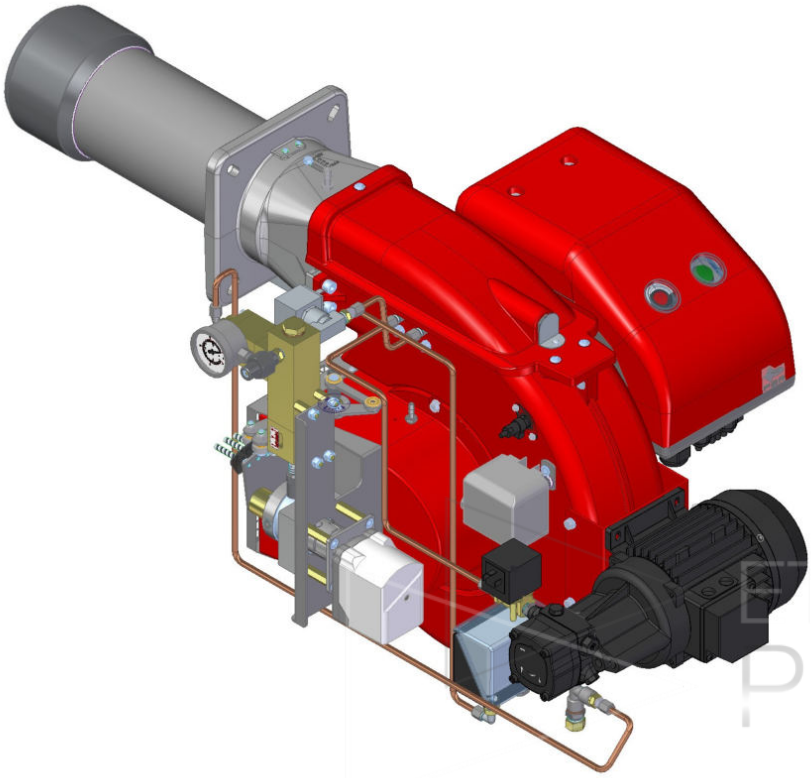
FBR
BURNERS MADE IN ITALY



F00039

FGP 50/M EVO

Installation, use and maintenance instructions

070003_2B

SYMBOLS AND NOTE USED IN THIS HANDBOOK

In some parts of this handbook you will see DANGER signs. Read them carefully: they describe situations of potential danger.

ELECTRIC SHOCK DANGER: Sign used in case of operations that, in not carried out correctly, cause electric shocks with lethal consequences.

MAXIMUM DANGER WITH SERIOUS CONSEQUENCES: Sign used in case of operations that, if not carried out correctly, CAUSE serious injury, death or long-term health risks.

WARNING: Sign used in case of operations that, if not carried out correctrly, MAY CAUSE serious injury, death or long-term health risks.

CAUTION: Sign used in case of operations that, if not carried out correctrly, MAY CAUSE damage to things and/or people.

WARNING - DO NOT OPEN NERVER: Sign used in order to indicate parts that must not be opened in any case.

WARING - HOT SURFACE: Sign used in order to indicate parts that reach hot temperatures and as a consequence MAY CAUSE burns.

CRUSHING RISK: Sign used for operations that, if not carried out correctly, MAY CAUSE crushing.

DELIVERY AND OPERATING INSTRUCTIONS

The Installer is responsible for the supplying of operating instructions to the plant in-charge Operator/User of the burner before final delivery of the burner. Moreover he must inform the plant in-charge Operator/User of the burner that these instructions must be kept together with the burner. The address and telephone number of the nearest ASSISTANCE CENTRE should be written down on the back of the HANDBOOK. The plant in-charge Operator/User of the burner must note that the plant/burner must be checked at least once a year from the Installer or another qualified expert. In order to ensure recurring checks, the Manufacturer recommends the drawing up of a maintenance contract.

WARRANTY AND RESPONSABILITY

There are no rights for warranty or responsability in the case of damages to people, animals or things if one or more of the following causes are referable: 1) no appropriate use of the appliance; 2) no correct use, maintenance, operation or installation of the appliance; 3) use of the appliance with damaged security devices and/or protections, wrong applicated or not working; 4) no observation ot the reminds indicated in the installation, use and maintenance instructions; 5) modify of the appliance; 6) assemblage of supplemental components that are not been tested together to the appliance; 7) moditications of the combustion chamber or of the chimney through introduction of inserts that prevents the regular development of the flame; 8) insufficient overseeing and care of appliance components which are subject to usury; 9) wrong repairing; 10) excessive effort; 11) damages which are caused by use in presence of an an anomaly; 12) wrong combustion fuel; 13) lack in the feeding pipelines; 14) use of not original parts; 15) force majeure.

TECHNICAL DATA FGP 50/M EVO

MODEL		FGP 50/M EVO
Flow min. 1°st. / min. 2°st. - max. 2°st. *	[kg/h]	10.5/20-53
Thermal power min. 1°st. / min. 2°st. - max. 2°st. *	[Mcal/h]	107/204-542
Thermal power min. 1°st. / min. 2°st. - max. 2°st. *	[kW]	124/237-630
Fuel: LIGHT-OIL 1.5°E at 20°C = 6.2 cSt = 35 sec Redwood N°1		
Intermitted working operation (min. 1 stop every 24 hours) two stages progressive or modulating		
Environmental conditions operation / storage:	-15... +40°C / -20... +70°C, humedad rel. máx. 80%	
Max. temperature combustion air	[°C]	60
Nominal electric power	[kW]	1.1
Fan motor	[kW]	0.55
Pump motor	[kW]	0.37
Fan absorption	[A]	1.4
Pump absorption	[A]	1.2
Nominal auxiliary absorption	[A]	0.6
Power supply:	3~400V, 1N~230V - 50Hz	
Electric protection degree:		IP44

* Reference conditions: Environment temperature 20°C - Barometric pressure 1013 mbars - Altitude 0 metre (sea level).

OPERATING RANGE DIAGRAM FGP 50/M EVO

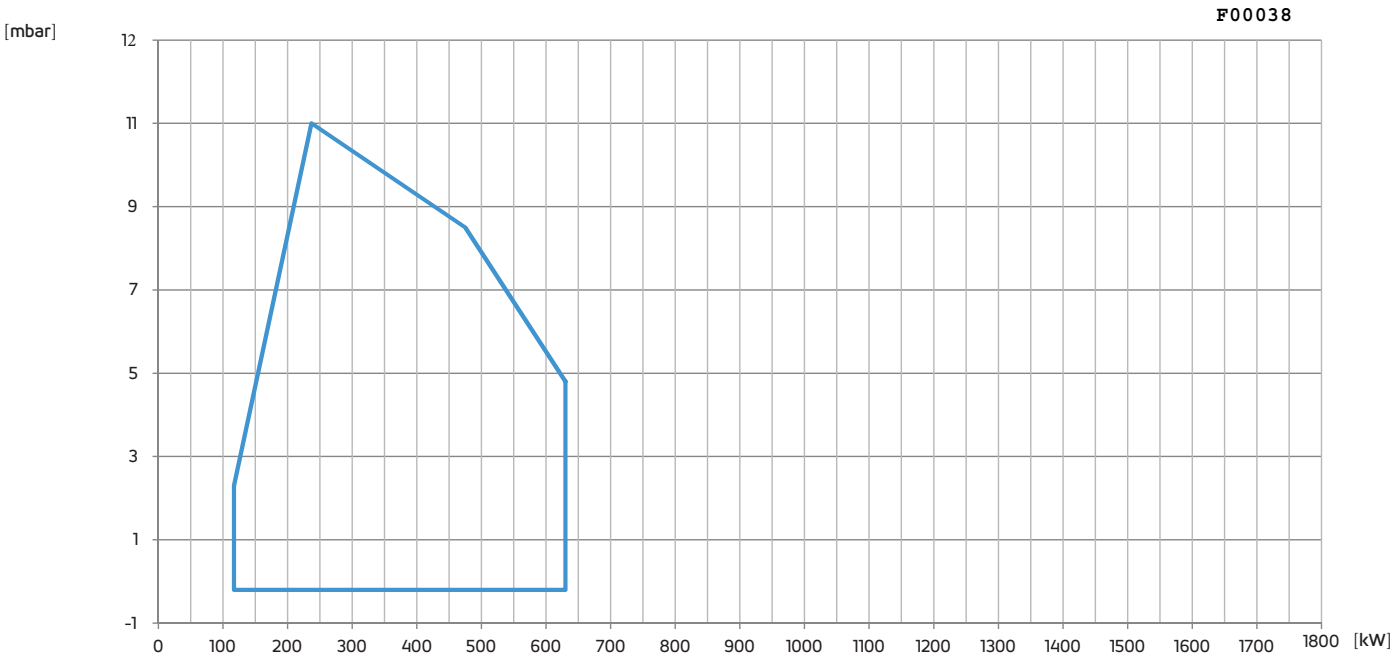


Fig. 1 X = Thermal power Y = Pression in the combustion chamber

The firing rates has been obtained based on test boilers in accordance with EN267 standards and are indicative of matching the burner to the boiler. For the correct operation of the burner, combustion chamber dimensions must be in accordance with current regulation. In case of non-compliance, contact the manufacturer.

DIMENSIONS [MM]

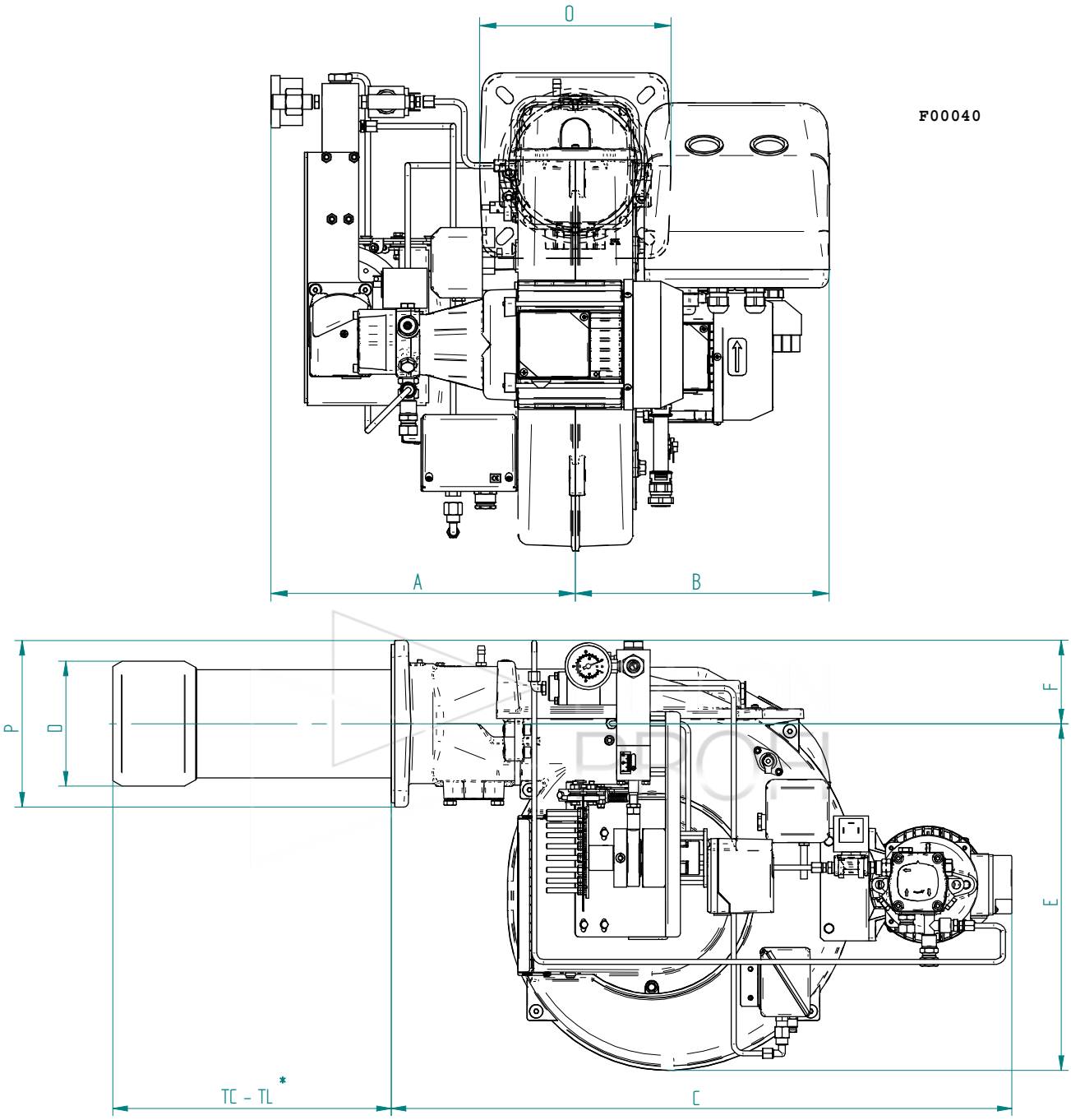


Fig. 2 Dimensions

MODEL	A	B	C	D	E	F	O	P
FGP 50/M EVO	329	274	746	150	416.5	100	207	200

TC - TL: Please see chapter "Flame tube length"

BURNER INSTALLATION

For the installation of the burner to the generator, follow to the diagram shown below:

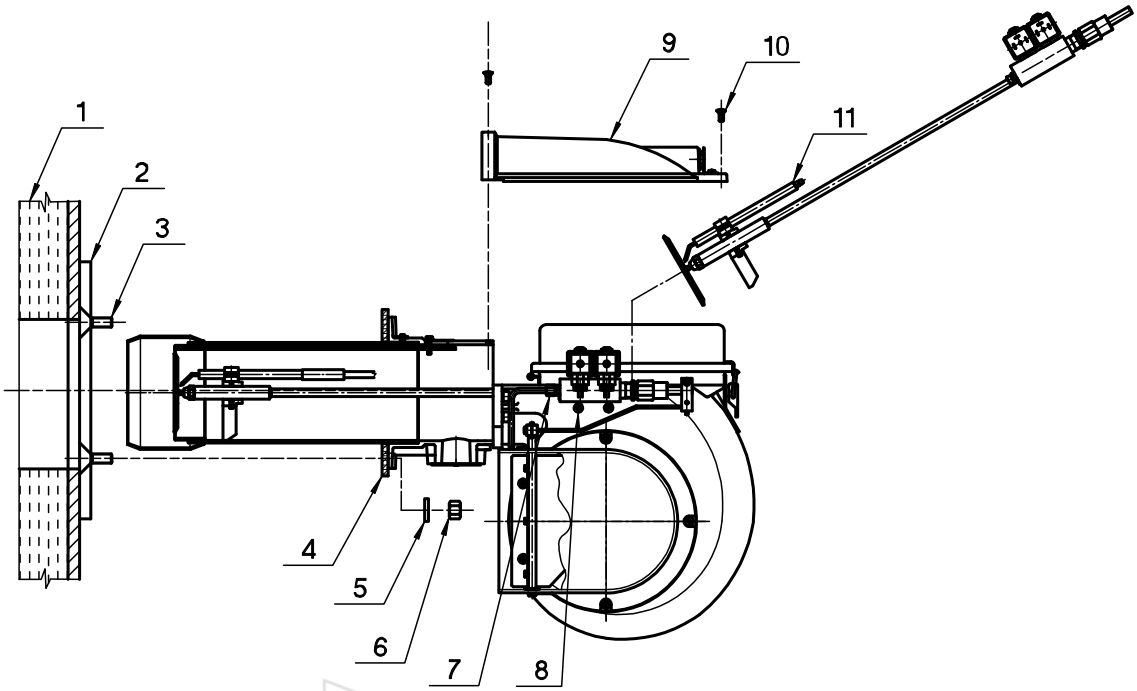


Fig. 3 Burner installation

LEGEND

1) Generator
2) Counterflange
3) Stud bolt
4) Gasket
5) Washer
6) Nut
7) Pipe connection
8) Screw
9) Cover
10) Screw
11) Head Group

BURNER SIGNAL DESCRIPTION

In the picture below there are indicated all the signalation present on the burner:

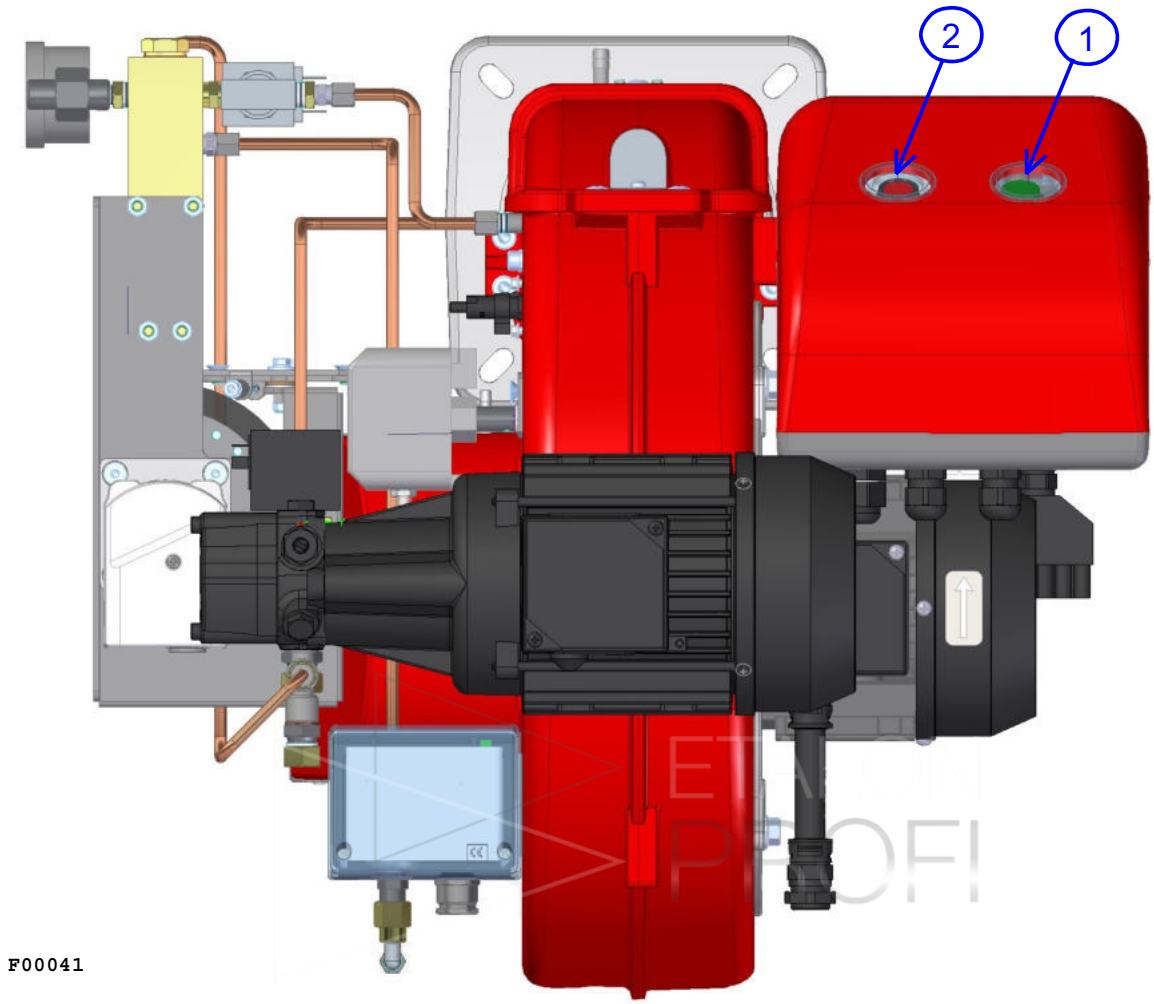


Fig. 4 Burner signal description

LEGEND

1) ON/OFF button

2) Reset from lockout button + status lamp

The multicolor signal lamp in the lockout reset button (pos.2) is the key indicating element for visual diagnostics and interface diagnostics.
In normal operation, the different operating states are indicated in the form of color codes; please refer to electrical device handbook supplied with the present instructions.

After a non-alterable lockout, the red signal lamp in the lockout reset button (pos.2) lights up.
By pressing the lockout reset button (pos.2) for more than 3 seconds, the visual diagnostics of the cause of fault can be activated; please refer to electrical device handbook supplied with the present instructions.

For close the diagnostics mode and for switch on the burner again, it is necessary to reset the burner control.
Press the lockout reset button (pos.2) for about 1 second (<3 seconds).

After a non-alterable lockout, the red signal lamp in the lockout reset button (pos.2) lights up.
For reset the control box press the lockout reset button (pos.2) for about 1 second (<3 seconds).

SAFETY

Before burner installation, clean carefully all around the area where the burner will be installed and arrange the correct lighting of the room.

The installation, adjustment and maintenance of the appliance must be carried out by professionaly qualified person in compliance with the standards and regulations of the laws in force as a wrong installation may cause damages to people, animals and things for which the Manufacturer will not be responsable.

Before starting installation, maintenance and disassembly turn off the electrical supply and check that it is not possible to turn accidentally the main switch on, close fuel inlet valves and make sure they could not accidentally be opened.

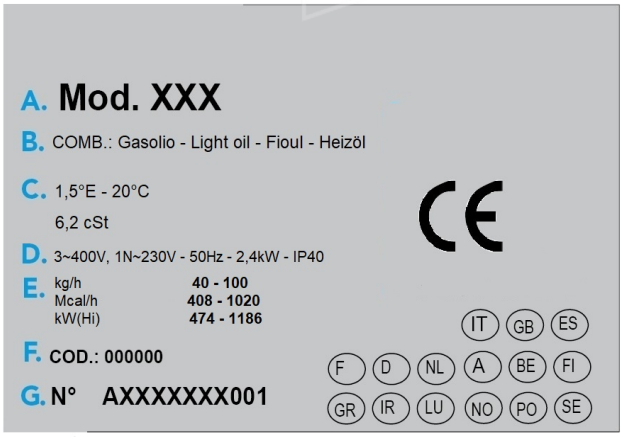
PRELIMINARY CHECKS

CHECK SUPPLY, TRANSPORT, PACKAGING, STORAGE

CHECK SUPPLY
Check that the supply is complete and without transport damages. After removing all the packaging, check the integrity of the contents. If in dubt do not use the burner and contact the supplier.
TRANSPORT
The transport weights of the burner and the gas train are indicated in the technical data.
STORAGE
Observe the environment temperatures which are allowed for storage and indicated in the technical data.

The packaging materials must not be abandoned as they may cause danger and pollution, but they should be collected and left in a appropriate place.

BURNER CHARACTERISTICS CHECK

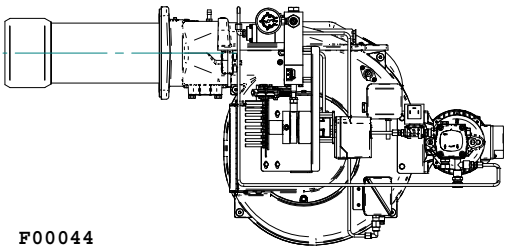


The burner data plate indicates:
A. model;
B. the fuel family;
C. the viscosity of the fuel;
D. the power supply and the degree of protection;
E. the minimum and maximum thermal power;
F. the burner code;
G. the serial number.
It also includes the CE marking and the countries of validity of the certification.

Check that the capacity of the boiler is within the operating range of the burner.

Violation, removal or loss of the data plate of the burner and any other components compromise the correct identification of the burner and hinder the installation and maintenance operation.

CORRECT BURNER POSITION

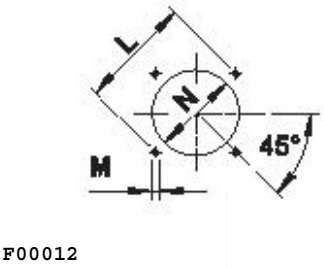


The burner is designed to work only in the position shown in picture.

If different deployement are needed, please contact our Tecnical-Sales Department to verify the disponibility of required kits.

Fig. 5 Correct burner position

BOILER PLATE



* Suggested dimension of connection between burner and generator.

Fig. 6 Boiler plate

MODEL		L min	L max	M	N min	N *	N max
FGP 50/M EVO	mm	275	325	M10	185	185	220

FLAME TUBE LENGTH

Flame tube length must be selected based on the specifications supplied by boiler manufacturer and, in any case, it must be greater than the thickness of the boiler door included its insulation.
In case of boilers with flame inversion or front flue combustion chambers, it is necessary to insulate the area between the flame tube and front door with refractory material. This protection material must not impede flame tube extraction.

MODEL		TC	TL **
FGP 50/M EVO	mm	250	335

** For different flame lengths, please contact our Technical-Sales Department.

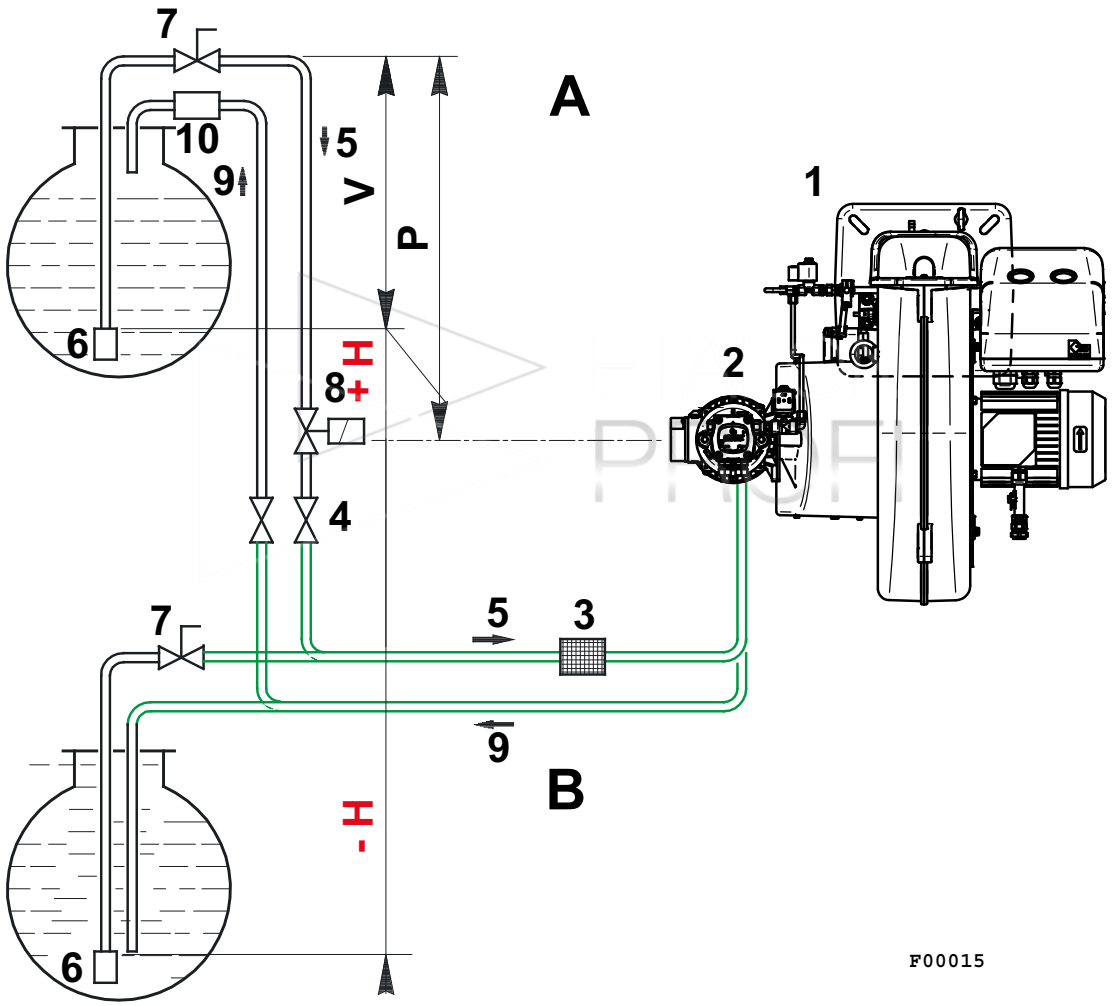
Warning! The fuel supply system to the burner must be equipped with all the safety and control devices required by the regulations in force. If provided for on a national standard basis, the manual fuel shut-off valve is not part of the burner equipment but of the requirements of the heat generator room.

HYDRAULIC SYSTEM LAYOUT

Please refer to the hydraulic system layout included in the elctrical panel layout supplied with the present Instructions.

PIPES SIZING

Check the return pipe for obstructions before starting the burner. An obstruction would cause the pump sealing to break.



LEGEND

H) Pump/Foot valve height difference
1) Burner
2) Pump
3) Filter
4) Manual on/off valve
5) Suction line
6) Foot valve
7) Fast closing manual valve, remote controlled (only Italy)
8) On/off solenoid valve (only Italy)
9) Return line
10) Check valve (only Italy)

The burner is equipped with a self-priming pump and is able to feed itself autonomously, in compliance with the limits indicated.

H [m]	L [m]			
	Øi : 10 mm	Øi : 12 mm	Øi : 14 mm	Øi : 16 mm
+ 4,0	22	28	53	92
+ 3,0	20	24	47	80
+ 2,0	17	21	40	70
+ 1,0	14	17	33	58
+ 0,5	12	15	30	52
0	11	13	27	47
- 0,5	9	12	23	41
- 1,0	8	10	20	36
- 2,0	-	-	13	24
- 3,0	-	-	7	13
- 4,0	-	-	-	-

Case A: Tank higher than the burner.
The "P" distance must not exceed 10 m and that the V quota must not exceed 4 m to make it possible to self-prime the pump even with the tank almost empty.

Case B: Tank lower than the burner.]
The low pressure in the pump must not exceed 0.6 bar. It is advisable to have the return pipe arrive at the same height as the suction pipe.

ELECTRICAL PANEL LAYOUT

Please refer to elctrical panel layout supplied with the present Instructions.

WORKING DIAGRAM OF THE ELECTRICAL DEVICE

Please refer to electrical device handbook supplied with the present Instructions.

BURNER CALIBRATION

ATTENTION: Before starting the burner it is necessary to respect the general norms of security; especially check:

- **Electrical supply**
- **The tightness of the plant and its correct realization**
- **The presence of water in the plant**
- **The ventilation of the boiler location**
- **The correct function of the thermostats and pressure switches of the boiler.**

TABLE OF ADVISABLE CALIBRATIONS FGP 50/M EVO

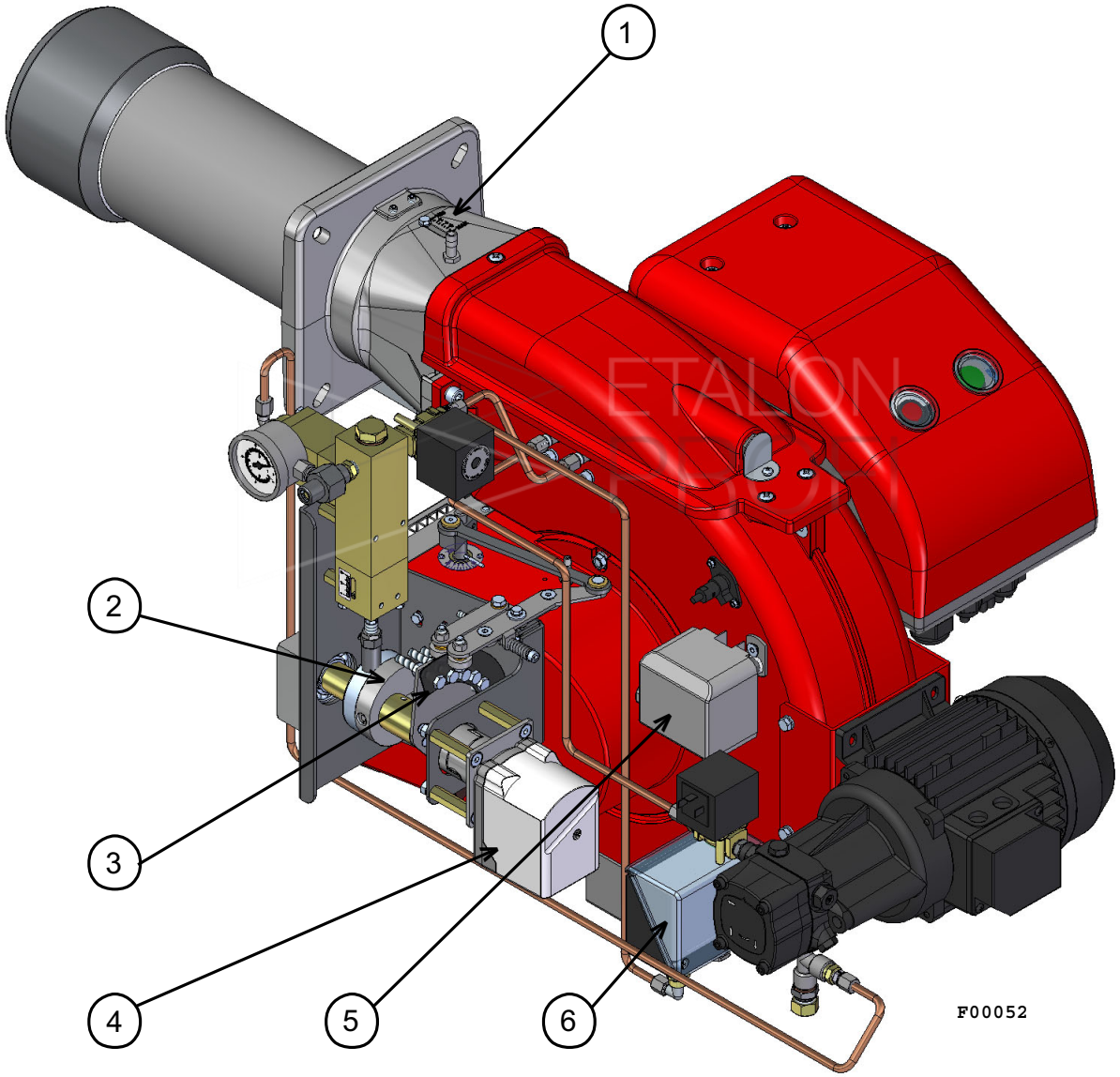


Fig. 7

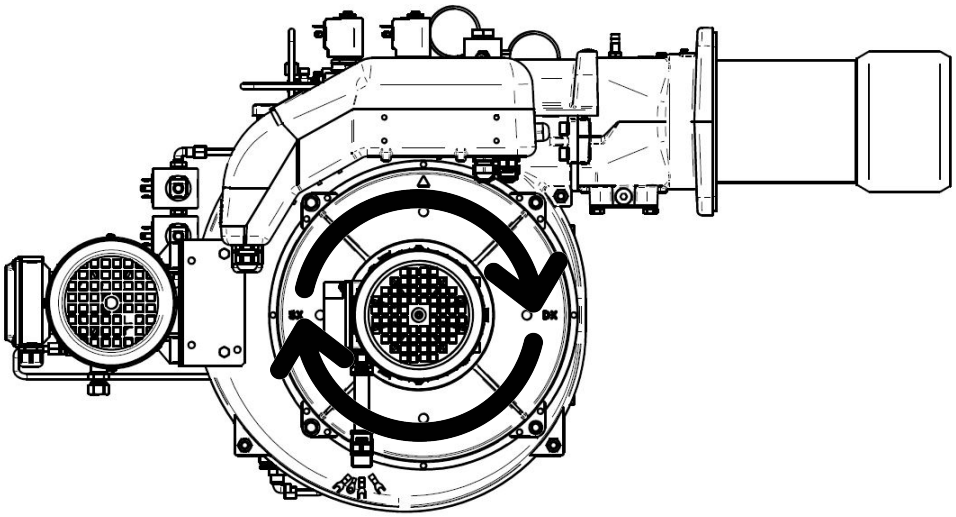
LEGEND

1) Head adjustment

2) Cams

3) Adjustment screw

CHECKING THE DIRECTION OF ROTATION OF THE FAN MOTOR



Positioning with the burner nozzle to your right, the motor must rotate clockwise.

PUMP CALIBRATION

The pump must provide a delivery pressure of 20 bar.

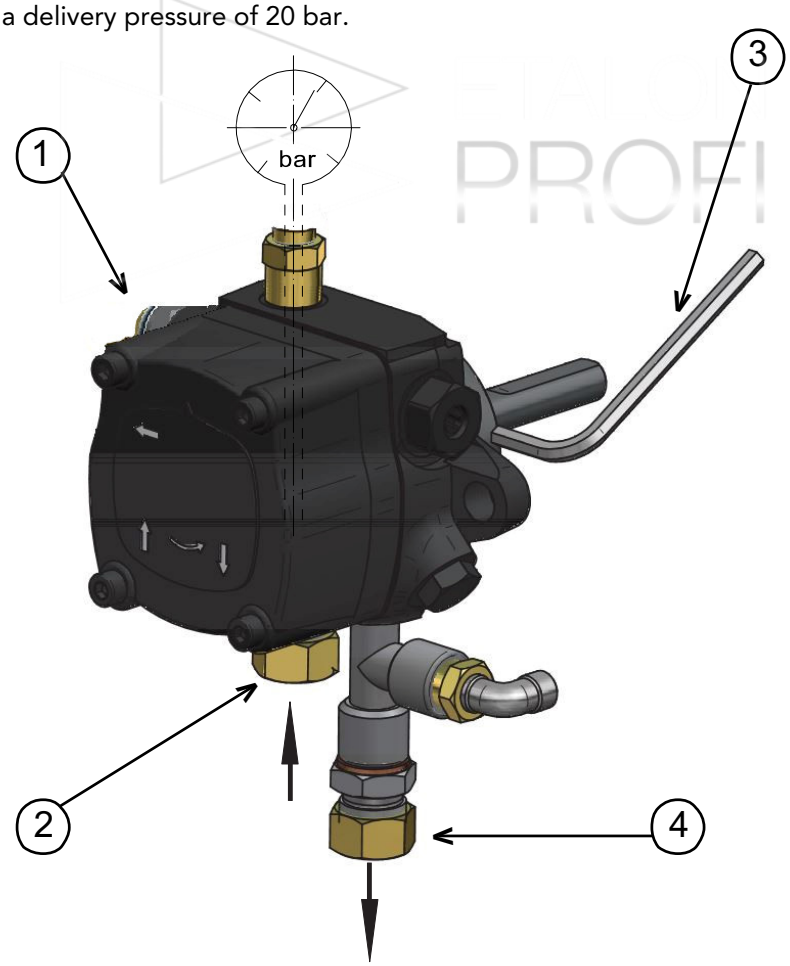


Fig. 8 Pump calibration

LEGEND

1) Outlet
2) Suction
3) Pressure adjustment
4) Return

SERVOMOTOR CALIBRATION SIEMENS SQN71.664.A20

Warning: the factory setting of the cams must never be changed. To modify the opening of the air dampers act on the variable profile of the cams.

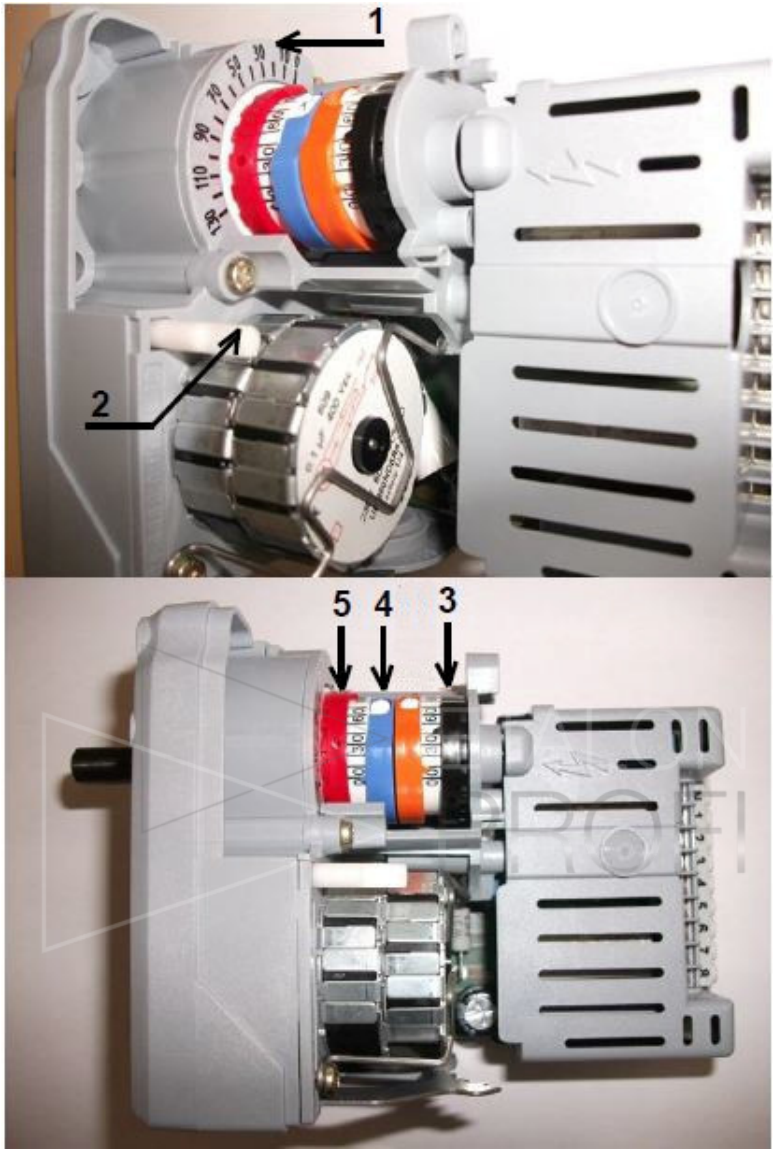


Fig. 9 SIEMENS SQN71.664.A20

LEGEND

1) Index of air shutter opening
2) Release pivot (PUSH TO RELEASE)
3) Allow start-up [5°] (BLACK)
4) Close cam [0°] (BLUE)
5) Maximum cam [90°] (RED)

CALIBRATION OF THE BURNER

During the whole operation of calibration of the burner it is necessary the aid of a combustion analyzer.

Example of calibration of the cams:

- Close cam: 0° cam (II) (BLUE)
- Allow start-up: 5° (IV) (BLACK)
- Maximum modulation cam: 90° cam (I) (RED)

RETURN PRESSURE ADJUSTMENT

F00048

The actuator cams are already adjusted in the factory, do not modify the setting.

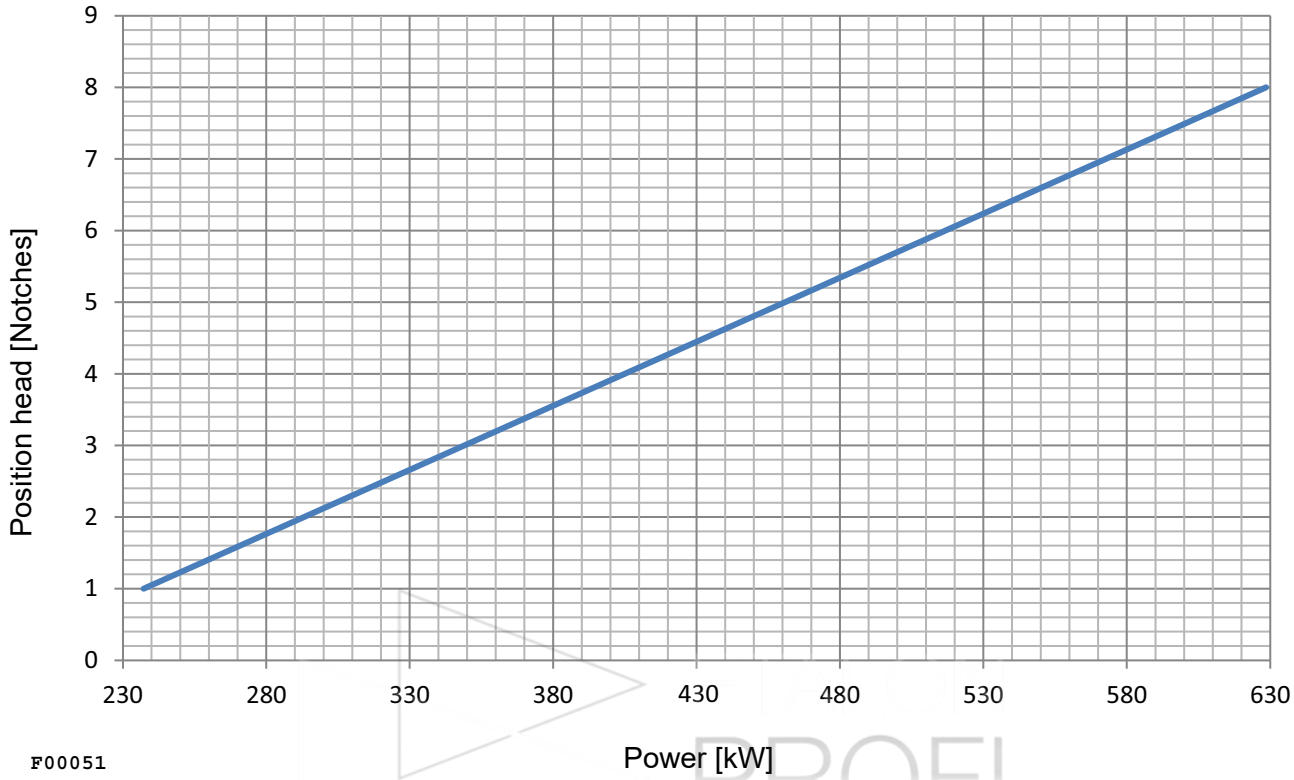
1) Bring the servomotor to the minimum power position.

2) Adjust the return pressure to 3 bar - turn the screws indicated in the figure.

3) Bring to the maximum power position.

4) Adjust the return pressure to 16 bar - turn the screws indicated in the figure.

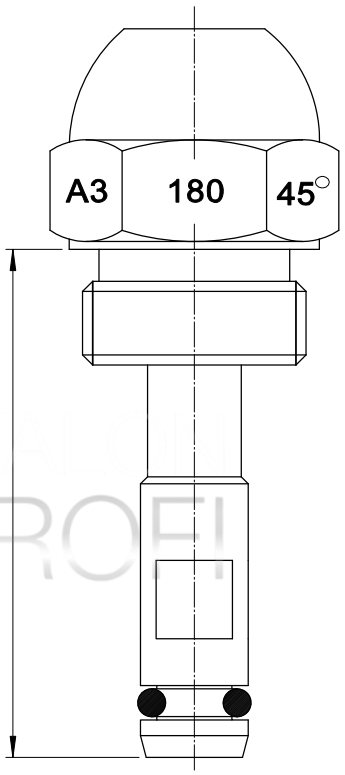
COMBUSTION HEAD POSITION ADJUSTMENT



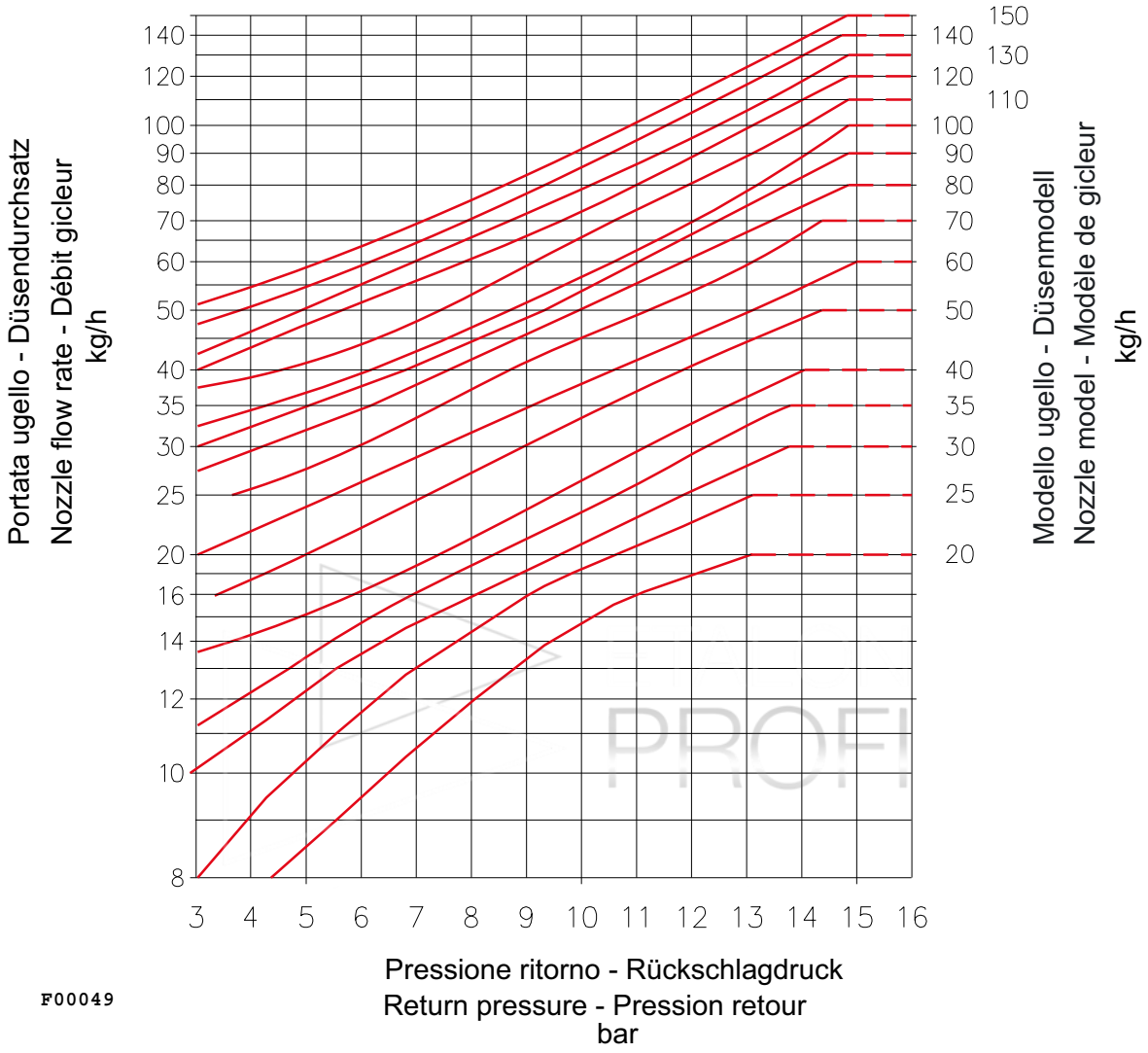
CALIBRATION OF INDUSTRIAL NOZZLES WITH RETURN BERGONZO A3-45 °

Enrollment Flow [kg/h]	Fuel Flow [kg/h]	
	[max]	[min]
3	3	1
4	4	1
5	5	2
7.5	7.5	2.5
10	10	3
15	15	5
20	20	7
25	25	8
30	30	10
35	35	12
40	40	13
45	45	15
50	50	17
55	55	18
60	60	20
65	65	22
70	70	23
80	80	27
90	90	30
100	100	33
110	110	37
120	120	40
130	130	43
140	140	47
150	150	50
160	160	53
170	170	57
180	180	60
190	190	63
200	200	67
210	210	70
220	220	73
230	230	77
240	240	80

F00046



Pump pressure 20 bar.
Return pressure Max. : see the nozzle curve diagram.
Return pressure Min.: 6 bar



Maximum pump pressure: 20 bar.

ELECTRODES POSITIONING

Millimeters [mm]

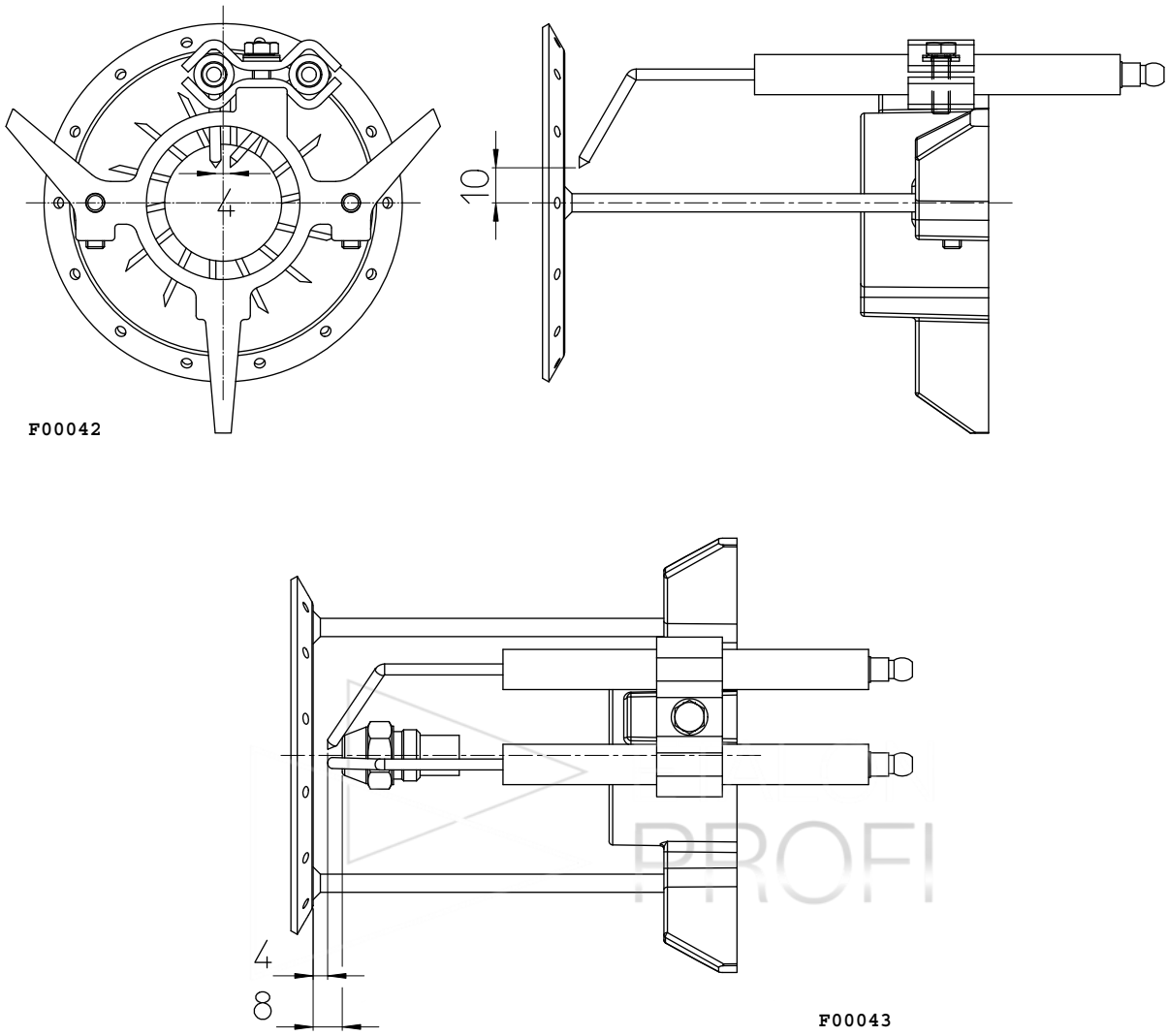
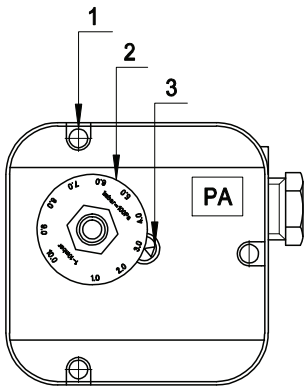


Fig. 10 Electrode positioning

CALIBRATION OF THE AIR PRESSURE SWITCH (PA)

The air pressure switch checks the minimum AIR pressure of the fan.



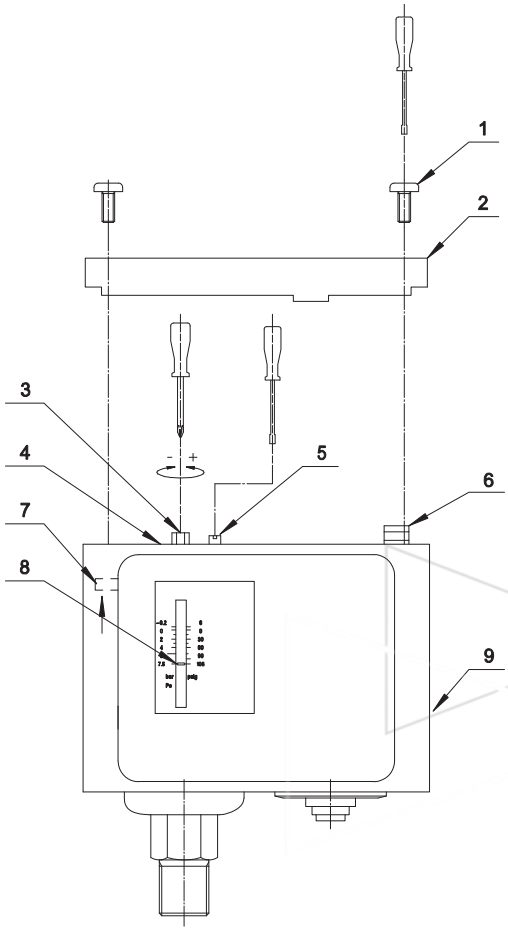
The air pressure switch controls the minimum AIR pressure of the fan. When the air pressure value supplied by the fan is lower than the pressure switch set-point, the burner goes into lockout.
To calibrate the air pressure switch, proceed as follows:

A) Adjust the air pressure switch to minimum;
B) Turn on the burner;
C) Measure the air pressure on the air pressure switch pressure point;
D) Calibrate the air pressure switch at 50% of the measured pressure value;
E) Turn the burner off and on again to check for correct operation.

Fig. 11 1-Cover screw 2-Regulation collar 3-Regulation indicator

CALIBRATION OF THE MAXIMUM LIGHT OIL PRESSURE SWITCH DANFOSS (PRMAX)

The maximum light-oil pressure switch is a security device with manual reset which supervises the pressure of the light-oil on the return pipe and it intervenes when the pressure rises higher then the setpoint.
The pressure switch is positioned between the regolator of the return pressure from the nozzle and the backstrike valve (see).
The calibration is already done in the factory at 7,5 bar. In the case if the pressure rises up over setting value the pressure switch goes into lockout and stop the burner.



LEGEND:

1- Screws
2- Top cover
3- Adjustment screw
4- Adjustment plaque
5- Lock-screwadjustment plaque
6- Reset button
7- Test lever
8- Adjustment index
9- Front cover

Fig. 12 Maximum light oil pressure switch Danfoss

For reset proceed like follows:
A) Find out why the pressure has been higher then the calibration (f.ex. closed shutters or valves, locked backstrike valves, return pipe is clogged).
B) Take away the 2 screws and open the cover.
C) Push the reset button.
D) Close the cover.

Verify periodical the function of the pressure switch like follow:
A) Take away the 2 screws and open the cover.
B) Get off the front cover.
C) Push the test lever in upper position, the pressure switch is lockout.
D) Push the reset button.
E) Close the front cover.
F) Close the upper cover.

In the case of sostitution calibrate the pressure switch like follows:
A) Take away the 2 screws and open the cover.
B) Open the lock - screw and take away the regulation plaque.
C) Turn the regulation screw till the indication is 7,5 bar.
D) Reassemble the regulation plaque.
E) Close the cover.

Before any operation:
- Shut down the burner and disconnect current using the main switch.
- Close the fuel valve.

The maintenance should be carried out by professional qualified people and under observation of the current applicable laws and standards, because bad maintenance can cause damages to people, animals or things
Maintenance operations, calibration and substitution of unperfect components should be performed by a service center authorized by the manufacturer and only original components can be used.

Main maintenance operations:
Clean the outside of the burner;
Clean the intake;
Verify the combustion values: if necessary recalibrate the burner;
Check and clean the photocell or flame probe;
Check and clean fuel filter, substitute it fi needed;
Check the integrity of fuel tubes;
Extract, examine and clean the combustion head: verify its integrity, shape and correct positioning;
Check and clean the fan;
Check the electrodes, clean them and substitute them if needed;

EXTRACTION OF THE COMBUSTION HEAD

ATTENTION: REMOVE VOLTAGE!

it is possible to take out the head group without removing the burner from the boiler:

a) Take off the cover (pos.9) by loosening the screws (pos.10)
b) Loosen the connection (pos.7) and the screws (pos.8)
c) Take out the head group (pos.11) and pull the ignition cables.

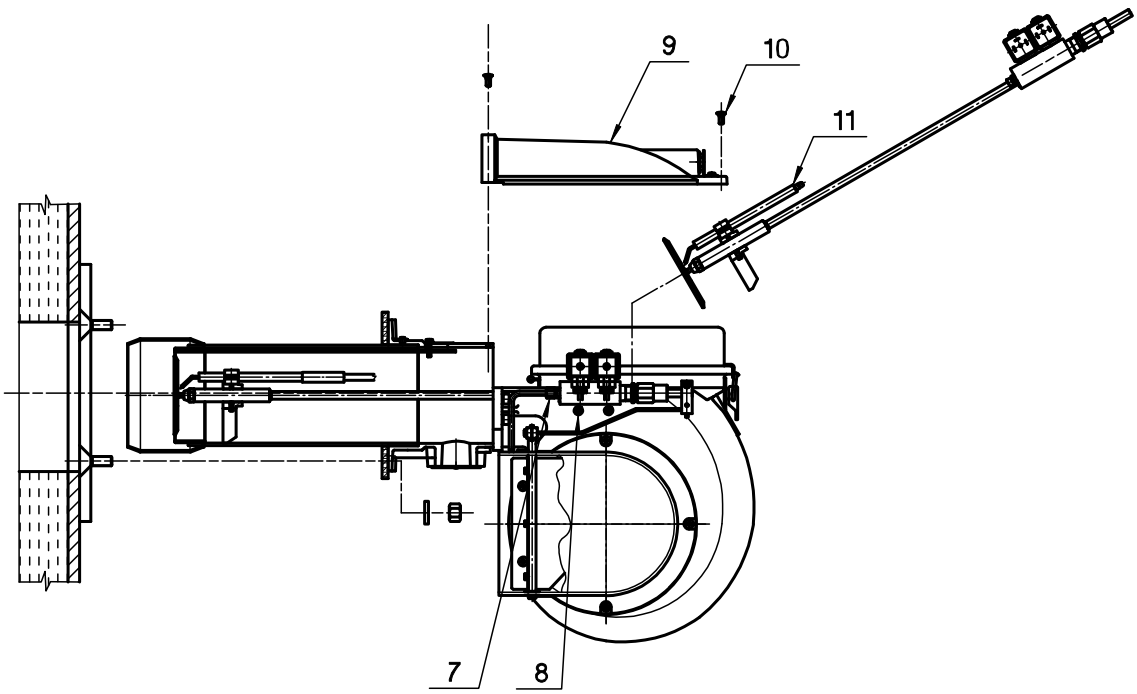


Fig. 13 Extraction of the combustion head

POSSIBLE CAUSES - SOLUTIONS

TYPE OF IRREGULARITY	PROBABLE CAUSE	RIMEDY
The control-box stops with flame (red light on). The failure is limited to the flame-controlling device.	1) Photoresistance is cut off or dirty with smoke.	1) Clean or replace it.
	2) Insufficient draught.	2) Check all smoke circuits inside the boiler and the chimney.
	3) The photo-resistance circuit is broken.	3) Replace the control-box.
	4) Dirty disk or mouth.	4)To be cleaned.
Not well-shaped flame with smoke and soot.	1) Insufficient combustion air.	1) Increase combustion air.
	2) Insufficient nozzie since it is dirty or worn out.	2) Clean or replace it.
	3) Clogged boiler pipe or chimney.	3) Clean them.
	4) Low spraying pressure.	4) Bring it to the prescribed value.
The burner does not start	1) Open contact in (Boiler or room) thermo-stats or pressure-switches.	1) Increase the value or wait for them to close by natural decrease in temperature or pressure.
	2) Short-circuited photo-resistance.	2) Replace it.
	3) There is no voltage because of the an open contact in the main switch or the meter overload-release, or no voltage in the line.	3) Close the contact of the switches or wait for voltage to be supplied again.
	4) The thermo-stats line was not carried out according to the diagram or thermo-stats did not close their contacts.	4) Check thermo-stat connections.
	5) Failure inside the control-box.	5) Replace it.
Defective flame with sparks.	1) Spraying pressure is too low.	1) Bring it to the expected value.
	2) Too much combustion air.	2) Decrease combustion air.
	3) Insufficient nozzle since it is dirty or worn out.	3) Clean or replace it.
	4) Water in fuel.	4) Discharge it from the tank by using a suitable pump (never use the burner pump to carry out this operation).
The control-box stops the burner without spraying fuel (red light on).	1) There is one phase missing.	1) Check the feeder line.
	2) Insufficient electric motor.	2) Repair or replace it.
	3) Light-oil does not reach the pump.	3) Check the suction pipe.
	4) No light-oil inside the tank.	4) Fill with fuel.
	5) Closed gate-valve in suction pipe.	5) Open it.
	6) Clogged nozzle	6) Disassemble and clean it completely.
	7) Motor (three-phase) rotating in the opposite direction as that indicated by the arrow.	7) Invert a phase in the input switch.

TYPE OF IRREGULARITY	PROBABLE CAUSE	RIMEDY
The control-box stops the burner with fuel spraying but no flame (red light on).	1) The ignition circuit is broken.	1) Check the circuit completely.
	2) The ignition transformer cables have dried over time.	2) Replace them.
	3) The ignition transformer cables are not well connected.	3) Fasten them.
	4) The ignition transformer is cut off.	4) Replace it.
	5) The electrode faces are not at the right distance.	5) Adjust them to the prescribed position.
	6) Electrodes discharge to earth since they are dirty or with a cracked insulation; also check under the clamps fastening the insulating materials.	6) Clean or, if necessary, replace them.

SPARE PARTS AND DISPOSAL

It shall be used only original spare parts, for more information refer to the document "General Instructions".

The appliance contains electrical and/or electronic components. Such components are to dispose of in according to local legislations.

FBR
BURNERS MADE IN ITALY

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