Compact Wide Range DC Power Supply (CV/CC)

PWR-01 Series

LAN LXI | USB | GPIB OPTION | RS232C | DRIVERS | CE

Dimensions

400 W model: 71(2.80″)W×124(4.88″)H×350(13.78″)Dmm(inch)
800 W model: 142.5(5.61″)W×124(4.88″)H×350(13.78″)Dmm(inch)
1200 W model: 214(8.43″)W×124(4.88″)H×350(13.78″)Dmm(inch)
2000 W model: 428.5(16.87″)W×128(5.04″)H×350(13.78″)Dmm(inch)

Accessories

Chassis connection short bar, Output terminal M4 screws (2 pcs.), Output terminal bolt set (2 sets) *Only L type and ML type included (400 W/800 W/1200 W model: M8 bolt set, 2000 W model: M10 bolt set), Output terminal cover, Packing list, Safety Information, Quick Reference (Japanese/English), CD-ROM
400 W/800 W model: Power cord *1 *2
1200 W model: Input terminal cover, Ferrite core set

*1 Power cord is not included for the 1200 W model. Please purchase the optional accessory separately (AC5.5-3P3M-M4C-VCTF). Not CE certified product.
*2 Power cord is not included for the 2000 W model. Please purchase the optional accessory separately (AC5.5-1P3M-M6C-3S).

New flagship bench-top DC power supply

The PWR-01 is a series of high performance, multifunctional, compact, wide-range DC power supplies. It consists of 13 models in total with 4 maximum voltage outputs (L, ML, MH, and H) and 4 maximum power outputs (400 W, 800 W, 1200W and 2000 W). With the PWR-01 series you can set sequences with an embedded CPU as well as analog control. The series is equipped with LAN (LXI), USB, and RS232C as standard interfaces that are essential for system integration. The PWR-01 also features front-facing output terminals, variable internal resistance, bleeder ON/OFF functions, CC/CV priority switching function, synchronized operation, various protections, and programmable internal memory.

Features

- Sequence function (supports triggered synchronization)
- Variable internal resistance function
- LAN (LXI compliant) /USB/RS232C as standard interface
- A virtual multi-channel bus (VMCB) function makes multi-channel operation more efficient
- A wide range of voltage and current settings can be combined within its output power rating (3 to 4 times)
- All models are equipped with front-facing output terminals as standard (maximum 10 A)
- Supporting universal input voltage (85 V to 265 V)
- CONFIG setting shortcut function and display (Up to three parameters can be registered.)
- Setting preset memory function (3 combinations of settings for voltage, current, OVP, OCP, and UVL)
- Bleeder (sink) can be turned ON/OFF, with an even stronger bleeder mode setting available
- Output ON/OFF delay function
- Soft start/stop function

Options

■ AC power cord
for 1200 W model
AC5.5-3P3M-M4C-VCTF
*Not CE certified product


AC5.5-3P3M-M4C-VCTF

■ AC power cord
for 2000 W model
AC5.5-1P3M-M6C-3S

■ J1/ J2 connector plug kit
OP01-PWR-01
A plug kit for externally controlling the PWR-01 through the J1/J2 connector. 30 pin pieces, Housing for the J1 connector and J2 connector, 1 piece each

■ Parallel operation cable
(for 2 units in parallel)
OP02-PWR-01

■ External control cable and connector set
OP03-PWR-01
Cables 20 pcs., length: approx. 500 mm (Crimped on one end)
Housing for the J1 connector and J2 connector: 1 piece each,
Core: 1 piece

■ RS232C control conversion cable
RD-8P/9P

■ Safety plugs
TL41 (screw connection type)
TL42 (solder connection type)


TL41

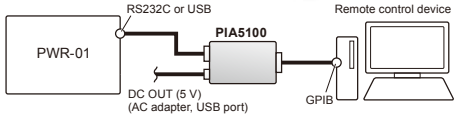

TL42

■ Sequence creation software
SD027-PWR-01 (Wavy for PWR-01)

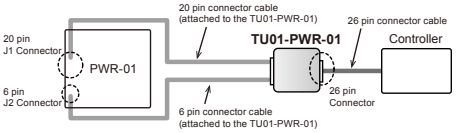
■ GPIB Converter
PIA5100
This converter converts RS232C or USB of the PWR-01 to GPIB, enabling connection of a remote controller using GPIB.
[Accessories: Power cord set, Magnetic sheet]
*Not CE certified product

*DC 5 V (power supply with commercially-available universal AC adapter etc.) is required to operate the PIA5100.

[Connection example]



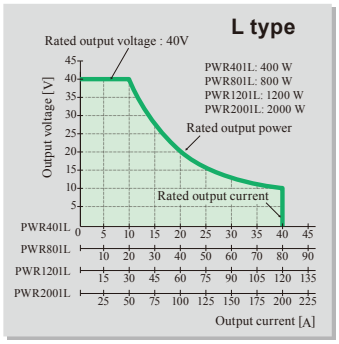
■ Terminal unit
TU01-PWR-01
A terminal unit for converting the J1 and J2 connectors of this product to the J1 connector of the Kikusui PWR Series Regulated DC Power Supplies.

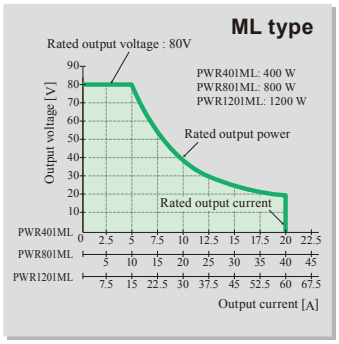


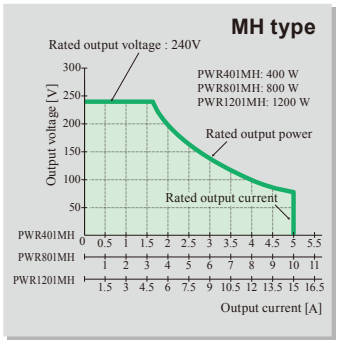
Operation Area

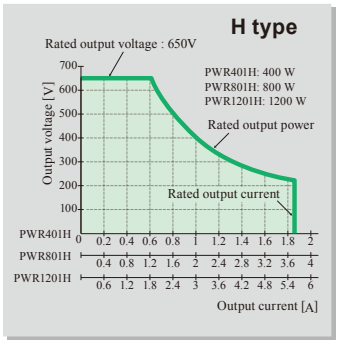
■ 3 to 4 times ratio power operation

3 to 4 time ratio power operating range covers a wide variety of voltage and current setting combinations. For example, the 1200 W model PWR1201ML is capable of seamless operation within ranges of 80 V/15 A to 20 V/60 A.







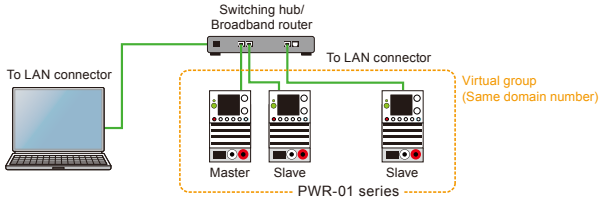


Equipped with standard LAN interface and VMCB function to support network-based remote control and monitoring

The PWR-01 series is equipped with LAN, USB, and RS232C interfaces as standard features. The virtual multi-channel bus (VMCB) feature allows for remote control and monitoring for 1-to-N as well as N-to-M in large-scale networks. In particular, the LAN interface is LXI compliant, enabling you to easily control and monitor the power supply through a browser on a PC, smartphone, or tablet by accessing the web server built into the PWR-01 series .

● Basic configuration with LAN interface and VMCB (example)

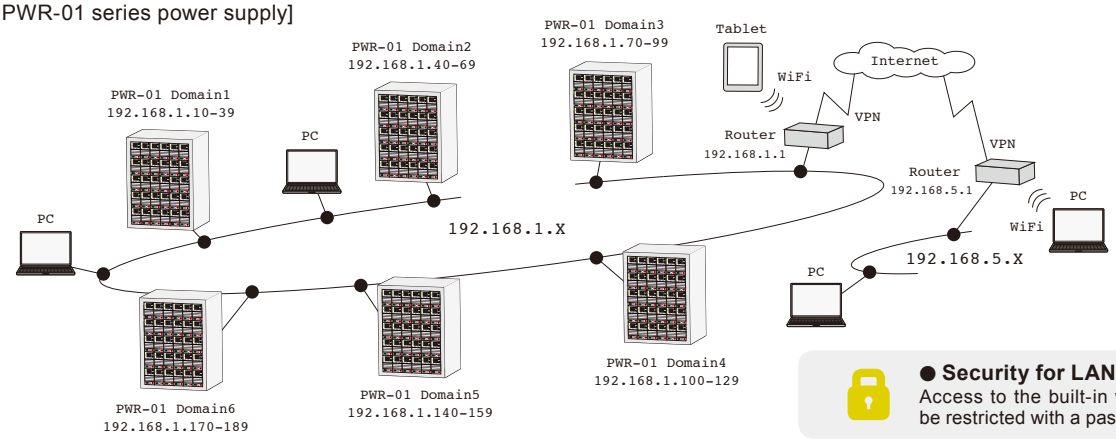
As shown in the figure below, it is possible to connect a PC and the PWR-01 series with a hub to create a virtual group using a LAN connection. A maximum of 255 virtual groups can be set, and the maximum number of units can be configured up to 31 units per group. A group can have a mixture of models.



Configuration	IP address	Domain number	Channel number
Master	192.168.1.1	1	0
Slave	192.168.1.2	1	1
	192.168.1.3	1	2

* A DHCP server can also establish settings automatically

[Schematic LAN network configuration with the PWR-01 series power supply]



● Security for LAN connections

Access to the built-in web server can be restricted with a password.

Easy access with a built-in web server

Use a browser from a PC, smartphone, or tablet to access the web server built into the PWR-01 series for convenient control and monitoring.

[Recommended browser]
- Requires for the Internet Explorer version 9.0 or later
- Requires for the firefox 8.0 or later
- Requires for the safari/mobile Safari 5.1 or later
- Requires for the Chrome 15.0 or later
- Requires for the Opera 11.0 or later

* Connecting with a smartphone, tablet, etc. requires a Wi-Fi environment (wireless LAN router etc.).

*Screen sample

PWR-01 Series 400 W Type Specifications

Item/Model			PWR401L	PWR401ML	PWR401MH	PWR401H
AC input						
Nominal input rating			100 Vac to 240 Vac, 50 Hz to 60 Hz, single phase			
Input voltage range			85 Vac to 265 Vac			
Input frequency range			47 Hz to 63 Hz			
Current (TYP) *1		100 Vac	5.6 A			
		200 Vac	2.8 A			
Inrush current (MAX) *2			25 A or less			
Power (MAX) *3			560 VA			
Power factor (TYP) *1			0.99 (input voltage: 100 V), 0.97 (input voltage: 200 V)			
Efficiency (MIN) *1			75 % (TYP)			
Output hold time *3			20 ms or more			
Output						
Rating	Output voltage *4		40 V	80 V	240 V	650 V
	Output current *4		40 A	20 A	5 A	1.85 A
	Output power		400 W			
Voltage	Maximum settable voltage *5		42 V	84 V	252 V	682.5 V
	Setting accuracy		± (0.05 % of set +0.05 % of rating)			
	Resolution		200 mV	400 mV	1000 mV	2500 mV
		Using FINE, OUT OFF	10 mV	10 mV	100 mV	100 mV
		Using FINE, OUT ON	1 mV	1 mV	10 mV	10 mV
		When using a communication interface	1 mV	1 mV	10 mV	10 mV
	Line regulation *6		±6 mV	±10 mV	±26 mV	±67 mV
	Load regulation *7		±6 mV	±10 mV	±26 mV	±67 mV
	Transient response *8		1 ms or less	2 ms or less	2 ms or less	3 ms or less
	Ripple noise *9	p-p *10	50 mV	50 mV	100 mV	300 mV
		rms *11	5 mV	5 mV	20 mV	50 mV
	Rise time	At full load	50 ms or less		100 ms or less	
		No load	50 ms or less		100 ms or less	
	Fall time *12	At full load	50 ms or less		150 ms	250 ms
		No load	500 ms or less		1200 ms	2000 ms
	Maximum remote sensing compensation voltage (single line)		1.5 V	4 V	5 V	5 V
	Temperature coefficient *13		100 ppm/°C			

Item/Model			PWR401L	PWR401ML	PWR401MH	PWR401H
Output						
Current	Maximum settable current *5		42 A	21 A	5.25 A	1.9425 A
	Setting accuracy *14		± (0.5 % of set +0.1 % of rating)			
	Resolution		200 mA	100 mA	20 mA	10 mA
		Using FINE, OUT OFF	10 mA	10 mA	1 mA	1 mA
		Using FINE, OUT ON	1 mA	1 mA	0.1 mA	0.1 mA
		When using a communication interface	1 mA	1 mA	0.1 mA	0.1 mA
	Line regulation		±6 mA	±4 mA	±2.5 mA	±2.2 mA
	Load regulation		±13 mA	±9 mA	±6.0 mA	±5.4 mA
	Ripple noise*15	rms *11	80 mA	40 mA	12 mA	6 mA
	Rise time (TYP)	At full load	50 ms		100 ms	
	Fall time (TYP)	At full load	50 ms		100 ms	
	Temperature coefficient *13		100 ppm/°C			
Maximum internal resistance that can be set			1.000 Ω	4.000 Ω	36.00 Ω	263.5 Ω
Display function						
Voltage display	Maximum display		99.99		999.9	
	Display accuracy		± (0.2 % of reading + 5 digit)			
Current display	Maximum display		99.99		9.999	
	Display accuracy		± (0.5 % of reading + 8 digit)			
Power display			The PWR DSPL LED lights in red.			
	Maximum display		9999			
	Display accuracy		Displays the result of multiplying the current and voltage. The display is toggled with the voltage or current display.			

*1. At the rated output power for the rated output current.
*2. Excludes the charge current component that flows through the capacitor of the internal EMC filter circuit immediately after the POWER switch is turned on (for approximately 1 ms).
*3. 100 Vac, at the rated output power.
*4. The maximum output voltage and maximum output current are limited by the maximum output power.
*5. Can be limited to approximately 95 % of the OVP trip point or OCP trip point.
*6. 85 Vac to 135 Vac or 170 Vac to 265 Vac, fixed load
*7. The amount of change that occurs when the load is changed from no load to full load (rated output power/rated output voltage) with rated output voltage. The value is measured at the sensing point.
*8. The amount of time required for the output voltage to return to a value within "rated output voltage ± (0.1 % +10 mV)." The load current fluctuation is 50 % to 100 % of the maximum current with the set output voltage.
*9. Measured using an RC-9131C probe that conforms to the JEITA specifications. At the rated output current.
*10. When the measurement frequency bandwidth is 10 Hz to 20 MHz.
*11. When the measurement frequency bandwidth is 10 Hz to 1 MHz.
*12. When the bleeder circuit is set to bleeder normal.
*13. When the ambient temperature is within 0°C and 50 °C
*14. Applies to the range of 1 % to 100 % of the rated current. TYP (0.1 % of rating) for 0 % to 1 %.
*15. When the output voltage is 10 % to 100 % of the rating. At the rated output current.

PWR-01 Series 800 W Type Specifications

Item/Model			PWR801L	PWR801ML	PWR801MH	PWR801H
AC input						
Nominal input rating			100 Vac to 240 Vac, 50 Hz to 60 Hz, single phase			
Input voltage range			85 Vac to 265 Vac			
Input frequency range			47 Hz to 63 Hz			
Current (TYP) *1		100 Vac	11.2 A			
		200 Vac	5.6 A			
Inrush current (MAX) *2			50 A or less			
Power (MAX) *3			1120 VA			
Power factor (TYP) *1			0.99 (input voltage: 100 V), 0.97 (input voltage: 200 V)			
Efficiency (MIN) *1			75 % (TYP)			
Output hold time *3			20 ms or more			
Output						
Rating	Output voltage *4		40 V	80 V	240 V	650 V
	Output current *4		80 A	40 A	10 A	3.70 A
	Output power		800 W			
Voltage	Maximum settable voltage *5		42 V	84 V	252 V	682.5 V
	Setting accuracy		± (0.05 % of set +0.05 % of rating)			
	Resolution		200 mV	400 mV	1000 mV	2500 mV
		Using FINE, OUT OFF	10 mV	10 mV	100 mV	100 mV
		Using FINE, OUT ON	1 mV	1 mV	10 mV	10 mV
		When using a communication interface	1 mV	1 mV	10 mV	10 mV
	Line regulation *6		±6 mV	±10 mV	±26 mV	±67 mV
	Load regulation *7		±6 mV	±10 mV	±26 mV	±67 mV
	Transient response *8		1 ms or less	2 ms or less	2 ms or less	3 ms or less
	Ripple noise *9	p-p *10	50 mV	50 mV	100 mV	300 mV
		rms *11	5 mV	5 mV	20 mV	50 mV
	Rise time	At full load	50 ms or less		100 ms or less	
		No load	50 ms or less		100 ms or less	
	Fall time *12	At full load	50 ms or less		150 ms	250 ms
		No load	500 ms or less		1200 ms	2000 ms
	Maximum remote sensing compensation voltage (single line)		1.5 V	4 V	5 V	5 V
	Temperature coefficient *13		100 ppm/°C			

Item/Model			PWR801L	PWR801ML	PWR801MH	PWR801H
Output						
Current	Maximum settable current *5		84 A	42 A	10.5 A	3.885 A
	Setting accuracy *14		± (0.5 % of set +0.1 % of rating)			
	Resolution		400 mA	200 mA	40 mA	20 mA
		Using FINE, OUT OFF	10 mA	10 mA	10 mA	1 mA
		Using FINE, OUT ON	1 mA	1 mA	0.1 mA	0.1 mA
		When using a communication interface	1 mA	1 mA	0.1 mA	0.1 mA
	Line regulation		±10 mA	±6 mA	±3 mA	±2.4 mA
	Load regulation		±21 mA	±13 mA	±7 mA	±5.7 mA
	Ripple noise*15	rms *11	160 mA	80 mA	24 mA	12 mA
	Rise time (TYP)	At full load	50 ms		100 ms	
	Fall time (TYP)	At full load	50 ms		100 ms	
	Temperature coefficient *13		100 ppm/°C			
Maximum internal resistance that can be set			0.500 Ω	2.000 Ω	18.00 Ω	131.8 Ω
Display function						
Voltage display	Maximum display		99.99		999.9	
	Display accuracy		± (0.2 % of reading + 5 digit)			
Current display	Maximum display		99.99			9.999
	Display accuracy		± (0.5 % of reading + 8 digit)			
Power display			The PWR DSPL LED lights in red.			
	Maximum display		9999			
	Display accuracy		Displays the result of multiplying the current and voltage. The display is toggled with the voltage or current display.			

*1. At the rated output power for the rated output current.
*2. Excludes the charge current component that flows through the capacitor of the internal EMC filter circuit immediately after the POWER switch is turned on (for approximately 1 ms).
*3. 100 Vac, at the rated output power.
*4. The maximum output voltage and maximum output current are limited by the maximum output power.
*5. Can be limited to approximately 95 % of the OVP trip point or OCP trip point.
*6. 85 Vac to 135 Vac or 170 Vac to 265 Vac, fixed load
*7. The amount of change that occurs when the load is changed from no load to full load (rated output power/rated output voltage) with rated output voltage. The value is measured at the sensing point.
*8. The amount of time required for the output voltage to return to a value within "rated output voltage ± (0.1 % +10 mV)." The load current fluctuation is 50 % to 100 % of the maximum current with the set output voltage.
*9. Measured using an RC-9131C probe that conforms to the JEITA specifications. At the rated output current.
*10. When the measurement frequency bandwidth is 10 Hz to 20 MHz.
*11. When the measurement frequency bandwidth is 10 Hz to 1 MHz.
*12. When the bleeder circuit is set to bleeder normal.
*13. When the ambient temperature is within 0°C and 50 °C
*14. Applies to the range of 1 % to 100 % of the rated current. TYP (0.1 % of rating) for 0 % to 1 %.
*15. When the output voltage is 10 % to 100 % of the rating. At the rated output current.

PWR-01 Series 1200 W Type Specifications

Item/Model			PWR1201L	PWR1201ML	PWR1201MH	PWR1201H
AC input						
Nominal input rating			100 Vac to 240 Vac, 50 Hz to 60 Hz, single phase			
Input voltage range			85 Vac to 265 Vac			
Input frequency range			47 Hz to 63 Hz			
Current (TYP) *1		100 Vac	16.8 A			
		200 Vac	8.4 A			
Inrush current (MAX) *2			75 A or less			
Power (MAX) *3			1680 VA			
Power factor (TYP) *1			0.99 (input voltage: 100 V), 0.97 (input voltage: 200 V)			
Efficiency (MIN) *1			75 % (TYP)			
Output hold time *3			20 ms or more			
Output						
Rating	Output voltage *4		40 V	80 V	240 V	650 V
	Output current *4		120 A	60 A	15.0 A	5.55 A
	Output power		1200 W			
Voltage	Maximum settable voltage *5		42 V	84 V	252 V	682.5 V
	Setting accuracy		± (0.05 % of set +0.05 % of rating)			
	Resolution		200 mV	400 mV	1000 mV	2500 mV
		Using FINE, OUT OFF	10 mV	10 mV	100 mV	100 mV
		Using FINE, OUT ON	1 mV	1 mV	10 mV	10 mV
		When using a communication interface	1 mV	1 mV	10 mV	10 mV
	Line regulation *6		±6 mV	±10 mV	±26 mV	±67 mV
	Load regulation *7		±6 mV	±10 mV	±26 mV	±67 mV
	Transient response *8		1 ms or less	2 ms or less	2 ms or less	3 ms or less
	Ripple noise *9	p-p *10	50 mV	50 mV	100 mV	300 mV
		rms *11	5 mV	5 mV	20 mV	50 mV
	Rise time	At full load	50 ms or less		100 ms or less	
		No load	50 ms or less		100 ms or less	
	Fall time *12	At full load	50 ms or less		150 ms	250 ms
		No load	500 ms or less		1200 ms	2000 ms
	Maximum remote sensing compensation voltage (single line)		1.5 V	4 V	5 V	5 V
	Temperature coefficient *12		100 ppm/°C			

*1. At the rated output power for the rated output current.
*2. Excludes the charge current component that flows through the capacitor of the internal EMC filter circuit immediately after the POWER switch is turned on (for approximately 1 ms).
*3. 100 Vac, at the rated output power.

Item/Model			PWR1201L	PWR1201ML	PWR1201MH	PWR1201H
Output						
Current	Maximum settable current *5		126 A	63 A	15.75 A	5.8275 A
	Setting accuracy *14		± (0.5 % of set +0.1 % of rating)			
	Resolution		600 mA	300 mA	60 mA	30 mA
		Using FINE, OUT OFF	100 mA	10 mA	10 mA	1 mA
		Using FINE, OUT ON	10 mA	1 mA	1 mA	0.1 mA
		When using a communication interface	10 mA	1 mA	1 mA	0.1 mA
	Line regulation		±14 mA	±8 mA	±3.5 mA	±2.6 mA
	Load regulation		±29 mA	±17 mA	±8.0 mA	±6.1 mA
	Ripple noise*15	rms *11	240 mA	120 mA	36 mA	18 mA
	Rise time (TYP)	At full load	50 ms		100 ms	
	Fall time (TYP)	At full load	50 ms		100 ms	
	Temperature coefficient *13		100 ppm/°C			
Maximum internal resistance that can be set			0.333 Ω	1.333 Ω	12.00 Ω	87.84 Ω
Display function						
Voltage display	Maximum display		99.99		999.9	
	Display accuracy		± (0.2 % of reading + 5 digit)			
Current display	Maximum display		999.9	99.99		9.999
	Display accuracy		± (0.5 % of reading + 8 digit)			
Power display			The PWR DSPL LED lights in red.			
	Maximum display		9999			
	Display accuracy		Displays the result of multiplying the current and voltage. The display is toggled with the voltage or current display.			

*4. The maximum output voltage and maximum output current are limited by the maximum output power.
*5. Can be limited to approximately 95 % of the OVP trip point or OCP trip point.
*6. 85 Vac to 135 Vac or 170 Vac to 265 Vac, fixed load
*7. The amount of change that occurs when the load is changed from no load to full load (rated output power/rated output voltage) with rated output voltage. The value is measured at the sensing point.
*8. The amount of time required for the output voltage to return to a value within "rated output voltage ± (0.1 % +10 mV)." The load current fluctuation is 50 % to 100 % of the maximum current with the set output voltage.
*9. Measured using an RC-9131C probe that conforms to the JEITA specifications. At the rated output current.
*10. When the measurement frequency bandwidth is 10 Hz to 20 MHz.
*11. When the measurement frequency bandwidth is 10 Hz to 1 MHz.
*12. When the bleeder circuit is set to bleeder normal.
*13. When the ambient temperature is within 0°C and 50 °C
*14. Applies to the range of 1 % to 100 % of the rated current. TYP (0.1 % of rating) for 0 % to 1 %.
*15. When the output voltage is 10 % to 100 % of the rating. At the rated output current.

PWR-01 Series 2000 W Type Specifications

Item/Model			PWR2001L
AC input			
Nominal input rating			100 Vac to 240 Vac, 50 Hz to 60 Hz, single phase
Input voltage range			85 Vac to 265 Vac
Input frequency range			47 Hz to 63 Hz
Current (TYP) *1		100 Vac	28.0 A
		200 Vac	14.0 A
Inrush current (MAX)			125 A or less
Power (MAX) *2			2800 VA
Power factor (TYP) *1			0.99 (input voltage: 100 V), 0.97 (input voltage: 200 V)
Efficiency (MIN) *1			75 % (TYP)
Output hold time *2			20 ms or more
Output			
Rating	Output voltage *3		40 V
	Output current *3		200 A
	Output power		2000 W
Voltage	Maximum settable voltage *4		42 V
	Setting accuracy		± (0.05 % of set +0.05 % of rating)
	Resolution		200 mV
		Using FINE, OUT OFF	10 mV
		Using FINE, OUT ON	1 mV
		When using a communication interface	1 mV
	Line regulation *5		±6 mV
	Load regulation *6		±6 mV
	Transient response *7		1 ms or less
	Ripple noise *8	p-p *9	50 mV
		rms *10	5 mV
	Rise time	At full load	50 ms or less
		No load	50 ms or less
	Fall time *11	At full load	50 ms or less
		No load	500 ms or less
	Maximum remote sensing compensation voltage (single line)		1.5 V
	Temperature coefficient *12		100 ppm/°C

*1. At the rated output power for the rated output current.
*2. 100 Vac, at the rated output power.

Item/Model			PWR2001L
Output			
Current	Maximum settable current *4		210 A
	Setting accuracy *13		± (0.5 % of set +0.1 % of rating)
	Resolution		1000 mA
		Using FINE, OUT OFF	100 mA
		Using FINE, OUT ON	10 mA
		When using a communication interface	10 mA
	Line regulation		±22 mA
	Load regulation		±45 mA
	Ripple oise*14	rms *10	400 mA
	Rise time (TYP)	At full load	50 ms
	Fall time (TYP)	At full load	50 ms
	Temperature coefficient *12		100 ppm/°C
Maximum internal resistance that can be set			0.200 Ω
Display function			
Voltage display	Maximum display		99.99
	Display accuracy		± (0.2 % of reading + 5 digit)
Current display	Maximum display		999.9
	Display accuracy		± (0.5 % of reading + 8 digit)
Power display			The PWR DSPL LED lights in red.
	Maximum display		9999
	Display accuracy		Displays the result of multiplying the current and voltage. The display is toggled with the voltage or current display.

*3. The maximum output voltage and maximum output current are limited by the maximum output power.
*4. Can be limited to approximately 95 % of the OVP trip point or OCP trip point.
*5. 85 Vac to 135 Vac or 170 Vac to 265 Vac, fixed load
*6. The amount of change that occurs when the load is changed from no load to full load (rated output power/rated output voltage) with rated output voltage. The value is measured at the sensing point.
*7. The amount of time required for the output voltage to return to a value within "rated output voltage ± (0.1 % +10 mV)." The load current fluctuation is 50 % to 100 % of the maximum current with the set output voltage.
*8. Measured using an RC-9131C probe that conforms to the JEITA specifications. At the rated output current.
*9. When the measurement frequency bandwidth is 10 Hz to 20 MHz.
*10. When the measurement frequency bandwidth is 10 Hz to 1 MHz.
*11. When the bleeder circuit is set to bleeder normal.
*12. When the ambient temperature is within 0°C and 50 °C
*13. Applies to the range of 1 % to 100 % of the rated current. TYP (0.1 % of rating) for 0 % to 1 %.
*14. When the output voltage is 10 % to 100 % of the rating. At the rated output current.

PWR-01 Series Specifications

Item/Model			Common
Protection functions			
Overvoltage protection (OVP)			Turns the output off *1, displays OVP, and lights ALM
	Setting range		10 % to 112 % of the rated output voltage
	Setting accuracy		± (1.5 % of rating)
Overcurrent protection (OCP) *2			Turns the output off *1, displays OCP, and lights ALM
	Setting range		10 % to 112 % of the rated output current
	Setting accuracy		± (3 % of rating)
Front-panel output terminal overcurrent protection (FOCP) *3			Turns the output off *1, displays FOCP, and lights ALM
	Value (fixed)		11 A (TYP)
Undervoltage limit (UVL)			Cannot be set to a value less than or equal to the set voltage
	Setting range		0 % to 105 % of the rated output voltage
Overheat protection (OHP)			Turns the output off, displays OHP, and lights ALM
Incorrect sensing connection protection (SENSE)			Turns the output off, displays SENS, and lights ALM
Low AC input protection (AC-FAIL)			Turns the output off,*4 displays AC, and lights ALM
Shutdown (SD)			Turns the output off *1, displays SD, and lights ALM
Power limit (POWER LIMIT)			ALM blinking
	Value (fixed)		Approx. 105 % of the rated output power
Communication monitoring (watchdog)			Turns the output off, displays WDOG, and lights ALM
Master-slave parallel operation protection (PRL ALM)			Turns the output off *1, displays PRL, and lights ALM

*1. Output off or breaker trip on the 2000 W model.
*2. This does not protect against the discharge current peak that is generated from the capacitors inside the PWR-01 output section when the load is changed suddenly.
*3. Available on models with a maximum settable current of 11 A or more. If the OCP value is less than the FOCP value, the OCP value takes precedence.
*4. Auto recovery after eliminating the cause of the alarm is selectable.

Item/Model			Common
Signal output and input			
Monitor signal output	Voltage monitor (VMON)		Selectable monitor voltage range: 0 V to 5 V or 0 V to 10 V
		Setting accuracy	2.5 % of f.s. *5
	Current monitor (IMON)		Selectable monitor voltage range: 0 V to 5 V or 0 V to 10 V
		Setting accuracy	2.5 % of f.s. *5
Status signal output *6	OUTON STATUS		On when output is on.
	CV STATUS		Turns on during CV operation
	CC STATUS		Turns on during CC operation
	ALARM STATUS		Turns on when an alarm has been activated
	POWER ON STATUS		Turns on when the power is turned on
Trigger signal	Input (TRG IN)		Logic selectable: LOW (0 V to 1.5 V), HIGH (3.5 V to 5 V)
			Input impedance: 10 kΩ (TYP)
	Output (TRG OUT)		Logic selectable: LOW (0 V to 0.6 V), HIGH (4.2 V to 5 V)
			Pulse width: 100 µs (TYP)

*5. f.s. is the full scale at the selected range. It is 10 V for the 10 V range and 5 V for the 5 V range.
*6. Photocoupler open collector output;
maximum voltage 30 V, maximum current (sink) 8 mA; isolated from the output and control circuits; status commons are floating (withstand voltage of less than or equal to 60 V); and status signals are not mutually isolated.

Item/Model			Common
Control functions			
External control	Output voltage control (VPGM)		0 % to 100 % of the rated output voltage
			Selectable control voltage range: 0 V to 5 V or 0 V to 10 V
		Accuracy	5 % of rating
	Output current control (IPGM)		0 % to 100 % of the rated output current
			Selectable control voltage range: 0 V to 5 V or 0 V to 10 V
		Accuracy	5 % of rating
	Output on/ off control OUTPUT ON/OFF CONT		Logic selectable: Output on when set to LOW (0 V to 0.5 V) or shorted; output off when set to HIGH (4.5 V or 5 V) or open Output on when set to HIGH (4.5 V to 5 V) or open; output off when set to LOW (0 V or 0.5 V) or shorted
	Output shutdown control SHUT DOWN		Output on when set to LOW (0 V to 0.5 V) or shorted
	Alarm clear control ALM CLR		Alarm cleared when set to LOW (0 V to 0.5 V) or shorted

Item/Model			400 W model	800 W model	1200 W model	2000 W model
Other functions						
Output-on/ off delay			Setting range: 0.0 s, 0.5 s to 99.9 s *7 setting resolution: 0.1 s			
Soft start and soft stop			Setting range: 0.0 s, 0.5 s to 10.0 s *7 setting resolution: 0.1 s			
Overcurrent protection (OCP) activation delay			Setting range: 0.0 s to 2.0 s *7 setting resolution: 0.1 s			
Preset memory			Up to three sets of the following settings can be saved: the set voltage, the set current, the set OVP, the set OCP, and the set UVL.			
Key lock			Locks the operation of all keys other than the OUTPUT key.			
CONFIG shortcut			Up to three CONFIG parameters can be registered to the SC1, SC2, and SC3 keys			
Sequence			Number of programs: 1			
			Number of steps: 64			
			Repetition count: 1 to 99998, INFinity			
			Number of configurable interval loops: 16			
			Number of interval loops: 2 to 99998			
			Step time: 0.1 s to 100 h (common to step transition and ramp transition)			
Synchronized Operation			Synchronization of voltage and current settings, synchroniza-tion of the resumption of steps in a sequence program			
Master-slave parallel operation *8			Up to three units (same models) including the master unit		Up to two units (same models) including the master unit	
Series operation *9			Two units (the same model)			
Multi-channel (VMCB)	Connection bet-ween the master unit and PC		LAN, USB, RS232C			
	Connection with slave units		LAN			

*7. Factory default is 0.0 s.
*8. Current difference between the master and slaves is 5 % (TYP).
*9. H type is excluded

Item/Model		Common
Operation display		
OUTPUT ON/ OFF		OUTPUT LED lights green when the output is on.
Output-on/ off delay		“DLY” lights when it is set and blinks when it is in effect. OUTPUT LED blinks orange while output-on delay is in effect.
		OUTPUT LED blinks green while output-off delay is in effect.
Soft start and soft stop		“SS” lights when it is set and blinks when it is in effect. OUTPUT LED lights green when soft start is in effect. OUTPUT LED blinks green when soft stop is in effect.
CV operation		CV LED lights in green.
CC operation		CC LED lights in red.
Alarm operation		ALM LED lights in red when a protection function has been activated. ALM LED blinks red when the power limit (POWER LIMIT) is activated. OUTPUT LED blinks orange when a protection function is activated when the output is on.
Preset memory		PRESET A, B, or C LED lights green when a preset memory entry is being recalled or saved.
Key lock operation		LOCK LED lights green when the keys are locked.
Remote operation		REMOTE LED lights green during remote control.
	LAN operation	LAN LED lights or blinks depending on the status. No fault status: Lights green. Fault status: Lights red. Standby status: Lights orange. WEB identify status: Blinks green.
Bleeder circuit		“HB” lights when the hyper bleeder is set.
Variable internal resistance (VIR)		“VIR” lights when it is set.
Sequence		“SEQ” lights when a sequence is being executed and blinks the PWR-01 is waiting for a trigger.

PWR-01 Series Specifications

Item/Model		Common
Interface		
Common specifications	Software protocol	IEEE Std 488.2-1992
	Command language	Complies with SCPI Specification 1999.0
RS232C	Hardware	Complies with the EIA232D specifications (excluding the connector)
		RJ-45 connector (male) *10
		Baud rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
		Data length: 8 bits, Stop bits: 1 bit, Parity bit: None
		No flow control
	Program message terminator	LF during reception, CR/LF during transmission
USB	Hardware	Complies with the USB 2.0 specifications; data rate: 480 Mbps (HighSpeed)
		Socket B type
	Program message terminator	LF or EOM during reception, LF + EOM during transmission
	Device class	Complies with the USBTMC-USB488 device class specifications
LAN	Hardware	IEEE 802.3 100Base-TX/10Base-T Ethernet
		Complies with LXI Specification2011 Ver.1.4, Complies with LXI HiSLIP Extended Function Rev.1.01
		IPv4, RJ-45 connector *11
	Communication protocol	VXI-11, SCPI-RAW, HiSLIP
	Program message terminator	VXI-11, HiSLIP: LF or END during reception, LF + END during transmission SCPI-RAW: LF during reception, LF during transmission.

*10. The RD-8P/9P adapter cable is an option.
*11. Category 5; use a straight cable.

Item/Model		400 W model	800 W model	1200 W model	2000 W model
General					
Weight (main unit only)		Approx. 3 kg (6.61 lb)	Approx. 5.5 kg (12.13 lb)	Approx. 7.5 kg (16.53 lb)	Approx. 13 kg (28.66 lb)
Dimensions		See the outline drawing.			
Environmental conditions	Operating environment	Indoor use, overvoltage category II			
	Operating temperature	0 °C to +50 °C (32 °F to +122 °F)			
	Operating humidity	20 %rh to 85 %rh (no condensation)			
	Storage temperature	-25 °C to +60 °C (-13 °F to 140 °F)			
	Storage humidity	90 %rh or less (no condensation)			
	Altitude	Up to 2000 m			
Cooling method		Forced air cooling using fan			
Grounding polarity		Negative grounding or positive grounding possible			
Isolation voltage		L/ ML/ MH type: ±500 Vmax, H type: ±800 Vmax			
Withstanding voltage	Across the primary circuit and chassis	No abnormalities when 1500 Vac is applied for 1 minute			
	Across the primary and secondary circuits	L/ ML/ MH type: No abnormalities when 1650 Vac is applied for 1 minute			
		H type: No abnormalities when 1900 Vac is applied for 1 minute			
	Across the secondary circuit and chassis	L/ ML/ MH type: No abnormalities when 2300 Vdc is applied for 1 minute			
		H type: No abnormalities when 2640 Vdc is applied for 1 minute			
Insulation resistance	Across the primary circuit and chassis	100 MΩ or more (70 % or less) at 500 Vdc			
	Across the primary and secondary circuits	LL/ ML/ MH type: 100 MΩ or more (70 % or less) at 500 Vdc			
		H type: 100 MΩ or more (70 % or less) at 1000 Vdc			
	Across the secondary circuit and chassis	L/ ML/ MH type: 40 MΩ or more (70 % or less) at 500 Vdc			
		H type: 40 MΩ or more (70 % or less) at 1000 Vdc			
Electromagnetic compatibility (EMC) *12 *13		Complies with the requirements of the following directive and standards. EMC Directive 2014/30/EU EN61326-1 (Class A *14), EN 55011 (Class A *14, Group 1 *15), EN 61000-3-2, EN 61000-3-3 Applicable under the following conditions The maximum length of all cabling and wiring connected to the product must be less than 3 m.			
Safety *12		Complies with the requirements of the following directive and standards. Low Voltage Directive 2014/35/EU *13 EN 61010-1 (Class I *16 , Pollution Degree 2 *17)			

*12. Does not apply to specially ordered or modified products.
*13. Limited to products that have a CE mark. Does not apply unless a core is attached to the J1 connector cable.
*14. This is a Class A instrument. This product is intended for use in an industrial environment. This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.
*15. This is a Group 1 instrument. This product does not generate and/or use intentionally radio-frequency energy, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purpose.
*16. This is a Class I instrument. Be sure to ground this product's protective conductor terminal. The safety of this product is guaranteed only when the product is properly grounded.
*17. Pollution is addition of foreign matter (solid, liquid or gaseous) that may produce a reduction of dielectric strength or surface resistivity. Pollution Degree 2 assumes that only non-conductive pollution will occur except for an occasional temporary conductivity caused by condensation.

Unless specified otherwise, the specifications are for the following settings and conditions.

- Loads are pure resistive loads.
- The product is warmed up for at least 30 minutes (with current flowing).
- After warm-up, the product must be calibrated correctly in a 23 °C ± 5 °C environment according to the appropriate calibration procedure.
- Values indicated by “TYP” are typical values. They are not guaranteed performance values.
- Values indicated by “rating” are ratings.
- Values indicated by “reading” are readings.
- Values indicated by "f.s." are full scale values.
- The PWR-01 operates over a wide range of output voltage and output current within rated output power. However, the current that can be output with rated output voltage and the voltage that can be output with rated output current are limited by the rated output power.
- The current that can be output with rated output voltage and the voltage that can be output with rated output current are as follows.
  Maximum output current with rated output voltage = Rated output power/ rated output voltage.
  Maximum output voltage with rated output current = Rated output power/ rated output current.
- Rated load and no load are defined as follows:
  In constant-voltage mode (when the output current is set to a value greater than or equal to the maximum output current with rated output voltage)
  Rated load: Refers to a resistive load that, when the rated output voltage is applied,makes the flowing current 95 % to 100 % of the maximum output current with rated output voltage.
  No load: Refers to a load through which no output current flows. In other words,refers to an open load (no load being connected).
  In constant-current mode (when the output voltage is set to a value greater than or equal to the maximum output voltage with rated output current)
  Rated load: Refers to a resistive load that, when the rated output current flows, makes the voltage drop to 95 % to 100 % of the maximum output voltage with rated output current.
  Including the voltage drop in the load cables, the PWR-01 output voltage must not exceed the maximum output voltage with rated output current.
  No load: Refers to a resistive load that, when the rated output current flows, makes the voltage drop to 10 % of the maximum output voltage with rated output current or 1 V whichever is higher.
- The specifications of the PWR-01 apply to the rear-panel output terminals.

Wide Range DC Power Supply (CV/CC) * While Supplies Last

PWR Series

USB OPTION GPIB OPTION RS232C OPTION CE

TYPE II (800W TYPE)

TYPE III (1600W TYPE)

Dimensions / Weight

Type II : 214(8.43″)W × 124(4.88″)H × 400(15.75″)Dmm / 8kg(17.64 lbs.)
Type III : 428.5(16.87″)W × 128(5.04″)H × 400(15.75″)Dmm / 15kg(33.07 lbs.)

Accessories

Operation manual, TP-BUS connector, Output terminal screws (M4, M8), Output protection cover
Type II : 3 m power supply cable with 3-pin plug
Type III: 3 m power supply cable with no plug, Cable clamp

Three types of Wide-Range Power Supplies Covering 80 V to 650 V

The PWR Series offers constant voltage (CV)/constant current (CC) automatic crossover DC power supplies that enable you to combine a wide range of voltages and currents within the output power rating. For example, the model that has an output power rating of 1600 W (PWR1600L) provides a seamless operation range from 80 V to 20 A to 16 V to 100 A. With a single PWR Series power supply alone, you can cover an extensive output range equivalent to what is provided by three to six conventional single range DC power supplies. L type can output up to 160 % of the output current rating (in the continuous and intermittent extended operation areas).
PWR1600L supports a maximum output of 10 V to 160 A.

Features

- Supports a digital communication function (TP-BUS) as standard.
- Analog external control functions are available, providing voltage and resistance-based output voltage and current controls.
- Comes standard with the remote monitoring function.
  External analog monitoring can be done with respect to the output voltage, output current, and operation mode.
- A built-in power factor correction circuit (with power factor 0.98) for harmonic current suppression, as well as a highly efficient switching circuit (efficiency 70 %).
- A four-digit display can display the voltage, current, and power (W).
- Front-side output terminals (up to 30 A) for desktop use.
- A universal AC input supports a range of voltages from 100 V to 240 V.

Functions

■ Seamless five times variable voltage/current range (Note: For H type, 3.25-time variable voltage/current range)

A single PWR Series power supply supports an extensive operation range, covering an output range equivalent to what is provided by several conventional single range DC power supplies. Also, the maximum output powers of the power supplies of this series are 800 W and 1600 W - slightly higher than those of their predecessors. You can conduct tests without worrying about power limits.

■ Best for testing a wide variety of high-voltage devices including margin tests

The maximum output voltage of L type is 80 V. For example, 150 % of 42 V (63 V) can be supplied for testing vehicular electrical components, or 150 % of 48 V (72 V) can be supplied for testing communication equipment. In addition, the M type (320 V) is suitable for checking designs of energy-saving circuits for flat display panels and the development of new materials, while the H type (650 V) can be used to test various components and devices that use high voltages such as automotive devices, photovoltaic inverters, and many more.

■ Two extended operation areas where up to 160 % of the output current rating can be output (L type only)

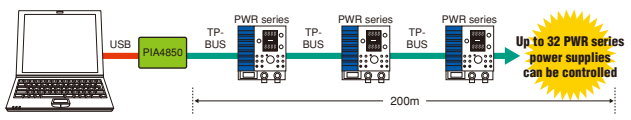
In the extended operation areas, the power supply can output up to 160 % of the output current rating. This feature is convenient when testing an automobile motor or other load device that requires high current at startup time. Since the power supply can output continuous current up to 120 % of the output current rating with the restricted ambient temperature range and current up to 160 % of the output current rating with the restricted output time tests can be conducted with a power capacity one rank lower. This feature also helps you cut equipment costs and save floor space.

■ Parallel or serial operation

Parallel operation enables multiple power supplies of the same model to operate in parallel, offering a large capacity of up to 8 kW (when five 1600-watt models are connected in parallel). In a serial operation, the voltage can be increased up to 160 V.
(Note: • Parallel and serial operations cannot be done at the same time.
• Serial operations are not possible for the M and H types.)

■ Up to 32 PWR Series power supplies can be controlled with one GPIB address

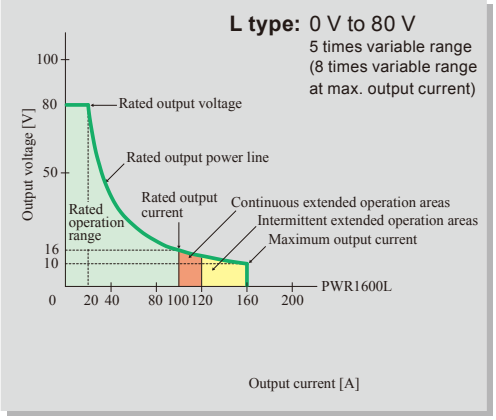
The PWR Series supports a digital communication function (TP-BUS) as its standard feature. When used with a power supply controller (PIA4850) to be purchased separately, the function enables up to 32 PWR Series power supplies to be controlled using USB interface. In addition, the sequence generation software (Wavy for PAS & PWR), also to be purchased separately, allows even those users who have no knowledge of any programming language to exert output control over the PWR Series power supplies with sequence patterns of their choice and to read resultant data through the use of a PC.
(Note: For controlling via GPIB or RS232C, please use PIA4830.)

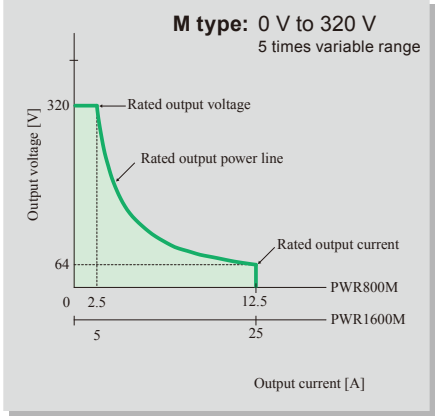


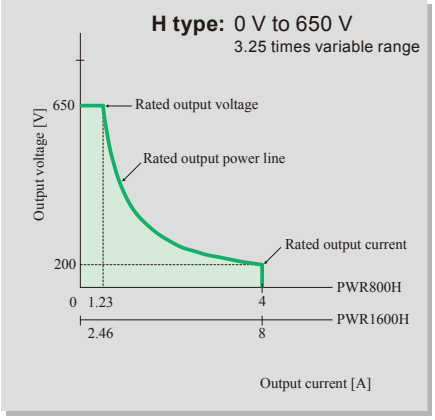
*For the details, please refer to page 46.

Operation Area

Note: The ambient temperature and output time are restricted in the extended operation areas.







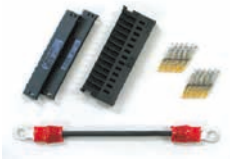
Options

■ Accessory kit

OP01-PAS

(used for the connection of J1 connector on the rear panel when operating by external control)

● Connector, Semi-cover, Pin 10 pcs., Ground cable



■ Carrying handle (for 400 W model)

CH01-PWR

■ Sequence creation software

Wavy for PAS & PWR

[NOTICE]

Because a noise filter is used for the primary input for the PWR Series, the leakage breaker, etc. may be activated, depending on the environment of the input power, when using multiple quantities of them at the same time. Therefore, we provide models for customers who are planning to use multiple devices at the same time. If you have any other questions, please contact our sales department for details.

PWR Series Specifications

Model		Output			Constant voltage (CV) characteristics				Constant current (CC) characteristics			Power input/Miscellaneous		
		CV	CC	Rated power	Ripple	Line regulation	Load regulation	Transient response	Ripple	Line regulation	Load regulation	Input current	Inrush current	Weight
		V	A	W	mVrms	0.05 % + mV	0.05 % + mV	ms	mArms	0.1 % + mA	0.1 % + mA	AC (100/200 V) A	Apeak (Max)	kg/lb (approx.)
L type	PWR1600L	0 to 80	0 to 100 MAX 160*	1600	20	3	5	2	160	10	10	26.0/13.0	140	15/33.07
M type	PWR800M	0 to 320	0 to 12.5	800	20	3	5	8	35	10	10	12.5/6.25	70	817.64
	PWR1600M		0 to 25	1600	25	3	5	12	50	10	10	25.0/12.5	140	15/33.07
H type	PWR800H	0 to 650	0 to 4	800	30	3	5	7	20	10	10	12.0/6.0	70	8/17.64
	PWR1600H		0 to 8	1600	40	3	5	8	40	10	10	24.0/12.0	140	15/33.07

*The L type offers extended operation areas equivalent to up to 160 % of the output current rating. Some of the specifications may not be satisfied in the extended operation areas.
• Continuous extended operation area (up to 120 % of the output current rating): Continuous current output is enabled. However, derating occurs at an ambient temperature 30 ˚C or higher.
• Intermittent extended operation area (120 % to 160 % of the output current rating):
Continuous current output is enabled for 10 minutes or less. However, a nonoperating period more than twice the output period must be taken.

■ Input power ..... 100 to 240 VAC (85 to 250 VAC), single-phase
50 to 60 Hz (47 to 63 Hz)
■ Power factor..... 0.98 standard
■ Efficiency ..... 70 % or greater
■ Temperature coefficient ..... 100 ppm/˚C for constant voltage output
200 ppm/˚C for constant current output
■ Measuring meters
● Voltmeter (23 ˚C ±5 ˚C) ..... Maximum display (fixed point):
99.99 (L type), 999.9 (M and H types)
Display error: ±(0.2 % of rdg* + 5 digits) *rdg = reading
● Ammeter (23 ˚C ±5 ˚C) ..... Maximum display (fixed point)

Maximum output current	Maximum display digits
Models supporting 10 A or less	9.999
Models supporting 10 to less than 100 A	99.99
Models supporting 100 A or greater	999.9

Display error: ±(0.5 % of rdg* + 5 digits) *rdg = reading

■ Protection function ..
● Over voltage protection (OVP):
Setting range (10 % to 110 % of the rated output voltage)
● Over current protection (OCP):
Setting range: (10 % to 110 % of the rated output current) for the M and H types
Setting range: (10 % to 176 % of the rated output current) for the L type
● Over power protection (OPP):
Approx. 110 % of the rated output power or greater
● Over heat protection (OHP):
Operates due to an internal temperature rise.
● Power limit (POWER LIMIT):
Power limit imposed at approx. 105 % of the rated output power.
■ Parallel operation .. Up to 5 units including master (of same model)
■ Serial operation .... Up to 2 units including master (of same model, for the L type only)
■ Digital control ..... TP-BUS (directly controllable from PIA4810/PIA4830)
■ Monitor signal output .. VMON (at rated voltage output),
IMON (at maximum current output): 10.00 ±0.25 V
■ Status signal output .. OUT ON/CV/CC/ALM/PWR OFF/PWR ON

■ Environmental conditions .... Operating ambient temperature range: 0 ˚C to + 50 ˚C
Derating occurs on output current at 45 ˚C or higher for the L type and 40 ˚C or higher for the M/H types.
● Operating ambient humidity range: 20 % to 85 %rh (non-condensing)
● Storage temperature range: -25 ˚C to +70 ˚C
● Storage humidity range: 90 %rh or less (non-condensing)
■ Cooling system.... Forced air cooling
(thermal control: Fan control function attached)
■ Ground polarity ... Negative or positive ground polarity possible.
■ Ground voltage.... ±600 Vmax for the L and M types
±1000 Vmax for the H type
■ Electromagnetic compatibility ... Complies with the requirements of the following directives and standards.
EMC Directive 2014/30/EU
EN61326-1: Class A
EN55011: Class A, Group 1
Immunity: Minimum immunity test requirements
EN61000-3-2
EN61000-3-3
*Not applicable to custom-made modified products.
*Only those models with CE marking provided on their panel.
■ Safety ..... Complies with the requirements of the following directives and standards.
Low Voltage Directive 2014/35/EU
EN61010-1: Class I, Pollution Degree 2
■ Dimensions (mm(inch)) (maximum) ..... 800-watt type:
214(8.43”) W × 124(4.88”) (155(6.1”)) H × 400(15.75”) (470(18.5”)) D
1600-watt type:
428.5(16.87”) (450(17.72”)) W × 128(5.04”) (150(5.91”)) H × 400(15.75”) (470(18.5”)) D
*Enclosed in parentheses are maximum dimensions.
■ Accessories..... ● Instruction manual
● Power cord
(800-watt type: Approx. 3 m in length, with a plug
1600-watt type: 3 m in length, without a plug)
● Rear side output terminal protection cover
● TP-BUS connector
● J1 dummy connector
● Output terminal screws etc.

Compact Variable Switching Regulated DC Power Supply

PAV Series

LAN (OPTION) USB RS232C RS485 CE

Dimensions

70(2.76″)W × 83(3.27″)H × 350(13.78″)Dmm(inch)

Accessories

Setup Guide, Quick Reference (1 English copy, 1 Japanese copy), Safety Information, Power code, RS485 link cable, CD-ROM.
Models whose rated output voltage is 10 V to 100 V :
Bus bar screw set, Bus bar cover (top and bottom), PT screws, J1, J2, and J3 connector cover, Connector housing 12P, Connector housing 8P, Connector housing 4P, Contact pins.
Models whose rated output voltage is 160 V to 650 V :
Output terminal plug 4P, Output terminal cover (top and bottom), PT screws, Connector housing 12P, Connector housing 8P, Connector housing 5P, Contact pins.

High power density up to 800 W in palm-size with high performance switching system.

The PAV series is a compact, high power density, high performance constant voltage (CV) / constant current (CC) variable switching power supply. The PAV consists of 64 models total*1 with 4 types of maximum power outputs at 200 W, 400 W, 600 W and 800 W and output voltages from 10 V through 650 V. All models are standardized to the same size with 2U height (approximately 88 mm) and have high power density for bench-top use. The PAV series allows sequence settings with an embedded CPU as well as analog control. Parallel operation (up to 6 units)*2 and synchronized operation features are employed to allow extended output current. The PAV series is equipped standard with USB, RS232C and RS485 as communication interfaces which are essential for system upgrades. LAN*3 interface is also available as an option. A harmonic current control circuit is embedded with a power factor of 0.99 to take power environment into account.

*1 LAN model included (with LAN) *2 The PAV series with the same rating *3 Factory option

Features

- 2U bench-top type
- Palm-sized, portable power supply
- Output power: 200 W / 400 W / 600 W / 800 W 4 models
- Output voltage: 10 V to 650 V 8 models
- USB/RS232C/RS485 as standard interface *LAN is a factory option
- 64 models total (LAN model included)

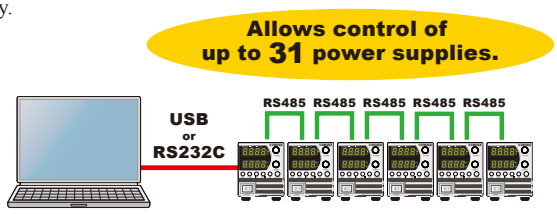
Options

- Sequence creation software
  SD024-PAV (Wavy for PAV)

Functions

■ USB/RS232C/RS485 Control

The PAV series employs USB/RS232C/RS485 interfaces as a standard.
Up to 31 PAV series power supplies can be connected and controlled.
The USB/RS232C/RS485 interfaces are integrated in the PAV series main body.



■ Control using serial communication (USB/RS232/RS485)

The following items can be controlled through the serial ports.

- Output voltage setting
- Output current setting
- Output voltage measurement
- Output current measurement
- Output on/off
- Foldback protection setting
- Overvoltage protection (OVP) setting and readout
- Undervoltage protection (UVP) setting and readout
- Undervoltage limit (UVL) setting and readout
- Start mode setting (auto or safe)

■ Control and monitoring using analog signals

The output voltage and current can be controlled by applying analog voltage or external resistance through the external control terminal on the rear panel. In addition, the output voltage and current can be monitored by monitoring the terminal voltage.
Further, the output on/off state can be controlled, and the operating status and constant voltage/constant current (CV/CC) operation mode can be monitored.

■ Parallel operation/Synchronized operation

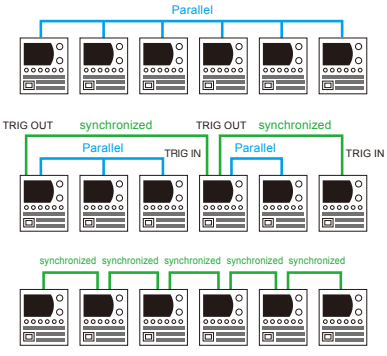
Parallel operation (PAV series with the same rating) and synchronized operation (trigger synchronization) are available. Use of optional rack-mount adapter KRA2-PAV (allows up to 6 units) and half-size integrated chassis cover CC01- PAV (allows up to 3 units) allows integration for smart rack mounting and transportation.

* Parallel operation and synchronized operation can be achieved without the optional KRA2-PAV and CC01-PAV.

Up to 4.8 kW (up to 6 units) can be mounted into a 19-inch general-purpose rack

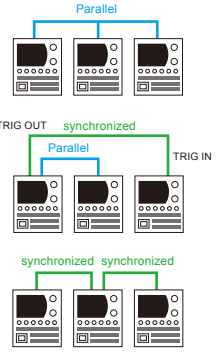
KRA2-PAV
(e.g. 6 units are mounted)

*Vacant slot without a power supply allows the mounting of an optional blank panel (KBP2-6-PAV).



Three-in-one on the bench top is available

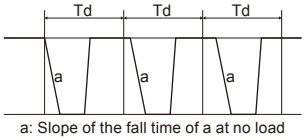
CC01-PAV
(e.g. 3 units are mounted)



PAV Series 200 W Type Specifications

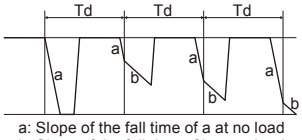
Item/Model		PAV10-20	PAV20-10	PAV36-6	PAV60-3.5	PAV100-2	PAV160-1.3	PAV320-0.65	PAV650-0.32
Output									
Rated output voltage *1		10 V	20 V	36 V	60 V	100 V	160 V	320 V	650 V
Rated output current *2		20 A	10 A	6 A	3.5 A	2 A	1.3 A	0.65 A	0.32 A
Rated output power		200 W	200 W	216 W	210 W	200 W	208 W	208 W	208 W
AC input									
Nominal input rating		100 Vac to 240 Vac continuous input, 50 Hz to 60 Hz, single phase							
Input voltage range		85 Vac to 265 Vac							
Input frequency range		47 Hz to 63 Hz							
Input current (typ) *3 (100 Vac/200 Vac)		2.65 A/1.31 A	2.62 A/1.29 A	2.76 A/1.37 A	2.69 A/1.33A	2.55 A/1.26 A	2.64 A/1.30 A		
Power factor (typ) (100 Vac/200 Vac, at the rated output power)		0.99 / 0.98							
Efficiency (typ) *3		76% / 77.5%	77% / 79%	79% / 80.5%	79% / 80.5%	79% / 81%	79% / 81%		
Inrush current (100 Vac/200 Vac) *4		15 A / 30 A or less					25 A / 25 A or less		
Constant voltage mode									
Maximum line regulation *5 (for the rated output voltage)		0.01% + 2 mV					0.01%		
Maximum load regulation *6 (for the rated output voltage)									
Ripple noise *7	20 MHz, p-p	50 mV	50 mV	50 mV	50 mV	80 mV	100 mV	150 mV	250 mV
	5 Hz to 1 MHz, rms	5 mV	6 mV	6 mV	7 mV	8 mV	10 mV	25 mV	60 mV
Temperature coefficient		30 PPM /°C (after a 30 minute warm-up, for the rated output voltage)							
Aging drift *8 (for the rated output voltage)		0.02%							
Initial drift *9 (for the rated output voltage)		0.05% + 2 mV					0.05%		
Maximum remote sensing compensation voltage (single line (positive or negative))		1 V	1 V	2 V	3 V	5 V	5 V		
Rise time *10		15 ms	30 ms	30 ms	50 ms	50 ms	110 ms	170 ms	170 ms
Fall time	At full load *10	12 ms	25 ms	30 ms	40 ms	50 ms	180 ms	270 ms	270 ms
	Td (typ) *11	210 ms	250 ms	320 ms	380 ms	1200 ms	---		
	No load a *12	40 ms	65 ms	85 ms	100 ms	250 ms	---		
	No load b *13	200 ms	200 ms	290 ms	310 ms	1100 ms	2000 ms	2500 ms	3000 ms
Transient response time *14		1 ms or less					2 ms or less		
Output hold time (typ) *15		15 ms	16 ms				16 ms	16 ms	15 ms
Constant current mode									
Maximum line regulation *5 (at the rated output current)		0.01% + 2 mA					0.02%		
Maximum load regulation *16 (at the rated output current)		0.01% + 5 mA					0.09%		0.15%
Change in the load due to the temperature drift of internal components (at the rated output current)		0.05% or less (for 30 minutes after the load conditions are changed)							
Ripple noise *17 (5 Hz to 1 MHz, rms)		25 mA	15 mA	8 mA	4 mA	3 mA	1.2 mA	0.8 mA	0.5 mA
Temperature coefficient		100 PPM /°C (after a 30 minute warm-up, at the rated output current)							
Aging drift *8 (at the rated output current)		0.05%							
Initial drift *9 (at the rated output current)		0.1%							
Protection functions									
Foldback protection		Turns off the output when the operation switches from constant voltage mode to constant current mode or vice versa. Can be set as necessary.							
Overvoltage protection (OVP)		Inverter shutoff system. Prevents the output voltage from being set higher than the OVP value. Also shuts off the output when an output overvoltage (exceeding the OVP value) occurs.							
Overvoltage protection voltage setting range		0.5 V to 12 V	1 V to 24 V	2 V to 40 V	5 V to 66 V	5 V to 110 V	5 V to 176 V	5 V to 353 V	5 V to 717 V
Undervoltage limit (UVL)		Prevents the output voltage from being set lower than the UVL value. Disabled during external control.							
Undervoltage protection (UVP)		Shuts off the output when the output voltage falls below the UVP value.							
Overheat protection		Shuts off the output before the temperature of the internal components exceeds the safe operation temperature.							
Setting and readback (USB, RS232, RS485, optional LAN interface)									
Output voltage setting	Accuracy	0.05% of the rated output voltage					0.05% of the output voltage + 0.05% of the rated output voltage		
	Number of decimal digits	3 digits				2 digits			
	Resolution	Approx. 1/60000 of rated output voltage							
Output current setting	Accuracy *18	0.1% of output current + 0.1% of the rated output current					0.2% of the rated output current		
	Number of decimal digits	3 digits	4 digits						
	Resolution	Approx. 1/60000 of rated output current							
Output voltage readback	Accuracy	0.05% of the rated output voltage					0.05% of the output voltage + 0.05% of the rated output voltage		
	Resolution	Approx. 1/60000 of rated output voltage							
Output current readback	Accuracy *18	0.1% of output current + 0.3% of the rated output current							
	Resolution	Approx. 1/60000 of rated output current							
Front panel									
Control function		● Separate knobs (encoders) for setting the output voltage and output current (setting resolution switchable). ● Knobs (encoders) for setting OVP,UVP,and UVL. ● Protection functions (OVP, UVP, UVL, foldback) ● Output shutoff function (output on/off control, shutdown) ● Communication functions: Standard equipped with USB, RS232, RS485. LAN optional. ● Baudrate, address setting ● External control: Configuration using external voltage (5 V or 10 V) or external resistance (5 kΩ or 10 kΩ), output voltage/current monitor output (5 V or 10 V), output on/off, front panel operation lock							
Output voltage display	Accuracy	0.5% of the rated output voltage ± 1 count							
	Number of decimal digits	2 digits				1 digit			
Output current display	Accuracy	0.5% of the rated output current ± 1 count							
	Number of decimal digits	2 digits	3 digits						
LED display		Green: FINE, MENU, SET, ALARM, REM, OUTPUT, CV, CC Red: ALARM (OVP, UVP, OTP, FOLD, AC FAIL)							
Setting keys		FINE, MENU, SET, ALARM, REM, OUTPUT							

*1. The minimum voltage is 0.1 % of the rated output voltage.
*2. The minimum current is 0.2 % of the rated output current.
*3. Input voltage 100 Vac/200 Vac, at the rated output power, ambient temperature 25 °C If the LAN option is built in, the efficiency decreases by 0.5 % and the input current increases by 0.5 %.
*4. Excludes input surge current (duration 0.2 ms or less) applied to the built-in noise filter section.
*5. 85 Vac to 132 Vac or 170 Vac to 265 Vac, fixed load
*6. With the input voltage held constant, the sensing point was measured using remote sensing from no load to full load.
*7. Models with rated output voltages from 10 V to 100 V were measured using an RC-9131 A 1:1 probe that conforms to the JEITA specifications. Models with rated output voltage from 160 V to 650 V were measured using a 10:1 probe.
*8. When at least 8 hours has passed after a 30 minute warm-up with the input voltage, load, and ambient temperature held constant
*9. For 30 minutes after turning on the power with the input voltage, load, and ambient temperature held constant
*10. Between 10 % and 90 % of the rated resistive load and rated output voltage
*11. If the output voltage is repeatedly decreased, Td is the minimum duration from a given voltage drop to the next voltage drop.
*12. Duration for the voltage to change from 90 % to 10 % of the rated output voltage when the output voltage is repeatedly decreased and the duration from a given voltage drop to the next voltage drop is longer than Td.



a: Slope of the fall time of a at no load

*13. Duration for the voltage to change from 90 % to 10 % of the rated output voltage when the output voltage is repeatedly decreased and the duration from a given voltage drop to the next voltage drop is shorter than Td.



a: Slope of the fall time of a at no load
b: Slope of the fall time of b at no load

*14. The amount of time required for the output voltage to return to a value within 0.5 % of the rated output voltage. The change in the load current is 10 % to 90 % of the rating. The output voltage is between 10 % and 100 % of the rating. During local sensing.
*15. At the rated output power
*16. The value when the output voltage is changed from the lower limit to the rated voltage in constant current mode with the input voltage held constant
*17. For models with a 10 V rated output voltage, this is the value for when the output voltage is 2 V to 10 V at the rated output current. For other models, this is the value for when the output voltage is 10 % to 100 % of the rating at the rated output current. Models with rated output voltage from 160 V to 650 V were measured using a 10:1 probe.
*18. In output current control, the current, linearity, and monitor accuracies do not include the load variation caused by initial drift and temperature drift of internal components.

PAV Series 400 W Type Specifications

Item/Model		PAV10-40	PAV20-20	PAV36-12	PAV60-7	PAV100-4	PAV160-2.6	PAV320-1.3	PAV650-0.64
Output									
Rated output voltage *1		10 V	20 V	36 V	60 V	100 V	160 V	320 V	650 V
Rated output current *2		40 A	20 A	12 A	7 A	4 A	2.6 A	1.3 A	0.64 A
Rated output power		400 W	400 W	432 W	420 W	400 W	416 W	416 W	416 W
AC input									
Nominal input rating		100 Vac to 240 Vac continuous input, 50 Hz to 60 Hz, single phase							
Input voltage range		85 Vac to 265 Vac							
Input frequency range		47 Hz to 63 Hz							
Input current (typ) *3 (100 Vac/200 Vac)		5.05 A/2.47 A	4.98 A/2.45 A	5.25 A/2.57 A	5.10 A/2.50 A	4.80 A/2.37 A	5 A / 2.44 A		
Power factor (typ) (100 Vac/200 Vac, at the rated output power)		0.99							
Efficiency (typ) *3		80% / 82%	81% / 83%	83% / 85%	83% / 85%	84% / 88%	84% / 86%		
Inrush current (100 Vac/200 Vac) *4		25 A / 25 A or less					25 A / 25 A or less		
Constant voltage mode									
Maximum line regulation *5 (for the rated output voltage)		0.01% + 2mV					0.01%		
Maximum load regulation *6 (for the rated output voltage)									
Ripple noise *7	20 MHz, p-p	50 mV	50 mV	50 mV	50 mV	80 mV	100 mV	150 mV	250 mV
	5 Hz to 1 MHz, rms	5 mV	6 mV	6 mV	7 mV	8 mV	10 mV	25 mV	60 mV
Temperature coefficient		30 PPM /°C (after a 30 minute warm-up, for the rated output voltage)							
Aging drift *8 (for the rated output voltage)		0.02%							
Initial drift *9 (for the rated output voltage)		0.05% + 2 mV					0.05%		
Maximum remote sensing compensation voltage (single line (positive or negative))		1 V	1 V	2 V	3 V	5V	5 V		
Rise time *10		15 ms	30 ms	30 ms	50 ms	50 ms	80 ms	150 ms	150 ms
Fall time	At full load *10	10 ms	10 ms	15 ms	30 ms	50 ms	100 ms	150 ms	150 ms
	Td (typ) *11	210 ms	250 ms	320 ms	380 ms	1200 ms	---		
	No load a *12	40 ms	65 ms	85 ms	100 ms	250 ms	---		
	No load b *13	200 ms	200 ms	290 ms	310 ms	1100 ms	2000 ms	2500 ms	3000 ms
Transient response time *14		1 ms or less					2 ms or less		
Output hold time (typ) *15		15 ms	16 ms				16 ms		15 ms
Constant current mode									
Maximum line regulation *5 (at the rated output current)		0.01% + 2 mA					0.02%		
Maximum load regulation *16 (at the rated output current)		0.01% + 5 mA					0.09%		
Change in the load due to the temperature drift of internal components (at the rated output current)		0.05% or less (for 30 minutes after the load conditions are changed)							
Ripple noise *17 (5 Hz to 1 MHz, rms)		70 mA	40 mA	15 mA	8 mA	3 mA	1.5 mA	1 mA	0.6 mA
Temperature coefficient		100 PPM /°C (after a 30 minute warm-up, at the rated output current)							
Aging drift *8 (at the rated output current)		0.05%							
Initial drift *9 (at the rated output current)		0.1%							
Protection functions									
Foldback protection		Turns off the output when the operation switches from constant voltage mode to constant current mode or vice versa. Can be set as necessary.							
Overvoltage protection (OVP)		Inverter shutoff system. Prevents the output voltage from being set higher than the OVP value. Also shuts off the output when an output overvoltage (exceeding the OVP value) occurs.							
Overvoltage protection voltage setting range		0.5 V to 12 V	1 V to 24 V	2 V to 40 V	5 V to 66 V	5 V to 110 V	5 V to 176 V	5 V to 353 V	5 V to 717 V
Undervoltage limit (UVL)		Prevents the output voltage from being set lower than the UVL value. Disabled during external control.							
Undervoltage protection (UVP)		Shuts off the output when the output voltage falls below the UVP value.							
Overheat protection		Shuts off the output before the temperature of the internal components exceeds the safe operation temperature.							
Setting and readback (USB, RS232, RS485, optional LAN interface)									
Output voltage setting	Accuracy	0.05% of the rated output voltage					0.05% of the output voltage + 0.05% of the rated output voltage		
	Number of decimal digits	3 digits				2 digits			
	Resolution	Approx. 1/60000 of rated output voltage							
Output current setting	Accuracy *18	0.1% of output current + 0.1% of the rated output current					0.2% of the rated output current		
	Number of decimal digits	3 digits				4 digits			
	Resolution	Approx. 1/60000 of rated output current							
Output voltage readback	Accuracy	0.05% of the rated output voltage					0.05% of the output voltage + 0.05% of the rated output voltage		
	Resolution	Approx. 1/60000 of rated output voltage							
Output current readback	Accuracy *18	0.1% of output current + 0.3% of the rated output current							
	Resolution	Approx. 1/60000 of rated output current							
Front panel									
Control function		● Separate knobs (encoders) for setting the output voltage and output current (setting resolution switchable). ● Knobs (encoders) for setting OVP,UVP,and UVL. ● Protection functions (OVP, UVP, UVL, foldback) ● Output shutoff function (output on/off control, shutdown) ● Communication functions: Standard equipped with USB, RS232, RS485. LAN optional. ● Baudrate, address setting ● External control: Configuration using external voltage (5 V or 10 V) or external resistance (5 kΩ or 10 kΩ), output voltage/current monitor output (5 V or 10 V), output on/off, front panel operation lock							
Output voltage display	Accuracy	0.5% of the rated output voltage ± 1 count							
	Number of decimal digits	2 digits				1 digit			
Output current display	Accuracy	0.5% of the rated output current ± 1 count							
	Number of decimal digits	2 digits			3 digits				
LED display		Green: FINE, MENU, SET, ALARM, REM, OUTPUT, CV, CC Red: ALARM (OVP, UVP, OTP, FOLD, AC FAIL)							
Setting keys		FINE, MENU, SET, ALARM, REM, OUTPUT							

*1. The minimum voltage is 0.1 % of the rated output voltage.

*2. The minimum current is 0.2 % of the rated output current.

*3. Input voltage 100 Vac/200 Vac, at the rated output power, ambient temperature 25 °C If the LAN option is built in, the efficiency decreases by 0.5 % and the input current increases by 0.5 %.

*4. Excludes input surge current (duration 0.2 ms or less) applied to the built-in noise filter section.

*5. 85 Vac to 132 Vac or 170 Vac to 265 Vac, fixed load

*6. With the input voltage held constant, the sensing point was measured using remote sensing from no load to full load.

*7. Models with rated output voltages from 10 V to 100 V were measured using an RC-9131 A 1:1 probe that conforms to the JEITA specifications. Models with rated output voltage from 160 V to 650 V were measured using a 10:1 probe.

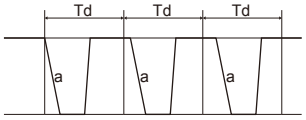
*8. When at least 8 hours has passed after a 30 minute warm-up with the input voltage, load, and ambient temperature held constant

*9. For 30 minutes after turning on the power with the input voltage, load, and ambient temperature held constant

*10. Between 10 % and 90 % of the rated resistive load and rated output voltage

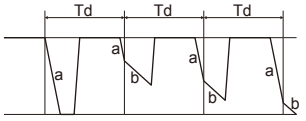
*11. If the output voltage is repeatedly decreased, Td is the minimum duration from a given voltage drop to the next voltage drop.

*12. Duration for the voltage to change from 90 % to 10 % of the rated output voltage when the output voltage is repeatedly decreased and the duration from a given voltage drop to the next voltage drop is longer than Td.



a: Slope of the fall time of a at no load

*13. Duration for the voltage to change from 90 % to 10 % of the rated output voltage when the output voltage is repeatedly decreased and the duration from a given voltage drop to the next voltage drop is shorter than Td.



a: Slope of the fall time of a at no load
b: Slope of the fall time of b at no load

*14. The amount of time required for the output voltage to return to a value within 0.5 % of the rated output voltage. The change in the load current is 10 % to 90 % of the rating. The output voltage is between 10 % and 100 % of the rating. During local sensing.

*15. At the rated output power

*16. The value when the output voltage is changed from the lower limit to the rated voltage in constant current mode with the input voltage held constant

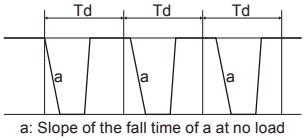
*17. For models with a 10 V rated output voltage, this is the value for when the output voltage is 2 V to 10 V at the rated output current. For other models, this is the value for when the output voltage is 10 % to 100 % of the rating at the rated output current. Models with rated output voltage from 160 V to 650 V were measured using a 10:1 probe.

*18. In output current control, the current, linearity, and monitor accuracies do not include the load variation caused by initial drift and temperature drift of internal components.

PAV Series 600 W Type Specifications

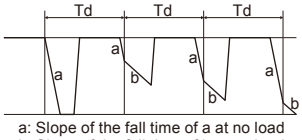
Item/Model		PAV10-60	PAV20-30	PAV36-18	PAV60-10	PAV100-6	PAV160-4	PAV320-2	PAV650-1
Output									
Rated output voltage *1		10 V	20 V	36 V	60 V	100 V	160 V	320 V	650 V
Rated output current *2		60 A	30 A	18 A	10 A	6 A	4 A	2 A	1 A
Rated output power		600 W	600 W	648 W	600 W	600 W	640 W	640 W	650 W
AC input									
Nominal input rating		100 Vac to 240 Vac continuous input, 50 Hz to 60 Hz, single phase							
Input voltage range		85 Vac to 265 Vac							
Input frequency range		47 Hz to 63 Hz							
Input current (typ) *3 (100 Vac/200 Vac)		7.48 A/3.69 A	7.22 A/3.56 A	7.70 A/3.80 A	7.13 A/3.52 A	7.13 A/3.52 A	7.47 A / 3.69 A		7.59 A/3.75 A
Power factor (typ) (100 Vac/200 Vac, at the rated output power)		0.99 / 0.98							
Efficiency (typ) *3		81% / 83%	84% / 86%	85% / 87%	85% / 87%	85% / 87%	86.5% / 88.5%	87% / 88.5%	86.5% / 88.5%
Inrush current (100 Vac/200 Vac) *4		30 A / 30 A or less					30 A / 30 A or less		
Constant voltage mode									
Maximum line regulation *5 (for the rated output voltage)		0.01% + 2 mV					0.01%		
Maximum load regulation *6 (for the rated output voltage)									
Ripple noise *7	20 MHz, p-p	50 mV	50 mV	50 mV	50 mV	80 mV	100 mV	150 mV	250 mV
	5 Hz to 1 MHz, rms	5 mV	5 mV	5 mV	12 mV	15 mV	10 mV	30 mV	60 mV
Temperature coefficient		30 PPM /°C (after a 30 minute warm-up, for the rated output voltage)							
Aging drift *8 (for the rated output voltage)		0.05%					0.02%		
Initial drift *9 (for the rated output voltage)		0.05% + 2 mV					0.05%		
Maximum remote sensing compensation voltage (single line (positive or negative))		1 V	1 V	2 V	3 V	5 V	5 V		
Rise time *10		50 ms	50 ms	50 ms	50 ms	100 ms	55 ms	75 ms	75 ms
Fall time	At full load *10	25 ms	25 ms	25 ms	25 ms	80 ms	65 ms	85 ms	85 ms
	Td (typ) *11	285 ms	425 ms	450 ms	570 ms	1370 ms	---		
	No load a *12	65 ms	110 ms	155 ms	175 ms	375 ms	---		
	No load b *13	280 ms	470 ms	470 ms	500 ms	1200 ms	2000 ms	2500 ms	3000 ms
Transient response time *14		1 ms or less					2 ms or less		
Output hold time (typ) *15		15 ms		20 ms			16 ms		14 ms
Constant current mode									
Maximum line regulation *5 (at the rated output current)		0.01% + 2 mA					0.02%		
Maximum load regulation *16 (at the rated output current)		0.01% + 5 mA					0.09%		
Change in the load due to the temperature drift of internal components (at the rated output current)		0.15% or less (for 30 minutes after the load conditions are changed)					0.05% or less (for 30 minutes after the load conditions are changed)		
Ripple noise *17 (5 Hz to 1 MHz, rms)		150 mA	75 mA	25 mA	8 mA	5 mA	2 mA	1.5 mA	1 mA
Temperature coefficient		100 PPM /°C (after a 30 minute warm-up, at the rated output current)							
Aging drift *8 (at the rated output current)		0.05%							
Initial drift *9 (at the rated output current)		0.3%	0.15%		0.1%		0.1%		
Protection functions									
Foldback protection		Turns off the output when the operation switches from constant voltage mode to constant current mode or vice versa. Can be set as necessary.							
Overvoltage protection (OVP)		Inverter shutoff system. Prevents the output voltage from being set higher than the OVP value. Also shuts off the output when an output overvoltage (exceeding the OVP value) occurs.							
Overvoltage protection voltage setting range		0.5 V to 12 V	1 V to 24 V	2 V to 40 V	5 V to 66 V	5 V to 110 V	5 V to 176 V	5 V to 353 V	5 V to 717 V
Undervoltage limit (UVL)		Prevents the output voltage from being set lower than the UVL value. Disabled during external control.							
Undervoltage protection (UVP)		Shuts off the output when the output voltage falls below the UVP value.							
Overheat protection		Shuts off the output before the temperature of the internal components exceeds the safe operation temperature.							
Setting and readback (USB, RS232, RS485, optional LAN interface)									
Output voltage setting	Accuracy	0.05% of the rated output voltage					0.05% of the output voltage + 0.05% of the rated output voltage		
	Number of decimal digits	3 digits				2 digits			
	Resolution	Approx. 1/60000 of rated output voltage							
Output current setting	Accuracy *18	0.1% of output current + 0.1% of the rated output current					0.2% of the rated output current		
	Number of decimal digits	3 digits				4 digits			
	Resolution	Approx. 1/60000 of rated output current							
Output voltage readback	Accuracy	0.05% of the rated output voltage					0.05% of the output voltage + 0.05% of the rated output voltage		
	Resolution	Approx. 1/60000 of rated output voltage							
Output current readback	Accuracy *18	0.1% of output current + 0.3% of the rated output current							
	Resolution	Approx. 1/60000 of rated output current							
Front panel									
Control function		● Separate knobs (encoders) for setting the output voltage and output current (setting resolution switchable). ● Knobs (encoders) for setting OVP,UVP,and UVL. ● Protection functions (OVP, UVP, UVL, foldback) ● Output shutoff function (output on/off control, shutdown) ● Communication functions: Standard equipped with USB, RS232, RS485. LAN optional. ● Baudrate, address setting ● External control: Configuration using external voltage (5 V or 10 V) or external resistance (5 kΩ or 10 kΩ), output voltage/current monitor output (5 V or 10 V), output on/off, front panel operation lock							
Output voltage display	Accuracy	0.5% of the rated output voltage ± 1 count							
	Number of decimal digits	2 digits				1 digit			
Output current display	Accuracy	0.5% of the rated output current ± 1 count							
	Number of decimal digits	2 digits				3 digits			
LED display		Green: FINE, MENU, SET, ALARM, REM, OUTPUT, CV, CC Red: ALARM (OVP, UVP, OTP, FOLD, AC FAIL)							
Setting keys		FINE, MENU, SET, ALARM, REM, OUTPUT							

*1. The minimum voltage is 0.1 % of the rated output voltage.
*2. The minimum current is 0.2 % of the rated output current.
*3. Input voltage 100 Vac/200 Vac, at the rated output power, ambient temperature 25 °C If the LAN option is built in, the efficiency decreases by 0.5 % and the input current increases by 0.5 %.
*4. Excludes input surge current (duration 0.2 ms or less) applied to the built-in noise filter section.
*5. 85 Vac to 132 Vac or 170 Vac to 265 Vac, fixed load
*6. With the input voltage held constant, the sensing point was measured using remote sensing from no load to full load.
*7. Models with rated output voltages from 10 V to 100 V were measured using an RC-9131 A 1:1 probe that conforms to the JEITA specifications. Models with rated output voltage from 160 V to 650 V were measured using a 10:1 probe.
*8. When at least 8 hours has passed after a 30 minute warm-up with the input voltage, load, and ambient temperature held constant
*9. For 30 minutes after turning on the power with the input voltage, load, and ambient temperature held constant
*10. Between 10 % and 90 % of the rated resistive load and rated output voltage
*11. If the output voltage is repeatedly decreased, Td is the minimum duration from a given voltage drop to the next voltage drop.
*12. Duration for the voltage to change from 90 % to 10 % of the rated output voltage when the output voltage is repeatedly decreased and the duration from a given voltage drop to the next voltage drop is longer than Td.



a: Slope of the fall time of a at no load

*13. Duration for the voltage to change from 90 % to 10 % of the rated output voltage when the output voltage is repeatedly decreased and the duration from a given voltage drop to the next voltage drop is shorter than Td.



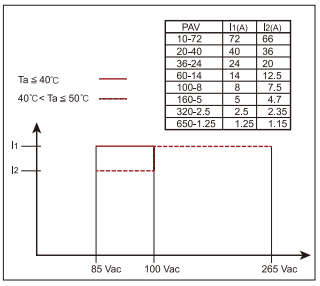
a: Slope of the fall time of a at no load
b: Slope of the fall time of b at no load

*14. The amount of time required for the output voltage to return to a value within 0.5 % of the rated output voltage. The change in the load current is 10 % to 90 % of the rating. The output voltage is between 10 % and 100 % of the rating. During local sensing.
*15. At the rated output power
*16. The value when the output voltage is changed from the lower limit to the rated voltage in constant current mode with the input voltage held constant
*17. For models with a 10 V rated output voltage, this is the value for when the output voltage is 2 V to 10 V at the rated output current. For other models, this is the value for when the output voltage is 10 % to 100 % of the rating at the rated output current. Models with rated output voltage from 160 V to 650 V were measured using a 10:1 probe.
*18. In output current control, the current, linearity, and monitor accuracies do not include the load variation caused by initial drift and temperature drift of internal components.

PAV Series 800 W Type Specifications

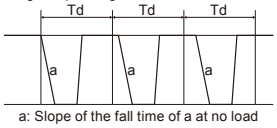
Item/Model		PAV10-72	PAV20-40	PAV36-24	PAV60-14	PAV100-8	PAV160-5	PAV320-2.5	PAV650-1.25
Output									
Rated output voltage *1		10 V	20 V	36 V	60 V	100 V	160 V	320 V	650 V
Rated output current *2	100 Vac ≤ Vin*3 Ta*4 ≤ 50°C	72 A	40 A	24 A	14 A	8 A	5 A	2.5 A	1.25 A
	Vin < 100 Vac Ta ≤ 40°C	72 A	40 A	24 A	14 A	8 A	5 A	2.5 A	1.25 A
	Vin < 100 Vac 40°C < Ta ≤ 50°C	66 A	36 A	20 A	12.5 A	7.5 A	4.7 A	2.35 A	1.15 A
Rated output power	100 Vac ≤ Vin Ta ≤ 50°C	720 W	800 W	864 W	840 W	800 W	800 W	800 W	812.5 W
	Vin < 100 Vac Ta ≤ 40°C	720 W	800 W	864 W	840 W	800 W	800 W	800 W	812.5 W
	Vin < 100 Vac 40°C < Ta ≤ 50°C	660 W	720 W	720 W	750 W	750 W	752 W	752 W	747.5 W
AC input									
Nominal input rating		100 Vac to 240 Vac continuous input, 50 Hz to 60 Hz, single phase							
Input voltage range		85 Vac to 265 Vac							
Input frequency range		47 Hz to 63 Hz							
Input current (typ) *5 (100 Vac/200 Vac)		9.00 A / 4.45 A	9.65 A / 4.75 A	10.30 A / 5.10 A	10.00 A / 4.95 A	9.50 A / 4.70 A	9.34 A / 4.61 A	9.34 A / 4.59 A	9.43 A / 4.66 A
Power factor (typ) (100 Vac/200 Vac, at the rated output power)		0.99 / 0.98							
Efficiency (typ) *5		81% / 83%	84% / 86%	85% / 87%	85% / 87%	85% / 87%	86.5% / 88.5%	86.5% / 89%	87% / 89%
Inrush current(100 Vac/200 Vac) *6		30 A / 30 A or less							
Constant voltage mode									
Maximum line regulation *7 (for the rated output voltage)		0.01% + 2 mV					0.01%		
Maximum load regulation *8 (for the rated output voltage)									
Ripple noise *9	20 MHz, p-p	50 mV	50 mV	50 mV	60 mV	80 mV	100 mV	150 mV	250 mV
	5 Hz to 1 MHz, rms	5 mV	5 mV	5 mV	12 mV	15 mV	10 mV	30 mV	60 mV
Temperature coefficient		30 PPM /°C (after a 30 minute warm-up, for the rated output voltage)							
Aging drift *10 (for the rated output voltage)		0.05%					0.02%		
Initial drift *11 (for the rated output voltage)		0.05% + 2 mV					0.05%		
Maximum remote sensing compensation voltage (single line (positive or negative))		1 V	1 V	2 V	3 V	5 V	5 V		
Rise time *12		50 ms	50 ms	50 ms	50 ms	100 ms	45 ms	55 ms	55 ms
Fall time	At full load *12	25 ms	25 ms	25 ms	25 ms	80 ms	55 ms	65 ms	65 ms
	Td (typ) *13	285 ms	425 ms	450 ms	570 ms	1370 ms	---		
	No load a *14	65 ms	110 ms	155 ms	175 ms	375 ms	---		
	No load b *15	280 ms	470 ms	470 ms	500 ms	1200 ms	2000 ms	2500 ms	3000 ms
Transient response time *16		1 ms or less					2 ms or less		
Output hold time (typ) *17		10 ms					13 ms	11.5 ms	
Constant current mode									
Maximum line regulation *7 (at the rated output current)		0.01% + 2 mA					0.02%		
Maximum load regulation *18 (at the rated output current)		0.01% + 5 mA					0.09%		
Change in the load due to the temperature drift of internal components (at the rated output current)		0.15% or less	0.1% or less				0.05% or less		
		(for 30 minutes after the load conditions are changed)							
Ripple noise *19 (5 Hz to 1 MHz, rms)		180 mA	100 mA	31 mA	28 mA	12 mA	2 mA	1.5 mA	1 mA
Temperature coefficient		100 PPM /°C (after a 30 minute warm-up, at the rated output current)							
Aging drift *10 (at the rated output current)		0.05%							
Initial drift *11 (at the rated output current)		0.3%					0.1%		
Protection functions									
Foldback protection		Turns off the output when the operation switches from constant voltage mode to constant current mode or vice versa. Can be set as necessary.							
Overvoltage protection (OVP)		Inverter shutoff system. Prevents the output voltage from being set higher than the OVP value. Also shuts off the output when an output overvoltage (exceeding the OVP value) occurs.							
Overvoltage protection voltage setting range		0.5 V to 12 V	1 V to 24 V	2 V to 40 V	5 V to 66 V	5 V to 110 V	5 V to 176 V	5 V to 353 V	5 V to 717 V
Undervoltage limit (UVL)		Prevents the output voltage from being set lower than the UVL value. Disabled during external control.							
Undervoltage protection (UVP)		Shuts off the output when the output voltage falls below the UVP value.							
Overheat protection		Shuts off the output before the temperature of the internal components exceeds the safe operation temperature.							
Setting and readback (USB, RS232, RS485, optional LAN interface)									
Output voltage setting	Accuracy	0.05% of the rated output voltage					0.05% of the output voltage + 0.05% of the rated output voltage		
	Number of decimal digits	3 digits				2 digits			
	Resolution	Approx. 1/60000 of rated output voltage							
Output current setting	Accuracy *20	0.1% of output current + 0.1% of the rated output current					0.2% of the rated output current		
	Number of decimal digits	2 digits	3 digits				4 digits		
	Resolution	Approx. 1/60000 of rated output current							
Output voltage readback	Accuracy	0.05% of the rated output voltage					0.05% of the output voltage + 0.05% of the rated output voltage		
	Resolution	Approx. 1/60000 of rated output voltage							
Output current readback	Accuracy *20	0.1% of output current + 0.3% of the rated output current							
	Resolution	Approx. 1/60000 of rated output current							
Front panel									
Control function		● Separate knobs (encoders) for setting the output voltage and output current (setting resolution switchable). ● Knobs (encoders) for setting OVP,UVP,and UVL. ● Protection functions (OVP, UVP, UVL, foldback) ● Output shutoff function (output on/off control, shutdown) ● Communication functions: Standard equipped with USB, RS232, RS485. LAN optional. ● Baudrate, address setting ● External control: Configuration using external voltage (5 V or 10 V) or external resistance (5 kΩ or 10 kΩ), output voltage/current monitor output (5 V or 10 V), output on/off, front panel operation lock							
Output voltage display	Accuracy	0.5% of the rated output voltage ± 1 count							
	Number of decimal digits	2 digits				1 digit			
Output current display	Accuracy	0.5% of the rated output current ± 1 count							
	Number of decimal digits	2 digits				3 digits			
LED display		Green: FINE, MENU, SET, ALARM, REM, OUTPUT, CV, CC Red: ALARM (OVP, UVP, OTP, FOLD, AC FAIL)							
Setting keys		FINE, MENU, SET, ALARM, REM, OUTPUT							

*1. The minimum voltage is 0.1% the rated output voltage.
*2. The minimum current is 0.2% of the rated output current.
*3. Vin: Input voltage
*4. Ta: Ambient temperature (performance depending on the input voltage versus rated output current and ambient tempera-ture shown below)



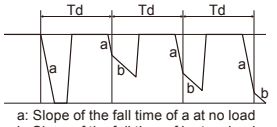
PAV	I1(A)	I2(A)
10-72	72	66
20-40	40	36
36-24	24	20
60-14	14	12.5
100-8	8	7.5
160-5	5	4.7
320-2.5	2.5	2.35
650-1.25	1.25	1.15

*5. Input voltage 100 Vac/200 Vac, at the rated output power, ambient temperature 25 °C If the LAN option is built in, the efficiency decreases by 0.5% and the input current increases by 0.5%.
*6. Excludes input surge current (duration 0.2 ms or less) applied to the built-in noise filter section.
*7. 85 Vac to 132 Vac or 170 Vac to 265 Vac, fixed load
*8. With the input voltage held constant, the sensing point was measured using remote sensing from no load to full load.
*9. Models with rated output voltages from 10 V to 100 V were measured using an RC-9131 A 1:1 probe that conforms to the JEITA specifications. Models with rated output voltage from 160 V to 650 V were measured using a 10:1 probe. At an ambient temperature of 0 °C, measurement was performed after at least 1 minute had passed after startup.
*10. When at least 8 hours has passed after a 30 minute warm-up with the input voltage, load, and ambient temperature held constant
*11. For 30 minutes after turning on the power with the input voltage, load, and ambient temperature held constant
*12. Between 10% and 90% of the rated resistive load and rated output voltage
*13. If the output voltage is repeatedly decreased, Td is the minimum duration from a given voltage drop to the next voltage drop.
*14. Duration for the voltage to change from 90% to 10% of the rated output voltage when the output voltage is repeatedly decreased and the duration from a given voltage drop to the next voltage drop is longer than Td.



a: Slope of the fall time of a at no load

*15. Duration for the voltage to change from 90% to 10% of the rated output voltage when the output voltage is repeatedly decreased and the duration from a given voltage drop to the next voltage drop is shorter than Td.



a: Slope of the fall time of a at no load
b: Slope of the fall time of b at no load

*16. The amount of time required for the output voltage to return to a value within 0.5% of the rated output voltage. The change in the load current is 10% to 90% of the rating. The output voltage is between 10% and 100% of the rating. During local sensing.
*17. At the rated output power
*18. The value when the output voltage is changed from the lower limit to the rated voltage in constant current mode with the input voltage held constant
*19. For models with a 10 V rated output voltage, this is the value for when the output voltage is 2 V to 10 V at the rated output current. For other models, this is the value for when the output voltage is 10 % to 100 % of the rating at the rated output current. Models with rated output voltage from 160 V to 650 V were measured using a 10:1 probe.
*20. In output current control, the current, linearity, and monitor accuracies do not include the load variation caused by initial drift and temperature drift of internal components.

PAV Series All Type Specifications

External control	
Output voltage control using external voltage	0% to 100% of the rated output voltage (application voltage range selectable: 0 V to 5 V or 0 V to 10 V) Accuracy and linearity: ± 0.5% of the rated output voltage
Output current control using external voltage *1	0% to 100% of the rated output current (application voltage range selectable: 0 V to 5 V or 0 V to 10 V) Accuracy and linearity: ± 1% of the rated output current
Output voltage control using external resistance	0% to 100% of the rated output voltage (application resistance range selectable: 0 Ω to 5 kΩ or 0 Ω to 10 kΩ) Accuracy and linearity: ± 1% of the rated output voltage
Output current control using external resistance *1	0% to 100% of the rated output current (application resistance range selectable: 0 Ω to 5 kΩ or 0 Ω to 10 kΩ) Accuracy and linearity: ± 1.5% of the rated output current
Output shutoff (SO) control	External voltage application: 0 V to 0.6 V, 4 V to 15 V, or a contact switch. Positive or negative logic selectable.
Output current monitor *1	Monitor voltage range selectable: 0 V to 5 V or 0 V to 10 V, Accuracy: 1%
Output voltage monitor	Monitor voltage range selectable: 0 V to 5 V or 0 V to 10 V, Accuracy: 1%
Normal operation status signal	Normal (4 V to 5 V), abnormal (0 V), output resistance 500 Ω
Parallel operation *2 *3	Possible up to six power supplies. Master-slave operation with a current balance function.
Series operation *4	Possible up to two power supplies.
Constant voltage/constant current mode (CV/CC) signal	Open collector output (maximum application voltage 30 V, maximum sink current 10 mA) Low level (on) during constant current (CC) mode High level (off) during constant voltage (CV) mode
Output on / off control (ILC)	Output can be shut off using a contact switch or the like (maximum voltage between terminals: 5 V). When open: Output off When shorted: Output on
Local / remote	Output can be shut off using a contact switch or the like (maximum voltage between terminals: 5 V). When open: Output off When shorted: Output on
External control status signal	Open collector output (maximum application voltage 30 V, maximum sink current 10 mA) High level (off) during local mode Low level (on) during external control
Trigger output signal	Maximum low level output signal: 0.8 V, Minimum high level output signal: 3.8 V, maximum high level output signal: 5 V Maximum source current: 16 mA, output trigger signal span: 20 µs (typ)
Trigger input signal	Maximum low level input signal: 1.2 V, Minimum high level input signal: 3.5 V, maximum high level input signal: 5 V Maximum sink current: 16 mA, positive edge trigger span: 10 µs (min), Tr/Tf: 1 µs (max)
Program signal output 1 / Program signal output 2	Open collector output (maximum application voltage 25 V, maximum sink current 100 mA)
Environmental conditions	
Operating ambient temperature and humidity	0 °C to 50 °C (32 °F to 122 °F) 20%rh to 90%rh (no condensation)
Storage ambient temperature and humidity	-20 °C to 85 °C (-4 °F to 185 °F) 10%rh to 95%rh (no condensation)
Installation location	Indoor use, Overvoltage category II Altitude: Up to 3000 m (at 2000 m and above, the operating ambient temperature must be reduced), At 2000 m to 3000 m, the operating ambient temperature is 0 °C to 40 °C (32 °F to 104 °F).
Structure	
Cooling method	Forced air cooling using internal fan
Weight	1.9 kg (4.2 lb) or less: 200 W, 400 W types (models whose rated output voltage is 10 V to 100 V and 160 V to 650 V) 2.0 kg (4.4 lb) or less: 600 W, 800 W types (models whose rated output voltage is 160 V to 650 V) 2.1 kg (4.6 lb) or less: 600 W, 800 W types (models whose rated output voltage is 10 V to 100 V)
Vibration resistance	IEC60068-2-64
Shock resistance	196.1 m/s^2 (20 G) or less, half sine, 11 ms, when not packaged, when not operating (IEC 60068-2-27)

*1. In output current control, the current, linearity, and monitor accuracies do not include the load variation caused by initial drift and temperature drift of internal components. *2. For parallel operation of two or more PAV series power supplies with the same rating, the minimum load current is 5% of the rating or higher. For parallel operation of four or less models with rated output voltage of 160 V to 650 V, the minimum load current is 5% of the rating or higher. For parallel operation of more than four, the minimum load current is 20% of the rating or higher. *3. The ammeter's display accuracy when the total current is displayed on the master unit is 2% ± 1 count of the total of rated currents. *4. An external protection diode is necessary.

Safety / EMC	
Safety standards	Complies with the requirements of the following directive and standards. Low Voltage Directive 2014/35/EU UL/EN/IEC 61010-1 (Class I *1, Pollution degree 2 *2) (Design to meet UL/EN 60950-1) ●Models whose rated output voltage is 10 V, 20 V, 36 V, or 60 V Output terminals and signal terminals produce non-hazardous voltage. ●Models whose rated output voltage is 100 V, 160 V, 320 V, or 650 V Output terminals and J1 and J2 terminals produce hazardous voltage (other signal terminals produce non-hazardous voltage).
EMC standards	Complies with the requirements of the following directive and standards. EMC Directive 2014/30/EU EN/IEC 61326-1 (Design to meet EN 55022/EN 55024)
Withstanding voltage *3	●Models whose rated output voltage is 10 V, 20 V, or 36 V. 4242 Vdc: Between input and output (including between signal terminals) 2828 Vdc: Between input and FG 707 Vdc: Between output (including between signal terminals) and FG ●Models whose rated output voltage is 60 V or 100 V 4242 Vdc: Between input and output (including between signal terminals) 2828 Vdc: Between input and FG 707 Vdc: Between signal terminals (excluding J1/J2) and FG 1910 Vdc: Between output as well as J1/J2 terminals and signal terminals (excluding J1/J2) 1380 Vdc: Between output as well as J1/J2 terminals and FG ●Models whose rated output voltage is 160 V or 320 V 2970 Vdc: Between input and output (including between signal terminals) 2828 Vdc: Between input and FG 707 Vdc: Between signal terminals (excluding J1/J2) and FG 4242 Vdc: Between input and signal terminals (excluding J1/J2) 3200 Vdc: Between output as well as J1/J2 terminals and signal terminals (excluding J1/J2) 2000 Vdc: Between output as well as J1/J2 terminals and FG ●Models whose rated output voltage is 650 V 3704 Vdc: Between input and output (including between signal terminals) 2828 Vdc: Between input and FG 707 Vdc: Between signal terminals (excluding J1/J2) and FG 4242 Vdc: Between input and signal terminals (excluding J1/J2) 4244 Vdc: Between output as well as J1/J2 terminals and signal terminals (excluding J1/J2) 2780 Vdc: Between output as well as J1/J2 terminals and FG
Insulation resistance	100 MΩ or higher (25 °C, 70%rh)
Conducted emission	IEC/EN 61326-1, Class B, FCC part15-B, VCCI-B
Radiated emission	IEC/EN 61326-1, Class A *4, FCC part15-A, VCCI-A

*1. This is a Class I equipment. Be sure to ground the product's protective conductor terminal. The safety of this product is only guaranteed when the product is properly grounded. *2. Pollution is addition of foreign matter (solid, liquid or gaseous) that may produce a reduction of dielectric strength or surface resistivity. Pollution Degree 2 assumes that only non-conductive pollution will occur except for an occasional temporary conductivity caused by condensation. *3. Test voltage application time: 1 minute *4. This is a Class A equipment. The product is intended for use in an industrial environment. This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.

1U Wide Range Programmable DC Power Supply

PWX Series

LAN USB GPIB (OPTION) RS232C DRIVERS CE LXI

Dimensions / Weight

750 W type: 422.8(16.65″)W × 43(1.69″)H × 500(19.69″)Dmm/ 8 kg(17.64 lbs.)
1500 W type: 422.8(16.65″)W × 43(1.69″)H × 500(19.69″)Dmm/ 9.5 kg(20.94 lbs.)

Accessories

Output terminal cover: 1 pc., Input terminal cover set, Output terminal M8 bolt set ×2 sets Chassis connection wire: 1 wire, J1 connector plug kit: 1 set(Housing: 1 pc., Connector: 1 pc., Plug: 1 pc., Strain relief: 1 pc., Clips: 2 pcs., and two types of Screws: 2 pcs.,), Packing list: 1 copy, Quick reference (1 each for English and Japanese), Safety precautions: 1 copy, China RoHS sheet: 1 copy, CD-ROM: 1 disc

* Power cord is not included for the 1500 W type.
Please purchase the optional accessory separately(AC5.5-3P3M-M4C-VCTF).

Ideal for N-to-M network-based remote control and monitoring

A Next-Generation Rack-Mounted Power Supply

The PWX series is a CVCC programmable regulated DC power supply designed to optimize for a rack-mounted power supply. To increase its mounting efficiency, it has a 19-inch rack width with a thin shape and intakes and outtakes for cooling on only the front and back surfaces so that it can be mounted flush top and bottom.
The series is equipped standard with USB, RS232C, and LAN interfaces, which are essential for system upgrades. The series also has a virtual multi-channel bus (VMCB) function that allows it to be used efficiently for remote control and monitoring with 1-to-N and as well as with N-to-M in large-scale networks. Moreover, the PWX is an LXI (LAN eXtention for Instrumentation) compliant instrument, so it can be connected easier with the measurement system using LAN interface. You can also manage the power supply in a different building.
Two output power specifications are available: 750 W and 1500 W, and a wide range of voltage and current settings can be combined within its output power rating (3 times). For example, the output power of 1500 W model, the PWX1500ML is capable to operate seamlessly from the range of "80 V-18.75 A" to "26.8 V-56 A". The input voltage has a universal 85 V to 265 V input voltage range, and the unit also has an internal power factor correction (PFC) circuit to control the harmonic current. It also includes an analog external control/monitoring output, master-slave parallel operation function, various protective functions, and memory function.

Features

- A wide range of voltage and current settings can be combined within its output power rating (3 times)
- PFC circuit of 0.99 (with 100 V) or 0.97 (with 200 V) at full load *TYP value
- Supporting universal input voltage (85 V to 265 V)
- LAN (LXI compliant) /USB/RS232C as standard interface
- A virtual multi-channel bus (VMCB) function makes multi-channel operation more efficient
- Emulation setting, Command language setting function
- A thin and lightweight design with a 1U height for increased rack-mounting efficiency
- Expandable output capacity by parallel operation
- Expandable output voltage by series operation (up to 2 units by the same model)

*Excluding the PWX750HF and the PWX1500H.

- External analog control function (Output control based on voltage and resistance; ON/OFF based on contact signals)
- Analog monitor output (output voltage, output current, and operating mode can be monitored)
- Various protection functions: overvoltage protection, overcurrent protection, and overheat protection
- Memory function (3 combinations of settings for voltage, current, OVP, OCP, and UVL)
- Remote sensing function
- Bleeder circuit ON/OFF setting (to prevent over-discharging of batteries)
- CV, CC priority start function (prevents overshoot with output ON)

Options

- AC power cord for 1500 W model
  AC5.5-3P3M-M4C-VCTF
  * Not CE certified product
- Parallel operation cable
  PC01-PWX (for 2 units in parallel)
  PC02-PWX (for 3 units in parallel)
  PC03-PWX (for 4 units in parallel)

- Sequence creation software
  SD013-PWX (Wavy for PWX)
- RS232C control conversion cable
  RD-8P/9P
- Interface
  ISO PROGRAMING VOLT CONT factory option
  ISO PROGRAMING CURR CONT factory option

Note: Only one interface board can be installed.
The interface option can not be sold separately.

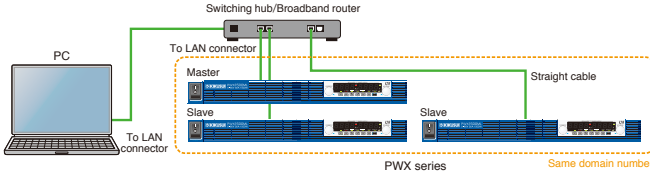
Equipped with standard LAN interface and optional VMCB function to support network-based remote control and monitoring

The PWX series is equipped with LAN, USB, and RS232C interfaces as standard features. By using the feature of virtual multi-channel bus (VMCB), it allows you to control remotely and monitoring for 1-to-N as well as N-to-M for large-scale networks. In particular, the LAN interface is LXI compliant, enabling you to easily control and monitor the power supply through a browser on a PC, smartphone, or tablet by accessing the web server built into the PWX series .
Additionally, the optional application software, Wavy for PWX (SD013-PWX), sequence creation and control software, allows you to change settings for specific channels (in individual) on VMCB-connected PWX series power supplies, and lets you perform batch control using global commands*. You can also turn the output ON and OFF on multiple units and adjust the output voltage and current.

* This is only enabled for “Direct control” on Wavy for PWX. Global commands that can be also used under control with VXI-11, HiSLIP, and SCPI-RAW.

● Basic configuration with LAN interface and VMCB (example)

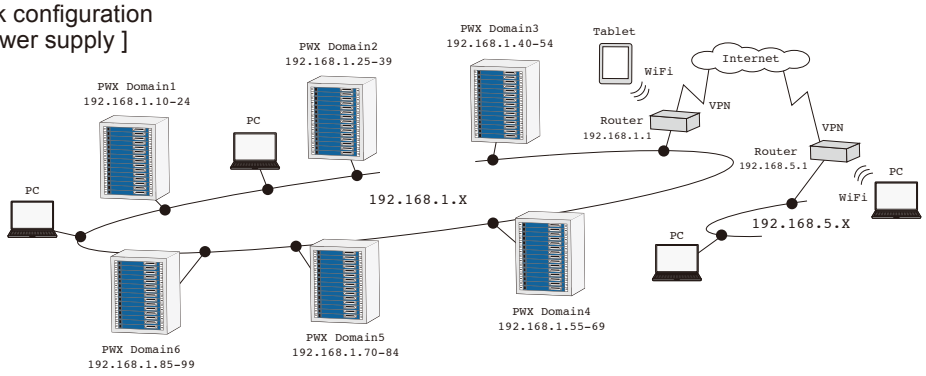
As shown in the figure below, it is possible to connect a PC and the PWX series with a hub to create a virtual group using a LAN connection. A maximum of 255 virtual groups can be set, and the maximum number of units can be configured up to 31 units per group. A group can have a mixture of models.



Configuration	IP address	Domain number	Channel number
Master	192.168.1.1	1	0
Slave	192.168.1.2	1	1
	192.168.1.3	1	2

* A DHCP server can also establish settings automatically

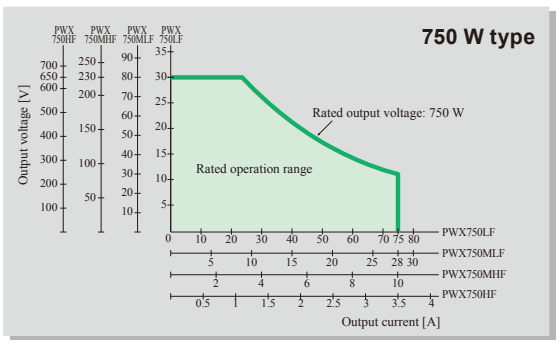
[Schematic LAN network configuration with the PWX series power supply]

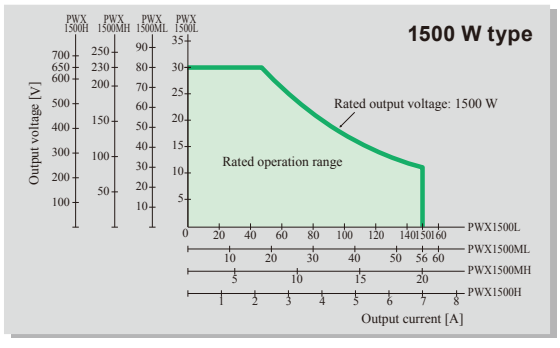


● Security for LAN connections

Access to the built-in web server can be restricted with a password. Also, when using VXI-11, HiSLIP, and SCPI-RAW for control, host restrictions can be set with the IP address. It is possible to prevent access from any terminal other than the ones registered as a host (up to 4 hosts can be registered).

Operation Area



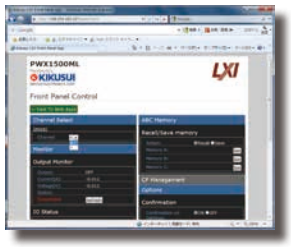


Easy access with a built-in web server

Use a browser from a PC, smartphone, or tablet to access the web server built into the PWX series for convenient control and monitoring.

[Recommended browser]
- Requires for the Internet Explorer version 9.0 or later
- Requires for the firefox 8.0 or later
- Requires for the safari/mobile Safari 5.1 or later
- Requires for the Chrome 15.0 or later
- Requires for the Opera 11.0 or later

* Connecting with a smartphone, tablet, etc. requires a Wi-Fi environment (wireless LAN router etc.).



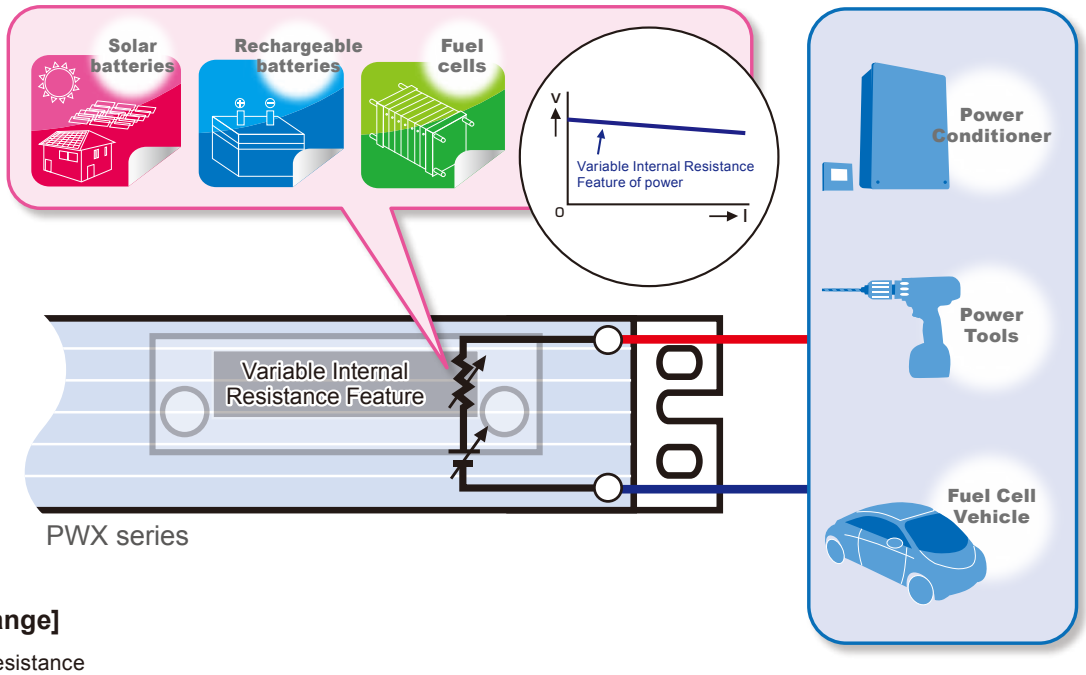
Variable Internal Resistance Feature

The variable internal resistance feature enables you to easily simulate the internal resistance of rechargeable batteries, solar batteries, fuel cells, and the like. By setting the internal resistance value in constant voltage (CV) mode, you can decrease the output voltage according to the output current.
You can use a CONFIG setting to set the internal resistance.

● Variable Internal Resistance Feature

model			
PWX750LF	PWX750MLF	PWX1500L	PWX1500ML
PWX750MHF	PWX750HF	PWX1500MH	PWX1500H

* Factory option



[Variable range]

Rint: Internal resistance
0 =<Rint =<Rint (max)

	PWX750LF	PWX750MLF	PWX750MHF	PWX750HF	PWX1500L	PWX1500ML	PWX1500MH	PWX1500H
Rint (min) [Ω]	0.0001 *1	0.001	0.01	0.1	0.0001 *1	0.001	0.01	0.1
Rint (max) [Ω]	0.4000 *1	2.857	23.00	185.7	0.2000 *1	1.429	11.50	92.9
Resolution [Ω]	0.0001 *1	0.001	0.01	0.1	0.0001 *1	0.001	0.01	0.1

*1 When the value is set from the front panel, the least significant digit is not shown on the panel display.
The value varies at a higher resolution than what is shown, and the least significant digit is rounded and shown in the next higher digit.

The maximum internal resistance that can be set from the front panel in parallel operation is the value obtained by dividing Rint (max) during standalone operation by the number of units in parallel operation.The resolution is the value obtained by dividing the resolution during standalone operation by the number of units in parallel operation.

[Specifications]

	PWX750LF	PWX750MLF	PWX750MHF	PWX750HF	PWX1500L	PWX1500ML	PWX1500MH	PWX1500H
Maximum internal resistance that can be set Rint (max) [Ω]	0.400	2.857	23.00	185.7	0.200	1.429	11.50	92.9

PWX Series 750 W Type Specifications

Item/Model			PWX750LF	PWX750MLF	PWX750MHF	PWX750HF
AC input						
Nominal input rating			100 Vac to 240 Vac, 50 Hz to 60 Hz, single phase			
Input voltage range			85 Vac to 265 Vac			
Input frequency range			47 Hz to 63 Hz			
Current (MAX) *1	100 Vac		10.5 A			
	200 Vac		5.25 A			
Inrush current (MAX) *2			70 Apeak or less			
Power (MAX) *3			1100 VA			
Power factor (TYP) *1			0.99 (input voltage 100 V), 0.97 (input voltage 200 V)			0.98 (input voltage 100 V), 0.96 (input voltage 200 V)
Efficiency (MIN) *1			74 % or more			
Hold-up time for power interruption (MIN) *3			20 ms or greater			
Output						
Rating	Output voltage *1		30 V	80 V	230 V	650 V
	Output current *1		75 A	28 A	10 A	3.5 A
	Output power		750 W			
Voltage	Setting range		0 V to 31.5 V	0 V to 84 V	0 V to 241.5 V	0 V to 682.5 V
	Setting accuracy		± (0.05 % of set +0.05 % of rating)			
	Line regulation *2		± 5 mV	± 10 mV	± 25 mV	± 67 mV
	Load regulation *3		± 5 mV	± 10 mV	± 25 mV	± 67 mV
	Transient response *4		1 ms or less		7 ms or less	
	Ripple noise *5	(p-p) *6	60 mV	80 mV	120 mV	330 mV
		(rms) *7	8 mV	8 mV	25 mV	60 mV
	Rise time	Rated load	100 ms			
		No load	100 ms			
	Fall time*8	Rated load	100 ms		150 ms	250 ms
		No load	450 ms		1500 ms	3000 ms
	Maximum remote sensing compensation voltage (single line)		1.5 V	4 V	5 V	5 V
	Temperature coefficient (MAX) *9		100 ppm/°C (during external control)			
Current	Setting range		0 A to 78.75 A	0 A to 29.4 A	0 A to 10.5 A	0 A to 3.675 A
	Setting accuracy *10		±(0.5 % of set +0.1 % of rating)			
	Line regulation		± 9.5 mA	± 4.8 mA	± 3 mA	± 2.35 mA
	Load regulation		± 20 mA	± 10.6 mA	± 7 mA	± 5.7 mA
	Ripple noise *11	(rms) *7	150 mA	65 mA	30 mA	15 mA
	Temperature coefficient (TYP) *9		100 ppm/°C			
Display function						
Voltage display	Maximum display		99.99 (fixed decimal point)		999.9 (fixed decimal point)	
	Display accuracy		± (0.2 % of reading +5 digits)			
Current display	Maximum display		99.99 (fixed decimal point)			9.999 (fixed decimal point)
	Display accuracy		± (0.5 % of reading +5 digits)			
Power display *1			The PWR DSPL key lights in red.			
	Maximum display		9999			
	Display accuracy		Displays the result of multiplying the current and voltage			
Operation display			OUTPUT ON/OFF, CV operation, CC operation, Alarm operation, Remote operation (LAN operation), Key lock operation, Preset memory			
Protection functions						
Overvoltage protection (OVP), Overvoltage protection 2 (OVP2), Overcurrent protection (OCP), Undervoltage limit (UVL), Overheat protection (OHP), Overheat protection 2 (OHP2), Fan failure protection (FAN), Incorrect sensing connection protection (SENSE), Low AC input protection (AC-FAIL), Shutdown (SD), Power limit (POWER LIMIT)						
Signal output						
Monitor signal output *1	Voltage monitor (VMON)		Selectable monitor voltage range: 0 V to 5 V or 0 V to 10 V			
	Setting accuracy		2.5 % of f.s.			
	Current monitor (IMON)		Selectable monitor voltage range: 0 V to 5 V or 0 V to 10 V			
	Setting accuracy		2.5 % of f.s.			
Status signal output *1 *2			OUTON STATUS, CV STATUS, CC STATUS,ALM STATUS, PWR ON STATUS			
Control features						
External control *1	Output voltage control (VPGM)		0 % to 100 % of the rated output voltage		Selectable control voltage range: 0 V to 5 V or 0 V to 10 V	
	Accuracy		5 % of f.s.			
	Output current control (IPGM)		0 % to 100 % of the rated output current		Selectable control voltage range: 0 V to 5 V or 0 V to 10 V	
	Accuracy		5 % of f.s.			
	Output on/off control [OUTPUT ON/OFF CONT]		Possible logic selections: turn the output on using a low TTL level signal or turn the output on using a high TTL level signal			
	Output shutdown control [SHUT DOWN]		Turns the output off with a low TTL level signal			
	Alarm clear control [ALM CLR]		Clears alarms with a low TTL level signal			
Other features						
Master-slave parallel operation			Including the master unit, up to four units(all the same model) can be connected.			
Series operation*1			Up to two units (all the same model) can be connected.			
Preset memory			Up to three sets of the following settings can be saved: the set voltage, the set current, the set OVP, the set OCP, and the set UVL.			
Key lock			Locks the operation of all keys other than the OUTPUT key.			
Interface						
Software protocol			IEEE Std 488.2-1992			
Command language			Complies with SCPI Specification 1999.0 Has a compatibility mode (switchable)*1 •Genesys Series made by TDK-Lambda •N5700/N8700 made by Agilent Technologies •PAG Series made by Kikusui			
RS232C, USB, LAN			USBTMC-USB488, LXI 1.3 Class C			

[AC input]
*1. With rated load.
*2. Excludes the charge current component that flows through the capacitor of the internal EMC filter circuit immediately after the POWER switch is turned on (for approximately 1 ms).
*3. 100 Vac with rated load.

[Output]
*1. The maximum output voltage and current are limited by the maximum output power.
*2. 85 Vac to 135 Vac or 170 Vac to 265 Vac, fixed load.
*3. The amount of change that occurs when the load is changed from no load to rated load (rated output power/rated output voltage) with rated output voltage. The value is measured at the sensing point.
*4. The amount of time required for the output voltage to return to a value within "rated output voltage ± (0.1 % + 10 mV)." The load current fluctuation is 50 % to 100 % of the maximum current with the set output voltage.
*5. Measured using an RC-9131 1:1 probe that conforms to the JEITA specifications. At the rated output current.
*6. When the measurement frequency bandwidth is 10 Hz to 20 MHz.
*7. When the measurement frequency bandwidth is 5 Hz to 1 MHz.
*8. When the breeder circuit on/off setting is on.
*9. When the ambient temperature is within 0 °C and 50 °C.
*10. For the PWX750HF, in the range of 0.2 % to 100 % of the rated current.
*11. When the output voltage (Rated Power ÷ Rated Current) is 10 % to 100 % of the rating. At the rated output current.

[Display function]
*1. Press PWR DSPL to display the power on the ammeter. Each time you press this key, the display switches between power and current.

[Signal output]
*1. J1 connector on the rear panel.
*2. Photocoupler open collector output; maximum voltage 30 V, maximum current (sink) 8 mA; isolated from the output and control circuits; status commons are floating (withstand voltage of less than or equal to 60 V); and status signals are not mutually isolated.

[Control features]
*1. J1 connector on the rear panel

[Other features]
*1. Excluding the PWX750HF

[Interface]
*1. This setting does not guarantee compatibility with all measuring instrument application software and drivers.

PWX Series 750 W Type Specifications

Item/Model		PWX750LF	PWX750MLF	PWX750MHF	PWX750HF
General					
Environmental conditions	Operating environment	Indoor use, overvoltage category II			
	Operating temperature/humidity	0 °C to +50 °C/20 %rh to 85 %rh (no condensation)			
	Storage temperature/humidity	-10 °C to +60 °C (ML only -20 °C to +70 °C)/90 %rh or less (no condensation)			
	Altitude	Up to 2000 m			
Cooling method		Forced air cooling using fan			
Grounding polarity		Negative grounding or positive grounding possible			
Isolation voltage		± 250 Vmax		± 500 Vmax	± 800 Vmax
	Isolated analog interface *1	± 60 Vmax			
Withstand voltage	Input-FG	No abnormalities at 1500 Vac for 1 minute			
	Input-Output	No abnormalities at 2000 Vac for 1 minute			No abnormalities at 2250 Vac for 1 minute
	Output-FG	No abnormalities at 1500 Vdc for 1 minute		No abnormalities at 1600 Vac for 1 minute	No abnormalities at 2000 Vac for 1 minute
	Input-Isolated analog interface *1	No abnormalities at 2650 Vac for 1 minute			
	Output-Isolated analog interface *1	No abnormalities at 2300 Vdc for 1 minute		No abnormalities at 2650 Vac for 1 minute	No abnormalities at 3300 Vac for 1 minute
Insulation resistance		500 Vdc, 100 MΩ or more(70 % or less)			1000Vdc, 100 MΩ or more (70 % or less)
	Output-FG	500 Vdc, 40 MΩ or more(70 % or less)			1000Vdc, 40 MΩ or more (70 % or less)
Safety *2		Complies with the requirements of the following directive and standard. Low Voltage Directive 2014/35/EU EN 61010-1 (Class I *4, Pollution degree 2)			
Electromagnetic compatibility (EMC) *2		Complies with the requirements of the following directive and standard. EMC Directive 2014/30/EU EN 61326-1 (Class A *4), EN 55011 (Class A *4, Group 1 *5) EN 61000-3-2, EN 61000-3-3 Applicable under the following conditions The maximum length of all cabling and wiring connected to the PWX series must be less than 3 m.			
Dimensions(mm(inch)) (maximum)/Weight		485(19.09") W × 43(1.69")(44(1.73")) H × 500(19.69") (580(22.83")) D /Approx. 8 kg(17.64 lbs)		485(19.09") W × 43(1.69")(44(1.73")) H × 500(19.69") (580(22.83")) D /Approx. 7.5 kg(16.53 lbs)	
Accessories		AC cable: 1 wire, Output terminal cover: 1 pc., Output terminal M8 bolt set: M8 bolts ×2 sets(Bolt, nut, spring washer, and washer for each bolt), Chassis connection wire: 1 wire, J1 connector plug kit: 1 set (Housing: 1 pc., Connector: 1 pc., Plug: 1 pc., Strain relief: 1 pc., Clips: 2 pcs., and two types of Screws: 2 pcs.,), Packing list: 1 copy, Quick reference (1 each for English and Japanese), Safety precautions: 1 copy, China RoHS sheet: 1 copy, CD-ROM: 1 disc			

[General]
*1. Option
*2. Only on models that have the CE marking on the panel. Does not apply to specially ordered or modified PWXs.
*3. This is a Class I equipment. Be sure to ground this product's protective conductor terminal. The safety of this product is only guaranteed when the product is properly grounded.
*4. This is a Class A equipment. This product is intended for use in an industrial environment. This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.
*5. This is a Group 1 equipment. This product does not generate and/or use intentionally radio-frequency energy, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purpose.

PWX Series 1500 W Type Specifications

Item/Model			PWX1500L	PWX1500ML	PWX1500MH	PWX1500H
AC input						
Nominal input rating			100 Vac to 240 Vac, 50 Hz to 60 Hz, single phase			
Input voltage range			85 Vac to 265 Vac			
Input frequency range			47 Hz to 63 Hz			
Current (MAX) *1		100 Vac	21 A			
		200 Vac	10.5 A			
Inrush current (MAX) *2			75 Apeak or less			
Power (MAX) *3			2200 VA			
Power factor (TYP) *1			0.99 (input voltage 100 V), 0.97 (input voltage 200 V)			0.98 (input voltage 100 V), 0.96 (input voltage 200 V)
Efficiency (MIN) *1			74 % or more			
Hold-up time for power interruption (MIN) *3			20 ms or greater			
Output						
Rating	Output voltage *1		30 V	80 V	230 V	650 V
	Output current *1		150 A	56 A	20 A	7 A
	Output power		1500 W			
Voltage	Setting range		0 V to 31.5 V	0 V to 84 V	0 V to 241.5 V	0 V to 682.5 V
	Setting accuracy		± (0.05 % of set +0.05 % of rating)			
	Line regulation *2		± 5 mV	± 10 mV	± 25 mV	± 67 mV
	Load regulation *3		± 5 mV	± 10 mV	± 25 mV	± 67 mV
	Transient response *4		1 ms or less		7 ms or less	
	Ripple noise *5	(p-p) *6	60 mV	80 mV	120 mV	330 mV
		(rms) *7	8 mV		25 mV	60 mV
	Rise time	Rated load	100 ms			
		No load	100 ms			
	Fall time *8	Rated load	100 ms		150 ms	250 ms
		No load	800 ms		1500 ms	3000 ms
	Maximum remote sensing compensation voltage (single line)		1.5 V	4 V	5 V	5 V
	Temperature coefficient (MAX) *9		100 ppm/°C (during external control)			
Current	Setting range		0 A to 157.5 A	0 A to 58.8 A	0 A to 21 A	0 A to 7.35 A
	Setting accuracy *10		± (0.5 % of set +0.1 % of rating)			
	Line regulation		± 17 mA	± 7.6 mA	± 4 mA	± 2.7 mA
	Load regulation		± 35 mA	± 16.2 mA	± 9 mA	± 6.4 mA
	Ripple noise *11	(rms) *7	300 mA	130 mA	60 mA	30 mA
	Temperature coefficient (TYP) *9		100 ppm/°C			

[AC input]
*1. With rated load.
*2. Excludes the charge current component that flows through the capacitor of the internal EMC filter circuit immediately after the POWER switch is turned on (for approximately 1 ms).
*3. 100 Vac with rated load.

[Output]
*1. The maximum output voltage and current are limited by the maximum output power.
*2. 85 Vac to 135 Vac or 170 Vac to 265 Vac, fixed load.
*3. The amount of change that occurs when the load is changed from no load to rated load (rated output power/rated output voltage) with rated output voltage. The value is measured at the sensing point.
*4. The amount of time required for the output voltage to return to a value within "rated output voltage ± (0.1 % + 10 mV)." The load current fluctuation is 50 % to 100 % of the maximum current with the set output voltage.
*5. Measured using an RC-9131 1:1 probe that conforms to the JEITA specifications. At the rated output current.
*6. When the measurement frequency bandwidth is 10 Hz to 20 MHz.
*7. When the measurement frequency bandwidth is 5 Hz to 1 MHz.
*8. When the breeder circuit on/off setting is on.
*9. When the ambient temperature is within 0 °C and 50 °C.
*10. For the PWX1500H, in the range of 0.2 % to 100 % of the rated current.
*11. When the output voltage (Rated Power ÷ Rated Current) is 10 % to 100 % of the rating. At the rated output current.

PWX Series 1500 W Type Specifications

Item/Model		PWX1500L	PWX1500ML	PWX1500MH	PWX1500H
Display function					
Voltage display	Maximum display	99.99 (fixed decimal point)		999.9 (fixed decimal point)	
	Display accuracy	± (0.2 % of reading +5 digits)			
Current display	Maximum display	999.9 (fixed decimal point)	99.99 (fixed decimal point)		9.999 (fixed decimal point)
	Display accuracy	± (0.5 % of reading +5 digits)			
Power display *1		The PWR DSPL key lights in red.			
	Maximum display	9999			
	Display accuracy	Displays the result of multiplying the current and voltage			
Operation display		OUTPUT ON/OFF, CV operation, CC operation,Alarm operation, Remote operation (LAN operation), Key lock operation, Preset memory			
Protection functions					
Overvoltage protection (OVP), Overvoltage protection 2 (OVP2), Overcurrent protection (OCP), Undervoltage limit (UVL), Overheat protection (OHP), Overheat protection 2 (OHP2), Fan failure protection (FAN), Incorrect sensing connection protection (SENSE), Low AC input protection (AC-FAIL), Shutdown (SD), Power limit (POWER LIMIT)					
Signal output					
Monitor signal output *1	Voltage monitor (VMON)	Selectable monitor voltage range: 0 V to 5 V or 0 V to 10 V			
	Setting accuracy	2.5 % of f.s.			
	Current monitor (IMON)	Selectable monitor voltage range: 0 V to 5 V or 0 V to 10 V			
	Setting accuracy	2.5 % of f.s.			
Status signal output *1 *2		OUTON STATUS, CV STATUS, CC STATUS, ALM STATUS, PWR ON STATUS			
Control features					
External control *1	Output voltage control	0 % to 100 % of the rated output voltage Selectable control voltage range: 0 V to 5 V or 0 V to 10 V			
	(VPGM) Accuracy	5 % of f.s.			
	Output current control	0 % to 100 % of the rated output current Selectable control voltage range: 0 V to 5 V or 0 V to 10 V			
	(IPGM) Accuracy	5 % of f.s.			
	Output on/off control [OUTPUT ON/OFF CONT]	Possible logic selections: turn the output on using a low TTL level signal or turn the output on using a high TTL level signal			
	Output shutdown control [SHUT DOWN]	Turns the output off with a low TTL level signal			
	Alarm clear control [ALM CLR]	Clears alarms with a low TTL level signal			
Other features					
Master-slave parallel operation		Including the master unit, up to four units(all the same model) can be connected.			
Series operation*1		Up to two units (all the same model) can be connected.			
Preset memory		Up to three sets of the following settings can be saved: the set voltage, the set current, the set OVP, the set OCP, and the set UVL.			
Key lock		Locks the operation of all keys other than the OUTPUT key.			
Interface					
Software protocol		IEEE Std 488.2-1992			
Command language		Complies with SCPI Specification 1999.0 Has a compatibility mode (switchable) *1 • Genesys Series made by TDK-Lambda • N5700/N8700 made by Agilent Technologies • PAG Series made by Kikusui			
RS232C, USB, LAN		USBTMC-USB488, LXI 1.3 Class C			
General					
Environmental conditions	Operating environment	Indoor use, overvoltage category II			
	Operating temperature/humidity	0 °C to +50 °C/20 %rh to 85 %rh (no condensation)			
	Storage temperature/humidity	-10 °C to +60 °C/90 %rh or less (no condensation)			
	Altitude	Up to 2000 m			
Cooling method		Forced air cooling using fan			
Grounding polarity		Negative grounding or positive grounding possible			
Isolation voltage		± 250 Vmax		± 500 Vmax	± 800 Vmax
	Isolated analog interface *1	± 60 Vmax			
Withstand voltage	Input-FG	No abnormalities at 1500 Vac for 1 minute			
	Input-Output	No abnormalities at 2000 Vac for 1 minute			No abnormalities at 2250 Vac for 1 minute
	Output-FG	No abnormalities at 1500 Vdc for 1 minute		No abnormalities at 1600 Vac for 1 minute	No abnormalities at 3300 Vac for 1 minute
	Input-Isolated analog interface *1	No abnormalities at 2650 Vac for 1 minute			
	Output-Isolated analog interface *1	No abnormalities at 2300 Vdc for 1 minute		No abnormalities at 2650 Vac for 1 minute	No abnormalities at 3300 Vac for 1 minute
Insulation resistance		500 Vdc, 100 MΩ or more(70 % or less)			1000 Vdc, 100 MΩ or more (70 % or less)
	Output-FG	500 Vdc, 40 MΩ or more(70 % or less)			1000 Vdc, 40 MΩ or more (70 % or less)
Safety *2		Complies with the requirements of the following directive and standard. Low Voltage Directive 2014/35/EU EN 61010-1 (Class I *3, Pollution degree 2)			
Electromagnetic compatibility (EMC) *2		Complies with the requirements of the following directive and standard. EMC Directive 2014/30/EU EN 61326-1 (Class A *4), EN 55011 (Class A *4, Group 1 *5) EN 61000-3-2, EN 61000-3-3 Applicable under the following conditions The maximum length of all cabling and wiring connected to the PWX Series must be less than 3 m.			
Dimensions (maximum) /Weight		485(19.09") W × 43(1.69")(44(1.73")) H × 500(19.69") (580(22.83")) D /Approx. 9.5 kg(20.94 lbs)		485(19.09") W × 43(1.69")(44(1.73")) H × 500(19.69") (580(22.83")) D /Approx. 9 kg(19.84 lbs)	
Accessories		Output terminal cover: 1 pc., Input terminal cover set, Output terminal M8 bolt set: M8 bolts ×2 sets(Bolt, nut, spring washer, and washer for each bolt), Chassis connection wire: 1 wire, J1 connector plug kit: 1 set (Housing: 1 pc., Connector: 1 pc., Plug: 1 pc., Strain relief: 1 pc., Clips: 2 pcs., and two types of Screws: 2 pcs.,), Packing list: 1 copy, Quick reference (1 each for English and Japanese), Safety precautions: 1 copy, China RoHS sheet: 1 copy, CD-ROM: 1 disc * A power cord is not included. Please purchase the optional accessory separately (AC5.5-3P3M-M4C-VCTF).			

[Display function]
*1. Press PWR DSPL to display the power on the ammeter. Each time you press this key, the display switches between power and current.

[Signal output]
*1. J1 connector on the rear panel.
*2. Photocoupler open collector output; maximum voltage 30 V, maximum current (sink) 8 mA; isolated from the output and control circuits; status commons are floating (withstand voltage of less than or equal to 60 V); and status signals are not mutually isolated.

[Control features]
*1. J1 connector on the rear panel

[Other features]
*1. Excluding the PWX1500H

[Interface]
*1. This setting does not guarantee compatibility with all measuring instrument application software and drivers.

[General]
*1. Option
*2. Only on models that have the CE marking on the panel. Does not apply to specially ordered or modified PWXs.
*3. This is a Class I equipment. Be sure to ground this product's protective conductor terminal. The safety of this product is only guaranteed when the product is properly grounded.
*4. This is a Class A equipment. This product is intended for use in an industrial environment. This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.
*5. This is a Group 1 equipment. This product does not generate and/or use intentionally radio-frequency energy, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/ analysis purpose.

Compact DC Power Supply(CV/CC)

PMX-A Series

LAN USB GPIB (OPTION) RS232C DRIVERS CE LXI

Dimensions

107(4.21″)W × 124(4.88″)H × 315(12.40″)Dmm(inch)

A standard feature of the networking capability provides extended applications of the ordinary testing.

The PMX-A series is a compact, high-performance DC power supply that provides constant voltage (CV) and constant current (CC). It is designed to improve working efficiency for benchtop uses. For this purpose, the output terminals are located on the front panel and are ergonomically designed so that wiring harnesses for electrical loads can be connected by moving your fingers naturally. Moreover, a forced air cooling system is used to intake and exhaust of the internal air, so the unit can be rack mounted without space. Furthermore, the PMX-A is equipped with LAN, USB, and RS232C interfaces as standard interfaces required for system operation. In particular, the LAN interface enables you to control and monitor the power supply from Web browsers on PCs, smartphones, tablets, and other terminal devices. Moreover, the PMX-A is LXI(LAN eXtention for Instrumentation) compliant instrument, so it can be connected easier with your measurement system using LAN interface. The PMX-A is also equipped with remote sensing (for 18V, 35V models only), analog external control/monitoring output, various protective functions, memory function, and other functions.

Accessories

Power cord: 1 pc (Approximately 2.5 m). Packing list: 1 copy. Quick reference: Japanese:1 copy, English: 1 copy, Chinese: 1 copy.Safety precautions: 1 copy. CD-ROM: 1 disc.

Options

■ Connector kit
OP01-PMX
■ Terminal unit(for use with the PMC-A series)
TU01-PMX
■ Sequence creation software
SD025-PMX(Wavy for PMX)

Features

- Series regulator system with excellent noise performance
- High setting resolution - Voltage: 1 mV, Current: 0.1 mA (PMX18-2A)
- Wide range of output variations (9 models are available)
- LAN (LXI compliant) / USB / RS232C as standard interface
- External analog remote control
- Monitoring and status signal output
- CV, CC priority start function (to prevent overshoot when the output is ON)
- Remote sensing function (18V, 35V models)
- Key lock, 3-point preset memory function

Easy access with a built-in web server

Use a browser from a PC, smartphone, or tablet to access the web server built into the PMX-A series for convenient control and monitoring.

[Recommended browser]
- Requires for the Internet Explorer version 9.0 or later
- Requires for the firefox 8.0 or later
- Requires for the safari / mobile Safari 5.1 or later
- Requires for the Chrome 15.0 or later
- Requires for the Opera 11.0 or later

* Connecting with a smartphone, tablet, etc. requires a Wi-Fi environment (wireless LAN router etc.).

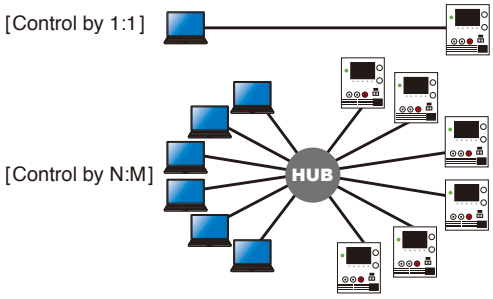
■ Digital, analog and other various external controls are supported. Remote control and monitoring can also be performed from Web browsers!

The PMX-A series is equipped with LAN, USB, and RS232C interfaces as standard communication interfaces. These interfaces enable remote control and monitoring to be performed efficiently in 1-to-N node configurations as well as in N-to-M node configurations even under large-scale networks. In particular, the LAN interface enables you to control and monitor the power supply through a browser on the PC, smartphone, tablet, or other terminal devices by accessing the built-in Web server of the PMX-A series.

■ LAN Interface

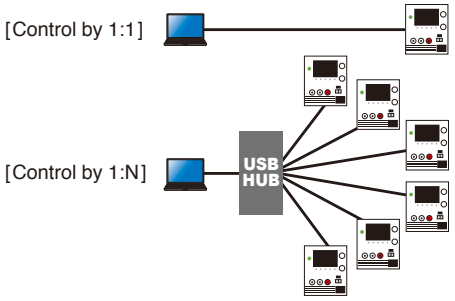
The LAN interface can control the number of devices with high speed, and it's theoretical controllable maximum number is to be calculated by approximately 4.2 billion. (The maximum transmission speed varies by the number of connected devices) In accordance with its applied standard, it is possible to combine the device that is to control or to be controlled, it is also the feature that it can be used with various applications. Also, in computers installed with Apple Bonjour, it is possible to access with a host name instead of the IP address.

● **AUTO MDIX function:** The PMX-A series can automatically identify the type of LAN cable whether straight or cross is connected and it connects using the appropriate method.



■ USB Interface

The USB interface has a feature with high versatility, and ease of a setup. The automatic recognition by the plug and play releases a user from the complex setting operation under the digital control, and it can be suitable interface when control by 1:1. In accordance with the standard, the maximum number of the connected devices can be configured up to 127 units. Moreover, the USB interface of the PWX series complies to USB2.0, and it has realized transmission speed of a maximum of 12 Mbps (es) (Full Speed).



Limited function edition *

Free downloads of "Wavy" sequence creation software

The limited function of the optional sequence creation and control software "SD025-PMX (Wavy for PMX)" is available to be downloaded free of charge. For details, please refer to the following information and our WEB.

* The number of steps is limited up to 5 steps.

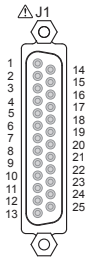
■ RS232C Interface

It can be used for communication with PCs and sequencers.

■ Analog Interface

The PMX-A series is equipped with external voltage/resistance control, which are interfaces required for analog external control and monitoring applications for test power supply devices. The input external signal and the output status signal can be conducted through the J1 connector on the rear panel.

J1 connector pin arrangement



Pin number positions when you are facing the rear panel

Pin No.	Signal name	Description
1	VMON	Output voltage monitor; outputs 0 V to 10 V for 0 % to 100 % of the rated output voltage.
2	IMON	Output current monitor; outputs 0 V to 10 V for 0 % to 100 % of the rated output current.
3	ACOM	External signal common for pins 1, 2, 4, and 14. *1
4	EXT-V CV CONT	Output voltage control using external voltage; receives 0 V to 10 V to output 0 % to 100 % of the rated voltage.
5	ACOM	External signal common for pins 1, 2, 4, and 14. *1
6	EXT-R CV CONT	Output voltage control using external resistance; uses 0 Ω to 10 kΩ to output 0 % to 100 % of the rated voltage.
7	EXT-R CV CONT COM	Common for output voltage control using external resistance.
8	N.C.	Not connected.
9	N.C.	Not connected.
10	N.C.	Not connected.
11	CV STATUS	On when the PMX series is in CV mode (open-collector output from a photocoupler).*2
12	CC STATUS	On when the PMX series is in CC mode (open-collector output from a photocoupler).*2
13	ALM STATUS	On when a protection function (OVP, OCP, or OHP) is activated (open-collector output from a photocoupler).*2
14	EXT-V CC CONT	Output current control using external voltage; receives 0 V to 10 V to output 0 % to 100 % of the rated current.
15	ACOM	External signal common for pins 1, 2, 4, and 14.1 *1
16	EXT-R CC CONT	Output current control using external resistance; uses 0 Ω to 10 kΩto output 0 % to 100 % of therated current.
17	EXT-R CC CONT COM	Common for output current control using external resistance.
18	OUT ON/OFF CONT	Output on/off control using external contact input.
19	DCOM	External signal common for pin 18.*1
20	N.C.	Not connected.
21	N.C.	Not connected.
22	N.C.	Not connected.
23	OUT ON STATUS	On when output is on (output through an open-collector photocoupler).*2
24	PWR ON STATUS	On when the power is on (output through an open-collector photocoupler).*2
25	STATUS COM	Status signal common for pins 11, 12, 13, 23, and 24.

*1. During remote sensing, this is the negative electrode (-S) of sensing input. When remote sensing is not being performed, this isconnected to the negative output.
*2. Open collector output: maximum voltage 30 V, maximum current (sink) 8 mA; the status common is floating (isolation voltage or less), it is isolated from the control circuit.

PMX-A Series Specifications

Item/Model			PMX18-2A	PMX18-5A	PMX35-1A	PMX35-3A	PMX70-1A	PMX110-0.6A	PMX250-0.25A	PMX350-0.2A	PMX500-0.1A
AC input											
Nominal input rating			100 Vac *1, 50 Hz / 60 Hz, single phase								
Input voltage range			± 10 %								
Input frequency range			47 Hz to 63 Hz								
Inrush current (MAX) *2			50 Amax or less	60 Amax or less	45 Amax or less	60 Amax or less	65 Amax or less	55 Amax or less	40 Amax or less	55 Amax or less	40 Amax or less
Power (MAX) *3			150 VA	310 VA	150 VA	310 VA	230 VA	210 VA	210 VA	230 VA	170 VA
Output											
Rating	Output voltage		18.00 V	18.00 V	35.00 V	35.00 V	70.00 V	110.0 V	250.0 V	350.0 V	500.0 V
	Output current		2.000 A	5.000 A	1.000 A	3.000 A	1.000 A	0.600 A	0.250 A	0.200A	0.100 A
	Output power		36 W	90 W	35 W	105 W	70 W	66 W	62.5 W	70 W	50 W
Voltage	Setting range		0 V to 18.90 V	0 V to 18.90 V	0 V to 36.75 V	0 V to 36.75 V	0 V to 73.5 V	0 V to 115.5 V	0 V to 262.5 V	0 V to 367.5 V	0 V to 525.0 V
	Setting resolution *4		1 mV				2 mV		10 mV		
	Setting accuracy		± (0.2 % of setting +0.1 % of rating)								
	Line regulation *5		±1 mV	±1 mV	±3 mV	±3 mV	±5 mV	±7 mV	±15 mV	±25 mV	±30 mV
	Load regulation *6		±2 mV	±5 mV	±3 mV	±4 mV	±5 mV	±7 mV	±15 mV	±25 mV	±30 mV
	Transient response *7		50 µs				100 µs				
	Ripple noise (rms) *8		0.5 mV				1 mV	2 mV	3 mV	5 mV	10 mV
	Rise time *9	Rated load	120 ms or less				150 ms or less	120 ms or less	120 ms or less	150 ms or less	120 ms or less
		No load	120 ms or less				150 ms or less	120 ms or less	120 ms or less	150 ms or less	120 ms or less
	Fall time *10	Rated load	50 ms or less				50 ms or less	50 ms or less	50 ms or less	80 ms or less	50 ms or less
		No load	270 ms or less	320 ms or less	270 ms or less	270 ms or less	270 ms or less	120 ms or less	120 ms or less	220 ms or less	60 ms or less
	Maximum remote sensing compensation voltage(single line)		0.6 V				---				
	Temperature coefficient (TYP)		100 ppm / °C								
Current	Setting range		0 A to 2.1 A	0 A to 5.25 A	0 A to 1.05 A	0 A to 3.15 A	0 A to 1.050 A	0 A to 0.630 A	0 A to 0.263 A	0 A to 0.210 A	0 A to 0.105 A
	Setting resolution *4		0.1 mA								
	Setting accuracy		± (0.3 % of setting +0.1 % of rating)								
	Line regulation		±5 mA				±2 mA	±2 mA	±1 mA	±1 mA	±1 mA
	Load regulation		±5 mA				±5 mA	±5 mA	±5 mA	±5 mA	±3 mA
	Ripple noise (rms) *8		1 mA	2 mA	1 mA	1 mA	1 mA				
	Temperature coefficient (TYP)		200 ppm / °C								
Display function											
Voltage display	Maximum display		99.99 (fixed decimal point)					999.9 (fixed decimal point)			
	Display accuracy *11		± (0.5 % of reading +2 digits)								
Current display	Maximum display		9.999 (fixed decimal point)								
	Display accuracy *11		± (1 % of reading +5 digits)								
Operation display	OUTPUT ON / OFF		Output on: OUTPUT LED lights in green. Output off: OUTPUT LED turns off.								
	CV operation		CV LED lights in green.								
	CC operation		CC LED lights in red.								
	Alarm operation		ALARM LED lights in red when a protection function has been activated.								
	Remote operation		REMOTE LED lights in green during remote control.								
		LAN operation	LAN LED lights or blinks depending on the LAN communication status. No fault status: Lights in green.Fault status: Lights in red.Standby status: Lights in orange.WEB identify status: Blinks green.								
	Key lock operation		LOCK LED lights in green when the keys are locked.								
	Preset memory		When a preset memory entry is being used, the PRESET A, B, or C LED lights in green.								
Protection functions											
Overvoltage protection (OVP)		Operation	Turns the output off, displays OVP, and lights ALARM								
		Setting range	1.8 V to 19.8 V	1.8 V to 19.8 V	3.5 V to 38.5 V	3.5 V to 38.5 V	7 V to 77.00 V	11 V to 121.0 V	25 V to 275.0 V	35 V to 385.0 V	50 V to 550.0 V
			10 % to 110 % of the rated output voltage								
		Setting accuracy	± (1 % of rating)								
Overcurrent protection (OCP)		Operation *12	Turns the output off, displays OCP, and lights ALARM								
		Setting range	0.2 A to 2.2 A	0.5 A to 5.5 A	0.1 A to 1.1 A	0.3 A to 3.3 A	0.100 A to 1.100 A	0.060 A to 0.660 A	0.025 A to 0.275 A	0.020 A to 0.220 A	0.010 A to 0.110 A
			10 % to 110 % of the rated output current								
		Setting range	± (1 % of rating)								
Overheat protection (OHP)		Operation	Turns the output off, displays OHP, and lights ALARM								
External Control • Signal output											
Monitor signal output *13, *14	Voltage monitor (VMON)	At rated voltage output	10.00 V ±0.1 V								
		At 0 V output	0.00 V ±0.1 V								
	Current monitor (IMON)	At rated current output	10.00 V ±0.1 V								
		At 0 A output	0.00 V ±0.1 V								
Status signal output *14, *15	OUTON STATUS		Turns on when the output is on								
	CV STATUS		Turns on during CV operation								
	CC STATUS		Turns on during CC operation								
	ALM STATUS		Turns on when an alarm has been activated								
	PWR ON STATUS		Turns on when the power is turned on								
External control *16	EXT-V CV CONT (CV external voltage control)		0 % to 100 % of the rated output voltage in the range of 0 V to 10 V.								
		Accuracy	1 % of rating +10 mV				1 % of rating				
	EXT-R CV CONT (CV external resistance control)		0 % to 100 % of the rated output voltage in the range of 0 Ω to 10 kΩ.								
		Accuracy	1 % of rating +10 mV				1 % of rating				
	EXT-V CC CONT (CV external voltage control)		0 % to 100 % of the rated output current in the range of 0 V to 10 V.								
		Accuracy	1 % of rating +5 mV				1 % of rating				
	EXT-R CC CONT (CV external resistance control)		0 % to 100 % of the rated output current in the range of 0 Ω to 10 kΩ.								
		Accuracy	1 % of rating +5 mV				1 % of rating				
	OUTPUT ON/OFF CONT (Output on/off control)		Possible logic selections: Turn the output on using a LOW (0 V to 0.5 V) or short-circuit, turn the output off using a HIGH (4.5 V to 5 V) or open-circuit. Turn the output on using a HIGH (4.5 V to 5 V) or open-circuit, turn the output off using a LOW (0 V to 0.5 V) or shortcircuit.								

PMX-A Series Specifications

Item/Model		PMX18-2A	PMX18-5A	PMX35-1A	PMX35-3A	PMX70-1A	PMX110-0.6A	PMX250-0.25A	PMX350-0.2A	PMX500-0.1A
Other features										
Preset memory		Save up to 3 combinations of the voltage and current setting value.								
Key lock		Select from the following three modes. Loc1: Locks the operation of all keys except the OUTPUT key and the preset memory A, B, and C keys. Loc2: Locks the operation of all keys except than the OUTPUT key. Loc3: Locks the operation of all keys and the rotary knob.								
Interface										
Common specifications	Software protocol	IEEE Std 488.2-1992								
	Command language	Complies with SCPI Specification 1999.0								
RS232C	Hardware	Complies with the EIA232D specifications D-SUB9 pin connector (male) *17 Baud rate: 19200 bps fixed, Data length: 8 bits, Stop bits: 1 bit, Parity bit: None, No flow control.								
	Program message terminator	LF during reception, LF during transmission								
USB	Hardware	Complies with the USB 2.0 specifications. Baud rate:12 Mbps (full speed). Standard Type B socket								
	Program message terminator	LF or EOM during reception, LF + EOM during transmission								
	Device class	Complies with the USBTMC-USB488 device class specifications								
LAN	Hardware	IEEE 802.3 100Base-TX / 10Base-T Ethernet Complies with LXI Device Core Specification 2011 Rev 1.4								
		IPv4, RJ-45 connector *18								
	Communication protocol	VXI-11, HiSLIP, or SCPI-RAW								
	Program message terminator	VXI-11 and HiSLIP: LF or END during reception, LF + END during transmission SCPI-RAW: LF during reception, LF during transmission								
General specifications										
Weight (main unit only)		Approximately 5 kg (11.02 lbs)	Approximately 6 kg (13.23 lbs)	Approximately 5 kg (11.02 lbs)	Approximately 6 kg (13.23 lbs)	Approximately 6 kg (13.23 lbs)	Approximately 6 kg (13.23 lbs)	Approximately 6 kg (13.23 lbs)	Approximately 6 kg (13.23 lbs)	Approximately 6 kg (13.23 lbs)
Dimensions (mm(inch))(maximum dimensions)		107 (4.21") W×124 (4.88")(150 (5.91")) H×315 (12.40")(355 (13.98")) Dmm								
Environmental conditions	Operating environment	Indoor use, overvoltage category II								
	Operating temperature / Operating humidity	0 °C to +40 °C / 20 %rh to 85 %rh (no condensation) (32 °F to +104 °F)								
	Storage temperature / Storage humidity	−25 °C to +70 °C / 90 %rh or less (no condensation) (-13 °F to +158 °F)								
	Altitude	Up to 2000 m								
Cooling method		Forced air cooling using fan								
Grounding polarity		Negative grounding or positive grounding possible								
Isolation voltage		±70 Vdc				±550 Vdc				
Withstand voltage	Between input and FG	No abnormalities at 1500 Vac for 1 minute								
	Between input and output	No abnormalities at 2100 Vac for 1 minute								
	Between output and FG	No abnormalities at 1600 Vac for 1 minute				No abnormalities at 2000 Vac for 1 minute				
Insulation resistance	Between input and FG	500 Vdc, 30 MΩ or more				1000 Vdc, 30 MΩ or more				
	Between input and output									
	Between output and FG									
Safety *19		Complies with the requirements of the following directive and standard. Low Voltage Directive 2014/35/EU EN 61010-1 (Class I *20, Pollution degree 2)								
Electromagnetic compatibility *19		Complies with the requirements of the following directive and standards. EMC Directive 2014/30/EU EN 61326-1 (Class A *21) , EN 55011 (Class A *21, Group 1 *22) , EN 61000-3-2, EN 61000-3-3 Applicable under the following conditions The maximum length of all cabling and wiring connected to the PMX-A must be less than 3 m.								
Accessories		Power cord: 1 pc (Approximately 2.5 m). Packing list: 1 copy. Quick reference: Japanese:1 copy, English: 1 copy, Chinese: 1 copy. Safety precautions: 1 copy. CD-ROM: 1 disc.								

Unless specified otherwise, the specifications are for the following settings and conditions.

- Loads are pure resistive loads.
- The warm-up time is 30 minutes (with current flowing).
- Negative output is connected to the chassis terminal using the short bar.
- Values indicated by “TYP” are typical values. They are not guaranteed performance values.
- Values indicated by “rating” are rated values.
- Values indicated by “setting” are setting values.
- Values indicated by “reading” are readout values.
- Rated load and no load are defined as follows:

In constant-voltage mode (when the output current is set to a value greater than or equal to the maximum output current with rated output voltage)

Rated load: Refers to a resistive load that, when the rated output voltage is applied, makes the flowing current 95 % to 100 % of the maximum output current with rated output voltage.

No load: Refers to a load through which no output current flows. In other words, refers to an open load (no load being connected).

In constant-current mode (when the output voltage is set to a value greater than or equal to the maximum output voltage with rated output current)

Rated load: Refers to a resistive load that, when the rated output current flows, makes the voltage drop to 95 % to 100 % of the maximum output voltage with rated output current.
Including the voltage drop in the load cables, the PMX-A output voltage must not exceed the maximum output voltage with rated output current.

No load: Refers to a resistive load that, when the rated output current flows, makes the voltage drop to 10 % of the maximum output voltage with rated output current or 1 V whichever is higher.

*1. 117 Vac, 200 Vac, 217 Vac and 234 Vac are factory options.
*2. Excludes the charge current component that flows through the capacitor of the internal EMC filter circuit immediately after the POWER switch is turned on (for approximately 1 ms).
*3. With the rated load.
*4. When the output is on, hold down SHIFT and turn the VOLTAGE or CURRENT knob to change the value at 1/10th the resolution of the minimum digit. When the output is off, hold down SHIFT and turn the VOLTAGE or CURRENT knob to change the value at increments of 1 in the minimum digit. If you are setting the value through the communication interface, you can set the value at 1/10th the resolution of the minimum digit, regardless of whether the output is on.
*5. 100 Vac to 90 Vac or 100 Vac to 110 Vac, rated load.
*6. The amount of change that occurs when the load is changed from no load to rated load with rated output voltage.The value is measured at the sensing point.
*7. The amount of time required for the output voltage to return to a value within “rated output voltage ±(0.05 % + 10mV).” When the load current is changed from 10 % to 100 % of the rated output current
*8. When the measurement frequency bandwidth is 5 Hz to 1 MHz.
*9. The time it takes for the output voltage to rise from 10 % to 90 % of the rating when the output is turned on.
*10. The time it takes for the output voltage to fall from 90 % to 10 % of the rating when the output is turned off.
*11. Ambient temperature at 23 °C ±5 °C.
*12. This does not protect against the discharge current peak that is generated from the capacitors inside the PMX-A output section when the load is changed suddenly.
*13. When remote sensing is used, connect the monitor signal's common line to the negative S terminal of the sensing terminal. When remote sensing is not used, connect it to the negative output terminal.
*14. J1 connector on the rear panel.
*15. Photocoupler open collector output; maximum voltage 30 V, maximum current (sink) 8 mA; isolated from the output and control circuits;status commons are floating (isolation voltage or less); and status signals are not mutually isolated.
*16. J1 connector on the rear panel.
*17. Use a cross cable (null modem cable).
*18. Category 5; use a straight cable.
*19. Limited to products that have the CE mark on their panels. Does not apply to specially ordered or modified PMX-As.
*20. This is a Class I equipment. Be sure to ground this product's protective conductor terminal. The safety of this product is only guaranteed when the product is properly grounded.
*21. This is a Class A equipment. This product is intended for use in an industrial environment. This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.
*22. This is a Group 1 equipment. This product does not generate and/or use intentionally radio-frequency energy, in the from of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purpose.

Compact Multi-Output DC Power Supply (CV/CC)

PMX-Multi Series

LAN USB RS232C CE LXI

Three models with 2, 3 and 4 outputs. Optimal for R&D as well as manufacturing lines.

The PMX-Multi series is a multi-channel DC power supply with isolated outputs on each channel. The PMX32-3DU (2ch), PMX32-3TR (3ch), and PMX32-2QU (4ch) are all capable of simultaneous output in all channels and come with an output tracking feature. Also, channels 1 & 2 of each model can be easily connected in either series or parallel to increase the output voltage/current at the press of a button. LAN (LXI Compliant), USB, and RS232C are included as standard digital interfaces for easy system integration. The PMX-Multi benefits from a low noise, series regulator design that makes this series the perfect choice for experiments involving transistors, IC circuits, and op amp circuits as well as R&D and production line applications.

Dimensions / Weight

214(8.42″)W×124(4.88″)H×400(15.74″)Dmm(inch) / 13kg(28.66 lbs.)

Accessories

Power cord: 1 pc. Output terminal cover set: 1 set. Packing list: 1 copy. Safety Information: 1 copy. CD-ROM: 1 disc.

Application

- Power supply for tests involving transistors, IC circuits and operational amplifiers
- Integration into semiconductor evaluation test systems
- Power supply for research and development and manufacturing line integration

Features

- All channels with isolated outputs for maximum safety
  High level of safety due to each output being completely isolated
- High setting resolution (Voltage: 1 mV, Current: 0.1 mA)
- Independent ON/OFF configuration for all channels
- Simple series/parallel connection between channels (CH1 & CH2)
- Tracking control in all channels
- ON/OFF delay feature in all channels
- Key lock, Preset memory function (3 slots)
- Simultaneous display of all channels
- Remote sensing function
- High quality LCD panel for improved visibility
- LAN (LXI Compliant)/USB/RS232C standard interface

Easy access with a built-in web server

Use a browser from a PC, smartphone, or tablet to access the web server built into the PMX-Multi series for convenient control and monitoring.

[Recommended browser]

- Requires for the Internet Explorer version 9.0 or later
- Requires for the firefox 8.0 or later
- Requires for the safari / mobile Safari 5.1 or later
- Requires for the Chrome 15.0 or later
- Requires for the Opera 11.0 or later

* Connecting with a smartphone, tablet, etc. requires a Wi-Fi environment (wireless LAN router etc.).

Functions

■ Tracking feature

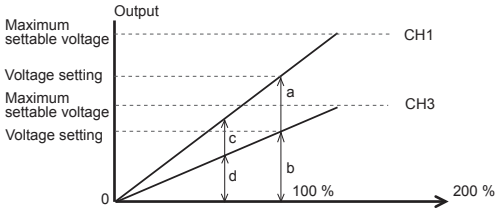
The tracking feature allows the operator to control the ratio for increase/decrease of output among multiple channels within the power rating. This feature can be used freely among all channels with two ratio options: absolute value variation and variation ratio.

Absolute Value Variation(TRACKING 1)
This mode allows for voltage/current settings in all specified channels to change at the same rate as a selected channel.

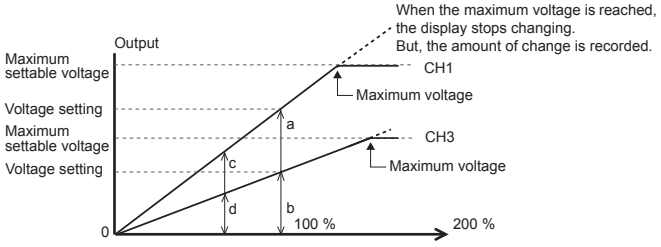
Variation Ratio(TRACKING 2)
This mode allows for voltage/current settings in all specified channels to change in equal proportion to a selected voltage or current rating.
*The variable range is from 0.0% to 200.0%

Example: Here we will use TRACKING 2 on CH1 and CH2 of a PMX32-2QU.
When you turn the rotary knob during tracking operation, the outputs change at the same percentage as the preset output percentage (b/a).
b/a = d/c
This proportional expression is satisfied.

Example when the voltage is changed within the rated output

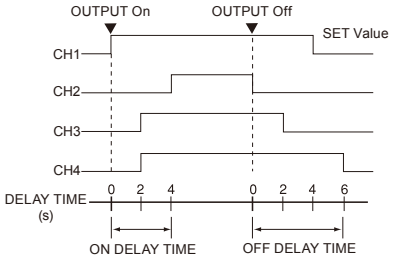


Example when the voltage is changed above the maximum settable output



■ Delay function

The optional setting creates a programmable delay between the OUTPUT switch being activated and the actual output being released. The setting range for DELAY TIME is from 0.1 - 99.9 seconds.



Item	ON DELAY SET value	OFF DELAY SET value
CH1	0 s	4 s
CH2	4 s	0 s
CH3	2 s	2 s
CH4	2 s	6 s

Timing chart of delay function

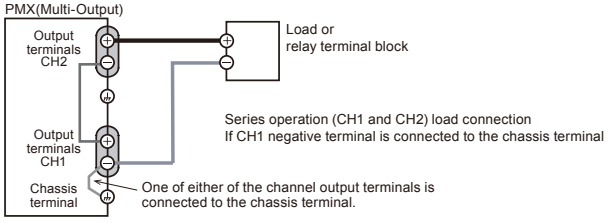
* The actual rise/fall time with output off will vary depending on the output and load conditions. Note that the timing chart above ignores rise and fall time. There are cases where the actual delay time varies by a few tens of milliseconds even when the delay time is set to 0 seconds.

When power supplies are not activated properly, there is the slight risk of damage being caused to the overall system. For this reason ON delay control is a very important feature that is required for power source output. This feature is also necessary when turning output OFF, and is highly convenient for operating circuits.

■ Series and parallel connection at the press of a button

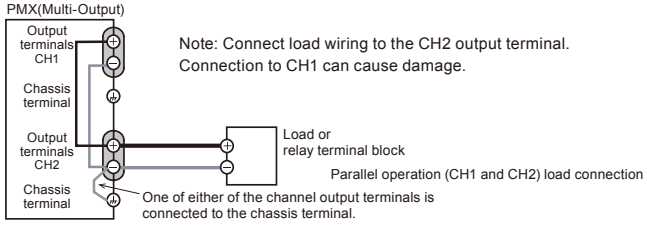
● Series Operation

CH1 and CH2 can be connected in series to increase the overall voltage output range. CH2 operates as master and CH1 as slave. The total output voltage will be the sum of CH1 and CH2.



● Parallel Operation

CH1 and CH2 can beconnected in parallel to increase the overall current range. CH2 operates as master and CH1 as slave.
The total output current will be the sum of CH1 and CH2.



PMX-Multi Series Specifications

Unless specified otherwise, the specifications are for the following settings and conditions.

- Loads are purely resistive loads.
- The product is warmed up for at least 30 minutes.
- The negative output is connected to the chassis terminal with a short bar.
- Values indicated by "TYP" are typical values. These values do not guarantee the performance of the PMX seres (multiple-output).
- rating: Indicates the rated. ● set: Indicates a setting. ● reading: Indicates the readout value.
- Rated load and no load are defined as follows:

In constant-voltage mode (when the output current is set to a value greater than or equal to the maximum output current with rated output voltage)

Rated load: Refers to a resistive load that, when the rated output voltage is applied, makes the flowing current 95 % to 100 % of the maximum output current with rated output voltage.

No load: Refers to a load through which no output current flows. In other words, refers to an open load (no load being connected).

In constant-current mode (when the output voltage is set to a value greater than or equal to the maximum output voltage with rated output current)

Rated load: Refers to a resistive load that, when the rated output current flows, makes the voltage drop to 95 % to 100 % of the maximum output voltage with rated output current. Including the voltage drop in the load cables, the product's output voltage must not exceed the maximum output voltage with rated output current.

No load: Refers to a resistive load that, when the rated output current flows, makes the voltage drop to 10 % of the maximum output voltage with rated output current or 1 V whichever is higher.

Item/Model			PMX32-3DU	PMX32-3TR	PMX32-2QU
AC input					
Nominal input rating			234 Vac *1, 50 Hz/ 60 Hz, single phase		
Input voltage range			± 10 %		
Input frequency range			47 Hz to 63 Hz		
Inrush current (MAX) *2			150 A	150 A	150 A
Power (MAX)			700 VA	900 VA	800 VA
Output					
Rating	Output voltage	CH1	32.000 V	32.000 V	32.000 V
		CH2	32.000 V	32.000 V	32.000 V
		CH3	—	6.000 V	18.000 V
		CH4	—	—	18.000 V
	Output current	CH1	3.000 A	3.000 A	2.000 A
		CH2	3.000 A	3.000 A	2.000 A
		CH3	—	5.000 A	2.500 A
		CH4	—	—	2.500 A
Constant voltage	Maximum voltage setting	CH1	33.600 V	33.600 V	33.600 V
		CH2	33.600 V	33.600 V	33.600 V
		CH3	—	6.300 V	18.900 V
		CH4	—	—	18.900 V
	Resolution		1 mV		
	Voltage setting accuracy *3		±(0.03 % set +5 mV)		
	Input line regulation *4	CH1	3 mV	3 mV	3 mV
		CH2	3 mV	3 mV	3 mV
		CH3	—	1 mV	1 mV
		CH4	—	—	1 mV
	Load regulation *5	CH1	4 mV	4 mV	2 mV
		CH2	4 mV	4 mV	2 mV
		CH3	—	5 mV	3 mV
		CH4	—	—	3 mV
	Transient response *6		50 µs		
	Ripple noise (rms) *7		500 µV		
	Command delay		80 ms		
	Rise time (at rated load) *8		10 ms ±30 %		
	Fall time (at no load) *9	CH1	350 ms ±30 %	350 ms ±30 %	350 ms ±30 %
		CH2	350 ms ±30 %	350 ms ±30 %	350 ms ±30 %
		CH3	—	220 ms ±30 %	240 ms ±30 %
		CH4	—	—	240 ms ±30 %
	Temperature coefficient (TYP)		100 ppm/ °C		
Constant current	Maximum current setting	CH1	3.150 A	3.150 A	2.100 A
		CH2	3.150 A	3.150 A	2.100 A
		CH3	—	5.250 A	2.625 A
		CH4	—	—	2.625 A
	Resolution		0.1 mA		
	Current setting accuracy *3		±(0.3 % set +0.1 % rating)		
	Input line regulation *4		0.01 % + 0.25 mA		
	Load regulation *10		5 mA		
	Ripple noise (rms) *7	CH1	1 mA	1 mA	1 mA
		CH2	1 mA	1 mA	1 mA
		CH3	—	2 mA	1 mA
		CH4	—	—	1 mA
	Temperature coefficient (TYP)		200 ppm/ °C		

*1. 100 Vac, 117 Vac, 200 Vac, and 217 Vac are factory options. (Not CE certified product.)
*2. Excludes the charge current component that flows through the capacitor of the internal EMC filter circuit immediately after the POWER switch is turned on (for approximately 1 ms).
*3. At an ambient temperature of 23 °C±5 °C.
*4. 90 % to 100 % or 100 % to 110 % of the nominal input voltage rating, rated load.
*5. The amount of change that occurs when the load is changed from no load to rated load at the rated output voltage. The value is measured at the sensing point.
*6. The amount of time required for the output voltage to return to a value within "rated output voltage ± (0.05 % + 10 mV)." When the load current is changed from 10 % to 100 % of the rated output current. The value is measured at the sensing point.
*7. When the measurement frequency bandwidth is 5 Hz to 1 MHz.
*8. The time for the output voltage to rise from 10 % to 90 % of the rating when the output is turned on.
*9. The time for the output voltage to fall from 90 % to 10 % of the rating when the output is turned off.
*10. The amount of current change when the load is changed from 10 % of the rated voltage or 1 V, whichever is higher, to the rated voltage at rated output current.

Item/Model			PMX32-3DU	PMX32-3TR	PMX32-2QU
Display function					
Voltmeter	Maximum display		99.999 (fixed decimal point)		
	Display accuracy *1		±(0.1 % of reading +10 mV)		
Ammeter	Maximum display		9.999 (fixed decimal point)		
	Display accuracy *1		±(0.2 % of reading +5 mA)		
Operation display	OUTPUT ON/OFF		Output on: "ON" display (green) Output off: "OFF" display		
	Output-on delay/ off dela		Displays "DELAY SET" when set. "DELAY" blinks during output-on delay/ off delay. "DELAY" is displayed after the output-on delay/off delay has passed.		
	CV operation		"CV" display (green)		
	CC operation		"CC" display (red)		
	Alarm operation		Displays "ALARM" (red) when a protection function is activated.		
	Memory		Displays "PRESET A," "PRESET B," or "PRESET C" when a memory area is in use.		
	Key lock		Displays "LOCK" when the keys are locked.		
	Tracking		Displays "TRACKING 1" or "TRACKING 2" when tracking is in operation.		
	Remote operation		Displays "REMOTE" during remote control.		
		LAN operation	Displays or blinks "LAN" (depending on the status). • No fault status: Lights green. • Fault status: Lights red. • Standby status: Blinks red. • WEB identify status: Blinks green.		
Protection function					
Overvoltage protection (OVP)	Action		Turns the output off, displays "OVP," and displays "ALARM" (red).		
	Setting range		10 % to 110 % of the rated output voltage		
	Setting accuracy		±(1 % of rating)		
	Resolution		1 mV		
Overcurrent protection (OCP)	Action *2		Turns the output off, displays "OCP," and displays "ALARM" (red).		
	Setting range		10 % to 110 % of the rated output current		
	Setting accuracy		±(1 % of rating)		
	Resolution		0.1 mA		
Overheat protection (OHP)	Action		Turns the output off, displays "OHP," and displays "ALARM" (red).		
Communication monitorring (WATCHDOG)	Action		Turns the output off, displays "WDOG," and displays "ALARM" (red).		
Alarm signal input (ALARM IN)	Action		Turns the output off, displays "IN," and displays "ALARM" (red).		
Signal output					
Status Signal output *3	OUTPUT ON STATUS		On when output is on.		
	ALARM STATUS		On when an alarm is activated (OVP, OCP, OHP, WATCHDOG, ALARM IN).		
	POWER ON STATUS		Turns on when the power is turned on		
Control functions					
External control	Output on/off control (OUTPUT ON/OFF CONT)		Logic selectable: • Negative logic Output on when set to LOW (0 V to 0.5 V) or shorted; output off when set to HIGH (4.5 V or 5 V) or open • Positive logic Output on when set to HIGH (4.5 V to 5 V) or open; output off when set to LOW (0 V or 0.5 V) or shorted		
	Alarm input (ALARM IN)		The output turns off with an alarm signal input (the contact switch shorted for at least 0.5 s).		
Sensing			0.6 V for a single line (but the output terminals are controlled at the rated voltage)		

*1. At an ambient temperature of 23 °C±5 °C.
*2. This does not protect against the discharge current peak that is generated from the capacitors inside the product's output section when the load is changed suddenly.
*3. Photocoupler open collector output; Maximum voltage 30 V, maximum current (sink) 8 mA. Isolated from the output and control circuits. The status common is floating (within the isolation voltage).

PMX-Multi Series Specifications

Item/Model		PMX32-3DU	PMX32-3TR	PMX32-2QU
Parallel operation				
Applicable channels		Master: CH2, slave: CH1		
Constant voltage	Operating range	0 V to 32 V		
	Setting range	0 V to 33.6 V		
	Setting accuracy *1	0.3 % set + 0.1 % rating		
	Resolution	1 mV		
Constant current	Operating range	0 A to 6 A		0 A to 4 A
	Setting range	0 A to 6.3 A		0 A to 4.2 A
	Setting accuracy *1	0.4 % set + 0.1 % rating		
	Resolution	0.2 mA		
Voltmeter	Maximum display	99.999 (fixed decimal point)		
	Display accuracy *1	±(0.5 % of reading + 10 digit)		
Ammeter	Maximum display	9.999 (fixed decimal point)		
	Display accuracy *1	±(1 % of reading + 10 digit)		
Series operation				
Applicable channels		Master: CH2, slave: CH1		
Constant voltage	Operating range	0 V to 64 V		
	Setting range	0 V to 67.2 V		
	Setting accuracy *1 *2	0.3 % set + 0.1 % rating		
	Resolution	2 mV		
Constant current	Operating range	0 A to 3 A		0 A to 2 A
	Setting range	0 A to 3.15 A		0 A to 2.1 A
	Setting accuracy *1	0.4 % set + 0.1 % rating		
	Resolution	0.1 mA		
Voltmeter	Maximum display	99.999 (fixed decimal point)		
	Display accuracy *1 *2	±(0.5 % of reading + 20 digit)		
Ammeter	Maximum display	9.999 (fixed decimal point)		
	Display accuracy *1	±(1 % of reading + 5 digit)		

*1. At an ambient temperature of 23 °C±5 °C.
*2. The value is measured at the sensing point.

Item/Model		PMX32-3DU	PMX32-3TR	PMX32-2QU
Other functions				
Output-on delay/ off delay				
	Applicable channels	All channels		
	Setup	Set the output on/off delay time.		
	Setting range	0.1 s to 99.9 s		
	Resolution	0.1 s		
	Setting accuracy *1	±50 ms		
Memory		Saves three combinations of voltage, current, OVP, OCP, and output-on delay/ off delay settings.		
Key lock		Selectable from the following three modes. • Loc1: Lock all keys except the OUTPUT and memory A, B, and C keys. • Loc2: Lock all keys except the OUTPUT key. • Loc3: Lock all keys and the rotary knob.		
Tracking				
	Applicable channels	All channels		
	Operation mode: Tracking function 1 *2	Absolute value change		
	Operation mode: Tracking function 2 *3	Percentage change		
	Setting accuracy: CV setting accuracy	0.4 % of rating + 40 mV		
	Setting accuracy: CC setting accuracy	0.7 % of rating + 10 mA		

*1. The difference between the time from when the reference output reaches 5 % of the setting to when the target output reaches 5 % of the setting and the delay time setting.
*2. In tracking function 1, the output can be varied within the output range of the reference channel voltage or current.
*3. In tracking function 2, the output can be varied at the same percentage as the reference output in reference to the output at the start of the tracking function.

Item/Model		PMX32-3DU	PMX32-3TR	PMX32-2QU
Interface				
Common specifications	Software protocol	IEEE Std 488.2-1992		
	Command language	Complies with SCPI Specification 1990.0		
RS232C	Hardware	Complies with the EIA232D specifications (excluding the terminal block) D-sub 9-pin terminal block (male) Baudrate: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps Data length: 8 bits, Stop bits: 1 bit, Parity bit: None, Flow control: No		
	Program message terminator	LF during reception, LF during transmission.		
USB	Hardware	Standard type B socket. Complies with the USB 2.0 specifications; data rate: 12 Mbps (full speed)		
	Program message terminator	LF or EOM during reception, LF + EOM during transmission.		
	Device class	Complies with the USBTMC-USB488 device class specifications.		
LAN	Hardware	IEEE 802.3 100Base-TX/10Base-T Ethernet, IPv4, RJ-45 terminal block		
	Compliant standards	LXI Device Specification 2016, LXI HiSLIP Extended Function Rev. 1.0, LXI VXI-11 Extended Function Rev. 1.0		
	Communication protocol	VXI-11, HiSLIP, SCPI-RAW, SCPI-Telnet		
	Message terminator	VXI-11, HiSLIP: LF or END during reception, LF + END during transmission. SCPI-RAW: LF during reception, LF during transmission.		
General specifications				
Environmental conditions	Operating temperature range	0 °C to 40 °C (32 °F to 104 °F)		
	Operating humidity range	20 %rh to 85 %rh (no condensation)		
	Storage temperature range:	-25°C to 70°C (13°F to 158°F)		
	Storage humidity range:	90 %rh or less (no condensation)		
	Installation location	Indoor use, altitude of up to 2 000 m, overvoltage category II		
Isolation voltage	Between channels	±70 Vdc		
	Between the output and chassis	±70 Vdc		
Withstanding voltage	Between the primary circuit and chassis	No abnormalities at 1500 Vac for 1 minute.		
	Between the primary and secondary circuits	No abnormalities at 2600 Vac for 1 minute.		
	Between the secondary circuit and chassis	No abnormalities at 1500 Vdc for 1 minute.		
Insulation resistance	Between the primary circuit and chassis	500 Vdc, 30 MΩ or greater		
	Between the primary and secondary circuits			
	Between the secondary circuit and chassis			
	Between channels			
Cooling method		Forced air cooling using a fan motor		
Common		All channels are independent.		
Grounding polarity		Negative grounding or positive grounding possible		
Electromagnetic compatibility *1 *2		Complies with the requirements of the following directive and standards. EMC Directive 2014/30/EU, EN 61326-1(Class A*3), EN 55011(Class A*3, Group 1*4), EN 61000-3-2, EN 61000-3-3 Applicable under the following conditions. The maximum length of all cabling and wiring connected to the product must be less than 3 m.		
Safety *1		Complies with the requirements of the following directive and standards. Low Voltage Directive 2014/35/EU*2, EN 61010-1(Class I*5, Pollution Degree 2*6)		

*1. Does not apply to specially ordered or modified products.
*2. Only on models that have the CE marking on the panel.
*3. This product confirms to Class A. This product is intended for use in an industrial environment. This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.
*4. This is a Group 1 instrument. This product does not generate and/or use intentionally radio-frequency energy, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purpose.
*5. This product confirms to Class I. Be sure to ground the protective conductor terminal of this product. If not grounded properly, safety is not guaranteed.
*6. Pollution is addition of foreign matter (solid, liquid or gaseous) that may produce a reduction of dielectric strength or surface resistivity. Pollution Degree 2 assumes that only non-conductive pollution will occur except for an occasional temporary conductivity caused by condensation.

Programmable Bipolar Power Supply (CV/CC)

PBZ Series

LAN OPTION LXI USB GPIB RS232C DRIVERS CE

Dimensions / Weight

429.5(16.91″)W × 128(5.0″)H × 550(21.65″)Dmm / 22kg(48.5 lbs)

Accessories

Operation manual, Power cord, Cord set, Weight sticker

Superior output characteristic by adopting the Power Amp System

The PBZ series is a bipolar type DC regulated power source that can continuously change both positive and negative polarities passing through 0 without changing the output terminal.
By adopting a "Switching + Linear" system, the PBZ is able to realize 40 % lighter than PBX series while achieving high speed operation with low ripple noise. Since operation covers 4 quadrants, power can be both supplied (source) and absorbed (sink). The PBZ can also drive inductive or capacitive loads. The unit also equips a signal generator function which enables waveform and sequence creation. The PBZ is also capable of synchronized operation which is required for voltage variation tests, and it can also be expanded for large current applications through master-slave parallel operation.

Features

- Waveform generation function
- Low ripple noise
- Synchronized operation function(Trigger-based, Clock-based)
- Sequence function
- Unipolar mode
- Parallel operation function
- High-speed response 100kHz (CV)

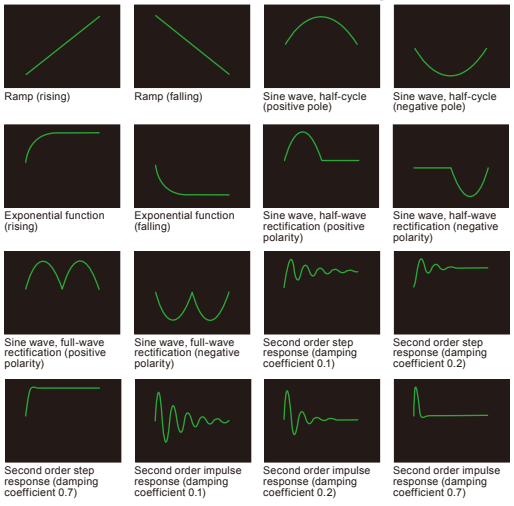
Functions

■ Waveform generation function

In addition to the basic sine, square and triangular waveforms, the PBZ series is equipped with a user-defined waveform generating function that can register up to 16 waveforms. It allows the amplitude, frequency, start phase, frequency sweep and square wave duty to be set as needed.
The 16 user-defined waveforms can be freely edited, and the original created and edited waveforms can be registered and easily recalled for use.
The sequence function allows each waveform to be set as a single step, and a maximum of 1024 steps can be set in the 16 programs.

● 3 basic waveforms

● 16 user-defined waveforms (The waveforms below are registered as defaults.)



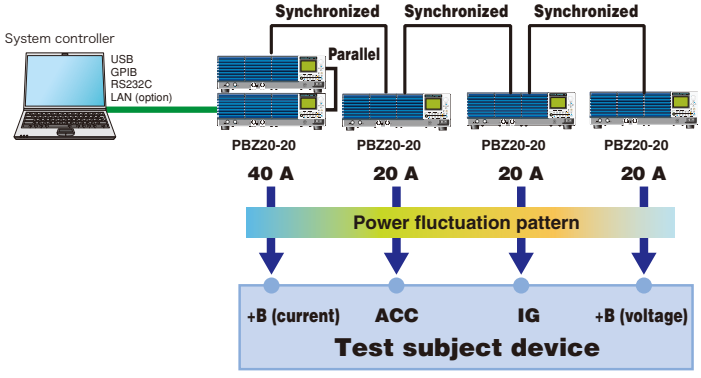
■ Low ripple and noise (in CV mode)

For the Ripple 2 mVrms, Noise 20 mVp-p (PBZ20-20)
4 mVrms, Noise 20 mVp-p (PBZ40-10)
4 mVrms, Noise 30 mVp-p (PBZ60-6.7)
4 mVrms, Noise 30 mVp-p (PBZ80-5)

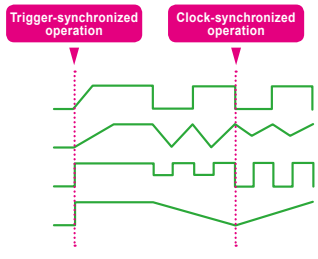
■ Synchronized operation function (Trigger synchronized, Clock synchronization)

This function synchronizes the power output when a sequence is executed using multiple PBZ. It prevents time deviations from occurring even when a long sequence is executed. *A delay of up to 1μs occurs at the start.

● Sample configuration of a voltage fluctuation test system



● Example of combined trigger- and clock-synchronized operation



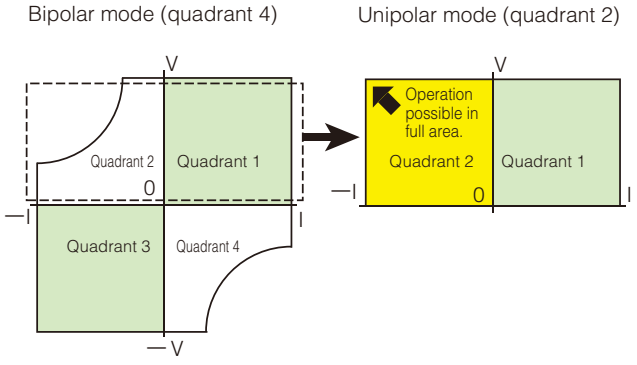
Functions

■ Sequence function

The basic sine, triangular and square waveforms, as well as the 16 user-defined waveforms, can each be set as a sequence step, allowing even complex sequences to be created easily. Sequences are composed of up to 1024 steps. This combination of steps forms a program, and the 1024 steps can be allocated and set in a maximum of 16 programs. When executing sequences, in addition to executing a single program, the script function also allows multiple programs to be combined and executed as needed.
A script is a function that specifies the sequence and number of repetitions for the set programs. A maximum of 50 lines can be set in 1 script for each CV and CC mode.

■ Unipolar mode

This is a function unique to this product. Because the voltage is unipolar, this function is called “unipolar mode”. With unipolar power, although the current flows in a single direction, in unipolar mode it is still possible to apply current in both directions (source and sink). As shown in the diagram, on a graph with perpendicular axes of voltage (vertical) and current (horizontal), operation is possible in quadrant 1 and quadrant 2 (2 quadrants). In bipolar mode, there are power restriction areas (PBZ20-20: 100 W, PBZ40-10: 180 W, PBZ60-6.7, PBZ80-5: 200 W) in quadrants 2 and 4. However in unipolar mode, operation is possible in the full area of quadrant 2.



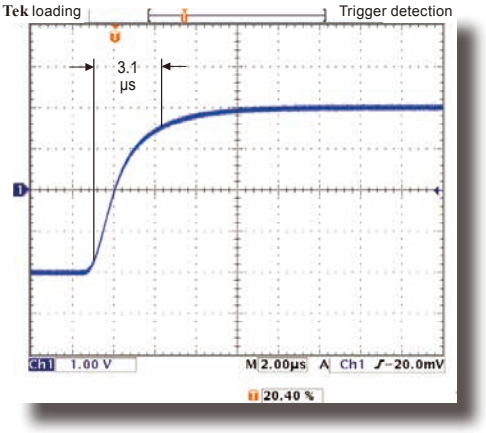
■ Parallel operation function

This function expands the output current. It allows multiple units to be connected in parallel according to the required current. With 2 units of the same model and the optional parallel operation kit, the user can easily complete the setup. Although up to 5 units can be operated in parallel, if 3 or more units will be used, please consult with us.

■ High-speed response

100 kHz frequency characteristic (CV)

The superior waveform quality with rise and fall with times of 3.5 µs which makes it possible to reproduce a variety of waveforms with high precision.



▲ Sample of rising waveform
When response of 3.5 µs is set

Options

■ Vertical stand

VS01

■ Parallel operation kit

PK01-PBZ
PK02-PBZ (EIA)
PK03-PBZ (JIS)

■ Interface board

LAN Interface factory option

It applies to control and monitor the power supply from a browser.

■ Sequence creation software

Wavy for PBZ

PBZ Series Specifications

Unless specified otherwise, the specifications are for the following settings and conditions.

- The warm-up time is 30 minutes (with current flowing).
- TYP value: These are typical values that are representative of situations where the PBZ operates in an environment with an ambient temperature of 23 °C. These values do not guarantee the performance of the PBZ.
- rating/CF: The rated voltage or rated current divided by CF (crest factor).
- The polarity of the output voltage and current is defined as follows.
  - Voltage: Using the output's COM terminal as a reference, the voltage is positive (+) when the OUT terminal is positive and negative (-) when the OUT terminal is negative.
  - Current: Positive (+) when current flows out from the OUT terminal and negative (-) when current flows into the OUT terminal.
- The output specifications apply to the rear panel output terminals under the following conditions:
  The short bar is used to connect the output's COM terminal and chassis terminal.
  Remote sensing is not being performed.
  The auxiliary output terminals may not meet the specifications.
- Loads are purely resistive loads.
- Rated loads are defined as follows:
  When the PBZ is generating its rated voltage, the load causes the rated current to flow.
  Or, when the PBZ is generating its rated current, the load makes the voltage drop to the PBZ's rated voltage.

AC input, rated output		PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
AC input	Nominal input voltage	100 V to 240 V AC, 50/60 Hz			
	Voltage and frequency range	90 V to 250 V AC, 47 Hz to 63 Hz			
	Current	10 A AC or less (at rated load)			
	Inrush current	40 Apeak or less			
	Power	900 VA or less (at rated load)			
	Power factor	0.95 (at input voltage 100 V, rated load) (TYP. value)			
Rated output	Output power	400 W		402 W	400 W
	Output voltage	±20 V	±40 V	±60 V	±80 V
	Output current	±20 A	±10 A	±6.7 A	±5 A
	Voltage to ground	DC 500 V, grounding permitted at COM terminal only			

Constant voltage (CV mode)			PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
DC voltage	Setting range *1	Bipolar mode	0.000 V to ±21.000 V	0.000 V to ±42.000 V	0.000 V to ±63.000 V	0.000 V to ±84.000 V
		Unipolar mode	0.000 V to 21.000 V	0.000 V to 42.000 V	0.000 V to 63.000 V	0.000 V to 84.000 V
		Fine function	±5 % of rating			
	Setting resolution		0.001 V (Fine function setting resolution 0.0001 V)		0.002 V (Fine function setting resolution 0.0002 V)	
	Setting accuracy *2		±(0.05 % of setting + 0.05 % of rating)			
	Temp. coefficient		±(100 ppm/°C of rating) (TYP. value)			
AC voltage	Setting range *1		0.00 Vpp to 42.00 Vpp	0.0 Vpp to 84.0 Vpp	0.0 Vpp to 126.0 Vpp	0.0 Vpp to 168.0 Vpp
	Setting resolution		0.01 V	0.1 V		
	Setting accuracy *3		±0.5 % of rating			
AC frequency	Setting range		0.01 Hz to 100.00 kHz			
	Setting resolution		0.01 Hz			
	Setting accuracy		±200 ppm			
	Sweep		Linear, log			
	Sweep time		100 µs to 1000 s (resolution 100 µs)			
AC waveform	Type		Sine wave, square wave, triangular wave, user-defined waves (16 waves)			
	Start phase		0 ° to 359 °			
	Square wave duty		0.1 % to 99.9 % (f < 100 Hz), 1 % to 99 % (100 Hz ≤ f < 1 kHz) 10 % to 90 % (1 kHz ≤ f < 10 kHz), 50 % fixed (10 kHz ≤ f)			
Constant voltage characteristic	Frequency characteristic *4		DC to 100 kHz (TYP. value)			
	Response *5, *6		3.5 µs, 10 µs, 35 µs, 100 µs (TYP. value)			
	Overshoot		5 % or less (TYP. value)			
	Ripple Noise	(p-p) *7	20 mV (TYP. value)		30 mV (TYP. value)	
		(rms) *8	2 mV (TYP. value)	4 mV (TYP. value)		
	Load effect *9		±(0.005 % of setting + 1 mV)			
	Source effect *10		±(0.005 % of setting + 1 mV)			

*1. The combination of the DC voltage and AC voltage peak values is limited to within the DC voltage setting range.
*2. At ambient temperature of 18 °C to 28 °C
*3. At ambient temp. 18 °C to 28 °C, 1 kHz sine wave, response 3.5 µs, no load
*4. Frequency at which the amplitude ratio of the output voltage relative to the external signal input voltage is -3 dB (at standard frequency 1 kHz, response 3.5 µs, rated load)
*5. Rise time / fall time (at rated load, excepting output ON/OFF) Frequency characteristic determined by the set response (frequency band = 0.35 / Rise time).
*6. Rise time: When the output voltage is changed from 0 V to the rated voltage, the rise time is the time during which output voltage changes from 10 % to 90 % of the rated voltage.
Fall time: When the output voltage is changed from the rated voltage to 0 V, the fall time is the time during which output voltage changes from 90 % to 10 % of the rated voltage.
*7. Measurement frequency band is 10 Hz to 20 MHz (at the output terminal).
*8. Measurement frequency band is 10 Hz to 1 MHz (at the output terminal).
*9. Change in output voltage (at sensing terminal using remote sensing) in response to a change from 0 % to 100 % of the rated output current
*10. Change in output voltage (at sensing terminal using remote sensing) in response to a ±10 % change from the nominal input voltage

Constant current (CC mode)			PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
DC current	Setting range *1	Bipolar mode	0.000 A to ±21.000 A	0.000 A to ±10.500 A	0.000 A to ±7.035 A	0.000 A to ±5.250 A
		Unipolar mode				
		Fine function	±5 % of rating			
	Setting resolution		0.001 A (Fine function setting resolution 0.0001 A)			
	Setting accuracy *2		±(0.3 % of rating)			
	Temp. coefficient		±(100 ppm/°C of rating) (TYP. value)			
AC current	Setting range *1		0.00 App to 42.00 App	0.00 App to 21.00 App	0.00 App to 14.07 App	0.00 App to 10.50 App
	Setting resolution		0.01 A			
	Setting accuracy *3		±0.5 % of rating			
AC frequency	Setting range		0.01 Hz to 100.00 kHz			
	Setting resolution		0.01 Hz			
	Setting accuracy		±200 ppm			
	Sweep		Linear, log			
	Sweep time		100 µs to 1000 s (resolution 100 µs)			
AC waveform	Type		Sine wave, square wave, triangular wave, user-defined waves (16 waves)			
	Start phase		0 ° to 359 °			
	Square wave duty		0.1 % to 99.0 % (f < 100 Hz), 1 % to 99 % (100 Hz ≤ f < 1 kHz) 10 % to 90 % (1 kHz ≤ f < 10 kHz), 50 % fixed (10 kHz ≤ f)			
Constant current characteristic	Frequency characteristic *4		DC to 10 kHz (TYP. value)	DC to 5 kHz (TYP. value)	DC to 10 kHz (TYP. value)	
	Response		35 µs, 100 µs, 350 µs, 1 ms (TYP. value)	70 µs, 100 µs, 350 µs, 1 ms (TYP. value)	35 µs, 100 µs, 350 µs, 1 ms (TYP. value)	
	Overshoot		5 % or less (TYP. value)			
	Ripple noise (rms) *7		3 mA (TYP. value)			
	Load effect *8		±(0.01 % of setting + 1 mA)			
	Source effect *9		±(0.01 % of setting + 1 mA)			

*1. The combination of the DC current and AC current peak values is limited to within the DC current setting range.
*2. At ambient temperature of 18 °C to 28 °C
*3. At ambient temp. 18 °C to 28 °C, 100 Hz sine wave, response 35 µs, output short circuited
*4. Frequency at which the ratio of the external signal input amplitude and output current amplitude is -3 dB (at standard frequency 100 Hz, response 35µs, rated load)
The frequency characteristic varies depending on the load impedance.When the load impedance increases, the frequency characteristic declines.
*5. Rise time / fall time (at rated load, excepting output ON/OFF) Rise/fall time varies depending on the load impedance.
*6. Rise time: When the output current is changed from 0 A to the rated current, this is the rise time is the time during which the output current changes from 10 % to 90 % of the rated current.
Fall time: When the output current is changed from the rated current to 0 A, the fall time is the time during which the output current changes from 90 % to 10 % of the rated current.
*7. The measurement frequency band is 10 Hz to 1 MHz (at 10% to 100% of rated output voltage).
*8. Change in the output current in response to a voltage change from 10 % to 100 % of the rated output voltage

Measurement display function			PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
Voltage measurement	DC	Measurement range (resolution)	120 % of rating (0.001 V)			
		Accuracy *1	±(0.05 % of reading + 0.05 % of rating)			
		Temp. coefficient	±(100 ppm/°C of rating) (TYP. value)			
	AC	Measurement range (resolution)	120 % of rating/CF (0.001 V)			
	DC + AC	Measurement range (resolution)	120 % of rating (0.001 V)			
	AC, DC + AC	Accuracy *1, *2	±(0.5 % of reading + 0.1 % of rating) (5 Hz to 10 kHz)			
			±(1 % of reading + 0.2 % of rating) (10 kHz to 50 kHz)			
			±(2% of reading + 0.2 % of rating) (50 kHz to 100 kHz)			
	PEAK	Measurement range (resolution)	120 % of rating (0.01 V)			
	PEAK	Accuracy *1, *3	±(0.5 % of rating)			
Current measurement	DC	Measurement range (resolution)	120 % of rating (0.001 A)			
		Accuracy *1	±(0.3 % of reading + 0.1 % of rating)			
		Temp. coefficient	±(150 ppm/°C of rating) (TYP. value)			
	AC	Measurement range (resolution)	120 % of rating/CF (0.001 A)			
	DC + AC	Measurement range (resolution)	120 % of rating (0.001 A)			
	AC, DC + AC	Accuracy *1, *2	±(3 % of reading + 0.1 % of rating) (5 Hz to 10 kHz)			
			±(10 % of reading + 1 % of rating) (10 kHz to 100 kHz)			
	PEAK	Measurement range (resolution)	120 % of rating (0.01 A)			
	PEAK	Accuracy *1, *3	±(0.5 % of rating)			
Measurement time			100 µs to 3600 s			

*1. At ambient temperature of 18 °C to 28 °C
*2. When the input signal is a sine wave with a crest factor of 3 or less within the prescribed frequency range and the measurement time is the no more than 10 times the period of the input signal
*3. Peak value of a 1 kHz sine wave

PBZ Series Specifications

Protection functions		PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
Overvoltage protection	Protection trip *1, *2	OVP or V-LIMIT (output restriction) For OVP, select either output OFF or POWER switch OFF.			
	Setting range (Bipolar mode)	Select whether (-110 % of rtg ≤ -V.LIM ≤ +V.LIM ≤ +110 % of rtg) or (-110 % of rtg ≤ -OVP ≤ -1 % of rtg, +1 % of rtg ≤ +OVP ≤ +110 % of rtg)			
	Setting range (Unipolar mode)	Select whether -1 % of rtg ≤ -V.LIM ≤ +V.LIM ≤ +110 % of rtg or +1 % of rtg ≤ +OVP ≤ +110 % of rtg			
	Setting resolution	0.01 V			
	Setting accuracy	±1 % of rating			
Overcurrent protection	Protection trip *1, *2	OCP or I-LIMIT (output limit). Select whether output or the POWER switch turns off when OCP is activated.			
	Setting range	Select wheter (-110 % of rtg ≤ -I.LIM ≤ -1 % of rtg ≤+1 % of rtg ≤ +I.LIM ≤ +110 % of rtg) or (-110 % of rtg ≤ -OCP ≤ -1 % of rtg ≤+1 % of rtg ≤ +OCP ≤ +110 % of rtg)			
	Setting resolution	0.01 A			
	Setting accuracy	±1 % of rating			
Overheating protection	Protection trip	Turns output off when overheating is detected.			
Power restriction (Sink power)	Bipolar mode	100 W (TYP. value)	180 W (TYP. value)	200 W (TYP. value)	
	Unipolar mode	400 W (TYP. value)		402 W (TYP. value)	400 W (TYP. value)

Control functions		PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
Internal signal source DC signal control	Control voltage input	Approx 0 V to Approx. ±10.0 V, 0 % to ±100 % of rated output			
	Control voltage ratio input	0 % to ±108 % of rated voltage by changing the voltage ratio of the internal standard voltage, using 10 kΩ external resistance			
Output ON/OFF control input		External contact input for output ON/OFF			
Shutdown input		External contact input for POWER switch OFF			
Status output		CV mode, CC mode, output ON, alarm active			

*1. Voltage is detected at the output terminal.
*2. OVP is enabled even when V-LIMIT (voltage restriction) is selected. OVP operation point is approx. ±(120 % of rtg).

Signal I/O			PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
External signal input	Amplifier gain	CV mode	-20.00 to +20.00	-40.0 to +40.0	-60.0 to +60.0	-80.0 to +80.0
		CC mode	-20.00 S to +20.00 S	-10.00 S to +10.00 S	-6.70 S to +6.70 S	-5.00 S to +5.00 S
		Setting resolution	0.01 V (CV mode), 0.01 S (CC mode)	0.1 V (CV mode), 0.01 S (CC mode)		
		Setting accuracy *1	±5 % of rating			
	Max. allowable input voltage		±12 Vpeak			
	Input impedance		10 kΩ (TYP. value)			
	Terminal		BNC Safety Socket (Common connects to output COM terminal.)			
Current monitor Output	Output voltage		2 V at rated current			
	Output voltage accuracy		±1 % of rating (TYP. value)			
	Output voltage frequency characteristic		DC to 20 kHz			
	Terminal		BNC Safety Socket (Common connects to output COM terminal.)			
Clock input	Input voltage		0.5 Vpp to 5 Vpp			
	Input impedance		1 kΩ (AC coupled) (TYP. value)			
	Lock frequency range		10 MHz ± 200 Hz			
	Lock time		2 s or less			
	Terminal		Insulated BNC (Common is insulated from chassis: Voltage to ground Max. 42 V peak)			
Clock output	Output voltage		1 Vpp (with 50 Ω terminal) (TYP. value)			
	Output impedance		50 Ω (AC coupled) (TYP. value)			
	Output frequency		10 MHz ± 200 Hz			
	Terminal		BNC (Common connected to chassis.)			
Trigger input	Input level		H level: 2 V to 5 V, L level: 0 V to 0.8 V (TTL compatible)			
	Polarity		H level, L level			
	Pulse width		1 µs or more			
	Delay		1 µs or less			
	Input impedance		10 kΩ (TYP value) (DC coupled)			
	Terminal		BNC (Common connected to chassis.)			
Trigger output	Output level		H level: 2.7 V to 5 V, L level: 0 V to 0.4 V (TTL compatible)			
	Polarity		H level, L level			
	Pulse width		10 µs (TYP. value)			
	Rise/fall time		100 ns or less			
	Fan-out		5 PBZ series units			
	Terminal		BNC (Common connected to chassis.)			

*1. With DC and amplifier gain at maximum

Interface		PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
Common specifications	Software protocol	IEEEStd 488.2-1992			
	Command language	Conforms to SCPI Specification 1999.0			
RS232C	Hardware	Conforms to EIA232D specifications. D-SUB 9-pin connector (male) *1 Baud rate: 1200, 2400, 4800, 9600, 19200, 38400 bps Data length: 7 bits or 8 bits, Stop bit: 1 bit or 2 bits, No parity Flow control: X-Flow/None			
	Program message terminator	LF when receiving, CR/LF when sending			
GPIB	Hardware	Conforms to IEEEStd 488.2-1987 specifications. SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E1 24-pin connector (receptacle)			
	Program message terminator	LF or EOI when receiving, LF + EOI when sending			
	Primary address	1 to 30			
USB	Hardware	Conforms to USB 2.0 specifications. Communications speed: 12 Mbps (full speed) Socket B type			
	Program message terminator	LF or EOM when receiving, LF + EOM when sending			
	Device class	Conforms to USBTMC-USB488 device class specifications.			
LAN (factory option)	Hardware	IEEE802.3 100Base-TX/10Base-T Ethernet, IPv4, RJ-45 connector *2			
		Complies with the LXI 1.4 Core 2011			
	Communication protocol	VXI-11			
	Program message terminator	LF or END when receiving, LF + END when sending			

*1. For the cable, use a crossing cable (null modem cable).
*2. Use a category 5 straight type.

Other functions		PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
Sequence function	No. of programs	16			
	No. of steps	Total 1024			
	Step time	100 µs to 1000 H (100 µs step) *1			
Preset memory		3 memories			
Setup memory		10 memories			
Key lock		Select from 1 of 3 levels.			
Remote sensing		Function ON/OFF, used in CV mode			
Operation setting at power ON		Output ON, start sequence function execution			
Soft start / soft stop		Function ON/OFF Soft start/stop time 0.1 ms to 1000 s			
Parallel operation		Max. 2 units of same model (using optional parallel operation kit)			

*1. Step time for DC rump, AC amplitude sweep, or Frequency sweep stops at 1000 s. To set a step time longer than 1000 s for those items,compose several steps every 1000 s.

General specifications		PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
Environment	Operating environment	Indoor use, overvoltage category II			
	Operating temp./ humidity range	0 to +40 °C / 20 to 85 % RH (no condensation)			
	Storage temp./ humidity range	-25 to +70 °C / Max. 90 % RH (no condensation)			
Grounding polarity		Only the output COM terminal can be grounded.			
Voltage to ground		DC 500 V Max.			
Withstand voltage	Between primary side and chassis	1500 V AC, no abnormalities at 1 minute			
	Between primary side and output terminal				
Insulation resistance	Between primary side and chassis	500 V DC, 30 MΩ or more (at humidity 70 % RH or less)			
	Between primary side and output terminal				
	Between output terminal and chassis	500 V DC, 1 MΩ or less (at humidity 70 % RH or less)			
Ground continuity	Between power cord connector, grounding pin <-> chassis	25 A AC, 0.1 Ω or less			
Cooling method		Forced air cooling by a temperature-sensitive variable-speed fan			
Safety *1		Complies with the requirements of the following directive and standard. Low Voltage Directive 2014/35/EU EN 61010-1 (Class I *2, Pollution degree 2)			
Electromagnetic compatibility (EMC) *1		Complies with the requirements of the following directive and standard. EMC Directive 2014/30/EU EN 61326-1 (Class A *3), EN 55011 (Class A *3, Group 1 *4) EN 61000-3-2, EN 61000-3-3 Applicable under the following conditions The maximum length of all cabling and wiring connected to the PBZ Series must be less than 3 m.			
Dimensions (mm(inch)(muximum)		429.5 (16.91") W × 128 (5.0") (145 (5.7")) H × 550 (21.65") (595(23.4")) D mm			
Weight		Approx. 22 kg (48.50 lbs)			
Accessories		Power cord: 1, J1 connector (Socket: 1, Protective covers: 2, Terminals: 30), Heavy object warning label: 1, Instruction manual: 1			

*1. Cannot be used for special-order or modified products.
*2. This is a Class I equipment. Be sure to ground this product's protective conductor terminal. The safety of this product is only guaranteed when the product is properly grounded.
*3. This is a Class A equipment. This product is intended for use in an industrial environment. This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.
*4. This is a Group 1 equipment. This product does not generate and/or use intentionally radio-frequency energy, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purpose.

Inteligent Bipolar Power Supply (CV/CC)

PBZ20-20A

LAN OPTION LXI USB GPIB RS232C DRIVERS CE

Ideal for voltage variation testing of automotive electrical components, high power capacitor voltage fluctuation tests and motor evaluation tests!

The PBZ20-20A Intelligent Bipolar Power Supply takes a fresh new look at bipolar power supply design, allowing for peak current up to 6 times that of the rated output. As a result, peak currents exceeding the 20A rating can be easily compensated with a single unit, eliminating the need to connect multiple units in parallel, and greatly cutting costs.

Dimensions / Weight

429.5(16.91″)W × 128(5.0″)H × 550(21.65″)Dmm (inch)/ 22kg(48.5lbs)

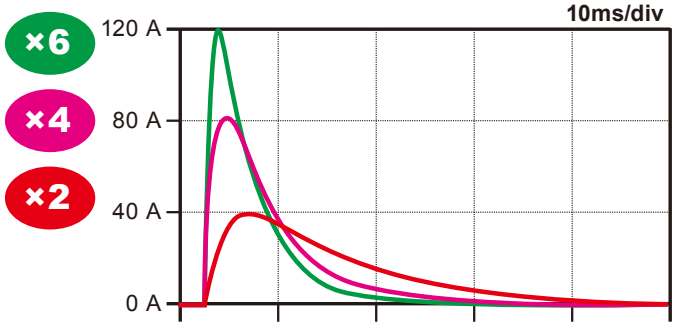
Accessories

Operation manual, Power cord, Cord set, Weight sticker

Features

- Peak Current 6x Rating (±120 Apk CV)
- Parallel Operation up to 10 Units (Max 1200 Apk)
  *Please consult if using 11 units or more.
- CV Frequency: 150 kHz DC
- Waveform generation function
- Sequence function
- Synchronized operation function(Trigger-based, Clock-based)
- Unipolar mode
- Low ripple noise(CV mode)

Functions



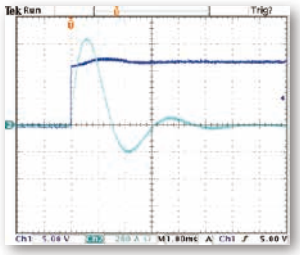
[PBZ20-20A Peak Current]

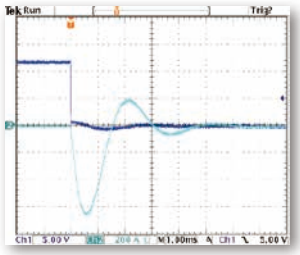
PBZ20-20A
Output Rating: 400 W, ±20 V, ±20 A

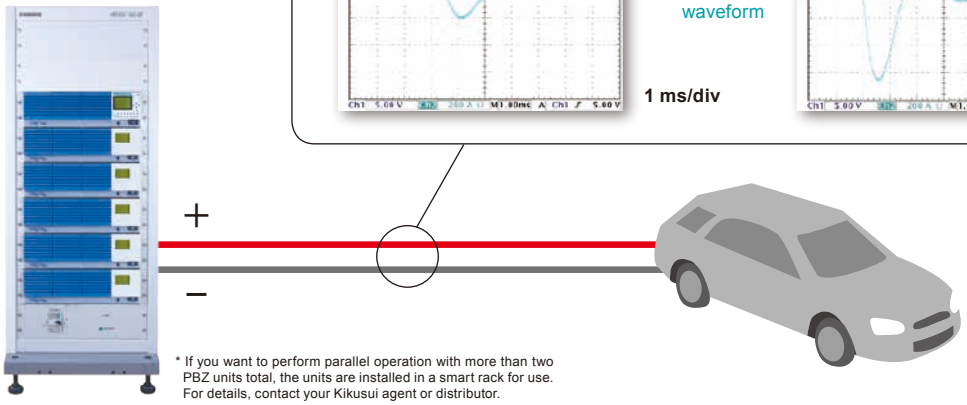
The car battery is the primary source of energy for modern-day vehicular components, but factors such as electronic circuit chatter as well as inrush caused by the engine can present various difficulties. Power source disturbances caused by these factors make programming and evaluating power supply fluctuation waveforms an absolute must. The PBZ20-20A Intelligent Bipolar Power Supply has the high speed response to meet the demands of voltage fluctuation tests (Pulse2b, Pulse4, etc.) for international standards such as the ISO16750-2 and ISO7637-2 as well as for the increasingly complicated fluctuation waveform tests requried by automotive manufacturers. The PBZ20-20A is also equipped to easily comply with the steady increase of electronic components per vehicle (high power capacitors, etc.) and total current (esp. peak current) required in modern-day automotive testing.

■ Power variation test

PBZ20-20A 6 parallel
720 A peak compatible
Voltage rising edge/falling edge waveform
Ch1 5 V/div
Ch2 200 A/div







* If you want to perform parallel operation with more than two PBZ units total, the units are installed in a smart rack for use. For details, contact your Kikusui agent or distributor.