



Power Tools Battery Testing Solutions

The Arbin PTBTS series is designed specifically to meet the needs of Power Tool Battery testing applications. This was done by researching present industry needs, and noticing trends from our own experiences after 20 years of manufacturing battery testing systems.

Arbin understands the proprietary nature of Power Tool Batteries and internal circuitry that sets them apart. This is why we have designed our systems to surpass present-day testing requirements and allow for future innovations. Our teams of engineers are ready to design a solution for any new smart circuitry or communication protocols that are developed.

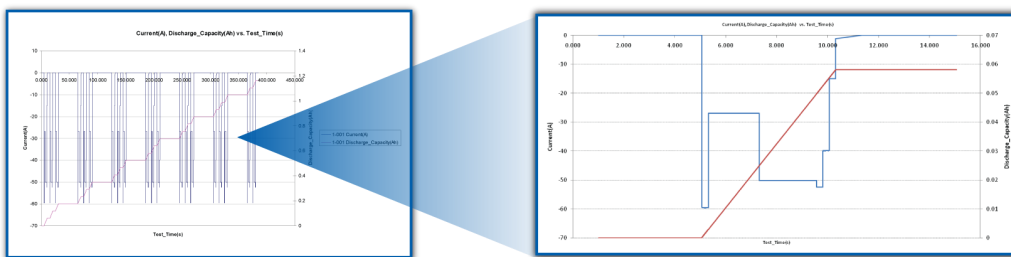
PTBTS

Voltage Range of 24V and 60V

Current Ranges from 10A to 100A

The PTBTS is able to perform the real-world simulations that are demanded when testing Power Tool Batteries. The user is able to customize the test profile for each channel. Each channel has the capability to interface with an external charger or load and the Arbin system can be used to record real data while a tool is being used and then use this data to simulate the same charge/discharge pattern on other devices.

- Independent Programmable control of current, voltage, load and power - Arbin's software is the most flexible in the industry and allows a user to create and simulate test profiles based on real-world applications, including those which have pulse charge or discharge steps.



The charts display a discharge profile for a circular saw.

- Digital input/output relays that are commonly used for triggering external conditions such as turning on or off an external charger. Available in TTI and Relay. Eight channels of input and eight channels of output are included.
- Industry-leading accuracy for current and voltage at 0.05% FSR using our linear bipolar circuitry.

Key Features



PTBTS

Voltage Range of 24V and 60V

Current Ranges from 10A to 100A

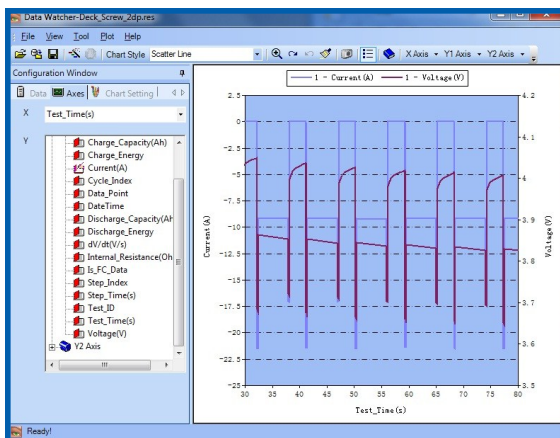
Key Features *Continued...*

- Interface with an external charger/load on each channel. This is useful when qualifying chargers to be used with your batteries or studying load profiles. Using this option, the user connects the battery to the main I/V channel and the charger or load to the External Charge input provided.

The user can program the battery to be charged/discharged by the external charger/load at a predetermined step in the schedule. The system internally and automatically connects the battery to the charger/load. During the External Charge/Load step, the Arbin system collects data about the charger/load performance. The system then disconnects the charger/load once the preset limit conditions are met.

This can also be used to have a battery connected through the external charger and the power tool connected to the main I/V channel while performing an action with the power tool such as drilling a hole. The Arbin System will record the current and voltage profile, which can then be used to simulate this same profile on other batteries.

- Option to add auxiliary voltage measurement channels to measure each cell voltage in a multi-cell battery pack or to measure the reference electrode voltage in a three electrode setup. The value of voltage can be recorded in the results file or used to further control the experiment.
- Option to add auxiliary temperature measurement channels to measure the temperature at any point in the setup using either our thermocouple module (E, J, K or T) or our thermistor module (type to be specified when placing the order). The value of temperature can be recorded in the results file and/or used to further control the experiment.
- View results graphically in real time with Arbin's Data Watcher program. This can be used to view individual or multiple channels at the same time and the user may customize what is plotted on each axis. The raw data files are saved as Microsoft Access database file, but Arbin provides the macro to automatically convert this into Excel format for easy data analysis and manipulation.



Data Point	Test Time(s)	Date	Step	Step Time(s)	Step Index	Cycle Index	Current(A)	Voltage(V)	Charge_Capacity(Ah)	Discharge_Capacity(Ah)	Charge_Efficiency(Wh)	Discharge_Efficiency(Wh)	dV/dt(V/s)
59	30.61845928	04/05/2006 12:47:05	1	5.00145558	3	3	0.40404887	4.050295455	0	0.00592948	0	0.00592948	0
60	31.13604653	04/05/2006 12:47:06	2	2.01570139	3	3	0.40404887	4.050295455	0	0.00592948	0	0.00592948	0
61	31.63408487	04/05/2006 12:47:06	2	2.51271151	3	3	0.40404887	4.050295455	0	0.00592948	0	0.00592948	0
62	32.11925446	04/05/2006 12:47:06	2	3.00942873	3	3	0.40404887	4.050295455	0	0.00592948	0	0.00592948	0
63	32.60442311	04/05/2006 12:47:11	2	4.00283413	4	4	-0.00824313	4.050407844	0	0.05033342	0	0	0
64	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
65	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
66	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
67	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
68	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
69	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
70	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
71	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
72	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
73	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
74	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
75	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
76	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
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82	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
83	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
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91	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
92	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
93	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
94	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
95	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
96	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
97	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
98	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
99	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0
100	32.14913912	04/05/2006 12:47:13	2	4.00283413	2	4	-0.02138213	4.050324917	0	0.05033342	0	0	0

PTBTS

Voltage Range of 24V and 60V

Current Ranges from 10A to 100A

Hardware Specifications

MODEL NUMBER	24 - 10	24 - 50	24 - 100
Voltage Range (max/min)	2V to 24V		
Voltage Accuracy (0.05% FSR)	±24mV		
Voltage and Current Resolution	16 bit		
Current Ranges Provided	High: 10A ± 10mA	High: 50A ± 50mA	High: 100A ± 100mA
0.05% Full Scale Accuracy	Medium: 500mA ± 0.5mA	Medium: 5A ± 5mA	Medium: 10A ± 10mA
	Low: 10mA ± 0.01mA	Low: 500mA ± 0.5mA	Low: 1A ± 1mA
Minimum V at Maximum Current	2V @ 10A	2V @ 50A	2V @ 100A
Voltage Input Impedance	~10GΩ		
Current Rise Time	~200μS	~500μS	~500μS
Voltage Clamp	Individual / Channel Based Voltage Clamp		
Max Continuous Power per Channel	240W	1200W	2400W
Max Current of External Charger Circuit	10A	20A	20A
Pulse Capability	Only one repeated or single pulse profile can be run at the same time on channels connected to the same microcontroller. Systems with 8 channels or fewer have a dedicated microcontroller for each channel. Systems with more than 8 channels will have one microcontroller shared by four channels.		
Internal Board Circuitry	Arbin 2243-2	Arbin SCT200	Arbin SCT200
Ventilation Method	Air cooled		
Room Operating Temperature	10 to 35 degrees C		
Connection to Computer	TCP/IP		
Computer Specifications	PC with 22" flat-screen monitor is included, preloaded with our MITS Pro testing software		

CHASSIS SIZE OPTIONS	Number of Channels (Microcontrollers)		
30" X 30" X 65"	20 (3)	4 (2)	2 (2)
40" X 40" X 77"	X	8 (4)	5 (5)



PTBTS

Voltage Range of 24V and 60V

Current Ranges from 10A to 100A

Hardware Specifications

MODEL NUMBER	60 - 10	60 - 50	60 - 100
Voltage Range (max/min)	2V to 60V		
Voltage Accuracy (0.05% FSR)	±60mV		
Voltage and Current Resolution	16 bit		
Current Ranges Provided	High: 10A ± 10mA	High: 50A ± 50mA	High: 100A ± 100mA
0.05% Full Scale Accuracy	Medium: 500mA ± 0.5mA	Medium: 5A ± 5mA	Medium: 10A ± 10mA
	Low: 10mA ± 0.01mA	Low: 500mA ± 0.5mA	Low: 1A ± 1mA
Minimum V at Maximum Current	2V @ 10A	2V @ 50A	2V @ 100A
Voltage Input Impedance	~10GΩ		
Current Rise Time	~1mS		
Voltage Clamp	Individual / Channel Based Voltage Clamp		
Max Continuous Power per Channel	240W	1200W	2400W
Max Current of External Charger Circuit	10A	20A	20A
Pulse Capability	Only one repeated or single pulse profile can be run at the same time on channels connected to the same microcontroller. Systems with 8 channels or fewer have a dedicated microcontroller for each channel. Systems with more than 8 channels will have one microcontroller shared by four channels.		
Internal Board Circuitry	Arbin HVL		
Ventilation Method	Air cooled		
Room Operating Temperature	10 to 35 degrees C		
Connection to Computer	TCP/IP		
Computer Specifications	PC with 22" flat-screen monitor is included, preloaded with our MITS Pro testing software		

CHASSIS SIZE OPTIONS	Number of Channels (Microcontrollers)		
40" X 40" X 77"	12 (3)	5 (5)	4 (4)



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Software Control Specifications

Arbin Software	MITS Pro 4.0
Standard Types of Control	Current and voltage control via constant, ramp, staircase, or user-defined formula Constant power, constant load
End Conditions	Time, Voltage, Current, Capacity, Energy, ΔV , DV/dt , formula, meta-variables, and other combinations
Data Logging Rate	40-150 data points per second, per PC. Faster data logging during High Speed Pulse Mode
Simulation for Non-Formulated Profile	Current, voltage, or power simulation, response in seconds
Network Capabilities	TCP/IP access for networking provided
Data Result File	Imported into Microsoft Excel; Arbin's Excel Data Pro macro included for easy data manipulation

Safety Features

Multiple layers of safety provisions are provided in Arbin's system. The system itself is secure internally to protect from unintentional misuse. Multiple levels of fusing are provided inside the system for protections at the channel or board and power supply level.

The software also has several safety functions which the user can use to avoid over charging the cells, over charging, over-heating etc. For the lithium battery charging profile, Arbin includes the CCCV (constant current and constant voltage) switching step to provide safe charging.

- Watchdog - monitors the machine's internal communication and turns off the system in case of a major hardware failure. See Figure 1.2 for more information.
- Fuses - multiple levels of fuses prevent damage from unexpected shortage or over-current.
- Thermostiches - prevent over heating from an abnormally large current or breakdown of cooling fans.
- UPS (Optional) - (uninterruptible power supply) for the PC only to help prevent data loss or damage from power failure.
- Software Safety Limits - each test schedule has programmable safety limits for current, voltage, and temperature for the entire test.
- Software Step Limits - each step in a test schedule has limits available for almost every variable or meta-variable that can be set for termination of the step or the test.
- Independent voltage clamp - is a powerful hardware feature to prevent voltage overshoot, which is critical for Li-batteries. Since it is hardware-based, the clamp reacts much quicker than any form of software control (<1ms) and will protect even in the case of a PC failure. It allows the independent control of voltage clamp for each channel.