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# Operation Manual for Automatic PMCC Flash Point Tester **FP-26A**



**PLEASE READ THIS MANUAL CAREFULLY BEFORE OPERATION**

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## **I. Summary**

The instrument is used to determine closed cup flash point of petroleum product. The instrument adopts colored LCD screen, man machine conversation interface, blank buttons, open and fuzzy controlled integration software, and modular structure. It can preset temperature, sample ID, barometric pressure, test date, and other parameters. It has prompt menu and input guide. The instrument is automatic, convenient, and rapid. It can meet the requirements of the National Standard of People's Republic of China GB/T261-2008 "Test Methods for Flash Point of Petroleum Products by the Pensky-Martens Closed Cup Method". It is the best choice of similar products. It can be widely used in the field of railway, aviation, power plant, petroleum industry, and scientific research institutes.

## **II. Purpose and scope**

The instrument is designed and made as per the National Standard GB/T261-2008 "Test Methods for Flash Point of Petroleum Products by the Pensky-Martens Closed Cup Method". It is suitable to determine the closed cup flash point of petroleum products, which is expressed as the lowest temperature when a sample is heated in a closed cup under the stipulated condition until the mixture of its vapor and air contacts flame and appears flash.

## **III. Main technical specification and parameters**

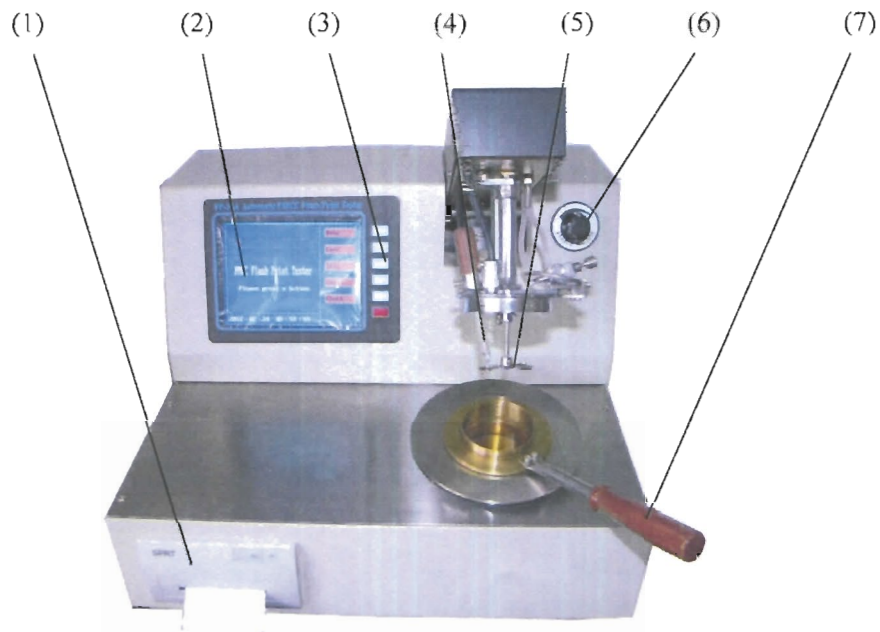
1. Power supply: AC 220V $\pm$ 10%, 50 Hz;
2. Temperature measurement:
  - (1) Full scale: room temperature ~ 300 $^{\circ}$ C;
  - (2) Repeatability:  $\leq$ 2 $^{\circ}$ C;
  - (3) Reproducibility:  $\leq$ 4 $^{\circ}$ C;
  - (4) Resolution: 0.1  $^{\circ}$ C;
  - (5) Accuracy: 0.5%;
3. Basic parameters:

- (1) Temperature rising rate: as per GB/T261-2008;
- (2) Flame application mode: gas flame for flame application;
- 4. Working environment:
  - (1) Ambient temperature: 10℃ ~ 40℃;
  - (2) Relative humidity: ≤80 %;
- 5. Total power consumption: not more than 500 W;

#### IV. Instrument structure and characteristics

##### (I) Instrument structure

The instrument structure is shown as Fig.1.



- (1) Printer    (2) Display    (3) Operation buttons    (4) Temperature sensor    (5) Stirrer  
(6) Flame adjustment knob    (7) Sample cup

Fig.1

##### (II) Instrument characteristics

1. It adopts colored LCD screen, man machine conversation interface, and blank buttons. It can preset temperature, sample ID, barometric pressure, test date, and other parameters. It has prompt menu as input guide.

2. It can simulate and show temperature-time curve. It has modification prompts for software operation error. It has prompts for test date, test time, and other parameters.
3. It can save 100 groups of test data.
4. It can correct the affect of the barometric pressure to test and calculate the modified value.
5. Differential detection; It can modify system deviation automatically.
6. It can open cup lid, apply flame, detect flash, and print test data automatically. The test arm can be raised up and lowered down automatically.

## **V. Working principle**

Fill sample in the test cup, and heat the test cup containing sample on the instrument as per the requirements of the National Standard GB/T261-2008. The flash point is expressed as the lowest temperature when the mixture of sample vapor and air contacts flame and appears flash.

The controlling system can send orders through I/O port as per the collected temperature changes to control the heater, so that the sample temperature can increase at a certain rate. The flame application interval, flame application time, and flash detection can be automatically controlled. When a flash is detected, the controlling system will stop collecting data. Then the instrument will show the flash point value and print out test results. The heater will stop working, the flame is extinguished, and the test arm is automatically raised up. The test is over.

## **VI. Operation methods and procedures**

### **(I) Preparation before test**

1. The instrument is automatic, so please carefully read the Operation Manual before use.
2. Please carefully read the National Standard of People's Republic of China GB/T261-2008 to acquaint and familiar with test methods, test procedures, and test requirements stipulated in the standard.
3. Please get ready for all test apparatus and materials as per GB/T261.
4. Please check the working state of the instrument to make sure it is in accord with working

environment and working condition stipulated in the Operation Manual.

5. Check the shell of the instrument to make sure it is fine grounded. The power supply wire should have fine grounding end.

(II) Instrument installation

1. Open the package to check whether there is anything damage or loss.
2. Check the amount of main unit and accessories as per the packing list.
3. Debug the instrument if everything is correct after checking.

(III) Preparation to run the instrument

1. Place the instrument on a stable workbench. Insert the power supply wire into the socket of three cores. The power supply should be fine grounded.

2. Connect LPG or acetylene gas to the gas inlet through decompression valve and check whether it is leaking.

3. Clean the test cup using petroleum ether.

(IV) Test procedures

1. Turn on the power supply switch, and the display screen is shown as Fig.2.

Press a function button to the corresponding interface.

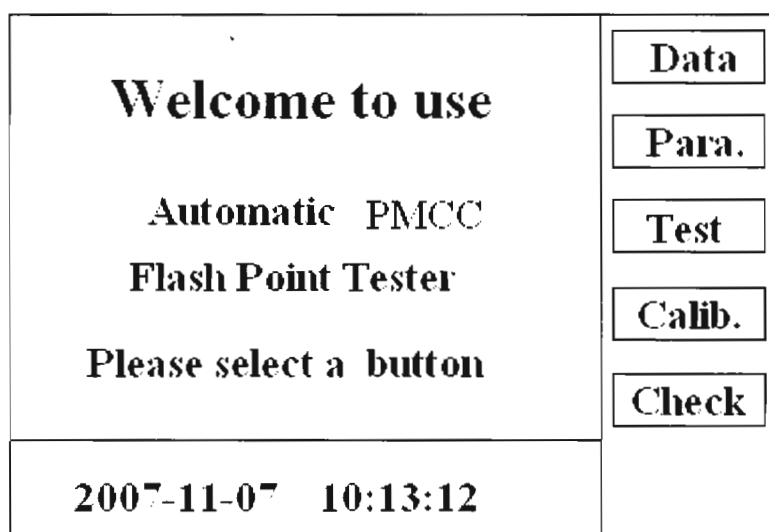


Fig.2

(1) Data interface

Press the Data button to the interface shown as Fig.3. The interface contains information about

test serial number, test date, test cup serial number, sample ID, and flash point value, etc.

| No.        | Date     | Cup      | Oil ID | Flash | Mdf |
|------------|----------|----------|--------|-------|-----|
| 0001       | 00/00/00 | 0        | 000    | 000   | 000 |
| 0002       | 00/00/00 | 0        | 000    | 000   | 000 |
| 0003       | 00/00/00 | 0        | 000    | 000   | 000 |
| 0004       | 00/00/00 | 0        | 000    | 000   | 000 |
| 0005       | 00/00/00 | 0        | 000    | 000   | 000 |
| 0006       | 00/00/00 | 0        | 000    | 000   | 000 |
| 0007       | 00/00/00 | 0        | 000    | 000   | 000 |
| 0008       | 00/00/00 | 0        | 000    | 000   | 000 |
| 0009       | 00/00/00 | 0        | 000    | 000   | 000 |
| 0010       | 00/00/00 | 0        | 000    | 000   | 000 |
| 0011       | 00/00/00 | 0        | 000    | 000   | 000 |
| 0012       | 00/00/00 | 0        | 000    | 000   | 000 |
| 2007-11-07 |          | 10:13:12 |        |       |     |

PageUp

Pagedown

Clear

Delete

Print

Back

Fig.3

- Pageup button: Press the button, and it will show data on the previous page;
- Pagedown button: Press the button, and it will show data on the next page;
- Clear button: Press the button, and then the data saved will be completely deleted;
- Delete button: Press the button, and it will delete the latest data;
- Print button: Press the button to print out test data in the current interface;
- Back button: Press the button to the main interface;

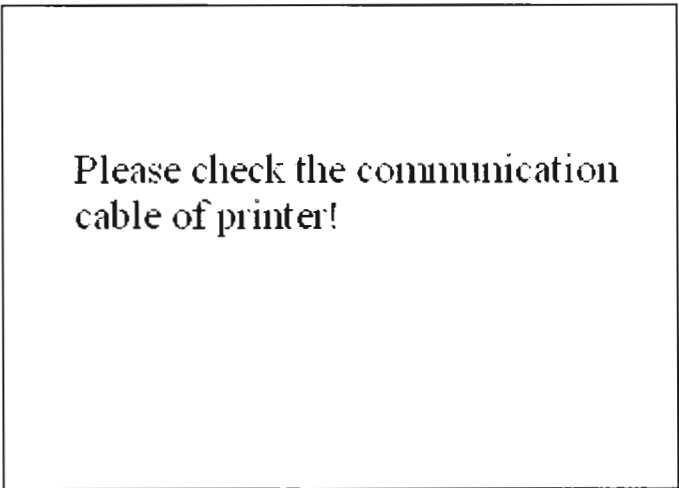


Fig.4

Press the Print button, if the power of the printer is off, the words “Please check the

communication cable of printer” will shown on the interface, please see Fig.4.

(2) Parameter preset interface

Press the Parameter preset button (Para. Button) to the interface shown as Fig.5. You can preset test temperature, sample ID, barometric pressure, temperature lag and printing status, etc in the interface.

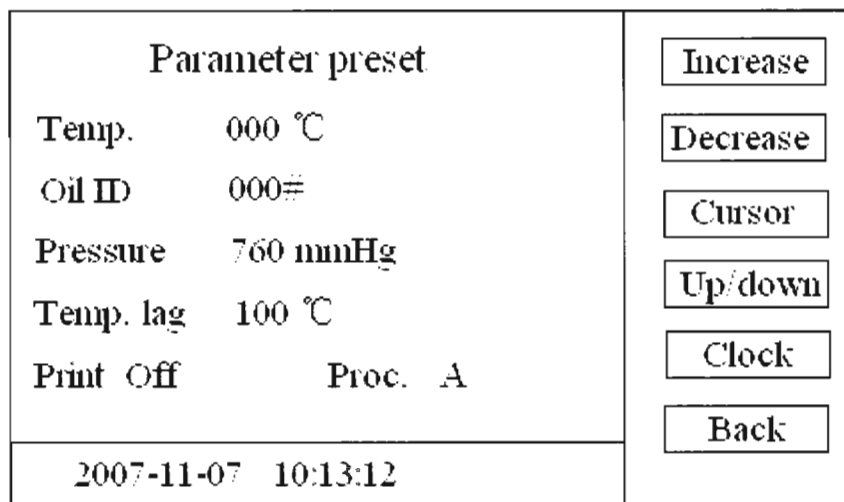


Fig.5

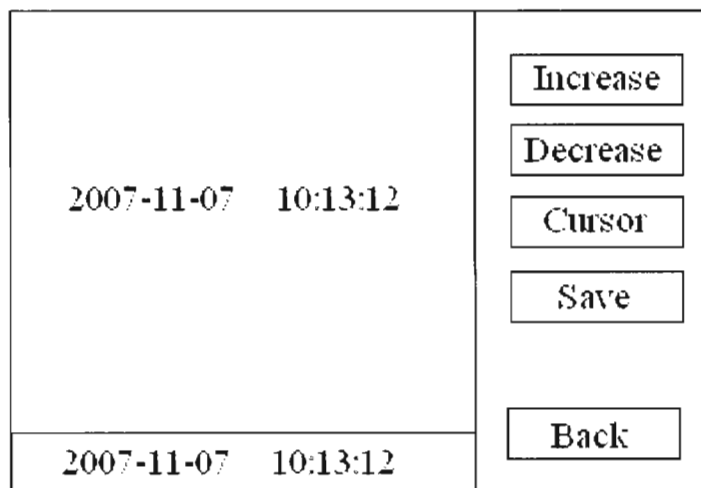


Fig.6

Increase: Press the button to increase preset value.

Decrease: Press the button to decrease preset value.

Cursor: Press the button to move cursor from left to right in a line.

Up/down: Press the button, and then the cursor will move to next line;



Clock: Press the button to the clock preset interface.

Back: Press the button to the main interface.

(3) Clock preset interface (see Fig.6)

Increase: Press the button to increase the preset value;

Decrease: Press the button to decrease the preset value;

Cursor: Press the button to move cursor;

Save: To save the preset value;

Back: Press the button and the interface will back to the main interface.

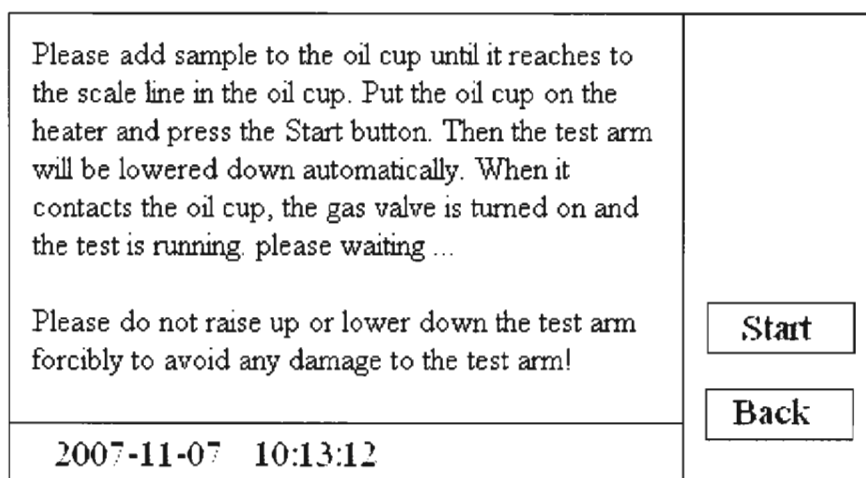


Fig.7

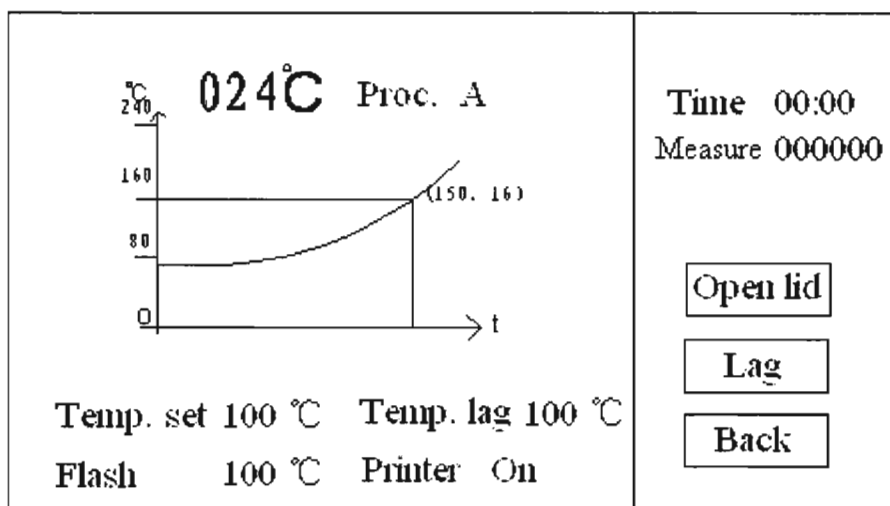


Fig.8

(4) Sample measurement interface

Press the Test button and it will show prompt interface (see Fig.7). Fill sample into a clean and dry test cup and put them on the heater. Press the Start button, and then the test arm will lower down automatically. The instrument connects gas source, and it starts timing. The working interface is shown as Fig.8.

(V) Test procedures

1. Working interface

- (1) The interface will show current sample temperature;
- (2) Time-temperature curve
- (3) It can preset test temperature, temperature lag, and printer status.

2. Test procedures

(1) If the oil sample is transformer oil, the expected flash point of which is 150 °C, please preset the temperature to 150 °C. The instrument will apply flame to the sample when the sample temperature is 20 °C lower than the preset temperature. It will apply flame to sample at 130 °C. If the expected flash point is unknown, please preset the temperature from a low temperature to a high temperature and preset the temperature lag.

(2) Preset sample ID. The serial number of sample ID is for data recording. It can be preset in the range of 1 ~ 999.

(3) The test results may be different for different altitudes. Input the barometric pressure at the test area, it will correct the effect of barometric pressure to the test and calculate the modified value. Please refer to GB/T261-2008.

The value can be calculated as per the following equation:

$$T_c = T_o + 0.25 (101.3 - P);$$

Where:

$T_c$  = Modified flash point, °C,

$T_o$  = Observed flash point, °C;

$P$  = Barometric pressure, kPa;

The equation is only used when the barometric pressure is in the range of 98.0 ~ 104.7 kPa;

- (4) Move cursor to the item you need to modify, and then input modified value to modify the

current value.

(5) Press the Back button to the main interface after parameter preset. Press the Test button to the interface shown as Fig.7. Press the Start button and the test arm will lower down automatically. The instrument will enter into the working interface. The current sample temperature will be shown on the interface and it will enter into temperature controlling state. There are two working states, procedure A and procedure B. Please refer to GB/T261-2008 for more details.

(6) Ignite the pilot flame and the flame application device. Adjust the flame height to 3 ~ 4 mm. The instrument will enter into automatic measurement state. Then the indication light of printer is on, and the sample temperature and test time will be shown on the instrument. The whole test procedures are in accord with the requirements of GB/T261-2008.

(7) Move cursor to the Open lid button and press the Enter button during automatic measurement procedures, then the lid will open and the flame will be applied to the sample once. You can check the flash point using this method at any time before automatic flame application to check whether the preset temperature is proper.

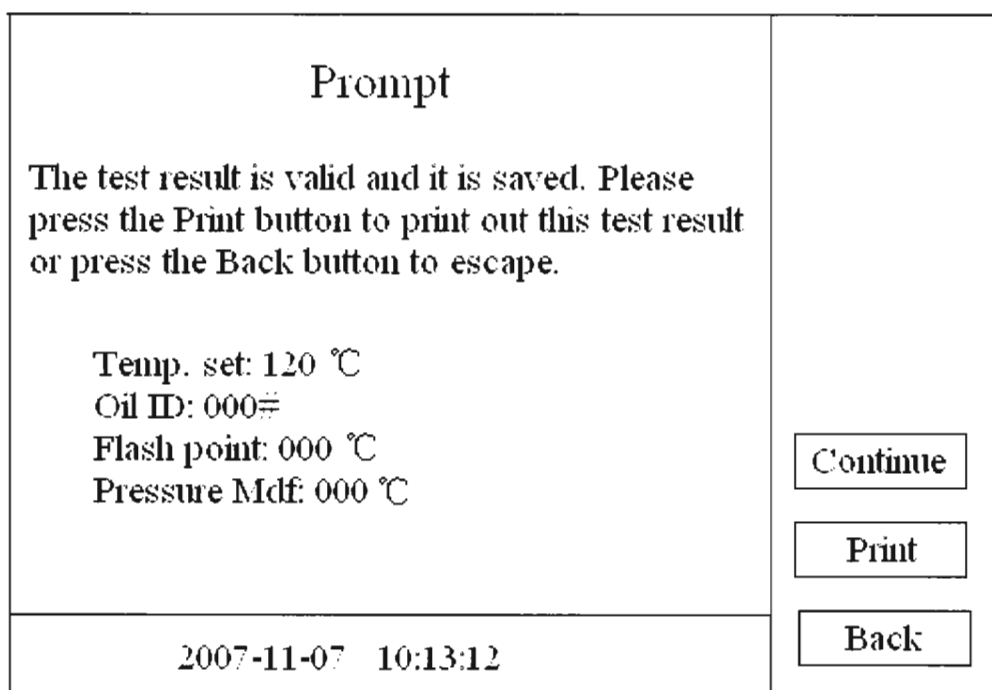


Fig.9

(8) When the preset temperature is a little low and the sample temperature reaches to the upper limit, but there is still no flash appears, please press the Temperature lag button once. Then the

preset temperature will increase 10 °C.

(9) It can detect flash point automatically when the temperature reaches to the flash point. Then the current sample temperature, and test time will be locked on the LCD screen. The test arm will be raised up, the data will be saved (The data will not be saved if test fails), the data is printed out, and the gas valve will be turned off. The instrument starts cooling at the end of the test. You can make next test only after the instrument is cooled down to a temperature 60 °C lower than the preset temperature. The interface is shown as Fig.9 at the end of the test. The interface for data printing is shown as Fig.10.

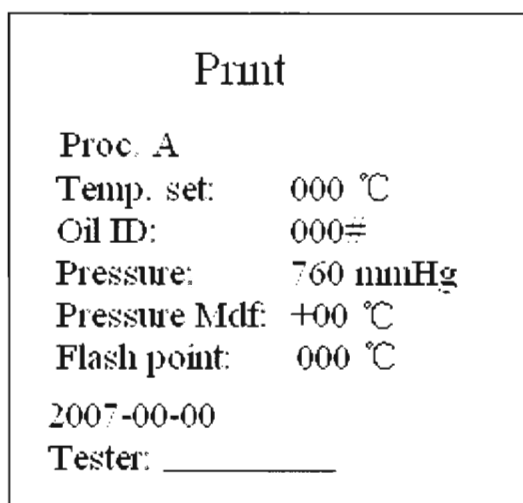


Fig.10

(VI) Several prompts during operation procedures

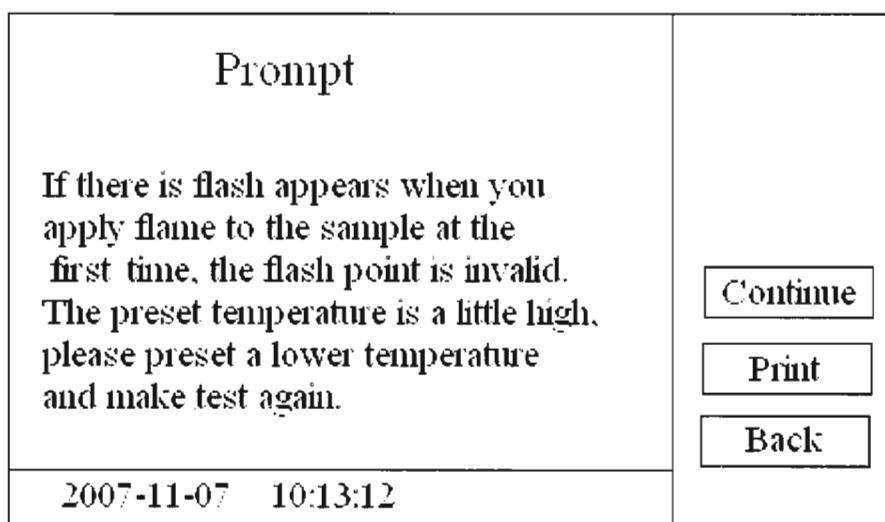


Fig.11

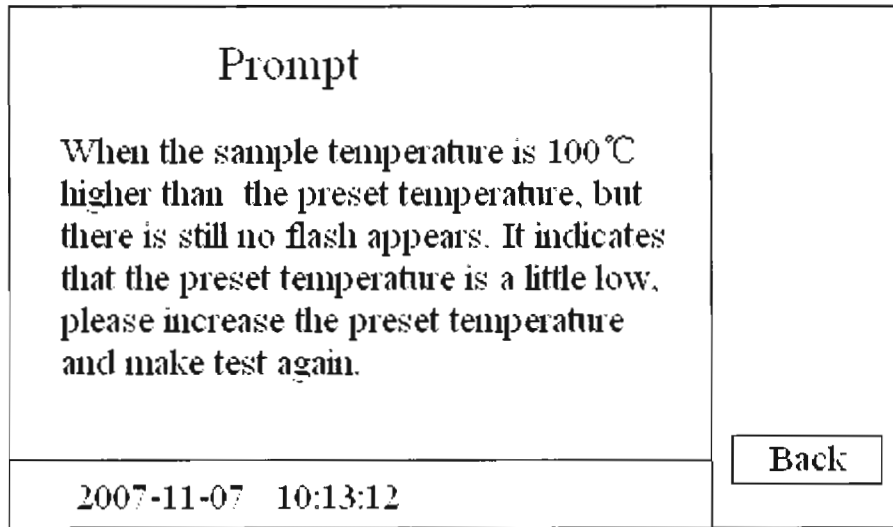


Fig.12

1. When the flash point is detected when it makes flame application at the first time, the test data is invalid. Then the test arm will be raised up, and the test data will not be saved. Please make test again. The prompt interface is shown as Fig.11.

2. When the sample temperature is higher than the preset temperature plus temperature lag, but there is still no flash appears, the instrument will stop testing automatically. Then the test arm will be raised up and the test data will not be saved. Please make test again. The prompt interface is shown as Fig.12.

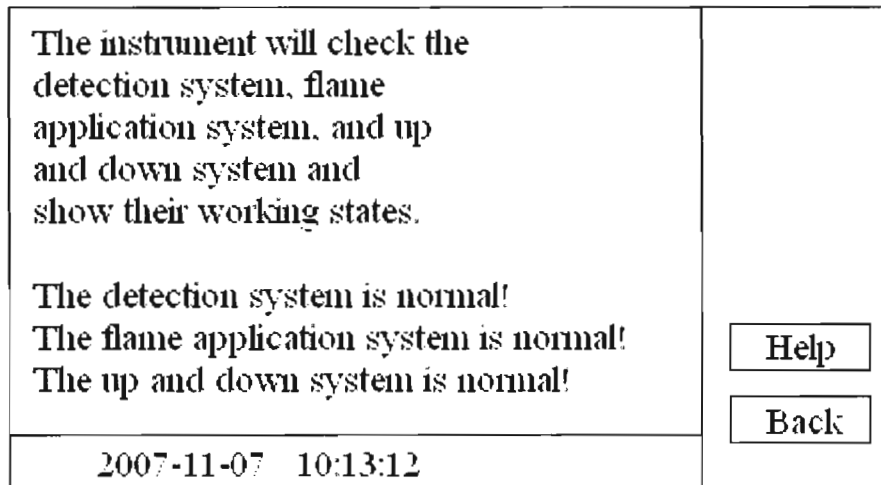


Fig.13

3. Instrument self-check

When you need to check the working state of the instrument, please press the Check button, the test arm will be raised up and lowered down automatically, and the instrument will make flame application once. If these functions are in normal, the interface will back to main interface. If they are abnormal, the instrument will give prompt automatically. Please make test only after the problem is solved. Please see Fig.13 and Fig.14.

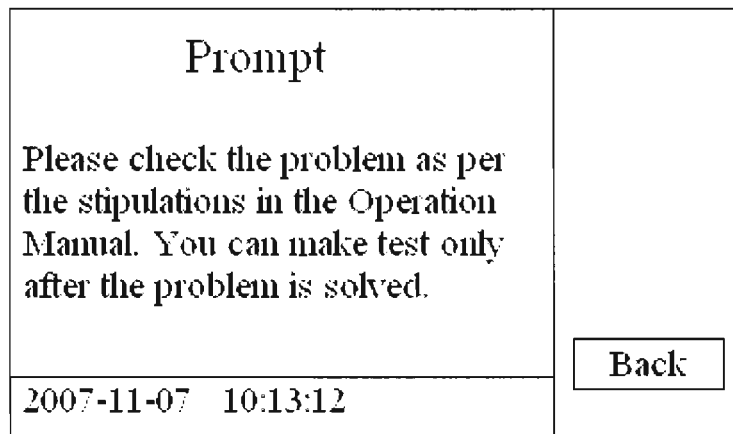


Fig.14

4. The instrument will check whether the test data are in accord with the requirements of GB/T261-2008 after test. If the difference between the flash point and the preset temperature is in the range of 18 ~ 28 °C, the test data is valid. Or the test data is invalid.

**VII. Instrument calibration**

Please calibrate the instrument temperature as per the manufacturer’s instruction, or you may change the initial value preset before leaving factory and this will affect use of the instrument. The calibration method is expressed as following, see Fig.15.

1. Input the instrument password

If you need to calibrate the instrument temperature, please press the Calibrate button in the main interface and enter into the interface shown as Fig.15. The password area is shown on the interface and the current temperature value is shown under the password area. Then input the password and enter into the calibration interface.

|   |   |
|---|---|
| <p><b>Please input password</b></p> <p>Password <input type="text" value="000"/></p> <p>023.6</p> | <p><input type="button" value="Increase"/></p> <p><input type="button" value="Decrease"/></p> <p><input type="button" value="Cursor"/></p> <p><input type="button" value="Enter"/></p> <p><input type="button" value="Back"/></p> |
| <p>2007-11-07 10:13:12</p>  |   |

Fig.15

|  |  |
|--|--|
| <p><b>Calibration prompt</b></p> <p><b>Please input the first calibrated resistance</b></p> <p>Resistance <input type="text" value="100"/></p> | <p><input type="button" value="Increase"/></p> <p><input type="button" value="Decrease"/></p> <p><input type="button" value="Cursor"/></p> <p><input type="button" value="Temp.Mdf"/></p> <p><input type="button" value="Enter"/></p> <p><input type="button" value="Back"/></p> |
| <p>2007-11-07 10:13:12</p>   |  |

Fig.16

|   |   |
|---|---|
| <p><b>Calibration prompt</b></p> <p><b>Please input the second calibrated resistance</b></p> <p>Resistance <input type="text" value="200"/></p> | <p><input type="button" value="Increase"/></p> <p><input type="button" value="Decrease"/></p> <p><input type="button" value="Cursor"/></p> <p><input type="button" value="Enter"/></p> <p><input type="button" value="Back"/></p> |
| <p>2007-11-07 10:13:12</p>  |   |

Fig.17

2. Calibration methods (See Fig.16)

(1) Calibrate temperature sensor: Let precision resistance case stay at 0100 ohms. Press the Enter button to next interface shown as Fig.17 (Do not press the Temperature Modification button). Make calibration for the second resistance using the same methods as per the prompt interface.

Press the Enter button to the calibration prompt interface, see Fig.18. It is better the ref. voltage is 6000 and the ref. resistance is 4000. These values indicate the temperature value of sensor. You can calibrate them as per the standard Pt100 calibration table. If there is great difference between these values and standard calibration values, please press the Recalibrate button to calibrate it again until these values are close to the calibration values. Press the Back button to the main interface.

|                           |  |
|---------------------------|--|
| <b>Calibration prompt</b> |  |
| R1                        | 100  |
| R2                        | 100  |
| Ref. resistance           | 0000   |
| Ref. voltage              | 0000   |
| 2007-11-07 10:13:12       |  |
|                           | <input type="button" value="Recalibrate"/><br><input type="button" value="Save"/><br><input type="button" value="Back"/> |

Fig.18

(2) Temperature error calibration (See Fig.19)

A. When there is difference between the displayed temperature on the LCD screen and the real temperature in the test cup, please press the Calibrate button and enter into the interface shown as Fig.17. Press the Temp. Mdf button (Do not press the Enter button at this time, or it will enter into sensor calibration interface. If you press the Enter button by accident, please press the Back button to escape) and enter into the interface shown as Fig.19. Move the cursor to the temperature modification item and modify its value. Please do not modify it unnecessarily. If you need to modify it, please contact us for help.



|                           |                 |
|---------------------------|-----------------|
| <b>Calibration prompt</b> | <b>Increase</b> |
| Temp. Mdf: 000 °C         | <b>Decrease</b> |
| Time interval: 000 s      | <b>Cursor</b>   |
| TC Calib.: 0200           | <b>Enter</b>    |
| Fire time: 3 s            | <b>Back</b>     |
| 2007-11-07 10:13:12       |                 |

Fig.19

### 3. Thermocouple calibration

The function is used to modify the sensitivity of the instrument. Please do not modify it unnecessarily. If you need to modify it, please contact us for help.

### 4. Flame time (It is useless at present)

The function is used to modify the flame time of electron ignition device. Please do not modify it unnecessarily. If you need to modify it, please contact us for help.

## VIII. Attention

1. The instrument should be operated in the environment without corrosive substance. Please clean the test cup when you make test for a different sample.

2. If there is oil dirty on the detection ring, please dry and clean it using filter paper to avoid any affects to its sensitivity.

3. If the instrument is not used for a long time, please place it in a area where the temperature is 10 ~ 40°C, the relative humidity is lower than 80%, and there is no corrosive gas or hazardous substance.

**Warning:** If there is any trouble appears, please cut off the power supply immediately. Then ask a professional to check and repair it after it is cooled down. You can use it again only after the

problem is solved to avoid any accidents.

### IX. Instrument maintenance

| No. | Problem   | Solution   |
|-----|---|--|
| 1   | Turn on the power supply, but there is nothing shown on the LCD   | <ol style="list-style-type: none"> <li>1. Check the power supply to make sure it is fine connected.</li> <li>2. Open the door at one side of the instrument to check whether there is any plug loose.</li> </ol>   |
| 2   | Great repeatability error   | <ol style="list-style-type: none"> <li>1. To make sure the working environment are in accord with the requirements stipulated in the Operation Manual.</li> <li>2. Check the temperature shown on the LCD screen. Recalibrate it if necessary.</li> <li>3. The oil adhered on the detection ring affects sensitivity of the instrument. Please clean it using filter paper.</li> </ol> |
| 3   | <ol style="list-style-type: none"> <li>1. The heater does not work;</li> <li>2. The flame application device could not be ignited.</li> </ol> | <ol style="list-style-type: none"> <li>1. Check the heating furnace. Replace it if it is damaged.</li> <li>2. Check the gas circuit to ascertain whether the gas circuit is blocked or the gas source is fine adjusted.</li> </ol>   |
| 4   | The test arm could not move   | The screw between motor and test arm is fall off   |

### X. Full set and technical documents

#### 1. Full set

| No. | Name                        | Unit  | Quantity |
|-----|-----------------------------|-------|----------|
| 1   | Main unit                   | Set   | 1        |
| 2   | Oil cup                     | Piece | 1        |
| 3   | Power supply wire (250V 6A) | Piece | 1        |
| 4   | Printing paper              | Roll  | 1        |

FP-26A Automatic PMCC Flash Point Tester

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|   |         |       |   |
|---|---------|-------|---|
| 5 | Igniter | Piece | 1 |
|---|---------|-------|---|

2. Technical documents

- (1) Operation Manual 1 piece
- (2) Quality Certificate 1 piece
- (3) Repair Guarantee 1 piece

Checker:

Packager:

Date:

Date: