

Dear Client,

Thank you for Purchasing our HTBYC-4000 Transformer On-Load Tap-Changer Tester. Please read the manual in detail prior to first use, which will help you use the equipment skillfully.



Our aim is to improve and perfect the company's products continually, so there may be slight differences between your purchase equipment and its instruction manual. You can find the changes in the appendix. Sorry for the inconvenience. If you have further questions, welcome to contact with our service department.



The input/output terminals and the test column may bring voltage, when you plug/draw the test wire or power outlet, they will cause electric spark. PLEASE

**CAUTION RISK OF ELECTRICAL SHOCK!**

**Company Address:**

- ◆ **T4, No. 1, High-tech 2 Road, East Lake High-tech Development Zone, Wuhan**
- ◆ Sales Hotline: 86-27- 87492243
- ◆ After Service Hotline: 86-27- 87459656
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- ◆ Website: [www.hvtest.cc](http://www.hvtest.cc)

## ◆ **SERIOUS COMMITMENT**

All products of our company carry one year limited warranty from the date of shipment. If any such product proves defective during this warranty period we will maintain it for free. Meanwhile we implement lifetime service. Except otherwise agreed by contract.

## **SAFETY REQUIREMENTS**

Please read the following safety precautions carefully to avoid body injury and prevent the product or other relevant subassembly to damage. In order to avoid possible danger, this product can only be used within the prescribed scope.

*Only qualified technician can carry out maintenance or repair work.*

--To avoid fire and personal injury:

### **Use Proper Power Cord**

Only use the power wire supplied by the product or meet the specification of this produce.

### **Connect and Disconnect Correctly**

When the test wire is connected to the live terminal, please do not connect or disconnect the test wire.

### **Grounding**

The product is grounded through the power wire; besides, the

ground pole of the shell must be grounded. To prevent electric shock, the grounding conductor must be connected to the ground.

Make sure the product has been grounded correctly before connecting with the input/output port.

### **Pay Attention to the Ratings of All Terminals**

To prevent the fire hazard or electric shock, please be care of all ratings and labels/marks of this product. Before connecting, please read the instruction manual to acquire information about the ratings.

### **Do Not Operate without Covers**

Do not operate this product when covers or panels removed.

### **Use Proper Fuse**

Only use the fuse with type and rating specified for the product.

### **Avoid Touching Bare Circuit and Charged Metal.**

Do not touch the bare connection points and parts of energized equipment.

### **Do Not Operate with Suspicious Failures**

If you encounter operating failure, do not continue. Please contact with our maintenance staff.

### **Do Not Operate in Wet/Damp Conditions.**

### **Do Not Operate in Explosive Atmospheres.**

### **Ensure Product Surfaces Clean and Dry.**

## — **Security Terms**

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Warning: indicates that death or severe personal injury may result if proper precautions are not taken

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Caution: indicates that property damage may result if proper precautions are not taken.

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## Table of Contents

I. Product Description .....	- 6 -
II. Performance characteristics .....	- 6 -
III. Technical Parameters .....	- 7 -
IV. Service Conditions .....	- 7 -
V. Menu description .....	- 8 -
VI. Panel .....	- 9 -
VII. Operating Instructions .....	- 9 -
VIII. Others .....	- 13 -
VIII. After-Sales Service .....	- 15 -

## **I. Product Description**

The tester is the sole moving part that connects with transformer circuit and thus, its testing attaches increasing attention. In accordance with the industrial standard *Transformer On-Load Tap-Changer Tester* (DL/ T846.8—2004), action sequence of on-load tap changer shall be checked and its switching time shall be measured. For that purpose, our Company has successfully developed the testing instrument for transformer OLTC parameters, which can be mainly used for measurement of transition waveform, transition time, various instantaneous transition resistances and three-phase synchronism etc. of the transformer OLTC.

Characterized by high intelligence, whole-process prompt from Chinese menu, simple operation, small volume, light weight, strong anti-interference capability, this kind of instrument can greatly relieve labor intensity for on-site workers and is an ideal product for assuring production safety and improving product quality in the transformer manufacturing industry for power generation & supply enterprises.

## **II. Performance characteristics**

### **Host machine**

- Floor-standing chassis structure, light and portable;
- Built-in precision constant current source, with perfect and reliable protection circuit;
- Available for tests with or without winding;
- Embedded PC-104 industrial personal computer (IPC), high speed and large memory capacity;
- 6-channel high-speed synchronized data sampling; and
- Built-in panel thermal printer

### **Operation interface**

- 5.7in wide-temperature LCD with backlight, clear display in the sunshine;
- Graphic and text display for results;
- Chinese menu for operation interface;
- T9 input, available for figures, alphabets, Chinese characters and various symbols.

### **Data storage**

- Host machine has the memory storage of 1G and can be used for storing over ten thousand groups of test data;
- External USB flash drive can be connected for storing more data;
- It can realize data synchronism with USB flash drive and data exchange is convenient.
- Data files saved on USB flash drive can be opened directly; and

- It adopts the tree structure for storage and data can be stored as per station name, serial number and tap position, convenient for data query.

#### **Online features**

- Attached with *OTS Data Management Software* applicable for Windows
- Available for USB and RS232 connections;
- Perfect PC data management and analysis; and
- Data import or site test can be completed when PC is online.

#### **Software upgrading**

- Online upgrading for USB or RS-232; and
- USB flash drive can be used for upgrading at the site.

### **III. Technical Parameters**

Output current:  $\geq 1\text{A}$ , 3 channels;

Data sampling:

Sampling channels: 6 channels

Frequency: 10KHz/s

Range of measurement:

Transition resistance:  $0.5\Omega\sim 20\Omega$

Transition time:  $\leq 250\text{ms}$

Resolution:

Resistance:  $0.01\Omega$

Time: 0.1ms

Measuring accuracy:

Transition resistance:  $\pm(5\%+3 \text{ bytes})$

Transition time:  $\pm(0.1\%+1 \text{ byte})$

Storage mode: USB flash drive, local storage 1G

Overall dimension: 350mm×230mm×200mm

Weight of host machine: 5kg

### **IV. Service Conditions**

Ambient temperature:  $-10^{\circ}\text{C}\sim 50^{\circ}\text{C}$

Ambient humidity:  $\leq 85\%\text{RH}$

Working power supply:  $\text{AC}220\text{V}\pm 10\%$

Frequency of power supply:  $50\pm 1\text{Hz}$

## V. Menu description

This instrument adopts the standard menu operation. For the sake of convenience, it is hereby agreed that menus and buttons in the interface will be stated in **【】** while buttons on the instrument panel will be contained in  . Menu shall include the following contents:

1. **【check】**

**【curvilinear figure】** : check curve of test results.

**【text data】** : check text data.

**【print data】** : print current data.

**【test information】** : check related test information.

2. **【test】**

**【start test】** : start a test.

**【test setting】** : change test position.

3. **【setting】**

**【date & time】** : set date and time.

**【program upgrading】** : upgrade instrument programs by USB flash drive.

4. **【files】**

**【save file】** : save test results to instrument DOM.

**【open file】** : open a piece of data from instrument DOM.

**【save to USB flash drive】** : save test results to external USB flash drive.

**【open from USB flash drive】** : open a piece of data from external USB flash drive.

**【data export】** : synchronize data saved on instrument DOM to external USB flash drive.

5. **【help】**

**【instrument information】** : describe the instrument information.

**【about】** : contact information of the manufacturer.

## VI. Panel



Fig. 6.1 Panel

1.  $\text{⏏}$  – earthing ground, for the complete machine enclosure, ground protection.
2. Sockets for test lines; A, B, C and N are respectively for A, B, C and N of the transformer.
3. RS-232 for connecting PC.
4. U-disk interface, available for hot plugging.
5.  $\text{USB}$  for connecting PC.
6. Printer, thermal printer with front-loading paper tray, for printing test results.
7. Power socket, power input port for the complete machine, equipped with fuse box.
8. Power switch, for the complete machine.
9. LCD display, 320×240 lattice LCD display
10. Key-press board

## VII. Operating Instructions

Please pay attention to the following matters during operation:

- Before use, earthing terminal of the instrument must be connected to ground wire properly.
- Test line must not be removed during test.
- For test with winding, non-test end of the transformer shall be connected to ground via three-phase short circuit system.

### (1) Method of test with winding

1. Remove the three-side lead of the transformer to be tested and connect the non-test ends (normally MV and LV sides) to ground via three-phase short circuit systems separately. Clip yellow, green, red and black test clamps onto Phase-A, Phase-B, Phase-C of bushing and neutral point at the voltage regulation side (normally HV side) of the transformer to be tested, in sequence; then, connect yellow, green, red and black wires at the other end of test line onto terminals A, B, C and N of the instrument. Procedures of test with winding are same as those for test without winding.
2. After confirming the correctness of the foresaid connection, start the instrument and enter into the home screen (see Fig. 7.1).



Fig. 7.1 Home Screen

If you want to start the test, choose **【test】** - **【start test】** ; then, set interface will pop up (see Fig. 7.2). After setting as required, choose **【OK】** and press **OK**.

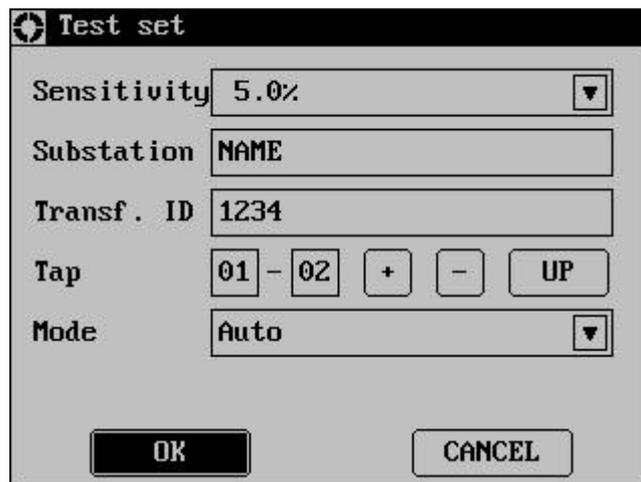


Fig. 7.2 Set Interface

Upon completion of test set, enter into charging interface (see Fig. 7.3). When current change is less than 10mA, press **OK** to continue.

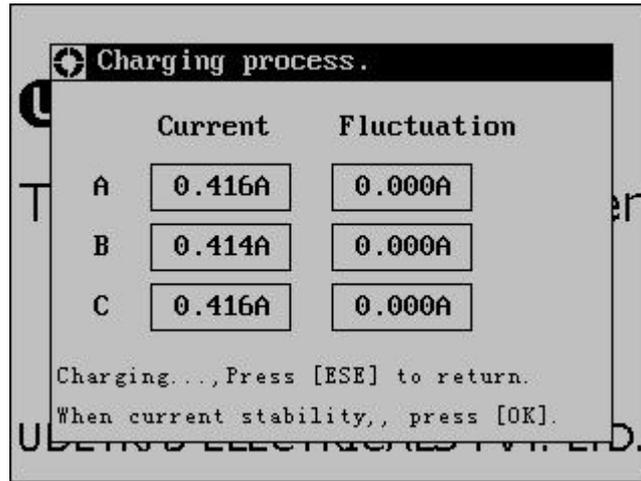


Fig. 7.2 Charging Interface

Upon completion of charging, enter into the wait-for-test interface (see Fig. 7.3) and then operate the mechanism manually or electrically; after that, action waveform will appear on LCD automatically (see Fig. 6.4).

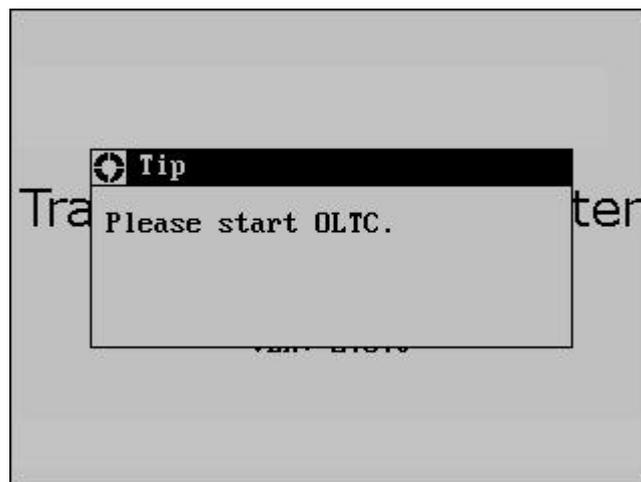


Fig. 7.3 Wait-for-Test Interface

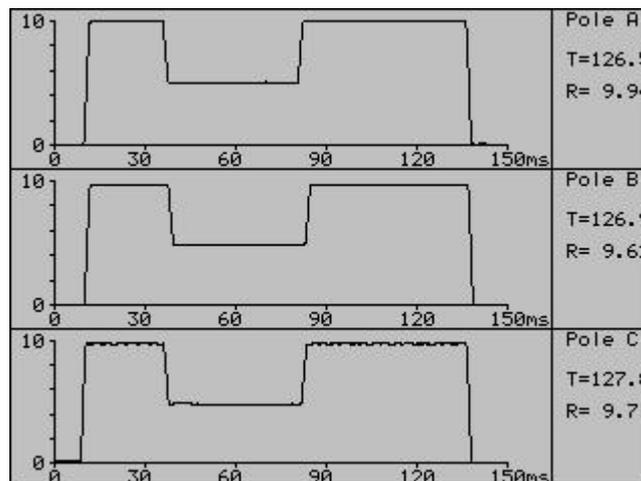


Fig. 7.4 Curve of Test Result

**(2) Method of test without winding**

Connect yellow, green and red test clamps of the test line onto tap changers X1(A1), Y1(B1) and Z1(C1) respectively and connect them onto the corresponding X2(A2), Y2(B2) and Z2(C2) with short-circuit wires. Connect black test clamp to neutral point and connect the other end of test line onto the corresponding terminal of the instrument. Compared with the test with winding, this test has shorter actuation time.

For instance: connection method for switch action waveform in test without winding, tap 4 to tap 5 (see Fig. 7.5)

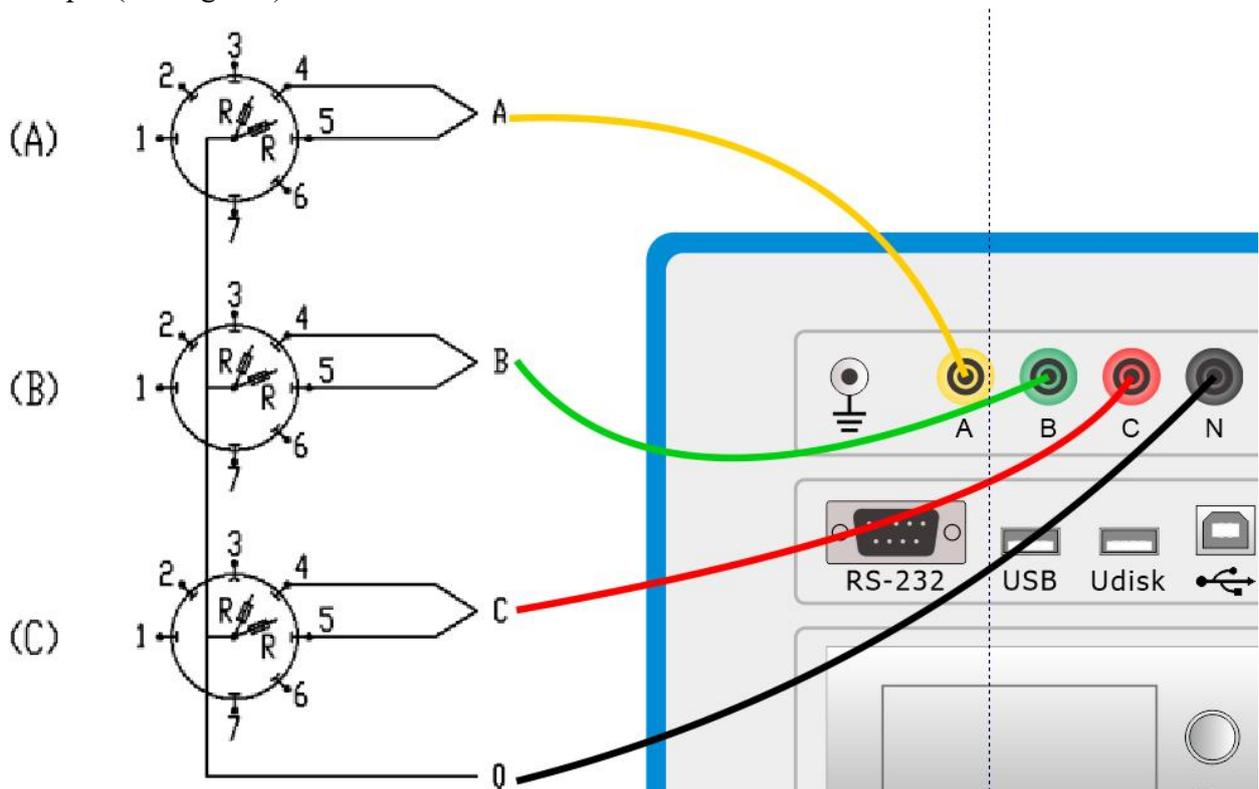


Fig. 7.5

Note: after short-circuit connection, connect three-phase moving contacts A, B and C to wiring terminal for neutral point of the instrument.

**(3) Test method for transformer for which neutral point of Y-connected winding at the voltage regulation side is not led out**

Without suspended core, test object of this structure cannot make the neutral point be led out and test can only be done for every two phases. For instance, test phases A and B, with the connection method same as Fig. 7.6 and deem Phase C as the neutral point. Operation procedures are same as the test with winding. Only two groups of waveform and data can be displayed on LCD at a time. Data analysis is done by the method same as that of the transformer for which neutral point can be led out and only transition resistance should be converted: when the measured value is set as  $R'$  and the actual value as  $R$ ,  $R=1/3R'$  for

two-phase measurement ( $R = 1/2R'$  for single-phase measurement). Upon measurement of phases A & B, deem Phase A as the neutral point and measure phases B & C; or, deem Phase B as the neutral point and measure phases A & C. Connection method and data analysis are all the same.

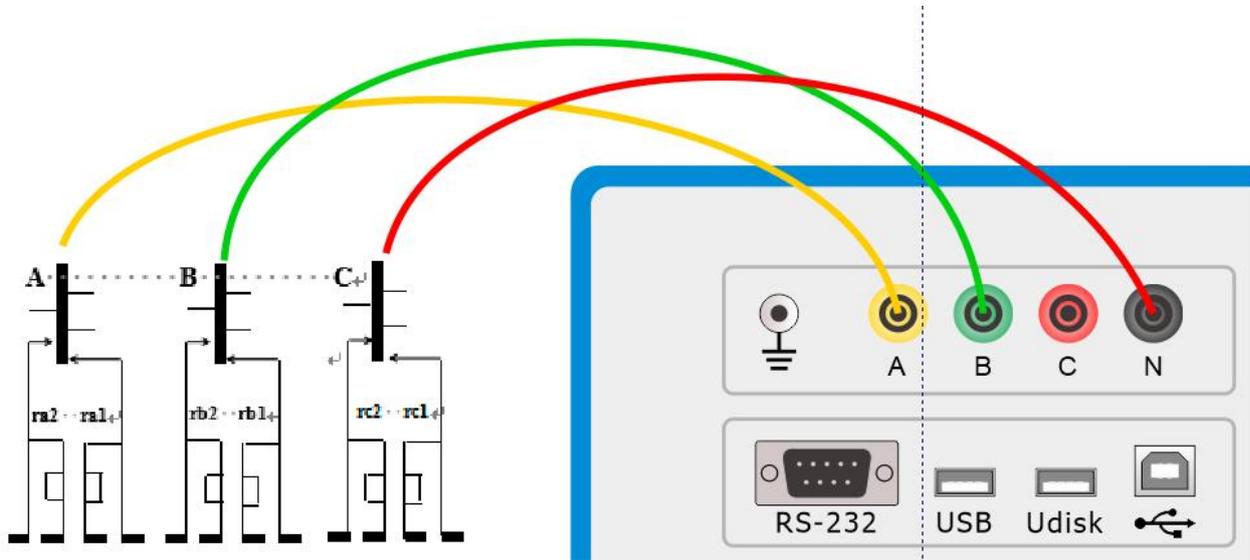


Fig. 7.6

**(4) Test method for transformer with  $\Delta$ -connected winding at the voltage regulation side**

Connection method is same as Fig. 7.6. Operation procedures and data analysis are same as other transformer tests and only transition resistance should be converted: when the measured value is set as  $R'$  and the actual value as  $R$ ,  $R = R'$  for two-phase measurement and  $R = 2/3 R'$  for single-phase measurement.

**VIII. Others**

**(1) About data saving**

Data can be saved in local DOM or external USB flash drive. There is no need for users to choose the path. However, data shall be saved as per the directory structure of “station name”, “line number” and “date” and file name shall be the serial number of tap positions, i.e. 01-02.TSD.

**(2) About data reading**

Users can read the data from local hard disk or external USB flash drive in compliance with the interface description (see Fig. 8.1).

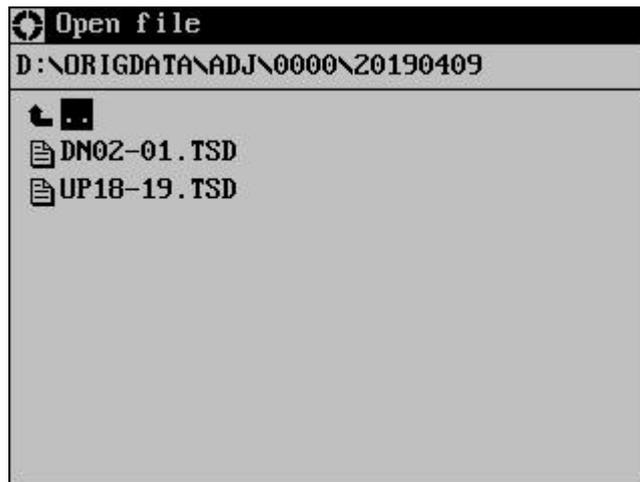


Fig. 8.1 Data Reading

Press  $\uparrow$ ,  $\downarrow$ ,  $\leftarrow$ ,  $\rightarrow$ , **page up** and **page down** to move cursor. If you want to go back to the previous directory, move cursor to  $\square$ .. and then press **OK** to return to the previous directory. If you want to enter into a certain directory, choose it in the contents and then press **OK**. If you want to open a file, select it and then press **OK**.

### (3) About file export

This function is used to dump data to the external USB flash drive in batches and can simplify the operation. If synchronization is required, firstly insert USB flash drive and choose **【export file】** from menu **【files】**; in such a case, instrument will copy files to “ORIGDATA” directory in USB flash drive as per the directory structure of data in the internal DOM. It will take a longer time if the data size is large. In the process of copying, there are prompts for copying state. After completion of data export, prompt as shown in the figure below will pop out:

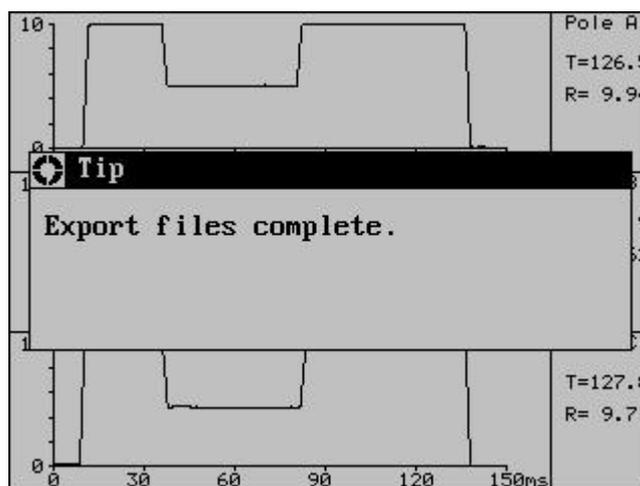


Fig. 8.2 File Export

### (4) Date & time setting

Choose **【date & time】** from menu **【setting】**, to set up the real-time clock in the instrument.

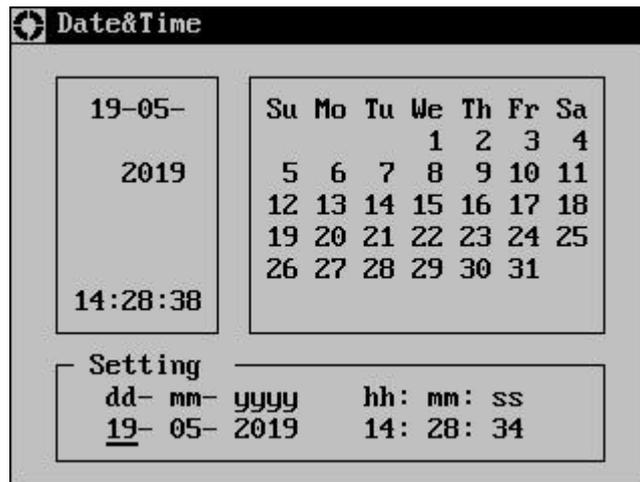


Fig. 8.3 Date & Time Setting

### VIII. After-Sales Service

If there is any quality problem within one year from the date of purchase, this instrument will be repaired for free. Lifelong maintenance and technical services will be rendered. If there is any abnormal condition or failure, please contact us without hesitation. We will offer you the fastest and the most convenient solution.