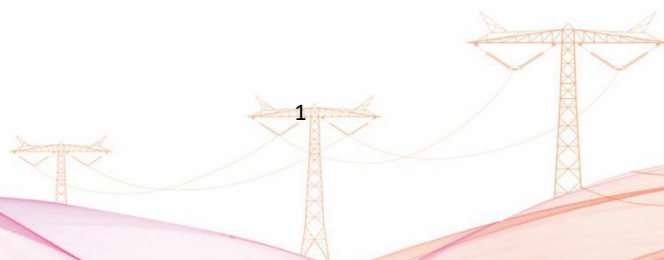


Oil Immersed Current Transformer

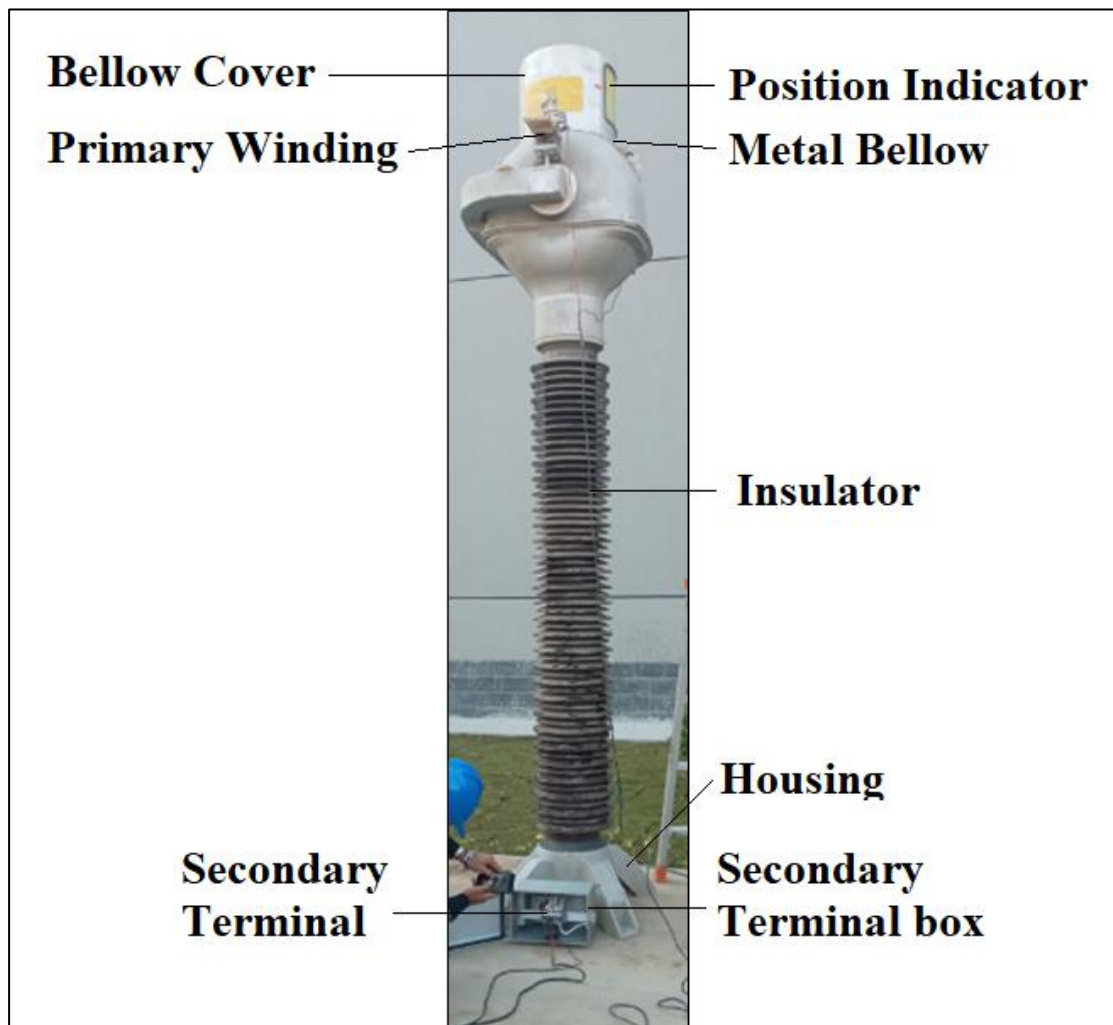
Muhammad Shamaas

The oil immersed current Transformer is used to step up or step down AC electric current for measurement and protection purposes. CA type current Transformer is single phase, outdoor using, oil Immersed and top head type. Its performance is stable and reliable and it conforms to the latest version of IEC and GB standards.



Structure

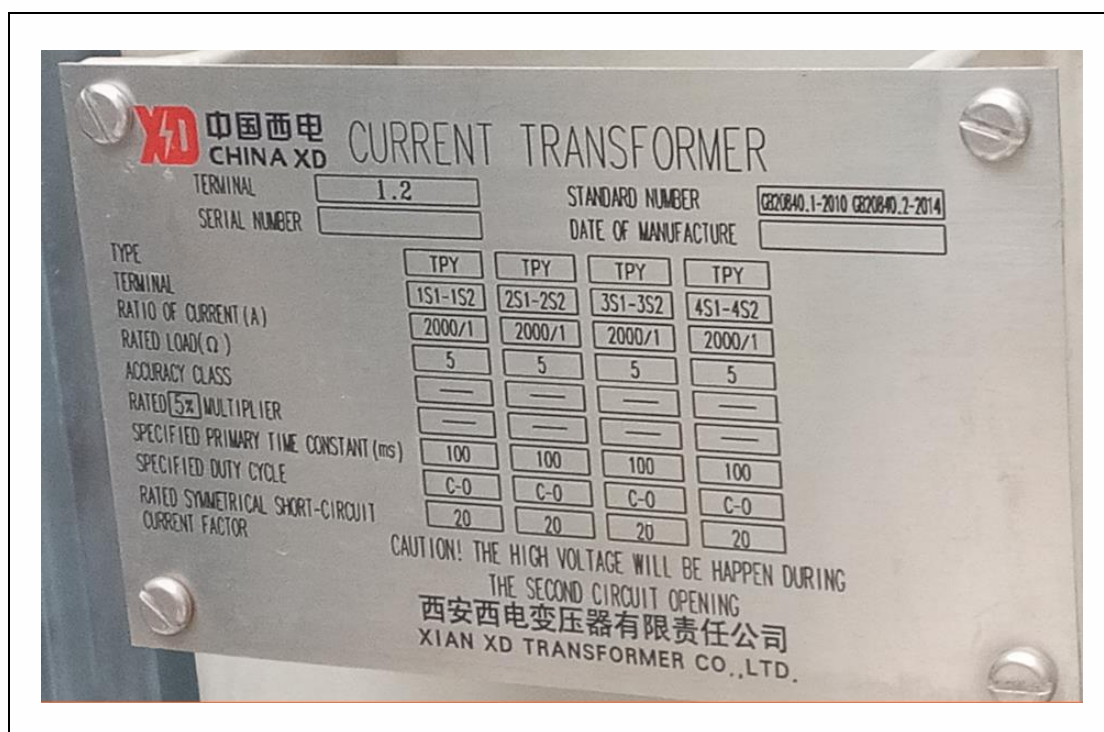
Top head current Transformer is mainly composed of expander, oil storage cabinet, porcelain, body and housing. It has the advantages of excellent electromagnetic performance, uniform electric field distribution, reliable main Insulation, high value of withstand short circuit current and excellent seismic performance. This ensures safe Operation of the Transformer for 40 years.



Use Condition

Parameter	Value
Environment temperature	-5~+53°C
Solar radiation	0.1W/cm ²
Altitude	≤1000m
Maximum wind speed	34m/s
Ability to withstand earthquake	0.2g
Sine Resonance three period safety factor	≥1.67

Nameplate



Type	Outdoor, single phase, oil Immersed
Accuracy class	5P30/5P30/0.2S/0.5S
Current Ratio	1500/1 A
Rated output	20/20/10/20 VA
Rated short time thermal current and time	40/4 (kA/s)



Operation Requirements and precautions

The following matters need to be checked before putting CA current Transformer into operation:

1. The secondary wire connection should be normal, open circuit is forbidden
2. The L shape connecting board between the earthing screen and the base should be well connected. The Resistance between the mounting screw and the base shall be less than 0.3 Ohm.
3. Primary configuration must follow the requirements on the nameplate
4. The oil Level should be normal
5. The appearance should be normal and there should be no oil leakage.

After checking according to the requirements above, it can be energized.





Insulation Resistance Test (earthing screen included)

The insulation resistance test determines the quality of the transformer insulation.

Cycle	1-3 years
Test Condition	Ambience humidity Lower than 80%
Method	Insulation Resistance meter 2500V for primary and secondary metering.
Requirements	Primary $\geq 1000\text{M}\Omega$, Secondary $\geq 100\text{M}\Omega$
Measures	For Transformers that failed the standard, it may be caused by damp exterior surface. It can be tackled by drying exterior of Windings.



Figure 1: High Voltage Insulation Tester



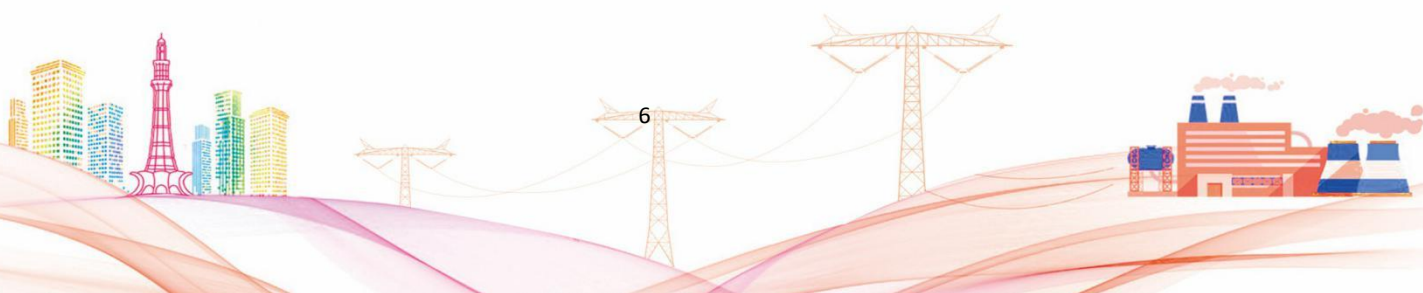
Dissolved Gas Analysis

Dissolved Gas Analysis (DGA) is used to analyze the concentration of gases dissolved in the oil.

Cycle	1-3years
Requirements	Attention should be paid when dissolved gases in the oil exceeds the following values: Total hydrocarbon: 100uL/L. H ₂ : 150uL/L. C ₂ H ₂ : 1uL/L.
Method	Chromatograph.
Measures	Check the oil Level after taking the oil sample and refill the oil if necessary. Check the oil type on the nameplate when refilling the oil. If the ethylene content increases abnormally, put the Transformer out of service.



Figure 2:Gas Chromatography using GC 9560



Insulation oil Dielectric test

The Insulation Dielectric Test is used to determine the quality of transformer oil.

Cycle	When necessary
Requirements	66kV ~ 220kV \geq 35kV 330kV \geq 45kV 500kV \geq 50kV.
Method	Oil Dielectric
Measures	Return the Transformer to manufacturer for repairing if it fails to meet the standard.

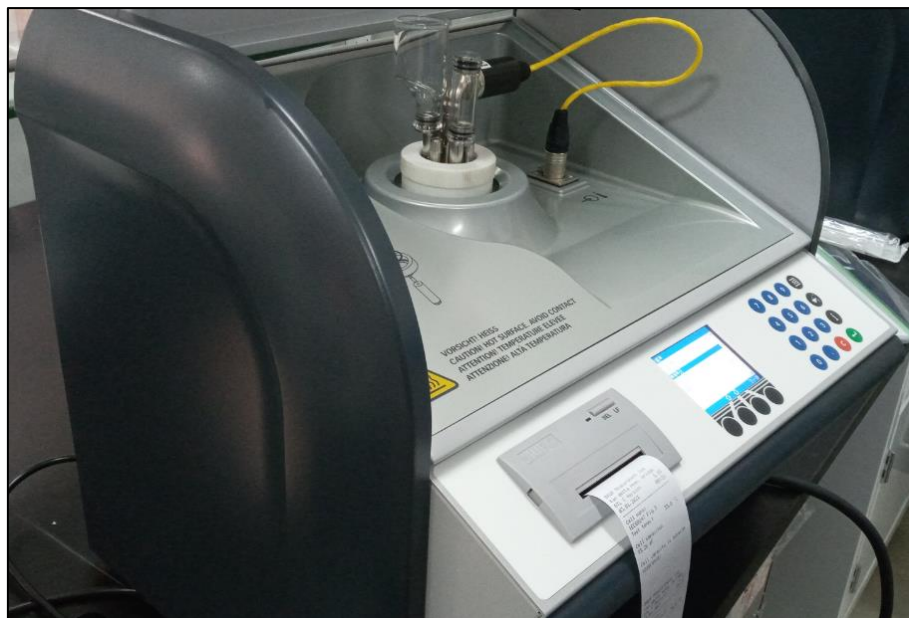


Figure 3: Oil Dielectric Strength Tester



Dielectric dissipation Factor and Capacitance measurement

The Dielectric dissipation factor determines the $\tan\delta$ of the insulation, which is indicative of the insulation degradation. The insulation capacitance is compared against the standard.

Cycle	1-3 years
Conditions	Ambient humidity should not exceed 60%.
Requirements	Should not exceed the value required in DL/T 596 preventive test code for electric power equipment.
Method	Electric Bridge
Measures	Maybe caused by damping or degradation of Insulation.



Figure 4: Oil Dielectric Loss Factor and Capacitance Tester



CT analyzer Tests

The CT analyzer can be used for verification of terminal markings, excitation curve measurement, accuracy class test and measurement of secondary winding resistance.

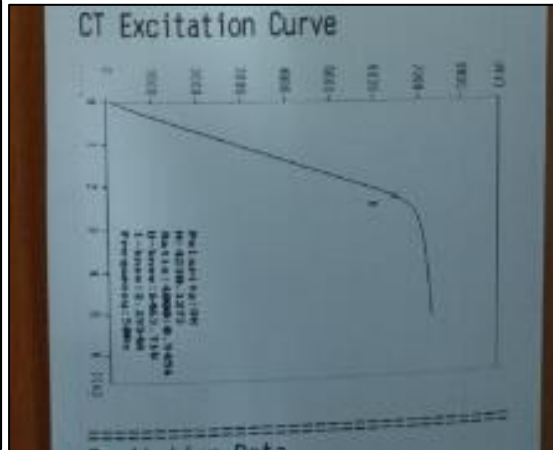
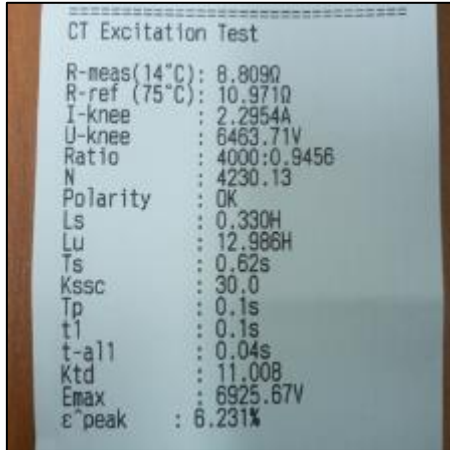


1. Verification of terminal markings: The test result should be minus polarity.

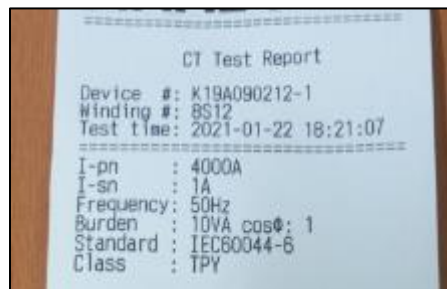




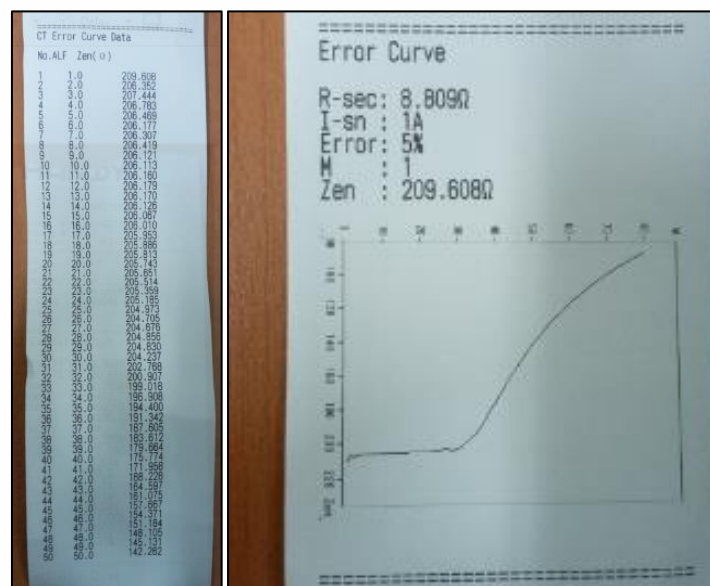
2. Excitation curve measurement: Input excitation current test voltage, there should be no saturation phenomenon.



3. Accuracy class test: The error must meet the requirements of the nameplate or the report.



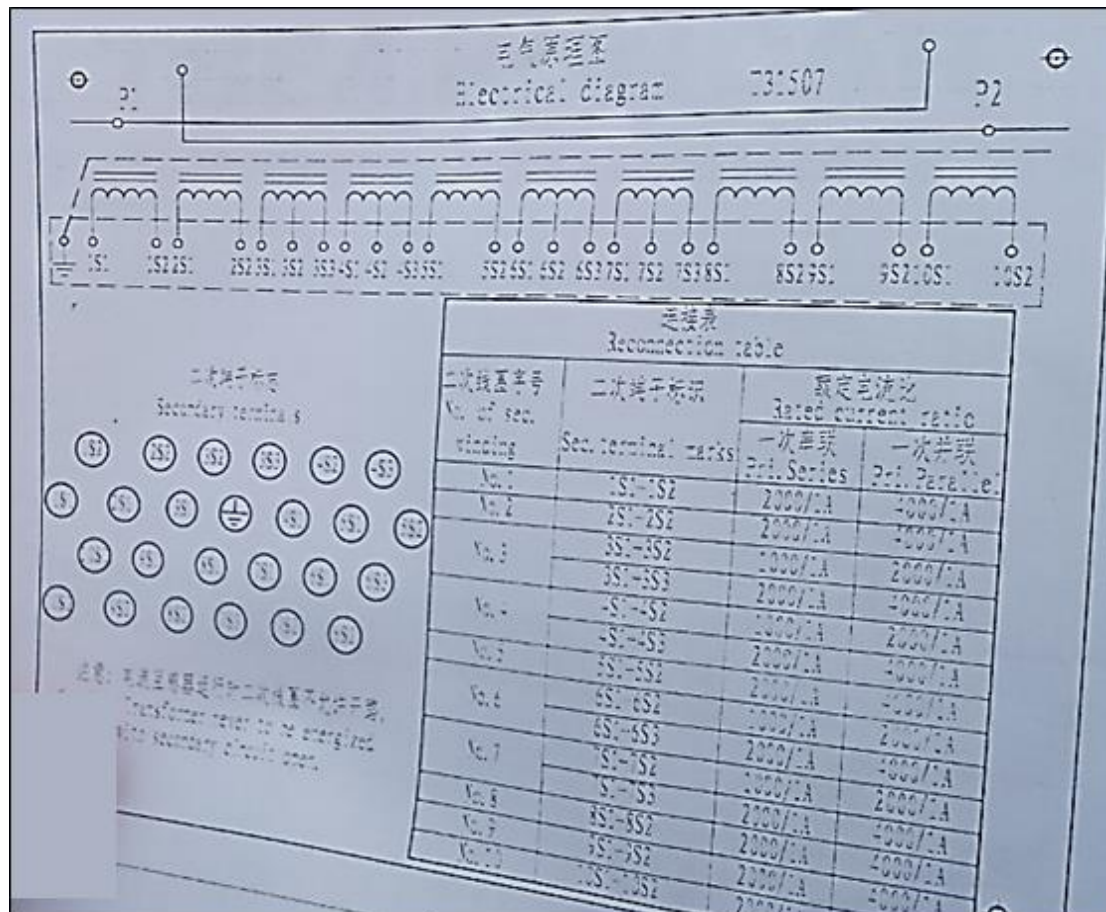
4. DC Resistance of secondary Windings: The difference between the value measured on site and the value measured when the Transformer is released should not exceed 10%.





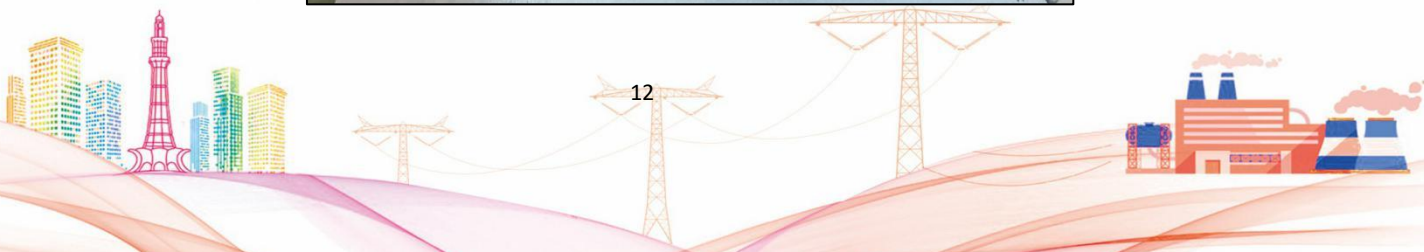
Primary power frequency withstand voltage test

Use portable power frequency withstand voltage equipment for the test. The test voltage should be 80% of the voltage withstand value. The reliable Grounding of the tan delta terminal of the equipment should be checked before the test.



Operation and Maintenance

1. Adopt Lifting tools with appropriate length to lift the Transformer. Fasten it firmly with mounting bracket.
2. Check for rust and oxidation on contacts surface of primary Winding terminals.
3. If primary serial/ parallel connection is required, the fixing mode of connection plate at P1/P2 side shall be changed according to the primary current.
4. Before connecting the secondary terminal, make sure that the system is not energized, and pay attention to free electromagnetic field caused by the nearby operating Electrical equipment. Check the schematic diagram of the Transformer nameplate or Instruction plate before connection. Secondary terminal is not allowed to be opened. Unused secondary terminal must be shorted. Secondary terminals must be grounded when the CT end plate screen is in normal Operation.
5. The Grounding terminal located under the base must be reliably connected to the ground grid of the power station. The ground wire should be able to withstand the system short circuit current on the nameplate of the Transformer.
6. Confirm the oil Level of the three phase Transformer is consistent. Check for oil leakage.
7. Check whether the protector (insulating paper, foam pad) in the product expander is removed. The oil level indication should be clearly visible. The oil Level height of the three phase Transformer should be consistent. The red mark line of the oil Level should be between MAX and MIN, and be clearly visible.
8. Check for oil stains on connecting positions and oil valve inlet.





9. There should be no distortion for the connection of the primary terminal, and the bolts in the primary series and parallel connection should be fastened and not discolored.
10. Check the insulator for damage, cracks, Serious oil stains, Electrical discharging trace and other abnormal conditions for the insulator skirt.
11. Test the temperature of the oil tank and primary terminal using infrared thermal imager during operation. The operating temperature of the three phase products in the same group should be the same and the temperature difference in the same group should be $\leq 4^{\circ}\text{C}$.
12. Clean the surface of porcelain bushing. Calibrate the creepage distance of porcelain bushing to meet the requirements of pollution level. Conduct antitrust treatment for oil tank and base. Clean the inside of the secondary terminal box, conductive junction and Insulation Resistance.
13. Adjust the oil Level in case of slight leakage of oil. Tighten the primary and secondary lead connectors. Check and tighten Grounding terminal connection and end plate screen terminal connection. Check for abnormal sound.
14. In case of current Ratio anomaly, the test cable on the primary terminal contact with product housing or bolts Results in short circuit of primary coil. The test cable should be connected with primary terminal. The primary series parallel connection should be correct. The wiring at the secondary terminals should be correct.
15. In case of abnormal noise in Operation, the secondary side is slightly open circuit. Check whether the wiring in the secondary terminal box or secondary common junction box is correct or loose. Check the console wiring for looseness. Check whether the secondary route is well insulated.
16. If the overall Capacitance of field test does not conform with the Report, the Insulation to ground must be missing. Put the insulation pad under the Transformer when testing Capacitance to ensure the Transformer is insulated to ground.

