

- High performance, compact size, low cost
- Programmable discharge current control
- Multiple, independent channels
- DC-IR monitoring
- Plug & play modules
- Custom design options

PBT system is specifically designed for testing of primary batteries. Commonly used functions in primary battery testing such as constant current discharge, constant load, and constant power discharge are independently conducted on each channel of PBT. Ramp or staircase discharge current control are also applicable. PBT is capable to perform most of ANSI (American National Standards Institute) and IEC (International Electrotechnical Commission) test standards. The plug & play design of hardware emphasizes a preventive safety net, system reliability, easy maintenance, and low cost.



Main Features

- Maximum of 128 I/V channels in one system/ subsystem, each channel has two current ranges. Independent control for each test channel.
- Programmable discharge current control with Constant, Ramp or Staircase mode, as well as constant load or constant power control. Specified formula function can generate particular control profiles.
- Voltage cut-off can be set at any value in voltage range, but constant voltage control is not available in PBT.
- 0.1% FSR accuracy on current control and reading, and 0.1% FSR on voltage reading and cut-off.
- Capable to conduct most of ANSI and IEC test standards, particularly for dry cells. A set of pre-set testing schedules is included in software package.
- Current rise time between $300\mu\text{s}$ and 1ms, depending upon current rate and setting.
- Online measurement of DC internal resistance.
- Auxiliary inputs such as temperature, and/or voltage, are available.
- Optional Macro-command to extract and derive required data, as well as to interpolate data at middle voltage values. It also summarizes the data over a batch of cells to obtain maximum, minimum, average, and standard deviation values.
- Plug & play module, easy maintenance, reliable safety-net design.
- Continuous constant-load discharge. In contrast to traditional "Discharge Rack", on which cell discharges on real resistor, PBT software acquires cell voltage, then adjusts current to match with the set resistance. This method removes an error source in Discharge Rack, i.e., resistance error of real resistor. Frequent change of real resistors, which is a time consuming work, is not a part of operation on Arbin PBT.
- Single-cycle intermittent discharge. Some of the test standards require single-cycle intermittent discharge at constant current, load or power. For example, to discharge at constant load of 10Ω for 4 hour per day, or discharge at constant current of 120mA for 10 seconds per hour. A simple schedule in MITS Pro software can conduct such test and result in testing time or total number of intermittent pulses to cut-off voltage.



An 8-channel PBT module board and a 16-channel PBT system employing two of the modules.

Plug & Play Modular Design

PBT is designed with plug and play module boards made possible by Arbin's efficient heat sink and chip mounting technology. System maintenance and upgrade become easier for customer to do.

- Double-cycle intermittent discharge.

Double-cycle intermittent discharge is required in other standard tests. For example, to discharge at constant current of 1A for 10 seconds per minute (first cycle) and run one hour per day (second cycle) or to discharge at constant load of 3.9Ω for 4 minutes per hour (first cycle) and run for 8 hours per day (second cycle). A schedule of few steps in MITS Pro software can conduct such test and result in testing time or total number of intermittent pulses to cut-off voltage.

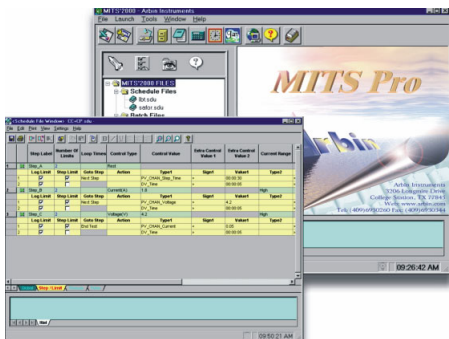
- DC internal-resistance monitoring.

DC internal resistance (DC-IR) of primary battery can be measured during testing using standard feature in MITS Pro software. This method employs DC Pulse mode with time domain analysis. Each DC-IR measurement usually takes less than 0.2 seconds. The interval of DC-IR measurement is very flexible as user may set it at any state of charge in a testing.

- Data extraction/interpolation and summary report with built-in Excel macro commands.



A typical model of PBT-4V-10A-80ch system consists of 80 main I, V channels with a voltage range of 0.5 ~ 4V and 2 current ranges of $\pm 10A/10\text{ mA}$.



Flexible Test Scheduling

PBT is supported by a dedicated software version of MITS Pro, which provides a powerful yet very user-friendly interface. The software is simple, easy and intuitive to use to schedule battery testing.

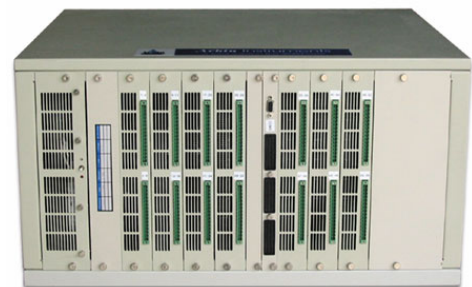


Hardware Specifications of Typical PBT Models

PBT Model	PBT-10V-4A-128Ch	PBT-4V-10A-80Ch	PBT-10V-25A-28Ch	PBT-6V-50A-28Ch	PBT-7V-200A-5Ch	PBT-10V-200A-5Ch	PBT-20V-200A-2Ch	PBT-36V-200A-1Ch	PBT-50V-200A-1Ch	PBT-100V-200A-2Ch	PBT-150V-200A-2Ch
Channel Control	Independent	Independent	Independent	Independent	Independent	Independent	Independent	Independent	Independent	Independent	Independent
Voltage Cutoff	Independent	Independent	Independent	Independent	Independent	Independent	Independent	Independent	Independent	Independent	Independent
I/V Output Voltage	0.5 ~ 10V	0.5 ~ 4V	0.5 ~ 10V	0.5 ~ 6V	2 ~ 7V	3 ~ 10V	3 ~ 20V	3 ~ 36V	3 ~ 50V	3 ~ 100V	3 ~ 150V
Accuracy of V Reading	±10mV	±4mV	±20mV	±12mV	±14mV	±20mV	±40mV	±72mV	±100mV	±200mV	±300mV
Voltage Input Impedance	~10GΩ	~10GΩ	~10MΩ (10GΩ, optional)	~10MΩ (10GΩ, optional)	~10MΩ (10GΩ, optional)	~10MΩ (10GΩ, optional)	~10MΩ (10GΩ, optional)	~10MΩ (10GΩ, optional)	~10MΩ (10GΩ, optional)	~10MΩ	~10MΩ
High Range of Current	4A	10A	25A	50A	200A	200A	200A	200A	200A	200A	-200A
Medium Range of Current	10mA	10mA	100mA	None	10A	10A	10A	50A	40A	13A	13A
Low Range of Current	None	None	None	None	100 mA	100 mA	100 mA	None	None	None	None
Accuracy of I Control & Reading in Regular Step	± 8mA(H); ± 20μA(M)	± 20mA(H); ± 20μA(M)	± 50 mA(H); ± 200μA(M)	± 100mA(H)	± 400mA(H); ± 20mA(M); ± 0.2 mA(L)	± 400mA(H); ± 20mA(M); ± 0.2 mA(L)	± 400mA(H); ± 20mA(M); ± 0.2 mA(L)	± 400mA(H); ± 100mA(M)	± 400mA(H); ± 80 mA(M)	± 400 mA(H); ± 30 mA(M)	± 400mA(H); ± 30mA(M)
Current Rising Time	~ 200μs	~ 200μs	~ 200μs	~ 200μs	500 μs ~ 2 ms	500 μs ~ 2 ms	500 μs ~ 2 ms	500 μs ~ 2 ms	500 μs ~ 2 ms	500 μs ~ 2 ms	500 μs ~ 2 ms



A custom-designed 1-channel PBT system. The channel has minimum voltage of 10V, maximum voltage of 100V, maximum discharge current of 25A, and maximum power of 2500W.



A custom-designed 56-channel PBT system. Each channel has minimum voltage of 0V, maximum voltage of 5V, 2 current ranges of 0.1A/0.001A, and maximum power of 0.5W.