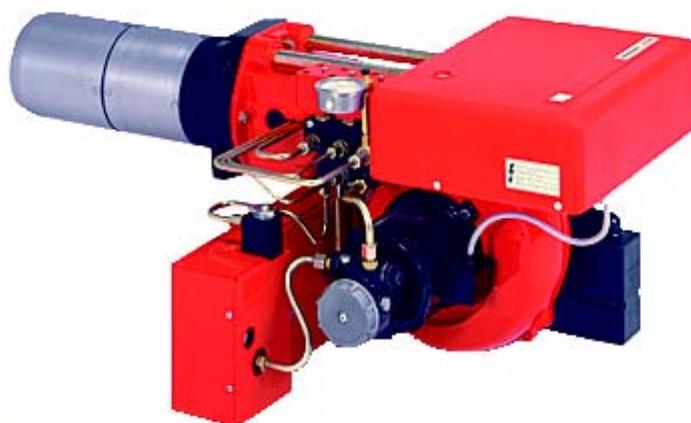


**GB** Heavy oil burner

Two-stage operation



CODE	MODELE - MODEL	TYPE
3434623	PRESS 45 N/ECO	627 T
3434624	PRESS 45 N/ECO	627 T

# INDEX

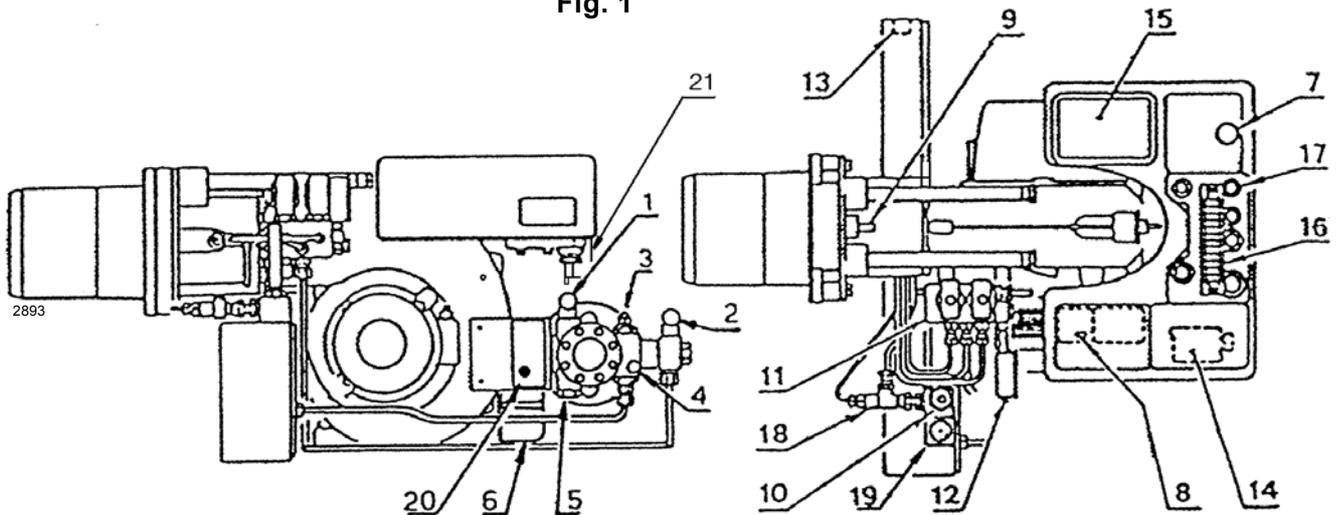
<b>1. BURNER DESCRIPTION</b> . . . . .	<b>1</b>	<b>4. OPERATION</b> . . . . .	<b>6</b>
1.1 Equipment . . . . .	1	4.1 Choice of nozzles . . . . .	6
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2.1 Technical data . . . . .	2	4.3 Combustion head setting. . . . .	6
2.2 Dimensions . . . . .	2	4.4 Adjustment of the air damper motor . . . . .	6
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## 1. BURNER DESCRIPTION

Two stage heavy oil burner.

- The burner meets protection level of IP 40, EN 60529.
- Burner with CE marking in conformity with EEC directives: EMC 89/336/EEC, Low Voltage 73/23/EEC and Machines 98/37/EEC.

Fig. 1



- |   |                                      |
|---|--------------------------------------|
| 1 - Suction line  | 11 - Valve assembly                  |
| 2 - Return line   | 12 - Manometer with protection valve |
| 3 - Pump pressure adjustment screw                        | 13 - Adjustment thermostat           |
| 4 - Manometer fitting (G1/8)                              | 14 - Pre-heater contact maker        |
| 5 - Vacuumeter fitting (G1/2)                             | 15 - Ignition transformer            |
| 6 - Air damper opening motor                              | 16 - Terminal strip                  |
| 7 - Control box reset push-button and lock-out indication | 17 - Cable glands                    |
| 8 - Fan overload cutout reset                             | 18 - Antigas valve                   |
| 9 - Combustion head regulating screw                      | 19 - Thermometer                     |
| 10 - Double filter  | 20 - Pump motor starter with reset   |
|   | 21 - Air pressure switch             |

### 1.1 EQUIPMENT

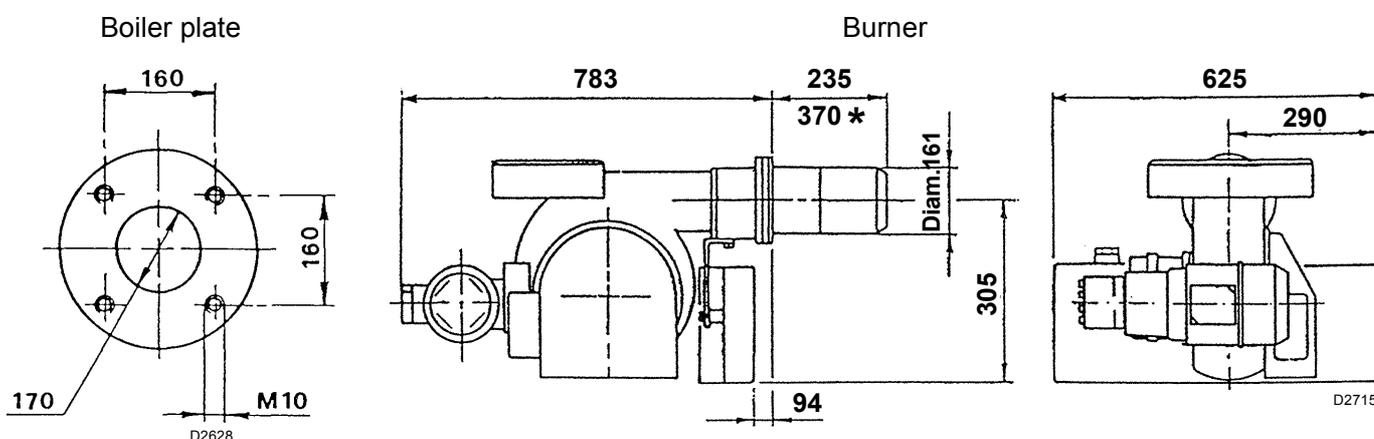
Flexible tubes . . . . .	No. 2	Nipples . . . . .	No. 2
Gaskets . . . . .	No. 2	Screws . . . . .	No. 4
Flange shield . . . . .	No. 1	Nozzles . . . . .	No. 2
Guide extensions (for the lengthened head version).No. 2		Gasket . . . . .	No. 1
Fitting for operation with emulsified oil fuel (see page 9) . . . . .	No. 1		

## 2. TECHNICAL DATA

### 2.1 TECHNICAL DATA

TYPE	627 T
Thermal power - Flow rate	114/205 - 513 kW - 10/18 - 45 kg/h
Fuel	Oil with max. viscosity at 50° C 115 sq. mm/sec (15° E)
Electrical supply	Three-phase, 230V ± 10% ~ 50Hz without neutral 400V ± 10% ~ 50Hz with neutral
Motor 230V - 400V	Fan: 2.4A - 1.4A Pump: 2.1A - 1.2A
Ignition transformer	Primary 2 A - Secondary 2 x 6.5 kV - 35 mA
Heaters	2.8 kW
Electrical intake power	4.1 kW
Pump	60 kg/h at 20 bar

### 2.2 DIMENSIONS



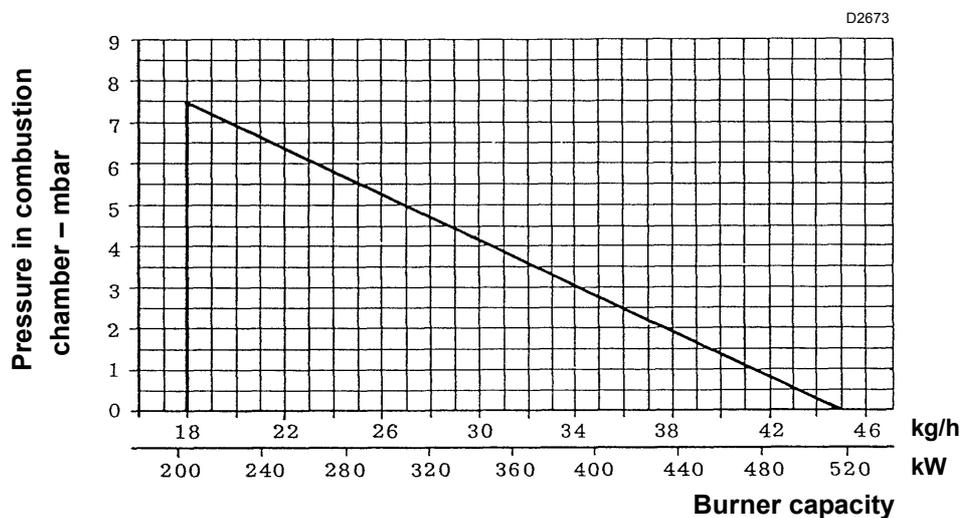
#### NOTE

The weight of the rear part of the pumping assembly exerts flexure stress on the guides; you are advised to hold the burner while it is being extracted so as not to damage the flame disc and the said guides.

\* For long - head version.

Use the pin extensions provided to move the burner back.

### 2.3 FIELD OF OPERATION (2 nozzles in operation)



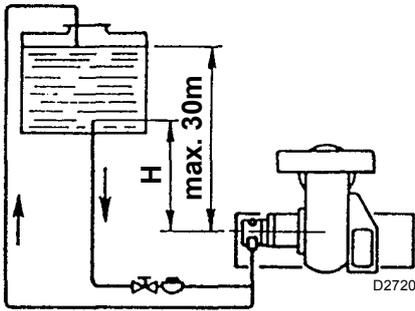
When the burner operates with only one nozzle, the pressurization conditions are better and no problems arise. Minimal flow rate with one only nozzle: 10 kg/h - 114 kW.

### 3. INSTALLATION

#### 3.1 FUEL OIL SUPPLY SYSTEMS

##### GRAVITY SYSTEM

For light oil with viscosity max. 7°E at 50°C.



##### Pump priming:

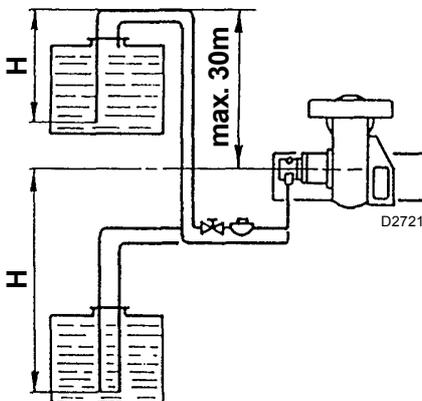
loosen the cap of the vacuum fitting (5, fig. 1) and wait for the fuel to flow out.

H: Difference in height  
L: Length of the suction tube

H metres	L metres	
	diam. 3/4"	diam. 1" gas
0	5	10
0.5	8	15
1	11	20
1.5	14	25
2	17	30

##### SUCTION SYSTEM

For light fuel oil with viscosity max. 7°E at 50°C.



##### Not advised, to be used only in case of previously existing system.

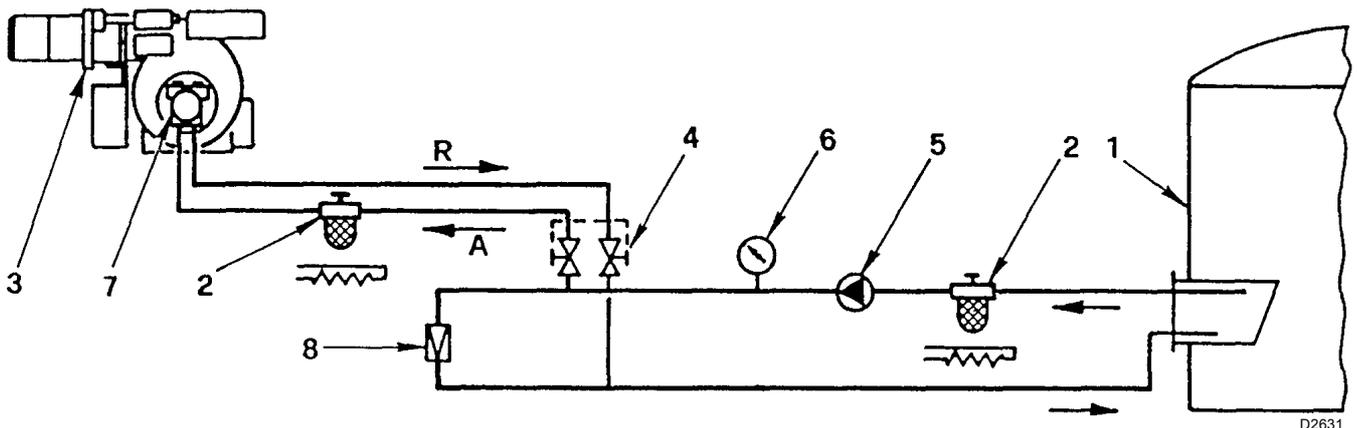
Never exceed the max. vacuum of 0.5 bar (38 cm Hg) measured at the vacuum fitting (5, fig. 1).

The pipes should be perfectly airtight. When the tank is placed below of the burner level, the return pipe should arrive at the same level as the suction pipe. In this case the foot valve is not required.

H metres	L metres	
	diam. 1" gas	diam. 1 1/4"
0	24	45
0.5	21	40
1	18	35
1.5	15	30
2	12	25
2.5	9	20
3	6	15

##### LOOP SYSTEM (max loop pressure 3 bar)

For heavy oil with viscosity up to 20°E / 50°C.



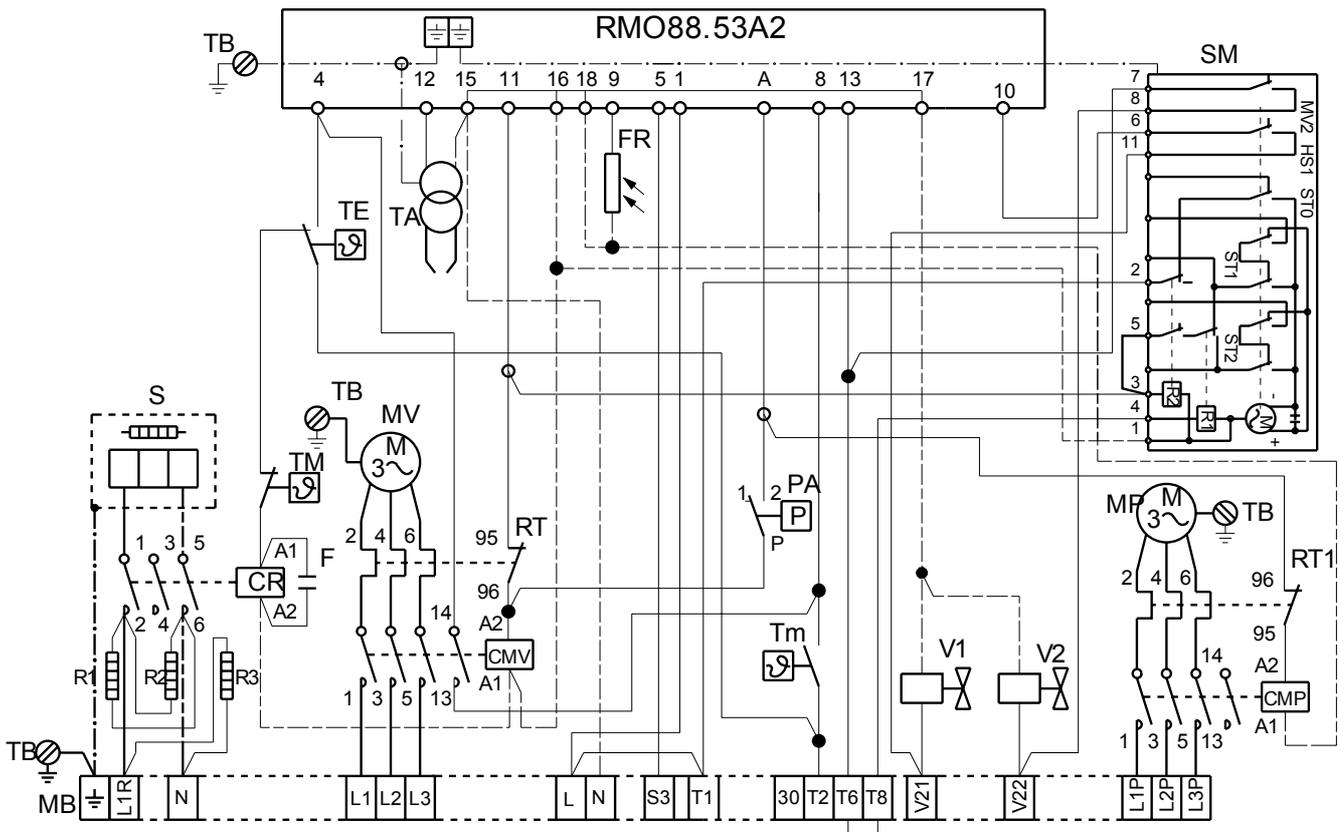
- 1 - Tank (properly heated for heavy oil)
- 2 - Filter (with resistor for oil > 7°E / 50°C)
- 3 - Burner
- 4 - Air dampers to exclude the burner (coupled)

- 5 - Transfer pump
- 6 - Check Manometer
- 7 - Burner pump
- 8 - Pressure adjuster

**Important note:** to let the fuel flow properly all the pipes have to be properly sized, insulated and heated (with elec. resistor or steam or hot water).

**Warning:** before to starting up the burner, make sure that there are no obstructions in the pipes. Any obstruction may damage the sealing of the pump.

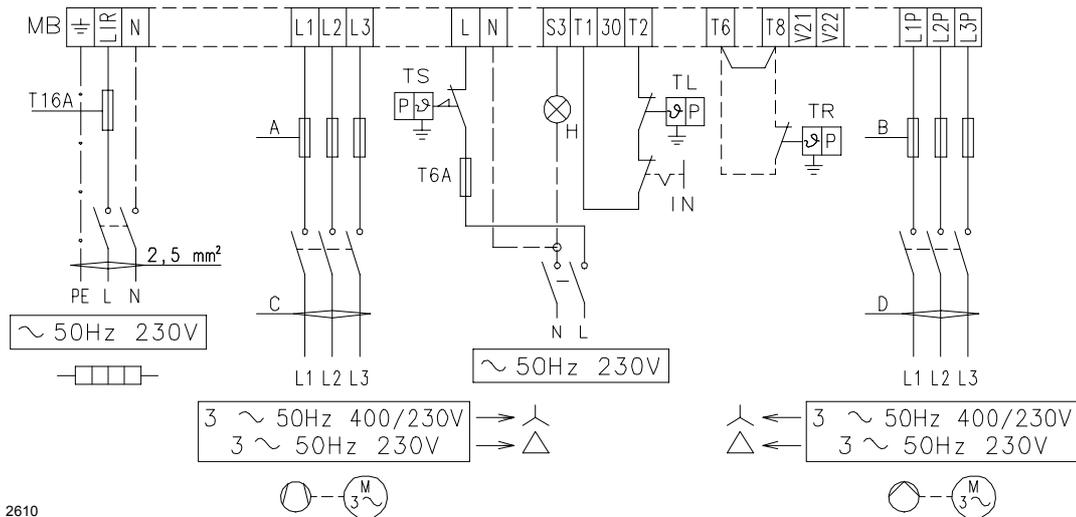
### 3.2 BURNER ELECTRICAL SYSTEM (carried out in the factory)



2598

- |                                     |  |
|-------------------------------------|--|
| <b>CMP</b> Pump motor contact maker | <b>RT</b> Fan motor thermal relay                            |
| <b>CMV</b> Fan motor contact maker  | <b>RT1</b> Pump motor thermal relay                          |
| <b>CR</b> Pre-heater contact maker  | <b>S</b> Pre-heater tank                                     |
| <b>F</b> Suppressor                 | <b>SM</b> Servomotor   |
| <b>FR</b> Photocell                 | <b>TA</b> Ignition transformer                               |
| <b>MB</b> Burner terminal strip     | <b>TB</b> Burner earth                                       |
| <b>MP</b> Pump motor                | <b>TE</b> Regulation thermostat and start-up enabling signal |
| <b>MV</b> Fan motor                 | <b>Tm</b> Minimum contact thermostat                         |
| <b>PA</b> Air pressure switch       | <b>Tm</b> Maximum contact thermostat                         |
| <b>R1</b> Atomiser holder resistor  | <b>V1</b> 1 <sup>st</sup> stage valve                        |
| <b>R2</b> Pump resistor             | <b>V2</b> 2 <sup>nd</sup> stage valve                        |
| <b>R3</b> Valve assembly resistor   |  |
| <b>RMO</b> Electrical control box   |  |

### 3.3 ELECTRICAL CONNECTIONS TO THE TERMINAL STRIP (to be made by the installer)



2610

#### NOTE

Wire cross sections: min. 1 sq. mm.  
(Unless required otherwise by local standards and legislation).

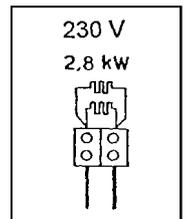
- IN** Manual switch
- MB** Burner terminal strip
- H** Lock-out signal
- TL** Limit remote control
- TR** Adjustment remote control
- TS** Safety remote control

	230V	400V
A Ampere	10	6
B Ampere	6	4
C sq.mm	1.5	1.5
D sq.mm	2.5	1.5

#### TWO STAGE OPERATION

This is achieved by the remote control device connected to terminals 5-6 (removing the jumper), that controls the second valve.

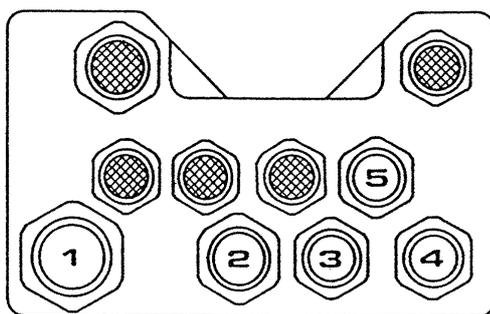
#### RESISTOR CONNECTIONS PRE-HEATER



D2634

#### FASTENING OF THE ELECTRICAL WIRES

All the wires, which have to be connected to the burner terminal strip (16, fig. 1) shall pass through the cable glands (17, fig. 1), see the figure below.



D2635

- 1 - Single phase pre-heated resistor power supply: ..... cable entry Pg 21
- 2 - Motor three-phase supply: ..... cable entry Pg 16
- 3 - Single phase power supply and safety thermostat: ..... cable entry Pg 13.5
- 4 - Control thermostat: ..... cable entry Pg 13.5
- 5 - Second stage thermostat: ..... cable entry Pg 13.5

Further prospective signals or controls can be connected to the burner terminal strip pushing out the pre-sheared disc from the holes and inserting a common cable gland for the passage and the clamping of the leads. To ensure the IP 40 degree of protection in compliance with EN 60529 close the passage holes of the cables and any unused cable entries with appropriate discs.

#### NOTES

- Make a safe earth connection.
- Verify the burner stop by opening the boiler thermostat and the burner lock-out by darkening the photocell.

## 4. OPERATION

### 4.1 CHOICE OF NOZZLES

#### Recommended nozzles:

- Monarch F 80 H0.

### 4.2 PUMP PRESSURE

#### Recommended pressure:

- Fluid oil: 20 bar
- Heavy oil: 25 bar

The flow rates of the nozzles indicated on the table are nominal and refer to a light oil having viscosity from 3 to 5°E at 50° C pre-heated to 100°C. The actual flow rate may vary by  $\pm 5\%$  against the rated one.

If flowrate values between those in the table are required, the pump pressure may be varied or the nozzles arranged differently.

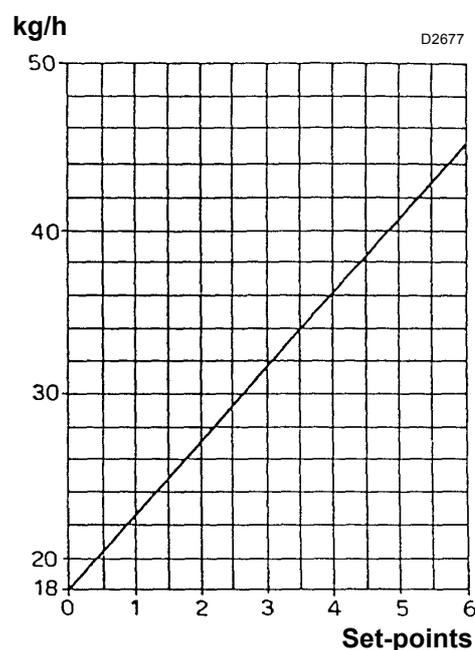
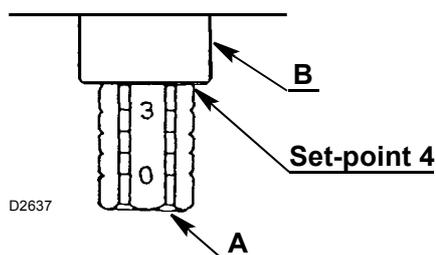
The pump leaves the factory set at 20 bar.

Nozzle GPH (45° - 60°)	20 bar kg/h	25 bar kg/h
1.50 + 1.50	18.00	20.30
1.75 + 1.75	21.00	23.80
2.00 + 2.00	24.00	27.10
2.25 + 2.25	27.00	30.50
2.50 + 2.50	30.00	34.00
3.00 + 3.00	36.00	40.60
3.50 + 3.50	42.00	-
3.50 + 4.00	45.00	-

### 4.3 COMBUSTION HEAD ADJUSTMENT

Turn the screw **A**, fig. 2 till the set-point, shown in the diagram, is in line with the level of the sleeve **B**, fig. 2.

Fig. 2



### 4.4 ADJUSTMENT OF THE AIR DAMPER MOTOR

#### PARK - Blue lever

This lever leaves the factory vertically positioned and corresponds to the air damper completely closed.

A partial opening of the air damper might be obtained by moving this lever leftwards (+ on the plate).

The new position of the air damper is detectable when the burner is off.

Do not exceed the position of the orange lever for the 1<sup>st</sup> stage.

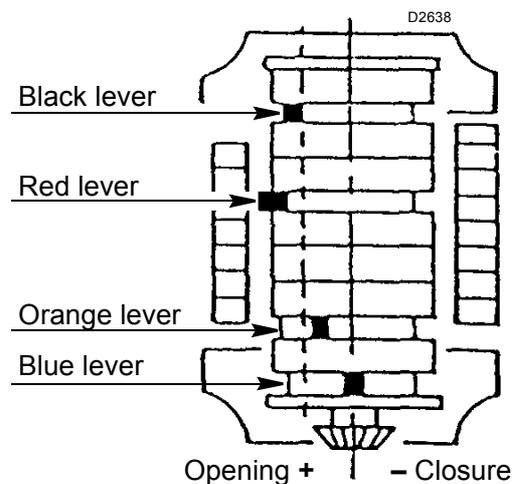
#### 1<sup>st</sup> STAGE - Orange lever

The orange lever controls the air damper position for the first flame, it is adjustable on both opening and closing.

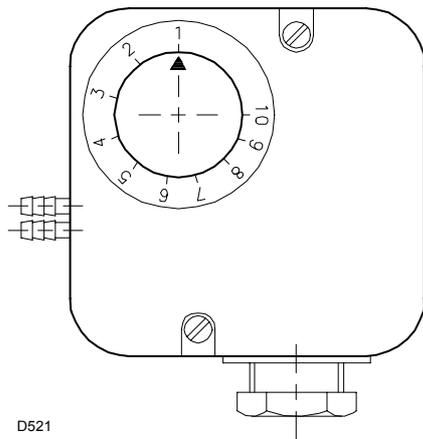
#### 2<sup>nd</sup> STAGE - Red and black levers

The red lever controls the air damper position for the second flame, it is adjustable on both closing and opening.

The black lever controls the opening of the second oil valve and it must always be slightly earlier than the red lever, but never the first stage orange one.



## 4.5 AIR PRESSURE SWITCH



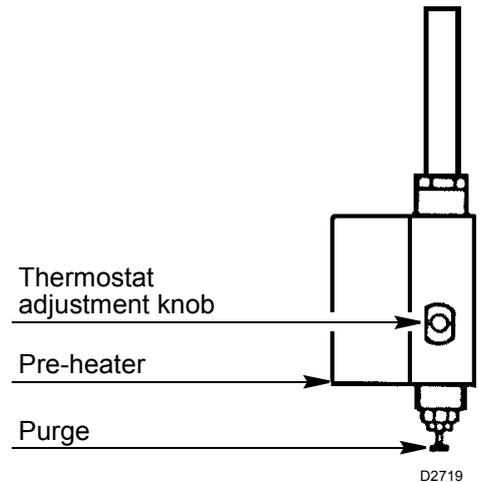
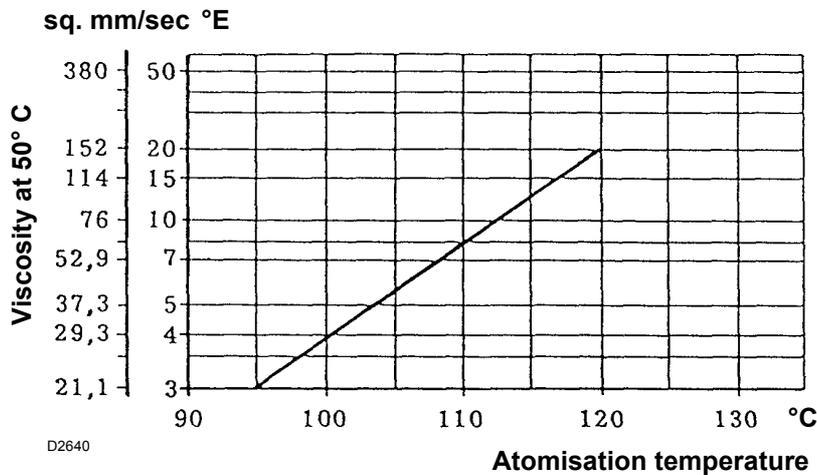
Carry out the regulation of the air pressure switch after carrying out all the other regulations of the burner with the air pressure switch adjusted to the beginning of the scale.

With the burner operating at the MIN power increase the pressure of the adjustment by slowly turning the appropriate knob clockwise until the burner locks out. Then turn the knob counterclockwise to a value equal to about 20% of the regulated value and then check the correct turning on of the burner. If the burner locks out again turn the knob a bit further in a counterclockwise direction.

## 4.6 ATOMISATION TEMPERATURE ADJUSTMENT

**Thermostat for adjustment - maximum value - minimum value**

**Adjustment thermostat** prevents burner start up if the fuel temperature has not reached the required value for a better atomisation as indicated in the diagram below.



### Example

Fuel oil with viscosity of 7 °E at 50 °C is pre-heated to approximately 110 °C.

The thermostat has to be generally set at a value higher than the required one (120°C indicated on the knob to get approximately 100°C at the nozzles).

The value read has to be done after some minutes of operation and later the necessary adjustments could be carried out.

**Minimum value contact thermostat** intervenes by stopping the burner if the fuel temperature decreases under the value necessary for better combustion.

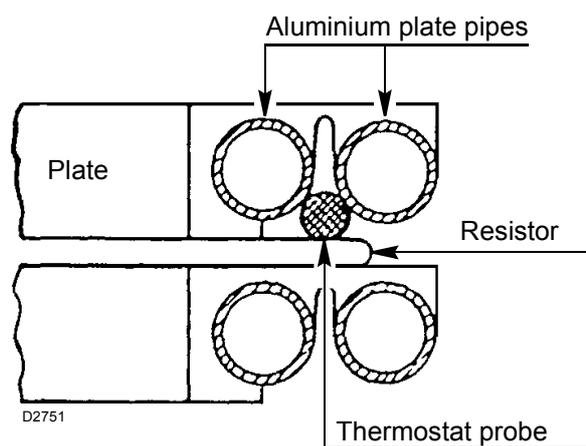
**Maximum value contact thermostat** switches off the resistors when in case of failure of the adjustment thermostat, the temperature increases inside the pre-heater. In case of abnormal temperature, make sure of the regular functioning of control thermostat and of the resistor in contact with the probe of the thermostat.

## IMPORTANT NOTES

If the pre-heater thermostat or the resistor in contact with the probe should be replaced, the probe has to be positioned in contact with the resistor and with the pipes of the last aluminium plate, after loosening of the fixing screws of the aluminium plate packs, see drawing.

If during the operation exceptional differences or temperature peaks that are too high should be detected, verify the continuity of the resistor, using an ohmmeter in contact with the temperature probe (approximately 35 Ohm).

Use only filters marked with a groove on the tightening hexagon.



## NOTES

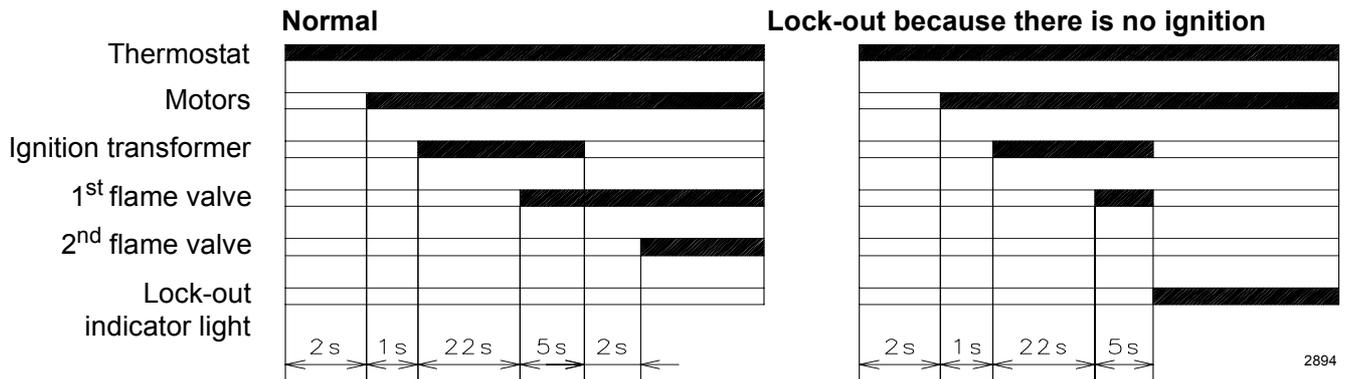
- The pre-heater might be fitted with a second maximum value contact thermostat.  
That thermostat can be used to act on an external contact maker by means of a switch to cut off the current from the pre-heater, in case of excess temperature (Kit code no. 3000800).
- The resistor **R** placed on the atomiser holder is wired to the supply line of the pre-heater (see page 4).  
When the burner is off, the pre-heater supply line shall remain fed.  
Should the pre-heater line be turned off, the fuel must be pre-heated for approximately 30 minutes before the burner start-up. On the contrary, the nozzle-holder resistor shall be supplied with an independent single-phase line, protected by a fuse of 1A.  
This line shall never be switched off, when the burner is off.
- Before the burner start-up, verify that the pump is filled of fuel in order to avoid any idling for too long time.
- Filter cleaning:  
periodically clean the filters in order to avoid any trouble in the burner operation.
- Supply line filter:  
positioned on the suction line, it causes the increase of the vacuum in the pump with the consequent flow of gas and noise. Do not exceed the vacuum of 38 cm Hg (5 m W.c.) (5, fig. 1).
- Pre-heater filter (10, fig. 1):  
positioned in the delivery line, it causes a decrease of the atomising pressure which is detectable by use of a manometer (12, fig. 1).

## MANOMETER PROTECTION VALVE

After atomisation pressure has been checked, it is recommended to cut out the manometer (12, fig. 1) to avoid pressure shocks that it might be subjected to at every burner start up.

To achieve this, close the protection valve when the burner is not working and the manometer indicates 0 bar.

## 4.7 START-UP PROGRAMME



### Motor lock-out

It is caused by the motor overload relay if there is an overload or no phase.

## 4.8 ECOLOGICAL OIL BURNERS

### WARNING

The transition from normal fuel oil to ecological fuel oil requires:

- The tank to be emptied of normal fuel oil.
- Cleaning of the cistern and the pipes that carry the fuel oil to the burner.
- Application of a filter if there is not one already on the burner fuel line with a filtering grade of 0.3 mm maximum.

If this is not done, Riello S.p.A. declines all liability if the burner fails to work properly or wears out prematurely.

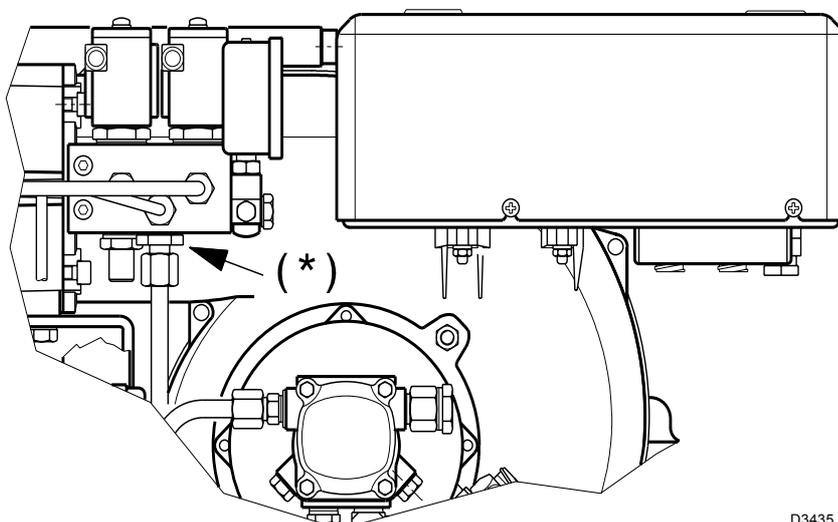
### NOTES

These burners are the result of careful study that allows them to be used with ecological fuels as well; oils, that in certain temperature and speed conditions, are particularly aggressive for the vital parts of the burner.

The objective has been achieved with the reduction of the transiting speed in some of the parts and an appropriate choice of materials (in particular surface treatments) as well as a redefinition of the backlashes and coupling tolerances.

The burners for ecological oils are very different from normal fuel oil burners because they have a separate pump (worked by its own motor at 1400 rpm) and for the presence of double filtration between pump and nozzle.

## 4.9 EMULSIFIED FUEL OIL FUNCTIONING



### WARNING

In the case of functioning with emulsified fuel oil it is necessary to change the fitting on the burner (\*) with the one supplied with it.

D3435

## 4.10 BURNER START-UP PROGRAM DIAGNOSTICS

During start-up, indication is according to the following table:

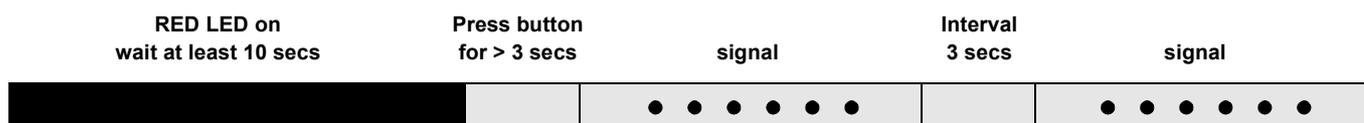
COLOUR CODE TABLE	
Sequences	Colour code
Preventilation	●●●●●●●●●●
Ignition phase	●○●○●○●○●○●○●○
Operation with flame ok	□□□□□□□□□□
Operation with weak flame	□○□○□○□○□○□○□○
Electrical supply lower than ~ 170V	●▲●▲●▲●▲●▲●▲●▲
Lock-out	▲▲▲▲▲▲▲▲▲▲
Extraneous light	▲□▲□▲□▲□▲□▲□▲□
<b>Key:</b>	○ Off      ● Yellow      □ Green      ▲ Red

## 4.11 OPERATING FAULT DIAGNOSTICS

The control box has a self-diagnostic system, which allows operating faults to be found easily: (**RED LED**) signal.

To use this function, wait at least ten seconds from the safety lock out, and then press the reset button for a minimum of 3 seconds.

After releasing the button, the RED LED starts blinking as shown in the diagram below.



The pulses of the LED constitute a signal with intervals of approximately three seconds.

The number of pulses will provide the information on the possible faults, according to the table below:

SIGNAL	PROBABLE CAUSE
2 blinks ● ●	A stable flame is not detected in the safety time: – faulty photocell; – oil valve fault; – neutral/phase reversal; – faulty ignition transformer – poor burner regulation (insufficient fuel oil).
3 blinks ● ● ●	Min. air pressure switch (if installed) does not close: – air pressure switch faulty; – air pressure switch not regulated; – max. air pressure switch triggered (if installed).
4 blinks ● ● ● ●	Min. air pressure switch (if installed) does not open or light in the chamber before ignition: – air pressure switch faulty; – air pressure switch not regulated.
7 blinks ● ● ● ● ● ● ●	Loss of flame during operation: – poor burner regulation (insufficient fuel oil); – oil valve fault; – short circuit between photocell and earth.
8 blinks ● ● ● ● ● ● ● ●	– Not used.
10 blinks ● ● ● ● ● ● ● ● ● ●	– Wiring error or internal fault.



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