



# 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 of 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

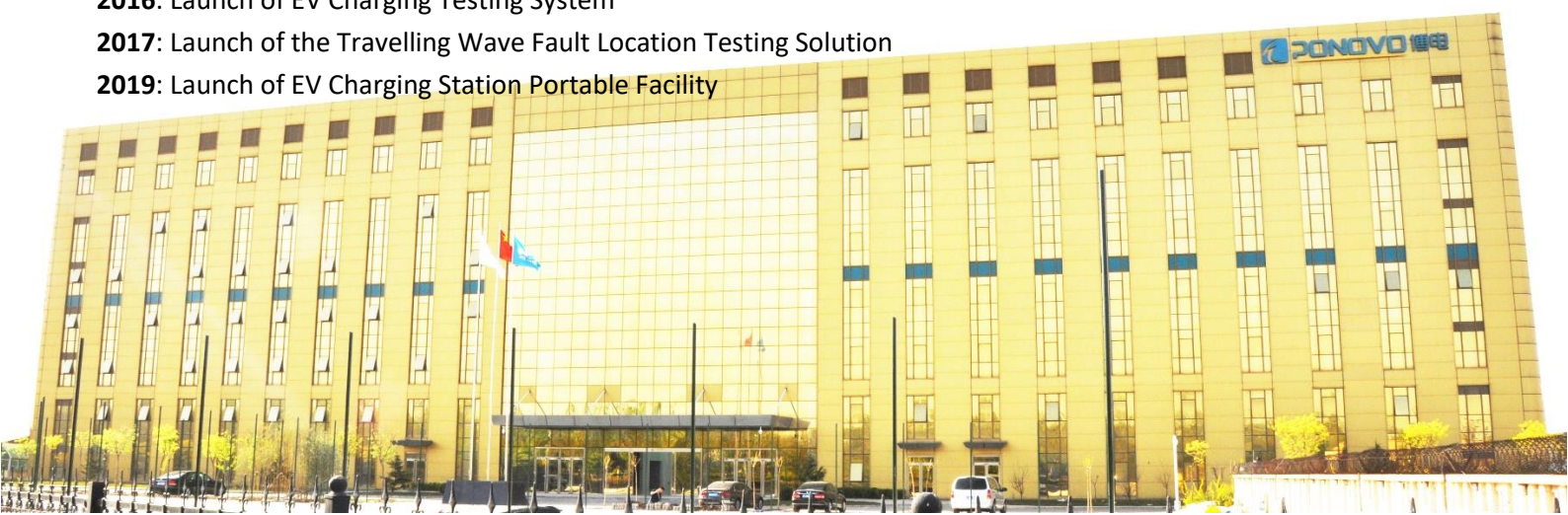
**2015:** Launch of the New Modular Analog-Digital Protection Relay Tester

**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



## Products Introduction



### 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



### POM2-6143 Protective Relay Test Set

- ❖ 6×15A, 4×300V
- ❖ 8 binary inputs and 8 binary outputs, 12 low level outputs
- ❖ Adjustable threshold for binary inputs
- ❖ Auxiliary DC (0-300V)
- ❖ DC measuring inputs
- ❖ 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



### POM2-3243 Three-phase Protection Relay Test Set

- ❖ 3×20A, 4×300V
- ❖ 8 binary inputs and 8 binary outputs, 12 low level outputs
- ❖ Adjustable threshold for binary inputs
- ❖ Auxiliary DC (0-300V)
- ❖ DC measuring inputs
- ❖ 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



### PW41i Protective Relay Test Set

- ❖ 3×40A, 4×300V/3×300V\*
  - ❖ Auxiliary DC (220V, 110V, ADJ(0-300V))
  - ❖ 8 binary inputs and 4 binary outputs
  - ❖ Local control with LCD
  - ❖ Can Import Test Templates
- \*Economic Version

# Products Introduction



## PW466i Protective Relay Testing Equipment

- ❖ 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
- ❖ Independent amplifier interface for external simulation system



## S40A Protection Relay Testing Equipment

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



## 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: 256X110X395mm

\*Economic Version



## 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 (0-240V)
- ❖ 2 binary inputs and 1 binary outputs
- ❖ In-built voltmeter and ammeter
- ❖ Long output time: 120s at 250A



## PNS630 Hand-held IEC61850 Network Analyzer

- ❖ 7.0 inch touch screen
- ❖ 4 Ethernet optical ports, 2 ST Serial optical ports
- ❖ 1 pairs binary inputs, 1 pairs binary outputs
- ❖ 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
- ❖ IEEE1588 synchronization
- ❖ GPS Synchronization interface, IRIG-B code interface



## PCT200 Series CT/PT Test Set

- ❖ Test Standard: IEC60044-1/6, IEC61869-2 and ANSI/IEEE C57.13
- ❖ One test can get all CT parameters
- ❖ Fast test for excitation check
- ❖ Also can do the PT test
- ❖ PCT series: PCT200Ai, PCT200i



## 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



## T1000 Primary Injection Test Set

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



## 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



## POM2-3333 Digital Relay and Merging Unit Tester

- ❖ 6 pairs LC 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 low level output



## 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

# Products Introduction



## 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
- ❖ Local control System based in Windows



## 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

# Amplifier for Real Time Digital Simulator



## 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



## PAV Series of 4-Quadrant Amplifier

- ❖ PAV3000 1X24A, 3KVA
- ❖ PAV5000 1X40A, 5KVA
- ❖ PAV7500, 1X60A, 7.5KVA
- ❖ PAV10000 1X80A, 10KVA
- ❖ PAV15000 1X120A, 15KVA
- ❖ PAV20000 1 x160A, 20KVA
- ❖ PAV30000 1 x240A, 30KVA



## 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



## PA460Bi Panel-mounted Power Amplifier

- ❖ PA460Bi 6X32A RMS, 6X120V
- ❖ PA460Bi-C 6X15A RMS
- ❖ PA460B-L 6X15ARMS, 6X120V
- ❖ PA460Bi-H 6X32A RMS, 4X300V



## 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.



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



- SR489
- SR745
- F650
- SR750
- GT60
- D60
- DLPD
- G30
- L90
- GE345



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



- GRB100
- GRD110
- GRD140
- GRD150
- GRF100
- GRL100



- CAG17
- CTIG
- CTIGM
- CTMFM
- CTMM
- CTNM
- CTT
- CTTM
- CTU
- DIFB
- MFVUM
- Micromho
- MVAPM
- MWTU
- Optimho
- P111
- P115
- P120
- P121
- P122
- P123
- P124
- P127
- P141
- P142
- P143
- P144
- P145
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- P441
- P442
- P443
- P921
- P922
- P923
- P940
- P941
- P942
- P943
- PPX
- PVMM
- Quadromho
- SKD
- VAGM22
- VAPM
- P632
- P633
- P634
- P642
- P643
- P645



- SEPAM 10
- SEPAM 80
- SEPAM 2000
- SEPAM S42
- T20



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



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



- MRA4
- MRDT4
- MRI4
- MRM
- MRN



- F\_PRO
- L\_PRO
- T\_PRO



- 326GD



- PCT210

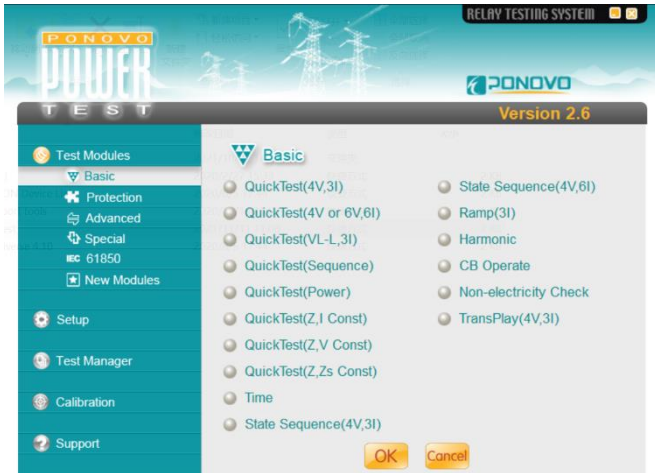


- VAMP 255
- VAMP 265

More Templates can be download from our website [www.ponovo.net](http://www.ponovo.net)

## PowerTest Relay Test Software

### Start Page



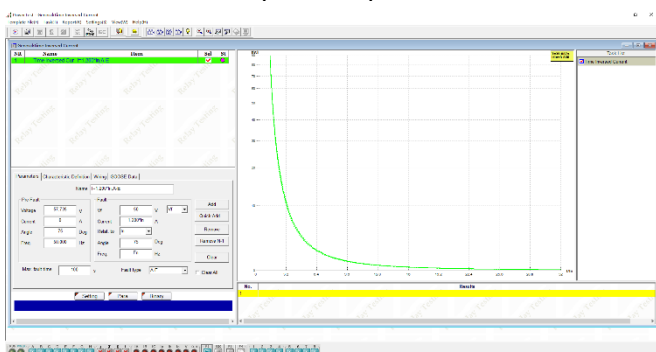
### Differential

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.



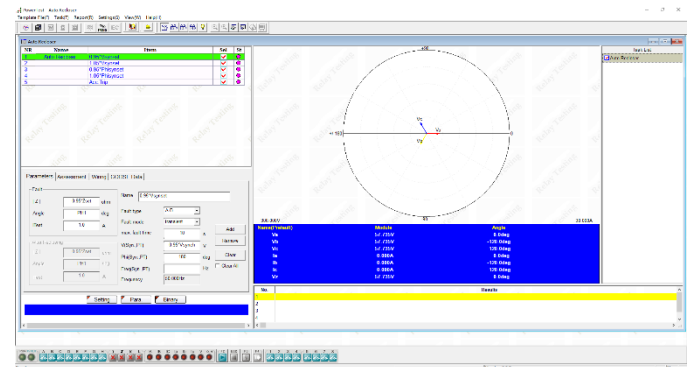
### Inverse time overcurrent

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.



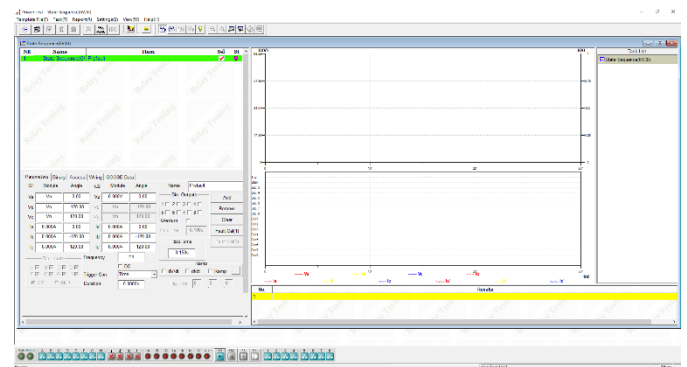
### Auto-reclosing

Auto-reclosing module is the specific module which is applied to test the reclose function. This module can realize that relay automatic reclosing with checking the difference between system and unit, checking the synchronization setting, reclose set time checking and automatic evaluating of testing results.



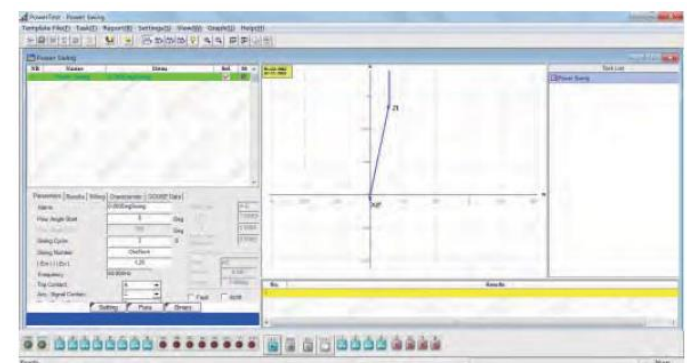
### State Sequence

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



### Power swing

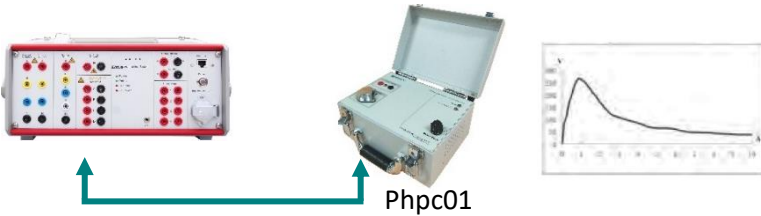
Power swing module is applied to simulate the power system swing, testing the out of step for generator and power grid swing splitting device.





## Optional Accessories

### • Current Booster (Phpc01)



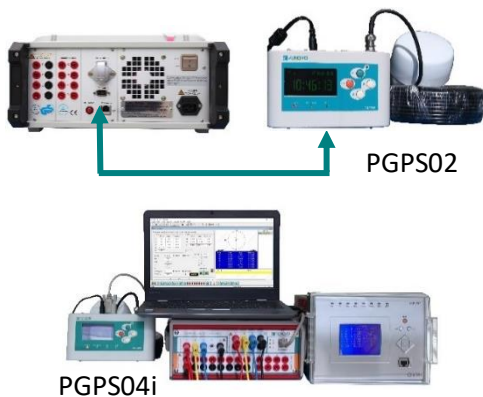
Phpc01 current booster is designed to supply high compliance voltage even at small current range, suitable for testing high burden electromagnetic current relays.

### • 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.

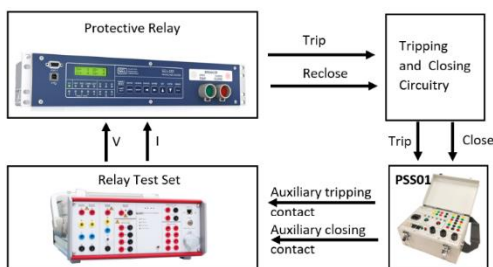
### • GPS synchronization (PGPS02/PGPS04i)



**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:** The PGPS04i 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.

