P W X S E R I E S

NEW

D C P O W E R S U P P L Y

1U Multi Range Programmable DC Power Supply

PWX Series

A next-generation, internet-enabled rack mounted power supply
A virtual multi-channel bus (VMCB) function that fully supports multi-channel operation
A thin and lightweight design with 1U height for increased rack-mounting efficiency
Voltage and current range can be varied within the rated power (the ratio of 3 times)
Rated output power: 750 W/1500 W. Rated output voltage: 30 V/80 V
PFC circuit of 0.99 (with 100 V) or 0.97 (with 200 V) at full load *TYP value
LAN/USB/RS-232C as standard interface

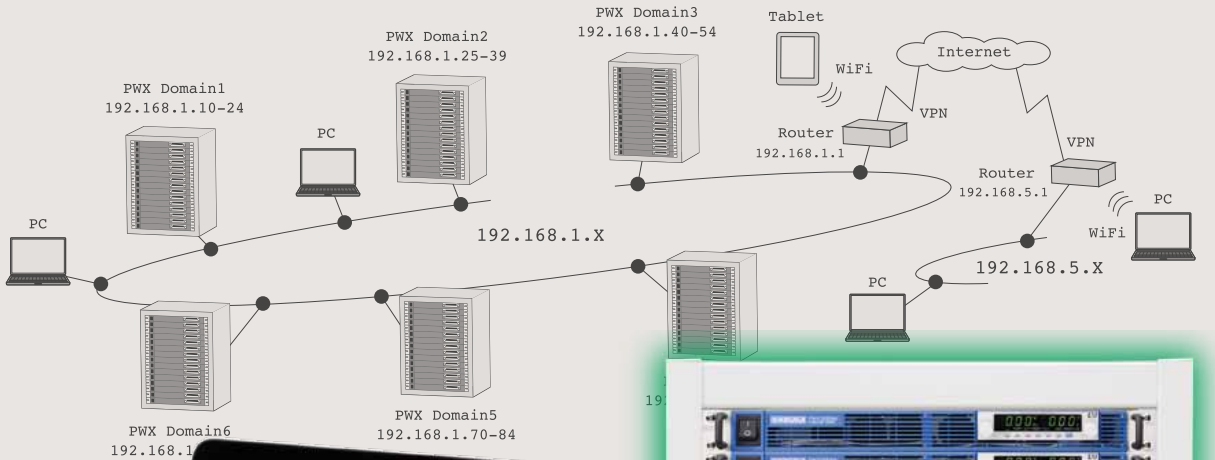
KIKUSUI

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

A Next-Generation Rack-Mounted Power Supply

1U Multi Range Programmable DC Power Supply

Thin & Wide range DC Power Supply **PWX series**



THIN & WIDE RANGE
PWX SERIES

Network
LAN (LXI: compliant), USB, RS-232C: as standard interface

Thin
1U size

Wide Range
3 times of coverage ratio for the voltage and current range

Model	Voltage output	Current output
PWX750LF	0 to 30 V	0 to 75 A
PWX750ML	0 to 80 V	0 to 28 A
PWX750MLF	0 to 80 V	0 to 28 A
PWX1500L	0 to 30 V	0 to 150 A
PWX1500ML	0 to 80 V	0 to 56 A

● About the name of model

(Example) PWX (Series) 750 (Output power) ML (Output [0 to 80 V/ 0 to 28 A]) F* (Cabinet size)


PWX750ML

* Indicates the cabinet size of the 750 W model (19 inches full size).
The PWX750ML is the 19-inch half-rack size model. (The only half-size model available is PWX750ML.)

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, RS-232C, 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. In particular, the LAN interface is LXI compliant*, enabling you to control and monitor the power supply easily from a browser on a PC, smartphone, or tablet. 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.
*LXI: LAN eXtention for Instrumentation

- Rated output power: 750 W/1500 W
- Rated output voltage: 30 V/80 V
- 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/RS-232C 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)
- 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)

[Applications] For testing of the Solar system, Semiconductor test equipment, Manufacturing equipment integration, various motors testing, various experiments and evaluations, electronic component testing, automotive electronic components testing, research and development, quality control, and production line.

Equipped with standard LAN interface and optional VMCB function to

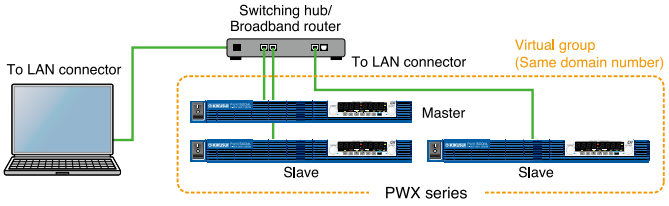
The PWX series is equipped with LAN, USB, and RS232C interfaces as standard features. By using the feature of virtual multi-channel bus (VMCB), it allows you to control remotely and monitoring for 1-to-N as well as N-to-M for large-scale networks. In particular, the LAN interface is LXI compliant*1, 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*2. You can also turn the output ON and OFF on multiple units and adjust the output voltage and current.

*1: This function is expected for the PWX750ML in firmware version 2.0 and later.
*2: 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)

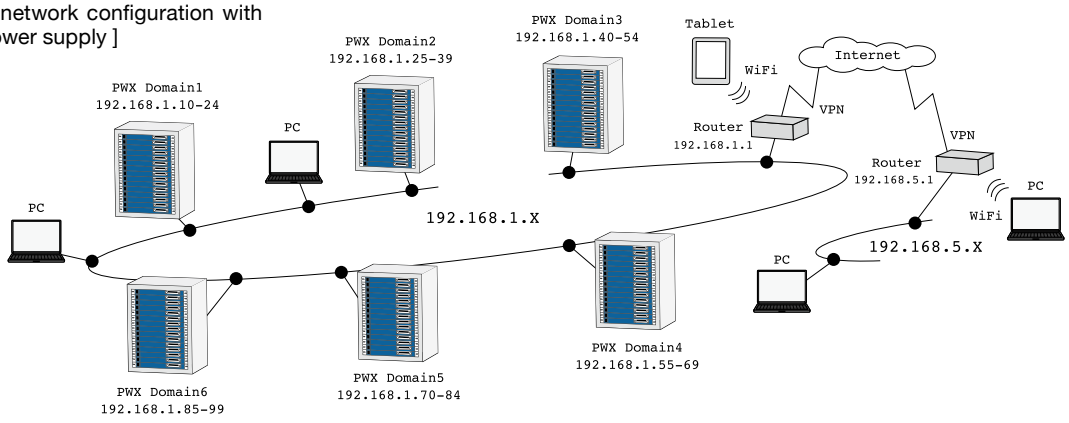
As shown in the figure below, it is possible to connect a PC and the PWX series with a hub to create a virtual group using a LAN connection. A maximum of 255 virtual groups can be set, and the maximum number of units can be configured up to 31 units per group. A group can have a mixture of models.



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

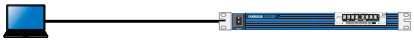
Access to the built-in web server can be restricted with a password. Also, when using VXI-11, HiSLIP, and SCPI-RAW for control, host restrictions can be set with the IP address. It is possible to prevent access from any terminal other than the ones registered as a host (up to 4 hosts can be registered).

■ LAN Interface

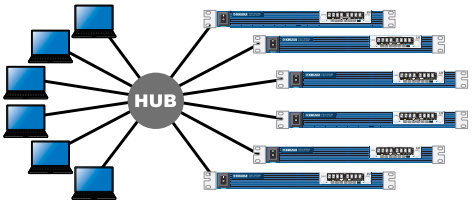
The LAN interface can control the number of devices with high speed, and it's theoretical controllable maximum number is to be calculated by approximately 4.2 billion. (The maximum transmission speed varies by the number of connected devices) In accordance with its applied standard, it is possible to 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 PWX series can automatically identify the type of LAN cable whether straight or cross is connected and it connects using the appropriate method.

[Control by 1:1]



[Control by N:M]

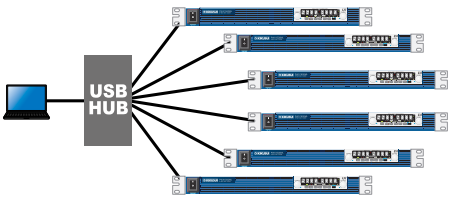


■ USB Interface

The USB interface has a feature of high versatility, and the 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).

[Control by 1:1]

[Control by 1:N]



support network-based remote control and monitoring

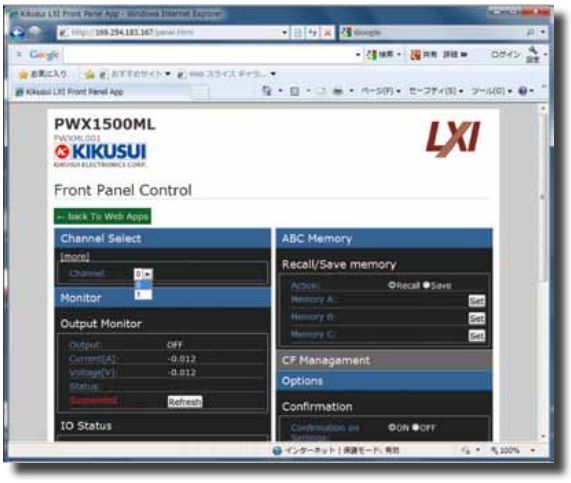
THIN & WIDE RANGE PWX SERIES

■ Easy access with the 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.).



■ Application Software

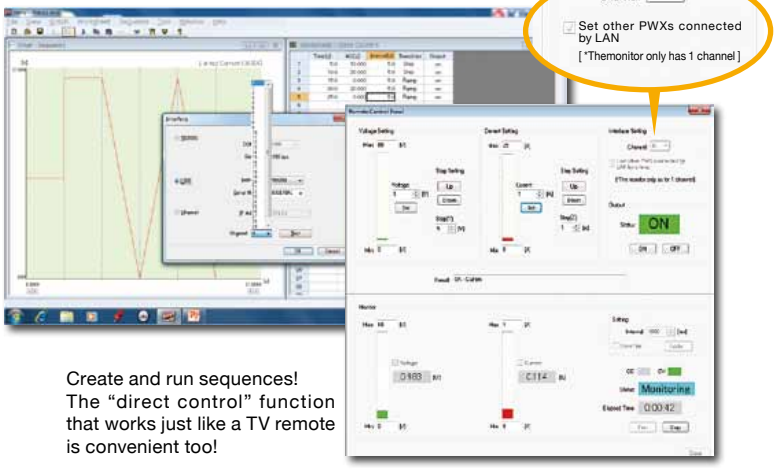
Sequence Creation Software SD013-PWX (Wavy for PWX)

The software that supports to the auto testing of the power supply. Allows you to create and edit sequence data easily using a mouse !

SD013-PWX (Wavy for PWX) is an application software that supports sequence creation and the operation for Kikusui power supplies and electronic loads. Wavy allows you to create and edit sequences visually with a mouse without programming knowledge. It enables you to control the power supply in much the same way as remote controller for such monitoring the voltage and current, logging and so on.

[Operating environment, conditions]
- ●Number of power supplies or electronic loads that the Wavy can control is limited to one unit.
- * When a VMCB connection is used, the slave units are controlled at the same time the master unit is controlled.
- ●CPU: Pentium 4 HT or better (Recommended: Core2 or better)
- ●CD-ROM: Necessary to install the “Wavy”
- ●Mouse: Necessary ●Monitor: 1024 x 768 dots or higher resolution
- ●Memory: 128MB or more ●Interfaces: LAN, USB, RS-232C

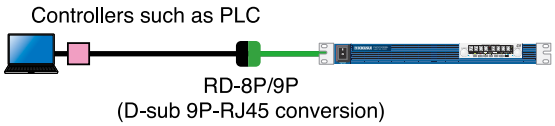
Global commands can be used for batch control of VMCB-connected PWX power supplies!



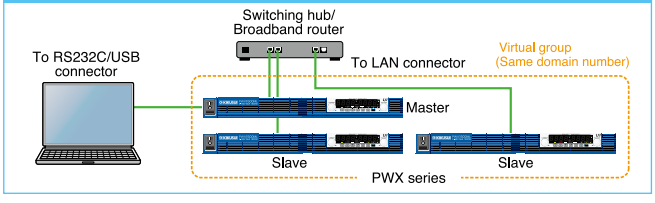
Create and run sequences!
The “direct control” function that works just like a TV remote is convenient too!

■ RS-232C Interface

The PWX series is also equipped with a RS-232C connector. It can be used for communication with PCs and sequencers. Since the PWX series has a RJ45 connector, it is required for a separate D-sub 9P-RJ45 adapter cable (RD-8P/9P).



Application: VMCB can be also used with USB/RS-232C!



Emulation setting Command language setting function

Emulate devices from companies around the world!

The command language and the emulation which are used at the time of remote control can be set. When the emulation setting is selected, the digital remote control is possible as a substitute of other manufacturer’s device. Furthermore, the RS232C interface corresponds to other products by setting the command language into a LGCy language.

Emulation setting	*IDN? The contents of reply
nonE	KIKUSUI, PWX750ML, PWX00003, VER01.00 BLD0134
5700	Agilent Technologies, N5748A, PWX00003, A.01.00
Gen	LAMBDA, GENH80-28-USB, S/N: PWX00003, REV: 1U: 1.00-AP0134
PAG	KIKUSUI, PAGH80-28-USB, S/N: PWX00003, REV: 1U: 1.00-AP0134

The operating range can be varied the ratio of 3 times within its output power rating with a

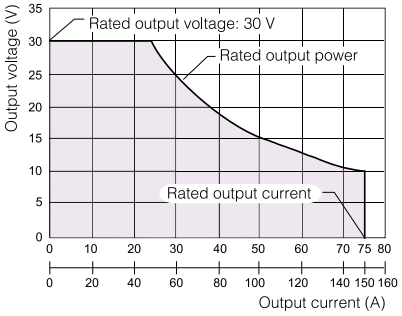
■ Operating Range

● 3 times output power rating

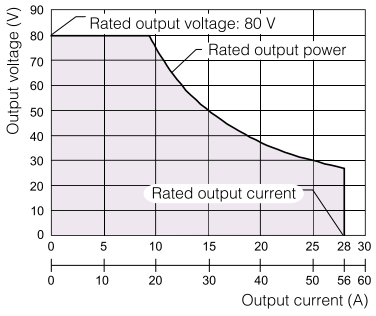
A wide range of voltage and current settings can be combined within its output power rating (3 times).
For example, the output power of 1500 W model, the PWX1500ML is capable to operate seamlessly from the range of "80 V-18.75 A" to "26.8 V-56 A".

Operating range conceptual diagram

[PWX750LF/PWX1500L]



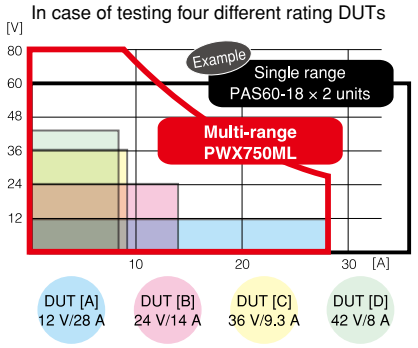
[PWX750ML (MLF)/PWX1500ML]



Model type	L (LF)					ML (MLF)						
Rated voltage range	10 to 30 V					26.8 to 80 V						
Sample of the rated output voltage	10 V	12.5 V	15 V	20 V	30 V	26.8V	30 V	35 V	40 V	45 V	60 V	80 V
750 W	75 A to 25 A					28 A to 9.37 A						
	75 A	60 A	50 A	37.5 A	25 A	28 A	25 A	21.4 A	18.75 A	16.66 A	12.5 A	9.375 A
1500 W	150 A to 50 A					56 A to 18.75 A						
	150 A	120 A	100 A	75 A	50 A	56 A	50 A	42.8 A	37.5 A	33.33 A	25 A	18.75 A

■ Space Comparison

● This product replaces multiple single-range units!



The PWX750ML is 1/6 the size of single-range power sources needed to cover the same range!

■ Practical convenient functions are equipped as standard features.

● Bleeder on/off function

The capacitor is connected to the output end of the PWX series, and the bleeder circuit is equipped to discharge the electric charge when the OUTPUT is OFF. For example, when the battery is connected to the output terminal, even if it is in the state of OUTPUT OFF, when the bleeder circuit is set to ON, the bleeder circuit will discharge electric charges of the battery. In this case, excessive electric discharge can be prevented by setting the bleeder circuit to OFF state. It is possible to omit the diode for reverse current prevention required for the charge of such a battery.

● A startup state setup at the time of output ON

You can set for the priority operation mode (CC (constant current) priority/CV (constant voltage)) when the output is turned ON. It prevents the overshooting when the output is turned ON.

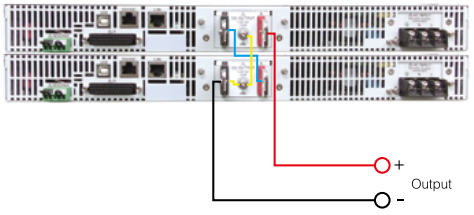
● Preset memory function

The preset memory function allows you to save up to three combination of each preset value of voltage, current, OVP, OCP, and UVL. The saved preset value can be called from the preset memory on the front panel.

■ Extending the capacity

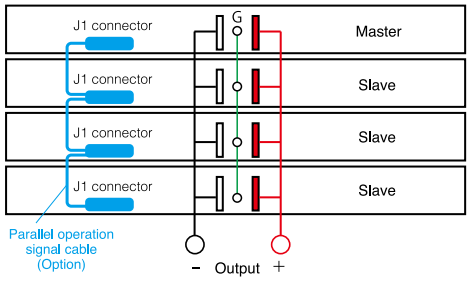
● Series Operation

You can connect up to two units in series. The total of the output voltages of the two units is applied to the load. The voltage setting accuracy is the same as the accuracy of an individual unit.
*You cannot perform master-slave configuration in series operation.



● Master-Slave Parallel Operation

In master-slave parallel operation, one unit is the master unit, and all other units connected in parallel are slave units. The master and slave units must all be the same model. You can control the whole system by operating the master. You can use master-slave parallel operation to increase the output current (maximum output current: the rated output current of one unit × the number of units connected in parallel). You can connect up to four units, including the master, in parallel. The difference in the output voltage and output current between the master unit and the slave units is within approximately 5 % of the rating.



●Parallel operation signal cable

For 2 units in parallel (PC01-PWX)

For 3 units in parallel (PC02-PWX)

For 4 units in parallel (PC03-PWX)

■ Analog Interface

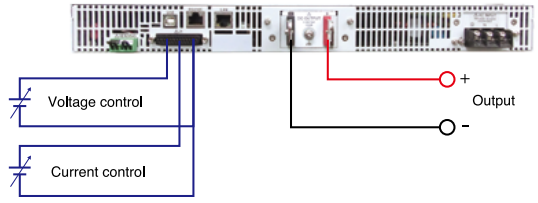
The PWX series is equipped with external voltage/resistance control, which are interfaces necessary for analog external control and monitoring applications for test power supply devices. The input external signal and the output status signal can be conducted through the J1 connector on the rear panel.

[Analog remote control application]

● Controlling the Output Voltage & Output Current.

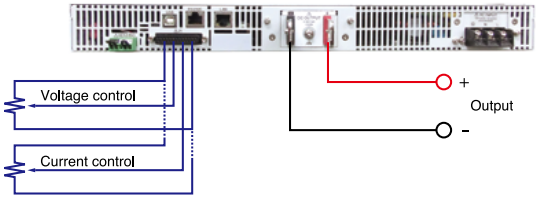
▼ Control using an external voltage.

It is possible to control the output voltage/output current of the PWX series by using an external voltage.



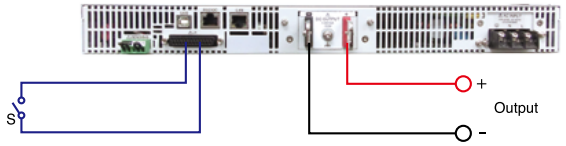
▼ Control using an external resistance.

It is possible to control the output voltage/output current of the PWX series by using an external variable resistor.



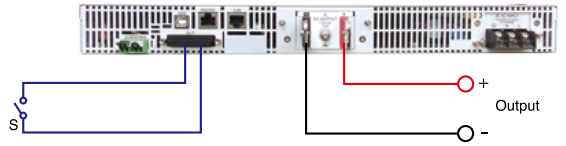
▼ Turning output on and off using an external contact.

It is possible to turn the output ON/OFF of the PWX series by using an external contact.



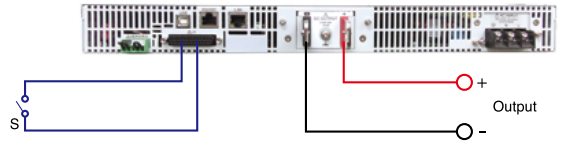
▼ Output shutdowmn control using an external contact.

It is possible to turn the output OFF of the PWX series by using an external contact.



▼ Clearing alarms using an external contact. (Excluding OVP2, OHP2, SD)

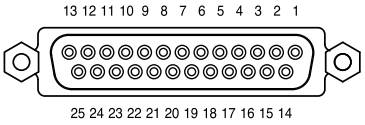
It is possible to clear the alarm of the PWX series by using an external contact.



▼ Monitoring operation modes

External monitoring of the output voltage and output current

J1 connector pin arrangement



Pin no.	Signal name	Description
1	STATUS COM	Status signal common for pins 2, 3, and 14 to 16.
2	CV STATUS	On when the PWX series is in CV mode (open-collector output from a photocoupler).*1
3	CC STATUS	On when the PWX series is in CC mode (open-collector output from a photocoupler).*1
4	N.C.	Not connected.
5	ALM CLR	Alarm clear terminal. Alarms are cleared when a low TTL level signal is applied to this terminal.
6	SHUT DOWN	Output shutdown control terminal. The output is turned off when a low TTL level signal is applied to this terminal.
7	PRL IN-	Negative input terminal for master-slave parallel operation.
8	PRL IN+	Positive input terminal for master-slave parallel operation.
9	PRL COMP IN	Correction signal input terminal for master-slave parallel operation.
10	A COM	External signal common for pins 5 to 9, 11 to 13, 20 to 22, 24, and 25. During remote sensing, this is the negative electrode (-S) of sensing input. When remote sensing is not being performed, this is connected to the negative output.
11	PRL OUT+	Positive electrode output terminal for master-slave parallel operation.
12	PRL COMP OUT	Correction signal output terminal for master-slave parallel operation.
13	I SUM	Current signal terminal for master-slave parallel operation.
14	ALM STATUS	On when a protection function (OVP, OCP, OHP, FAN, SEN, or AC_FAIL) has been activated or when an output shutdown signal is being applied (output through an open-collector photocoupler).*1
15	PWR ON STATUS	Outputs a low level signal when power is turned on (CF11: 0) or when power is turned off (CF11: 1; output through an open-collector photocoupler).*1
16	OUT ON STATUS	On when output is on (output through an open-collector photocoupler).*1
17	N.C.	Not connected.
18	OUT ON/ OFF CONT	Output on/off terminal. On (or off) when a low (or high) TTL level signal is applied.
19	A COM	External signal common for pins 5 to 9, 11 to 13, 20 to 22, 24, and 25. During remote sensing, this is the negative electrode (-S) of sensing input. When remote sensing is not being performed, this is connected to the negative output.
20	REF OUT	External resistance control terminal; 5.25 V (CF07: Lo) or 10.5 V (CF07: Hi).
21	I PGM	Terminal used to control the output current with an external voltage or external resistance. 0 V to 5 V; 0 % to 100 % of the rated output current (CF07: Lo). 0 V to 10 V; 0 % to 100 % of the rated output current (CF07: Hi).
22	V PGM	Terminal used to control the output voltage with an external voltage or external resistance. 0 V to 5 V; 0 % to 100 % of the rated output voltage (CF07: Lo). 0 V to 10 V; 0 % to 100 % of the rated output voltage (CF07: Hi).
23	A COM	External signal common for pins 5 to 9, 11 to 13, 20 to 22, 24, and 25. During remote sensing, this is the negative electrode (-S) of sensing input. When remote sensing is not being performed, this is connected to the negative output.
24	I MON	Output current monitor. 0 % to 100 % of the rated output current is generated as a voltage between 0 V and 5 V (CF08: Lo) or a voltage between 0 V and 10 V (CF08: Hi).
25	V MON	Output voltage monitor. 0 % to 100 % of the rated output voltage is generated as a voltage between 0 V and 5 V (CF08: Lo) or a voltage between 0 V and 10 V (CF08: Hi).

*1 Open collector output: Maximum voltage of 30 V and maximum current of 8 mA.
The status common is floating (isolation voltage of 60 V or less), it is isolated from the control circuit.

■ Isolated Analog Interface (factory option)*

The optional isolated analog interface can be installed upon request at the time of an order. You can use a signal that is isolated from the reference potential of the PWX to control the output voltage/current, turning output on/off, and output shut down control using an external contact, and output voltage/ current monitoring. This option can be selected from the voltage control type (0 V to 5 V or 0 V to 10 V) or the current control type (4 mA to 20 mA). *Coming soon

■ Option

AC power cord for PWX750ML
(For Japan and U.S.)
AC2-3P3M-IEC320-UL

AC power cord for PWX750ML
(For Europe)
AC1-3P2R5M-IEC320-EU

AC power cord for PWX750ML
(For China)
AC1-3P2R5M-IEC320-CN

1500 W model AC power cord
(3 m)
AC5.5-3P3M-M4C-VCTF

Rack mount adapter for 1U
half independent packaging
KRA1-PWX HALF SINGLE

Rack mount adapter for 1U
half interconnected packaging
KRA1-PWX HALF PAIR

Thin support angle
KRB1-PWX SUPPORT ANGLE

Parallel operation cable
(For 2 units in parallel)
PC01-PWX

Parallel operation cable
(For 3 units in parallel)
PC02-PWX

Parallel operation cable
(For 4 units in parallel)
PC03-PWX

RS232C control
conversion cable
(D-sub 9p female-RJ45, 2 m)
RD-8P/9P

Isolated analog interface (factory option)
Voltage control type
ISO PROG VOLT CONT PWX OPTION *Coming soon
Current control type
ISO PROG CURR CONT PWX OPTION *Coming soon

■ Panel Description

Front Panel

[PWR DSPL key]
Used to display the output power on the ammeter (the key has an LED).

[LOCAL key]
Used to switch between local mode and remote mode (the key has an LED).

[CURRENT knob]
Used to set the current value or select a parameter number in the CONFIG settings.

[SHIFT key]
Used to enable the functions that are written in blue characters below the key.

[Rack mount bracket]

[POWER switch]

[Air inlet (louver)]
Air inlet for cooling

[VOLTAGE knob]
Used to set the voltage value or change the value of a CONFIG parameter.

[OUTPUT key]
Used to turn output on and off.

[CONFIG key]
Used to configure the various operating conditions (the key has an LED).

[SET key]
Used to set and confirm the output voltage and output current (the key has an LED).

[OCP, OVP keys]
Used to set and display the overcurrent protection (OCP), overvoltage protection(OVP), undervoltage limit (UVL) trip points (the key has an LED).

Rear Panel

[RS232C]
RS232C port for controlling the PWX series remotely

[USB]
USB port for controlling the PWX series remotely

[LAN]
Ethernet port for controlling the PWX series remotely

[Chassis terminal]
Connector for grounding the output

[Sensing terminal connectors]
Terminals to connect the sensing cables

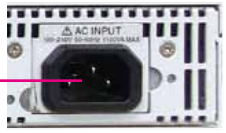
[J1]
External control connector

[Option slot]
Slot for installing an optional interface board (factory option)

[DC OUTPUT]
Output connector

[AC INPUT]
1500 W type: input terminal

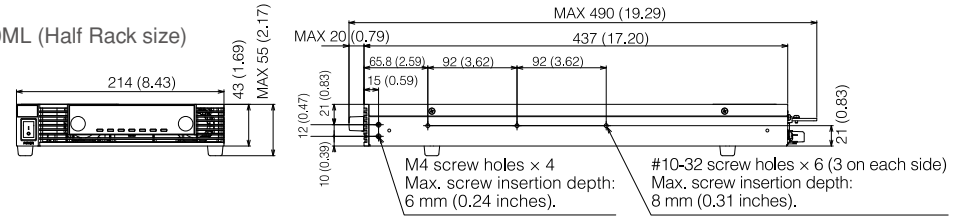
[AC INPUT]
750 W type: AC inlet



▲750 W type

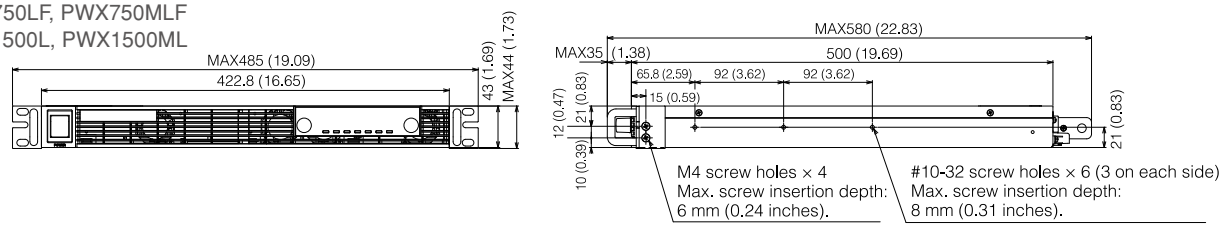
■ Dimensions/Rack Mount

■PWX750ML (Half Rack size)

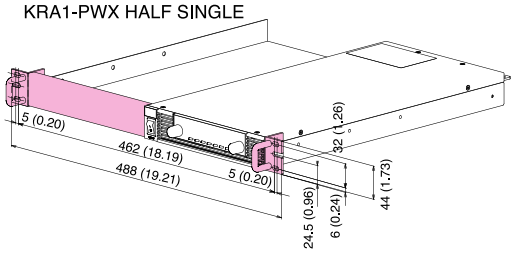


Unit: mm (inches)

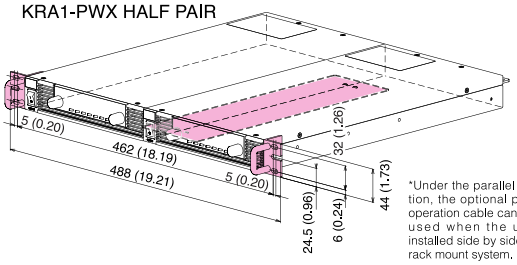
■PWX750LF, PWX750MLF
PWX1500L, PWX1500ML



●Rack mount adaptor
KRA1-PWX HALF SINGLE



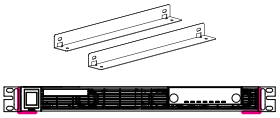
●Rack mount adaptor
KRA1-PWX HALF PAIR



*Under the parallel operation, the optional parallel operation cable can not be used when the unit is installed side by side in the rack mount system.

●Brackets
KRB1-PWX

●Thin support angle
KRB1-PWX SUPPORT ANGLE



Specifications

750 W type

Item/Model		PWX750LF	PWX750MLF
Half rack size			PWX750ML
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)	
Efficiency (MIN) *1		74 % or more	
Hold-up time for power interruption (MIN) *3		20 ms or greater	

*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.

Item/Model			PWX750LF	PWX750MLF
Half rack size				PWX750ML
Output				
Rating	Output voltage *1		30 V	80 V
	Output current *1		75 A	28 A
	Output power		750 W	
Voltage	Setting range		0 V to 31.5 V	0 V to 84 V
	Setting accuracy		± (0.05 % of set +0.05 % of rating)	
	Line regulation *2		± 5 mV	± 10 mV
	Load regulation *3		± 5 mV	± 10 mV
	Transient response *4		1 ms or less	
	Ripple noise *5	(p-p) *6	60 mV	80 mV
		(rms) *7	8 mV	
	Rise time	Rated load	100 ms	
		No load	100 ms	
	Fall time	Rated load	100 ms	
		No load	450 ms	
	Maximum remote sensing compensation voltage (single line)		1.5 V	4 V
	Temperature coefficient (MAX) *8		100 ppm/°C (during external control)	
Current	Setting range		0 A to 78.75 A	0 A to 29.4 A
	Setting accuracy		±(0.5 % of set +0.1 % of rating)	
	Line regulation		± 9.5 mA	± 4.8 mA
	Load regulation		± 20 mA	± 10.6 mA
	Ripple noise *9	(rms) *7	150 mA	65 mA
	Temperature coefficient (TYP) *8		100 ppm/°C	

*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 ambient temperature is within 0 °C and 50 °C. *9. When the output voltage (Rated Power ÷ Rated Current) is 10 % to 100 % of the rating. At the rated output current.

Display function		
Voltage display	Maximum display	99.99 (fixed decimal point)
	Display accuracy	± (0.2 % of reading +5 digits)
Current display	Maximum display	99.99 (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

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

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

*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		
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

*1. J1 connector on the rear panel

Other features	
Master-slave parallel operation	Including the master unit, up to four units (all the same model) can be connected.
Series operation	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) ·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

Item/Model			PWX750LF	PWX750MLF
Half rack size				PWX750ML
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	
	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	
	Output-FG		No abnormalities at 1500 Vdc (ML only 500 Vdc) 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 (ML only 500 Vdc) for 1 minute	
Insulation resistance			500 Vdc, 100 MΩ or more	
	Output-FG		500 Vdc, 40 MΩ or more	
Safety *2			Complies with the requirements of the following directive and standard. Low Voltage Directive 2006/95/EC 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 2004/108/EC 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 W×43(44) H×500(580) Dmm/Approx. 8 kg *6	
Accessories			AC cable *7: 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) *PWX750ML includes M6 bolt set, 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	

*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. *6. Dimensions for PWX750ML: 214 W×43(55) H×437(490) Dmm/Approx. 5 kg *7. AC cable is option for PWX750ML.

Specifications

1500 W type

Item/Model		PWX1500L	PWX1500ML
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)	
Efficiency (MIN) *1		74 % or more	
Hold-up time for power interruption (MIN) *3		20 ms or greater	

*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.

Item/Model			PWX1500L	PWX1500ML
Output				
Rating	Output voltage *1		30 V	80 V
	Output current *1		150 A	56 A
	Output power		1500 W	
Voltage	Setting range		0 V to 31.5 V	0 V to 84 V
	Setting accuracy		± (0.05 % of set +0.05 % of rating)	
	Line regulation *2		± 5 mV	± 10 mV
	Load regulation *3		± 5 mV	± 10 mV
	Transient response *4		1 ms or less	
	Ripple noise *5	(p-p) *6	60 mV	80 mV
		(rms) *7	8 mV	
	Rise time	Rated load	100 ms	
		No load	100 ms	
	Fall time	Rated load	100 ms	
		No load	800 ms	
	Maximum remote sensing compensation voltage (single line)		1.5 V	4 V
	Temperature coefficient (MAX) *8		100 ppm/°C (during external control)	
Current	Setting range		0 A to 157.5 A	0 A to 58.8 A
	Setting accuracy		± (0.5 % of set +0.1 % of rating)	
	Line regulation		± 17 mA	± 7.6 mA
	Load regulation		± 35 mA	± 16.2 mA
	Ripple noise *9	(rms) *7	300 mA	130 mA
	Temperature coefficient (TYP) *8		100 ppm/°C	

*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 ambient temperature is within 0 °C and 50 °C. *9. When the output voltage (Rated Power ÷ Rated Current) is 10 % to 100 % of the rating. At the rated output current.

Display function		
Voltage display	Maximum display	99.99 (fixed decimal point)
	Display accuracy	± (0.2 % of reading +5 digits)
Current display	Maximum display	L: 999.9 (fixed decimal point), ML: 99.99 (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

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

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

*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		
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

*1. J1 connector on the rear panel

Other features	
Master-slave parallel operation	Including the master unit, up to four units (all the same model) can be connected.
Series operation	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) ·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

Item/Model		PWX1500L	PWX1500ML
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	
	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	
	Output-FG	No abnormalities at 1500 Vdc 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	
Insulation resistance		500 Vdc, 100 MΩ or more	
	Output-FG	500 Vdc, 40 MΩ or more	
Safety *2		Complies with the requirements of the following directive and standard. Low Voltage Directive 2006/95/EC 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 2004/108/EC 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 W×43(44) H×500(580) Dmm/Approx. 9.5 kg	
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).	

*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.

■ Order Information

● Lineup

Type	Model	Voltage output	Current output
750 W	PWX750LF	0 to 30 V	0 to 75 A
	PWX750ML	0 to 80 V	0 to 28 A
	PWX750MLF	0 to 80 V	0 to 28 A
1500 W	PWX1500L	0 to 30 V	0 to 150 A
	PWX1500ML	0 to 80 V	0 to 56 A

● Option

* One AC cable suitable for the country in question is included standard with the 750 W type. (Excluding PWX750ML)
If another cable is required, please order it as an optional accessory.

Product	Model	Remark
AC power cord for PWX750ML	AC2-3P3M-IEC320-UL	For Japan and U.S., with plug, total length 3 m (rated voltage 125 V/rated current 15 A)
	AC1-3P2R5M-IEC320-EU	For Europe, with plug, total length 2.5 m (rated voltage 250 V/rated current 10 A)
	AC1-3P2R5M-IEC320-CN	For China, with plug, total length 2.5 m (rated voltage 250 V/rated current 10 A)
1500 W model AC power cord	AC5.5-3P3M-M4C-VCTF	3 m
Rack mount adapter for 1U half independent packaging	KRA1-PWX HALF SINGLE	
Rack mount adapter for 1U half interconnected packaging	KRA1-PWX HALF PAIR	
Thin support angle	KRB1-PWX SUPPORT ANGLE	For our cosmetic rack KRC/KRO Series 1U type cohesive packaging
Parallel operation cable	PC01-PWX	For 2 units in parallel
	PC02-PWX	For 3 units in parallel
	PC03-PWX	For 4 units in parallel
RS232C control conversion cable	RD-8P/9P	D-sub 9P to famale-RJ45
Isolated analog interface	Voltage control type	Factory option. Coming soon
	Current control type	Factory option. Coming soon
Sequence Creation Software	SD013-PWX (Wavy for PWX)	

KIKUSUI ELECTRONICS CORPORATION
1-1-3, Higashiyamata, Tsuzuki-ku, Yokohama, 224-0023, Japan
Phone: (+81) 45-593-7570, Facsimile: (+81) 45-593-7571, www.kikusui.co.jp

KIKUSUI AMERICA, INC. 1-877-876-2807 www.kikusuiamerica.com
530 Lakeside Drive, Suite#180, Sunnyvale, CA 94085, U.S.A.
Phone : 408-733-3432 Facsimile : 408-733-1814

KIKUSUI TRADING (SHANGHAI) Co., Ltd. www.kikusui.cn
Room, B/C,12F, Majesty Bld, No.138, Pudong Ave, Shanghai City
Phone : 021-5887-9067 Facsimile : 021-5887-9069

For our local sales distributors and representatives, please refer to "sales network" of our website.

●Distributor/Representative

Printed in Japan

Issue: Feb.2013 2013022KPRIEC11