P C R - M A S E R I E S

Compact AC Power Supply
PCR-MA Series

NEW

Compact AC power supply using the PWM inverter method
Output capacity: 500 VA, 1,000 VA and 2,000VA and 4,000VA (single phase)
AC output: 0 V to 155 V/0 V to 310 V at 40 Hz to 500 Hz
DC output: ±0 V to 219 V/±0 V to 438 V
The maximum peak current triples the rated current (RMS value).
Equipped with various communication interface options (LAN and USB are standard features)
Sensing function

KIKUSUI

CE

The Friendly

Output voltage is variable over a wide range, with maximum output voltage increased to 310 Vrms.
The same ease of use, with improved practicality and convenience.

The PCR-MA series are PWM inverter system AC power supplies improved from the conventional models (PCR-M series).
While maintaining the compactness of the conventional models (PCR-M series), the output voltage range has been expanded to AC 310 Vrms, and LAN (LXI) and USB interfaces indispensable for upgrading the system are standard equipped. Functions such as sensing are also added.
With the LAN interface, you can use the Web browser interface to control and observe from a virtual front panel. This power supply comes with easy to operate measurement features, memory features, and various protection functions.

Outlet is covered with consideration for safety

Selectable output modes

In addition to the “AC mode” and “DC mode,” by using an optional AC + DC mode*1 analog interface board (EX08-PCR-M), it is possible to control the output of EXT-AC mode and EXT-DC mode by external analog signals.

Output Mode	Description
AC mode	AC output
DC mode	DC output
AC+DC mode	Superimpose DC voltage on the AC voltage and output *1
EXT-AC mode	Output sine waves using external DC signals *2
EXT-DC mode	Simply amplify and output the waveform applied externally *2

*1 Only communication commands
*2 Only when the analog interface board (EX08-PCR-MA) is installed.

[AC mode]

Since it is possible to comply with the nominal voltage (single phase) of each country, the output voltage range can be set in two ranges for 0 V to 155 V or 0 V to 310 V, and the frequency range can be set from 40 Hz to 500 Hz. It can be also applied to the testing of power supply systems such as those equipped on aircraft, boats, and actuators.

Settable Voltage Range		Frequency Setting Range
155 V range	310 V range	
0.0 V to 157.5 V	0.0 V to 315.0 V	40 Hz to 500 Hz

[DC mode]

The output voltage can be varied from ±0 V to 219 V or ±0 V to 438 V

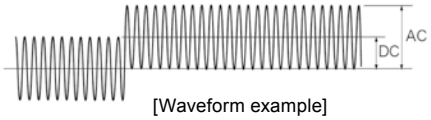
Output Voltage Setting	
155 V range	310 V range
-222.5 V to +222.5 V	-445 V to +445 V

[AC+DC mode]

The output voltage can be varied from ±0 V to 219 V or ±0 V to 438 V

Output Voltage Setting	
155 V range	310 V range
-222.5 V to +222.5 V	-445 V to +445 V

AC + DC mode is a function used to superimpose DC voltage on AC voltage or AC voltage on DC voltage. It can only be used with the communication commands.



[Waveform example]

Protection features

The following protection features are available:
- Protection against non-rated input voltage
- Protection against overheating (OHP)
- Protection against overloading: Current limit (OCP)/monitoring for exceeded power (OPP)/Monitoring for exceeded peak current (OCPP)
- Detection of voltage abnormalities:Increased voltage (OVP)/decreased voltage (LVP)
- Abnormal sensing cable connection detection (SF)

Communication interface

LAN and USB are standard features

Abundant measurement functions

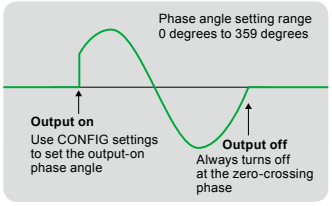
The PCR-MA is capable of measuring the voltage, current, and power of AC and DC output. It can display the true RMS and the average (DC) values for the output voltage, and the true RMS, peak and the average (DC) values for the output current. When a communication interface is used, the PCR-MA can measure the apparent power (VA), the reactive power (VAR), the power factor (PF), the crest factor (CF), and the peak hold current.

Sensing function (ON/OFF)

Even when the load device is installed at a separate location, the voltage drop from the load wire can be corrected.

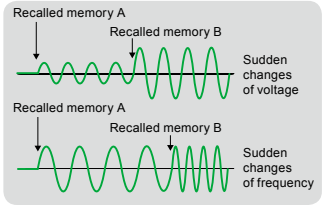
Output-on phase angle

The output-on phase angle can be set in AC mode.
The output-off phase angle is turned off at the zero-crossing phase.



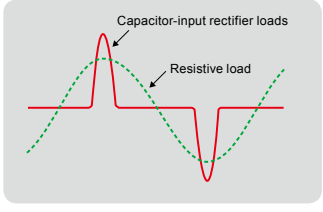
Memory function

The PCR-MA can store three sets of setting values for output voltage and frequency, and limit values. In addition, up to 11 memory areas are available only with communication commands.



Maximum peak current

Maximum peak current of up to three times the rated maximum current (rms value) can be output to a capacitor-input rectifier load.
Maximum peak current = rated maximum current (rms) × 3.



COMPACT AC POWER SUPPLY
PCR-MA Series

NEW
4 Models

■ Lineup

Model	Voltage	Max current	Power capacity
PCR500MA	0 V to 155 V 0 V to 310 V (2 range)	5 A / 2.5 A	500 VA
PCR1000MA		10 A / 5 A	1 kVA
PCR2000MA		20 A / 10 A	2 kVA
PCR4000MA		40 A / 20 A	4 kVA

Easy access with the built-in web server

Remote control and monitoring can also be performed from Web browsers!

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

[Recommended browser]

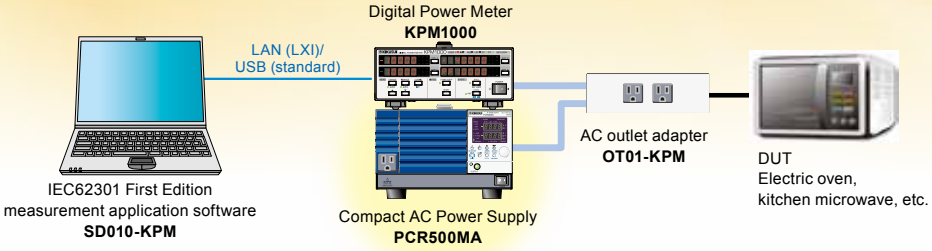
Requires for the Microsoft Edge 10
Requires for the Internet Explorer version 9.0 or laterater
Requires for the Firefox 8.0 or laterater
Requires for the safari / mobile Safari 5.1 or later
Requires for the Chrome 15.0 or later
Requires for the Opera 11.0 or later

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

Application example

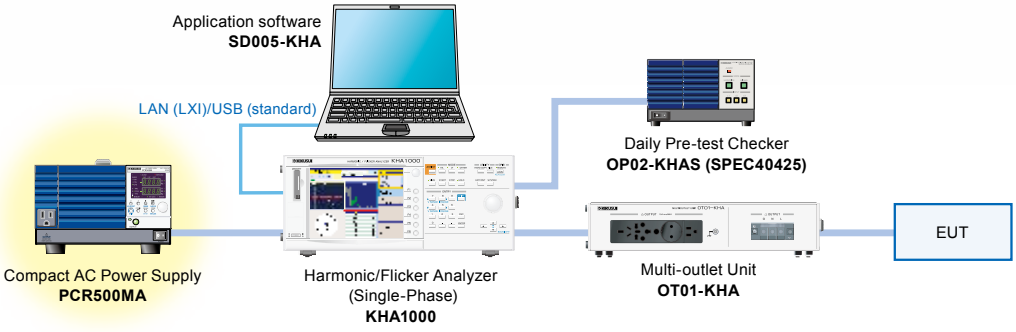
The AC power supply used for the measurement of standby power.

Combining with the Digital Power Meter, Model KPM1000, you can conduct measurements compliant with the First Edition of IEC63201.
It is possible to measure the “standby and off mode power” of household and office electrical and electronic equipment products required by standards such as ErP Directive Lot 6.



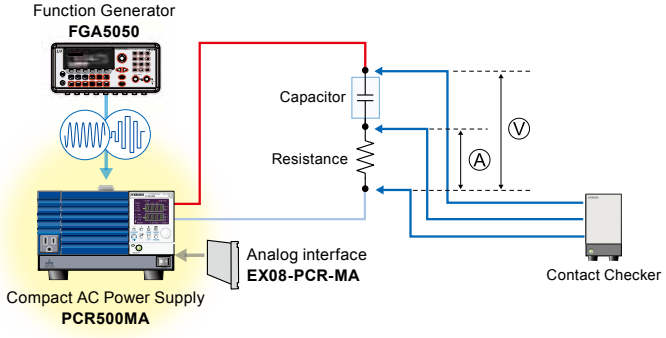
The AC power supply used for the measurement of harmonic current.

Combining with the Harmonic/Flicker Analyzer, Model KHA1000, you can conduct a harmonic measurement of power supply complied to IEC61000-3-2.



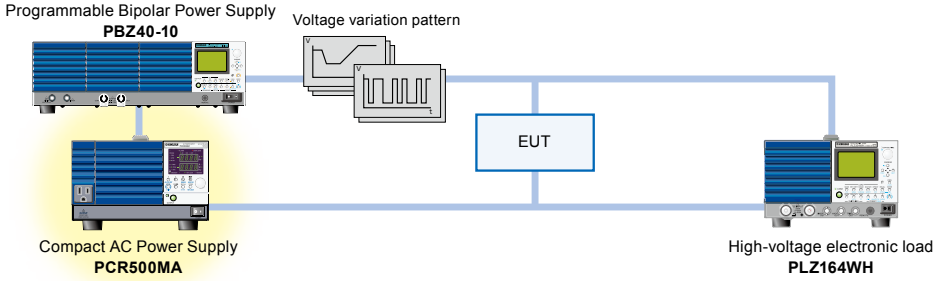
The AC power supply used for the contact check.

Combining with the Contact Checker, it allows you to detect the current flowing through the capacitor, and verify whether the capacitor has been connected or not.



The DC power supply used for the simplified power source variation test.

Combining with our programmable Bi-polar power supply, Model PBZ40-10 and a High-voltage electronic load device, Model PLZ164WH, it allows you to conduct simplified power variation tests for the DC high-voltage of automotive equipment.



Specifications

TYP: These are typical values. These values do not guarantee the performance. Reading: Indicates a readout value. Set: Indicates a setting.

Model			PCR500MA	PCR1000MA	PCR2000MA	PCR4000MA
Output rating AC mode						
Rated voltage range (output 155 V/310 V range)			0 V to 155 V/0 V to 310 V			
Settable voltage range (output 155 V/310 V range)			0 V to 157.5 V/0 V to 315.0 V			
Voltage setting resolution			0.1 V			
Voltage setting accuracy *1			±(1 % of set + 0.6 V/1.2 V)			
Number of output phases			Single phase			
Maximum current *2			5 A/2.5 A	10 A/5 A	20 A/10 A	40 A/20 A
Maximum peak current *3			15 A/7.5 A	30 A/15 A	60 A/30 A	120 A/60 A
Load power factor			0 to 1 (leading or lagging)			
Power capacity			500 VA	1 kVA	2 kVA	4 kVA
Frequency setting range			40.0 Hz to 500.0 Hz			
Frequency setting resolution			0.1 Hz			
Frequency setting accuracy			≤ ±2 × 10^{-4}			
Output rating DC mode						
Rated voltage range (output 155 V/310 V range)			-219 V to +219 V/-438 V to +438 V			
Settable voltage range (output 155 V/310 V range)			-222.5 V to +222.5V/-445.0 V to +445.0 V			
Voltage setting resolution			0.1 V			
Voltage setting accuracy *4			±(1 % of set + 0.6 V/1.2 V)			
Maximum current (output 155 V/310 V range) *5			4 A/2 A	8 A/4 A	16 A/8 A	32 A/16 A
Maximum instantaneous current (output 155 V/ 310 V range) *6			12 A/6 A	24 A/12 A	48 A/24 A	96 A/48 A
Power capacity			400 W	800 W	1600 W	3200 W
Output voltage stability						
Line regulation *7			≤ ±0.15 %			
Load variation (output 155 V/310 V range) *8			40 Hz to 100 Hz, DC : ≤ ±0.15V/±0.3V Other than above : ≤ ±0.5 V/±1 V			
Output frequency variation *9			≤ ±1 %			
Ripple noise *10			0.8 Vrms/1.6 Vrms (TYP)			
Ambient temperature variation *11			100 ppm/°C (TYP)			
Output voltage waveform distortion ratio *12			≤ 0.5 %			
Output voltage response speed *13			150 µs (TYP)			
Efficiency *14			≥ 70 %			
Indicators *15						
Voltmeter	Resolution		0.1 V			
	Accuracy (output 155 V/310 V range)	RMS, AVE *16	45 Hz to 65 Hz, DC : ±(0.5 % of reading +0.3 V/0.6 V) Other than above : ±(0.7 % of reading +0.9 V/1.8 V)			
Ammeter	Resolution		0.01 A			0 A to 99.99 A (RMS, AVE): 0.01 A 100 A to (RMS, AVE), IPK: 0.1A
	Accuracy (output 155 V/310 V range)	RMS, AVE *17	45 Hz to 65 Hz, DC: ±(0.5 % of reading +0.02 A/0.01 A) Other than above: ±(0.7 % of reading +0.04 A/0.02 A)	45 Hz to 65 Hz, DC: ±(0.5 % of reading +0.04 A/0.02 A) Other than above: ±(0.7 % of reading +0.08 A/0.04 A)	45 Hz to 65 Hz, DC: ±(0.5 % of reading +0.08 A/0.04 A) Other than above: ±(0.7 % of reading +0.16 A/0.08 A)	45 Hz to 65 Hz, DC: ±(0.5 % of reading +0.16 A/0.08 A) Other than above: ±(0.7 % of reading +0.32 A/0.16 A)
Wattmeter	Resolution		0.1 W	0.1W (<1 000 W), 1 W (1000 W≤)		
	Accuracy *18		±(2 % of reading +0.5 W)	±(2 % of reading +1 W)	±(2 % of reading +2 W)	±(2 % of reading +4 W)
Input rating						
Nominal input rating			100 Vac to 120 Vac/200 Vac to 240 Vac, 50 Hz/60 Hz, single phase			
Voltage range			90Vac to 132Vac/180Vac to 264Vac (auto detection at power-on)			
Number of phases, frequency			Single phase, 47 Hz to 63 Hz			
Displays the apparent power.			Approx. 800 VA	Approx. 1600 VA	Approx. 3200 VA	Approx. 6400 VA
Power factor *19			0.9 (standard value)			
Current		Input 90 V to 115 V	8 A/6.3 A or less	16 A/12.5 A or less	32 A/25 A or less	64 A/50 A or less
		Input 180 V to 230 V	4 A/3.2 A or less	8 A/6.3 A or less	16 A/12.5 A or less	32 A/25 A or less

*1. For an output voltage of 13.5 V to 155 V/27 V to 310 V, an output frequency of 45 Hz to 65 Hz, no load, and 23°C ± 5°C.
*2. For an output voltage of 1 V to 100 V/2 V to 200 V.
Limited by the power capacity when the output voltage is 100 V to 155 V/200 V to 310 V.
*3. For the capacitor-input rectifying load. Limited by the maximum current.
*4. For an output voltage of 19 V to 219 V/38 V to 438 V, no load, and 23°C ± 5°C.
*5. For an output voltage of 1.4 V to 100 V/2.8 V to 200 V.
Limited by the power capacity when the output voltage is 100 V to 219 V/200 V to 438 V.
*6. Limited by the maximum current.
*7. For changes in the rated range.
*8. For an output voltage of 80 V to 155 V/160 V to 310 V, a load power factor of 1,
output voltage variation between 0 A and maximum current, using the output terminal on the rear panel.
*9. For an output voltage of 100 V/200 V and a load power factor of 1.
Output voltage variation with 60 Hz as a reference.
*10. For 5 Hz to 1 MHz components in DC mode using the output terminal on the rear panel.
*11. For an output voltage of 100 V/200 V, an output current 0 A, within the operating temperature range.
*12. For an output voltage of 50 V to 155 V/100 V to 310 V, a load power factor of 1, in AC mode.
*13. For an output voltage of 100 V/200 V, a load power factor of 1,
and an output current variation between 0 A and maximum current.
*14. For AC mode, at an output voltage of 100 V/200 V, maximum current, a load power factor of 1,
and an output frequency of 40 Hz to 500 Hz.
*15. RMS, average (AVE), and power (W) are derived using the following equations.
RMS (true rms computation) = (Σ (square of the instantaneous voltage or instantaneous current)/
the number of samples.)
AVE = (instantaneous voltage or instantaneous current)/the number of samples
W_{AC} = Σ (instantaneous voltage x instantaneous current)/the number of samples
$W_{DC} = V_{AVG} \times I_{AVG}$
•Sample period: 100 ms to 125 ms for AC output (an integer multiple of the output waveform period.
125 ms for DC output.
•Update interval: Approx. 3 times/s, averaging over 2s when averaging is turned on.
•Peak current value holds the maximum value of the absolute value of the peak current for 0.3s or
approximately 5s.
•The voltage display is set to RMS in AC mode and AVE in DC mode.
*16. AC mode: For an output voltage of 13.5 V to 155 V/27 V to 310 V and 23°C ± 5°C.
DC mode: For an output voltage of 19 V to 219 V/38 V to 438 V and 23°C ± 5°C.
*17. For waveforms with a crest factor of 3 or less. At 5 % to 100 % of the maximum rated current,
23°C ±5°C
*18. For an output voltage of 50 V or greater, an output current in the range of 10 % to 100 % of the
maximum rated current, a load power factor of 1, an output frequency of 45 Hz to 65 Hz or DC,
and 23°C ± 5°C.
*19. For an output voltage of 100 V/ 200 V (155 V/310 V range), maximum current,
and a load power factor of 1.

Specifications

TYP: These are typical values. These values do not guarantee the performance. Reading: Indicates a readout value.

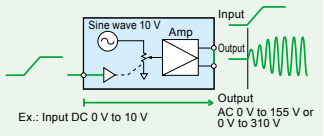
Model		PCR500MA	PCR1000MA	PCR2000MA	PCR4000MA
Insulation resistance	Between input and case, between output and case, between input and output	500 Vdc, 30 MΩ or more			
Withstanding voltage	Between input and case, between output and case, between input and output	1.5 Vac for 1 minute			
Earth continuity		25 Aac/0.1 Ω or less			
Electromagnetic compatibility *1 *2		Complies with the requirements of the following directive and standards. EMC Directive 2014/30/EU EN 61326-1 (Class A), EN 55011 (Class A, Group 1), EN 61000-3-2, EN 61000-3-3			
		Applicable under the following conditions: Load cables are less than 30 m. Other cables connected to the product are all less than 3 m.			
Safety *1		Complies with the requirements of the following directive and standards. EMC Directive 2014/35/EU EN 61010-1 (Class I, Pollution Degree 2)			
Circuit method		PWM inverter system			
Environment	Operating environment	Indoor use, overvoltage category II			
	Operating temperature and humidity range	0°C to 40°C, 20 % to 80 %rh (no condensation)			
	Storage temperature and humidity range	-10°C to 60°C, 0 % to 90 %rh (no condensation)			
	Altitude	2000 m or less			
Dimensions		214(8.43)W×124(4.88)H× 350(13.78)D mm(inches)	429(16.89)W×128(5.04)H× 350(13.78)D mm(inches)	429(16.89)W×128(5.04)H× 450(17.72)D mm(inches)	429(16.89)W×262(10.31)H× 520(20.47) Dmm (inches)
Weight		Approx. 6 kg	Approx. 11 kg	Approx. 15 kg	Approx. 32 kg
Input terminal block		(Inlet)	M4	M6	M6
Output terminal block		M4			M6
Accessories	Power cord	1 pc. with plug Length: Approx. 2.5 m	1 pc. without plug 3-core flexible cable Nominal cross-sectional area : 3.5 mm^2 Length: Approx. 3 m	1 set with ferrite core without plug 1-core cable : 3pcs. Nominal cross-sectional area : 5.5 mm^2 Length: Approx. 3 m	1 set without plug, 1-core cable : 3pcs. Nominal cross-sectional area : 14 mm^2 Length: Approx. 3 m
	Core	1 pc.	1 pc.	1 pc.	1 pc.
	Cable tie	1 pc.	1 pc.	1 pc.	1 pc.
	CD-ROM *3	1 disc			
	Packing List(1 pc.), Quick Reference(Japanese 1 sheet, English 1 sheet), Safety Information(1 copy)				

*1 Not applicable to custom order models.
*2 Only on models that have the CE marking on the panel.
*3 Included in the user's manual, and communication interface manual.

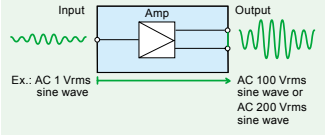
● Analog interface specifications (EX08-PCR-MA: optional)

Input terminal	Maximum allowable input voltage		±15 V
	Type		BNC
	Input impedance		10 kΩ ±5 % (unbalanced)
	Isolation voltage		42 Vpk
EXT-AC mode *1	Input voltage range		0 V to ±10 V (DC)
	Voltage amplification rate (155 V/310 V range)		15.5 times or 31 times
	Frequency setting range		40 Hz to 500 Hz
EXT-DC mode	Input voltage range *2	ATT OFF	0 V to ±2.19 Vpeak (0 to 155 Vrms sine wave)
		ATT ON	0 V to ±10 V (DC)
	Input frequency range	ATT OFF	40 Hz to 500 Hz (sine wave) / 40 Hz to 100 Hz (square wave) /DC
	Frequency characteristics	ATT OFF	-0.3 dB at 500 Hz (typical value) with 55 Hz as a reference
	Voltage amplification rate (155 V/310 V range)	ATT OFF	100 times or 200 times
		ATT ON	19 times or 38 times
Output voltage distortion ratio *3			Main unit specifications + 0.5 % or less

*1 ATT is always set to on.
*2 Measurable range for voltage, current and power is DC and from 40 Hz to 500 Hz.
The frequency is set based on the input waveform cycle.
*3 In the EXT-AC mode, when direct current is input. In the EXT-DC mode, when a sine wave with 0.1 % or less distortion rate is input.



EXT-AC mode
The output AC voltage value can be varied according to the input DC signal.



EXT-DC mode
Amplifies the waveforms that it receives and outputs the result.

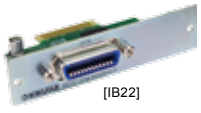
● Specifications of the communication interfacen

LAN	Complies with IEEE 802.3 100base-TX/10Base-T Ethernet LXI Device Core Specification 2011 Rev. 1.4, RJ-45 connector
USB	Complies with the USB 2.0 specifications. Communication speed: 480 Mbps (High-speed) Complies with the USBTMC-USB488 device class specifications.
GPIB (IB22: optional)	Complies with IEEE STD. 488.1-1978 specifications. SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E1
Common	Software protocol: IEEE 488.2 STD 1992 Command language: SCPI Specification 1999.0

Options

■ Interface boards

*Only one interface board can be installed.


[IB22]

GPIB interface board [IB22]

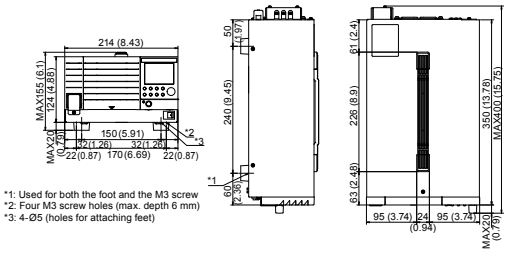

[EX08-PCR-MA]

Analog interface board [EX08-PCR-MA]

■ Rack mount adapters

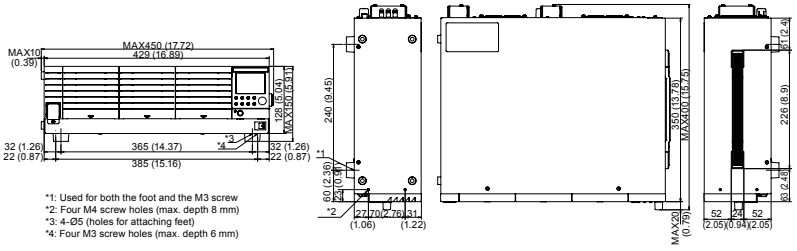
For the PCR500MA
KRA3 (for inch size EIA specifications)
KRA150 (for millimeter size JIS specifications)
KBP3-2 (Blank panel)
For the PCR1000MA and PCR2000MA
KRB3-TOS (for inch size EIA specifications)
KRB150-TOS (for millimeter size JIS specifications)
For the PCR4000MA
KRB6 (for inch size EIA specifications)
KRB300 (for millimeter size JIS specifications)

Rear Panel/External dimensions (Unit: mm (inches))



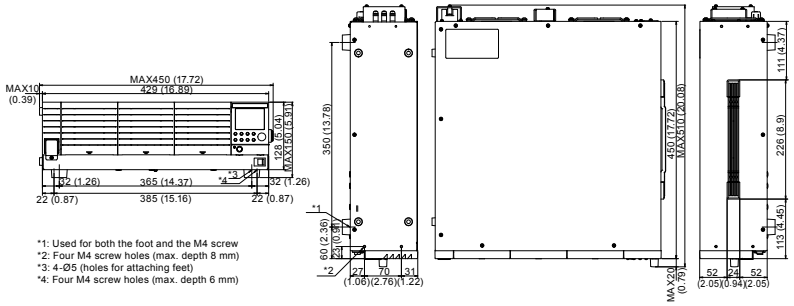
*1: Used for both the foot and the M3 screw
*2: Four M3 screw holes (max. depth 6 mm)
*3: 4-Ø5 (holes for attaching feet)

PCR500MA 214(8.43)W×124(4.88)H×350(13.78)Dmm(inches)



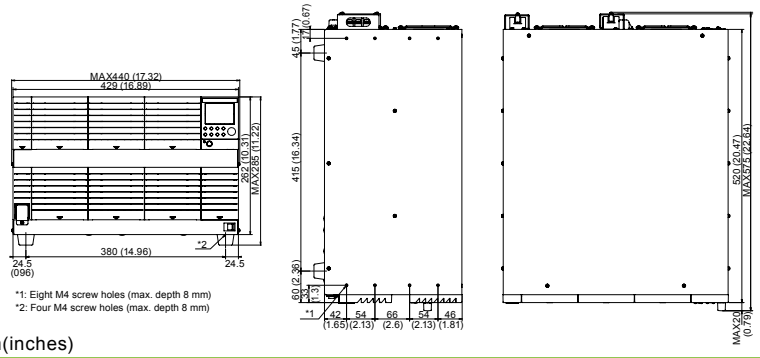
*1: Used for both the foot and the M3 screw
*2: Four M4 screw holes (max. depth 8 mm)
*3: 4-Ø5 (holes for attaching feet)
*4: Four M3 screw holes (max. depth 6 mm)

PCR1000MA 429(16.89)W×128(5.04)H×350(13.78)Dmm(inches)



*1: Used for both the foot and the M4 screw
*2: Four M4 screw holes (max. depth 8 mm)
*3: 4-Ø5 (holes for attaching feet)
*4: Four M4 screw holes (max. depth 6 mm)

PCR2000MA 429(16.89)W×128(5.04)H×450(17.72)Dmm(inches)



*1: Eight M4 screw holes (max. depth 8 mm)
*2: Four M4 screw holes (max. depth 8 mm)

PCR4000MA 429(16.89)W×262(10.31)H×520(20.47)Dmm(inches)

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