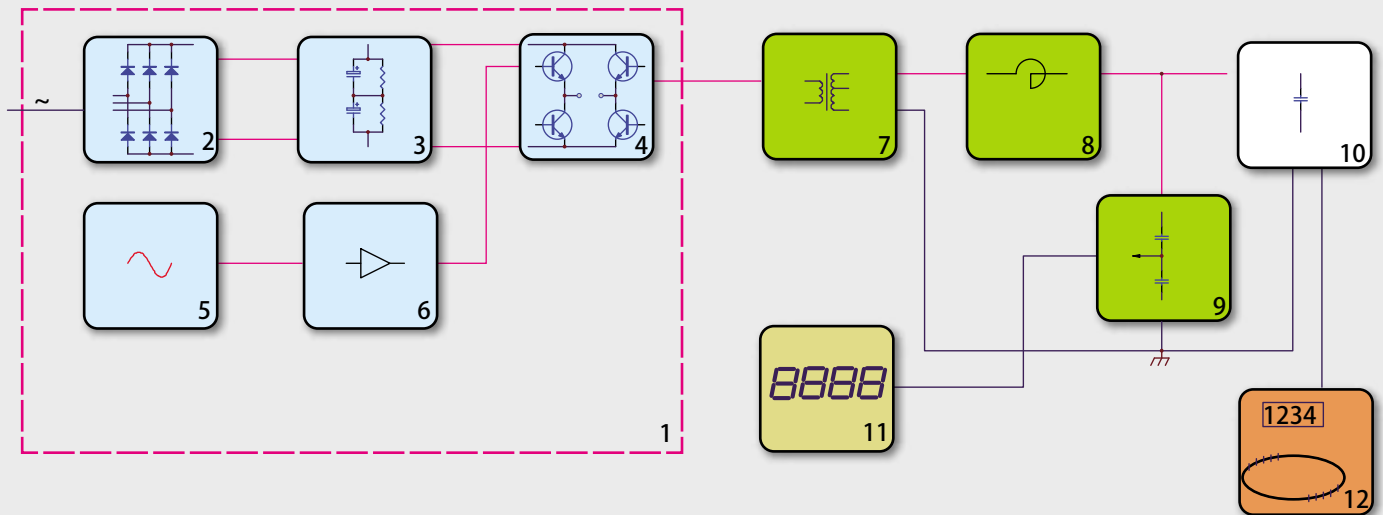


Transformer PD and Induced Voltage Withstand Test System

- PD-free VF Power Supply--output power 5kW~1350kW, pure sine wave with less than 1% distortion, and PD level less than merely 5pC
- Parallel compensation method adopted as mid-freq power generator set
- All PD and induced voltage withstand test of 1000kV UHV & 750kV EHV transformers, and DC converter transformers in China are completed with the PD-free VF Power Supplies provided by Haiwo Science & Technology cable on-site test

Transformer PD and Induced Voltage Withstand Test System



- | | | | |
|---------------------------|---------------------|-----------------------|-----------------------|
| 1 PD-free VF Power Supply | 2 3-phase Rectifier | 3 Filtering Capacitor | 4 Push-pull Amplifier |
| 5 Standard Signal-source | 6 Pre-amplifier | 7 Exciter Transformer | 8 Coupling Capacitor |
| 9 Voltage-divider | 10 Test Object | 11 HV Tester | 12 PD Tester |

Principle

- Classic parallel compensation method adopted as the mid-freq power generator set
- Output power only consumed on resistive load, by vary the frequency, the capacitive reactive power can be completely compensated
- The output voltage from the PD-free VF Power Supplies can be raised through exciter transformer, applied on test object(transformer), and induce test HV on the primary side
- PD is sampled from the bushing tap of the test object transformer

Main Feature

- Linear amplifier matrix composed by high-power transistors applied, without any switching components, the power supply avoids high-freq noise and provides pure sine wave with less than 1% distortion and 5pC PD level
- Conform to the PD standards IEC 60076-3 & GB 1094.3-2003
- Smaller in size and starting current, lighter, and noise level lower compared to mid-freq power generator set; self-exciting over-voltage avoided
- ABB, phoenix, Sanyo, ODU, Suzuki high-quality components applied Multi-protection: over voltage/current, arcing, zero protection, and so on
- Also available for other tests: series-resonant test, electro-magnetic instrument transformer induce voltage withstand test, grounding test, and transformer loss test; or used as high-power mid-freq signal source
- Multi-tap exciter transformer for different voltage level transformer test
- Multi-tap inductor installed on the anti-eddy-current base, equipped on the test truck for the convenience of the test



- 1 ABB Italian made main switch
- 2 Japanese Suzuki Pre-charging Capacitor
- 3 ABB Italian made contactor
- 4 Powe amplifying panel composed by Japanese SANYO 2SC3997 transistors
- 5 Germany ODU Connector
- 6 Germany EMPAST Fan
- 7 Low-temp-resistant Op-fibre Cable
- 8 Rectifier Bridge Arms

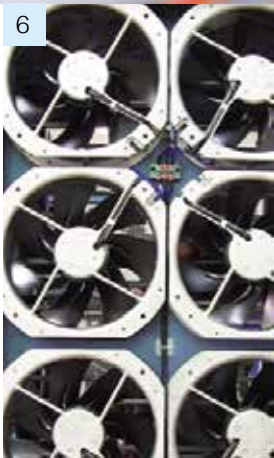


HVFP PD-free VF Power Supply Principle

Successive-step power amplifying theory has been adopted. Electronic signal is amplified many times by H-bridge circuit with four arms composed by thousands of power transistors. With effective current-averaging, guarantees high power output

HVFP	
额定电压: 351.4 V	额定功率: 50.0 kW
总电流: 3823 A	
ARM的额定电流: 1274 A	
ARM的额定电压: 1283 V	
CRM的额定电流: 1266 A	
总额定功率: 1343 kW	
总效率: 1331 kW	总效率: 0.99

450kWx3
power supplies working in parallel





1000kV main transformer on-site test in Huainan East, Anhui Province

1000kV Transformer PD Test

Application

1000kV/1000MVA UHV transformer PD and induced voltage withstand test

Component	Type	Quantity	Parameter
PD-free VF Power Supply	HVFP-450kW	2	900kW output power in parallel; 380V 3-phase input; 0~350V single phase output; 20~300Hz output frequency
PD-free Exciter Transformer	ZB-800kVA/200kV	1	Input tap 2×350/400/450V; output tap 0~200kV; rated frequency 100~300Hz
PD-free Compensating Inductor	HVFR-2500kVA/100kV	4	100kV/25A/5H/120min/130Hz



±500kV converter transformer on-site test in Fengxiang, Shaanxi Province

DC Converter Transformer PD Test System

±800kV、±660kV、±500kV converter transformer PD and induced voltage withstand test

Component	Type	Quantity	Parameter
PD-free VF Power Supply	HVFP-450kW	2	900kW output power in parallel; 380V 3-phase input; 0~350V single phase output; 20~300Hz output frequency
PD-free Exciter Transformer	ZB-450kVA/200kV	2	Input tap 2×350/400/450V; output tap 0~200kV; rated frequency 100~300Hz
PD-free Compensating Inductor	HVFR-1500kVA/100kV	4	100kV/15A/8H/120min/130Hz



500kV 3-phase transformer on-site test in Yuhuan, Zhejiang Province

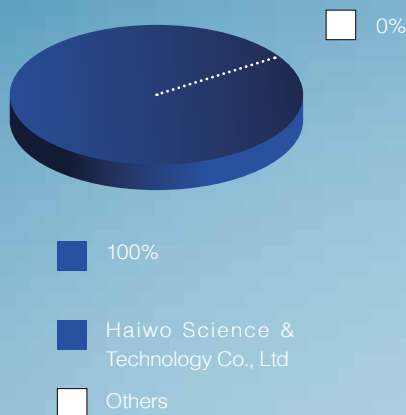
500kV Transformer PD Test

Application

Up to 500kV transformer PD and induced voltage withstand test (Low side 10~66kV)

Component	Type	Quantity	Parameter
PD-free VF Power Supply	HVFP-450kW	1	900kW output power in parallel; 380V 3-phase input; 0~350V single phase output; 20~300Hz output frequency
PD-free Exciter Transformer	ZB-450kVA/2×5/25/60kV	1	Input tap 2×350/400/450V; output tap 0~200kV; rated frequency 100~300Hz
PD-free Compensating Inductor	HVFR-420kVA/35kV	4	35kV/12A/3H/180min/150Hz, 35kV/6H/8A and 20kV/1H/20A multi-tap

Market Share



Our Clients:

1000kV UHV Customers: National Grid, Huabei, Anhui, Henan, Shanxi, Zhejiang, and Hubei Electric Power Research Institute, and Shandong Electric Power Equipment Co.,Ltd.

DC Converter Customers: Shandong, Ningxia, Qinghai, Sichuan, Xinjiang, and Henan Electric Power Research Institute, and China Southern Power Grid EHV Company



220kV transformer on-site test in Jinwei, Shandong Province

220kV Transformer PD Test

Application

Up to 220kV transformer PD and induced voltage withstand test (Low side 10~66kV)

Component	Type	Quantity	Parameter
PD-free VF Power Supply	HVFP-260kW	1	380V 3-phase input; 0~350V single phase output; 20~300Hz output frequency
PD-free Exciter Transformer	ZB-260kVA/2×5/10/35kV	1	Input tap 2×350/400/450V; output tap 2x(±5/25/35) kV; rated frequency 50~300Hz
PD-free Compensating Inductor	HVFR-100kVA/20kV	4	20kV/5A/6H/90min/100Hz

500kV Truck & Container PD Test System

HVFP PD-free VF Power Supply testing system can be installed in a container on truck, integral hoisting, convenient for transportation and on-site test



500kV Truck PD Test System



500kV Container PD Test System

Transformer PD and Induced Voltage Withstand Test System

HVTP 3-phase Transformer Simultaneous PD Test System



110kV 3-phase transformer simultaneous on-site test in Duishan, Xiamen, Fujian Province

- HVTP 3-phase Transformer Simultaneous PD Test System can finish PD test and induced voltage test on three phases simultaneously, conformed to IEC and other relevant international standards
- HVTP power supply can be used as single phase VF power supply, with 100% power output converted; It is also available for series-resonant test

HVTP-100 System Configuration

Component	Type	Quantity	Parameter
PD-free VF Power Supply	HVTP-100kW	1	380V 3-phase input; 0~310V 3-phase 4-core phase output; 20~300Hz output frequency
PD-free Exciter Transformer	ZB3-100kVA/20kV	1	Dry-type, Y-type input 310V; Δ -type output 20kV
PD-free Compensating Inductor	HVFR-100kVA/20kV	3	20kV/5A/6H/90min/100Hz



GIS Synchronized AC Voltage Withstand Test System



220kV GIS Synchronized AC voltage withstand on-site test in Chongqing Iron & Steel (Group) Co., Ltd

The system has been applied more than ten times in Chongqing on GIS Synchronized AC voltage withstand test

The system samples voltage signal from the PT on working bus bar as the reference. With high-speed digital hybrid PLL frequency synthesizer and linear amplifying technique, the system output is synchronized to operating voltage. For the recently built or refurbished GIS substations with double bus bar, the voltage applied on between the operating bus bar and isolation switch at the testing point equals to that between the bus bar operating voltage and the test voltage. When synchronized, the frequency and phase of the two systems are identical, therefore, the voltage the isolation switch withstands is the potential difference between two sides, which eliminates the risk of breakdown.