KIKUSUI

Part No. Z1-005-860, I0012702
Jul 2021

Setup Guide

Large-Capacity Bipolar Power Supply
Smart Rack System

PBZ-SR Series

1.2 kW model

PBZ20-60 SR
PBZ40-30 SR
PBZ60-20.1 SR
PBZ80-15 SR

1.6 kW model

PBZ20-80 SR
PBZ40-40 SR
PBZ60-26.8 SR
PBZ80-20 SR

2 kW model

PBZ20-100 SR
PBZ40-50 SR
PBZ60-33.5 SR
PBZ80-25 SR

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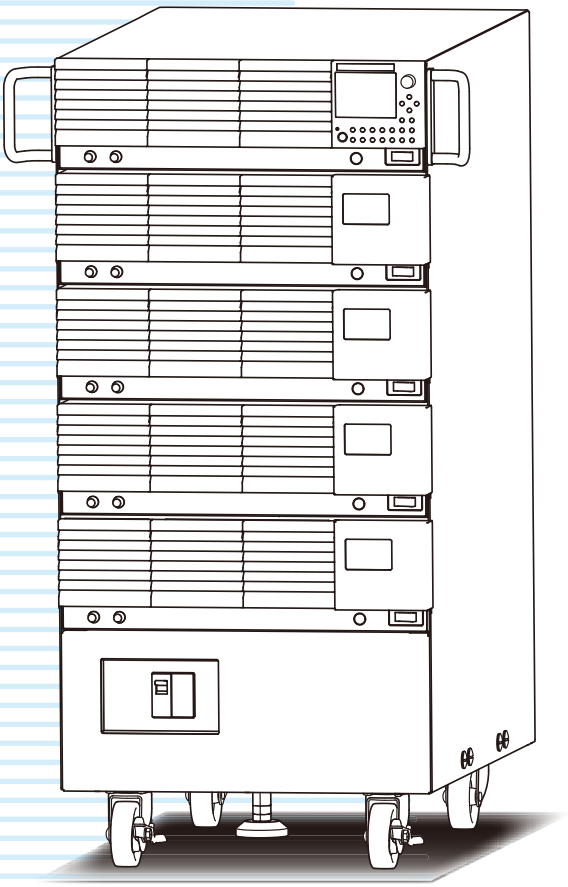

About PBZ-SR Series Manuals

There are PBZ-SR series Manuals listed as follows.

- Setup Guide Paper PDF (this manual)
  This manual is intended for users who are using the PBZ-SR Series for the first time. It includes covers topics related to setting up the product such as installing the product, wiring the power cables and load cables, and connecting the connectors.
- Specifications PDF
  This document describes the specifications of the PBZ-SR series.
- User's Manual of base model PBZ-SR series PDF
  This manual describes the base model PBZ-SR series. It provides an overview of the base model and notes on usage. It also gives various settings, operation procedures, maintenance and so on.
  Read first the setup guide to set up the PBZ-SR series, next read the User's Manual to use the functions of the product effectively.
- Quick Reference of base model PBZ-SR series Paper PDF
  This manual explains Panel description and operation briefly.
- The communication interface manual PDF
  This manual contains details about remotely controlling the tester using SCPI commands. The interface manual is written for readers with sufficient basic knowledge of how to control measuring instruments using a PC.
- Safety Information Paper PDF
  This document contains general safety precautions for this product. Keep them in mind and make sure to observe them.

The PBZ-SR series Manuals are intended for users of the product or persons teaching other users on how to operate the product.

Explanations are given under the presumption that the reader has knowledge about Power Supply.

PDF is provided on the included CD-ROM.

Adobe Acrobat Reader is required to view the PDF file.

If you find any incorrectly arranged or missing pages in the manual, they will be replaced. If the manual gets lost or soiled, a new copy can be provided for a fee. In either case, please contact Kikusui distributor/agent, and provide the “Kikusui Part No.” given on the cover.

The PBZ-SR series Manuals has been prepared with the utmost care; however, if you have any questions, or note any errors or omissions, please contact Kikusui distributor/agent.

After reading, always keep the manual nearby so that you may refer to it as needed.

Product firmware versions

This manual applies to products with firmware versions 2.2X.

When contacting us about the product, please provide us with:

The model (marked in the top section of the front panel)

The firmware version (see page 8)

The serial number (marked in the bottom section of the rear panel)

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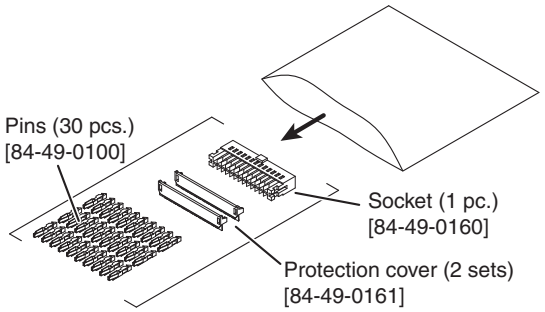
Checking the Package Contents

When you receive the product, check that all accessories are included and that the accessories have not been damaged during transportation.

If any of the accessories are damaged or missing, contact your Kikusui agent or distributor.

We recommend that all packing materials be saved, in case the product needs to be transported at a later date.



☐ J1 connector kit (1 set)

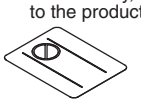
☐ CD-ROM (1 pc.)

☐ Quick Reference
English:1 pc., Japanese:1 pc.

☐ Setup guide
(This manual, 1 pc.)

☐ Safety information (1 pc.)

If necessary, attach to the product.



☐ Heavy object warning label (1 pc.)
[A8-900-158]

Product Overview

The PBZ-SR series is a large-capacity bipolar regulated DC power supply. It is a large-current model consisting of PBZ series bipolar power supplies that are mounted using dedicated rack parts (smart rack).

- It supports four-quadrant output, which means that it can source and sink both positive and negative voltages and currents.
- The internal AC signal or an external signal can be superimposed on the DC output.
- You can use the sequence feature to generate test signals for automotive and other electronic devices.
- Additionally, the PBZ-SR can be used with a variety of loads to perform tests such as motor endurance tests, solenoid operation tests, and capacitor ripple tests.
- You can control the PBZ-SR series externally using external analog signals and control it remotely using RS232C, GPIB, USB, and LAN communication features.

Option

The PBZ-SR has the following options. For information about options, contact your Kikusui agent or distributor.

- Low Inductance Cable (TL02-PLZ, TL03-PLZ)
  When you connect the cable to the output terminal block of the PBZ-SR, be sure to provide grounding through the ⏚ terminal.

	TL02-PLZ	TL03-PLZ
Full length*1	1000 mm	2000 mm
Inductance value*2	150 nH	200 nH
Maximum allowable current	100 A	

*1. Between the insulation caps
*2. at 100 kHz

- Low Inductance Cable
  (LIC40-2P1M-M6M6, LIC40-2P2M-M6M6)
  When you connect the cable to the output terminal block of the PBZ-SR, be sure to provide grounding through the ⏚ terminal.

	LIC40-2P1M-M6M6	LIC40-2P2M-M6M6
Full length*1	1000 mm	2000 mm
Inductance value*2	150 nH	200 nH
Maximum allowable current	50 A	

*1. Between the insulation caps
*2. at 100 kHz

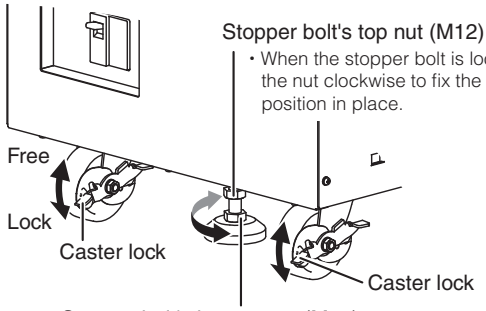
⚠ Precautions for Installation

When installing this product, be sure to observe the precautions provided in “Precautions Concerning Installation Location” in the Safety information manual. Items specific to this product are given below.

- Avoid locations where the product is exposed to high temperature or direct sunlight.
  Do not install the product near a heater or in areas subject to drastic temperature changes.
  Operating temperature range: 0 °C to +40 °C (32 °F to +104 °F)
  Storage temperature range: -25 °C to +70 °C (-13 °F to +158 °F)
- Avoid humid environments.
  Do not install the product in high-humidity locations–near a boiler, humidifier, or water supply.
  Operating humidity range: 20 %rh to 85 %rh (no condensation)
  Storage humidity range: 90 %rh or less (no condensation)
  Condensation may occur even within the operating relative humidity range. If this happens, do not use the product until the condensation dries up completely.
- The PBZ-SR series does not allow individual PBZs to be operated separately. Using them separately is outside the scope of the warranty.

When fixing the power supply at the installation location

This product can be easily moved by casters on its bottom side. To ensure that the product is not moved accidentally while it is being operated, lock the casters, and fix the product in place by lowering the stopper to the floor. Lock/unlock the casters with your feet.



⚠ Precautions for Moving

When installing this product, be sure to observe the precautions provided in “Precautions to Be Taken When Moving the Product” in the Safety information manual. Items specific to this product are given below.

- Unlock the casters.
- If the power supply is fixed in place with the stopper, release the stopper. Otherwise, it may cause injuries due to the power supply falling over.
- When using a forklift to move the power supply, place the fork underneath the power supply and confirm all safety conditions before lifting. When lifting the power supply with a crane using lifting bands, always apply the bands at the equipment bottom and confirm all safety conditions before lifting.
- Do not lift the power supply using the handles. The handles are used to grab the power supply when moving power supply on the casters. The handles are not strong enough to support the weight of the power supply.
- Do not lay the power supply with its side up or place the power supply upside-down.

Notations Used in This Manual

- The large-capacity bipolar power supplies smart rack system PBZ20-60 SR, PBZ20-80 SR, PBZ20-100 SR, PBZ40-30 SR, PBZ40-40 SR, PBZ40-50 SR, PBZ60-20.1 SR, PBZ60-26.8 SR, PBZ60-33.5 SR, PBZ80-15 SR, PBZ80-20 SR, and PBZ80-25 SR are also referred to as the PBZ-SR and PBZ-SR series respectively.
- The bipolar power supplies (the individual power supplies) PBZ20-20, PBZ40-10, PBZ60-6.7 and PBZ80-5 are also referred to as the PBZ series respectively.
- The screen captures and illustrations used in this manual may differ from the actual items.
- The following markings are used in this manual.

⚠WARNING

Indicates a potentially hazardous situation which, if ignored, could result in death or serious injury.

⚠CAUTION

Indicates a potentially hazardous situation which, if ignored, may result in damage to the product or other property.

NOTE

Indicates information that you should know.

See

Indicates reference to detailed information.

Contents of the Included CD-ROM

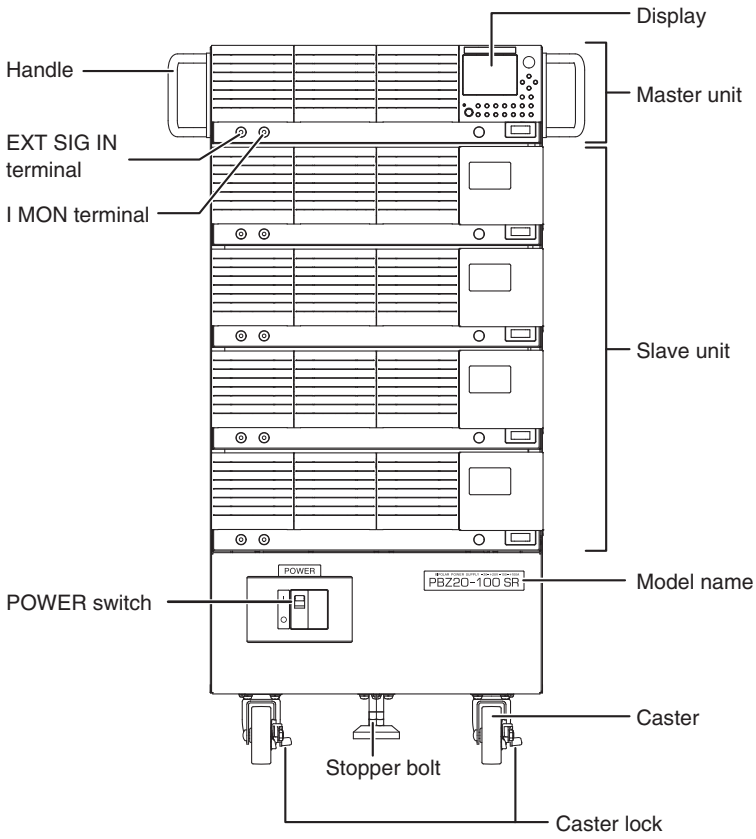
Insert the program CD-ROM in the drive. The menu program window will appear momentarily. If the menu program window does not appear, open the CD-ROM folder in Windows Explorer, and then double-click index.htm to start the menu program.

Accompanying CD-ROM contains following the items.

- PBZ-SR series Setup Guide (PDF)
- PBZ-SR series Specifications (PDF)
- PBZ series User’s Manual (PDF)
- PBZ series Quick Reference (PDF)
- PBZ series Communication interface manual (PDF)
- Safety Information (PDF)

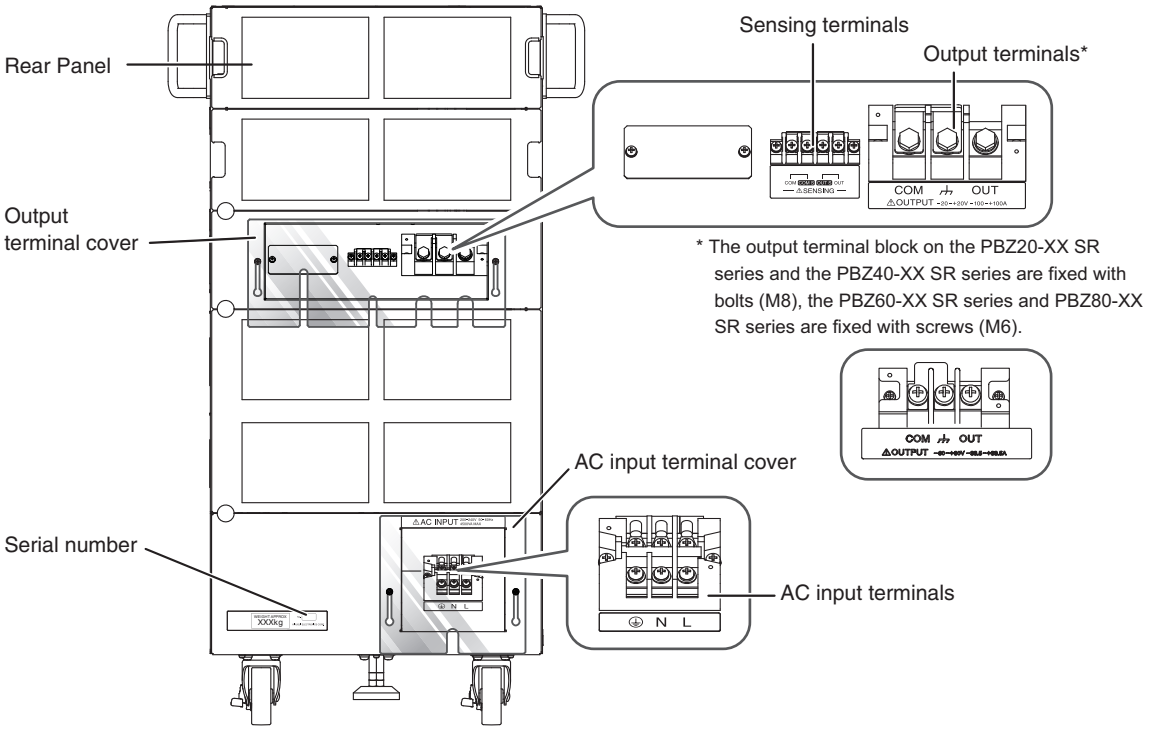
Part Names

Front panel (example of PBZ20-100 SR)



The PBZ-SR series does not have the OUTPUT terminals that are available on the front panel of individual PBZ power supplies.

Rear panel (example of PBZ20-100 SR)



1 Preparation

This chapter describes how to connect the power cable and how to turn the power on and off.

Connecting the Power Cable

This product is designed as an equipment of IEC Overvoltage Category II (energy-consuming equipment supplied from the fixed installation)

⚠WARNING

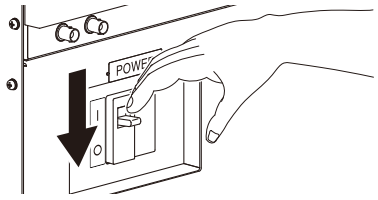
- **Be sure to have a qualified engineer connect the power cable to the distribution board.**
- **Install the AC power cord such that the distance between the power supply and the switch on the switchboard is within 3 m. This procedure facilitates operation of the switch on the switchboard in the event of emergency.**
  If the distance to the switch on the switchboard is to be 3 m or more, install the AC power cord with a separate switch provided within 3 m from the power supply. For such a switch, use one with two poles that can be disconnected simultaneously.

Possible electric shock.

- **This product is an IEC Safety Class I equipment (equipment with a protective conductor terminal). Be sure to ground the product to prevent electric shock.**
- **Connect the ground terminal to earth ground.**
- **When you connect the power cable, attach the input terminal cover regardless of whether this product is in use.**

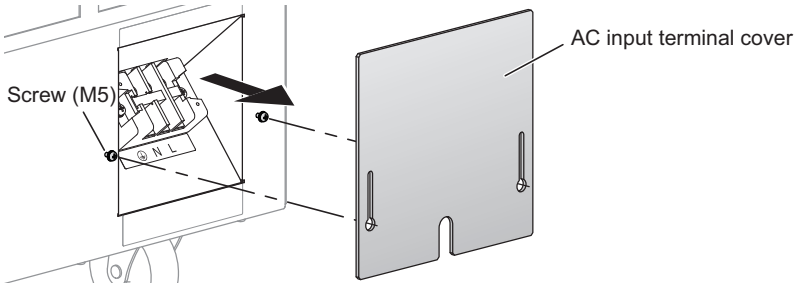
A power cable is not supplied with the PBZ-SR series. Use a power cable in compliance with your local standards, and with a nominal cross-sectional area of at least AWG8 (8 mm^2).

1 **Turn the POWER switch off (○).**



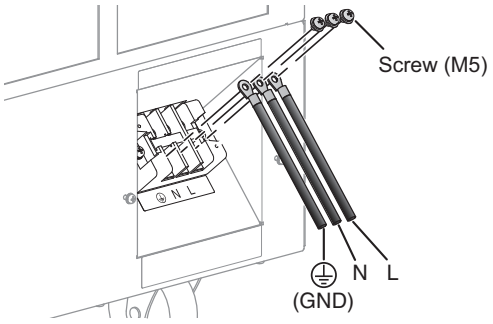
2 **Check that the AC power line complies with the input rating of the product.**
The voltage that can be applied is any of the nominal power supply voltages in the range of 200 Vac to 240 Vac. The frequency is 50 Hz or 60 Hz (frequency range of 47 Hz to 63 Hz).

3 **On the rear panel, loosen the screws holding the AC input terminal cover in place, and remove the cover.**

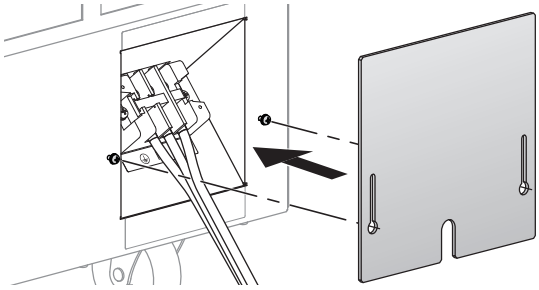


4 **Connect the power cables to the AC input terminals.**

The size of the terminal block screws is M5. Attach appropriate crimping terminals to the power cable.

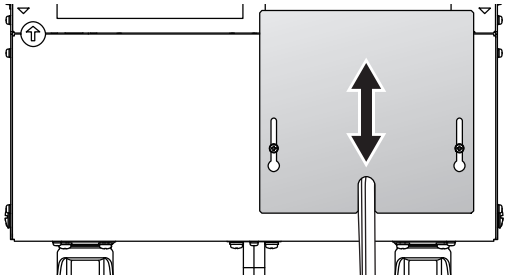


5 **Attach the AC input terminal cover.**



6 **Adjust the AC input terminal cover to the appropriate position, and tighten the screws.**

Adjust the position so that the space between the cover and power cables is small.



7 **Attach crimping terminals to the switchboard end of the power cable. Use crimping terminals that conform to the switchboard's terminal screws.**

8 **Turn off the switchboard's breaker.**

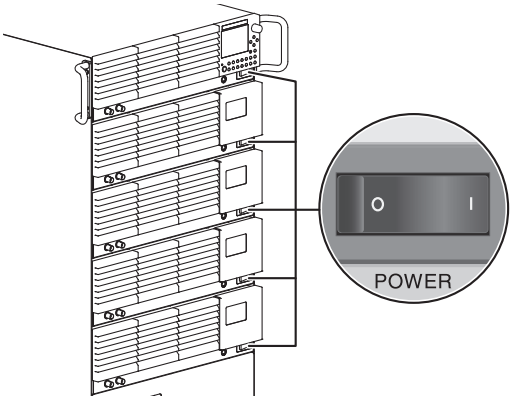
9 **Connect the N, L, and ⏚ (GND) wires of the power cable to the matching terminals on the switchboard.**

Be sure to connect the GND terminal of the AC INPUT terminal block to the GND terminal of the switchboard.

NOTE The POWER switch can be used to disconnect the product from the AC power line in an emergency. Provide enough space around the POWER switch to ensure that it can be turned off at any time.

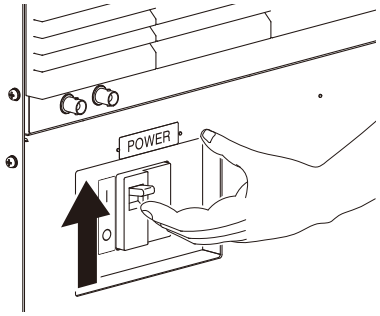
1 **Check that the power cable is correctly connected.**

2 **Check that the POWER switches on the individual PBZ power supplies are all turned on.**



PBZ20-100 SR example

3 **Turn the POWER switch on.**



The display shows the model and firmware version, and a self test starts.

(Display example)

```
PBZ20-20
  BIPOLAR POWER SUPPLY
  Ver 1.00
KIKUSUI ELECTRONICS CORP.
[----------------]
```

SELF TEST…PASS (When the test passes)
SELF TEST…E101 (When an error is detected)

When the self test finishes, if no errors were detected, “PASS” is displayed. If an error was detected, the error number is displayed.

NOTE

- If you notice strange sounds, unusual odors, fire, or smoke around or from inside the PBZ-SR, lower the POWER switch lever to turn the power off.
- When you turn the POWER switch on for the first time after purchase, the PBZ-SR starts with its default values. For details on the default values, See "Initial Settings" on page 10 .
- If you want to turn on the POWER switch of the PBZ-SR first and then the POWER switches of the individual PBZ power supplies, turn on the slave units first.
- The circuit breaker used in the POWER switch of the PBZ-SR is indicated below.
  EW32AAG-2P032BX (72-08-2800) Rated current: 32 A
  Rated current sensitivity: 30 mA
- If the display shows “ALARM,” an OVP (overvoltage protection), OCP (overcurrent protection), or OHP (overheat protection) is activated. Remove the root cause of the alarm. For details on the OVP, OCP and OHP, refer to the “Protection Features and Alarms” in PBZ series User’s Manual.

When the PBZ-SR Does Not Start Properly

If an error number is displayed after the self test

Follow the remedy that corresponds to the appropriate error number shown in the following table. If following the remedy shown here does not solve the problem, contact your Kikusui agent or distributor.

Error number	Message	Cause and remedy
E101	CALIBRATION DATA	An error was detected in the calibration values. There is an error in the calibration values that are stored in non-volatile memory. The PBZ-SR must be calibrated properly. If this error number (E101) appears even after you have calibrated the PBZ-SR, it may be malfunctioning.
E102	EEPROM DATA	An error was detected in the backup data. There is an error in the backup data that is stored in nonvolatile memory. You can clear this error by starting the PBZ-SR with the factory default settings. For details, see “List of Factory Default Settings” in PBZ series User’s Manual.
E901	INTERNAL ERROR	An error was detected in the internal system. There is an execution error in the internal system. Restart the PBZ-SR.

NOTE If you initialize the PBZ-SR to its factory default settings, you need to set the number of parallel operation units and the remote sensing on/off setting again. See "Initial Settings" on page 10, and set the number of parallel operation units installed in the PBZ-SR and the remote sensing on/off setting.

If “POWER OFF” is displayed

“POWER OFF” may be displayed on the screen while the PBZ-SR is running. If this occurs, the input voltage is low, so the PBZ-SR can not function properly. Lower the POWER switch lever to turn the power off, and then check the voltage of the input power supply.

Initial Settings

As shown in the following table, the initial settings of the PBZ-SR are different from the factory default settings of individual PBZ power supplies. If you initialize the PBZ-SR to its factory default settings, the factory default settings of individual PBZ power supplies will be applied, so be sure to change the items in the following table.

For the factory default settings, see “List of Factory Default Settings” in the PBZ series User’s Manual. For information on how to change the settings, see “Setting and Viewing Config Settings” in the PBZ series User’s Manual.

Model	Initial settings for the PBZ-SR series	
	The number of parallel operation units (UNIT)	Remote sensing on/off (SENSING)
PBZ 20-60 SR PBZ 40-30 SR PBZ 60-20.1 SR PBZ 80-15 SR	3	ON
PBZ20-80 SR PBZ40-40 SR PBZ60-26.8 SR PBZ80-20 SR	4	ON
PBZ20-100 SR PBZ40-50 SR PBZ60-33.5 SR PBZ80-25 SR	5	ON

Turning Off

Lower the POWER switch lever to turn the power off.

“POWER OFF” is shown on the display for a few seconds and disappears.

⚠CAUTION After you turn the POWER switch off, wait at least 5 seconds after the fan stops before you turn the POWER switch back on. Turning the PBZ-SR on too soon after you turn it off can cause damage to the inrush current limiter circuit, as well as reduce the life of components such as the POWER switch and the internal input fuses.

NOTE

- The PBZ-SR series stores the panel settings (excluding output on/off condition) immediately before the POWER switch is turned off. If you turn the power on, the PBZ-SR starts in the same state as it was in the last time that it was turned off. If the POWER switch is turned off immediately after changing the settings, the last settings may not be stored.
- If you want to turn off the POWER switches of the individual PBZ power supplies before the POWER switch of the PBZ-SR, turn off the slave units first.

2 Connecting the Load

This chapter describes how to connect a load to the PBZ-SR.

Connecting the Load Cable

Selecting the Load Cable

⚠WARNING **To prevent the possibility of fire.**

- **Use a load cable with sufficient current capacity with respect to the rated output current of the PBZ-SR series.**

Possible electric shock.

- **Use load cables whose rated voltage meets or exceeds the PBZ-SR's isolation voltage (500 Vdc).**

The load cables that you use must have a current capacity that allows the PBZ-SR's rated output current to flow. If you use load cables whose capacity meets or exceeds the rated output current, even if the load is shorted, the cables will not be damaged. Use wires that have diameters that correspond to the output current to connect to the load.

Nominal cross-sections area (mm^2)	AWG (reference cross-section area; mm^2)	Allowable current*1 (A; Ta = 30 °C)	Kikusui-recommended current (A)
3.5	12 (3.31)	37	-
5.5	10 (5.26)	49	20
8	8 (8.37)	61	30
14	6 (13.3)	88	50
22	4 (21.15)	115	80
30	2 (33.62)	139	-
38	1 (42.41)	162	100

*1. Excerpt from Japanese laws related to electrical equipment.

See p. 3

You can also use the optional low inductance cable (TL02-PLZ, TL03-PLZ, LIC40-2P1M-M6M6 or LIC40-2P2M-M6M6).

NOTE

A cable's temperature is determined by the resistive loss based on the current, the ambient temperature, and the cable's external thermal resistance. The above table shows the current capacity of heat-resistant vinyl cables that have a maximum allowable temperature of 60 °C when one of the cables is separated and stretched out horizontally in air in an ambient temperature of 30 °C. The current capacity must be reduced under certain conditions, such as when vinyl cables that have a low heat resistance are used, when the ambient temperature is 30 °C or greater, or when cables are bundled together and little heat is radiated.

Connecting the Load Cable

Using load cables, connect the load to the PBZ-SR through the output terminals on the rear panel.

⚠WARNING **Possible electric shock.**

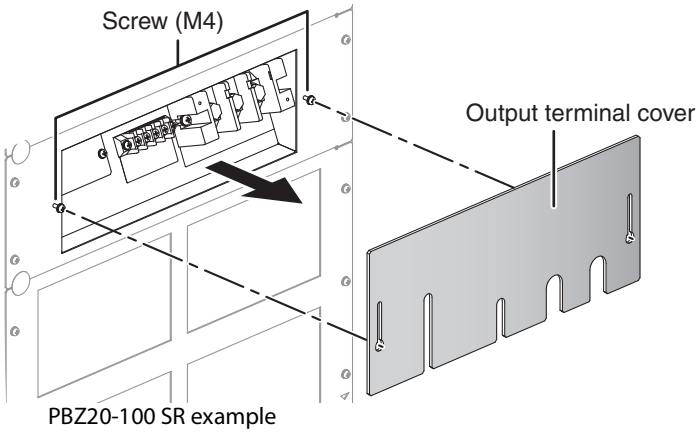
- **Turn the POWER switch off before you touch the OUTPUT terminals.**
- **Be sure to attach the OUTPUT terminal cover after you connect the load cables to the OUTPUT terminals.**

⚠CAUTION Risk of overheating.

- Attach crimping terminal to the wire and use the set of screws that came with the package for connection.

1 **Lower the POWER switch lever of the PBZ-SR to turn the power off.**

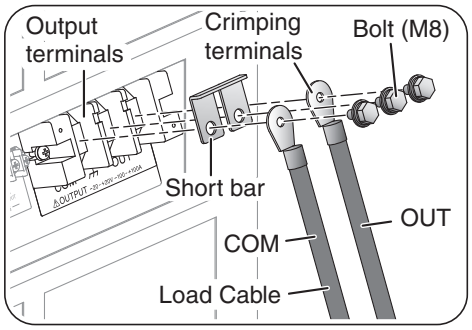
2 **On the rear panel, loosen the screws holding the output terminal cover in place, and remove the cover.**



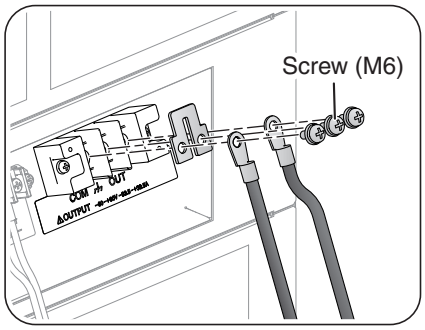
3 **Connect the load cables to the OUTPUT terminals.**

The size of the bolts used in the output terminal block is M8. Attach appropriate crimping terminals to the load cable.

When using bolts
(PBZ20-100 SR example)



When using screws
(PBZ80-25 SR example)



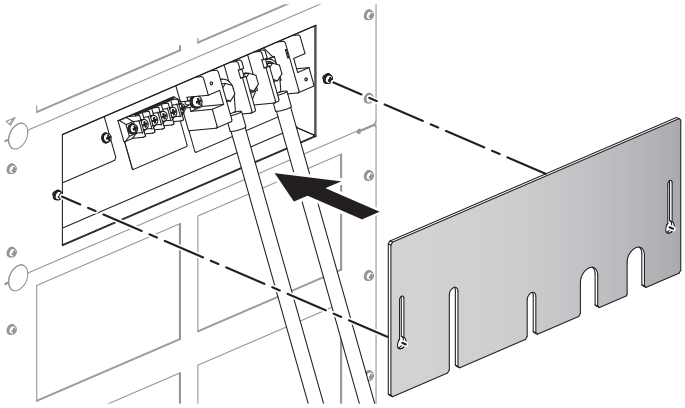
If want to use the optional low inductance cable (TL02-PLZ, TL03-PLZ, LIC40-2P1M-M6M6 or LIC40-2P2M-M6M6), be sure to connect the cable to ground using the short bar, as shown in the figure above.

To connect sensing cables, see “Using Remote Sensing.”

See p. 3

See p. 15

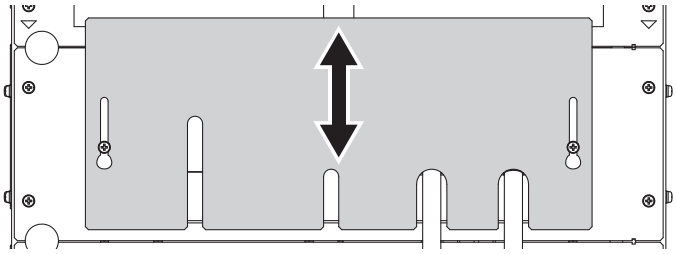
4 **Attach the output terminal cover.**



PBZ20-100 SR example

5 **Adjust the output terminal cover to the appropriate position, and tighten the screws.**

Adjust the position so that the space between the cover and cables is small.

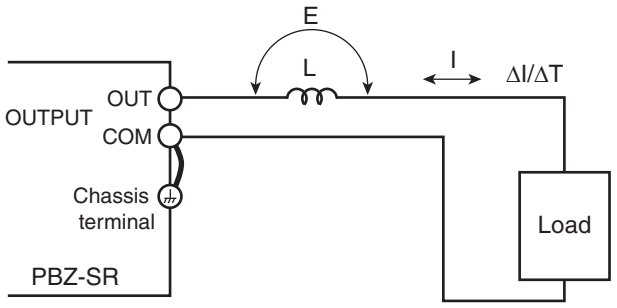


Influence of Cables

When you use the PBZ-SR, you must wire the load and configure the response setting correctly and reduce the inductance. If these conditions are not met, the PBZ-SR may oscillate or become unstable.

Load cables and inductance

Load cables have inductance L. If current I changes quickly, a large voltage is induced on both ends of the cable. This voltage is applied to both the PBZ-SR and the load. The load cable's inductance L and voltage E that is induced according to the changes in current I (hereafter referred to as the induced voltage) are expressed as follows:



E = L × (ΔI/ΔT)

E: The induced voltage

L: The wiring inductance

ΔI: The change in current

ΔT: The duration of time over which the current changes

NOTE Generally, a cable's inductance is 1 µH per meter of cable. If 2 meters of cable are used to wire the load (the total length of the cables that are connected to the OUT terminal and the COM terminal) and the current change is 10 A/µs, the induced voltage is 20 V.

How to reduce the effect of wiring

See p. 3

- You can reduce the inductance of load cables by using the optional low inductance cables (TL02-PLZ, TL03-PLZ, LIC40-2P1M-M6M6 or LIC40-2P2M-M6M6).
- If fast transient response is not required, increase the response setting.
  The value of ΔI/ΔT is reduced, so even if you can't reduce the load cable's inductance, you can reduce the induced voltage. For details on the response setting, see "Response Setting" in PBZ series User's Manual.
- Use the shortest cables possible to wire the load, and twist them.

When Connecting Capacitive or Inductive Loads

Oscillation may occur when the PBZ-SR is connected to a capacitive load in CV mode or when the PBZ-SR is connected to an inductive load in CC mode. To remedy this problem, increase the response setting or use the soft start and soft stop features.

For details on each feature, see the following sections in the PBZ series User's Manual.

- For CV mode and CC mode, see "CV/CC Mode."
- For response settings, see "Response Setting."
- For soft start and soft stop, see "The Output Soft Start and Soft Stop Features."

When Connecting Battery Loads

If you connect a device to the OUTPUT terminals that can supply power, like a battery, the PBZ-SR is a load to the device. In this situation, there is a limit to the amount of power that the PBZ-SR can consume. When the PBZ-SR's sink power becomes too large, it limits its output current (the sink current to the PBZ-SR) so that the sink power reduces to a constant value.

Model name	Sink power*1	
	Bipolar mode	Unipolar mode
PBZ20-60 SR	300 W	1200 W
PBZ20-80 SR	400 W	1600 W
PBZ20-100 SR	500 W	2000 W
PBZ40-30 SR	540 W	1200 W
PBZ40-40 SR	720 W	1600 W
PBZ40-50 SR	900 W	2000 W
PBZ60-20.1 SR	600 W	1206 W
PBZ60-26.8 SR	800 W	1608 W
PBZ60-33.5 SR	1000 W	2010 W
PBZ80-15 SR	600 W	1200 W
PBZ80-20 SR	800 W	1600 W
PBZ80-25 SR	1000 W	2000 W

*1. The sink power values are typical values at an ambient temperature of 23 °C.

Using Remote Sensing

Remote sensing is a feature that is used to switch the voltage measurement point of CV/CC mode and the voltage feedback point of CV mode.

When remote sensing is enabled, the voltage measurement point of CV/CC mode and the voltage feedback point of CV mode are switched from the rear panel OUTPUT terminals to the contact points of the sensing terminals. Connecting the sensing terminals to the load (1) reduces the influence of the voltage drop caused by the resistive component of the load wires and by the load current and (2) allows measurement and compensation of the output voltage across the load. The compensation of the output voltage is effective to the voltage drop that is 1.8 V or less for a single line.

Remote sensing of CV mode has a protection feature. Even if the remote sensing wires are connected in reverse, shorted, or disconnected, the output voltage in CV mode is limited within the specified voltage ± approximately 3.6 V. When the connection is fixed, the protection feature automatically recovers.

⚠WARNING **To avoid electric shock and damage to the PBZ-SR's internal circuits, observe the following precautions.**

- **Never wire the sensing terminals while the POWER switch is turned on.**
- **For sensing cables, use cables whose rated voltage is higher than the PBZ-SR's isolation voltage (500 Vdc).**

Connecting the Sensing Cables

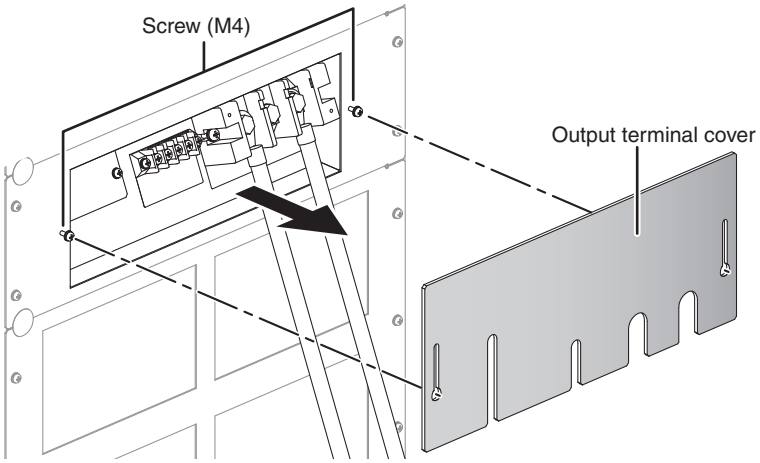
To use remote sensing, connect sensing cables to the sensing terminals of the PBZ-SR.

⚠CAUTION

- If the remote sensing cables come loose while remote sensing is in use, the PBZ-SR and load may break. Be sure to connect the cables securely.
- If you are not using remote sensing, be sure to attach the two short bars to the sensing terminals.

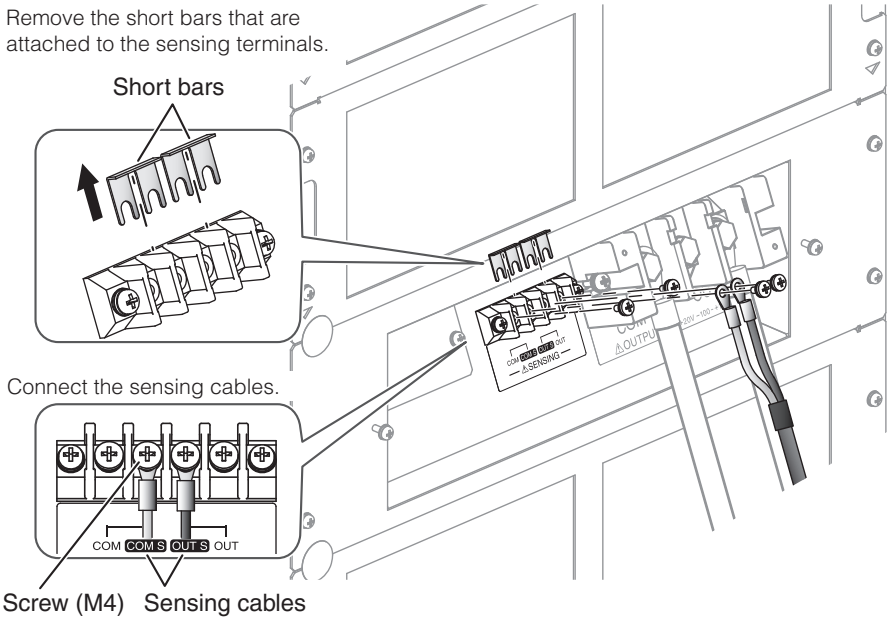
1 **Lower the POWER switch lever of the PBZ-SR to turn the power off.**

2 **On the rear panel, loosen the screws holding the output terminal cover in place, and remove the cover.**



3 **Connect the sensing cables to the sensing terminals.**

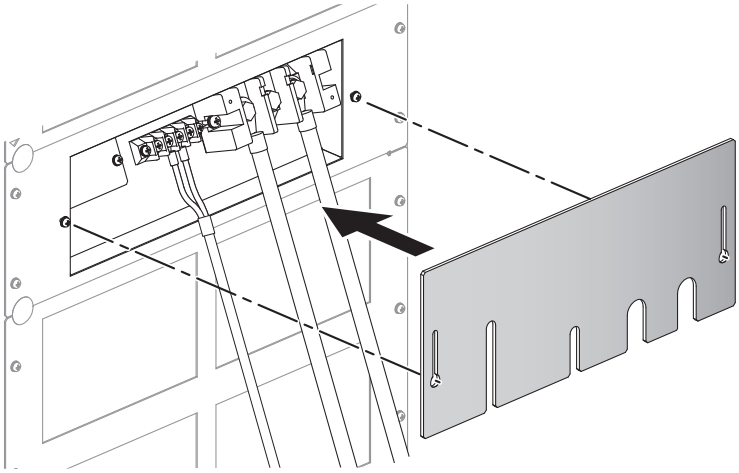
Remove the two short bars from the sensing terminals before connecting the cables.



Use AWG24 to AWG16 (0.2 mm² to 1.25 mm²) cables.
To avoid noise induction, use a two-wire shielded cable to connect the sensing terminals. Connect the shield to the OUTPUT COM terminal. If you cannot use a shielded cable, twist the sensing cables from the OUT terminal and the COM terminal together.

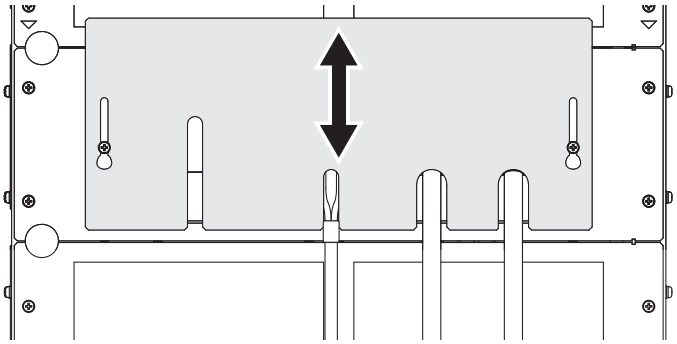
short bars must be connected to the sensing terminals when remote sensing is not in use. Store the short bars in a safe place.

4 Attach the OUTPUT terminal cover.



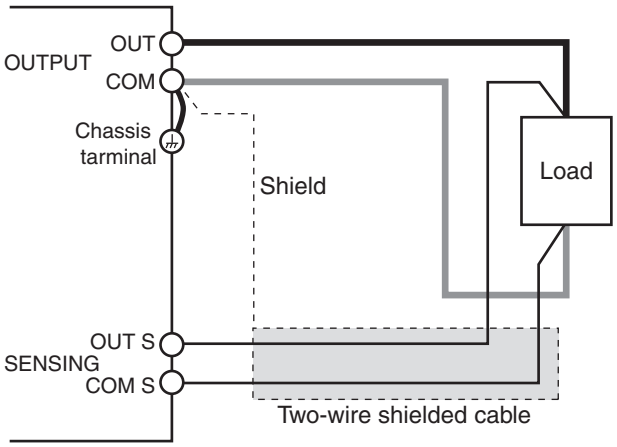
5 Adjust the output terminal cover to the appropriate position, and tighten the screws.

Adjust the position so that the space between the cover and cables is small.



6 Connect the sensing cables to the load.

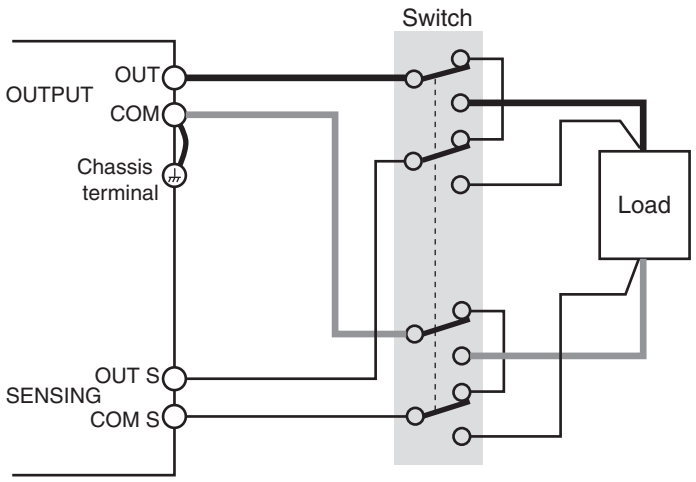
Connect by referring to the following information.



When remote sensing is enabled, if the sensing terminals are shorted, opened, or are wired in reverse, the sensing protection is activated, and the output voltage in CV mode is limited within the specified voltage ± approximately 3.6 V. When the connection is fixed, the protection feature automatically recovers. Do not leave the PBZ-SR while the sensing protection is activated.

If You Are Inserting a Mechanical Switch between the OUTPUT Terminals and the Load

If you want to insert a mechanical switch between the OUTPUT terminals and the load, be sure to include the sensing cables in the switch as shown in the figure below and turn on and off the load and sensing cables simultaneously. Before you turn the mechanical switch on or off, be sure to turn the output or the POWER switch off.



3 Connecting External Devices

This chapter describes how to connect an external controller when you want to control the PBZ-SR externally or remotely.

Connecting an External Controller

By applying control signals to the rear panel J1 connector, you can control the following aspects of the PBZ-SR. The J1 connector also generates status signals that indicate the PBZ-SR's operating state.

- Controlling DC signals (the DC settings)
- Turning the OUTPUT terminal's output on and off
- Shutting down the PBZ-SR

For details on external control and how to perform it, see "External Control" in the PBZ series User's Manual.

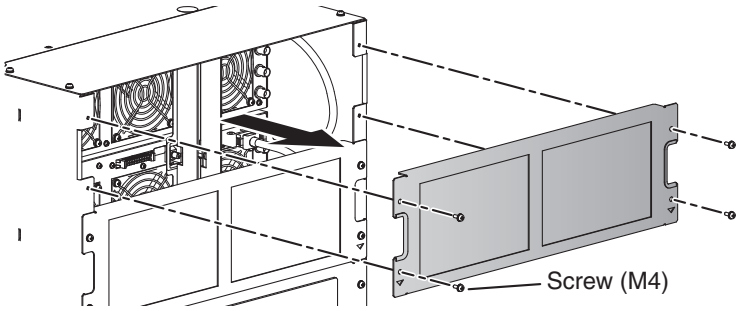
⚠WARNING **Possible electric shock.**

- **Before removing the rear panel or connecting to the J1 connector, be sure to lower the POWER switch lever of the PBZ-SR to turn the power off.**

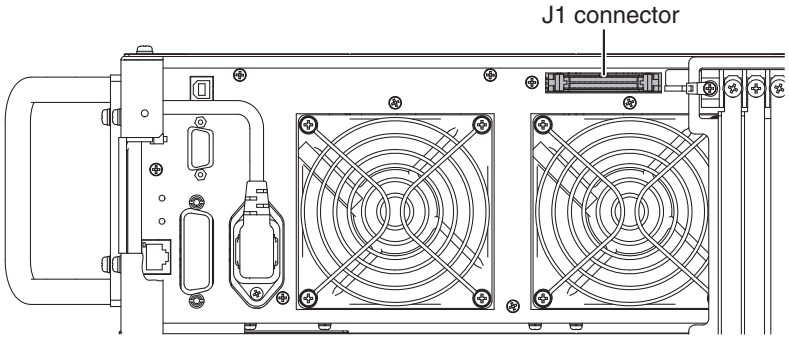
1 **Lower the POWER switch lever of the PBZ-SR to turn the power off.**

2 **Remove the topmost rear panel.**

You can now see the master unit rear panel.



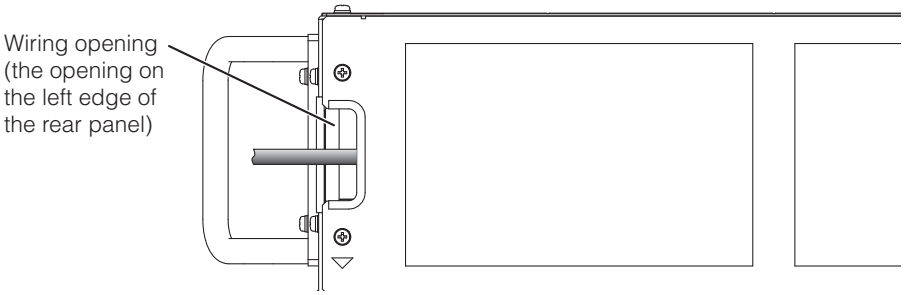
3 **Remove the dummy plug that is attached to the J1 connector of the master unit.**



4 **Connect a cable to the J1 connector of the master unit.**

5 **Attach the rear panel that you removed in step 2 .**

When you attach the rear panel, pass the cables that you wired to the J1 connector through the open space on the left edge of the panel.



Connecting an Remote Controller

In addition to controlling the PBZ-SR from the front panel, you can control it remotely through the following standard-equipped interfaces.

- RS232C interface
- GPIB interface
- USB interface
- LAN interface

You cannot control the PBZ-SR through RS232C, GPIB, USB, and LAN at the same time.

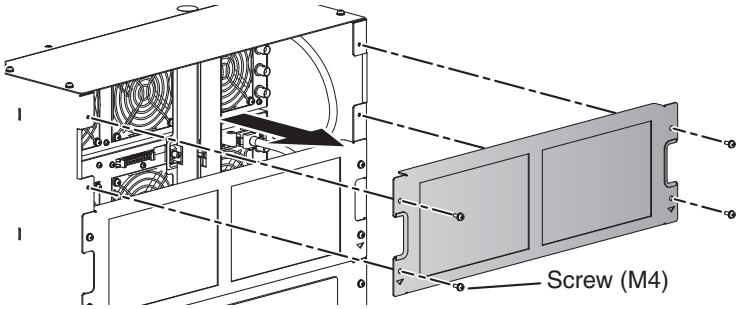
For details on remote control and how to perform it, see the PBZ Series Communication Interface Manual.

⚠WARNING Risk of electric shock. Before removing the rear panel or connecting to the interface connector, be sure to lower the POWER switch lever of the PBZ-SR to turn the power off.

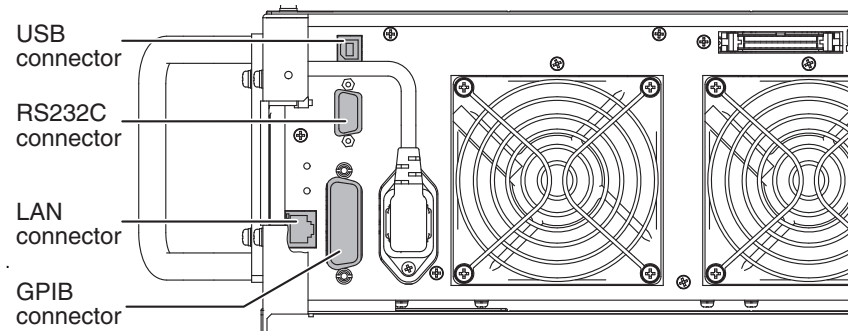
1 Lower the POWER switch lever of the PBZ-SR to turn the power off.

2 Remove the topmost rear panel.

You can now see the master unit rear panel.

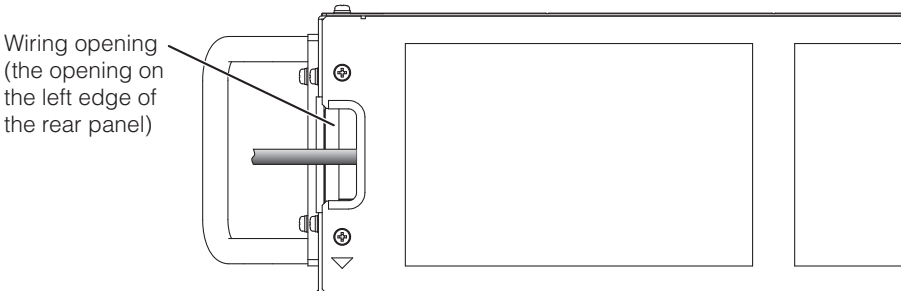


3 Connect a cable to the master unit's interface connector that you are going to use.



4 Attach the rear panel that you removed in step 2 .

When you attach the rear panel, pass the cable that you connected to the interface connector through the open space on the left edge of the panel.



Connecting Devices to Synchronize

You can use the following synchronization features by connecting multiple products (individual PBZ power supplies or other PBZ-SR series) to the PBZ-SR.

- Turn the output of multiple units on and off at the same time.
- Synchronize sequence start timing across multiple units.
- Synchronize the clocks of multiple PBZ-SRs.

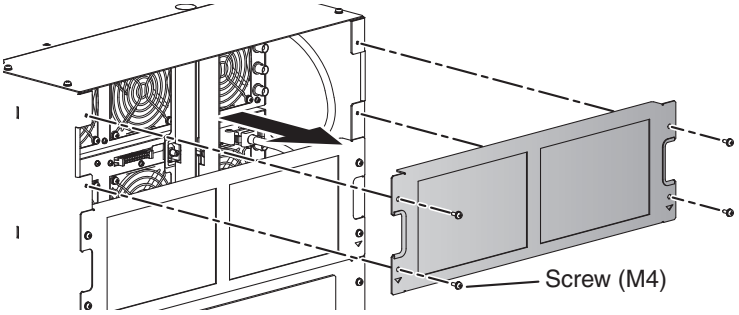
Output on/off synchronization and sequence start timing synchronization can be used at the same time as clock synchronization. For details on the synchronization feature and how to use it, see “Synchronization Feature” in the PBZ series User’s Manual.

⚠WARNING Risk of electric shock. Before removing the rear panel or connecting to the interface connector, be sure to lower the POWER switch lever of the PBZ-SR to turn the power off.

1 Lower the POWER switch lever of the PBZ-SR to turn the power off.

2 Remove the topmost rear panel.

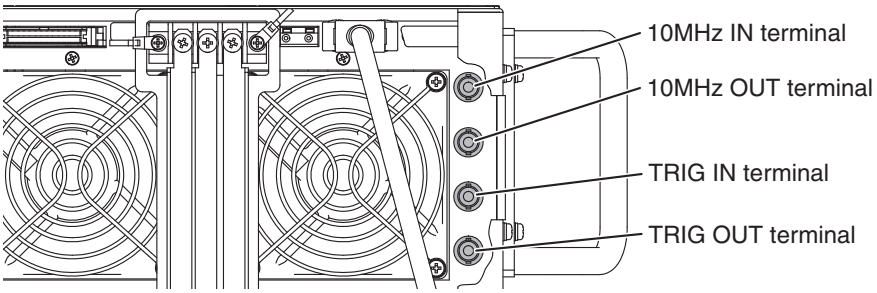
You can now see the master unit rear panel.



3 Connect a cable to the 10MHz or TRIG terminal of the master unit.

To perform output on/off synchronization and sequence start timing synchronization, use the TRIG terminal.

To perform clock synchronization, use the 10MHz terminal.



4 Attach the rear panel that you removed in step 2 .

When you attach the rear panel, pass the cable that you connected to the interface connector through the open space on the right edge of the panel.

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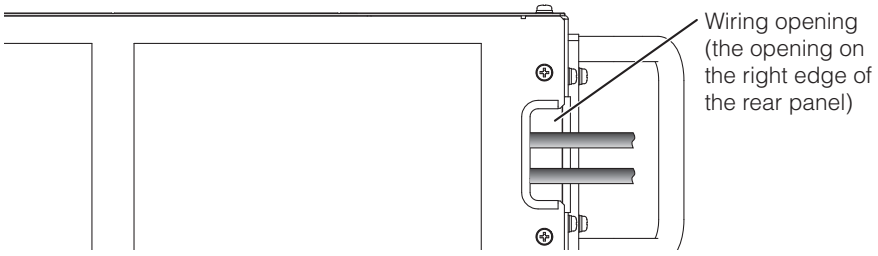


Connecting an External Signal Source

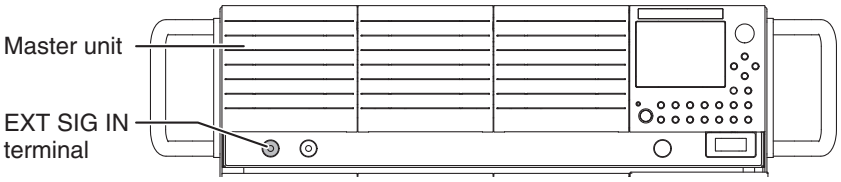
By using an external signal, you can create a bipolar amplifier that amplifies the input signal that the PBZ-SR receives through EXT SIG IN (BNC terminal). You can set the gain, the polarity (inverted or not inverted), and the offset of the amplifier. For details on how to use an external signal source, see “Using the EXT SIG IN Signal (External Signal Source)” in the PBZ series User’s Manual.

Item	Input terminal specifications
Maximum allowable input voltage	±12 Vpeak
Input impedance	Approx. 10 kΩ
Common terminal	Connected to the OUTPUT COM terminal

1 **Lower the POWER switch lever of the PBZ-SR to turn the power off.**

2 **Connect an external signal source to the EXT SIG IN terminal on the front panel of the master unit.**

Do not connect to the EXT SIG IN terminals of the slave units.

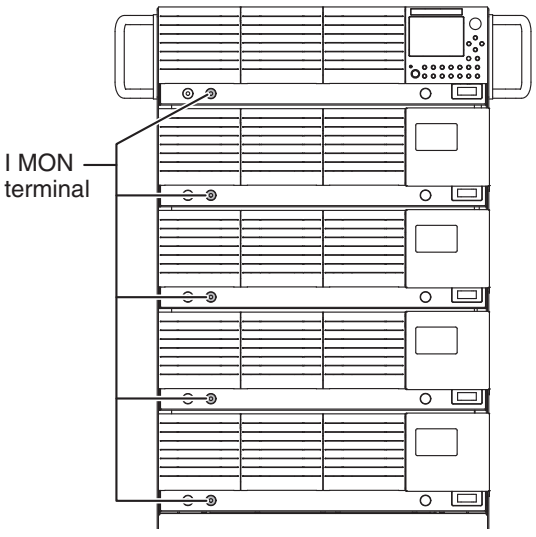


Using Current Monitor Output

The front panel I MON terminal (BNC terminal) generates a voltage that is proportional to the output current.

Item	I MON terminal specifications
Output voltage	± 2 V at the rated current
Frequency response	DC to 20 kHz (-3 dB)
Common terminal	Connected to the OUTPUT COM terminal

On the master unit, voltage output proportional to the total output current (total parallel current) of the PBZ-SR is generated. On the slave units, voltage output proportional to the output current per slave unit is generated.



Example of PBZ20-100 SR

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