
Operation Manual

LCRY Series Burner

LC2020V3C



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Important Information

Purpose

This brochure is the important guidance about the oil burner installation and commissioning. Please do read it carefully before installation and commissioning. If there is any unclear place, please contact our company anytime to avoid any unnecessary equipment faults and danger.

Important Safety Warnings

All participants involved in installation, dismantling, commissioning, operation and maintenance (including inspection, maintenance and repair) should complete related training and carefully read and understand this guidance brochure

All of the other work out of oil burner related operations ONLY can be started AFTER the shutting off of burner, cutting off of the power supply and fuel valve.



Warning: If violating the regulations, it may cause electric shock or fire disasters and result in serious personal injury or even death.

Safety Regulations

Importance of Safety Regulations

This chapter includes the required important information about safe operation on burner. For further safe operation guidelines, you can find in the following chapters. The operators are duty-bound to comply with all the safety rules.

Training

All participants involved in installation, dismantling, commissioning, operation and

maintenance (including inspection, maintenance and repair) should complete related training and carefully read and understand this guidance brochure

Transformation and Retrofit

Any unauthorized transformation and refit towards the burner is strictly prohibited. If necessary, please do contact the manufacturer. Unauthorized transformation or refit may cause safety problems. please do not carry it. The manufacturer and seller will be not be liable for any damage caused by any unauthorized transformation and refit towards the burner.

Burner Operation and Maintenance

The burner will start to combust high efficiently once after installation and commissioning and no need of additional manual operation. All of the other work out of burner related operations ONLY can be started AFTER the shutting off of oil burner, cutting off the power supply and fuel valve. There will be possible dangers of electric shock or fire disasters caused by the violating of the regulations which can result in serious personal injury or even death.


Troubleshooting Process

If any breakdown, the operator should analyze the issues and resolve those according to the troubleshooting procedure. Then give feedback to the manufacturer or seller timely.

Stop-working Process

- Cut off the master switch
- Please do turn off the oil valve and gas valve if the equipment will not be used for a long time

Indications and Warning Symbols

	<p>This is the symbol of “paying attention to safety”. When you look at the symbols in this brochure or on the equipment, please pay attention to the possible danger which can result in personal injury and make sure to comply with all the attentions points and safe operation methods.</p> <p>There are always other similar symbols used on the equipment to express the extent of damage including”Danger”, ”Warning” and”Caution” as below.</p>
Danger	<p>“Danger” symbol indicates immediate danger which can result in serious injury or even death.</p>
Warning	<p>“Warning” symbol indicates potential danger which can cause serious injury or even death.</p>
Caution	<p>“Caution” symbol indicates potential danger which can cause minor or moderate injury. In this brochure, this symbol also used to remind the attention to safety indication.</p>
Important	<p>“Important” indicates any danger towards the machine but not to person.</p>
Notes	<p>“Notes” indicates the additional remark to some info.</p>

Note: In this user manual, the illustrations are described according to the LCR1500Y ~ LCR5000Y model. The LCR1000Y has different shapes, but the working principle is consistent. It is hereby explained.

I、Product Overview

LCRY series oil burner is self-designed full-automatic media atomizing oil burner based on thorough research on the asphalt plant drying drum. It has the remarkable cost-effective advantage comparing with international high end brand. The burner has impact structure and design is reasonable, It's applicable to all kinds of layout of asphalt plant dryer drums with convenient moving, installation and maintenance

- By adopting advanced low pressure media atomizing spray gun , the burner features energy conservation, environmental friendly and powerful adaptability to various quality oil
- With impact structure and moveable wheel device, the integrated-designed burner is specially designed for the asphalt plant drying drum, which features easy installation and maintenance. The compact arrange of the oil and gas pipes and control wires enables easier connection with the system. The double access doors on the left and right sides enables much easier layout and maintenance
- Both of the oil pump and the fan adopt variable frequency control technology so as to decrease the complexity of the traditional mechanical ratio modulation system and enhance the system reliability;
- The heavy oil can burn directly no need of traditional switch between light oil and heavy oil to reduce the faulty which may be caused by oil quality problem
- The safety , energy saving , environment protection all meet China and International industrial standards
- Using accurate air oil ratio control algorithm, the combustion efficiency is higher. The self-adaption control technology was adopted to automatic compensate the deviation of air-oil ratio caused by the oil pump wearing, which entered the life cycle of the oil pump.
- Burner regulation ratio: 1:10, The start of ignition is running steadily and the temperature control precision is high
- Applicable fuel type: light oil、 heavy oil、 residual oil and blend oil

II、Technical Parameters

Model	LCR1000Y	LCR1500Y	LCR2000Y	LCR3000Y	LCR4000Y	LCR5000Y
Max oil consumption (kg/h)	650	940	1280	1940	2400	3000
Max heating out (MW)	7.2	10.5	14.2	21.7	26.8	33.3
(KW) Fan power	7.5	11	15	22	30	37
Pump power (KW)	1.5	1.5	2	3	4	4
Matched asphalt plant model	80tph	120tph	160tph	240tph	320tph	400tph
Regulation ratio	1:10					
Compressed air pressure	$\geq 0.6\text{MPa}$					
Oil supply pressure	$\leq 0.03\text{MPa}$					
Applicable fuel	Diesel, heavy oil, residual oil					

III、Structure Introduction

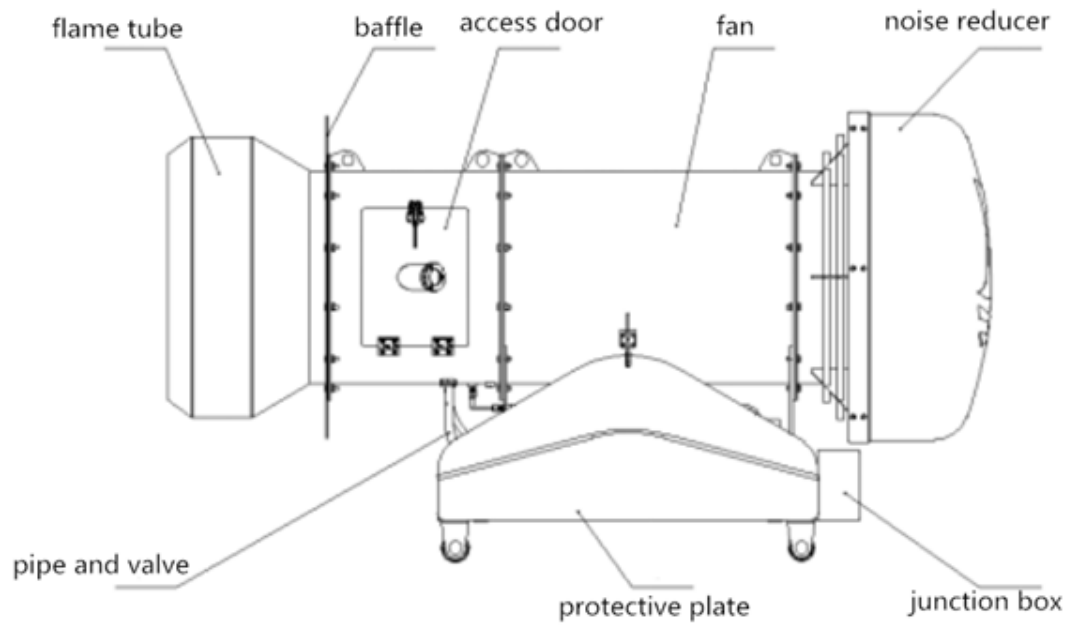


Diagram 1:oil burner main body outside view diagram

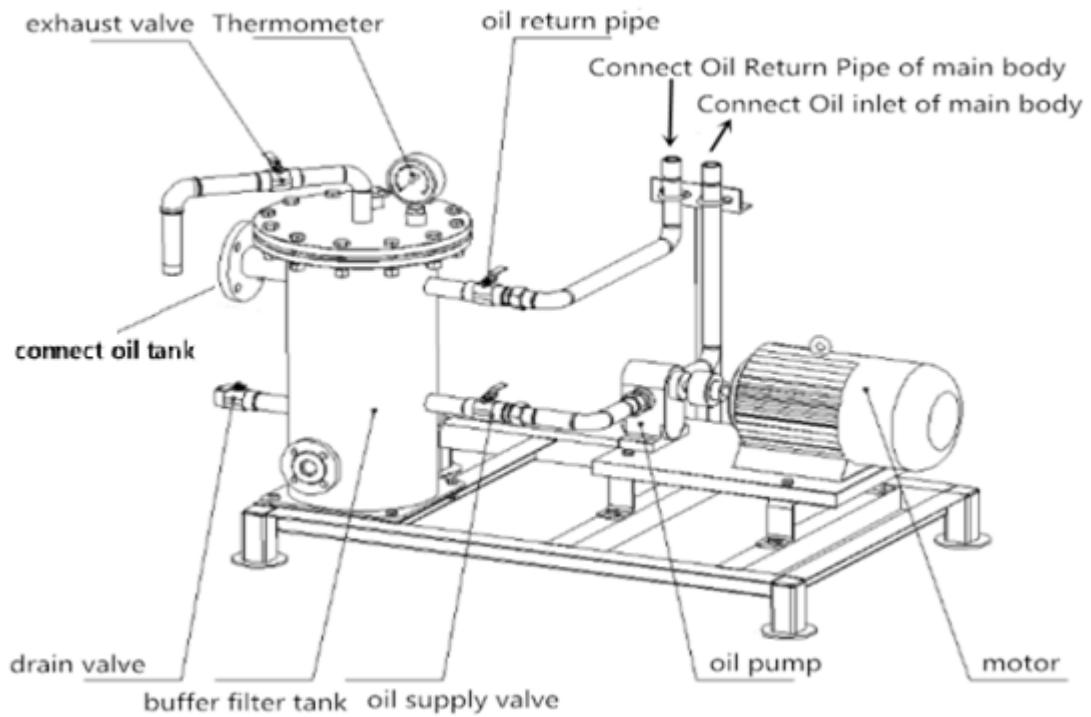


Diagram 2: Oil Pump Unit Composition

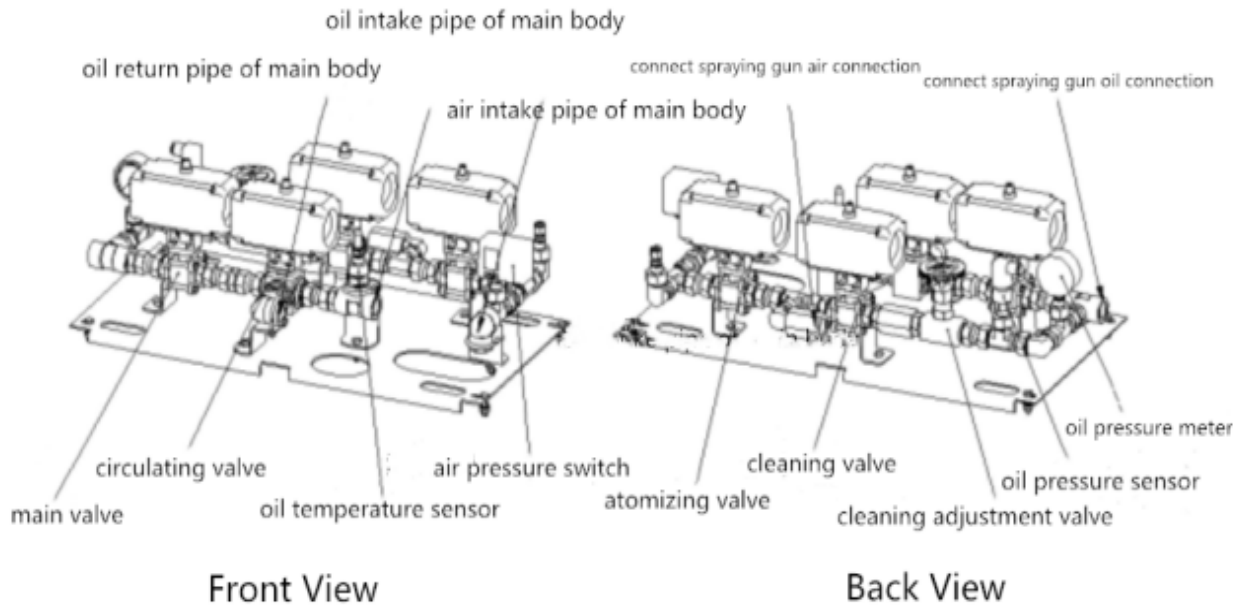


Diagram 3: composition of pipe and valve system

IV、Burner Working Flow Introduction

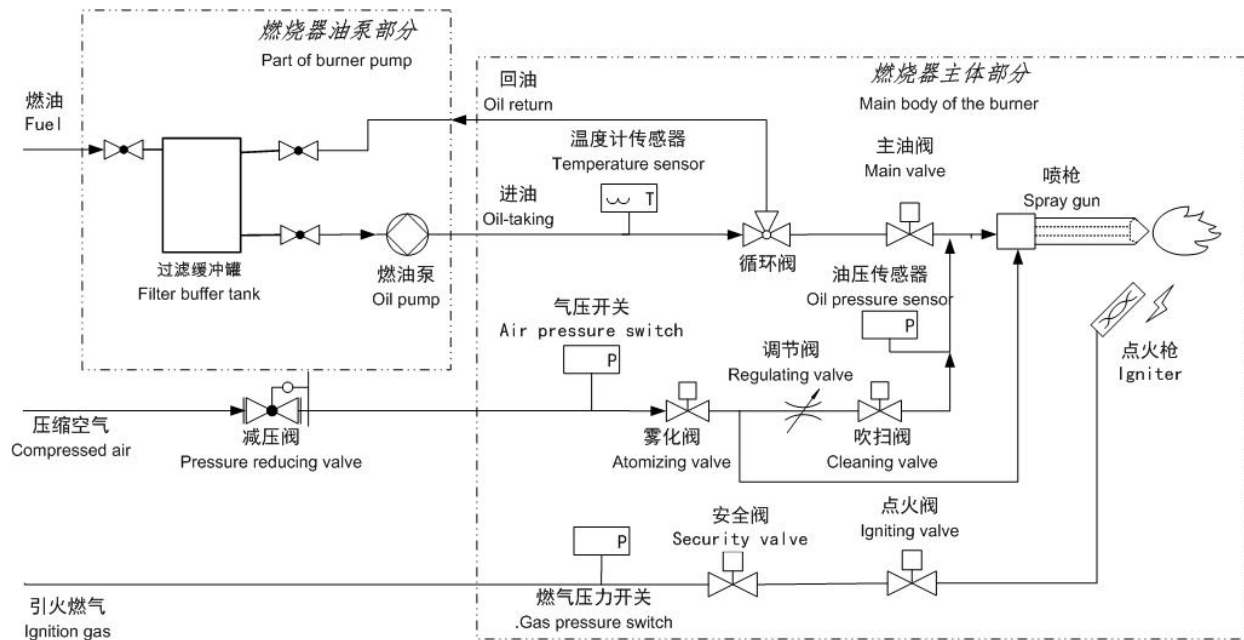


Diagram 4:oil burner pipes system schematic diagram

As shown in the burner pipes system, the filter buffer tank and the oil supply pipeline are heated by the heat conducting oil in advance. The burner can be started when the temperature of the oil in the buffer tank meets the operating requirements. The fuel oil pump and the inlet and return pipeline connecting the main body of the burner are also heated by electric trace heating in advance to ensure that the pipeline temperature can make the oil flow. When starting the burner, the oil pump starts and the heated heavy oil in the filter buffer tank passes through the inlet valve →oil pump →oil intake pipe →circulation valve →oil return pipe →oil return valve →filter buffer tank to complete the heavy oil cycle. The oil pump and pipeline are preheated through the oil circulating to let the pressure of the oil pump is gradually going steadily during the circulation. .

At the same time of oil pump circulating preheating, the burner fan starts, the system carries on the self-inspection of security, After each inspection passes, the burner enters the ignition state. First, the oil pump and the fan run at the initial speed of ignition and the atomizing valve opens and the compressed air to be injected by the spray gun, so that the spray gun has the condition of atomizing oil. Then the high-voltage electrode is electrified to produce an electric spark, the gas ignition valve is opened, and the gas emitted from the ignition head is ignited. When the system confirms the normal combustion of the gas ignition head, the main oil valve and the circulating valve are opened, The oil is atomized with air by the spray gun and sprayed out from the nozzle, the flame of ignition head ignites the oil from the spray gun, Closes the high-voltage electrode and the gas valve after a few seconds, the system confirms that the flame is ignited, the combustion enters the preset load combustion state. The burner will increase or reduce the flame according to the control instruction. This process always carries out flame monitoring. Once the flame is extinguished, the system will

immediately enter shutdown procedure

When press the “Stop” button , the system enters the shutdown procedure. The main oil valve, circulating valve, atomizing valve and oil pump are closed immediately, the flame in the spray gun is extinguished. After a few seconds, the oil pump turns backwards and opens the circulating valve and main oil valve to pump the oil in the spray gun and the connecting pipe back to the oil tank .The process is very short and then the oil pump stops, The main oil valve and the circulating valve are closed,the same time, the atomizing valve and cleaning valve are opened, Compressed air goes into the oil pipe of spray gun to clean out the remaining oil, The fan continues blowing for a period of time to clean out the remaining oil and gas in the dryer drum.

. After the cleaning process, the system enters the reset standby state.

V、Burner Operation Interface Introduction

1、Main Control Interface Description

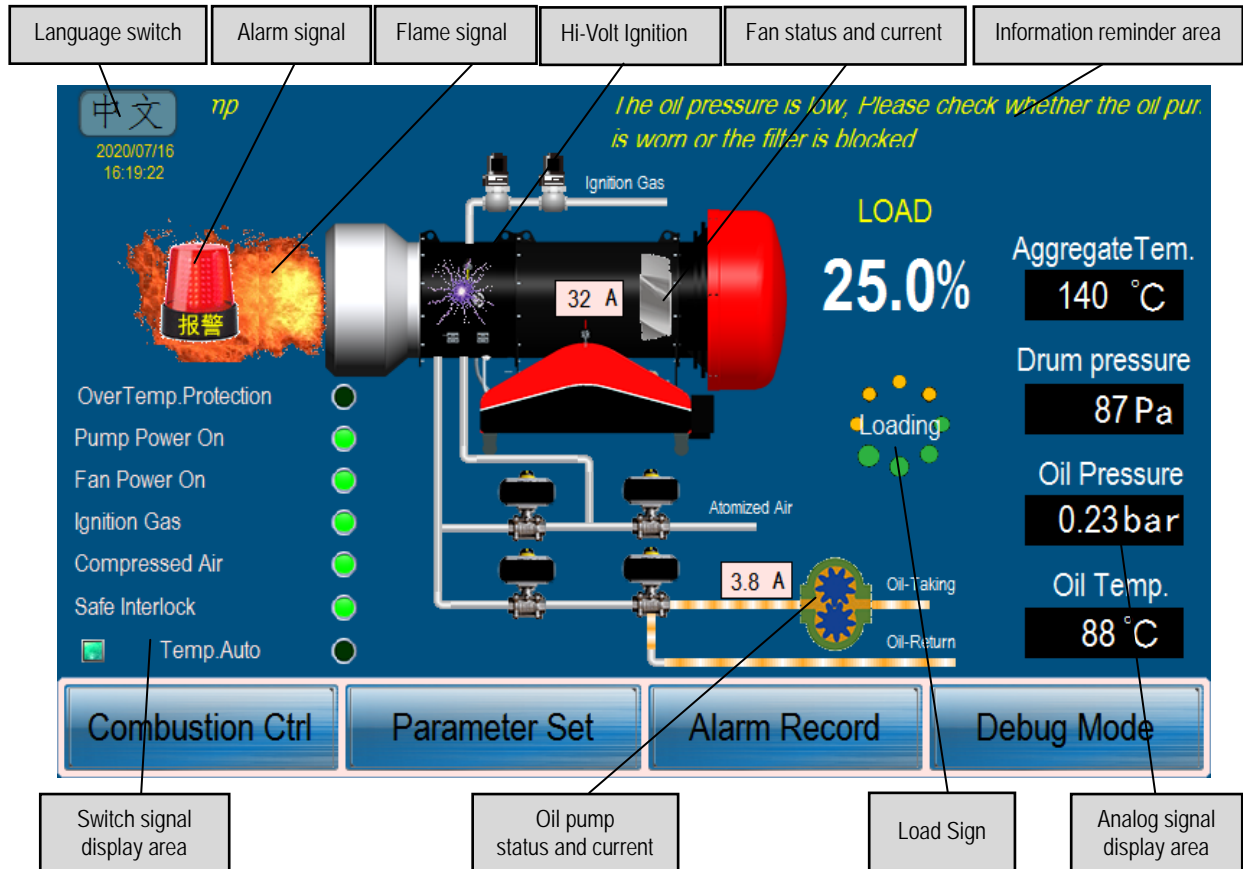


Diagram 5: Main Control Interface

Main interface as picture 5, There are four menu buttons on the bottom of the screen: combustion Ctrl, Parameter Set, Alarm Record, Debug Mode.

On the left side of the screen is switch signal display area, it will display "over temp protection", "pump power on", "fan power on", "ignition gas", "compressed air", "safe interlock", "Temp.Auto" switching value state.

On the right side of the screen is analog signal display area: it displays "Aggregate Temp", "oil pressure", "oil temp" signal value. The "fan current" and "oil pump current" will be displayed at the corresponding pattern.

The middle area of the screen shows the state of the burner main body, which can

dynamically reflect the current situation of each component. Among them, "flame signal", "high-volt ignition", "fan starting", "loading sign" are not displayed at ordinary time. They are only displayed after triggered. When the action of each valve is triggered, the corresponding pattern will be shown in green cubes, and the corresponding oil and gas pipelines will show the flow state and direction dynamically. The yellow pipeline stands for the fuel, the blue pipeline stands for the compressed air.

Information Reminding Area on the top of the screen is not displayed at ordinary time. When the system makes a warning signal, the Yellow Italic script message will be scrolled in this area. The information in this area will not control the burner action, but will remind the operator to pay attention.

When the burner fails and affects the normal operation, the flashing alarm lamp pattern will be displayed in the flame area, and the relevant shutting down action will be automatically performed. At that time, you can click the "alarm record" to see the cause of the failure and remove the trouble according to the prompt.

There is a Chinese-English switch button on the upper left of the interface. When the Chinese interface is displayed, click "English" it will switch to the English interface; when the English interface is displayed, click "中文" it will switch to the Chinese interface.

2、Combustion Control Interface Description

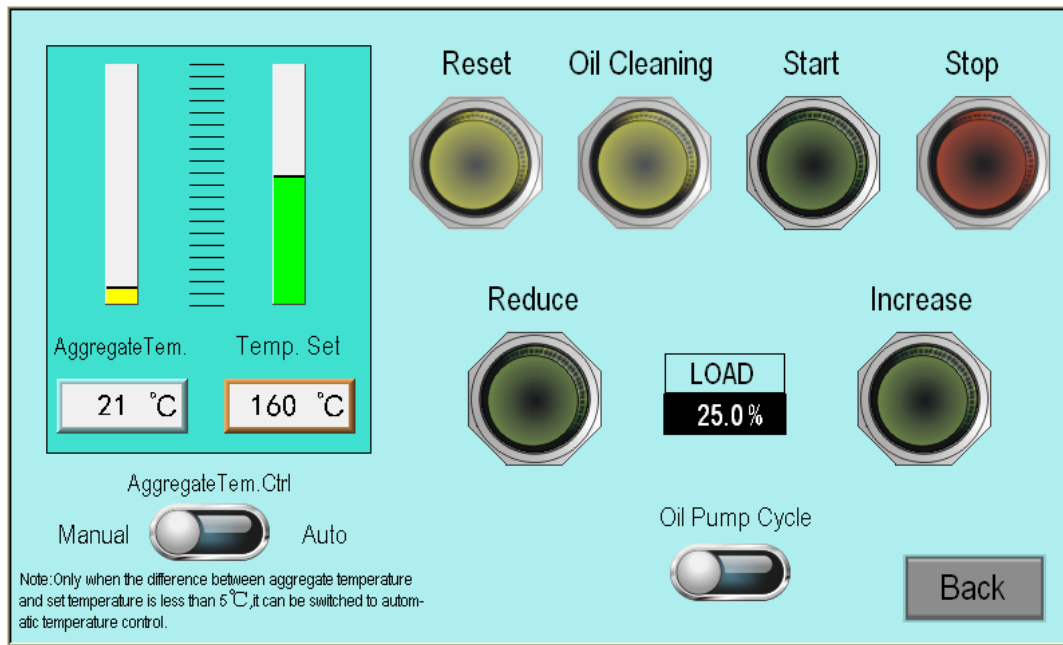


Diagram 6: Combustion Control Interface

In the main interface, click the "combustion ctrl" button in the lower left corner of the interface that pops up the interface shown in diagram 6. In this interface you can complete the burner starting, stopping, increasing, reducing, reset, oil pipe cleaning, oil pump cycle and other common combustion control action, but also can set aggregate automatic temperature control function, most of the buttons have physical objects. Among them, the function of "oil cleaning" button is to open atomizing valve and cleaning valve separately to clean the pipeline and spray gun; the function of "oil pump cycle" button is to open the oil pump separately before ignition, and fully preheat the oil in the pipeline and filter buffer tank, which can shorten the heating time of the oil and improve the ignition efficiency . When the "oil pump cycle" button is opened, if you do not close it, it will run for 300 seconds and then close itself (the pump circulation time can be adjusted at the parameter set interface, default is 300 seconds, the adjustment range is 20-900S).

After clicking "Temp.Set" and " Load" numeric box in the interface, the numeric keyboard

will pop up to input the settings. In the interface, "aggregate temp ctrl" can adjust the aggregate temperature by PID during the normal operation of the drying drum. Only when the difference between aggregate temperature and set temperature is less than 5°C, it can be switched to automatic temperature control. Otherwise, the system will not switch and display prompt information at the top of the main interface. Once the aggregate temperature control is set to the automatic state, the system will automatically increase and decrease the fire according to the aggregate temperature, and automatically revise the control coefficient to the optimal value. After the stopping of burner, it will automatically reset to manual temperature control.

Notes "oil cleaning" and "oil pump cycle" button touch time needs to be maintained for more than 0.5 seconds before it can be activated.

3. Parameter Set Interface Description

The screenshot shows a 'Parameter Set' interface with a light blue background. At the top right is a 'Back' button. The interface is divided into two main sections. The left section contains a list of parameters with their current values in yellow boxes: Fan frequency of precleaning(Hz) at 30.0, Oil pump frequency of circulating(Hz) at 25.0, Time of precleaning(S) at 60.0, Fan frequency when ignition(Hz) at 13.0, Oil pump frequency when ignition(Hz) at 7.0, Fan frequency of postcleaning(Hz) at 40.0, Time of postcleaning(Hz) at 300.0, Time of oil pump circulating(S) at 300.0, and Load Control Mode at 0. Below these is a note: '(Given pressure control is 0 and given frequency is 1)'. The right section contains 'Excess Air Coefficient' at 1.00 with a note '(Range 0.85 - 1.15, initial value is 1)'. Below this is a password input field showing '*****' and a 'Cancel' button.

Parameter	Value
Fan frequency of precleaning(Hz)	30.0
Oil pump frequency of circulating(Hz)	25.0
Time of precleaning(S)	60.0
Fan frequency when ignition(Hz)	13.0
Oil pump frequency when ignition(Hz)	7.0
Fan frequency of postcleaning(Hz)	40.0
Time of postcleaning(Hz)	300.0
Time of oil pump circulating(S)	300.0
Load Control Mode	0

Excess Air Coefficient: 1.00
(Range 0.85 - 1.15, initial value is 1)

Password: *****

Cancel

Diagram 7: Parameter Set Interface

In the main interface, click the "parameter set" button at the bottom of the button that pops up the interface of diagram 7, in which you can modify the burner control parameters, The initial state of the various parameter bar numbers are displayed in gray colour, at this time you can not modify the parameters, you need to enter the correct password then these fonts will turn into black colour so that you can to modify the parameters, Each parameter has a limited range, and only the numbers in the input range are valid. Each time when a password is entered, the system automatically gives 30 seconds to modify the parameters. If it exceeds, the system automatically saves the modified parameters and logs out the password. If it continues to modify, it needs to re-enter the password.

4、Alarm Record Interface Description

Alarm Record			
S/N	Date	Time	Fault information, reason and solution
4	18/09/01	14:05:25	Exhaust gas temperature too high, stops automatically.
3	18/09/01	14:05:14	Oil flame failed to catch fire, some reasons: 1. Ignition Oil pump frequency set too low or main flame stable burning time too short 2. Oil Mixed with too much water or bubble 3. Oil supply line is blocked
2	18/09/01	14:05:00	Can not work because of compressed air pressure low, please check 1. Air compressor working or not 2. Compressed air pipe valve opened or not 3. Compressed air pipe broken or not 4. Compressed air pressure switch fault
1	18/09/01	14:04:47	The fan inverter is not power on

Back

Diagram 8: Alarm Record interface

Click the "alarm record" button at the bottom of the main interface, it will pop up the interface of diagram 8. This interface will record all the fault records and prompt information of the burner. The operator can find out the time and reason of the fault by inquiring the interface. The record will be saved for later inquiry.

VI、 Burner Adjustment

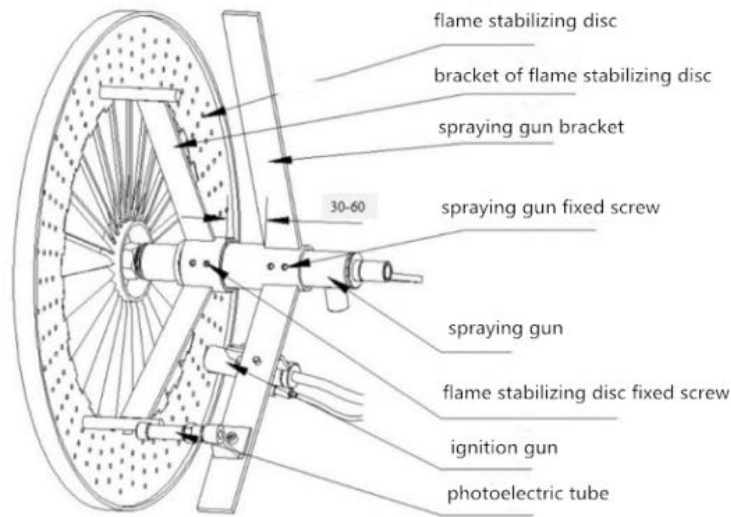


Diagram 9:FrontPart Structure Diagram of Oil Burner Middle Tube

1、 Flame Stabilizing DiscAdjustment

The initial adjustment of the flame stabilizing disc can control the distance between the two brackets as shown in diagram 9 to be about 30-60 mm. After the position is determined, the fixed screw of the flame stabilizing disc can be tightened. When the disc is tightened, it should be tightened along the circumference respectively. The best position is that the flame tube is in the coaxial position along the outer edge of the flame stabilizing disc. The position adjustment of flame stabilizing disc will affect the shape of flame. Moving towards the fan will make the flame thick and short, otherwise the flame will become thin and long.

2、 Adjustment of the Spray Gun

When the spray gun is installed, the initial adjustment position is the head of the spray gun exceeds the front of the flame stabilizing disc by 10-20 mm. After confirming the position, the spray gun is fixed with the fixing screw and then the corresponding pipeline is connected after the fixing.

3、 Adjustment of Photoelectric Tube

The installation position of the photoelectric tube is located near the flame stabilizing disc at the initial stage. After installation, the photoelectric tube's light receiving surface is facing forward and it is best to pass through the hole on flame stabilizing disc, After the adjustment, fasten screws.

4、 Adjustment of Ignition Gun

There are two types of gas ignition guns (see diagram 10 and diagram 11 respectively), the functions of the two are the same. There are two aspects to adjust the ignition gun. First check and adjust the electrode gap of the spark plug or the porcelain rod high voltage electrode. The minimum distance between the electrodes of the front end of the spark plug is 3-5mm. The spark plug should be of burner-specific type.

After adjusting the gap between the electrodes, the position of the ignition gun should be adjusted. The position of the ignition gun nozzle should be directed towards the nozzle lower circle gap. After adjusting, the relevant screws should be locked to prevent loosening.

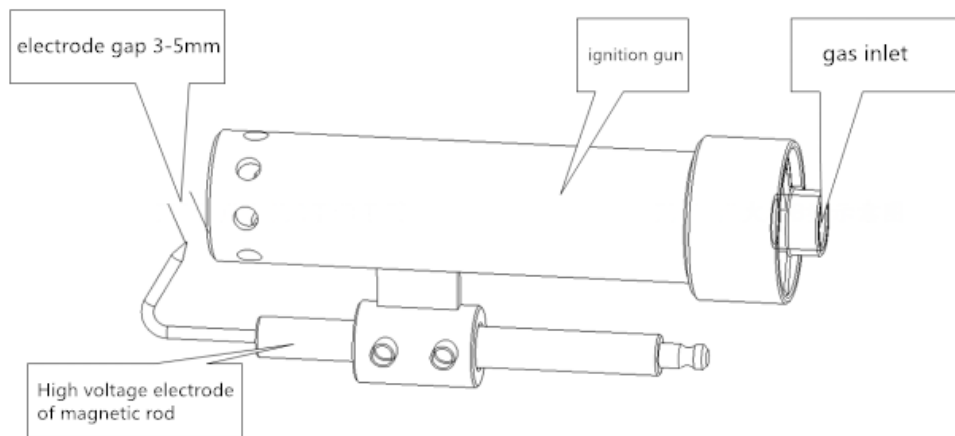


Diagram 10: A Type Ignition Diagram

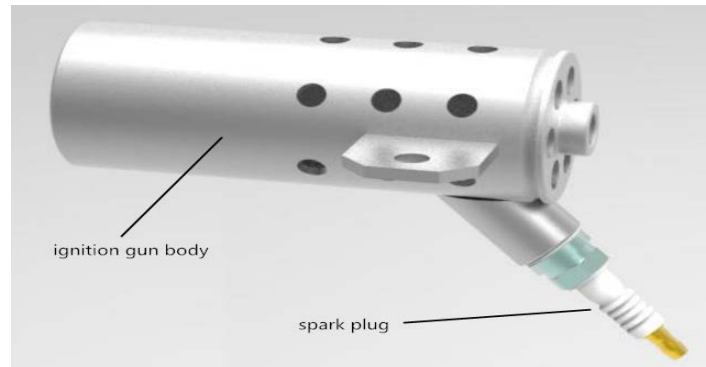


Diagram 11: B Type Ignition Diagram

VII、 Oil Burner Installation

1.The oil burner is easy and simple to install. After the platform is in place and the relative position between the burner platform and the drying drum is determined, the burner main body is hoisted onto the platform track. Re-determine the relevant dimensions of the platform track and the drying drum discharge outlet, push the burner main body into the discharge outlet opening. Pay attention to push it in place and properly pad or move the platform, It is the best that make the burner flame tube and the guiding tube of discharge outlet coaxial. Finally, lock the burner rail with locking device, see the diagram 12

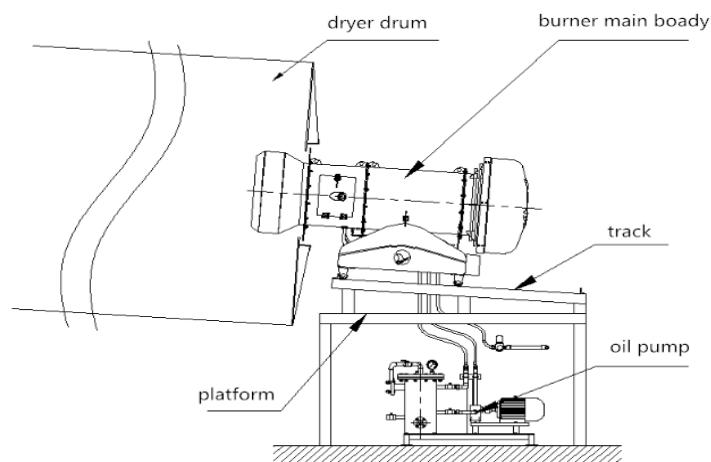


Diagram 12: Oil Burner Installation Diagram

2.Place the oil pump under the burner platform and connect the relevant heavy oil, diesel and heat conduction oil pipelines according to the designed pipeline system diagram.

3.According to the cable configuration of the oil burner to lay the cable, the length of the cable depends on the site installation.

4.The fuel supply pressure in the fuel tank to the oil burner should range from 0 to 0.3kg/cm².If the fuel is heavy oil, the user needs to heat the oil temperature to about 80-90 °C (a small part of heavy oil needs to be maintained at 50-60 °C, and the excess temperature is easy to produce bubbles. The heating temperature should be determined according to the actual situation, It is better that the fuel is easy to flow and does not produce bubbles. In principle, the temperature is better to be high not low)

5.The metal hose is used to connect the main body of the burner with the oil pump assembly unit. If the metal hose is not long enough, a steel pipe should be added on the oil system of the burner. After the connection,please confirm it is leak-free, then use attached electric tracing hot wire to wrap on the connecting pipe to ensure that there is no heating dead angle. At the same time, the aluminum tape and adhesive tape are used to tightly close the electrical heat tracing cable and the hos and the electrical tracing cable wrap it not less than 3 meters per meter of pipe. It is suggested to wrap the rubber-plastic foam insulation hose to get better effect.

6.Compressed air is needed for combustion operation and system control of the burner. The pressure of air supply should be greater than 0.65 MPaand the air supply should meet the burner operating conditions. There is a pressure reducing valve at the end of the burner where the nozzle of the burner enters the burner, which needs to be adjusted to 0.5 MPa in advance.

Notes: When adjusting the pressure, the valve should be kept in a continuous air consuming state, otherwise it can cause the inaccuracy of pressure adjustment

7. The ignition gas of burner should be LPG or acetylene, connect the acetylene pipeline to the ignition gas inlet of burner body, seal the interface and prevent leakage. The acetylene and relevant connection pipelines are provided by the user. Pressure of acetylene should be between 0.02 MPa and 0.06 MPa (according to the type of gas and the size of flame, it is set when site debugging, the first debugging proposal pressure is set at 0.05 MPa). Gas is used only at the initial stage of burner start-up. After the ignition and the burner running normally, close the gas main valve, and open again before the next start-up.

8. After all the parts of the burner are in place, all the parts are connected by the cables. When connecting, the types of cables should be distinguished. In principle, special cables should be used for sensor cables and the cable shield layer should be grounded reliably. The specific installation circuit diagram can be referred in the attached drawings.

VIII、 Burner Debugging

Caution: The debugging of burner needs strong professional knowledge, which can only be done after burner debugging training. Otherwise, it will bring certain risks.

Before commissioning, it is necessary to check whether the burner components are damaged, whether the connecting parts are tightened, whether the pipeline is leaked by air pressure monitoring in advance, whether the connecting cable joints are connected correctly and reliably. Remove the sundries (especially the sundries left in the fan housing) which affects the normal operation of the burner on site and equipment. After the checking, if all is correct,

the system can be powered on, the power of the control cabinet can be switched on to debug the burner.

1. System is Powered on Operation

Turn on the main switch and air compressor

Turn on the power of burner fan

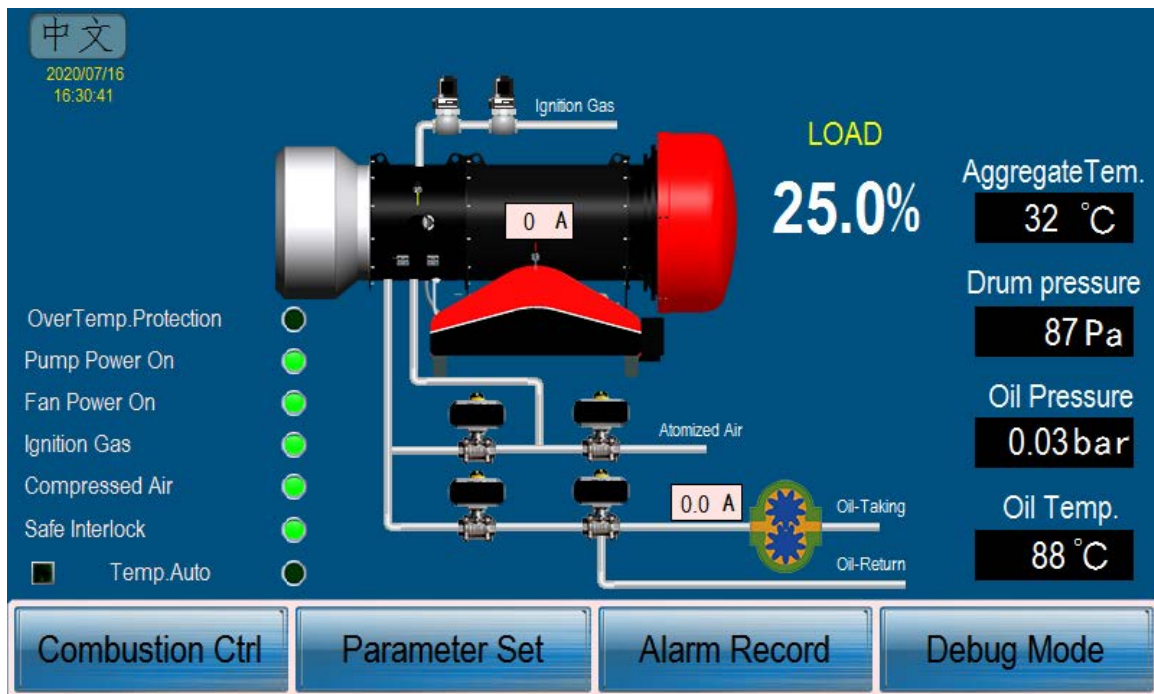
Turn on the power of oil pump

Turn on the power of electric tracing wire

Turn on the power of burner control

Notes: turn on power and make pre-heating more than 20 minutes ahead of time to ensure that the valve and pipelines are fully heated.

2. Turn on the power and after the system completes self inspection, it enters the main interface (see diagram 13)



After entering the burner main interface, check whether the aggregate temperature,oil temperature,oil pressure,oil pump current,fan current analog signal are normal or not, if not normal, please check the circuit and sensor.

Notes: sometimes signal window displays"" flashing occasionally, that is a normal phenomenon.

Check the left switch signal lamps, under normal condition, the pump power on, fan power on, ignition gas , compressed air and safe interlock lamps should be on, indicating that it meets the ignition start-up requirements.

Notes: The temp auto-control lamp can only be turned on when it meets the automatic temperature control requirements(aggregate actual temperature and set temperature have the difference within 5°C) .The right lamp is turned on when it is under the automatic temperature control status.The over temp protection lamp can only be turned on when the asphalt plant gives the stop signal.

3. Enter The Manual Debugging Interface

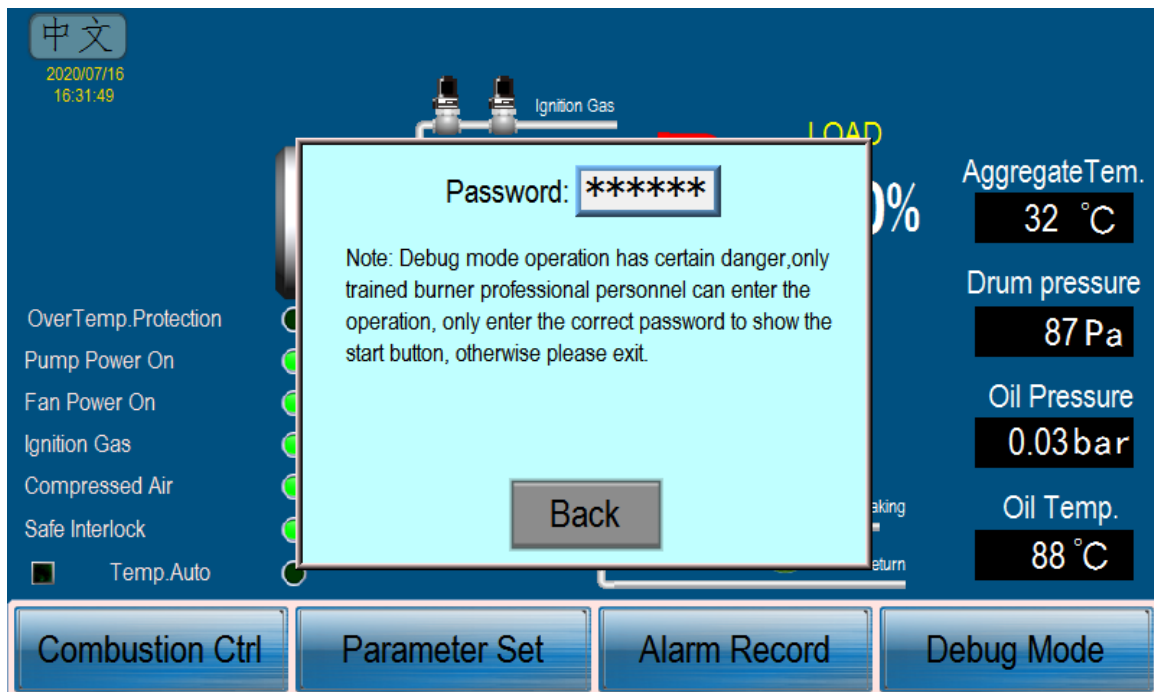


Diagram 14:Enter Debug Mode Security Question and Password Input Dialog Box

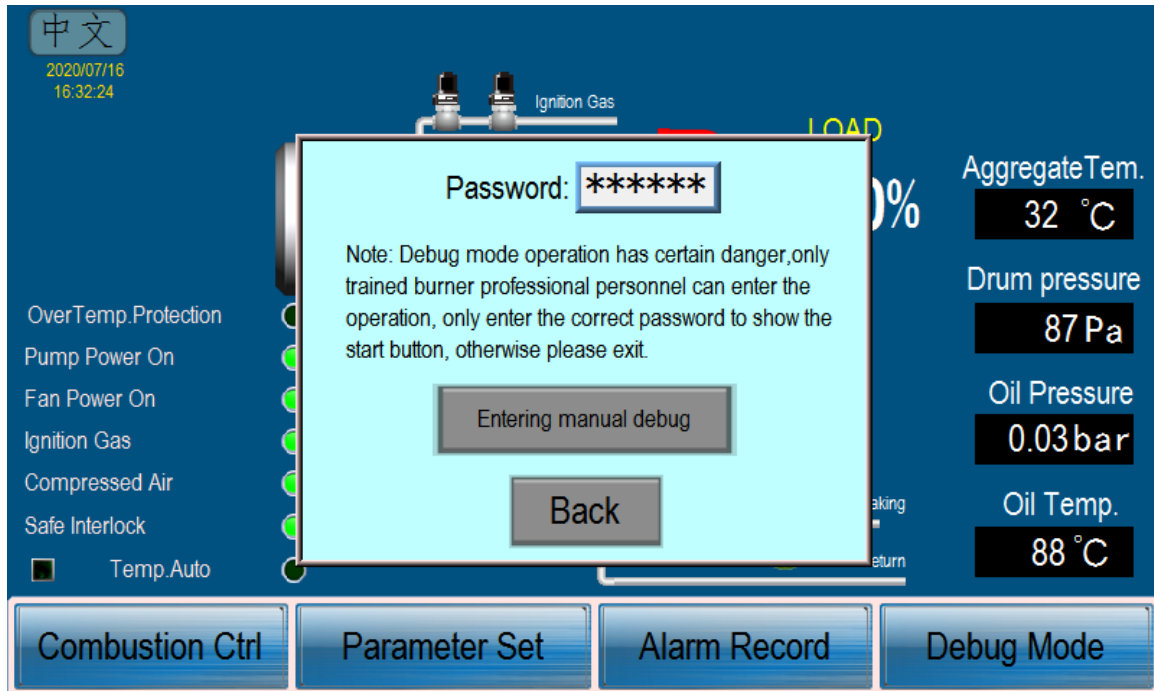


Diagram 15 : Indicating Entering Manual Debug Mode Button

To enter the manual debug mode, you first need to enter the debug mode, click the debug mode button in the lower right corner of the main interface, pop up the security question and password input dialog box (diagram 14), click the password box and pops up the password input keyboard, Enter the correct debug password and it will enter the manual debug mode (diagram 15), continue to click the button to enter debug interface (diagram 16)

On the manual debug interface, the left area are the state indicators and oil pressure indication, showing the On-Off status of each part, the right area of the interface are the control buttons, which can manually control the on-off action of each executive device, The middle upper area is the current display and operating frequency of the fan and the oil pump. lick on the frequency display box to input respective operating frequency, The oil pump motor has clockwise rotation and counter-clockwise rotation debug buttons. The middle lower areas of the interface is the burner combustion increasing or reducing adjustment buttons after you enter forced SWITCH operation mode.

Notes: clockwise rotation and Switch buttons touching time should be kept over 0.5 seconds so that it can be switched, but the Switch also needs to meet the requirements: manual ignition successful and main flame burning over 20 seconds, then it can be switched.

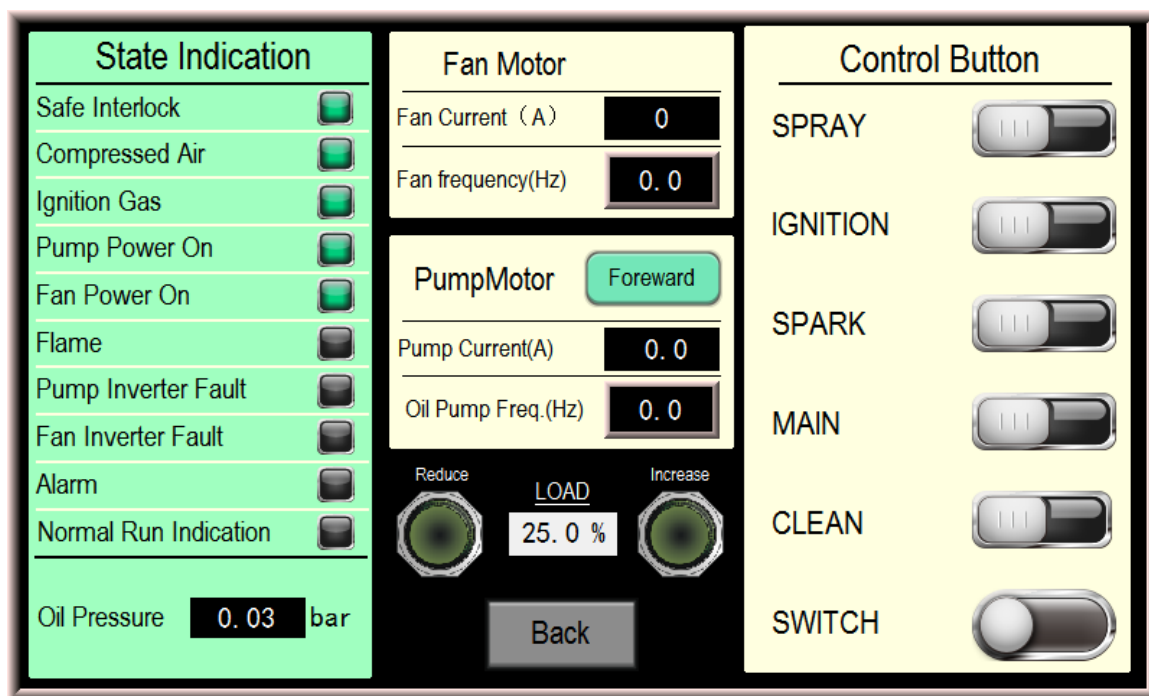


Diagram 16:Manual Debug Interface

4. Burner Control Button Manual Debugging

Firstly, open the valve on the compressed air pipeline to let the compressed air enter the burner, then open the control power on the burner control cabinet to check the opening and closing state of the valves on the pipeline; After turning power on, the valves(MAIN, CLEAN,SPRAY)should be in the initial closing state; If the opening and closing state of the valves do not conform to the above status after turning power on,the pipelines and system should be checked again to keep the initial state of the valve closed.

Turn on the ignition gas supply valve and adjust the gas supply pressure to 0.03-0.05MPa

Check whether the state indicators are consistent with the physical, for example: when compressed air pressure is normal, compressed air pressure indicator lights; when the flame signal is normal (can use lighter flame to test), the flame signal lights. If not, fix the breakdown in time. Before starting the manual operation, make sure that the five indicating lights are on :safe interlock, compressed air, ignition gas, pump power on and fan power on.

Start Entering Manual Debug Mode.

- Click on the SPARK control button to see if the ignition relay in the control cabinet works and if the ignition device on the spot has an electric spark
- Check whether ignition gas pressure is normal and whether the valve leaks. Confirm the ignition gas supplying condition and the sealing of the pipeline.
- Click on the CLEAN valve to see if valve action is normal. Click on the SPRAY valve to see whether the valve is working normally. Confirm the sealing property of the atomizing medium (compressed air) pipeline to see if there is any leakage. Shut down after examination.

Click on the MAIN valve to observe whether the valve action is identical

Notes: The time of continuous power-on should not exceed 20 seconds during electric spark debugging. Wait for more than one minute after each power-on before the next power-on debugging. Otherwise, the high voltage ignition coil will be damaged easily.

5. Fan and Oil Pump Debugging

Click on the fan frequency and pump frequency display box, first input 10HZ frequency in the pop-up digital keyboard , then observe the operation of the motor, if it has faults, please check wiring, observe whether the real rotation direction and demand rotation is consistent, if it reverses, please change the motor phase sequence and change the speed frequency value settings, then observe whether the frequency converter transmission is corresponding, at the

same time observe the change of motor current on the main interface. (diagram 17)

When the frequency of the fan and the oil pump is greater than or equal to 2.5Hz, it will start automatically, On the contrary, it automatically stops.

Notes: When do the oil pump debugging , it should be idle running for the first time, but not more than three minutes running. If fuel oil available, ensure that the pipes and fuel are fully heated and the sealing condition of the fuel oil circulation must be checked first

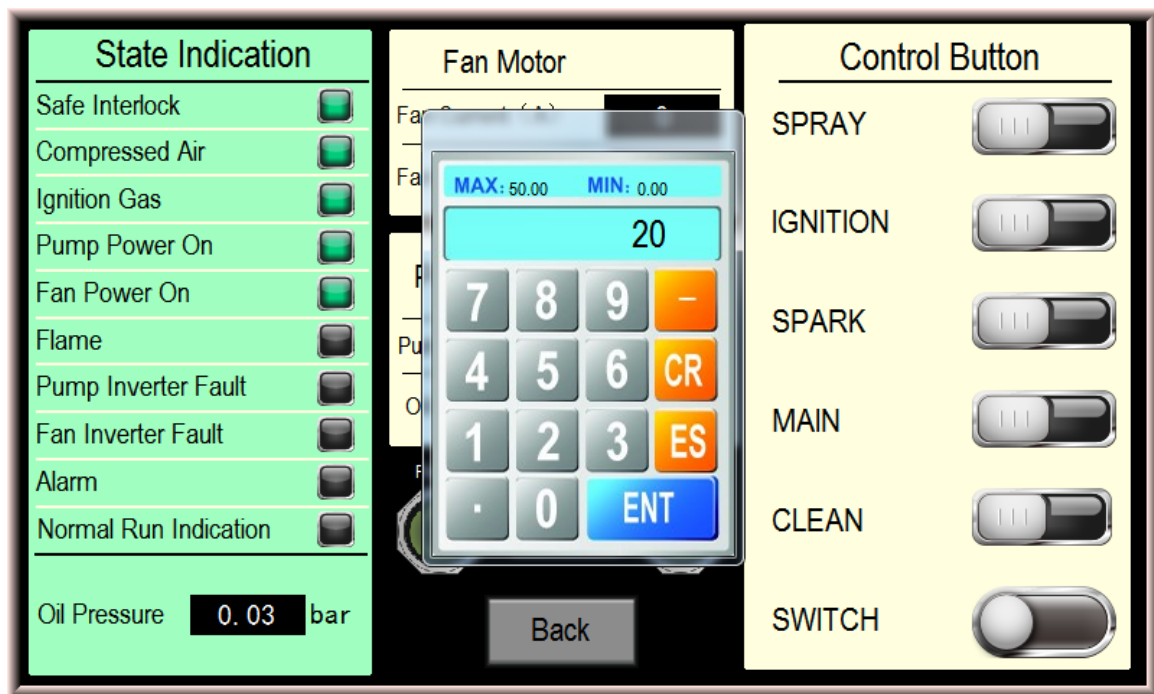


Diagram 17: Fan and Oil Pump Debugging

6. Parameter Set

As mentioned above, on the main interface window, click the bottom parameter set button to enter the parameter set interface and enter password to modify the relative parameters

If you enter the authorized debug password on the parameter set interface, advanced set and air-oil ratio buttons will pop up at the lower part, you can enter the respective interfaces for more advanced parameter modifications. (see diagram 18, 19, 20).

Notes: When you enter password to start parameters settings, you only have 30 seconds to modify it, when time out, the system will shut down the modification function

Caution: advanced system parameters and air-oil ratio are the key core parameters, unauthorized personnel should not change it, the parameters only used for that said machine, please backup it after debugging

The image shows a 'Parameter Set' interface with a light blue background. At the top right is a 'Back' button. On the left, a list of parameters is shown with their current values in yellow boxes:

Parameter	Value
Fan frequency of precleaning(Hz)	30.0
Oil pump frequency of circulating(Hz)	25.0
Time of precleaning(S)	60.0
Fan frequency when ignition(Hz)	13.0
Oil pump frequency when ignition(Hz)	7.0
Fan frequency of postcleaning(Hz)	40.0
Time of postcleaning(Hz)	300.0
Time of oil pump circulating(S)	300.0
Load Control Mode	0

Below the table is a note: '(Given pressure control is 0 and given frequency is 1)'. To the right of the table, the 'Excess Air Coefficient' is set to 1.00, with a range of 0.85 - 1.15 and an initial value of 1. Below this is a password field with the text 'Password: *****' and a 'Cancel' button. At the bottom right are two buttons: 'Advanced Set' and 'Air-oil Ratio'.

Diagram18:Parameter Settings Interface 2

Advanced parameters are set in the same way as above. Advanced parameters are more important and need to be set carefully. Otherwise, it may cause system failure.

After the parameter settings are completed, close the interface and ignition operation can be carried out

Advanced Set

Oil filling readiness time (S)	2.0
Oil pump reverse time(S)	2.0
Burning time together(S)	8.0
Pressure fluctuation alarm(bar)	2.00
Temperature control zone(%)	60.0
Temp.Ctrl integration time(S)	8.0
Temp.Ctrl sampling period(S)	0.10

Diagram 19:Advanced Parameter Settings Interface

Air-oil Ratio

LOAD (%)	FAN (Hz)	Oil-F (Hz)	Oil-P (bar)
0.0	3.0	3.0	0.50
20.0	9.0	7.0	1.68
40.0	22.0	14.3	2.42
60.0	28.0	21.3	2.98
80.0	35.0	28.0	3.54
100.0	42.0	35.4	4.08

Pressure anomaly Set (bar)	
Up Limit	Down Limit
1.50	1.50

Frequency anomaly Set (Hz)	
Up Limit	Down Limit
5.0	5.0

Note: The air-oil ratio parameters can be optimized during debugging. Once set, please do not change it at will. If you need to change, please contact the engineer.

Diagram 20:Air-oil RatioSettings Interface

7. Ignition Debugging

In the main interface of the burner, first check the fuel oil temperature (generally about 80 °C-90°C), adjust induced draft fan to make the drum negative pressure at about 50-100 Pa.(click the button “Increase” and “Reduce” to adjust flame opening value between 25%-30%(default value is 25%) After confirming that the system is fault-free, click the start button and start the automatic ignition program,otherwise,the system will prompt a fault and cannot be started.

Notes: Before starting, check that five indicator lamps on the left side should be on ,(see diameter 21), otherwise,the system will not go to the next step.

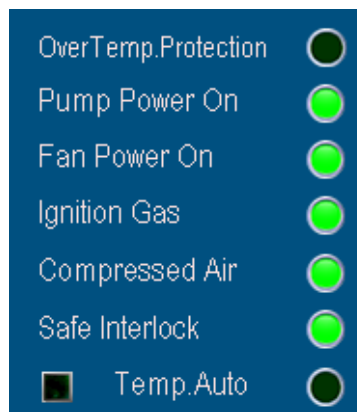


Diagram 21: The Indicator lampson the Left side of the Combustion Main Control Interface

During the ignition operation, the relevant parts of the burner will act in a set order and display on the main interface, such as: fan operation, oil pump operation, fuel or compressed air flow direction in the pipeline, high-voltage ignition, valve switch and so on. If the system fails, the operator will be alerted and the relevant fault information and solutions will be prompted in the fault Bar. The system alarm is divided into two situations, one is the serious fault which will affect the burner operation, the system will display the alarm signal in the flame area and at the same time ,buzzer sounds in control cabinet,you need to click the alarm record button under the main interface to see the specific problems and solutions, it can be eliminated by pressing the reset button. The second fault is slight and does not cause serious consequences. In this case, the system sends out a reminder sound and rolls the subtitle at

the top of the main interface. After the troubleshooting, subtitle will disappear automatically. After the ignition is successful, the flame image will be displayed on the interface. When the upper space of the oil pump moving diagram appears, it shows that the system is now in normal working state, you can make flame increase and reduce operation. At this time, you can check whether the burner works according to the requirements. The above situation is shown in diagram 22-27.

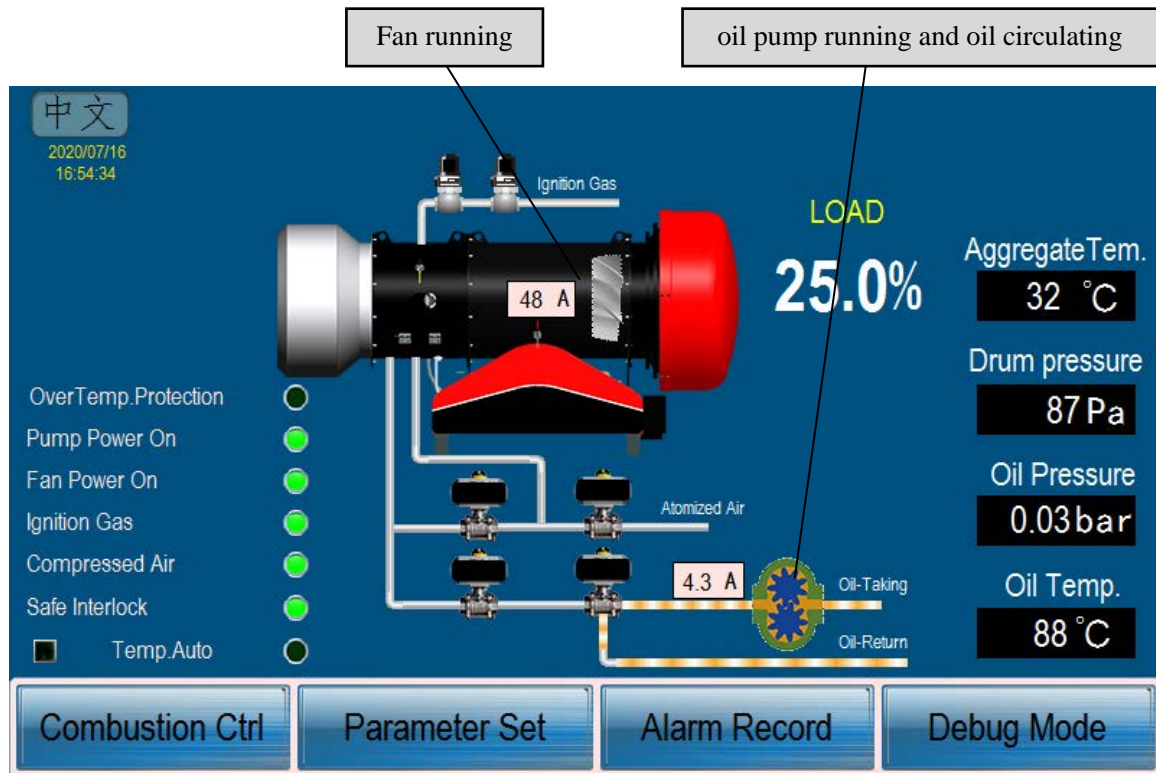


Diagram 22: Interface Diagram of Self Inspection at the Beginning of System Start up Stage

Atomizing valve opening and atomized gas flow diagram

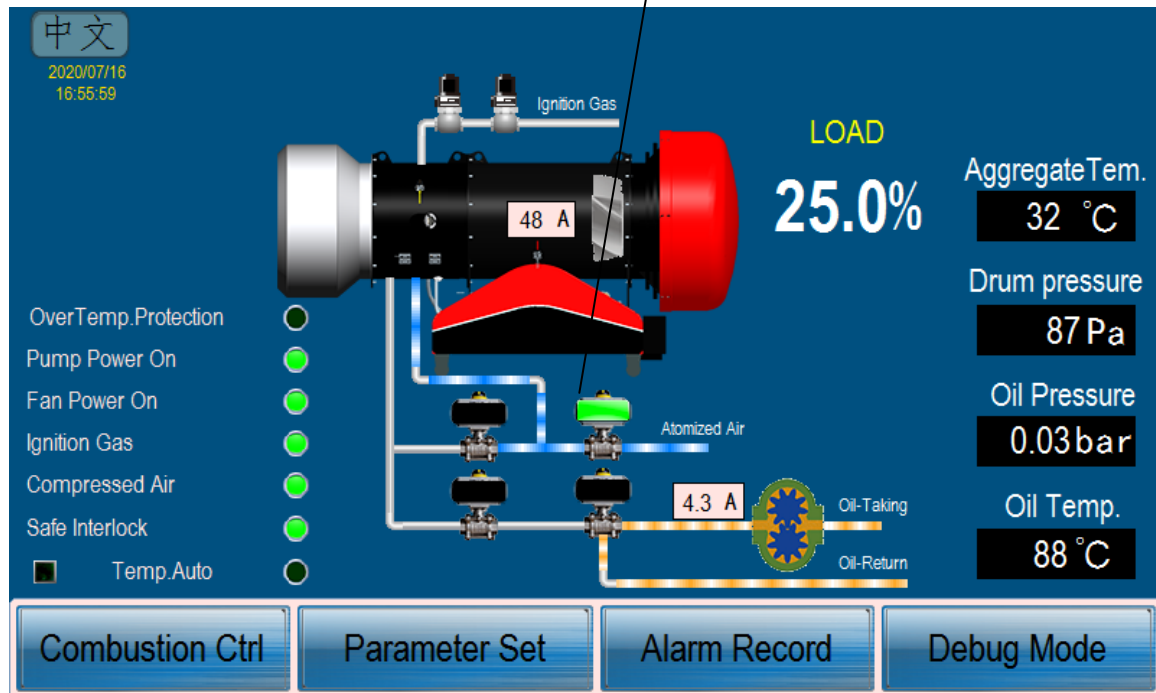


Diagram 23:Atomizing Valve OpeningStage and Atomized Air Flowing

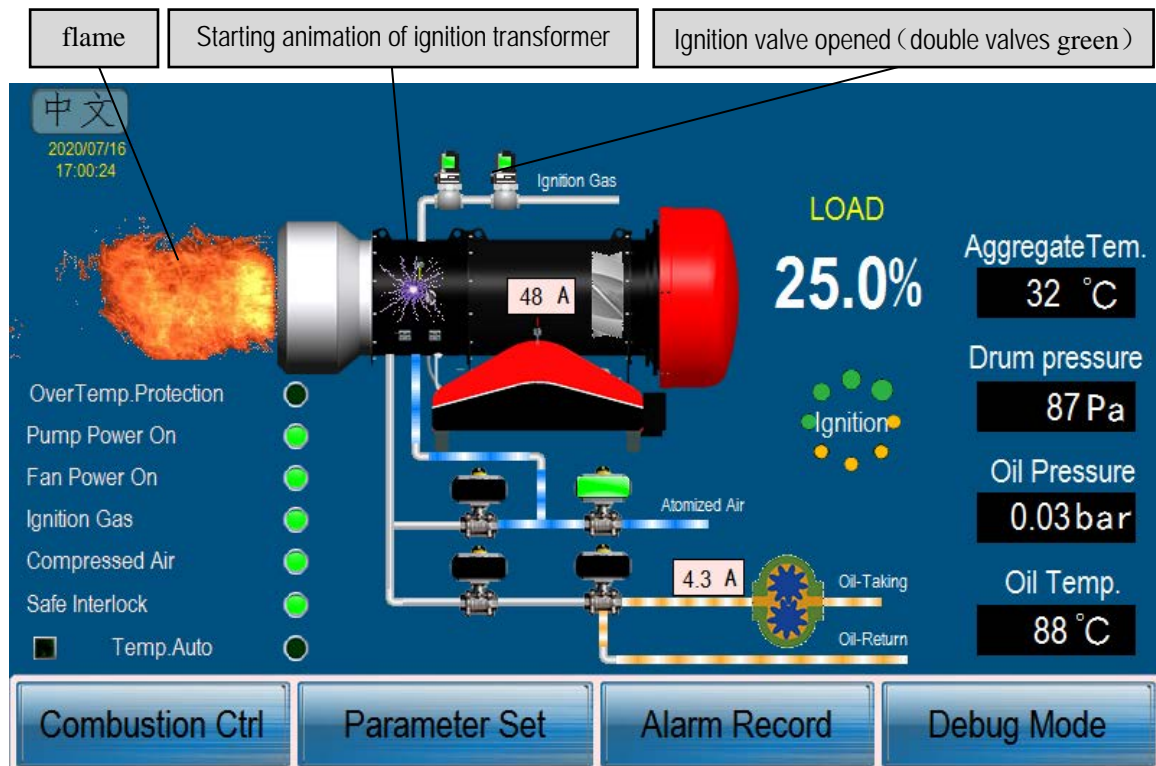
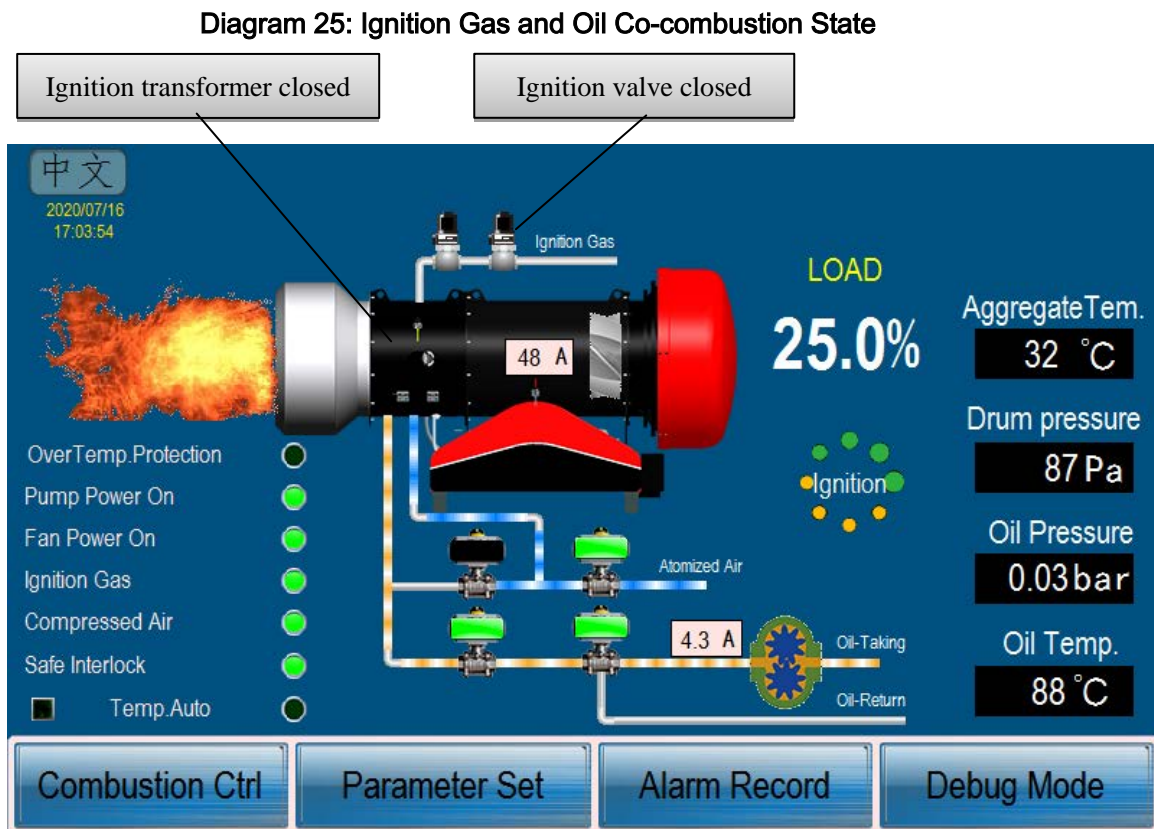
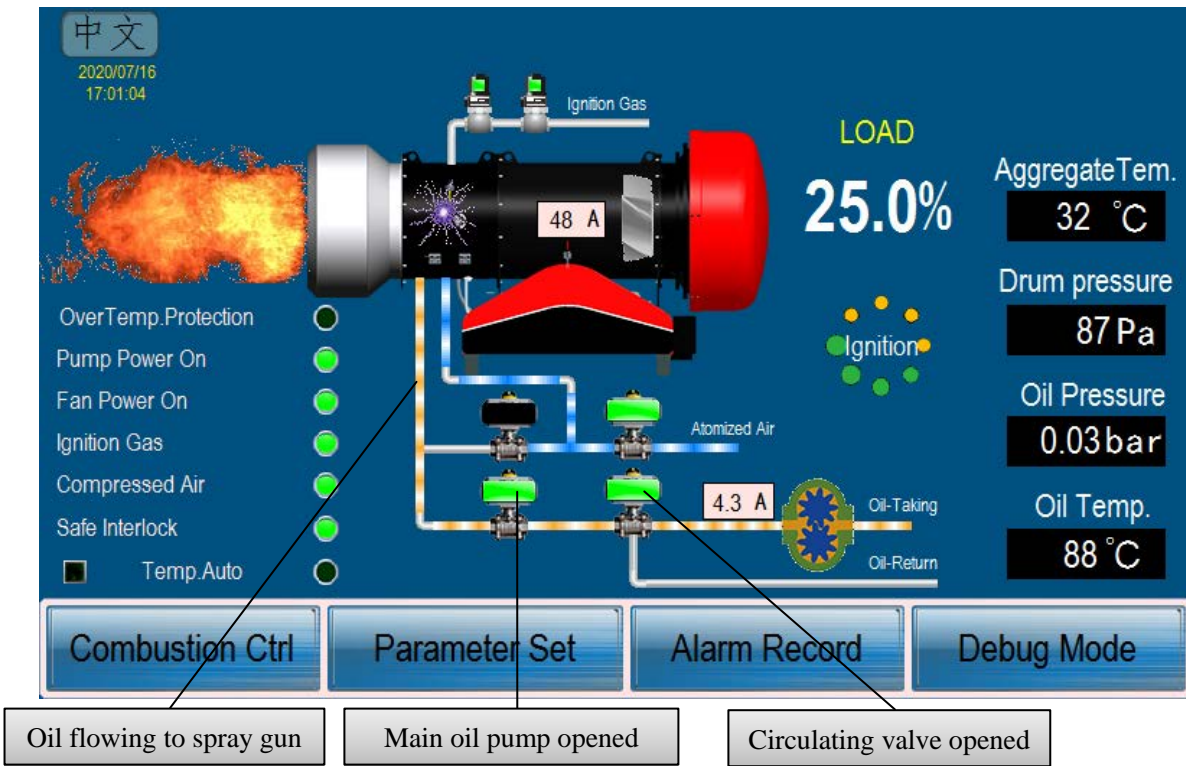


Diagram 24:IgnitionGas/Pilot Gas Ignition Stage Interface



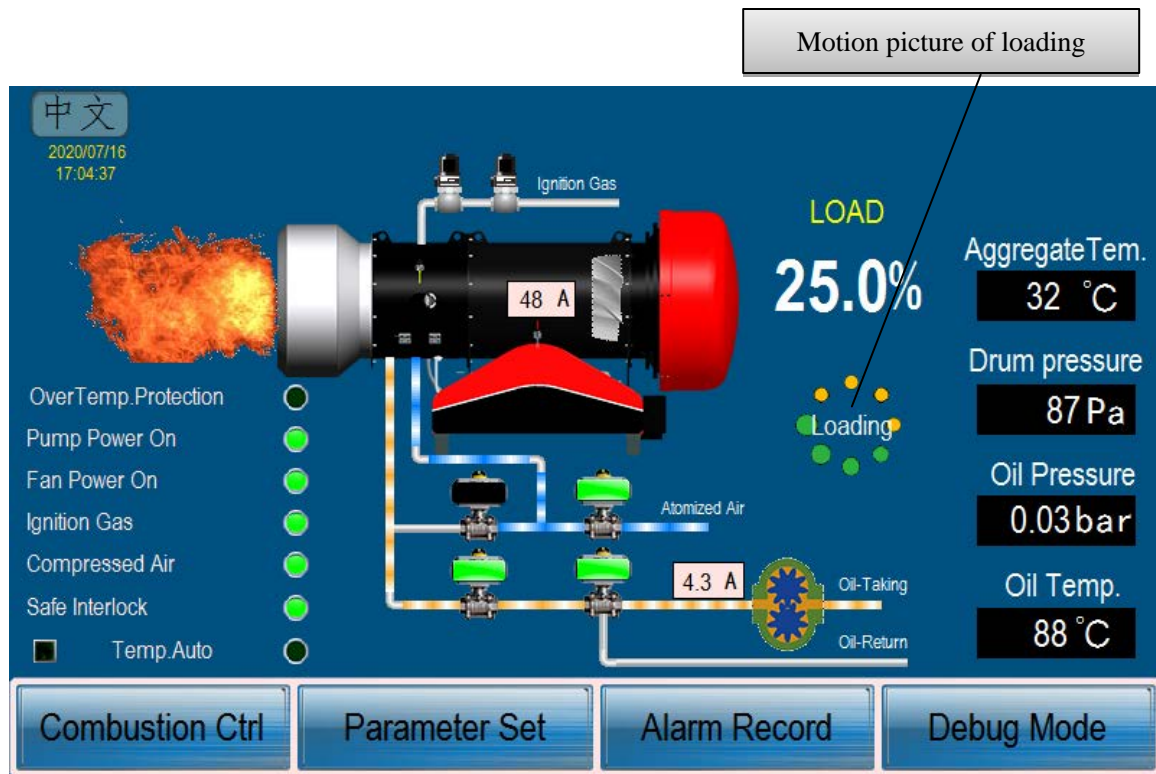


Diagram 27: The System Enters the Normal Combustion Loading State

8. Burner Shutdown OperationDebugging

After the ignition is successful, click the “stop” button and the system enters the automatic shutdown procedure. The system will control each part of the system to make the relevant shutdown operations according to the set shutdown procedure: first, the oil pump stops running, the main oil valve and circulating valve closes, the fan opens after flame extinguishing, then the oil pump reverses, the main oil valve and circulating valve will open and send the oil in the pipeline to the filter tank and then the oil pump stops. the main oil valve and circulating valve close, the clean valve opens to blow down residual fuel in pipes and spray guns. finally the atomizing valve and clean valve closes, the fan continues to work for a certain period of time. The fan is always in the state of cleaning under the condition of shutdown process. After the finishing of blowing, the system automatically resets to the pre-ignition state and the shutdown operation is completed. The above situation is shown in diagram 28-31.

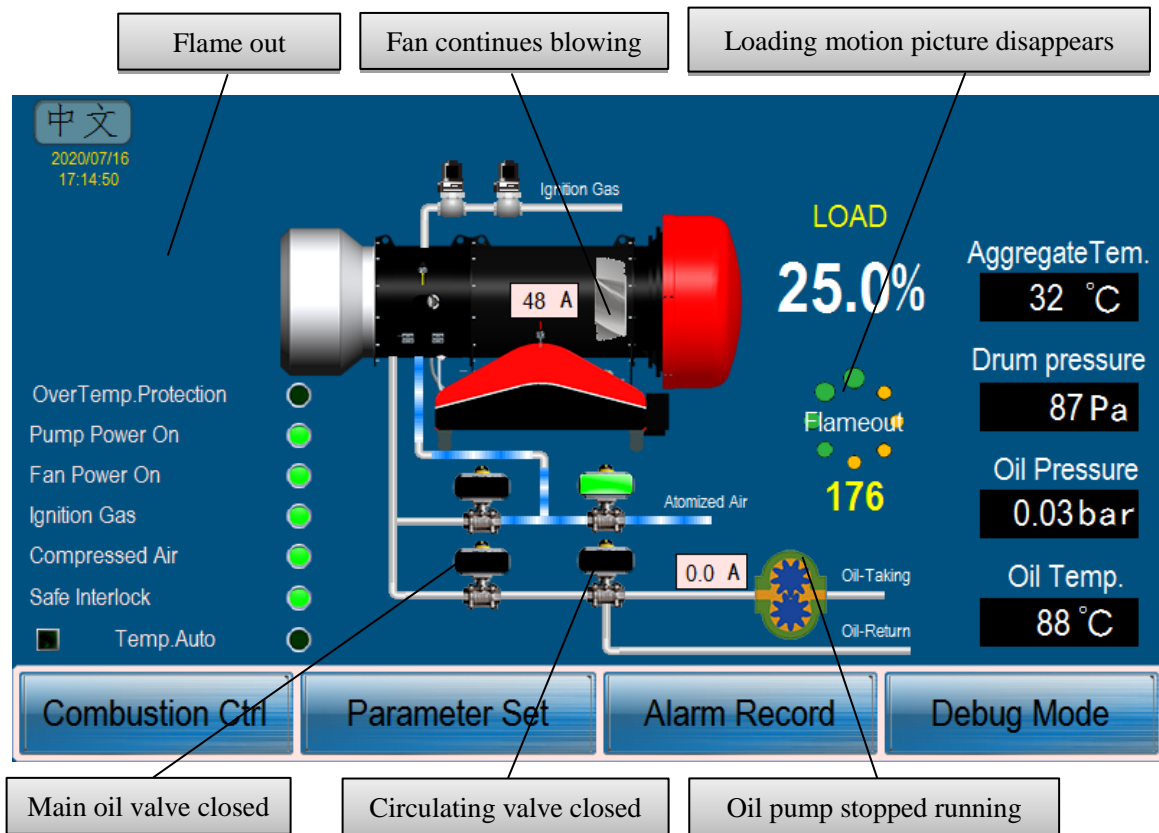


Diagram 28:The System EntersShutdownState 1

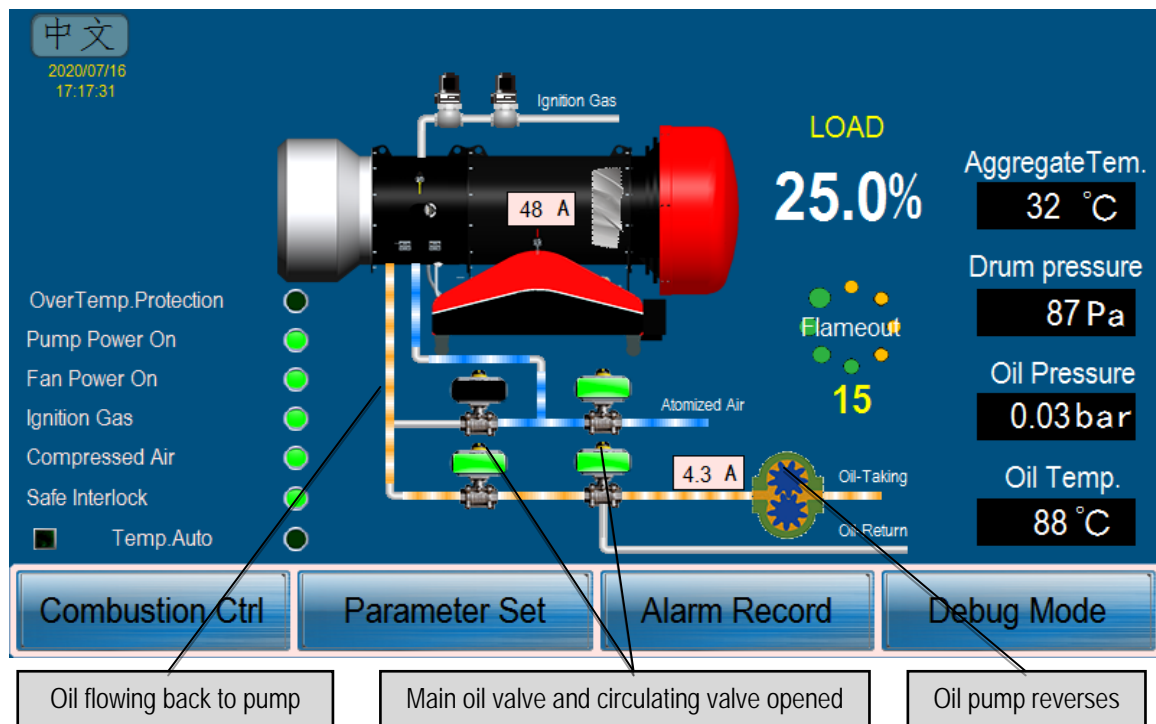


Diagram 29:The System EntersShutdownState 2

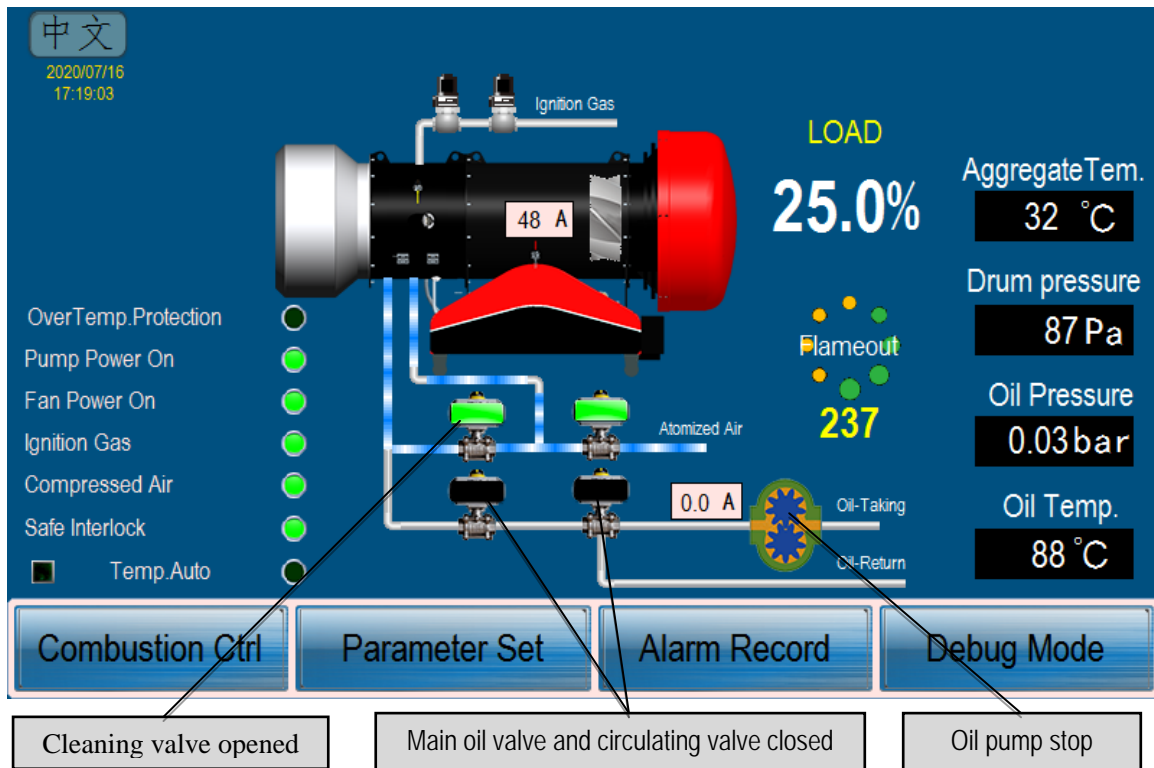


Diagram 30: The System Enters Shutdown State 3

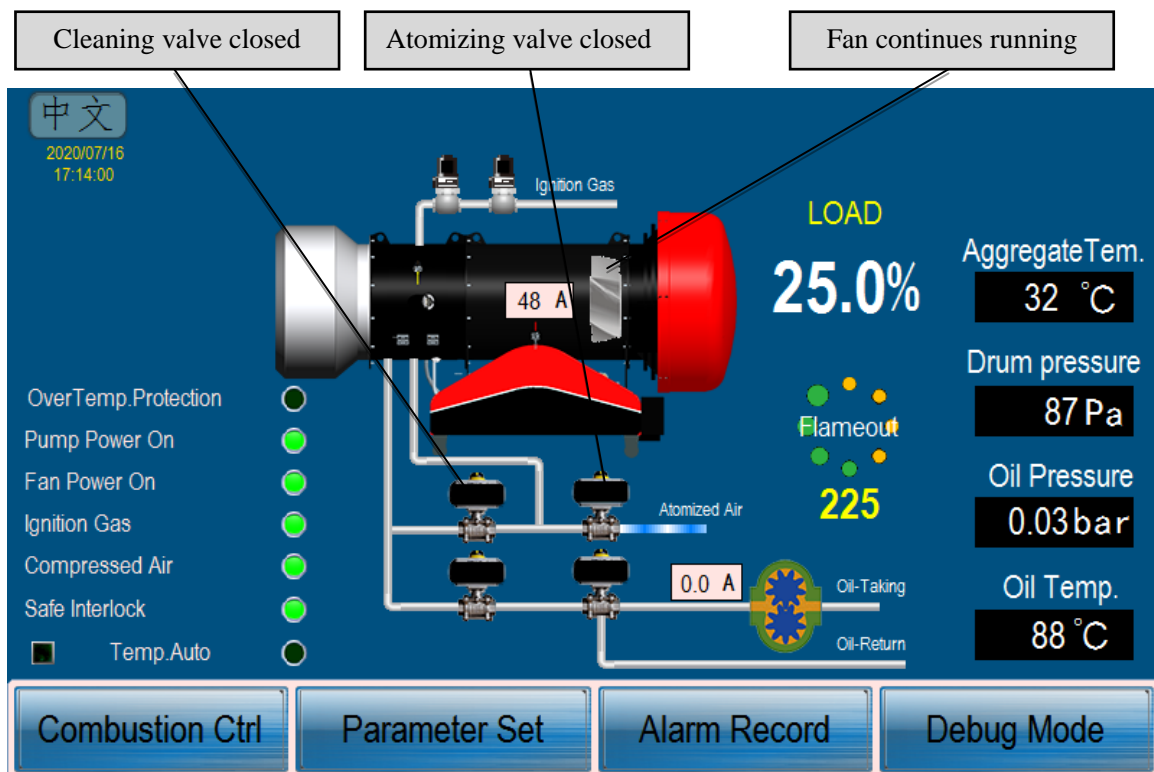


Diagram 31: The System Enters Shutdown State 4

IX、 Troubleshooting

1. If a fault occurs, please first check the following contents:

(1) Check whether the compressed air pressure is normal, whether there is too much condensation water in the air tank, and whether the air inlet valve of the burner pipe has been opened.

(2) Check whether the ignition gas is enough in the gas cylinder, whether the valve has been opened, whether the pipeline is not damaged and whether the ignition gas pressure is normal.

(3) Check whether the oil tank has oil, whether the oil valve is opened, whether the heavy oil temperature is heated enough, whether the heat tracing pipe and valve have been fully heated, whether the heating switch of the spray gun is opened and whether the oil pump can run smoothly and normally.

(4) Check whether all control devices are properly adjusted and whether the burner safe interlock channel is abnormal or not.

(5) Check whether the electrical circuit is normal or not

If it is confirmed that the fault is not caused by external causes, the functions of each part of the burner must be checked.

2. Abnormal Problems and Elimination

The Fault Phenomenon	Possible Reasons	Measures
The burner ignition gun has no spark	Wrong position of ignition electrode	The distance between the ignition electrode is 3-5mm
	The ignition electrode has carbon deposition	clean it
	Ignition electrode insulation leakage	Replace or clean and keep dry
	Ignition transformer is damaged	Replace
	The ignition transformer has no power	Check the wiring and control system

(Connect the above-mentioned)

The Fault phenomenon	Possible Reasons	Measures
Burner ignition gun has electrical spark, but it can't ignite	The gas solenoid valve was not opened	Check the wiring and control system
	gas pressure is low	Adjust the pressure to the specified value or change the gas cylinder
	connecting gas hose is broken	Replace
	The wind speed is too large	Reduce the fan opening
The gas is ignited but the oil cannot be ignited	oil pressure is low	Increase oil pump speed or change oil pump
	The oil temperature is low	Increase oil temperature
	the pressure of compressed air is low	Check the pipeline
	Solenoid valve fault	Repair or replace
	spray gun temperature is low or nozzle blocked	Preheat the spray gun or clean the nozzle
	Ignition flame is too small	Appropriately increase the gas pressure to increase the flame
	oil mixed with water	Change the oil

(Connect the above-mention)

Fault Phenomenon	Possible Reasons	Measures
3 minutes later,the flame goes out after it is ignited	The flame photocell cannot detect the flame.	Check and clean flame photocell or readjust to make the photocell aligns to the flame.
	Flame amplifier fault	Check the flame amplifier and connection lines.
	Flame photocell is damaged.	Replace it
	The buffer filter tank has air or filter screen is blocked	Exhaust or clean the oil filter screen
When normal combustion occurs, the flame is extinguished or flame flicker	Oil pressure is not steady	Clean the oil filter or Replace the oil
	No fuel oil	Replace fuel tanks or refuel
	Flame photocell dirty	Clean it
	Carbon accumulates on the flame stabilizing disc	Clean it
	The oil contains too many impurities and produces bubbles	Replace oil or dehydrate it
Discharge white smoke	excessive air volume	readjust to reduce air volume
	Oil pressure is low	Increase oil pressure & oil pump speed
	large water content	Replace oil or oil dehydrating

(Connect the above-mention)

Fault Phenomenon	Possible Reasons	Measures
Discharge dark smoke	The air is too small or the air inlet is blocked	Check and adjust to increase air volume
	nozzle worn	replace it
	oil pressure is too high	Reduce oil pressure and oil pump rotation speed
	compressed air pressure is low	Check the compressed air valve and air compressor
	oil viscosity is high	Increase oil temperature to reduce viscosity
Oil pressure abnormal	filter blocked	Close the valve and clean the filter
	Oil pump worn	Replace it

X、Maintenance and Overhaul



Warning: During maintenance and overhaul, must cut off the power supply of the burner and all control switches inside the control cabinet, Manually Shut off the compressed air pipeline and valve, oil supply pipeline and valve, ignition gas pipeline and valve.

1、Maintenance

(1) Remove the cover plate of the filter on the oil system and remove the filter element. Clean the impurities on the filter screen to prevent the filter from blocking the oil pipelines.

Clean the filter daily when using dirty heavy oil.

(2) Check the working conditions of the packing seal of the oil pump on the fuel line system of the burner. In case of oil leakage, the pressure cover of the packing seal can be adjusted properly. But it is not allowed to press down too tightly, so as to avoid the heat at the packing and the rapid wear of the seal ring.

(3) Regularly remove ash accumulation from flame detection tubes of the flame monitoring system.

(4) Regularly check the wear of the probe of the aggregate temperature sensor, rotate the probe of the aggregate temperature sensor according to the wear of the probe, and ensure that the probe of the temperature sensor extends into the aggregate about 20mm.

(5) Check whether there is coking and blockage in the flame disc of the combustion head of the burner. If there is coking, clean out the coke and ash accumulation.

2、Overhaul.

When inspecting the burner, if a small fault is found, the cause should be found out in time and the cause should be eliminated or handled. If the small fault can not be handled, the burner should be repaired immediately.

(1) Check the wear of the sealing filler at the oil pump seal; if the wear is serious, replace the sealing filler in time.

(2) Check the wear of the probe of the aggregate temperature sensor. If it cannot meet the installation requirements, the aggregate temperature sensor should be replaced.

(3) Check the oil pipeline system. If there are no other abnormal conditions but the pressure of the oil system fails to meet the operating requirements, the pump head may need to be replaced .

(4) Check the nozzle wear of the oil spray gun in the combustion head. If it is seriously worn, it shall be replaced in time.

(5) Please use original parts. When ordering parts, please provide the burner's nameplate number and model number.

(6) When you need maintenance services, please contact the after-sales service engineer of the factory .

Appendix: Fuel Oil Requirements

The company's fuel burners can use diesel, heavy oil and other fuel oil. In order to ensure that the burner is in continuous good operation, it is recommended to use standard fuel oil. If non-standard fuel oil is used, it is recommended to select and operate according to the following requirements

(1) The calorific value of the fuel should be $\geq 9000\text{kcal / kg}$, and the components in the fuel should be homogenized, without acid or alkaline substances, excessive sediment and moisture

(2) The viscosity of fuel oil flowing into the burner oil pump should be $\leq 40\text{mm}^2 / \text{S}$ (or 5°E). If the viscosity is too high, the viscosity should be reduced by increasing the fuel temperature;

(3) The sulfur content in fuel oil should be less than or equal to 3%. Excessive sulfur content will cause serious environmental pollution and accelerate the wear of burner nozzle, oil pump

and valve, and also aggravate the corrosion of flue, dust collector and induced draft fan in asphalt mixing plant.

(4) Fuel flash point (closed) $\geq 38^{\circ}\text{C}$, low flash point will bring fire hazard

(5) The mechanical impurities in the fuel are less than or equal to 1%. Excessive mechanical impurities will block the filter screen, cause the wear of oil pump and the blockage of fuel injection nozzle, which will affect the normal combustion

(6) The water content in the fuel oil should be as small as possible. If the water content is too much and segregated and gathered at the bottom of the oil tank, the water should be drained completely. Otherwise, if the water enters the oil path, the burner will not be able to ignite, or the flame will flash violently or even flameout

(7) Before using the fuel oil, the fuel oil should be heated to a temperature that meets the viscosity of the burner. In principle, it is better to heat the oil at a slightly higher temperature. A higher oil temperature can reduce the fuel viscosity, which is conducive to improving the combustion efficiency

(8) Please note: The oil pipeline from the oil tank to the oil pump connecting end of the burner shall be equipped with heating sleeve, and the temperature of the pipe section shall be controllable, so long as the fuel oil can flow to the filter end well. In daily use, this section of pipeline is easy to be overheated, which causes a large number of bubbles in the fuel oil in the pipeline, which causes the ignition failure or flameout of the burner. This is also a frequent fault in the initial stage of ignition.

Before using the burner, please read and be familiar with this manual carefully. If you have any unclear points, please contact the company to avoid the occurrence of faults and dangers. If you use non original accessories, serious dangerous accidents will occur. At the same time, you will give up the right of quality assurance and service.

