

DTTS Series

Distribution and Traction Transformer Test System



5MVA Automatic Distribution Transformer Test System

The **DTTS Series Distribution and Traction Transformer Test System** are self-contained test sets incorporating all features necessary for testing single and three phase distribution transformer at factory and onsite.

Distribution and traction transformers are highly quality requirement products in the power transmission system, so it needs the testing products with compromising quality and high technology. **The DTTS system** can totally arrive the entire requirement from customer, it have the most modern design with best quality components inside. For all routine test, within one system, the DTTS system supply customer a turn key test solution.

Our DTTS system supply customer highly automated and minimal manual intervention to keep the test duration of a single transformer as short as possible,

The DTTS Distribution and Traction Transformer Test System has been designed with these requirements in mind, as a multifunctional tool for testing distribution transformers. All supported tests are performed in conformity with IEC, IEEE/ANSI, GB and GOST.

Applications:

- ◆ 36kV and Below Dry and Oil Filled Distribution and Traction Transformer

Testing Applications:

- ◆ Transformer No Load Loss
- ◆ Transformer Load Loss
- ◆ Induce Withstanding Voltage Test
- ◆ Apply Voltage Test
- ◆ Temperature Rise Test **(Option)**
- ◆ Transformer Turn Ratio Test
- ◆ Winding Resistance Test
- ◆ Insulation Test
- ◆ Partial Discharge Measurement **(Option)**
- ◆ Impulse Voltage Test **(Option)**

Benefit and Advantage:

- ◆ No Load / Load / Induce Voltage / Apply Voltage Test / by one time connection
- ◆ TTR / Winding Resistance / Insulation Resistance / Power factor Measurement by one connection
- ◆ Significantly reduce testing time
- ◆ Suitable to frequent transportation
- ◆ Increase production efficiency
- ◆ High repeatability of the test result
- ◆ Direct build-ip of database
- ◆ Pass-Fail criteria from database
- ◆ Short throughput time
- ◆ Less manpower
- ◆ All measured results are directly compared
- ◆ Barcode reading capability
- ◆ Integrates all routine tests within one unique system
- ◆ Fulfills all international standards (IEC, IEEE/ANSI and GOST).
- ◆ Easy integration into existing production lines

- ◆ Output tap selector switch (Motorized)
- ◆ Norma/ Yokogawa Wattmeter



1MVA Automatic Distribution Transformer Test System



5MVA Automatic Distribution Transformer Test System



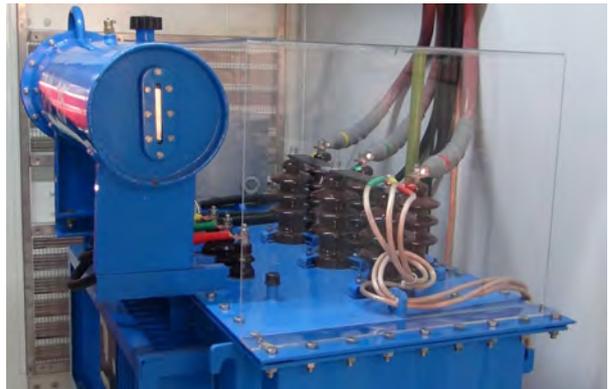
Module Type Shielding Room for PD Measurement

Safety Feature:

- ◆ Main power circuit breaker with indicating light
- ◆ On/Off push-button
- ◆ Emergency stop mushroom switch
- ◆ High voltage "On" flashing warning light
- ◆ "Foot Switch" safety interlock
- ◆ External interlock provision for test cage or other safety interlock

- ◆ "Zero Start" interlock
- ◆ Slow and fast-acting resettable overload protection
- ◆ Over current / over voltage alarm (over current relay)
- ◆ Door switch
- ◆ Intelligent circuit breaker
- ◆ Intelligent locker
- ◆ CCTV

Protection cover:



International brand electronics



SICK safety system:



Intelligent door locker:



CCTV:



Voltage Regulator Feature:

- ◆ IP22 protection level
- ◆ Dry & contact type voltage regulator
- ◆ Voltage adjust from 2%-120%
- ◆ Three phase input / output
- ◆ Liner adjust voltage
- ◆ Voltage adjust speed changeable
- ◆ Low impedance to 8%
- ◆ Low noise to 60dB
- ◆ Easy maintenance / repair
- ◆ Waveform distortion is less than 1%
- ◆ Heavy duty
- ◆ DC motor with position indication
- ◆ Double limit position switch
- ◆ Oil temperature meter with temperature limit

Tunable Frequency Electronics Power Source Feature:

- ◆ IP22 protection level
- ◆ Siemens IGBT module
- ◆ EPCOS DC filter capacitor
- ◆ Voltage adjust from 5%-110%

- ◆ Waveform distortion is less than 2%
- ◆ Heavy duty design
- ◆ Frequency from 30-300Hz available
- ◆ Manual / automatic control panel available in the system
- ◆ Intelligent power meter
- ◆ Partial discharge is lower than 50pC (<2pC model also can be special request)
- ◆ Three phase/ single phase output
- ◆ Output frequency stability is less than 0.1%
- ◆ Output voltage stability is less than 0.1V

TMS System Feature:

- ◆ IP22 protection level
- ◆ Use Norma/ Yokogawa wattmeter to permit accuracy and stability
- ◆ Automatic generate test report
- ◆ 0.01% accuracy of ratio Error and phase error for CT and PT
- ◆ 5%-120% range permit the accuracy
- ◆ 5W output power
- ◆ Typical 0.1A-2000A Test Range for CT
- ◆ Typical 5V-12kV Test Range for PT

LV Capacitor Bank Cabinet Feature:

- ◆ IP22 protection level
- ◆ Automatic switchover the capacitors according to the quality factor at on load condition
- ◆ Heavy duty design
- ◆ Automatic on load adjustable capacitors according to the power factor
- ◆ CTs
- ◆ Manual/ automatic control panel available in the system
- ◆ Intelligent power meter
- ◆ LV side compensation capacitor bank always guarantee the lowest input power for whole system

HV Capacitor Bank Cabinet Feature:

- ◆ IP22 protection level
- ◆ Heavy duty design
- ◆ Automatic switchover the capacitors according to the

quality factor at on load condition

- ◆ Manual/ Automatic Control Panel Available in the system according to the quality factor
- ◆ Intelligent Power Meter
- ◆ HV compensation capacitor bank use few capacitors for general compensation

Intermediate Transformer Feature:

- ◆ Oil filled, tank, bushing output, motorized tap changer
- ◆ Low noise to 65dB
- ◆ Waveform distortion is less than 2%
- ◆ Oil temperature meter with temperature limit
- ◆ Three phase input / output
- ◆ 6 bushings by output side, Y/D Connection is available
- ◆ Heavy duty, temperature rise is lower than 35K
- ◆ Typical 800V-13200V, 10 taps available
- ◆ Frequency from 30-300Hz available
- ◆ Partial discharge is lower than 50pC, (<10pC model also can be special request)
- ◆ Software control tap changer and calculate user time

Switchgear Cabinet Feature:

- ◆ IP22 protection level
- ◆ Intelligent circuit breaker
- ◆ Army level contactor be used, 5kV DC insulation between each tap
- ◆ ABB over current relay
- ◆ Voltage and current indication In the each cabinet and control software
- ◆ Manual and automatic switch On/OFF and indication
- ◆ Professional design and producing with perfect protection



Cylinder Type Test Transformer Feature:

- ◆ Fulfilled one test process in the software, test finished by itself
- ◆ Heavy duty design
- ◆ 0.5% measuring accuracy for voltage/current
- ◆ Partial discharge is lower than 10pC
- ◆ 2% start voltage
- ◆ 6% short circuit impedance
- ◆ 50Hz/60Hz available
- ◆ Manual/semi-automatic/fully automatic are available

Impulse Voltage Test System Feature:

- ◆ 300kV/30kJ impulse voltage generator
- ◆ Modern design structure: S
- ◆ Module design, easy upgrade
- ◆ Generate LI: $1.2 \pm 30\% / 50 \pm 20\% \mu\text{s}$
- ◆ Generate chopping wave with delay time 2-6us
- ◆ Efficiency is high than 90%
- ◆ Automatic control and 12bit/100Ms/s, 2 channels measuring system
- ◆ Grainger circuit for low voltage winding test
- ◆ Automatic grounding switch
- ◆ Automatic safety grounding switch
- ◆ Automatic make out Pass/Failure



DTTS LV Measuring Unit Feature:

- ◆ TTR / DC resistance / Insulation resistance / Power factor measurement
- ◆ Significantly reduce testing time
- ◆ Increase production efficiency
- ◆ High repeatability of the test result
- ◆ Direct build-up of database
- ◆ Pass-fail criteria from database
- ◆ Short throughput time
- ◆ Suitable to measure single phase/ three phase transformer
- ◆ Ratio range from 0.9-25000 for TTR measurement
- ◆ Accuracy: 0.2%
- ◆ 10A/5A/1A/10mA are available to selected for DC resistance measurement
- ◆ Test range from 0.2m Ω -20k Ω
- ◆ Accuracy: 0.2%
- ◆ 1000V/1500V/2500V/5000V are available to select for insulation resistance measurement
- ◆ Input:110V-230V 50Hz/60Hz



Module Type Shielding Room Feature:

- ◆ Quick assemble and dismantle due to evolution module design, typical within 3 days finish assemble;
- ◆ Customer allow factory inspection, for traditional shielding room, never be possible to factory inspection by whole shielding room, and easy upgrading when it is in the factory not onsite;
- ◆ Low background noise level which less than 1pC;
- ◆ Light, CCTV and soft decorate all include and install before shipment;
- ◆ Extremely high structural strength, extremely long working life up to 100 years;
- ◆ Surface treatment follow ISO1496 standard, it suitable for any means of transportation, guarantee it still keep nice outlook;
- ◆ Rolling up or sliding shielding door are available;
- ◆ Double steel or epoxy ground are available;
- ◆ Fast delivery time
- ◆ Supply turnkey solution for shielding room, save time and money for customer;
- ◆ Complete solution to solve the partial discharge background noise from grounding, EMI and EMC;



Partial Discharge Detector Feature:

- ◆ SG4008
- ◆ 0.1pC-10nC test range
- ◆ 6 Channels
- ◆ Automatic synchronism input frequency
- ◆ Powerful anti-influence function inside
- ◆ Input:110V-230V 50Hz/60Hz



Digital Power Analyzer Feature:

- ◆ WT503
- ◆ 6 Channels
- ◆ Simultaneous measurement of voltage, current, power, and harmonics
- ◆ High-speed data updating (100 ms)
- ◆ Display of numerical values, waveforms and trends
- ◆ Measurement of bought and sold watt hours
- ◆ Easy setup and operation
- ◆ Voltage range: 15 to 1000 V
- ◆ Current range: 0.5 to 40 A
- ◆ Frequency range: DC 0.5 Hz to 100 kHz
- ◆ Basic power accuracy: 0.1%
- ◆ Input: 110V-230V 50Hz/60Hz



Automatic Tap Changer Controller Feature:

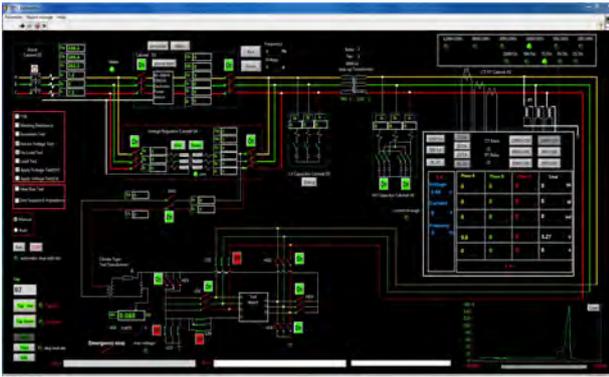
- ◆ ATC-1
- ◆ Motorized external tap changer controller
- ◆ Max. 5 taps control
- ◆ Remote control by RS485
- ◆ Intergrade with main software
- ◆ Fully consider safety and misoperation



Digital DTTS Control and Measuring System Feature:

- ◆ Fulfill IEC, IEEE/ANSI, GB and GOST international standard
- ◆ Automatic final all routine test of distribution transformer and generate test report
- ◆ Manual / automatic test can be select
- ◆ Automatic update the test detail to the internet host computer by ACSII automatically
- ◆ Diagnose pass or fail test
- ◆ International brand electronics are only be used
- ◆ Hardware and software interlocking
- ◆ Industry computer with Labview base software, easy upgrade
- ◆ Laser printer



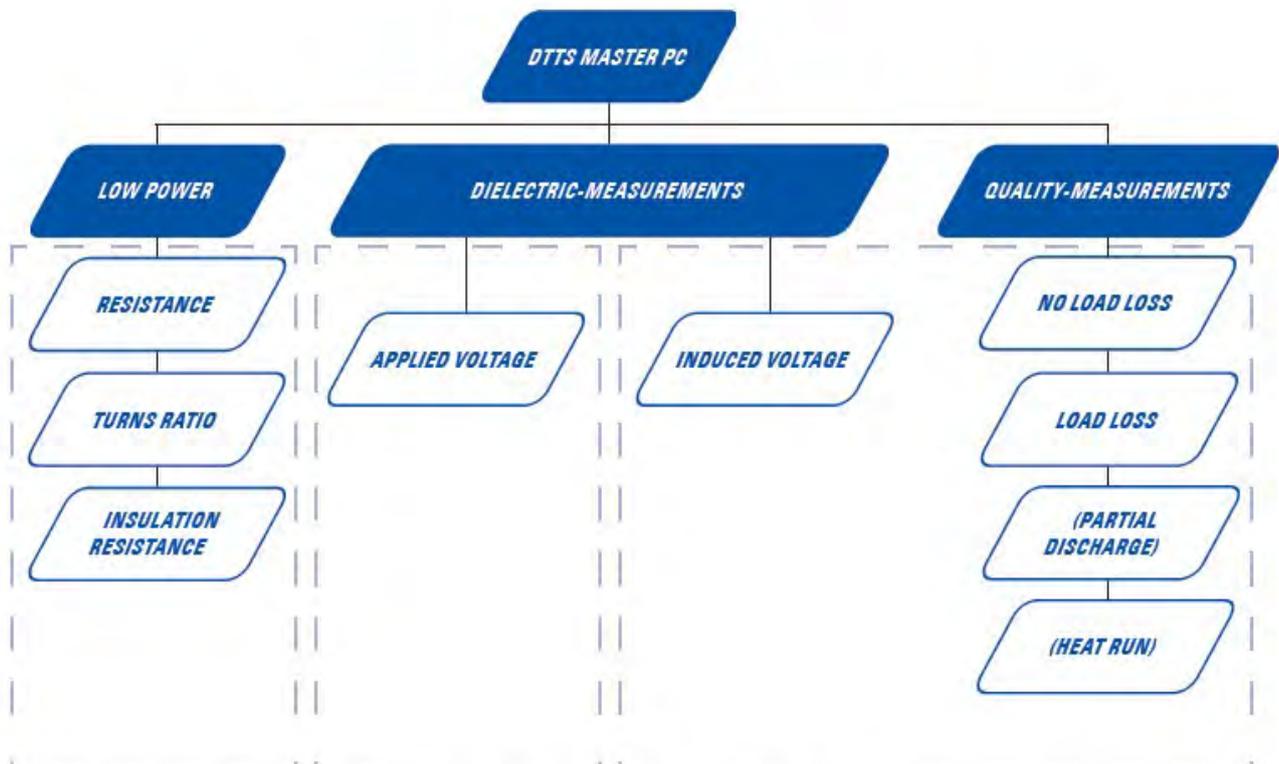


Control Room

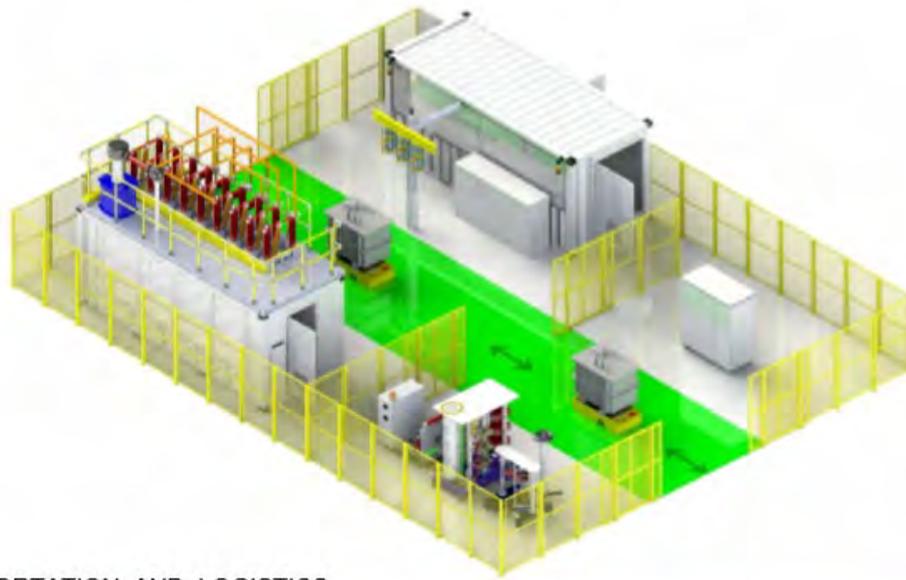
Control Room Container Feature:

- ◆ 10ft standard container to modified and upgrade
- ◆ Install the air conditioner, lighter, windows, control table, chairs, personnel door and staircase
- ◆ Suitable to frequent transportation

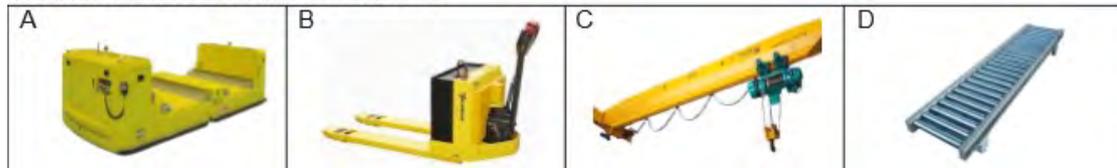
Block Diagram for Typical Distribution Transformer Test System:



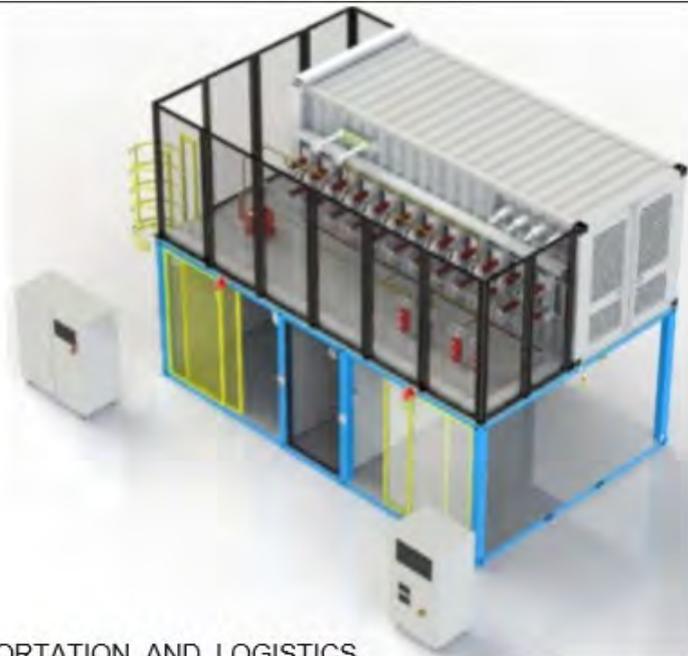
System Design 1:



TRANSPORTATION AND LOGISTICS



System Design 2:



TRANSPORTATION AND LOGISTICS



DTTS includes following main components:

- ◆ Voltage Regulator Cabinet
- ◆ Step Up Transformer Cabinet
- ◆ Electronics Power Supply Cabinet
- ◆ Switchgear Cabinets
- ◆ Automatic Selection Capacitor Bank (LV/HV)
- ◆ Testing Transformer System
- ◆ CT,PTs
- ◆ Power Analyzer
- ◆ Automatic/ Manual Control and Measuring System
- ◆ Partial Discharge Detector
- ◆ Coupling Capacitors
- ◆ Winding Resistance Meter
- ◆ Transformer Turn Ratio Meter
- ◆ Insulation Tester
- ◆ Multi-Channel Temperature Detector
- ◆ Impulse Voltage Generator
- ◆ Control, Measuring, Power Cable

Update to Fully Automatic Test System (Apply Voltage / Induce Voltage / No Load / Load Test By One Time Connection)

- ◆ Control Container
- ◆ Machine Container
- ◆ Module Type Shielding Room
- ◆ Test Platform
- ◆ High Voltage Insulation Switches

DTTS Series Distribution and Traction Transformer Test System for Onsite Repair Testing

In recent years, several successful high voltage on-site tests have been reported as acceptance test of large EHV and distribution and traction transformers repaired onsite in all around world.

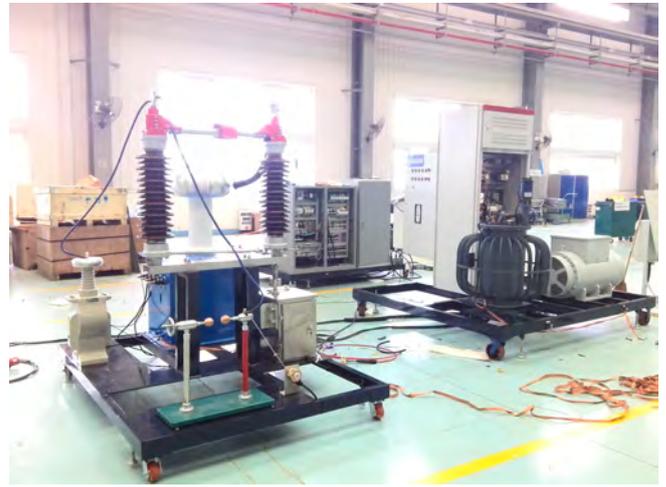
As a natural extension, the same onsite testing technology has also been applied in many cases as an efficient diagnostic tool for transformers where a fault has been detected by another means. More recently, the same technology has also used as an acceptance test for new transformers after problematic factory station shipment.

Samgor has developed the DTTS system is suitable for onsite routine and type testing, it can install in container, compact design for transportation.

The following HV tests have performed on site:

- ◆ Apply Voltage Test

- ◆ Longtime induced voltage (1 hour) with electrical and acoustic monitoring and measurement of Partial Discharge and voltage level up to 150% of rated voltage
- ◆ No load energization with rated voltage during 24 hours with electrical and acoustic monitoring and measurement of Partial Discharge and voltage level up to 115% of rated voltage



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