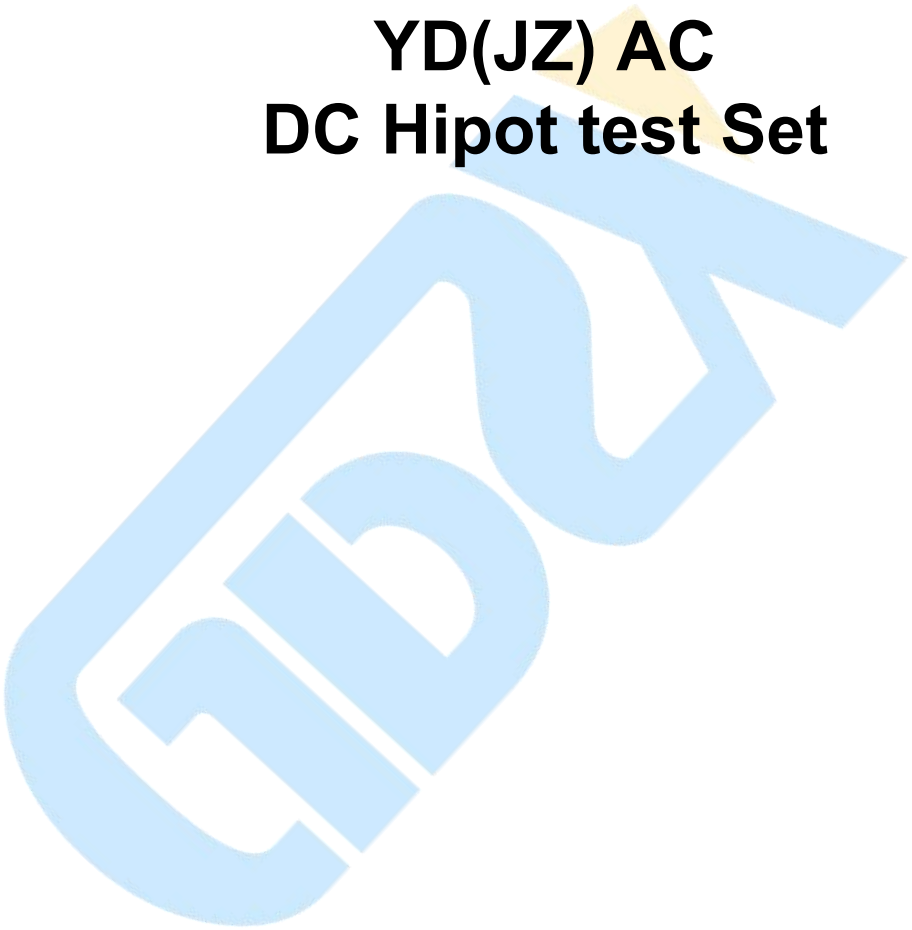
YD(JZ) AC
DC Hipot test Set



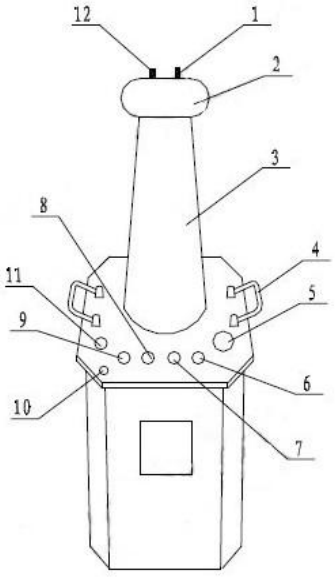
Contents

I. Product Description

YDJ(Z) series AC DC Tester is composed of testing transformer and control unit. The transformer is designed based on "test transformer" standard. This series oil immersed transformer is featured with light weight, compact structure, easy operation. Especially suitable for various high-voltage electrical equipment (power systems, industrial and mining enterprises, scientific research departments), electrical components, insulation material insulation strength test.

II. Product Structure

YDJ (Z) series power frequency voltage test transformer adopts single frame core-type iron core structure. Primary winding wound on the core, high-voltage winding outwards, the coaxial arrangement reduces leakage flux, thus increasing the coupling between the windings. The housing plus the internal core is made into octagonal structure, with very nice appearance. Its external structure shown in Figure 1, the internal structure shown in Figure 2.



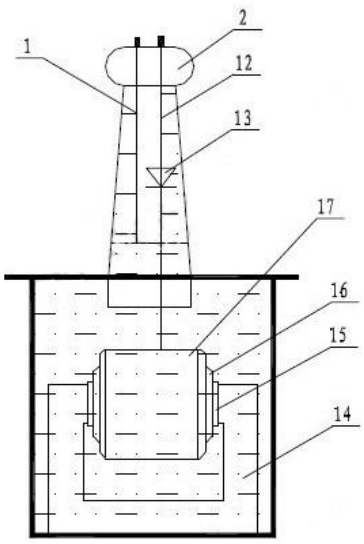


Figure 1: Transformer structure diagram

Figure 2: Transformer internal structure

1. Short circuit bar D 2.electrode 3.High voltage bushing

4.Transformers handle 5.Oil Valve 6~7. Input a, x

8~9.Terminals E, F 10.Transformer case GND 11.HV tail

12. HV output 13.HV silicon stack 14.Transformer oil

15.Core 16.Secondary voltage winding 17.Measuring winding

In YDJZ test transformer, a, x are LV input terminals, E F are measuring terminals, A X are HV output. YDJ series for AC voltage output only without silicon stack

III. Working principle

YDJ(Z) series test transformer is single-phase, connecting group I.I. Power supply 50Hz 220V (380V for 10kVA above) connect to XC / TC control unit, after coupling in the control box regulator (>50kVA regulator is external attached) the voltage output to transformer primary winding, according to the principle of electromagnetic induction, the test transformer high voltage winding obtain the necessary high voltage test. Diagram shown in Figure 3, Figure 4

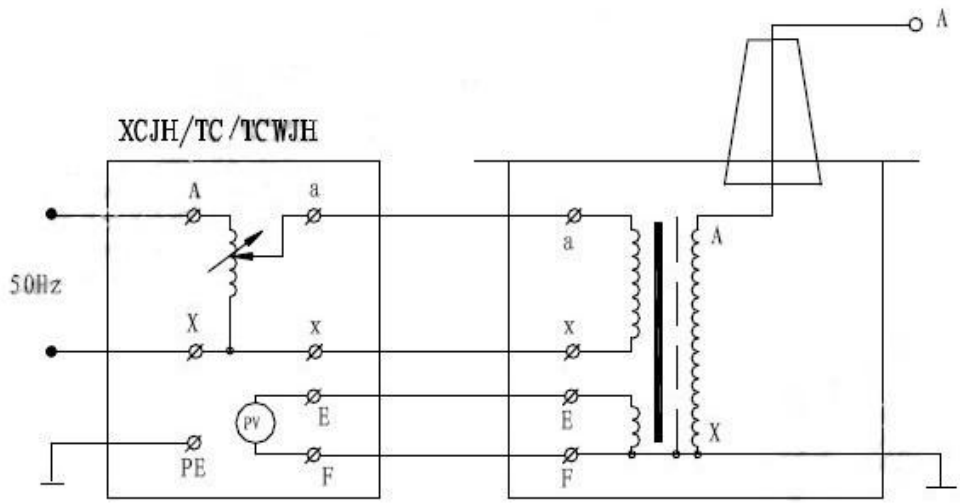


Figure 3: YDJ series AC test transformer working diagram

Figure 4 shows bushing fitted with voltage silicon stack, which is connected in high voltage circuit in series for half-wave rectification to obtain a DC high voltage. When using short circuit bar to short-circuit voltage silicon stack, there output power frequency high voltage, AC output status; working without short circuit bar here gets DC output.

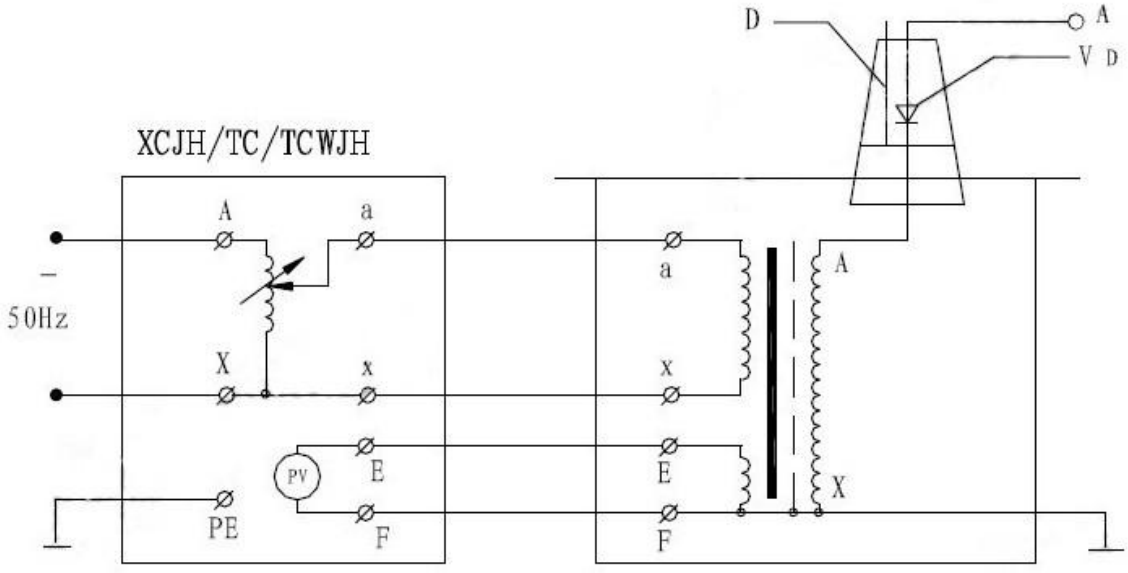


Figure 4: YDJZ AC and DC test transformer working diagram

D - short circuit bar V_D - high voltage silicon stack

2. Figure 5 shows wiring diagram of 3 sets testing transformers connecting in series to get more higher voltage. Cascade high voltage test transformers has great advantages, the entire test devices consists of several single test transformers are easy for transportation, and can be used for several kinds of solutions. In Figure 5 there is a excitation winding A1 C1 C1 and A2, C2 in the first stage and second stage test transformers, when low-voltage power is applied to the test transformer primary winding a1x1 on first stage transformer I, all the transformer I II III output voltage is V. Excitation winding A1, C1 supplying power to the second stage transformer II, the second stage transformer excitation winding A2 C2 supplying power to primary winding on the third stage test transformer III. Second and third grade test transformer body is in the position with voltage to ground at 1V and 2V, insulating to the ground, while transformer I is grounded, thus test transformers rated output to ground is respectively 1V, 2V, 3V; rated capacity 3P, 2P, 1P.

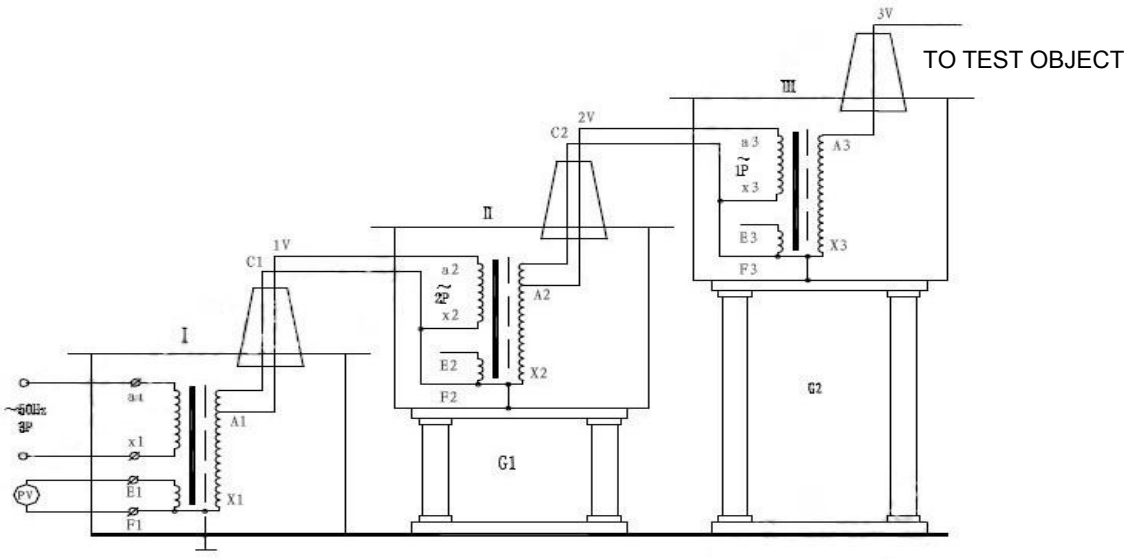


Figure 5: Three test transformer cascade wiring diagram

P- capacity (kVA) V- voltage (kV) G1, G1- insulation bracket

IV. Operation Instructions

A. YDJ power frequency voltage test wiring diagram is shown in Figure 6.

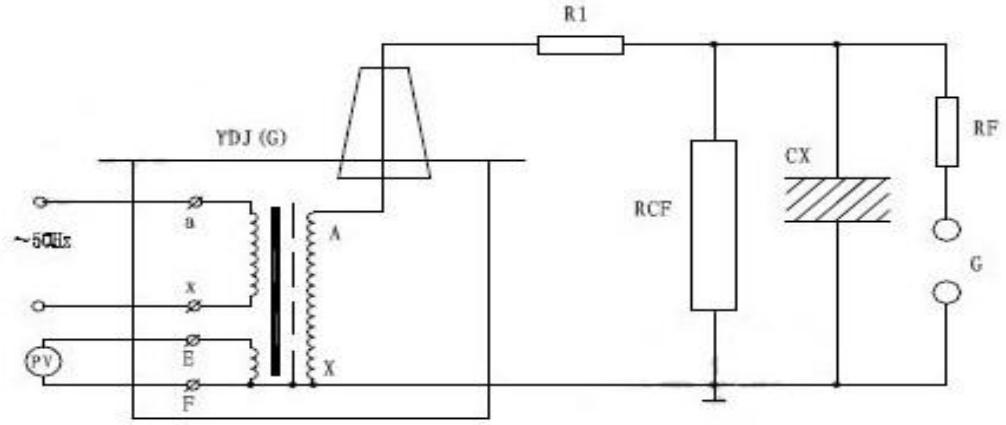


Figure 6

R1- limiting resistor divider RCF-RC divider RF-ball gap protection resistor G-ball gap CX-test item

NOTE: High tail GND end must be grounded.

In Power Frequency voltage withstand test, current limiting resistor R1 is selected based on test transformer rated capacity. When HV side rated output current is at 100-300mA, choose 0.5 - 1Ω/V (test voltage); when HV side rated output current is above 1A, choose 1Ω/V(test voltage). usually water resistor is used as current-limiting resistor, tube length can be considered as per 150kV/m, the thickness of the tube should have sufficient heat capacity (water resistance liquid preparation methods: adding an appropriate amount of copper sulfate with distilled water).

Ball gap and resistor protection: When the voltage exceeds ball gap setting value (usually set as 110% - 120% of the test voltage), the ball gap discharge to protect the test sample. Ball gap protection resistor can be set as per

1Ω/V(test voltage).

In the power frequency voltage withstand test, the LV side measuring voltage (meter voltage) is not very accurate, because there exist leakage reactance, so as well as voltage drop or capacitive rise, causing the voltage on the test sample lower or higher than the value reflected on LV side measuring meter. To accurately measure the test voltage applied, RC divider is often used in the HV side for measuring the voltage (Figure 6).

PRECAUTIONS:

1. Make a clear plan and arrange professional persons to handle and monitor. Ensure safety and observe test sample closely
2. The test items should be cleaned and absolutely dry to reduce test errors and avoid damage to the sample.
3. In large voltage test, firstly make no load test without connecting sample, calibrate the meters and adjust the ball gap.
4. The voltage stepping up speed should not be too fast, No sudden closing when the regulator handle is not at Zero position, or sudden switching off the power supply
5. When the voltage raise to the test voltage, it start timing, after 1min, the voltage is rapidly down, till 1/3 of the test voltage, its ok to switch off the power supply.
6. Step down voltage and switch off power immediately at following abnormal situation:

1) voltmeter pointer fluctuates a lot;

2) found burns or smoke;

3) abnormal noise in sample.

7. Check insulation resistance first before make the test.

8. DC test or leakage test wiring diagram shown in Figure 7.

Note: withdrawn the short circuit bar "D" before the test

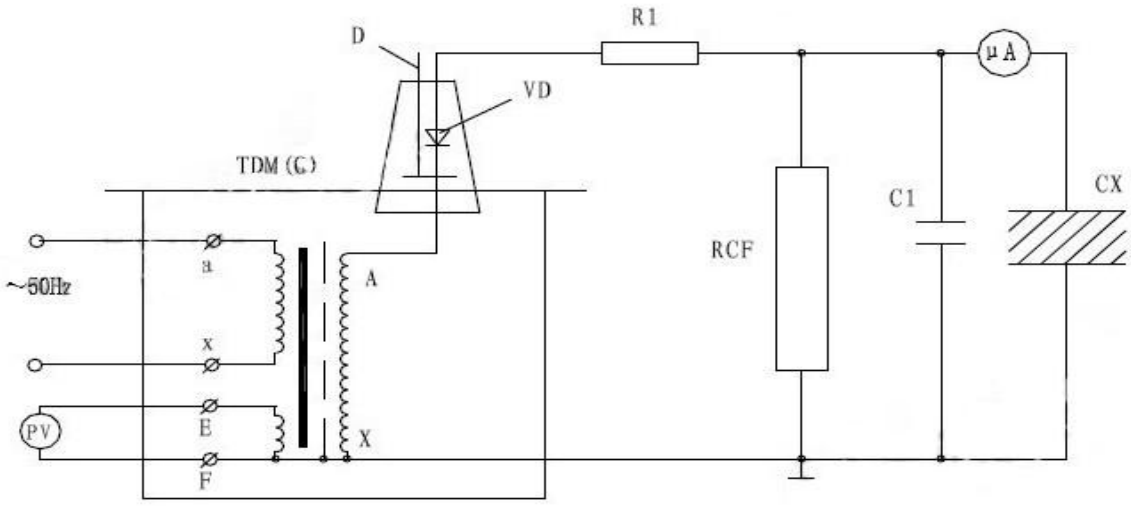


Figure 7

VD- high voltage silicon stack R1-Limiting resistor

C1- HV filter capacitor RCF- RC divider

CX- test product uA- protective microammeter

B. In Leakage test, the current limiting resistor R1 is set as the output terminal short circuit current at the rated output voltage, not exceeding the maximum rectified current of the silicon stack. For example, when silicon stack max rectified current is 100mA, used in 60kV test, the current limiting resistor R1 = 60 / 0.1 = 600KΩ. Limiting resistor should also have sufficient capacity and creeping discharge distance. HV filter capacitor C1 generally choose

0.01-0.1uF, when the test sample capacitance is very large, C1 can be omitted.

LEAK TEST NOTICE:

1 Before test check whether the test product has been de-energized, discharged to ground. All the external connection should be clean. No test voltage applied to the working site.

2 Checking wiring carefully before the test, especially check HV equipment wiring to ground, safety distance with operation personnel, test sample case wiring to ground

3 In large capacitance equipment test, increase voltage slowly, or by steps to get stable reading, avoid damage to micro-ammeter.

4 Watch closely the situation of the test sample, micro-ammeter, test devices, move voltage down and cut off power immediately when there is breakdown, flicker and other anomalies. FInd the reason and make records

5 After the test is completed, voltage down and power off the switch, fully discharge the device.

More matters need attention:

1 In wiring, the transformer case and control unit case shall be grounded, transformer X terminal (HV end) and measuring winding terminal F must be grounded

2 In cascade test, the second third stage transformer LV X terminal, F terminal, HV X terminal should be connected to the first transformer housing. 2nd 3rd

transformer housing grounded through the insulating bracket.

3 Before power is turned on, the regulator must be adjusted to zero power

4 Start from Zero to rotate the regulator hand wheel, quick way is 20s gradual boost, slow way is 60s gradual method; after reach 75% of the expected voltage, move in a speed of 2% rated voltage per second, pay close attention to the situation of the test sample and test device

5 Move regulator back to zero in an evenly speed in a few seconds, then turn off the power.

6 No exceeding of the rated values

V. Selecting Transformer Capacity

Formula for determining the nominal test transformer capacity Pn:

$$Pn = kVn2\omega Ct \times 10\text{-}9$$

Where: Pn ---- nominal test transformer capacity (kVA)

Vn ----- high voltage test transformer rated output of RMS (kV)

K ------- safety factor. K≥1, nominal voltage Vn≥1MV, K = 2

Ct ------ electric capacity of the test product (PF)

ω ---- angular frequency, ω = 2πf, f ----- test power frequency

Test sample Capacitance Ct can be measured by the AC bridge. Ct can be large, depends on the type of equipment can be.

Typical data are as follows:

Simple bridge or suspension insulators: tens microfarads

Simple hierarchical casing 100-1000PF

Voltage transformer 200-500PF

Power Transformer <1000kVA-1000PF, > 1000kVA1000-10000PF

High voltage power cables with oil impregnated paper insulated 250-300PF / m

Gas-insulated - 60PF / m

Closed substations, SF6 gas insulated 100-10000PF

For different test voltages Vn, choose a different (appropriate) safety factor K. Below for reference

Vn = 50-100kV K = 4

Vn = 150-300kV K = 3

Vn> 300kV K = 2

VI. YDJ/YDJ(Z) series Transformer Main Technical Parameters:

1 YDJ (Z) Series AC and DC test equipment (see Table 1)

2 YDJ Series AC transformer test (Table 2)

Table 1

Model series	Capacity	High voltage (kV)		High-voltage current (mA)		Low voltage input		Ratio	Temperature rise ℃
	(kVA)	AC	DC	AC	DC	（V）	（A）		30 mins
1.5/50	1.5	50	70	30	15	200	7.5	500	10
3/50	3	50	70	60	15	200	15	500	10
5/50	5	50	70	100	15	200	25	500	10
10/50	10	50	70	200	50	200	50	500	10
20/50	20	50	70	400	100	380	53	500	10
30/50	30	50	70	600	100	380	79	500	10
40/50	40	50	70	800	100	380	105	500	10
50/50	50	50	70	1000	100	380	132	500	10
10/100	10	100	140	100	50	200	50	1000	10

20/100	20	100	140	200	100	380	53	1000	10
30/100	30	100	140	300	100	380	79	1000	10
40/100	40	100	140	400	100	380	105	1000	10
50/100	50	100	140	500	100	380	130	1000	10
20/150	20	150	210	133	100	380	53	1000	10
15/50	30	150	210	200	100	380	79	1000	10
40/150	40	150	210	267	100	380	105	1000	10
50/150	50	150	210	333	100	380	132	1000	10
100/150	100	150	210	667	150	380	263	1000	10

Note: This series of products have 200V tap, can two or three sets connect cascade into AC 100kV, 150kV, 200kV, 300kV; DC 140kV, 280kV, 420kV high voltage. According to user needs, 5-15kV taps can be withdrawn in high voltage winding for motor AC voltage test. Specifications can be customized.

Table 2

Model series	Capacity (kVA)	High Voltage (kV)	HV current (mA)	Low voltage input		Ratio	Temperature rise ℃
				（V）	（A）		
3/50	3	50	60	200	15	500	10
5/50	5	50	100	200	25	500	10
15/50	15	50	100	200	25	500	10
10/50	10	50	200	200	50	500	10
20/50	20	50	400	380	53	500	10
30/50	30	50	600	380	79	500	10
50/50	50	50	1000	400	12	500	10
5/100	5	100	50	200	25	1000	10
15/50	10	100	100	200	50	1000	10
20/100	20	100	200	400	50	1000	10
30/100	30	100	300	400	75	1000	10
50/100	50	100	500	400	125	1000	10
20/150	20	150	133	400	50	1000	10
25/150	25	150	166	400	62.5	1500	10
30/150	30	150	200	400	75	1000	10
50/150	50	150	333	400	125	1000	10
100/150	100	150	667	400	250	1000	10
50/200	50	200	250	400	125	1000	10

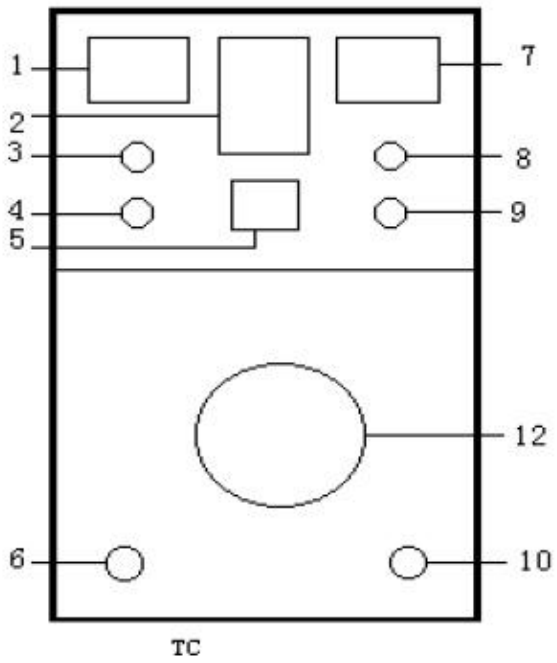
100/200	100	200	500	400	250	1000	10
150/200	150	200	750	400	395	1000	10
200/200	200	200	1000	400	375	1000	10
300/200	300	200	1500	400	750	1000	10
50/300	50	300	170	400	125	1000	10
100/300	100	300	333	400	250	1000	10
150/300	150	300	500	400	375	1000	10
200/300	200	300	667	400	500	1000	10

VII. Control Unit Introduction

1. Model Series

Model	Cap (kVA)	Power supply			Output		Operating Mode	Estimated Weight	Remarks
		Phase	(V)	(A)	(V)	(A)			
2/220	2	1	220	50	0-220	10	Manual	14	
3/220	3	1	220	50	0-220	15	Manual	16	
5/220	5	1	220	50	0-220	25	Manual	18	
10/220	10	1	220	50	0-220	50	Manual	80	
15/400	15	2	380	50	0-430	37.5	Manual	90	
20/400	20	2	380	50	0-430	50	Manual	100	
25/400	25	2	380	50	0-430	62.5	Manual	120	
30/400	30	2	380	50	0-430	75	Manual	140	
50/400	50	2	380	50	0-430	125	Manual/ Auto	160	
100/400	100	2	380	50	0-430	250		50	Separated voltage regulator
150/3000	150	2	380	50	0-430	50		50	
200/3000	200	2	380	50	0-430	65		50	
250/3000	250	2	380	50	0-430	84	Auto	50	
300/3000	300	2	380	50	0-430	100	Auto	50	
Remark:Different type of products can be manufactured according to customer needs									

2.Panel



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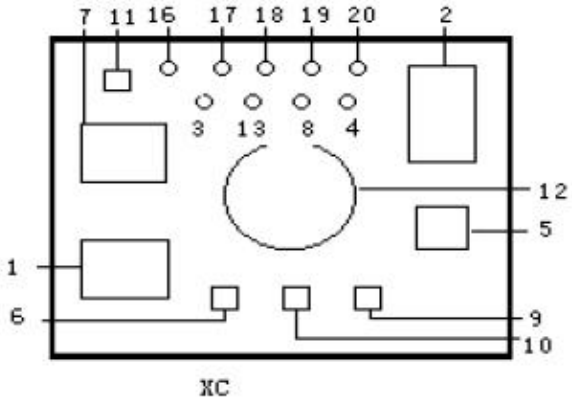
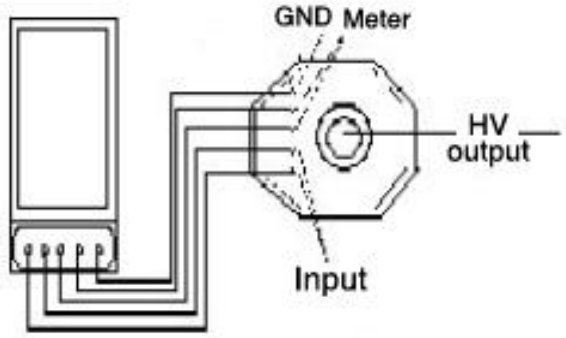
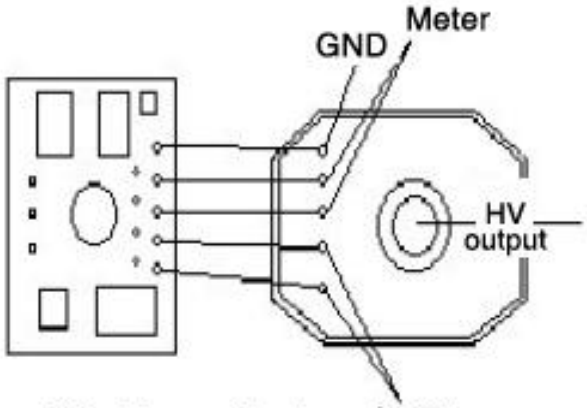


XC

3. External Wiring Diagram



TC wiring method



XC wiring method

4. Operating Procedures

1) Arrange the site according to the relevant procedures, connected the wires, when necessary a person should be arranged for safety guidance.
2) Adjust the current relay (KA) according to the capacity and voltage level of the tested product.
3) Turn on the power switch, press start button, the regulator power supply lights will be off, power feeding light will be on, at this time start voltage step-up

4) Slowly clockwise the regulator handle and pay close attention to the voltmeter (3kV per second speed is appropriate), when reach the standard withstanding voltage, press the time button, and watch situation of the test sample.

5)When reach the specified test time, the alarm (bell) will sound, indicating withstanding test qualified. At this time, counter clockwise the regulator handle to put the regulator to zero position. And press stop button to turn off the power.

6)During the test if over-voltage occurs, turn the voltage regulator counterclockwise in time to return voltage to the specified value.

7)During the test if current meter indicates that the current exceeds the specified range, immediately stop the step up and find out the relevant reasons before retest.

8) During the test, if there is short circuit, flash-over, breakdown and other over-current events, the current relay will work to stop so that the regulator automatically power off, which means the tested product failed to pass the test. Return the regulator to zero and reset the timing button to prepare operation next time

5. Operation Conditions

1) Ambient temperature: 0 ~ 40 ℃

2) Altitude: <2000m

3) Relative humidity: <85%

4) No gas, steam, chemical dust and other explosive and corrosive media seriously impact the insulation

6. Attentions

1) When unpacking, check the electrical components and contact points if any damage and bad contact.
2) Before use check the electrical contact, especially the regulator carbon brush contact must be good.
3) Strictly follow the relevant operation procedures, don't use personally without security persons on site.
4) The equipment should be stored in a ventilated, dry, non corrosive gas place.

Ⅷ. Packing List

1.	Control Unit	1 set
2.	Test transformer	1 set
3.	Test lines	1 set
4.	User Manual	1 copy
5.	Inspection report	1 copy