



Protection Relay Test Solutions

IEC61850 Test Solutions

Amplifier for Power Simulation Application





About us

Throughout the last decade, PONOVO POWER CO., LTD. (previously known as Power Advanced Co., LTD.) has been focusing on providing professional solutions to over 5000 clients in the fields of intelligent testing and power quality control.

2001: Foundation of PONOVO POWER CO., LTD.

2001: Launch of PWA, the relay test system with in-built output monitoring and recording function

2002: Launch of PW466A, the relay test system with 6 currents and 6 voltages

2003: Launch of PH01, the testing system for Traveling Wave Fault Locator

2004: Launch of PWS, the relay test system for subway used protective relays

2005: Launch of PWF, the relay test system for digital substation with IEC61850 protocol

2005: Launch of e40, the software for automatic test and management

2006: Launch of the relay test system for serial compensation system used relays

2007: Launch of PM605A, the universal calibrator and test system

2008: Launch of T200A, the single phase universal tester which can provide 120s output time at 250A

2008: Launch of MR1200, the portable disturbance recorder with in-built oscilloscope function

2008: Launch of PowerTest relay test software

2009: Launch of the relay test system for 500KV DC converting station test application

2009: Launch of L336i, the compact relay test system with 6 currents and 4 voltages and has a weight of 8.6kg

2009: Launch of PCT100i, the CT/PT tester with a weight of 11 kg

2009: Launch of HB-6000, the online DGA (dissolved gas analyzer) system for transformer

2009: Launch of PF3000, the test system for automatic test of power filters

2009: Launch of T1000/T2000, the primary injection kit which can provide 120s output time at 1000A

2009: Launch of TD4000A, which can continuously supply 4000A DC current for testing DC type CT

2010: Launch of PCT200i, new generation CT/PT Tester

2010: Launch of PNS series handheld digital signal analyzer for intelligent substation maintenance

2010: Launch of new generation NF801 portable fiber digital relay tester with 8 fiber optical ports

2012: Launch of Merging Unit (MU) Tester

2012: Launch of NF802 Intelligent Relay Tester

2013: Launch of PNS610 digital signal analyzer

2014: Launch of PW40i, new 3-phase relay test set specially for G59 testing solution

2014: Launch of PNA1000, 24hours online monitor and analyzing system for digital substation

2014: Launch of the PNS630, new touch-screen handheld network analyzer based on IEC61850

2015: Launch of the New Modular Analog-Digital Protection Relay Tester

2016: Launch of PAV series, 3-phase 4-Quadrant amplifier system

2016: Launch of EV Charging Testing System

2017: Launch of the Travelling Wave Fault Location Testing Solution

2019: Launch of EV Charging Station Portable Facility

2020: Launch of L336EXi SUPER-LIGHT Digital Protection Relay Test Set, the whole machine is only 9kg

2021: Launch of PST6747A Semiconductor Test Equipment, a high power semiconductor test platform

2022: Launch of PAS series, Switching-mode 4-Quadrant Power Amplifier

2023: Launch of PCT200 Portable CT/PT Testing System with a weight of only 4kg

Products Introduction

➤ Protection Relay Test Solutions



L336i SUPER-LIGHT Protection Relay Test Set

- ❖ 6X15A, 4X300V / 3X20A, 4X300V*
- ❖ 8 binary inputs and 4 binary outputs
- ❖ IEC61850 test optional
- ❖ Weight: 8.6kg
- ❖ Size(mm): 256X110X395

*Economic Version



PW636i Protection Relay Test Set

- ❖ 6×32A, 4×300V
- ❖ 8 binary inputs and 8 binary outputs, 4 counter inputs, 12 low level outputs
- ❖ Adjustable threshold for binary inputs
- ❖ Auxiliary DC (0-300V)
- ❖ DC measuring inputs
- ❖ In-built output monitoring and recording function
- ❖ IEC61850 test optional



PW460 Protective Relay Test Kit

- ❖ 6×15A, 4×300V
- ❖ 8 binary inputs and 8 binary outputs, 4 counter inputs, 12 low level outputs
- ❖ Adjustable threshold for binary inputs
- ❖ Auxiliary DC (0-300V)
- ❖ DC measuring inputs
- ❖ In-built output monitoring and recording function
- ❖ IEC61850 test optional



PW466i Protective Relay Test Set

- ❖ 6×20A, 6×150V
- ❖ 8 binary inputs and 4 binary outputs
- ❖ Adjustable threshold for binary inputs
- ❖ Auxiliary DC (0-300V)
- ❖ In-built output monitoring and recording function
- ❖ IEC61850 test optional



PW336i Protection Relay Tester

- ❖ 6×15A, 4×150V
- ❖ 8 binary inputs and 4 binary outputs
- ❖ Adjustable threshold for binary inputs
- ❖ Auxiliary DC (0-300V)
- ❖ In-built output monitoring and recording function
- ❖ IEC61850 test optional



PW866i Protection Relay Tester

- ❖ 6×32A, 4×300V
- ❖ Auxiliary DC (220V, 110V, ADJ(0-300V))
- ❖ 8 binary inputs and 8 binary outputs, 4 counter inputs, 12 low level outputs
- ❖ Support both local control with 10.4inch touch screen and PC control by PowerTest software
- ❖ DC measuring inputs
- ❖ In-built output monitoring and recording function
- ❖ IEC61850 test optional



PW41i (Advanced) Protective Relay Test Set

- ❖ 3×40A, 4×300V
- ❖ Auxiliary DC (220V, 110V, ADJ(0-300V))
- ❖ 8 binary inputs and 4 binary outputs
- ❖ Support both local control with 10.4inch touch screen and PC control by PowerTest software
- ❖ Can import test templates



PW41i (Basic) Protective Relay Test Set

- ❖ 3×40A, 3×300V
- ❖ Auxiliary DC (220V, 110V, ADJ(0-300V))
- ❖ 8 binary inputs and 4 binary outputs
- ❖ Local control with LCD and shortcut keys to simplify operation
- ❖ Can import test templates



POM2-6143 Protective Relay Test Set

- ❖ 6×15A, 4×300V
- ❖ 8 binary inputs and 8 binary outputs, 12 low level outputs
- ❖ Support both local control and PC control
- ❖ Auxiliary DC (0-300V)
- ❖ DC measuring inputs
- ❖ IEC61850 test optional



POM2-3243 Three-phase Protection Relay Test Set

- ❖ 3×20A, 4×300V
- ❖ 8 binary inputs and 8 binary outputs, 12 low level outputs
- ❖ Support both local control and PC control
- ❖ Auxiliary DC (0-300V)
- ❖ DC measuring inputs
- ❖ IEC61850 test optional



S40A Protection Relay Testing Equipment

- ❖ 3X40A, 3X300V
- ❖ Auxiliary DC (24V, 110V, 220V)
- ❖ 4 binary inputs and 1 binary outputs
- ❖ Local control with LCD display



S100A Single Phase Universal Protection Relay Test Set

- ❖ 1X100A/1X200mA, 3X150V
- ❖ Auxiliary DC (24V, 110V, 220V)
- ❖ 2 binary inputs and 1 binary outputs
- ❖ Local control with LCD display



T200A Universal Single Phase Test Set/ T200A Single Phase Secondary Injection Test Set

- ❖ 1X250Aac, 1X20A ac/dc, 1X200mA ac/dc
- ❖ 1X500Vac, 1X120V ac/dc, 1X300Vdc
- ❖ Auxiliary DC (20-240V)
- ❖ 2 binary inputs and 1 binary outputs
- ❖ In-built voltmeter and ammeter
- ❖ Long output time: 120s at 250A



T1000 Primary Injection Test Set

- ❖ 1x1000Aac/7000VA
- ❖ 1x250Vac/750VA
- ❖ 1x300Vdc/600W
- ❖ In-built voltmeter and ammeter
- ❖ 120s continuous output time at 1000A

➤ **IEC61850 Test Solutions**



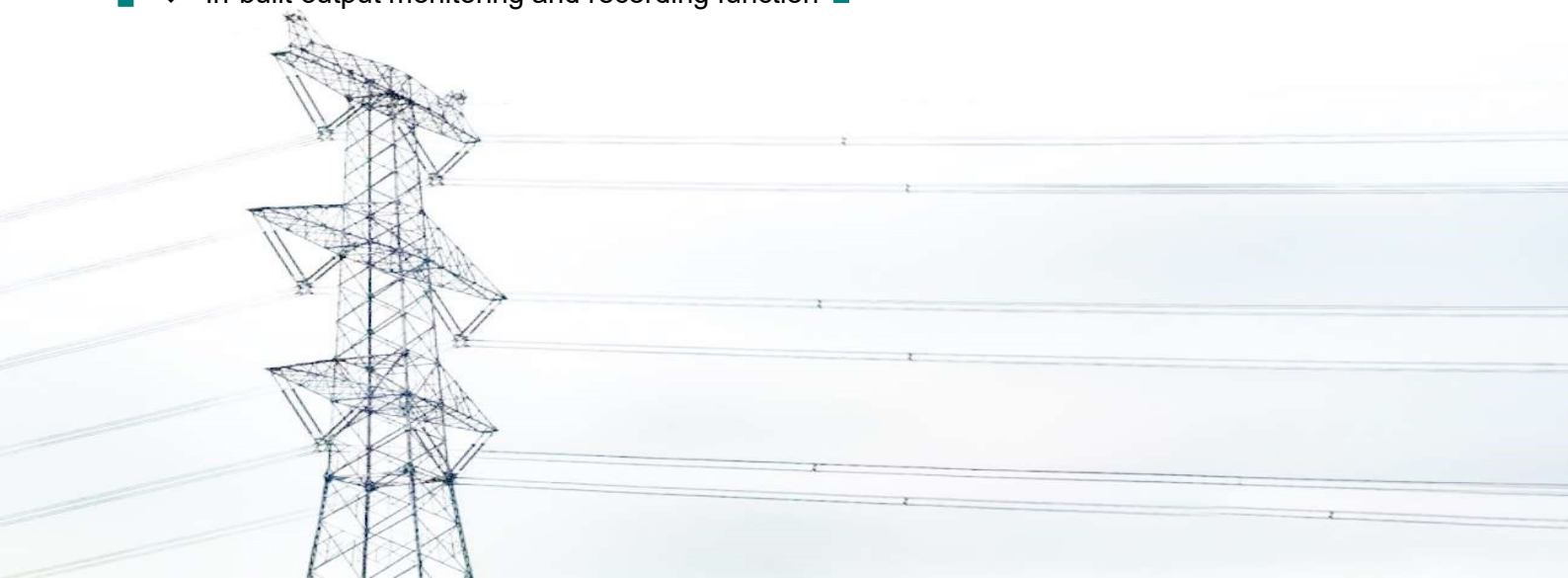
PW636i-F Digital Relay Test Kit

- ❖ 6×32A, 4×300V, 8 fiber optic ports
- ❖ Can be used both as a conventional relay test kit and IEC61850 testing tools
- ❖ Auxiliary DC (0-300V)
- ❖ 8 binary inputs and 8 binary outputs, 4 counter inputs, 12 low level outputs
- ❖ DC measuring inputs
- ❖ In-built output monitoring and recording function



PNS330i Digital Protection Relay Test Set

- ❖ 3×10A, 4×120V, 4 fiber optic ports
- ❖ Can be used both as a conventional relay test set and IEC61850 testing tools
- ❖ 4 binary inputs and 4 binary outputs
- ❖ The whole machine is <3kg
- ❖ Support local control with 10.4inch touch screen and connect with mobile terminals and cloud by Wi-Fi, 4G, and Bluetooth.





L336EXi Digital Protection Relay Test Set

- ❖ 6×20A, 6×130V, 8 fiber optic ports
- ❖ Can be used both as a conventional relay test set and IEC61850 testing tools
- ❖ 8 binary inputs and 8 binary outputs
- ❖ The whole machine is only 9kg
- ❖ Support both local control with 10.4inch touchscreen and PC control with PowerTest software



L336EXi-E Digital Protection Relay Test Set

- ❖ 4×20A, 4×300V, 8 fiber optic ports
- ❖ Can be used both as a conventional relay test set and IEC61850 testing tools
- ❖ 8 binary inputs and 8 binary outputs
- ❖ The whole machine is only 9kg
- ❖ Support both local control with 10.4inch touchscreen and PC control with PowerTest software



POM2-3333 Digital Relay and Merging Unit Tester

- ❖ 6×12.5A, 6×120V, 6 fiber optic ports
- ❖ Receiving and sending IEC61850-9-1/2/2LE and IEC60044-7/8
- ❖ Measuring received fiber optical power
- ❖ IEEE1588 synchronization
- ❖ GPS synchronization interface
- ❖ IRIG-B interface
- ❖ 12 independent lowlevel output
- ❖ 8 binary inputs and 4 binary outputs



NF802 IEC61850 Protection Digital Relay Test Kit

- ❖ 8 fiber optical ports
- ❖ Receiving and sending IEC61850-9-1/2 and IEC60044-7/8
- ❖ Measuring received fiber optical power
- ❖ IEEE 1588 synchronization
- ❖ GPS Synchronization interface
- ❖ IRIG-B code interface
- ❖ 12 independent low level output
- ❖ 8 binary inputs and 8 binary outputs



PNS630 Hand-held IEC61850 Network Analyzer

- ❖ 7inch touch screen
- ❖ 4 Ethernet optical ports, 4 ST serial optical ports
- ❖ 1 binary input, 1 binary output
- ❖ Available programmable upgrade, all in one Micro SD card
- ❖ Receiving and sending IEC61850-9-1/2 and IEC60044-7/8
- ❖ Measuring received fiber optical power
- ❖ IRIG-B and IEEE1588 synchronization



PNA1000 IEC61850 Digital Substation Network Analyzer

- ❖ Vast recording and storage capacity: 1100Mb/s
- ❖ Data process accuracy: 100%
- ❖ High accuracy: frame lost rate 0%
- ❖ 24-hours online monitoring and analyzing network communication in digital substation
- ❖ Warning, detecting and excluding, etc. for the network message communication

➤ CT/PT Test Set



PCT200X Portable CT/PT Testing System (external power supply type)

- ❖ Test Standard: IEC60044-1/6, IEC61869-2, ANSI/IEEE C57.13, IS2705
- ❖ Can test M/P/TP/PS/PX/PXR type, bushing and GIS type CT
- ❖ Ratio check up to 50000:1
- ❖ Knee point/Excitation Test check up to 45000V
- ❖ 7inch built-in touch screen, all test items can be completed automatically after press Run key
- ❖ The whole machine is only 4kg
- ❖ Ratio test accuracy better than $\pm 0.05\%$
- ❖ Support control through mobile phone and tablet



PCT200X Portable CT/PT Testing System (battery type)

- ❖ Test Standard: IEC60044-1/6, IEC61869-2, ANSI/IEEE C57.13, IS2705
- ❖ Can test M/P/TP/PS/PX/PXR type, bushing and GIS type CT
- ❖ Ratio check up to 50000:1
- ❖ Knee point/Excitation Test check up to 45000V
- ❖ 7inch built-in touch screen, all test items can be completed automatically after press Run key
- ❖ The whole machine is only 4kg
- ❖ Ratio test accuracy better than $\pm 0.05\%$
- ❖ With built-in battery can complete a day's duty of testing after being fully charged
- ❖ Support control through mobile phone and tablet



PCT200AX Portable CT/PT Testing System (external power supply type)

- ❖ Test Standard: IEC60044-1/6, IEC61869-2, ANSI/IEEE C57.13, IS2705
- ❖ Can test M/P/TP/PS/PX/PXR type, bushing and GIS type CT
- ❖ Ratio check up to 50000:1
- ❖ Knee point/Excitation Test check up to 45000V
- ❖ 7inch built-in touch screen, all test items can be completed automatically after press Run key
- ❖ The whole machine is only 4kg
- ❖ Ratio test accuracy better than $\pm 0.02\%$
- ❖ Support control through mobile phone and tablet



PCT200AX Portable CT/PT Testing System (battery type)

- ❖ Test Standard: IEC60044-1/6, IEC61869-2, ANSI/IEEE C57.13, IS2705
- ❖ Can test M/P/TP/PS/PX/PXR type, bushing and GIS type CT
- ❖ Ratio check up to 50000:1
- ❖ Knee point/Excitation Test check up to 45000V
- ❖ 7inch built-in touch screen, all test items can be completed automatically after press Run key
- ❖ The whole machine is only 4kg
- ❖ Ratio test accuracy better than $\pm 0.02\%$
- ❖ With built-in battery can complete a day's duty of testing after being fully charged
- ❖ Support control through mobile phone and tablet



PCT200i CT/PT Testing System

- ❖ Standards: IEC60044-1/6, IEC61869-2, ANSI/IEEE C57.13, IS2705
- ❖ Can test M/P/TP type, bushing and GIS type CT
- ❖ Ratio check up to 30000:1 and 45000:5
- ❖ Knee point/Excitation test check up to 45000V
- ❖ One test can get all CT parameters
- ❖ Ratio test accuracy better than $\pm 0.05\%$



PCT200Ai CT/PT Testing System

- ❖ Standards: IEC60044-1/6, IEC61869-2, ANSI/IEEE C57.13, IS2705
- ❖ Can test M/P/TP type, bushing and GIS type CT
- ❖ Ratio check up to 30000:1 and 45000:5
- ❖ Knee point/Excitation Test check up to 45000V
- ❖ One test can get all CT parameters
- ❖ Ratio test accuracy better than $\pm 0.02\%$

➤ Amplifier for Power Simulation Application



Panel Mount Type

- ❖ PAC2000B 1X200ARMS, 2400VA/phase
- ❖ PAC60Ci 6X30A RMS, 450VA/phase
- ❖ PA60Bi 3X60A RMS, 800VA/phase
4X120V RMS, 60VA/phase
- ❖ PA30Bi 3X30A RMS, 450VA/phase
4X120V RMS, 60VA/phase
- ❖ PA30Bi-H 3X30A RMS, 450VA/phase
4X250V RMS, 75VA/phase
- ❖ PAV250Bi 6X250V RMS, 75VA/phase
- ❖ PAV120Bi 6X120V RMS, 60VA/phase



PA460Bi Panel-mounted Power Amplifier

- ❖ PA460Bi 6X32A RMS, 6X120V
- ❖ PA460Bi-C 6X15A RMS
- ❖ PA460Bi-L 6X15A RMS, 6X120V
- ❖ PA460Bi-H 6X32A RMS, 6X300V



Portable Type

- ❖ PAC60Cip 6X30A RMS, 210VA/phase
- ❖ PA60Bip 3X60A RMS, 800VA/phase
4X120V RMS, 60VA/phase
- ❖ PA30Bip 3X30A RMS, 210VA/phase
4X120V RMS, 60VA/phase
- ❖ PA30Bip-H 3X30A RMS, 210VA/phase
4X250V RMS, 75VA/phase
- ❖ PAV250Bip 6X250V RMS, 75VA/phase
- ❖ PAV120Bip 6X120V RMS, 60VA/phase



PAV Series of 4-Quadrant Amplifier

- ❖ PAV3000 1X24A, 3KVA
- ❖ PAV5000 1X40A, 5KVA
- ❖ PAV7500 1X60A, 7.5KVA
- ❖ PAV10000 1X80A, 10KVA
- ❖ PAV15000 1X120A, 15KVA
- ❖ PAV20000 1X160A, 20KVA
- ❖ PAV30000 1X240A, 30KVA



PAS Series Switching-mode 4-Quadrant Power Amplifier

- ❖ PAS60i 60kW/kVA, 3 phases, (270VrmsX75A and $\pm 382VX$ 52.5A)/phase
- ❖ PAS120i 120kW/kVA, 3 phases, (270VrmsX150A and $\pm 382VX$ 105A)/phase
- ❖ PAS240i 240kW/kVA, 3 phases, (270VrmsX300A and $\pm 382VX$ 210A)/phase
- ❖ PAS360i 360kW/kVA, 3 phases, (270VrmsX450A and $\pm 382VX$ 315A)/phase
- ❖ PAS100Di 100kW/kVA, 3 phases, (270VrmsX124A and $\pm 382VX$ 87.5A)/phase
- ❖ PAS120Ai 120kW/kVA, 3 phases, (270VrmsX150A and $\pm 382VX$ 105A)/phase
- ❖ PAS240Ai 240kW/kVA, 6 phases, (270VrmsX150A and $\pm 382VX$ 105A)/phase

➤ Other Testers Used in Lab, Factory and Debugging Institute



PST6747A Semiconductor Test Equipment

- ❖ For measuring and analyzing the static parameters of power semiconductor devices, such as IGBT, and new materials, such as GaN and SiC.
- ❖ 3KV (10KV, optional) and 2200A
- ❖ Fast pulse, fA level current detection capability



MR Series Multi-channel Waveform Monitoring Recorder

- ❖ 0-300A, 0-1000V, could be customized
- ❖ 4-24 analog sampling channels
- ❖ 16 binary sampling channels
- ❖ Sampling frequency 100KS/s
- ❖ Recording time 3000 hours



FT3000 HVDC Power Filter Characteristic Tester

- ❖ Precisely and automatically complete power filter amplitude-frequency and phase-frequency characteristic measurement
- ❖ Automatically measure power filter by parameters of reactor, capacitor and resistor
- ❖ Compensate and measure capacitor group unbalanced current 0.01mA-10mA



TD Series High Voltage DC Test Set

- ❖ TD series testing equipment consists of control unit and DC high current output unit
- ❖ It outputs 0-2000A/0-4000A DC with the accuracy of 0.1% high accuracy DC current used in HVDC convertor station and testing DC current transformer characteristics

Optional Accessories

• Current Booster (Phpc01)



Phpc01 current booster is designed to supply high compliance voltage even at small current range, suitable for testing high burden electromagnetic current relays.

• PW-VP50 CT Polarity checker



2 units. Master machine injects pulse current to primary side of CT, slave machine receives and analysis the waveform of induced pulse current at the secondary side so as to judge the polarity is positive or negative automatically by the LED indicator on the kits.

• GPS synchronization (PGPS02/PGPS04i)

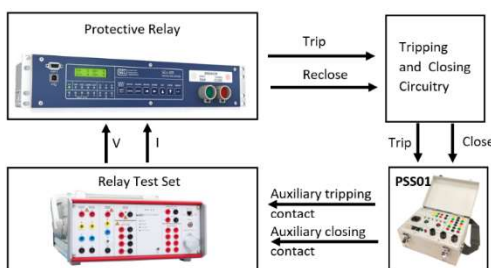


PGPS02: It provides GPS synchronization signal in PPS (pulse per second) or PPM (pulse per minute) for synchronized test. Trigger time can be set for end-to-end test application.



PGPS04i: it is a multi-functional time synchronization device that integrates with GPS time synchronization, IRIG-B (DC-TTL/DC-RS422/optical) outputs, IRIG-B (DC-TTL/DC-RS422/fiber) pulse input, 1PPS/1PPM (DC-TTL/DC-RS232 /fiber) pulse output, timing set of whole trigger points, real-time clock auto-generating and other relevant functions.

• Circuit breaker simulator (PSS01)



Working together with PONOVO relay testing device, PSS01 is to be used to simulate the circuit breaker operation for checking the relay scheme performance. Complicated software settings can be avoided by using this simple accessory.

• Scanning Head (PACB108)



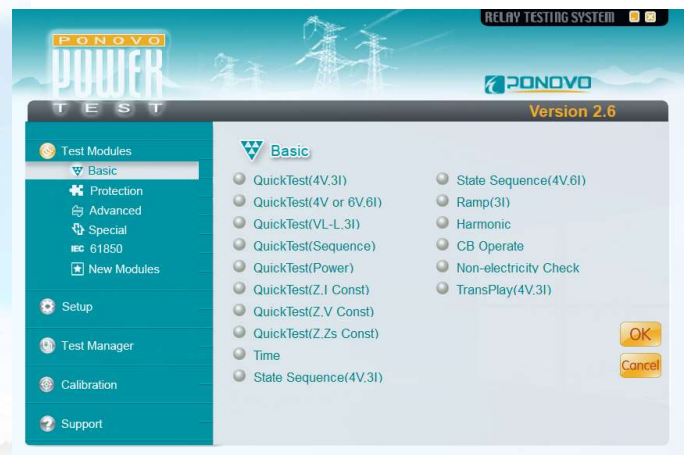
The passive optical scanning head PACB108 detects the status of an LED, that is either an optical pulse output from an energy meter or the binary status of a protective relay or other similar optical source.

PowerTest

Protection Relay Test Software



For all the three phase or six phase relay testers of PONOVO, one universal software can be used, the name is **PowerTest** software. PowerTest is a relay test software that includes different test packages, the **Basic** package, **Protection** package, **Advanced** package, **Special** package and **New Modules**. Each package includes different testing modules, that can be used for different kinds of relay testing, and the special package for more testing application, such as transducer, energy meter, etc.



Basic package



Protection package



Advanced package



Special package

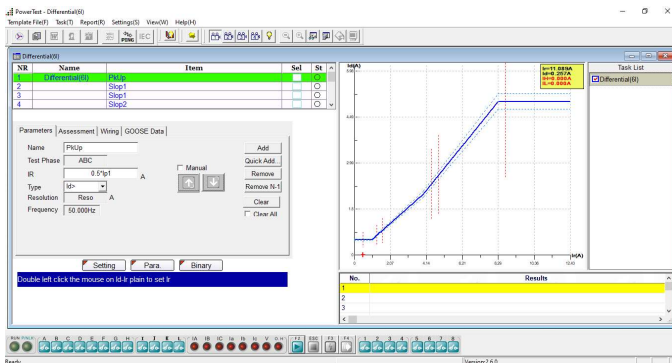


New modules

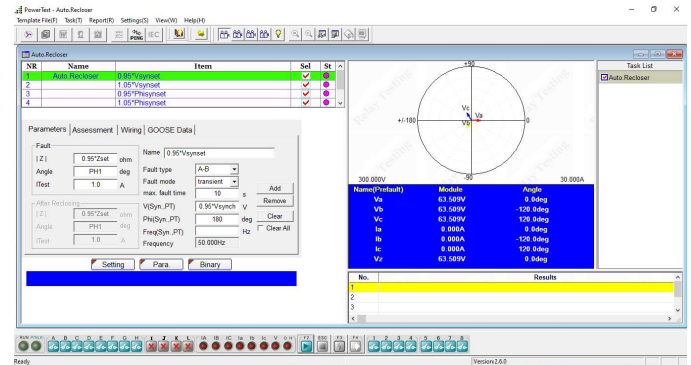
PowerTest-some test modules introduction

Differential

Differential module is suitable for use the 6 output current channels' relay tester, which is applied on transformer, generator and bus bar etc. differential protection equipment test. Because of adopting the 6 currents output, it realizes the two sides three phases test between relay tester and relay equipment.

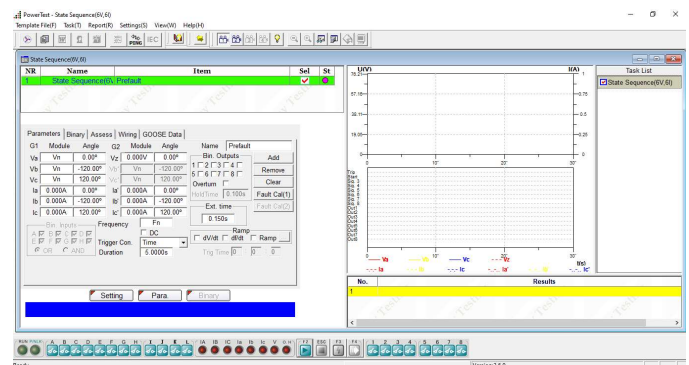


with checking the difference between system and unit, checking the synchronization setting, reclose set time checking and automatic evaluating of testing results.



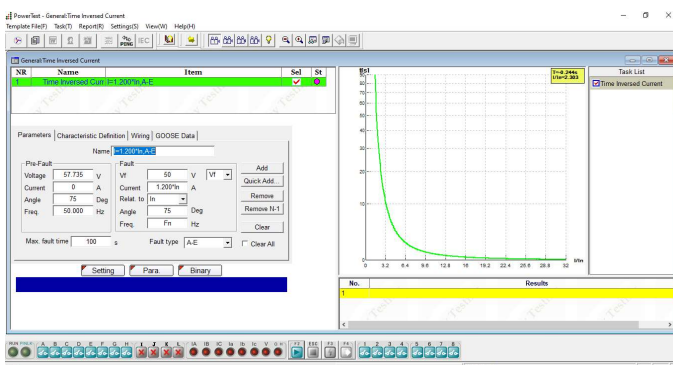
State Sequence

In the State-Sequence module, the relay tester can output multiple continuous state sequences. This module can help user to do customized test.



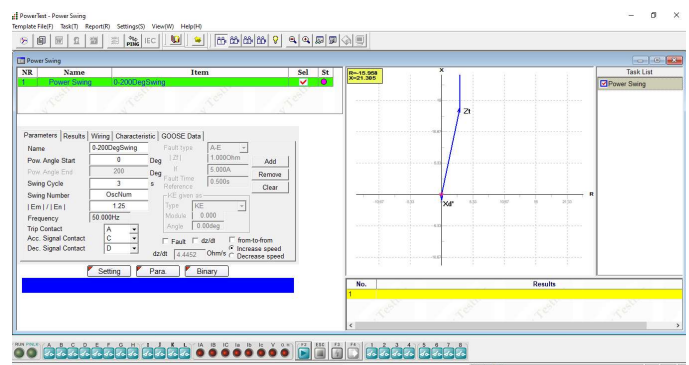
Inverse time overcurrent

This module realizes the directional over-current test and non-directional over-current test. This module also include: testing positive sequence, negative sequence and zero sequence inverse-time over-current, definite- time over-current, over-heat protection or the customized "Current/Time" operation characteristics.



Power swing

Power swing module is applied to simulate the power system swing, testing the out of step for generator and power grid swing splitting device.



Auto-reclosing

Auto-reclosing module is the specific module which is applied to test the reclose function. This module can realize that relay automatic reclosing

PONOVO Template Service

PONOVO provides relay test templates based on relay model from different relay manufactures. With the use of template, the relay test work can be simplified greatly. Each relay test template is one independent file which can be opened in PowerTest relay test software. Registered users can download Basic Template for free use. Customers can contact us to get Customized Test Templates.



• CAG17	• CTU	• P115	• P142	• P343	• P438	• P941	• VAGM22
• CTIG	• DIFB	• P120	• P143	• P344	• P441	• P942	• VAPM
• CTIGM	• MFVUM	• P121	• P144	• P345	• P442	• P943	• P632
• CTMFM	• Micromho	• P122	• P145	• P430	• P443	• PPX	• P633
• CTMM	• MVAPM	• P123	• P241	• P433	• P921	• PVMM	• P634
• CTNM	• MWTU	• P124	• P242	• P435	• P922	• Quadromho	• P642
• CTT	• Optimho	• P127	• P243	• P436	• P923	• SKE	• P643
• CTTM	• P111	• P141	• P342	• P437	• P940	• SKD	• P645 ...



• SEL300	• SEL411
• SEL351	• SEL311C
• SEL587	• SEL311L
• SEL311B	• SEL321
• SEL487B	• SEL421
• SEL487E	• SEL501
• SEL167	• SEL587
...	

• 7RW600	• 7SD5	• 7ST6
• 7SA6XX	• 7SD52	• 7UM61
• 7SA511	• 7SD63	• 7UM62
• 7SA513	• 7SJ61	• 7UM512
• 7SA518	• 7SJ63	• 7UM515
• 7SA519	• 7SJ80	
• 7SA522	• 7SS52	...

• LZ96	• REF542	• REL512
• REG100	• REG216	• REL521
• REL511	• REL300	• REL531
• REL531	• REL316	• REL561
• MSOC	• REL350	• REL650
• RAZFE	• REL352	• REL670
• REB670	• REL356	...
• REC670	• REL511	



• PCS-902	• PCS-9611
• RCS-915	• PCS-902H
• RCS-931	• PCS-931D
• RCS-993	• PCS-9611C
• RCS-902	...

• SR489	• D60
• SR745	• DLDP
• F650	• G30
• SR750	• L90
• GT60	• GE345
...	

• SEPAM 10
• SEPAM 80
• SEPAM 2000
• SEPAM S42
• T20
...

• MRA4
• MRDT4
• MRI4
• MRM
• MRN
...



• GRB100
• GRD110
• GRD140
• GRD150
• GRF100
• GRL100
...

• F_PRO
• L_PRO
• T_PRO
...

• VAMP 255
• VAMP 265
...

• 326GD
...

• PCT210
...

More Templates can be download from our website www.ponovo.net

Professional Solution Provider For The Power World

*Since 2001, **Ponovo Power** has been focusing on providing professional solutions to over 5000 clients in the fields of intelligent testing and power quality control in China and abroad*



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