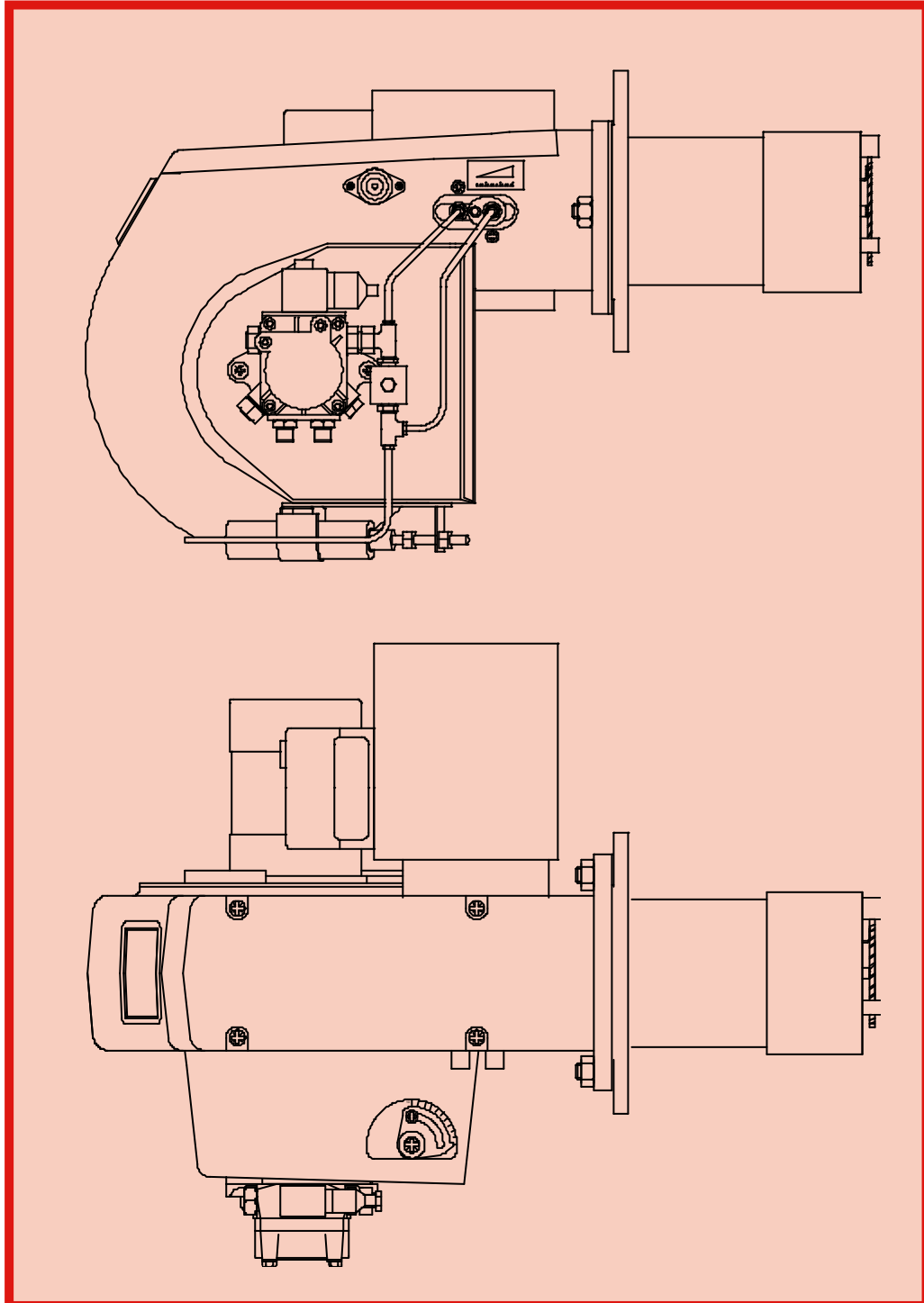


HANDBOOK



Series SD forced draught oil burners Selectos D300, D380 & D420



Light Oil & Kerosene

IMPORTANT - SAFETY

It is essential that qualified engineers who are experienced in pressure jet oil burner commissioning carry out the following instructions and adjustments. The manufacturer cannot be held responsible for any consequential damage, loss or personal injury as a result of failure to follow these instructions, or as a result of misuse.

EMERGENCY INSTRUCTIONS

This product has been designed and constructed to meet all of the essential requirements of the applicable European Directives and under normal circumstances should not give occasion to any hazardous conditions. If such a condition should occur during commissioning or subsequent use of this product, be it a fault of the burner, the appliance or of any instrument, machine or service in the proximity of the burner, then the OIL and ELECTRICITY supply to the burner should be IMMEDIATELY ISOLATED until such time that the fault has been investigated and rectified.

Contents

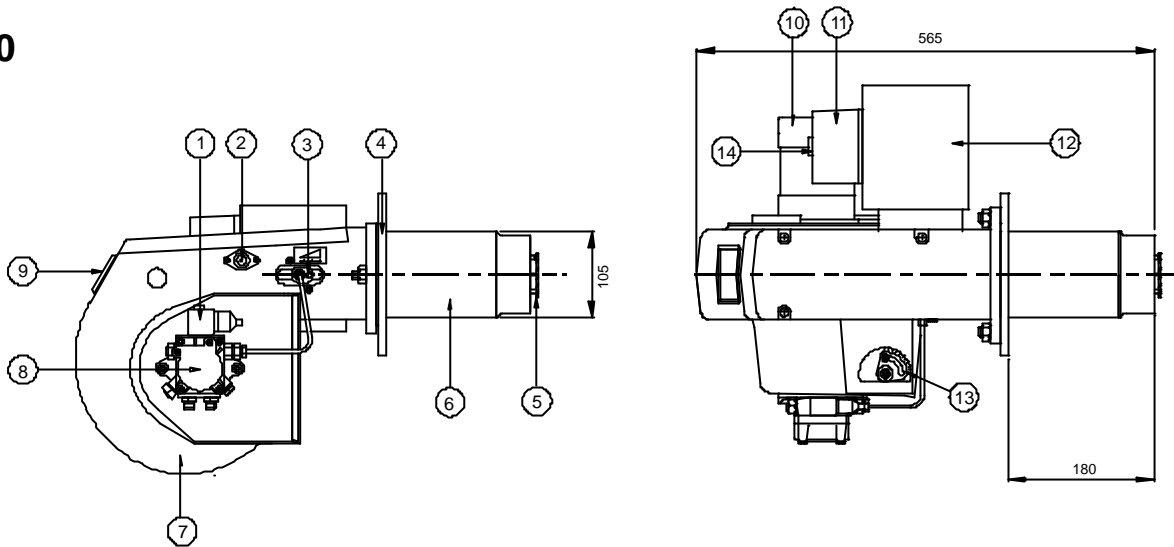
COMPONENT IDENTIFICATION AND DIMENSIONS	4
TECHNICAL DATA	5
OUTPUT RANGE AND RECOMMENDED NOZZLES	5
ELECTRICAL DATA	5
ELECTRODE ADJUSTMENT	5
PERFORMANCE ENVELOPE	5
GENERAL INSTRUCTIONS	6
SAFETY	6
FLUE REQUIREMENTS	6
BURNER ADJUSTMENTS AND SETTINGS	7
BURNER AIR CONTROLS	7
BURNER HEAD SETTINGS	7
PRE-COMMISSIONING	8
COMMISSIONING - SINGLE STAGE (ON/OFF)	8
COMMISSIONING - TWO STAGE (HIGH/LOW)	9
BURNER SEQUENCE CONTROLLER	10
PUMP INSTRUCTIONS AS67	11
ROUTINE MAINTENANCE	12
GENERAL	12
DAILY CHECKS	12
FAN	12
PHOTOELECTRIC CELL	12
REPLENISHING THE FUEL SUPPLY	12
COMBUSTION SURFACE	12
FILTERS	12
MOTOR	12
FAULT FINDING	13
COMMISSIONING SHEET	14
BURNER SERVICE RECORD	15

COMPONENT IDENTIFICATION AND DIMENSIONS

All dimensions in mm

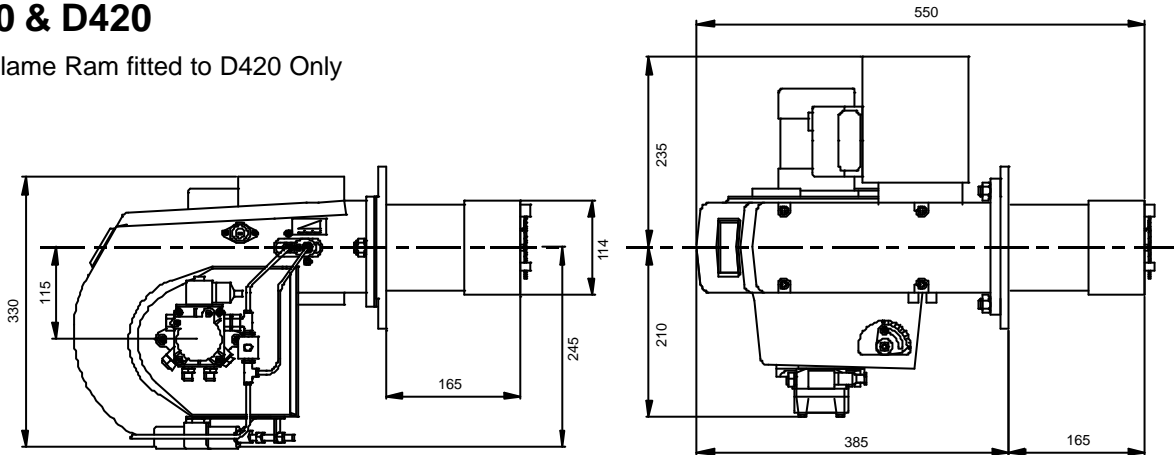
Standard Projection Shown

D300



D380 & D420

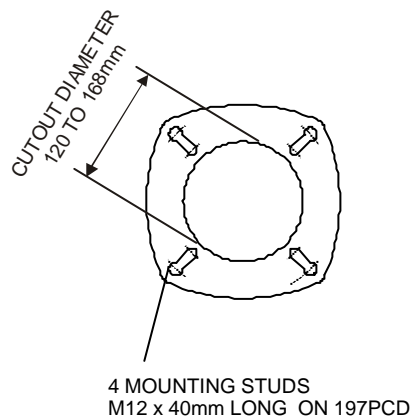
High Flame Ram fitted to D420 Only



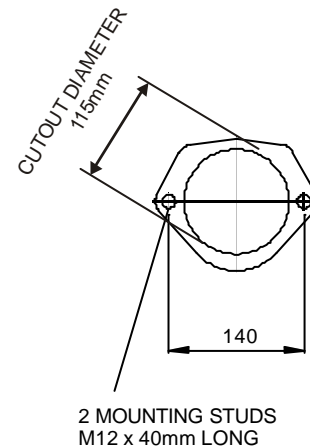
Item	Description
1	Main Solenoid
2	UV Cell
3	Head Adjustment
4	Mounting Flange
5	Diffuser
6	Flame Tube
7	Fan Case
8	Fuel Pump
9	Sight Glass
10	Fan Motor
11	Control Box
12	Control Panel
13	Damper position
14	Reset/Lockout Button

MOUNTING DIMENSIONS

WITH MOUNTING FLANGE



WITHOUT MOUNTING FLANGE
(D300 ONLY - ADD 12MM TO PROJECTION)



TECHNICAL DATA

Model D300, D380 & D420

OUTPUT RANGE AND RECOMMENDED NOZZLES

Burner Model	Operation	Output (kW)	Oil Capacity (kg/h)	Recommended Nozzle*	Pump Pressure (psi)
D300	On/Off (Single Nozzle)	150-300	11.9-23.8	Monarch 60° PLP	150-170
D380	On/Off (Two Nozzle)	220-380	17.5-30.2	Monarch 45° PLP	150-150
D420	High/Low (Two Nozzle)	200-420	15.9-33.3	Monarch 45° PLP	150-180

Calculated with calorific value of 12.6 kW/kg

RECOMMENDED NOZZLE*

Because of different and varying applications it is not possible to state a definite spray angle or spray pattern.

DIFFUSER POSITION

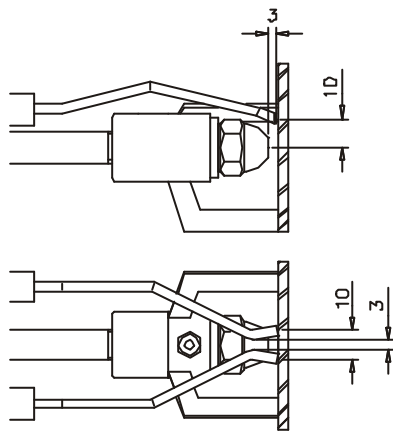
The diffuser position relative to the nozzle tip needs to be adjusted according to spray angle. See page 7.

ELECTRICAL DATA

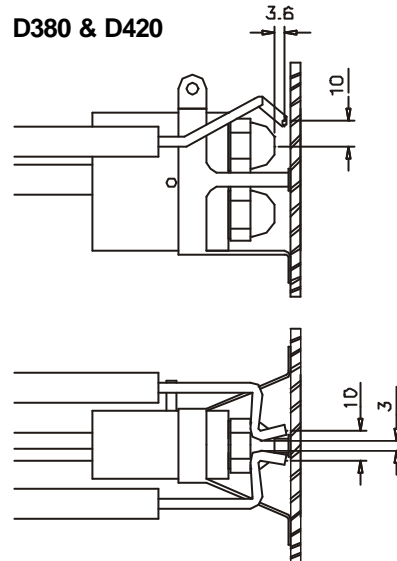
Supply	Motor	Start Current	Main Fuse
230v, 50Hz, 1 or 3 phase	250w	7.0A	10.0A

ELECTRODE ADJUSTMENT

D300

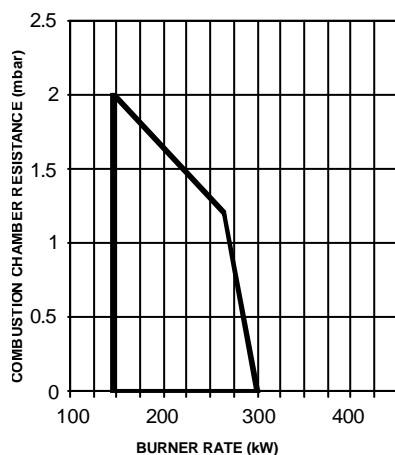


D380 & D420

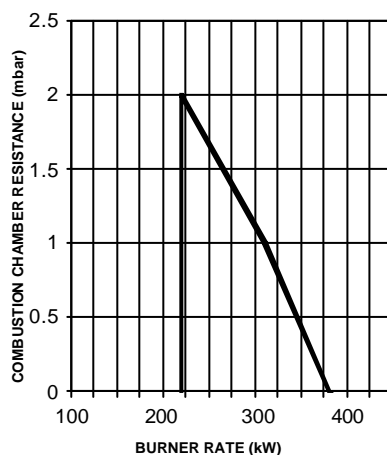


PERFORMANCE ENVELOPE

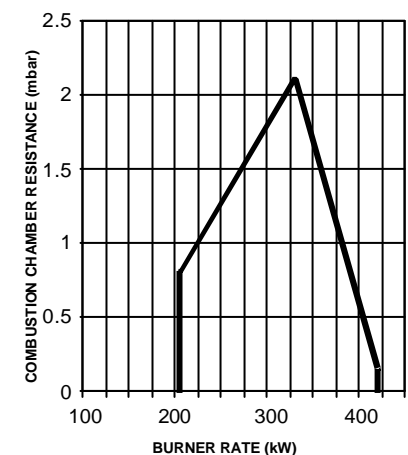
D300



D380



D420



GENERAL INSTRUCTIONS

SAFETY

The installation of an oil burner should be carried out in accordance with local regulations. The installer of the burner must therefore be aware of all regulations relating to oil and combustion.

These instructions should be left in a prominent place adjacent to the burner.

The end user of the burner should be instructed about the operation and safety features of the burner.

The end user should also be made aware of the importance of the area around the boiler/burner being kept free of combustible material.

FUEL STORAGE AND HANDLING

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 (14°F).

If the burner is replacing an existing burner, make sure that the oil filter is replaced or cleaned.

FUEL SUPPLY

This burner is suitable for use with:- Class C2 (1.1-2.0cSt) Kerosene or Class D (1.5-5.5cSt) Light Gas Oil in combination with a suitable oil filter before the oil pump.

The oil line should consist of copper tube (NEVER galvanised steel). The final connection to the pump inlet port is made with a flexible pipe supplied with the burner. Joints should be made with compression fittings.

When gravity feed is used, the maximum head should not exceed 4m, (0.35 Bar).

On installations where the fuel tank is situated below the level of the burner the maximum suction permitted is 0.40

Bar and a two-pipe (supply and return) fuel supply system MUST be used.

Note that the pump is factory set for single pipe installation. Conversion to a two-pipe system is detailed in the pump section of this manual.

The fuel pump fitted is suitable for single pipe gravity or two pipe suction lift systems. The filter supplied with the burner is of the disposable element type.

FLUE REQUIREMENTS

The flue and chimney must be constructed and installed to the appropriate local conditions, Codes, and Standards. It shall be of sufficient size to satisfy the volume of flue gases at all firing conditions.

Condensation in the chimney must be avoided. The risk is increased if the area of the chimney flue is too large.

MAINTENANCE

The boiler/burner should be examined regularly for any signs of malfunction or oil leakage.

Refer to the maintenance section of this handbook for detailed instructions.

PLANT ROOM VENTILATION

An adequate dust free supply of fresh air is required for the burner at both high and low level in accordance with the appropriate standards.

ELECTRICAL POWER SUPPLY

The main Electrical supplies to the burner must have a means of disconnection which has a contact separation of at least 3mm in all poles.

Connect a single or three phase 50Hz electrical supply to the burner observing all applicable IEE Regulations.

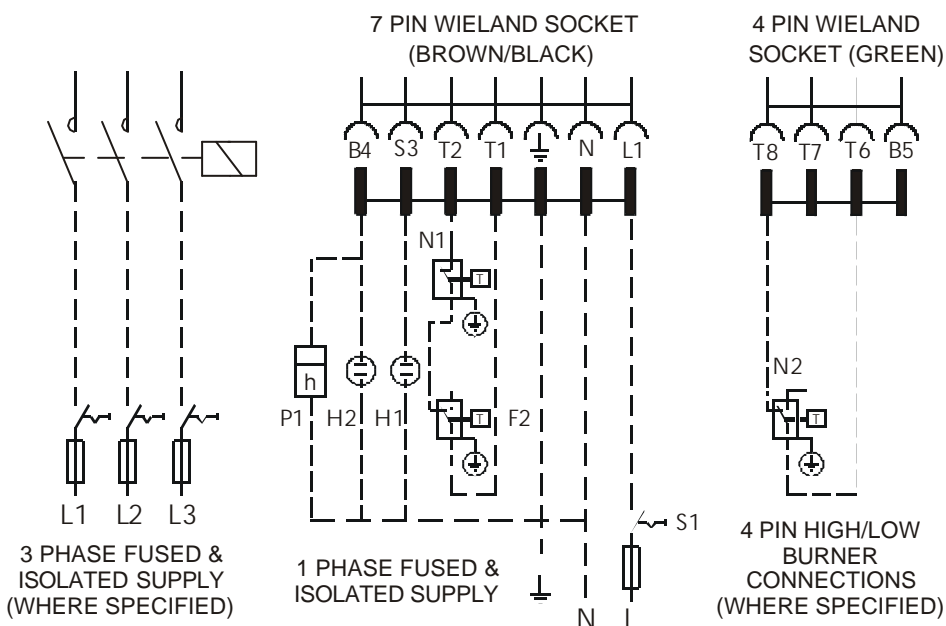
Connect all of the applicable external auxiliary controls.

Refer to the electrical supply specifications and connection diagrams shown.

Ensure that adequate earthing is provided for motor supply.

If supplied as a packaged appliance/burner unit refer to the manufacturers instructions.

ELECTRICAL CONNECTIONS



ITEM	DESCRIPTION
F2	Appliance Limit Instrument
H1	Burner Fault Signal
H2	Burner Operating Signal
H3	Burner High Flame Signal
N1	Appliance On/Off Instrument
N2	Appliance High/Low Instrument
P1	Burner Operating Hours Run Counter
S1	Supply On/Off Switch

BURNER ADJUSTMENTS AND SETTINGS

BURNER AIR CONTROLS

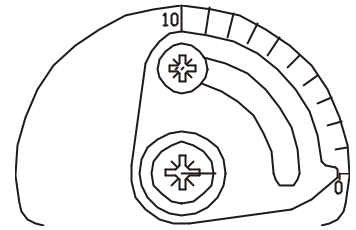
D300 & D380 SINGLE STAGE (ON/OFF)

Air for combustion is controlled by an adjustable air flap located inside the air inlet on the right hand side of the burner, viewed from the rear. A quadrant calibrated 0 - 10 for the visual setting of the air control is located on the top of the air inlet. To increase the flow of combustion air, slacken the locking screw and turn the air flap quadrant anti-clockwise. To decrease the flow of combustion air turn the air flap quadrant clockwise. Re-tighten the locking screw after any adjustments are made.

A table is provided below giving approximate setting positions for the air control according to firing rate.

Full combustion analysis should be performed for the precise setting of the air damper as described in the commissioning instructions.

**AIR ADJUSTMENT D300
ON/OFF**



D420 TWO STAGE (HIGH/LOW)

Air for combustion is controlled by an hydraulic ram mechanism located on the underside of the air inlet on the right hand side of the burner, viewed from the rear. A quadrant calibrated 0 - 10 for the indication of the position of the air control is located on the underside of the air inlet.

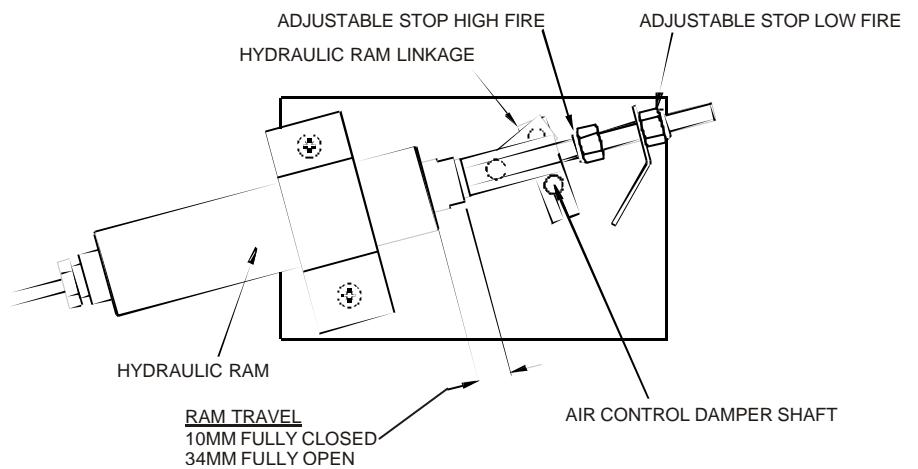
To increase the flow of combustion air for the low fire position turn the adjustable stop towards the ram.

To increase the flow of combustion air for the high fire position turn the adjustable stop towards the ram.

A table is provided below giving approximate setting positions for the air control according to firing rate.

Full combustion analysis should be performed for the precise setting of the air damper as described in the commissioning instructions.

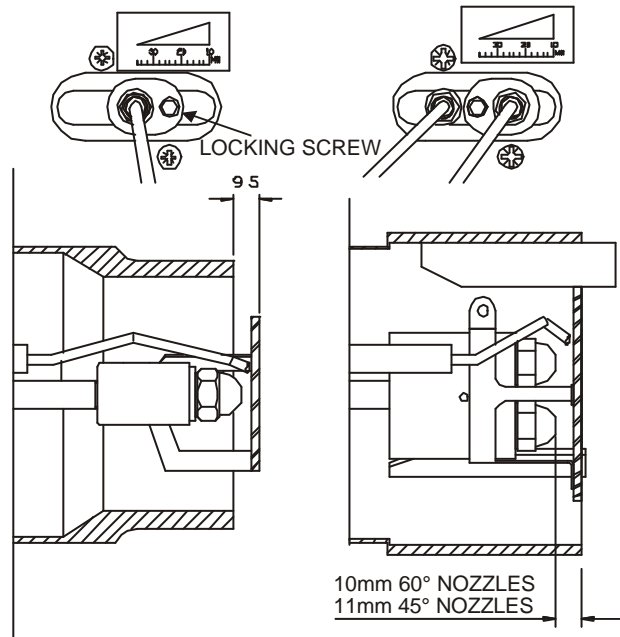
**AIR ADJUSTMENT D380
& D420 HIGH/LOW**



HEAD ADJUSTMENTS

D300

D380/D420



BURNER HEADS SHOWN IN CENTRE POSITION

ADJUSTMENTS

HEAD SETTING

The burner head is preset to the centre of the adjustment slot as shown in the illustrations. Adjust the head position according to firing rate using the table below as a guide.

NOZZLE SETTING

Adjust the position of the diffuser relative to the nozzle tip according to the spray angle of the nozzle fitted. The dimensions are shown in the diagram opposite.

MODEL	MINIMUM	DAMPER SETTING	HEAD SETTING (From centre)	MAXIMUM	DAMPER SETTING	HEAD SETTING (From centre)
D300	150kW	3	+4.5mm	300kW	5.5	+4.5mm
D380	220kW	4	-11mm	380kW	6	-8mm
D420	200kW	4	-11mm	420kW	6.5	-5mm

PRE-COMMISSIONING

Before commissioning, the installation should be checked to see that it is complete, 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 suitable test equipment.

The burner should be inspected to make sure that it has suffered no damage during transit, storage or installation.

The motors on these burners are normally single phase, although three phase may be fitted on a specific request.

Turn on the main switch and check the motor rotation. The motor should rotate in an anti-clockwise direction as viewed from the cooling fan end.

For three phase motors if the motor rotates clockwise interchange any two phases on the incoming mains supply and re-test. If a single phase motor is not rotating correctly it must be replaced.

FINAL CHECKS

Check that oil supply pipework is correctly sized and has been checked for leakage.

Check that oil is available at the fuel pump at the correct pressure.

Check or fit nozzles of correct size for appliance.

Check that the electrode setting is correct.

Check that the head settings are correct.

Check that the fuel to be burnt is of the same class as that for which the burner has been built and set.

COMMISSIONING - SINGLE STAGE (ON/OFF)

Connect a pressure gauge to the pressure port on the pump.

Switch on the burner.

There is a pre purge period during which the ignition is on and the motor is running.

At the end of this period the magnetic oil valve will open and the burner will light.

Check the oil pressure. (Recommended pressures are given in the tables on page 5.

If during start-up if the flame fails to be established the photocell will detect this and shut down the burner. The 'lockout' lamp on the sequence controller will be illuminated. The 'lockout' lamp requires manual reset.

Adjust the air damper to give a clear, but not sparky, flame. The flame should be clear with a continuous halo visible around the outer edge of the diffuser.

If there is flame failure during operation, the burner will shut down, and a single restart cycle will follow.

Turn off the burner at the main switch. The flame should go out immediately, the oil pressure gauge falling to, or just above, zero.

Start the burner again and take combustion readings from as close to the burner as possible. Note: Care must be taken to ensure that there are no points at which air can leak into the system before the sampling point.

Specific figures for CO₂ and for smoke numbers may be included in the equipment manufacturer's instructions. If not, the CO₂ should be within 11.5% to 12.5% at smoke number 1 or less. Make small adjustments to the air damper until the correct combustion is achieved.

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.

Switch off the burner.

Restart the burner and remove the photocell from its holder and cover whilst the burner is running. The flame should extinguish within 2 seconds. The control attempts to re-start the burner. As the photocell cannot see light, the control will go to lockout.

Finally tighten all associated locking devices and remove the pressure gauge.

Check for vibration and for oil leaks.

Complete the commissioning sheet at the rear of this handbook.

COMMISSIONING - TWO STAGE (HIGH/LOW)

Connect a pressure gauge to the pressure port on the pump.

There is a low flame hold link inside the burner terminal box (marked LFC), open this to hold the burner in the low flame position. If this is not fitted 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.

There is a pre purge period during which the ignition is on and the motor is running.

The burner should light on low flame.

Check the oil pressure. (Recommended pressures are given in the tables on page 5.

If during start-up if the flame fails to be established the photocell will detect this and shut down the burner. The 'lockout' lamp on the sequence controller will be illuminated. The 'lockout' lamp requires manual reset.

Adjust the low flame damper stop to give a clear, yet not sparky flame. The flame should be clear with a continuous halo visible around the outer edge of the diffuser.

If there is flame failure during operation, the burner will shut down, and a single restart cycle will follow.

Turn off the burner at the main switch. The flame should go out immediately, the oil pressure gauge falling to, or just above, zero.

Replace the low flame hold link, 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, the hydraulic ram will operate and the burner will change smoothly to high flame.

Adjust the high flame damper stop to produce a clear yet not sparky flame. There should be a continuous halo of flame surrounding the outer edge of the diffuser.

Turn the burner to low flame by means of the low flame hold link, or by reducing the setting of the H/L control instrument to check that this operation takes place smoothly.

Run the burner on low, and on high flame, while taking CO₂ and stack temperature readings as close to the appliance 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 appliance manufacturer's instructions. If not, the high flame CO₂ should be within the band of 11% to 12% and the low flame about 1% lower than these figures.

Smoke readings should not exceed No. 2 on low flame and No.1 on high flame on the Bacharach Scale under steady flow conditions.

Adjust the damper stops as necessary, and finally tighten all associated locking devices.

Restart the burner and remove the photocell from its holder and cover whilst the burner is running. The flame should extinguish within 2 seconds. The control attempts to re-start the burner. As the photocell cannot see light, the control will go to lockout.

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 eliminate tripping on overswing of temperature or pressure, yet will shut the burner down before overheating can occur.

Set all of 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.

Finally tighten all associated locking devices and remove the pressure gauge.

Check for vibration and for oil leaks.

Complete the commissioning sheet at the rear of this handbook.

BURNER SEQUENCE CONTROLLER

OIL BURNER CONTROL: SATRONIC TF 830B/TF 830B.2B/TF 832.3

This is the standard control box used for this burner, check the actual control box fitted before proceeding. If there is a different control box fitted contact Nu-way technical department if assistance is required.

FUNCTION

1. Switch on operating switch and thermostat

The burner motor starts, an ignition spark is formed, the prepurge goes on until the prepurge period expires and the solenoid valve opens (2).

2. Solenoid valve opens

Oil mist is formed and ignited. The photoelectric cell recognises the flame.

3. The safety time expires

- If no flame is established before this time limit the control cuts out.
- If the flame disappears after this time limit, the burner will make an attempt to re-start.

4. Ignition spark stops

The ignition spark stops 20s after flame recognition and the burner is in operating position.

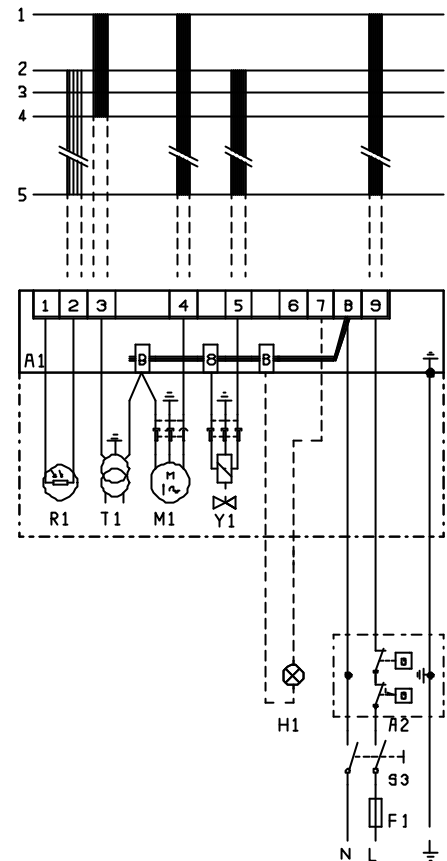
4-5. Operating position

If the burner operation is interrupted by means of the main switch or the thermostat, a restart takes place when the conditions in point 1 are fulfilled.

The oil burner control cuts out

A red lamp in the control is lit. Press the reset button and the burner re-starts.

**WIRING DIAGRAM
TF830**



LIST OF COMPONENTS

A1	Oil burner control	Y1	Solenoid valve
M1	Burner motor	R1	Photoelectric cell
A2	Twin thermostat	S3	Main switch
F1	Fuse, max. 10A	T1	Ignition Transformer
H1	Alarm lamp		

Optional Components

P1	Time meter	H2	Signal lamp
----	------------	----	-------------

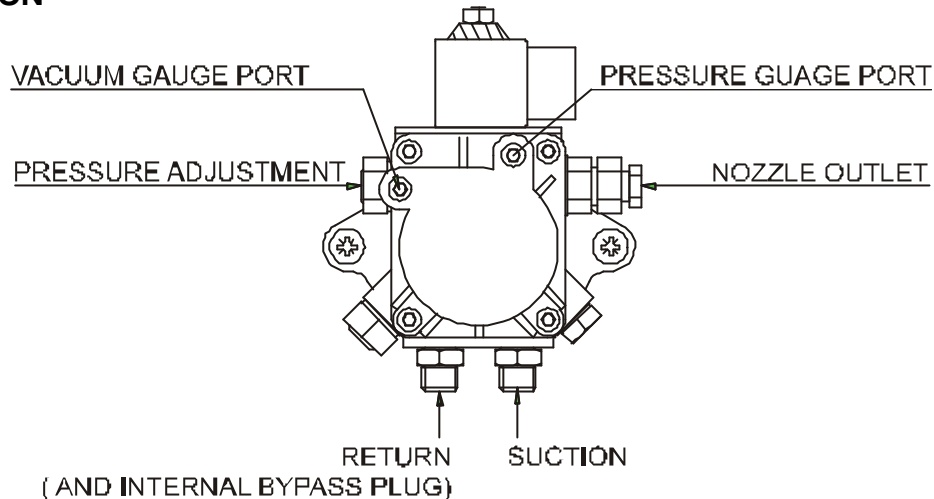
Mains connection and fuses must be in accordance with local regulations.

TECHNICAL DATA

Pre-ignition time:	12 s		
Pre-purge time:	12 s		
Safety lock-out time:	10 s		
Post-ignition time:	TF830	20 s/TF832	2.5s
Reset time after lockout:	min. 60 s		
Reaction time on flame failure:	max. 1 s		
Ambient temperature:	from - 0 to +60°C		
Min. current with flame established:	30µA		
Enclosure:	IP 44		

PUMP INSTRUCTIONS AS67

IDENTIFICATION



CONNECTION SIZES

Inlet and return G 1/4

Nozzle outlet G 1/8

Pressure gauge ports G 1/8

Vacuum gauge port G 1/8

PRESSURE RANGE

Inlet pressure 2 bars max.

Return pressure 2 bars max.

Nozzle pressure range 7- 14 bar

Suction height 0,45 bars max. vacuum to prevent air separation from oil.

OPERATING VISCOSITY

2 - 12 mm²/s (cSt)

FUNCTION

When the oil pump is started, oil is drawn from the suction connection through the filter to the gear wheel.

The gear wheel then pumps oil to the pressure side and the oil is put under pressure.

The pressure is controlled and kept constant at the set value by the regulating valve and diaphragm.

The regulating valve distributes the oil quantity supplied by the gear set between the nozzle port and the return side of the pump.

The oil quantity used is determined by the set pressure on the regulating valve and the size of the oil nozzle.

The valve functions in the following way:

-When the opening pressure has been reached, the passage to the return side opens.

-The diaphragm and the spring keep the pump pressure constant at set value.

-If the pump is overloaded, i.e. if you try to get out more oil than the gear set can supply under existing circumstances, the oil pressure falls below the set value and the valve against the return side closes against the return side.

BY PASS PLUG

The bypass plug is to be inserted into the return port for two-pipe system

To remove the bypass plug use a 4 mm Allen key, the pump is now set for single pipe system.

BLEEDING

Bleeding in two pipe operation is automatic the process may be accelerated by opening a pressure port.

In single pipe operation, a pressure port must be opened to bleed the system.

SOLENOID

A solenoid valve is fitted which controls the regulator cut-off valve giving fast cut-off and cut-on function independent of the motor speed

The solenoid valve of the AS pump is of the "normally opened" type.

CONTINUOUSLY RUNNING FAN

For burners fitted with a continuously running fan which operates in excess of ten minutes per hour, provision will be required to stop the fuel pump overheating.

The recommended method is the two-pipe system back to the tank, however, dependent on site conditions, it may be sufficient to use a long bypass loop external to the fuel pump.

ROUTINE MAINTENANCE

Warning: Before performing any service operation isolate the electricity supply and the oil supply.

GENERAL

It is vitally important that personnel responsible for the day to day operation and maintenance of the plant are instructed by the commissioning engineer on the basic function of the burner as well as the need for routine maintenance and daily checking of burner operations.

Final adjustments, which will have been made during the commissioning, must be recorded on the *Commissioning Sheet* at the back of this manual.

The burner should be kept clean inside and out. It will be more reliable, and if an oil leak occurs it will be spotted more readily.

DAILY CHECKS

Inspect the burner daily to check if there is any variation from the correct operating sequence, as follows:

Check the oil pressure.

If there is an inspection window on the appliance through which the ignition spark and flame can be observed, ignition and flame should be inspected and any irregularities that are observed should be rectified i.e. nozzle/electrodes cleaned and any deposits removed from the inside of the flame tube and diffuser.

FAN

The fan should be cleaned using a stiff brush. If the fan has been damaged or becomes loose on the motor shaft it should be replaced.

PHOTOELECTRIC CELL

Remove the photoelectric cell and clean with a soft lint free cloth. Be careful not to touch the glass bulb of the cell as this can lead to premature failure of the unit.

REPLENISHING THE FUEL SUPPLY

It is usual practice to shut the burner off whilst delivery of fuel is being made and allow approximately 30 minutes for any sediment to settle before restarting the burners.

COMBUSTION SURFACE

Keep the boiler combustion surfaces and flueways clean. Any accumulation of soot will decrease the efficiency of the boiler and increase the flue gas exit temperature. Always cover up the burner during cleaning operations.

FILTERS

A filter is fitted within the pump, to gain access remove the pump access plate as shown in the pump instruction in this handbook.

Withdrawn the filter and clean it using paraffin or other suitable solvent and a stiff brush.

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

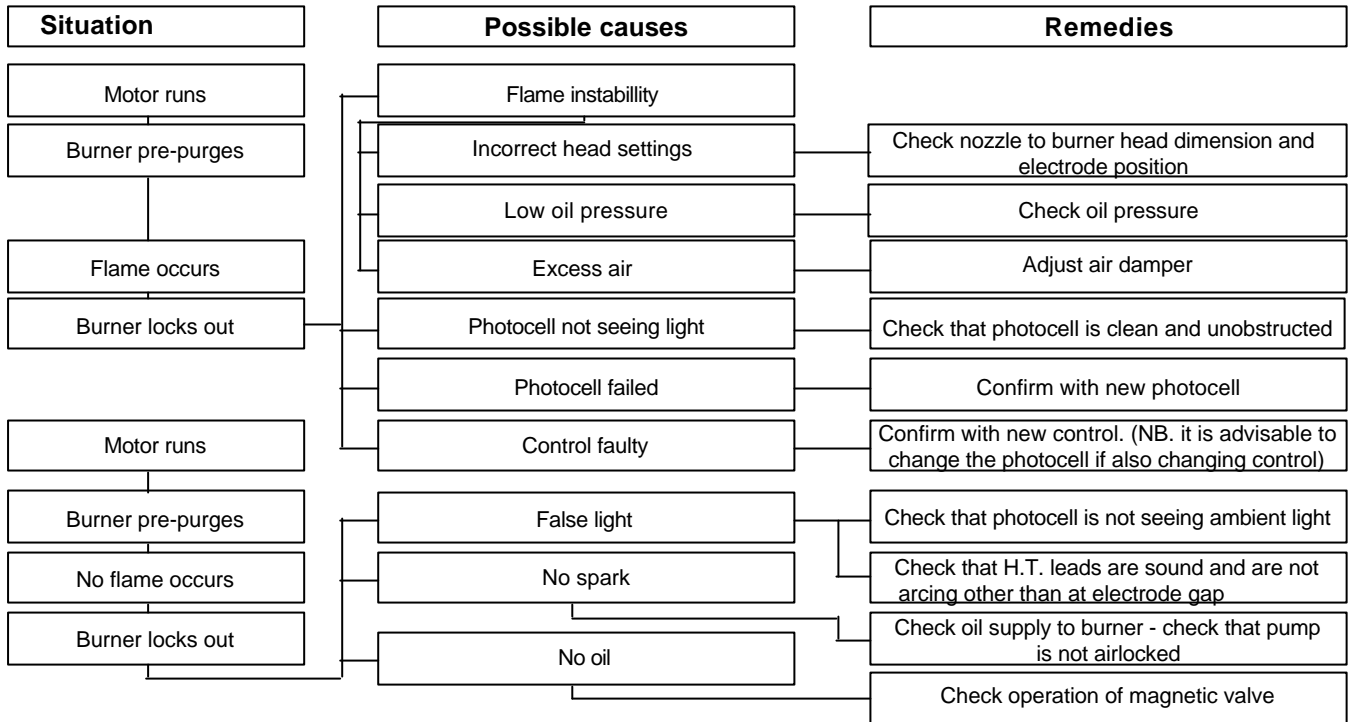
There should also be a filter in the fuel supply line, this should be cleaned in the same way unless it has a disposable filter which should be replaced.

MOTOR

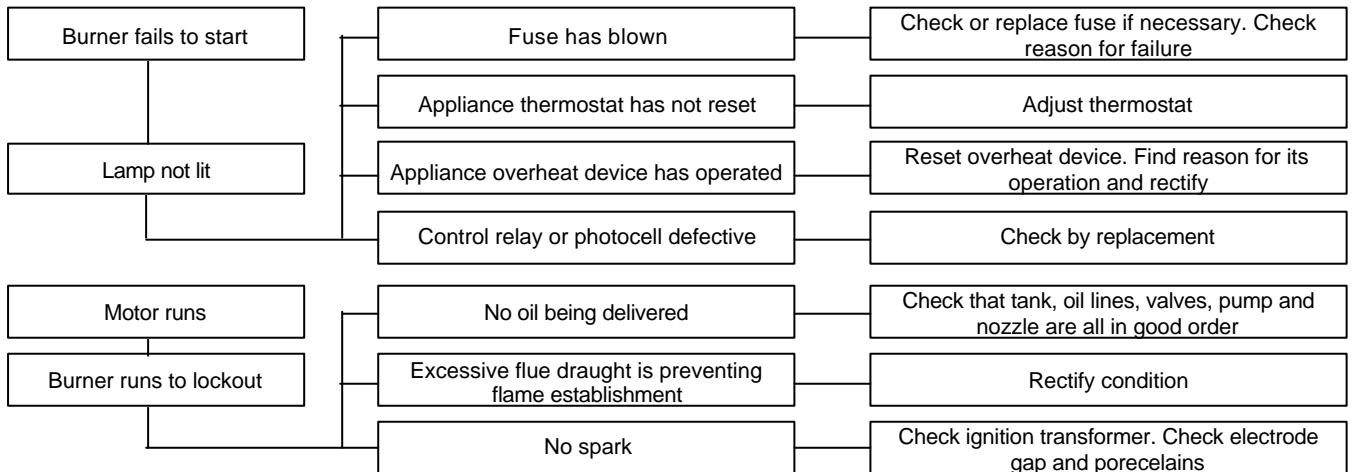
The motor fitted to this burner requires no maintenance, It has sealed bearings that are lubricated for the life of the motor.

FAULT FINDING

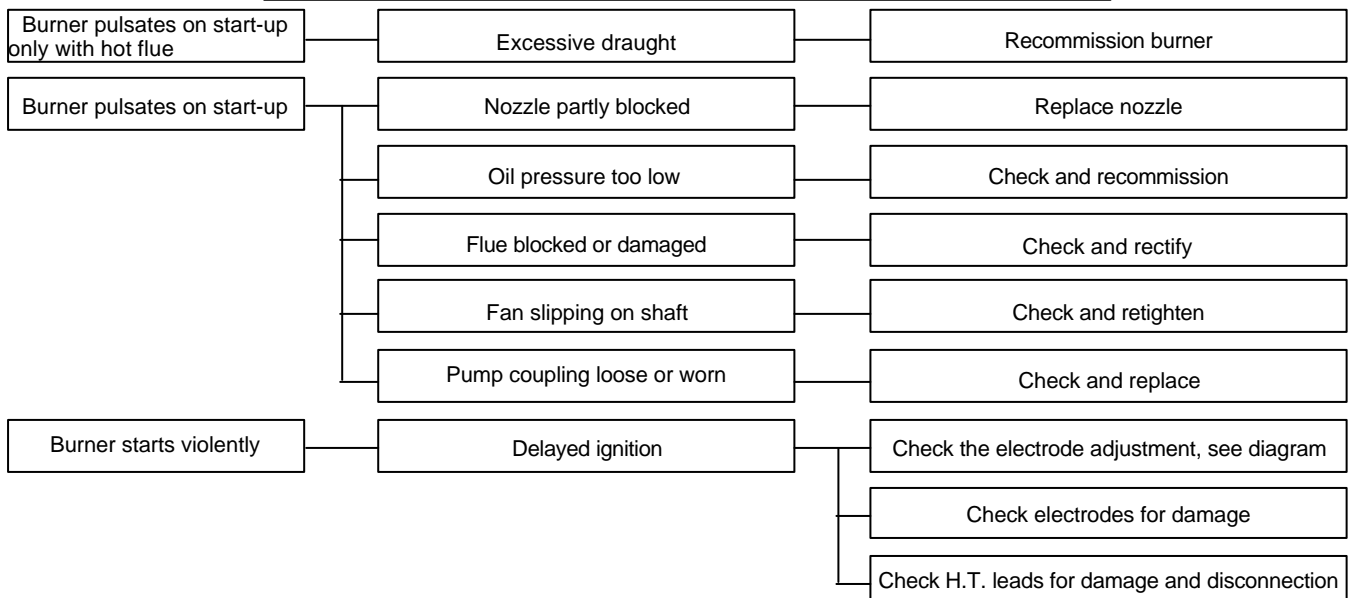
BURNER FAILS TO START



BURNER FAILS TO START AFTER NORMAL OPERATION



DELAYED IGNITION, BURNERS STARTS VIOLENTLY



COMMISSIONING SHEET

CUSTOMER/SITE ADDRESS:	CONTRACT NO:
BOILER TYPE/DETAILS:	Rating:
BURNER TYPE/DETAILS:	Serial No:
Nozzles (Make/Size/Angle):	Spec No:
Oil Viscosity:	Production Date:

Boiler Room Ventilation (BS 6644)	Satisfactory		Unsatisfactory	
Flue Check (Visual) (BS 5440)	Satisfactory		Unsatisfactory	
Oil Leaks (Visual)	Satisfactory		Unsatisfactory	

COMBUSTION DETAILS								
CO ₂	%							
Smoke Number								
Ambient Temp.	°C							
Gross Stack Temperature	°C							
Chamber Pressure	mbar							
Draught Smoke Flood								
Fan Static	mbar/mm							
Oil Temperature	°C							
Oil Pressure Atomising	bar							
Spill Pressure	bar							
Oil Throughput:	cal/metre							
Boiler	Temperature / Pressure							
Boiler Starting Resistance	mbar/mm							
Air Control Setting	%							
P E Signal								
MM Position - Air								
MM Position - Fuel								

CHANGE TO SPECIFICATION:

.....

SATISFACTORY / UNSATISFACTORY NAME:

SIGNED: DATE:

BURNER SERVICE RECORD

The details below are to be completed by the Servicing Engineer
This sheet to be completed and signed following each service / adjustment

DATE	DETAILS OF SERVICE	SIGNATURE

NU-WAY LIMITED, P O Box 1, Vines Lane,
Droitwich, Worcs, WR9 8NA, England.
Tel: (01905) 794331 & 794242 (Direct Dial)
Fax: (01905) 794017 & 795829 (Spares Dept)
E-mail: info@nu-way.co.uk
Website: www.nu-way.co.uk

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

An Enertech Group Company