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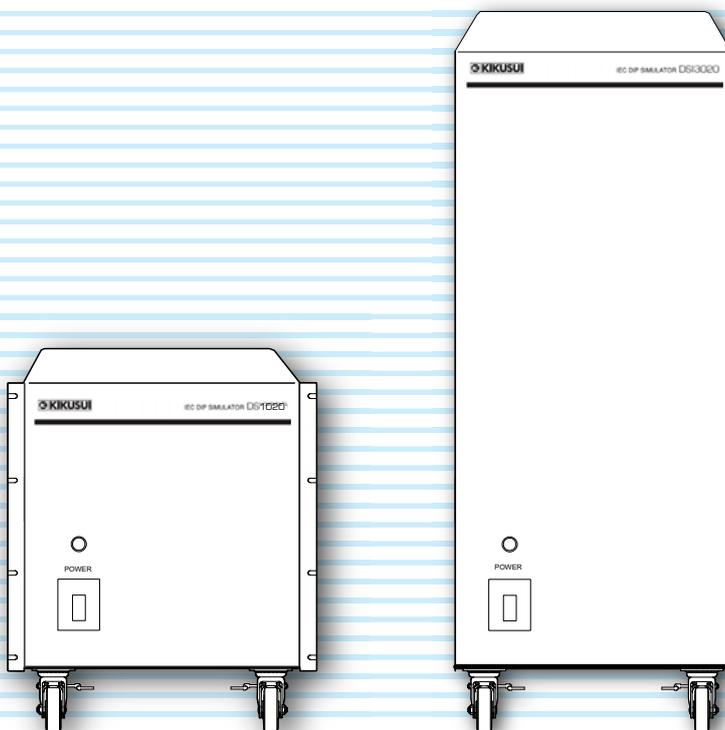
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Operation Manual

Dip Simulator

DSI1020 DSI3020



About the Manuals

This operation manual describes the physical and electrical aspects of the product. For details on how to use the product, see the operation manual for the application software.

For details on how to handle hardware including Kikusui AC power supplies, see the operation manual of the corresponding device.

You can download the most recent version of these manuals from the Kikusui Electronics Corporation website (<https://www.kikusui.co.jp/en/download/>).

How to read this manual

This manual is designed to be read from beginning to end. We recommend that you read it thoroughly before using this product for the first time.

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Related manuals

PCR-LE/PCR-LE2 series AC power supplies

- PCR-LE series manuals
- PCR-LE2 series manuals

PCR-LE series AC power supply options

- Single-phase three-wire output driver (2P05-PCR-LE) setup guide
- Three-phase output driver (3P05-PCR-LE) setup guide

SD009-PCR-LE application software

- SD009-PCR-LE Quick Immunity Sequencer 2 Ver. 3.x setup guide and operation guide

Notations used in this manual

- In this manual, DSI1020/DSI3020 Dip Simulator is also referred to as “the product,” “this product,” or “DSI.”
- In this manual, Kikusui AC Power Supplies (PCR-LE series or PCR-LE2 series) are also referred to as “the AC power supplies.”
- The term “PC” is used to refer generally to both personal computers and workstations.
- This manual also uses abbreviations for wiring systems.
Single-phase two-wire: 1P2W
Single-phase three-wire: 1P3W
Three-phase three-wire: 3P3W
Three-phase four-wire: 3P4W
- This manual refers to each phase of a wiring system as U phase, V phase, W phase, and N phase. These phases correspond respectively to the R, S, T, and N phases used in other manufacturers’ products.
- The following markings are used in the explanations 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

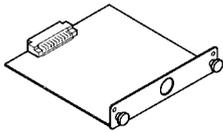
Indicates a reference to detailed information.

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 something is damaged or missing, contact your Kikusui agent or distributor.

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

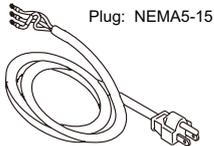
■ Accessories



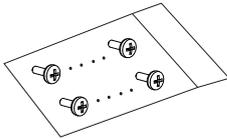
- Control board (1 card)
[UA-1894-01]



- Control cable
3 m (1 pc.) [85-50-0390]



- Control power cable
3 m (1 pc.) [85-10-0650]



- Screws (6 pcs.)
Model DSI1020 only



- Heavy object warning label (1 pc.)
Model DSI1020 [A8-900-157]
Model DSI3020 [A8-900-158]

If you remove the rack mount bracket, use these screws to fix the side panels in place.



- Operation manual (1 copy)

Options

The following options can be used with this product.

■ USB interface (factory option)

A communication interface unit for controlling the product through a USB interface.

To control the product from a PC via the USB interface, you must install a device driver that supports the USB T&M class (USBTMC; for Windows 7 or 8).

The USBTMC driver is installed automatically when the VISA library is installed. For details on installing the VISA library, see the SD009-PCR-LE application software setup guide.

■ GPIB interface (factory option)

A communication interface unit for controlling the product through a GPIB interface.

■ Control power cable (heavy PVC jacketed three-core)

This power cable is for connecting to the control power input (AC INPUT) terminal on the rear panel of the product.

Model: AC5.5-3P3M-M4C

Type: Heavy PVC jacketed three-core cable

Length: 3 m

Nominal cross-sectional area: 5.5 mm² (AWG10 equivalent)

Crimping terminal size: M4





Safety markings

For the safe use and safe maintenance of this product, the following symbols are used throughout this manual and on the product. Note the meaning of each of the symbols to ensure the safe use of the product. (Some symbols are not used depending on the product.)



Indicates that a high voltage (over 1000 V) is used here.

Touching an area marked with this symbol without taking proper precautions may cause a fatal or serious electric shock. If you must touch an area marked with this symbol, ensure that the area is safe before you do so.

DANGER

Indicates an imminently hazardous situation which, if ignored, will result in death or serious injury.



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 and other property.



Indicates a prohibited act.



Indicates a warning, caution, or danger. When this symbol is marked on the product, see the relevant section in this manual.



Protective conductor terminal.



Chassis (frame) terminal.



On (power supply).



Off (power supply).



In position of a bi-stable push control.



Out position of a bi-stable push control.



Safety precautions

The following safety precautions must be observed to avoid fire hazards, electric shock, accidents, and device failures. Keep them in mind and make sure to observe them.

Using the product in a manner that is not specified in this manual may impair the protection functions provided by the product.



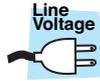
Users

- This product must be used only by qualified personnel who understand the contents of this operation manual.
- If unqualified personnel are to use the product, be sure the product is handled under the supervision of qualified personnel (those who have electrical knowledge). This is to prevent the possibility of personal injury.



Purpose of use

- Never use the product for purposes other than the product's intended use.
- Do not connect electrical appliances that are normally used with commercial power supplies as the PCR-LE Series load.
- This product is not designed or manufactured for general home or consumer use.



Input power

- Always use the product within the rated input line voltage range.
- Use the power cable provided to apply power. For details, see the appropriate pages in this manual.
- This product conforms to IEC Overvoltage Category II (energy-consuming equipment that is supplied from a fixed installation).



Cover

- Some parts inside the product are hazardous. Do not remove the external cover.



Grounding

- This product conforms to IEC Safety Class I (equipment that has a protective conductor terminal). To prevent electric shock, be sure to connect the protective conductor terminal of the product to electrical ground (safety ground).



Operation

- If you notice a malfunction or abnormality in the product, stop using it immediately, and remove the power cable plug from the outlet or remove the power cable from the switchboard. Make sure the product is not used until it is completely repaired.
- Do not disassemble or modify the product. If you need to modify the product, contact your Kikusui agent or distributor.



Maintenance, Inspection and Calibration

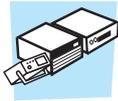
- To maintain the performance and safe operation of the product, we recommend periodic maintenance, inspection, cleaning, and calibration.
- To prevent the possibility of electric shock, remove the power plug from the outlet, or remove the power cable from the switchboard before carrying out maintenance or inspection. Do not remove the external cover.
- Check periodically that there are no tears or breaks in the power cable.
- If the panel needs cleaning, gently wipe it using a soft cloth with water-diluted neutral detergent. Do not use volatile chemicals such as benzene or thinner.
- The product is calibrated before shipment. To maintain long-term performance, we recommend periodic calibration. To have your product calibrated, contact your Kikusui distributor or agent.



Service

- Kikusui service engineers will perform internal service on the product. If the product needs adjustment or repairs, contact your Kikusui agent or distributor.

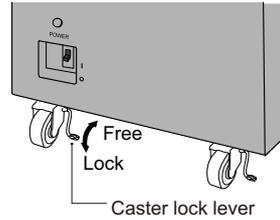
Precautions when choosing the installation location



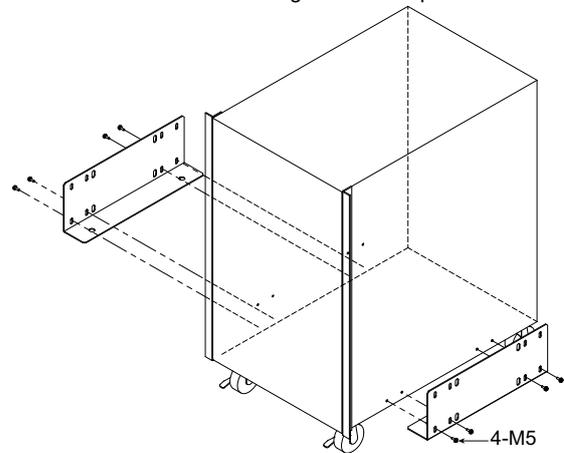
Be sure to observe the following precautions when installing the product.

- **Do not use the product in a flammable environment.**
Risk of explosion or fire. Do not use the product near alcohol, thinner, or other combustible materials, or in an environment containing such vapors.
- **Avoid locations where the product is exposed to high temperatures or direct sunlight.**
- **Do not install the product near a heater or in areas subject to drastic temperature changes.**
The product's operating temperature range is 0°C to 50°C.
- **Avoid humid environments.**
Do not install the product in high-humidity locations, such as near a boiler, humidifier, or water supply. Condensation may form even within the operating humidity range. If this happens, do not use the product until the condensation dries up completely.
The product's operating humidity range is 20 %rh to 80 %rh (no condensation).
- **Be sure to use the product indoors.**
This product is designed for safe indoor use.
- **Do not install the product in a corrosive environment.**
Do not install the product in a corrosive atmosphere or in an environment with a high level of sulfuric acid mist or other types of poisonous gas. Doing so may damage the terminals or cause the internal conductors to corrode. This can lead to malfunction, damage to the product, or fire.
- **Do not install the product in a dusty location.**
Accumulation of dust can lead to electric shock or fire.
- **Do not use the product in a poorly ventilated location.**
Secure adequate space around the product so that air can circulate around it. Allow at least 20 cm of space between the product and the nearest wall (or obstacles).
- **Do not place objects on top of the product.**
Placing objects (especially heavy ones) on top of the product can lead to malfunctions.
- **Do not use the product in a location subject to strong magnetic or electric fields or in a location where the input power supply signal contains large amounts of distortion or noise.**
Doing so may cause the product to malfunction.
- **Use the product in an industrial environment.**
Using this product in a residential area may interfere with radio and TV broadcast reception. In such case, users may need to take special measures to reduce the electromagnetic radiation.
- **Affix the heavy object warning label.**
Affix the heavy object warning label to the product where it can be readily seen. The DSI1020 weighs approximately 110 kg (243 lbs). The DSI3020 weighs approximately 230 kg (507 lbs).

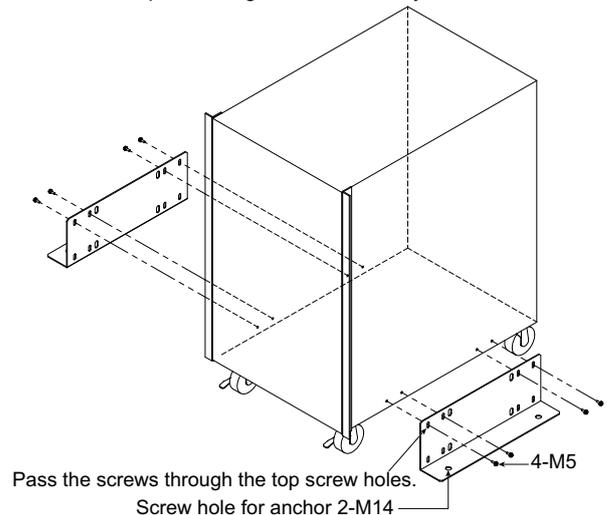
- **Do not install the product on an inclined surface or in a location subject to vibrations.**
The product may fall or tip over and cause damage and injury.
- **Lock the casters.**
Use the caster lock levers to lock the casters.



- **Use the base hold angles.**
To prevent the product from falling over, use the base hold angles to fix the product to the installation location.
When the product is shipped from the factory, base hold angles are attached to the left and right sides of the bottom of the product.
Remove the base hold angles from the product.



Face the base hold angles away from the product, and fix them in place using the screws that you removed.



Pass the screws through the top screw holes.

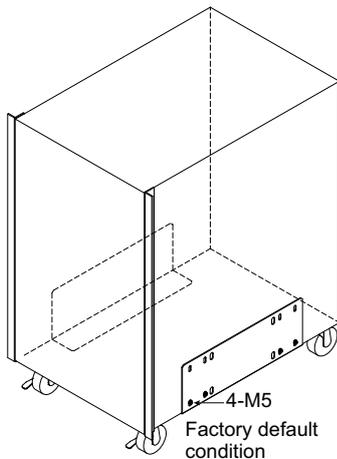
Screw hole for anchor 2-M14

Precautions for moving the product



Note the following points when moving the product to the installation location or when transporting the product.

- **Turn off the POWER switch.**
Moving the product with the POWER switch turned on may cause electric shock or damage to the product.
- **Remove all wiring.**
Moving the product with the cables connected may cause wires to break or injuries due to the product falling over.
- **Remove the base hold angles.**
Remove the base hold angles or return them to the factory default condition.



- **Unlock the casters.**
Use the caster lock levers to unlock the casters. Moving the product without releasing the lock may cause injuries due to the product falling over. Move the product over a surface that is as flat as possible.
- **Do not move the product by yourself.**
Be sure to have two or more people move the product. Exercise special care when carrying the product over a slope or across steps.
Check the weight that is indicated on the heavy object warning label that you affixed at the time of installation.
If you are using a forklift, be sure to slide the forks under the bottom of the product, check that the product is stable, and then raise the product.
If you are using a band or similar item to raise the product with a crane, be sure to slide the band under the bottom of the product, check that the product is stable, and then raise the product. (There are four eye bolt holes on the top panel of this product. M10 eye bolts can be used for the DSI1020, and M12 eye bolts can be used for the DSI3020.)
When you move the product, do not tip the product on its side or turn it upside down.
- **When transporting the product, be sure to use the original packing materials.**
Otherwise, damage may result from vibrations or from the product falling during transportation.
- **Be sure to include this manual.**

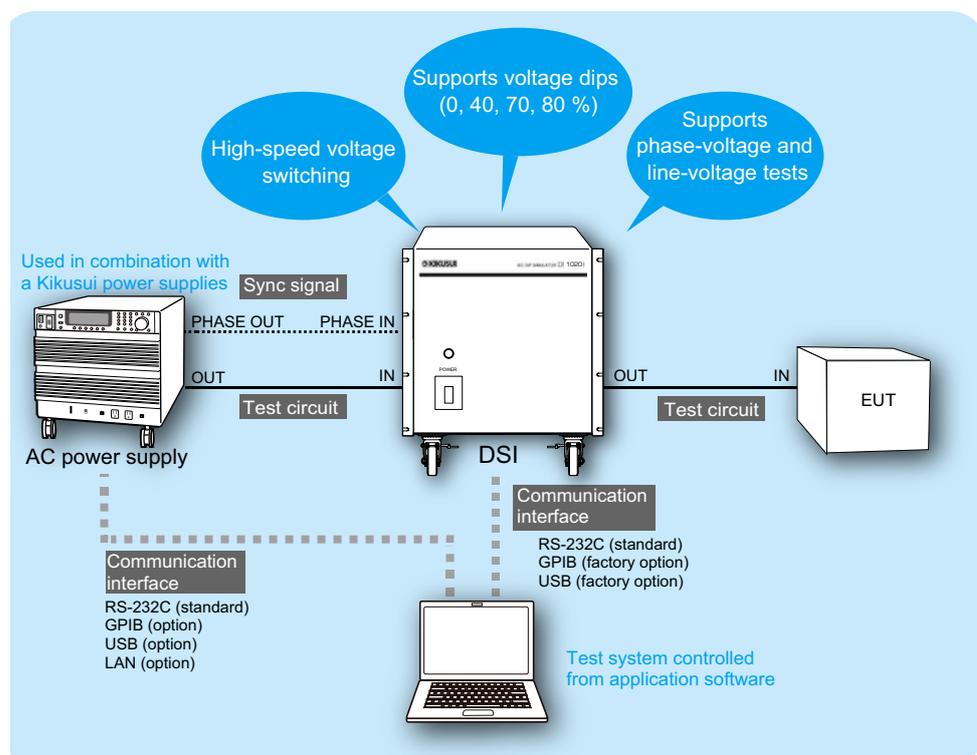
1 Introduction

Thank you for purchasing the DSI1020/ DSI3020 Dip Simulator.

This is an option unit used to construct a test system complying with the “Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests” as defined in the IEC61000-4-11 (2004) standard. It can be used in combination with one or more Kikusui AC power supplies (PCR-LE and PCR-LE2 series).

It meets the following test requirements: high-speed voltage switching (rise time: 1 μ s to 5 μ s), voltage dips (0 %, 40 %, 70 %, and 80 %), and phase-voltage and line-voltage tests.

■ Voltage dips, short interruptions and voltage variations immunity tests



Product features

■ **Controlled from a PC software application**

The test system including this product is controlled from a PC software application connected via a communication interface.

SD009-PCR-LE Quick Immunity Sequencer 2 is used to control a test system consisting of this product and one or more AC power supplies that will perform “voltage dips, short interruptions and voltage variations immunity tests.”

■ **Three types of communication interfaces (RS232C, USB, and GPIB)**

The product is standard equipped with an RS-232C interface.

You can add a USB or GPIB interface as a factory option. These options gives you flexibility in constructing your test system.

 See
“Options” (p. 3)

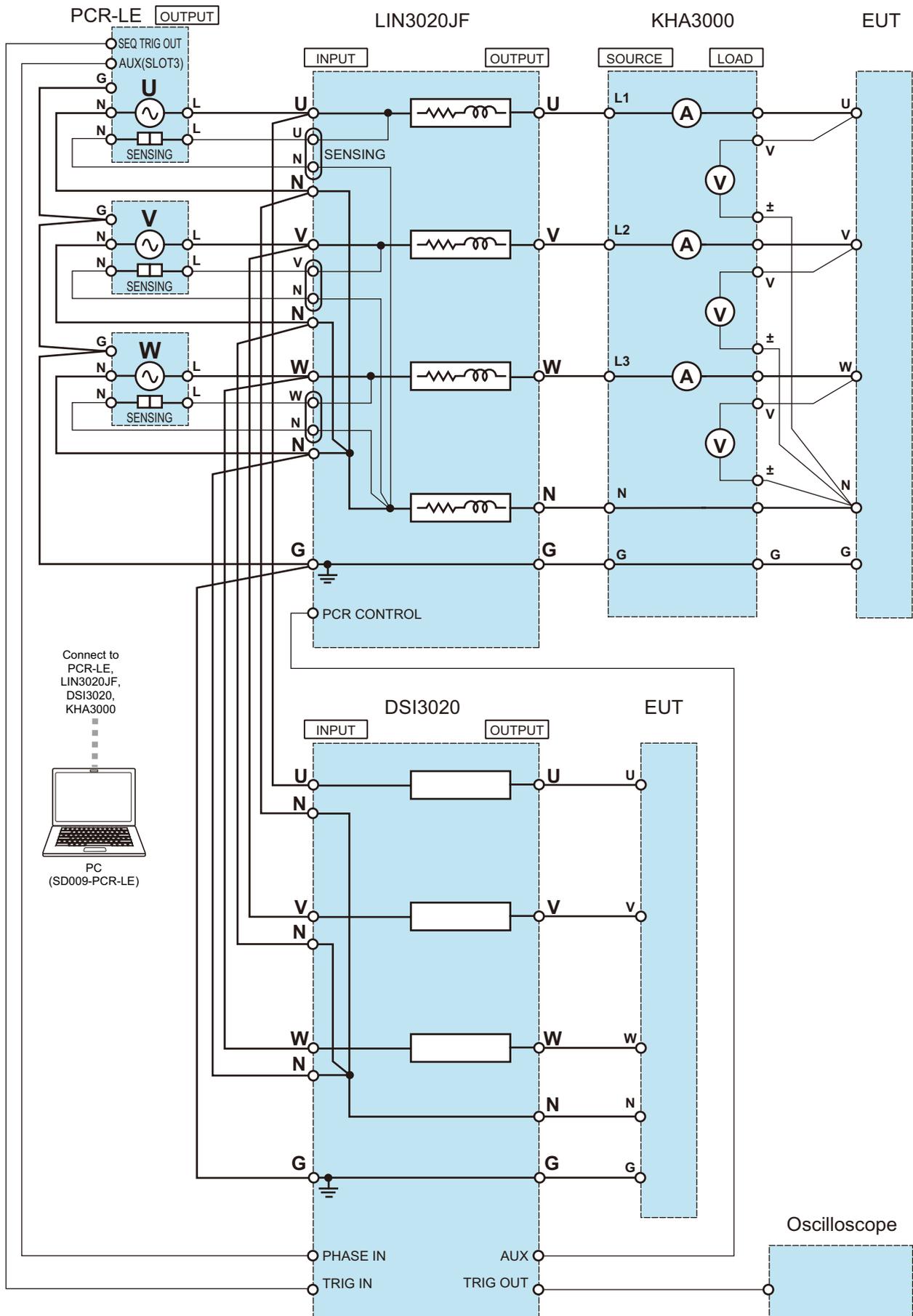
■ **Input voltage up to 500 V**

The DSI3020 supports testing of 230 V three-phase four-wire, phase-voltage systems and 400 V line-voltage systems.

■ **Incorporation into a total test system**

By combining this product with a Kikusui Harmonic/Flicker Analyzer (KHA series) and a line impedance network (LIN series), you can construct a total test system that fully complies with relevant IEC standards.

The page on the right shows an example of a three-phase four-wire test system comprising PCR-LEs, LIN3020JF, KHA3000, and DSI3020.



Example of a three-phase four-wire total test system

2 Overview of the Test System

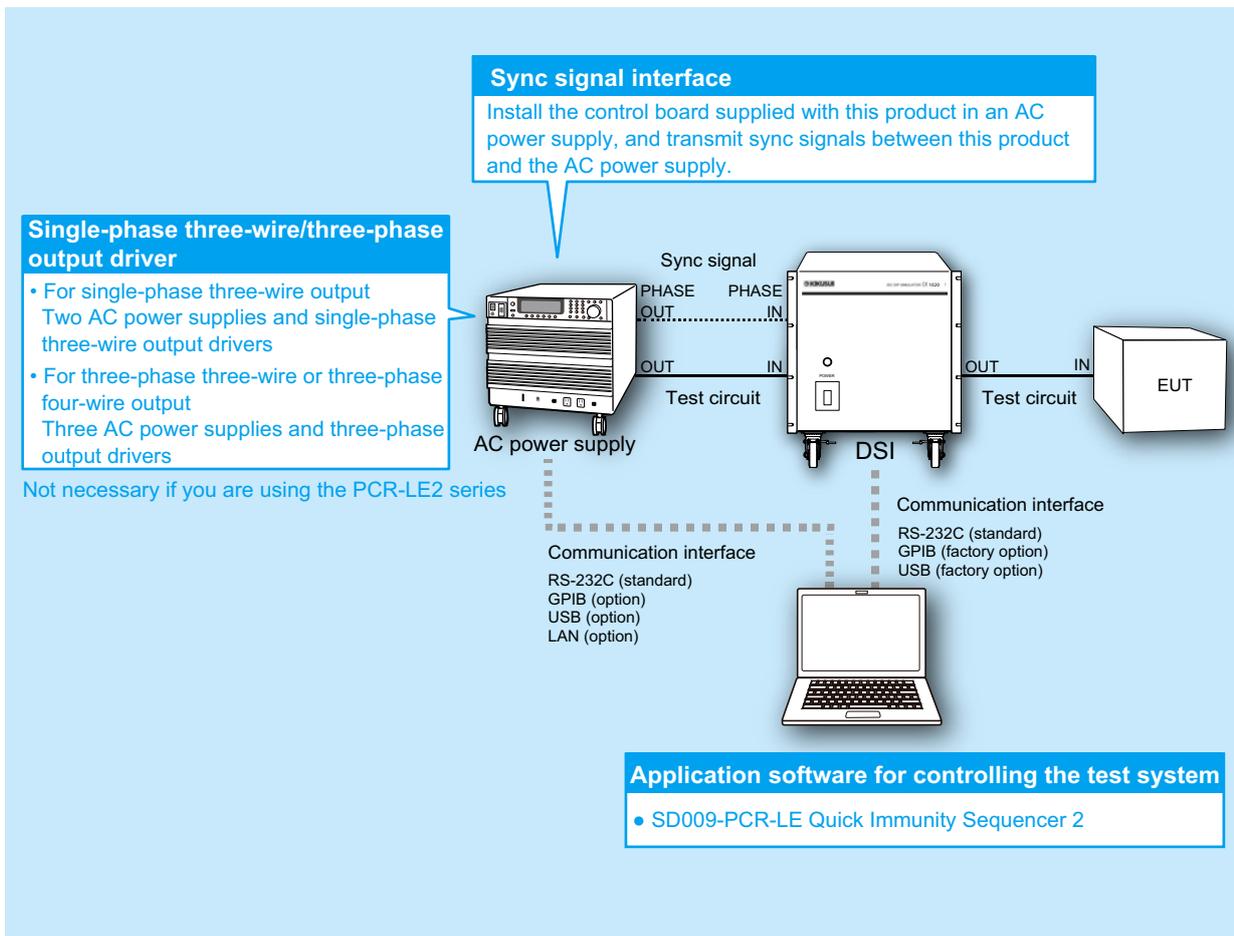
This option unit is used to construct a test system complying with the “Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests” as defined in the IEC61000-4-11 (2004) standard. To actually perform tests using this product, you will need to install a test system that consists of this product and one or more Kikusui AC power supplies.

NOTE

Be sure to use this product in combination with one or more Kikusui PCR-LE or PCR-LE2 series AC power supplies. It cannot be combined with AC power supplies made by other manufacturers.

Voltage dips, short interruptions and voltage variations immunity tests

To construct a test system for single-phase three-wire, three-phase three-wire, or three-phase four-wire output, several AC power supplies are required. However, if you are using a PCR-LE2 series AC power supply, you need only one.



For instructions on how to install a test system for “voltage dips, short interruptions and voltage variations immunity tests,” see chapter 3, “Installing the Test System”.

AC power supply and firmware version

The following AC power supplies can be used.

AC power supply	Firmware version
PCR-LE Series	3.0 and later
PCR-LE2 Series	4.0 and later



CAUTION

This product cannot be combined with custom-order AC power supplies with built-in EMI filters. Doing so can cause a malfunction.

Communication interface (this product and AC power supplies)

The following communication interfaces can be used.

Communication interface	This product	AC power supplies
RS-232C	Standard	Standard (terminal in the top section of the front panel)
GPIOB	Factory option	IB05-PCR-LE (option) ¹
USB	Factory option	US05-PCR-LE (option) ¹
LAN	—	LN05-PCR-LE (option) ¹

¹ The optional communication interface board is installed in SLOT 4 of each AC power supply. For details, see the AC power supply manual.

Single-phase three-wire and three-phase output drivers (PCR-LE options)

The following options are not necessary if you are using a PCR-LE2 series AC power supply.

■ For single-phase three-wire output

Prepare two AC power supplies (used as a U-phase unit and V-phase unit). Then, install a single-phase three-wire output driver (2P05-PCR-LE) in SLOT 1 of each unit.

■ For three-phase three-wire or three-phase four-wire output

Prepare three AC power supplies (used as a U-phase unit, V-phase unit, and W-phase unit). Then, install a three-phase output driver (3P05-PCR-LE) in SLOT 1 of each unit.



NOTE

Use the cables supplied with the drivers to connect between the single-phase three-wire or three-phase output driver connectors. For details, see the setup guide of the driver.

Sync signal interface

Install the control board supplied with this product in SLOT3 of the (master) AC power supply.

Application software for controlling the test system

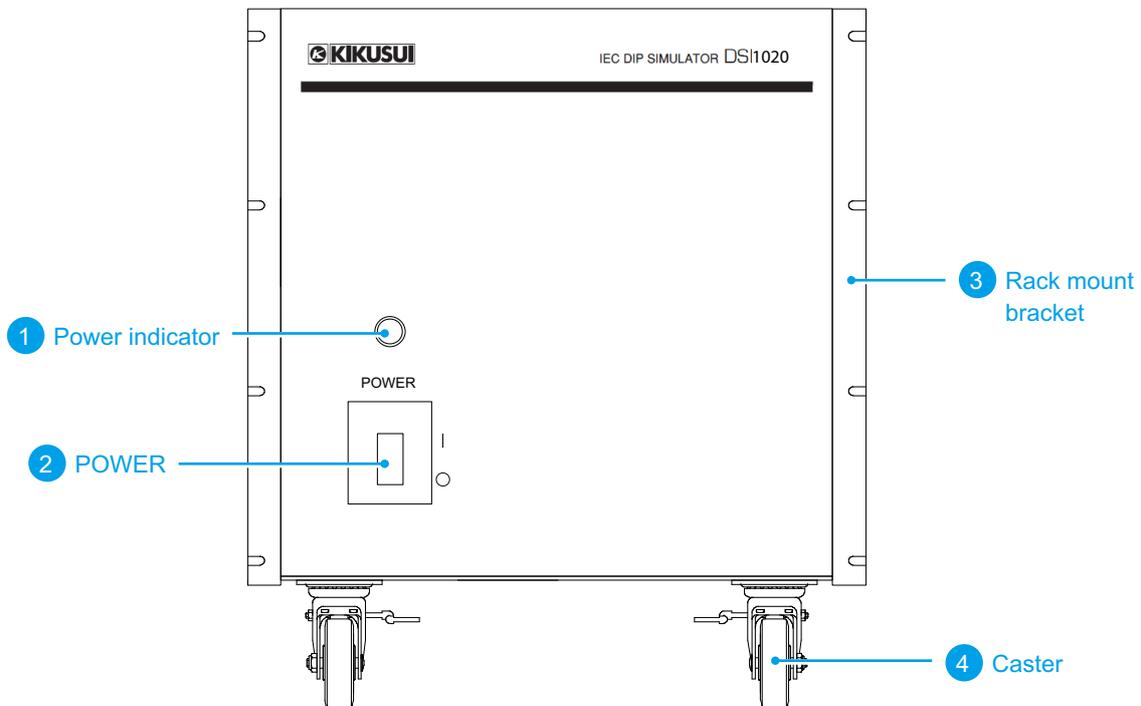
Use the SD009-PCR-LE Quick Immunity Sequencer 2 application software to control the test system.

3 Installing the Test System

This chapter explains how to install a test system for “voltage dips, short interruptions and voltage variations immunity tests.” First, the product’s component names and functions will be described. For details on the component names and functions of AC power supplies, see the AC power supply manual.

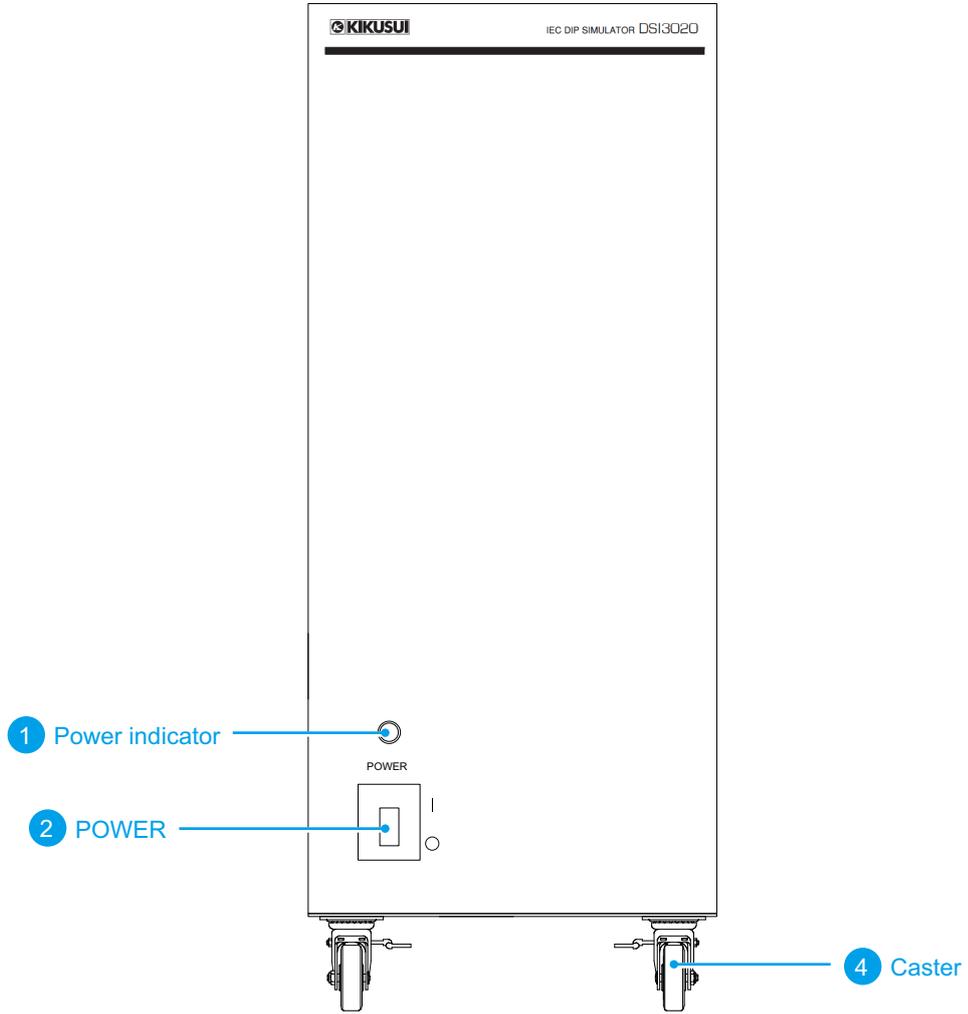
Product’s component names and functions

Model DSI1020 front panel

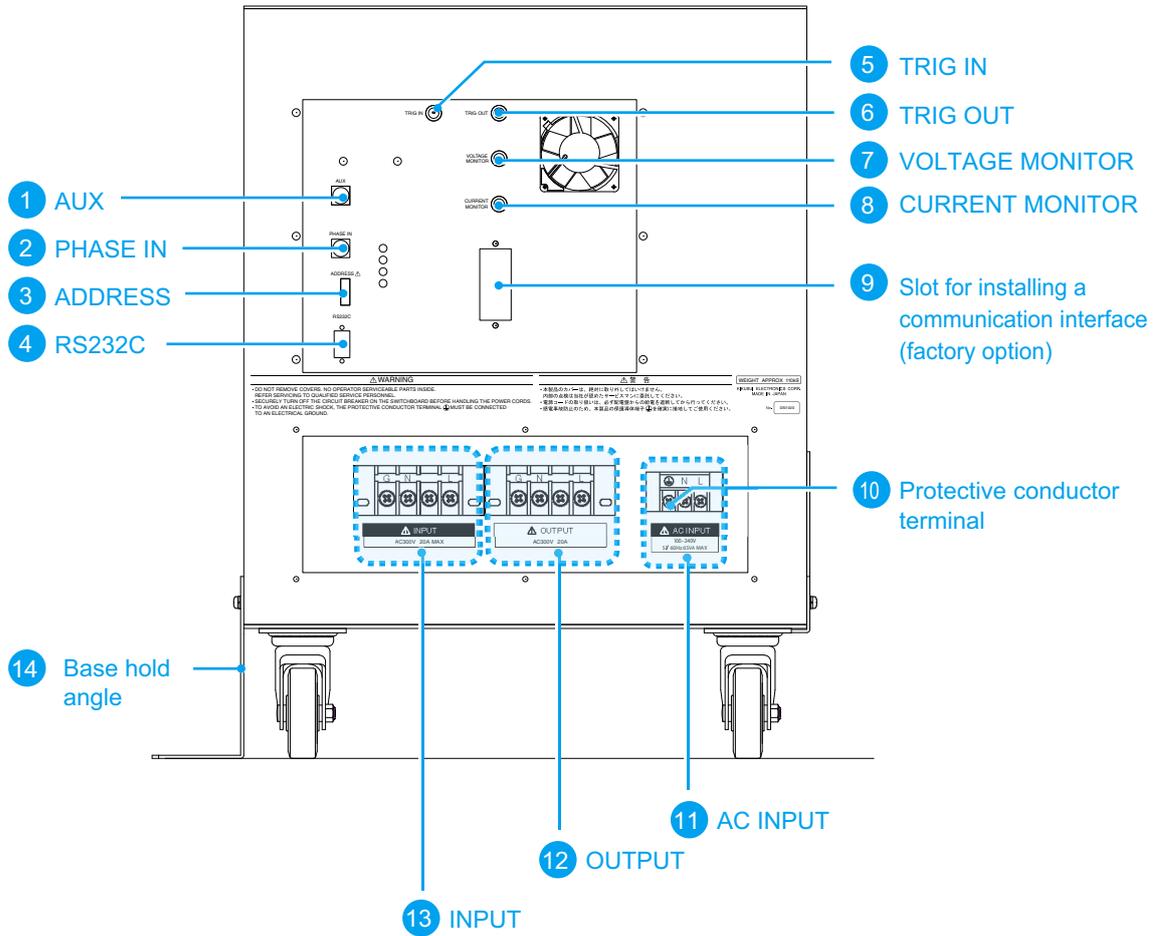


Name	Function
1 Power indicator	Lights in green when the power is on.
2 POWER	Flip the switch up to the (I) side to turn the power on. Flip it down to the (O) side to turn the power off.
3 Rack mount bracket (DSI1020 only)	L-shaped bracket for mounting the product on a rack
4 Caster	For moving the product. (The caster can be locked.)

Model DSI3020 front panel

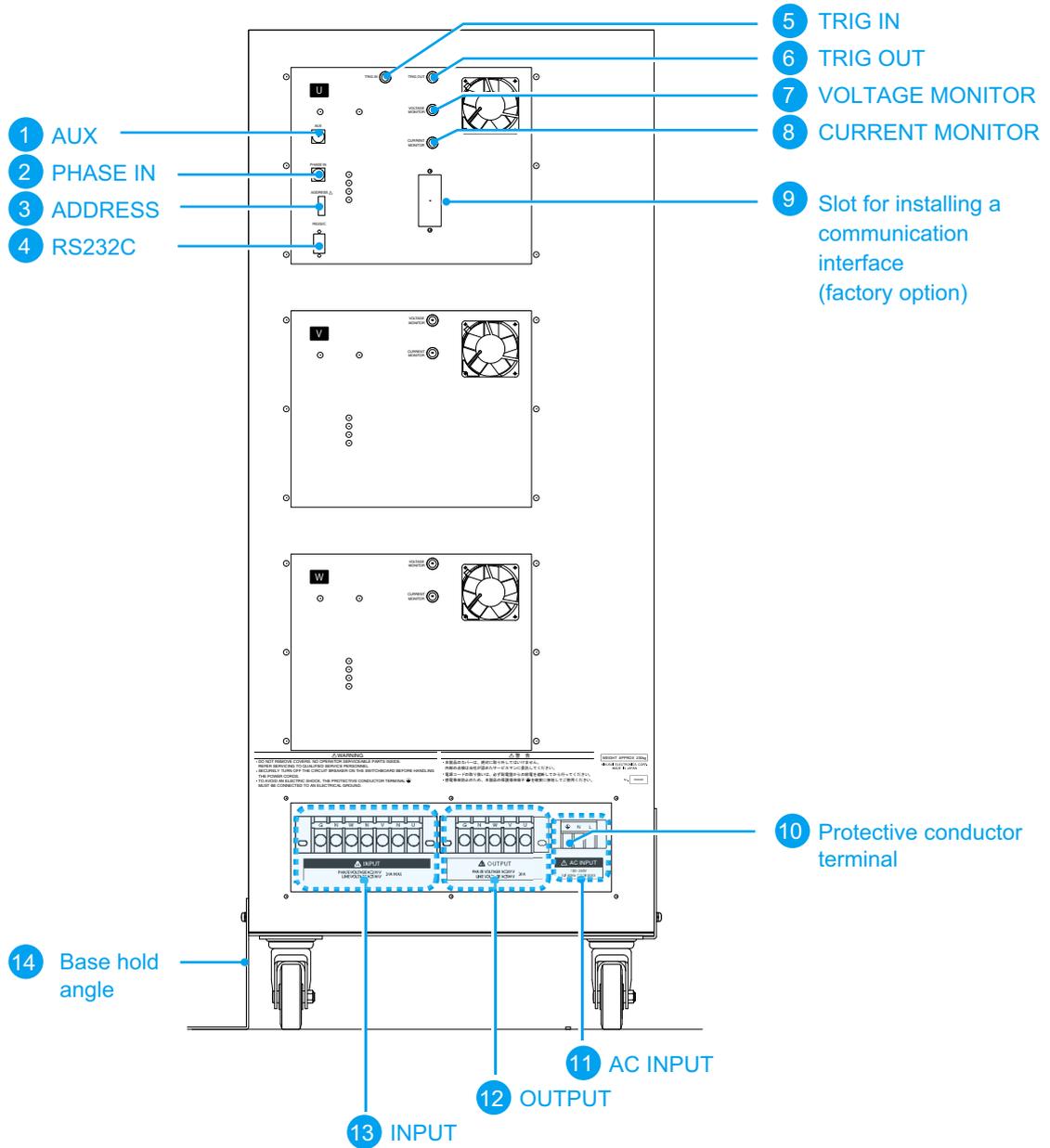


Model DSI1020 rear panel



Name	Function
1 AUX	An exclusive input terminal for receiving overheat protection signals (PCR CONTROL) from a LIN series line impedance network in a total test system.
2 PHASE IN	A control cable terminal for receiving sync clock signals from an AC power supply.
3 ADDRESS	Switches for selecting the communication interface (RS-232C, GPIB, or USB) and setting the GPIB address.
4 RS232C	A connector for the RS-232C cable.
5 TRIG IN	An exclusive input terminal for receiving signals from AC power supplies to transmit trigger signals during voltage variation tests.
6 TRIG OUT	An output terminal for transmitting trigger signals for starting and stopping voltage dips and short interruptions and starting and stopping voltage variation.
7 VOLTAGE MONITOR	A signal output terminal for monitoring output voltage waveforms.
8 CURRENT MONITOR	A signal output terminal for monitoring output current waveforms.
9 —	A slot for installing a factory-option communication interface.

Model DSI3020 rear panel



Name	Function
10 	Protective conductor terminal
11 AC INPUT	Control power input terminal block
12 OUTPUT	Output terminal block Model DSI1020: G, N, L Model DSI3020: G, N, W, V, U
13 INPUT	Input terminal block Model DSI1020: G, N, L Model DSI3020: G, N, W, N, V, N, U
14 Base hold angle	L-shaped bracket for fixing the product to the installation location

Test system installation procedure

This section explains how to install a test system for “voltage dips, short interruptions and voltage variations immunity tests.”

Model DSI3020 supports single-phase two-wire, single-phase three-wire, three-phase three-wire, and three-phase four-wire tests.

Model DSI1020 supports single-phase two-wire tests.

To install the system, you need carry out the following procedure.

- 1** Connect the sync signal interface
- 2** Connect the test circuit
- 3** Connect the communication interface

Note that to use a single-phase three-wire, three-phase three-wire, or three-phase four-wire output test circuit, you will need to prepare several AC power supplies, attach a single-phase three-wire output driver or three-phase output driver to each power supply, and connect them. (This is not necessary if you are using a PCR-LE2 series power supply.)

NOTE

For details on where to connect the single-phase three-wire or three-phase driver, see [appendix A, “AC Power Supply Connection Diagram” \(p. 51\)](#).

For details on how to install the driver, see the setup guide of the driver.

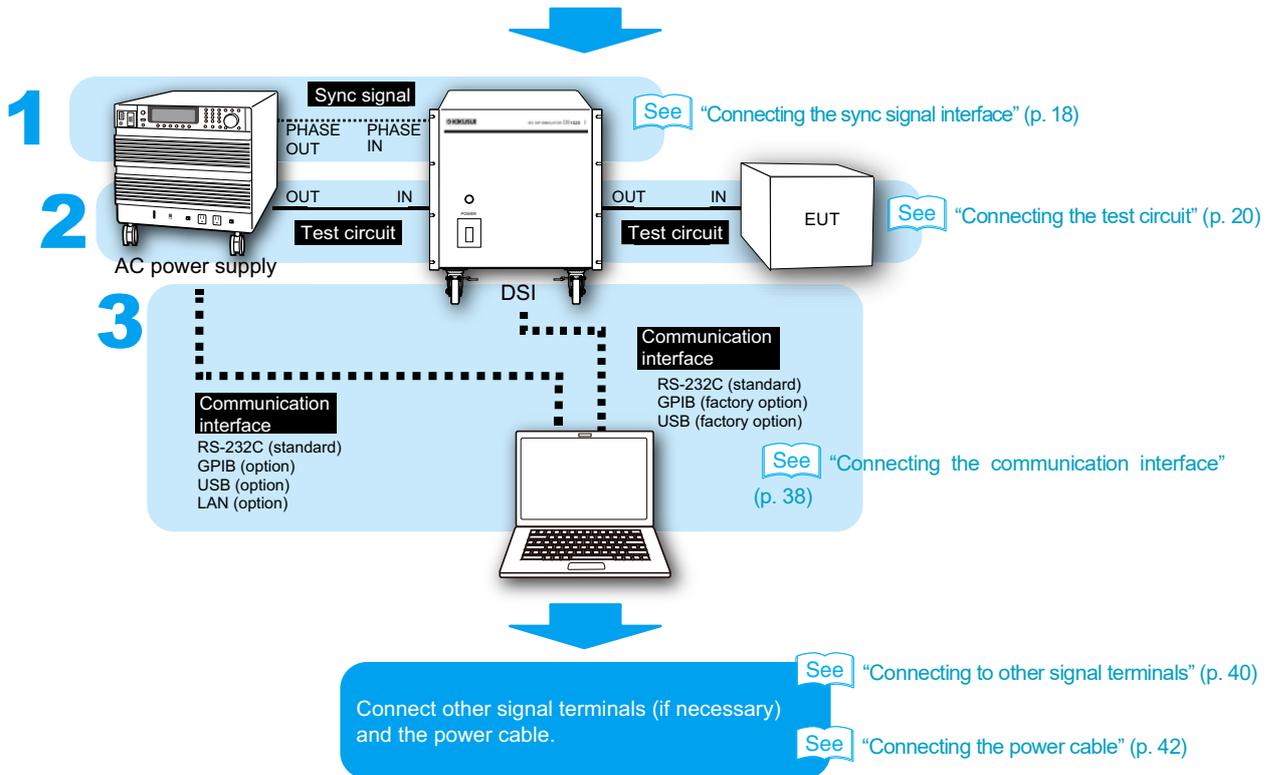
You need to make special preparations to use single-phase three-wire, three-phase three-wire, or three-phase four-wire output. (This is not necessary if you are using the PCR-LE2 series.)

For single-phase three-wire output

- Prepare two AC power supplies (U-phase unit and V-phase unit).
- Install a single-phase three-wire output driver in each unit and connect.

For three-phase three-wire or three-phase four-wire output

- Prepare three AC power supplies (U-phase unit, V-phase unit, and W-phase unit).
- Install a three-phase output driver in each unit and connect.



Connecting the sync signal interface

See
“AC Power Supply Con-
nection Diagram” (p.
51)

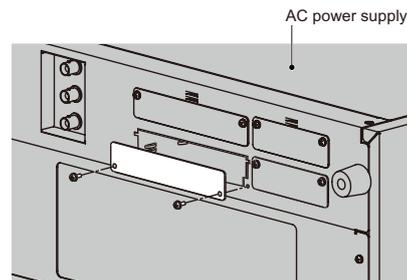
This product needs to receive sync signals from the (master) AC power supply in order to run. To receive it, the control board supplied with this product must be installed in the (master) AC power supply, and the AC power supply and this product must be connected using a control cable.

Installing the control board in the (master) AC power supply

NOTE

For single-phase three-wire, three-phase three-wire, or three-phase four-wire output, connect the control board to the master unit (U-phase unit).

- 1 Check that the **POWER** switches of the AC power supplies are turned off (○).
- 2 Touch a grounded metal object (for example, the metal parts of the rear panel) to discharge any static electricity from your body.
- 3 Remove the screws that are holding the **SLOT 3** cover (rear panel) in place from the AC power supply, and remove the cover from the panel.
(The figure is an example of a PCR-LE series.)

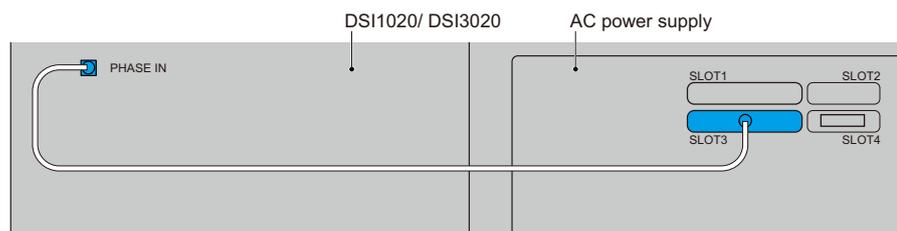


- 4 Flip the control board supplied with the product so that the side with the components is facing down, and hold the panel area of the board.
- 5 Insert the board all the way into the slot so that the connector is firmly inserted into the slot.
- 6 Use the screws that you removed in step 3 to fix the control board in place in the panel.

Connecting this product to the AC power supply using the control cable

- 1 Check that the POWER switches of this product and AC power supplies are turned off (○).**
- 2 Connect the control cable supplied with this product.**

Connect one end of the cable to the connector of the control board that was installed in the AC power supply.
Connect the other end to the PHASE IN connector on the rear panel of this product.
(The figure is an example of a PCR-LE series.)



Connecting the test circuit

See
 “DSI1020 test circuits:
 two types” (p. 22)
 “DSI3020 test circuits:
 five types” (p. 23)

Connect this product, the AC power supplies, and the EUT to construct the test circuit. Connect the wires according to the test circuit connection diagram that corresponds to your product model.

- When using model DSI1020, you can use two types of test circuits. See “DSI1020 test circuits: two types” (p. 22).
- When using model DSI3020, you can use five types of test circuits. See “DSI3020 test circuits: five types” (p. 23).

Select the test circuit appropriate for your EUT.

WARNING

Risk of electric shock.

- **Be sure to attach the terminal cover of this product. High voltage will be applied to the terminals.**
- **Before you connect cables to the AC power supplies’ OUTPUT terminal blocks, be sure to turn the POWER switch off, and then shut off the power supply from the switchboard.**
- **Be sure to ground the product to prevent electric shock.**
- **Never connect the INPUT terminal block of this product to the AC line. The internal circuit of this product is not designed to be connected to the AC line.**
- **Fasten the terminal screws securely. Loose screws are dangerous because the wires may come loose or the connection may heat up.**

NOTE

- The G terminal in the connect diagrams is not the protective conductor terminal (the main ground terminal to be connected to an external protective conductor).

Connecting wires

NOTE

This product does not include wires for connecting devices or crimping terminals for the wires. Check the screw sizes of the I/O terminals of each device, and use appropriate single-core wires and crimping terminals. We recommend that you use wires with a nominal cross-sectional area of at least 8 mm² (AWG8).

■ Terminal screw sizes

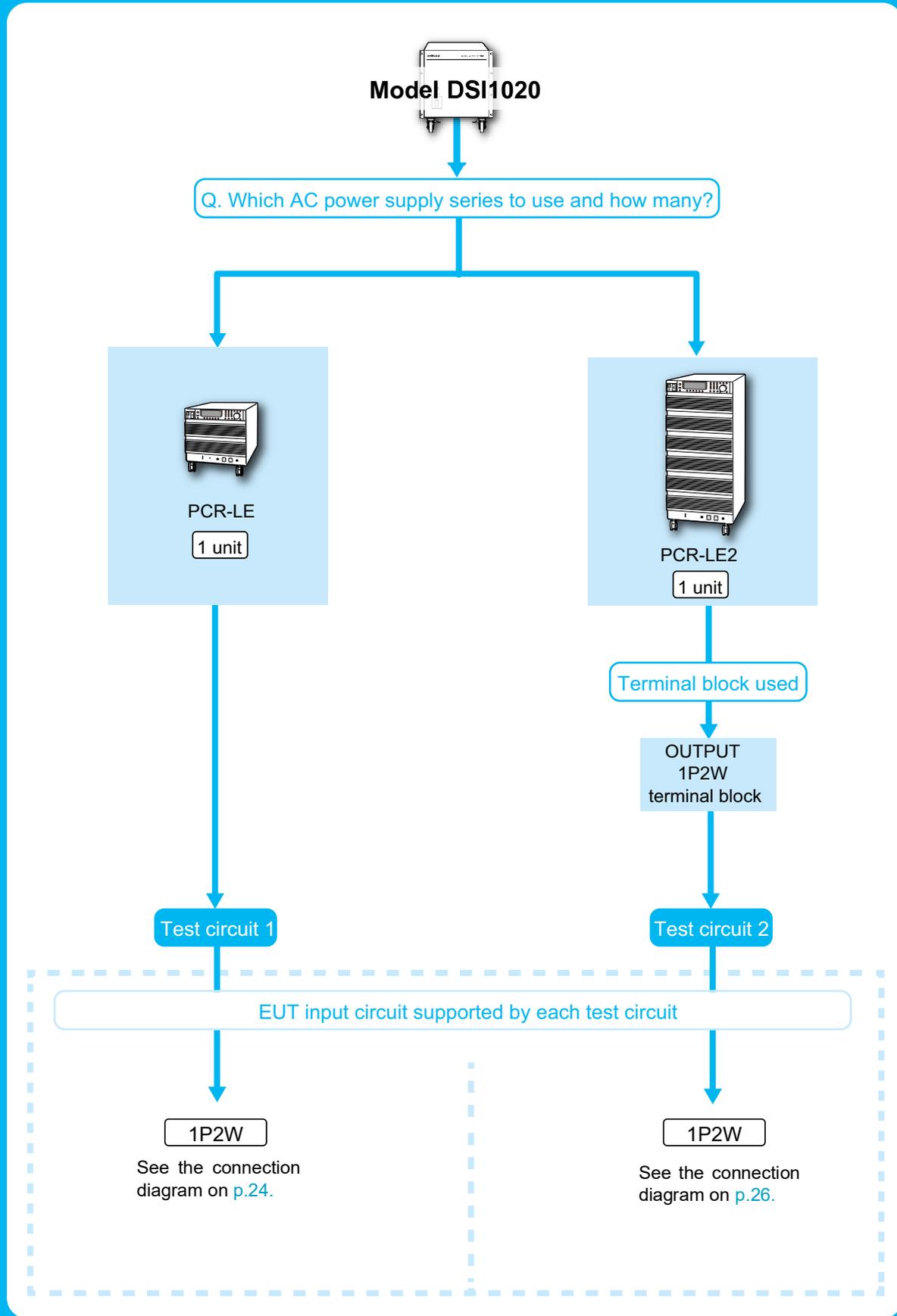
- I/O terminal screw size of the DSI (this product): M6
- Output terminal screw sizes of AC power supplies

M4	M5	M8
PCR500LE	PCR3000LE	PCR6000LE
PCR1000LE	PCR4000LE	PCR9000LE
PCR2000LE	PCR6000LE ¹	PCR6000LE ²
	PCR9000LE ¹	PCR9000LE ²
		PCR27000LE2

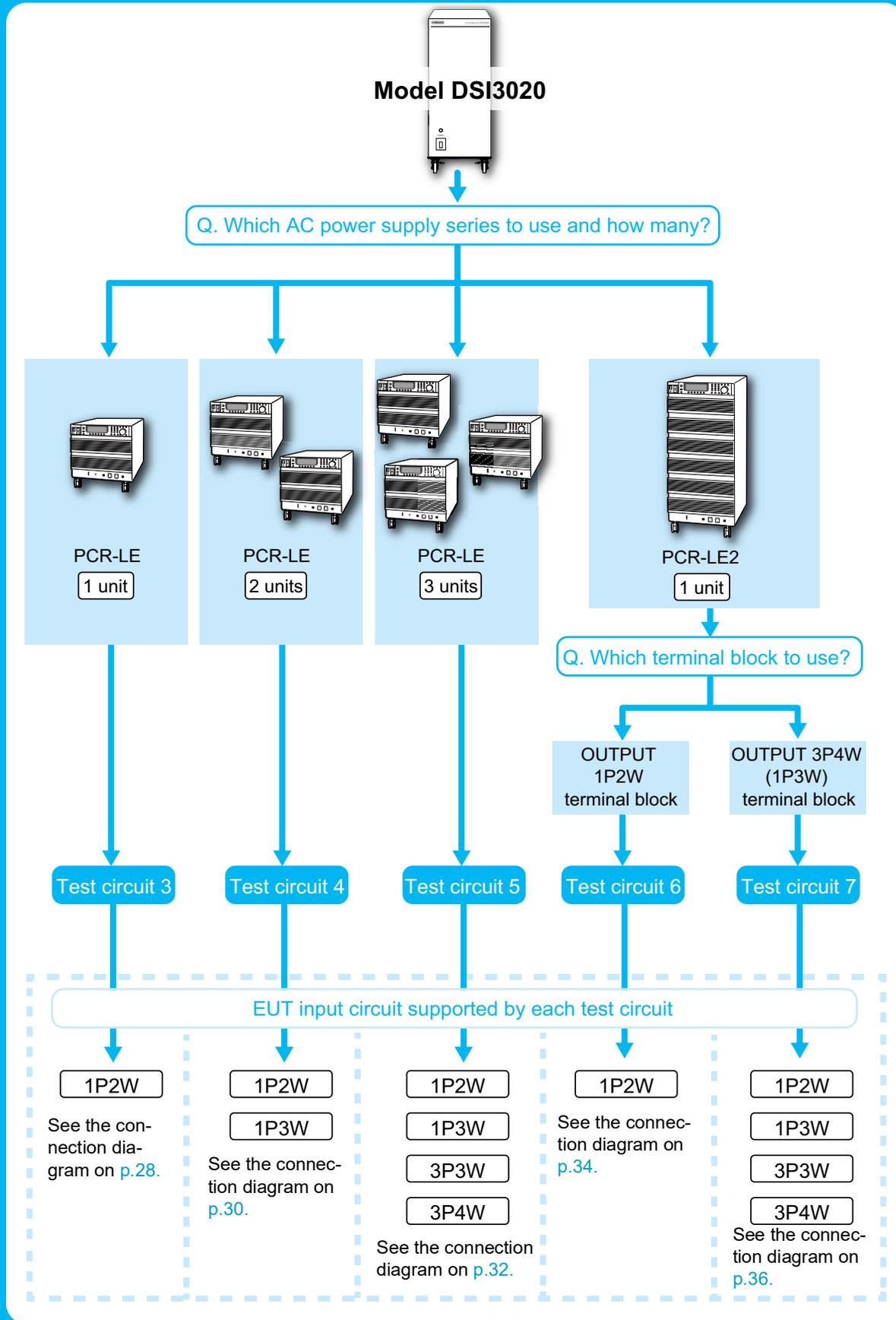
- 1 When using an OUTPUT 3P4W(1P3W) terminal block for single-phase three-wire or three-phase output
- 2 When using an OUTPUT 1P2W terminal block for single-phase two-wire output

- 1** Check that the **POWER** switches of all devices are turned off (○), and shut off the power supply from the switchboard.
- 2** Check that the ⚡ terminal (protective conductor terminal) of each AC power supply's **INPUT** terminal block is grounded.
- 3** Unfasten the screws from the terminal cover attached to the lower part of the rear panel of this product.
- 4** Connect the **OUTPUT** terminal blocks of the AC power supplies to the **INPUT** terminal block of this product using wires.
Refer to “DSI1020 test circuits: two types” (p. 22) and “DSI3020 test circuits: five types” (p. 23), and select the test circuit appropriate for your EUT.
For connection details, see the AC power supply manual.
- 5** Connect the **OUTPUT** terminal block of this product to the **INPUT** terminal block of the EUT using wires.
If necessary, attach relay terminals between this product and the EUT.
- 6** Attach the terminal cover that you removed in step 3.

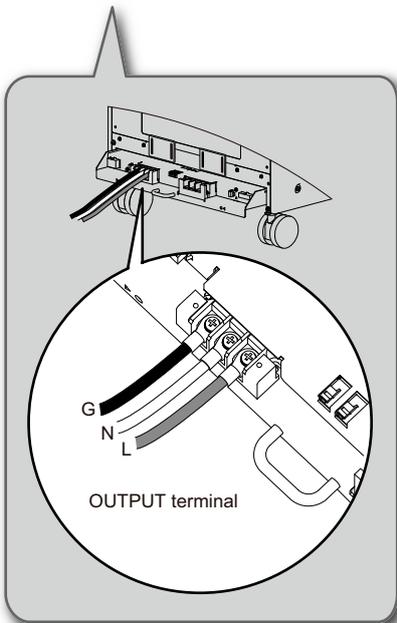
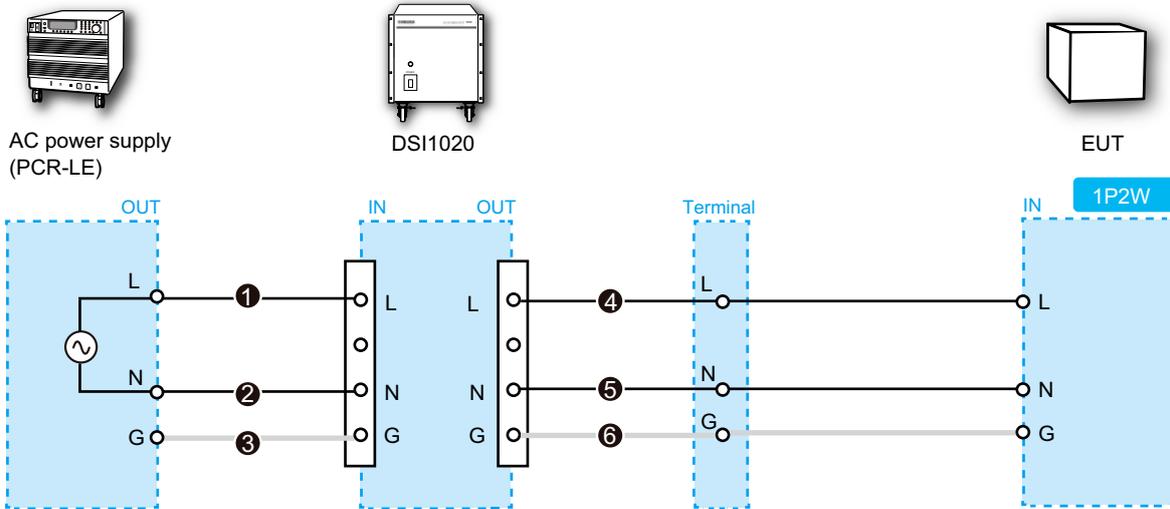
Test circuit using model DSI1020 (two types)



Test circuit using model DSI3020 (five types)

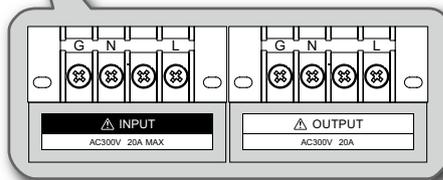


Test circuit 1: DSI1020 + PCR-LE (1 unit)



PCR-LE Series AC Power Supply

OUTPUT terminal screw size
 M4: PCR500LE, PCR1000LE, PCR2000LE
 M5: PCR3000LE, PCR4000LE
 M6: PCR6000LE, PCR9000LE



DSI1020 Dip Simulator

INPUT terminal screw size: M6
 OUTPUT terminal screw size: M6

The output terminal shape on the PCR500LE is different from the above figure.
 For details, see the PCR-LE series manual.



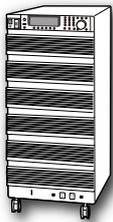
“Connecting wires” (p. 20)

	PCR-LE OUT		DSI 1020 IN		DSI 1020 OUT		Terminal
①	Output terminal L	↔	Input terminal L	④	Output terminal L	↔	Terminal L
②	Output terminal N	↔	Input terminal N	⑤	Output terminal N	↔	Terminal N
③	Output terminal G	↔	Input terminal G	⑥	Output terminal G	↔	Terminal G

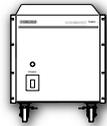
NOTE

For details on how to connect a DSI1020 and an AC power supply (PCR-LE series), see “One PCR-LE series + DSI1020” (p. 51).

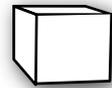
Test circuit 2: DSI1020 + PCR-LE2 (1 unit)



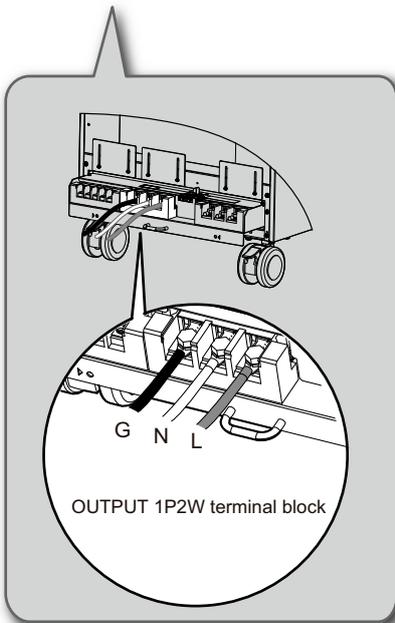
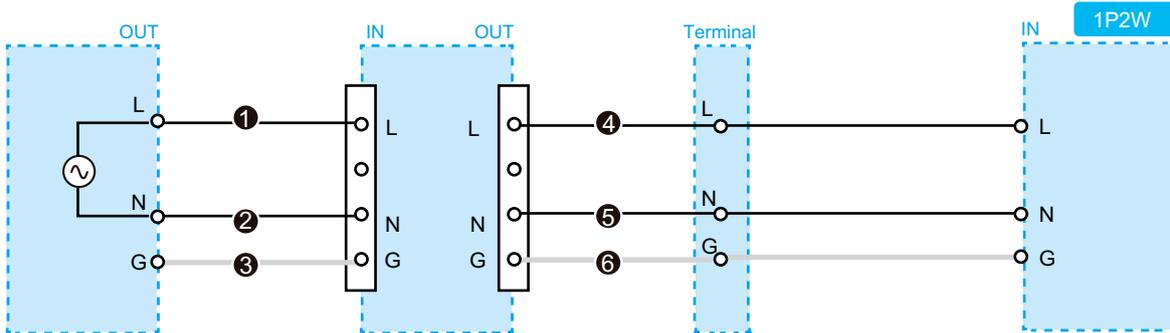
AC power supply (PCR-LE2)



DSI1020

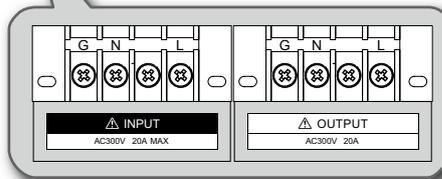


EUT



PCR-LE2 Series AC Power Supply

OUTPUT 1P2W terminal screw size
M8: PCR6000LE2, PCR9000LE2,
PCR27000LE2



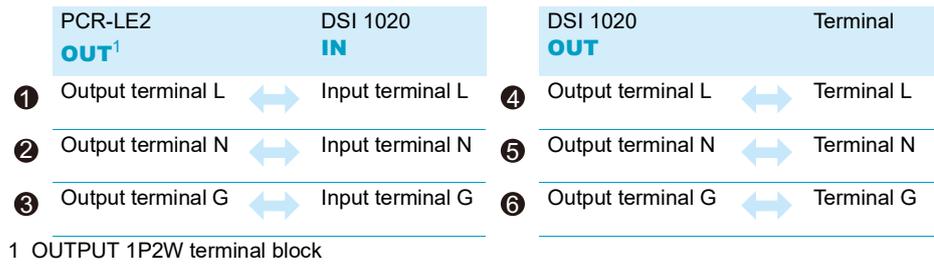
DSI1020 Dip Simulator

INPUT terminal screw size: M6
OUTPUT terminal screw size: M6

The output terminal shape on the PCR27000LE2 is different from the above figure. For details, see the PCR-LE2 series manual.



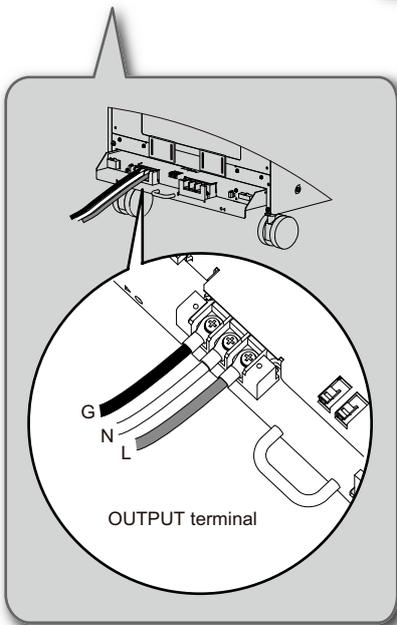
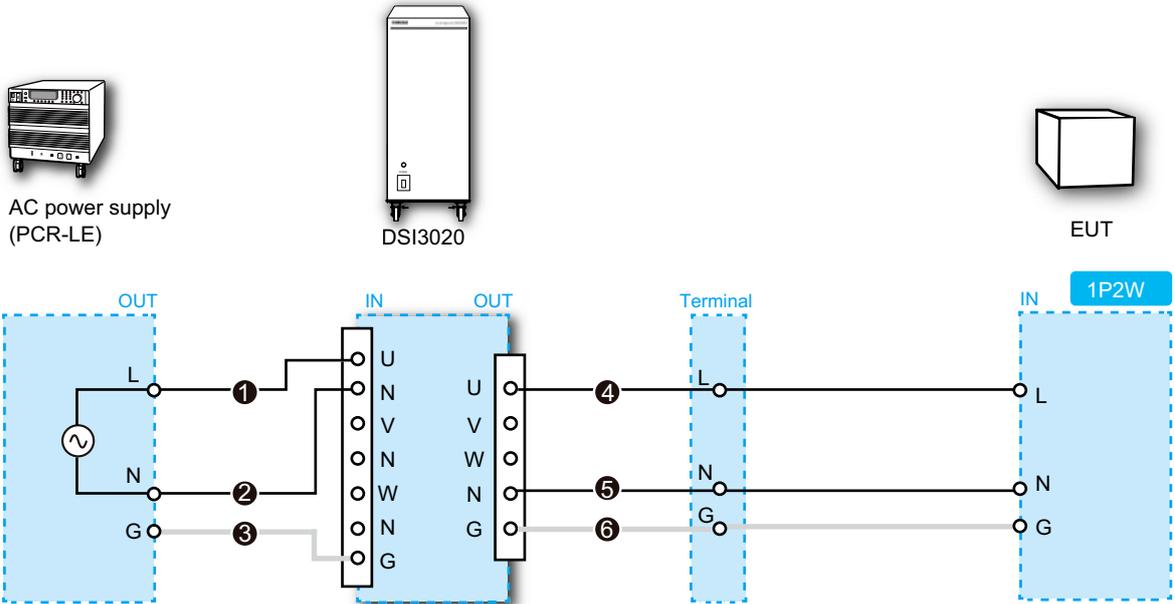
“Connecting wires” (p. 20)



NOTE

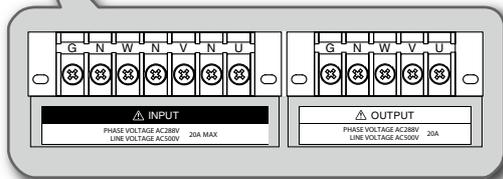
For details on how to connect a DSI1020 and an AC power supply (PCR-LE2 series), see “One PCR-LE2 series (with OUTPUT 1P2W terminal block) + DSI1020” (p. 56).

Test circuit 3: DSI3020 + PCR-LE (1 unit)



PCR-LE Series AC Power Supply

OUTPUT terminal screw size
 M4: PCR500LE, PCR1000LE, PCR2000LE
 M5: PCR3000LE, PCR4000LE
 M6: PCR6000LE, PCR9000LE



DSI3020 Dip Simulator

INPUT terminal screw size: M6
 OUTPUT terminal screw size: M6

The output terminal shape on the PCR500LE is different from the above figure.
 For details, see the PCR-LE series manual.

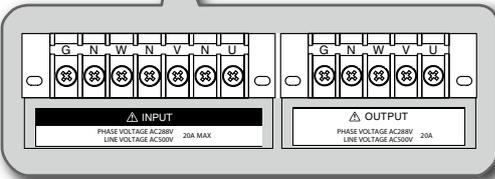
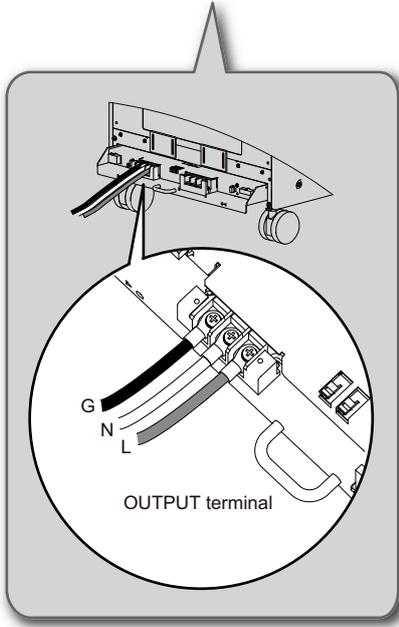
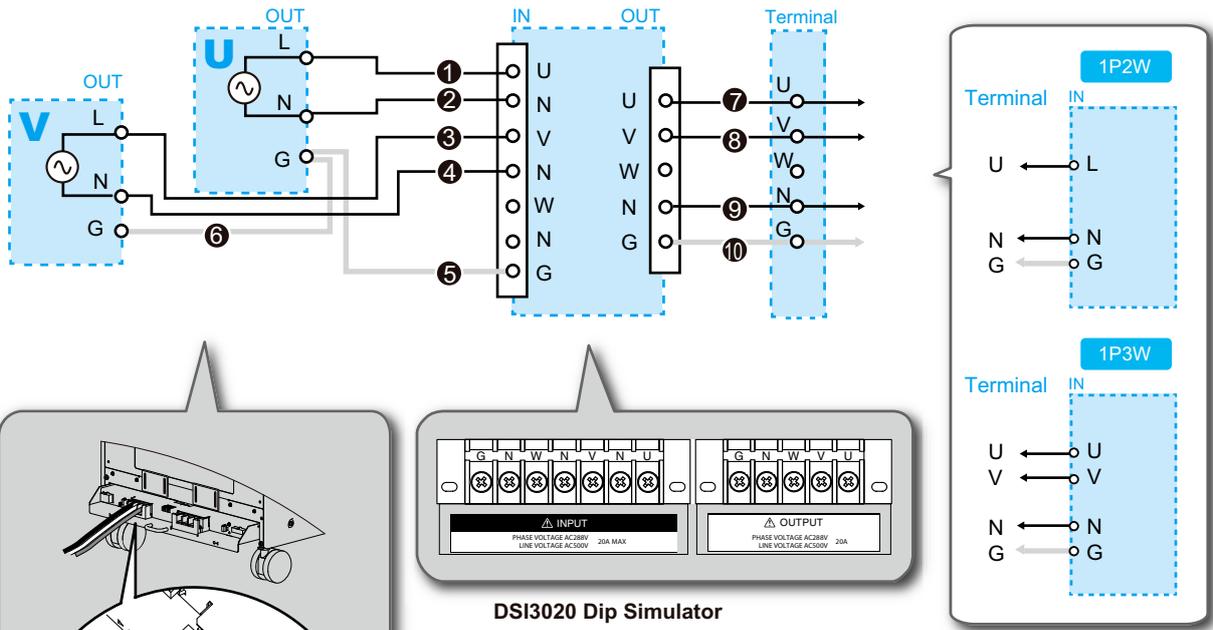
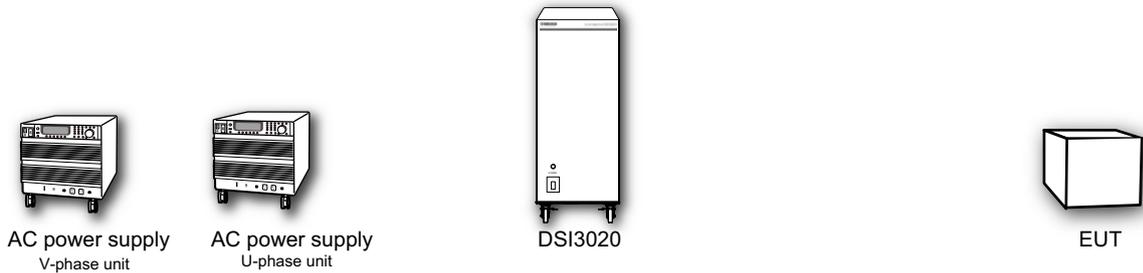
 "Connecting wires" (p. 20)

	PCR-LE OUT		DSI 3020 IN		DSI 3020 OUT		Terminal
①	Output terminal L	↔	Input terminal U	④	Output terminal U	↔	Terminal L
②	Output terminal N	↔	Input terminal N	⑤	Output terminal N	↔	Terminal N
③	Output terminal G	↔	Input terminal G	⑥	Output terminal G	↔	Terminal G

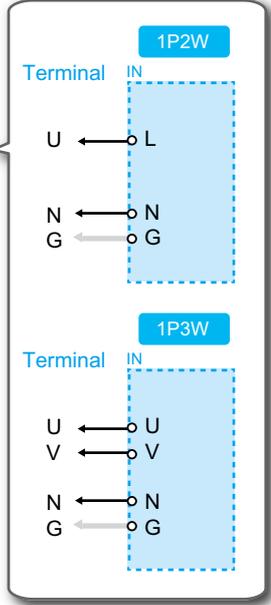
NOTE

For details on how to connect a DSI3020 and an AC power supply (PCR-LE series), see "One PCR-LE series + DSI3020" (p. 52).

Test circuit 4: DSI3020 + PCR-LE (2 units)



DSI3020 Dip Simulator
 INPUT terminal screw size: M6
 OUTPUT terminal screw size: M6



When this test circuit is used, the single-phase two-wire power will be one-half that of single-phase three-wire.

PCR-LE Series AC Power Supply

- OUTPUT terminal screw size
- M4: PCR500LE, PCR1000LE, PCR2000LE
- M5: PCR3000LE, PCR4000LE
- M6: PCR6000LE, PCR9000LE

The output terminal shape on the PCR500LE is different from the above figure. For details, see the PCR-LE series manual.



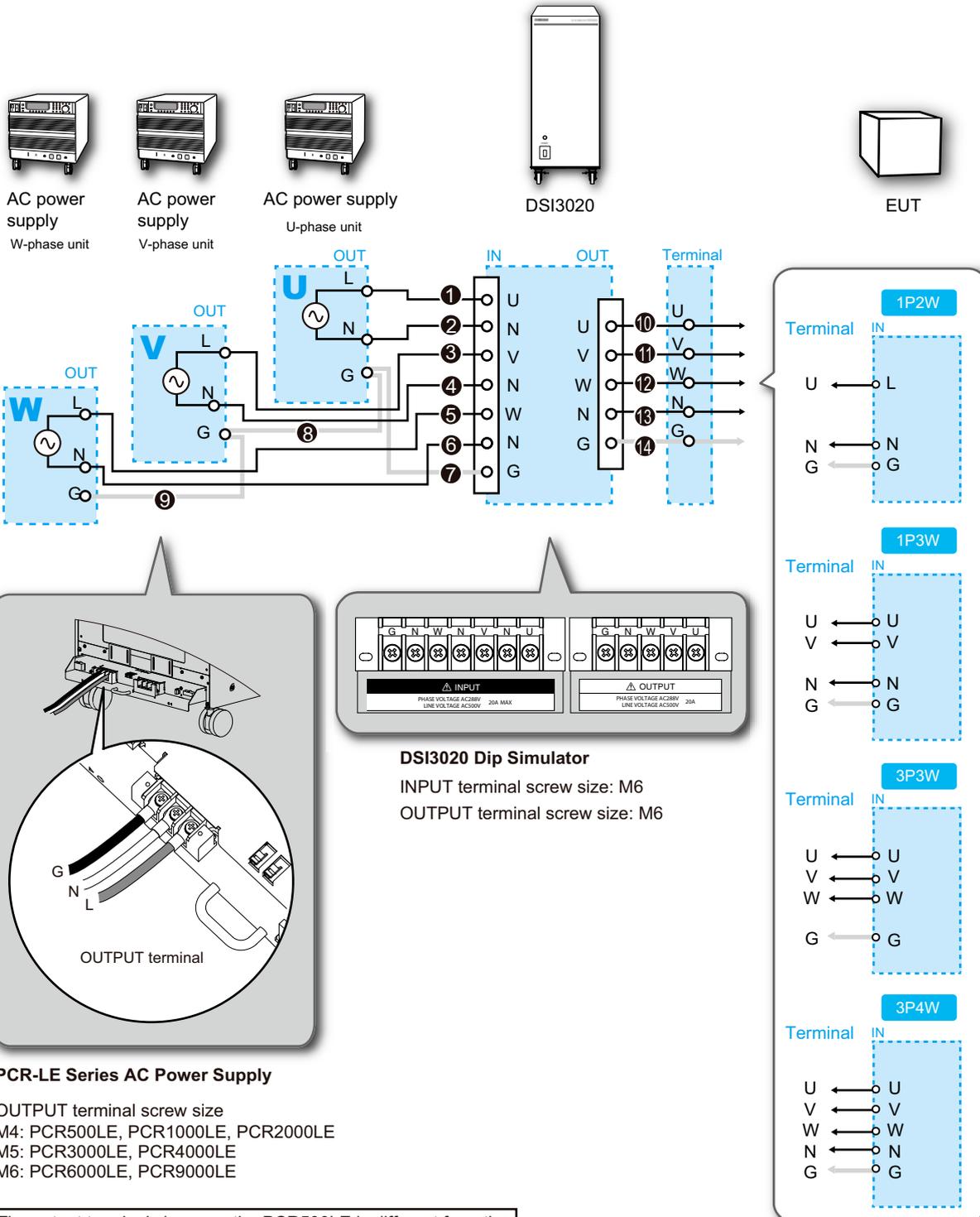
“Connecting wires” (p. 20)

	PCR-LE OUT		DSI 3020 IN		DSI3020 OUT		Terminal
①	U phase output terminal L	↔	Input terminal U	⑦	Output terminal U	↔	Terminal U
②	U phase output terminal N	↔	Input terminal N	⑧	Output terminal V	↔	Terminal V
③	V phase output terminal L	↔	Input terminal V	⑨	Output terminal N	↔	Terminal N
④	V phase output terminal N	↔	Input terminal N	⑩	Output terminal G	↔	Terminal G
⑤	U phase output terminal G	↔	Input terminal G				
	PCR-LE OUT		PCR-LE OUT				
⑥	U phase output terminal G	↔	V phase output terminal G				

NOTE

For details on how to connect a DSI3020 and two AC power supplies (PCR-LE series), see “Two PCR-LE series + DSI3020” (p. 53).

Test circuit 5: DSI3020 + PCR-LE (3 units)



PCR-LE Series AC Power Supply

- OUTPUT terminal screw size
- M4: PCR500LE, PCR1000LE, PCR2000LE
 - M5: PCR3000LE, PCR4000LE
 - M6: PCR6000LE, PCR9000LE

The output terminal shape on the PCR500LE is different from the above figure.
For details, see the PCR-LE series manual.

DSI3020 Dip Simulator
INPUT terminal screw size: M6
OUTPUT terminal screw size: M6

When this test circuit is used, the single-phase two-wire power will be one-third that of three-phase. Likewise, the single-phase three-wire power will be two-thirds that of three-phase.



“Connecting wires” (p. 20)

	PCR-LE OUT		DSI 3020 IN		DSI3020 OUT		Terminal
①	U phase output terminal L	↔	Input terminal U	⑩	Output terminal U	↔	Terminal U
②	U phase output terminal N	↔	Input terminal N ¹	⑪	Output terminal V	↔	Terminal V
③	V phase output terminal L	↔	Input terminal V	⑫	Output terminal W	↔	Terminal W
④	V phase output terminal N	↔	Input terminal N ¹	⑬	Output terminal N	↔	Terminal N
⑤	W phase output terminal L	↔	Input terminal W	⑭	Output terminal G	↔	Terminal G
⑥	W phase output terminal N	↔	Input terminal N ¹				
⑦	U phase output terminal G	↔	Input terminal G				

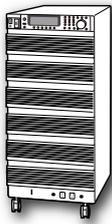
1 Connection necessary also for three-phase three-wire output

	PCR-LE OUT		PCR-LE OUT
⑧	U phase output terminal G	↔	V phase output terminal G
⑨	V phase output terminal G	↔	W phase output terminal G

NOTE

For details on how to connect a DSI3020 and three AC power supplies (PCR-LE series), see “Three PCR-LE series + DSI3020” (p. 54).

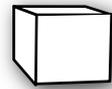
Test circuit 6: DSI3020 + PCR-LE2 (1 unit)



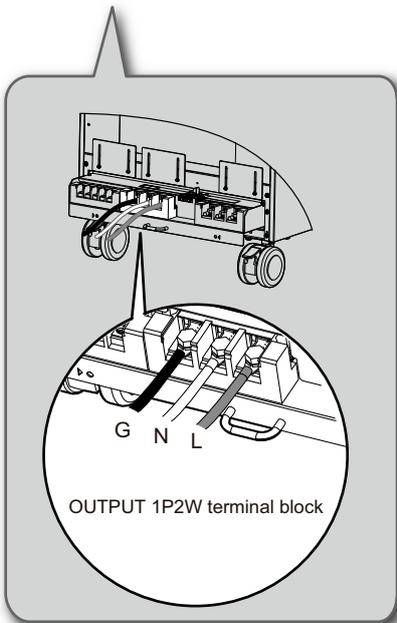
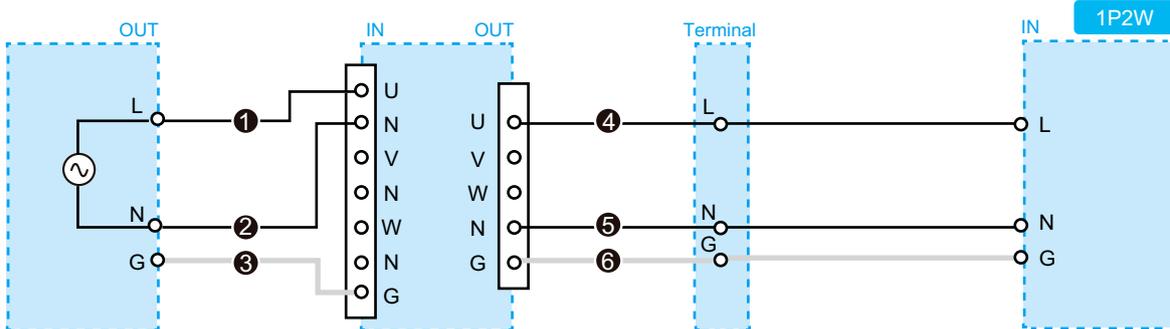
AC power supply (PCR-LE2)
With a OUTPUT 1P2W terminal block



DSI3020

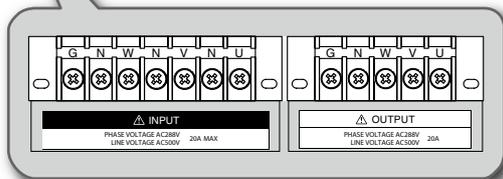


EUT



PCR-LE2 Series AC Power Supply

OUTPUT 1P2W terminal screw size
M8: PCR6000LE2, PCR9000LE2,
PCR27000LE2



DSI3020 Dip Simulator

INPUT terminal screw size: M6
OUTPUT terminal screw size: M6

The output terminal shape on the PCR27000LE2 is different from the above figure.
For details, see the PCR-LE2 series manual.

 "Connecting wires" (p. 20)

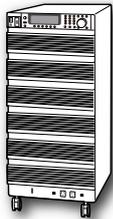
	PCR-LE2 OUT ¹		DSI 3020 IN		DSI 3020 OUT		Terminal
①	Output terminal L	↔	Input terminal U	④	Output terminal U	↔	Terminal L
②	Output terminal N	↔	Input terminal N	⑤	Output terminal N	↔	Terminal N
③	Output terminal G	↔	Input terminal G	⑥	Output terminal G	↔	Terminal G

1 OUTPUT 1P2W terminal block

NOTE

For details on how to connect a DSI3020 and an AC power supply (PCR-LE2 series), see "One PCR-LE2 series (with OUTPUT 1P2W terminal block) + DSI3020" (p. 57).

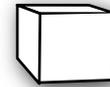
Test circuit 7: DSI3020 + PCR-LE2 (1 unit)



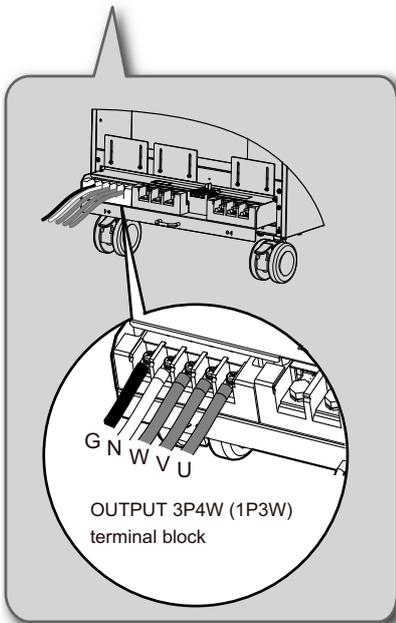
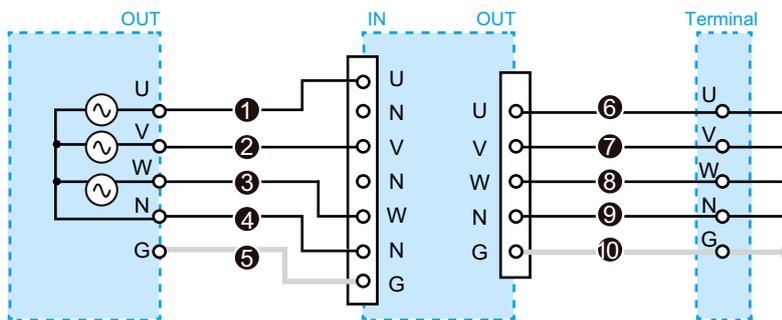
AC power supply (PCR-LE2) With a OUTPUT 3P4W (1P3W) terminal block



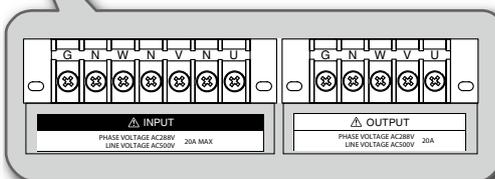
DSI3020



EUT

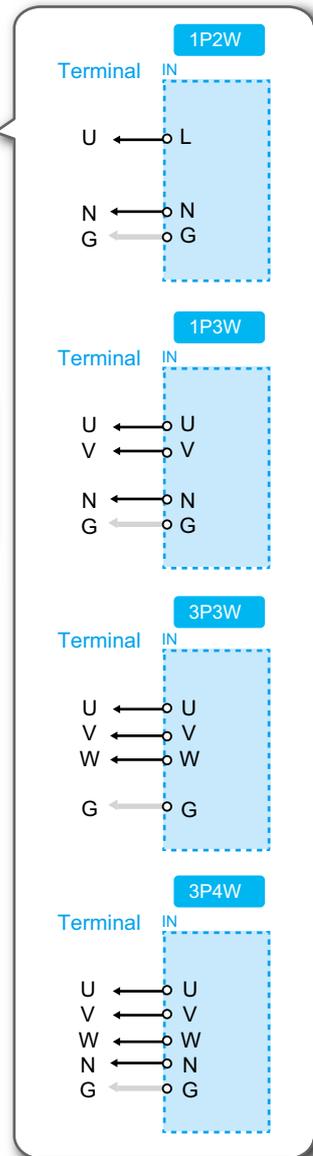


OUTPUT 3P4W (1P3W) terminal block



DSI3020 Dip Simulator

INPUT terminal screw size: M6
OUTPUT terminal screw size: M6



PCR-LE2 Series AC Power Supply

OUTPUT 3P4W (1P3W) terminal screw size
M5: PCR6000LE2, PCR9000LE2
M8: PCR27000LE2

The output terminal shape on the PCR27000LE2 is different from the above figure. For details, see the PCR-LE2 series manual.

When this test circuit is used, the single-phase two-wire power will be one-third that of three-phase. Likewise, the single-phase three-wire power will be two-thirds that of three-phase.



“Connecting wires” (p. 20)

	PCR-LE2 OUT¹		DSI 3020 IN		DSI3020 OUT		Terminal
①	Output terminal U	↔	Input terminal U	⑥	Output terminal U	↔	Terminal U
②	Output terminal V	↔	Input terminal V	⑦	Output terminal V	↔	Terminal V
③	Output terminal W	↔	Input terminal W	⑧	Output terminal W	↔	Terminal W
④	Output terminal N	↔	Input terminal N ²	⑨	Output terminal N	↔	Terminal N
⑤	Output terminal G	↔	Input terminal G	⑩	Output terminal G	↔	Terminal G

1 OUTPUT 3P4W (1P3W) terminal block

2 Connection necessary also for three-phase three-wire output

NOTE

For details on how to connect a DSI3020 and an AC power supply (PCR-LE2 series), see “One PCR-LE2 series (with OUTPUT 3P4W (1P3W) terminal block) + DSI3020” (p. 58).

Connecting the communication interface

The test system including this product is controlled from a PC software application connected via a communication interface. As such, the product and the AC power supplies must be connected to the PC.

For these connections, the standard or optional communication interfaces of this product and AC power supplies can be used.

■ Standard communication interface

This product: RS-232C

AC power supplies (PCR-LE/PCR-LE2 series): RS-232C

■ Optional communication interfaces

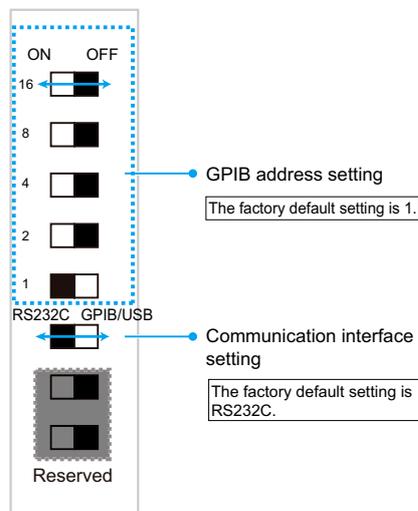
- This product: GPIB or USB (both factory options)
- AC power supplies: GPIB, USB, or LAN

For instructions on how to connect the optional communication interfaces to AC power supplies, see the manual for your AC power supplies.

See
 “Options” (p. 3),
 “Communication interface (this product and AC power supplies)” (p. 11)

Configuring the interface

If the product has a factory-option interface, you can select the interface you want to use using the communication interface switches.



By factory default, the top four switches are set to the right, and the fifth and sixth switches are set to the left.

We recommend that you turn off the power before you change the communication interface and GPIB address settings.

If you change the settings with the power turned on, for the new settings to take effect, you need to turn the power off, wait approximately 10 seconds, and then turn the power back on.

NOTE

To use the USB interface, the PC for controlling the system must have a USB T&M class (USBTMC) device driver installed. The USBTMC driver is installed automatically when the VISA library is installed. For details on installing the VISA library, see the SD009-PCR-LE application software setup guide.

Connecting the cables

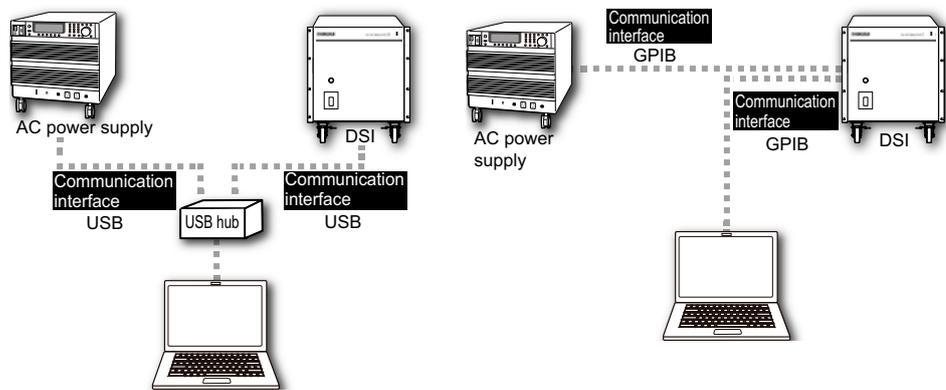
- 1 Check that the product and AC power supplies are turned off (○).
- 2 Check that the PC for controlling the test system is turned off.
- 3 Using the proper cables for your communication interface, connect this product and the AC power supplies to the PC.

NOTE

- Communication interface cables are not included with this product.
- For the PC system requirements, see the SD009-PCR-LE application software setup guide.

Other ways of connecting

In addition to connecting the product and the AC power supplies to the PC, the communication interfaces can be connected in the following ways.



Using a USB hub

Daisy chaining via GPIB interface

Cables

Use cables that are appropriate for the communication interface that you are using.

AC power supplies/DSI	PC	Required cable
RS-232C	RS-232C	RS-232C crossover cable
RS-232C	USB	RS-232C crossover cable * An RS-232C-to-USB adapter is required.
USB	USB	USB cable
GPIB	GPIB	GPIB (IEEE488 compliant) cable
GPIB	USB	GPIB (IEEE488 compliant) cable * A GPIB-to-USB adapter is required.

Connecting to other signal terminals

You can use the following terminals as necessary.

AUX terminal

To construct a total test system that includes a LIN series line impedance network, apply overheat protection signals (PCR CONTROL) from a LIN series to this terminal. The input overheat protection signal is connected to the AUX terminals of the AC power supplies via the PHASE IN terminal.

The LIN series is connected using the supplied control cable.

TRIG IN terminal

This is an exclusive input terminal for receiving signals from AC power supplies to transmit trigger signals during voltage variation tests.

The SEQ TRIG OUT terminals of the AC power supplies are connected to the TRIG IN terminal using BNC-BNC cables. Please provide your own cables.

This connection is required if you need to use trigger signals such as when monitoring the trigger signals on an oscilloscope during voltage variation tests. During voltage-dip and short-interruption tests, this product transmits trigger signals on its own, so this connection is not necessary, but there is no problem if it is connected.

TRIG OUT terminal

This is an output terminal for transmitting trigger signals for starting and stopping voltage dips and short interruptions and starting and stopping voltage variation.

- Trigger signal output: 0 V to +5 V (10 k Ω)
This signal is normally at high level (2.5 V or higher into a load resistance of 10 k Ω or more) and is set to low level during trigger transmission (0.5 V or less).
- The trigger signal is activated from the SD009-PCR-LE Quick Immunity Sequencer 2 application software.

VOLTAGE MONITOR terminal

This is a signal output terminal for monitoring output voltage waveforms.

- Voltage monitor output: 1 V/100 V (± 5 V MAX)

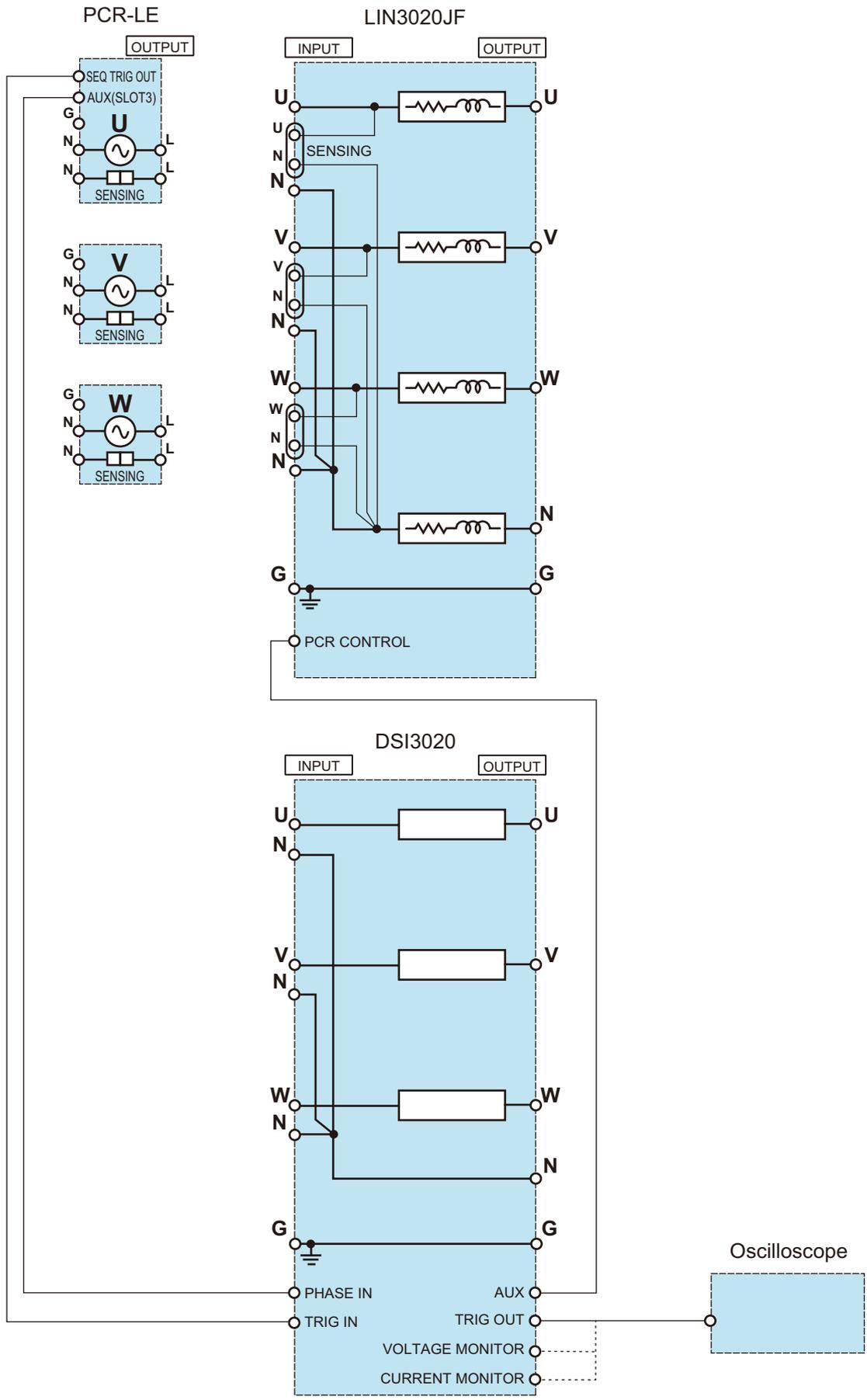
CURRENT MONITOR terminal

This is a signal output terminal for monitoring output current waveforms. The terminal was designed mainly for monitoring the inrush current waveform flowing through the EUT. As such, if this terminal is used to monitor minute current waveforms, the voltage signal level will be low, and large waveform distortion or noise may appear in the signal.

- Current monitor output: 1 V/100 A (± 5 V MAX)

NOTE

Except for the AUX terminal, the metal parts around the terminals are at the same electric potential and are connected to the internal circuit of the product. However, the terminals are isolated from the INPUT terminal block, OUTPUT terminal block, and AC INPUT terminal block.



Signal terminal connection example

Connecting the power cable

Connect the power cable to the control power supply input (AC INPUT) terminal on the rear panel of the product.

WARNING

Risk of electric shock.

- **This product conforms to IEC Safety Class I (equipment that has a protective conductor terminal). Be sure to earth ground the product to prevent electric shock.**
- **Connect the protective conductor terminal to earth ground.**
- **Have a qualified engineer connect the power cable to the switchboard.**
- **For the connected switchboard, select a circuit breaker that has a cut-off current that can handle the maximum input current of the product**

CAUTION

- If the voltage distortion of the AC power line is large, the product may malfunction. The product cannot be connected to a generator or the like.
- Use the AC line for the input power supply. Do not supply power from the output of the AC power supplies that are connected to this product.
- Inside the product, protective circuits are connected to match the input terminal. Connect the cable correctly.

NOTE

- The control power cable supplied with the product or an optional heavy PVC jacketed three-core control power cable (AC5.5-3P3M-M4C) can be used.

 **See**
"Options" (p. 3)

1 Check that the AC power line meets the nominal input rating of the product.

This product can be used with an input voltage ranging from 100 V to 240 V. The supported frequencies are 50 Hz and 60 Hz.

2 Check that the POWER switch is turned off (○).

3 Remove the terminal cover from the lower part of the rear panel.

For instructions on how to remove the terminal cover, see steps 3 and 4 in "[Connecting wires](#)" on page 20.

4 Connect the power cable to the control power supply input (AC INPUT) terminal on the rear panel.

If you want to use a power cable other than the supplied or optional cable, use a cable with crimping terminals that match the M4 screws of the AC INPUT terminal.

5 Turn off the switchboard's circuit breaker.

6 Connect the power cable to the switchboard.

Use crimping terminals that match the size of the screws of the switchboard terminals.

7 Attach the terminal block cover that you removed in step 3.

Turning the power on

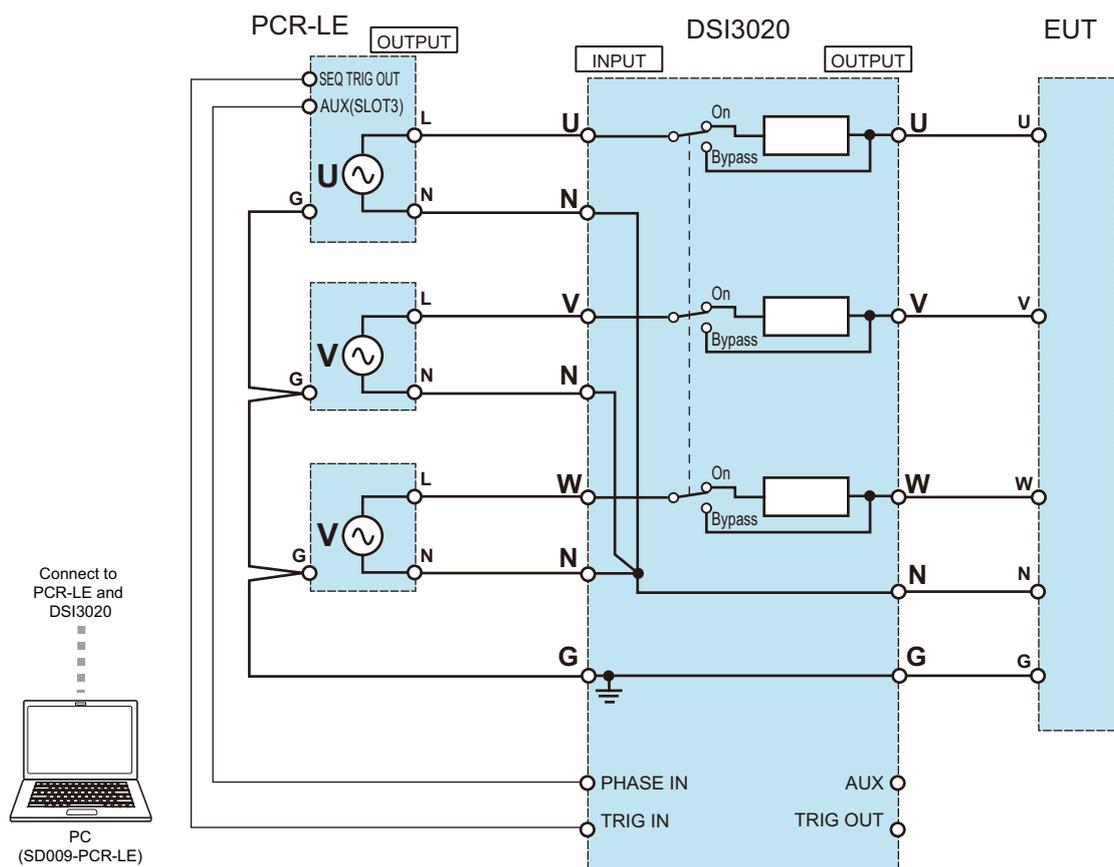
Turn on the test system devices in the following order.

- 1 Turn on this product.
- 2 Turn on the **POWER** switches on the AC power supplies.

If a single-phase three-wire, three-phase three-wire, or three-phase four-wire output test circuit has been constructed using several AC power supplies, turn on the phase units in the order described on the next page. For details, see the setup guide of the single-phase three-wire output or three-phase output driver that you are using.

Output from this product

Relays are inserted in the input circuit of this product as shown below. These relays switch to on (dip simulator circuit) only when the dip simulator is enabled from the SD009-PCR-LE Quick Immunity Sequencer 2 application software. For all other cases, the relays are set to Bypass, which means that the AC power supply output is connected directly to the EUT. You can perform tests without changing the wiring even when the dip simulator is not needed.



Order in which to turn on multiple AC power supplies

Turn on the POWER switches of the PCR-LE AC power supplies in the following order.

■ Single-phase three-wire

Turn on the U-phase unit first and then the V-phase unit within 15 seconds, or turn on both units at the same time.

■ Three-phase three-wire or three-phase four-wire

Turn on the U-phase unit first, the V-phase unit second, and then the W-phase unit within 15-second intervals, or turn on all three units at the same time.

4 Specifications

This chapter lists the electrical and mechanical specifications and test performance.

System configuration and output capacity

The following table shows the output capacity of the AC power supply of each phase after passing through this product.

Single phase	Load power factor	PCR500LE	PCR1000LE	PCR2000LE	PCR3000LE	PCR4000LE	PCR6000LE	PCR9000LE
100 V ¹	1.0	440 VA	890 VA	1700 VA	2000 VA ²	2000 VA ²	2000 VA ²	2000 VA ²
	0.0	57 VA	190 VA	460 VA	730 VA	1000 VA	1500 VA	2000 VA ²
230 V ¹	1.0	Not allowed ³	870 VA	1700 VA	2600 VA	3500 VA	4600 VA ²	4600 VA ²
	0.0		44 VA	310 VA	580 VA	850 VA	1300 VA	2200 VA

Three phase	Load power factor	PCR500LE (3 units)	PCR1000LE (3 units)	PCR2000LE (3 units)	PCR3000LE (3 units)	PCR4000LE (3 units)	PCR6000LE (3 units)	PCR9000LE (3 units)
200 V ¹	1.0	Not allowed ³	890 VA	1700 VA	2300 VA ²	2300 VA ²	2300 VA ²	2300 VA ²
	0.0		160 VA	430 VA	700 VA	970 VA	1500 VA	2300 VA ²
400 V ¹	1.0		850 VA	1700 VA	2600 VA	3500 VA	4600 VA ²	4600 VA ²
	0.0		Not allowed ³	260 VA	530 VA	800 VA	1300 VA	2100 VA

1 Line voltage

2 Limited by the maximum current of this product

3 Not allowed because the output capacity of the AC power supply is insufficient

Voltage-dip and short-interruption test performance

Compliant standards		IEC 61000-4-11 Ed.2.0:2004	
Phase		1P2W	• Model DSI1020
		1P2W, 1P3W, 3P3W, 3P4W	• Model DSI3020
Dip source		Phase voltage	• Model DSI1020
		Line voltage, phase voltage	• Model DSI3020
Voltage dips voltage setting accuracy ¹		±5 %	
Voltage dips voltage load regulation ¹		< 5 % of the U_T ²	
Maximum input voltage ¹		288 Vrms	• Phase voltage (between U, V, W and N)
		500 Vrms	• Line-voltage (U-V, V-W, and W-U)
		700 Vpeak	• Model DSI3020
Maximum output current		Rms value	
		16 Arms/phase	• At test voltage 100 % U_T
		40 Arms/phase	• At test voltage 40 % U_T
		Peak value	
		500 Apeak	• 1 s or less
Voltage overshoot ¹		< 5 % of the U_T	• Test voltage U_T 100 V to 240 V, load 100 Ω When varied from 0 % U_T to 100 % U_T (phase angle 90°)
Voltage undershoot ¹		< 5 % of the U_T	• Test voltage U_T 100 V to 240 V, load 100 Ω When varied from 100 % U_T to 0 % U_T (phase angle 90°)
Voltage rise time ¹		1 μ s to 5 μ s	• Test voltage U_T 100 V to 240 V, load 100 Ω When varied from 0 % U_T to 100 % U_T (phase angle 90°)
Voltage fall time ¹		1 μ s to 5 μ s	• Test voltage U_T 100 V to 240 V, load 100 Ω When varied from 100 % U_T to 0 % U_T (phase angle 90°)
Voltage dips phase setting accuracy ¹		< 10°	• Test voltage U_T 100 V to 240 V, load 100 Ω Phase angle 0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°, 360°
Voltage dips duration setting		0.5, 1, 5, 10, 25, 50 cycles, 2 to 300 cycles (can be set to any cycle value. Resolution 1 cycle)	
Interval time setting accuracy		±10 %	• Setting range 10 s to 99 s (default 10 s)

- 1 The specifications are relative to the phase-voltage variation.
- 2 U_T denotes the nominal test voltage.

Signal output terminal (BNC)

Current monitor output ¹	1 V/100 A	• Load impedance 10 kΩ or higher
Accuracy	≤ ±3 %	• At output current 20 Arms
Voltage monitor output ¹	1 V/100 V	• Load impedance 10 kΩ or higher
Accuracy	Within ±3 %	• At test voltage U_T 240 Vrms
Trigger signal output ¹	Trigger pulse width 40 μs to 50 μs Trigger level 0 V to +5 V Low level 0.5 V or less High level 2.5 V or higher	• Load impedance 10 kΩ or higher
Trigger signal input ¹	Conforms to the trigger output (SEQ TRIG OUT) signal of the PCR-LE/PCR-LE2 series AC power supplies	

1 Each common is shared.

Communication function

RS232C ¹	D-SUB 9-pin connector (EIA-232-D compliant) Crossover cable
GPIB (option)	IEEE std. 488.1-1987
USB (option)	Complies with USB 2.0 and the USBTMC-USB488 device class specifications Standard Type B connector

1 Use the standard crossover cable (null modem cable) to connect this product to the PC.
The product's RS232C port is a standard DB9P male connector.

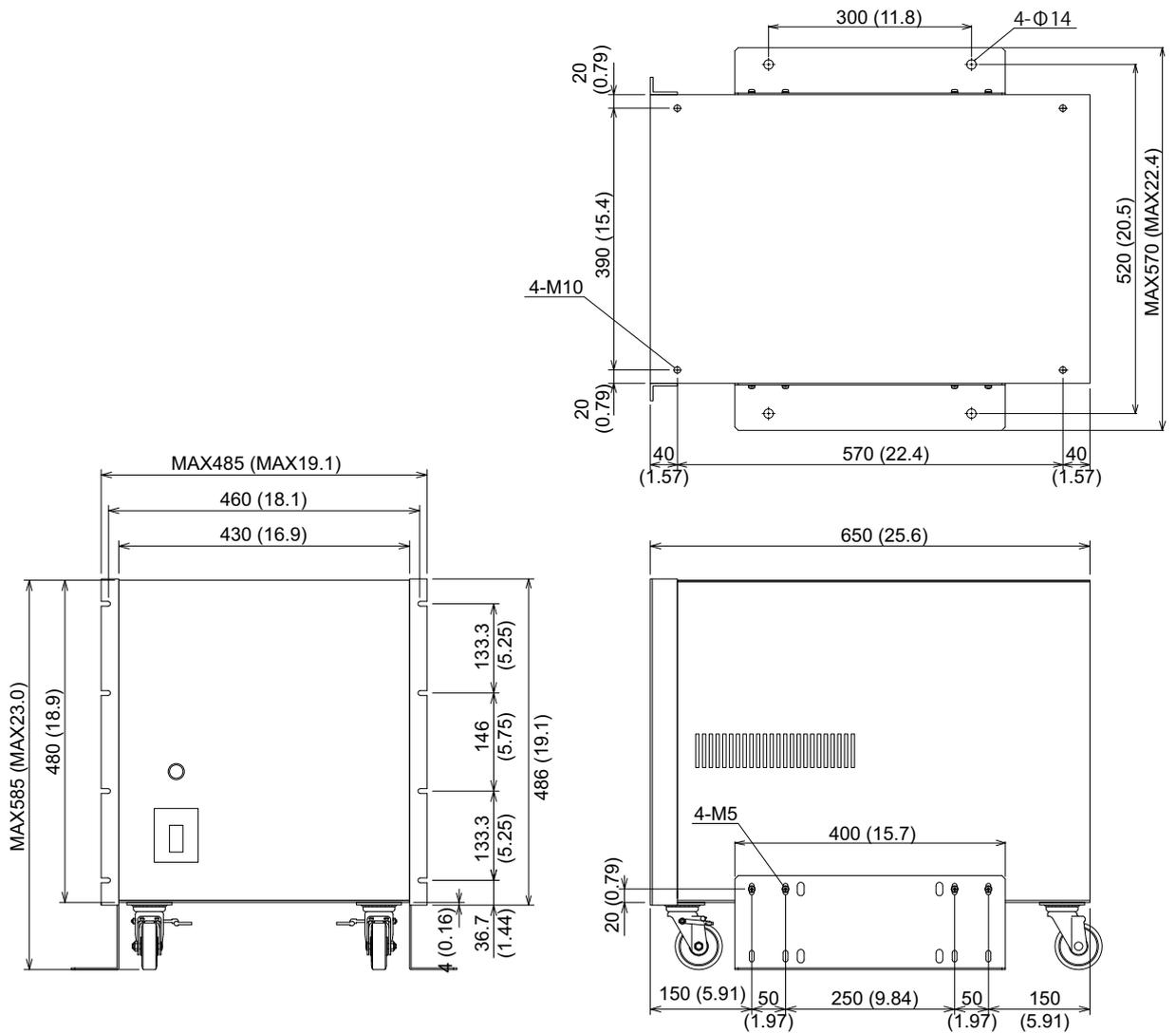
Pin no.	Function
1	Not used
2	Receive (RX)
3	Send (TX)
4	Not used
5	Ground (FG)
6 to 9	Not used

General specifications

Control power supply	Nominal input rating	Single-phase 100 Vac to 240 Vac, 50 Hz/60 Hz	
	Input voltage range	90 Vac to 264 Vac	
	Input current	0.75 A or less	• Model DSI1020
		1.7 A or less	• Model DSI3020
Input apparent power	65 VA or less	• Model DSI1020	
	150 VA or less	• Model DSI3020	
Isolation voltage		300 Vrms Max	• Between case and each phase
Insulation resistance		500 Vdc, 30 MΩ or more	• Between input power supply (AC INPUT) and case • Between input power supply (AC INPUT) and input/output terminals
		500 Vdc, 10 MΩ or more	• Between Input/output terminals and case
		500 Vdc, 30 MΩ or more	• Between signal output terminal (BNC) and case • Between signal output terminal (BNC) and input power supply (AC INPUT) • Between signal output terminal (BNC) and input/output terminal
Withstanding voltage		1500 Vac for 1 minute	• Between input power supply (AC INPUT) and case • Between input power supply (AC INPUT) and input/output terminals • Between Input/output terminals and case
		500 Vac for 1 minute	• Between signal output terminal (BNC) and case • Between signal output terminal (BNC) and input power supply (AC INPUT) • Between signal output terminal (BNC) and input/output terminal
Environmental conditions	Installation location	Indoors, altitude of up to 2000 m, overvoltage category II	
	Temperature and humidity range in which specifications are guaranteed	23 °C ± 5 °C (73.4 °F ± 41 °F)	
	Operating temperature and humidity range	0 °C to 50 °C (32 °F to 122 °F), 20 %rh to 80 %rh (no condensation)	
	Storage temperature and humidity range	-20 °C to 70 °C (-4 °F to 158 °F), 90 %rh or less (no condensation)	
I/O terminal block connecting screws		M6	
External dimensions		See the outline drawing.	
Weight		Approx. 110 kg (243 lbs)	• Model DSI1020
		Approx. 230 kg (507 lbs)	• Model DSI3020
Safety		Complies with the requirements of the following standard. IEC61010-1:2001 (Class I ¹ , Pollution degree 2 ²)	
Accessories		Control board: 1 card Control cable (3m): 1 pc. Control power cable (3 m): 1 pc. Screws: 6 pcs ³ (DSI1020 only) Heavy object warning label: 1 pc. Operation manual: 1 copy	

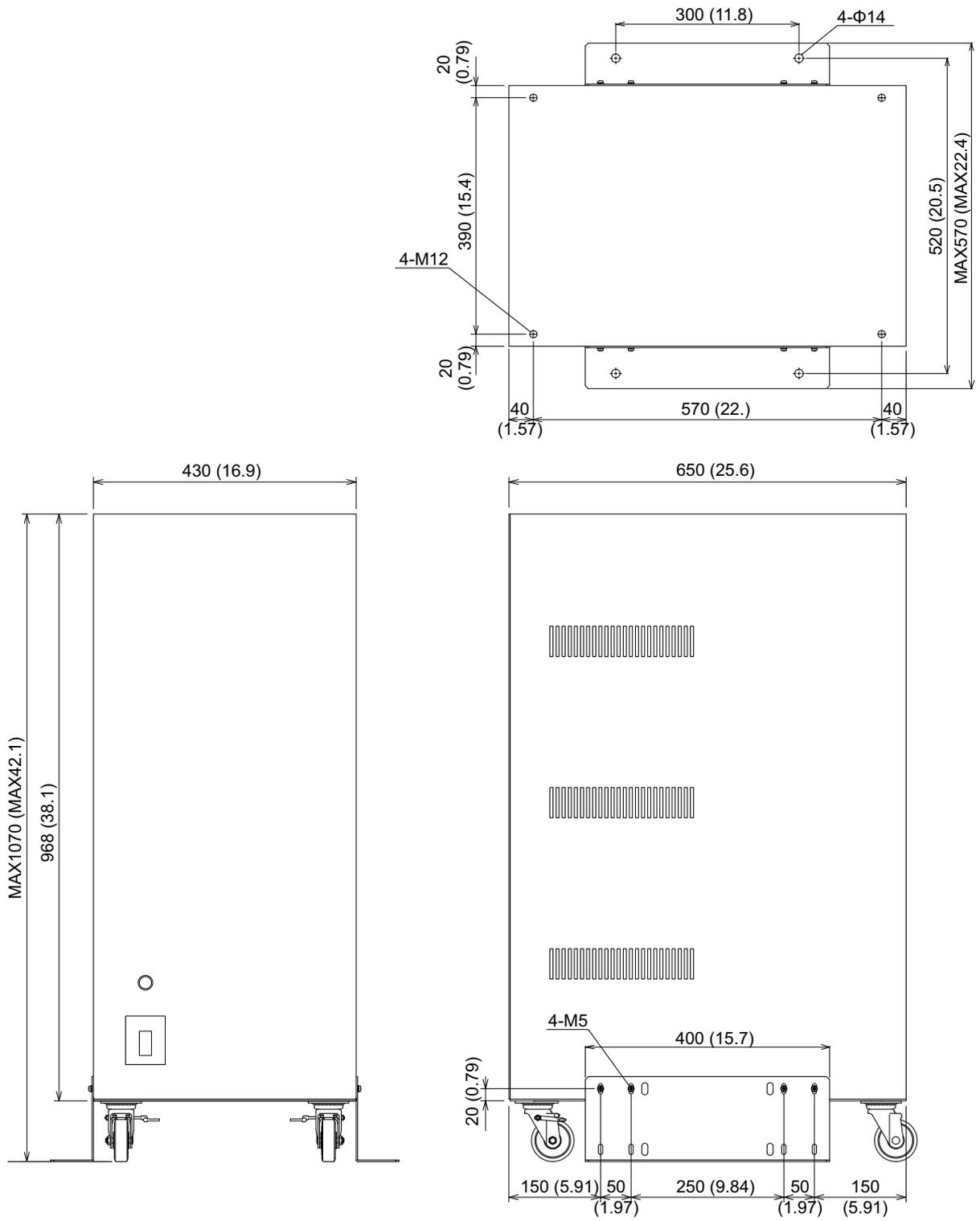
- 1 This product is a Class I instrument. Be sure to ground the protective conductor terminal of this product. If not grounded properly, safety is not guaranteed.
- 2 Pollution is addition of foreign matter (solid, liquid or gaseous) that may produce a reduction of dielectric strength or surface resistivity. Pollution Degree 2 assumes that only non-conductive pollution will occur except for an occasional temporary conductivity caused by condensation.
- 3 When shipped from the factory, a rack mount bracket is attached to each side of the DSI1020. If you remove the rack mount bracket, use these screws to fix the side panels in place.

Outline drawing



Unit: mm (inches)

DSI1020 outline drawing



Unit: mm (inches)

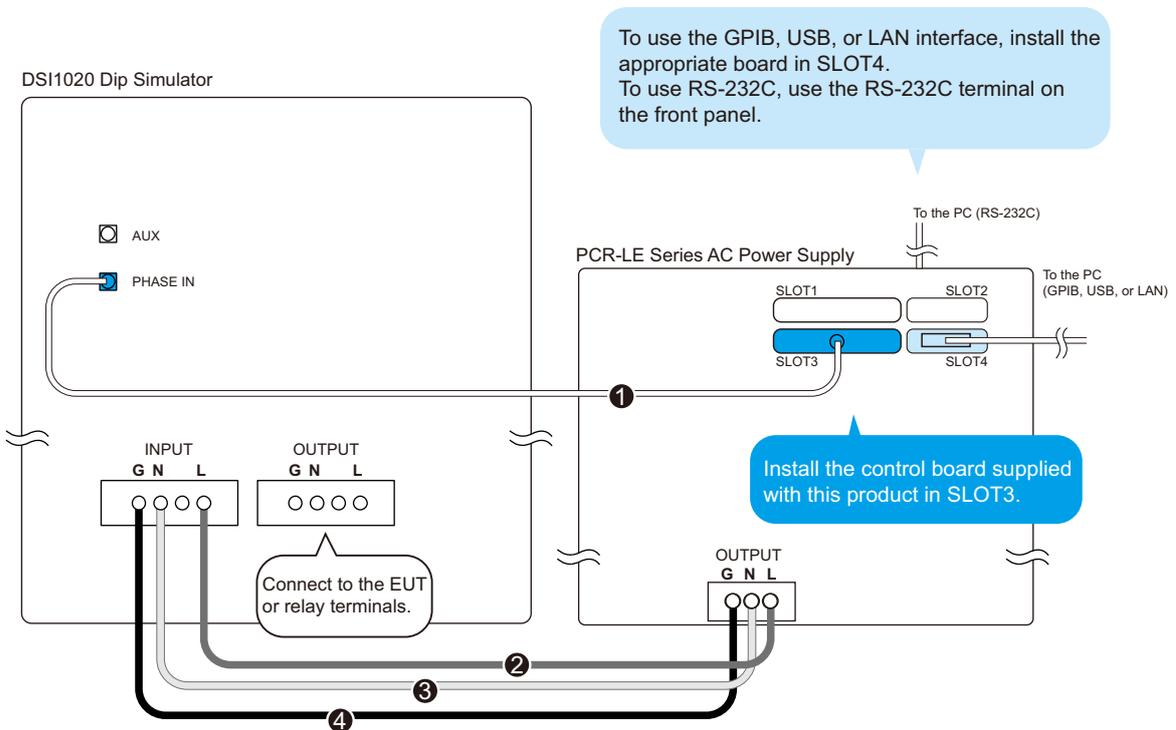
DSI3020 outline drawing

Appendix A AC Power Supply Connection Diagram

PCR-LE series

One PCR-LE series + DSI1020

Connectable EUT input circuits 1P2W

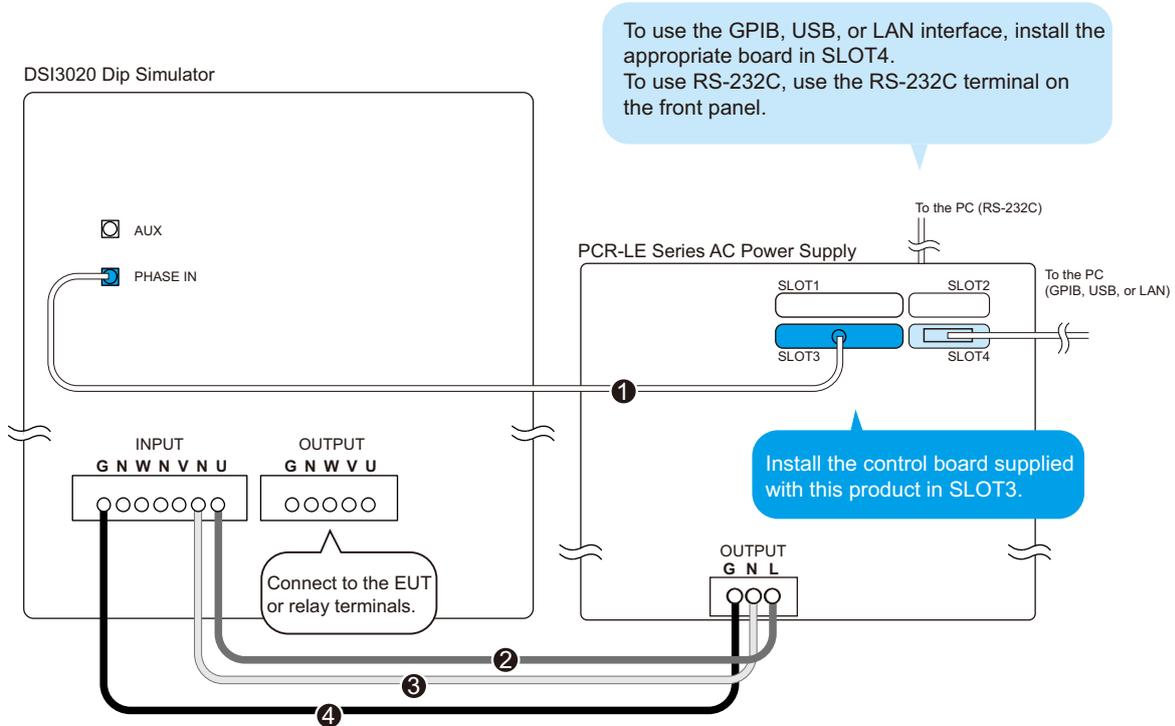


	Start point	End point	Cable
1	Signal connector (PCR-LE rear panel SLOT 3)	PHASE IN connector (DSI1020)	Control cable (supplied with this product)
2	Output terminal L (PCR-LE)	Input terminal L (DSI1020)	Single-core wire ¹
3	Output terminal N (PCR-LE)	Input terminal N (DSI1020)	Single-core wire ¹
4	Output terminal G (PCR-LE)	Input terminal G (DSI1020)	Single-core wire ¹

¹ This product does not include wires for connecting devices or crimping terminals for the wires. Check the screw sizes of the I/O terminals of devices in use, and use appropriate single-core wires and crimping terminals. (See "Connecting wires," on page 20.) We recommend that you use wires with a nominal cross-sectional area of at least 8 mm² (AWG8).

One PCR-LE series + DSI3020

Connectable EUT input circuits 1P2W

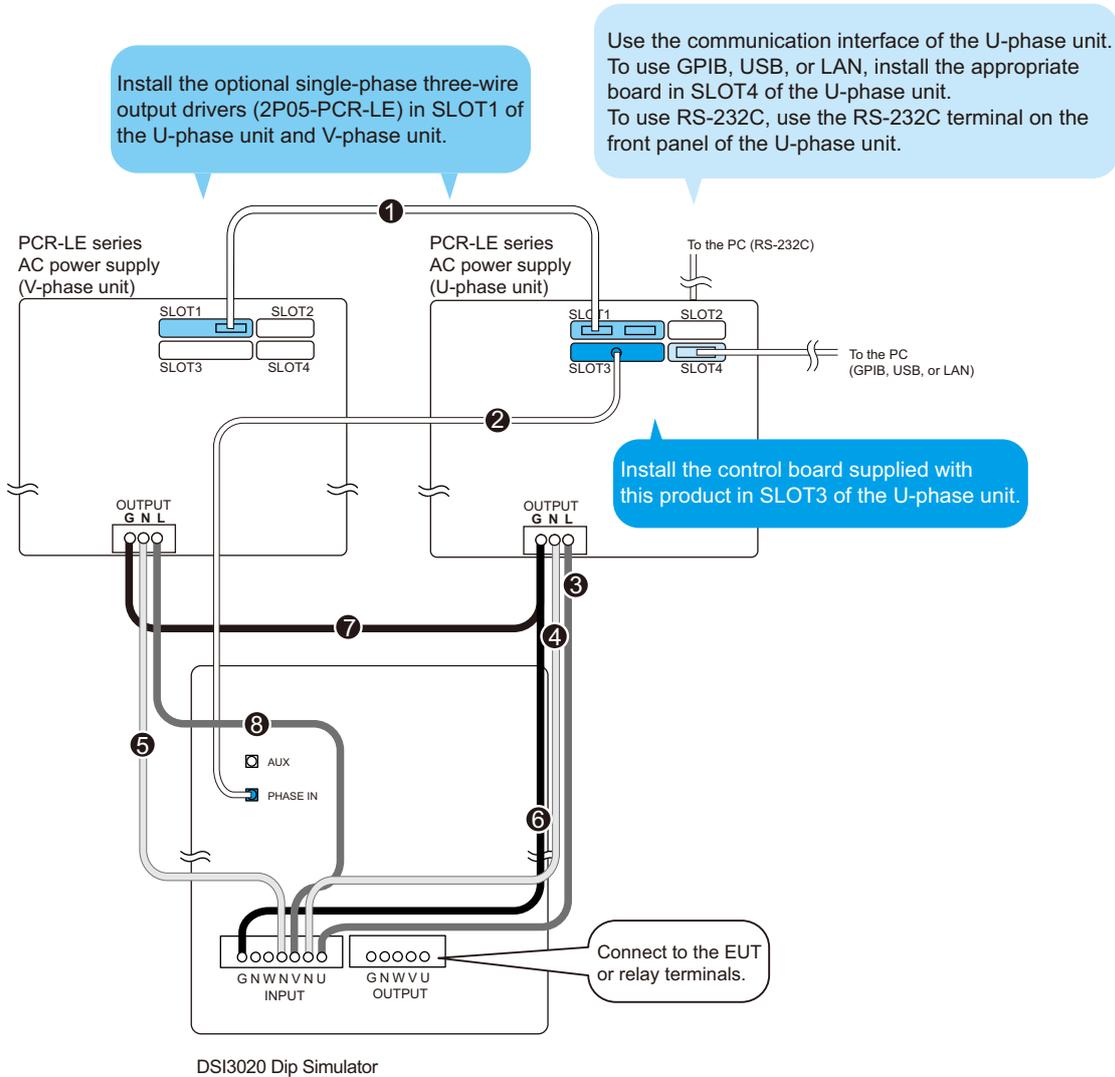


	Start point	End point	Cable
1	Signal connector (PCR-LE SLOT 3)	PHASE IN connector (DSI3020)	Control cable (supplied with this product)
2	Output terminal L (PCR-LE)	Input terminal U (DSI3020)	Single-core wire ¹
3	Output terminal N (PCR-LE)	Input terminal N (DSI3020)	Single-core wire ¹
4	Output terminal G (PCR-LE)	Input terminal G (DSI3020)	Single-core wire ¹

1 This product does not include wires for connecting devices or crimping terminals for the wires. Check the screw sizes of the I/O terminals of devices in use, and use appropriate single-core wires and crimping terminals. (See “Connecting wires,” on page 20.) We recommend that you use wires with a nominal cross-sectional area of at least 8 mm² (AWG8).

Two PCR-LE series + DSI3020

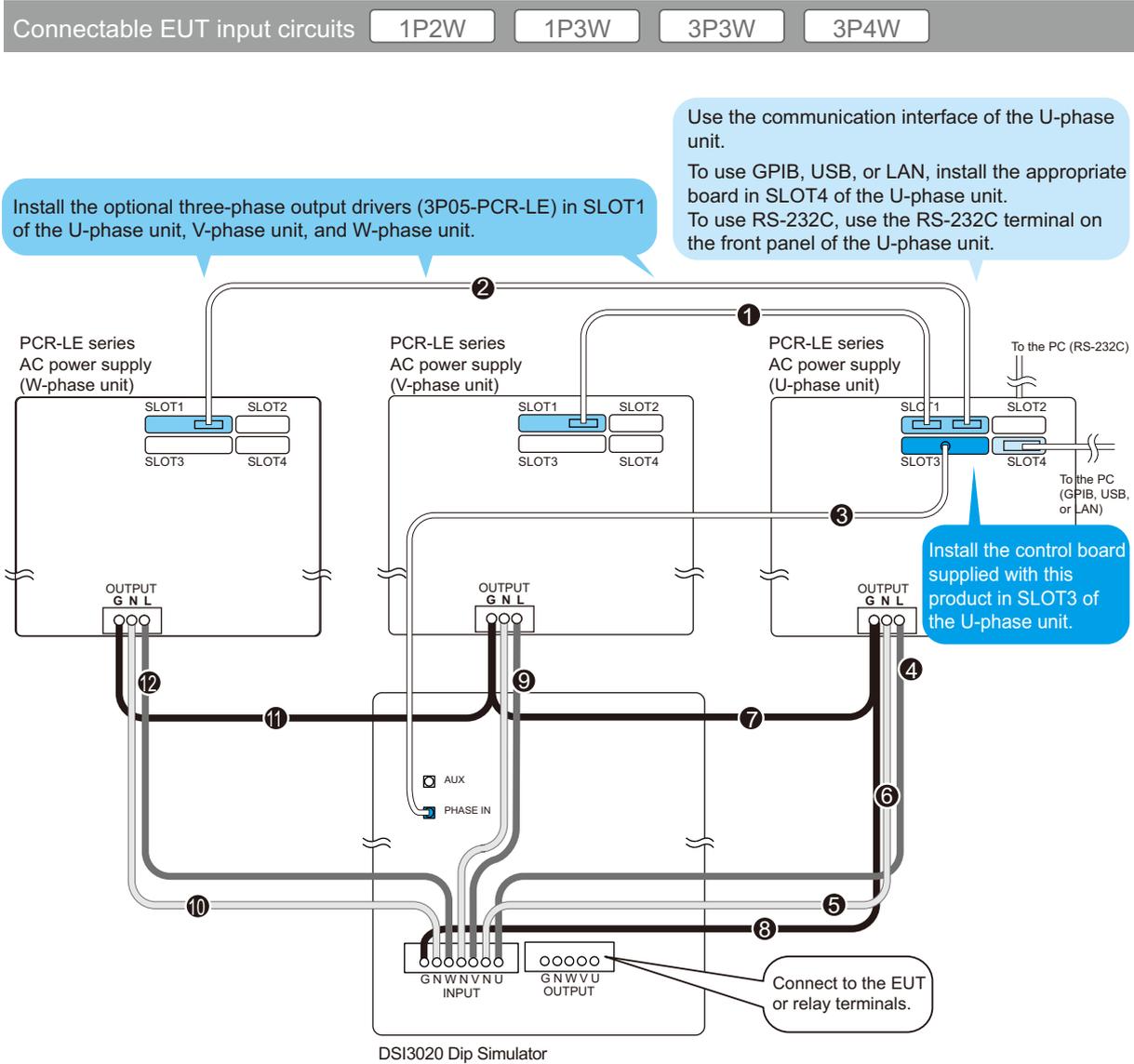
Connectable EUT input circuits 1P2W 1P3W



	Start point	End point	Cable
1	Three-phase connector (PCR-LE, U-phase unit, SLOT 1)	Three-phase connector (PCR-LE, V-phase unit, SLOT 1)	Supplied three-phase output driver cable
2	Signal connector (PCR-LE, U-phase unit, SLOT 3)	PHASE IN connector (DSI3020)	Control cable (supplied with this product)
3	Output terminal L (PCR-LE, U-phase unit)	Input terminal U (DSI3020)	Single-core wire ¹
4	Output terminal N (PCR-LE, U-phase unit)	Input terminal N (DSI3020)	Single-core wire ¹
5	Output terminal N (PCR-LE, U-phase unit)	Output terminal N (PCR-LE, V-phase unit)	Single-core wire ¹
6	Output terminal G (PCR-LE, U-phase unit)	Input terminal G (DSI3020)	Single-core wire ¹
7	Output terminal G (PCR-LE, U-phase unit)	Output terminal G (PCR-LE, V-phase unit)	Single-core wire ¹
8	Output terminal L (PCR-LE, V-phase unit)	Input terminal V (DSI3020)	Single-core wire ¹

1 This product does not include wires for connecting devices or crimping terminals for the wires. Check the screw sizes of the I/O terminals of devices in use, and use appropriate single-core wires and crimping terminals. (See “Connecting wires,” on page 20.) We recommend that you use wires with a nominal cross-sectional area of at least 8 mm² (AWG8).

Three PCR-LE series + DSI3020



The PCR-LE with the U-phase board will be the master unit controlling the other two PCR-LEs. It is convenient to place the U-phase PCR-LE in an easy-to-operate location.



As shown in example 1, the U-phase unit must be located in the center when connecting the cables supplied with the three-phase output driver (3P05-PCR-LE).

To connect as shown in example 2, you need the option cable (150 cm/280 cm) for the 3P05-PCR-LE.

	Start point	End point	Cable
1	Three-phase connector (PCR-LE, U-phase unit, SLOT 1)	Three-phase connector (PCR-LE, V-phase unit, SLOT 1)	Supplied three-phase output driver cable
2	Three-phase connector (PCR-LE, U-phase unit, SLOT 1)	Three-phase connector (PCR-LE, W-phase unit, SLOT 1)	Three-phase output driver option cable ¹
3	Signal connector (PCR-LE, U-phase unit, SLOT 3)	PHASE IN connector (DSI3020)	Control cable (supplied with this product)
4	Output terminal L (PCR-LE, U-phase unit)	Input terminal U (DSI3020)	Single-core wire ²
5	Output terminal N (PCR-LE, U-phase unit)	Output terminal N (PCR-LE, V-phase unit)	Single-core wire ²
6	Output terminal N (PCR-LE, U-phase unit)	Input terminal N (DSI3020)	Single-core wire ²
7	Output terminal G (PCR-LE, U-phase unit)	Output terminal G (PCR-LE, V-phase unit)	Single-core wire ²
8	Output terminal G (PCR-LE, U-phase unit)	Input terminal G (DSI3020)	Single-core wire ²
9	Output terminal L (PCR-LE, V-phase unit)	Input terminal V (DSI3020)	Single-core wire ²
10	Output terminal N (PCR-LE, V-phase unit)	Output terminal N (PCR-LE, W-phase unit)	Single-core wire ²
11	Output terminal G (PCR-LE, V-phase unit)	Output terminal G (PCR-LE, W-phase unit)	Single-core wire ²
12	Output terminal L (PCR-LE, W-phase unit)	Input terminal W (DSI3020)	Single-core wire ²

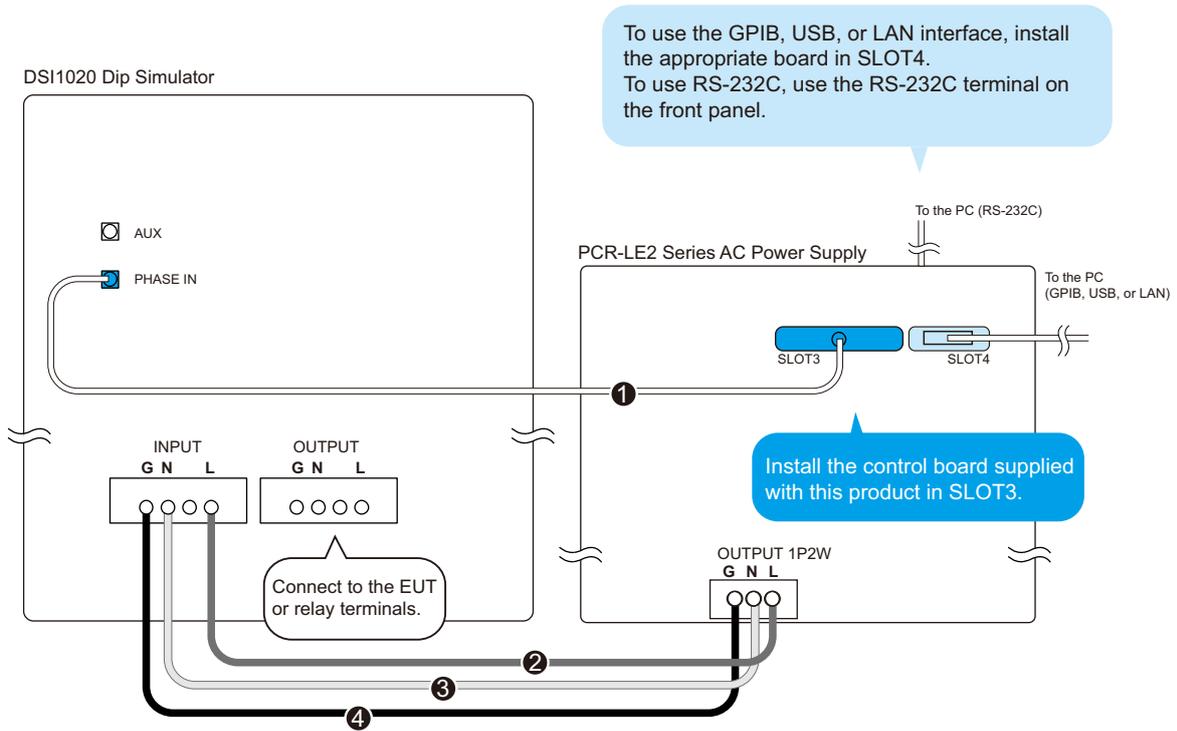
1 Option cable (150 cm/280 cm) for the three-phase output driver (3P05-PCR-LE)

2 This product does not include wires for connecting devices or crimping terminals for the wires. Check the screw sizes of the I/O terminals of devices in use, and use appropriate single-core wires and crimping terminals. (See "Connecting wires," on page 20.) We recommend that you use wires with a nominal cross-sectional area of at least 8 mm² (AWG8).

PCR-LE2 series

One PCR-LE2 series (with OUTPUT 1P2W terminal block) + DSI1020

Connectable EUT input circuits 1P2W

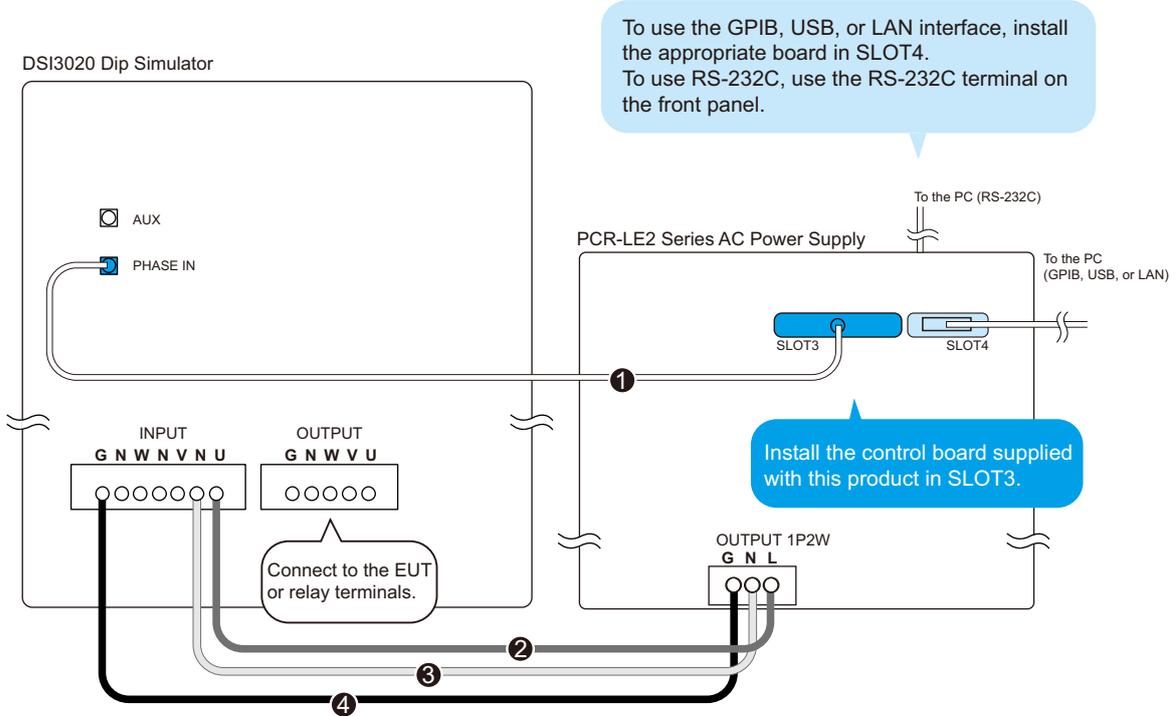


Start point	End point	Cable
1 Signal connector (PCR-LE2, SLOT 3)	PHASE IN connector (DSI1020)	Control cable (supplied with this product)
2 Output terminal L (PCR-LE2) ¹	Input terminal L (DSI1020)	Single-core wire ²
3 Output terminal N (PCR-LE2) ¹	Input terminal N (DSI1020)	Single-core wire ²
4 Output terminal G (PCR-LE2) ¹	Input terminal G (DSI1020)	Single-core wire ²

- 1 Terminal of the OUTPUT 1P2W terminal block
- 2 This product does not include wires for connecting devices or crimping terminals for the wires. Check the screw sizes of the I/O terminals of devices in use, and use appropriate single-core wires and crimping terminals. (See “Connecting wires,” on page 20.) We recommend that you use wires with a nominal cross-sectional area of at least 8 mm² (AWG8).

One PCR-LE2 series (with OUTPUT 1P2W terminal block) + DSI3020

Connectable EUT input circuits 1P2W

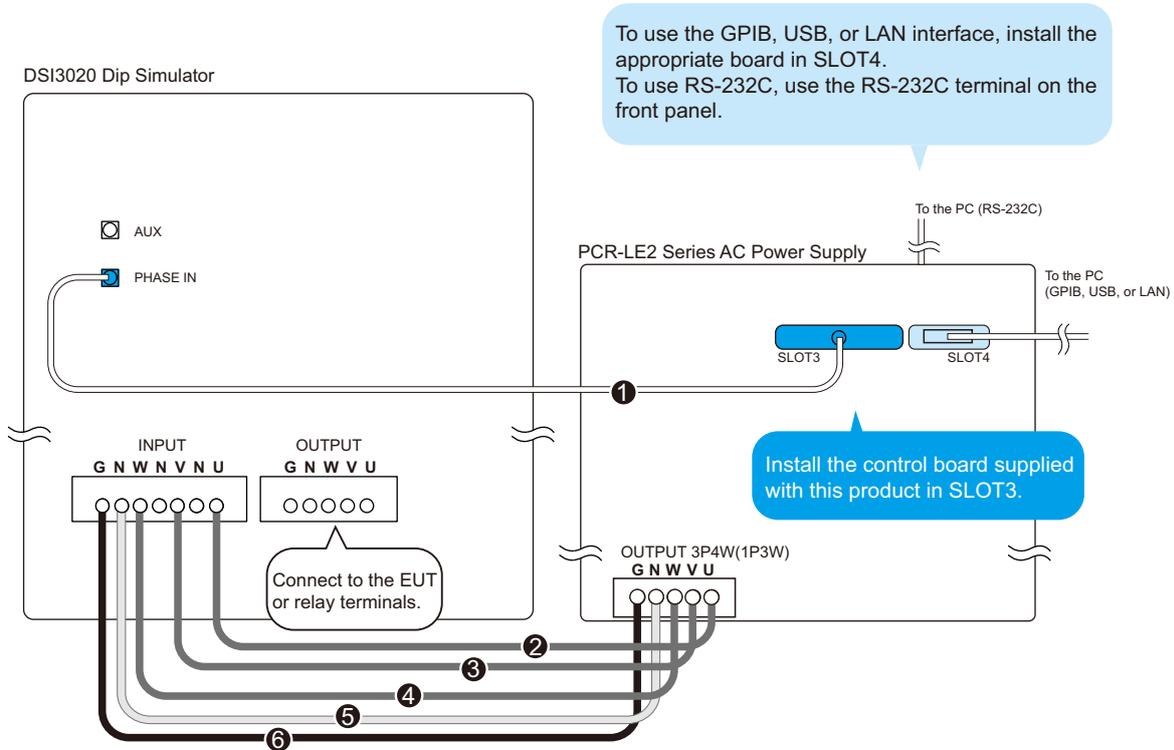


	Start point	End point	Cable
1	Signal connector (PCR-LE2, SLOT 3)	PHASE IN connector (DSI3020)	Control cable (supplied with this product)
2	Output terminal L (PCR-LE2) ¹	Input terminal U (DSI3020)	Single-core wire ²
3	Output terminal N (PCR-LE2) ¹	Input terminal N (DSI3020)	Single-core wire ²
4	Output terminal G (PCR-LE2) ¹	Input terminal G (DSI3020)	Single-core wire ²

- 1 Terminal of the OUTPUT 1P2W terminal block
- 2 This product does not include wires for connecting devices or crimping terminals for the wires. Check the screw sizes of the I/O terminals of devices in use, and use appropriate single-core wires and crimping terminals. (See "Connecting wires," on page 20.) We recommend that you use wires with a nominal cross-sectional area of at least 8 mm² (AWG8).

One PCR-LE2 series (with OUTPUT 3P4W (1P3W) terminal block) + DSI3020

Connectable EUT input circuits 1P2W 1P3W 3P3W 3P4W



	Start point	End point	Cable
1	Signal connector (PCR-LE2, SLOT 3)	PHASE IN connector (DSI3020)	Control cable (supplied with this product)
2	Output terminal U (PCR-LE2) ¹	Input terminal U (DSI3020)	Single-core wire ²
3	Output terminal V (PCR-LE2) ¹	Input terminal V (DSI3020)	Single-core wire ²
4	Output terminal W (PCR-LE2) ¹	Input terminal W (DSI3020)	Single-core wire ²
5	Output terminal N (PCR-LE2) ¹	Input terminal N (DSI3020)	Single-core wire ²
6	Output terminal G (PCR-LE2) ¹	Input terminal G (DSI3020)	Single-core wire ²

- 1 Terminal of the OUTPUT 3P4W (1P3W) terminal block
- 2 This product does not include wires for connecting devices or crimping terminals for the wires. Check the screw sizes of the I/O terminals of devices in use, and use appropriate single-core wires and crimping terminals. (See “Connecting wires,” on page 20.) We recommend that you use wires with a nominal cross-sectional area of at least 8 mm² (AWG8).

Appendix B Troubleshooting

If you notice any symptoms that seem to indicate a malfunction while using the product, check the table below, and try the relevant remedy.

If you see no relevant items, contact your Kikusui agent or distributor.

Symptom	Inspection	Remedy
Tried to start a test from the SD009-PCR-LE application software, but the software stopped with an error.	<ul style="list-style-type: none">• Did you install the control board supplied with this product into the PCR-LE/PCR-LE2 series power supply that you are using?• Did you use the control cable supplied with the product to connect the AC power supply to this product?	<p>Install the control board supplied with this product into the PCR-LE/PCR-LE2 AC power supply, and connect between the control board connector and the PHASE IN connector on the rear panel of this product using the control cable supplied with the product.</p> <p>For details, see “Connecting the sync signal interface,” on page 18.</p>

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环境保护使用期限
Environment-friendly Use Period

该标记为适用于在中华人民共和国销售的电子信息产品的环境保护使用期限。

只要遵守有关该产品的安全及使用注意事项，从制造年月起计算，在该年度内，就不会对环境污染、人身、财产产生重大的影响。

产品的废弃请遵守有关规定。

产品的制造年月可以在以下网址中确认。

<https://www.kikusui.co.jp/pi/>

有毒有害物质或元素名称及含有标示
Name of hazardous materials and symbol of element in the equipment and quantity

部件名称	有毒有害物质或元素					
	铅 Pb	汞 Hg	镉 Cd	六价铬 Cr(VI)	多溴联苯 PBB	多溴二苯醚 PBDE
印刷电路板组装机	×	○	×	○	○	○
内部接线	×	○	×	○	○	○
外壳	×	○	×	○	○	○
底盘组装机 (含变压器)	×	○	×	○	○	○
辅助设备	×	○	×	○	○	○

本表格依据SJ/T 11364 的规定编制。

- ：该部件所有均质材料的有毒有害物质的含量不超过GB/T 26572标准所规定的极限值要求。
- ×：该部件至少有一种均质材料的有毒有害物质的含量超过GB/T 26572标准所规定的极限值要求。

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If you find any misplaced or missing pages in the manuals, 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 your Kikusui agent or distributor. At that time, inform your agent or distributor of the "Part No." written on the front cover of this manual.

Every effort has been made to ensure the accuracy of this manual. However, if you have any questions or find any errors or omissions, please contact your Kikusui agent or distributor.

After you have finished reading this manual, store it so that you can use it for reference at any time.

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