PONOVO

Power Amplifier for Real Time Digital Simulation

PONOVO POWER CO., LTD.

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 Locater
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 8.8kg
2009: Launch of PCT100i, the CT/PT tester with a weight of 11kg
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 portable digital signal analyzer for intelligent substation maintenance
2010: Launch of new generation NF801 portable Fiber Digital relay tester with 8 fiber optical ports
2010: Launch of SSCS, the solid state composite switch for improving the performance of capacitor bank control
2010: Launch of LVRT (Low voltage ride through)
2011: Launch of APF (Active Power Filter)
2012: Launch of PMU600 phasor measurement unit
2012: Launch of PNS610 new generation of network analyzer
2013: Launch of PNA1000 online network monitoring and analyzing system
2015: Launch of PNI302i the merging unit tester
2015: Launch of PW4361D new optic-analog relay tester
2015: Launch of PNS630 new generation of network analyzer
2015: Launch of PNA702 electrical switchboard network test set
2015: Launch of PMUT600 PMU(Phasor Measurement Unit - IEC61850) test set

Power Amplifier for Real Time Digital Simulator

PA series amplifiers are specially designed for power network real time simulation applications,which requires large power output,high accuracy even at high current output for all kinds of load.It can be used together with RTDS to compose a complete power network real time dynamic simulation system.

Specifications and typical configurations

Panel mount type

Model	Output	Type	Notes
PAC2000B	1×200A RMS, 2400VA/phase	4U	Requires PAP-01 power unit
PA60Bi	3×60A RMS, 800VA/phase, 4×120**V** RMS ,60VA/phase,	4U	3 phase 380VAC±10%,47-63Hz
PAC60Ci	6×30A RMS, 450VA/phase	4U	3 phase 380VAC±10%,47-63Hz
PA30Bi	3×30A RMS, 450VA/phase ,4×120**V** RMS ,60VA/phase,	4U	3 phase 380VAC±10%,47-63Hz
PA30Bi-H	3×30A RMS 450VA/phase,4×250**V** RMS 75VA/phase	4U	3 phase 380VAC±10%,47-63Hz
PAV250Bi	6 x 250**V** RMS,75VA/phase	4U	3 phase 380VAC±10%,47-63Hz
PAV120Bi	6 x 120**V** RMS,60VA/phase	4U	3 phase 380VAC±10%,47-63Hz

Portable Type

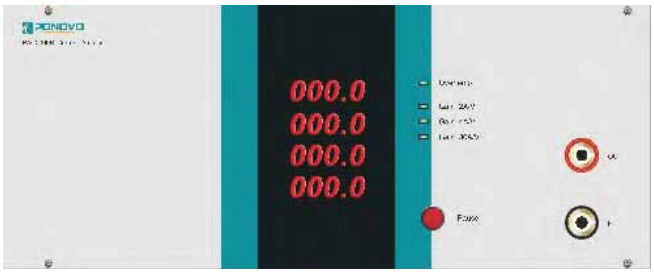
PAC60Cip	6×30A RMS,210VA/phase	4U	110V or 220V AC
PA60Bip	3×60A RMS, 800VA/phase, 4×120**V** RMS ,60VA/phase,	4U	110V or 220V AC
PA30Bip	3×30A RMS,210VA/phase ; 4×120**V** RMS,60VA/phase	4U	110V or 220V AC
PA30Bip-H	3×30A RMS,210VA/phase; 4×250**V** RMS,75VA/phase	4U	110V or 220V AC
PAV250Bip	6 x 250**V** RMS,75VA/phase	3U	110V or 220V AC
PAV120Bip	6 x 120**V** RMS,60VA/phase	3U	110V or 220V AC

Optional Accessories

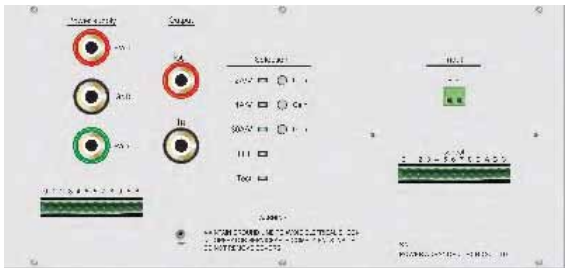
PAD24	Binary input & output converter Number: 12; type: NC (300V,0.5A)	2U	220V AC
PAP01	Three phase main power supply for PAC2000	Cabinet	3 phase 380VAC±10%, 47-63Hz
PAP02	Three phase main power supply for PA series amplifiers	Cabinet	3 phase 380VAC±10%, 47-63Hz
PSS01B	Circuit Breaker Simulator(single tripping coil)	3U	220V AC
PSS02B	Circuit Breaker Simulator(two tripping coils, 2.5A)	3U	220V AC
PSS05B	Circuit Breaker Simulator(two tripping coils, 5A)	3U	220V AC
PAT01	Control unit(limit high current output, protect relay under test, reference base signal for calibrating amplifier source)	2U	220V AC

Panel mount type

PAC2000B



PAC2000B front view

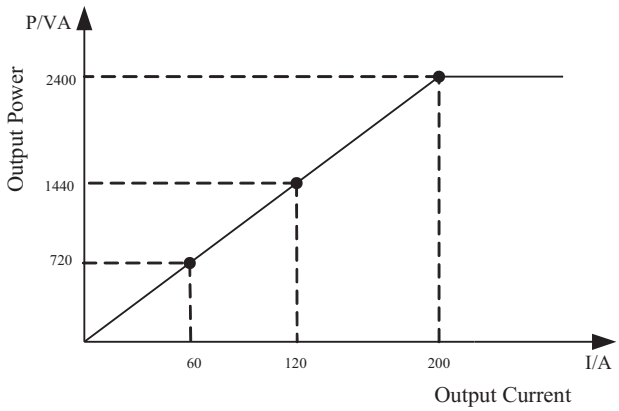


PAC2000B rear view

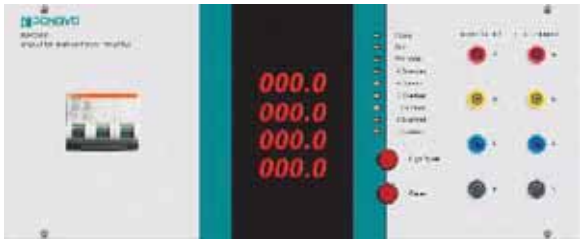
Technical Data

	Single phase current amplifiers(200A)
Model	**PAC2000B**
Current output	**0~200A RMS**
Max. output power	> 2400VA(200A output)
Input signal-Analog	Standard: 0~7.07V RMS (±10Vpek)
Input signal-Digital (optional)	Support Aurora protocol communication
Current accuracy	0.2%(0.5A-200A)
Current typical accuracy	< 0.1%
Differential input impedance	20k
Gain	2A/V or 4A/V or 30A/V
Harmonic distortion ratio	⩽0.2%
Linearity	⩽0.2%
Phase accuracy	0.2°
Frequency range	DC-5kHz±1dB
Step response	< 20us
Input/output delay	< 20us
DC power supply	PAP01
Power supply	**3 phase** 380V AC 50/60 Hz
Chassis	4U 19 inches

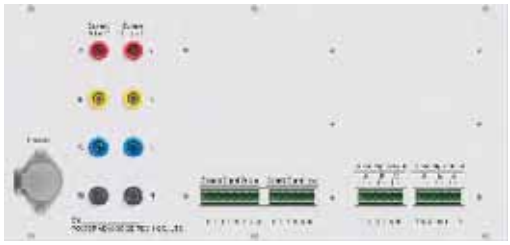
Current amplifiers (200A) Power



PAC60Ci



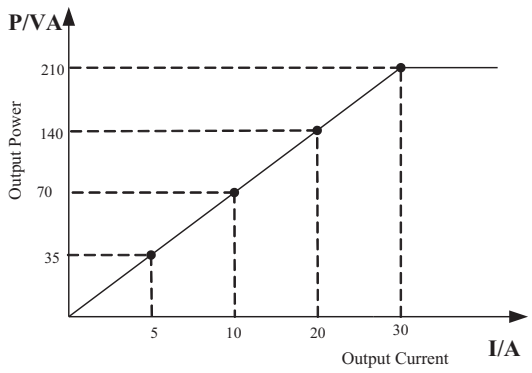
PAC60Ci front view



PAC60Ci rear view

Technical Data

	6 Phase Current Amplifiers(6×30A)
Model	**PAC60Ci**
Current output	6 × 0~30A RMS
Max. output power	>450VA(30A output)
Input signal-Analog, Gain	Standard: Input signal: 0~7.07V RMS (±10Vpek), Gain: 4.5A/V Option: Input signal: 0~11.31V RMS (±16Vpek), Gain: 3A/V
Input signal-Digital (optional)	Support Aurora protocol communication
Current accuracy	0.2%(0.5~30A)
Current typical accuracy	<0.1%
Differential input impedance	20k
Harmonic distortion ratio	⩽0.2%
Linearity	⩽0.2%
Phase accuracy	0.2°
Frequency range	DC~5kHz±1dB
Step response	< 20us
Input/output delay	< 20us
Power supply	**3 phase** 380V AC 50/60 Hz
Chassis	4U 19 inches



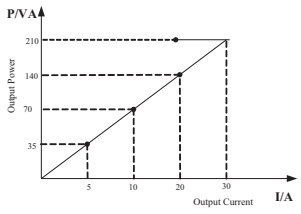
PA30Bi, PA30Bi-H,PA60Bi

Front View

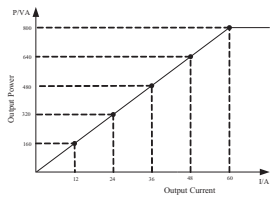
Rear View

Technical Data

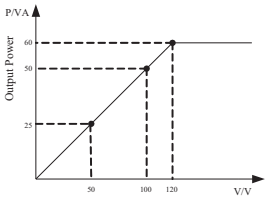
3 Phase Current Amplifier and 4 Phase Voltage Amplifier			
Model	**PA30Bi**	**PA30Bi-H**	**PA60Bi**
Current output	3 × 0~30A RMS	3 × 0~30A RMS	3 × 0-60A RMS
Max. output power	>450VA(30A output)	>450VA(30A output)	>800VA (60A output)
Input signal-Analog, Gain	Standard: 0~7.07V RMS (±10Vpek), Gain: 4.5A/V Option: 0~11.31V RMS (±16Vpek), Gain: 3A/V	Standard: 0~7.07V RMS (±10Vpek), Gain: 4.5A/V Option: 0~11.31V RMS (±16Vpek), Gain: 3A/V	Standard: 0~7.07V RMS (±10Vpek), Gain: 9A/V Option: 0~11.31V RMS (±16Vpek), Gain: 6A/V
Input signal-Digital (optional)	Support Aurora protocol	Support Aurora protocol	Support Aurora protocol
Current accuracy	0.2%(0.5-30A)	0.2%(0.5-30A)	0.2%(0.5A-60A)
Current typical accuracy	<0.1%	<0.1%	<0.1%
Differential input impedance	20k	20k	20k
Harmonic distortion ratio	⩽0.2%	⩽0.2%	⩽0.2%
Linearity	⩽0.2%	⩽0.2%	⩽0.2%
Phase accuracy	0.2°	0.2°	0.2°
Frequency range	DC-5kHz±1dB	DC-5kHz±1dB	DC-5kHz±1dB
Step response	< 20us	< 20us	< 20us
Input/output delay	< 20us	< 20us	< 20us
Voltage output	4 × 0~120V RMS	4 × 0~250V RMS	4 × 0~120V RMS
Max. output power	>60VA(120V output)	>75VA(250V output)	>60VA(120V output)
Input signal, Gain	Standard: 0~7.07V RMS (±10Vpek), Gain: 20V/V Option: 0~11.31V RMS (±16Vpek), Gain: 12V/V	Standard: 0~7.07V RMS (±10Vpek), Gain: 40V/V Option: 0~11.31V RMS (±16Vpek), Gain: 24V/V	Standard: 0~7.07V RMS (±10Vpek), Gain: 20V/V Option: 0~11.31V RMS (±16Vpek), Gain: 12V/V
Voltage accuracy	<0.1%(5V~120V)	<0.2%(5V~250V)	<0.1%(5V~120V)
Voltage typical accuracy	<0.05%	<0.1%	<0.05%
Differential input impedance	20k	20k	20k
Harmonic distortion ratio	⩽0.1%	⩽0.1%	⩽0.1%
Linearity	⩽0.1%	⩽0.2%	⩽0.1%
Phase accuracy	0.2°	0.2°	0.2°
Frequency range	DC-5kHz±1dB	DC-3kHz±1dB	DC-5kHz±1dB
Step response	< 20us	< 80us	< 20us
Input/output delay	< 20us	< 80us	< 20us
Power supply	**3 phase** 380V AC 50/60 Hz	**3 phase** 380V AC 50/60 Hz	**3 phase** 380V AC 50/60 Hz
Chassis	4U 19 inches	4U 19 inches	4U 19 inches



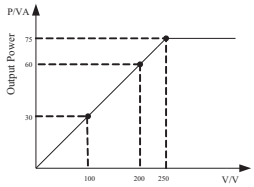
Voltage Amplifiers (120V) Power



Voltage Amplifiers (250V) Power



Output voltage

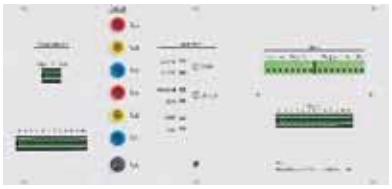


Output voltage

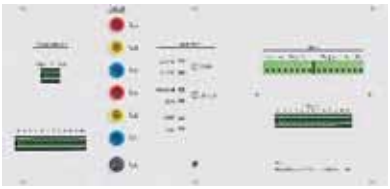
PAV250Bi, PAV120Bi

PAV250Bi front view

PAV120Bi front view



PAV250Bi rear view

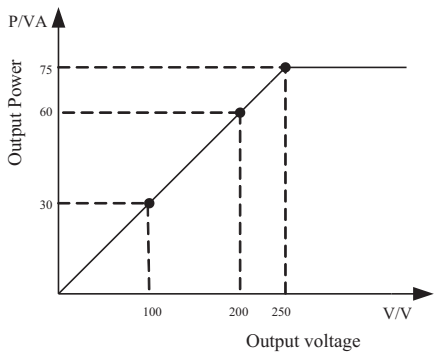


PAV120Bi rear view

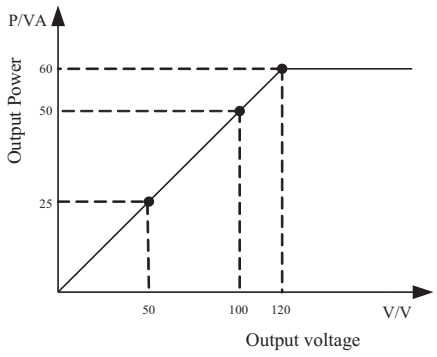
Technical Data

	6 Phase Voltage Amplifier (6 × 250V)	6 Phase Voltage Amplifier (6 × 120V)
Model	**PAV250Bi**	**PAV120Bi**
Voltage output	6 × 0~250V RMS	6 × 0~120V RMS
Max. output power	>75VA(250V output)	>60VA(120V output)
Input signal-Analog,Gain	Standard: 0~7.07V RMS (±10Vpek), Gain: 40V/V Option: 0~11.31V RMS (±16Vpek), Gain: 24V/V	Standard: 0~7.07V RMS (±10Vpek), Gain: 20V/V Option: 0~11.31V RMS (±16Vpek), Gain: 12V/V
Input signal-Digital (optional)	Support Aurora protocol communication	Support Aurora protocol communication
Voltage accuracy	<0.2%(5V-250V)	<0.1%(5V-120V)
Voltage typical accuracy	<0.1%	<0.05%
Differential input impedance	20k	20k
Harmonic distortion ratio	⩽0.1%	⩽0.1%
Linearity	⩽0.2%	⩽0.1%
Phase accuracy	0.2°	0.2°
Frequency range	DC-3kHz±1dB	DC-5kHz±1dB
Step response	<80us	<20us
Input/output delay	<80us	<20us
Power supply	3 phase 380V AC	3 phase 380V AC
Chassis	4U 19 inches	4U 19 inches

Voltage amplifiers (250V) Power:



Voltage amplifiers (120V) Power:



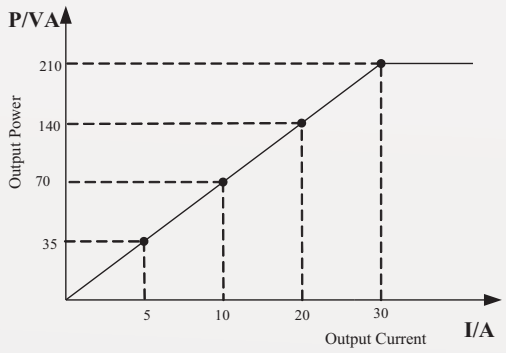
Portable

PAC60Cip

Technical Data

	6 Phase Current Amplifier (6 × 30A)
Model	**PAC60Cip**
Current output	6 × 0~30A RMS
Max. output power	>210VA(30A output)
Input signal, Gain	Standard: Input signal: 0~5V RMS (±7.07Vpek), Gain: 6A/V Option 1: Input signal: 0~7.07V RMS (±10Vpek), Gain: 4.5A/V Option 2: Input signal: 0~11.31V RMS (±16Vpek), Gain: 3A/V
Current accuracy	0.2%(0.5-30A)
Current typical accuracy	<0.1%
Differential input impedance	20k
Harmonic distortion ratio	⩽0.2%
Linearity	⩽0.2%
Phase accuracy	0.2°
Frequency range	DC-5kHz±1dB
Step response	< 20us
Input/output delay	< 20us
Power supply	Single phase 110/220V AC 50/60 Hz
Chassis	4U

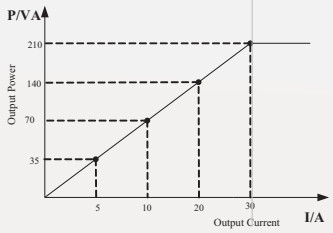
PAC60Cip



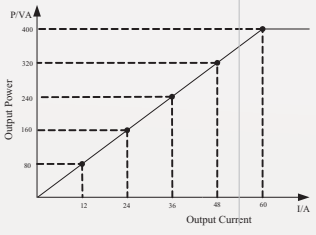
PA30Bip, PA30Bip-H, PA60Bip

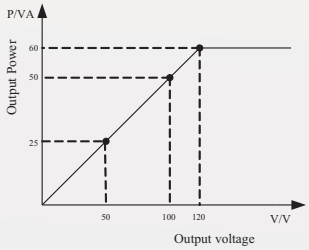
Technical Data

	3 Phase Current Amplifier and 4 Phase Voltage Amplifier		
Model	**PA30Bip**	**PA30Bip-H**	**PA60Bip**
Current output	3 × 0~30A RMS	3 × 0~30A RMS	3×0~60A RMS
Max. output power	>210VA(30A output)	>210VA(30A output)	>800VA (60A output)
Input signal, Gain	Standard: 0~5V RMS (±7.07Vpek), Gain: 6A/V Option 1: 0~7.07V RMS (±10Vpek), Gain: 4.5A/V Option 2: 0~11.31V RMS (±16Vpek), Gain: 3A/V	Standard: 0~5V RMS (±7.07Vpek), Gain: 6A/V Option 1: 0~7.07V RMS (±10Vpek), Gain: 4.5A/V Option 2: 0~11.31V RMS (±16Vpek), Gain: 3A/V	Standard: 0~5V RMS (±7.07Vpek), Gain: 12A/V Option 1: 0~7.07V RMS (±10Vpek), Gain: 9A/V Option 2: 0~11.31V RMS (±16Vpek), Gain: 6A/V
Current accuracy	0.2%(0.5~30A)	0.2%(0.5~30A)	0.2%(0.5~60A)
Current typical accuracy	<0.1%	<0.1%	<0.1%
Differential input impedance	20k	20k	20k
Harmonic distortion ratio	⩽0.2%	⩽0.2%	⩽0.2%
Linearity	⩽0.2%	⩽0.2%	⩽0.2%
Phase accuracy	0.2°	0.2°	0.2°
Frequency range	DC-5kHz±1dB	DC-5kHz±1dB	DC-5kHz±1dB
Step response	< 20us	< 20us	< 20us
Input/output delay	< 20us	< 20us	< 20us
Voltage output	4 × 0~120V RMS	4 × 0~250V RMS	4 × 0~120V RMS
Max. output power	>60VA(120V output)	>75VA(250V output)	>60VA(120V output)
Input signal, Gain	Standard: 0~5V RMS (±7.07Vpek), Gain: 25V/V Option 1: 0~7.07V RMS (±10Vpek), Gain: 20V/V Option 2: 0~11.31V RMS (±16Vpek), Gain: 12V/V	Standard: 0~5V RMS (±7.07Vpek), Gain: 50V/V Option 1: 0~7.07V RMS (±10Vpek), Gain: 40V/V Option 2: 0~11.31V RMS (±16Vpek), Gain: 24V/V	Standard: 0~5V RMS (±7.07Vpek), Gain: 25V/V Option 1: 0~7.07V RMS (±10Vpek), Gain: 20V/V Option 2: 0~11.31V RMS (±16Vpek), Gain: 12V/V
Voltage accuracy	<0.1%(5V~120V)	<0.2%(5V~250V)	<0.1%(5V~120V)
Voltage typical accuracy	<0.05%	<0.1%	<0.05%
Differential input impedance	20k	20k	20k
Harmonic distortion ratio	≤0.1%	≤0.1%	⩽0.1%
Linearity	≤0.1%	≤0.2%	⩽0.1%
Phase accuracy	0.2°	0.2°	0.2°
Frequency range	DC-5kHz±1dB	DC-3kHz±1dB	DC-5kHz±1dB
Step response	<20us	<80us	<20us
Input/output delay	<20us	<80us	<20us
Power supply	Single phase 110/220V AC 50/60 Hz	Single phase 110/220V AC 50/60 Hz	Single phase 110/220V AC 50/60 Hz
Chassis	4U	4U	4U

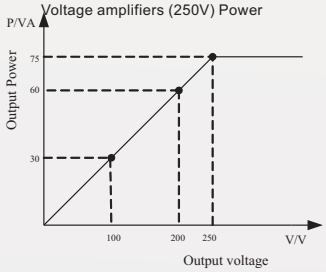


Voltage amplifiers (120V) Power





Voltage amplifiers (250V) Power

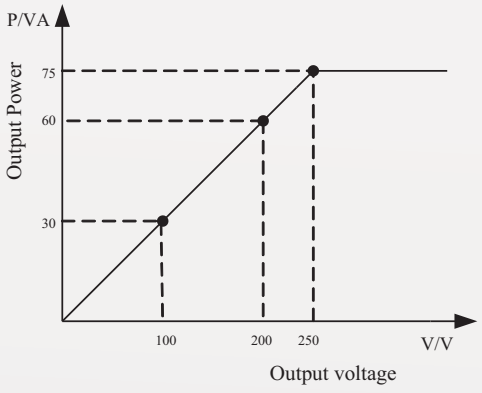


PAV250Bip, PAV120Bip

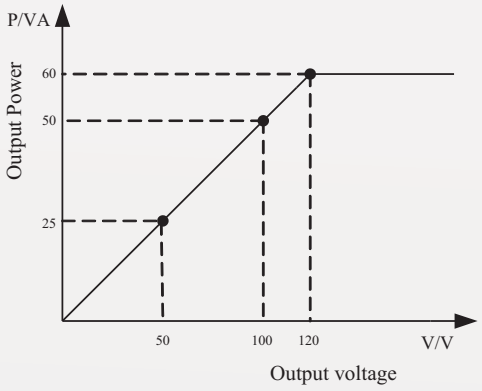
Technical Data

	6 Phase Voltage Amplifier (6 × 250V)	6 Phase Voltage Amplifier (6 × 120V)
Model	**PAV250Bip**	**PAV120Bip**
Voltage output	6× 0~250V RMS 6× 0~300V RMS (optional)	6 × 0~120V RMS
Max. output power	>75VA(250V/300V output)	>60VA(120V output)
Input signal, Gain	Standard: 0~5V RMS (±7.07Vpek), Gain: 50V/V; Gain: 60V/V (300V output, optional) Option 1: 0~7.07V RMS (±10Vpek), Gain: 40V/V; Gain: 45V/V (300V output, optional) Option 2: 0~11.31V RMS (±16Vpek), Gain: 24V/V; Gain: 30V/V (300V output, optional)	Standard: 0~5V RMS (±7.07Vpek), Gain: 25V/V Option 1: 0~7.07V RMS (±10Vpek), Gain: 20V/V Option 2: 0~11.31V RMS (±16Vpek), Gain: 12V/V
Voltage accuracy	<0.2%(5V~250V)	<0.1%(5V~120V)
Voltage typical accuracy	<0.1%	<0.05%
Differential input impedance	20k	20k
Harmonic distortion ratio	≤0.1%	≤0.1%
Linearity	≤0.2%	≤0.1%
Phase accuracy	0.2°	0.2°
Frequency range	DC-3kHz±1dB	DC-5kHz±1dB
Step response	<80us	<20us
Input/output delay	<80us	<20us
Power supply	Single phase 110/220V AC 50/60 Hz	Single phase 110/220V AC 50/60 Hz
Chassis	3U	3U

Voltage amplifiers (250V) Power:



Voltage amplifiers (120V) Power:



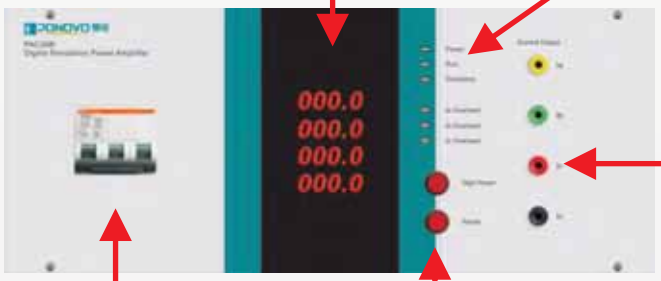
Panel Configuration for panel mount type amplifier

Amplifier output display

The in-built sampling unit in the amplifier is designed to sample the real time output signal and the output value for each current/voltage channel will be displayed in the display area.

LED indicator for amplifier working status

a) Power On display
b) Operation display
c) Overheat display
d) Current open circuit display
e) Voltage short circuit display



Amplifier outputs

Three phase power supply switch

Panel control button

a) High power output button
b) Output pause button

Amplifier protection

The following protection is designed for current/voltage amplifier

a) Current open-circuit
b) Voltage short-circuit
c) Overload
d) Overhead

Main power supply

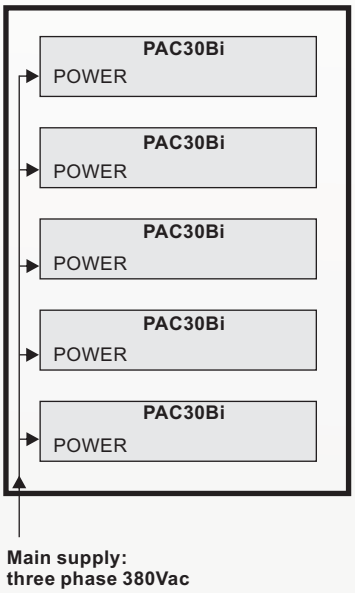
Three phase power supply will be used to drive the amplifier and can be designed according to customer requirement, such as 240Vac, 380Vac, 400Vac, etc.

Why three phase power supply is considered?

Once a number of amplifiers and generate the maximum power at the same time, the power consumption of the main power supply may become huge. If there is single power supply it may cause the unbalance for the three phase power supply system.

In the following example 5 PAC30Bi amplifier units (6*30A) are mounted on the panel. The maximum of main supply power for each unit is about 2.5-3.0kVA and the total power supply requirement is12.5-15kVA. If 15kVA power is supplied by single phase power supply sourceunbalance will be caused.. This is the reason why we design three phase main supply on the panel.

Power supply and distribution



Why large output power is required?

1. The length of cable connecting amplifier and RTDS system
2. Quantity of relays which need to be connected together

Relations between cable type/length and output power can be better explained with the following able.

Calculation condition:

1. Relay impedance : 0.1-0.2 ohm
2. Cable type: 4 sq mm at 25 °C

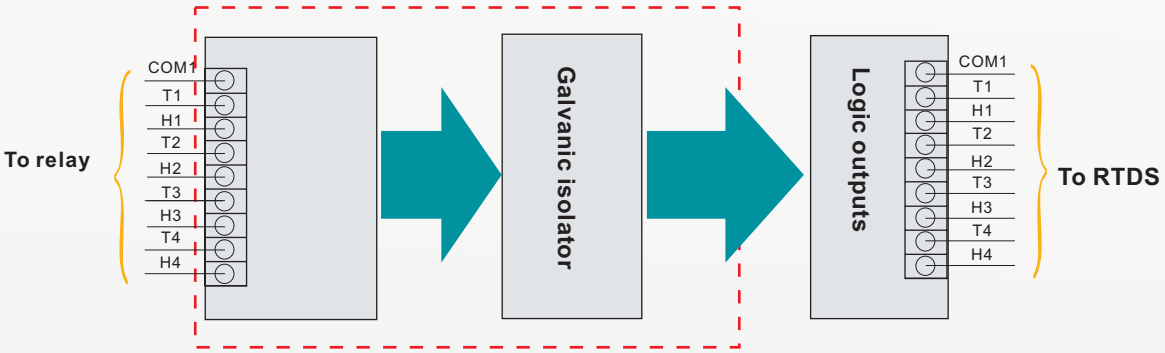
Relations between the compliance voltage of current **output and cable length**

	Current Output (A)	Power Output (VA)	Compliance Voltage (V)	Max Load(ohm)	Recommended Cable Length (M)
PONOVO 30Bi/60Bi	7.5A(L-N)	120	16	2.13	10~20
	22.5A(L-N)	342	15.2	0.68	4~8
	30A(L-N)	458	15	0.5	2~4
	50A(3L-N)	600	12	0.24	1~2
	180A(3L-N) 6×30A	1260	7	0.26	1~2
Other brands	7.5A(L-N)	70	9.3	1.24	6~12
	22.5A(3L-N)	210	9.3	0.41	2~4
	30A(3L-N)	200	6.66	0.22	1~2
	50A(3L-N)	160	3.2	0.06	0

Optional accessories

PDA24/PDA36 : the binary input & output converter

It is used to create galvanic isolation between protective relay and RTDS system
Inputs : 24 or 36 binary inputs, dry or wet (15-250Vdc)
Outputs : compatible to TTL, CMOS , Opto-coupler

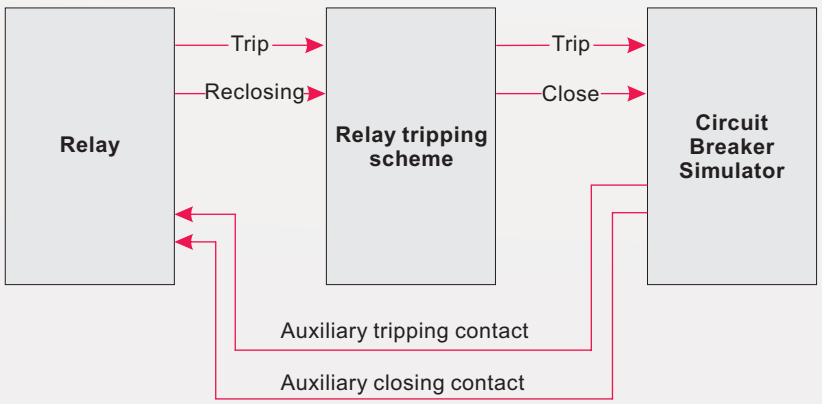


PSS series Circuit Breaker Simulator

Application: simulate circuit breaker operation

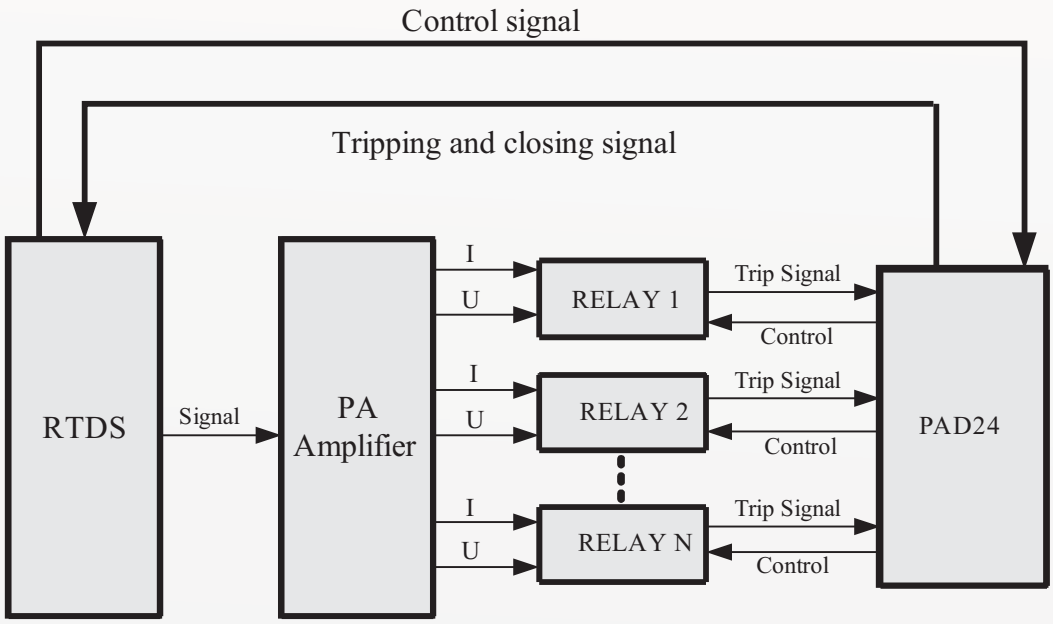
Features:

- Can select 3 pole or 1 pole tripping
- Separate coil for single closing and single tripping
- Can simulate circuit breaker failure
- Separate settings for tripping and closing time
- Separate settings for tripping and closing current
- Provide circuit breaker auxiliary contacts for complex test applications
- Can select single tripping coil and two tripping coils

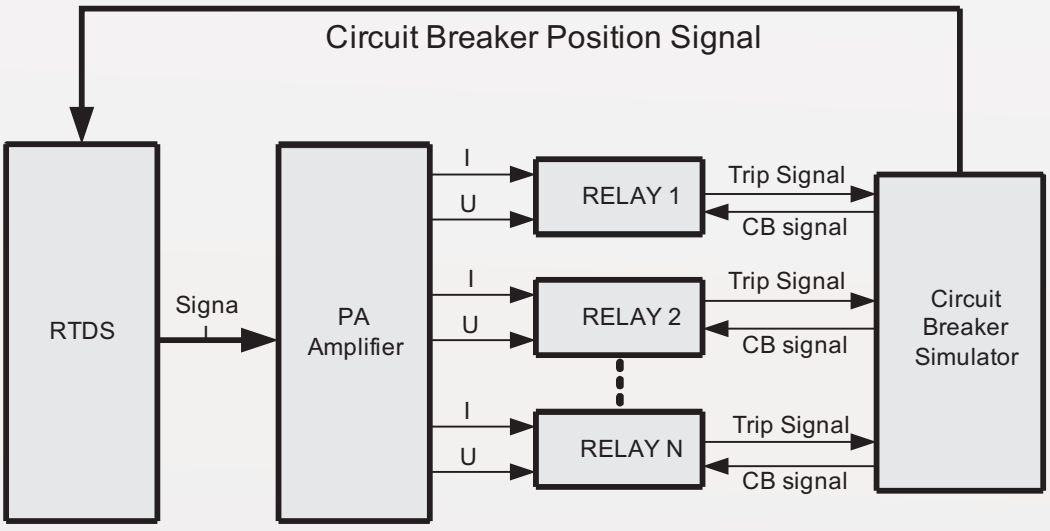


Typical Application Example

Relay Test Simulation – with PAD24



Relay Scheme
Simulation - with Circuit Breaker Simulator



Project Examples

★State Grid Consrtuction Company Limited

*Beijing Sifang Automation Co.,Ltd

*East China Electric
Power Test & Research Institute

*North China EPRI

*State Grid Nanjing Automation Research Institute

PONOVO Amplifier Reference List

	Customer Name	Country	Voltage Source	Current Source
2002				
	Sichuan Electrical Power Research Institute	China	18*120V	9*60A/3*200A
2003				
	Shandong Electrical Power Research Institute	China	12*120V	9*60A
	East China Electric Power Test & Research Institute	China	24*120V	9*60A/6*200A
	NARI Group Corporation	China	196*120V	42*60A/210*30A/12*200A
	XJ Group CO.,LTD	China	146*120V	138*60A/3*200A
	State Grid Nanjing Automation CO.,LTD	China	60*120V	27*60A/12*200A
	State Grid Nanjing Automation Research Institute	China	196*120V	27*60A/56*30A
	Beijing Yiqun Engineering Consultant Co., LTD	China	12*120V	63*30A
	State Grid Consrtuction Company Limited	China	60*120V	66*30A/30*60A
	North China Electrical Power Research Institute	China	36*120V	12*60A/18*30A/6*200A
2004				
	Xi'an Jiaotong University	China	18*120V	6*60A/3*200A
	Beijing Sifang Automation Co., LTD	China	56*120V	42*60A/9*200A/30*30A
	Fujian Electrical Power Research Institute	China	14*120V	6*30A/3*200A
	Jiangsu Electrical Power Research Institute	China	20*120V	9*60A/6*200A
	Beijing Sifang Automation Co.,LTD	China	56*120V	42*60A/6*200A
2005				
	Tianjin University	China	16*120V	12*60A
	East China Electric Power Test & Research Institute	China	24*120V	9*60A/6*200A
	XJ Group CO.,LTD	China	146*120V	138*60A/3*200A
	Beijing Sifang Automation Co., LTD	China	56*120V	42*60A/9*200A/30*30A
	NR Electric CO.,LTD	China	152*120V	78*60A/24*30A/24*10A/3*200A
	China Southern Power Grid CO.,LTD	China	108*120V	54*60A/30*30A/6*200A
	China Electrical Power Research Institute	China	242*120V	78*60A/87*30A/15*200A
2006				
	NR Electric CO.,LTD	China	152*120V	78*60A/24*30A/24*10A/3*200A
	China Electrical Power Research Institute	China	242*120V	78*60A/87*30A/15*200A
	South China University of Technology	China	12*120V	9*60A
2007				
	NR Electric CO.,LTD	China	152*120V	78*60A/24*30A/24*10A/3*200A
	China Electrical Power Research Institute	China	242*120V	78*60A/87*30A/15*200A
	XJ Group CO.,LTD	China	146*120V	138*60A/3*200A
	NARI Group Corporation	China	196*120V	42*60A/210*30A/12*200A
	Beijing Yiqun Engineering Consultant Co., LTD	China	12*120V	63*30A
	State Grid Consrtuction Company Limited	China	60*120V	66*30A/30*60A
	State Grid Nanjing Automation CO.,LTD	China	60*120V	27*60A/12*200A
	State Grid Nanjing Automation Research Institute	China	196*120V	27*60A/56*30A
	Hebei Electrical Power Research Institute	China	24*120V	12*60A/6*30A/3*200A
	Shanxi Electric Power Research Institute	China	6*120V	6*200A
	Shanghai Electric Power Transmission & Distribution Group	China	14*120V	6*60A/3*200A
2008				
	NR Electric CO.,LTD	China	152*120V	78*60A/24*30A/24*10A/3*200A
	VNIIR,JSC	Russia	12*120V	9*200A
	China Electrical Power Research Institute	China	242*120V	78*60A/87*30A/15*200A
	Beijing Yiqun Engineering Consultant Co., LTD	China	12*120V	63*30A
	State Grid Consrtuction Company Limited	China	60*120V	66*30A/30*60A
	Tsinghua University	China	6*120V	3*30A/3*30A/6*200A
	Zhejiang University	China	24*120V	18*30A
	Jiangxi Electrical Power Research Institute	China	16*120V	24*60A
	Inner Mongolia Electrical Power Research Institute	China	24*120V	8*60A/12*30A
	Chongqing Electrical Power Research Institute	China	12*120V	24*60A/6*200A
	Anhui Power Electric Test & Research Institute	China	16*120V	12*60A/9*30A
2009				
	Beijing Jiaotong University	China	14*120V	9*60A/6*30A
	China Electrical Power Research Institute	China	242*120V	78*60A/87*30A/15*200A
	XJ Group CO.,LTD	China	146*120V	138*60A/3*200A
	China Agricultural University	China	18*120V	9*60A/6*30A/3*200A
	North China Electric Power University	China	18*120V	12*60A/6*200A
	Shanxi North West Grid Technology Center	China	10*120V	6*60A/3*200A
2010				
	NR Electric CO.,LTD	China	152*120V	78*60A/24*30A/24*10A/3*200A
	Experiment & Verification Center of State Grid	China	200*120V	27*60A/123*30A
	Electric Power Research Institute China Electrical Power Research Institute	China	242*120V	78*60A/87*30A/15*200A
	NARI Group Corporation	China	196*120V	42*60A/210*30A/12*200A
	Shandong Electric Power College	China	12*120V	9*30A
	State Grid of Electrical Power Research Institute	China	200*120V	27*60A/123*30A

	Customer Name	Country	Voltage Source	Current Source
2011				
	Washingtong State University	USA	6*250V	6*30A
	National Research University "Moscow Power Engineering Institute" (MPEI)	Russia	12*120V	6*30A/6*60A
	State Grid of China Technology College	China	48*120V	15*60A/21*30A
	XJ Group CO.,LTD	China	146*120V	138*60A/3*200A
	China Electrical Power Research Institute	China	242*120V	78*60A/87*30A/15*200A
	Beijing Sifang Automation Co., LTD	China	56*120V	42*60A/9*200A/30*30A
	NR Electric CO.,LTD	China	152*120V	78*60A/24*30A/24*10A/3*200A
	Wuhan University	China	4*120V	9*30A
	Xi'an High Voltage Apparatus Research Insitute Co., Ltd	China	18*120V	6*60A/3*200A
	Zhejiang Electrical Power Research Institute	China	20*120V	27*30A
2012				
	"NTC EES"	Russia	12*250V	6*30A/ 3*60A
	XJ Group CO.,LTD	China	146*120V	138*60A/3*200A
	NARI Group Corporation	China	196*120V	42*60A/210*30A/12*200A
	Southwest Jiaotong Univeristy	China	8*120V	18*30A
	Shanghai University of Electric Power	China	12*120V	12*60A/3*200A
2013				
	Kazan National Research Technical University	Russia	6*120V	6*30A
	Zhejiang Electrical Power Research Institute	China	20*120V	27*30A
	NTC EES	Russia	6*250V	6*30A
	Shanghai Eletric	China	24*120V	18*30A
	Inner Mongolia University of Technology	China	16*120V	6*60A/12*30A
	NARI Group Corporation	China	196*120V	42*60A/210*30A/12*200A
	NR Electric CO.,LTD	China	152*120V	78*60A/24*30A/24*10A/3*200A
	South China University of Technology	China	20*120V	15*30A
	CLP Power Engineering Co., LTD Purell	China	120*120V	90*30A
	Shanghai Electric Group Co., Ltd	China	24*120V	18*30A
	Xian XD Power Systems Co., Ltd	China	16*120V	12*60A
	The 704 Research Institute of China Shipbuilding Industry Corporation	China	8*120V	6*30A
2014				
	Tecon	Russia	6*120V	6*30A
	Tomsk Polytechnic University (TPU)	Russia	6*120V	6*30A
	CJSC ELAB"	Russia	6*120V	6*30A
	RTDS Technologies Inc	Russia	/	6*30A*2
	RTDS Technologies Inc	Russia	6*120V*2	/
	CONECTA	Chile	/	6*30A
	CONECTA	Chile	6*120V	/
	XJ Group CO.,LTD	China	146*120V	138*60A/3*200A
	South China University of Technology	China	24*120V	18*30A
	Liao Ning Electrical Power Research Institute	China	32*120V	6*200A/18*30A/6*60A
	Shandong Electrical Power Research Institute	China	12*120V	9*60A/3*200A
	Jiang Su Electrical Power Research Institute	China	44*120V	15*60A/18*30A/6*200A
	Experiment & Verification Center of State Grid Electric Power Research Institute	China	200*120V	27*60A/123*30A
	NARI Group Corporation	China	196*120V	42*60A/210*30A/12*200A
	NR Electric CO.,LTD	China	152*120V	78*60A/24*30A/24*10A/3*200A
	China Southern Power Grid	China	184*120V	54*60A/60*30A/6*200A
2015				
	Xi'an Jiao Tong University	China	20*120Vv	18*30A
	Hua Dian Electric Power Research Insitute	China	36*120V	12*60A/24*30A/6*200A
	South China University of Technology	China	24*120V	18*30A
	China Southern Power Grid	China	184*120V	54*60A/60*30A/6*200A
	NR Electric CO.,LTD	China	152*120V	78*60A/24*30A/24*10A/3*200A
	Taiyuan University of Technology	China	8*120V	6*30A
2016				
	Taiyuan University of Technology	China	8*120V	6*30A
	Si Chuan Electrical Power Research Institute	China	64*120V	9*60A/3*200A/48*30A
	China Southern Power Grid	China	184*120V	54*60A/60*30A/6*200A
	NR Electric CO.,LTD	China	152*120V	78*60A/24*30A/24*10A/3*200A
	NARI Group Corporation	China	196*120V	42*60A/210*30A/12*200A
	XJ Group CO.,LTD	China	146*120V	138*60A/3*200A
	Beijing Sifang Automation Co., LTD	China	56*120V	42*60A/9*200A/30*30A
	Zhe Jiang Electrical Power Research Institute	China	20*120V	27*30A/3*200A
	University of Manchester	UK	3*30A	6*30A
	Opal-RT Technologies Inc.	Canada	3*30A	/
2017				
	Liao Ning EPRI	China	32*120V	6*200A/18*30A/6*60A
	NR Electric CO.,LTD	China	152*120V	78*60A/24*30A/24*10A/3*200A
	Russian Telecom Equipment Company (RTEC)	Russia	12*120V	30*30A
	Electrical Energy Research Center (CEPEL)	Brazil	12*30A	/

PONOVO POWER CO., LTD.

No.139 Jinghai Third Road, BDA, Beijing, China. 100176
Tel : +86 (10) 59089666
Fax : +86 (10) 59089999
www.ponovo.net
info@relaytest.com
support@relaytest.com

ISO 9001 QMS
ISO 14001 EMS
OHSAS 18001