



Zhangjiagang Wilford Thermal Technology Co.,Ltd.

Installation & Operation Manual

Vertical Oil Gas Steam Boiler

(LWS) (LSS)

Beloved User

Please read this manual carefully prior to run this machine.

The operation of this equipment have to be carried out only by qualified missionary.

There may cause dangerous accidents if the works are not carried out correctly.

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Attachment: product pictures	

1 Important notes

- Boiler installation and use shall comply with the following laws and regulations: GB50041 "boiler room design specifications"; GB50273 "industrial boiler installation construction and acceptance"; GB4272 "equipment and pipe insulation technology General"; GB/T17954 "industrial boilers economy running"; TSG G0001 "Boiler Safety Technology Supervision"; TSG G0002 "boiler energy saving technical supervision and management procedures" and so on;
- Pls. read the manual in details when operating and maintaining the products.
- Boiler make up water must meet state standards of GB1576 "industrial boiler water quality requirements". Boiler should be equipped with water softener, otherwise it is easy to be scaled and cause lower efficiency and service life, even accident.
- Pipe connected to boiler must meet state standards.
- Do not use low conductivity medium such as distilled water, pure water, it will affect level controlling and measuring.
- To make sure operating safety, terminal electricity should be equipped with suitable leakage protector and be connected to ground reliable by customers. Professionals should tighten and check main circuit connections, power line, controller wiring, burner wiring regularly. Must cut electricity when maintaining and repairing boiler.
- To ensure the normal operation of the burner, oil boiler equipment should use specified oil, the use of poor quality oil and inconsistent oil are prohibited, do regular cleaning for tank, piping, filters, and pumps. Gas boilers should use natural gas or liquefied petroleum gas to meet the requirements. The gas pipeline should be equipped with regulator valves (reducing valves), pressure gauge. Should meet the required flow and pressure of the burner to ensure the efficient operation of the boiler burner.
- Pls. discharge safety valve by hand every week, otherwise any consequence is none of manufacturer's business.
- Boiler should be blowdown twice everyday below pressure 0.15Mpa. Blowdown pipe should be connected to safety place.
- To avoid boiler operating in negative pressure, after blowdown, do not shut down blowdown valve before start up boiler.
- Washing water level gauge (when pressure blow 0.15Mpa), electrode, water tank regularly.
- When environment temperature is below 0 °C , take care of make up water line to avoid damage. After operating, pls. discharge rest water in water pump.
- When shift boiler, do make sure shift documents together with boiler.
- No particular notice when boiler technology is improved and state's regulations changed. There will be some difference between products and the manual, pls. operate as detail parts manual and state updated regulations.

- Any consequences caused by incorrect operation of equipment, or ways not mentioned in the manual, are not in manufacturer’s responsibility.
- Before operating boiler, pls. apply permission from local institution.

2 Installation Description

1. Preparation Work before Installation

Check the completeness of the boiler accessories according to the packing list and the general drawing of the boiler. Check whether there are any damage or deformation. If need lift the large boiler parts, any damage to the heat insulation layer should be avoided.

1.1 Organization and Personnel

The boiler should be in charged by special personnel, the boiler stoker should join in, also need pipe fitter, fitter, lifting operator, cold worker, qualified welder and assistant.

1.2 In order to let the relevant person know and master the relevant items of installation, lifting, running and so on, should organize them to study, let them familiar with the following documents: standard of < Safety Technical Supervision Regulation for Steam Boiler >, the boiler drawings, installation and operation manual.

1.3 Installation Place

1.3.1 The best installation place should be close to the location supply steam, so as to shorten the steam pipeline, decrease the construction fees, decrease the differential pressure and the heat loss.

1.3.2 Power wire should meet related laws.

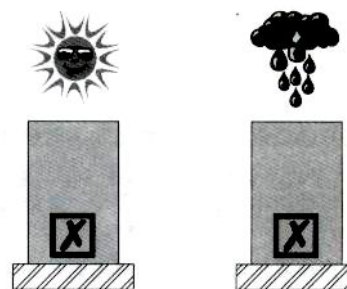
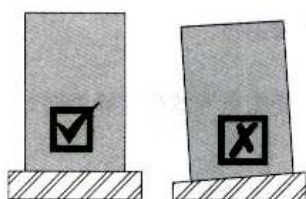
1.3.3 Feeding and draining water should be very convenient.

1.3.4 The arrangement of the boiler room should meet the relevant regulations of chapter 8 < Safety Technical Supervision Regulation for Steam Boiler >.

Before using this machine, please report to the local Labor Department or the quality and technical supervision agency of the State Council according the relevant regulations, then use it when permitted.

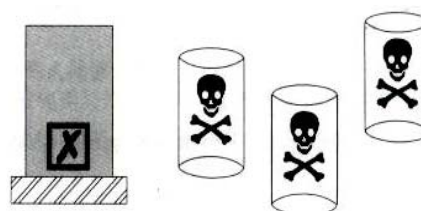
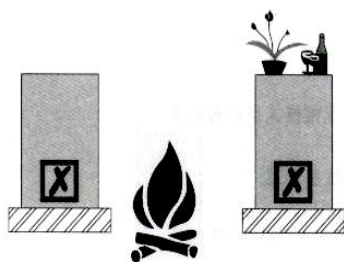
2. Placement

2.1:Notes



⊙ No keeping it on the inclination or un-flat position.

⊙ To avoid keeping on the position has direct sunlight, rain or wet.



⊙ Keeping away from the fire resources and high temperature. No other articles on the upside of the products.

◎ To avoid keeping on the position contains corrosive gas, inflammable and explosive gas.

2.2 Using Surrounding Requirements

◎ Surrounding Temperature $+5^{\circ}\text{C} \sim +40^{\circ}\text{C}$ ($+41^{\circ}\text{F} \sim +104^{\circ}\text{F}$)

◎ Relative Humidity: 45%~85%no dew

◎ Good Ventilation Conditions and Proper Illumination

3 Introduction for boiler structure

3.1 LWS Structure of Body

This boiler heated surface uses three returns to reduce the discharge temperature of the boiler, the up part is the steam space, which has got steam-water separate equipment to improve the steam quality, the mid and down space of the boiler shell is the water space.

The product uses the built-in furnace, no vertical pipe, smoke four return structure, increasing the gas furnace to heat the water transfer effectively, improving thermal efficiency, energy-saving effect is good.. The vertical structure is compact and beautiful, which occupies small space and is easy to install. The design of ductless makes it against burn out because of scaling, and the heat transfer to the pipe wall and the heat-transfer fin in order not to cause stress, to extend the service life.

3.2 Enclosure Settings and Function

Main steam valve——is set on the top of the boiler, it can transport steam to the total steam fitter or the steam header.

Safety valve——is set on the top of the boiler, it can discharge steam to release the boiler pressure when the boiler pressure is too high.

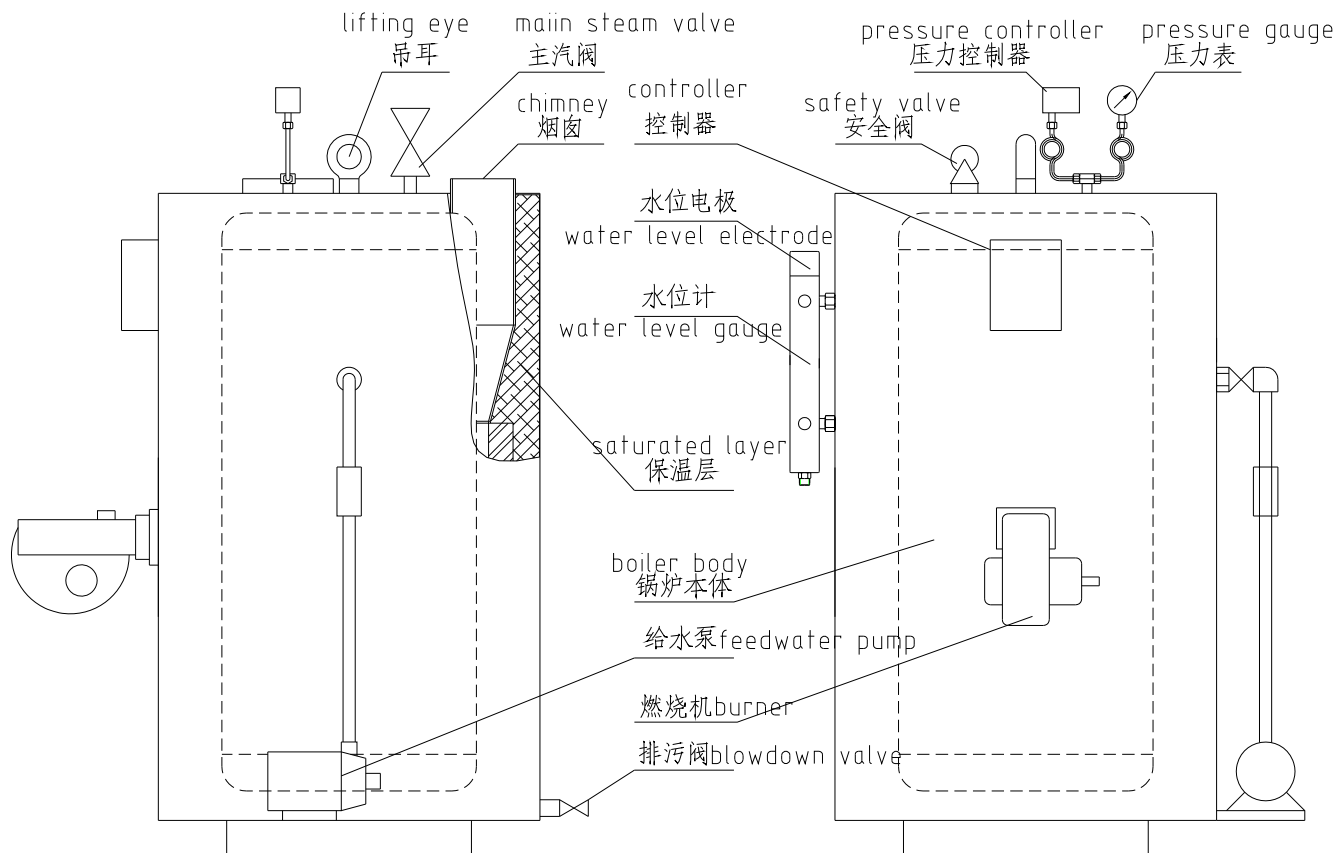
Water gauge and water level controller——is set up and down on the interface of water & steam, the gauge shows the water level in the boiler and supervised by managers; the water level controller

Feedwater pump and the check valve——is set on the side of the boiler to feeding water to the boiler。

Blowdown valve——is set on the bottle of the boiler to discharge the accumulated mud or something inside the boiler.

The outside of the boiler shell is announced by saturated materials and epiboly cold rolling board to decrease the heat loss and the surface temperature of the boiler.

3.4 Structure Sketch



3.5 LSS Structure of Body

This boiler furnace uses tubular pipes and the frame of vertical three returns, the boiler burner uses top-burning structure. Each of the three returns to the flue gas heat transfer, greatly reducing the exhaust smoke temperature and smoke from the fast-pound boost, producing steam faster, reducing preheating the boiler start-up and shutdown of the heat loss and improving the thermal efficiency.

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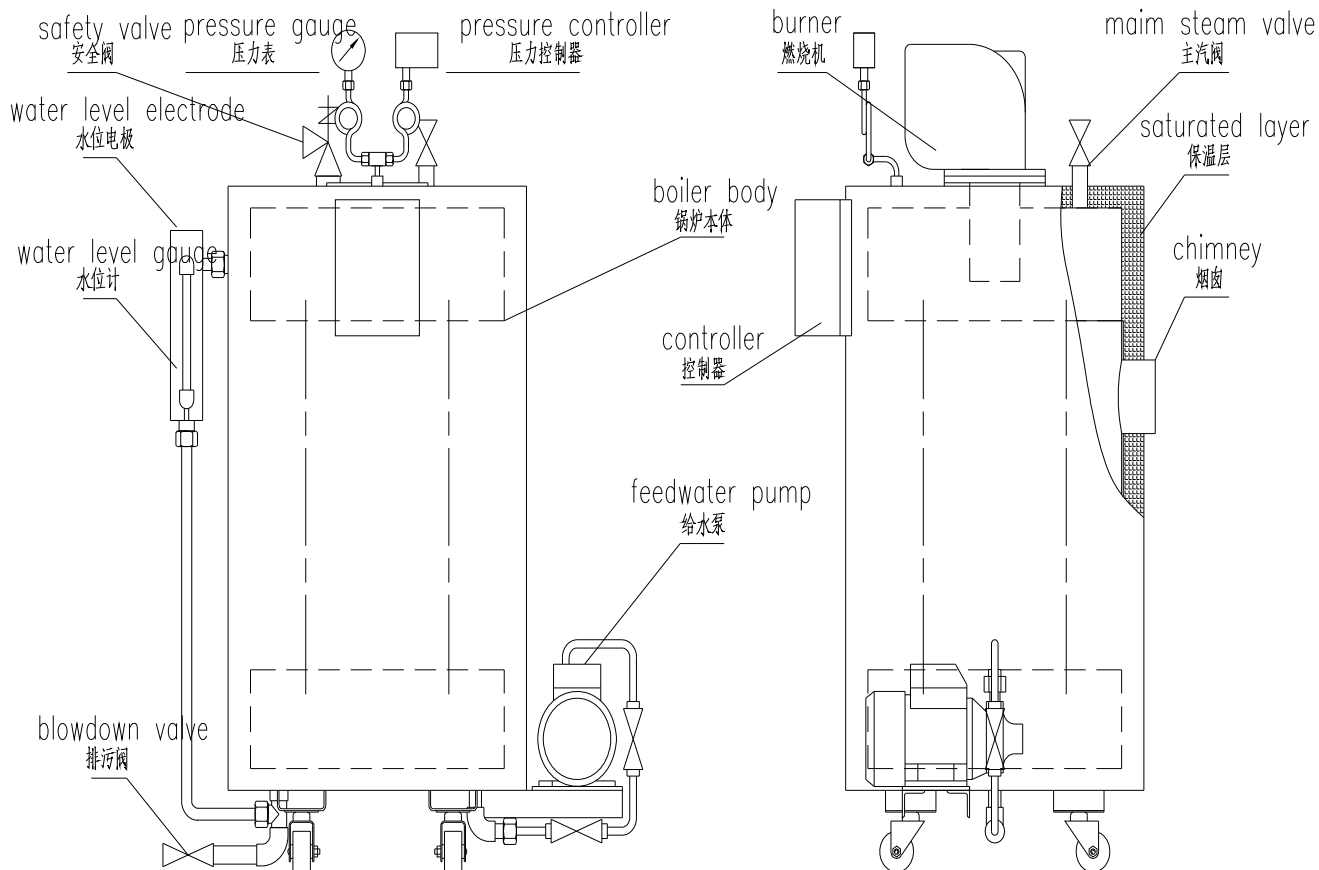
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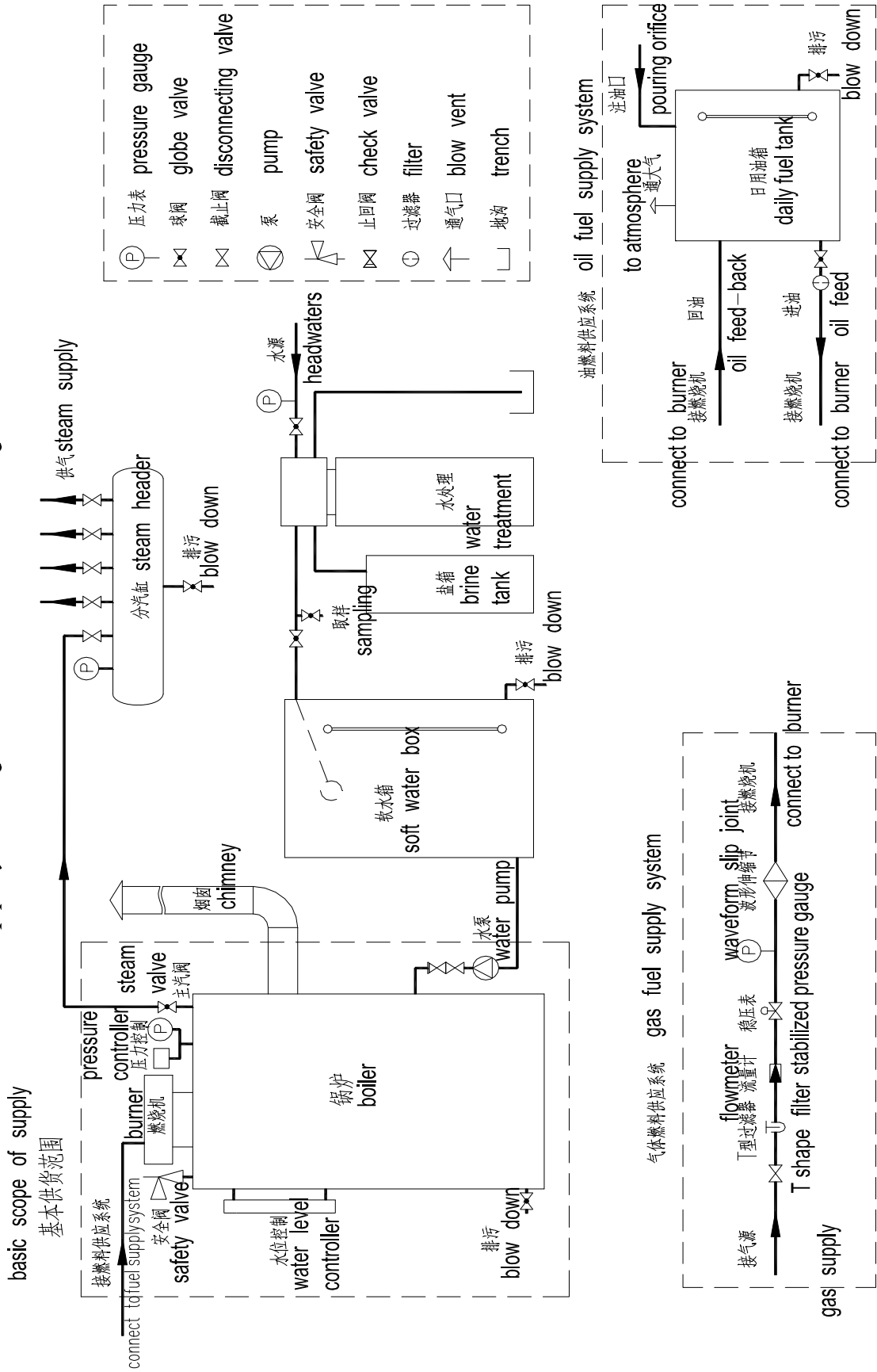
According to the requirements of energy saving boiler, some of the products of this series can be equipped with a fire-tube economizer.

3.9 LSS



5、LSS

LSS系列燃油(气)蒸汽锅炉系统图
General pipe system diagram of LSS series oil-fired (gas) steam boiler



3 Directions for use

1. Installation and Check

Note: for the machine, there may cause any damage when transport, loading or unloading, so it should be checked before operation.

Check all kinds of pipeline and interface to see whether there are any flexible or damage, also, the electric line should be checked to see whether there are looses or other damage.

The connection of the soft facilities and oil tank.(To install a blowdown valve at the lowest end of the natural gas pipeline to convenient for discharging the accumulated water in the pipeline in order not to affect the burning quality.)

Note: the outlet of the safety valve should connected to the safe place outside, and the blow down valve should connected to the sewer.

Note: Any damage caused by non-softened water is not in our guarantee.

To make sure water level electrodes work in good condition, it is not allowed to use low conductivity media, such as distilled water, purified water.

Check all the electric line to see whether they are match up to the instructions in the circuit diagrams. The joint to the power of the machine should install a power-leakage-breaker to protect and to break the electric power.

Note: There must be equipped with the credible earth wire which connect to the machine shell.

1.3 To check whether the water inlet is connect and whether the water box has water in it.(The boiler starts working for first time or when running, if the air goes into the water pump, revolve the discharge thread beside the water outlet, then revolve again when the water is discharged.)

1.4 To check whether the oil (gas) transport pipeline is connected correctly, whether the oil tank has oil in it, whether the oil valve is open, the pressure of gas transport is normal, the blowdown valve is closed, the gas transport valve is open. Please install valves at the gas pipeline beside the gas-fired burner to maintain the burner conveniently.

√ You can start the steam generator after you finished all the inspection that mentioned above.

2. Preparation

2.1 Push down the power button, the indication lamp of “power” is on, the controller send alarming signal because of lacking of water inside the boiler, at the same time, the water pump start working, making up water until get to the limit low water level, the controller stop sending alarming signal, the indication lamp of “boiler run” is on, making up water automatically until get to the high water level, the water pump stop working.

2.2 Making up water to the middle level, the indicator light of burner is on, the electric power is connected, after timelag, light a fire for combustion.

2.3 When the boiler pressure gets to the set point, stop heating



automatically, now you can open the steam valve and use steam.

2.4 While using the steam, the pressure inside the boiler will be drop until it get to the limit low set point, heating will start again automatically.

While using the steam, the water level inside the boiler will be down continuously until it get to the low water level, start the water pump automatically, making up water to the boiler until it get to the high water level (when the boiler water level is lower than the low level, the making up water system don't work normally, also can't get to the low water level electrode in 10seconds, the heating tube will stop heating. If the water level continues drop until it to the limit low water level electrode, the controller will send alarm signal and stop running the boiler).

Note: To assure the good running and the safety of the generator, the stoker should observe weather the boiler pressure, the water level and the heating are running normally. When the generator went wrong, it should be shut down and checked immediately, and restart when finished the trouble shooting.

3. Stop Running Boiler Sequence

3.1 After finish work, push down the switch of "power", shut off power source, the indication lamp of "power" will be off, close the general switch of power source.



3.2 When the indication pin of the pressure gauge point to 0.15~0.1Mpa, open the blow down valve, start working, close the inlet water valve.

Note: To make preparation against the negative pressure in the boiler, after blowing down, please don't shut off the blow down valve.

4 Controlling System

The control system of the steam generator has the following automatic controlling function: the boiler water level control, the steam pressure control, the protection control for lacking of water, the controlling for protection of over pressure and so on.

For the details, please refer to attached drawing 3 or drawing 7 according to the burner.

1. Status Indication

The steam generator has abundant indication functions as following: the working status of pressure, water pump, electric-heating tube and so on can be showed correctly and directly.



2. Input Signal

2. 1 Pressure Transducer

The pressure of steam generator is controlled by pressure controller. If the pressure is lower than set point,



the output signal of pressure transmitter will be put through; if the pressure is higher than set point, the signal will be cut off, and when the pressure drops back to set point again, the signal will be put through again.

2.2 Water Level Signal

The controller measures the water level through level electrode.

During operation should pay attention to the insulation of two ends of water level electrode, keep away damp. If the electric resistance of two ends of water level electrode is less than 100K, it will be deemed that the water level is higher than electrode. If the electric resistance of two ends of water level electrode is over than 500K, it will be deemed that the water level is lower than electrode.

2.3 The burner breakdown signal: The burner breakdown light signal is parallel connected to the controller, this signal is the strong electrical signal for 220 voltage.

3. Controlling for Output

The capacity of the controller relay adherent point is 10A/220VAC, the load should be less than 1KW when using.

3.1 Burner Control

The controller provides a set of self-governed start-control extreme, its loop has got a fuse whose normal current is 2A, which directly control the electric power source of the burner. For the details, please refer to drawing

3.2 Feeding Water Pump Control

The pump of the controller controls the outlet directly switch in the water pump(the single-phase pump whose electric power is less than 1KVA), for the details, please refer to drawing

4. Alarm Protection

After starting controller, it will check the pressure transmitter, water level electrode and self circuit continuously. Once find trouble will send alarm immediately and stop running boiler for protection. Controller will indicate the point of trouble automatically, the inside buzzer will send sound alarm.

5 Oil-fired Burner Using Methods

1. The Running of the Burner

1.1 Confirm that there is sufficient oil in tank, all the valves are fully open, to ensure no blocking of the return line, or seal rupture of oil pump.

1.2 Check the impeller of the blower to see whether it can turn flexible or freely, and to see whether there is mechanical noise.

1.3 Adjust the blower structure to a proper position, screw down the compress bolt(it is fixed when leave factory, ordinary there is no necessary to re-adjust).

1.4 Ensure a clean and dark electric eye, or it cannot ignite.

1.5 Put through the electric power source, the burner will start to running. Motors, oil pumps, ignition electrode work, the solenoid valve on the oil pump provides oil after 20 seconds, atomized oil goes

through a nozzle into the hot zone arc for burning. After 5 seconds the ignition electrode stops working .

1.6 If the ignition is unsuccessful after the injection nozzle, the indicator lights on the controller will be on, then the controller goes into the protected status, burner stops working.

1.7 If flameout suddenly while burning normally, the burner will re-start to work again immediately and automatically. If failed start light a fire, the controller will still enter to the protective state and the indicator light is on.

1.8 When the controller enter into the protective state, press the reposition button(the red indicator button) and the controller will re-start working.

1.9 If unsuccessful staring occurs so many times, one should ask for the professional inspection for burning machine troubleshooting.

Note: Please do not light the burner with any open fire.

2. Adjustment of the Burner

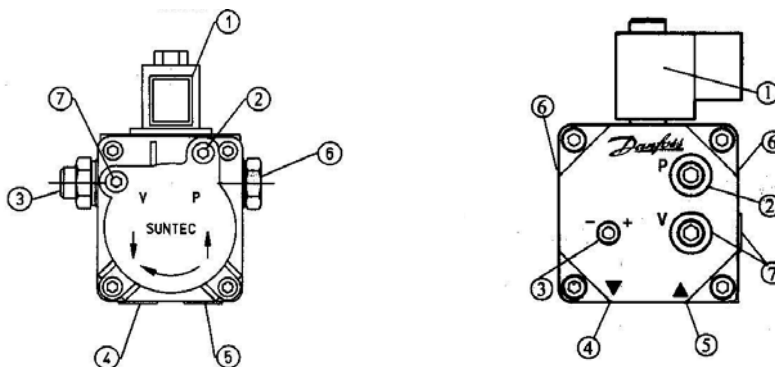
2.1 Adjustment of the Air Door

When there is smoke in the exhaust pipeline, it means the air is insufficient, one should open the air door smoothly until it stops smoking. The discharge pipeline is going to be blocked with long smoke, and burning efficacy will also be affected until the burner is going to be in trouble.

2.2 Adjustment of the oil pressure

When the throttle is adjusted to the maximum, but there is still black smoke in the exhaust pipe, oil pressure should be addressed to "-" to adjust the amount of oil to reduce the oil injection, a small amount of rotation should be done to observe smoke, if it can't work, repeat the above adjustment several times until it produces no black smoke. Please note the DANFOSS or SUNTEC pumps, regulator of their location see Figure 4.

Note: The Air Door and hydraulic pump has been set at the factory, usually with no need for further adjustment. If really necessary, adjust the requirements according to chapter 2.1, 2.2.



附图4 油泵

① Solenoid valve ② gauge connector ③ Oil pressure regulating place ④ oil return opening ⑤ oil inlet port ⑥ Nozzle interface ⑦ Vacuum gauge interface

3. maintain of the burner

3.1 To assure the burner's working surrounding is clean, and to prevent the dust from entering the air inlet to injure the impeller.

3.2 Keep the machine shell clean. When cleaning it, cut off the electric power source first then shut it down, in order to prevent water entering into the electric wiring elements please not to wash it directly with water.

3.3 Regular cleaning of electric eye:

Electric eye (also known as photosensitive or light eyes) is a safety device to monitor the ignition of the oil injection. Blackened photoelectric surface will influence light sensitivity, and control device fails.

Cleaning method: Carefully set aside photocell, use a clean, soft cloth to wipe the glass cover,

glass cover should be reloaded toward the nozzle direction.

3.4 Periodically clean the oil

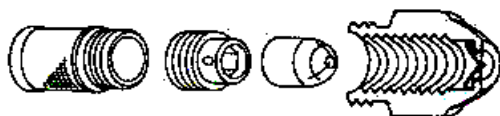
3.4.1 Clean up the oil filter:

- a. Unscrew the oil filter on both cover, remove the filter, gasket.
- b. Use kerosene, clean diesel to clean or clean and puff the filter with compressed air, check the filter for damage or perforation, the filter must be replaced if broken.
- c. Clean with kerosene, under both cover and gasket.
- d. Recover the oil filter as assembled.

3.4.2 Clean up the oil pump strainer:

- a. Unscrew bolt 8 of the oil pump DANFOSS or side four bolts 9 of SUNTEC pump, remove the inside filter, location see Figure 4.
- b. Clean according to the requirements of this chapter 4.4.1.2
- c. Recover the oil pump as assembled.

3.4.3 Nozzle cleaning:



- a. Use a clean, soft cloth to wipe the dirt on the nozzle, and a 16mm socket wrench to remove the nozzle.
- b. Put the nozzle head on the sleeve, pinch the screen side, unscrew the filter, if it can't work, use grip pliers to unscrew the end, note that one should not destroy the filter, or else then nozzle will be useless, then use 4mm allen wrench to unscrews the bottom screws, pour the small cone. See Figure 6.
- c. Clean according to the requirements of this chapter 4.4.1.2, and then recover as assembled.
- d. Mount the filter, and then put back the nozzle in nozzle seat and tighten.

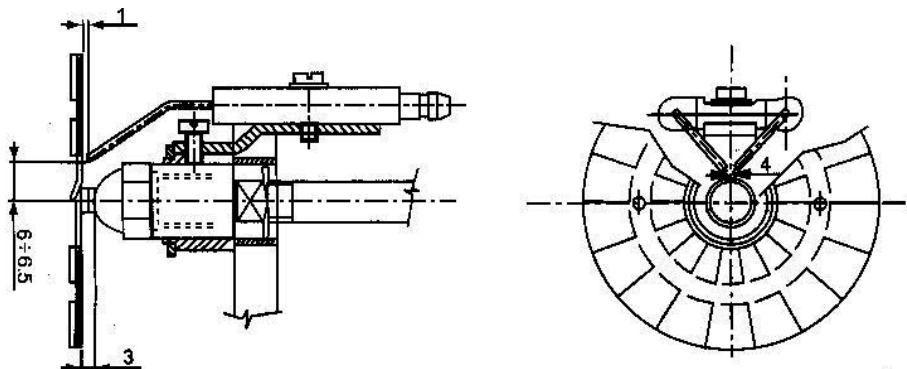
Note: Do not damage vent holes and the edge of the nozzle holes in the disassembly process, do not damage the oil seal ring and threaded end surface of the nozzle seat.

Note: Cleaned once every two weeks generally, if the oil is dirty and then it should be cleaned once a week, in the cleaning process if filter is relatively clean, one doesn't need to clean it and oil injectors,.

3.5 Clean spares subassembly inner the flame tube

- a. Unload flame tube, then unload the light-fire electrode and subassembly of flame-steady cover one by one.
- b. Nozzle cleaning, in accordance with the requirements of this chapter 3.4.3.
- c. Abrasion the ash in the flame-steady cover smoothly with the “—” shape screwdriver, pay attention that make sure the manger in the flame-steady cover should not be out of shape.
- d. Clear the accumulated charcoal on the light-fire electrode.
- e. Heal the subassembly of the flame-steady cover and the light-fire electrode.
 - a. Heal the flame tube.

Note: one must make sure the space between two discharge ignition electrode is less than that between then and any point on the burner, otherwise it will misfire. Slight coke on combustion components is a normal phenomenon, one do not have to clear.



3.6 The burner used in the surrounding that the dust is plentiful must clear the accumulated ash on the impeller periodically.

3.6.1 Unload the fixed screw that connect the flange and the shell, lift down the electric motor and the flange

and the impeller.

3.6.2 Clean the accumulated ash on the laminate with the bamboo sheet. Pay attention not to let the laminate and the impeller be out of shape. At the same time, examine the impeller to see whether the impeller is fixed on the electric motor axis securely, if not, wring the close-fix bolt.

3.6.3 Heal the connect axis, impeller, motor according the original assembly, turn the impeller by handwork to examine if it can turn flexible and freely, friction with the shell or other parts is impermissibility.

3.7 Add oil once a year to the motor bearings.

3.8 If the burner is not used for a long time, anti-rust oil must be injected within the oil pump (open suction pump).

3.9 Before re-use the burner after a long-time unused, examine whether there are some looses at each connection, if the electric wiring line is drop off, then you can use it after you have examined all and there is no abnormal situations.

3.10 Oil tanks and oil feeding systems:

3.10.1 LWS series use: kerosene or diesel, kerosene is better in cold zone, the use of gasoline is prohibited. Waste oil or seepage water must not be injected, otherwise it will affect the ignition and combustion.

3.10.2 Oil tank or barrel port position should at or above the appropriate level of the burner pump.

3.10.3 Always check whether there is leakage (if found, should be added for processing sealant or reinstall).

3.10.4 Oil tanks or barrels must be cleaned regularly (depending on the oil quality used).

4. The troubles of the burner and the removal methods

Phenomenon	Causing reason	Removal methods
The electric motor does not work	1 Power supply is not normal, the controller has electricity power lines 2 The controller is protected, the indicator light on the controller is on 3 Motor goes wrong 4 The boiler has reached set pressure 5 Oil pump drive shaft is stuck	1 Unplug the controller body, check fuse, replace if broken 2 Press the reset button, so that the controller is ready for operation 3 Replace the motor 4. Adjust correctly 5 Professional repair or replacement of the pump
Motor rotates but does not ignite	1 Oil tank and the oil system have no oil 2 Oil pipeline system is not sealed 3 Filter in oil pipeline system (including pump filter) is clogged 4. Pump solenoid valve coil is broken 5 Controller is broken 6 No spark between the ignition electrode a. ignition electrode position is incorrect b. ignition electrode and ignition transformer high-voltage lead to poor contact c. ignition transformer is broken	1 Refuel oil 2 Examination every section to exclude 3 Clean or replace the filter 4 Replace the coil or solenoid valve 5 Replace the controller 6. a. correctly adjust according to chapter 4.5.5 b. examine to exclude c. replace the ignition transformer
Can be fired, but then shut down	1 Electric eye contamination or damage 2 Way inlet pipe is not sealed 3 Air door too large	1 Clean or replace electric eye according to chapter 4.3 2 Check to exclude

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	4 Controller is broken	3 Adjust air door according to Chapter 2.1 4 Replace the controller
Can be fired, but the flames are instable and flameout	1 Water is in oil 2 Oil feeding system is in leakage or blockage 3 Nozzle part is blocked	1 Replace Oil 2 Check to exclude 3 Clean or replace nozzle according to chapter 4.4.3
Black smoke in exhaust	1 Air door opens small 2 Impeller is dirty 3 Air flow channel in burner is in blockage 4 Exhaust flue is in blockage	1 Appropriate open the air door 2 Clean the impeller according to chapter 4.6 3 Exclude foreign body 4 Check other parts

Note: To ensure the normal operation of the burner, oil boiler equipment should use specified oil, the use of poor quality oil and inconsistent oil are prohibited, do regular cleaning for tank, piping, filters, and pumps.

6 Gas-fired Burner Using Methods

1. The Running of the Burner

1.1 Make sure that all the circuit connect to the burner is grounding according the wiring diagram, there is no leakage in the gas feeding pipe. The discharging air pipe examine the pressure via the measurement point that pressure is fixed.

1.2 Check the impeller of the blower to see whether it can turn flexible or freely, and to see whether there is mechanical noise.

1.3 Adjust the blower structure to a proper position, screw down the compress bolt(it is fixed when leave factory, ordinary there is no necessary to re-adjust).

1.4 Put through the electric power source, the burner will start to running. The burner is about to puff and sweep for 45 seconds, then the light-fire transformer lights a fire, three seconds later, open the gas valve of one stage fire, the gas feeding quantity is controlled by the gas flowmeter and adjust in the gas valve.

1.5 If not light a fire, the burner is about to stop running in 2 seconds. When running flameout, the stop running time will be less than one second. If there is no pressure or the pressure is decreased, then the floor lever pressure switch is about to cutting off the expire valve.

1.6 If flameout suddenly while burning normally, the burner will re-start to work again immediately and automatically. If failed start light a fire, the controller will still enter to the protective state and the indicator light is on.

1.7 When the controller enter into the protective state, press the reposition button(the red indicator button) and the controller will re-start working.

1.8 If failed re-start some times, should invite the professional person who is familiar with the burner to check and remove the troubles.

1.9 Examine the gas supply system

The surroundings leakage may cause working staff poisoned and the explosion accident in the working places, so it must be paid highly attention to. Firstly, make sure the pipelines are sealed, examine the leakage periodically, discharge all the dangerous reasons then use the machine again; Secondly, to avoid poisoned that caused by the consistency of the explosion, the ventilation of the working places must be good: to deploy the lasting ventilation hole and forcibly ventilation equipment; Additionally, the fireworks, request the electricity wiring elements to anti-explosion in working places.

Warning: Please do not light the burner with any open fire.

2. Adjustment of the Burner

2.1 Adjustment of the Air Door

When it smoking in the exhaust smoke pipeline, it means the air is insufficient, we should open the air door smoothly until it stops smoking. The discharge pipeline is going to be blockage if smoking at long time, also effect the burning efficacy and the burner is going to be in trouble.

2.2 Adjustment of the air pressure switch

While burning normally, adjust the air pressure switch until the burner shutdown, then anti-adjust one circle to the finally position with a anti-clockwise direction.(If the the air pressure switch is too loose, it may cause there is no light-fire process, if it opened too slowly, there may cause troubles alarming.)

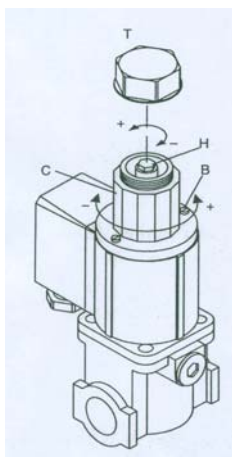
2.3 Adjustment of the gas flow rate

To adjust gas output, loosed the screw B and turn the knob C as required. To reduce output, turn knob clockwise, to increase it turn knob counter-clockwise. Tighten the screw B. for fast opening adjustment, remove the cap T and insert the spanner on the pin H turning on the requested direction. To reduce firing output screw it up, to increase, unscrew it.

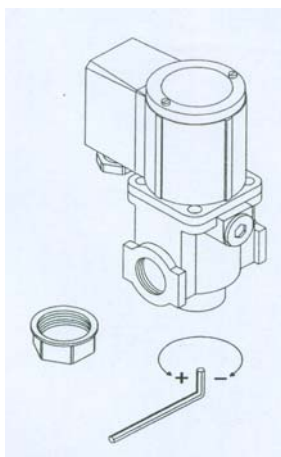
Max output adjustment is to be made by inserting and elbow spanner in the socket S situated at the bottom of the valve and turning to the left to increase output, to the right to reduce it.
one stage fire

For start flame adjustment, loosen the screw R and turn the body P as required(see scale). Tighten the screw R. Max output adjustment is to be made by inserting and elbow spanner in the socket S situated at the bottom of the valve and turning to the left to increase output, to the right to reduce it.

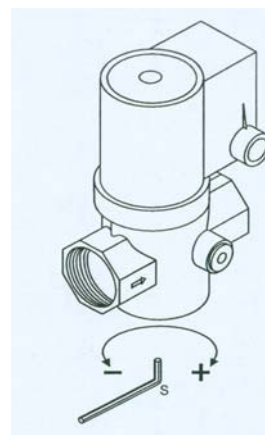
Note: The settings of the air door and the oil pump is fixed when leave the factory, ordinary there is no need to re-adjust. If there is necessary, for the details, please refer to the requirements written on 2.1.2.2 in this chapter.



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3. maintain of the burner

3.1 To assure the burner’s working surrounding is clean, and to prevent the dust from entering the air inlet to injure the impeller.

3.2 Keep the machine shell clean. When cleaning it, cut off the electric power source first then shut it down, in order to prevent water entering into the electric wiring elements please not to wash it directly with water.

3.3 Clean spares subassembly inner the flame tube

3.3.1 Unload flame tube, then unload the light-fire electrode and subassembly of flame-steady cover one by one.

3.3.2 Abrasion the ash in the flame-steady cover smoothly with the “—” shape screwdriver, pay attention that make sure the manger in the flame-steady cover should not be out of shape.

3.3.3 Clear the accumulated charcoal on the light-fire electrode.

3.3.4 Heal the subassembly of the flame-steady cover and the light-fire electrode.

3.3.5 Heal the flame tube.

3.4 The burner used in the surrounding that the dust is plentiful must clear the accumulated ash on the impeller periodically.

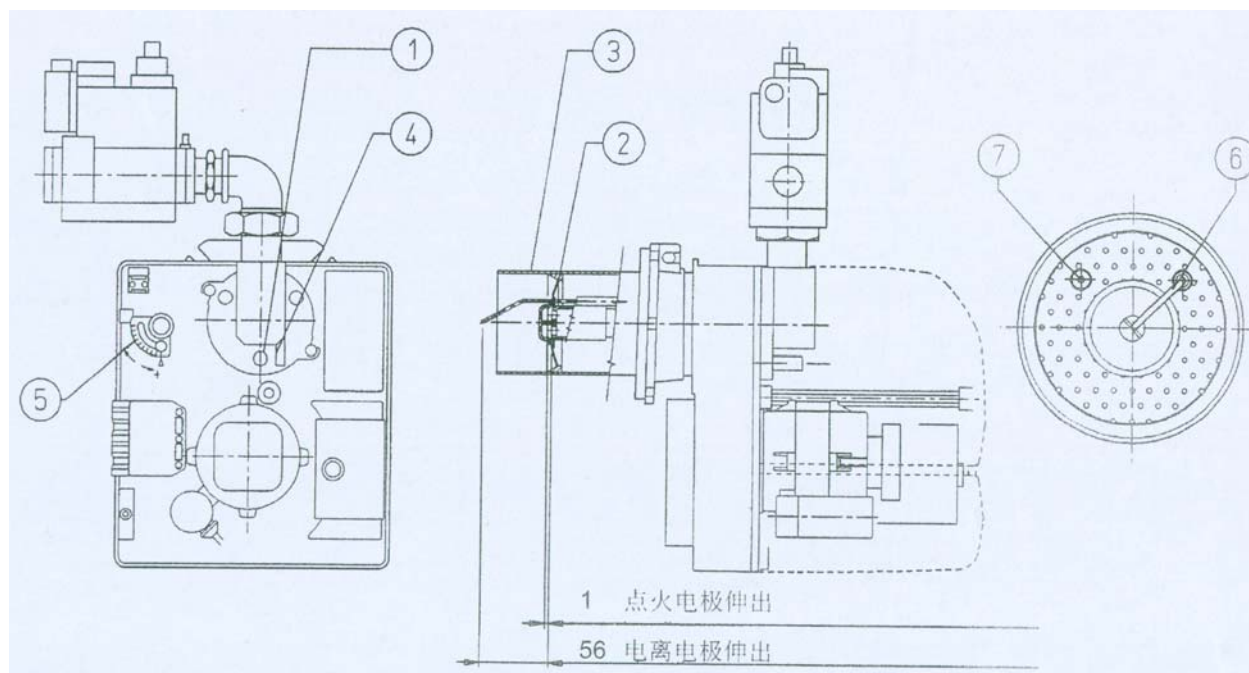
3.4.1 Unload the fixed screw that connect the flange and the shell, lift down the electric motor and the flange and the impeller.

3.4.2 Clean the accumulated ash on the laminate with the bamboo sheet. Pay attention not to let the laminate and the impeller be out of shape. At the same time, examine the impeller to see whether the impeller is fixed on the electric motor axis securely, if not, wring the close-fix bolt.

3.4.3 Heal the connect axis, impeller, motor according the original assembly, turn the impeller by handwork to examine if it can turn flexible and freely, friction with the shell or other parts is impermissibility.

3.5 Add oil once a year to the motor bearings.

3.6 Before re-use the burner after a long-time unused, examine whether there are some looses at each connection, if the electric wiring line is drop off, then you can use it after you have examined all and there is no abnormal situations.



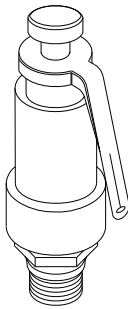
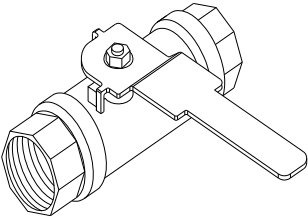
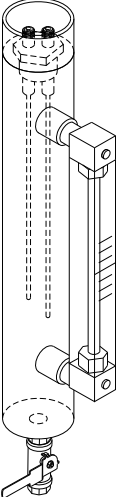
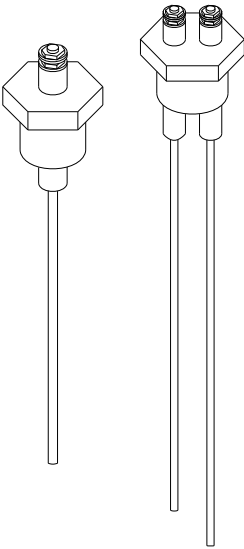
1. adjust bolt of the disk-combustion head position(to screw down means opening the air channel between the disk and the combustion head, otherwise means closing);
 2. disk: it should avoid being closed entirely;
 3. combustion head;
 4. reference mark of the combustion head position;
 5. adjust bolt of the air door strobe opening;
 6. ionization electrode;
 7. light-fire electrode.
4. The troubles of the burner and the removal methods

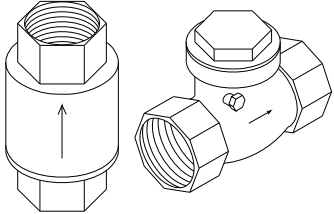
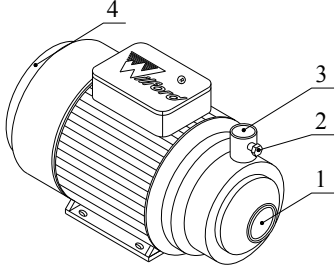
Phenomenon		Causing reason	Removal methods
The electric motor does not work or work exceptional		<ol style="list-style-type: none"> 1. The connection is loose or disconnected 2. The ac contactor has got troubles, the loop or the adherent point is burn out 3. The fuse is damaged 4. The zero curve is discontinued 5. The bearings of the electric motor is damaged or the loop is burn out 6. The blower is locked by other things 7. The circuit of the control is disconnected 8. The gas transmission is broken , the pressure power switch is shutdown 9. The controller is out of control 	<ol style="list-style-type: none"> 1. Re-connect 2. Replace the ac contactor 3. Replace 4. Repair 5. Replace or repair 6. Clare other things 7. Find out the disconnect point, then connect them or cut the controller or monitor 8. Open the globe valve, give notice to the gas administrative organization when the gas fuel is insufficient for a long time 9. Replace or repair
The air is insufficient	The electric motor is running but shutdown after the pre-blow & sweep	<ol style="list-style-type: none"> 1. The air pressure power switch is out of control 2.The pressure power switch is polluted and the pipeline is block 	Replace and clare

Vertical Oil Gas Steam Boiler

	The electric motor is running but shutdown when the pre-blow & sweep	1.The adherent point of the pressure power switch does not connect with the operating position (the air pressure is too low) 2. The blower is polluted	1. Adjust the pressure power switch correctly, if necessary, replace it 2.Clear and clean
The electric motor is running but either light fire or shutdown		The air pressure power switch is too loose, and it does not reposition The process controller is damaged	1.Re-adjust the ir pressure power switch 2. To detect and replace the process controller
The fire is lighted defeated: The electric motor is running but can't light fire, shutdown after a short while		1.The electrode of light-fire or the electric line is ground connect 2. The light-fire transformer is out of control	1.Exclude the ground connect, replace the damaged electrode or cable 2. Replace the light-fire transformer
The flame does not shaped	The electric motor is running and the light-fire is normal but shutdown after a short while	The solenoid pilot actuated valve is not opened, because of the loop of the solenoid pilot actuated valve is damaged or the cable is broken	Replace the solenoid pilot actuated valve or exclude the troubles causes by the differences of the current
	The electric motor is running and the light-fire is normal but shutdown after a short while (without troubles showing)	1. Because of the blockage of the filter, the pressure is fall down when open the solenoid pilot actuated valve	清洁或更换 Clean or replace
Shutdown after the flame shaped; the flame shaped, but shutdown at case that running at rated load		1. The filter is polluted 2.The gas measurement gauge is out of control, or the deep pipeline is accumulate water	1. Clean the filter 2. Give notice to the gas administrative organization
While in the process of ionization, the flame monitor is in trouble, the electric motor is running and it can be heard the light fire sound; the flame shaped normally, but shutdown for troubles after a short while		1. The current of the ionization is not steady, it is too low 2. The zero curve and the live wire are anti-connect 3. The adjustment of gas/air is not proper, the spark of the light-fire is about to change the current of the ionization	1. To change the position of the current of the ionization 2. To adjust the position of the zero curve and the live wire 3. Re-adjust the junior loop of the light-fire transformer, replace the phase line and the midline

7 Daily Maintenance

<p>1</p> 	<p>Safety Valve</p> <p>The safety valve should be calibrated by the department approved by local labor safety supervision division. Every year should be at least calibrated for one time.</p> <p>In order to avoid the sticking between disk and seat of safety valve, every week should do draining test by hand.</p> <p>It is not permitted to increase the set pressure of safety valve by every means, or safety valve will be out of efficiency.</p>
<p>2</p> 	<p>Blow Down</p> <p>The operation is very important, because the scale and the mineral composition will generate in the boiler even already used the soft water or the scale dissolver. The blow down can delay the generation of the scale in the boiler mural, also it can prolong the life span of the boiler, so it must be carried out at least once a day when finished the working.</p>
<p>3</p> 	<p>Water level gauge clearing</p> <p>It is located on the right side of boiler, connected to boiler by loose joint nut, blow equip with clear ball valve to display water condition and fluctuation while boiler operating. It could advance test validity.</p> <p>After long term working and poor water quality, hole will be blocked by scale, electrode will be impacted.</p> <p>To avoid electrode out of using and boiler operate safety, should check water level gauge regularly (if water quality bad, need to clean every day together with blowdown). Open ball valve (pressure 0.1-0.15mpa) clean.</p> <p>Cleaning pipe should be connected to safety place.</p>
<p>4</p> 	<p>Electrode Cleaning</p> <p>Whether the feeding water system can work automatically and dependable largely depend on the probe of the high-low water electrode inside the boiler, so the probe must be cleaned once every two to three months. If the local water quantity is poor, it should be cleaned once every half month.</p> <p>Clean ways: after boiler discharge pressure totally, remove water level gauge top cap (lack of electrode in the top of boiler), remove electrode wire (mark it), and turn in counter-clockwise, clear scale. If scaling seriously, must use rubber polish electrode surface. Use multimeter test metal rod and outside, resistance should be higher than 500KΩ, more higher more better.</p>

<p>5</p> 	<p>Clean the Non-Return Valve</p> <p>If find the phenomenon of back water to the boiler, should dismantle the check valve in time, and remove all scale and impurity, shake the check valve, if the baffle plate inside the check valve can move freely, it means that is good. But if can't clean it by any method, should change a new check valve.</p>
<p>6</p> 	<p>Water pump,</p> <p>Pump inlet ①connect to water tank, outlet ③make up water to boiler water inlet through check out valve.</p> <p>5.2.1 The rotation of vane of water pump may be not so well or may be blocked because of scaling forming of water pump during operation and vibration during transportation for new water pump. So when run water pump for first time or re-start pump again after stopping running for a long time, should turn the vane behind the motor through cover hole by screw driver to water pump running very well.</p> <p>5.2.2 Loose the screw for discharging air (adding water plug), after filling water, screw and tight the adding water plug (can help adding water by spot starting water pump).</p> <p>5.2.3 During cold weather, should pay attention to the frozen ice of deposit water inside pump.</p> <p>5.2.4 Water pump structural sketch.</p> <p>Water pump structural sketch.</p>
<p>7 Periodically Fixtures</p> <p>The screw cap of flange and joint bolt of heating tube should be tightened periodically. The scale will be formed on the heating tubes easily, so should remove the scale about every six-month. When re-assemble the heating tubes, should pay attention to reset the connecting wire and tightness of screw of flange to avoid happening water leakage. Should often check the running status of oil pipelines, control board, water feeding pump, electric cabinets, pressure switches and safety valves and so on, if occur abnormal phenomena, should search the reason in time.</p>	
<p>8 Resin tank</p> <p>Safety valve must be discharged to outside safety place, and blowdown valve to cloacae.</p> <p>Blowdown could make less scale and long service life. Must blowdown at least twice every day after operating.</p> <p>Boiler is equipped with display function. Pressure, water pump and electric heating elements status could be displayed.</p> <p>During operating, unqualified water will affect boiler safety. Scale, with low conductive factor, will cause higher electricity consumption and non-safety working. So, it must to softener water to save energy, prolong boiler service life and better operating.</p>	

According to state water quality rules < low pressure water quality>, boiler should use soft water, delete Ca^{2+} , Mg^{2+} outside of boiler. Generally, it uses ionic resin ways to softener water.

NOTE: Please refer to the Installation & Operation Manual of the water softener.

9 Other Precautions

In order to avoid occurring the phenomena of freezing and rust, after stop running boiler for a long time, should cut off the power resource, at the time should drain the water completely inside boiler and piping. In usual time, if not running boiler, should cut off power resource, open the control box, check all terminals of electrical parts and tightening piece, if find loose parts, should tighten it for preventing burning through the wires and electrical parts because of bad contacting. To avoid poor contact lead to wires and electrical components burnt

Note: It is not permitted that water or steam and explosion & firing gas enter into electric box.

8 Removal for Common Troubles

Trouble phenomena		Causing reason	Removal methods
Troubles of the water pump	The water pump is running, but not adding water	1. There is air in the water pump 2. The dust gauge of the water box is stop up 3. The water pump is fray	1. Discharge air according the item 6 in chapter 8 2. Clear the dust gauge 3. Replace the water pump
	Not adding water	1. The water level in the boiler is already high 2. The electrode for measurement is broken 3. The water pump is burn out 4. The controller of the boiler is out of control	1. Add water when the water level is fall down 2. Clear or repair the measure electrode 3. Maintain or replace the water pump Maintain or replace the controller of the boiler
	Adding water incessant	1. The electrode for measurement is broken 2. The controller of the boiler is out of control	1. Clear or repair the measure electrode 2. Replace the controller of the boiler
The water in the water box is hot		1. The check valve is flow backwards	Clear or repair the check valve
The electric light is not on		1. The power is off 2. 0.1A The protective tube is broken	1. Re-start when the power is on 2. 0.1A Replace the protective tube
The point light of the burner and water pump are on, but not running at practice		1. 10A 保险管坏 The protective tube is broken	1. 更换 10A 保险管 Replace the protective tube
Troubles of the controller	The water level is normal, but the super high water level light is on	1. The water level is super high 2. The water level is connected with the boiler shell or there is water in the cover of the water level shell	1. Re-start when blowdown until the water level is normal 2. Adjust it and dry the water
	The trouble light of the burner is on	The burner has got troubles	Re-start when push the reposition button

9 Attention for Users

You are kindly advised to well keep the product quality certification for the convenience of repairing service.

If the customers need to look up the relevant documents of LWS series full automatically oil (gas) -fired boiler, please indicate the product number. If need shift the boiler, should transfer all the relevant documents at the same time.

Our company will repair the boiler with charge for following items:

- a. The using is not comply with correct way or change something freely or un-correct maintenance.
- b. The parts are broken because of un-correct transportation or handling, impacting, vibration and so on.
- c. There is trouble because of bad water quality (not use soft water).
- d. The trouble or broken due to Force Majeure such as natural calamity.

☆ Thank you very much for using our products ☆

1、LWS product pictures

