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T1000
Series Universal Tester


VERSION: T1000-AE-2.00
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Notes


 In order to prevent accumulation of static electricity inside the running tester, make reliable ground connection via its ground terminal before the test.


 Be caution when output voltage is over 36V, this might cause some electric accident. Keep safety and avoid this situation occurring.

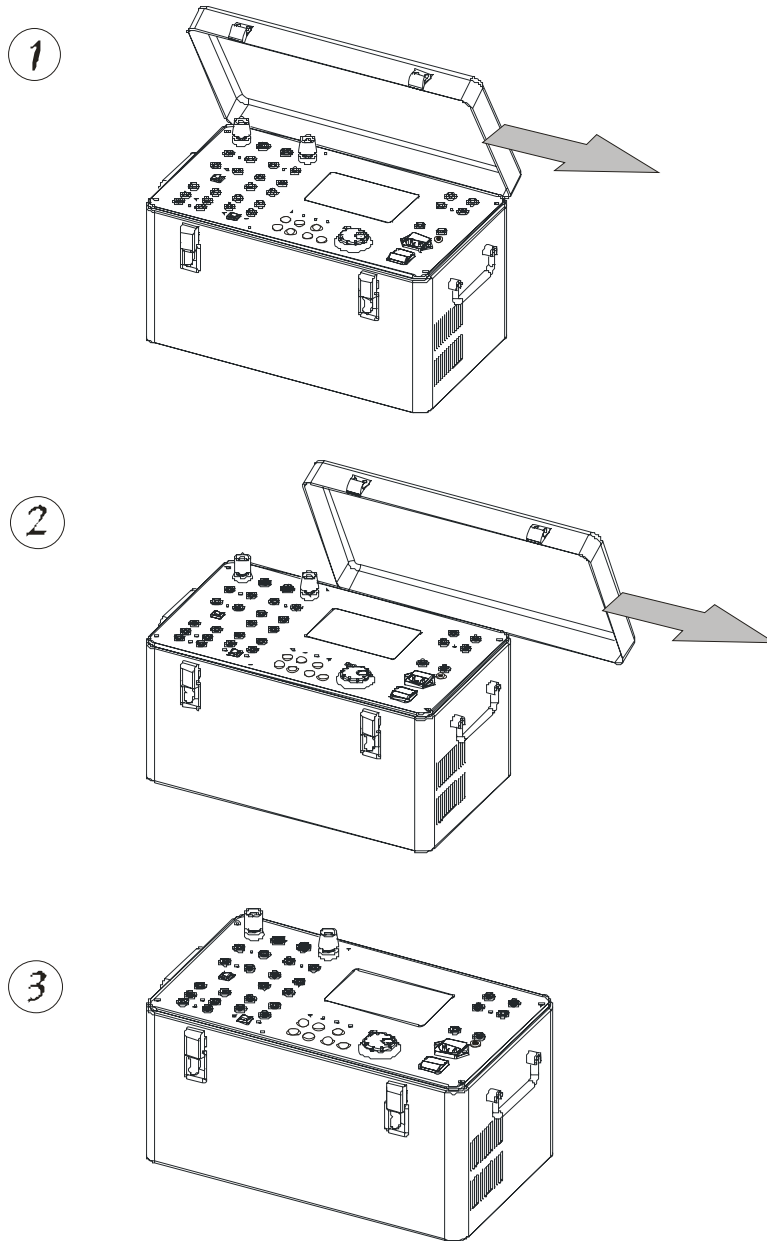
 When high current is being outputted, avoid personal injury and the equipment damage, which is under test.

 Never add external voltage and current onto the voltage/current output terminals of the tester.

 Since the tester is a kind of precision electronic equipment, keep a water-proof and damp-proof environment for it.

 Find any abnormal signs during the installation of the tester, please inform factory immediately and don't fix it by yourself.

 Notice: In order to facilitate the practical application, the design of the superstructure is removable; the illustration is shown in the chart below.



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1. General Introduction

The T1000 series single phase relay test kits are designed for easy and safe test of different type of relays. The powerful 1000A current source can be used to test all kinds of current relays, including high burden relay and CT. The AC/DC current and/or voltage sources allow phase angle and frequency to be adjusted smoothly. This makes it possible to precisely test directional and frequency relay. 1000A is integrated with two current sources and thus can test differential relays easily. The kit uses advanced switching power amplifier to replace the traditional transformer, thus avoiding the dangerous high voltage across the current output.

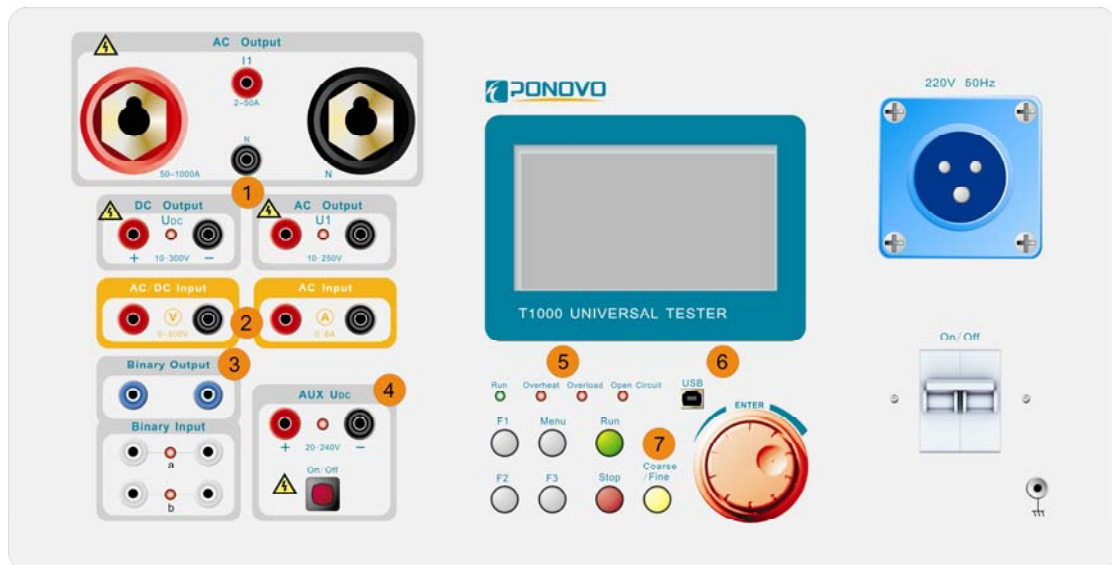
Hardware Configuration

Model	T1000
High power AC current I1	1000A
High power AC voltage U1	10-250V
High power DC voltage Udc	10-300V
Auxiliary DC	20-240V
Ammeter	0-2000V
Voltmeter	0-600V
Binary inputs	2
Binary output	1

Function configuration

Model		T1000
CT test	Ratio	•
	V-A test	
	CT resistance	
Relay test	Manual	•
	Auto	
	Trip time	
	Pick up	
	Recloser	
Tripping current test		•
Timer		•
Multimeter		•

2. Panel introduction



- 1) High power output: it's mainly applied for CT test and relay test.
- 2) AC/DC voltmeter and ammeter: they can be applied for measuring both internal and external outputs.
- 3) Binary output: one pair, relay contacts
Binary input: two pairs with no polarity. It can not only receive protection acting contacts, but be applied for timer test, with single channel and double channels for options.
- 4) Auxiliary DC power supply: it's mainly used to provide power supply to protection or relay with the load of 0.5A.
- 5) Running lamp: it's used for the equipment to output indications.
Overheat lamp: it will turn on the lamp, alarm and close the output, if the operation temperature of the power module inside the equipment exceeds 80°C.
Overload lamp: it will turn on the lamp and close the output when an overload of current and/or voltage occurs.
Open-circuit lamp: it will flame if an open circuit is detected at the output of high power current I1.
- 6) USB port: it is applied for reading report and debugging the computer in high level.
- 7) Menu selection, parameter setting and adjustment's output control areas.

3. Technique parameters

High power AC current I1

Range	2—50A	50—1000A
Accuracy (relative)	±0.5%	±0.5%
Compliance voltage	20V	7V
Max load time	120S at 1000A	

High power AC voltage U1

Range	10—250V
Accuracy (relative)	±0.5%
Power	750VA(250V)

High power DC voltage Udc

Range	10-300V
Accuracy (relative)	±0.5%
Power	750W (300V)

Auxiliary DC voltage

Range	20-240V 0.5A
Accuracy	±1%
Power	55W/110V 110W/ 220V
Output time	Continuous at 0.5A

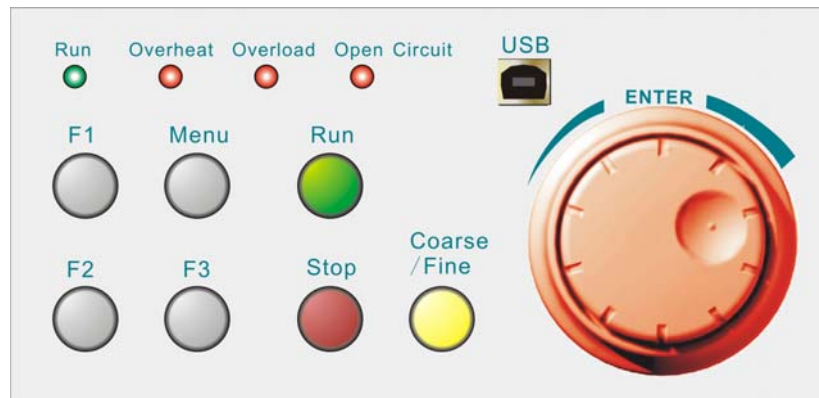
Ammeter and voltmeter

	Voltmeter	Ammeter
Range	0~600V AC/DC	0~6A AC direct measurement 0-2000A AC with external CT
Accuracy	±1%	±1%

4. Operation guide

4.1 How to select test item

The tester has a test unit selection area on the right bottom of the equipment panel, where gets 4 buttons: F1, F2, F3 and the menu. Press the **MENU** button in the area, you will enter into the main menu directly.



In the main menu, rotate the **ENTER** button to select certain test item, and then press the ENTER button to go into the interface of the test item you selected.

For sub-menu, you may press the F1 button to go back to last level menu.

4.2 How to select variable

In the test item interface, rotate the **ENTER** button (clockwise or counter clockwise) to select the variable. The variable you selected will be displayed in white characters with black background.

AC-I1		F1 ↑
Range 1000A ▾	Pick up	
I1 0100.00A	Drop off	
	Ratio	

4.3 How to set parameters

When the variable was selected, press the **ENTER** button and rotate it clockwise or counter-clockwise to change the magnitude of the variable. Select the step of parameter changing by using the **Fast/Fine** adjustment button. You may switch the step between 0.001, 0.1, 1,10,100 and 1000 by pressing the button.

The parameter setting of action unit and manual unit:

- Both before and after test, you may select certain variable to set corresponding parameters
- Both before and after test, you may press the Fast/Fine adjustment button to change the variable output.

Other units can't be changed with their parameters as soon as the test starts.

4.4 How to control output

The **Run** and **Stop** buttons are applied to control the tester of its output, or to stop it.

4.5 Report's setting, view and saving

4.5.1 Report view: select the view option in the main menu to go into the report view interface, where you may view all saved reports. Here, each page can display 10 reports. With total 3 pages, it can save 30 reports at most. "1/3" denotes there have 3 pages and the current page is the first page.

The report with cursor below has test items whose names are listed as following figure in their item names.

080406-181145	080206-121722
080406-181340	080118-175147
080406-181536	080212-092145
080405-181148	080309-141011
080406-181148	080403-151105
Pick up AC-I1	1/3
F1:↓	F2:Delete all
	F3:Delete

4.5.2 Report saving: after the test, you may save current item following the guide on the screen. Both date and time will be saved in the report.

4.6 System setting

Select the system setting option in the main menu, and then go to its interface, where you can set time, volt, freq., off delay.

System setting		F1 ↑
Time	<input checked="" type="checkbox"/> s <input type="checkbox"/> cycles	
Volt	057.74V	Fre 60.0Hz
Off delay	000.00ms	
Date	2008-05-16	14:19:23
F2-Time Set		F3-Time Save

Time can be represented by second or cycles.

Off delay: When the tester receive a trip or reclose signal from the relay undertest, the tester will generate the voltage and current continually ,until the delay time end.

5. Introduction to test function

T1000A Universal Tester		V1.0
Any test	Relay test	Auxiliary DC
CT test	Timer	Report view
		System Setting
		PC control

5.1.Aux DC

Aux DC	F1 ↑
Aux DC: 020.00V	
Press Run button to → Press ON/OFF button to control the output	

Mainly provide power supply for protection or relay

- Select the **Aux DC** menu as above figure shown.
- Set the output voltage value, press the **Run** button to output
- The **ON/OFF** button on the panel can control the output voltage,

Note: a. The aux DC output can be controlled by the **ON/OFF** button, and be outputted with other terminals at the same time.

b. The maximum output current is 0.5A.

5.2. Any test

5.2.1 Manual & Meter

Manual & Meter		F1 ↑
I1-50A ▼	I1	0000.00A
		Ⓟ 000.000V
		Ⓜ 00.000A
		000.000Ω

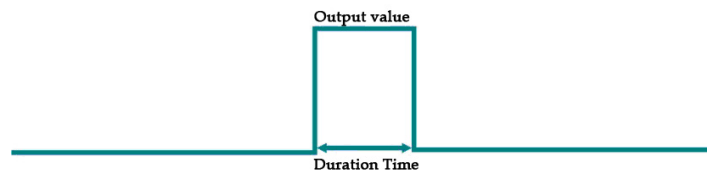
This unit can output high power AC voltage/current, high power DC voltage, high precision voltage/current and display the reading values of voltmeter and ammeter. It can realize manual control on the amplitude, phase of AC variables or amplitude of DC variables by the step.

5.2.2 Shot, Linear Ramp

It can output high power AC voltage/current, high power DC voltage, high precision voltage/current, realize automatic control on amplitude, phase of AC variables and amplitude of DC variables by the step, and record action values, action time automatically. There have 3 test methods for your selection.

Pulse

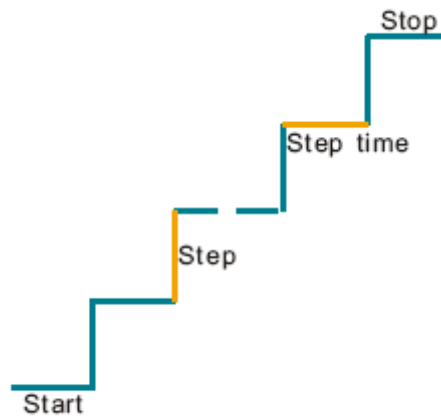
Shot		F1 ↑
Shot	AC-I1-1000A ▼	
Start	0100.00A	
Duration	01.00s	



- Select variables from the menu: AC-I1 -1000A, AC-I1-50A, AC-U1, U_{DC}
- Set the start value and duration time of variables.
- Press the **Run** button to output. When the tester receives the binary input of protection acting signal and finish recording the action time, the test will stop.

Linear ramp

Linear Ramp		F1 ↑
Source	AC-I1-1000A▼	Pick up
Start	0050.00A	Drop off
Stop	0060.00A	Ratio
Step	01.00A	
Step time	01.00s	

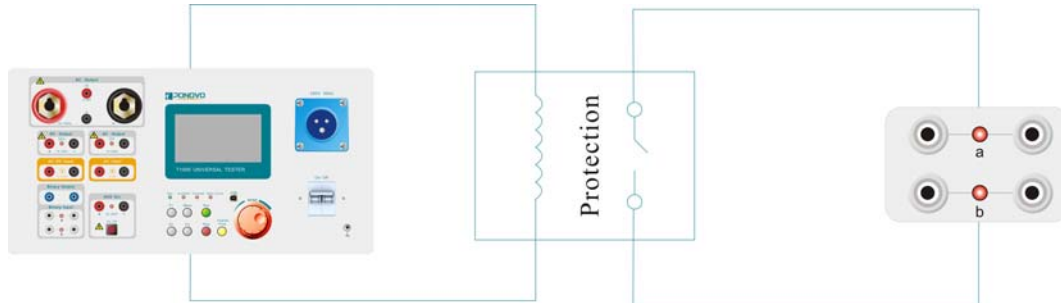


Linear Ramp

- Select output phase from the menu: AC-I1-1000A, AC-I1-50A,, AC-U1, UDC
- Set variable, start value, stop value, step and step time.
- Press the **Run** button to start output, shown as figure. The variable will gradually increase on the step from the start value to the stop value. When the tester receives the binary input of protection acting signal and finish recording the action time, the test will stop.

5.3 Relay test

5.3.1 Trip time test, Trip time + pulse length test



AC-I1		F1 ↑
Range	1000A ▽	Time Pulse
Offset I1	0000.00A > Press Enter	
Test I1	0100.00A	

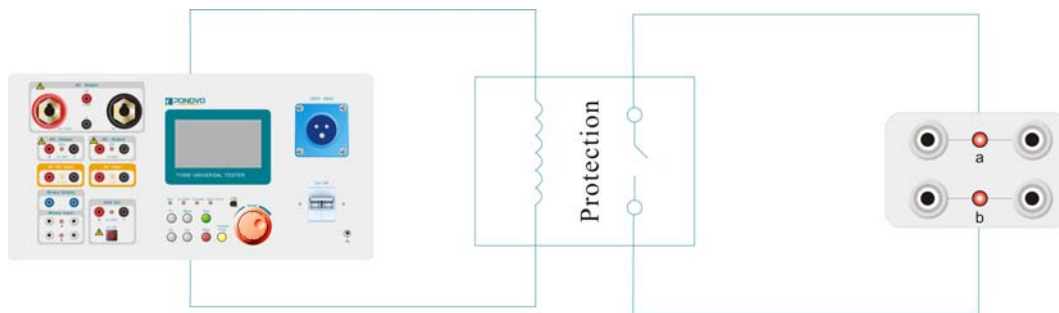
- There have two states for setting. You can set amplitude and phase for these two states, and the tester will count time when entering into the 2nd state.
- Perform tests on the action time in all kinds of over-voltage/current and under-voltage/current relays.

Test process

- 1) Select test item.
- 2) Set voltage and current values.
 - Set the variable of "Offset" to relay but no-action.
 - Set the variable of "test" to reliable action of relay undertest.
- 3) Test:

Press the **Run** button, the tester will start to output under the "Offset". Press the **ENTER** button into the "Test" and start time counting at the same time. As soon as the tester receives the binary input of protection acting signal, the tester will start to record the action time, pulse time.

5.3.2 Trip value test



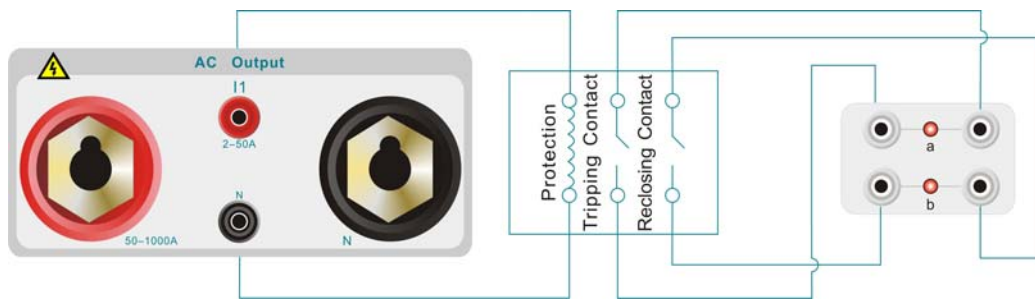
AC-I1		F1 ↑
Range	1000A ▽	Pick up Drop off Ratio
I1	0100.00A	

- For high power output, you can manually control the amplitude to change on the step.
- Nominal voltage and current can manually control the amplitude, phase and frequency of AC variables and amplitude of DC variables to change on the step.

Test process:

- Select test item and then go into the action value test unit.
- Set voltage and current values.
- Press the **Run** button → the tester starts to output based on the setting → rotate the **ENTER** button to control the output of the variable you selected → as soon as the tester receives the binary input of relay acting signal, the tester will start to record the action time. → change the variable to make the relay equipment return the record values, and automatically calculate the return coefficient at the same time, and finally stop the test.

5.3.3 Reclosing



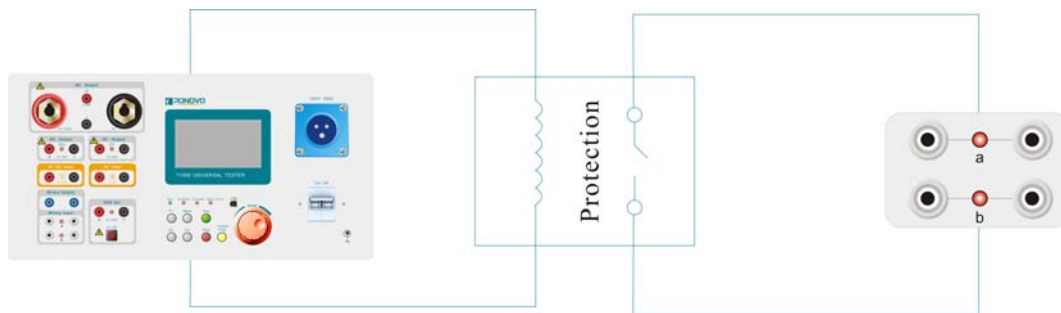
Reclosing		F1 ↑
Number	6 ▼	
Fault	AC-I2 ▼	020.00A
Pick up	-a	001.069s
Reclosing	-b	000.667s
000.734s	000.653s	000.503s
000.529s	000.690s	F3 Save

- This unit can perform reclosing test, set 6 times of faults at most and record 6 times of reclosing time.
- During test, you must connect the relay's acting contacts and reclosing contacts to the binary input terminals of the tester to make sure the correct logic for output.
- Time counting definition: pick up, denotes the time of first time tripping; reclosing, denotes the time between binary input a and b after each fault.

Test process:

- Select test item, go into the reclosing unit.
- Set the fault times, which can be 6 times at most, and each fault current (I1/I2 for options)
- Press the **Run** button, the tester will start to output based on the setting. As soon as the tester receives the binary input of relay acting signal, it will record acting time, reclosing time, etc.

5.3.4 Motor overload test



Motor 1000A		F1 ↑
Offset		Time
I1	0000.00A	
Test > Press Enter		
I1	0300.00A	

- This unit can test trip time of motor.
- The output current values can be set in two states, the tester will count time when press the **ENTER** button.
- There are two ways to record the action time. Firstly, as soon as the tester receives a signal from the relay under test; secondly, the current stop to output,
- In this unit, the max output time of max output current is 40s.

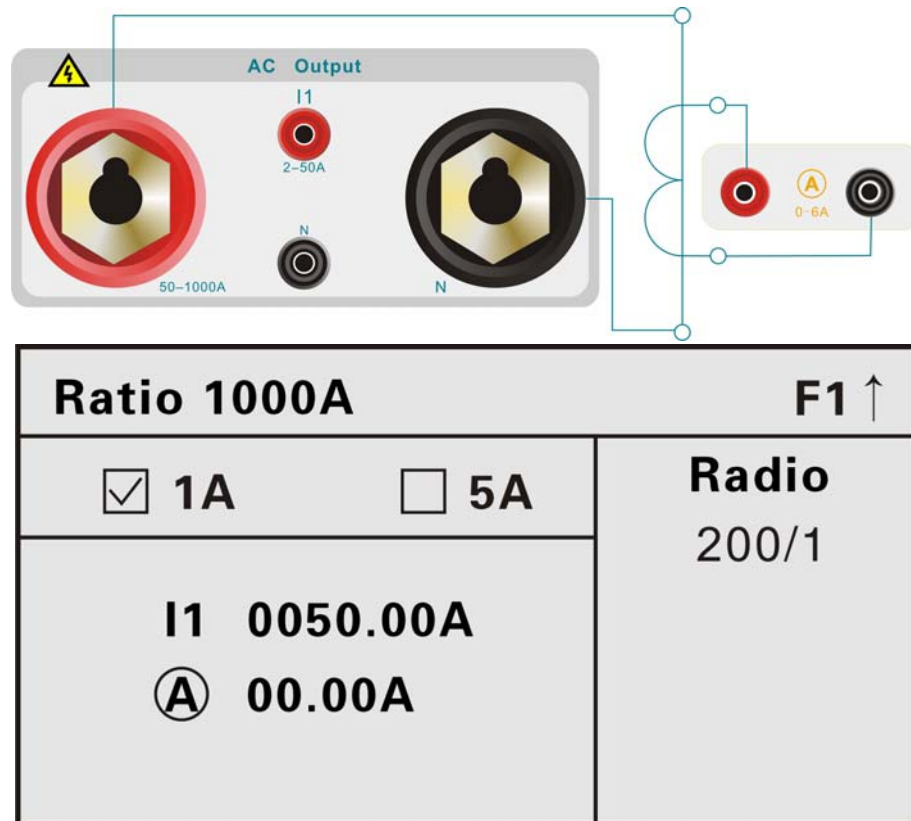
Test process

- 1) Select test item.
- 2) Set current values.
- 3) The first state output current value should be smaller than trip current value of relay.
- 4) The second state output current value should be bigger than trip value of relay, and makes the relay act.

Press the **Run** button, the tester will start to output the first state current value. Press the **ENTER** button, the state will change into the second state and start time counting at the same time. As soon as the tester receives the acting signal from relay or stops to output, the tester will record the action time.

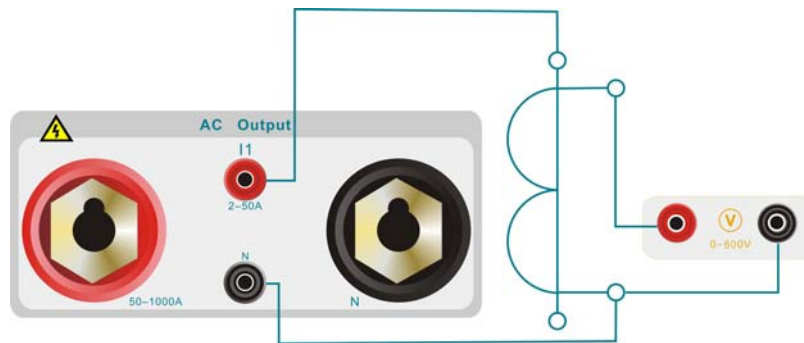
5.4 CT Test:

5.4.1 Ratio test



- Connect I1 output to the CT once side and CT secondary side to the current measuring terminal, shown as above figure. Don't make open circuit.
- Select the **Ratio 250A** menu, shown as above figure.
- Set the current for output, and CT secondary current rating. The software will calculate the ratio by the CT secondary current rating automatically.
- Press the **Run** button to output current. The tester will display the current it has measured and the ratio that has been calculated.

5.4.2 Excitation curve test

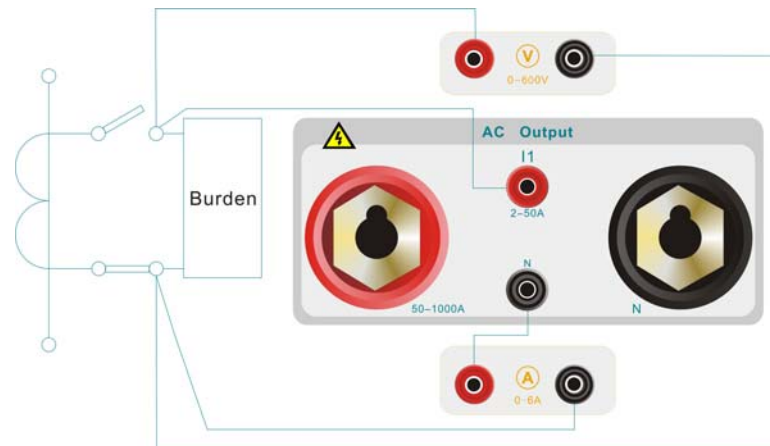


Excitation		F1 ↑
I1-50A	000.00A	
V	000.000V	

- Connect wires as above figure shown
- Select the **Excitation Curve** test menu, shown as above figure.
- Set the start current value for output
- Press the **Run** button to output the start current, elevate the current gradually and record the corresponding voltages that have been measured and corresponding series of test points.

Note: During the test, the current should be rise gradually and can't be swing up and down, which might cause remanence. The existence of remanence will have great effects on the measuring results. Once this situation happens, you should re-elevate the current to be higher than the original value and then decrease it gradually to zero. Repeat foregoing process for one or two times, thus the effect of CT remanence can be cured.

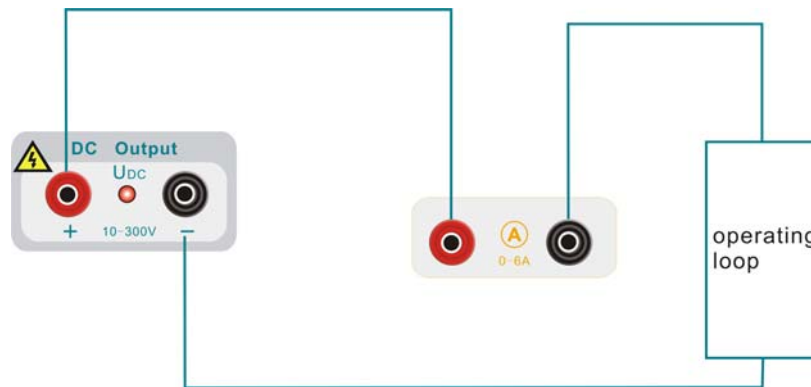
5.4.3 Secondary impedance test



Manual & Meter		F1 ↑
I1-50A ▼	I1	0000.00A
		(V) 000.000V (A) 00.000A 000.000Ω

- Connect wires as above figure shown. Disconnect the connecting sheet inside the CT terminal box heading to CT winding.
- Select the **Manual&Meter** menu, shown as above figure.
- Set the current value for output, which is normally the secondary current rating.
- Press the **Run** button to output current, and the tester will display the voltage and secondary impedance value that have been measured.

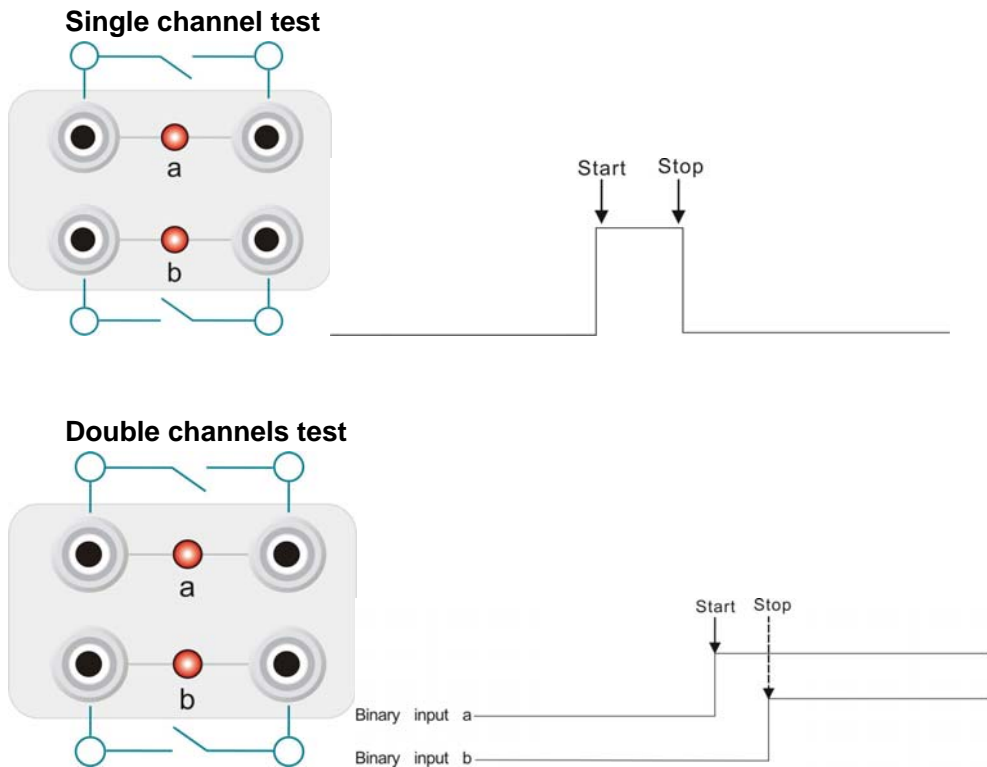
5.5 DC test of operating loop



Manual & Meter		F1 ↑
UDC ▼	UDC 220.00V	
	(V) 000.00V (A) 000.00A 000.000 Ω	

- Connect wires as above figure shown.
- Select the **Manual&Meter** menu, shown as above figure.
- Select the DC voltage value from the menu.
- Press the **Run** button to output the DC voltage, adjust DC voltage value, and record the corresponding DC current value at the same time.

5.6 Timer



Timer		F1 ↑
<input checked="" type="checkbox"/>	Start Input a Stop Input a	Time 075.000ms
<input type="checkbox"/>	Start Input a Stop Input b	

- Connect wires as above figure shown
- Select the Timer menu, shown as above figure.
- Set single channel and/or double channels from the menu.
- Press the **Run** button to start the test. The action time will be measured automatically before the test has ended.