



## Battery Charge and Discharge Test Solution

Carbon neutrality has become consensus of global development. Clean energy and low-carbon transition have become inevitable trend. It makes new energy new energy automobile industry keep growing vigorously as past ten years. It is also the crucial guarantee to realized low carbon in life cycle. With opportunities of carbon peak and neutrality targets, market penetration of new energy automobile has reach to 10%. Industry experts believe that new energy automobile is expected to account to more than 35% of new car sales amount in China. Recently, GM, Ford and Toyota successively announced plan of building battery manufacture or automobile assembly plant in US.

High mileage, fast charge and battery safety are the requirement of customer to automobile. Constant fire accident and other trouble are exposed since new energy vehicles released. Safety, reliability and life time of battery tend to be concern by battery manufacture and new energy vehicles assembly plant. Hereby, APM specially develop high power source and E-load to fit the market demand.

### Test target:

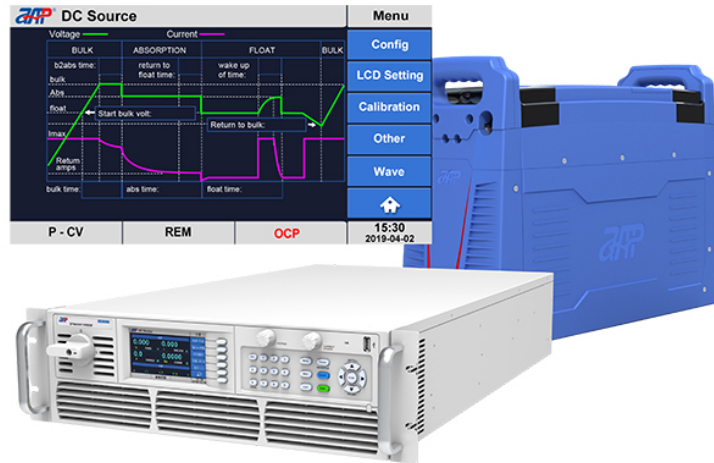
All kind of batteries include fuel battery, lead-acid battery, lithium battery (power battery), nickel cadmium battery

### Recommended instruments

- SP3U/6U series wide range high power programmable DC source
- SPS-M/A series DC source system
- EL series high power density DC E-load
- ELS series DC E-load system



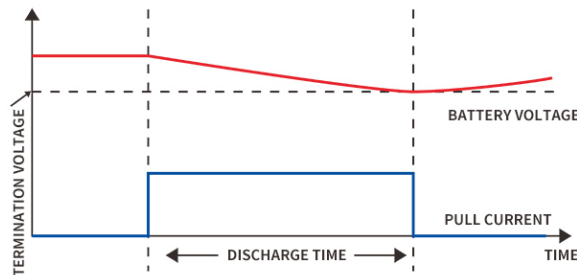
### Charge application



### Advantage

- 1. Smart 3-stage charge algorithm. Perfectly match battery type. Precisely manage charge progress.
- 2. Real time redraw battery charge conditional curve.
- 3. Professional test software, support date export.
- 4. High accuracy, high resolution, low ripple and completed communication interface.
- 5. Support master-slave mode to extend power range.

### Discharge application



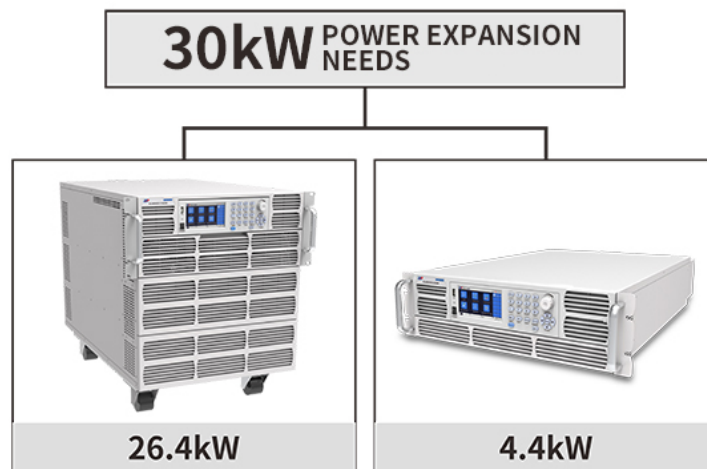


## Advantage

1. Support mater-slave mode to extend power range. No limited to model type.
2. Multiple discharging cut off condition setting; avoid permanent damage due to over discharge.
3. Multiple discharge mode setting. Match different test application.

## Flexible power range extension

When power range of E-load is Insatiable, it could parallel connect two or more unit. If customer purchased higher power range E-load already, it could purchase a small power range unit to extend power range. For example, customer need to extend test range to 30kW and has already purchase 26.4kW unit. Then, only need to purchase one 4.4kW E-load. Mater-slave mode is applicable to build parallel system by different models.

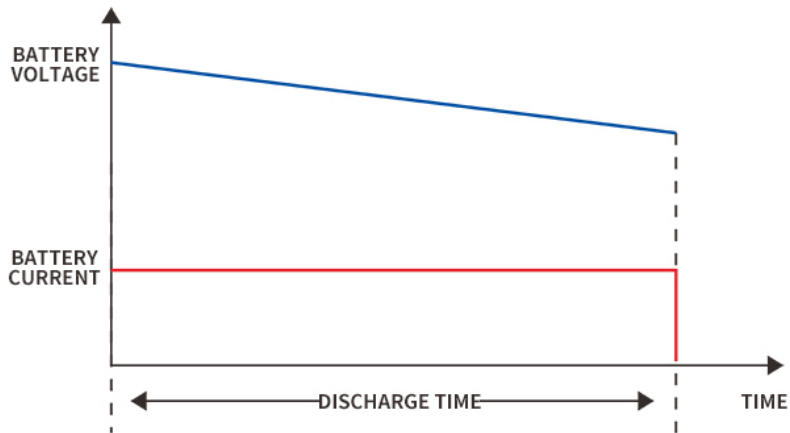


Multiple discharging cut off condition providing discharge protection.

Over discharge brings damage to battery especially high current over discharge or repeatedly discharge. Generally, over discharge will cause voltage increasing in battery, which will damage reversibility of active substance in polarity. It could only partial recover in charge and capacities will significantly damping. Battery function of E-load could set end voltage in battery mode. When battery voltage reaches to this value, it will automatically

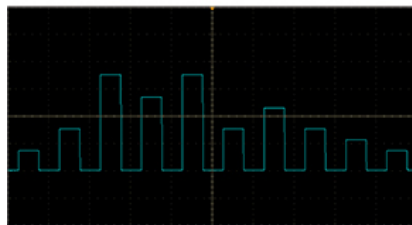


shut down input to avoid over discharge. DC E-load could also provide specific discharge time. When discharge time reach to setting time, shut down discharge automatically.

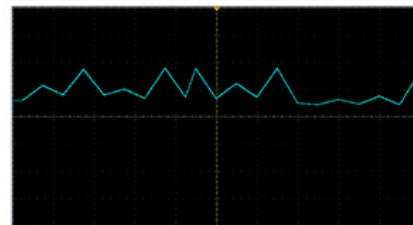


Multiple discharge modes can be set.

Common discharge mode includes pulse discharge and slope rate discharge mode. E-load simulates complicate change of load according to the list file edited by user. Describing rise time, fall time and operation intermittent with maximum 300 steps. Each step has 6 modes for selection (CC, CV, CR, CP, Short mode, unload). Each step could independently set operation time.



PULSE DISCHARGE MODE



SLOPE DISCHARGE MODE

APM devoted itself to providing professional battery test solution to match international



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standard. Measurable items include battery capacity, DC internal resistance of battery, battery charge and discharge life, battery-aging life and multiple key parameters. It provides first rate service and cost effective product for battery industry and related industry.