4S/6S/8S Active Balancer with Voltage Display Screen User Manual

DS0855/DS1004(C)/DS0877

Heltec Energy

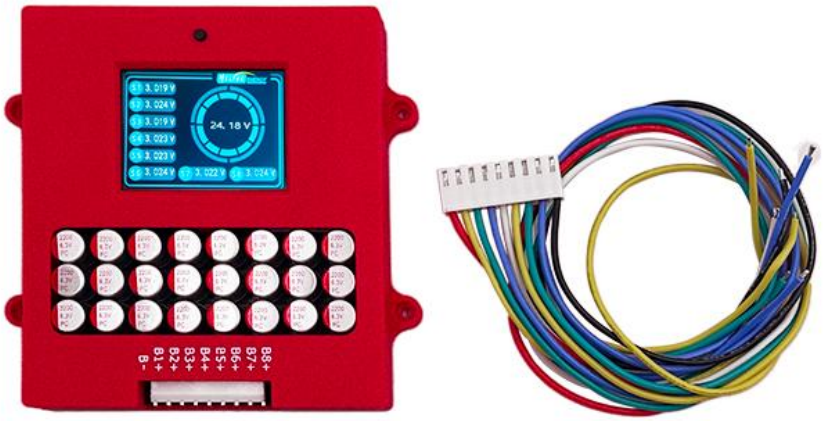
1.Product Overview

The 4S/6S/8S balancers feature overall uniform balance and automatic low-voltage sleep function. **The minimum voltage difference can be balanced to approximately 0.01V, and the maximum balancing current can reach 5A**. When the voltage difference is 0.1V, the current is approximately 0.5A (the actual value will depend on the battery capacity and internal resistance). When the voltage of a single cell of 4S/6S/8S (DS0855/DS1004/DS0877) is lower than 2.7V (lithium-ion/ferro-ferrite lithium), or when the voltage of a single cell of 6S (DS1004C) is lower than 1.8V, the balancer will stop working and enter a sleep state. The battery voltage display supports real-time display of the overall battery voltage and single-string voltage, with a numerical accuracy of approximately 5mV. This product is suitable for lithium-ion and ferro-ferrite lithium batteries.

The circuit board is sprayed with three-proof paint, which has excellent insulation, moisture-proof, leakage-proof, shock-proof, dust-proof, corrosion-proof, anti-aging, corona-resistant and other properties, which can effectively protect the circuit and improve the safety and reliability of the product. The actual product is shown below

DS0855

DS1004/DS1004C



DS0877

2.Technical Specifications

2.1Main Parameters of the Display

Table 1. Main Technical Indicators for Display

Name	Parameters
Number of strings	4S/6S/8S
Battery type	NCM/LFP/LTO(DS1004C)
Single string voltage range	2V-5V
Measurement accuracy	0.5% / ±5mV

2.2Main Parameters of the Active Balancer

Table 2. Main Technical Indicators for Active Balancer

Technical indicators	Index
Product model	DS0855/DS1004(C)/DS0877
Applicable string number	4S/6S/8S
Applicable battery type	NCM/LFP/LTO(DS1004C)
Operating voltage range	NCM/LFP: 2.7-4.2V LTO:1.8-2.8V
Balance voltage accuracy	5mV (typical)
Balance mode	The entire battery group participates in active balancing of energy conversion at the same time
Balance current	When the voltage difference is about 1V, the maximum balancing current is 5A, and the balancing current decreases as the voltage difference decreases. The minimum balancing starting voltage difference of the instrument is 0.01V.
sleep voltage	NCM/LFP: 2.7V LTO:1.8V
Static operating current	4S:13mA 6S/8S:20mA
Operating environment temperature	-10℃-60℃
External power	No external power supply is required, relying on the internal energy transfer of the battery to achieve the balance of the entire

	battery group.

3.Installation and Assembly

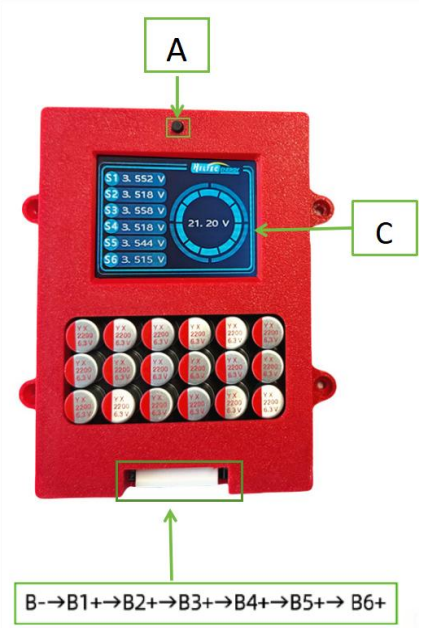
3.1Description of the Connection Position

The connection definition is shown as in the following figure, and its definition can be found in the table below.

DS0855 Connection Position

Connection Definition Table

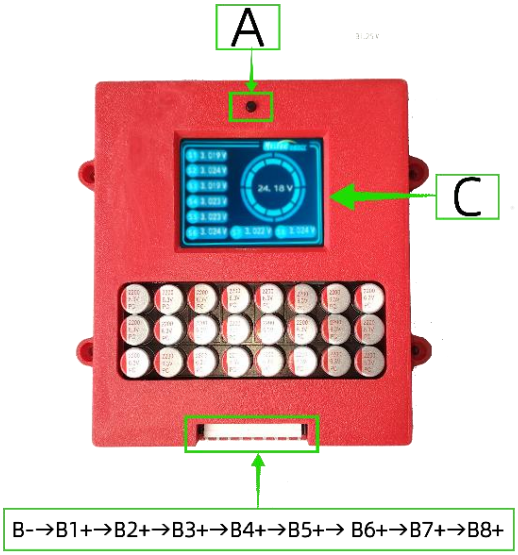
Number	Name	Definition
A	Black button	Screen sleep button (sleep/always on)
B-→B1+→B2+ →B3+→B4+	B-	Negative pole of the first battery string
	B1+	Positive pole of the first battery string
	B2+	Positive pole of the second battery string
	B3+	Positive pole of the third battery string
	B4+	Positive pole of the fourth battery string
C	Screen display area	Left: Single battery voltage; Right: Total voltage



DS1004/DS1004C Connection Position

Connection Definition Table

Number	Name	Definition
A	Black button	Screen sleep button (sleep/always on)
B- →B1+→B2 +→B3+→B4 +→B5+→B6 +	B-	Negative pole of the first battery string
	B1+	Positive pole of the first battery string
	B2+	Positive pole of the second battery string
	B3+	Positive pole of the third battery string
	B4+	Positive pole of the fourth battery string
	B5+	Positive pole of the fifth battery string
	B6+	Positive pole of the sixth battery string
C	Screen display area	Left: Single battery voltage; Right: Total voltage

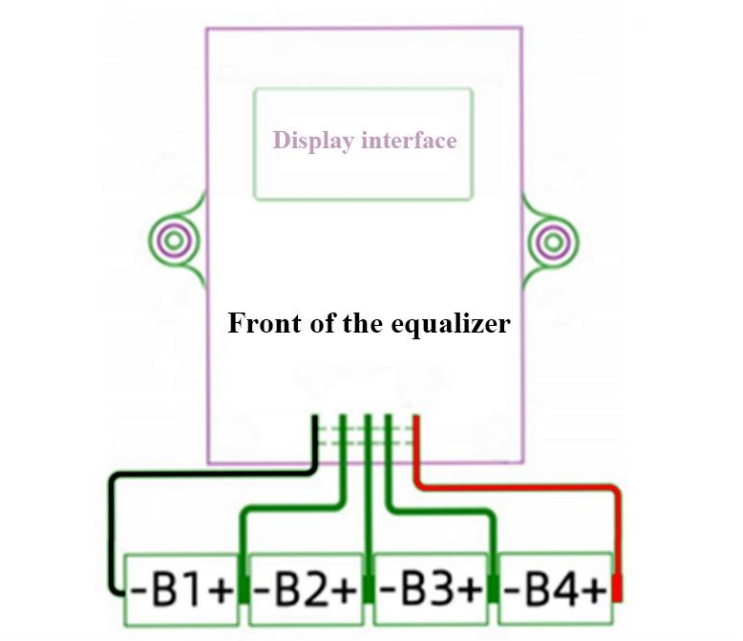


DS0877 Connection Position

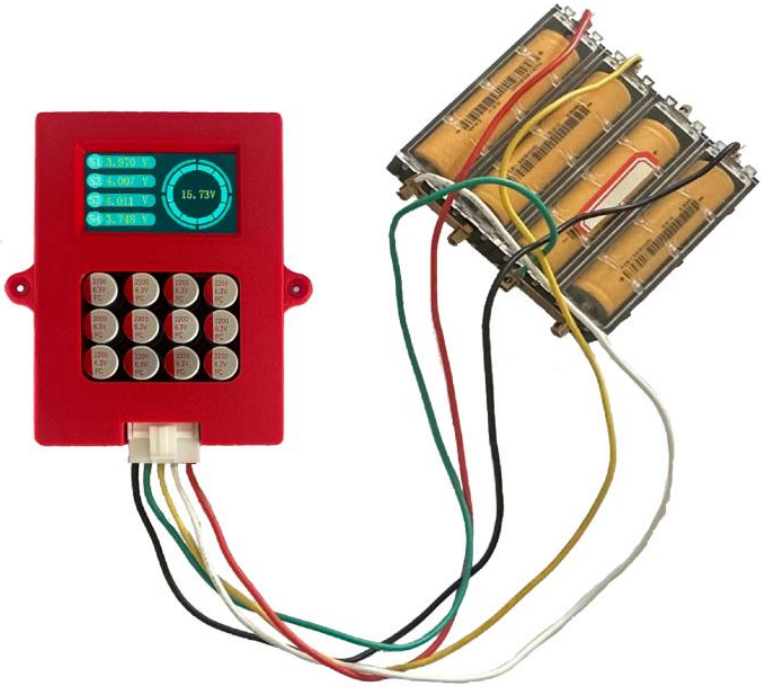
Connection Definition Table

Number	Name	Definition
A	Black button	Screen sleep button (sleep/always on)
B- →B1+→B2+→B3+→B4+ →B5+→B6+→B7+→B8+	B-	Negative pole of the first battery string
	B1+	Positive pole of the first battery string
	B2+	Positive pole of the second battery string
	B3+	Positive pole of the third battery string
	B4+	Positive pole of the fourth battery string
	B5+	Positive pole of the fifth battery string
	B6+	Positive pole of the sixth battery string
	B7+	Positive pole of the seventh battery string
	B8+	Positive pole of the eighth battery string
C	Screen display area	Left: Single battery voltage; Right: Total voltage

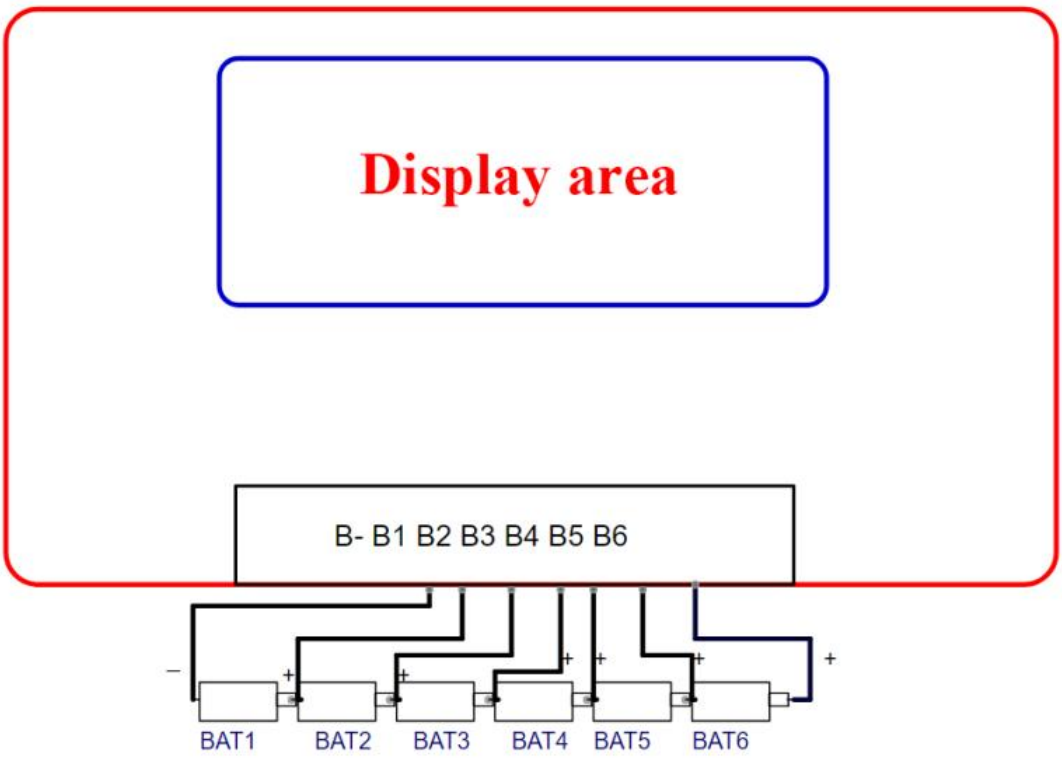
3.2Connection Diagram



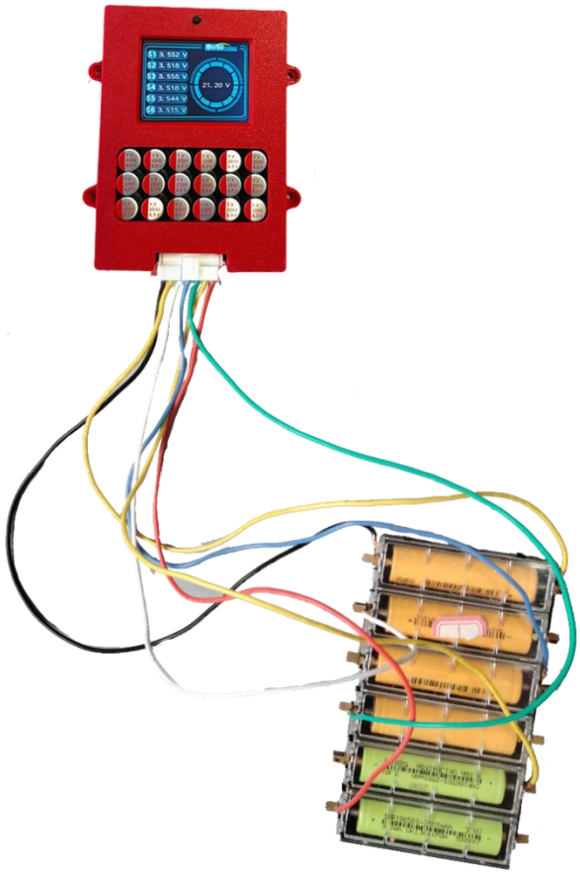
DS0855 Circuit Connection Diagram



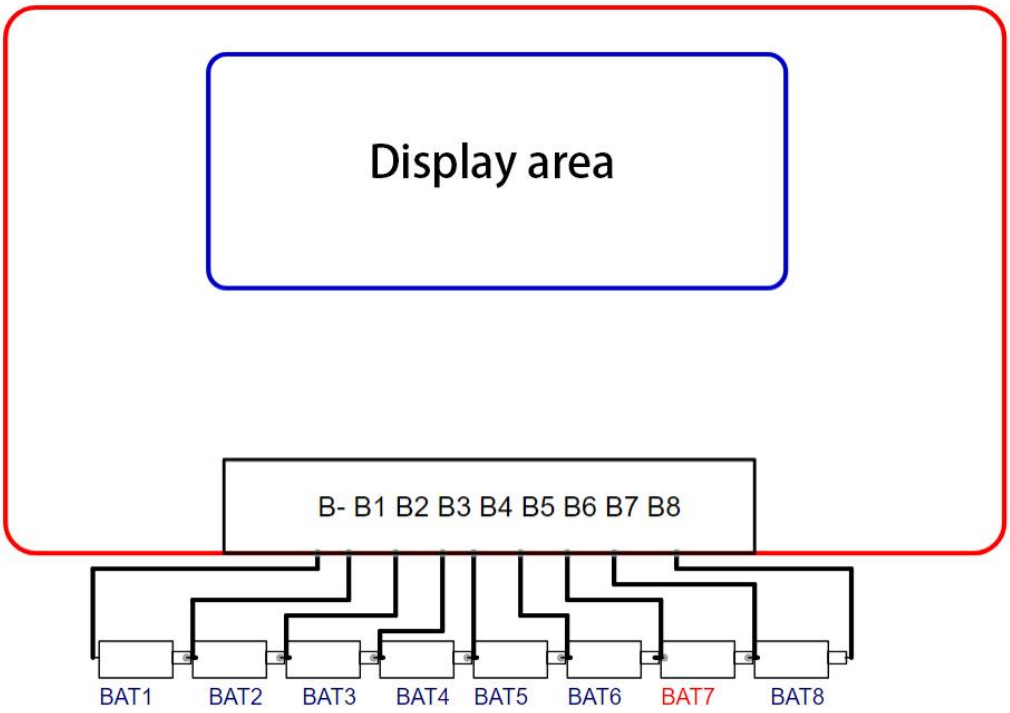
DS0855 Physical Diagram



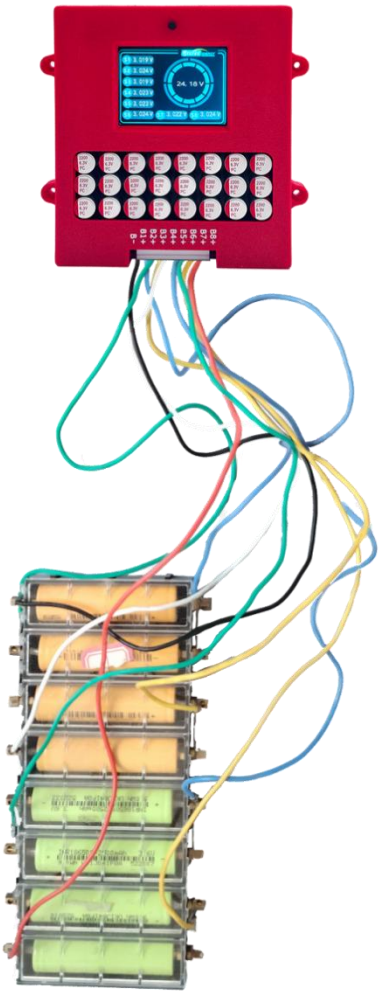
DS1004/DS1004C Circuit Connection Diagram



DS1004/DS1004C Physical Diagram



DS1004/DS1004C Circuit Connection Diagram



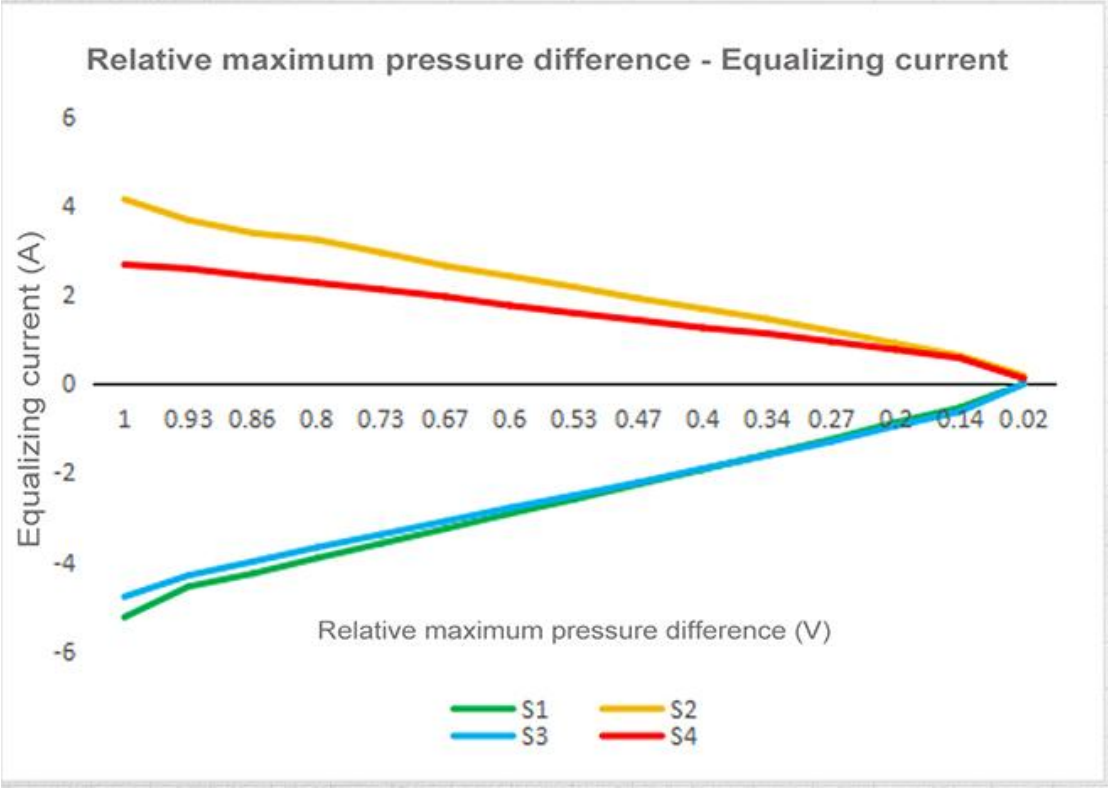
4.test data

Simulation Test
DS series is an active equalizer. When using the equalizer, the battery is continuously in the dynamic balancing process. Internal resistance, load, temperature environment, battery type and other environmental factors will affect the balancing effect and current
The following test results are for reference only

DS0855 test data

B1/B3(V)	B2/B4(V)	Relative maximum Pressure Difference(V)	S1 (B1+)/A	S2 (B2+)/A	S3 (B3+)/A	S4 (B4+)/A
4	3	1	-5.24	4.16	-4.78	2.69
3.93	3	0.93	-4.55	3.69	-4.3	2.6
3.86	3	0.86	-4.26	3.4	-3.99	2.43
3.8	3	0.8	-3.91	3.25	-3.67	2.28
3.73	3	0.73	-3.58	2.96	-3.38	2.13
3.67	3	0.67	-3.25	2.66	-3.08	1.97
3.6	3	0.6	-2.91	2.43	-2.78	1.77
3.53	3	0.53	-2.59	2.19	-2.5	1.6
3.47	3	0.47	-2.25	1.93	-2.21	1.44
3.4	3	0.4	-1.92	1.7	-1.9	1.27
3.34	3	0.34	-1.58	1.47	-1.6	1.14
3.27	3	0.27	-1.24	1.2	-1.29	0.96
3.2	3	0.2	-0.86	0.92	-0.94	0.78
3.14	3	0.14	-0.53	0.65	-0.62	0.59
3.02	3	0.02	0.01	0.2	0.01	0.13

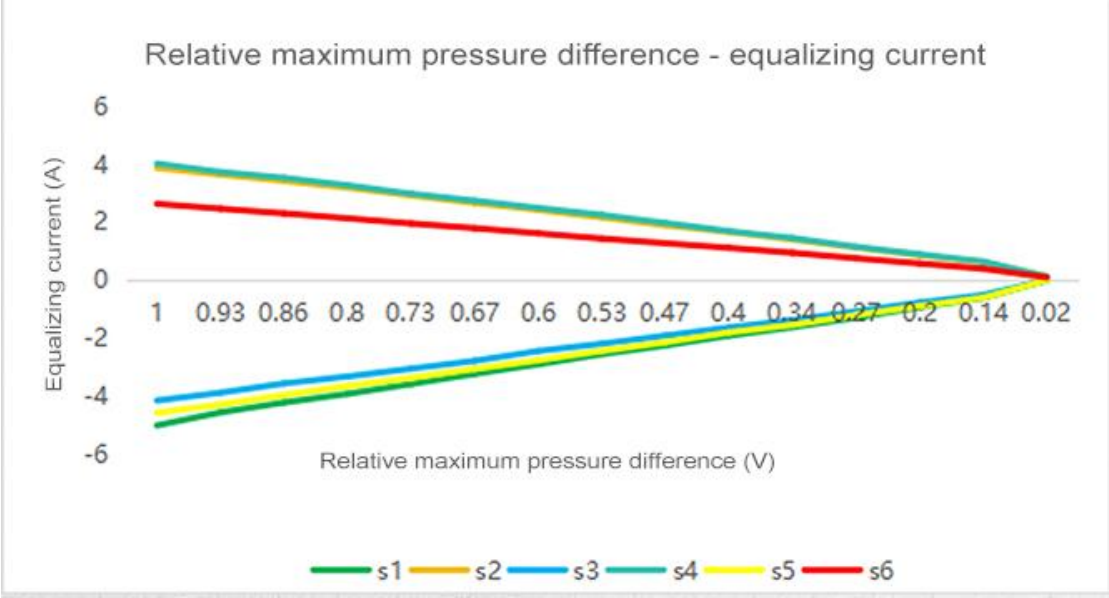
The initial pressure difference between adjacent batteries is 1V



4 series test Relative maximum differential pressure - balanced current diagram

DS1004/1004C test data

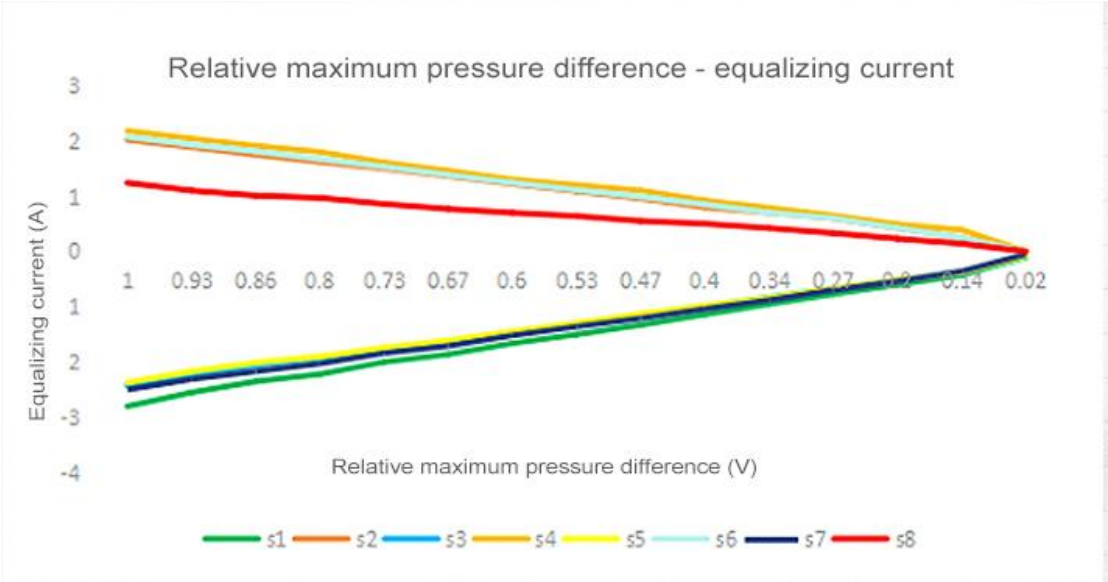
B1/B3/B5(V)	B2/B4/B6(V)	Relative maximum Pressure Difference(V)	S1 (B1+) /A	S2 (B2+) /A	S3 (B3+) /A	S4 (B4+) /A	S5(B5+)A	S6(B6+)/A
4	3	1	-5.01	3.88	-4.15	4.03	-4.57	2.64
3.93	3	0.93	-4.56	3.65	-3.88	3.74	-4.29	2.47
3.86	3	0.86	-4.22	3.43	-3.56	3.54	-3.96	2.31
3.8	3	0.8	-3.92	3.2	-3.32	3.28	-3.65	2.14
3.73	3	0.73	-3.58	2.93	-3.05	2.99	-3.37	1.96
3.67	3	0.67	-3.23	2.67	-2.78	2.75	-3.06	1.8
3.6	3	0.6	-2.9	2.43	-2.44	2.5	-2.76	1.62
3.53	3	0.53	-2.55	2.17	-2.19	2.26	-2.44	1.44
3.47	3	0.47	-2.25	1.9	-1.91	1.98	-2.14	1.28
3.4	3	0.4	-1.91	1.67	-1.63	1.7	-1.8	1.12
3.34	3	0.34	-1.62	1.41	-1.37	1.46	-1.54	0.95
3.27	3	0.27	-1.29	1.13	-1.07	1.16	-1.2	0.76
3.2	3	0.2	-0.93	0.86	-0.77	0.9	-0.89	0.58
3.14	3	0.14	-0.61	0.63	-0.51	0.65	-0.6	0.4
3.02	3	0.02	0	0.14	0	0.13	0	0.1



6 series test Relative maximum differential pressure - balanced current diagram

DS0877 test data

B1/B3/B5/B7(V)	B2/B4/B6/B8(V)	Relative maximum Pressure Difference(V)	S1 (B1+)/A	S2 (B2+)/A	S3 (B3+)/A	S4 (B4+)/A	S5(B5+)A	S6(B6+)/A	S7(B7+)A	S8(B8+)A
4	3	1	-2.8	2.02	-2.42	2.18	-2.37	2.07	-2.5	1.24
3.93	3	0.93	-2.55	1.89	-2.23	2.04	-2.17	1.93	-2.31	1.1
3.86	3	0.86	-2.35	1.75	-2.06	1.91	-2.01	1.81	-2.17	1.01
3.8	3	0.8	-2.22	1.62	-1.93	1.8	-1.9	1.67	-2.03	0.97
3.73	3	0.73	-2	1.5	-1.78	1.61	-1.74	1.53	-1.84	0.86
3.67	3	0.67	-1.86	1.36	-1.63	1.46	-1.61	1.38	-1.71	0.77
3.6	3	0.6	-1.66	1.22	-1.47	1.30	-1.45	1.24	-1.52	0.7
3.53	3	0.53	-1.5	1.09	-1.31	1.2	-1.3	1.11	-1.36	0.64
3.47	3	0.47	-1.33	0.96	-1.15	1.1	-1.13	0.99	-1.21	0.55
3.4	3	0.4	-1.14	0.8	-0.99	0.92	-0.98	0.86	-1.04	0.5
3.34	3	0.34	-0.95	0.7	-0.83	0.79	-0.84	0.7	-0.88	0.42
3.27	3	0.27	-0.77	0.6	-0.67	0.65	-0.67	0.6	-0.7	0.33
3.2	3	0.2	-0.6	0.42	-0.53	0.49	-0.52	0.42	-0.54	0.23
3.14	3	0.14	-0.43	0.24	-0.39	0.39	-0.38	0.24	-0.36	0.14
3.02	3	0.02	0.1	0	0.09	0	0.08	0	-0.05	0



8 series test Relative maximum differential pressure - balanced current diagram

5.Precautions for Use

- During use, the design parameters and use conditions must be followed, and the parameters of this specification must not be violated. Otherwise, it is easy to damage the instrument and then damage the battery pack.
- During use, the cable must be connected to the battery in the order of the instruction manual, and then connected to the instrument after checking.
- The product will generate a certain amount of heat during use, so avoid using the product in a high temperature environment.
- If any abnormal situation occurs during use, please stop using it immediately, return it to the original factory or ask professional maintenance personnel for repair.
- This product has undergone a lot of reliability tests, and its reliability is far higher than that of general equalizing equipment on the market. At the same time, the process of the battery cell must be guaranteed to minimize the occurrence of combustion.

***Safety Precautions:**

Our company is committed to improving quality and reliability, but generally speaking, electrical products have a probability of failure. Depending on the use environment and conditions, the durability will also vary. Use a lengthy design when using it to avoid abnormal heating, smoking, and even personal accidents, fire accidents, social damage, etc. caused by overload use.