KIKUSUI

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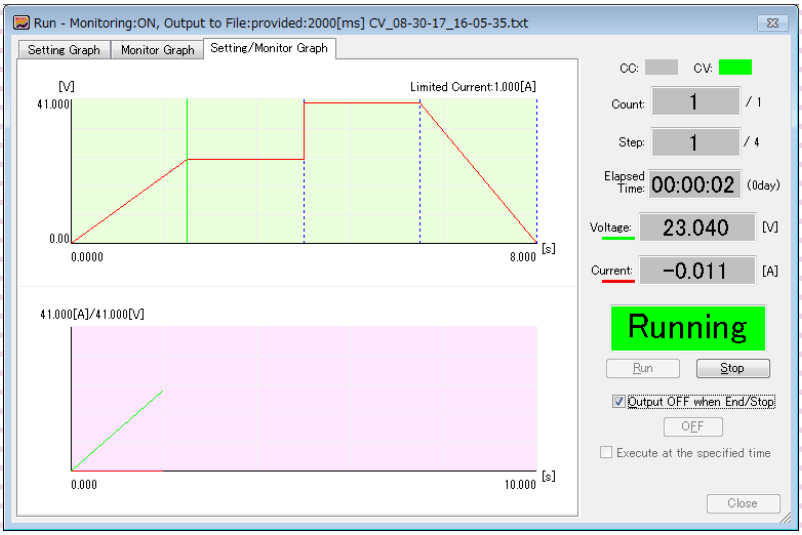
Operation Guide

Sequence Creation Software

SD027-PWR-01 Wavy for PWR-01

Ver. 6.x



Contents

Introduction

Sequence Creation Software SD027-PWR-01 Wavy for PWR-01 is used to create and execute sequences for Kikusui PWR-01 Series Regulated DC Power Supplies.

This document explains how to use SD027-PWR-01 Wavy for PWR-01 to control the PWR-01.

■ Safety Precautions

Before you use Wavy, read the operation manual of the PWR-01 regulated DC power supply, 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 guide covers

This guide applies to version 6.x of SD027-PWR-01 Wavy for PWR-01. To check the Wavy version, on the Help menu, click About Wavy.

Wavy for PWR-01 applies to PWR-01 Series with firmware version 1.0x and later. For instructions on how to view the firmware version, see the PWR-01 Series operation manual.

■ Intended readers

This document is intended for users who will use SD027-PWR-01 Wavy for PWR-01 to control PWR-01 Series Regulated DC Power Supplies and instructors of such users. The manual assumes that the reader has knowledge about DC power supplies.

■ Trademarks

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■ Notations Used in This Manual

- In this guide, Sequence Creation Software SD027-PWR-01 Wavy for PWR-01 is referred to as Wavy for PWR-01 or Wavy.
- The PWR-01 Series Regulated DC Power Supply is also referred to as the PWR-01 Series or PWR-01.
- “PC” in this manual is a generic term for personal computers and workstations.
- The following markings are used in this guide.

⚠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.

■ Copyright

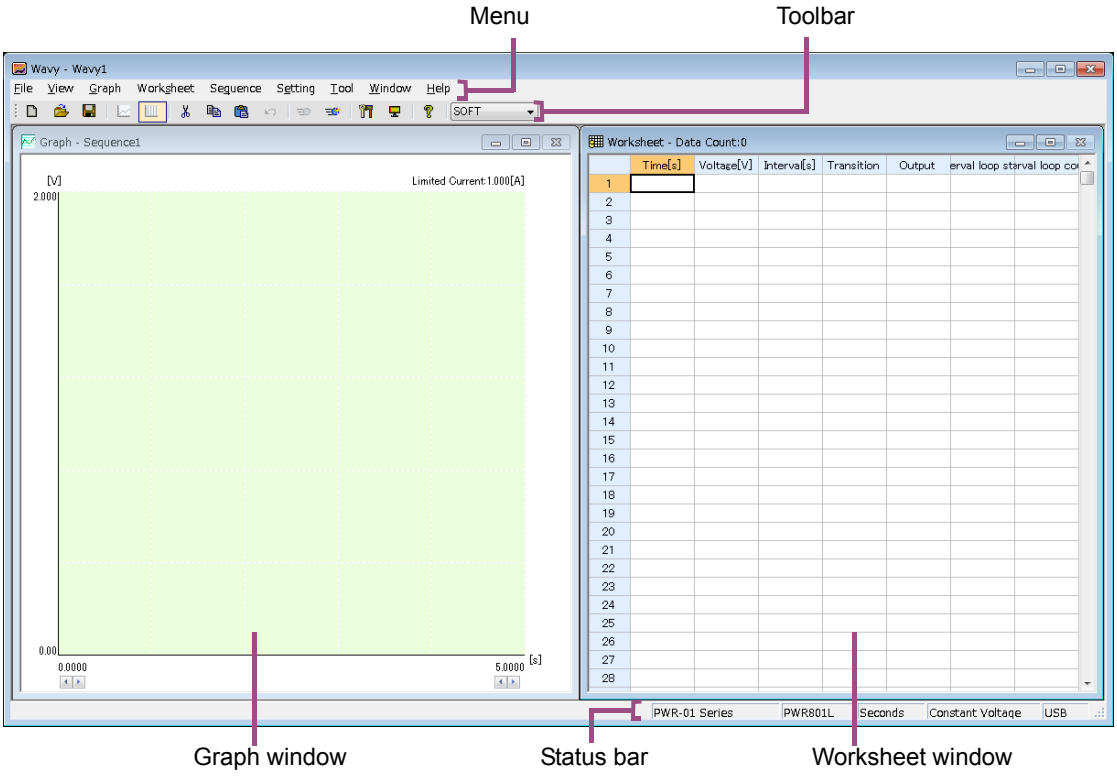
Starting Wavy

To start Wavy, on the taskbar, click Start, All Programs, Kikusui, and then SD027-PWR-01>Wavy for PWR-01.

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.

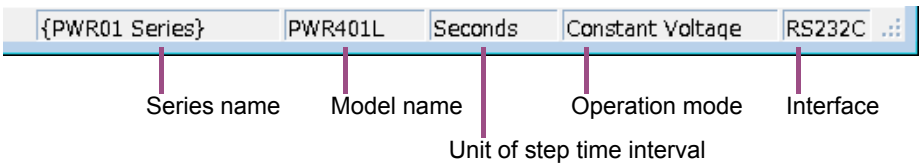
When you start Wavy, the sequence setup window (main window) appears.



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.

If SCPI error codes are displayed

SCPI error codes may be displayed while using Wavy. If an error code is displayed, see the PWR-01 Communication Interface Manual.

Configuring the Interface

Before using Wavy, configure the interface to connect to PWR-01. You can select from the following three interfaces:

- RS232C *(p.6)*
- USB *(p.9)*
- LAN *(p.11)*

RS232C

Connection

Connector cover
[P1-000-131]

The PWR-01's RS232C/TRIG IN connector (RS232C port) is RJ45. The connector comes with a cover. For safety reasons, be sure to attach the cover when you are not using the RS232C port. If the cover is damaged or lost, contact your Kikusui agent or distributor.

1 **Turn off the PWR-01 and PC.**

2 **Remove the RS232C port cover from the PWR-01.**

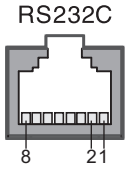
Keep the cover in a safe place.

3 **Connect the PWR-01 to the PC with a RJ45-DB9 adapter cable.**

The PWR-01's RS232C port is the same shape as a LAN port. Check the markings on the rear panel, and then connect it.

An RJ45-DB9 adapter cable is available as an option to the PWR-01.

The following figure shows the connector pinout when you are facing the rear panel of the PWR-01.



TRIG-IN is assigned to pin 7 of the PWR-01's RS232C port.

TRIG-IN is used for synchronized operation.

RJ-45 connector (on the PWR-01)	
Pin no.	Signal name
1	RXD (receive data)
2	TXD (transmit data)
8	GND (signal ground)
Housing	Shield

DB9 connector (on the PC)	
Pin no.	Signal name
2	RXD (receive data)
3	TXD (transmit data)
5	GND (signal ground)
Housing	Shield

Setup

■ PWR-01 setup

By factory default, the PWR-01's RS232C is set as follows:

- RS232C: Enabled
- Data rate (baudrate): 19200 bps

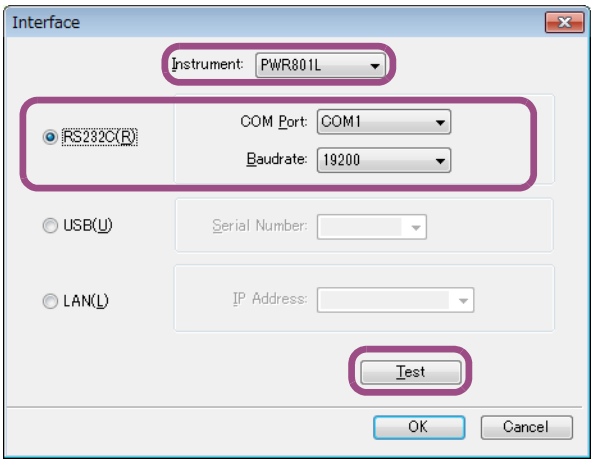
If you are going to use the PWR-01 with the factory default settings, there is no need to configure the PWR-01. If you want to change the settings, see the PWR-01 Series Communication Interface Manual.

■ Wavy setup

1 **Start Wavy.**

2 **On the Settings menu, click Interface.**

The Interface window appears.



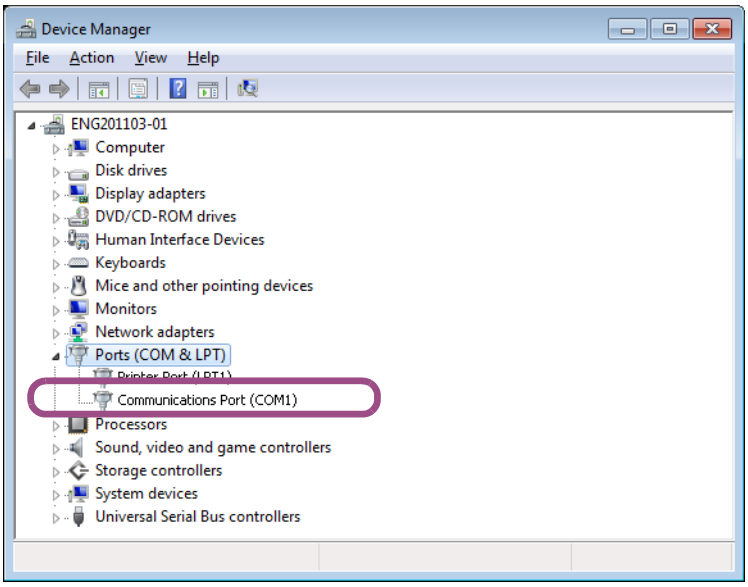
3 **On the Instrument list, click the model name of the connected PWR-01.**

The maximum value that can be specified on Wavy is limited to 105% of the rated output of the selected model. For example, if you select PWR401L, you will not be able to set values exceeding 42 V (40 × 1.05).

4 **Select RS232C/485.**

5 **From COM port, select the port number that the PWR-01 is using.**

From Windows Control Panel, open Device Manager. Open Port (COM & LPT) to view the port number in use.



6 **Select the baudrate set on the PWR-01.**

7 **Click Test to check that Wavy can communicate with the PWR-01.**

Protocol settings other than the baudrate are fixed on the PWR-01. They are set as follows:

Data length: 8 bits; stop bits: 1 bit; parity bit: none, flow control: none

Wavy exchanges data according to the above protocol settings. There is no need to manually change them on the PC side.

8 **Click OK.**

USB

Connection

Connector cover
[P1-000-132]

The PWR-01 USB port comes with a cover. For safety reasons, be sure to attach the cover when you are not using the USB port. If the cover is damaged or lost, contact your Kikusui agent or distributor.

1 **Remove the USB port cover from the PWR-01.**

Keep the cover in a safe place.

2 **Connect the PWR-01 to the PC with a USB cable.**

Setup

■ PWR-01 setup

By factory default, the PWR-01's USB is set as follows:

- USB: Enabled

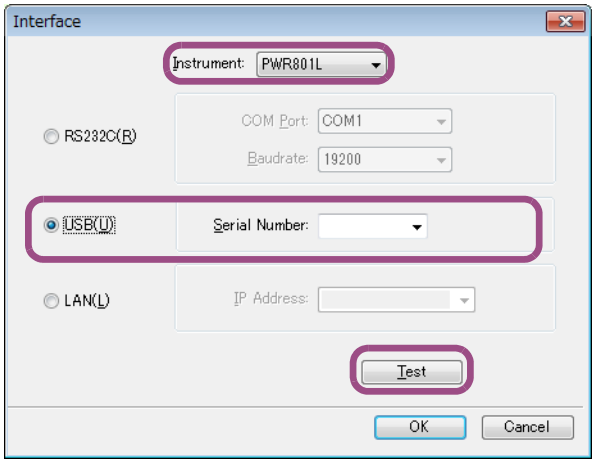
If you are going to use the PWR-01 with the factory default settings, there is no need to configure the PWR-01. If you want to change the settings, see the PWR-01 Series Communication Interface Manual.

■ Wavy setup

1 **Start Wavy.**

2 **On the Settings menu, click Interface.**

The Interface window appears.



3 **On the Instrument list, click the model name of the connected PWR-01.**

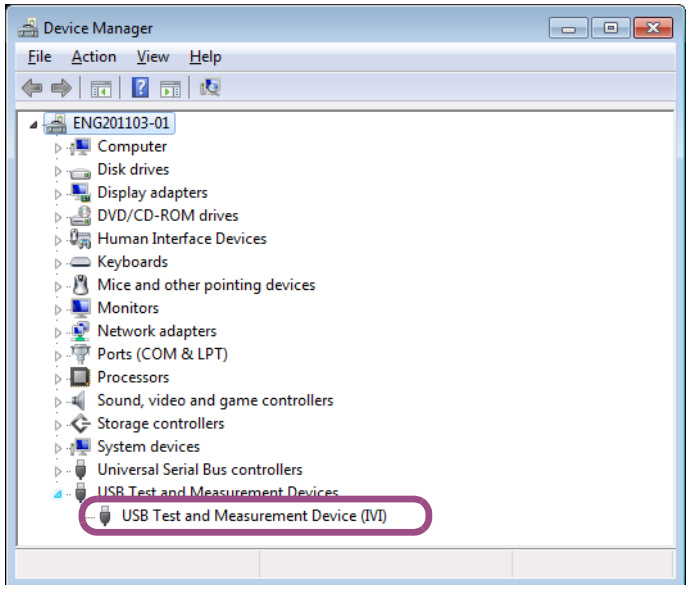
The maximum value that can be specified on Wavy is limited to 105% of the rated output of the selected model. For example, if you select PWR401L, you will not be able to set values exceeding 42 V (40 × 1.05).

4 **Select USB.**

5 **On the Instrument list, click the serial number of the connected PWR-01.**

You can check the serial number on the top panel of the PWR-01.

If the serial number does not appear even when the instrument is connected properly, check whether the PC has detected the PWR-01. In Control Panel, click “System and Security” and then Device Manager under System.



Check that “USB Test and Measurement Device” is displayed. If the driver is not installed correctly, reinstall VISA.

6 **Click Test to check that Wavy can communicate with the PWR-01.**

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 PWR-01 from a distance, install a Web camera or take other measures to monitor the status.**

Connection

Connector cover
[P1-000-131]

The PWR-01 LAN port comes with a cover. For safety reasons, be sure to attach the cover when you are not using the LAN port. If the cover is damaged or lost, contact your Kikusui agent or distributor.

1 **Remove the LAN port cover from the PWR-01.**

Keep the cover in a safe place.

2 **Use a LAN cable (category 5, straight) to connect the PWR-01 using method (a) or (b).**
(a) Connect the PWR-01 to a corporate LAN or router.
(b) Connect the PWR-01 directly to the PC or through a switching hub.

The PWR-01's RS232C port is the same shape as a LAN port. Check the markings on the rear panel, and then connect it.

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

Setup

■ PC setup

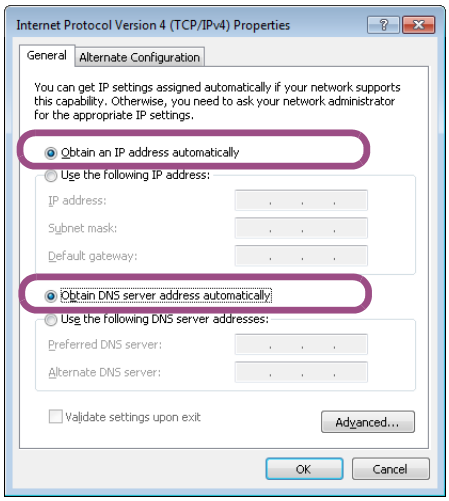
Method (a)

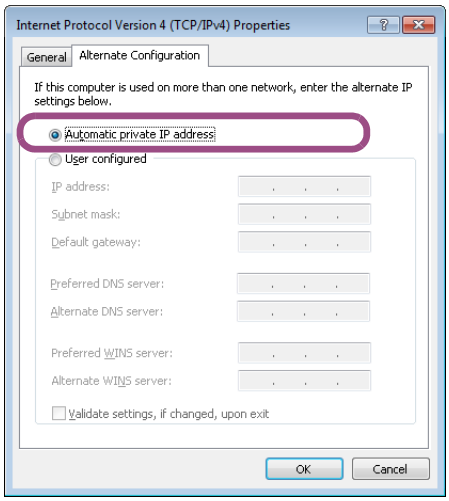
There are no particular settings you need to make.

Method (b)

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

- Start > Control Panel > Network and Internet > Network and Sharing Center > Change adapter settings >Local Area Connection > Local Area Connection Status > Properties >Internet Protocol Version (TCP/IPv4) > Properties





■ PWR-01 setup

By factory default, the PWR-01'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	CONFIG setting
LAN interface	LAN: Enabled	CF40: ON
IP address assignment method	DHCP: On[1] AUTO IP: On MANUAL IP: Off	CF61: 110

1 With method (b), it will take about a minute to establish a connection between the PC and PWR-01. The time can be shortened by setting DHCP to off (CF61: 010).

To control the PWR-01 from Wavy through LAN, you need to know the PWR-01's IP address.

If you are going to use the PWR-01 with the factory default settings, the PWR-01's IP address will be automatically assigned. To check the IP address, follow the procedure below. If you want to change the PWR-01 settings such as when you want to use a fixed IP address, see the PWR-01 Series Communication Interface Manual.

1 **Hold down CONFIG until CF50 (IP address display (1)) is displayed.**

The ammeter displays the IP address (1).

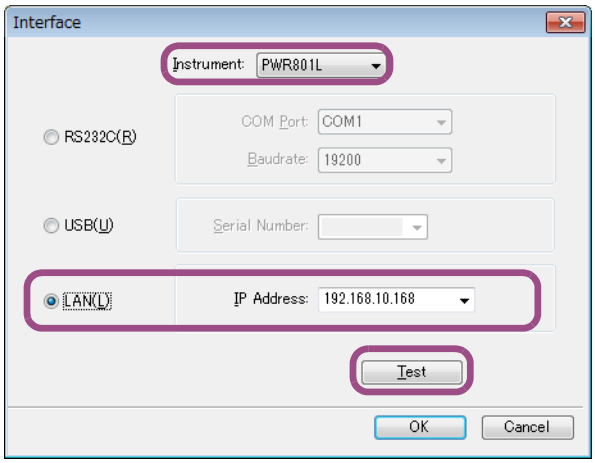
2 **Turn the VOLTAGE knob, and take note of the IP address values from CF50 to CF53 displayed on the ammeter.**

■ Wavy setup

3 **Start Wavy.**

4 **On the Settings menu, click Interface.**

The Interface window appears.



5 **On the Instrument list, click the model name of the connected PWR-01.**

The maximum value that can be specified on Wavy is limited to 105% of the rated output of the selected model. For example, if you select PWR401L, you will not be able to set values exceeding 42 V (40 × 1.05).

6 **Click LAN.**

7 **From [IP Address], select the IP address of the connected PWR-01.**

If the IP address is not displayed even when the PWR-01 is connected properly, enter the IP address you noted in Step 2 .
The IP address can also be found by searching for devices connected via LAN using the VISA library. *(p.14)*

8 **Click Test to check that Wavy can communicate with the PWR-01.**

9 **Click OK.**

If the PWR-01 is no longer recognized

If you are not using a fixed IP address, the PWR-01'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 "PWR-01 setup" *(p.12)*.

Searching for a device connected through LAN

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.

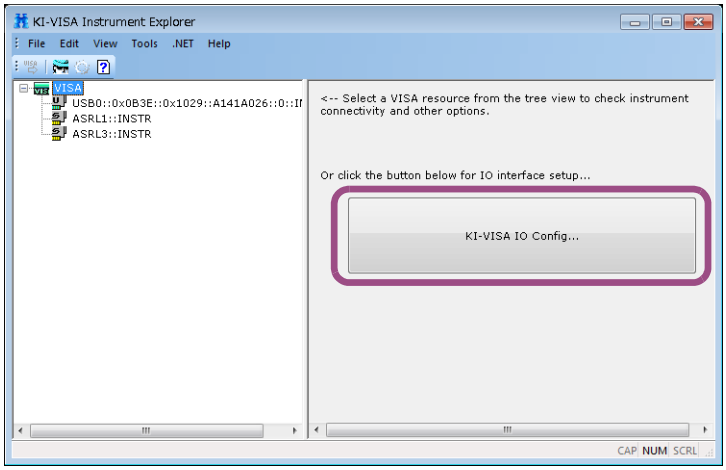
1 **Click Start, All Programs, Kikusui IO Software, KI-VISA, and then Instrument Explorer.**

Instrument Explorer will start.

If "Instrument Explorer" is not displayed in the Start menu or the desktop, open KiVisaExp.exe in the following folder.

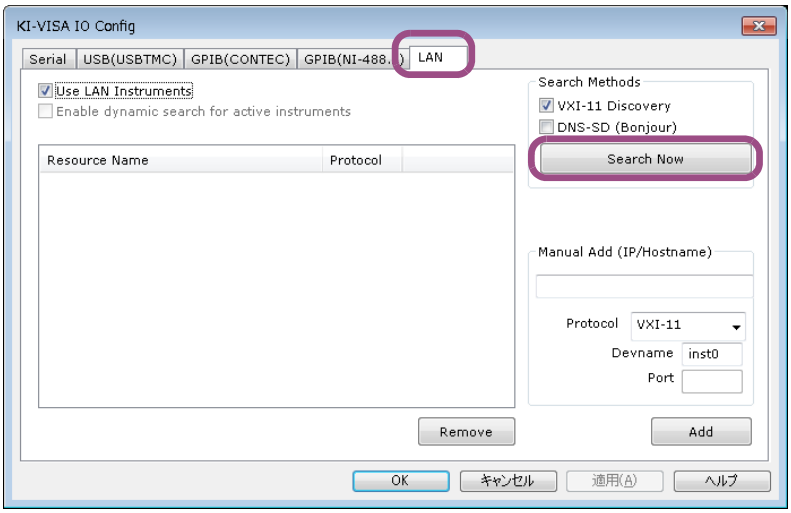
- 64 bit OS: C:\Program Files\IVI Foundation\VISA\VisaCom64\KiVisa
- 32 bit OS: C:\Program Files (x86)\IVI Foundation\VISA\VisaCom\KiVisa

2 **Click KI-VISA IO Config.**



3 **Click LAN.**

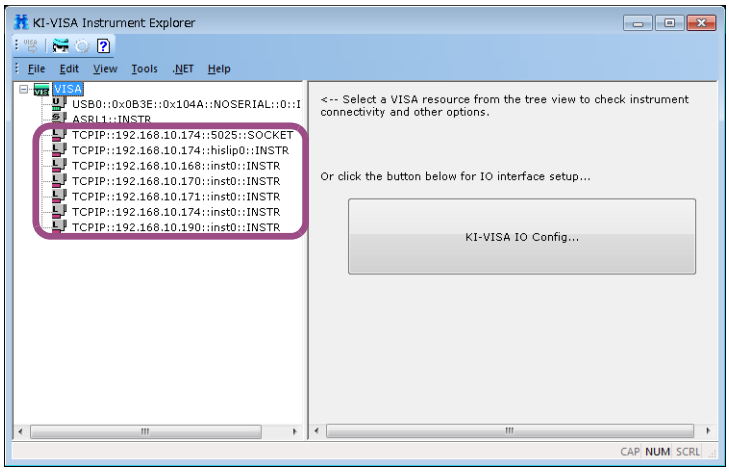
4 **Click Search Now.**



5 **Check that the IP address of the connected PWR-01 is displayed under Resource Name, and click OK.**

The KI-VISA IO Config window closes.

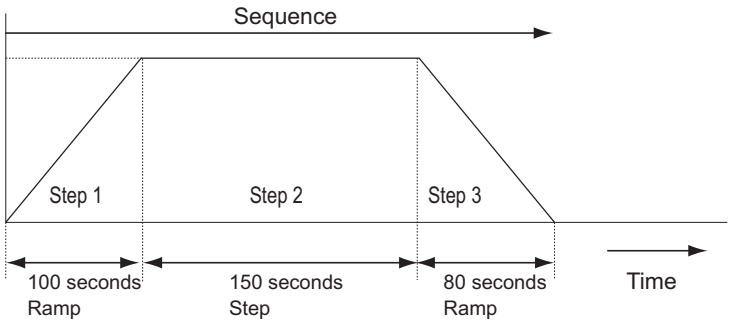
6 **Close Instrument Explorer.**



You can now select the IP address in the Wavy's Interface window.

Sequence Overview

A sequence is a function that automatically executes steps that you set in advance one step at a time. You can execute a variety of waveform simulations.



A sequence is a collection of steps. When you execute a sequence, the software executes the steps in order starting with the first step. A single execution of a sequence is complete after the sequence's last step is finished.

Wavy has two “Sequence mode” *(p.18)* that you can choose from depending on the application.

Procedure up to Sequence Execution

This section describes the basic procedure up to sequence execution.

1 **Select the Sequence mode *(p.18)* (software control or hardware control).**

2 **In the Sequence creation mode *(p.19)* window, set global sequence items.**

3 **In the Protection Settings *(p.26)* window, set protection items.**

4 **Create steps.**

Creating and Editing Steps with the Mouse *(p.29)*

Creating and Editing Steps by Entering Values *(p.33)*

5 **Save the sequence you created.**

Saving sequence data *(p.36)*

6 **Set items related to monitoring and file saving.**

Specifying monitor settings *(p.45)*

7 **In the Sequence run window *(p.39)*, run the sequence.**

Running a sequence *(p.41)*

Sequence Settings

This section explains global sequence settings (settings common to all steps).

- Sequence mode *(p.18)*
- Sequence creation mode *(p.19)*

NOTE The maximum value that can be specified on Wavy is limited to 105 % of the rated output of the PWR-01 specified by Instrument in the interface window. For example, if you select PWR401L, you will not be able to set values exceeding 42 V (40 × 1.05).

Sequence mode

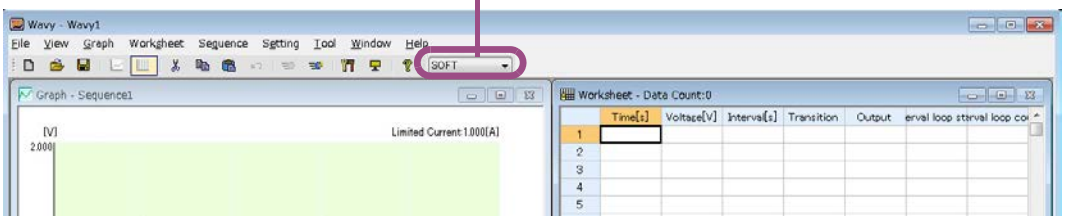
There are two sequence modes: software control and hardware control.

Sequence mode	Maximum number of steps	Interval loop	Trigger control	Description
Software control	1024	Available	Not available	Wavy sends step conditions one step at a time to the PWR-01 to execute a sequence.
Hardware control	64	Available	Available	Wavy uses the PWR-01's hardware sequence function. Wavy sends the conditions of all steps to the PWR-01 first, and then the PWR-01 sequence begins. It is also possible to send a sequence from the PWR-01, and then run the sequence from the PWR-01 panel.

Select the sequence mode from the toolbar in the sequence setup window. You can select the sequence mode when there is no step data in the sequence setup window.

The settings that appear in the sequence window vary depending on the selected sequence mode.

Sequence mode selection

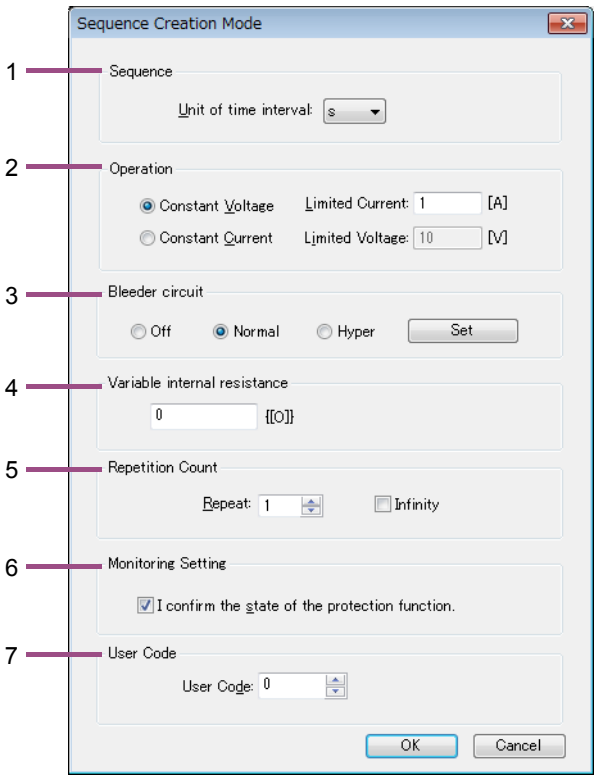


Sequence creation mode

You can set the six global sequence items in the Sequence Creation Mode window.

To open the Sequence Creation Mode window, click Sequence Creation Mode on the Sequence menu.

Or, click on the toolbar.



- 1. Sequence *(p.19)*
- 2. Operation *(p.19)*
- 3. Bleeder circuit *(p.20)*
- 4. Variable internal resistance *(p.20)*
- 5. Repetition count *(p.20)*
- 6. Status monitoring during execution *(p.20)*
- 7. User Code *(p.21)*

■ Sequence

Set the unit of step time interval.

Do this when there is no data in the sequence setup window.

■ Operation

Set the PWR-01 operation mode. If you select constant voltage mode, set the current limit. If you select constant current mode, set the voltage limit.

Do this when there is no data in the sequence setup window.

■ Bleeder circuit

WARNING **Risk of electric shock. Set the bleeder circuit to Normal or Hyper before you touch the output terminals. If set to Off, the voltage that was present when the output was on will remain at the output terminals even if you turn off the output or the PWR-01's POWER switch.**

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

Select from the following three types, and click Set to apply.

Bleeder circuit	Description
Off[1]	Bleeder circuit off.
Normal	Bleeder circuit on.
Hyper	Bleeder circuit on. "HB" lights on the PWR-01 display. For details on current sinking with the hyper bleeder, see the PWR-01 Series User's Manual. The fall time at no load is reduced to about 70 % of that using the normal bleeder.

1 Even if the output terminals are open and the output is turned off or the voltage setting is at 0 V, up to several hundred millivolts of voltage may appear across the output terminals.

NOTE
- If you close the window by clicking OK without clicking Set, the setting will not be applied to the PWR-01.
- If Hyper is selected, the fan speed is fixed to the maximum speed regardless of whether a sequence is running.

■ Variable internal resistance

By reducing the output voltage according to the output current, you can easily simulate rechargeable batteries, solar batteries, fuel cells, and other power supplies that have internal resistance.

The variable internal resistance can be configured in constant voltage (CV) mode. For details on the available resistance values, see the PWR-01 User's Manual.

To turn off the variable internal resistance function, set the resistance to 0 Ω. When the variable internal resistance function is on, "VIR" lights on the PWR-01 display.

If the output voltage falls to or below 3 % of the rated voltage, the output voltage may not be stable. If the difference between the voltage setting and the output voltage (voltage drop due to internal resistance) is less than 20 % of the rated voltage, the accuracy of the resistance setting degrades. It cannot handle transient operation (variation).

■ Repetition count

Set the number of sequence repetitions (1 to 99998 or infinite).

■ Status monitoring during execution

To monitor the activation of protection functions during sequence execution, select the "I confirm the state of the protection function" check box.

User Code

User codes are used to identify sequences saved in the PWR-01. Assign unique user codes to sequences you create. You can use the user codes to manage sequences.

When you execute a sequence from the PWR-01 panel, the user code is displayed before the execution. By checking the user code, you can prevent unintentional sequences from being executed.

Step Settings

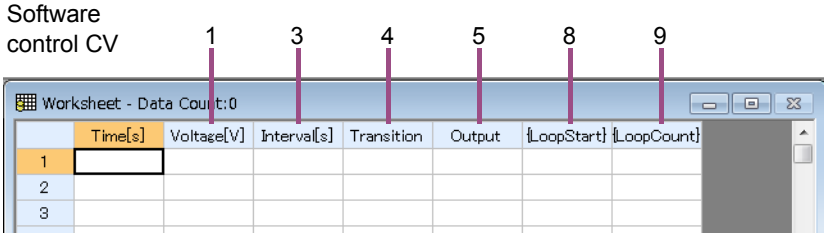
Set one condition for each step. One step corresponds to one operation in the executed waveform.

For each step set the following conditions:

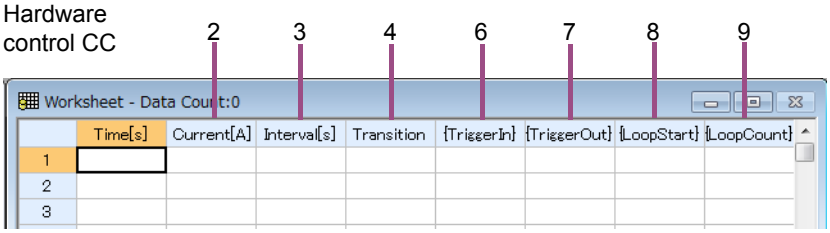
- 1*. Voltage (CV mode only) *(p.22)*
- 2*. Current (CC mode only) *(p.22)*
- 3*. Interval *(p.23)*
- 4*. Transition *(p.23)*
- 5. Output (software control sequence mode only) *(p.23)*
- 6. Triggr IN (hardware control sequence mode only) *(p.23)*
- 7. Trigger OUT (hardware control sequence mode only) *(p.24)*
- 8. Loop start *(p.24)*
- 9. Loop count *(p.25)*

  * Can also be set in the Graph window

Software control CV



Hardware control CC



NOTE

- There is no “Output” setting in hardware control sequence mode. The PWR-01 output is fixed to on.
- Time represents the cumulative time from step 1. You cannot set this value.

■ Voltage (CV mode only)

Set the output voltage.

This is displayed when “Operation” *(p.19)* is set to Constant Voltage in the Sequence Creation Mode window.

■ Current (CC mode only)

Set the output current.

This is displayed when “Operation” *(p.19)* is set to Constant Current in the Sequence Creation Mode window.

■ Interval

Set the step execution time.

You can set the unit of time with “Sequence” *(p.19)* in the Sequence Creation Mode window.

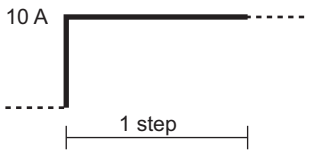
■ Transition

Set the step transition. The default value is step.

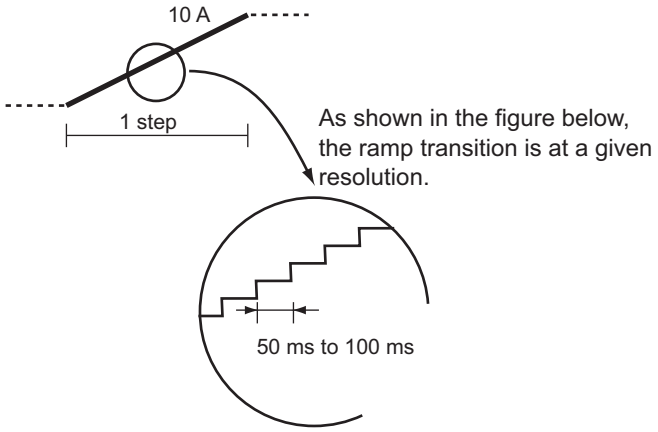
The ramp transition resolution is 50 ms to 100 ms for software control and 100 ms for hardware control.

When there are short step intervals, the ramp lines are not smooth.

(Example 1) Current:10 A
Transition: Step



(Example 2) Current: 10 A
Transition: Ramp



■ Output (software control sequence mode only)

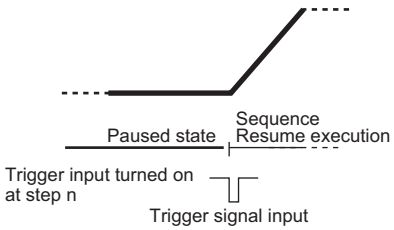
Set the output to on or off. The default value is on.

The output is fixed to on in hardware control sequence mode

■ Triggr IN (hardware control sequence mode only)

Set the trigger input to on or off. The default value is off.

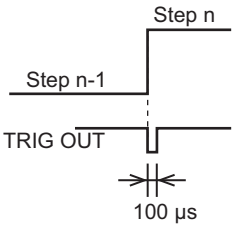
When set to on, the sequence pauses before executing the step. To resume the sequence, apply a trigger signal (pin 7 of the RS232C/TRG IN connector on the PWR-01 rear panel).



■ Trigger OUT (hardware control sequence mode only)

Set the trigger output to on or off. The default value is off.

When set to on, a trigger signal (100 µs) is output from pin 7 of the TRIG OUT terminal on the PWR-01 rear panel simultaneously with execution of the step.



■ Loop start

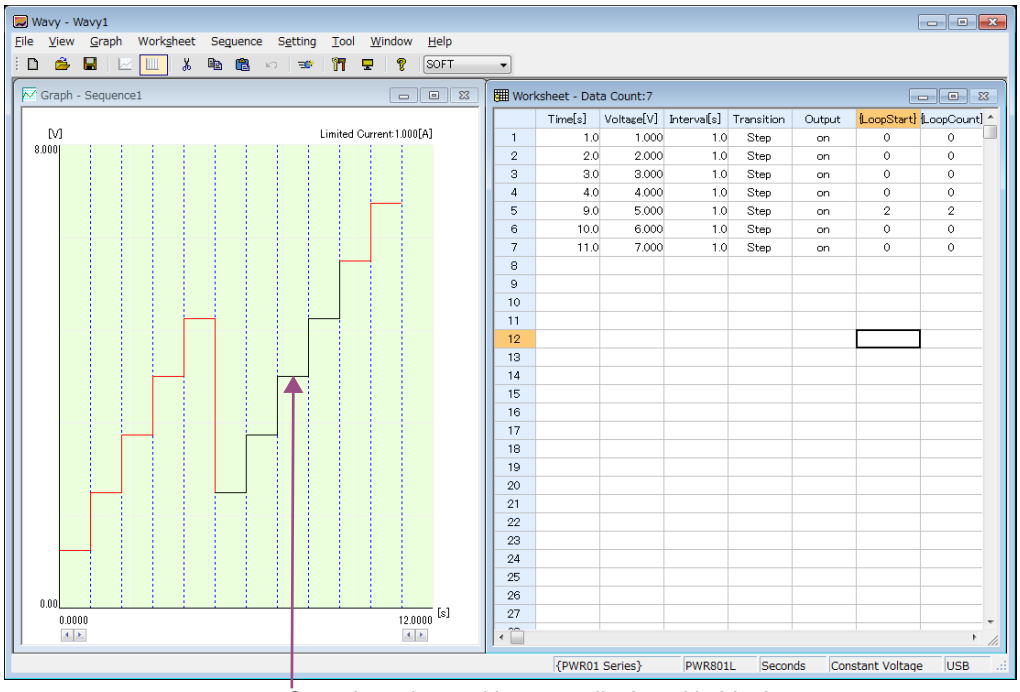
Interval loop refers to a function that repeatedly executes a specified range of steps.

Set the step number at which the interval loop will start. The step number set for LoopStart becomes the starting step of the interval loop.

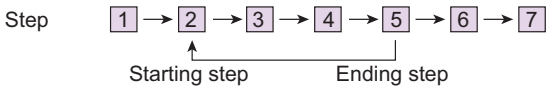
You can set up to 16 interval loops in a sequence.

- Example of setting an interval loop

  Start from step 1, repeat steps 2 to 5 twice, and execute step 6 and subsequent steps

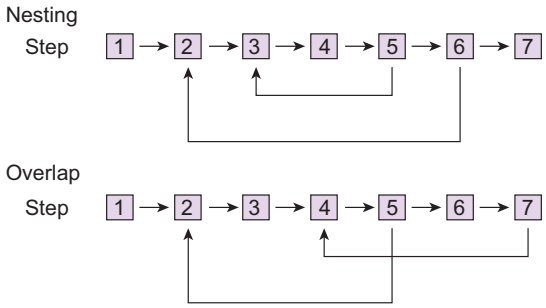


Steps in an interval loop are displayed in black.



- Interval loops that are not allowed

  You cannot nest or overlap interval loops as shown in the following figure.



■ Loop count

Set the interval loop count (between 2 and 99998).

Protection Settings

There are two protection types: Power Supply Setting and Soft Setting.

- Power Supply Setting *(p.26)*
- Soft Setting *(p.28)*

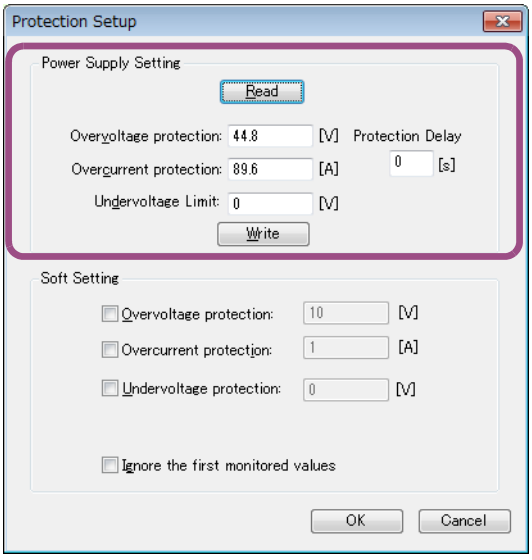
NOTE Setting all the settings of the following two items to on (factory default value) allows protection functions to be activated accurately.

- Status monitoring during execution *(p.20)*
- Setting limit function of the PWR-01 Series *(p.27)*

Power Supply Setting

Protection is activated using the protection functions that the PWR-01 Series is equipped with.

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



NOTE Wavy obtains the protection settings from the connected PWR-01 through communication. When setting the voltage or current of a step, Wavy limits the input with the protection value to prevent a value outside the range from being set. Every time you start Wavy, we recommend that you obtain the protection values by clicking Read or Write.

■ Read

The settings applied to the connected PWR-01 are read.

■ Overvoltage protection (OVP) and overcurrent protection (OCP)

Set the voltage and current to use as overvoltage and overcurrent.

Setting range: 10 % to 112 % of the rated output voltage or current

If a step contains a value exceeding the OVP or OCP value, the operation will vary depending on the sequence mode.

- Hardware control sequence mode: An error occurs, and the sequence is not executed.
- Software control sequence mode: An error occurs when the step containing a value outside the range is about to be executed, and the sequence is aborted.

■ Undervoltage limit (UVL)

Set the voltage use as undervoltage. Values less than this value will be considered outside the range.

Setting range: 0 % to 105 % of the rated output voltage

The UVL value is enabled when the PWR-01's voltage setting limit is specified. For details, see "Setting limit function of the PWR-01 Series" *(p.27)*.

If a step contains a value less than the UVL value, the operation will vary depending on the sequence mode.

- Hardware control sequence mode: An error occurs, and the sequence is not executed.
- Software control sequence mode: An error occurs when the step containing a value outside the range is about to be executed, and the sequence is aborted.

■ Write

Clicking Write will set the values to the PWR-01.

NOTE If you close the window by clicking OK without clicking Write, the setting will not be applied to the PWR-01. If this is the case, the values set in the PWR-01 beforehand will be valid.

Setting limit function of the PWR-01 Series

The PWR-01 series has three setting limits: voltage, current, and undervoltage.

■ Voltage and current setting limits

The maximum value is limited to 95 % of the OVP or OCP value. This function is set to on by factory default for voltage and current.

If you enable the voltage or current setting limit when the current setting is higher than 95 % of the OVP or OCP value, the voltage or current setting is retained, but the OVP or OCP value is changed to 105 % of the voltage or current setting.

NOTE You cannot turn the setting limit function on and off from Wavy. If you need to change the setting, use the PWR-01 CONFIG settings (voltage: CF23, current: CF22). For details, see the PWR-01 Series User's Manual.

■ Undervoltage limit (UVL)

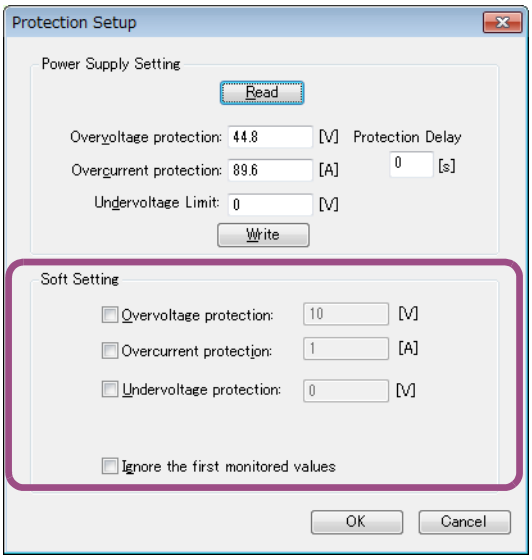
The minimum voltage that can be set is limited to the UVL value. This function is synchronized to the on/off state of the voltage setting limit (CF23). By factory default, the voltage setting limit is set to on.

If you enable the voltage setting limit when the voltage is set less than the set UVL value, the voltage is retained, but the UVL value is changed to the voltage.

Soft Setting

Protection is activated based on the data monitored by Wavy.

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



■ Overvoltage protection (OVP) and overcurrent protection (OCP)

Select the check boxes, and set the voltages and currents. The maximum values that you can enter do not depend on the rated output of the connected PWR-01.

If you set OVP or OCP, the sequence execution will stop when the monitored value reaches or exceeds the set value.

■ Undervoltage protection (UVP)

Select the check boxes, and set the voltages and currents. The maximum values that you can enter do not depend on the rated output of the connected PWR-01.

If you set UVP, the sequence execution will stop when the monitored value goes below the set value.

■ Ignoring the first monitored values

Because the first monitored values are unstable, they may activate a protection function and stop the sequence execution.

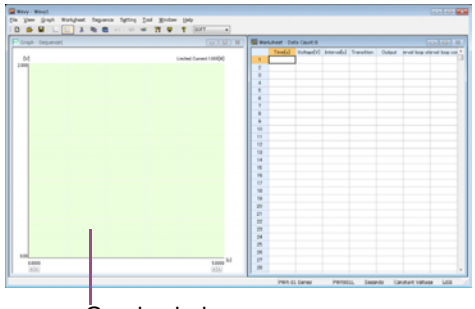
If you select the check box, the sequence execution will continue even when the first monitored values exceed or fall below the protection values.

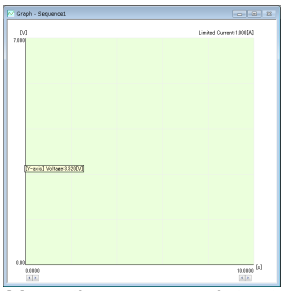
Creating and Editing Steps with the Mouse

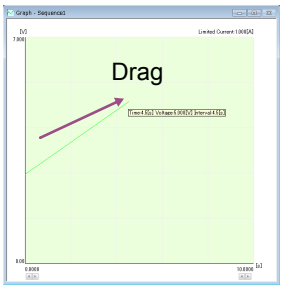
You can set step items (voltage/current, interval, transition) using only the mouse. Default value are assigned to step items that cannot be set with the mouse. After creating a step, you can change all the step items in the worksheet window.

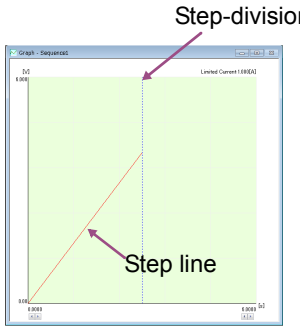
Creating a step (Graph window)

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




Move the mouse pointer to the Y-axis.





The step is confirmed.

1 **Move the mouse pointer over the Y-axis.**

The pointer becomes a crosshair.

In constant voltage mode, the voltage is displayed. In constant current mode, the current is displayed.

2 **Drag the pointer to the time and the current or 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.

This completes the creation of step 1.

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 mouse pointer becomes a cross-hair, drag the mouse pointer to the point that corresponds to the time and the current or voltage that you want to set.**

The value is confirmed, and the step values are entered in the first blank row of the worksheet window.

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.43)*.

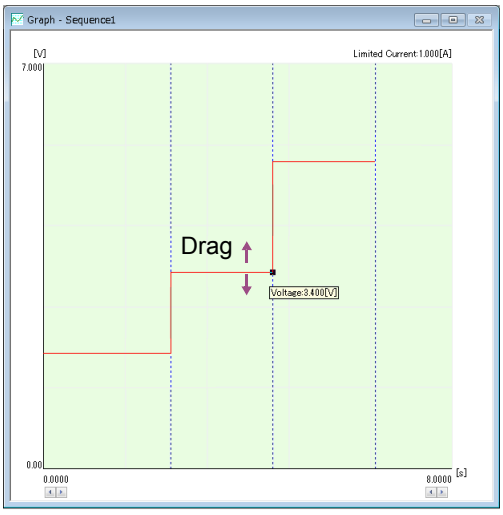
Copying graph images to the clipboard

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

Editing a step (Graph window)

- Changing the set voltage or current *(p.30)*
- Changing the interval (step execution time) *(p.31)*
- Changing the transition (Step or Ramp) *(p.32)*
- Deleting steps *(p.32)*
- Changing the Graph window display *(p.32)*

Changing the set voltage or current



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/current setting resolution

Right-click the Graph window, click “Resolution of setting value” and then the resolution that you want to use (Default, zero decimal places to three decimal places). The “default” value is zero decimal places.

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, zero decimal places or one decimal place). The “default” value is zero decimal places.

You can also set it by clicking Resolution of time 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.43)*.

Copying graph images to the clipboard

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

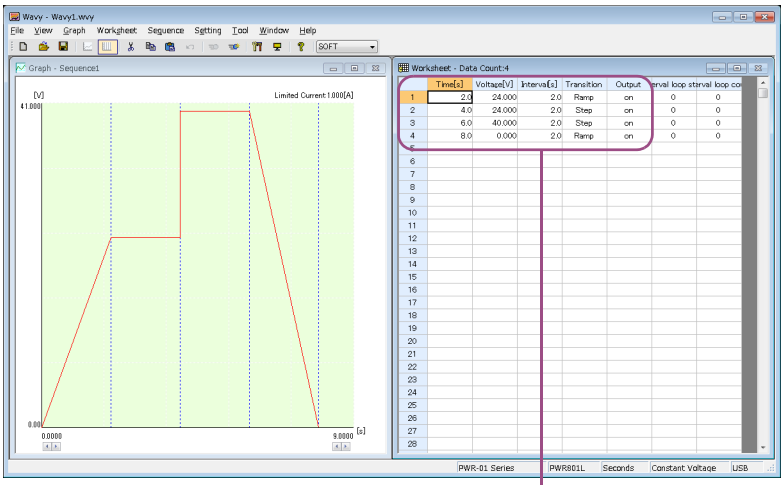
Creating and Editing Steps by Entering Values

You can change all the step items in the worksheet window. The available step items vary depending on the sequence mode and operation mode.

- Creating a step (worksheet window) *(p.33)*
- Editing a step (worksheet window) *(p.34)*

Creating a step (worksheet window)

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



	Time[s]	Voltage[V]	Interval[s]	Transition	Output	[LoopStart]	[LoopCount]
1	2.0	24.000	2.0	Ramp	on	0	0
2	4.0	24.000	2.0	Step	on	0	0
3	6.0	40.000	2.0	Step	on	0	0
4	8.0	0.000	2.0	Ramp	on	0	0

Step 1
Step 2
Step 3

You cannot edit the Time column.

- The first row of the worksheet is step 1. Time[s] represents the total elapsed time from step 1. You cannot set this value.
- To edit the voltage, current, interval, loop start, or loop count, click the relevant cell, and enter a value. You can cancel the entering or editing of a cell's value by pressing Esc.
- To edit the transition, output, trigger IN, and trigger OUT, double-click the cell. Or click the cell, and press Enter.
- Enter step data in order, starting from step 1.

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 before the selected step, 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.

NOTE Steps in which a starting step number of interval loops is specified and steps that start such interval loops cannot be deleted. To delete such steps, set the relevant LoopStart cell to zero first.

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 dialog appears before execution.

Saving and Loading Sequences

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

- Saving sequence data *(p.36)*
- Loading sequence data *(p.37)*

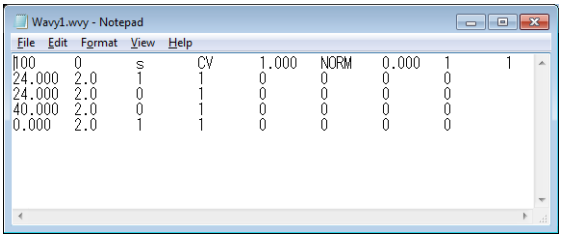
Saving sequence data

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.



By default, data is saved as tab-separated values. You can change this to comma-separated values by using "Environment settings" *(p.50)*.

- Displayed items in the first row

Column	Item	Description
1	File version	
2	Sequence mode	0: software control, 1: hardware control
3	Step interval unit	s: seconds, min: minutes, h: hours
4	Operation mode	CV: constant voltage mode, CC: constant current mode
5	Limit	Current limit or voltage limit
6	Bleeder circuit	DIS: off, NORM: normal, HYP: hyper
7	Variable internal resistance	Resistance
8	Repetition count	Number of repetitions
9	Status monitoring during execution	0: off, 1: on

- Displayed items in the second and subsequent rows

Column	Item	Description
1	The voltage or current value	
2	Interval	The unit is shown in row 1.
3	Transition	0: step, 1: ramp
4	Output[1]	0: off, 1: on
5	trigger IN[2]	0: off, 1: on
6	Trigger OUT[2]	0: off, 1: on
7	Interval loop start	0: none, 1 or more: loop start position
8	Interval loop count	0: none, 2 or more: loop count

1 Software control sequence mode only
2 Hardware control sequence mode only

Loading sequence data

You can load saved data and use it.

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

Wavy cannot load sequences that are saved in the PWR-01.

Transferring Sequences (hardware control only)

In hardware control sequence mode, you can only transfer sequences that you create with Wavy to the PWR-01. (You cannot execute them on Wavy.) Transferred sequences can be executed from the PWR-01 panel.

Sequence transfer and execution are different in the following ways.

Operation on Wavy	Sequences in the PWR-01	Sequence execution from the PWR-01 panel
Transfer	The existing sequence is only overwritten.	Can be executed in local mode.
Run	The existing sequence is only overwritten and executed.	

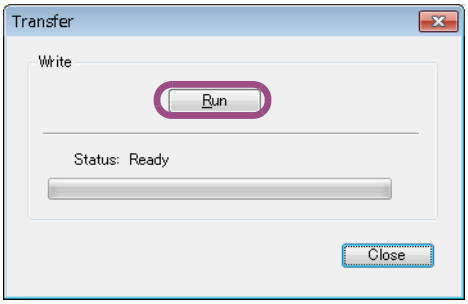
Transferring a sequence

On the Sequence menu, click Transfer. Or, click on the toolbar. The Transfer window appears.

To transfer the sequence, click Run.

The following items are transferred.

- Bleeder circuit settings
- Variable internal resistance settings
- Repetition count
- User code
- All the data in the worksheet window



For details on how to run sequences from the PWR-01 panel, see the PWR-01 Series User's Manual.

NOTE

- The PWR-01 Series can store a single sequence. When you transfer a sequence, the sequence already stored in the PWR-01 will be overwritten.
- Save the sequence data that you transfer. Wavy cannot load sequence data from the PWR-01.
- We recommend that you manage the sequence data using the User Code *(p.21)*.
- If a value outside the range is included in a step, the PWR-01 buzzer will sound when the sequence is transferred.

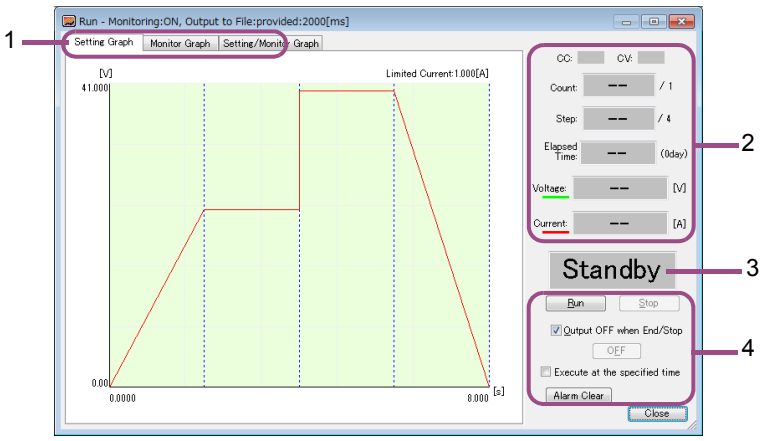
Running Sequences

You can run sequences from the sequence run window.

- Sequence run window *(p.39)*
- Saving monitored data *(p.41)*
- Running a sequence *(p.41)*

Sequence run window

On the Sequence menu, click Run. Or, click  on the toolbar. The sequence run window appears.



- 1. Tab *(p.39)*
- 2. Monitor *(p.39)*
- 3. Status *(p.40)*
- 4. Operation *(p.40)*

■ Tab

If “Display the monitor graph” is selected in the Monitoring Setup window *(p.45)*, you can select from three types of displays using tabs.

■ Monitor

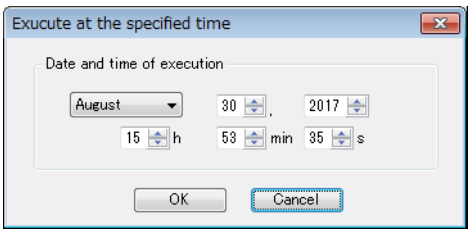
Item	Description
CC / CV	In constant current (CC) mode, a red indicator appears. In constant voltage (CV) mode, a green indicator appears.
Count	Displays the present run count.
Step	Displays the step that is currently being executed. The update interval of the sequence run window is 1 second. If the step execution time *(p.23)* 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 start of sequence execution. If “Execute at the specified time” *(p.40)* is selected, the time remaining until execution is displayed.
Voltage and current	The item (voltage or current) selected in the Monitoring Setup window *(p.45)* is displayed. You can set the monitoring interval in the Monitoring Setup window *(p.45)*.

Status

Status	Description
Standby	Standing by.
Running	The sequence is running.
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 the interface and protection settings.
OVP OVP (OVP example)	A protection function was activated (alarm).[1] OVP: overvoltage protection, OCP: overcurrent protection, FOCP: front-panel output terminal overcurrent protection, OHP: overheat protection, AC: low AC input protection
Waiting	Waiting for the specified time to run the sequence.
Paused	Waiting for a trigger in hardware control sequence mode.

1 You can determine which protection function (hardware or software) was activated with the background color.
Orange indicates that a PWR-01 protection function was activated.
Yellow indicates that a Wavy protection function was activated.

Operation

Item	Description
Run	Runs the sequence.
Stop	Stops the sequence.
Output OFF when End/Stop	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. If you do not select this check box, you must manually turn off the output.
OFF	Click this to turn the output off when the sequence completes. This command is invalid while a sequence is running.
Execute at the specified time	Selecting this check box opens a window for specifying the time to run the sequence. Set the time to run the sequence by specifying the year, month, day, hour, minute, and second. 
Alarm Clear	Clears alarms. • If the background changes to an orange alarm status, this indicates that a PWR-01's protection function has been activated. Eliminate the root cause of the alarm, and then click the button. • If the background changes to a yellow alarm status, this indicates that a Wavy's protection function has been activated. After clicking the button, change the setting of the protection function that caused the alarm.

Changing the sequence run window display

You can change the sequence run window display items.

See “Sequence run window display settings” *(p.47)*.

Saving monitored data

You can save monitored data to a file while a sequence is running. For details, see “Specifying monitor settings” *(p.45)*.

You can change the file format of monitored output data using “Environment settings” *(p.50)*.

Running a sequence

NOTE

When running a long sequence

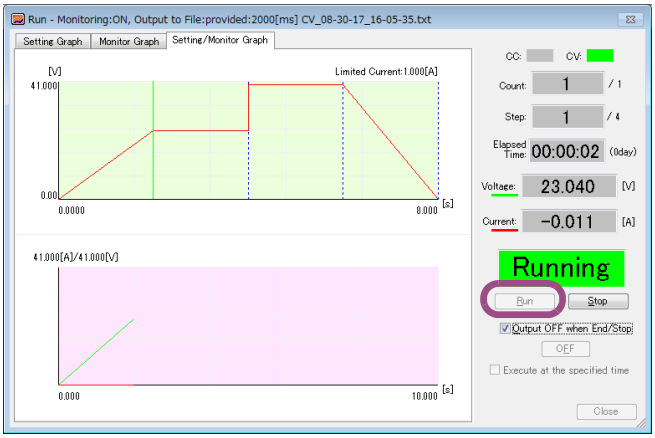
- The amount of data of the monitor graph may increase and load the PC. This may cause the PC to malfunction. If this occurs, you can reduce the load by setting the Max Data Count *(p.48)*.
- We recommend that you use Task Manager to check the amount of physical memory being used.

When running a sequence in hardware control sequence mode

- The sequence is executed after it is transferred to the PWR-01.
- The PWR-01 can store only a single sequence. When you run a sequence, the sequence already stored in the PWR-01 will be overwritten.

To start a sequence, click Run.

To abort a sequence that is running, click Stop.



The green line 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.

While a sequence is running, the menus and the toolbar are disabled. Further, the window cannot be resized.

You can turn on or off the sound that is generated when an event occurs using “Environment settings” *(p.50)*

Handling when communication is disconnected while a sequence is running

If communication with the PWR-01 is disconnected while a sequence is running, the status in the sequence run window will change to “Error” or “End.”

Take the following measures according to the sequence mode in use.

Software control

1. **Click Close to close the sequence run window.**
2. **After the communication is restored, run the sequence again.**

Hardware control

In hardware control sequence mode, the PWR-01 continues to run the sequence even when communication is disconnected because the sequence transferred to the PWR-01 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 PWR-01 panel.**

   The PWR-01 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 PWR-01 panel.**

   The output will turn off, and the sequence will be aborted.

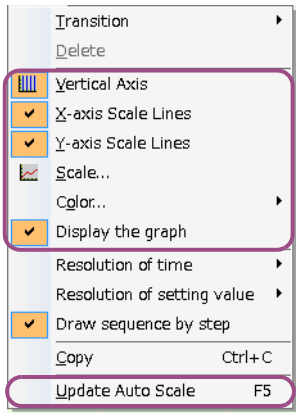
3. **Click Close to close the sequence run window.**
4. **After the communication is restored, run the sequence again.**

Settings

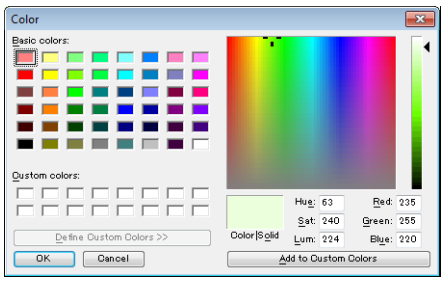
Graph window display settings

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).

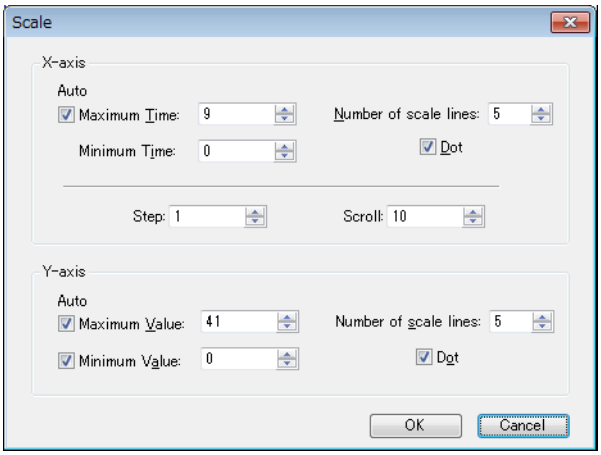


Graph window display menu	Description
Vertical Axis	Shows and hides the vertical-axis lines. This is equivalent to clicking on the toolbar.
X-axis Scale Lines	Shows and hides the X-axis grid. By default, the scale line color is set to white.
Y-axis Scale Lines	Shows and hides the Y-axis grid. By default, 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.44)*.

Graph window display menu		Description
Color		Set the color of items using the Color window.  You can reset the graphs colors you changed back to the default conditions using “Environment settings” *(p.50)*.
	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.
Display the graph		Shows or hides graphs.
Update Auto Scale (A)		Applies auto scaling to the graph window.

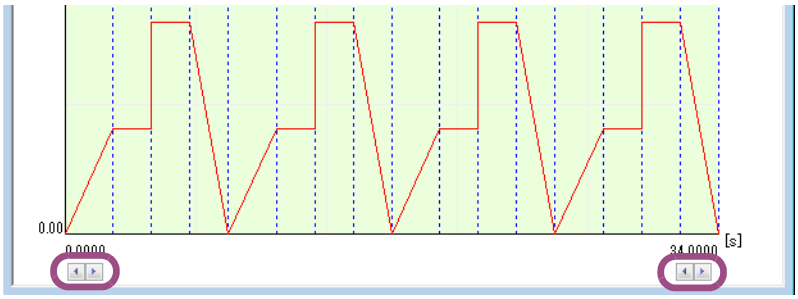
Changing the Graph window scale

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 the Maximum Time, Maximum Value, or Minimum Value check box, 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 the Dot check box to display the grid lines using dotted lines.

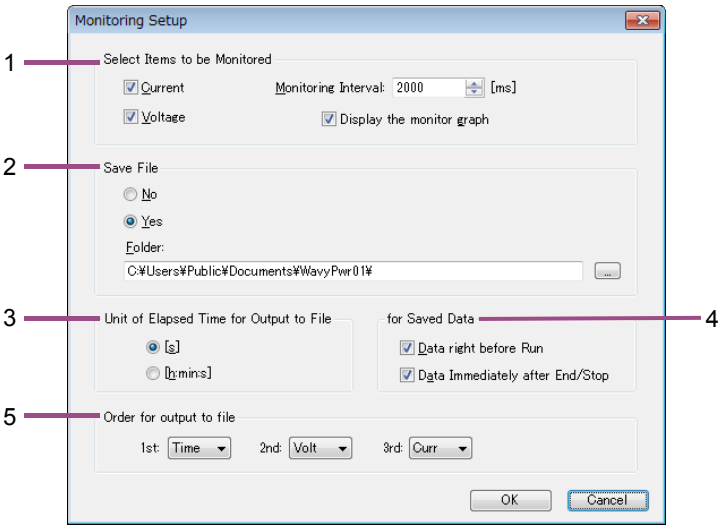
- For Step, set the amount of change that takes place when the graph is moved with at the lower right of the graph window. For Scroll, set to the unit of scrolling shown at the lower right of the graph window when the graph is moved with at the lower left.



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 Monitoring Setup window, click Monitoring Setup on the Sequence menu or click on the toolbar.



- 1. Selecting the Monitor *(p.45)*
- 2. Save File *(p.46)*
- 3. Unit of Elapsed Time for Output to File *(p.46)*
- 4. for Saved Data *(p.46)*
- 5. Order for output to file *(p.46)*

■ Selecting the Monitor

Select the Current or Voltage check box to display the monitored values of the output in the sequence run window.

In the Monitoring Interval box, set the monitor update interval (200 ms to 600000 ms).

If you select the Display the monitor graph check box, 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	A setting graph appears in the top half, and a monitor graph appears in the bottom half.

■ 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 operation 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.50)*.

■ 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.

■ for Saved Data

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

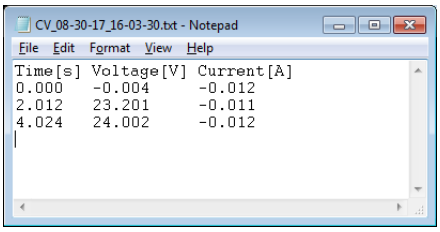
If you select the Data Immediately after End/Stop check box, the monitored values after the sequence is completed or aborted will be written at the end of the saved data.

■ Order for output to file

You can set the order that saved data (time, voltage, and current) is written to files.

Viewing saved monitored data

You can use Notepad to view saved monitored data.

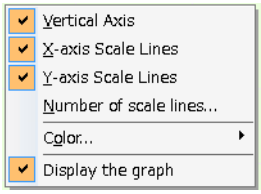


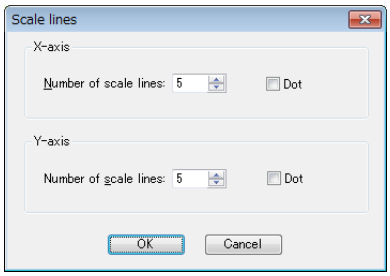
By default, data is saved as tab-separated values. You can change this to comma-separated values by using “Environment settings” *(p.50)*.

Sequence run window display settings

Setting graph display settings

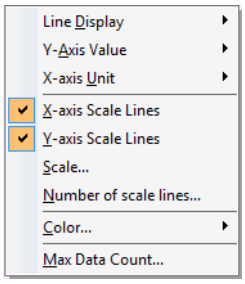
Right-click the setting graph of the sequence run window to display a shortcut menu for the graph display.

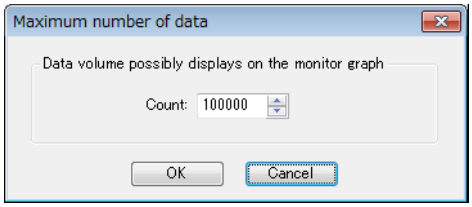


Setting graph shortcut menu	Description
Vertical Axis	Shows and hides the vertical-axis lines.
X-axis Scale Lines	Shows and hides the X-axis grid. By default, the scale line color is set to white.
Y-axis Scale Lines	Shows and hides the Y-axis grid. By default, the scale line color is set to white.
Number of scale lines	Set the number and types of grid lines in the Scale lines window. 
Color	See “Color” *(p.44)* in “Graph window display settings.”
Display the graph	Shows or hides graphs.

Monitor graph display settings

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

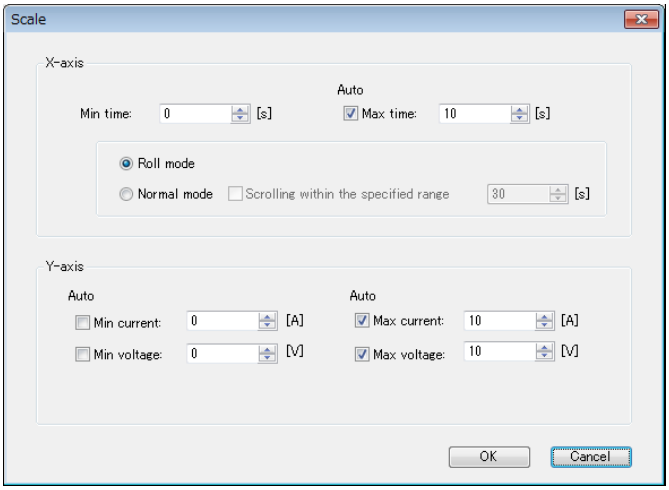


Monitor graph shortcut menu		Description
Line Display	Current	Shows and hides current lines.
	Voltage	Shows and hides voltage lines.
Y-Axis Value	Current	Select the value (voltage or current) that appears when the mouse pointer is placed on the Y-axis.
	Voltage	
X-axis Unit	[s]	Select the unit of X-axis (second 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.49)*.
Number of scale lines		See “Number of scale lines” *(p.47)* in “Setting graph display settings.”
Color		See “Color” *(p.44)* 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 the Max time, Max current, Max voltage, Min current, or Min voltage check box, auto scale will be enabled. This feature updates the scale values according to the monitored values.

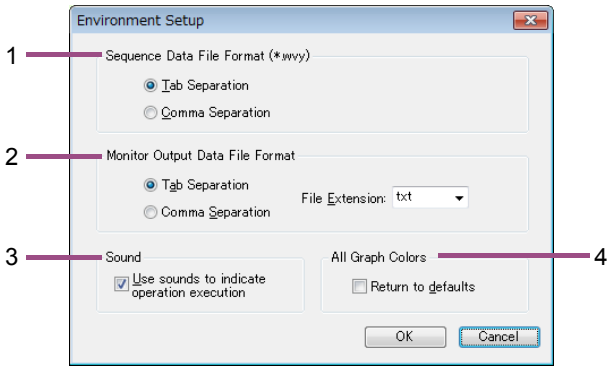
If auto scale is disabled, monitored values that are outside of the range are not displayed on the graph.

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).

Environment settings

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



- 1. Sequence data file format (*.wvy) *(p.50)*
- 2. Monitor output data file format *(p.50)*
- 3. Sound *(p.50)*
- 4. All Graph Colors *(p.50)*

■ Sequence data file format (*.wvy)

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

■ 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.

■ Sound

Select the Use sounds to indicate operation execution check box to generate sounds when events occur such as when a test begins or ends.

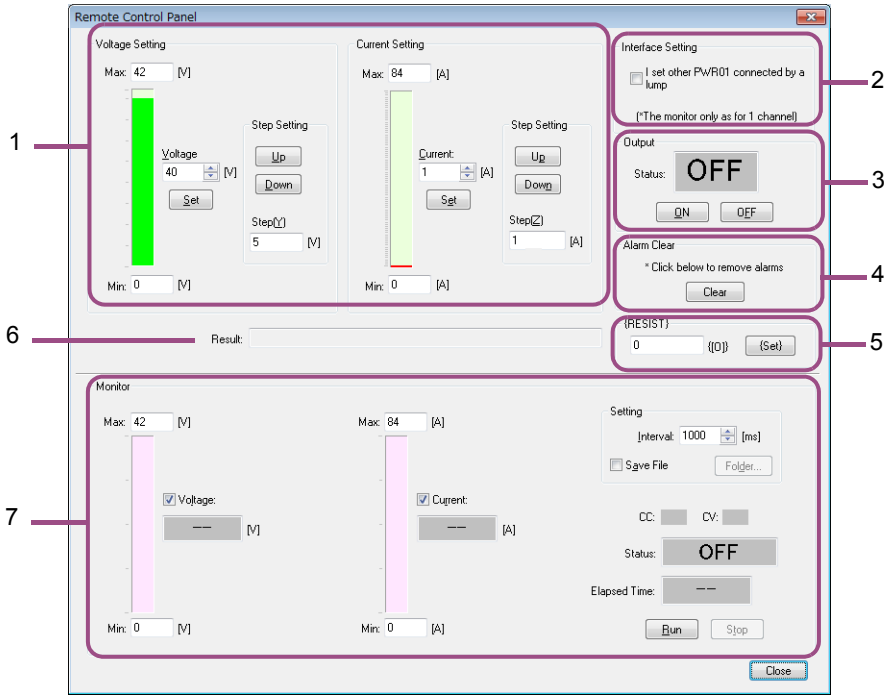
■ All Graph Colors

To reset the graph colors that you have changed to their default colors, select the Return to defaults check box, and click OK.

Direct Control

You can use the Remote Control Panel window to remotely control the PWR-01's voltage and current settings, the output on/off state, and the monitor.

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



1. Voltage Setting and Current Setting *(p.51)*
2. Interface Setting *(p.51)*
3. Output *(p.52)*
4. Alarm Clear *(p.52)*
5. Variable internal resistance *(p.52)*
6. Result *(p.52)*
7. Monitor *(p.52)*

■ Voltage Setting and Current Setting

Item	Description
Min and Max	Set the voltage and current ranges. When the PWR-01's setting limit function is set to on, the maximum value is limited to about 95 % of the OVP or OCP value in the "Power Supply Setting" *(p.26)* of the Protection Setup window. For details, see "Setting limit function of the PWR-01 Series" *(p.27)*. The ratios of the specified values relative to the minimum and maximum values are displayed with bar graphs.
Voltage and Current	Enter the values in the boxes, or use the arrows to change the values. The resolution is 1 V and 1 A. Clicking a blinking Set button sends the value to the PWR-01.
Step Setting	Click the Up and Down buttons to change the values at the specified resolution.

■ Interface Setting

Select the I set other PWR01 connected by a lump check box to control PWR-01s connected through multichannel.

Output

Item	Description
ON	Click this to turn the output on.
OFF	Click this to turn the output off.
Status	Displays the current PWR-01 status.

Alarm Clear

Click Clear to clear the alarm that occurred.

Variable internal resistance

Enter a resistance in the box and click Set to send the value to the PWR-01. If you enter zero, the variable internal resistance function is turned off.

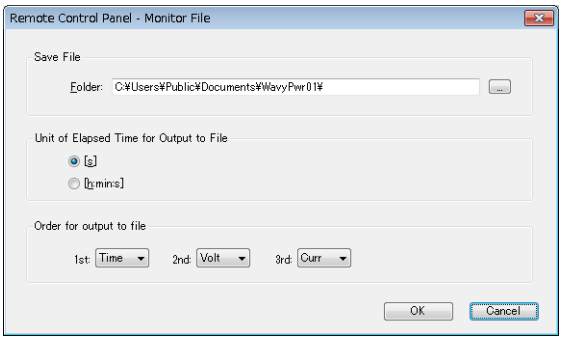
The variable internal resistance can be configured in constant voltage (CV) mode. For details on the available resistance values, see the PWR-01 Series User's Manual.

Result

The response to the sent value returned by the PWR-01 is displayed.

If an SCPI error code is displayed, see the PWR-01 Series Communication Interface Manual.

Monitor

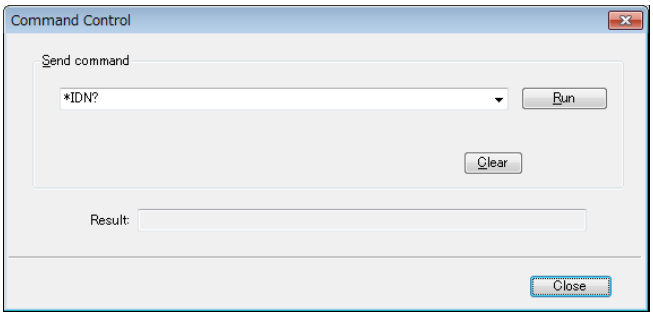
Item	Description
Min and Max	Set the voltage and current ranges you want to monitor. The ratios of the monitored values relative to the minimum and maximum values are displayed with bar graphs.
Voltage and current	To monitor the values, select the check boxes. The monitored values are displayed below the check boxes.
Interval	Set the interval for updating the monitor.
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, the unit of elapsed time output to the file, and the file output order.  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.50)*.
CC / CV	In constant current (CC) mode, a red indicator appears. In constant voltage (CV) mode, a green indicator appears.
Status	Displays the current status. "Status" *(p.40)* is displayed when a PWR-01 protection function is activated while monitoring is in progress.

Item	Description
Elapsed Time	Displays the elapsed monitoring time.
Run	Starts the monitor.
Stop	Stops the monitor.

Control Using Commands

You can send commands from Wavy to control a PWR-01.

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 PWR-01 Communication Interface Manual.

Reference

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

SD027-PWR-01 specifications

Item			Specifications		
Operation mode			Constant current, constant voltage		
Number of significant decimal places[1]			Voltage: 3 digits, current: 4 digits		
Monitor function			Output current, output voltage		
Interval[2]			200 ms to 600000 ms (0.2 s to 600 s)		
Number of steps	Software control		1024		
	Hardware control		64		
Ranges of sequence times (intervals)[2]					
	Software control	Value	0.5 s to 999.5 s	0.1 min to 999.9 min	0.1 h to 999.9 h
		Resolution	0.5 s	0.1 min	0.1 h
	Hardware control	Value	0.1 s to 360000 s	0.1 min to 6000 min	0.1 h to 100 h
		Resolution	0.1 s	0.1 min	0.1 h

1 The actual number of significant decimal places varies depending on the PWR-01 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.
Recent File		Shows up to four paths to the recently opened sequence data files (.wvy extension).
Exit		Exits Wavy for PWR-01.
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.
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.
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.
Display the graph		Shows or hides graphs.
Resolution of time	Default	Changes the setting resolution by dragging. The default value is three decimal places.
	1st digit of integer	
	1st digit of decimal place	
Resolution of setting value	Default	Changes the setting resolution by dragging. The default value is three decimal places.
	1st digit of integer	
	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 PWR-01 (hardware control only).
Run[1]	Executes the sequence.
Sequence Creation Mode[1]	Sets Unit of time interval, Operation mode, Bleeder circuit, Variable internal resistance, Repetition Count, Monitoring Setting, and User code.
Monitoring Setup[1]	Configures the monitor settings to be used while the sequence being executed.
Protection Setup	Sets OVP, OCP, UVL, and UVP.
Setting	
Interface	Configures the interface to connect to the device.
Environment Setup	Sets the file format.
Tool	
Remote Control	Controls the device directly without using a sequence.
Command Control	Controls the connected device by using commands.
Window	
Cascade	Cascades the windows.
Tile Vertically	Tiles the windows in the vertical direction.
Tile Horizontally	Tiles the windows in the horizontal 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.

Index

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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