



## **Battery Tester PFX2000 Series Basic Package**

Best suited for the evaluation on secondary batteries  
5 V/5 A, 25 W × 2 channels(PFX2011 Basic Package)  
20 V/10 A, 200 W × 1 channel(PFX2021 Basic Package)



## Point 2

### Dependable safety!

Equips various protections such as OVP, UVP, OHP, OTP, etc to prevent the batteries from being damaged by a system malfunction or operation mistake.

## Point 1

### All-in-one package!

This all-in-one package includes the necessary and convenient application software, load cable with alligator clips for connecting to the test material and everything you need to begin.

## Point 3

### High cost - performance!

Realizes high-accuracy and high-stability testing for 1ch and 2ch battery tests at an affordable price.



\*This photo shows an example of the PFX2011 package. The PC is not included.

# Battery Tester Basic Package PFX2000 SERIES Basic Package

<Lineup>

- PFX2011 Basic Package [5 V-5 A/ 2ch]
- PFX2021 Basic Package [20 V-10 A/ 1ch]

<Package contents>

- Charging/discharging power unit (PFX2011 or 2021)
- Control unit
- Unique single-unit frame
- Unique application software
- Load cable for test material connection (with alligator clips)

\*PC is not included. The specifications of the unique application software that is provided with this product (BPChecker2000 BASIC Edition) are limited to 2-channel operation. The impedance measurement unit cannot be connected. The other specifications are all the same as the BPChecker2000 FULL Edition application software (SD002).

### Examples of applications



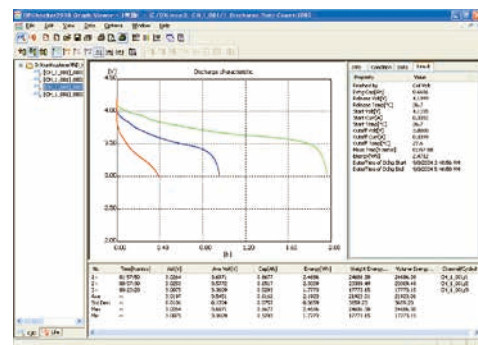
With the PFX2000 Series Basic Package and a Windows PC, you can begin battery testing including PASS/NG tests, lifetime diagnosis (deterioration tests) and comparison tests. The PFX2000 Series is a high-performance battery testing system that is used by battery manufacturers. This package is all that is needed to perform high-accuracy, high-stability testing that meets the strict needs of battery manufacturers. PFX2011 is suitable for characteristic evaluation for single cell batteries and mobile phones. PFX2021 is ideal for characteristic evaluation for laptop PC, digital cameras, etc.

## Application Software

Application software, BPChecker2000 provides centralized management including setting of test conditions, test execution and analysis of results.

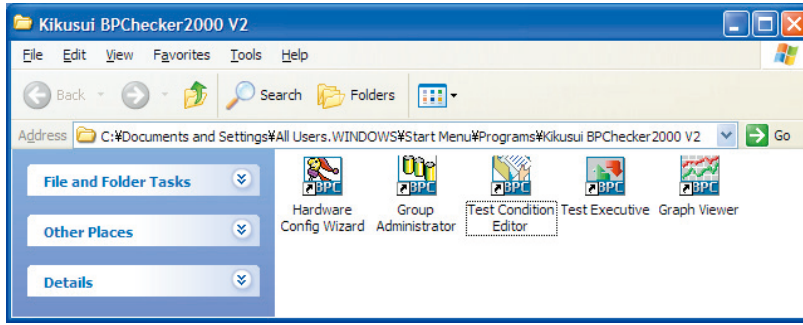
It also allows external control of a thermostatic chamber (product of Espec Corp.) via GPIB or RS232C communications, and it is capable of synchronized test with the chamber temperature.

Recommended operating environment : CPU: Pentium IV 1 GHz or higher / Memory: Minimum 512 MB / Windows 2000 (SP4 + Update Rollup1), XP (SP2 or later, x86), Vista (x86, x64) / USB interface (For thermostatic chamber control, GPIB or RS232C is also required.)



▲ Example of screen display: The charging (discharging, charging + discharging) curve can be overlaid on the display. The average, standard deviation, maximum value and minimum value for the overlaid data can also be calculated for data analysis.

# The entire operation can be managed by the application software (standard accessory)

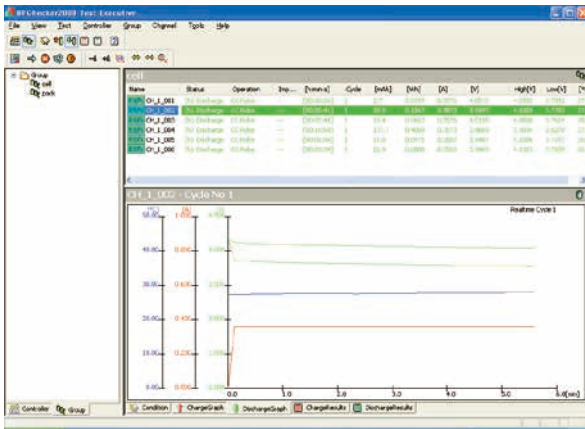


The "BPChecker 2000 Basic Edition", a standard accessory, can manage the entire operation from the setting of the test conditions, the execution of the test, and analyzing the test result files. This software can control the thermostatic chambers (manufactured by ESPEC) and also applies to the synchronized test with the thermostatic chambers.

The recommended operating environment : CPU: Pentium IV 1GHz or higher / Memory 512 MB or more / Windows 2000 Professional (SP4 + Update Roll up1), Windows XP (SP2 or later with Intel x86) or Windows Vista (Intel x86,x64) / USB interface (GPIB or RS232C interface is required for controlling the thermostatic chamber)

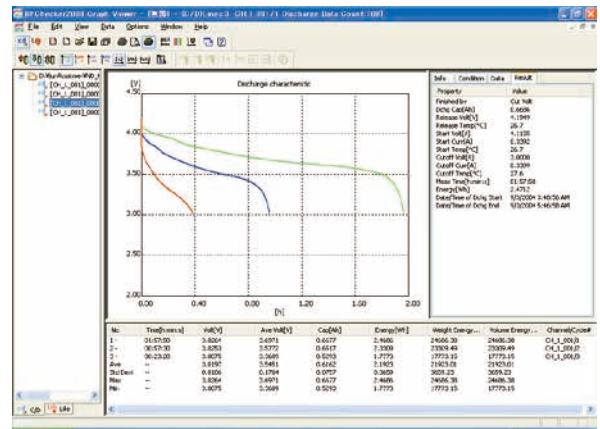
## Test Executive

This application controls the execution of the test. It starts and stops the test and monitors the test execution. It provides a real-time graphical representation of the per-channel charging/discharging trends.



## Graph Viewer

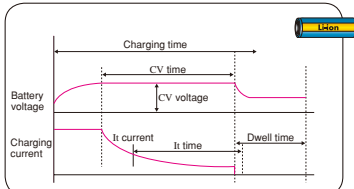
This application offers graphical representations of the charging/discharging data for each cycle. It can display up to 99 sets of data overlaid one another in a single graph and perform statistical processing.



▲The figure shows the overlapped graph of charging curve (discharge, charge + discharge), it is also capable of calculating the average, standard deviation, max or min value, and the data analysis.

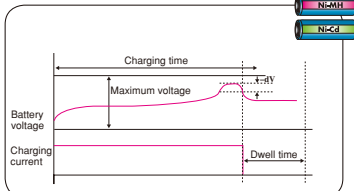
## Conceptual Diagrams of Charging Mode Operation

### CC-CV (constant current-constant voltage)



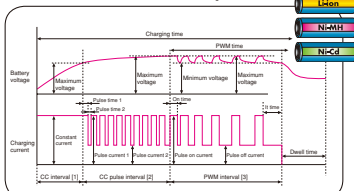
[Termination conditions] Time, CV time, current, and temperature

### CC (constant current)



[Termination conditions] Time, voltage,  $-\Delta V$ , temperature, and  $\Delta T/\Delta t$

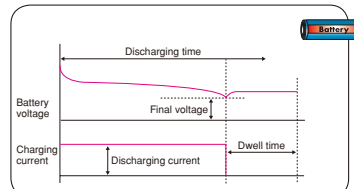
### CC PWM (constant current PWM pulse)



[Termination conditions] Time and off time

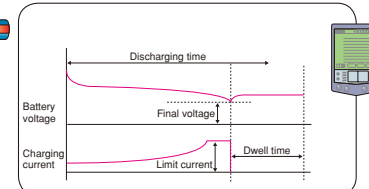
## Conceptual Diagrams of Discharging Mode Operation

### CC (constant current)



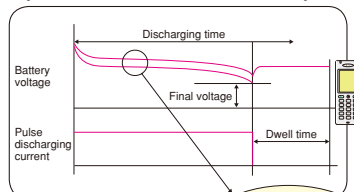
[Termination conditions] Time and voltage

### CP (constant power)



[Termination conditions] Time and voltage

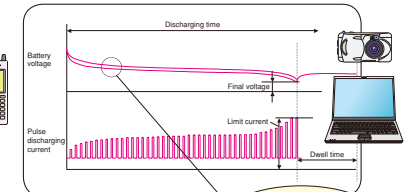
### CC pulse (constant current 8-value/20-value pulse)\*



[Termination conditions] Time and low voltage

\* The above diagram applies to the 8-value pulse of PFX2011. The 20-value pulse is supported only for PFX2021.

### CP pulse (constant power 20-value pulse) \* For PFX2021 only



[Termination conditions] Time and low voltage

## Function specifications

|                             | PFX2011   | PFX2021                         |
|-----------------------------|---|---------------------------------|
| <b>Charge function</b>      |   |                                 |
| Static                      | Constant current/constant voltage (CC-CV), Constant current (CC)  |                                 |
| Pulse                       | PWM pulse (CC-PWM)  |                                 |
| <b>Discharge function</b>   |   |                                 |
| Static                      | Constant current (CC), Constant power (CP)  |                                 |
| Pulse                       | Constant pulse current (CC Pulse)   |                                 |
|                             | -   | Constant pulse power (CP Pulse) |
| <b>Measurement function</b> |   |                                 |
| Static                      | Battery voltage, Charge/discharge current, Battery temperature, Capacity, Time                          |                                 |
| Pulse                       | Battery voltage (PeakPoint, Multi Point), Charge/discharge current, Battery temperature, Capacity, Time |                                 |
| <b>Protection function</b>  |   |                                 |
|                             | Overvoltage (overcharge) protection: Software OVP, Hardware OVP   |                                 |
|                             | Undervoltage (overdischarge) protection: Software UVP, Hardware UVP                                     |                                 |
|                             | Overcharge capacity protection (OAH)  |                                 |
|                             | DUT overtemperature protection (OTP)  |                                 |
|                             | PS board error (PS Alm)   |                                 |
|                             | CD board overheat (OHP)   |                                 |
|                             | CD board error (CD Alm)   |                                 |
|                             | DUT (battery) connection error (Connection Error)   |                                 |
|                             | Communication error   |                                 |
|                             | Watchdog timer  |                                 |
|                             | AC power line error (AC off)  |                                 |
|                             | Alarm monitoring  |                                 |

## Electrical specifications

|  | PFX2011  | PFX2021  |                     |
|--|--|--|---------------------|
| <b>Rated output</b>                      |  |  |                     |
| Number of outputs                        | 2 ch   | 1 ch   |                     |
| Charge current range                     | 0.0 mA to 5000.0 mA (High range)<br>0.00 mA to 500.00 mA (Low range) | 0 mA to 10000 mA   |                     |
| Charge voltage range                     | 0.0000 V to 5.0000 V   | 0.000 V to 20.000 V  |                     |
| Discharge current range                  | 0.0 mA to 5000.0 mA (High range)<br>0.00 mA to 500.00 mA (Low range) | 0 mA to 10000 mA   |                     |
| Discharge voltage range                  | -0.5000 V to 5.0000 V  | -2.000 V to 20.000 V   |                     |
| Maximum charge/<br>discharge power       | 25.00 W  | 200.00 W   |                     |
| <b>Accuracy of settings</b>              |  |  |                     |
| Static constant current charge/discharge | Range  | 0.0 mA to 5000.0 mA (High range)<br>0.00 mA to 500.00 mA (Low range) | 0 mA to 10000 mA    |
|  | Accuracy *1 *10  | ±(0.05 %+1.0 mA) (High range)<br>±(0.05 %+0.10 mA) (Low range)       | ±(0.15 %+2.0 mA)    |
|  | Resolution   | 0.1 mA (High range)<br>0.01 mA (Low range)                           | 1 mA                |
|  | Ripple*2 *10   | 1 mA rms (High/Low range)  | 3 mA rms            |
| Static constant voltage charge           | Range  | 0.0000 V to 5.0000 V   | 0.000 V to 20.000 V |
|  | Accuracy *3 *10  | ±(0.03 %+1.0 mV)   | ±(0.10 %+3.0 mV)    |
|  | Resolution   | 0.1 mV   | 1 mV                |
|  | Ripple*2 *10   | 2 mV rms   | 5 mV rms            |
| Static constant power discharge          | Range  | 0.01 W to 25.00 W (High range)<br>0.001 W to 2.500 W (Low range)     | 0.02 W to 200.00 W  |
|  | Accuracy *4 *10  | ±(0.10 %+10.0 mW) (High range)<br>±(0.10 %+2.0 mW) (Low range)       | ±(0.50 %+20.0 mW)   |
|  | Resolution   | 10 mW (High range)<br>1 mW (Low range)                               | 10 mW               |
|  | *5   |  |                     |
| Pulse constant current discharge         | Range  | 0.0 mA to 5000.0 mA (High range)<br>0.00 mA to 500.00 mA (Low range) | 0 mA to 10000 mA    |
|  | Resolution   | 0.1 mA (High range)<br>0.01 mA (Low range)                           | 1 mA                |
|  | Accuracy *1 *10  | ±(0.07 %+1.0 mA) (High range)<br>±(0.07 %+0.10 mA) (Low range)       | ±(0.15 %+3 mA)      |
|  | Number of settings   | 8 values   | 20 values           |
|  | Response *6 *10  | 50 μs (typical)  | 70 μs (typical)     |
| Time width                               | Range*7  | 0.50 ms to 65000.00 ms   |                     |
|  | Accuracy*10  | ±(0.05 %+0.05 ms)  |                     |
|  | Resolution   | 10 μs  |                     |

|                                | PFX2011                              | PFX2021  |                        |
|--------------------------------|--------------------------------------|--|------------------------|
| <b>Accuracy of settings</b>    |                                      |  |                        |
| Pulse constant power discharge | Range                                | 0.02 W to 200.00 W   |                        |
|                                | Resolution                           | 10 mW  |                        |
|                                | Accuracy*10                          | ±(0.5 %+20.0 mW)*8   |                        |
|                                | Number of settings                   | 20 values  |                        |
| Time width                     | Update rate                          | 2 ms (typical)*9   |                        |
|                                | Range                                | 5.00 ms to 65000.00 ms   |                        |
|                                | Accuracy*10                          | ±(0.05 %+0.05 ms)  |                        |
| Pulse PWM charge               | Resolution                           | 10 μs  |                        |
|                                | Range                                | 0.0 mA to 5000.0 mA (High range)<br>0.00 mA to 500.00 mA (Low range) | 0 mA to 10000 mA       |
|                                | Resolution                           | 0.1 mA (High range)<br>0.01 mA (Low range)                           | 1 mA                   |
|                                | Accuracy *1 *10                      | ±(0.07 %+1.0 mA) (High range)<br>±(0.07 %+0.10 mA) (Low range)       | ±(0.15 %+3.0 mA)       |
| Time width                     | Response *6 *10                      | 50 μs (typical)  |                        |
|                                | Range*7                              | 0.50 ms to 65000.00 ms   |                        |
| Measurement accuracy           | Accuracy*10                          | ±(0.05 %+0.05 ms)  |                        |
|                                | Resolution                           | 10 μs  |                        |
|                                | Static current measurement           | 0.0 mA to 5000.0 mA (High range)<br>0.00 mA to 500.00 mA (Low range) | 0.0 mA to 10000.0 mA   |
| Static voltage measurement     | Accuracy *10 *11                     | ±(0.15 %+1.5 mA)   |                        |
|                                | Resolution                           | 0.1 mA (High range)<br>0.01 mA (Low range)                           | 0.1 mA                 |
| Pulse charge/discharge current | Range                                | -0.5000 V to 5.0000 V  | -2.0000 V to 20.0000 V |
|                                | Accuracy *10 *11                     | ±(0.02 %+1.0 mV)   |                        |
|                                | Resolution                           | 0.1 mV   |                        |
| Pulse battery voltage          | Range                                | 0.0 mA to 5000.0 mA (High range)<br>0.00 mA to 500.00 mA (Low range) | 0.0 mA to 10000.0 mA   |
|                                | Accuracy *10                         | ±(0.10 %+1.0 mA) (High range)<br>±(0.10 %+0.10 mA) (Low range)       | ±(0.20 %+3.0 mA)       |
|                                | Resolution                           | 0.1 mA (High range)<br>0.01 mA (Low range)                           | 0.1 mA                 |
|                                | Measured value*12                    | Average current  |                        |
| Measurement point              | Range                                | -0.5000 V to 5.0000 V  | -2.0000 V to 20.0000 V |
|                                | Accuracy*10                          | ±(0.05 %+1.0 mV)   |                        |
|                                | Resolution                           | 0.1 mV   |                        |
| Measurement point              | High voltage, Low voltage, Arbitrary |  |                        |

## General Specifications

|                               | PFX2011  | PFX2021                   |          |
|-------------------------------|--|---------------------------|----------|
| Input power                   | AC 100 V 50/60 Hz  |                           |          |
| Power consumption             | At rated output  | 400 VAmx                  | 800 VAmx |
|                               | With no load   | 60 VAmx                   | 50 VAmx  |
| External dimensions (Approx.) | 85.5 W x 177 H x 523 D mm (3.37 W x 3.97 H x 20.59 D inch)<br>85.5 W x 177 H x 560 D mm maximum (3.37 W x 3.97 H x 22.05 D inch maximum) |                           |          |
| Weight                        | Approx. 4 kg (8.82 lbs)  | Approx. 4.5 kg (9.92 lbs) |          |

- \*1. With respect to the specified current within the rated range.
- \*2. Maximum value at 10 Hz to 500 kHz.
- \*3. With respect to the specified voltage within the rated range.
- \*4. With respect to the specified power at a battery voltage of 0.5 V or greater on the PFX2011, or 2 V or greater on the PFX2021.
- \*5. Voltage operation range of constant power discharge (warranted value) 0.5 V to 5 V on the PFX2011, 2 V to 20 V on the PFX2021.
- \*6. At 10 % to 90 % of the pulse current waveform when rated current is set. Short-circuit at the tip of the 7-m loadable.
- \*7. The pulse time width is measured at the mesial point of the pulse.
- \*8. With respect to the specified power at a battery voltage of 2 V or greater.
- \*9. Indicates the update rate of the control current by software computation. It is always a fixed time regardless of the pulse time width.
- \*10. Ambient temperature: 18 °C to 28 °C
- \*11. With respect to the actual value within the rated range.
- \*12. Measures the average current every 500 ms.



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