

## Instruction for burner

**EBURN**<sup>®</sup>



**EBURN**<sup>®</sup>

**MODEL: M 3 、 6、 11、 17、 20、 30、 35 GF  
M 17、 20、 30、 35 GRF**

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- Read carefully the instructions before starting the burner and service it
  - The works on the burner and on the system have to be carried out only by competent people.
  - The system electric feeding must be disconnected before starting working on it
- If the works are not carried out correctly it is possible to cause dangerous accidents.

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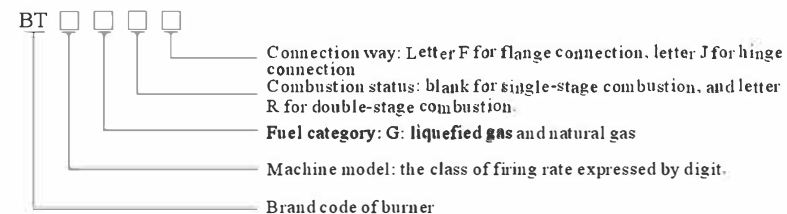
## 五、( L.P.G. ) INSTRUCTION

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## 1.SUMMARIZE

### 1. Description of burner model

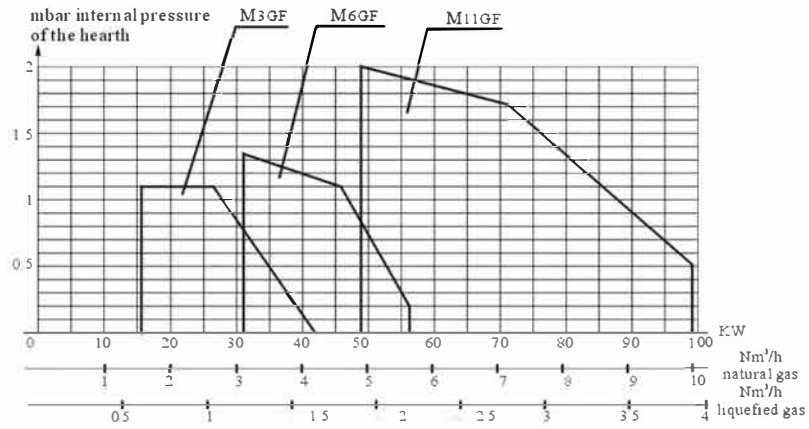


### 2. Technical parameters

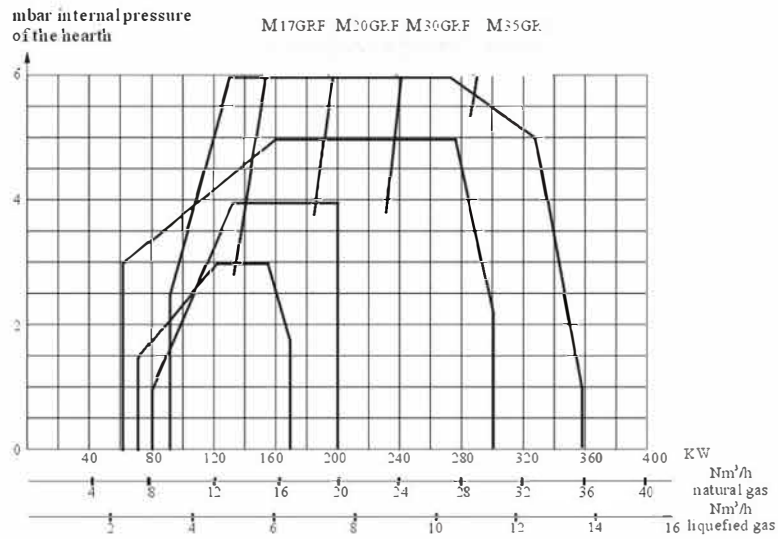
Table 1 Technical parameters of burner

Burner Model	Output power kW	Gas quantity Nm <sup>3</sup> /h	Natural gas bar Min pressure mbar	Gas quantity Nm <sup>3</sup> /h (liquefied gas)	Motor power W	Power supply
M3GF	16.3 ~ 41.9	1.6 ~ 4.2	12	0.64 ~ 1.63	110	230V 50Hz
M6GF	30.6 ~ 56.3	3.1 ~ 5.7	12	1.2 ~ 2.2	110	
M11GF	48.8 ~ 99	4.9 ~ 10	12	1.9 ~ 3.9	110	
M17GF	69 ~ 168	7 ~ 17	15	2.7 ~ 6.6	150	
M20GF	50 ~ 200	5.1 ~ 20.7	15	2.4 ~ 8	370	
M30GF	60 ~ 300	6.1 ~ 30.3	13	2.4 ~ 11.8	370	
M35GF	90 ~ 358	9.1 ~ 36.2	13	3.5 ~ 14	370	
M17GRF	69 ~ 168	7 ~ 17	15	2.7 ~ 6.6	150	
M20GRF	50 ~ 200	6.1 ~ 20.7	15	2.4 ~ 8	370	
M30GRF	60 ~ 300	6.1 ~ 30.3	13	2.4 ~ 11.8	370	
M35GRF	90 ~ 358	9.1 ~ 36.2	13	3.5 ~ 14	370	

3. Refer to drawing 1 and drawing 2 for operation curve

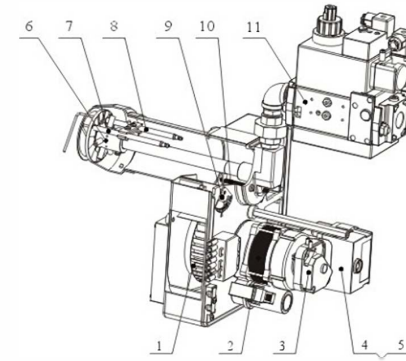


Drawing 1 Operation curve of M 3~11 burner



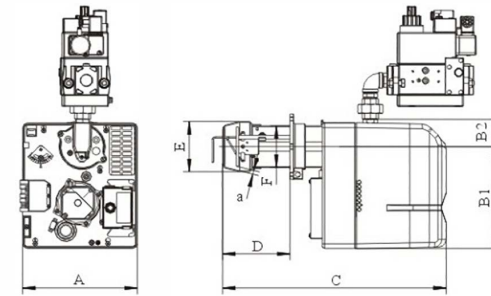
Drawing 1 Operation curve of M 17~35 burner

4. Structure of burner, refer to drawing 3~drawing 7, table 2 and table 3 for main parts and outline size



Drawing 3 Assembly of M3~11 GF burner

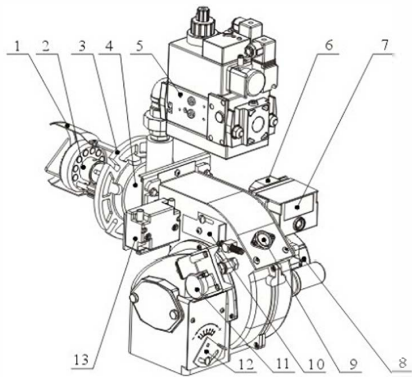
- 1. Blade wheel    2. Motor    3. Air pressure switch    4. Program controller
- 5. Ignition transformer    6. Mixing chamber    7. Electrode    8. Ion probe
- 9. Air door adjusting plate    10. Temper screw    11. Combined valve



Drawing 4 Outline size of M3-11GF burner

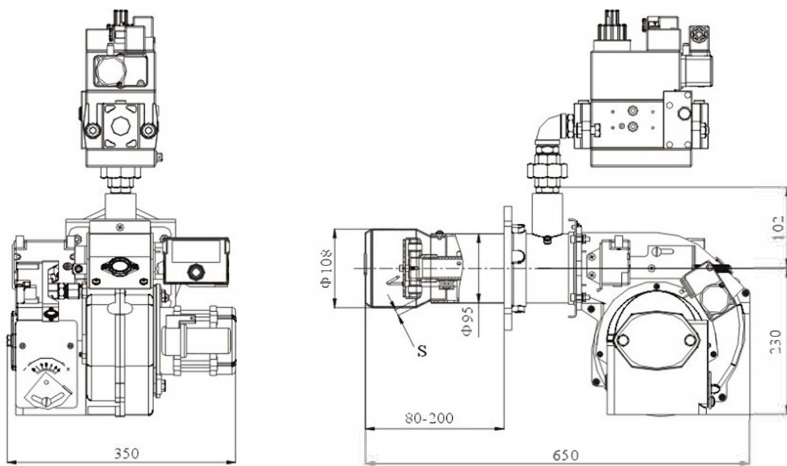
Table 2 Outline size of M3~11 GF burner

Model	A	B1	B2	C	D	E	F
M3GF	245	218.5	53	410	50-105	90	90
M6GF	245	218.5	53	410	50-105	90	90
M11GF	245	218.5	53	475	90-150	108	90

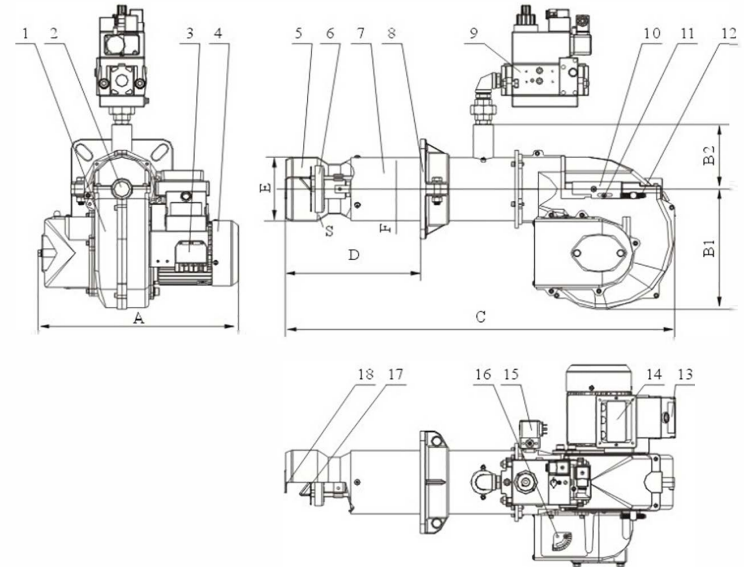


Drawing 5 Assembly of M17GF type burner

- 1. Combustion head    2. Mixing chamber    3. Mounting flange    4. Fire tube
- 5. Gas valve        6. 7-jack socket    7. Program controller 8. Motor
- 9. Peep sight        10. Adjusting mechanism of mixing chamber
- 11. Air pressure switch    12. Air door adjusting plate
- 13. Ignition transformer



Drawing 7 Main parts an dm17GF burner



Drawing 7 Main parts and outline size of M20.30.35 burner

- 1. Enclosure        2. Peep sight        3. 7-jack socket    4. Motor
- 5. Combustion head    6. Mixing chamber    7. Fire tube
- 8. Mounting flange    9. Gas valve        10. Dead plate    11. Fastening screw
- 12. Temper screw    13. Program controller    15. Air pressure switch
- 14. Ignition transformer    16. Air door adjusting plate    17. Ignition electrode
- 18. Ion probe

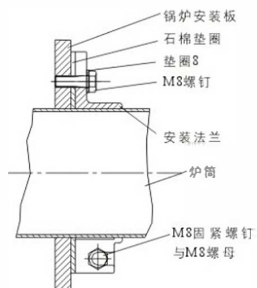
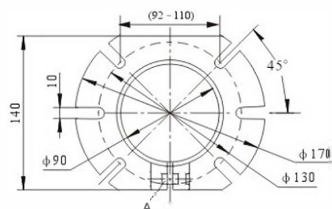
Table 3 Outline size of M20~251GF burner

Model	A	B1	B2	C	D	E	F
M 20GF M 20GRF	475	263	102	740	120 ~ 280	134	114
M 30GF M 30GRF	475	263	102	835	170 ~ 300	135	133
M 35GF M 35GRF	475	263	102	925	130 ~ 350	155	133

## II. Installation

### 1. Installation of M3~11 type burner

Refer to drawing 8 for outline and size of mounting flange



Drawing 8 Mounting flange for type M3~11 Drawing 9 Installation of M3~11 type burner

There are six slots for the mounting flange, two horizontal slots can be used and fixed with two screws, also four slots formed 45 degree angle can be used and screwed with four screws, the central distance is from  $\phi 130$  to  $\phi 155$ . Finish selecting the position of fixing screw, drill M8 bolt hole in the corresponding position of boiler mounting plate, the hole shall be larger than that of fire tube or combustion head (refer to table 2 for the fire tube or combustion head size), insert the combustion head of burner and fire tube into the mounting plate hole of boiler, as shown in the drawing 9, put on asbestos gasket and mounting flange. Adjust the fire tube, and let it reach a certain distance in the hearth, pass the hole shown in the drawing 8A with M8 fastening screw, and tighten M8 nut, clamp the fire tube, at last, fasten the flange on the mounting plate of boiler with two or four M8 screws.

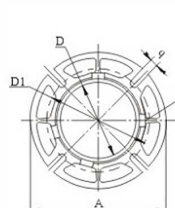
### 2. Installation of other burners

Refer to drawing 10, drawing 11 and table 4 for the outline and main size of mounting flange

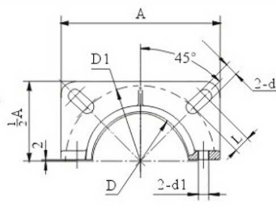
The installation methods and steps are the same as those above mentioned, complement more information that an asbestos rope is filled in the groove of mounting flange at the side of boiler, to get the effective heat insulation. For M17 type boiler at D position, the fire tube is fixed by the way of holding with the M8 screw, and for M20~35 type burner, use two screws to pass  $d_1$  hole (see drawing 11), then tighten the nut, clamp the fire tube with two mounting flanges.

Table 4 Main size of mounting flange

Model	D	D1	A	d	d1	L
M17 type 95	130	170	10	M8		/
M20 type	114	166	186	14	14	20
M30 type	133	205	216	18	14	22
M35 type	133	205	216	18	14	22



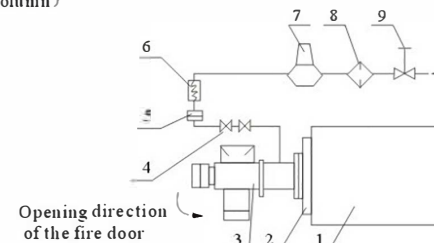
Drawing 10 M17 type mounting flange



Drawing 11 M20~35 type mounting flange

## 3. Gas supply system of burner

1) Refer to drawing 12 for low pressure gas supply system under the gas pressure below 4KPa (400mm water column)



Drawing 12 Low pressure gas supply system

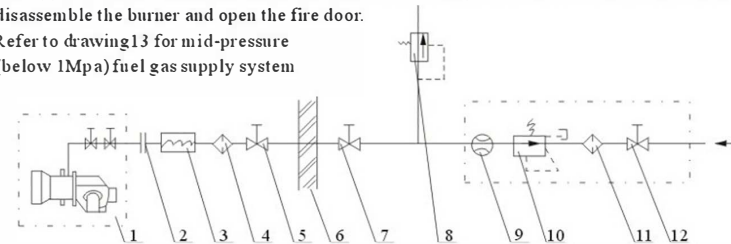
1. Boiler
2. Fire door
3. Burner
4. Fuel gas valve block
5. Pipe coupling
6. Shockproof component
7. Manostat
8. Filter
9. Shut-off valve

Mount the coupling 5, shockproof component 6, manostat or relief valve 7, filter 8 and shut-off valve 9 in front of gas valve, the diameter and length of fuel gas pipe are proportional to the fuel gas capacity, the resistance loss doesn't exceed 50Pa, the coupling sealing shall be perfect.

It's worth noting that:

- a. To prevent pressure drop during igniting, the length of pipeline between manostat and burner shall be 1.5~2m, this pipe diameter shall not be less than the diameter of pipe at the connection place of burner.
- b. The manostat shall be installed on the horizontal pipe, not be installed in vertical.
- c. It's suggested that an elbow should be mounted on the fuel gas pipeline in front of demountable coupling, to disassemble the burner and open the fire door.

2) Refer to drawing 13 for mid-pressure (below 1Mpa) fuel gas supply system



Drawing 13 Mid pressure gas supply system

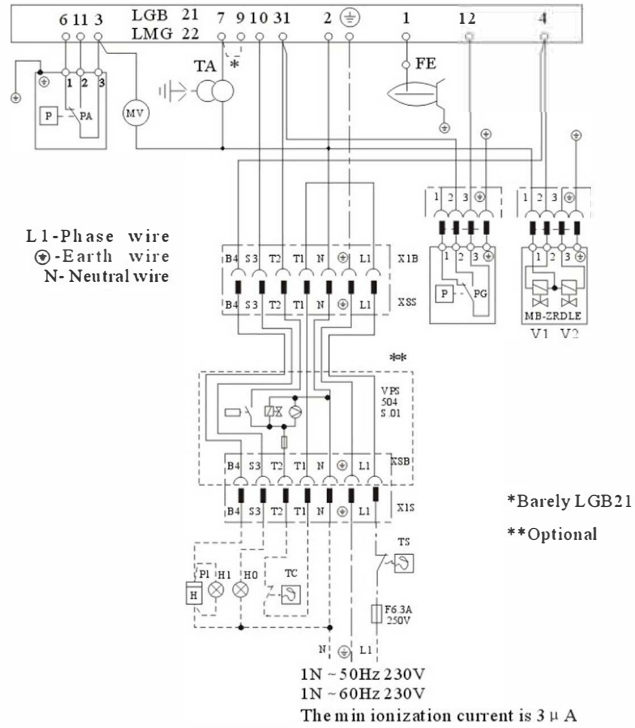
1. Burner and gas valve
2. Coupling flange
3. Shockproof device
4. Filter
5. Ball valve
6. Wall
7. Emergency shut-off valve
8. Overflow valve
9. Flow meter and instrument
10. Relief valve
11. Filter
12. Shut-off valve

When the fuel gas pressure is too high, a set of relief equipment including relief valve and flow meter must be equipped, this set of equipment is provided by user or fuel gas company, but it shall be installed as per the rules of fuel gas company.

When several burners work synchronously, it is suggested that each burner should be provided with one set of relief equipment to make sure the stable conveying and correct adjustment. The relief valve capacity shall be big enough, usually is two times larger than the max burning capacity of burner.

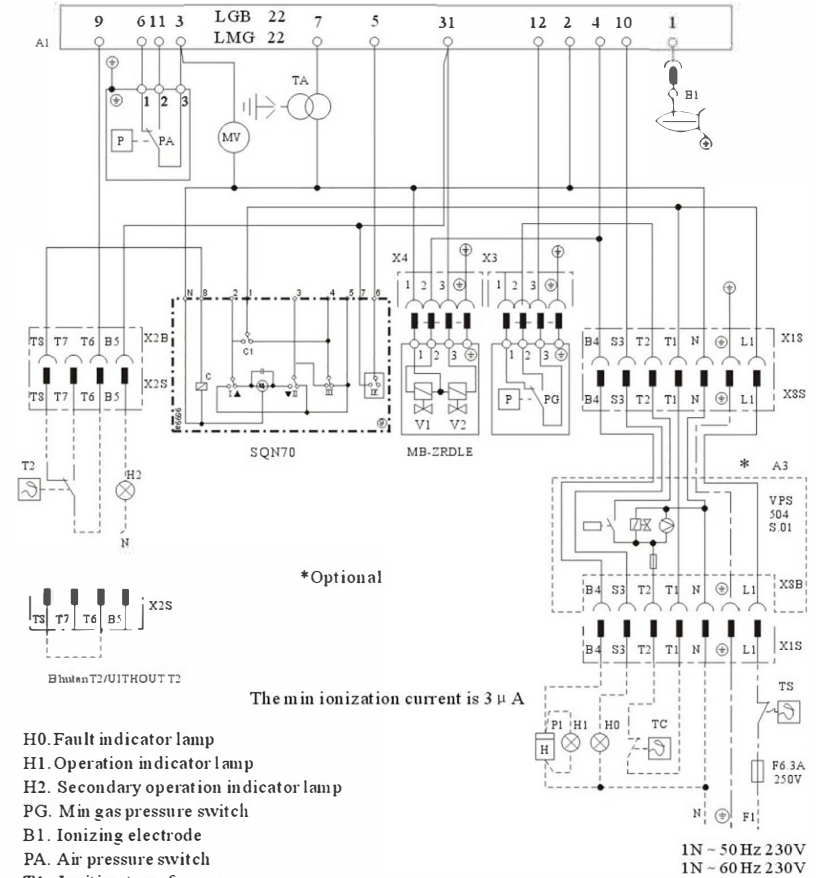
#### 4. Wiring diagram

Note: This drawing is only for reference, because the functions or optional parts are different, the actual connection will be various possibly, user shall take the real object or the drawing along with the machine as to allow.



Drawing 15 Wiring of M17.20.30.35GRF burner

- |                          |                              |                            |
|--------------------------|------------------------------|----------------------------|
| H0. Fault indicator lamp | H1. Operation indicator lamp | PG. Gas pressure switch    |
| Fe. Ion probe            | PA. Air pressure switch      | TA. Ignition transformer   |
| TS. Safety thermostat    | TC. Boiler thermostat        | V1, V2. Gas solenoid valve |
| MV. Fan motor            | P1. Counter                  | VPS504- Leak detector      |
| LGB21/LMG22 Control box  |                              |                            |



Drawing 15 Wiring of M17.20.30.35GRF burner

### 三. Start and run

#### 1. Working principle and working flow of the burner

Put through the power supply, make gas pressure inspection, if the air supply pressure is larger than the min pressure, boiler steam pressure or hot water temperature has not reached the requests, start the burner, motor works, open the air door to extreme wide, proceed to pre-purge. If the air pressure is tested normal, close the air door at suitable wideness, returns to the ignition position, that is the primary combustion state position, ignition transformer is powered on and light a fire, gas solenoid valve is opened to supply gas, during burning, the electric ion probe will make flame inspection and track. If necessary, restart the secondary combustion and augment the fire power to provide more heat energy.

#### 2. Prepare for starting

- 1) Before starting, open the exhaust valve of boiler and chimney to outlet smoke.
- 2) Open the valve on air supply pipeline to check if the air supply is in accordance with the requests.
- 3) After the air delivery pipeline is connected with the burner, please replace the air remained in the pipeline with gas, pay regard to safety.
- 4) It must have water in the boiler, keep the valves on the water supply pipeline open.
- 5) Make sure that the circuit wiring is right, the voltage is in accordance with the requirements and the rotation direction of the motor is correct. If it rotates in wrong direction, just exchange the two wire of motor.
- 6) The secondary air passage between combustion head and mixing chamber should not be too small. (Refer to the adjustment part for details, adjustment of combustion head).
- 7) Regulate the gas consumption to the primary combustion flow rate position (Refer to the adjustment part for details, valve adjustment).
- 8) Adjust the opening extent of air door to a suitable degree to make it easy for igniting, and also enable it own right air capacity for primary combustion. (Refer to the adjustment part for details, air door adjusting)
- 9) The combustion head should be concentric with the mixing chamber, gaps around should be equal (Refer to the adjustment part for details, mixing chamber's alignment adjustment)
- 10) Mount a U-shape water pressure gage of reasonable pressure measurement range on the adapter of gas pressure switch for inspecting and measuring the supplied air pressure.

#### 3. Start and run

- 1) Put through the power supply, close the boiler temperature switch and pressure switch, motor runs and supplies air. Servo motor opens the air door to extreme wide, and proceed to pre-purge.
- 2) When finishing pre-purging, the air door returns to the ignition position, and ignition transformer is powered on and begins to ignite
- 3) 3s later of ignition transformer starting, primary gas solenoid valve and relief valve will open at the same time (use flow regulator to set the gas flow rate for starting beforehand, enters into the primary combustion state, Make adjustment of burning capacity and ratio of gas and air).
- 4) During ignition, ion probe enters into working state. (If the ignition is failed, and ion probe does not detect the flame, 2s later of opening, the primary gas solenoid valve will close up automatically, does not supply gas any more, and enters into lock state).
- 5) When finishing setting the primary fire, close the burner, switch on the secondary thermostatic switch or pressure switch, and turn on the main switch, restart the burner to make it enter into secondary fire burning status.
- 6) When the temperature of hot water or vapor pressure in the boiler exceeds the set value of secondary fire thermostatic switch or pressure switch, this switch will break, and the burner will get into the primary fire burning status automatically (the high temperature switch is connected to NO position).
- 7) When the temperature of hot water or vapor pressure in the boiler exceeds the set value, this temperature switch or pressure switch will break, then the burner will stop burning.
- 8) When the boiler thermostat is out of use, the temperature of hot water rises continuously, when it reaches to the ultimate set value of thermostat, the thermostat will be short circuit at once, and the burner will stop burning.
- 9) During starting, any symptom on any procedure will cause the burner to stop. Only when all the symptoms are remedied that you can restart the machine by pressing the reset button manually.

#### 4. Verify the safety device

- 1) For the pressure switch, when the inlet air pressure is lower than the set value of air pressure switch, the burner shall stop automatically and alarm.
- 2) For ion probe, when the connecting wire of ion probe is disconnected or the ion probe leaves the flame, the burner shall get into the status of locking at once.
- 3) When the gas pressure is lower than the min value or higher than the max value of pressure switch, burner shall stop working.
- 4) When the temperature of hot water in the boiler is higher than both set values of boiler thermostatic switch and ultimate thermostatic switch, these two switches will cut off the circuit; when the vapor pressure in the boiler is higher than both set values of boiler pressure switch and ultimate pressure switch, these two switch will also cut off the circuit.

### Adjustment

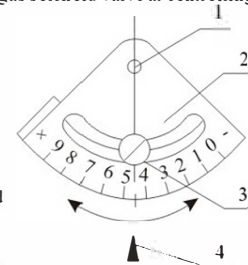
#### 1. Adjusting mechanism of air door

Because the burner has two stages, namely single stage (one-section fire) and double stage (two-section fire), the adjustment of air door also has single stage and double stage. The single-stage one is operated by hand, the air supply capacity is controlled through rotating the adjusting plate of air door, and the two-stage one that uses opening of air door plate controlled by servo motor to meet the air demand at small fire burning and intense fire burning respectively as well as the time for opening the fuel gas solenoid valve at controlling the intense burning.

#### Adjustment of single-stage burning air door

Refer to drawing 3 and drawing 16 for M3~11GF type burner

Loose the locking screw 3, rotate the adjusting plate 2 of air door and air door shaft 1 that is connected with it, to drive the air door plate to rotate together. The opening of air door is displayed with the digit on the adjusting plate of air door corresponding to



triangle indication mark 4. If the adjusting plate of air door rotates

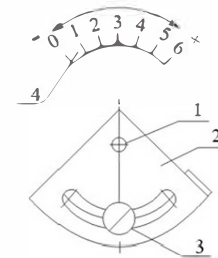
CW, the digit pointed by triangle indication mark will get small, the air door will be closed a little, consequently, the air capacity will go down. on the contrary, the air capacity will go up. Adjust properly and fasten with locking screw 3.

Drawing 16 M3~11GF air door adjustment

1. Shaft of air door
2. Adjusting plate of air door
3. Locking screw
4. Triangle indication mark

M17GF type burner, as shown in drawing 5 and drawing 17. The adjusting way is the same above mentioned, the opening of air door is displayed by the scale pointed by 90° closed angle of air adjusting plate.

The shape of air door adjusting plate and adjusting method of M20~35GF burner is the same as those of type M3~11G. Their difference lie in that M3~11GF air door adjusting plate shall be put in vertical, and the M20~35GF type air door adjusting plate shall be put on the air ear in horizontal because the air inlets from the side.



Drawing 17 Adjustment of M17GF air door

1. Shaft of air door
2. Adjusting plate of air door
3. Locking screw
4. Indication plate

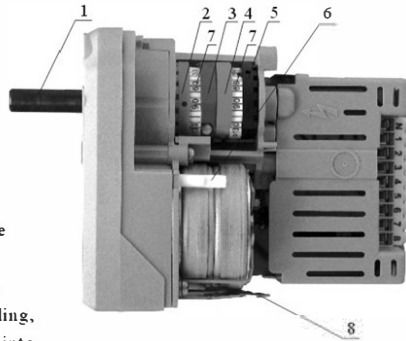
## 2) Two-stage burner door adjustment

The air door of M17~35GRF type burner is controlled by servo motor, the usual servo motor has two types: SQN70 and SQN30. See drawing 18 and drawing 19.

Press the clutch pin 6 of camshaft, to make the motor shaft separate from the cam shaft. Release the holding screw of each cam, and adjust the cam position with the special spanner. The scale pointed by angle scale indication 7 and small triangle tip projection on the cam is the approximate opening of air door.

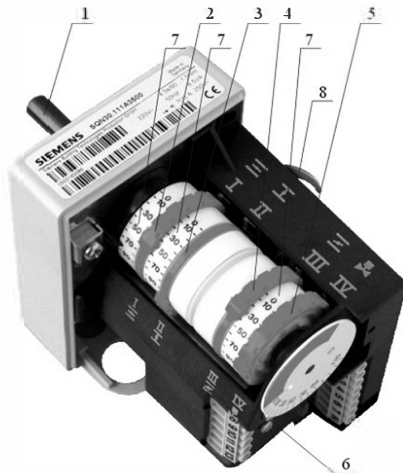
Release the clutch pin 6 of camshaft, to make the motor shaft mesh with the camshaft. When assembling, let the motor shaft be connected with air door shaft into one unit, when the servomotor rotates, four cams touch the sensitive switch one by one, connect to the circuit, and make kinds of orders. In the meantime, the plate of air door also can be stopped at different positions, to meet requirements of three statuses: shut down, burning with small fire, burning with intense fire.

If the adjustment of cams is in line with the requirements, please fix it with the holding screw.



Drawing 18 SQN70 type servo motor

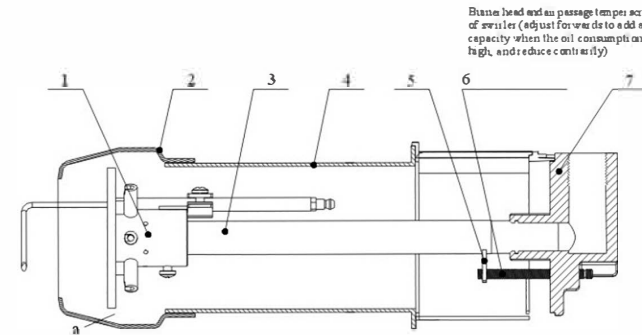
1. Motor shaft
2. Air conditioning cam for secondary fire (full load)
3. Adjusting cam in the air door closing position a stopping running
4. Air conditioning cam for primary fire (partial load)
5. Solenoid valve controls the cam, to control opening time of secondary combustion used oil (or gas) between 4 and 2.
6. Motor camshaft clutch pin
7. Rotation angle scale indication
8. Special spanner



Drawing 19 SQN30 type servo motor

## 2. Adjustment for the relative position of mixing chamber and combustion head

The annular area between the mixing chamber and combustion head is a passage of secondary air, this passage area will influence the capacity and speed of secondary air, it depends on the relative position of mixing chamber and combustion head, so it can be got through adjusting the mixing chamber or combustion head.



Drawing 20 Adjustment for the relative position of mixing chamber and combustion head of M 11GF burner

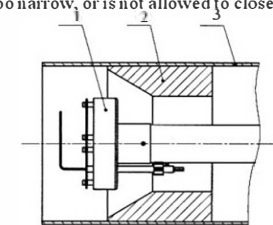
1. Mixing chamber
2. Combustion head
3. Gas-supply pipe
4. Fire tube

5. Driving plate
6. Temper screw
7. Air core seat
- a. Air passage

### 1) M11GF burner

The drawing 20 shows the adjustment for the relative position of mixing chamber and combustion head of M11GF burner, the combustion head 2 and fire tube 4 are fixed with the screws, so are mixing chamber 1 and gas-supply pipe 3, the one end of driving plate 5 is welded on the gas-supply pipe, the other end is clamped in the ring groove of adjusting screw 6, when the temper screw 6 is rotated, the driving plate 5 will drive the gas-supply pipe 3, the mixing chamber 1 will move back and forth, consequently, the passage area between mixing chamber 1 and combustion head 2 will change. If the adjusting screw is rotated CW, the mixing chamber will move forth, and in corresponding, the passage area will reduce, the secondary air capacity will become small, and its speed will get fast. It's worth noting that when the wind speed reaches a certain range, the ignition will be more difficult, the passage area will be narrow, so that the combustion air will be insufficient to cause the serious anoxia. Therefore, the air passage mustn't be adjusted too narrow, or is not allowed to close completely.

2) M3~6GF burner has no combustion head, it depends on an innerring welded in the fire tube to adjust the flame, as shown in the drawing 21, its adjusting ways is the same as that of type M 11, namely, rotate the adjusting screw to drive the gas-supply pipe and mixing chamber to move back and forth, and to get the relative position of mixing chamber and inner ring and change the passage area. Their different point that is when the screw is rotated CW, the mixing chamber moves forth, the passage area will increase, and the secondary air capacity will get large, and it will flow more slowly than before.



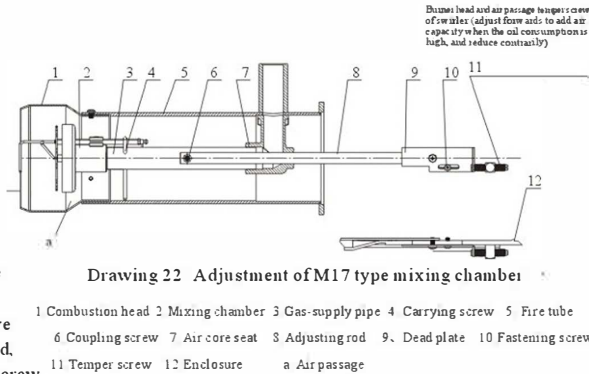
Drawing 21 Adjustment of M3~6 type mixing chamber

1. Mixing chamber
2. Inner ring
3. Fire tube



### 3) Type M17

Like type M11, M17 type also changes the secondary air passage area through moving the mixing chamber, as shown in drawing 22, the combustion head 1 and fire tube 5 are fixed with the screw. When the temper screw 12 is rotated CW, it will drive the dead plate 9, adjusting plate 8, gas-supply pipe 3 and mixing chamber 2 to move back together, in order to reduce the passage area and air capacity, improve air speed. After the adjustment is finished, the unit is locked with the fastening screw.



Drawing 22 Adjustment of M17 type mixing chamber

Three carrying screws 4 are provided for each device, distributed in radial, used for supporting the mixing chamber and gas supply pipe, their heads are equipped the ball nut. In addition, through screwing the gas supply pipe into or giving the proper screw and nut, the mixing chamber and combustion head can be kept concentric, the surrounding gaps are average, so that the combustion head can be prevented being damaged for the deflect on of flame. Other types of machines also have these parts and functions, we won't describe again.

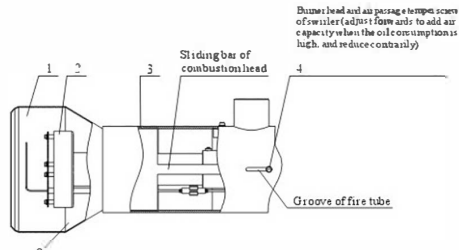
#### 4) Type M30 and type M35

Like type M17, M30 also depends on the temper screw to drive the dead plate, adjusting rod, in order to make the mixing chamber move forth or back, however, there are different points, M30 adjusting rod is connected with mixing chamber directly, not through the gas-supply pipe, so the gas supply pipe is dead, it is fixed with the air core seat, and slips with the mixing chamber.

The adjustment way for relative position of combustion head and mixing chamber of M35 type burner is the same as that of M17 type.

#### 5) Type M20

M20 type changes the secondary air flow area through adjusting the combustion head, as shown in the drawing 23, loose the screw 4 to drive two sliding bars (on the left and right for each) of combustion head to move back and forth along the groove of fire tube, thus to change the relative position of cone face of combustion head and mixing chamber, and get the adjustment efficiently finally. If the combustion head moves back, the secondary air passage will get narrow, its area and air capacity will be smaller, the air will flow more fast, and the flame will be longer than before. On the contrary, when the temper screw 4 moves forth, the air passage area will be larger, and the secondary air passage will increase, the air speed will get slow and the flame will be shorter than before.



Drawing 23 Adjustment of M20 combustion head

1. Combustion head 2. Mixing chamber 3. Fire tube  
4. Temper screw a. Air passage

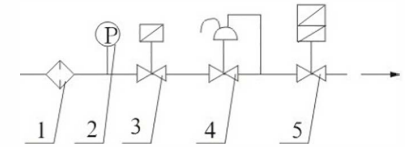
### 3. Adjustment of gas valve

The burner is usually provided with combined gas valves of following brands: DUNGS, BRAHMA, SIMENS, etc. The following description for several valves:

#### 1) DUNGS MB-ZRDLE combined gas valve

##### a. Construction of gas valve

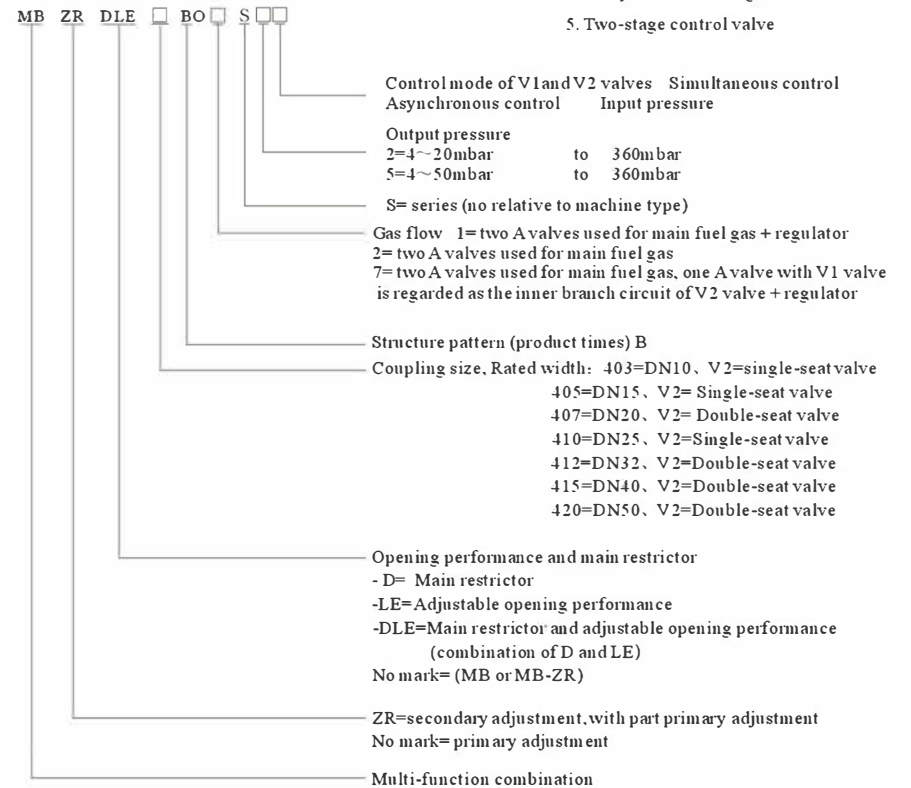
This type of combined valves is made up of filter, min pressure switch, safety valve, booster, two-stage control valve, etc. as shown in drawing 24. Some gas valves are equipped with gas control pressure switch, VPS 504 leak detector.



Drawing 24 Construction of combined gas valve

1. Filter 2. Min pressure switch  
3. Safety valve 4. Regulator  
5. Two-stage control valve

##### b. Model description



## Outline and adjustment

Adjustment of MB-ZRDLE type combined gas valve (see drawing 17)

Gas pressure adjustment: rotate to the both sides, open the cover 5, rotate the adjusting screw 6 CW with the flat head screwdriver, namely, rotate it in  $\square+\square$  direction, the outlet pressure increases, on the contrary, the outlet pressure falls down. This adjustment can be done through mounting hydraulic gage at Pa coupling.

Initial fast open adjustment of valve: loosen the nut cap 1, rotate the temper screw 2 with the groove at the top of nut cap CW, namely, rotate in  $\square-\square$  direction, the air capacity will become small, contrarily, the air capacity will become large. After finishing the adjustment, please tighten the nut cap to the original position.

Gas output flow adjustment for primary burning: loosen the fastening screw 4 (the one of extended round head who is unprinted), tighten secondary flow control sleeve 3 to the end CW, then rotate 1~2 cycles CCW, turn the class 1 flow adjusting ring 9 CW, the flow will reduce, and rotate it CCW, the flow will increase. The total travel is half and three cycles, if it is opened completely, the gas flow will share about 40% of total flow.

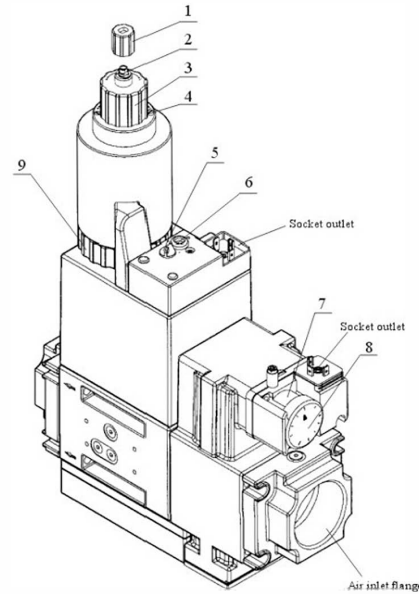
Gas output flow adjustment for secondary burning: loose the fastening screw 4 (the one of extended round head who is unprinted), rotate secondary flow control sleeve 3 CW, the flow will reduce, and rotate it CCW, the flow will increase. The total travel is half and five cycles

After finishing the adjustment, please lock the fastening screw 4 to prevent position changing.

The pressure switch 7, also is referred to as pressure monitor. In order to guarantee the burner to burn stably and get the max heat, please provide the min gas pressure. Therefore, the min pressure switch is provided for all the gas combination valves.

Adjustment of pressure switch 7: remove the cap, rotate the adjusting panel 8 of pressure switch, to make the digit required align with white triangle mark. This digit is the gas pressure value monitored by pressure switch.

Alarm signal of the monitor used for the min pressure switch is connected to normal close position. Namely, when the gas pressure is lower than the set value, once switch on, the red lamp will go on, and the monitor will give an alarm. On the contrary, when the monitor used for the max pressure switch, its alarm signal is connected to the normal open position, only the gas actual pressure is higher than the set value, the circuit can be connected to the electricity, and the monitor will alarm.



Drawing 17 MB-ZRDLE B01 type combined air valve door

1. Nut cap
2. Temper screw
3. Secondary flow control sleeve
4. Fastening screw
5. Cover
6. Adjusting screw
7. Pressure switch
8. Adjusting panel of pressure switch
9. Primary flow adjusting ring

## 2) Adjustment of DUNGS MVDLE type fuel gas single valve See drawing 18

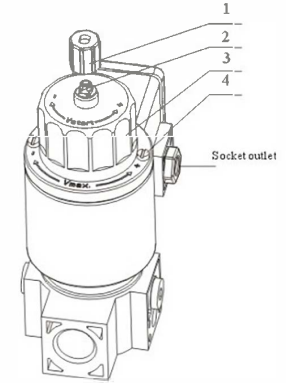
MVDLE is the single-stage solenoid valve, closes without current. It starts slowly and closes fast, has mechanism that adjusts the starting time and fast starting range, and main flow adjustment mechanism.

### a. Adjust the initial fast opening range

Loose the protective cap 1, rotate the temper screw 2 with the groove at the top of protective cap CW, namely, rotate in  $\square-\square$  direction, the initial fast unit will open, and the air capacity will be small, contrarily, the air capacity will be large. The whole travel is about half and four circles, after finishing the adjustment, please tighten the protective cap to the original position.

### B. Adjust main flow

Loose the screw 4 (unpainted), rotate the control sleeve 3 CW, the valve flow area will be shorten, and the air output will reduce, on the contrary, the output will increase. After ending the adjustment, please - tighten the screw 3 again.

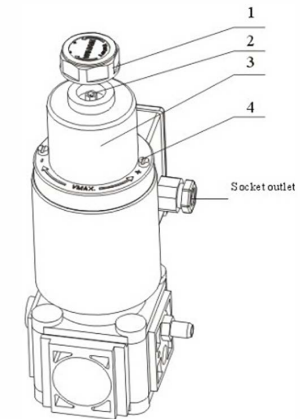


Drawing 18 MVDLE gas valve

1. Protective cap
2. Temper screw
3. Control sleeve
4. Screw (unpainted)

## 3). The adjustment of BRAHMA gas single-stage solenoid valve

is shown in the drawing 19, its function and adjustment methods are similar to those of MVDLE type gas valve.



Drawing 19 MVDLE gas valve

1. Protective cap
2. Temper screw
3. Control sleeve
4. Screw (unpainted)

## II. Operating instruction of liquefied petroleum gas ( L.P.G. )

It is necessary to introduce the common sense about operating liquefied petroleum gas ( L.P.G. )

1) .Approximate operation cost

- The heat value of gassiness L.P.G. is about 22, 000Kcal per cube.
- To get 1 cube gas, about 2Kg L.P.G. shall be required, equal to 4L, from above mentioned, the below approximation of L.P.G. can be calculated. 2200Kcal=1 cube (gassiness)=2Kg L.P.G (liquidness)=4L L.P.G. (liquidness), as per this, the operation cost can be calculated.

2) .Safety measures

Because L.P.G in the state of gas is heavier than air (The relative weight of L.P.G and air is 1.56), and the methane gas relative weight is smaller than air (The relative weight of methane gas and air is 0.60), so the L.P.G. doesn't disperse in the air, but it falls down to the ground (similar to liquid). In terms of this, we shall pay attention to the following items.

- Only use the L.P.G. burner and/or boiler in the house on the ground or open flat, don't install L.P.G equipment in the cellar.
- The room for operating L.P.G must have the ventilation inlet of external wall and shall not have the external locking equipment, the min ventilation inlet area shall be 1/15 of room area, but not smaller than 0.5 square meters. The entrance area must be 1/3 of total area from ground at the bottom of external wall at least.

3) .Conditions required by safety and correct operation of L.P.G. equipment Due to gasification of natural gas, whether the air cylinder or air bottle, they are applicable for the equipment of small power. The gaseous output flow is different depending on the size of air cylinder and the min temperature of the location. Except the equipment of small power, it is essential that a suitable L.P.G heater (carburetor) should be mounted close to decompressor, in order to get smooth operation and safety. The carburetor is a container that shall reach a certain standard and is equipped with the controlling thermostat which heats the liquid gas with the resistance or flowing of thermal liquid. The pressure drop and conversion of state (from liquid to gas) is decided by the great fall of temperature. In general, in the cold season, the temperature is easy to reach the below zero. There may be humidity (water) in the L.P.G., it will freeze to prevent the decompressor operating correctly (like locking the open position), and it would be a dog's breakfast. The carburetor must be mounted close to decompressor, to prevent the liquid oil in the air cylinder being cooled before it reaches the decompressor. In the cold season, the carburetor is indispensable, it can guarantee the normal supply of gaseous fuel gas. The drop of pressure can be done with the suitable decompressor, and now, two-stage decompressors are widely used, because it can

- Avoid the freezing danger and condensed gas
- Diameter of pipeline including first-stage decompressor and second-stage decompressor may be smaller than that required by single-stage decompressor, it can reduce the cost obviously when the supply range is quite large.
- Get the more stable final pressure value. For the double-stage decompressing, the first decompressor is installed near the air bottle (Or the outlet of carburetor), the pressure can be lowered for about 1bar; the first decompressor is installed outside before entering the boiler room, used to reduce the boiler air pressure (usually, 300mm. C.A.=0.03bar). At performing natural gasification, the installation of first-stage regulator must be correct, it shall enable the condensed gas to get into the air bottle.

Note: When the liquefied petroleum gas ( L.P.G. ) is used, the fuel gas pressure provided for burner must be adjusted by regulator special for liquefied petroleum gas ( L.P.G. ), the compressor shall have suitable filter protection.

4) .Burner

The required burner must use liquefied petroleum gas ( L.P.G. ) , and be provided with proper air valve to guarantee its normal ignition and to realize the staged adjustment. Our air valve is applicable for 300mm water column, it is suggested that use the water pressure gage to measure the fuel gas pressure of burner.

Note: The max and min power of burner are the original value of methane burner (The LPG heat value is higher than the methane, in order to combust fully, the air capacity is required to be proportional to the heat produced.)

## 5) Combustion inspection

In order to limit the consumption and avoid problems, please use special devices to adjust the combustion. Please make sure that the percentage of CO does not exceed 0.1% of the allowable value (use combustion analytical instrument).

The loss due to operating the liquefied petroleum gas (L.P.G) burner in device that is without the above safety measures is beyond the coverage granted by us.

## 六. Part 6. Maintenance and repair

- Check regularly, clean the filter, keep the gas flows smoothly .
- Keep the ignition electrode and free probe clean and staying at relative position, guarantee the ignition and combustion process to run smooth. (Notice: Please be very careful during reassembling, fear of shorting the circuit due to earthing the electrode; and then the burner would be locked.)
- Clear the carbon deposition or soot, and keep the combustion head, flame plate and mixing chamber clean. (Notice: only miscible liquids of water and detergent can clean the enclosure.)
- Check the fastening screws of servo motor and air door plate, flow controlling fastening screws of combined air valve and combustion head, to see if they are in well condition. Refer to table 5 for symptom and remedy of burner.

Table 5 Symptom and remedy of burner

Symptom	Possible cause	Remedy
The burner refuses to start	1.Power line has no voltage or low voltage 2.Thermostat has not been wired according the request 3.Fuse is broken or has not been mounted 4. . Controller has not been reset 5.Thermostat is open-circuit	1.Check the circuit and remedy 2. Correct the wiring 3.Momnt or change the fuse 4.Press the reset button 5.Increase the set value, or let the water temperature in the boiler fall down naturally until it closes again.
Burner starts, but the controller does not work	Air pressure switch is wrong set	Reset the pressure value of the switch
Burner starts but is unable to ignite	1. There is air in the combustion gas tube 2. The combustion gas quantity passes through the valve is not enough 3. Ignition electrode and free probe have not been set at the right positions	1 Exhaust the air from the tube 2. Adjust the valve opening extent to increase gas consumption. 3. Check and adjust the positions of ignition electrode and free probe
Burner ignites, but locks during safety time	1. Free probe has not touched the flame 2. Gas pressure switch is wrong set 3. Phase conductor and neutral conductor are wrong wired 4. Ground wire is open-circuit 5. Mutual interference between ionization current and ignition arc	1. Check and adjust the position of free probe 2. Adjust the set value of pressure switch 3. Check the wiring and correct it 4. Check and connect 5. Exchange the ignition transformer and power line
Flame is not stable	1. Air capacity is too high or too low 2. Combustion head has not been set at the right position, and the air speed is too high 3. Gas quantity is too high	1. Check and adjust the air door position 2. Check the position of combustion head 3. Adjust the gas consumption

