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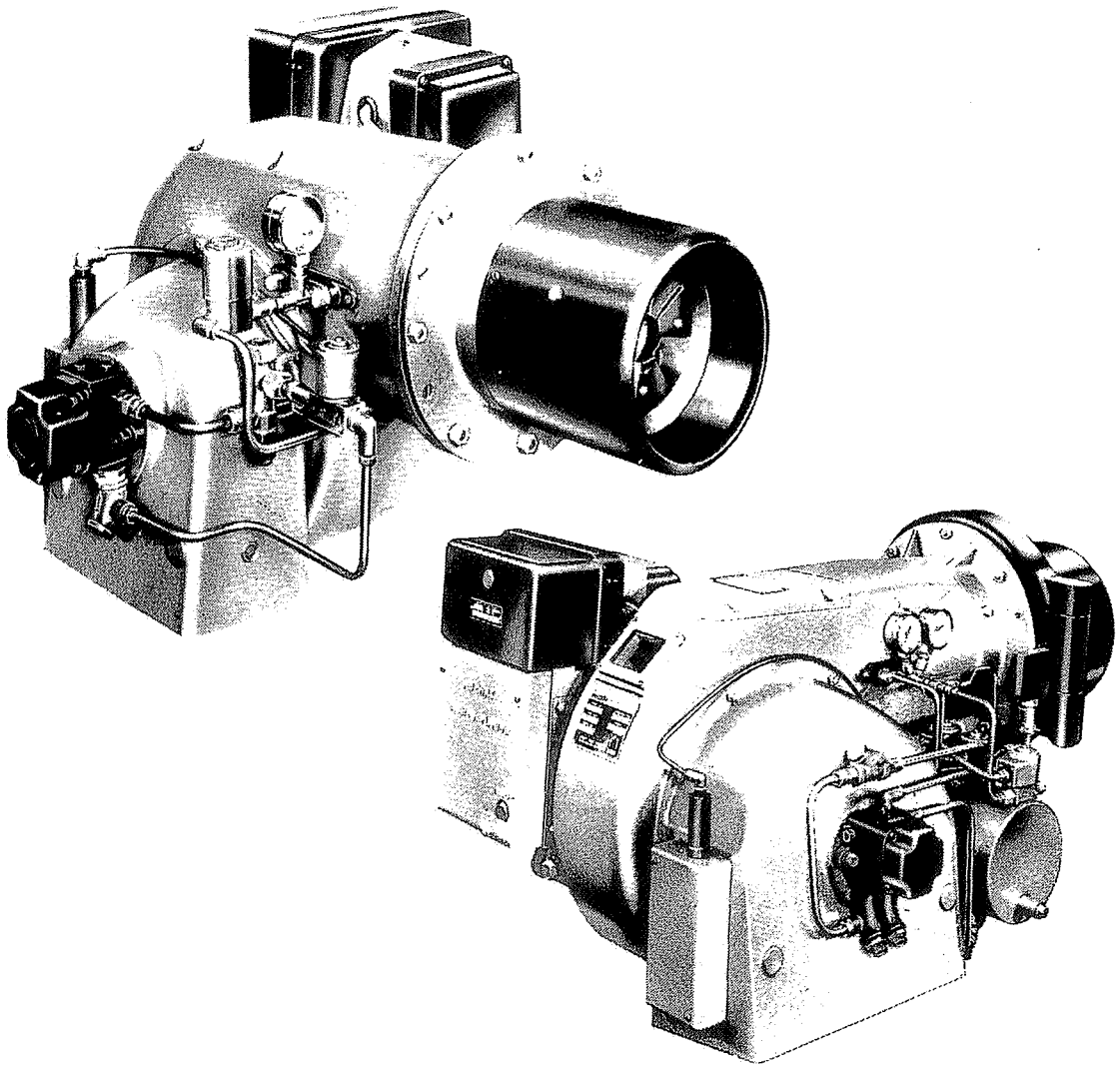
MANUFACTURERS OF
COMBUSTION EQUIPMENT
NU-WAY HEATING PLANTS LTD
DROITWICH

INSTALLATION AND SERVICE MANUAL FOR SERIES 'A' FULLY AUTOMATIC OIL BURNERS



NU-WAY HEATING PLANTS LTD.

NU-WAY
Oil & Gas Firing

NU-WAY SERIES 'A' FULLY AUTOMATIC OIL BURNERS

Installation and Service Manual

INTRODUCTION

Series A oil burners are 'Gun type' fully automatic units of packaged design which incorporate fuel pump, fan, oil preheater (where necessary), sequence controller and flame safeguard, together with all the components necessary for safe and reliable operation. The burners are of monoblock construction and form a single unit for flange or hinge mounting onto the frontplate of the appliance. Pressure atomisation is used throughout the range, the method of control being determined by the application.

Regarding the Mk2 version of the 'A' burner, it will be observed that the air inlet is detachable. This facilitates the removal of the burner fan impellor without removing the motor. Ease of access of the burner for impellor and scroll for cleaning purpose is also greatly improved. The air inlet can of course be repositioned if the application makes this necessary.

The burner air flap on these models takes the form of a single blade with a strengthened operating linkage, and the top cover provides easier access for removal of the nozzle assembly on none hinged burners.

Models are available for firing appliances the combustion chambers of which are at, or close to, atmospheric pressure. Models are also available for firing high resistance appliances where the combustion chamber is above atmospheric pressure.

All grades of petroleum based fuel oils up to 960 seconds Redwood No. 1 at 100°F (15° Engler at 50°C. 115 Centitokes at 122°F), may be burnt, the only difference between models for one fuel and another being the presence or absence of the means of oil pre-heater, oil circulation and the maintenance of certain components above a temperature at which oil flow becomes sluggish.

Model designation is formed with six symbols, e.g., Al HA/5.

Legend

A — Burner type

0, 1, 2 — Burner firing rate

L, H — Fuel grade (viscosity)*

A, B, C — Range sub division. Relates to application requirements.

4, 5, 10 — Nominal fan pressure (ins. WG)

*N.B. 'L' 30 (min) to 43 seconds (max) R1 @ 100°F (U.K. Class D)
Equivalent to 2.0 (min)—6.5 max Kinematic centistokes @ 37.8°C.

H. Up to 960 secs R1 @ 100°F (U.K. classes E & F)
15° engler @ 50 °C
115 centistokes @ 122°F

FUEL SYSTEMS

There are four basic fuel systems used on these burners, which can be sub-divided into those used for distillate and those for residual oils. Obviously, the use of residual oils necessitate the inclusion of an oil pre-heater tank in the fuel system, with resulting complication in burner pipework.

A0H and A1H Standard burners use the single/twin nozzle pressure variation system (also A2H if required), as described in the following paragraphs, but variations can occur when burners have to be matched to particular appliance as with O.E.M. equipment. (Original Equipment Manufacturer). 200 p.s.i. low flame, 300-400 p.s.i. high flame. For details see appendix 2.

Single/twin nozzle pressure variation systems

A0H A1H see drg 9554/1

Purge. In order to prevent slugs of cold oil passing to the burner nozzle, hot oil is circulated around the burner fuel system. This process is carried out for a period of time determined by the burner control, before any attempt is made to establish a flame. Valves A & C open.

Low flame. Magnetic valve A closes, and fuel pressure builds up to the preset low flame pressure controlled by the pressure regulating valve. Oil passes to the nozzle block, and the nozzle cut-off operates at the set pressure (150 p.s.i.) allowing oil to pass through the nozzle.

As magnetic valve C remains open then no oil pressure is applied to hydraulic ram controlling low air flap and this remains in the low fire position.

High flame. Magnetic valve C closes preventing spill back to the suction line, and rendering the pressure regulating valve inoperative.

Fuel pressure will build up until this is controlled by the fuel pump pressure regulating valve, at the high flame operating pressure.

As magnetic valve C is closed the hydraulic ram is subjected to oil pressure, and the burner air flap will move to the high flame position.

Shut down. Magnetic valve A opens, relieving oil pressure from nozzle block and ensuring a clean, rapid shut down due to the operation of the nozzle cut cut-off.

AOL/A1L/A2H

A2. Standard burners use the twin nozzle, constant pressure system as described in the following paragraphs, but occasion may arise where variations occur depending on particular manufacturers requirements.

(For particulars see Appendix II)

TWIN NOZZLE CONSTANT PRESSURE SYSTEMS

AOL/A1L/A2L. See drg. XS 8926

Low flame. Magnetic valve A opens and oil passes from the fuel pump at a constant pressure maintained by the fuel pump pressure regulating valve to the right hand nozzle. Magnetic valve B is closed so that oil is prevented from reaching the bottom nozzle, or the hydraulic ram controlling the burner air flap. The burner air flap therefore remains in the low flame position.

High flame. Magnetic valve B is opened allowing oil to pass to the left hand nozzle and the hydraulic ram. Burner air flap then moves to the pre-set high flame position.

A2H. See drg XS 8927/2

(also applicable to A1H if required)

Purge. See notes relating to AOH, A1H burners.

Each nozzle is controlled by a pressure operated cut-off valve integral with the nozzle block assembly. These valves are held closed by springs while the pump circulates hot oil through the nozzle block and back to suction during the purge period, (approx 30 p.s.i. on both gauges).

During this period an oil supply is brought to bear on the back of the bottom nozzle cut off valve, and upon the hydraulic ram, via magnetic valve A. This oil supply is derived from a subsidiary pump tapping, (pump bleed port).

N.B.—In this system alone the hydraulic ram is extended for low flame and retracted for high flame.

Low flame. Magnetic valve C is closed and oil pressure rises in hydraulic and nozzle lines. The hydraulic cylinder drives the air flap to its low flame position and pressure is equalised on rear of high flame cut-off. The low flame cut-off opens and allows oil to spray from low flame (right hand nozzle).

High flame. Magnetic valve A is closed and magnetic valve B is opened simultaneously. Hydraulic pressure is relieved from both the cylinder and the rear of high flame cut-off valve and exhausted back to suction. As a result, the bottom nozzle cut-off valve lifts allowing oil to pass through the left hand nozzle, and the air flap moves to its high flame position under spring tension.

Shut down. Magnetic valve C opens, relieving pressure in the nozzle block, and ensures a clean rapid shut down due to quick action of the nozzle cut-off valves.

Alternative pressure variation system

(1 or 2 nozzles) for AOL/A1L/A2L (drg. 9553/1).

Single/twin nozzle pressure variation systems

AOL A1L see drg. E9553/1

Low flame. Oil is passed from the fuel pump via magnetic valve A to the burner nozzles.

As magnetic valve C is also open then the pressure regulating valve will control oil pressure at the preset low fire point, by spilling oil back to suction. Due to the fact that valve C is open no oil pressure is passed to the hydraulic ram controlling the burner air flaps and this will remain in the low fire position.

High flame. Magnetic valve C is closed preventing spill back to the suction line, and rendering pressure regulating valve inoperative.

Fuel pressure will build up, until this is controlled by the fuel pump pressure regulating valve at the high flame operating pressure.

As magnetic valve C is closed the hydraulic ram is subjected to oil pressure opening the air flap to the high flame position.

INSTALLATION OF BOILER/BURNER UNITS

The boiler makers instructions should be followed in all matters relating to the boiler. There may also be instructions relating to the burner which are more specific to the models employed. These should also be followed carefully.

AIR HANDLING PARTS

The standard combustion head utilises a rigid slotted annular disc or diffuser, with its centre orifice slightly in advance of the nozzle(s). A flame tube of high temperature resistant material surrounds the diffuser and extends forward of it terminating in an end, shaped to give a final throat section. The nozzle/electrode assembly is shrouded with a tube which locates in a 45° recess in the diffuser support. The air entering the tube may be restricted to reduce the velocity of air leaving the centre orifice over the electrodes and surrounding the nozzle. Full air pressure is applied to the perforations in the diffuser and the annular gap between the diffuser and the flame tube.
The fuel systems and the wiring diagrams relating to them are shown later in this publication, but are listed below :-

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BOILERHOUSE VENTILATION

The permanent ventilation of the boilerhouse (not including doors and windows which may be closed), is essential.
Boilerhouse ventilation serves two essential purposes. One is to permit combustion air to flow freely to the burner or burners from outside the building. The second is to maintain a clean atmosphere within the boilerhouse at a reasonable temperature level. The minimum area of entry into the boilerhouse for combusion air purposes only is proportional to the size of the appliance or appliances within. It should be calculated on the basis of one fifth of a square foot per Imperial Gallon per Hour (Maximum boilerhouse consumption). To maintain a satisfactory atmosphere in the boilerhouse this area must be substantially increased.

The frequency of air changes necessary will depend to a very large extent upon the effectiveness of the boiler lagging, and the amount of exposed metal flue pipe within the boilerhouse. Although fully automatic oil burners and their associated controls will operate at temperatures up to 110°F (43°C) their ultimate reliability will be impaired by such temperatures and it is thus strongly recommended that the temperature should be held below 80°F (27°C) whenever possible by effective lagging of both appliance and flue and by good boilerhouse ventilation.

It is suggested that for ground level and raised boilerhouses the total area for Ventilation and burner supply should be 3/5 square foot per gallon of oil per hour. This area should be disposed with 2/3 at low level and 1/3 at high level, in this way air movement will be promoted by natural convection.

For boilerhouse below ground level arrangements should be made to induce fresh air as necessary. Mechanical induction must not be allowed to affect the boilerhouse pressure, however, or the performance of the burner will suffer.

FLUE SYSTEM

The performance of burners firing pressurised appliances is not normally affected by the design of the system. The boilermaker's instructions relating to flue and chimney design should be followed carefully. The NU-WAY booklet "Flues and Chimneys" may be of assistance. This booklet and Appendix I should be studied when firing non-pressurised boilers.

BURNER INSTALLATION

It is customary for the burner to be fixed to the boiler when it is delivered to site by the boilermaker, when it is not so mounted follow the boilermaker's instructions. For installation to existing boilers see Appendix 1.

OIL SUPPLY SYSTEM

Residual oils must be available at the burner pump under all circumstances at a positive pressure of between 0.5 and 10lbs. per square inch, and at a temperature appropriate to the grade.

Oil supply temperatures must be maintained at the pump inlet as follows:-

Class F (960 secs R1)—110°-130°F (43-55°C)
Class E (220 secs R1)—50°-70°F (10-21°C)
— Engler and centistokes.

Sufficient thermostatically controlled tracing must be installed to maintain these temperatures during long standby periods. Gas oil (Class D) must be available at the same pressures but does not require heating. The size and type of pumps and oil pre-heater incorporated in the burner require an oil supply as specified above B.S. code of practice CP 3002 part 3. "Oil Firing Installations Burning pre-heating fuels classes E.F. and G Fuel oils and CT.F to 250" should be consulted together with the B.S.S. 799.

Pipes should be sized to allow for a flow equivalent to the swept volume of the pump, or pumps, and not the firing rate. (See Appendix 2). Except for Gas Oil Burners, when a single flexible pipe connection is provided all the other models are supplied with two flexible oil pipes connected to the burner. The pump flexible pipe must be connected to the filter outlet. The second flexible pipe, which discharges oil from the pump pressure regulating valve must be connected onto the main oil supply immediately before the filter (and after the stop valve which preceeds it).

Should an Air Locking problem subsequently arise, this second pipe may be re-arranged to return oil through suitably sized and traced steel pipe-work to the tank or to a 'vented' outflow heater arranged to accommodate it. For advice on this please contact your nearest Nu-Way Office.

ELECTRIC SUPPLY

'A' type oil burners incorporate relatively sophisticated controls, which, while they are designed to operate from a nominal voltage supply of 440 volts, 3 phase, 4 wire, nominal, and will function correctly at 10% above and 15% below these figures, will not accept voltages outside these ranges. It is advisable to check that the voltages, at peak periods, remain within the statutory limits

Burner wiring may now be carried out to the wiring diagrams supplied with the burner, or with the appliance, in accordance with the relevant British standards and I.E.E. regulations. Final electrical connections to the burner and to the thermostats or pressure switches should be in flexible conduit, these being arranged in such a way that they do not require disconnecting during burner maintenance.

PRE-COMMISSIONING

Before commissioning, the installation should be checked over to see that it is complete, that there is water in the boiler, that any flue dampers are locked in the fully open position, that all inspection plates are in position and that the oil and electricity connections have been fully tested. It is vital that the live and neutral wires are connected to their appropriate terminals as shown on the wiring diagrams. Reversal of these connections could present a hazard, also, the earth bonding must be checked by a "Megger". The burner should be inspected to make sure that it has suffered no damage during transit, storage or installation.

Check that the fuel to be burnt is of the same class as that for which the burner has been built and set. The symbol H in the burner model number on the nameplate signifies that the burner is suitable for either class E or class F fuels. If class F fuel is to be burnt check the setting of the preheater controlling thermostat (central stat). If this is below 220°F the burner has been prepared for class E fuel and the fuel preheater tank thermostat must be reset. (See under servicing). If class E fuel is to be burnt no action is required at this stage but the thermometer should be checked once the burner is operating, when the thermostat may be reset if necessary.

Check that the flexible oil pipes between the filter and pump are so arranged as to prevent twisting when the burner is hinged back and to limit the bend radius to 5" for a $\frac{1}{2}$" pipe and 7" for a $\frac{3}{4}$" pipe. Twisting can be checked by slackening one end of the pipe and holding it loosely so as to feel any twisting.

Make sure that oil is present at the outlet of the flexible supply pipe where it enters the pump.

BLEED PUMP MANUALLY THROUGH PUMP BLEED PORT UNTIL OIL FLOWS AIR FREE (PUMP SHOULD NOT BE ROTATED AUTOMATICALLY UNTIL OIL IS PRESENT OTHERWISE IT MAY SEIZE).

IT IS STRONGLY RECOMMENDED THAT A PIECE OF RAG IS PLACED OVER BLEED PORT TO PREVENT OIL RUNNING DOWN THE SIDE OF THE BURNER CASING.

The motors on these burners are normally three phase although single phase may be fitted on a specific request. Turn on the main switch and depress the burner motor contactor (where two

are fitted the motor contact is the one on the right). Check the motor rotation. The motor should rotate in an anti-clockwise direction as viewed from the cooling fan end. If the motor rotates clockwise interchange any two phases on the incoming mains supply and re-test.

ONLY TURN ON THE MAIN SWITCH FOR LONG ENOUGH TO CARRY OUT THIS TEST, FOR AT THIS STAGE IT IS NOT INTENDED TO PREPARE THE BURNER FOR FIRING.

The next task is to bleed the pump automatically. This operation tends to create a cascade of oil down the face of the pump, the surface of the air inlet housing and the damper mechanism. Unless precautions are taken, a quantity of oil will be sucked into the air inlet by the air stream when the fan is restarted, and will coat the fan and the interior of its casing with oil which will later pick up dirt. Slack off again the small bleed screw in the pressure gauge port plug, wait until air free oil flows, and make certain all oil valves are open. Turn on the main switch and again depress the motor contractor until oil flows in a steady stream from the pump bleed port. Wait until all air is purged and oil flows freely before tightening the bleed screw. If there is a large accumulation of air this operation may have to be repeated. Wipe the burner clean. After this the process is completed.

INITIAL AIR DAMPER SETTINGS

There are two damper designs in use, one employing a single blade (Mk. II), and the other two independent blades (Mk. I).

TWIN DAMPERS

Adjust the automatic damper stop, so the damper can completely close. Adjust its high flame stop so that it can move to the three-quarters open position. Adjust the fixed damper so it is about half open.

The air settings are provisionally factory set so that the manual low flame damper is $\frac{1}{4}$ open and the automatic high flame damper moves between the closed and the $\frac{1}{2}$ open position. These are not re-adjusted until the flame is present.

SINGLE DAMPERS

Adjust the damper low flame stop so that the damper can move to about $\frac{3}{8}$'' open. Adjust the high flame stop so that it can move to about three quarters open. There are three pressure or temperature sensing switches associated with the boiler.

COMMISSIONING

If there is a low flame hold switch, on the left hand side of the burner terminal box, turn this to the low flame position. If not, temporarily disconnect the live feed to the H/L thermostat from its connection in the burner terminal block. Insulate this wire. Turn on the main switch and wait until the oil preheater low oil temperature thermostat becomes satisfied by the hot oil (set approx. 50°F below control stat.).

The burner should light on low flame. Adjust the manual damper to give a clear, yet not sparky, flame when viewed through the boiler inspection window. If the manual damper, of a twin damper system, is found to pass insufficient air for low flame, the automatic damper may be opened slightly. Allow the burner and boiler to run until the boiler and flue system are at normal operating temperature. Check that the oil temperature averages about 220°F (104°C) for class F fuels. The appropriate temperature for class E fuel is 180°C (82°C). Check that the oil pressure is not below the required setting. View the flame through both the boiler inspection window, and the burner inspection window. When viewed through the latter, the flame should be clear, and the slots in the burner diffuser should be emitting a steady bright light. A continuous halo should be visible around the outer edge of the diffuser. Turn off the burner at the main switch. The flame should go out immediately, the oil pressure gauge falling to, or just above, zero.

Turn the low flame hold switch to Auto, or reconnect the H/L thermostat live feed. Turn on the main switch. The burner should start smoothly and after a period of about 18 seconds, change smoothly to high flame.

Adjust the high flame automatic damper stop, to produce a clear yet not sparky flame when viewed through the boiler inspection window. View the flame through the burner inspection window. The slots in the diffuser should again be emitting a steady bright light, and there

should still be a continuous halo of flame surrounding the outer edge of the diffuser. By means of the low flame hold switch, or by reducing the setting of the H/L control instrument, turn the burner to low flame and check that this operation takes place smoothly.

Run the burner on low, and on high flame, while taking CO2 and stack temperature readings at the smoke hood, or in the flue adjacent to it, as close to the boiler as possible. Care must be taken to ensure that there are no points at which air can leak into the system before the sampling point, otherwise the readings will be upset. Specific figures for CO2 on high, and low flame, and for smoke numbers may be included in the boiler manufacturers instructions. If not, the high flame CO2 should be within the band of 11% to 13% and the low flame about 1% lower than these figures. No guide can be given for the correct flue gas temperatures as these will depend upon the boiler concerned. Smoke readings should not exceed No. 5 on the Bacharach Scale under steady flow condition. Adjust the damper stops as necessary, and finally tighten all associated locking devices. Check the oil temperature average, and the oil pressures on both high and low flame.

Check for vibration and for oil leaks.

The H/L instrument, which determines the level at which the burner changes between high and low flame, is set at the low end of the working pressure or temperature band. The on/off instrument, which determines the level at which the burner starts and stops, is set at the high end of the band. The high limit instrument which acts as a safeguard, is set sufficiently far above the on/off instrument to elminate tripping on overswing of temperature or pressure, yet will shut the burner down before overheating can occur.
Set all these instruments. If the burner is to be operated on a low flame start system the H/L instrument is not present the appropriate burner terminals being linked.

SAFETY CHECKS

Remove the photo electric cell from its holder and cover this whilst the burner is running. The burner should stop firing within 2 seconds. The control re-cycle and attempt to re-start the burner. As the photo electric cell cannot see light, the control will go to lockout shortly after the flame appears.

Notes: With certain control boxes the fan will continue to run during the re-cycling period before the re-start attempt.

Expose the cell to strong light. Press the re-set button and allow the control to re-cycle. No attempt to re-start should occur until the cell is replaced in its hold. The burner should then re-start normally.

OPERATIONAL TEST OF CONTROLLING INSTRUMENTS

Run the burner continuously. The burner should change to low flame at the temperature or pressure desired. If not, adjust the High/Low instrument setting. Do not isolate the boiler from all load. Check the level at which the burner shuts down. If this is not satsifactory adjust the on/off instrument setting. Finally check the limit instrument in the same way by temporarily raising the set point of the on/off instrument to above that of the limit. Check that the high limit warning light — if fitted — lights when the burner shuts down. Adjust the setting of this instrument as necessary and reset the on/off instrument to the original level.

APPENDIX 1

Series "A" Burner Variants. Small 'A' burners may be required to fire low resistance appliances on an on/off cycle. These burners have fixed air dampers and both the low pressure regulating valve and its associated magnetic valve are absent.
Any Series 'A' burner may be operated on a low flame start cycle by linking the terminals associated with the H/L control instrument. The burner then lights up on low flame, changes to high flame almost immediately and, when the control instrument is satisfied, shuts down.

Firing into Combustion Spaces which are under Negative Pressure

It is possible that such appliances are not completely sealed against air leakage inwards from the surroundings. Such leaks will not be apparent but will dilute the products of combustion and lead to false CO2 readings. Efficiency calculations from these readings will be correct, but the flame will be burning with less air than intended and the smoke number will be high. If at all possible reduce the draught so that the combustion space is under a slight positive pressure. This can be done by opening clean-

out doors on the stack or partially closing the boiler damper. The C02 will rise considerably if air leaks are present, but only fractionally if they were not. Leaks should be located and sealed as far as possible and further test taken.

Firing Old Boilers and Air Heaters

The appliance should be inspected and passed by an expert before the burner is fitted. A change in the pattern of firing may well produce new stresses which an old appliance in poor condition cannot stand.

CAPACITY OF PUMPS, FOR OIL SUPPLY PIPE SIZING

Burner Model	Pump Model No.	Capacity (Imperial gallons per hour)
A0L	1LG1RK7	20
A0H	1LM1RK7	20
A1L	2LG1RK7	45
A1H	2LM1RK7	45
A2L	3LG1RK7	65
A2H	2LM1RK7	45

APPENDIX 2

Firing Rates—Nozzle Marking and Fuel Pressure

Each grade of fuel is heated to a temperature sufficient to reduce its viscosity to a level suitable for good atomisation. At these temperatures the pressure/flow characteristics can, for practical purposes, be considered the same for all grades of fuel.

The fuel flow through a simplex nozzle varies as the square root of the pressure. Every nozzle is calibrated in U.S. gallons at a fuel pressure of 100 p.s.i. The following table shows the factors corresponding to different pressures, by which the nozzle marking must be multiplied to obtain the firing rate in Imperial gallons per hour.

Pressure (p.s.i.)	Firing Rate Factor	Remarks
100	0.84	Nominal—not to be used on 'A' burners
175	1.1	
200	1.18	
225	1.25	
250	1.32	
275	1.38	All grades of fuel and all nozzle sizes
300	1.44	
325	1.5	
350	1.56	
375	1.61	
400	1.67	

The turndown of the burner is given by the high flame firing rate divided by the low flame firing rate.

Example.

(1) 1 x 10 gallon (U.S. marking) nozzle on an A1 burner will have approximate capacity at a low flame pressure of 225 p.s.i. of 10 x 1.25 equals 12.5 Imperial gallons per hour, and a high flame capacity at 350 p.s.i. of 10 x 1.56 equals 15.6 Imperial gallons per hour. The turndown range will be 15.6 divided by 12.5 = 1.25:1.

Example.

(2) An A2 burner fitted with two 10 gallon (U.S. marking) nozzles operating at 300 p.s.i. will have a low flame firing rate of 10 x 1.44 equals 14.4 Imperial gallons per hour, and a high flame firing rate of 20 x 1.44 equals 28.8 Imperial gallons per hour. The turndown range will be 28.8 divided by 14.4 = 2:1.

OPERATING OIL PRESSURES

Pressure variation systems: Low flame 200 p.s.i. High flame 300 to 400 p.s.i., depending upon nozzle throughput.

Constant pressure systems: 300 p.s.i.

OEM

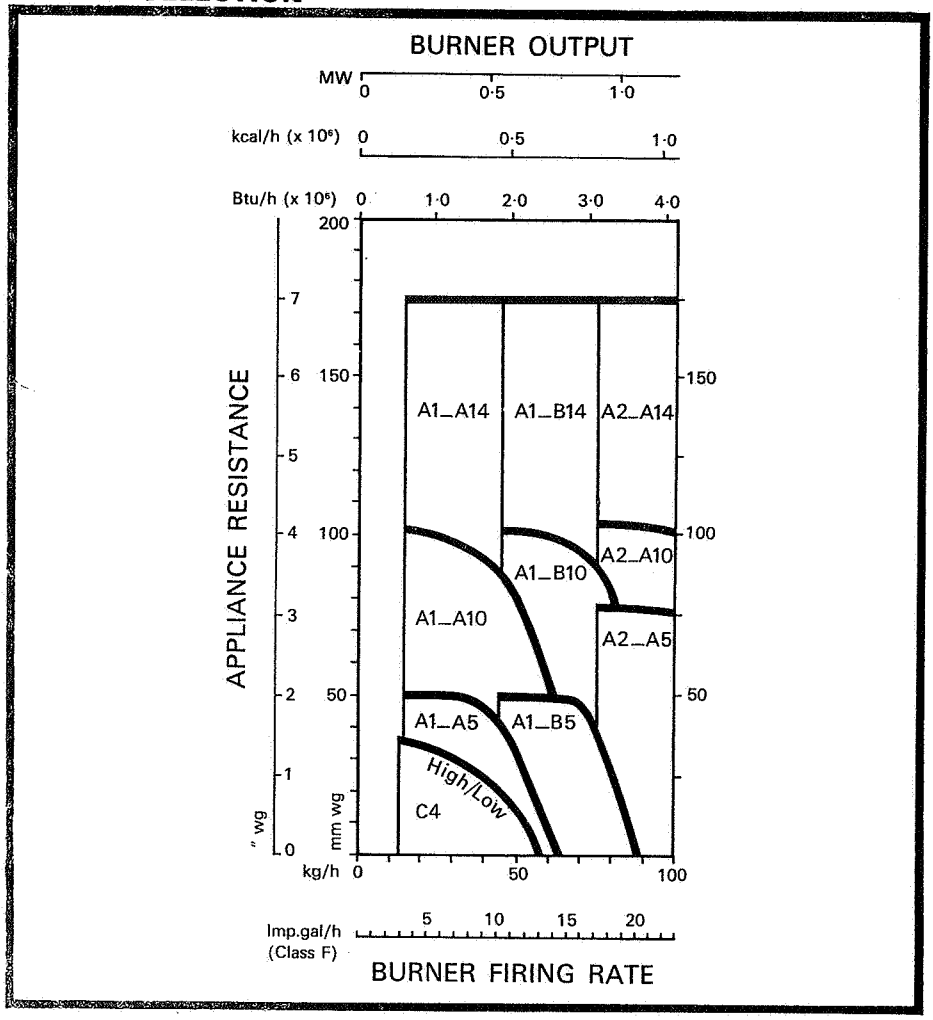
All models for operation on light distillate oils have a constant pressure oil system and are equipped for High-Low operation which is effected through twin atomising nozzles. The turn down available on these models is 2:1 and the set fuel pump pressure is 300 PSI.

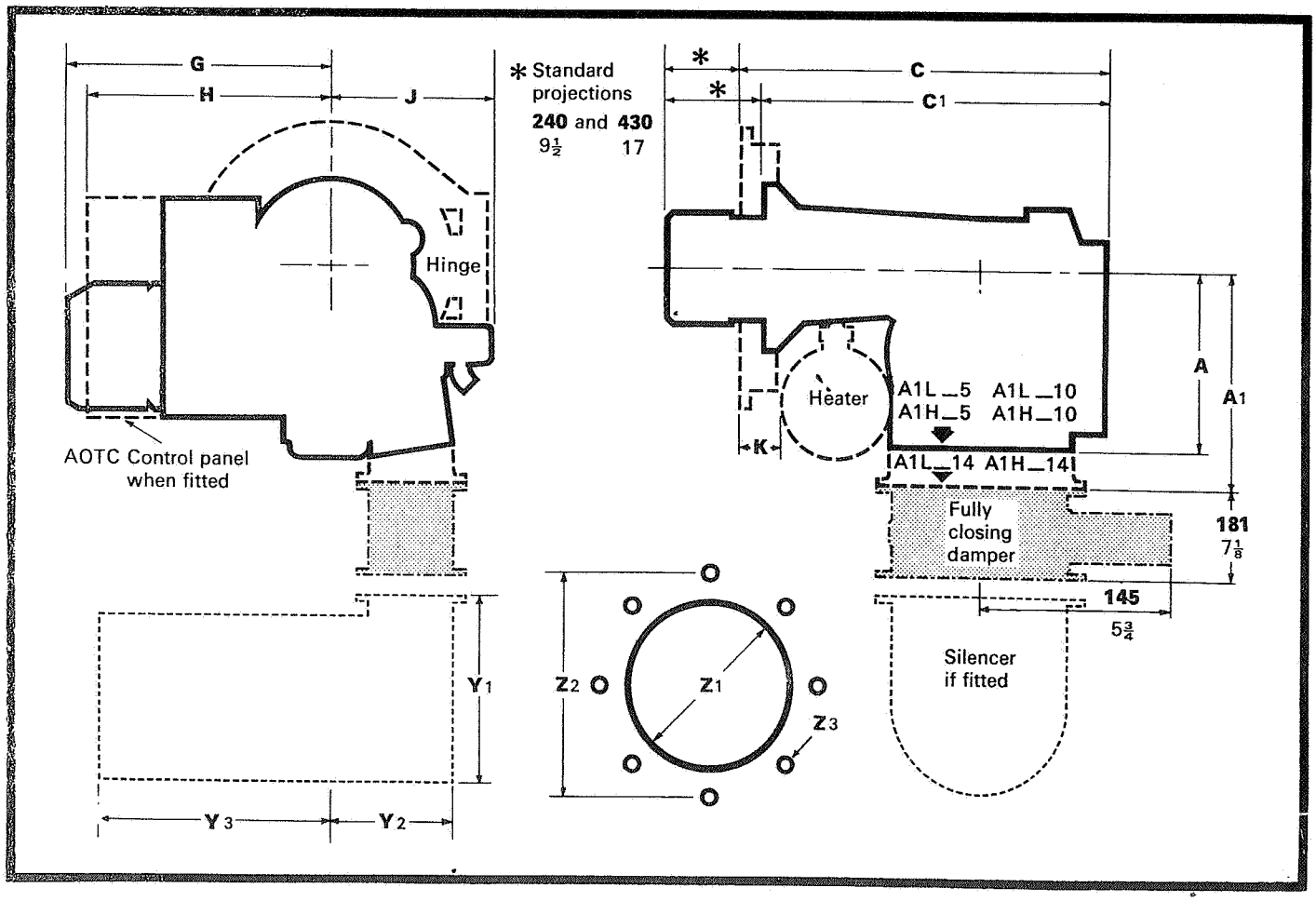
Series 'A' models offered for operation on medium and heavy fuel oils are equipped with the following oil systems :–
Models A0, A1A5 and 10. Pressure variation single atomising nozzle. Models A1B5 and 10. Pressure variation twin atomising nozzles. Models A2, all constant pressure with twin atomising nozzles.

All burners offered incorporate High-Low operation. The turn down available on these models is:- pressure variation 1.5:1 constant pressure 2:1.

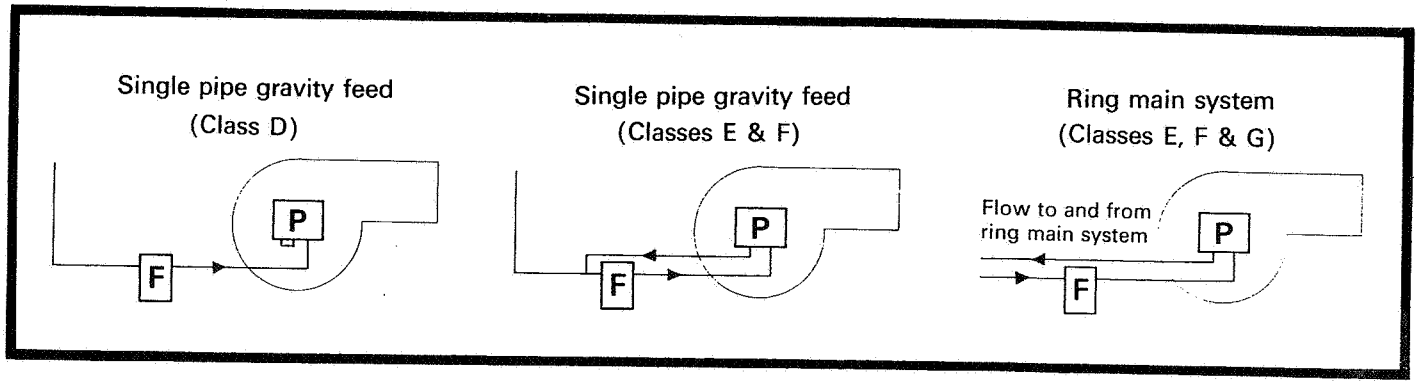
All burners are supplied as standard for a single pipe system with a positive oil pressure requirement at the pump inlet of from 0.25 to 9 PSI (maximum). Suction lift systems for gas oil burners may be used if required. Oil temperature at fuel pump inlet on heavy oil burners is:
220 seconds— 05– 60°F.
960 seconds—110–120°F.

BURNER SELECTION





FUEL SYSTEMS



ELECTRICAL DATA

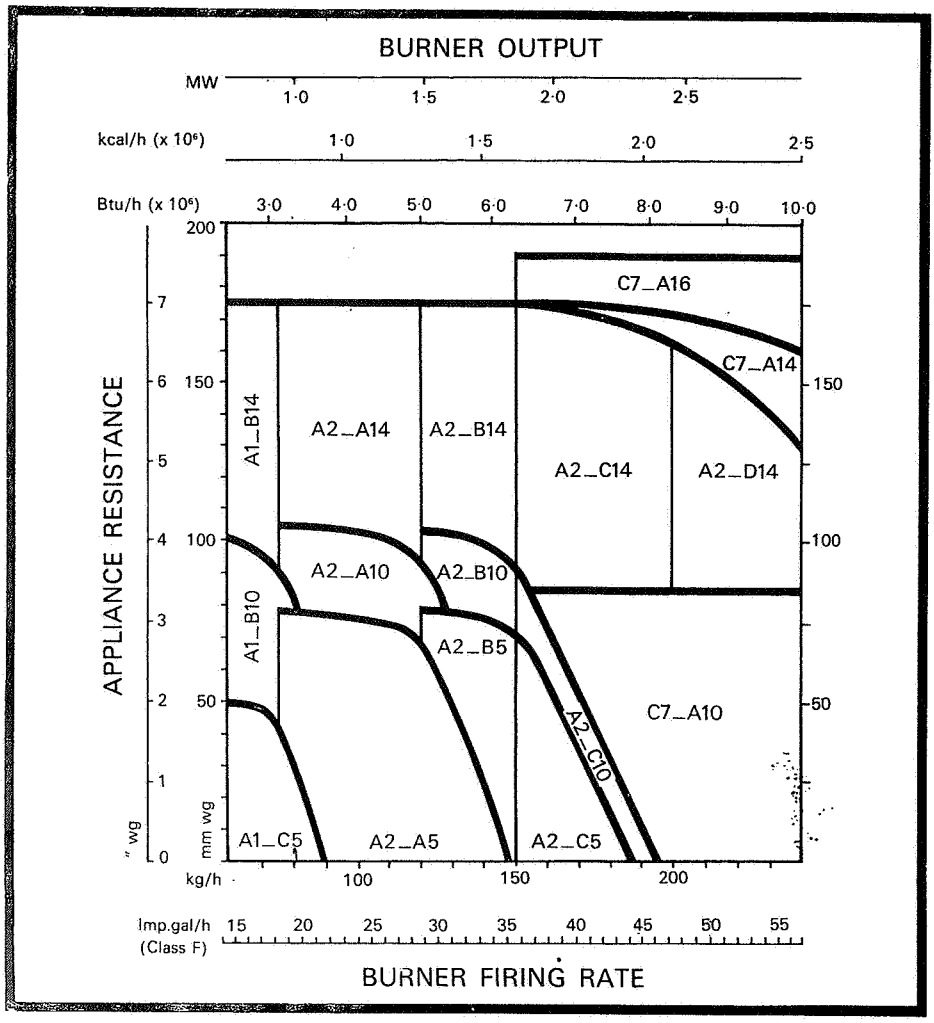
Burner Model	BURNER WITHOUT PRE-HEATER						BURNER WITH PRE-HEATER		
	Motor		Start current A/phase	Run current A/phase	Cable size (mm^2)	HRC fuse (A)	Pre-heater (kW)	Cable size (mm^2)	HRC fuse (A)
	hp	kW							
A1–A5	1·5	1·1	15	2·5	1·0	10	3	1·5	15
10	3·0	2·2	25	4·6	1·5	15	3	1·5	15
14	4·0	3·0	35	6·1	1·5	20	3	2·5	20
A1–B5	1·5	1·1	15	2·5	1·0	10	$4\frac{1}{2}$	1·5	15
10	3·0	2·2	25	4·6	1·5	15	$4\frac{1}{2}$	2·5	20
14	4·0	3·0	35	6·1	1·5	20	$4\frac{1}{2}$	2·5	20
A1–C5	2·0	1·5	18	3·4	1·0	15	6	2·5	20

All data calculated at 415 volts. All motors are 2 pole, 2800 rpm.

DIMENSIONS

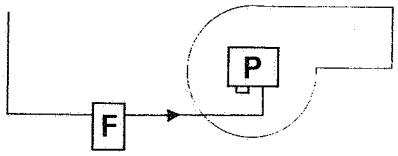
Model	A	A1	C	C1	G	H	J	K	Y1	Y2	Y3	Z1	Z2	Z3	Weight lb	Weight kg
A1LA5 B5 C5	$12\frac{3}{8}$ 314			22 560	$13\frac{7}{8}$ 352 $13\frac{7}{8}$ 352 $15\frac{3}{4}$ 400	20 508	$11\frac{7}{8}$ 300		12 305	$8\frac{1}{2}$ 216	$11\frac{3}{4}$ 299	9 230	10 254	$\frac{3}{8}$ 10	167	76
A1LA10 B10	$15\frac{1}{4}$ 387			27 686	$16\frac{5}{8}$ 422 $16\frac{1}{2}$ 420	20 508	$11\frac{3}{4}$ 299		$14\frac{3}{8}$ 365	$8\frac{1}{2}$ 216	$11\frac{3}{4}$ 299	9 230	12 305	$\frac{3}{8}$ 10	218	99·1
A1LA14 B14		$18\frac{7}{8}$ 480		29 737	17 432	20 508	$13\frac{3}{4}$ 350		15 381	$10\frac{1}{4}$ 260	$18\frac{3}{4}$ 476	9 230	12 305	$\frac{3}{8}$ 10	248	113
A1HA5 B5 C5	$12\frac{3}{8}$ 314		$24\frac{1}{4}$ 616		$13\frac{7}{8}$ 352 $13\frac{7}{8}$ 352 $15\frac{3}{4}$ 400	$19\frac{1}{4}$ 490	$11\frac{7}{16}$ 300	3 76	12 305	$8\frac{1}{2}$ 216	$11\frac{3}{4}$ 299	9 230	12 305	$\frac{3}{8}$ 10	262	115
A1HA10 B10	$15\frac{1}{4}$ 387		$29\frac{1}{4}$ 743		$16\frac{5}{8}$ 422 $16\frac{1}{2}$ 420	$19\frac{1}{4}$ 490	$11\frac{3}{4}$ 299	$5\frac{1}{4}$ 133	$14\frac{3}{8}$ 365	$8\frac{1}{2}$ 216	$11\frac{3}{4}$ 299	9 230	12 305	$\frac{3}{8}$ 10	320	146
A1HA14 B14		$18\frac{7}{8}$ 480	$31\frac{1}{8}$ 790		17 432	20 508	$13\frac{3}{4}$ 350	$5\frac{1}{8}$ 130	15 381	$10\frac{1}{4}$ 216	$18\frac{3}{4}$ 476	9 230	12 305	$\frac{3}{8}$ 10	400	182

BURNER SELECTION

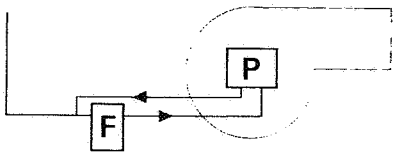


FUEL SYSTEMS

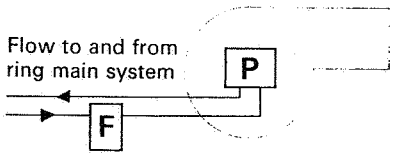
Single pipe gravity feed (Class D)

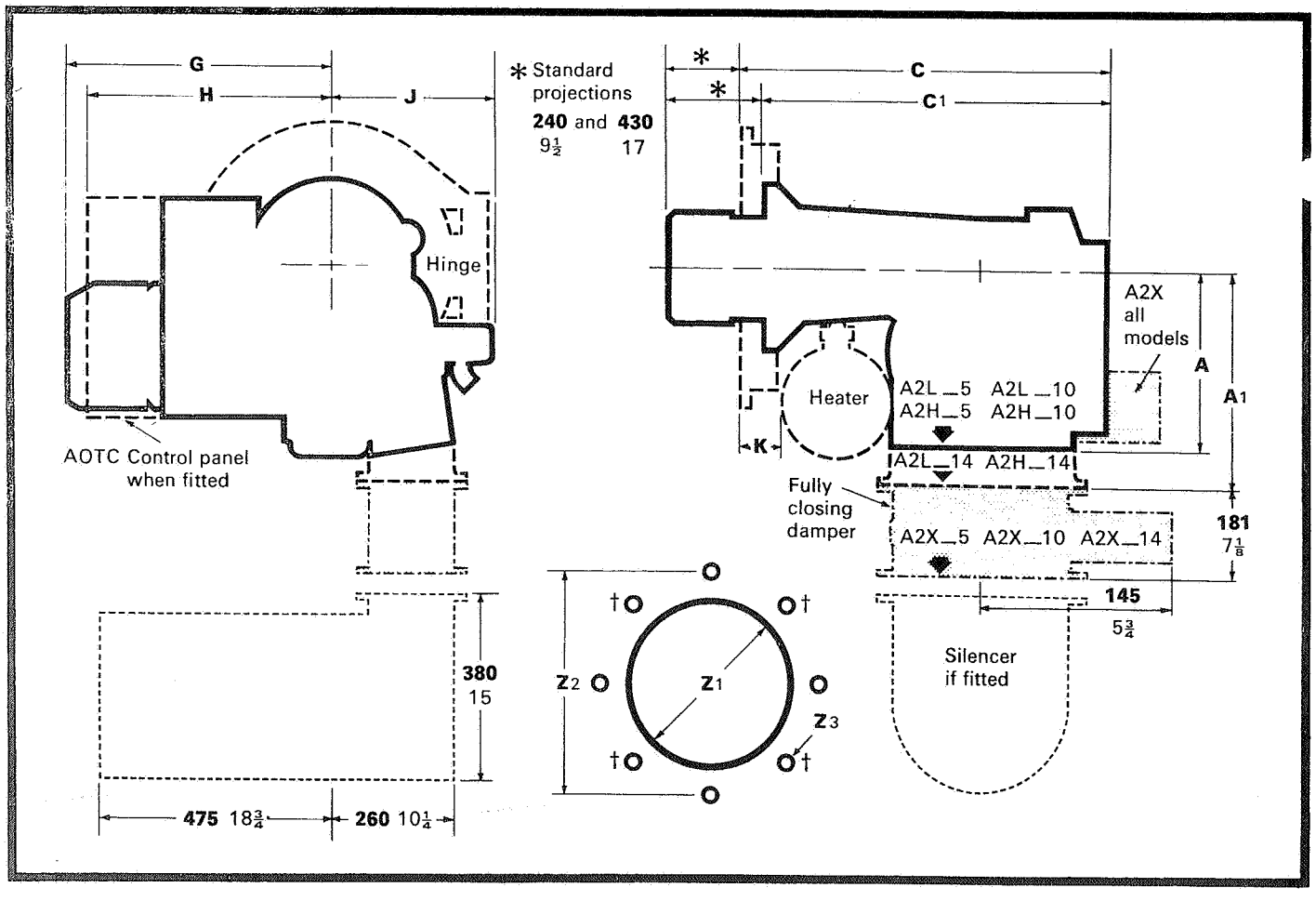


Single pipe gravity feed (Classes E & F)



Ring main system (Classes E, F & G)





ELECTRICAL DATA

Burner Model	BURNER WITHOUT PRE-HEATER						BURNER WITH PRE-HEATER		
	Motor		Start current A/phase	Run current A/phase	Cable size (mm^2)	HRC fuse (A)	Pre-heater (kW)	Cable size (mm^2)	HRC fuse (A)
	hp	kW							
A2–A5	3·0	2·2	25	4·6	1·5	15	6	2·5	25
10	4·0	3·0	35	6·1	1·5	20	6	4	30
14	5·5	4·0	45	8·0	2·5	25	6	4	30
A2–B5	4·0	3·0	35	6·1	1·5	20	6	4	30
10	5·5	4·0	45	8·0	2·5	25	6	4	30
14	5·5	4·0	45	8·0	2·5	25	6	4	30
A2–C5	4·0	3·0	35	6·1	1·5	20	7·5	4	30
10	5·5	4·0	45	8·0	2·5	25	7·5	4	40
14	7·5	5·5	40	11·5	2·5	20	7·5	6	30
A2–D14	10	7·5	60	14·4	4	25	9	10	40

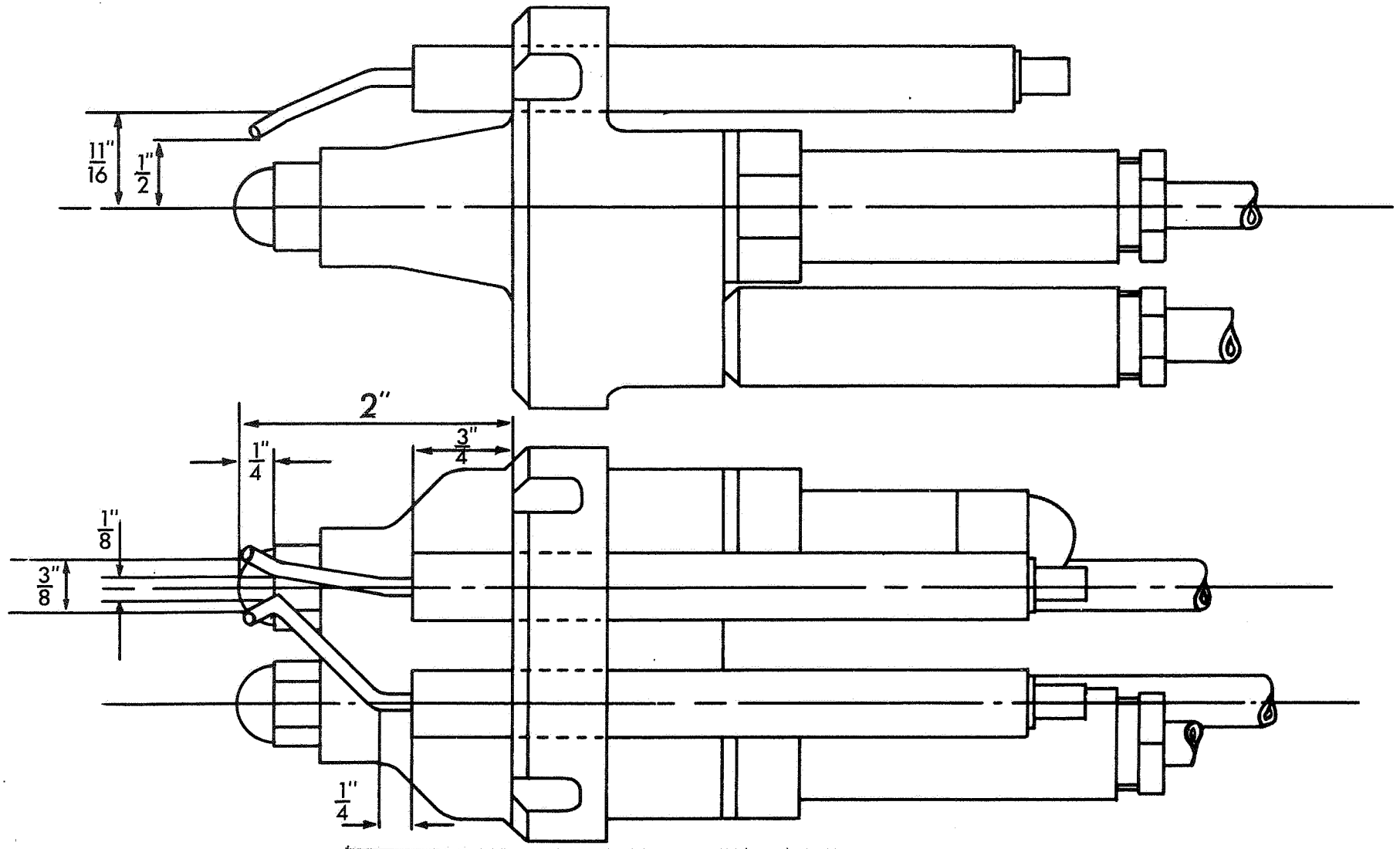
All data calculated at 415 volts. All motors are 2 pole, 2800 rpm.

DIMENSIONS

Model		A	A1	C	C1	G	H	J	K	Z1	Z2	Z3	Weight lb	Weight kg
	A2LA5					$16\frac{1}{2}$ 420				10 254				
	B5	$15\frac{1}{4}$ 387			27 686	$17\frac{7}{8}$ 454	20 508	$13\frac{1}{4}$ 337		10 254	12 305	$\frac{3}{8}$ 10	208	94·5
	C5					$17\frac{7}{8}$ 454				11 280				
	A2LA10					$17\frac{7}{8}$ 454				10 254				
	B10	$15\frac{1}{4}$ 387			27 686	$18\frac{7}{8}$ 480	20 508	$13\frac{1}{4}$ 337		10 254	12 305	$\frac{3}{8}$ 10	212	96·4
	C10					$18\frac{7}{8}$ 480				11 280				
	A2LA14					18 457				10 254	12 305	$\frac{3}{8}$ 10	248	113
	B14					$18\frac{3}{4}$ 476				10 254	12 305	$\frac{3}{8}$ 10	248	113
	C14		$18\frac{7}{8}$ 480		29 737	$21\frac{1}{8}$ 537	20 508	$13\frac{3}{4}$ 350		11 280		10	285	129
	D14					$21\frac{1}{8}$ 537				13 330	454	$\frac{3}{4}$ 20	285	129
A2XA5*	A2HA5					$16\frac{1}{2}$ 420				10 254				
B5	B5	$15\frac{1}{4}$ 387		$29\frac{1}{4}$ 743		$17\frac{7}{8}$ 454	$19\frac{1}{4}$ 490	$13\frac{1}{4}$ 337	$5\frac{1}{4}$ 134	10 254	12 305	$\frac{3}{8}$ 10	316	144
C5	C5					$17\frac{7}{8}$ 454				11 280				
A2XA10*	A2HA10					$17\frac{7}{8}$ 454				10 254				
B10	B10	$15\frac{1}{4}$ 387		$29\frac{1}{4}$ 743		$18\frac{7}{8}$ 480	$19\frac{1}{4}$ 490	$13\frac{1}{4}$ 337	$5\frac{1}{4}$ 134	10 254	12 305	$\frac{3}{8}$ 10	336	153
C10	C10					$18\frac{7}{8}$ 480				11 280				
A2XA14*	A2HA14			$31\frac{1}{8}$ 790		18 457		$13\frac{3}{4}$ 350	$5\frac{1}{8}$ 130	10 254	12 305	$\frac{3}{8}$ 10	336	153
B14	B14			$31\frac{1}{8}$ 790		$18\frac{3}{4}$ 478		$13\frac{3}{4}$ 350	$5\frac{1}{8}$ 130	10 254	12 305	$\frac{3}{8}$ 10	336	153
C14	C14		$18\frac{7}{8}$ 480	30 762		$21\frac{1}{8}$ 537	20 508	$14\frac{3}{8}$ 365	$5\frac{1}{8}$ 130	13 330	454	$\frac{3}{4}$ 20	403	182
D14	D14			30 762		$21\frac{1}{8}$ 537		$14\frac{3}{8}$ 365	$3\frac{1}{4}$ 83	13 330	$17\frac{1}{2}$ 454	$\frac{3}{4}$ 20	412	187

** For the weight of the A2X burner, add 29 lb (13 kg) to that of the A2H.*

NU-WAY HEATING PLANTS LTD. DROITWICH



NOTE:– ENDS OF ELECTRODES TO BE IN LINE WITH ENDS OF NOZZLES AS SHOWN.

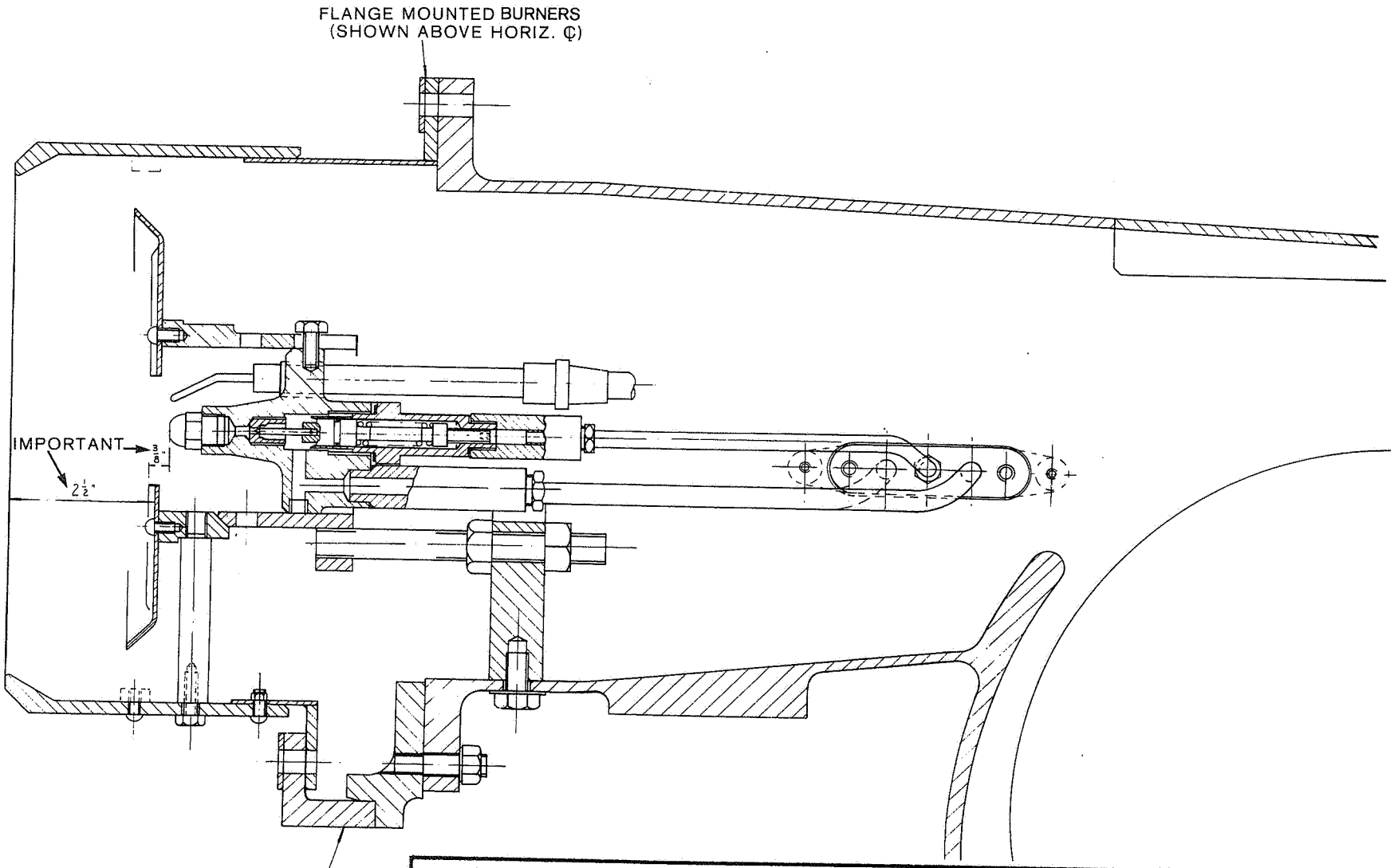
E. & O.E.

ELECTRODE SHAPE FOR 'A' BURNERS

DRAWING No. E. 9872

NU-WAY HEATING PLANTS LTD.

DROITWICH



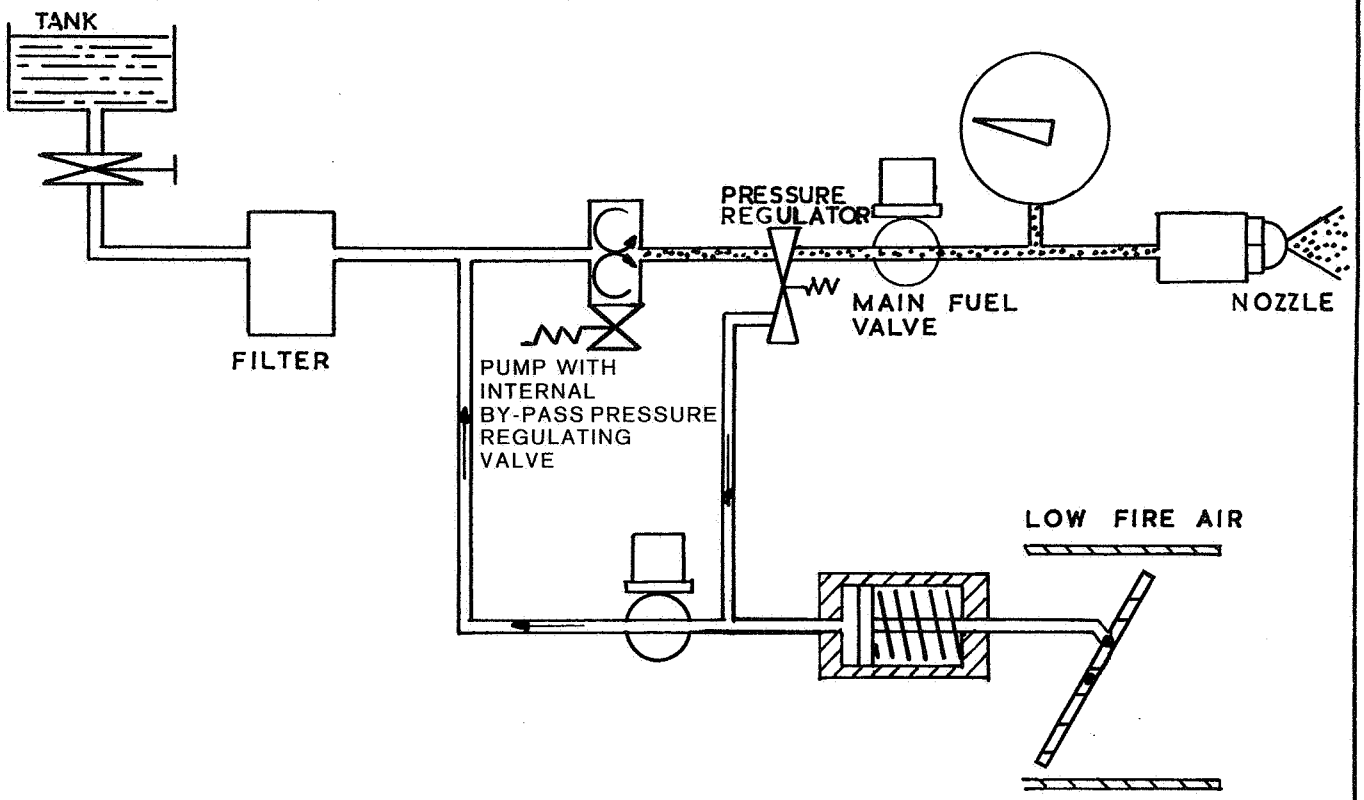
TITLE:

LONGITUDINAL CROSS SECTION OF MK 2 "A" BURNERS CONST. PRESS VERSION.

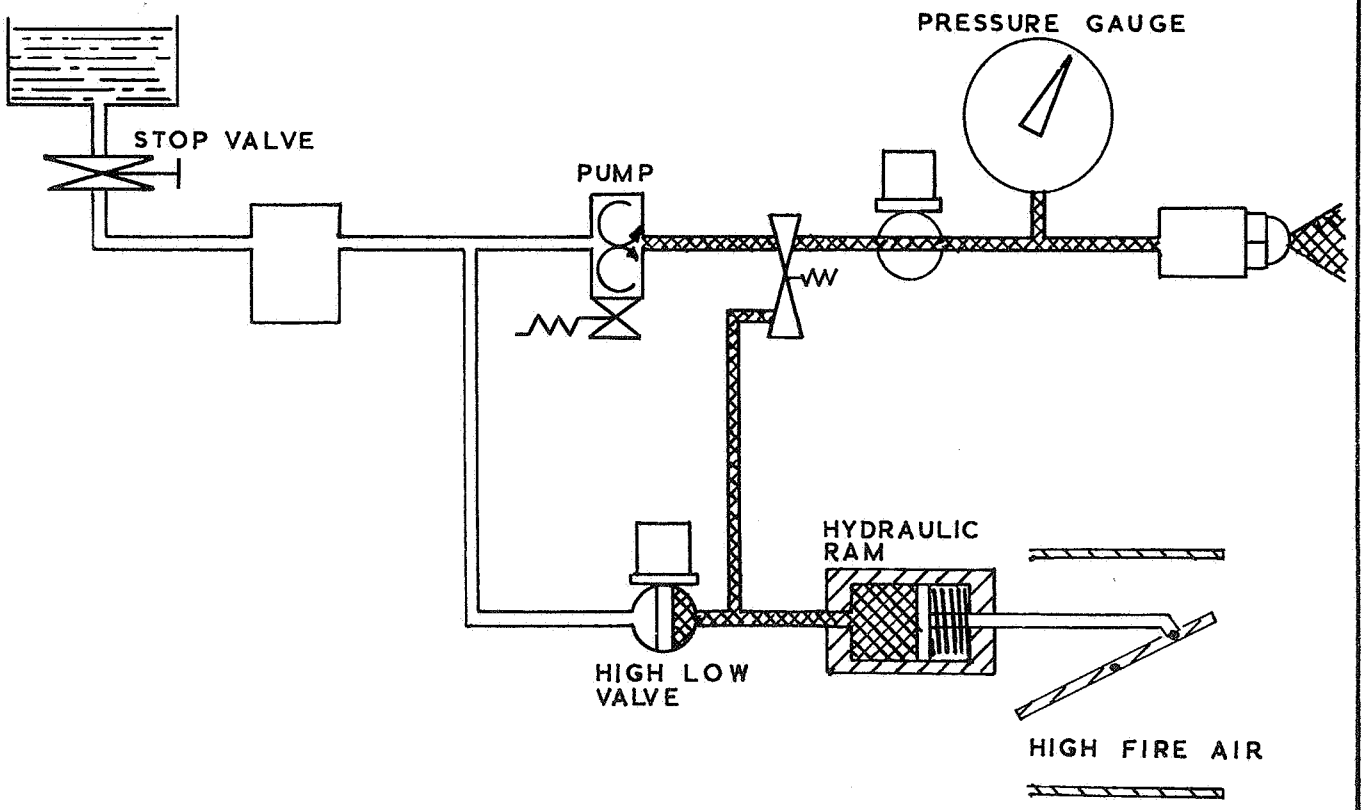
NU-WAY HEATING PLANTS LTD. DROITWICH.

NU-WAY HEATING PLANTS LTD. DROITWICH.

E.&O.E.



LOW FIRE MEDIUM PRESSURE



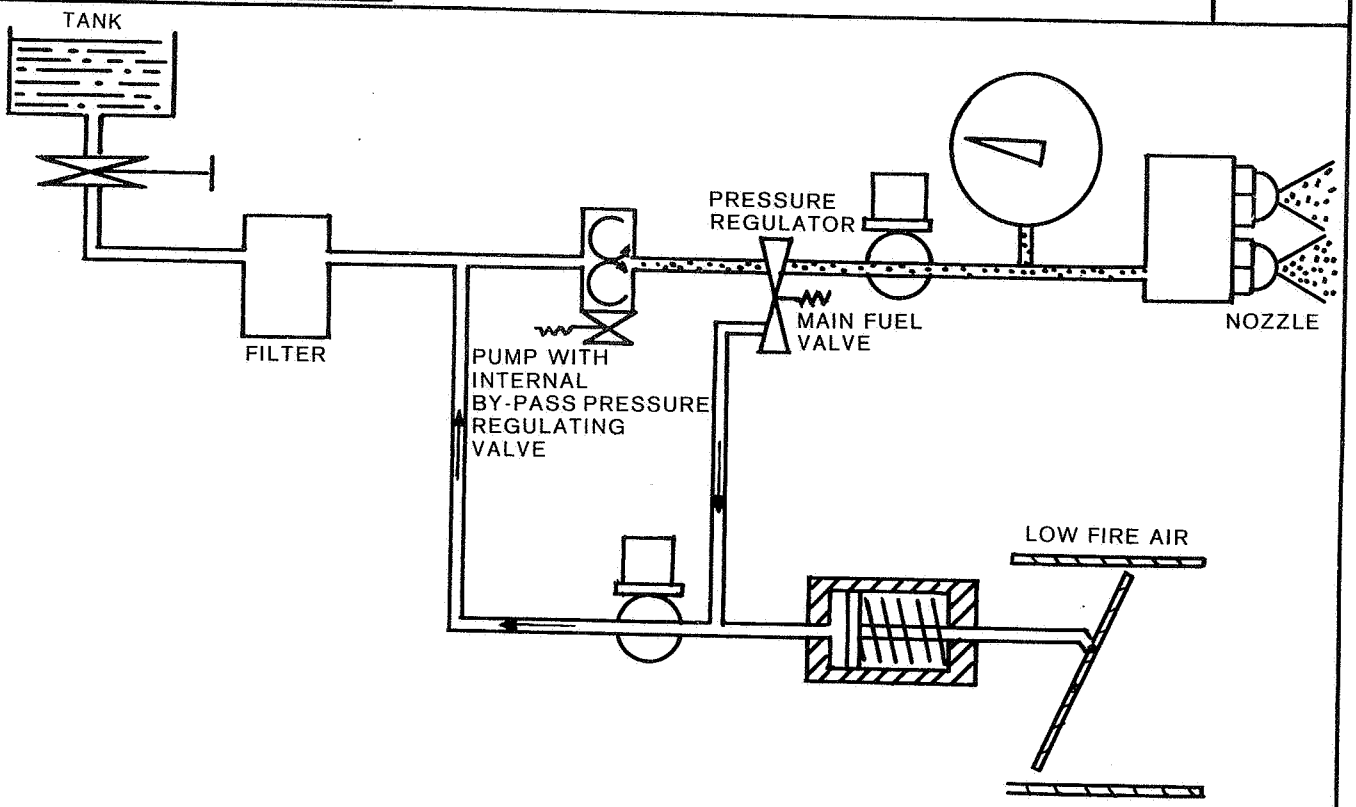
HIGH FIRE HIGH PRESSURE

TITLE: OIL CIRCULATION FOR HIGH/LOW LIGHT OIL "A" BURNERS.
35 SEC. ONE PIPE SYSTEM

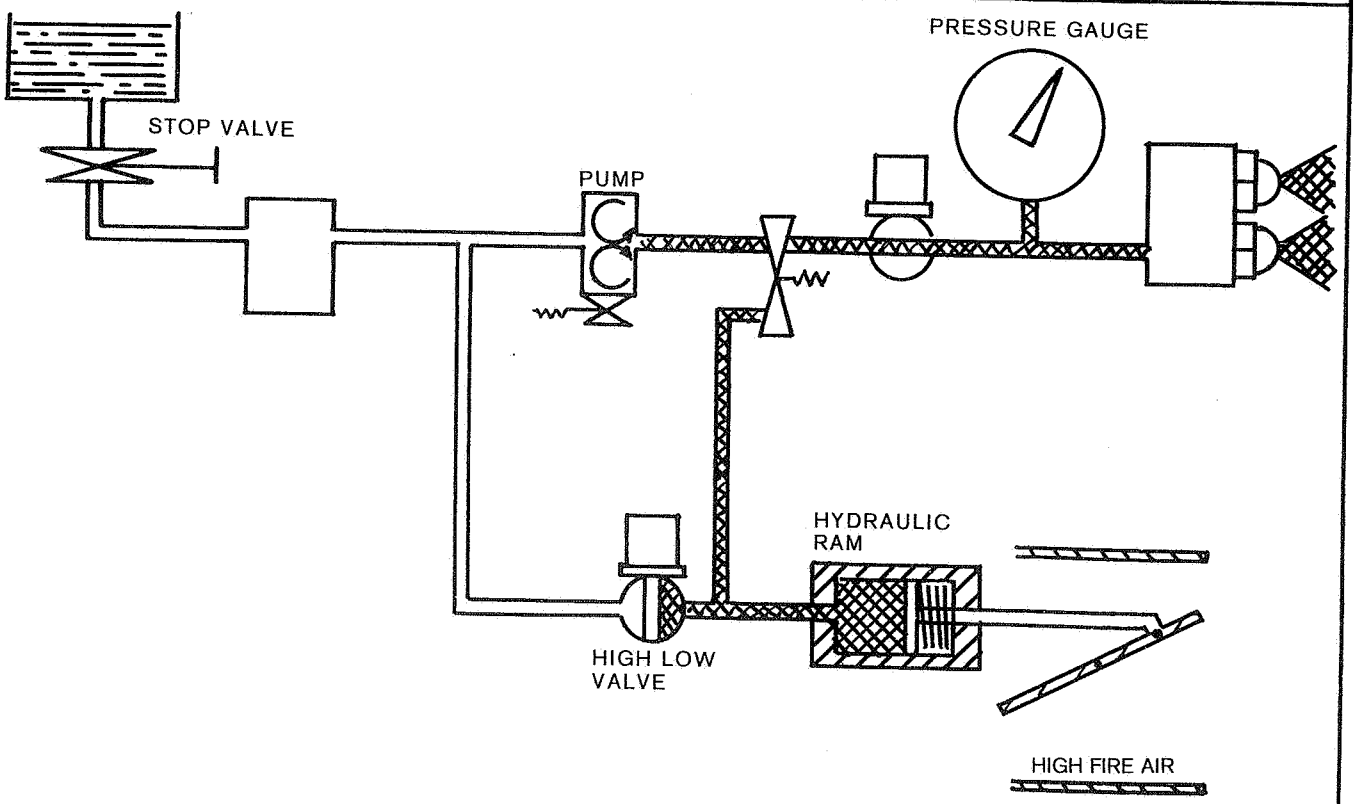
DRAWING No.
E 9553/1

NU-WAY HEATING PLANTS LTD. DROITWICH.

E. & O.E.



LOW FIRE MEDIUM PRESSURE

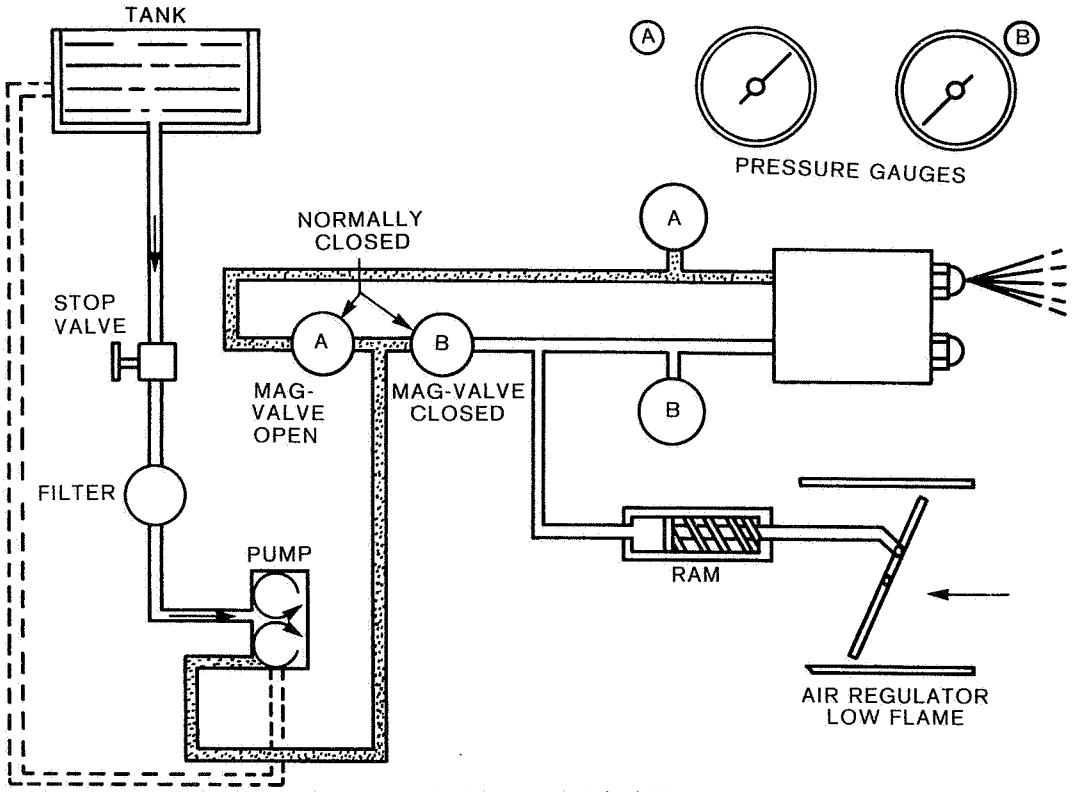


HIGH FIRE HIGH PRESSURE

TITLE: OIL CIRCULATION FOR HIGH/LOW LIGHT OIL "A" BURNERS. (2 NOZZLE) 35 SEC. ONE PIPE SYSTEM

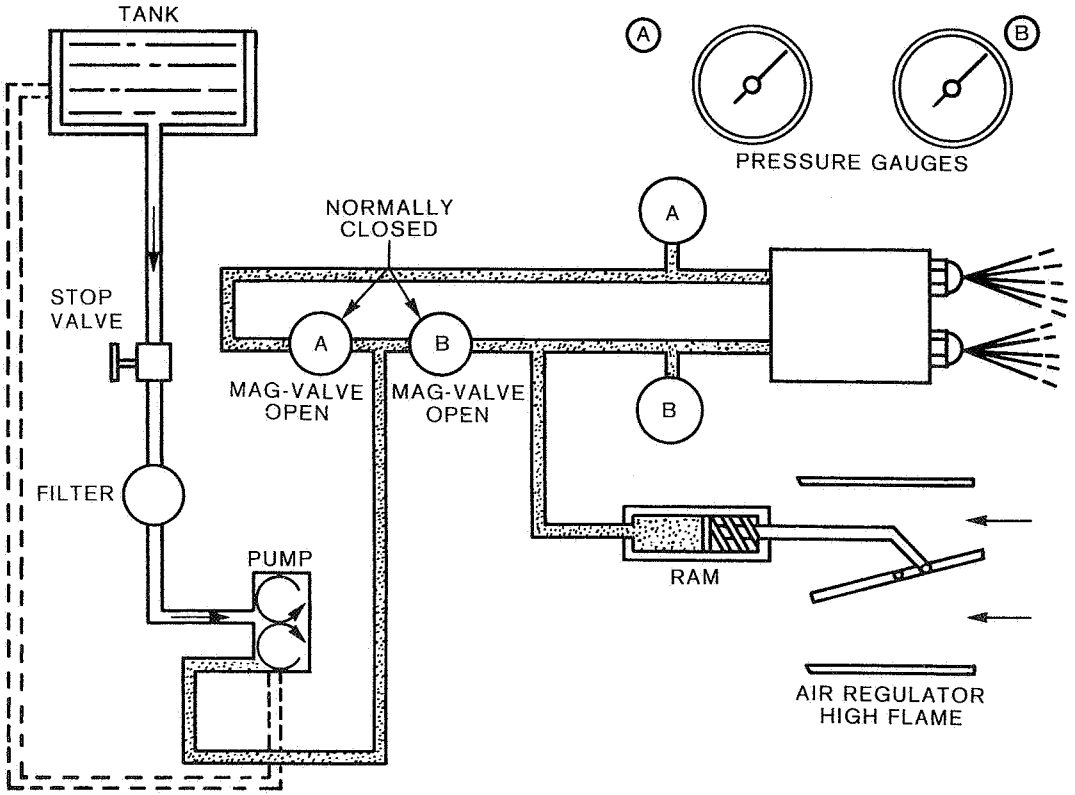
DRAWING No. E 9998

NU-WAY HEATING PLANTS LTD. DROITWICH.



THIS LINE REQUIRED ON TWO PIPE SUCTION LIFT SYSTEM
(WITH PUMP INSTALLED TO MANUFACTURES INSTRUCTIONS)

LOW FLAME (OPERATING PRESSURE=300 O.S.I.)



THIS LINE REQUIRED ON TWO PIPE SUCTION LIFT SYSTEM
(WITH PUMP INSTALLED TO MANUFACTURERS INSTRUCTIONS)

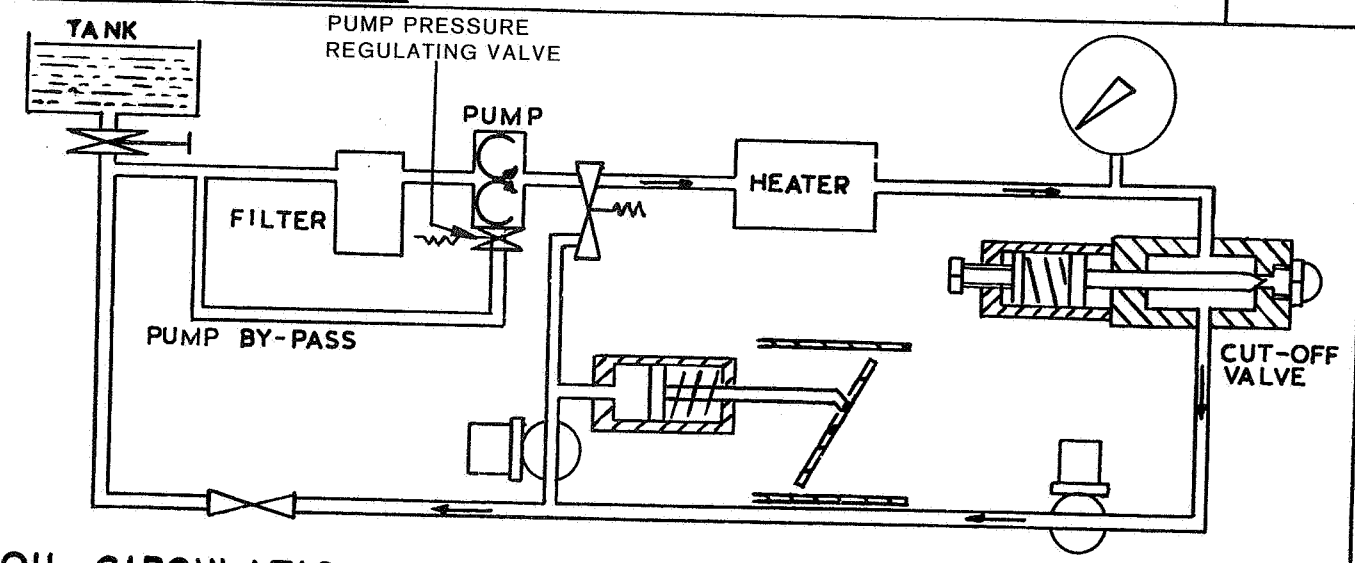
HIGH FLAME (OPERATING PRESSURE=300 P.S.I.)

TITLE:
OIL CIRCULATION FOR 'A' TYPE BURNERS FOR HIGH/LOW

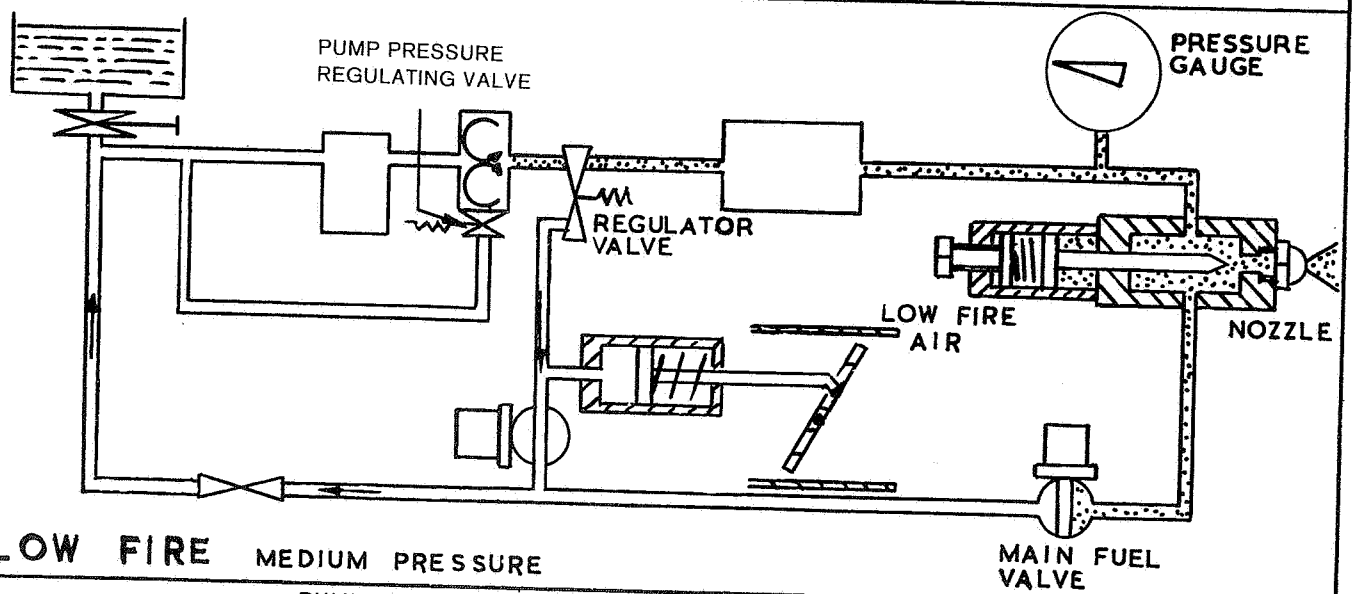
DRAWING No.
XS 8006

NU-WAY HEATING PLANTS LTD. DROITWICH.

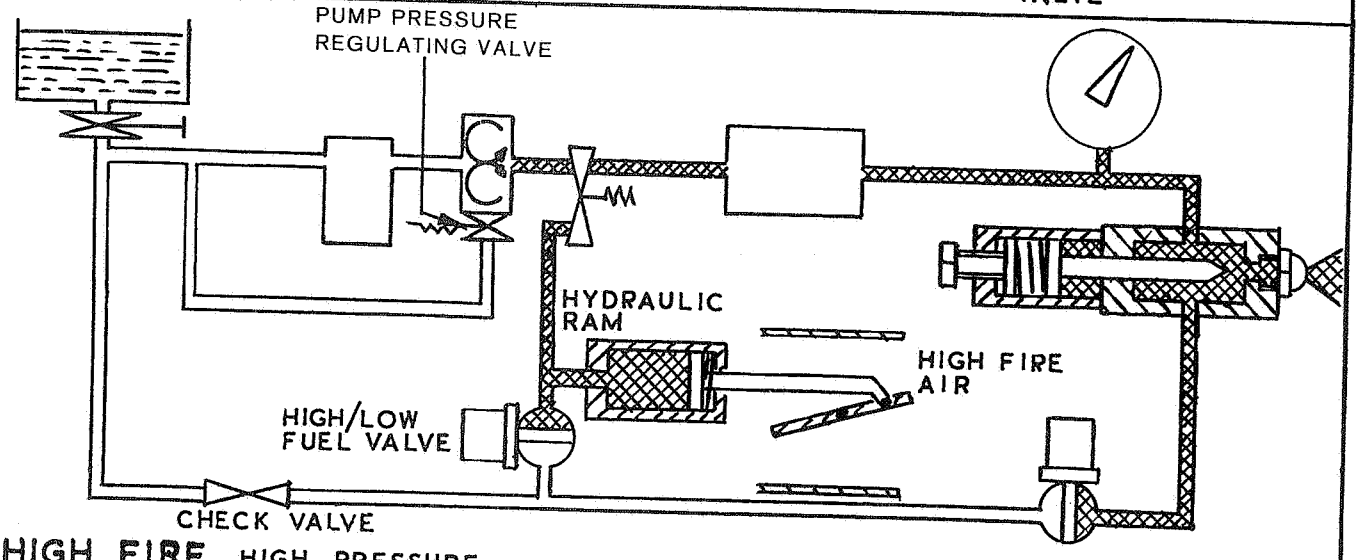
E. & O.E.



OIL CIRCULATION LOW PRESSURE



LOW FIRE MEDIUM PRESSURE



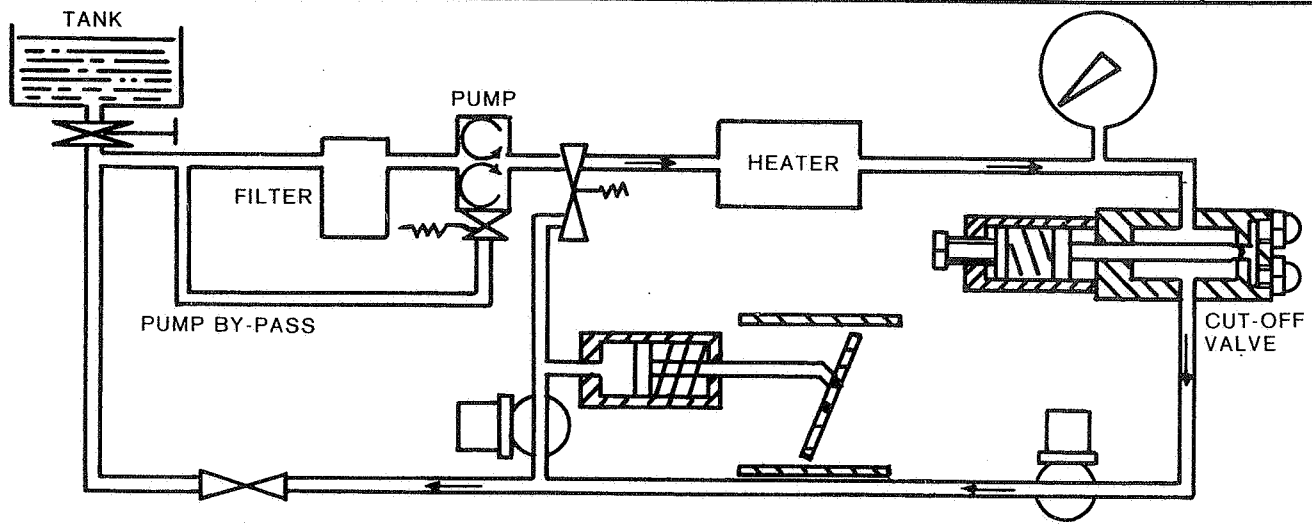
HIGH FIRE HIGH PRESSURE

TITLE: OIL CIRCULATION FOR HIGH/LOW FUEL OIL "A" BURNERS. 200-960 SEC. ONE PIPE SYSTEM

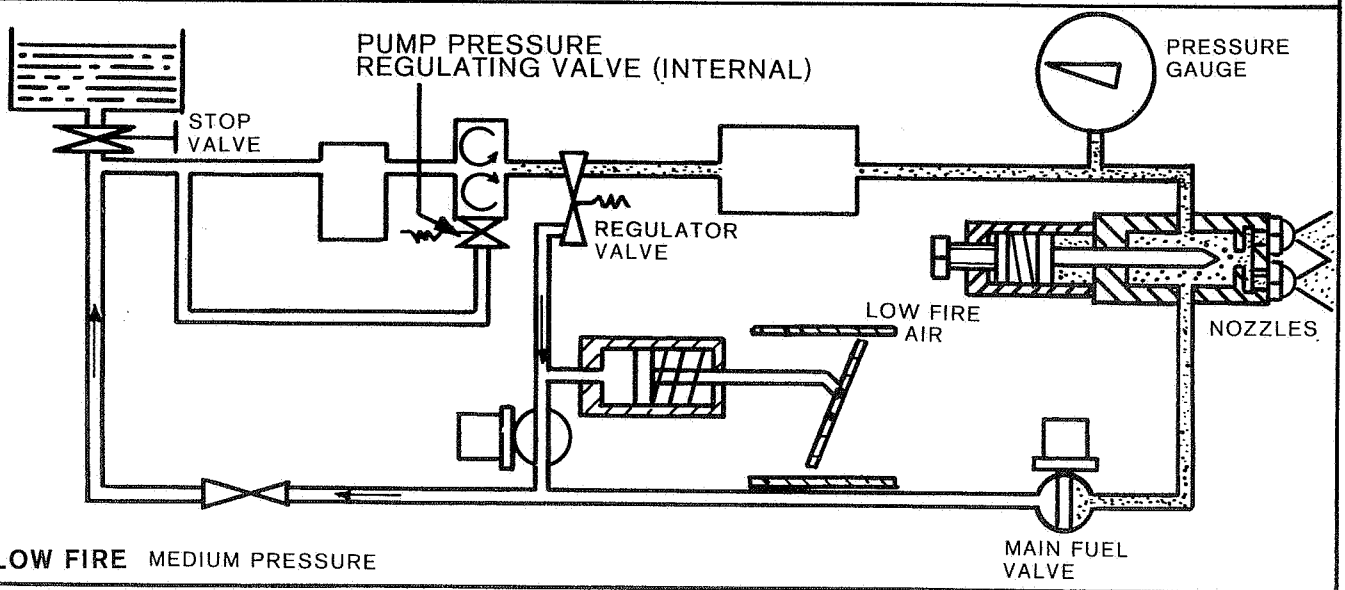
DRAWING No. E 9554/1

NU-WAY HEATING PLANTS LTD. DROITWICH.

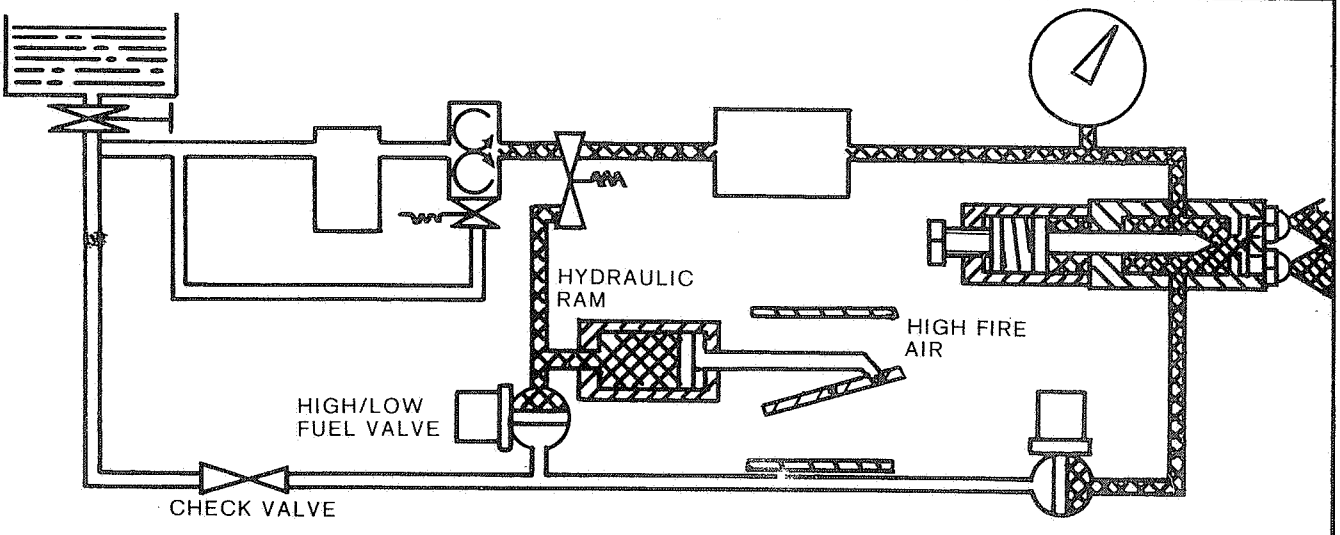
E. & O.E.



OIL CIRCULATION LOW PRESSURE



LOW FIRE MEDIUM PRESSURE



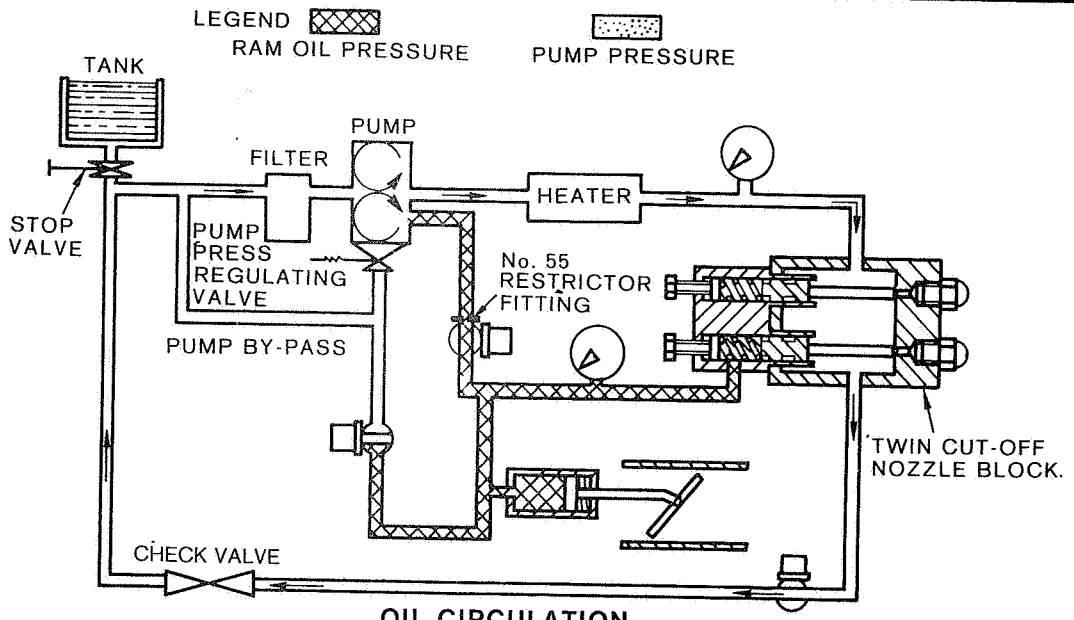
HIGH FIRE HIGH PRESSURE

TITLE: OIL CIRCULATION FOR HIGH/LOW FUEL OIL "A" BURNERS. (2 NOZZLE) 200-960 SEC. ONE PIPE SYSTEM

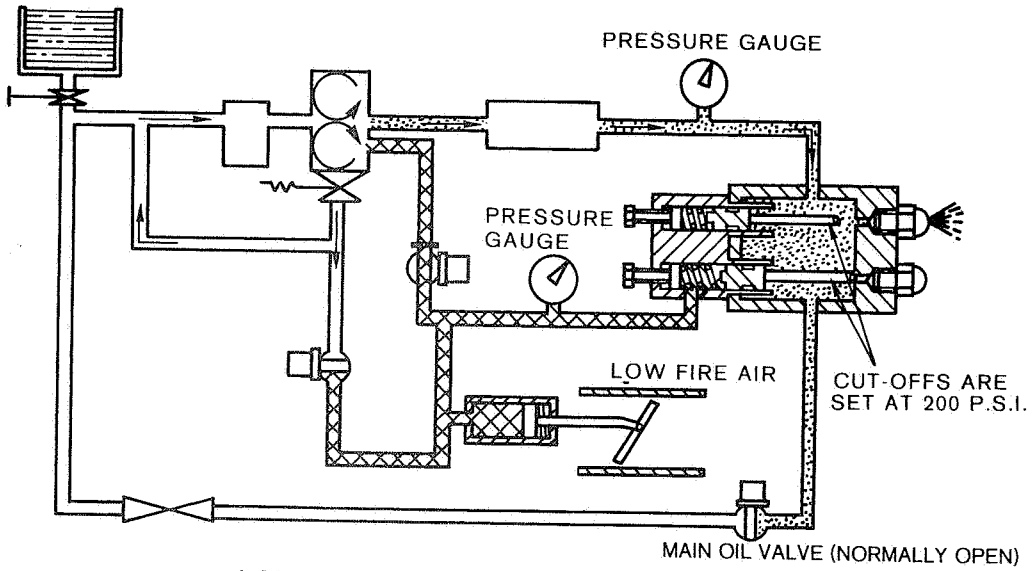
DRAWING No. E 10016

NU-WAY HEATING PLANTS LTD. DROITWICH.

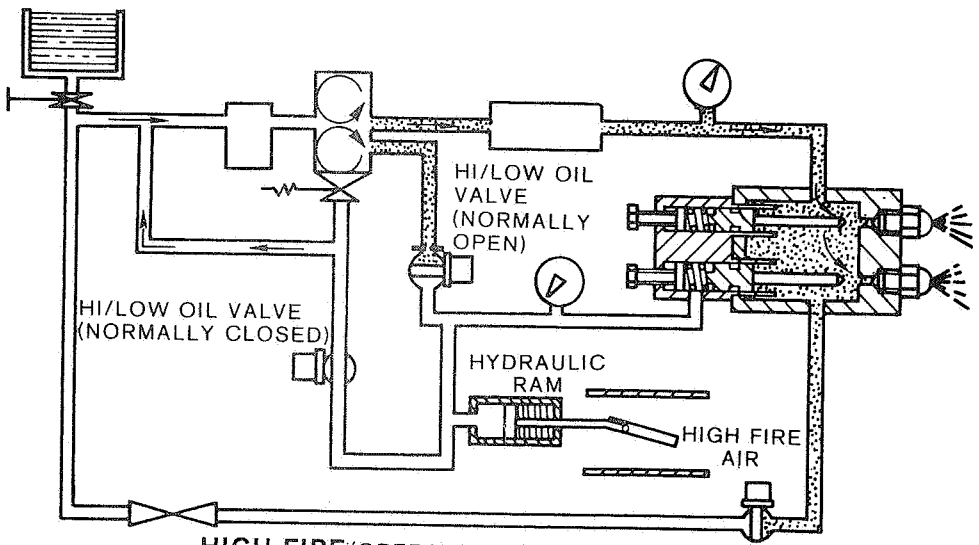
E. & O.E.



OIL CIRCULATION



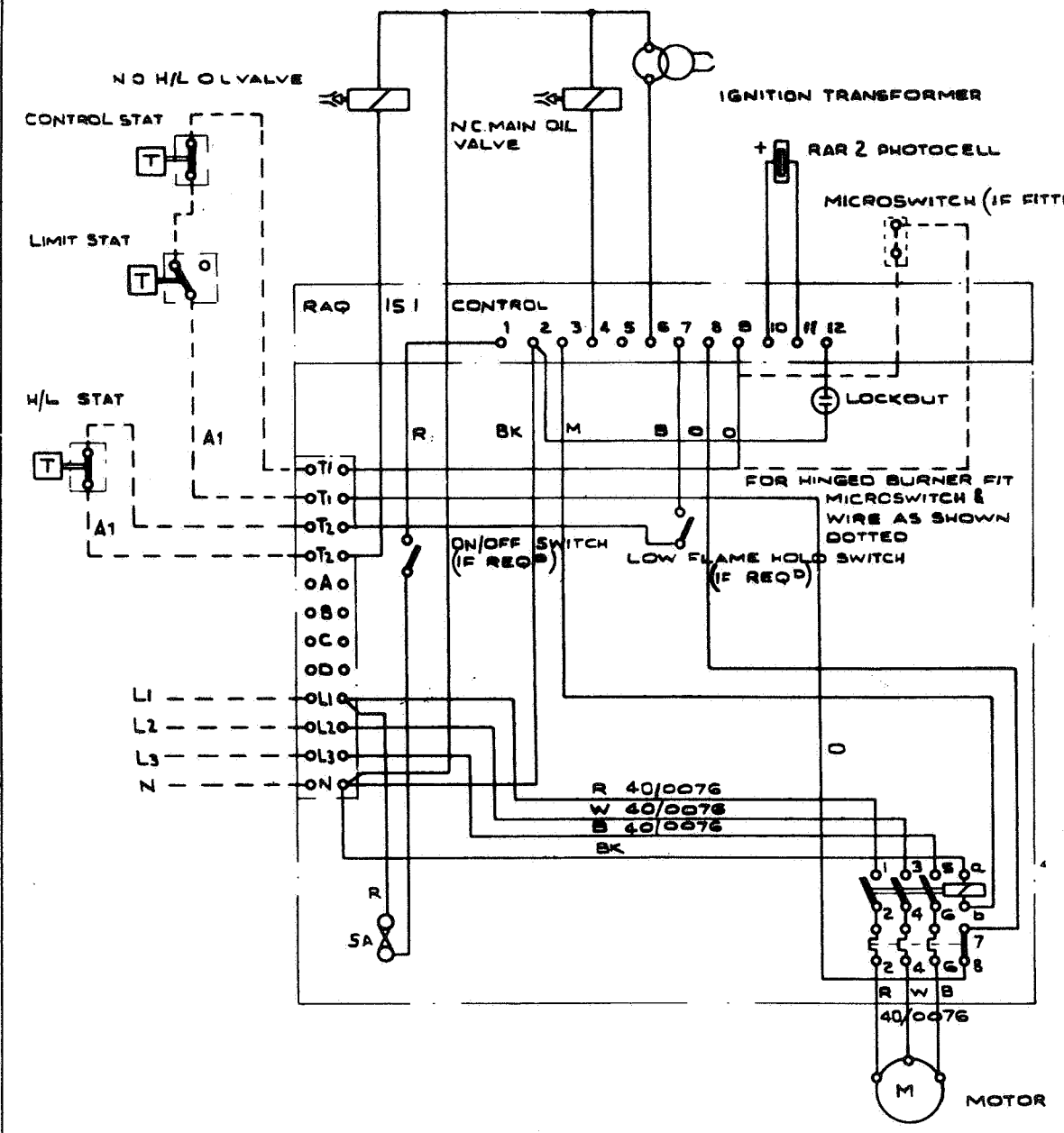
LOW FIRE (OPERATING PRESSURE 300 P.S.I.)



HIGH FIRE (OPERATING PRESSURE 300 P.S.I.)

TITLE: OIL CIRCULATION FOR HIGH/LOW 200-960 SEC. OIL

DRG. No.



NOTE FOR LFS BURNERS OMIT H/L STAT & LINK TERMINALS.
ANY INTERLOCK DESIGNED TO SWITCH OR CONTROL BURNER TIME SWITCH, DAMPER, I D FAN ETC TO BE WIRED IN SERIES WITH CONTROL & LIMIT STATS

NU-WAY HEATING PLANTS LTD.

DROITWICH

FUSE AT 20 AMPERE

BURNER WIRING

EXTERNAL WIRING

E. & O.E.

A 250 V GRADE
B 500 V GRADE

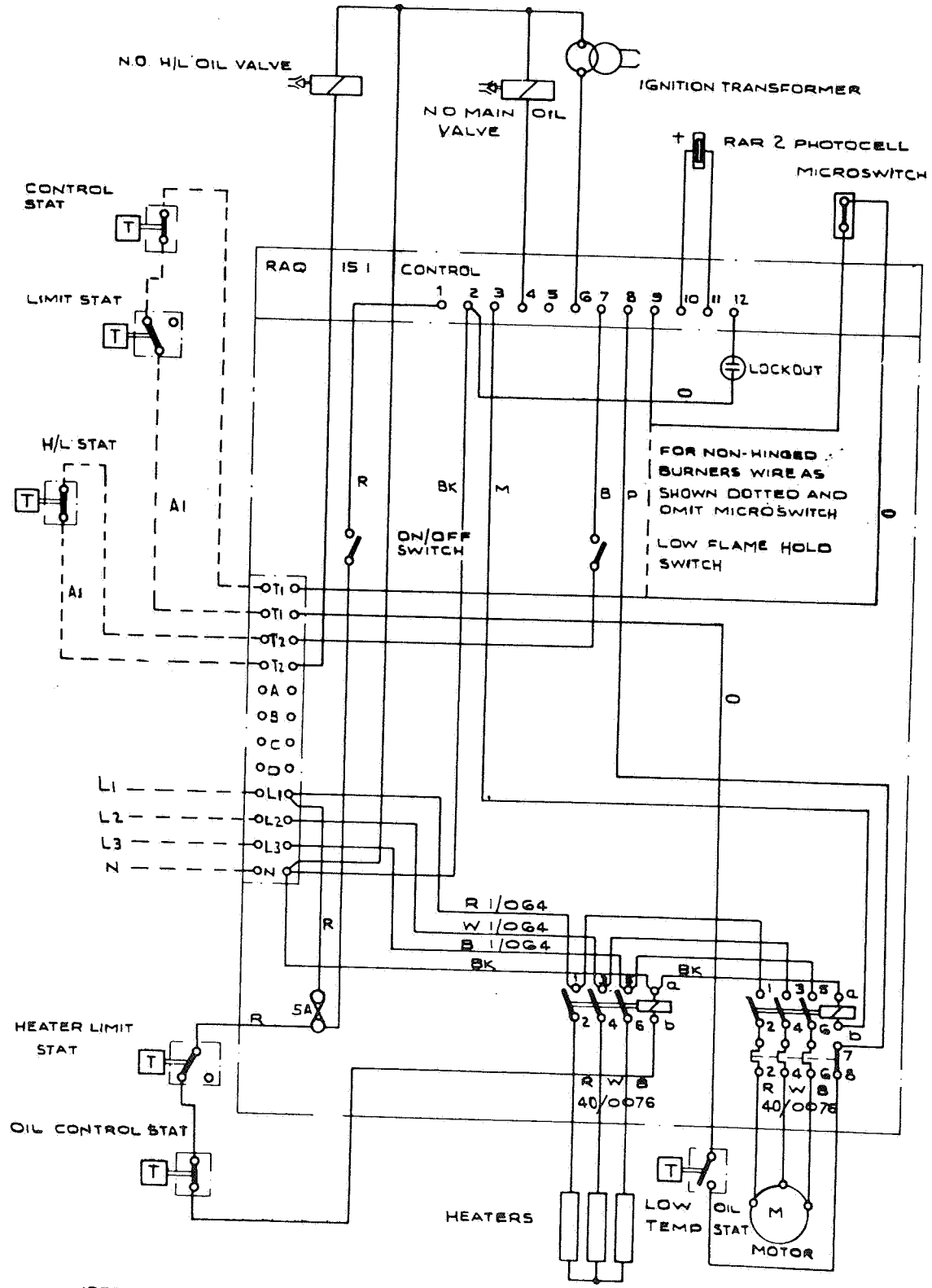
WIRING CODE FOR INSTALLER
1:5 AMP 2:10 AMP 3:15 AMP 4:20 AMP 5:30 AMP 6:60 AMP 7:100 AMP

TITLE: CONNS FOR AO & AILA 5-A2LB IO H/L & LFS (3-PH) ON RAQ 151 (STANDARD)

DRAWING No. WDS.3406/4

NU-WAY HEATING PLANTS LTD.

DROITWICH



NOTE FOR LFS BURNERS OMIT H/L STAT & LINK TERMINALS
ANY INTERLOCK DESIGNED TO SWITCH OR CONTROL BURNER (TIME SWITCH, DAMPER, ID FAN ETC) TO BE WIRED IN SERIES WITH CONTROL & LIMIT STATS

FUSE AT 30 AMPERE

BURNER WIRING

EXTERNAL WIRING

A 250 V GRADE
B 500 V GRADE

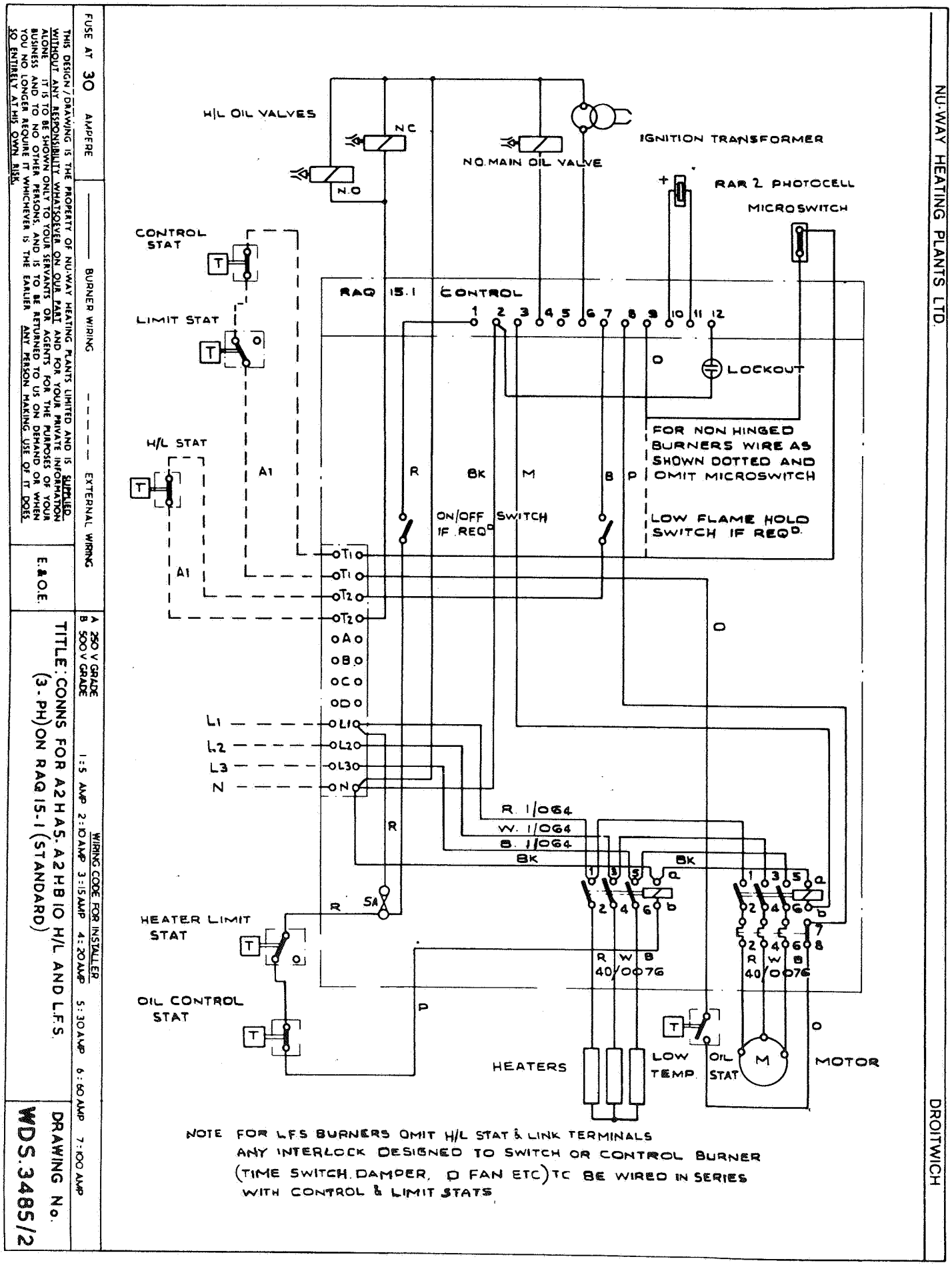
WIRING CODE FOR INSTALLER

1:5 AMP 2:10 AMP 3:15 AMP 4:20 AMP 5:30 AMP 6:60 AMP 7:100 AMP

E. & O.E.

TITLE CONNS FOR AIHA5-AIHB10 H/L AND LFS. (3-PH) ON RAQ 151 (STANDARD)

DRAWING No. WDS.3484/2


NU-WAY HEATING PLANTS LTD.
DROITWICH
H/L OIL VALVES
N.C
N.O
N.O. MAIN OIL VALVE
IGNITION TRANSFORMER
RAR 2 PHOTOCELL
MICROSWITCH
CONTROL STAT
LIMIT STAT
H/L STAT
RAQ 15.1 CONTROL
1 2 3 4 5 6 7 8 9 10 11 12
LOCKOUT
FOR NON HINGED BURNERS WIRE AS SHOWN DOTTED AND OMIT MICROSWITCH
LOW FLAME HOLD SWITCH IF REQD.
ON/OFF SWITCH IF REQD
A1
R
Bk
M
B
P
T1
T1
T2
T2
A
B
C
D
L1
L2
L3
N
R. 1/064
W. 1/064
B. 1/064
Bk
SA
HEATER LIMIT STAT
OIL CONTROL STAT
R W B
40/0076
HEATERS
LOW TEMP. STAT
OIL
M
MOTOR
NOTE FOR LFS BURNERS OMIT H/L STAT & LINK TERMINALS
ANY INTERLOCK DESIGNED TO SWITCH OR CONTROL BURNER (TIME SWITCH. DAMPER, D FAN ETC) TC BE WIRED IN SERIES WITH CONTROL & LIMIT STATS
FUSE AT 30 AMPERE
BURNER WIRING
EXTERNAL WIRING
E. & O.E.
A 250 V GRADE
B 500 V GRADE
WIRING CODE FOR INSTALLER
1:5 AMP 2:10 AMP 3:15 AMP 4:20 AMP 5:30 AMP 6:60 AMP 7:100 AMP
TITLE: CONNS FOR A2HA5. A2HB10 H/L AND L.F.S. (3-PH) ON RAQ 15-1 (STANDARD)
DRAWING No.
WDS.3485/2
THIS DESIGN/DRAWING IS THE PROPERTY OF NU-WAY HEATING PLANTS LIMITED AND IS SUPPLIED WITHOUT ANY RESPONSIBILITY WHATSOEVER ON OUR PART AND FOR YOUR PRIVATE INFORMATION ALONE. IT IS TO BE SHOWN ONLY TO YOUR SERVANTS OR AGENTS FOR THE PURPOSES OF YOUR BUSINESS AND TO NO OTHER PERSONS, AND 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.

FUELMASTER

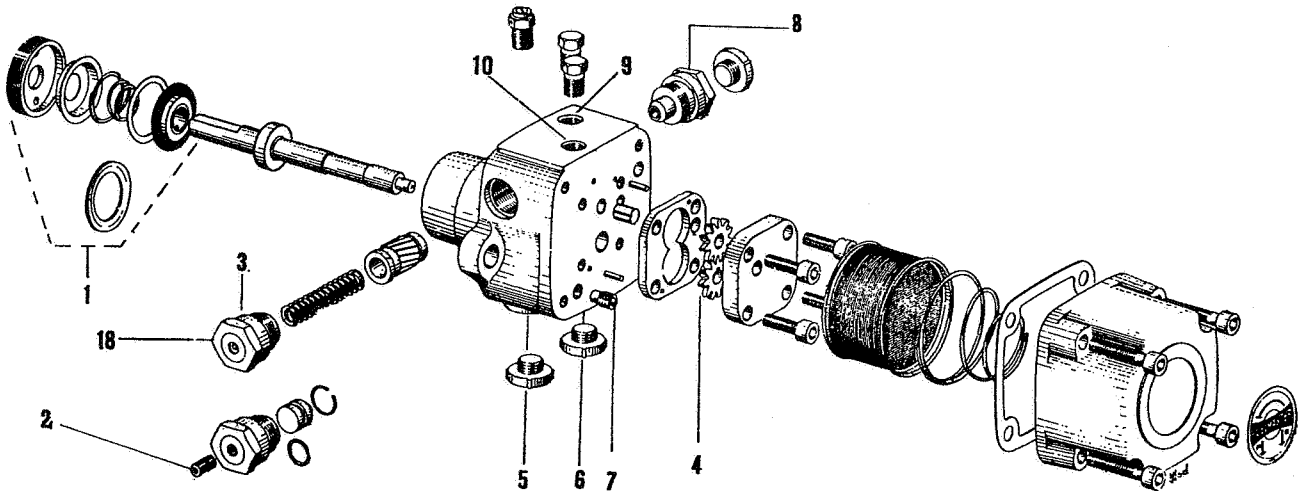
FUEL UNITS — TYPE N - S - SO

for domestic fuel oil

Inf. 410-1

June 1968

Installation and Servicing instructions



1 Shaft seal.
2 Pressure adj. screw.
3 Pressure regulator.
4 Pump gears.
5 Return port.
6 Intake port.
7 By-pass plug.
8 Nozzle port.
9 Pressure gauge port.
10 Vacuum gauge port.

NOTE:
The pressure gauge port ⑨ and the intake port ⑥ are always at the nozzle port ⑧ side.

GENERAL INFORMATION

Pumppressures

Pressure settings kg/cm²	p.s.i.	Setting pressure kg/cm²	p.s.i.
0,6 - 1,5	8,5 - 21	1	14
1,5 - 4,5	21 - 64	3	42,5
2.5 - 7,5	35,5 - 107	5	71
6 - 12	85 - 171	7	100
8 - 18	124 - 256	10	142
12 - 25	170 - 355	15	215
15 - 30	213 - 425	20	284

Units are normally ordered for a 2 pipe-system. For 1-pipe-system if ordered only.

Pressure adjustment

The pressure adjusting screw varies the pressure. To increase pressure turn in a clockwise direction.
Pressure ranges can be obtained by changing the springs and the pressure regulators.
To set or to check pressure and vacuum use FUELMASTER gauges (order nr. Art. 271).

Operating conditions

Max. allowed: vacuum at intake port: —0,5 kg/cm² (—15" mercury)
pressure at intake and return port:
for N and S-type units: 0,7 kg/cm² (10 p.s.i.)
for SO-type units : 0,5 kg/cm² (7 p.s.i.)

Nozzle line connection: For ⅛" NPT connectors.
For ¼" NPT and ¼" BSP on order.

Note:

Use thread sealer tape on all fittings and plugs, do not use hemp.

MANTENANCE

Shaft seal

Dismantling: Remove nut, spring cover, conical spring, washer and finally the shaft seal. Use the special spanner provided in the toolkit.
Assembling: Before commencing ensure all parts are thoroughly clean and dry, especially the seal and the pump housing. Slightly lubricate only that part of the bronze ring on the shaft that comes into contact with the lapped surface on the shaft seal. Assemble in the reverse order to dismantling and ensure the washer is inserted with its smooth side to the seal. Tighten the nut with due care, using the special spanner for this purpose.

Pressure regulator

Before removing the pressure regulator plug release tension on the spring by turning the adjusting screw counter clockwise several turns. Remove piston from its cylinder, using tapered pin and clean both parts.
Check the seat of the piston and if damaged, replace with a new piston. Before assembling, lubricate the piston and ensure it slides smoothly in the bore. After assembling reset to pressure required.

Strainer

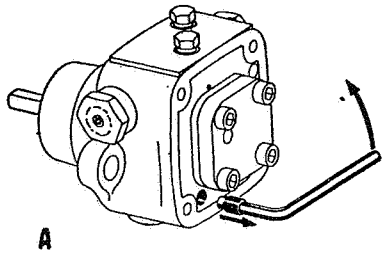
Access is made by removing the cover plate, where the strainer is held in position by a conical spring. It must be thoroughly cleaned at least once in a season to ensure correct working of the fuel unit.

Note:

If the joint plate between cover and pump housing should be damaged, it must be renewed.

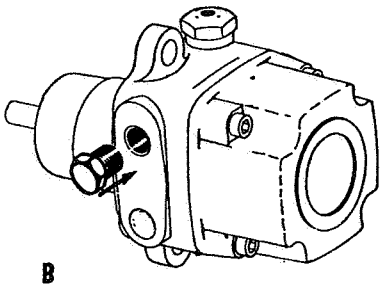
Type N...RGIR...

Modifying a fuel unit from 2-pipe into 1-pipe-system.



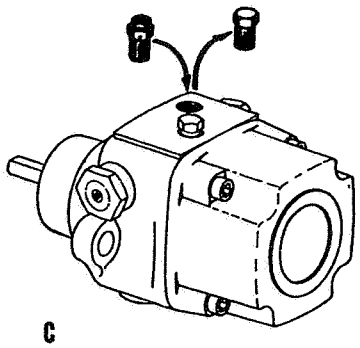
A

A. After removing the cover, spring and strainer, take out the by-pass plug.
Replace strainer, spring and cover. again.



B

B. Close return port with a ¼" NPTF plug (order nr. 24221).



C

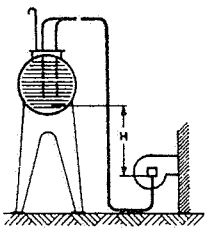
C. Replace plug on pressure gauge port with an air bleed plug (order nr. 25537).

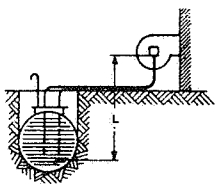
Determination of the suction line length, both horizontal and vertical in feet.

For N- and S-pumps at 1400 rpm. and SO-pumps at 28(rpm.
For N- and S-pumps at 2800 rpm. multiply with ½.

2-pipe-system

Viscosity: 15 cS (2,3°E)

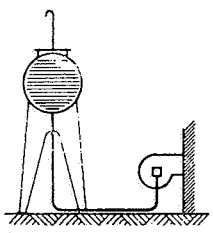




H ; L		Pump Nr. 0						Pump Nr.1						Pump Nr. 2						Pump Nr. 3					
		Pipe diameter ID ; DI																							
H		ø 8	5/16"	ø 10	3/8"	ø 12	½"	ø 8	5/16"	ø 10	3/8"	ø 12	½"	ø 10	3/8"	ø 12	½"	ø 14	9/16"	ø 12	½"	ø 14	9/16"	ø 16	5/8"
2 m	6'	22	66'	54	162'	↑	↑	22	66'	54	162'	↑	↑	27	81'	55	165'	↑	↑	36	108'	↑	↑	↑	↑
1.5 m	4.5'	21	63'	53	159'			21	63'	53	159'			26	78'	53	159'			35	105'				
1 m	3'	20	60'	50	150'	60	180'	20	60'	50	150'	60	180'	25	75'	50	150'	60	180'	33	99'	60	180'	60	180'
0.5 m	1.5'	18	54'	46	138'	↓	↓	18	54'	46	138'	↓	↓	23	69	46	138'	↓	↓	30	90'	↓	↓	↓	↓
L		ø 8	5/16"	ø 10	3/8"	ø 12	½"	ø 8	5/16"	ø 10	3/8"	ø 12	½"	ø 10	3/8"	ø 12	½"	ø 14	9/16"	ø 12	½"	ø 14	9/16"	ø 16	5/8"
0	0	17	51'	42	126'	60	180'	17	51'	42	126'	60	180'	21	63'	42	126'	60	180'	28	84'	59	177'	60	180'
0.5 m	1.5'	15	45'	39	117'	60	180'	15	45'	39	117'	60	180'	19	57'	39	117'	60	180'	26	78'	54	162'	60	180'
1 m	3'	13	39'	33	99'	60	180'	13	39'	33	99'	60	180'	17	51'	33	99'	60	180'	22	66'	47	141'	60	
1.5 m	4.5'	12	36'	29	87'	59	177'	12	36'	29	87'	59	177'	15	45'	30	90'	60	180'	20	60'	41	123'	60	
2 m	6'	10	30'	25	75'	50	150'	10	30'	25	75'	50	150'	12	36'	25	75'	52	156'	16	48'	34	102'	54	162'
2.5 m	7.5'	9	27'	22	66'	45	135'	9	27'	22	66'	45	135'	11	33'	22	66	'47	141'	14	42'	30	90'	47	141'
3 m	9'	7	21'	17	51'	35	105'	7	21'	17	51'	35	105'	8	24'	17	51'	36	108'	11	33'	23	69'	36	108'
3.5 m	10.5'	6	18'	14	42'	31	93'	6	18'	14	42'	31	93'	7	21'	14	42'	31	93'	9	27'	19	57'	29	87'
4 m	12'	4	12'	9	27'	20	60'	4	12'	9	27'	20	60'	3	9'	9	27'	20	60'	6	18'	12	36'	18	54'

1-pipe-system

Viscosity: 15 cS (2,3°E)



066920

H		Pump Nr. 0						Pump Nr.1						Pump Nr. 2						Pump Nr. 3					
		Pipe diameter ID ; DI																							
		ø 8	5/16"	ø 10	3/8"	ø 12	½"	ø 8	5/16"	ø 10	3/8"	ø 12	½"	ø 10	3/8"	ø 12	½"	ø 14	9/16"	ø 12	½"	ø 14	9/16"	ø 16	5/8
0	0	14	42'	36	108'	↑	↑	6	18'	17	51'	37	111'	6.5	19.5'	15	45'	30	90'	10	30'	18	54'	31	9
0.5 m	1.5'	21	63'	54	162'			9	27'	26	78'	56	168'	10	30'	23	69'	45	135'	15	45'	28	84'	47	14
1 m	3'	28	84'	60	180'	60	180'	13	39'	35	105'	60	180'	14	42'	31	93'	60	180'	20	60'	38	114'	60	18(
1.5 m	4.5'	36	108'	60	180'			16	48'	44	132'	60	180'	17	51'	39	117'	60	180'	26	78'	48	144'	60	18(
2 m	6'	43	129'	60	180'	↓	↓	18	57'	53	159'	60	180'	21	63'	47	141'	60	180'	31	93'	58	174'	60	18(

FUELMASTER

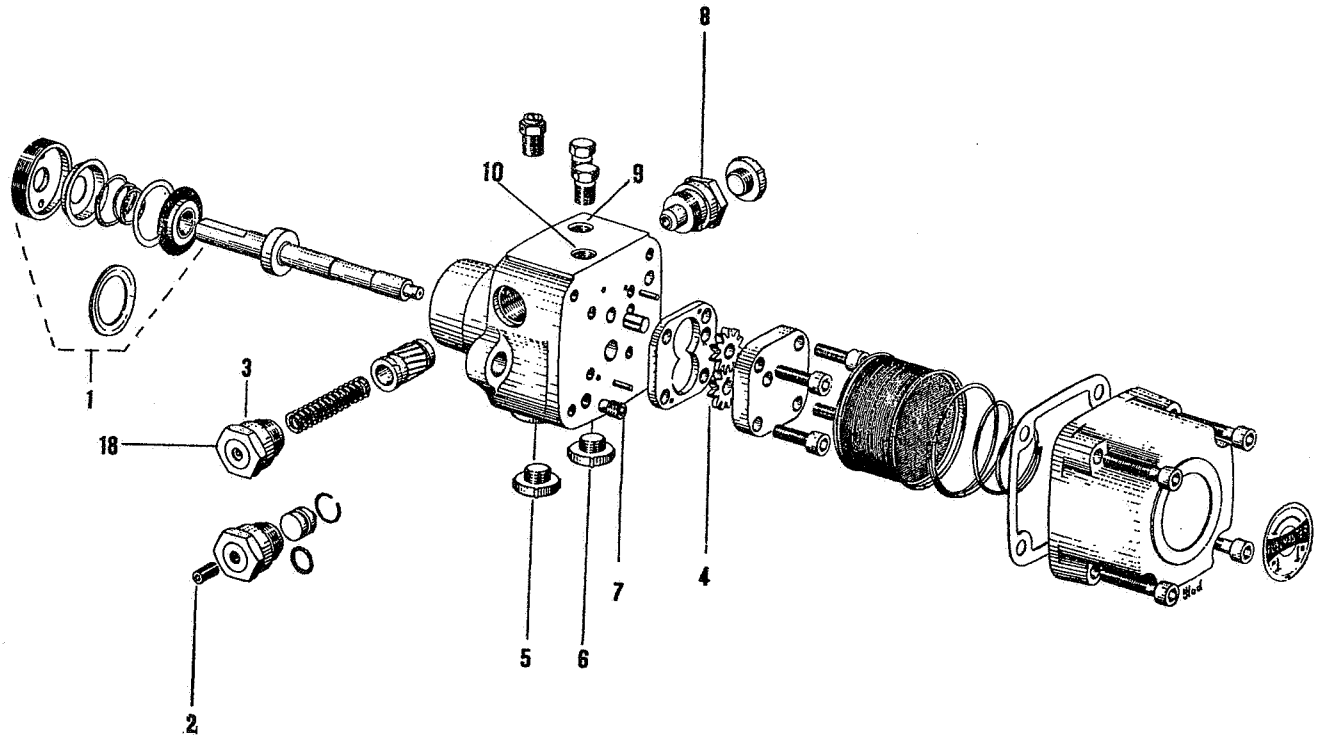
FUEL UNITS - TYPE N

for heavy fuel oil

Installation and Servicing instructions

Inf. 410-2

June 1969



1 Shaft seal.
2 Pressure adj. screw.
3 Pressure regulator.
4 Pump gears.
5 Return port.
6 Intake port.
7 By-pass plug.
8 Nozzle port.
9 Pressure gauge port.
10 Vacuum gauge port.

NOTE:
The pressure gauge port ⑨ and the intake port ⑥ are always at the nozzle port ⑧ **side.**

GENERAL INFORMATION

Factory setting

Pressure range kg/cm²	Pressure range p.s.i.	Pressure setting kg/cm²	Pressure setting p.s.i.
0,6 - 1,5	8,5 - 21	1	14
1,5 - 4,5	21 - 64	3	42,5
2,5 - 7,5	35,5 - 10,7	5	71
6 - 12	85 - 171	7	100
6 - 18	85 - 256	15	213
15 - 30	213 - 425	20	284

Units will be delivered for 2-pipe-system.
All units are provided with an air bleed plug. (order nr. 25537).

Pressure adjustment

The pressure adjusting screw varies the pressure. To increase pressure turn in a clockwise direction.
Pressure ranges can be obtained by changing the springs and the pressure regulators.
To set or to check pressure and vacuum use FUELMASTER gauges (order nr. Art. 271).

1-pipe-system

Preferably, DO NOT modify fuel units for heavy fuel oil into 1-pipe-system, but make an external by-pass by connecting the return port to the suction line.

Operating conditions

Max. allowed: oil temperature: 100°C (212°F)
oil viscosity : 750cS (100°E)
vacuum at intake port: —0,8 kg/cm² (—24" mercury)
pressure pulsations at intake and return port: up to 6 kg/cm² (86 p.s.i.)
Nozzle line connection: For ¼" NPT connections
For ¼" BSP on order.

Note:

Use only thread sealer tape on all fittings and plugs. Do not use hemp.
Standard nozzle port: ¼" NPSF
¼" BSP on order.

MAINTENANCE

Shaft seal

Dismantling: Remove nut, spring cover, conical spring, washer and finally the shaft. Use the special spanner provided in the toolkit.

Assembling: Before commencing ensure all parts are thoroughly clean and dry, especially the seal and the pump housing. Slightly lubricate only that part of the bronze ring on the shaft that comes into contact with the lapped surface on the shaft seal. Assemble in the reverse order to dismantling and ensure the washer is inserted with its smooth side to the seal. Tighten the nut with due care, using the special spanner for this purpose.

Pressure regulator

Before removing the pressure regulator plug release tension on the spring by turning the adjusting screw counter clockwise several turns. Remove piston from its cylinder, using tapered pin and clean both parts.
Check the seat of the piston and if damaged, replace with a new piston. Before assembling, lubricate the piston and ensure it slides smoothly in the bore. After assembling reset to pressure required.

Strainer

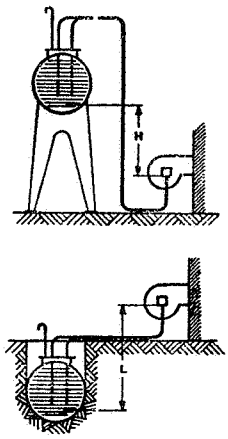
Access is made by removing the cover plate, where the strainer is held in position by a conical spring. It must be thoroughly cleaned at least once in a season to ensure correct working of the fuel unit.

Note:

If the cover plate gasket should be damaged whilst dismantling, it must be renewed.

Determination of the suction line length, both horizontal and vertical, in feet.

2-pipe-system



Viscosity : 50 cS (6,5 °E)

H ; L		Pump Nr. 0						Pump No. 1						Pump Nr. 2						Pump No. 3					
		Gas tube w.w.																							
H		3/8"		1/2"		3/4"		3/8"		1/2"		3/4"		1/2"		3/4"		1"		3/4"		1"		1 1/4"	
2 m	6'	18	54'	59	177'	172	516'	18	54'	59	177'	172	516'	36	108'	108	324'	296	888'	71	213'	193	579'	612	1836'
1.5 m	4.5'	17.5	52.5'	57.5	172.5'	166	498'	17.5	52.5'	57.5	172.5'	166	498'	35	105'	104	312'	285	855'	69	207'	188	564'	595	1785'
1 m	3'	17	51'	55.5	166.5'	160	480'	17	51'	55.5	166.5'	160	480'	33	99'	98	294'	269	807'	65	195'	177	531'	561	1683'
0.5 m	1.5'	16	48'	53.5	160.5'	154	462'	16	48'	53.5	160.5'	154	462'	30	90'	92	276'	251	753'	61	183'	164	492'	519	1557'
L		3/8"		1/2"		3/4"		3/8"		1/2"		3/4"		1/2"		3/4"		1"		3/4"		1"		1 1/4"	
0	0	15	45'	50.5	151.5'	147	441'	15	45'	50.5	151.5'	147	441'	27.5	82.5'	85	255'	230	690'	56	168'	150	450'	476	1428'
0.5 m	1.5'	14	42'	47.5	142.5'	139	417'	14	42'	47.5	142.5'	139	417'	25.5	76.5'	78	234'	210	630'	51	153'	134	402'	442	1326'
1 m	3'	13.5	40.5'	44.5	133.5'	129	387'	13.5	40.5'	44.5	133.5'	129	387'	23	69'	69	207'	186	558'	46	138'	118	354'	391	1173'
1.5 m	4.5'	13	39'	41.5	124.5'	120	360'	13	39'	41.5	124.5'	120	360'	20	60'	60	180'	161	483'	40	120'	101	303'	340	1020'
2 m	6'	12	36'	37.5	112.5'	106	318'	12	36'	37.5	112.5'	106	318'	17	51'	51	153'	136	408'	34	102'	91	271'	289	867'
2.5 m	7.5'	9.5	28.5'	30	90'	90	270'	9.5	28.5'	30	90'	90	270'	14	42'	42	126'	110	330'	28	84'	74	222'	238	714'
3 m	9'	7.5	22.5'	24.5	73.5'	72	216'	7.5	22.5'	24.5	73.5'	72	216'	11	33'	33	99'	83	249'	22	66'	58	174'	187	561'

Viscosity scale																
Viscosity	cS	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750*
	oE	6.6	13	20	26	33	40	46	53	60	66	73	80	85	92	100
	Rwl	200	405	610	810	1000	1230	1420	1650	1850	2000	2200	2400	2600	2800	3000
Factor		1	0.5	0.33	0.25	0.2	0.16	0.14	0.125	0.11	0.1	0.09	0.083	0.077	0.07	0.066

Max. viscosity at the fuel unit

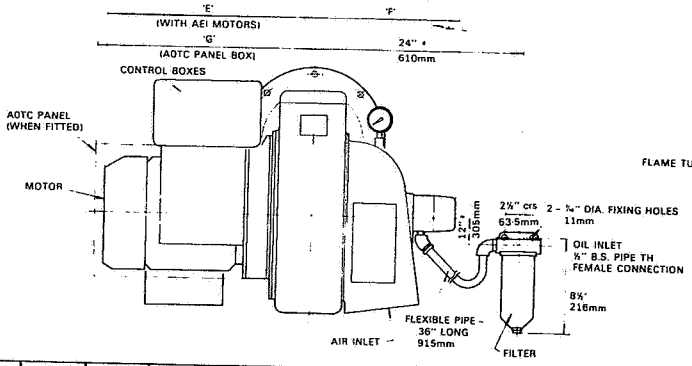
EXAMPLE: To find the line lengths at a viscosity of 200cS, multiply above mentioned lengths with **0,25.**

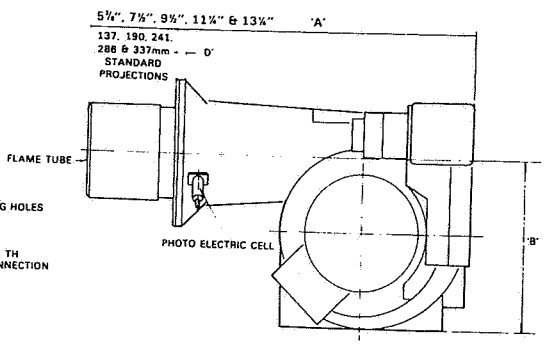
Pump type: nr. 2
Pipe size: 3/4"
Viscosity of the fuel oil: 200cS (26°E)
Factor: 0,25

Capacity and Consumption

Burner Model	Firing Rate Imperial G.P.H. min.	max.	Nett Burner Outputs Btu's/hr at heat exchanger efficiencies: 75% min.	75% max.	80% min.	80% max.	Burner Fan Static Pressure Inches W.G.	Maximum Boiler Resistance Inches W.G
LIGHT DISTILLATE OIL – CLASS D								
AOL/4	3·8	7·4	470,000	845,000	500,000	900,000	4·0	1·5
MEDIUM & HEAVY FUELS – CLASSES E & F								
AOH/4 on/off	3·8	7·6	500,000	1,000,000	535,000	1,070,000	4·0	1·5
AOH/4 H/L	7·6	11·4	1,000,000	1,500,000	1,070,000	1,600,000	4·0	2·0

Leading Dimensions (Light Oil)

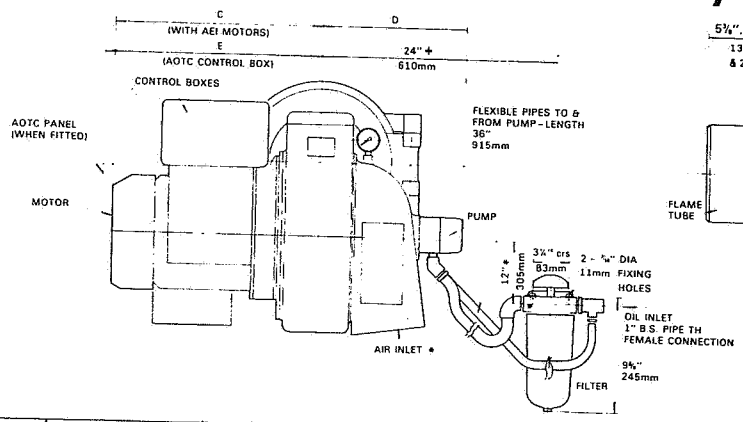


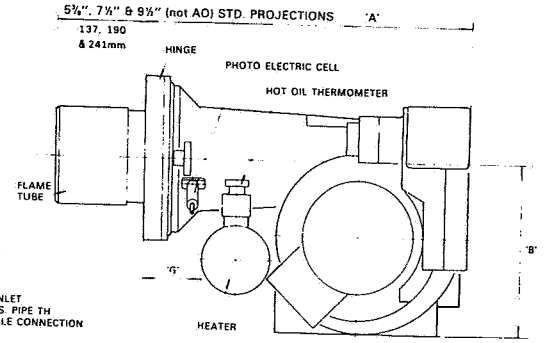


BURNER MODEL	A	B	C	D	E	F	G	UNITS
AOL *	22⅜	12⅛	12⅛	¾	13¼	11⅜	18¾	inches
	568	308	308	19	337	290	476	mm

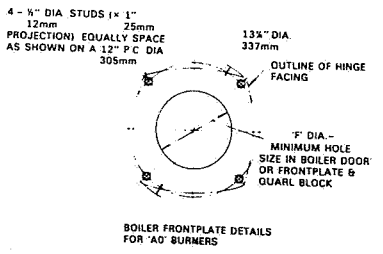
* THE AIR INLET ON THE 'AO' BURNER ONLY, FACES BACKWARDS AWAY FROM THE BOILER NOT VERTICALLY DOWNWARDS AS SHOWN

Leading Dimensions (Medium/Heavy Oil)





BURNER MODEL	A	B	C	D	E	F	UNITS
AOH *	23½	12⅛	13¼	11⅜	18¾	9	inches
	597	308	337	290	476	230	mm



BOILER FRONTPLATE DETAILS FOR 'AO' BURNERS

Electrical Data

Burner Model	Fan Motor H.P. *	Pre-Heater kw	Pre-Heater Amps	Starting Current Amps	Run Current Amps	Recommended Fuse Rating Amps (H.R.C.)	Recommended Mains Cable Size sq. mm
LIGHT DISTILLATE OIL – CLASS D							
AOL.4	1·0			13·3	1·9	10	1·5
MEDIUM AND HEAVY FUELS – CLASSES E AND F							
AOHA.4 ON/OFF	1·0	2·0	2·7	14·0	4·6	15	1·5
AOHB.4 H/L	1·0	2·0	2·7	14·0	4·6	15	1·5

All Series 'A' Burners are equipped for 400/440 volts, 3 phase, 50 cycle, 4 wire supply and all data given calculated at 415 volts.
*All motors are 2 pole 2,850 rpm.

A BURNER - C BURNER EQUIVALENTS

A1A/5	C5 - 25A	ALL FUELS	Except 3500 S.R. No. 1
A1B/5	C5 - 25B	ALL FUELS	
A1A/10	C6 - 34A	ALL FUELS	
A1B/10	C6 - 34B	ALL FUELS	
A1A/14	C7 - 38A	ALL FUELS	
A1B/14	C7 - 38B	ALL FUELS	
A2A/5	C6 - 28C	ALL FUELS	
A2B/5	C6 - 28D	ALL FUELS	
A2C/5	C6 - 28E	ALL FUELS	
A2A/10	C6 - 34C	ALL FUELS	
A2B/10	C6 - 34D	ALL FUELS	
A2C/10	C6 - 34E	ALL FUELS	
A2A/14	C7 - 38C	ALL FUELS	
A2B/14	C7 - 38D	ALL FUELS	
A2C/14	C7 - 38E	ALL FUELS	
A2D/14	C7 - 38F	ALL FUELS