

## Heavy oil burners



| CODE    | MODEL         | TYPE    |
|---------|---------------|---------|
| 3436885 | PRESS 140 T/N | 466 T80 |
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## TECHNICAL DATA

|                        |   |
|------------------------|---|
| Thermal power - Output | 320 / 1600 kW - 28 / 140 kg/h (See page 3)  |
| Operation              | 1 <sup>st</sup> stage - 2 <sup>nd</sup> stage - 3 <sup>rd</sup> stage   |
| Fuel                   | Oil with max. viscosity 50 mm <sup>2</sup> /s (7°E) at 50°C<br>with kit: max. viscosity 500 mm <sup>2</sup> /s (65°E) at 50°C |
| Pump                   | 350 kg/h at 25 bar  |

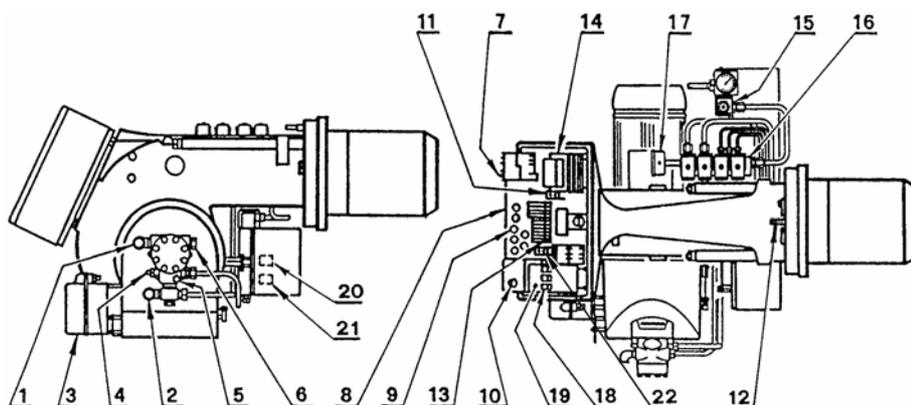
## ELECTRICAL DATA

### Motor IE1

|                           |  |
|---------------------------|--|
| Electrical supply         | Three phase: 220 V +10% -10% ~ 60 Hz without neutral<br>220-380 V +10% -10% ~ 60 Hz with neutral |
| Motor                     | 15.9 A / 220V - 9.2 A / 380V   |
| Ignition transformer      | Primary: 2 A - Secondary: 2 x 6.5 kV - 35 mA   |
| Heaters                   | 4 kW   |
| Absorbed electrical power | 18.6 kW  |

### Motor IE2

|                           |  |
|---------------------------|--|
| Electrical supply         | Three phase: 220 V +10% -10% ~ 60 Hz without neutral<br>220-380 V +10% -10% ~ 60 Hz with neutral |
| Motor                     | 14.6 A / 220V - 8.5 A / 380V   |
| Ignition transformer      | Primary: 2 A - Secondary: 2 x 6.5 kV - 35 mA   |
| Heaters                   | 4 kW   |
| Absorbed electrical power | 18.6 kW  |

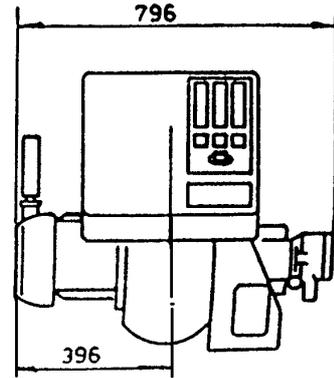
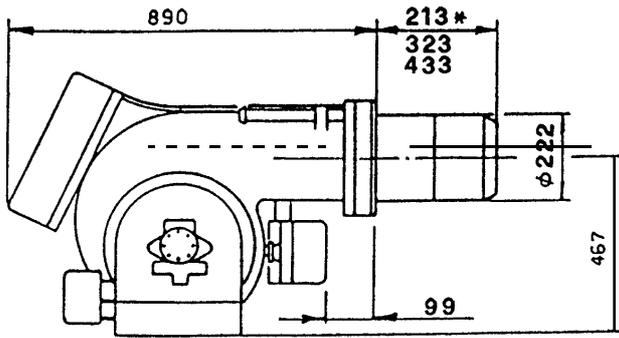


**Fig. 1**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>1 - Suction line</li> <li>2 - Return line</li> <li>3 - Air shutter opening motor</li> <li>4 - Pump pressure adjustment screw</li> <li>5 - Manometer plug (G 1/8)</li> <li>6 - Vacuumeter plug (G 1/2)</li> <li>7 - Reset push-button of the motor overload relay</li> <li>8 - Electric board</li> <li>9 - Cable clamps</li> <li>10 - Control box reset push-button and lock-out lamp</li> <li>11 - Adjustment thermostat</li> <li>12 - Regulating bush for combustion head</li> <li>13 - Wiring terminal board</li> <li>14 - Ignition transformer</li> <li>15 - Filter</li> <li>16 - Valves group</li> <li>17 - Manometer</li> </ul> | <ul style="list-style-type: none"> <li>18 - Lamp</li> <li>19 - Commutator</li> <li>20 - Low limit thermostat</li> <li>21 - High limit thermostat</li> <li>22 - Timer</li> </ul> |
|---|---|

| Quantity | Accessories       |
|----------|-------------------|
| 2        | Flexible tubes    |
| 2        | Nipples           |
| 4        | Screws            |
| 1        | Gasket for flange |
| 5        | Cable clamps      |

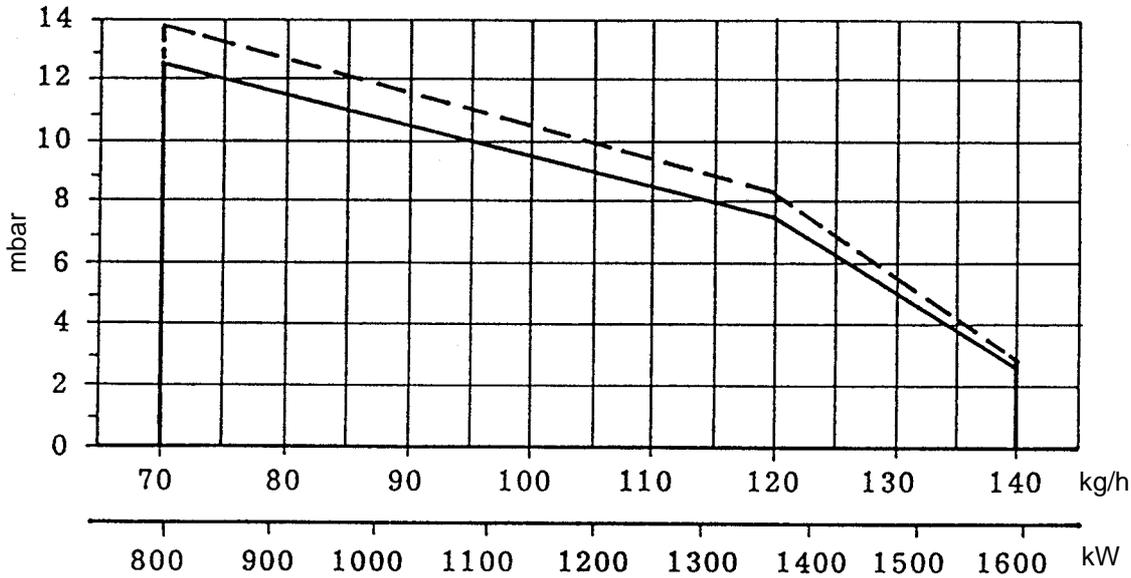
**DIMENSIONS**



\*It is possible with a spacer, upon request

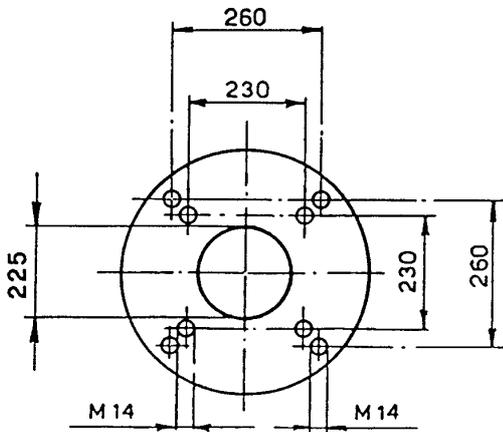
**COMBUSTION CHAMBER PRESSURE - MAXIMUM OUTPUT**  
(Three nozzles in operation)

Operation field:                      Limit                      Safety



When the burner operates with only one or two nozzles, the pressurization conditions are improved and no problems arise.

**Boiler front plate drilling**  
**Combustion head projection**



For the combustion head projection carefully follow the boiler manufacturer indications.  
A proper protection with refractory material on the combustion head projecting into the combustion chamber shall be made, when boilers with frontal smoke box are used.

## OPERATION AND EFFICIENCY OF THE BURNER

| <b>1<sup>st</sup> STAGE</b>   | <b>POWER AND OUTPUT</b> |           |         |            |
|---|-------------------------|-----------|---------|------------|
|   | MINIMUM                 |           | MAXIMUM |            |
|   | kW                      | kg/h      | kW      | kg/h       |
| 1 <sup>st</sup> nozzle: ignition phase                                      | 262                     | 23        | 536     | 47         |
| 1 <sup>st</sup> + 2 <sup>nd</sup> nozzle: intermediate phase                | 536                     | 47        | 1060    | 93         |
| 1 <sup>st</sup> + 2 <sup>nd</sup> + 3 <sup>rd</sup> nozzle: operation phase | 798                     | <b>70</b> | 1595    | <b>140</b> |

| <b>2<sup>nd</sup> STAGE</b>  | <b>POWER AND OUTPUT</b> |           |         |            |
|--|-------------------------|-----------|---------|------------|
|  | MINIMUM                 |           | MAXIMUM |            |
|  | kW                      | kg/h      | kW      | kg/h       |
| 1 <sup>st</sup> nozzle: ignition phase   | 262                     | 23        | 536     | 47         |
| 1 <sup>st</sup> + 2 <sup>nd</sup> nozzle: 1 <sup>st</sup> stage of operation                   | 536                     | <b>47</b> | 1060    | <b>93</b>  |
| 1 <sup>st</sup> + 2 <sup>nd</sup> + 3 <sup>rd</sup> nozzle: 2 <sup>nd</sup> stage of operation | 798                     | <b>70</b> | 1595    | <b>140</b> |

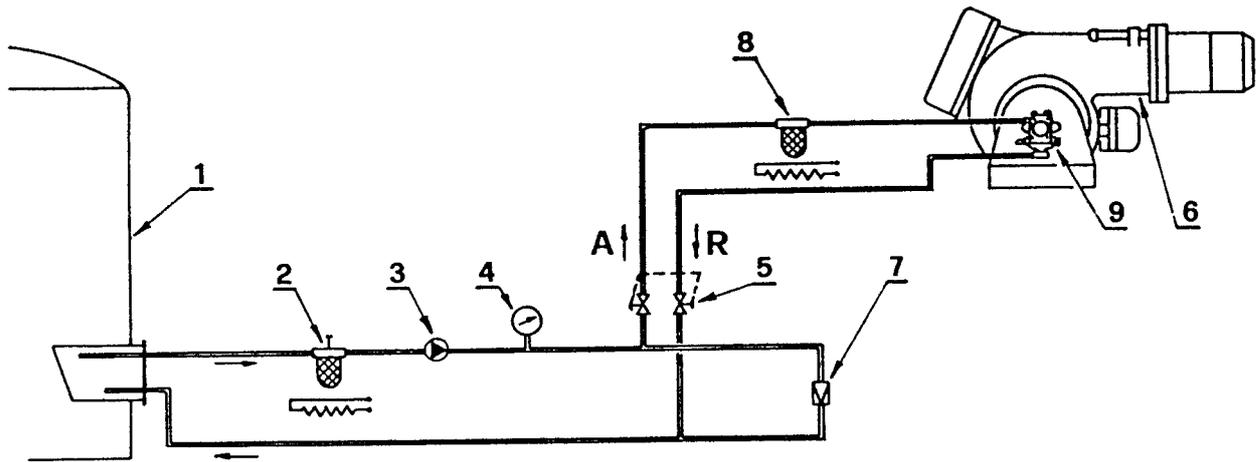
| <b>3<sup>rd</sup> STAGE</b>  | <b>POWER AND OUTPUT</b> |           |         |            |
|--|-------------------------|-----------|---------|------------|
|  | MINIMUM                 |           | MAXIMUM |            |
|  | kW                      | kg/h      | kW      | kg/h       |
| 1 <sup>st</sup> nozzle: 1 <sup>st</sup> stage of operation                                     | 319                     | <b>28</b> | 536     | <b>47</b>  |
| 1 <sup>st</sup> + 2 <sup>nd</sup> nozzle: 2 <sup>nd</sup> stage of operation                   | 638                     | <b>56</b> | 1060    | <b>93</b>  |
| 1 <sup>st</sup> + 2 <sup>nd</sup> + 3 <sup>rd</sup> nozzle: 3 <sup>rd</sup> stage of operation | 798                     | <b>70</b> | 1595    | <b>140</b> |

## ACCESSOIRES

### RADIO DISTURBANCE PROTECTION KIT: Code 3010386

If the burner is installed in places particularly subject to radio disturbance (emission of signals exceeding 10 V/m) owing to the presence of an INVERTER, or in applications where the length of the thermostat connections exceeds 20 metres, a protection kit is available as an interface between the control box and the burner.

## HEAVY OIL SUPPLY LINE



### RING SUPPLY LINE

(for heavy oil with viscosity up to 50°E at 50°C)

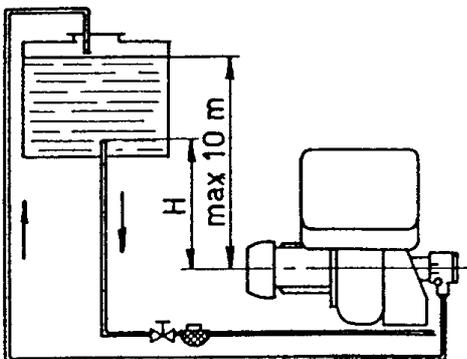
- 1 - Tank (heated for heavy oil)
- 2 - Filter (with resistance for oil > 7°E at 50°C)
- 3 - Forwarding pump
- 4 - Control manometer
- 5 - Shutter valves (in couple) excluding the burner
- 6 - Burner (provided for kit for heavy oil code no. 3000721)
- 7 - Pressure adjuster
- 8 - Filter (with resistance for oil > 7°E at 50°C)
- 9 - Burner pump

### WARNING

- The oil could easily flow through the pipes if those are properly seized, protected and heated (by electricity, steam or hot water).
- The forwarding pump capacity should be at the least double of that of the burner pump.
- If several burners are supplied through the same ring supply line, the forwarding pump should have a capacity of approx. 30% more than the sum of the single burners outputs.
- For starting-up: after excluding the burner by the shutter valves (5) let the oil flow into the supply ring up to reach the required circulation; after that open the valves and supply normally the burner.

### GRAVITY SUPPLY LINE

(only for oil with max. viscosity up to 7°E at 50°C)



#### Pump priming

Loose the tap of the vacuometer plug (6) (fig. 1) and wait for the oil flow.

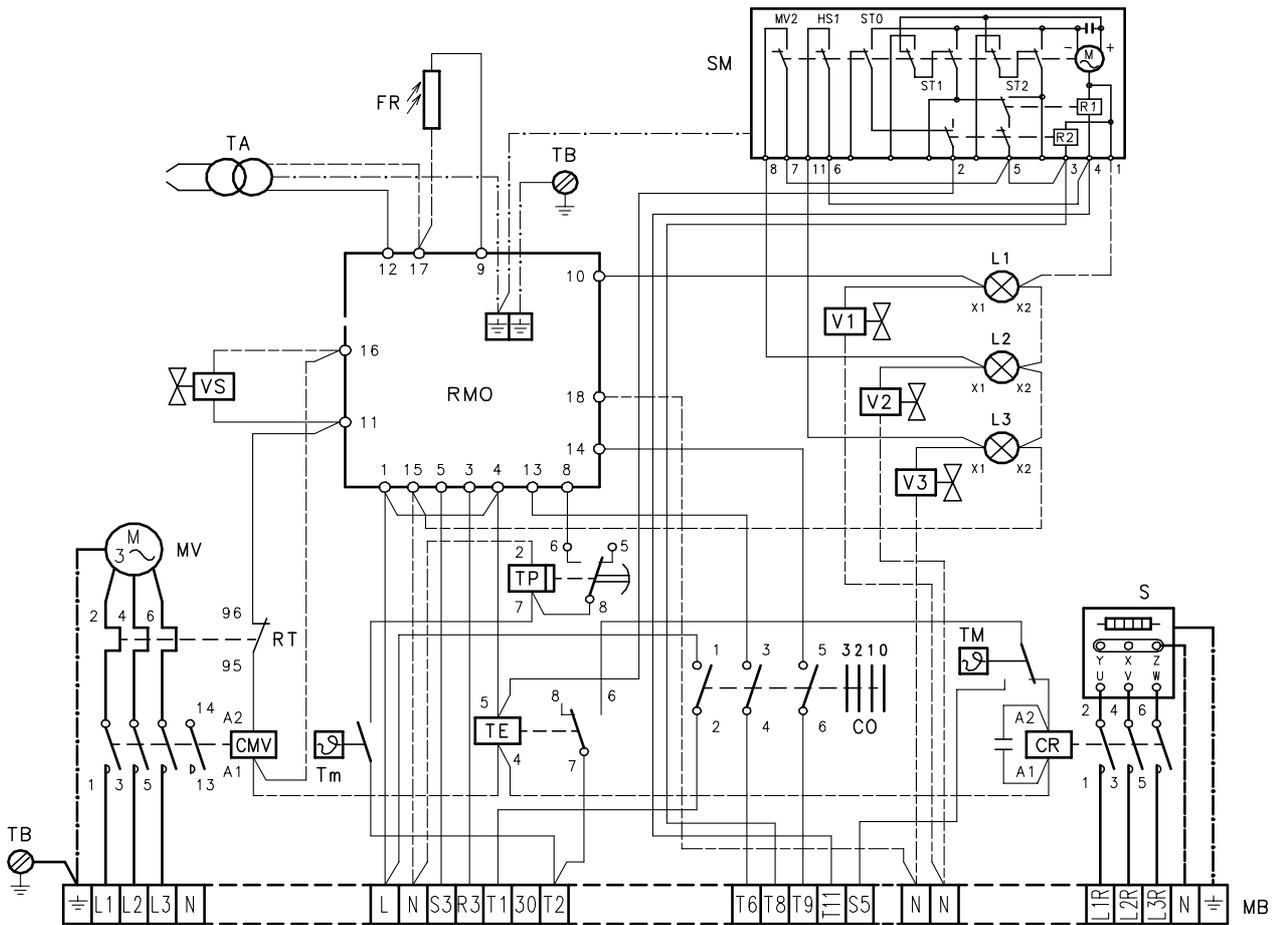
H= Difference in the pipes height  
L= Total length of the suction tube

| H<br>meters | L meters |          |
|-------------|----------|----------|
|             | ø 1"     | ø 1 1/4" |
| 0           | 2        | 10       |
| 0,5         | 3        | 11       |
| 1           | 4        | 12       |
| 1,5         | 5        | 13       |
| 2           | 6        | 14       |

**Notice:** before placing the burner in operation, ensure that the return line is open. Any obstruction may damage the pump seal.

# INTERNAL WIRING DIAGRAM

(carried out by the factory)

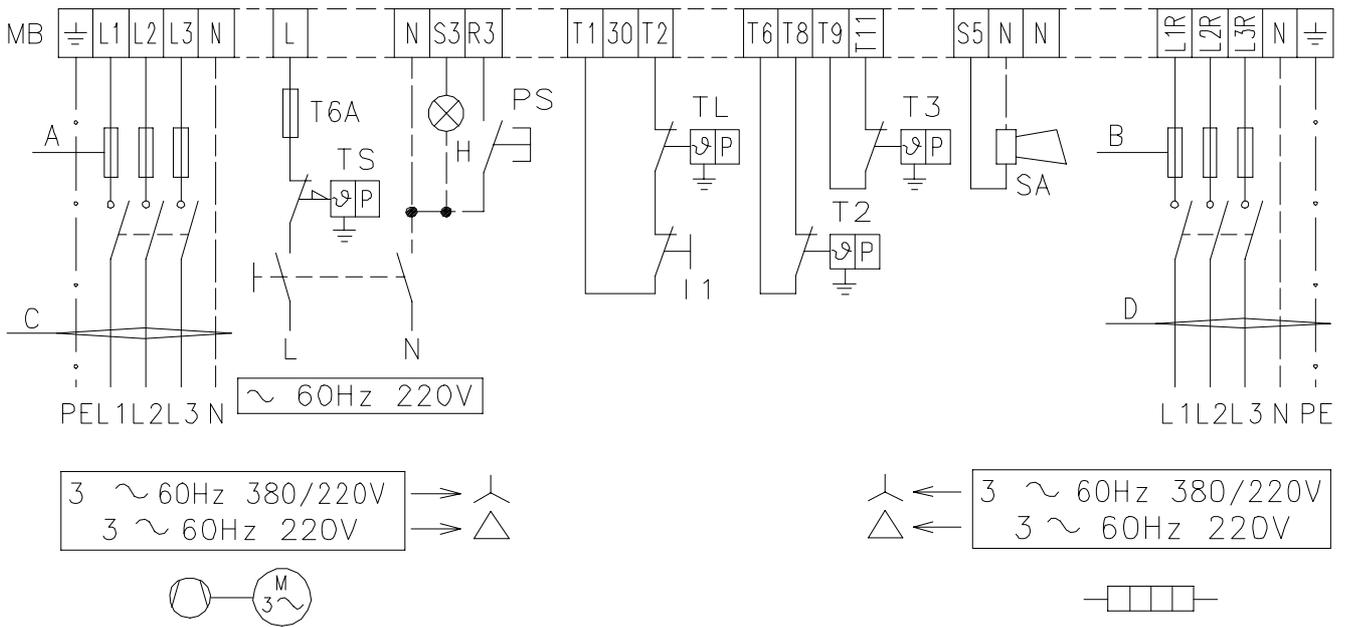


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## LEGEND

|            |                         |           |                         |
|------------|-------------------------|-----------|-------------------------|
| <b>CMV</b> | Fan motor contact maker | <b>TB</b> | Burner earth            |
| <b>CO</b>  | Commutator              | <b>TE</b> | Electronic thermostat   |
| <b>CR</b>  | Resistor contact maker  | <b>TM</b> | Maximal thermostat      |
| <b>FR</b>  | Photoresistance         | <b>Tm</b> | Minimal thermostat      |
| <b>MB</b>  | Burner terminal strip   | <b>TP</b> | Timer                   |
| <b>MV</b>  | Fan motor               | <b>L1</b> | Lamps for 1° stage      |
| <b>RMO</b> | Control box             | <b>L2</b> | Lamps for 2° stage      |
| <b>RT</b>  | Overload                | <b>L3</b> | Lamps for 3° stage      |
| <b>S</b>   | Pre-heater tank         | <b>V1</b> | Oil valves for 1° stage |
| <b>SM</b>  | Air-damper actuator     | <b>V2</b> | Oil valves for 2° stage |
| <b>SO</b>  | Probe PT100             | <b>V3</b> | Oil valves for 3° stage |
| <b>TA</b>  | Ignition transformer    | <b>VS</b> | Safety valves           |

## WIRING CONNECTIONS TO THE TERMINAL BOARD (carried out by the installer)



2645

|                   | 220V | 380V |
|-------------------|------|------|
| A Ampere          | T25  | T25  |
| B Ampere          | T50  | T35  |
| C mm <sup>2</sup> | 2,5  | 2,5  |
| D mm <sup>2</sup> | 10   | 6    |

- |           |                               |           |   |
|-----------|-------------------------------|-----------|---|
| <b>H</b>  | Remote lock-out signal        | <b>TL</b> | Limit control device system                   |
| <b>I1</b> | Optional switch on-off burner | <b>TS</b> | Safety control device system                  |
| <b>MB</b> | Burner terminal strip         | <b>T2</b> | Load control system for 2 <sup>nd</sup> stage |
| <b>PS</b> | Reset push - button           | <b>T3</b> | Load control system for 3 <sup>rd</sup> stage |
| <b>SA</b> | High temperature oil alarm    |           |   |

### NOTE:

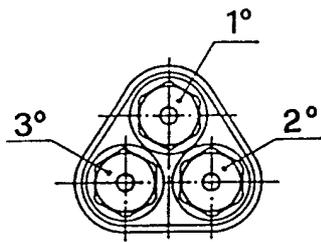
- Check the lock-out by darkening the photo-cell after removal of the cover.  
**ATTENTION HIGH VOLTAGE.**
- In case of supply 220V without neutral, connect the motor and the pre-heater tank through delta (the “star” connection is the original one, made for 380V).
- **NOTE**  
In systems where the run of wiring connecting the thermostat exceeds 20 metres in length, or in places where the burner is subject to particularly disturbing electromagnetic interference (over 10 v/m), you must insert the relay-interface kit item number 3010386.

## CHOICE: OF THE NOZZLES - OF THE PUMP PRESSURE - OF THE COMBUSTION HEAD ADJUSTMENT

- First of all state the maximum output required with all three nozzles in operation.
- On the base of the maximum output choose, from table A, three related nozzles.  
Nozzles: 60° - Pump pressure: 25 bar.
- The references of table B should be followed in case of need of:
  - modification of the pump pressure in order to vary the output,
  - diverse composition of the 3 nozzles group,
  - knowledge of the output in 1<sup>st</sup> and 2<sup>nd</sup> stage.

### SUGGESTED NOZZLES

A



| NOZZLES 60°<br>GPH |      |      | TOTAL OUTPUT<br>kg/h 1° + 2° + 3° |        |
|--------------------|------|------|-----------------------------------|--------|
| 1°                 | 2°   | 3°   | 25 bar                            | 28 bar |
| 3.50               | 3.50 | 3.50 | 66                                | 70     |
| 4.00               | 4.00 | 4.00 | 75                                | 79     |
| 4.50               | 4.50 | 4.50 | 84                                | 90     |
| 5.00               | 5.00 | 5.00 | 96                                | 99     |
| 5.50               | 5.50 | 5.50 | 105                               | 111    |
| 6.00               | 6.00 | 6.00 | 114                               | 120    |
| 6.50               | 6.50 | 6.50 | 123                               | 132    |
| 7.00               | 7.00 | 7.00 | 132                               | 141    |
| 7.50               | 7.50 | 7.50 | 141                               | -      |

The pump pressure is referred to all three nozzles operating. The pump pressure increases automatically when two nozzles are operating and becomes higher with only one nozzle.

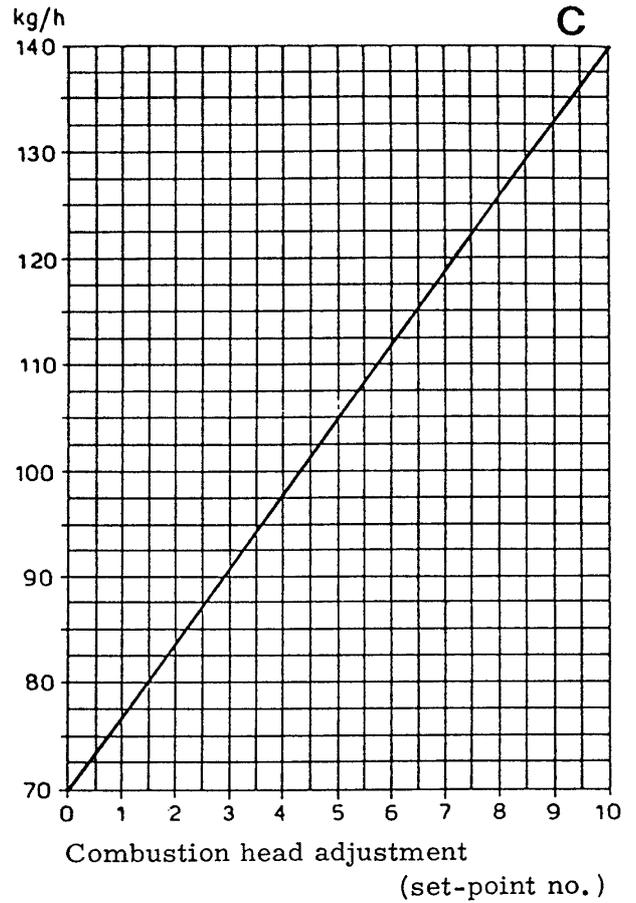
**Nozzles delivery**  
**Pump pressure**

**B**

| GPH  | 25 bar<br>kg/h | 28 bar<br>kg/h |
|------|----------------|----------------|
| 3.50 | 22             | 23,5           |
| 4.00 | 25             | 26,5           |
| 4.50 | 28             | 30             |
| 5.00 | 32             | 33             |
| 5.50 | 35             | 37             |
| 6.00 | 38             | 40             |
| 6.50 | 41             | 44             |
| 7.00 | 44             | 47             |
| 7.50 | 47             | 50             |

**Combustion head adjustment**  
**Maximum output**

**C**



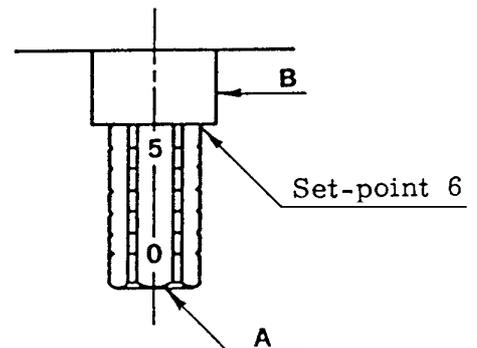
**Suggested pressure**

- Light oil: 25 bar
- Heavy oil: 28 bar (transformation kit)

Rated nozzles deliveries are listed on the table.  
 A tolerance of  $\pm 5\%$  concerns the real delivery against the rated one.  
 The pump leaves the factory set at 25 bar.

- On the base of the maximum delivery detect, from table C, the combustion head adjustment.

The adjustment should be made by turning the screw **A** till the set-point (see diagram) is on the line with the washer **B**.



## AIR SHUTTERS ADJUSTMENTS

The adjustment of the air shutters shall be set each time, with reference to the nozzles deliveries and the combustion chamber pressurization.

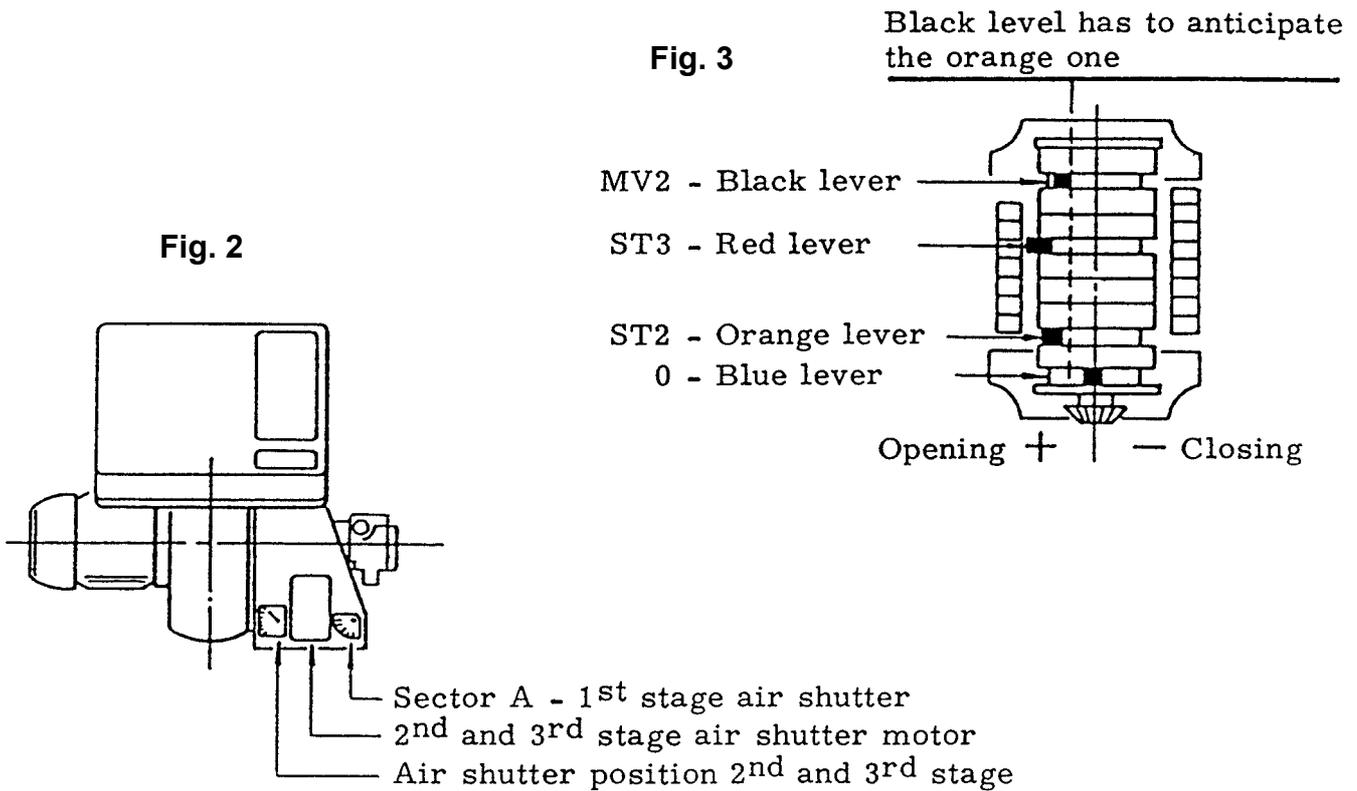


Fig. 2 shows the positioning of the air shutters.  
 Fig. 3 shows the positioning of the cams of the motor.

### Air shutters adjustments

1<sup>st</sup> stage: manual regulation carried out by acting on the sector **A** (fig. 2).

2<sup>nd</sup>-3<sup>rd</sup> stage: carried out by acting on the coloured lever of the motor (fig. 3).

Blue lever: adjustment not necessary.

Positioned by the factory on the vertical of the motor axis. It maintains the shutters of 2<sup>nd</sup>- and 3<sup>rd</sup> stage closed during the 1st stage operation and in the stop periods.

Do not turn clockwise (-) the lever to avoid crawlings of the air shutters, turning the lever anticlockwise (+) the motor will be in different position during the passage from 2<sup>nd</sup> to 1st stage or during the stop.

Orange lever: for 2<sup>nd</sup> stage air shutters adjustment, it is adjustable both in opening and in closing position.

Red lever: for 3<sup>rd</sup> stage air shutters adjustment, it is adjustable both in opening and closing position.

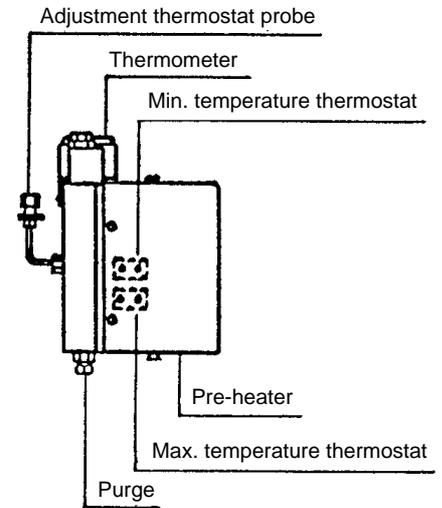
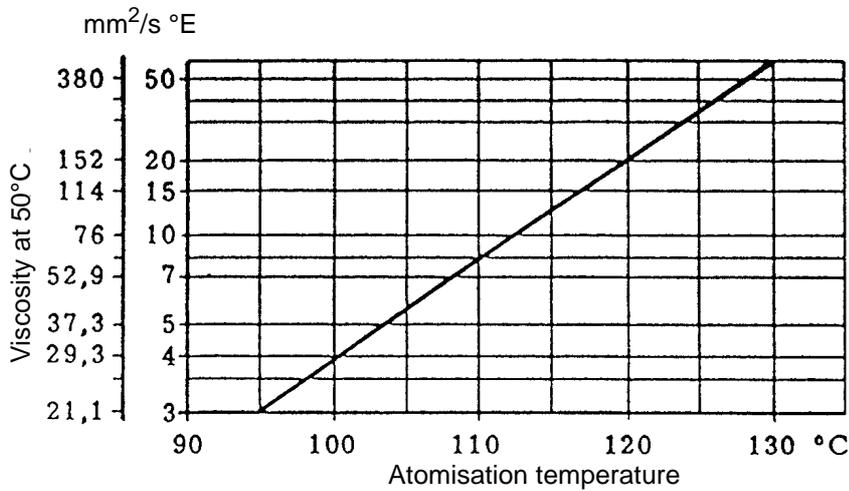
Black lever: it controls the opening of the 2<sup>nd</sup> stage oil valve. It has always to anticipate the orange lever.

The control of the 3<sup>rd</sup> stage valve is automatic through one of the cam next to the red lever.

## SPRAY TEMPERATURE ADJUSTMENT

### Thermostat for adjustment - maximum value - minimum value

Electronic adjustment thermostat By means of information relayed from a PT100 probe immersed in the oil in the delivery manifold, the thermostat adjusts spray temperature. (The correct conditions for fuel spray are shown in the temperature/viscosity graph below).



Example: fuel oil with 7 °E viscosity at 50 °C is pre-heated to approximately 110 °C.

**Note:** although the temperature set on the thermostat should correspond to the temperature of the fluid, it is good practice to check that the thermometer shows the correct reading once the unit has been in operation for a few minutes.

The LED will illuminate to indicate that the heating resistances are working properly.

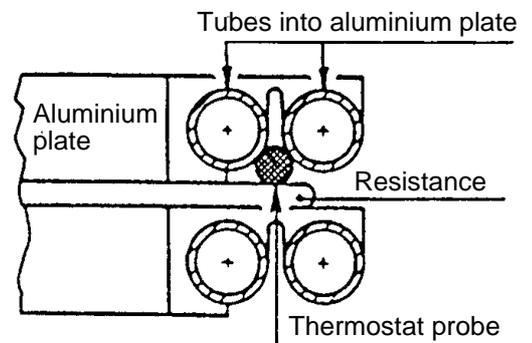
Minimum temperature thermostat. In addition to shutting down the burner if the fuel temperature should fall below the critical value for correct combustion, this thermostat also provides a permissive signal at the time of burner start-up. (Factory set at approximately 80°C, adjustable by removing the pre-heater cover and relative plate).

Maximum temperature thermostat. This switches off the resistance when, because of failure of the adjustment thermostat, the temperature of the pre-heater increases to unacceptable levels; a "high temperature" alarm output is provided on the burner terminal strip. (Factory setting is approximately 180°C).

### Renewing the minimum and maximum temperature thermostats.

Reposition the probes of the new thermostat, after having first loosened the plate pack securing screws. Make sure that the probe is touching the resistance and the plate pack as shown in the adjacent figure. The same precautions should be taken when renewing the resistances in contact with the thermostat probes.

If the pre-heater should malfunction, use an ohmmeter to check that the resistances located in contact with the temperature probes are not burnt out (reading of approximately 35 Ohm).

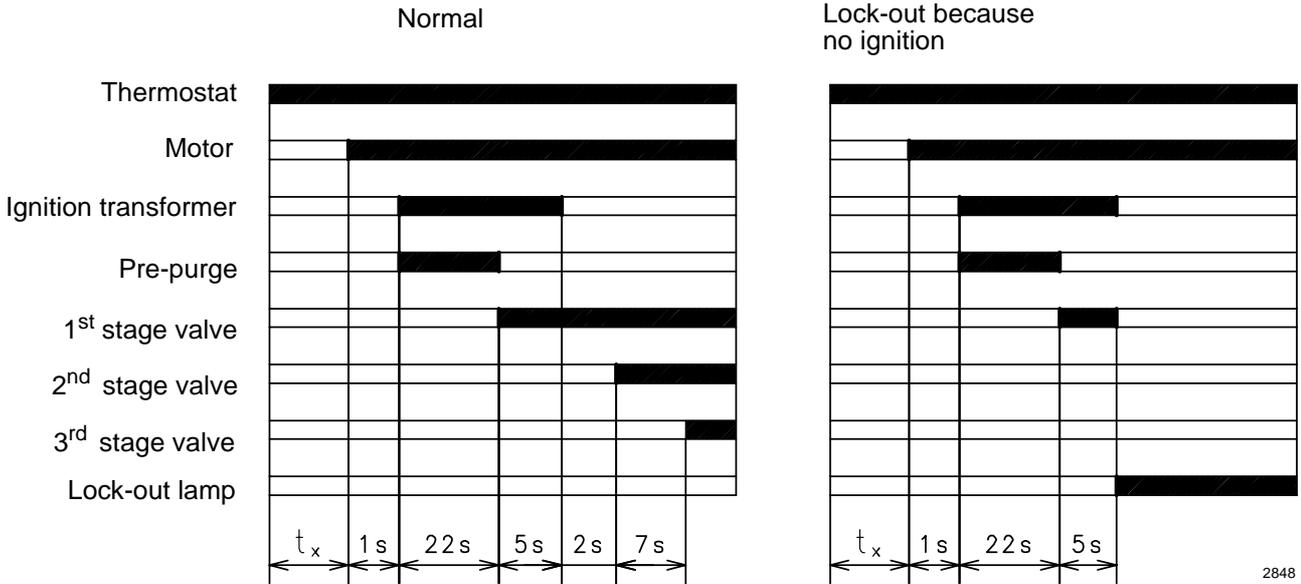


### Changing the PT100 probe in the oil delivery manifold:

Fit the supplied nut and biconical collar on the new probe, insert a length of approximately 40 mm in the manifold, and secure firmly into place.

At this point, the section remaining outside the manifold can be bent as required, with no risk of damaging the resistance.

## CYCLE OF THE BURNER START-UP

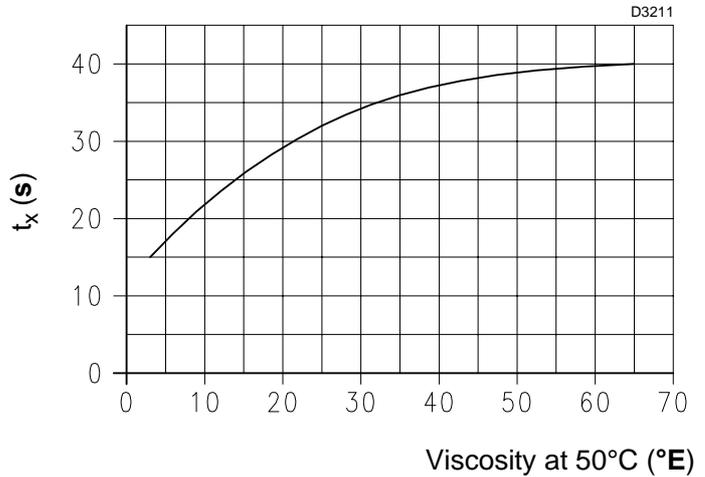


**( $t_x$ ) Factory setting: 20 s.**  
**This time determines the heavy oil temperature at ignition. It can be adjusted, according to the fuel's viscosity, by the timer 22) (Fig. 1).**  
**The adjacent diagram shows the suggested settings.**

**$t_x$  max = 60 s**

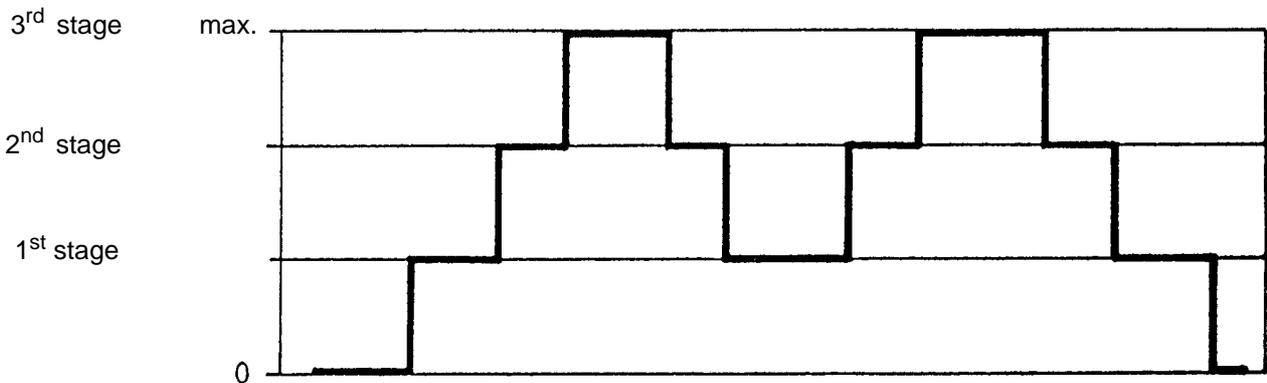
### Motor lock-out

It is caused by the over load relay when overload occurs or no current supply.  
 Re-set: push button 7 and 10 (fig. 1)



**NB.:** Periodically clean the filter of the pre-heater tank.

## THREE STAGE OPERATION









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