

User's Manual

Regulated DC Power Supply PMX-E Series

PMX18-2E

PMX18-5E

PMX35-1E

PMX35-3E

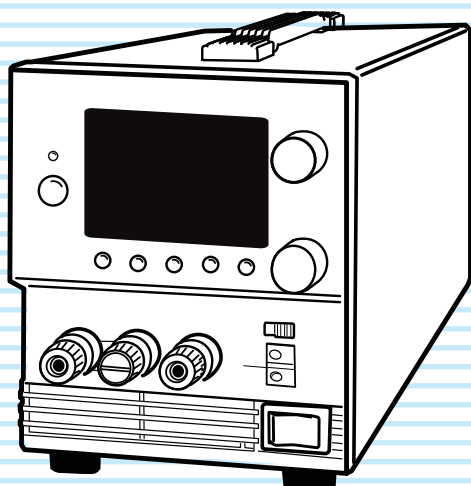
PMX70-1E

PMX110-0.6E

PMX250-0.25E

PMX350-0.2E

PMX500-0.1E



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Introduction

About Manuals

This manual provides an overview of the PMX-E series and notes on usage. It also explains how to configure it, operate it, perform maintenance on it, and so on. Read this manual thoroughly before use, and use the product properly.

Intended readers

These manuals are intended for users of the PMX-E series and their instructors. The manuals assume that the reader has knowledge about power supplies.

Manual construction

User's manual (this manual)



This document is intended for first-time users of this product. It provides an overview of the product, notes on usage, and specifications. It also explains how to connect the product, configure the product, operate the product, perform maintenance on the product, and so on.

Communication Interface Manual



This document contains details about remote control. It is written for readers with sufficient basic knowledge of how to control testers and measuring instruments using SCPI commands.

Start Guide



Provides basic usage instructions for first-time users. Please read this guide before operating the PMX-E series.

Safety Information



This document contains general safety precautions. Keep them in mind and make sure to observe them.

Manual updates

This manual is subject to be revised due to product improvement and/or specification change. The latest manual (PDF and HTML) is available on our website.



<https://global.kikusui.co.jp/manual/>

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Export

Exporting certain services or goods is regulated by Cabinet Orders and Ministerial Ordinances under the Foreign Exchange and Foreign Trade Act, which also applies to Kikusui products.

Even if a product does not fall under the ordinances, the relevant evidence must be submitted to customs. If, however, the product is found to come under the ordinances, an export license must be obtained from the Ministry of Economy, Trade and Industry, and the license must be submitted to customs.

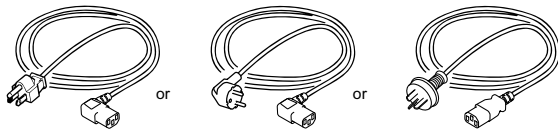
If you export Kikusui products, contact your Kikusui agent or distributor beforehand.

Disposal

Dispose of the PMX-E series in accordance with your local regulations.

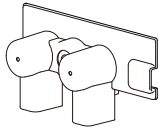
Accessories

The attached power cord varies depending on the shipment destination.



Plug: NEMA5-15, Rating: 125 Vac/10 A Plug: CEE7/7, Rating: 250 Vac/10 A Plug: GB1002, Rating: 250 Vac/10 A

☐ Power cord (1 pc., length: 2.5 m)



☐ DC OUTPUT terminal cover (1 pc.)

☐ Safety Information (1 copy)
☐ China RoHS sheet (1 sheet)
☐ Start Guide (1 copy)

Product Overview

The PMX-E series products are regulated DC power supplies that come standard with communication functionality. These are easy-to-operate, versatile, and compact power supplies with simple functions.

Model configurations

Model	Rated output voltage	Rated output current
PMX18-2E ¹	18 V	2 A
PMX18-5E	18 V	5 A
PMX35-1E ¹	35 V	1 A
PMX35-3E	35 V	3 A
PMX70-1E	70 V	1 A
PMX110-0.6E	110 V	0.6 A
PMX250-0.25E	250 V	0.25 A
PMX350-0.2E	350 V	0.2 A
PMX500-0.1E	500 V	0.1 A

1. Has a high-speed rising/falling function (p.114) available as a factory option.

Features

Communication function

RS232C, USB, and LAN are standard-equipped features. The remote interfaces comply with IEEE std 488.2-1992 and SCPI Specification 1999.0.

Because the LAN interface complies with the LXI standard, the construction of a highly cost-effective system is possible.

Communication monitoring function (WatchDog)

Monitors the communication status and detects abnormal conditions.

Setting preset memory function

You can save up to three output value settings (combinations of voltage, current, OVP, OCP, voltage and current soft starts, voltage and current soft stops, on-delay, and off-delay). You can simply select a set of output settings that you want to use rather than having to specify each setting every time.

External Control

External analog signals can be used to control the output voltage and current, turn the output on and off, and monitor the operation mode.

Remote Sensing Function

(Equipped on models with 18 and 35 V rated output voltages)

Remote sensing stabilizes the output voltage across the load by reducing the influence of voltage drops and other effects caused by the load cable resistance.

Soft start/stop function

You can set the rise and fall times of the output voltage/current.

This is useful when the load cannot keep up with a sudden rising or falling, or when the overvoltage protection (OVP) or overcurrent protection (OCP) activates unintentionally.

Output-on/off delay function

You can set the delay time from pressing the OUTPUT key until the output turns on/off. This is useful when you want to turn the output on or off by setting a delay according to the load characteristics.

Overcurrent protection (OCP) activation delay time setting

You can set the amount of time that an overcurrent must persist after the first detection of the overcurrent before the overcurrent protection (OCP) is activated. If inrush current from the load causes an excessive current to flow temporarily, you can adjust the delay time to prevent the overcurrent protection (OCP) from being activated.

Equipped with various protection functions

Equipped with overvoltage protection (OVP), overcurrent protection (OCP), overheat protection (OHP), communication monitoring (WDOG), external control error (EXT) detection, alarm signal (ALIN), and system error (SYS) detection.

When a protection function is activated, the cause of it is indicated on the front panel display area. The output is turned off to protect the PMX-E series and the load.

Bleeder on/off function

You can turn off the bleeder circuit when you do not want the internal bleeder circuit to sink output current.

When you connect a battery, you can prevent excessive electrical discharges by turning the bleeder circuit off.

Memory sequence function

You can consecutively recall and output preset memories A, B, and C in order. You can obtain a variety of output waveforms by defining a recall of three preset memories as one sequence and setting the item, output time, and repetition count to be saved in each preset memory.

Output-off timer function

When all set conditions are met, the output will automatically turn off.

You can set the following parameters as desired.

- Output-on time
- Voltage upper/lower limits
- Current upper/lower limits
- Output-on time after the start of the specified operation mode

High-speed rising/falling function (factory option)

The output rising and falling are faster than those of the standard model. This is useful, for example, for repeated testing of electronic components.

Notations Used in This Manual

Notations used in this text

- The regulated DC power supplies PMX18-2E, PMX18-5E, PMX35-1E, PMX35-3E, PMX70-1E, PMX110-0.6E, PMX250-0.25E, PMX350-0.2E, and PMX500-0.1E may be collectively referred to as the "PMX-E series".
- "PC" is a generic term for personal computers and workstations.
- The illustrations used in this manual may differ from the actual items.
- For "CFxx : x", the first two characters "CF" represent the CONFIG setting, and the two low digits represent the CONFIG setting parameter number; the semicolon ":" is followed by the selected parameter value.
- For "SHIFT +key name", press the key indicated in blue characters (below the key) while holding down SHIFT.

Safety information**⚠ 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 slight injury or damage to the product and other property.

NOTE

Indicates information that you should know.

Safety Precautions

When using the PMX-E series, be sure to observe the precautions in the separate document entitled "Safety Information".

This manual describes the precautions specific to the PMX-E series.

Installation**⚠ CAUTION**

- **Do not install the product in residential environment.**
The PMX-E series is not intended for use in residential environments. Using this product in a residential environment may cause failure to satisfyingly protect peripherals receiving radio signals.

Connection**⚠ WARNING**

Risk of fire.

- **Use load cables having strong flame-resistant insulation with sufficient margin for the current.** (p.18)
- **Use wires with a coating temperature tolerance of 85 °C or higher.**
The area around the DC OUTPUT terminal becomes very hot.

Risk of electric shock.

- **Ground the PMX-E series to a part that has been grounded per electrical equipment technical standards.**
PMX-E series is IEC Safety Class I equipment (equipment with a protective conductor terminal). Ground the product to prevent electric shock.
- **For load cables, use wire with a rated voltage higher than the isolation voltage of the PMX-E series.** (p.105)
- **Do not touch a DC OUTPUT terminal when the POWER switch is on.**
- **Always keep the DC OUTPUT terminal cover attached to the main unit except when connecting load cables to the DC OUTPUT terminal.**
- **Even if the DC OUTPUT terminal is grounded, make sure that the insulation of the load, external control device, and their connecting wires is equal to or greater than the isolation voltage of the PMX-E series.** (p.105)

Power On and Off**⚠ WARNING**

Risk of electric shock.

- **Always keep the DC OUTPUT terminal cover attached to the main unit except when connecting load cables to the DC OUTPUT terminal.**
- **Set the bleeder circuit to on (CF09: ON) before you touch the DC OUTPUT terminals.**

If you set it to off (CF09: OFF), the voltage present when the output is on will remain at the DC OUTPUT terminal even if you turn the output off or the POWER switch off.

CAUTION

Risk of damage to load.

- **Set OVP/OCV appropriately.**
If you change the load, you may need to change the setting. Depending on the CONFIG settings, the output may be turned on automatically when you turn the POWER switch on. For inappropriate OVP/OCV settings, excessive voltage/current may be output to the load.

Remote sensing

WARNING

Risk of electric shock.

- **Do not wire the sensing terminals while the POWER switch is on.**
- **For SENSING cables, use cables whose rated voltage is higher than the isolation voltage of PMX-E series.**
- **If you use shielded cable, protect the exposed shield section with an insulation tube or the like with a higher withstand voltage than the isolation voltage of the PMX-E series.**
- **Make sure not to have the conductor of the cable touch the chassis when connecting.**
The electric potential of the sensing terminal is approximately the same as that of the negative output terminal.

External Control

WARNING

Risk of electric shock.

- **Always keep the cover it except when connecting the signal line to the J1 connector.**
- **The insulation of the external voltage (Vext), external resistance (Rext), and control signal lines must be equal to or greater than the isolation voltage of the PMX-E series. (p.105)**
- **If you use a shielded cable for the control signal line, protect the exposed shield section with an insulation tube with a higher withstand voltage than the isolation voltage of the PMX-E series.**
- **The insulation of the external contacts and control signal lines must be equal to or greater than the isolation voltage of the PMX-E series. (p.105)**

CAUTION

Otherwise, the control signal wires may be burned.

- **Do not ground the external voltage (Vext) output, but leave it floating.**
- **When connecting the shield of the control signal wire to the external voltage (Vext) side, do not connect the shield to the DC OUTPUT terminal.**
- **Do not apply a 10.5 V or higher voltage or reverse voltage between the external voltage control pins.**

Parallel operation

WARNING

Risk of electric shock.

- **Do not touch a DC OUTPUT terminal when the POWER switch is on.**

CAUTION

Risk of damaging the wire.

- **Do not connect the commons (ACOM, DCOM) of the J1 connector.**
Otherwise, the common line may be damaged when the load cable comes off.

Risk of the output being short.

- **When connecting the DC OUTPUT terminal to the chassis terminal, connect the same polarity terminal (positive or negative) to the chassis terminal.**
If the polarity is different, the output will be shorted through the ground wire of the power cord.

Series operation

WARNING

Risk of electric shock.

- **Do not connect multiple power supplies in series in such a way that the maximum output voltage exceeds the isolation voltage. (p.109)**
- **Do not connect the commons (ACOM, DCOM) of the J1 connector.**
When monitoring the output voltage or current during series operation, the common potentials of the monitor signals between devices are different.
- **Do not touch a DC OUTPUT terminal when the POWER switch is on.**

Calibration

WARNING

Risk of electric shock.

- **Do not touch a DC OUTPUT terminal when the POWER switch is on.**
- **Ensure that the output terminal is connected to the chassis terminal.**

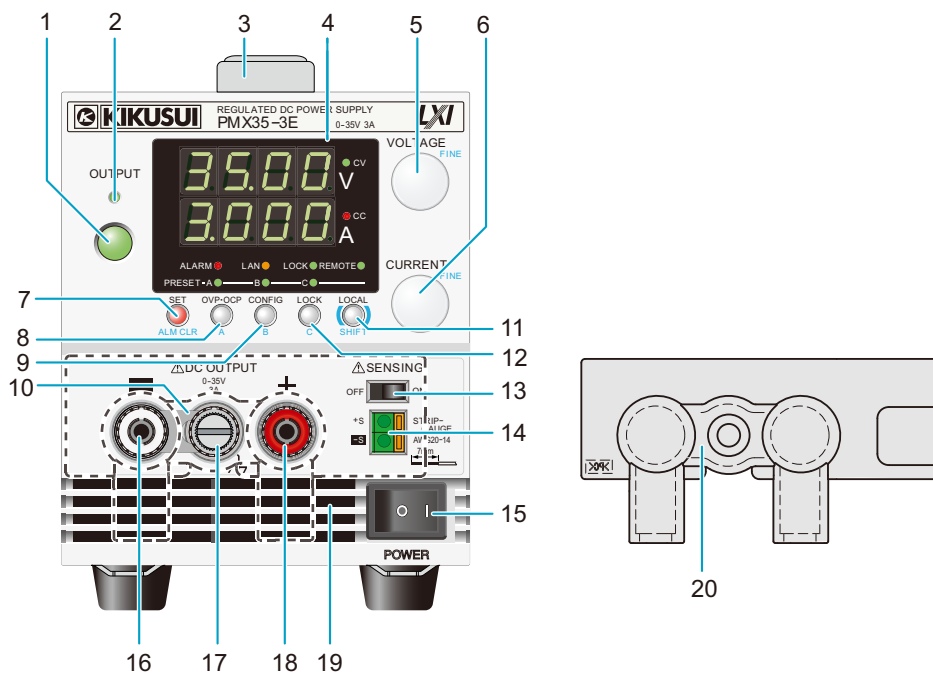
Notes on Usage

- PMX-EWhen using or storing the series, be sure to observe the temperature and humidity ranges. For environmental conditions, see General Specifications ([p.105](#)) .
- For your safety and DUT protection, refer to the “Protection Functions” ([p.28](#)) section and set the protection functions appropriately.

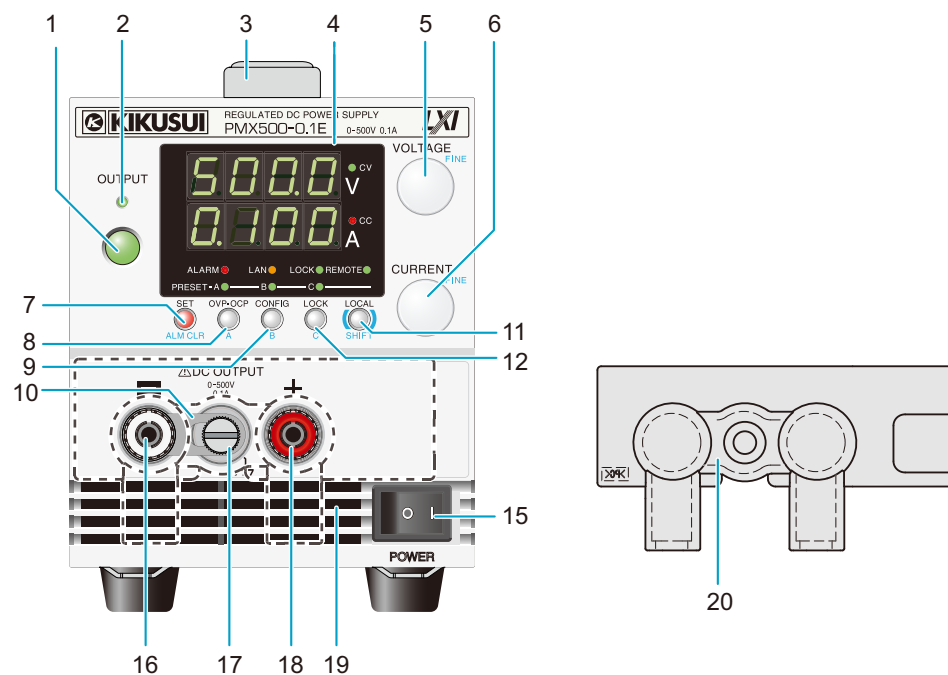
Component Names

Front panel

PMX18-2E, PMX18-5E, PMX35-1E, PMX35-3E



PMX70-1E, PMX110-0.6E, PMX250-0.25E, PMX350-0.2E, PMX500-0.1E

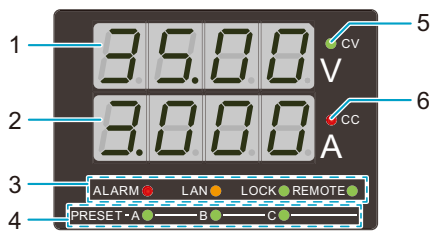


Number	Name	Function
1	OUTPUT key	Switches the output on/off (p.26)
2	OUTPUT LED	The LED indicates the output status by its color and whether it is lit or blinking (p.26) output is off, the LED is off. • Green (lit): Output on or soft start behavior (p.60) • Green (blink): Output off delay behavior or soft stop behavior (p.59) (p.60) • Orange (blink): Output-on delay behavior (p.59) • Green/orange (blink): Output-off timer behavior (p.65)
3	Handle	It is a handle for carrying the product.
4	Display	See "Display" (p.12) .
5	VOLTAGE knob	Sets the voltage value (p.25) . Selects the CONFIG setting parameter number (p.35) .
	FINE	Fine-tunes the voltage setting (p.25)
6	CURRENT knob	Sets the current value (p.25) . Changes the CONFIG parameter value (p.35) .
	FINE	Fine-tunes the current setting (p.25)
7	SET key	An LED-equipped key to set and check the output voltage or output current value (p.23)
	ALM CLR key	An LED-equipped key to clear the protection mode (p.28)
8	OVP•OCP key	An LED-equipped key to set and display the overvoltage protection (OVP) and overcurrent protection (OCP) trip points (p.29)
	A	An LED-equipped key to recall/save the value of preset memory A (p.52)
9	CONFIG key	An LED-equipped key to configure the operating conditions (p.34)
	B	An LED-equipped key to recall/save the value of preset memory B (p.52)
10	Short bar	Connects the DC OUTPUT and chassis terminals (p.19) (p.89) (p.92)
11	LOCAL key	Switches between the local and remote modes (p.56)
	SHIFT key	Used to enable the functions that are written in blue characters below the key.
12	LOCK key	Used to lock the operation of panel keys, rotary knob, etc. (p.55)
	C	Recalls/saves the value of preset memory C (p.52)
13	SENSING switch ¹	Switches remote sensing on/off (p.20)
14	SENSING terminal ¹	Connects the sensing cables. (p.20)
15	POWER switch	Pressing the I side turns the power on, and pressing the O side turns it off (p.16)
16	DC OUTPUT -	Negative output terminal (p.19)
17	Chassis terminal	A connector for grounding the output.
18	DC OUTPUT +	Positive output terminal (p.19)
19	Air inlet	Air inlet for cooling
20	DC OUTPUT terminal cover ²	A cover to prevent electric shock. (p.19)

1. The remote sensing function is unavailable on models with a rated output voltage of 70 V or higher.

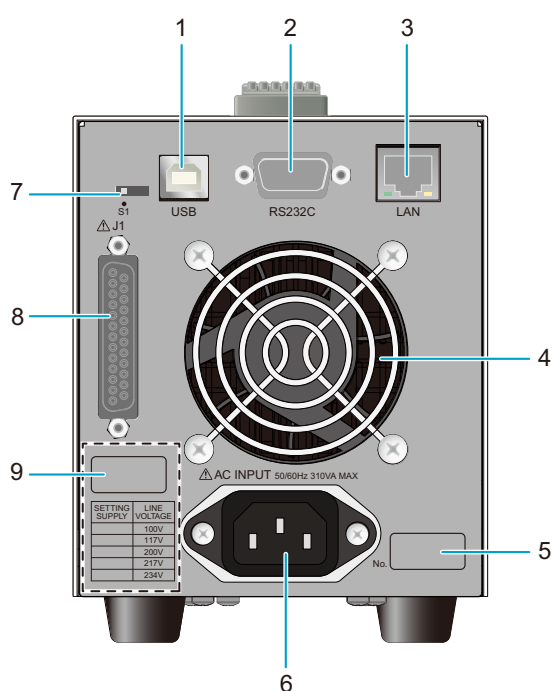
2. Attached separately as an accessory.

Display



Number	Name	Function
1	Voltmeter	Displays the voltage value (p.23) , the CONFIG setting (p.34) parameter number, or the occurrence of an alarm is displayed (p.28) .
2	Ammeter	Displays the current value (p.23) , the CONFIG parameter (p.34) value, or the cause of the alarm (p.28) .
3	Status LEDs	ALARM: Lights up when a protection function activates, and blinks when power is limited while the output is on (red). LAN: Lights up or blinks when the LAN interface is in use. • Green (lit): No Fault status • Red (lit): Fault status • Orange (lit): Standby state • Green (blink): WEB Identify status LOCK: Lights up when the key is locked (green). REMOTE: Lights up during operation by remote control (green).
4	PRESET LED (p.52)	A: Lights up green when the value of memory A is recalled/saved. B: Lights up green when the value of memory B is recalled/saved. C: Lights up green when the value of memory C is recalled/saved.
5	CV LED	Lights up green during constant-voltage mode (p.27)
6	CC LED	Lights up red during constant-current mode (p.27)

Rear panel



Number	Name	Function
1	USB port	USB port for remote control
2	RS232C port ¹	RS232C port for remote control
3	LAN port	LAN port for remote control
4	Air outlet	Air outlet for internal cooling
5	Serial number	Serial number
6	AC INPUT	AC inlet (p.14)
7	S1 ²	Maintenance switch.
8	J1 connector ³	External control connector (p.77)
9	Factory option display	Display area of factory option model - The models marked "HS" are equipped with a high-speed rising/falling function (p.114) - The models with changed rated input voltages have a mark to the left of "117 V", "200 V", "217 V", or "234 V" in the "LINE VOLTAGE" column (p.114)

- When the product is shipped from the factory, a cover is attached to the RS232C port.
- Kikusui service engineers use this switch only during maintenance and servicing. Normally, the LED is off when the switch is on the opposite side of ●.
- When the product is shipped from the factory, a cover is attached to the J1 port.

Preparation

This chapter explains how to prepare the PMX-E series for use.

- For installing and moving the PMX-E series, refer to “Precautions Concerning Installation Location” and “Precautions to Be Taken When Moving the Product” in the Safety Information.
- When using or storing the PMX-E series, be sure to observe the temperature and humidity ranges. For environmental conditions, see “General Specifications” [\(p. 105\)](#)
- If you want to mount the product on a rack, see “Rack mount option” [\(p. 112\)](#)

Connecting the Power Cord

WARNING

Risk of electric shock.

- **Ground the PMX-E series to a part that has been grounded per electrical equipment technical standards.**

PMX-E series is IEC Safety Class I equipment (equipment with a protective conductor terminal). Ground the product to prevent electric shock.

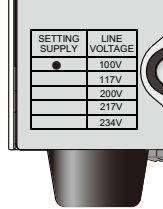
NOTE

- Use the supplied power cord to connect to the AC power line.
 - If the supplied power cord cannot be used because the rated voltage or the plug shape is incompatible, have a qualified engineer replace it with an appropriate power cord that is 3 m or less in length. If obtaining a power cord is difficult, contact your Kikusui agent or distributor.
 - The power cord with a plug can be used to disconnect the PMX-E series from the AC power line in an emergency. Connect the plug to an easily accessible power outlet so that the plug can be removed from the outlet at any time. Be sure to provide adequate clearance around the power outlet.
 - Do not use the supplied power cord with other instruments.
-

The PMX-E series is IEC standard overvoltage category II equipment (energy-consuming equipment supplied from a fixed installation).

1 Check that the AC power line meets the input rating of the PMX-E series.

PMX-EThe nominal input rating of the series is labeled on the rear panel. The frequency is 50 Hz or 60 Hz. The supply voltage is set before factory shipment by a Kikusui service engineer. A mark is indicated to the left of the appropriate voltage. The following shows an example where the supply voltage is 100 Vac.



Be sure to check the nominal input rating before connecting the power cord.

- 2 Check that the POWER switch is turned off.**
- 3 Connect the power cord to the rear panel's AC inlet.**
- 4 Insert the power plug into a grounded outlet.**

Turning the power on and off

Turning the POWER switch on

⚠ WARNING

Risk of electric shock.

- Always keep the DC OUTPUT terminal cover attached to the main unit except when connecting load cables to the DC OUTPUT terminal.

⚠ CAUTION

Risk of damage to load.

- Set OVP/OCP appropriately.

Depending on the CONFIG settings, the output may be turned on automatically when you turn the POWER switch on. For inappropriate OVP/OCP settings, excessive voltage/current may be output to the load.

When you first turn on the POWER switch after purchase, the product starts up with the factory default settings. (p.57) When you turn it on the second time or later, it starts up with the panel settings used immediately before you turn off the POWER switch, excluding the output on/off settings.

You can use the CONFIG settings (CF01) to select the output state of the product when the POWER switch is turned on. (p.39)

1 Turn the POWER switch on (I).

All the LEDs light, and then the voltmeter and the ammeter display the following sequence of information: the rated voltage and rated current, the firmware version number, and then the build number. Each item is displayed for approximately 1 second.

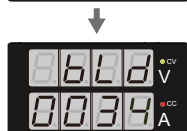
After a few seconds, the PMX-E series enters the operation standby state (the output value is displayed).



Display of rated voltage and rated current values
(Example of PMX18-5E)



Firmware version display
(Example of Ver. 1.10)



Build number display
(Example of build number BLD0034)

If the operation standby state is not entered for approximately 30 seconds when the LAN interface is on, it is waiting for a response from the DHCP server (p.115) (p.117)

■ Inrush current

When the POWER switch is turned on, an inrush current flows. Especially when using multiple units and turning on their POWER switches simultaneously, pay attention to the capacity of the AC power line or distribution board. For the inrush current of each model, see "AC input" (p.98) in the Specifications chapter.

Turning the POWER switch off

1 Turn the POWER switch off (O).

The panel settings used immediately before the POWER switch was turned off are saved, except for output on/off.

- You can use the CONFIG settings (CF01) to select how the PMX-E series starts when the POWER switch is turned on. ([p.39](#))
- If the POWER switch is turned off immediately after the settings have been changed, the last settings may not be stored.

NOTE

After you turn the POWER switch off, wait at least 10 seconds after the panel display turns off before you turn the POWER switch back on. Repeatedly turning the POWER switch on and off at short intervals can cause damage. This may also shorten the life of the POWER switch and the internal input fuse.

Selecting the Load Cables

WARNING

Risk of fire.

- Use load cables having strong flame-resistant insulation with sufficient margin for the current.
- Use wires with a coating temperature tolerance of 85 °C or higher.
The area around the DC OUTPUT terminal becomes very hot.

Risk of electric shock.

- For load cables, use wire with a rated voltage higher than the isolation voltage of the PMX-E series. (p.105)

■ Allowable current of power cables

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 following 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 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 higher, or when cables are bundled together and little heat is radiated.

Nominal cross-sectional area [mm ²]	AWG	(Reference cross-sectional area; mm ²)	Allowable current ¹ [A] (Ta = 30 °C)	Kikusui- Recommended Current [A]
0.9	18	(0.82)	17	4
1.25	16	(1.31)	19	6
2	14	(2.08)	27	10
3.5	12	(3.31)	37	—
5.5	10	(5.26)	49	20

1. Excerpt from Japanese laws related to electrical equipment.

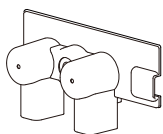
■ Measures against noise

When connecting cables that have the same heat resistance, separating the cables as much as possible to increase heat radiation enables a greater amount of current to flow. However, wiring the + (positive) and - (negative) output wires of the load cable side by side or bundling them together is more effective against unwanted noise. The Kikusui-recommended currents shown in the above table are allowable currents that have been reduced in consideration of the potential bundling of load cables. Use these values as a guideline when connecting cables.

■ Voltage drop

All wires have resistance. As the cable becomes longer or the current becomes larger, the voltage drop in the cable becomes greater. This results in a smaller voltage applied to the load. The PMX-E series has a sensing function that compensates for voltage drop up to approximately 0.6 V in a single line (equipped only on models with 18 V and 35 V rated output voltages). If the voltage drop exceeds this level, use cables that have a greater cross-sectional area.

Connecting to the DC OUTPUT terminals

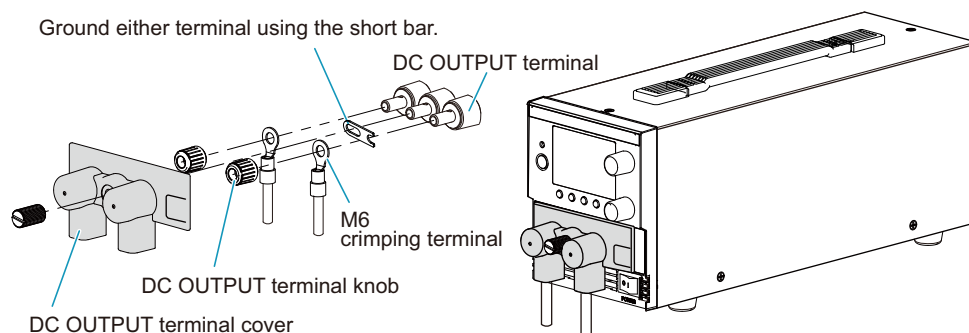


⚠ WARNING

Risk of electric shock.

- Do not touch a DC OUTPUT terminal when the POWER switch is on.
- Always keep the DC OUTPUT terminal cover attached to the main unit except when connecting load cables to the DC OUTPUT terminal.
- Even if the DC OUTPUT terminal is grounded, make sure that the insulation of the load, external control device, and their connecting wires is equal to or greater than the isolation voltage of the PMX-E series. (p.109)

- 1 Turn the POWER switch off.
- 2 Attach crimping terminals to the load cables.
- 3 Connect the load cable to the DC OUTPUT terminal as in the figure below.
 - To reduce the influence of noise on the output, keep the cables as short as possible. If possible, twist the positive and negative load cables.
 - Normally, to ground the DC OUTPUT terminal, connect the short bar to the negative or positive terminal of the DC OUTPUT terminal. Do not use the short bar for loads that require a floating (not grounding the DC OUTPUT terminal) output. Before connection, see "Grounding and insulating the DC OUTPUT terminal" (p.109) .
- 4 Attach the DC OUTPUT terminal cover and knob.



NOTE

Use a tool to attach and remove the DC OUTPUT terminal cover.

Remote Sensing Function

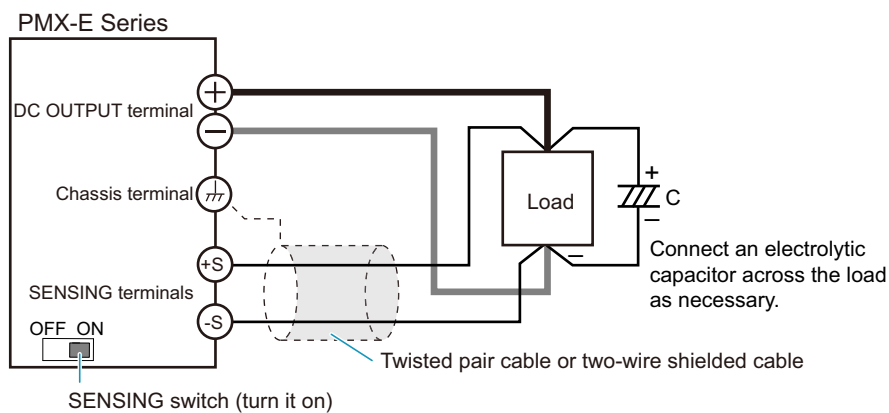
NOTE

The remote sensing function is only available on models with 18 V and 35 V rated output voltages.

Remote Sensing

Remote sensing is a function that stabilizes the output voltage across the load by reducing the influence of voltage drops and other effects caused by the load cable resistance. The remote sensing function compensates for voltage drop in the load wires up to 0.6 V in a single line.

- Select a load cable that has sufficient current capacity to prevent the voltage drop from exceeding the compensation voltage.
- When you perform remote sensing, set the voltage of the sensing point (across the load) so that it does not exceed the rated output voltage.
- Use it in the output voltage range where the DC OUTPUT terminal voltage is not over the rated power.
- Electrolytic capacitors may be required at the sensing point (across the load).
- To reduce the effects of noise, use twisted-pair or 2-core shielded cables for the sensing cables.
- If the sensing cables come loose, the output voltage will rise several volts. To prevent voltage output exceeding the voltage setting, set an appropriate OVP trip point. (p.30)



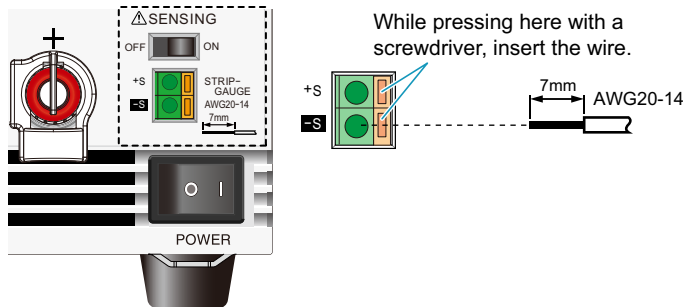
Connecting the Sensing Cables

⚠ WARNING

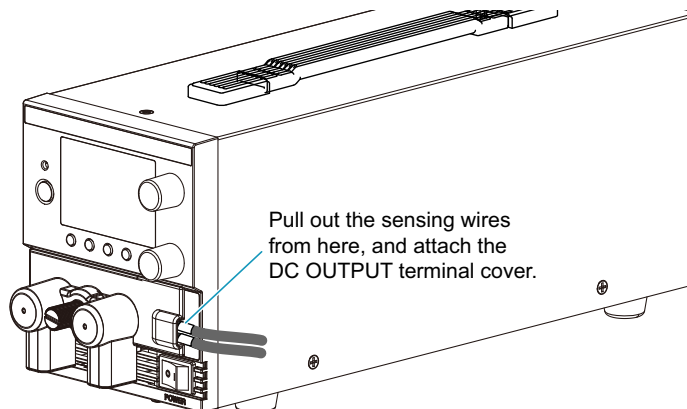
Risk of electric shock.

- Do not wire the sensing terminals while the POWER switch is on.
 - For SENSING cables, use cables whose rated voltage is higher than the isolation voltage of PMX-E series.
 - If you use shielded cable, protect the exposed shield section with an insulation tube or the like with a higher withstand voltage than the isolation voltage of the PMX-E series.
 - Make sure not to have the conductor of the cable touch the chassis when connecting.
- The electric potential of the sensing terminal is approximately the same as that of the negative output terminal.

While remote sensing is not in use, turn off the SENSING switch.



- 1 Turn the POWER switch off.
- 2 Remove the DC OUTPUT terminal cover (p.19) and turn on the front panel's SENSING switch.
- 3 Remove 7 mm of the wire covering. Connect the negative sensing cable to -S and the positive sensing cable to +S.
- 4 As in the figure below, pull out the sensing cable horizontally, and attach the DC OUTPUT terminal cover.



■ If the output oscillates or fluctuates

If the wiring inductance component is large, the following symptoms may appear.

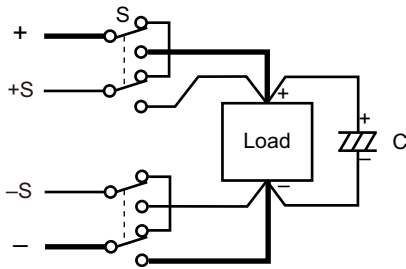
- The PMX-E series oscillates.
If the wires used to connect to the load are long, the wiring inductance and capacity can cause phase shifting at a level that cannot be ignored. This may lead to oscillation.
- The output fluctuates
If the load current changes drastically in a pulse-shaped pattern, the output voltage may become large due to the wiring's inductance component.

You can reduce the inductance component by twisting the load cables, which stabilizes the voltage. However, if this does not correct the problem, connect an electrolytic capacitor across the load.

- Electrolytic capacitor to connect across the load
Capacity: 0.1 μF to several 100 μF
Withstanding voltage: At least 120 % of the rated output voltage of the PMX-E series

■ If a mechanical switch is inserted between the PMX-E series and load

If you turn on/off the connection between the PMX-E series and the load with a mechanical switch, also turn on the sensing cable as in the figure below, and turn on/off the load and sensing cables simultaneously. Before turning on/off the mechanical switch, be sure to turn off the output with the OUTPUT key.



Basic Functions

Measured Value Display and Setting Display

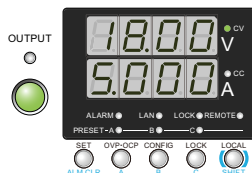
The voltage and current displays have the following 2 states.

- Measured value display
- Setting display

In addition to displaying voltage and current values, it also displays the OVP/OCP setting values, alarms, and system configuration.

Measured value display

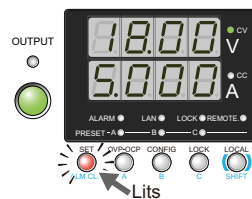
The state where the current output voltage and output current have been displayed. The SET key is off. You can change the output voltage and output current in the measured value display.



Setting display

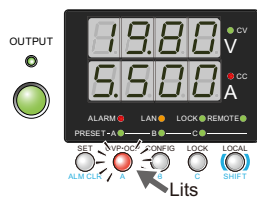
When you press the SET key in measured value mode, the LEDs will light up and the current output voltage and output current setting will be displayed. Press SET again to return to the measured value display. When you recall a preset memory, the panel display will indicate the setting stored in the preset memory. The display is different when the PMX-E series is being controlled externally.

During external voltage control, the voltmeter displays $\overline{E.000}$. During external current control, the ammeter displays $\overline{E.EE5}$. (p.79)



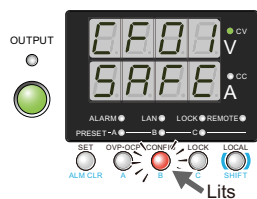
■ Overvoltage protection and overcurrent protection setting display

Press OVP•OCP to light the LED and display the present overcurrent protection and overvoltage protection settings. (p.30)



■ System configuration setting display

Press CONFIG to light the key and display the current system configuration settings. (p.34)

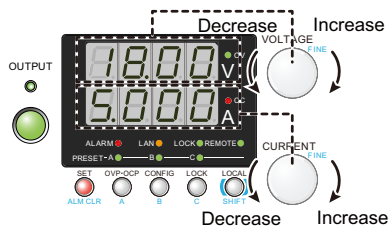


Panel Operations

Setting the output voltage and output current

Regardless of whether the output is on or off, you can change the voltage value by turning the VOLTAGE knob, and the current value by turning the CURRENT knob.

Press SET to switch to the setting display, and then change the output while you view the actual voltage or current settings.



Fine adjustment of settings (FINE)

This product internally holds a setting value with one more digit than the displayed one. When you turn the knob while holding down the SHIFT key, the setting resolution will be fine and the amount of change will decrease compared to turning the knob alone.

When you set a value, it is convenient to first use normal resolution to set the value roughly and then switch to fine resolution (FINE) to set it precisely.

When the output is on, the displayed current or voltage may not change even if you turn the VOLTAGE or CURRENT knob. In this situation, the values are being changed at a finer resolution than that which is being displayed. The display will change when the amount that you change the value by reaches the smallest display digit of the set voltage or current. The amount of change varies depending on whether the output is on or off.

The specified resolution may not necessarily be applied to the actual output.

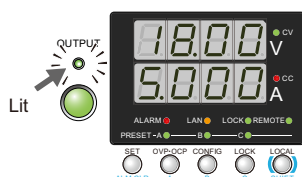
When the output is on ¹	Changes are made at 1/10th the resolution of the minimum digit on the voltmeter or ammeter.
When using a communication interface	
When the output is off	The minimum digits of the voltmeter and ammeter displays change by 1 digit each.

- Note that, because smaller digits that are not displayed are also set, the actual setting may be different from the displayed value.
Decimal display: Lights up when the least significant digit, 1/10, is set to 0, and blinks when it is 1 to 9.

Output Operation

The output turns on and off each time that you press OUTPUT key. When output is on, the OUTPUT LED lights. When the output is off, the OUTPUT LED turns off.

When the output is on, output is generated at the currently set values. If you change the settings while the output is on, the changes are applied to the output. The following shows an example where the output is on.



You can control the output on/off via external control (p.40) (p.84)

Output state at startup

By factory default, the output is off when you turn on the POWER switch. You can use the CONFIG settings CF01 (p.39) to set the output state when you turn on the POWER switch.

To use AUTO or FORC with CF01, set "CF06 Set output-on/off control and function enhancements via external contacts" (p.40) to OFF (disabled).

If you want to set the output status setting when the POWER switch is turned on to "output is on at power-on (FORC)", check the OVP trip point setting before turning off the POWER switch (p.29).

CAUTION

Risk of damage to load.

- **Set OVP/OCF appropriately.**

If you change the load, you may need to change the setting.

Output-on startup state

You can set whether to start it as a constant voltage (CV) power supply or a constant current (CC) power supply when the output is turned on. ("CF08 Set the priority operation mode when the output is on" (p.41)).

Set this according to the operation mode that you are using. You can prevent overshoot from occurring when the output is turned on by prioritizing CV when using the PMX-E as a constant-voltage power supply and by prioritizing CC when using the PMX-E as a constant-current power supply.

Using the PMX as a CV or CC Power Supply

When the PMX-E is used as a constant-voltage power supply, the set current is the limit to the current that can flow through the load.

When the PMX-E is used as a constant-current power supply, the set voltage is the limit to the voltage that can be applied to the load.

If the specified limit is reached, the PMX-E automatically switches its operation mode. Once the operation mode changes, the CV LED and CC LED on the display will change state to indicate that the operation mode has changed. ("CV Power Supply and CC Power Supply" (p.110))

1 Turning the POWER switch on.

If the OUTPUT LED in the display area is lit, press OUTPUT key to turn the output off.

2 Press the SET key to display the setting value.

The SET key lights.

3 Turn the VOLTAGE knob to set the voltage and the CURRENT knob to set the current. (p.25)

Model	Voltage	Current
PMX18-2E	0 V to 18.90 V	0 A to 2.10 A
PMX18-5E	0 V to 18.90 V	0 A to 5.25 A
PMX35-1E	0 V to 36.75 V	0 A to 1.05 A
PMX35-3E	0 V to 36.75 V	0 A to 3.15 A
PMX70-1E	0 V to 73.50 V	0 A to 1.05 A
PMX110-0.6E	0 V to 115.5 V	0 A to 0.63 A
PMX250-0.25E	0 V to 262.5 V	0 A to 0.262 A
PMX350-0.2E	0 V to 367.5 V	0 A to 0.21 A
PMX500-0.1E	0 V to 525.0 V	0 A to 0.105 A

4 Press OUTPUT key to turn the output on.

The SET key turns off, and the OUTPUT LED in the display area lights. Voltage/current is output to the DC OUTPUT terminal. When the PMX-E series is operating as a constant-voltage power supply, the CV LED in the display area lights. When the PMX-E series is operating as a constant-current power supply, the CC LED lights.

Even when the output is on, you can set the output voltage or current in Step 3 and Step 4 while checking the actual output voltage or current.

Protection Functions

The PMX-E series has protection that shuts off the output and protection that limits the settings.

■ Output shutoff (occurrence of alarm)

- Overvoltage protection (OVP)
- Overcurrent protection (OCP)
- Overheat protection (OHP)
- Communication monitoring (WDOG)
- External control error (EXT)
- Alarm signal input (ALIN)
- System error (SYS)

■ Setting limits

- Voltage setting limit (limited to about 95 % of the OVP trip point)
- Current setting limit (limited to about 95 % of the OCP trip point)
- Power limit

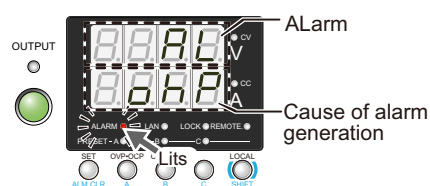
Alarm occurrence and clearing alarms

Alarm occurrence

When a protection function activates, the PMX-E series behaves as follows.

- Output off
- The ALARM LED lights up on the front panel's display area.
- The voltmeter displays AL, and the ammeter the alarm name.
- An alarm signal is output (J1-connector pin-13).

The following shows an example where an OHP activation alarm has been displayed.



Voltmeter	Ammeter	Description
RL	OVLP (OVP)	Overvoltage protection
RL	OC P (OCP)	Overcurrent protection
RL	OH P (OHP)	Overheat protection
RL	WDOG (WDOG)	Communication monitoring
RL	EXT (EXT)	External control error
RL	AL IN (ALIN)	Alarm signal input
RL	SYS (SYS)	System error

Clearing alarms

There are two methods to clear alarms. If you do not eliminate the cause of the alarm, an alarm will occur again.

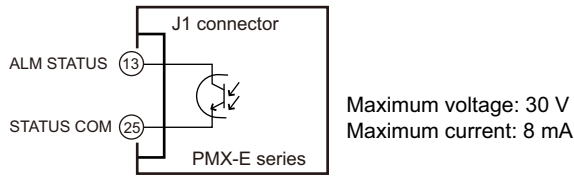
- Press ALM CLR (SHIFT+SET) key.
- Turning on the POWER switch again.

If an alarm still occurs even after you have corrected all the causes of alarms, the PMX-E series may be malfunctioning. Stop using the PMX-E series immediately, and contact your Kikusui agent or distributor.

Alarm signal

The alarm signal is isolated from other terminals through an open collector photocoupler.

The CV, CC, output-on, and power-on signals share a common ground.



Protection by Output Cutoff

Overvoltage protection (OVP) and overcurrent protection (OCP)

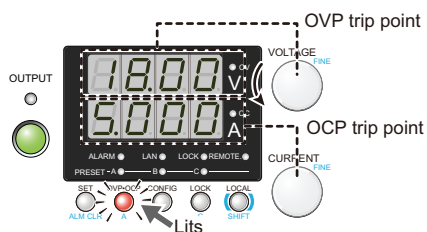
The OVP and OCP trip points need to be set to appropriate values. Immediately after you purchase the PMX-E series or immediately after a load is changed, set the OVP and OCP trip points to values that are appropriate for the load.

- OVP activates when the DC OUTPUT terminal voltage exceeds the preset voltage value (OVP trip point).
OVP also activates if the sensing cables are not connected securely or the product is used with an incorrectly connected polarity. OVP activates because the output voltage may become unstable or the sensing voltage may exceed the maximum compensation voltage.
For the maximum sensing voltage, see the “Specifications” (p.97).
- OCP activates when the output current exceeds the preset current (OCP trip point). You can set the amount of time from when an overcurrent is detected until the output is turned off in the CONFIG settings (CF25) (p.44) .

■ Setting the OVP and OCP trip points

OVP activates against the DC OUTPUT terminal voltage. If you want to activate the protection feature according to the voltage across the load, take the voltage drop in the load cable into consideration when you set the OVP trip point.

The following shows an example where both the OVP and OCP trip points have been displayed.



1 Press the OVP•OCP key.

The OVP•OCP key lights, and the OVP trip point and OCP trip point are displayed in the display area.

2 While viewing the panel display, turn the VOLTAGE knob to set the OVP trip point or the CURRENT knob to set the OCP trip point.

Hold down SHIFT key while you turn the VOLTAGE knob or CURRENT knob to make small changes to the value. (p.25)

OVP setting range: 10 % to 112 % of the rated output voltage

OCP setting range: 10 % to 112 % of the rated output current

Model	OVP setting	OCP setting
PMX18-2E	1.8 V to 20.16 V	0.2 A to 2.24 A
PMX18-5E	1.8 V to 20.16 V	0.5 A to 5.6 A
PMX35-1E	3.5 V to 39.2 V	0.1 A to 1.12 A
PMX35-3E	3.5 V to 39.2 V	0.3 A to 3.36 A
PMX70-1E	7.0 V to 78.4 V	0.1 A to 1.12 A
PMX110-0.6E	11.0 V to 123.2 V	0.06 A to 0.672 A
PMX250-0.25E	25.0 V to 280.0 V	0.025 A to 0.28 A
PMX350-0.2E	35.0 V to 392.0 V	0.02 A to 0.224 A
PMX500-0.1E	50.0 V to 560.0 V	0.01 A to 0.112 A

3 Press OVP•OCP to finalize the setting.

The OVP•OCP key turns off, and the PMX-E series returns to the measured value display.

■ Checking the OVP operation

Turn off the CF23 Set the output voltage limit.

1 Turn off the output, i.e., turn off the OUTPUT LED.

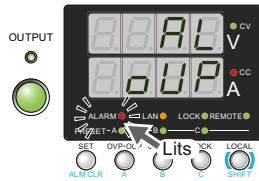
2 Set the output voltage to a value lower than the OVP trip point.

3 Press OUTPUT key to turn the output on.

The OUTPUT LED lights.

4 Slowly turn the VOLTAGE knob clockwise.

When the output voltage exceeds the OVP trip point, the display area's ALARM LED lights up to indicate that the OVP function has activated.



5 Check that the OUTPUT LED is off.

If you do not change the output settings, the OVP function will be activated again.

6 Press ALM CLR (SHIFT + SET) to clear the alarm.

7 Set the output voltage below the OVP trip point.

■ Checking the OCP operation

Turn off the CONFIG CF22 Set the output current limit.

1 Turn off the output, i.e., turn off the OUTPUT LED.

2 Shorten the DC OUTPUT terminal.

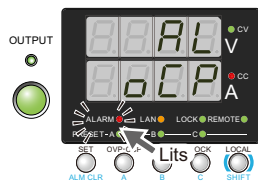
3 Set the output current to a value lower than the OCP trip point.

4 Press OUTPUT key to turn the output on.

The OUTPUT LED lights.

5 Slowly turn the CURRENT knob clockwise.

When the output current exceeds the OCP trip point, the display area's ALARM LED lights up to indicate that the OCP function has activated.



6 Check that the OUTPUT LED is off.

If you do not change the output settings, the OCP function will be activated again.

7 Press ALM CLR (SHIFT + SET) to clear the alarm.

8 Set the output current below the OCP trip point.

Overheat protection (OHP)

The overheat protection function is activated when the PMX-E series' internal temperature rises to an abnormal level. The following causes of activation are possible:

- It was used in an environment above the operating temperature range (0 °C to +40 °C).
- It was used with the intake or exhaust vents blocked.
- The fan motor stopped.

Remove the cause of the OHP activation, then leave it for a while. If the internal temperature has dropped, the alarm will be cleared. Otherwise, OHP will activate again.

Communication monitoring (WDOG)

It monitors communication by SCPI commands at specified intervals. If there is no communication within the specified time, communication will be assumed to have stopped. You can set the interval for monitoring communication in CONFIG settings ([p.43](#))

The function operates regardless of whether the PMX-E series is in remote or local (panel control) mode. However, if the communication interface settings CF40 (LAN), CF41 (USB), and CF42 (RS232C) are all set to off (not used), it will not monitor communications.

In the following cases, turn off communication monitoring (factory default setting).

- Clearing an alarm caused by communication monitoring (WDOG).
- Disabling remote control (commands).

External control error (EXT)

This activates when:

- A voltage of 12.6 V or more was applied to the J1-connector pin-4 (EXT-V CV CONT) or -14 (EXT-V CC CONT); or
- A resistor of 12.6 kΩ or more is connected to the J1-connector pin- 6 (EXT-R CV CONT) or -16 (EXT-R CC CONT).

Alarm signal input (ALIN)

Activates when a LOW signal is input to the J1-connector pin-20 (ALM IN).

System error (SYS)

An internal error occurred. Repair is necessary.

Contact your Kikusui agent or distributor.

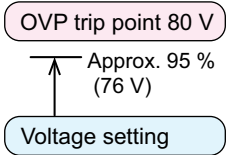
Setting limits

Voltage setting limit

The maximum voltage that can be set is limited to about 95 % of the OVP trip point to prevent OVP activation due to mistaken operations. The output voltage limit is set to "Limited" (CF23: □□) by factory default (p.43) .

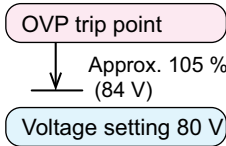
If you turn on the output voltage limit when the voltage setpoint is higher than approximately 95 % of the OVP trip point, the voltage setting will be maintained; however, the OVP trip point will change to approximately 105 % of the voltage setting.

Example 1: Setting the OVP trip point to 80 V with CF23 on and then setting the voltage value



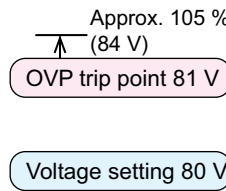
Because the voltage setting is limited to approximately 95 % of the OVP trip point, the voltage can be set up to 76 V.

Example 2: Setting the voltage value to 80 V with CF23 on and then setting the OVP trip point



Because the OVP trip point is limited to approximately 105 % of the voltage setting, the OVP trip point can be set at 84 V or higher.

Example 3: Setting the OVP trip point to 81 V with CF23 off and then turning on CF23 (voltage setting approx. 80 V)



When the CF23 is enabled, the OVP trip point is changed to approximately 105 % of the voltage setting. The voltage setting remains at 80 V, and the OVP trip point is changed to 84 V.

Current setting limit

The maximum current that can be set is limited to about 95 % of the OCP trip point to prevent OCP activation due to mistaken operations.

The output current limit is set to "Limited" (CF22: □□) by factory default.

If you turn on the output current limit when the current setting is higher than 95 % of the OCP trip point, the current setting is retained, but the OCP trip point is changed to 105 % of the current setting.

Power limit

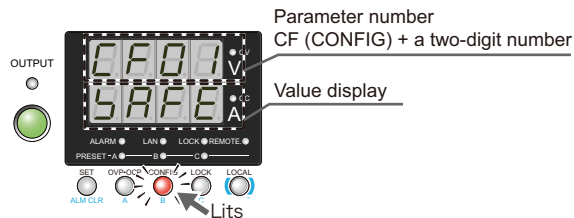
The output power can be limited to 1 W to 105 % of the rated output power.

This function delays the activation by approximately 0.2 seconds. It cannot handle transient operation (variation).

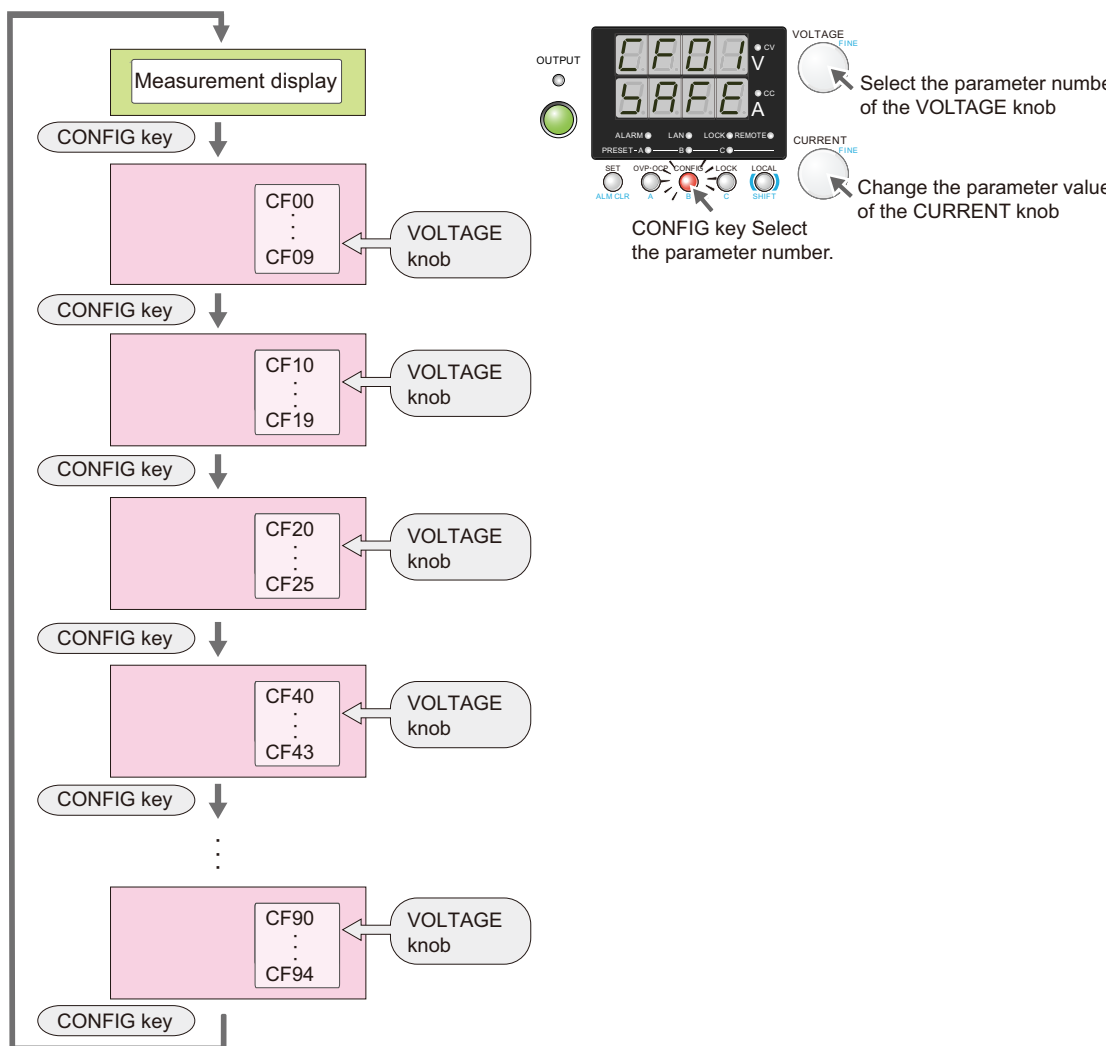
The output power limit is set to "Not limited" (CF24: □FF) by factory default.

CONFIG Settings

Use the CONFIG settings to perform system configuration of the PMX-E series.
Pressing the CONFIG key causes the system to enter the configuration mode.



- Pressing the LOCK key causes it to exit the configuration mode.
- Each time you press the CONFIG key, the second digit of the parameter number increments. After this has completed one cycle, it exits the CONFIG setting mode (with no CF3X setting).
- Use the VOLTAGE knob to select the item number.
- Use the CURRENT knob to select the parameter value.
- Pressing the SHIFT key changes the parameter number to the mnemonic display (except for CF00).
- If the option is a numerical setting, holding down the LOCAL key while turning the CURRENT knob decreases the amount of change.



CONFIG Settings List

You can set and display the following parameters in the CONFIG settings.

Application: A circle (○) indicates a parameter that is applied when the system exits the CONFIG settings.

A triangle mark (△) indicates a parameter that is applied at the next power-on.

A square mark (□) indicates a parameter is applied after execution of CF60 (RPP_L).

A diamond mark (◇) indicates a parameter that is applied only when the output is off.

Effects: The parameters marked with a black circle (●) are affected when the panel settings are reset (CF00).

■ indicates that the parameter may be affected when the LAN interface settings are reset (CF60: L_L / dEF).

Parameter number	Mnemonic	Setting or display description	Applica- tion	Effect
CF00	—	Reset the panel settings	○	—
CF01	P _{ON}	Set the output state when the POWER switch is turned on	△	—
CF02	P _{RE}	Set the memory content display	○	—
CF03	L _o L	Set the key lock	○	—
CF04	E _{CC}	CC control using an external voltage or external resistance	◇	●
CF05	E _{CV}	CV control using an external voltage or external resistance	◇	●
CF06	E _{OUT}	Set output-on/off control and function enhancements via external contacts	◇	●
CF07	E _{LOG}	Set the logic for output-on/off control via external contacts	◇	—
CF08	P _{RI}	Set the priority operation mode when the output is on	○	—
CF09	b _{LE}	Set the bleeder function	○	—
CF10	b _{CC}	Set the CC status signal polarity	○	—
CF11	b _{CV}	Set the CV status signal polarity	○	—
CF12	b _{OUT}	Set the output status signal polarity	○	—
CF13	b _{PR}	Set the protection function/alarm status signal polarity	○	—
CF14	b _{CCr}	Set the soft start time (CC mode)	◇	●
CF15	b _{CCF}	Set the soft stop time (CCmode)	◇	●
CF16	b _{CVr}	Set the soft start time (CV mode)	◇	●
CF17	b _{CVF}	Set the soft stop time (CV mode)	◇	●
CF18	o _{nd}	Set the output-on delay time	◇	●
CF19	o _{FFd}	Set the output-off delay time	◇	●
CF20	b _{ri}	Panel display brightness setting	○	—
CF21	W _{DOG}	Set the communication monitoring (WATCHDOG) timer	○	—
CF22	C _{CL}	Set the output current limit	○	●
CF23	C _{VL}	Set the output voltage limit	○	●
CF24	C _{PL}	Set the output power limit	○	●
CF25	o _{cdL}	Set the time from overcurrent detection to OCP activation	○	—
CF40	L _{AN}	LAN interface setting	△	■
CF41	u _{sb}	USB interface settings	△	—
CF42	r ₂₃₂	Set the RS232C interface	△	—
CF43	e _{rr}	SCPI communication error display parameter	○	—
CF50	i _{P1}	IP address display (1)	—	—
CF51	i _{P2}	IP address display (2)	—	—
CF52	i _{P3}	IP address display (3)	—	—

Parameter number	Mnemonic	Setting or display description	Applica- tion	Effect
CF53	ሰዋ	IP address display (4)	—	—
CF54	ከዘ 1	MAC address display (1) and (2)	—	—
CF55	ከዘ 2	MAC address display (3) and (4)	—	—
CF56	ከዘ 3	MAC address display (5) and (6)	—	—
CF60	ከመተ	LAN interface setting reset (LCI)	○	—
CF61	ዘደሩ	Set the IP address assignment	△/□	■
CF62	ኃ. ሰ 1	Manual IP address setting (1)	△/□	■
CF63	ኃ. ሰ 2	Manual IP address setting (2)	△/□	■
CF64	ኃ. ሰ 3	Manual IP address setting (3)	△/□	■
CF65	ኃ. ሰ 4	Manual IP address setting (4)	△/□	■
CF66	ኃህኔ	Set the IP address subnet mask	△/□	■
CF70	ህ ሰደ	VID (vendor ID) display	—	—
CF71	ዋ ሰደ	PID (product ID) display	—	—
CF72	ከዘህደ	RS232C baud rate	△	—
CF80	ዐፑፑህ	Set the output-off timer function	◇	—
CF81	ዐፎከ	Set the duration from output on to off (h)	◇	—
CF82	ዐፎቤኔ	Set the duration from output on to off (m) (s)	◇	—
CF83	ዐኔዐህ	Set the upper voltage limit at which the output turns off	○	—
CF84	ዐኔህህ	Set the lower voltage limit at which the output turns off	○	—
CF85	ዐኔዐፒ	Set the upper limit current at which the output turns off	○	—
CF86	ዐኔህፒ	Set the lower limit current at which the output turns off	○	—
CF87	ዐኔፒከ	Set the duration from the start of the specified operation mode to output off (h)	◇	—
CF88	ዐኔቤኔ	Set the duration from the start of the specified operation mode to output off (m) (s)	◇	—
CF89	ዐፓዘኔ	Set the duration during which to exclude the output-off condition (s)	◇	—
CF90	ቤኔፎፆ	Set the memory sequence function	◇	—
CF91	ፎ ሰዘ	Set the output time of preset memory A (s)	◇	—
CF92	ፎ ሰኔ	Set the output time of preset memory B (s)	◇	—
CF93	ፎ ሰፒ	Set the output time of preset memory C (s)	◇	—
CF94	ሩፎዋ	Set the repetition count of the memory sequence	◇	—

CONFIG settings

(excluding panel setting reset CF00 and LAN interface reset [LCI] CF60)

- 1 Press CONFIG key.**
The CONFIG key lights and the SET key blinks. The voltmeter displays the parameter number "CF00" (CF00) and the ammeter the setting "rST" (rST).
- 2 Press CONFIG or turn the VOLTAGE knob to select the number of the parameter that you want to set.**
Pressing the CONFIG key increments the second digit of the parameter number and changes the display. Turning the VOLTAGE knob changes the parameter number (with no setting for CF3X).
- 3 Turn the CURRENT knob to change the value of the parameter.**
For information on when the settings are applied, see "CONFIG Settings List" (p.35).
- 4 To set or display other parameters, repeat steps 2 and 3.**
To exit the CONFIG settings, go to step 5.
- 5 Press and hold down the CONFIG key until the measured value display appears, or press the LOCK key.**
The PMX-E series exits from CONFIG settings.
If you change a parameter marked with a circle "○" in the "Application" column in the "CONFIG Settings List" (p.35), the setting will be applied.

CF00 and CF60 are execution functions for operations. Use the SET key to confirm the settings.

For resetting the settings, see "Reset the panel settings (CF00)" (p.37).

For the LAN interface, see "LAN interface setting reset (LCI)(CF60)" (p.38).

Reset the panel settings (CF00)

- 1 Press the CONFIG key once.**
The CONFIG key lights and the SET key blinks.
The voltmeter displays the parameter number "CF00" (CF00) and the ammeter the setting "rST" (rST).
- 2 Press the blinking SET key once.**
Both the "CF00" (CF00) and "rST" (rST) displays will blink.
- 3 Press the blinking SET key once.**
After the settings have been reset, the system will exit from the configuration settings and show the measured values.
While "CF00" (CF00) and "rST" (rST) are blinking, the reset will not be executed until you press the SET key. If you do not need resetting, press the CONFIG or LOCK key.
If you press the CONFIG key, "CF10" (CF10) will be displayed.
If you press the LOCK key, the system will exit from the configuration settings and show the measured values.

LAN interface setting reset (LCI)(CF60)

- 1 Press the CONFIG key six times.**

The CONFIG key lights and the SET key blinks.
The voltmeter displays the parameter number "CF60" (CF60) and the ammeter the setting "LCI" (LCI).
- 2 Press the blinking SET key twice.**

The SET key will remain blinking and the "CF60" (CF60) and "LCI" (LCI) displays will light up.
The LAN interface settings are reset.
- 3 Press the CONFIG or LOCK key.**

If you press the CONFIG key, "CF70" (CF70) will be displayed.
If you press the LOCK key, the system will exit from the configuration settings and show the measured values.

CONFIG parameter details

This section explains the settings for each CONFIG parameter.

CF00 Reset the panel settings

Resets the panel settings. The following are reset. When the settings are reset, the settings take on the same values as they do when an *RST command is received. For details, see the communication interface manual.

- Output voltage
- Output current
- Overvoltage protection
- Overcurrent protection
- CC control using an external voltage or external resistance (CF04)
- CV control using an external voltage or external resistance (CF05)
- Set output-on/off control and function enhancements via external contacts (CF06)
- Soft start/stop time (CF14 to CF17)
- Output-on/off delay time (CF18, CF19)
- Set the output current limit (CF22)
- Set the output voltage limit (CF23)
- Set the output power limit (CF24)

Display	Description
ⓇⓈⓉ	RST Resets the panel settings

CF01 Set the output state when the POWER switch is turned on

Sets the output condition that the PMX-E series will be in when the power is turned on. When you are using an external contact to turn the output off, this parameter is invalid.

Options	Description
ⓈⓇⓕⓔ	SAFE The PMX-E series starts with the output turned off (factory default setting).
ⓇⓊⓉⓄ	AUTO The PMX-E series starts with the output set to the condition that was used immediately before the POWER switch was turned off.
ⓕⓄⓇ⓬	FORC The PMX-E series starts with the output turned on.

CF02 Set the memory content display

Selects whether to display the saved contents before recalling the preset memory ([p.53](#))

Options	Description
Ⓞⓕⓕ	OFF Recalls it without displaying the saved contents in the preset memory.
ⓄⓃ	ON Recalls it after displaying and previewing the saved contents in the preset memory (factory default setting).

CF03 Set the key lock

The key lock function locks the panel. Select from the following three values. (p.55)

Options	Description
LOC1	Only the OUTPUT key and recalling of settings using memory keys A, B, and C are allowed.
LOC2	Only the OUTPUT key can be used.
LOC3	All keys and rotary operations are disabled (factory default setting).

CF04 CC control using an external voltage or external resistance

Selects whether to control the output current by external voltage or external resistance (J1 connector) (p.79)(p.82) When you reset the panel settings (CF00), the display changes to “none”.

Options	Description
none	CC control is not performed (factory default setting).
VOLT	CC control using external voltage will be performed.
RES	CC control using external resistance will be performed.

CF05 CV control using an external voltage or external resistance

Selects whether to control the output voltage with an external voltage or external resistance (J1 connector) (p.79)(p.82) When you reset the panel settings (CF00), the display changes to “none”.

Options	Description
none	CV control is not performed (factory default setting).
VOLT	CV control using external voltage will be performed.
RES	CV control using external resistance will be performed.

CF06 Set output-on/off control and function enhancements via external contacts

Selects whether to control the output on/off by external contact, J1 connector, or whether to enable the output function (p.84). When you reset the panel settings (CF00), the display changes to “OFF”.

Options	Description
OFF	External control is not performed (factory default setting).
ON	External control is performed.
ENH	External control is performed, and the output on/off-delay function and soft start/stop function are enabled.

CF07 Set the logic for output-on/off control via external contacts

Sets the logic applied to control output on/off via the external contact, J1 connector (p.84).

Options	Description
LO	The output is turned on with a low signal (0 V to 0.5 V) or short circuit (factory default setting).
HI	The output is turned on with a high signal (4.5 V to 5 V) or open circuit.

CF08 Set the priority operation mode when the output is on

Sets the prioritized operation mode when the output is turned on.
It cannot be set during external control.

Options		Description
$\square \sqcup$	CV	CV (constant voltage) is prioritized (factory default setting).
$\square \sqsubset$	CC	CC (constant current) is prioritized.

CF09 Set the bleeder function

Sets the bleeder circuit ([p.62](#)). You can turn the bleeder circuit off when you do not want current to be sunk by the internal bleeder circuit, such as when you are charging a battery.
For parallel or series operation, use the same settings on all connected units.

Options		Description
$\square FF$	OFF	The bleeder circuit is turned off.
$\square n$	ON	The bleeder circuit is turned on (factory default setting).

CF10 Set the CC status signal polarity

Sets the polarity of the status signal for monitoring the constant-current mode ([p.86](#)).

Options		Description
$nE \sqcup$	NEG	Negative (factory default setting)
$P \square \sqcup$	POS	Positive

CF11 Set the CV status signal polarity

Sets the polarity of the status signal for monitoring the constant-voltage mode ([p.86](#)).

Options		Description
$nE \sqcup$	NEG	Negative (factory default setting)
$P \square \sqcup$	POS	Positive

CF12 Set the output status signal polarity

Sets the polarity of the status signal for monitoring the output on status ([p.86](#)).

Options		Description
$nE \sqcup$	NEG	Negative (factory default setting)
$P \square \sqcup$	POS	Positive

CF13 Set the protection function/alarm status signal polarity

Sets the polarity of the status signal for monitoring the protection function or alarm ([p.86](#)).

Options		Description
$nE \sqcup$	NEG	Negative (factory default setting)
$P \square \sqcup$	POS	Positive

CF14 Set the soft start time (CC mode)

Sets the rise time of the output current ([p.60](#)). You can set the output current to rise gradually. Set this to a non-0.0 value if you have enabled the memory sequence function (CF90: ON).

Options	Description
0.0	Disable soft start (factory default setting)
0.5 to 10.0	Soft start time, 0.5 to 10.0 seconds

CF15 Set the soft stop time (CCmode)

Sets the fall time of the output current ([p.60](#)). You can set the output current to fall gradually. Set this to a non-0.0 value if you have enabled the memory sequence function (CF90: ON).

Options	Description
0.0	Disable soft stop (factory default setting)
0.5 to 10.0	Soft stop time, 0.5 to 10.0 seconds

CF16 Set the soft start time (CV mode)

Sets the rise time of the output voltage ([p.60](#)). You can set the output voltage to rise gradually. Set this to a non-0.0 value if you have enabled the memory sequence function (CF90: ON).

Options	Description
0.0	Disable soft start (factory default setting)
0.5 to 10.0	Soft start time, 0.5 to 10.0 seconds

CF17 Set the soft stop time (CV mode)

Sets the fall time of the output voltage ([p.60](#)). You can set the output voltage to fall gradually. Set this to a non-0.0 value if you have enabled the memory sequence function (CF90: ON).

Options	Description
0.0	Disable soft stop (factory default setting)
0.5 to 10.0	Soft stop time, 0.5 to 10.0 seconds

CF18 Set the output-on delay time

Sets the delay time from pressing the OUTPUT key to when the output turns on ([p.59](#)). Set this to a non-0.0 value if you have enabled the memory sequence function (CF90: ON).

Options	Description
0.0	No delay (factory default setting)
0.5 to 99.9	Output-on delay time, 0.5 to 99.9 seconds

CF19 Set the output-off delay time

You can set the delay time from pressing the OUTPUT key to when the output turns off ([p.59](#)). Set this to a non-0.0 value if you have enabled the memory sequence function (CF90: ON).

Options	Description
0.0	No delay (factory default setting)
0.5 to 99.9	Output-off delay time, 0.5 to 99.9 seconds

CF20 Panel display brightness setting

Sets the panel display brightness. The larger the number, the brighter the display.

Even if you specify the same number, the brightness may be different between individual products. The brightness is not proportional to the setting.

Options	Description
1 to 6	Screen brightness adjustment (factory default setting: 6)

CF21 Set the communication monitoring (WATCHDOG) timer

Sets the interval for monitoring SCPI command communication ([p.32](#)).

The communication monitoring function operates regardless of whether the product is in remote or local (panel control) mode.

If you are not using remote control (commands), set this to "OFF".

Options	Description
OFF	Communication monitor timer is set to off (factory default setting).
1 to 3000	1, 3, 10, 30, 100, 300, 1000, or 3000 seconds

CF22 Set the output current limit

Sets whether to limit the output current setting at the OCP trip point (about 95 % of the OCP trip point) ([p.29](#)).

Options	Description
OFF	The setting is not limited.
ON	The setting is limited (factory default setting).

CF23 Set the output voltage limit

Sets whether to limit the output voltage setting at the OVP trip point (approximately 95 % of the OVP trip point) ([p.29](#)).

Options	Description
OFF	The setting is not limited.
ON	The setting is limited (factory default setting).

CF24 Set the output power limit

The output power can be limited to 1 W to 105 % of the rated output power.

When the load is in constant-current mode, output may be unstable while output power is limited.

Options		Description
☐ FF	OFF	Not limited (factory default setting).
☐ to Max	1 to Max	1 W to 105 % of rated output power

CF25 Set the time from overcurrent detection to OCP activation

Sets the time from when an overcurrent is detected to when the output is turned off in steps of 100 ms.

Options		Description
☐ 0	0.0	0.0 s (factory default setting)
☐ .1 to ☐ 2	0.1 to 2.0	0.1 to 2.0 seconds

CF40 LAN interface setting

Enables or disables the LAN interface.

By setting this parameter to “☐FF,” you can disable the LAN interface function even when a LAN cable is connected.

Options		Description
☐ FF	OFF	LAN disabled
☐ n	ON	LAN enabled (factory default setting).

CF41 USB interface settings

Enables or disables the USB interface.

By setting this parameter to “☐FF,” you can disable the USB interface function even when a USB cable is connected.

Options		Description
☐ FF	OFF	USB disabled
☐ n	ON	USB enabled (factory default setting).

CF42 Set the RS232C interface

Enables or disables the RS232C interface.

By setting this parameter to “☐FF,” you can disable the RS232C interface function even when a RS232C cable is connected.

Options		Description
☐ FF	OFF	RS232C disabled
☐ n	ON	RS232C enabled (factory default setting).

CF43 SCPI communication error display parameter

Sets whether to display communication errors.

Options	Description
OFF	SCPI communication errors are not displayed (factory default setting).
ON	SCPI communication errors are displayed.

CF50 to CF53 IP address display

These parameters display the set IP addresses. These parameters are only displayed when you are using the LAN interface.

To set a fixed IP address, set it from the panel (CF62 to CF65) or from the Web browser interface. When you access the PMX-E through a Web browser, do so under conditions in which a DHCP server or AUTO IP can be used.

For details on the Web interface, see the "Communication Interface Manual".

Parameter number	Display	Description
CF50	□ to 255	The first number of the IP address
CF51	□ to 255	The second number of the IP address
CF52	□ to 255	The third number of the IP address
CF53	□ to 255	The fourth number of the IP address

CF54 to CF56 MAC address display

These parameters display the set MAC addresses. They are only viewable but cannot be configured from the panel.

The MAC address is 00.0F.CE.xx.xx (x: 0 to F).

Parameter number	Display	Description
CF54	□□□□.	The first and second numbers of the MAC address
CF55	□□□□.	The third and fourth numbers of the MAC address
CF56	□□□□	The fifth and sixth numbers of the MAC address

■ Example of display

For MAC address "00.0F.CE.11.22.33"



CF54:00.0F.



CF55:CE.11.



CF56:22.33

Display	0	1	2	3	4	5
Hexadecimal	A	B	C	D	E	F

CF60 Reset the LAN interface setting reset (LCI)

Selects whether to reset or apply the LAN interface settings (p.38). Then, press the SET key twice to execute the reset or application.

If you select "Reset the LAN interface" (LCI, [LAN Configuration Initialize] / DEF [Default]), the security password will be cleared, resulting in a security-less state.

If the LAN LED turns red (p.12), set it again.

For the LAN interface detailed settings, refer to the "Communication Interface Manual".

Display	Description		
LCI	LCI	LAN Configuration Initialize	Resets the LAN interface settings.
DEF	DEF	Default	Resets the LAN interface settings to the factory default settings.
RPPL	APPL	Apply	The LAN interface is restarted, and the CONFIG settings are applied.

CF61 Set the IP address assignment

Sets the IP address assignment method.

Set whether to use (on: 1) or not use (off: 0) the following: DHCP server, AUTO IP function (automatic assignment), and MANUAL IP function (manual assignment).

If DHCP and AUTO IP are both set to on and an IP address is not assigned through a DHCP server, AUTO IP is used.

To use MANUAL IP, set DHCP and AUTO IP to off. The address that is assigned by the AUTO IP function is 169.254.x.x (where x is a number between 1 and 254).

If the DHCP server environment is unavailable or poor, it may take a long time to confirm the IP address.

Display	Description		
001	001	DHCP: off, AUTO IP: off, MANUAL IP: on	
010	010	DHCP: off, AUTO IP: on, MANUAL IP: off	
011	011	DHCP: off, AUTO IP: on, MANUAL IP: on	
100	100	DHCP: on, AUTO IP: off, MANUAL IP: off	
101	101	DHCP: on, AUTO IP: off, MANUAL IP: on	
110	110	DHCP: on, AUTO IP: on, MANUAL IP: off (factory default setting)	
111	111	DHCP: on, AUTO IP: on, MANUAL IP: on	

CF62 to CF65 Manually set the IP address (MANUAL IP)

If you are not using the DHCP server or the AUTO IP function, set the IP address manually. To do so, use CF61 to set MANUAL IP to on.

Parameter number	Display	Description	
CF62	0 to 255	0 to 255	The first number of the IP address
CF63	0 to 255	0 to 255	The second number of the IP address
CF64	0 to 255	0 to 255	The third number of the IP address
CF65	0 to 255	0 to 255	The fourth number of the IP address

CF66 Set the IP address subnet mask

If you want to set the IP address manually (MANUAL IP), set the subnet mask prefix. To do so, use CF61 to set MANUAL IP to on. If the MANUAL IP setting is off (010, 100, 110 (factory default)), 0000 is displayed and it cannot be set.

Display	Description
16 to 31	Sets the subnet mask prefix (the factory default setting is 24)

Example: Display example when “16” is selected 255.255.0.0
 Display example when “24” is selected 255.255.255.0
 Display example when “31” is selected 255.255.255.255

CF70 VID (vendor ID) display

Displays the USB vendor ID.

Display	Vendor ID
0B3E	0x0B3E

CF71 PID (product ID) display

Displays the USB product ID.

Display	Product ID
105E	0x105E

CF72 RS232C baud rate

Sets the baud rate of the RS232C interface.

Display	Baud rate
1.2	1200 bps
2.4	2400 bps
4.8	4800 bps
9.6	9600 bps
19.2	19200 bps (factory default setting)
38.4	38400 bps
57.6	57600 bps
115.2	115200 bps

CF80 Set the output-off timer function

Sets whether to enable the output-off timer function.

Even if you set "Enable the output-off timer function", the output-off timer cannot function with output-on disabled if the CONFIG settings CF81 to CF88 are set to nonE or 0.00 (p.68)

Options	Description
OFF	Disabling the output-off timer (factory default setting)
ON	Enabling the output-off timer

CF81 Set the duration from output on to off (h)

Set the duration in hours from when the output turns on until it automatically turns off.

Set this to nonE or a non-0.00 value if you have enabled the output-off timer (CF80: ON).

Options	Description
nonE	Not setting the duration in hours (factory default setting).
0 to 99 ¹	Set the duration in hours (0 to 99).

1. 1 to 99 hours if CF82 is set to "nonE (NONE)".

CF82 Set the duration from output on to off (m) (s)

Sets the duration from when the output turns on until it automatically turns off in minutes and seconds.

Set this to nonE or a non-0.00 value if you have enabled the output-off timer (CF80: ON).

Options	Description
nonE	Not setting the duration in minutes and seconds (factory default setting).
0 to 59 ¹	Setting the duration from 0 seconds to 59 minutes and 59 seconds.

1. When you have set CF81 to "nonE (NONE)", it ranges from 1 second to 59 minutes and 59 seconds.

CF83 Set the upper voltage limit at which the output turns off

Sets the upper limit voltage at which the output turns off.

Set this to nonE or a non-0.00 value if you have enabled the output-off timer (CF80: ON).

- PMX18-2E, PMX18-5E, PMX35-1E, PMX35-3E, PMX70-1E

Options	Description
nonE	The upper limit is not set (factory default setting).
0.01 to Max	Sets the upper limit value from 0.01 V to the maximum (rated voltage: ×112 %).

- PMX110-0.6E, PMX250-0.25E, PMX350-0.2E, PMX500-0.1E

Options	Description
nonE	The upper limit is not set (factory default setting).
0.1 to Max	Sets the upper limit value from 0.1 V to the maximum (rated voltage: ×112 %).

CF84 Set the lower voltage limit at which the output turns off

Sets the lower limit voltage at which the output turns off.

Set this to nonE or a non-0.00 value if you have enabled the output-off timer (CF80: ON).

- PMX18-2E, PMX18-5E, PMX35-1E, PMX35-3E, PMX70-1E

Options	Description
nonE	NONE The lower limit value is not set (factory default setting).
0.01 V to 112V	0.01 to Max Sets the lower limit value from 0.01 V to the maximum (rated voltage: ×112 %).

- PMX110-0.6E, PMX250-0.25E, PMX350-0.2E, PMX500-0.1E

Options	Description
nonE	NONE The lower limit value is not set (factory default setting).
0.1 V to 112V	0.1 to Max Sets the lower limit value from 0.1 V to the maximum (rated voltage: ×112 %).

CF85 Set the upper limit current at which the output turns off

Sets the current upper limit value at which the output turns off.

Set this to nonE or a non-0.00 value if you have enabled the output-off timer (CF80: ON).

Options	Description
nonE	NONE The upper limit is not set (factory default setting).
0.001 A to 112A	0.001 to Max Sets the upper limit value from 0.001 A to the maximum (rated current: ×112 %).

CF86 Set the lower limit current at which the output turns off

Sets the current upper limit value at which the output turns off.

Set this to nonE or a non-0.00 value if you have enabled the output-off timer (CF80: ON).

Options	Description
nonE	NONE The lower limit value is not set (factory default setting).
0.001 A to 112A	0.001 to Max Sets the lower limit from 0.001 A to the maximum (rated current: ×112 %).

CF87 Set the duration from the start of the specified operation mode to output off (h)

Sets the duration in hours from the start of the specified operation mode until the output automatically turns off.

Set this to nonE or a non-0.00 value if you have enabled the output-off timer (CF80: ON).

Options	Description
nonE	NONE The trigger operation mode is not set (factory default setting).
CV.00 to CV.99	CV.00 to CV.99 Defines the start of CV mode as the trigger and sets the duration in hours (0 to 99).
CC.00 to CC.99	CC.00 to CC.99 Defines the start of CC mode as the trigger and sets the duration in hours (0 to 99).

CF88 Set the duration from the start of the specified operation mode to output off (m) (s)

Sets the duration in minutes and seconds from the start of the specified operation mode until the output automatically turns off.

Set this to nonE or a non-0.00 value if you have enabled the output-off timer (CF80: ON).

Options	Description
nonE NONE	The trigger operation mode is not set (factory default setting).
0.00 to 59.59 0.00 to 59.59	These set the duration from 0 minutes to 59 minutes and 59 seconds.

CF89 Set the duration during which to exclude the output-off condition (s)

Sets the duration during which to exclude the output-off conditions set in CF83 to CF88.

Options	Description
1.0 1.0	1.0 s (factory default setting)
0.0 to 60.0 0.0 to 60.0	These set the duration (0.0 to 60.0 seconds) during which to exclude the output-off conditions.

CF90 Set the memory sequence function

Sets whether to use the memory sequence function.

If you set CONFIG settings CF91 to CF93 to nonE or 0.00, or CONFIG settings CF14 to CF19 to 0.0, output on will be disabled even if the memory sequence function is enabled; the memory sequence will not function ([p.70](#))

Options	Description
OFF OFF	Specifies disabling the memory sequence function (factory default setting).
ON ON	Enables the memory sequence function.

CF91 Set the output time of preset memory A (s)

Sets the output time of preset memory A when a memory sequence is executed.

Set this to nonE or a non-0.00 value if you have enabled the memory sequence function (CF90: ON).

Options	Description
nonE NONE	Preset memory A is not output.
0.00 to 99.99 0.00 to 99.99	0.00 to 99.99 s (factory default setting: 1.00 s)

CF92 Set the output time of preset memory B (s)

Sets the output time of preset memory B when the memory sequence is executed.

Set this to nonE or a non-0.00 value if you have enabled the memory sequence function (CF90: ON).

Options	Description
nonE NONE	Preset memory B is not output.
0.00 to 99.99 0.00 to 99.99	0.00 to 99.99 s (factory default setting: 1.00 s)

CF93 Set the output time of preset memory C (s)

Sets the output time of preset memory C when the memory sequence is executed.

Set this to nonE or a non-0.00 value if you have enabled the memory sequence function (CF90: ON).

Options		Description
nonE	NONE	Preset memory C is not output.
0.00 to 9999	0.00 to 9999	0.00 to 9999 s (factory default setting: 1.00 s)

CF94 Set the repetition count of the memory sequence

Sets the repetition count for the memory sequence operation.

Options		Description
INF	INF	INF (infinite loop)
1 to 9999	1 to 9999	1 to 9999 times (factory default setting: 1)

Preset Memory Function

For preset memories, three combinations of setting values (A, B and C) can be saved. Saved settings can be recalled from the preset memory when needed.

The following 10 parameters can be saved.

- Output voltage setting
- Output current setting
- OVP trip point
- OCP trip point
- Soft start time in CCmode (CF14)
- Soft stop time in CCmode (CF15)
- Soft start time in CVmode (CF16)
- Soft stop time in CVmode (CF17)
- Output-on delay time (CF18)
- Output-off delay time (CF19)

NOTE

Of the 10 saved items, you can preview the setting values only for the output voltage and current when recalling the preset memory. You can preview the setting values of all parameters by accessing the Web browser interface. For details on the Web interface, see the Communication Interface Manual.

Saving settings to preset memory

We recommend that you operate the unit while displaying the current settings, although you can save settings to the preset memory even when the output is on (SET key off).

- 1 Press the SET key.**
- 2 Set the parameters to be saved.**
 - If you are not using the soft start/stop function (CF14 to CF17), set each set value to disabled (0.0 s).
 - If you are not using the output-on/off delay function (CF18 and CF19), set each set value to disabled (0.0 s).
- 3 While holding down the SHIFT key, press and hold the destination memory key (A, B, or C) until the corresponding PRESET LED lights up.**

The selected one of PRESET A, B, and C LEDs on the display area lights up and the set value is saved.

Recall settings from preset memory

You can recall preset memory entries from the measured value display (when the SET key is off) and from the setting display (when the SET key is lit).

You can recall preset memories whether the output is on (the SET key off) or off. If the output is on (SET key off), the value is applied to the output when the recall is completed.

The soft start and stop times (CF14, CF15, CF16, CF17) and output on/off delay times (CF18/CF19) will be applied the next time the output turns on.

NOTE

When recalling a preset memory, do not press and hold down the destination memory key (A, B, or C). Holding it down saves the current settings to the memory.

For CONFIG settings, there are two ways to recall saved settings: displaying and previewing them (CF02: on) before recalling and recalling them immediately without displaying (CF02: off) ([p.34](#))

Displaying and previewing the saved settings before recalling (CF02:ON)

You can only preview the output voltage and current values when recalling a preset memory. You can preview the setting values of all parameters by accessing the Web browser interface. For details on the Web interface, see the Communication Interface Manual.

- 1 While holding down SHIFT key, press the appropriate memory key (A, B, or C).**

This displays the SET key, the PRESET LED for the recall destination, and the saved output voltage/output current settings all of which are blinking. If you press another memory key while holding down SHIFT key, the contents of the corresponding memory appear blinking.

Press LOCAL to cancel recalling.
- 2 Preview the settings and press the SET key.**

The voltage and current displays change from blinking to lit. The PRESET LED for the recalled memory lights up.

This completes recalling.

Recalling the saved contents without previewing (CF02:OFF)

- 1 While holding down SHIFT key, press the appropriate memory key (A, B, or C).**

The PRESET LED for the recalled memory lights up and the settings will be recalled.

If the SET key is lit, the output voltage/current settings are displayed.

This completes recalling.

Locking the Panel Controls (Key Lock)

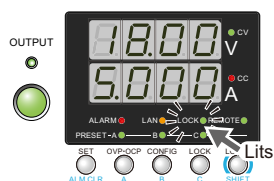
This function prevents the panel settings from accidental changes. You can select one of the following three lock states.

Use CONFIG parameter CF03 to set the mode. [\(p.40\)](#)

- Loc1: Only the OUTPUT key and recalling of settings using memory keys A, B, and C are allowed.
- Loc2: Only the OUTPUT key is operable.
- Loc3: All keys and rotary knob operations are disabled.

1 Hold down LOCK until the LOCK LED in the display area lights.

When the LOCK LED lights, the keys are locked.



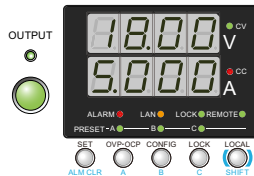
To unlock the LOCK key, press and hold it down until the LOCK LED turns off.

Switching from Remote Mode to Local Mode

When the PMX-E series is being controlled remotely, the REMOTE LED in the display area lights.

You can switch the state from remote to local via the panel (panel operation).

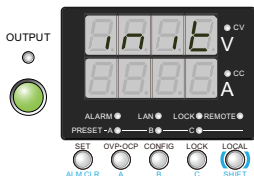
To switch to the local state, press the LOCAL key while the REMOTE LED is on, except when accessing the Web browser interface (refer to the Communication Interface Manual).



Factory Default Settings (Initialization)

There are two ways to reset the PMX-E series settings to their default values.

- Resetting the panel settings, i.e., executing CF00 (equivalent to *RST) ([p.37](#))
- Turning on the POWER switch (on the display) while holding down both the SHIFT and LOCK keys



Basic settings

Basic item	Description	a	b
Output voltage	0 V	☐	☐
Output current	Maximum settable current	☐	☐
OVP (overvoltage protection)	112 % of the rated output voltage	☐	☐
OCP (overcurrent protection)	112 % of the rated output current	☐	☐
Preset memory value A/B/C	Voltage: 0 V; Current: Maximum settable current value OVP: 112 % of rated output voltage; OCP: 112 % of rated output current Soft start CV: 0.0 s; Soft stop CV: 0.0 s Soft start CC: 0.0 s; Soft stop CC: 0.0 s Output-on delay: 0.0 s; Output off delay: 0.0 s	—	☐

CONFIG settings

Parameter number	Setting/display description or CONFIG parameter	Description	a	b
CF01	Set the output state when the POWER switch is turned on	SAFE (output off)	—	☐
CF02	Set the memory content display	ON (displayed)	—	☐
CF03	Set the key lock	LOC3 (disable operations of all keys and the rotary knob)	—	☐
CF04	CC control using an external voltage or external resistance	NONE (disabled)	☐	☐
CF05	CV control using an external voltage or external resistance	NONE (disabled)	☐	☐
CF06	Set output-on/off control and function enhancements via external contacts	OFF (disabled)	☐	☐
CF07	Set the logic for output-on/off control via external contacts	LOW (0 to 0.5 V; or turned on for shorting)	—	☐
CF08	Set the priority operation mode when the output is on	CV (CV prioritized)	—	☐
CF09	Set the bleeder function	ON (use)	—	☐
CF10	Set the CC status signal polarity	NEG (negative polarity)	—	☐
CF11	Set the CV status signal polarity	NEG (negative polarity)	—	☐
CF12	Set the output status signal polarity	NEG (negative polarity)	—	☐
CF13	Set the protection function/alarm status signal polarity	NEG (negative polarity)	—	☐
CF14	Set the soft start time (CC mode)	0.0 (Not use)	☐	☐
CF15	Set the soft stop time (CC mode)	0.0 (Not use)	☐	☐
CF16	Set the soft start time (CV mode)	0.0 (Not use)	☐	☐
CF17	Set the soft stop time (CV mode)	0.0 (Not use)	☐	☐
CF18	Set the output-on delay time	0.0 (no delay)	☐	☐
CF19	Set the output-off delay time	0.0 (no delay)	☐	☐
CF20	Panel display brightness setting	6 (MAX)	—	☐

Parameter number	Setting/display description or CONFIG parameter	Description	a	b
CF21	Set the communication monitoring (WATCHDOG) timer	OFF (turn off the timer function)	—	○
CF22	Set the output current limit	ON (the setting is limited)	○	○
CF23	Set the output voltage limit	ON (the setting is limited)	○	○
CF24	Set the output power limit	OFF (not limited)	○	○
CF25	Set the time from overcurrent detection to OCP activation	0.0 (set to 0.0 s)	—	○
CF40	LAN interface setting	ON (used)	—	○
CF41	USB interface settings	ON (used)	—	○
CF42	Set the RS232C interface	ON (used)	—	○
CF43	SCPI communication error display parameter	OFF (not used)	—	○
CF60	LAN interface setting reset (LCI)	LCI (reset)	—	○
CF61	Set the IP address assignment	110 (DHCP: On, AUTO IP: On, MANUAL IP: Off)	—	○
CF66	IP address setting method	24 (255.255.255.0)	—	○
CF72	RS232C baud rate	19.2 (19200 bps)	—	○
CF80	Set the output-off timer function	OFF (not used)	—	○
CF81	Set the duration from output on to off (h)	NONE (not set)	—	○
CF82	Set the duration from output on to off (m) (s)	NONE (not set)	—	○
CF83	Set the upper voltage limit at which the output turns off	NONE (not set)	—	○
CF84	Set the lower voltage limit at which the output turns off	NONE (not set)	—	○
CF85	Set the upper limit current at which the output turns off	NONE (not set)	—	○
CF86	Set the lower limit current at which the output turns off	NONE (not set)	—	○
CF87	Set the duration from the start of the specified operation mode to output off (h)	NONE (not set)	—	○
CF88	Set the duration from the start of the specified operation mode to output off (m) (s)	NONE (not set)	—	○
CF89	Set the duration during which to exclude the output-off condition (s)	1.0 (1.0 s)	—	○
CF90	Set the memory sequence function	OFF (not used)	—	○
CF91	Set the output time of preset memory A (s)	1 (1 s)	—	○
CF92	Set the output time of preset memory B (s)	1 (1 s)	—	○
CF93	Set the output time of preset memory C (s)	1 (1 s)	—	○
CF94	Set the repetition count of the memory sequence	1 (1 time)	—	○

Advanced Functions

This chapter describes the following functions, which are useful in combination with the basic functions.

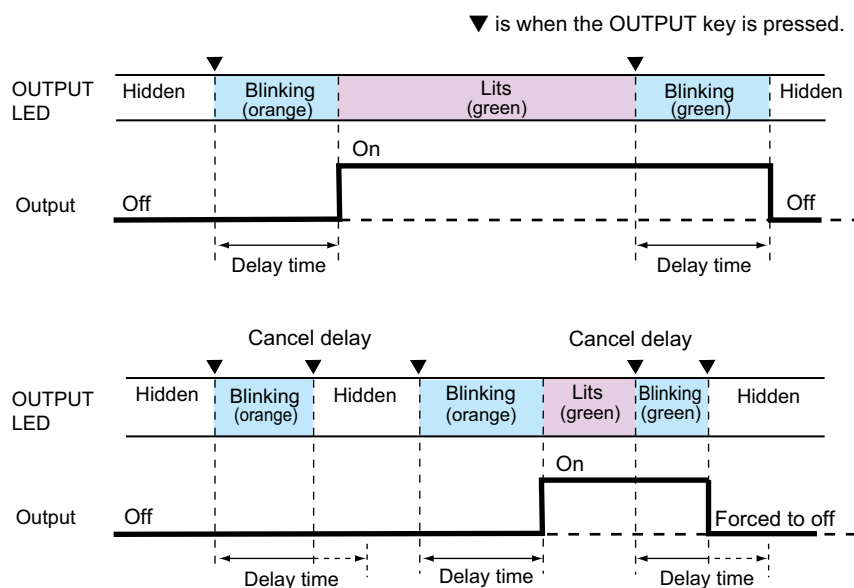
- Output-on/off delay function ([p.59](#))
- Soft start/stop function ([p.60](#))
- Bleeder circuit function ([p.62](#))
- Output-off timer function ([p.65](#))
- Memory sequence function ([p.70](#))

Output-on/off delay function

You can set the delay from when the OUTPUT key is pressed to when the output actually turns on or off. This is a useful function when you want to turn the output on or off by setting a delay according to the load characteristics.

Set the delay time in CONFIG parameters CF18 and CF19.

- While the output-on delay is in operation, the OUTPUT LED blinks orange.
- While the output-off delay is in operation, the OUTPUT LED blinks green.
- If you press OUTPUT key when the output-on delay is in effect, the process is canceled, and the output is turned off. If you press OUTPUT key again, the output-on delay resumes.

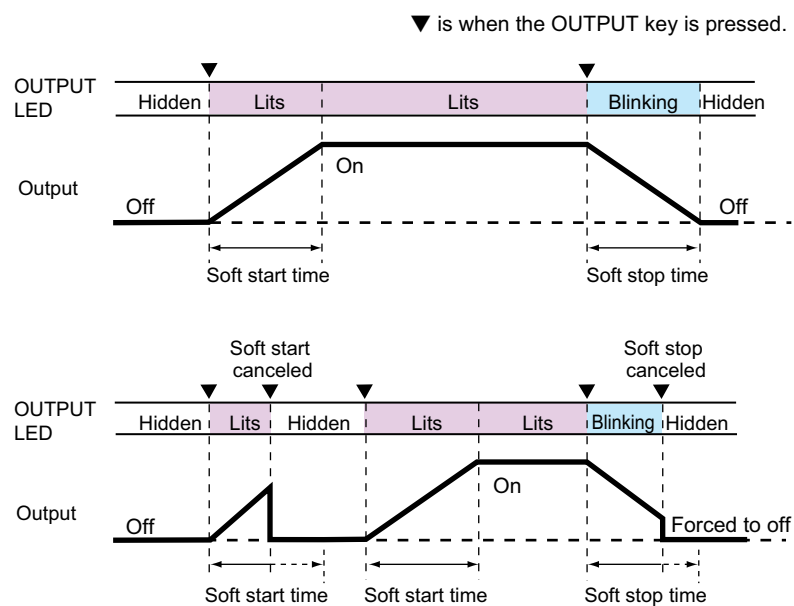


Soft start/stop function

You can set the rise and fall times of the output voltage/current. This is useful when the load cannot keep up with a sudden rising or falling, or when the OVP/OCP activates unintentionally.

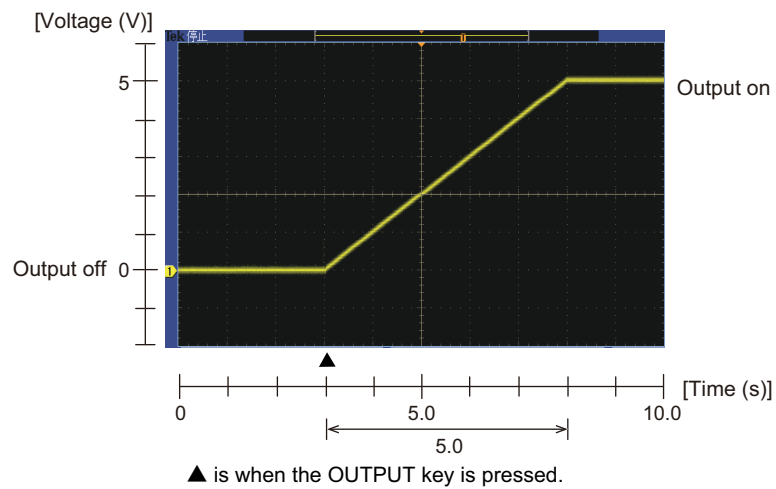
Set the soft start and stop times in the configuration parameters CF14 to CF17.

- The soft start/stop function is enabled for the operation mode set by CONFIG parameter (CF08: [\(p.41\)](#): □□/□□).
- While the soft start is in operation, the OUTPUT LED lights up green.
- While the soft stop is in operation, the OUTPUT LED blinks green.
- If you press the OUTPUT key during soft start operation, the operation stops, turning off the output. If you press OUTPUT key again, soft start resumes.
- If the bleeder circuit is set to off (CF09: □FF), the output current may not fall gradually even if soft stop is used.

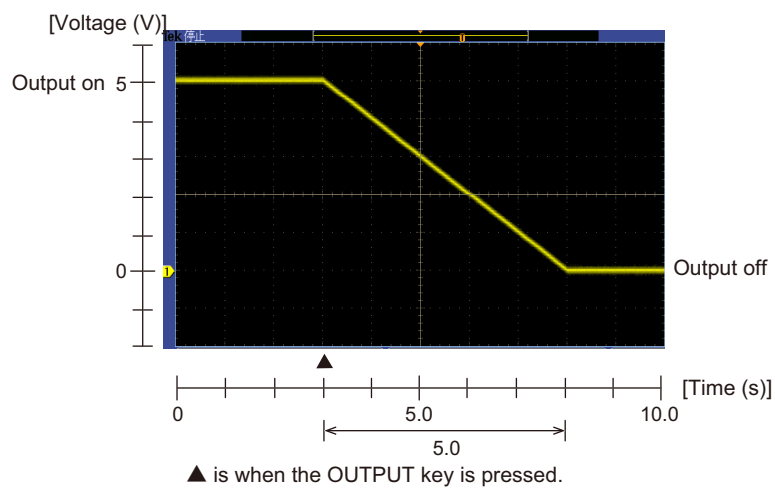


Soft start/stop operation waveforms

■ During soft start operation



■ During soft stop operation



Bleeder circuit function

WARNING

Risk of electric shock.

- **Set the bleeder circuit to on (CF09: ON) before you touch the DC OUTPUT terminals.**
If you set it to off (CF09: OFF), the voltage present when the output is on may remain at the DC OUTPUT terminal even if you turn off the output or the POWER switch.

Sink current from external voltage source by bleeder circuit

The factory default setting is ON for the bleeder circuit. If an external voltage source is connected to the DC OUTPUT terminal as a load, a sink current will flow through the internal bleeder circuit, which may damage the PMX-E series or shorten the life of the load.

Turn the bleeder circuit off when you do not want the internal bleeder circuit to sink output current. When you connect a battery or other load, you can prevent excessive electrical discharges by turning off the bleeder circuit.

When you turn the POWER switch from ON to OFF, bleeder current flows for a few seconds.

You can use CONFIG parameter CF09 to set the bleeder circuit to on/off.

■ Sink current (reference value) from an external voltage source according to the bleeder circuit setting

- PMX18-2E, PMX18-5E

Vout: DC OUTPUT terminal voltage.

State	Sink current ¹ (mA)					
	1 Vout	2 Vout	5 Vout	10 Vout	15 Vout	18 Vout
The bleeder circuit is turned off.	2 (1)	2 (1)	3 (2)	4 (3)	4 (3)	5 (4)
The bleeder is on. ²	84 (495)	86 (496)	87 (496)	87 (497)	88 (338)	89 (282)
POWER off	0 (0)	0 (0)	1 (1)	2 (2)	7 (7)	8 (8)

1. The values in parentheses apply to models equipped with the high-speed rising/falling function (factory option).
2. The sink current is reduced when the power consumption of the bleeder circuit reaches approximately 5 W or more.

- PMX35-1E, PMX35-3E

Vout: DC OUTPUT terminal voltage.

State	Sink current ¹ (mA)							
	2 Vout	5 Vout	10 Vout	15 Vout	20 Vout	25 Vout	30 Vout	35 Vout
The bleeder circuit is turned off.	2 (5)	2 (5)	3 (6)	3 (7)	4 (7)	5 (8)	6 (9)	8 (10)
The bleeder is on. ²	103 (534)	103 (535)	104 (536)	104 (354)	105 (266)	106 (214)	107 (180)	109 (156)
POWER off	0 (0)	1 (2)	4 (4)	7 (7)	9 (9)	11 (11)	14 (14)	17 (17)

1. The values in parentheses apply to models equipped with the high-speed rising/falling function (factory option).
2. The sink current is reduced when the power consumption of the bleeder circuit reaches approximately 5 W or more.

- PMX70-1E

Vout: DC OUTPUT terminal voltage.

State	Sink current (mA)							
	5 Vout	10 Vout	20 Vout	30 Vout	40 Vout	50 Vout	60 Vout	70 Vout
The bleeder circuit is turned off.	2	3	5	7	9	11	13	15
The bleeder is on.	58	59	62	64	66	68	70	72
POWER off	1	2	4	6	8	10	12	14

- PMX110-0.6E

Vout: DC OUTPUT terminal voltage.

State	Sink current (mA)							
	5 Vout	10 Vout	20 Vout	30 Vout	40 Vout	50 Vout	100 Vout	110 Vout
The bleeder circuit is turned off.	3	4	6	8	10	12	23	25
The bleeder is on. ¹	96	97	99	102	104	106	68	66
POWER off	1	2	4	6	8	10	20	22

1. The sink current is reduced when the power consumption of the bleeder circuit reaches approximately 5 W or more.

- PMX250-0.25E

Vout: DC OUTPUT terminal voltage.

State	Sink current (mA)							
	10 Vout	20 Vout	30 Vout	50 Vout	100 Vout	150 Vout	200 Vout	250 Vout
The bleeder circuit is turned off.	4	5	5	6	9	12	15	17
The bleeder is on. ¹	75	75	76	76	61	45	39	36
POWER off	0	1	1	2	5	7	9	12

1. The sink current is reduced when the power consumption of the bleeder circuit reaches approximately 5 W or more.

- PMX350-0.2E

Vout: DC OUTPUT terminal voltage.

State	Sink current (mA)							
	10 Vout	20 Vout	50 Vout	100 Vout	200 Vout	250 Vout	300 Vout	350 Vout
The bleeder circuit is turned off.	3	3	3	4	5	7	9	10
The bleeder is on. ¹	68	68	68	69	51	29	22	21
POWER off	0	0	0	1	2	3	5	6

1. The sink current is reduced when the power consumption of the bleeder circuit reaches approximately 5 W or more.

- PMX500-0.1E

Vout: DC OUTPUT terminal voltage.

State	Sink current (mA)						
	10 Vout	20 Vout	50 Vout	100 Vout	200 Vout	250 Vout	300 Vout
The bleeder circuit is turned off.	1	1	2	3	4	5	7
The bleeder is on. ¹	8	8	9	10	11	12	13
POWER off	0	1	1	2	4	5	6

1. The sink current is reduced when the power consumption of the bleeder circuit reaches approximately 5 W or more.

Output-off timer function

This function automatically turns off the output when all set conditions are met. This function delays the activation by approximately 0.2 seconds. It cannot handle transient operation (variation).

You can set any of the following parameters as the activation condition.

Item		Activation condition
• Output on to off (hours)	CF81	The specified time elapsed since the output was turned on.
• Output on to off (minutes, seconds)	CF82	The specified time elapsed since the output was turned on.
• Upper/lower voltage limits for output off	CF83/ CF84	The output voltage exceeded or fell below the specified voltage value.
• Upper/lower current limits for output off	CF85/ CF86	The output current exceeded or fell below the specified current value.
• Output-on time after the start of the specified operation mode	CF87	The trigger operation mode started and the specified time elapsed.

In addition, you can set an activation condition exclusion duration that prevents the output-off timer function from operating until the specified time has passed since the output was turned on. This helps prevent unintended activation due to inrush current. See the graphs in “Application behavior” (p.69).

Setup

The activation condition is applied immediately after being set.

Item	Configuration Item	Setup	Default settings ¹
Output-off timer function	CF80	 (ON)	Output-off timer function enabled OFF
Output-on time (Duration from output on to off)			
Set the duration in hours	CF81	 to 	0 hour to 99 hours 1 to 99 hours if the CF82 setting is NONE
Set the duration in minutes and seconds	CF82	 to  .	1 minute and 00 seconds to 59 minutes and 59 seconds +LOCAL key is for setting in seconds.
Voltage upper/lower limits (Voltage value at which output turns off)			
Set the upper limit value	CF83	 to MaxV	0.01 V to MaxV
Set the lower limit value	CF84		MaxV = rated voltage × 112 %
Current upper/lower limits (Current value at which output turns off)			
Set the upper limit value	CF85	 to MaxC	0.01 A to MaxC
Set the lower limit value	CF86		MaxC = Rated current × 112 %

Item	Configuration Item	Setup		Default settings ¹
Output-on time after the start of the specified operation mode (Duration from the start of the trigger operation mode to output off)				
Select the trigger operation mode and set the duration in hours	CF87	0000 to 0999 0000 to 0999	CV.00 to CV.99 hours The start of CV mode is the trigger. CC.00 to CC.99 hours The start of CC mode is the trigger.	NONE
Select the trigger operation mode and set the duration in minutes and seconds.	CF88	000 to 5959	CV.0 minutes and 00 seconds to 59 minutes and 59 seconds The start of CV mode is the trigger. CC.0 minutes and 00 seconds to 59 minutes and 59 seconds The start of CC mode is the trigger. The +LOCAL key is for setting in seconds. Not displayed when the CF87 setting is NONE.	0.00
Activation condition prohibition duration (duration that prohibits the condition for turning off the output, specified by CF83 to CF88, from the time the output is turned on)	CF89	00 to 600	0.0 to 60.0 seconds	1.0

1. After resetting (p.37), only CF80 is displayed and the output-off timer function is disabled. The CF81 to CF89 initial settings are those when the output-off timer function is enabled.
2. If the CF81 setting is 1 or more, it will be changed to 0.00.

■ Set the time from output on to off (CF81 and CF82)

To set the duration from output on to off in minutes and seconds, select CF82 using the VOLTAGE knob. You can turn the CURRENT knob to set the duration in minutes. You can set the duration in seconds by turning the CURRENT knob while holding down the LOCAL key.

NOTE

- If the CF82 setting is NONE, the minimum value for CF81 will be 1.
- If you set a value in CF82 when both the CF81 and CF82 settings are NONE, the value in CF81 will change to 0.

■ Set the output-on time after the specified operation mode starts (CF87 and CF88).

Select CF87 with the VOLTAGE knob. You can turn the CURRENT knob to set the trigger operation mode (CC.xx or CV.xx). You can set the time in seconds by turning the CURRENT knob while holding down the LOCAL key.

To set the duration from the start of the trigger operation mode to turning off the output in minutes and seconds, select CF88 with the VOLTAGE knob. You can turn the CURRENT knob to set the duration in minutes. You can set the duration in seconds by holding down the LOCAL key and turning the CURRENT knob.

Example: With CF87 set to CC.01 and CF88 set to 20.30, turning on the output in CV mode

The output turns off 1 hour, 20 minutes, and 30 seconds after transition to the CC mode. The specified output-on time is counted from the first transition of the operation mode after the output turns on.

NOTE

If the output turns on in the trigger operation mode, the output-on time is counted from that point.

■ Set the activation condition prohibition duration (CF89)

If you set both the output-on time (CF81/CF82) and the activation condition exclusion duration (CF89), both are counted from the time the output is turned on.

See the graphs in “Application behavior” (p.69).

■ Priority setting conditions

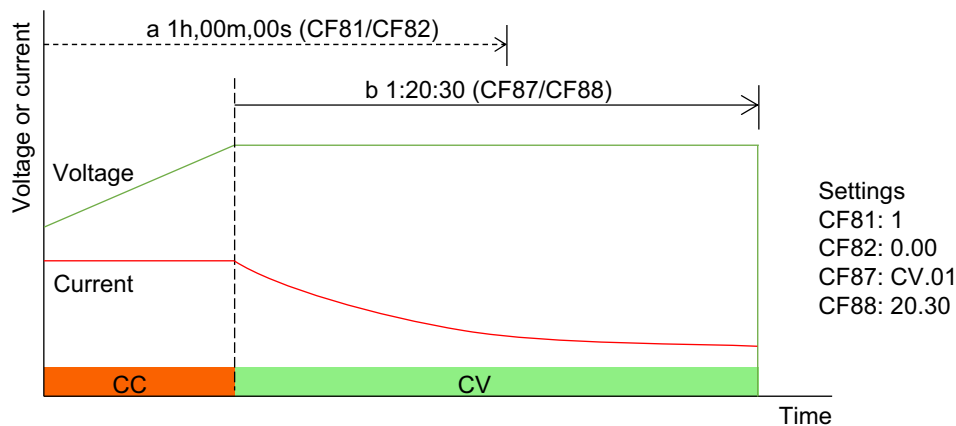
If the following two conditions are set to turn the output off, item b takes priority.

- a. Output-on time (CF81/CF82)
- b. Set the output-on time after the specified operation mode starts (CF87/CF88)

Example: a. Output-on time < b. Output-on time after the specified operation mode starts

If you transition to the CV mode within the time specified by item a (CF81/CF82), the settings of item b (CF87/CF88) will take priority from that point on.

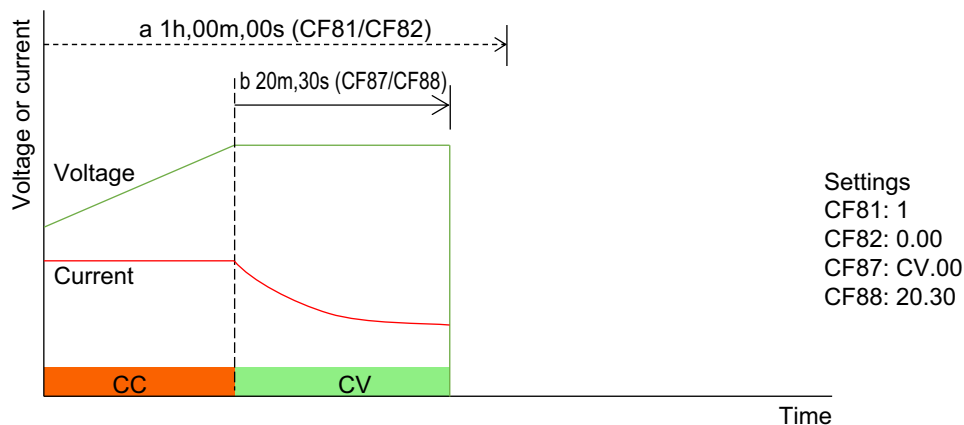
Therefore, even if the time specified by item a has elapsed, the output will not turn off until the time specified by item b has elapsed.



Example: a. Output-on time > b. Output-on time after the specified operation mode starts

If you transition to the CV mode within the time specified by item a (CF81/CF82), the settings of item b (CF87/CF88) will take priority from that point on.

Therefore, even if the time specified by item a has not elapsed, the output will turn off until the time specified by item b has elapsed.

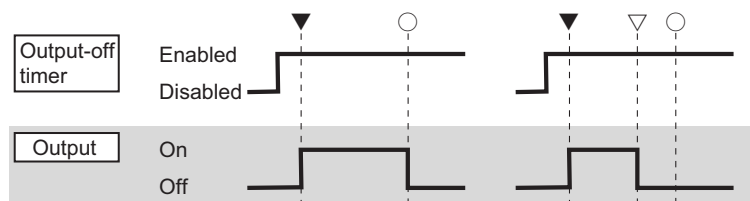


Output-on behavior and operations

This section describes the behavior and operations when the output-off timer function is enabled and the output is on.

■ Output-off operations

When the set condition is met, the output turns off. When you turn off the output before the set condition is met, the output turns off.



▼: Turn on the output*

▽: Turn off the output*

○: The setting condition for the output-off timer function is met.

* Pressing the OUTPUT key, inputting an external control signal, or sending an OUTP command

■ OUTPUT LED

Blinks alternately green and orange to indicate that the output is on.

■ Set the output-off timer function that allows setting change

Allows you to change the following settings while the output is on.

- Voltage upper/lower limits (CF83/CF84)
- Current upper/lower limits (CF85/CF86)

■ Displaying the remaining output-on time

If one of the following settings is enabled, pressing the LOCAL key while the output is on will display the remaining output-on time. The voltmeter displays $\bar{E}$ xx hours and the ammeter xx minutes. xx seconds.

Pressing the LOCAL key again turns off the remaining on-time display.

- Output on-time (CF81/CF82)
- Output-on time after the specified operation mode starts (CF87/CF88)

NOTE

- If you have enabled only the output-on time (CF87/CF88) after the specified operation mode starts, the time remaining until the trigger operation mode starts is displayed as the set time.
- If the memory sequence function (CF90) is also being executed, pressing the LOCAL key while the output is on will display the sequence execution count.

■ Output-on disabled display

If the CF81 to CF88 settings are nonE or 0.00, the output-off timer cannot function. If you turn on the output with this setting, the following will appear.

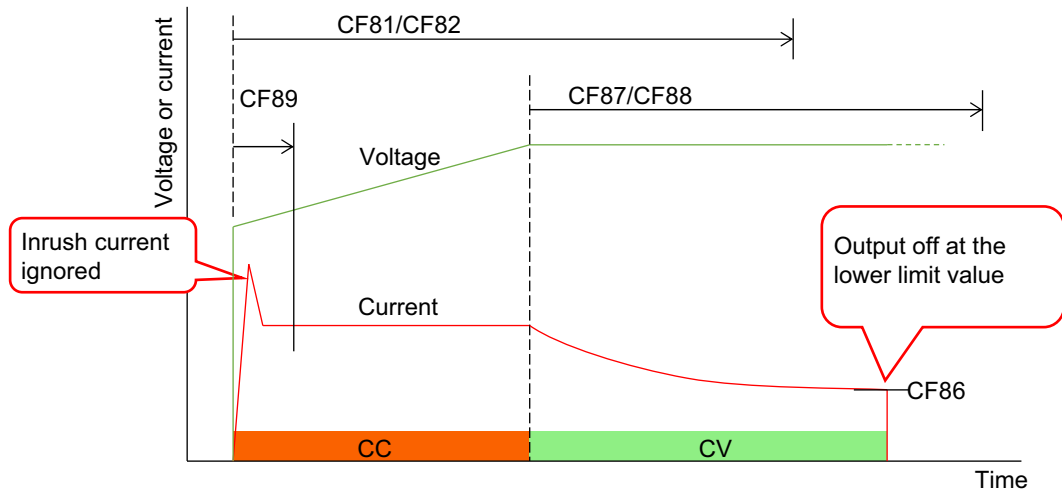


Application behavior

Charging the Battery

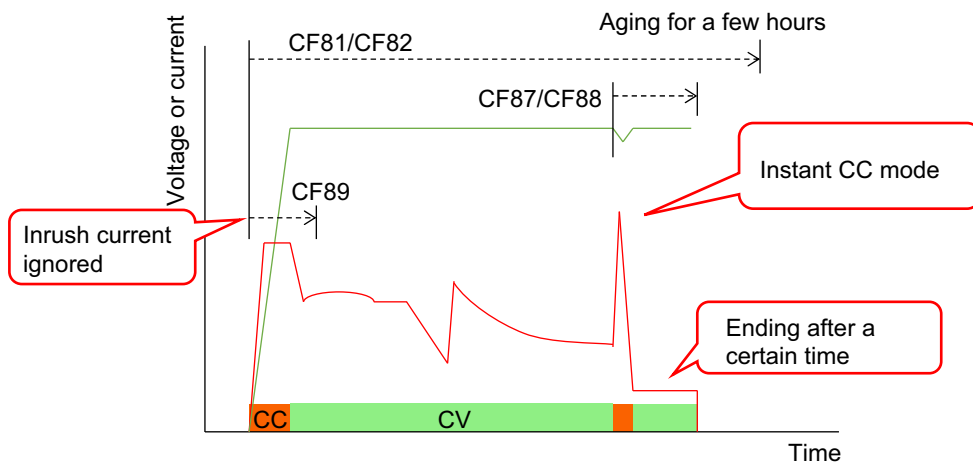
The battery is charged with constant current (CC) and when it reaches the maximum battery voltage, the operation mode transitions to constant voltage (CV). If you have set the lower current limit (CF86), you can stop charging when the charging current decreases.

You can additionally set the output-on time (CF81/CF82) and the output-on time after the specified operation mode starts (CF87/CF88), which allows the charging to stop even if the battery does not switch to CV mode due to deterioration, or if it switches to CV mode but the current continues to flow.



Long-term aging

If an abnormality occurs in the DUT during long-term aging and the operation mode shifts to constant current (CC) even for a moment, setting the output-on time after the specified operation mode starts (CF87/CF88) allows the aging process to stop after a certain time.



Memory sequence function

You can consecutively recall and output preset memories A, B, and C in order. With the recalling of three preset memories defined as one sequence, you can set the output time for each preset memory and the sequence repetition count. You can obtain various waveforms by setting the item, output time, and repetition count to be saved in each preset memory.

For the preset memory saving items, see "Preset Memory Function" (p.52). For the setting parameters for the memory sequence function, see CF90 to CF94 (p.50).

During operation with the memory sequence function, one of the PRESET A/B/C LEDs corresponding to the recalled preset memory will light up on the display area.

NOTE

- The order of recalling preset memories cannot be changed.
- Set the output time to NONE for any preset memories that are not recalled.
- During the soft start duration, the output varies from the starting output value to the ending output value over the soft start time.
- During the soft stop period, the output varies from the starting output value to 0 V after the soft stop time has elapsed.
- You can set the preset memory output time from 0.01 seconds (CF91 to CF93), but the actual output time will be affected by the rise and fall times.

■ Displaying the number of times the memory sequence has been executed

If the memory sequence function (CF90) is enabled, pressing the LOCAL key during output on displays the execution count. The voltmeter displays 5xx and the ammeter xxxx seconds.

If the execution count is 10,000 times or more, the voltmeter displays the digits of 10,000 times or more, while the ammeter the digits under 10,000 times.

The following figure shows an example displaying the execution count, 10,000 times.



If the execution count is 999,999 or more, the count display stops at 999,999.

Pressing the LOCAL key again turns off the execution count display.

■ Output-on disabled display

If the CF91 to CF93 settings are set to nonE, the memory sequence cannot function. If you turn on the output with this setting, the following will appear.



Example

The setting values and waveform images are shown for the following five examples.

- Pulse sequence 1
- Pulse sequence 2
- Ramp sequence 1
- Ramp sequence 2
- Pulse&ramp sequence

In the following table, assume that the OVP and OCP settings are set appropriately although not shown as the setting parameters.

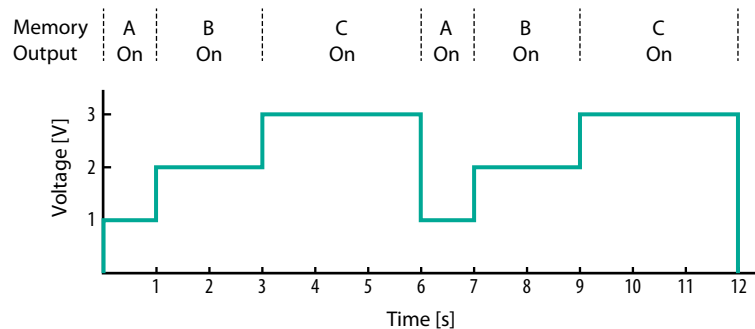
■ Pulse sequence 1

Sets the voltage and current values and the output time for each preset memory.

Setting parameter		Preset Memory		
		A	B	C
Voltage setting [V]		1	2	3
Current setting [A]		Arbitrary		
CF14	Soft start time (CC mode) [s]	0	0	0
CF15	Soft stop time (CC mode) [s]	0	0	0
CF16	Soft start time (CV mode) [s]	0	0	0
CF17	Soft stop time (CV mode) [s]	0	0	0
CF18	Output-on delay time [s]	0	0	0
CF19	Output-off delay time [s]	0	0	0

Setting parameter		Value
CF91	Memory A output time [s]	1
CF92	Memory B output time [s]	2
CF93	Memory C output time [s]	3
CF94	Repetition count	2

Pulse sequence1voltage waveform



■ Pulse sequence 2

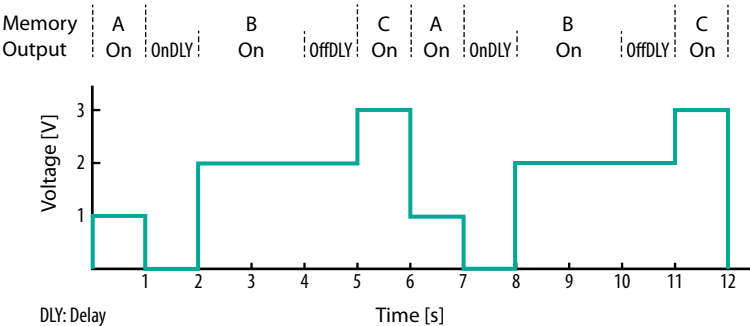
The following is an example of setting the output-on/off delay in preset memory B.

With the output-on delay, the output will be 0 V before the memory B output turns on. In addition, the output-off delay keeps the output on even after the memory B output time has elapsed. The result will be the same even if you assign the output off delay time to the output time.

Setting parameter		Preset Memory		
		A	B	C
Voltage setting [V]		1	2	3
Current setting [A]		Arbitrary		
CF14	Soft start time (CC mode) [s]	0	0	0
CF15	Soft stop time (CC mode) [s]	0	0	0
CF16	Soft start time (CV mode) [s]	0	0	0
CF17	Soft stop time (CV mode) [s]	0	0	0
CF18	Output-on delay time [s]	0	1	0
CF19	Output-off delay time [s]	0	1	0

Setting parameter		Value
CF91	Memory A output time [s]	1
CF92	Memory B output time [s]	2
CF93	Memory C output time [s]	1
CF94	Repetition count	2

Pulse sequence 2 voltage waveform



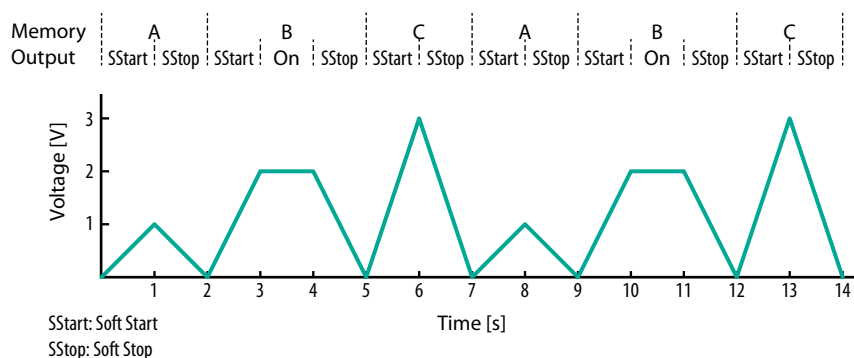
■ Ramp sequence 1

A ramp waveform can be obtained by setting the soft start and stop times. Setting the output time to 0 seconds generates a triangle wave.

Setting parameter		Preset Memory		
		A	B	C
	Voltage setting [V]	1	2	3
	Current setting [A]	Arbitrary		
CF14	Soft start time (CC mode) [s]	0	0	0
CF15	Soft stop time (CC mode) [s]	0	0	0
CF16	Soft start time (CV mode) [s]	1	1	1
CF17	Soft stop time (CV mode) [s]	1	1	1
CF18	Output-on delay time [s]	0	0	0
CF19	Output-off delay time [s]	0	0	0

Setting parameter		Value
CF91	Memory A output time [s]	0
CF92	Memory B output time [s]	1
CF93	Memory C output time [s]	0
CF94	Repetition count	2

Voltage waveform of lower ramp sequence1



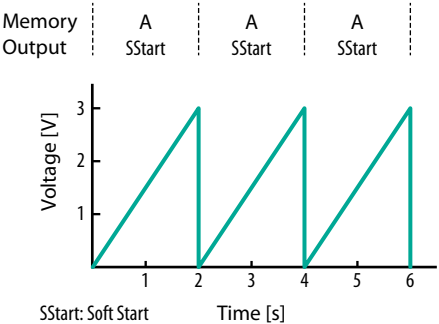
■ Ramp sequence 2

Obtains a sawtooth wave by setting only the soft start time in preset memory A.
Preset memory C is not recalled because the output time is set to NONE. Preset memory B is not recalled because CF14 to CF19 and the output time are set to 0.

Setting parameter		Preset Memory		
		A	B	C
Voltage setting [V]		3	1	—
Current setting [A]		Arbitrary		
CF14	Soft start time (CC mode) [s]	0	0	—
CF15	Soft stop time (CC mode) [s]	0	0	—
CF16	Soft start time (CV mode) [s]	2	0	—
CF17	Soft stop time (CV mode) [s]	0	0	—
CF18	Output-on delay time [s]	0	0	—
CF19	Output-off delay time [s]	0	0	—

Setting parameter		Value
CF91	Memory A output time [s]	0
CF92	Memory B output time [s]	0
CF93	Memory C output time [s]	NONE
CF94	Repetition count	3

Voltage waveform of ramp sequence 2



■ Pulse&ramp sequence

The following shows an example where the first and second output waveforms will be different by combining the soft start/stop and output times.

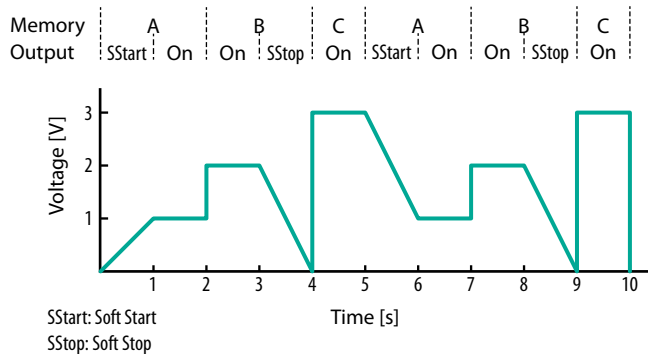
This section describes the behavior of soft start/stop in memory sequence. During the soft start duration, the output varies from the starting output value to the ending output value over the soft start time.

Therefore, whereas the first sequence causes the output to rise from 0 V, the second sequence causes it to fall from the memory C output value, 3 V. In contrast, during the soft stop period, the output varies from the starting output value to 0 V after the soft stop time has elapsed.

Setting parameter		Preset Memory		
		A	B	C
	Voltage setting [V]	1	2	3
	Current setting [A]	Arbitrary		
CF14	Soft start time (CC mode) [s]	0	0	0
CF15	Soft stop time (CC mode) [s]	0	0	0
CF16	Soft start time (CV mode) [s]	1	0	0
CF17	Soft stop time (CV mode) [s]	0	1	0
CF18	Output-on delay time [s]	0	0	0
CF19	Output-off delay time [s]	0	0	0

Setting parameter		Value
CF91	Memory A output time [s]	1
CF92	Memory B output time [s]	1
CF93	Memory C output time [s]	1
CF94	Repetition count	2

Voltage waveform of pulse&ramp sequence



External Control

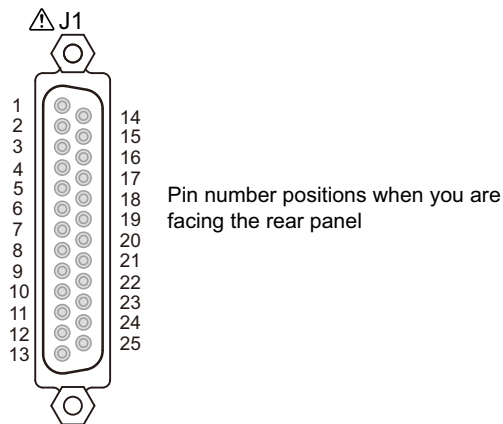
Overview of External Control

The following external controls are available using the J1 connector.

- Output voltage control by external voltage or external resistance
- Output current control by external voltage or external resistance
- Turning output on and off using an external contact
- Monitoring operation modes

J1 connector

J1 connector pin arrangement



Number	Signal name	Description
1	VMON	Output voltage monitor; outputs 0 V to 10 V for 0 % to 100 % of the rated output voltage.
2	IMON	Output current monitor; outputs 0 A to 10 A for 0 % to 100 % of the rated output current.
3	ACOM	External signal common for pins 1, 2, 4, and 14 ¹
4	EXT-V CV CONT	Output voltage control using external voltage; receives 0 V to 10 V to output 0 % to 100 % of the rated voltage.
5	ACOM	External signal common for pins 1, 2, 4, and 14 ¹
6	EXT-R CV CONT	Output voltage control using external resistance; uses 0 Ω to 10 k Ω to output 0 % to 100 % of the rated voltage.
7	EXT-R CV CONT COM	Common for output voltage control using external resistance.
8	N.C.	Not connected
9	N.C.	Not connected
10	N.C.	Not connected
11	CV STATUS	On when the PMX-E series is in CV mode (open-collector output from a photocoupler). ²
12	CC STATUS	On when the PMX-E series is in CC mode (open-collector output from a photocoupler). ²
13	ALM STATUS	On when a protection function (OVP, OCP, OHP, WDOG, EXT, ALIN, or SYS) activates (open-collector output from a photocoupler). ²
14	EXT-V CC CONT	Output current control using external voltage; receives 0 V to 10 V to output 0 % to 100 % of the rated current.
15	ACOM	External signal common for pins 1, 2, 4, and 14 ¹
16	EXT-R CC CONT	Output current control using external resistance; uses 0 Ω to 10 k Ω to output 0 % to 100 % of the rated current.
17	EXT-R CC CONT COM	Common for output current control using external resistance.
18	OUT ON/OFF CONT	Output on/off control using external contact input
19	DCOM	External signal common for pins 18 and 20 ¹
20	ALM IN	Alarm and output-off control via external contact
21	N.C.	Not connected
22	N.C.	Not connected
23	OUT ON STATUS	On when output is on (output through an open-collector photocoupler). ²
24	PWR ON STATUS	On when the power is on (output through an open-collector photocoupler). ²
25	STATUS COM	Status signal common for pins 11, 12, 13, 23, and 24 ³

1. During remote sensing, this is the negative electrode (-S) of sensing input. When remote sensing is not being performed, this is connected to the negative output.
2. Open-collector output from a photocoupler: Maximum voltage 30 V, maximum current 8 mA
3. The status common is floating (isolation voltage or less). It is isolated from the control circuit.

Connection to the J1 connector

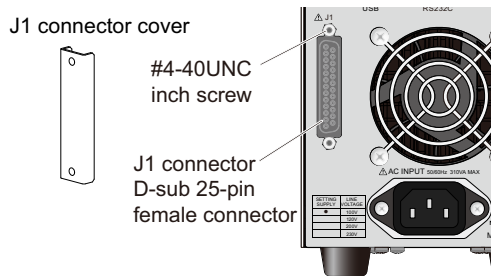
⚠ WARNING

Risk of electric shock.

- Always keep the cover it except when connecting the signal line to the J1 connector.
- Even if the DC OUTPUT terminal is grounded, make sure that the insulation of the load, external control device, and their connecting wires is equal to or greater than the isolation voltage of the PMX-E series. (p.105)

When the product is shipped from the factory, a cover is attached to the J1 port. If they are damaged or lost, contact your Kikusui agent or distributor.

The cable is not supplied with the product. These must be obtained separately.



- J1 connector
25-pin female D-sub connector, manufactured by TE Connectivity
- Compatible connector (plug)
D-sub 25-pin male (with fix screw)

To avoid malfunctions caused by noise, use shielded D-sub 25-pin connectors and a cable that is 3 m or less in length.

■ Connection options

The connector kit OP01-PMX (749809-9 DB25) is available as an option for connecting the J1 connector (p.113). The connector kit consists of connector parts manufactured by TE Connectivity.

For instructions on use, read the TE Connectivity catalog.

For information about how to obtain these tools or replacement parts, contact your Kikusui agent or distributor.

Connector type	5747461-3 [made by TE Connectivity]
Plug type	745211-7 [made by TE Connectivity]
Wire diameter	AWG26 to AWG22
Manual pressure welding tool	Handle assembly 58074-1 [made by TE Connectivity] Head assembly 58063-2 [made by TE Connectivity]
Insertion/extraction tool	91232-1 [made by TE Connectivity] or equivalent

Output voltage/current control

⚠ WARNING

Risk of electric shock.

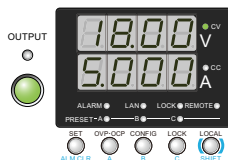
- The insulation of the external voltage (Vext), external resistance (Rext), and control signal lines must be equal to or greater than the isolation voltage of the PMX-E series. (p.105)
- If you use a shielded cable for the control signal line, protect the exposed shield section with an insulation tube with a higher withstand voltage than the isolation voltage of the PMX-E series.

This section explains how to control the output voltage or output current by external voltage (Vext) or external resistance of approximately 10 kΩ (Rext).

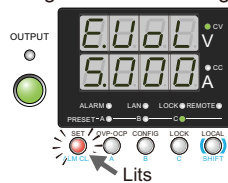
If output control is by an external voltage, the panel display varies depending on the display status.

For setting display, the voltmeter or ammeter displays $\overline{E000}$ or $\overline{E000}$.

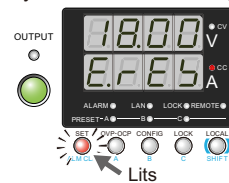
Measurement display



When controlling the output voltage using an external voltage (Vext)



When controlling the output current by external resistance (Rext)



Control using an external voltage (Vext)

This function enables external control performed in CONFIG settings (p.40).

Function to perform	CONFIG parameter	Setup
CV control by external voltage	CF05	$\overline{U0LE}$ (VOLT)
CC control by external voltage	CF04	$\overline{U0LE}$ (VOLT)

For external voltages (Vext) of 0 to 10 V, the output voltage (Eo) or output current (Io) varies between 0 and the rated output current (Irtg).

Output voltage control	Output current control
$E_o = E_{rtg} \times V_{ext} / 10$ [V]	$I_o = I_{rtg} \times V_{ext} / 10$ [A]
• Eo: Output voltage	• Io: Output current
• Ertg: Rated output voltage [V]	• Irtg: Rated output current [A]
• Vext: External voltage [V]	• Vext: External voltage [V]

Avoiding Output Short Circuit due to External Voltage (Vext)

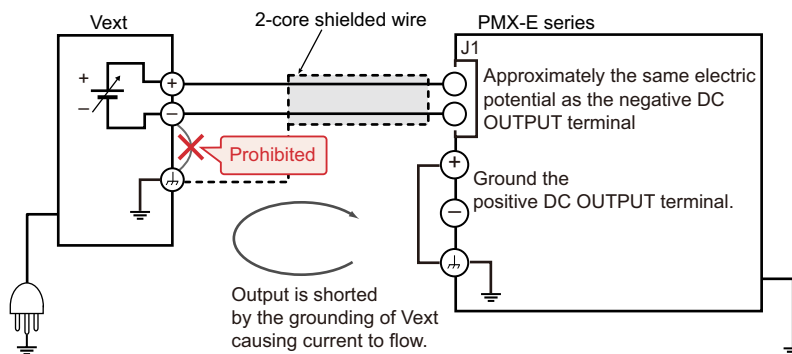
⚠ CAUTION

Otherwise, the control signal wires may be burned.

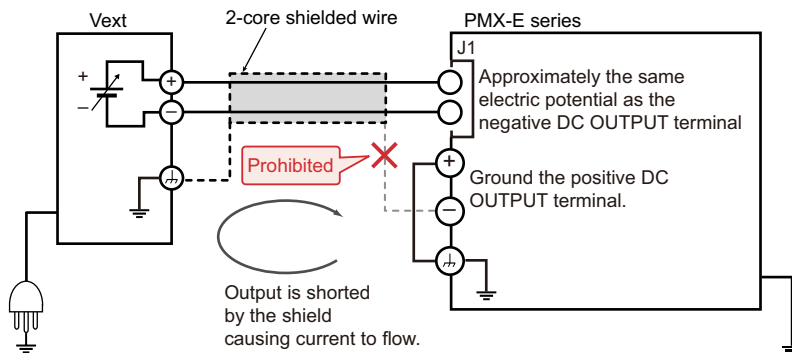
- Do not ground the external voltage (Vext) output, but leave it floating.
- When connecting the shield of the control signal wire to the external voltage (Vext) side, do not connect the shield to the DC OUTPUT terminal.

Connect the cables so that output is not shorted. See the following figures for examples of shorted output.

■ A connection in which the output is shorted by the grounding of Vext (example of a prohibited connection)



■ A connection in which the output is shorted by the shield (example of a prohibited connection)



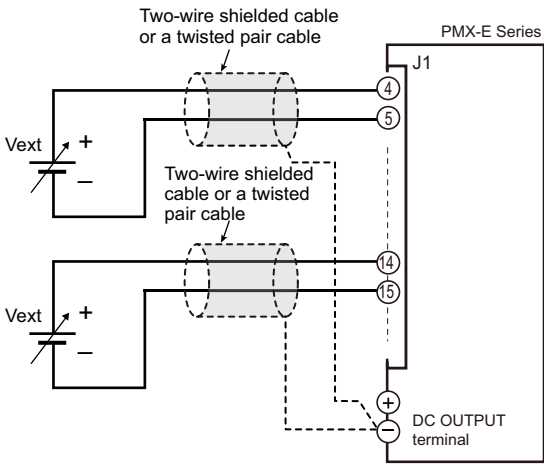
External voltage (Vext) connection

⚠ CAUTION

Otherwise, the control signal wires may be burned.

- Do not apply a 10.5 V or higher voltage or reverse voltage between the external voltage control pins.

Use a low-noise, stable voltage source for Vext. The Vext noise multiplied by the amplification factor of the PMX-E series appears in the output. Therefore, the output ripple noise may not meet the specifications of the PMX-E series.



Control	J1 connector connection pin		
	Vext input	Common	Internal resistance
Output voltage	No.4 (EXT-V CV CONT)	No.5 (ACOM)	Approx.20 kΩ
Output current	No.4 (EXT-V CC CONT)	No.15 (ACOM)	Approx.20 kΩ

- To reduce the influence of noise on the output, connect a 2-core shielded wire or a twisted-pair wire across Vext, and keep the wire as short as possible. If the wiring between the PMX-E and the external contact is long, it becomes easy for noise to influence the operation of the PMX-E. Even if you use cables that are designed to suppress noise, the PMX-E may not operate properly.
- If you use a shielded cable, connect the shield to the negative output terminal.
- Use the J1 connector pin-4, -5, -14, and -15.

Control using an external resistance (Rext)

With the CONFIG settings, enable the external control that needs to be executed (p.40).

Function to perform	CONFIG parameter	Setup	
CV control by external resistance			
Increase the output voltage with increasing resistance value	CF05	$r_{E\Delta}$ (RES)	An increase from 0 V to the rated output voltage corresponds to an increase from 0 Ω to 10 kΩ.
CC control by external resistance			
Increase the output current with increasing resistance	CF04	$r_{E\Delta}$ (RES)	An increase from 0 A to the rated output current corresponds to an increase from 0 Ω to 10 kΩ.

With an external resistance (Rext) of 0 Ω to 10 kΩ, the output voltage (Eo) or output current (Io) varies between 0 and the rated output voltage (Ertg) or rated output current (Irtg).

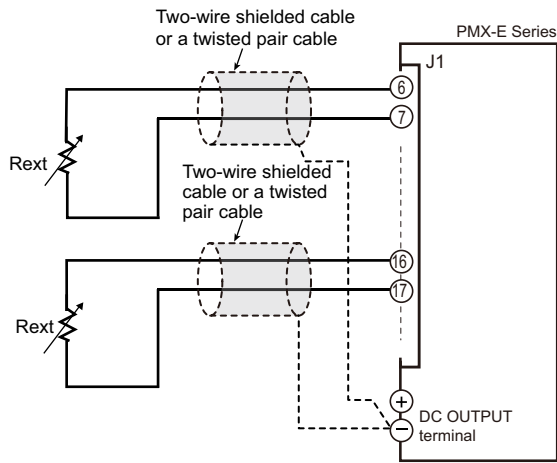
Output voltage control	Output current control
$E_o = E_{rtg} \times R_{ext} / 10 \text{ [V]}$	$I_o = I_{rtg} \times R_{ext} / 10 \text{ [A]}$
- Ertg: Rated output voltage [V] - Rext: External resistance [kΩ]	- Irtg: Rated output current [A] - Rext: external resistance [kΩ]

External resistance (Rext) connection

NOTE

Removal of external resistance (Rext) may result in excessive voltage or current being output. Ensure secure connections. Otherwise, the external control fault protection circuit may activate.

For Rext, use a resistor that is rated at approximately 10 kΩ, 1/2 W or greater, that has a low temperature coefficient, and that will change little over time. Examples of such resistors are metal film or wire wound resistors.



Control	J1 connector connection pin	
	Rext input	Common
Output voltage	No.6 (EXT-R CV CONT)	No.7 (EXT-R CV CONT COM)
Output current	No.16 (EXT-R CC CONT)	No.17 (EXT-R CC CONT COM)

- To reduce the influence of noise on the output, connect a 2-core shielded wire or a twisted-pair wire across Rext, and keep the wire as short as possible. If the wiring between the PMX-E and the external contact is long, it becomes easy for noise to influence the operation of the PMX-E. Even if you use cables that are designed to suppress noise, the PMX-E may not operate properly.
- If you use a shielded cable, connect the shield to the negative output terminal.
- Use the J1 connector pin-6, -7, -16, and -17.

Controlling the Output On and Off States

WARNING

Risk of electric shock.

- The insulation of the external contacts and control signal lines must be equal to or greater than the isolation voltage of the PMX-E series. (p.105)
- If you use a shielded cable for the control signal line, protect the exposed shield section with an insulation tube with a higher withstand voltage than the isolation voltage of the PMX-E series.

This section explains how to use an external contact to control the output on and off states.

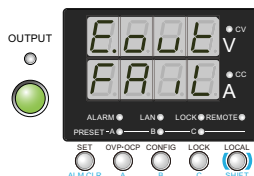
This function enables external control performed in CONFIG settings (p.40). The settings will be applied when it exits the configuration settings.

Function to perform	CONFIG parameter	Setup	
Logic			
Output on and off using an external contact	CF06	ON (ON)	Control enabled.
Negative logic	CF07	LO (LO)	The output turns on when pin 18 is set to LOW (0 V to 0.5 V) or shorted.
Positive logic	CF07	HI (HI)	The output turns on when pin 18 is set to HIGH (4.5 V to 5 V) or shorted.

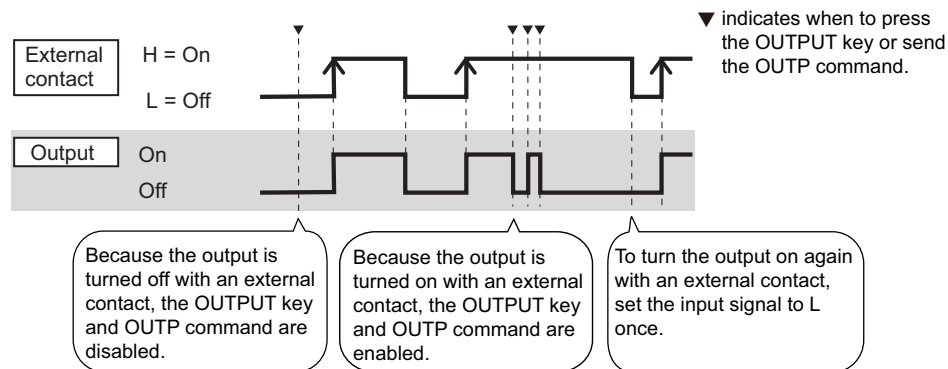
Output on/off control is performed by detecting rising edges or falling edges. Because it is not a level detection, if you want to turn on the output at startup, you need to apply a signal so that an edge is detected.

Because output off is prioritized, if the output is turned off with an external contact, the OUTPUT key and OUTP command are disabled.

If the OUTPUT key is disabled, E.out FAIL appears.



The figure shows an output-on/off control example when the output is turned on at HIGH.

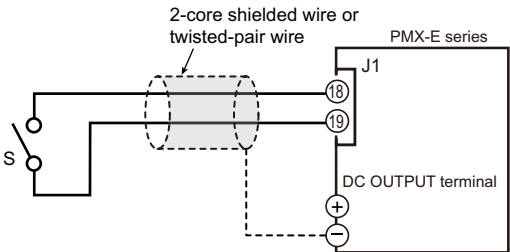


External contact connection

To reduce the effect of noise on the output, use 2-core shielded wire or twisted pair wire for control signal lines and connect them as short as possible. If the wiring is long, it becomes easy for noise to influence the operation of the PMX-E. Even if you use cables that are designed to suppress noise, the PMX-E may not operate properly.

If you use a shielded cable, connect the shield to the negative output terminal.

Use pins 18 and 19 of the J1 connector.

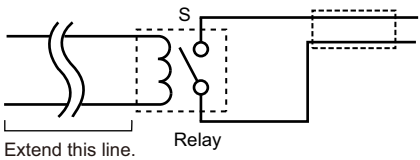


Control	J1 connector connection pin	
	S input	Common
Output on/off	No. 18 (OUT ON/OFF CONT)	No. 19 (DCOM)

- The open-circuit voltage between pins 18 and 19 is approximately 5 V, and the short-circuit current is approximately 0.5 mA.
- Use external contacts that have a contact rating greater than or equal to 0.5 mA at 5 Vdc.
- If two or more units are floating, and you are using a single external contact to turn on and off, use a relay or similar device for the external contact signal to isolate the signal transmitted to each unit.

■ For long-distance wiring

When you are wiring over a great distance, use a small relay and extend the coil side of the relay.



External Monitoring

The external monitors include a voltage/current monitor and an operating status monitor.

External monitoring of the output voltage/current

This monitor can externally monitor the output voltage and current.

For output voltage/current from 0 V to the rated value, a voltage from 0 V to approximately 10 V is output to each monitor terminal.

The monitor output signals are used to monitor the DC voltage (mean value). They cannot be used to accurately monitor the AC components (such as ripple and transient response waveform) of the actual output voltage or current.

NOTE

Shorting VMON and IMON to ACOM may damage the PMX-E series.

“Connection to the J1 connector” (p.78).

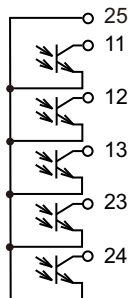
Target to monitor	J1 connector		
	Monitor output	Common	Rating
Output voltage	No. 1 (VMON)	Nos. 3, 5, and 15 (ACOM)	Output impedance: 1 kΩ or less
Output current	No. 2 (IMON)		Maximum output current: Approx. 1 mA

External monitoring of the operating status

The following five statuses can be monitored externally.

- Constant voltage mode The level changes in constant-voltage mode.
- Constant current mode The level changes in constant-current mode.
- Protection function operation The level changes when a protection function (OVP/OCP/OHP/EXT/ALIN/WDOG) activates.
- Output on The level changes when the output is on.
- Turn the power on. It will go to the LOW level approximately 0.5 seconds after you turn on the POWER switch.

The figure below shows the internal equivalent circuit of the status output.



Monitor output	J1 connector		
	Monitor output ¹	Common	Rating
Constant voltage mode	No. 11 (CV STATUS)	No. 25 (STATUS COM) ²	Maximum voltage: 30 V Maximum current (sink): 8 mA
Constant current mode	No. 12 (CC STATUS)		
Protection function operation	No. 13 (ALM STATUS)		
Output on	No. 23 (OUT ON STATUS)		
Turn the power on.	No. 24 (PWR ON STATUS)		

1. The outputs are open collector outputs of photocouplers and isolated from the internal circuits of the PMX-E series.
2. The status common is floating (isolation voltage or less). It is isolated from the control circuit.

Parallel/Series Operation

This chapter describes the functions, connections, settings, and operations for the parallel and series operation.

Parallel operation

You can increase the current capacity by connecting multiple PMX-E series units of the same model number in parallel.

- You cannot control multiple slave units with one master unit (one-control operation).
- Each unit operates independently because the output terminals of each unit are simply connected in parallel. All units require the same connections, settings, and operations.

NOTE

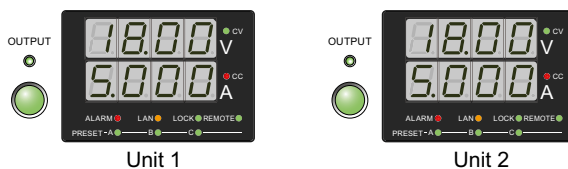
Parallel operation of units with different model names may not work properly.

Functions in Parallel Operation

Voltage display and current display

The voltage or current is displayed on each unit. To calculate the total output current, add the current values of each unit.

The following figure shows a panel display example of a two-unit parallel operation with an output voltage of 18 V and an output current of 10 A.



Remote sensing

Only models with a rated output voltage of 18 V or 35 V are available for remote sensing ([p.20](#))

Performing remote sensing requires that every unit be configured and connected.

External Control

All functions of the J1 connector are available for each unit.

⚠ CAUTION

Risk of damaging the wire.

- **Do not connect the commons (ACOM, DCOM) of the J1 connector.**
Otherwise, the common line may be damaged when the load cable comes off.

Alarm

Each device detects alarms.

■ Clearing alarms

Press ALM CLR (SHIFT+SET) or turn off the POWER switch once. After removing the cause of the alarm, turn on the POWER switch back (p.28)

Keep the output off on units where no alarm has occurred.

Connection

Connecting the Load

⚠ WARNING

Risk of electric shock.

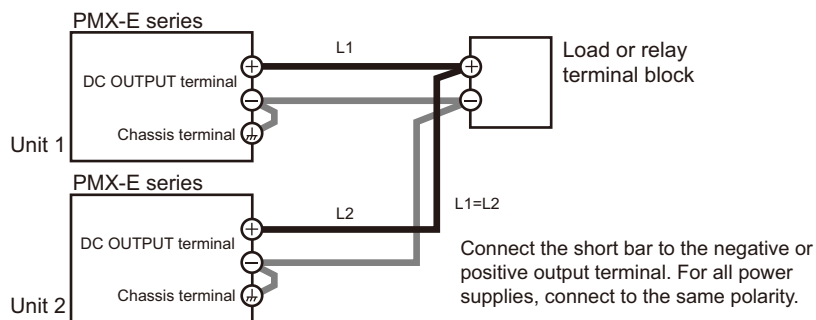
- Do not touch a DC OUTPUT terminal when the POWER switch is on.

⚠ CAUTION

Risk of the output being short.

- When connecting the DC OUTPUT terminal to the chassis terminal, connect the same polarity terminal (positive or negative) to the chassis terminal.
If the polarity is different, the output will be shorted through the ground wire of the power cord.

The following figure shows an example of the connection to a load when two PMX-E series units are operated in parallel.



1 Turn off the POWER switches of all PMX-E series units to be connected in parallel.

2 Connect each unit and load as shown in the figure.

- If you are going to use a relay terminal block, make sure that the wires used to connect the units are as short as possible.
- Use load cables that have sufficient current capacity.
- Use load cables of equivalent length and cross-sectional area to connect to each unit, and wire the cables so that they are as short as possible.

3 Connect the positive or negative DC OUTPUT terminal of the units to be connected in parallel to the chassis terminals.

The DC OUTPUT terminals of all units must be grounded with the same polarity.

If you are using the units under floating conditions, do not connect the terminals.

Setup

Set voltage and current

Set the voltage and current on each unit. The current that is output is the total of the currents of all the units. Set the voltage and current to the same values on each unit.

Setting the overvoltage protection (OVP) and overcurrent protection (OCP)

Every unit requires the OVP and OCP settings. Specify the same values on each unit. [\(p.29\)](#)

Performing parallel operation

Power On and Off

Turn on or off the POWER switch of each unit.

NOTE

If you want to turn the POWER switch back on, wait for 10 seconds or more after the panel display turns off. Avoid turning on and off the POWER switch repeatedly in short intervals. Otherwise, this may cause malfunctions or shorten the lifespan of the POWER switch and the internal input fuse.

Turns output on/off

Turn on or off the OUTPUT key on each unit.

Series operation

You can connect multiple PMX-E series units in series to increase the output voltage.

- You cannot control multiple slave units with one master unit (one-control operation).
- The number of units that can be connected in series depends on the output voltage and the isolation voltage of each unit. The total of the output voltages of the PMX-E series units connected in series is supplied to the load.

WARNING

Risk of electric shock.

- Do not connect multiple power supplies in series in such a way that the maximum output voltage exceeds the isolation voltage. (p. 105)

Number of power supplies to connect in series

The number of units that can be connected in series depends on the output voltage and the isolation voltage of each unit.

Example) For the PMX18-5E, the isolation voltage is 70 V. The maximum number of units is determined as $70/18 = 3.888$, so up to 3 units can be connected.

NOTE

For the PMX-E series, units of even different model names can be connected, provided that you ensure that the withstand voltage and total output voltage are appropriate.

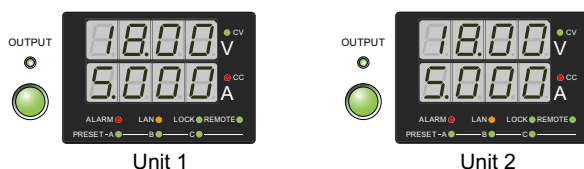
Functions in series operation

Voltage display and current display

The voltage or current is displayed on each unit. To calculate the total output voltage, add the voltage values of each unit.

Set the current to the same value on each unit.

The following figure shows a panel display example of a two-unit series operation with an output voltage of 36 V and an output current of 5 A.



Remote sensing

This is not available.

External Control

All functions of the J1 connector are available for each unit.

⚠ WARNING

Risk of electric shock.

- **Do not connect the commons (ACOM, DCOM) of the J1 connector.**

When monitoring the output voltage or current during series operation, the common potentials of the monitor signals between devices are different.

Alarm

Each device detects alarms.

■ Clearing alarms

Press ALM CLR (SHIFT + SET) or turn off the POWER switch. Fix the problem that caused the alarm, and turn the POWER switch back on ([p.28](#))

Keep the output off on units where no alarm has occurred.

Connection

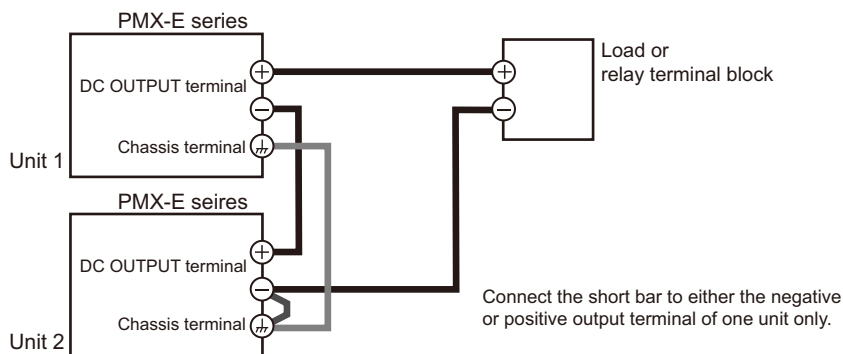
Connecting the Load

⚠ WARNING

Risk of electric shock.

- **Do not touch a DC OUTPUT terminal when the POWER switch is on.**

The following figure shows an example of connecting two PMX-E series units to perform a series operation.



- 1 Turn off the POWER switches of all PMX-E series units to be connected in series.

- 2** Connect each unit to the load or relay terminal block as shown in the figure.
 - Use load cables with sufficient current capacity and wire them as short as possible.
 - The larger the voltage drop in the load cable, the larger the unit-to-unit potential difference and load variation.
- 3** Connect the DC OUTPUT terminals of each unit in series.
- 4** Connect the chassis terminals of each unit.
- 5** For any one of the units connected in series, connect the positive or negative DC OUTPUT terminal to the chassis terminal using the short bar.

Setup

Set voltage and current

Set the voltage and current on each unit. The voltage that is output is the total of the voltages of all the units. Set the current to the same value on each unit.

Setting the overvoltage protection (OVP) and overcurrent protection (OCP)

You have to set the overvoltage protection (OVP) and overcurrent protection (OCP) on each unit. Specify the same values on each unit. [\(p.29\)](#)

Performing a series operation

Power On and Off

Turn on or off the POWER switch of each unit.

NOTE

If you want to turn the POWER switch back on, wait for 10 seconds or more after the panel display turns off. Avoid turning on and off the POWER switch repeatedly in short intervals. Otherwise, this may cause malfunctions or shorten the lifespan of the POWER switch and the internal input fuse.

Turns output on/off

Turn on or off the OUTPUT key of each unit.

This chapter describes how to perform calibration.

Calibration

The PMX-E series is calibrated before shipment. To maintain long-term reliable performance, we recommend periodic calibration. To calibrate the product, follow the procedure below.

Calibration Overview

The following 6 parameters can be calibrated. Each of the voltage and current items includes calibration of the offset, full scale, overvoltage protection (OVP), and overcurrent protection (OCP).

The offset should be calibrated to 1 % of the full scale.

■ Voltage

- Output voltage offset (1 %)
- Output voltage full scale (100 %)
- Overvoltage protection (OVP)

■ Current

- Output current offset (1 %)
- Output current full scale (100 %)
- Overcurrent protection (OCP)

Required devices

- DC voltmeter (DVM): Measurement accuracy 0.02 % or more
- Shunt resistor: Accuracy 0.1 % or more; Allowable current: More than the rated output of the PMX-E series unit to be calibrated

Environment

- Temperature: 23 °C±5 °C
- Humidity: 80 %rh or less

To minimize the calibration error due to initial drift, warm up, i.e., power on, the PMX-E series for 30 minutes or more before calibration. In addition, warm up the DVM and shunt resistor for as long as is necessary.

Connection

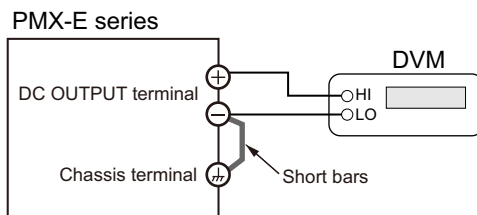
WARNING

Risk of electric shock.

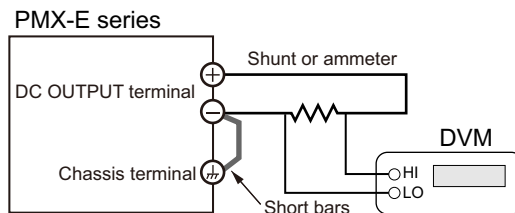
- Do not touch a DC OUTPUT terminal when the POWER switch is on.
- Ensure that the output terminal is connected to the chassis terminal.

Connect the short bar between the negative output terminal and the chassis terminal.

■ Voltage/OVP calibration



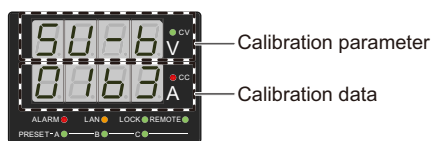
■ Current/OCV calibration



Calibration procedure

- 1 While holding down the SET and LOCAL keys, turn on the POWER switch.**
The unit starts in calibration mode.
- 2 Select the calibration parameter by turning the VOLTAGE knob.**
Turning the VOLTAGE knob switches the calibration parameter.
- 3 Press the SET or LOCK key to complete the calibration.**
You can save the calibration information when pressing the SET key to complete it. If you press the LOCK key to complete it, no calibration information will be saved.
When the calibration information is saved, **SAVE** (SAVE) is displayed on the ammeter.
When the calibration information is not saved, **ABOR** (ABOR) is displayed on the ammeter.
After displaying the calibration completion status, the calibration mode ends. Then, the unit transitions to normal operation.

The following figure shows an example of the display when calibration mode starts up.



Calibration parameter (selected with VOLTAGE knob)		DVM reading
50-0	Output voltage offset	1 % of the rated output voltage
50-1	Output voltage full scale	100 % of the rated output voltage
50-2	Output current offset	1 % of the rated output current
50-3	Output current full scale (100 %)	100 % of the rated output current
00P	Overvoltage protection (OVP)	—
00C	Overcurrent protection (OCP)	—

■ Calibrating the output voltage/current

- 1** Select the calibration parameter by turning the **VOLTAGE** knob.
- 2** Turn on output.
The calibration value cannot be changed unless you turn on the output.
- 3** Use the **CURRENT** knob to adjust the DVM reading to the value in the table above.
While holding down LOCAL, turn the CURRENT knob to reduce the amount of change.
- 4** Turns off the output.

■ OVP/OCP calibration

NOTE

- Perform OVP calibration after calibrating the output voltage.
- Perform OCP calibration after calibrating the output current.

- 1** Use the **VOLTAGE** knob to select the calibration parameter.
- 2** Turn on the output.
- 3** Press the **OVP•OCP** key.
The OVP•OCP key lights up and calibration starts automatically.
When the calibration is complete, the OVP•OCP key turns off.

When the calibration is completed normally, **DONE** (DONE) is displayed on the ammeter.

When the calibration is not completed normally, **FAIL** (FAIL) is displayed on the ammeter.

Specifications

Unless specified otherwise, the specifications are for the following settings and conditions.

- Loads are pure resistive loads.
- The product is warmed up for at least 30 minutes (with current flowing).
- The negative output is connected to the chassis terminal with a short bar.

The definitions of the terms are as follows.

- TYP values: indicates a typical value. These values do not guarantee the performance of this product.
- rating: Indicates a rated value.
- setting: Indicates a setting.
- reading: Indicates a readout value.
- The rated load and no load in constant-voltage mode (with the rated output voltage, setting the output current to a value equal to or higher than the rated output current) are defined as follows.
 - Rated load: A load with a resistance value such that when the rated output voltage is applied, the current that flows is 95 % to 100 % of the rated output current at the rated output voltage.
 - No load: A load state in which no output current flows, i.e., the output terminal is open with no load connected.
- The rated load and no load in constant-current mode (with the rated output current, setting the output voltage to a value equal to or higher than the rated output voltage) are defined as follows.
 - Rated load: Refers to a resistive load that, when the rated output current flows, makes the voltage drop to 95 % to 100 % of the maximum output voltage with rated output current. Including the voltage drop in the load cables, the output voltage must not exceed the maximum output voltage with rated output current.
 - No load: Refers to a resistive load that, when the rated output current flows, makes the voltage drop to 10 % of the maximum output voltage with rated output current or 1 V whichever is higher.

AC input

■ PMX18-2E, PMX18-5E, PMX35-1E, PMX35-3E

	PMX18-2E	PMX18-5E	PMX35-1E	PMX35-3E
Nominal input rating	100 Vac ¹ , 50 Hz/60 Hz, single phase			
Input voltage range	± 10 %			
Input frequency range	47 Hz to 63 Hz			
Inrush current (MAX)	50 A	60 A	45 A	60 A
Power (MAX) ²	150 VA	310 VA	150 VA	310 VA

1. 117 Vac, 200 Vac, 217 Vac, and 234 Vac are factory options.
2. At rated load.

■ PMX70-1E, PMX110-0.6E, PMX250-0.25E, PMX350-0.2E, PMX500-0.1E

	PMX70-1E	PMX110-0.6E	PMX250-0.25E	PMX350-0.2E	PMX500-0.1E
Nominal input rating	100 Vac ¹ , 50 Hz/60 Hz, single phase				
Input voltage range	± 10 %				
Input frequency range	47 Hz to 63 Hz				
Inrush current (MAX)	65 A	55 A	40 A	55 A	40 A
Power (MAX) ²	230 VA	210 VA	210 VA	230 VA	170 VA

1. 117 Vac, 200 Vac, 217 Vac, and 234 Vac are factory options.
2. At rated load.

Output

■ PMX18-2E, PMX18-5E, PMX35-1E, PMX35-3E

		PMX18-2E	PMX18-5E	PMX35-1E	PMX35-3E
Rating	Output voltage	18.00 V	18.00 V	35.00 V	35.00 V
	Output current	2.000 A	5.000 A	1.000 A	3.000 A
	Output power	36 W	90 W	35 W	105 W
Voltage	Setting range	0 V to 18.90 V	0 V to 18.90 V	0 V to 36.75 V	0 V to 36.75 V
	Setting resolution ¹	1 mV			
	Setting accuracy	$\pm(0.2\% \text{ of setting} + 0.1\% \text{ of rating})$			
	Power fluctuation ²	$\pm 1 \text{ mV}$	$\pm 1 \text{ mV}$	$\pm 3 \text{ mV}$	$\pm 3 \text{ mV}$
	Load variation ³	$\pm 2 \text{ mV}$	$\pm 5 \text{ mV}$	$\pm 3 \text{ mV}$	$\pm 4 \text{ mV}$
	Transient response ⁴	50 μs			
	Ripple noise (rms) ⁵	0.5 mV (1 mV) ⁶	0.5 mV	0.5 mV (1 mV) ⁶	0.5 mV
	Rise time ⁷	Rated load	$\leq 120 \text{ ms}$ ($\leq 20 \text{ ms}$) ⁶	$\leq 120 \text{ ms}$ ($\leq 20 \text{ ms}$) ⁶	$\leq 120 \text{ ms}$
		No load	$\leq 120 \text{ ms}$ ($\leq 20 \text{ ms}$) ⁶	$\leq 120 \text{ ms}$ ($\leq 20 \text{ ms}$) ⁶	$\leq 120 \text{ ms}$
	Fall time ⁸	Rated load	$\leq 50 \text{ ms}$ ($\leq 20 \text{ ms}$) ⁶	$\leq 50 \text{ ms}$ ($\leq 20 \text{ ms}$) ⁶	$\leq 50 \text{ ms}$
		No load	$\leq 120 \text{ ms}$ ($\leq 20 \text{ ms}$) ⁶	$\leq 120 \text{ ms}$ ($\leq 20 \text{ ms}$) ⁶	$\leq 120 \text{ ms}$
	Maximum remote sensing compensation voltage	0.6 V (single line)			
	Temperature coefficient (TYP)	100 ppm/ °C			
Current	Setting range	0 A to 2.10 A	0 A to 5.25 A	0 A to 1.05 A	0 A to 3.15 A
	Setting resolution ¹	0.1 mA			
	Setting accuracy	$\pm(0.3\% \text{ of setting} + 0.1\% \text{ of rating})$			
	Power fluctuation ²	$\pm 5 \text{ mA}$			
	Load variation ³	$\pm 5 \text{ mA}$			
	Ripple noise (rms) ⁵	1 mA (2 mA) ⁶	2 mA	1 mA (2 mA) ⁶	1 mA
	Rise time ^{7 9}	Rated load	—	—	—
			($\leq 20 \text{ ms}$) ⁶	($\leq 20 \text{ ms}$) ⁶	
	Fall time ^{8 9}	Rated load	—	—	—
			($\leq 20 \text{ ms}$) ⁶	($\leq 20 \text{ ms}$) ⁶	
	Temperature coefficient (TYP)	200 ppm/ °C			

1. You can set a value down to 1/10 of the minimum digit by using the SHIFT key and knob together or with a communication command.
2. 100 Vac to 90 Vac or 100 Vac to 110 Vac, fixed load.
3. For 0 % to 100 % of output voltage or output current.
4. The amount of time required for the output voltage to return to a value within "rated output voltage $\pm (0.05\% + 10 \text{ mV})$." When the load current is changed from 10 % to 100 % of the rated output current.
5. At rated load. When the measurement frequency bandwidth is 10 Hz to 1 MHz.
6. The values in parentheses apply to models equipped with the high-speed rising/falling function (factory option).
7. The time for the output voltage to rise from 10 % to 90 % of the rating when the output is turned on.
8. The time for the output voltage to fall from 90 % to 10 % of the rating when the output is turned off.
9. The current rise/fall time specifications apply only to models equipped with the high-speed rising/falling function.

■ PMX70-1E, PMX110-0.6E, PMX250-0.25E, PMX350-0.2E, PMX500-0.1E

		PMX70-1E	PMX110-0.6E	PMX250-0.25E	PMX350-0.2E	PMX500-0.1E
Rating	Output voltage	70.00 V	110.0 V	250.0 V	350.0 V	500.0 V
	Output current	1.000 A	0.600 A	0.250 A	0.200 A	0.100 A
	Output power	70 W	66 W	62.5 W	70 W	50 W
Voltage	Setting range	0 V to 73.50 V	0 V to 115.5 V	0 V to 262.5 V	0 V to 367.5 V	0 V to 525.0 V
	Setting resolution ¹	2 mV	10 mV			
	Setting accuracy	$\pm(0.2 \% \text{ of setting} + 0.1 \% \text{ of rating})$				
	Power fluctuation ²	$\pm 5 \text{ mV}$	$\pm 7 \text{ mV}$	$\pm 15 \text{ mV}$	$\pm 25 \text{ mV}$	$\pm 30 \text{ mV}$
	Load variation ³	$\pm 5 \text{ mV}$	$\pm 7 \text{ mV}$	$\pm 15 \text{ mV}$	$\pm 25 \text{ mV}$	$\pm 30 \text{ mV}$
	Transient response ⁴	100 μs				
	Ripple noise (rms) ⁵	1 mV	2 mV	3 mV	5 mV	10 mV
	Rise time ⁶	Rated load	$\leq 150 \text{ ms}$	$\leq 120 \text{ ms}$	$\leq 120 \text{ ms}$	$\leq 150 \text{ ms}$
		No load	$\leq 150 \text{ ms}$	$\leq 120 \text{ ms}$	$\leq 120 \text{ ms}$	$\leq 150 \text{ ms}$
	Fall time ⁷	Rated load	$\leq 50 \text{ ms}$	$\leq 50 \text{ ms}$	$\leq 50 \text{ ms}$	$\leq 80 \text{ ms}$
		No load	$\leq 150 \text{ ms}$	$\leq 120 \text{ ms}$	$\leq 120 \text{ ms}$	$\leq 150 \text{ ms}$
	Temperature coefficient (TYP)	100 ppm/ °C				
Current	Setting range	0 A to 1.050 A	0 A to 0.630 A	0 A to 0.262 A	0 A to 0.210 A	0 A to 0.105 A
	Setting resolution ¹	0.1 mA				
	Setting accuracy	$\pm(0.3 \% \text{ of setting} + 0.1 \% \text{ of rating})$				
	Power fluctuation ²	$\pm 2 \text{ mA}$	$\pm 2 \text{ mA}$	$\pm 1 \text{ mA}$	$\pm 1 \text{ mA}$	$\pm 1 \text{ mA}$
	Load variation ³	$\pm 5 \text{ mA}$	$\pm 5 \text{ mA}$	$\pm 5 \text{ mA}$	$\pm 5 \text{ mA}$	$\pm 3 \text{ mA}$
	Ripple noise (rms) ⁵	1 mA				
	Temperature coefficient (TYP)	200 ppm/ °C				

1. You can set a value down to 1/10 of the minimum digit by using the SHIFT key and knob together or with a communication command.
2. 100 Vac to 90 Vac or 100 Vac to 110 Vac, fixed load.
3. For 0 % to 100 % of output voltage or output current.
4. The amount of time required for the output voltage to return to a value within "rated output voltage $\pm (0.05 \% + 10 \text{ mV})$ " When the load current is changed from 10 % to 100 % of the rated output current.
5. At rated load. When the measurement frequency bandwidth is 10 Hz to 1 MHz.
6. The time for the output voltage to rise from 10 % to 90 % of the rating when the output is turned on.
7. The time for the output voltage to fall from 90 % to 10 % of the rating when the output is turned off.

Display function

		PMX18-2E, PMX18-5E, PMX35-1E, PMX35-3E, PMX70-1E	PMX110-0.6E, PMX250-0.25E, PMX350-0.2E, PMX500-0.1E
Voltage display	Maximum display	99.99 (fixed decimal point)	999.9 (fixed decimal point)
	Display accuracy ¹	$\pm(0.5\% \text{ of reading} + 2 \text{ digits})$	
Current display	Maximum display	9.999 (fixed decimal point)	
	Display accuracy ¹	$\pm(1\% \text{ of reading} + 5 \text{ digits})$	
Operation display	OUTPUT LED		Lighting up green: When the output is on or during soft start. Blinking green: At output-off delay or soft stop. Blinking orange: At output-on delay. Blinking green/orange: During output-off timer operation.
	CV LED		Lighting up green: During constant-voltage mode.
	CC LED		Lighting up red: During constant-current mode.
	ALARM LED		Lighting up red when a protection function activates.
	Remote	REMOTE	Lighting up green during remote control.
		LAN LED	Lights and blinks when the LAN interface is in use. Lighting up green: No Fault status. Lighting up red: Fault status. Orange: Standby status Blinking green: WEB Identify status
	LOCK LED		Lighting up green when it is locked.
PRESET A/B/C LED		When a preset memory is in use, the corresponding LED lights up green.	

1. At an ambient temperature of $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ ($73.4\text{ }^{\circ}\text{F} \pm 41\text{ }^{\circ}\text{F}$).

Protection function

■ PMX18-2E, PMX18-5E, PMX35-1E, PMX35-3E

		PMX18-2E	PMX18-5E	PMX35-1E	PMX35-3E
Overvoltage protection (OVP)	Operation	Output off, OVP display, ALARM lit.			
	Setting range	1.80 V to 20.16 V	1.80 V to 20.16 V	3.50 V to 39.20 V	3.50 V to 39.20 V
		10 % to 112 % of the rated output voltage			
Overcurrent protection (OCP)	Setting accuracy	$\pm(1 \text{ \% of rating})$			
	Operation	Output off, OCP display, ALARM lit.			
	Setting range	0.20 A to 2.24 A	0.50 A to 5.60 A	0.10 A to 1.12 A	0.30 A to 3.36 A
Power limit ¹		10 % to 112 % of the rated output current			
	Setting accuracy	$\pm(1 \text{ \% of rating})$			
	Operation	Limited between 1 W and 105% of rated output power.			
	Setting range	1 W to 37 W	1 W to 94 W	1 W to 36 W	1 W to 110 W
	Setting resolution	1 W			
	Setting accuracy	$\pm(5 \text{ \% of setting} + 5 \text{ \% of rating})$			

1. Current is software-controlled in constant-power mode. With a delay of approximately 0.2 seconds. Transient behavior (change) is not handled.

■ PMX70-1E, PMX110-0.6E, PMX250-0.25E, PMX350-0.2E, PMX500-0.1E

		PMX70-1E	PMX110-0.6E	PMX250-0.25E	PMX350-0.2E	PMX500-0.1E
Overvoltage protection (OVP)	Operation	Output off, OVP display, ALARM lit.				
	Setting range	7.00 V to 78.40 V	11.00 V to 123.2 V	25.00 V to 280.0 V	35.00 V to 392.0 V	50.00 V to 560.0 V
		10 % to 112 % of the rated output voltage				
Overcurrent protection (OCP)	Setting accuracy	$\pm(1 \text{ \% of rating})$				
	Operation	Output off, OCP display, ALARM lit.				
	Setting range	0.100 A to 1.120 A	0.060 A to 0.672 A	0.025 A to 0.280 A	0.020 A to 0.224 A	0.010 A to 0.112 A
Power limit ¹		10 % to 112 % of the rated output current				
	Setting accuracy	$\pm(1 \text{ \% of rating})$				
	Operation	Limited between 1 W and 105% of rated output power.				
	Setting range	1 W to 73 W	1 W to 69 W	1 W to 65 W	1 W to 73 W	1 W to 52 W
	Setting resolution	1 W				
	Setting accuracy	$\pm(5 \text{ \% of setting} + 5 \text{ \% of rating})$				

1. Current is software-controlled in constant-power mode. With a delay of approximately 0.2 seconds. Transient behavior (change) is not handled.

Common specifications

	Operation
Overheat protection (OHP)	Output off, OHP display, ALARM lit.
Communication monitoring (WDOG)	Output off, WDOG display, ALARM lit.
External control error (EXT)	Output off, EXT display, ALARM lit.
Alarm signal input (ALIN)	Output off, ALIN display, ALARM lit.
System error (SYS)	Output off, SYS display, ALARM lit.

Signal output

			Common specifications
Monitor signal output ¹	Voltage monitor (VMON)	At rated voltage output	10 V $\pm$ 0.1 V
		At 0 V output	0 V $\pm$ 0.1 V
	Current monitor (IMON)	At rated current output	10 V $\pm$ 0.1 V
		At 0 A output	0 V $\pm$ 0.1 V
Status signal output ^{1 2}	OUTON STATUS		Turns on when the output is on
	CV STATUS		Turns on during CV operation
	CC STATUS		Turns on during CC operation
	ALM STATUS		Turns on when an alarm has been activated
	PWR ON STATUS		Turns on when the power is turned on

1. The signal output common is connected to the negative DC OUTPUT terminal.
2. Photocoupler open collector output. Maximum voltage 30 V, maximum current (sink) 8 mA. Isolated from the output and control circuits. The status common is floating (within the isolation voltage), and status signals are not mutually isolated.

Control function

			PMX18-2E, PMX18-5E, PMX35-1E, PMX35-3E	PMX70-1E, PMX110-0.6E, PMX250-0.25E, PMX350-0.2E, PMX500-0.1E
External Control	EXT-V CV CONT (CV external voltage control)	Control	0 % to 100 % of rated output voltage at 0 V. to 10 V.	
		Accuracy	1 % of rating + 10 mV	1 % of rating
	EXT-R CV CONT (CV external resistance control)	Control	0 % to 100 % of rated output voltage at 0 Ω to 10 k Ω .	
		Accuracy	1 % of rating + 10 mV	1 % of rating
	EXT-V CC CONT (CC external voltage control)	Control	0 to 100 % of rated output current at 0 to 10 V.	
		Accuracy	1 % of rating + 5 mA	1 % of rating
	EXT-R CC CONT (CC external resistance control)	Control	0 % to 100 % of rated output current at 0 Ω to 10 k Ω .	
		Accuracy	1 % of rating + 5 mA	1 % of rating
	OUTPUT ON/OFF CONT (Output on/off control)		Logic selectable Output on when set to LOW (0 V to 0.5 V) or shorted; output off when set to HIGH (4.5 V or 5 V) or open Output on when set to HIGH (4.5 V to 5 V) or open; output off when set to LOW (0 V or 0.5 V) or shorted	

Other functions

	Common specifications
Preset Memory	Can store up to three combinations of the voltage and current settings, OVP, OCP, the soft start and stop, and the output-on and -off delays.
Key lock	Selectable from the following three modes. Loc1: Disables all operations of the controls except for the OUTPUT key and memory keys A/B/C. Loc2: Disables all operations of the controls except for the OUTPUT key. Loc3: Locks the operation of all keys and the rotary knob
Output-on/off delay	Setting range: 0.0 s, 0.5 s to 99.9 s, setting resolution: 0.1 s
Soft start/stop	Setting range: 0.0 s, 0.5 s to 10.0 s, setting resolution: 0.1 s
Bleeder circuit	Buzzer on or off
Memory sequence	Loop count: 1 to 9999 (INF) INFINITY Step time: nonE, 0.00 s to 99.99 s, 100.0 s to 999.9 s, or 1000 s to 9999 s
Output-off timer	The output automatically turns off when the set condition is met, including the output-on time, voltage limit value, current limit value, or output-on time after starting a specified operating mode.

Interface

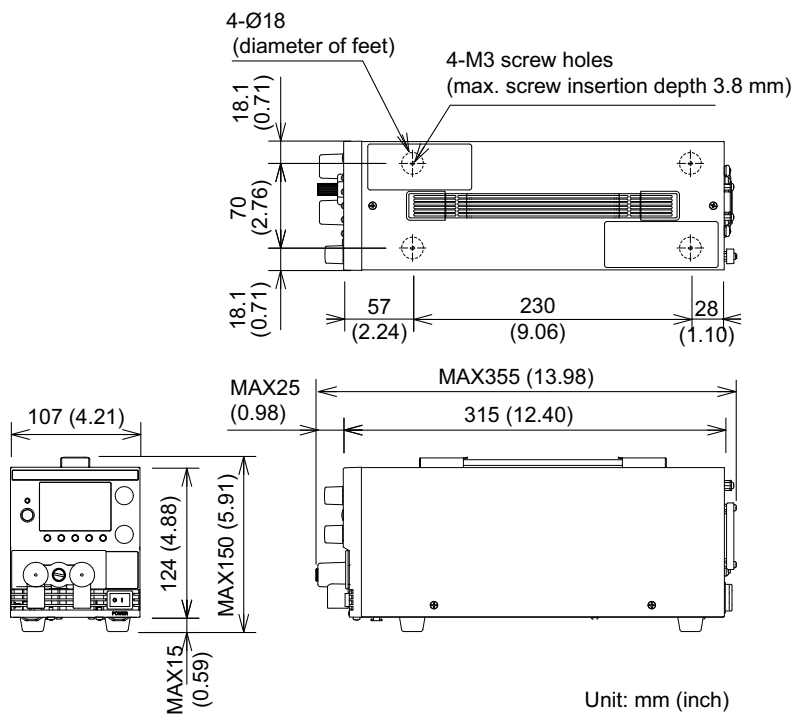
		Common specifications
Common specifications	Software protocol	IEEE Std 488.2-1992
	Command language	Complies with SCPI Specification 1999.0
RS232C	Hardware	D-SUB 9-pin connector (male)
		Baud rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
		Data length: 8 bit (fixed), stop bit: 1 bit (fixed), parity bit: none (fixed)
		Flow control: Enabled (fixed) - RTS/ CTS
	Program message terminator	LF during reception, LF during transmission
USB	Hardware	Complies with the USB 2.0 specifications. Baud rate:12 Mbps (full speed).
		Socket B type
	Program message terminator	LF or EOM during reception, LF + EOM during transmission.
	Device class	Compliant with the USBTMC-USB488 device class specifications.
LAN	Hardware	IEEE 802.3 100Base-TX or 10Base-T Ethernet IPv4, RJ-45 connector
	Compliant standards	Compliant with the 1.5 LXI Device Specification 2016. Compliant with the LXI VXI-11 Discovery and Identification Extended Function. Compliant with the LXI HiSLIP Extended Function.
	Communication protocol	VXI-11, SCPI-RAW, HiSLIP
	Program message terminator	VXI-11, HiSLIP: LF or END during reception, LF + END during transmission. SCPI-RAW: LF during reception, LF during transmission.

General Specifications

		PMX18-2E	PMX18-5E	PMX35-1E	PMX35-3E	PMX70-1E, PMX110-0.6E, PMX250-0.25E, PMX350-0.2E, PMX500-0.1E
Weight (main unit only)		Approx. 5 kg (11.02 lbs)	Approx. 6 kg (13.23 lbs)	Approx. 5 kg (11.02 lbs)	Approx. 6 kg (13.23 lbs)	Approx. 6 kg (13.23 lbs)
Dimensions		See External dimensions (p.106).				
Environmental conditions	Operating environment	Indoor use, overvoltage category II				
	Operating temperature	0 °C to + 40 °C (32 °F to +104 °F)				
	Operating humidity	20 %rh to 85 %rh (no condensation)				
	Storage temperature	-25 °C to + 70 °C (-13 °F to +158 °F)				
	Storage humidity	90 % rh or less (no condensation)				
	Altitude	Up to 2000 m				
Cooling method		Forced air cooling by fan (with temperature sensor control).				
Grounding polarity		Negative grounding or positive grounding possible				
Isolation voltage		±70 Vdc				±550 Vdc
Withstand voltage	Between input and FG	No abnormalities when 1500 Vac is applied for 1 minute				
	Between input and output	No abnormalities when 2250 Vac is applied for 5 seconds.				No abnormalities when 2900 Vac is applied for 5 seconds.
	Between output and FG	No abnormalities when 1250 Vdc is applied for 1 minute.				No abnormalities when 1650 Vdc is applied for 1 minute.
Insulation resistance	Between input and FG	500 Vdc, 30 MΩ or more				1000 Vdc, 30 MΩ or more
	Between input and output					
	Between output and FG					
Electromagnetic compatibility (EMC) ^{1 2}		Complies with the requirements of the following directive and standards. EMC Directive 2014/30/EU EN 61326-1 (Class A ³) EN 55011 (Class A ³ , Group 1 ⁴) EN 61000-3-2 EN 61000-3-3 Applicable under the following conditions: The maximum length of all cabling and wiring connected to the PMX-E series must be less than 3 m.				
Safety ¹		Complies with the requirements of the following directive and standards. Low Voltage Directive 2014/35/EU ² EN 61010-1 (Class I ⁵ , Pollution Degree 2 ⁶)				
Accessories		See Accessories (p.6).				

- Does not apply to specially ordered or modified products.
- Only for models with CE or UKCA marking on the panel.
- The PMX-E series is a Class A device. This product is intended for use in an industrial environment. Using it in residential areas may cause interference. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.
- The PMX-E series is a Group 1 device. It does not generate and/or use intentionally radio-frequency energy, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purposes.
- The PMX-E series is a Class I device. Be sure to ground the protective conductor terminal. The safety of this product is guaranteed only when the product is properly grounded.
- 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.

External dimensions



Appendix

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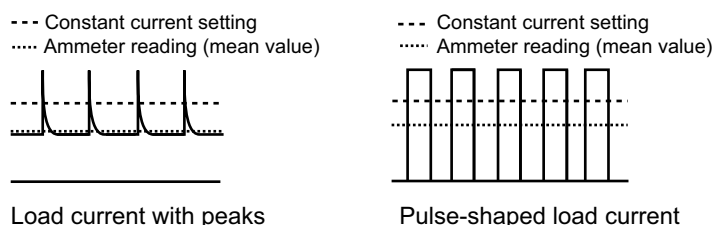
- Load Considerations (p.107)
- Grounding and insulating the DC OUTPUT terminal (p.109)
- CV Power Supply and CC Power Supply (p.110)
- Options (p.112)
- Troubleshooting (p.115)

Load Considerations

Note that the output may be unstable if the loads below are connected to the product. To stabilize the output, you may need to take measures depending on the load.

Loads with peak current or pulse-shaped current

The ammeters of the PMX-E series indicate average values. Even when the indicated value is less than or equal to the set constant current, the peak value may exceed the set constant current. If this happens, PMX-E series is instantaneously put into the constant-current mode, and the output voltage drops. For loads with peak or pulse currents, increase the output current setting or the current capacity.



Loads that generate reverse current to the power supply

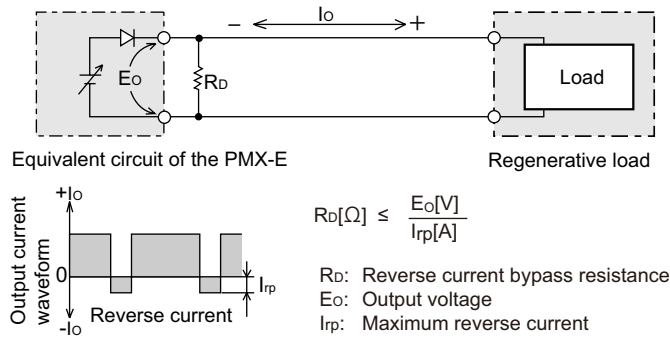
CAUTION

Risk of burn-damage to the resistance.

- If you connect a reverse-current bypass resistor, select one with a sufficient power rating for the circuit.

The PMX-E series cannot absorb reverse current from the load. If a load that may regenerate power (e.g., inverter, converter, transformer) is connected to the power supply, the output voltage increases and the output becomes unstable. This can cause a malfunction.

If the load generates reverse current to the power supply, connect a resistor (R_D) to bypass the reverse current as shown in the following figure. However, the current capacity to the load decreases by 1rp.



Loads with accumulated energy

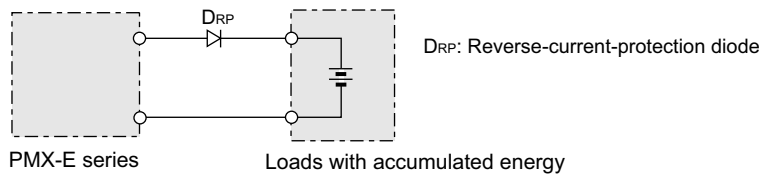
⚠ CAUTION

The load, the diode and the PMX-E series may be damaged.

- When connecting a load with stored energy, select an appropriate reverse current prevention diode.

Connecting a load with stored energy, such as a battery, may cause the current to flow from the load into the internal circuitry of the PMX-E series, potentially damaging the PMX-E series or degrading the load.

For those loads with accumulated energy, connect a reverse current prevention diode (DRP) between the PMX-E series and the load in series as shown in the following figure. This cannot be used in conjunction with remote sensing.



■ Requirements for reverse current prevention diode

- Reverse voltage resistance: Twice the rated output voltage of the PMX-E series
- Forward current capacity: 3 to 10 times the rated output current of the PMX-E series
- Low loss
- Sufficient heat dissipation measures

Grounding and insulating the DC OUTPUT terminal

⚠ WARNING

Risk of electric shock.

- Even if the DC OUTPUT terminal is grounded, make sure that the insulation of the load, external control device, and their connecting wires is equal to or greater than the isolation voltage of the PMX-E series. (p.105)

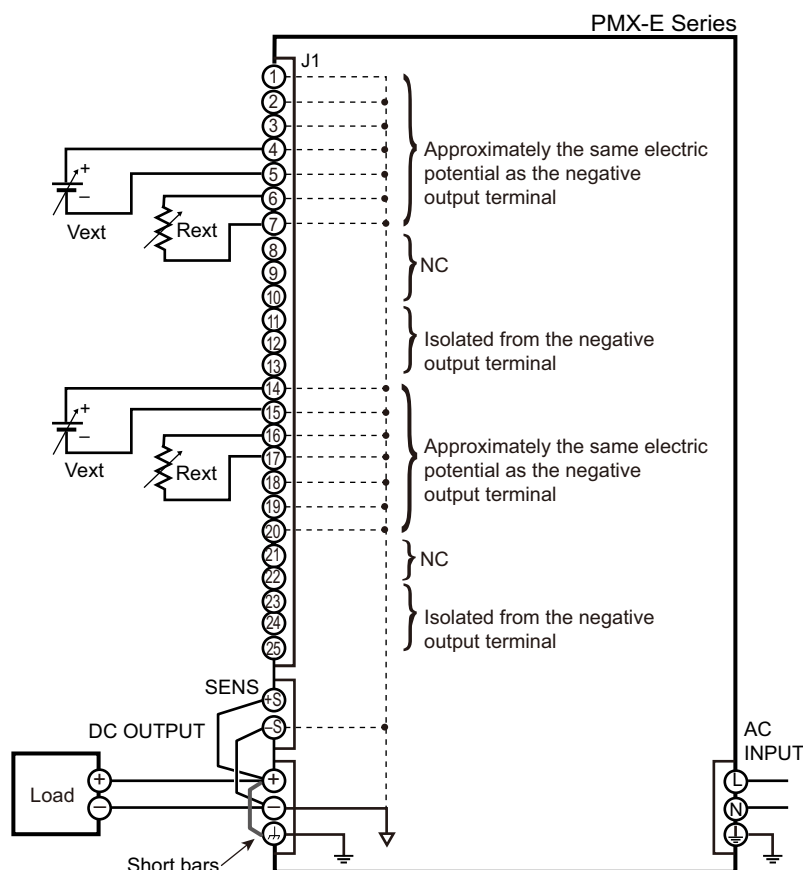
Isolation voltage indicates the maximum allowed voltage that appears across the output terminal of the power supply unit and the protective conductor terminal (chassis terminal). For the isolation voltage of the PMX-E series, see "General Specifications" (p.105)

- The DC OUTPUT terminal is insulated from the protective conductor terminal. By grounding the power cord of the power cord, the chassis will be at ground potential.
- The rear panel's J1 connector will have approximately the same potential as the negative output terminal of the PMX-E series.

The above means that the insulation required for grounding the DC OUTPUT terminal or not grounding it is as follows.

Grounding the DC OUTPUT terminal	Required insulation	
	Insulation level	Target
Yes	More than the Maximum output voltage of PMX-E series	DC OUTPUT terminals, including sensing terminals, and connected loads, including load cables.
No	More than the Isolation voltage of the PMX-E series	J1 connector and connected devices, including cables.

The following figure shows an example of connecting the positive output terminal to the chassis terminal.

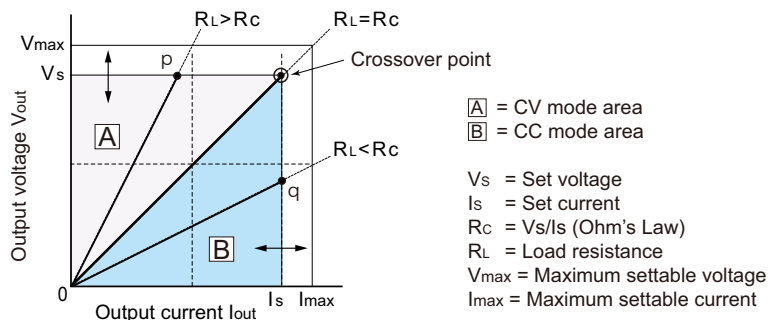


CV Power Supply and CC Power Supply

When the load changes, the PMX-E series functions as a constant-voltage power supply that maintains a constant output voltage and as a constant-current power supply that maintains a constant output current. The constant-voltage source operation is referred to as constant-voltage (CV) mode. The constant-current source operation is referred to as constant-current (CC) mode. The operation mode is determined by the following three values.

- Output voltage setting (V_s)
- Output current setting (I_s)
- The load resistance (R_L)

The operation modes are described below.



The load resistance is denoted as R_L . The resistance, which is denoted as R_c , is calculated from the set voltage and current ($R_c = V_s/I_s$). The power supply is designed so that it operates in CV mode in area [A] and CC mode in area [B]. The boundary is the line defined by $R_L = R_c$. This line represents the load at which the output voltage and the set voltage are equal and the output current and the set current are equal. If load resistance R_L is greater than resistance R_c , the operating point is in area [A], and the PMX-E operates in CV mode (point p). In this case, the set current I_s equals the current limit.

When the product is operating in CV mode, the output voltage is maintained at the set voltage. Output current I is determined by the equation $I = V_s/R_L$ and is a current that is less than current limit I_s . The actual current that flows is not necessarily equal to the specified value.

For loads in which transient peak current flows, current limit I_s must be set higher than the peak value.

Conversely, if load resistance R_L is less than resistance R_c , the operating point is in area [B], and the product operates in CC mode (point q). In this case, set voltage V_s equals the voltage limit.

When the product is operating in CC mode, the output current is maintained at the set current. Output voltage V is determined by the equation $V = I_s \times R_L$ and is a voltage that is less than voltage limit V_s . The actual voltage that is applied is not necessarily equal to the specified value.

■ Crossover point

The product switches automatically between CV mode and CC mode according to the changes in the load. A crossover point is the point at which the mode switches.

For example, when operating in CV mode, if the load changes and the output current reaches the current limit, the PMX-E automatically switches to CC mode to protect the load. Likewise, when operating in CC mode, if the output voltage reaches the voltage limit, the PMX-E switches to CV mode.

■ CV mode and CC mode operation example

This section uses a power supply with a rated output voltage of 35 V and a rated output current of 3 A (PMX35-3E) as an example.

A 60 Ω load resistor (R_L) is connected to the DC OUTPUT terminal. The output voltage is 20 V, and the output current 0.5 A. In this case, $R_c = 20 \text{ V}/0.5 \text{ A} = 40 \Omega$. Because 60 Ω is greater than 40 Ω ($R_L > R_c$), the power supply operates in CV mode. When increasing the voltage while still in CV mode, you can increase the voltage to 30 V because $V_s = I_s \times R_L = 0.5 \text{ A} \times 60 \Omega = 30 \text{ V}$. If you try to increase the voltage above this point, the crossover point is reached, and the power supply automatically switches to CC mode. To maintain operations in CV mode, increase the current limit.

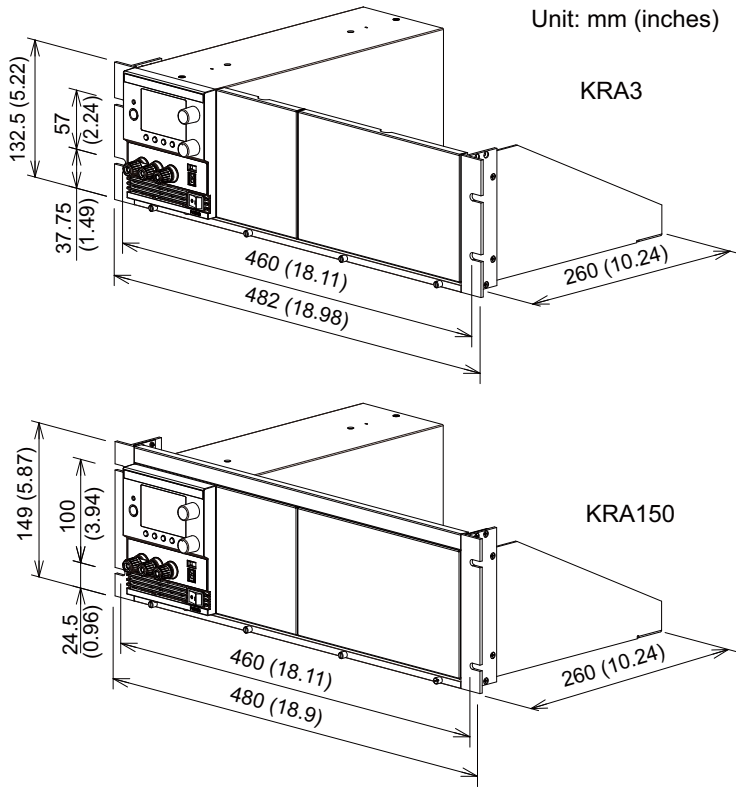
Next, connect a 25 Ω load resistor (R_L) to the DC OUTPUT terminal, and set the output voltage to 20 V and the output current to 0.5 A. In this case, $R_c = 20 \text{ V}/0.5 \text{ A} = 40 \Omega$. Because 40 Ω is greater than 25 Ω ($R_L < R_c$), the power supply operates in CC mode. When increasing the current in CC mode, you can increase the current to 0.8 A because $I_s = V_s/R_L = 20 \text{ V}/25 \Omega = 0.8 \text{ A}$. If you try to increase the current above this point, the crossover point is reached, and the power supply automatically switches to CV mode. To maintain operations in CC mode, increase the voltage limit.

Options

The PMX-E series has the following options.
For information about options, contact your Kikusui agent or distributor.

Rack mount option

Name	Model	Notes
Rack mount adapter	KRA3	Inch racks (for EIA)
	KRA150	Millimeter racks (for JIS)
Blank panel	KBP3-2 (1/2 width)	Common to inch racks (for EIA standards) and millimeter racks (for JIS standards)
	KBP3-4 (1/4 width)	

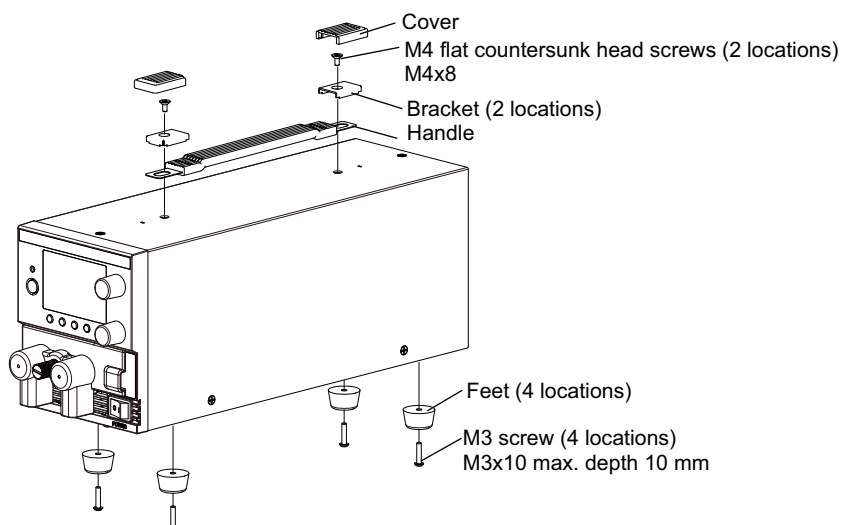


Remove the handle and rubber feet before you mount the PMX-E to a rack.
For information on rack mounting, see the KRA3 or KRA150 operation manual. To support the main unit, attach an angle support to it that is appropriate for the rack.
We recommend keeping all parts in case you remove the main unit from the rack mount frame. When you re-attach the original rubber feet, use the pieces that you removed.

NOTE

To reinstall the handle that has been removed, use screw locking agent (e.g., 1401B by ThreeBond International, Inc.) to prevent screws from loosening.

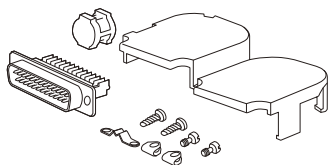
■ Removing the handle and rubber feet



- 1** Remove the two handle covers.
- 2** Remove the two M4 screws and remove the entire handle.
- 3** Remove the four M3 screws and the four rubber feet.

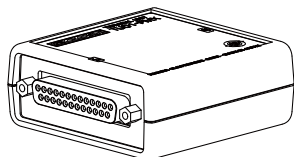
Connector kit OP01-PMX (749809-9 DB25)

Used to connect to the J1 connector for external control.



Terminal unit TU01-PMX

Used to convert the J1 connector to the J2 connector of Kikusui's PMC-A series regulated DC power supply.



Factory option

Input power

Can be replaced with the following nominal input voltage ratings.

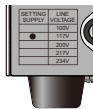
The product comes with a power cord that meets the specifications.

Rated voltages: 117 V, 200 V, 217 V, and 234 V

Frequency (range): 50 Hz/60 Hz (47 Hz to 63 Hz)

The models with changed rated input voltages have a mark to the left of "117 V", "200 V", "217 V", or "234 V" in the "LINE VOLTAGE" column.

The following figure shows an example where the rated input voltage is 117 V.



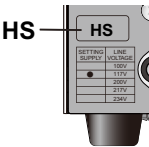
High-speed rising/falling function

The output rising and falling are faster than those of the standard model.

This is useful, e.g., for repeated testing of electronic components.

The models equipped with this function will have "HS" labeled on the rear panel.

Model equipped	Model (Option name)
PMX18-2E	PMX18-2E WITH HIGH SPEED
PMX35-1E	PMX35-1E WITH HIGH SPEED



Troubleshooting

This section introduces troubleshooting measures. Typical symptoms are listed. Check whether any of the items listed below apply to your case. In some cases, the problem can be solved quite easily.

If none of the items apply to your case, we recommend resetting the product to its factory default settings (p.57). If following the remedy does not solve your problem, contact your Kikusui agent or distributor.

■ Startup symptoms

Symptom	Items to check	Remedy
The product does not operate when the POWER switch is turned on.	Is the power cord broken?	Exchange the power cord with a new one. (p.14)
	Is the power cord connected correctly?	Yes Exchange the power cord with a new one. (p.14)
		No Connect the power cord correctly. (p.14)
When the POWER switch is turned on, it takes time before the operation-ready screen appears.	Is the device configured to use a DHCP server for the LAN interface?	If a DHCP server is not available or if the network environment is not in good condition, it may take time for the PMX-E series to start. Configure the device not to use a DHCP server with the CONFIG settings (CF61), or consult your network administrator.

■ No output is generated

Symptom	Items to check	Remedy
No output is generated even when the OUTPUT key is turned on.	Is the output voltage set to 0 V and the output current set to 0 A?	Turn the knobs to set the output voltage and output current to the required values. (p.25)
	Are you using an external contact to turn output on and off?	Yes Use the external contact to turn output on. (p.84)
		No Set the external control parameter for turning output on and off to "off" (CF06: oFF) (p.40)
The output turns off immediately even when it is set to on.	Is the overvoltage protection (OVP) function activated?	Set the OVP value higher than the voltage setting. (p.29)
	Has the overheat protection (OHP) function been activated?	The internal temperature is abnormally high. Check the operating conditions. After you have removed the cause of the abnormal temperature, turn the power switch on. (p.32)
		Probably due to a clogged air intake or a broken fan. Check them.

■ Unable to perform panel operations

Symptom	Items to check	Remedy
Unable to perform panel operations.	Is the LOCK LED lit?	Release the panel control lock. (p.55)
	Is the REMOTE LED lit?	For operation from the panel, press the LOCAL switch to set the unit to the local mode (p.56)
	Is the PMX-E series being controlled via the RS232C, USB, or LAN interface?	
The PMX-E series does not switch to local mode even when the LOCAL switch is pressed.	Was a local lockout (llo) command sent through the communication interface?	Send the "SYST:LOC" communication command to clear the local lockout (llo) status.

■ The output is unstable

Symptom	Items to check	Remedy
When the output is on, turning the VOLTAGE knob or CURRENT knob results in unstable output.	Is the operation mode switching from CV to CC or CC to CV?	Change the setting (output voltage or output current) that is limiting the output to a value greater than the present setting. If the setting is at maximum, you must use a power supply that has a larger output voltage or current. (p.110)
The output voltage or output current fluctuates.	Is the remote sensing function turned on?	While remote sensing is not in use, turn off the SENSING switch (p.20)
	Are both the CV and CC LEDs turned on?	If the output is oscillating when you are using remote sensing, insert a capacitor across the load. The circuit may be malfunctioning. Immediately stop using the PMX-E series, and have it repaired (p.20)
	Do the sensing cables or load cables have poor contact, or are the cables broken?	Turn the POWER switch off, and check the wiring (p.14) (p.20)
	Does the load current have peaks, or is it pulse shaped?	The peak values may be exceeding the set constant current. Increase the set constant current or increase the current capacity (p.110)
The output voltage is offset from the voltage that was generated when it was turned on.	Has 30 minutes or more passed since the power was turned on?	Warm up the PMX-E series for at least 30 minutes.

■ The output ripple is large

Symptom	Items to check	Remedy
The ripple sometimes becomes large.	Is the input voltage outside the range?	Apply a voltage that is within the input voltage range.
The ripple increased when the PMX-E was installed in a different location.	Is something nearby generating a strong magnetic or electrical field?	Take measures such as moving the PMX-E series away from the field source or twisting its cables.
The output ripple is large during external control.	Is there a large amount of external voltage noise?	Take measures against noise.
The ripple increased when the load cable was changed.	Are the remote sensing cables connected?	When you are not using remote sensing, disconnect the remote sensing cables. (p.20)

■ The preset memory settings change.

Symptom	Items to check	Remedy
A value different from the registered setting value is recalled from the preset memory.	When recalling the value, do you press and hold down the memory key for 3 seconds or more?	If you press and hold the memory key for 3 seconds or more when trying to recall a preset memory value, the current settings will be saved in the memory key. When recalling it, you must keep the hold-down time within 3 seconds (p.53)

■ Tuning on the OUTPUT key turns on the ALARM LED.

Symptom	Items to check	Remedy
The ALARM LED lights when the OUTPUT key is turned on.	Is the OVP trip point set to a value less than the output voltage?	Set the OVP trip point to a value higher than the output voltage. (p.29)
	Is the OCP trip point set to a value less than the output current?	Set the OCP trip point to a value above the output current (p.29)
	Is the remote sensing function turned on?	While remote sensing is not in use, turn off the SENSING switch (p.20) Set up the environment so that the voltage drop in each load cable is within the compensation voltage range (0.6 V for a single line). (p.20)
	Are the polarities of the remote sensing cables connected in reverse?	The polarities of the remote sensing cables may be connected in reverse, or the ends of the cables may be shorted. Check the load cables. (p.20)
	Are you using external control with a loose control cable?	Connect the cable correctly (p.77)
	Is the external voltage excessive during external control?	Apply the correct voltage. (p.79)
	Is the internal temperature too high?	The overheat protection function (OHP) has been activated. Check the operating environment. (p.32) Other possible causes include issues such as clogged air intake and fan breakage. Check them.
The ALARM LED lights when the load is changed.	Is a large external voltage, such as that of a battery load, being applied?	The overvoltage protection function (OVP) or the overcurrent protection function (OCP) may have been activated. Do the check (p.28)
	Is the actual output voltage higher than the set voltage that is displayed on the panel?	The product may be overloaded. Check the load.
	Is a special load connected?	The product may be overloaded. Check the load.

■ Unable to perform remote control

Symptom	Items to check	Remedy
Remote control through the communication interface cannot be performed.	Have you selected the communication interface that you want to use in the CONFIG settings?	Select the remote control communication interface (CF40) (CF41) (CF42).
When the LAN interface is in use, the IP address cannot be obtained from the DHCP server.	Is the LAN LED lit in orange or red?	If it is lit in orange, the PMX-E series is waiting for a response from the DHCP server. If it turns red afterward, the PMX-E series may have timed out. Consult your network administrator.

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Warranty Period

Before delivery, our products have undergone strict testing and inspections and have been found to comply with the specifications. We offer different warranty periods for different product models. If the product should become defective within the specific warranty period applied to the product model after the date of purchase, we will repair the product or replace it with a new one for free. In a case in which the customer concluded a separate agreement with us regarding the warranty period, the conditions of the warranty period are applied based on such agreement.

Scope of Warranty

If the product should become defective within the warranty period, we will repair the product or replace it with a new one. However, the warranty does not cover:

- Failure or damage caused by use that is not in accordance with the Operation Manual, misuse, or neglect.
- Failure or damage during transportation after delivery.
- Failure or damage caused by improper modification, adjustment, or repair.
- Failure or damage caused by an Act of God, fire, or other events beyond our control.
- Failure or damage caused by use in a corrosive atmosphere, a dusty environment, or an environment where salt damage occurs or contamination by liquid or foreign matters is likely to occur.
- Failure or damage due to causes that are not attributable to us.

Disclaimer

Regardless of the warranty period, in no event shall we be liable for loss of opportunity or profit caused by the failure of our product, or initial or secondary damages, accident compensation, damages to products other than our products, or compensation for other operations caused by unavoidable circumstances that we may or may not have foreseen.

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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