



PTA-2000C PT Analyzer

User Manual V2.0

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Dear Customers:

Thank you for purchasing our PTA-2000C PT Analyzer. Before you use the product for the first time, please carefully read this Manual which can help you skillfully use the Tester.



Our aim is to improve our products continuously, so that the product you use may be a little bit different from the Manual. In case of any changes, we will inform you in the attached sheets! Thanks for your understanding. If anything is unclear, please contact the After-Sale Service Department in our company, and we will certainly meet your requirements.



Since the I/O terminal, testing column and *etc.* may carry voltage, electric spark may be produced when you insert and unplug the test lead, power socket and *etc.*. Please do be careful of electric shock and avoid hazards. Pay attention to your personal safety!

Prudent Warranty

For the products manufactured by our Company, if the defects appear within 6 months from the date of delivery, we can provide the replacement; if the defects appear within 2 years from the date of delivery, we can provide free services and repairs; if the defects appear more than 2 years after delivery, we can provide life-long paid maintenance services.

Safety Requirements

Please carefully read the following safety precautions so as to avoid personal injury and prevent the product or any other products connected thereto from being damaged. In order to avoid the possible dangers, the product can only operate within a specified range.

Only the qualified technicians can implement the maintenance.

- ◆ As a safety measure, the instrument is equipped with a protective earthing terminal. The ground terminal on the side of the device shall be reliably grounded before the test.
- ◆ Prevent falling: Do not put this instrument on an unstable platform or desktop in case the instrument falls down.
- ◆ Use the proper power cord: should use 220VAC, 50/60Hz, withstand current 10A and above the power cord.
- ◆ Ensure good heat dissipation: Instrument side fan, ventilation hole for ventilation and heat dissipation, please do not plug.
- ◆ Short circuit protection: Do not let any foreign object fall into the case to avoid short circuit.
- ◆ Connect and disconnect properly: Do not connect or disconnect the test lead when the device is being tested.
- ◆ Please do not operate without instrument cover: if cover plate or panel has been removed, please do not operate this product.
- ◆ Use proper fuse: This equipment uses 10A fuse.
- ◆ Avoid exposed circuits and live metal: Please do not touch exposed contact and parts when electricity is on.
- ◆ In case of suspicious fault, please do not operate: if the product is suspected of damage, please repair personnel to check, do not continue to operate.
- ◆ Operating environment: please do not operate in humid environment and explosive environment.
- ◆ This instrument is a precision electronic instrument. Please pay attention to the high temperature environment such as scorching sun, etc. when you use it outdoors, pay attention to the blocking of the hot sun and ventilation, in case the instrument is overheated or leads to the decrease of the measuring accuracy.
- ◆ Product transportation: Please transport the cushion and so on outside the instrument when the transportation, in order to avoid the vibration bump, damage the instrument or reduces the instrument accuracy.

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1. Device characteristics and parameters

The PTA-2000C Voltage transformer tester is based on the traditional voltage transformer, calibrator voltage regulator, booster, the series resonant, widely listen to the views of users, after a lot of market and in-depth theoretical research of a new generation of innovative PT test instrument. Device adopts high performance DSP+FPGA and ARM industrial computer, advanced manufacturing technology, to ensure stable and reliable product performance, complete functions, high degree of automation, high testing efficiency, in the domestic leading level, is used for professional testing instrument transformer in electric power industry.

1.1 Function

- ◆ It uses for VT, CVT, CCVT tests;
- ◆ Measure the ratio of each independent secondary winding of the voltage transformer;
- ◆ Measurement and analysis of errors and phase angle accuracy at different voltages and loads;
- ◆ Measure the coil resistance of the secondary winding of the voltage transformer;
- ◆ Test the volt ampere characteristic (magnetization curve) of the secondary winding;
- ◆ Measuring the secondary load of transformer.

1.2 Applicable standard

- ◆ IEC 60042-2 for VT
- ◆ IEC 60044-5 for CVT/CCVT
- ◆ IEC 61869 -3 for VT (Supplementary requirements)
- ◆ IEC 61869 -5 for CVT/CCVT (Supplementary requirements)
- ◆ IEEE C57.13 for traditional transformers
- ◆ ANSI C93.1 for CVT/CCVT

1.3 Main features

- ◆ You can achieve the error test of capacitive PT(CVT), electromagnetic PT by using a single instrument, without resonance booster, standard voltage transformer, load box, tester and other equipment, greatly reducing the workload of the on-site job.
- ◆ The test range is wide, can test the voltage level is 6kV~800kV electromagnetic voltage transformer.
- ◆ Using internal standard voltage transformer 0.01, low voltage transformer error measuring

difference test; excitation characteristic curve can be obtained by using the frequency interval test technology, combined with the error of the measured value of low voltage transformer error range by extrapolation of the whole work. The test level of the instrument can reach level 0.03. During the test, the maximum output voltage is not more than 3kV, to ensure the safety of field testing.

- ◆ The test wiring is simple, the operation is simple and easy to learn, only the operation of the transformer can be completed easily according to the operation of the guide prompt, and the testing efficiency is greatly improved.
- ◆ With the intelligent judgment of external wiring, wiring error, tip ratio, polarity errors etc..
- ◆ Automatic test data for the whole, and determine whether the ultra poor, poor data using the color display, the data characteristics of the transformer is simple and clear.
- ◆ Large memory can store the test data of up to 10000.
- ◆ Aluminum chassis, with good anti - interference, and to ensure the safety of the operator in the field of high pressure test and equipment safety.
- ◆ The use of high resolution, large size 8 inch true color LCD display, outdoor light with a clear display, with touch screen auxiliary operation, simple and quick.

1.4 Technical parameter

Power Supply	
Voltage range	200VAC~240VAC
Allowable voltage range	180VAC~260VAC
Frequency	50Hz/60Hz
Allowable frequency range	45Hz~65Hz
Input power	Standby: 80VA Rated test power:600VA Peak power:1800VA
Output	
High voltage output	0~3000VAC
Low voltage output	0~120VAC, 0~120VDC
Output current	0~5A eff(15A peak)
Output power	0~600VA eff(1500VA peak)

Electromagnetic voltage transformer(VT)	
Ratio test	Ratio:1~350 Voltage level: 0.6kV~35kV Typical accuracy:0.03%
	Ratio:350~1100 Voltage level: 35kV~110kV Typical accuracy:0.05%
	Ratio: 1100~2450 Voltage level: 110kV~245kV Typical accuracy:0.07%
Phase error test	Ratio:1~350 Voltage level : 0.6kV~35kV Typical accuracy:1min
	Ratio:350~2450 Voltage level: 35kV~245kV Typical accuracy:2min
Capacitor voltage transformer(CVT/CCVT)	
Ratio test	Ratio:300~8000 Voltage level: 30kV~800kV Typical accuracy:0.07%
Phase error test	Ratio:300~8000 Voltage level: 30kV~800kV Typical accuracy:2min
Winding resistance measurement	
Resolving power	1mΩ
Typical accuracy	0.2%
Guaranteed accuracy	0.5% ± 2mΩ
Load test	
Resolving power	0.02VA
Typical accuracy	0.05%
Guaranteed accuracy	0.1% ± 0.02VA
Size	
Volume	700mm*590mm*350mm
Weight	15kg (No accessories included)
Environment condition	
Working temperature	-10℃~50℃
Storage temperature	-25℃~70℃
Relative humidity	5%~95%,No condensation

2. Hardware structure

2.1 Front panel layout

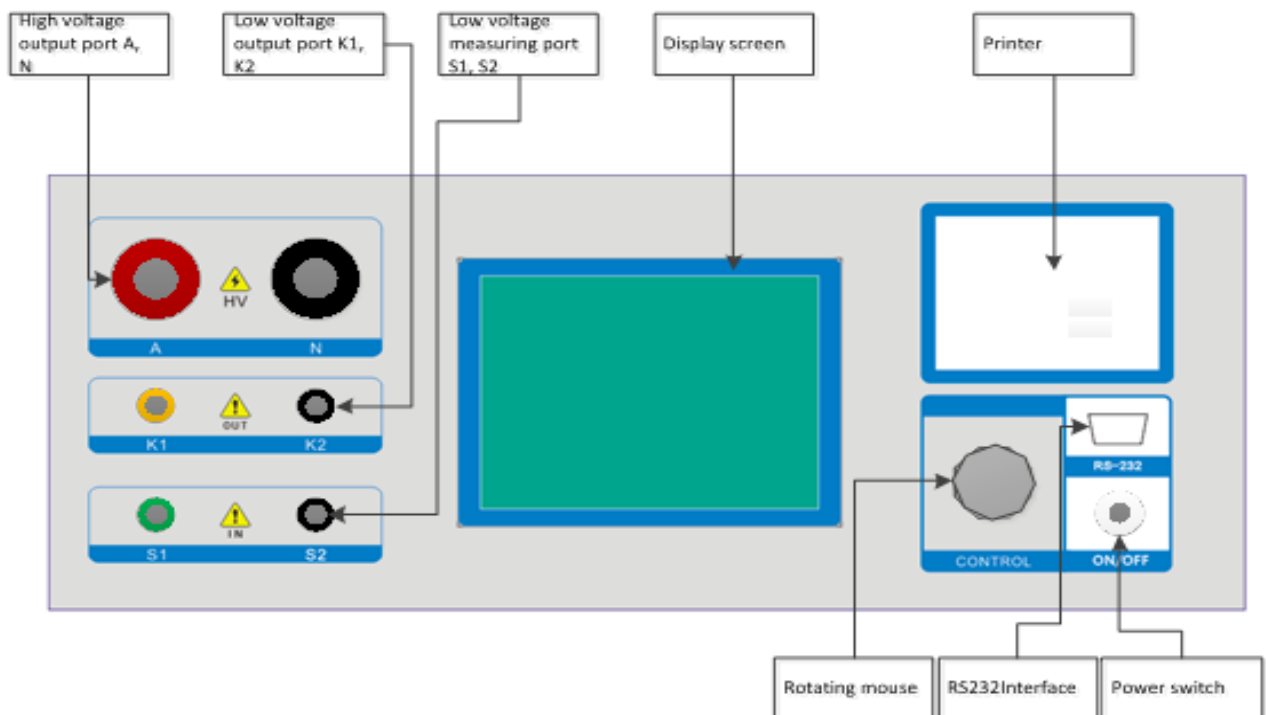


Figure 2-1 Instrument front panel layout

2.2 Rear panel layout

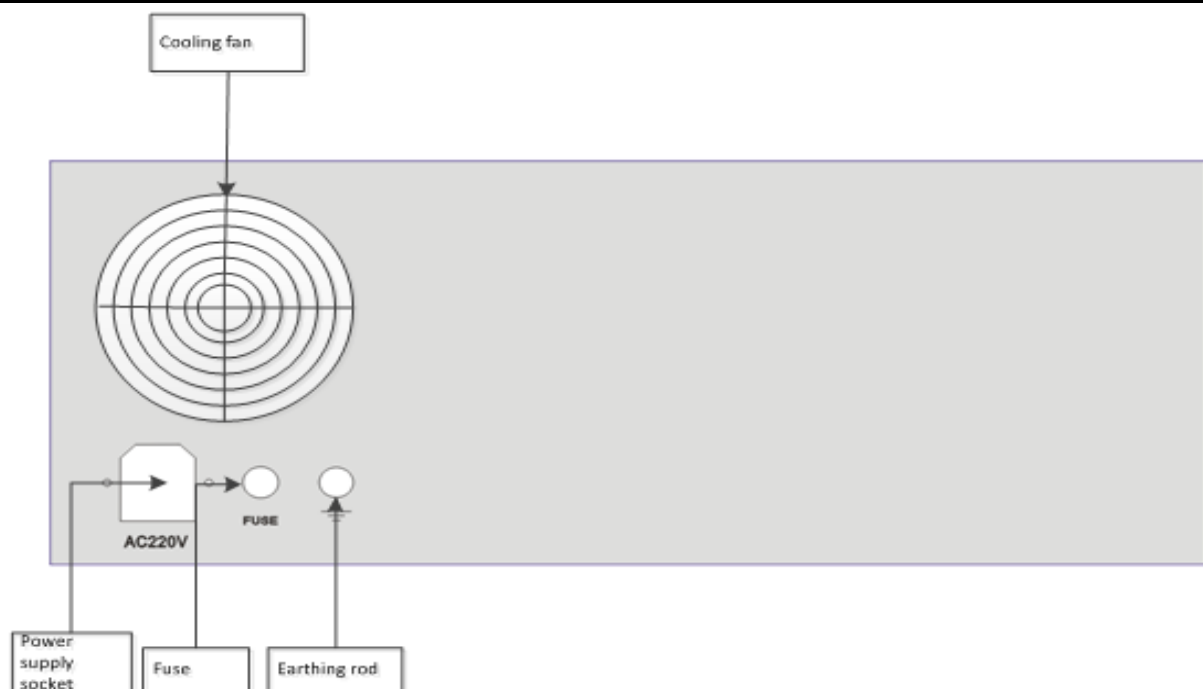


Figure 2-2 Instrument rear panel layout

3. Test process and method

3.1 Preparation before test

Warning: In connecting or disconnecting operation of voltage transformer, must use the discharge rod to discharge for all terminal grounding of voltage transformer!

The following safety operation rules should be followed before testing:

- ◆ Disconnected connections must be completely disconnected and kept safe distance;
- ◆ The terminal need be connected and test line must ensure that the connection is firm, is strictly prohibited;
- ◆ All earthing terminals must be grounded reliably;
- ◆ Provide necessary protective measures for adjacent live parts

3.1.1 Primary test preparation for PT

- ◆ Disconnect the supply voltage on either side of the terminal, and the breaking point shall be as close as possible to the voltage transformer;
- ◆ Connect the primary power line to the ground after disconnecting;
- ◆ The primary side of the line connected to the voltage transformer should be as short as possible to avoid any voltage coupling to these lines, affecting test accuracy;
- ◆ Connect the primary high voltage terminal N of the voltage transformer to the ground;
- ◆ Disconnect the voltage transformer from the power cord completely.

3.1.2 Secondary test preparation for PT

(1) For electromagnetic voltage transformers (VT):

- ◆ Ensure that the primary side of the voltage transformer is completely disengaged from the power supply;
- ◆ Disconnect the secondary load connecting of transformer;
- ◆ If necessary, the secondary N terminals of the transformer shall be earthed.

(2) For capacitive voltage transformers (CVT/CCVT):

- ◆ Ensure that the primary side of the voltage transformer is completely disengaged from the power supply;
- ◆ Disconnecting damping circuit;
- ◆ Switch off arresters and varistors;
- ◆ According to the test items and wiring diagram, choose whether to disconnect the capacitor

terminal (N) and the ground wire;

- ◆ Disconnect the secondary load of the tested transformer;
- ◆ If necessary, the secondary N terminals of the transformer shall be earthed.

3.2 Display interface specification

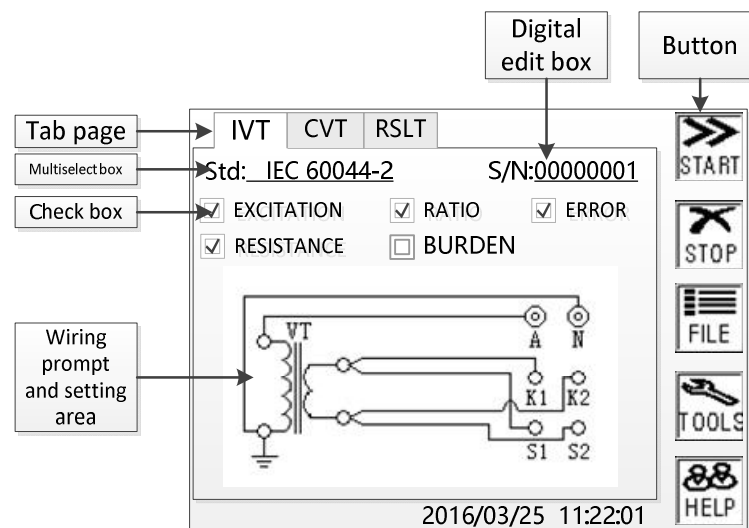
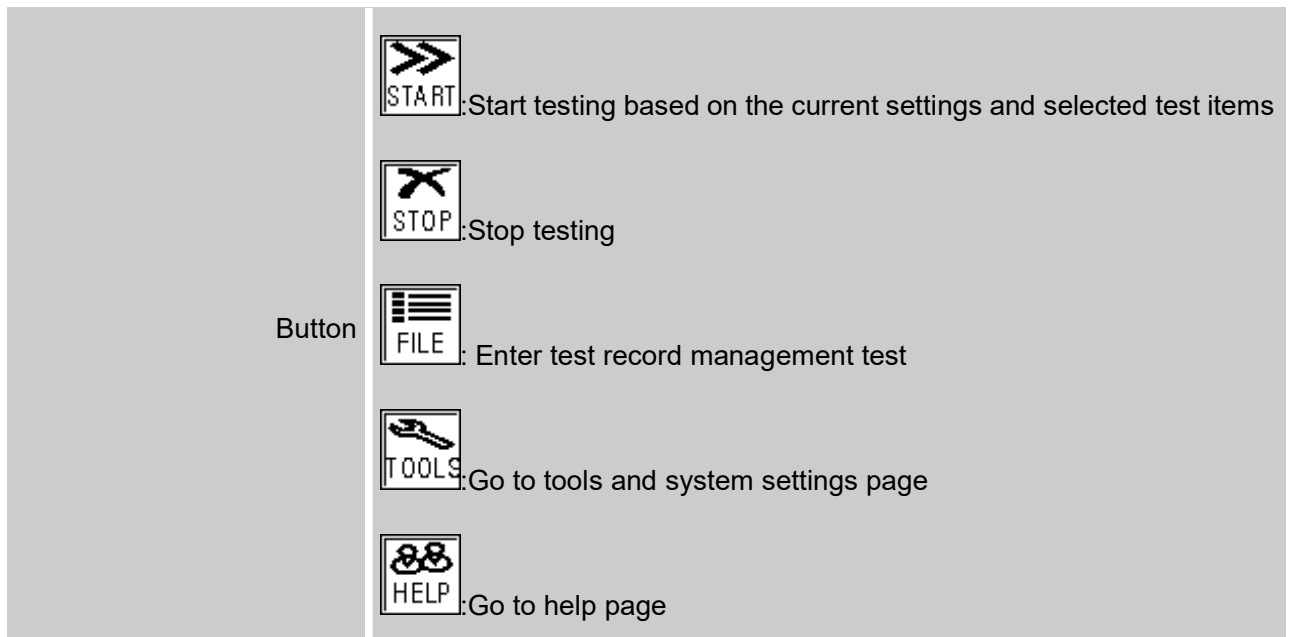


Figure 3-1 Display interface specification

Object	Description
Tab	IVT:Electromagnetic voltage transformer(VT)parameter settings page CVT:Capacitive coupled voltage transformer(CVT/CCVT)parameter settings page
Check box	Select test items : EXCITATION:Test the volt ampere characteristic (magnetization curve) of the secondary winding; RATIO: Test the ratio and polarity of PT; ERROR:Test the error characteristics of PT; RESISTANCE:Test the DC resistance of the secondary winding; BURDEN:Test the load of the secondary circuit; <i>Note: When you select ERROR,you select RATIO by default</i>
Prompt and settings area	



3.3 Rotating mouse using method

There are three kinds of input state for rotating mouse: counterclockwise rotation ($\leftarrow$), clockwise rotation ($\rightarrow$), and press OK ($\downarrow$), when pressing, there will be a sound prompt.

The specific methods of use are as follows:

Freedom of choice: the state " $\leftarrow$ " or " $\rightarrow$ " can select all tabs, buttons, check the page in the edit box, check box and digital edit boxes and other objects, if you enter or edit the selection object press " $\downarrow$ " into the object edit mode.

Object editable mode:

When editing the numeric edit box, " $\leftarrow$ " or " $\rightarrow$ " can change the number and decimal point, " $\downarrow$ " select current shift, when all confirmed after return to the free state;

Multiselect edit box: " $\leftarrow$ " or " $\rightarrow$ " can change the edit box contents, " $\downarrow$ " to confirm the changes, return to the free state.

3.4 Test flow chart

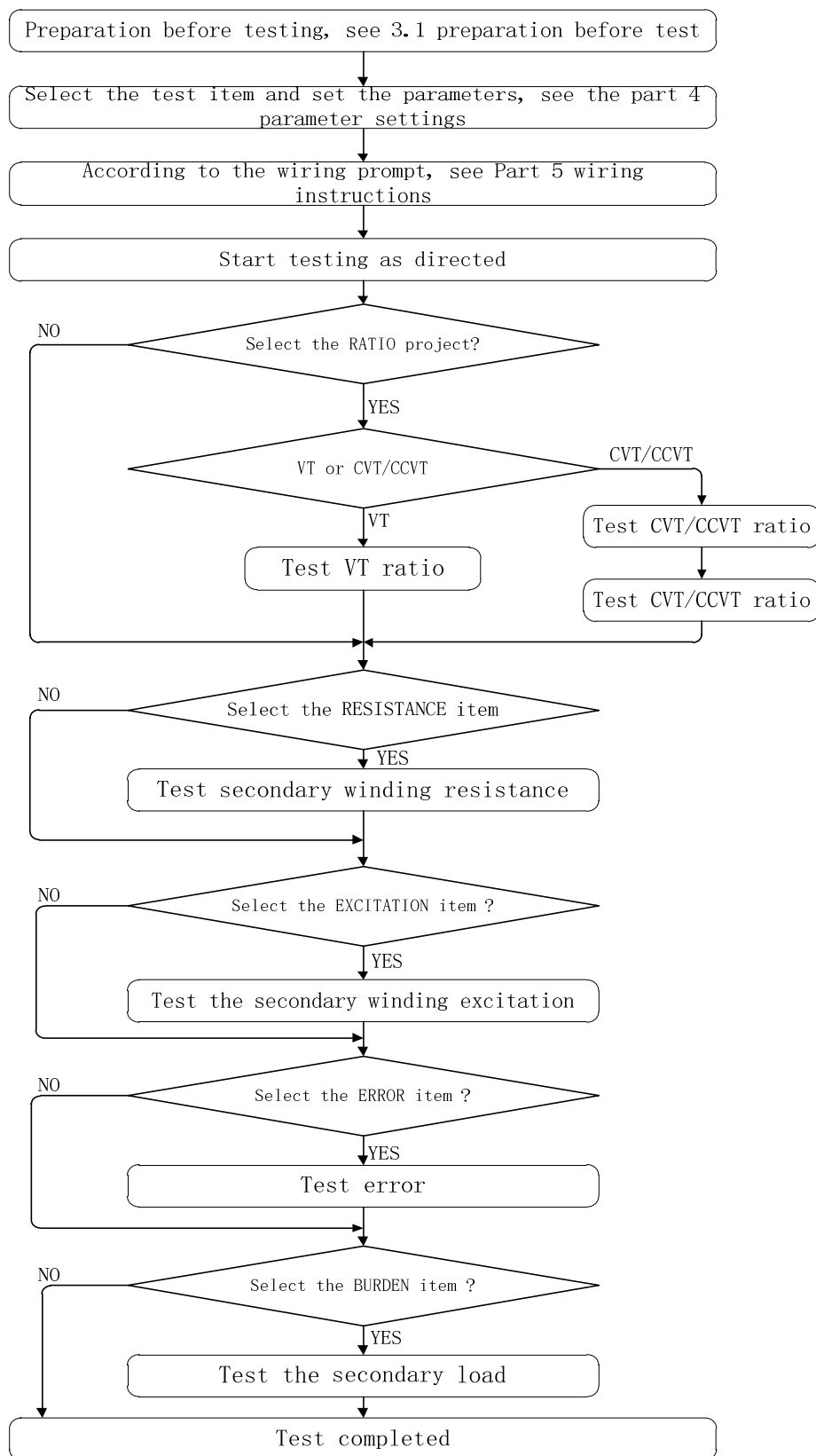


Figure 3-2 Test flow chart

3.5 Test procedure introduction

Warning: during the test,the instrument will give a interrupted sound alarm,indicating that the device has high voltage output,and when the alarm sound appears,the operator is not allowed to change the wiring! And maintain a certain safety distance with the tested products.If there is any accident during the test,the power should be turned off in time.

◇ Here's an example of selecting all test projects to describe the entire testing process and considerations.

3.5.1 Start testing as directed

Select all test items in the Figure 3-1,then according to the part 4 parameter setting instructions, according to the transformer nameplate or manual to set the corresponding parameters, confirm the parameter is correct,press the "START" to start the test as directed.Enter the test as directed as shown in Figure 3-3 and figure 3-4.

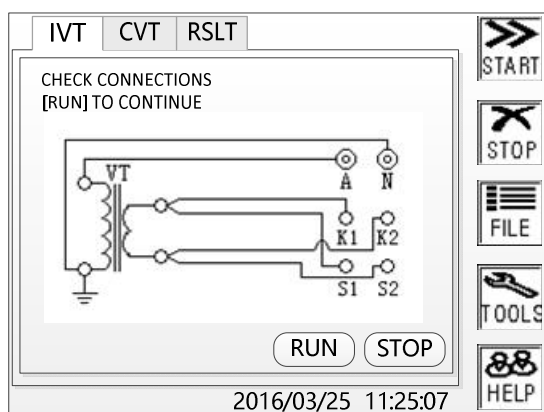


Figure 3-3 VT Test as directed interface

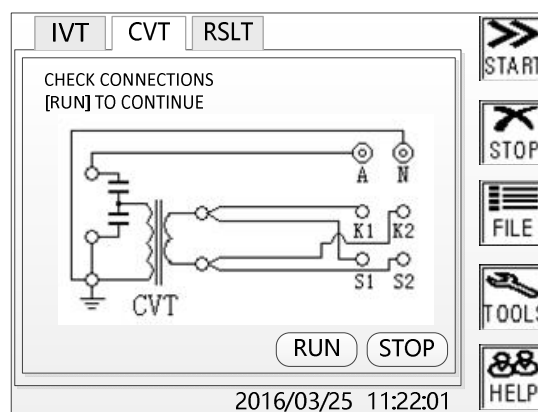


Figure 3-4 CVT Test as directed interface

According to the prompt wiring diagram and the part 5 test wiring diagram,connect the equipment and the voltage transformer correctly,confirm the connection is correct,press the "RUN" to start the test,will enter the 3.5.2 ratio test firstly.

3.5.2 Ratio Test

When the ratio test starts,the "TESTING:RATIO" appears,as shown in figures 3-5 and 3-6,the instrument will give a interrupted sound alarm.The test can be stopped at any time by "STOP".

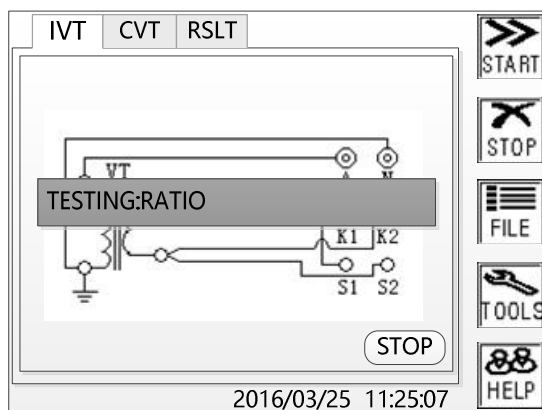


Figure 3-5 VT Ratio test

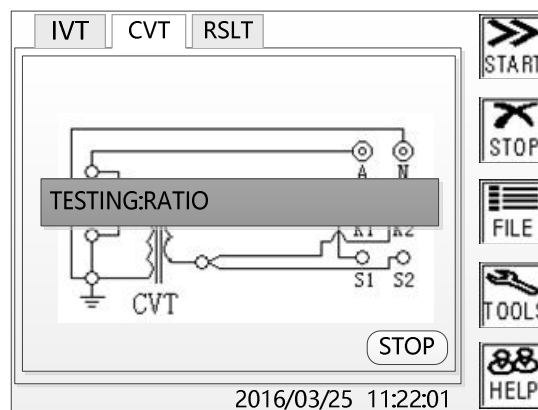


Figure 3-6 CVT Ratio test

When the ratio test is completed, the alarm sounds stopped. If it is the CVT test, it will prompt the CVT induction ratio connection. If it is the VT test, the resistance test wiring will be indicated, as shown in figures 3.7 and 3.8:

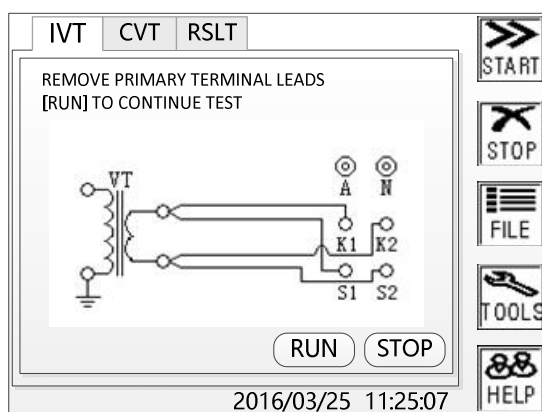


Figure 3-7 VT Resistance, excitation, and error prompt

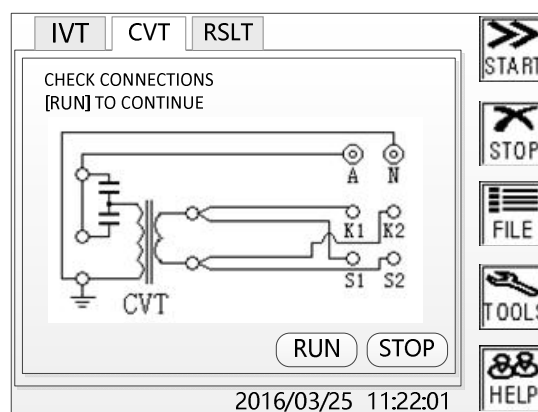


Figure 3-8 CVT induction ratio prompt

3.5.3 CVT Induction ratio test

At the interface of figure 3-8, change the connection line according to the indicated wiring hint or the part 5 test wiring instructions. Press "RUN" to begin the test, as shown in Figure 3-9:

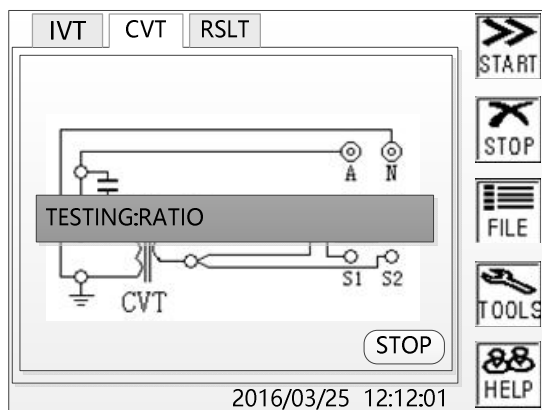


Figure 3-9 CVT Test of induction change ratio

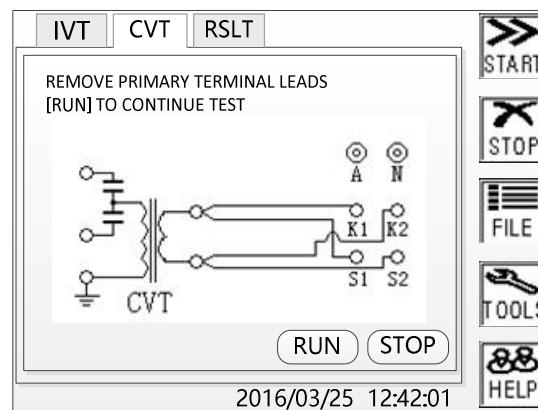


Figure 3-10 CVT Resistance, excitation, and error prompt

When the CVT induction ratio test is completed, the CVT resistance, excitation and error wiring shown in Figure 3-10. After the connection is changed, press "RUN" to continue the test.

3.5.4 Resistance, excitation and error test

Since the wiring of the resistance, excitation, and error tests is the same, the wiring will not be prompted during the three tests until the load test is indicated. As shown in figures 3-11 and 3-12:

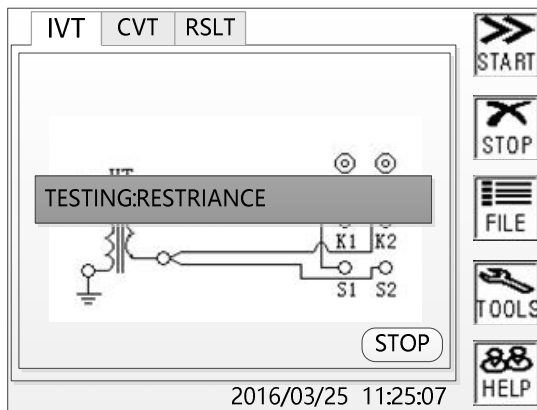


Figure 3-11 VT Resistance, excitation and error test

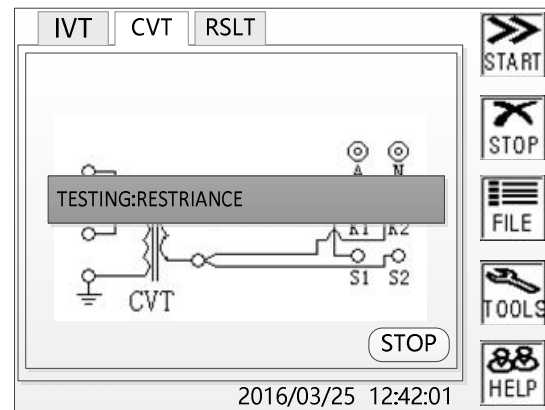


Figure 3-12 CVT Resistance, excitation and error test

When the resistance, excitation and error tests are completed, the load test wiring will be shown, as shown in Figure 3-13.

3.5.5 Load test

Change the connection to the load test as indicated, and then press RUN to enter the load test interface as shown in Figure 3-14.

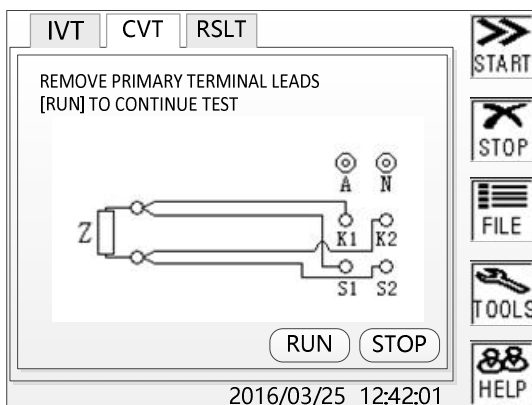


Figure 3-13 VT/CVT Load test prompt

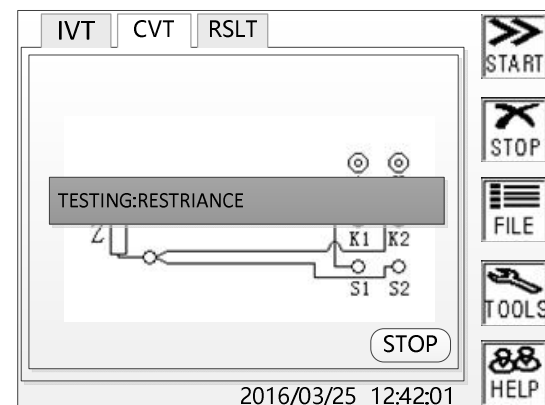


Figure 3-14 VT/CVT Load test prompt

When the load test is completed, it will represent the end of the testing process. The instrument will automatically enter the result interface, and the results page will be explained in detail at the results 6.

4. Parameter settings specification

4.1 Standard parameter

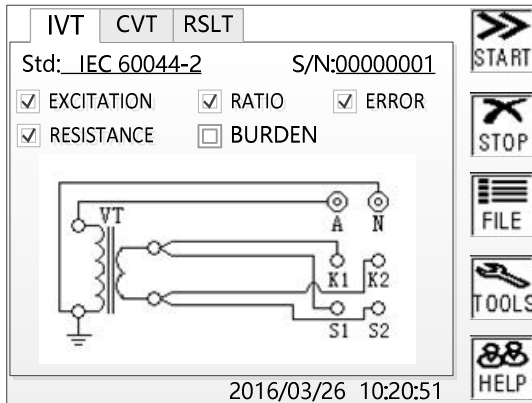


Figure 4-1 VT Standard parameter

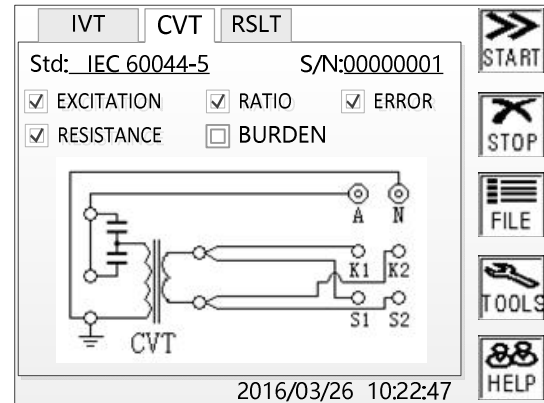


Figure 4-2 CVT Standard parameter

Parameter	Description
Std	Standards for tested transformer The three option is optional: IEC 60044-2, IEC 61869-3 & IEEE C57.13 for VT The three option is optional: IEC 60044-5, IEC-61869-5 & ANSI C93.1 for CVT/CCVT
S/N	The serial number of the transformer is easy to manage and record the measurement

4.2 Excitation parameter

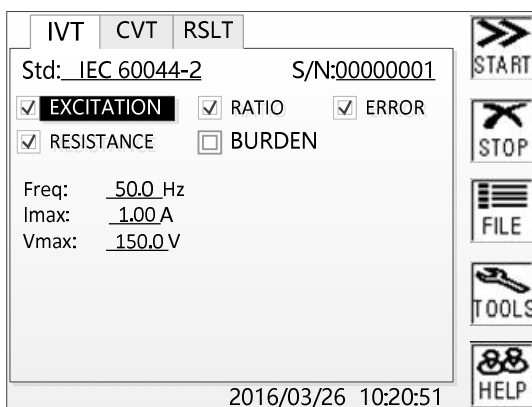


Figure 4-3 VT Excitation parameter

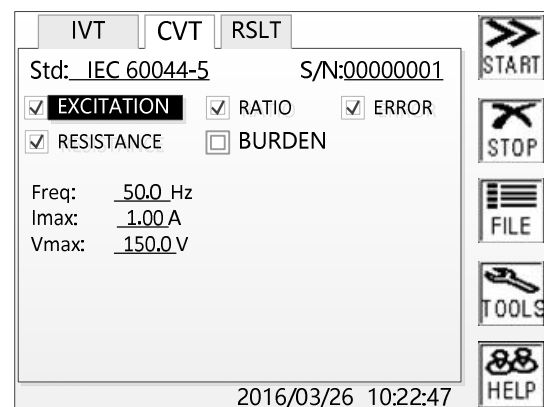


Figure 4-4 CVT Excitation parameter

Parameter	Description
Freq	Rated working frequency of transformer is 50Hz or 60Hz.
Imax	Maximum current for testing excitation
Vmax	Maximum voltage for testing excitation

4.3 Ratio parameter

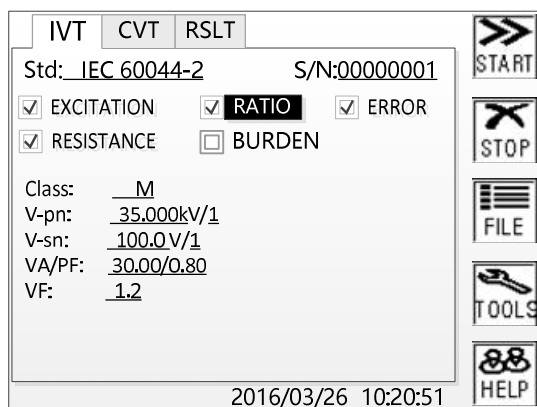


Figure 4-3 VT Ratio parameter

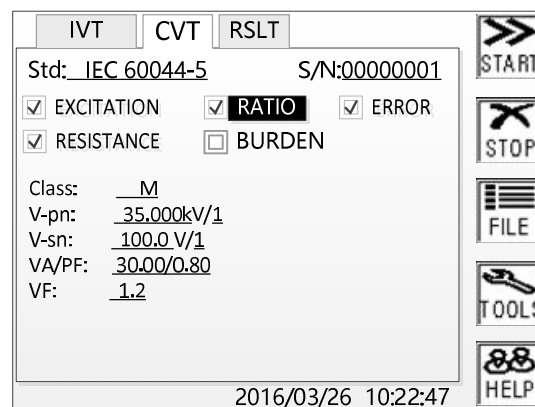


Figure 4-4 CVT Ratio parameter

Parameter	Description
Class	M(Metering)& P(Protection)2 types for tested transformer secondary winding. M: measuring winding; P: protective winding. When the standard is ANSI C57.13 (VT) only M one option.
V-pn	Primary rated voltage of tested transformer
V-sn	Rated voltage of secondary winding for tested transformer
Burden	Set the standard load,and only Std is ANSI C57.13 (VT) or ANSI C93.1 (CVT) will display this setting,the following options are available: W,X,M,Y,Z,ZZ & CUSTOM
VA/PF	VA: Rated load of test winding PF: Power factor of the rated output specified
VF	Rated voltage factor up to which the voltage transformer must fulfill the accuracy requirements. Possible values: between 1.0 and 3.0 Note: Only available if an IEC standard is selected

4.4 Resistance parameter

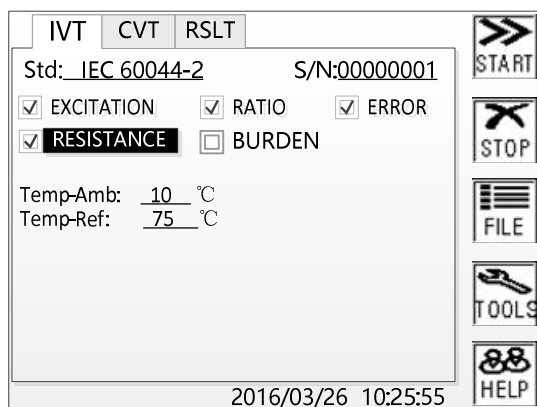


Figure 4-5 VT Resistance parameter

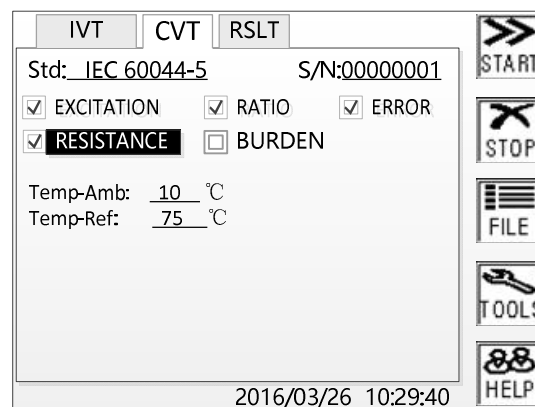


Figure 4-6 CVT Resistance parameter

Parameter	Description
Temp-Amb	Current test temperature
Temp-Ref	Calibrating temperature of resistance

4.5 Burden parameter

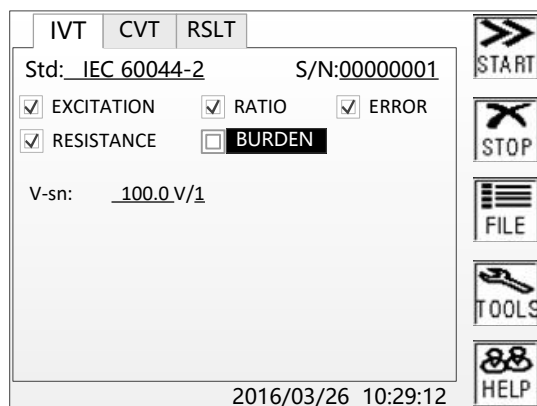


Figure 4-7 VT Burden parameter

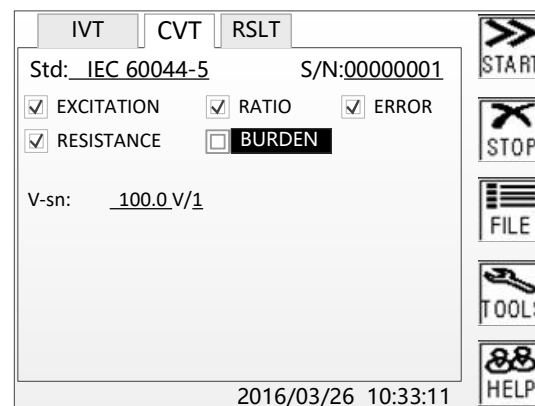


Figure 4-8 CVT Burden parameter

Parameter	Description
V-sn	Secondary rated voltage of tested winding

5. Test wiring instructions

5.1 VT Ratio test connection

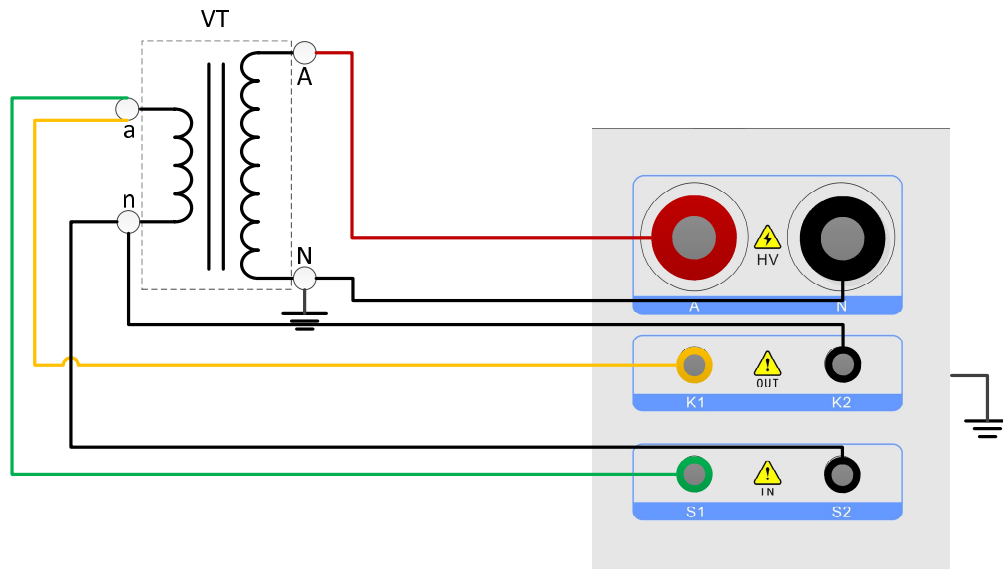


Figure 5-1 VT Ratio test connection

5.2 VT Resistance,excitation and error test wiring

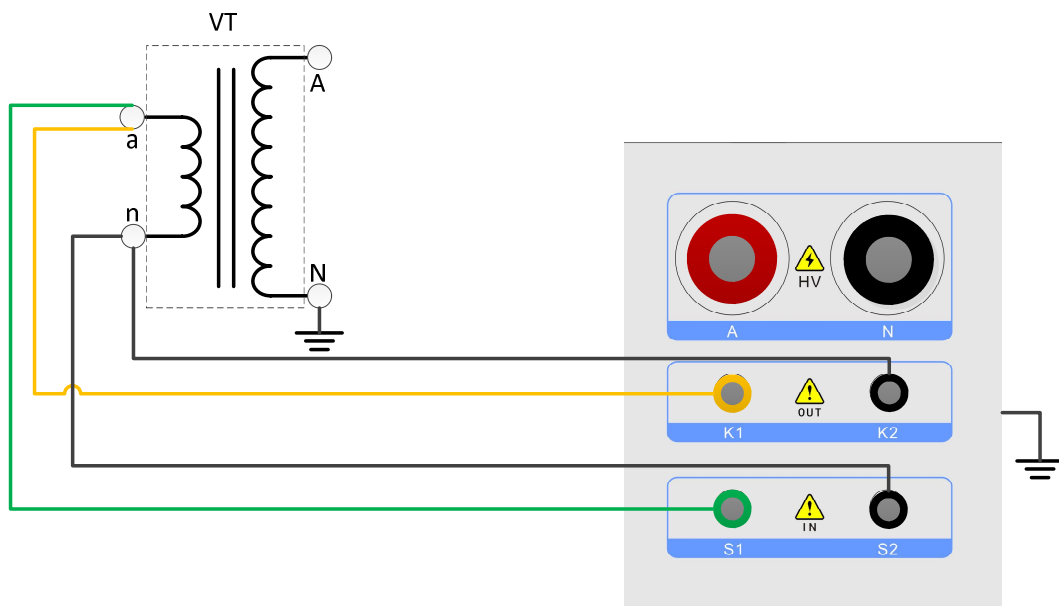


Figure 5-2 VT Resistance,excitation and error test connection

5.3 VT/CVT Load test wiring

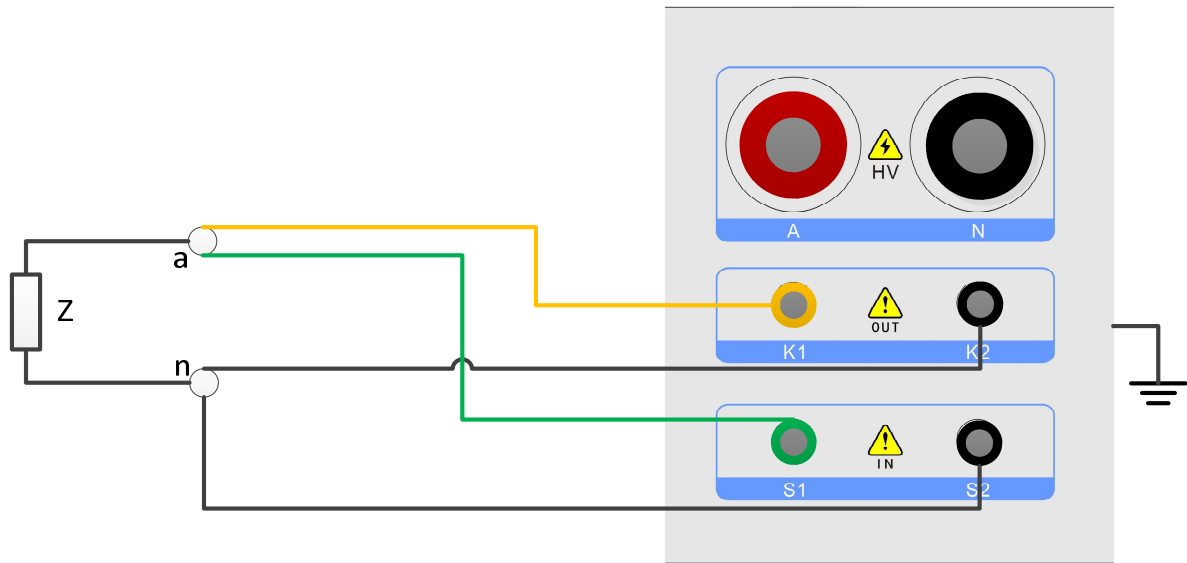


Figure 5-3 VT/CVT Load test wiring

5.4 CVT Ratio test connection

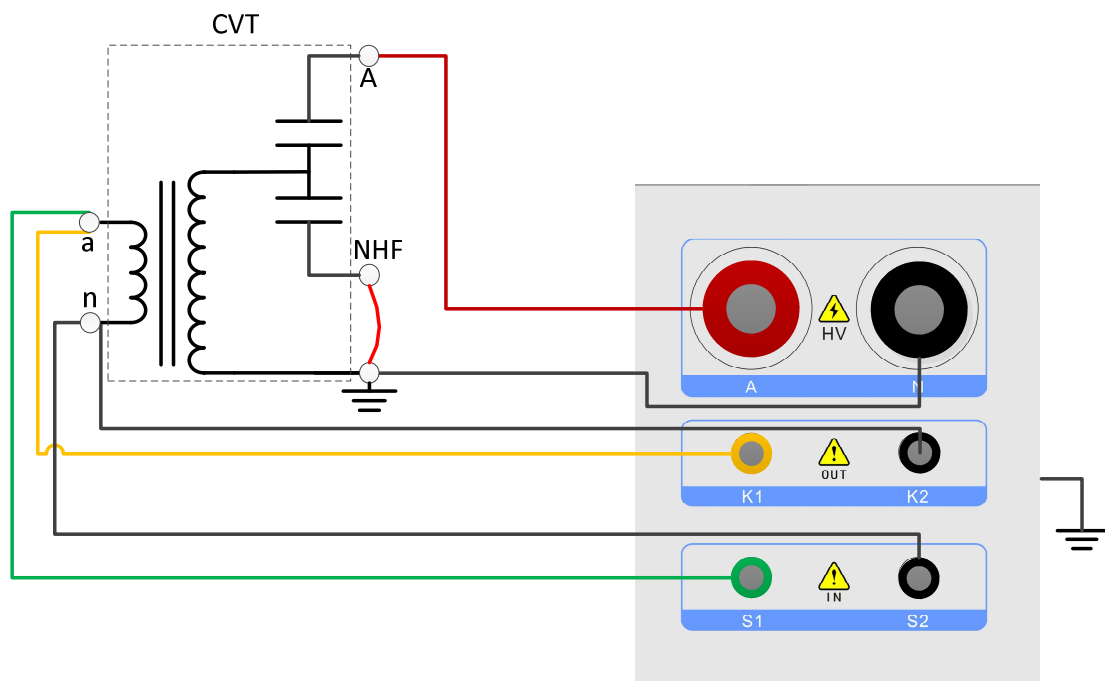
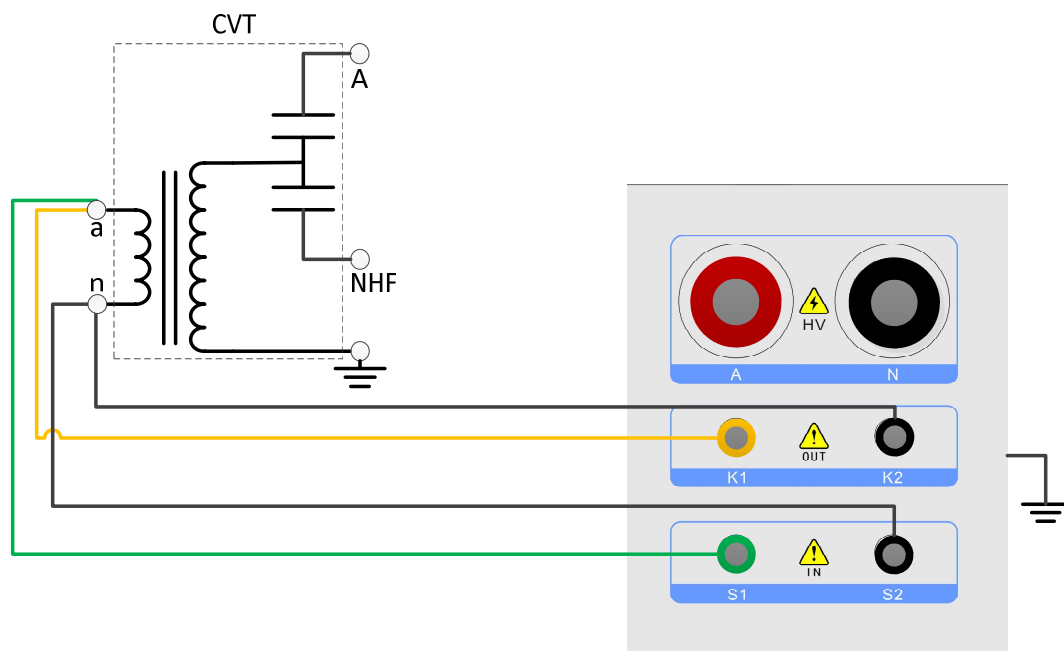


Figure 5-4 CVT Ratio test connection

5.6 CVT Resistance,excitation and error test connection



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6. Result description

6.1 Result description

IVT	CVT	RSLT
VT Metering	S/N:10000001	
IEC 60044-2	VA/PF:30.0/0.8	
V-pn:35.000/1	VF:1.2	
V-sn:100.0/1	Polarity:OK	
R@10C:0.1857Ω	N:349.5	
R@75C:0.2350Ω	Lu(H):2.1447	
f(%):-0.1557	N:395.89	
δ ('):-3.5666	Burden: 15.230VA	
Y(mS):7.912	G(mS):-6.125	
B(mS):-4.979	PF: 0.7745	
2013/06/26 15:26:33		

Figure 6-1 Result description

Result	Description
R@xx°C	Measured resistance of secondary winding at setting temperature
R@xx°C	The secondary winding resistance value is converted to the corrected temperature
Polarity	Polarity of ratio results in two kinds: OK and NOK
N	Test result of ratio
f(%)	Error results at rated voltage tested
δ (')	The phase difference results at the rated voltage of the test
Burden	Test load results,unit VA
Y(mS)	Admittance of measured load results
G(mS)	Conductance of measured load
B(mS)	Electrical susceptance of measured load results
PF	Power factor of actual load

The button function in the result page is shown in the form below:

Button	Description
	Save all the results of the current test into the internal memory of the device. The saved results can be checked in the record manager. See 7 test record management
	Print current results
	Check the excitation curve,as shown in Figure 6-2 of the excitation curve. This button will only be available when the "EXCITATION" test item is selected.
	Check the error result of change ratio, See 6-3 Error result This button will only be available when the "ERROR" test item is selected
	Check the excitation data results,as shown in Figure 6-3 excitation data results This button will only be available when the "EXCITATION" test item is selected
	Previous page
	Next page

6.2 Excitation result

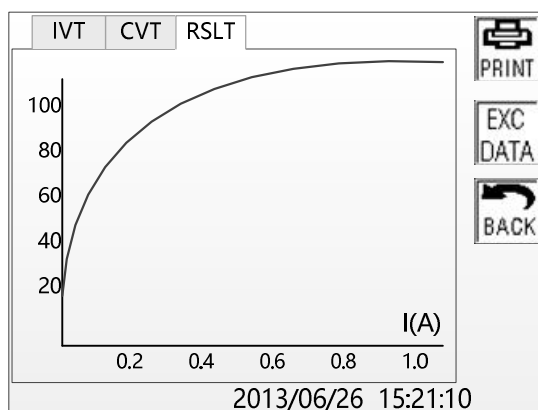
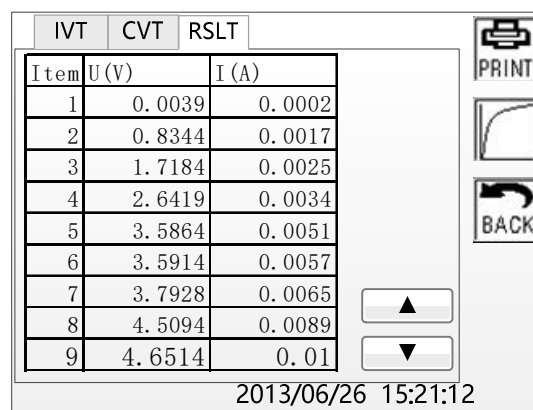


Figure 6-2 Excitation curve results



Item	U(V)	I(A)
1	0.0039	0.0002
2	0.8344	0.0017
3	1.7184	0.0025
4	2.6419	0.0034
5	3.5864	0.0051
6	3.5914	0.0057
7	3.7928	0.0065
8	4.5094	0.0089
9	4.6514	0.01

Figure 6-3 Excitation data results

6.3 Error result

IVT

CVT

RSLT

PRINT

V _{pn} %	VA/PF			
	30.0/0.8		7.5/0.8	
	%	(')	%	(')
	80	-0.176	-3.89	-0.173
100	-0.167	-3.75	-0.165	-3.85
120	-0.138	-3.405	-0.136	-3.506

BACK

2013/06/26 16:28:35

Figure 6-3 Error test result

Type	Error result
M(Metering) IEC 60044-2 (VT) IEC 61869-3 (VT) IEC 60044-5 (CVT) IEC 61869-5 (CVT)	at 25 % and 100 % of the rated burden VA and at 80 %,100 % and 120 % of the rated primary voltage V _{pn}
P(Protection) IEC 60044-2 (VT) IEC 61869-3 (VT) IEC 60044-5 (CVT) IEC 61869-5 (CVT)	at 25 % and 100 % of the rated burden VA and at 2%,5%,100% and 100%*VF of the rated primary voltage V _{pn}
M(Metering) ANSI C57.13 (VT)	Under no-load and Burden (W,X,M,Y,Z,ZZ) (if Burden is set to CUSTOM,load is VA/PF) at 90 %,100 % and 110 % of the rated primary voltage V _{pn}
P(Metering) ANSI C93.1 (CVT)	Under no-load and Burden (W,X,M,Y,Z,ZZ) (if Burden is set to CUSTOM,load is VA/PF) at 5 %,25 %,90 % and 100 % of the rated primary voltage V _{pn}
P(Protection) ANSI C93.1 (CVT)	Under no-load and Burden (W,X,M,Y,Z,ZZ) (if Burden is set to CUSTOM,load is VA/PF) at 90 % and 100 % of the rated primary voltage V _{pn}
PF	Power factor of actual load

7. Test record management

FILE BIN

Record: 001/003
Standard: IEC 60044-2
Specimen: VT
Class: M
S/N: 10000001
TEST TIME: 2015/08/03

▲
▼
OPEN
DELET
CLEAR
BACK

IVT CVT RSLT

▲ ▼ DEL

SAVE

PRINT

f/δ

VT Metering	S/N:10000001
IEC 60044-2	VA/PF:30.0/0.8
V-pn:35.000/1	VF:1.2
V-sn:100.0/1	Polarity:OK
R@10C:0.1857Ω	N:349.5
R@75C:0.2350Ω	Lu(H):2.1447
f(%):-0.1557	N:395.89
δ ('):-3.5666	Burden: 15.230VA
Y(mS):7.912	G(mS):-6.125
B(mS):-4.979	PF: 0.7745

001/003 2013/06/26 15:26:33

Figure 7-1 Test record management page

Figure 7-2 Open the test record page

The current test record information is shown in Figure 7-1, which is the setting information at the time of the test.

Project	Description
Record	The current record number and total number of records of the display device;
Standard	Current record standard;
Specimen	Current record type of tested transformer, VT or CVT
Class	Current record The winding type: M or P;
S/N	The serial number of the voltage transformer being tested;
TEST TIME	Save the date of the test record .

Button	Description
▲	Previous record
▼	Next record
OPEN	Open current record
DELET/DEL	Delete the current record, note that the deleted records can not be restored, please operate carefully
CLEAR	Delete all records stored by the device and cannot be restored. Please operate with caution

8. System tools

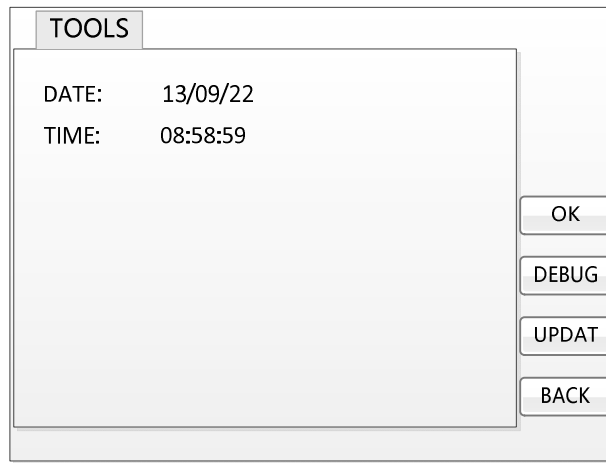


Figure 8-1 System settings page

In the figure 8-1 ,you can change the system time,"DEBUG": factory debugging,testing,use access,you need to enter a password,temporarily not open to users. "UPDAT": upgrade system button,at this time you can on-line computer operation,upgrade software.

9. Appendix

9.1 Error code

Error code	Description	Terms of settlement
0001	Overcurrent protection is generally caused by output short circuits	Check for short circuit
0002	Over temperature protection,long time high current operation,and excessive ambient temperature	Standby for 15minutes to make the instrument return to normal temperature
0004	Boost fault	1.Check wiring for error; 2.Check the output pipe;
0008	Test ratio fault	Check if the ratio test connection is wrong
0032	When testing the DC resistance,the DC resistance is too large or there is no resistance	Check the resistance test wiring for error
0256	When the PT test is set,the rated change ratio is not consistent with the actual measurement ratio	Check if the ratio test connection is wrong. Check whether the primary rated voltage and the secondary rated voltage are consistent with the actual transformer.

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