



KIKUSUI

Part No. IX001183

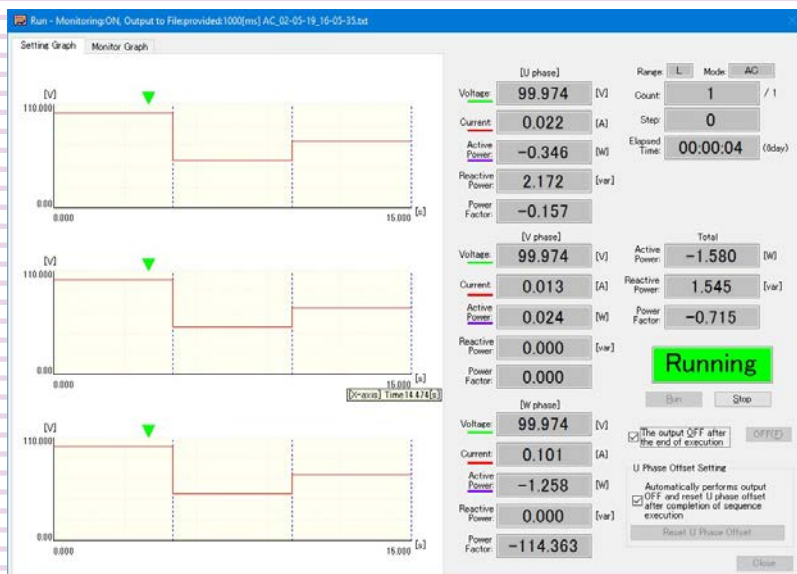
Feb 2023

User's Manual

Sequence Creation Software

SD032-PCR-WE Wavy for PCR-WE

Ver. 6.1x



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Introduction

This manual explains how to use SD032-PCR-WE Wavy for PCR-WE to control the following Kikusui AC power supplies.

- The PCR-WE series and PCR-WE2 series (including the PCR-WE2R, a model with a regeneration function) with firmware version 1.42 and later^{*1}
- The PCR-WEA series and PCR-WEA2 series (including the PCR-WEA2R, a model with a regeneration function) with firmware version 3.10 and later^{*1}

■ Safety Precautions

Before you use Wavy, read the AC power supply manual, and be sure to make connections and handle the device properly.

Improper connections or handling can lead to serious accidents, injury, and fire.

■ Product versions that this manual covers

This manual applies to version 6.1x of SD032-PCR-WE Wavy for PCR-WE. To check the Wavy version, on the Help menu, click About Wavy.

■ Intended readers

This manual is intended for users who will use SD032-PCR-WE Wavy for PCR-WE to control the AC power supply and instructors of such users. The manual assumes that the reader has knowledge about AC power supplies.

■ Notations Used in This Manual

- In this manual, Sequence Creation Software SD032-PCR-WE Wavy for PCR-WE is referred to as Wavy for PCR-WE or Wavy.
- **In this manual, the PCR-WE Series and PCR-WE2 Series (including the PCR-WE2R, a model with a regeneration function) AC Power Supply, in addition the PCR-WEA Series and PCR-WEA2 Series (including the PCR-WEA2R, a model with a regeneration function) AC Power Supply are also referred to as the AC power supply or the PCR-WE.**
- “PC” in this manual is a generic term for personal computers and workstations.
- In this manual, operations on Windows 10 are described when explaining operations related to the OS.
- The following markings are used in this manual.



WARNING

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

NOTE

Indicates information that you should know.

>

Indicates the menu command you need to select. The menu command to the left of “>” is the higher level command.

^{*1}. For instructions on how to view the firmware version, see the AC power supply manual.

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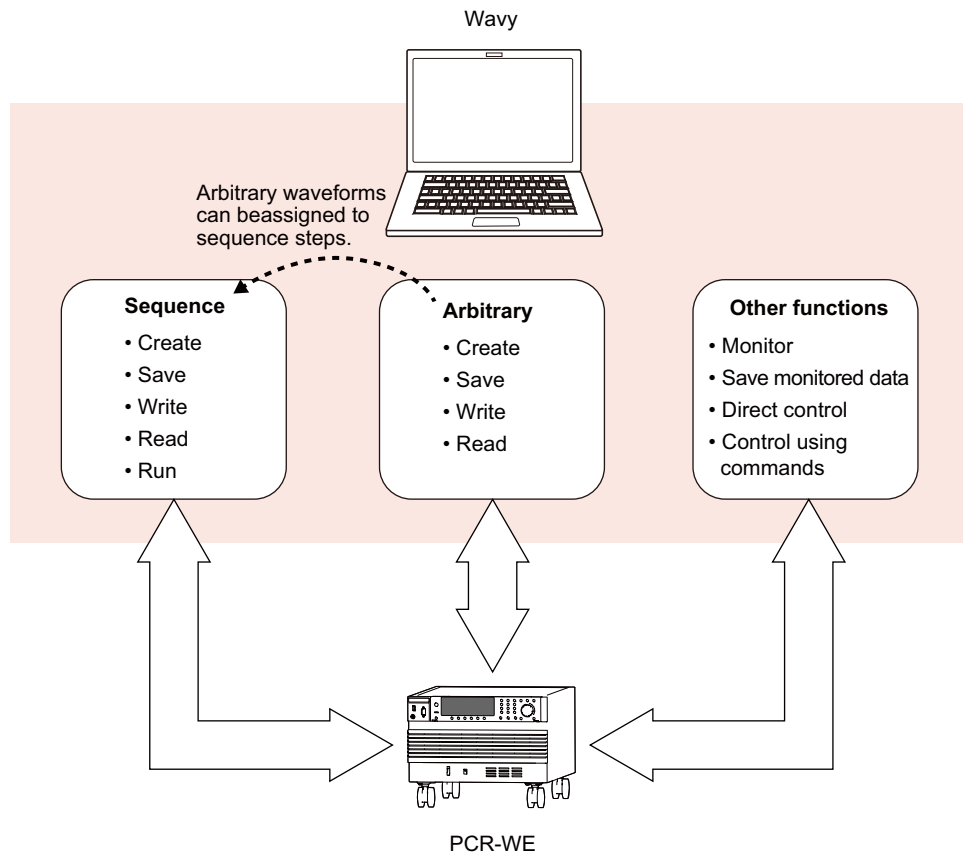
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Wavy Overview

Sequence Creation Software SD032-PCR-WE Wavy for PCR-WE is used to create and execute sequences for Kikusui PCR-WE/PCR-WE2 Series or PCR-WEA/PCR-WEA2 Series AC Power Supply.

You can use graphs and spreadsheets to intuitively create sequence steps. The sequence data that you create are stored and managed in sequence files (.wvy extension). You can write them to a PCR-WE and execute them when necessary.

Wavy also allows you to create arbitrary waveform data that can be transmitted using the special waveform output feature of the PCR-WE. The arbitrary waveform data that you create is saved and managed in individual arbitrary waveform files (.arb extension). You can write them to waveform banks in the PCR-WE or assign them to steps in sequences created using Wavy. You can also use Wavy to monitor and directly control the PCR-WE as well as control them using commands.



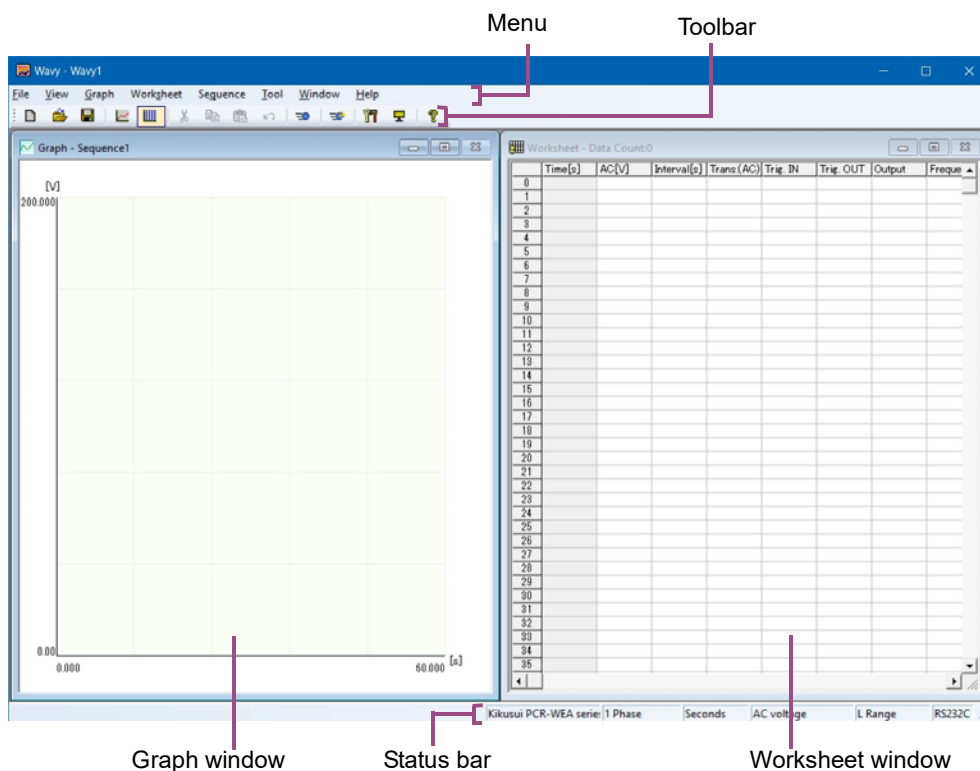
Starting Wavy

NOTE

- Disable the Windows power-saving mode and screen saver. Also, avoid using other applications with Wavy.
- If you are using a PC that has advanced power management (APM) or sleep mode, disable these functions.
- When you change the DPI setting, the display may not appear properly depending on the resolution.

To start Wavy, on the taskbar, click Start, All Programs, Kikusui, and then SD032-PCR-WE>Wavy for PCR-WE.

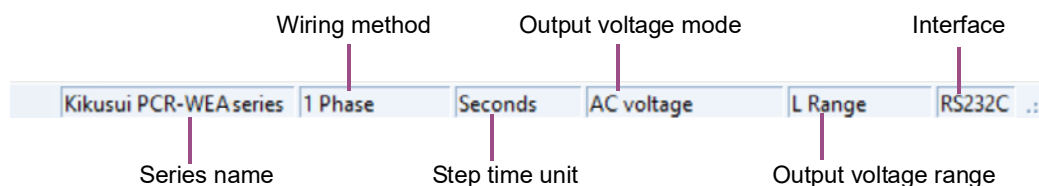
When you start Wavy, the sequence setup window (main window) appears.



The sequence setup window contains a graph window and a worksheet window. Either window can be used to set steps, which are elements of sequences.

- Graph window: Use the mouse to set steps.
- Worksheet window: Enter values and conditions to set steps.

The status bar shows the following items.



Changing the window display format

On the Window menu, click Cascade, Tile Vertically, or Tile Horizontally.

If you select Arrange Icons while windows are minimized, the Graph window and Worksheet window icons are arranged in the bottom area of the window.

View settings at startup

If you select Save Position from the View menu, the position and size of the window are saved and applied the next time Wavy is run.

If you select Previous File, the most recent file that you used will be opened the next time Wavy is run.

If SCPI error codes are displayed

SCPI error codes may be displayed while using Wavy. If an error code is displayed, see the PCR-WE Communication Interface Manual.

Configuring the Interface

Before using Wavy, configure the interface to connect to PCR-WE. You can select from the following three interfaces:

- RS232C (p.8)
- USB (p.10)
- LAN (p.11)
- GPIB (p.14)

RS232C

Connection

- 1 Turn off the PCR-WE and PC.**
- 2 Connect the PCR-WE to the PC with a RS232C cable.**
Use a D-sub, 9-pin, female-to-female AT crossover cable.

Setup

■ PCR-WE setup

By factory default, the PCR-WE's RS232C is set as follows:

- RS232C: Enabled
- Data rate (baudrate): 19200 bps
- Flow control: Xon/Xoff (on)

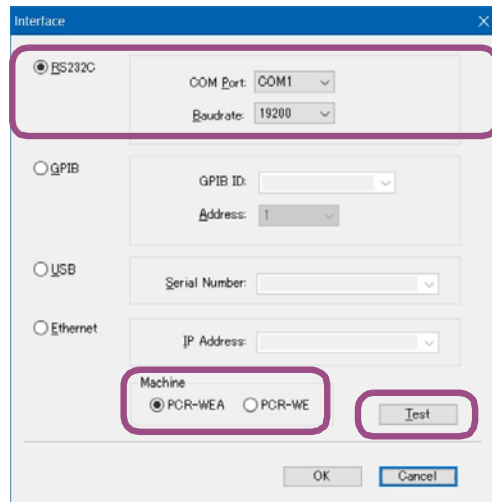
NOTE

Wavy does not perform flow control when exchanging waveform data (binary data). Follow the procedure below to set flow control to NONE (off).

- 1 On the PCR-WE panel, press CONFIG (SHIFT+OPR MODE) > COM-I/F (F1) > RS232C (F3).**
- 2 Press FLOW CTRL (F4) > NONE (F1).**
- 3 Press ESC > APPLY (F5).**
- 4 Turn the PCR-WE's POWER switch off and then back on.**

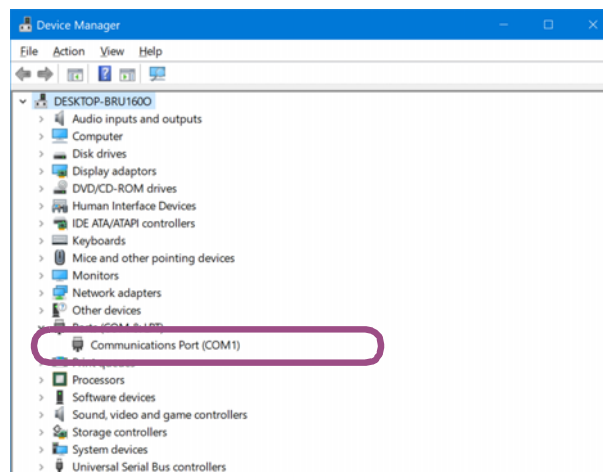
■ Wavy setup

- 1 **Start Wavy.**
- 2 **On the Sequence menu, click Interface.**
The Interface window appears.



- 3 **Select RS232C.**
- 4 **Set the COM port number that the PCR-WE is using.**

Right-click Windows Start, and select Device Manager. Open Port (COM & LPT) to view the port number in use.



- 5 **Set the baudrate set on the PCR-WE.**
- 6 **Select Machine.**
Select PCR-WE if a PCR-WE/PCR-WE2 Series AC Power Supply is to be connected, or select PCR-WEA if a PCR-WEA/PCR-WEA2 Series AC Power Supply is to be connected.
- 7 **Click Test to check that Wavy can communicate with the PCR-WE.**
- 8 **Click OK.**

USB

Connection

- 1 Turn off the PCR-WE and PC.
- 2 Connect the USB connector (device) on the rear panel of the PCR-WE to the PC with a USB cable.

Setup

■ PCR-WE setup

By factory default, the PCR-WE's USB is set as follows:

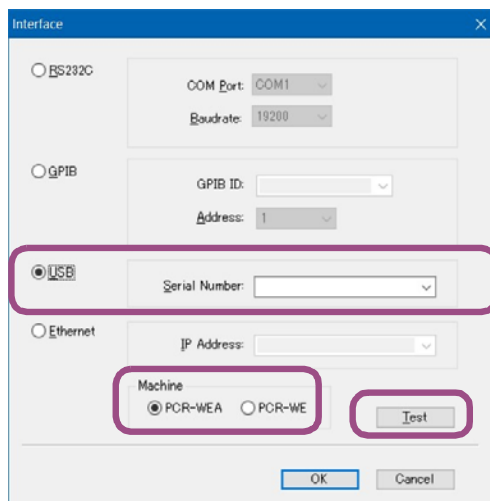
- USB: Enabled

If you are going to use the PCR-WE with the factory default settings, there is no need to configure the PCR-WE. If you want to change the settings, see the PCR-WE Communication Interface Manual.

■ Wavy setup

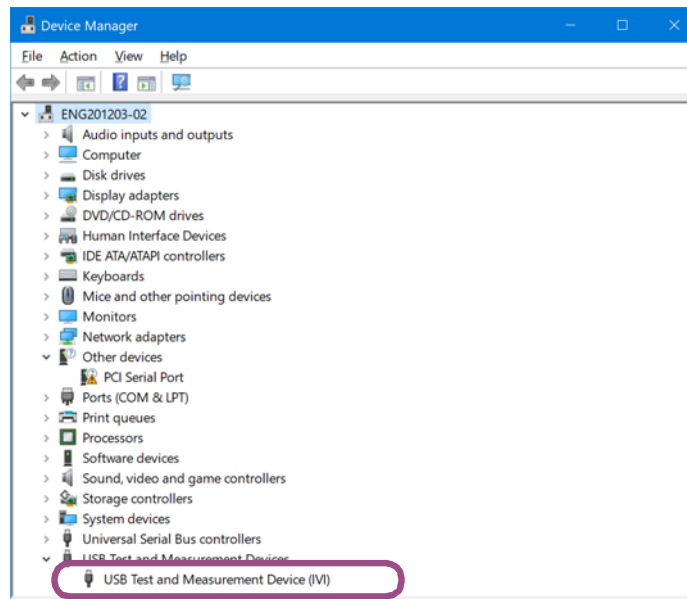
- 1 Start Wavy.
- 2 On the Sequence menu, click Interface.

The Interface window appears.



- 3 Select USB.
- 4 Enter the serial number of the connected PCR-WE.
You can check the serial number on the rear panel of the PCR-WE.

If the serial number does not appear even when the instrument is connected properly, check whether the PC has detected the PCR-WE. Right-click Windows Start, and select Device Manager.



If "USB Test and Measurement Device" is not displayed, VISA is not installed correctly. Reinstall VISA.

5 Select Machine.

Select PCR-WE if a PCR-WE/PCR-WE2 Series AC Power Supply is to be connected, or select PCR-WEA if a PCR-WEA/PCR-WEA2 Series AC Power Supply is to be connected.

6 Click Test to check that Wavy can communicate with the PCR-WE.

7 Click OK.

LAN



WARNING

If a network problem occurs, an unexpected dangerous voltage may occur that may cause electric shock, fire, physical damage to the DUT, and so on. If you are going to remotely control the PCR-WE from a distance, install a Web camera or take other measures to monitor the status.

Connection

- 1 Use a LAN cable (category 5 or greater, straight) to connect the PCR-WE using method (a) or (b).
 - (a) Connect the PCR-WE to a corporate LAN or router.
 - (b) Connect the PCR-WE directly to the PC or through a switching hub.

When connected to the network, the LAN LED on the front panel turns green.

Setup

■ PC setup

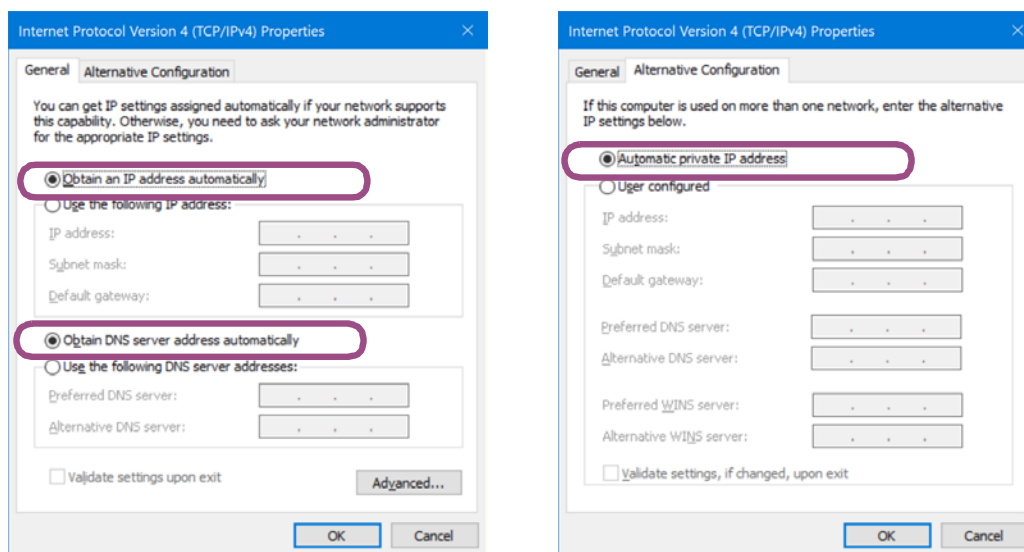
Method (a)

There are no particular settings you need to make.

Method (b)

Set the Internet protocol version 4 (TCP/IPv4) properties as follows:

- Windows Start (right click) > Network connections > Network and Sharing Center > Ethernet > Properties > Internet Protocol Version (TCP/IPv4) > Properties



■ PCR-WE setup

By factory default, the PCR-WE's LAN is set as follows: Unless there is a special reason otherwise, you can simply use these settings for methods (a) and (b).

Setup item	Setting
LAN interface	LAN: Enabled
IP address assignment method	AUTO ^{*1}

^{*1} With method (b), it will take about a minute to establish a connection between the PC and PCR-WE.

To control the PCR-WE from Wavy through LAN, you need to know the PCR-WE's IP address.

If you are going to use the PCR-WE with the factory default settings, the PCR-WE's IP address will be automatically assigned. To check the IP address, follow the procedure below. If you want to change the PCR-WE settings such as when you want to use a fixed IP address, see the PCR-WE Communication Interface Manual.

1 On the PCR-WE panel, press CONFIG (SHIFT+OPR MODE) > COM-I/F (F1) > LAN (F1).

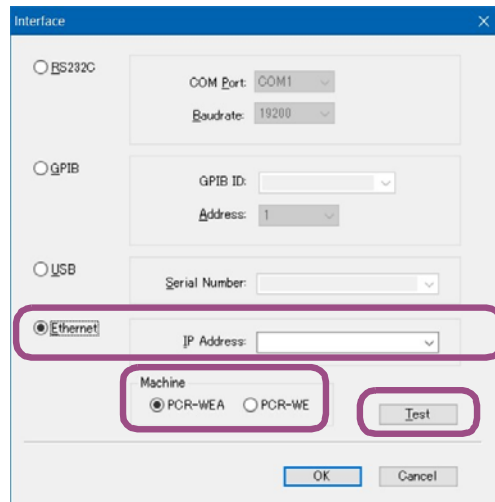
The LAN settings are displayed.

2 Note the IP address.

■ Wavy setup

- 1 Start Wavy.**
- 2 On the Settings menu, click Interface.**

The Interface window appears.



- 3 Click Ethernet.**
- 4 Enter the IP address of the connected PCR-WE.**
The IP address that you enter is not stored in the drop-down list. The drop-down list shows the results of searching the IP addresses registered in VISA.
- 5 Select Machine.**
Select PCR-WE if a PCR-WE/PCR-WE2 Series AC Power Supply is to be connected, or select PCR-WEA if a PCR-WEA/PCR-WEA2 Series AC Power Supply is to be connected.
- 6 Click Test to check that Wavy can communicate with the PCR-WE.**
- 7 Click OK.**

If the PCR-WE is no longer recognized

If you are not using a fixed IP address, the PCR-WE's IP address may change, causing the PC to no longer recognize it. If this happens, check the IP address by following the procedure in "PCR-WE setup" (p. 12).

GPIB

To use GPIB, an optional GPIB interface board (IB07-PCR-WE) must be available in the PCR-WE.

Connection

- 1 Turn off the PCR-WE and PC.
- 2 Connect the PCR-WE to the PC with a GPIB cable.

Setup

■ PCR-WE setup

By factory default, the PCR-WE's GPIB is set as follows:

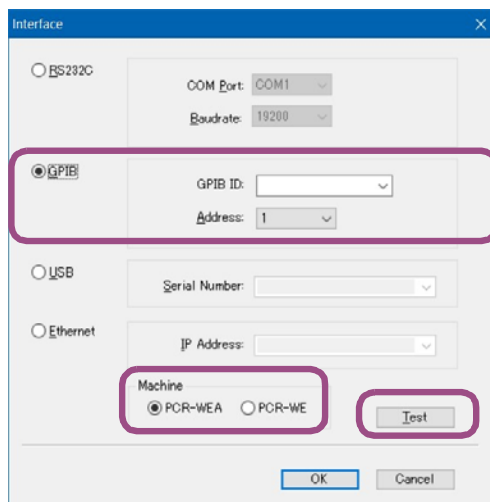
- GPIB: Enabled
- GPIB address: 5

If you are going to use the PCR-WE with the factory default settings, there is no need to configure the PCR-WE. If you want to change the settings, see the PCR-WE Communication Interface Manual.

■ Wavy setup

- 1 Start Wavy.
- 2 On the Settings menu, click Interface.

The Interface window appears.



- 3 Click GPIB.

4 Sets the GPIB ID that you want to use.

Normally the GPIB ID is 0 (GPIB0), but if several GPIB boards, USB-GPIB adapter, or the like are connected to the PC, the ID is used to distinguish them. The drop-down list shows the results of searching the GPIB IDs registered in VISA.

If the GPIB ID you want to use is not displayed in the drop-down list, see “When the GPIB ID is not displayed” (p.15).

5 Set the GPIB address of the connected PCR-WE.

To view the GPIB address, on the PCR-WE panel, press CONFIG (SHIFT+OPR MODE) > COM-I/F (F1) > GPIB (F4).

6 Select Machine.

Select PCR-WE if a PCR-WE/PCR-WE2 Series AC Power Supply is to be connected, or select PCR-WEA if a PCR-WEA/PCR-WEA2 Series AC Power Supply is to be connected.

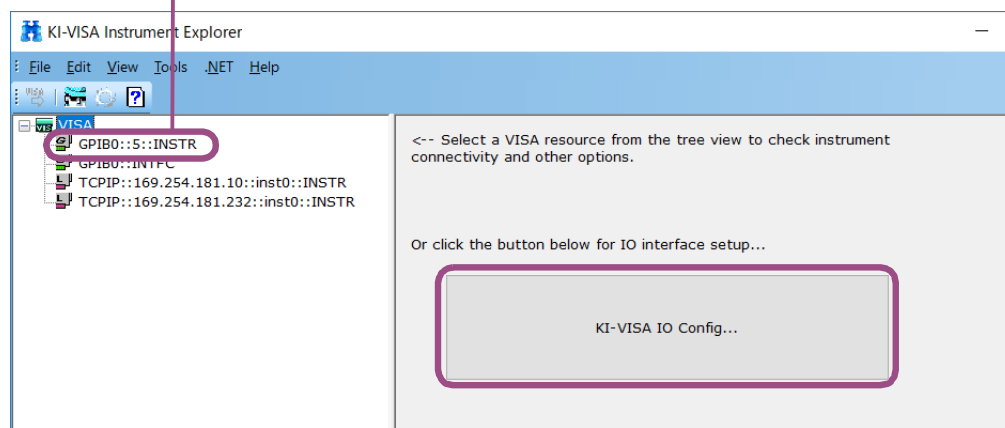
7 Click Test to check that Wavy can communicate with the PCR-WE.**8 Click OK.****When the GPIB ID is not displayed**

You need to register the GPIB ID. The following procedure is for when KI-VISA is used for the VISA library. If you are using another VISA library, see the corresponding manual.

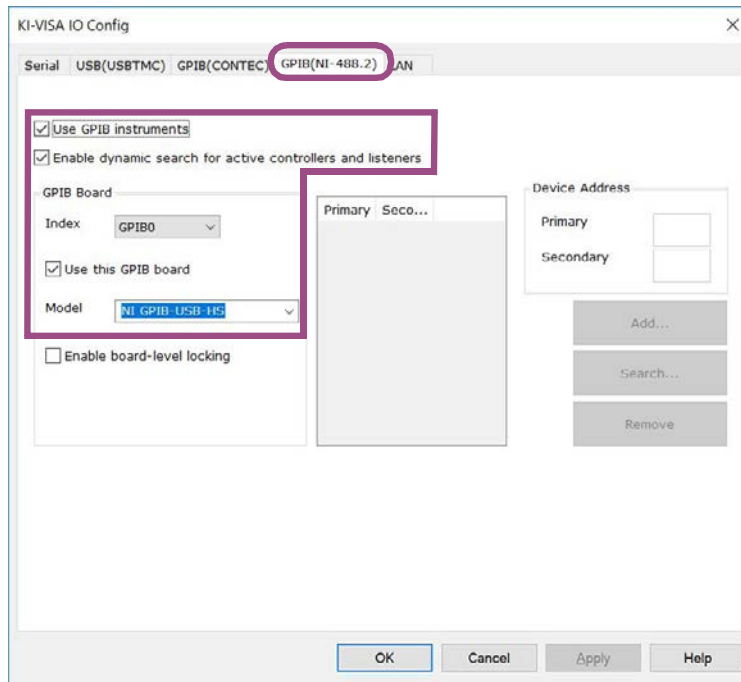
1 From the Windows start menu, select Kikusui io Software > Instrument Explorer.

If a GPIB ID is registered in VISA, a character string that starts with GPIB will appear on the left side of the KI-VISA Instrument Explorer window, as shown below.

(Example) ID: 0, Address: 5

**2 To register a GPIB ID in VISA, click KI-VISA IO Config.**

3 Click the GPIB (NI-488.2) tab.



4 Select the “Use GPIB instrument,” “Enable dynamic search for active controllers and listeners,” and “Use this GPIB board” check boxes.

5 From the Index drop-down list, select the GPIB ID to register.

If you want to additionally register GPIB boards or USB-GPIB adapters, select IDs that do not overlap with the existing IDs.

6 From the Model drop-down list, select the applicable model name.

7 Click OK.

8 Check that the GPIB ID that you registered is displayed on the left side of the KI-VISA Instrument Explorer window.

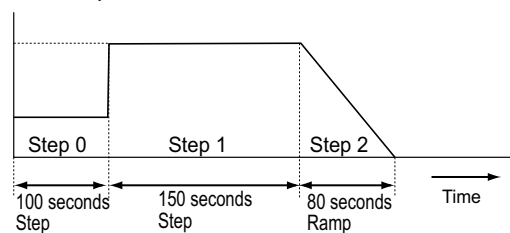
The registered ID will also appear in the GPIB ID drop-down list in the Interface window.

Sequence Overview

Sequences are groups of executable units called steps. In Wavy, first set conditions that apply to all steps in the Sequence Creation Mode window, and then create the individual steps.

You can create steps in the Graph window and Worksheet window. The setup settings that appear in the Worksheet window vary depending on the sequence creation mode settings. You cannot change the sequence creation mode while a step is being created.

When you execute a sequence, the software automatically applies the settings that are recalled in order from step 0.



A single execution of a sequence is complete after the sequence's last step is finished. The maximum number of steps in a sequence is 600. You can specify the sequence repeat count when transferring a sequence to the PCR-WE to run the sequence the specified number of times.

NOTE

Wavy does not check the validity of the settings for the PCR-WE. Do not set the step to a value outside the PCR-WE range specifications. You can transfer a sequence containing invalid values to the PCR-WE, but you will not be able to run it.

Procedure up to Sequence Execution


This section describes the basic procedure up to sequence execution.

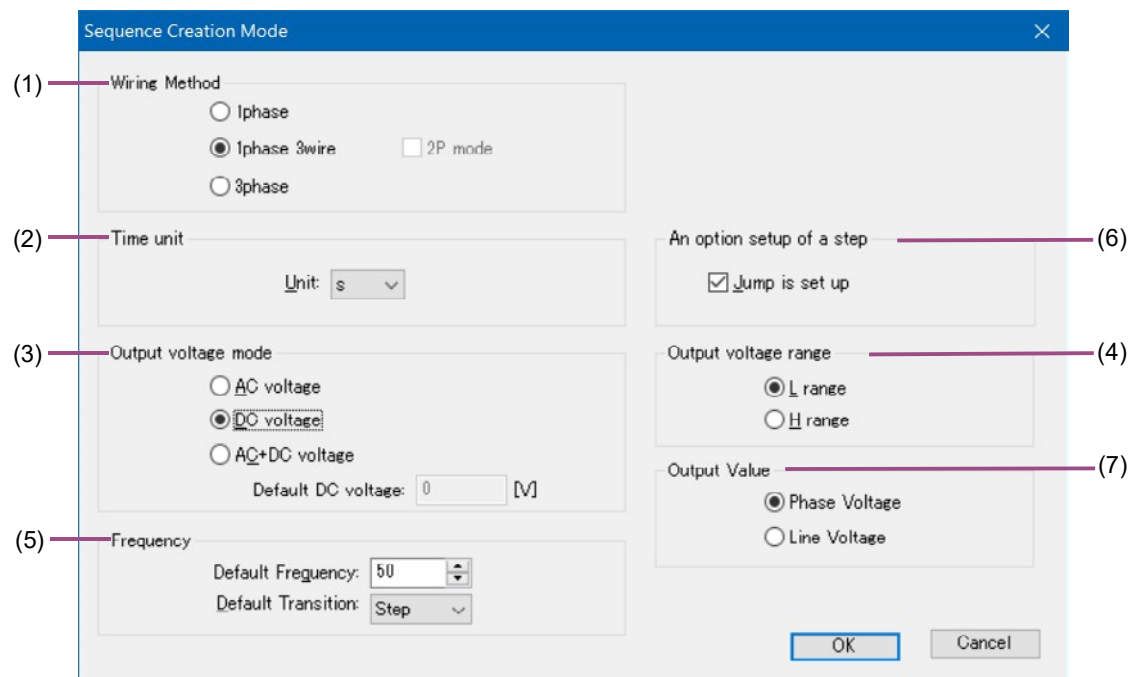
NOTE

To assign an arbitrary waveform to a step, have the necessary arbitrary waveform ready. For details on arbitrary waveforms, see “Creating and Transferring Arbitrary Waveforms” ([p.65](#)).

- 1** In the **Sequence Creation Mode Settings** ([p.19](#)) window, set global sequence items.
- 2** **Create steps.**
 - Creating and Editing Steps with the Mouse ([p.32](#))
 - Creating and Editing Steps by Entering Values ([p.36](#))
- 3** **Save the sequence you created.**
 - Saving sequence data ([p.41](#))
- 4** **Set items related to monitoring.**
 - Specifying monitor settings ([p.55](#))
- 5** In the **Protection Settings** ([p.30](#)) window, set protection items.
- 6** In the **Sequence run window** ([p.47](#)), run the sequence.
 - Running a sequence ([p.50](#))

Sequence Creation Mode Settings

You can set the global sequence items in the Sequence Creation Mode window. To open the window, click Sequence Creation Mode on the Sequence menu. Or, click  on the toolbar.



- (1) Wiring Method ([p.19](#))
- (2) Time unit ([p.19](#))
- (3) Output voltage mode ([p.20](#))
- (4) Output voltage range ([p.20](#))
- (5) Frequency ([p.20](#))
- (6) An option setup of a step ([p.21](#))
- (7) Output Value ([p.21](#))

■ (1) Wiring Method

You can select 1phase, 1phase 3wire, or 3phase.

For PCR-WEA/PCR-WEA2 Series AC Power Supply, if you select 1phase 3wire, you can also select 2P mode. See "(7) Output Value" ([p.21](#)).

■ (2) Time unit

You can set the step interval unit that is used to create steps to milliseconds, seconds, minutes, or hours.

Unit	Interval setting range	Resolution
ms (milliseconds)	0.1 ms to 10000.0 ms	0.1 ms
s (seconds)	0.001 s to 1000.000 s	1 ms
min (minutes)	0.1 min to 1000.0 min	0.1 min
h (hours)	0.1 h to 1000.0 h	0.1 h

■ (3) Output voltage mode

Select the output voltage mode for the sequence.

The PCR-WE does not have the concept of output voltage mode and can output AC voltage and DC voltage (AC+DC) at all times. However, on Wavy, you can specify Step Settings (p.22) to use three output voltage modes: AC voltage, DC voltage, and AC+DC voltage.

Output voltage mode	Items set automatically ^{*1}
AC voltage	DC[V]: 0 V
DC voltage	AC[V]: 0 V, frequency: 50 Hz, wave No: 0, starting phase: FREE, ending phase: FREE, sudden phase change: off, U phase offset ^{*2} : off, UV phase ^{*2} : off, UW phase ^{*2} : off
AC+DC voltage	None

^{*1} These are not shown as settings in steps. They are internal settings.

^{*2} Only when the wiring method is three-phase.

In AC+DC voltage mode, you can set the default DC voltage to use when you are creating sequence data.

	Setting range
Default DC voltage	-455.0 V to 455.0 V (-445.0 V to 445.0 V) ^{*1}

^{*1} The values inside the parentheses apply to PCR-WE/PCR-WE2 AC power supply series (with $1.42 \leq$ firmware version < 2.00 .)

There are three significant decimal places (x.xxx). The actual number of significant decimal places varies depending on the PCR-WE that the PC is connected to.

NOTE

When a sequence with the output voltage mode set to AC voltage or DC voltage is transferred to the PCR-WE, the values of the above items in the PCR-WE are overwritten.

■ (4) Output voltage range

Select the output voltage range for the sequence to L or H. The maximum output current varies depending on the output voltage range. The maximum output current of the H range is half of the that of the L range.

The output voltage setting ranges for the L range and H range are shown below.

	AC voltage	DC voltage/AC+DC voltage
L range	0 V to 161.0 V (0 V to 157.5 V) ^{*1}	-227.5 V to 227.5 V (-225.5 V to 225.5 V) ^{*1}
H range	0 V to 322.0 V (0 V to 315.0 V) ^{*1}	-455.0 V to 455.0 V (-445.0 V to 445.0 V) ^{*1}

^{*1} The values inside the parentheses apply to PCR-WE/PCR-WE2 AC power supply series (with $1.42 \leq$ firmware version < 2.00 .)

■ (5) Frequency

Set the default frequency for the sequence setup settings (1.00 Hz to 5000 Hz) and default frequency transition (step or ramp).

You can set the frequency when the output voltage mode is set to AC voltage or AC+DC voltage.

■ (6) An option setup of a step

Select the check box to enable the step jump function. If you select the check box, jump settings will appear in the worksheet window. See “Step Settings” [\(p.22\)](#).

NOTE

If you enable the jump function, the marker or bar that indicates the approximate position of execution will no longer be displayed during sequence execution.

■ (7) Output Value

This is enabled when 1phase 3wire is selected for “(1) Wiring Method” [\(p.19\)](#) and DC voltage is selected for “(3) Output voltage mode” [\(p.20\)](#). You can select whether to set the output voltage value as phase voltage or line voltage.

When setting with phase voltage, set the voltage for each of the U phase and V phase. For PCR-WEA/PCR-WEA2 Series AC Power Supply, when 2P mode is off, the V phase setting is ignored and the V phase outputs a value with the opposite polarity to the U phase.

When setting with line voltage, set the voltage between the U and V phases.

Step Settings

Set the conditions for each sequence step. One step corresponds to one operation in the executed sequence.

Create and edit steps in the Graph or Worksheet window. In the Graph window, you can set only the output voltage, voltage transition, and execution time.

NOTE

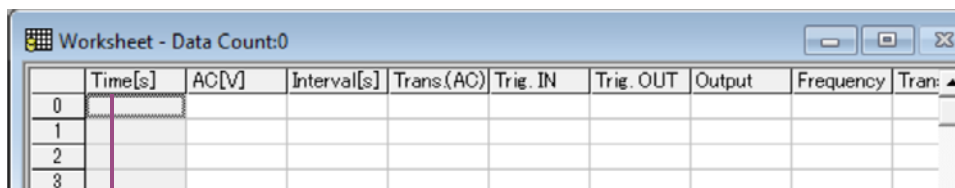
To assign an arbitrary waveform to a step, have the necessary arbitrary waveform ready. For details on arbitrary waveforms, see “Creating and Transferring Arbitrary Waveforms” (p.65).

For each step set the following conditions:

- (1) Setting the execution time (p.24)
- (2) Setting the voltage (p.24)
- (3) Setting the Frequency (p.25)
- (4) Setting the output (p.25)
- (5) Setting the waveform bank number (p.25)
- (6) Setting the phase (p.26)
- (7) Setting the phase difference (only when the wiring method is 1P3W or 3P) (p.27)
- (8) Setting the phase sweep (only when the wiring method is 1P3W or 3P) (p.28)
- (9) Setting the output impedance (p.28)
- (10) Setting the jump function (p.29)

The settings that appear in the Worksheet window vary depending on the wiring method specified in sequence creation mode and output voltage mode. Settings that you cannot change are not displayed.

(Example) Wiring Method: 1phase and Output voltage mode: AC+DC voltage



	Time[s]	AC[V]	Interval[s]	Trans.(AC)	Trig. IN	Trig. OUT	Output	Frequency	Tran: ▲
0									
1									
2									
3									

Time represents the cumulative time from step 1. You cannot set this value.

Table of step settings

	Setting			Output voltage mode		
	Wiring: 1P	Wiring: 1P3W	Wiring: 3W	AC	DC	AC+DC
(2)	AC[V]	AC U[V]	AC U[V]	Yes		Yes
		AC V[V]	AC V[V]	Yes		Yes
			AC W[V]	Yes		Yes
(1)	Interval[ms/s/min/h]	Interval[ms/s/min/h]	Interval[ms/s/min/h]	Yes	Yes	Yes
(2)	Trans.(AC)	Trans.(AC)	Trans.(AC)	Yes		Yes
(4)	Trig. IN	Trig. IN	Trig. IN	Yes	Yes	Yes
	Trig. OUT	Trig. OUT	Trig. OUT	Yes	Yes	Yes
	Output	Output	Output	Yes	Yes	Yes
(3)	Frequency	Frequency	Frequency	Yes		Yes
	Trans.(f)	Trans.(f)	Trans.(f)	Yes		Yes
(2)	DC[V]	DC U[V]	DC U[V]		Yes	Yes
		DC U-V[V] ^{*1}				
		DC V[V] ^{*1,*2}	DC V[V]		Yes	Yes
			DC W[V]		Yes	Yes
	Trans.(DC)	Trans.(DC)	Trans.(DC)		Yes	Yes
(5)	WB No. U	WB No. U	WB No. U	Yes		Yes
		WB No. V ^{*2}	WB No. V	Yes		Yes
			WB No. W	Yes		Yes
(6)	S.Phase	S.Phase	S.Phase	Yes		Yes
	Start[deg]	Start[deg]	Start[deg]	Yes		Yes
	E.Phase	E.Phase	E.Phase	Yes		Yes
	End[deg]	End[deg]	End[deg]	Yes		Yes
	Pri. phase	Pri. phase	Pri. phase	Yes		Yes
(8)			U offset	Yes		Yes
			U offset[deg]	Yes		Yes
			U offs. ramp	Yes		Yes
(7)		UV phase ^{*2}	UV phase	Yes		Yes
		UV [deg] ^{*2}	UV [deg]	Yes		Yes
(8)		UV ramp ^{*2}	UV ramp	Yes		Yes
(7)			UW phase	Yes		Yes
			UW [deg]	Yes		Yes
(8)			UW ramp	Yes		Yes
(4)	Stat. Out	Stat. Out	Stat. Out	Yes	Yes	Yes
(9)	Outp. Imp.	Outp. Imp.	Outp. Imp.	Yes	Yes	Yes
	OutputRESI U[mΩ]	OutputRESI U[mΩ]	OutputRESI U[mΩ]	Yes	Yes	Yes
		OutputRESI V[mΩ]	OutputRESI V[mΩ]	Yes	Yes	Yes
			OutputRESI W[mΩ]	Yes	Yes	Yes
	OutputREAC U[μH]	OutputREAC U[μH]	OutputREAC U[μH]	Yes	Yes	Yes
		OutputREAC V[μH]	OutputREAC V[μH]	Yes	Yes	Yes
			OutputREAC W[μH]	Yes	Yes	Yes
(10)	Jump	Jump	Jump	Yes	Yes	Yes
	Jump Step	Jump Step	Jump Step	Yes	Yes	Yes
	Jump Count	Jump Count	Jump Count	Yes	Yes	Yes

^{*1} When line voltage is selected in "(7) Output Value" (p.21) of the Sequence Creation Mode window, only DC U-V[V] is set and there is no DC V[V] setting.

^{*2} For PCR-WEA/PCR-WEA2 Series AC Power Supply only

■ (1) Setting the execution time

Setting	Description	Value
Interval[ms] ^{*1}	Step execution time.	0.1 ms to 10000.0 ms (Resolution: 0.1 ms)
Interval[s]		0.001 s to 1000.00 s (Resolution: 1 ms)
Interval[min]		0.1 min to 1000.0 min (Resolution: 0.1 min)
Interval[h]		0.1 h to 1000.0 h (Resolution: 0.1 h)

*1 Depending on the time unit that you specified in sequence creation mode (s, ms, min, or h), the interval in the worksheet is set to Interval[s], Interval[ms], Interval[min], or Interval[h].

■ (2) Setting the voltage

Setting	Description	Value
AC[V] ^{*1}	AC output voltage	0.0 V to 322.0 V (0.0 V to 315.0 V) ^{*2, *3}
DC[V] ^{*4}	DC output voltage	Phase voltage
		-455.0 V to 455.0 V (-445.0 V to 445.0 V) ^{*3}
		Line voltage -910.0 V to 910.0 V (-890.0 V to 890.0 V) ^{*3}
Trans.(AC) ^{*5}	AC voltage change	Step, Ramp ^{*6}
Trans.(DC)	DC voltage change	Step, Ramp ^{*6}

*1 If the wiring method is single-phase, three-wire or three-phase, specify the phase voltage. Phase voltage settings appear as AC U[V], AC V[V], or AC W[V].

*2 You can set the voltage as low as 0.0 V, but even if you do, the actual output voltage will always be in the range of 0.1 V to 0.6 V. (The minimum value varies depending on the output voltage range and temperature.)

*3 The values inside the parentheses apply to PCR-WE/PCR-WE2 AC power supply series (with $1.42 \leq \text{firmware version} < 2.00$.)

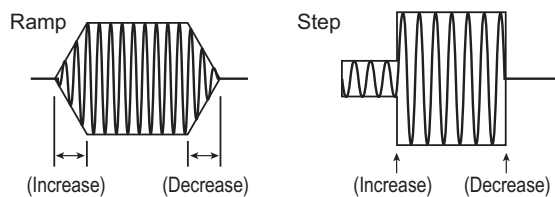
*4 If the wiring method is single-phase, three-wire, set according to the selection of "(7) Output Value" (p.21) in the Sequence Creation Mode window.

When setting with phase voltage, set the voltage for each of the U phase and V phase. For PCR-WEA/PCR-WEA2 Series AC Power Supply, when 2P mode is off, the V phase setting is ignored and the V phase outputs a value with the opposite polarity to the U phase.

When setting with line voltage, set the voltage between the U and V phases.

*5 In the PCR-WE user's manual, "step" is denoted as "ramp off," and "ramp" as "ramp on."

*6 To change the voltage linearly over a specified time, select Ramp. To change the value as a step, select Step. If the interval (step execution time) is short, a smooth straight line may not be obtained for ramp.

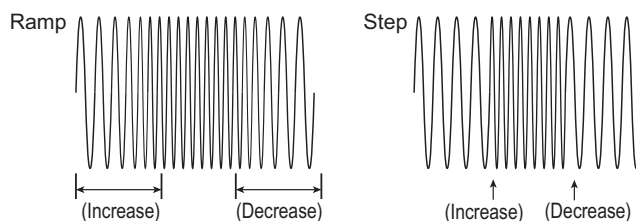


■ (3) Setting the Frequency

Setting	Description	Value
Frequency	Step frequency	1.00 Hz to 5000 Hz
Trans.(f) ^{*1}	Frequency change	Step, Ramp ^{*2}

*1 In the PCR-WE user's manual, "step" is denoted as "ramp off," and "ramp" as "ramp on."

*2 To change the frequency gradually over a specified time, select Ramp. To change the value as a step, select Step.



■ (4) Setting the output

If Trig. IN, Trig. OUT, or Stat. Out is set to on, set the channel of the PCR-WE's DIGITAL I/O connector. For the setup procedure, see "DIGITAL I/O Settings" (p.61).

Setting	Description	Value
Output	Output on/off	on, off
Trig. IN ^{*1 *2}	Trigger wait state	on, off
Trig. OUT ^{*3}	Trigger signal output	on, off
Stat. Out ^{*4}	Status signal output	on, off

*1 A sequence pauses and waits for a trigger before executing a step whose Trig. IN is set to on. If you click Continue on the Sequence run window (p.47), the trigger wait state is cleared, and the sequence resumes. In addition, if a SEQ Trigger In (p.63) signal is applied to the PCR-WE's DIGITAL I/O connector, the trigger wait state is cleared, and the sequence resumes.

*2 Do not set both Pri. phase and Trig. IN to on in the same step. If you do, the sequence cannot be executed.

*3 If Trig. OUT is set to on, a SEQ Trigger Out (p.64) signal is output from the PCR-WE's DIGITAL I/O connector when the step is executed.

*4 If Stat. Out is set to on, a SEQ Status Out (p.64) signal is output from the PCR-WE's DIGITAL I/O connector while the waveform of the step is being output.

■ (5) Setting the waveform bank number

Setting	Description	Value
WB No ^{*1}	Waveform bank number	0 to 256

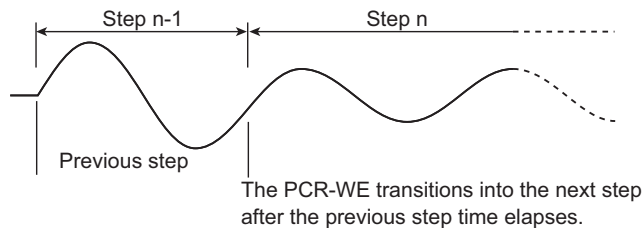
*1 Specify a waveform bank number that is registered in the list of waveform banks in the waveform view. For details on the list of waveform banks, see "Displaying the Waveform View" (p.73). Output waveform data is stored in the PCR-WE internal memory. The memory area for storing the data of one output waveform is referred to as a waveform bank. The banks are assigned number from 0 to 256. Waveform bank 0 contains sine wave data that is used in the PCR-WE's reference voltage waveform and cannot be overwritten. In the factory default settings, all waveform banks have the same waveform (sine wave) as the one that is stored in waveform bank 0.

■ (6) Setting the phase

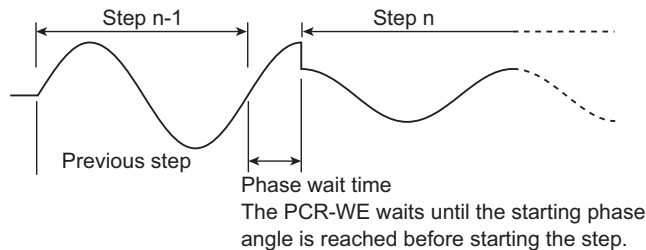
Setting	Description	Value
S. Phase ^{*1 *3}	Starting phase angle control	FREE, FIXED
Start[deg] ^{*1 *4}	Starting phase angle	0 deg to 360 deg (0 = 360)
E. Phase ^{*2 *3}	Ending phase angle control	FREE, FIXED
End[deg] ^{*2 *4}	Ending phase angle	0 deg to 360 deg (0 = 360)
Pri. phase ^{*5 *6}	Sudden phase change	on, off

- *1 Steps are managed in terms of time. If you set S. Phase to FIXED and set the starting phase angle, the step will start from the specified phase angle.
For example, if you set the starting phase angle of step (n) to 90°, even if the execution of the previous step (n-1) finishes, the execution of the next step will not begin until the phase angle reaches 90°. The wait time that is inserted after the execution of a step as a result of setting a phase angle is called phase wait time. The phase wait time is dependent on frequency.

When the starting phase angle is not specified (S. Phase: FREE)

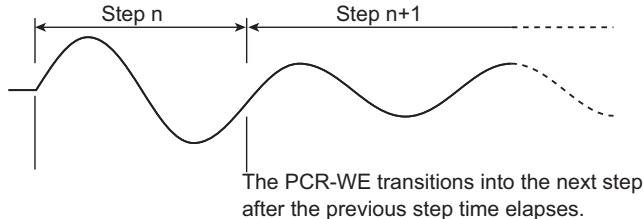


When the starting phase angle is set to 90° (S. Phase: FREE and Start[deg]: 90)

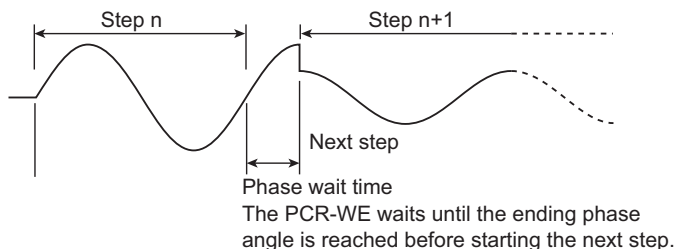


- *2 Steps are managed in terms of time. If you set E. Phase to FIXED and set the ending phase angle, the step will end at the specified phase angle.
For example, if you set the ending phase angle of step (n) to 90°, even if the execution of the step (n) finishes, the execution of the next step (n+1) will not begin until the phase angle reaches 90°. The wait time that is inserted after the execution of a step as a result of setting a phase angle is called phase wait time. The phase wait time is dependent on frequency.

When the ending phase angle is not set (E. Phase: FREE)

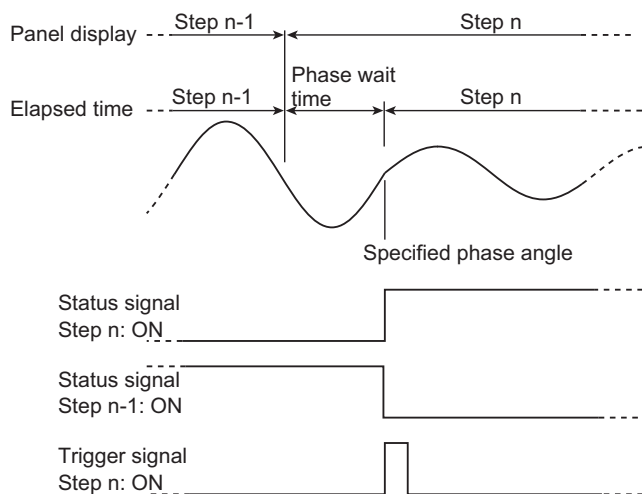


When the ending phase angle is set to 90° (E. Phase: FIXED and End[deg]: 90)

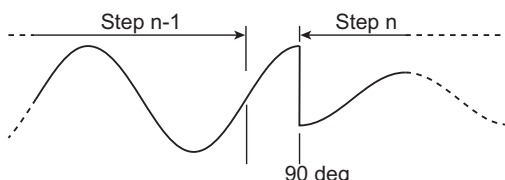


- *3 S.Phase or E.Phase to FIXED will cause phase wait time to be inserted in the sequence. The PCR-WE panel shows the next step during a phase wait time, but the elapsed time remains at 0 until the next step is actually started.

For example, during the phase wait time after the execution of step n-1, the PCR-WE panel will show step n. The status signal is output while the waveform of the step whose status signal is set to on is being output.



- *4 Be careful if you want to output waveforms continuously (without sudden phase changes). For example, if you set the starting phase angle of step n and the ending phase angle of the previous step (n-1), the phase wait time between the completion of step n-1 and the start of step n may be as long as one period. To prevent this sort of confusion, we recommend that you set only the starting phase angle if you want to output waveforms continuously.
- *5 If you set Pri. phase to on, S.Phase of the step and E.Phase of the previous step are automatically set to FIXED, and the phase will make a sudden change. For example, if you set Pri. phase of step n to on, S.Phase of step n and E.Phase of the previous step (n-1) are automatically set to FIXED, and the phase will make a sudden change. If you set Start[deg] of step n to 270° and End[deg] of step n-1 to 90°, when the execution of step n-1 finishes and the phase angle reaches 90°, the execution of step n will begin immediately.



- *6 Do not set both Pri. phase and Trig. IN to on in the same step. If you do, the sequence cannot be executed.

■ (7) Setting the phase difference (only when the wiring method is 1P3W or 3P)

Setting	Description	Value
UV phase ^{*1 *3}	UV phase difference control	on, off
UV [deg] ^{*1 *3}	UV phase angle	0 deg to 360 deg (0 = 360)
UW phase ^{*3}	UW phase difference control	on, off
UW [deg] ^{*2 *3}	UW phase angle	0 deg to 360 deg (0 = 360)

*1 To suddenly change the V phase, set UV phase to on, and set the UV phase angle.

*2 To suddenly change the W phase, set UW phase to on, and set the UW phase angle. (The UW phase difference can be set only when the wiring method is three-phase.)

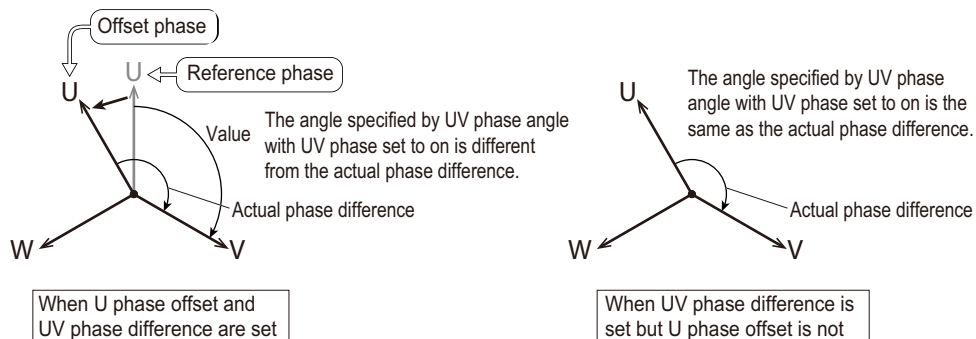
*3 For details on setting the sudden phase change of the V phase and W phase, see "Sequence Creation Tutorial" in the PCR-WE User's Manual.

■ (8) Setting the phase sweep (only when the wiring method is 1P3W or 3P)

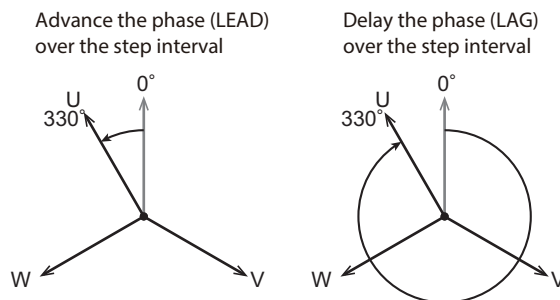
Setting	Description	Value
U offset ^{*1}	U phase offset control	on, off
U offset[deg] ^{*1}	U phase offset angle	0 deg to 360 deg (0 = 360)
U offs.ramp ^{*2}	U phase transition	off, LEAD, LAG
UV ramp ^{*2}	V phase transition	off, LEAD, LAG
UW ramp ^{*2}	W phase transition	off, LEAD, LAG

^{*1} If you set U offset to on and set the U phase offset angle, the U phase will be offset from the reference phase by the specified angle. By offsetting the U phase, you can suddenly change the phase of one or two phases and sweep the phase.

If you offset the U phase, the U-V and U-W phase difference settings (the UV and UW phase angles specified by setting UV phase and UW phase to on) will be different from the actual U-V and U-W phase differences. Therefore, if you do not need to sweep the phase, we recommend that you set the U phase offset to off. For details, see "Sequence Creation Tutorial" in the PCR-WE User's Manual.



^{*2} The phase change that you specify when you want to sweep the phase. To gradually change the phase over the specified time, set this to LEAD or LAG. This is effective for varying the line voltage. For details, see "Sequence Creation Tutorial" in the PCR-WE User's Manual.



■ (9) Setting the output impedance

Setting	Description	Value
Outp. Imp.	Output impedance	on, off
OutputRESI[mΩ]	Output impedance (resistance component)	0 mΩ to 8000 mΩ
OutputREAC[μH]	Output impedance (reactance component)	0 μH to 8000 μH

■ (10) Setting the jump function

Setting	Description	Value
Jump ^{*1}	Jump function	on, off
Jump Step ^{*1 *2}	Jump destination step	0 to 599
Jump Count ^{*1 *2}	Number of jump repetitions	0 to 99999 ^{*3}

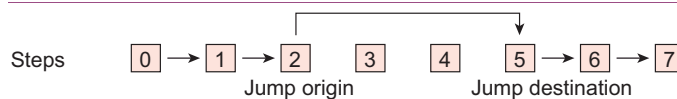
*1 This setting is available only when “An option of a step” is enabled in the step option settings in the Sequence Creation Mode window. Normally sequence steps are executed in order from the first step, but you can use the jump function to skip or repeat steps.

*2 To set the range of steps to execute repeatedly, set Jump of the jump source step to on, and set Jump Step and Jump Count. This will cause the steps from the jump source step to the jump destination step to be executed repeatedly.

*3 99999 represents infinity.

• Example of skipping steps

Step	Jump	Jump Step	Jump Count
0, 1, 3 to 7	off	0	1
2	on	5	1

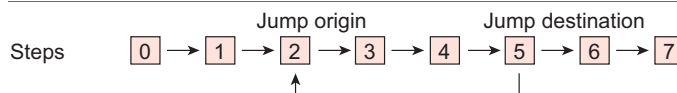


The execution jumps over steps 3 and 4.

The step execution order is 0→1→2→5→6→7

• Example of repeating steps

Step	Jump	Jump Step	Jump Count
0 to 4, 6, 7	off	0	1
5	on	2	2



The execution jumps from step 5 to step 2.

Order of step execution: 0→1→2→3→4→5→2→3→4→5→2→3→4→5→6→7

Protection Settings

You can set the PCR-WE protection function and limit values from Wavy. Set these before running a sequence.

On the Sequence menu, click Protection Setup to open the Protection Setup window.

The screenshot shows the 'Protection Setup' dialog box. It has a blue title bar with a close button. Inside, there's a 'Read' button at the top. Below it is the 'Protection' section with four input fields: 'OVP: 0.0 [V]', 'UVP: 0.0 [V]', '(+)peak OVP: 0.0 [V]', and '(-)peak OVP: 0.0 [V]', followed by a 'Set' button. Below that is the 'Current Limit' section. It has a sub-section 'Current Limit' with three input fields: 'U Phase 0.00 [A]', 'V Phase 0.00 [A]', and 'W Phase 0.00 [A]'. Below that is the '(+)peak current limit' section with three input fields: 'U Phase 0.00 [A]', 'V Phase 0.00 [A]', and 'W Phase 0.00 [A]', and a 'Trip' checkbox with a '0 [s]' input field. Below that is the '(-)peak current limit' section with three input fields: 'U Phase 0.00 [A]', 'V Phase 0.00 [A]', and 'W Phase 0.00 [A]'. A 'Set' button is at the bottom right of the 'Current Limit' section. A 'Close' button is at the bottom right of the dialog box. Callout (1) points to the 'Read' button. Callout (2) points to the 'Protection' section. Callout (3) points to the 'Current Limit' section.

- (1) Read ([p.30](#))
- (2) Protection ([p.31](#))
- (3) Current Limit ([p.31](#))

■ (1) Read

The settings applied to the connected PCR-WE are read. Clicking Read shows the values in the Protection and Current Limit items.

■ (2) Protection

This function protects the load from overvoltage and undervoltage.

If you set the wiring method to single-phase, three-wire or three-phase, specify a phase voltage. The values apply to all phases.

Setting	Description
OVP	Set the OVP (output overvoltage protection) value. If the output voltage exceeds this setting and remains there for approximately 1 second, the OVP will be activated. Setting range: 14.0 V to 500.5 V (14.0 V to 489.5 V) ^{*1}
UVP	Set the UVP (output undervoltage protection) value. If the output voltage drops below this setting and remains there for approximately 1 second, the UVP will be activated. Setting range: 0.0 V to 500.5 V (0.0 V to 489.5 V) ^{*1}
(+)peak OVP	Set the positive peak OVP value of the output voltage. If the output voltage exceeds this setting and remains there for approximately 1 second, the OVP will be activated. Setting range: 14.0 V to 500.5 V (14.0 V to 489.5 V) ^{*1}
(-)peak OVP	Set the negative peak OVP value of the output voltage. If the output voltage exceeds this setting and remains there for approximately 1 second, the OVP will be activated. Setting range: -500.5 V to -14.0 V (-489.5 V to -14.0 V) ^{*1}
Set	Clicking Set will set the values to the PCR-WE, and the settings are updated.

^{*1} The values inside the parentheses apply to PCR-WE/PCR-WE2 AC power supply series (with 1.42 ≤ firmware version < 2.00.)

■ (3) Current Limit

This function limits the current flowing through the load.

The phase that can be set varies depending on the wiring method selection.

Setting	Description
Current Limit	Set the output current's upper limit with an rms value. Setting range: Maximum output current of L range × 0.1 to maximum output current of L range × 1.1
(+)peak current limit	Sets the positive peak current limit. Setting range: Maximum output current × 0.1 to Maximum output current × 4.2
(-)peak current limit	Sets the negative peak current limit. Setting range: Maximum output current × -4.2 to Maximum output current × -0.1
Trip	Set the action taken when a current flows exceeding the current limit. If you select Trip, the output is turned off when the current limit is activated. You can also set the time (0 s to 10 s) until the output is turned off after the current limit is exceeded.
Set	Clicking Set will set the values to the PCR-WE, and the settings are updated.

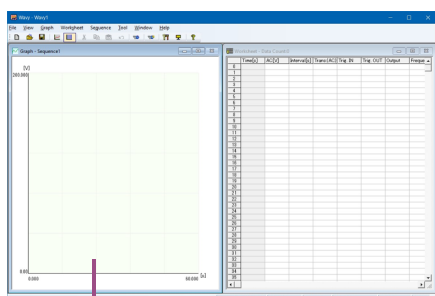
Creating and Editing Steps with the Mouse

In the Graph window, you can create steps by drawing lines with the mouse. The settings that you can specify in the Graph window are output voltage, voltage transition (voltage change), and step execution time (interval). Default values are assigned to step items that cannot be set with the mouse. After creating a step, you can change all the step items in the worksheet window.

- Creating a step (Graph window) (p.32)
- Editing a step (Graph window) (p.33)

Creating a step (Graph window)

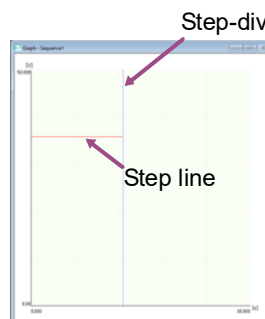
This section explains how to create a step in the Graph window.



Graph window



Move the mouse pointer to the Y-axis.



The step is confirmed.

NOTE

If the wiring method is single-phase, three-wire or three-phase and the output voltage mode is set to AC, you must create steps one step at a time. You cannot draw the next step until you have finished drawing all the phases of the present step. (You cannot enter the steps continuously for a given phase.)

1 Move the mouse pointer over the Y-axis.

The pointer becomes a crosshair, and a voltage is displayed.

2 Drag the pointer to the time and the voltage that you want to set.

The step line is drawn, the setting is confirmed, and the step data is entered in the first row of the worksheet window. The voltage transition of step 0 are fixed to Step. You cannot change them to Ramp.

This completes the creation of step 0.

- 3** If you want to continue creating steps, move the mouse pointer over the end point of the step that you have just created. When the pointer becomes a crosshair, drag the mouse pointer to the point that corresponds to the time and the voltage that you want to set.

The setting is confirmed, and the step settings are entered in the first blank row of the Worksheet window. You can change the voltage transition later. Repeat this procedure until you have set all the steps.

Changing the Graph window display

You can change the Graph window display items.

See “Graph window display settings” (p.52).

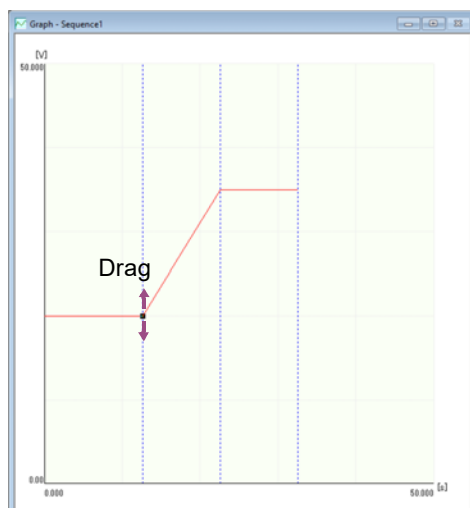
Copying graph images to the clipboard

On the Graph menu, click Copy to copy the graph image to the clipboard.

Editing a step (Graph window)

- Changing the set voltage (p.33)
- Changing the interval (step execution time) (p.34)
- Changing the transition (Step or Ramp) (p.35)
- Deleting steps (p.35)
- Changing the Graph window display (p.35)

Changing the set voltage



- 1** Double-click the line of the step that you want to edit.

A black square is displayed at the step's end point, and you can edit the step.

2 Move the mouse pointer over the black square.

The pointer changes to a double arrow.

3 Drag the pointer up or down to the value that you want to change to.

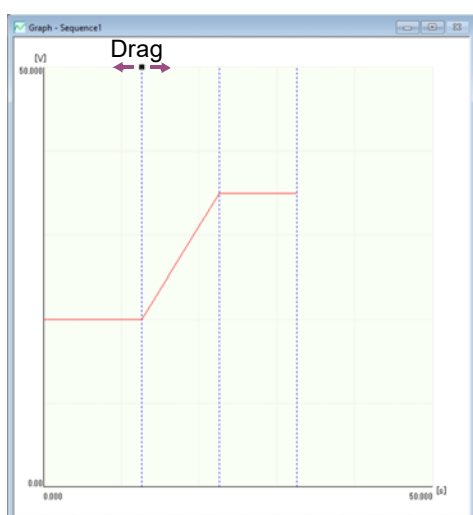
The value changes accordingly.

■ Changing the voltage setting resolution

Right-click the Graph window, click Resolution of setting value and then the resolution that you want to use (Default, 1st digit of integer to 2nd digit of decimal place). The Default is 1st digit of integer.

You can also set it by clicking Resolution of setting value on the Graph menu.

Changing the interval (step execution time)



1 Double-click the vertical line (the step-division line) at the end point of the step that you want to edit.

A black square is displayed at the top of the step-division line, and you can edit the step.

2 Move the pointer over the black square.

The pointer changes to a double arrow.

3 Drag the pointer left or right to the value that you want to change to.

The value changes accordingly.

■ Changing the step execution time resolution

Right-click the Graph window, click Resolution of time period and then the resolution that you want to use (Default, 1st digit of integer to 3rd digit of decimal place). The Default is 1st digit of integer.

You can also set it by clicking Resolution of time period on the Graph menu.

Changing the transition (Step or Ramp)

- 1 Double-click the line of the step that you want to change.**
A black square is displayed at the top of the vertical line, and you can edit the step.
- 2 Right-click to display a shortcut menu. Click Transition and then Ramp or Step.**
The transition of the selected step changes accordingly.

■ Always using step transition

You can fix the transition when setting steps with the mouse to step.

Right-click the Graph window, and then click Draw sequence by step.

You can also set it by clicking Draw sequence by step on the Graph menu.

Deleting steps

- 1 Double-click the line of the step that you want to delete.**
A black square is displayed at the top of the vertical line, and you can edit the step.
- 2 Right-click to display a shortcut menu. Click Delete.**
The step is deleted.

Changing the Graph window display

You can change the Graph window display items.

See “Graph window display settings” ([p.52](#)).

Copying graph images to the clipboard

On the Graph menu, click Copy to copy the graph image to the clipboard.

Creating and Editing Steps by Entering Values

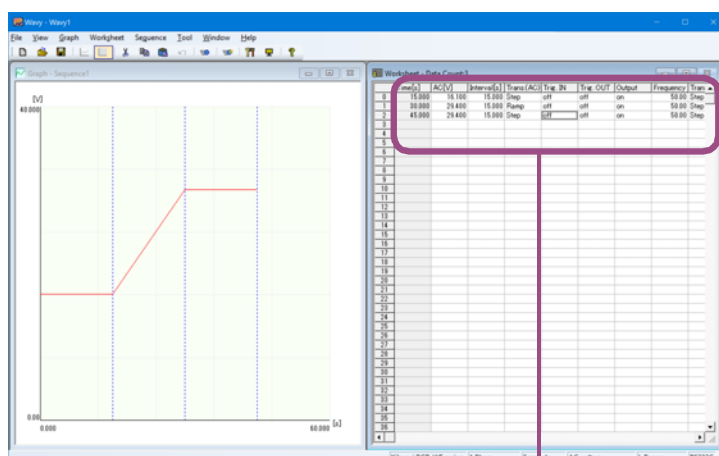
In the Worksheet window, you can create steps by entering values for the settings.

The displayed settings vary depending on the settings specified in the Sequence Creation Mode window. For details on each setting, see “Step Settings” (p.22).

- Creating a step (worksheet window) (p.36)
- Editing a step (worksheet window) (p.37)

Creating a step (worksheet window)

This section explains how to create a step in the worksheet window.



	Time[s]	AC[V]	Interval[s]	Trans(AC)	Trig. IN	Trig. OUT	Output	
0	15.000	16.100	15.000	Step	off	off	on	Step 1
1	30.000	29.400	15.000	Ramp	off	off	on	Step 2
2	45.000	29.400	15.000	Step	off	off	on	Step 3

You cannot edit the Time column.

■ Default step setting values

Trig. IN	: off	End[deg]	: 0	UW [deg]	: 240
Trig. OUT	: off	Pri. phase	: off	UW ramp	: off
Output	: on	U offset	: off	Stat. Out	: off
Frequency	: 50.00	U offset[deg]	: 0	Outp. Imp.	: off
Trans(f)	: Step	U offs. ramp	: off	OutputRESI[mΩ]	: 0
WB No.	: 0	UV phase	: off	OutputREAC[μH]	: 0
S. Phase	: FREE	UV [deg]	: 180/120 ^{*1}	Jump	: off
Start[deg]	: 0	UV ramp	: off	Jump Step	: 0
E. Phase	: FREE	UW phase	: off	Loop Count	: 0

*1 Wiring method: At 1phase 3wire/3phase

NOTE

- The first row of the worksheet is step 0. Enter data in order, starting from step 0. The voltage transition and frequency transition of step 0 are fixed to Step. You cannot change them to Ramp.
- Time[s] represents the cumulative time from step 0. It is automatically calculated, so you cannot change it. If phase wait time is created as a result of setting starting phase angles or ending phase angles, the actual cumulative time will not match the cumulative time shown in Time[s]. For details on phase wait time, see “(6) Setting the phase” (p.26).
- Values that have been entered in cells cannot be deleted. To delete them, delete the entire step.
- You can cancel the entering or editing of a cell's value by pressing Esc.
- To set WB No. to a value different from the default value of 0, you must create, save, and transfer an arbitrary waveform in advance. For details, see “Creating and Transferring Arbitrary Waveforms” (p.65).
- The settings are transferred to the PCR-WE only when values are assigned to all the step settings.
- If you select one or several voltage or frequency cells and right-click and then select Voltage, Frequency Replaced, a Voltage, Frequency Replaced window appears. Enter a new value and click Replace to collectively overwrite the values of the selected cells.
- If you right-click a cell and select Trigger waiting step addition, a trigger wait step is added below the selected cell.

To preview the sequence that you are working on, see “Previewing a Sequence” (p.39).

1 Set the voltage.

Click the AC[V] or DC[V] cell, enter a value, and press Enter.

2 Set the voltage transition.

Double-click the Trans.(AC) or Trans.(DC) cell, select Step or Ramp from the list, and press Enter.

3 Set the execution time (interval).


Click the Interval[s] cell, enter a value, and press Enter.

4 Configure the other settings.

When you set the voltage, voltage transition, and execution time (interval), all other settings are automatically set to their default values. To change them, click the cells and enter values, or double-click the cells and select the values from the lists.

Editing a step (worksheet window)

You can delete and copy steps that you have created.

Right-click the worksheet window and then click Undo to undo the last step insertion or deletion (only once). You can also click Undo on the Worksheet menu or click  on the toolbar.


Copying and inserting steps

1 Click a cell in the step that you want to copy.

You can click any cell in the step.

You can select consecutive rows by holding down the Shift key.


2 Right-click, and select Copy.

You can also click Copy on the Worksheet menu or click  on the toolbar.

The LoopStart and LoopCount values are not copied. They are set to zero.

3 Click a cell of the appropriate step.

4 Right-click, and select Paste.

You can also click Paste on the Worksheet menu or click  on the toolbar.

The copied step is inserted in the selected cell, and the total number of steps increases.

Deleting steps

1 Click a cell in the step that you want to delete.

You can click any cell in the step.

You can select consecutive rows by holding down the Shift key.

2 Right-click, and select Delete.

You can also click Delete on the Worksheet menu or click  on the toolbar.

When you delete a step, the step contents are copied to the clipboard. If you insert a step immediately after deleting steps, the deleted steps will be inserted.

Keyboard shortcuts

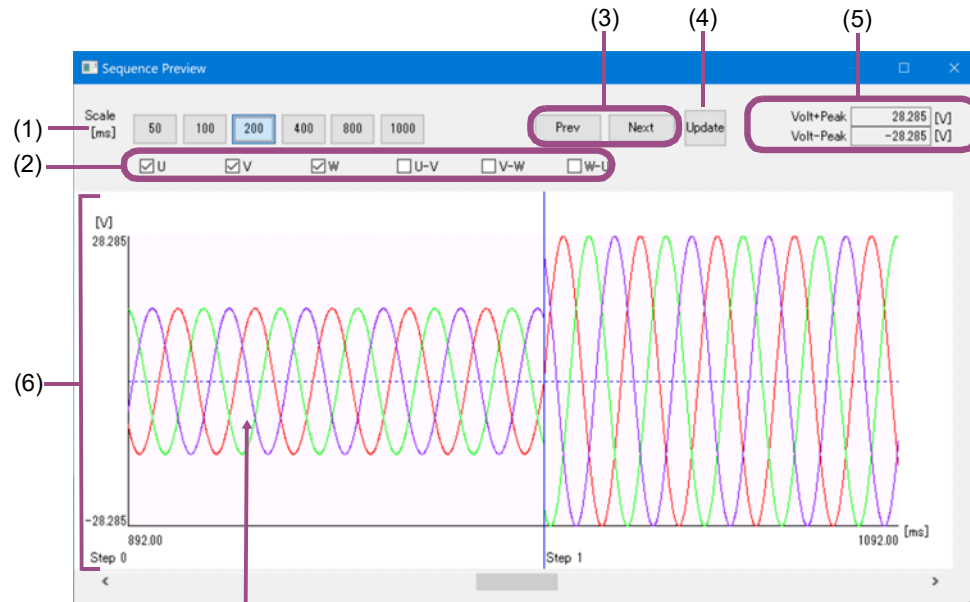
You can use keyboard shortcuts on the [Worksheet] window.

Operation	Shortcut keys
Copy steps	C or Ctrl+C
Insert steps ^{*1}	V or Ctrl+V
Delete steps ¹	Delete
Undo ¹	Z or Ctrl+Z
Select all rows	A or Ctrl+A

^{*1}. A confirmation window appears before execution.

Previewing a Sequence

You can view the sequence that you are working on in the Sequence Preview window. To display the window, on the View menu, click Sequence Preview.



Move the cursor over the line to display the voltage (V) and time (ms) at that point.

- (1) Changing the time axis scale ([p.40](#))
- (2) Changing the display item ([p.40](#))
- (3) Moving to step boundaries ([p.40](#))
- (4) Updating the preview ([p.40](#))
- (5) Peak value display ([p.40](#))
- (6) Changing the display item color ([p.40](#))

NOTE

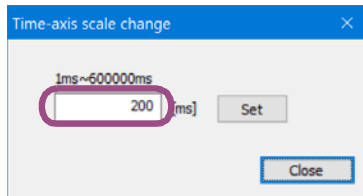
- If S. Phase of step 0 is set to FREE, the starting phase angle of step 0 is displayed as 0° in the sequence preview graph.
- If E. Phase of the step is set to FIXED and End [deg] is set to 0°, one excessive period of the step may be output depending on the interval (step execution time) setting. (One such example is when the frequency is set to 50 Hz and the interval is set to an integer multiple of 20 ms.)

■ (1) Changing the time axis scale

Using the Scale setting, you can change the time scale.

You can also set the time span in more detail using the time-axis scale change window.

To display the window, right-click on the graph, and select Scale.



After entering a value, click Set. The time axis display span changes, and Scale [ms] appears next to the display span buttons.

NOTE

If you display a step with the frequency set to 3 kHz or higher at a display span of 800 ms or more, the sequence may not be displayed properly.

■ (2) Changing the display item

You can change the display items by selecting the check boxes.

You can also right-click the graph, and select the display items.

■ (3) Moving to step boundaries

Click Prev or Next to move to the boundary line of the previous or next step.

■ (4) Updating the preview

If you change a step setting while the preview is open, click Update to update the preview.

■ (5) Peak value display

The maximum peak voltages among all steps are displayed.

■ (6) Changing the display item color

Right-click on the graph to select the item, and specify the color. You can change the color of the line (U/DC, V, W), U-V, U-W, and W-U), step boundary line, background, XY-axes, and XY-axis scale lines.


Saving and Loading Sequences

You can save sequence data that you create and load it whenever necessary.

- Saving sequence data ([p.41](#))
- Loading sequence data ([p.44](#))

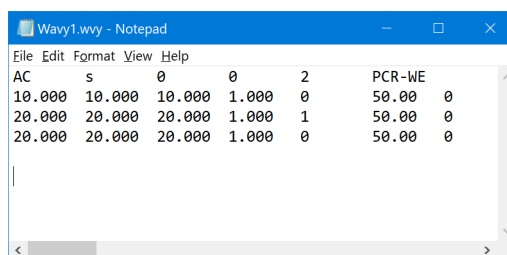
Saving sequence data

To save as a new sequence, on the File menu, click Save As.

To overwrite a file, on the File menu, click Save. Or, click  on the toolbar. The file name extension is “.wvy.”

Viewing saved sequence data

You can use Notepad to view saved sequence data.



(Example)
Wiring method: Three phase
Output voltage mode: AC+DC

By default, data is saved as tab-separated values. You can change this to comma-separated values by using “Environment settings” ([p.60](#)).

■ Displayed items in the first row

The first line contains the conditions common to all steps, which was specified in the Sequence Creation Mode window.

Column	Item	Description
1	Output voltage mode	AC: AC voltage, DC: DC voltage, ACDC: AC+DC voltage, DC LINE: DC line voltage
2	Time unit	ms: milliseconds, s: seconds, min: minutes, h: hours
3	Arbitrary waveform availability	0: arbitrary waveform not available, 1: arbitrary waveform available
4	Voltage range	0: L range, 1: H range
5	Wiring method	0: 1P, 1: 1P3W, 2: 3P
6	Model	PCR-WE: PCR-WE/PCR-WE2 Series AC Power Supply, PCR-WEA: PCR-WEA/PCR-WEA2 Series AC Power Supply

■ Displayed items in the second and subsequent rows

The second and subsequent lines contain settings of individual steps. The contents vary depending on the wiring method.

- Wiring method: Single-phase

Column	Item	Description
1	AC voltage	Unit: V
2	Step execution time	The unit is shown in row 1.
3	AC voltage transition	0: step, 1: ramp
4	Frequency	Unit: Hz
5	Frequency transition	0: step, 1: ramp
6	Trig. IN	0: off, 1: on
7	Trig. OUT	0: off, 1: on
8	Output	0: off, 1: on
9	DC voltage	Unit: V
10	DC voltage transition	0: step, 1: ramp
11	WB No	0 to 256
12	Arbitrary waveform file name	.arb file name
13	Starting phase angle control	0: FREE, 1: FIXED
14	Starting phase angle	Unit: degrees
15	Ending phase angle control	0: FREE, 1: FIXED
16	Ending phase angle	Unit: degrees
17	Sudden phase change	0: off, 1: on
18	Status signal output	0: off, 1: on
19	Output impedance	0: off, 1: on
20	Output impedance (resistance component)	Unit: mΩ
21	Output impedance (reactance component)	Unit: μH
22	Jump	0: off, 1: on
23	Jump Step	0 to 599
24	Loop Count	0 to 99999

- Wiring method: Single-phase, three-wire

Column	Item	Description
1	AC voltage (U phase)	Unit: V
2	AC voltage (V phase)	Unit: V
3	Step execution time	The unit is shown in row 1.
4	AC voltage transition	0: step, 1: ramp
5	Frequency	Unit: Hz
6	Frequency transition	0: step, 1: ramp
7	Trig. IN	0: off, 1: on
8	Trig. OUT	0: off, 1: on
9	Output	0: off, 1: on
10	DC voltage, DC line voltage ^{*1}	Unit: V
11	DC voltage transition	0: step, 1: ramp
12	WB No	0 to 256
13	Arbitrary waveform file name	.arb file name
14	Starting phase angle control	0: FREE, 1: FIXED
15	Starting phase angle	Unit: degrees

Column	Item	Description
16	Ending phase angle control	0: FREE, 1: FIXED
17	Ending phase angle	Unit: degrees
18	Sudden phase change	0: off, 1: on
19	Status signal output	0: off, 1: on
20	Output impedance	0: off, 1: on
21	Output impedance (U phase, resistance component)	Unit: mΩ
22	Output impedance (V phase, resistance component)	Unit: mΩ
23	Output impedance (U phase, reactance component)	Unit: μH
24	Output impedance (V phase, reactance component)	Unit: μH
25	Jump	0: off, 1: on
26	Jump Step	0 to 599
27	Loop Count	0 to 99999
28	DC voltage (V phase)* ²	Unit: V
29	WB No (V phase)* ²	0 to 256
30	Arbitrary waveform file name (V phase)* ²	.arb file name
31	UV phase difference control* ²	0: off, 1: on
32	UV phase angle* ²	Unit: degrees
33	V phase transition* ²	0: off, 1: LEAD, 2: LAG

*1 When line voltage is selected for the output value in sequence creation mode

*2 For PCR-WEA/PCR-WEA2 Series AC Power Supply only


- Wiring method: Three-wire

Column	Item	Description
1	AC voltage (U phase)	Unit: V
2	AC voltage (V phase)	Unit: V
3	AC voltage (W phase)	Unit: V
4	Step execution time	The unit is shown in row 1.
5	AC voltage transition	0: step, 1: ramp
6	Frequency	Unit: Hz
7	Frequency transition	0: step, 1: ramp
8	Trig. IN	0: off, 1: on
9	Trig. OUT	0: off, 1: on
10	Output	0: off, 1: on
11	DC voltage (U phase)	Unit: V
12	DC voltage (V phase)	Unit: V
13	DC voltage (W phase)	Unit: V
14	DC voltage transition	0: step, 1: ramp
15	WB No (U phase)	0 to 256
16	WB No (V phase)	0 to 256
17	WB No (W phase)	0 to 256
18	Arbitrary waveform file name (U phase)	.arb file name
19	Arbitrary waveform file name (V phase)	.arb file name
20	Arbitrary waveform file name (W phase)	.arb file name
21	Starting phase angle control	0: FREE, 1: FIXED
22	Starting phase angle	Unit: degrees
23	Ending phase angle control	0: FREE, 1: FIXED

Column	Item	Description
24	Ending phase angle	Unit: degrees
25	Sudden phase change	0: off, 1: on
26	U phase offset control	0: off, 1: on
27	U offset angle	Unit: degrees
28	U phase transition	0: off, 1: LEAD, 2: LAG
29	UV phase difference control	0: off, 1: on
30	UV phase angle	Unit: degrees
31	V phase transition	0: off, 1: LEAD, 2: LAG
32	UW phase difference control	0: off, 1: on
33	UW phase angle	Unit: degrees
34	W phase transition	0: off, 1: LEAD, 2: LAG
35	Status signal output	0: off, 1: on
36	Output impedance	0: off, 1: on
37	Output impedance (U phase, resistance component)	Unit: mΩ
38	Output impedance (V phase, resistance component)	Unit: mΩ
39	Output impedance (W phase, resistance component)	Unit: mΩ
40	Output impedance (U phase, reactance component)	Unit: μH
41	Output impedance (V phase, reactance component)	Unit: μH
42	Output impedance (W phase, reactance component)	Unit: μH
43	Jump	0: off, 1: on
44	Jump Step	0 to 599
45	Loop Count	0 to 99999

Loading sequence data

You can load saved data and use it.

On the File menu, click Open. Or, click  on the toolbar.

NOTE

If you assigned arbitrary waveforms to steps in the sequence, manage the relevant arbitrary waveform files (.arb) along with the sequence file (.wvy) in your PC. When Wavy recalls the sequence, if the arbitrary waveform file is not in the specified location, Wavy may assign an unintended waveform.

For details on where arbitrary waveform files are stored, see “Environment settings” (p.60).

Writing or Reading a Sequence

To execute a sequence, either write the sequence that you created to the PCR-WE or read the sequence in the PCR-WE into Wavy.

- Writing a sequence ([p.45](#))
- Reading a sequence ([p.46](#))

Writing a sequence

- 1 On the Sequence menu, click Transfer. Or, click  on the toolbar.**

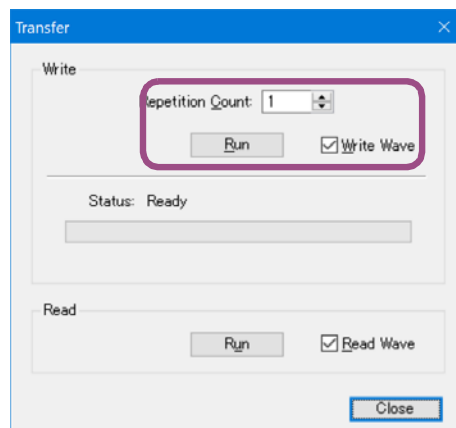
The Transfer window appears.

- 2 Set the number of sequence repetitions (1 to 99999).**

99999 represents infinity.

- 3 If the steps in the sequence that you will write to the PCR-WE contain arbitrary waveforms, select the Write Wave.**

Selecting Write Wave causes arbitrary waveform data and then sequence data to be written in the PCR-WE.



- 4 Click Run.**

The sequence settings in the PCR-WE are initialized, and data created using Wavy is written in the PCR-WE.

NOTE

- The maximum number of arbitrary waveforms that can be transferred to the PCR-WE is 256.
- If there are many steps, transferring may take a while.
- Wavy uses “List of waveform banks” ([p.74](#)) of the waveform view to manage the arbitrary waveforms written to the PCR-WE waveform banks.

Reading a sequence

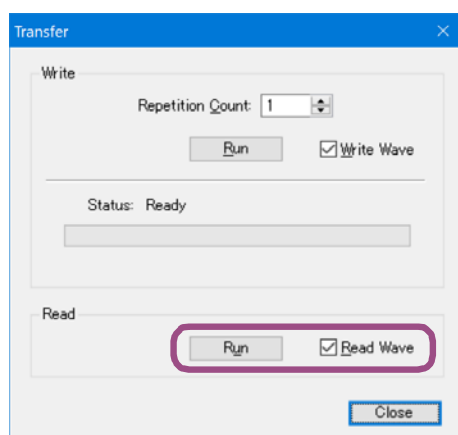
- 1 On the **Sequence** menu, click **Transfer**. Or, click  on the toolbar.

The Transfer window appears.

- 2 If the steps in the sequence that you will read from the PCR-WE contain arbitrary waveforms, select the **Read Wave**.

The waveform data assigned to the steps in the sequence will also be read. Arbitrary waveform data that is read is automatically saved to files with .arb extension.

The file name is automatically assigned according to the waveform bank number (001 to 256). For example, if the waveform bank number is 1, the file name is Wave_001.arb. The file save destination is the arbitrary waveform folder specified in the **Environment settings** (p.60) window. If a file with the same name exists, it is overwritten.



- 3 Click **Run**.

NOTE


- If the voltage transition or frequency transition of step 0 in the PCR-WE is set to ramp, it will be changed to Step after reading the data into Wavy.
- For details on the folder in which arbitrary waveforms are saved, see “Environment settings” (p.60).
- Wavy uses “List of waveform banks” (p.74) of the waveform view to manage the arbitrary waveforms written to the PCR-WE waveform banks.

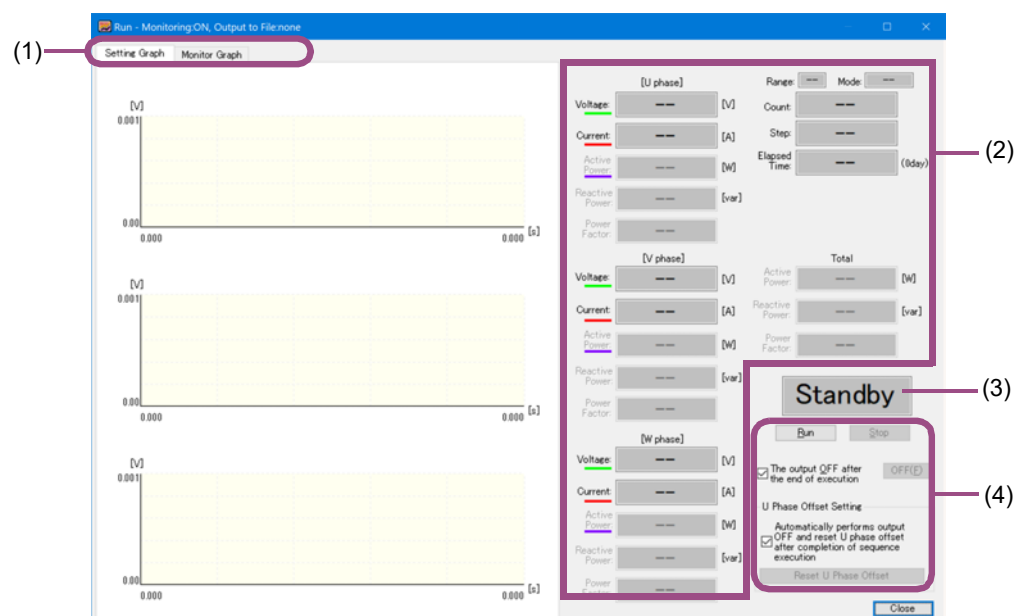
Running Sequences

You can run sequences from the sequence run window.

- Sequence run window ([p.47](#))
- Saving monitored data ([p.49](#))
- Running a sequence ([p.50](#))
- Handling when an alarm occurs on the PCR-WE ([p.51](#))
- Handling when communication is disconnected ([p.51](#))

Sequence run window

On the Sequence menu, click Run. Or, click  on the toolbar. The sequence run window appears. The following figure is an example of a three-phase wiring method.



- (1) Tab ([p.47](#))
- (2) Monitor ([p.48](#))
- (3) Status ([p.48](#))
- (4) Operation ([p.49](#))

■ (1) Tab

If Monitor Graphical Representation is selected in the Monitoring Setup window ([p.55](#)), you can select from three types of displays using tabs.

■ (2) Monitor

Item	Description
Range	Displays the output voltage range.
Mode	Displays the wiring method.
Count	Displays the present iteration.
Step	Displays the number of the step that is being executed.* ¹ The update interval of the sequence run window is 1 second. If the Step execution time. (p.24) is less than or equal to 1 second, the step that is displayed and the step that is being executed may not be the same.
Elapsed Time	Displays the elapsed time since the sequence execution started.* ²
Measured values	Displays the items (current, voltage, active power (total value), reactive power (total value), and power factor (total value)) that are selected in the Monitor Setup window (p.55). You can set the monitoring interval in the Monitor Setup window.

*1 If the sequence is paused (in a trigger wait state), the number of the step before the step in which Trig. IN is set to on is displayed.

*2 This display may be slightly different from the actual elapsed time.

■ (3) Status

Status	Description
Standby	Standing by.
Running	The sequence is running.
PAUSE	The sequence is paused. The sequence will pause before a step whose Trig. IN has been set to on.
End	The sequence is complete.
Stop	The Stop button was clicked.
Error	A communication error occurred, or a protection setting is out of range. Check Configuring the Interface (p.8) and Protection Settings (p.30).
OVP (OVP example)	A protection function was activated (alarm). OVP: overvoltage protection, UVP: undervoltage protection, OHP: overheat protection, OL: Over load protection For instructions on how to clear alarms, see "Handling when an alarm occurs on the PCR-WE" (p.51).

■ (4) Operation

Item	Description
Run	Runs the sequence.
Stop	Stops the sequence.
The output OFF after the end of execution	If you select this check box, the output is turned off when the sequence finishes executing, when the sequence is aborted, or when a protection function is activated.* ¹ After the sequence is completed, to manually turn off the output, click OFF. This command is invalid while a sequence is running.
U phase Offset Setting* ²	If you select this check box, the output is turned off and the U phase offset is reset when the sequence is completed or aborted or when a protection function is activated. After the sequence is completed, to manually reset the U phase offset, click Reset U phase Offset. This command is invalid while a sequence is running.

*¹ If you want to accurately control the time when the output is turned off, add a step for turning off at the end of the sequence.

*² This appears when the wiring method is three-phase.

Changing the sequence run window display

You can change the sequence run window display items. See “Sequence run window display settings” (p.57).

Saving monitored data

You can save monitored data to a file while a sequence is running. For details, see “Specifying monitor settings” (p.55).

You can change the file format of monitored output data using Environment settings (p.60) window.

Running a sequence

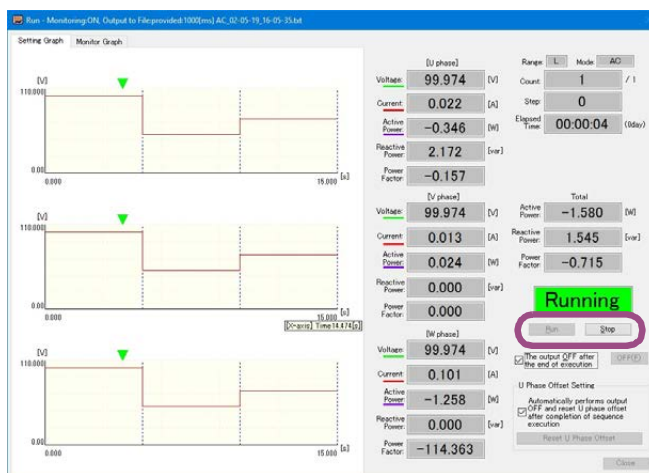
NOTE

When running a long sequence

- The amount of data of the monitor graph may increase and load the PC. This may cause the PC to malfunction. If this occurs, you can reduce the load by setting the Max Data Count ([p.58](#)).
- We recommend that you use Task Manager to check the amount of physical memory being used.

To start a sequence, click Run.

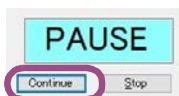
To abort a sequence that is running, click Stop.



The green marker on the setting graph represents the approximate position of execution. For sequences that have a large number of repetitions or those that take a long time to run, the position indicated by the green line may appear offset from the actual position.

You can change this display to a bar display. For the procedure, see “Specifying monitor settings” ([p.55](#)).

If a step whose Trig. IN has been set to on exists, the sequence will pause before executing the step. To resume the sequence, click Continue.



While the sequence is paused, the Run button changes to Continue.

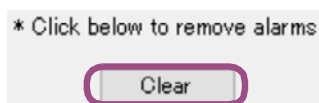
During test execution, the menus and toolbar are disabled. In addition, the window cannot be resized.

Handling when an alarm occurs on the PCR-WE

If an alarm occurs on the PCR-WE while a sequence is running, you can clear the alarm from Wavy's Remote Control Panel window.

Clear the alarm, and then eliminate the cause of the alarm.

- 1 Close the sequence run window.**
- 2 On the Tool menu, click Direct Control.**
A Remote Control Panel window opens.
- 3 Click Clear in the lower left of the Remote Control Panel.**
The PCR-WE alarm will be cleared.



- 4 Close the Remote Control Panel window.**

Handling when communication is disconnected

If communication with the PCR-WE is disconnected while a sequence is running, the status in the sequence run window will change to "Error" or "End."

The PCR-WE continues to run the sequence even when communication is disconnected because the sequence transferred to the PCR-WE is running. Even if communication is restored while the sequence is running, Wavy will not be able to obtain monitored data. An error will occur if you try to run the sequence again.

- 1 Press LOCAL on the PCR-WE panel.**
The PCR-WE control switches from remote to local. If there are steps that have not been executed yet, the sequence will continue to run.
- 2 Press OUTPUT on the PCR-WE panel.**
The output will turn off, and the sequence will be aborted.
- 3 Close the sequence run window.**
- 4 After the communication is restored, run the sequence again.**

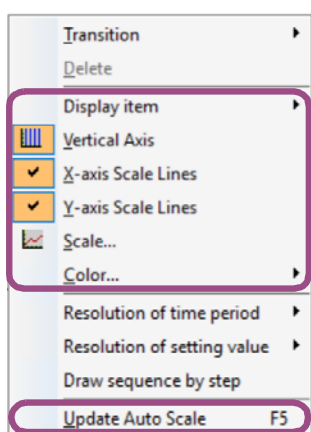
Settings



- Graph window display settings ([p.52](#))
- Specifying monitor settings ([p.55](#))
- Sequence run window display settings ([p.57](#))
- Environment settings ([p.60](#))
- DIGITAL I/O Settings ([p.61](#))

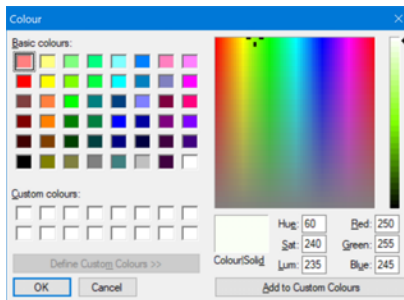
Graph window display settings

You can select Graph window display items from the Graph menu.

You can also right-click the Graph window to display an equivalent shortcut menu (without Copy).



Graph window display menu	Description
Display item	Select the items (voltage, frequency, starting phase angle, phase difference) to show on the Y-axis. To create steps using the mouse, select Voltage. If you select Start phase angle or Phase difference, see “If you select the starting phase angle or phase difference for the Y-axis” (p.53).
Vertical Axis	Shows and hides the vertical-axis lines (step-division lines.) This is equivalent to clicking  on the toolbar.
X-axis Scale Lines	Shows and hides the X-axis grid. By default, the scale line color is set to white.
Y-axis Scale Lines	Shows and hides the Y-axis grid. By default, the scale line color is set to white.
Scale	Changes the X-axis and Y-axis scale lines on the scale window. This is equivalent to clicking  on the toolbar. See “Changing the Graph window scale” (p.54).

Graph window display menu	Description
Color	Set the color of items using the Color window.
	
Background	Changes the background color of the graph.
Line	Changes the step line color.
Line to Draw	Changes the color of lines drawn with the mouse.
Vertical Axis	Changes the vertical-axis color.
X/Y-axis	Changes the X-axis and Y-axis colors.
XY-axis Scale lines	Changes the colors of the X-axis and Y-axis grid lines.
Update Auto Scale	Applies auto scaling to the graph window.

If you select the starting phase angle or phase difference for the Y-axis

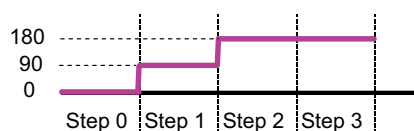
When the Y-axis is displaying the starting phase angle, the absolute position of each phase is displayed. When the Y-axis is displaying the phase difference, the phase difference between each phase is displayed.

(Example) The figure below shows how the graphs appear when the sequence output voltage mode is set to single-phase, three-wire and the starting phase, UV phase, sudden phase change, and U phase offset of steps 0 to 3 are set as shown in the following table.

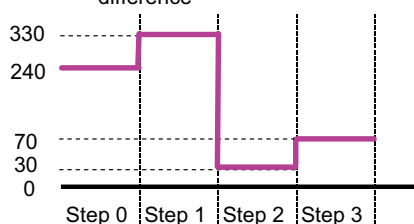
	S. Phase	Start [deg]	U offset	U offset [deg]	U offs. ramp	UV phase	UV [deg]	Pri. phase
Step0	FIXED	0	off	0	off	on	120	off
Step1	FIXED	90	off	0	off	on	120	on
Step2	FIXED	180	off	0	off	on	150	off
Step3	FIXED	180	off	0	off	on	110	off

When the Y-axis display is set to Start phase angle

U phase Drawn based on the starting phase angle and U phase offset

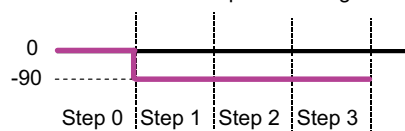


V phase Drawn based on the starting phase angle and U-V phase difference

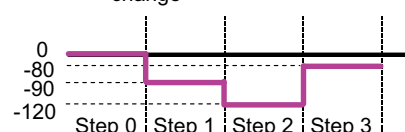


When the Y-axis display is set to Phase difference


U phase Drawn based on the starting phase angle, U phase offset, and sudden phase change

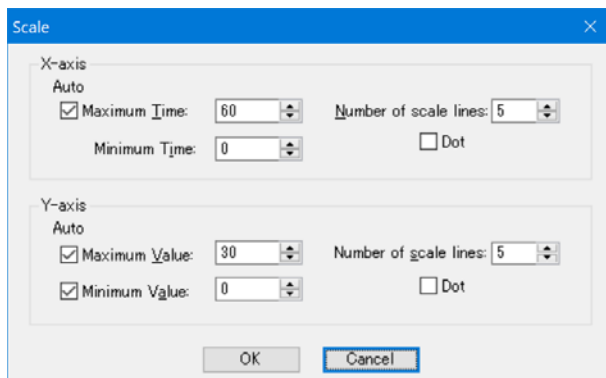


V phase Drawn based on the starting phase angle, U-V phase difference, and sudden phase change




Changing the Graph window scale

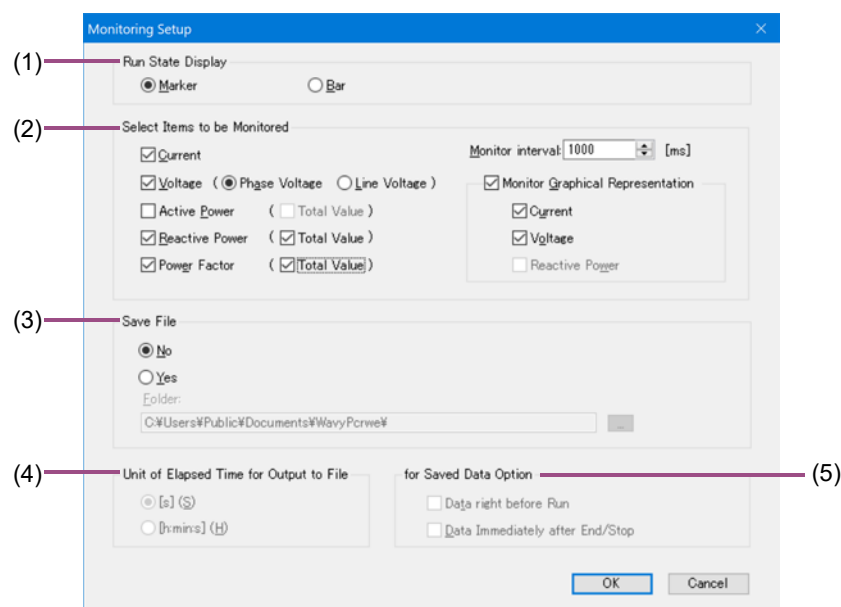
Select the Graph window. Click Scale on the Graph menu or click  on the toolbar to display the Scale window. You can also right-click the graph window and select Scale to display the Scale window.



- If you select Maximum Time, Maximum Value, or Minimum Value, auto scale will be enabled. The scale values will be set to appropriate values when you create steps or when you open a saved file.
- If auto scale is disabled, settings that are outside of the range are not displayed on the graph.
- If you are using the mouse to set steps, the scale will not be updated automatically even if auto scale is enabled. On the Graph menu, click Update Auto Scale, or right-click the Graph window and select Update Auto Scale.
- Use Number of scale lines to set the number of grid lines.
- Select Dot to display the grid lines using dotted lines.

Specifying monitor settings

You can change settings related to the sequence run window display and saving of monitored data in the Monitoring Setup window. To open the window, click Monitoring Setup on the Sequence menu or click  on the toolbar.



- (1) Run State Display ([p.55](#))
- (2) Select Items to be Monitored ([p.55](#))
- (3) Save File ([p.56](#))
- (4) Unit of Elapsed Time for Output to File ([p.56](#))
- (5) for Saved Data Option ([p.56](#))

■ (1) Run State Display

The sequence's execution position display can be set to marker display or bar display.

The run state display does not function if Jump function ([p.29](#)) is set to on.

■ (2) Select Items to be Monitored

Select the displayed measured values (current, voltage, active power, reactive power, or power factor). You can select multiple items.

If the wiring method is single-phase three-wire or three-phase, you can also select Phase Voltage, Line Voltage, and Total Value. If you select the total values for active power, reactive power, and power factor, the total of each phase will be displayed.

Using Monitor interval, you can set the monitor update interval (single-phase: 200 ms to 600000 ms, single-phase three-wire or three phase: 500 ms to 600000 ms).

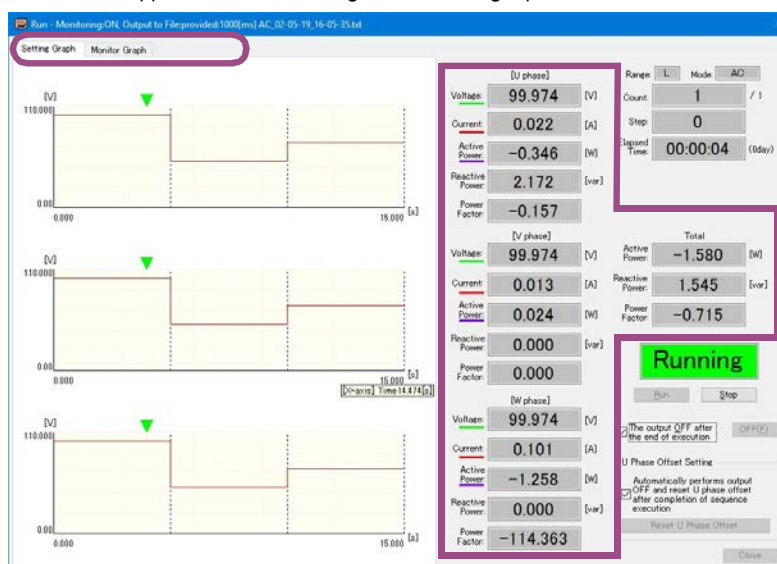
NOTE

If the interface is RS232C and you want to set the monitoring interval to a value less than 500 ms, set the baudrate ([p.9](#)) to 38400 bps or higher to ensure the reception of monitored data. For details on the baudrate setting on the PCR-WE, see the Communication Interface Manual of the PCR-WE.

If you select Monitor Graphical Representation, you can select from three types of displays using tabs.

Tab	Description
Setting Graph	A graph of the sequence to be executed appears.
Monitor Graph	A graph of monitored voltages and currents while executing a sequence appears.
Setting Graph and Monitor Graph ^{*1}	A setting graph appears in the top half, and a monitor graph appears in the bottom half.

^{*1} This appears when the wiring method is single-phase.



■ (3) Save File

Select whether to save the monitored data to a text file.

If you select Yes, specify the save destination folder.

The saved data file name consists of the output voltage mode, the execution start date and time, and the file name extension. You can change the file name extension (the default is .txt) using "Environment settings" (p.60).

■ (4) Unit of Elapsed Time for Output to File

You can set the unit of elapsed time (second or hour:minute:second). The accuracy of the elapsed time varies depending on the PC environment that you are using.

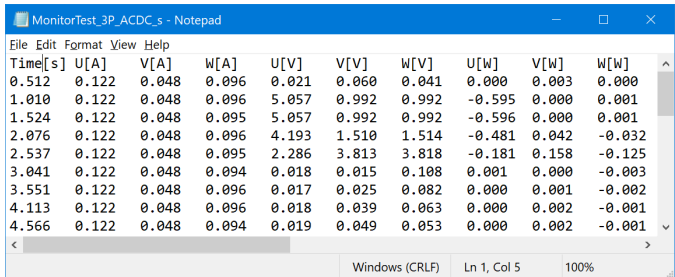
■ (5) for Saved Data Option

If you select Data right before Run, the monitored values before sequence execution (monitored values at time 0 s) will be written at the beginning of the saved data.

If you select Data Immediately after End/Stop, the monitored values after the sequence is completed or aborted will be written at the end of the saved data.

Viewing saved monitored data

You can use Notepad to view saved monitored data.

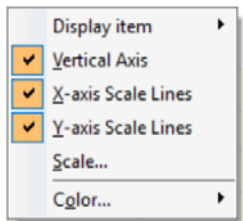


By default, data is saved as tab-separated values. You can change this to comma-separated values by using “Environment settings” [\(p.60\)](#).

Sequence run window display settings

Setting graph display settings

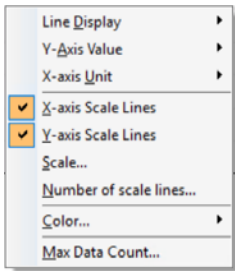
Right-click the setting graph of the sequence run window to display a shortcut menu for the graph display.



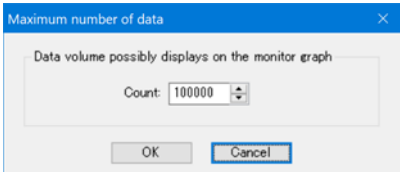
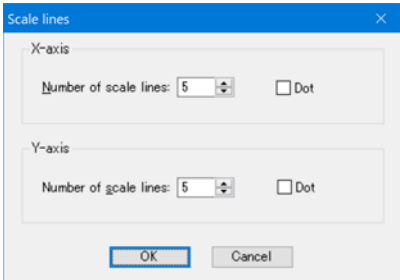
Setting graph shortcut menu	Description
Display item	Select the items (voltage, frequency, starting phase angle, phase difference) to show on the Y-axis. If you select Start phase angle or Phase difference, see “If you select the starting phase angle or phase difference for the Y-axis” (p.53) .
Vertical Axis	Shows and hides the vertical-axis lines (step-division lines.)
X-axis Scale Lines	Shows and hides the X-axis grid. By default, the scale line color is set to white.
Y-axis Scale Lines	Shows and hides the Y-axis grid. By default, the scale line color is set to white.
Color	See “Color” (p.53) in “Graph window display settings.”

Monitor graph display settings

Right-click the monitor graph of the sequence run window to display a shortcut menu for the graph display.



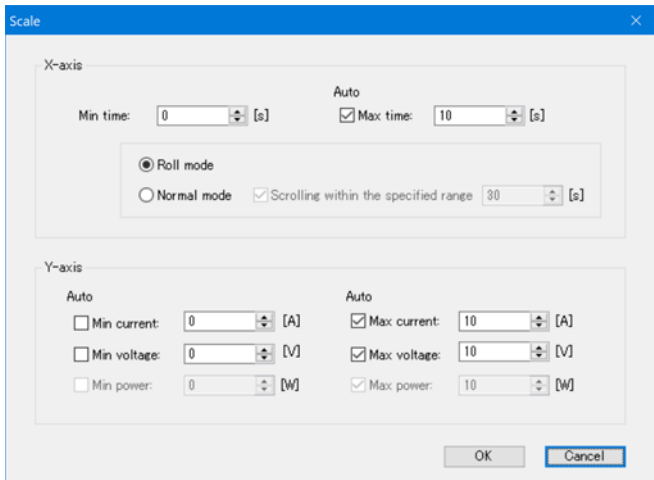
Monitor graph shortcut menu	Description
Line Display	Shows and hides current, voltage, and power lines. (You can select multiple items.)
Y-Axis Value	Select the value (voltage, current or power) that appears when the mouse pointer is placed on the Y-axis.
X-axis Unit	Select the unit of X-axis (second [s] or hour:minute:second [h:m:s]).
X-axis Scale Lines	Shows and hides the X-axis grid. By default, the scale line color is set to white.
Y-axis Scale Lines	Shows and hides the Y-axis grid. By default, the scale line color is set to white.
Scale	Changes the X-axis and Y-axis scale lines on the scale window. See "Changing the monitor graph scale" (p.59).
Number of scale lines	Set the number and types of grid lines in the Scale lines window.
Color	See "Color" (p.53) in "Graph window display settings."
Max Data Count	Set the number of data entries that can be displayed (10000 to 1000000, 100000 by default) in the Maximum number of data window.



Executing a long sequence will increase the amount of monitor graph data. This puts a heavy load on the PC and may cause the PC to malfunction. If this occurs, you can reduce the load on your PC by setting the maximum number of data entries. Even if you set the maximum data size, all monitored data will be saved. If the number of monitored data entries exceeds the maximum data size, the oldest entries will no longer be displayed. One monitored data entry uses approximately 200 bytes. When you run a long sequence, we recommend that you use Task Manager to check the amount of physical memory being used.

■ Changing the monitor graph scale

You can change the X-axis and Y-axis scales of the monitor graph.
To change the scales, right-click the monitor graph, and click Scale to display the Scale window.



If you select Max time, Max current, Max voltage, Max power, Min current, Min voltage, or Min power, auto scale will be enabled. This feature updates the scale values according to the monitored values.
If auto scale is disabled, monitored values that are outside of the range are not displayed on the graph.
If the Max time check box is selected to enable auto scale, you can select between roll mode and normal mode.

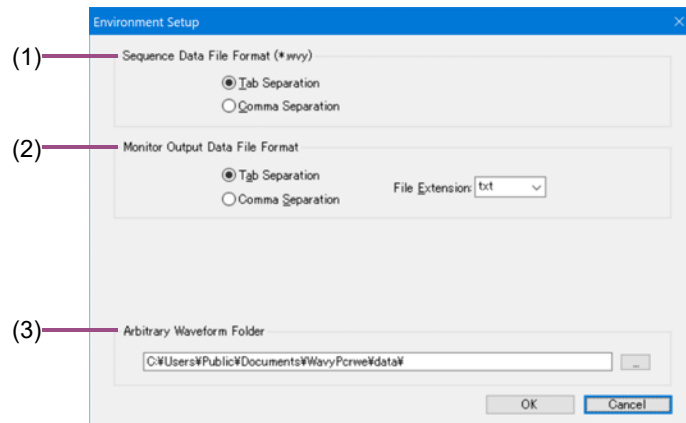
Mode	Description
Roll mode	The X-axis and Y-axis are scrolled at the same time. The display range is defined by subtracting the minimum time from the maximum time.
Normal mode	The minimum time is fixed. The maximum time is updated to the appropriate value. If you select the Scrolling within the specified range check box, the graph is scrolled when the monitored values exceed the maximum time of the X axis. The scroll start position is determined by subtracting the minimum time and the set scroll time from the maximum time. For example, if the minimum time is set to 0 seconds, the maximum time to 23 seconds, and the scroll time to 10 seconds, scrolling starts after 23 seconds elapse (at 23 - 0 - 10 = 13 seconds).

NOTE

If the wiring method is single-phase, three-wire or three-phase output and you select normal mode, the “Scrolling within the specified range” check box is always selected (you cannot clear the check box).
The range of scroll time that you can specify is 4 s to 3600 s for single-phase and 4 s to 600 s for single-phase.

Environment settings

On the Setting menu, click Environment Setup to display the Environment Setup window.



- (1) Sequence data file format (*.wvy) (p. 60)
- (2) Monitor output data file format (p. 60)
- (3) Arbitrary Waveform Folder (p. 60)

■ (1) Sequence data file format (*.wvy)

Select Tab Separation or Comma Separation. The default is tab separation.

■ (2) Monitor output data file format

Select Tab Separation or Comma Separation. The default is tab separation.

You can select the extension (txt, csv, log) from the File Extension list. You can also enter an extension of your choice in the box.

■ (3) Arbitrary Waveform Folder

Specify where the arbitrary waveform data files are saved.

NOTE

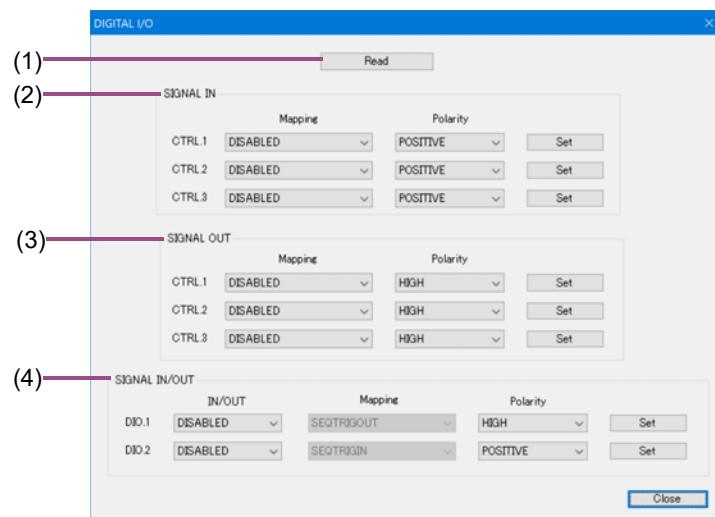
When Wavy recalls a sequence, if the arbitrary waveform files are not in their appropriate location, Wavy may assign unintended waveforms.

DIGITAL I/O Settings

You can set the PCR-WE's DIGITAL I/O connector channels from Wavy. If you set the step setting Trig. IN, Trig. OUT, or Stat. Out to on, set these settings before running a sequence.

Selecting DIGITAL I/O from the Tool menu displays a DIGITAL I/O window.

For details on mapping parameters (control signals), see the PCR-LE Series User's Manual.



- (1) Read ([p.61](#))
- (2) SIGNAL IN ([p.62](#))
- (3) SIGNAL OUT ([p.62](#))
- (4) SIGNAL IN/OUT ([p.63](#))

■ (1) Read

The settings applied to the connected PCR-WE are read. Click Read to display the DIGITAL I/O connector channel (excluding CTRL.4 and STAT.4) settings.

■ (2) SIGNAL IN

Assign (map) control signals to channels (CTRL.1 to CTRL.3) controllable using external contacts.

Item			Description
Mapping	DISABLED	Disabled	Disabled
	OUTCTL	Output Control	Output on/off
	SEQEXEC	SEQ Execution Control	Sequence run/stop
	ALMCLR	Alarm Clear	Alarm Clear
	EXTALM	External Alarm	External alarm input
	WIRCTRL_1P	Wiring Control 1P	Wiring method change (single-phase)
	WIRCTRL_1P3W	Wiring Control 1P3W	Wiring method change (single-phase three-wire)
	WIRCTRL_3P	Wiring Control 3P	Wiring method change (single-phase)
	VRANGE	Volt Range	Output range change
	RCL_A	Recall A Memory	Preset memory A recall
	RCL_B	Recall B Memory	Preset memory B recall
	RCL_C	Recall C Memory	Preset memory C recall
	OUTINH	Output Inhibit	Output-on inhibit
	USERPROGIN	Programmable Signal	Programmable signal in
Polarity	POSITIVE		Sets logical true to high.
	NEGATIVE		Sets logical true to low.
Set			When you click the button, the values are sent to the PCR-WE, and the settings are updated.

■ (3) SIGNAL OUT

Assign (map) control signals to channels (STAT.1 to STAT.3) that can be monitored.

If you set the step setting Stat. Out (p.25) to on, map any channel from STAT.1 to STAT.3 to SEQSTAT.

Item			Description
Mapping	DISABLED	Disabled	Disabled
	OUTON	Output ON Status	Output on status
	IPKLIM	I Pk Limit Status	Peak current limit status
	OVRTLOAD	Overload Status	Overload status
	BUSY	Busy Status	Busy status
	WIRING_1P	Wiring 1P Status	Wiring method status (single-phase)
	WIRING_1P3W	Wiring 1P3W Status	Wiring method status (single-phase three-wire)
	WIRING_3P	Wiring 3P Status	Wiring method status (single-phase)
	VRANGE_H	Volt Range H Status	Output voltage H range status
	POWON	Power ON Status	POWER switch on status
	SEQSTAT	SEQ Status Out	Sequence/power line abnormality simulation status output status
	USERPROGOUT	Programmable Signal	Programmable signal status
Polarity	HIGH		Sets status polarity to high.
	LOW		Sets status polarity to low.
Set			When you click the button, the values are sent to the PCR-WE, and the settings are updated.

■ (4) SIGNAL IN/OUT

Assign (map) control signals to channels (DIO.1/DIO.2), which allow you to select whether to control using external contacts or monitor the operation status.

If you set the step setting Trig. IN ([p.36](#)) to on, map either DIO.1 or DIO.2 to SEQTRIGIN.

If you set the step setting Trig. OUT ([p.25](#)) to on, map either DIO.1 or DIO.2 to SEQTRIGOUT.

Item	Description	
IN/OUT	DISABLED	Disabled
	IN	Controllable using external contacts.
	OUT	The operation status can be monitored.
Set	When you click the button, the values are sent to the PCR-WE, and the settings are updated.	

- If IN/OUT is set to IN

Item	Description		
Mapping	SYNCLK	Sync Clock In	Output reference phase input
	SEQTRIGIN	SEQ Trigger In	Sequence trigger input
	OUTCTL	Output Control	Output on/off
	SEQEXEC	SEQ Execution Control	Sequence run/stop
	ALMCLR	Alarm Clear	Alarm Clear
	EXTALM	External Alarm	External alarm input
	WIRCTRL_1P	Wiring Control 1P	Wiring method change (single-phase)
	WIRCTRL_1P3W	Wiring Control 1P3W	Wiring method change (single-phase three-wire)
	WIRCTRL_3P	Wiring Control 3P	Wiring method change (single-phase)
	VRANGE	Volt Range	Output range change
	RCL_A	Recall A Memory	Preset memory A recall
	RCL_B	Recall B Memory	Preset memory B recall
	RCL_C	Recall C Memory	Preset memory C recall
	OUTINH	Output Inhibit	Output-on inhibit
	USERPROGIN	Programmable Signal	Programmable signal in
Polarity	POSITIVE	Sets logical true to high.	
	NEGATIVE	Sets logical true to low.	

- If IN/OUT is set to OUT

Item		Description	
Mapping	STDCLK	Standard Clock Out	Output reference phase output
	SEQTRIGOUT	SEQ Trigger Out	Sequence trigger output
	OUTON	Output ON Status	Output on status
	IPKLIM	I Pk Limit Status	Peak current limit status
	OVRTLOAD	Overload Status	Overload status
	BUSY	Busy Status	Busy status
	WIRING_1P	Wiring 1P Status	Wiring method status (single-phase)
	WIRING_1P3W	Wiring 1P3W Status	Wiring method status (single-phase three-wire)
	WIRING_3P	Wiring 3P Status	Wiring method status (single-phase)
	VRANGE_H	Volt Range H Status	Output voltage H range status
	POWON	Power ON Status	POWER switch on status
	SEQSTAT	SEQ Status Out	Sequence/power line abnormality simulation status output status
	USERPROGOUT	Programmable Signal	Programmable signal status
Polarity	HIGH		Sets status polarity to high.
	LOW		Sets status polarity to low.

Creating and Transferring Arbitrary Waveforms

Wavy allows you to create, save, and transfer arbitrary waveforms that can be transmitted using the special waveform output feature of the PCR-WE. When you transfer an arbitrary waveform that has been saved, the waveform data is registered in the PCR-WE waveform bank and in the List of waveform banks (p.74) in Wavy. Arbitrary waveforms that are in the list of waveform banks can be assigned to steps in a sequence.

In addition, you can create arbitrary waveforms by importing text data of measurements taken on instruments such as oscilloscopes and data loggers.

NOTE

- For details on the special waveform output feature of the PCR-WE, see “Generating Special Waveforms (Waveform bank)” in the PCR-WE User’s Manual.
- The maximum number of arbitrary waveforms that can be registered in the PCR-WE is 256.

- Creating a new arbitrary waveform and transferring it to the waveform bank (p.65)
- Editing an existing arbitrary waveform and transferring it to the waveform bank (p.71)
- Editing an existing arbitrary waveform and transferring it to the waveform bank (p.71)
- Creating arbitrary waveform data using data from an oscilloscope or other instrument (p.71)

Creating a new arbitrary waveform and transferring it to the waveform bank

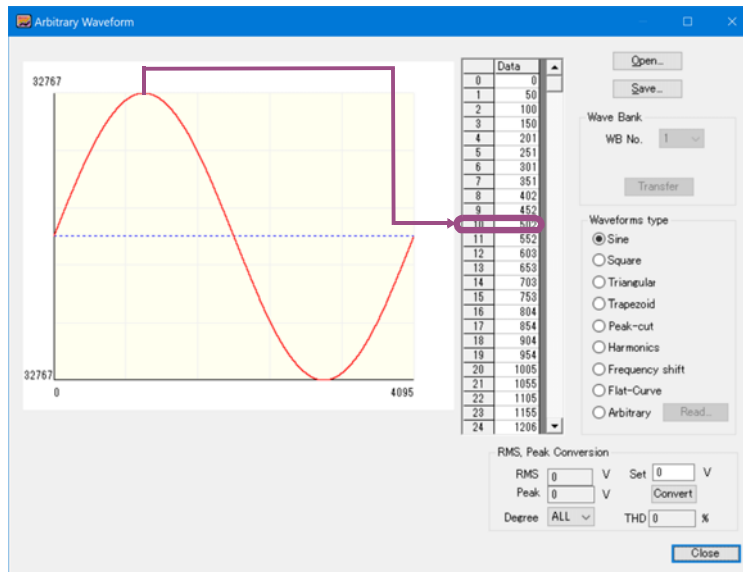
There are nine types of arbitrary waveforms that you can choose from.

- Sine
- Square
- Triangular
- Trapezoidal
- Peak-cut
- Harmonics
- Frequency shift
- Flat curve
- Arbitrary

Selecting Arbitrary enables you to directly edit arbitrary waveform data. If you select any other type, you cannot directly edit the data.

1 On the Sequence menu, click Arbitrary Waveform.

The Arbitrary Waveform window appears.



2 Select the arbitrary waveform type.

Arbitrary waveform data is 16 bits high (-32767 to 32767) and 12 bits wide (0 to 4095).

Double-click the waveform to select the corresponding data in the worksheet.

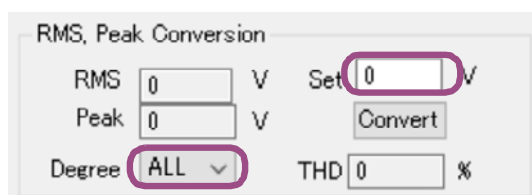
3 Depending on the waveform that you select, set the necessary values.

See "Waveform settings" (p.67).

4 Enter the voltage to output from the PCR-WE in the Set box under RMS, Peak Conversion, select a value from the Degree list, and click Convert.

You can check what kind of values the RMS value (V), peak value (V), and THD (%) will take on when the specified voltage is output when arbitrary waveform data is used.

If you specify the voltage and harmonic (ALL, 1 to 40), other values will be calculated automatically.



THD (total harmonic distortion) is expressed by the following equation.

$$THD = \frac{\sqrt{\sum(V_n^2)}}{V_{rms}} \text{ (where } ^2 \text{ represents squared, } n \text{ is a number between 2 and 40)}$$

V_n: RMS values of the 2nd to the 40th harmonic voltage components

V_{rms}: RMS voltage (ALL)

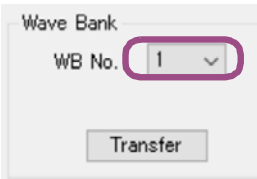
5 To save the arbitrary waveform data that you have created, click Save.

The data is saved to an arbitrary waveform file (.arb extension).

If you do not want to transfer the arbitrary waveform data to the waveform bank, the procedure ends here.

6 Specify WB No. (1 to 256), and click Transfer.

The arbitrary waveform data is written to the PCR-WE waveform bank and is registered in the list of waveform banks in Wavy.



To transfer arbitrary waveform data to a waveform bank, you must save the data to a file first. The waveform bank items are unavailable until you save the data.

7 Click Close.

Waveform settings

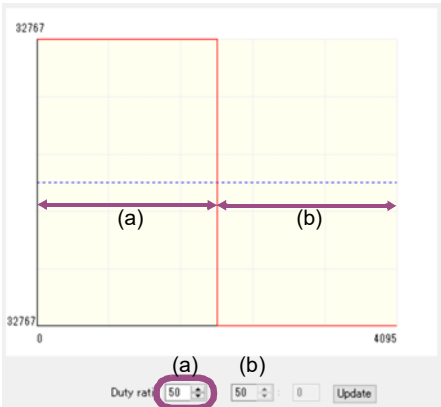
You can directly edit waveform data only when Arbitrary is selected.

■ Sine waveform

There are no settings you can change.

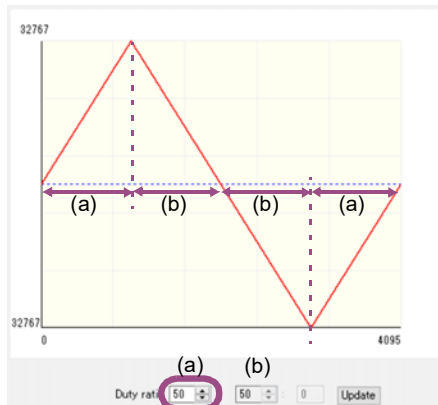
■ Square waveform

Enter a value (0.1 to 99.9) in Duty ratio (a), and click Update or press Enter. (b) is set automatically.



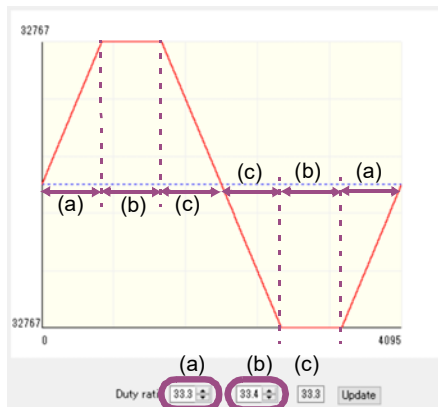
■ Triangular waveform

Enter a value (0.0 to 100) in Duty ratio (a), and click Update or press Enter. (b) is set automatically.



■ Trapezoid waveform

Enter values (0.0 to 100) in Duty ratio (a) and (b), and click Update or press Enter. (c) is set automatically.



■ Peak-cut waveform

Enter the peak-cut factor (0.1 to 100), and click Update or press Enter.



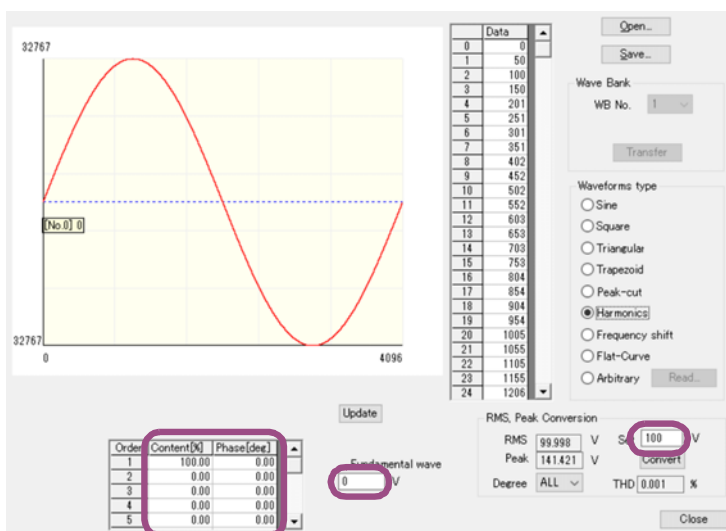
The peak-cut sine waveform is different from the "peak clipped waveform" (special waveform output feature) of the PCR-WE.

■ Harmonics

Enter the level and phase in each harmonic order, and click Update or press Enter.

- Level range: 0.00 % to 100.00 % (in 0.01 % steps)
- Phase range: 0.0 ° to 359.9 °
- Harmonic order range: 1st to 50th

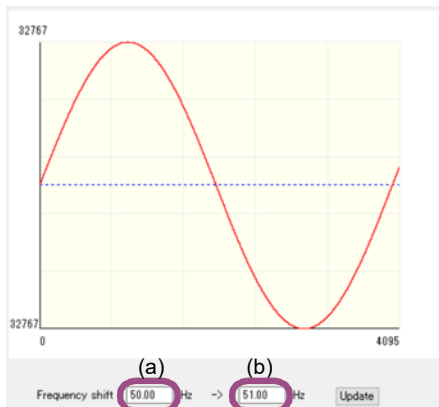
If you specify Fundamental waveform and click Update, the output voltage settings necessary to change the harmonic waveform levels and phases while keeping the fundamental waveform voltage constant are displayed in Set.



■ Frequency shift

Enter values (40.00 to 120.00) in Frequency shift (a) and (b), and click Update or press Enter.

Enter the original frequency in (a) and the shifted frequency in (b).



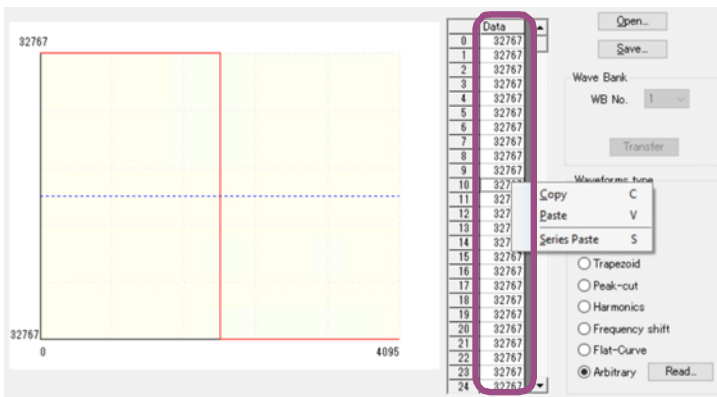
■ Flat-Curve

Enter a value (0.4 to 1.0) in Specified Clip Factor, and click Update or press Enter.
This is a waveform defined in IEC61000-4-13.



■ Arbitrary

The waveform displayed when Arbitrary is selected depends on the waveform selected previously. For example, if Square is selected and you select Arbitrary, a square wave will be displayed.
To edit the data, change the values in the data sheet cells.
Right-click a cell, and select Copy, Paste, or Series Paste to copy or paste data. To paste to consecutive cells, select the cells, right-click, and select Series Paste. The value of the first selected cell will be pasted to the selected cells.



Editing an existing arbitrary waveform and transferring it to the waveform bank

NOTE

To use in a sequence an arbitrary waveform file (.arb format) stored in a separate PC or memory card, move the file you want to transfer to the folder for saving arbitrary waveforms in advance. You can set the folder for saving arbitrary waveforms in the Environment settings (p. 60) window.

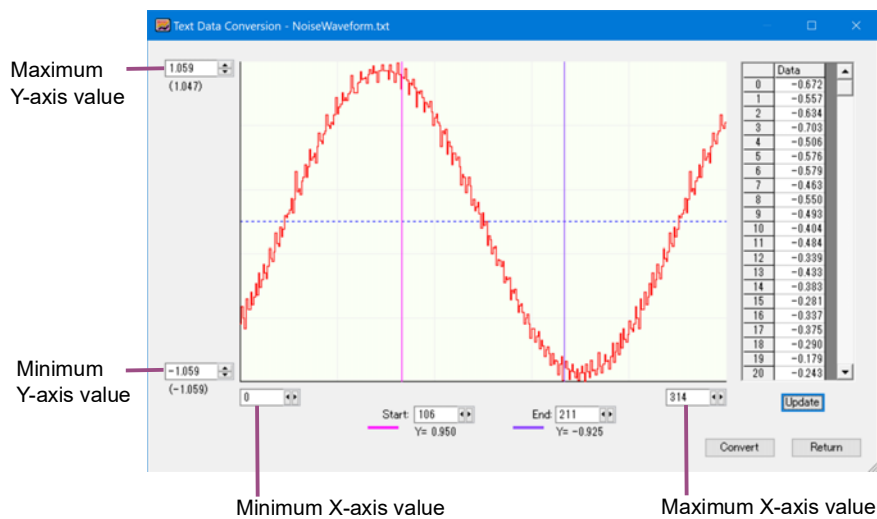
- 1 On the Sequence menu, click Arbitrary Waveform.**
The Arbitrary Waveform window appears.
- 2 Click Open, and select an arbitrary waveform file (.arb).**
The data of the selected file appears.
- 3 Edit the settings, and click Save.**
The edited data is saved to the file.
If you do not want to transfer the arbitrary waveform data to the waveform bank, the procedure ends here.
- 4 Specify WB No. (1 to 256), and click Transfer.**
The arbitrary waveform data is written to the PCR-WE waveform bank and is registered in the list of waveform banks in Wavy.
- 5 Click Close.**

Creating arbitrary waveform data using data from an oscilloscope or other instrument

You can create arbitrary waveform data by importing measurement data files of other instruments such as oscilloscopes and data loggers.

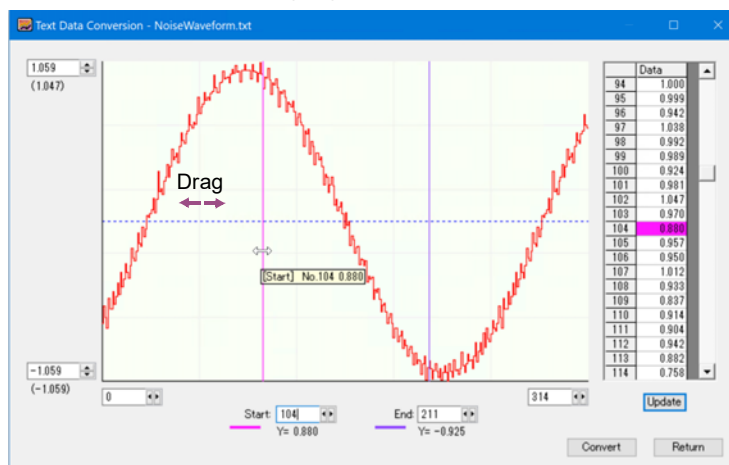
Wavy can import data files in text format. The maximum number of data values that can be imported is 10000. From the imported data, select the arbitrary waveform that you want to use, and then convert it for PCR-WE.

- 1 On the Sequence menu, click Arbitrary Waveform.**
The Arbitrary Waveform window appears.
- 2 Under Waveforms type, select Arbitrary, and then click Read.**
- 3 Select a data file in text format.**
A text data conversion confirmation window appears.
- 4 Set the minimum and maximum values for the X-axis and Y-axis, and then click Update or press Enter.**
The graph display range will change.



5 Set the starting and ending positions of the waveform that you want to use as an arbitrary waveform.

You can also drag the start and end position lines. When you drag a line, the corresponding data entry in the data sheet is highlighted.



You can also set the start and end positions in the following manner.

- While holding down the Shift key, double-click the waveform.
(The start position line moves to the point you double-clicked.)
- While holding down the Ctrl key, double-click the waveform.
(The end position line moves to the point you double-clicked.)

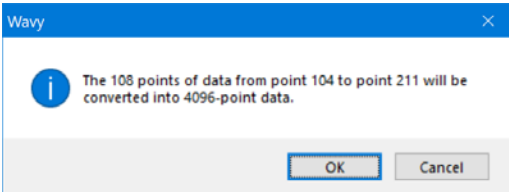
If you double-click the following locations, the corresponding data on the sheet will be highlighted.

- The Start or End character or the start or end position line on the graph
- Any specific point on the waveform

You can right-click the waveform and change the colors of the start and end position lines.

6 Click Convert.

A confirmation window appears.



- 7 Click OK.**
The data will be converted. X values will be converted into 1024 values.
- 8 Check the minimum and maximum Y-axis values.**
- 9 Click Return.**
The Arbitrary Waveform window returns. The converted data appears.
- 10 Click Save.**
- 11 Click Close.**

Displaying the Waveform View

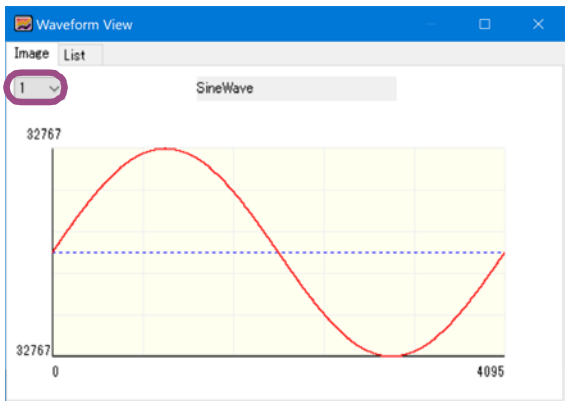
Wavy uses the list of waveform banks to manage arbitrary waveforms that have been written to the PCR-WE from Wavy and arbitrary waveforms that have been read from the PCR-WE into Wavy.

To display the Waveform View window, on the View menu, click Waveform View.

In the Waveform View window, you can display waveform images or the list of waveform banks.

Waveform image

Specify the wave number of an arbitrary waveform from the list of waveform banks and the phase (for single-phase, three-wire and for three-phase) to display an image of the waveform.



List of waveform banks

A list containing the information of the arbitrary waveforms in the list of waveform banks is displayed.

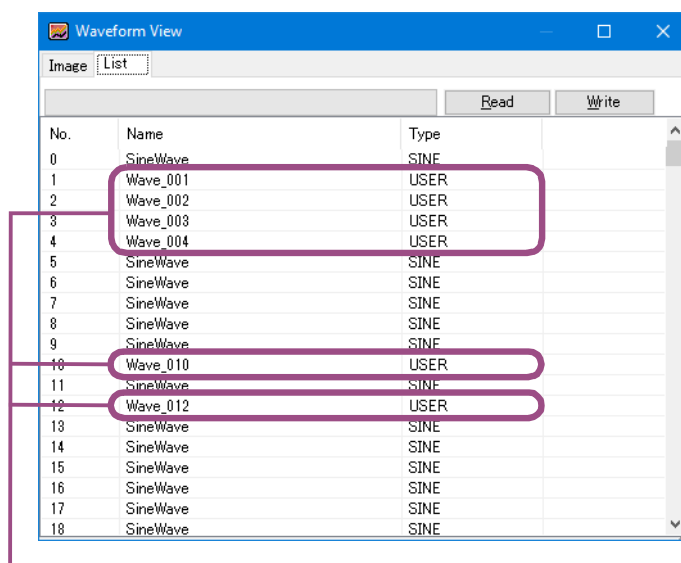
From this list, you can read or write all waveforms (waveforms 1 to 256 excluding 0) to completely synchronize the waveform banks between the PCR-WE and Wavy.

To read waveform data from the PCR-WE, click Read.

To write waveform data to the PCR-WE, click Write.

The list of waveform banks is updated when you execute any of the following operations.

- When waveform data is transferred to the waveform bank from the Arbitrary Waveform window (see “Creating and Transferring Arbitrary Waveforms” (p.65))
- If the Write Wave is selected when writing a sequence to the PCR-WE from the Transfer window (see “Writing a sequence” (p.45))
- If the Read Wave is selected when reading a sequence from the PCR-WE from the Transfer window (see “Reading a sequence” (p.46))



Arbitrary waveform file name of the registered waveform data
All others are default file names.

NOTE

- By default, when Wavy starts, all waveform names are “SineWave.”
- Wavy manages waveform data registered in the list of waveform banks using .arb files. Therefore, when waveform data is read from the PCR-WE, the data is automatically saved in a .arb data file.
File names are automatically assigned on the basis of waveform bank numbers (001 to 256.) For example, the file name “Wave_001.arb” indicates that the waveform bank number is 01. The files are saved to the Arbitrary Waveform Folder that is specified in the Environment settings (p.60) window. If a file with the same name exists, it is overwritten.
- Output waveform data is stored in the PCR-WE internal memory. The memory area for storing the data of one output waveform is referred to as a waveform bank. The banks are assigned number from 0 to 256. Waveform bank 0 contains a sine wave data that is used in the PCR-WE reference voltage waveform. This waveform bank cannot be overwritten. In the factory default settings, all waveform banks have the same waveform (sine wave) as the one that is stored in waveform bank 0.

Direct Control

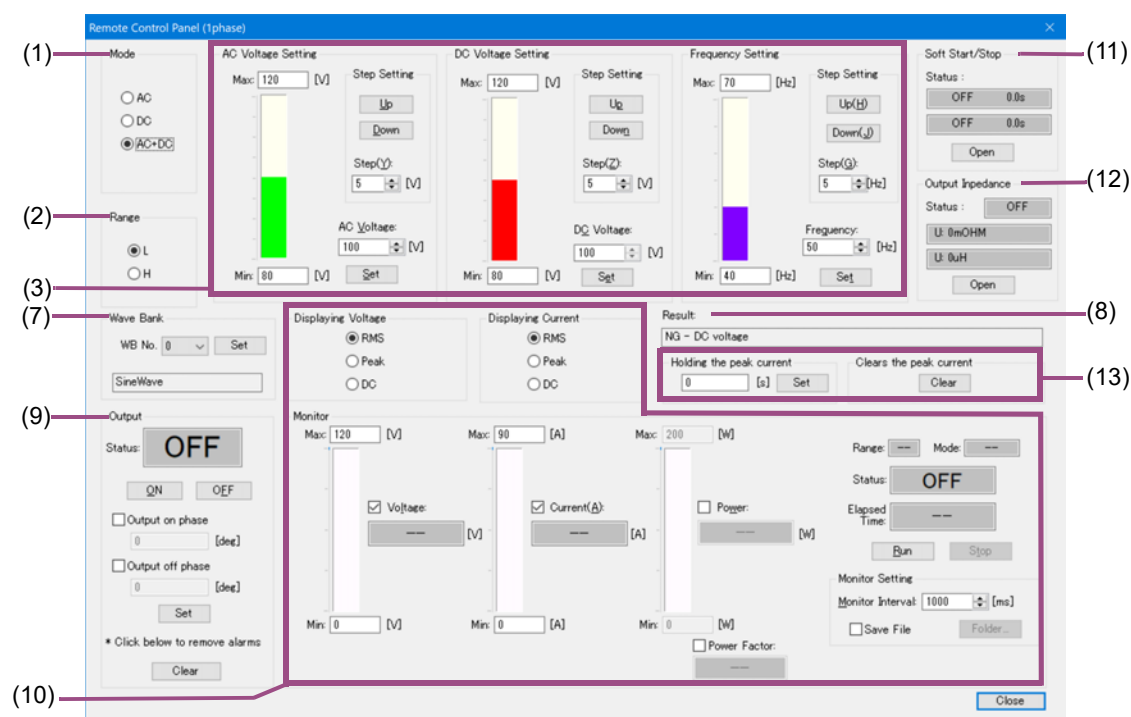
You can use Wavy to remotely control a PCR-WE.

On the Tool menu, click Direct Control to display the Remote Control Panel window.

A window appears corresponding to the selected “(1) Wiring Method” (p.19) of the sequence creation mode.

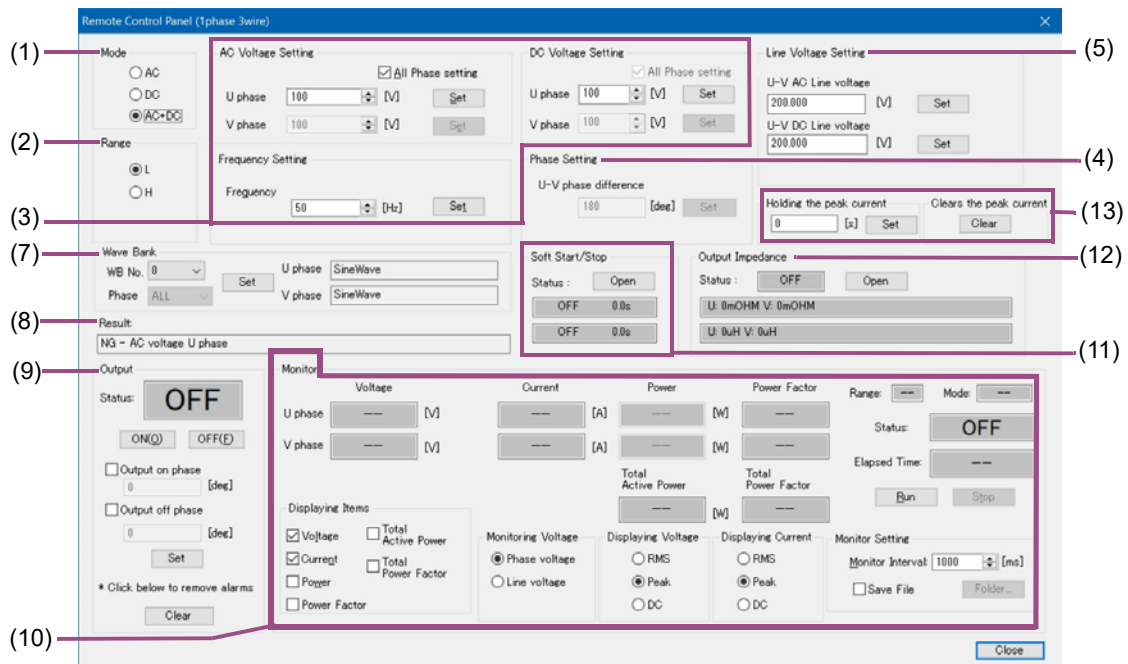
- Wiring method: Single-phase (p.75)
- Wiring method: Single-phase, three-wire (p.76)
- Wiring method: Three-phase (p.77)
- Control parameters (p.78)

Wiring method: Single-phase



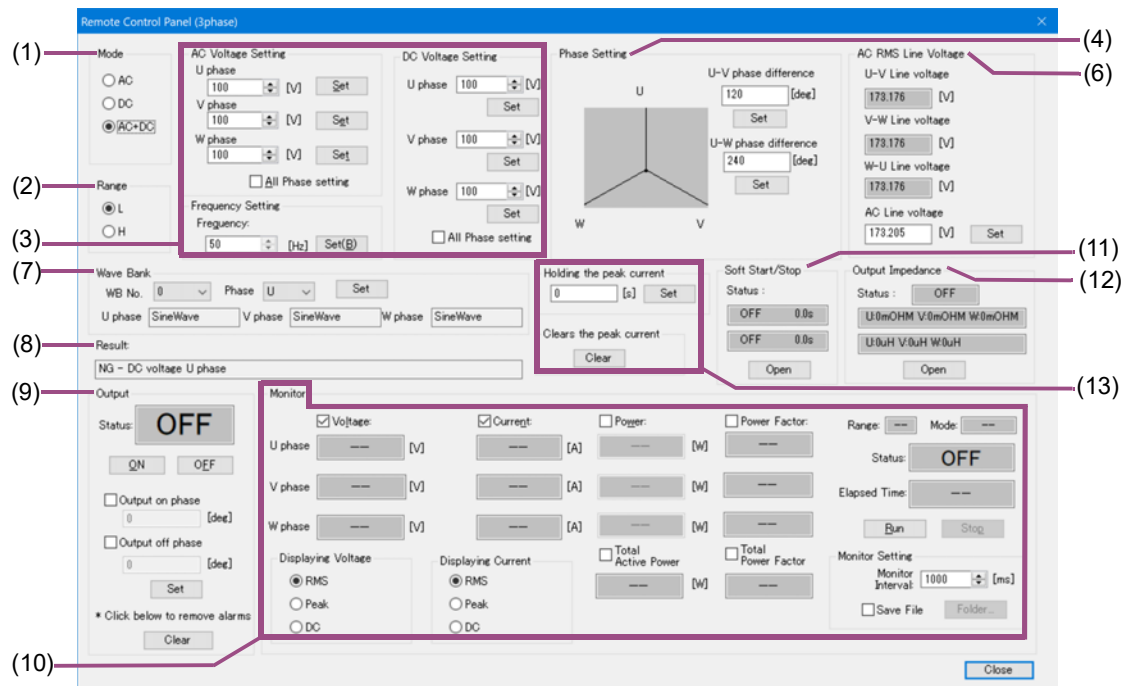
- (1) Mode (p.78)
- (2) Range (p.78)
- (3) AC Voltage Setting/DC Voltage Setting/Frequency Setting (p.78)
- (7) Wave Bank (p.79)
- (8) Result (p.79)
- (9) Output (p.80)
- (10) Monitor (p.80)
- (11) Soft Start/Stop (p.81)
- (12) Output Impedance (p.82)
- (13) Holding the peak current/Clears the peak current (p.82)

Wiring method: Single-phase, three-wire



- (1) Mode ([p. 78](#))
- (2) Range ([p. 78](#))
- (3) AC Voltage Setting/DC Voltage Setting/Frequency Setting ([p. 78](#))
- (4) Phase Setting ([p. 78](#))
(For PCR-WEA/PCR-WEA2 Series AC Power Supply only)
- (5) Line Voltage Setting ([p. 79](#))
- (7) Wave Bank ([p. 79](#))
- (8) Result ([p. 79](#))
- (9) Output ([p. 80](#))
- (10) Monitor ([p. 80](#))
- (11) Soft Start/Stop ([p. 81](#))
- (12) Output Impedance ([p. 82](#))
- (13) Holding the peak current/Clears the peak current ([p. 82](#))

Wiring method: Three-phase



- (1) Mode ([p.78](#))
- (2) Range ([p.78](#))
- (3) AC Voltage Setting/DC Voltage Setting/Frequency Setting ([p.78](#))
- (4) Phase Setting ([p.78](#))
- (6) AC RMS Line Voltage ([p.79](#))
- (7) Wave Bank ([p.79](#))
- (8) Result ([p.79](#))
- (9) Output ([p.80](#))
- (10) Monitor ([p.80](#))
- (11) Soft Start/Stop ([p.81](#))
- (12) Output Impedance ([p.82](#))
- (13) Holding the peak current/Clears the peak current ([p.82](#))

Control parameters

■ (1) Mode

Select the output voltage mode.

The PCR-WE does not have the concept of output voltage mode and can output AC voltage and DC voltage (AC+DC) at all times. However, on Wavy, you can specify the following items to use three output voltage modes: AC, DC, and AC+DC.

Output voltage mode	Items set automatically*1
AC	DC Voltage Setting: All phases 0 V
DC	AC Voltage Setting: All phases 0 V, Frequency Setting: 50 Hz, Output on phase and Output off phase: FREE, U-V phase difference: 120 deg, and U-W phase difference: 240 deg
AC+DC	None

*1 The settings are hidden and cannot be changed.

NOTE

If you execute direct control in AC or DC mode, the above values in the PCR-WE will be overwritten.

■ (2) Range

Select the output voltage range (L or H.)

■ (3) AC Voltage Setting/DC Voltage Setting/Frequency Setting

Item	Description
AC voltage DC voltage	Enter the phase voltages in the boxes. If the wiring method is single-phase, you can also change the phase voltages using the arrow buttons. Clicking a blinking Set sends the value to the PCR-WE. The line voltages displayed in (5) Line Voltage or (6) AC RMS Line Voltage also change according to the specified phase voltages.
Frequency	Enter the frequency in the box. If the wiring method is single-phase, you can change the frequency using the arrow buttons. Clicking a blinking Set sends the value to the PCR-WE.
Max Min	This appears when the wiring method is single-phase. The ratios of the specified values relative to the minimum and maximum values are displayed with bar graphs. Click the Up and Down to change the values at the specified resolution.
All Phase setting	This appears when the wiring method is single-phase three-wire or single-phase. When this check box is selected, phases other than the U phase become unavailable. The voltage set for the U phase is applied to all phases.

■ (4) Phase Setting

This appears when the wiring method is 1phase 3wire or 3phase.

Set the phase difference of the V phase and W phase (0 deg to 360 deg, 0 = 360) relative to the U phase.

Clicking a blinking Set sends the value to the PCR-WE.

■ (5) Line Voltage Setting

This appears when the wiring method is single-phase three-wire.

Item	Description
U-V AC Line voltage	Enter the line voltages in the boxes.
U-V DC Line voltage	If the wiring method is single-phase three-wire, the line voltages are twice the phase voltages. Clicking a blinking Set sends the value to the PCR-WE. The phase voltages displayed in (3) AC Voltage Setting or (6) DC Voltage Setting also change according to the specified line voltages.

■ (6) AC RMS Line Voltage

This appears when the wiring method is three-phase.

Item	Description
U-V Line voltage	Based on the phase voltage, phase difference, and arbitrary waveform data, the converted RMS voltage between phases are displayed.
V-W Line voltage	
W-U Line voltage	
AC Line voltage	Enter the line voltage in the box. If the wiring method is three-phase, the line voltage is $\sqrt{3}$ times the phase voltage. Clicking a blinking Set sends the value to the PCR-WE. The phase voltages displayed in (3) AC Voltage Setting or (6) DC Voltage Setting also change according to the specified line voltages.

■ (7) Wave Bank

In AC or AC+DC mode, you can set the waveforms registered in the waveform bank.

Before selecting Wave No., be sure to click Read or Write in the Wavy's List of waveform banks (p. 74) to synchronize the waveform banks between the PCR-WE and Wavy.

Before selecting Wave No., be sure to click Read or Write in the Wavy's List of waveform banks (p. 74) to synchronize the waveform banks between the PCR-WE and Wavy.

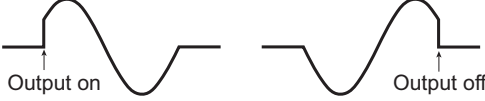
Select the WB No. (0 to 256) and phase (phase to assign the waveform to, only when the wiring method is single-phase, three-wire or three-phase), and check the displayed waveform name. Click the blinking Set button to send the settings to the PCR-WE and output the waveform.

■ (8) Result

The response to the sent value returned by the PCR-WE is displayed.

If an SCPI error code is displayed, see the PCR-WE Series Communication Interface Manual.

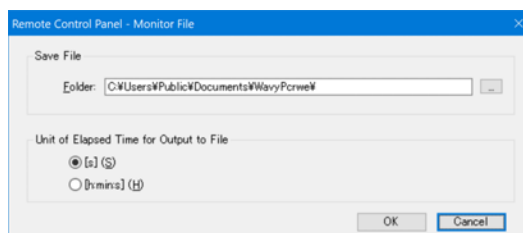
■ (9) Output

Item	Description
ON OFF	Click this to turn the output on or off.
Status	Displays the current PCR-WE status.
Output on phase Output off phase	<p>In AC or AC+DC mode, you can set the on and off phases for AC output. If the wiring method is single-phase, three-wire or three-phase, specify the U phase.</p>  <p>Select the Output on phase and/or Output off phase, enter the phase angles (0 deg to 360 deg, 0 = 360.) Clicking a blinking Set sends the value to the PCR-WE.</p>
* Click below to remove alarms	You can clear the alarms that have been activated by the PCR-WE protection function.

■ (10) Monitor

Item	Description
Voltage Current Power Power Factor Total Active Power Total Power Factor	<p>When you select the items you want to monitor using Displaying Items, the monitored values will be displayed.</p> <p>In AC or AC+DC mode, you can select the power factor.</p> <p>If the wiring method is single-phase three-wire or three-phase, you can select Total Active Power and Total Power Factor.</p>
Max Min	<p>This appears when the wiring method is single-phase.</p> <p>Set the voltage, current and power ranges you want to monitor. The ratios of the monitored values relative to the minimum and maximum values are displayed with bar graphs.</p>
Monitoring Voltage	<p>This appears when the wiring method is single-phase three-wire or single-phase.</p> <p>Set the displayed values on the voltage monitor to phase voltage or line voltage.</p>
Displaying Voltage	Set the displayed values on the voltage monitor to rms value, peak value, or DC (DC mode only).
Displaying Current	<p>Set the displayed values on the current monitor to rms value, peak value, or DC (DC mode only).</p> <p>Wavy measures the maximum instantaneous current and displays the measured peak current with an absolute value. In DC mode, even if you are generating negative voltage, the peak measured current is displayed as a positive value.</p>
Range	Displays the set output voltage range.
Mode	Displays the set output voltage mode.
Status	<p>Displays the current status.</p> <p>OFF Monitoring paused.</p> <p>Monitoring Monitoring running.</p> <p>ERROR A communication error occurred. Check Configuring the Interface (p.8).</p> <p>OVP A protection function was activated (alarm). (OVP example) OVP: overvoltage protection, UVP: undervoltage protection, OHP: overheat protection, OL: Over load protection</p>
Elapsed Time	Displays the elapsed monitoring time.
Run Stop	Starts or stops the monitor.
Monitor Interval	Set the interval (Single-phase: 200 ms to 600000 ms, Single-phase, three-wire and Three-phase: 500 ms to 600000 ms) for updating the monitor.

Item	Description
Save File	Select the check box to save monitored values to a file while monitoring is in progress. Click Folder to select the save destination, and the unit of elapsed time output to the file.



The accuracy of the elapsed time varies depending on the PC environment that you are using.

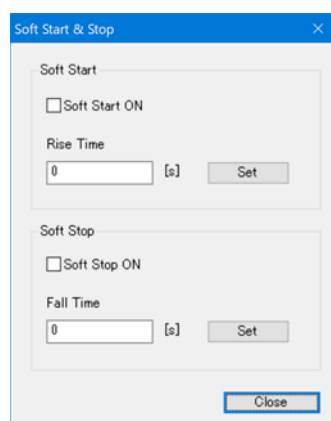
The file name consists of the operation mode, the execution start date and time, and the extension. You can change the extension (.txt by default) using "Environment settings" (p.60).

■ (11) Soft Start/Stop

Set the soft start function, which gradually increases the output voltage when the output is turned on, and the soft stop function, which gradually decreases the output voltage when the output is turned off.

Next to Status, the present settings are displayed in order from the top as follows: soft start and soft stop.

Clicking Open opens a Soft Start & Stop window.



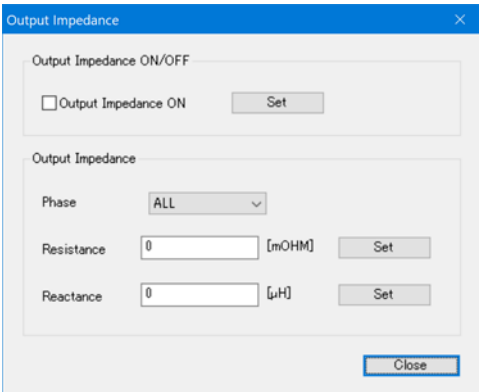
Item	Description
Soft Start ON	Selecting this check box enables the soft start function.
Rise Time	Set the rise time (0.1 s to 30.0 s).
Soft Stop ON	Selecting this check box enables the soft stop function.
Fall Time	Set the fall time (0.1 s to 3.0 s).
Set	Clicking a blinking Set sends the value to the PCR-WE.

■(12) Output Impedance

Set the PCR-WE output impedance.

Next to Status, the present settings are displayed in order from the top as follows: output impedance on/off, resistance component, and reactance component.

Clicking Open opens an Output Impedance window.



Item	Description
Output Impedance ON	Selecting this check box enables the output impedance setting.
Phase	Select the phase for setting the output impedance. To set all phases collectively, select ALL.
Resistance	Set the output impedances (resistance component).
Reactance	Set the output impedances (reactance component).
Set	Clicking a blinking Set sends the value to the PCR-WE.

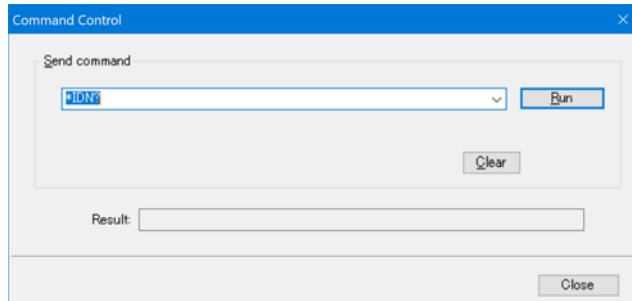
■(13) Holding the peak current/Clears the peak current

Item	Description
Holding the peak current	<p>If Displaying Current is set to Peak, the peak current measurement can be held.</p> <p>Enter the hold time in the box. You can enter a value between 0 s and 10 s or infinity (enter a value greater than 10).</p> <p>Clicking a blinking Set sends the value to the PCR-WE.</p>
Clears the peak current	To clear the peak current, click Clear.

Control Using Commands

You can send commands from Wavy to control a PCR-WE.

On the Tool menu, click Command Control to display the Command Control window.



Enter a command, and then click Run.

The result will be displayed.

The command transmission log (only the commands that were successfully transmitted and received) is recorded in the list box. You can clear it by clicking Clear.

For details on commands, see the PCR-WE Communication Interface Manual.

Reference

This section describes the main specifications of Wavy and the menus.

- SD032-PCR-WE specifications ([p.84](#))
- Menu reference ([p.85](#))

SD032-PCR-WE specifications

Item		Specifications			
Output voltage mode		AC voltage, DC voltage, AC+DC voltage			
Number of significant decimal places ^{*1}		3 digits			
Monitor function		Output current, output voltage, output power			
Interval ^{*2}	Single-phase	200 ms to 600000 ms			
	Single-phase, three-wire	500 ms to 600000 ms			
	Three-phase				
Number of steps		600			
Ranges of sequence times (intervals) ^{*2}	Value	0.1 ms to 10000.0 ms	0.001 s to 1000.000 s	0.1 min to 1000.0 min	0.1 h to 1000.0 h
	Resolution	0.1 ms	1 ms	0.1 min	0.1 h

*1 The actual number of significant decimal places varies depending on the PCR-WE that the PC is connected to.

*2 The accuracy depends on the PC environment that you are using.

Menu reference

Menu		Description
File		
New ^{*1}		Creates a new file.
Open ^{*1}		Opens an existing file.
Save ^{*1}		Overwrites the file that you are working on.
Save As		Saves the file with a new name.
Close		Closes the file.
Exit		Exits Wavy for PCR-WE.
View		
Toolbar		Shows/hides the toolbar.
Status Bar		Shows/hides the status bar.
Save Position		Saves the present position and size of the window.
Previous File		Loads the last file that was used when the software starts.
Waveform View		Displays a preview of the arbitrary waveform.
Sequence Preview		Displays a preview of the sequence.
Graph		
Transition	Ramp	Changes the transition of the selected line to "ramp".
	Step	Changes the transition of the selected line to "step".
Delete		Deletes the selected line.
Display item		Selects the item (voltage, frequency, starting phase angle, or phase difference) to show on the Y-axis.
Vertical Axis ^{*1}		Shows/hides the vertical axis.
X-axis Scale Lines		Shows/hides the X-axis grid
Y-axis Scale Lines		Shows/hides the Y-axis grid
Scale ^{*1}		Changes the scale of X-axis and Y-axis.
Color...	Background	Changes the background color of the graph.
	Line	Changes the step line color.
	Line to Draw	Changes the line color being drawn.
	Vertical Axis	Changes the vertical axis color.
	X/Y-axis	Changes the color of X-axis and Y-axis.
	XY-axis scale lines	Changes the color of X-axis and Y-axis grid lines.
Resolution of time period	Default	Changes the setting resolution by dragging.
	1st digit of integer	The default value is three decimal places.
	1st digit of decimal place	
	2nd digit of decimal place	
Resolution of setting value	Default	Changes the setting resolution by dragging.
	1st digit of integer	The default value is three decimal places.
	1st digit of decimal place	
	2nd digit of decimal place	
	3rd digit of decimal place	
Draw sequence by step		Draws graphs using steps regardless of the Transition setting.
Copy		Copies the graph to the clipboard.
Update Auto Scale		Applies the auto scaling to the graph.

Menu	Description
Worksheet	
Select All	Selects all cells.
Undo ^{*1}	Cancels the previous operation.
Delete ^{*1}	Deletes the step data.
Copy ^{*1}	Copies the step data.
Paste ^{*1}	Inserts the copied step data.
Sequence	
Transfer ^{*1}	Sends a sequence to the PCR-WE.
Run ^{*1}	Executes the sequence.
Sequence Creation Mode ^{*1}	Sets Wiring Method, Time unit, Output voltage mode, Output voltage range, Frequency, and An option setup of a step.
Monitoring Setup ^{*1}	Configures the monitor settings to be used while the sequence being executed.
Protection Setup	Sets Protection and Current Limit.
Arbitrary Waveform	Create and edit arbitrary waveforms.
Interface	Configures the interface to connect to the device.
Environment Setup	Sets the file format.
Tool	
Direct Control	Controls the device directly without using a sequence.
Command Control	Controls the connected device by using commands.
Digital I/O	Sets the PCR-WE's DIGITAL I/O connector channels.
Window	
Cascade	Cascades the windows.
Tile Horizontally	Tiles the windows in the horizontal direction.
Tile Vertically	Tiles the windows in the vertical direction.
Arrange Icons	Arranges icons along the window frame.
Help	
Help Topics	Opens the help file.
About Wavy ^{*1}	Displays the application software information including the version and the copyright.

^{*1} A button with the same function is available on the toolbar.

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If you find any misplaced or missing pages in the manuals, they will be replaced. If the manual gets lost or soiled, a new copy can be provided for a fee. In either case, please contact your Kikusui agent or distributor. At that time, inform your agent or distributor of the "Part No." written on the front cover of this manual.

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

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

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