P B Z S E R I E S

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

Intelligent Bipolar Power Supply

PBZ Series

4 models: PBZ20-20 (±20 V/±20 A), PBZ40-10 (±40 V/±10 A),
PBZ60-6.7 (±60 V/±6.7 A) and PBZ80-5 (±80 V/±5 A)
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 optimum testing!

1. **User-defined waveform generation function**
2. **Sequence function**
3. **Synchronized operation function**
4. **Parallel operation function**
5. **Unipolar mode**
6. **High-speed response100 kHz (CV)**
7. **Low ripple noise!**

Intelligent Bipolar Power Supply

PBZ series

NEW
PBZ60-6.7, PBZ80-5

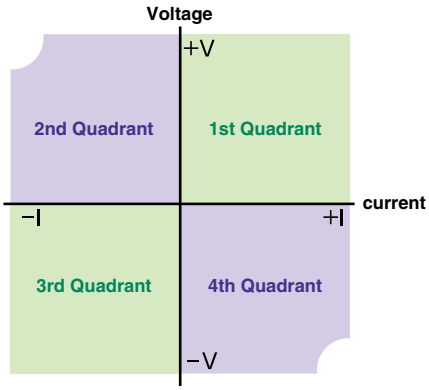
- PBZ20-20 (±20 V/±20 A)
- PBZ40-10 (±40 V/±10 A)
- PBZ60-6.7 (±60V/±6.7 A)
- PBZ80-5 (±80 V/±5 A)

● **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.

Four quadrants (bipolar) operation concept diagram



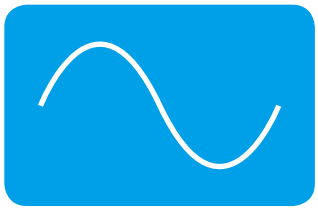
: Voltage and current directions are the same (source)
: Voltage and current directions are opposite (sink)

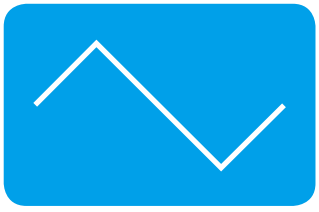
1 Waveform generation function

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 P11.)

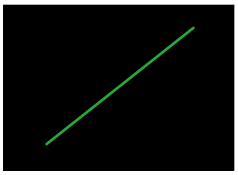
● 3 basic waveforms

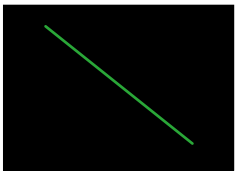

Sine wave

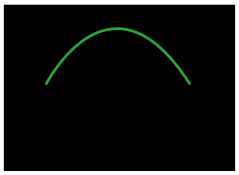

Triangular wave


Square wave

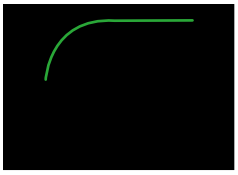
● 16 user-defined waveforms (The waveforms below are registered as defaults.)

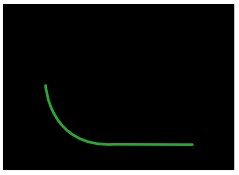

Ramp (rising)

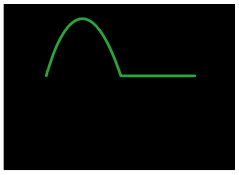

Ramp (falling)

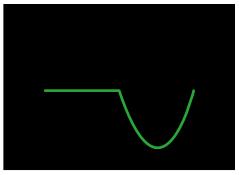

Sine wave, half-cycle (positive pole)

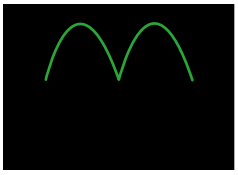

Sine wave, half-cycle (negative pole)

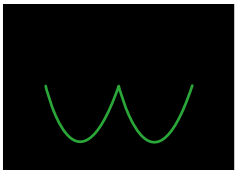

Exponential function (rising)

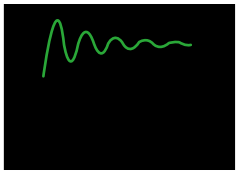

Exponential function (falling)

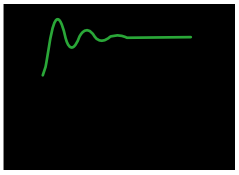

Sine wave, half-wave rectification (positive polarity)

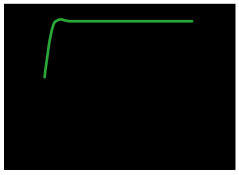

Sine wave, half-wave rectification (negative polarity)

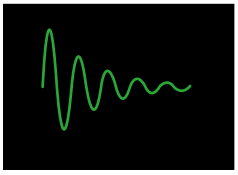

Sine wave, full-wave rectification (positive polarity)

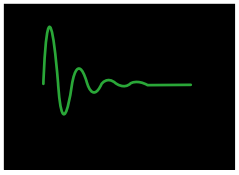

Sine wave, full-wave rectification (negative polarity)

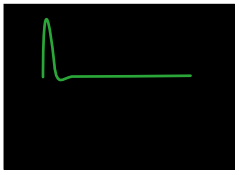

Second order step response (damping coefficient 0.1)


Second order step response (damping coefficient 0.2)


Second order step response (damping coefficient 0.7)


Second order impulse response (damping coefficient 0.1)

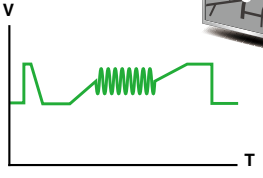

Second order impulse response (damping coefficient 0.2)


Second order impulse response (damping coefficient 0.7)

Expanded applications through free waveform generation

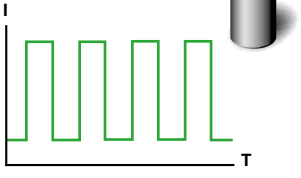
Power fluctuation test for automotive electronic components

Car navigation systems, others



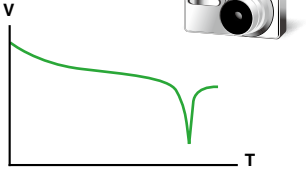
Rechargeable battery charge/discharge test

Various rechargeable batteries



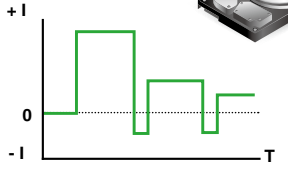
Simulated battery charge/discharge test

Digital cameras, cellular phones, and others



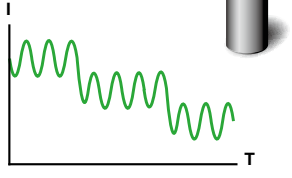
Constant current source for pulse plating

HDD, others



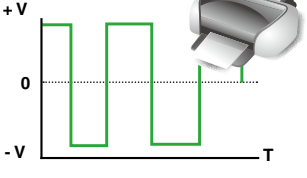
Ripple overlap test

Various electrical storage elements



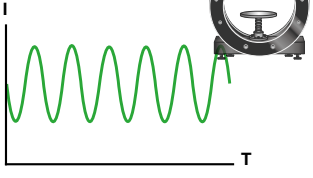
DC motor durability test

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

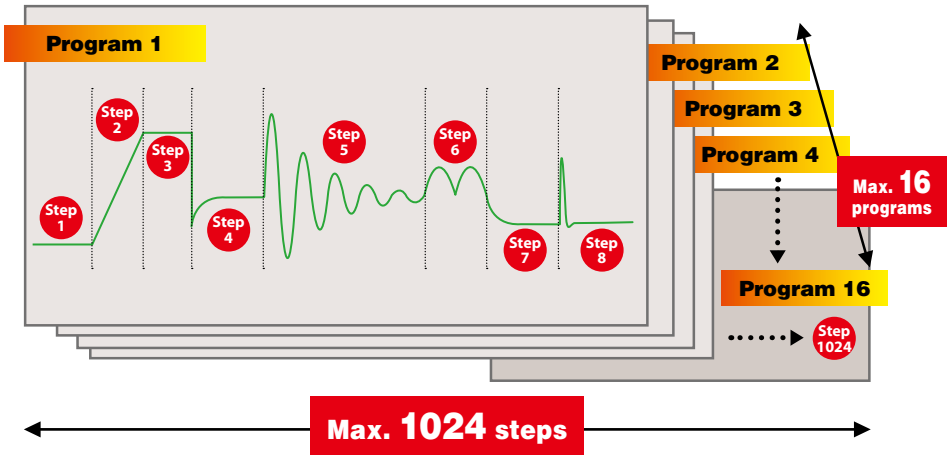
2 Sequence function

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.

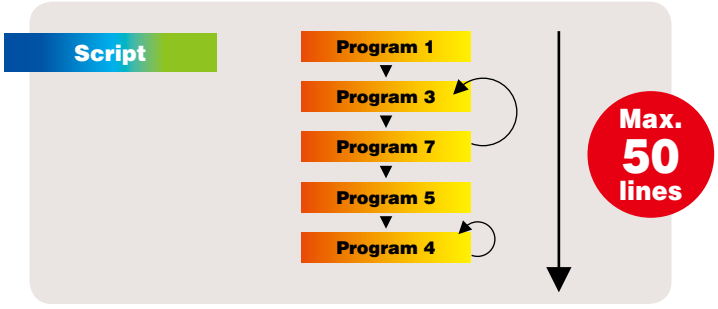
As shown in the figure on the right, when Program 1 uses 8 steps, 1024 – 8 = 1016, the remaining 1016 steps can be allocated to the remaining 15 programs.

●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.

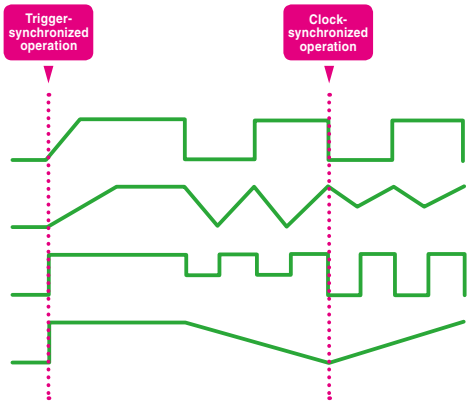
●Example of script



3 Synchronized operation function

No time deviations occur when a sequence is executed!

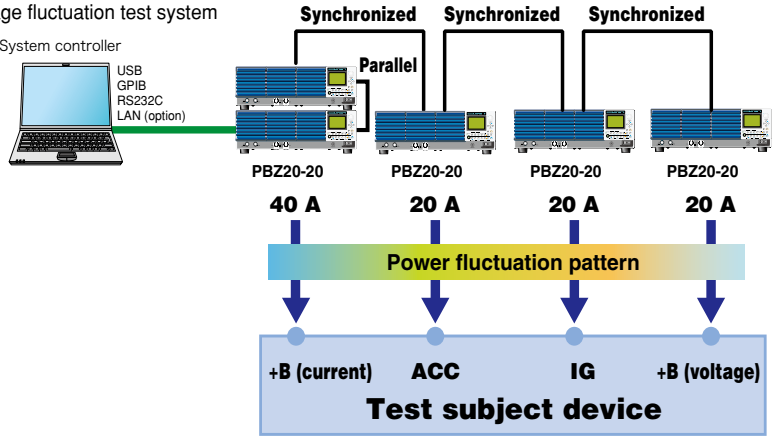
This function synchronizes the power output when a sequence is executed using multiple PBZ.
It prevents time deviations from occurring even when a long sequence is executed. * A delay of up to 1μ s occurs at the start.



▲ 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.
As for the system more than 3 units, please refer to the PBZ-SR Series (Page 12), and for the system more than 6 units, please contact with our local distributor.

■ Parallel operation kit (option)

The optional accessory kit for parallel system operation by connecting two units of the PBZ Series (same model). Select the type of kit for your installing condition.
*The bracket is not included for the PK02-PBZ or PK03-PBZ

● For Desktop use: PK01-PBZ
Contents of the Kit: Bracket, Insulating sheet, OUTPUT terminal connection bar, Parallel output terminal cover, Bracket screws (M4-8L), Spacer, Load wire screw (M5-10L), Parallel operation signal cable

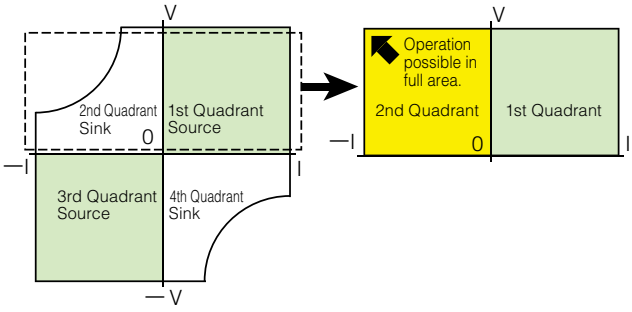
● For Rack-mounted system: PK02-PBZ (For EIA inch size)
Contents of the Kit: Insulating sheet, OUTPUT terminal connection bar, Load wire screw (M5-10L), Parallel operation signal cable

● For Rack-mounted system: PK03-PBZ (For JIS metric size)
Contents of the Kit: Insulating sheet, OUTPUT terminal connection bar, Load wire screw (M5-10L), Parallel operation signal cable

5 Unipolar mode — Operation in the full quadrant 2 area

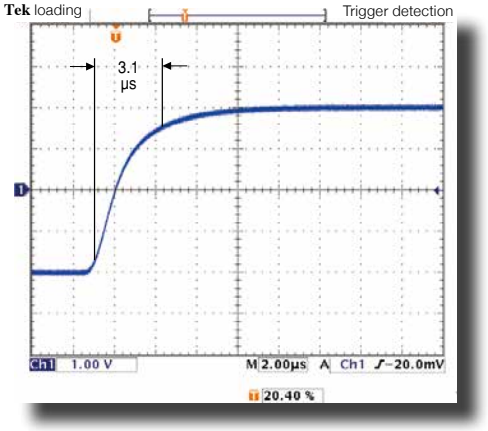
This is a function unique to this product. Because the voltage is unipolar, this function is called “unipolar mode”. With unipolar power, although the current flows in a single direction, in unipolar mode it is still possible to apply current in both directions (source and sink). As shown in the diagram,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

Bipolar mode (Four quadrants) Unipolar mode (Two quadrants)



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

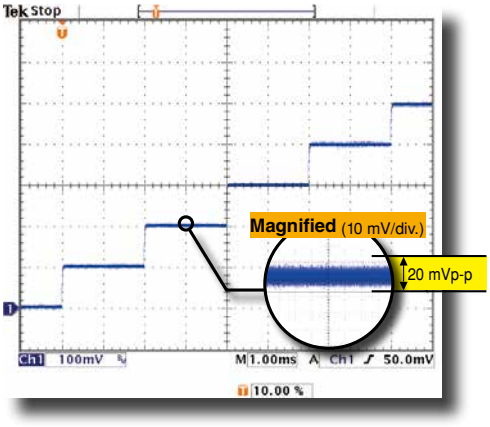
100 kHz frequency characteristic (CV). The superior waveform quality with rise and fall with times of 3.5 µs which makes it possible to reproduce a variety of waveforms with high precision.



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

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

*PBZ40-10 :Ripple 4 mVrms, noise 20 mVp-p
PBZ60-6.7 :Ripple 4 mVrms, noise 30 mVp-p
PBZ80-5 :Ripple 4 mVrms, noise 30 mVp-p

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

*1. At ambient temperature of 18 °C to 28 °C
*2. When the input signal is a sine wave with a crest factor of 3 or less within the prescribed frequency range and the measurement time is 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.

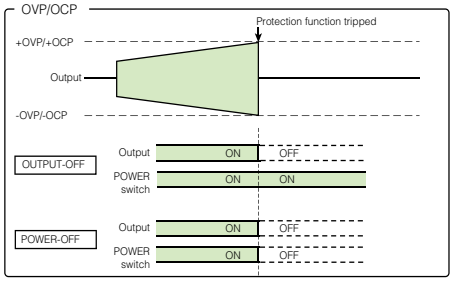
Response switching

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.)

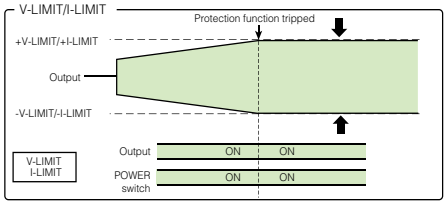
Setting description	CV mode	CC mode			
	Voltage response	Current response			
		PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
Selectable values	3.5 µs	35 µs	70 µs	35 µs	35 µs
	10 µs	100 µs	100 µs	100 µs	100 µs
	35 µs	350 µs	350 µs	350 µs	350 µs
	100 µs	1 ms	1 ms	1 ms	1 ms
Factory default setting	3.5 µs	35 µs	70 µs	35 µs	35 µs

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.



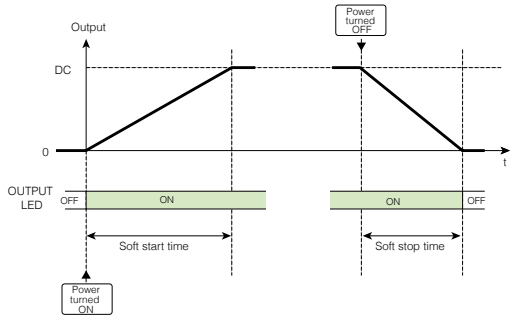
▶ V/I-LIMIT
Prevents voltage and current exceeding the protection trip points. (Output is not turned OFF.)
The V/I-LIMIT function can be used to automatically change the unit from CV mode to I-LIMIT, and from CC mode to V-LIMIT. This allows the unit to be used as a power source that changes automatically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

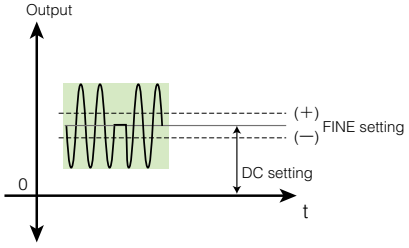


Fine settings function

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

Input range

- PBZ20-20
CV : DC setting value ±1.0000 V, resolution 0.0001 V
CC: DC setting value ±1.0000 A, resolution 0.0001 A
- PBZ40-10
CV : DC setting value ±2.0000 V, resolution 0.0001 V
CC: DC setting value ±0.5000 A, resolution 0.0001 A
- PBZ60-6.7
CV : DC setting value ±3.0000 V, resolution 0.0002 V
CC: DC setting value ±0.3350 A, resolution 0.0001 A
- PBZ80-5
CV : DC setting value ±4.0000 V, resolution 0.0002 V
CC: DC setting value ±0.2500 A, resolution 0.0001 A



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

External control

- External output ON/OFF
- Shutdown

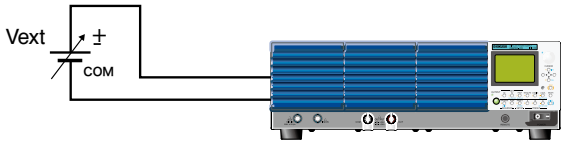
Status signal output

CV, CC, OUTPUT, and ALARM are output.

External signal input (external voltage control)

It is compatible with two types of input signals.

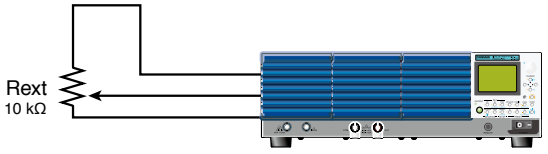
- The DC signal of the internal signal source can be controlled by external voltage at the rear panel (J1 connector) from DC control signal 0 to approximately ±10 V.



- 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: ±12 Vpeak, input impedance is: Approx. 10 kΩ, 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 P11.

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

Constant voltage (CV mode)			PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
DC voltage	Setting range *1	Bipolar mode	0.000 V to ±21.000 V	0.000 V to ±42.000 V	0.000 V to ±63.000 V	0.000 V to ±84.000 V
		Unipolar mode	0.000 V to 21.000 V	0.000 V to 42.000 V	0.000 V to 63.000 V	0.000 V to 84.000 V
		Fine function	±5 % of rating			
	Setting resolution		0.001 V (Fine function setting resolution 0.0001 V)		0.002 V (Fine function setting resolution 0.0002 V)	
	Setting accuracy *2		±(0.05 % of setting + 0.05 % of rating)			
	Temp. coefficient		±(100 ppm/°C of rating) (TYP. value)			
AC voltage	Setting range *1		0.0 Vpp to 42.0 Vpp	0.0 Vpp to 84.0 Vpp	0.0 Vpp to 126.0 Vpp	0.0 Vpp to 168.0 Vpp
	Setting resolution		0.01 V	0.1 V		
	Setting accuracy *3		±0.5 % of rating			
AC frequency	Setting range		0.01 Hz to 100.00 kHz			
	Setting resolution		0.01 Hz			
	Setting accuracy		±200 ppm			
	Sweep		Linear, log			
	Sweep time		100 µs to 1000 s (resolution 100 µs)			
AC waveform	Type		Sine wave, square wave, triangular wave, user-defined waves (16 waves)			
	Start phase		0 ° to 359 °			
	Square wave duty		0.1 % to 99.9 % (f < 100 Hz), 1 % to 99 % (100 Hz ≤ f < 1 kHz) 10 % to 90 % (1 kHz ≤ f < 10 kHz), 50 % fixed (10 kHz ≤ f)			
Constant voltage characteristic	Frequency characteristic *4		DC to 100 kHz (TYP. value)			
	Response *5, *6		3.5 µs, 10 µs, 35 µs, 100 µs (TYP. value)			
	Overshoot		5 % or less (TYP. value)			
	Ripple	(p-p) *7	20 mV (TYP. value)		30 mV (TYP. value)	
	Noise	(rms) *8	2 mV (TYP. value)	4 mV (TYP. value)	4 mV (TYP. value)	4 mV (TYP. value)
	Load effect *9		±(0.005 % of setting + 1 mV)			
	Source effect *10		±(0.005 % of setting + 1 mV)			

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

Constant current (CC mode)			PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
DC current	Setting range *1	Bipolar mode	0.000 A to ±21.000 A	0.000 A to ±10.500 A	0.000 A to ±7.035 A	0.000 A to ±5.250 A
		Unipolar mode				
		Fine function	±5 % of rating			
	Setting resolution		0.001 A (Fine function setting resolution 0.0001 A)			
	Setting accuracy *2		±(0.3 % of rating)			
	Temp. coefficient		±(100 ppm/°C of rating) (TYP. value)			
AC current	Setting range *1		0.0 App to 42.0 App	0.0 App to 21.0 App	0.0 App to 14.07 App	0.0 App to 10.5 App
	Setting resolution		0.01 A			
	Setting accuracy *3		±0.5 % of rating			
AC frequency	Setting range		0.01 Hz to 100.00 kHz			
	Setting resolution		0.01 Hz			
	Setting accuracy		±200 ppm			
	Sweep		Linear, log			
	Sweep time		100 µs to 1000 s (resolution 100 µs)			
AC waveform	Type		Sine wave, square wave, triangular wave, user-defined waves (16 waves)			
	Start phase		0 ° to 359 °			
	Square wave duty		0.1 % to 99.0 % (f < 100 Hz), 1 % to 99 % (100 Hz ≤ f < 1 kHz) 10 % to 90 % (1 kHz ≤ f < 10 kHz), 50 % fixed (10 kHz ≤ f)			
Constant current characteristic	Frequency characteristic *4		DC to 10 kHz (TYP. value)	DC to 5 kHz (TYP. value)	DC to 10 kHz (TYP. value)	
	Response		35 µs, 100 µs, 350 µs, 1 ms (TYP. value)	70 µs, 100 µs, 350 µs, 1 ms (TYP. value)	35 µs, 100 µs, 350 µs, 1 ms (TYP. value)	
	Overshoot		5 % or less (TYP. value)			
	Ripple noise (rms) *7		3 mA (TYP. value)			
	Load effect *8		±(0.01 % of setting + 1 mA)			
	Source effect *9		±(0.01 % of setting + 1 mA)			

*1. The combination of the DC current and AC current peak values is limited to within the DC current setting range.
*2. At ambient temperature of 18 °C to 28 °C
*3. At ambient temp. 18 °C to 28 °C, 100 Hz sine wave, response 35 µs, output short circuited
*4. Frequency at which the ratio of the external signal input amplitude and output current amplitude is -3 dB (at standard frequency 100 Hz, response 35µs, rated load)
The frequency characteristic varies depending on the load impedance.When the load impedance increases, the frequency characteristic declines.
*5. Rise time / fall time (at rated load, excepting output ON/OFF) Rise/fall time varies depending on the load impedance.
*6. Rise time: When the output current is changed from 0 A to the rated current, this is the rise time is the time during which the output current changes from 10 % to 90 % of the rated current.
Fall time: When the output current is changed from the rated current to 0 A, the fall time is the time during which the output current changes from 90 % to 10 % of the rated current.
*7. The measurement frequency band is 10 Hz to 1 MHz (at 10% to 100% of rated output voltage).
*8. Change in the output current in response to a voltage change from 10 % to 100 % of the rated output voltage
*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	PBZ60-6.7	PBZ80-5
Voltage measurement	DC	Measurement range (resolution)	120 % of rating (0.001 V)			
		Accuracy *1	±(0.05 % of reading + 0.05 % of rating)			
		Temp. coefficient	±(100 ppm/°C of rating) (TYP. value)			
	AC	Measurement range (resolution)	120 % of rating/CF (0.001 V)			
	DC + AC	Measurement range (resolution)	120 % of rating (0.001 V)			
	AC, DC + AC	Accuracy *1, *2	±(0.5 % of reading + 0.1 % of rating) (5 Hz to 10 kHz)			
			±(1 % of reading + 0.2 % of rating) (10 kHz to 50 kHz)			
			±(2% of reading + 0.2 % of rating) (50 kHz to 100 kHz)			
	PEAK	Measurement range (resolution)	120 % of rating (0.01 V)			
	PEAK	Accuracy *1, *3	±(0.5 % of rating)			
Current measurement	DC	Measurement range (resolution)	120 % of rating (0.001 A)			
		Accuracy *1	±(0.3 % of reading + 0.1 % of rating)			
		Temp. coefficient	±(150 ppm/°C of rating) (TYP. value)			
	AC	Measurement range (resolution)	120 % of rating/CF (0.001 A)			
	DC + AC	Measurement range (resolution)	120 % of rating (0.001 A)			
	AC, DC + AC	Accuracy *1, *2	±(3 % of reading + 0.1 % of rating) (5 Hz to 10 kHz)			
			±(10 % of reading + 1 % of rating) (10 kHz to 100 kHz)			
	PEAK	Measurement range (resolution)	120 % of rating (0.01 A)			
	PEAK	Accuracy *1, *3	±(0.5 % of rating)			
Measurement time			100 µs to 3600 s			

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

Protection functions		PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
Overvoltage protection	Protection trip *1, *2	OVP or V-LIMIT (output restriction) For OVP, select either output OFF or POWER switch OFF.			
	Setting range (Bipolar mode)	Select whether (-110 % of rtg ≦ -V.LIM ≦ +V.LIM ≦ +110 % of rtg) or (-110 % of rtg ≦ -OVP ≦ -1 % of rtg, +1 % of rtg ≦ +OVP ≦ +110 % of rtg)			
	Setting range (Unipolar mode)	Select whether -1 % of rtg ≦ -V.LIM ≦ +V.LIM ≦ +110 % of rtg or +1 % of rtg ≦ +OVP ≦ +110 % of rtg			
	Setting resolution	0.01 V			
	Setting accuracy	±1 % of rating			
Overcurrent protection	Protection trip *1, *2	OCP or I-LIMIT (output limit). Select whether output or the POWER switch turns off when OCP is activated.			
	Setting range	Select wheter (-110 % of rtg ≦ -I.LIM ≦ -1 % of rtg ≦ +1 % of rtg ≦ +I.LIM ≦ +110 % of rtg) or (-110 % of rtg ≦ -OCP ≦ -1 % of rtg ≦ +1 % of rtg ≦ +OCP ≦ +110 % of rtg)			
	Setting resolution	0.01 A			
	Setting accuracy	±1 % of rating			
Overheating protection	Protection trip	Turns output off when overheating is detected.			
Power restriction (Sink power)	Bipolar mode	100 W (TYP. value)	180 W (TYP. value)	200 W (TYP. value)	
	Unipolar mode	400 W (TYP. value)		402 W (TY.P value)	400 W (TYP. value)
Control functions		**PBZ20-20**	**PBZ40-10**	**PBZ60-6.7**	**PBZ80-5**
Internal signal source DC signal control	Control voltage input	Approx 0 V to Approx. ±10.0 V, 0 % to ±100 % of rated output			
	Control voltage ratio input	0 % to ±108 % of rated voltage by changing the voltage ratio of the internal standard voltage, using 10 kΩ external resistance			
Output ON/OFF control input		External contact input for output ON/OFF			
Shutdown input		External contact input for POWER switch OFF			
Status output		CV mode, CC mode, output ON, alarm active			

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

Signal I/O			PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
External signal input	Amplifier gain	CV mode	-20 to +20	-40 to +40	-60 to +60	-80 to +80
		CC mode	-20 S to +20 S	-10 S to +10 S	-6.70 S to +6.70 S	-5 S to +5 S
		Setting resolution	0.01 V (CV mode), 0.01 S (CC mode)	0.1 V (CV mode), 0.01 S (CC mode)		
		Setting accuracy *1	±5 % of rating			
	Max. allowable input voltage		±12 Vpeak			
	Input impedance		10 kΩ (TYP. value)			
	Terminal		BNC Safety Socket (Common connects to output COM terminal.)			
Current monitor Output	Output voltage		2 V at rated current			
	Output voltage accuracy		±1 % of rating (TYP. value)			
	Output voltage frequency characteristic		DC to 20 kHz			
	Terminal		BNC Safety Socket (Common connects to output COM terminal.)			
Clock input	Input voltage		0.5 Vpp to 5 Vpp			
	Input impedance		1 kΩ (AC coupled) (TYP. value)			
	Lock frequency range		10 MHz ± 200 Hz			
	Lock time		2 s or less			
	Terminal		Insulated BNC (Common is insulated from chassis: Voltage to ground Max. 42 V peak)			
Clock output	Output voltage		1 Vpp (with 50 Ω terminal) (TYP. value)			
	Output impedance		50 Ω (AC coupled) (TYP. value)			
	Output frequency		10 MHz ± 200 Hz			
	Terminal		BNC (Common connected to chassis.)			
Trigger input	Input level		H level: 2 V to 5 V, L level: 0 V to 0.8 V (TTL compatible)			
	Polarity		H level, L level			
	Pulse width		1 µs or more			
	Delay		1 µs or less			
	Input impedance		10 kΩ (TYP value) (DC coupled)			
	Terminal		BNC (Common connected to chassis.)			
Trigger output	Output level		H level: 2.7 V to 5 V, L level: 0 V to 0.4 V (TTL compatible)			
	Polarity		H level, L level			
	Pulse width		10 µs (TYP. value)			
	Rise/fall time		100 ns or less			
	Fan-out		5 PBZ series units			
	Terminal		BNC (Common connected to chassis.)			

*1. With DC and amplifier gain at maximum

Interface		PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
Common specifications	Software protocol	IEEEStd 488.2-1992			
	Command language	Conforms to SCPI Specification 1999.0.			
RS232C	Hardware	Conforms to EIA232D specifications. D-SUB 9-pin connector (male) *1 Baud rate: 1200, 2400, 4800, 9600, 19200, 38400 bps Data length: 7 bits or 8 bits, Stop bit: 1 bit or 2 bits, No parity Flow control: X-Flow/None			
	Program message terminator	LF when receiving, CR/LF when sending			
GPIB	Hardware	Conforms to IEEEStd 488.2-1987 specifications. SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E1 24-pin connector (receptacle)			
	Program message terminator	LF or EOI when receiving, LF + EOI when sending			
	Primary address	1 to 30			
USB	Hardware	Conforms to USB 2.0 specifications. Communications speed: 12 Mbps (full speed) Socket B type			
	Program message terminator	LF or EOM when receiving, LF + EOM when sending			
	Device class	Conforms to USBTMC-USB488 device class specifications.			
LAN (factory option)	Hardware	IEEE802.3 100Base-TX/10Base-T Ethernet, IPv4, RJ-45 connector *2			
		Complies with the LXI Class C, Specification 1.2		Not LXI certified	
	Communication protocol	VXI-11			
	Program message terminator	LF or END when receiving, LF + END when sending			

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

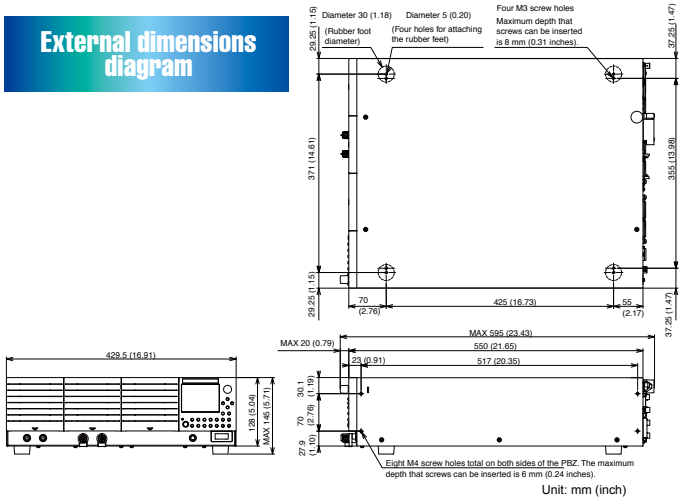
Other functions		PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
Sequence function	No. of programs	16			
	No. of steps	Total 1024			
	Step time	100 µs to 1000 H (100 µs step) *1			
Preset memory		3 memories			
Setup memory		10 memories			
Key lock		Select from 1 of 3 levels.			
Remote sensing		Function ON/OFF, used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

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

General specifications		PBZ20-20	PBZ40-10	PBZ60-6.7	PBZ80-5
Environment	Operating environment	Indoor use, overvoltage category II			
	Operating temp./humidity range	0 to +40 °C / 20 to 85 % RH (no condensation)			
	Storage temp./humidity range	-25 to +70 °C / Max. 90 % RH (no condensation)			
Grounding polarity		Only the output COM terminal can be grounded.			
Voltage to ground		DC 500 V Max.			
Withstand voltage	Between primary side and chassis	1500 V AC, no abnormalities at 1 minute			
	Between primary side and output terminal				
Insulation resistance	Between primary side and chassis	500 V DC, 30 MΩ or more (at humidity 70 % RH or less)			
	Between primary side and output terminal				
	Between output terminal and chassis	500 V DC, 1 MΩ or less (at humidity 70 % RH or less)			
Ground continuity	Between power cord connector, grounding pin <-> chassis	25 A AC, 0.1 Ω or less			
Cooling method		Forced air cooling by a temperature-sensitive variable-speed fan			
Safety *1		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)		429.5 (16.91") W × 128 (5.0") (145 (5.7")) H × 550 (21.65") (595(23.4")) D mm			
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.

External dimensions diagram



Unit: mm (inch)

Rear panel

■ Sequence creation software

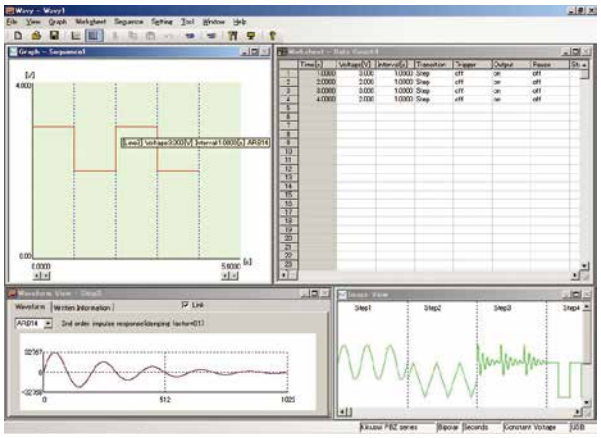
Wavy

Wavy for PBZ

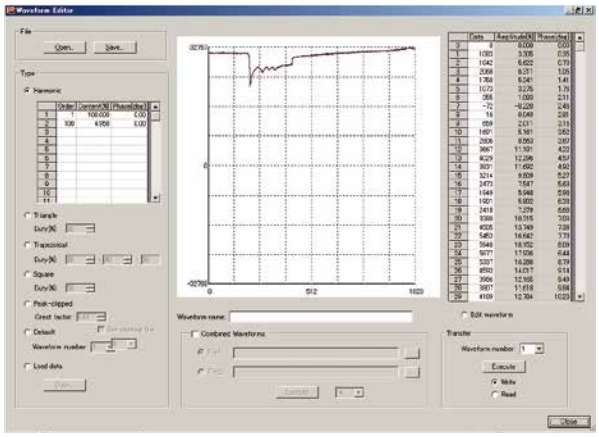
[Operating environment] Windows Vista / Windows 7

*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



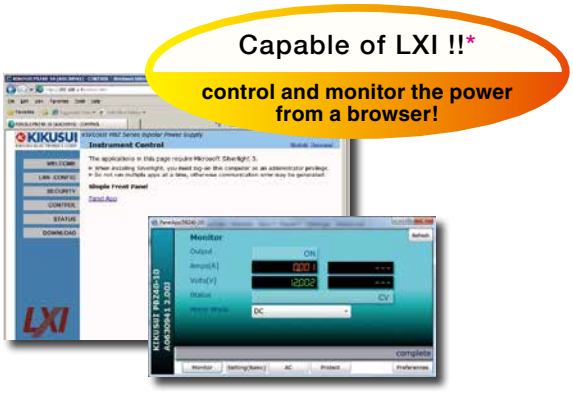
▲ User-defined waveform edit screen

- 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

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.



*PBZ60-6.7 and PBZ80-5 are under application.

■ Vertical Stand

- VS01

*Not included with the PBZ series main unit.

■ Rack-mounting bracket

- KRB3-TOS
  (For EIA inch size)
- KRB150-TOS
  (For JIS metric size)

■ Parallel operation kit

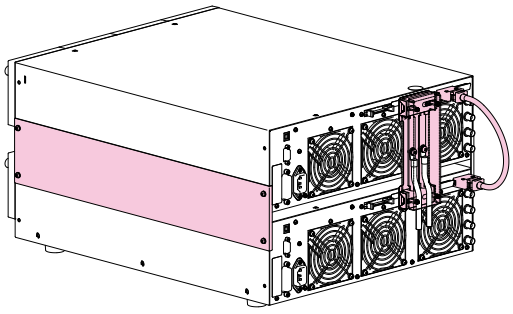
- PK01-PBZ
- PK02-PBZ
  (For EIA inch size)
- PK03-PBZ
  (For JIS metric size)

Parallel operation kit components

PBZ series
Intelligent Bipolar DC power supply

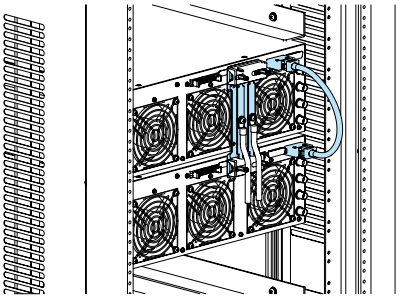
Parallel operation kit PK01-PBZ (option) components

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



Parallel operation kit PK02-PBZ (For EIA inch size, option) ,
PK03-PBZ (For JIS metric size, option) components

Component	Qty.	Component	Qty.
Insulating sheet	1	Load wire screws (M5-10L)	2
OUTPUT terminal connection bars	2	Parallel operation signal cable	1



Rack mount bracket
KRB3-TOS or KRB150-TOS is required.

Smart Rack System

line-up

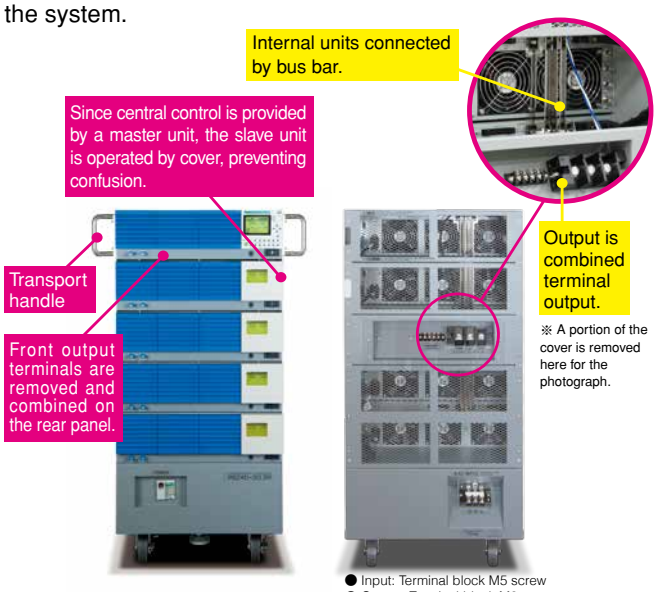
Available in total of 6 models with up to 2 kW of the maximum output power in 2 types of output voltage, ±20 V and ±40 V.

Capacity • Appearance	Three parallel	Four parallel	Five parallel
20 V System	60 A	80 A	100 A
	PBZ20-60 SR	PBZ20-80 SR	PBZ20-100 SR
40 V System	30 A	40 A	50 A
	PBZ40-30 SR	PBZ40-40 SR	PBZ40-50 SR

*If the prallel operation system required more than 6 units, please contact with our local distributor.

appearance

The Smart Rack package offers the safety and easy to use, with adopting the know-how of which details can be found in the system.



● Input: Terminal block M5 screw
● Output: Terminal block M8 screw

KIKUSUI ELECTRONICS CORPORATION
1-1-3, Higashiyamata, Tsuzuki-ku, Yokohama, 224-0023, Japan
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2975 Bowers Avenue, Suite 307, Santa Clara, CA 95051
Phone : 408-980-9433 Facsimile : 408-980-9409

KIKUSUI TRADING (SHANGHAI) Co., Ltd. www.kikusui.cn
Room 216,Building 4, No.641,Tianshan Road, Shanghai City, China
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

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KIKUSUI

Realizing the Large-Scale system of the high power Bipolar Power Supply!

New

High Power Intelligent Bipolar Power Supply

PBZ SR SERIES

PBZ20-60 SR
PBZ20-80 SR
PBZ20-100 SR
PBZ40-30 SR
PBZ40-40 SR
PBZ40-50 SR

* The SR model name is an abbreviation for "Smart Rack."

High Power Intelligent Bipolar Power Supply

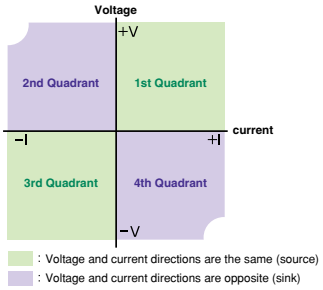
PBZ SR series

High-speed response even with high power

With 100 kHz (CV), 10 kHz (CC: 20 V model), and 5 kHz (CC: 40 V model) frequency characteristics, the superior waveform quality makes it possible to reproduce a variety of waveforms with high precision.

The PBZ SR series is a series of high-power bipolar DC stabilized power supplies. The PBZ SR series are designed based on the PBZ Intelligent Bipolar power supply series, that supports large currents (up to ±100 A) and is assembled with exclusive rack system (Smart Rack). The 4-quadrant operation allows the power to be supplied (source) or absorbed (sink), and it is suitable for driving inductive loads or capacitive loads.
Also, the PBZ SR series is equipped with LAN, USB, GPIB, and RS232C as standard communication interfaces.

Four quadrants (bipolar) operation concept diagram

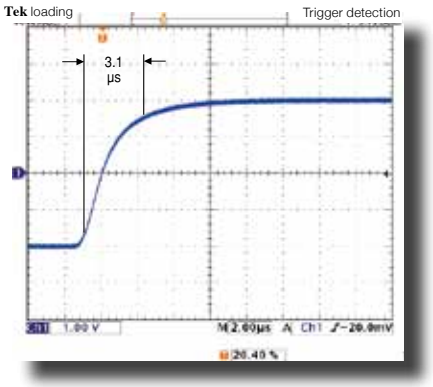


- User-defined waveform generation function
- Sequence function
- Synchronized operation function
- Central control with the master unit utilizing master and slave operation
- Displays the total output current of all units on the master unit (display of combined value) *1
- Safety design that switches all units off when ever the alarm is occurred on any unit of the system *2
- Guarantee of specifications with Smart Rack (test data standardly included)
- Equipped with LAN (Capable of LXI), USB, GPIB, and RS232C,as standard interface.

*1 Slave unit displays its own output current
*2 If the alarm for the master unit is cleared, alarms for all units are cleared.

High-speed response (Voltage)

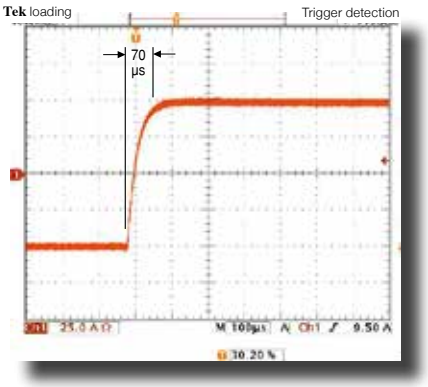
100 kHz frequency characteristic (CV). The superior waveform quality with rise and fall times of 3.5 µs which makes it possible to reproduce a variety of waveforms with high precision.



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

High-speed response (Current)

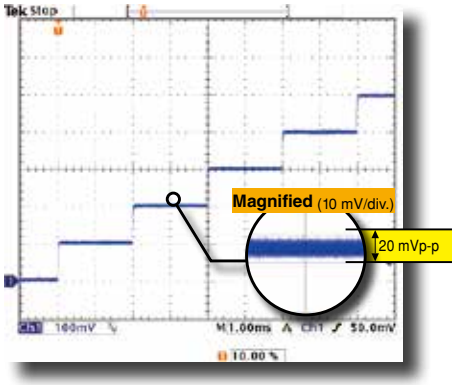
5 kHz frequency characteristic (CV). The superior waveform quality with rise and fall times of 70 µs which makes it possible to reproduce a variety of waveforms with high precision. (PBZ40-50SR)



▲ Sample of rising waveform
When response of 70 µs is set

Low ripple noise

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



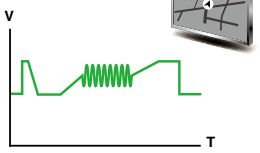
▲ Sample of actual 0.1 V step waveform
Ripple 6 mVrms, noise 30 mVp-p (PBZ40-50SR)

applications

Expanded applications through the user-defined waveform generation

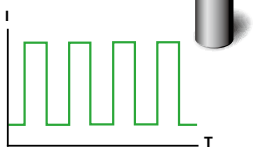
Power fluctuation test for automotive electronic components

Car navigation systems, others



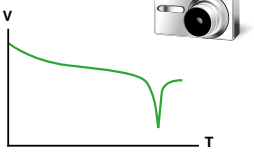
Rechargeable battery charge/ discharge test

Various rechargeable batteries



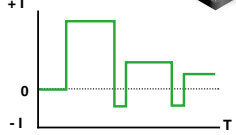
Simulated battery charge/ discharge test

Digital cameras, cellular phones, and others



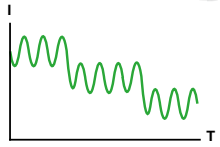
Constant current source for pulse plating

HDD, others



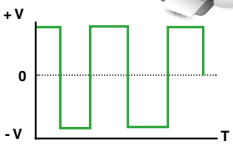
Ripple overlap test

Various electrical storage elements



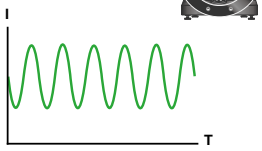
DC motor durability test

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

line-up

Available in total of 6 models with up to 2 kW of the maximum output power in 2 types of output voltage, ±20 V and ±40 V.

Capacity • Appearance	Three parallel	Four parallel	Five parallel
20 V System	60 A	80 A	100 A
	PBZ20-60 SR	PBZ20-80 SR	PBZ20-100 SR
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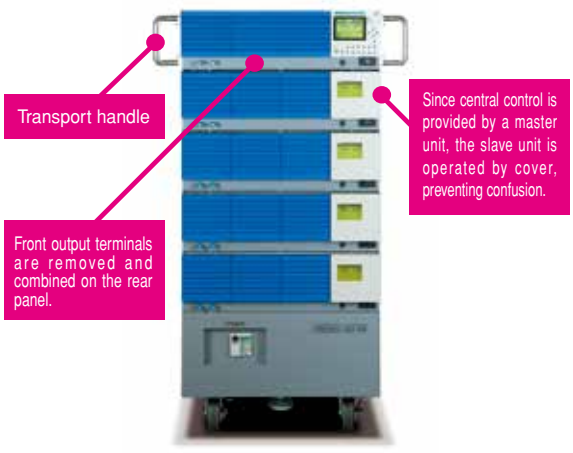
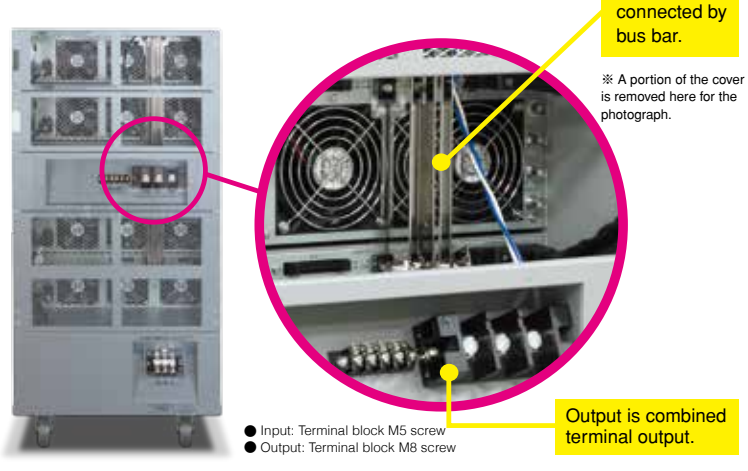
	PBZ40-30 SR	PBZ40-40 SR	PBZ40-50 SR

appearance

The Smart Rack package offers the safety and easy to use, with adopting the know-how of which details can be found in the system.





Application software

Supporting Kikusui power supplies and electronic loads more intelligently!

Expanding the ideas of engineers　“Wavy” sequence creation software

Wavy series

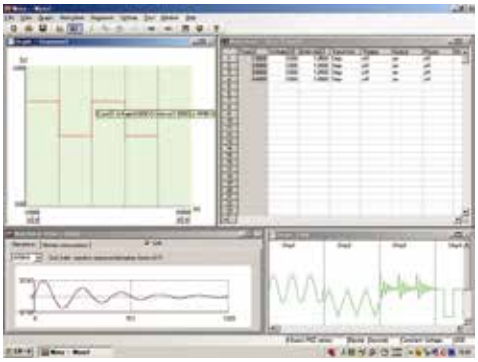
Wavy for PBZ

■ Sequence creation software “Wavy for PBZ”

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

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

The “Wavy” is an application software that supports sequence creation and the operation for the Kikusui power supplies and electronic loads. Even a person without any programming knowledge can freely control the sequencing of power supplies and electronic loads. Sequences can easily be created, just like drawing a picture or with the feel of a spreadsheet.



▲ Main screen

▲ User-defined waveform edit screen

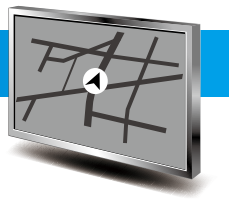
Trial version is available on our web!!

http://www.kikusui.co.jp/en/download/index.html

Download !

- It makes easier for creation or editing the test condition file required for the sequence operation.
- By using the storage function of test condition data file, it enables you to manage the test condition of the standard routine test.
- The progress of execution sequence will be displayed on the "execution graph" with the setting value and the cursor.
- It is possible to observe the intuitionistic output through by the "monitor graph" that plots the ongoing monitor value.
- You can save the acquired monitor data as a test result.
- Added the "waveform image" window. You can easily kept track of the AC signal.
- Allows you to edit and create the new arbitrary waveform easily. You can instantly write then output the created arbitrary waveform.
- Supports the status of description of sequence step for "selected" or "not selected". It enables you to select depends on the requirement such as the "pausing function", "trigger function", or "AC waveform".
- Data from Wavy for the PBX series (the former model of the PBZ series) can be loaded (upward compatibility).

Example of Wavy use ～Automotive equipment power fluctuation test～

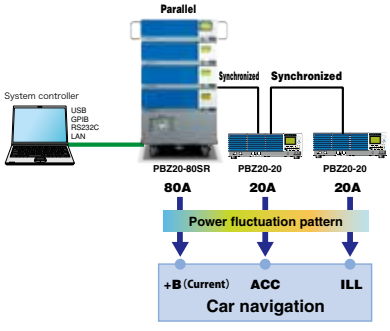


Achievement of multichannel power fluctuation testing (specification testing)!

[Example of multichannel power fluctuation test]

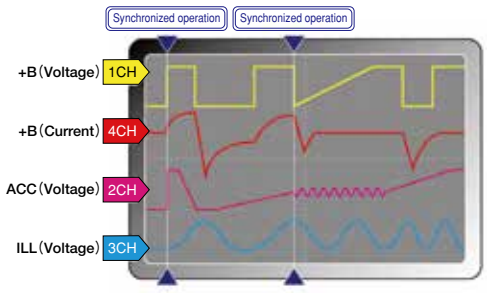
With automobiles, electricity is supplied from a battery. Multiple automotive electronic components either switch ON or OFF depending on the order in which the electricity is turned ON = order in which the key is turned (+B → ACC → IG). There are an extremely large number of unstable elements in an automobile's power supply environment, including engine start-up and electrical circuit chattering; thus, potential power supply problems caused by these elements, such as instantaneous power interruptions and fluctuations, a power fluctuation test is performed for the channels of automotive electronic components.

■ Example of using synchronized operation



[Car navigation system]

CH1：+B LINE	Power is continuously being supplied from the battery to components such as clocks and memory.
CH2：ACC LINE	A car navigation system's power supply is turned on via the ignition switch's ACC contact. In this condition, it becomes possible to make navigation settings, listen to music, and perform other operations.
CH3：ILL LINE	Power supply line (ILL) that directly pulls up +B, IG, and ACC. It is a backup power supply line.



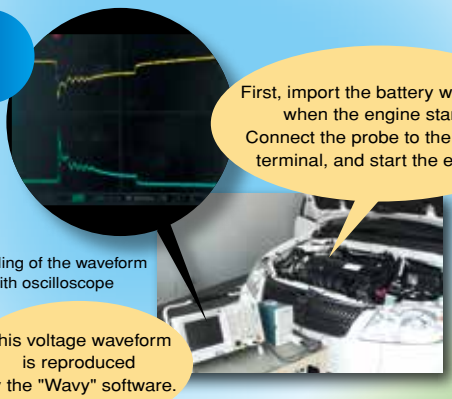
Example of application using the “Wavy” software ～Automotive equipment power fluctuation test～

Achievement of actual waveforms with the PBZ series!

Sampling the waveform data ▶ **Importing the waveform data** ▶ **Formatting and editing of the waveform data** ▶ **Reproduction of the waveform (output)**

▼ Example of the creation of actual waveform reproduction program

1

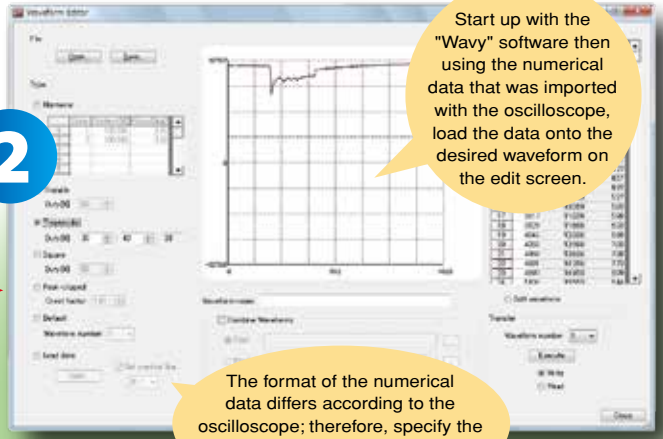


First, import the battery waveform when the engine starts. Connect the probe to the battery terminal, and start the engine.

Sampling of the waveform with oscilloscope

This voltage waveform is reproduced by the "Wavy" software.

2



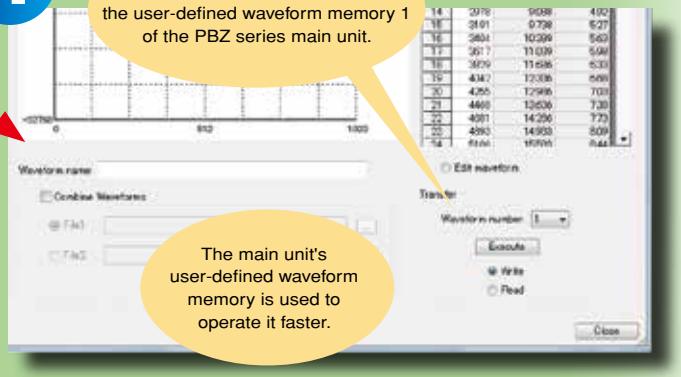
Start up with the "Wavy" software then using the numerical data that was imported with the oscilloscope, load the data onto the desired waveform on the edit screen.

The format of the numerical data differs according to the oscilloscope; therefore, specify the loading start position, row, and column as needed.

3

Select the file to be loaded. Specify the desired range to be used for the data that was loaded, and convert the maximum number of points that can be edited up to the maximum point of 1024 with "Wavy" software.

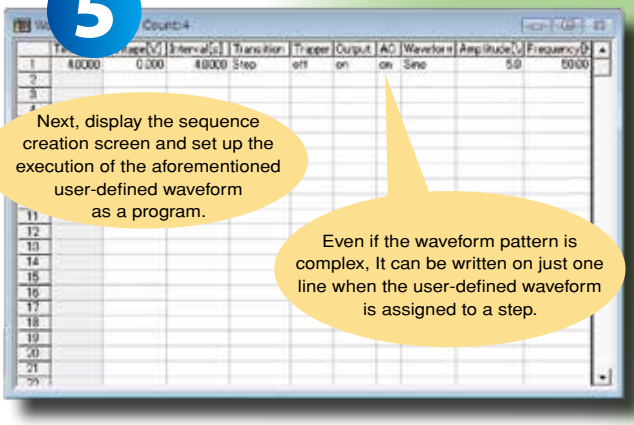
4



Load the saved file and write it into the user-defined waveform memory 1 of the PBZ series main unit.

The main unit's user-defined waveform memory is used to operate it faster.

5



Next, display the sequence creation screen and set up the execution of the aforementioned user-defined waveform as a program.

Even if the waveform pattern is complex, It can be written on just one line when the user-defined waveform is assigned to a step.

6

Finally, transfer the sequence to the program memory 1 of the PBZ series main unit. The preparation is now completed.

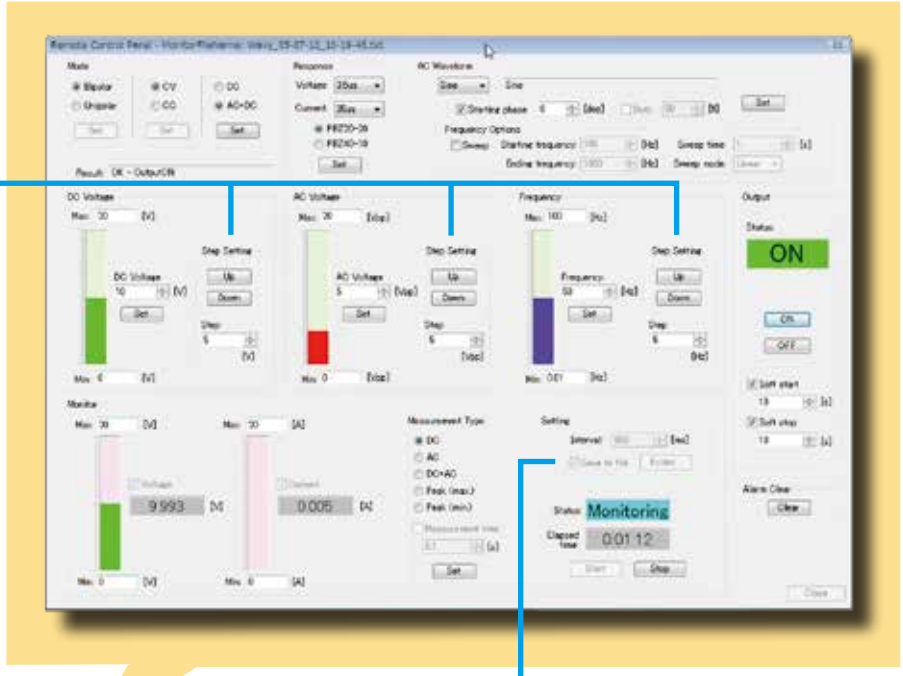
OK, it's ready to reproduce the waveform!

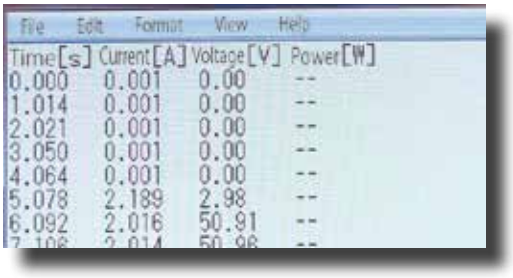
Example of application using the "Wavy" software ～Step conversion capability and monitoring～

Simple, convenient "direct control" with a sense of remote control

When the "Wavy" software's direct control is used for delicate operations and complicated settings that cannot be performed by the panel operation of the power supply. The "Wavy" software can be used conveniently as a "remote control" for power supplies and electronic loads, and also as a simple data logger.

Capable of step change, that is like the steps on stairs. This is something that cannot be operated from the knobs of a power supply main unit.





The output can be monitored and the data can be saved as a text file in CSV or tab-separated value (TSV) form.

interface

LAN INTERFACE

LXI compliant !!

control and monitor the power from a browser!

The PBZ SR series is equipped with the LAN interface (LXI compliant) as a standard interface in addition to the GPIB, RS232C, and USB interface. In regards to the command, it applies to the SCPI in addition to IEEE488.2. Using the instrument drivers (downloaded from our website) allows you to 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.

specifications

【Conditions】
Condition in which the output COM terminal is connected to the chassis with the short piece (included) at the rear output terminal. If not specified, condition in which remote sensing is not performed.
Warm-up time is 30 minutes (condition with current flowing). Load is pure resistance. TYP value is typical value for 23°C, but performance is not guaranteed.

Input / Output			PBZ20-60/80/100 SR	PBZ40-30/40/50 SR
Input rating	Nominal input voltage		200 Vac to 240 Vac	
	Voltage range		180 Vac to 250 Vac	
	Frequency range		47 Hz to 63 Hz	
	Current		5 A × parallel unit max	
	Inrush current		40 A × parallel unit peak or less	
	Power		900 VA × parallel unit or less	
	Power factor		0.95 TYP.	
Output rating	Power		400 W × parallel unit	400 W × parallel unit
	Voltage		±20 V	±40 V
	Current		±20 A × parallel unit	±10 A × parallel unit
Output terminal	Output terminal		Rear panel output terminals	
	Isolation Voltage		500Vdc Only the output's COM terminal can be grounded.	
Constant Voltage(CV)				
DC voltage	Settable range *1		0V to ±(105 % of rating)(BIPOLAR), or 0V to+(105 % of rating)(UNIPOLAR)	
	Resolution(Fine resolution)		0.001 V(0.0001 V)	
	Accuracy *2		±(0.05 % of setting+0.05 % of rating)	
	Temperature coefficient		±(100 ppm/°C of rating) TYP.	
AC voltage	Voltage	Settable range *1	0Vp-p to(210 % of rating)p-p	
		Resolution	0.1 V	
		Accuracy *3	±(0.5 % of rating)	
	Frequency	Settable range	0.01 Hz to 100.00 kHz	
Constant voltage characteristics	Frequency response *4		DC to 100 kHz(-3 dB)	
	Ripple noise		3 mVrms (10 Hz to 1 MHz)	6 mVrms(10 Hz to 1 MHz)
			30 mVp-p TYP. (10 Hz to 20 MHz)	
	Load effect *5		±(0.005 % of setting + 1 mV)	
	Source effect *6		±(0.005 % of setting + 1 mV)	
	Response *7		3.5 µs,10 µs、35 µs、100 µs TYP.	
	Overshoot *8		5 % or less(TYP)	
Constant current(CC)				
DC current	Settable range *9		0 A to ±(105 % of rating)	
	Resolution(Fine resolution)		0.001 A(0.0001 A)	
	Accuracy *10		±(0.3 % of rating)	
	Temperature coefficient		±(100 ppm/°C of rating)TYP.	
AC current	Current	Settable range *9	0 Ap-p to(210 % of rating)p-p	
		Resolution	0.1 A	
		Accuracy *11	±(0.5 % of rating)	
	Frequency	Settable range	0.01 Hz to 100.00 kHz	
Constant current characteristics	Frequency response *12		DC to 10 kHz(-3 dB)TYP.	DC to 5 kHz(-3 dB)TYP.
	Ripple noise		5 mArms. (10 Hz to 1 MHz)	
	Load effect *13		±(0.01 % of setting + 1 mA)	
	Source effect *14		±(0.01 % of setting + 1 mA)	
	Response *15		35 µs、100 µs、350 µs、1 ms TYP.	70 µs、100 µs、350 µs、1 ms TYP.
	Overshoot *16		5 % or less(TYP)	
AC common characteristics				
Frequency resolution			0.01 Hz	
Frequency Accuracy *10			±200 ppm	
Sweep			Linear and logarithmic	
Waveform	Type		Sine wave, square wave, triangle wave, and 16 user-defined arbitrary waveforms	
	Start phase		0 to 359°	
	Square wave duty cycle		0.1 % to 99.9 % (f < 100 Hz)	
			1 % to 99 % (100 Hz ≤ f < 1 kHz)	
			10 % to 90 % (1 kHz ≤ f < 10 kHz)	
			fixed to 50 % (10 kHz ≤ f)	

Measurement function			PBZ20-60/80/100 SR	PBZ40-30/40/50 SR
Voltage measurement	Measurement range		120 % of rating	
	Resolution		0.001 V	
	Accuracy *17		±(0.05 % of reading + 0.05 % of rating)	
	Temperature coefficient		±(100 ppm/°C of rating)TYP.	
Voltage measurement (AC,DC + AC)	Measurement range	AC	120 % of rating/CF	
		DC + AC	120 % of rating	
	Resolution		0.001 V	
	Accuracy *17,*18	5Hz<f ≦ 10kHz	±(0.5 % of reading + 0.1 % of rating)	
		10kHz<f ≦ 50kHz	±(1 % of reading + 0.2 % of rating)	
		50kHz<f ≦ 100kHz	±(2 % of reading + 0.2 % of rating)	
Voltage measurement (PEAK)	Measurement range		120 % of rating	
	Resolution		0.01 V	
	Accuracy *17,*19		±(0.5 % of rating)	
Current measurement (DC)	Measurement range		120 % of rating	
	Resolution		0.001A× parallel unit	
	Accuracy *17		± 〔0.3 % of reading + |0.1 %+0.3 %(parallel unit-1)| of rating 〕	
	Temperature coefficient		±(150 ppm/°C of rating)TYP.	
Current measurement (AC,DC + AC)	Measurement range	AC	120 % of rating/CF	
		DC + AC	120 % of rating	
	Resolution		0.001A× parallel unit	
	Accuracy *17,*18	5Hz<f ≦ 10kHz	±(3 % of reading + 0.1 % of rating)	
		10kHz<f ≦ 100kHz	±(10 % of reading + 1 % of rating)	
Current measurement (PEAK)	Measurement range		120 % of rating	
	Resolution		0.01 A× parallel unit	
	Accuracy *17,*19		±(0.5 % of rating)	
Common	Measurement time(Aperture)		100 µs to 3600 s	

Protection Features
Overvoltage protection, Overcurrent protection, Overheat protection, Power limit(sink power)

Interface
RS232C.GPIB.USB.LAN

General		
Operating temperature range		0 °C to 40 °C
Operating humidity range		20 %RH to 85 %RH(no condensation)
Storage temperature range		-25°C to 70°C
Storage humidity range		90 %rh or less (no condensation)
Insulation resistance	Across the primary circuit and the output terminals	500 Vdc, 30 M or greater (at 70 %rh humidity or less)
	Across the primary circuit and chassis	
	Across the output terminals and chassis	500 Vdc, 200 k or greater(at 70 %rh humidity or less)
Withstand voltage	Across the primary circuit and the output terminals Across the primary circuit and chassis	No abnormalities at 1500 Vac for 1 minute
Leakage current (250V/60Hz)		10 mA or less
Earth continuity		100 Aac, 0.1 or less
Cooling method		Forced air cooling using variable-speed, heat-sensitive fan
Battery backup		Settings are retained when the power is off. At least three years of battery life(at 25 °C).
Weight	Three parallel	Approx. 110 kg (242.51 lbs)
	Four parallel	Approx. 130 kg (286.60 lbs)
	Five parallel	Approx. 160 kg(352.74 lbs)
Dimensions (maximum)	Three parallel	432.6(545) W×579.4(685) H×700(735) Dmm
	Four parallel	432.6(545) W×712.1(815) H×700(735) Dmm
	Five parallel	432.6(545) W×844.8(950) H×700(735) Dmm
Accessories		Setup Guide(Smart rack) : 1 pc Manuals(PBZ-SR series) : 1 pc J1 connector kit : 1 pc

*1 : The peak value of the sum of the DC voltage and AC voltage is limited by the DC voltage's settable range.
*2 : At an ambient temperature between 18 °C and 28 °C.
*3 : 1 kHz sine wave, 3.5 µs response.
*4 : A frequency where the amplitude ratio of the output voltage to the external signal input voltage is -3 dB (when the referencefrequency is 1 kHz, the response is 3.5 µs, and when a rated load is connected).
*5 : The change in the output voltage in response to a change in the output current from 0 % to 100 % of the current rating (mea-sured at the sensing terminals when remote sensing is used).
*6 : The change in the output voltage in response to a ±10 % change in the input voltage in reference to the nominal input voltage (measured at the sensing terminals when remote sensing is used).
*7 : The rise or fall time (at rated load; excluding when output is turned on and off).
The frequency response is based on the specified response setting (frequency bandwidth = 0.35/the rise time).
Rise time: The time it takes for the output voltage to rise from 10 % to 90 % of the rating when the output voltage is changed from 0 V to the rated voltage.
Fall time: The time it takes for the output current to fall from 90 % to 10 % of the rating when the output current is changed from the rated current to 0 A.
*8 : Under no load or rated load.
*9 : The peak value of the sum of the DC current and AC current is limited by the DC current's settable range.
*10 : At an ambient temperature between 18 °C and 28 °C.
*11 : 100 Hz sine wave, 35 µs/70 µs response, and shorted output.
*12 : A frequency where the amplitude ratio of the output current to the external signal input voltage is -3 dB (when the reference frequency is 100 Hz, the response is 35 µs/75 µs, and a rated load is connected).
The frequency response changes accord- ing to the load impedance. When the load impedance increases, the frequency response decreases.
*13 : The change in the output voltage in response to a change in the output current from 10 % to 100 % of the current rating
*14 : The change in the output current in response to a ±10 % change in the input voltage in reference to the nominal input voltage (when the output voltage is in the range of 10 % to 100 % of the voltage rating).
*15 : The rise or fall time (at rated load; excluding when output is turned on and off). The rise and fall times change according to the load impedance.
Rise time: The time it takes for the output current to rise from 10 % to 90 % of the rating when the output current is changed from 0 A to the rated current.
Fall time: The time it takes for the output current to fall from 90 % to 10 % of the rating when the output current is changed from the rated current to 0 A.
*16 : Under no load or rated load.
*17 : At an ambient temperature between 18 °C and 28 °C.
*18 : When the input signal is in the 100 kHz bandwidth and has a crest factor of 3 or less (the measurement time is at least 10 times the input signal period).
*19 : Calibrated with a 1 kHz sine wave.

■ Cable option

Model	Part	Remarks
AC8-3P3M-M5C	AC Input Cable	8sq3-core 3m
TL02-PLZ	LOW Inductance Cable	100A 1m
TL03-PLZ	LOW Inductance Cable	100A 2m

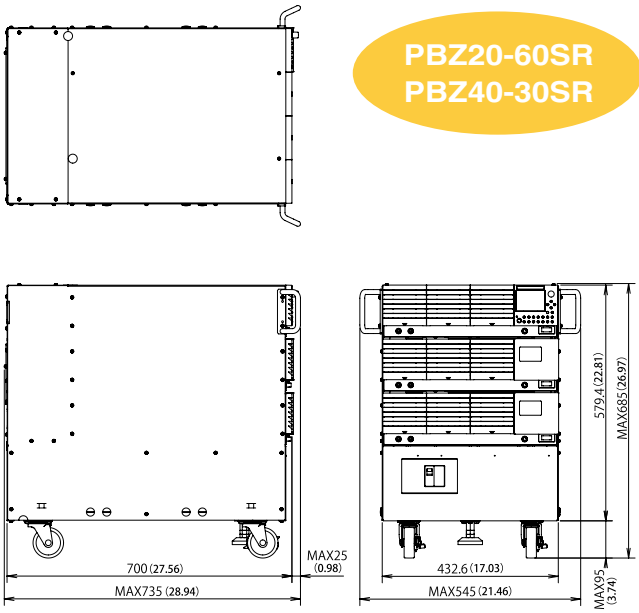
* LOW inductance cable can be used only when output is grounded, and cannot be used when not grounded.

TL02-PLZ

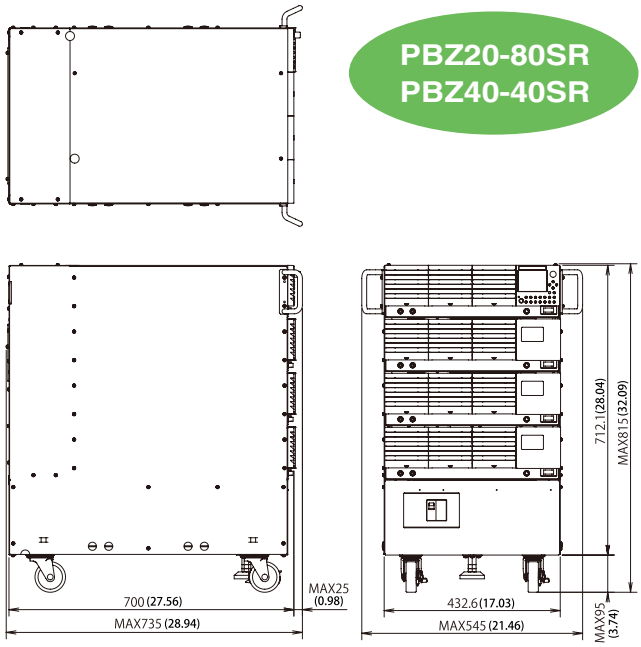
TL03-PLZ

dimensions

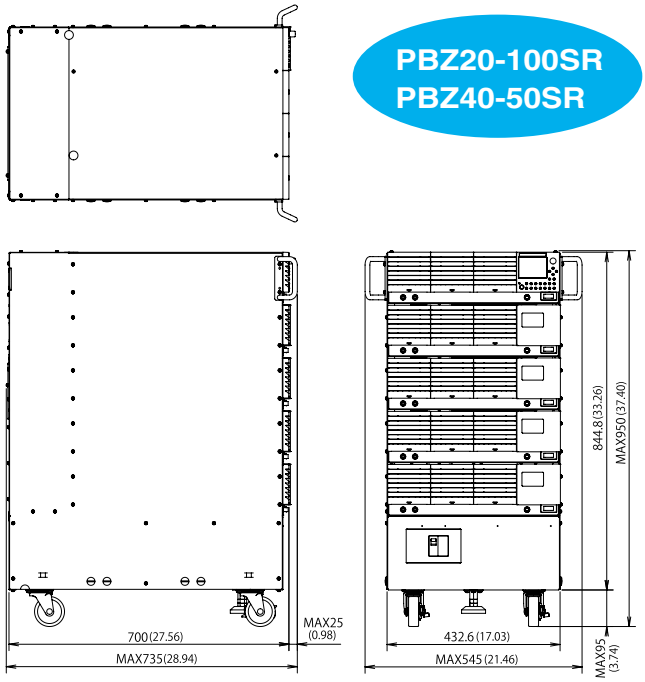
PBZ20-60SR
PBZ40-30SR



PBZ20-80SR
PBZ40-40SR



PBZ20-100SR
PBZ40-50SR



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