

SOLUTION

HTXZ (W) -200kW

Non-Partial Discharge AC Series Resonant Test System



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Design time: 2022.11.1

1. Scope of test article

HTXZ (W) -200kW Non-Partial Discharge AC Series Resonant Test System can meet the requirement for:

- Partial discharge Test and Induced voltage withstand test of 110kV/ 60MVA power transformer (low-voltage side voltage 10kV) or smaller transformer (three-phase simultaneous or single-phase);
- AC withstand voltage test of 110kV switch, GIS, transformer and other electrical equipment;

2. Main components

No.	Name of components	Specification	Unit	Qty
1	AC Power Source (PD free)	HTXZ(W)-200kW	PC	1
2	Excitation Transformer (PD free)	HTJL(W)-200kVA/5/10/20kV	PC	1
3	Compensation Reactor (PD free)	HTDK(W)-100kVA/20kV	PC	3
4	Capacity Divider (PD free)	HTFY(W)-300pF/60kV	PC	1
5	Accessories (for PD test)	Power cord, system cable, high-voltage test cable, corona ring, insulating base, outer package, etc	PC	1
6	Partial Discharge Tester	HTJF-8004	PC	2
7	High Voltage Reactor	HTDK-55kVA/55kV	PC	5
8	Capacity Divider	HTFY-500pF/300kV	PC	1
9	Accessories (for withstand voltage test)	Power cord, system cable, high-voltage test cable, corona ring, insulating base, outer package, etc	PC	1

3. Testing Standard

GB10229-1988	Reactor
GB50150-2016	Electrical equipment installation engineering Electrical equipment handover test standard
DL/T596-1996	Preventive Test Procedures for Electric Power Equipment

GB1094.1-GB1094.6-96	Enclosure protection grade
GB2900	Electrotechnical terminology
GB1094	Power transformer
GB/T16927.1-2-1997	High voltage test technology
GB191-2000	Packaging Pictorial signs for storage and transportation
JB/T9641-1999	Test transformer
IEC 358 (1990)	Coupling capacitor and capacitive voltage divider
Q/ED116501-2004	Specification for handover and preventive test of rubber plastic insulated power cables
GB/T.311	Insulation and Coordination of High Voltage Transmission and Transformation Equipment
GB10237	Insulation level and insulation test of power transformer Air gap of external insulation
GB4793-1984	Safety requirements for electronic measuring instruments
GB/T3859.2-199	Application Guide for Semiconductor Converters
GB/T2423.8-1995	Basic environmental test procedures for electric and electronic products
DL/T849.6-2004	General specification for special test instruments for power equipment Part 6: High voltage resonance test device
GB/T7354	Partial discharge measurement
DL417—91	Guide for partial discharge field measurement of power equipment

4. System main function feature:

4.1 Work Environment

- Altitude: $\leq 3000\text{m}$
- Ambient temperature: $-20\text{ }^{\circ}\text{C} \sim 50\text{ }^{\circ}\text{C}$ (for use), $-25\text{ }^{\circ}\text{C} \sim 55\text{ }^{\circ}\text{C}$ (for storage)
- Maximum temperature difference: 30K
- Ambient humidity: $\leq 95\%$ (at $25\text{ }^{\circ}\text{C}$)
- Sunshine intensity: $\leq 0.1\text{W/cm}^2$ (wind speed 0.5m/s)
- Site wind speed: $< 4\text{m/s}$
- Field ground inclination: $\leq 5^{\circ}$
- Place of use: indoor or outdoor
- There is a reliable grounding point

- There is no gas containing corrosive metal and insulation
- No fire and explosion hazard

4.2 Parameters

- Rated power: 200kW
- Input power supply: AC380V \pm 10% three-phase; 50Hz
- Output voltage: single-phase sine wave, 0~350V continuously adjustable; Or three-phase output, 0~310V continuously adjustable
- Number of output phases: single-phase or three-phase
- Test voltage accuracy: 1%
- Test voltage stability: 1.5%
- Output waveform: sine wave; Waveform distortion rate \leq 1.0%
- Test frequency range: 20 ~ 300Hz
- Output frequency resolution: 0.01Hz
- Partial discharge index of system body: \leq 10pC (measured at the secondary side of excitation transformer)
- Operation time: continuous operation time of 90min under rated capacity
- Insulation level: 1.2U₀/1min

4.3 Main features:

Large screen display, it can indicate: output voltage, output current, operating frequency, ambient temperature, air outlet temperature, output voltage waveform of variable frequency power supply, date time, countdown time, fault information display, etc;

It has the function of setting test parameters such as test voltage and time.

4.4 Protection function:

The protection function is complete. If resonance overvoltage occurs during the test, the protection can automatically cut off the output to avoid damage to the test object and test device. The manufacturer shall ensure that the control equipment, transformer and reactor of the device will not cause personal injury and the test equipment will not suffer from harmful mechanical and thermal stress and electrical performance damage or damage if the high-voltage side test object flashover to ground occurs during the test under 1.2 times of the rated maximum voltage.

- Short circuit (overcurrent) protection: when the output current of the frequency conversion cabinet reaches the protection setting value, the output will be automatically cut off.
- Overvoltage protection: the current test voltage value is calculated through current channel sampling, and the output is automatically cut off when the calculated value exceeds 1.2 times of the set value. To prevent overvoltage of the test object caused by incorrect setting of the partial pressure ratio, or in case of out of control voltage regulation.
- Breakdown and flashover protection: when the high-voltage side has a flashover to the ground or the test object breaks down, the output can be automatically cut off.

- Power loss protection: special function modules are installed at the output end of the variable frequency power supply. When the voltage on the electrolytic capacitor is too high, the output will be short circuited quickly, so that the energy of the resonant system will slowly oscillate and be consumed in the resonant system; And the special function module can work continuously for more than 10s after the power supply is suddenly disconnected to ensure that the energy consumption process is completely completed.
- Automatic voltage stabilization and detuning protection: the system has the automatic voltage stabilization function to compensate the voltage drop and fluctuation caused by various conditions, and ensure that the test voltage fluctuation amplitude is within 1.5% during the entire test time. When the test system is out of tune due to the drastic change of the parameters of the tested object due to internal defects, the output will be automatically closed.
- Programming according to the requirements of zero start.

4.5 Other requirement:

The device can be assembled and disassembled indoors and outdoors; Special transportation, binding and on-site lifting measures are provided.

The oil filled equipment in the complete set of equipment of the whole system is free from oil leakage and oil leakage.

All metal shells in the complete set of equipment of the whole system are subject to anti rust and anti-corrosion treatment. The main components are provided with stainless steel nameplates and terminal marks. The variable frequency power cabinet is equipped with a dust and rain cover. The power control box is equipped with a special shockproof aluminum alloy box.

The shell of the equipment is made of materials that can prevent corrosion and rust, and the structure is firm and reliable. The outer surface has a coating to prevent metal oxidation, and the coating is uniform and beautiful. The enclosure protection grade of variable frequency power supply shall meet the requirements of IP54, and the enclosure protection grade of other equipment shall meet the requirements of IP66.

All parts of the equipment shall be provided with nameplates that conform to the national standard. The words and symbols on the nameplates shall be clear and durable. The nameplates shall be visible at their installation positions during normal operation of the equipment.

5. Main performance parameters

5.1 AC Power Source(PD free)

- Model: HTXZ(W)-200kW
- Quantity: 1 set
- Output power: 100kW (single-phase or three-phase)
- Input voltage: AC380V \pm 10% three-phase; 50Hz
- Output voltage: 0~350V (sine wave) continuous adjustable for single phase; Three phase use 0~400V (line voltage)
- Output mode: three-phase output YN mode, three-phase four wire system; It can also be used in single phase;
- Three phase phase offset: $\leq 120^\circ \pm 0.1^\circ$;
- Three phase output symmetry: three-phase line voltage imbalance $\leq 1\%$
- Output waveform: pure sine wave
- Output waveform distortion rate: $\leq 1.0\%$
- Output voltage instability: $\leq 1.0\%$
- Voltage measurement accuracy: Class 0.5
- Output current: 0 \sim 428A
- Cooling mode: forced air cooling
- Adjustable range of output frequency: 20 \sim 300Hz
- Output frequency adjustment sensitivity: 0.1Hz
- Frequency instability: $\leq 0.05\%$
- Noise level: $\leq 85\text{dB}$
- Local discharge of the body: interference level to the system $\leq 5\text{pC}$
- Insulation level: 1.2U0/1min
- Continuous operation time: $> 90\text{min}$ under rated power
- Temperature rise: under rated power, continuous operation for 90min, temperature rise at air outlet $< 25\text{K}$
- Size: 1500 (long) \times 950 (high) \times 1800 (thick) mm
- Weight: 980kg



5.2 Excitation Transformer (PD free)

- Model: HTJL(W)-200kVA/5/10/20kV
- Quantity: 1 set
- Rated capacity: 200kVA
- Single phase use: input single phase 350V; Output single-phase 5KV, 10KV and 20KV voltage levels with capacity of 200kVA;
- Three phase use: input three-phase four wire, neutral point is ungrounded, input voltage is 310V; Output voltage: three-phase four wire, neutral point grounding, voltage: 11kV and 20kV, capacity: 100kVA;
- Output voltage regulation mode: through electric sectioning switch;
- Rated frequency: 30 ~ 300Hz
- Insulation level: AC of each bushing of low-voltage winding to ground: 5kV/1min; High voltage winding to ground AC: 1.2UN/1min;
- Local discharge of the body: $\leq 5\text{pC}$
- Impedance voltage: $\leq 5\%$
- Allowable continuous operation time: 90min continuous operation under rated voltage and current
- Cooling mode: ONAN;
- Rated temperature rise (rated operation 90min): the winding temperature rise is less than 65K, and the top oil temperature rise is less than 55K;
- Noise level: $\leq 65\text{dB}$
- Insulation heat resistance grade: F
- Overall dimension: 1250 (long) \times 950 (width, including side casing thickness) \times 1200 (height) mm
- Weight: 2.0T



5.2 Compensation Reactor (PD free)

- Model: HTDK (W) - 100kVA/20kV
- Quantity: 3
- Rated capacity: 100kvar
- Rated voltage: 20kV
- Rated current: 5A
- Rated inductance: 6H
- Operating frequency range: 30 ~ 300Hz
- Insulation level: 1.2UN/1min
- Local discharge of the body: $\leq 10\text{Pc}$
- Insulation heat resistance grade: Grade A, using # 25 transformer oil
- Continuous working time: 90min under rated current
- Temperature rise: continuous operation under rated capacity for 90min, winding $\leq 95\text{K}$; Top oil $\leq 85\text{K}$



- Noise: $\leq 65\text{dB}$
- Size: Φ eight hundred \times 800mm
- Weight: 500kg

5.4 Capacity Divider (PD free)

- Model: HTFY(W)-300pF/60kV
- Number of sections: 1 section
- Rated voltage: 60kV
- Electric capacity: 0.3nF
- Local discharge of body: local discharge under rated voltage $\leq 10\text{pC}$
- Dielectric loss: $\leq 0.2\%$
- Operating frequency: 50~300Hz
- Partial pressure ratio: 600:1
- Insulation level: 1.2UN/1min
- System measurement error: $\leq \pm 0.5\%$
- Size: Φ one hundred \times 1000mm
- Weight: 15kg



5.5 High Voltage Reactor

- Model: HTDK-55kVA/55kV
- Quantity: 5
- Rated capacity: 55kvar
- Rated voltage: 55kV
- Rated current: 1A
- Rated inductance: 160H
- Operating frequency range: 30 ~ 300Hz
- Insulation level: 1.2UN/1min
- Insulation and heat resistance grade: H, imported epoxy resin
- Continuous working time: continuous working for 30min under rated current
- Temperature rise: continuous operation under rated capacity for 30min, winding $\leq 65\text{K}$;
- Noise: $\leq 65\text{dB}$
- Size: Φ three hundred and eighty \times 420mm
- Weight: 68kg



5.6 Capacity Divider

- Model: HTFY-500pF/300kV
- Number of sections: 1 section
- Rated voltage: 300kV
- Electric capacity: 0.5nF
- Dielectric loss: $\leq 0.05\%$
- Operating frequency: 50~300Hz
- Partial pressure ratio: 3000:1
- Partial pressure ratio error: $\leq 0.5\%$
- Insulation level: 1.2UN/1min
- System measurement error: 0.5 level
- Size: Φ one hundred \times 1000mm
- Weight: 15kg



5.8 Partial discharge tester

- Model: HTJF-8004
- Quantity: 2 sets
- Detection sensitivity: 4 (completely independent)
- Rated current: 0.1pc
- Measuring frequency band and cut-off frequency: 3dB; bandwidth: 10kHz \sim 1000kHz; any combination of multiple gears is allowed; Low end: 10K, 20K, 40K, 80K; High end: 100K, 200K, 300K, 500K, 1000K
- Pulse resolution time: less than 100 μ S
- Sampling accuracy: 12Bit
- Output standard pulse rising edge: $<60\text{nS}$
- Output standard pulse falling edge: $>100 \mu$ S
- Calibration charge error: $<\pm 5\%$
- Standard pulse voltage range: 0.5V, 1.0V, 2.0V, 5.0V

6. Test items for key components

6.1 AC Power Source (PD free) (with analog load, measured after continuous operation at full capacity for 1h)

- Adjustment range of output voltage and frequency
- Full load input/output voltage, current and power
- Air inlet and outlet temperature of radiator plate and heating of each large current contact
- The over-current protection test will bring the variable frequency power supply to full load, use the metal wire on the insulating rod to directly short-circuit the output end of the variable frequency power supply, and the fast protection device of the variable frequency power supply should act reliably. Repeat the above steps for 3 times and the action should be normal.

6.2 Excitation transformer (PD free)

- Measurement of DC resistance and insulation resistance of winding
- Measuring transformation ratio
- Induced voltage withstand test

6.3 Compensation reactor (PD free)

- Measurement of winding DC resistance and insulation resistance
- Measure the inductance, and the deviation from the design value shall not exceed $\pm 2\%$
- Resonance withstand voltage test

6.4 Capacity Divider (PD free)

- Measure the capacitance, and the deviation from the design value shall not exceed $\pm 1\%$
- AC withstand voltage test

6.5 Partial discharge test system

- Test voltage accuracy and stability
- Discharge protection test
- Emergency stop test
- Automatic tuning and automatic boost test

7. Acceptance, training and after-sales service

7.1 Acceptance

7.1.1 Your company sends representatives to our company to jointly carry out factory acceptance of equipment.

7.1.2 The acceptance items and standards shall refer to the relevant provisions above. If there is any difference between the two parties on the acceptance results, it shall be settled in the principle of friendly negotiation.

7.1.3 Our company will assist your company to conduct a field test as the final acceptance.

7.2 Training

Our company provides an on-site test guidance and training to ensure that your company's testers learn how to operate and maintain the device.

7.3 After sales service

7.3.1 The provided devices shall be guaranteed for one year free of charge (calculated from the date of acceptance), and lifelong maintenance service shall be provided. During the warranty period, it is responsible for free inspection and replacement of damaged parts and components, and maintenance services beyond the warranty period only charge maintenance costs. The Supplier shall guarantee the service performance of the equipment, the quality of the products and the reliability of the equipment operation.

7.3.2 Respond to your on-site telephone or fax technical consultation 24 hours a day. After receiving the telephone or fax from the user who needs after-sales service, we will provide quick technical response service within 1 hours to give the user a correct reply;

8. Quality commitment

8.1 The Supplier shall ensure that all processes, key parts, etc. in the manufacturing process comply with the provisions of this document.

8.2 The supplier has an ISO9001 quality assurance system that complies with the provisions and work items in this document, and the quality assurance system has passed the national certification and operates normally.

8.3 The Supplier guarantees that the goods provided are brand new, unused, manufactured with the latest design and appropriate materials, and conform to the quality, specification and performance specified in the Contract in all aspects.

8.4 The Supplier shall ensure that the equipment can reach the highest technical performance of the product after correct installation guidance and adjustment.

8.5 The Supplier guarantees that, within the warranty period specified in the contract, it shall be responsible for any defects, failures and damages of the product caused by the Supplier's responsibility for providing design, manufacturing, installation, commissioning or material defects.

9. List of ex factory technical documents

No.	Item	Qty	Mark
①	Manual	1PC	Including product use and equipment maintenance
②	Certificate	1PC	

③	Warranty card	1PC	
④	Product inspection report	1PC	Components inspection
⑤	Delivery test report	1PC	Whole system inspection
⑥	Packing list	1PC	