

Operation Manual

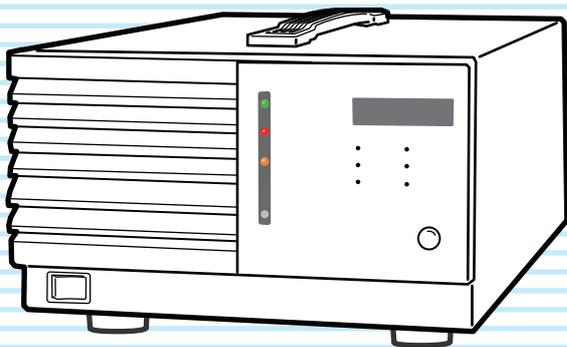
Charge/Discharge System

Charge/Discharge System Controller
PFX2500 Series

PFX2511

Communication Control Unit

PFX2121



General
Description

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Installation and
Preparation

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Volt / Thermometer Unit
OP01-PFX

5

Features of the digital
CC/CV control

App.

Description of the Function

Connecting to a Bias Power Supply

Reference Data

Troubleshooting

Maintenance

Thank you for purchasing the PFX2511 Charge / Discharge System Controller.

Dedicated application software enables you to set the conditions of the battery charge/discharge characteristics tests, execute the tests, and analyze the test results on a PC.

Use the following to operate the PFX2511 Charge / Discharge System Controllers.

Communication control unit	PFX2121
Application software	BPChecker2000 Basic Edition BPChecker2000 Full Edition

There are two versions of BPChecker2000: Full Edition and Basic Edition. Basic Edition is included with the PFX2511 Charge / Discharge System Controller. For information on how to configure BPChecker2000, see the BPChecker2000 setup guide. The Full Edition BPChecker2000 application software are sold separately.

About this manual

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

Read this manual thoroughly to use the functions of the product effectively. You can also review this manual when you are confused about an operation or when a problem occurs.

After reading, always keep the manual nearby so that you may refer to it as needed.

If you find any misplaced or missing pages in operation manual, it will be replaced.

If the operation manual gets lost or soiled, a new copy can be provided for a fee. In either case, please contact Kikusui distributor/agent, and provide the "Kikusui Part No." given on the cover page.

Operation manual has been prepared with the utmost care; however, if you have any questions, or note any errors or omissions, please contact Kikusui distributor/agent.

Product firmware versions

This manual applies to products with firmware versions
2.0X

When contacting us about the product, please provide us with:

- The model (marked in the top section of the front panel)
- Firmware version (See 50 page)
- The serial number (marked in the bottom section of the rear panel)

How to read this manual

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

Related manuals

For details on the BPChecker2000 Full Edition, see the corresponding operation manual.

For details on the PWR series Regulated DC Power supplies, PAS series Regulated DC Power supplies, and PLZ-4W series Electronic Loads, see the corresponding operation manual.

Intended readers of this manual

This manual is intended for users of the product or persons teaching other users on how to operate the product.

The manual assumes that the reader has knowledge about electrical safety testing.

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The specifications of this product and the contents of operation manual are subject to change without prior notice.

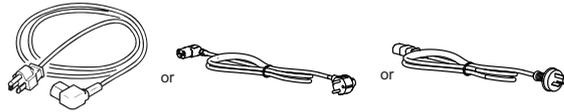
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Checking the Package Contents

When you receive the product, check that all accessories are included and that the accessories have not been damaged during transportation.

If any of the accessories are damaged or missing, contact your Kikusui agent or distributor.

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



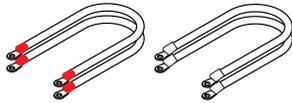
Rated: 125 Vac/ 10 A
PLUG: NEMA5-15
[85-AA-0003]

Rated: 250 Vac/ 10 A
PLUG: CEE7/7
[85-AA-0005]

Rated: 250 Vac/ 10 A
PLUG: GB1002
[85-10-0790]

Power cord (1 pc.)
Length: Approx. 2.5 m

The power cord that is provided varies depending on the destination for the product at the factory-shipment.



Cable with crimp terminal (4 pcs.)
[Red (2 pc.): 91-80-7557
White (2 pc.): 91-80-7522]



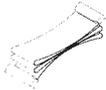
Thermistor (1 pc.)
[38-00-0160]



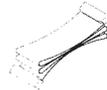
Sensing connector (1 pc.)
[84-61-7705]



Lock lever (2 pcs.)
[83-06-5060]



26-core flat cable (1 pc.)
(Dc Power Supply I/F cable)
[83-22-6050]



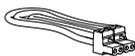
20-core flat cable (1 pc.)
(Electronic Load I/F cable)
[91-80-6136]



26-core flat cable core (1 pc.)
[96-01-0260]



20-core flat cable core (1 pc.)
[96-01-0250]



Shielded wire with
TP-BUS connectors
(1 pc.) [91-40-3002]



Operation manual
(This manual, 1 copy)



Setup guide
BPChecker2000
Basic Edition (1 copy)



BPChecker2000
Basic Edition CD-ROM (1 pc.)

⚠ Safety Symbols

For the safe use and safe maintenance of this product, the following symbols are used throughout operation manual and on the product. Note the meaning of each of the symbols to ensure safe use of the product. (Not all symbols may be used.)



Indicates that a high voltage (over 1 000 V) is used here.

Touching the part causes a possibly fatal electric shock. If physical contact is required by your work, start work only after you make sure that no voltage is output here.

DANGER

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



WARNING

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



CAUTION

Indicates a potentially hazardous situation which, if ignored, may result in damage to the product and other property.



Indicates a prohibited act.



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



Protective conductor terminal.



Chassis (frame) terminal.



On (supply)



Off (supply)



In position of a bi-stable push control



Out position of a bi-stable push control



Safety Precautions

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

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



Users

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



Purpose of use

- Never use the product for purposes other than the product's intended use.
- This product is not designed or manufactured for general home or consumer use.



Input power

- Use the product within the rated input line voltage range.
- For applying power, use the power cord provided. For details, see the respective page in this manual.
- The PFX2511 is an equipment of IEC Overvoltage Category II (energy-consuming equipment supplied from the fixed installation).



Cover

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



Grounding

- The PFX2511 is IEC Safety Class I equipment (equipment with a protective conductor terminal). To prevent electric shock, be sure to connect the protective conductor terminal of the PFX2511 to electrical ground (safety ground).



Operation

- Before use, visually check for problems in the power cord, discharge gun, and high-voltage cable. When checking for these problems, remove the power cord plug from the outlet.
- If you notice a malfunction or abnormality in the product, stop using it immediately, and remove the power cord plug from the

outlet. Make sure the product is not used until it is completely repaired.

- Do not disassemble or modify the product. If you need to modify the product, contact your Kikusui distributor or agent.



Maintenance, Inspection and Calibration

- To maintain the performance and safety of the product, we recommend periodic maintenance, inspection, cleaning, and calibration.
- To prevent electric shock, be sure to unplug the product before carrying out maintenance or inspection. Do not remove the external cover.
- Check periodically that there are no tears or breaks in the power cord.
- If the panel needs cleaning, gently wipe it using a soft cloth with water-diluted neutral detergent. Do not use volatile chemicals such as benzene or thinner.
- This product is calibrated before shipment. To maintain the product's performance, we recommend periodic calibration. To have your product calibrated, contact your Kikusui agent/distributor.



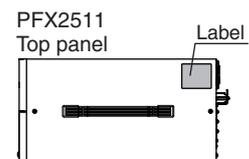
Service

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



Warning label

There is a warning label affixed to the PFX2511. If this label tears or falls off, replace with a new label. If you need a new label, contact your Kikusui agent or distributor.



Precautions When Moving the Product

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

- Turn the POWER switch off.
Moving the product with the POWER switch turned on may cause electric shock or damage to the product.
- Remove all wiring.
Moving the product with the cables connected may cause wires to break or injuries due to the product falling over.
- When transporting the product, be sure to use the original packing materials.
Otherwise, damage may result from vibrations or from the product falling during transportation.
- Be sure to include this manual.

Precautions Concerning Installation

Be sure observe the following precautions when installing the product.

- Do not use the product in a flammable atmosphere.
To prevent the possibility of explosion or fire, do not use the product near alcohol, thinner, or other combustible materials, or in an atmosphere containing such vapors.
- Avoid locations where the product is exposed to high temperature or direct sunlight.
Do not install the product near a heater or in areas subject to drastic temperature changes.
Operating temperature range: 0 °C to 40 °C (32 °F to 104 °F)
Storage temperature range: -10 °C to 60 °C (14 °F to 140 °F)
- Avoid humid environments.
Do not install the product in high-humidity locations such as near a boiler, humidifier, or water supply.
Operating humidity range
PFX2511 : 20 %rh to 85 %rh (no condensation)
PFX2121 : 30 %rh to 80 %rh (no condensation)
Storage humidity range
PFX2511 : 0 %rh to 90 %rh (no condensation)
PFX2121 : 20 %rh to 80 %rh (no condensation)
Condensation may form even within the operating humidity range. If this happens, do not use the product until the condensation dries up completely.
- Be sure to use the product indoors.
This product is designed for safe indoor use.
- Provide adequate space around the power cord plug.
Do not insert the power cord plug into an outlet that is not easily accessible. Do not place objects near the power cord plug that would make it difficult to access.
- Do not install the product in a corrosive atmosphere.
Do not install the product in a corrosive atmosphere or in environments containing sulfuric acid mist, etc. This may cause corrosion of various conductors or reduce the quality of the connector contacts inside the product, and this could lead to malfunction, failure, and possibly fire.
- Do not install the product in a dusty location.
Dust accumulation can lead to electric shock or fire.
- Do not use the product in a poorly ventilated location.
Provide adequate space around the product for air to circulate around it.
- Do not place objects on top of the product.
Placing heavy objects on top of the product may cause malfunction.
- Do not install the product on an inclined surface or in a location subject to vibrations.
The product may fall or tip over and cause damage and injury.
- Do not use the product in a location subject to strong magnetic or electric fields or in a location where the input power supply signal contains large amounts of distortion or noise.
Doing so may cause the product to malfunction.
- Use the product in an industrial environment.
This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.

- For KC mark.

이 기기는 업무용 (A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Notations used in this manual

- The PFX2511 Charge / Discharge System Controller is also referred to as the PFX2500 series, PFX2500 or PFX2511 in this manual.
- The PFX2121 Communication Control Unit is also referred to as the PFX2121 in this manual.
- The BPChecker2000 application software is also referred to as the BPChecker2000 in this manual.
- The PWR series Regulated DC Power supply is also referred to as the PWR series in this manual.
- The PAS series Regulated DC Power supply is also referred to as the PAS series in this manual.
- The PLZ-4W series Electronic Load is also referred to as the PLZ-4W series in this manual.
- The OP01-PFX Volt / Thermometer Unit is also referred to as the OP01-PFX in this manual.
- "PC" in this manual is a generic term for personal computers and workstations.
- The screen captures used in this manual may differ from the actual screens that appear on the PFX2511. The screen captures are merely examples.
- The following markings are used in this manual.

WARNING

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

CAUTION

Indicates a potentially hazardous situation which, if ignored, may result in damage to the product or other property.

NOTE

Indicates information that you should know.

See

Indicates reference to detailed information.

Ope

Indicates reference to detailed information operation manual.

Help

Indicates reference to detailed information help file.

Memo

Indicates useful information.

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Setup



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 [Hardware Config Wizard, Group Administrator, Test Condition Editor, Test Executive, Graph Viewer](#)
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 [PWR Series, PAS Series, PLZ-4W Series](#)
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Maintenance



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To solve problems

See "Troubleshooting" on page 96.

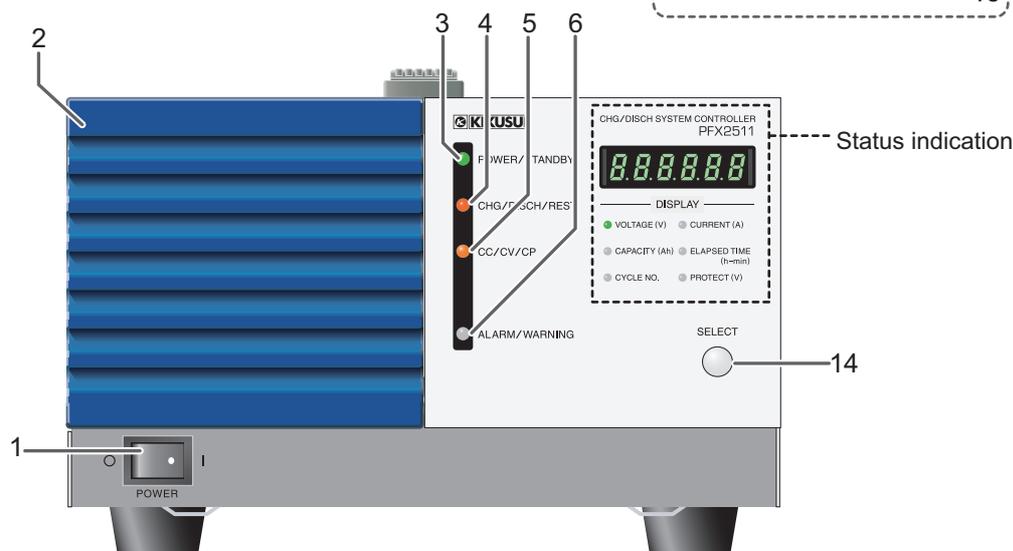
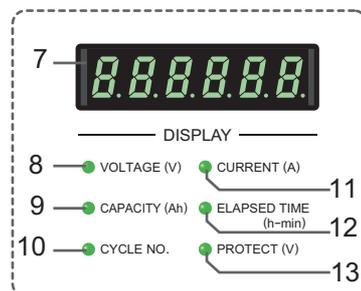
Charge / Discharge System Controller PFX2511

Front panel

The color of status indication LED and the operation status

	Red	Green	Orange
● POWER/STANDBY	—	POWER	STANDBY
● CHG/DISCH/REST	CHG	DISCH	REST
● CC/CV/CP	CC	CV	CP
● ALARM/WARNING	ALARM	—	WARNING

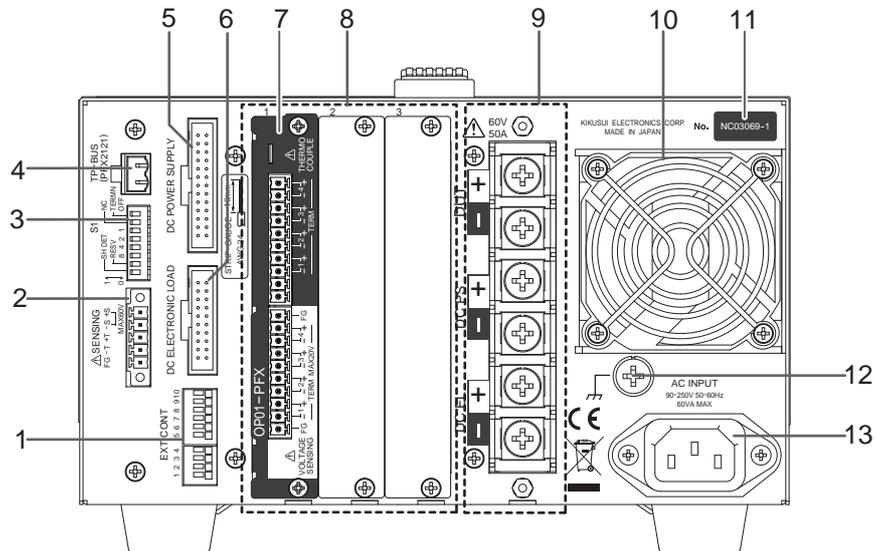
Status indication for PFX2511



No.	Name	Function	See
1	POWER switch	Turns on / off of the power.	p.50
2	Air inlet (Louver)	Intake for air circulation to cool down of the internal components.	—
3	POWER/STANDBY LED	The POWER LED (Green) Illuminates when the test can be executed. The STANDBY LED (Orange) Illuminates when the test is on standby status.	—
4	CHG/DISCH/REST LED	The CHG LED (Red) Illuminates when it is in the charge status, the DISCH LED (Green) Illuminates when it is in the discharge status, and the REST LED (Orange) Illuminates when it is in the resting status.	—
5	CC/CV/CP LED	The CC LED (Red) Illuminates when it is in the constant current operation, the CV LED (Green) Illuminates when it is in the constant voltage operation, and the CP LED (Orange) Illuminates when it is in the constant power operation.	—
6	ALARM/WARNING LED	The ALARM LED (Red) Illuminates when the alarm is detected. The WARNING LED (Orange) Illuminates when the protection function is activated.	p.54
7	Display	Displays the status of selected function by SELECT key (VOLTAGE (V), CURRENT (A), CAPACITY (Ah), ELAPSED TIME (h-min), CYCLE NO., PROTECT, Alarm, etc.).	p.52 p.54
8	VOLTAGE (V) LED	It Illuminates when the voltage value is displayed. (when it is selected by the SELECT key)	p.52
9	CAPACITY (Ah) LED	It Illuminates when the capacity value is displayed. (when it is selected by the SELECT key)	p.52
10	CYCLE NO. LED	It Illuminates when the testing cycle number is displayed. (when it is selected by the SELECT key)	p.52
11	CURRENT (A) LED	It Illuminates when the current value is displayed. (when it is selected by the SELECT key)	p.52
12	ELAPSED TIME (h-min) LED	It Illuminates when the elapsed time is displayed. (when it is selected by the SELECT key)	p.52

No.	Name	Function	See
13	PROTECT (V) LED	It Illuminates when the status of protection function is displayed. (when it is selected by the SELECT key)	p.52
14	SELECT key	To select the item to display on the DISPLAY.	p.52

Rear panel



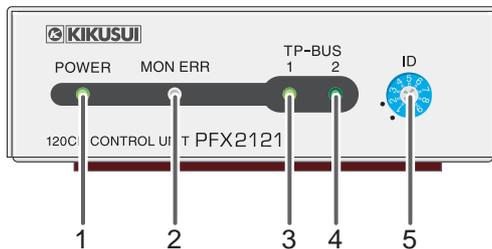
Example in which a Volt / Thermometer Unit OP01-PFX is installed in slot 1 of a PFX2511.

No.	Name	Function	See
1	EXT CONT terminal board	External control terminal	p.52
2	SENSING connector	A connector for the sensing cables	p.46 p.48
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6	DC ELECTRONIC LOAD connector	A connector for controlling the Electronic load	p.31
7	Volt / Thermometer Unit (OP01-PFX)	An option board for expanding the number of voltage and temperature measurement points	p.20 p.75
8	Extra slots for the option board	Slots for installing the option board From the left: slot 1, slot 2, and slot 3	p.20 p.75
9	Input/Output terminal board*1	Terminals for the testing device (DUT), the DC power supply (DCPS), and the Electronic load (DCEL)	p.24 p.27 p.29 p.44
10	Air outlet	Exhaust port for cooling	—
11	Serial number	—	—
12	Chassis terminal	A terminal used for ground the output	p.24
13	AC INPUT connector	AC inlet	p.22

*1. The terminal cover for protecting the input/output terminal is being attached to the terminal when the PFX2511 is shipped from the factory.

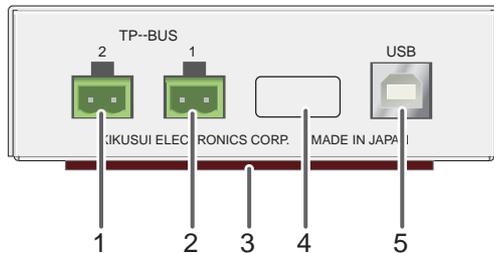
Communication Control Unit PFX2121 (Option)

Front panel



No.	Name	Function	See
1	POWER LED	The LED blinks (Green) when the power is being supplied by the USB cable, and it illuminates (Green) when it is in the operatable status	p.51
2	MON ERR LED	It illuminates (Red) if an error occurs while in the monitor communication	p.51
3	TP-BUS 1 LED	The LED illuminates (Green) when communicating between devices connected with the TP-BUS1	p.43
4	TP-BUS 2 LED	The LED illuminates (Green) when communicating between devices connected with the TP-BUS2	p.43
5	ID switch	Setting switch for the instrument ID	p.36

Rear panel



No.	Name	Function	See
1	TP-BUS 2 connector	A connector for the TP-BUS 2 (Unable to be used when the PFX2511 is connected)	p.32
2	TP-BUS 1 connector	A connector for the TP-BUS 1	p.32
3	Magnet sheet	To mount on the cover of PC	—
4	Serial number	—	—
5	USB connector	A connector for the USB cable	p.35



1

General Description

This chapter describes the outline of product, the connectable equipments, and the options.

Product Overview

The Charge / Discharge system Controller PFX2511 is a controller exclusively designed for the charge and discharge control combined with the DC power supply and the Electronic load that evaluates the characteristic of the DUT such as rechargeable batteries, and measures the value of charge and discharge voltage/current of the DUT in high accuracy. The configured system may apply to the high performance evaluation test of the large scale and wide range of ratings by the combination of the DC power supply and the Electronic load.

NOTE

For the system requirements, see the BPChecker2000 application software's setup guide .

Features

Charge / Discharge Control system

● Applies to the wide range of power ratings.

The PFX2511 can be used for the wide range of power ratings combined with the selected model of Kikusui's DC power supply and the Kikusui's Electronic load. The initial cost can be reduced by selecting the equipment applied to the desired testing condition of the charge / discharge test.

● Adopting the digital control of the constant current (CC) and the constant voltage (CV).

The PFX2511 equips the control method of Digital CC / CV, it minimize the difference between the setting accuracy and the drift characteristic of constant current (CC) / constant voltage (CV) generated from the system configuration of the DC power supply and the Electronic load, and it can apply for the precise evaluation. Any of the adjustment are not required after the system configuration is set up.

● Precise measurement

The PFX2511 equips the high precision measurement circuit and it detects the battery voltage and the charge and discharge current in high accuracy. (voltage measurement: 100 μ V resolution and current measurement: 100 μ A resolution, and the elapsed time measurement: within 30 seconds per month (within 10 ppm))

Capable of measuring the amount of power and the integrated capacity even with the pulse current which is hardly captured.

● Protection functions

The PFX2511 equips the route switch (load switch) which it has a feature of high-speed interruption function to disconnect immediately between the DUT and the DC power / Electronic load when the abnormal state are detected.

It detects such as an incomplete connection of the DUT, an abnormality of wirings, the potential difference when it exceeds a regulated value of the DUT cable and the voltage sensing line, and it protects connecting equipments and the DUT (battery) from being damaged.

● Equipped with the vibration sensor

In case of disaster, the PFX2511 detects a big shake and the impact when the charge/discharge test is executed, and it turns off the output. it protects connecting equipments and the DUT (battery) from being damaged.

- **20-value CC / CP Pulse discharge function**

The PFX2511 can pulse settings can be assigned up to 20 different values, which perform discharge test that simulates a change of the dynamic load current.

- **Expandable measurement feature**

By installing a Volt / Thermometer Unit OP01-PFX, you can expand the number of measurement points by four voltage and four temperature measurement points. There are three option board slots, so you can expand the number of measurement points by a maximum of 12 voltage and 12 temperature measurement points.

- **Controlled with an exclusive application software "BPChecker2000"**

The BPChecker2000 can manage all processes from creating the test condition file until to output the test result file. The test condition file and the test result file can be moved independently, so you can edit these data files from the distance.

As for the "Basic Edition" of the BPChecker2000 (included as a standard accessory) controls up to 2 channels and the "Full Edition" of the BPChecker2000 (optional software) controls up to 30 channels (When 2 sets of the Communication control units PFX2121 are used).

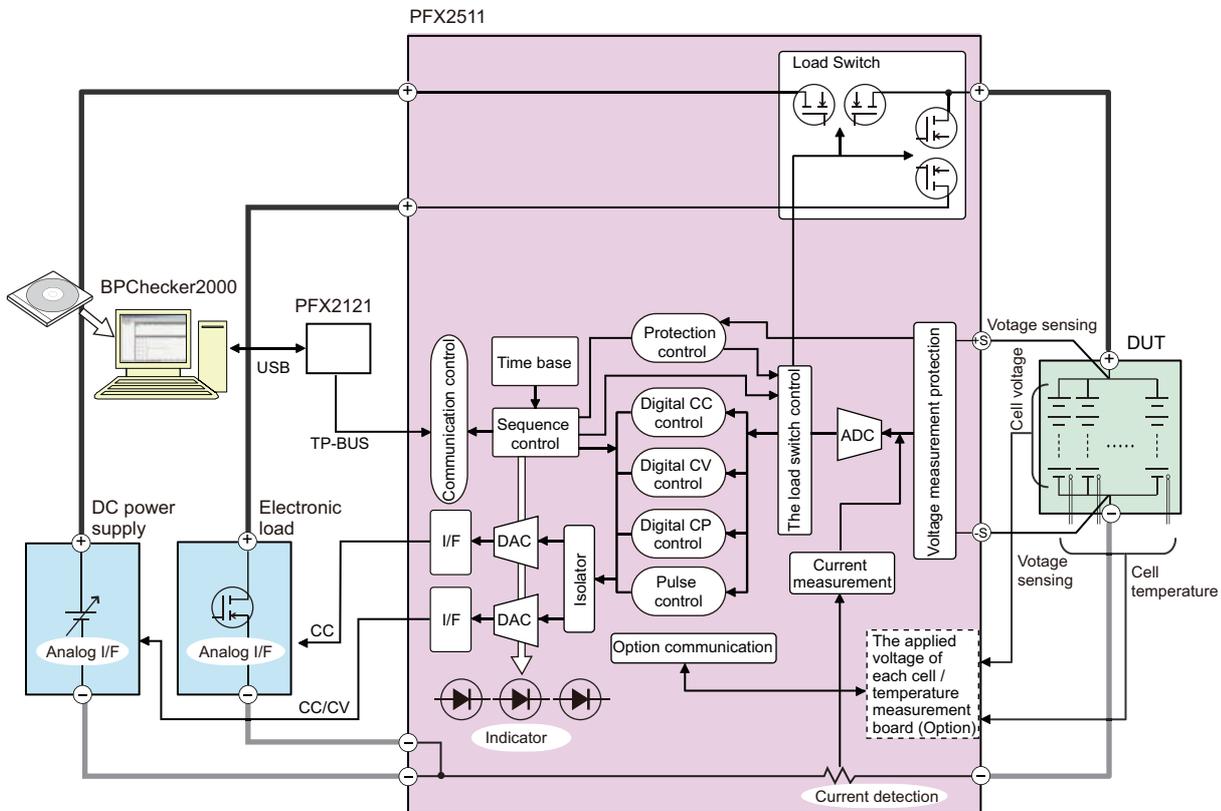
Communication Control unit PFX2121 (Option)

- **USB connection**

It enables you to control by the PC. It uses it so that the personal computer may control. If it is a personal computer equipped with USB, other interface boards are not necessary.

System Configuration

The figure below shows an example of basic configuration of the charge and discharge system using the PFX2511. The system consists of the selected Kikusui's Electronic load and the DC power supply combined with a peripheral subsystem.



Charge / Discharge System configuration (Example)

The functional block of the PFX2511 are composed of measurement function of the DUT voltage / current / temperature, control function of the digital constant current / constant voltage, I/F function of the power supply / Electronic load, host communication control function, and the load switch function.

The PFX2511 is equipped with the I/F that can be connected directly with the selected Kikusui's Power supply and the Electronic load. It only requires simple initial setting and no other equipments or external circuit are required, the PFX2511 is designed to perform the complete charge and discharge test.

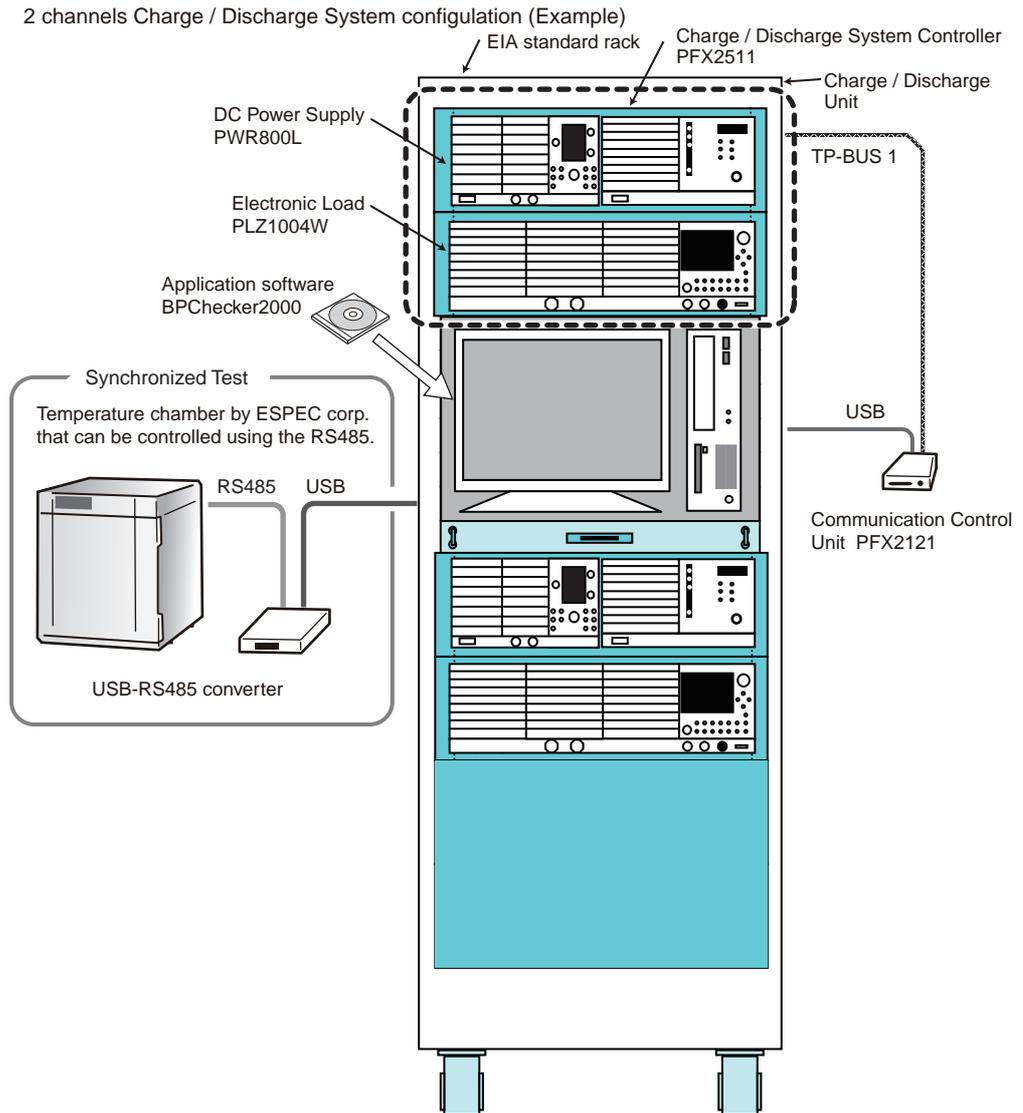
The connection status with the Power supply, the Electronic load, and the DUT (battery) is always monitored, and when any status of abnormality is detected, the PFX2511 has a function to stop safely the charge and discharge testing condition.

The PFX2511 is controlled by the TP-BUS through the PFX2121 (Option), Communication control unit.

Use the application software to set the charge/discharge test conditions and to operate the PFX2511.

Use BPChecker2000 for the PFX2511. For details on the application software, see the corresponding help file.

 Help	BPChecker2000
Hardware configuration	Hardware Config Wizard
Group creation and deletion	Group Administrator
Test condition creation	Test Condition Editor
Test execution	Test Executive
Test result analysis	Graph Viewer



The 1 channel of the charge and discharge system consists of one unit of each PFX2511, DC power supply, and Electronic load.

The figure shown above is an example of system configuration for 2 channels of the charge and discharge system. This system consists of 2 sets of each for the PFX2511, PWR800L (DC power supply), the PLZ1004W (Electronic load), and 1 set of each for the PC, the PFX2121 (Communication control unit) installed into the rack unit connecting with the temperature chamber.

1 set of the PC can connect 2 units of the PFX2121. By using 1 unit of the PFX2121, it can be connected up to 15 units of the charge and discharge unit. And when using 2 units of the PFX2121, it can be connected up to 30 units of the charge and discharge unit.^{*1}

The synchronized testing with the temperature chamber can be performed. The PC can be connected with the temperature chamber (manufactured by ESPEC) through USB to RS485 using the exclusive design of converter.^{*2} If you want to use a temperature chamber to perform synchronized tests, you require a VISA library.^{*3}

It is possible to use the PFX2511 combined with the PFX2000 series, Charge/Discharge Battery Test System. For further information, please contact Kikusui distributor or agent.

*1. If the charge and discharge unit contains a PFX2511 in which optional Volt / Thermometer Units are installed, the number of channels that you can connect to is different (See p. 76).

*2. Use a converter of the ESPEC corp. recommended.

*3. VISA (Virtual Instrument Software Architecture) is a standard developed by the VXIplug&play Systems Alliance that defines software specifications for communicating with instruments from a PC. KI-VISA is a Kikusui-original VISA library that complies with the VXIplug&play VISA specifications. You can download the latest version of KI-VISA from the Kikusui website (<http://www.kikusui.co.jp/en/download/>).

Applied DC Power Supplies and Electronic Loads

The maximum voltage and the maximum current for charge and discharge testing shall be determined by the connected DC power supply and the Electronic load unit.

The PFX2511 can be used to perform the charge and discharge testing with the following system configuration. Select the system which applies to your required charge and discharge testing.

See p. 56

Each of the system configuration is assigned for the specific model ID. Set the model ID number according to your operating system configuration.

The system of which model ID has not been assigned shall be subject to concern when the future upgrade version is made.

As for the latest information for the system configuration can be confirmed on our website (<http://www.kikusui.co.jp/en>). Please contact our distributor or agent for details.

The factory default settings are arranged by the following configuration.

DC Power supply: PWR800L

Electronic load: PLZ1004W (H range)

■ Applied configuration

Model ID	DC Power supply	Electronic load	Maximum charging power *1	Maximum discharging power
5101 *2	PWR800L	PLZ1004W (H range)	800 W	1 000 W
5102	PWR800L	PLZ1004W (M range)	800 W	1 000 W
5103	PWR1600L	PLZ1004W (2 units parallel)	1 600 W	2 000 W
5104	PWR800L	PLZ334W (H range)	800 W	330 W
5106	PWR1600L	PLZ1004W (H range)	1 600 W	1 000 W
5107	PAS10-70	PLZ1004W (H range)	700 W	1 000 W
5108	PAS20-36	PLZ1004W (H range)	720 W	1 000 W
5109	PAS20-54	PLZ1004W (H range)	1 080 W	1 000 W
5110	PAS40-27	PLZ1004W (H range)	1 080 W	1 000 W
5111	PWR800L	PLZ164W (H range)	800 W	165 W
5112	PAS10-35	PLZ334W (H range)	350 W	330 W

*1. Because of the route loss, the maximum power may not be reached to the specified number as indicated.

*2. Default setting at the time of shipment.

Selecting the system for the DC power supplies and the electronic loads

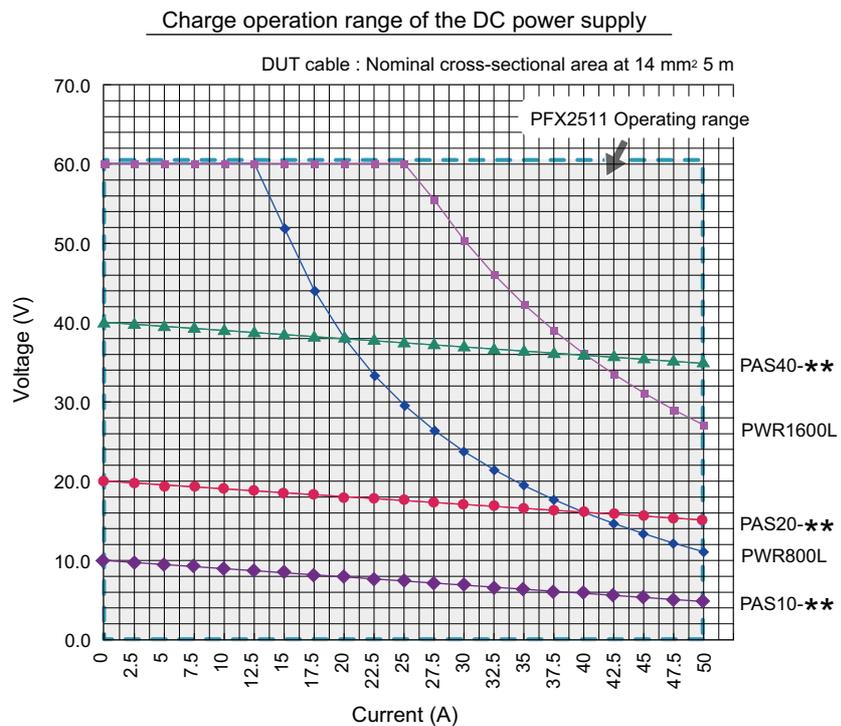
The range is different between the charge operation and the discharge operation state. Select the applicable model of the DC power supply and the Electronic load that meets each requirement.

The following graph indicates the range of allowable charge voltage value / current value calculated by the formula specified below. Use the equipments which do not exceed the range of the voltage value (constant voltage value/end voltage value) and the current value (constant current value).

$$\text{Maximum charging power} = \text{Maximum rated power of the DC power supply} - \text{Route loss}^{*1}$$

NOTE

When the charging power exceeds the range of allowable power of the power supply while the charge operation is executed, the PS / B alarm will be activated and stop the testing.



Voltage (V) axis	Constant voltage value (CV Voltage), or End voltage value (Cutoff Voltage)
Current (A) axis	Constant current value (CC Current)

*1. What is the route loss?
The voltage drop is occurred in the DUT cable, the connecting cable, and the PFX2511 current passing circuit, etc. caused by flowing the charging current. The route loss is the power loss of the voltage drop while the execution of charging state. The allowable maximum power in the charging state is the value subtracting the route loss.

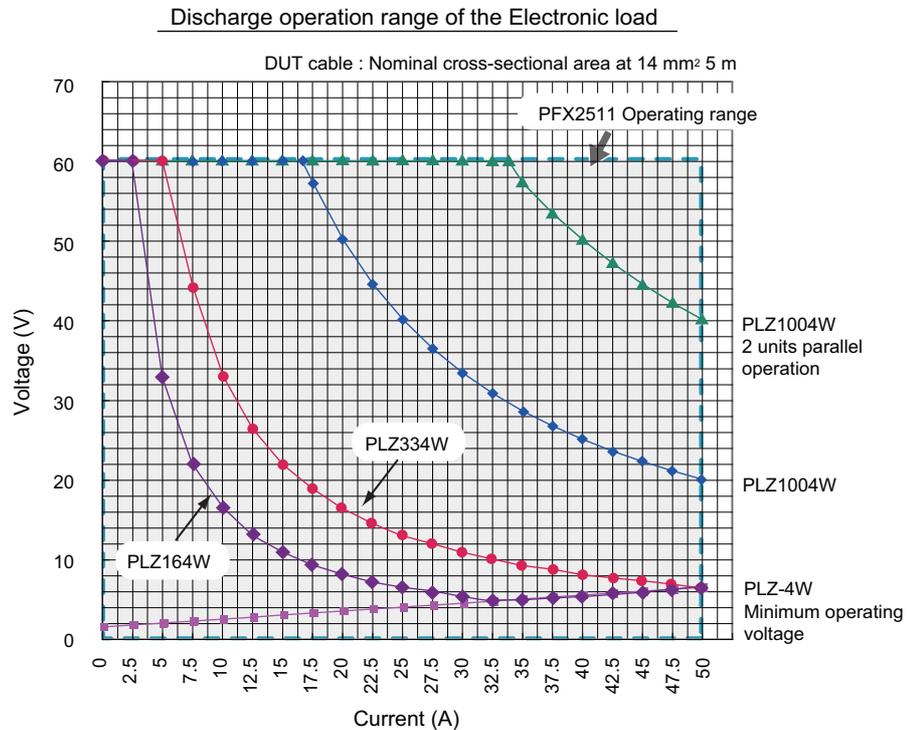
The following graph indicates the range of allowable charge voltage value / current value calculated by the formula as specified below. Use the equipment that should not exceed the range of the voltage value (starting discharge voltage value/end voltage value) and the current value (constant current value). And the discharge voltage should not be applied below the discharge minimum operating voltage.

When using the constant power discharge function (CP Dish), calculate the value of the discharging current from the setting value of the constant power and the DUT (battery) voltage, and confirm its value is within the range of the graph.

Discharge minimum operating voltage*1 =
 Minimum operating voltage of the Electronic load + the value of voltage drop caused by the route loss

NOTE

When the Electronic load exceeds the allowable power or becomes under the lowest discharge operating voltage while the discharge operation, the CD / B alarm is occurred and abort the test.



Voltage (V) axis	Start discharge voltage value (Start Voltage), or End voltage value (Cutoff Voltage)
Current (A) axis	Constant current value (CC Current)

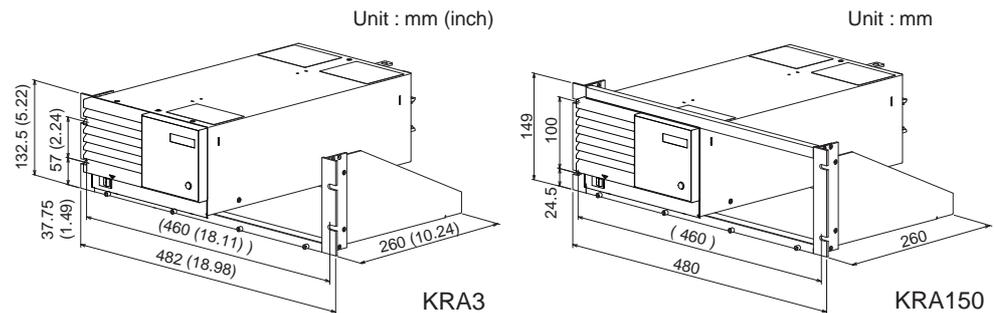
*1. What is the discharge minimum operating voltage?
 The discharge minimum operating voltage relies on the minimum operating voltage of the Electronic load. Furthermore, the discharge minimum operating voltage shall be determined with adding the value of route loss (the voltage drop).

Options

For details on the options, contact your Kikusui agent or distributor.

Rack mounting options

Product	Model	Notes
Rack mount frame	KRA3	Inch rack EIA Standard
	KRA150	Milli rack JIS standard



Remove the handle and rubber feet before you mount the product to a rack.

For details on rack mounting, see the KRA series or KRB series Operation Manual. Install the suitable support angles applying to the used rack system to support the instrument.

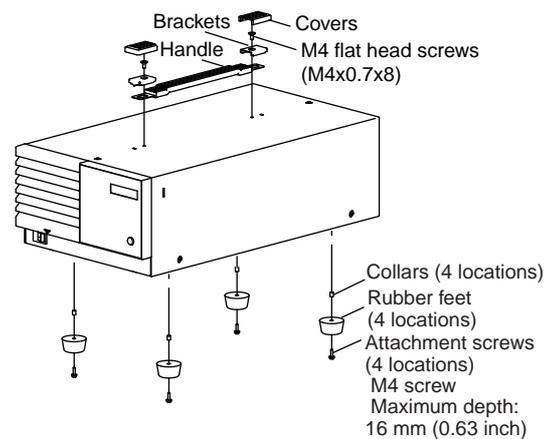
We recommend that you keep all the parts so that you can use them again when you detach the PFX2511 from the frame.

To reattach the rubber feet, use the screws that you removed.

NOTE

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

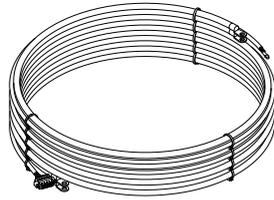
Removing the handle and rubber feet



- 1 Pull up on the handle covers (two locations).**
- 2 Unfasten the M4 flat head screws (two locations) and remove the entire handle.**
- 3 Unfasten the screws and remove the four rubber feet.**

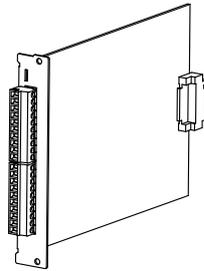
Load cable TL08-PFX

The dedicated load cable for connecting the PFX2511 and the DUT (battery). It makes easier for the connection, because the cable and the sensing cable are assembled.



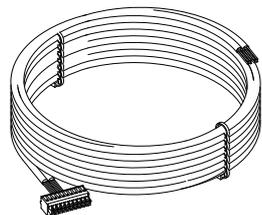
Volt / Thermometer Unit OP01-PFX

This is an expansion board for the measurement feature. By installing this board, you can expand the number of measurement points by four voltage and four temperature measurement points. There are three option board slots, so you can expand the number of measurement points by a maximum of 12 voltage and 12 temperature measurement points.



Sensing cable set TL09-PFX

This cable set consists of a dedicated voltage sensing cable and thermocouple for connecting the DUT (battery) to a PFX2511 in which a Volt / Thermometer Unit OP01-PFX is installed. This product supports four voltage and four temperature measurement points. Connectors are attached to these cables, so it is easy to connect them to the DUT and the PFX2511.



Voltage sensing cable



Thermocouple



2

Installation and Preparation

This chapter describes the procedures of unpacking and preparation of the PFX2511 before use .

Connecting the Power Cord



Possible electric shock.

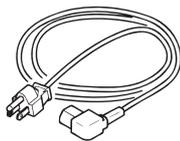
- The PFX2511 is an IEC Safety Class I equipment (equipment with a protective conductor terminal). Be sure to ground ground the product to prevent electric shock.
- The PFX2511 is grounded by the earth wire of the AC power cable. Connect the ground terminal to earth ground.

Connecting the power cord with a plug



- Use the supplied power cord to connect to an AC power line. If the supplied power cord cannot be used because the rated voltage or the plug shape is incompatible, have a qualified engineer replace it with an appropriate power cord that is 3 m or less in length. If obtaining an appropriate power cord is difficult, consult your Kikusui agent or distributor.
- A power cord with a plug can be used to disconnect the PFX2511 from the AC line in an emergency. Connect the plug to an easily accessible power outlet so that the plug can be removed from the outlet at any time. Be sure to provide adequate clearance around the power outlet.
- Do not use the supplied power cord for other devices.
- It may cause a damage of the test data or a malfunction of the product, please connect the power cable of each equipment to the same outlet.

The PFX2511 is designed as an equipment of IEC Overvoltage Category II (energy-consuming equipment supplied from the fixed installation).



Rated : 125 Vac/ 10 A
PLUG : NEMA5-15
[85-AA-0003]

Power cord for 100 V System
Length :Approx: 2.5 m



Rated : 250 Vac/ 10 A
PLUG : CEE7/7
[85-AA-0005]

Rated : 250 Vac/ 10 A
PLUG : GB1002
[85-10-0790]

Power cord for 200 V System
Length :Approx: 2.5 m

- 1 Confirm that the POWER switch of all connected equipments are turned off.**
- 2 Check whether or not the AC power line is compatible with the input rating of the PFX2511.**

The product can receive a nominal line voltage in the range of 100 Vac to 240 Vac at 50 Hz or 60 Hz.
- 3 The power cord of the all connected equipments should be connected with the AC INPUT inlet of a rear panel of each equipment.**

4 To ensure the safety charge and discharge testing, the power cord of the all connected equipments should be connected to the outlet with the same ground terminal.

Protect the malfunction in such case when the AC power line is shut down.

Connection to the switch board

To ensure the safety charge and discharge testing, the AC power line connected with other equipments should be wired to the same AC power line.



WARNING Possible electric shock.

- Turn off the circuit breaker of switchboard before connecting the cord.
- **Possible Fire.**
- Have a qualified engineer connect the power cord to the switchboard.
- The breaker of switchboard is required to meet following requirement.



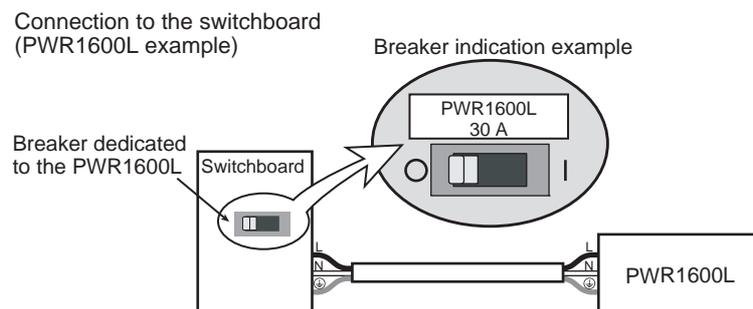
Inside the product, protective circuits including input fuses are connected to match the polarity of the input terminal. Make sure the colors of the wires connected to the corresponding input terminals (L, N, and \oplus (GND)) are correct.



Turn off the circuit breaker of switchboard to disconnect the PWR from the AC line in an emergency.

■ Circuit breaker of switchboard requirement

- Rated current: 30 A (The circuit breaker of which the rated current is more than 30 A is disabled for safety.)
- The breaker of the switch board should be assigned exclusively for the equipment used in the system.
- Keep the switchboard easily accessible at any time.
- It is required to indicate that the breaker is used exclusively for the equipment of the system and it separates the AC power supply line.



Connection and Setting of the Each Equipment

The following example is consisting of the Charge/ Discharge System Controller (PFX2511), DC power supply (PWR800L), the Electronic load (PLZ1004W), and the DUT (battery).

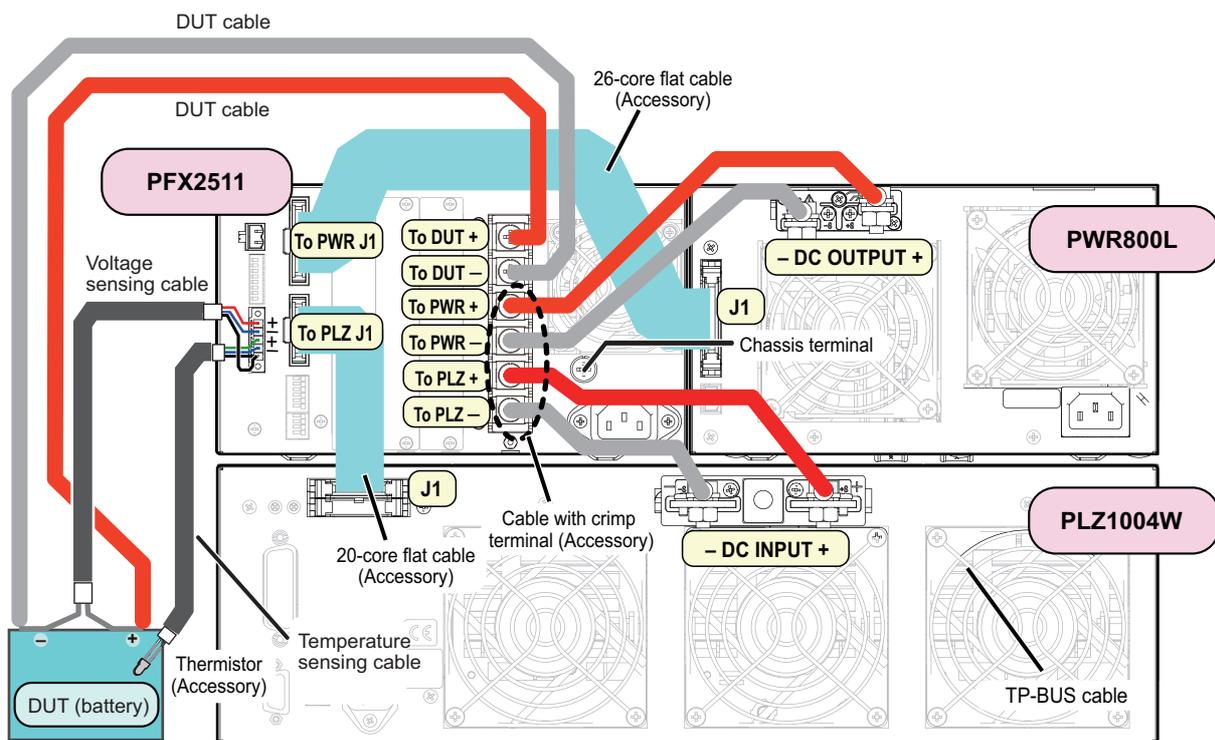
The direction of leading cables of input / output terminal board can be either right or left angle. However, wire the all the cables to become same directions as possible. Use the cable whichever it comes as standard accessory.

Please note the following for the stability of operation, the reduction of noise effect, and the prevention of the malfunction.

- Twist the cables between the equipments.
- Do not entwine or cross of the connected cables between the equipments.
- Do not entwine the cable with the flat cable which flows.

The following describes connecting procedure for the entire system. Please refer to the connection between each equipment.

⚠ WARNING Possible electric shock. It is not concerned of any sequence of the connecting equipments, however, the DUT (battery) must be connected at the final connection and it must be connected from the side of PFX2511.



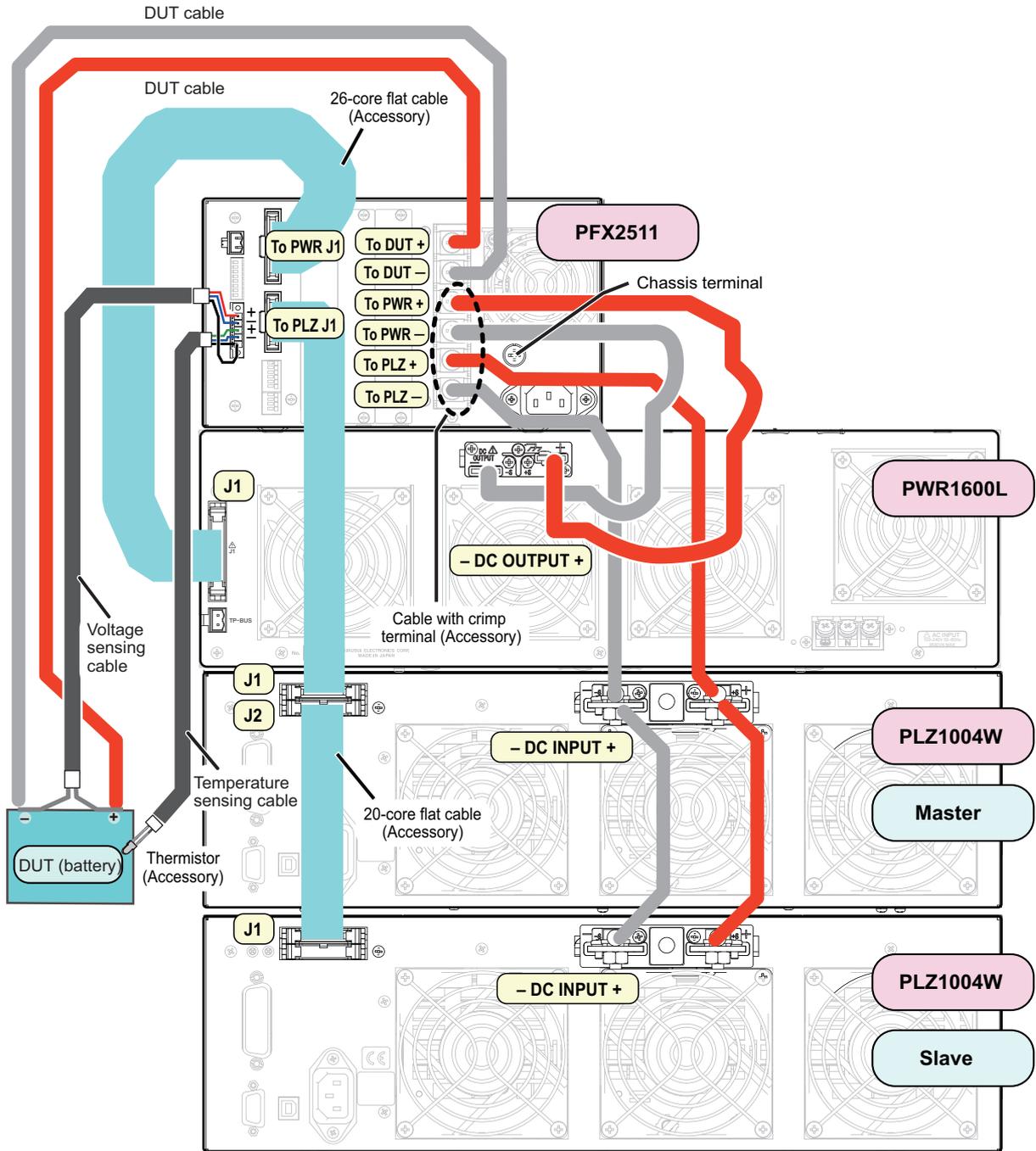
Example of connecting figure of the charge / discharge system with the DUT (battery)

■ Connection for the chassis terminal

The chassis terminal is used for an earthing terminal as multipurpose usage. It can be applied to the reduction of noise under the large current operation, and prevention of the malfunction. Even if the DUT cable come in contact with the chassis by any chance, it can prevent the electric shock accident. To secure the safety operation of the charge and discharge testing, it is recommended to earthing the chassis terminal.

For the ground cable of the chassis terminal, use the cable equivalent to the DUT cable or use the cable with higher capacity of rated current of the DUT cable.

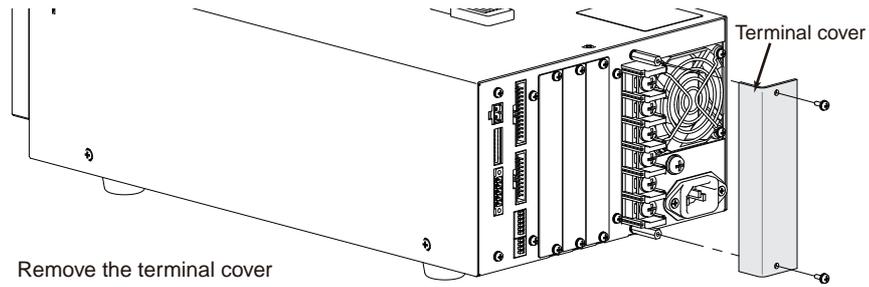
The following shows an example of system configuration which consist of 1set of the Charge/Discharge System Controller (PFX2511), 1 set the DC power supply (PWR1600L), and 2sets of the Electronic load (PLZ1004W) in parallel operation. As for the parallel operation of the Electronic load units (PLZ1004W), locate the master unit with a position nearest to the PFX2511.



Example of charge / discharge system by connecting two units of the PLZ1004W in master-slave

Connecting the each equipment

- 1 Confirm that the POWER switch of all connected equipments are turned off.
- 2 Remove the terminal cover attached to the input/output terminal board on the rear panel of the PFX2511.



Remove the terminal cover

See p. 27

3 Connect the PFX2511 to the DC power supply.

Use the cable with a crimp terminal which comes with the PFX2511 as a standard accessory.

See p. 29

4 Connect the PFX2511 to the Electronic load.

Use the cable with a crimp terminal which comes with the PFX2511 as a standard accessory.

See p. 32

5 Connect the PFX2511 to the Communication control unit PFX2121.

Use the Shielded wire with TP-BUS connector which comes with the PFX2511 as a standard accessory.

See p. 35

6 If you want to use BPChecker2000, connect to the PC through the PFX2121.

Use the USB cable that comes with the PFX2121 to connect it to the PC.

Set the each equipments

See p. 37

1 Set the DC power supply

Set the protection function, then switch to the operation state in the external analog control.

See p. 38

2 Set the Electronic load.

Set the protection function, then switch to the operation state in the external analog control.

See p. 41

3 Set the state of S1 switch.

Connecting the DUT (Battery)

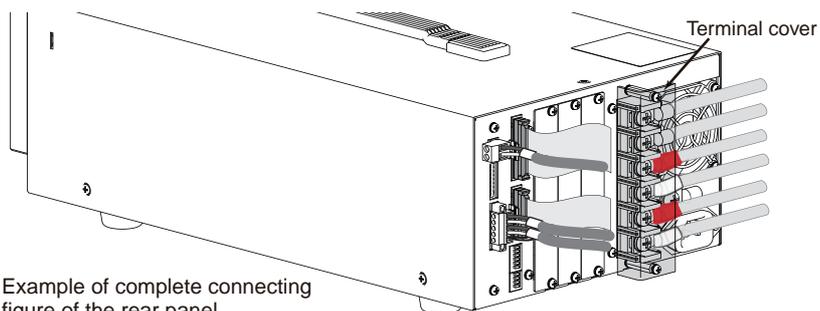
See p. 44

1 Connect the DUT (Battery) with the PFX2511.

Use the DUT cable, the voltage sensing cable, and the temperature sensing cable.

2 When all of the connection between equipment are completed, attach the terminal cover on the input/output terminal board.

Attach the terminal cover along with the direction of wiring cables.



Example of complete connecting figure of the rear panel

Connecting with the DC Power Supply

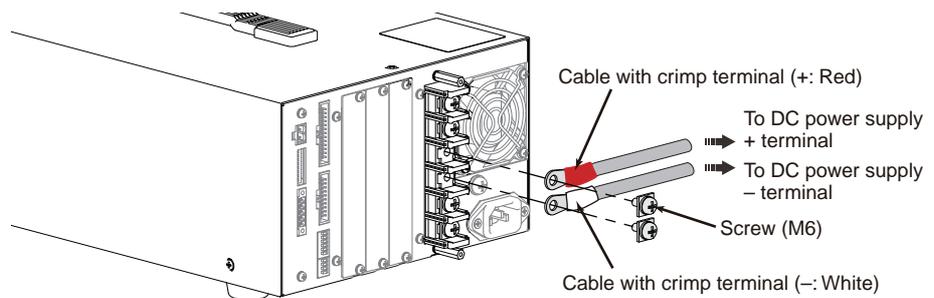
Connect the PFX2511 to the DC power supply using the cable with the crimp terminal and the 26-core flat cable.

The following procedure refers to the case of connecting Kikusui's Regulated DC power supply PWR800L.

Connecting the cable with the crimp terminal

- 1 Confirm that the POWER switch of all connected equipments are turned off.**
- 2 Connect the cable with the crimp terminal to the DC PS + and the DC PS- on the input/output terminal of the PFX2511. The crimp terminal (M6) with a red cap is connected to the DC PS + terminal, and the crimp terminal (M6) with a white cap is connected to the DC PS - terminal.**

Pull out the cable in horizontal angle and fix it by screws.



- 3 Remove the chassis wire when it is connected the output terminal of the DC power supply.**

The output of the DC power supply is used as floating.

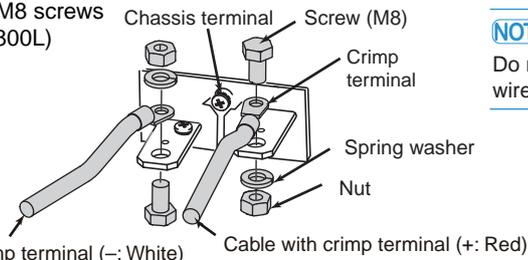
- 4 Connect the other end of the cable with the crimp terminal to the output terminal on the rear panel of the DC power supply. The crimp terminal (M8) with a red cap is connected to the DC OUTPUT + terminal, and the crimp terminal (M8) with a white cap is connected to the DC OUTPUT -terminal.**

Follow the figure for the direction of the screw. If the screw are not mounted correctly, the OUTPUT terminal cover may not be attached properly.

★ Memo

To prevent short circuits, this has been designed to operate in a completely floating condition.

Connection using M8 screws
(Example of PWR800L)



NOTE

Do not connect the chassis wire to the chassis terminal.

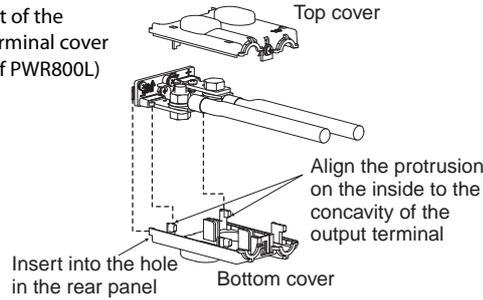
Open PWR series
PAS series

- 5 Insert the hook of the bottom cover into the hole located above and to the left of the output terminal of DC power supply.**
- 6 Align the hook of the bottom cover to the groove located to the side of the output terminal.**

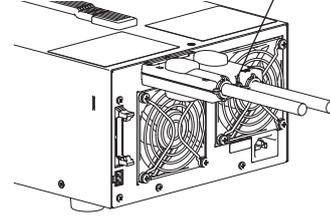
7 Fix them in place using the screws.

Check that the screws are securely fastened.

Attachment of the OUTPUT terminal cover (Example of PWR800L)



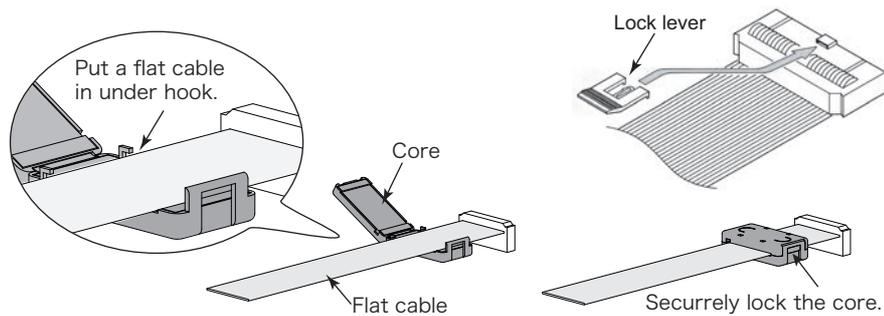
Align the top and bottom parts of the terminal cover and screw them in place.



Connecting the flat cable

1 Attach the lock lever and core to the 26-core flat cable. (those items come with the PFX2511 as standard accessories)

If the lock lever is not attached, the connector may come off.



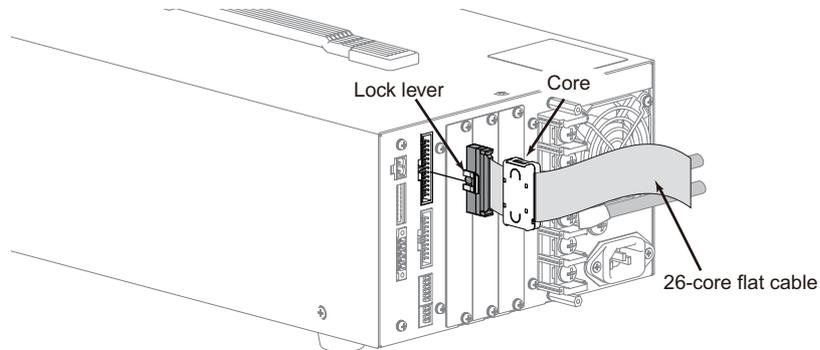
2 Confirm that the POWER switch of all connected equipments are turned off.

3 Insert the 26-core flat cable to the "DC POWER SUPPLY" connector on the rear panel of PFX2511.

Insert the end with a core into the PFX2511. Confirm that the lock lever is pulled down and it is firmly connected.

★ Memo

If you reverse the cable ends, it will not work.



4 Insert the other end of the 26-core flat cable to the "J1" connector on the DC POWER SUPPLY.

Confirm that the lock lever is pulled down and it is firmly connected.

Connecting with the Electronic Load

Connect the PFX2511 to the Electronic load using the cable with the crimp terminal and the 20-core flat cable.

The following procedure refers to the case of connecting Kikusui's Electronic load PLZ1004W.

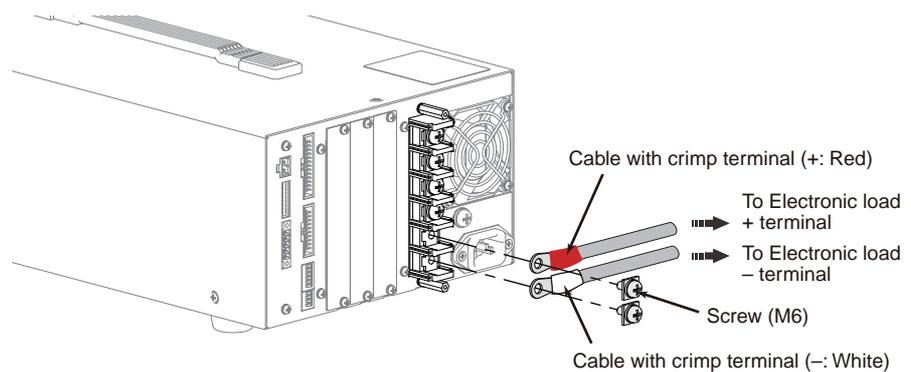
2

Installation and Preparation

Connecting the cable with the crimp terminal

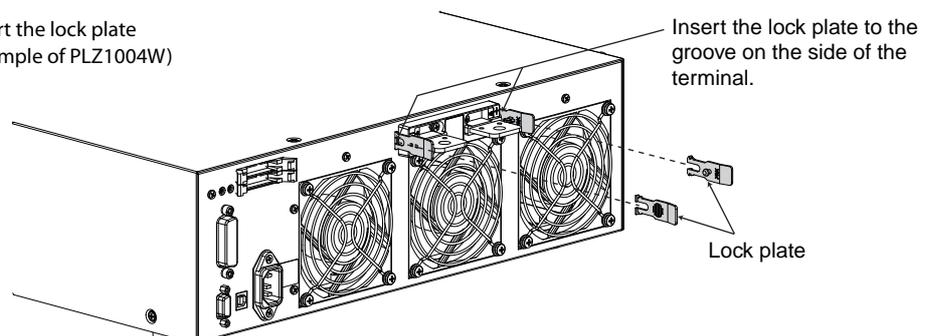
- 1 Confirm that the POWER switch of all connected equipments are turned off.**
- 2 Connect the cable with the crimp terminal to the DC EL + and the DC EL - on the input/output terminal of the PFX2511. The crimp terminal (M6) with a red cap is connected to the DC EL + terminal, and the crimp terminal (M6) with a white cap is connected to the DC EL - terminal.**

Pull out the cable in horizontal angle and fix it by screws.



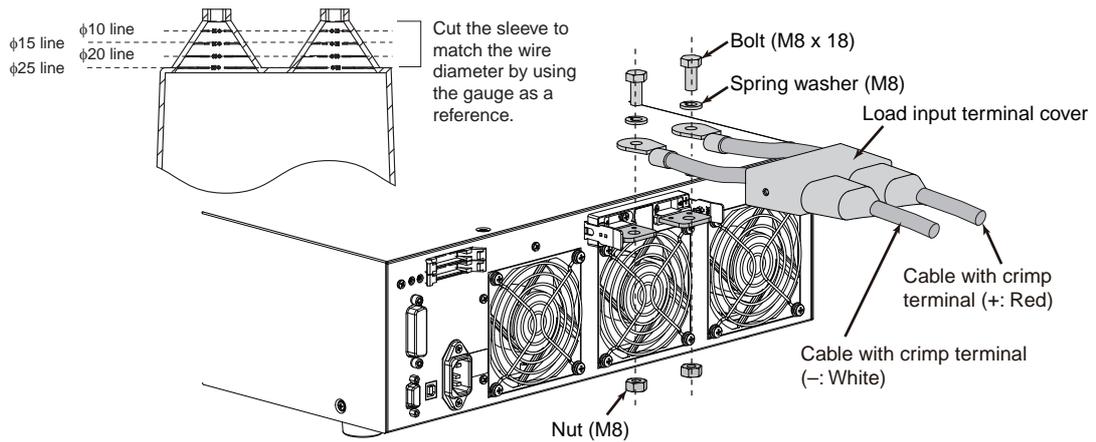
- 3 Insert the lock plate as included as an accessory to the both side of the load input terminal on the rear panel of PLZ-4W series.**

Insert the lock plate
(Example of PLZ1004W)



- 4 Insert the other end of cable with crimp to the load input terminal cover which comes with a standard accessory of the PLZ-4W series.**

Cut the sleeve of the load input terminal cover for the appropriate size that the cable with the crimp can go through its terminal cover.



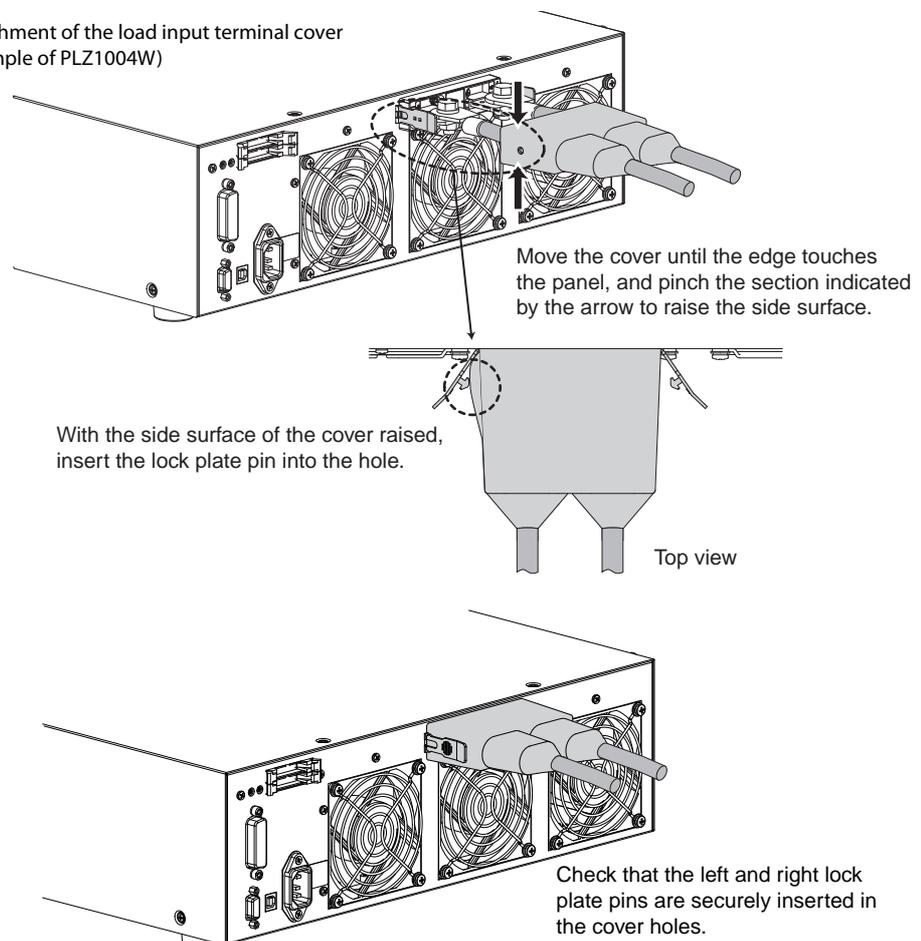
Using the load input terminal cover (Example of PLZ1004W)

- 5** Connect the other end of the cable with the crimp terminal to the output terminal on the rear panel of the PLZ-4W series. The crimp terminal (M8) with a red cap is connected to the DC INPUT + terminal, and the crimp terminal (M8) with a white cap is connected to the DC INPUT -terminal.

Use the bolt and the nut which comes with a standard accessory of the PLZ-4W series. Connect the cable against the input terminal in horizontal angle as possible.

- 6** Attach the load input terminal cover to the rear pane of the PLZ-4W series using the lock plate. Fix the pin located inside of the lock plate through the hole on the cover side.

Attachment of the load input terminal cover (Example of PLZ1004W)



Connecting the flat cable

See p. 28

★ Memo

If you reverse the cable ends, it will not work.

1 Attach the lock lever and core to the 20-core flat cable. (those items come with the PFX2511 as standard accessories)

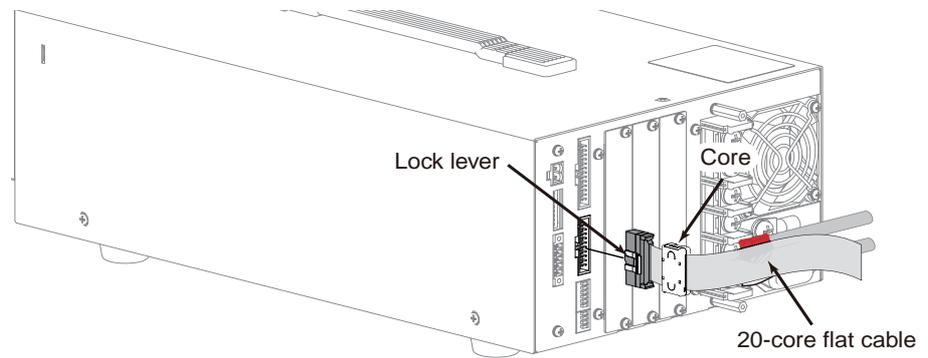
If the lock lever is not attached, the connector may come off.

2 Confirm that the POWER switch of all connected equipments are turned off.

3 Insert the 20-core flat cable to the "DC ELECTRONIC LOAD" connector on the rear panel of PFX2511.

Insert the end with a core into the PFX2511.

Confirm that the lock lever is pulled down and it is firmly connected.



4 Insert the other end of the 20-core flat cable to the "J1" connector on the PLZ-4W series.

Confirm that the lock lever is pulled down and it is firmly connected.

2

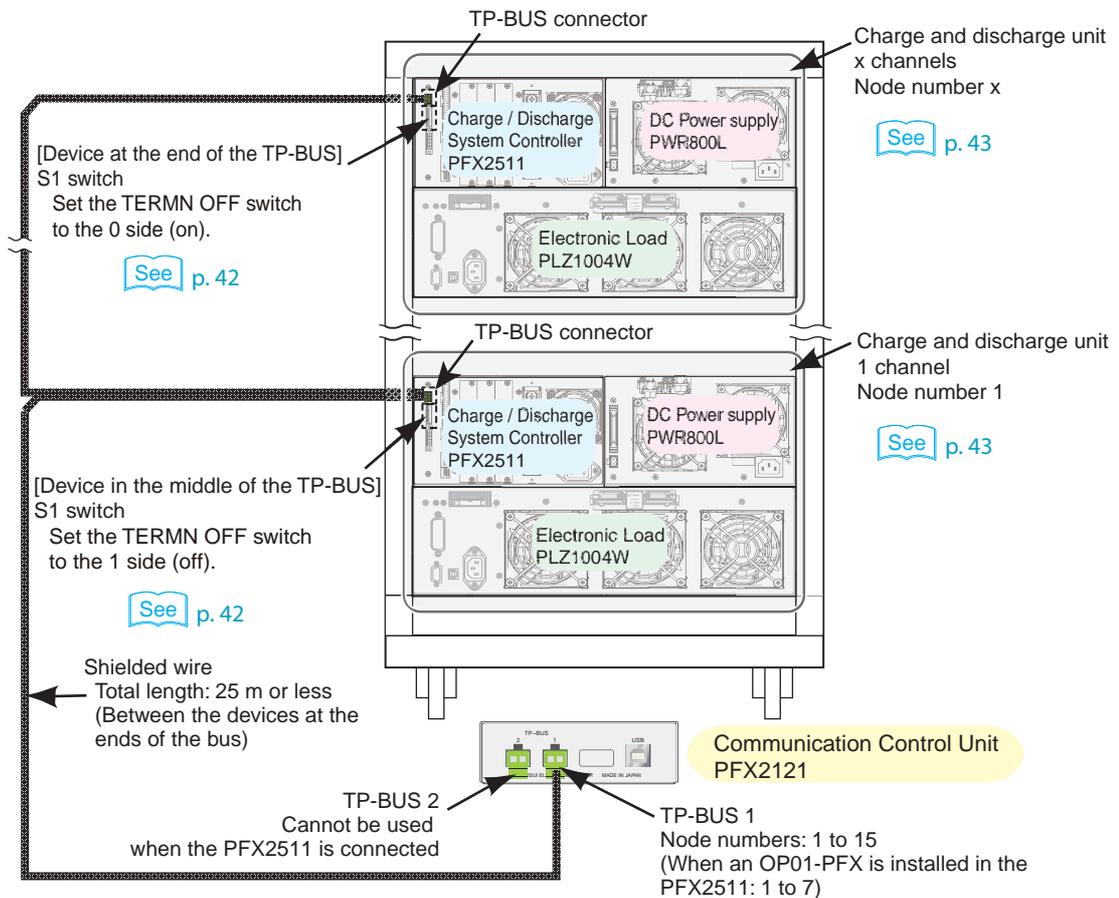
Installation and Preparation

Using BPChecker2000 to Control the PFX2511

To use BPChecker2000 to control a charge/discharge system, connect the system to the PC through the PFX2121 (sold separately). Connect the PFX2511 and the PFX2121 through a TP-BUS.

Connection of the PFX2121 communication control unit

Connection example of the charge and discharge unit (PFX2511+PWR800L+PLZ1004W) and the PFX2121 control unit



The PFX2121 has two TP-BUSes, but when you are using it together with the PFX2511, only TP-BUS 1 can be used. You can connect up to 15 channels (7 channels when the OP01-PFX is installed in the PFX2511) of charge and discharge units to the PFX2121.

Assign a unique address and termination to each unit that you connect. This unique address is called the node number.

If there is a large distance between the PC and the charge/discharge system, extend the TP-BUS, and install the PFX2121 close to the PC. To ensure the reliability of the system, do not carelessly separate the PC and the PFX2121 so that they are far apart. We recommend that you use the USB cable that is included with the PFX2121 to connect it to the PC.

★ Memo

Assign unique node numbers that correspond to the channels on the charge and discharge unit.

See p. 42, p. 43

1 Connect the TP-BUS connector on the rear panel of the PFX2511 to the TP-BUS1 connector on the front panel of the PFX2121.

Use the included shielded wire with TP-BUS connector or the TP-BUS connector that comes with the PFX2121 and a shielded wire to chain the devices together.

2 Using the S1 switch, assign a unique address and termination to each unit that you connect.

NOTE

The PFX2121 Communication Control Unit is a dedicated controller of the PFX2000 series and the PFX2511. You cannot use it to control other Kikusui devices that have TP-BUS interfaces.

TP-BUS connector wiring

CAUTION

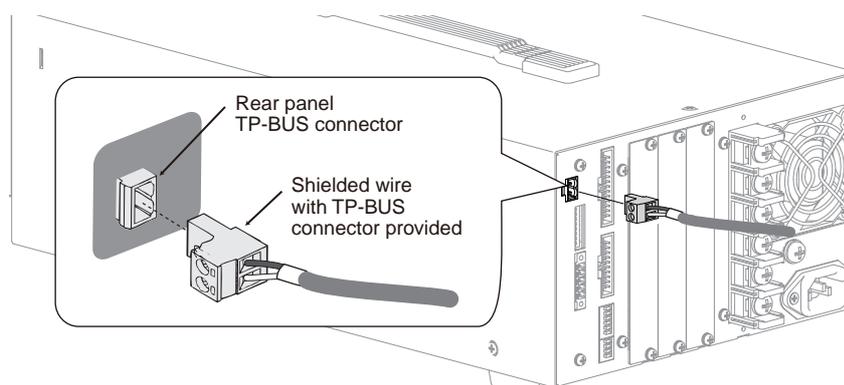
The TP-BUS connector can be connected or disconnected even when the power of equipments are turned on, however, do not connect or disconnect the TP-BUS connector when the charge / discharge test is being executed. It may cause the damage of the test data and malfunction of the system.

NOTE

- Connect the PFX2121 so that it is at the end of the TP-BUS. The PFX2121 does not have a TERMN OFF switch and the termination is always on. Therefore, it must be connected to the end of the TP-BUS. For details, See "Setting the TP-BUS termination" on page 42.
- Allow extra length of cable between devices.

1 Confirm that the POWER switch of all connected equipments are turned off.

2 Insert the shielded wire with TP-BUS connector to the TP-BUS connector on the rear panel for the PFX2511.



3 Connect the other end of the shielded wire with TP-BUS connector to the TP-BUS1 connector on the front panel of the PFX2121.

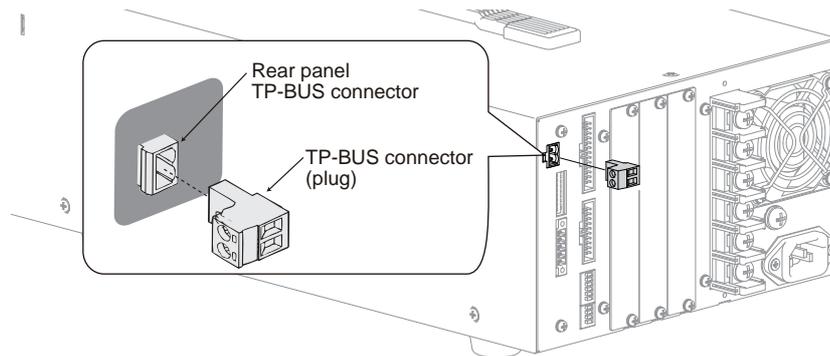
When the distance between the PFX2511 and the PFX2121 for more than 1 meter, or connecting the multiple number of the system, wire for the TPBUS connector in accordance with the following procedure.

■ **Wires and tools required for connection**

Wires	Model: CMX/ 2464-1061/ 2A-SB LF AWG24 2CORE, 25 m or less Manufacture: Taiyo Cabletec Corporation
Flat-blade screwdriver	Axis diameter : $\phi 3$, End width : 2.6 mm
Wire stripper	Wire stripper suitable for the wires described above.

1 Insert the TP-BUS connector (plug) to the TP-BUS connector on the rear panel for the PFX2511.

The connecting wires can be done easily by fixing the TP-BUS connector plug.



2 Use a wire stripper to remove the covering from the wires.

Remove 10 mm of the covering. Use the strip gauge that is indicated on the rear panel of the unit or the strip gauge of Fig.



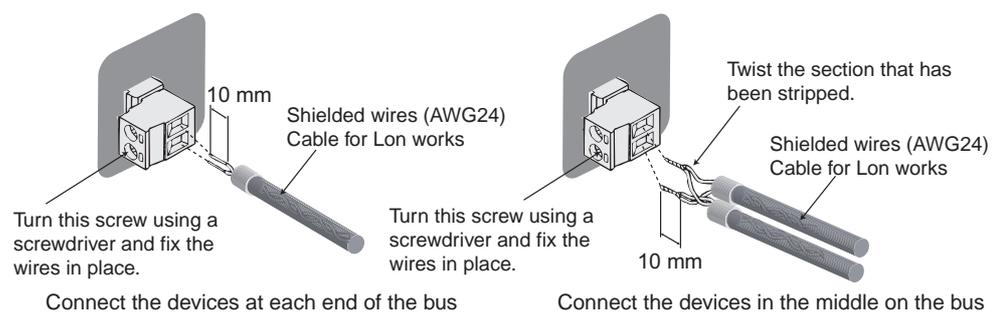
3 Insert the wire to the TP-BUS connector plug.

TP-BUS has no polarity. You do not have to match the polarities between units.

4 Use the screwdriver to turn the connector screw and fix the wires in place.

Check that the wires do not come loose.

5 Connect the other TP-BUS connectors in a similar fashion.



- ⚠ CAUTION**
- Check that the wires are not short-circuited. Communication is not possible.
 - Check that the conducting sections of the wires are not touching the chassis. It may cause to burn out the PFX2511 and other connecting equipments.

Connection of the communication control unit PFX2121 and the PC

2

Connecting the USB cable

The Communication control unit PFX2121 and the personal computer (PC) are connected via the USB.

The PFX2121 is a high-powered device that operates by receiving power (5 V, 300 mA) from the USB. Connect the PFX2121 directly to the USB port on the PC (recommended) or through a self-powered USB hub to the PC. You cannot use a bus-powered USB hub.

Attaching the USB cable core

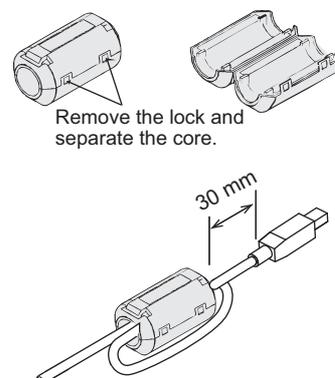
1 Unlock the snap-on core and open to split.

2 Wrap the USB cable once around one of the core halves.

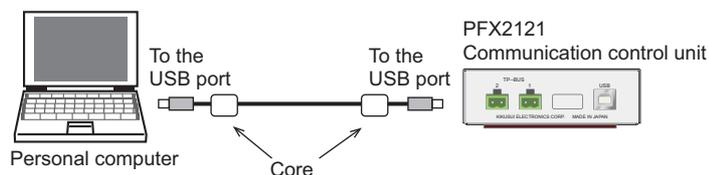
Wrap the wire so that the distance between the core and the connector is within 30 mm.

3 Close the core keeping the USB cable from being wedged in between.

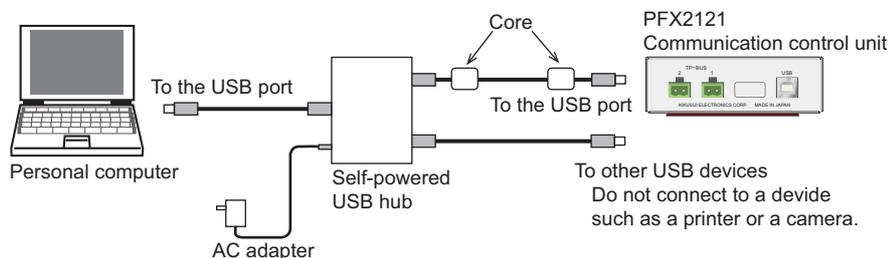
Check that the core is securely locked.



■ Connecting the USB cable between the Communication control unit PFX2121 and the PC



■ Connect the USB cable through the USB hub



USB driver for PFX2121



A dedicated USB driver must be installed in the PC for the PC to identify the PFX2121 on the USB. The driver software is included in the BPChecker2000.

Setting the instrument ID

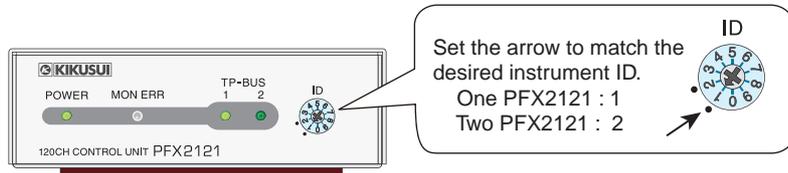
If the PC has multiple USB ports or if you are using a self-powered USB hub, you can connect up to two PFX2121 on a single USB. In this case, you must set a different ID to each PFX2121 so that the PC can identify the two PFX2121. This ID is called instrument ID.

Use the ID switch on the front panel of the control unit to set the instrument ID to 1 or 2.

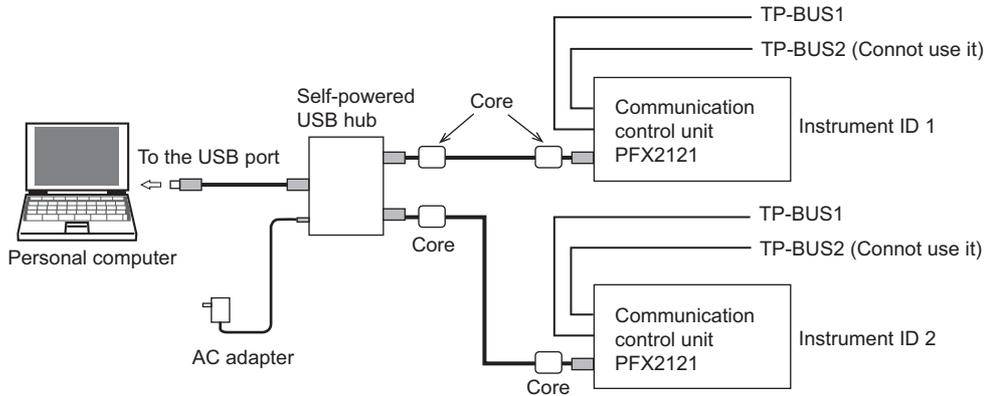
NOTE

Set the instrument ID to "1" when 1 unit of the PFX2121 is used.

When using the PFX2121, the example of the one



Example of connection for two units of the PFX2121



Setting the DC Power Supply

Set the protection function to protect the DUT (battery) and the connected equipments.
Set the external analog control to control the PFX2511.

 PWR series
PAS series

It is recommended to set the lock function when all the settings are completed. It prevents from being changed of setting by the operational error.

1 Set the PWR series, to the factory default settings. Turn on the POWER switch while keep pushing the SHIFT key.

The contents of stored memory is cleared.

You cannot reset the PAS series to the factory default settings. Carry out the settings from step 2.

2 Set the protection functions.

If the factory setting were applicable, you don't need to set the protection functions.

3 Set the external analog control.

4 When the LOCK switch of the DC power supply is pressed, the LOCK switch illuminates and it locks the panel operation.

Press the LOCK switch again to release the panel lock.

NOTE

- Even when the panel operation is locked, the key operation for the output on / off is enable to function. Please note that if the output on/off operation is conducted during the charge and discharge testing, it activates the alarm function and stop the testing.
- Adjustment is not required for connecting the equipments.

Setting the protection functions

If the unit of the DC power supply is set as the factory default settings, it is not necessary to set the protection function.

Especially, when the DUT is concerned the safety as a matter of high priority or the charge and discharge test is conducted with a risk, the level of safety can be improved by the setting of protection functions.

Model	Over voltage protection (OVP)	Over current protection (OCP)
PWR series	110 % of the maximum charge voltage	105 % of the maximum charge current
PAS series	110 % of the maximum charge voltage	110 % of the maximum charge current

 See p. 54

When the OVP or the OCP of the DC power supply activates while the charge and discharge testing is executed, it becomes the state of the PS/B alarm by the PFX2511 and it turns off the output. Please turn off the POWER switch of the DC power supply once, and remove the cause of the alarm. After releasing the alarm of the DC power supply, turn on the POWER switch of the DC power supply and release the alarm from the application software BPChecker2000.

For details of setting procedure such as setting and releasing the alarm when the protection function is activated, please refer to the operation manual of the PWR series or PAS series, "Basic operation".

Setting the external analog control

Set the item concerning the external analog control to the following condition by using the CONFIG setting.

Model	CV control source settings	CC control source settings	External control logic setting of the output on/off
PWR series	External voltage control (C-1:1)	External voltage control (C-2:1)	Turn the output on with a low signal (C-6:1)
PAS series	External voltage control (DIGIT A:1)	External voltage control (DIGIT B:1)	Turn the output on with a low signal (DIGIT F:1)

For detailed setting procedure, refer to the chapter "Basic operation" of the operation manual of PWR series or PAS series.

Setting the Electronic load

Set the protection function to protect the DUT (battery) and the connected equipments.

When the Electronic load is connected in parallel operation, assign the master unit and the slave unit.

Set the external analog control to control the PFX2511.



It is recommended to set the lock function when all the settings are completed. It prevents from being changed of setting by the operational error.

1 Set the PLZ-4W series, to the factory default settings. Turn on the POWER switch while keep pushing the ENTER key.

The contents of stored memory is cleared.

2 Set the protection functions.

If the factory setting were applicable, you don't need to set the protection functions.

3 When the PLZ-4W series is connected in parallel (maximum discharge power : 2 kW), assign the master unit and the slave unit.

4 Set the external analog control.

5 Set the slew rate.

6 When the LOCK (SHIFT + LOCAL) key of the PLZ-4W series is pressed, the key icon will be displayed and the panel operation becomes disabled.

Press the LOCK (SHIFT + LOCAL) key again to release the panel lock. Keep pressing down the key for few seconds until the beep sound comes out. The key icon clears, and the lock is released.

NOTE

- Even when the panel operation is locked, the key operation for the output on/off is enable to function. It may cause the damage of the test data if the operation of output on/off is conducted during the charge and discharge testing.
- Adjustment is not required for connecting the equipments.

Setting the protection functions

If the unit of the PLZ-4W series is set as the factory default settings, it is not necessary to set the protection function.

Especially, when the DUT is concerned the safety as a matter of high priority or the charge and discharge test is conducted with a risk, the level of safety can be improved by the setting of protection functions.

- Over Current protection (OCP) : 105 % of the maximum discharge current

 p. 54

When the OCP or the others alarm of the PLZ-4W series activates while the charge and discharge testing is executed, it becomes the state of the CD/B alarm by the PFX2511 and the load is turned off. Press the ENTER key of the PLZ-4W series, and remove the cause of alarm occurrence. Then after releasing the alarm of the PLZ-4W series, release the alarm from the application software BPChecker2000.

For details of setting procedure such as setting and releasing the alarm when the protection function is activated, please refer to the operation manual of the PLZ-4W series, "Basic operation".

Specifying the master unit and slave units of the parallel operation

1 By the setting menu concerning to the master slave parallel operation, set the following conditions respectively.

- Master unit Menu > Configuration > Master/Slave > Operation : Master
- Slave unit Menu > Configuration > Master/Slave > Operation : Slave

2 On the master unit, specify the connecting number of slave units.

- Two units Menu > Configuration > Master/Slave > Parallel : 2

NOTE

In Menu setting, power cycle the PLZ-4W after finishing the menu setup. The new setting is confirmed by power cycling the PLZ-4W.

For detailed setting procedure, refer to the chapter "Basic operation" and "Applied operation" of the operation manual of PLZ-4W series.

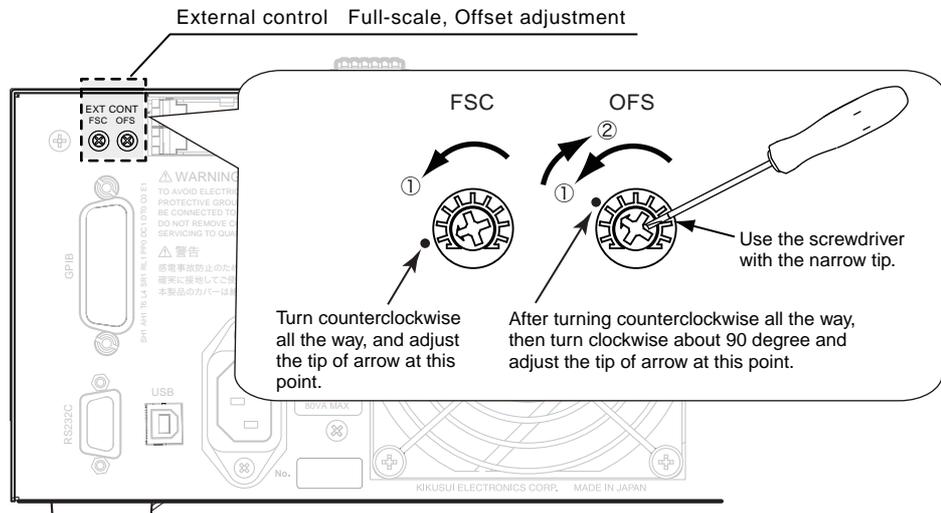
Setting the external analog control

1 Set the item concerning the external analog control to the following condition by using the Menu setting.

- Response Menu > Setup > Response : 1/2
- External voltage control Menu > Configuration > External > Control : V
- External control logic setting Menu > Configuration > External > LoadOn IN : LOW

2 Set the EXT CONT on the rear panel. For the FSC adjustment, turn it anti-clockwise all the way, and for the OFS adjustment, turn it anti-clockwise all the way, then turn it back about 90 degree in clockwise.

Adjust the full-scale and the offset against the input value of the external control source (voltage or resistance).



For detailed setting procedure, refer to the chapter "Basic operation" and "Applied operation" of the operation manual of PLZ-4W series.

NOTE

In Menu setting, power cycle the PLZ-4W after finishing the menu setup. The new setting is confirmed by power cycling the PLZ-4W.

Setting the slew rate

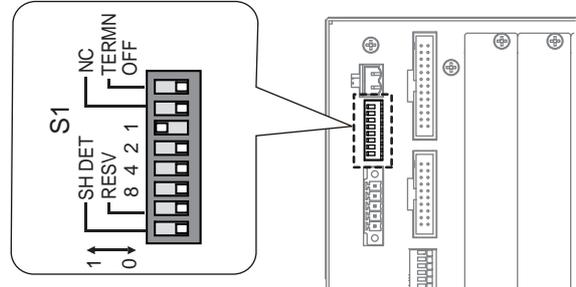
For the press the SLEW RATE key, turn the rotary knob to set the slew rate value to 16.000 A/μs (MAX value).

You can press the rotary knob to switch between coarse adjustment and fine adjustment.

Setting the PFX2511

The following settings can be done by the S1 switch on the rear panel. If you changed the settings, turn on the power of the PFX2511 again.

- TP-BUS termination
- Node number
- The vibration sensor



Switch position status of factory default

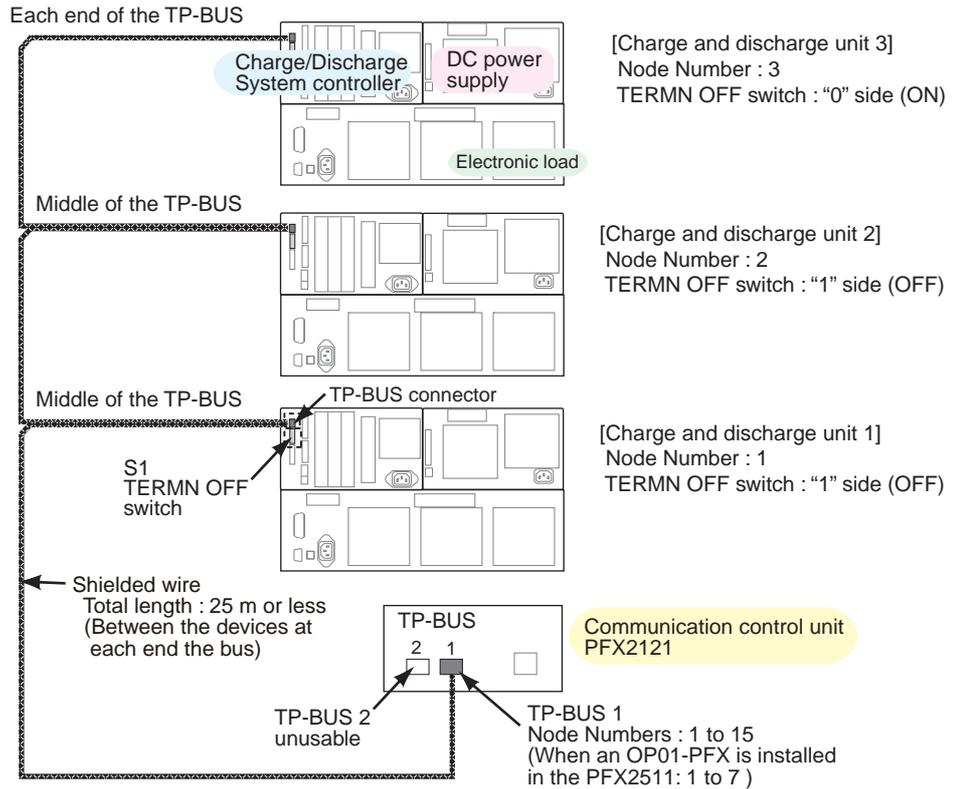
Signal name	Logic	Notes	Factory default
TERMN OFF	0: TERMN ON 1: TERMN OFF	TP-BUS termination	0
NC	Unused	Always set at 0	0
1	Set the TP-BUS address	–	1
2	Set the Node number (1 to 15)	–	0
4	(1 to 7 when an OP01-PFX is installed)	–	0
8	It can not be set for 0	–	0
RESV	Unused	Always set at 0	0
SH DET	0: The vibration sensor OFF 1: The vibration sensor ON	–	0

Setting the TP-BUS termination

NOTE

If the TERMN OFF switch is not set properly. Communications become unstable and erroneous operation may result.

Setting example for the 3 channels of charge and discharge unit connected with the PFX2121 by the TP-BUS termination



It is necessary to set the termination for the equipment connected with the TP-BUS.

Set the TERMN OFF switch as follows depends on the connecting position.

Set the TERMN OFF switch to the "0" (ON) position for the equipment in the end of the TP-BUS line that is not on the side of PFX2121, and set the TERMN OFF switch to the "1" (OFF) position for rest of other equipments.

There is no TERMN OFF switch on the PFX2121. This is because the PFX2121 is designed on the assumption that it be connected to the end of the TP-BUS. The internal termination of the control unit is always on.

TP-BUS location	TERMN OFF Switch	Termination
At the end	0	ON (Factory default)
In the middle	1	OFF

Setting the node number

 p. 41 , p. 42

Assign the specific address called the node number to the connected PFX2511 on the TP-BUS. Specify a different value for each channel of the charge and discharge unit.

Connect the PFX2511 to the TP-BUS1 connector of the PFX2121.

PFX2121 Connector	The valid node number	
		When an optional OP01-PFX is installed
TP-BUS 1	1 to 15	1 to 7
TP-BUS 2	Unusable	Unusable

Setting the vibration sensor

The vibration sensor is installed for the PFX2511.

The sensitivity of the variation sensor is fixed. When the vibration sensor is turned on, and detects the big shake (5 or more in the seismic intensity) or the impact, the SHOCK DETECT alarm activates and it turns off the output.

To releasing the alarm when the vibration sensor is activated, it is executed by the application software BPChecker2000.

SH DET switch	Vibration sensor
0	OFF (Factory default)
1	ON

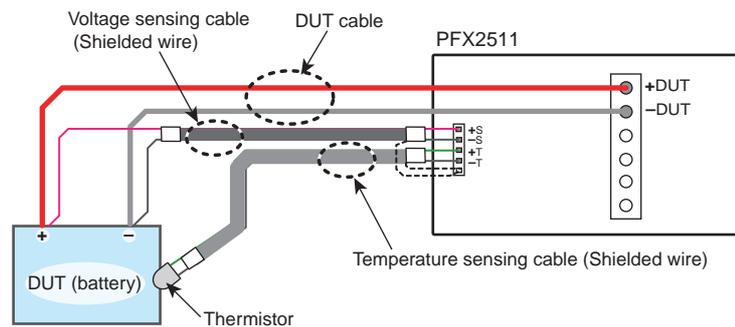
NOTE

- The vibration sensor is concerned not to react the single shot of impact (such as hit the equipment), however, it detects the vibration and impacts other than the earthquake, and it is possible to interrupt the testing. Please pay attention when you set the vibration sensor to be turned on (position to the "1" side).
- If you want to set the vibration sensor to on (set the switch to 1), install the PFX2511 as upright as possible in a location without vibration or the like. If the installation is inappropriate, the SHOCK DETECT alarm may be activated preventing you from performing tests.

Preparation of the DUT (battery) Connection

Standard accessories of the PFX2511 does not include the cable*1 for connecting to the DUT (battery). Prepare the cable applied to description of the DUT (battery).

- DUT cable The cable used for the charge / discharge current between the PFX2511 and the DUT(battery).
- Voltage sensing cable The cable used for sensing of the electro voltage of the DUT (battery).
- Temperature sensing cable The cable used for sensing of the temperature of the DUT (battery).



Example of the connecting configuration of the PFX2511 and the DUT (battery)

Wires and tools required for connection

Wires	DUT cables (stranded wire)	See "Nominal cross-sectional area of cables and allowable currents (reference)" (p. 45)
	Sensing cable	0.20 mm ² (AWG24) to 0.52 mm ² (AWG20), Shielded wire
Flat-blade screwdriver		Axis diameter : $\phi 3$, End width : 2.6 mm
Wire stripper		Wire stripper suitable for the wires described above.

*1. The dedicated load cable (TL08-PFX) is available as an optional item for connecting between the PFX2511 and the DUT (battery). (See p. 20)

Making the DUT cable

- 1 Refer to the following table, select the cable.
- 2 Attach the crimp terminal of M6 to the cable end connecting to the PFX2511.

CAUTION

When the DUT is exposed under the high temperature such as using a temperature chamber, please pay attention for the allowable temperature of the DUT cable. If the temperature of heat resistant of the DUT cable is not sufficient, the DUT may get into the condition of danger caused by the insufficient insulation and increasing the contact resistance.

NOTE

- The length of the cable can be extended up to 5 m. If any longer length of the cable is used, the constant current control may become unstable and it may effect to the accurate capacity measurement.
- To prevent erroneous wiring, change a color of the cable or the crimp terminal to verify the positive (+) pole and the negative (-) pole easily.

Nominal cross-sectional area of cables and allowable currents (reference)

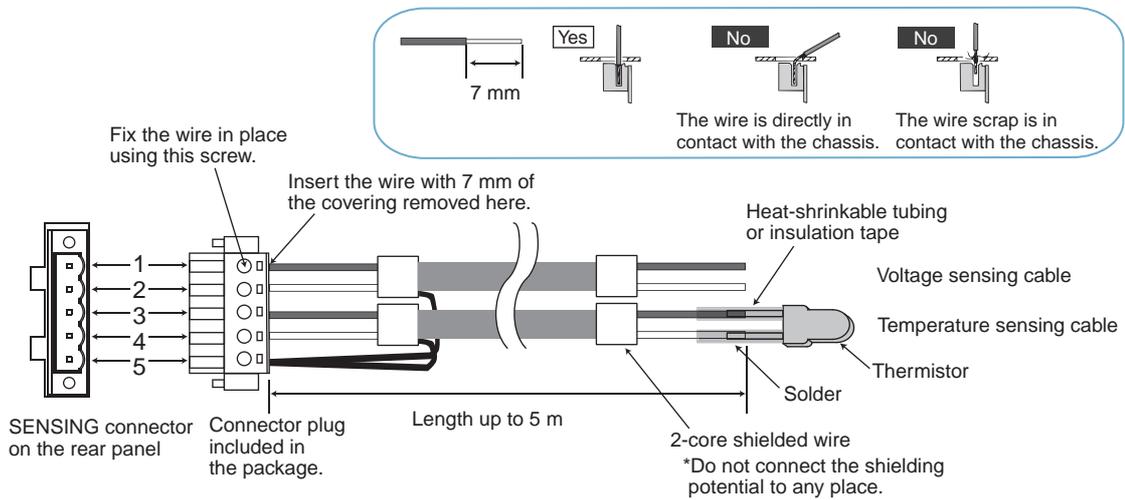
Nominal cross-sectional area [mm ²]	AWG	(Reference cross-sectional area) [mm ²]	Allowable current* ¹ [A] (Ta = 30 °C)	Current recommended by Kikusui [A]
2	14	(2.08)	27	10
3.5	12	(3.31)	37	-
5.5	10	(5.26)	49	20
8	8	(8.37)	61	30
14	6	(13.3)	88	50
22	4	(21.15)	115	80
30	2	(33.62)	139	-
38	1	(42.41)	162	100
50	1/0	(53.49)	190	-
60	2/0	(67.43)	217	-
80	3/0	(85.01)	257	200
100	4/0	(107.2)	298	-
125	-	-	344	-
150	-	-	395	300
200	-	-	469	-

*1. Excerpts from Japanese laws related to electrical equipment.

Making the sensing cable

Pin No.	Symbol	Description
1	+ S	Positive voltage terminal. Connect to the positive terminal of the DUT (battery).
2	- S	Negative voltage terminal. Connect to the negative terminal of the DUT (battery).
3	+ T	Temperature measurement terminal. Connect to the thermistor that comes with the package.
4	- T	Temperature measurement terminal. Connect to the thermistor that comes with the package.
5	FG	Shield grounding terminal. It is connected to the chassis of the PFX2511. Do not connect the shielding potential to any part of the DUT (battery).

1 Assemble the sensing cable using the wire of size for AWG 24 to 20 (0.20 mm² to 0.52 mm²).

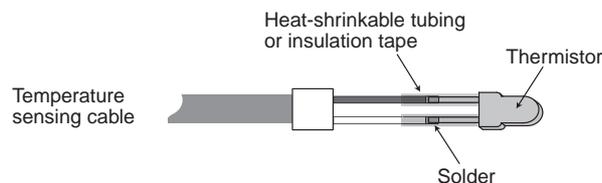


2 Solder the thermistor lead to the tip of the temperature sensing cable.

As a guideline, the time for soldering the thermistor included in the package should be less than 7 seconds at the position at least 5 mm away from the root of the lead using a soldering iron (50 W) at 340 °C.

There is no polarity on the thermistor.

Be sure to insulate the thermistor lead such as by using an heat-shrinkable tubing.



Connecting the DUT (battery)



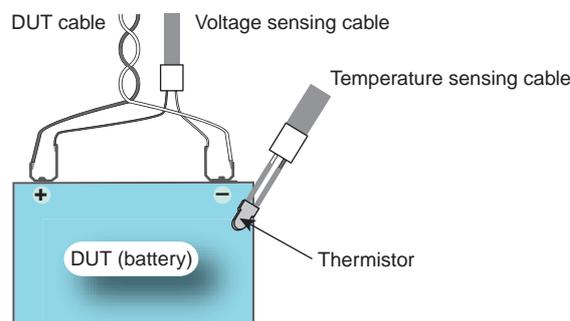
Possible electric shock.

- After connecting the devices, connect the PFX2511 to the DUT (battery). Connect the PFX2511 side first.
- When installing the fuse between the PFX2511 and the DUT (battery), make sure that the POWER switch is turned off and unplug the AC power cable from the outlet.

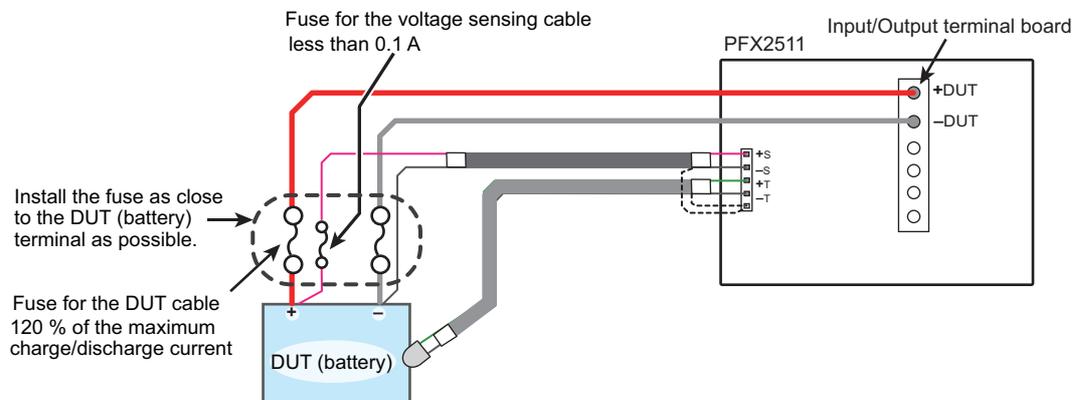


Please secure to wire the voltage sensing cable.

Unless otherwise, the operation can not be performed properly without connecting the voltage sensing cable. Connect the voltage sensing cable nearest to the terminal of the DUT (battery). If the charge and discharge test is conducted without connecting the voltage sensing cable, there is a danger and it may cause to damage the DUT (battery).



It is recommended to install fuses between the PFX2511 and the DUT (battery) to prevent short-circuiting of the DUT cable or the voltage sensing cable and to secure the connection. Install the fuse as close to the DUT (battery) terminal as possible.



Example for the installation of fuse between the PFX2511 and the DUT (battery)

- Rating of the fuses for the DUT cables 120 % of the maximum charge / discharge current
- Rating of the fuse for the voltage sensing cable less than 0.1 A



- A fuse blowing may lead to explosions or fire. Be sure to put a cover on the fuse.
- Use DC fuses that have sufficient breaking capacity.

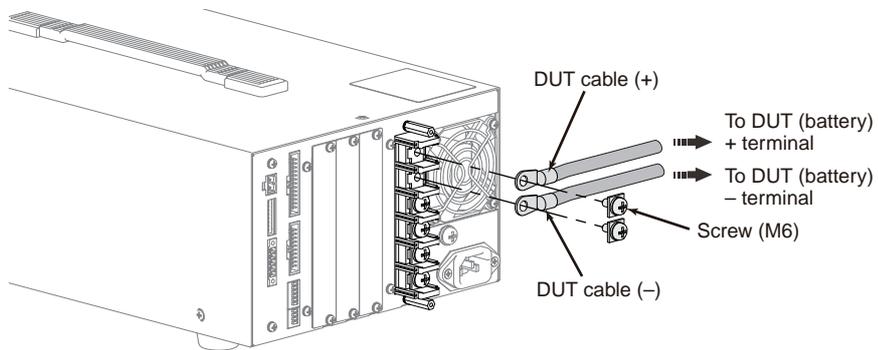
Connecting the DUT cable

- 1 Confirm the status of POWER switch of the PFX2511 whether it is turned off or being in the STANDBY position.**

Even when the POWER switch is turned on, the DUT cable and the sensing connector can be disconnected only in the "STANDBY" state that must not be under execution of the charge and discharge test.

- 2 Connect the DUT cable to the "DUT +" and "DUT -" of the input/output terminal board of the PFX2511.**

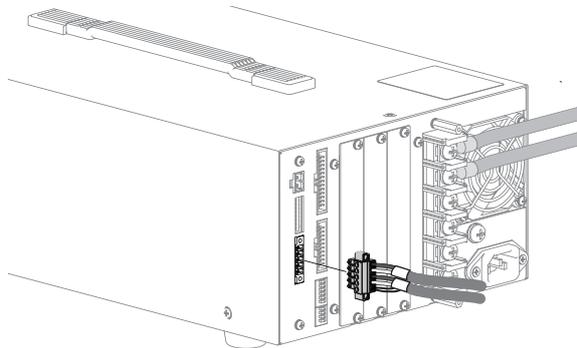
When making the cable, follow the color code to be wired.
Pulling out the cable in horizontal angle and fix it by screws.



- 3 Connect the other end of the DUT cable to the DUT (battery).**

Connecting the sensing cable

- 1 Connect the assembled sensing cable to the SENSING connector on the rear panel of the PFX2511.**



- 2 Connect or fix the voltage sensing and thermistor to the DUT (battery) respectively.**



3

Operations

This chapter describes the turning on the power, the panel operation, the external control / monitoring, the protection functions, alarms and setting of the model ID's.

Turning On and Off of the Power Supply

There is no specific order to turn on the power of equipments in the system (the PFX2511, DC power supply, Electronic load, and other peripherals that compose the system), and also there is no order for when turn off the power of equipments.

Confirm safety, then turn on / off of the power.

Turning on the power switch

1 Confirm that the connecting cables between the equipments and the power cables are correctly connected.

2 Turn on the POWER switch of the connected DC power supply and the Electronic load.

See p. 37, p. 38

Confirm that protection functions and an external analog control of each equipment are being set properly. When the Electronic load unit is connected in the parallel operation, assign the master unit and the slave unit.

3 Press the front-panel POWER switch so that it is on (the I position).

4 Check the firmware version on the screen.

All of LED's on the front panel illuminates for a few seconds, then only the "POWER/STANDBY" LED stays to be illuminated.

Few seconds after the firmware version is displayed, the node address will be displayed for few seconds. After the node address is displayed, the voltage value will be displayed.

It becomes in the STANDBY state, so the order from the application software BPChecker2000.

 Example for model ID 5101

↓ Few seconds later

 Example for firmware version 1.00

↓ Few seconds later

 Example for node address 1

See p. 16

When you turn the POWER switch on for the first time after purchase, the PFX2511 starts with its factory default settings.

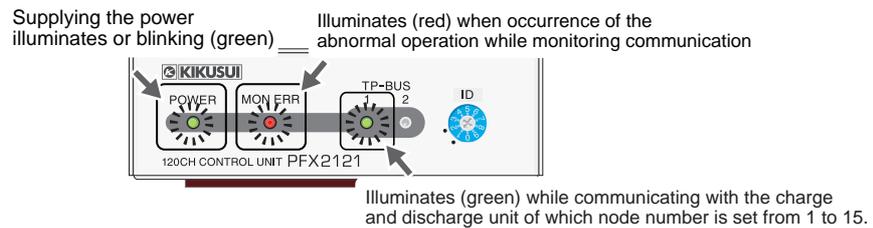
See p. 54, p. 96

When the "ALARM/WARNING" LED illuminates, the occurrence of alarm or the activation of protection function may be concerned.

Communication control unit PFX2121

The power for the PFX2121, a Communication control unit, is received through the USB cable, so whenever the PC is powered on, it supplies the power to the PFX2121. If the USB cable is connected through the self-powered USB hub, please supply power to the hub.

Status of the PFX2121	LED display	
Supplying the power	POWER LED	Blinking (green)
Enable operation	POWER LED	Illuminates (green)
Occurrence of the abnormal operation while monitoring communication	MON ERR LED	Illuminates (red)
Communicating by the TP-BUS 1	TP-BUS 1 LED	Illuminates (green)



Turning off the power switch

CAUTION

To avoid breakdown.

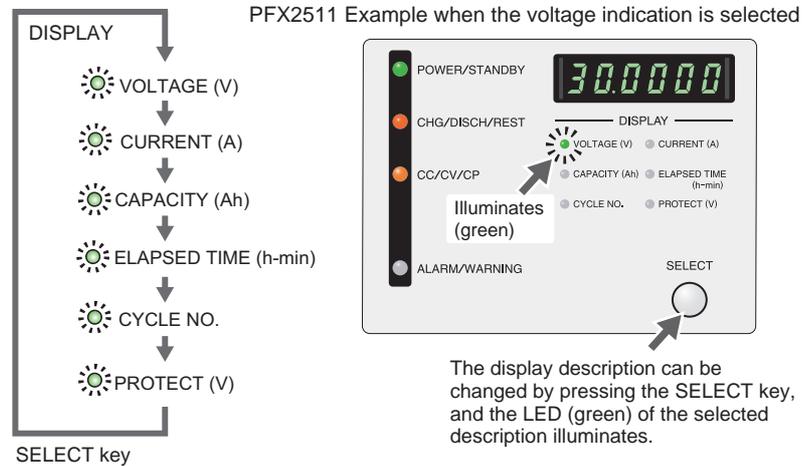
- Allow at least 10 seconds to turn the PFX2511's POWER switch on after it has been turned off, or off after it has been turned on. Do not needlessly turn the switch on and off repeatedly.
- Do not turn off the POWER switch while the charge / discharge test is executed.
- When after turning off the POWER switch of the PFX2511, do not leave the cable connected with the DUT (battery). If the cable connected with the DUT (battery) for long time, it may cause a malfunction of the PFX2511 or possible discharge of the DUT (battery).

- 1 Confirm that the testing is terminated by the application software BPChecker2000, and the current is not flowing into the DUT (battery).**
- 2 Turn off the POWER switch of the DC power supply and the Electronic load.**
- 3 Turn off the POWER switch of the PFX2511.**

It is possible to turn on and off of the power for all equipments at the same time by customizing the system. If you need assistance, please contact Kikusui agent or distributor.

Panel Operation

You can select the function to show the value on the display by the SELECT key on the front panel. The display can be changed by pressing the SELECT key. When the power is turned on, the display shows the voltage value.



Panel display	Description of the display
VOLTAGE (V)	Voltage value
CURRENT (A)	Current value
CAPACITY (Ah)	capacity value of the DUT (battery)
ELAPSED TIME (s)	Elapsed time of the ongoing cycle
CYCLE NO.	Test cycle, The display blinks when the test cycle or preliminary discharge is performed
PROTECT (V)	Displays alternately for the H_OVP or H_UVP

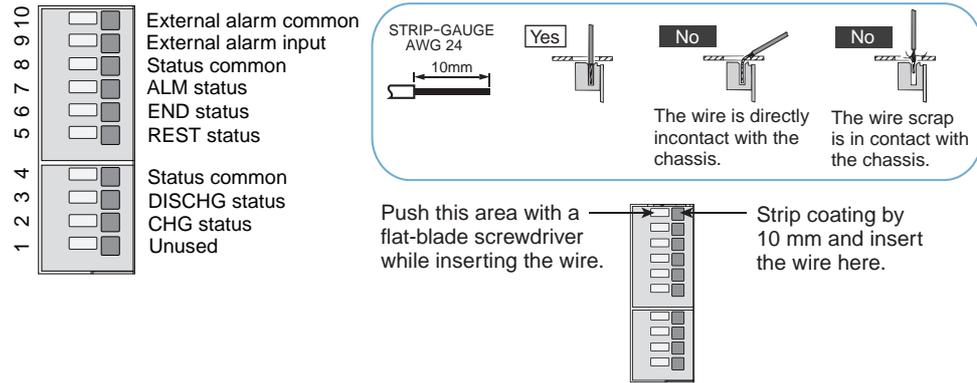
Outline of the External Control

In addition to the control using the front panel, the PFX2511 can control the following operations by means of the EXT CONT terminals on the rear panel.

- The external monitoring of the operating status
- Alarm input based on an external contact input signal

The maximum rating of each signal terminal is as follows:

- Maximum voltage: 30 V
- Maximum current (Sink): 8 mA



External monitoring of the operating status

The output is available for the monitoring of the operating status by the external contact. The outputs are open collector outputs of photocouplers; they are insulated from the internal circuits of the PFX2511.

The insulation circuit of the photocoupler of the status output consists of chassis, internal circuit, and the insulation of 80 Vdc.

Controlling the alarm input using external contact (ALM IN)

This function shuts off the outputs from the PFX2511 according to the input from an external contact. Short-circuit the contact switch to apply an alarm signal input at 0.5 s or longer.

Terminal number	Signal	Description	Circuit
10	External alarm common	Common for the external alarm input.	
9	External alarm input	Stops the test at the LOW level. *1 It is pulled up to +5 V at 5.1 kΩ.	
8	Status common	Common for the status signal. *2	
7	ALM status	Becomes LOW level when the ALARM is activated. Open collector output	
6	END status	Becomes LOW level when the test is terminated. Open collector output	
5	REST status	Becomes LOW level when in the rest condition. Open collector output	
4	Status common	Common for the status signal. *2	
3	DISCHG status	Becomes LOW level while in the discharge state. Open collector output	
2	CHG status	Becomes LOW level while in the charge state. Open collector output	
1	Unused	Do not connect any wire.	

*1. This PFX2511 becomes in the state of an external alarm by short circuit with the external alarm input common, and it stops the testing.
 *2. Same potential for the No.4 pin and No.8 pin of the status signal common.

CAUTION

The external alarm input and the external alarm common are the potential of the internal circuit. It should be connected with the circuit insulated from other potential such as the switch or the photo coupler output, etc. It may cause to malfunction of the internal circuit if the wirings were cnnected in correctly.

Protection Functions and Alarms

When the protection function interrupts or the alarm occurs while the test, either turning off the output or illuminate the "ALARM/WARNING" LED (in red or orange) and interrupts testing.

The warning function is activated when a test is not being executed. In this case, the ALARM / WARNING LED lights orange. You cannot start a test in this condition.

In case the PC operation stopped suddenly, the charge and discharge test is executed for the cycle of condition just prior to the occurrence, but not go to the next cycle and quit halfway of the testing. And the test data can not be saved.

For emergency, entire charge / discharge test can be stopped immediately.

Refer to the help file of application software BPChecker2000 for details of the setting procedure and the counter measure for protection functions, confirming status of the equipments and the system, repeating of the test.

Alarm occurrence



Test Condition Editor
Test Executive



PWR series
PLZ-4W series

Example when the detection of wiring error is occurred



The PFX2511 equips the following protection features.

When either receiving the alarm, or detecting the error, or activating the protection function, the "ALARM/WARNING" LED illuminates in red, and the error code is displayed on the front panel. The error code display can be back to the normal display by pressing the SELECT key or by releasing the alarm from the application software BPChecker2000.

The delay (delaying the operation) can be set for the S_OVP, S_UVP, and S_OCP.

To the PFX2511 and the connected devices, we recommend that you set the voltage protection functions.

Setting: "PFX" indicates that it is set on the PFX2511. "BPC" indicates that it is set with BPChecker2000. "Fixed" indicates that it is always detected.

Panel display	Cause of alarms · Descriptions		Output status	Setting
Err.001	Conn	Detection of abnormal wirings, DUT connection error (See p. 92)	No change	BPC
Err.002	S_OVP	Software over voltage (over charge) protection	Output off	BPC
Err.003	S_UVP	Software low voltage (over discharge) protection		BPC
Err.004	S_OCP	Software over current protection		BPC
Err.005	OTP	Over temperature / DUT (battery) over temperature protection		BPC
Err.006	OAH	Over charge · over charge capacity / over discharge capacity protection		BPC
Err.007	Comm	Communication error detection, command alarm error		No change
Err.008	AC_OFF	Abnormal AC line detection, Power line alarm	Output off	Fixed
Err.009	H_OVP	Hardware over voltage (over charge) protection		BPC
Err.010	H_UVP	Hardware low voltage (over discharge) protection		BPC
Err.011	H_OCP	Hardware over current protection		Fixed
Err.012	OHP	PFX2511 Over heat protection		Fixed
Err.013	Shock_Det.	Vibration alarm		PFX
Err.014	EXT_ALM	External trigger alarm		Fixed
Err.050	CD/B	PLZ_ALM Electronic load alarm		Fixed
Err.051		PLZ_CONT Exceeding control voltage of the Electronic load	Fixed	

Panel display	Cause of alarms · Descriptions			Operating status	Setting
Err.060	PS/B	PS_ALM	Power supply alarm	Output off	Fixed
Err.061		PS_CONT	Exceeding control voltage of the power supply		Fixed
Err.062		PS_OFF	No input of the power for the power supply (POWER off state)		Fixed
Err.100	Cell_S_OVP	Cell software over voltage (over charge) protection			BPC
Err.101	Cell_S_UVP	Cell software low voltage (over discharge) protection			BPC
Err.102	Cell_BALANCE_V	Cell unbalance voltage detection (See p. 93)			BPC
Err.103	OP_Comm	Option board communication error detection			Fixed
Err.104	Cell_OTP	Cell over temperature / DUT (battery) over temperature protection		BPC	

When the error code No.200's (Err.2xx) is displayed, it is an occurrence of an internal error. Confirm the displayed error code, and contact Kikusui agent or distributor.

Releasing the alarm



Test Condition Editor
Test Executive

The alarm can be released from the application software BPChecker2000. Transmit the alarm release command after eliminating the cause of alarm occurrence indicated by the error code.

If you cannot clear the alarm even when all of the causes of the alarm occurrence are eliminated, the PFX2511 may have malfunctioned. If this happens, stop using the PFX2511 and contact your Kikusui agent or distributor.

Warning occurrence

Example when the volage indication is at 30 V and the warning is occurred



The PFX2511 equips the following warning features.

When there is any potential any possible activation of the protection function, it becomes the state of "Warning" (as the standby state) before execution of the test. The ALARM/WARNING LED illuminates in orange. The display on the front panel remains as the state of before occurrence of the warning.

When the warning is occurred, the test can not be executed

Setting: "PFX" indicates that t is set on the PFX2511. "Fixed" indicates that it is always detected.

Panel display	Description of the warning occurrence		Operating status	Setting
Remains the present display	Idle (SH Detect Warning)	Improper installation. The unit is not horizontally installed or placed where the vibration have been generated. Activates only when the vibration sensor is set to ON status.	Disable entry of the test conditions Disable execution of the test	PFX See p. 43
	Idle (Protection Warning)	The activation range of the DUT (battery) voltage for the H_OVP or H_UVP.		Fixed

Releasing the warning

Remove the cause of warning occurrence.

If you cannot clear the warning even when all of the causes of the warning occurrence are eliminated, the PFX2511 may have malfunctioned. If this happens, stop using the PFX2511 and contact your Kikusui agent or distributor.

Setting the Model ID

See p. 16

The operating range of charge and discharge (maximum voltage / maximum current) for the possible charge and discharge test depends on the DC power supply and the Electronic load connected with the PFX2511. Model IDs are defined for the various combinations of device connections.

The factory default setting, Model ID is set for the following combinations.

Model ID	Combination
PFX2511 5101	PWR800L, PLZ1004W (H range)

See p. 57

The model ID can be set using the application software by the PC.

Model ID	DC power supply	Electronic load	Maximum power for the charge ^{*1}	Maximum power for the discharge
5101 ^{*2}	PWR800L	PLZ1004W (H range)	800 W	1 000 W
5102	PWR800L	PLZ1004W (M range)	800 W	1 000 W
5103	PWR1600L	PLZ1004W (2 units parallel)	1 600 W	2 000 W
5104	PWR800L	PLZ334W (H range)	800 W	330 W
5106	PWR1600L	PLZ1004W (H range)	1 600 W	1 000 W
5107	PAS10-70	PLZ1004W (H range)	700 W	1 000 W
5108	PAS20-36	PLZ1004W (H range)	720 W	1 000 W
5109	PAS20-54	PLZ1004W (H range)	1 080 W	1 000 W
5110	PAS40-27	PLZ1004W (H range)	1 080 W	1 000 W
5111	PWR800L	PLZ164W (H range)	800 W	165 W
5112	PAS10-35	PLZ334W (H range)	350 W	330 W

*1. The value of power indicated above may not be used because of the route loss. (See p. 16)

*2. Factory default settings

NOTE

If the selected model ID's is not applied to the equipment configured in the system, the charge and discharge testing cannot be executed. In case two or more models ID's are set, please make sure they are set properly.

Test Procedure

To perform charge/discharge tests, use BPChecker2000 for the PFX2511 to configure settings such as the information of the connected devices and the test conditions. When the test is executed for the first time, follow the instruction specified below.

BPChecker2000 test procedure



Hardware Config Wizard

1 Configuration of the hardware.

Activate the "Hardware Config Wizard".

Set the number of unit for the Communication control unit PFX2121 and the use of the temperature chamber. Compose each Communication control unit PFX2121 respectively for setting up the channels (charge and discharge unit).

Set the "Model ID" of the connected DC power and the Electronic load.



Test Condition Editor

2 Set the testing conditions.

Activate the "Test Condition Editor".

Create the testing condition file.

Create the folder in the specified group that is recognized by the BPC2000 system and specify the name and the pass of the group folder.

Specify the group folder to save the testing conditions.



Test Executive

3 Execute the test.

Activate the "Test Executive".

Allocate the channel organized by the "Hardware Config Wizard" to the specified group.

The testing condition made by the "Test Condition Editor" is allocated to the specified channel, and the test is executed.



Graph Viewer

4 Analyze the test result.

Activate the "Graph Viewer".

Display the graph of the test data file made by the "Test Executive".



Group Administrator

To create or delete the group, use the "Group Administrator".



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4

Specification

This chapter contains the PFX2511 specifications, outline drawings and Communication control unit PFX2121 (sold separately) specifications.

PFX2511 Functional Specifications

- Static: General term to indicate CC charge, CC - CV charge, CC discharge, and CP discharge
- Pulse: General term to indicate pulse CC discharge and pulse CP discharge

Charge function

Static		
Constant current / Constant voltage charge CC - CV	Settings	Constant current value (Current)
		Constant voltage value (CV Voltage)
	Cutoff condition	Specified time after charge start (Charge Time)
		Specified time after constant voltage operation start (CV Time)
		Specified current after constant voltage operation start (It Current)
		Specified time after the current falls below It Current (It Time)
Rest	Specified time after charge end (Rest Time)	
Constant current charge CC	Settings	Constant current value (Current)
		Cutoff condition
	Cutoff condition	Specified time after charge start (Charge Time)
		Battery voltage (Max Voltage)
		Battery temperature (Max Temp)
		Battery voltage drop (-dV)
Temperature increase per unit time (dT/dt)		
Rest	Specified time after charge end (Rest Time)	

Discharge function

Static		
Constant current discharge CC	Settings	Constant current value (Current)
	Cutoff condition	Specified time after discharge start (Discharge Time)
		Battery voltage (Cutoff Voltage)
Rest	Specified time after discharge end (Rest Time)	
Constant power discharge CP	Settings	Constant power value (Wattage)
		Limit current (Limit Current)
	Cutoff condition	Specified time after discharge start (Discharge Time)
		Battery voltage (Cutoff Voltage)
Rest	Specified time after discharge end (Rest Time)	
Pulse		
Constant pulse current discharge CC Pulse	Settings	Constant pulse current (Pulse Current)
		Pulse time (Pulse Time)
	Cutoff condition	Specified time after discharge start (Discharge Time)
Battery voltage (Cutoff Voltage)		
Rest	Specified time after discharge end (Rest Time)	
Constant pulse power discharge CP Pulse	Settings	Constant pulse power value (Pulse Wattage)
		Pulse time (Pulse Time)
		Limit current (Limit Current)
	Cutoff condition	Specified time after discharge start (Discharge Time)
Battery voltage (Cutoff Voltage)		
Rest	Specified time after discharge end (Rest Time)	

Measurement function

Static		
Battery voltage		Average voltage of the every 500 ms
Charge / discharge current		Average current of the every 500 ms
Battery temperature		Simplified temperature measurement function using a thermistor as a temperature sensing element (Temperature)
Capacity		The product of the measured current (average current) and the elapsed time
The scale of power		Integration of the measured value of the current / voltage and the elapsed time (Wh)
Time		Integrated time since charge / discharge start during measurement
Pulse		
Battery voltage		Maximum voltage and minimum voltage in one cycle of the pulse setting (PeakPoint)
		Set arbitrary points to measure the voltage (Multi Point)
Charge / discharge current		Average current (Average)
Battery temperature		Simplified temperature measurement function using a thermistor as a temperature sensing element (Temperature)
Capacity		The product of the measured current (average current) and the elapsed time
The scale of power		Integration of the measured value of the current / voltage and the elapsed time
Time		Integrated time since charge / discharge start during measurement
Data recording		
Delta time	Fixed time	Records data at the specified interval Time: 1 s to 50000 s
	Automatic time	Automatically adjusts the recording interval so that the specified data is recorded Number of data entries: 1000 to 5000
Delta voltage *1		Records data when the specified voltage value changes 0.0001 V to 0.9999 V
Delta current *1		Records data when the specified current value changes 0.0001 A to 0.9999 A

*1. Data is recorded after the recording interval time that you specified with the delta time elapses.

Protection function

Overvoltage (overcharge) protection	Software OVP	Detection of the overvoltage (overcharge) by the measured value of voltage (the AD converted value) Output off
	Hardware OVP	Direct detection by the hardware comparator Output off
Undervoltage (overdischarge) protection	Software UVP	Detection of the undervoltage (overdischarge) by the measured value of voltage (the AD converted value) Output off
	Hardware UVP	Direct detection by the hardware comparator Output off
Overcurrent protection	Software OCP	Detection of the over-current by the measured value of current (the AD converted value) Output off
	Hardware OCP	Direct detection by the hardware comparator Output off
Overheat protection (OHP)		Detects abnormal temperature of the route switch After reaching to the normal temperature, return to the Idle state
Overcharge / discharge capacity protection (OAH)		Detects the over charged capacity by the judgment of the current integral value, Output off
DUT (battery) over temperature (OTP)		Detects over temperature of the DUT (battery) by the judgment of the thermistor temperature, Output off
Power supply alarm (PS Alm)		Receives the alarm of power supply
Electronic load alarm (CD Alm)		Receives the alarm of Electronic load
Connection check (Connection Error)		Detects connection error of the DUT (battery)
Communication error		Detects internal communication error
Watchdog timer		Detection of the CPU operation error
AC power line error (AC off)		Voltage drop, Detects short interruption of approx. 50 ms, Output off
Vibration alarm (SH Detect)		The vibration sensor detects shaking or shock equivalent to the level 5 of seismic intensity scale

Display function

Power supply status	POWER	Test under execution or enable status of test execution Illuminated "POWER / STANDBY" LED (Green)
	STANDBY	Standby status, or enable status of terminating system Illuminates the "POWER / STANDBY" LED (Orange)
Charge / discharge status	CHG	Charge operation status, Illuminated "CHG / DISCH/REST" LED (Red)
	DISCH	Discharge operation status, Illuminated "CHG / DISCH / REST" LED (Green)
	REST	Rest status, Illuminated "CHG / DISCH / REST" LED (Orange)
Control status	CC	Constant current operation status, or under pulse operation Illuminated "CC / CV / CP" LED (Red)
	CV	Constant voltage operation status Illuminated "CC / CV / CP" LED (Green)
	CP	Constant power operation status, or under pulse operation Illuminated "CC / CV / CP" LED (Orange)
ALARM	ALARM	Detected alarm, protection function operation status Illuminated "ALARM / WARNING" LED (Red)
	WARNING	The advanced notice of the warning for the alarm detection, or the protection function when the test is executed Illuminated "ALARM / WARNING" LED (Orange)
DISPLAY	DISPLAY	6-digit LED display (Green) Display the information by switching the SELECT key (voltage / current / capacity / elapsed time / cycle numbers / protection functions/ alarm information / etc.)

Interface

DC power supply I/F	Exclusive connector for Kikusui's product *1	Equipped 1 channel, 26 pin connector, isolation input / output
Electronic load I/F	Exclusive connector for Kikusui's product *2	Equipped 1 channel, 20 pin connector, isolation input / output
System Communication	TP-BUS	1 channel, exclusively used for the PFX2121
External control	REST status signal output	L level when in the rest status, isolated open collector output *3
	END status signal output	L level when the test is completed, isolated open collector output *3
	ALM status signal output	L level when the alarm is activated, isolated open collector output *3
	CHG status signal output	L level when the charge operation is conducted, isolated open collector output *3
	DISCHG status signal output	L level when the discharge operation is conducted, isolated open collector output *3
	External alarm input	Terminate the test at L level, pull up to +5 V at 5.1 kΩ
	Expansion slot	3 slots, for the optional boards

*1. Direct connection with the PWR series, PAS series.

*2. Direct connection with the PLZ-4W series.

*3. The insulation voltage against other circuits is 80 Vdc with the applied voltage of 30 Vmax and the sink current of 8 mAmax.

PFX2511 Electrical Specifications

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

- The warm-up time is 30 minutes.
- TYP (typical) values do not guarantee the performance.
- reading: Indicates the readout value.
- set: Indicates the setting value.
- rating: Indicates the rated.
- Static: General term to indicate CC charge, CC - CV charge, CC discharge, and CP discharge
- Pulse: General term to indicate pulse CC discharge and pulse CP discharge

Rated output

Number of outputs	1 ch
Charge current range ^{*1}	0.000 A to 50.000 A
Charge voltage range ^{*1}	0.000 V to 60.000 V
Discharge current range ^{*1}	0.000 A to 50.000 A
Discharge voltage range ^{*1 *2}	0.000 V to 60.000 V

*1. The range varies depending on factors such as the connected power supplies and electronic loads, the wiring configuration of the system, and the charge/discharge operation.

*2. The minimum voltage of possible discharge may vary depends on the connected Electronic loads and wiring configuration of the system.

Setting accuracy

Static			
Constant current charge / discharge	Range ^{*1}	0.000 A to 50.000 A	
	Accuracy ^{*2}	^{*3}	
	Resolution	1 mA	
Constant voltage charge / discharge	Range ^{*1}	0.000 V to 60.000 V	
	Accuracy ^{*2}	^{*3}	
	Resolution	1 mV	
Constant power discharge	Range ^{*1}	0.1 W to 3000.0 W	
	Accuracy ^{*2 *4}	$\pm(0.5 \% \text{ of set} + 1 \text{ W})$ ^{*5}	
	Resolution	100 mW	
Pulse			
Constant current discharge	Range ^{*1}	0.000 A to 50.000 A	
	Accuracy ^{*2}	^{*3}	
	Resolution	1 mA	
	Number of settings	20 values	
	Time width	Range	5.0 ms to 65000.0 ms
		Accuracy ^{*2 *6}	$\pm(0.05 \% \text{ of set} + 0.05 \text{ ms})$
Resolution		100 μ s	
Constant power discharge	Range ^{*1}	0.1 W to 3000.0 W ^{*1}	
	Accuracy ^{*2 *4}	$\pm(0.5 \% \text{ of set} + 1 \text{ W})$ ^{*5}	
	Resolution	100 mW	
	Number of settings	20 values	
	Time width	Range	5.0 ms to 65000.0 ms
		Accuracy ^{*2 *6}	$\pm(0.05 \% \text{ of set} + 0.05 \text{ ms})$
Resolution		100 μ s	

- *1. The range varies depending on factors such as the connected DC power supplies and electronic loads and the wiring configuration of the system.
- *2. At an ambient temperature between 18 °C and 28 °C.
- *3. The external devices are controlled through software so that the measured values are equal to the settings. The accuracy of the settings is the same as the measurement accuracy.
- *4. With battery voltage of 2 V or more.
- *5. The battery voltage is measured, and the control current (constant current control) is calculated from the set power value through software calculation.
The time required to process one calculation (from the voltage measurement to the output setting) is approximately 1 ms.
- *6. Triggers are set at a position that is half of the pulse amplitude (the current amplitude) to measure the time.

Measurement accuracy

Static			
Charge / discharge Current measurement	Range	0.0000 A to 50.0000 A	
	Accuracy ^{*1 *2}	±(0.15 % of reading + 0.02 % of rating)	
	Resolution	0.1 mA	
Voltage measurement	Range	-6.0000 V to 60.0000 V	
	Accuracy ^{*1 *2}	±(0.05 % of reading + 0.02 % of rating)	
	Resolution	0.1 mV	
Capacity calculation	Range	0.000 Ah to 2000.000 Ah	
	Accuracy ^{*1 *2}	Depends on the current measurement accuracy and the time accuracy	
	Resolution	1 mAh	
Time ^{*3}	Accuracy ^{*1 *4}	±10 ppm (TYP values)	
Pulse			
Charge / discharge current	Range	0.0000 A to 50.0000 A	
	Accuracy ^{*1 *2}	±(0.2 % of reading + 0.03 % of rating)	
	Resolution	0.1 mA	
	Measured value	Average current; updated every 500 ms (consecutive measurements)	
Battery voltage	Range	0.0000 V to 60.0000 V	
	Accuracy ^{*1 *2}	±(0.05 % of reading + 0.02 % of rating)	
	Resolution	0.1 mV	
	Measurement point	High voltage	Indicates the maximum battery voltage in one cycle of the pulse setting.
		Low voltage	Indicates the minimum battery voltage in one cycle of the pulse setting.
Arbitrary		At the specified pulse point	
Capacity calculation	Range	0.000 Ah to 2000.000 Ah	
	Accuracy ^{*1 *2}	Rely on the current measuring accuracy and the time accuracy	
	Resolution	1 mAh	
Time ^{*3}	Accuracy ^{*1 *4}	±10 ppm (TYP values)	

*1. Ambient temperature at 18 °C to 28 °C.

*2. Measurable range: within the range listed in the table.

*3. Accuracy of the elapsed time (cutoff condition) when charging/discharging or resting.

*4. Monthly error: approximately 30 seconds.

Temperature measurement

The thermistor 103AT-2 (Ishizuka denshi) is used for the temperature sensor.

Resistance (temperature) measurement section *1	
Measurable range	-40.0 °C to 100.0 °C
Measurement resolution	0.1 °C
Measurement accuracy *2 *3	±0.5 °C (Measuring temperature at 0 °C to 40.0 °C)
	±1 °C (Measuring temperature at -20 °C to 80 °C)
Reference (thermistor 103AT)	
Model	103AT-2, Ishizuka denshi
R25	10.0 kΩ, Nominal zero load resistance at 25 °C
Operating temperature range	-50.0 °C to 110.0 °C
Temperature accuracy *3	±0.5 °C (Measuring temperature at 0 °C to 40.0 °C)
Tolerance	±1 %
B value	3435K±1 % (Measuring temperature at 25 °C)

- *1. The temperature measurement does not trace the absolute temperature. Temperature derived by converting the resistance.
- *2. Excluding errors in the temperature sensing element.
- *3. Ambient temperature at 18 °C to 28 °C.

Protection function

Overvoltage (overcharge) protection		
Software OVP	Range ^{*1}	0 % to 105 % of the rated value
	Accuracy ^{*1*2}	$\pm(0.05 \% \text{ of set} + 0.02 \% \text{ of rating})$
	Resolution	1 mV
	Time to trip	150 ms maximum
Hardware OVP	Range ^{*1}	0 % to 110 % of the rated value
	Error ^{*1*2}	$\pm 0.5 \% \text{ of rating}$
	Resolution	100 mV
	Time to trip ^{*2}	10 ms (TYP value), from the detection of the over voltage to shut down the output
Undervoltage (overdischarge) protection		
Software UVP	Range ^{*1}	-10 % to 95 % of the rated value
	Accuracy ^{*1*2}	$\pm(0.05 \% \text{ of set} + 0.02 \% \text{ of rating})$
	Resolution	1 mV
	Time to trip	150 ms maximum
Hardware UVP	Range ^{*1}	-10 % to 100 % of the rated value
	Error ^{*1*2}	$\pm 0.5 \% \text{ of rating}$
	Resolution	100 mV When set using the application software.
	Time to trip ^{*2}	10 ms (TYP value), from the detection of the low voltage to shut down the output
Overcurrent protection		
Software OCP ^{*3}	Range	The added value of 1 A to the setting current value
	Accuracy ^{*2}	$\pm(0.2 \% \text{ of set} + 0.03 \% \text{ of rating})$
	Time to trip	150 ms maximum
	Delay time	0 ms to 3000 ms The time setting of the detection delay timer
Hardware OCP	Range	55 A (TYP value) fixed
	Time to trip	100 ms (TYP value), from the detection of the over current to shut down the output
Load shorting protection		60 A Depends on the fuse at the output end.
Capacity (overcharge / overdischarge) protection		
Software OAH ^{*4}	Range	100 % to 1000 % of the nominal capacity
	Accuracy ^{*2}	Depends on the current measurement accuracy and the accuracy of the CPU clock.
	Resolution	1 % Above 1 mAh
Overtemperature protection (DUT)		
Software OTP	Range	-40.0 °C to 100.0 °C
	Accuracy ^{*2}	$\pm 1 \text{ }^\circ\text{C}$
	Resolution	0.1 °C

*1. At the rated values of all ranges.

*2. Ambient temperature at 18 °C to 28 °C.

*3. As for software OCP, the application software sets the value automatically adding of 1A to the setting current.

*4. The OAH is calculated by the application software for which the value of capacity is multiplied by the setting percentage against the nominal capacity.

General specifications

Nominal input rating		100 Vac to 240 Vac, 50 Hz / 60 Hz
Input voltage range		90 Vac to 250 Vac
Power consumption		60 VAmx When three OP01-PFX units are installed: 80 VAmx
Operating temperature and humidity ranges		0 °C to 40 °C (32 °F to 104 °F) , 20 %rh to 85 %rh (no condensation)
Storage temperature and humidity ranges		-10 °C to 60 °C (14 °F to 140 °F) , 0 %rh to 90 %rh (no condensation)
Operating environment		Indoors, Overvoltage Category II
Altitude		Up to 2000 m
Isolation voltage	Input / Output terminal ⇔ chassis	±80 Vmax
Insulation resistance	Primary circuit ⇔ chassis	30 MΩ or greater at 500 Vdc
	Primary circuit ⇔ Input / Output terminal	70 %rh or less
Withstand voltage	Primary circuit ⇔ chassis	No abnormality at 1500 Vac over 1 minute
	Primary circuit ⇔ Input / Output terminal	
Safety ^{*1}		Complies with the requirements of the following directive and standards. Low Voltage Directive 2014/35/EU ^{*2} EN 61010-1 (Class I ^{*3} , Pollution Degree 2 ^{*4})
Electromagnetic compatibility (EMC) ^{*1 *2}		Complies with the requirements of the following directive and standards. EMC Directive 2014/30/EU EN 61326-1 (Class A ^{*5}) EN 55011 (Class A ^{*5} , Group 1 ^{*6}) EN 61000-3-2 EN 61000-3-3 Applicable under the following conditions The maximum length of all cabling and wiring connected to the PFX2511 is less than 5 m.
Outline drawing		See the outline drawing
Wight		Approx. 7 kg (15.43 lb)
Accessories	Power cord	1 pc.
	Cable with crimp terminal	4 pcs. (Red : 2 pcs., White: 2 pcs) 45 cm each (17.72 inch)
	26-core flat cable	1 pc.
	26-core flat cable core	1 pc.
	20-core flat cable	1 pc.
	20-core flat cable core	1 pc.
	Shielded wire with TP-BUS connectors	1 pc. (1 m (39.37 inch))
	Sensing connector	1 pc.
	Thermistor	1 pc.
	Lock lever	2 pcs.
	BPChecker2000 Basic Edition CD-ROM	1 pc.
	Operation manual (this manual)	1 copy
	BPChecker2000 Setup guide	1 copy

*1. Does not apply to specially ordered or modified PFX2511s.

*2. Limited to products that have the CE mark on their panels.

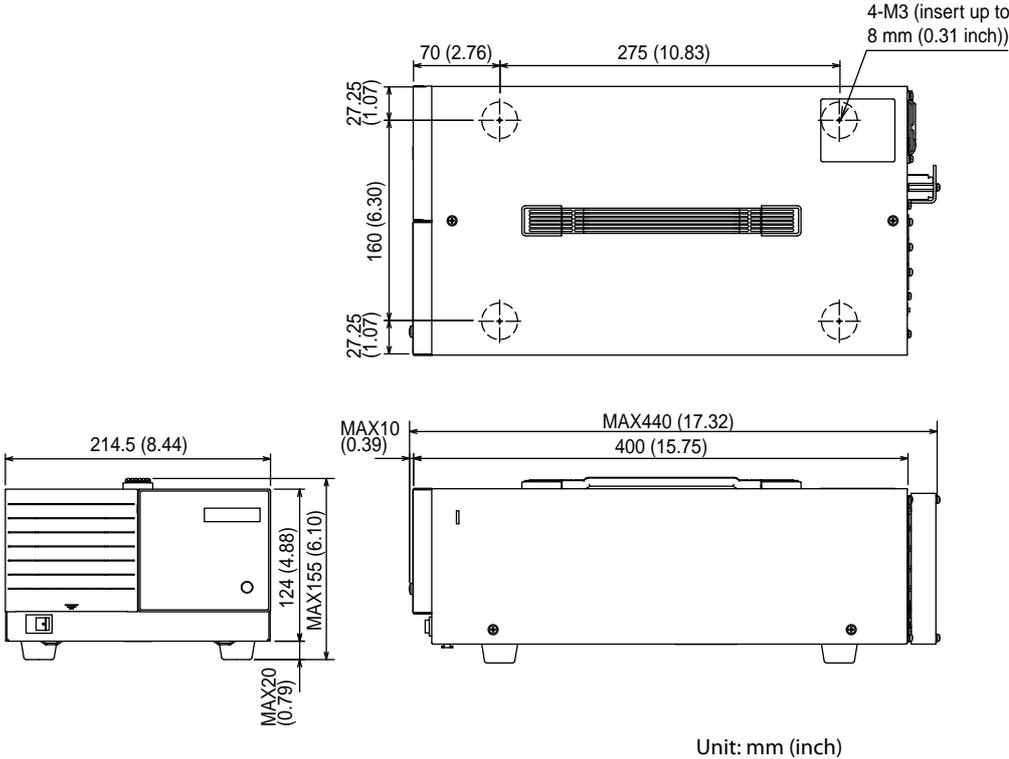
When the optional OP03-PFX Voltmeter Unit is used, compliance is achieved by using the optional TL12-PFX sensing cable (length: approx. 3 m, connector area: with cover, with core).

*3. This is a Class I equipment. Be sure to ground the PFX2511's protective conductor terminal. The safety of this product is only guaranteed when the product is properly grounded.

*4. Pollution is addition of foreign matter (solid, liquid or gaseous) that may produce a reduction of dielectric strength or surface resistivity. Pollution Degree 2 assumes that only non-conductive pollution will occur except for an occasional temporary conductivity caused by condensation.

- *5. This is a Class A equipment. The PFX2511 is intended for use in an industrial environment. This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.
- *6. This is a Group 1 equipment. The PFX2511 does not generate and/or use intentionally radio-frequency energy, in the from of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purpose.

Outline drawing



Communication Control Unit PFX2121 (option) Specifications

Specification of the product that have the CE mark on their panels.

Display function

Indication of the Power supply	POWER	Blinked "POWER" LED (Green) Indicates the supplied power from the bus line (Connected with the USB)
		Illuminated "POWER" LED (Green) Indicates the enable operation
Monitoring communication	MON ERR	Illuminated "MON ERR" LED (Red) Indicates that an error occurred in the periodic monitoring communication with the application software
TP-BUS	TP-BUS1	Illuminated "TP-BUS1" LED (Green) PFX2000 series : Indicates against the channel 1 to 60, or the impedance measurement unit during the communication is performed PFX2511 : Indicates against the channel 1 to 15 during the communication is performed When an OP01-PFX is installed in the PFX2511: Indicates that the PFX2121 is communicating with channels 1 through 7
	TP-BUS2	Illuminated "TP-BUS2" LED (Green) PFX2000 series : Indicates against the channel 61 to 120 during the communication is performed PFX2511 : Not available

Interface

USB	Number of lines	1 line
	Communication specifications	Complies with USB1.1
	Data rate	Full speed 12 Mbps maximum
	Connection	Connect to a PC using the USB cable that is included in the package. *1
TP-BUS	Number of lines	2 lines TP-BUS1 / TP-BUS2
	Connection	60 ch / line Using the TP-BUS connector included in the package. Total length of a single line: 25 m or less
	Polarity	None
Update rate	1 to 30 channels / port (TP-BUS)	Every 1 s *2
	31 to 60 channels / port (TP-BUS)	Every 2 s *3

*1. Connectable to the USB connector on the PC or a self-powered USB hub. The PFX2121 is a high-powered device (BUS powered). You cannot connect the product to a bus-powered USB hub.

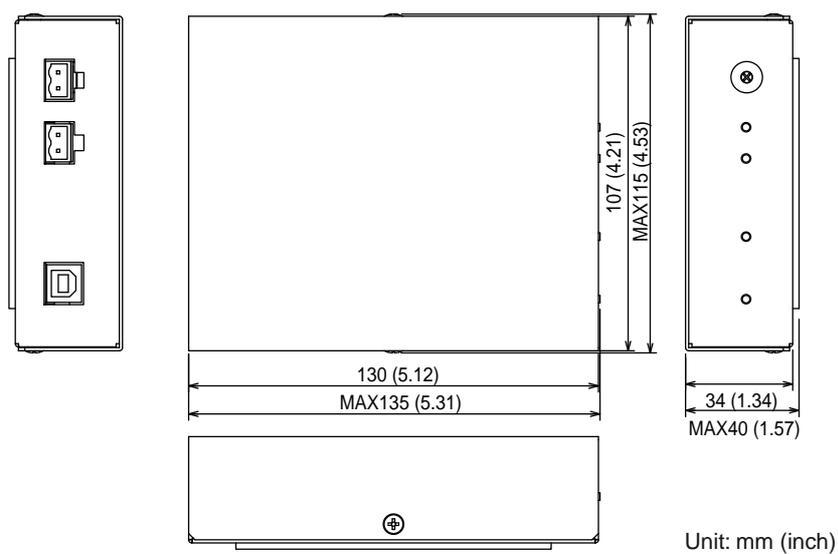
*2. USB 2 port (two Communication control units), update possible at 120 channels / 1 s when 30 channels are connected to each port.

*3. USB 2 port (two Communication control units), update possible at 240 channels / 2 s when 60 channels are connected to each port.

General specifications

Power		5 V, 300 mA or less, Receiving power from the USB
Operating temperature and humidity ranges		0 °C to 40 °C (32 °F to 104 °F) 30 %rh to 80 %rh (no condensation)
Storage temperature and humidity ranges		-10 °C to 60 °C (14 °F to 140 °F) 20 %rh to 80 %rh (no condensation)
Outline drawing		See the outline drawing
Wight		Approx. 500 g (1.10 lb)
Accessories	USB cable	1 pc. 2 m (78.74 inch)
	USB cable core	2 pcs.
	TP-BUS connector	2 pcs.
	Operation manual	1 copy

Outline drawing





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5

Volt / Thermometer Unit (Option)

This chapter describes how to install the optional Volt / Thermometer Units OP01-PFX and how to connect the DUT (battery) and bias power supply to the units and contains the specifications of the units.

Attaching the Volt / Thermometer Unit

When you want to expand the number of voltage and temperature measurement points, you can install Volt / Thermometer Unit OP01-PFXs in the rear-panel option slots.

After you remove a Volt / Thermometer Unit, attach a slot cover over the empty slot using screws.

The number of channels that you can connect to the charge and discharge unit differs depending on whether OP01-PFX units are installed in the PFX2511.

Number of PFX2121s	Volt / thermometer units not installed	Volt / thermometer units installed	Number of units that can be installed
1	1 to 15	1 to 7	Up to 3 OP01-PFXs
2	16 to 30	8 to 14	



Possible electric shock. Be sure to turn the POWER switch off before you install an OP01-PFX or connect the DUT (battery).

NOTE

- To use the PFX2511 with the OP01-PFX, the following firmware versions and software version are required. For information on how to check the current version, see the BPChecker2000 help file.

Communication control unit PFX2121	Ver. 2.0 and later
Application software BPChecker2000	Ver. 3.0 and later

You must update the firmware of the PFX2121 if its current firmware is version 1.9 or earlier. You must update the version of the BPChecker2000 software if it is version 2.9 or earlier.

- If you install a Volt / Thermometer Unit OP01-PFX in the PFX2511, you cannot construct a system that contains both this device and PFX2000 series devices.
- Install Volt / Thermometer Unit OP01-PFX in adjacent option slots starting from the leftmost slot.

- 1 Confirm that the POWER switch of all connected equipments are turned off.**
- 2 Touch the grounded metal to discharge your physical static electricity.**
- 3 Unfasten the screws that are holding the slot cover in place, and remove the cover from the panel.**
- 4 Hold the panel section of the OP01-PFX so that the connector section of the printed circuit board is facing right.**
- 5 Insert the OP01-PFX into the leftmost slot (slot 1) so that the printed circuit board's connector is inserted into the connector at the back of the slot.**

If you are installing multiple OP01-PFX units, install them from the leftmost slot (from slot 1 as they are displayed on the rear panel).
- 6 Push the OP01-PFX all the way in.**
- 7 Use the attached screws that the OP01-PFX in place to fix the board to the panel.**

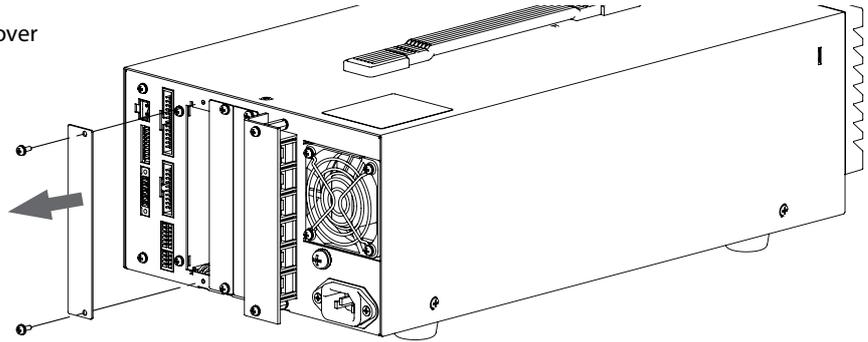
Be sure to use the screws that come with the OP01-PFX units to fix the units in place.
- 8 Set the node number.**

See p. 41 , p. 43

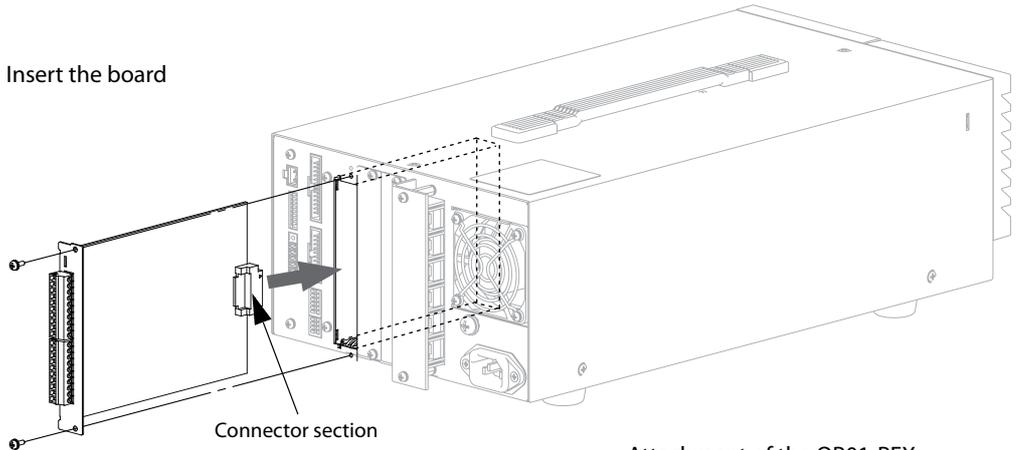


9 The first time that you install the OP01-PFX after you purchase it, use the application software BPChecker2000 to customize the model ID.

Remove the cover



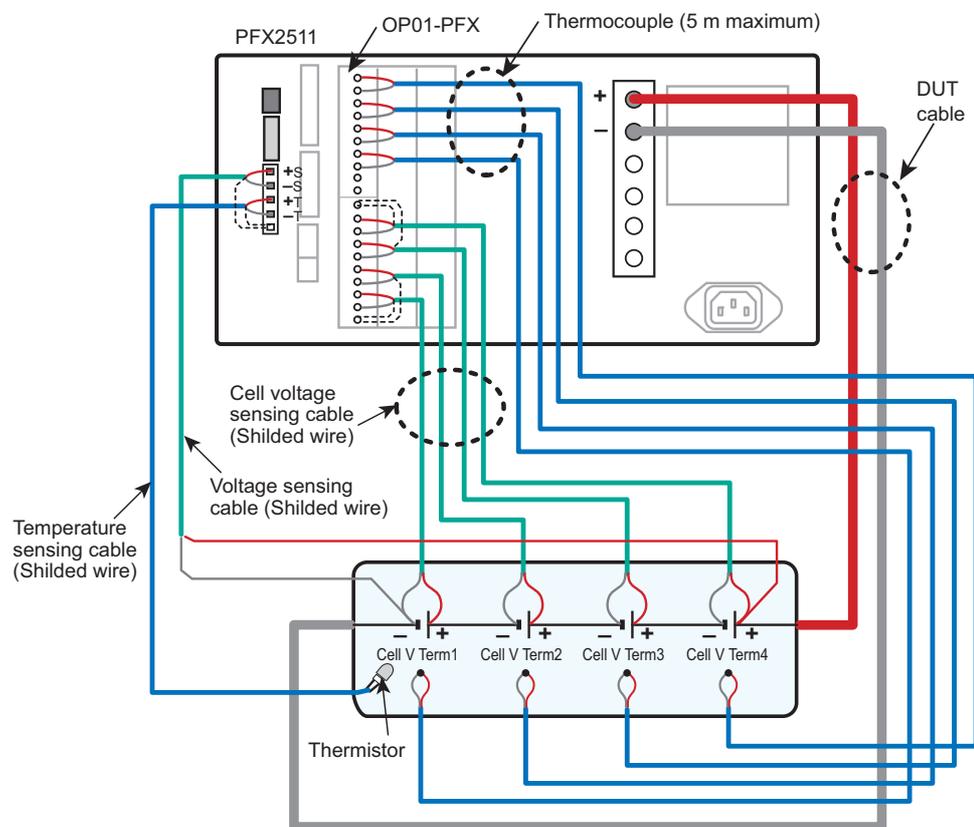
Insert the board



Preparation of the DUT (battery) Connection

Cables^{*1} for connecting the OP01-PFX and the input terminal to the DUT (battery) are not included with the OP01-PFX. Prepare the cable applied to description.

- DUT cable The cable used for the charge / discharge current between the PFX2511 and the DUT(battery).
- Voltage sensing cable The cable used for sensing of the electro voltage of the DUT (battery). [See p. 44](#)
- Temperature sensing cable The cable used for sensing of the temperature of the DUT (battery).
- Thermocouple (K type)
- Cell voltage sensing cable The cable used for sensing of the cell electro voltage of the DUT (battery).



Example of a Volt / Thermometer Unit OP01-PFX installed in slot 1; only the wiring between the PFX2511 and the DUT (battery) is shown

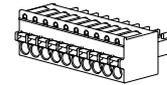
■ Wires and tools required for connection

Wires	Cell voltage sensing cable	0.20 mm ² (AWG24) to 0.52 mm ² (AWG20), Shilded wire
	Thermocouple (K type)	Element-wire diameter: 0.20 mm ² or more
Flat-blade screwdriver		Axis diameter : $\phi 3$, End width : 2.6 mm
Wire stripper		Wire stripper suitable for the wires described above.

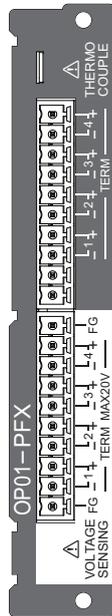
*1. The optional sensing-cable set TL09-PFX consists of a dedicated voltage sensing cable and thermocouple for connecting the DUT (battery) to a PFX2511 in which an OP01-PFX is installed. ([See p. 20](#))

Input terminal (Connector MC1.5/10-G : Phoenix Contact)

When the PFX2511 is shipped from the factory, connectors are attached to the input terminals. If they are damaged or lost, contact your Kikusui agent or distributor.



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Temperature measurement (THERMOCOUPLE)

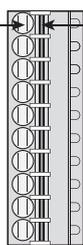
Term No.	Signal	Description
4	Cell T Term4+	Thermocouple connecting terminal 4+
	Cell T Term4-	Thermocouple connecting terminal 4-
3	Cell T Term3+	Thermocouple connecting terminal 3+
	Cell T Term3-	Thermocouple connecting terminal 3-
2	Cell T Term2+	Thermocouple connecting terminal 2+
	Cell T Term2-	Thermocouple connecting terminal 2-
1	Cell T Term1+	Thermocouple connecting terminal 1+
	Cell T Term1-	Thermocouple connecting terminal 1-
-	NC	Unused (Reserved)
-	NC	Unused (Reserved)

Voltage measurement (VOLTAGE SENSING)

Term No.	Signal	Description
-	FG	Potential for shielding
4	Cell V Term4+	Cell Voltage sensing connecting terminal 4+
	Cell V Term4-	Cell Voltage sensing connecting terminal 4-
3	Cell V Term3+	Cell Voltage sensing connecting terminal 3+
	Cell V Term3-	Cell Voltage sensing connecting terminal 3-
2	Cell V Term2+	Cell Voltage sensing connecting terminal 2+
	Cell V Term2-	Cell Voltage sensing connecting terminal 2-
1	Cell V Term1+	Cell Voltage sensing connecting terminal 1+
	Cell V Term1-	Cell Voltage sensing connecting terminal 1-
-	FG	Potential for shielding

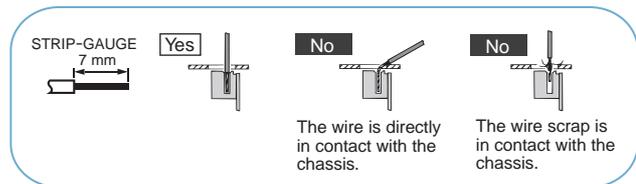
Assemble the sensing cable using the wire of size for AWG 24 to 20 (0.20 mm² to 0.52 mm²).

Insert the wire with 7 mm of the covering removed here.



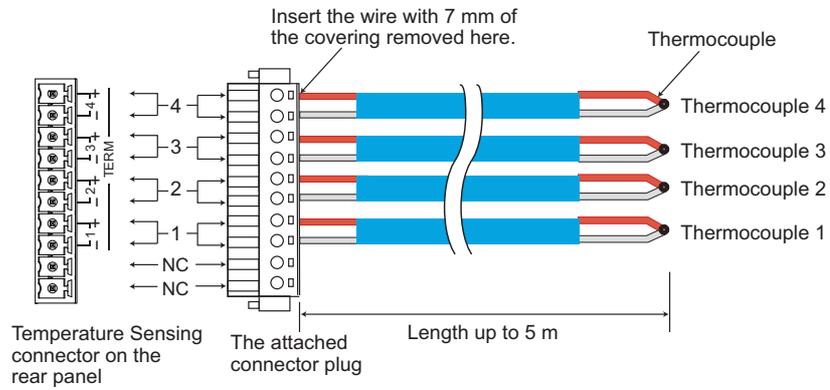
SENSING connector plug

Insert the wire while you press this part down with a flat-blade screwdriver.



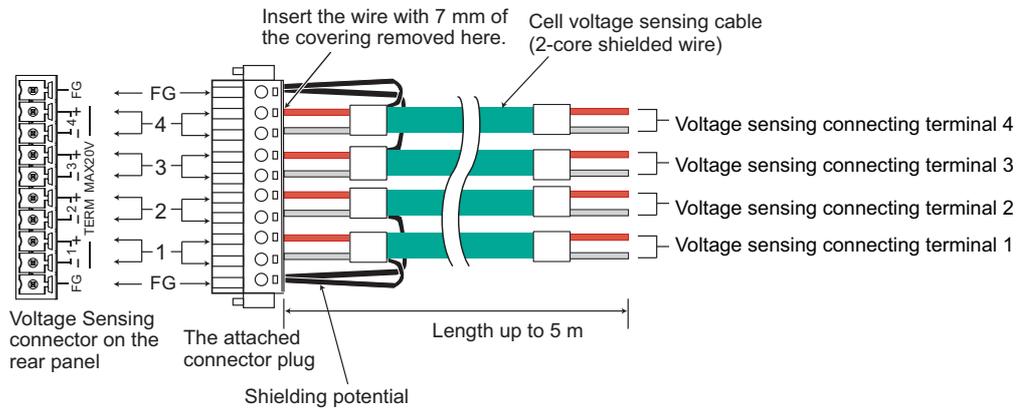
Connecting the thermocouple for connector plug

Connect type K thermocouples directly to the connector plug.



Making the cell voltage sensing cable

Connect the shielded wire directly to the connector plug.



Connecting the DUT (battery)



WARNING

Possible electric shock.

- When installing the fuse between the OP01-PFX and the DUT (battery), make sure that the POWER switch is turned off.
- There is no order for wiring between the connecting equipments, however, the wiring with the DUT (battery) must be arranged at the last and it should be connected from the side of OP01-PFX.



CAUTION

- Be sure to connect the cell voltage sensing cable to both ends of the cell. Failure to do so may cause incorrect voltage measurements or a malfunction. (See p. 93)
- CC - CV, CP and CP Pulse are controlled by the PFX2511 voltage sensing feature. Be sure to connect the PFX2511 cell voltage sensing cables to the DUT.
- If you turn the PFX2511 off while the DUT is still connected to it through cell voltage sensing cables, the DUT will continue to discharge a minute current. This may damage the DUT. (The input impedance of cell voltage sensing cables is 10 MΩ).
- Do not connect the thermocouple element wires (the conductive parts) to the positive and negative terminals of the DUT (battery). Doing so may cause incorrect temperature measurements or a thermometer malfunction.

See p. 45

- 1 Confirm that the POWER switch of all connected equipments are turned off.**
- 2 Connect the DUT cable to the DUT + and the DUT - on the input/output terminal of the PFX2511.**
Pull out the cable in horizontal angle and fix it by screws.
- 3 Connect the other end of the DUT cable to the DUT (battery). Connect DUT + to the positive terminal and DUT - to the negative terminal.**
- 4 Insert the assembled thermocouple and cell voltage sensing connectors into the OP01-PFX input terminals.**
- 5 Connect the other end of the cell voltage sensing cable to the DUT (battery). Connect the positive cell voltage sensing terminal to the DUT (battery) positive terminal and the negative cell voltage sensing terminal to the DUT (battery) negative terminal.**
- 6 Fix the other end (the end that is used to measure the temperature) of the thermocouple to the DUT (battery).**
Use tape, or another appropriate adhesive, to firmly fix the thermocouple to the DUT.
- 7 Insert the assembled sensing connector into the PFX2511 SENSING connector.**
- 8 Connect or fix the other end of the cell voltage sensing cable and the thermiste of the sensing cable, to the DUT (battery).**

See p. 46

Volt / Thermometer Unit OP01-PFX Specifications

Items not listed below conform to the specifications of the PFX2511.

- reading: Indicates the readout value.
- set: Indicates the setting value.
- rating: Indicates the rated.
- Static: General term to indicate CC charge, CC - CV charge, CC discharge, and CP discharge
- Pulse: General term to indicate pulse CC discharge and pulse CP discharge

Charge function

Static		
Constant current / Constant voltage CC - CV	Cutoff condition	Cell voltage (Cell Max Voltage)
		Cell temperature (Cell Max Temp)
		Cell unbalance (Cell Unbalance) ^{*1}
Constant current CC	Cutoff condition	Cell voltage (Cell Max Voltage)
		Cell temperature (Cell Max Temp)
		Cell unbalance (Cell Unbalance) ^{*1}

*1. The maximum and minimum cell voltages are calculated for the cells in the object under measurement, and charging finishes when the difference between these two values exceeds the set value.

Discharge function

Static		
Constant current CC	Cutoff condition	Cell voltage (Cell Cutoff Voltage)
		Cell unbalance (Cell Unbalance) ^{*1}
Constant power CP	Cutoff condition	Cell voltage (Cell Cutoff Voltage)
		Cell unbalance (Cell Unbalance) ^{*1}
Pulse		
Constant pulse current CC Pulse	Cutoff condition	Cell voltage (Cell Cutoff Voltage)
		Cell unbalance (Cell Unbalance) ^{*1}
Constant pulse power CP Pulse	Cutoff condition	Cell voltage (Cell Cutoff Voltage)
		Cell unbalance (Cell Unbalance) ^{*1}

*1. The maximum and minimum cell voltages are calculated for the cells in the object under measurement, and charging finishes when the difference between these two values exceeds the set value.

Cell measurement function

Static	
Cell voltage	Average current of the every 500 ms (Cell Voltage)
Cell temperature	Temperature measurement function using a thermocouple as a temperature sensing element, updated every second (Cell Temperature)
Pulse	
Cell voltage	Maximum voltage and minimum voltage in one cycle (Cell Peak Point).
	Set arbitrary points to measure the voltage (Cell Multi Point)
Cell temperature	Temperature measurement function using a thermocouple as a temperature sensing element, updated every second (Cell Temperature)

Cell protection function

Cell overvoltage (overcharge) protection		Detects overvoltage (overcharge) on the basis of the measured voltage (A/D-converted value) Output off
Cell software OVP	Range	0 % to 105 % of the measured range
	Accuracy*1	±(0.05 % of set + 0.02 % of rating)
	Resolution	1 mV
	Time to trip	150 ms maximum
Cell undervoltage (overdischarge) protection		Detects undervoltage (overdischarge) on the basis of the measured voltage (A/D-converted value) Output off
Cell software UVP	Range	-10 % to 95 % of the measured range
	Accuracy*1	±(0.05 % of set + 0.02 % of rating)
	Resolution	1 mV
	Time to trip	150 ms maximum
Overtemperature protection		Detects the temperature through a thermocouple, Output off
Cell OTP	Range	-100.0 °C to 400.0 °C
	Accuracy*1	±(0.05 % of set + 0.02 % of rating)
	Resolution	0.1 °C
Detection of the cell unbalance protection		Detects the difference between the maximum and minimum cell voltages*2, Output off
	Range	10 mV to 5000 mV*3
	Accuracy*1	±(0.05 % of set + 0.02 % of rating)
	Resolution	1 mV
	Time to trip	1 s maximum
Option communication error		Communication error of option board, Output off

*1. Ambient temperature at 18 °C to 28 °C.

*2. The maximum and minimum cell voltages are calculated for the cells in the object under measurement, and an alarm occurs when the difference between these two values exceeds the set value.

*3. The voltage difference setting. Voltage difference = Vcell_Max - Vcell_Min

Cell voltage measurement

Static		
Number of measurement terminals	4	
Measurable range *1	-2.0000 V to 20.0000 V	
Measurement resolution *2	±(0.05 % of reading + 0.02 % of rating)	
Accuracy	0.1 mV	
Measurement value	Average voltage of the every 500 ms	
Measurement interval	500 ms	
Pulse		
Number of measurement terminals	4	
Measurable range *1	-2.0000 V to 20.0000 V	
Measurement resolution *2	±(0.05 % of reading + 0.02 % of rating)	
Accuracy	0.1 mV	
Measurement value *3	High voltage	Maximum battery voltage in one cycle
	Low voltage	Minimum battery voltage in one cycle
	User-specified	—
Measurement interval *4	1 ms	

- *1. You can apply a voltage from -20 V to 22 V.
- *2. Ambient temperature at 18 °C to 28 °C.
- *3. Automatically synchronized with the BPChecker2000 pulse setting (specify two points from high voltage, low voltage, and user-specified).
- *4. The application software records data every second.
[Data recording time] BPChecker2000 : 1 s to...

Cell temperature measurement

Thermocouple voltage (Temperature) measurement *1	
Number of measurement terminals	4
Thermocouple type	K type
Measurable range *2	-100.0 °C to 400.0 °C
Measurement resolution *3 *4	±1.5 °C (TYP value)
Reference junction compensation *3 *5	±0.5 °C (TYP value)
Accuracy	0.1 °C
Measurement interval	1 s

- *1. The temperature scale conforms to JIS C 1602-1995 (ITS-90). (ITS-90 is an international temperature scale.)
- *2. Depending on your thermocouple's specifications (thermocouple class, wire diameter and insulation), the usable temperature range will vary.
- *3. Ambient temperature at 18 °C to 28 °C.
- *4. When the voltage that the thermocouple calibrator produces is measured.
- *5. This shows the internal sensor performance.
This indicates the temperature measurement accuracy of the thermocouple connector.
Thermometer accuracy = Measurement accuracy + reference junction compensation + thermocouple tolerance

General specifications

Performance when the OP01-PFX is installed in the PFX2511.

Isolation voltage	Input terminal ⇔ chassis	±500 Vmax *1
Insulation resistance *2	Input terminal ⇔ DUT terminal *3	30 MΩ or greater at 500 Vdc, 70 %rh or less *1
	Input terminal ⇔ Input terminal *4	
Outline drawing	Approx. 105W mm x 15H mm x150D mm (4.13W inch x 0.59H inch x5.90D inch)	
Accessories	Locking screws	2 EA

*1. With the PFX2511.

*2. Shared with the voltage / temperature sensing input terminal.

*3. Indicates the terminals for connecting the DUT (the DUT's positive terminal and the DUT's negative terminal).

*4. This indicates the resistance between measurement terminals.



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Appendix

- A Features of the Digital CC/CV Control
- B Description of the Function
- C Connecting a Bias Power Supply
- D Reference Data
- E Troubleshooting
- F Maintenance

A Features of the Digital CC/CV Control

The digital control is adopted to control the operation of constant current (CC) and the constant voltage (CV).

To perform the efficient evaluation test, the following describes the feature and the principle of operation for the digital control of the CC/CV operation.

Features of the digital CC / CV control

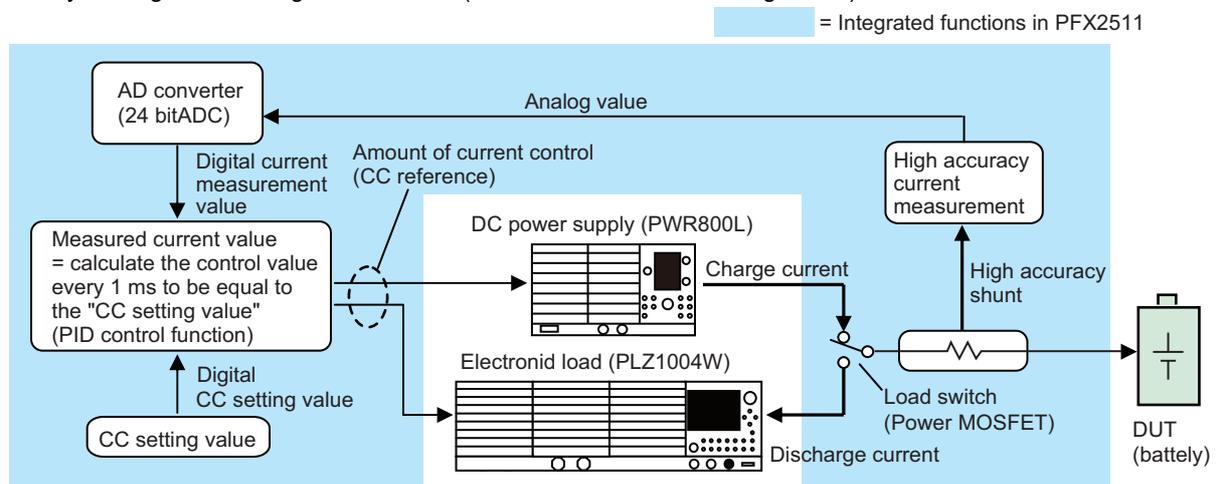
- Enables to keep a high precision of the CC/CV control with less effect of the specification of the connected DC power supply and the Electronic load.
- The adjustment is not required for the system between the DC power supply and the Electronic load.
- The accurate efficiency of the charge and discharge can be measured with less discrepancy in the measurement performance of the charging capacity and discharging capacity.

Description of operation

As an example of the digital CC control under the charging state, the principle of operation is described as follows.

In the constant current charging operation, when the setting value of the CC is forwarded to the PID control section and the operation starts, the PID control function increases the amount of the current control applied to the DC power supply (PWR800L). At this time, the charging current is measured by the high-precision shunt, and the digital current measurement value is acquired by the 24-bit AD converter. The PID control function compares the digital CC setting value and the digital current measurement value, and calculate the amount the amount of the current control to become equal. Each sequence of this operation performs 1000 times per second.

The system figure of the digital CC control (Model ID: 5101 for the charge state)



When the connected DUT is other than the battery, there is a possibility that the operation of the CC / CV control may not be functioned properly.

When at no load (no connection) or the connected battery with the internal impedance at abnormally high, the CV operation may not be activated normally.

Even when the PFX2511 works under the CV operation or the CP operation, the connected DC power supply and the Electronic load operate in the CC mode. This is the normal operation because of that the external equipments are operated as a current source.

Concerning the current rise at the time of when the pulse discharge operation is started

See p. 95

Even when in the state of pulse discharge, the PFX2511 activates the digital CC control to set the current value of each pulse accurately. However, the digital CC control can be operated per 1 ms, so when the pulse with short time width is set, it may take the time to reach the value of set current after pulse discharge is begun. pulse. The figure "The rising waveform of the pulse discharge (measured by the current probe)" in C "Reference Data" indicates an example that the time requires for the period in 4 cycles of the pulse setting until all of the current values reach to the set value (the time varies depends on the setting condition).

App.

B Description of the Function

The following describes the outline and the direction for the measurement features and other function of PFX2511, charge/Discharge System Controller.

Description of the measurement function

The PFX2511 equips the high-speed, a 24-bit delta-sigma analog-to-digital converter (ADC). It enables to perform a wide range of the measurement in 60 V / 50 A without switching the range with a resolution of 100 μ V / 100 μ A in high-speed and high-accuracy.

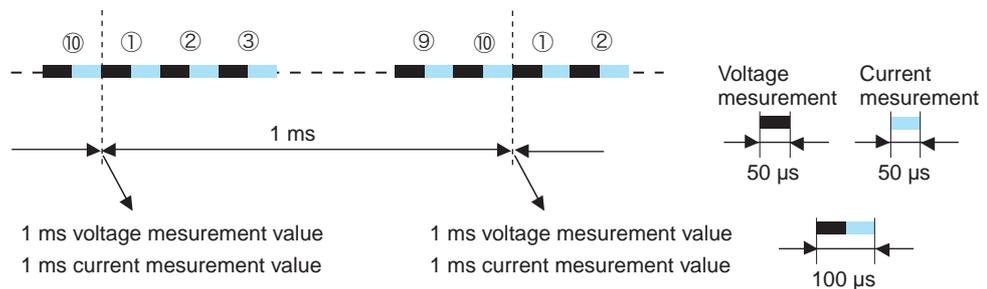
Moreover, the feature of high-speed conversion (ADC) with using application software enables controlling the constant current and constant voltage, detecting each peak voltage at the voltage measurement when in the state of pulse discharge, and calculating the mean value of the pulse current in high accuracy.

Measurement of the normal operation

■ Acquisition and application for the measured value of 1 ms

The time of the ADC is 50 μ s per conversion. The voltage and the current are converted alternately, and when after counting ten conversions of each voltage and current are completed, the average operation is calculated and 1 ms of each measured value is acquired. This measured value of 1 ms is used for the digital CC / CV control, and also used for the measured value of the detecting protection operation (SOVP / SUVP / SOCP).

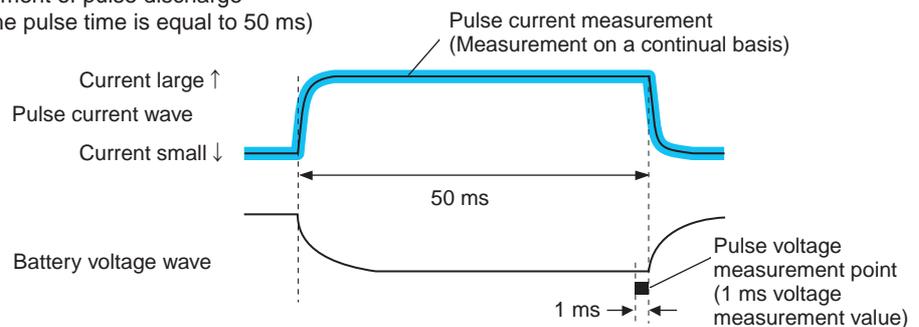
After counting five hundred (500) measured values of 1 ms are acquired, the calculated mean value becomes the measured value of 500 ms. The measured value of 500 ms is continuously recorded by the application software as a data of charge and discharge voltage / current.



Measurement for the operation of pulse discharge

When in the state of pulse discharge operation, the measured value of 1 ms is acquired as well as measurement of the normal operation. As for the pulse voltage measurement, the measurement is executed by the pre-specified pulse. The measurement point is allocated in the position immediately before switching the pulse from the specified pulse to the next pulse. On the other hand, the pulse current measurement measures the capacity integration of the pulse current in high-precision by acquiring the current measurement value of 1ms in consecutively.

Measurement of pulse discharge
(When the pulse time is equal to 50 ms)



App.

Pulse voltage measurement

The pulse voltage measurement has 2 types of measuring mode as Peak measurement and Real measurement.

- **Peak measurement**

Measures a maximum / minimum voltage per cycle of the pulse setting.

- **Real measurement**

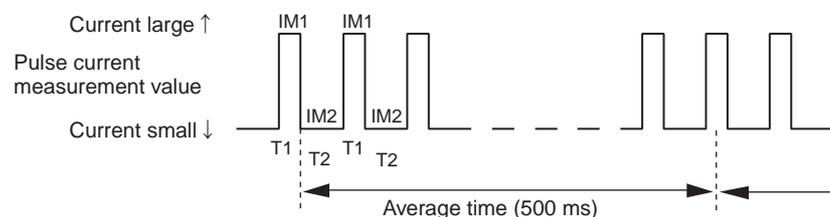
It measures according to the measurement point by the specified position. It is useful when the measurement point to be fixed arbitrarily.

Pulse current measurement

In the pulse current measurement, it measures each pulse current and calculate the average current value by every unit time.

Describes using a practical sample of the operating wave form

[Example 1] Averaging example of the pulse current measurement



Average calculation

$$\text{Average current value} = \frac{\text{IM1} \times \text{T1} + \text{IM2} \times \text{T2} + \text{IM1} \times \text{T1} + \text{IM2} \times \text{T2} + \text{IM1} \times \text{T1} + \dots + \text{IM2} \times \text{T2}}{\text{Tave}}$$

IMn : Each pulse current measurement value

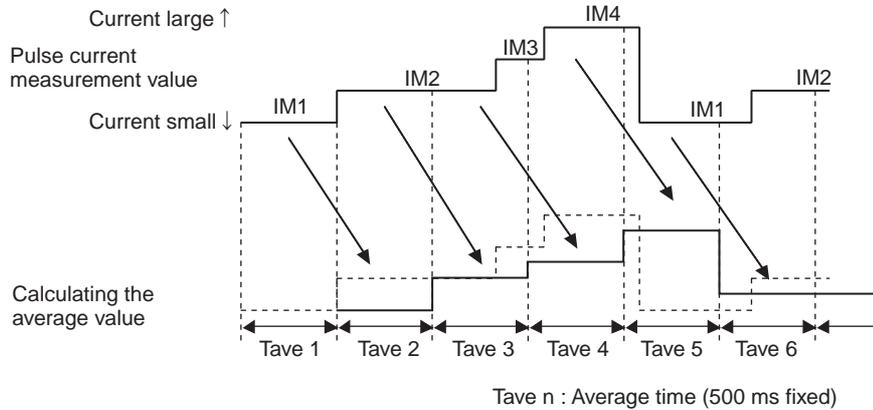
Tn : Each pulse time width

Tave : Average time (500 ms fixed)

The "Example 1" describes the pulse wave which is composed of the pulse time width shorter than the average time.

In this case, the calculation of average current is adding the integration of the actual measurement pulse current value until reaching to the unit time and the pulse time width. And the average current value can be calculated in division by the unit time from the added value when reaching at the unit time.

[Example 2] Averaging example of the pulse current measurement



The "Example 2" describes the pulse wave which is composed of the pulse time width longer than the average time or an equivalent amount of time.

The calculation of the average current uses the actual measurement of the current value which flows in the average time as referred to the "Example 1".

Please note that the result of the calculated average current is generated after the applied average time is elapsed (This case is similar to the "Example 1").

The average current measurement function of the PFX2511 is operated in asynchronous to the cycle of the set pulse wave.

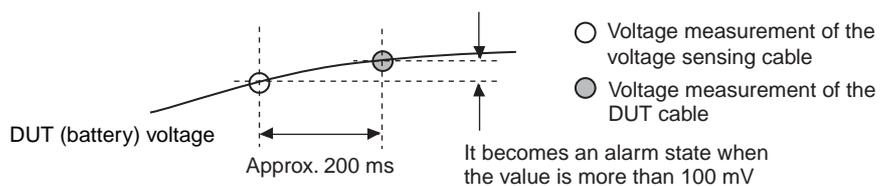
Therefore, the displayed current value is not an indication of the average current value for each cycle of the pulse. The average current measurement value does not indicate the fixed amount of value under the execution of operation, however, it is because of that the average current measurement function of the PFX2511 is operated in asynchronous to the cycle of the set pulse wave.

Connection check function

The connection check function is to measure the voltage value on each of the connected DUT cable and the voltage sensing cable, and if there is any difference in measured voltage value, this function determine the status as abnormal connection and abort the execution of the test. This function prevents from an accident caused by such disconnection of the cables, incorrect wirings. The connection check function activates immediately before the charge or the discharge operation is begun.

The measurement of voltage between the DUT cable and the voltage sensing cable requires time as approx. 200 ms. During this period, if the voltage of the DUT (battery) varies, it may cause generation of the alarm even when the connection is wired properly. Especially, if the rest time is set to short time in the transition from the charge operation to the discharge operation (or from the discharge operation to the charge operation), the voltage of the DUT (battery) varies drastically and it may cause a detection error of the alarm. In such case, please disable off the connection check function.

The connection check function is not a function to verify the wiring condition completely for which might be the case of difficult judgment such as connection failure.



Unbalance detection function (only when an OP01-PFX is installed)

This function measures the voltages of all the cells in the object under measurement, and detects the maximum and minimum cell voltages. When the unbalance voltage (the difference between the maximum and minimum cell voltages) exceeds the set value, an alarm occurs and the output is turned off. If you have set this as a cutoff condition, the charge / discharge operations stop (they are cut off).

The unbalance voltage detection response time is approximately 1 second after the cell voltage measurement begins.

You can connect up to 12 (when three OP01-PFX units are installed) objects under measurement.

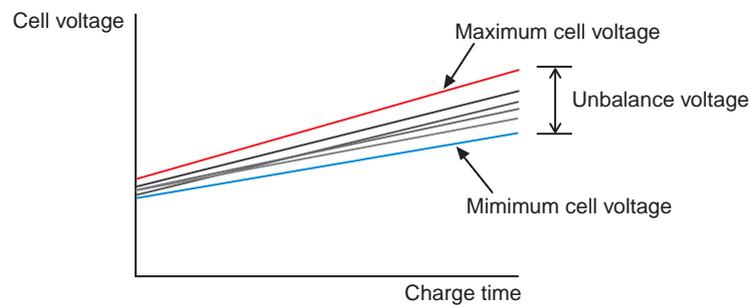
To set the unbalance voltage, use the application software BPChecker2000 .

If the internal resistance of the DUT (battery) is high and the voltage fluctuates greatly during charge / discharge, this function may not operate correctly. Turn this function off during these situations.



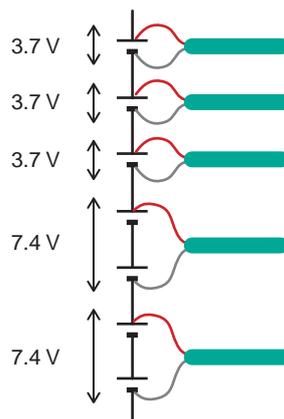
Test Condition Editor

Example of the voltage



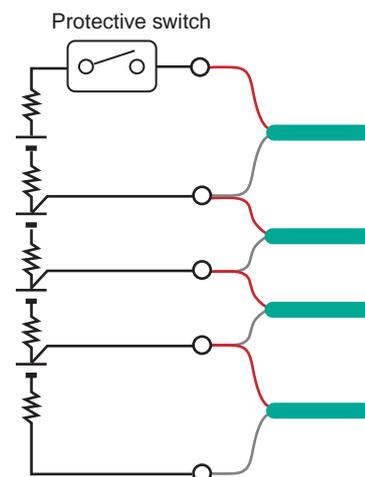
If you connect to the cells in one of the following ways, the unbalance detection function will not work properly. Doing so may lead to the abrupt interruption of tests or the generation of alarms.

Connecting to different voltages
(Example of a prohibited connection)



Be sure to connect a sensing cable to each cell. The unbalance detection function only works on cells of the same type and same voltage.

Not connecting sensing cables to both ends of the cells
(Example of a prohibited connection)



The function is affected by the resistance between the cells and affected by resistance of the protection switch and it cannot measure the correct cell voltages.

App.

C Connecting a Bias Power Supply

参照 p. 18

The discharge minimum operating voltage of this charge/discharge system is approximately 1.5 V (The discharge minimum operating voltage relies on the minimum operating voltage of the Electronic load). If you want to perform discharge tests with a voltage lower than this value, connect a bias power supply.

This is useful when you want to evaluate a low voltage range, when you want to perform a charge/discharge test on a single cell, or in similar situations.

For the bias power supply, you can use variable-voltage power supplies such as the Kikusui PAS series, PWR series, and PAG series or fixed-voltage power supplies.

By connecting a bias power supply of approximately 5 V between the PFX2511 and the electronic load, the voltage becomes "DUT voltage + bias power supply voltage," which is a voltage within the operating area where specifications are guaranteed.

The current capacity of the PFX2511 is 50 A, so when you connect a 5 V bias power supply, configure the settings so that the power capacity is at least $5\text{ V} \times 50\text{ A} = 250\text{ W}$.

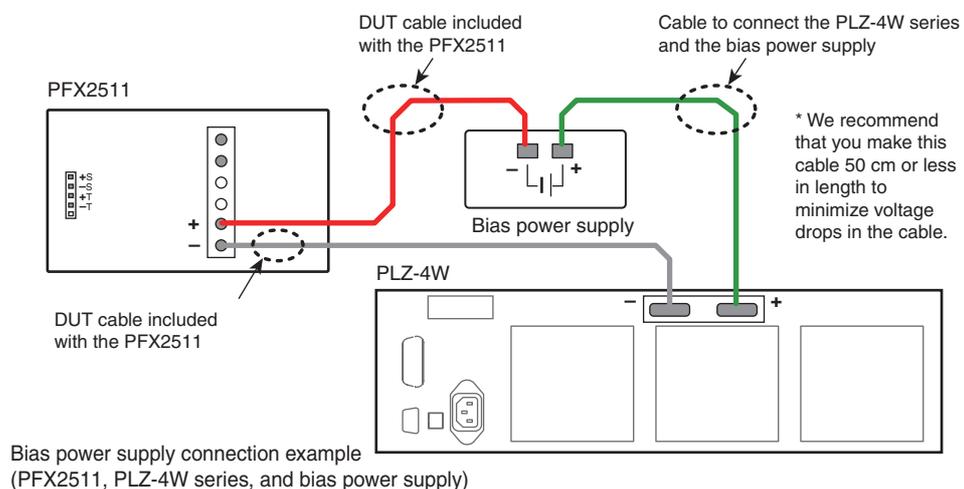
Regarding the power distribution of the PLZ series, the part for the bias power supply is consumed, so if you want to use the PLZ1004W and a 250 W bias power supply, the power range that can be used for DUT (battery) discharge is $1000\text{ W} - 250\text{ W} = 750\text{ W}$.

CAUTION

- Set the bias power supply so that it is always on (its output is on) when the charge/discharge system is on. If the discharge is started with the bias power supply off, the bias power supply may be damaged.
- Pay attention to the bias power supply settings and the permitted capacity (the current rating) to ensure that the bias power supply does not operate in constant current mode (current limit) during discharging. If the bias power supply enters constant current mode (current limit) during discharging, an alarm will occur.
- When a bias power supply is connected, the electronic load's panel displays a voltage of approximately 4 V even when the system is at rest, but this is not a malfunction.

Wires and tools required for connection

Bias power supply	Output voltage: 5 V constant voltage operation Output current: greater than the discharge current
Wires	Cable to connect the PLZ-4W series and the bias power supply 14 mm ² (AWG6) or more, 50 cm or less in length See the table "Nominal cross-sectional area of cables and allowable currents (reference)" on p. 45.



PFX2511 pulse discharge

The data acquired under the following conditions.

System requirement

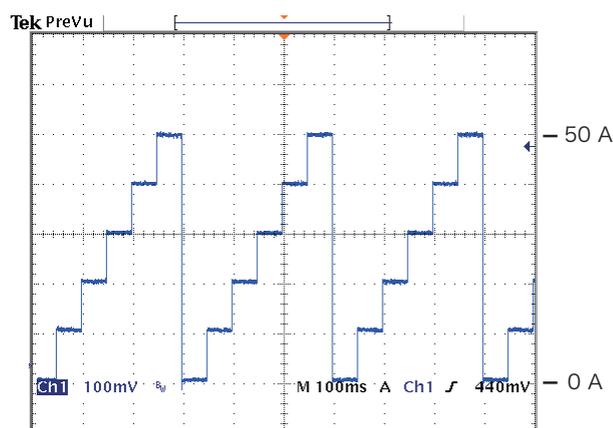
Charge/ discharge system controller	PFX2511
Power supply	PWR800L
Electronic load	PLZ1004W
The DUT (battery)	Connecting the PWR1600L by the 14 mm ² cable with length of 5 m long. (at the operation of 10 V in CV mode)

Measuring conditions

Current probe	3274 (HIOKI)
Oscilloscope	TDS3032 (Tektronix)

App.

Pulse current waveform (measured by the current probe)

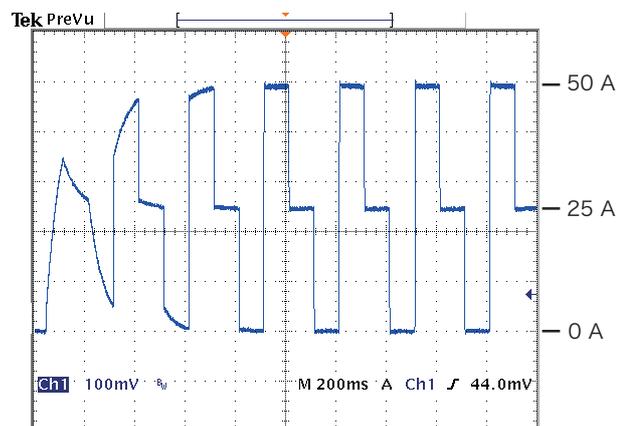


Setting conditions

6 values CC pulse discharge		
Pulse I1	0 A	50 ms
Pulse I2	10 A	50 ms
Pulse I3	20 A	50 ms
Pulse I4	30 A	50 ms
Pulse I5	40 A	50 ms
Pulse I6	50 A	50 ms

The rising waveform of the pulse discharge (measured by the current probe)

After the beginning of discharge operation, the transient response of the pulse controlled by the digital CC indicates as following figure.



Setting conditions

3 values CC pulse discharge		
Pulse I1	0 A	100 ms
Pulse I2	50 A	100 ms
Pulse I3	25 A	100 ms

E Troubleshooting

This appendix explains troubleshooting measures for typical problems. Check whether or not your problem corresponds to any of the items listed below. In some cases, the problem can be solved easily.

If your problem does not correspond to any of the listed items, If you carry out the corrective action but the situation does not improve, contact your Kikusui agent or distributor.

Symptom concerning Charge / Discharge System Controller PFX2511

The power does not turn on.

Problem	Items to check and corrective actions	See
The "STANDBY" LED does not light on even when the POWER switch is turned on.	Is the power cable connected properly?	p. 22
	Are those cables between the equipments connected properly?	p. 24
When the POWER switch is turned on, the "ALARM/WARNING" LED illuminates.	The "ALARM/WARNING" LED may illuminate in red for rare case. However, it does not indicate as an abnormal condition, it is because of the detection of the momentary interruption activates when turning on the POWER switch. Please turn off the POWER switch, then wait for more than 5 seconds and turn on the POWER switch again.	—
	Is any of protection functions or alarm functions activated?	p. 54

Unable to perform testing properly.

Problem	Items to check and corrective actions	See
When it is in the "Idle" state, the "ALARM/WARNING" LED illuminates in orange color.	When it is in the "Idle" state even if the charge/discharge test is not being executed, the alarm function activates. Please remove the cause of occurrence.	p. 43 p. 55
	 Test Condition Editor, Test Executive	
After the test is started, the "ALARM/WARNING" LED illuminates in red color.	The test is interrupted because of an abnormal operation was detected, and it becomes in the state of alarm. Please remove the cause of occurrence.	p. 54
	 Test Condition Editor, Test Executive	
The channel is not identified and the "STANDBY" LED illuminates.	Is the TP-BUS wired properly?	p. 33
	Is the setting node number on the rear panel of the PFX2511 same for other PFX2511's ?	p. 43

Problem	Items to check and corrective actions	See
The PC is suddenly shut down when it is used.	Is the PC in the state of the standby or hibernation mode? Please make sure to turn off the setting for shifting the state to the standby and or hibernation mode.	—
	When the PC is shutting down or freezing while the execution of the charge and discharge test, ongoing test of the charge or discharge continues for its operation, however, the test data is not subject to be saved. To restart the test, please refer to the Help file of application software BPChecker2000.  Test Executive	p. 54
The test can not be executed.	Is the model ID set correctly?	p. 56
	Does the "ALARM/WARNING" LED (Orange) illuminate?	p. 55
	The vibration sensor may have been activated. Confirm that the PFX2511 is located on the stable surface in horizontal position.	p. 43
The breaker of the power supply trips	The protection function of the power supply (OVP or OCP) may have been activated. Please confirm the setting of the protection function of the power supply. It also may happen when the current doesn't flow into the DUT (battery) or when at no load, it is likely to become this operation.	p. 37
It displays <code>Err.000</code> on the front panel.	When the power failure of AC power line is occurred longer than 50 ms or any voltage error is occurred, the alarm (AC_OFF alarm) activates. Moreover, if there is a regenerative device on the same power line and the waveform of the power line confirms large distortion, it may cause to malfunction of the alarm operation or to fluctuate the measurement value. Install the line filter or the like, if necessary.	p. 22 p. 54
It displays <code>Err.012</code> on the front panel.	The over heat protection function of the power circuit may have been activated. It may be concerned for the case such as when the ambient temperature exceeds the operating temperature, the air intake vent and the exhaust vent are blocked, the failure of the cooling fan, the clogged dust filter, etc. When the LED illuminates even any abnormal operation environment is found, stop the operation immediately and contact Kikusui distributor/agent.	p. 54 p. 70 p. 101
It displays <code>Err.050</code> on the front panel.	The alarm was occurred in the connected Electronic load. Confirm whether the protection function (such as "OPP") of the Electronic load is being set properly. Is the power of the Electronic load turned on?	p. 39 p. 54
It displays <code>Err.051</code> on the front panel.	Is the setting of an external analog control of the connected Electronic load properly arranged? Is the flat cable correctly connected? Is there any abnormality found in the DUT cable and the DUT (battery)? When the value of discharge exceeds the rated power of the Electronic load, it may become in the state of alarm.	p. 31 p. 40 p. 54
It displays <code>Err.060</code> on the front panel.	The alarm was occurred in the connected power supply. Confirm whether the protection function (such as "OVP", "OCP", etc.) of the power supply is being set properly. Is the power of the power supply turned on?	p. 37 p. 54
It displays <code>Err.061</code> on the front panel.	Is the setting of an external analog control of the connected power supply properly arranged? Is the flat cable correctly connected? Is there any abnormality found in the DUT cable and the DUT (battery)? When the value of charge exceeds the rated power of the power supply, it may become in the state of alarm.	p. 28 p. 38 p. 54

Problem	Items to check and corrective actions	See
The overshoot is occurred on the pulse current.	Is the Electronic load is properly arranged? Confirm that the setting is correctly arranged as follows. Menu > Setup > Response : 1/2 SLEW RATE settings : Maximum value.	p. 40
	When the pulse current is set at 0 A, a bigger overshoot may be occurred in the following pulse wave. This is caused by the characteristic of the Electronic load. The pulse wave can be improved with setting of the small value of current (several 10 mA).	—
	When the DUT cable is bundled or in excess length, it may become an abnormal wave.	p. 24 p. 45
Indicates the I/O (Comm) alarm on the display of the application softwar.	Indicates when neither the PC nor the PFX2511 are communicated. Please confirm for the connection status of the system. Moreover, when the power supply of the PFX2511 is temporarily disconnected, it becomes this alarm. In case of power failure, please refer to the Help file of application software BPChecker2000.	p. 32
The CC / CV operation has not been functioned correctly.	Do you connect the other than the battery? When the connected DUT is other than the battery, there is a possibility that the operation of the CC / CV control may not be functioned properly.	p. 88
	When at no load (no connection) or the connected battery with the internal impedance at abnormally high, the CV operation may not be activated normally.	
	Do you connect the voltage sensing cable? Unless otherwise, the operation can not be performed properly without connecting the voltage sensing cable. Please secure to wire the voltage sensing cable.	p. 47
Even though option boards are installed, the number of measurement points has not been expanded.	Are the option boards pushed all the way into the PFX2511?	
	Have you customized the model ID? The first time that you use the OP01-PFX after you purchase it, use the application software BPChecker2000 to customize the model ID.	p. 76
	Is the version of the PFX2121 Communication Control Unit version 2.0X or later?	

 [Test Executive](#)

The value of voltage / current is not correctly displayed.

Problem	Items to check and corrective actions	See
The value has not been displayed correctly.	Is the item of description for which you wish to display on the front panel been correctly selected ?	p. 52
The error of display is large.	Due to the initial temperature drift, the error range may be large immediately after turning on of the power . Wait until it becomes in stable condition (approximately 30 minutes), then please confirm it again.	p. 65
	In the pulse average current measurement, the error may become large depends on the setting length of the pulse time and current setting value.	—
	When the dust filter is clogged and the internal temperature rises, the error range becomes large due to the temperature drift of the measurement circuit etc. Clean the dust filter.	p. 101
	When the error becomes large under any condition, it is concerned that the adjustment may be shifted. Contact Kikusui distributor/agent.	—
The voltage display is unstable.	When the DUT other than battery is connected, or any other device connected with the DUT, the indication of the voltmeter may not be stable.	—
	Is the GND line of the power cable grounded? The indication of the voltmeter may be fluctuated if it not grounded properly.	p. 22 p. 24
	It is normal operation, even though the instantaneous value of the pulse voltage measurement (High/ Low voltage etc.) may be affected for several mV of fluctuation due to the characteristic of the measurement circuit.	—
The test data varies.	Do you connect the chassis terminal? It may cause the influence of the noise between the equipments. It is recommended for the wiring of the chassis terminal in order to prevent the mis-operation, acquiring the accurate test data, and execution of charge and discharge test safely.	p. 24

App.

The temperature is not displayed correctly.

Problem	Items to check and corrective actions	See
The error of display is large.	Is the specified thermistor used? If other parts such as capacitor is attached to the thermistor, the display error become large. Use the specified thermistor.	p. 3 p. 46
	Confirm the DUT and the contact method of the thermistor. Even a tiny space causes great effect for the result of a measurement.	p. 47

Symptom concerning Communication control unit PFX2121

The power does not turn on.

Problem	Items to check and corrective actions	See 
The "POWER" LED doesn't blink even when the PFX2121 is connected to the PC with the USB connection.	Is the power of the PC turned on? Has the OS completely been activated? The PFX2121 is operated by the supplied power from the USB connection.	p. 51
	The USB port may not be recognized by the PC. Remove the cause of problem.  Hardware Config Wizard	p. 35
	The power for the self-powered USB hub may not be supplied. Please confirm that the power is supplied to the self-powered USB hub.	p. 35

Unable to perform testing properly.

Problem	Items to check and corrective actions	See 
The "MON ERR" LED remains illuminated.	Does the application software BPChecker2000 operate normally? When any problem is occurred, restart the application software or reactivate the PC.	p. 57

F Maintenance

Cleaning the dust filter



WARNING

Possible electric shock. When performing maintenance work, be sure to turn off the POWER switch and remove the power cord plug.

Dust filters are furnished on the inside of the louver. Periodically clean the filter to prevent clogging.

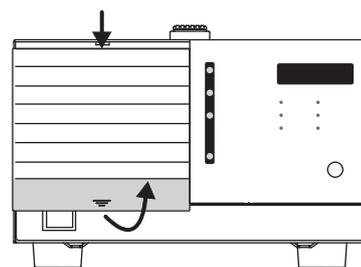


CAUTION

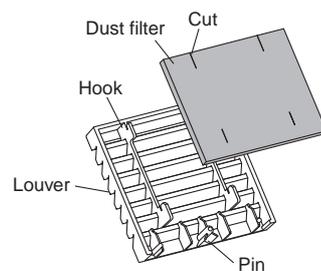
Cause malfunction and shortening of the service life.

- Clogged dust filters hinder the cooling of the inside of the unit
- When the PFX2511 is in operation, air is sucked through the dust filter to cool the inside. If moisture is present in the dust filter, the temperature or humidity inside the PFX2511 increases.

App.



1 Pull down the top section of the louver while pulling the bottom step toward you.

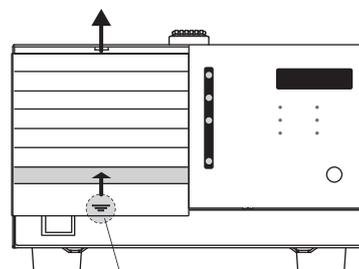


2 Remove the dust filter from the inside of the louver and clean it.

Dispose of foreign particles and dust from the dust filter using a vacuum cleaner. If the filter is extremely dirty, clean it using a water-diluted neutral detergent and dry it completely.

3 Attach the dust filter to the louver.

Attach them so that the tab on the louver fits into the cut on the dust filter.



4 Align and set the hooks of the louver to the panel fingers. While pressing the fourth level from the bottom, slide the louver upward to attach it to the panel.

Fix the pins in place.

Located the inside of louver
fix the pins in place.



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