

# Heavy oil burner

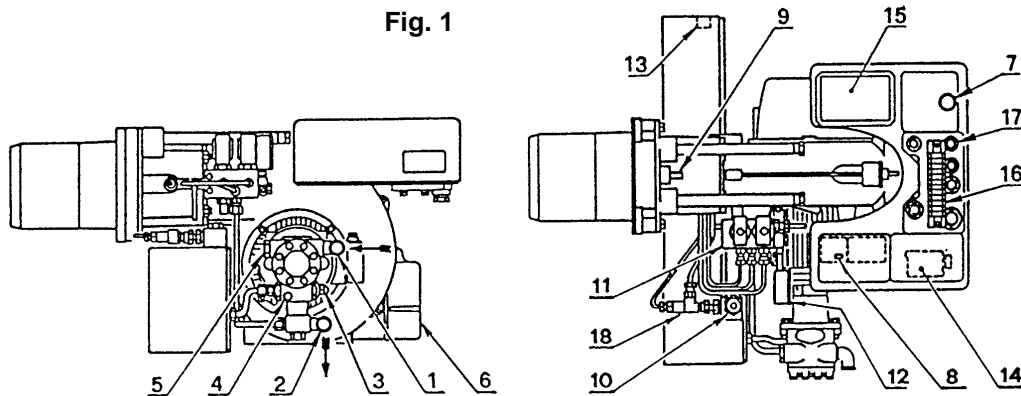


CODE	MODEL	TYPE
3435985	PRESS 100 N	617 T80
3435986	PRESS 100 N	617 T80



Thermal power - Output	285 / 490 - 1140 kW - 25 / 43 - 100 kg/h
Operation	Two stages
Fuel	Oil with max. viscosity at 50 °C: 150 mm <sup>2</sup> /s (20 °E)
Electrical supply	Three phase 220V +10% -10% ~ 60Hz without neutral 380V +10% -10% ~ 60Hz with neutral
Motor	7.4 A / 220V - 4.3 A / 380V
Ignition transformer	Primary: 2 A - Secondary: 2x 6.5 kV / 35 mA
Heaters	7 kW
Absorbed electrical power	9 kW
Pump	150 kg/h at 20 bar

Fig. 1

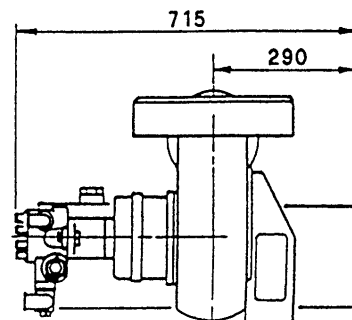
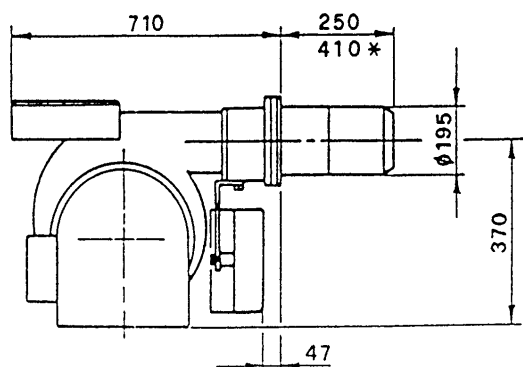


- 1 - Suction line
- 2 - Return line
- 3 - Pump pressure adjustment screw
- 4 - Manometer plug (G1/8)
- 5 - Vacuumeter plug (G1/2)
- 6 - Air shutter opening motor
- 7 - Control box reset push-button and lock-out lamp
- 8 - Reset push-button of the motor over load relay
- 9 - Regulating bush for combustion head
- 10 - Sheathed filter for the thermometer
- 11 - Valves group
- 12 - Manometer with protection valve
- 13 - Adjustment thermostat
- 14 - Pre-heater relay
- 15 - Ignition transformer

Quantity	Accessories
2	Flexibles tubes
2	Nipples
2	Seals
4	Screws
1	Gasket for flange
2 *	Extensions for bars

- 16 - Wiring terminal board
- 17 - Fair leads
- 18 - Back-pressure valve

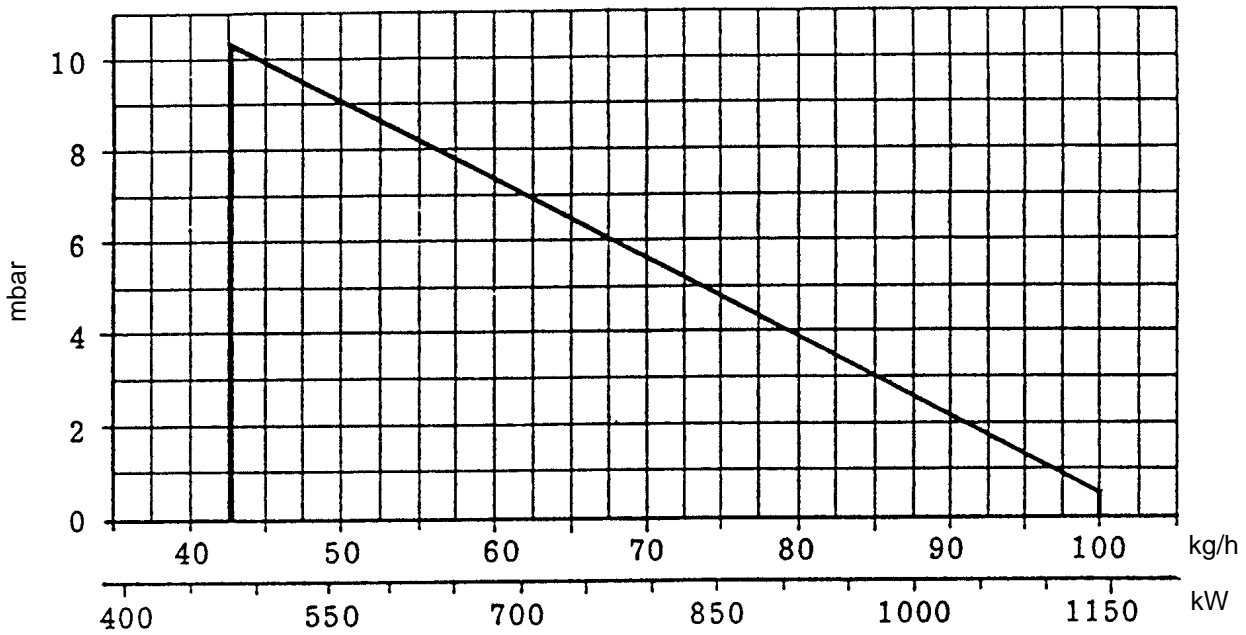
#### DIMENSIONS



\* For extended head version

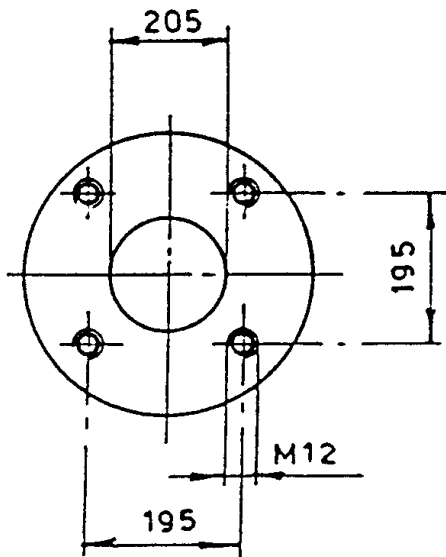
## COMBUSTION CHAMBER PRESSURE - MAXIMUM OUTPUT

(two nozzles in operation)



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

Minimal fuel capacity with only one nozzle: 25 kg/h - 285 kW



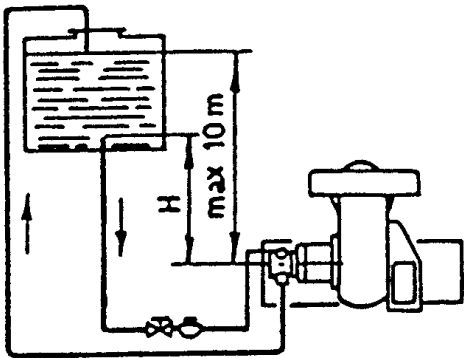
Front plate detail for boiler mounting

Note for the extended combustion head version

Apply the extensions provided as accessories for the burner withdrawing.

## FUEL OIL GRAVITY FEED SYSTEMS

### Gravity system (fuel oil with viscosity max. 7°E at 50° C)



Pump priming: loose the tap of the vacuumeter plug 5) (fig. 1) and wait for the fuel flow.

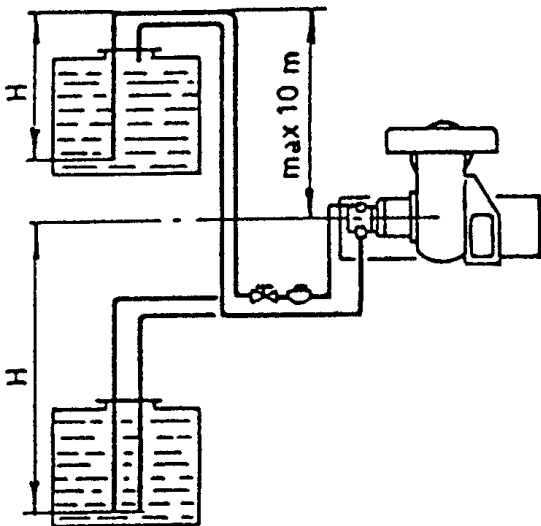
H: Difference in the pipes height.

L: Length of the suction pipe.

H meters	L meters	
	ø 3/4" gas	ø 1" gas
0	3	5
0.5	6	10
1	9	15
1.5	12	20
2	15	25

### SUCTION SYSTEM (fuel oil with viscosity max. 7°E at 50°C)

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



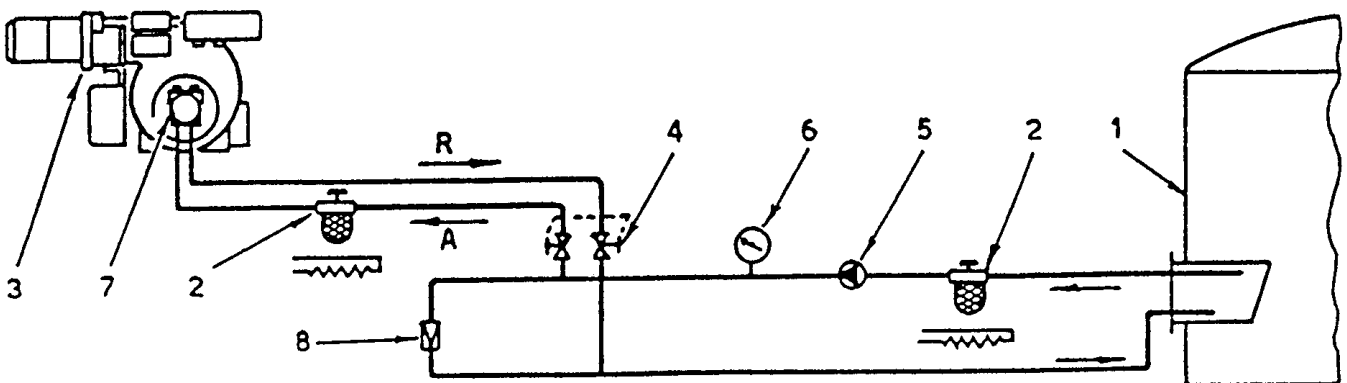
Never overcome the max. depression of 0.5 bar (38 cm Hg). With higher values the fuel emanates gas.

The pipes shall be perfectly sealed. When the tank is placed below of the burner level, the return pipe should reach the same level of the suction pipe.

In this case the foot valve is not required.

H meters	L meters	
	ø 1" gas	ø 1 1/4" gas
0	12	26
0.5	10	22
1	9	18
1.5	7	15
2	5	12
2.5	4	9
3	-	6

### RING SYSTEM (for heavy oil with viscosity up to 65°E at 50°C)



- 1 - Tank (properly heated for heavy oil)
- 2 - Filter (with resistance for oil >7°E/50°C)
- 3 - Burner
- 4 - Couple of cocks (excluding the burner)

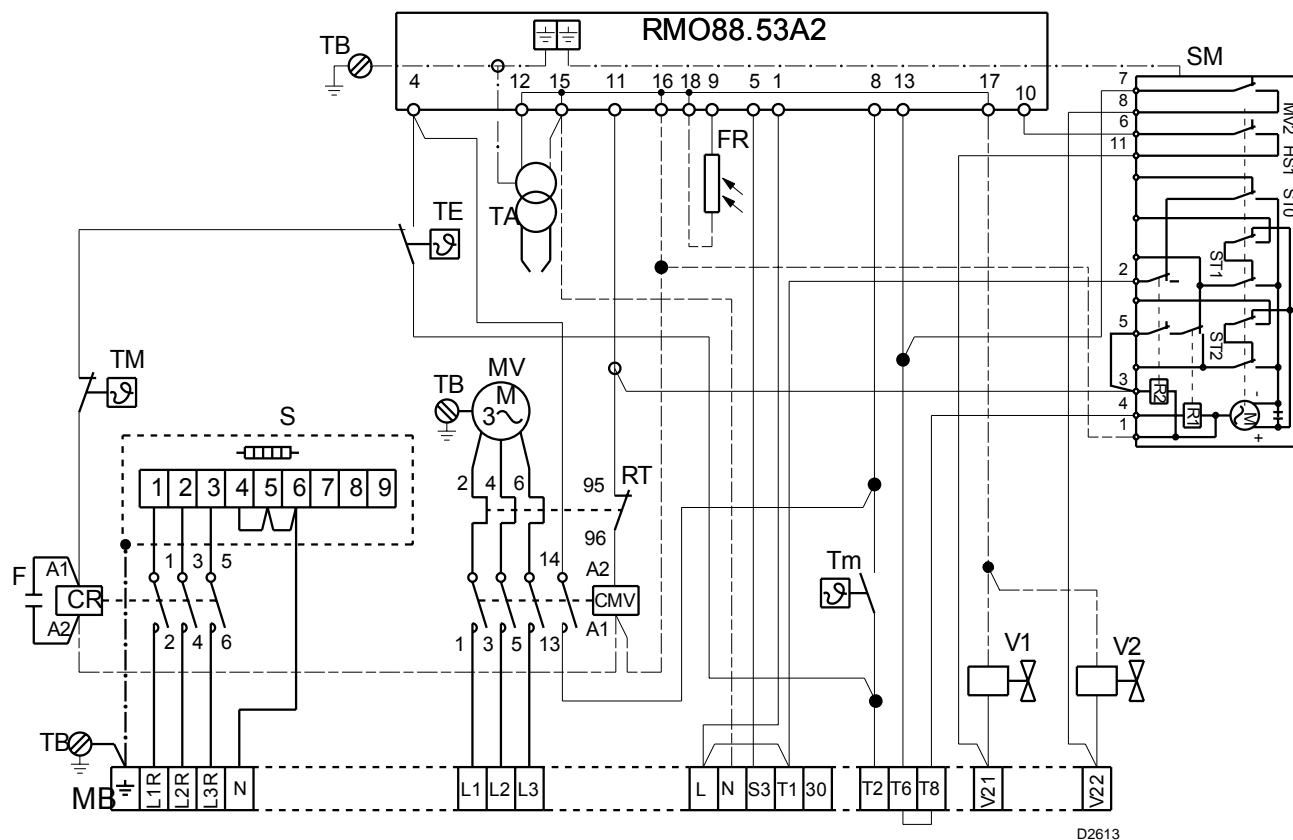
- 5 - Forwarding pump
- 6 - Manometer
- 7 - Burner pump
- 8 - Pressure adjuster

Notice: All the pipes have to be properly seized, sealed and heated (elect. resistance or hot steam or water) to let the fuel flow.

Warning: Before to put the burner in operation verify that no obstruction exists into the pipes, any obstruction may damage the sealing of the pump.

## ELECTRICAL WIRING CONNECTIONS

(carried out by the factory)

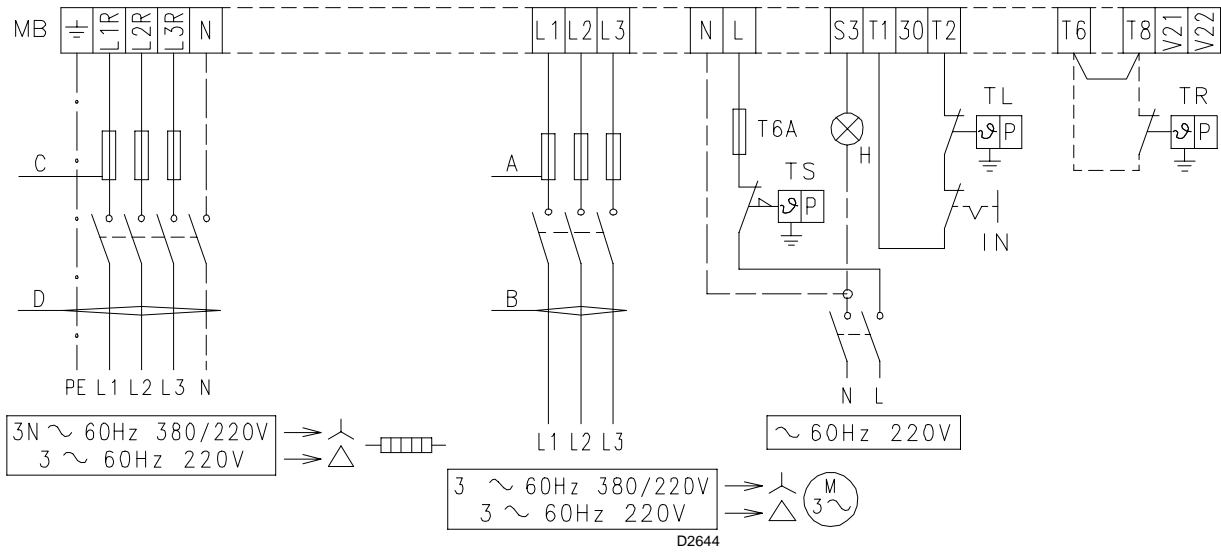


### KEY TO LAYOUT

- CMV** Fan motor contactor
- CR** Pre-heart contactor
- F** Suppressor
- FR** Photoresistance
- MB** Wiring terminal board
- MV** Fan motor
- RMO** Control box
- RT** Thermal overload
- S** Pre-heart
- SM** Servomotor
- TA** Ignition transformer
- TB** Earth of the burner
- TE** Start-up and adjustment thermostat
- Tm** Minimum value contact thermostat
- TM** Maximum value contact thermostat
- V...** Electromagnetic valves

# ELECTRICAL CONNECTIONS TO THE WIRING TERMINAL BOARD

(to be carried out by the installer)



## KEY TO LAYOUT

- H** Remote lock-out signal
- IN** Manual burner stop switch
- MB** Wiring terminal board
- TL** Limit control device system
- TR** High-low mode control device system
- TS** Safety control device system

	220V	380V
A Ampere	T16	T10
B mm <sup>2</sup>	1,5	1,5
C Ampere	T25	T16
D mm <sup>2</sup>	6	4

## NOTE

- Leads minimal section: 1,5 mm<sup>2</sup>.

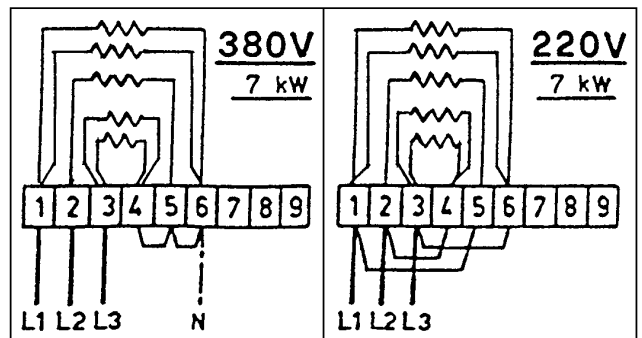
## WARNING

For supply at 220 V make the triangle connection on the pre-heater and on the motor (the original connection is "star" for 380 V).

## TWO STAGE OPERATION

It can be achieved by the thermostat connected to 14 - 15 wiring terminal board (removing the bridge) controlling 2<sup>nd</sup> valve.

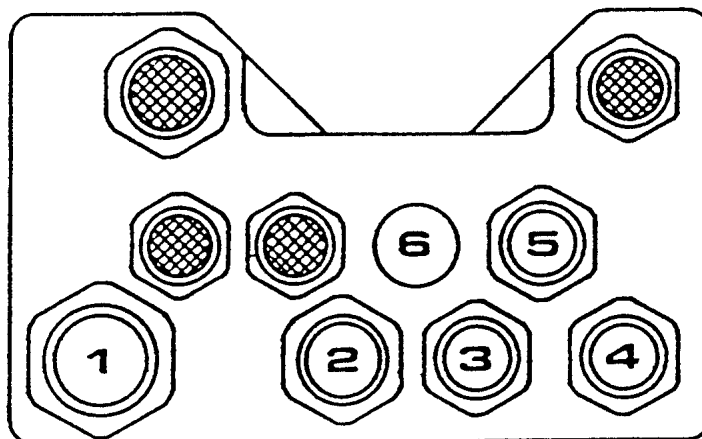
## PRE-HEATER RESISTANCES CONNECTIONS



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## FASTENING OF THE ELECTRICAL WIRES

All the wires, which are to be connected to the wiring terminal board 16) (fig. 1) shall pass through the fair leads 17) (fig. 1) as per this scheme.



- |   |                   |
|---|-------------------|
| 1 - Pre-heating resistances three-phase supply: | fair lead Pg 21   |
| 2 - Motor three phase supply:                   | fair lead Pg 16   |
| 3 - Single phase supply and safety thermostat:  | fair lead Pg 13.5 |
| 4 - Control thermostat:                         | fair lead Pg 13.5 |
| 5 - 2 <sup>nd</sup> stage thermostat:           | fair lead Pg 13.5 |
| 6 - Pre-sheared holes                           |                   |

Further prospective signals or controls can be connected to the burner wiring terminal board by removing the metal weldnuts from the pre-sheared holes and inserting a common fair lead for the passage and the clamping of the leads.

### NOTES

- Carry out a safe earth connection.
- Check the stop of the burner, by opening the boiler thermostat and the burner lock-out, by disconnecting the lead from the flame probe.

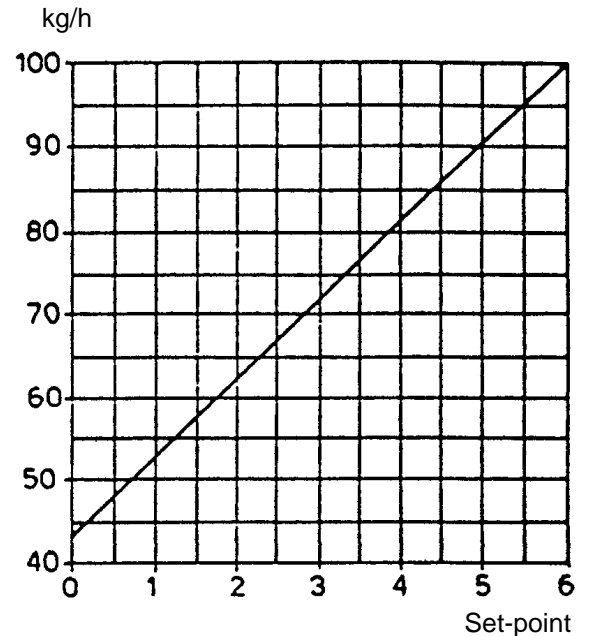


## CHOICE OF NOZZLES - OF THE PUMP PRESSURE OF THE COMBUSTION HEAD ADJUSTMENT

**Nozzles delivery  
Pump pressure**

Nozzle GPH (45° - 60°)	20 bar kg/h	25 bar kg/h
3,50 + 3,50	42,00	47,40
4,00 + 4,00	48,00	54,20
4,50 + 4,50	54,00	61,00
5,00 + 5,00	60,00	67,80
5,50 + 5,50	66,10	74,50
6,00 + 6,00	72,10	81,40
6,50 + 6,50	78,10	88,10
7,00 + 7,00	84,10	95,00
7,50 + 7,50	90,10	101,60
8,00 + 8,00	96,10	-
8,50 + 8,50	100,00	-

**Combustion head adjustment  
Maximum output**



In case of very heavy oil it is advised to use high wear resistance nozzles (for instance Monarch F 80 H0)

### Advised pressure

- Light oil: 20 bar
- Heavy oil: 25 bar

Rated deliveries of the nozzles are indicated on the above list and refer to a light oil having viscosity from 3 to 5° E at 50° C pre-heated at 100° C.

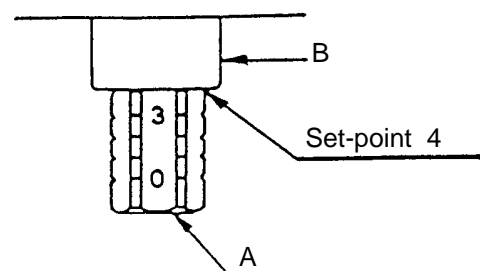
The effective delivery may vary of  $\pm 5\%$  against the rated one.

In case of requirement of intermediate values, the pump pressure or the nozzles match could be changed.

The pump is set by the factory at 20 bar.

### Combustion head adjustment

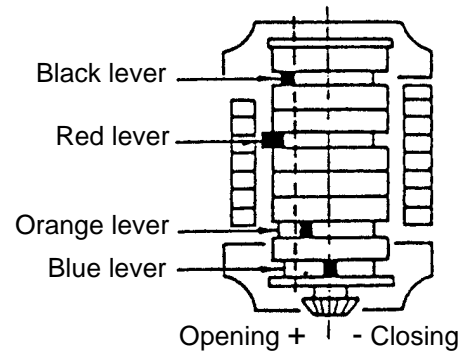
Turn the screw A till the set-point, detected from the diagram, is on line with the washer B.



## ADJUSTMENT OF THE AIR DAMPER MOTOR

### STOP - Blue lever

This lever leaves the factory vertically positioned and corresponds to the complete closing of the air damper. A partial opening of the air damper might be obtained by moving leftwards this lever (+ on the label). The new position of the air damper is detectable when the burner is off. Do not overcome the position of the orange lever for the 1<sup>st</sup> stage.



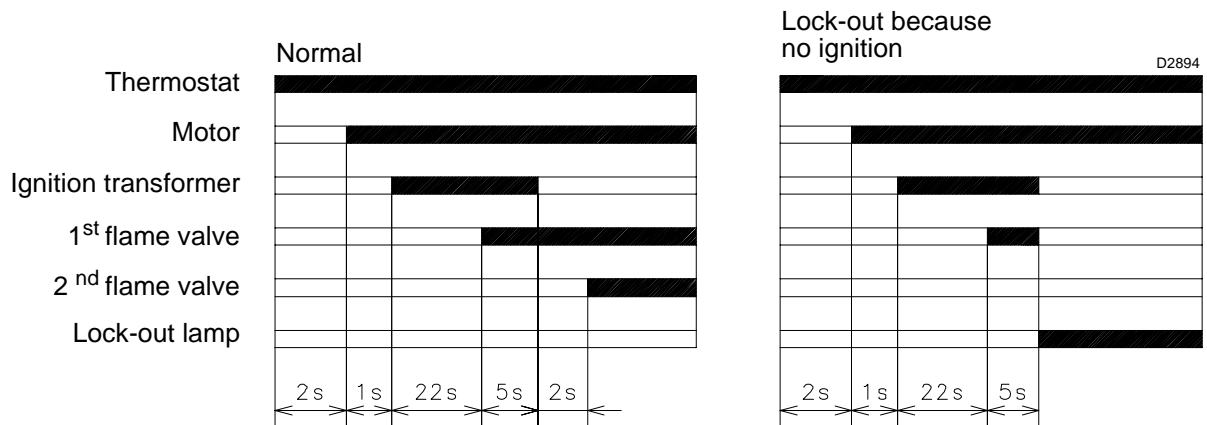
### 1<sup>st</sup> STAGE - Orange lever

The orange lever controls the air damper position for the first flame, it is adjustable both for 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 both for closing and opening. The black lever controls the opening of the second oil valve and it must always anticipate - for a bit - the red lever, but never the orange one.

## BURNER START-UP PROGRAM



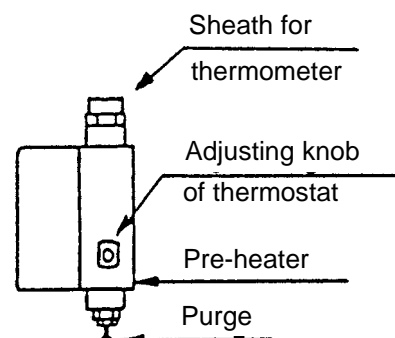
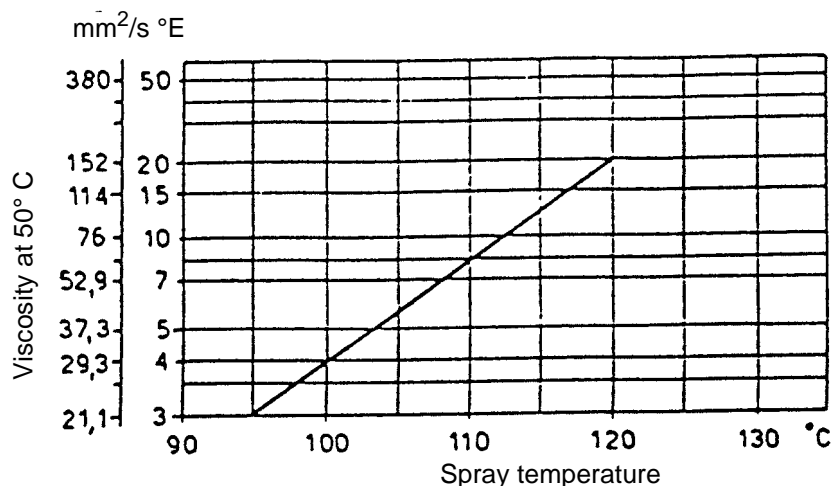
## MOTOR LOCK-OUT

It is caused by the motor overload relay if overload occurs or no phase. Reset: push the buttons 7) and 8) fig. 1.

## SPRAY TEMPERATURE ADJUSTMENT

**Thermostats for: adjustment - maximum value - minimum value**

Adjustment thermostat it prevents the burner start up if the fuel temperature has not reached the required value for a good spray 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 approx. 100° C at the nozzles).

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

Minimum value contact thermostat: it intervenes by stopping the burner if the fuel temperature decreases under the value necessary for a good combustion.

Maximum value thermostat: it switches off the resistance 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 resistance in contact with the probe of the thermostat.

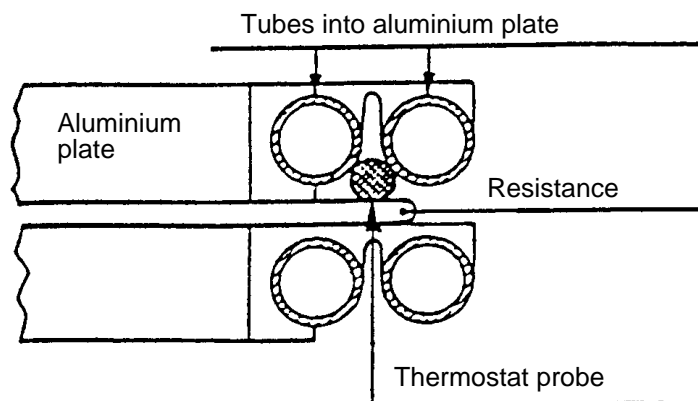
The thermostat is calibrated by the factory at 180° C.

### IMPORTANT NOTICES.

Replace the probe of the new thermostat, after the loosening of the fixing screws of the plates pack, taking care of good contact between the probe and the tubes and the resistance, see drawing.

Similarly for the resistance substitution.

- If during the operation exceptional changes or too much high temperatures should be detected, verify the continuity of the resistance, using an ohmmeter, contacting the temperature probe (approximately 35 Ohm).



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## NOTE

- The pre-heater might be provided with a second thermostat of maximum value with manual reset. That thermostat can be used as a switch operating by means of an external commutator, which can take off the current from the pre-heater in case of over-temperature. (Kit code no. 3000800).
- Before the burner start-up, verify that the pump is filled of fuel in order to avoid any idling for too long time.
- Filters cleaning: periodically clean the filters in order to avoid any trouble at the burner operation.
- Supply line filter: positioned on the suction line, it causes the increase of the depression in the pump with the consequent flow of gas and noise. Do not overcome the depression of 45 cm Hg (6 m W.c.) (fig. 1 pos. 5).
- Pre-heater filter: (fig. 1 pos. 10) positioned in the delivery line, it causes a decrease of the spraying pressure which is detectable by use of a manometer (fig. 1 pos. 12).

## MANOMETER PROTECTION VALVE

After spray pressure check, it is recommended to cut out the manometer (fig. 1 pos. 12) to avoid pressure shock that it can suffer at every burner starting.

Close protection valve when the burner is not working and the manometer indicate 0 bar.

# BURNER START-UP CYCLE DIAGNOSTICS

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

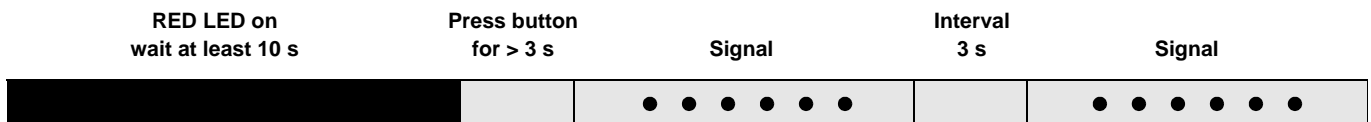
COLOUR CODE TABLE	
Sequences	Colour code
Pre-purging	●●●●●●●●●●
Ignition phase	●○●○●○●○●
Operation, flame ok	□□□□□□□□
Operating with weak flame signal	□○□○□○□○□
Electrical supply lower than ~ 170V	●▲●▲●▲●▲●▲
Lock-out	▲▲▲▲▲▲▲▲▲▲
Extraneous light	▲□▲□▲□▲□▲
<b>Key:</b>	○ Off      ● Yellow      □ Green 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

## OPERATING FAULT DIAGNOSTICS

The control box has a self-diagnostic system, which easily allows identifying the operating faults (**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 flashing as shown in the diagram below.



The pulses of the LED constitute a signal spaced by approximately 3 seconds.

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

SIGNAL	PROBABLE CAUSE
2 flashes ● ●	The flame does not stabilise at the end of the safety time: – faulty photocell; – faulty or soiled oil valves; – neutral/phase exchange; – faulty ignition transformer – poor burner regulation (insufficient heavy oil).
3 flashes ● ● ●	Min. air pressure switch (if installed) does not close: – air pressure switch faulty; – air pressure switch incorrectly regulated; – max. air pressure switch triggered (if installed).
4 flashes ● ● ● ●	Min. air pressure switch (if installed) does not open or light in the chamber before firing: – air pressure switch faulty; – air pressure switch incorrectly regulated.
7 flashes ● ● ● ● ● ● ●	Loss of flame during operations: – poor burner regulation (insufficient heavy oil); – faulty or soiled oil valves; – short circuit between photocell and earth.
8 flashes ● ● ● ● ● ● ● ●	– Faulty thermostat for oil permissive signal; – Heating resistances blown.
10 flashes ● ● ● ● ● ● ● ● ● ●	– Wiring error or internal fault.







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