

## Handbook

# Series NOL fully automatic oil burners Models NOL1/NOL2/NOL3

**NOL1**  
43 kW to 60kW

**NOL2**  
29 kW to 80 kW

**NOL3**  
76kW to 107kW

### THE NOL SERIES

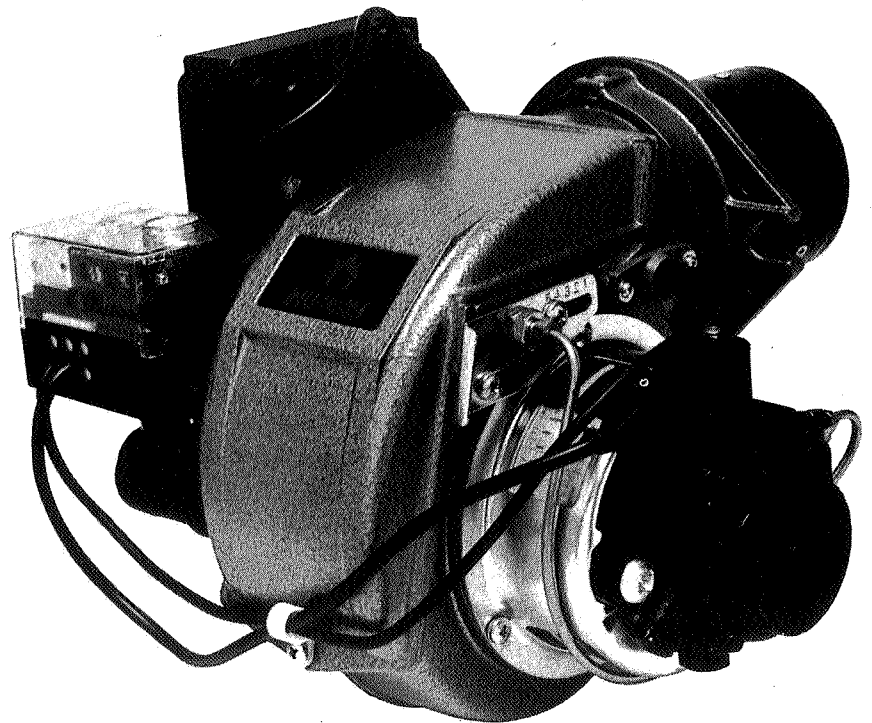
The Nu-way NOL series of Pressure Jet Oil Burners sets new standards in efficient and reliable operation. Developed to meet current test authority requirements in the UK and overseas markets. The burner is fitted with an adjustable swirler head to give efficient combustion performance and this ensures the best fuel economy. Delivered ready to install with pre-wired packaged control system.

### CONSTRUCTION

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

### AIR REGULATION

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



### CONTROLS

Flame supervision by photo-electric cell with sequence controller. The burner on/off operation may be controlled by thermostats, time switches etc.

### OPERATION

Single stage (on/off) operation only.

### FUEL

Light distillate oil Class D (1.5 – 5.5 cSt @ 40°C). (Gas Oil). Or Class C2 (1.1 – 2.0 cSt @ 40°C).

### BURNER OUTPUTS

Based on a Gross CV of 45.5 MJ/kg for Gas Oil and 46.1 MJ/kg for Kerosene C2.

### FUEL SYSTEM

Pump fitted with solenoid cut/off valve, suitable for single pipe gravity feed or two pipe suction lift systems. A fuel filter and flexible oil pipe is provided, fuel connection 1/4" BSP. For fuel storage and handling temperature requirements please see Burner Manual.

### APPROX. WEIGHT

11 kg.

## BURNER DATA

Burner Model	Minimum Burner Throughput		Minimum Burner Capacity †			Maximum Burner Throughput		Maximum Burner Capacity †			Standard Pump Pressure		Standard Nozzle Spray Angle
	Litres/h	USgal/h	kW	kcal/h x 10 <sup>3</sup>	Btu/h x 10 <sup>3</sup>	Litres/h	USgal/h	kW	kcal/h x 10 <sup>3</sup>	Btu/h x 10 <sup>3</sup>	bar	psi	
NOL1	2.38	0.63	25.0	21.5	85.4	5.19	1.37	55.0	47.2	187.4	9.5	140	60° or 80°
NOL2	2.95	0.78	31.4	26.9	107.0	7.07	1.87	75.0	64.0	256.0	12.2	180	60°
NOL3	5.15	1.36	54.8	47.1	187.0	10.3	2.73	109.6	93.5	374.0	12.2	180	60°

† To obtain **appliance** output, multiply burner capacity by efficiency;  
 e.g. max. appliance output for NOL1 @ 80% efficiency =  $55 \text{ kW} \times \frac{80}{100} = 44 \text{ kW}$ .

## INSTALLATION

**Flue** The top of the chimney should be above all roofs within a radius of 10 m. If a cowl is fitted, remove it.

Ensure that the flue pipe from the appliance finishes flush with the inside wall of the chimney.

If draught over the fire exceeds 0.02 kPa (2mm wg: 0.08 in wg) draught stabiliser should be fitted in a position recommended by the appliance maker. Draught over the fire when the burner is operating should be between 0.05 and 0.012 kPa (5.0—1.2mm wg: 0.05—0.2 in wg).

**Fuel Storage and handling** The provisions of BS.2869 will normally ensure that the fuel will be of adequate performance. As there are Winter and Summer fuel grades and in order to prevent the fuel waxing under sustained cold and exposed conditions, Class D grade of fuel should be stored and supplied to the burner at a minimum temperature of 5°C (41°F), in line with the fuel suppliers recommendations to suit site conditions.

**Fuel Supply** (and, where fitted, return) line should consist of copper tube (NEVER galvanised steel), the final connection to the pump inlet port being made with the length of flexible pipe supplied with the burner. Joints should be made with compression fittings, not by soldering.

When gravity feed is used (the most common), the maximum head should not exceed 4m (equivalent to a pressure of 35 kPa).

On installations where the fuel tank is situated below the level of the burner the maximum suction permitted is 40 kPa (300mm HG) and a two-pipe (supply and return) fuel supply system **MUST** be used.

Note that the pump is factory set for single pipe installation. When using a two-pipe system refer to the appropriate sketch opposite for pump modifications.

**Single Pipe System** On a single pipe (gravity feed) system, the pump should be primed under gravity from the tank and not by running the pump mechanically. To prime the pump remove the purge plug, connect the purge port to a suitable container.

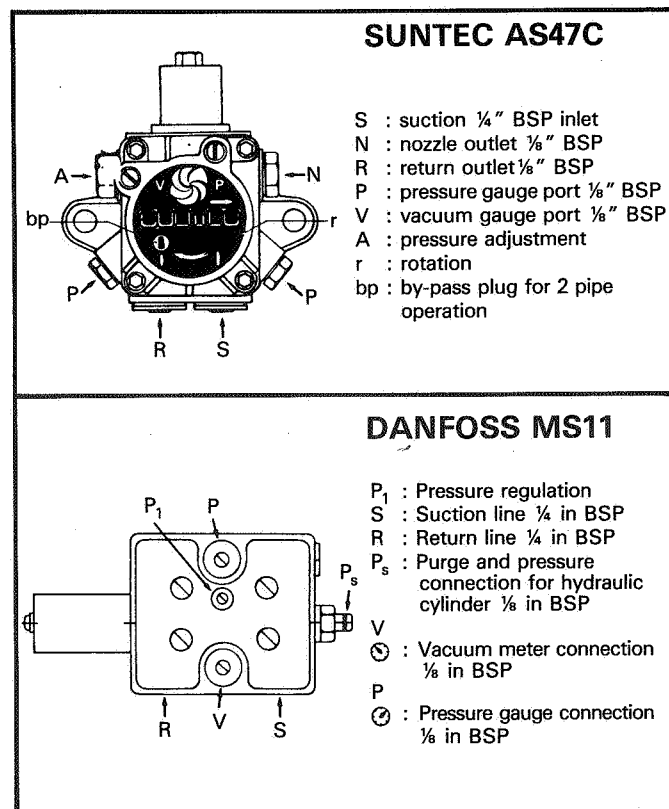
**Two Pipe System** The suction line/pump will require priming before energising the pump mechanically. It is essential to ensure that the return pipe is not obstructed in any way, e.g. by a plug, closed valve, etc. Any obstructions will damage the pump.

The fuel supply line/pump may need bleeding/priming, if the oil storage is allowed to drain completely.

**Electricity Supply** Connect burner to electricity supply, thermostats, time switches etc., as appropriate.

**Nozzles** Burner nozzles are calibrated in U.S. gallons/hour at 100 psi. (1 US gall. = 40 kW input). Type, size and angle should be carefully selected in accordance with the appliance manufacturer's instructions, in order to give appropriate oil input. For 140 psi multiply nominal throughput by 1.2. For 180 psi multiply nominal throughput by 1.34. e.g. 1.25 nozzle @ 140 psi gives  $1.25 \times 1.2 = 1.5$  U.S. gall. Input = 60 kW = 48 kW appliance output @ 80% efficiency.

**Modifying a fuel unit to two-pipe from one-pipe installation.**

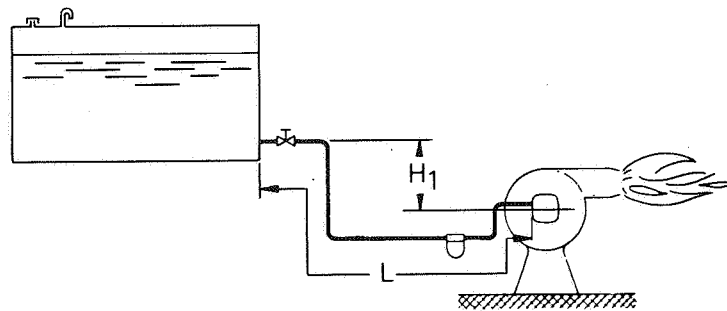


**The MS11 pump provides automatic change over from single to two pipe operation.**

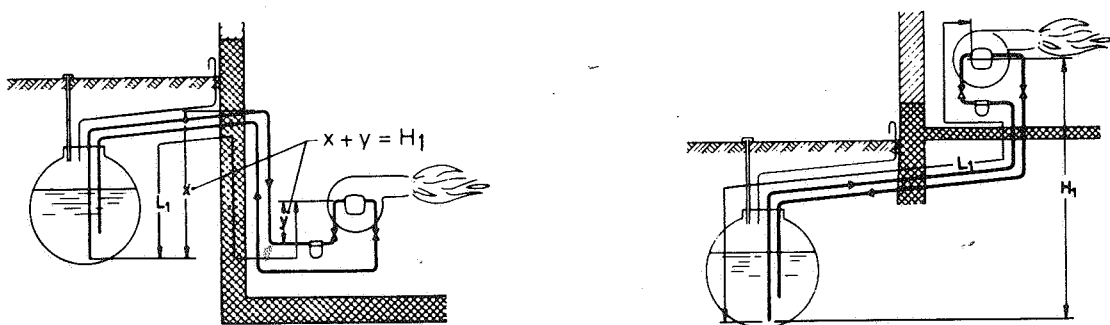
**Important:** When using a two pipe system it is essential for the return line to go direct to tank without obstruction and a non-return valve (foot valve) should be fitted on the end of the suction line, inside the tank.

**One-pipe system** — to be used only when there is a positive pressure in the suction line.

FUEL Class D 4.3 cSt @ (20°C)									
$H_1$	Pipe Size I/D								
m	ø4 mm	ø5 mm	ø6 mm	ø4 mm	ø5 mm	ø6 mm	ø4 mm	ø5 mm	ø6 mm
4,0	77	100	100	39	94	100	25	60	100
3,5	67	100	100	33	82	100	21	52	100
3,0	56	100	100	28	67	100	18	44	91
2,5	46	100	100	23	56	100	15	36	74
2,0	35	86	100	18	43	89	11	27	57
1,5	24	60	100	12	30	63	8	19	40
1,0	14	35	72	7	17	36	5	11	23
0,5	4	9	19	2	4	9	1	3	6
Nozzle capacity	1.9—2.7 Litres/h 0.503—0.713 USG/h			2.7—4.9 Litres/h 0.713—1.297 USG/h			4.9—7.5 Litres/h 1.297—1.996 USG/h		



**Two-pipe system** — to be used when a vacuum may occur in the suction line.



FUEL Class D 4.3 cSt @ (20°C)							
$H_1$	Pipe Size I/D			$H_1$	Pipe Size I/D		
m	ø6 mm	ø8 mm	ø10 mm	m	ø6 mm	ø8 mm	ø10 mm
4,0	34	100	100	0,0	17	55	100
3,5	32	100	100	-0,5	15	48	100
3,0	30	95	100	-1,0	13	41	100
2,5	28	89	100	-1,5	11	35	85
2,0	26	82	100	-2,0	9	28	68
1,5	24	75	100	-2,5	7	21	52
1,0	22	68	100	-3,0	5	14	35
0,5	20	62	100	-3,5	0	8	19
				-4,0	0	0	0

## OPERATION

To start burner turn main electricity isolating switch and, where fitted, separate burner switch, to ON.

The burner can be stopped in an emergency by opening the electrical switch provided in the line between the burner and the electricity supply.

There is a pre-purge period during which the ignition is switched on. If a magnetic oil valve is fitted the motor will run.

At the end of this period magnetic oil valve (if fitted) opens: if magnetic oil valve is not fitted motor starts. Burner lights.

After a further period the ignition is switched off and the burner continues to run until it is switched off by:-

- (a) the control thermostat contacts opening upon the room or water temperature being reached
- or (b) safety or limit thermostat contacts opening
- or (c) burner is switched off manually.

If, during start up, the flame fails to be established the photocell will detect this and will shut down the burner and the "lock out" lamp in the sequence control box is automatically lit.

If, during normal running, the flame is extinguished the ignition spark is restored within 1 second. If no magnetic oil valve is fitted the motor stops. After 10-15 seconds the motor starts again. If burner fails to light it goes to "lock out" after 10-15 seconds.

If magnetic oil valve is fitted oil is cut off but motor continues to run. After 10-15 seconds oil valve opens and burner attempts to light. If it fails to light burner goes to "lock out" after 10-15 seconds.

The manual reset button, also on the sequence control box, should not be operated until at least 30 seconds after the burner has been "locked out".

During normal operation photocell should NOT be removed.

## FAULT FINDING

**Motor fails to start** Check that power is available to the burner. Check all fuses in the supply to the burner.

Check that the contacts of both control and safety limit thermostats on the appliance or in the room are closed, and therefore "calling for heat". If these thermostat contacts are not closed check the thermostat settings.

**Motor starts but burner will not light** If the flame is not established the burner will be stopped and "locked out" after a safety period of 10-15 seconds: a warning light is illuminated on the sequence control box. The manual reset button on the sequence controller should not be operated until at least 30 seconds after the burner has been "locked out".

Ascertain whether oil is being sprayed by the nozzle.

If oil is passing through nozzle, check that there is a spark at the electrodes. Check all connections including high voltage leads.

Check electrode gap and correct if necessary.

Ensure that electrodes are not short circuited and that their insulators are clean and not cracked.

If there is no oil spray check that there is an oil supply to the burner and that all valves are open. Check that nozzle is not blocked. Ensure that all filters are able to pass oil. Check that the solenoid valve, if fitted, is open. Check that fuel pressure delivered by the pump is correct.

**Unstable pump pressure** On two pipe suction lift systems disconnect return pipe from pump; air free fuel should flow out when the pump is run.

On single pipe systems remove the purge plug to ascertain that air-free oil flows out.

Check that all pipework and connections on the suction side are free of leaks and that there are no blockages.

**Burner starts, then stops after a short time** Check that photocell is clean and correctly located. Check air damper setting and re-adjust as necessary. Check for blocked nozzle.

**Flame unstable, burner stops** Check for fuel supply fault, e.g. partial blockage of fuel supply pipe. Check nozzle atomisation, etc.

**Burner stops after satisfactory running period** If flame fails during normal running period, the ignition will be switched on again. If the flame is not re-established after a period the burner is stopped and "locked out", and a warning (lock out) light illuminated in the sequence control box.

If the flame is re-established during this period the ignition is switched off and the burner will continue to operate normally.

## MAINTENANCE

Before carrying out any work on the burner ensure that the electricity and oil supply is switched off.

**Filters** A filter is fitted within the pump. To gain access remove pump end-plate.

Withdraw filter and clean it in paraffin or other solvent, using a stiff brush.

Replace filter and pump end-plate. Re-prime pump.

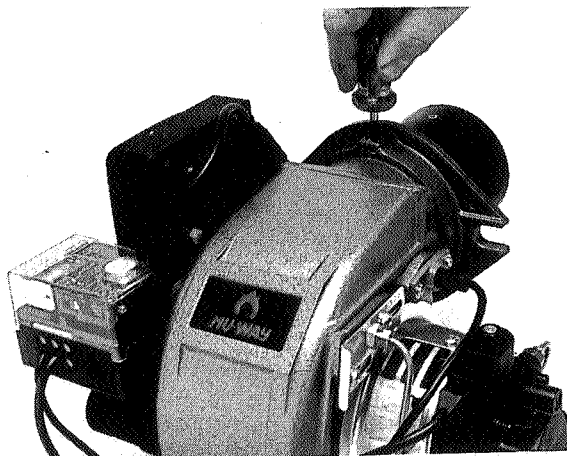
A filter should also be fitted in the fuel supply line. If fitted with a disposable element this should be replaced at least once per year, the frequency depending on the needs of the installation and the cleanliness of the fuel. If the filter has a cleanable element this should be cleaned, at suitable intervals, in exactly the same way as has been described for the pump filter. Re-prime the pump.

**Motor** The motor requires no maintenance: it has bearings which are factory lubricated for the life of the motor.

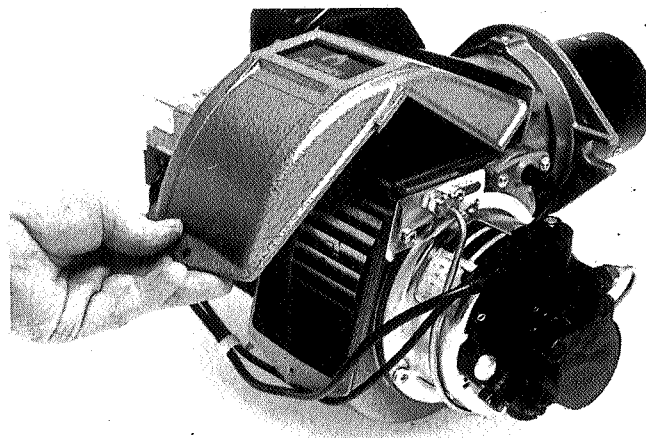
**Fan** If fan is damaged or becomes loose on the motor shaft the motor must be removed from the burner casing. Re-fit/replace fan.

## MAINTENANCE

Switch off electricity supply and oil supply to burner.



General view of the burner showing one of the fixing screws which secures burner to mounting bracket: latter is bolted to boiler front plate. Sequence control is to left of burner casing and is secured in position by a single screw adjacent to the reset button.



Cover removed after withdrawal of a single screw at cover base. Ignition electrode lead can then be removed from electrodes.

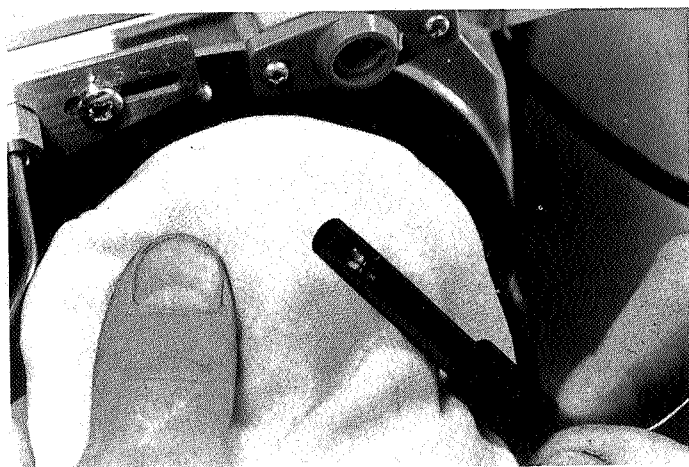
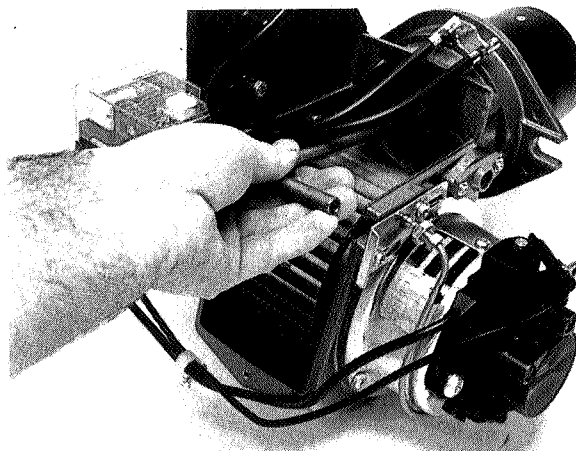
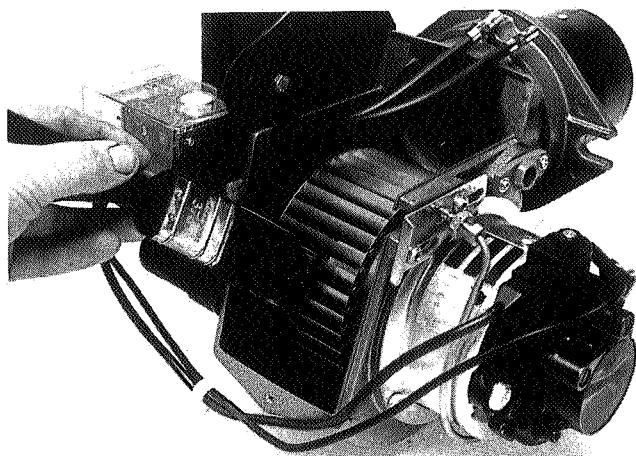


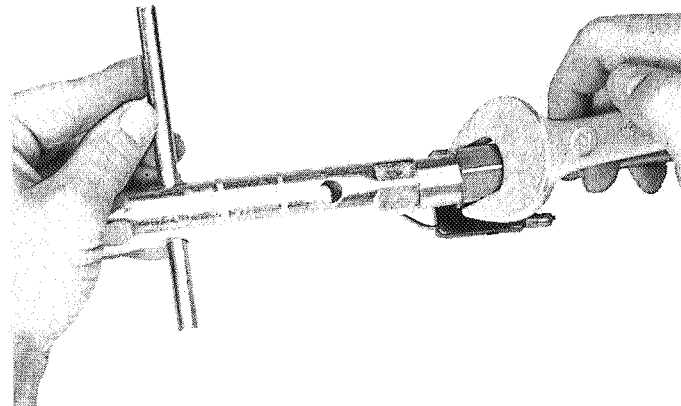
Photo-cell is removed from burner for cleaning. Do not touch cell with the fingers; use only a clean, dry cloth for cleaning. For burners fitted with Satronic TF830N control box you should ensure the 'M.Z.' photo-cell is positioned as indicated by the position label.



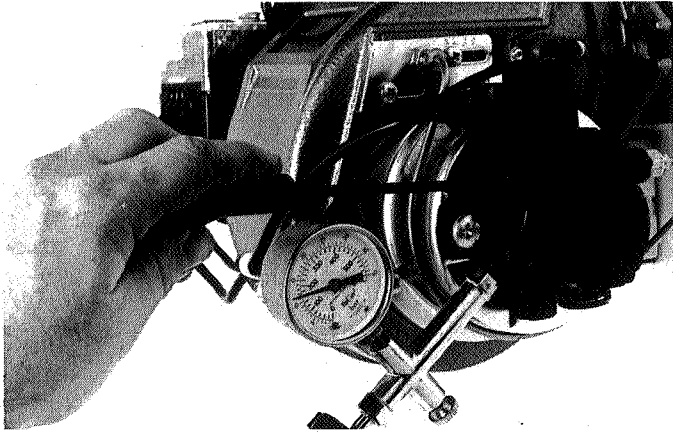
Before attempting to remove inner assembly withdraw photo-electric cell from its housing on right side of burner. Tubing nut and lock nut is fully unscrewed to release inner assembly which can now be withdrawn from burner.



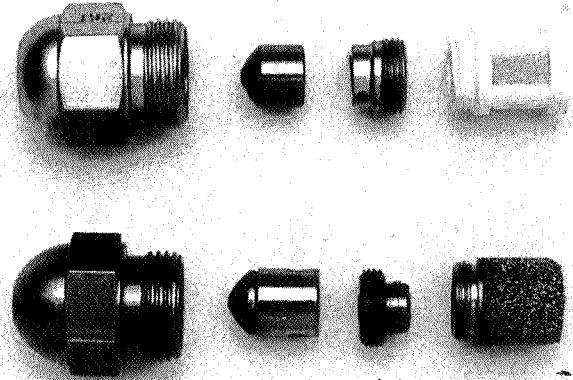
Cleaning the fan runner: use stiff brush.



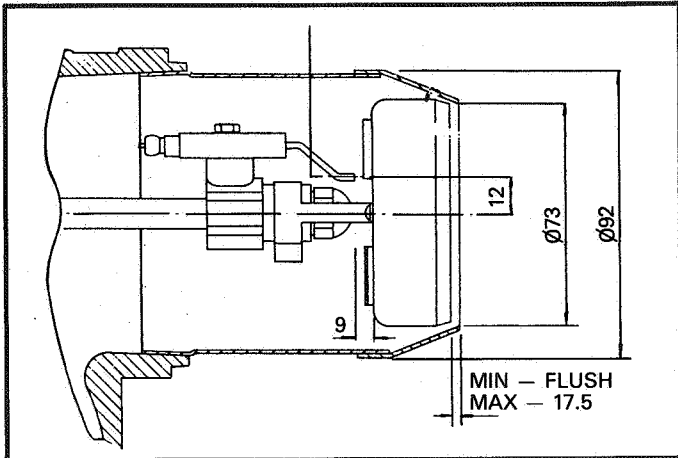
Note diffuser position before removal for nozzle changing/cleaning. Nozzle is removed from inner assembly using a tube spanner. Fit nozzle to burner inner assembly by hand: use spanner only for final tightening. Handle with care to avoid damage to electrode porcelains. REFIT DIFFUSER. See head arrangement drawing opposite.



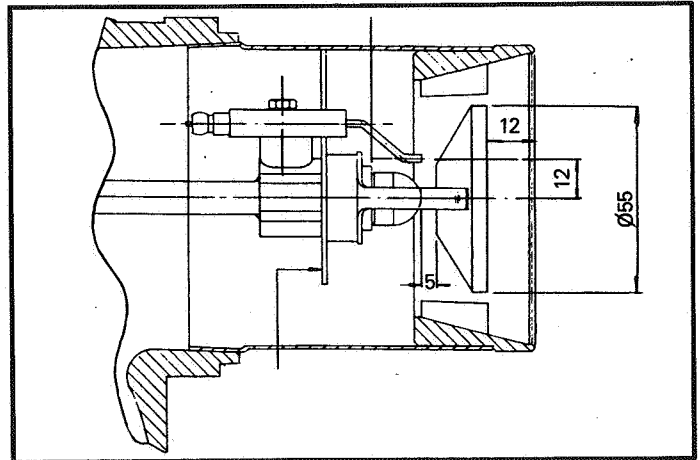
To check pump pressure fit pressure gauge and test manifold. Adjusting pump delivery pressure.



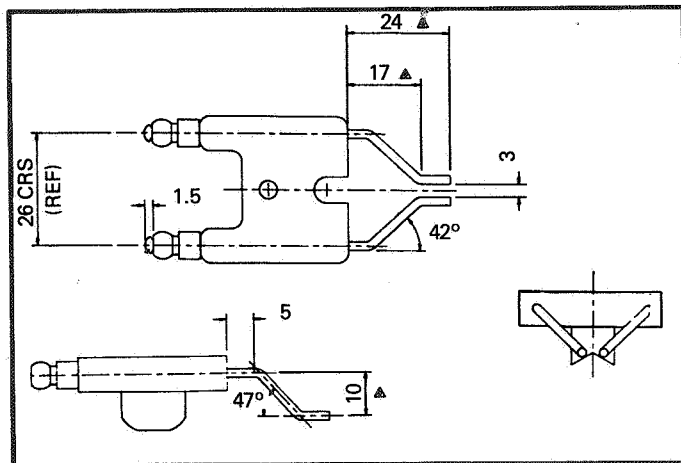
Dismantle nozzle itself to enable internal filter to be cleaned. Do not use any metal or wood to remove deposits. Wash in solvent. Wipe off any remaining dust using a clean, lint-free rag. Illustration shows correct assembly sequence for Danfoss (top) and Monarch (bottom) nozzles. If possible, nozzle should be replaced in preference to cleaning. Care should be taken to use same type, size and spray angle. (Nozzles are calibrated in US gallons/hour – 1.22 US gall = 1 Imp. gall.)



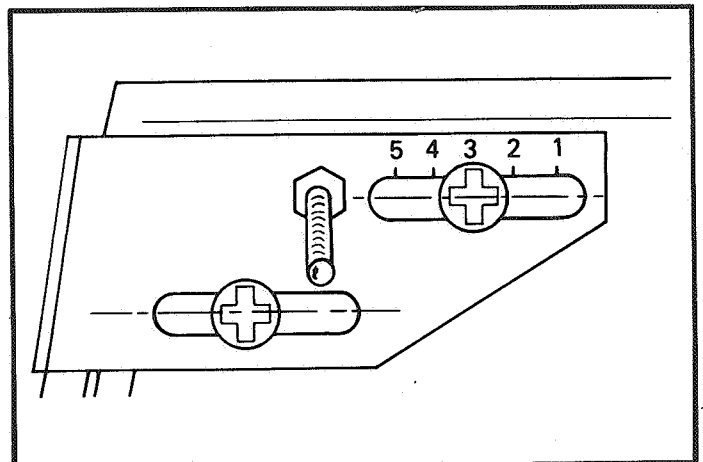
Adjustable head arrangement NOL1 burners. Dimensions in mm.



Adjustable head arrangement NOL2 & NOL3 burners. Dimensions are in mm.



Electrodes should be set to these dimensions to ensure trouble free ignition. Dimensions are in millimetres.



#### COMBUSTION HEAD ADJUSTMENT

Loosen the two Pozidriv screws sufficiently to allow the inner assembly adjustment plate to move easily. The uppermost slot is numbered 1 to 5. The centre of the top fixing screw designates the position of the diffuser. In position 5 the diffuser is fully advanced. In position 1 the diffuser is fully retracted. Positions 2, 3 and 4 are intermediate positions. When the desired setting has been attained tighten both screws.

# BOILERHOUSE INSTRUCTIONS

# NOL1 NOL2 NOL3

These instructions are provided for the benefit of the operator and are intended to be of assistance in making minor adjustments and providing the burner with proper maintenance, cleaning and lubrication. Additional information can be obtained through your installer or from the manufacturer.

## FUEL

The unit is designed to burn light distillate oil Class D (1.5 – 5.5 cSt @ 40°C). (Gas Oil). Or Class C2 (1.1 – 2.0 cSt @ 40°C). Do not attempt to use petrol, or any oil which may contain traces of petrol.

## BOILERHOUSE VENTILATION

It is most important that the boilerhouse has an adequate supply of fresh air for both ventilation and combustion purposes.

## PUMP BLEEDING

If the fuel tank is allowed to drain completely it will be necessary to bleed the oil pump free of air by slackening the plug in the pressure gauge port allowing oil to run through until air free. (See pump instructions.)

## OIL FILTRATION - SEDIMENT REMOVAL

There is an oil strainer inside the body of the fuel pump and a separate oil filter between the oil pipe from the tank and the oil burner. The oil strainer should be removed and cleaned with paraffin during the pre-season check-up. At the same time the oil filter cartridge should be replaced or cleaned, as appropriate for the type fitted. Bleed fuel pump free of air, as described above, to remove any trapped air.

Draw off any accumulation of water or sediment in the fuel tank by opening the sludge cock in the tank bottom, immediately before any new delivery of fuel. Do not run the burner while the tank is being refilled and, if possible, do not restart for one hour after refilling is concluded.

## NOZZLE CLEANING

Nozzles cleaned as required see maintenance photographs. Replace after 2000 hours service.

## STARTING AND STOPPING

Start the burner by setting the thermostat pointer to a figure which is higher than the room or water temperature. Stop the burner by setting the thermostat to a point below this temperature.

The burner may set itself in the 'Safety Lockout' position — this will occur if the burner stops for any reason other than the action of the thermostat — and must then be restarted by pressing the reset button on the flameguard/sequence control. Ask your installer to

instruct you in the proper method of resetting. If frequent resetting becomes necessary, call the service engineer whose name and address should be inserted below.

Do not attempt to start the burner when the fire-box may be full of oil vapour. It is desirable to allow the furnace to cool for about 15 minutes before resetting the control to restart the burner from the 'Lock-out' position.

## EMERGENCY STOP

The burner can be stopped in emergency by opening the wall switch provided on the line between the burner and the electric supply. The installer must identify this switch.

## CHECKING BURNER OPERATION

Inspect burner flame periodically. If it becomes lopsided or smokey, call a service engineer.

When cleaning the room housing the heater unit, always switch off the burner to reduce the amount of dust and lint drawn in through the air inlet.

## SUMMER CARE, AUTUMN RESTART

During the summer months, or whenever heat is not required over a considerable period, the wall switch may be opened. To restart the burner it is only necessary to close this switch.

At the close of the heating season have the furnace cleaned and flues swept. See that the complete burner plant, especially the electric ignition system, nozzle, oil filter etc., is checked over and cleaned by a competent service engineer.

## PREVENTIVE MAINTENANCE

Consult your heating engineer for advice on regular preventive maintenance intervals. It is not possible to recommend a service interval for universal use since operating conditions vary widely from installation to installation.

## CAUTION

Never burn rubbish or refuse in the heater fire-box. Never leave waste paper or rags lying around near the burner or the heater.

## NOTES

Nu-way oil burner training courses are available — for details of specific courses contact the training officer at head office.

## SAFETY

The burner must be operated and serviced in accordance with the procedures detailed within this handbook.

## SPARES

**IMPORTANT:** It is essential when ordering spare parts that model number, serial number and specification number are quoted.



**MODEL**

**NOL1**  
**NOL2**  
**NOL3**

**ELECTRICAL DATA**

Mains Supply (V) 230 + 10% - 15%  
Single phase

Frequency (Hz) 50

Burner Motor (W) 75 (1/10 hp)  
2700 rpm

Start Current (A) 1.0 Capacitor start

Run Current (A) 0.6

Main Fuse (A) 5.0 HRC

Ignition by direct spark from a double wound and suppressed transformer.

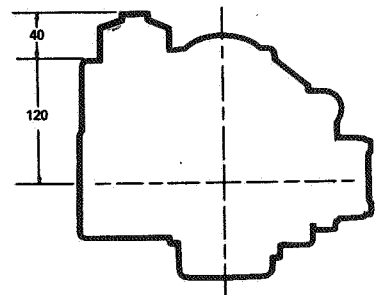
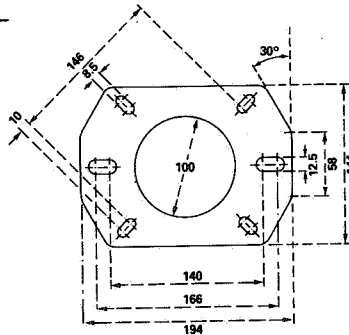
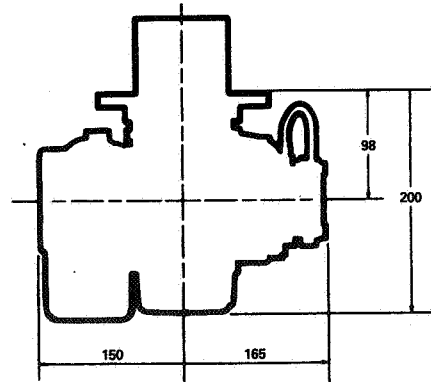
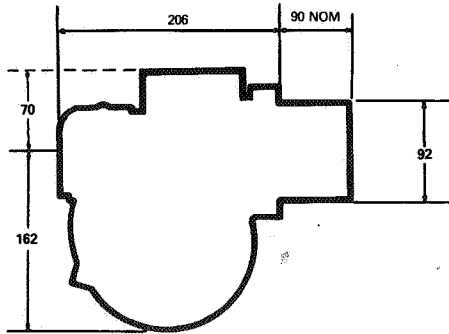
Secondary winding gives 10 kV

23 mA. Centre tap to earth.

Recommended minimum mains cable size - 1 mm<sup>2</sup>.

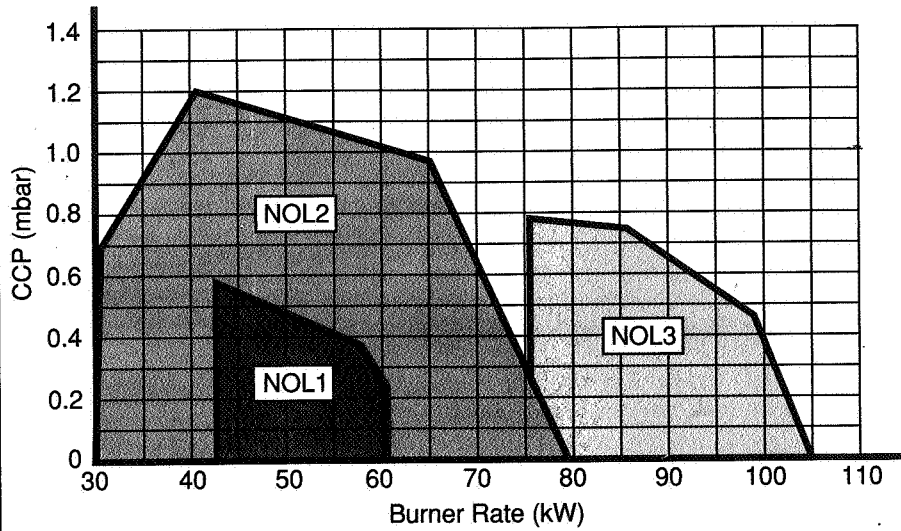
**DIMENSIONS**

All dimensions are in mms



Appliance Frontplate drilling to D.I.N. standards

**BURNER SELECTION CHART**



**BURNER OUTPUT**

Burner outputs shown are based upon an air temperature of 20°C and an altitude of 500m.



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