GB

Light oil burners

Three stage operation

CODE	MODEL
3476823	P 140 T/G
3477723	P 200 T/G
3477724	P 200 T/G
3477785	P 200 T/G
3478837	P 300 T/G
3478838	P 300 T/G
3478841	P 300 T/G
3478842	P 300 T/G
3478985	P 300 T/G
3478986	P 300 T/G
3479336	P 450 T/G
3479338	P 450 T/G
3479339	P 450 T/G

20216426 (4) - 10/2025

Translation of the original instructions

1 Information and general warnings

1.1 Information about the instruction manual

1.1.1 Introduction

The instruction manual supplied with the burner:

- ➤ is an integral and essential part of the product and must not be separated from it; it must therefore be kept carefully for any necessary consultation and must accompany the burner even if it is transferred to another owner or user, or to another system. If the manual is lost or damaged, another copy must be requested from the Technical Assistance Centre of the area;
- ➤ is designed for use by qualified personnel;
- ➤ offers important indications and instructions relating to the installation safety, start-up, use and maintenance of the burner.

Symbols used in the manual

In some parts of the manual you will see triangular DANGER signs. Pay great attention to these, as they indicate a situation of potential danger.

1.1.2 General dangers

The **dangers** can be of **3 levels**, as indicated below.

Maximum danger level!
This symbol indicates operations which, if not carried out correctly, cause serious injury, death or long-term health risks.

This symbol indicates operations which, if not carried out correctly, may cause serious injury, death or long-term health risks.

This symbol indicates operations which, if not carried out correctly, may cause damage to the machine and/or injury to people.

1.1.3 Other symbols

DANGER: LIVE COMPONENTS

This symbol indicates operations which, if not carried out correctly, lead to electric shocks with lethal consequences.

DANGER: FLAMMABLE MATERIAL

This symbol indicates the presence of flammable materials.

DANGER: BURNING

This symbol indicates the risks of burns due to high temperatures.

DANGER: CRUSHING OF LIMBS

This symbol indicates the presence of moving parts: danger of crushing of limbs.

WARNING: MOVING PARTS

This symbol indicates that you must keep limbs away from moving mechanical parts; danger of crushing.

DANGER: EXPLOSION

This symbol signals places where an explosive atmosphere may be present. An explosive atmosphere is defined as a mixture - under atmospheric conditions - of air and flammable substances in the form of gases, vapours, mist or dust in which, after ignition has occurred, combustion spreads to the entire unburned mixture.

PERSONAL PROTECTION EQUIPMENT

These symbols indicate the equipment that must be worn and kept by the operator for protection against threats against safety and/or health while at work.

OBLIGATION TO ASSEMBLE THE COVER AND ALL THE SAFETY AND PROTECTION DEVICES

This symbol signals the obligation to reassemble the cover and all the safety and protection devices of the burner after any maintenance, cleaning or checking operations.

ENVIRONMENTAL PROTECTION

This symbol gives indications for the use of the machine with respect for the environment.

IMPORTANT INFORMATION

This symbol indicates important information that you must bear in mind.

➤ This symbol indicates a list.

Abbreviations used

Ch.	Chapter
Fig.	Figure
Page	Page
Sec.	Section
Tab.	Table

1.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

➤ the instruction manual is delivered to the user by the system manufacturer, with the recommendation to keep it in the room where the heat generator is to be installed.

➤ The instruction manual shows:
– the serial number of the burner;

.....

– the address and telephone number of the nearest Assistance Centre;

.....
.....
.....

➤ The system supplier must carefully inform the user about:
– the use of the system;
– any further tests that may be required before activating the system;
– maintenance, and the need to have the system checked at least once a year by a representative of the manufacturer or another specialised technician. To ensure a periodic check, the manufacturer recommends the drawing up of a Maintenance Contract.

1.2 Guarantee and responsibility

The manufacturer guarantees its new products from the date of installation, in accordance with the regulations in force and/or the sales contract. At the moment of the first start-up, check that the burner is integral and complete.

ATTENTION

Failure to observe the information given in this manual, operating negligence, incorrect installation and carrying out of non authorised modifications will result in the annulment by the manufacturer of the guarantee that it supplies with the burner.

In particular, the rights to the guarantee and the responsibility will no longer be valid, in the event of damage to things or injury to people, if such damage/injury was due to any of the following causes:

➤ incorrect installation, start-up, use and maintenance of the burner;
➤ improper, incorrect or unreasonable use of the burner;
➤ intervention of unqualified personnel;
➤ carrying out of unauthorised modifications on the equipment;
➤ use of the burner with safety devices that are faulty, incorrectly applied and/or not working;
➤ installation of untested supplementary components on the burner;
➤ powering of the burner with unsuitable fuels;
➤ faults in the fuel supply system;
➤ continuation of use of the burner when a fault has occurred;
➤ repairs and/or overhauls incorrectly carried out;
➤ modification of the combustion chamber with inserts that prevent the regular development of the structurally established flame;
➤ insufficient and inappropriate surveillance and care of those burner components most likely to be subject to wear and tear;
➤ use of non-original components, including spare parts, kits, accessories and optional;
➤ force majeure.

The manufacturer furthermore declines any and every responsibility for the failure to observe the contents of this manual.

2 Safety and prevention

2.1 Introduction

The burners have been designed and built in compliance with current regulations and directives, applying the known technical safety rules and envisaging all the potential danger situations.

It is necessary, however, to bear in mind that the imprudent and clumsy use of the equipment may lead to situations of death risk for the user or third parties, as well as the damaging of the burner or other items. Inattention, thoughtlessness and excessive confidence often cause accidents; the same applies to tiredness and sleepiness.

It is a good idea to remember the following:

➤ The burner must only be used as expressly described. Any other use should be considered improper and therefore dangerous.

Specifically:

it can be applied to boilers operating with water, steam, diathermic oil, and to other uses expressly named by the manufacturer;

the type and pressure of the fuel, the voltage and frequency of the electrical power supply, the minimum and maximum deliveries for which the burner has been regulated, the pressurisation of the combustion chamber, the dimensions of the combustion chamber and the ambient temperature must all be within the values indicated in the instruction manual.

➤ Modification of the burner to alter its performance and destinations is not allowed.

➤ The burner must be used in exemplary technical safety conditions. Any disturbances that could compromise safety must be quickly eliminated.

➤ Opening or tampering with the burner components is not allowed, apart from the parts requiring maintenance.

➤ Only those parts envisaged by the manufacturer can be replaced.

The manufacturer guarantees safety and proper operation only if all burner components are intact and correctly positioned.

2.2 Personnel training

The user is the person, body or company that has acquired the machine and intends to use it for the specific purpose. He is responsible for the machine and for the training of the people working around it.

The user:

➤ undertakes to entrust the machine exclusively to suitably trained and qualified personnel;

➤ undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, the user undertakes to ensure that everyone knows the use and safety instructions for his own duties;

➤ Personnel must observe all the danger and caution indications shown on the machine.

➤ Personnel must not carry out, on their own initiative, operations or interventions that are not within their province.

➤ Personnel must inform their superiors of every problem or dangerous situation that may arise.

➤ The assembly of parts of other makes, or any modifications, can alter the characteristics of the machine and hence compromise operating safety. The manufacturer therefore declines any and every responsibility for any damage that may be caused by the use of non-original parts.

In addition:

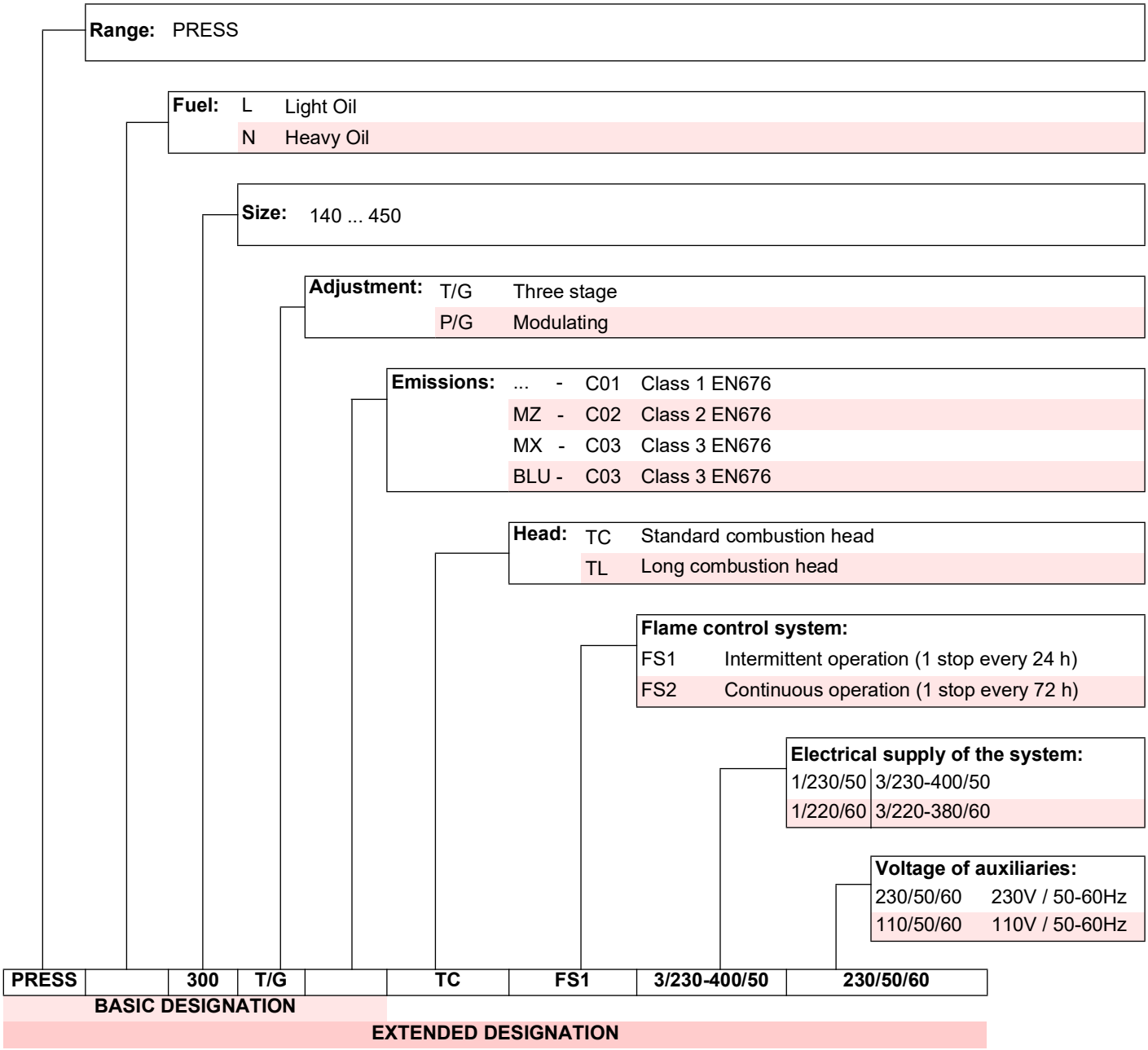
➤ must take all the measures necessary to prevent unauthorised people gaining access to the machine;

➤ the user must inform the manufacturer if faults or malfunctioning of the accident prevention systems are noticed, along with any presumed danger situation;

➤ personnel must always use the personal protective equipment envisaged by legislation and follow the indications given in this manual.

3 Technical description of the burner

3.1 Burner designation



3.2 Models available

Designation			Voltage	Start-up	Code
P 140 T/G	TC	FS1	3/230-400/50	Direct	3476823
P 200 T/G	TC	FS1	3/230-400/50	Direct	3477723
P 200 T/G	TL	FS1	3/230-400/50	Direct	3477724
P 200 T/G	TC	FS1	3/220-380/60	Direct	3477785
P 300 T/G	TC	FS1	3/400/50	Direct	3478837
P 300 T/G	TL	FS1	3/400/50	Direct	3478838
P 300 T/G	TC	FS1	3/400/50	Star/Triangle	3478841
P 300 T/G	TL	FS1	3/400/50	Star/Triangle	3478842
P 300 T/G	TC	FS1	3/380/60	Direct	3478985
P 300 T/G	TL	FS1	3/380/60	Direct	3478986
P 450 T/G	TC	FS1	3/230/50	Star/Triangle	3479336
P 450 T/G	TC	FS1	3/400/50	Star/Triangle	3479338
P 450 T/G	TL	FS1	3/400/50	Star/Triangle	3479339

Tab. A

3.3 Technical data

MODEL		P 140 T/G	P 200 T/G	P 300 T/G	P 450 T/G
Output (1)	kW	380/830 - 1660	557/1186 - 2372	712/1779 - 3560	890/2670 - 5340
Delivery (1)	kg/h	32/70 - 140	47/100 - 200	60/150 - 300	75/225 - 450
Fuel		Light oil			
- Net calorific value	kWh/kg Mcal/kg	11.8 10.2			
- density	kg/dm3	0.82 - 0.85			
- viscosity at 20 °C	mm2/s	max 6 (1.5 °E - 6 cSt)			
Operation		• Intermittent (min. 1 stop every 24 hours) • Three stage			
Nozzle	No.	3			
Standard applications		Boilers: water, steam, diathermic oil			
Ambient temperature	°C	0 - 40			
Combustion air temperature	°C max	60			
Pump	tipo	**J7**		**TA2**	**TA3**
- Min. pressure output at 12 bar	kg/h	270		385	612
- Pressure range	bar	10 - 21		7 - 40	7 - 40
- Fuel temperature	° C max	90		140	150
Weight of the burner (complete with packaging)	kg	130	220	238	300

Tab. B

(1) Reference conditions: Room temperature 20°C - Barometric pressure 1000 mbar – Altitude 100 m above sea level.

3.4 Electrical data

MODEL (50 Hz)		P 140	P 200	P 300	P 300	P 450	P 450
CODE		3476823	3477723 3477724	3478837 3478838	3478841 3478842	3479336	3479338 3479339
Electrical power supply	V Hz	3/230-400/50			3/400/50	3/230/50	3/400/50
Absorbed electrical power	kW max	5.2	5.3	10.6	10.6	16.9	16.9
Protection level	IP	40					

MODEL (60 Hz)		P 200	P 300
CODE		3477785	3478985 3478986
Electrical power supply	V Hz	3 ~ 220-380/60	
Absorbed electrical power	kW max	5.3	10.9
Protection level	IP	40	

Tab. C

3.5 Operation and efficiency of the burner

THREE STAGE			POWER - OUTPUT			
			Minimum		Maximum	
			kW	kg/h	kW	kg/h
P 140 T/G	1° nozzle	: 1° stage of operation	380	**32**	545	**46**
	1° + 2° nozzle	: 2° stage of operation	664	**56**	1103	**93**
	1° + 2° + 3° nozzle	: 3° stage of operation	830	**70**	1660	**140**
P 200 T/G	1° nozzle	: 1° stage of operation	557	**47**	794	**67**
	1° + 2° nozzle	: 2° stage of operation	1067	**90**	1576	**133**
	1° + 2° + 3° nozzle	: 3° stage of operation	1186	**100**	2372	**200**
P 300 T/G	1° nozzle	: 1° stage of operation	712	**60**	1186	**100**
	1° + 2° nozzle	: 2° stage of operation	1245	**105**	2372	**200**
	1° + 2° + 3° nozzle	: 3° stage of operation	1779	**150**	3558	**300**
P 450 T/G	1° nozzle	: 1° stage of operation	890	**75**	1780	**150**
	1° + 2° nozzle	: 2° stage of operation	1780	**150**	3560	**300**
	1° + 2° + 3° nozzle	: 3° stage of operation	2670	**225**	5340	**450**

Tab. D

3.6 Overall dimensions

The dimensions of the burner are given in Fig. 1.

Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part drawn back on the slide bars.

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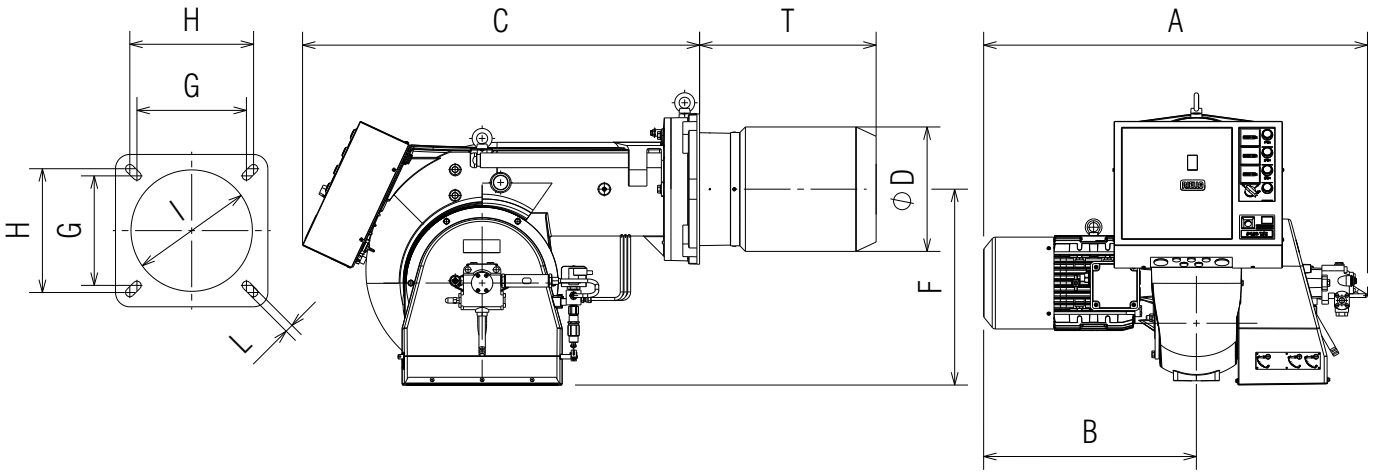

Fig. 1

mm	A	B	C	D	F	G	H	I	L	T
P 140 T/G	765	365	890	222	467	230	260	225	M14	363
P 200 T/G	795	396	890	250	467	-	260	255	M16	391
P 300 T/G	920	482	1000	295	500	-	260	300	M18	444
P 450 T/G	1037	575	1070	336	529	-	310	350	M20	476

Tab. E

3.7 Standard equipment

Flexible hoses	No.	2
Nipples for flexible hoses	No.	2
Screws	No.	4
Thermal flange gasket	No.	1
Cable grommet	No.	4
Nozzle	No.	3
Motor starter*	No.	1
Diffuser disc (P 450 T/G)	No.	1
Manual	No.	1
Spare parts list	No.	1

***** For versions with star-delta starting

3.8 Firing rates

During operation, burner output varies between:

➤ **MINIMUM FLOW RATE**: can drop down to:
P 140 = 32 kg/h
P 200 = 47 kg/h
P 300 = 60 kg/h
P 450 = 75 kg/h

➤ **MAXIMUM OUTPUT**: must be within the firing rate (Fig. 2).

ATTENTION

The FIRING RATE was obtained with an ambient temperature of 20°C and a barometric pressure of 1000 mbar (approx. 100m above sea level), with the combustion head adjusted as shown on page 20.

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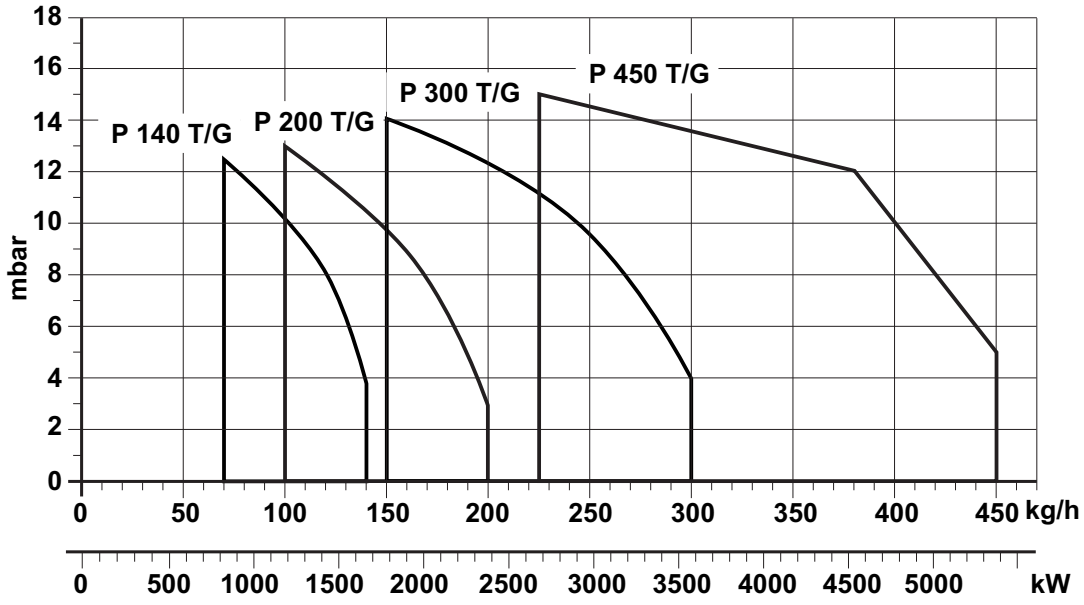

Fig. 2

3.9 Test boiler

The burner/boiler combination does not pose any problems if the boiler is EC approved and its combustion chamber dimensions are similar to those indicated in the diagram (Fig. 3).

If the burner must be combined with a boiler that has not been EC approved and/or its combustion chamber dimensions are clearly smaller than those indicated in the diagram, consult the manufacturer.

The firing rates were obtained in special test boilers, according to EN 267 standard.

In you can see the diameter and length of the test combustion chamber.

Example:
Output 650 Mcal/h (407 kW): diameter 60 cm - length 2 m.

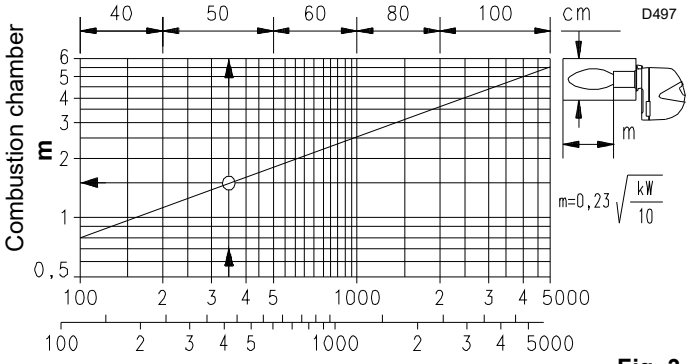

Fig. 3

MODULATING RATIO

The modulating ratio, obtained in test boilers according to standard (EN 267 for light oil) is 4:1 for light oil.

ATTENTION

Per la sporgenza della testa di combustione seguire le indicazioni fornite dal costruttore della caldaia.
Per caldaie con cassa fumo anteriore eseguire una opportuna protezione in materiale refrattario sulla parte della testa sporgente in camera di combustione (Fig. 4).

D - Diametro caldaia in cm

P - Posizione fondo mobile in m

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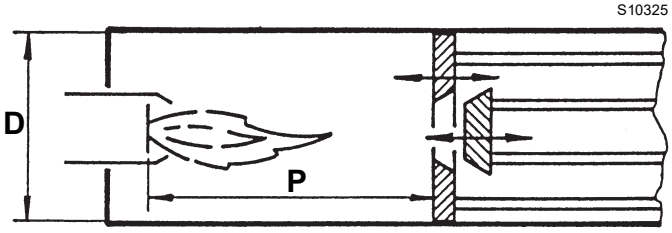

Fig. 4

3.10 Burner description

P 140-200 T/G

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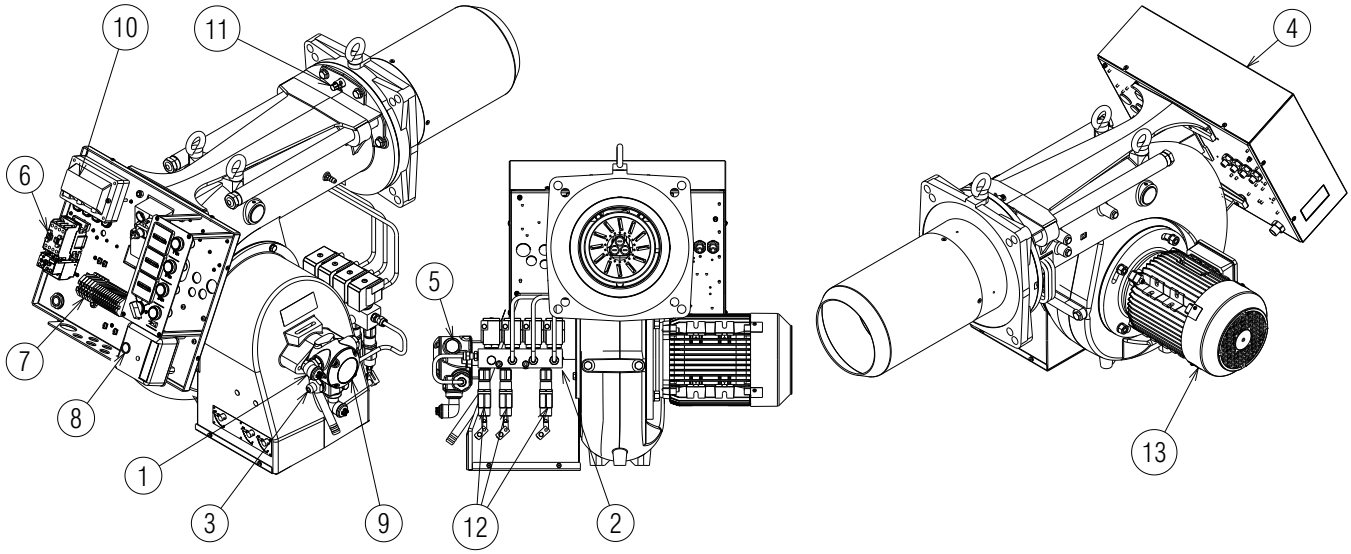

P 300-450 T/G

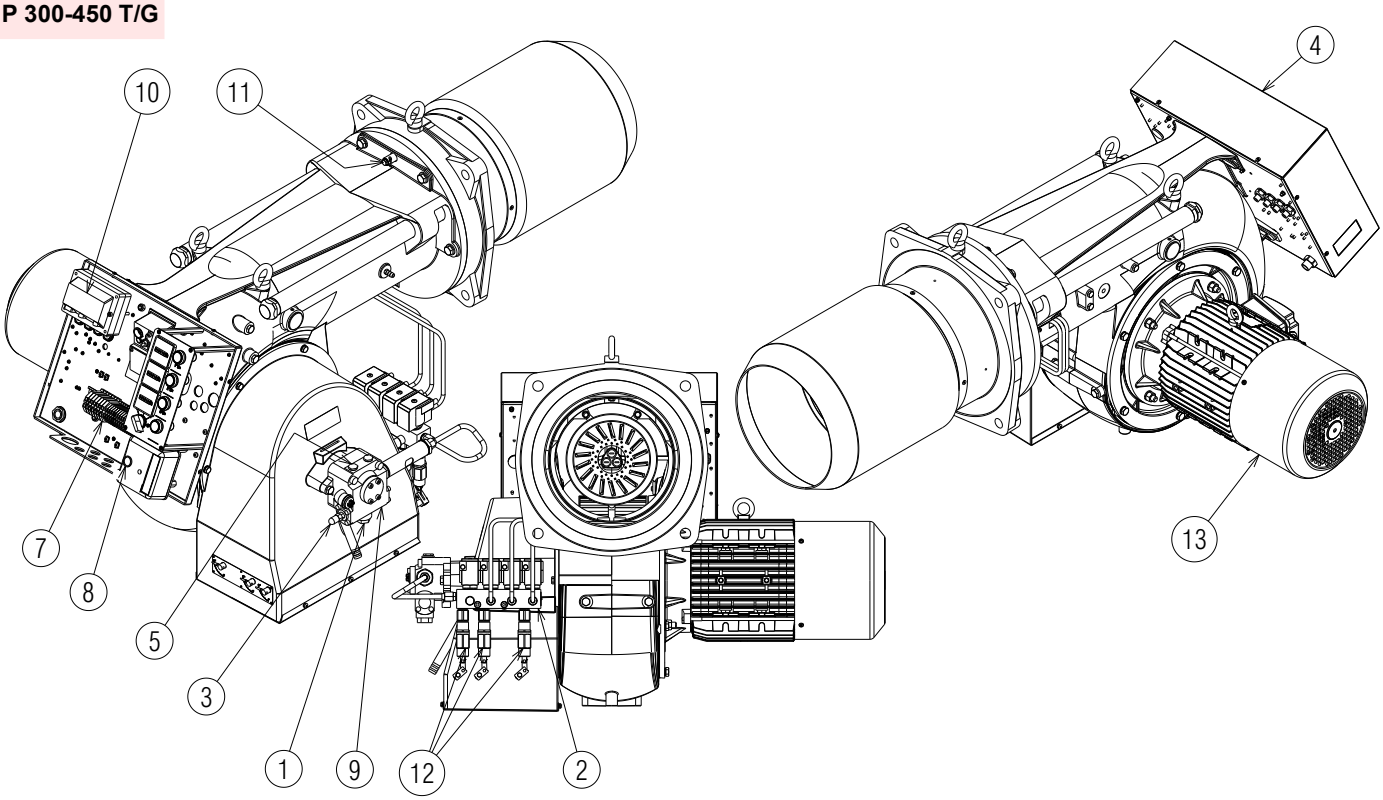

Fig. 5

1 Suction line
2 Valves assembly
3 Pump pressure adjustment screw
4 Electric board
5 Vacuometer plug (**G 1/4**)
6 Reset-push-button of thermal relay (if present)
7 Terminal strip
8 Flame control reset push-button and lock-out lamp
9 Pump
10 Ignition transformer
11 Regulating bush for combustion head
12 Hydraulic jack for dampers opening
13 Fan motor

3.11 Flame control

Important notes

ATTENTION

To avoid accidents, material or environmental damage, observe the following instructions!

The flame control is a safety device! Avoid opening or modifying it, or forcing its operation. Riello S.p.A. cannot assume any responsibility for damage resulting from unauthorised interventions!

- ➤ All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- ➤ Before modifying the wiring in the flame control connection area, fully disconnect the system from the power supply (omnipolar separation). Check the system is not powered and cannot be accidentally reconnected. Failure to do this will lead to the risk of electrocution.
- ➤ Protection against electrocution from the flame control and all connected electric components is obtained with the correct assembly.
- ➤ Before any intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order and that the parameters are correctly set, then make the safety checks.
- ➤ Falls and collisions can negatively affect the safety functions.
  In this case, the flame control must not be operated, even if it displays no evident damage.
- ➤ Press the reset button of the burner lockout command or the reset button (by applying a force of not more than 10 N), without the aid of tools or sharp objects.

For the safety and reliability of the flame control, comply with the following instructions:
- – avoid conditions that can favour the development of condensate and humidity. Otherwise, before switching on again, make sure that the entire flame control is perfectly dry!
- – Static charges must be avoided since they can damage the flame control's electronic components when touched.

S8906

Fig. 6

Technical data

Mains voltage	AC 220...240 V +10 % / -15 %
Mains frequency	50 / 60 Hz ±6%
Power absorption	20 VA
Protection level	IP20
Safety class	I
Weight	approx. 260 g
Cable length:	
Thermostat cable	Max. 20 m at 100 pF/m
Air pressure switch	Max. 1 m at 100 pF/m
Gas pressure switch	Max. 20 m at 100 pF/m
Remote reset	Max. 20 m at 100 pF/m
CPI	Max. 1 m at 100 pF/m
Environmental conditions:	
Operation	DIN EN 60721-3-3
Climatic conditions	Class 3K3
Mechanical conditions	Class 3M3
Temperature range	-20...+60°C
Humidity	< 95 % r.h.

Mechanical structure

The flame control is made of plastic to resist knocks, heat and flame propagation.
The flame control contains the following components:

- a microprocessor that controls the program sequence, and a relay for controlling the load
- an electronic flame signal amplifier
- a built-in reset button, with 3 signalling colours (LED) for status and error messages.

4 Installation

4.1 Notes on safety for the installation

After carefully cleaning all around the area where the burner is to be installed, and arranging for the environment to be illuminated correctly, proceed with the installation operations.

DANGER

All the installation, maintenance and disassembly operations must be carried out with the electricity supply disconnected.

ATTENTION

The installation of the burner must be carried out by qualified personnel, as indicated in this manual and in compliance with the standards and regulations of the laws in force.

DANGER

The combustion air inside the boiler must be free from hazardous mixes (e.g.: chloride, fluoride, halogen); if present, it is highly recommended to carry out cleaning and maintenance more frequently.

4.2 Handling

The burner packaging includes a wooden platform, it is therefore possible to handle the burner (still packaged) with a pallet truck or fork lift truck.

ATTENTION

Burner handling operations can be highly dangerous if not carried out with the greatest attention: distance unauthorised personnel, check integrity and suitability of the means available.
Check also that the area in which you are working is empty and that there is an adequate escape area (i.e. a free, safe area to which you can quickly move if the burner should fall).
During handling, keep the load at no more than 20-25 cm from the ground.

After positioning the burner near the installation point, correctly dispose of all residual packaging, separating the various types of material.

CAUTION

Before proceeding with the installation operations, carefully clean all around the area where the burner will be installed.

4.3 Preliminary checks

Checking the consignment

CAUTION

After removing all the packaging, check the integrity of the contents. In the event of doubt, do not use the burner; contact the supplier.

The packaging elements (wooden cage or cardboard box, nails, clips, plastic bags, etc.) must not be abandoned as they are potential sources of danger and pollution; they should be collected and disposed of in the appropriate places.

Check the identification label of the burner, showing:
- ➤ the model (see **A** in Fig. 7) and the type of burner (**B**);
- ➤ the year of manufacture, in cryptographic form (**C**);
- ➤ the serial number (**D**);
- ➤ the absorbed electrical power (**E**);
- ➤ the types of fuel used and the relative supply pressures (**F**);
- ➤ the minimum and maximum possible output data of the burner (**G**) (see Firing rate).

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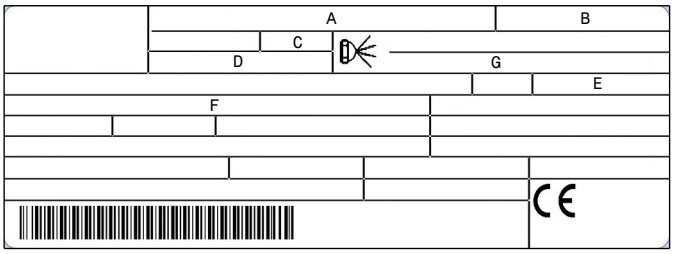

Fig. 7

ATTENTION

A burner label that has been tampered with, removed or is missing, along with anything else that prevents the definite identification of the burner makes any installation or maintenance work difficult.

4.4 Operating position

ATTENTION

- The burner is designed to work only in positions **1** and **4** (Fig. 8).
- Installation **1** is preferable, as it is the only one that allows the maintenance operations as described in this manual.
- The installation **4** permits the operation but makes the maintenance and inspection operations of the combustion head more difficult.

DANGER

- Any other position could compromise the correct operation of the appliance.
- The installation **5** is prohibited for safety reasons.

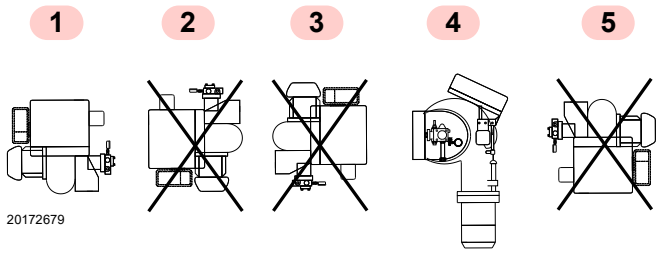

Fig. 8

4.5 Boiler plate

Pierce the closing plate of the combustion chamber, as in Fig. 9. The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

For the combustion head protrusion follow the indications provided by the boiler manufacturer.

MODEL	L	O	N
P 140 T/G	260	225	M16
P 200 T/G	260	255	M18
P 300 T/G	260	310	M18
P 450 T/G	310	350	M20

Tab. F

NOTE:
For boilers with front smoke box provide a suitable protection made of refractory material on the part of the head protruding in the combustion chamber.

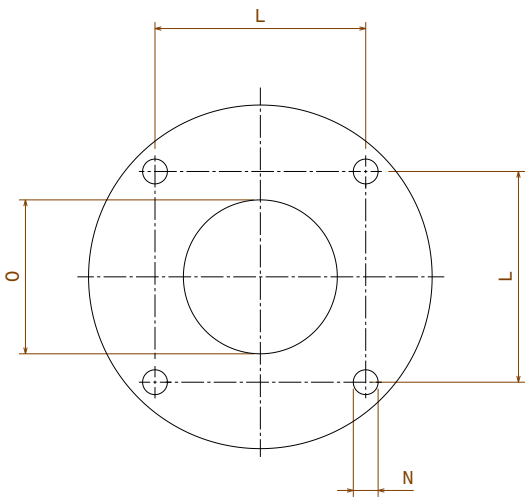

Fig. 9

4.6 Blast tube length

The length of the blast tube must be selected according to the indications provided by the manufacturer of the boiler, and in any case it must be greater than the thickness of the boiler door complete with its fettling.

MODELLO	MIN	MAX
P 140 T/G TC	200	310
P 140 T/G TL	310	420
P 200 T/G TC	250	370
P 200 T/G TL	360	480
P 300 T/G TC	250	400
P 300 T/G TL	380	530
P 450 T/G TC	270	420
P 450 T/G TL	400	530

Tab. G

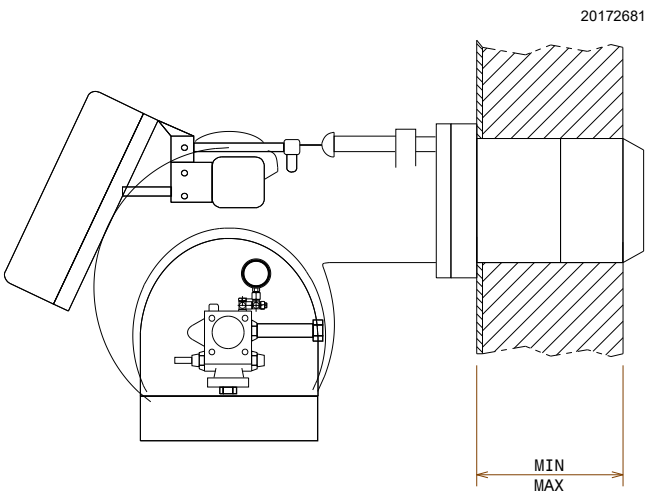

Fig. 10

4.7 Securing the burner to the boiler

Provide an adequate lifting system.

Be careful as some drops of fuel may leak out during this phase.

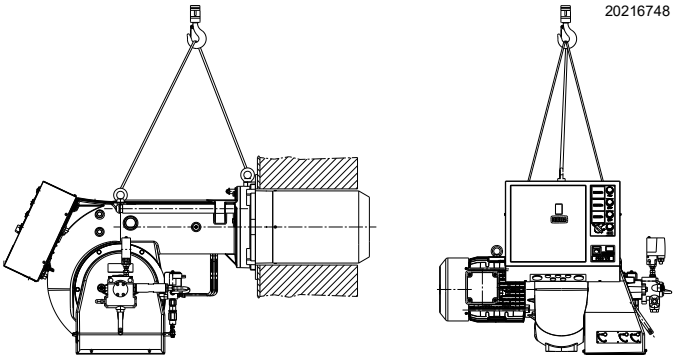

Fig. 11

ATTENTION

The seal between burner and boiler must be airtight.

4.8 Electrodes positioning

ATTENTION

Check that the electrodes are positioned correctly, as in Fig. 12, complying with the dimensions indicated.

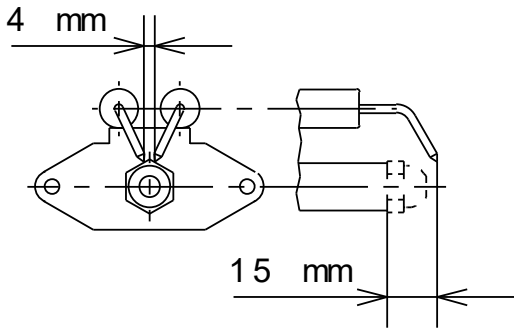

Fig. 12

4.9 Nozzle installation

The burner complies with the emission requirements of the EN 267 standard. In order to guarantee that emissions do not vary, recommended and/or alternative nozzles specified by Riello in the Instruction and warning booklet should be used.

ATTENTION

It is advisable to replace the nozzle once a year during periodical maintenance.

CAUTION

The use of nozzles other than those specified by Riello S.p.A. and inadequate regular maintenance may result into emission limits non-conforming to the values set forth by the regulations in force, and in extremely serious cases, into potential hazards to people and objects.

The manufacturing Company shall not be liable for any such damage arising from non-observance of the requirements contained in this manual.

4.9.1 Choice of the nozzles

State, first of all, the maximum output required with all three nozzles in operation (Fig. 13).

On the base of the maximum required output, choose, from table A, three related nozzles.

Use nozzles with a 60° spray angle at the recommended pressure of 12 bar.

For three-stage operation, up to:
– 116 kg/h (P 140 T/G)
– 170 kg/h (P 200 T/G)
– 193 kg/h (P 300 T/G)

1st and 2nd nozzle are not equal to the 3rd one. Follow this procedure in order to obtain higher values of CO2 (during 1st and 2nd stage of operation), complying with standard.

S10524

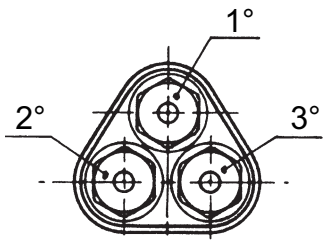

Fig. 13

4.9.2 Three-stage operation suggested nozzles:

MODEL	NOZZLES 60° PUMP 12 BAR * GPH 1°	2°	3°	TOTAL DELIVERY kg/h 1°+2°+3°
P 140 T/G	6,5	6,5	3,5	71,1
	7	7	4	77,2
	7,5	7,5	4	81,6
	8	8	4	85,8
	8,3	8,3	4	88,4
	8,5	8,5	4,5	92,3
	9	9	5	98,7
	9,5	9,5	6	107,4
	9,5	9,5	8	115,9
	9,5	9,5	9,5	122,4
	10	10	10	128,7
	10,5	10,5	10,5	135,3
	11	11	11	141,6
P 200 T/G	10	10	5	107,3
	10,5	10,5	5	111,7
	10,5	10,5	6	115,9
	11	11	6,5	122,3
	12	12	6,5	130,9
	12	12	7,5	135,2
	13	13	7,5	143,8
	13,8	13,8	7,5	150,7
	13,8	13,8	10	161,3
	13,8	13,8	12	169,9
	13,8	13,8	13,8	177,6
	14	14	14	180,3
	15	15	15	193,2
	15,3	15,3	15,3	197,1

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

Tab. H

MODEL	NOZZLES 60° PUMP 12 BAR * GPH 1°	2°	3°	TOTAL DELIVERY kg/h 1°+2°+3°
P 300 T/G	13,8	10,5	10,5	149,4
	13,8	11,0	11,0	153,6
	13,8	12,0	12,0	162,2
	14,0	13,0	13,0	171,7
	15,3	13,8	13,8	184,1
	15,0	14,0	14,0	184,6
	15,0	15,0	15,0	193,2
	15,3	15,3	15,3	197,1
	16,0	16,0	16,0	206,1
	17,0	17,0	17,0	219,0
	17,5	17,5	17,5	225,3
	18,0	18,0	18,0	231,9
	19,0	19,0	19,0	244,8
	19,5	19,5	19,5	251,1
	20,0	20,0	20,0	257,7
	21,5	21,5	21,5	276,9
	22,0	22,0	22,0	283,2
	24,0	24,0	24,0	309,0
P 450 T/G	17,5	17,5	17,5	225,3
	18	18	18	231,9
	19	19	19	244,8
	19,5	19,5	19,5	251,1
	20,0	20,0	20,0	257,7
	21,5	21,5	21,5	276,9
	22,0	22,0	22,0	283,2
	24,0	24,0	24,0	309,0
	26,0	26,0	26,0	334,7
	28,0	28,0	28,0	360,5
	30,0	30,0	30,0	386,3
	32,0	32,0	32,0	412,0
	35,0	35,0	35,0	450,6

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

Tab. I

4.10 Nozzle assembly

It is possible to install the nozzles before inserting the burner into the boiler.

Fit the nozzle with a 16 mm wrench.

- ➤ Do not use any sealing products such as: gaskets, tape or sealants.
- ➤ Be careful to avoid damaging the nozzle sealing seat.
- ➤ The nozzle must be screwed into place tightly but not to the maximum torque value provided by the wrench.

4.11 Light oil supply

Explosion danger due to fuel leaks in the presence of a flammable source.

Precautions: avoid knocking, attrition, sparks and heat.

Make sure the fuel shut-off valve is closed before performing any operation on the burner.

ATTENTION

The fuel supply line must be installed by qualified personnel, in compliance with current standards and laws.

The vacuum should not exceed a maximum of 0.45 bar (35 cm Hg). Beyond this limit, gas is released from the fuel.

When the tank is at a level lower than the burner, the return line should terminate 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.

ATTENTION

Before starting the burner make sure that the return pipe line is not clogged.

Any obstruction would cause the pump seals to break.

Oil pipes must be completely airtight.

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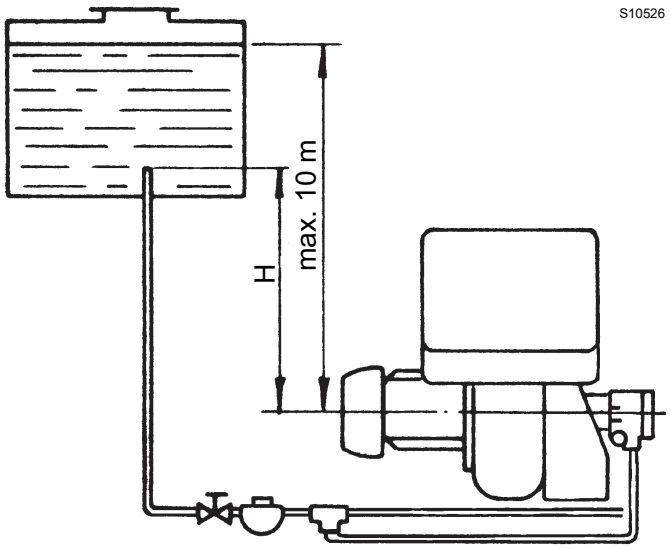


Fig. 14

H meters	P 140-200-300 T/G L meters Øi 14 mm	P 140-200-300 T/G L meters Øi 16 mm	P 450 T/G L meters Øi 16 mm	P 450 T/G L meters Øi 18 mm
0	20	40	20	40
0,5	25	45	25	45
1	30	50	30	50
1,5	35	55	35	55
2	40	60	40	60

Tab. J

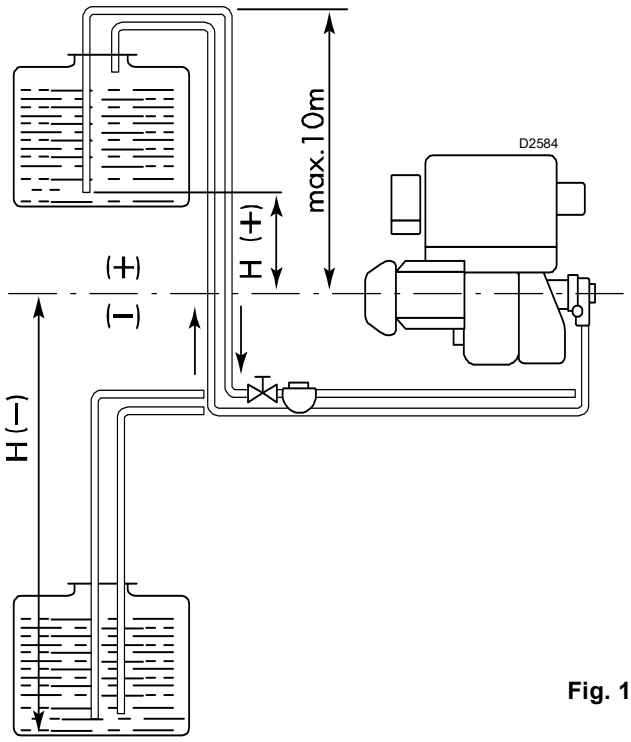


Fig. 15

H meters	P 140-200-300 T/G L meters Øi 14 mm	P 140-200-300 T/G L meters Øi 16 mm	P 450 T/G L meters Øi 16 mm	P 450 T/G L meters Øi 18 mm
0	50	60	20	40
0,5	40	50	18	35
1	30	40	15	30
1,5	20	30	13	25
2	10	20	10	20
3	5	10	5	10

Tab. K

Key

H = Difference in the pipes heights

L = Total length of the suction tube

Øi = Internal diameter of the tube. Copper tubes øi 14 mm could be replaced by steel tubes G 1/2" ; copper tubes øi 16 and 18 mm could be replaced by steel tubes G 3/4 ".

4.12 Pump

4.12.1 Technical data

Burner		P 140 - P 200	P 300	P 450
Pump		**J7**	**TA2**	**TA3**
Min. delivery rate at 12 bar pressure	kg/h	270	385	540
Delivery pressure range	bar	10 - 21	7 - 40	7 - 40
Max. suction depression	bar	0.45	0.45	0.45
Viscosity range	mm^2/s (cSt)	3 - 75	2 - 75	2 - 75
Maximum light oil temperature	°C	90	150	150
Max. suction and return pressure	bar	1.5	5	5
Pressure calibration in the factory	bar	12	12	12

Tab. L

4.13 Electrical connections

Notes on safety for the electrical wiring

DANGER

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burner has been type-approved for intermittent use.
  This means they should compulsorily be stopped at least once every 24 hours to enable the flame control to perform checks of its own start-up efficiency. Normally, burner stopping is guaranteed by the boiler's thermostat/pressure switch.
- If this is not the case, a time switch should be fitted in series to TL to stop the burner at least once every 24 hours. Refer to the wiring diagrams.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum power absorption of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for that level of power absorption.
- For the main power supply of the device from the electricity mains:
  - do not use adapters, multiple sockets or extensions;
  - make provisions for an omnipolar switch with a gap between the contacts of at least 3 mm (over-voltage category III), as required by current safety regulations.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:

DANGER

Disconnect the electrical supply from the burner by means of the system main switch.

DANGER

Close the fuel shut-off valve.

DANGER

Avoid condensate, ice and water leaks from forming.

If the cover is still present, remove it and proceed with the electrical wiring according to the wiring diagrams.

Use flexible cables according to EN 60 335-1 standard.

HOURCOUNTER

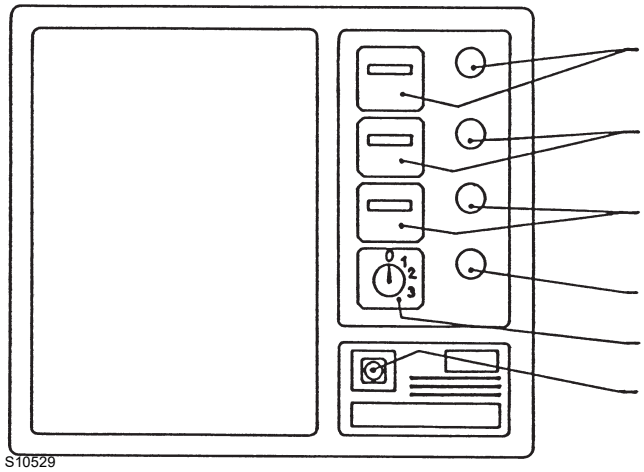
Deducting the number of hours of 2nd nozzle hourcounter from those indicated in the 1st nozzle hourcounter you could know how many hours the burner has been performing only at 1st stage; the same procedure to detect the performance hours of the 2nd stage alone, deduct from the 2nd stage hourcounter the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

COMMUTATOR

Position 0:	Burner stop
Position 1:	Burner operation only at 1st stage
Position 2:	Burner operation at 1st and 2nd stage
Position 3:	Burner operation at 1st, 2nd, 3rd stage

MOTOR LOCK-OUT

It is caused by the overload relay in case of overload or no electric supply.
Release by pressing the push-button on thermal relay.



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1st nozzle hourcounter with operation signal

2nd nozzle hourcounter with operation signal

3rd nozzle hourcounter with operation signal

Motor lock-out signal

4 positions commutator

Flame control lock-out signal with reset push-button

Fig. 16

5 Start-up, calibration and operation of the burner

5.1 Notes on safety for the first start-up

ATTENTION

The first start-up of the burner must be carried out by qualified personnel, as indicated in this manual and in compliance with the standards and regulations of the laws in force.

ATTENTION

Check the correct working of the adjustment, command and safety devices.

5.2 Adjustments prior to ignition (light oil)

ATTENTION

It is recommended to adjust first the light oil burner and then the gas burner.

Carry out the fuel change with burner off.

The optimum calibration of the burner requires an analysis of the flue gases at the boiler outlet and interventions on the following points.

5.2.1 Nozzle

See information on page 15.

5.2.2 Combustion head

The adjustment of the combustion head already carried out on page 22 need not to be altered unless the 2nd stage output of the burner is changed.

5.2.3 Pump pressure

See information on page 18.

5.3 Combustion head adjustment

Rated nozzles delivery are shown in Tab. H on page 15 and Tab. I on page 16. 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 (Fig. 18).

The adjustment should be made by turning the screw **A** till the set-point (see diagram Fig. 18) is on the line with the washer **B** (Fig. 19).

NOTE:
(only for P 450 T/G)
depending on the desired output, you can use the ready-fitted standard-issue diffuser disc or the disc supplied (see the diagram Fig. 18).

To replace the diffuser disc, proceed as follows (Fig. 17):
- ➤ unscrew screws 1);
- ➤ slide the ventilating part back on pins 2);
- ➤ first unscrew screws 3), then replace diffuser disc;
- ➤ refit all parts following the above procedure in reverse order.

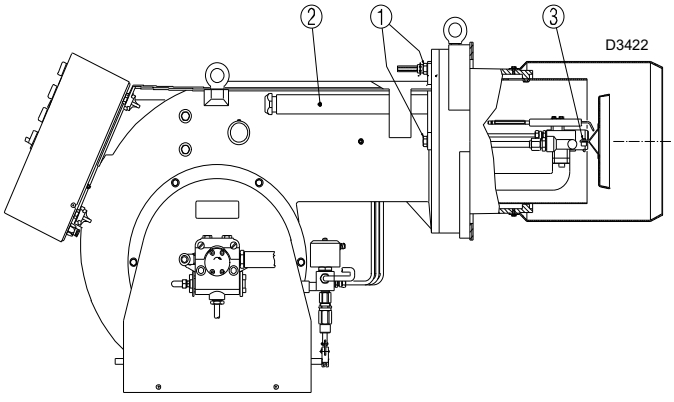

Fig. 17

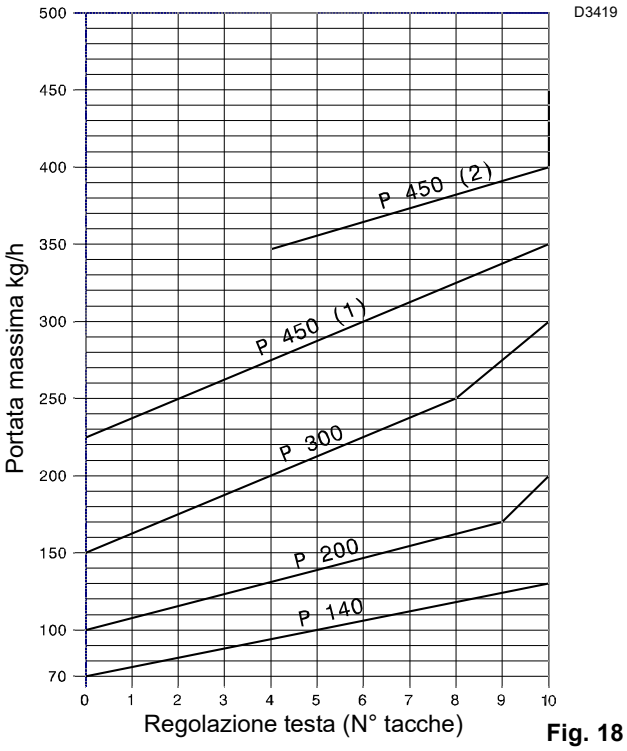

Fig. 18

P450: 1) with diffuser disc Ø 192 (standard issue ready fitted)

P450: 2) with diffuser disc Ø 215 (supplied as equipment)

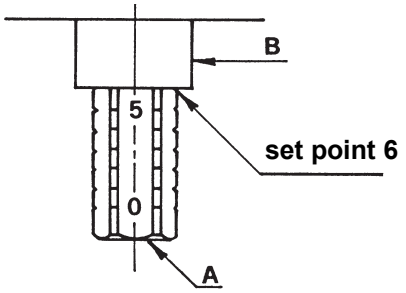

Fig. 19

5.4 Air damper setting

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

A (Fig. 20) shows the placement of the air dampers; **B** (Fig. 20) their correspondent hydraulic jacks.

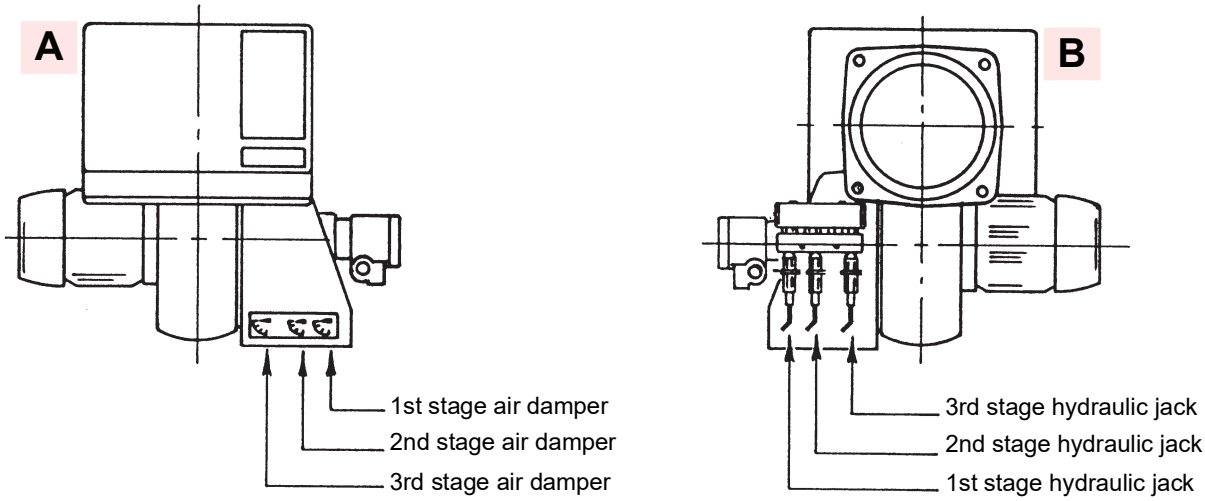

Fig. 20

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 counter-clockwise to increase it (Fig. 21).

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 should be set to the position corresponding to the burner stage to be controlled.

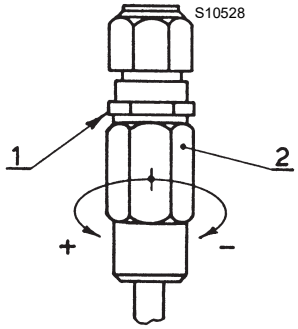

Fig. 21

5.5 Operation sequence of the burner

5.5.1 Burner start-up program

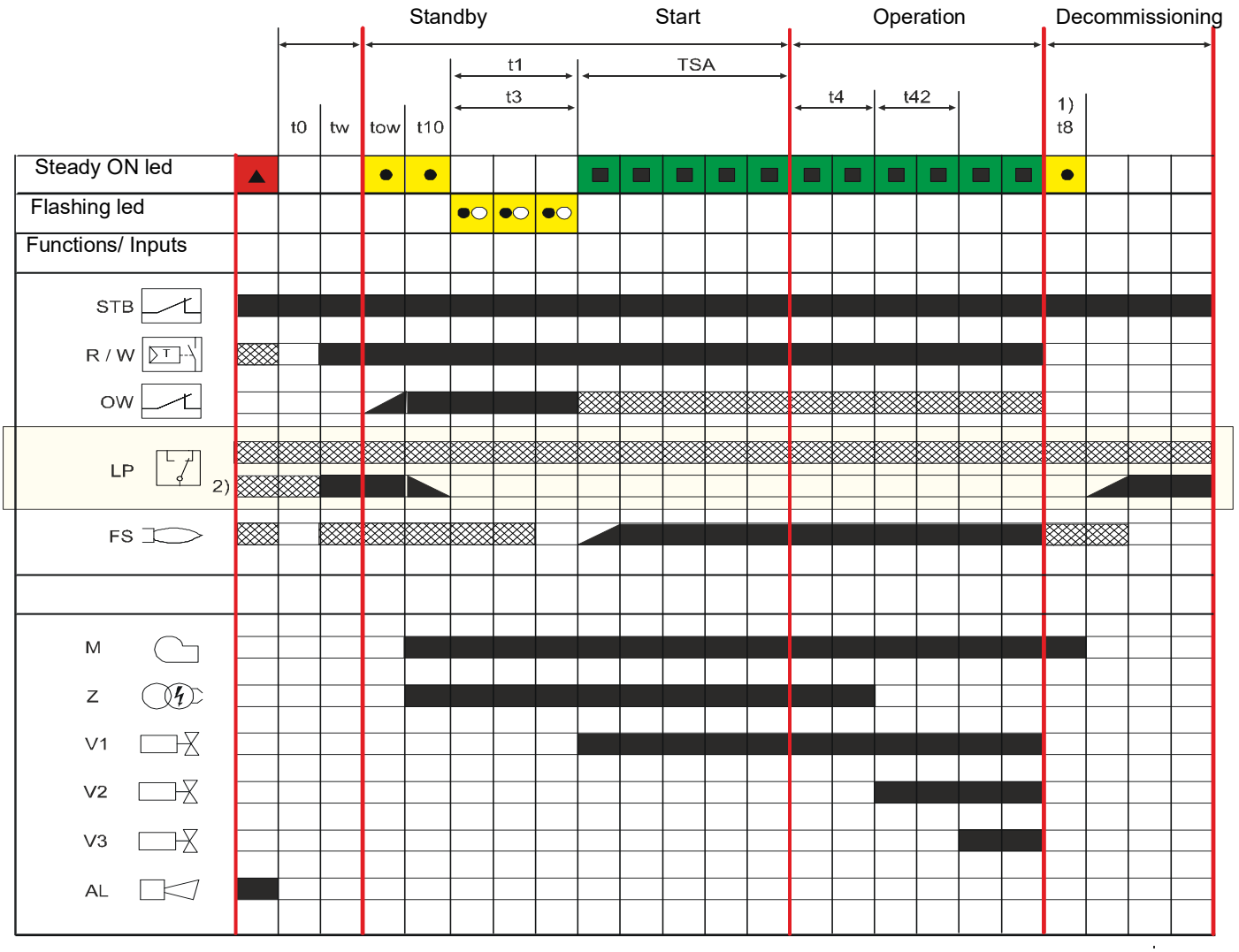

Fig. 22

1) Only in case of active post-purging

2) Only in case of active air pressure control

Key

Times in seconds (s)

tw max.	TSA max.	t1 / t3 min.	t3n min.	t4 min.	t8 min.	t10 max.	t42 min
2	5	23	7	7	0	10	7

5.5.2 Three-stage operation

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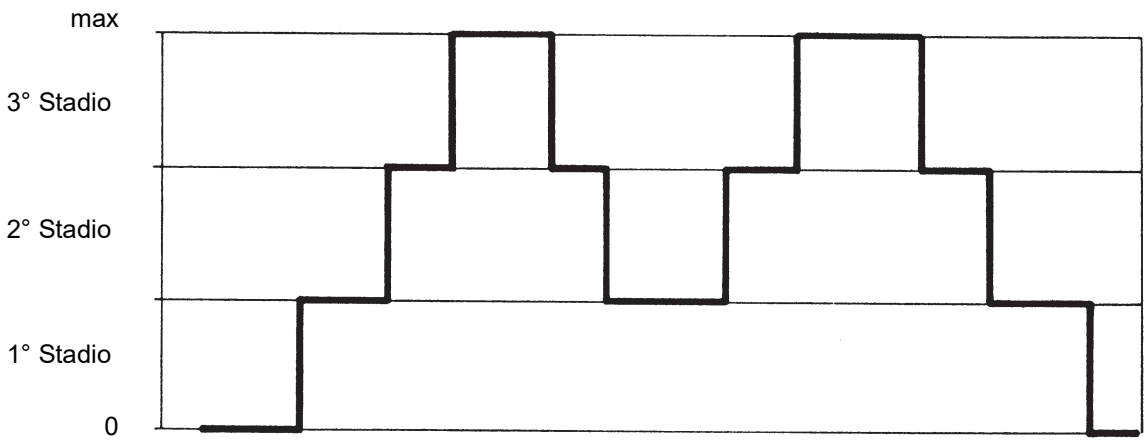


Fig. 23

5.6 Final checks

- ➤ **Block the flame sensor and turn off the remote controls:** the burner must start and then stop in lockout after approximately 5 s after start-up.
- ➤ **Free the flame sensor and turn off the remote controls:** the burner must stop in lockout.
- ➤ **Block the flame sensor when the burner is operating:** the flame must turn off and the burner stop in lockout within 3 s.
- ➤ **Turn on the remote control TL followed by TS while the burner is operating**: the burner must stop.

ATTENTION

Make sure that the mechanical locking systems on the adjustment devices are fully tightened.

5.7 Burner start-up cycle diagnostics

During start-up, indication is according to the Tab. M:

Sequences used	Color code	Color
Waiting time (tw), other waiting states	○	OFF
Oil: Oil pre-heater ON Gas: Pre-purging	●	Yellow
Ignition phase, ignition controlled	○ ● ○ ● ○ ● ○ ● ○	Flashing yellow
Operation, regular flame	■	Green
Operation, poor flame (when detector current drops below the recommended value for reliable operation)	○ ■ ○ ■ ○ ■ ○ ■ ○	Flashing green
Undervoltage	● ▲ ● ▲ ● ▲ ● ▲ ● ▲ ● ▲	Yellow-Red
Error, alarm	▲	Red
Extraneous light in stand-by	■ ▲ ■ ▲ ■ ▲ ■ ▲ ■ ▲ ■	Green-red
Error code output (refer to *Error code table*)	○ ▲ ○ ▲ ○ ▲ ○ ▲ ○ ▲ ○	Flashing red

Key

..... Steady ON

○ OFF

▲ Red

● Yellow

■ Green

Tab. M

5.8 Resetting the flame control and using diagnostics

The flame control features a diagnostics function through which any causes of malfunctioning are easily identified (indicator: **RED LED**).

To use this function, you must wait at least 10 seconds once it has entered the safety condition (lock-out), and then press the reset button.

The flame control generates a sequence of pulses (1 second apart), which is repeated at constant 3-second intervals.

Once you have seen how many times the light pulses and identified the possible cause, the system must be reset by holding the button down for between 1 and 3 seconds.

RED LED on wait at least 10s	Lock-out	Press reset for > 3s	Pulses	Interval 3s	Pulses
			●●●●		●●●●

The methods that can be used to reset the flame control and use diagnostics are given below.

5.8.1 Resetting the flame control

To reset the flame control, proceed as follows:

– Hold the button down for between 1 and 3 seconds.
  The burner restarts after a 2-second pause once the button is released.
  If the burner does not restart, you must make sure the limit thermostat is closed.

5.8.2 Visual diagnostics

Indicates the type of burner malfunction causing lockout.

To view diagnostics, proceed as follows:

– Hold the button down for more than 3 seconds once the red LED (burner lockout) remains steadily lit.
  A yellow light pulses to tell you the operation is done.
  Release the button once the light pulses.
  The number of times it pulses tells you the cause of the malfunction, according to the coding system indicated in the table on page 27.

5.8.3 Diagnostics

Reports burner life by means of an optical link with the PC, indicating hours of operation, number and type of lock-outs, serial number of flame control etc ...

To view diagnostics, proceed as follows:

– Hold the button down for more than 3 seconds once the red LED (burner lockout) remains steadily lit.
  A yellow light pulses to tell you the operation is done.
  Release the button for 1 second and then press again for over 3 seconds until the yellow light pulses again.
  Once the button is released, the red LED will flash intermittently with a higher frequency: only now can the optical link be activated.

Once the operations are done, the flame control's initial state must be restored using the resetting procedure described above.

Button pressed for	Flame control
Between 1 and 3 seconds	Flame control reset without viewing visual diagnostics.
More than 3 seconds	Visual diagnostics of lockout condition: (Led pulses at 1-second intervals).
More than 3 seconds starting from the visual diagnostics condition	Software diagnostics by means of optical interface and PC (hours of operation, malfunctions etc. can be viewed)

The sequence of pulses issued by the flame control identifies the possible types of malfunction, which are listed in the table on page 27.

6 Maintenance

6.1 Notes on safety for the maintenance

The periodic maintenance is essential for the good operation, safety, yield and duration of the burner.

It allows you to reduce consumption and polluting emissions and to keep the product in a reliable state over time.


DANGER

The maintenance interventions and the calibration of the burner must only be carried out by qualified, authorised personnel, in accordance with the contents of this manual and in compliance with the standards and regulations of current laws.

Before carrying out any maintenance, cleaning or checking operations:


DANGER

Disconnect the electrical supply from the burner by means of the system main switch.


DANGER

Close the fuel shut-off valve.

Wait for the components in contact with heat sources to cool down completely.

6.2 Maintenance programme

6.2.1 Maintenance frequency

The gas combustion system should be checked at least once a year by a representative of the manufacturer or another specialised technician.

6.2.2 Checking and cleaning

The operator must use the required equipment during maintenance.

Combustion

Carry out an analysis of the combustion flue gases. Significant differences with respect to the previous measurements indicate the points where more care should be exercised during maintenance.

If the combustion values measured before starting maintenance do not comply with applicable Standards or do not indicate efficient combustion, consult the table below or contact our Technical Support Service to implement the necessary adjustments.

EN 267	Air excess		CO
	Max. output $\lambda \leq 1.2$	Min. output $\lambda \leq 1.3$	
Theoretical max CO_2 0 % O_2	CO_2 % Calibration		mg/kWh
	$\lambda = 1.2$	$\lambda = 1.3$	
15.2	12.6	11.5	≤ 100

Tab. N

Burner

Make sure that the screws are well secured.

Combustion head

Check to make sure that all the parts of the combustion head are in good condition, positioned correctly, free of all impurities, and that no deformation has been caused by operation at high temperatures.

Nozzle

It is advisable to replace nozzles once a year during periodical maintenance.

Do not clean the nozzle openings.

Flexible hoses

Check to make sure that the hoses are still in good condition.

Fuel tank

Approximately every 5 years, or whenever necessary, suck any water or other impurities present on the bottom of the tank using a separate pump.

Pump

The delivery pressure must be stable at 20 bar.

The depression must be less than 0.45 bar.

Unusual noise must not be evident during pump operation.

If the pressure is unstable, or the pump runs noisily, the flexible hose must be detached from the line filter and the fuel must be sucked from a tank located near the burner. This measure permits the cause of the anomaly to be traced to either the suction piping or the pump.

If the pump is found to be responsible, check to make sure that the filter is not dirty. The vacuometer is installed upstream from the filter and consequently will not indicate whether the filter is clogged or not.

Contrarily, if the problem lies in the suction line, check to make sure that the filter is clean and that air is not entering the piping.

6.2.3 Safety components

The safety components should be replaced at the end of their life cycle indicated in the following table.

The specified life cycles do not refer to the warranty terms indicated in the delivery or payment conditions.

Safety component	Life cycle
Flame control	10 years or 250.000 operation cycles
Flame sensor	10 years or 250.000 operation cycles
Gas valves (solenoid)	10 years or 250.000 operation cycles
Pressure switches	10 years or 250.000 operation cycles
Pressure adjuster	15 years
Servomotor (electronic cam)	10 years or 250.000 operation cycles
Oil valve (solenoid)	10 years or 250.000 operation cycles
Oil regulator	10 years or 250.000 operation cycles
Pipes/ oil fittings (metallic)	10 years
Fan impeller	10 years or 500.000 start-ups

Tab. O

6.3 Opening the burner

Disconnect the electrical supply from the burner by means of the system main switch.

Close the fuel shut-off valve.

Wait for the components in contact with heat sources to cool down completely.

To open the burner, proceed as indicated in paragraph "Securing the burner to the boiler" on page 14.

6.4 Closing the burner

Refit following the steps described but in reverse order; refit all burner components as they were originally assembled.

After carrying out maintenance, cleaning or checking operations, reassemble the cover and all the safety and protection devices of the burner.

7 Faults - Possible causes - Solutions

Find a list of faults, causes and possible solutions for a set of failures that may occur and result in irregular burner operation or no functioning at all.

If a burner malfunction is detected, first of all:
– check that the electrical wiring is adequately connected;
– check whether fuel is delivered;
– check that every adjustment parameter is adequately set.


ATTENTION

In the event of a burner lockout, more than two consecutive burner reset operations could cause damage to the installation. On the third lockout, contact the Aftersales Service.


DANGER

If further lockouts or burner faults occur, interventions must only be made by qualified, authorised personnel (as indicated in this manual, and in compliance with the laws and regulations currently in force).

SIGNAL	FAULT	POSSIBLE CAUSE	SOLUTION
No pulse	The burner does not start	No electrical power supply	Close all switches - Check fuses
		A limit or safety control device is open	Adjust or replace
		Flame control lock-out	Reset flame control (no sooner than 10 s after the lockout)
		Pump is jammed	Replace
		Erroneous electrical connections	Check connections
		Defective flame control	Replace
		Defective electrical motor	Replace
1 pulse ●	1 flash (followed by a further blink code): output contact error	2 yellow flashes: Fan (M)	Check
		3 yellow flashes: Ignition (Z)	Check
		4 yellow flashes: Fuel valve (V1)	Check
		5 yellow flashes: Fuel valve (V2)	Check
		6 yellow flashes: Fuel valve (V3) / load controller (LR) release	Check
		7 yellow flashes: Oil pre-heater (OW)	Check
2 pulses ●●	After pre-purge and the safety time, the burner goes to lockout at the end of the safety time	No fuel in tank; water on tank bottom	Top up fuel level or suck up water
		Inappropriate head and air damper adjustments	Adjust
		Fuel solenoid valves fail to open (1st stage or safety)	Check connections; replace coil
		1st nozzle clogged, dirty, or deformed	Replace
		Dirty or poorly adjusted firing electrodes	Adjust or clean
		Grounded electrode due to broken insulation	Replace
		High voltage cable defective or grounded	Replace
		High voltage cable deformed by high temperature	Replace and protect
		Ignition transformer defective	Replace
		Erroneous valves or transformer electrical connections	Check
		Defective flame control	Replace
		Pump unprimed	Prime pump
		Pump/motor coupling broken	Replace
		Pump suction line connected to return line	Correct connection
		Valves up-line from pump closed	Open
		Filters dirty: line - pump - nozzle	Clean
		Defective sensor flame or flame control	Replace sensor flame or flame control
		Sensor flame dirty	Clean
		1st stage operation of cylinder is faulty	Change the cylinder
		Motor lockout	Reset thermal relay
		Defective motor command remote control device	Substitute it
		2-phase power supply thermal relay trips	Reset thermal relay
		Incorrect motor rotation direction	Change motor electrical connections

SIGNAL	FAULT	POSSIBLE CAUSE	SOLUTION
4 pulses ●●●●	The burner starts and then goes into lockout	Sensor flame short-circuit	Replace sensor flame
		Light is entering or flame is simulated	Eliminate light or replace flame control
7 pulses ●●●●●●●	Flame detachment	Poorly adjusted head	Adjust
		Poorly adjusted or dirty firing electrodes	Adjust
		Poorly adjusted fan air gate: too much air	Adjust
		1st nozzle is too big (pulsation)	Reduce 1st nozzle delivery
		1st nozzle is too small (flame detachment)	Increase 1st nozzle delivery
		1st nozzle dirty, or deformed	Replace
		Pump pressure not suitable	Adjust it: between 10 - 14 bar
		1st stage nozzle unsuited to burner or boiler	See Nozzle Table; reduce 1st stage nozzle
		Defective 1st stage nozzle	Replace
	The burner does not pass to 2nd stage	Control device TR does not close	Adjust or replace
		Defective flame control	Replace
		2nd stage solenoid valve coil defective	Replace
		Piston jammed in valve unit	Replace entire unit
	Fuel passes to 2nd stage but air remains in 1st	Low pump pressure	Increase
		2nd stage operation of cylinder is faulty	Change cylinder
	Burner stops at transition between 1st and 2nd stage. Burner repeats starting cycle.	Nozzle dirty	Renew nozzle
		Sensor flame dirty	Clean
		Excess air	Reduce
	Uneven fuel supply	Check if cause is in pump from tank or fuel supply system	Feed burner located near burner
	Internally rusted pump	Water in tank	Suck water from tank bottom with separate pump
	Noisy pump, unstable pressure	Air has entered the suction line	Tighten connectors
		- Depression value too high (higher than 35 cm Hg):	
		Tank/burner height difference too great	Feed burner with loop circuit
		Piping diameter too small	Increase
		Suction filters clogged	Clean
		Suction valves closed	Open
		Paraffin solidified due to low temperature	Add additive to fuel
	Pump unprimes after prolonged pause	Return pipe not immersed in fuel	Bring to same height as suction pipe
		Air enters suction piping	Tighten connectors
	Pump leaks fuel	Leakage from sealing organ	Replace pump
	Smoke in flame - dark Bacharach	Not enough air	Adjust head and fan air damper
		Nozzle worn or dirty	Replace
		Nozzle filter clogged	Clean or replace
		Erroneous pump pressure	Adjust to between 10 - 14 bar
		Flame stability disc dirty, loose, or deformed	Clean, tighten in place, or replace
		Boiler room air vents insufficient	Increase
	- yellow Bacharach	Too much air	Adjust head and fan air damper
	Dirty combustion head	Nozzle or filter dirty	Replace
		Unsuitable nozzle delivery or angle	See recommended nozzles
		Loose nozzle	Tighten
		Impurities on flame stability spiral	Clean
		Erroneous head adjustment or not enough air	Adjust; open gate valve
		Blast tube length unsuited to boiler	Contact boiler manufacturer
8 pulses ●●●● ●●●●	Errore preriscaldatore	Oil pre-heater lockout	Check
		Time check of oil pre-heater	Check

SIGNAL	FAULT	POSSIBLE CAUSE	SOLUTION
10 pulses 	Burner lock-out	Connection or internal fault	
		Presence of electromagnetic disturbance	Use the radio disturbance protection kit

Tab. P

A Appendix - Accessories

Soundproofing box kit

Burner	Type	dB(A20170350 (1))	Code
P 140 T/G	C4/5	10	3010404
P 200 T/G			
P 300 T/G	C7	10	3010376
P 450 T/G			

Burner support kit

Burner	Code
P 300-450 T/G	3000731

Protection kit (electromagnetic interferences)

Burner	Code
All models	3010386

PC interface PC

Burner	Code
All models	3002719

Spacer kit

Burner	Code
P 140 T/G	3000722
P 200 T/G	3000722
P 300 T/G	3000723
P 450 P/G	3000751

220-230 V conversion kit

Burner	Code
PRESS 300 T/G	20163347

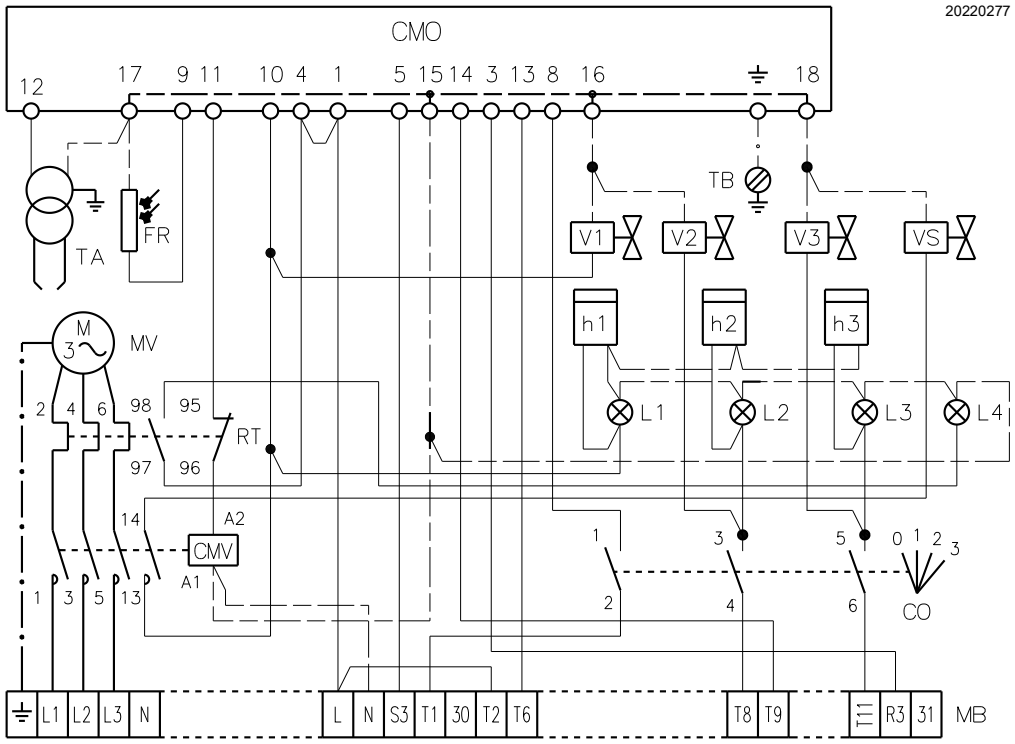
ATTENTION

The installer is responsible for the addition of any safety device not foreseen in this manual.

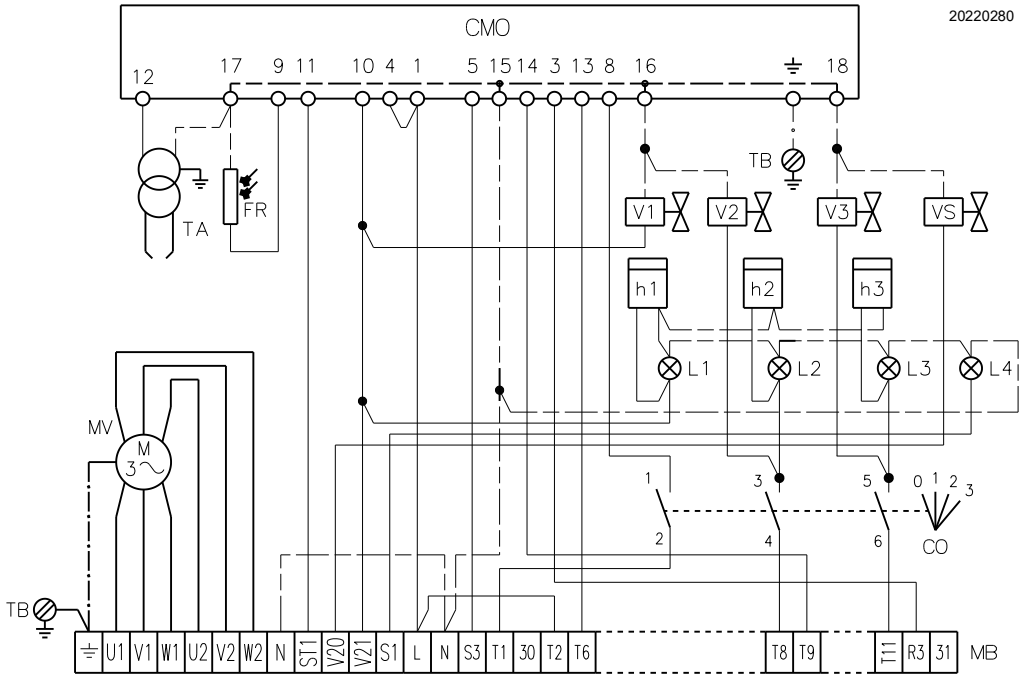
B Appendix - Electrical panel layout

ELECTRICAL SYSTEM FACTORY-SET

P 140-200-300 T/G (DIRECT MOTOR STARTING) - 50 Hz



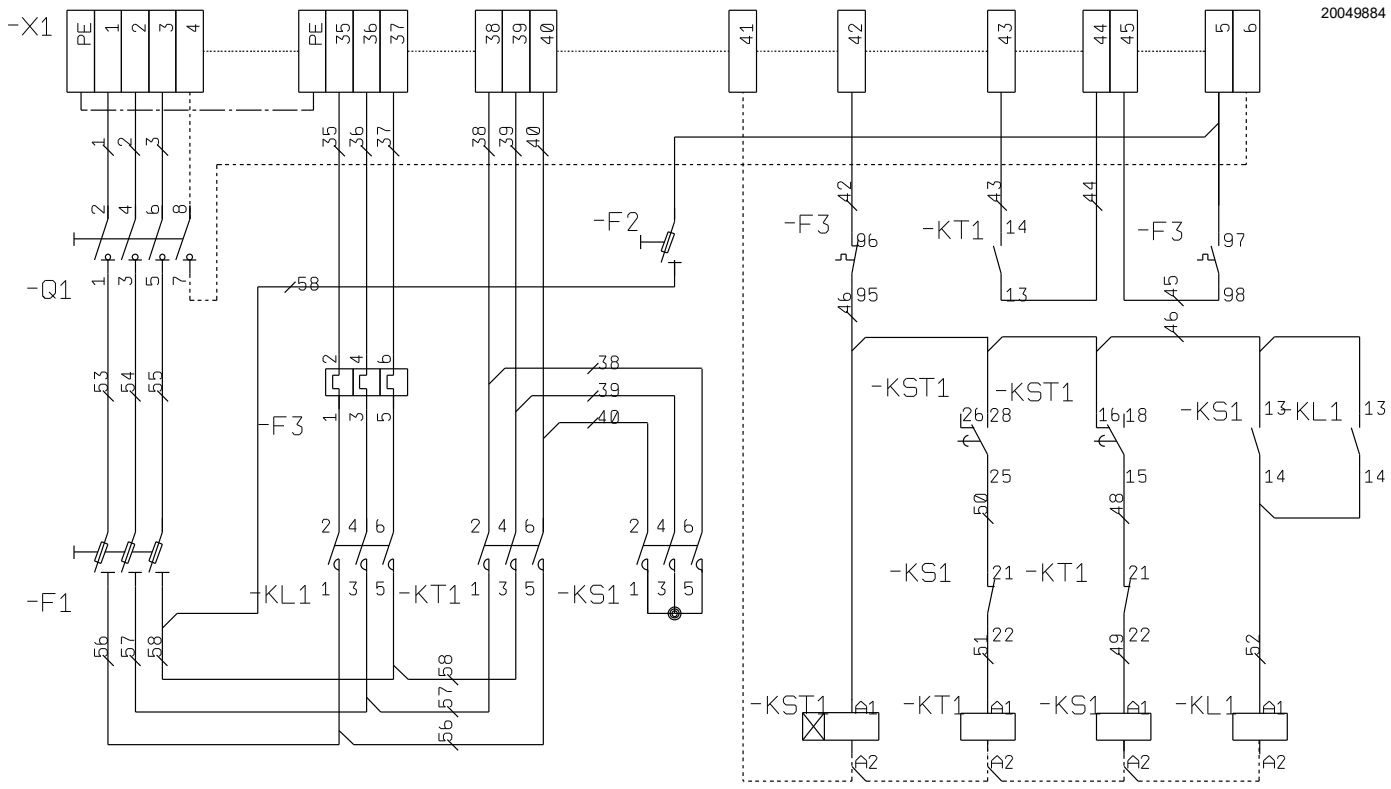
P 300-450 T/G (STAR-DELTA MOTOR STARTING) - 50 Hz



Key to layout

CMV	Motor contactor
CO	Commutator
FR	Flame sensor
h1, 2, 3	1., 2., 3. stage hourconters
L1, 2, 3	Segnalazione di 1°, 2°, 3° stadio
L4	Segnalazione di blocco motore
MB	Morsettiera bruciatore
MV	Fan motor
RT	Thermal relay
TA	Ignition transformer
TB	Burner ground (earth)
VS	Safety valve
V1, 2, 3°	1., 2., 3. stage solenoid valves

STAR-DELTA STARTER - 50 Hz



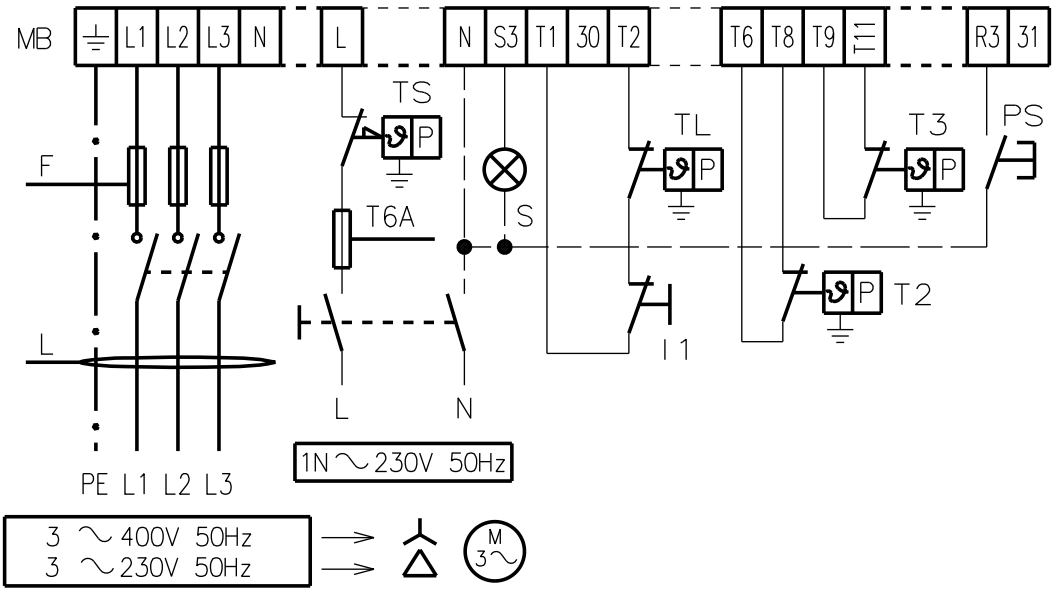
Key to layout

F1	Power line fuses
F2	Control devices fuse
F3	Thermal relay Factory calibration at: - P 300 T/G: 10.2 A for 400 V - 17.6 A for 230 V - P 450 T/G: 16.7 A for 400 V - 29 A for 230 V
KL1	Line Contact-maker
KS1	Star Contact-maker
KST1	Timer relay for switching from star to delta (factory calibration at 10 s.)
KT1	Delta Contact-maker
X1	Starter terminal strip
Q1	Disconnecting switch with interlock

Electrical connection to the terminal strip (installer-set)

P 140-200-300 T/G (DIRECT MOTOR STARTING) - 50 Hz

20220278



Key to layout

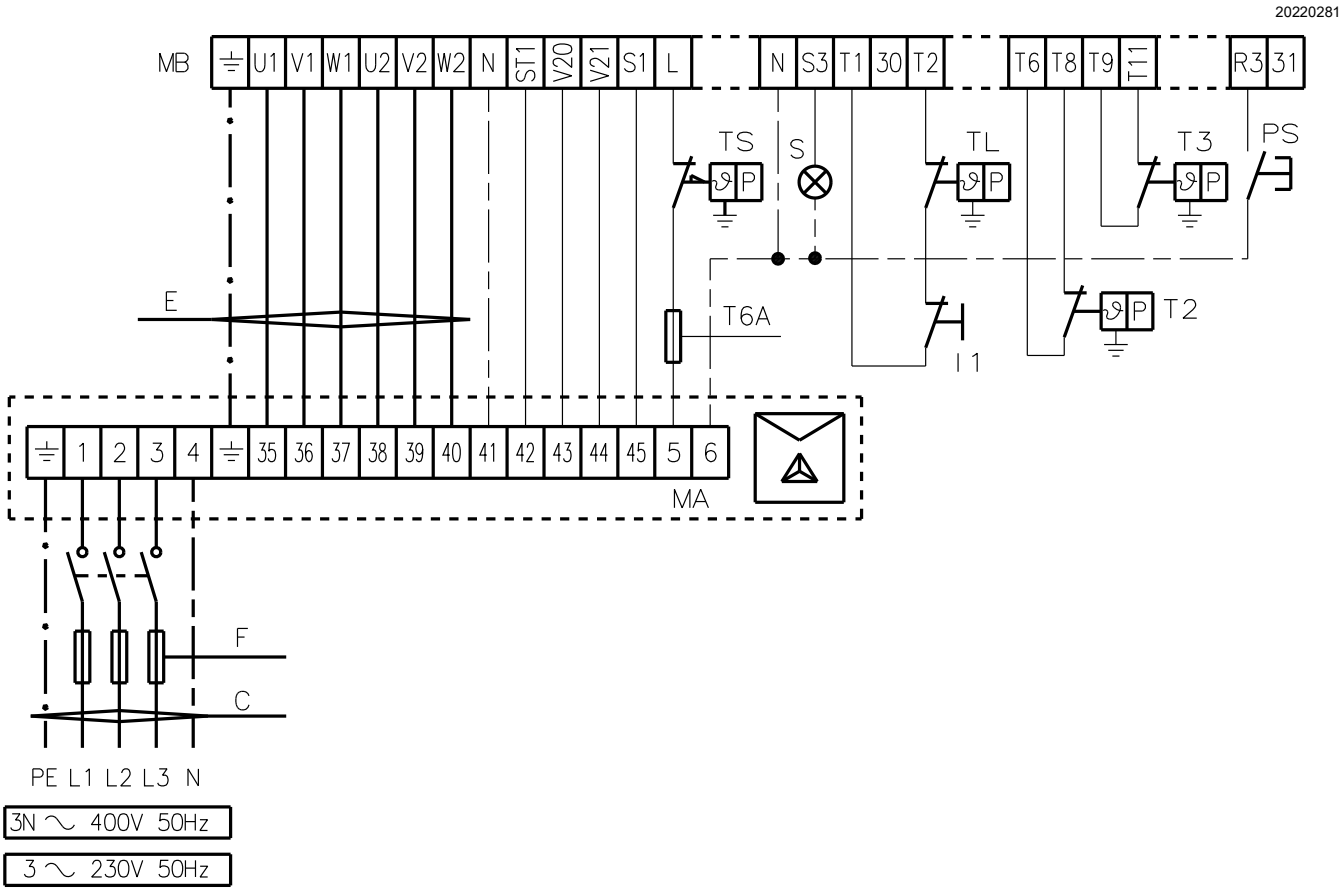
I2	Burner manual stop switch
MA	Star-delta starter terminal strip
MB	Burner terminal strip
PS	Reset push-button
S	Remote lock-out signal
TL	Load limit remote control system: shut down the burner when the boiler temperature or pressure reaches the maximum preset value
TS	Safety load control system: operated when TL is faulty
T2	2nd stage load control system
T3	3rd stage load control system

Electrical connection P 140-200-300 T/G burners with direct motor starting

Cables cross-section		P 140 T/G		P 200 T/G		P 300 T/G	
		230 V	400 V	230 V	400 V	230 V	400 V
F	A gG/gL	25	25	40	25	63	50
L	mm^2	2,5	2,5	4	2,5	6	4

P 300-450 T/G (STAR-DELTA MOTOR STARTING) - 50 Hz

20220281



Key to layout

I2	Burner manual stop switch
MA	Star-delta starter terminal strip
MB	Burner terminal strip
PS	Reset push-button
S	Remote lock-out signal
TL	Load limit remote control system: shut down the burner when the boiler temperature or pressure reaches the maximum preset value
TS	Safety load control system: operated when TL is faulty
T2	2nd stage load control system
T3	3rd stage load control system

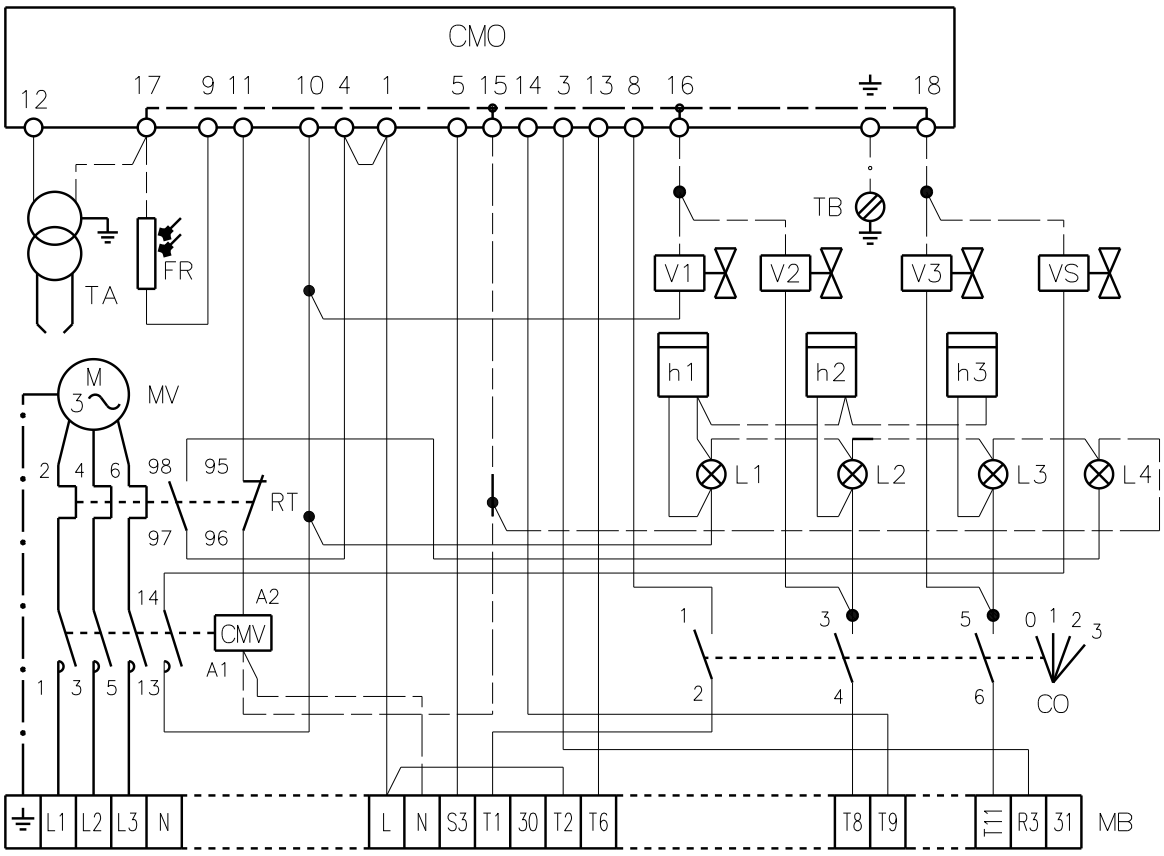
Electrical connection P 300-450 T/G burners with star-delta motor starting

Cables cross-section		P 300 T/G		P 450 T/G	
		230 V	400 V	230 V	400 V
F	A gG/gL	50	40	63	50
L	mm^2	6	4	10	6
E	mm^2	4	2,5	6	4

ELECTRICAL SYSTEM FACTORY-SET

P 200-300 T/G (DIRECT MOTOR STARTING) - 60 Hz

20220277



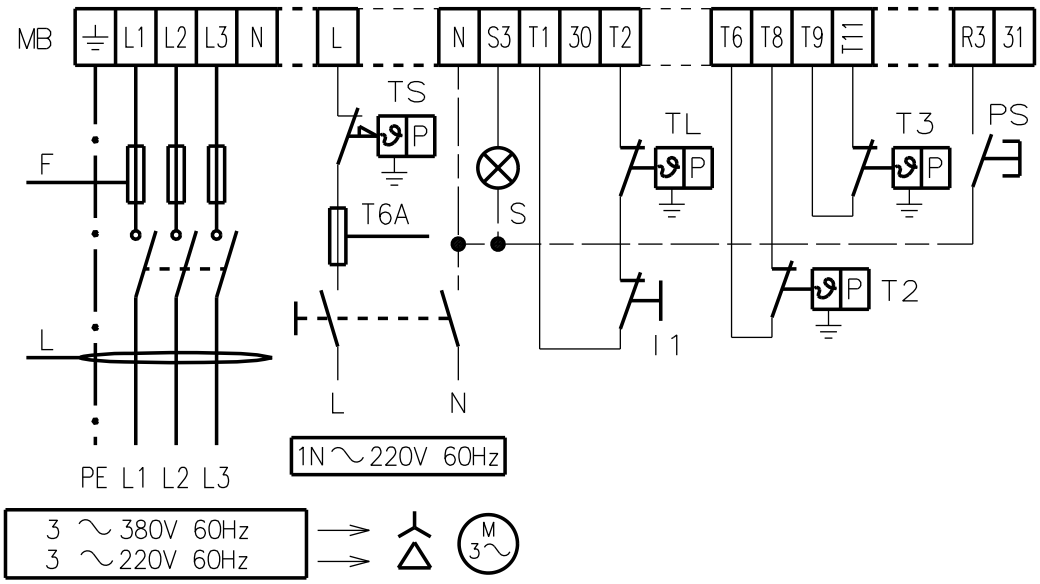
LEGENDA SCHEMI ELETTRICI

CMV	Motor contactor
CO	Commutator
FR	Flame sensor
h1, 2, 3	1., 2., 3. stage hourconters
L1, 2, 3	Segnalazione di 1°, 2°, 3° stadio
L4	Segnalazione di blocco motore
MB	Morsettiera bruciatore
MV	Fan motor
RT	Thermal relay
TA	Ignition transformer
TB	Burner ground (earth)
VS	Safety valve
V1, 2, 3°	1., 2., 3. stage solenoid valves

ELECTRICAL CONNECTION TO THE TERMINAL STRIP (INSTALLER-SET)

P 200-300 T/G (DIRECT MOTOR STARTING) - 60 Hz

20220279



KEY TO LAYOUT

H	Remote lock-out signal
I1	Burner manual stop switch
MB	Burner terminal strip
PS	Reset push-button
TB	Burner ground (earth)
TL	Load limit remote control system: shut down the burner when the boiler temperature or pressure reaches the maximum preset value
TS	Safety load control system: operated when TL is faulty
T2	2nd stage load control system
T3	3rd stage load control system

P 200	**220V**	**380V**
F Ampere	T35	T25
S mm^2	4,0	2,5
P 300	**220V**	**380V**
F A gG/gL	63	50
S mm^2	6,0	4,0

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