Catalogue

I Introduction

Transformer capacity tester is specialized in bad power users evading basic electricity fee and secretly adding capacity problems and is a new-type high precision instrument specially used for the measurement of the transformer capacity and characteristic parameters. This product use wide-screen color LCD , English display, simple and quick menu operation, human-machine interface is very friendly. There is a built -in rechargeable battery inside the instrument and it can work without external power source. A fully charged battery can be continuously measured more than 100 sets of transformer. In addition, the instrument can provide three-phase precise 50Hz sine wave AC test power without the external three-phase test power, the voltage regulator, current regulator and other auxiliary equipment in measuring the capacity and transformer load loss, thus greatly improving the efficiency of your work.

This is a multi-functional measuring instrument, which is equivalent to two common meters: such as active transformer capacity tester plus transformer parameter tester. It can be used for test transformer capacity, type, no-load current, no-load loss, load loss, impedance voltage and so on.

This product has many advantages such as small dimension, light , high accuracy, good stability, simple operation and so on. It can replace of the commonly many meters, you can measure the transformer loss and capacity with simple wiring and convenient testing in only one this kind of instrument so that the work efficiency can be greatly improved.

Function

- We can measure a variety of distribution transformer, power transformer capacity instead of the additional extra power. It is more convenient and efficient.
- Combined with the external power source, voltage, current regulator equipment etc, it can measures various transformer parameter such as no-load current, no-load loss, impedance voltage, load loss and so on.
- Characteristic test of transformer, test range is wide,flexible configured.only through the simple connection to current transformer and voltage transformer, test scope can be enlarged to high-grade power transformer.
- Short-circuit the terminals of cable,humanization design,with lock,easy connected to fasten units of transformation.

- All results are automatically carried out relevant correction. You only need to input the related parameters (such as temperature, load adjustment coefficients etc), then the instrument can automatically calibrate such as waveform deformity correction, temperature correction, correction of non rated voltage, rated current

correction,so that the accurate is much higher

- The maximum voltage is up to 750V and the maximum current is up to 100A range with protection circuit in it,when you make the characteristic test of transformer.don't worry the precision and damage of the instrument due to in-proper shift.
- The voltage and current range can be very flexible and easy to expand by connecting the external CT or VT
- It has large screen, high brightness LCD display, English menu and operation tips, friendly man-machine interface and wide temperature tolerance, brightness adjustable type LCD screen, which can adapt to the different temperature.
- Thermal sensitive printer is set inside the instrument,it can easily print on site.

II Definition and terms of Transformer Testing

Transformer capacity and characteristic test is a professional test. There are many contents and items in transformer testing ,it is needed to use uniform terms to describe and define these characteristic and process under test

1. Tap

In the transformer with tapped winding, every tap in this winding stands for a fixed turns number of winding in this tap, which also means a fixed turns number ratio of winding between this tap winding with other constant winding

2. Main Tapping

Tap corresponds to the rated parameters of transformation.
Attention: The data of load/no-load loss and no-load current is the data of transformer under the principal tapping (except for appointed other taps)

3. On-load Tap switch

It is the device that is used to change the position of tap winding of transformer under the operating with excitation or on-load.

4. No excitation Tap switch

It is the device that is used to change the position of tap winding of transformer under operating no-load or without excitation.

5. No-load Loss (commonly known as: iron loss, iron core loss)

When rated voltage (tapped voltage) under rated frequency is applied to terminal of one winding and the circuit of other windings are open, in this case ,the active power consumed is No-load loss.

6. No-load Current

When rated voltage (tapped voltage) under rated frequency is applied to terminal of one winding and open circuit of other windings, it is the value of the root average of current.

Note 1: For three phase transformer, it is the average of current of three phase terminals.

Note 2: Generally use the percentage of the rated current to display. For the multi-winding transformer, it is based on the winding with the max rated capacity.

7. Load Loss (Short Circuit Loss/Copper Loss)

in one pair of winding, when rated current flows through the line terminal and make short circuit of the other winding under the rated frequency and referenced temperature,in this case, the active power consumed is called load loss, at the same time ,other winding if there is , please make the circuit open .

Note1: For the double winding transformer, there is just one pair of winding and one value of load loss.
For multi-windings transformer, there are multi pairs and values of loading loss,the total load loss should be corresponding to the load loss of appointed winding combination.

Note2: When the rated capacities are different for two windings in a winding combination(or wingding portfolio), the load loss should be based on the rated current value of the windings with the minimum rated capacity, and should appointed out the reference capacity.

8. Total loss

The sum of no-load loss and load loss

9. Short circuit Impedance

Generally, short circuit impedance is the impedance value of a pair of winding Under the rated frequency and reference temperature, the equivalent series impedance in one winding of a pair windings between the terminals of this winding is $Z=R+jX(\Omega)$. To figure out the value, the terminal of the other winding need to short circuit. If there are other windings, they need to open circuit.

Note1: For the transformer with tapped windings, short circuit impedance need to be the appointed tap, if there is no special instruction, it means the principal tap.

For three-phase transformer, it means the impedance value of a single phase if the circuit is in equivalent star connection.

Note 2: It can be represented using non-directional relative value that means fraction value Z of the reference impedance value Zref in same winding of one pair windings, is as follows

$$z = \frac{Z}{Z_{ref}} \times 100$$

$$Z_{ref} = \frac{U^2}{S_r}$$

the Formula is suitable for the three phase and single phase transformer.

U——Voltage of Z and Z_{ref} in windings (rated voltage or tapped voltage)

Sr——Basic value of rated capacity.

The relative value is equal to the ratio between the applied voltage and rated voltage (tapped voltage) when operator wants to get the corresponding rated current (tapped current) in short circuit test. This voltage is also called the short-circuit voltage of this pair windings. It is generally expressed as a percentage.

III Technical Parameters

1. The output range of built-in battery
   Voltage: 0～10V
   Current: 0～10A
2. The input range of characteristic test power source
   Voltage: 0～750V
   Current: 0～100A
3. Accurate of test
   Voltage, current: ±0.2%
   Power: ±0.5% (CosΦ>0.1), ±1.0% (0.02<CosΦ<0.1)
4. Working temperature
   -20℃～+60℃
5. The requirement of charger
   Electric supply AC160V～265V
   Adapter output 12.6V 1000mA
6. Insulation
   (1) Insulation resistance between capacity , voltage, current to enclosure ≥ 100MΩ

(2) bear the 2kV power frequency (effective value) between the input power and machine enclosure, testing time is 1 minute.

7. Volume

32cm×25cm×12cm

8. Weight

2.5KGS

IV Function of Interface

1. Operation panel diagram.

The operation panel is like figure 1 : including printer , LCD, keyboard, the wiring hole of capacity test , binding post of characteristic test and communication interface.

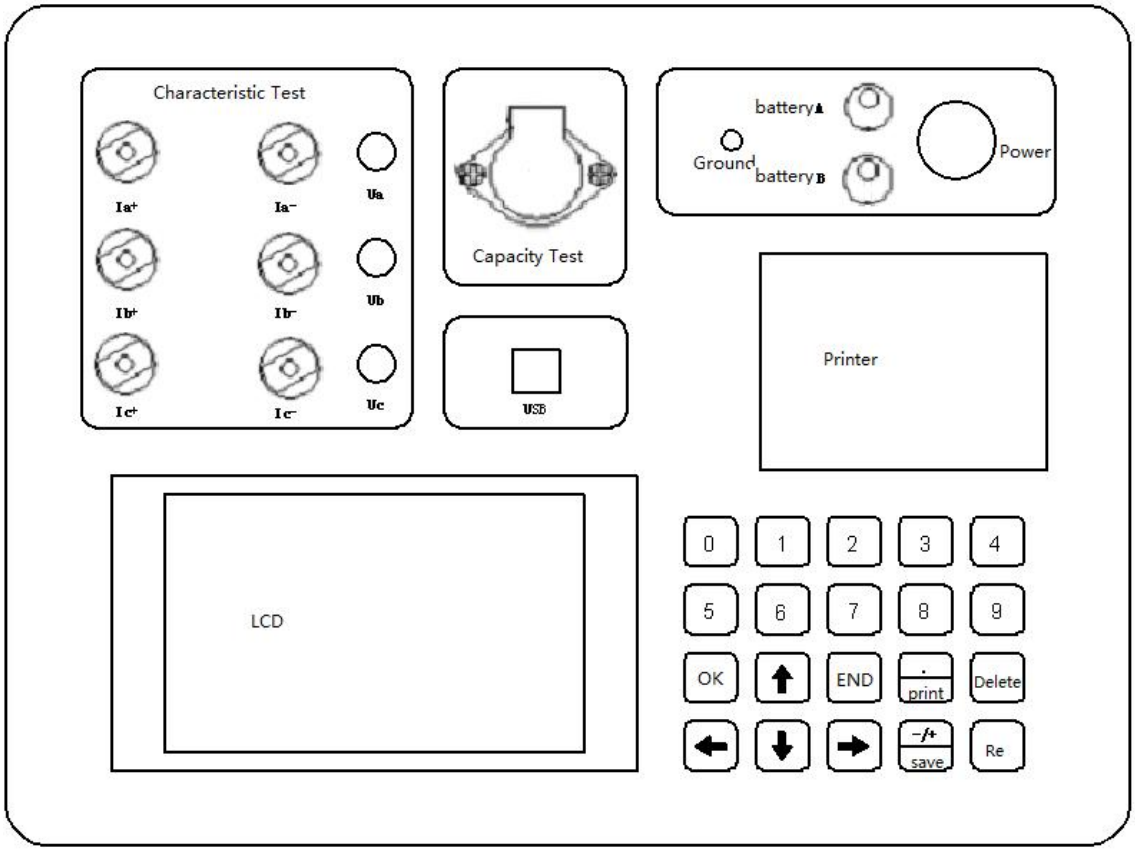


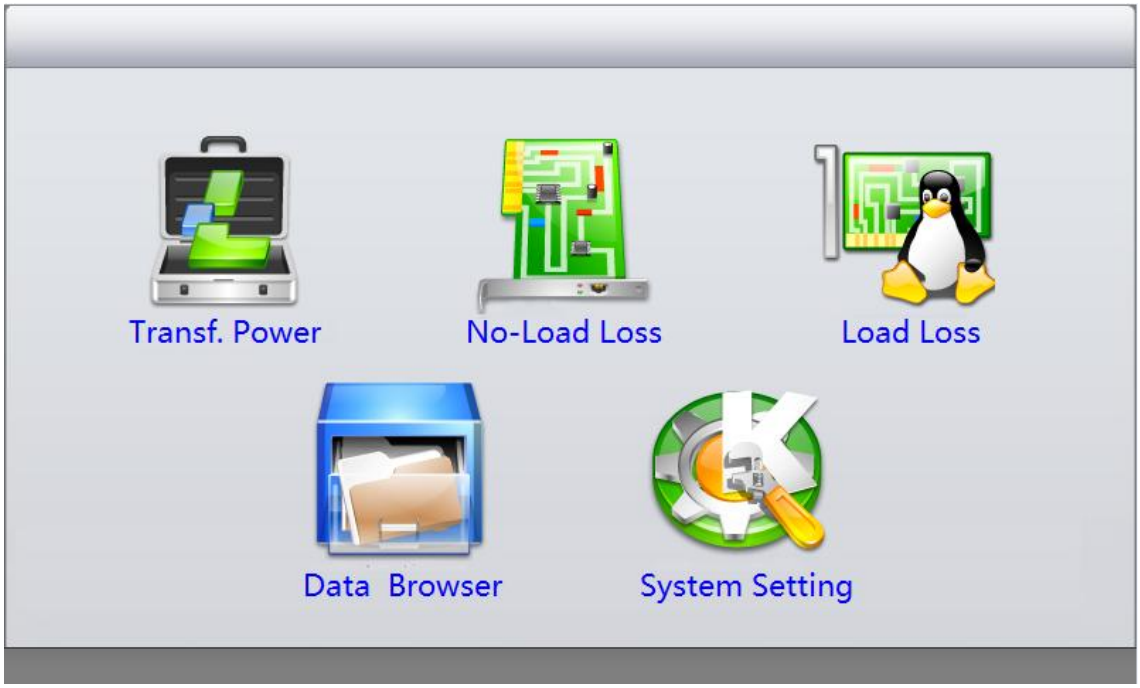
Figure 1 Display and operating Panel diagram

2. Main Menu

After open the power switch, automatic enter into the main menu interface (see

Figure 2) Main Menu includes: "Transf. power ", "No - load loss", "Load loss", "Data Browser", "System Settings" five Items. You can use the "↑", "↓", key to select the needed function and click "OK" to enter.

At the same time, the instrument according to the system's internal clock chip, can accurately display the present time.



3. Transf. Power

3.1 Transformer Power Parameter Setup

In the main menu, select the "Transf.Power" item and click "OK", then it enter into parameter setting interface before the test, there are total 10 items(see Figure 3).

Primary U: Before making the determination of transformer Power, you need to input the working voltage of the transformer correctly, which is the transformer primary rated voltage. Enter directly through keyboard, Unit: kV.

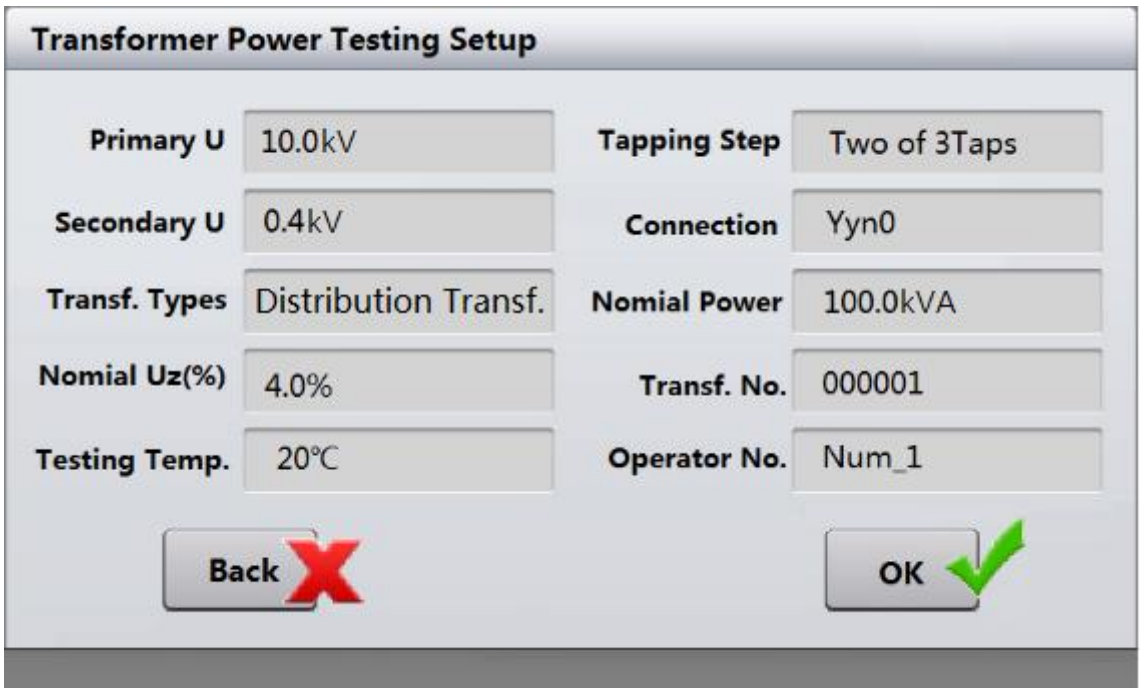


Figure 3 (Transformer Power Testing Setup)

Secondary U: Before making the determination of transformer Power, you need to input the working voltage of the transformer correctly, which is the transformer secondary rated voltage. Enter directly through keyboard, Unit: kV.

The input data of the primary voltage and secondary voltage are not higher than 500kV, and if the input data is not included in those following voltage levels, the instrument will change "Transformer Type" into "non-standard transformers." When testing "non-standard transformer," you need input the measured transformer "impedance voltage" to measuring this non-standard transformer capacity accurately.

The following 12 transformer voltage levels is included by our instrument: 10kV / 0.4kV, 10kV / 3kV-6.3kV, 35kV / 0.4kV, 35kV / 3.5kV-11kV, 6kV / 0.4kV, 6kV / 3kV-3.15kV, 6.3kV / 0.4kV , 6.3kV / 3kV-3.15kV, 10.5kV / 0.4kV, 10.5kV / 3kV-6.3kV, 11kV / 0.4kV, 11kV / 3kV-6.3kV etc.(In front of "/" is the transformer primary rated

voltage, after “ / “ is the secondary transformer rated voltage).

Transf. Types: due to the power transformer main production need standards as a basis.Between states and national standard is not unified, so, the instrument of international edition, standard distribution transformer transformer type can be Any country, Any distribution transformer), as long as the input parameters, can accurately measure the rated capacity of the measured power transformer.

Nomial Uz(%): If you want to the accurate result of capacity When testing the "NonStand. Transf." , you should input impedance voltage accurately. You can enter data directly using the number keys. When testing the other transformers except "NonStand. Transf." type. The instrument will display impedance voltage according to the rated voltage and transformer type. Under normal circumstances, operators can carry out test without modify data except when the test impedance voltage has large difference with impedance voltage marked on the transformer nameplate, it is recommended to change its impedance voltage data, to make it closer to the marked "Nomial Uz(%)" data., better for transformer capacity testing.

Testing Temp.: Capacity test required temperature correction, so we need to input current temperature. Generally inputting data is equal to the data of under test transformer’s back side temperature ℃ plus 10 ℃. You can enter the data directly via the numeric keys.

Tapping Step: the tap-switch position of the transformer under test. Distribution transformers usually have three tap shifts; two of them are standard taps. When capacity measuring, please keep the tap-changer position of the tested transformer

is the same position as the data set in this item. if under test transformer’ s tap positions are not three, please set this item to 2nd tap position, at the same time change the transformer’ s tap-switch position to standard tap position before the capacity test. The data can be changed by clicking "←", "→" key.

Connection: According to the internal wiring of the transformer, it can be divided into a number of different connection groups. Please accurately input transformer’ s connection group before measuring. These groups Including "Yyn0", "Dyn11", "Yzn11", "Yd11", "YNd11" etc items. By clicking "←", "→" key to change the data.

Nominal Power: As a reference of the measurement result, here input the nominal capacity of the transformer measured, in order to compare with the measured capacity. It can be input directly via the numeric keys in this item.

Transf. No.: total 6 digits number in order to management and check , inputting through keyboard.

Operator No.: Input operator No. in order to check and save testing file, inputting through keyboard.

The above mentioned items are set finished, and after the right wiring (see later for details), click "OK" button ,you can perform capacity test.

3.2 Transformer Power Test Results

Test results screen shown in Figure 4. It includes the following items:

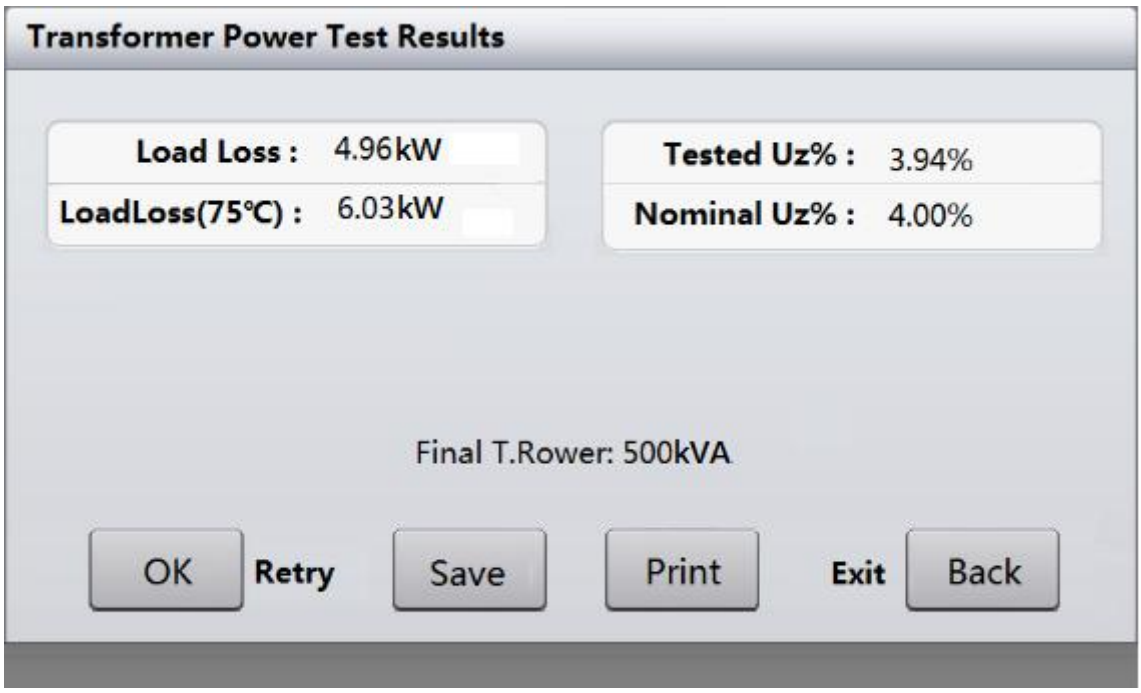


Figure 4(Transformer Power Test Results)

Load Loss: under the current test conditions, the actual measured load loss;

LoadLoss(75℃): the measured load loss correction to the rated load loss data obtained by rated experimental conditions;

Tested Uz(%): impedance voltage of measured transformer in the current test conditions;

Nominal Uz(%): impedance voltage data used during the capacity test;

Final T.Power: when measured transformer capacity can be archived, the item displays archived capacity data. When measured transformer capacity cannot be archived, the item is not displayed;

Tested Power: the item displays the actual measurement capacity of the transformer. When measured capacity can be archived, the item is not displayed;

After testing, Click “Save”, testing result can be saved in instrument in order to

check in future; Click “Print”, testing result can be printed; click “End”, Screen returns to the part of setting up parameter; Click "Ok" button, which can be tested capacity again.

4. No-Load Loss.

Please choose “No-Load Loss “on the menu, and click “ok”, and then enter the no-load test setup interface. No-load test is the test of AC power of external power source (including boosting voltage, regulating voltage, boosting current)

4.1 Setting

Before testing, necessary parameters set up is needed. Operator can set up the parameter by moving “↑” and “↓” on the screen.

Related parameter as follows: primary voltage, secondary voltage, nominal capacity, transformer model, transformer connection group, testing model, voltage ratio, current ratio, and transformer No., operator and so on.” Except transformer model, connection group of transformer, testing model can set up by moving “↑” and “↓”, the others can input data.

Primary U: before identify the transf power, the working voltage must be input correctly, this item is the primary rated voltage of transformer which can input directly by using keyboard. Unit is kV.

Secondary U: before identify the transf power, the working voltage must be input correctly, this item is the secondary rated voltage which can input directing by using keyboard. Unit is kV.

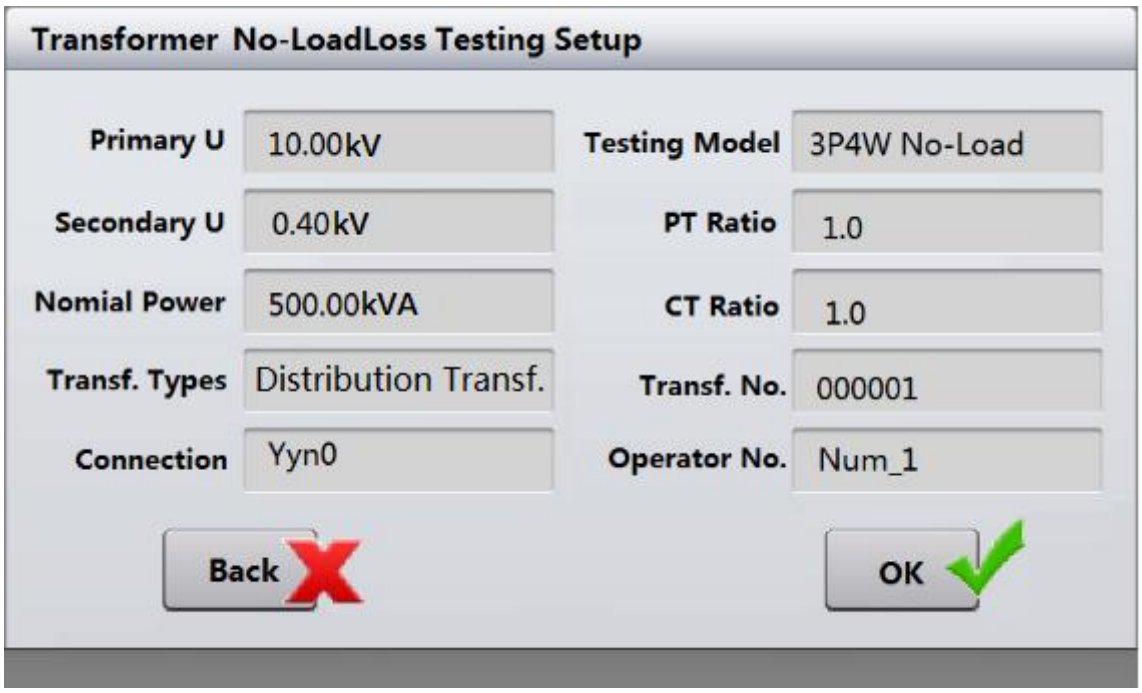


Figure 5 (Setting screen)

Nominal Power: Rated capacity of tested transformer

Transf. Types ： Setting up the transformer model.

Main setting model: "SJ (73) Transf.", "S7.S9 (11) Transf. ", "S7.S9 (11) Power", "S13 Transf.", "Coating CRDT", "unCoating CRDT", "NonStand. Transf."etc.

Connection : Tested transformer connection model , it can be chosen by using "←"、"→" according to nameplate

Testing Model: including "3P4W No-Load test" " 1Phase No-Load test", "3P3W No-load test" three types

PT Ratio: When testing voltage is over the testing range of instrument, user can extend the voltage range through connecting PT. This data is the ratio of the connected PT(for example: 10kV/0.1kV PT =100,you input 100). When it is not necessary to connect PT, the ratio is 1.

CT Ratio: same with Voltage ratio. When testing current is over than the testing

range of instrument, user can extend the current range through connecting CT. This data is the ratio of the connected CT(for example: 10kV/0.1kV CT =100,then input 100). When it is not necessary to connect CT, the ratio is 1.

Transf. No. : 6 digit number in order to check and management,.

Operator No.: input operator No. in order to check and archive.

After inputting the right data, Click "Save", data can be saved in instrument in order to check in future; click "End", cancel this operation, click "End" again, Screen will return to the main interface..

4.2 3P4W No-LoadLossTesting

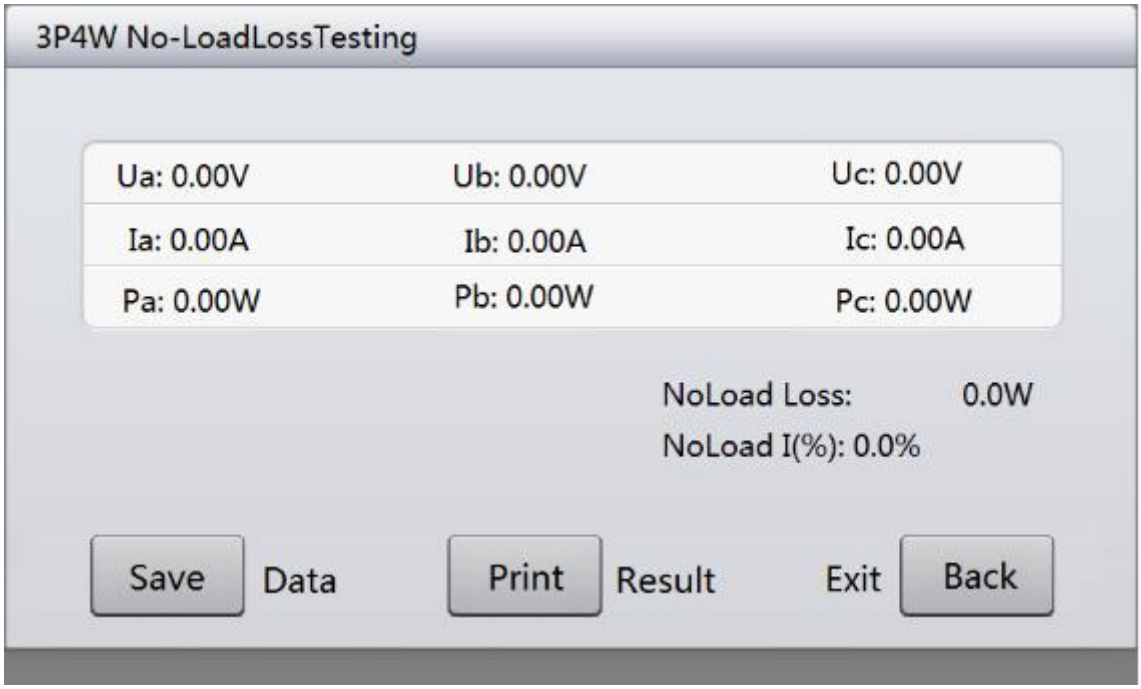


Figure6 (3P4W No-LoadLossTesting)

Changing the testing method to "3P4W No-Load" through moving the "↑"、"↓"、"←"、"→" on no-load test screen, and then beginning test(please see the following instruction)

Testing result shows Voltage(Ua、Ub、Uc); Current(Ia、Ib、Ic) ; Active loss (Pa、Pb、 Pc). Other result is Io ,Po . Means no-load current and no-load power after calibrating ,the same. Click "Print "to print , click "save " to save.

The instrument will automatically save the result when the input voltage is up to rated voltage under 3 phase no-load test. Upon saving , power can be cut off. Data also can be saved through clicking "enter" when the input power is not up to rated voltage.

4.3 3P3W No-Load

Changing the testing method to "3P3W No-Load" through moving the "↑" 、"↓" 、 "←" 、 "→" on no-load test screen, and then beginning test(please see the following instruction)

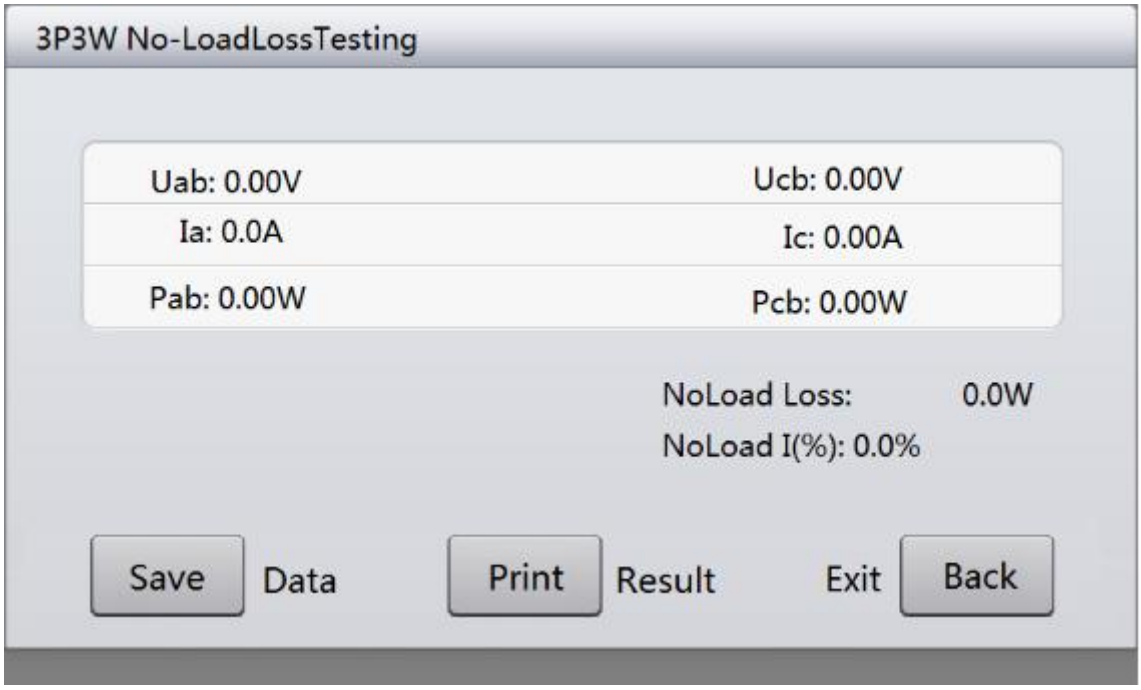


Fig7 3P3W No-Load

Testing result shows Voltage(Uab/Ucb); Current(Ia/Ic) ; Active loss (Pab、Pcb). Other result is Io ,Po after calibrating . Also Click “Print “to print , click “save “ to save.

The instrument will automatically save the result when the input voltage is up to rated voltage under test. Upon saving , power can cut off. Data also can be saved through clicking “enter” when the input power is not up to rated voltage.

4.4 1Phase No-Load Test

Changing the testing method to “1Phase No-Load Test” through moving the “↑” 、 “↓” 、 “←” 、 “→” on no-load test screen, and then beginning test(please see the following instruction)

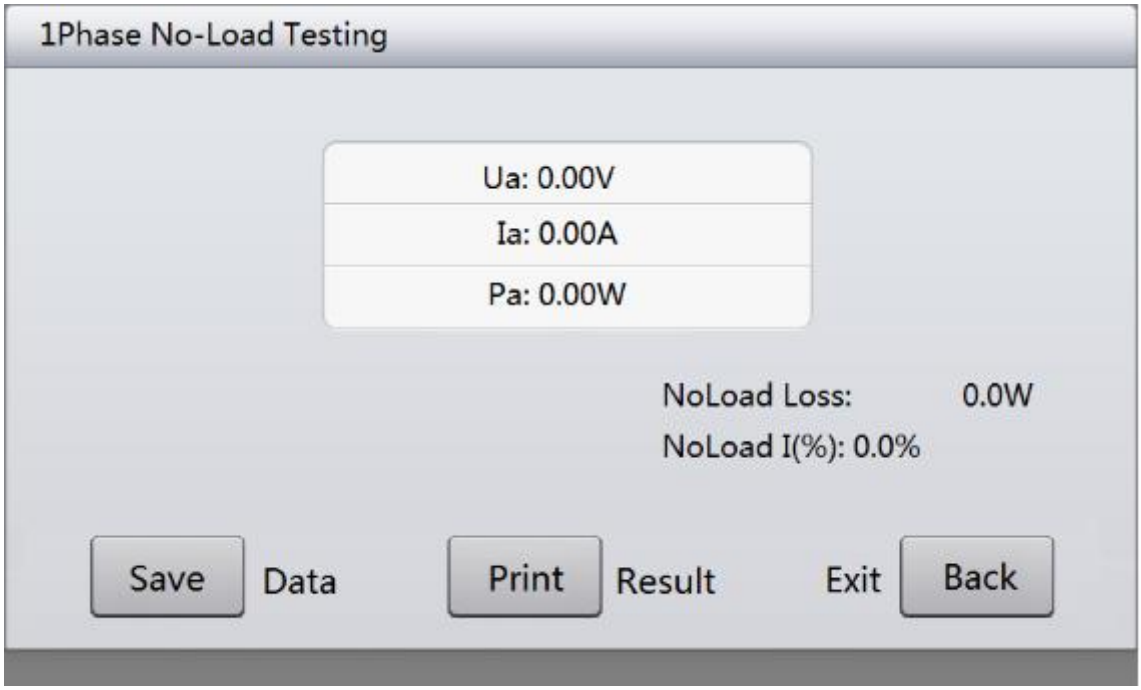


Fig8 1Phase No-Load Test

Testing result shows Voltage (Ua); Current (Ia) ; Active loss (Pa). Other result is Io,

Po after calibrating and the level No. of transformer according to the test. Click "Print "to print, click "save "to save.

The instrument will automatically save the result when the input voltage is up to rated voltage under single phase no-load test. Upon saving , power can cut off. Data also can be saved through clicking "enter" when the input power is not up to rated voltage.

5 Load Loss

"Load Loss" and "No-Load Loss" have similar screens and operations. Just emphasize the difference as follows:

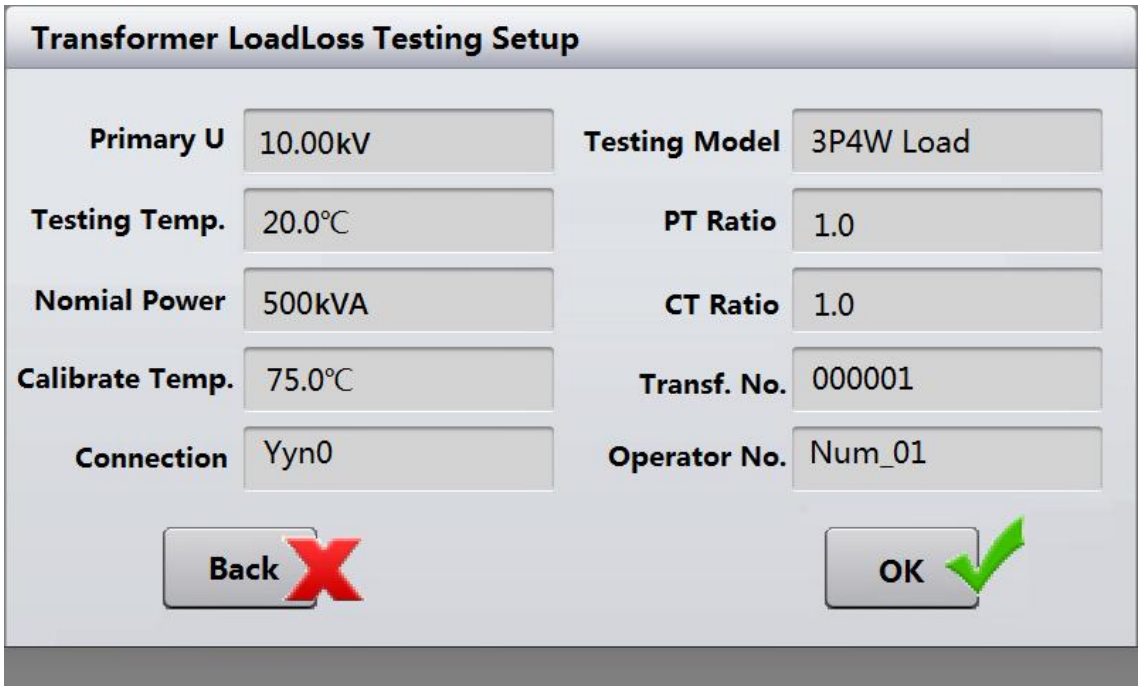


Figure 9 Parameter setting interface for the load test

5.1 Parameter setting

It needs to set some necessary parameters before the load test. On the interface of setting load test,moving cursor of the "↑" , "↓" , "←" , "→" keys, and enter "parameter Settings" interface.(Figure 9).

Primary voltage:correctly input the working voltage of the transformerbefore confirm the transformer capacity,this is transformer prime rated voltage, which can be inputted directly through the digital keyboard. Unit: kV.

Testing Temp.: It is used to make the load loss value corrected to the standard load test conditions(Such as 75 ℃),the correction formula of load loss is $P_{k75} = K \times P_k$,K is temperature coefficient of resistance .The algorithm is $K = \frac{(235+75)}{(235+t)}$,in this formula,t is the actual temperature when test. The temperature correction formula of impedance voltage is $Uk = \sqrt{U_{KT}{}^2 + (P_{KT}/10S_N)^2(K^2-1)}$, U_{KT} is the actual percentage of impedance voltage under current temperature, P_{KT} is the actual load loss of the current temperature, S_N is the actual tested transformer rated capacity. Please use infrared thermometer to measure the current temperature of the transformer under test, and input through the digital key.

Nominal capacity: the rated capacity of the tested transformer.

Calibrate Temp.: As mentioned in the "Testing Temp." item, load loss experiment results need to be calibrated to uniform temperature range, this is the uniform temperature range. General calibration of oil-immersed transformer temperature is

75 ℃, while the dry type transformer has a variety of different temperature correction.

Connection: The tested transformer connection group. Please choose in accordance with the nameplate by press , “←” , “→” button.

Testing Model :This project contains the content of four modes, they are "In3P4W Load", "3P4W Load", "1Phase Load", "3P3W Load” , the specific connection mode please refer to the state later.

PT Ratio: When the measured voltage value exceeds the range of the instrument itself, users can extend the testing range by the external voltage transformer, This parameter is outside enlarged voltage transformer ratio (for example: 10 kV / 0.1 kV voltage transformer, should enter 100).if do not use outside enlarge voltage transformer, please enter 1.

CT Ratio: same with Voltage ratio. When testing current is over than the testing range of instrument, user can extend the current through connecting CT. This data is the ratio between the rated current and the connected CT (for example: 10kV/0.1kV CT =100,input 100). When it is not necessary to connect CT, the ratio is 1.

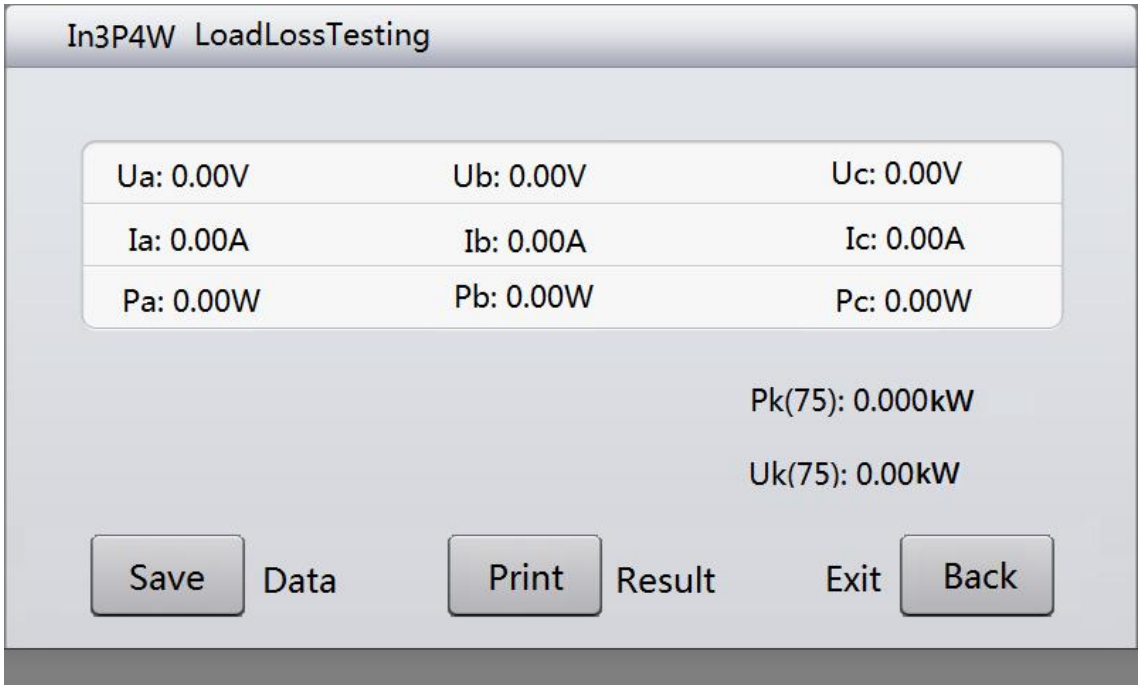
Transf. No. : 6 digits number in order to check and management.

Operator No.: input operator No. in order to check and save.

When you input the correct data, you can click the "ok" button to save the da ta. Click the "end" button, you can cancel the input. Again, click the "end" but ton to return to main interface.

5.2 In3P4W Load Loss Testing(Active Three-phase Load Testing)

"In3P4W Load" approach is to use an instrument built-in three-phase power supply as a test power. Results show Uk, that is a calibrated impedance voltag e, adjusted the load loss Pk (75℃).The correction here refers to the value of t he load voltage and load loss which measured by the load test are not under the rated current, correct to the rated current, and at the meaning time, the te mperature correct to the standard test conditions (such as 75 ℃).the calibratio n of load test are all this mean, so do not repeat any more. Please see figure 10.



Figue 10 In3P4W LoadLossTesting

5.3 3P4W Load Loss Testing

The function is basically the same as the In3P4W Load Loss, the only differenc e is the selection way of test power source, Active three-phase load test is to use an instrument built-in three-phase power supply as a test power, while the

three-phase load test is the external power supply as a test power. Detailed wiring method, please refer to the following detailed description.

Test and the content display is the same with the active three-phase load test, do not repeat description any more.

Note: The instrument will automatically latch the result if the short circuit current reaches rated current of the transformer when testing. The testing power supply can be cut off once the test result is latched. In the process of test, you can also latch test results temporarily by clicking the "ok" button.

5.4 The other load testing

Wiring method is the main difference between 3P3W Load Loss and 1Phase Load; Details please see the following specific wiring instructions.

The test results are basic the same. Refer to figure 11 and figure 12.

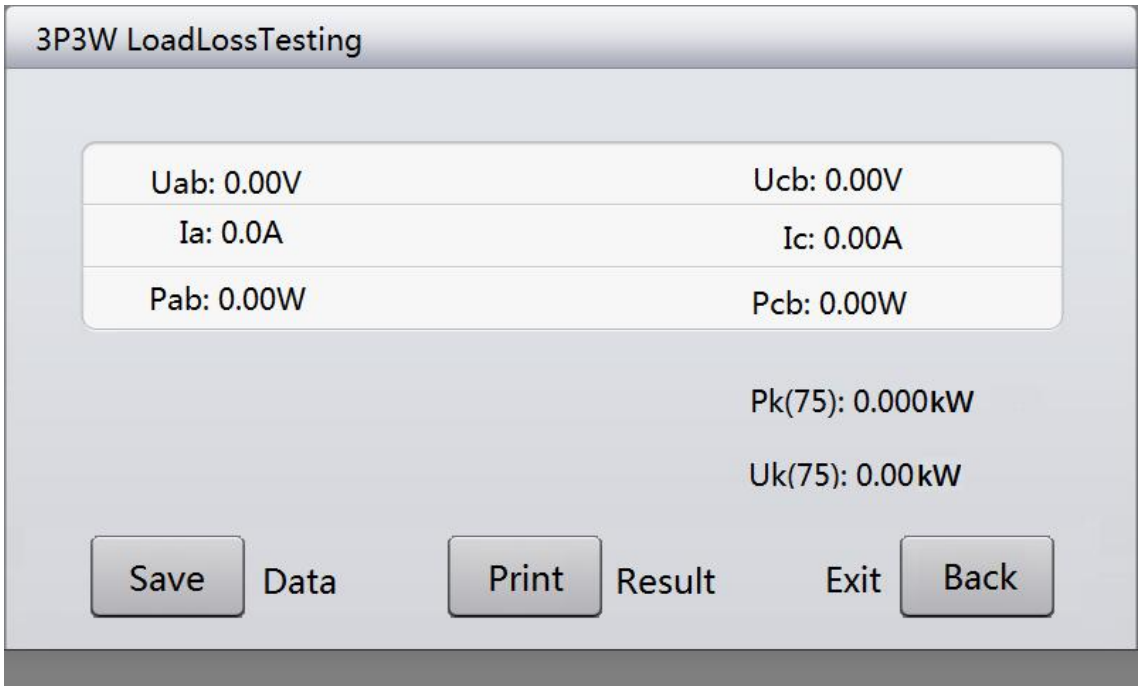


Figure 11 3P3W Load Loss

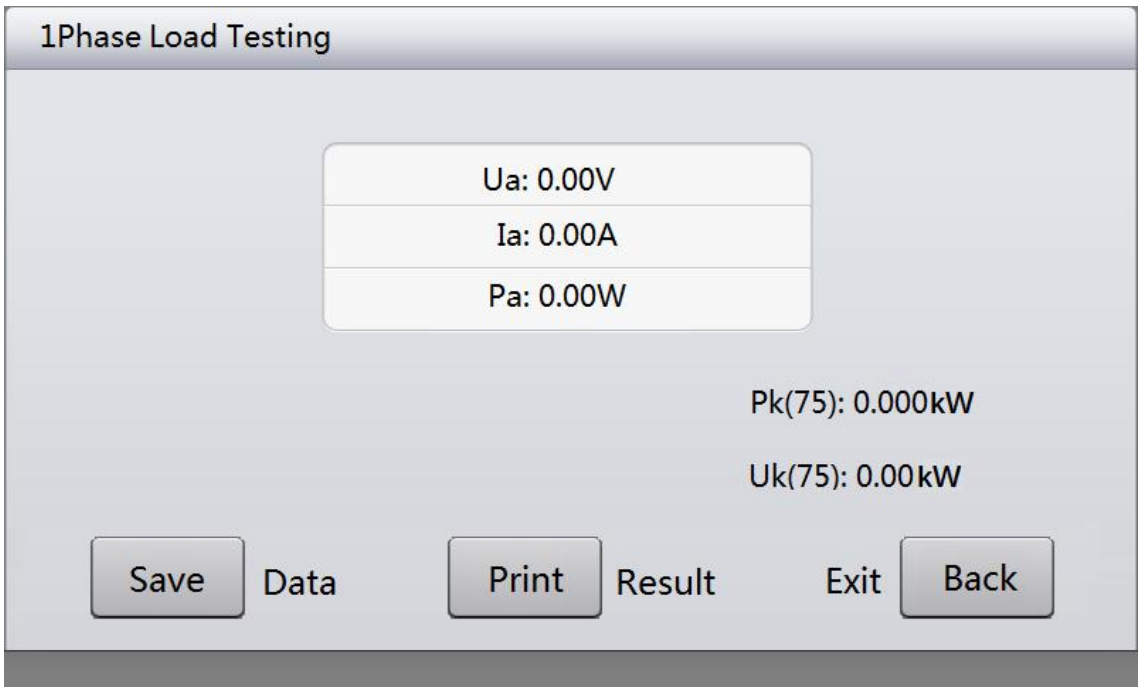


Figure 12 1Phase Load Testing

Note: The instrument will automatically latch the result if the short circuit current reaches rated current of the transformer when testing. The testing power supply can be cut off once the test result is latched. In the process of test, you can also latch test results temporarily by clicking the "ok" button.

6. Data Browser

Selected"Data Browser" in the main menu interface , and click "ok" button and enter the data query interface (seeFigure. 13;Figure14)

Data shown here is the saving data of test result.When the preservation of "no-load test" or "load test" data is made,The lower right corner of figure 13 will display “→” , then,By pressing the “←” 、 “→” button to view the capacity test, no-load test, load test of the test results.Using "up", "down"button to see other

transformers storage page.Click "print" button to print the current page data.Click "delete" button, you can delete the current record or all of the records. Click the "end", that means, back to the main menu.

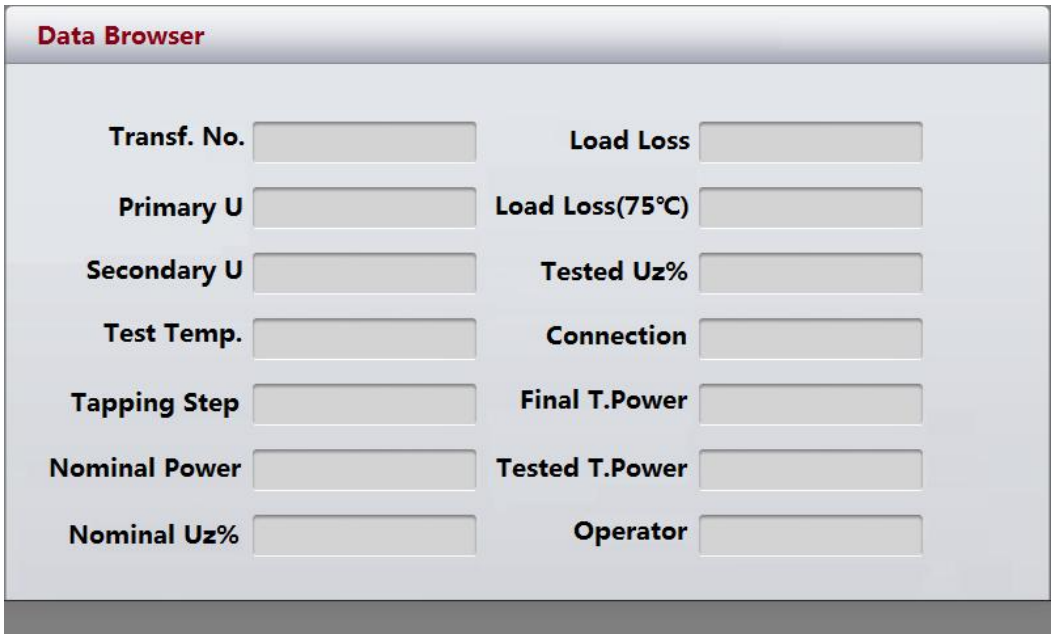


Figure 13 Store data browsing interface—1

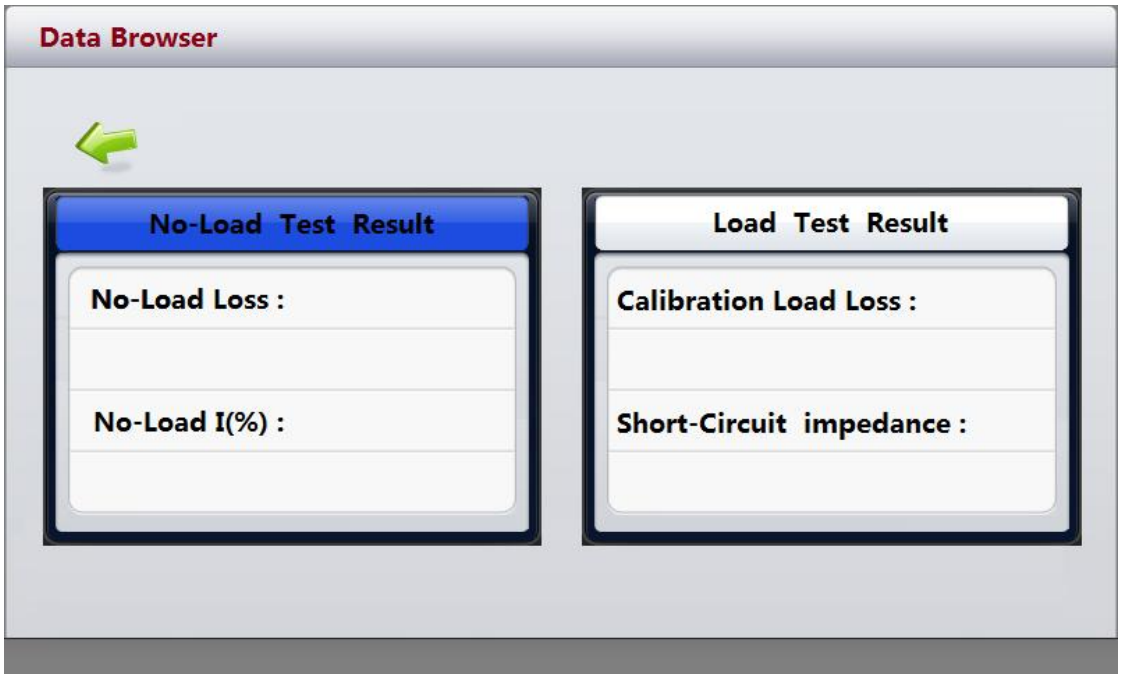


Figure 14 Store data browsing interface—2

V Wiring method

1. Concept Introduction

No load test: Please apply rated voltage under the rated frequency (usually the 50Hz sine wave) from one winding of transformer; other windings need to open circuit. The measurement result includes the no-load current and no-load loss.
If the test condition is limited, the power supply voltage is not up to the rated voltage, it can be tested under the condition of non-rated voltage. But the error of the measurement is relatively large, generally it is only used to check if the transformer is in good condition. Only when the test voltage is up to 70% of the rated voltage, it can be measured no-load current and no-load loss more accurately.

Load test: Please apply rated voltage under the rated frequency (usually the 50Hz sine wave), short circuit one winding of transformer (generally the low voltage current side), and then access the Ac rated voltage from tap of coil (generally high voltage side), boost the current of testing winding up to the rated current, and then testing the load loss and load voltage

2. Wiring Method of Transformer Capacity Test and Active Load Test

As shown in figure 15. The "binding post "is just to facilitate your understanding. The actual wiring is a seven-hole socket.

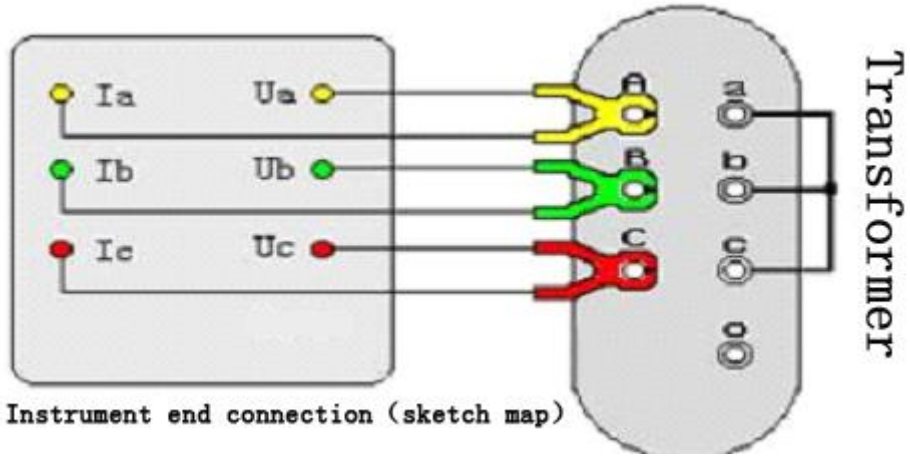


Figure 15 the connection method of active load test and Capacity test

3. Wiring Method of Single-Phase Transformer No-load Loss with Single-phase Power

When the voltage and current of the test are within the range of the instrument's

measuring range, please apply the current and voltage directly to the instrument as shown in Figure 16. When the no-load loss is tested, generally low voltage side is the tested side. High voltage side is non-tested side which need to open circuit.

When the test voltage exceeds the voltage range of the instrument, please use the voltage transformer, current transformer, according to figure 17.

When the test current exceeds the test range of the instrument, but the voltage is not over, please use the current transformer to access the current, the voltage directly access, according to figure 18.

4. Wiring method of Single-phase Transformer Short-circuit Loss with Single-phase Power

It is similar with the wiring method of no-load loss test for single phase power and single phase transformer; please refer to figure 16, figure 17, figure 18. The difference is just that the short-circuit loss test, generally high voltage side for the tested side. The low pressure side is a non-tested end, in addition, the non-tested side needs to manually short circuit.

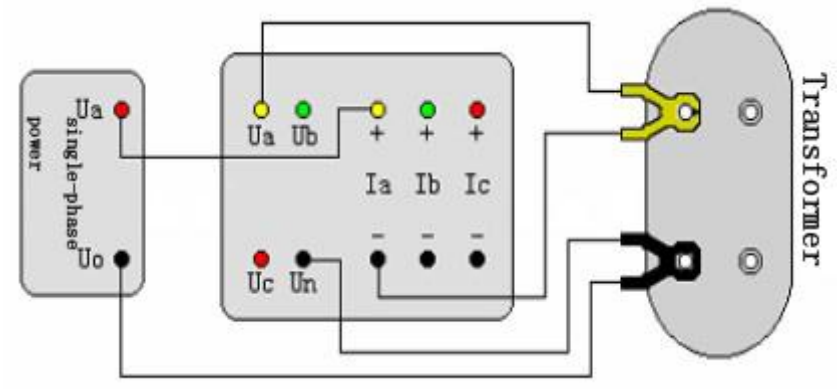


Figure 16 Direct access method for single phase load test

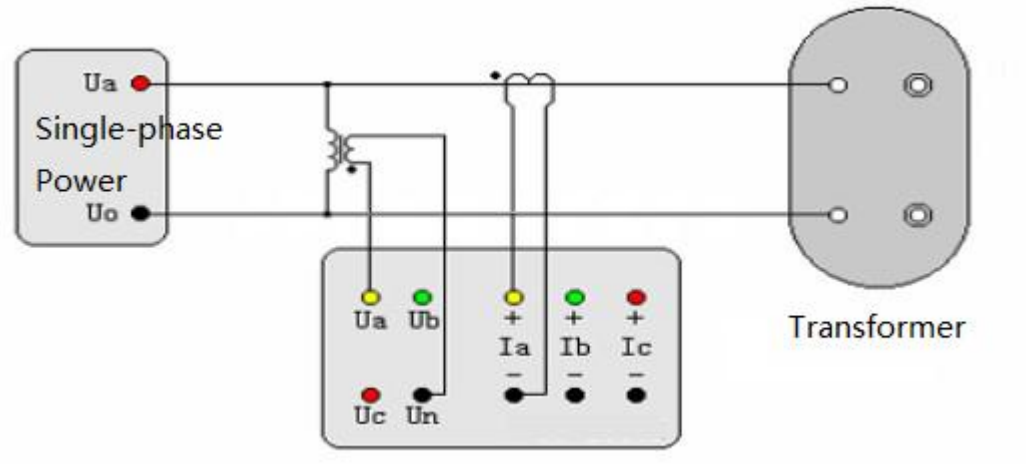


Figure 17 Single phase no-load test external PT and CT access method

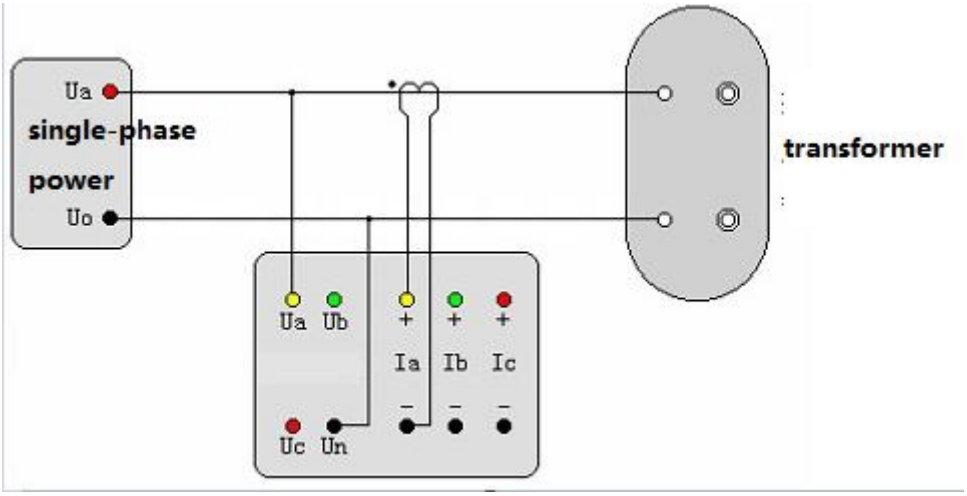


Figure 18 Single phase no-load test external CT access method

5. Wiring Method of Three-phase Transformer No-load Loss with Single-phase power

When finding the loss is over than the standard value after three phases no-load loss test, operator needs to test three losses, compare and analyze the no-load loss, observe the distributed situation of no-load loss in every phase in order to check whether there is shortage in every winding resistance and flux circuit. Basic method is to take the three phase transformer as three individual separated transformers to add voltage. That means one phase of transformer need to be short circuit and then

apply the voltage on the other two phases to test the no-load loss and no-load current. Figure 19.20.21 are the different wiring methods according to winding resistance of tested transformer Figure 22, 23, 24 are the different methods according to the range of current and voltage.

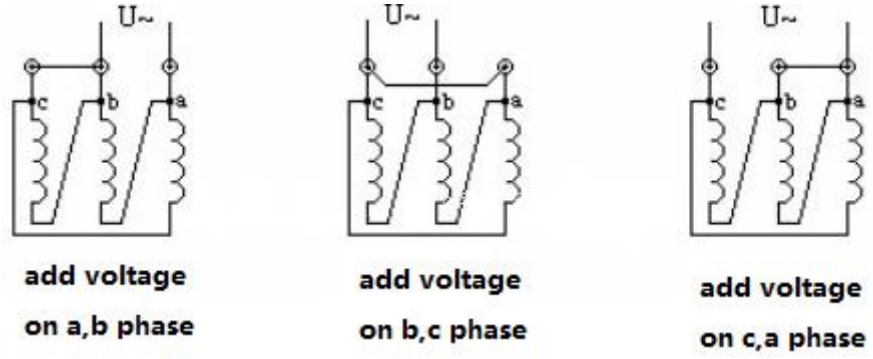


Figure 19 schematic diagram of delta connection of winding applied voltage

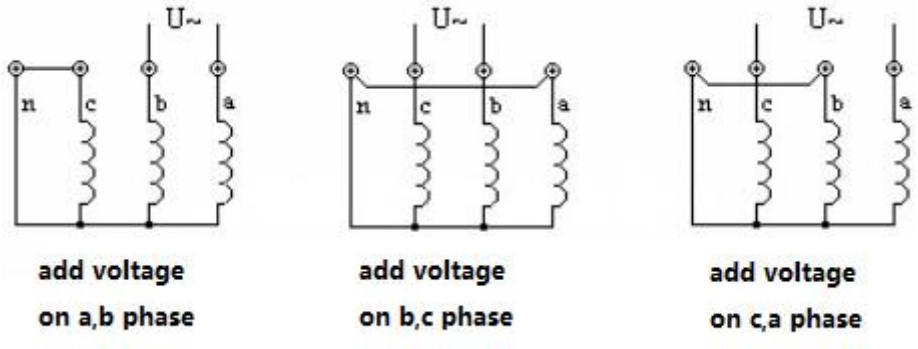


Figure 20 schematic diagram of neutral point Y -type connection of winding applied voltage

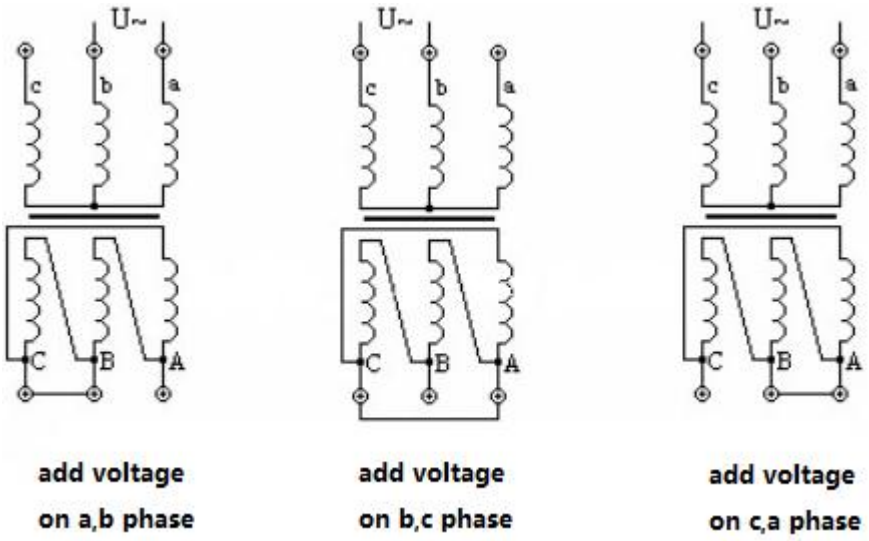


Figure 21 schematic diagram of Y connection of winding applied voltage without neutral point

Attention: When the wiring method is the Y-type (star connection), please apply double voltage of the phase voltage on product, When the wiring method is not Y-type connection, operator should make the relevant secondary winding short circuit because we cannot make the winding un-applied voltage short circuit for the sake of there is no neural point ,

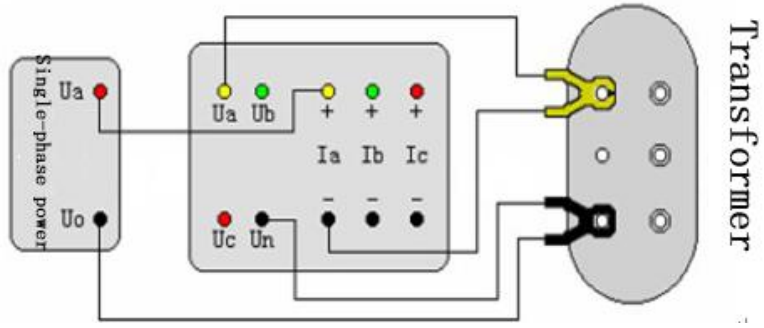


Figure22 Direct access method of that single-phase power measures three-phase transformer no-load loss

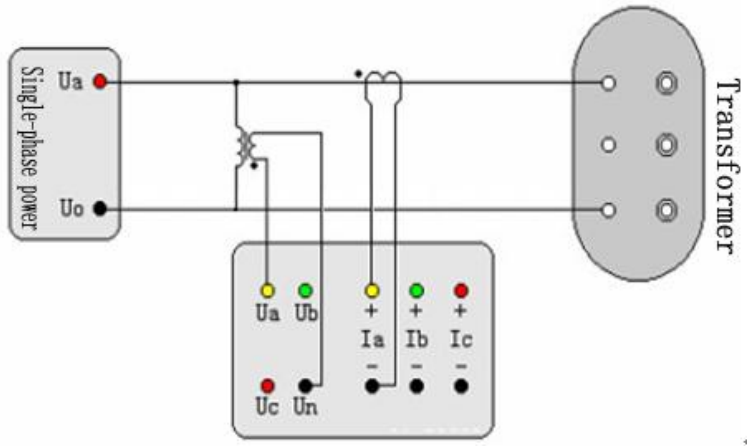


Figure 23 the connection method of that the single-phase power measures three-phase transformer no-load loss with external PT and CT .

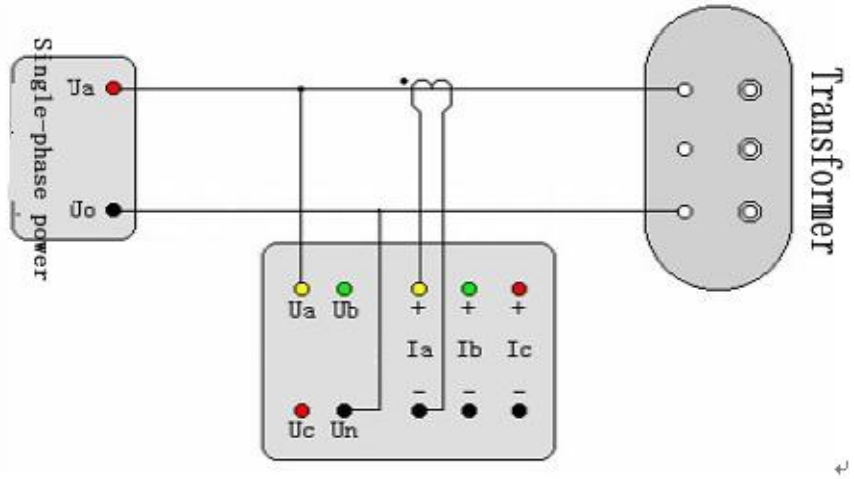


Figure 24 the access method of the single-phase power measures three-phase transformer no-load loss external CT

6. Wiring Method of Three-phase Transformer Short Circuit Loss with Single-phase Power test.

Under the influence of power (no three phase power supply or power supply capacity is small), or phase breakdown need to be checked during the producing process or operation, single-phase power can be applied to make short-circuit loss test. The test method is to make short circuit to three phase low voltage side of

transformer, and then test high voltage side every phase separately . “Single phase test” in short circuit test of this instrument can directly test three phases without exiting test program, and then show the total result of three phase.

According to the winding connection mode of the tested transformer ,that can be divided into two cases: A , when the powered winding is type △ , please make reference of figure 19. The difference is that the non powered side (usually for the low voltage side) of the three-phase outlet side need to short circuit manually. The current in the windings should be2/ √ 3 times than the rated current of the transformer. B. When powered winding is Y - type connection,please the make the reference of Figure 21, the difference is that the outlet of the three-phase side need to short circuit manually.

According to the measured voltage, current and the instrument voltage and current measuring range, there are also three cases ,which is similar with the three types of no-load loss three phase transformer under single phase power, please refer to figure 22, 23, 24 ,it shows the connection mode, the difference is,that the secondary side should short circuit.

7、Wiring method and two elements No-load Loss Test (three-phase three wire power)

Please let non-tested terminal short circuit and please refer to figure 25 .when the voltage and current does not exceed the test range of the instrument, please refer to figure 25; when the voltage exceeds the test range of the instrument, please refer to the connection of figure 26 ; when the test current exceeds the instrument

testing scope and voltage does not exceed the test range of the instrument, please refer to figure 27. When the no-load loss is tested, generally the low voltage side is the tested side. High voltage side is non-tested end that need to open circuit

Note: this method here is equivalent to the two power meters test method, only measuring Uab and Ubc two phase voltage value, the result is the average value of the two phases; at the same time only no-load loss would be measured for Pab and Pcb phase,total loss is the sum of two phases.

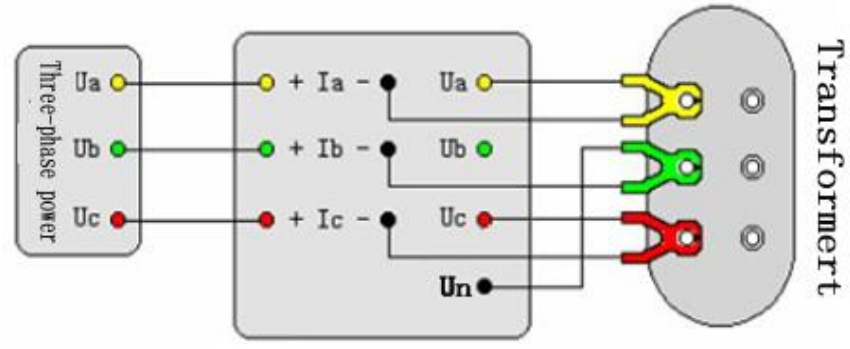


Figure25 Two components no-load loss test method of direct wiring diagram

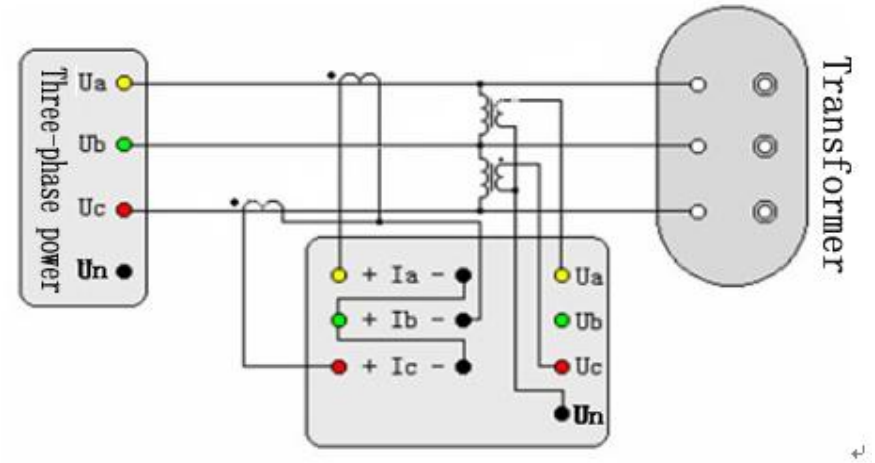


Figure26 the wiring diagram of No-load loss test method of two components through external PT and CT

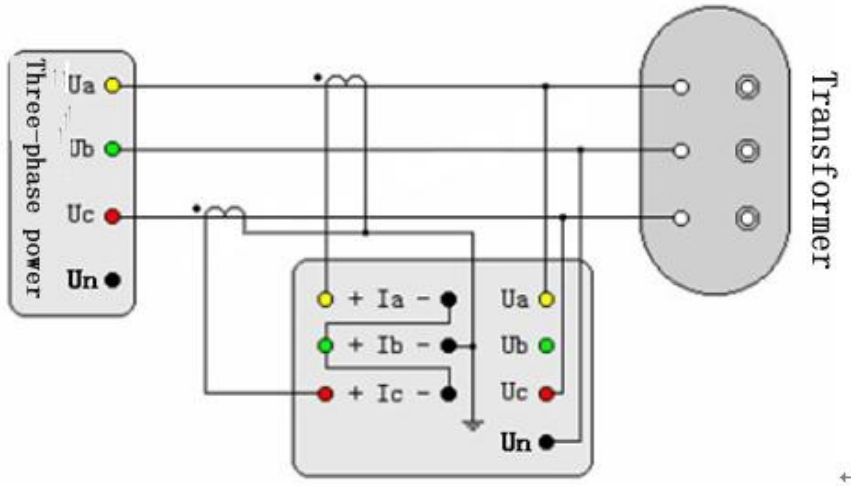


Figure27 wiring diagram of two components no-load loss test through external CT

8、Wiring method and two elements Load Loss Test (three-phase three wire power)

Basically it is similar with wiring connection of two element method of no-load loss ,please refer to figure 25, 26, and 27. The difference is that the high-voltage side is the test side. Low voltage side is not the test side when making short circuit loss. In addition, the un-tested side need to be short-circuit . If the high or medium voltage side outlet casing contains the ring-type current transformer, please short circuit the current transformer secondary side before the test..

9、Wiring method of Three phase No-load loss Test (three-phase four wire power)

Please open the non-tested terminal,please refer to figure 28. when the voltage and current does not exceed the test range of the instrument, please refer to figure 28; when the voltage exceeds the test range of the instrument, please refer to figure

29 connection; when the test current exceeds the instrument testing scope and voltage does not exceed the test range of the instrument, please refer to figure 30. When the no-load loss is tested, generally the low voltage side is the tested side. High voltage side is non-tested end that need to open circuit.

10、Wiring method and Three phase Load loss Test (three-phase four wire power)

It is basically similar with wiring mode of two element method of no-load loss ,please refer to figure 28, 29, and 30. The difference is that the high-voltage side is the tested end. Low voltage side for non-tested side when no-load loss test is made. In addition, the un-tested side need manually short-circuit. If high or medium voltage side outlet casing contains the ring current transformer, please short circuit the current transformer secondary side.

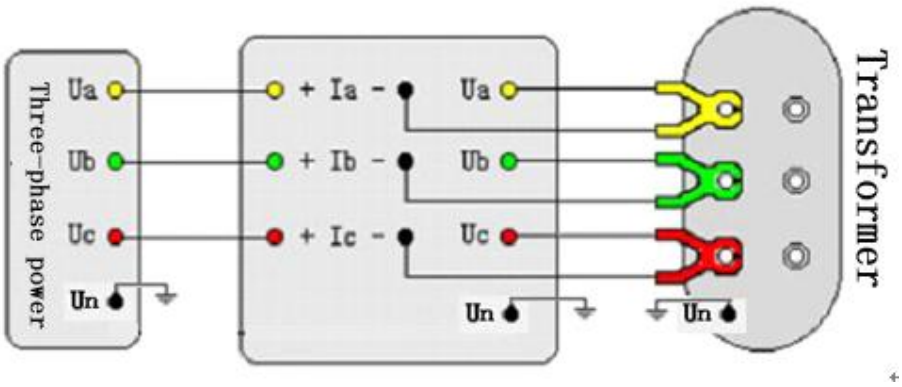


Figure28 Direct wiring diagram of three-phase no-load loss test

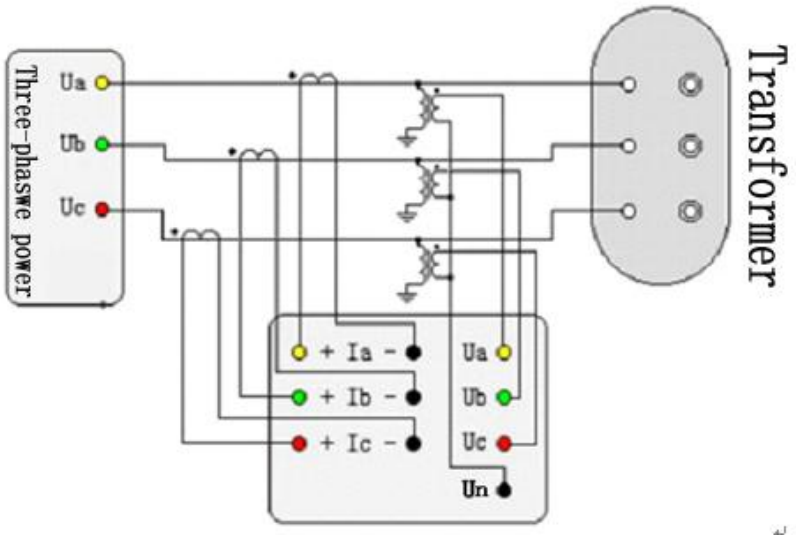


Figure29　Wiring diagram of three-phase no-load loss test through external PT and CT wiring

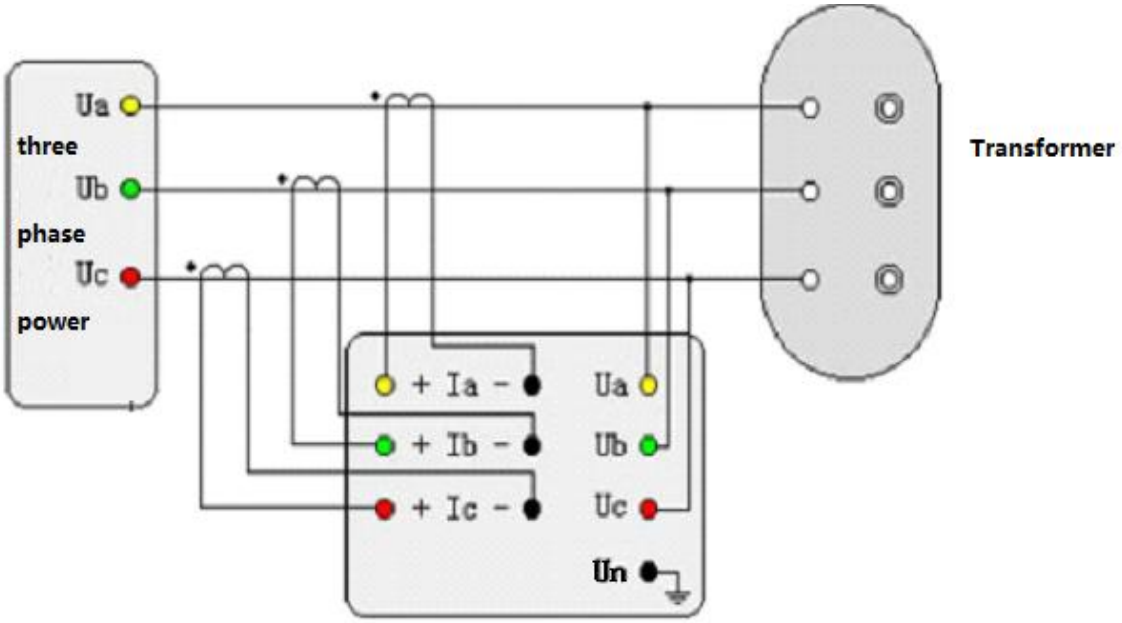


Figure29 Wiring diagram of three-phase no-load loss test through external CT

VI Note

1、The connecting method of testing line should operate according to instruction, otherwise it will affect the result

2、 The wiring should be proceeded under the testing line has been grounded in order to avoid the electric shock of induced voltage.

3、Please ensure the voltage ,current under the testing range. When exceeding the range,It need to connect with the external CT or PT to expand the range , otherwise ,the testing result will not right.

4、When making capacity test, active load test, load test by this instrument,Please ensure the short circuit of the non-powered side, otherwise it will affect the result.

5、When making the load test, if there is a current transformer in the outlet casing of HV LV side(Eg: CT), Please ensure to short circuit the secondary winding of CT.