HTXZ-12150kVA/270kV AC Resonant Test System for Cable Testing (60min)

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Design time: 2023.6.10

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Ⅰ. Scope of test article

HTXZ-12150kVA/270kV AC Resonant Test System for Cable Testing (60min) is used for conducting withstand voltage test for:

1. 220kV/2200mm² 5km cable , test frequency is 20-300hz, Capacity ≤ 1.2uF, test voltage is 220kv, and test time is 60min.

Attention: Pls conduct the test in strict conformity with the above situation including the test object, test frequency, test voltage and test time, if any test requirement need to change for on site test, pls firstly consult us before conduct the test !

Ⅱ. Main components

No.	Name of components	Specification	Unit	Quantity
1	AC Power Source	HTXZ-315kW	Pcs	1
2	Excitation Transformer	HTJL-315kVA/5.5kV/0.4kV	Pcs	1
3	High Voltage Reactor	HTDK-3037.5kVA/225kV	Pcs	4
4	Capacity Divider	HTFY-750pF/270kV	Set	1

Ⅲ. Main function

HTXZ series Series Resonant Test System adopts the way of adjusting the electric power frequency, which makes the reactor and the tested capacitor realize resonance, so as to obtain high voltage and high current on the tested object. Because of the small power required, the light weight and small volume of the equipment, it has been widely praised and applied at home and abroad, which is a popular method and trend of high voltage test.

The main functions and technical features of the frequency series resonant test device are as follows:

1.The device has protection functions such as overvoltage protection, overcurrent protection, zero start, system detuning (flashover), what's more, overvoltage and overcurrent protection values can be set according to user needs, and flashover protection action when the sample flashes to protect the

product.

2.The entire unit is lightweight and easy to use on site.

3.The device has three working modes, which is convenient for the user to flexibly select according to the site conditions and improve the test speed. The working modes are: fully automatic mode, manual mode, and automatic tuning manual boost mode.

4.It can store and print data off-site, and the stored data number is a number, which is convenient for users to identify and find.

5.When the device is automatically swept, the starting point of the frequency can be arbitrarily set within the specified range, and the large screen of the liquid crystal displays the scanning curve, which is convenient for the user to intuitively know whether to find the resonance point.

6.The DSP platform technology is adopted, which can conveniently increase or decrease functions and upgrades according to user needs, and also makes the human-machine exchange interface more humanized.

7.The required power capacity is greatly reduced. The series resonant power supply uses the resonant of the resonance reactor and the capacitance of the tested object to generate high voltage and current. In the whole system, the power supply only needs to provide the active power consumption part of the system, so the power required for the test is only 1 / Q of the test capacity.

8. The weight and volume of the equipment are greatly reduced. In the series resonance device,on need to use the bulky high-power voltage regulating device and common high-power power frequency test transformer . Moreover, the resonant excitation power supply only needs 1 / Q of the test capacity, which greatly reduces the weight and volume of the system, generally 1 / 10-1 / 30 of the common test device

9. Effectively improve the output voltage waveform. The resonant power supply is a resonant filter circuit, which can improve the waveform distortion of the output voltage, obtain a good sinusoidal waveform, and effectively prevent the false breakdown of the test object by the harmonic peak value

10. Prevent large short circuit current from burning the fault point.under the condition of series resonance , when the insulation weakness of the test object is broken down, the circuit will immediately de resonance, and the circuit current will rapidly drop to 1 / Q of the normal test current. While the parallel resonance or the test transformer is used for the withstand voltage test, the

breakdown current will immediately rise dozens of times. Compared with the two testing method, the short-circuit current and the breakdown current are hundreds of times different. Series resonance can effectively find the weak point of insulation, and there is no danger of large short-circuit current burning the fault point.

11.There will be no recovery overvoltage. In case of breakdown of the test object, due to the loss of resonance condition, the high voltage disappears immediately, the arc goes out immediately, and the recovery voltage process is very long, so it is easy to disconnect the power supply before reaching the flashover voltage again. The recovery process of this voltage is an intermittent oscillation process of energy accumulation, with a long process and no recovery overvoltage.

IV.Technical parameters

Rated Capacity	12150kVA
Rated Voltage	220kV
Rated current	55A
Accuracy of measurement	Effective value of the system is 1.5
Working frequency	20-300Hz
Device output waveform	Sine wave
The quality factor	Device Q≥30(f=45Hz)
Waveform distortion rate	Output voltage waveform distortion rate ≤1%
The input power	Three phase 380V , frequency: 50Hz
Working time	Continuous 60min is allowed under rated load; Overvoltage 1.1 times 1 min
Temperature rise	Continuous 60min operation under rated load, Temperature rise ≤65K

Protection function	Over voltage, Over current,Zero start, and system detuning protection function
Accuracy of measurement	Effective value of the system is 1.5
Environment temperature	－20°C-55°C
Relative humidity	≤90%RH
The altitude	≤3000m

V. Verify device capacity

Verification: 1. 220kV/2200mm² 5km cable , test frequency is 20-300hz, Capacity ≤1.2uF, test voltage is 220kV, and test time is 60min.

☆4 PC Reactors, in parallel connection: L= 88/4=22H, then:

Testing frequency: $f=1/2\pi\sqrt{LC}=1/(2\times3.14\times\sqrt{22\times1.2\times10^{-6}})=30.98$ Hz

Testing current: $I=2\pi fCU_{test}=2\pi\times30.98\times1.2\times10^{-6}\times220\times10^{3}=51.39$A

Conclusion: The Resonant System Capacity set as 12150kVA-270kV , 4 PC Reactors together, single reactor is 3037.5kVA/225kV/13.5A/88H , Can meet your requirements of testing Cable etc.

VI. Equipment combination model

MODEL / TEST ITEMS	REACTOR （4 PCS 3037.5kVA/225kV）	EXCITATION TRANSFORMER	TESTING VOLTAGE (KV)
220kV/2200mm² 5km cable	4 PCS REACTORS IN PARALLEL CONNECTION	5.5KV	≤220KV

VII. System parameters

AC Power Source HTXZ-315kW 1 pc

Rated output capacity	315kW
Working power supply	380±10%V (three-phase), power frequency
The output voltage	0-400V
Rated input current	787.5A
Rated output current	787.5A
Voltage resolution	0.01kV
Accuracy of voltage measurement	1.5%
Frequency range	20-300Hz
Frequency regulation resolution	≤0.1Hz
Frequency stability	0.1%
Rising Temperature	Continuous 60min at rated capacity, ≤65k
Running time	Continuous 60min at rated capacity
Noise level	≤50dB
Dimension	/
Gross Weight	/

Excitation Transformer HTJL-315kVA/5.5/0.4kV 1pc

Rated Capacity	315kVA
The input voltage	0-400V
The output voltage	5.5kV/0.4kV
structure	Oil type
Dimension	/
Gross Weight	/

High Voltage Reactor HTDK-3037.5kVA/225kV 4pc

Rated Capacity	3037.5kVA
Rated Voltage	225kV
Rated Voltage	13.5A
inductance	88H/single section
The quality factor	Q≥30(f=45Hz)
structure	Hollow Core Oil type
Dimension	/
Weight	3000kg

Capacity Divider HTFY-750pF/270kV 1 Set

Rated voltage	270kV
High piezoelectric capacity	750pF
Dielectric loss	tgσ≤0.5%
Voltage division ratio	3000：1
measurement accuracy	Valid value of 1.5
Dimension (Inner Height)	Single stage ∅160×1000，2 stages in total
Weight	/

Ⅷ. Packing list

No.	Product name	Model	Unit	QTY
1	AC Power Source	HTXZ-315kW	pcs	1
2	Excitation Transformer	HTJL-315kVA/5.5/0.4kV	pcs	1
3	High Voltage Reactor	HTDK-3037.5kVA/225kV	pcs	3
4	Capacity Divider	HTFY-750pF/270kV	pcs	1
5	Test wires		pcs	1
6	Inspection report		pcs	1
7	Instruction manual		pcs	1
8	Certificate		pcs	1
9	Packing list		pcs	1

IX. Testing Standard

DL/T 596-1996	Preventive test procedures for electric equipment
GB50150-2006	Power equipment test and hand over standard in electric power project
GB10229-88	Reactor
GB1094	Power Transformer
GB1094.1-GB1094.6-96	Casing protection of transformer and reactor
GB2900	Electrotechnical terminology
GB/T16927.1~2-1997	Technique of High Voltage Test
DL/T474.4-2006	Guide for field insulation test - AC withstand voltage test
DL/T1015	Guide for the use of voltage measurement systems for field DC /AC withstand voltage tests
GB/T311.1-1997	Insulation and coordination of high voltage transmission and transformation equipment
GB191-2000	Packaging, storage and transportation pictorial mark
JB/T9641-1999	Testing transformer
IEC358(1990)	Coupling capacitors and capacitive dividers
GB4793-1984	Electric measuring device safety requirement
GB/T3859.2-1993	Application guide of semiconductor converter
GB/T2423.8-1995	Power equipment basic environment test regulation