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)
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.

Intelligent Bipolar Power Supply
PBZ series

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

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

Four quadrants (bipolar) operation concept diagram

1. User-defined waveform generation function
2. Sequence function
3. Synchronized operation function
4. Parallel operation function
5. Unipolar mode
6. High-speed response 100 kHz (CV)
7. Low ripple noise!
Primary features/characteristics

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 0.7)
- Second order step response (damping coefficient 0.1)
- Second order step response (damping coefficient 0.2)
- 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
Primary features/characteristics

2 Sequence function

The script function makes sequences even more convenient!

- Concept diagram showing steps and program settings

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.

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.

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 1μs occurs at the start.

- Example of using synchronized operation

Sample configuration of a voltage fluctuation test system

-Example of combined trigger- and clock-synchronized operation
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 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 (MS-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 (MS-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 (MS-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 quadrant.

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.

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 mV-p (PBZ20-20)

*PBZ40-10 :Ripple 4 mVrms, noise 20 mV-p
PBZ40-10-6,7 :Ripple 4 mVrms, noise 30 mV-p
PBZ80-5 :Ripple 4 mVrms, noise 30 mV-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 description

<table>
<thead>
<tr>
<th>Setting item</th>
<th>DC measurement</th>
<th>AC measurement</th>
<th>DC + AC measurement</th>
<th>AC + AC measurement</th>
<th>Measurement time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range</td>
<td>120 % of rating (0.001 V)</td>
<td>120 % of rating/CF (0.001 V)</td>
<td>120 % of rating (0.001 V)</td>
<td>120 % of rating (0.001 V)</td>
<td>100 µs to 3000 s</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±0.05 % of reading</td>
<td>±0.05 % of reading</td>
<td>±0.1 % of reading</td>
<td>±0.1 % of reading</td>
<td></td>
</tr>
</tbody>
</table>

- **Voltage measurement**
  - **DC**: 120 % of rating (0.001 V)
  - **AC**: 120 % of rating/CF (0.001 V)
  - **DC + AC**: 120 % of rating (0.001 V)
  - **AC + AC**: 120 % of rating (0.001 V)
- **PEAK**: 120 % of rating (0.01 V)
- **AC**: 120 % of rating (0.001 A)
- **DC**: 120 % of rating (0.001 A)
- **AC + AC**: 120 % of rating (0.001 A)
- **DC + AC**: 120 % of rating (0.001 A)

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.)

<table>
<thead>
<tr>
<th>Selectable setting</th>
<th>CV mode Voltage response</th>
<th>CC mode Current response</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5 µs</td>
<td>10 µs</td>
<td>10 µs</td>
</tr>
<tr>
<td>70 µs</td>
<td>100 µs</td>
<td>100 µs</td>
</tr>
<tr>
<td>35 µs</td>
<td>350 µs</td>
<td>350 µs</td>
</tr>
<tr>
<td>100 µs</td>
<td>1 ms</td>
<td>1 ms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 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-stop 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.

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°C. These values do not guarantee the performance of the PBZ.
- **rating/CF:** The rated voltage or rated current divided by CF (crest factor).
- **The polarity of the output voltage and current is defined as follows.**
  - **Voltage:** Using the output’s COM terminal as a reference, the voltage is positive (+) when the OUT terminal is positive and negative (-) when the OUT terminal is negative.
  - **Current:** Positive (+) when current flows out from the OUT terminal and negative (-) when current flows into the OUT terminal.
- **The output specifications apply to the rear panel output terminals under the following conditions:**
  - The short bar is used to connect the output’s COM terminal and chassis terminal.
  - Remote sensing is not being performed.
  - The auxiliary output terminals may not meet the specifications.
  - Loads are purely resistive loads.
  - Rated loads are defined as follows:
    - When the PBZ is generating its rated voltage, the load causes the rated current to flow.
    - Or, when the PBZ is generating its rated current, the load makes the voltage drop to the PBZ’s rated voltage.

### AC Input, rated output

<table>
<thead>
<tr>
<th>Model</th>
<th>PBZ20-20</th>
<th>PBZ20-40</th>
<th>PBZ20-6.7</th>
<th>PBZ20-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal input voltage</td>
<td>100 V to 240 V AC, 50/60 Hz</td>
<td>90 V to 250 V AC, 47 Hz to 63 Hz</td>
<td>10 A AC or less (at rated load)</td>
<td>40 A peak or less</td>
</tr>
<tr>
<td>Power factor</td>
<td>0.95  (at input voltage 100 V, rated load)</td>
<td>(TYP value)</td>
<td>(TYP value)</td>
<td>(TYP value)</td>
</tr>
<tr>
<td>Output power</td>
<td>400 W</td>
<td>400 W</td>
<td>400 W</td>
<td>400 W</td>
</tr>
</tbody>
</table>

### Constant voltage (CV) mode

<table>
<thead>
<tr>
<th>Model</th>
<th>PBZ20-20</th>
<th>PBZ20-40</th>
<th>PBZ20-6.7</th>
<th>PBZ20-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bipolar mode</td>
<td>0.00 V to ±2100 V</td>
<td>0.00 V to ±4200 V</td>
<td>0.00 V to ±6500 V</td>
<td>0.00 V to ±84000 V</td>
</tr>
<tr>
<td>Bipolar mode</td>
<td>0.00 V to 2100 V</td>
<td>0.00 V to 4200 V</td>
<td>0.00 V to 6500 V</td>
<td>0.00 V to 84000 V</td>
</tr>
<tr>
<td>AC current</td>
<td>≤0.01 V to 200 V</td>
<td>≤0.01 V to 400 V</td>
<td>≤0.01 V to 600 V</td>
<td>≤0.01 V to 800 V</td>
</tr>
<tr>
<td>AC frequency</td>
<td>≤1000 Hz</td>
<td>≤1000 Hz</td>
<td>≤1000 Hz</td>
<td>≤1000 Hz</td>
</tr>
<tr>
<td>Temperature</td>
<td>≤20°C</td>
<td>≤20°C</td>
<td>≤20°C</td>
<td>≤20°C</td>
</tr>
<tr>
<td>AC waveform</td>
<td>Square wave</td>
<td>Square wave</td>
<td>Square wave</td>
<td>Square wave</td>
</tr>
<tr>
<td>Frequency characteristic: ²</td>
<td>DC to 10 kHz (TYP value)</td>
<td>DC to 5 kHz (TYP value)</td>
<td>DC to 5 kHz (TYP value)</td>
<td>DC to 10 kHz (TYP value)</td>
</tr>
</tbody>
</table>

### Constant current (CC) mode

<table>
<thead>
<tr>
<th>Model</th>
<th>PBZ20-20</th>
<th>PBZ20-40</th>
<th>PBZ20-6.7</th>
<th>PBZ20-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bipolar mode</td>
<td>0.000 A to ±21000 A</td>
<td>0.000 A to ±10500 A</td>
<td>0.000 A to ±7035 A</td>
<td>0.000 to ±5250 A</td>
</tr>
<tr>
<td>Bipolar mode</td>
<td>0.000 A to 10500 A</td>
<td>0.000 A to 7035 A</td>
<td>0.000 A to 5250 A</td>
<td>0.000 A to 5250 A</td>
</tr>
<tr>
<td>AC current</td>
<td>≤0.01 A</td>
<td>≤0.01 A</td>
<td>≤0.01 A</td>
<td>≤0.01 A</td>
</tr>
<tr>
<td>AC frequency</td>
<td>≤1000 Hz</td>
<td>≤1000 Hz</td>
<td>≤1000 Hz</td>
<td>≤1000 Hz</td>
</tr>
<tr>
<td>AC waveform</td>
<td>Square wave</td>
<td>Square wave</td>
<td>Square wave</td>
<td>Square wave</td>
</tr>
<tr>
<td>Frequency characteristic: ²</td>
<td>DC to 10 kHz (TYP value)</td>
<td>DC to 5 kHz (TYP value)</td>
<td>DC to 5 kHz (TYP value)</td>
<td>DC to 10 kHz (TYP value)</td>
</tr>
</tbody>
</table>

### Response

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting range</th>
<th>Setting range</th>
<th>Setting range</th>
<th>Setting range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bipolar mode</td>
<td>0.000 A to ±21000 A</td>
<td>0.000 A to ±10500 A</td>
<td>0.000 A to ±7035 A</td>
<td>0.000 A to ±5250 A</td>
</tr>
<tr>
<td>Bipolar mode</td>
<td>0.000 A to 10500 A</td>
<td>0.000 A to 7035 A</td>
<td>0.000 A to 5250 A</td>
<td>0.000 A to 5250 A</td>
</tr>
<tr>
<td>Bipolar mode</td>
<td>0.000 A to 10500 A</td>
<td>0.000 A to 7035 A</td>
<td>0.000 A to 5250 A</td>
<td>0.000 A to 5250 A</td>
</tr>
<tr>
<td>Bipolar mode</td>
<td>0.000 A to 10500 A</td>
<td>0.000 A to 7035 A</td>
<td>0.000 A to 5250 A</td>
<td>0.000 A to 5250 A</td>
</tr>
</tbody>
</table>

### Remote sensing

- **When the OUT terminal is positive:**
  - Positive (+) when the PBZ is generating its rated voltage, the load makes the voltage drop to the PBZ’s rated voltage.

### Performance

- **When the PBZ is generating its rated current, the load makes the voltage drop to the PBZ’s rated voltage.**
### Measurement display function

| DC | Measurement range (resolution) | 120 % of rating (0.01 V) |
| AC | Measurement range (resolution) | 120 % of rating (0.01 V) |
| AC + DC | Measurement range (resolution) | 120 % of rating (0.01 V) |
| PEAK | Measurement range (resolution) | 120 % of rating (0.01 V) |

**Temp. coefficient**

- DC: ±0.025 % of reading + 0.05 % of rating
- AC: ±0.05 % of reading + 0.1 % of rating
- AC + DC: ±0.1 % of reading + 0.2 % of rating
- PEAK: ±10 % of rating

**Voltage measurement**

| DC | Accuracy *1 | ±0.025 % of reading + 0.05 % of rating |
| AC | Accuracy *1 | ±0.05 % of reading + 0.1 % of rating |
| AC + DC | Accuracy *1 | ±10 % of rating |
| PEAK | Accuracy *2 | ±10 % of rating |

**Current measurement**

| DC | Accuracy *1 | ±0.025 % of reading + 0.05 % of rating |
| AC | Accuracy *1 | ±0.05 % of reading + 0.1 % of rating |
| AC + DC | Accuracy *1 | ±10 % of rating |
| PEAK | Accuracy *2 | ±10 % of rating |

**Measurement time**

100 µs to 3600 s

---

### Protection functions

- **Overvoltage protection**
  - Setting range (Bipolar mode): Select whether [-110 % of rating ≤ VULM ≤ +110 % of rating]
  - Setting range (Unipolar mode): Select whether [-1 % of rating ≤ VULM ≤ ±110 % of rating or -110 % of rating ≤ VULM ≤ +110 % of rating]

- **Overcurrent protection**
  - Setting range (Bipolar mode): Select whether [-110 % of rating ≤ IULM ≤ -1 % of rating or +110 % of rating ≤ IULM ≤ +110 % of rating or -110 % of rating ≤ OCP ≤ -110 % of rating or +110 % of rating ≤ OCP ≤ +110 % of rating]

- **Overheating protection**
  - Setting range: Turns output off when overheating is detected.

### Control functions

- **Input signal source**
  - DC voltage input: Approx 0 V to approx. 10.0 V, or 0 % to 100 % of rated output
  - DC voltage ratio input: 0 % to a full % of rated voltage by changing the voltage ratio of the internal standard voltage, using 10 kΩ external resistance

### Signal I/O

- **Amplifier gain**
  - DC mode: ±100 mV (IPV)
  - CC mode: ±10 mV (IPV)

- **Input impedance**
  - 10 kΩ (IPV)

- **Output voltage**
  - ±2 V (IPV)

- **Output voltage characteristic**
  - DC to 200 Hz

### Trigger input

- **Input impedance**
  - 10 kΩ (IPV)

- **Pulse width**
  - 1 µs or more

### Trigger output

- **Input impedance**
  - 10 kΩ (IPV)

### Terminal

- **Input level**
  - H level, L level

- **Pulse width**
  - 10 µs (IPV)
<table>
<thead>
<tr>
<th>Interface</th>
<th>PBZ20-20</th>
<th>PBZ40-10</th>
<th>PBZ60-1.7</th>
<th>PBZ90-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common specifications</td>
<td>Software protocol</td>
<td>IEJIE001:IEJIE002</td>
<td>Conforms to OPC Specification 1995.6</td>
<td></td>
</tr>
<tr>
<td>Command language</td>
<td>Conforms to EA233D specifications.</td>
<td>Conforms to OPC Specification 1995.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS232C</td>
<td>Hardware</td>
<td>conforms to EIEEE1681-1998 specifications.</td>
<td>Common pins 1, 4, 6, 7, 8, 9, 11, 12, 13, 16, 17, 19, 20, 21, 22, 23, 24.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Program message terminator</td>
<td>LF when receiving, OR when sending</td>
<td>LF when receiving, OR when sending</td>
<td>LF when receiving, OR when sending</td>
</tr>
<tr>
<td></td>
<td>USB</td>
<td>Conforms to USB 2.0 specifications.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Device class</td>
<td>IEEE802.3 100Base-TX, 10Base-T Ethernet, RJ45 connector -2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LAN (factory option)</td>
<td>Hardware</td>
<td>BIKE802.1 100Base-TX, 10Base-T Ethernet, RJ45 connector -2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Program message terminator</td>
<td>LF or EOM when receiving, LF = EOM when sending</td>
<td>LF or EOM when receiving, LF = EOM when sending</td>
</tr>
<tr>
<td>Other functions</td>
<td>PBZ20-20</td>
<td>PBZ40-10</td>
<td>PBZ60-1.7</td>
<td>PBZ90-5</td>
</tr>
<tr>
<td>Sequence function</td>
<td>No. of programs</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>No. of steps</td>
<td>Total 1024</td>
<td>Total 1024</td>
<td>Total 1024</td>
</tr>
<tr>
<td></td>
<td>Step time</td>
<td>100 μs to 1000 H (100 μs step) *1</td>
<td>100 μs to 1000 H (100 μs step) *1</td>
<td>100 μs to 1000 H (100 μs step) *1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Present memory</td>
<td>3 memories</td>
<td>3 memories</td>
<td>3 memories</td>
</tr>
<tr>
<td></td>
<td>Setup memory</td>
<td>10 memories</td>
<td>10 memories</td>
<td>10 memories</td>
</tr>
<tr>
<td></td>
<td>Key lock</td>
<td>Select from 8 levels.</td>
<td>Select from 8 levels.</td>
<td>Select from 8 levels.</td>
</tr>
<tr>
<td></td>
<td>Remote sensing</td>
<td>Function ON/OFF, used in CV mode</td>
<td>Function ON/OFF, used in CV mode</td>
<td>Function ON/OFF, used in CV mode</td>
</tr>
<tr>
<td></td>
<td>Operation setting at power ON</td>
<td>Output ON, start sequence function execution</td>
<td>Output ON, start sequence function execution</td>
<td>Output ON, start sequence function execution</td>
</tr>
<tr>
<td></td>
<td>Soft start / soft stop</td>
<td>Function ON/OFF</td>
<td>Function ON/OFF</td>
<td>Function ON/OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soft start/stop time 0.1 ms to 1000 s</td>
<td>Soft start/stop time 0.1 ms to 1000 s</td>
<td>Soft start/stop time 0.1 ms to 1000 s</td>
</tr>
<tr>
<td></td>
<td>Parallel operation</td>
<td>Max. 2 units of same model (using optional parallel operation kit)</td>
<td>Max. 2 units of same model (using optional parallel operation kit)</td>
<td>Max. 2 units of same model (using optional parallel operation kit)</td>
</tr>
<tr>
<td>General specifications</td>
<td>PBZ20-20</td>
<td>PBZ40-10</td>
<td>PBZ60-1.7</td>
<td>PBZ90-5</td>
</tr>
<tr>
<td>Environment</td>
<td>Operating environment</td>
<td>Indoor use, (overvoltage category II)</td>
<td>Indoor use, (overvoltage category II)</td>
<td>Indoor use, (overvoltage category II)</td>
</tr>
<tr>
<td></td>
<td>Operating temp/humidity range</td>
<td>0 to +40 °C / 20 to 85 % RH (no condensation)</td>
<td>0 to +40 °C / 20 to 85 % RH (no condensation)</td>
<td>0 to +40 °C / 20 to 85 % RH (no condensation)</td>
</tr>
<tr>
<td></td>
<td>Storage temp/humidity range</td>
<td>-25 to +70 °C / Max. 90 % RH (no condensation)</td>
<td>-25 to +70 °C / Max. 90 % RH (no condensation)</td>
<td>-25 to +70 °C / Max. 90 % RH (no condensation)</td>
</tr>
<tr>
<td>Grounding polarity</td>
<td>Only the output GND terminal can be grounded.</td>
<td>Only the output GND terminal can be grounded.</td>
<td>Only the output GND terminal can be grounded.</td>
<td></td>
</tr>
<tr>
<td>Voltage to ground</td>
<td>DC 500 V Max</td>
<td>DC 500 V Max</td>
<td>DC 500 V Max</td>
<td>DC 500 V Max</td>
</tr>
<tr>
<td>Withstand voltage</td>
<td>Between primary side and chassis</td>
<td>1500 V AC, no abnormalities at 1 minute</td>
<td>1500 V AC, no abnormalities at 1 minute</td>
<td>1500 V AC, no abnormalities at 1 minute</td>
</tr>
<tr>
<td></td>
<td>Between primary side and output terminal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>Between primary side and chassis</td>
<td>500 V DC, 30 MΩ or more (at humidity 70 % RH or less)</td>
<td>500 V DC, 30 MΩ or more (at humidity 70 % RH or less)</td>
<td>500 V DC, 30 MΩ or more (at humidity 70 % RH or less)</td>
</tr>
<tr>
<td></td>
<td>Between primary side and output terminal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Between output terminal and chassis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground continuity</td>
<td>Between power cord connector, grounding pin &lt;-&gt; chassis</td>
<td>25 A AC, 0.1 Ω or less</td>
<td>25 A AC, 0.1 Ω or less</td>
<td>25 A AC, 0.1 Ω or less</td>
</tr>
<tr>
<td>Cooling method</td>
<td>Forced air cooling by a temperature-sensitive variable-speed fan</td>
<td>Forced air cooling by a temperature-sensitive variable-speed fan</td>
<td>Forced air cooling by a temperature-sensitive variable-speed fan</td>
<td>Forced air cooling by a temperature-sensitive variable-speed fan</td>
</tr>
<tr>
<td>Safety</td>
<td>Conforms to the following safety requirement. EEC/21010-1 (Class I: Pollution degree 2)</td>
<td>Conforms to the following safety requirement. EEC/21010-1 (Class I: Pollution degree 2)</td>
<td>Conforms to the following safety requirement. EEC/21010-1 (Class I: Pollution degree 2)</td>
<td>Conforms to the following safety requirement. EEC/21010-1 (Class I: Pollution degree 2)</td>
</tr>
<tr>
<td>Electromagnetic compatibility (EMC)</td>
<td>Conforms to the following safety requirement. EEC/21010-1 (Class I: Pollution degree 2)</td>
<td>Conforms to the following safety requirement. EEC/21010-1 (Class I: Pollution degree 2)</td>
<td>Conforms to the following safety requirement. EEC/21010-1 (Class I: Pollution degree 2)</td>
<td>Conforms to the following safety requirement. EEC/21010-1 (Class I: Pollution degree 2)</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 22 kg</td>
<td>Approx. 22 kg</td>
<td>Approx. 22 kg</td>
<td>Approx. 22 kg</td>
</tr>
<tr>
<td>Accessories</td>
<td>Power cord: 1</td>
<td>J1 connector (Socket: 1, Protective covers: 2, Terminals: 3)</td>
<td>J1 connector (Socket: 1, Protective covers: 2, Terminals: 3)</td>
<td>J1 connector (Socket: 1, Protective covers: 2, Terminals: 3)</td>
</tr>
</tbody>
</table>

*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.

1. Cannot be used for special-order or modified products.
**Wavy series**

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.

- **Communication interface**
  - LAN

  In addition to IEEE 488.2, 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.

- **Vertical Stand**
  - VS01

- **Parallel operation kit**
  - PK01-PBZ
  - PK02-PBZ (For EIA inch size)
  - PK03-PBZ (For JIS metric size)

- **Rack-mounting bracket**
  - KRB3-TOS (For EIA inch size)
  - KRB150-TOS (For JIS metric size)

---

**Parallel operation kit components**

<table>
<thead>
<tr>
<th>Component</th>
<th>Qty.</th>
<th>Component</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brackets</td>
<td>2</td>
<td>Bracket screws (M4-8L)</td>
<td>8</td>
</tr>
<tr>
<td>Insulating sheet</td>
<td>1</td>
<td>Spacers</td>
<td>4</td>
</tr>
<tr>
<td>OUTPUT terminal connection bars</td>
<td>2</td>
<td>Load wire screws (M5-10L)</td>
<td>2</td>
</tr>
<tr>
<td>Parallel output terminal cover</td>
<td>1</td>
<td>Parallel operation signal cable</td>
<td>1</td>
</tr>
</tbody>
</table>

---

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Qty.</th>
<th>Component</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulating sheet</td>
<td>1</td>
<td>Load wire screws (M5-10L)</td>
<td>2</td>
</tr>
<tr>
<td>OUTPUT terminal connection bars</td>
<td>2</td>
<td>Parallel operation signal cable</td>
<td>1</td>
</tr>
</tbody>
</table>

---

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

*Not included with the PBZ series main unit.*
Smart Rack/Bipolar Pack System

line-up

■ PBZ SR Series line-up
Available in total of 12 models with up to 2 kW of the maximum output power in 4 types of output voltage, ± 20 V and ± 40 V and ± 60 V and ± 80 V.

<table>
<thead>
<tr>
<th>Capacity System</th>
<th>Three parallel</th>
<th>Four parallel</th>
<th>Five parallel</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 V System</td>
<td>60 A</td>
<td>80 A</td>
<td>100 A</td>
</tr>
<tr>
<td>40 V System</td>
<td>30 A</td>
<td>40 A</td>
<td>50 A</td>
</tr>
<tr>
<td>60 V System</td>
<td>20.1 A</td>
<td>26.8 A</td>
<td>33.5 A</td>
</tr>
<tr>
<td>80 V System</td>
<td>15 A</td>
<td>20 A</td>
<td>25 A</td>
</tr>
</tbody>
</table>

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

■ PBZ BP Series line-up
Available in total of 10 models with up to 4 kW of the maximum output power in 2 types of output voltage, ± 20 V and ± 40 V.

<table>
<thead>
<tr>
<th>Capacity System</th>
<th>Six parallel</th>
<th>Seven parallel</th>
<th>Eight parallel</th>
<th>Nine parallel</th>
<th>Ten parallel</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 V System</td>
<td>120 A</td>
<td>140 A</td>
<td>160 A</td>
<td>180 A</td>
<td>200 A</td>
</tr>
<tr>
<td>40 V System</td>
<td>60 A</td>
<td>70 A</td>
<td>80 A</td>
<td>90 A</td>
<td>100 A</td>
</tr>
</tbody>
</table>

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.

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

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

Distributor/Representative

All products contained in this catalogue are equipment and devices that are premised on use under the supervision of qualified personnel, and are not designed or produced for home-use or use by general consumers. Specifications, design and so forth are subject to change without prior notice to improve the quality. Product names and prices are subject to change and production may be discontinued when necessary. Product names, company names and brand names contained in this catalogue represent the respective registered trade name or trade mark. Colors, textures and so forth of photographs shown in this catalogue may differ from actual products due to a limited fidelity in printing. Although every effort has been made to provide the information as accurate as possible for this catalogue, certain details have unavoidably been omitted due to limitations in space. If you find any misprints or errors in this catalogue, it would be appreciated if you would inform us. Please contact our distributors to confirm specifications, price, accessories or anything that may be unclear when placing an order or concluding a purchasing agreement.