P B Z S E R I E S

New Functions
Built-in function generator !
Capable of synchronized and parallel operation !

NEW

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

Intelligent Bipolar Power Supply
PBZ Series

2 models: PBZ20-20 (±20V/±20A) and PBZ40-10 (±40V/±10A)
CV : 100 kHz, CC : 10 kHz (PBZ20-20), 5 kHz (PBZ40-10)
USB, GPIB, and RS232C provided (standard)
LAN option available (complies with LXI)

KIKUSUI

CE

New simulation power source for more realistic and more flexible power reproductions!

A new product with 7 features for comfortable testing!

1. User-defined waveform generation function
2. Sequence function
3. Synchronized operation function
4. Parallel operation function
5. Unipolar mode
6. High-speed response100kHz (CV)
7. Low ripple noise!

Intelligent Bipolar Power Supply

PBZ series

NEW

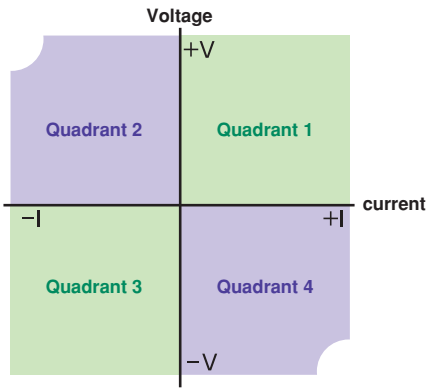
- PBZ20-20 (±20V/±20A)
- PBZ40-10 (±40V/±10A)

● **USB, GPIB, and RS232C provided (standard)**
LAN (option)

The PBZ series is a series of bipolar DC stabilized power supply that can, without changing the output terminals, vary both the + and – polarity toward either side while continuously passing through zero. 4-quadrant operation allows power to be supplied (source) or absorbed (sink), making this series suitable for driving inductive loads or capacitive loads.

The power source contains a function generator (signal generating function), allowing free waveform generation and sequence settings. It also includes a synchronized operation function that is necessary for power fluctuation tests and a parallel operation function that expands the output current. The use of a Switching + Linear system makes this series 40% lighter (weight is approximately 22 kg) than previous models from our company, while also achieving high-speed operation (CV mode: 100 kHz) with low ripple noise.

4-quadrant (bipolar) operation concept diagram



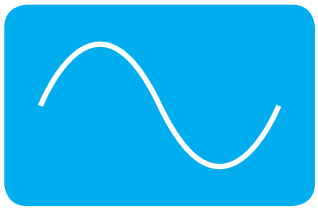
: Voltage and current directions are the same (source)
: Voltage and current directions are opposite (sink)

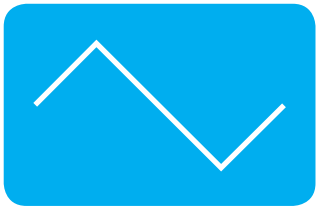
1 Waveform generation function

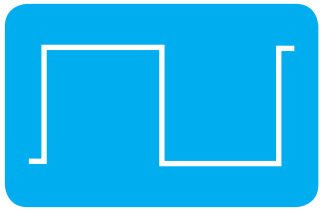
Built-in function generator! Easily create programs using user-defined waveforms!

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 (see P4) allows each waveform to be set as a single step, and a maximum of 1024 steps can be set in the 16 programs.
* Waveform editing requires special application software (option: Wavy for PBZ). (See P10.)

3 basic waveforms


Sine wave

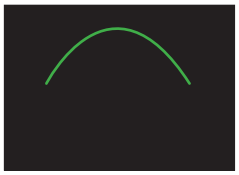

Triangular wave


Square wave

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

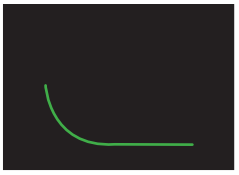

Ramp (rising)

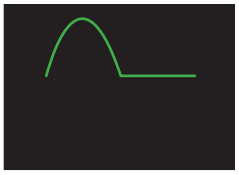

Ramp (falling)

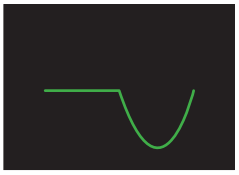

Sine wave, half-cycle (positive pole)

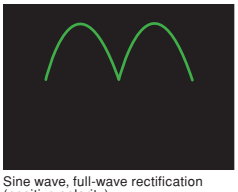

Sine wave, half-cycle (negative pole)

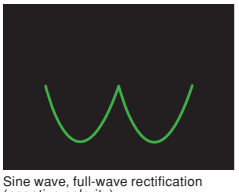

Exponential function (rising)

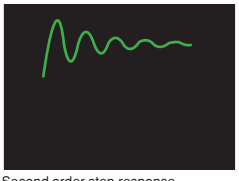

Exponential function (falling)

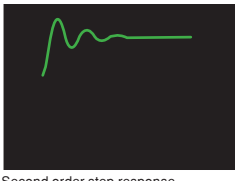

Sine wave, half-wave rectification (positive polarity)


Sine wave, half-wave rectification (negative polarity)

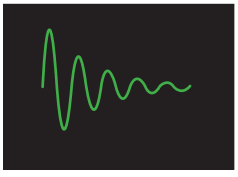

Sine wave, full-wave rectification (positive polarity)

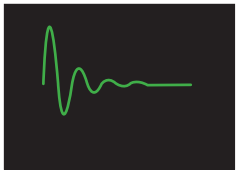

Sine wave, full-wave rectification (negative polarity)

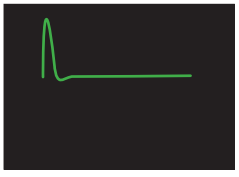

Second order step response (damping coefficient 0.1)


Second order step response (damping coefficient 0.2)


Second order step response (damping coefficient 0.7)


Second order impulse response (damping coefficient 0.1)

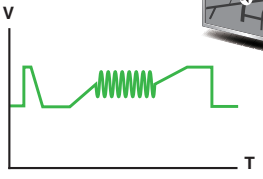

Second order impulse response (damping coefficient 0.2)


Second order impulse response (damping coefficient 0.7)

Expanded applications through free waveform generation

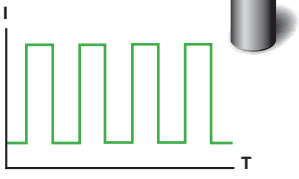
Power fluctuation test for automotive electronic components

Car navigation systems, others



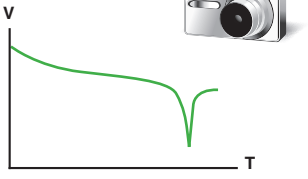
Rechargeable battery charge/discharge test

Various rechargeable batteries



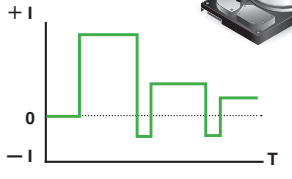
Simulated battery charge/discharge test

Digital cameras, cellular phones, and others



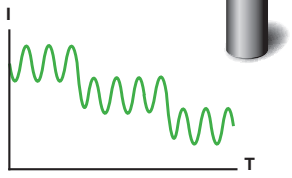
Constant current source for pulse plating

HDD, others



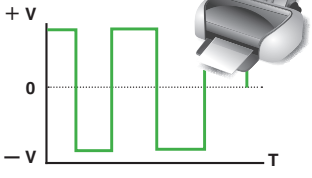
Ripple overlap test

Various electrical storage elements



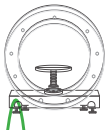
DC motor durability test

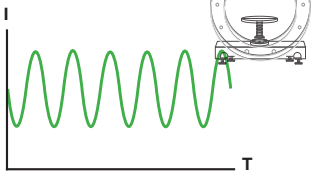
Printers, others



Constant current source for magnetic field generation

Helmholtz coil





Others

- Contact resistance test for breakers and relays
- Characteristics test for solenoid valves, coils and others

2 Sequence function

The script function makes sequences even more convenient!

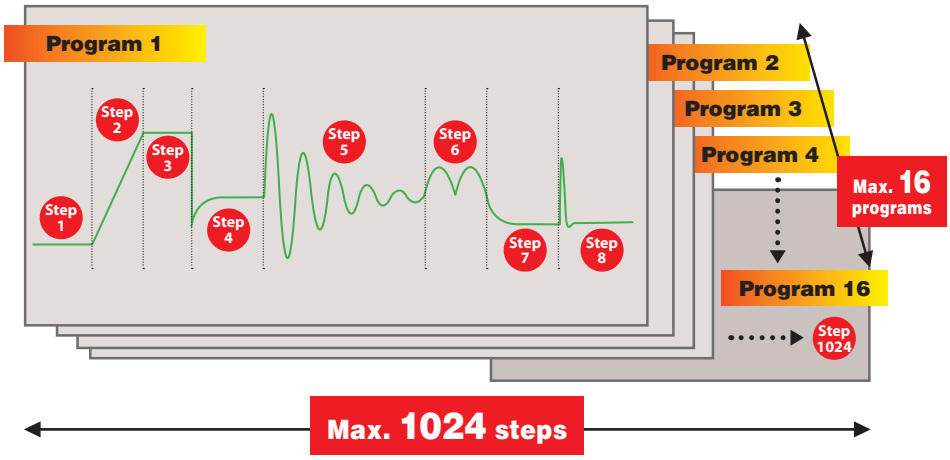
The basic sine, triangular and square waveforms, as well as the 16 user-defined waveforms, can each be set as a sequence step, allowing even complex sequences to be created easily. Sequences are composed of up to 1024 steps.

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.

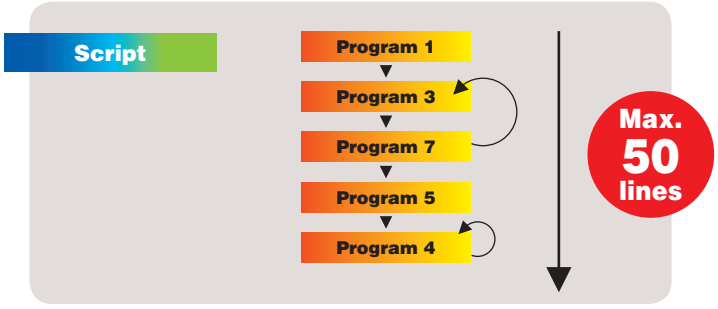
As shown in the figure on the right, when Program 1 uses 8 steps, 1024 – 8 = 1016, the remaining 1016 steps can be allocated to the remaining 15 programs.

Concept diagram showing steps and program settings



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. 1 script can be set each for CV and CC mode.

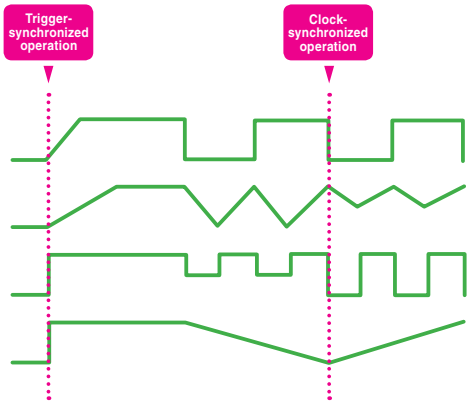
Example of script



3 Synchronized operation function

No time deviations occur when a sequence is executed!

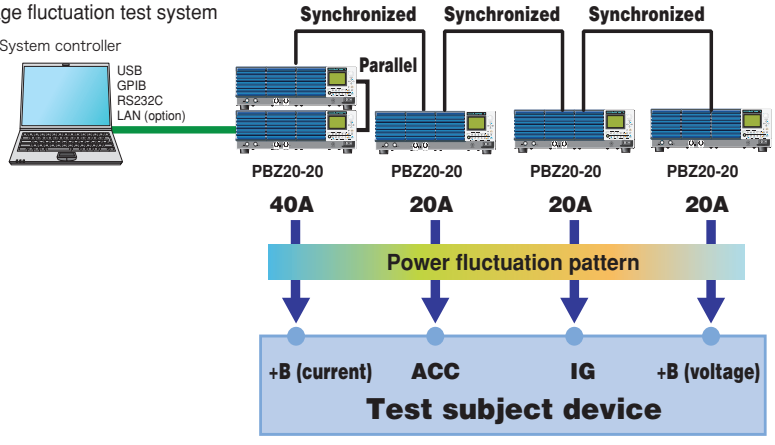
This function synchronizes the power output when a sequence is executed using multiple PBZ.
It prevents time deviations from occurring even when a long sequence is executed. * A delay of up to 1μ s occurs at the start.



▲ Example of combined trigger- and clock-synchronized operation

Example of using synchronized operation

Sample configuration of a voltage fluctuation test system



4 Parallel operation function — Easily expand the capacity

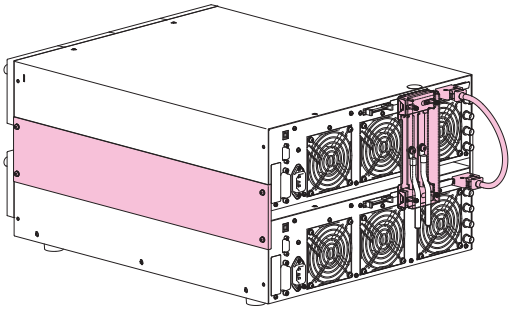
This function expands the output current. It allows multiple units to be connected in parallel according to the required current.
With 2 standard units of the same model and the optional parallel operation kit, the user can easily complete the setup.
Although up to 5 units can be operated in parallel,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

■ Parallel operation kit (option)

● PK01-PBZ NEW

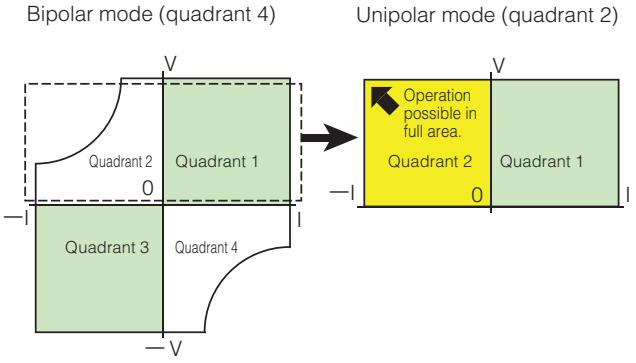
Parallel operation kit PK01-PBZ (option) components

Component	Qty.	Component	Qty.
Bracket	2	Bracket screws (M4-8L)	8
Insulating sheet	1	Spacer	4
OUTPUT terminal connection bar	2	Load wire screw (M5-10L)	2
Parallel output terminal cover	1	Parallel operation signal cable	1



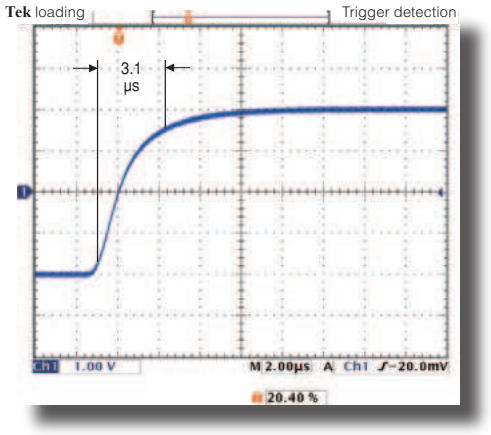
5 Unipolar mode — Operation in the full quadrant 2 area

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: 100W, PBZ40-10: 180W) in quadrants 2 and 4. However in unipolar mode, operation is possible in the full area of quadrant 2.



6 High-speed response — 100 kHz (CV mode)

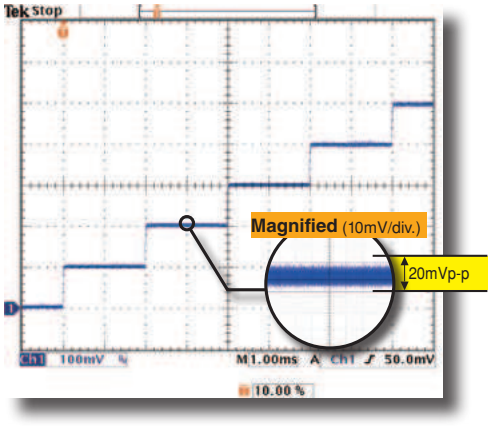
100 kHz frequency characteristic (CV). The superior waveform quality with rise and fall with times of 3.5μs which makes it possible to reproduce a variety of waveforms with high precision.



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

7 Low ripple noise — Superior waveform quality

The superior quality of the waveforms prevents the waveform quality from affecting the simulations or pulse-driven devices.



▲ Sample of actual 0.1V step waveform
Ripple 2mVrms, noise 20mVp-p
(PBZ20-20)

40% lighter than previous models

Weight: Approx. 22 kg. A large reduction in weight was achieved by using a Switching + Linear system. This contributes to improved workability not only on bench-tops, but also when test environments are moved.

Expanded measurement functions

The built-in measurement functions allow testing without the multimeter and other measurement devices that were previously needed. In addition, the measurement time TRIG signal allows the measurement start and measurement start delay times to be set.

Setting item			
Voltage measurement	DC	Measurement range (resolution)	120% of rating (0.001V)
		Accuracy *1	±(0.05% of reading + 0.05% of rating)
	AC	Measurement range (resolution)	120% of rating/CF (0.001V)
	DC + AC	Measurement range (resolution)	120% of rating (0.001V)
	AC, DC + AC	Accuracy *1, *2	±(0.5% of reading + 0.1% of rating) (5Hz to 10kHz)
			±(1% of reading + 0.2% of rating) (10Hz to 50kHz)
			±(2% of reading + 0.2% of rating) (50Hz to 100kHz)
	PEAK	Measurement range (resolution)	120% of rating (0.01V)
	PEAK	Accuracy *1, *3	±(0.5% of rating)
Current measurement	DC	Measurement range	120% of rating (0.001A)
		Accuracy *1	±(0.3% of reading + 0.1% of rating)
	AC	Measurement range (resolution)	120% of rating/CF (0.001A)
	DC + AC	Measurement range (resolution)	120% of rating (0.001A)
	AC, DC + AC	Accuracy *1, *2	±(3% of reading + 0.1% of rating) (5Hz to 10kHz)
			±(10% of reading + 1% of rating) (10Hz to 100kHz)
	PEAK	Measurement range (resolution)	120% of rating (0.01A)
	PEAK	Accuracy *1, *3	±(0.5% of rating)
Measurement time			100µs to 3600s

*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 no more than 10 times the period of the input signal
*3. Peak value of a 1 kHz sine wave

Memory functions

● Preset memory
Stores the setting conditions that are most often used. Three memory positions are available each for CV mode and CC mode. The items that are stored are limited to the DC signal and AC signal.

● Setup memory
This can be used as ordinary memory. It can store all of the basic setting items.
The total number of available memory positions is 10, regardless of the mode.

CC/CV selection function

When using as a constant-voltage power source, select CV mode. When using as a constant-current power source, select CC mode. The voltage and current upper/lower limits utilize a “V” or “I” limit function.

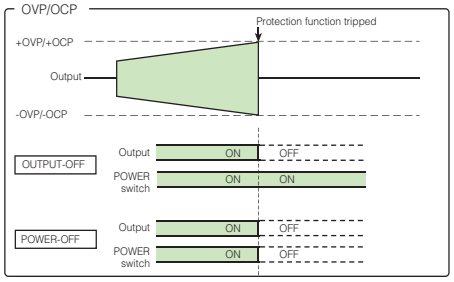
Response switching

In both CV and CC mode, the 4 ranges can be switched.
The output voltage and current rise/fall times vary according to the response setting.(The response time setting indicates the rise/fall time.)

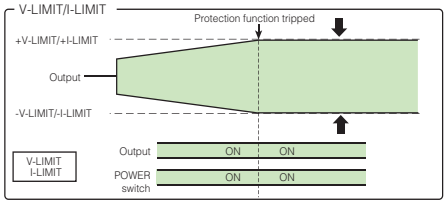
Setting description	Selections	Setting at factory shipment
CV mode Voltage response	3.5 µs	3.5µs
	10 µs	
	35 µs	
	100 µs	
CC mode Current response (PBZ20-20)	35 µs	35µs
	100 µs	
	350 µs	
	1ms	
CC mode Current response (PBZ40-10)	70 µs	70µs
	100 µs	
	350 µs	
	1ms	

Protection functions (overvoltage, overcurrent, V-I LIMIT, overheating)

● Overvoltage and overcurrent protection
This protection activates if the output voltage or current exceeds the protection trip point. The protection trip point can be set separately for the positive (+) and negative (-) sides. The following 3 operating types can be selected for the both the overvoltage and overcurrent operation protection functions.
▶ OUTPUT-OFF setting: Output is turned OFF.
▶ POWER-OFF setting: Output is turned OFF and the POWER switch is also turned OFF.



▶ V/I-LIMIT
Prevents voltage and current exceeding the protection trip points. (Output is not turned OFF.)
The V/I-LIMIT function can be used to automatically change the unit from CV mode to I-LIMIT, and from CC mode to V-LIMIT. This allows the unit to be used as a power source that changes automatically from CV mode to CC mode, and from CC mode to CV mode.

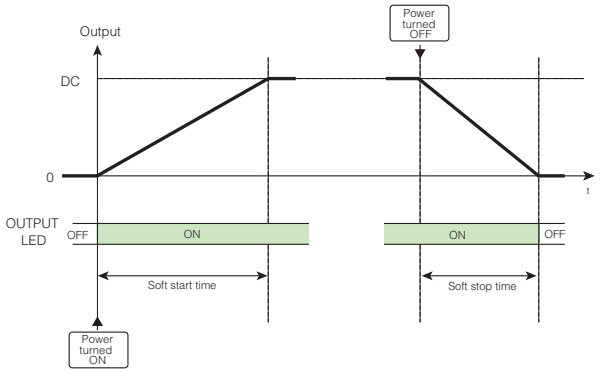


● Overheating protection
This protection activates when the temperature inside the product is abnormally high.
It protects the product when it is used in an environment that exceeds the ambient temperature range for operation, or when sufficient space has not been secured around the intake and exhaust ports.

Soft start and soft stop function

With soft start, when output is changed from OFF to ON, a soft-start time is applied at startup from when output is 0 to when the DC set value is reached. With soft stop, when output is changed from ON to OFF, a soft-start time is applied at stop from when output is the DC setting to when the output reaches 0.

Soft start and stop times can be set only for the DC setting value. If the OUTPUT key is pressed while soft start or soft stop is operating, the operation is canceled and the output turns OFF.



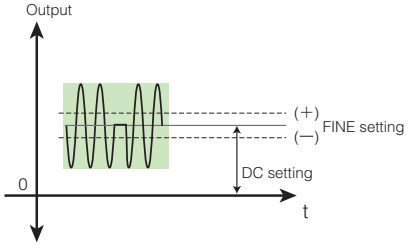
Fine settings function

Fine adjustments (increase, decrease) can be made to the DC setting value

Input range

- PBZ20-20
  CV: DC setting value ±1.0000V, resolution 0.0001V
  CC: DC setting value ±1.0000A, resolution 0.0001A

- PBZ40-10
  CV: DC setting value ±2.0000V, resolution 0.0001V
  CC: DC setting value ±0.5000A, resolution 0.0001A



Key lock

3 levels of key lock are available.

- All operations other than the OUTPUT key, RECALL key, and A, B, and C keys (preset memory) are prohibited.
- All operations other than the OUTPUT key are prohibited.
- All key operations are prohibited
  (except for the KEY LOCK (SHIFT + LOCAL) key)

Remote sensing function

Remote sensing is a function that stabilizes the load terminal output voltage by reducing the effects from problems such as voltage drops caused by the resistance of the load wires. It can be used in CV mode.

One-way compensation of up to approximately 0.5V can be made. Select load wires with sufficient current capacity, so that the load wire voltage drop does not exceed the compensation voltage.

Output voltage/current monitor

- Voltage monitor
  Rear panel (J1 connector)
  0 to ±2V from 0V to ± rated voltage
- Current monitor
  Front panel (BNC terminal)
  0 to ±2V from 0A to ± rated current
  Frequency characteristics DC to 20 kHz (-3dB)
  Rear panel (J1 connector)
  0 to ±2V from 0A to ± rated current

External control

- External output ON/OFF
- Shutdown

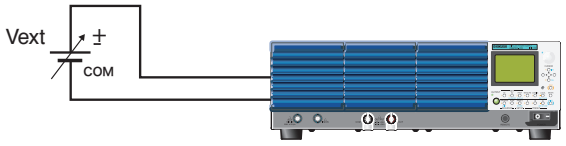
Status signal output

CV, CC, OUTPUT, and ALARM are output.

External signal input (external voltage control)

It is compatible with two types of input signals.

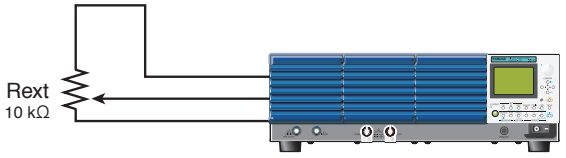
- The DC signal of the internal signal source can be controlled by external voltage at the rear panel (J1 connector) from DC control signal 0 to approximately ±10V.



- Front panel EXT SIG IN (BNC terminal) input signal
  This is composed of a bipolar amplifier that uses the EXT SIG IN (BNC terminal) as the input signal. The amplifier gain, polarity (inverted, non-inverted) and offset can be set. The maximum allowable input voltage is: ±12Vpeak, input impedance is: Approx. 10kΩ, and common terminal is: connected to OUTPUT terminal COM.

External signal input (external resistance control)

Using an external variable resistor to change the standard voltage and voltage ratio can be used to control the DC signal of the internal signal source. In CV mode, the voltage can be controlled. In CC mode, the current can be controlled. The output is the sum of the setting at the external resistor, the DC setting at the panel, and the setting at the remote controller.



Temperature-sensitive fan motor

The internal temperature is detected in order to control fan operation.

Interface

USB, GPIB and RS232C provided (standard).

For LAN (option), see P10.

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

Constant voltage (CV mode)			PBZ20-20	PBZ40-10
DC voltage	Setting range *1	Bipolar mode	0.000V to ±21.000V	0.000V to ±42.000V
		Unipolar mode	0.000V to 21.000V	0.000V to 42.000V
		Fine function	±5% of rating	
	Setting resolution		0.001V (Fine function setting resolution 0.0001V)	
	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		0.0Vpp to 42.0Vpp	0.0Vpp to 84.0Vpp
	Setting resolution		0.1V	
	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		100µs to 1000s (resolution 100µs)	
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		3.5µs, 10µs, 35µs, 100µs (TYP value)	
	Overshoot		5% or less (TYP value)	
	Ripple Noise	(p-p) *7	20mV (TYP value)	
		(rms) *8	2mV (TYP value)	4mV (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 3.5µs, 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 3.5µs, 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 0V 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 0V, 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
DC current	Setting range *1	Bipolar mode	0.000A to ±21.000A	0.000A to ±10.500A
		Unipolar mode		
		Fine function	±5% of rating	
	Setting resolution		0.001A (Fine function setting resolution 0.0001A)	
	Setting accuracy *2		±(0.3% of rating)	
	Temp. coefficient		±(100 ppm/°C of rating) (TYP value)	
AC current	Setting range *1		0.0App to 42.0App	0.0App to 21.0App
	Setting resolution		0.1A	
	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		100µs to 1000s (resolution 100µs)	
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)
	Response		35µs, 100µs, 350µs, 1ms (TYP value)	70µs, 100µs, 350µs, 1ms (TYP value)
	Overshoot		5% or less (TYP value)	
	Ripple noise (rms) *7		3mA (TYP value)	
	Load effect *8		±(0.01% of setting + 1mA)	
	Source effect *9		±(0.01% of setting + 1mA)	

*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 35µs, 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
*9. Change in the output current in response to a ±10% fluctuation from the nominal input voltage (at 10% to 100% of the rated output voltage)

Measurement display function			PBZ20-20	PBZ40-10
Voltage measurement	DC	Measurement range (resolution)	120% of rating (0.001V)	
		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 (0.001V)	
	DC + AC	Measurement range (resolution)	120% of rating (0.001V)	
	AC, DC + AC	Accuracy *1, *2	±(0.5% of reading + 0.1% of rating) (5Hz to 10kHz)	
			±(1% of reading + 0.2% of rating) (10kHz to 50kHz)	
			±(2% of reading + 0.2% of rating) (50kHz to 100kHz)	
	PEAK	Measurement range (resolution)	120% of rating (0.01V)	
	PEAK	Accuracy *1, *3	±(0.5% of rating)	
Current measurement	DC	Measurement range (resolution)	120% of rating (0.001A)	
		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 (0.001A)	
	DC + AC	Measurement range (resolution)	120% of rating (0.001A)	
	AC, DC + AC	Accuracy *1, *2	±(3% of reading + 0.1% of rating) (5Hz to 10kHz)	
			±(10% of reading + 1% of rating) (10kHz to 100kHz)	
	PEAK	Measurement range (resolution)	120% of rating (0.01A)	
	PEAK	Accuracy *1, *3	±(0.5% of rating)	
Measurement time			100µs to 3600s	

*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

Protection functions		PBZ20-20	PBZ40-10
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)	-22.0V to -0.2V 0.2V to 22.0V	-44.0V to -0.4V 0.4V to 44.0V
	Setting range (Unipolar mode)	0.2V to 22.0V	0.4V to 44.0V
	Setting resolution	0.1V	
	Setting accuracy	±1% of rating	
Overcurrent protection	Protection trip *1, *2	OCP or I-LIMIT (output restriction) For OCP, select either output OFF or POWER switch OFF.	
	Setting range	-22.0A to -0.2A 0.2A to 22.0A	-11.0A to -0.1A 0.1A to 11.0A
	Setting resolution	0.1A	
	Setting accuracy	±1% of rating	
Overheating protection	Protection trip	Output turns OFF when overheating is detected.	
Power restriction (Sink power)	Bipolar mode	100W (TYP value)	180W (TYP value)
	Unipolar mode	400W (TYP value)	400W (TYP value)
Control functions		**PBZ20-20**	**PBZ40-10**
Internal signal source DC signal control	Control voltage input	Approx 0V to Approx. ±10.0V, 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
External signal input	Amplifier gain	CV mode	-20 to +20	-40 to +40
		CC mode	-20S to +20S	-10S to +10S
		Setting resolution	0.1 (CV mode), 0.1S (CC mode)	
		Setting accuracy *1	±5% of rating	
	Max. allowable input voltage		±12 Vpeak	
	Input impedance		10kΩ(TYP value)	
	Terminal		BNC Safety Socket (Common connects to output COM terminal.)	
Current monitor Output	Output voltage		2V 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		0.5Vpp to 5Vpp	
	Input impedance		1kΩ (AC coupled) (TYP value)	
	Lock frequency range		10MHz ± 200Hz	
	Lock time		2s or less	
	Terminal		Insulated BNC (Common is insulated from chassis: Voltage to ground Max. 42V peak)	
Clock output	Output voltage		1 Vpp (with 50Ω terminal) (TYP value)	
	Output impedance		50Ω (AC coupled) (TYP value)	
	Output frequency		10MHz ± 200Hz	
	Terminal		BNC (Common connected to chassis.)	
Trigger input	Input level		H level: 2V to 5V, L level: 0V to 0.8V (TTL compatible)	
	Polarity		H level, L level	
	Pulse width		1µs or more	
	Delay		1µs or less	
	Input impedance		10kΩ (TYP value) (DC coupled)	
	Terminal		BNC (Common connected to chassis.)	
Trigger output	Output level		H level: 2.7V to 5V, L level: 0V to 0.4V (TTL compatible)	
	Polarity		H level, L level	
	Pulse width		10µs(TYP value)	
	Rise/fall time		100ns 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
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	
	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
Sequence function	No. of programs	16	
	No. of steps	Total 1024	
	Step time	100µs to 1000H (100µs step)	
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)	

General specifications		PBZ20-20	PBZ40-10
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 +70C / Max. 90% RH (no condensation)	
Grounding polarity		Only the output COM terminal can be grounded.	
Voltage to ground		DC 500V Max.	
Withstand voltage	Between primary side and chassis	1500V AC, no abnormalities at 1 minute	
	Between primary side and output terminal		
Insulation resistance	Between primary side and chassis	500V DC, 30 MΩ or more (at humidity 70% RH or less)	
	Between primary side and output terminal		
	Between output terminal and chassis	500V DC, 1 MΩ or less	
Ground continuity	Between power cord connector, grounding pin <-> chassis	25A AC, 0.1Ω or less	
Cooling method		Forced air cooling by a temperature-sensitive variable-speed fan	
Safety *1		Conforms to the following safety requirement. IEC61010-1 Class I Pollution degree2	
Electromagnetic compatibility (EMC) *1		Conforms to the following safety requirement. IEC61326-1	
External dimensions (largest part)		429.5W × 128（145）H × 550（595）Dmm	
Weight		Approx. 22 kg	
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.

Option

Sequence creation software

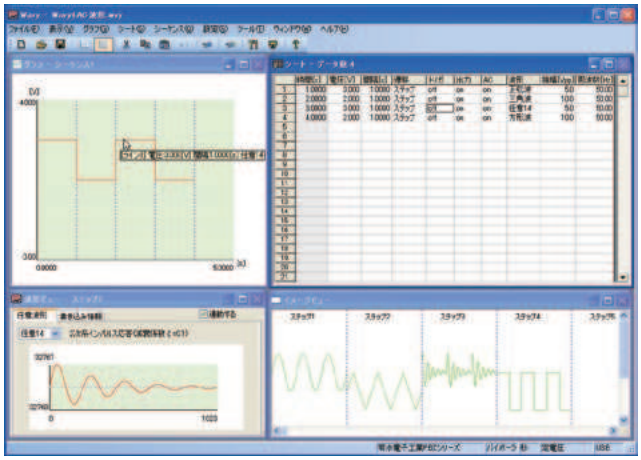
Wavy

Wavy for PBZ **NEW**

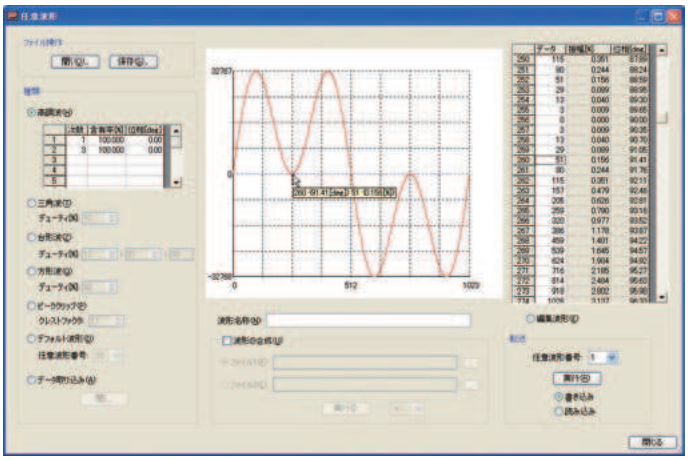
[Operating environment] Windows 2000 / Windows XP / Windows Vista / Windows 7

*For details, please see our company's homepage.

This software further strengthens the waveform generation and sequence functions of the PBZ series. Create and edit in two ways: either by drawing with the mouse or spreadsheet style.



▲ Main screen



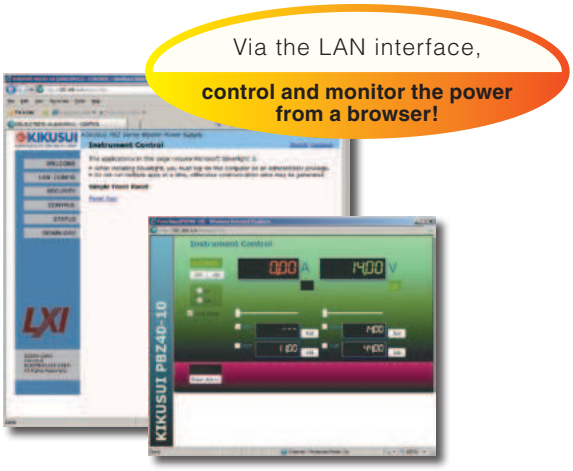
▲ User-defined waveform edit screen

- This software allows easy creation and editing of the test condition data that is necessary for sequence operation.
- The function for saving test condition data files makes it easy to manage the conditions for standardized tests.
- The course of the execution sequence is displayed with the set values and cursor on the "Execution graph".
- An intuitive and actual output can be monitor on the "Monitor graph", which plots the monitor values during sequence execution.
- The acquired monitor data can be saved as test results.
- A new "Waveform image" window has been added. This window makes it easy to understand the AC signal waveform.
- User-defined waveforms can be easily created and selected. The created user-defined waveform can be quickly written and output.
- Supports selection/deselection of sequence step items. A pause function, trigger function, AC waveform and other items can be selected as necessary.
- Data from Wavy for PBX can be loaded (upward compatibility).

Communication interface

- LAN **NEW**

In addition to IEEE488.2, this series is also compatible with SCPI commands. Using the instrument drivers (downloaded from our website) allows control with Excel VBA and LabVIEW, as well as sequence control with the sequence creation software Wavy (Wavy for PBZ). By using the LAN interface, power control and monitoring from a web browser is also possible.



Upright stand

- VS01 **NEW**

*Not included with the PBZ series main unit.

Rack-mounting bracket

- KRB3-TOS (inch-size)
- KRB150-TOS (mm-size)

Parallel operation kit

- PK01-PBZ **NEW**

Smart rack system

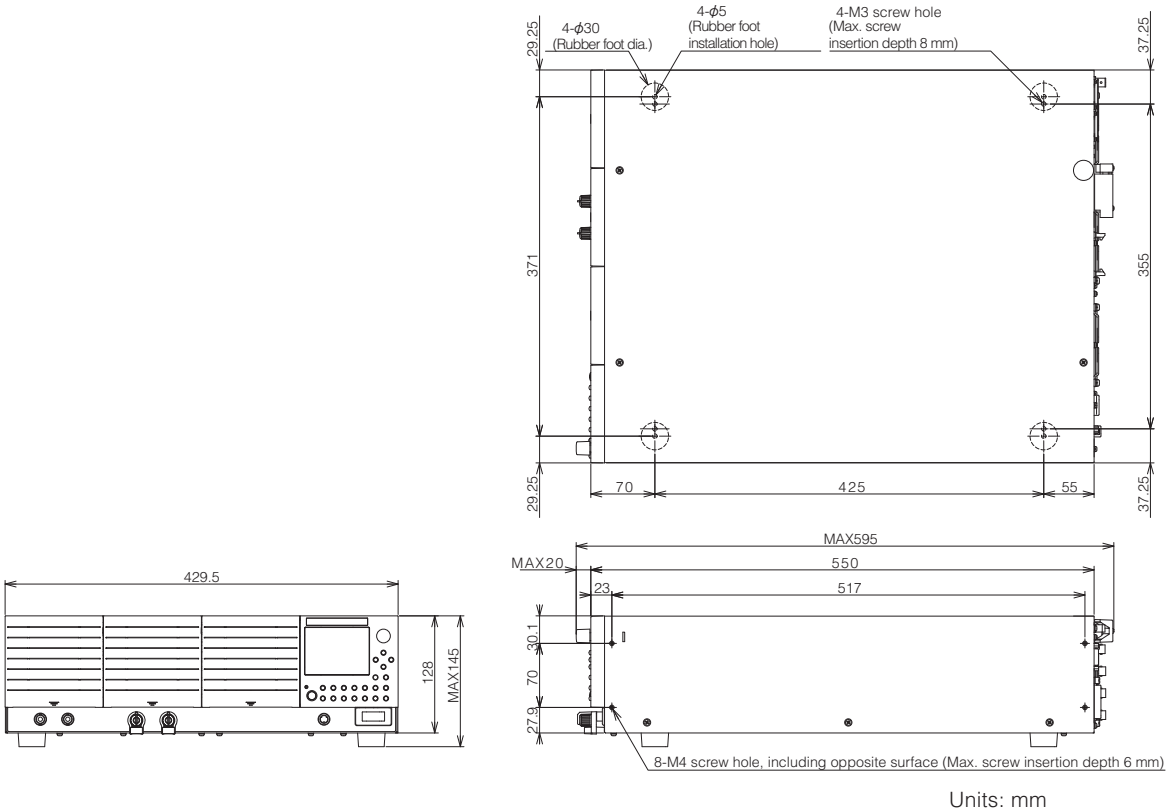
Parallel operation of same-model units can be used for large currents.
The ordinary option can be used for 2 units. For systems of 3 to 5 units, please consult with us.

The photo shows an image of a parallel operation system. (Be sure to consult with us)

★ Please contact us for details concerning the smart rack system.

Rear panel

External dimensions diagram



Units: mm

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