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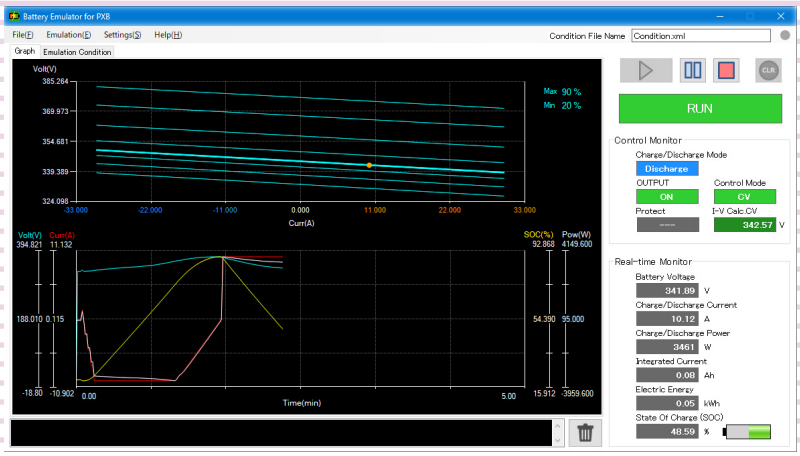
User's Manual

Battery Emulation Software

SD036-PXB

Battery Emulator for PXB

Ver. 1.0x



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Introduction

This user's manual describes how to simulate battery charge/discharge using the SD036-PXB Battery Emulator for PXB and the PXB Series Bidirectional DC Power Supply.

■ Product versions that this guide covers

This user's manual covers the SD036-PXB version 1.0x. To view the version, on the Help menu, click Version.

■ Intended readers

This user's manual is intended for users of the battery emulation system or those who instruct its operation. The descriptions in this user's manual are intended for those who have knowledge about electricity.

■ Trademarks

Microsoft and Windows are registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. All other company and product names in this document are trademarks or registered trademarks of their respective owners.

■ Notations used in this document

- Application software SD036-PXB Battery Emulator for PXB is sometimes referred to as the "SD036-PXB" or "Battery Emulator".
- The PXB Series Bidirectional DC Power Supply is sometimes referred to as the "PXB power supply".
- "PC" in this document is a generic term for personal computers and workstations.
- The screen captures used in this manual may differ from the actual items.
- In this manual, operations on Windows 11 are described when explaining operations related to the OS.
- The following symbols are used in the description.

⚠CAUTION	Indicates a potentially hazardous situation which, if ignored, may result in slight injury or damage to the product and other property.
NOTE	Indicates information that you should know.
>	Indicates the menu command you need to select. The menu command to the left of ">" is the higher level command.

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Overview of the SD036-PXB

The SD036-PXB Battery Emulator for PXB is an application software that reproduces battery behavior using our PXB Series Bidirectional DC Power Supply.

Since it can reproduce specific battery conditions through its settings, it can be used to repeatedly test batteries under conditions that are difficult to test with real batteries.

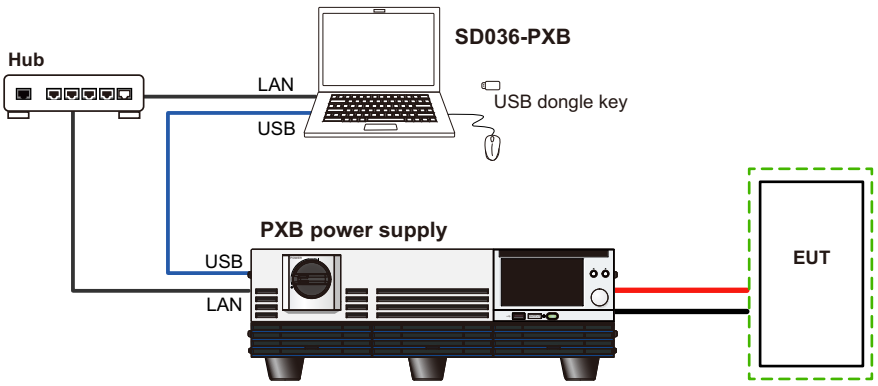
■ Main functions

- Loading I-V table files (CSV format)
- Create interpolated I-V table sheets for each status of charge (SOC) from the loaded I-V table file
- Voltage control using measured current values and I-V tables
- I-V curve graph display for each SOC
- Displays real-time measured values and graphs
- Definable SOC or capacity at start of operation
- SOC range can be set for stopping conditions
- Protection against operation outside the I-V table range
- Creating log files

System Connection Example

Here is a connection example of a battery emulation system.

Connect via LAN or USB. LAN connections can also be made via a hub.



Refer to the manual of the PXB power supply for the connection of the EUT.

Parallel connection of the PXB power supply is not supported.

Sample Files

The USB dongle key for the SD036-PXB Battery Emulator for PXB contains a sample file (BE_Sample.zip).

Emulation can also be performed in accordance with the EUT by referring to the sample files.

Sample files are available for PXB power supply models with output voltage ratings of 50 V, 250 V, 500 V, 1000 V, and 1500 V.

⚠CAUTION There is a risk of damage to the EUT. When using the sample files, review each setting value and ensure that the appropriate protection values are set.

Emulation Flow

Here are the steps to start operation using a sample file.

Configure the battery emulation system in advance by referring to the System Connection Example.

When the Battery Emulator is installed, a save folder is structured in the following location.

(User) Documents > Kikusui > Battery Emulator for PXB

Default folder structure	
Battery Emulator for PXB	Upper folder where files required for emulation are saved
Sheet	Folder for saving base I-V files

See the folder structure of files required for emulation.

After unzipping BE_Sample.zip, the file is structured as follows.

Folder structure of sample files	
BE_Sample	
xxxxxxx_Sample[1]	Folder that contains xxxxxxx sample files. If another sample files is added, a new folder will be added.
Sheet	It contains base I-V files
Condition.xml	Condition setting file

1. For the latest samplefile information for details, contact your Kikusui agent.

NOTE

- The Battery Emulator requires an I-V table file (base I-V file) as a base for emulation. See Creating I-V Table Files for information on creating base I-V files.
  Here we will use a sample base I-V file.
- When creating a new base I-V file, no condition setting file exists. After the Battery Emulator loads the base I-V file, it saves the condition setting file. Here we will use a sample condition setting file.

1. **Connect the USB dongle key to the PC that will run the Battery Emulator.**
   The dongle key must be connected while the Battery Emulator is running.
2. **Copy all of the sample base I-V files into the default Sheet folder.**
3. **Copy the sample Condition.xml (condition setting file) to the Battery Emulator for PXB folder.**
4. **Select Kikusui SD036-PXB > Battery Emulator for PXB from the Windows start menu.**
   The main screen will appear.
5. **Set the necessary items in the emulation conditions pane according to the EUT to be tested, and then use File > Save and save the condition setting file.**
6. **Turn on the POWER switch of the PXB power supply.**
7. **Establish an interface connection in the Interface Dialog box.**
8. **Click (Run).**
   Thereafter, please refer to the description in Step 1 of Start.

When performing emulation under new test conditions.

NOTE

- The Battery Emulator will load the condition setting file in the save folder used last time when it is started up. If the previously loaded condition setup file does not exist, the base I-V file in the default save folder is loaded. Here, the Battery Emulator for PXB folder is used because it is new and the condition setting file does not exist.
- To save the complete set of data generated by the emulation using the sample files, copy the Battery Emulator for PXB folder and rename the folder. To perform emulation using the sample file again, select File > Open > (folder with the changed folder name) > (Condition setting file).

1. **Delete everything in the Battery Emulator for PXB folder, then create a Sheet folder.**
2. **Place a new base I-V file in the Sheet folder.**

The rest of the steps are the same as when a sample file is used.

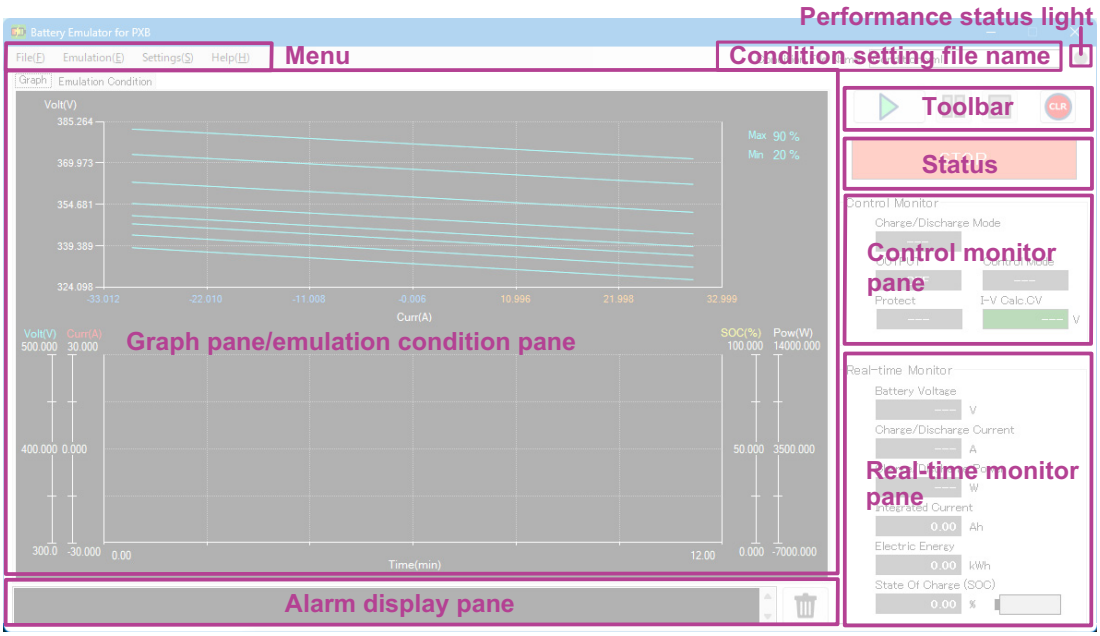
If a file loading error is displayed when starting Battery Emulator, change the Basic settings or the data in base I-V file.

Screen Configuration

- Main Window
- Details of Each Pane

Main Window

The Battery Emulator's main screen consists of four panes, a menu, and a toolbar.

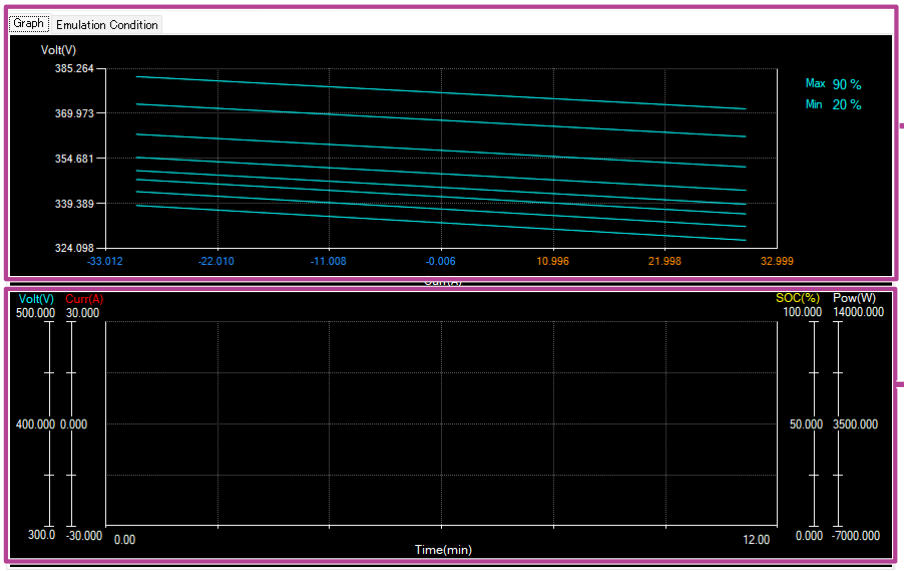


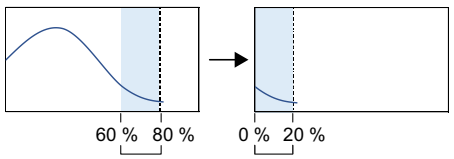
Name	Function	
Menu	See Menu Reference.	
Toolbar	By clicking a menu button, you can perform the function that corresponds to the button you clicked. See Emulation in Menu reference.	
Status	Indicates the operation status. In operation: RUN (green), stopped: STOP (red), paused: PAUSE (blue)	
Condition setting file name	The name of the condition setting file being loaded is displayed.	
Performance status light	PC performance is indicated by colors. See PC Performance Detection.	
Graph pane/emulation condition pane	Use the tabs in the upper left corner to switch views.	
	Graph pane	I-V curve graphs and real-time graphs are displayed.
	Emulation Condition pane	Sets the conditions for performing emulation.
Control monitor pane	The control status for the PXB power supply is displayed.	
Real-time monitor pane	Measured values during operation are displayed.	
Alarm display pane	Messages for generated alarms are displayed. See Alarms.	
	Erasure of information	Clears messages.

Details of Each Pane

Graph pane

Select a graph on the Graph/Emulation Conditions tab.



Name	Description
I-V curve graph	The data in the interpolated I-V file generated from the base I-V file is displayed. (Data for every 10 % between the minimum and maximum SOC. Interpolated I-V files are generated in the I-V Table folder for every 1 % SOC.) Display during operation: The interpolated I-V file to be simulated is selected according to the current I-V calculated CV value and charge/discharge current value. The I-V curve graph of the selected file is highlighted with a bold line, and the control operating points are plotted in orange. Update rate: 1 second
Real time graph	During operation, the values of battery voltage, charge/discharge current, charge/discharge power, and state of charge (SOC) are displayed with the X-axis as the time-axis. You can change the display items and ranges in the graph dialog box. When the graph is displayed up to 80 % of the range of the time-axis, data from 60 % to 80 % will be displayed again as data from 0 % to 20 % of the range of the time-axis. Update rate: 1 second 

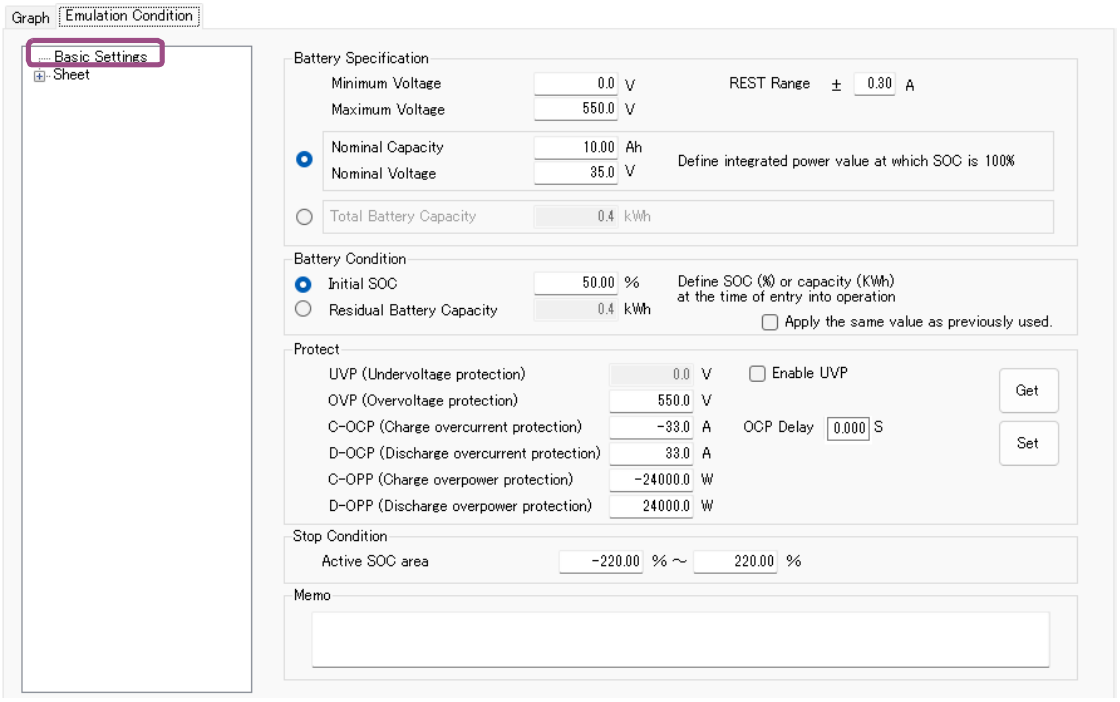
Emulation condition pane

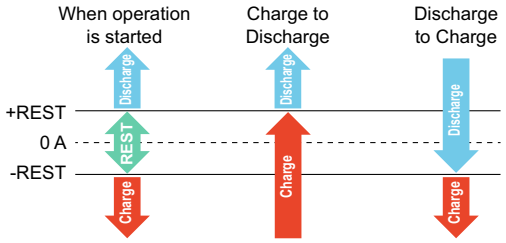
Select the emulation conditions on the Graph/Emulation Conditions tab.

The tree on the left of the pane allows you to select basic settings and sheets.

■Basic settings

The basic emulation settings are displayed.



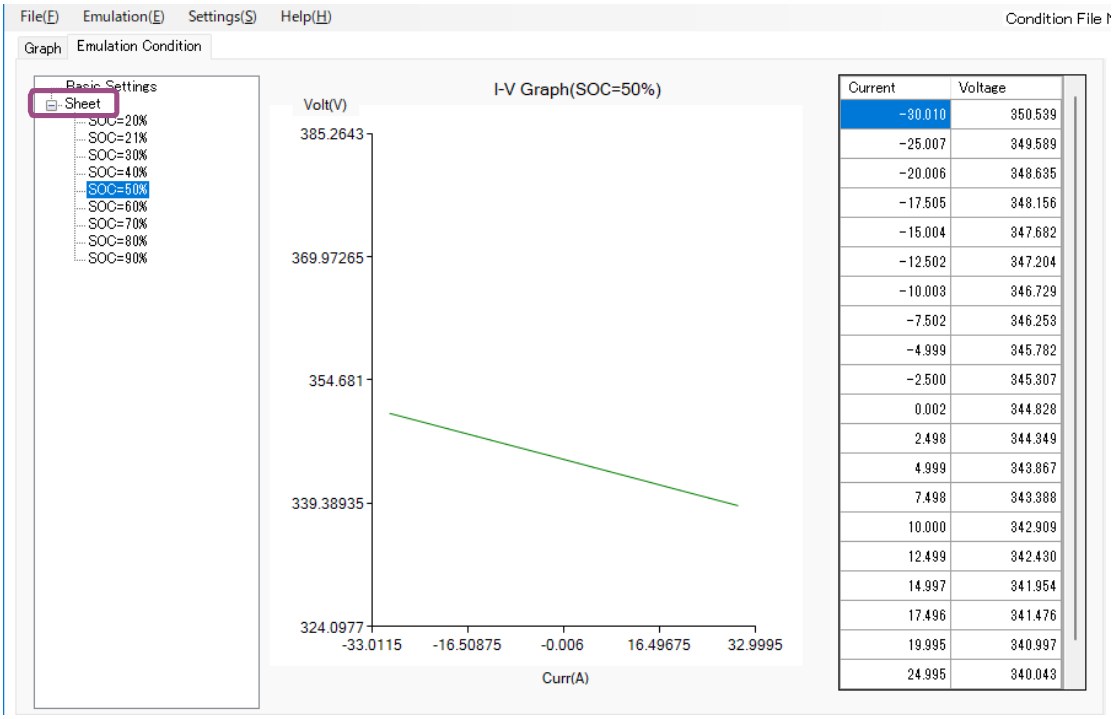
Item	Input range	Description
Battery specifications		
Minimum Voltage	0.0 to 1500.0	I-V control range minimum voltage If a value below the minimum voltage is present in the base I-V file to be loaded, it will result in an error.
Maximum Voltage	0.0 to 1500.0	I-V control range maximum voltage If a value exceeding the maximum voltage is present in the base I-V file to be loaded, it will result in an error.
REST Range	0.00 to 0.30	Set a margin current value to prevent chattering when switching between charging and discharging. When operation is started, REST will be displayed in the charge/discharge mode on the control monitor until a current value exceeding the REST range is detected. During operation, the mode will be maintained until the REST range is exceeded. Charge/discharge mode display when setting REST range 

Item	Input range	Description
Nominal Capacity	0.10 to 1000.00	Select either Nominal Ah × Nominal Volt or Nominal kWh to define the integrated power value that results in 100 % SOC. If Residual Battery Capacity is selected in the battery condition, the above integrated power value is assigned to Residual Battery Capacity as the maximum value.
Nominal Voltage	0.1 to 1500.0	
Total Battery Capacity	0.1 to 1500.0	
Battery Condition		
Initial SOC	0.00 to 100.00	Select either Initial SOC or Residual Battery Capacity to define the SOC (%) or capacity (KWh) at the start of operation. When ☐Apply the same value as previously used is delected, the electric energy or state of charge (SOC) value displayed in the real-time monitor pane will be used for the second and subsequent runs.
Residual Battery Capacity	Integral power value defined by 0.0 to battery specification	
Protect		
UVP (undervoltage protection)	0.0 to 1500.0	Set the protection functions listed on the left for the PXB power supply. When the protection functions are activated, the output of the PXB power supply is turned off, an alarm is generated, and operation is stopped. Select ☐Enable UVP to set the UVP value. When Get is clicked, the value set for the PXB power supply will be entered in each box. Click Set to apply the values set in the Battery Emulator to the PXB power supply. The range of protect values varies depending on the model of PXB power supply used. When the protect value is sent to the PXB power supply, the PXB power supply checks the value and if it is out of range, an error occurs. See the User's Manual of the PXB power supply for the appropriate protect value.
OVP (overvoltage protection)	5.0 to 1650.0	
C-OCP (Charge overcurrent protection)	-880.0 to -3.0	
D-OCP (Discharge overcurrent protection)	3.0 to 880.0	
C-OPP (Charge overpower protection)	-24000.0 to -2000.0	
D-OPP (Discharge overpower protection)	2000.0 to 24000.0	
OCP Delay	0.000 to 2.000	Sets the time for which the operation of the OCP (overcurrent protection) is delayed.
Stop Condition		
Active SOC area	-220.00 to 220.00	If the SOC exceeds the set range, operation stops.
Memo		
		You can enter up to 200 characters.

■Worksheet

A graph of the base I-V file is displayed.

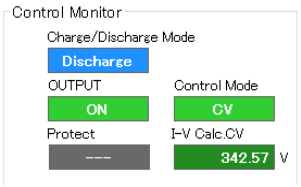
The scale of the graph can be changed in the graph dialog box.



Control monitor pane

The control status for the PXB power supply is displayed.

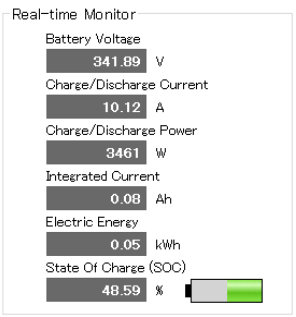
- Update rate: 1 second

Item		Description
	Charge/Discharge Mode	Discharge or charge is displayed by the current direction of the PXB power supply. Plus current value: Discharge Minus current value: Charge Current value is within REST range (Only When operation is started): REST Non-operation: ---
	OUTPUT	ON during operation, OFF during non-operation
	Control Mode	CV (constant voltage)/CC (constant current)/CP (constant power) Non-operation: ---
	Protect	UVP/ OVP/ C-OCP/ D-OCP/ C-OPP/ D-OPP/error (in case of communication error) Other than above:---
	I-V Calc CV	Voltage value (CV value) obtained from the selected interpolation I-V file Non-operation: ---

Real-time monitor pane

Measured values during operation are displayed.

- Update rate: 1 second

Item		Description
	Battery Voltage (V)	Measured value of PXB power supply
	Charge/Discharge Current (A)	
	Charge/Discharge Power (W)	
	Integrated Current (Ah)	
	Electric Energy (kWh)	
	State Of Charge (SOC)	Calculated from the integrated power value (kWh)[1] and the electric energy (kWh) that results in 100% SOC. When the whole area is green, it indicates 100% SOC.

1Value defined in Emulation Condition Pane > Battery Specification.
Nominal Capacity x Nominal Voltage or Total Battery Capacity

Preparation

Create the necessary condition setting files to run the emulation.

- Creating I-V Table Files
- Saving Condition Setting Files

Creating I-V Table Files

The Battery Emulator requires an I-V table file (base I-V file) as a base for emulation. Create files according to the following rules.

- One data is defined as comma[1] delimited data in the order of current value and voltage value.
- The range of current and voltage values is within the output range of the PXB power supply used, which differs depending on the model. (Numerical setting resolution: Three decimal places)
  See the user's manual of the PXB power supply for the appropriate output range.
- A minimum of ten data is required per file. (Maximum number of data: 1000)
- Data are arranged in ascending order based on current value.
- Minus current values indicate charging and positive current values indicate discharging.
- Data around 0 A is required. Defined as the output voltage when open (no load).
- Prefix the file name with the SOC value. The SOC value and subsequent values are optional, but file names with the same SOC value cannot be used. For example, 50.csv and 50_test.csv are recognized as the same file.
- Files are saved in CSV format.

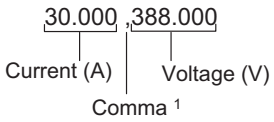
Place the created base I-V file in the specified Sheet folder.

NOTE When the Battery Emulator loads the base I-V file, if the data in the file is inconsistent with the Basic settings, an error message will be displayed. If this is the case, change the data in the Basic settings or base I-V file.

For example, if a voltage exceeding Maximum Voltage is present in the base I-V file, an error message will be displayed.

An error message will also be displayed if the condition setting file is saved though it is inconsistent with the Base settings.

■ Example of creating a base I-V file

SOC:	0 %	100 %
File name:	0.csv	100_test.csv
Data:  	-30.000,360.000 -25.000,359.000 -20.000,358.000 -15.000,357.000 -10.000,356.000 -5.000,355.000 0.000,354.000[2] 5.000,353.000 10.000,352.000 15.000,351.000 20.000,350.000 25.000,349.000 30.000,348.000	-30.000,400.000 -25.000,399.000 -20.000,398.000 -15.000,397.000 -10.000,396.000 -5.000,395.000 0.000,394.000[2] 5.000,393.000 10.000,392.000 15.000,391.000 20.000,390.000 25.000,389.000 30.000,388.000

1 The delimiter characters depend on the Windows regional settings.

2 The data around 0A is defined as the output voltage when open (no load).

Saving Condition Setting Files

1 **Select Basic settings in the emulation condition pane and set each item.**

2 **Select File > Save or File > Save as to save the condition setting file.**

Condition setting files are saved in XML format.

See Folder Structure.

Emulation

- Start
- Stop and Pause
- End of Emulation

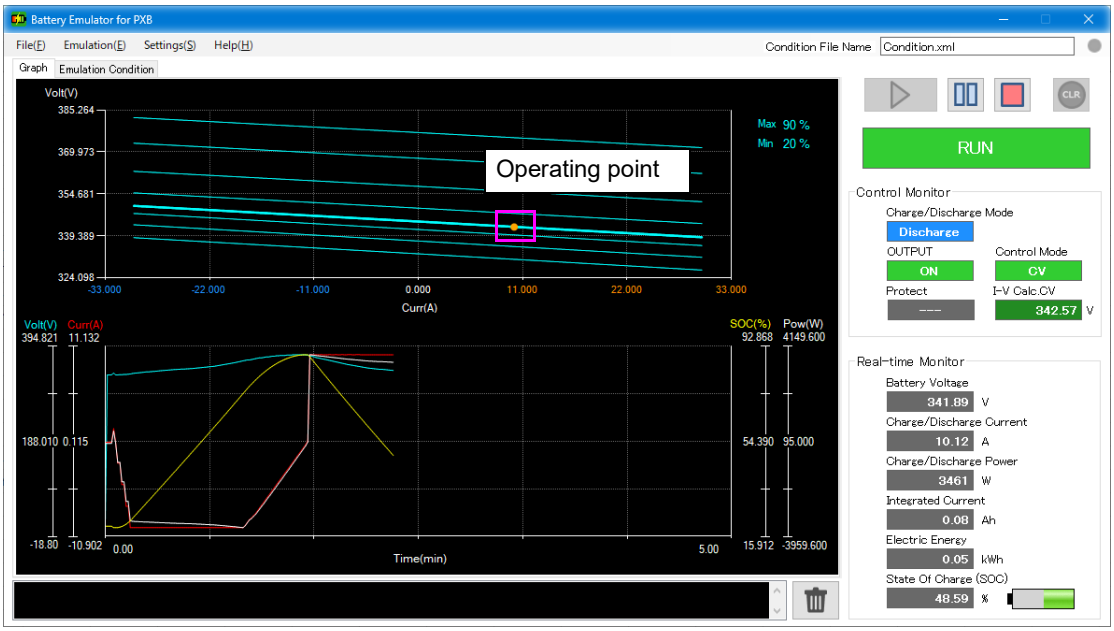
Start

NOTE

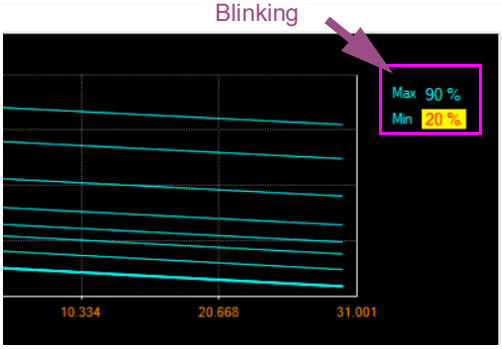
- Disable the Windows power-saving mode and screen saver. Also, avoid using other applications with this software.
- If you are using a PC that has advanced power management (APM) or sleep mode, disable these functions.
- The dongle key must be connected while the Battery Emulator is running.

1 Click (Run).

- A message appears when the PXB power supply setting items related to battery behavior are changed. For more information, Required settings for PXB power supply.
- If a protect value outside the specification range of the PXB power supply used is set, an error occurs.
  Click (Clear Alarm) and remove the error before changing the protect value. See the User's Manual of the PXB power supply for the appropriate protect value.
- When operation is started, the interpolated I-V file to be simulated is selected according to the current I-V calculated CV value and charge/discharge current value. The I-V curve graph of the selected file is highlighted with a bold line, and the control operating points are plotted in orange.
- The Real time graph displays measured values in graphical form.
- The graph dialog box allows you to change the display items and scale of the graph.



- The Battery Emulator will continue to operate if the SOC value is outside the SOC value range specified in the base I-V file, but still within the Active SOC area range. When operating outside the SOC value range, the maximum or minimum value on the I-V curve graph will blink. If the maximum value is exceeded, the operation continues along the I-V curve graph of the maximum SOC value, and if the value is below the minimum value, the operation continues along the I-V curve graph of the minimum SOC value.



Stop and Pause

Operation stops under the following conditions.

- (Stop) is clicked.
- The SOC value Active SOC area.
- An alarm was generated.
- A communication error occurred.

1 Click (Stop) to stop operation or (Pause) to pause.

When stopped, log data is saved in the Log folder.

When paused, the real-time graph continues to update measurements. Log data is paused.

Log data

Measured values and various statuses are recorded at one-second intervals as log data for the period from start to stop of operation.

The recorded data is saved as a temporary file after 24 hours from the start of recording. Thereafter, a new temporary file is created and recording continues.

If an alarm occurs during operation, the time from the start of operation until the alarm occurs is recorded.

Recorded data is automatically generated in CSV format with the file name containing the date and time.

- Example for March 20, 2023, 15:12

BPEmu_2023_03_20_15_12.csv

The date and time when the operation is stopped or an alarm is generated will be entered.

The automatically generated CSV file is saved in the Log folder. After the operation is stopped, the results of the operation up to that point can be referenced.

If you want to check the data during operation, refer to the CSV file in the Temp folder. It is created one minute after the start and updated every minute. This CSV file in the Temp folder is a temporary file and will be deleted automatically when operation stops.

End of Emulation

1 When the emulation is finished, select File > Exit to exit the Battery Emulator.

2 Turn off the POWER switch on the PXB power supply.

Alarms

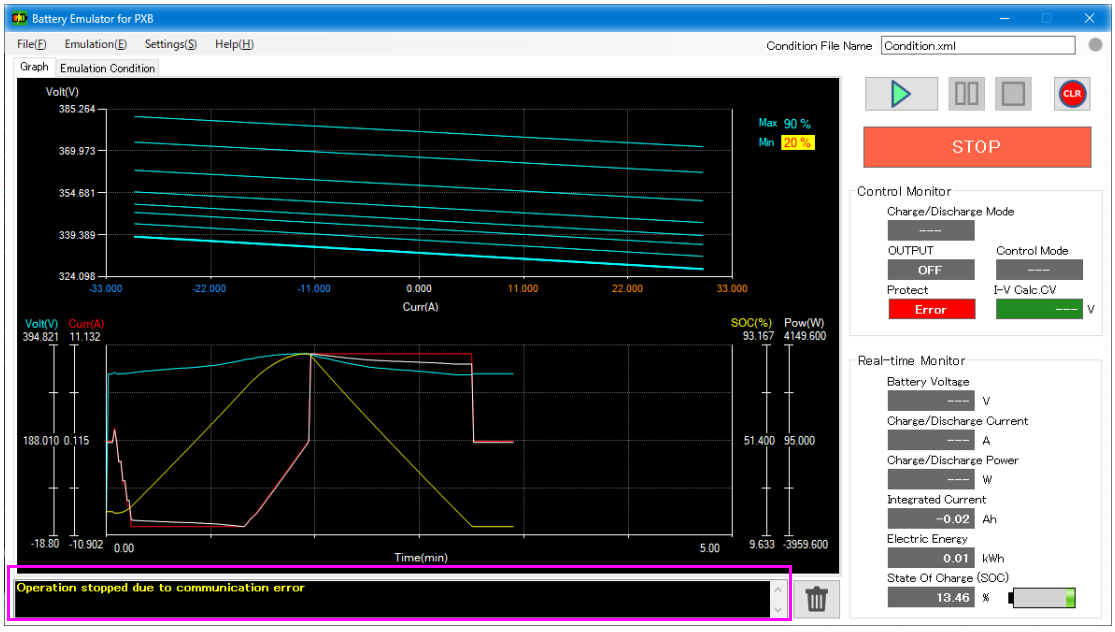
The Battery Emulator monitors alarms generated by the PXB power supply.

- Alarm Occurrence
- Clearing Alarms

Alarm Occurrence

If an error occurs during operation or if the protection functions are activated, the output of the PXB power supply is turned off and operation is stopped. The cause of the alarm is displayed in the alarm display pane.

The protection functions are set under Protect in the Basic settings.



Alarms generated by the PXB power supply

There are several alarms generated by the PXB power supply in addition to the protect (OVP/ UVP/ C-OCP/ D-OCP/ C-OPP/ D-OPP). A message corresponding to the cause of the alarm is displayed.

For more information on alarms, refer to Alarm Types under Protection Functions in the User's Manual of the PXB power supply.

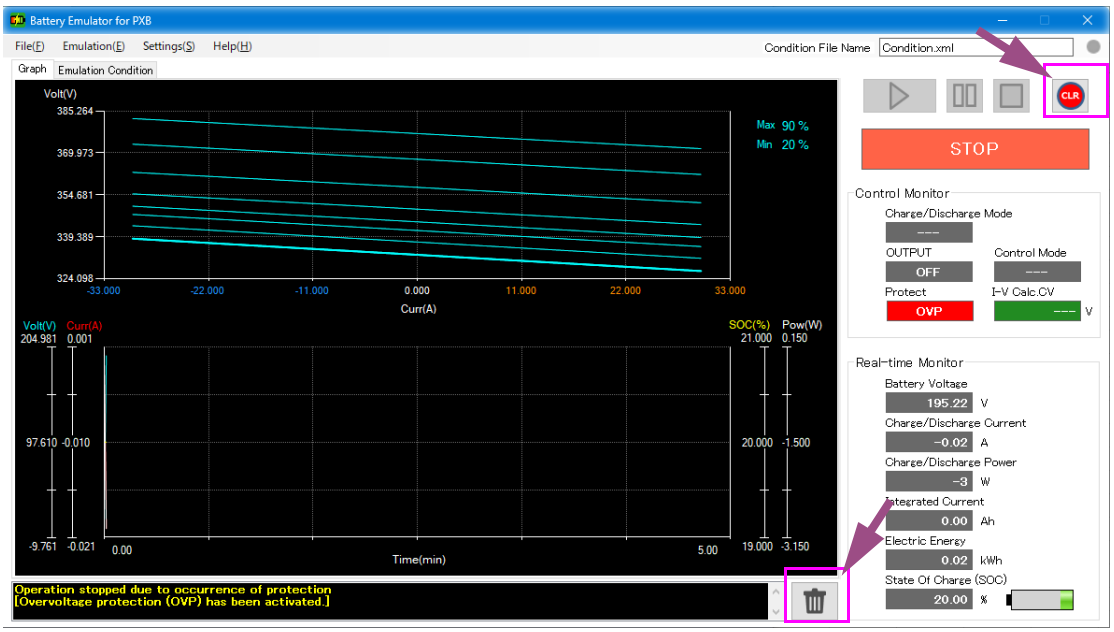
Clearing Alarms

1 **Click (Clear Alarm).**

Protect (UVP/ OVP/ C-OCP/ D-OCP/ C-OPP/ D-OPP) is unlocked. Operation remains stopped.

If the cause of the alarm is not removed, the alarm will occur again after operation is resumed.

Messages displayed in the alarm display pane can be deleted with (Erasure of Information).



Settings

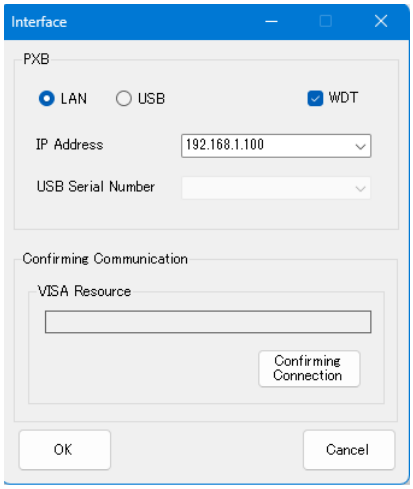
- Interface Settings
- Graph Setting
- Language

Interface Settings

Connect to PXB power supply via LAN or USB. LAN connections can also be made via a hub.

Select Settings > Interface to open the interface dialog box.

NOTE If the message [VISA library is not set up.] is displayed and the interface dialog box cannot be opened, make sure LAN or USB is connected to KI-VISA.



1 **Select LAN or USB.**

For a LAN connection, enter the IP address of the PXB power supply. To determine the IP address of the PXB power supply, see the Communication Interface Manual for the PXB power supply.

For USB connection, the serial number of the PXB power supply is displayed while connected via USB.

2 **Click WDT (Watch Dog Timer).**

For normal settings, enable WDT. When communication with the PXB power supply is lost for a certain period of time, the output of the PXB power supply is turned off as a communication error.

3 **Click Confirming Connection to establish communication.**

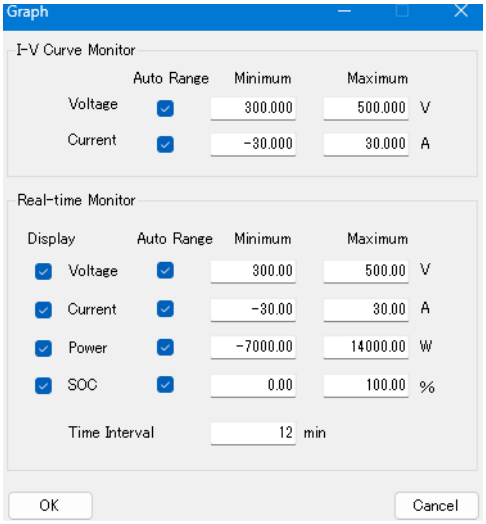
Communication is established when the resource name appears in the VISA Resource box.

4 **Click OK.**

Graph Setting

I-V curve graph and real-time graph settings can be changed. Changes can be made during operation.

Select Settings > Graphs to open the graph dialog box.



Item	Range	Description
I-V curve monitor		
Voltage	0.000 to 1650.000	Sets the display range of the I-V curve characteristic. When auto range is set, the optimum range is selected for the measured value.
Current	-880.000 to 880.000	
Real-time Monitor		
Voltage	-1.000 to 1650.000	Set the display items (voltage/current/power/SOC) and range for the real-time graph. Click Display for items to be displayed on the real-time graph. When auto range is set, the optimum range is selected for the measured value.
Current	-880.000 to 880.000	
Power	-22000.000 to 22000.000	
SOC	-200.000 to 200.000	
Time Interval	1 to 60	Sets the range of the time-axis.

Language

The display language can be changed to English or Japanese.

When the Battery Emulator is launched for the first time, it will be launched in either Japanese or English depending on the language settings in Windows.

To change the display language, select Language from the settings menu.

PC Performance Detection

The Battery Emulator monitors the PC performance.
The performance status of the PC is indicated by the performance status lamp on the main screen.

Display	PC performance
No light[1]	Normal status (no performance degradation)
Red light	Poor performance status.
Yellow light	Status in which performance returns to normal after a period of reduced performance.

1 Once the performance status lamp is illuminated, it will not return to no light even if the system is restored to normal status. To return to no light, the Battery Emulator must be restarted.

If you experience frequent PC performance degradation, take the following actions.

- Postpone the installation of updates until the appropriate time in the Windows Update settings.
- Turn off the OS power saving mode and screen saver. Avoid using it in conjunction with other applications.
- If you are using a PC that has advanced power management (APM) or sleep mode, disable these functions.

If you still experience frequent PC performance degradation, check the Required system configuration section in the Setup Guide.

Reference

- Menu Reference
- Folder Structure
- I-V Data Interpolation
- Required settings for PXB power supply

Menu Reference

Menu	Description
File	
Open	Opens the condition setting file.
Save	Overwrites and saves the condition setting file.
Save as	Save the condition setting file under another name.
Exit	Exits the Battery Emulator.
Emulation	
Run 	Starts operation. Resumes operation if it is paused. Starts recording a log file.
Pause 	Pauses operation. The real-time monitor continues to update measurements even when paused. Recording of log files is also paused.
Stop 	Stops operation. The log file is saved in the Log folder.
Clear Alarm 	Deactivates the alarm to stop operation.
Settings	
Graph	Open the graph dialog box.
Interface	Opens the interface dialog box.
Language	The display language can be changed to English or Japanese.
Help	
Help	Displays the User's manual.
About	Displays the version information of the Battery Emulator.

Folder Structure

The folder structure of files required for emulation is shown below.

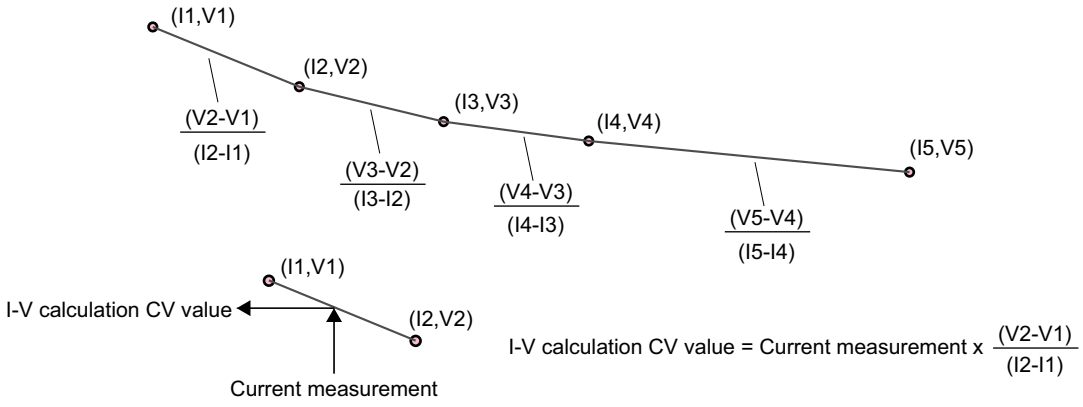
Folder structure	Description
Battery Emulator for PXB	Upper folder where files required for emulation are saved By default, it is automatically generated in (User) Documents > Kikusui. The save location and folder name can be changed.
I-V Table	Folder for saving interpolated I-V files It is automatically created when a new condition setting file is saved. Interpolated I-V files are updated when the condition setting file is saved.
Log	Log data (operation result) save folder Automatically generated when emulation is performed.
Sheet	Folder for saving base I-V files
Temp	Save folder for temporary log data (during operation) Automatically generated when emulation is performed.
Condition.xml	Save location for condition setting files The default file name is Condition.xml. It can be saved under a different name and used separately when emulation is performed.

I-V Data Interpolation

The Battery Emulator loads the base I-V file and performs two types of interpolation processing. Here, we refer to them as horizontal interpolation and vertical interpolation from the I-V curve graph displayed in the graph pane.

Horizontal interpolation

If the current values in the base I-V file are further apart than 0.1 A, the Battery Emulator fills in the data between the two points by linear interpolation. As shown in the figure below, the slope between two points generates current and voltage value data every 0.1 A.



During operation, the voltage value (I-V calculated CV value) is calculated from the current measurement and the current operating point is plotted on the I-V curve graph.

■ Example of horizontal interpolation processing

Base I-V file	Interpolated I-V file	
-4.5,3.3	-4.5,3.3	
	-4.4,3.266	-4.4 A and -4.3 A data are generated between -4.5 A and -4.2 A.
	-4.3,3.233	
-4.2,3.2	-4.2,3.2	
.	.	
.	.	

Vertical interpolation

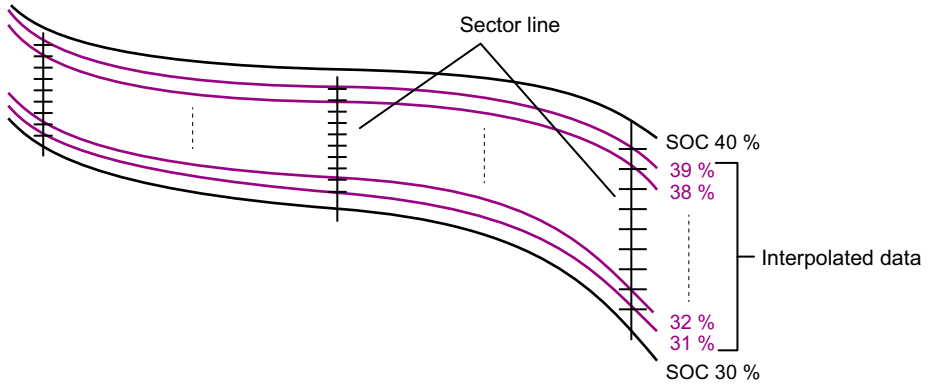
If the first number (SOC value) of the base I-V file name is further than 1 %, the Battery Emulator generates an interpolated I-V file for each 1 % by dividing it equally in 1 % increments, as shown in the figure below.

- Interpolated data is generated only when the current ranges of the upper and lower data match.
- Interpolated data by equal lines are calculated at 0.1 A intervals (horizontal interpolation).

■ Example of vertical interpolation processing

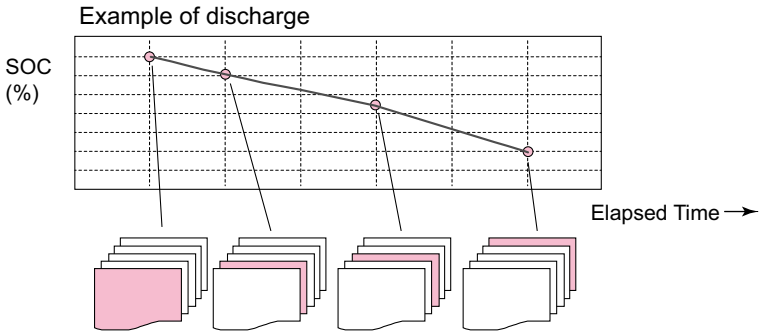
In the example below, an interpolated I-V file is generated from SOC 31 % to SOC 39 %.

Example of I-V table data sheet interpolation between SOC 30 % and SOC 40 %



■ Selection of interpolated I-V files during operation

The SOC is calculated based on the integrated current calculated from the charge/discharge current and the preset nominal capacity of the battery (integrated capacity at 100 % SOC). For SOCs that change with elapsed time, an interpolated I-V file corresponding to the SOC is selected and emulation is performed.



Required settings for PXB power supply

Configuration items required for the PXB power supply to reproduce battery behavior are automatically changed.

The Battery Emulator checks the following items at the start of operation and changes the settings if they are different.

When the setting is changed, a message is displayed.

The slew rate and output off impedance are different from the factory settings of the PXB power supply, so the settings are always changed when operation is started for the first time.

Refer to the User's Manual of the PXB power supply for the factory default settings.

Item	Screen display on PXB	Set value
Output mode	Output Mode	DC
Response (CV/CC)	Response CV/ CC	Fast
Slew rate (CV/CC)	Slew Rate CV/ CC	Maximum value
Priority operation mode	Priority when output is ON	CV
Impedance when the output is off	Impedance when output is OFF	High-Z

Troubleshooting

If the Battery Emulator operation does not work properly, check the following symptoms and try to take corrective actions.

Typical symptoms are listed. If none of the items apply to your case or if following the remedy does not solve your problem, contact your Kikusui agent or distributor.

Unable to perform emulation.

Symptom	Items to check	Remedy
A file loading error is displayed. A save processing error is displayed.	Is the data in the base I-V file consistent with the Basic settings?	Change the Basic settings or the data in base I-V file. See Creating I-V Table Files.
An error regarding the USB dongle key is displayed.	—	The USB dongle key must be connected while the Battery Emulator is running. Make sure it is connected properly.
Operation cannot be started.	Is the interface cable between the PXB power supply and the PC disconnected?	Make sure the interface cable is connected properly.
	Is the PXB power supply output turned on?	The Battery Emulator will not start operation if the output of the PXB power supply is turned on. Turn off the output.
	Are OOO, error messages and messages displayed? (OOO is a three-digit number)	An SCPI error has occurred. Refer to the Error list from the Appendix in the Communication Interface Manual of the PXB power supply.
The operation stops.	Did you manipulate log data other than the Temp folder?	Log data will be updated during operation. Do not manipulate log data outside of the Temp folder.
	Does the alarm display pane show Alarm occurred: OOO? (OOO is an alphabet code)	If OOO is UVP/OVP/OCP/OPP, click (Clear Alarm) to change the protect setting. See Clearing Alarms. If OOO is other than the above, clear the alarm with the PXB power supply. See Alarm types under Protection functions in the User's Manual of the PXB power supply.
	Does the alarm display pane show [-OOO, error message]? (-OOO is a three-digit number)	An SCPI error has occurred. Refer to the Error list from the Appendix in the Communication Interface Manual of the PXB power supply.
Unable to communicate with PXB power supply.	—	The message appears when communication with the PXB power supply is lost or when there is no response from the PXB power supply. Check the connection to the PXB power supply. It may depend on the PXB power supply settings. Check the PXB power supply settings.

Others

Symptom	Items to check	Remedy
A different folder for saving than the existing save folder cannot be created and a new condition setting file cannot be loaded.	Have you renamed the existing save folder and placed the base I-V file under (User) Documents > Kikusui > Battery Emulator for PXB > Sheet?	The Battery Emulator will load the condition setting file in the previously used save folder used when starting up the last time. If the previously loaded condition setting file does not exist, load the base I-V file in the default save folder (Battery Emulator for PXB>Sheet shown at left). After starting the Battery Emulator, save a new condition setting file.
Changes to the configured base I-V file are not reflected in the interpolated I-V file.	Did you save the condition setting file after replacing the base I-V file?	Interpolated I-V files are reflected when the condition setting file is saved.
The performance status of the PC is not normal.	Have you tried restarting the Battery Emulator?	If you experience frequent PC performance degradation after rebooting, see PC Performance Detection.
The Battery Emulator will close.	Do you have KI-VISA installed?	If any VISA libraries other than KI-VISA are already installed in your PC, uninstall them before installing the KI-VISA. Other than KI-VISA is not supported.

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.

KIKUSUI ELECTRONICS CORP.

1-1-3 Higashiyamata, Tsuzuki-ku, Yokohama,
224-0023, Japan

Phone: +81-45-482-6353
Facsimile: +81-45-482-6261

global.kikusui.co.jp