Battery Testing & Research Solutions

BT–I

A multiple independent channel test station fine-tuned for testing batteries, supercapacitors, and other energy storage devices. The BT-I Series provides individual voltage clamp safety limits for testing to prevent damage to the devices being tested. Includes a PC preloaded with our MITS Pro and Data Watcher software for writing test schedules, monitoring real-time data, and reviewing and plotting test results.

MODEL	VOLTAGE	CURRENT
BT-I-10V-10A	(-2)V to 10V	± 10A/100mA/1mA
BT-I-20V-10A	OV to 20V	± 10A/100mA/1mA

Primary Applications:

- Lithium, Lead-acid, Nickel & Alkaline Battery Testing
- Small battery packs
- Half cell testing and materials research
- Primary & secondary battery testing

Key Features

- Multiple independent channels, where each channel functions independently to run multiple experiments simultaneously.
- Each channel comes with three current ranges with 16 bit resolution.
- Advanced software package, MITS Pro (Multiple Integrated Testing System, professional version), provides flexible scheduling, user-friendly interface, distributed system control and data acquisition
- Software provides easy data analysis and plotting based in Data Watcher or Microsoft Excel
- In multi-electrode applications, each channel accommodates an individual RE, or several channels can share one RE (such as in a combinatorial cell). This results in accurate control and measurement and enables individual IR drop compensation. Channels share ground as the counter electrode (CE).

Individual Voltage Clamp

- Each channel in the test station will be safely controlled by their own Voltage Clamp Value
- User-defined value set in the software that is applied at the hardware level. The system will not allow the voltage to go above or below the set clamp values on all channels to keep batteries within the safety settings.
- The system provides a Low Voltage Clamp Value and High Voltage Clamp Value

Arbin INSTRUMENTS

BT-I

Hardware Specifications

MODEL NUMBER	10V-10A	20V-10A
Bipolar Linear Circuit Type	Provides zero switching time between charge and discharge Circuit Board: 2243-4	
Voltage Range (max/min)	-2V to 10V	0V to 20V
Accuracy of Voltage Control & Reading	±10mV, 0.05% Full Scale Resolution	
Current Ranges Provided 0.05% Full Scale Resolution	High: 10A ± 10mA Medium: 100mA ± 100uA Low: 1mA ± 1uA	High: 10A ± 10mA Medium: 100mA ± 100uA Low: 1mA ± 1uA
Minimum V at Maximum Current	-2V @ 10A	0V @ 10A
Maximum Continuous Power Output/Channel	100W	200W
Voltage Measurements Input Impedance	~10GΩ	
Current Rise Time	100-150µS Time required for current output to get from 10%-90% of requested value	
Current and Voltage Resolution	16 Bit or 0.0015% FSR	
Voltage Clamp	Individual Voltage Clamp	
Connection for Batteries	Standard 6 ft. cables with alligator clips Arbin can also provide different battery holder options to allow easy engagement of the device to the test station	
Connection to Computer	TCP/IP	
Ventilation Method	Air cooled, front-to-rear airflow	
Room Operating Temperature	10 to 35 degrees C	
Computer Specifications	PC with 22" flat-screen monitor is included, preloaded with our MITS Pro testing software	

CHASSIS SIZE OPTIONS	CHANNEL NUMBER OPTIONS	
15" X 30" X 25"	4	4
30" X 30" X 45"	32	32
30" X 30" X 77"	64	64

Arbin can provide input power options of 110V or 220V Single Phase, or 208V, 380V or 480V Three Phase System power input options are determined by customer site and system power required.

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Software Control Specifications

Current (A)	Outputs constant current to the cell or battery at the value specified Positive current refers to charge and negative current refers to discharge
Voltage (V)	Outputs constant voltage to the cell or battery at the value specified
C-Rate	C-Rate is a method for indicating the discharge as well as the charge current of a battery. It can be expressed as I=M∗C where I=current A; C=battery capacity; M is the C-rate value.
Rest	The battery is disconnected from the charge/discharge circuit but remains connected to the voltage measurement circuit to enable open-circuit voltage measurement
Power (W)	Outputs constant power to the cell of battery at the value specified.
Load (Ohm)	Applies a constant resistance load to the battery at the value specified. The load control type will always produce a negative current.
Set Variable (s)	Change test related variables including channel capacity, energy and all test counter variables.
Current/Voltage Ramp	Generates a current/voltage ramp with a positive scan rate for increasing current/voltage, and negative scan rate generates decreasing current/voltage ramp.
Current/Voltage Staircase	Generates a current/voltage staircase with increasing current/voltage, and negative decreasing current/voltage staircase with adjustable step amplitude.
Voltage Cycle V	This mode, commonly called Cyclic Voltammetry, permits the user to create linear sweeps in one step, eliminating the need to jump steps to reverse sweep directions
Current and Power Simulation	Non-standard time-domain functions may be inputted from external sources such as ASCII data streams and used as control parameters for repetitive tests
DC Internal Resistance	This function applies a 10-pulse train with 1ms pulse width of the specified magnitude following a constant-current charge or discharge step
CCCV	Allows users to implement a constant current-constant voltage charge regime in one step. Users specify the charge rate (CC) and the voltage limit (CV); with a specified current or time limit termination value.
Formula	Equips the user to control and limit schedule steps according to dynamic mathematical equations in addition to constants or instantaneous channel data
End Conditions	Time, Voltage, Current, Capacity, Energy, ΔV, DV/dt, formula, meta-variables, and other combinations
Data Logging Rate	During a standard step: 40-150 data points per second, per PC
Network Capabilities	Provide TCP/IP access for networking
Data Result File	Imported into Microsoft Excel; Arbin's Excel Data Pro macro included for easy data manipulation
Data File Content	Channel data; test time, step time, voltage, current, capacity, energy, first/second derivative of I or V, auxiliary input data (optional). Statistical data: cycle #, cycle capacity/energy, max voltage, etc.

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Auxiliary Options & Accessories

Arbin Instruments provides a wide variety of auxiliary modules for expanding the capability of the main I, V control circuitry. Each module plugs securely to the bus board. These auxiliary modules are classified as input, input/output, and control modules.

Input Modules: Auxiliary inputs can be used to record desired data as well as to terminate or regulate charge and discharge processes based upon measured conditions. Selectable inputs are of V (voltage), T (temperature), and P (pressure).

Input / Output Modules: Digital I/O is an integrated peripheral on/off control. The output commonly is used to control valves and switches. The input allows an external control signal to control testing procedure.

Control Modules: Arbin provides control modules for Auto-Calibration, Smart Battery Testing, External Charger, Temperature Chamber Interface and AC Impedance Measurement.

For more information please visit: www.arbin.com/products/accessories/auxiliaries.htm

Safety & UPS Features

Several safety provisions are provided in every Arbin system. There are multiple levels of fusing provided inside the system for further protection at the channel/board and power supply levels. The software also has several safety functions with which the user can avoid over charging the cells, over discharging, overheating, etc.

Smart UPS: (optional) This option uses a small Smart UPS to back up power to the computer only. This allows the system to automatically resume tests after a stop due to brief power interruption. There is provision for the user to intervene if desired before the channels resume. This is an essential component for any user with an unreliable power source unless the entire facility is on backup power.