

BUBBLE PJ MAX MARINE

230 VAC Automatic Pressure Jet Diesel Boiler Horizontal and Vertical versions
CE - C17873A 08-04-03

Front View Vertical Boiler



Front View Horizontal Boiler



<http://www.bubbleproducts.co.uk/>

Index

1. Service and Maintenance.	2
1-1. Service the Eco Flam Max Burner (See Sec 5.)	3
2. Service the boiler.	3
2-1. To remove the burner from vertical version boiler.	3
2-2. Service the Horizontal Boiler.	3
2-2-1 To Remove the burner from horizontal version boiler.	3
2-3. Clean out the flue system.	3
2-4. Checking for Down Draught.	3
2-5. Inspecting the oil line.	3
2-6. Inspecting the fuel filters and change where necessary.	4
2-7. Inspecting the firevalves.	4
2-8. Checking the provision of ventilation.	4
2-9. Checking the Flue Gas Emissions.	4
2-10. Burner Combustion Data.	4
3. Fault Finding.	4
3-1 Boiler internals must be free from obstructions.	4
3-1. Optional Digital Data Logger	5
3-2. Black Smoke is emitted from the flue terminal.	6
3-3. Light Grey smoke is heavily emitted from the flue terminal.	6
3-4. Burner goes to lockout after initially firing up for a short period.	6
3-5. Burner locks out and will not attempt to Ignite.	6
3-6 Burner is completely dead with no lock out light showing.	6
3-7. External controls faults.	7
3-8. Inverter faults.	7
3-9. Flue and exhaust faults.	7
4. Vertical Boiler parts.	7
FIG 1	7
FIG 2	8
FIG 3	8
5. Burner Exploded Parts.	9
5-1. Burner Parts List	10
6. Amendments.	2

1. SERVICE AND MAINTENANCE.

Depending upon the intensity of its use, the boiler should be serviced once or twice per year.

OFTEC registered, oil fired service engineers should be able to service the boiler as per the routine maintenance section.

OFTEC can be contacted on 0845 65 85 080 they have details of all registered service engineers in the UK.

www.oftec.org

Ecoflam Technical department can be contacted on 01905 788010 (U.K.)

www.ecoflam-burners.com

Bubble Products - Harworth Heating can be contacted on 01302 742520.

<http://www.bubbleproducts.co.uk/>

www.harworthheating.co.uk

Before any service work is carried out make sure that the appliance is fully and safely isolated.

Do not work on 230VAC systems without adequate training or in damp / wet conditions.

Make sure that RCD protection is functioning correctly.

Adequate Clearance for burner removal.

Vertical Boilers 100mm clearance required above the burner to allow it to be withdrawn vertically.

Horizontal Boilers 100mm clearance required in front of the burner to allow it to be withdrawn horizontally.

1-1. SERVICE THE ECO FLAM MAX BURNER (SEE SEC 5.)

Remove the burner from the boiler.

The burner is held in place via 1 x 8mm nut which should be loosened to allow the burner to be rotated slightly and lifted out of the mounting flange. See item 4 fig 3 and Item 29 in section 5.

Remove and clean the dust from the internals and externals of the burner. See sec 5

Remove the flame tube (23- 5) via two fasteners at the base of the tube and clean the air diffuser (27-5) and flame tube.

Examine and if necessary, adjust the electrode. (22-5)

Change the nozzle every second year. Nozzle screws into (26-5) Nozzle is Danfoss .4 x45 deg solid

Remove and clean the photocell. (14-5)

If considered necessary, check the fuel pump pressure. (Fuel Pump is 1-5) This should not need adjusting as it is set at the factory but we have had instances where it has been altered mistakenly.

2. SERVICE THE BOILER.

2-1. TO REMOVE THE BURNER FROM VERTICAL VERSION BOILER.

Slip the flue pipe up away from the boiler flue spigot.

The boiler has front and rear removable top plates held in place by 6 x m10 fasteners. See items 3 and 6 Fig 3

Undo the fasteners and remove the front top plate under which is a ceramic top board (11 FIG2) and then remove the rear top plate. (3 FIG3)

When the rear top plate has been removed withdraw the 4 baffles underneath it. (7 FIG2)

Clean all of the internals of the boiler and vac the debris out making sure that all the internal surfaces of the boiler are clean and soot free.

Make sure that the base of the boiler is clean and free from soot or any other residual debris.

When this is done, rebuild the boiler in reverse order.

2-2. SERVICE THE HORIZONTAL BOILER.

2-2-1 TO REMOVE THE BURNER FROM HORIZONTAL VERSION BOILER.

Slip the flue pipe up away from the boiler flue spigot.

The boiler has front and rear removable front plates held in place by 6 x m10 fasteners.

Undo the fasteners and remove the right-hand side access plate under which is a ceramic top board.

Then remove the left-hand side access plate and withdraw the 4 baffles behind it.

Clean all of the internals of the boiler and vac the debris out making sure that all the internal surfaces of the boiler are clean and soot free.

When this is done, rebuild the boiler in reverse order.

2-3. CLEAN OUT THE FLUE SYSTEM.

After cleaning and servicing both the burner and the boiler, make sure that the flue system is clean and free from obstruction using a small 70mm dia flexi brush.

Clean the flue system out twice per year.

2-4. CHECKING FOR DOWN DRAUGHT.

A quick check for this situation is to check that air is not being blown out of the burner air inlet, if it is then the air inlet to the burner must be ducted to a new location as follows.

The objective is to balance the pressures on both the flu outlet terminal and the air inlet.

The flue terminal will be outside the boat and if the air inlet can be ducted near to the flue terminal externally then whatever atmospheric condition is applied to one terminal will also be applied to the other neutralising any atmospheric effect and creating a BALANCED FLUE situation which will result in neither updraft nor downdraft.

2-5. INSPECTING THE OIL LINE.

Flexible oil lines are prone to deteriorate, check them for leaks every year and replace as necessary.

Make sure that the flow and return oil pipes are connected the correct way round as illustrated in fig1.

Additional checks for leaks should be carried out on the rest of the oil supply line including any filters.

2-6. INSPECTING THE FUEL FILTERS AND CHANGE WHERE NECESSARY.

The fuel filter should be changed every year but this depends upon the cleanliness of the fuel and the usage rate of the boiler. If the fuel tank is contaminated or infected with diesel bug then appropriate cleaning measures will be immediately required.

It is essential that fuel oil fed to the burner should be filtered through a 30-micron filter.

If there has been a water or bacterial contamination, clean out the tank and replace all filters.

Dirt in the fuel line will cause nozzles to block or partially block emitting a non-uniform spray pattern causing bad combustion.

If there are any air leaks on the fuel supply, this can cause erratic and inconsistent burner ignition.

2-7. INSPECTING THE FIREVALVES.

The boiler must be fitted with a 60 deg C, remote sensing fire valve, which should be inspected and tested every year.

The sensor of the valve should be located over the burner at a distance of 200mm above the burner.

2-8. CHECKING THE PROVISION OF VENTILATION.

Make sure that the boiler has adequate ventilation for cooling and combustion purposes in line with the boiler power rating of 12kW.

Check on a regular basis and make sure that all purpose made vents are free from obstruction.

In certain cases where negative air pressure is encountered either permanently or intermittently, it may be necessary to duct air into the burner air inlet from an outside source as mentioned in 2-4.

2-9. CHECKING THE FLUE GAS EMISSIONS.

Generally, the burner air setting needs to be at the lower setting on the air scale, typically between 1 and 2.

Before proceeding with testing the flue gas make sure that: -

1. You have Dwyer test point plugs and a suitable size of drill.
2. You have suitable Allen keys.
3. Your flue gas analyser is in good condition and set for the appropriate fuel.

Drill a suitable hole into the flue approximately 100 mm from the boiler outlet to allow insertion of the flue gas analyser probe and after inspection fill the hole with the Dwyer plug.

Fire the burner up and allow the boiler to come up to 60 deg C.

(Whilst the boiler is coming up to temperature keep an eye on the flue outlet terminal, if smoke is evident, increase the air until it goes.

When the boiler is up to temperature carry out flue gas analysis.

2-10. BURNER COMBUSTION DATA.

Danfoss Nozzle	0.4 U.S. gal x 45° S.
Fuel Pump pressure	10 bar.
Smoke	Zero to one on the Bacharach scale.
Efficiency	86 to 87%.
CO ²	10.5%.
O ²	6 to 6.5%.

3. FAULT FINDING.

Note that any work on electrical systems must be carried out by a suitably qualified person.

In the unlikely event of a malfunction check the following: -

3-1 BOILER INTERNALS MUST BE FREE FROM OBSTRUCTIONS.

3-2. If you have a side outlet flue and you have recently been to sea or in rough water conditions and the boiler refuses to fire up, remove the burner from the mounting flange, then remove the top plate and top board.

Look down into the flue ways and make sure that there is no water in the bottom of the boiler.

3-2. If the boiler is free from water contamination, check the following.

3-4. Is the boiler badly sooted up?

Remove the burner and both the front and rear top plates. Fig 3

Remove all the rear baffles.

On earlier boilers there may be baffles beneath the burner in the first part of the boiler, if there are then these baffles should be discarded as they are no longer used.

3-5. Is 230-volt ac connected to the boiler and live?

- 3-6. If power is supplied through a landline, is the supply 230VAC ?
- 3-7. Supply voltages can vary substantially in response to the combined applied load of other vessels on the same supply.
- 3-8. Is there adequate fuel oil in the fuel supply tank?
- 3-9. Are all or any shut off valves open?
- 3-10. Has the KBB remote sensing fire valve tripped off?
- 3-11. Are all controls such as the time clock and boiler stat set correctly?
- 3-12. Have the oil flow and return fuel pipes been connected the right way round? The burner oil pump body has clear indications marked on it to identify the flow and return ports, make sure that the oil feed pipes are connected flow to flow and return to return. See fig 1

3-1. OPTIONAL DIGITAL DATA LOGGER

To help interrogate problems with your burner Ecoflam have produced an optional digital diagnostic device which plugs into the burner control unit and can be used to access stored historical data as detailed below. Note that this device will log records of voltages allowing engineers to isolate voltage supply problems.

Service - Troubleshooting

Fault diagnosis and repair
 In the event of a malfunction, first check that the prerequisites for correct operation are fulfilled:

1. is the system connected to the power supply?
2. is there oil in the tank?
3. are all shut-off valves open?
4. are all control and safety devices, such as the boiler thermostat, low-water detector, limit switch, etc. adjusted correctly?

If the malfunction persists, use the following table.
 It is not permitted to repair any components relevant to safety. These

components must be replaced by parts with the same order number.
Only use original spare parts.

NB: after each operation:
 • under normal operating conditions (doors closed, hood fitted, etc.), check combustion and check the individual lines for leaks.
 • Record the results in the relevant documents.

E-BCU display interface must be used to read the faults by service personell.



Symbol fault	Fault	Cause	Remedy
	No heat request	Thermostats defective or incorrectly adjusted	Adjust the thermostats, replace if necessary.
	Burner does not start after thermostat shutdown. No malfunction indicated on the automatic combustion control unit.	Drop in supply voltage or power failure. Control unit malfunction	Check the cause of the fall in voltage or the power failure. Replace the control unit.
	Burner starts at switch-on for very short period and then shuts down and the red LED lights up.	The control unit has been intentionally locked	Reset control unit.
	Burner starts and then shuts down after pre-ventilation	Firing during pre-ventilation or pre-ignition	Check ignition sparks/adjust or replace electrode Check/replace fuel-oil solenoid valve
	Burner starts and then shuts down after the solenoid valves have opened	No flame signal at end of safety time	Check the oil level in the tank. Top tank up as required. Open the valves. Check the oil pressure and the operation of the pump, coupling, filter, solenoid valve. Check ignition circuit, electrode adjustment. Clean/replace electrodes. Clean/replace flame monitor.
	Flame extinguishing during operation	Flame goes out during operating phase	Replace the following items as required: Ignition electrodes/ignition cables/ignition transformer/nozzle/pump/solenoid valve/ automatic combustion control unit.

3-2. BLACK SMOKE IS EMITTED FROM THE FLUE TERMINAL.

This indicates **BAD COMBUSTION**, generally caused by excess fuel or a lack of combustion air.

1. Remove the boiler internal baffle system and check that the boiler is not contaminated with excess soot, if it is, brush and scrape both of the boiler flue ways and vac the soot out from the bottom of the boiler, making sure that there is no obstruction in the base of the boiler **OR THE FLUE SYSTEM**.

1A. Check for an obstruction on the burner air inlet.

2. Change the nozzle.

3. Check that the burner fan motor is running freely.

4. Check that the internal boiler baffle system is not distorted, damaged or sooty.

3-3. LIGHT GREY SMOKE IS HEAVILY EMITTED FROM THE FLUE TERMINAL.

This situation is caused where the boiler has failed to ignite and several ignition attempts have been made.

Where the internal flue passes of the boiler have been flooded with excess unburned fuel.

If this situation is present and the burner ignites, dense plumes of pungent, light grey smoke will issue from the exhaust as the fuel evaporates off.

If this situation is noticed: -

1. Turn the boiler off and make sure that it is electrically isolated.

2. Remove the burner and strip out all the internal baffles.

3. Remove all traces of unburned fuel from the bottom and sides of the boiler inners.

4. Replace the baffles.

5. Fit a new nozzle to the burner and check that the burner is clean and that the Photo cell is clean.

6. Rebuild the boiler and refit the burner.

If the cleanout and nozzle replacement has been successful, the exhaust fume should run clean in less than two minutes.

If not, it is very likely that the problem will be with the burner and further investigations are required.

3-4. BURNER GOES TO LOCKOUT AFTER INITIALLY FIRING UP FOR A SHORT PERIOD.

The boiler is energised via a live 230vac input from manual or automatic switching, when the burner has been energised the following ignition sequence is actioned.

1. The Motor runs and the H.F. spark is discharged across the electrodes.

2. A few seconds later the fuel is released by the solenoid valve, (note that the fuel release is deliberately delayed and must not occur simultaneously with the spark release.)

3. At this point Ignition occurs and the light sensitive Photocell recognizes ignition has occurred.

4. The Photocell sends a signal to the control unit, which turns the H.F. ignition off and then allows the burner to go into run mode.

The burner will run until it reaches the pre set temperature established by the setting of the boiler thermostat control knob at which point it will shut down and then modulate in on-off mode until either the auto or manual supply is removed.

If the burner locks out after the flame has been heard to establish, this would indicate that the fuel has been released too early and the photo cell and controller have recognised this fault, consequently putting the burner into lockout mode.

This situation can be caused by -:

1. A damaged solenoid spindle. (Bent) item 3 sec 5.

2. A faulty solenoid actuator coil. item 2 sec 5.

3. Micro particles of dirt lodged under the solenoid valve causing it not to be able to close, generally known as LET BY.

This situation allows the flame to establish too quickly causing a stray light fault and subsequently locking the burner out.

3-5. BURNER LOCKS OUT AND WILL NOT ATTEMPT TO IGNITE.

Check the mains voltage available. (Should be full sine wave 230vac. Plus or Minus 10%.)

3-6 BURNER IS COMPLETELY DEAD WITH NO LOCK OUT LIGHT SHOWING.

Check that there is a 230 VAC feed to the appliance.

Check that there is a 230 VAC feed through the control panel to the burner.

If power is available this would indicate that the burner control unit might have failed.

3-7. EXTERNAL CONTROLS FAULTS.

Not covered under this manual but as an aid, when the programmable time controller is calling for central heating or hot water via manual advance or timed signal, the boiler should receive a live feed and ignite.

3-8. INVERTER FAULTS.

If an inverter fault develops and the inverter does not output a full sign wave supply, damage will be caused to the Digital Thermowatt burner control box located on the burner. (See item 13 in section 5)

3-9. FLUE AND EXHAUST FAULTS.

The flue should be cleaned and swept every 12 months.

If the boiler is subject to a negative pressure, air can be drawn into the boiler flue system.

A quick check for this situation is to check that air is not being blown out of the burner air inlet, if it is then the air inlet to the burner must be ducted from a suitable vent. Note that if this problem exists either permanently or intermittently it can cause faulty starts and a noisy burner. See comments in 2-4.

4. VERTICAL BOILER PARTS.

Note that the horizontal boiler has a different flue outlet and a different rear access plate.

FIG 1

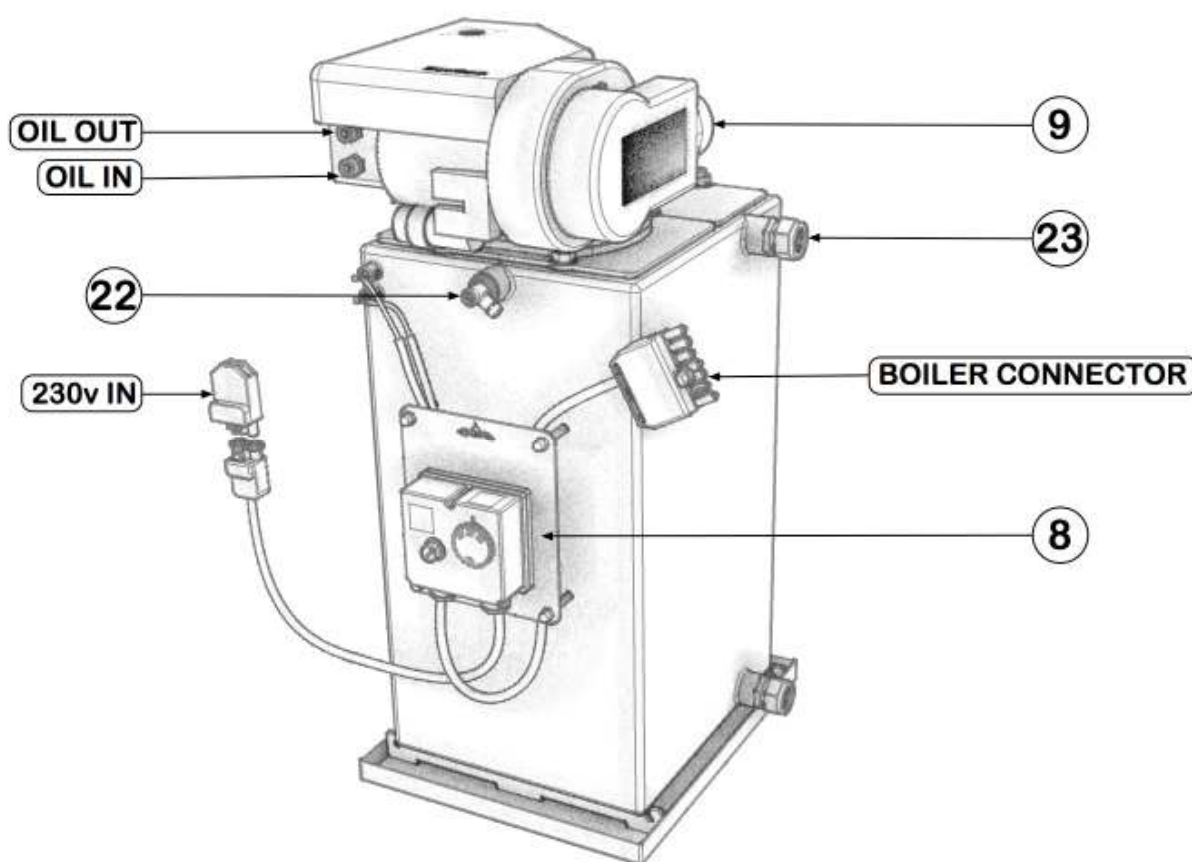


FIG 2

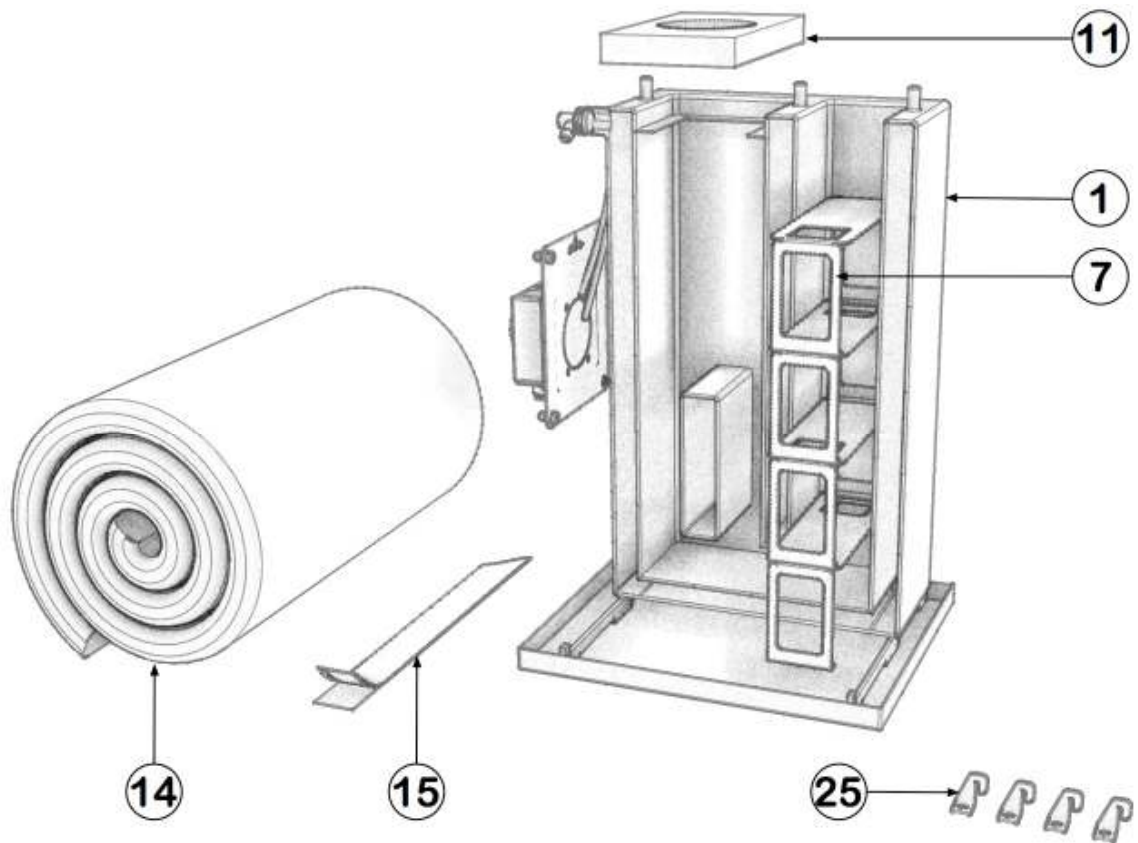
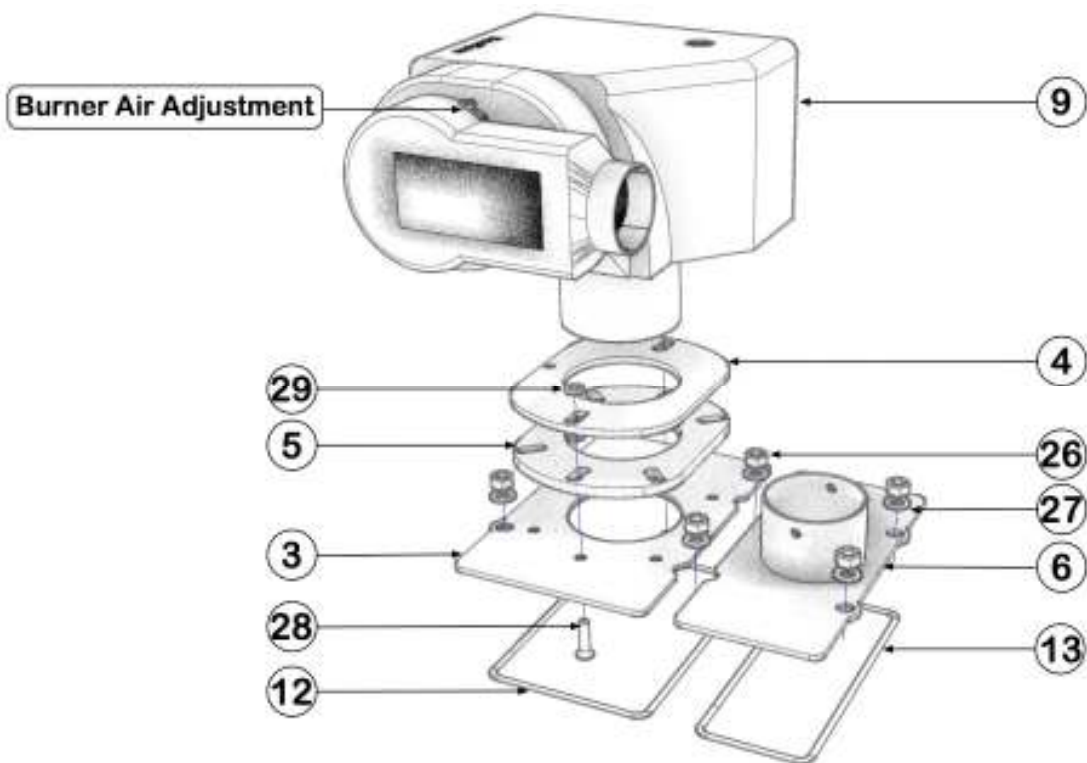
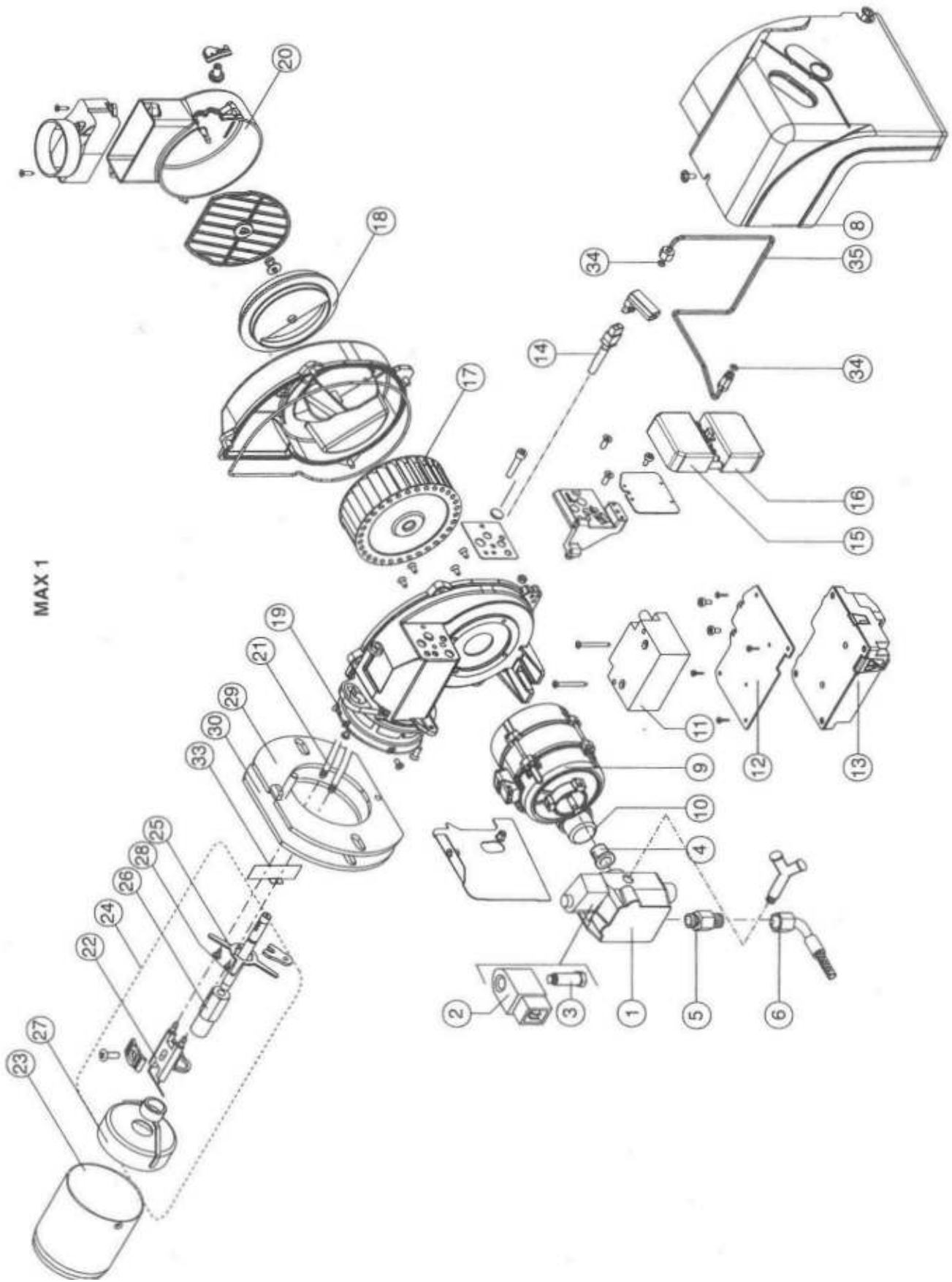


FIG 3



5. BURNER EXPLODED PARTS.

Read in conjunction with full boiler parts list.



5-1. BURNER PARTS LIST

n°	Description		MAX 1 code
1	OIL PUMP	DANFOSS BFP11 R3 071NO143	65322967
2	COIL	DANFOSS	65323773
3	OIL VALVE	DANFOSS	65323751
4	COUPLING		65322920
5	NIPPLE		65321179
6	HOSES	NW 4X700	65323198
7	FILTER		-
8	COVER		65325528
9	MOTOR	75 W AEG	65322868
10	CAPACITOR	3 μ F AEG	65321857
		5 μ F SIMEL	65325038
11	IGNITION TRANSFORMER		65323257
12	SUPPORT		65325251
13	CONTROL BOX WITH CABLES	THERMOWATT E-BCU OIL	65325255
14	PHOTORESISTOR	SATRONIC	65320083
15	SOCKET WIELAND		65322070
16	PLUG WIELAND		65322069
17	FAN	120 x 42	65323826
18	AIR DAMPER		65320519
19	ORING		65321066
20	COVER AIR INLET		65320132
21	CABLES	TC	65325252
		TL	65325253
22	ELECTRODES		65320924
23	BLAST TUBE	TC	65320333
		TL	65320339
24	FIRING HEAD	TC	65325400
		TL	65325401
25	NOZZLE HOLDER SUPPORT	TC	65320695
		TL	65320699
26	NOZZLE HOLDER	TC	65320708
		TL	65320710
27	DIFFUSER		65320760
28	ROD	TC	65324056
		TL	65320204
29	FLANGE		65325174
30	GASKET		65321071
31	AIR SELECTOR		-
32	REAR DISC		-
33	FAN SCOOP	TC	65320505
		TL	65320506
34	PIPE GASKET		65321065
35	PIPE		65321508

TC = Short Head TL = Long Head
R= Version pre-heater

ITEM NO	MAIN COMPONENTS FIG1	QTY PER BOILER	USED ON	PT NO
1	BOILER COMPLETE FABRICATION WITH DRIP TRAY	1	VERTICAL	87-01-900-30A55
1A	HORIZONTAL VERSION BOILER COMPLETE FABRICATION	1	HORIZONTAL	87-01-900-30A55H
2	TOP PLATE FRONT ASSEMBLY WITH FLANGE AND GASKET PRE ASSEMBLED	1	BOTH VERSIONS	87-01-900-7A55MAX
3	TOP PLATE FRONT SINGLE ITEM PART OF 87-01-900A55MAX	1	BOTH VERSIONS	87-01-900-7
4	BURNER MOUNTING FLANGE SINGLE ITEM PART OF 87-01-900-7A55MAX	1	BOTH VERSIONS	87-01-900-FLANGE
5	BURNER MOUNTING FLANGE GASKET (USE HT SILICONE TO SEAL BOTH SURFACES)	1	BOTH VERSIONS	87-01-900-GASKET
6	TOP PLATE REAR WITH FLUE OUTLET	1	VERTICAL	87-01-900-8A55
6A	HORIZONTAL VERSION REAR OUTLET COVER PLATE	1	HORIZONTAL	
6B	HORIZONTAL VERSION FLUE OUTLET ADAPTOR	1	HORIZONTAL	
7	BAFFLE PLATE SINGLE PART NO (4 REQUIRED PER SET.)	4		87-01-900-20
8	CONTROL PANEL ASSEMBLY COMPLETE	1	BOTH VERSIONS	87-01-900-90A55MAX
9	BURNER COMPLETE ASSEMBLY WITHOUT FUEL HOSES	1	BOTH VERSIONS	77-01-825-B
10	FLEXI RUBBER HOSES FOR BURNER ASS COMPLETE	2	BOTH VERSIONS	87-01-900-98
10A	HORIZONTAL VERSION BASE MOUNTING PLATE ASSEMBLY	1	HORIZONTAL	87-01-900-8PHA55
10B	HORIZONTAL VERSION FASTENING STRAPS	2	HORIZONTAL	
10C	HORIZONTAL VERSION RIGHT SIDE CONTROL MOUNTING BRACKET	1	HORIZONTAL	87-01-900FMPH
10D	HORIZONTAL VERSION LEFT SIDE CONTROL MOUNTING BRACKET	1	HORIZONTAL	
10E	HORIZONTAL VERSION FOR REMOTE MOUNTING (NOT YET DEVELOPED)	1	HORIZONTAL	
10F		1	HORIZONTAL	87-01-900-TPRP
BOILER SEALS AND INSULATION FIG1				
11	BOILER TOP INSULATION BOARD	1	BOTH VERSIONS	87-01-900-72
12	TOP PLATE FRONT ROPE SEAL (BEDDED ON HT BLACK SILICONE)	2	BOTH VERSIONS	87-01-900-83
13	TOP PLATE REAR ASS ROPE SEAL (BEDDED ON HT BLACK SILICONE)	1	BOTH VERSIONS	87-01-900-84
14	ONE PIECE WRAP AROUND INSULATION BLANKET THINSULATE	1	BOTH VERSIONS	87-01-900-87H
14A	BASE PIECE INSULATION THINSULATE	1	HORIZONTAL	87-01-900-87
15	3M ALLUMINIUM TAPE TO FASTEN THINSULATE BLANKET TO BOILER	1	BOTH VERSIONS	TAPE002
15A	6MM WIDE SELF ADHESIVE GLASS FIBRE TO FORM A GASKET FOR THE HORIZON FLUE ADAPTOR-TOP PLA	1	HORIZONTAL	87-01-900-85A
INSTRUMENTATION AND WIRING FIG1				
16	BOILER CONTROL PANEL PLATE (MOUNTING PLATE FOR THE THERMOSTAT CONTROL BOX)	1	VERTICAL	87-01-900-1MAX
17	IMET THERMOSTAT BOX ASSEMBLY (TO BE FITTED TO THE MOUNTING PLATE)	1	BOTH VERSIONS	77-07-1010A
18	BOILER STAT (NOT SOLD SEPARATLY THIS COMPONENT IS PART OF 87-01-900-90A55MAX)	1	BOTH VERSIONS	87-01-900-90A55MAX
19	SAFETY RESET STAT (NOT SOLD SEPARATLY THIS COMPONENT IS PART OF 87-01-900-90A55MAX)	1	BOTH VERSIONS	87-01-900-90A55MAX
20	MAINS INPUT 3 CORE CABLE ONLY .75MM WHITE	1	VERTICAL	87-01-900-90MAX
21	BURNER INPUT 3 CORE CABLE ONLY .75MM WHITE INPUT	1	VERTICAL	87-01-900-89MAX
21A	THERMO-WATT E-BCU DIGITALDIAGNOSTIC KIT (OPTIONAL EXTRA)	1	BOTH VERSIONS	87-01-900-DK
PLUMBING FIG1				
22	AIR VENT	1	VERTICAL	77-01-017-H
23	BOILER UNIONS	2	BOTH VERSIONS	77-01-767
FASTENERS				
24	M8 FLANGED NUT FOR BURNER FASTENING	1	BOTH VERSIONS	
25	BOILER FASTENING DOWN BRACKETS	4	VERTICAL	87-01-900-31
26	M10 NUTS FOR FRONT AND REAR BOILER TOP PLATES	6	BOTH VERSIONS	77-02-010-6
27	M10 WASHERS FOR FRONT AND REAR BOILER TOP PLATES	6	BOTH VERSIONS	77-01-057
28	BURNER MOUNTING FLANGE FASTENERS M8 X 25 COUNTERSUNK SETSCREWS	2	BOTH VERSIONS	77-01-211A
29	M8 HALF NUTS FOR BURNER MOUNTING FLANGE FASTENERS	2	BOTH VERSIONS	87-01-900-94
30	SPLIT PIN FOR THERMOSTAT PHIAL FASTENING	2	BOTH VERSIONS	87-01-900-18
OIL LINE				
31	FLEXI OIL LINES MARINE GRADE TO BS ISO 7840		BOTH VERSIONS	87-01-900-58
FLUEING				
32	FLUE LINER X 1METER	1	BOTH VERSIONS	77-02-750
33	THROUGH SIDE TUBE ASSEMBLY	1	BOTH VERSIONS	87-01-900-29B
34	PJ THROUGH SIDE ADDAPTOR	1	BOTH VERSIONS	77-02-770
35	90 DEGREE ELBOW	1	BOTH VERSIONS	77-02-678
36	FLAT ROPE SEAL FOR 90 DEGREE ELBOW (12MM X 3MM SELF ADHESIVE)	1	BOTH VERSIONS	77-01-915B
37	HEAVY DUTY CLAMPS FOR FLUE LINER TO THROUGH SIDE FITTING	2	BOTH VERSIONS	77-02-771
38	FLUE LAGGING (INSULATION FOR FLUE) 7 METERS FOR STANDARD FLUE LENGTH	1	BOTH VERSIONS	87-06-062-A
39	BLACK SILICONE SEALANT FOR LAGGING	1	BOTH VERSIONS	77-01-996
40	HORIZONTAL VERSION FLUE OUTLET ADAPTOR	1	HORIZONTAL	87-01-900FA
MAX 1 BURNER SPARES FIG2				
1	DANFOSS OIL PUMP 8FP11R3 071N0143 P/N 65327099	1	BOTH VERSIONS	77-01-470
2	OIL PUMP SOLENOID (SUPPLIED WITH REPLACEMENT PUMP) P/N 65327118	1	BOTH VERSIONS	
3	OIL PUMP SOLENOID STEM (SUPPLIED WITH REPLACEMENT PUMP) P/N 65325612	1	BOTH VERSIONS	
4	OIL PUM DRIVE COUPLING P/N 65074172	1	BOTH VERSIONS	87-01-900-04
5	PUMP ADAPTOR TO FASTEN FLEXI OIL PIPE TO OIL PUMP (NIPPLE) P/N 65321179	2	BOTH VERSIONS	87-01-472
7	FILTER (EXTERNAL TO THE BURNER) P/N 65070549	1	BOTH VERSIONS	87-01-900-103
8	COVER	1	BOTH VERSIONS	
9	FLEXI HOSES NOTE THAT HOSES USED IN UK MUST BE TO BS	2	BOTH VERSIONS	87-01-900-58
9	MOTOR	1	BOTH VERSIONS	
10	CAPACITOR 3uF AEG 65321857	1	BOTH VERSIONS	
10	CAPACITOR 5uF SIMMEL 65325038	1	BOTH VERSIONS	
11	IGNITION TRANSFORMER DANFOSS Type EB14 M No 052F4038	1	BOTH VERSIONS	DANFOSS EB14 M 052F4038
12	SUPPORT PLATE ON WHICH THE IGNITION TRANSFORMER IS MOUNTED	1	BOTH VERSIONS	not regular spare
13	THERMOWATT CONTROL BOX WITH CABLES old P/N 65325255 new pt no65324048 NEW A24	1	BOTH VERSIONS	87-01-900-1MAXD
14	PHOTOCELL	1	BOTH VERSIONS	77-01-351
15	7 WAY WEILAND SOCKET	1	BOTH VERSIONS	87-01-900-37
16	7 WAY WEILAND PLUG	1	BOTH VERSIONS	87-01-900-34
17	FAN	1	BOTH VERSIONS	
18	AIR DAMPER	1	BOTH VERSIONS	
19	O RING	1	BOTH VERSIONS	
20	AIR INLET COVER	1	BOTH VERSIONS	
21	IGNITION TRANSFORMER LEADS (HT CABLE)	2	BOTH VERSIONS	87-01-900-40
22	ELECTRODE P/N 65320924	1	BOTH VERSIONS	87-01-900-99
23	FLAME TUBE (BLAST TUBE) P/N 65320333	1	BOTH VERSIONS	87-01-900-95
24	NOZZLE HOLDER ASSEMBLY COMPLETE P/N 65325400	1	BOTH VERSIONS	87-01-900-100
25	NOZZLE HOLDER SUPPORT	1	BOTH VERSIONS	87-01-900-101
26	NOZZLE HOLDER	1	BOTH VERSIONS	87-01-900-102
27	AIR DIFFUSER END (SWERLS THE OIL) P/N 65320760	1	BOTH VERSIONS	87-01-900-96
28	ROD FROM NOZZLE TO TUBE PIPE 35 BELOW P/N 65324056	1	BOTH VERSIONS	87-01-900-97
29	BURNER FLANGE P/N 65325174	1	BOTH VERSIONS	84-01-900-FLANGE
30	BURNER GASKET P/N 65075375	1	BOTH VERSIONS	84-01-900-GASKET
	SOLENOID CABLE DANFOSS	1	BOTH VERSIONS	not regular spare
35	HIGH PRESSURE COPPER FEED PIPE FROM PUMP TO HEAD NOZZLE HOLDER P/N 65321508	1	BOTH VERSIONS	87-01-900-98
36	NOZZLE .4 X 45D S FOR MAX BURNER	1	BOTH VERSIONS	77-01-016-T
37	THERMO-WATT E-BCU DIGITALDIAGNOSTIC KIT (OPTIONAL EXTRA)	1	BOTH VERSIONS	87-01-900-DK

6. AMENDMENTS.

1. 03-05-13 Nozzle angle changed from 60 degree solid to 45 degrees solid. Current nozzle is a Danfoss .4 USG x 45 DEG S.

2. Notes on grey smoke exhaust emissions clarified, see sec 3-3. 20-09-24.

3. Fig numbers added to sec 1-1 for clarity, 20-09-24

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