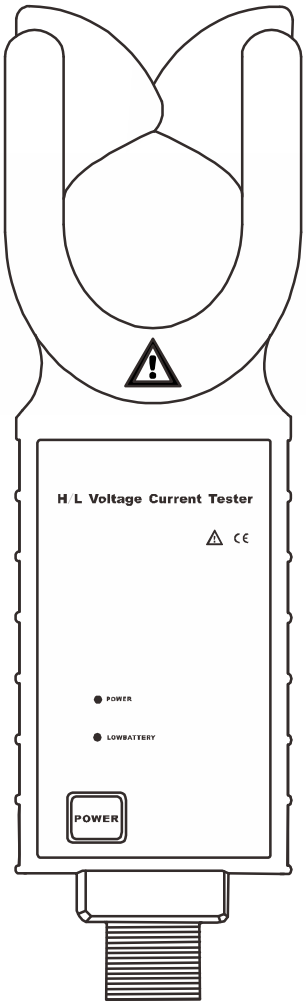
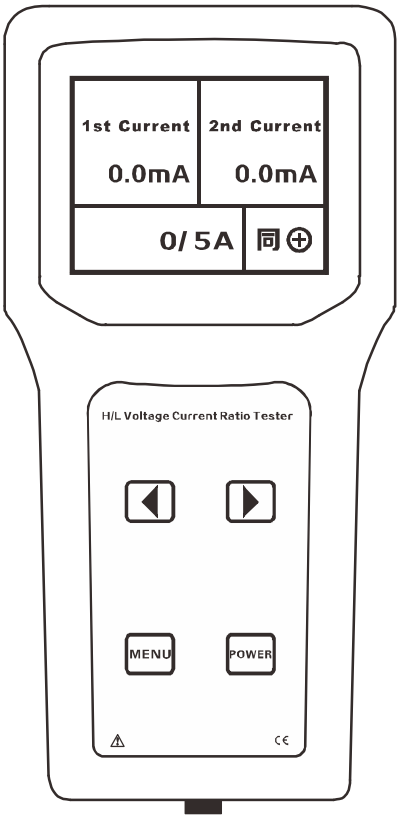
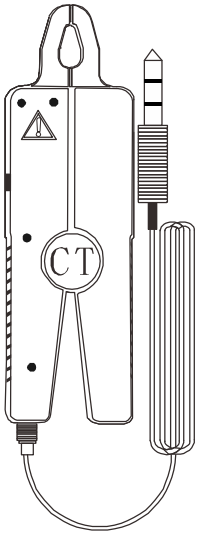
# H/L Voltage Current Ratio Tester




# ES1010

# USER MANUAL

**GuangZhou ZhengNeng Electronics Technology Co.**

# CONTENT

# I. Safety Precautions And Procedures

Thank you for buying our wireless high voltage ratio tester. In order to avoid possible electrical shock or personal injury, please be sure: strictly abide by the safety rules and precautions listed in this manual. ⚠

- Check whether the instrument is in good condition before use, no breakage, no use of the back cover before cover, otherwise there is a danger of electric shock
- Under any circumstances, use this instrument should pay special attention to safety, especially when measuring voltage lines above AC100V and above.
- If the line voltage exceeds 600v, the insulation rod must be connected to use
- Because high voltage lines are dangerous, operators have to be trained strictly and get relevant from the country
- High pressure Operation Authentication can be used to carry out Field Test with this instrument
- It is strictly prohibited to use this instrument to test bare conductors or busbars with voltages exceeding 60kv.
- Note the stickers and symbols on the panel and back of this instrument
- Do not place and store instruments for long periods of time in hot, wet, dewy places or under direct sunlight
- When high voltage current clamp displays low power, please replace battery in time to avoid affecting operation
- Disassembly and maintenance of this instrument must be operated by authorized personnel
- Check the housing before using the meter. Check for cracks or lack of plastic parts. If the clamp head and other parts of this instrument are damaged, please do not use
- Avoid impact clamp head, maintain this instrument regularly, do not clean with corrosives or coarse products, use soft cloth (such as spectacle cloth), clean antirust and dehumidification lubricant, gently wipe test instrument
- If it is dangerous to continue using this instrument, it should be stopped immediately and sealed immediately, and handled by an authorized organization
- The" ⚠"hazard sign on the instrument and manual, the user must follow the instructions for safe operation
- The extremely dangerous" ⚡"sign in the instrument and manual must be used in strict accordance with the instructions.
- It is recommended that the instrument conduct at least one insulation strength test per year. (Ac 60kv/rms between the two ends of the insulation rod).

## II Introduction

Wireless high and low voltage ratio tester is also called high and low voltage CT wireless ratio tester. It is composed of high voltage detector, low voltage current clamp, main engine, high voltage insulation rod, monitoring software and communication line. The instrument adopts fast digital circuit processing technology. It can connect insulation rods to measure high-voltage current transformers , primary transformers, high-voltage primary current, low-voltage secondary current, and can be calculated under the condition of not disconnecting or powering on site. Change ratio, phase, polarity, and ratio error below 60kV

When not using the insulation rod, it can also be used as a high-precision low-voltage clamp ammeter, leakage current meter, can accurately measure the current of 0.1mA, it has the characteristics of easy to use, easy to carry.

Its wireless transmission function can receive measured data within 30 meters (without obstacles) in a straight line, ensuring high precision, high reliability, and high stability for continuous testing without interruption.

The host uses a large-screen LCD display, featuring small size, light weight, and portability. It can save 500 groups data.

High-voltage current measurement range of 0.0mA ~ 1200A, low-voltage current measurement range of 0.0mA ~ 20A. High-voltage detector current signal using wireless transmission technology, connecting the insulation rod, through the push or pull back the insulation rod can easily clamp or evacuation of the measured wire, save time and fast.

Can be widely used in substations, power plants, industrial and mining enterprises and testing stations, electrical maintenance departments for current detection and field electrical work. Insulation rods are light, moisture-proof, high-temperature resistant, impact-resistant, bend-resistant, and highly insulating.

## III Electrical Symbols

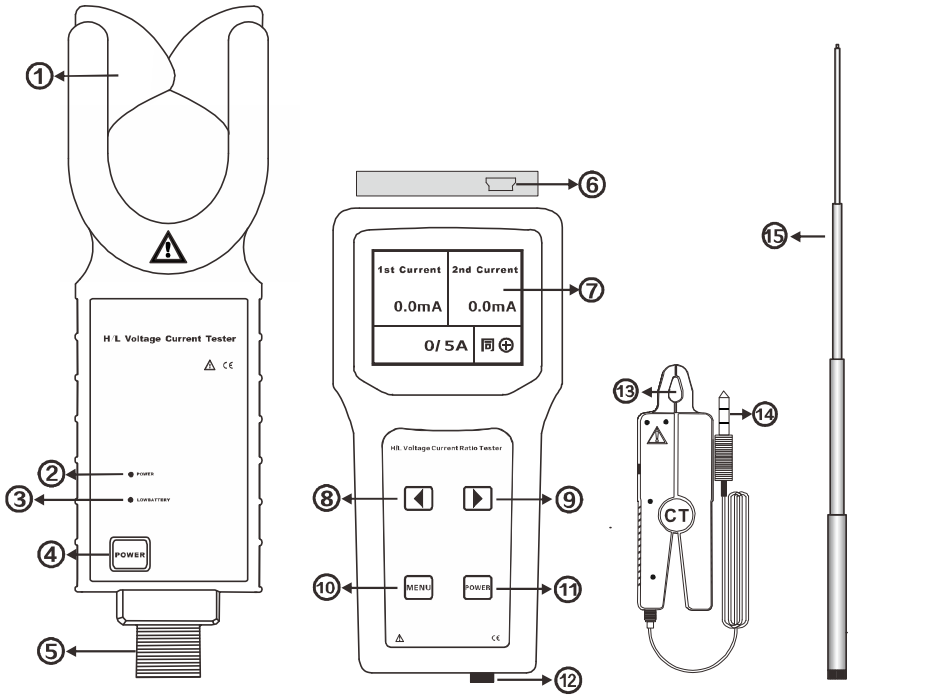
| Symbol | Meaning |
|---|---|
|  | Dangerous voltage (shock hazard) |
|  | Warning attention safety sign |
| | Comply with EU Community Safety Standards |
|  | Alternating current (AC) |
|  | Direct current (DC) |
| | Battery, when indicated, indicates low battery |

## IV Technical Specifications

| | | |
|---|---|---|
| **Tester** | High voltage detector | Mainframe (current clamp) |
| **Range** | 0.0mA～1200A（50/60Hz Auto） | 0.0mA～20A |
| **Resolution** | 0.1mA | 0.1mA |
| **Jaw size** | Φ50mm | Φ7.5mm |
| **Accuracy** | ±2%±5dgt | ±0.5%±5dgt |
| **Sampling Rate** | 2 times/second | |
| **Function** | High-low voltage current transformer primary and secondary loop current, transformation ratio, polarity, phase, and on-line test; current and voltage ratio on both sides of transformer; on-line test; load current test | |
| **Transmission type** | Wireless transmission, linear transmission distance 30m | |
| **Change gear** | Fully automatic shift | |
| **Power** | DC6V 7# alkaline battery（1.5V AAA×4） | DC7.5V 5# alkaline battery（1.5V LR6×5） |
| **Test method** | Clamp CT | |
| **Dimensions** | W/T/H 87*37*262mm | Host：W/T/H 100*35*204mm |
| | | Current clamp：W/T/H 42*20*137mm |
| Display mode | LCD：128dots×64dots Blue screen backlight for dim places | |
| **LCD Size** | 62mm×44mm | |
| Change ratio | Three kinds of transformation ratio display: (The primary and secondary circuit actually measured the current transformation ratio; the conversion ratio of the secondary circuit 5A; 10kV-YY transformer conversion ratio of 10kV/380V), the maximum ratio of 1:1 million | |
| **Line voltage** | Line test with insulation sheath below 60kV or bare wire current test below 35kV (with insulation rod operation) | |
| **Lead length** | Current clamp lead 2 meters | |

| | | |
|---|---|---|
| **Weight** | Total instrument weight：3.1Kg（Insulated rod and instrument package） | |
| | High pressure detector：370g（Including battery） | |
| | Host：409g（Including battery） | |
| | Current clamp：180g | |
| **Data interface** | USB transmission | |
| **Overflow display** | Over-range overflow function: "OL A" symbol display | |
| **Data storage** | 500 groups, press MENU to keep data, HOLD symbol display, press MENU again to cancel | |
| Data review | Long press the MENU button to enter the data reference mode, MR symbol display, press MENU again to exit | |
| **Data is full** | Data full function: "FULL" symbol display | |
| **Switch display mode** | Long press the POWER button to switch between the test display mode and the conversion ratio display mode | |
| No signal indication | When the host does not receive the transmit signal, it prompts "no signal" | |
| Automatic shut-down | About 15 minutes after power on, the meter will automatically shut down | |
| **Battery voltage** | When the battery voltage drops to 3.5V, the low-power indicator lights to remind you to replace the battery | When the battery voltage drops to 5.2V, the battery voltage is low symbol to remind to replace the battery |
| **Insulation rod** | Five section insulation rod (5 meters) | |
| **Insulation strength** | AC 60kV/rms | |
| **Line test** | Insulation sheath wire test below 60kV line voltage, bare wire test below 60kV (with insulation rod operation) | |
| **Working temperature** | -10℃～40℃ | |
| **Storage temperature** | -10℃～60℃ | |
| **Relative humidity** | 0℃～31℃≦75%，31℃～40℃≦50% | |
| **Suitable for safety regulations** | IEC1010-1、IEC1010-2-032、Pollution degree 2、CAT Ⅲ(600V) IEC61326(EMC standard) | |

## V Structure




High pressure Detector | Host | Low voltage secondary current clamp | Insulation rob

| No. | instruction |
|---|---|
| ① | Clamp head |
| ② | LED power indication |
| ③ | LED low battery indication（Lights when the power supply is below 3.5V） |
| ④ | POWER button |
| ⑤ | Insulation rod connector |
| ⑥ | USB interface |
| ⑦ | Host LCD display |
| ⑧ | Host LEFT button |
| ⑨ | Host RIGHT button |
| ⑩ | Host MENU button |
| ⑪ | Host POWER button |
| ⑫ | Low-voltage current input interface |
| ⑬ | Low voltage current clamp |
| ⑭ | Low voltage current clamp output plug |
| ⑮ | Insulation rod (5 meters in total) |

# VI Host Display Interface Description

| Status symbol | Instructions |
|---|---|
|  | When the high voltage detector is off or there is no signal, **no signal** is displayed in the primary current display box of the host |
|  | When the high voltage detector is out of range, **OL A** will be displayed in the primary current display box of the main unit |
|  | When the host detects the current exceeds the range, OL A displays in the host's secondary current display box |
|  | Press the MENU button to lock the display data. The data is automatically stored. Tol:001 indicates that a total of 01 sets of data are currently stored. The saved primary current is 25.0 A, the secondary current is 1.00 A, the 5 A converted current is 125, and the phase is the same as ⊕ |
|  | When the stored data is full of 500 groups, the "FULL" symbol flashes and can no longer be stored |
|  | Data clear symbol, displayed during clearing |
|  | When the number of storage groups is 0, the NULL symbol flashes when the MENU button is pressed for a long time to enter the reference mode. |
|  | In the lookup mode, the number after MR indicates the number of groups currently viewed, and the number after Tol indicates the total number of groups saved |
|  | Long press POWER button to switch to conversion ratio display interface |
|  | When the power supply voltage is lower than 5.2V, when the low voltage sign appears in the lower left corner, please replace the battery promptly. |

# VII Operation

| | |
|---|---|
| ⚠ | Before using the tester, examine whether there is any part broken; if no, it can be put into use. |
| | Install the battery according to the manual. |

**1. Switch of high voltage detector**

Press the POWER button to turn on the POWER indicator light, the high pressure detector starts automatic detection, and the test results (the current level and pulse of the high voltage side) are sent to the host through wireless transmission. The high-voltage detector turns off automatically after about 15 minutes to reduce battery consumption.

In normal test mode, press the POWER button to shut down.

**2. Switch of main engine**

Press the POWER button to turn on, LCD display, the host enters the test receiving mode after normal booting (as shown in Figure 1), the primary current is the test data of the high voltage side, the secondary current is the test data of the low voltage side,If the primary and secondary loops both detect the signal, the master will display the ratio of the secondary loop at 5A conversion and indicate the phase difference. If the master cannot identify the phase of the primary and secondary loops normally, the "Er" symbol will be displayed (as shown in Figure 2).

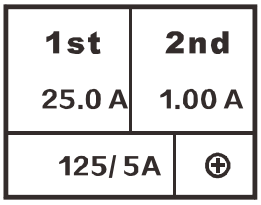



**Figure 1**

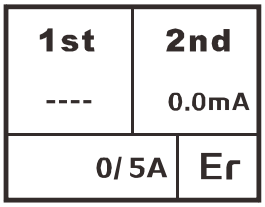



**Figure 2**

About 10 minutes after the main unit is turned on, the LCD will continue flashing, indicating that the LCD will automatically shut down. The LCD will continue to flash for approximately 30 seconds before shutting down automatically to reduce battery consumption. If the LCD continues to flash, press any key and the host continues to work.

If the conversion ratio coefficient is large, the primary loop current is large, the secondary loop current is small, and the transformation ratio coefficient exceeds 1000000, which is displayed as "x.xxK6" (x.xx×106), the number of points behind K is several times on the 10th,, of course, normal running lines will not show this situation

In the test mode, press the POWER button briefly to shut down. Long press

the POWER key to switch between the test interface and the conversion ratio display interface.

In the conversion ratio display interface, long press the MENU button to set the conversion ratio value, set by the LEFT button and the RIGHT button, long press the MENU button to exit the setting ratio.

In test mode, short press MENU to lock and save data. Press the MENU button for a long time to enter the reference mode. Press the LEFT button or the RIGHT button to view the data. Press and hold the MENU button to exit the reference mode.

In the test mode, press the POWER button shortly to enter the delete interface, select Yes or No by pressing the LEFT button or the RIGHT button, and press the POWER button to confirm the selection.

Press POWER to start the engine, and LCD displays. After the normal startup, the main engine will enter test receiving mode (see the picture above). The primary current is the testing data of high-voltage terminal while the secondary current the low-voltage. In case that signals are detected in both primary and secondary circuits, the main engine will show the transformation ratios on the basis of secondary circuit bearing current 5A, and indicate phase. If in phase，it shows "⊕" symbol；if out of phase, it shows "⊖" symbol, if the phase can't be properly identified, it shows "Er" symbol.

If transformation ratio is too high, which means that the current value in the primary circuit is large while it in the secondary is small, the ratio surpasses 1000,000, i.e. "x.xxxK6" (x.xxx×$10^6$) is displayed, the numeral value behind "K" means the power of 10. Of course, this phenomenon will not occur in the normal operational circuit.

In test mode, press POWER key to shut down. And long press POWER key to the ratio mode.

### 3. High - voltage current , high - altitude current , high - altitude leakage current test

| | |
|---|---|
| | **High voltage, very dangerous！Nobody but a qualified personnel after training could conduct operation on it. The operator should obey safety regulations; otherwise there will be the danger of electric shock resulting in personal injury or casualty.** |
|  | **Dangerous! It is not allowable to test bare wires or busbars whose voltage exceeds 60kV; otherwise there will be danger of electric shock resulting in personal injury or casualty.** |
| | **Dangerous! It is not allowable to detect the high current wire above 1200A.Otherwise there will be the danger of electric shock resulting in personal injury or casualty.** |

| | |
|---|---|
| ⚠ | **Prior to the detection, have the insulation bars connected properly, finally have the detector connected, and take care to avoid any ground impact on the instrument.** |
| | **Nothing but the special-made insulation bars could be connected to the instrument.** |
| | **After the detection, collect the insulation rod in slant direction, first take apart the detector, then the insulation bars, and take care to avoid ground impact on detector.** |

The high-voltage detector is connected to the insulating rod. After the normal power on, let the wire be in the middle of the guide area of the clamp head. The instrument guide area is perpendicular to the wire. Push the meter to clamp the high voltage tester of the measured wire to start the test and send the test result to the host.The host automatically enters the detection receiving state after the normal power on. If the host receives the signal sent by the high voltage detector, the current value of the primary loop of the high voltage side is displayed in real time.If the host does not receive the signal sent by the high-voltage detector, the primary current is “no signal”.If the host displays a current value of “OL”, it indicates that the current measured exceeds the upper limit of the high-voltage detector. After pulling back, the instrument can be evacuated from the tested wire. When evacuating, the instrument guide area should be kept perpendicular to the wire (as shown in Figure 3).

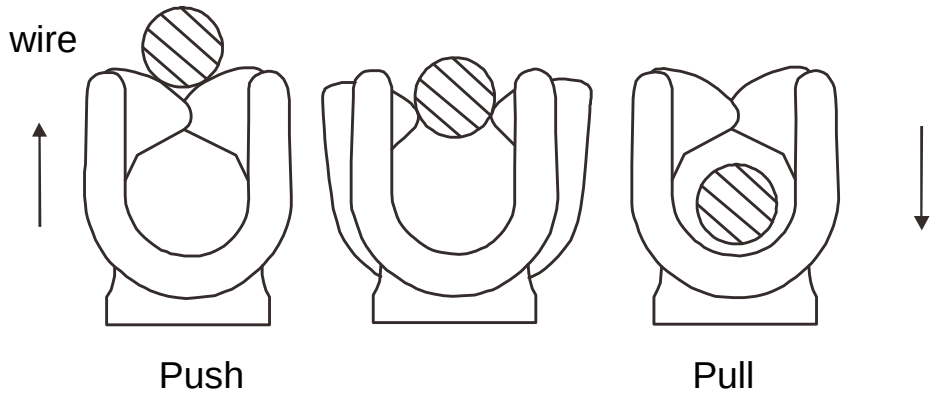
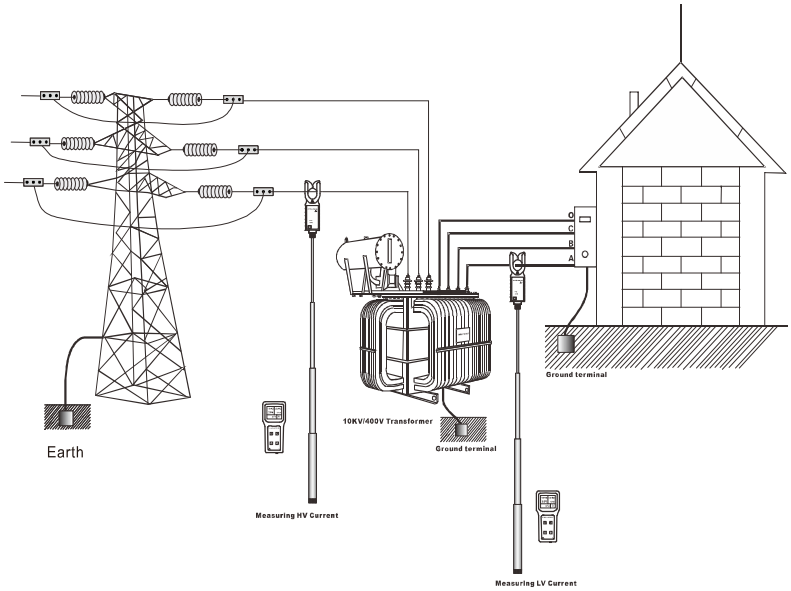



**Figure 3**

The test method for high and low voltage currents is shown in Figure 4.




| | |
|---|---|
| ⚠ | **Notice: For the sake of safety, please take the instrument away from the wire after the detection is finished.** |
| | **High current, high current leakage can also be tested with this instrument.** |

## 4. Low voltage current, leakage current test

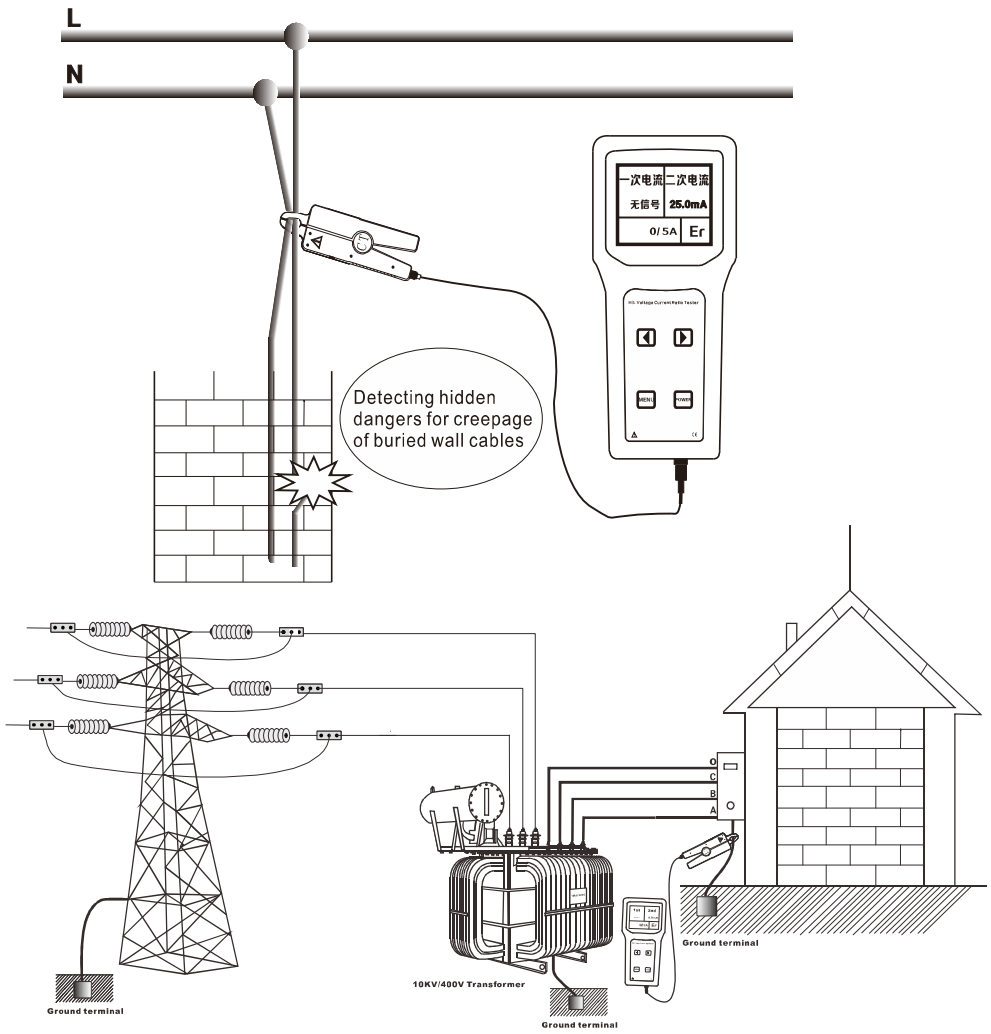
| | |
|---|---|
| ⚡ | **High voltage, very dangerous！Nobody but a qualified personnel after training can conduct operation on it. The operator should strictly follow the safety regulations; otherwise there will be the danger of electric shock resulting in personal injury or casualty.** |
| | **Low voltage current pliers are not allowable to detect high voltage wire above 600V or 10A; Otherwise, there is a danger of electric shock that may cause personal injury or equipment damage.** |

1）Connect low voltage current pliers and main set, turn the main set on, enter the detection mode.

2） Have low voltage current pliers clamp the wire(notice: it work holding jaws is fully closed),examine the current numerical reading, if the instrument has secondary current indication of "**OL**" ,the secondary current exceeds instrument upper current limit .

3） Refer to the legend (Figure 5, Figure 6)

| | |
|---|---|
| ⚠ | **The live and neutral wires are clamped together to measure the leakage current of the electrical equipment. (pay attention to 2)** |
| | **Clamp the ground wire to measure the leakage current of the grounding wire of the electrical equipment. (note: single wire)** |
| | **Clamp the main line, total current amount could be measured. (note: single wire)** |
| | **Where its numeral reading is not easily accessible, use high voltage detector to examine the current on low voltage wire.** |




## 5. Phase variation test

| | |
|---|---|
| | 【Primary current】: The current collected with high voltage current pliers is mutual inductor's first current |
| | 【Secondary current】: The current collected with low voltage current pliers is mutual inductor's secondary current. |
| ⚠ | 【Ration based on secondary current 5A】: The measured secondary current value is converted to be 5A, and then convert the first current based on that multiple, which is same with transformation ratio. Display 【XXX/5A】 |
| | 【Ratio】: The ratio between the first current and secondary current by actual measurement. |
| | 【10kV-YYconversion ratio】: high voltage detector collects the secondary bus current, the ratio between transformer's first current and mutual inductor secondary current could be calculated by |

| | |
|---|---|
| | transformer 10kV/380V |
| | 【同⊕】Phase difference is about 0° to 30° or 330° to 360°, which is positive polarity in phase |
| | 【同⊖】Phase difference of about 150 ° ~ 210 °; is the same negative polarity, that is,the current clamp reversed of the first or the second , the same phase polarity is opposite (high voltage detector's boot front and low voltage current clamp red marking point is the current input end of the same direction ) |
| | 【异】The phase difference is about ±120° or ±60° out of phase. The first and the secondary current clamp do not clamp the same phase current line. |
| | 【Er】Can not be identified normally, the host may not receive the high-low voltage signal normally, may interfere with the same frequency signal, the signal amplitude may be too small, etc. |

The high-voltage detector and the low-voltage current clamp are respectively clamped on the first and the secondary circuit of the CT. The host displays the current of the first and the secondary circuit (as shown in Fig. 7), and simultaneously displays the converted ratio of 5A, if the primary current is 25.0A.the secondary current is 1.00A, the actual current ratio is 25, the conversion ratio of the secondary loop current is 5A is 125/5A, (ie: 5÷1×25), according to the transformer 10kV/ 380V to calculate the transformer primary current and transformer secondary current ratio is: 0.95, ((25 ÷ (10kV ÷ 380V)).

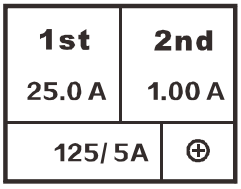



**Figure 7, test display mode**

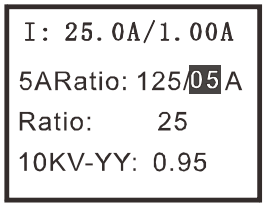



**Figure 8, conversion ratio display modee**

In the test mode, press and hold the POWER button for about 3 seconds to enter the conversion ratio display mode (as shown in Figure 8):The current value of the primary and secondary loops is automatically defaulted to the conversion ratio of the secondary loop 5A; the measured ratio and phase difference of the primary and secondary loop currents, and the phase difference is about 0° to 30° or 330° to 360°.which is considered to be the positive polarity of the same phase; 10kV-YY is the conversion ratio. Press the POWER button again for about 3 seconds to exit the conversion ratio display mode and return to the power-on test mode.

In the conversion ratio display mode, press and hold the MENU button for

about 3 seconds to enter the interface for setting the secondary conversion current base. Press the LEFT button and RIGHT button to adjust the base value of the converted current. Press and hold the MENU button for about 3 seconds to exit the conversion ratio display mode and return to the power-on test mode. Each time the instrument is powered on, the secondary current is converted to 5A by default.

Reference legend for comparison ratio tests, as shown in Figure 9 and Figure 10

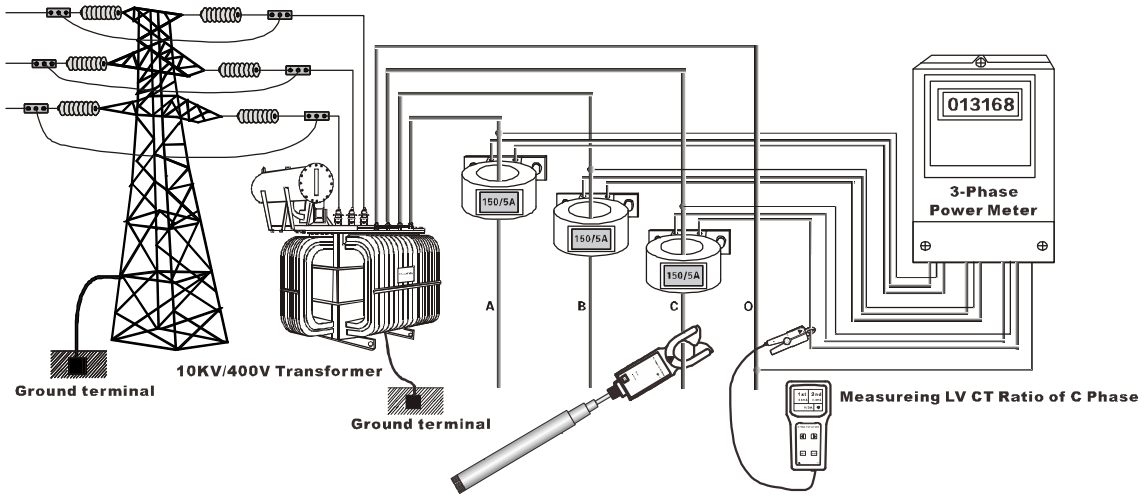



**Figure 9**

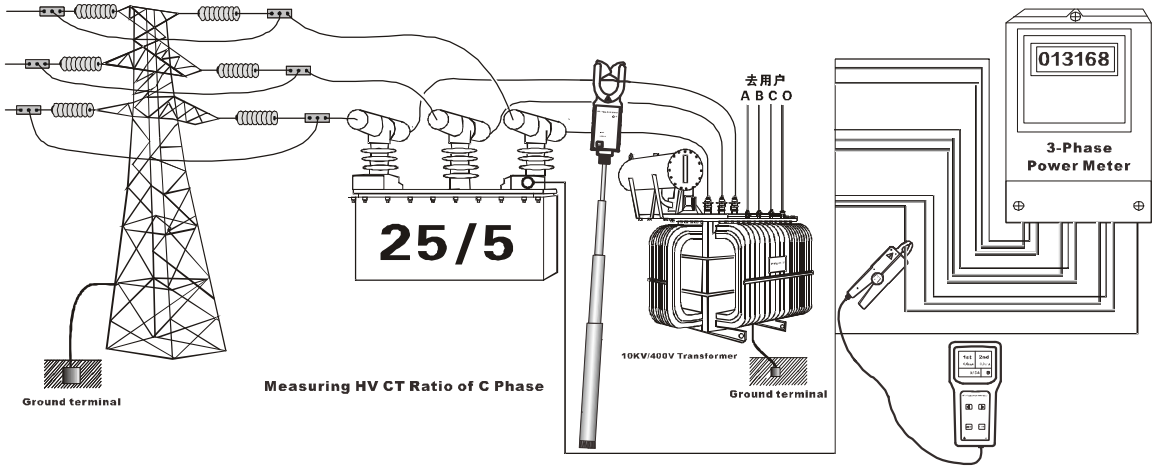



**Figure 10**

## 6. Data hold and delete

In the normal test mode, after pressing the MENU key for a short time, the LCD display can be maintained. The “HOLD” symbol indicates that the MEM flashes once and the measured current data is maintained. Press the MENU button again to release the data lock and return to the test mode. The “HOLD” symbol disappears.

## 7. Data storage

In the normal test mode, when the MENU key is pressed briefly to hold the

data, the meter automatically numbers and stores the currently held data. The “MEM” symbol blinks once during the storage process. The instrument can store 500 sets of data. If the memory is full, the “FULL” symbol will continue to flash, and the memory must be cleared before it can be stored again.

**8. Data access**

In normal test mode, press and hold the MENU button for about 3 seconds to enter the data review mode. If the number of storage groups is 0, the screen flashes "NULL" and returns to the test interface. If the number of storage groups is not 0, the "MR" symbol is displayed on the screen and the stored 01st group data is automatically displayed.The stored data can be scrolled up or down by pressing the LEFT button or the RIGHT button, and the first set of data is automatically returned when the stored last set of data is scrolled.

Scrolling operations include: long press the LEFT button (-10), long press the RIGHT button (+10), short press the LEFT button (-1), short press the RIGHT button (+1).

In the data reference mode, press and hold the MENU button for about 3 seconds to exit the data reference mode and return to the test mode

**9. Data deletion**

In the data reference mode, press the POWER button briefly to enter the delete interface. Select Yes or No by pressing the LEFT button or the RIGHT button. Press the POWER button shortly to confirm the selection and return to the test mode.

**10. Data upload**

Connect the RS232 communication cable between the computer and the host computer, turn on the detector and run the monitoring software. If the software shows that the serial port is open and the connection is successful, the stored historical data can be read, uploaded to the computer and saved.

The monitoring software has on-line real-time monitoring and historical query functions, dynamic display, with the maximum, minimum, average indication, alarm value setting and alarm indication function, with historical data reading, viewing, saving, printing and other functions.

## VIII. Battery

| | |
|---|---|
| ⚠ | Caution! No detection could be conducted when the battery cover is not properly closed, otherwise there is danger. |
| | Pay attention to battery electrode, otherwise it will do harm to the instrument. |
| | Can not mix old and new batteries. |

1. When the battery voltage of the receiving instrument is lower than 5.2V, the "🔋" symbol is displayed in the lower left corner of the instrument, indicating that the battery power is insufficient. Please replace the battery in time.
2. Power off, confirm that the instrument is shutdown. Open the battery cover and replace with new qualified batteries. Paying special attention to the size and electrode, close the battery cover, cover the battery cover.
3. Press the POWER button to check whether the meter can boot normally. If it cannot be started, please follow the second step to restart..

## IX Accessories

| | |
|---|---|
| High voltage detector | 1 PC |
| Main set | 1 PC |
| Low voltage current pliers | 1 PC |
| Insulation bar | 5 PC(5 meter |
| Instrument bag | 1 PC |
| High voltage detector (battery) DC6V 7 alkaline battery | 4 section |
| Host (battery) DC7.5V 5 alkaline battery | 5 section |
| Manual/warranty card/certification | 1 set |

The contents of this user manual cannot be used as a reason to use the product for special purposes.

The company is not responsible for other losses caused by use.

The company reserves the right to modify the contents of the user manual. If there is any change, it will not be notified.

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