Automatic Open Cup Flash Point Tester

(Cleveland Method)

MODEL DSY-202Z

Operation Manual

DALIAN PETROLEUM INSTRUMENT CO., LTD.

INSTRUCTION

Thank you for choosing GAOHE instruments manufactured by Dalian Petroleum Instrument Co., Ltd. (hereafter referred to as "GAOHE").

This User Manual is provided to guide you through proper use and maintenance of GAOHE instrument.

To ensure your safety and test result accuracy, please read this manual carefully BEFORE installation and operation. Should you have any question or need further information please contact our field technician or email foreign@dsy1988.com.cn

Please keep this manual for your future reference.

SAFETY WARNING

Please double check input voltage and ground resistance BEFORE POWER ON, make sure instrument has electrical GROUND CONNECTION, and there is no short circuit.

To prevent electric shock and short circuit, MUST POWER OFF when moving and/or repairing instrument. Turn off power when instrument is not in use.

DISCLAIMER

Warranty will not be provided in case of the following circumstances.

(1) Improper operation
(2) Operation under abnormal environment
(3) Abuse or unauthorized alteration of instrument
(4) Unexpected incident
(5) Force majeure etc.

TABLE OF CONTENTS

1. General

- DSY-201Z, Automatic Flash Point Tester (Cleveland open cup method) is designed and produced according to ASTM D92. It is used to test the flash point of samples automatically.
- Temperature and ignition is controlled by PID. The flash point is detected by flame ion detector, all the operation procedures can be executed automatically.
- The temperature is detected by platinum resistant: Pt 100.
- The instrument is equipped with an atmosphere pressure sensor. The instrument can calibrate the test result according to the tested atmosphere pressure automatically.
- The instrument is equipped with big LCD and control panel. Not only the flash point can be displayed, but also the other information such as expected flash point, standard, the highest flash point, test sensitiveness and firing time setup, test state monitoring all can be displayed and modified.
- The sample ID and expected flash point can also be modified during test.

2. Specifications

Test range of flash point: 79～400℃

Standard: ASTM D 92

Temperature test range of sensor: room temperature ~ 400℃

Temperature sensor: platinum resistant: Pt 100.

Flash point detector: flame ion detector

Fire point: flame ion detector

Temperature control: the temperature is controlled by PID.

Rate of temperature raise: 14～17℃/min and 5～6℃/min

Heater: 220V, 0.8kW

Ignition source: liquid petroleum gas, propane

The instrument will alarm in following conditions:

- The sample's temperature has reached 400℃, or reached the highest flash point that has been set, but the flash point has not been detected.
- In specified ignition times, the flash point has not been detected.
- When detect flash point, if the sample sustains burning for more than 5 s, then the temperature should be recorded as fire point.
- The thermal fuse in the arm is broken.
- The temperature sensor connection cable is broken.

Safety device: The built-in fire-extinguishing broad closes the test cup when the test is over.

- Power supply: AC220V 5A 50Hz
- Size: 260 (L) × 440(W) × (H)260（mm）
- Weight: 20kg

3. Cautions

3.1 Take care while operation with gas. Please repair or replace the relevant parts when they are damaged.

3.2 Do not touch the heating part when temperature is very high during the operation. Wear

gloves while operation.

3.3 The spattered sample oils maybe cause fire. Once the instrument is polluted, wipe it at once and please keep the instrument clean.

3.4 When the test has begun, please confirm that the igniting device has been ignited.

3.5 The operator should not be away from the instrument while operation.

3.6 Please prepare fire extinguishing equipments while test.

3.7 When the instrument is not used for a long time, please disconnect the power and cut off ignition gas source.

3.8 Cut off the gas source while the test is over.

4. Configuration

The instrument consists of electrical control circuit, sample heating bath, cooling fan, test flame applicator, igniter and gas source. To adjust the flame size correctly, the instrument is equipped with a needle valve.

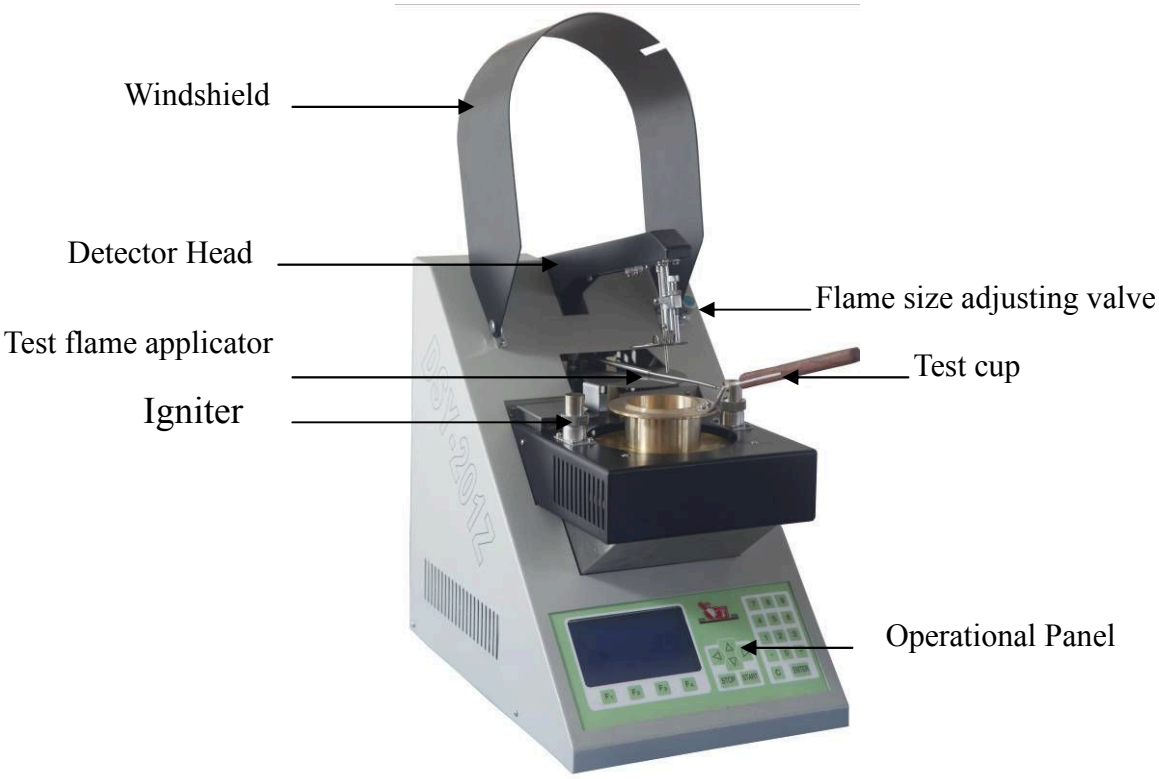
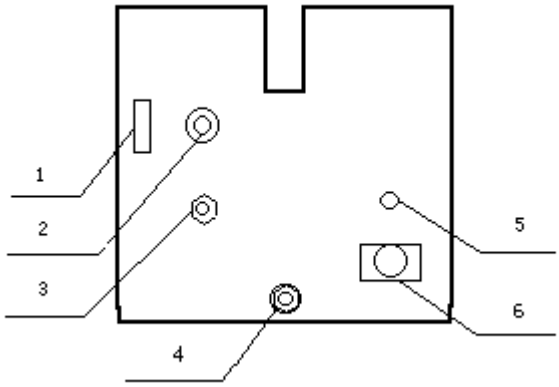


Figure 1 Automatic Flash Point Tester

(Open Cup Method)

The instrument is equipped with an electrical control circuit and a big LCD display. The power switch, fuse, printer interface, printer power, atmosphere pressure sensor and nozzle of ignition gas source are all on the rear.



1. PRINTER INTERFACE 2. PRINTER POWER
3. ATMOSPHERE PRESSURE NOZZLE
4. GAS SUPPLY NOZZLE 5. FUSE 6. POWER CORD

Figure 2 Rear view

5. Notes

5.1 The gas tube must be flexible and reliable.

5.2 Power supply: 220V±10%, 50Hz

5.3 The instrument must be placed in a ventilated and dry place and free of combustible material.

5.4 Do not use fume hood during operation.

Note1:Gas source pressure should not more than 3kPa. The nozzle connection of atmosphere pressure sensor must be in good conditions.

Note 2:The power supply must have grounding termination.

6. Unpack

6.1 Unpack and check all the parts according to the packing list carefully. Install the instrument only when you have determined it has not been damaged.

6.2 Disassembly the fixed support on the instrument, detailed as following, see Figure 3:

1) Unscrew the screw beside the support.

2) Unscrew the nuts on the “Fixed supporter” and take the “adjusting nut” away from “fixed supporter”, then, lift the “detector head”,

3) Re-screw the screw.

Note: The fixed support is mainly for fixing the detector head, to avoid the detector head will change its position.

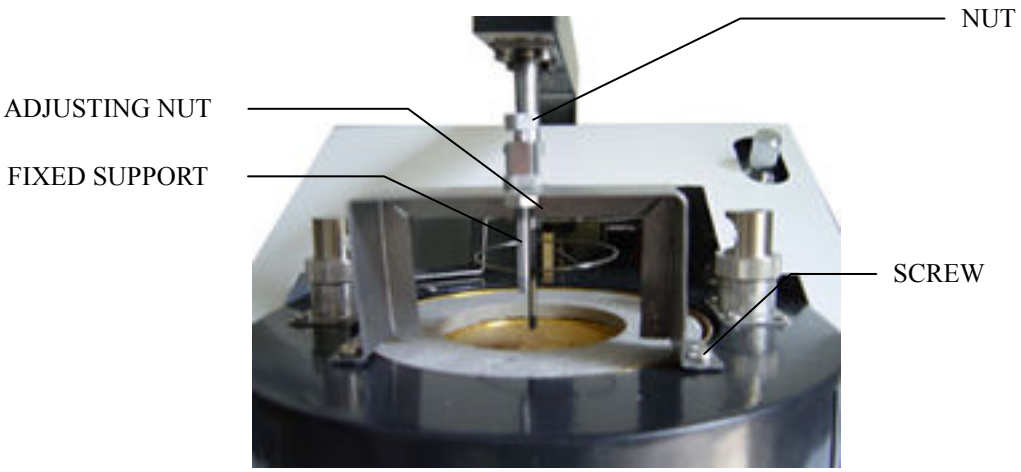


Figure 3 Disassembly of the fixed supporter

7. Display and operation menu

The instrument is equipped with a big display LCD which can display all the states and data.

7.1 Connect with power supply

After the connecting the power cable, turn on the power switch on the rear of the instrument..

7.2 Start menu

After turn on the power switch, the follow will be displayed for 5s.

DSY-201Z

Automatic Flash Point Tester

(Open Cup Method)

V1.2

DALIAN PETROLEUM INSTRUMENT CO., LTD.

Figure 4 Start menu

7.3 Main menu

After the start menu display for 5s, the main menu will be displayed. In this menu the setting and states can all be displayed.

2004-4-15	10:26:40	P
Sample ID	BAIYOU	
Standard	D92 Flash & Fire	
Exp flash	190℃	
Status	OFF	
Samp temp	19.9℃	
test setup	Check	System

Figure 5 Main menu

The current date and time is displayed on the top in the main menu. The **P** followed it means the printer has been connected. Of course, if the **P** is not displayed it means the printer has not been connected.

In the middle of this menu, the last test sample's information will be displayed, such as sample ID, standard and expected flash point. In this menu the information can not be changed. The instrument current state and sample temperature can also be displayed.

In the bottom is the function key menu.

8. Function key

8.1 System key

Press system key, the instrument will enter system operation menu:

MV gas	OFF	Igniter	OFF
Cool fan	OFF	T fuse	ON
Heater	OFF	Curr	OFF
Head MT	OFF	UP OFF	DN OFF
Arm MT	OFF	LF OFF	RI ON
Cover MT	OFF	OT OFF	BK ON
Clock	Comm	Calibr	Back

Figure 6 System menu

MV gas = gas valve

MT = motor

LF = left

RI = right

OT = front

BK = back

Communication = comm

Calibration = calibra

Curr = current

In this menu, the instrument can be operated manually to identify all the parts can work normally.

Note 4: The manual operation need to be carried out in case of the test is not running.

If the instrument does not work correctly, the trouble can be shot in the "system" menu..

Detailed is as following:

- MV gas **(Air valve)**
- Move the cursor to the position of MV gas **(Air valve)** (through **<▲>** and <▼>), press **<START>**, the air valve's state will be **ON**. At the same time you can hear the sound of the valve start. The gas will jet if the gas source has been connected. Press **<STOP>,** the valve will be closed.
- Igniter (ignition coil)
- Move the cursor to the position of igniter (ignition coil) (through <▲> and <▼>), press <START>, its state will be ON. The coil be heated to a very high temperature within 10 s. Press <STOP>, the heating will be stopped.
- Cool fan
- Move the cursor to the position of cool fan (through <▲> and <▼>), press <START>, its state will be ON. The fan will start work. Press <STOP>, the fan will stop working.
- T fuse
- When the fuse is in correct work state, its state will be ON. When the fuse is broken, its state will be OFF.
- Heater
- Move the cursor to the position of heater (through <▲> and <▼>), press <START>, the state of heater and mutual inductor will be ON at the same time. Press <STOP>, its states will be OFF.
- (Detector head)head motor
- Move the cursor to the position of (detection)head motor (through <▲> and <▼>), then press <◄> and <►> to the position of UP (its state is ON or OFF) or down (its state is ON or OFF). When the (detection) head is in the middle, the state of up is OFF and the state of DOWN is also OFF.
- Arm motor (test flame applicator motor)
- Move the cursor to the position of arm motor (test flame applicator motor) (through <▲> and <▼>), then press <◄> and <►>, the orifice will turn to LEFT (its state is ON or OFF) or RIGTH (its state is ON or OFF). When the sweeping stop, the state of the sweeping motor is OFF, while the state of LEFT is ON (or OFF) and the state of RIGHT is OFF (or ON).
- Cover motor (Fire extinguishing board motor)
- Only when the detector head is raised, the fire extinguishing board can be drove. Move the cursor to the position of fire extinguishing board motor (through <▲> and <▼>), then press <◄> and <►>, the fire extinguishing board will spread (we call it front, its state is ON or OFF) or withdrawal (we call it back, its state is ON or OFF). When the fire extinguishing is finished, the state of the fire extinguishing motor is OFF, while the state of FRONT is ON (or OFF) and the state of BACK is OFF (or ON).
- Through above manual operation, the operator can identify if all of parts can be work normally or not. Repair the broken parts at once, in order to avoid the troubles occur while testing.

8.1.1 Clock key

Press clock key, the instrument will enter clock setting menu:

2004-4-15		10:28:30			
Cool fan	OFF	T fuse			ON
Heater	OFF	Curr			OFF
Head MT	OFF	UP	ON	DN	OFF
Arm MT	OFF	LF	OFF	RI	ON
Cover MT	OFF	OT	OFF	BK	ON
					Back

Figure 7 Clock setting menu

Press <◄> and <►> to move the cursor' position, then enter relevant number to set or modify the date and time.

8.1.2 Communication key

Press communication key to enter the communication setting menu.

2004-4-15	10:29:48
Communication No: 1	
	Back

Figure 8 Communication setting menu

This menu has been set by the producer, it is unnecessary for the operator to modify it.

8.1.3 Calibration key

Press calibration key to enter calibration menu. This menu has been set by the producer, it is unnecessary for the operator to modify it.

Sample: 19.9℃	AD: 14434
Heater: 0.57℃	AD: -1677
Flash: 16901	AD: 16901
In temp: 17.14℃	AD: -2433
Atm prs 101.17 kPa	AD: 3339
Rref: 15781	Vref: -1640
	Back

Figure 9 Calibration menu

Flash = Flash point detector

8.2 Check key

Press calibration key to enter the check menu.

2004-4-15	10:38:59
T sample:	19.9℃
T heater:	17.7℃
Flash det:	16901
In temp:	17.5℃
Atm prs:	101.23 kPa
Thermo Baro Print	Back

Figure 10 Check menu

Thermometer = thermo

Baro = barometer

Flash det = Flash point detector

In this menu, the detailed working states are listed. During the operation, the operator can enter this menu to get the sample temperature, heater temperature, information of flash point detector and atmosphere pressure. Press **print**, then the flash point detector information and test results of every ignition can be printed out.

8.2.1 Thermometer key

Press thermometer key to enter thermometer menu.

2004-4-15	10:45:05
T sample:	19.9℃
T heater:	17.6℃
Flash det:	16907
Insid temp:	17.7℃
Atm prs:	101.23 kPa
Sample Others	Back

Figure 11 Thermometer menu

Flash det= Flash point detector

8.2.1.1 Sample key

Press sample key to enter the sample temperature sensor calibration menu.

	Sensor	Thermometer
1	20.0℃	20.5℃
2	39.6℃	40.0℃
3	60.2℃	60.0℃
4	83.5℃	80.0℃
5	100.2℃	100.0℃
PG DN		Back

Figure 12 Temperature sensor calibration menu

The instrument is equipped with a platinum resistance to test the sample temperature. Compare the sensor reading and the thermometer (which has been calibrated) reading, if bias occur, please correct the sensor reading through this menu. Any 20 points can be corrected. In the left enter the sample temperature of sensor reading, in the right enter the

calibrated thermometer reading.

The No.1 group reading must be under room temperature. In Figure 12, only 5 groups of reading have been listed. The calibrated can be executed at any temperature of test range. Press **next**, to go on correcting temperature. After the correcting, press **back** to return to last menu.

Note 5: If it is unnecessary to calibrate the temperature sensor for 20 points, then enter the reading of sensor and thermometer with 0.0.

8.2.1.2 Other key

Press other key to enter heater temperature, inside temperature and atmosphere pressure correction menu.

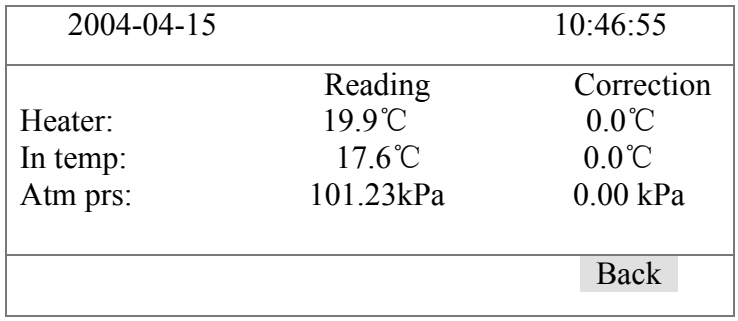


Figure 13 Other correction menu

If bias occurs in the heater temperature, inside temperature and atmosphere pressure, please correct the parameters through this menu. The correction = actual value –atmosphere pressure reading. When the actual value is more than the atmosphere pressure reading, we need to enter a positive value. When the actual value is less than the atmosphere pressure reading, we need to enter a negative one. After the correcting, press <**ENTER>** to confirm. Then the corrected value will be displayed. When the absolute value of the entered bias is more than the specified limit, then the buzzer will alarm to prompt the operator.

8.2.2 Atmosphere pressure key

Press atmosphere pressure key to enter the pressure password menu. This menu is especially designed for avoiding wrong operation (Atmosphere pressure change can lead to the wrong test result). Detailed is as following:

First return to **other** menu, clear the atmosphere pressure correction value, then to pressure password menu, see the following:

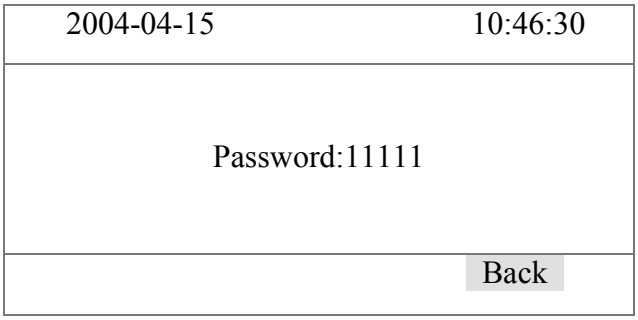


Figure 14 Pressure password menu

Enter the password: ***201***, then the displayed is ***201***11, press **<C>** continuously for twice to

delete No. 4 and No. 5 number. When the displayed value is ***201***, press **<ENTER>** to enter atmosphere pressure calibration menu. The operator can calibrate the atmosphere pressure sensor in this menu.

Note 6: about the function of <C> key.

1) **Clear the character**
2) **Start and stop ignition coil**

2004-04-15	10:48:30
Atm prs reading: Actual atm prs: Applied prs diff: After enter atm prs, press F1 After apply prs diff, press F2	106.58 kPa 101.25 kPa 40 mmHg
	Back

Figure 15 Atmosphere pressure calibration menu

The detailed calibration method is as following:

1) Use a calibrated barometer to measure the atmosphere pressure and enter the reading to the position of **actual atmosphere pressure**, then press **<F1>**.

2) Connect the mercury differential manometer with the sensor nozzle of atmosphere pressure tightly to avoid to leakage of air.

3) Apply a stable difference pressure to the mercury manometer. The range is 10~60mmHg, enter the value of the pressure difference to the position of "**apply prs diff"** on the menu, then press **<F2>**.

4) Change the value unit of "apply difference pressure", according to the formula: （1mmHg=0.133322kPa）in "Applied prs diff",then sum the value of "Actual atm prs" and value of "Applied prs diff". Observe the actual measured atmosphere pressure should be the same as the calculation value.

5) If the difference between actual measured atmosphere and the calculation value is very big, then calibrate the atmosphere pressure again.

For an example:

a) Make the instrument atmosphere pressure nozzle is opened to the atmosphere, enter the reading 101.25 kPa to the position of **current atmosphere pressure**, then press **<F1>**.

b) Connect the mercury manometer with the sensor nozzle of atmosphere pressure tightly. Through the mercury manometer apply the difference pressure of 40mmHg and enter the 40mmHg to the position of **applied difference pressure** on the menu, then press **<F2>**.

c) Calculate according to the formula (1mmHg=0.133322kPa).

the calculation value =101.25+40*0.133322=106.58288 kPa, compare it with the actual measured atmosphere to confirm they are the same or not.

Note 7: The atmosphere has been calibrated before delivery, Generally it is unnecessary to re-calibrate it again. Atmosphere pressure can effect the test result seriously. So, if the difference between the atmosphere pressure reading and the

calibrated barometer reading is very big, then the calibration must be executed according to above procedures carefully.

Note 8: The entered current pressure value must be the actual atmosphere pressure of the test environment.

8.3 Setup key

Press setup key to enter the setup menu.

2004-04-15	10:50:07
Highest flash point:	250℃
Sensitivity:	1000
Cooling end temperature	35℃
Max ignition times:	99
Heat Rapid	Back

Figure 16 Setup menu

■ The highest flash point

Before operation, set the highest flash point to avoid dangers. Once the sample temperature is higher than this, the test will be stopped automatically and begin to cool. Generally the highest flash point setting is higher than the expected flash point about 50℃.

Note 9: Once the entered expected flash point is higher than the highest flash point, the instrument will not work normally.

■ Detection Sensitivity: the instrument is equipped with electrode ring detector to detect the flash point. The principle is to search for the circuit change. When the measured value is bigger than the set one, it means the flash point has been found.

Note 10: Generally, the detection sensitivity value is set as 1000. The sensitivity is higher while the value is too small, but it is easy to judge incorrectly. If the value is too big, the first flash point may be missed.

■ Cooling end temperature

When the test is over, the cooling fan will cool the heater and sample. When the heater temperature is lower than the **cooling end temperature**, the fan will stop and the cooling is over.

■ The max ignition times

Before operation, set the max ignition times to avoid trouble. Once the ignition times is more than this, the test will be stopped automatically and begin to cool.

8.3.1 Heating key

Press heating key to enter heating correction menu.

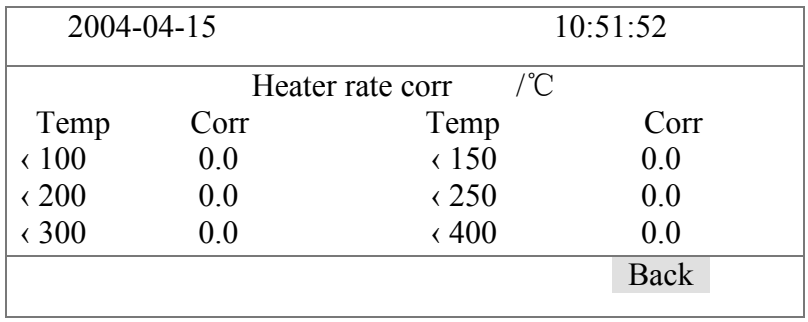


Figure 17 Heating correction menu

The heating rate has been set according to ASTM D92 before delivery, It is unnecessary for the user to modify it again.

8.3.2 Rapid method key

Press rapid method key to enter the rapid method menu. The temperature-increase rate, ignition interval can be set in this menu.

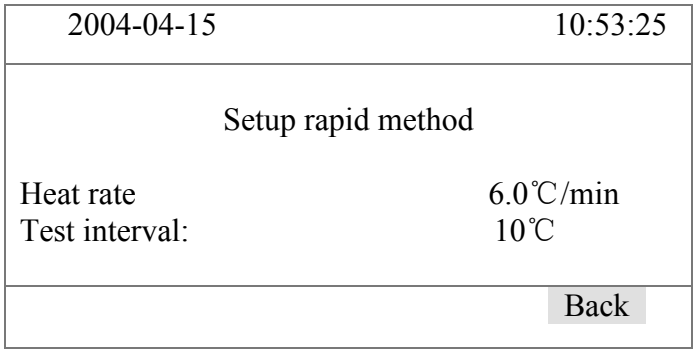


Figure 18 Rapid method menu

When the sample expected flash point is unknown, the operator can detect the expected flash point by this rapid method.

■ Heat rate (Heating rate):

Move the cursor to the position of **Heater rate** through <◄> and <►>. Set the heating rate through the numerical keys. After the setting, press **<ENTER>** to confirm.

■ Test interval (Ignition interval)

Move the cursor to the position of **Test interval** through <▲> and <▼>. Set the ignition interval through the <◄> and <►> as well as the numerical keys. After the setting, press **<ENTER>** to confirm.

Note 11: The rapid method is used to detect the expected flash point, it can not detect the sample flash point correctly.

When detect the expected flash point with rapid method, the highest flash point must be set. The operator should not away from the instrument during the operation.

Note 12: Ignition interval is 1-10℃, if it has been set too small, the ignition times must be reset .

8.4 Test key

Press test key to sample test menu. The operator can execute the relevant setting, cooling procedure and start the test.

If the instrument is not in working state. While the heater temperature is higher than the

cooling end temperature, Press <F1> to start the cooling procedure.

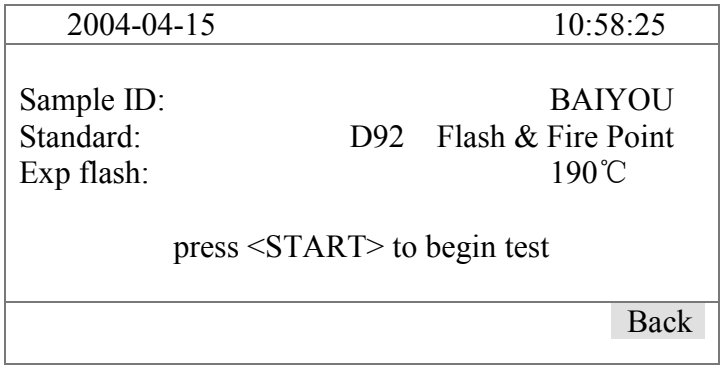


Figure 19 Test menu

- Sample ID

Select English letters or number through <▲> and <▼>. After entering, press **<ENTER>** to confirm. Then the cursor will move to **standard** item.

- Standard

Select the standard through the <◄> and <►>. The optional standards are:

1) ASTM D92 flash point and fire point
2) ASTM D92 flash point
3) Rapid method.

After the entering, press **<ENTER>** to confirm. Then the cursor will move to **expected flash point** item.

- Expected flash point

Please set the expected flash point before operation. Enter the expected flash point through numerical keys. Press **<ENTER>** to confirm. If the expected flash point is unknown. The expected flash point can be detected with the rapid method. After the entering, press **<ENTER>** to confirm.

After the setting, press **<START>** to begin the test.

Note 13: the expected flash point can be changed at any time, but it may cause trouble during the test.

9. Operation procedures

Please ensure that the temperature correction, atmosphere pressure calibration, temperature-increase rate correction can be finished.

9.1 Preparation

9.1.1 Place the instrument on to a stable workbench.

9.1.2 Tests are to be performed in a draft-free room or compartment. Tests made in a laboratory hood or in any location where drafts occur are no reliable.

9.1.3 Drop down the detector head, from the lower end of the sensor to the bottom of the test cup should be 6.4±0.1mm. Adjust the instrument according to 10.2.1 in case of bias occur.

9.1.4 The electrode ring should be positioned on the upside of the test cup and has the same axis with the cup. The distance is about 2 mm from the top edge down to the ring. The ring

plane should be parallel with the bottom.

9.1.5 Check the ignition coil and the relevant connection parts to ensure the good connection.

Note 14: If troubles occur, it also can be caused short circuit and damaged the coil.

9.1.6 Fill the test cup with the sample to the filling mark in side of the test cup. Then, put the test cup onto the heating bath.

9.2 Ensure the instrument and the gas source is connected well

9.3 Insert the power supply and turn on the power switch.

9.4 Press **setup** key to enter the setup menu, to set relevant information such as sample highest flash point and so on.

9.5 Press **back**, then press **test**, enter the sample ID, then press <**ENTER>** to confirm.

9.6 Select the standard through the <◄> and <►>. Press <**ENTER>** to confirm.

9.7 Enter the sample's expected flash point, Press <**ENTER>** to confirm.

9.8 Press **<START>**, to enter the **START** menu, detector head will drop automatically, and to begin the test. The heater begin to work. At the time, only the ignition coil is in very high temperature. The igniter coil will keep high temperature until the "test flame applicator" begin to sweep. Once the "test flame applicator" is away from the igniter coil ,it will be not work. After 10s, the gas valve is opened, then the flame will be ignited. (For first ignition, the total ignition time is about 2~5 minutes, because the it should be release the air left in the gas tube at first.). Warning: when it is not easy to ignite the flame, do not turn the knob of the gas valve to the maximum to avoid the fire happened .You had better to wait for a moment to release the air in the gas tube.

2005-4-15	10:59:20	P
Sample ID	BAIYOU	
Standard	D92 Flash & Fire	
Exp flash	190℃	
Status	heating	
Samp temp.	20.5℃	
test setup	Check	System

Figure 20 START menu

9.9 Adjust the diameter of the test flame to about 4 mm by knobbing the needle valve.

9.10 Press **check** key to enter the check menu. The information of sample, heater temperature and so on will be displayed. Press **print** key. The printer will print the result.

The first time apply when the temperature of the test specimen is approximately 28℃ below the expected flash point. Thereafter at the temperature that is multiple of 2℃ , the sweeping will begin. The left and right ignition coil will work alternately. At the same time the printer will print out the detector variation of each flash point test.

Detector variation is less than the sensitivity before the flash point is detected.

Detector variation is more than detection sensitivity while the flash point occur.

The buzzer will alarm for 2s, at this time, press back, following will be displayed:

2005-4-15	11:18:20	P
Sample ID:	BAIYOU	
Standard:	D92 Flash & Fire	
Exp flash:	190℃	
Status:	Heating	
Flash: 196℃	Fire: no found	
Test	Setup	Check	System

Figure 21 Flash point test menu

9.11 For detect fire point.

Go on the test until the flame sustains burning for minimum 5s, then the temperature will be recorded as fire point. The buzzer will alarm intermittently. Print out the flash point & fire point which has been calibrated through atmosphere pressure(see the Fig.22).

2004-04-15 11:20 DSY-201Z Automatic Flash Point Tester Open Cup Method	
Sample ID	BAIYOU
Standard	D92 Flash & Fire Point
Heat rate	5.5℃/min
Exp flash	190℃
Highest FP	250℃
Sensitivity	1000
Cooling end temperature	35℃
Atm prs ……..	101.23kPa
Find flash point at 18:	196℃
Flash point	196℃
Find fire point at 38:	216℃
Fire point	216℃

Figure 22 Output data

9.12 When the test is over, the detector head will be raised automatically, fire extinguish board will cover the cup, about 20s later, open the cup again. At the same time the automatic cooling procedure will be acted (the fan begin to work). When the temperature has dropped lower than the cooling end temperature, the fan will stop work and the buzzer alarm for the test end.

2005-4-15	11:18:20	P
Sample ID	BAIYOU	
Standard	D92 Flash & Fire	
Exp flash	190℃	
Status	cooling	
Flash point .	196℃	
Fire point	216℃	
test	setup	Check	System

Figure 23 Test end menu

Note 15: During test, if emergency occur or the test must be stopped, press <STOP> or turn off the power switch directly.

9.13 Cleaning

Clean the oils on the sensor with soft cloth gently. Wash the test cup with the cleaning solvent to remove any test specimen or traces of gum or residue remaining from a previous test. Ensure the test cup is completely clean an dry before using again.

10. Adjustment

The instrument has been adjusted before delivery, after some time, temperature and mechanical bias maybe occur which can lead incorrect test results.

10.1 Temperature correction

10.1.1 When the flash point is suspicious, the temperature can be corrected. Install the standard thermometer to the relevant position, detailed see Figure 24.

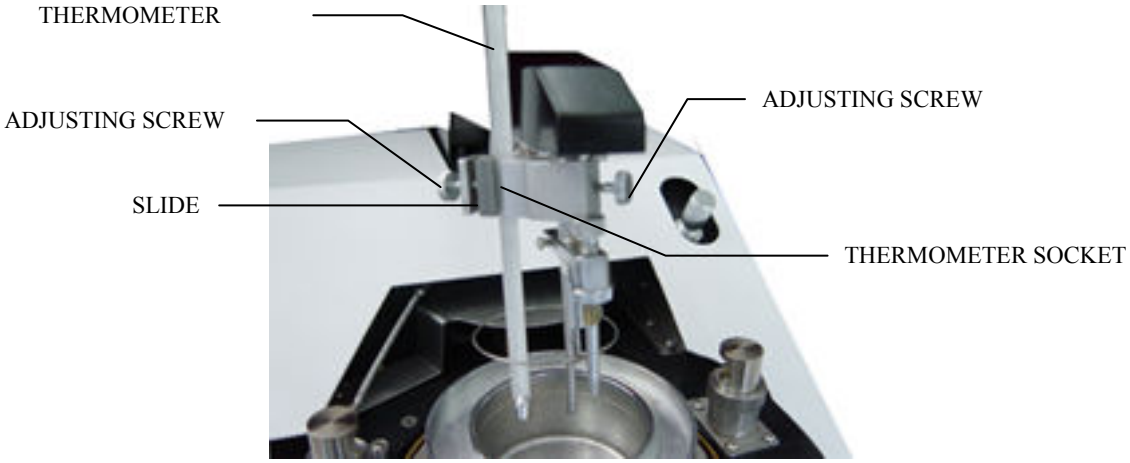


Figure 24 Thermometer base and thermometer installation

a) There are two notches on the thermometer base. One is on a plastic slide which position can be adjusted. Before install the thermometer move the slide to the left to install the thermometer.

The other notch is on a part which connected with the detection arm.

b) Install the temperature base onto the detection head, do not fix the screw tightly.

c) Insert the thermometer onto the base, place the “scale of thermometer” (6 mm) into the bottom of the cup, adjust the thermometer’s position and keep it’s ball bottom just contact the “scale of thermometer” (6 mm), then screw the screw to fix the thermometer.

Adjust the thermometer socket’s position to keep the thermometer just at a point halfway between the center and the side of the sweep of the test flame. Then screw the screw to fix the thermometer.

After the installation, Fill sample into the cup and begin to test.

10.1.2 Read and record the thermometer reading and sensor reading at suitable interval.

10.1.3 After the temperature measured, enter the temperature according to 8.2.1.1.

10.1.4 After temperature calibration, detect flash point with standard sample, If the flash point in the range of the value of the standard sample, it confirm the instrument in a good work condition.

10.2 Install the Temperature sensor and Flash point detector(electrode ring detector) and

10.2.1 Adjust the position of the temperature sensor , place the " temperature sensor scale" under the temperature sensor, whose thickness is 6.4±0.1mm, and at the bottom of the test cup. Drop the detection head, Unscrew the screw, and then drop the detection head, get the bottom of temperature sensor just touched the "thermometer sensor scale", then screw the SCREW to fix the sensor.

10.2.2 Adjust position of the electrode ring detector, put the "scale of electrode ring" into the test cup, when drop the detection head , the electrode ring detector just touch the "electrode ring scale", and then, screw the SCREW and the ADJUSTING BOILT (see the FIG.25).

Remark: The electrode ring and the test cup is at the same axis, the electrode ring should be 2 mm lower than the top edge of the test cup and be parallel with the bottom.

10.2.3 The electrode ring detector may cause wrong result while it is polluted seriously, it should be cleaned always.

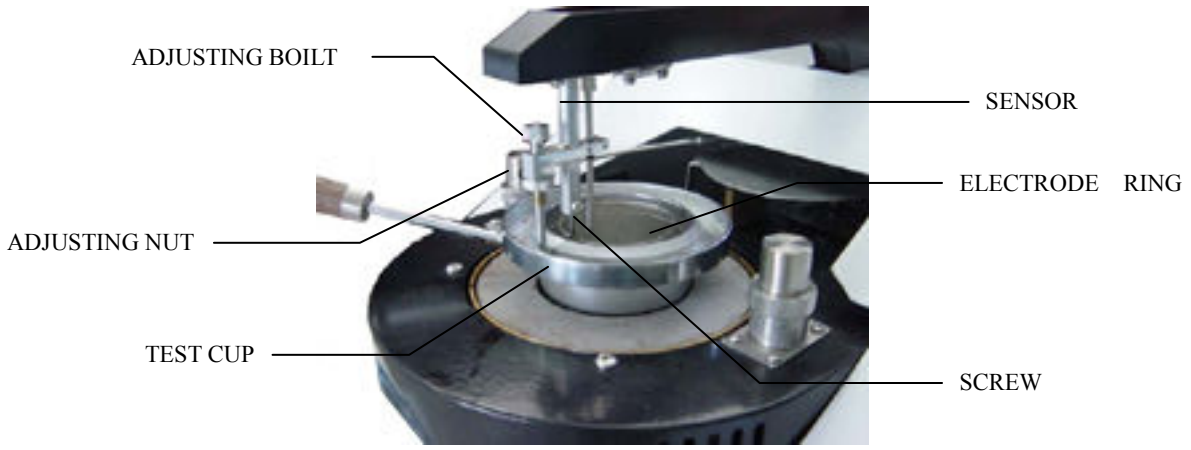


Figure 25 Detector

11. Trouble and alarm

11.1 If the setting of expected flash point is too high, the flash point may be detected while the first application. So, it is suggested that, use rapid method to detect the expected flash point first, then set according to this.

11.2 If the ignition times have exceeded the setting ones, the test will stop.

11.3 During the test, if the temperature has reached the highest flash point, the flash point is not detected, then test will stop.

11.4 During test or not, once trouble or abnormal phenomenon occur, The buzzer will alarm. Press **<STOP>**, the alarm will stop.

If troubles occur while during test, the heating will be stopped and gas source will be cut off.

12. Trouble and trouble shooting

See the following table for normal troubleshooting event, cause, and solution:

Trouble	Cause	Solution
No display on LCD	1. Power is disconnect 2. Power switch is broken 3. Fuse is broken	1. Check if power socket is connected 2. Replacement 3. Replacement
No flame on the "test flame applicator"	1. The main valve of the gas source is closed 2. The gas tube does not connect well 3. The temperature of ignition coil is not high enough 4. The adjusting needle valve is close 5. The air valve can not be open	1. Open the main valve of gas source. 2. Connect the gas tube tightly. 3. Check the input voltage of the ignition coil or replace the ignition coil. 4. Open the adjusting needle valve. 5. Check the air valve if can be work normally, or replace the air valve.
The sample temperature is not high	1. SSR is broken 2. The heater can not heat	1. Replacement 2. Replacement
The heat rate is not suitable	1. The correction of heat rate is not right 2. The heat-increase rate is too fast	1. Correct the temperature. 2. The SSR may be damaged, replace the SSR.
Result is incorrect	1. The test cup or electrode ring detector is polluted 2. Expect flash point and max ignition times are not suitable. 3.The temperature is offset	1. Clean the test cup and electrode ring detector 2. Reset the parameters 3. Correction of temperature.
There is no flash point	1. The setting of expect flash point is not suitable 2. The setting of sensitivity of electrode ring detector is to too high. 3. The test cup is polluted; lead to the electricity can't go through.	1. Reset the expect flash point 2. Decrease the sensitivity of the electrode ring detector. 3. Clean the test cup with the steel wool.

13. Case disassembly

Disassembly the instrument case first while repairing, the detailed is as following:

1) Lift the detection head.

2) Unscrew the 4 screws outside.

3) Take off the cap on the igniting device.

4) Move the case forward.

5) Take the case away slowly.

Note: The case is connected with LCD, take care while disassemble the case to avoid damaging the instrument.

Figure 26 Disassembly the case

14. Maintenance

14.1 The instrument should be placed at a draught and dry place and should be covered with suitable material.

14.2 The instrument should be cleaned after test is over.

15. Certified reference material

Use the following material to verify the performance of the instrument every year.

Hydrocarbon	Purity（mole%）	Flash point（℃）	Range
n-tetradecane	99+	115.5	±8.0
n-hexadecane	99+	138.8	±8.0

DALIAN PETROLEUM INSTRUMENT CO., LTD.

South Tangli Industrial Park, Ganjingzi District, Dalian, LIAONING, CHINA

Tel:86-411-84288128 Fax:86-411-84288138

www. dsy1988.com.cn/En Email:foreign@dsy1988.com.cn

Reversion: 201610