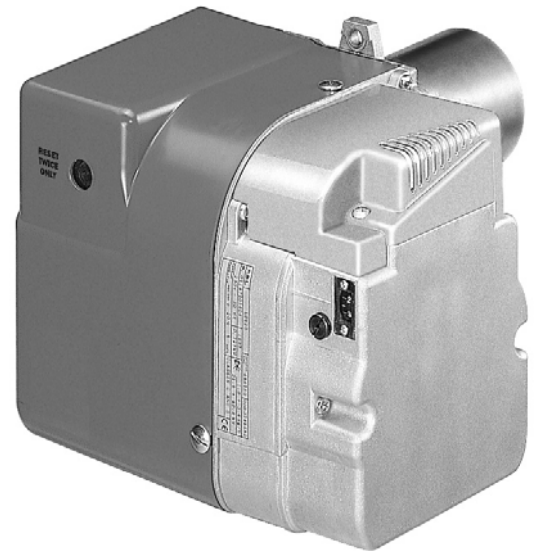


Light oil burners

One stage operation



CODE	MODEL	TYPE
3510225	RDB1 CF 38	501 T3
3510050	RDB1R CF 26	501 T1R
3510150	RDB1R CF 33	501 T2R
3510250	RDB1R CF 38	501 T3R
3510650	RDB2R CF 38	502 T3R
3510750	RDB2R CF 46	502 T5R

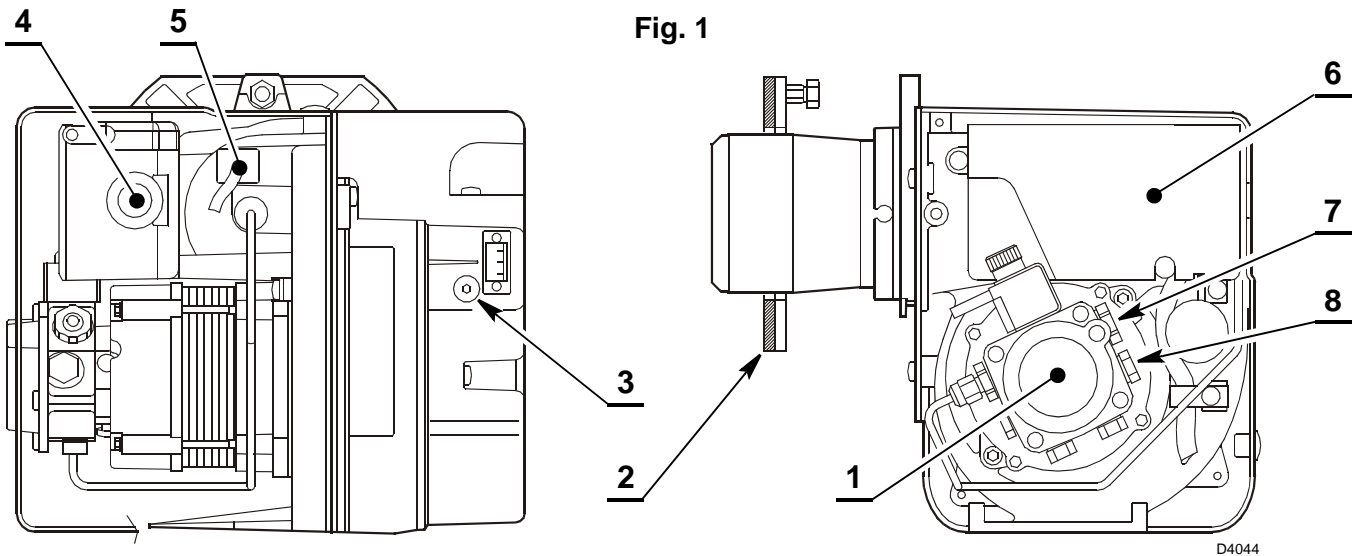
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1. BURNER DESCRIPTION

One stage gas oil burner.

- ▶ The burner meets protection level of IP 40, EN 60529.
- ▶ Burner with CE marking in conformity with EEC Directives: Machine Directive 2006/42/EC, Low Voltage Directive 2014/35/UE, Electromagnetic Compatibility 2014/30/UE.



- | | |
|-------------------------------------|------------------------------------|
| 1 – Pump | 5 – Flame sensor |
| 2 – Flange with insulating gasket | 6 – Control-box |
| 3 – Air damper adjustment screw | 7 – Pump pressure adjustment screw |
| 4 – Reset button with lock-out lamp | 8 – Pressure gauge port |

1.1 BURNER EQUIPMENT

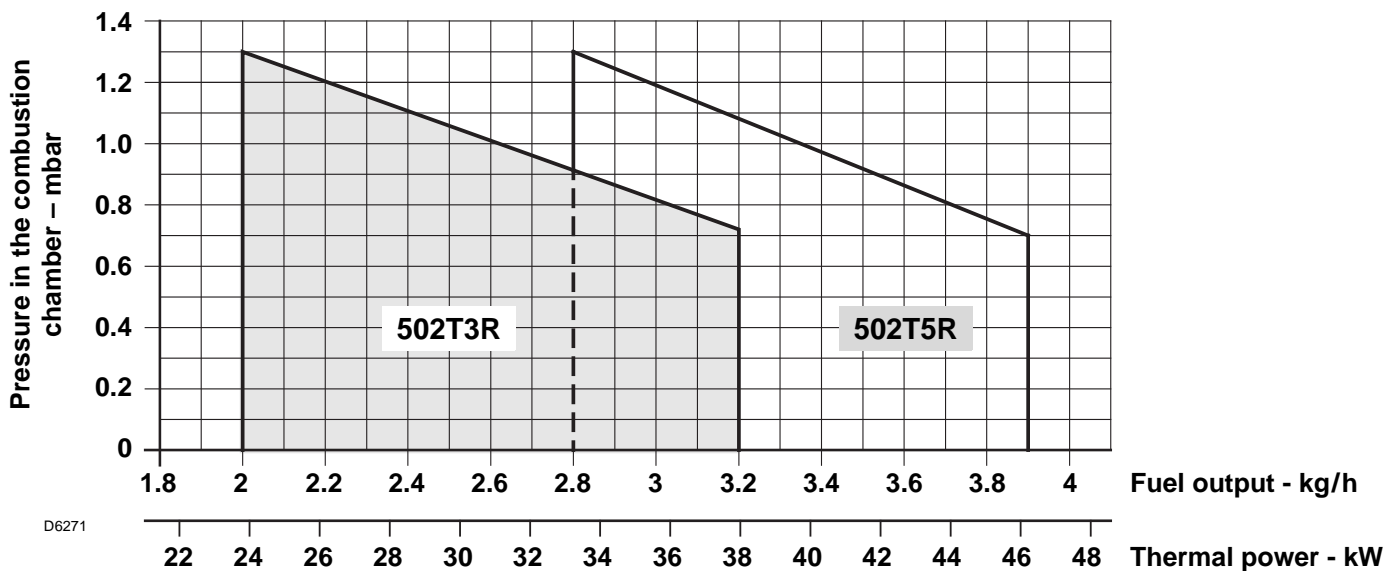
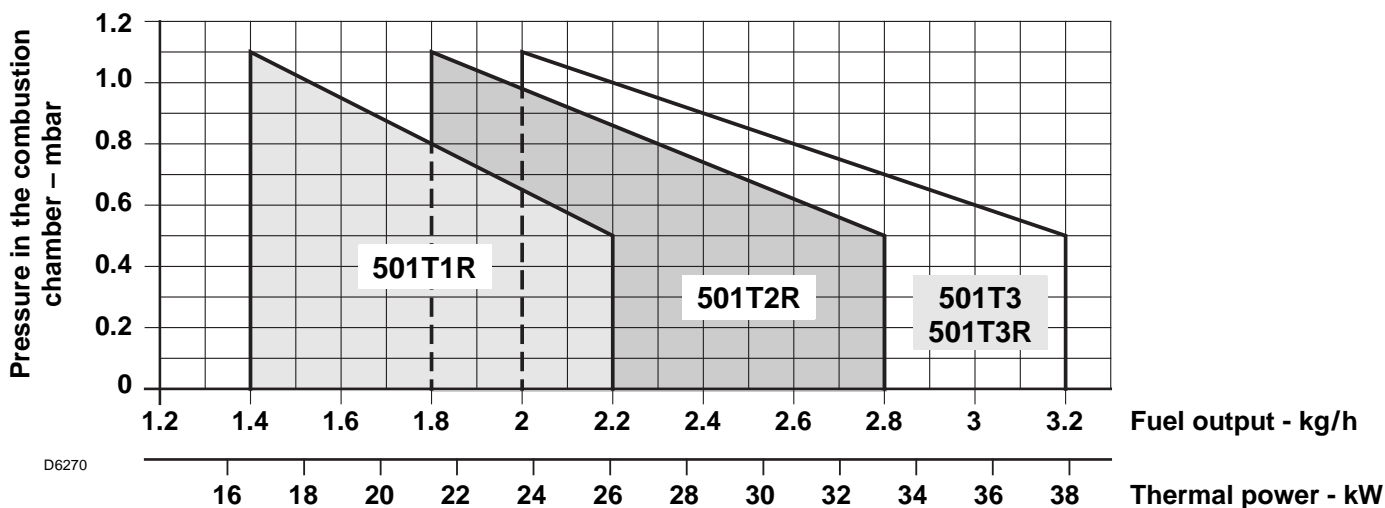
Flange with insulating gasket	No. 1	Screws for flange to be fixed to boiler.	No. 4
Screw and nuts for flange	No. 1	Flexible oil pipes with nipples	No. 2

2. TECHNICAL DATA

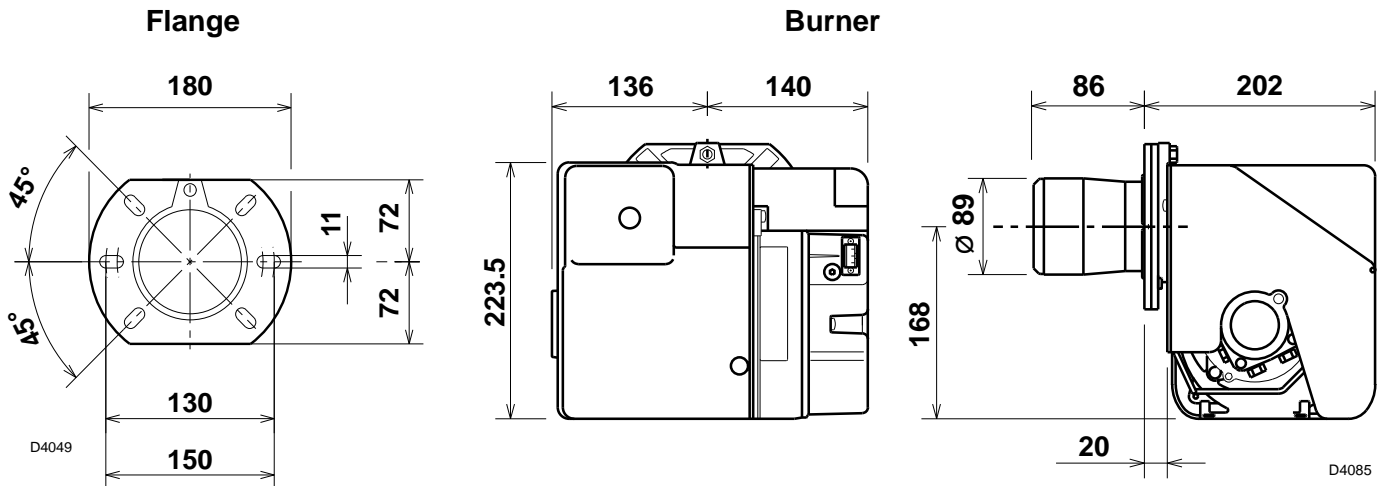
2.1 TECHNICAL DATA

TYPE	501T3	501T1R	501T2R	501T3R	502T3R	502T5R
Output kg/h	2 – 3.2	1.4 – 2.2	1.8 – 2.8	2 – 3.2	2 – 3.2	2.8 – 3.9
Thermal power kW (with air at 20 °C)	23.8 - 37.9	16.6 - 26	21.4 - 33.2	23.8 - 37.9	23.8 - 37.9	33.2 - 46.2
	($H_i = 11.86$ kWh/kg)					
Fuel	Gas oil, viscosity 4 – 6 mm ² /s at 20°C					
Electrical supply	Single phase, ~ 50Hz 230V ± 10%					
Motor	Run current 0.7 A – 2850 rpm – 298 rad/s					
Capacitor	4.5 µF					
Ignition transformer	Secondary 8 kV – 16 mA					
Pump	Pressure: 8 – 15 bar					
Absorbed electrical power	0.115 kW	0.170 kW			0.180 kW	

2.2 WORKING FIELDS (as EN 267)



2.3 OVERALL DIMENSIONS



3. INSTALLATION

THE BURNER MUST BE INSTALLED IN CONFORMITY WITH LEGISLATION AND LOCAL STANDARDS.

3.1 BOILER FIXING

- Put on the flange (1) the screw and two nuts, (see fig. 2).
- Fix the flange (1) to the boiler door (4) using screws (2) and (if necessary) the nuts (3) interposing the insulating gasket (5), (see fig. 3).

Fig. 2

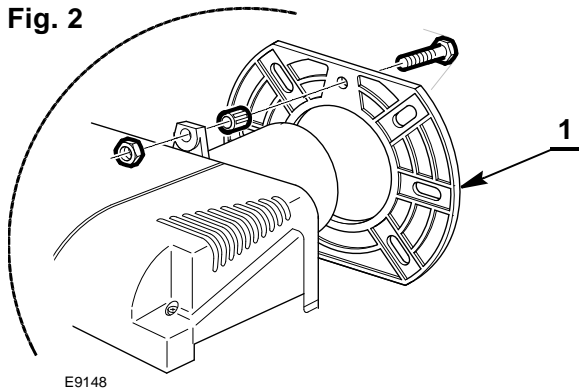
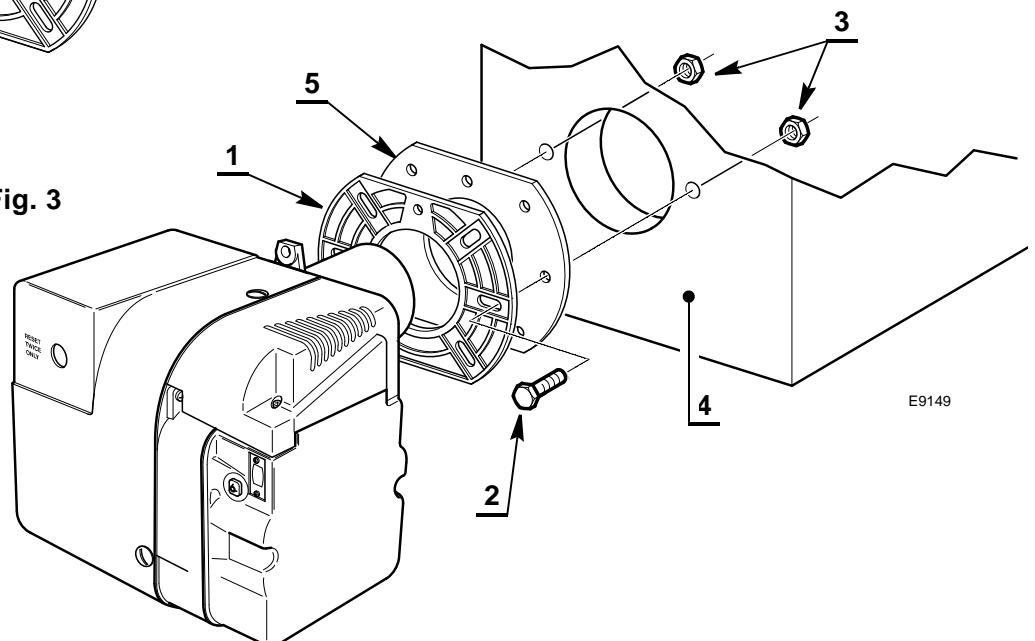


Fig. 3



3.2 HYDRAULIC SYSTEMS

The pump is designed to allow working with two pipes. In order to obtain one pipe working it is necessary to unscrew the return plug (2) (fig. 4), remove the by-pass screw (3) and then screw again the plug (2).



The suction plug (1) is made of plastic. Once removed, it must not be used again. In single-pipe installations, the plug in the return line (2) must be totally in steel.

- In the two pipes systems, before starting the burner make sure that the return pipe-line is not clogged. An excessive back pressure would cause the damage of the pump seal.
- A metal bowl filter with replaceable micronic filter must be fitted in the oil supply pipe.
- Check periodically the flexible pipes conditions.

PRIMING PUMP

On the system in fig. 5 it is sufficient to loosen the suction gauge connection (6) (fig. 4) and wait until oil flows out.

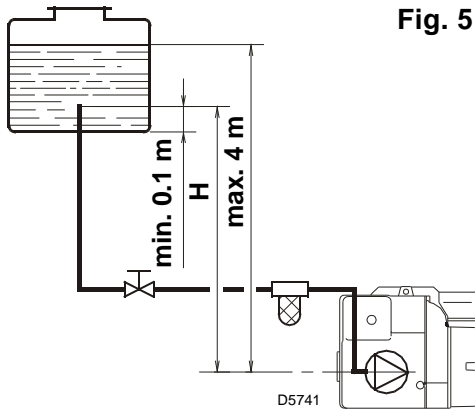
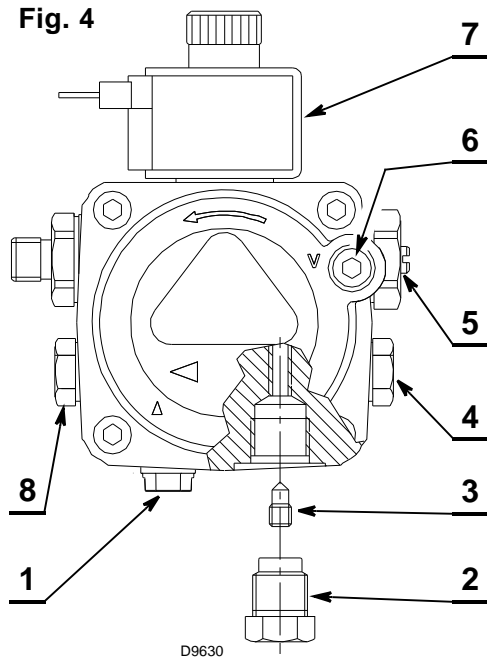


Fig. 5

H meters	L meters	
	I.D. 8 mm	I.D. 10 mm
0.5	10	20
1	20	40
1.5	40	80
2	60	100



- 1 Suction line
- 2 Return line
- 3 By-pass screw
- 4 Gauge connection
- 5 Pressure adjuster
- 6 Suction gauge connection
- 7 Valve
- 8 Auxiliary pressure test point

On the systems in fig. 6 and 7 start the burner and wait for the priming.

Should lock-out occur prior to the arrival of the fuel, await at least 20 seconds before repeating the operation.



The pump suction should not exceed a maximum of 0.4 bar (30 cm Hg). Beyond this limit gas is released from the oil. Oil pipes must be completely tight.

In the vacuum systems (fig. 7) the return line should terminate within the oil tank at the same level as the suction line. In this case a non-return valve is not required.

Should however the return line arrive over the fuel level, a non-return valve is required. This solution however is less safe than previous one, due to the possibility of leakage of the valve.

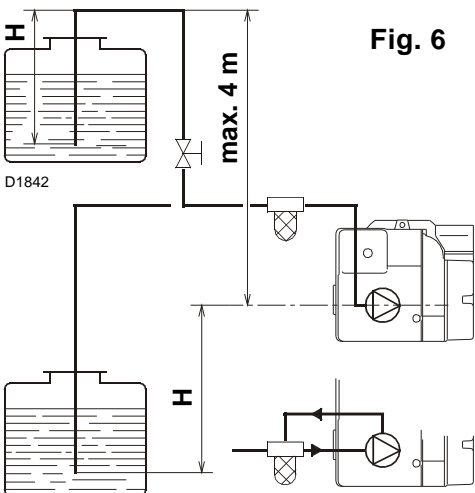


Fig. 6

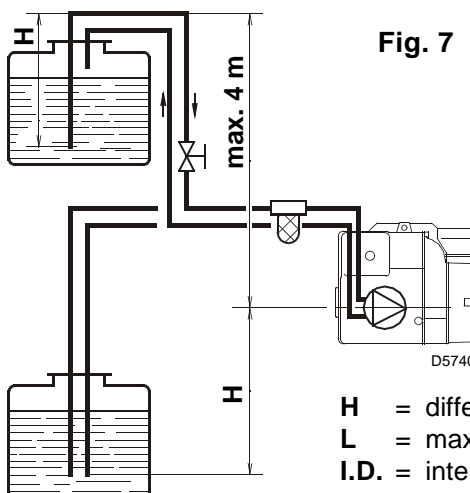


Fig. 7

H meters	L meters	
	I.D. 8 mm	I.D. 10 mm
0	35	100
0.5	30	100
1	25	100
1.5	20	90
2	15	70
3	8	30
3.5	6	20

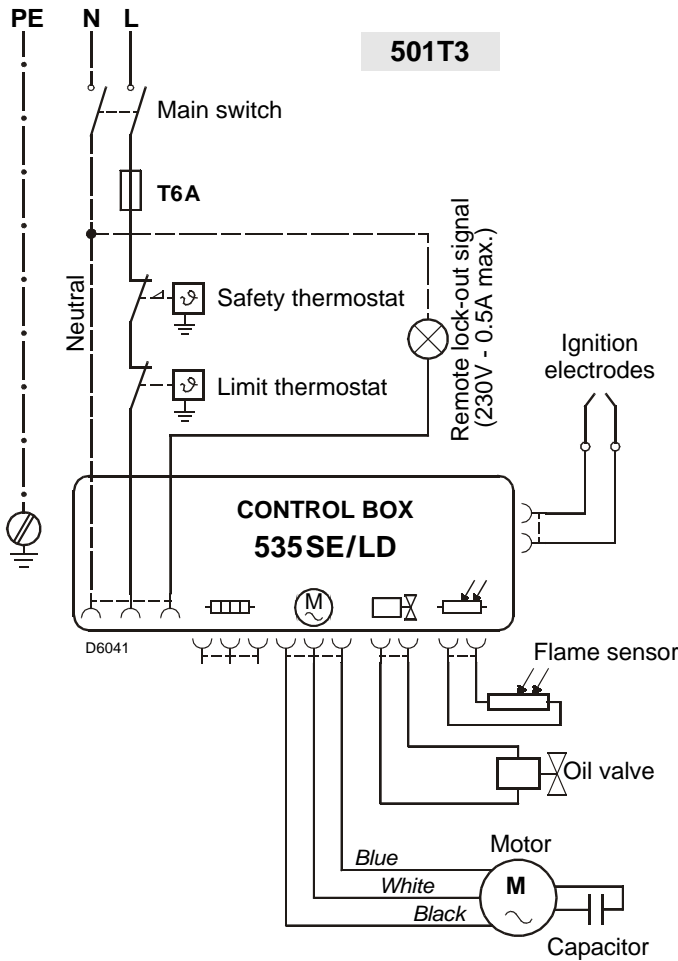
- H = difference of level;
 L = max. length of the suction line;
 I.D. = interterminal diameter of the oil pipes

3.3 ELECTRICAL WIRING

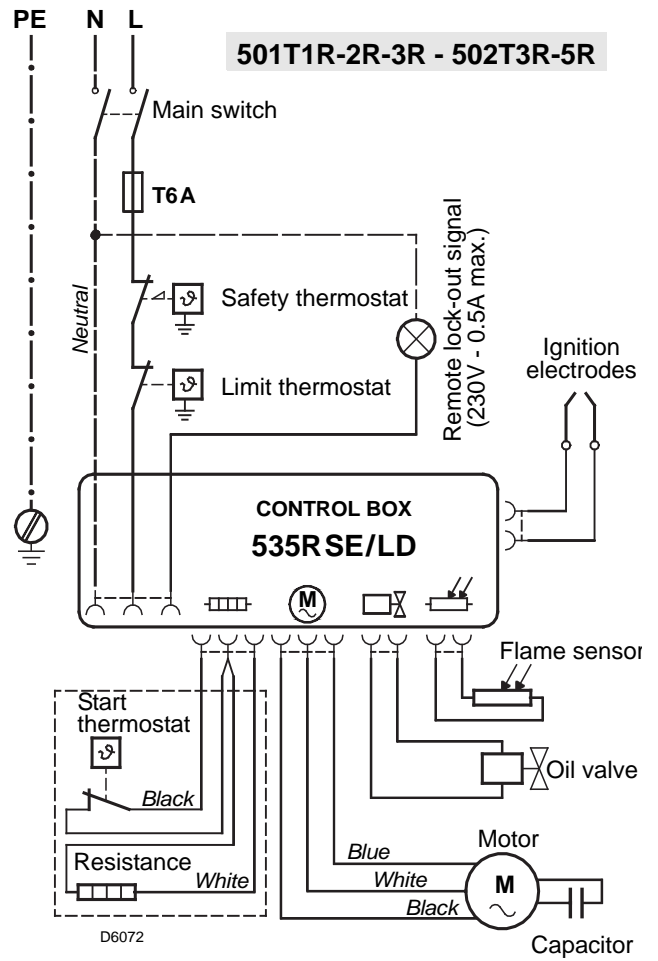
WARNING

DO NOT EXCHANGE NEUTRAL WITH PHASE

~ 50Hz - 230V



~ 50Hz - 230V



NOTES:

- Wires of min. 1 mm² section. (Unless requested otherwise by local standards and legislation).
- The electrical wiring carried out by the installer must be in compliance with the rules in force in the Country.

TESTING:

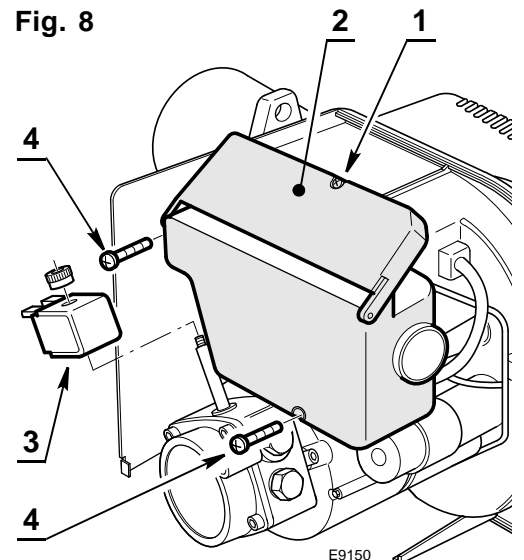
Check the shut-down of the burner by opening the thermostats and the lock-out by **darkening** the flame sensor.

CONTROL BOX (see fig. 8)

To remove the control box from the burner follow of the instruction:

- Loosen the screw (1), open the protection (2) and remove all components.
- Remove the coil (3).
- Loosen the two screws (4).
- Move a little the control box and remove the high voltage leads.

Fig. 8



4. WORKING

4.1 COMBUSTION ADJUSTMENT

In conformity with EN 267 the application of the burner on the boiler, adjustment and testing must be carried out observing the instruction manual of the boiler, including verification of the CO and CO₂ concentration in the flue gases, their temperatures and the average temperature of the water in the boiler.

To suit the required appliance output, fit the proper nozzle, then adjust the pump pressure and the air damper opening in accordance with the following schedule.

The values shown in the table are measured on a CEN boiler (as per EN 267).

They refer to 12.5% CO₂ at sea level and with gas oil and room temperature of 20 °C.

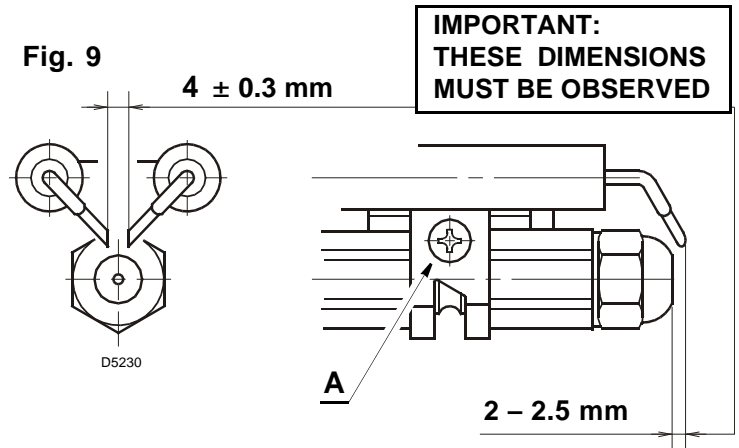
TYPE	Nozzle		Pump pressure	Burner output	Air damper adjustment
	GPH	Angle	bar	kg/h ± 4%	Set-point
501T3	0.50	60°	12	2.0	3.3
	0.55	60°	12	2.2	4.5
	0.60	60°	12	2.4	4.8
	0.65	60°	12	2.6	5.5
	0.75	60°	12	3.0	6.5
	0.75	60°	13.5	3.2	7.5
501T1R	0.40	60°	10.5	1.4	0.8
	0.50	60°	12	1.9	2.8
	0.55	60°	12	2.1	3.8
	0.55	60°	13	2.2	5
501T2R	0.50	60°	11	1.8	3.3
	0.50	60°	12	1.9	3.5
	0.55	60°	12	2.1	4.3
	0.60	60°	12	2.3	4.7
	0.65	60°	12	2.5	5.2
	0.75	60°	11	2.8	6
501T3R	0.55	60°	11	2.0	3.1
	0.60	60°	12	2.3	4.1
	0.65	60°	12	2.5	4.8
	0.75	60°	12	2.9	6.3
	0.85	60°	11.5	3.2	7.5
502T3R	0.55	60°	11	2.0	3.4
	0.60	60°	12	2.3	4
	0.65	60°	12	2.5	4.6
	0.75	60°	12	2.9	5.4
	0.85	60°	11.5	3.2	6.5
502T5R	0.75	80°	11	2.8	1.5
	0.85	60°	12	3.3	2.2
	1.00	60°	12	3.8	3.6
	1.00	60°	12.5	3.9	3.8

4.2 NOZZLES RECOMMENDED : Delavan type W - E ; Monarch type R - NS
Steinen type Q - H ; Danfoss type S - H.

4.3 ELECTRODES SETTING

ATTENTION

Before removing or assembling the nozzle, loosen the screw (A, fig. 9) and move the electrodes ahead.



4.4 PUMP PRESSURE:

12 bar: The pump leaves the factory set at this value.

14 bar: (Only for type 501T3).

Improves flame retention; it is therefore suitable for ignitions at low temperatures.

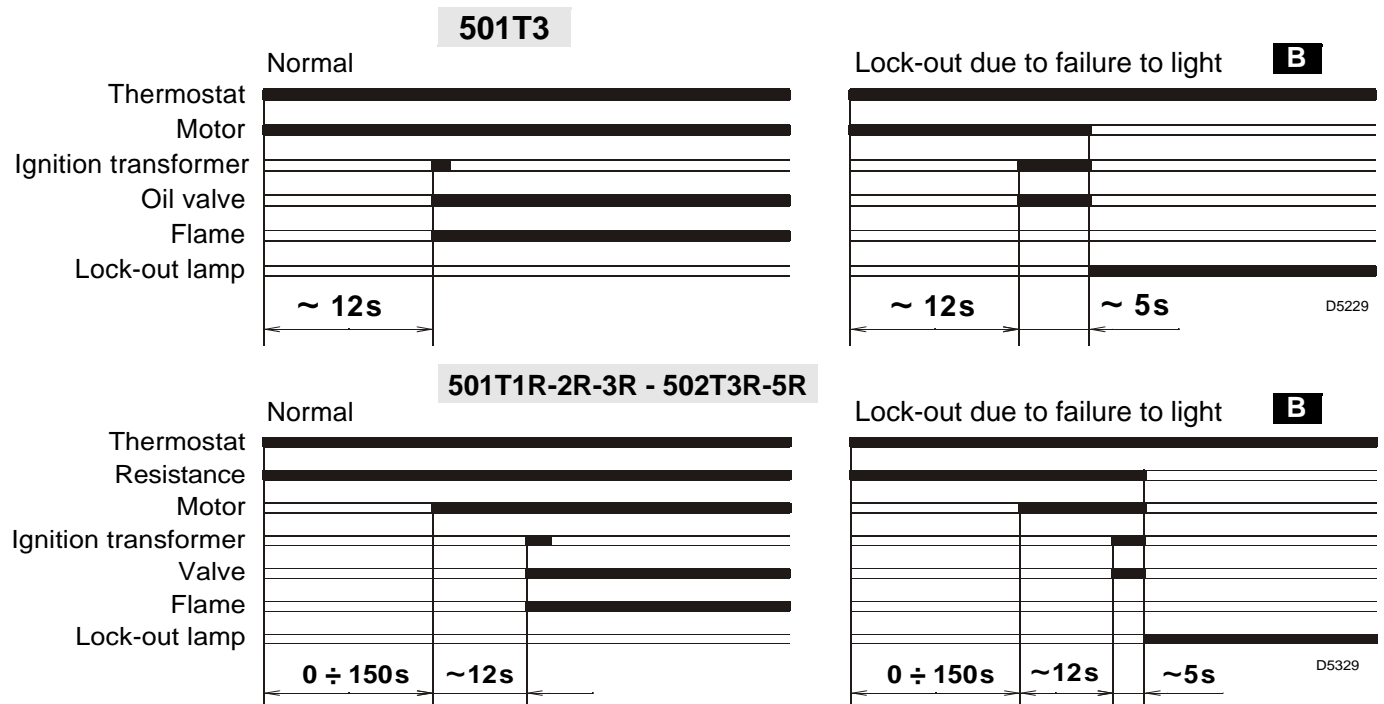
4.5 AIR DAMPER ADJUSTMENT

The settings indicated in the schedule are purely indicative. Each installation however, has its own unpredictable working conditions: actual nozzle output; positive or negative pressure in the combustion-chamber, the need of excess air, etc. All these conditions may require a different air-damper setting.

4.6 FUEL HEATING (for type 501T1R-2R-3R - 502T3R-5R)

In order to assure regular ignition and working also at low temperatures the burner has an oil pre-heater fitted in combustion head. The pre-heater starts when thermostats close and it is indicated by the ignition of an orange led placed on the control box. When the required temperature for ignition is reached the thermostat fitted on the nozzle holder starts the burner the orange led switches off, the green led switches on and the motor starts. The pre heater remains energised during working and cuts out when burner shuts-down.

4.7 BURNER START-UP CYCLE



B Lock out is indicated by a lamp on the control box (3, fig. 1, page 1)

5. MAINTENANCE

The burner requires periodic maintenance carried out by a qualified and authorised technician **in conformity with legislation and local standards**.

Maintenance is essential for the reliability of the burner, avoiding the excessive consumption of fuel and consequent pollution.

Before carrying out any cleaning or control always first switch off the electrical supply to the burner acting on the main switch of the system.

THE BASIC CHECK ARE:

- Check that there are not obstructions or dents in the supply or return oil pipes.
- Clean the filter in the oil suction line and in the pump.
- Clean the flame sensor, (5, fig. 1, page 1).
- Check for correct fuel consumption.
- Replace the nozzle and check the correct position of electrodes (fig. 9, page 7).
- Clean the combustion head in the fuel exit area, on the diffuser disc.
- Leave the burner working without interruptions for 10 min. and set rightly all the components stated in this manual.

Then carry out a combustion check verifying:

- ◆ Smoke temperature at the chimney; ◆ Content of CO₂ (%); ◆ Content of CO (ppm);
- ◆ Smoke value according to opacity smokes index according to Bacharach scale.

6. FAULTS / SOLUTIONS

Here below you can find some causes and the possible solutions for some problems that could cause a failure to start or a bad working of the burner.

A fault usually makes the lock-out lamp light which is situated inside the reset button of the control box (3, fig. 1, page 1).

When lock out lamp lights the burner will attempt to light only after pushing the reset button. After this if the burner functions correctly, the lock-out can be attributed to a temporary fault.

If however the lock out continues the cause must be determined and the solution found.

FAULTS	POSSIBLE CAUSES	SOLUTION
The burner will not start when the adjustment thermostat closes.	Lack of electrical supply.	Check presence of voltage in the clamps of the plug.
		Check the conditions of the fuses.
		Check that thermostat limit is not lock out.
	The flame sensor sees false light.	Eliminate the light.
	Resistance or start thermostats are faulty.	Replace them.
	The connections in the control box are wrongly inserted.	Check and connect completely all the plugs.
Burner runs normally in the prepurge and ignition cycle and locks out after 5 seconds ca.	The flame sensor is dirty.	Clear it.
	The flame sensor is defective.	Change it.
	Flame moves away or fails.	Check pressure and output of the fuel.
		Check air output.
		Change nozzle.
	Check the coil of solenoid valve.	
Burner starts with an ignition delay.	The ignition electrodes are wrongly positioned.	Adjust them according to the instructions of this manual.
	Air output is too high.	Set the air output.
	Nozzle dirty or worn.	Replace it.

WARNING

The manufacturer cannot accept responsibility for any damage to persons, animals or property due to error in installation or in the burner adjustment, or due to improper or unreasonable use or non observance of the technical instruction enclosed with the burner, or due to the intervention of unqualified personnel.

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