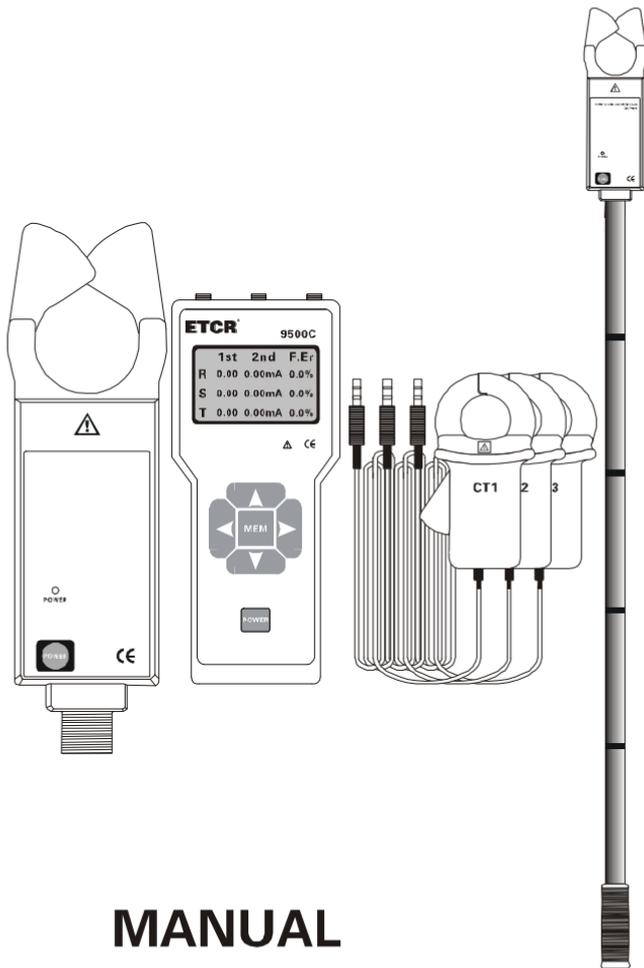


ETCR[®]

Three-Channel Wireless HV CT Ratio Tester

ETCR9500C

<http://www.etcrc.com>



MANUAL

Guangzhou ETCR Electronic Technology Co. , Ltd

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Warning



Thanks for purchasing **ETCR9500C Three-Channel Wireless HV CT Ratio tester (Full Name: Three-Channel Wireless High & Low Voltage Current Transformation Ratio Error tester for Current Transformer)**. For your better use of the product, please kindly follow the rules below:

---Read the manual carefully. The operator shall fully understand the guidelines set forth in the manual before conducting field tests.

---Comply with the safety rules and notices set forth in this manual strictly.

◆The safety shall come first when using this tester in any cases, especially, in which the voltage circuit bears the voltage of AC100V or more.

◆The tester shall be applied connecting insulating rod, with the hand holding on the fifth rod, in case that the voltage circuit bearing the voltage over 600V is to be tested.

◆Operators shall have accepted the rigid training and gained related certification for high-voltage operation before conducting field test with this tester, due to risk of high voltage lines.

◆Take notice of characters and symbols labeled on the face board and back board.

◆It is prohibited to operate the instrument cover and insulating rods under moisture condensation.

◆Please don't place or store the tester under direct sunshine, in

high-temperature and moist or dewed places.

◆ Take notice of the polarities of the battery when doing replacement; remove the battery from the tester if you expect not to use it for a long time.

◆ Disassembly and maintenance of this tester shall be only done by authorized operators.

◆ Please don't operate testers which clips and other parts are broken.

◆ Avoid attacking clips and maintain the tester regularly. Soft cloth (e.g. glasses cloth), moistened by clean, antirust and dehumidified lubricant (e.g. WD-40), instead of corrosive agent or rough issues shall be used to gently rub down the tester.

◆ Stop using and mothball, then leave it to authorized organization for handling in case that continuing use can cause safety hazard due to the performance of the tester itself.

◆ The users shall follow the user manual to do safe operation when contacting the dangerous signs “  ” labeled on the tester or in manual.

◆ The users shall follow the manual to do safe operation when contacting the extremely dangerous sign “  ” on the tester or in manual.

◆ It is recommended to test the insulating strength for this tester at least one time a year, (which insulating strength should be AC100kV/rms between HV detector and the fifth insulating rod; and be AC1000V/rms between the shell of LV current clamp and principal machine).

I Introduction

ETCR9500C Three-Channel Wireless HV CT Ratio tester is a core technological product under the long-term strategy of professional detecting techniques research on electric power instruments developed by ETCR, which is specific for the on-line measurement and detection for primary and secondary current, transformation ratio, error, phase (group) angle difference, polarity, phase sequence, and leaker in the high & low voltage current transformer and the voltage transformers in distribution system under 70KV (such as 10kV or 35kV), and is composed of high voltage detector, three-channel low-voltage secondary current clamps, principal machine, high-voltage insulating rods, monitoring software, communication link, etc. it adopts the wireless transmission signal that is capable of penetrating wall obstacles with a direct-line transmission distance of about 30m. ETCR9500C tester is widely applicable to the current detection, abstracting-proof of electricity and field operations of transformer substations, power plants, electrical power inspection departments, industrial and mining enterprises, inspection station, and electrical maintenance departments.

Current clamp: it adopts the special alloy, the latest CT technology, and the double shielding technology for a high accuracy, stability, and reliability during continuous monitoring in the entire year.

Principal machine: it displays four sets of current signals, CT ratio, phase angle difference , and polarity visually in one screen simultaneously, which memory can store 1,500 sets of data; it is available to set the auto-save interval time to monitor leaker.

HV detector breaks the traditional structure with an automatic opening and closing functions, it is easy to clamp or release measured wire by pressing or pulling back insulating rods, with the advantages of safety and time-saving. The lightweight insulating rod is characterized by thermo stability, moisture-proof, strong shock resistance & bending resistance high-insulation, high flexibility and so on.

Monitoring Software: Functions such as real-time monitoring, historical data search, accessing, browsing, saving, and printing data available; dynamic display;

ETCR9500C ratio tester integrates the functions of single-channel wireless HV CT tester, HV & LV clamp current meter, HA current remote sensor, HA leaker tester, High accuracy clamp leaker meter, phase detector, three-channel leaker recorder ,etc.

II Electrical Symbols

	Extremely dangerous! Operators shall rigidly follow the safety rules, or the potential electric shock can cause personal injury or death.
	Dangerous! Operators shall rigidly follow the safety rules, or the potential electric shock can cause personal injury or death.
	Warning! The safety rules shall be completely followed, or personal injury or damage to equipments can arise.
	Alternating current (AC)
	Direct current (DC)

III Technical Specifications

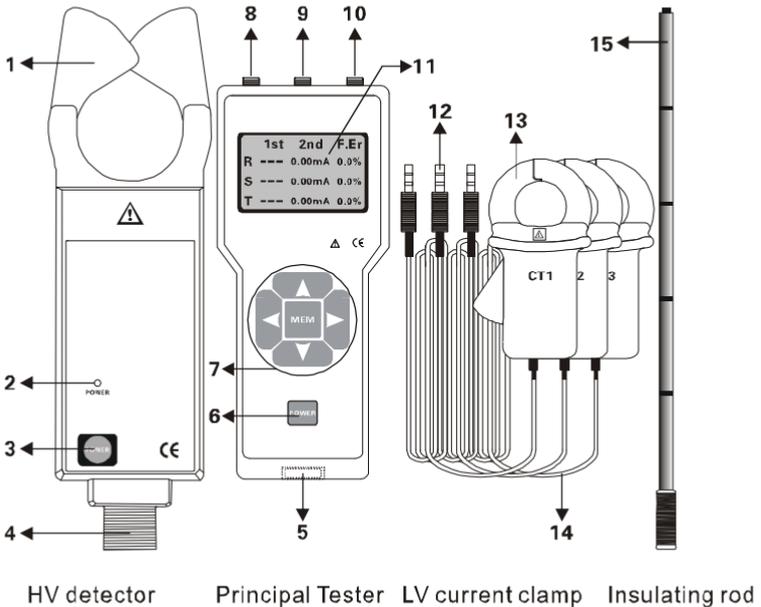
Functions	The on-line measurement and detection for primary and secondary current, transformation ratio, error, phase (group) difference, polarity, phase sequence, and leaker in the three-channel high & low voltage current transformer and the voltage transformers
Power supply	HV Detector: DC6V alkaline batteries (1.5V AAA × 4) Principal machine: DC6V alkaline batteries (1.5V AAA × 4) 30-hour continuous operation available
Test mode	Clamp CT, HV 1CT, LV 3 CT double- shield
Transmission mode	High-pressure tested data transmitted through wireless network, with a linear transmission distance of 20m;
Range	HV detector 1st: 0.1mA ~ 1000A LV current clamp 2nd: 0.01mA ~ 10A
Resolution	HV detector: 0.1mA; LV current clamp: 0.01mA
Primary circuit test accuracy (23 °C ± 3 °C, below 70% RH)	0.0mA ~ 9.99A: ±1%±5dgt
	10.0A ~ 49.9A: ±2%±5dgt
	50.0A ~ 199.9A: ±3%±5dgt
	200A ~ 600A: ±4%±5dgt
	601A ~ 1000A: ±5%±5dgt
Secondary circuit test accuracy	0.00mA ~ 10A : ±1%±5dgt (three-channel being displayed in one screen) (23°C±3°C, less than 70%RH)

CT ratio	Three kinds of transformation ratio indications : (1)convert the transformation ratio based on the adjustable basic value of 5A for secondary circuit current; (2)convert the transformation ratio based on 10kV-YY of 10kV/380V, that means 1st means the current of the line under 380V, 2nd means the secondary circuit current of CT under the 380V, and then calculate the ratio between the 10KV line and the secondary circuit; (3)the measured current ratio can be calculated by the measured CT ratio between the primary and secondary circuit.
Reference Range	Reference range of transformation: 0.00A ~ 99.99A, the default secondary circuit current is transformed to 5A;
Range of Ratio error (F.Er)	0.0% ~ 9.9%, the error between the measured CT ratio and the preset CT ratio
Range of CT ratio	0000~9999/0.0A~9.9A
Range of Ratio error	0.0%~ 9.9%, the principal machine can sound a alarm of “beep - beep – beep” if the measured value is more than the preset error.
Phase polarity	Symbol ⊕ indicated for in-phase positive polarity Symbol ⊖ indicated for in-phase negative polarity
Indication of Phase Sequence	Cursor in clockwise rotation and “Positive Phase” indicated for positive phase sequence Cursor in counterclockwise rotation and “Negative Phase” indicated for negative phase sequence
Indication of Error	Symbol “Error” indicated if the tester can't identify the phases, polarity, and phase sequence properly;
Data Storage	1500 sets of data memory; press the Left arrow key to select data, and to save and auto-number the selected data (the good condition of data available under power-down or battery replacement)
Automatic Recording Interval Time	From 00 minutes to 99 minutes, the tester stops automatic record if being set to 00 minutes; the principal machine doesn't shut down automatically if being set from 01 minutes to 99 minutes.

Sampling rate	3 times / sec
Shift	Full-automatic shift
Dimensions	Principal machine:W75mm × H170mm × T30mm; HV detector: W 76mm × H 255mm × T 31mm; LV current clamp: W 70mm × H115mm × T 38mm;
Clamp Size	HV detector clamp: ϕ 48mm LV current clamp: 25mm × 30mm
Voltage	Less than 70kV voltage for line test(operation by being connected to 5 insulating rods required)
Display Mode	LCD: 128dots × 64dots; backlight available for dark areas
LCD Size:	44mm × 27mm;
Data Retention	Press the Left arrow key to retain the data ; press the Left arrow key to cancel retention if the symbol "HOLD" displays;
Data Search	Press the MEM key and the Arrow key to search data;
Overflow Display	Overflow available if being out of range: the symbol "OL A" displayed;
Zero-signal indication	The symbol "---" is shown if the principal machine can't receive the signal from the HV detector;
Backlight Control	Available; ON / OFF means to open /close the backlight;
Alarm prompt	The principal machine can sound an alarm of "beep - beep – beep" if the measured value is more than the preset error. and press the Right arrow key to launch or stop the alarm function;
Auto power-off	Automatic power-off available after about 15 minutes as of starting;
Battery voltage	The low- voltage symbol is displayed to remind user to replace the battery if the battery voltage is lower than 4.8V;
Weight	Principal machine:240g (including batteries) HV detector: 335g (including batteries) LV current clamp: 150g × 3 Total weight: 10kg (including instrument box and the insulating rods)
Requirements on Interferences	No strong electromagnetic interference; no interference from 433MHz and 315MHz channel

Operating temperature and humidity	-25℃~45℃; less than 80%Rh
Storage temperature and humidity	-10℃~60℃; less than 70%Rh
Insulating rod size	Outer diameter $\phi 32\text{mm}$, inner diameter $\phi 24\text{mm}$, 1m /piece, 5 pieces
Lead length of LV current clamp	2 m / Piece
Dielectric strength	AC100kV/rms between HV detector cover and the 5 th insulating rod; the AC1000V/rms between the principal machine and the LV current clamp shell between
Structure	Anti-leak type II (HV detector)

IV. Structure



1. HV detector clamp (including the boot sectors)
2. HV detector booting indicator
3. POWER key on HV detector
4. Connector of insulating rods ($\phi 24\text{mm}$)
5. RS232 interface, for data upload to computer
6. POWER key on principal machine
7. MEM key and arrows keys
8. LV current clamp CT1 Interface
9. LV current clamp CT2 Interface
10. LV current clamp CT3 Interface
11. Principal machine LCD displayer
12. LV current clamp output plug
13. LV current clamp clips (3 pieces)
14. LV current clamp leads
15. Insulating rods (5 pieces)

V Operations

	<p>Check if any damage exists for each part before operating the tester; it can be put into use only after being qualified.</p>
	<p>Install the battery according to the requirements set forth in the manual.</p>

1. Power-on/off of HV detector

Press the POWER key to power on the HV detector, and the POWER indicator lights, the HV detector begins to detect automatically, and transmits the tested data to the principal machine by wireless network. The HV detector can power-off automatically when the POWER indicator flashes continually after about 15 minutes as of booting, and the detector can shut down automatically to save the battery power, after the POWER indicator flashes for 30 seconds. When the POWER indicator flashes

continually, press the POWER key to make HV detector in continuous running, and then press the POWER key again to power off.

2. Power-on/off of principal machine

Press the POWER key to power on, then LCD begins to display, the principal machine enters the test and receiving mode after a normal booting (see below), 1st means the measured data of the primary circuit on HV terminal, 2nd means the measured data of the secondary circuit on LV terminal, F. Er means the error between the measured CT ratio and preset CT ratio, R, S, and T means the three phases respectively, and the data measured by LV current clamps of CT1, CT2, and CT3 can be displayed on the position of R, S, and T on screen respectively. the LCD can display the symbol “ - - - ” if the principal machine doesn't receive the signal from primary circuit; the principal machine can detect the phase and polarity firstly, if receives the data of the primary and the secondary circuit normally, the primary circuit currents are correspondingly visible on the phases of R, S, and T, both the error and polarity can be displayed on the upper left corner of LCD. If the symbol “Err” displays on the upper left corner of LCD display, it is not available to detect the polarity properly, and the measured currents of the primary circuit remain being displayed on the R-phase.

Err	1st	2nd	F.Er
R	---	0.00mA	0.0%
S	---	0.00mA	0.0%
T	---	0.00mA	0.0%

⊕	1st	2nd	F.Er
R	---	0.00mA	0.0%
S	151.5A	2.50A	+1.0%
T	---	0.00mA	0.0%

The LCD flashes continually to prompt the soon power off after about 15 minutes as of booting, and the principal machine can shut down automatically to save the battery power, after the LCD flashes for 30 seconds. When the LCD flashes continually, press the POWER key to make the principal machine in continuous running, and then press the POWER key again to power it off

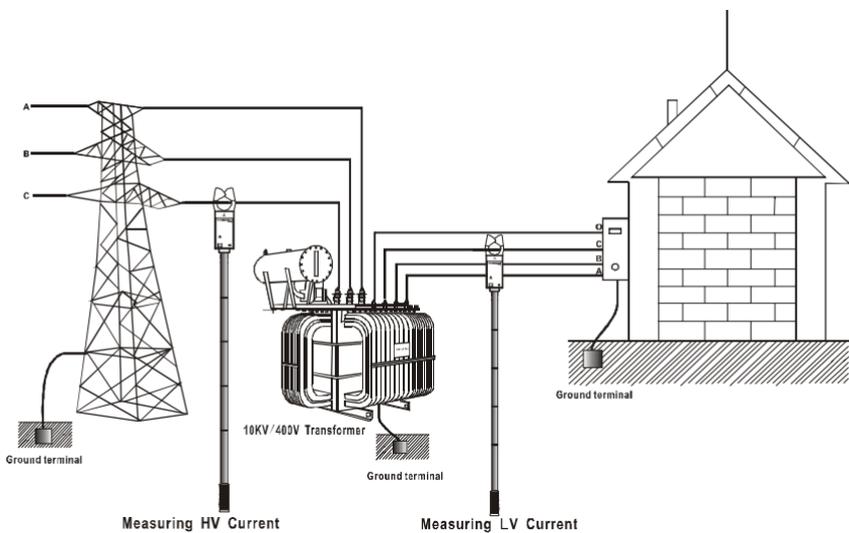
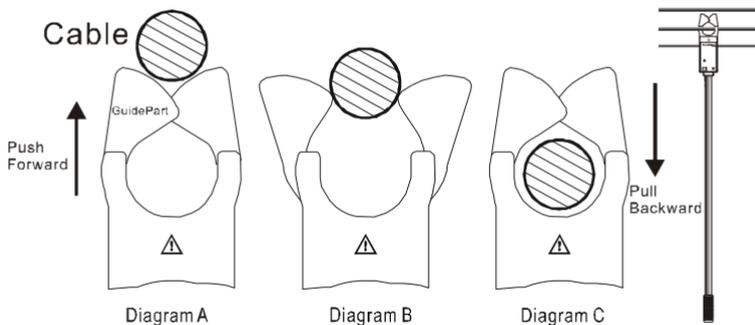
3. Test of HV current

	<p>High voltage, very dangerous ! Only qualified personnel after training could conduct operation on it. The operator should obey safety regulations; otherwise there can be the danger of electric shock resulting in personal injury or casualty.</p>
	<p>Only when all of the five insulating bars are connected, can the high voltage line be detected, otherwise there may be the danger of electric shock resulting in personal injury or casualty.</p>
	<p>Dangerous! It is prohibited to measure high voltage line above 70V; otherwise there can be danger of electric shock resulting in personal injury or casualty.</p>
	<p>Dangerous! Prohibited to detect the high current wire above 1000A.</p>

	<p>Prior to the detection, have the insulation bars connected properly; finally have the detector connected, for avoidance of any ground impact on the HV detector.</p>
	<p>Nothing but the special-made insulation bars could be connected to HV detector.</p>
	<p>After the detection, collect the insulating rod in slant direction; first remove the HV detector, then the insulation bars for the avoidance of ground impact on HV detector.</p>

If the high voltage detector can be properly connected with 5 insulating rods and starts normally, please set the lead at the center of boot sector on detector clamp (as shown in Figure A). The boot sector on HV detector is perpendicular to the lead, Push forward the insulating rod, the lead is clamped by the high voltage detector which starts detecting and feedbacks to the principal machine. Principal machine enters the detection and data collection state after its normal starting up, If the principal machine receives the signal sent by the high voltage detector, the primary circuit current of high voltage end can be shown on R phase, If the principal machine shows that the primary circuit current value is “OL”, it is indicated that the primary circuit current exceeds the upper limit of the high voltage detector. Push the insulating rod backward, the high voltage detector is disconnected with the lead (As shown in figure C). Please do keep the boot sector perpendicular to the lead while removing.

The principal machine can detect the phase (group) differences between the primary circuit and the secondary circuit firstly if receives the signal from the primary circuit, and then determine the polarity under in-phase; and the measured currents of the primary circuit remain being displayed on the R phase if different phases; the primary circuit currents are correspondingly visible on the phases of R, S, and T, under in-group.



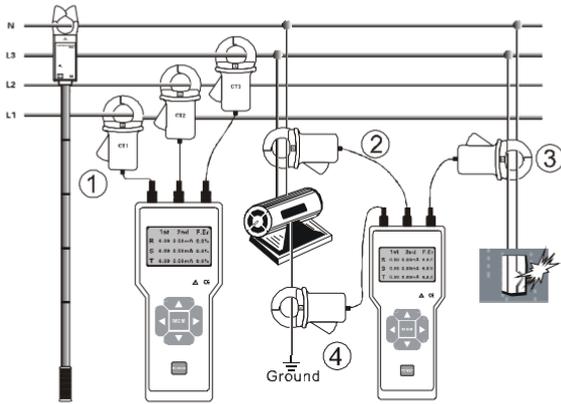
	<p>Notice: please take the instrument away from the wire after the detection is finished for a safe operation.</p>
	<p>It is available to measure HA current/leaker by the tester</p>

4. Test LV current

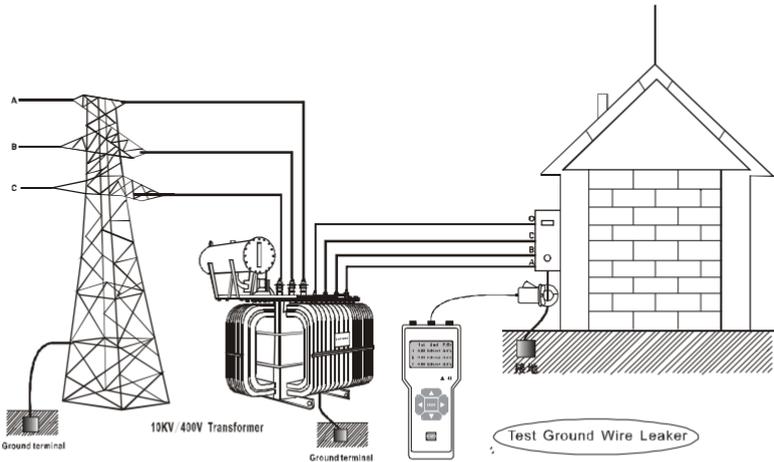
	High voltage, very dangerous ! Only personnel after training can conduct operation on it. The operator should bear safety regulations in mind; otherwise there can be the danger of electric shock resulting in personal injury or casualty.
	Testing the LV current by the HV detector available
	Testing the 4 circuit currents or leakers by the HV detector available
	It is prohibited to insert LV current clamp for an accurate measurement.
	It is prohibited to use low voltage current clamps to detect high voltage wire above 600V or 10A; otherwise there can be the danger of electric shock resulting in personal injury or casualty.

- 1) Connect three LV current clamps to the corresponding principal machines, power on the machine into the test mode.**
- 2) Vise the measured wires with the LV current clamp (Note: the clip should be fully closed), observe the readings of the secondary current, if the machine displays the symbol “OL A” while detecting the secondary current, it is indicated that the measured secondary current overflows the preset maximum of the LV clamp in the tester, it is recommended to use the HV detector for its measurements. The tester is capable of detecting three-channel or four-channel current /leaker, please operate based on actual requirements.**

3) Reference Diagram:



- ① Recording the circuit current
- ② monitoring leakers from equipment
- ③ Detecting cable leakers in wall
- ④ Detecting leaker from grounding wire



	Clamp live wire and null line at the same time, to measure leaker (note: total 2 wires)
	Clamp the earth wire to measure the leaker of earth wire of the tested electric equipment(note: single wire)
	Clamp the main wire to measure the total current of main wire of the tested electric equipment(note: single wire)
	Use high voltage detector to measure the current on low voltage wire in the places where its indication is not easily accessible.

Please preset the automatic recording interval time for a long-term record and monitoring of the current or leaker the automatic recording interval time is available from 01 to 99 minutes, it is recommended to switch off the backlight in order to reduce the consumption of battery.

5. Test of CT ratio, polarity

	【1st】 : the current detected by single-channel HV detector, the primary current for CT.
	【2nd】 : the current collected by three-channel LV current clamp; the secondary current for CT.
	【F.Er】 :The error between the measured CT ratio and the preset CT ratio.
	【R, S, T】 : indications of three phases; the in-phases indicated on the same wire.
	【⊕】 :the In-phase positive polarity; the phase-angle difference is about from 0° to 25° or from 335° to 360° .
	【⊖】 :The in-phase negative polarity, the phase angle difference is about from 155° to 205° ; the in-phase negative polarity means that the primary current polarity is opposite to the secondary current polarity under in-phase voltage; the current clamp is oppositely operated between the primary current and the secondary current. (Both the obverse side of HV detector and the obverse side of LV current clamp are the in-phase terminals for current input).



【Err】 : It indicates that the tester can't identify phase-angle difference and polarity properly, because the principal machine may not receive the signal from HV or LV terminals, or be interfered by the channel signal, or the signal amplitude may be much weak. The 1st current can remain being displayed on the R-phase.

【Ratio】:the ratio between the 1st and 2nd measured current ;

【Transformation】 : It is first to calculate the multiple between the measured secondary current and its default value of 5A, based on the benchmark of secondary current, and then transform the primary current to a value according to the multiple; the transformed value is as same as the measured value. It is available to set the benchmark of secondary current in the range from 0.00A to 99.99A.

【CT ratio of transformation based on benchmark of 10kV-YY】 : the HV detector collects the secondary current from the busbar (380V) of transformer; transform the primary current (10kV) of transformer based on the benchmark of 10kV/380V, and then calculate the ratio between the primary current and secondary current.

1) TEST OF CT RATIO, PHASE-ANGLE DIFFERENCE, AND POLARITY

As above described, the tester enters into the CT ratio measurement mode after starting, vise the primary and secondary circuit of CT with HV detector and three-channel LV current clamp respectively, and the principal machine displays the four current values in same screen simultaneously, and detects the phase-angle differences and polarity.

For example: The pretest current transformer is a LV terminal CT of 10kV/380V transformer, which primary circuit current is 151.5A,

and which secondary circuit is respectively 2.65A, 2.50A, and 2.23A. It is an in-phase positive polarity between the primary current 151.5A and the secondary current 2.50A, the error is +1.0% (the preset CT ratio is 300/5A), it is calculated as follows: $[151.5 \times (5 \div 2.50) - 300] \div 300 = +1.0 \%$.

⊕: In-phase positive

⊖: In-phase negative

Err: Error

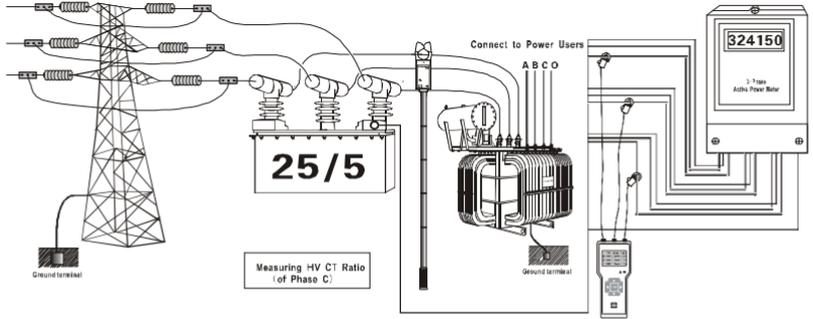
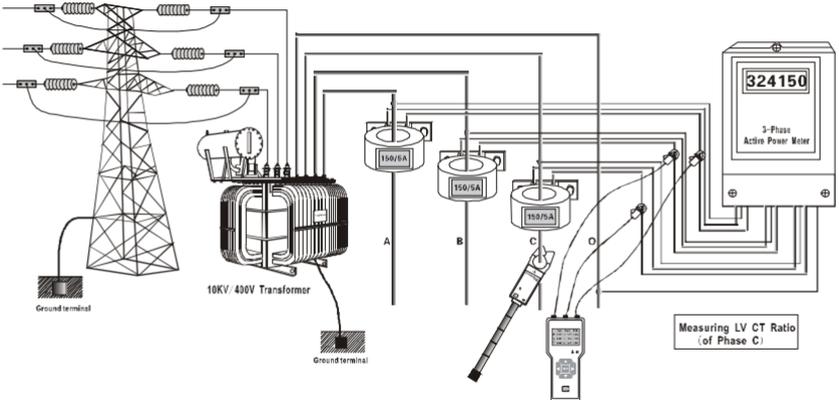
2) CT RATIO TEST

Press the Up arrow key to enter the CT ratio displaying mode for a detailed display of the three CT ratios, under the error test mode, and press the Up arrow key from the CT ratio display mode to the error test mode.

For example: The pretest current transformer is a low voltage terminal CT of 10kV/380V transformer, which primary current is 151.5A, and which secondary current is 2.50A, it is first to calculate the multiple between the secondary current and the benchmark of 5A; the calculated ratio is 303/5A, [i.e.: $151.5 \times (5 \div 2.50) = 303$]; the actual ratio of the primary and secondary currents can be calculated as follows: $151.5 \div 2.50 = 60.6$; the primary current of 10kV transformer can be calculated based on the benchmark of 10kV/380V transformer, and then calculate the CT ratio between the primary and secondary current as follows: [i.e.: $60.6 \div (10\text{kV} \div 380\text{V}) \approx 2.3$].

Current: 151.5A/2.50A
 Convert: 303/05.00A
 Ratio: 60.6
 10KV-YY ratio: 2.3

Press the Left arrow key to move the cursor in the CT ratio display mode, and press the **MEM** key and the Down arrow key to set the basic value for transformation of secondary current, while calculate the CT ratio on basis of the new basic value. The default basic value of the secondary current is 5A in the tester.



6. Detection on phase sequence

It is available to detect LV three-phase sequence, by operating the three-channel LV current clamp of the tester, which is a non-contact measurement for a safe operation under a as follow: dynamic display. Vise each corresponding wire on three phases respectively with the three-channel LV current clamp, CT1 for R, CT2 for S, CT3 for T, the phase sequence is positive if the R-phase angle is $120^\circ \pm 25^\circ$ more than the S-phase, and the S-phase angle is $120^\circ \pm 25^\circ$ more than the T-phase, otherwise it is negative. The cursor rotates clockwise on LCD under the positive phase sequence, and rotates counterclockwise under negative phase sequence, as shown in the figure:



7. Alarm launch

Press the Right arrow key to enable or disable the alarm function under the error test mode, the tester can sound a beep if the function is enabled, and displays a small dot on the upper right corner of LCD, otherwise, the small dot isn't shown when the alarm function is disenabled.

The principal machine can sound an alarm of “beep - beep – beep” under the alarm enable state during the testing process of error if the measured CT ratio error exceeds the preset error,

The default setting is to disable the alarm function after a normal booting each time.

8. Data retention and release

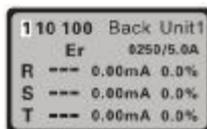
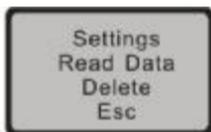
Press the Left arrow key to retain the LCD displaying under the error test mode, and the symbol “**HOLD**” is shown on the screen. And then press the Left arrow key to unlock the data and to return the error test mode, and the symbol “**HOLD**” disappears.

9. Data storage

Press the Left arrow key to retain data under the error test mode, meanwhile, the tester can number and save the current data automatically, and prompt that such an operation is completed. The tester can save up to 1,500 sets of data, if the memory is full; the symbol “**Full**” is shown, it is necessary to clear the memory for the more storage.

10. Data search

Press the **MEM** key to enter the function menu under the error test mode, and press the Up or Down arrow key to move the cursor to the position of “Search data”, then press the **MEM** key to enter the option, the tester displays the 0001st set of data automatically. Press the Left and Right arrow keys to move the cursor, press the Up or Down arrow key to search data under the change ratio signified by the cursor, the change ratio includes “1,10,and 100”. Move the cursor to the position of “Return” and press the **MEM** key to exit the data search mode, and to return the previous menu.



11. Data deletion

Press the **MEM** key to enter the function menu in the error test mode, and press the Up or Down arrow key to move the cursor to the position of “Delete Data”, press the **MEM** key to enter the option, press the Left or Right arrow key to move the cursor, press the **MEM** key to delete data or press the **MEM** key to cancel and return the previous menu.

12. Data upload

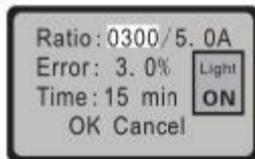
Connect the RS232 communication link of principal machine to a computer, and power on the principal machine, boot, and run the monitoring software, if the software displays the serial port is open and connected, it is available to access the historical data, which can be uploaded to the computer and saved under the Text or Microsoft Word format.

The monitoring software can be used for the online real-time monitoring, historical queries, and dynamic display, with the functions of reading, browsing, saving, and printing of historical data.

VI. Settings

Press the **MEM** key to enter the menu under the error test mode, and then press the **MEM** key to enter the settings. Press the left or right arrow key to move the cursor, move the cursor to the “OK” or “Cancel” key, and press the **MEM** key to return the previous menu.

The Settings menu includes setting CT ratio, setting error, setting time and setting backlight.



As shown in the right figure: Set the CT ratio to 300/5A; set the error to 3%; set the automatic recording interval time to 15 minutes; set the backlight to the enable state. Detailed operation is as follows:

1. Set CT ratio

The preset CT ratio here refers to the standard transformation ratio on the rating plate of pre-tested current transformer, it is easy to compare with the measured ratio and calculate the error by the above preset, its setting range is from 0000 to 9999 / 0.0 ~ 9.99A. Press the Left or Right arrow key to move the cursor, press the Up or Down arrow key continuously or interruptedly to change the setting range, move the cursor to the “OK” or “Cancel” position, and press the **MEM** key to return the previous menu.

2. Set error

The pre-set error means the allowable error of the pre-tested current transformer, if the error of measured values is more than the preset error, the principal machine can sound the “beep ... beep ... beep” alarm, the available setting range is from 0.0% to 9.9%, Press the Left or Right arrow key to move the cursor, press the Up or Down arrow key continuously or interruptedly to change

the setting range, move the cursor to the “OK” or “Cancel” position, and press the **MEM** key to return the previous menu.

3. Set time

The preset time means the interval time between the adjacent automatic recording operations, which range is from 00 minutes to 99 minutes, the principal machine can shut down automatically if be set to 00 minutes, and the principal machine can't shut down automatically in the setting range from 01 minutes to 99 minutes. Press the Left or Right arrow key to move the cursor, press the Up or Down arrow key continuously or interruptedly to change the setting range, move the cursor to the “OK” or “Cancel” position, and press the **MEM** key to return the previous menu.

4. Set backlight

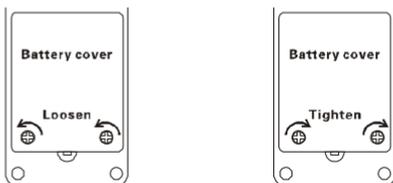
Press the Left or Right arrow key to move the cursor, press the Up or Down arrow key to open or close the backlight, ON means to open, OFF means to close, and move the cursor to the “OK” or “Cancel” position, and press the **MEM** key to return the previous menu.

VII. Battery Replacement

	Caution! Detection prohibited if the battery cover is not properly closed, otherwise there is danger.
	Pay attention to battery electrode, otherwise it can cause a harm to the instrument.

1. Please replace the battery, if the battery voltage of HV detector is less than 4.8V, and the principal machine can make a flashing

prompt “”, or if the battery voltage of principal machine is less than 4.8V, and the principal machine displays the low voltage symbol to indicate that the battery is short of power.



2. Power off, and check if the instrument is shutdown. Loosen the two screws on the battery cover, open the battery cover, and replace them with new qualified batteries. Paying special attention to the specification and electrode of new batteries, close the battery cover, tighten the two new screws.

3. Press the **POWER** key to check if the instrument starts up normally, and please follow the step 2 to re-operate if not.

VIII. Accessories

HV detector	1 PCS
Principal machine	1 PCS
LV current clamp	3 PCS
Insulating rod (1m/ piece)	5 PCS
Instrument box	1 PCS
Software (disk)	1 PCS
RS232 communication link	1 PCS
Battery (alkali dry battery AAA)	8 PCS
Manual/ Warranty Card/Certificate of Quality	1 SET

 **Manufactured by**

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