Light oil burners

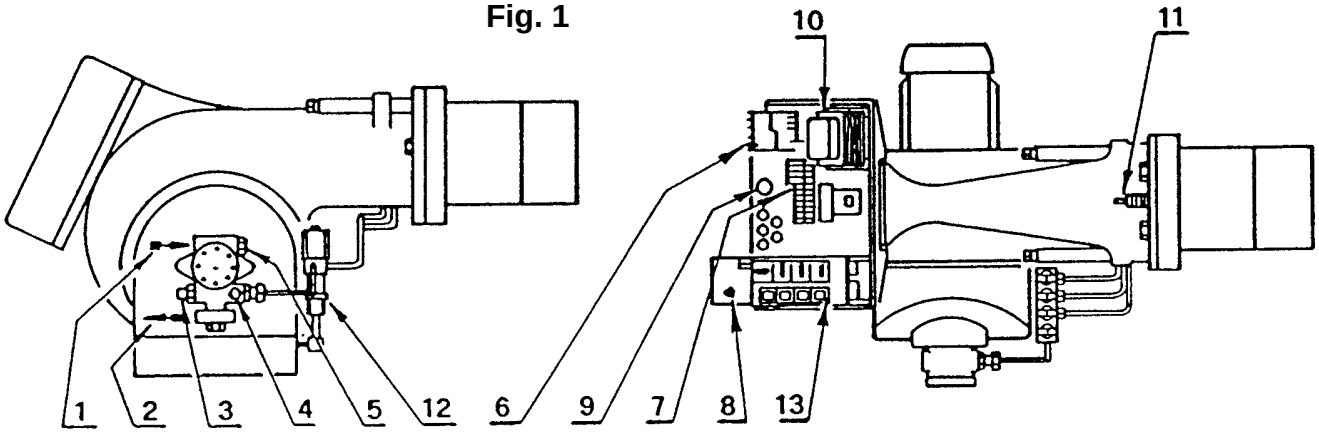
CODE	MODEL	TYPE
3476885	P140 T/G	476 T80
3476886	P140 T/G	476 T80

2915905 (3) - 03/2012

TECHNICAL DATA	
Thermal power - Output	355 / 1660 kW - 30 - 140 kg/h (see page 2)
Operation	1st stage - 2nd stage - 3rd stage
Fuel	Light oil, max. viscosity at 20° C: 6 mm^2/s (1.5° E)

ELECTRICAL DATA		
	MOTOR IE1	**MOTOR IE2**
Electrical supply	Three-phase 220V +10% -10% ~ 60Hz without neutral 380V +10% -10% ~ 60Hz with neutral	
Motor	10 A / 220V - 5.8 A / 380V	10 A / 230V - 5.8 A / 400V
Ignition transformer	Primary: 2 A - Secondary: 2x 6.5 kV - 35 mA	
Absorbed electrical power	4.5 kW	4.1 kW

Fig. 1

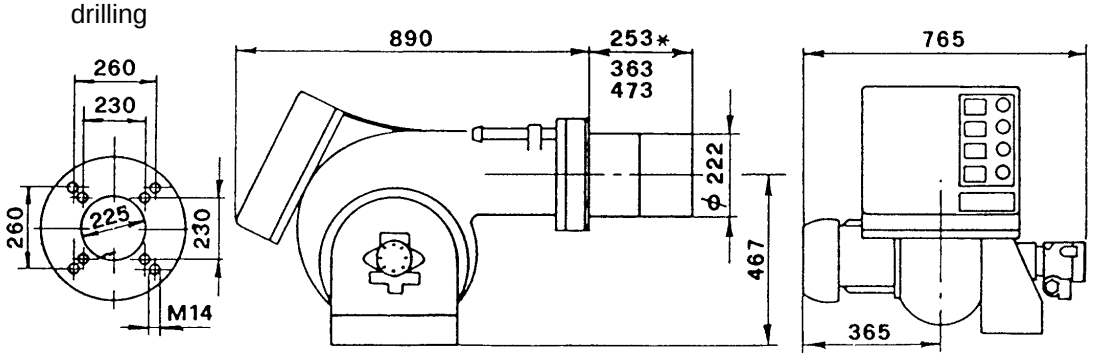


1 - Suction line
2 - Pump pressure adjustment screws
3 - Return line
4 - Manometer plug (G 1/8)
5 - Vacuometer plug (G 1/2)
6 - Reset push-button of the motor overload relay
7 - Wiring terminal board
8 - Control box reset push-button and lock-out lamp
9 - Cable clamps
10 - Ignition transformer
11 - Regulating bush for combustion head
12 - Valves group with hydraulic jacks
13 - Electric board

Quantity	Accessories
2	Flexibles tubes
2	Nipples
4	Screws
1	Gasket for flange
4	Cable clamps

DIMENSIONS (mm)

Boiler front plate drilling



* It is possible with a space upon request.

OPERATION AND EFFICIENCY OF THE BURNER

1st STAGE	POWER AND OUTPUT			
	MINIMUM		MAXIMUM	
	kW	kg/h	kW	kg/h
1st nozzle: ignition phase	273	23	545	46
1st + 2nd nozzle: intermediate phase	557	47	1103	93
1st + 2nd + 3rd nozzle: operation phase	830	**70**	1660	**140**

2nd STAGE	POWER AND OUTPUT			
	MINIMUM		MAXIMUM	
	kW	kg/h	kW	kg/h
1st nozzle: ignition phase	273	23	545	46
1st + 2nd nozzle: 1st stage of operation	557	**47**	1103	**93**
1st + 2nd + 3rd nozzle: 2nd stage of operation	830	**70**	1660	**140**

3rd STAGE	POWER AND OUTPUT			
	MINIMUM		MAXIMUM	
	kW	kg/h	kW	kg/h
1st nozzle: 1st stage of operation	355	**30**	545	**46**
1st + 2nd nozzle: 2nd stage of operation	664	**56**	1103	**93**
1st + 2nd + 3rd nozzle: 3rd stage of operation	830	**70**	1660	**140**

ACCESSORY

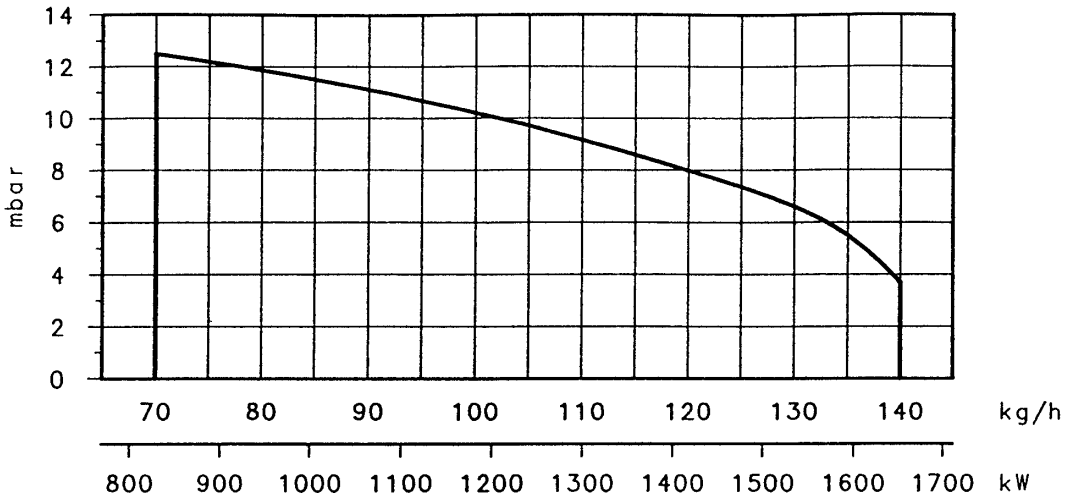
RADIO DISTURBANCE PROTECTION KIT: Code 3010386

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.

COMBUSTION CHAMBER PRESSURE - MAXIMUM OUTPUT

(three nozzles in operation)

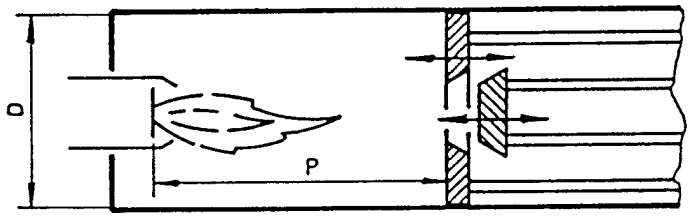
Operation field in accordance with DIN 4787



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

DIMENSIONS OF THE TESTING COMBUSTION CHAMBER

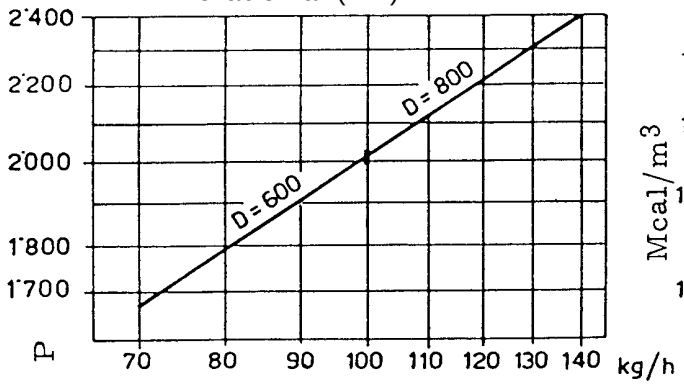
(in compliance with ISO 5063 - 1978)



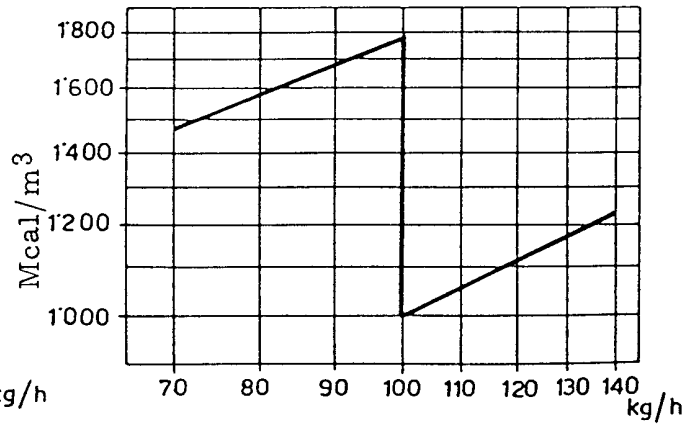
For the combustion head projection carefully follow the boiler manufacturer indications.
A proper protection with refractory material on the combustion chamber shall be made, when the boilers with frontal smoke box are used.

D = Boiler diameter in mm

P = Position of the mobile movable wall (mm)



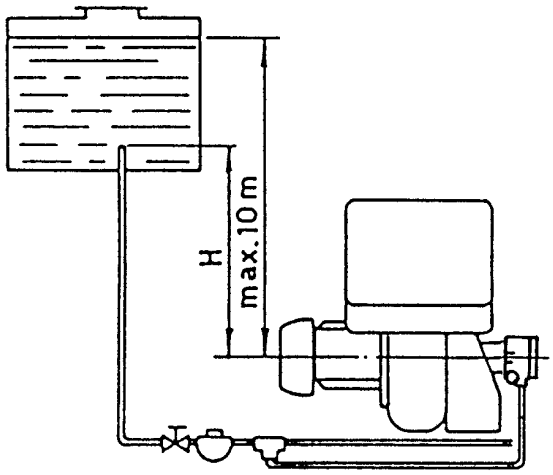
Testing thermal load



SUPPLY LINE

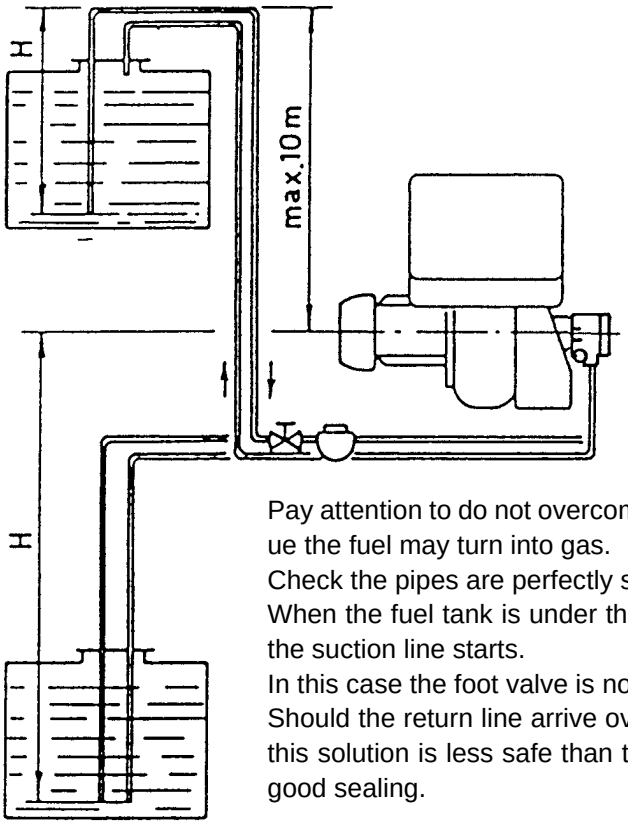
NOTICE

Before placing the burner in operation, ensure that the return line is open.
Any obstruction may damage the pump seal.



Pump priming: Loose the tap from the vacuometer plug 5 (fig. 1) and wait for the flow of the fuel.

H meters	L meters	
	I.D. 14 mm	I.D. 16 mm
0	0	5
0,5	5	10
1	10	20
1,5	20	40
2	30	50



H meters	L meters	
	I.D. 14 mm	I.D. 16 mm
0	50	100
0.5	40	80
1	30	60
1.5	20	40
2	10	20
3	5	10

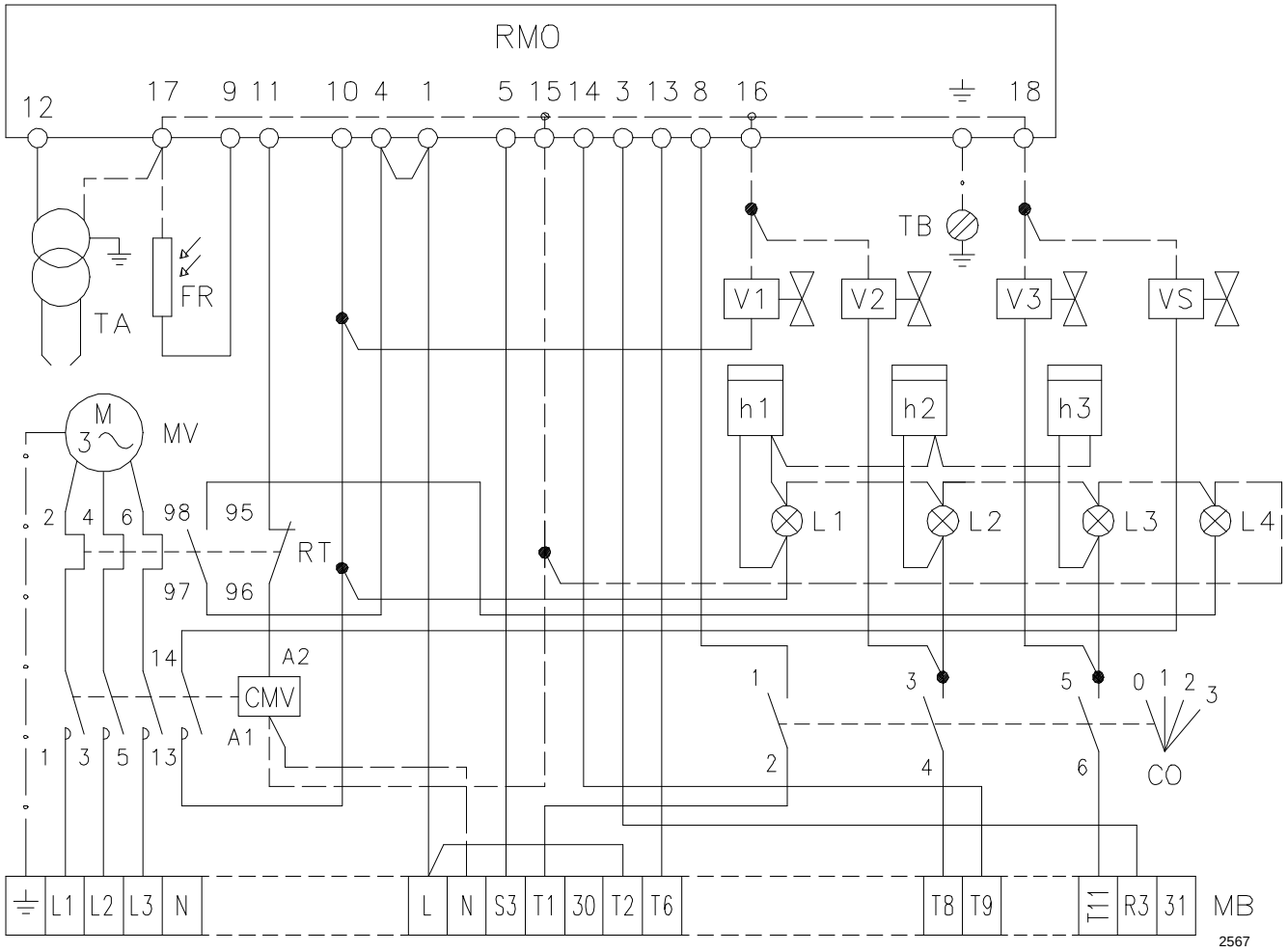
Pay attention to do not overcome the max. depression of 0.45 bar (35 cm Hg), over this value the fuel may turn into gas.
Check the pipes are perfectly sealed.
When the fuel tank is under the burner level we suggest to let the return line arrive where the suction line starts.
In this case the foot valve is not necessary.
Should the return line arrive over the fuel level, the foot valve is indispensable. Notice that this solution is less safe than the previous one, because it is possible the valve has not a good sealing.

Pump priming: Fill the pump with the light oil from the vacuometer plug (5) (fig. 1), put the burner in operation, purge the air from the manometer plug (4) (fig. 1) and wait for the pump priming. If lock-out occurs repeat the procedure.

H = Difference in the pipes height **L** = Total length of the suction tube
øi = Internal diameter of the tube. Copper tubes ø 14 and 16 mm could be replaced by steel tubes G 1/2” and G 3/4”.

INTERNAL WIRING DIAGRAM

(carried out by the factory)

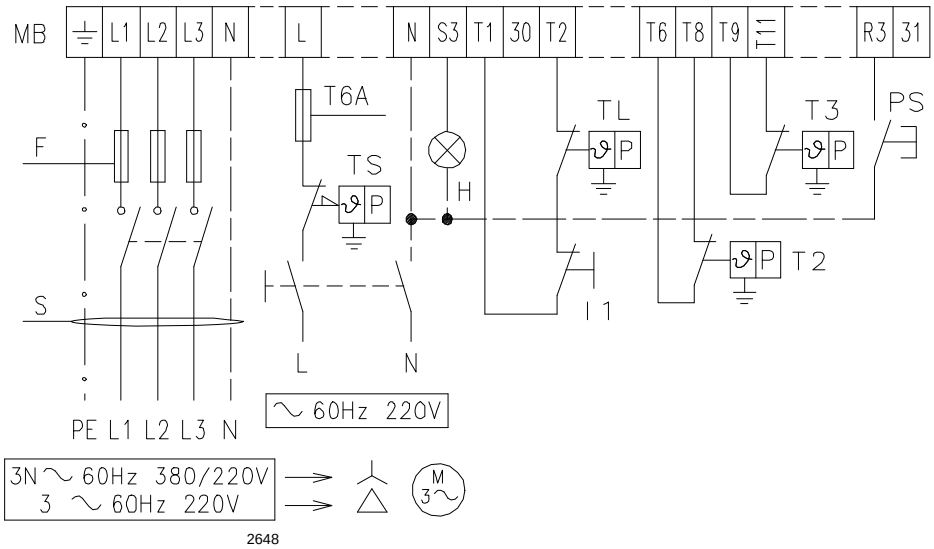


KEY TO LAYOUT

CMV Fan motor contactor
CO Commutator
FR Photocell
h 1 1 st stage hourcounter
h 2 2 nd stage hourcounter
h 3 3 rd stage hourcounter
L1 1 st stage lamp
L2 2 nd stage lamp
L3 3 rd stage lamp
L4 Lock - out motor lamp
MB Wiring terminal board
MV Fan motor
TA Ignition transformer
RT Thermal relay
VS Safety solenoid valve
V1 1 st stage solenoid valve
V2 2 nd stage solenoid valve
V3 3 rd stage solenoid valve

ELECTRICAL CONNECTIONS TO THE WIRING TERMINAL BLOCK

(to be carried out by the installer)



	220V	380V
F Ampere	T25	T25
S mm^2	2,5	2,5

KEY TO LAYOUT

H	Remote lock - out signal	**TL**	Load limit remote control system
I1	Burner manual stop switch	**TS**	Safety load control system
MB	Wiring terminal board	**T2**	2 nd stage load control system
PS	Reset push - button	**T3**	3 rd stage load control system
TB	Burner ground (earth) connection		

Important:

Check the lock-out by darkening the photo-cell after removal of the cover.
ATTENTION: HIGH VOLTAGE

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-inter face kit item number 3010386.

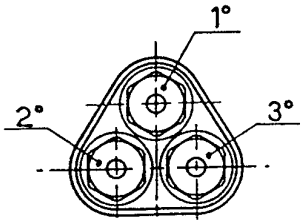
CHOICE OF: NOZZLES - PUMP PRESSURE - COMBUSTION HEAD ADJUSTMENT

- State, first of all, the maximum output required with all three nozzles in operation.

- On the base of the maximum required output, choose-from table A or B - three related nozzles.
  Nozzles: 60° - Pump pressure: 12 bar
  For three-stage operation (up to 116 kg/h) 1st and 2nd nozzle are not equal to the 3rd one. Follow this procedure in order to obtain higher values of CO_2 (during 1st and 2nd stage of operation), complying with German Standard DIN.

- The references on the table C have to 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 1st and 2nd stage.

SUGGESTED NOZZLES



1st Stage / 2nd Stage

A

Nozzles 60° Pump 12 bar (1)			Total delivery kg/h
GPH			
1st	2nd	3rd	1st + 2nd + 3rd
5.50	5.50	5.50	70.80
6.00	6.00	6.00	77.40
6.50	6.50	6.50	83.70
7.00	7.00	7.00	90.00
7.50	7.50	7.50	96.60
8.00	8.00	8.00	102.90
8.30	8.30	8.30	106.80
8.50	8.50	8.50	109.50
9.00	9.00	9.00	115.80
9.50	9.50	9.50	122.40
10.00	10.00	10.00	128.70
10.50	10.50	10.50	135.30
11.00	11.00	11.00	141.60

3rd Stage

B

Nozzles 60° Pump 12 bar (1)			Total delivery kg/h
GPH			
1st	2nd	3rd	1st + 2nd + 3rd
6.50	6.50	3.50	71.10
7.00	7.00	4.00	77.20
7.50	7.50	4.00	81.60
8.00	8.00	4.00	85.80
8.30	8.30	4.00	88.40
8.50	8.50	4.50	92.30
9.00	9.00	5.00	98.70
9.50	9.50	6.00	107.40
9.50	9.50	8.00	115.90
9.50	9.50	9.50	122.40
10.00	10.00	10.00	128.70
10.50	10.50	10.50	135.30
11.00	11.00	11.00	141.60

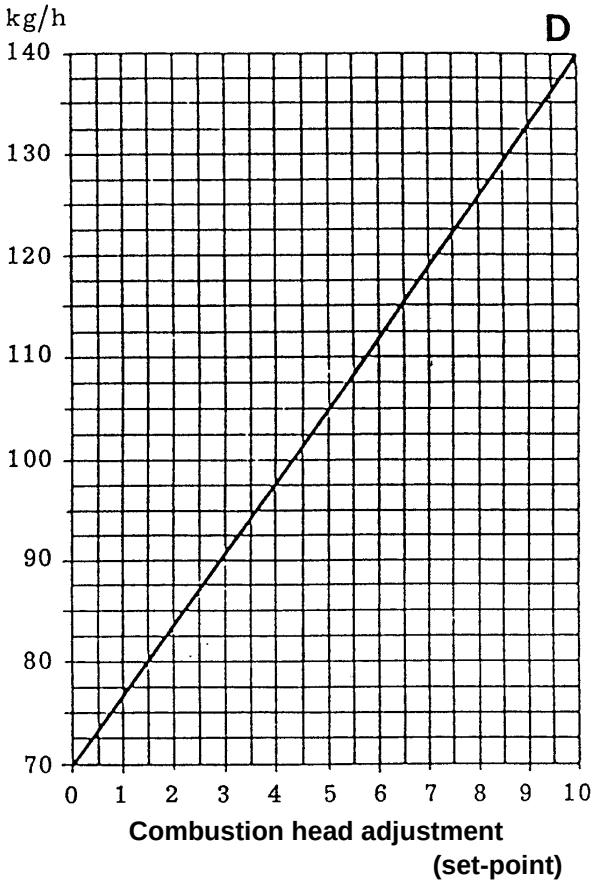
(1) The pump pressure is referred to all three nozzles operating, the pressure increases automatically with two nozzles in operation and more with only one.

Nozzles delivery
Pump pressure

C

GPH \ bar	10	11	12	13	14
5.50	21.4	22.5	23.6	24.6	25.7
6.00	23.3	24.6	25.8	26.9	28.0
6.50	25.3	26.6	27.9	29.1	30.3
7.00	27.2	28.7	30.0	31.4	32.7
7.50	29.2	30.7	32.2	33.6	35.0
8.00	31.1	32.8	34.3	35.9	37.3
8.30	32.3	34.0	35.6	37.2	38.7
8.50	33.1	34.8	36.5	38.1	39.7
9.00	35.0	36.9	38.6	40.3	42.0
9.50	37.0	38.9	40.8	42.6	44.3
10.00	38.9	41.0	42.9	44.8	46.7
10.50	40.8	43.0	45.1	47.1	49.0
11.00	42.8	45.0	47.2	49.3	51.3

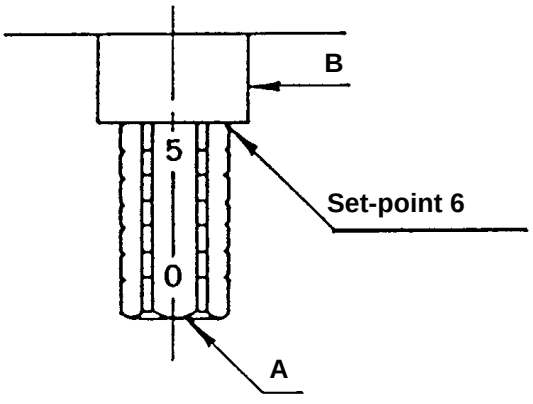
Combustion head adjustment
Maximum output



Rated nozzles delivery are shown in the table.
The real nozzle delivery may vary from the rated one up to ± 5%, its detection is made by weighing the oil sprayed out from the nozzle inserted in a tube.
The pump leaves the factory rated at 12 bar.
Pay attention to not overcome the pump pressure values of 10 and 14 bar.

• At the end, on the base of the maximum output, you obtain the combustion head adjustment from the diagram D.

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



AIR DAMPER ADJUSTMENT

The air dampers adjustment shall be set each time in relation with the nozzles delivery and the combustion chamber pressurization.

Fig. 2

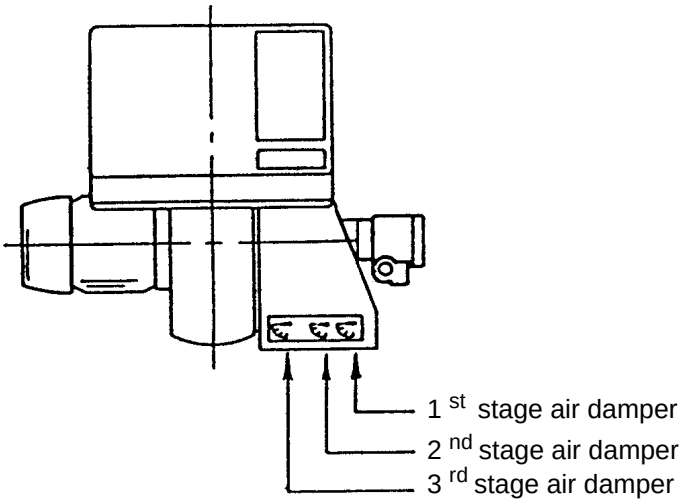


Fig. 3

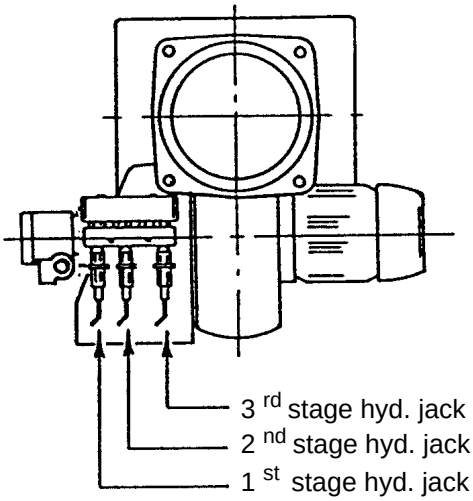
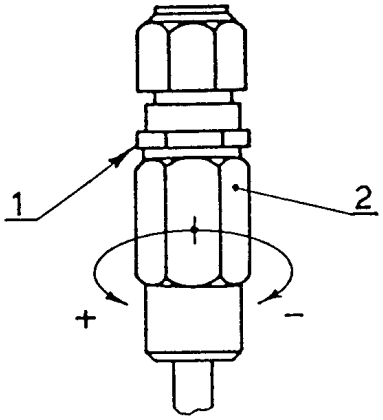


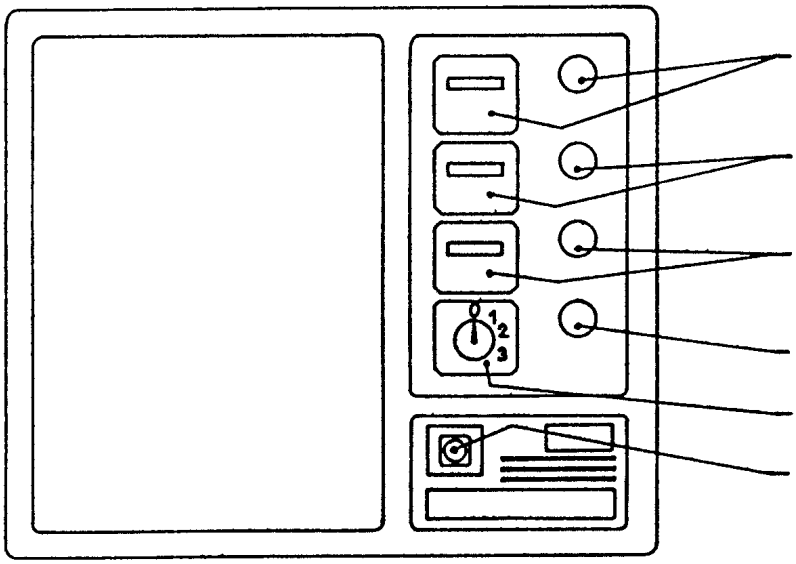
Fig. 2 shows the placement of the air dampers as fig. 3 their correspondent hydraulic jacks.

To open or close the air dampers proceed as follows:
Loose the ring nut (1), turn clockwise the hexagonal body (2) in order to decrease the air flow, and counterclocwise to increase it.



The right adjustment of the air dampers may be detect by checking the combustion results in the three stages of burner operation.
To check the combustion during the different stages, the commutator (see page 10) should be set to the position corresponding to the burner stage to be controlled.

ELECTRIC PANEL



1 st nozzle hourcounter with operation signal

2 nd nozzle hourcounter with operation signal

3 rd nozzle hourcounter with operation signal

Motor lock-out signal

4 positions commutator

Control box lock-out signal with re-set push-button

Hourcounter

Deducting the number of hours of 2nd nozzle hourcounter from those indicated in the 1st nozzle hourcounter you could know how many hours the burner has been performing only at 1st stage; the same procedure to detect the performance hours of the 2nd stage alone - deduct from the 2nd stage hourcounter the hours indicated in the 3rd nozzle hourcounter-. The hours of 3rd stage operation are shown rightly on the 3rd nozzle hourcounter.

Commutator

Pos. 0: Burner stop

Pos. 1: Burner operation only at 1st stage

Pos. 2: Burner operation at 1st and 2nd stage

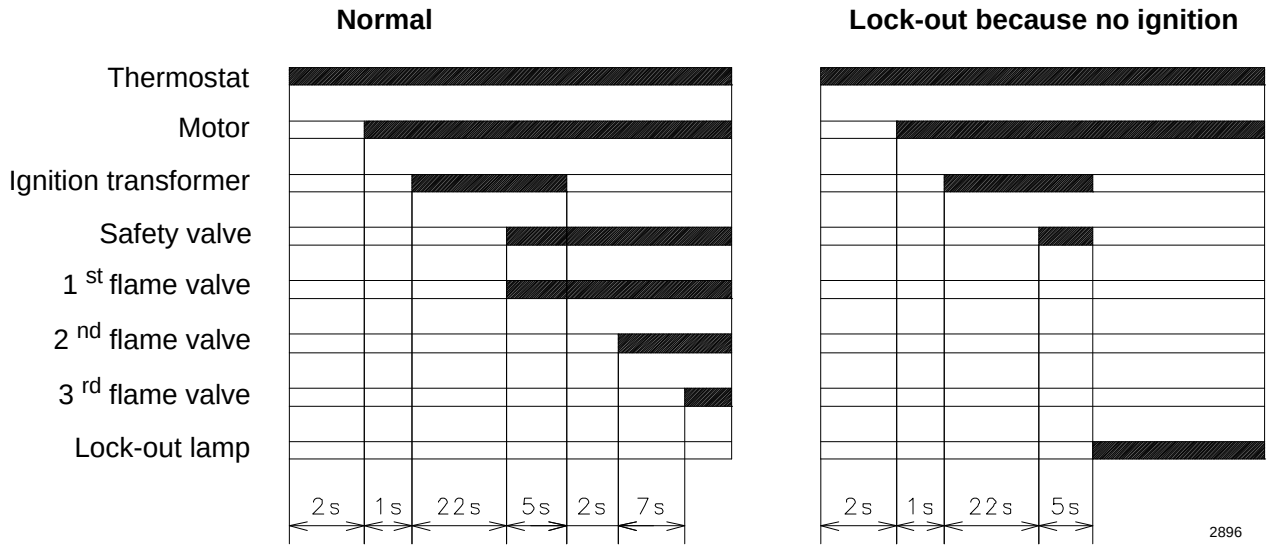
Pos. 3: Burner operation at 1st, 2nd and 3rd stage

Motor lock-out

It is caused by the overload relay in case of overload or no electric supply.

Push the proper reset button (after removal of the protective cover).

BURNER START-UP CYCLE

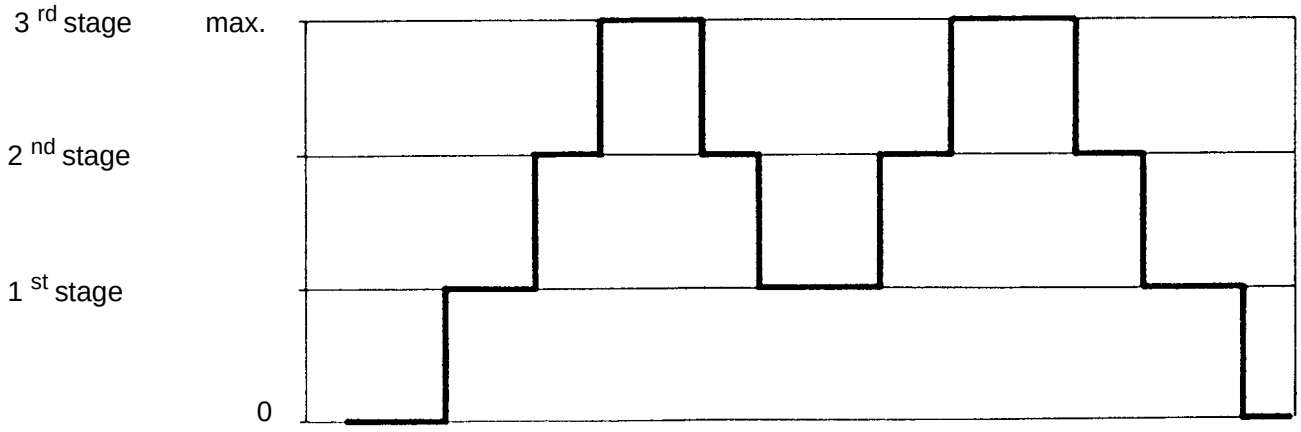


ALTERNATIVE START-UP CYCLES

1) If you desire the pre-ignition being present during the complete pre-purge phase (29,5 s) remove the bridge from the terminals 11 - 3 and put it on the terminals 11 - 7 of the control box.

2) If you desire to reduce the pre-purge period from 29,5 s to 16 s with contemporaneous presence of the pre-ignition remove the wire from the terminal no. 7 to the no. 3 of the control box, maintaining the bridge to the terminals 11 - 3.

THREE STAGE OPERATION



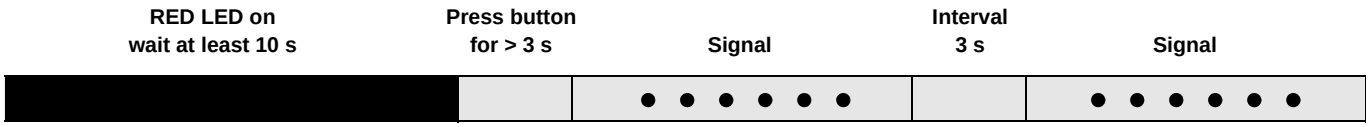
BURNER START-UP CYCLE DIAGNOSTICS

During start-up, indication is according to the followin 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	▲❑▲❑▲❑▲❑▲❑▲
Key: ❍ 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).
ITo 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 gas 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 gas oil); – faulty or soiled oil valves; – short circuit between photocell and earth.
8 flashes ●●●●●●●●	– Oil enabling thermostat fault; – Break in heating elements.
10 flashes ●●●●●●●●●●	– Wiring error or internal fault; – Presence of electromagnetic disturbance: use the radio disturbance protection kit

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