

# INSTRUCTION MANUAL FOR OIL BURNER MODELS X400 X500 X600



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# **IMPORTANT NOTE**

The contents of the manual must be read and followed prior to the fitting and commissioning of the burner.

Any work on this burner must be carried out by a suitably qualified, and experienced, engineer.

Any electrical or fuel supply must be isolated before any work is carried out.

The installation must be carried out in accordance with current Electrical Regulations and all relevant Building Regulations.

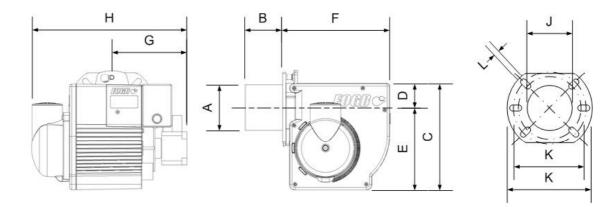
Failure to meet with these requirements could lead to damage or injury, and could invalidate any guarantee.

# **TECHNICAL SPECIFICATIONS**

# **Technical Data**

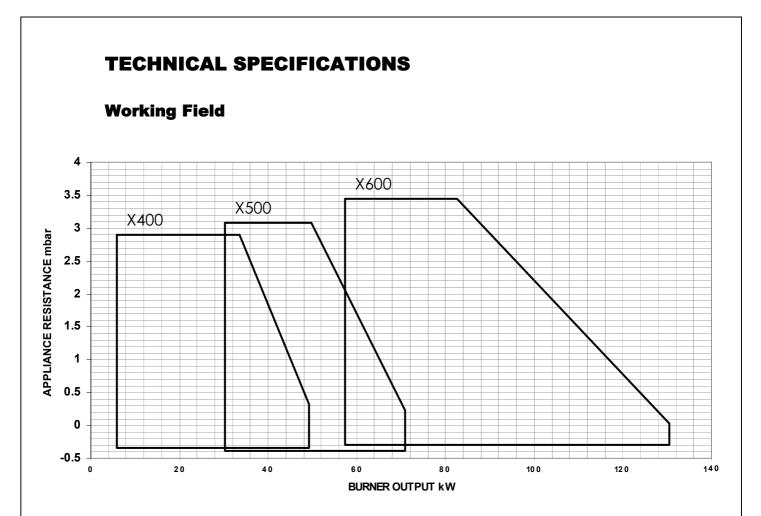
| Model             |          | X400                   | X500                       | X600 |  |  |
|-------------------|----------|------------------------|----------------------------|------|--|--|
| Burner output     | Min kW   | 14                     | 30                         | 58   |  |  |
|                   | Max kW   | 50                     | 70                         | 130  |  |  |
| Fuel Flow rate    | Min Kg/h | 1.2                    | 2.5                        | 4.8  |  |  |
|                   | Max Kg/h | 4.2                    | 5.8                        | 10.8 |  |  |
| Fuel              | Kerosene | osene Max viscosity 5  |                            |      |  |  |
|                   | Gas Oil  | Max vi                 | Max viscosity 5.5cst @ 20% |      |  |  |
| Electrical supply | V        | 230V ±10% 50Hz 1 phase |                            |      |  |  |
| Motor             | W        | 90                     | 90                         | 130  |  |  |
| Transformer       |          | 4                      | 0mA (rms) 15k              | V    |  |  |
| Current           | Start A  | 1.60                   | 1.60                       | 2.20 |  |  |
|                   | Run A    | 0.53                   | 0.53                       | 0.87 |  |  |
| Weight            | kg       | 9.2                    | 9.2                        | 9.5  |  |  |
| Mode of operation |          |                        | On/off                     |      |  |  |

# **Burner Dimensions (mm)**



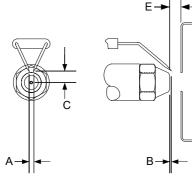
| Model   | AØ<br>root | AØ<br>max | В*  | с   | D  | E   | F   | G   | Н   | J  | К       | L  |
|---------|------------|-----------|-----|-----|----|-----|-----|-----|-----|----|---------|----|
| X400-1N | 89         | 89        | 73  | 231 | 50 | 161 | 194 | 138 | 268 | 90 | 125-150 | 10 |
| X400-2N | 89         | 89        | 73  | 231 | 50 | 161 | 194 | 138 | 268 | 90 | 125-150 | 10 |
| X400-1  | 89         | 89        | 73  | 231 | 50 | 161 | 194 | 138 | 297 | 90 | 125-150 | 10 |
| X400-2  | 89         | 89        | 73  | 231 | 50 | 161 | 194 | 138 | 297 | 90 | 125-150 | 10 |
| X500-1  | 89         | 89        | 73  | 231 | 50 | 161 | 204 | 204 | 318 | 90 | 125-150 | 10 |
| X500-2  | 89         | 89        | 80  | 231 | 50 | 161 | 204 | 204 | 318 | 90 | 125-150 | 10 |
| X600-1  | 89         | 89        | 80  | 231 | 50 | 161 | 204 | 204 | 360 | 90 | 125-150 | 10 |
| X600-2  | 89         | 109       | 120 | 231 | 50 | 161 | 204 | 204 | 360 | 90 | 125-150 | 10 |

\*Standard lengths only - other lengths are available.



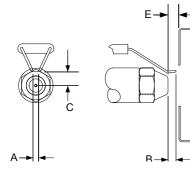
# Head / Electrode settings

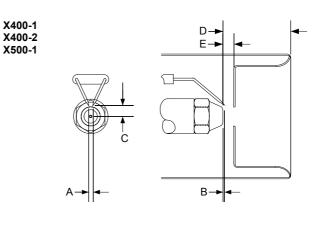
X500-2 X600-1



mm Model в С D Ε Α X400-1 2.5 0 9.0 43 4 X400-2 2.5 0 9.0 43 4 X500-1 2.5 0 9.0 43 4 X500-2 3.5 2.0 4.5 43 6 3.5 4.5 X600-1 2.0 \_ 6 X600-2 3.5 6 4.0 8.5 \_

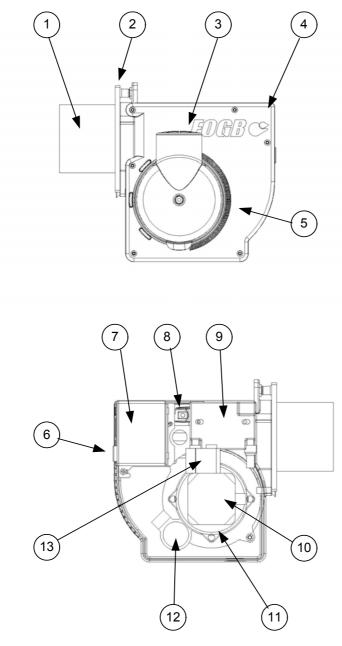
X600-2





# **TECHNICAL SPECIFICATIONS**

### Components



- ① Blast tube
- ② Mounting flange
- ③ Air intake
- ④ Fan housing
- ⑤ Air adjustment
- ⑥ Lockout reset button
- ⑦ Control box
- Photocell
- Ignition transformer
- 1 Fuel pump
- 1 Motor
- ② Capacitor

- ③ Solenoid valve
- HT leads
- (5) Ignition electrodes
- 16 Electrode holder
- 🗊 Nozzle
- Nozzle assembly

# **BURNER INSTALLATION**

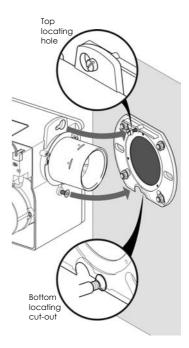
### Mounting onto the appliance

The burner is mounted onto the appliance by means of a removable 6-bolt flange.

The gasket needs to be put in place before the flange is fixed onto the appliance. The burner tube is then inserted through the centre hole.

With the burner rotated a few degrees clockwise the flange bolts will pass through the locating holes. When the burner is twisted into position the top bolt can then be tightened to secure the burner. If necessary the lower screw can be adjusted to give a more secure fixing.

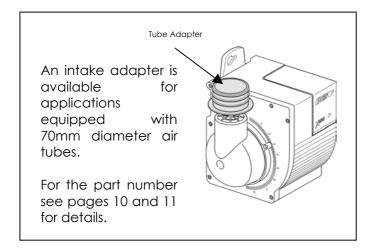
If required the burner can be mounted in any position. It is important though to ensure that the solenoid valve on the oil pump is not inclined below horizontal.

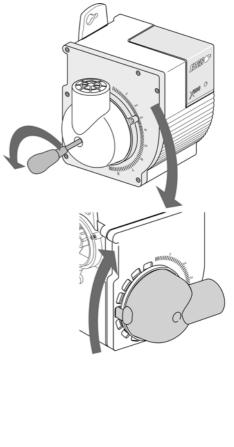


### **Air Intake Device**

The burner is supplied with an air intake device that can be rotated through 180° to allow the air to be taken from a position suitable within the appliance housing.

The intake has a 60mm diameter entry to allow a snorkel tube, as used on some balanced flue units, to be connected. There is a grill fitted to the entry that can be removed if required.





# **BURNER INSTALLATION**

### **Electrical Connection**

The electrical connections to this burner must be carried out by a suitably qualified engineer.

All Electrical connections to the burner must be carried out in accordance with all current applicable IEE Wiring Regulations.

All connections should be made according to the wring diagram shown on the supplementary page - page 20 within the manual.

If the burner is fitted with a 7-pin socket and supplied with the matching plug then all connections therefore are made within the 7-pin plug.

To gain access to the electrical connection strip the cover must be removed by means of undoing the 3mm Allen screw. Once undone the cover can be removed exposing the connection strip.

### **Fuel Supply**

The burner is usually supplied for one-pipe operation

but if required can be converted for a two-pipe system (see page 10 for details). When used in conjunction with a gravity feed supply the inlet pressure to the pump MUST NOT exceed 2 bar.

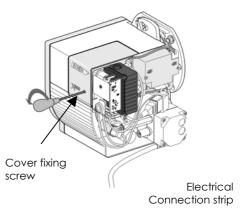
When using a two-pipe system the return line has to be fed back into the tank. Alternatively, a de-aeration device could be incorporated for ease of installation.

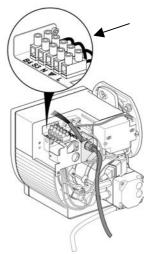
Oil lines must be completely air-tight and constructed in accordance with current standards.

The final connection to the oil pump must be made with the flexible oil line provided.

### **Air Supply**

Combustion air and ventilation requirements are detailed in BS5410:Part1. It requires that combustion air must be provided through purpose-made noncloseable openings, having a total free area of 550mm2 per kW of the appliance maximum output rating above 5kW.





# **BURNER OPERATION**

### **Before start-up**

Check that the correct nozzle is fitted. Reference should be made to the instructions of the appliance manufacturers.

If the burner is firing Kerosene the nozzle must be sized for a maximum pump pressure of 10 bar (145 psi). If Gas Oil is being used then a smaller nozzle must be selected to allow a pump pressure of approx 14 bar (200 psi). This is necessary to give better fuel atomisation and therefore better combustion.

Fit a pressure gauge to the oil pump (as shown in the diagram below).

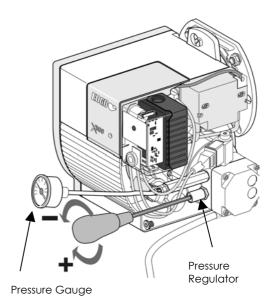
### **Start-up procedure**

Close the main switch and the thermostats to allow the burner to start up.

The burner motor and ignition transformer are both powered during the pre-purge period.

During pre-purge the oil pressure can be set, as the pressure will register before the solenoid valve is opened (see diagram). If necessary the oil supply can be deaerated from the pump through the pressure gauge manifold.

During this pre-purge period checks are made for 'stray-light' onto the photocell and the integrity of the solenoid coil of the pump. If 'stray-light' is detected, or if the coil is faulty, then the coil will not receive full voltage and therefore will not release any fuel.



If checks are ok then power is fed to the solenoid coil and the valve will open. Fuel is then released to the nozzle. The spark will ignite the fuel spray.

If a flame is formed this will be detected by the photocell and the control box will turn off the ignition and assume normal run mode.

If a flame is not formed, or detected, then the control box will go to a lockout condition and the indicator lamp on the control box will be illuminated. The control box will need to be reset to enable the burner to re-attempt a start up.

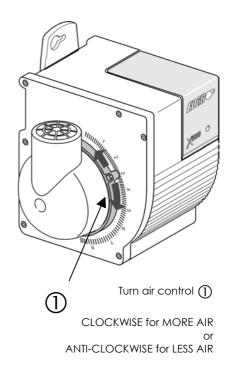
### Normal operating mode

Check the oil pressure on the gauge and adjust if necessary for the required burner output.

From a suitable test point on the boiler, or in the flue, a smoke reading should be taken to ensure clean smoke-free combustion.

With the aid of a flue gas analyser, and by making adjustments to the air damper control, the combustion can be set for maximum efficiency (see diagram).

The air control rotates around a central fixing screw that passes through both the control device and air inlet housing. This spring loaded screw is pre-tensioned in the factory but if the adjustment appears too loose or tight then it can be pre-tensioned to suit.



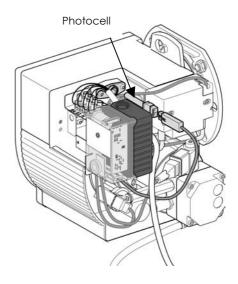
A CO<sub>2</sub> level of around 11.0% - 12.0% should be achievable.

If at any point during normal operating mode the photocell loses sight of the flame the control box will attempt to re-establish the flame. The oil valve will close and the ignition transformer will be powered. A pre-purge will be carried out before the valve is re-opened and the fuel is released. If successful the burner will continue in operating mode; if not the control box will go into lockout mode.

After commissioning a safety check must be carried out to ensure the correct operation of the flame detection.

During normal operation the photocell is to be removed and either covered with a clean rag to prevent any light from being sensed, or for the cell to be unplugged. As soon as this happens the burner will attempt to re-establish the flame

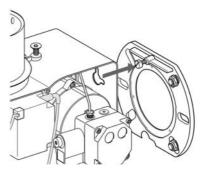
IMPORTANT: The photocell side opening must be pointing at the flame for reliable operation.



## **BURNER SERVICING**

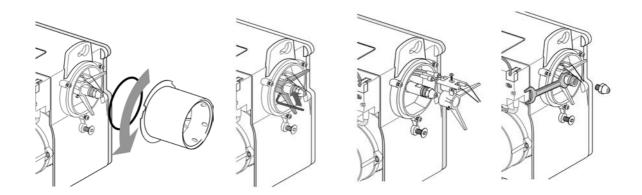
For ease of servicing and access to the burner components the burner has, on the bottom face, a keyhole cut-out. This allows the burner to be hung from the mounting flange in a more convenient position.

After loosening the fixing bolt the burner can be extracted from the flange, turned around and then the keyhole can be located onto the bolt.



The burner service requires that all of the components are cleaned and checked for correct operation, or signs of damage. A check must be carried out on all safety devices i.e. photocell, solenoid valves, etc. The nozzle should be replaced every 12 months, or sooner if worn or dirty. Filters and fuel lines must be inspected and replaced if necessary.

Below are a series of diagrams showing the removal of the combustion head components from the burner. This gives access for the nozzle to be replaced and the electrodes to be inspected. As shown below the electrode assembly is to be removed from the nozzle holder before the nozzle is replaced. This will prevent any accidental damage.

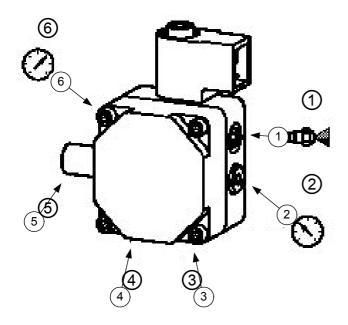


Once the burner has been re-fitted a smoke check and combustion analysis must be carried out. Once the burner has been commissioned on the appliance and all settings are correct the figures should then be recorded.

The burner and all other related equipment must be left in a safe and reliable working order.

# FUEL PUMP TYPE DANFOSS BFP11 L3

### **Technical Data**

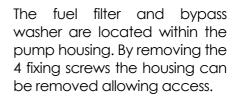


Oil Viscosity range: 1.3 – 12.0 cSt Pressure range: 7 – 15 bar Oil temperature: -10 - +70°C

- 1 Nozzle port 1/8"
- 2 Vacuum gauge port 1/8"
- 3 Suction line port 1/4"
- 4 Return line port 1/4"
- 5 Pressure adjustment (4mm allen key)
- 6 Pressure gauge port 1/8"

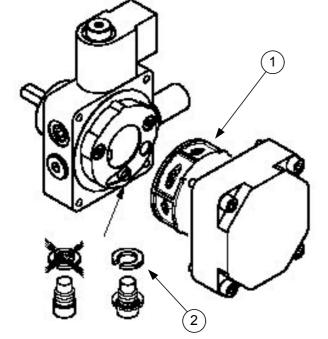
1 or 2 pipe operation

1 - Filter 2 – Bypass Washer



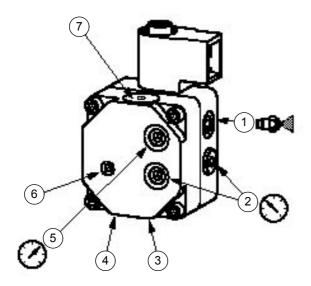
The bypass washer is located under the bottom of the 3 internal screws.

In case of one-pipe operation the horseshoe-shaped copper washer will be mounted under the screw head, and in case of two-pipe operation, the horseshoe-shaped copper washer will be removed.



# FUEL PUMP TYPE DANFOSS BFP21 L3

### **Technical Data**

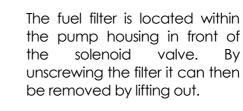


| Oil Viscosity range: | 1.3 – 12.0 cSt |
|----------------------|----------------|
| Pressure range:      | 7 – 15 bar     |
| Oil temperature:     | -10 - +70°C    |

- 1 Nozzle port 1/8"
- 2 Vacuum gauge port 1/8"
- 3 Suction line port 1/4"
- 4 Return line port 1/4"
- 5 Pressure gauge port 1/8"
- 6 Pressure adjustment (4mm allen key)
- 7 Filter

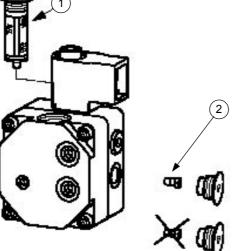
### 1 or 2 pipe operation

1 - Filter 2 – Bypass plug



The bypass plug is located inside the vacuum gauge port.

In the case of one-pipe operation the bypass plug should be removed and in the case of two-pipe operation, the plug should be fitted.

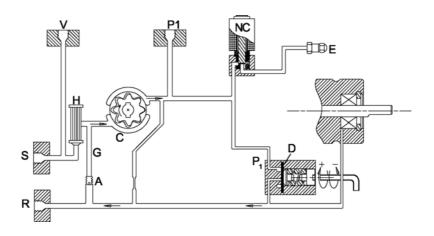


# FUEL PUMP TYPE DANFOSS BFP....

### Function

As the oil pump turns it draws oil from the suction line connection  $\mathbf{S}$ , through the filter  $\mathbf{H}$  and into the suction side of the gear set  $\mathbf{C}$ . Any suction generated before the gear set can be measured with an appropriate vacuum gauge at connection  $\mathbf{V}$ .

The gear set then pumps the oil through and puts it under pressure. The pressure is measured at connection **P1**. No oil will be released to the nozzle port **E** until the normally closed solenoid valve **NC** is opened.



The pressure is controlled and kept constant by means of the diaphragm  $\mathbf{D}$  behind the pressure regulator  $\mathbf{P}_1$ . The pressure regulator  $\mathbf{P}_1$  distributes the oil quantity supplied by the gear set between the nozzle port  $\mathbf{E}$  and the return side of the pump  $\mathbf{R}$ .

The oil quantity supplied is determined by the setting of the pressure regulator  $P_1$  and the size of the oil nozzle in the nozzle line **E**.

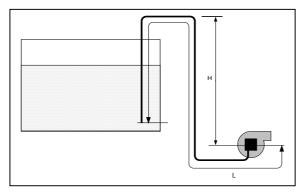
When the opening pressure has been reached, the passage to the return side of  $\mathbf{P}_1$  opens. The diaphragm and the spring keep the pump pressure constant at the set value.

When used in a one-pipe installation connection  $\mathbf{R}$  is closed and  $\mathbf{A}$  must be removed to allow internal recirculation of the fuel. If  $\mathbf{A}$  is not opened then damage to the pump seals will occur.

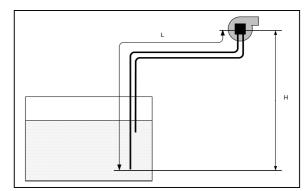
If a two-pipe system is required then a return line must be fitted into connection  $\bf{R}$  and  $\bf{A}$  must be fitted to divert the recirculating oil out through the return line.

# **OIL SUPPLY LINE TABLES**

### **One-pipe system**



### **Two-pipe system**



### Kerosene 2.15 mm²/s (cSt)

| н               | Ø4 | Ø5       | Ø6  | Ø5 | Ø6        | Ø8  |
|-----------------|----|----------|-----|----|-----------|-----|
| m               | mm | mm       | mm  | mm | mm        | mm  |
| 4.0             | 66 | 100      | 100 | 33 | 80        | 100 |
| 3.5             | 57 | 100      | 100 | 29 | 70        | 100 |
| 3.0             | 49 | 100      | 100 | 25 | 60        | 100 |
| 2.5             | 41 | 100      | 100 | 20 | 50        | 100 |
| 2.0             | 33 | 80       | 100 | 16 | 40        | 83  |
| 1.5             | 25 | 60       | 100 | 12 | 30        | 62  |
| 1.0             | 16 | 40       | 83  | 8  | 20        | 41  |
| 0.5             | 8  | 20       | 41  | 4  | 10        | 20  |
| Nozzle capacity |    | 5.0 kg/h |     |    | 10.0 kg/ł | 1   |

### Gas Oil 6.00 mm<sup>2</sup>/s (cSt)

| Н               | Ø4 | Ø5       | Ø6  | Ø5 | Ø6        | Ø8  |
|-----------------|----|----------|-----|----|-----------|-----|
| m               | mm | mm       | mm  | mm | mm        | mm  |
| 4.0             | 26 | 60       | 100 | 31 | 62        | 100 |
| 3.5             | 22 | 51       | 100 | 27 | 55        | 100 |
| 3.0             | 19 | 44       | 94  | 23 | 47        | 100 |
| 2.5             | 16 | 37       | 78  | 20 | 39        | 100 |
| 2.0             | 13 | 30       | 62  | 16 | 31        | 98  |
| 1.5             | 10 | 22       | 47  | 12 | 23        | 74  |
| 1.0             | 6  | 15       | 31  | 8  | 15        | 49  |
| 0.5             | 3  | 7        | 15  | 4  | 7         | 24  |
| Nozzle capacity |    | 5.0 kg/h |     |    | 10.0 kg/ł | 1   |

### Kerosene 2.15 mm<sup>2</sup>/s (cSt)

| н    | Ø6 | Ø8  | Ø10 |
|------|----|-----|-----|
| m    | mm | mm  | mm  |
| -0.0 | 54 | 100 | 100 |
| -0.5 | 48 | 100 | 100 |
| -1.0 | 42 | 100 | 100 |
| -1.5 | 36 | 100 | 100 |
| -2.0 | 30 | 94  | 100 |
| -2.5 | 24 | 75  | 100 |
| -3.0 | 18 | 55  | 100 |
| -3.5 | 11 | 36  | 88  |
| -4.0 | 5  | 16  | 40  |
|      |    |     |     |

### Gas Oil 6.0 mm<sup>2</sup>/s (cSt)

| н    | Ø6 | Ø8 | Ø10 |
|------|----|----|-----|
| m    | mm | mm | mm  |
| -0.0 | 17 | 53 | 100 |
| -0.5 | 15 | 47 | 100 |
| -1.0 | 13 | 41 | 99  |
| -1.5 | 11 | 34 | 84  |
| -2.0 | 9  | 28 | 68  |
| -2.5 | 7  | 22 | 53  |
| -3.0 | 5  | 15 | 37  |
| -3.5 | _  | 9  | 22  |
| -4.0 | _  | _  | 6   |

These tables are shown merely as guidance for the suitability of the oil supply line installation. The typical pipe system used for the calculations comprises -1 x check valve, 1 x cut off valve, 1 x in-line filter and 4 x 90° elbows

|  |  |   | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1  | - 0.0  |   | 2   |   | 25 25 25 25 25 25 25 25 25 25 25 25 25 2  | 722 28 28 28 28 28 28 28 29 28 29 28 29 28 29 28 29 28 29 29 29 29 29 29 29 29 29 29 29 29 29  | Micaun<br>22<br>22<br>23<br>23<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24   | _  | Mcann<br>41<br>28<br>28<br>28<br>28<br>27<br>216<br>216<br>216<br>238<br>238<br>260<br>216<br>216<br>216<br>216<br>216<br>216<br>216<br>216<br>216<br>216  | _  | _   | _   | Mcalm Rgm Rgm Rgm Rgm Rgm 717 176 1776 22 250 264 293 337 3,74 40 48 4,84 40 48 5,51 5,51 5,51 5,51 5,51 5,51 5,51 5,5   |
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| 2,75<br>3,61<br>4,24<br>5,09<br>5,09<br>5,09<br>5,09<br>5,09<br>5,09<br>5,00<br>5,00 | 2,75<br>3,61<br>3,61<br>5,73<br>5,73<br>7,00<br>7,00<br>7,00   |   |  |  |   |   | 33 33 35 35 36 35 36 35 36 35 36 35 36 35 36 35 36 35 36 35 35 35 35 35 35 35 35 35 35 35 35 35   | 20<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1   | 226<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22  | 22<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22   | 33         28           38         55           43         37           38         55           55         55           56         55           57         58           58         55           58         55           58         55           57         56           58         55           57         56           58         56           57         56           58         56           57         56           58         57           58         56           57         56           57         56           57         57           58         56           57         56           57         57           58         56           57         57           57         56           57         57           57         57           57         57           57         57           57         57           57         57           57         <   | 33<br>25<br>25<br>25<br>25<br>25<br>25<br>25<br>25<br>25<br>25<br>25<br>25<br>25   | 33 28 33 28 33 28 33 28 33 28 33 28 33 28 33 32 28 55 53 33 28 55 55 55 55 55 55 55 55 55 55 55 55 55  | 33 28<br>34 55 53 33<br>35 55 54<br>55 55 55<br>55 55 55<br>55 55 55<br>55 55<br>101 88<br>55 55<br>55 55<br>113 97<br>113 97<br>110 97<br>110 97<br>110 97<br>110 97<br>110 97<br>110 97<br>110 97 | 33 28<br>34 251 238<br>355 55 55 55 55 55 55 55 55 55 55 55 55  | 33 28<br>34 29<br>355 35 35<br>36 55 45<br>37 28<br>37 28<br>37 28<br>37 28<br>151 10<br>155 153<br>156 108<br>157 15<br>156 108<br>157 256<br>257 256<br>257 256<br>257 256<br>257 256<br>257 256<br>337 26<br>256 195<br>257 256<br>337 26<br>257 256<br>337 26<br>26<br>277 258<br>337 28<br>337 28<br>34<br>34<br>34<br>34<br>34<br>34<br>34<br>34<br>34<br>34<br>34<br>34<br>34   |
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     132         114         11,71           154         133         13,66  | 50         4/         4,08           59         51         5,27           66         57         5,85           73         63         6,44           77         66         6,83           88         76         7,81           99         85         8,78           121         104         10,73           123         114         10,73           132         114         10,73           176         152         15,62  | 50         4/         4,08           59         51         5,27           66         57         5,85           73         63         6,44           77         66         6,83           88         76         7,81           99         85         8,78           110         95         9,76           121         104         10,73           132         114         11,71           154         133         13,66           176         152         15,62           178         171         11,71           198         171         17,57   | 4,88<br>5,27<br>5,85<br>6,44<br>6,83<br>6,83<br>7,81<br>7,81<br>7,81<br>11,71<br>11,71<br>11,71<br>11,71<br>11,71<br>11,71<br>11,71<br>11,71<br>11,71<br>11,71<br>11,71<br>11,71<br>11,71<br>11,75<br>11,757   | 4/         4/08           57         5,85           57         5,85           63         6,44           66         6,83           66         6,83           66         6,83           76         7,81           85         8,78           85         8,78           85         9,76           114         11,71           113         13,66           152         15,62           171         17,57           190         19,52           209         21,47  | 4/         4/08           57         5,86           63         6,44           66         6,83           66         6,83           66         6,83           66         6,83           66         6,83           76         7,81           85         8,78           85         9,76           95         9,76           114         11,71           133         13,66           171         17,57           190         19,52           209         21,47           2209         21,47           228         23,42   | 4/         4/0           57         5,86           63         6,44           66         6,83           66         6,83           66         6,83           66         6,83           66         6,83           67         7,81           85         8,78           86         6,83           66         6,83           66         6,83           76         7,81           85         8,78           86         9,76           114         11,71           113         13,66           171         17,57           190         19,52           209         21,47           228         23,42           228         23,42           228         23,42           25,37         25,37   |   | 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| 59<br>66<br>73   | 59<br>66<br>73   | 59<br>77<br>88  | 59<br>88<br>99   | 59<br>66<br>77<br>88<br>88<br>99<br>99   |   | 55<br>66<br>77<br>73<br>88<br>88<br>99<br>99<br>121<br>121<br>132   | 55<br>110<br>121<br>121<br>152<br>152<br>152  | 55<br>88<br>121<br>121<br>132<br>155<br>132<br>155<br>132<br>132<br>132<br>132<br>132<br>132<br>132<br>132<br>132<br>132  | 55<br>56<br>57<br>110<br>110<br>110<br>110<br>110<br>110<br>110<br>110<br>110<br>11  |  |  |  |  | 51<br>57<br>57<br>66<br>66<br>85<br>88<br>88<br>104<br>114<br>114<br>114<br>111<br>111<br>111<br>120<br>209<br>2208<br>2208<br>2208   | 51<br>57<br>57<br>56<br>58<br>58<br>58<br>58<br>57<br>57<br>57<br>57<br>57<br>57<br>57<br>57<br>57<br>57<br>57<br>57<br>57  |  |
| 66 57 5,85<br>73 63 6,44   | 66 57 5,85<br>73 63 6,44<br>77 66 6,83   | 66 57 5,85<br>73 63 6,44<br>77 66 6,83<br>88 76 7,81  | 66 57 5,85<br>73 63 6,44<br>77 66 6,83<br>88 76 7,81<br>99 85 8,78   | 66 57 5,85<br>73 63 6,44<br>77 66 6,83<br>88 76 7,81<br>99 85 8,78<br>110 95 9,76  | 66         57         5,85           73         63         6,44           77         66         6,83           88         76         6,83           99         85         8,78           110         95         9,76           121         104         10,73  | 66         57         5,85           73         63         6,44           77         66         6,83           88         76         7,81           99         85         8,78           110         95         9,76           121         104         10,73           132         114         11,71  | 66         57         5,85           73         63         6,44           77         66         6,83           88         76         7,81           99         85         8,78           110         95         9,76           121         104         10,73           132         114         11,71           154         133         13,66  | 66         57         5,85           73         63         6,44           77         66         6,83           88         76         7,81           99         85         8,78           110         95         9,76           121         104         10,73           123         114         10,73           154         133         13,66           176         152         15,62  | 66         57         5,85           73         63         6,44           77         66         6,83           88         76         7,81           99         85         8,78           110         95         9,76           121         104         10,73           132         114         11,71           154         133         13,66           176         152         15,62           176         152         15,62           198         171         17,57   | 57 5,85<br>63 6,44<br>66 6,83<br>66,6,83<br>76 7,81<br>86 6,83<br>76 7,81<br>86 6,83<br>9,76<br>9,76<br>10,73<br>11,4<br>11,71<br>11,71<br>11,71<br>13,3<br>13,66<br>17,1<br>17,1<br>17,1<br>17,1<br>17,57<br>190 19,52  | 57         5,85           63         6,44           66         6,83           66         6,83           76         7,81           85         8,78           95         9,76           104         10,73           114         11,71           133         13,66           171         17,57           190         19,52           209         21,47  | 57         5,85           63         6,44           66         6,83           66         6,83           76         7,81           85         8,78           95         9,76           104         10,73           113         11,71           171         11,71           173         13,66           171         17,57           190         19,52           209         21,47           228         23,42  | 57         5,85           63         6,44           66         6,83           66         6,83           76         7,81           85         8,78           95         9,76           104         10,73           114         11,71           133         13,66           171         17,57           190         19,52           228         23,42           228         23,42           223         21,47           25,37         25,37  | 5,85<br>6,44<br>6,83<br>6,83<br>8,78<br>8,78<br>9,76<br>10,73<br>10,73<br>11,71<br>11,71<br>11,71<br>19,52<br>23,42<br>23,42<br>23,42<br>23,42<br>23,42<br>23,42<br>23,42<br>23,42<br>23,37<br>23,42<br>23,37<br>27,33  | 5,85<br>6,44<br>6,83<br>6,83<br>8,78<br>8,78<br>9,76<br>11,71<br>11,71<br>11,71<br>11,71<br>11,71<br>11,75<br>11,75<br>11,55<br>11,55<br>23,42<br>23,42<br>23,42<br>23,37<br>29,28  | 5,85<br>6,44<br>6,83<br>6,83<br>8,78<br>8,78<br>9,76<br>11,71<br>11,71<br>11,71<br>13,66<br>15,62<br>19,52<br>23,42<br>23,42<br>23,42<br>23,42<br>23,42<br>23,42<br>23,42<br>23,42<br>23,42<br>23,42<br>23,23<br>23,23<br>31,23  |
| 73 63 6,44 76 66   | 73 63 6,44 76 66<br>77 66 6,83 81 70   | 73         63         6,44         76         66           77         66         6,83         81         70           88         76         7,81         93         80  | 73         63         6,44         76         66           77         66         6,83         81         70           88         76         7,81         93         80           99         85         8,78         104         89 | 73         63         6,44         76         66           77         66         6,83         81         70           88         76         7,81         93         80           99         85         8,78         104         89           110         95         9,76         116         99  | 73         63         6,44         76         66         83         81         70         88         76         76         66         78         81         70         88         76         71         86         78         81         70         88         76         86         87         81         70         88         76         87         81         70         89         80         93         80         93         80         93         80         93         80         93         80         93         80         93         80         93         80         93         80         93         80         93         80         93         80         93         80         93         80         93         81         101         83         81         104         83         93         81         101         101         101         101         101         103         127         109         103         127         109 | 73         63         6,44         76         66           77         66         6,83         81         70           88         76         7,81         93         80           99         85         8,78         104         89           110         95         9,76         116         99           121         104         10,73         127         109           132         114         11,71         139         119   | 73         63         6,44         76         66           77         66         6,83         81         70           88         76         7,81         93         80           99         85         8,78         104         89           110         95         9,76         116         89           121         104         10,73         127         109           132         114         11,71         139         119           154         133         13,66         162         139   | 73         63         6,44         76         66           77         66         6,83         81         70           88         76         7,81         93         80           99         85         8,78         104         89           110         95         9,76         116         99           121         104         10,73         127         109           122         114         11,71         139         119           154         133         13,66         162         139           176         152         15,62         185         159   | 73         63         6,44         76         66           77         66         6,83         81         70           88         76         7,81         93         80           99         85         7,81         93         80           9110         95         8,78         104         89           110         95         9,76         116         99           121         104         10,73         127         109           122         114         11,71         139         119           154         133         13,66         162         139           176         152         15,62         185         159           176         152         15,62         185         159           198         171         17,57         208         179   | 63         6,44         76         66         66           66         6,83         81         70           76         7,81         93         80           85         8,78         104         89           95         9,76         116         99           104         10,73         127         109           114         11,71         139         119           152         15,62         185         159           171         17,57         208         179           190         19,52         231         199   | 63         6,44         76         66         66         83         81         70           76         7,81         93         80         81         70           76         7,81         93         80         85         8,78         104         89           85         8,78         104         83         80         89         80           85         8,76         116         11,71         139         119         119         113         127         109           113         11,71         139         127         109         119         119         119         119         119         119         119         119         119         127         109         119         119         119         119         127         109         119         119         119         119         125         126         119         119         119         125         129         119         119         126         129         129         129         129         129         129         129         129         129         129         129         129         129         129         129         129         129         129 | 63         6,44         76         66         66           76         7,81         93         81         70           76         7,81         93         81         70           85         8,78         104         89         89           95         9,76         116         99         80           104         10,73         127         109         119           1133         13,66         162         139         119           152         15,62         185         159         119           171         17,57         208         179         119           190         19,52         231         199         126           209         21,47         255         219         229           209         21,47         255         219         239           2203         23,42         2778         233         199  | 63         6,44         76         66         6         83         81         70         66         6,83         81         70         70         71         71         71         71         70         71         71         70         71         70         71         70         70         71         70         70         70         70         70         70         70         70         70         70         70         70         70         71 <th< td=""><td>6,44 76 66<br/>6,83 81 70<br/>7,81 93 80<br/>8,78 104 89<br/>9,76 116 99<br/>10,73 127 109<br/>11,71 139 119<br/>13,66 162 139<br/>15,62 185 159<br/>17,57 208 179<br/>19,52 231 199<br/>23,42 278 239<br/>23,42 278 239<br/>25,37 301 259<br/>25,33 324 279</td><td>6,44 76 66<br/>6,83 81 70<br/>7,81 93 80<br/>8,78 104 89<br/>9,76 116 99<br/>10,73 127 109<br/>11,71 139 119<br/>13,66 162 139<br/>15,62 185 159<br/>17,57 208 179<br/>19,52 231 199<br/>23,42 278 239<br/>25,37 301 259<br/>25,37 301 259<br/>27,33 324 279<br/>29,28 347 298</td><td>6,44 76 66<br/>6,83 81 70<br/>7,81 93 80<br/>8,78 104 89<br/>9,76 116 99<br/>10,73 127 109<br/>11,71 139 119<br/>13,66 162 139<br/>15,62 185 159<br/>17,57 208 179<br/>19,52 231 199<br/>21,47 255 219<br/>23,42 278 239<br/>25,37 301 259<br/>27,33 324 279<br/>29,28 347 298<br/>31,23 370 318</td></th<> | 6,44 76 66<br>6,83 81 70<br>7,81 93 80<br>8,78 104 89<br>9,76 116 99<br>10,73 127 109<br>11,71 139 119<br>13,66 162 139<br>15,62 185 159<br>17,57 208 179<br>19,52 231 199<br>23,42 278 239<br>23,42 278 239<br>25,37 301 259<br>25,33 324 279  | 6,44 76 66<br>6,83 81 70<br>7,81 93 80<br>8,78 104 89<br>9,76 116 99<br>10,73 127 109<br>11,71 139 119<br>13,66 162 139<br>15,62 185 159<br>17,57 208 179<br>19,52 231 199<br>23,42 278 239<br>25,37 301 259<br>25,37 301 259<br>27,33 324 279<br>29,28 347 298   | 6,44 76 66<br>6,83 81 70<br>7,81 93 80<br>8,78 104 89<br>9,76 116 99<br>10,73 127 109<br>11,71 139 119<br>13,66 162 139<br>15,62 185 159<br>17,57 208 179<br>19,52 231 199<br>21,47 255 219<br>23,42 278 239<br>25,37 301 259<br>27,33 324 279<br>29,28 347 298<br>31,23 370 318   |
|  | 77 66 6,83 81 70 7,14 85   | 77 66 6,83 81 70 7,14 85<br>88 76 7,81 93 80 8,18 97  | 77 66 6,83 81 70 7,14 85<br>88 76 7,81 93 80 8,18 97<br>99 85 8,78 104 89 9,18 109   | 77         66         6,83         81         70         7,14         85           88         76         7,81         93         80         8,18         97           99         85         8,78         104         89         9,18         109           110         95         9,76         116         99         10,19         121  | 77         66         6,83         81         70         7,14         85           88         76         7,81         93         80         8,18         97           99         85         8,78         104         89         9,18         109           110         95         9,76         116         99         10,19         121           121         104         10,73         127         109         11,21         133   | 77         66         6,83         81         70         7,14         85           88         76         7,81         93         80         8,18         97           99         85         8,78         104         89         9,18         109           110         95         9,76         116         99         10,19         121           121         104         10,73         127         109         11,21         133           132         114         11,71         139         119         12,23         145 | 77         66         6,83         81         70         7,14         85           88         76         7,81         93         80         8,18         97           99         85         8,78         104         89         9,18         109           110         95         9,76         116         99         10,19         121           121         104         10,73         127         109         11,21         133           132         114         11,71         139         119         12,23         145           154         133         13,66         162         139         14,27         169 | 77         66         6,83         81         70         7,14         85           88         76         7,81         93         80         8,18         97           99         85         8,78         104         89         9,18         109           110         95         9,76         116         99         10,19         121           121         104         10,73         127         109         11,21         133           121         104         10,73         127         109         11,21         133           132         114         11,71         139         119         12,23         145           154         133         13,66         162         139         14,27         169           176         152         165         185         159         16,31         193 | 77         66         6,83         81         70         7,14         85           88         76         7,81         93         80         8,18         97           99         85         8,78         104         89         9,18         109           110         95         9,76         116         99         10,19         121           121         104         10,73         127         109         11,21         133           121         104         10,73         127         109         11,21         133           121         10,73         127         109         11,21         133           132         114         11,71         139         119         12,23         145           156         162         185         159         16,31         193         145         169           176         155         1562         185         159         16,31         193         193           198         171         17,57         208         179         18,35         217 | 66         6,83         81         70         7,14         85           76         7,81         93         80         8,18         97           85         8,78         104         89         9,18         109           95         9,76         116         99         10,19         121           104         10,73         127         109         11,21         133           114         11,71         139         119         12,23         145           133         13,66         162         139         14,27         169           152         15,62         185         159         16,31         193           171         17,57         208         179         18,35         217           190         19,52         231         193         20,39         242 | 66         6,83         81         70         7,14         85           76         7,81         93         80         8,18         97           85         8,78         104         89         9,18         109           95         9,76         116         99         10,19         121           104         10,73         127         109         11,21         133           114         11,71         139         119         12,23         145           133         13,66         162         139         14,27         169           152         15,62         185         159         16,31         193           171         17,57         208         179         18,35         217           190         19,52         231         193         242         203         242           190         19,52         211         20,39         242         242         242           190         21,47         255         219         20,39         242         242           209         21,47         255         219         22,43         266   | 66         6,83         81         70         7,14         85           76         7,81         93         80         8,18         97           85         8,78         104         89         9,18         109           95         9,76         116         99         10,19         121           104         10,73         127         109         11,21         133           114         11,71         139         119         12,23         145           133         13,66         162         139         14,27         169           173         13,66         162         139         14,27         169           173         15,62         185         159         16,31         193           171         17,57         208         179         18,35         217           190         19,52         231         199         20,39         242           209         21,47         255         219         22,43         266           203         23,42         239         24,47         290 | 66         6,83         81         70         7,14         85           76         7,81         93         80         8,18         97           85         8,78         104         89         9,18         109           95         9,76         116         99         10,19         121           104         10,73         127         109         11,21         133           114         11,77         139         119         12,23         145           133         13,66         162         139         14,27         169           171         17,57         208         179         12,23         145           171         17,57         208         179         14,37         169           171         17,57         208         179         18,35         217           190         19,52         231         199         20,39         242           209         21,47         255         219         22,43         266           228         23,42         27,83         20,39         24,47         290           228         23,42         27,83         26,51         314   | 6,83         81         70         7,14         85           7,81         93         80         8,18         97           8,78         104         89         9,18         109           9,76         116         99         10,19         121           10,73         127         109         11,21         133           11,71         139         119         121         133           11,71         139         119         12,23         145           13,66         162         139         14,27         169           15,62         185         159         16,31         193           15,62         185         159         16,31         193           17,57         208         179         18,35         217           19,52         231         199         20,39         242           21,47         255         219         22,43         266           23,42         278         239         24,47         290           25,37         301         259         26,51         314           27,3         324         279         28,55         338   | 6,83         81         70         7,14         85           7,81         93         80         8,18         97           8,76         116         99         9,18         109           9,76         116         99         10,19         121           10,73         127         109         11,21         133           11,71         139         119         121         133           15,62         185         159         16,31         193           17,57         208         179         18,35         217           17,57         208         179         18,35         217           17,57         208         179         18,35         217           19,52         231         199         20,39         242           21,47         255         219         22,43         266           23,42         278         239         24,47         290           25,37         301         259         26,51         314           27,3         324         279         28,55         338           25,37         301         259         26,51         314 | 6,83         81         70         7,14         85           7,81         93         80         8,18         97           8,76         116         99         9,18         109           9,76         116         99         10,19         121           10,73         127         109         11,21         133           11,71         139         119         121         133           15,62         185         159         16,31         193           17,57         208         179         12,23         145           17,57         208         179         14,27         169           17,57         208         179         14,27         169           17,57         208         179         18,35         217           19,52         231         199         20,39         242           23,42         278         239         24,47         290           25,37         301         259         26,51         314           27,3         38,53         338         365         338           25,37         301         259         26,51         314  |

Pump Pressure - bar

**NOZZLE TABLE** 

Nozzle capacity - usg/h

Figures shown are for an oil of Viscosity 4.4mm<sup>2</sup>/s (cSt), Density 830 kg/cm<sup>3</sup>.

# FAULT FINDING

Below is a list of some scenarios that may lead to a failure causing the burner to go into lockout mode. There are also some relevant tests and solutions to hopefully overcome any problem that may occur.

Push the reset button to re-start the burner. If the burner then functions correctly the control has simply responded to a temporary fault. If the burner still fails then a further investigation will be required to correct any fault.

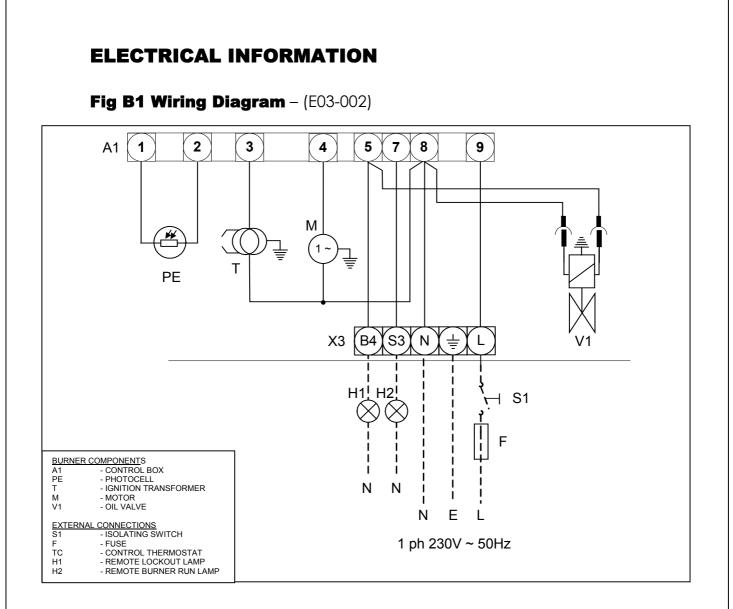
| Fault  | Probable cause   | Useful Test   | Solution  |
|--|--|---|---|
| The burner will not start  | 1) Lack of voltage.  | <ol> <li>If there is 240V onto<br/>terminal 9 of the control<br/>box but it is not<br/>responding then the box is<br/>at fault.</li> <li>If there is no voltage onto</li> </ol> | <ol> <li>Replace control box.</li> <li>Check any thermostats,</li> </ol>  |
|  |  | terminal 9 then there is an<br>external fault.  | switches, fuses, etc to<br>trace fault.   |
| The burner starts but<br>no flame is present and<br>the burner goes to | 1) No fuel to burner.  | <ol> <li>Check if there is oil<br/>present at the pump inlet</li> </ol>   | 1) Check fuel tank, valves, etc for problems.   |
| lockout  | 2) No fuel to the nozzle.<br>a) No voltage to<br>solenoid coil   | 2)<br>a)<br>i) Cover photocell. If<br>burner fires up ok then<br>photocell must be<br>detecting a light source<br>during pre-purge.   | 2)<br>a)<br>i) Identify source, spark,<br>etc and remedy.   |
|  |  | <li>ii) If there is still no flame<br/>disconnect photocell. If<br/>now ok then cell must<br/>be faulty.</li>   | ii) Replace photocell   |
|  | b) Voltage to coil but<br>not energizing.  | be ladity.  | b) Replace coil.  |
|  | <ul> <li>c) Coil energized but no<br/>oil at pump outlet.</li> <li>d) Oil at pump outlet<br/>but none through the<br/>nozzle.</li> </ul> |   | <ul> <li>c) Check valve opening.<br/>Replace if necessary.</li> <li>d) Replace nozzle, or<br/>check line for blockage.</li> </ul> |
|  | 3) No spark  | <ol> <li>Check electrodes, HT<br/>leads and voltage to igniter.</li> <li>If all ok then igniter is faulty.</li> </ol>   | 3) Replace igniter.   |
| The burner starts, a flame is established but                          | 1) Check burner wiring.  |   | 1) Remedy wiring<br>connections.  |
| the burner goes to lockout   | 2) Flame recognition.  | <ol> <li>Expose photocell to<br/>good ambient (or torch)<br/>light.</li> </ol>  | 2)  |
|  |  | a) If the problem<br>disappears then the<br>problem is with the flame<br>picture  | a) Reset combustion.  |
|  |  | <ul> <li>b) If the problem does not<br/>disappear then the<br/>photocell must be at<br/>fault</li> </ul>  | b) Replace photocell.   |
|  |  | fault   |   |

| Flame is pulsating                        | 1) Faulty or dirty nozzle<br>2) Excessive flue draught.   | 2) Measure draught.   | <ol> <li>Replace nozzle.</li> <li>Reset combustion or<br/>adjust draught stabilizer (if<br/>fitted).</li> </ol>   |
|---|---|---|---|
| Smoking Flame                             | <ol> <li>Faulty nozzle.</li> <li>Combustion not set<br/>correctly.</li> <li>Insufficient air.</li> <li>Fuel pressure too low</li> </ol> | <ol> <li>2) Check combustion.</li> <li>3) Check combustion.</li> <li>4) Check fuel pressure.</li> </ol>   | <ol> <li>Replace nozzle.</li> <li>Reset combustion</li> <li>Increase air setting.<br/>Check ventilation.</li> <li>Increase fuel pressure.</li> </ol>    |
| Burner keeps bringing<br>ignition back on | <ol> <li>Flame recognition.</li> <li>2) Low sulphur fuel.</li> </ol>  | <ol> <li>Expose photocell to<br/>good ambient (or torch)<br/>light.</li> <li>a) If the problem<br/>disappears then the<br/>problem is with the flame<br/>picture</li> <li>b) If the problem does not<br/>disappear then the<br/>photocell must be at<br/>fault</li> <li>2) As above.</li> </ol> | <ul> <li>1)</li> <li>a) Reset combustion.</li> <li>b) Replace photocell.</li> <li>2) Reset combustion to give a higher CO<sub>2</sub> level.</li> </ul> |

Please note: The information given above is provided to assist the engineer with any problems they may encounter. This is not a definitive list.

If further problems are encountered then please contact EOGB Energy Products Ltd for advice.

Technical Helpline – Tel: 08703 899499



### **Technical Data**

| 220/240 V (-15% - +10%) 50 Hz<br>10 A fast, 6 A slow<br>5 VA<br>12 sec<br>12 sec<br>20 sec<br>10 sec<br>90 sec |
|--|
| 90 sec<br>MZ770S<br>>6 Lux   |
| 20 L0X<br>min. 30μΑ<br>IP44<br>0°C +60°C<br>EN 230   |
|  |

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