

## Kerosene and light oil burners

One stage operation



**RDB**

CODE	BOULTER CODE	MODEL	TYPE
3748960	8-716-108-334	CAMRAY5 150/200	490 T51
3748961	8-716-108-333	CAMRAY5 200/240	490 T51
3748962	8-716-111-556	COH 280	490 T51

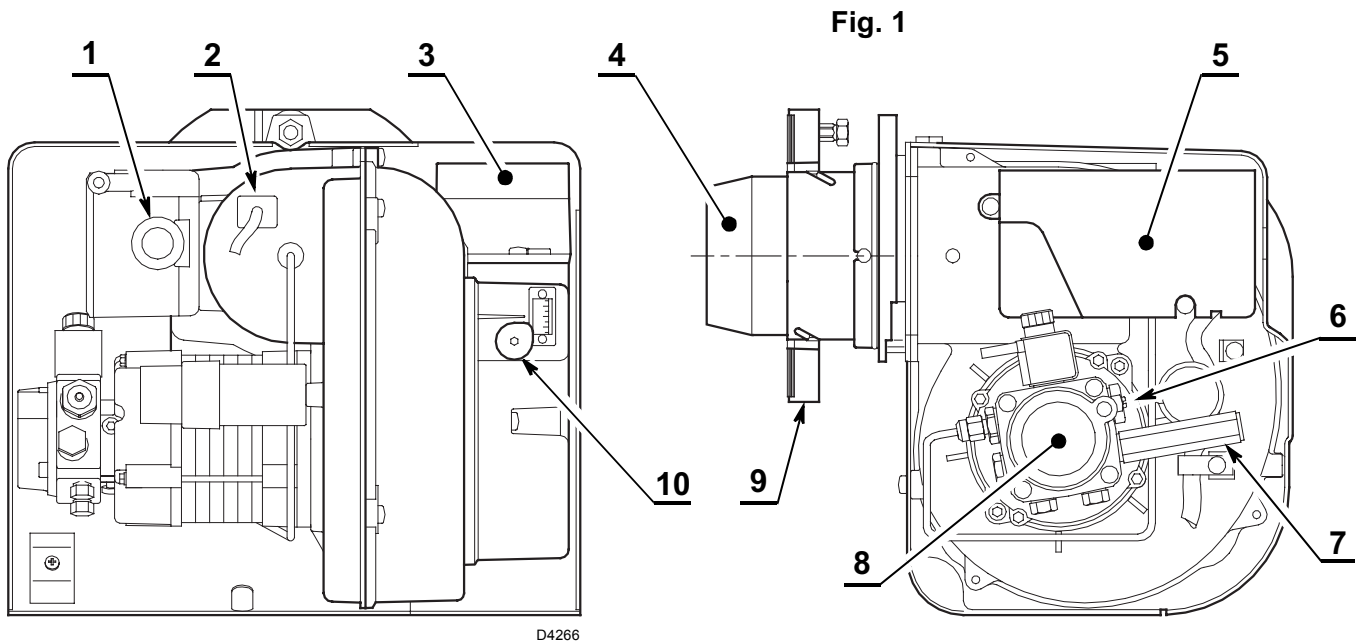
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## 1. BURNER DESCRIPTION

One stage kerosene and light oil burner.

- ▶ In case of **BF** applications the intake air temperature must not be over 70°C.
- ▶ CE Certification No.: **0036 0332/02** as 92/42/EEC.
- ▶ Burner with CE marking in conformity with EEC directives: EMC 89/336/EEC, Low Voltage 73/23/EEC, Machines 98/37/EEC and Efficiency 92/42/EEC.
- ▶ The burner meets protection level of IP 40, EN 60529.



- |                                     |                                    |
|-------------------------------------|------------------------------------|
| 1 – Reset button with lock-out lamp | 6 – Pump pressure adjustment screw |
| 2 – Photoresistance                 | 7 – Pressure gauge port            |
| 3 – Snorkel (BF)                    | 8 – Pump                           |
| 4 – Blast tube                      | 9 – Flange                         |
| 5 – Control-box                     | 10 – Air damper adjustment screw   |

### 1.1 BURNER EQUIPMENT

By-pass screw (clipped on the pump). . . . . No. 1

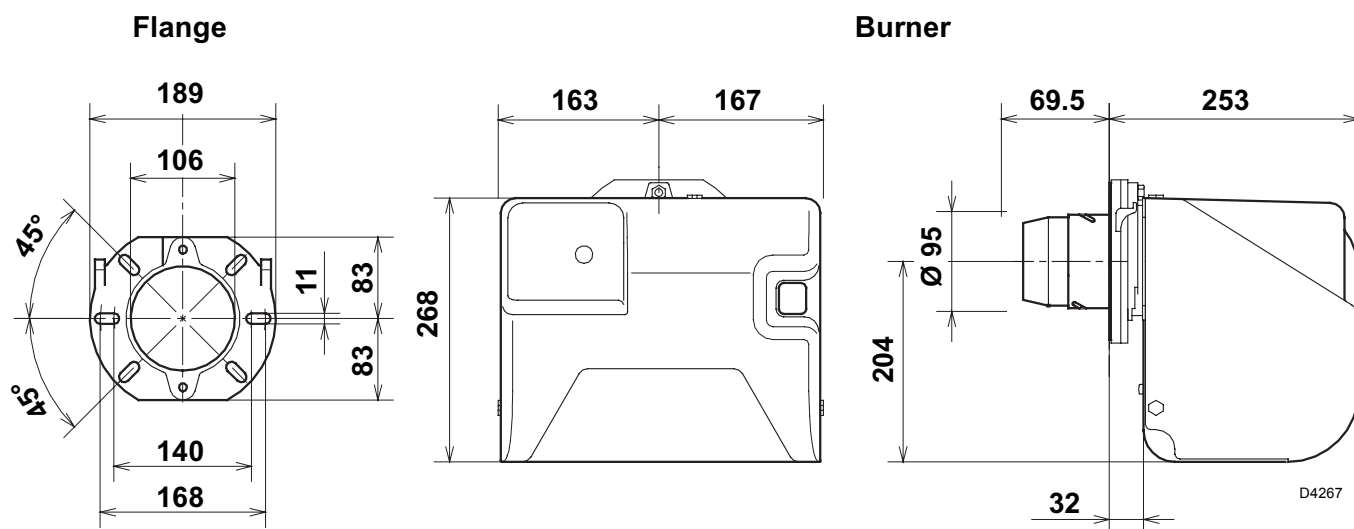
## 2. TECHNICAL DATA

### 2.1 TECHNICAL DATA

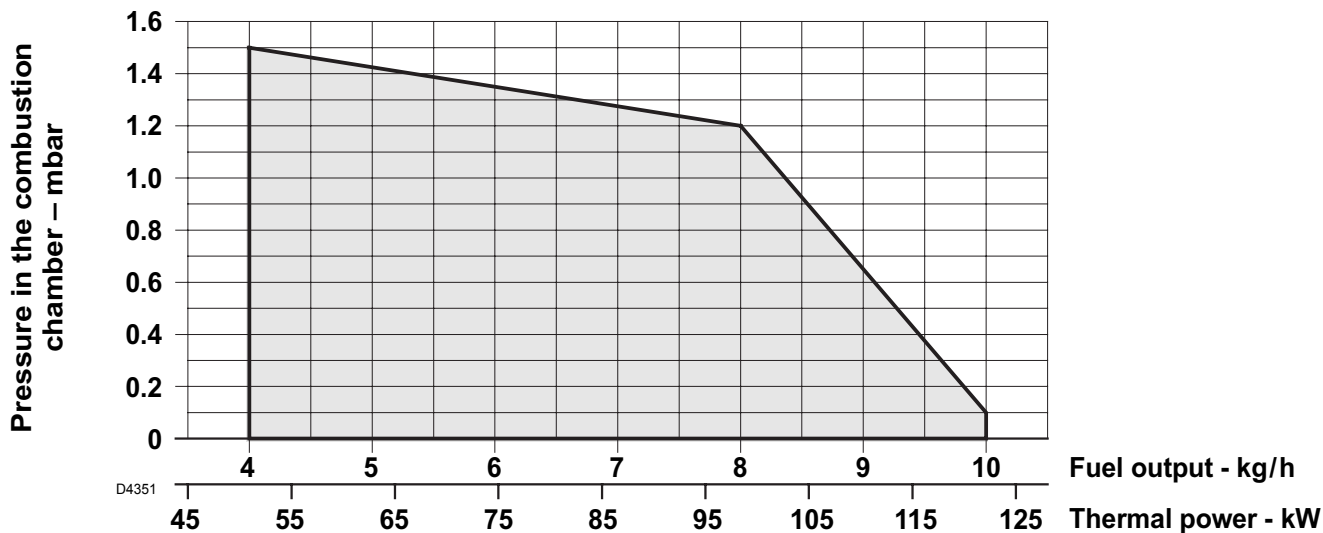
TYPE	490 T51
Output - Thermal power (with air at 20 °C)	4 – 10 kg/h – 47.45 – 120 kW
Fuel	Kerosene, viscosity 1.6 – 6 mm <sup>2</sup> /s at 20 °C ( $H_i = 11.97 \text{ kWh/kg}$ ) Light oil, viscosity 4 – 6 mm <sup>2</sup> /s at 20 °C ♦ ( $H_i = 11.86 \text{ kWh/kg}$ )
Electrical supply	Single phase, ~ 50Hz 230V ± 10%
Motor	Run current 1.3A – 2750 rpm – 288 rad/s
Capacitor	5 µF
Ignition transformer	Secondary 8 kV – 16 mA
Pump	Kerosene, maximum pressure 10 bar (145 psi) Light oil, maximum pressure 15 bar (218 psi)
Absorbed electrical power	0.16 kW

♦ Light oil is not permitted on low level discharge of flue gas products.

### 2.2 OVERALL DIMENSIONS



### 2.3 FIRING RATE, (as EN 267)



### 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).
- Widen, if necessary, the insulating gasket holes (5), (see fig. 3).
- 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. 4).

Fig. 2

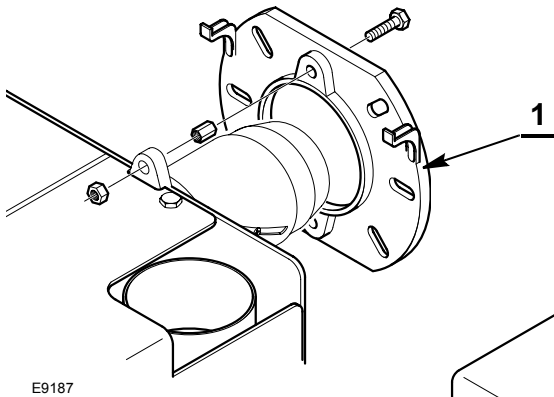


Fig. 3

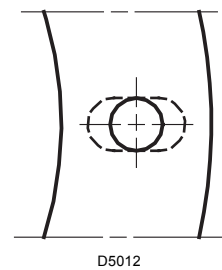
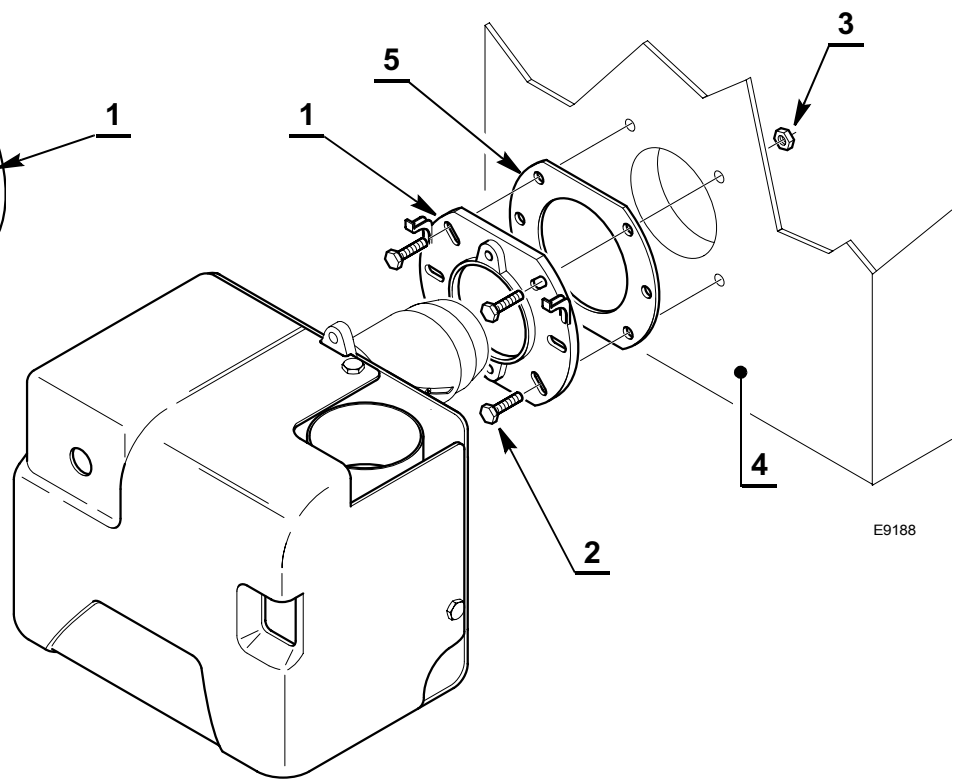


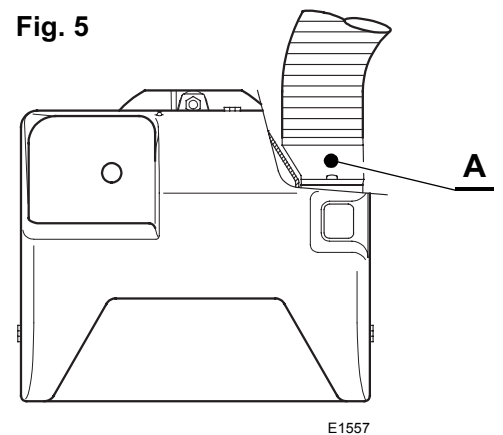
Fig. 4



#### 3.2 MOUNTING THE BURNER

In case of **BF** applications, the combustion air supply is through a flexible tube connected at the socket (**A**).

Fig. 5



### 3.3 HYDRAULIC SYSTEMS

#### WARNING:

- Check periodically the flexible pipes conditions. Using kerosene, they have to be replaced at least every 2 years.
- A metal bowl filter with replaceable micronic filter must be fitted in the oil supply pipe.
- The pump is designed to allow working with one pipe.  
In order to obtain two pipes working it is necessary to unscrew the return plug (2), screw the by-pass screw (3) and then screw again the plug (2). (See fig. 6).
- 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.

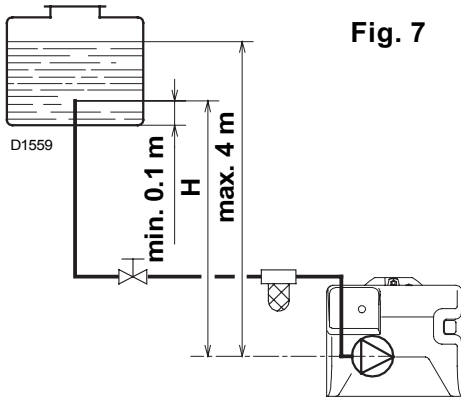
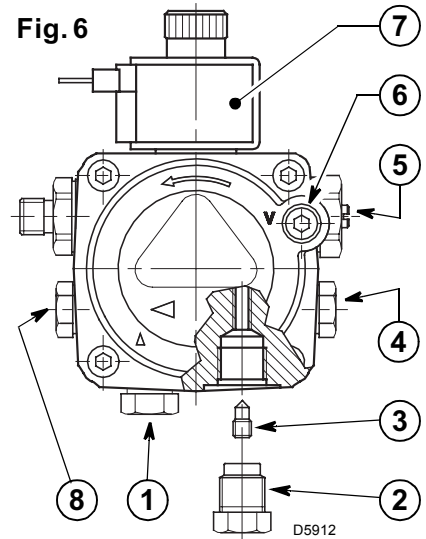


Fig. 7

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

#### PRIMING PUMP:

On the system in fig. 7 it is sufficient to loosen the suction gauge connection (6, fig. 6) and wait until oil flows out.

On the systems in fig. 8 and 9 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. 9) 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.

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

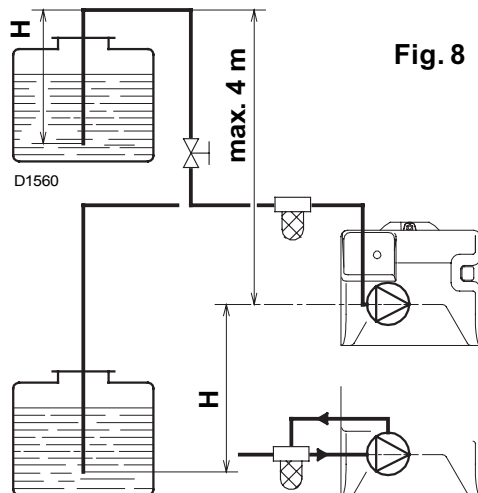


Fig. 8

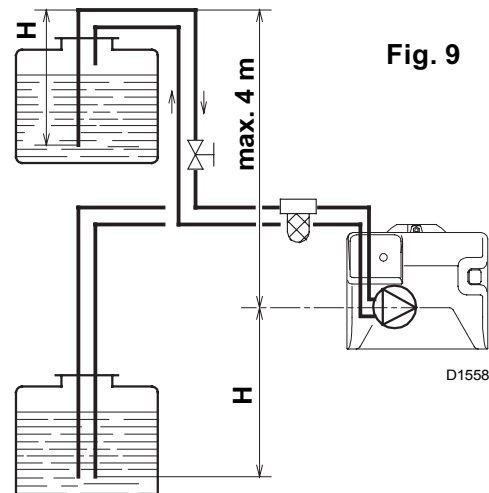
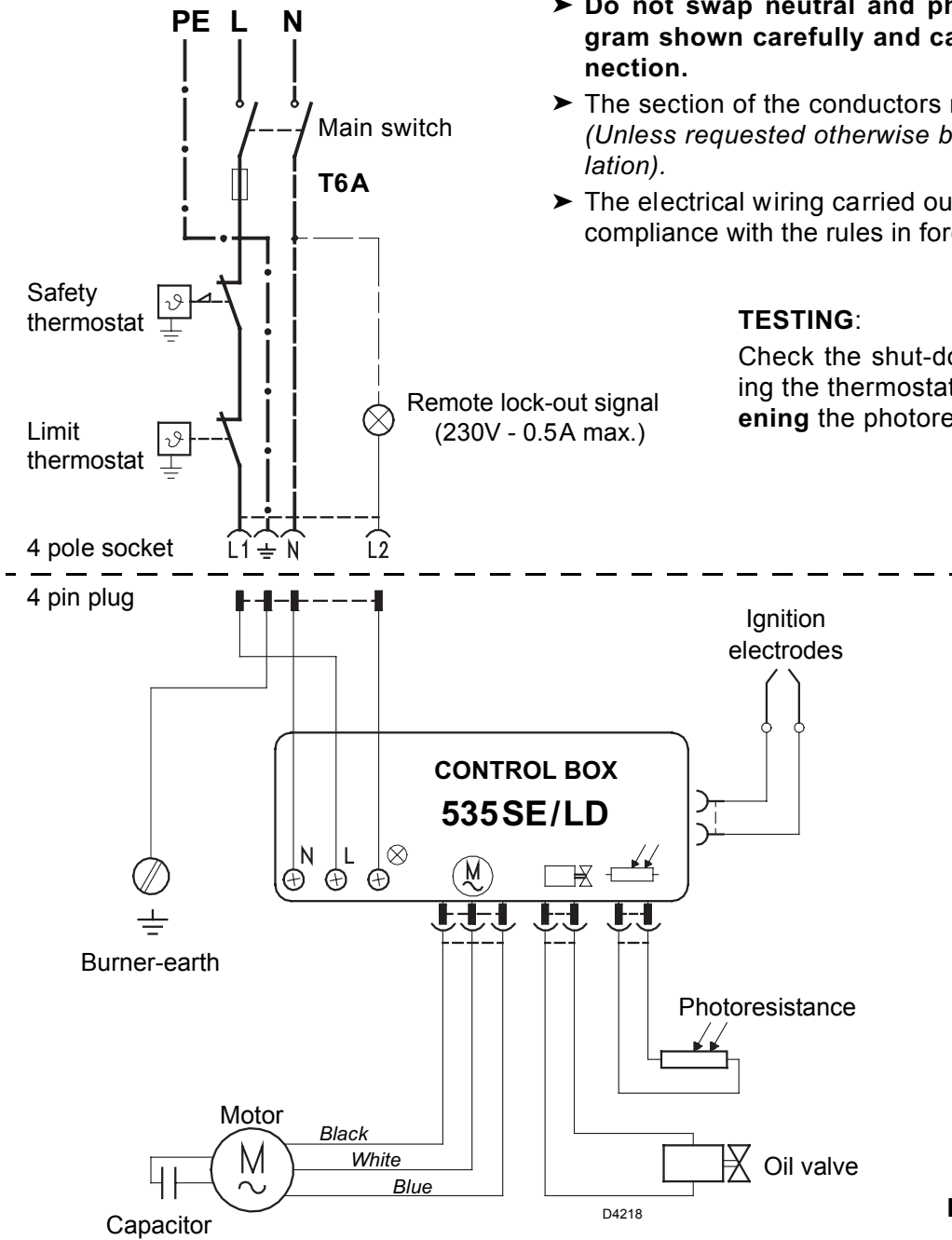


Fig. 9

H = difference of level    L = Max. length of the suction line    I.D. = Interminal diameter of the oil pipes.

### 3.4 ELECTRICAL WIRING

~ 50 Hz - 230 V



**ATTENTION:**

- Do not swap neutral and phase over, follow the diagram shown carefully and carry out a good earth connection.
- The section of the conductors must be at least 1mm<sup>2</sup>. (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.

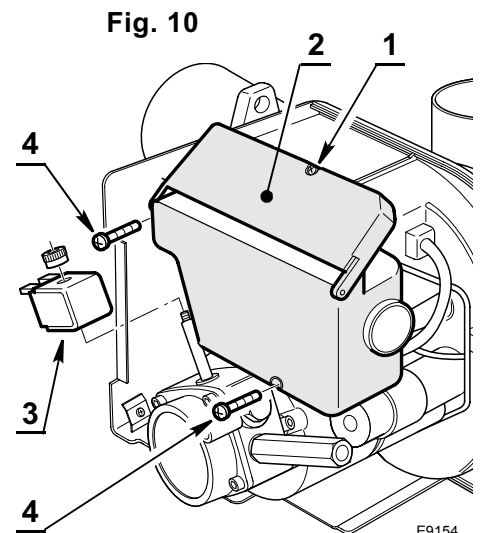
**TESTING:**

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

**CONTROL BOX (see fig. 10)**

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.



## 4. WORKING

### 4.1 COMBUSTION ADJUSTMENT

In conformity with Efficiency Directive 92/42/EEC 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 CO<sub>2</sub> concentration in the flue gases, their temperatures and the average temperature of the water in the boiler.

To suit the required appliance output, choose the proper nozzle and adjust the pump pressure, the setting of the combustion head, 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% CO<sub>2</sub> at sea level and with fuel and room temperature of 20°C.

FUEL	Nozzle		Pump pressure	Burner output	Combustion head adjustment	Air damper adjustment
	GPH	Angle	bar	kg/h $\pm$ 4%	Set-point	Set-point
KEROSENE	1.35	60° W	8	4.04	0	2.2
	1.50	60° W	8	4.49	1	2.8
	1.65	60° W	8	4.93	2	3.1
	1.75	60° W	8	5.23	2	3.5
	2.00	60° W	8	5.98	2	4.3
	2.25	60° W	8	6.73	3	5
	2.50	60° - 45° W	8	7.48	5	6
	2.75	60° - 45° W	8	8.22	5	8
	3.00	60° - 45° W	10	10.03	6	10
LIGHT OIL	1.00	60° W	12	4.0	0	2.3
	1.10	60° W	12	4.4	1	2.7
	1.25	60° W	12	5.0	2	3.3
	1.35	60° W	12	5.4	2	4
	1.50	60° W	12	6.0	2	4.7
	1.65	60° W	12	6.6	3	5
	1.75	60° W	12	7.0	4	6
	2.00	60° - 45° W	12	8.0	5	7
	2.25	60° - 45° W	12	9.0	6	8.4
	2.50	60° - 45° W	12	10.0	6	10

### 4.2 NOZZLES RECOMMENDED

Hago type ES - B ; Delavan type W - B (not for 45° light oil); Steinen type S; Danfoss type S;

**Use Delavan type W CSA.**

### 4.3 PUMP PRESSURE

The pump leaves the factory set for kerosene working.

**10 bar:** maximum pressure for kerosene.

#### FOR LIGHT OIL INCREASE PRESSURE

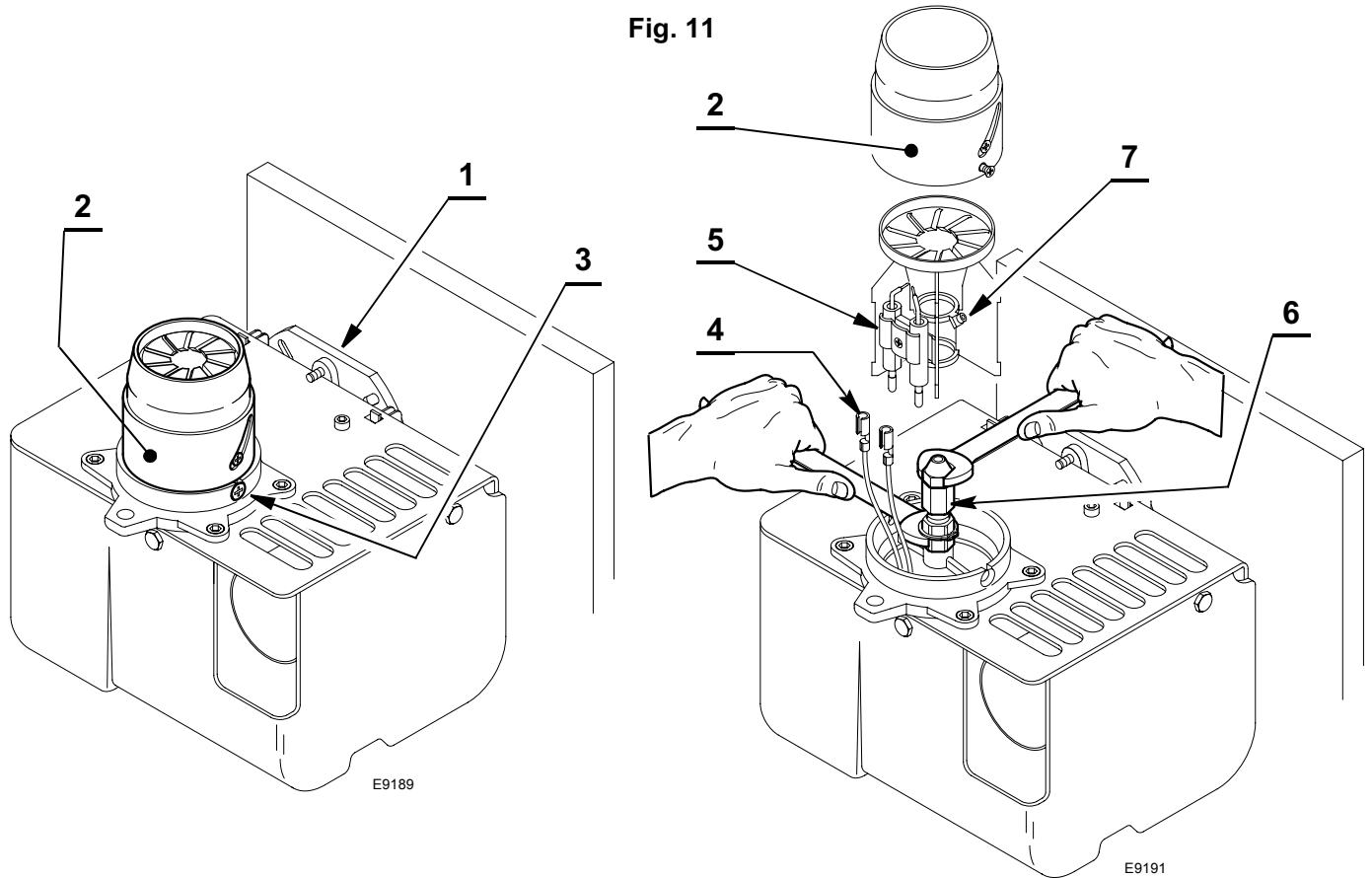
**12 bar:** pressure suitable for light oil in most cases.

**14 bar:** improves flame retention; it is therefore suitable for ignitions at low temperatures.

## 4.4 MAINTENANCE POSITION

Access to the combustion head, the diffuser disc-holder assembly, electrodes and nozzle (see fig. 11).

- Loosening the fixing nut to the flange and remove the burner out of the boiler.
- Hook the burner to the flange (1), by removing the blast tube (2) after loosening the fixing screws (3).
- Remove the small cables (4) from the electrodes (5) and the diffuser disc-holder assembly from the nozzle-holder (6) after loosening its fixing screw (7).
- Once replacement of the nozzle has been made, screw it and tighten it as shown in the figure 11.



## 4.5 DIFFUSER DISC AND ELECTRODES SETTING, see fig. 12

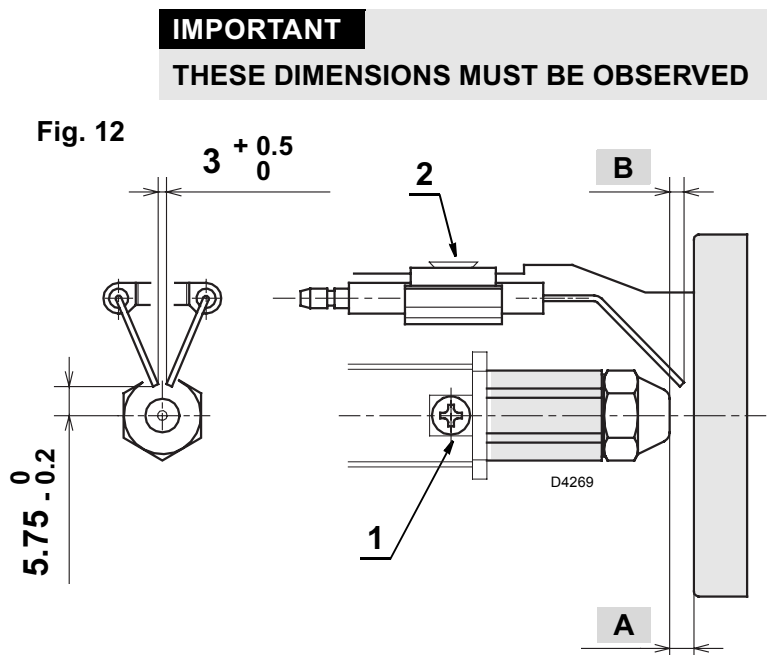
To adjust the diffuser disc unit, proceed as follows:

- Loosen the screw (1, fig. 12).
- Move the diffuser disc unit up to level **A**.
- Tighten the screw (1).

To adjust the electrodes unit, proceed as follows:

- Loosen the screw (2, fig. 12).
- Move the electrodes unit up to level **B**.
- Tighten the screw (2).

<b>A</b>	$7.5^{+0.7}_{-0.5}$
<b>B</b>	$4 \pm 0.5$





#### 4.6 COMBUSTION HEAD SETTING, (see fig. 13)

To adjust the combustion head, proceed as follows:

- Loosen the two screws in the ring slots.
- Turn the blast tube to regulate it, until the end of the slotted ring centres up with the notch shown in the table on page 6.

**Turn in a clockwise direction:**

in order to increase the volume of air entering the combustion chamber and thus diminishing its pressure. There is a reduction of CO<sub>2</sub> and the adhesion of the flame to the air diffuser disc improves.

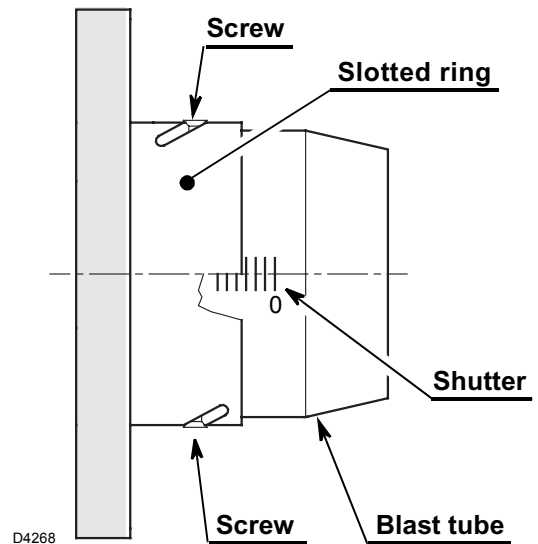
*(Setting advisable for ignitions at low temperatures).*

**Turn in an anticlockwise direction:**

in order to reduce the volume of air entering the combustion chamber and thus increasing its pressure. The CO<sub>2</sub> improves and the adhesion of the flame to the diffuser tends to reduce. *(This setting is not advisable for ignitions at low temperatures).*

- Tighten the two screws.

Fig. 13



In the sketch on the right, the combustion head is adjusted at set-point 3.5.

Combustion head settings indicated in the schedule at page 6 are valid for most cases.

#### 4.7 AIR DAMPER ADJUSTMENT

The settings indicated in the schedule refer to the combustion-chamber with “zero” depression. These regulations 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.

#### 4.8 BURNER START-UP CYCLE



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

## 5. 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 (1, 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
<b>The burner will not start when the limit thermostat closes.</b>	Lack of electrical supply.	Check presence of voltage in the L - N clamps of the control box.
		Check the conditions of the fuses.
		Check that safety thermostat is not lock out.
	The photoresistance sees false light.	Eliminate the light.
	The connections in the control box are wrongly inserted.	Check and connect completely all the plugs.
<b>Burner runs normally in the prepurge and ignition cycle and locks out after 5 seconds ca.</b>	The photoresistance is dirty.	Clear it.
	The photoresistance 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.		
<b>Burner starts with an ignition delay.</b>	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.

## **6. SAFETY WARNINGS**

The dimension of the boiler's combustion chamber must respond to specific values, in order to guarantee a combustion with the lowest polluting emissions rate.

The Technical Service Personnel will be glad to give you all the information for a correct matching of this burner to the boiler.

This burner must only be used for the application it was designed for.

The manufacturer accepts no liability within or without the contract for any damage caused to people, animals and property due to installation, adjustment and maintenance errors or to improper use.

### **6.1 BURNER IDENTIFICATION**

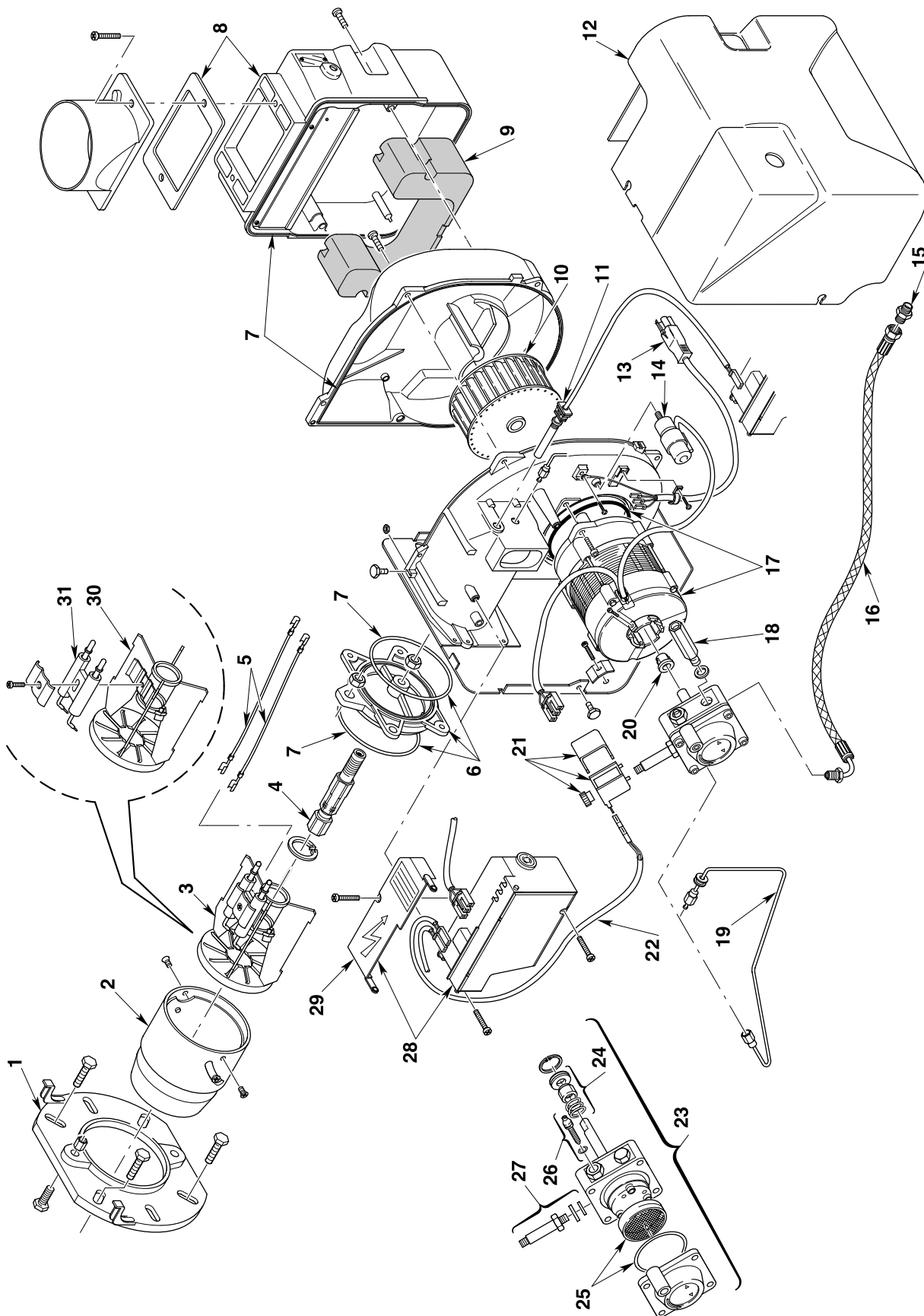
The Identification Plate on the product gives the serial number, model and main technical and performance data. If the Identification Plate is tampered with, removed or missing, the product cannot be clearly identified thus making any installation or maintenance work potentially dangerous.

### **6.2 BASIC SAFETY RULES**

- Children or inexperienced persons must not use the appliance.
- Under no circumstances must the intake grids, dissipation grids and ventilation vents in the installation room be covered up with cloths, paper or any other material.
- Unauthorised persons must not attempt to repair the appliance.
- It is dangerous to pull or twist the electric leads.
- Cleaning operations must not be performed if the appliance is not disconnected from the main power supply.
- Do not clean the burner or its parts with inflammable substances (e.g. petrol, alcohol, etc.). The cover must be cleaned with soapy water.
- Do not place anything on the burner.
- Do not block or reduce the size of the ventilation vents in the installation room.
- Do not leave containers and inflammable products in the installation room.

**Bruciatori di kerosene - gasolio • Kerosene - light oil burners • Brûleurs kérosène - fioul  
 Kerosin/Öl - Gebläsebrenner • Quemadores de kerosene/gasóleo**

MOD.	COD.	BOULTER COD.	TIPO/TYP/TYP
<b>CAMRAY5 150/200</b>	<b>3748960</b>	<b>8-716-108-334</b>	<b>490 T51</b>
<b>CAMRAY5 200/240</b>	<b>3748961</b>	<b>8-716-108-333</b>	<b>490 T51</b>
<b>COH 280</b>	<b>3748962</b>	<b>8-716-111-556</b>	<b>490 T51</b>



N.	COD.	DESCRIZIONE	DESCRIPTION	DESCRIPTION	BESCHREIBUNG	DENOMINACIÓN	RICAMBI CONSIGLIATI ADVISED SPARE PARTS RECHARGE CONSEIL EMPFOHLENE ERSATZTEILE RECAMBIO ACONSEJADOS
1	3008637	FLANGIA	FLANGE	BRIDE	KESSELFLANSCH	BRIDA	
2	3002572	GRUPPO BOCCAGLIO	BLAST TUBE ASSEMBLY	GROUPE GUEULARD	FLAMMROHRSYSTEM	CONJUNTO CABEZAL	B
3	3002571	GRUPPO ELICA - ELETTRODI	DIFFUSER DISC - ELECT. ASSEM.	ACCR. FLAM. - GROUPE ELECTR.	STAUSCHEIBE - ELEKTRODENBL	DISCO ESTABIL. - CONJUNTO ELECT.	A
4	3002570	PORTAUGELLO	NOZZLE HOLDER	PORTE-GICLEUR	DÜSENSTOCK	PORTABOQUILLA	B
5	3008794	COLLEGAMENTO A.T.	HIGH VOLTAGE LEAD	CABLE HAUTE TENSION	KABEL ZÜNDELEKTRODEN	CABLES ELECTRODOS	A
6	3008957	COLLARE	COLLAR	COLLIER	BRENNERFLANSCH COLLA	RÍN	
7	3008963	KIT GUARNIZIONI	KIT SEALS	KIT JOINTS	DICHTUNG ERSATZ	KIT JUNTAS	A
8	3008839	GRUPPO SERRANDA ARIA	AIR DAMPER ASSEMBLY	SYSTEME REGLAGE D'AIR	LUFTREGULIERUNG	CONJUNTO REGISTRO DEL AIRE	
9	3008958	FONOASSORBENTE	DEADENING	ISOLATION ACOUSTIQUE	GERÄUSCHDÄMMUNG	AISLAMIENTO ACÚSTICO	
10	3005799	GIRANTE	FAN	TURBINE	GEBLÄSERAD	TURBINA	C
11	3008646	FOTORESISTENZA	P.E. CELL	CELLULE PHOTORESISTANCE	FOTOWIDERSTAND	FOTORESISTENCIA	A
12	3008962	COFANO	COVER	CAPOT	BRENNERHAUBE	ENVOLVENTE	
13	3008863	COLLEGAMENTO	LEAD	CABLE DE CONNEXION	VERBINDUNG	CABLE CONEXIÓN	
14	3008960	CONDENSATORE 5 µF	CAPACITOR 5 µF	CONDENSATEUR 5 µF	KONDENSATOR 5 µF	CONDENSADOR 5 µF	B
15	3003602	RACCORDO	CONNECTOR	MAMELON	ANSCHLUßNIPPEL	RACORD	C
16	3005720	TUBO FLESSIBILE	FLEXIBLE	FLEXIBLE	ÖLSCHLAUCH	TUBO FLEXIBLE	A
17	3008964	MOTORE	MOTOR	MOTEUR	MOTOR	MOTOR	C
18	3008876	PRESA DI PRESSIONE	PRESSURE GAUGE	PRISE DE PRESSION	DRUCKANSCHLUß	ENCHUFE	
19	3008961	TUBO	TUBE	TUYAU	DRUCKROHR	TUBO	
20	3000443	GIUNTO	JOINT	ACCOUPLLEMENT	PUMPENKUPPLUNG	ACOPLAMIENTO	A
21	3008648	BOBINA - MANTELLO E POMELLO	COIL - SHELL AND KNOB	BOBINE V.M. - ETRIER ET ECROU	M.V. - SPULE - HALTEBÜG. MIT SCHRAUBE	BOBINA - PROTECCIÓN BOBINA	A
22	3008851	COLLEGAMENTO	LEAD COIL	CABLE DE CONNEXION	ANSCHLUßKABEL MAGNETSPULE	CABLES ELECTROVÁLVULA	
23	3008654	POMPA	PUMP	POMPE	ÖLPUMPE	BOMBA	C
24	3000439	ORGANO DI TENUTA	PUMP SEAL	ORGANE D'ETANCHEITE	DICHTUNGSEINSATZ ANTRIEBSWELLE	CONJUNTO ESTANQUIDAD	A
25	3008653	FILTRO - ANELLO OR	FILTER - O-RING	FILTRE - JOINT TORIQUE	FILTREINSATZ - O-RING-DICHTUNG	FILTRO - JUNTA TÓRICA	A
26	3008651	REGOLATORE	REGULATOR	REGULATEUR	DRUCKREGULIERSCHRAUBE	REGULADOR	A
27	3007582	VALVOLA	NEEDLE VALVE	VANNE MAGNETIQUE	MAGNETVENTIL KÖRPER	VÁLVULA	A
28	3008652	APPARECCHIATURA 535SE/LD	CONTROL BOX 535SE/LD	BOITE DE CONTROLE 535SE/LD	STEUERGERÄT 535SE/LD	CAJA DE CONTROL 535SE/LD	B
29	3008649	PROTEZIONE	PROTECTION	PROTECTION	SCHUTZ	PROTECCIÓN	
30	3020119	ELICA	DIFFUSER DISC	ACCROCHE FLAMME	STAUSCHEIBE	DISCO ESTABILIZADOR	A
31	3020121	ELETTRODO	ELECTRODE	ELECTRODE	ZÜNDELEKTRODE	ELECTRODO	A

A = Ricambi per dotazione minima - Spare parts for minimum fittings - Pièces détachées pour équipement minimum - Ersatzteile für minimale Ausstattung - Recambios para equipamiento mínimo.

A+B = Ricambi per dotazione base di sicurezza - Spare parts for basic safety fittings - Pièces détachées pour équipement standard de sécurité - Ersatzteile für Sicherheitsgrundausrüstung - Recambios para equipamiento básico de seguridad.

A+R+C = Ricambi per dotazione estesa di sicurezza - Spare parts for extended safety fittings - Pièces détachées pour équipement complet de sécurité - Ersatzteile für erweiterte Sicherheitsausstattung - Recambios para equipamiento general de seguridad