Dear Client,

Thank you for Purchasing our UHV-300 CT PT Analyzer. Please read the manual in detail prior to first use, which will help you operate the equipment skillfully.

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

The input/output terminals and the test column may bring voltage, when you plug in/pull out test line or power outlet, they will cause electric spark. PLEASE CAUTION RISK OF ELECTRIC SHOCK! To avoid risk of electric shock, be sure to follow the operating instructions!

◆ SERIOUS COMMITMENT

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

◆ SAFETY REQUIREMENTS

Please read the following safety precautions carefully to avoid personal injury and to prevent the product or any other attached products being damaged. In order to avoid possible danger, this product can only be used within the scope of the provision.

Only qualified technician can carry out maintenance or repair work.

--**To avoid fire hazard or personal injury**:

Use Proper Power Cord

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

Connect and Disconnect Correctly

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

Grounding

The product is grounded through the power cord; besides, the ground pole of the shell must be grounded. To prevent electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, please do check that the product

is properly grounded.

Pay Attention to the Ratings of All Terminals

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

Do Not Operate without Covers

Do not operate this product when covers or panels removed.

Use Proper Fuse

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

Avoid Touching Bare Wire and Charged Conductor

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

Do Not Operate with Suspicious Faults

If you encounter operating faults/suspect there is damage to this product, do not continue. Please contact with our maintenance staff.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in Explosive Atmospheres.

Ensure Product Surfaces Clean and Dry.

—Security Terms

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

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

Preface

Dear users：

Welcome！Thanks for choosing the instrument products. In order to use the instrument correctly, please read this reference manual before using it, especially the part of safety precautions.

If you have read through the entire reference manual, we suggest you keep it properly at the same place with the instrument or anywhere you can get to read easily, therefore, you can search for relative information in the future.

Safety Precautions

1. In order to protect both the instrument and the instructor, please read the reference manual details before testing, and operate strictly with the requirements of the manual.
2. Do not place the instrument on unsteady platform or desk, to prevent it from falling and being damaged.
3. The fan and ventilation holes of instrument side is for ventilating and cooling, so do not plug to ensure the instrument work normally.
4. This is a precision electronic instrument, do not place it under the burning sun to insolate or in high temperature environment in outdoor.And pay attention to keep it out of the sun and keep it in ventilated environment, to prevent overheating to cause instrument measurement precision decline
5. As a safety measure, the instrument is equipped with protective earthling terminal. the pilot should be installed prior to the grounding terminal side of a reliable ground.
6.The power supply of the instrument is 220V（50/60Hz）AC power, and you should choose 10A or more power line.
7. Do not let any foreign body into the case, in order to avoid short circuit.
8.Please bedding some buffering content such as sponge around the instrument when transport, to avoid vibration to damage the instrument or reduce the accuracy of the instrument

9. Do not arbitrarily delete the preservation of the history test records in the host, to avoid test data loss.

Our Company reserves the right to amend this statement; we will not inform you then. if you have any other technical problems.

Notes:

- When doing the measurings,primary side and secondary side don't connect with the load.
- When measuring the load,the testing load should not exceed the maximum measurement range.

Contents

Chapter I Instrument Characteristics and Parameters

UHV-300 CT PT Analyzer is new product created after widely adopt customers' advices and deep theoretical study. It is based on the automatic FA Series Transformer Tester General which is produced by our company that is widely acclaimed and applied. The adoption of high-performance DSP and ARM, advanced manufacturing technology ensure a stable and reliable product performance, full-featured, high degree of automation, high efficiency, in the domestic leading level, they are the professional testing equipments for transformer check in power industry.

1.1 Characteristics

★ Full-featured, not only satisfy the test requirements of various CTs (include TP class), such as the excitation characteristics (i.e., volt-ampere characteristics), ratio, polarity, secondary winding resistance, secondary burden, ratio error and phase displacement, but can also be used for the tests of various PTs, including excitation characteristics of the electromagnetic unit, ratio, polarity, secondary winding resistance, ratio error and phase displacement.

★ Automatically give CT, VT parameters, including knee point voltage / current, 10% error curve, the accuracy limit factor (ALF), instrument security factor (FS), the second time constant (Ts), remanence coefficient (Kr), saturated and unsaturated inductance etc.

★Test meet IEC60044 GB1208 (-1) GB16847 (IEC60044-6) became etc all kinds of transformer standards, and in accordance with the transformer types and levels of automatic choose which standard test

★ Based on advanced principle of low-frequency test method that can meet the CT test on knee voltage up to 30KV.

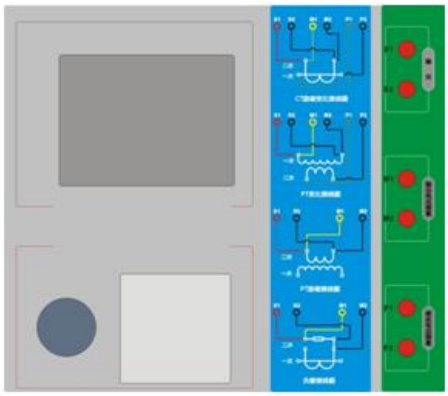
★Friendly interface beautiful, all Chinese graphic interface

★ The instrument can store 2000 groups of test data that won't be lost when power off. After test ended, the data can be coped to PC by USB disk for analysis and being transformed into WORD report.

★ Test is simple and convenient, one-click can complete tests of CT secondary resistance, excitation, ratio and olarity.

★ Easy to carry, because the weight is less than 9Kg.

1.2 Panel



The instrument panel structure is as shown in right figure.

·• Red S1, black S2 terminal: test power output

·• Yellow M1, black M2 terminal: measure output voltage

• Green P1, black P2 terminal: measure inductive voltage

1.3 Technical Parameter

Usage		CT & VT
Output		0~180Vrms，12Arms，18A（peak value）
CT Ratio	Range	1~40000
	accuracy	±0.2%
PT Ratio	Range	1~40000
	accuracy	±0.2%
Phase	Range	±5min
	accuracy	0.5min
DC resistance	Range	0~300Ω
	accuracy	2%±2mΩ
Burden	Range	0~300VA
	accuracy	2%±0.2VA
Power supply		AC220V±10%，50Hz
Environmental Conditions		Operating temperature :-10°C ~50°C,Humidity :≤90%
Weight and Dimensions		Dimensions:340 mm×300 mm×150mm,Weight<9kg

Chapter II User Interface and Method of Operation

2.1 Current transformer

In Para interface,use the Rotating mouse to switch cursor in transformer type frame,then choose the current transformer (CT).

2.1.1 Test connection

Used for selecting one or more experiment item, including four options such as resistance, excitation, ratio, burden etc. According to transformer type, four options can be combinated as shown in below table.

Table 2.1 CT experiment project description

experiment item				Description	Connection diagram
resistance	excitation	ratio	burden		
√				Measure CT's secondary winding resistance	Fig 2.1,can disconnection if measuring primary winding.
√	√			Measure CT's secondary winding resistance and excitation characteristic	Fig 2.1,can disconnection if measuring primary winding.
√		√		Measure CT's secondary winding resistance, check it's ratio and polarity	Fig 2.1
√	√	√		Measure CT's secondary winding resistance and excitation characteristic, check it's ratio and polarity	Fig 2.1
			√	Measure CT's secondary burden	Fig 2.2

Note：the '√' means valid ,and the blank means invalid

Step:

Step 1. According to the CT testing project description of the table 2.1 to wiring(For all the CT structures,please refer to the description of appendix D for the actual connection mode)

Step 2. The other windings of the same CT should be opened,CT's primary side to grounding, equipment should be also to ground

Step 3. Power on and prepare parameters Settings.

Step 4. Then switch cursor to the "start" button to start

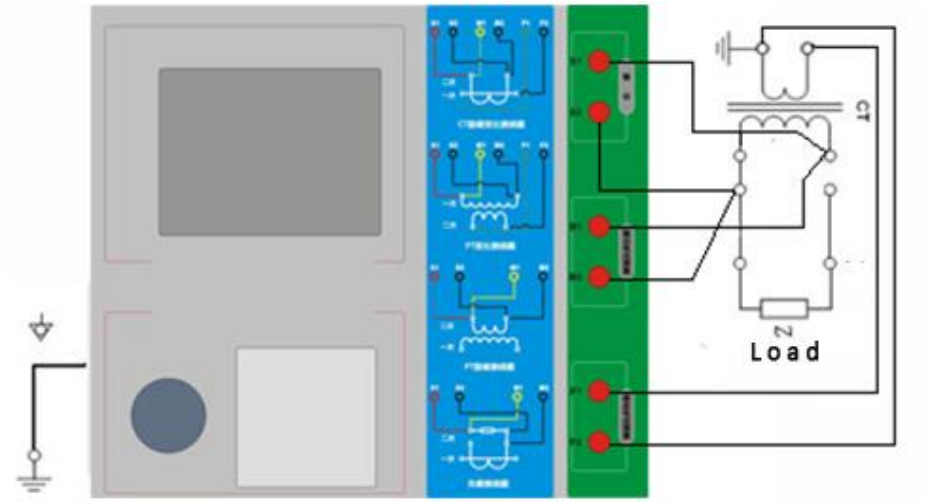


Fig 2.1 DC resistance, excitation,ratio experiment connection

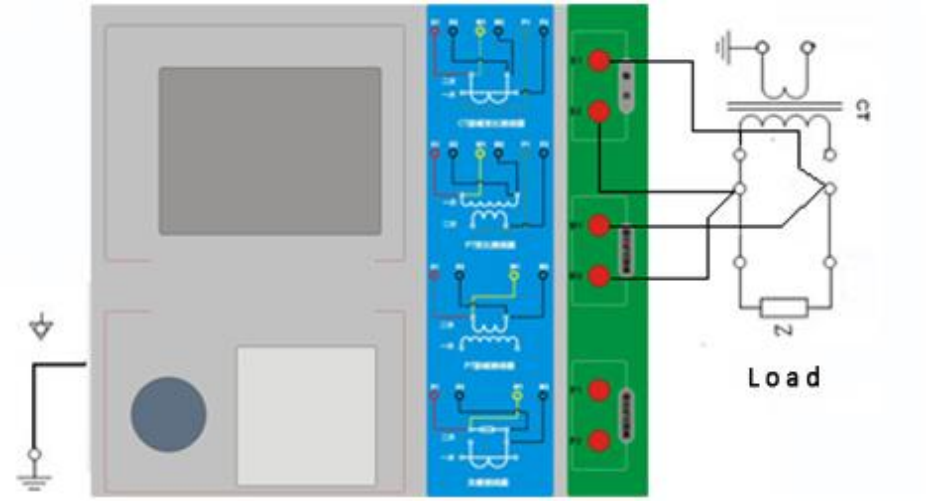


Fig 2.2 Secondary load experiment connection

2.1.2 Expansion parameters

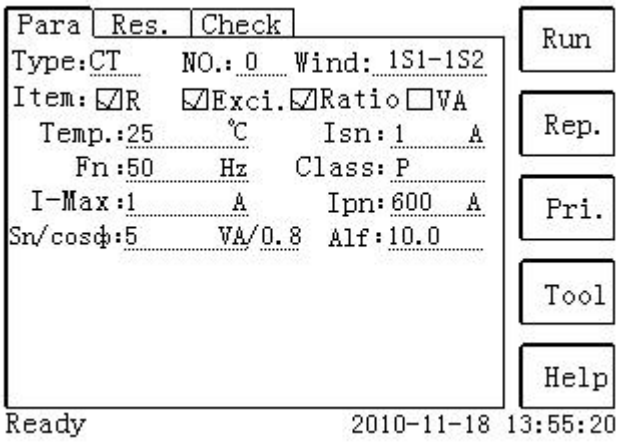


Fig 2.3 Basic parameter Settings interface

parameter Settings:

Switch cursor to where the parameter you want to set by turning the Rotating mouse

1. Serial number and resistance number: Input letters and numbers, the filename default saved is “CT_ numbers _ winding number.ctp”

2. Rated secondary current I_{sn}: The current transformer’s secondary rated current is 1A or 5A generally.

3.Class:For CT,there’re 8 options for Measured winding class,they are P,TPY,metering,PR,PX,TPS,TPX and TPZ etc.

4. Current temperature:When measure the temperature of winding,generally input the current room temperature for reference.

5. Rated frequency:50Hz or 60Hz

6. Maximum measured current: Can be generally set to rated secondary current value.For TPY class ,can be generally set to 2 times rated secondary current value.For P class ,assumed 5P40, rated secondary current is 5A,so the maximum should be set to 10%*15*5A=7.5A

If user want to measure the bellowing items,user need to set the basic parameters accurately(Suggest user setting himself)

1.Turn ratio error,ratio error and phase error

2. Accurately calculate the limit e.m.f and their corresponding compound error

3. Measured accurately limit coefficient, Instrument security coefficient and

symmetrical short-circuit current multiples

4. The measured transient dimensioning coefficient, peak transient error and second time constant

For different CT, different parameters should be set.Details as table 2.2

Table 2.2 CT parameter description

parameters	description	P	TPY	measure	PR	PX	TPS	TPX	TPZ
rated primary current	Used to calculate the ratio of actual current accurately	√	√	√	√	√	√	√	√
rated burden	Rated load of plate, power factor for 0.8 or 1	√	√	√	√	√	√	√	√
power factor		√	√	√	√	√	√	√	√
Rated accurate limit coefficient Kalf	The provisions of the plate,default 10,used to calculate the limit e.m.f. and their corresponding composite error	√							
Rated symmetric short-circuit current coefficient Kssc	The provisions of the plate,default 10,used to calculate the peak and their corresponding limits e.m.f transient error		√				√	√	√
Primary time constant	default :100ms		√					√	√
Second time constant	default :3000ms		√						√
Duty cycle	C-t1-O or C-t1-O-tfr-C-t2-O，default:C-t1-O cycle		√					√	
t1	Current time limit for the first time,default:100ms		√					√	
tal1	Time required to reach the specified accuracy during the first magnetization cycle,default:40ms								
tfr	Time required to reach the specified accuracy during the second magnetization cycle,default:500ms,Choose C-t1-O-tfr-C-t2-O,Cycle will be shown		√					√	
t2	Current time limit for the second time,default:100ms.Choose C-t1-O-tfr-C-t2-O,Cycle will be shown		√		√			√	

tal2	Second the flow by maintaining accurate limits of time,default:40ms choose C-t1-O-tfr-C-t2-O,cycle will be shown		√					√	
Rated instrument security coefficient FS	Nameplate regulation,default:10 Used for calculation of the limit of composite error and their corresponding electromotive force			√					
Rated calculating coefficients						√			
Rated inflection point potential(Ek)						√			
Ie corresponding with Ek						√			
dimensioning factor							√		
Rated Ual	The rated equivalent quadratic limit voltage						√		
Ial corresponding with Ual							√		

Note: "√" expressed the need for settings that do not need to set up a blank.

2.1.3 Test results

The test result interface as shown in fig 2.4

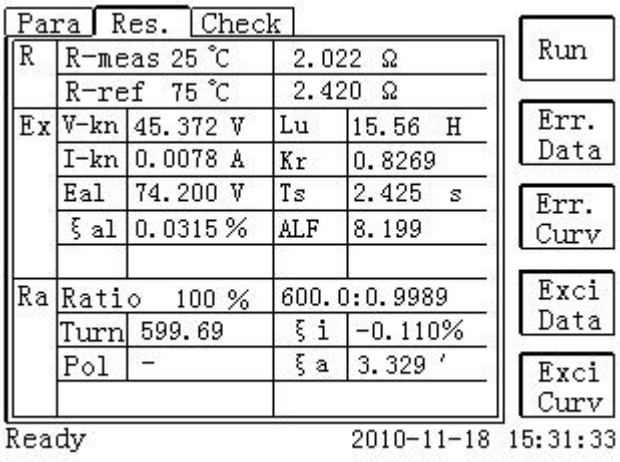


Fig 2.4 The test result interface

For different classes of CT and measured items,the test result will be different too,details as table 2.3:

Table 2.3 CT test results descriptio

result		description	P	TPY	M	PR	PX	TPS	TPX	TPZ
Load	Actual load	unit：VA，CT secondary measure actual load	√	√	√	√	√	√	√	√
	Power factor	Power factor of actual load	√	√	√	√	√	√	√	√
	impedance	unit：Ω，CT secondary measure secondary impedance	√	√	√	√	√	√	√	√
Resistance	resistance（25℃）	unit：Ω，CT secondary measure secondary resistance	√	√	√	√	√	√	√	√
	resistance（75℃）	unit：Ω，Convert to resistance under 75℃	√	√	√	√	√	√	√	√
excitation	knee voltage and knee current	unit:V and A，According to standard definition，when knee voltage increase 10%,knee current increase 50%.	√	√	√	√	√	√	√	√
	Unsaturated inductance Lu	unit:H,The average inductance of linear section for excitation curve	√	√	√	√	√	√	√	√
	remanence coefficient Kr	ratio of magnetism and magnetic	√	√	√	√	√	√	√	√

	Second time constant Ts	unit：s,the time constant of CT's second connect rated burden	√	√	√	√	√	√	√	√
	limiting e.m.f Eal	unit:V,calculation limit e.m.f. according to the CT nameplate and resistance under 75℃	√	√	√	√			√	√
	composite error ε_{al}	limiting e.m.f or the composite error of rated knee potential	√		√	√	√			
	Peak transient error ε	Peak transient error of limiting e.m.f		√					√	√
	ALF	actual ALF	√			√				
	Instrument security coefficient	actual instrument security coefficient			√					
	Symmetrical short-circuit current multiples Kssc	actual symmetrical short-circuit current multiples		√				√	√	√
	transient dimensioning factor	actual transient dimensioning factor		√					√	√
	calcuated coefficient Kx	actual calcuated coefficient					√			
	Rated knee potential Ek						√			
	Ie corresponding with Ek	The actual excitation current corresponding with rated knee potential					√			
	Rated voltage Ual	The rated equivalent second limit voltage						√		
	Ial corresponding with Ual	The actual excitation current corresponding with the rated equivalent second limit voltage						√		
Ratio	Ratio	Actual current ratio under rated burden	√	√	√	√	√	√	√	√
	Turns ratio	The ratio of actual secondary winding and primary winding	√	√	√	√	√	√	√	√

	Ratio difference	The current errors under rated load	√	√	√	√	√	√	√	√
	Phase difference	The D-value of phase under rated load	√	√	√	√	√	√	√	√
	Polarity	There're two polarity relationship for primary CT and secondary CT: Positive and Negative	√	√	√	√	√	√	√	√
	Turn ratio error	The relative error between measured trun ratio and rated turn ratio					√	√		

Note: "√" expressed the need for settings that do not need to set up a blank

(1)、Error data

Selecting the error data will show 5% and 10% error cases, the relationship of rated primary current multiple and the maximum burden is shown as Fig 2.5. These data is calculated according to the actual excitation. The calculation Method is given in appendix B.

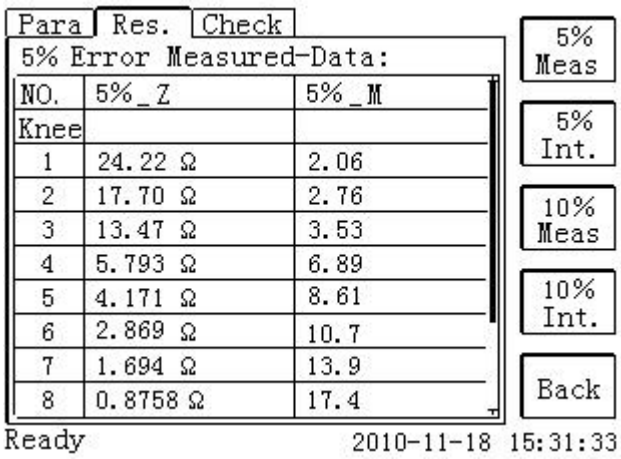


Fig 2.5 5% error data interface

(2)、error curve

Selecting the error curve, the relationship curve of rated primary current multiple and maximum burden will be shown as fig 2.6 according to 10% (or 5%) error. The xaxis is rated primary current multiple; axisy is allowable maximum burden.

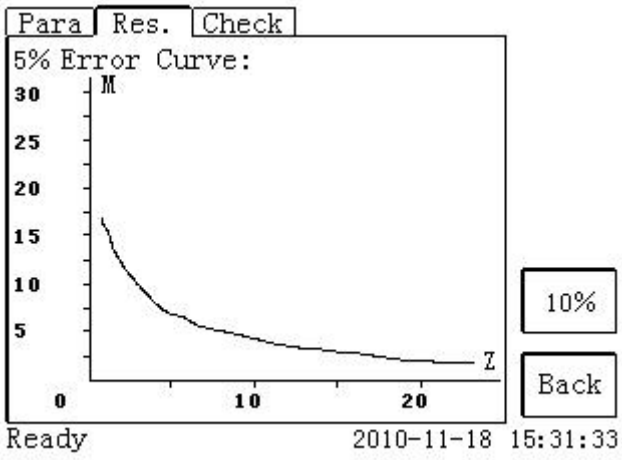


Fig 2.6 5% error curve interface

(3)、Excitation data

Selecting the excitation data, excitation data interface will be shown fig 2.7. In the figure, knee voltage and current is automatically calculated and shown, the user can print the date.

(1).Actual data:The actual measure data.

(2).Integer data:The data corresponding with some default integer point

(3). Apointed data:The data that use input himself.

(4). Designed step data:The test data corresponding with the designed step data inputing by user himself.

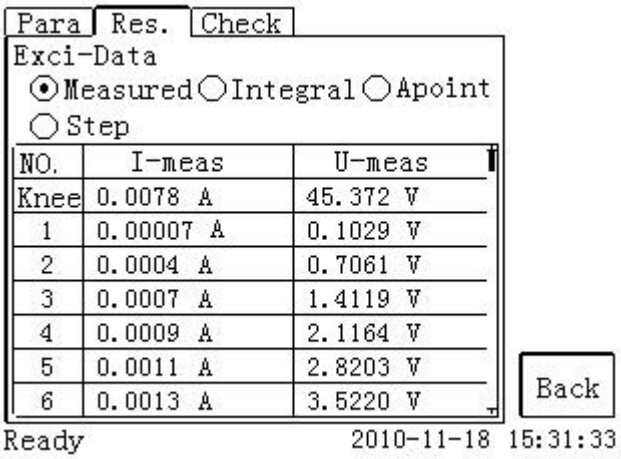


Fig 2.7 Excitation data

(4)、Excitation curve

Selecting Excitation curve, the excitation curve of the interface will be shown in Fig

2.8, knee voltage and current is given.

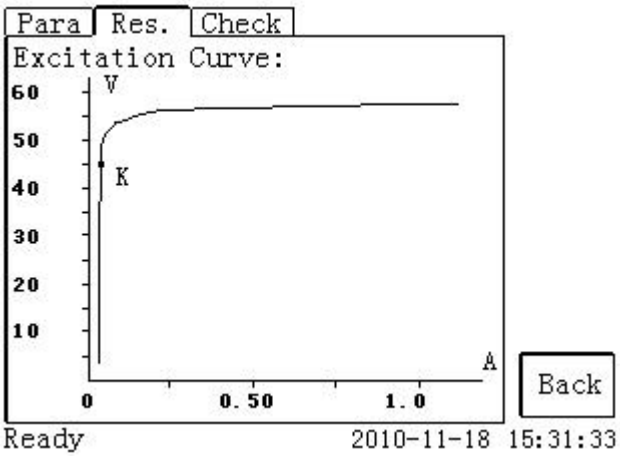


Fig 2.8 Excitation curve interface

(5)、Ratio page

Used for displaying the test results of ratio. Polarity, ratio error, and phase displacement as shown in fig 2.9.

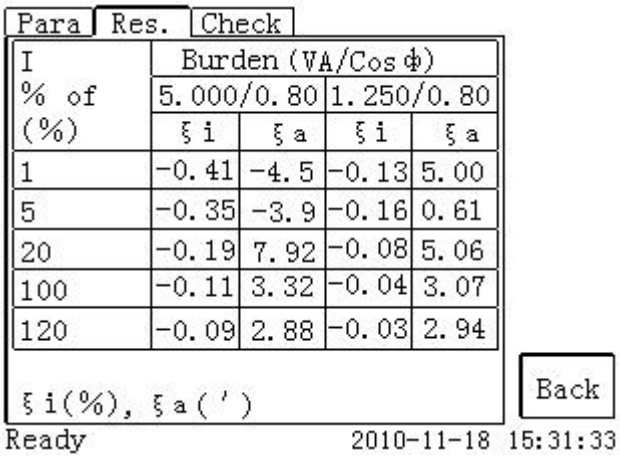


Fig 2.9 Ratio page

2.2 Votage transformer

2.2.1 Test connection

Used for selecting one or more experiment item, including three options such as resistance, excitation, ratio etc. According to transformer type,three options can be combinated as shown in table 2.4.

Table 2.4. PT experiment project description

experiment item			Description	Connection diagram
resistance	excitation	ratio		
√			Measure CT's secondary winding resistance	Fig 2.10,must disconnection if measuring primary winding.
√	√		Measure CT's secondary winding resistance and excitation characteristic	Fig 2.10,must disconnection if measuring primary winding.
		√	Check it's ratio and polarity	Fig 2.11

In Para interface,use the Rotating mouse to switch cursor in transformer type frame,then choose PT.

Experimental wiring procedure is as follows:

Step 1. According to PT testing program description of list 2.4,refer to figure 2.10 or figure 2.11 for wiring

Step 2. The other windings of the same CT should be opened

Step 3. Power on and prepare parameters Settings.

Step 4.Then switch cursor to the "start" button to start

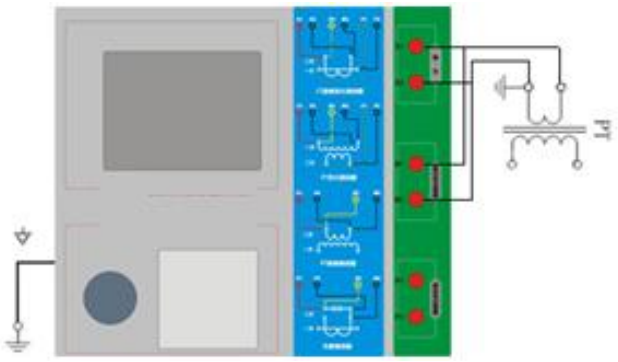


Fig 2.10 PT's DC resistance and excitation

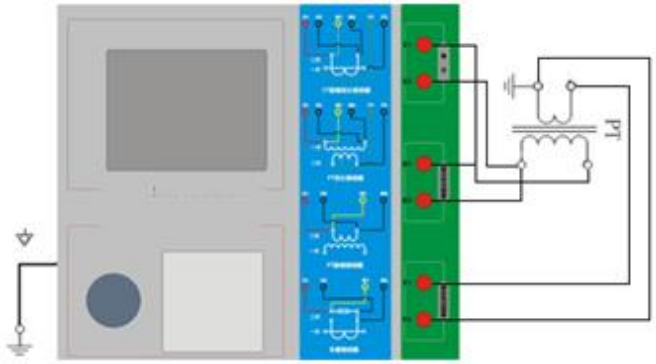


Fig 2.11 PT's ratio

2.2.2 Expansion parameters

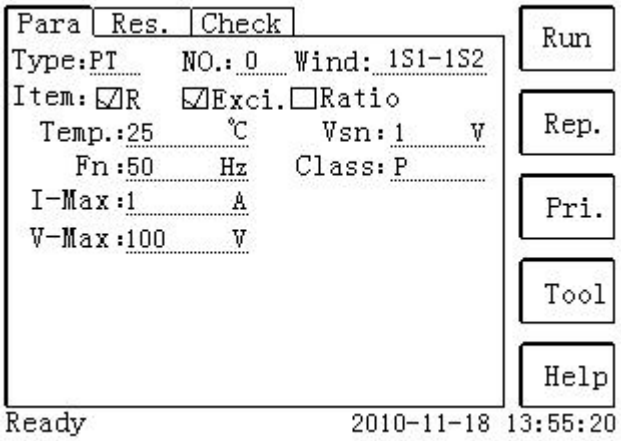


Fig 2.12 PT parameter establish interface

parameter Settings:

Switch cursor to where the parameter you want to set by turning the Rotating mouse

1. Serial number and resistance number: Input letters and numbers directly

2. Rated secondary voltage V_{sn} : Secondary rated voltage of Voltage transformer

3.Class:For CT,there're 2 options for Measured winding class, It is P .

4. Current temperature:When measure the temperature of winding,generally input the current room temperature for reference.

5. Rated frequency:50Hz or 60Hz

6. Maximum test voltage: The equivalent voltage under the maximum frequency of output while testing

7. Maximum test current: The maximum AC current of output while testing

2.2.3 Test results

Test results interface as shown in Fig 2.13

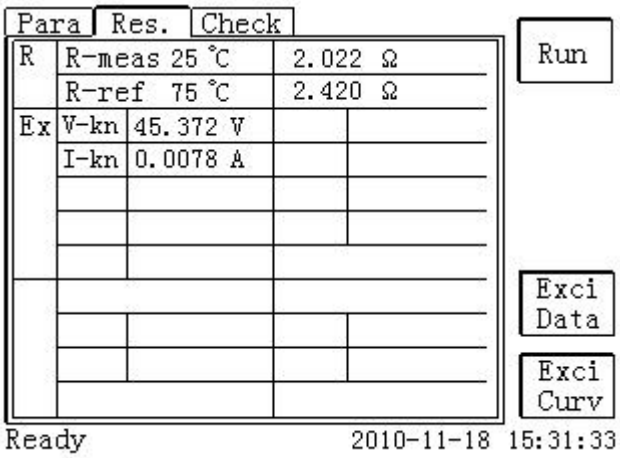


Fig 2.13 PT's test results interface

According to different voltage transformer type and experiment item, the results will be also different. The detailed as shown in Table 2.5.

result		description	P	M
Resistance	resistance（25℃） R	unit：Ω，resistance value under current temperature	√	√
	resistance（75℃） Rref	unit：Ω,Resistance value under reference temperature(the temperature is variable)	√	√
excitation	knee voltage and knee current	unit:V and A，According to standard definition，when knee voltage increase 10%,knee current increase 50%.	√	√
Ratio	Ratio	Actual current ratio under rated burden	√	√
	Turns ratio	The ratio of actual secondary winding and primary winding	√	√
	Polarity	There're two polarity relationship for primary and secondary , Positive and Negative	√	√

Table 2.5 PT test results description

2.3 Self-test page

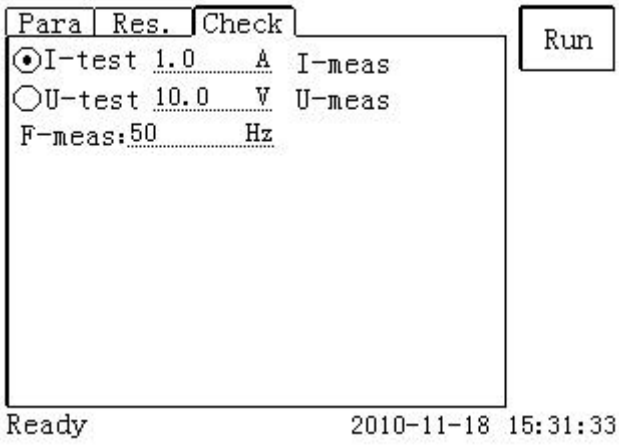


Fig 2.14 Self-test interface

2.3.1 Parameter Setting

The required self-test parameters are shown in the table 2.7:

Table 2.7 Self-test parameters

Parameter	description
Test current	The need for device output current, valid value range: 1mA ~ 5A
Test voltage	The need for device output voltage, valid value range: 0.1 ~ 100V
est. frequency	Installation of the output voltage or current frequency, scope: 0 ~ 50Hz

After testing Current test set or test voltage, set the test frequency, the frequency of the device will output the corresponding voltage or current, to detect and display the actual voltage or current. In the choice of voltage, if the burden is too small, resulting in greater than the actual current RMS 5A, show that information overburden. In the selection of current, if the burden too much, leading to the actual test voltage RMS is greater than 100V, it will display information overburden.

2.3.2 Connection

2.3.2 Connection

When Choosing voltage tests, the terminals S1 and M1 will be shorted. S2 and M2 also will be shorted. Use multimeter to get the voltage value between S1 and S2,if the value is the same with actual voltage of instrument,it is OK.

When Choosing Current test, the shorted output S1, S2 terminals. Do not take the wrong attention. Series connecting a multimerter between S1 and S2, if the current value of multimerter is the same with actual current of instrument,it is OK

2.4 Button Function

2.4.1 Button function for parameter interface

(1). Open report

Switch cursor to Report in parameter page by turning the Rotating mouse, The interface of open report is shown in fig 2.15. By turning the Rotating mouse,you can switch cursor to the pane before the serial number,and click the mouse to mark '√' in the pane, to choose the report which you want to open. If mark "√"before NO,it means you've chosen all of the reports.After choosing the report,you can do what you want to do by clicking the function options at the right of the interface.The smallest number corresponding the latest saved report.

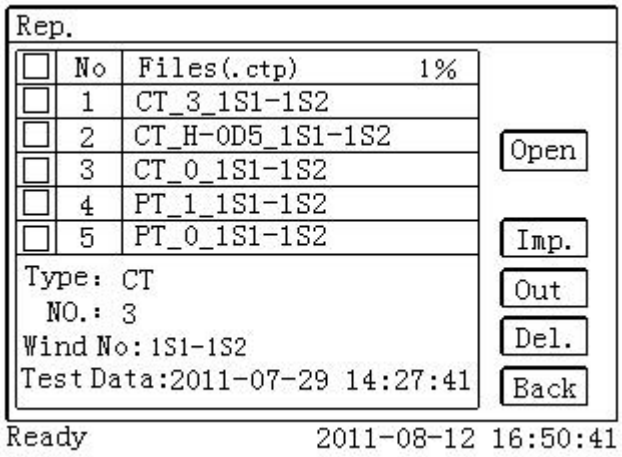


Fig 2.15 Open report interface

Only can open the marked report,and then read the experiment data by result interface.If marking two or more reports,you can only open the lastest report corresponding the smallest number.

(2). Save report

Save a report means save the current experiment report.

(3). Import report

Automatically read the document in the file named "REPORT" of USB fiash Disk,then it will display the interface shown as Fig 2.16.Choosing the report you want to import by

mark '√' in the pane before the number corresponding the report.,then click Imp. to enter tester.If mark '√' in the pane before NO,it means you've chosen all of the reports,but remember it can only import 200 reports at most one time.Pls refer to Fig 2.17.

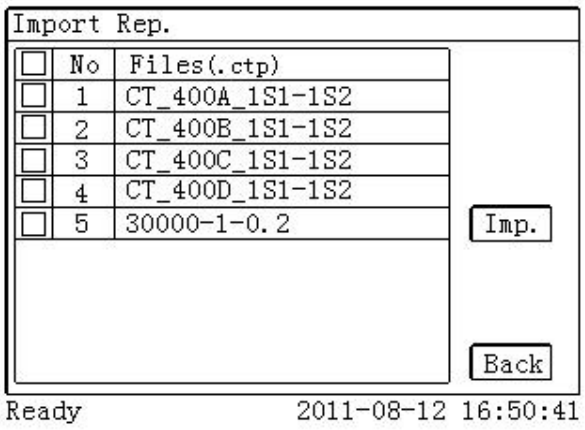


Fig 2.16 Import report interface

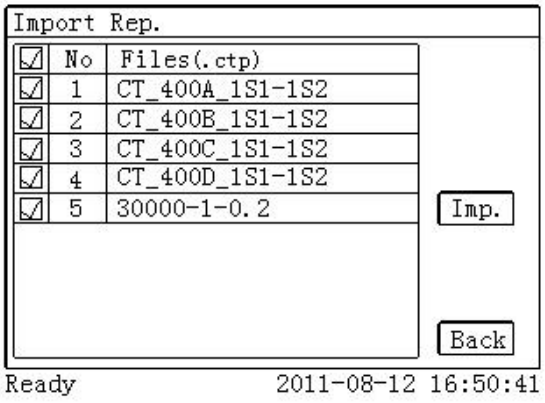


Fig 2.17 Import reports interface

(4). Export report

You can also export the report to the USB flash disk,so as to read on PC.

(5). Delete report

For the tester can only save 1500 reports,you can delete some of reports by marking '√'and click Del. to finishing tester's disk space.

(6). System Tools

The interface of system tools is shown in Fig 2.18. In this interface, some operations can be performed, such as time adjustment and system up gradation, etc. Debug is used to debug at factory.UpGUI is used to update software.

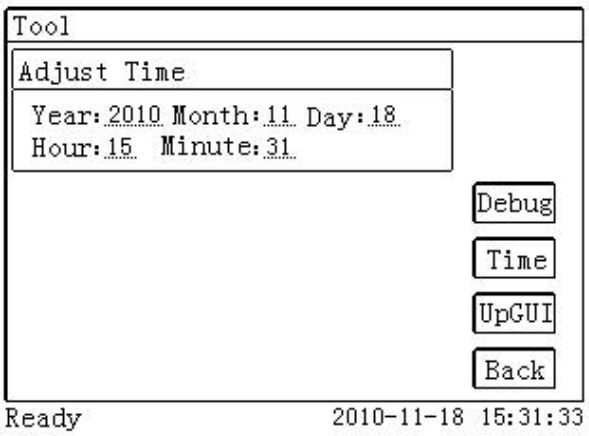


Fig 2.18 System tool interface

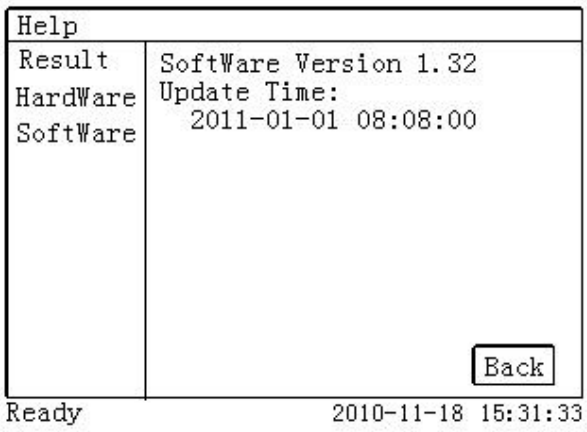


Fig 2.19 Help interface

(7). Help

The interface of help is shown in Fig 2.19.

（8）. Print

Users can print the current report, this report can be used as original records for field test.

Appendix

A. Principle of low-frequency test

IEC60044-6 standard (corresponding to the national standard GB16847-1977) claims, CT test can be done in conditions lower in frequency than the rated, and avoid secondary windings the risk of failing to allow the terminal voltage. The only requirement is that the core has the same size on the magnetic flux.

IEC60044-6 standard formula for calculating the magnetic flux given by:

$$\Psi(t) = \int_0^t [U_{CT}(t) - R_{CT} I_{CT}(t)]dt + \Psi_0 \qquad (A.1)$$

Where,

R_{CT} : Secondary winding resistance

U_{CT} : Secondary winding terminal voltage

I_{CT} : Secondary current

Ψ_0 : The initial flux Alternation

$\Psi(t)$: T the magnetic moment of the cross-linking

The definition of Core Voltage:

$$U_C(t) = U_{CT}(t) - R_{CT} I_{CT}(t) \qquad (A.2)$$

When the core voltage $U_C(t)$ for the sinusoidal signal are: (A.3)

Core voltage RMS to meet:

$$U_{Crms} = \frac{\omega \Psi_m}{\sqrt{2}} = \frac{2\pi f \Psi_m}{\sqrt{2}} = 4.44 f \Psi_m \qquad (A.4)$$

where:

f : For the sinusoidal signal frequency

As can be seen, the largest settlement in the same chain of magnetic flux Ψ_m, the core is proportional to voltage and frequency. Therefore, as long as the core has the same size on the magnetic flux, then the test CT can be lower than the rated frequency of the conduct, when the core voltage amplitude required to reduce the requirements, test

requirements of the secondary winding of the client voltage also be reduced accordingly. On the frequency of low-frequency test results can be rated after the conversion frequency of CT test results.

B. 10% error curve

Current transformer error was mainly due to the existence of exciting current I_0 , which allows the secondary current I_2 and secondary lateral conversion to a current value $I_1^{'}$ is not only not the same, but different phase, which resulted in the error of current transformer .

The ratio of differential current transformer is defined as:

$$\varepsilon = \frac{I_1^{'} - I_2}{I_1^{'}} \times 100 = \frac{I_0}{I_1^{'}} \times 100 \qquad \text{（B.1）}$$

Current Transformer relay request a current I_1 equal to the maximum short-circuit current, the ratio difference is less than or equal to 10%. Difference in the ratio equivalent to 10%, the secondary current I_2 , and conversion to a secondary lateral excitation current $I_1^{'}$ between the current I_0 and meet the following relationship:

$$I_1^{'} = 10 I_0 \qquad \text{（B.2）}$$

$$I_2 = 9 I_0 \qquad \text{（B.3）}$$

Definite M as a multiple of the maximum short-circuit current, K for the current transformer ratio, there are

$$M = \frac{I_{1M}}{I_{1N}} = \frac{K \times I_1^{'}}{K \times I_{2N}} = \frac{10 I_0}{I_{2N}} \qquad \text{（B.4）}$$

Where

I_{1M} The largest one-side short-circuit current

I_{1N} Rated current for one side

I_{2N} Rated current for the secondary side

When Ration error is 10 percent, the maximum allowable burden impedance Z_B is calculated as:

$$Z_B = \frac{E_0}{I_2} - Z_2 = \frac{E_0}{9 I_0} - Z_2 \qquad \text{（B.5）}$$

Where

Z_2 For the current transformer secondary winding impedance

E_0 Is Current transformer secondary winding for the induction electromotive force, and the relationship between E_0 and I_0 is the characteristic curves described by the excitation.

Based on the above formula, the final could be a multiple M of the maximum short-circuit current and burden impedance Z_B of the maximum allowable 10% error described curve (see Figure 2.12).

C. Actual Connection Method

TRANSFORMER TESTER for the CT test the basic connection steps (see Figure D.1) as follows:

(1) 4mm2 line the left side of TRANSFORMER TESTER is connected to the grounding terminal protected.

(2) To connect a CT primary side and secondary side terminals of a terminal to protected areas.

(3) To ensure that all the CT terminal of the other transmission lines disconnect from, all other windings open.

(4) 2.5mm2 red and black line CT secondary side connected to the TRANSFORMER TESTER "Output" S1 and S2 jack, the yellow line and 1.2mm2 line CT secondary side connected to the TRANSFORMER TESTER "Sec" jack of the S1 and S2, the attention of even the two black lines in the CT secondary side has received the same protection to terminal.

(5) Green Line and 1.2mm2 lines CT is connected to a side of CTY-200's "Prim" of P1 and P2 terminal, P2 and CT through the black line is connected to the protection of one side of the terminal connected.

(6) No problems in check wiring, to begin testing.

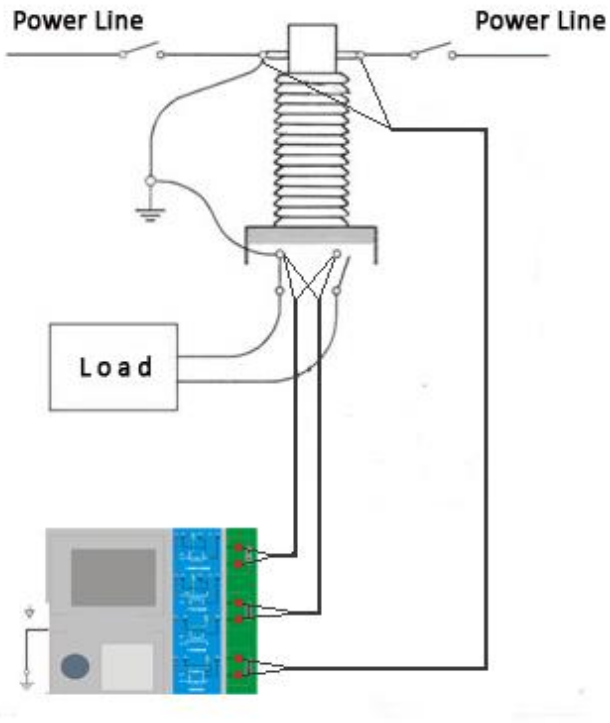


Figure D.1 Typical Connection

1. TRANSFORMER TESTER in the triangle connection transformer CT test conducted on the connection mode as shown in Figure D.2.

Figure D.2 TRANSFORMER TESTER in the triangle on the transformer connection when the connection mode test

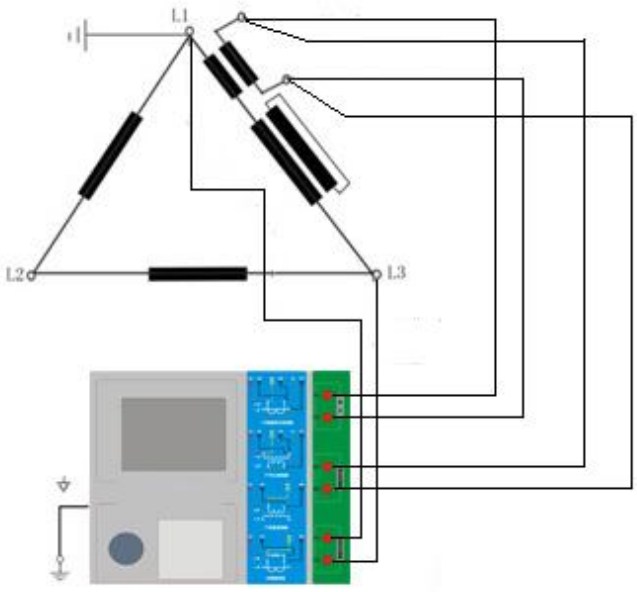


Figure D.2 TRANSFORMER TESTER in the triangle on the transformer connection when the connection mode test

2. TRANSFORMER TESTER for transformer testing casing CT Connection shown in Figure D.3.

Attention: H1 terminal must be disconnected first. Otherwise, if one took the short side, the TRANSFORMER TESTER can not obtain the correct result

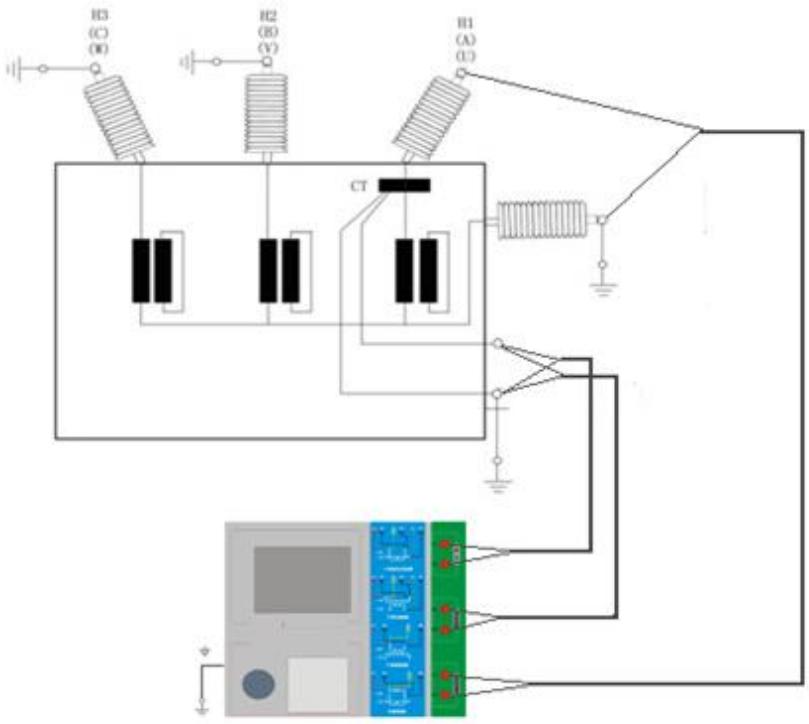


Figure D.3 TRANSFORMER TESTER on the transformer bushing testing at the time of CT Connection

4. TRANSFORMER TESTER in the GIS (SF6) switch on the wiring of the CT test mode as shown in Figure D.4. NOTE: Disconnect all connected with the bus switch, grounding switch closed.

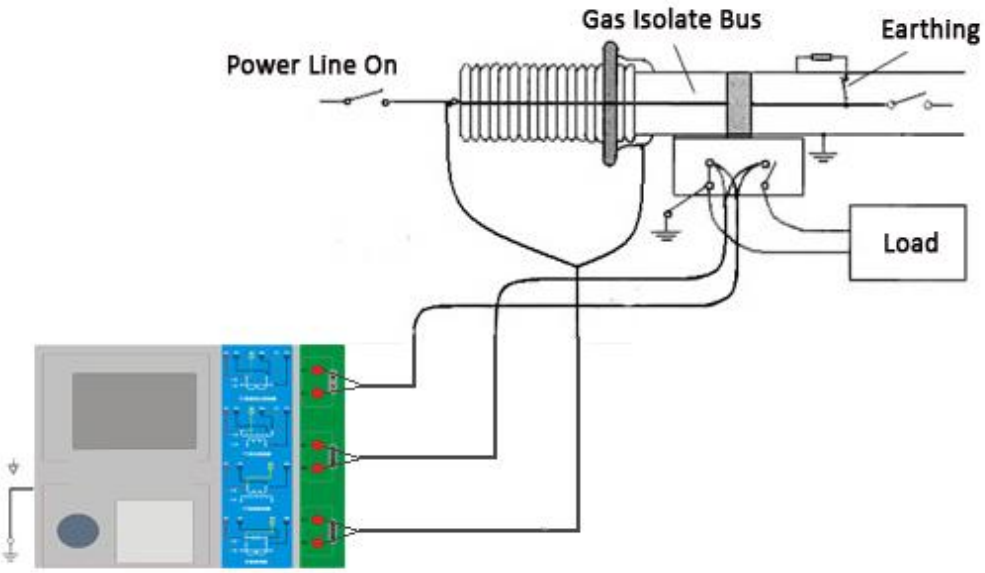
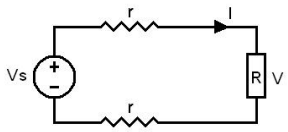
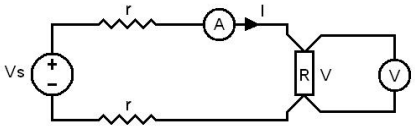


Figure D.4 TRANSFORMER TESTER on GIS (SF6) switch on the test at the time of CT Connection

D. Four-terminal method of measuring principle wiring

Impose a voltage output signal Vs to a source impedance R, will produce a current I, in figure E.1





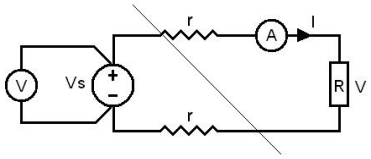


Figure E.1 figure E.2 figure E.3

For measurement of the impedance value, the impedance measurement of the voltage U is needed :

$$R = V / I$$

From the measured impedance voltage source to some wires, wires have resistance r, resulting in V = Vs, so if the accurate measurement of impedance R, can not simply replace the Vs with V.

Impedance R of the measuring circuit should be used Figure E.2 connection method, measuring the voltage meter voltage must be separate from the R at both ends with wire connection to the accurate measurement of R value of the voltage V. R is used at both ends by four wire cables, it is known as 4-side wiring method. Figure E.3 of the wiring is wrong.

Adopt TRANSFORMER TESTER measure the resistance, variable ratio, excitation, the law of transformers is required to use 4-side wiring, in figure E.4

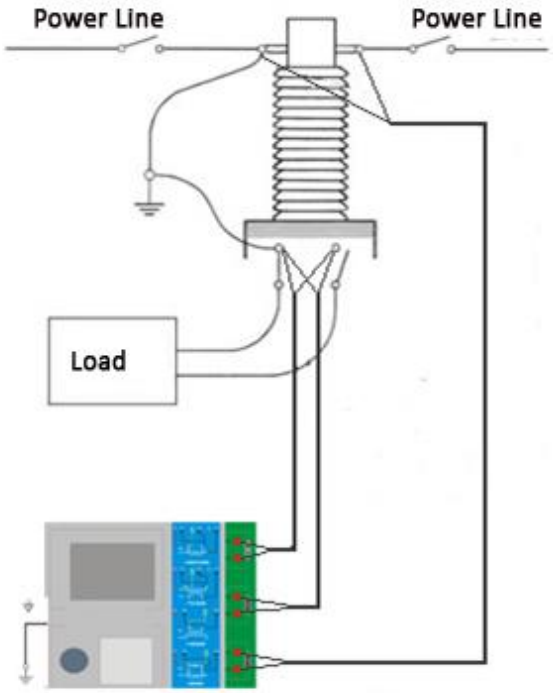


Figure E.4

Four-terminal method under test must pay attention to wiring terminal connection winding. Figure E.5 the connection is correct, Figure E.6, 7 the connections are wrong.

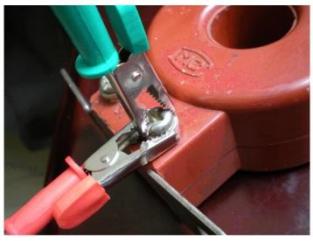
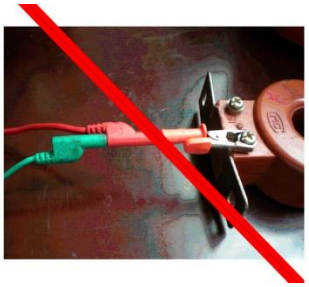


Figure E.5

Figure E.6



FigureE.7