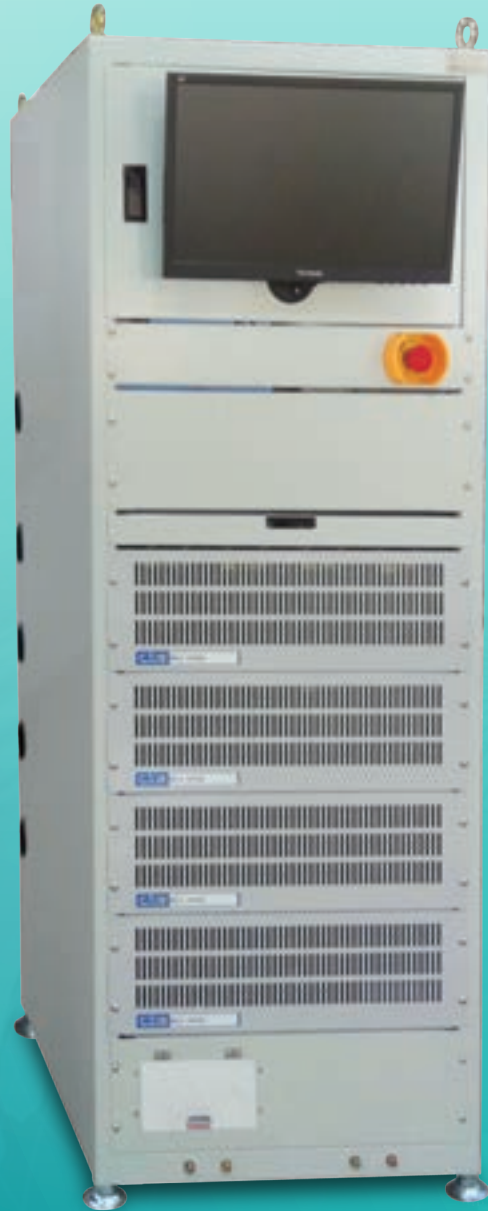


MCL2 Series

New Generation Advanced Battery Test Equipment

▪ Precise, Reliable, Expandable ▪



Highlight Features

Reaches High Precision Test

Certified by authorized inspection agency, MCL2 Series is equipped with 0.02% F.S. voltage and current accuracy, which makes the test data extremely precise and reliable.

Fully Supports EV Testing Functions

With a test data recording frequency of 1ms, all test details are within the grasp of the MCL2.

Easy To Operate with Customizable Program Settings

The MCL2 supports a variety of simple and convenient methods for configuring program settings, including A, C-rate, mAh/g and many others. With the highly flexible battery testing program, all professional research requirements are satisfied.

Captures Test Data In Real-Time

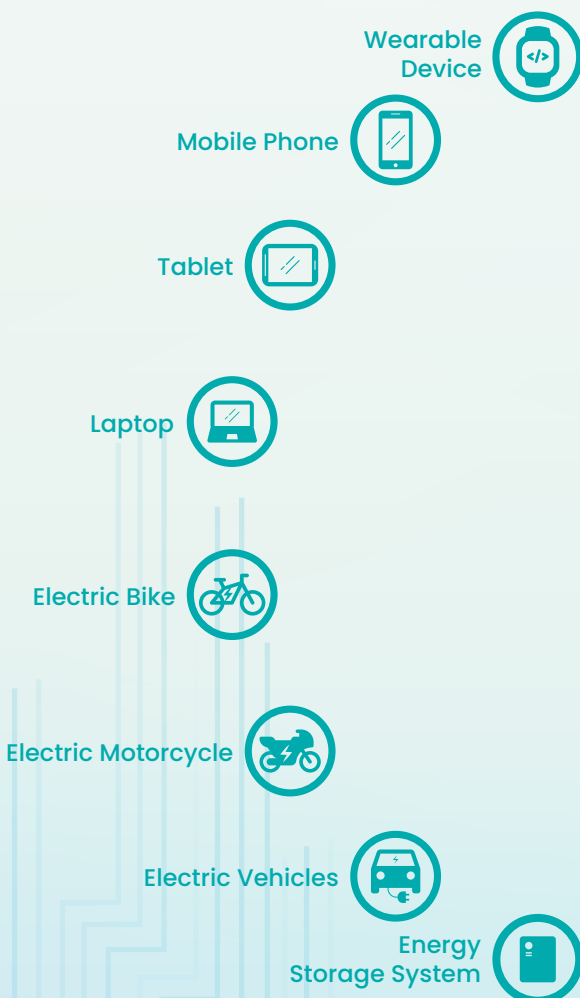
Features such as pulse charging/discharging and drive simulation have been introduced by taking actual testing practices into consideration. Multiple international testing standards, such as FUDS, DST, and HPPC, are also included to allow the MCL2 to provide seamless support for testing electric-car batteries.

Offers High Flexibility On Battery Test

Equipped with 2 phases of pulse charging/discharging and discharge to 0V options, the clients are able to get customized solutions by integrating all necessary features and accessories together.

Product Applications

Applied Tests



Technical Features

Highly Precise And Flexible System

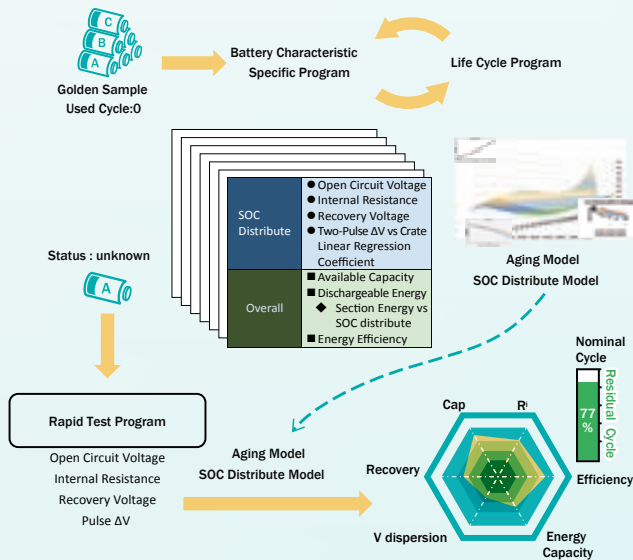
In addition to 0.02% current/ voltage accuracy, more advanced features can be included at all times to achieve even more powerful battery test, such as 1ms data recording, 5ms current switch, 0V discharge, and channel parallel connection.

2 Phases Of Pulse Charging/ Discharging

The precision pulse-width control within 10ms and high-speed current climbing rates can be used freely under any charging/discharging conditions for consumer electronics and power batteries to help clients perform advanced battery research and testing.

Battery State Of Health (SOH) Evaluation

Chen Tech Electric has developed a solution for calculating and testing various parameters associated with the battery's SOH. By running long-term life cycle test on golden sample batteries, the multi-phase distributed model and life cycle distributed model are created. When testing similar types of batteries in the future, by quantized analyzing the battery transient response under specific test conditions and mapping the eigen vector of transient response and steady state to the reference model, the overall characteristics of the battery can be provided and its remaining service life can also be estimated.



Drive Simulation*

With a current rise time of 1ms (10% to 90%) and a charging/discharging switch time of 5ms (-90% to 90%), international drive simulation standards such as FUDS and DST can be fully realized with the MCL2. Supports customized drive simulation test modes, and the import of Excel files to create customized testing processes. Each simulation is the reproduction of a real scenario. Under customized drive simulation mode, the minimum step time supported is 100ms. Constant current and constant power operating modes are also supported.

DCIR Measurement*

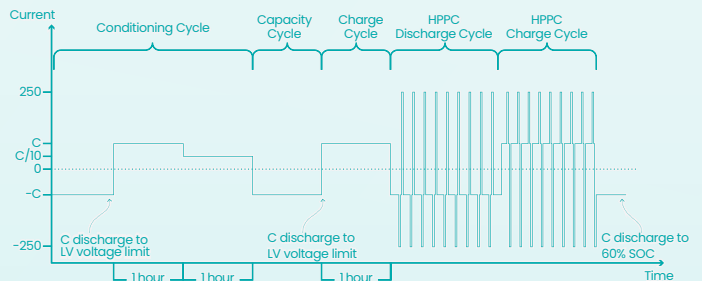
Equipped with ISO12405 and IEC61960 DC resistance measurement standards. Customized measurement methods set up by the user is also supported. The internal resistance experienced by the battery during charge/ discharge process can be measured to significantly enhance the efficiency of the battery's quality screening process.

Gas Gauge/ BMS Communication*

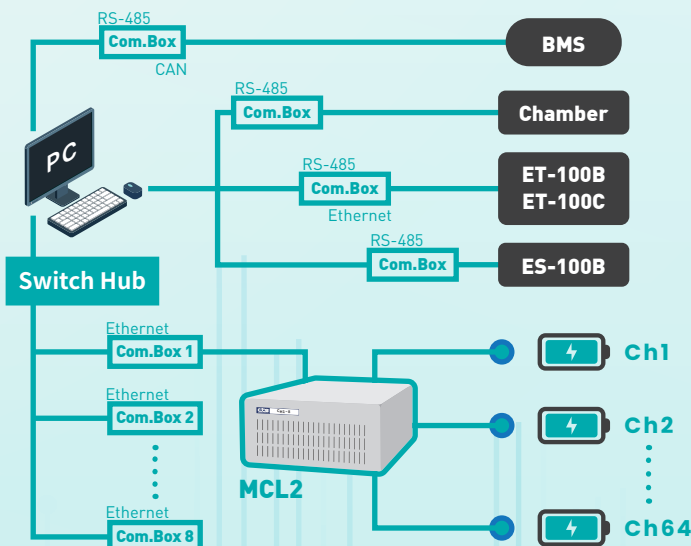
Supports a wide range of popular battery pack Gas Gauge/ BMS interfaces including SMBus, I2C, HDQ, CAN, ModBus, and RS485. Importing CAN Bus DBC files is also supported. The user is free to configure battery test equipment behavior and BMS parameters to be recorded during the test. Confidential BMS parameter data will not be leaked and the client do not have to wait for software development. The overall user experience is safe and unrestricted.

The Hybrid Pulse Power Characteristic (HPPC)

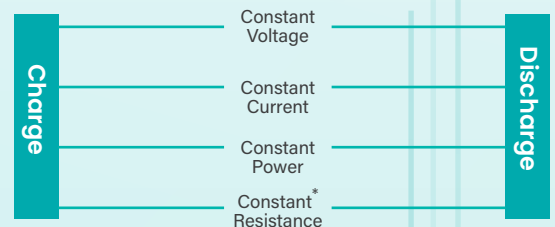
The Hybrid Pulse Power Characteristic (HPPC) is mainly used for testing characteristics of power batteries such as the power during charging and discharging cycles, open circuit voltage, and DC resistance. In addition to ensuring that all assembled batteries meet specifications, these parameters can also be used as battery BoL (Beginning of Life) test benchmarks to guarantee product quality. Chen Tech Electric provides appropriate equipment, combined with software functions to perform automatic calculations and record of key test parameters, to produce reports/tables that meet customer requirements as well as save configuration time for customers.



System Architecture



Operating Mode



• Drive Simulation* •

• ACIR* • • DCIR* •

• 100Hz Pulse Charge/ Discharge* •

* Option

Specifications

Model				MCL2 5V/3A	MCL2 5V/5A	MCL2 5V/10A	MCL2 5V/20A	MCL2 5V/30A
Number of Channels Per Unit				16ch			8ch	4ch
Charge/ Discharge Spec (Capacity, Voltage, Current)				5V/±3A	5V/±5A	5V/±10A	5V/±20A	5V/±30A
Output	Constant Voltage	Charge	0.005V~5V					
		Discharge (Option: 0V)	2~5V					
		Resolution	0.1mV					
		Accuracy	±0.02%F.S. (±1mV)					
	Constant Current	Range	3mA~3A	5mA~5A	10mA~10A	20mA~20A	30mA~30A	
		Resolution	0.1mA			1mA		
		Accuracy	±0.02%F.S. (±0.6mA)	±0.02%F.S. (±1mA)	±0.02%F.S. (±2mA)	±0.02%F.S. (±4mA)	±0.02%F.S. (±6mA)	
	Constant Power	Range	15mW~15W	25mW~25W	50mW~50W	100mW~100W	150mW~150W	
		Resolution	1mW			10mW		
		Accuracy	±0.04%F.S. (±6mW)	±0.04%F.S. (±10mW)	±0.04%F.S. (±20mW)	±0.04%F.S. (±40mW)	±0.04%F.S. (±60mW)	
Measurement	Voltage	Range	0V~5.5V					
		Resolution	10μV					
		Accuracy	±0.02%F.S. (±1mV)					
	Current	Range	0A~3.3A	0A~5.5A	0A~11A	0A~22A	0A~33A	
		Resolution	10μA			0.1mA		
		Accuracy	±0.02%F.S. (±0.6mA)	±0.02%F.S. (±1mA)	±0.02%F.S. (±2mA)	±0.02%F.S. (±4mA)	±0.02%F.S. (±6mA)	
Time	Data Recording Time	100ms						
	Charge/ Discharge Switch Time(10%→90%)	1.5s(0pt:5ms)						
Ambient Conditions	Temperature	23℃ ± 2℃						
	Humidity	20 ~ 90 HR						
AC Power`	Voltage	220V						
	Frequency	50/60Hz						
	Phase	1ψ						
	Current	2.76A	4.61A	9.21A		6.91A		
Communication Protocol				Ethernet				
Dimension(W*D*H)				584*780*178				
Weight				43KG	44KG	45KG		
Optional Feature				Constant Resistance, Drive Simulation, Pulse, DCIR Measurement, ACIR Measurement, Parallel Connections among Channels, BMS & Gas Gauge Data Collection, SOH Evaluation, Chamber Integration, Data Analyzer.				
Optional Accessory				BMS & Gas Gauge Data Collector, Auxiliary Voltage, Auxiliary Temperature, Chamber, Customized Fixture, Auto-Calibrator, Buzzer				

Model				MCL2 5V/50A	MCL2 5V/100A	MCL2 5V/200A	MCL2 5V/300A	MCL2 5V/400A
Number of Channels Per Unit				2ch		1ch		
Charge/ Discharge Spec (Capacity, Voltage, Current)				5V/±50A	5V/±100A	5V/±200A	5V/±300A	5V/±400A
Output	Constant Voltage	Range	Charge	0.005V~5V				
			Discharge (Option: 0V)	2~5V				
		Resolution		0.1mV				
		Accuracy		±0.02%F.S. (±1mV)		±0.04%F.S.(±2mV)		
	Constant Current	Range	50mA~50A	100mA~100A	200mA~200A	300mA~300A	400mA~400A	
		Resolution	1mA	10mA				
		Accuracy	±0.02%F.S. (±10mA)	±0.02%F.S. (±20mA)	±0.03%F.S. (±60mA)	±0.03%F.S. (±90mA)	±0.03%F.S. (±120mA)	
	Constant Power	Range	250mW~250W	500mW~500W	1W~1000W	1.5W~1500W	2W~2000W	
		Resolution	10mW	100mW				
		Accuracy	±0.04% (±0.1W)	±0.04% (±0.2W)	±0.07%F.S. (±0.7W)	±0.07%F.S. (±1.05W)	±0.07%F.S. (±1.4W)	
Measurement	Voltage	Range	0V~5.5V					
		Resolution	10μV					
		Accuracy	±0.02%F.S. (±1mV)		±0.04%F.S.(±2mV)			
	Current	Range	0A~55A	0A~110A	0A~220A	0A~330A	0A~440A	
		Resolution	0.1mA	1mA				
		Accuracy	±0.02%F.S. (±10mA)	±0.02%F.S. (±20mA)	±0.03%F.S. (±60mA)	±0.03%F.S. (±90mA)	±0.03%F.S. (±120mA)	
Time	Data Recording Time	100ms						
	Charge/ Discharge Switch Time(10%→90%)	1.5s(Opt:5ms)						
Ambient Conditions	Temperature	23℃ ± 2℃						
	Humidity	20 ~ 90 HR						
AC Power`	Voltage	220V						
	Frequency	50/60Hz						
	Phase	1ψ						
	Current	5.76A	11.52A		17.27A		23.03A	
Communication Protocol				Ethernet				
Dimension(W*D*H)				483*610*223			600*900*1200	600*900*1400
Weight				45KG			147KG	202KG
Optional Feature				Constant Resistance, Drive Simulation, Pulse, DCIR Measurement, ACIR Measurement, Parallel Connections among Channels, BMS & Gas Gauge Data Collection, SOH Evaluation, Chamber Integration, Data Analyzer.				
Optional Accessory				BMS & Gas Gauge Data Collector, Auxiliary Voltage, Auxiliary Temperature, Chamber, Customized Fixture, Auto-Calibrator, Buzzer				

* Can be customized according to the client needs

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Model				MCL2 5V/500A	MCL2 5V/1000A	MCL2 20V/5A	MCL2 20V/10A	MCL2 20V/20A
Number of Channels Per Unit				1ch		4ch		
Charge/ Discharge Spec (Capacity, Voltage, Current)				5V/±500A	5V/±1000A	20V/±5A	20V/±10A	20V/±20A
Output	Constant Voltage	Charge	0.005V~5V			0.02~20V		
		Range	2V~5V			3~20V		
		Resolution	0.1mV			1mV		
		Accuracy	±0.1%F.S.(±5mV)			±0.02%F.S.(±4mV)		
	Constant Current	Range	500mA~500A	1A~1000A	5mA~5A	10mA~10A	20mA~20A	
		Resolution	10mA	100mA	0.1mA	1mA		
		Accuracy	±0.1%F.S.(±0.5A)	±0.1%F.S.(±1A)	±0.02%F.S.(±1mA)	±0.02%F.S.(±2mA)	±0.02%F.S.(±4mA)	
	Constant Power	Range	2.5W~2500W	5W~5000W	100mW~100W	200mW~200W	400mW~400W	
		Resolution	100mW	1W	4mW	40mW		
		Accuracy	±0.2%F.S.(±5W)	±0.2%F.S.(±10W)	±0.04%(±40mW)	±0.04%(±80mW)	±0.04%(±0.16W)	
Measurement	Voltage	Range	0V~5.5V			0V~22V		
		Resolution	10μV			0.1mV		
		Accuracy	±0.1%F.S.(±5mV)			±0.02%F.S.(±4mV)		
	Current	Range	0A~550A	0A~1100A	0A~5.5A	0A~11A	0A~22A	
		Resolution	1mA	10mA	10μA	0.1mA		
		Accuracy	±0.1%F.S.(±0.5A)	±0.1%F.S.(±1A)	±0.02%F.S.(±1mA)	±0.02%F.S.(±2mA)	±0.02%F.S.(±4mA)	
Time	Data Recording Time		100ms					
	Charge/ Discharge Switch Time(10%→90%)		1.5s(Opt:5ms)					
Ambient Conditions	Temperature		23℃ ± 2℃					
	Humidity		20 ~ 90 HR					
AC Power*	Voltage		220V					
	Frequency		50/60Hz					
	Phase		1ψ					
	Current		28.79A	57.58A	2.95A	5.91A	11.82A	
Communication Protocol				Ethernet				
Dimension(W*D*H)				600*900*1400	600*900*2100	584*800*223		
Weight				202KG	370KG	45KG		
Optional Feature				Constant Resistance, Drive Simulation, Pulse, DCIR Measurement, ACIR Measurement, Parallel Connections among Channels, BMS & Gas Gauge Data Collection, SOH Evaluation, Chamber Integration, Data Analyzer.				
Optional Accessory				BMS & Gas Gauge Data Collector, Auxiliary Voltage, Auxiliary Temperature, Chamber, Customized Fixture, Auto-Calibrator, Buzzer				

Model				MCL2 20V/30A	MCL2 60V/10A	MCL2 60V/15A	MCL2 60V/20A	MCL2 60V/30A	
Number of Channels Per Unit				4ch	3ch	2ch		1ch	
Charge/ Discharge Spec (Capacity, Voltage, Current)				20V/±30A	60V/±10A	60V/±15A	60V/±20A	60V/±30A	
Output	Constant Voltage	Range	Charge	0.02~20V	0.06~60V				
			Discharge (Option: 0V)	3~20V	4~60V				
		Resolution		1mV					
		Accuracy		±0.02%F.S. (±4mV)	±0.02%F.S. (±12mV)				
	Constant Current	Range	30mA~30A	10mA~10A	15mA~15A	20mA~20A	30mA~30A		
		Resolution		1mA					
		Accuracy		±0.02%F.S. (±6mA)	±0.02%F.S. (±2mA)	±0.02%F.S. (±3mA)	±0.02%F.S. (±4mA)	±0.02%F.S. (±6mA)	
	Constant Power	Range	600mW~600W	600mW~600W	900mW~900W	1200mW~1200W	1800mW~1800W		
		Resolution		40mW	120mW				
		Accuracy		±0.04%F.S. (±0.24W)	±0.04%F.S. (±0.24W)	±0.04%F.S. (±0.36W)	±0.04%F.S. (±0.48W)	±0.04%F.S. (±0.72W)	
Measurement	Voltage	Range	0V~22V	0V~66V					
		Resolution		0.1mV					
		Accuracy		±0.02%F.S. (±4mV)	±0.02%F.S. (±12mV)				
	Current	Range	0A~33A	0A~11A	0A~16.5A	0A~22A	0A~33A		
		Resolution		0.1mA					
		Accuracy		±0.02%F.S. (±6mA)	±0.02%F.S. (±2mA)	±0.02%F.S. (±3mA)	±0.02%F.S. (±4mA)	±0.02%F.S. (±6mA)	
Time	Data Recording Time		100ms						
	Charge/ Discharge Switch Time(10%→90%)		1.5s(Opt:5ms)						
Ambient Conditions	Temperature		23℃ ± 2℃						
	Humidity		20 ~ 90 HR						
AC Power*	Voltage		220V						
	Frequency		50/60Hz						
	Phase		1ψ						
	Current		17.73A	11.23A		14.97A	11.23A		
Communication Protocol				Ethernet					
Dimension(W*D*H)				584*800*223					
Weight				45KG					
Optional Feature				Constant Resistance, Drive Simulation, Pulse, DCIR Measurement, ACIR Measurement, Parallel Connections among Channels, BMS & Gas Gauge Data Collection, SOH Evaluation, Chamber Integration, Data Analyzer.					
Optional Accessory				BMS & Gas Gauge Data Collector, Auxiliary Voltage, Auxiliary Temperature, Chamber, Customized Fixture, Auto-Calibrator, Buzzer					

* Can be customized according to the client needs

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Model			MCL2 60V/60A	MCL2 60V/80A	MCL2 60V/100A	MCL2 60V/200A	MCL2 60V/300A
Number of Channels Per Unit			1ch				
Charge/ Discharge Spec (Capacity, Voltage, Current)			60V/±60A	60V/±80A	60V/±100A	60V/±200A	60V/±300A
Output	Constant Voltage	Charge	0.06~60V				
		Range	4~60V				
		Discharge (Option: 0V)					
		Resolution	1mV				
	Constant Current	Accuracy	±0.02%F.S. (±12mV)			±0.05%F.S. (±30mV)	
		Range	60mA~60A	80mA~80A	100mA~100A	200mA~200A	300mA~300A
		Resolution	1mA	10mA			
	Constant Power	Accuracy	±0.02%F.S. (±12mA)	±0.02%F.S. (±16mA)	±0.02%F.S. (±20mA)	±0.05%F.S. (±100mA)	±0.05%F.S. (±150mA)
		Range	3.6W~3600W	4.8W~4800W	6W~6000W	12W~12000W	18W~18000W
Resolution		120mW	1.2W				
Measurement	Voltage	Accuracy	±0.04%F.S. (±1.44W)	±0.04%F.S. (±1.92W)	±0.04%F.S. (±2.4W)	±0.1%F.S. (±12W)	±0.1%F.S. (±18W)
		Range	0V~66V				
		Resolution	0.1mV				
	Current	Accuracy	±0.02%F.S. (±12mV)			±0.05%F.S. (±30mV)	
		Range	0A~66A	0A~88A	0A~110A	0A~220A	0A~330A
		Resolution	0.1mA		1mA		
	Time	Accuracy	±0.02%F.S. (±12mA)	±0.02%F.S. (±16mA)	±0.02%F.S. (±20mA)	±0.05%F.S. (±100mA)	±0.05%F.S. (±150mA)
		Data Recording Time	100ms				
		Charge/ Discharge Switch Time(10%→90%)	1.5s(Opt:5ms)				
Ambient Conditions	Temperature	23℃ ± 2℃					
	Humidity	20 ~ 90 HR					
AC Power`	Voltage	220V					
	Frequency	50/60Hz					
	Phase	1ψ					
	Current	22.46A	29.95A	37.43A	74.87A	112.3A	
Communication Protocol			Ethernet				
Dimension(W*D*H)			584*800*223	700*1000*1200	700*1000*1600	700*1000*2100	
Weight			50KG	146KG	271KG	384KG	473KG
Optional Feature			Constant Resistance, Drive Simulation, Pulse, DCIR Measurement, ACIR Measurement, Parallel Connections among Channels, BMS & Gas Gauge Data Collection, SOH Evaluation, Chamber Integration, Data Analyzer.				
Optional Accessory			BMS & Gas Gauge Data Collector, Auxiliary Voltage, Auxiliary Temperature, Chamber, Customized Fixture, Auto-Calibrator, Buzzer				

Model				MCL2 60V/500A	MCL2 100V/100A	MCL2 100V/200A	MCL2 100V/300A	MCL2 100V/500A
Number of Channels Per Unit				1ch				
Charge/ Discharge Spec (Capacity, Voltage, Current)				60V/±500A	100V/±100A	100V/±200A	100V/±300A	100V/±500A
Output	Constant Voltage	Charge	0.06~60V	0.1~100V				
		Discharge (Option: 0V)	4~60V	5~100V				
		Resolution	1mV	10mV				
		Accuracy	±0.1%F.S. (±60mV)	±0.02%F.S. (±20mV)	±0.05%F.S. (±50mV)		±0.1%F.S. (±100mV)	
	Constant Current	Range	500mA~500A	100mA~100A	200mA~200A	300mA~300A	500mA~500A	
		Resolution	10mA					
	Constant Power	Accuracy	±0.1%F.S. (±500mA)	±0.02%F.S. (±20mA)	±0.05%F.S. (±100mA)	±0.05%F.S. (±150mA)	±0.1%F.S. (±500mA)	
		Range	30W~30000W	10W~10000W	20W~20000W	30W~30000W	50W~50000W	
		Resolution	1.2W	2W				
		Accuracy	±0.2%F.S. (±60W)	±0.04%F.S. (±4W)	±0.1%F.S. (±20W)	±0.1%F.S. (±30W)	±0.2%F.S. (±100W)	
Measurement	Voltage	Range	0V~66V					
		Resolution	0.1mV					
		Accuracy	±0.1%F.S. (±60mV)	±0.02%F.S. (±20mV)	±0.05%F.S. (±50mV)		±0.1%F.S. (±100mV)	
	Current	Range	0A~550A	0A~110A	0A~220A	0A~330A	0A~550A	
		Resolution	1mA					
		Accuracy	±0.1%F.S. (±500mA)	±0.02%F.S. (±20mA)	±0.05%F.S. (±100mA)	±0.05%F.S. (±150mA)	±0.1%F.S. (±500mA)	
Time	Data Recording Time	100ms						
	Charge/ Discharge Switch Time(10%→90%)	1.5s(Opt:5ms)						
Ambient Conditions	Temperature	23℃ ± 2℃						
	Humidity	20 ~ 90 HR						
AC Power*	Voltage	220V						
	Frequency	50/60Hz						
	Phase	1ψ						
	Current	187.17A	60.96A	121.93A	182.89A	304.81A		
Communication Protocol				Ethernet				
Dimension(W*D*H)				1400*1000*2100	700*1000*1600	700*1000*2100	1400*1000*2100	2100*1000*2100
Weight				909KG	271KG	473KG	843KG	1553KG
Optional Feature				Constant Resistance, Drive Simulation, Pulse, DCIR Measurement, ACIR Measurement, Parallel Connections among Channels, BMS & Gas Gauge Data Collection, SOH Evaluation, Chamber Integration, Data Analyzer.				
Optional Accessory				BMS & Gas Gauge Data Collector, Auxiliary Voltage, Auxiliary Temperature, Chamber, Customized Fixture, Auto-Calibrator, Buzzer				

* Can be customized according to the client needs

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Optional Accessories

Auxiliary Voltage ES 100B

During serial/parallel battery pack testing, the voltage of each cell/module is measured and recorded. The safety of the battery can be monitored, and the data obtained can be used as the condition for program step change or providing protection.

1. Each module contains 24 measurement points.
A data recording frequency of 100ms.
2. Measurement range: $\pm 8V$, $\pm 32V$ or $\pm 64V$; accuracy $\pm 0.02\%$ F.S.

Auxiliary Temperature ET 100B

During battery testing, the temperature of each battery is measured and recorded. The safety of batteries can be monitored, and the data obtained can be used as the condition for program step change or providing protection.

1. Each module contains 24 measurement points.
A data recording frequency of 100ms.
2. Supports Thermistor as temperature sensors.
Measurement range: $-50^{\circ}C \sim 150^{\circ}C$; accuracy $\pm 1^{\circ}C$ ($-40^{\circ}C \sim 90^{\circ}C$).

Auxiliary Temperature ET 100C

During battery testing, the temperature of each battery is measured and recorded. The safety of batteries can be monitored, and the data obtained can be used as the condition for program step change or providing protection.

1. Each module contains up to 16 measurement points.
A data recording frequency of 4s.
2. Supports various mainstream temperature sensors available on the market, such as: Thermocouple, Thermistor, RTD, and Diode (can be selected according to customer specifications). Measurement range is vast, and accuracy can reach $\pm 1^{\circ}C$.

BMS Data Collector

During battery modules/ packs testing, the Gas Gauge/ BMS data is retrieved and recorded. The data obtained can be used as the condition for program step change or providing protection.

Supports CAN .dbc file editing and import.

Chamber/ Third-party Chamber Control

The synchronous control of chambers can be achieved during the testing processes. Temperature and humidity levels can be adjusted to simulate different environments for measuring the battery's performance.

Auto-Calibrator

Uses fully-automated methods to perform voltage and current calibration for the equipment channels to maintain accurate measurements and output, as well as to reduce the human resource costs, time costs, and errors caused by performing manual calibration.

1. Customizable reports.
2. The flexible and scalable design is capable of calibrating multiple channels simultaneously.

Fixtures

The following fixtures can be used along with the MCL2 Series

Applicable to polymer batteries; output current of 10 A or less.



Applicable to polymer batteries; output current of 100 A or less.



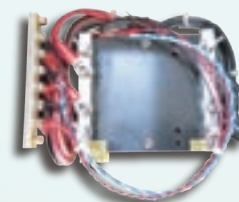
Applicable to 18650 batteries; output current of 10 A or less.



Applicable to cylindrical and rectangular batteries; output current of 30A or less.



Applicable to cylindrical batteries with nickel strips on positive/negative terminals; output current of 100 A or less.



Applicable to coin cell batteries; output current of 3 A or less.



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