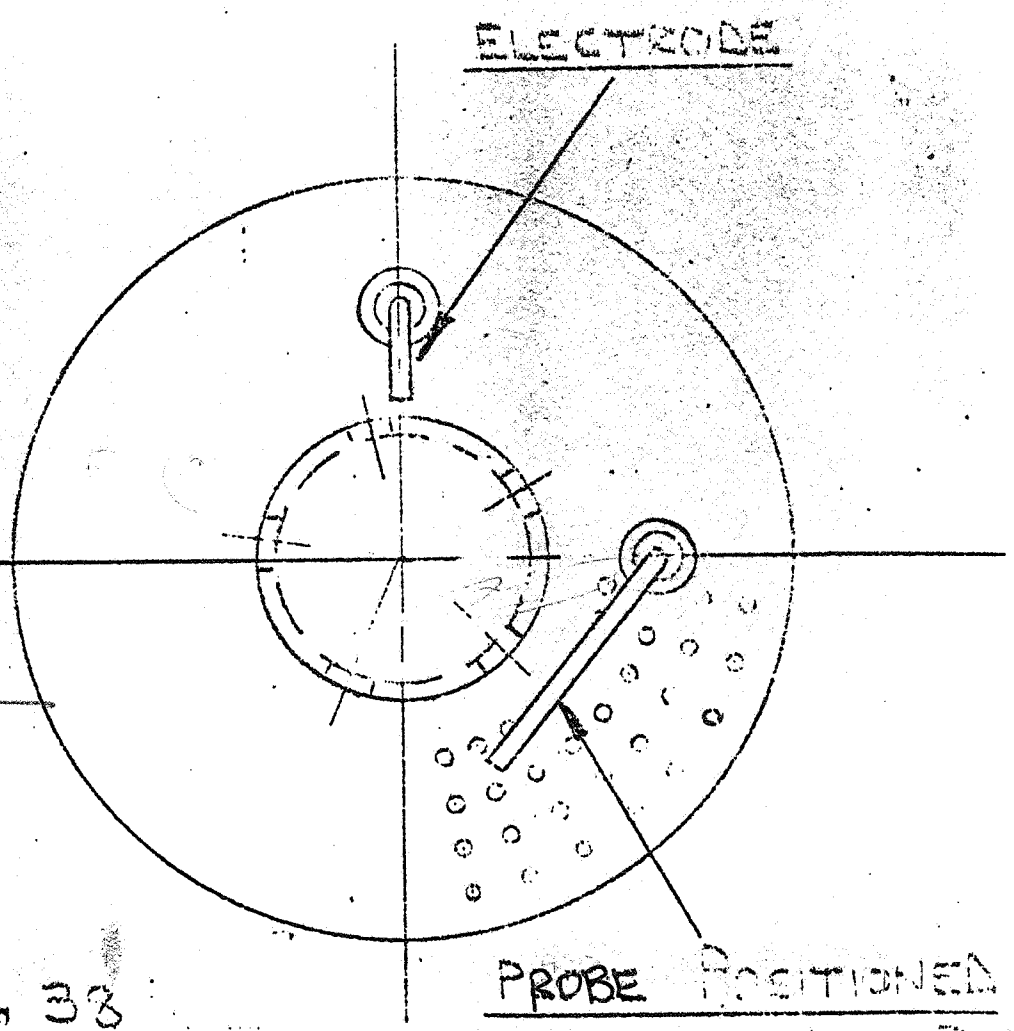
A4-659

THIRD ANGLE PROJECTION

MOOG





CG2 PROBE LENGTH PRIOR TO BENDING 33

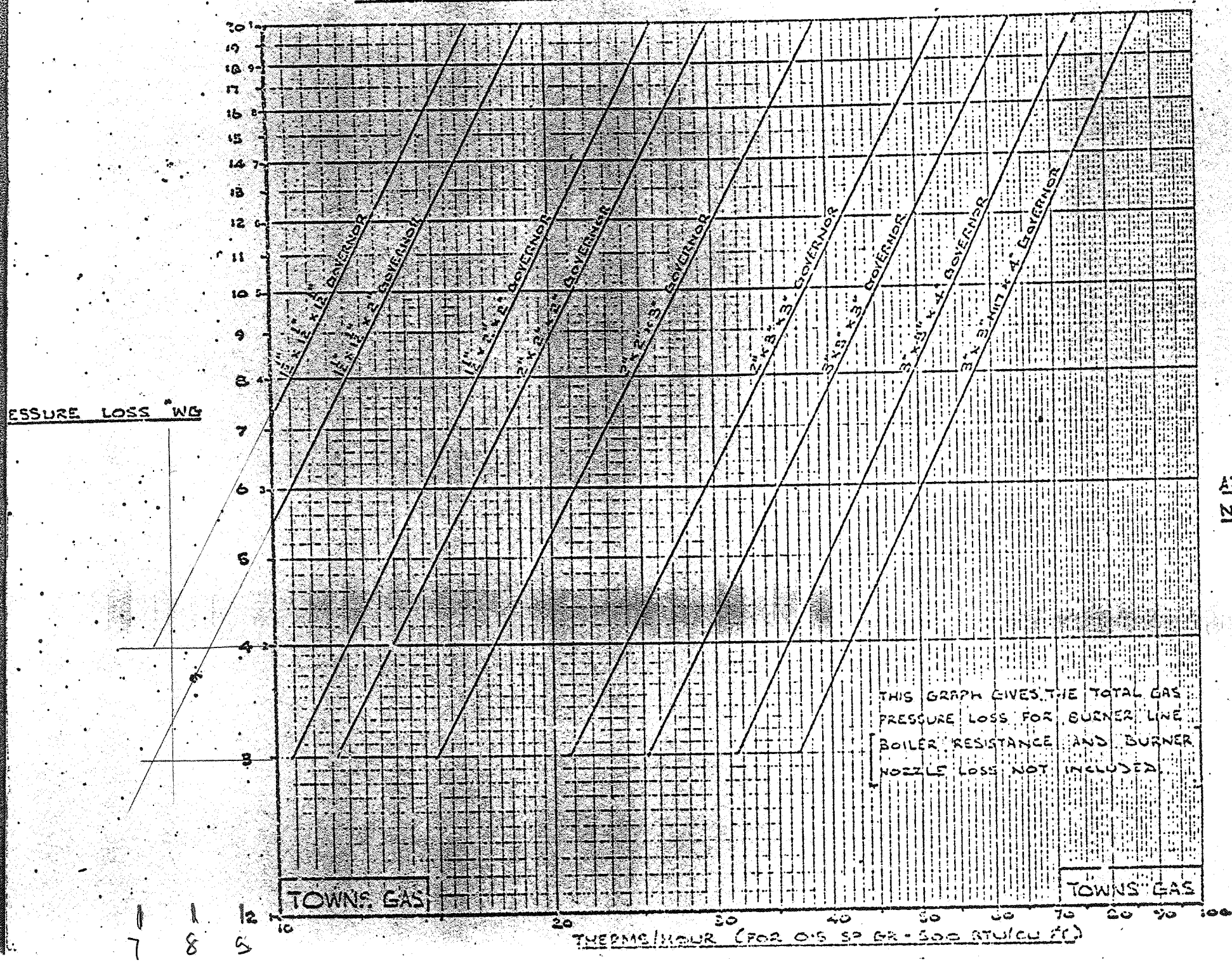
CG3 " " " " " 50

PROBE POSITIONED ACROSS INNER ROW OF HOLES

ALL DIMENSIONS IN mm.

DRAWN	PROTECTIVE FINISH				NU-WAY HEATING PLANTS LTD DROITWICH ENGLAND	THIS DESIGN OF AWING IS THE PROPERTY OF NU WAY HEATING PLANTS LTD & IS SUPPLIED WITHOUT ANY RESPONSIBILITY WHATSOEVER ON OUR PART & FOR YOUR PRIVATE INFORMATION ALONE IT IS TO BE SHOWN ONLY TO YOUR SERVANTS OR AGENTS FOR THE PURPOSES OF YOUR BUSINESS & TO NO OTHER PERSONS & IS TO BE RETURNED TO US ON DEMAND OR WHEN YOU NO LONGER REQUIRE IT WHICHEVER IS THE EARLIER ANY PERSON MAKING USE OF IT DOES SO ENTIRELY AT HIS OWN RISK	MATL. C
DATE	MACHINE FINISH	ROUGH ✓	FINISHED 32 ✓	FINE FINISHED 0·8 ✓	TITLE ELECTRODE / PROBE SETTING CG2 & CG3		FIN CO
SCALE	DIMENSION TOLERANCE	0-150mm ± 0·5mm		150mm & OVER ± 1·0mm			

TOTAL PRESSURE LOSS IN TWIN LINES INCLUDING GOVERNOR

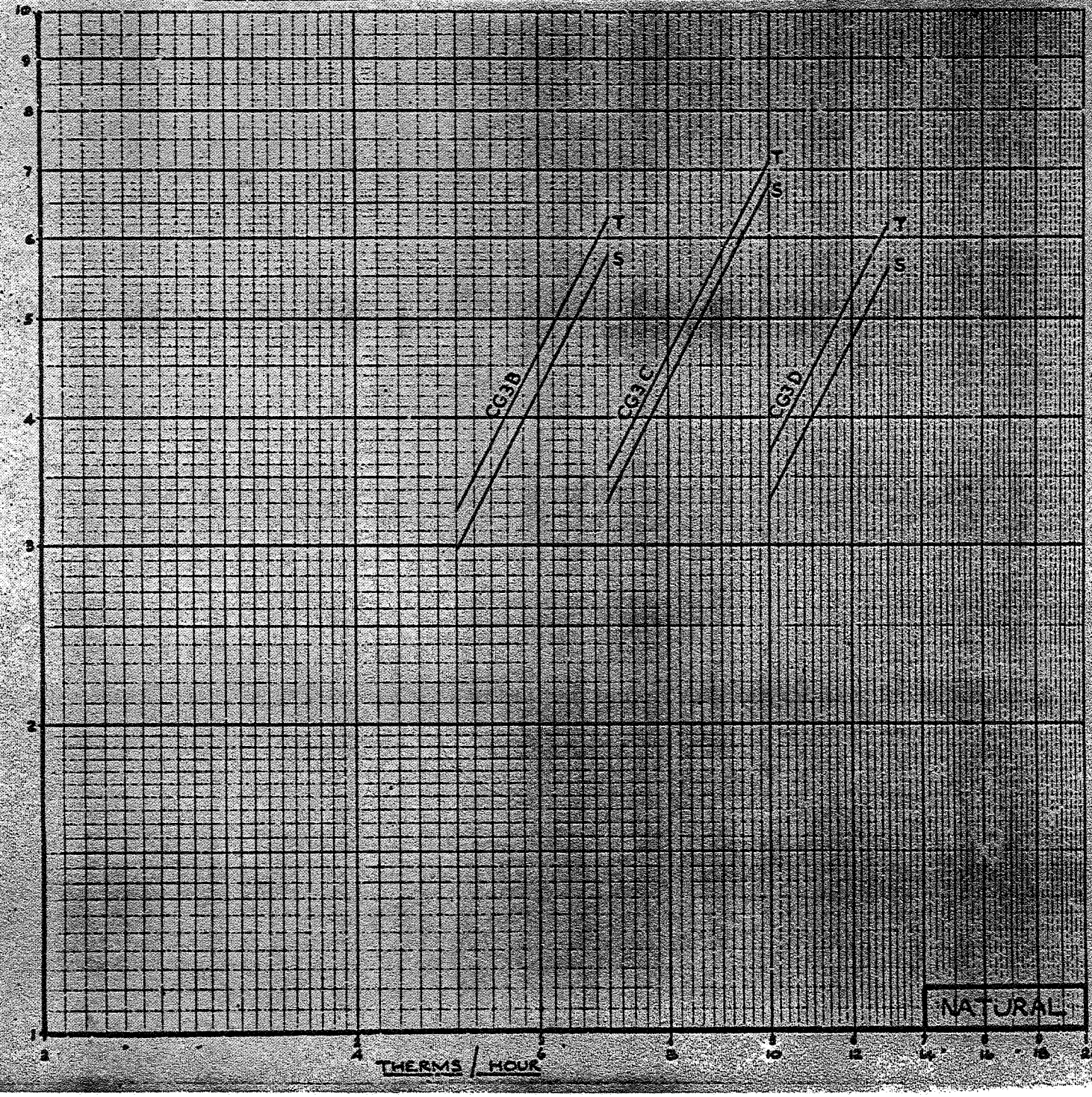


ADD 3" WG FOR NOZZLE LOSS.

1 1 12
7 8 5

WELL 8...2 Graph Data Ref. 5911 Log 1 Cycle x 1 Cycle

GOVERNED PRESSURE FOR CG3 SINGLE & TWIN GAS LINES



NS WG PRESSURE LOSS

INCLUDES NOZZLE LOSS

T - TWIN VALVE

S - SINGLE VALVE