



REGENERATIVE BATTERY PACK TEST SYSTEM MODEL 17020

Chroma's 17020 is a high precision system specifically designed for secondary battery modules and pack tests. Accurate sources and measurements ensure the test quality that is suitable to perform repetitive and reliable tests that are crucial for battery modules / packs, for both incoming or outgoing inspections as well as capacity, performance, production and qualification testing.

Chroma's 17020 system architecture offers regenerative discharge designed to recycle the electric energy sourced by the battery module either back to the channels in the system performing a charging function or to the utility mains in the most energy efficient manner. This feature saves electricity, reduces the facilities thermal foot print and provides a green solution by reducing the environmental impact on our planet.

Chroma's 17020 system is equipped with multiple independent channels to support dedicated charge / discharge tests, on multiple battery modules / packs, each with discrete test characteristics. The channels can easily be paralleled to support higher current requirements. This feature provides the ultimate flexibility between high channel count and high current testing.

Advanced hardware design can create seamless transitions between maximum charge and maximum discharge (or maximum discharge and maximum charge) with a rapid 50 ms conversion. This feature allows for charge/discharge modes simulating real world scenarios.

Chroma's 17020 system has flexible programming functions and may be operated with Chroma's powerful Battery Pro software. Battery Pro utilizes the system to create cycling tests from basic charge or discharge to complex drive cycle testing for each channel or channel groups. A thermal chamber control can be integrated into a profile and triggered by time or test results yielding a dynamic profile. Battery Pro's features allows quick and intuitive test development to eliminate the need of tedious scripting or programming by a software engineer.

There are multiple safety features including Battery Polarity Check, Over Voltage Protection, Over Current Protection check and Over Temperature Protection to ensure protected charge / discharge testing. In the unlikely event of power or computer communication loss, the data is securely stored in the system, on a non-volatile memory, protecting against potential data loss and allowing for continuous flow after restart.

Model 17020

Features:

- Regenerative battery energy discharge
 - Energy saving
 - Environment protection
 - Low heat output
- Channels paralleled for higher currents
- Charge / discharge mode (CC, CV, CP)
 - Constant current
 - Constant voltage
 - Constant power
- Driving cycle simulation
- High precision measurement accuracy
- Fast current conversion
- Smooth current without over shoot
- Testing data analysis function
- Data recovery protection (after power failure)
- Independent protection of multi-channel
- Total harmonic distortion: less than 5% of rated power



Chroma

APPLICATIONS

Battery Pack

- EV battery module
- Electric scooter/ bike
- UPS
- Electric gardening tools
- Energy storage battery
- Power tools
- Car battery
- Lead-acid battery

Application

- Drive cycle simulator
- Learning for manufactory
- Life cycle test
- Balance control test
- DCIR test
- Capacity test
- Performance test

- Reliability test
- Over charge/discharge test
- Thermal test

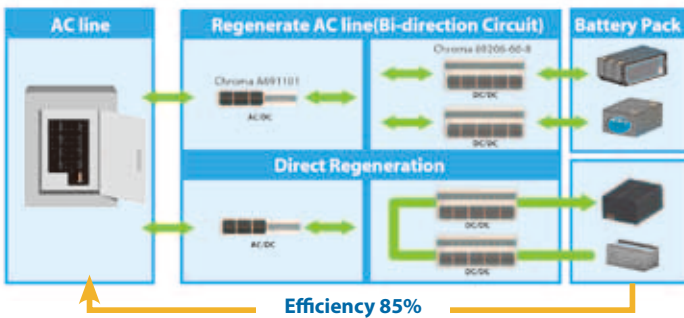
REGENERATIVE ENERGY

Regenerative Energy

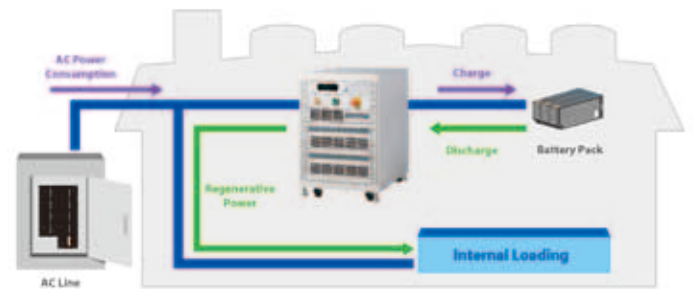
- Regenerative battery energy discharge
 - Direct recycle back to the battery unber charging
 - Regenerate to grid
- Low heat output

Efficiency

The return efficiency is up to 85% at above 20% rated power.



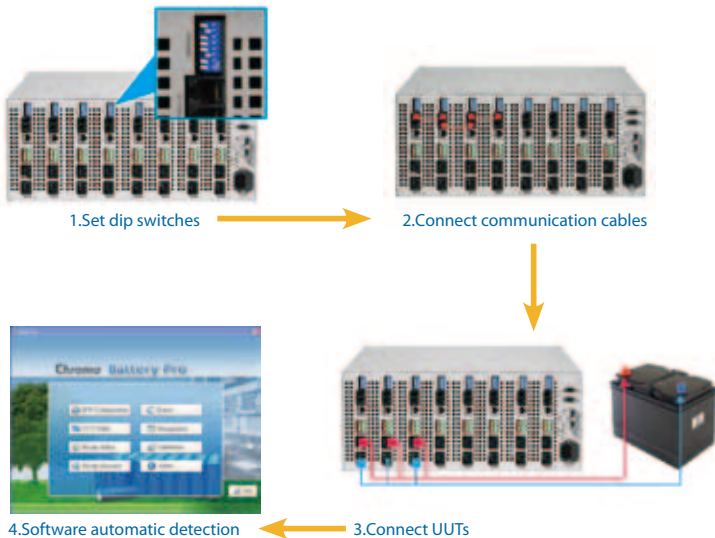
- Reduce air-conditioner power consumption
- THD is under 5% at rated power
- The PF is over 0.9 at rated power



PARALLEL FUNCTIONS

Parallel function

- Easy parallel operation for user flexibility
- The delay time is under 1ms between channels



Multi-channels

- Supports various capacity batteries by paralleling



- The system supports different capacity batteries from a base system configuration

- Battery companies have various capacity configurations. Some customers may purchase a high power system to test all capacity battery packs. The downside is that measurements accuracy are not sufficient for small-capacity battery packs. Using Chroma's systems, customers test under individual channels or parallel to test higher capacity battery packs



SYSTEM FEATURES

Independent Channels

- Independent channel operation
- Independent testing data
- Independent protection
- Independent testing process

Operating mode

- Constant current (CC) mode
- Constant voltage (CV) mode
- Constant power (CP) mode
- Constant voltage-limit current mode (CC-CV)
- Waveform current mode
- DCIR mode
- Rest

Cut-off mode

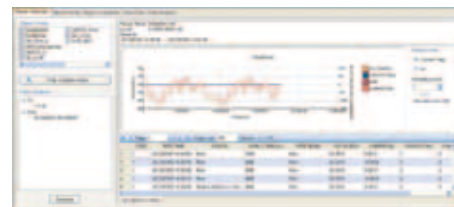
- Time (s)
- Capacity (Ah)
- Voltage (V)
- Current (A)
- Temperature (°C)
- Channel data in data logger (Option)

Protections

- Over voltage protection (V)
- Under voltage protection (V)
- Over current protection (A)
- Over temperature protection (°C)
- Over capacity protection (Ah)
- Wire loss protection (ΔV)
- Channel data in data logger (Option)
- $-\Delta V / +\Delta V$ protection (V)
- $+\Delta I / -\Delta I$ protection (A)
- Delta Protection: Protect internal short of battery cell

Testing Data

- Independent testing data
- Detail report: STEP / TEST TIME / TEST TIME ID / Cycle / Loop / STEP MODE / STEP TIME / VOLTAGE(V) / CURRENT(A) / CAPACITY (Ah) / Energy (Wh) / TEMPERATURE (°C) / Data Logger Channel (Option)
- STEP / STEP NO / LOOP / CYCLE / STATUS / STEP START TIME / STEP MODE / CUT OFF VOLTAGE(V) / CUT OFF CURRENT(A) / CUT OFF CAPACITY(Ah) / DCIR(mOhm) / Energy (Wh) / TEMPERATURE (°C) / Data Logger Channel (Option)



Data Recovery Function

- 60 min of temporary data storage when sampling time is 1 sec.
- Save the test settings to resume after power failure is recovered.

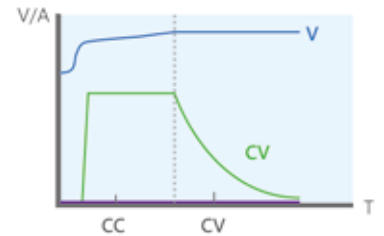
Compact Size

- The dimensions of a regenerative system is smaller compared to a system that has to dissipate energy.



Continuous transition

- Continuous charge and discharge transition: No time delay to transit from charge to discharge. The user can verify the battery pack for a design limit.
- Continuous CC-CV transition: No overshoot current or voltage to damage the battery when transiting CC-CV.



Response time

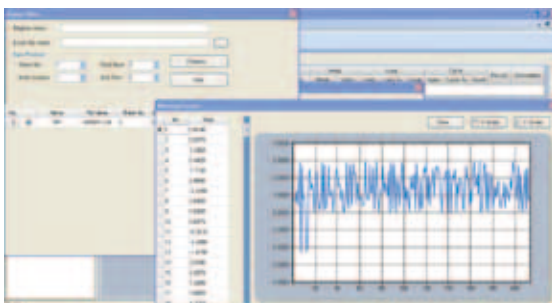
- The trip time between maximum charge and maximum discharge current is 50ms.
- Smooth current without overshoot for avoiding to damage the battery.



Driving cycle simulation

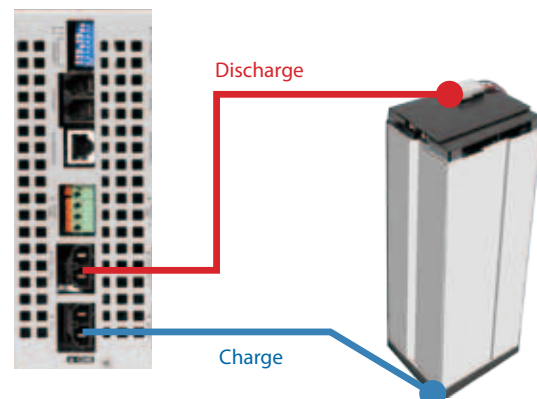
The battery pack always is used at quick and un-regular current condition. The system simulates the real condition on battery pack by working condition simulator.

- Import dynamic charge/discharge waveforms to simulate the DRIVE CYCLE or the actual application.
- Support Excel (xls) format
- There are 720,000 points of driving profile memory to save the waveform current in each channel.
- Minimum Δt : 10ms



Independent battery connections

- For battery pack design, the charge and discharge connections are independent. Users can set 17020's channels with independent charge / discharge connections to isolate each operation independently.



SOFTWARE FUNCTION

Battery Pro



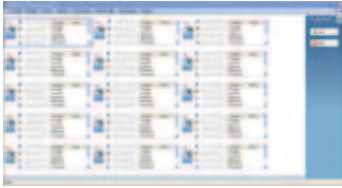
The 17020 Test system is specifically designed to meet the various requirements for testing secondary battery packs with high safety and stability. Charge and discharge protection aborts tests when abnormal conditions are detected. Data loss, storage and recovery are protected against power failure.

Testing Data

- Generate the detailed report and step report
- Customized report format
- Exports test reports in PDF, CSV and XLS
- Graphical report function
- Report analysis Function: Users can create customized reports such as life-cycle report, Q (AH)-V(V) report, V(V)/I(A)/T(°C)-time report...etc through the user-defined X and Y axis parameters.
- Real-time browsing test reports of each channel
- Diversified reports & charts: Real-time report, Cut-off report, X-Y scatter chart report

User friendly

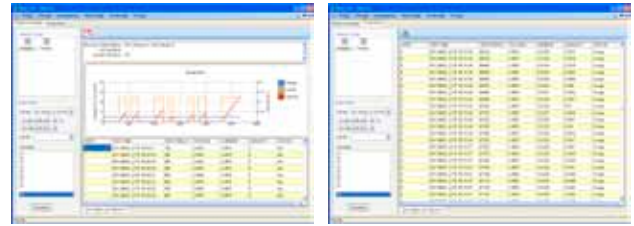
- Real-time multi channel battery pack status browse



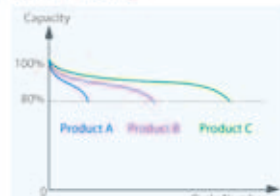
- Icon Manager: Test status of each channel is managed through different icons, easy to read and understand.



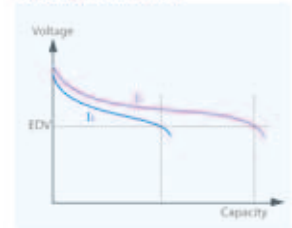
- Authority management: It sets the user's authority for operation.
- Fault record tracking: It records the abnormal state of each channel independently.



Cycle Life Testing

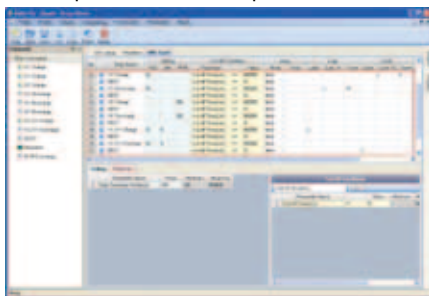


Capacity Measurement



Recipe editor

- 255 charge/discharge conditions
- Sets dual layer loops (cycle & loop) with 9999 loops per layer
- Able to edit dynamic charge/discharge waveform with 10ms current switching speed
- Testing Step: CV / CC / CP / CC-CV / Waveform current / DCIR)
- Cut-off conditions (time, current, capacity, cut-off voltage, cut-off current, etc.)
- Next Step: Next / End / Jump / Rest



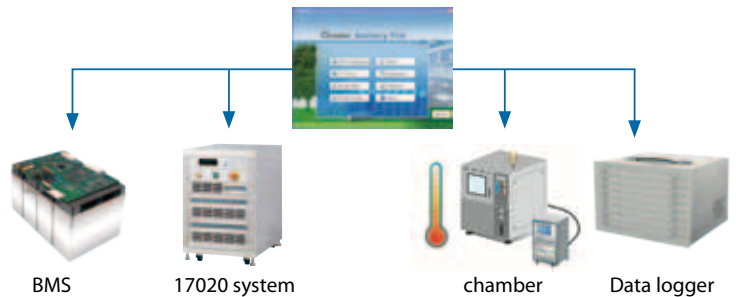
Temperature Measurement

- Temperature measured for each channel within the range of 0~90°C ± 2°C.
- 4 sets of measurements (Max) per channel to measure the battery surface temperature.

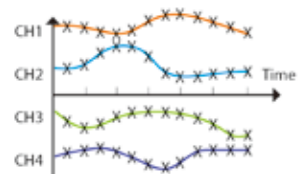


Software integration

- BMS communication interface : Collect the BMS data to controls the charge/ discharge profile and protection setting.
- Data logger : Collect the data logger to controls the charge/ discharge profile and protection setting.
- Thermal Chambers : It synchronize temperature control with charge/discharge profile.



- Data logger: Chroma 51101-64 Battery cell voltage and temperature measurement



What CHROMA data loggers see, constant rate each channel
 Sample rate per channel = constant
 Minimum: 200ms

PRODUCT DESCRIPTION

17020's Regenerative Module / Battery Pack Test System uses bi-directional AC-DC converter and bi-directional DC-DC tester with a battery charge/discharge controller that is composed of the three standalone units featured below:

■ **Battery Charge/Discharge Controller :**

Model 69200-1

■ **DC/AC Bi-directional Converter :**

Model A691101

■ **Regenerative Charge/Discharge Tester :**

Model 69206-60-8

Model 69224-60-4

Model 69212-60-4

Model 69212-20-4



The software installed in a computer, connects to controller by ethernet interface.

CPU speed Intel Core 2 Due 2.00G or above.

At least 4G memory.

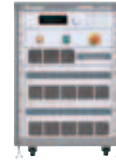
Operating system WinXP (SP2 or above) 32bit .

FLEXIBLE SYSTEM CONFIGURATION

■ 17020 Regenerative Battery Pack Test System can be configured to specified requirements and expandable to 60 channels.



8Channel

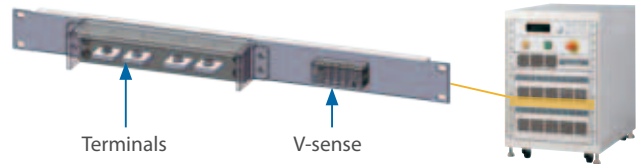


16Channel



48Channel

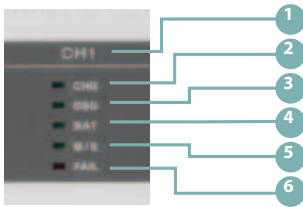
■ The driving cable can connect the front panel or rear outlet, users can choose their own.



Terminals

V-sense

692XX INTERFACE



- 1
- 2
- 3
- 4
- 5
- 6



- 7



- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16

1. Channel No
2. Charge Status Indicator
3. Discharge Status Indicator
4. UUT Connection Indicator
5. Parallel Indicator
6. Failure Indicator
7. Power Switch
8. Channel DIP Switch
9. Parallel Connector
10. Temperature Meas. Terminal
11. Voltage Meas. Terminal
12. Charge/ Discharge Output/ Input Connector
13. Charge Output Connector
14. Controller Connector
15. DC BUS Terminal
16. AC Input

SPECIFICATIONS

Model 692XX series		69206-60-8	69212-24-4	69212-60-4 *	69224-60-4 *	69224-100-4*
Channel		8	4	4	4	4
Charge / Discharge Mode	Voltage Range	10-60Vdc	2.8V-24Vdc	7.5V-60Vdc	7.5V-60Vdc	12.5V-100Vdc
	Maximum Current	12A	60A	60A	60A	60A
	Max Power	600W	1.2kW	1.2kW	2.4kW	2.4kW
	CC mode accuracy	0.1%+0.05% F.S.	0.1% + 0.05% F.S.	0.1%+0.05% F.S.	0.1%+0.05% F.S.	0.1%+0.05% F.S.
	Current Resolution	1mA	5mA	5mA	5mA	5mA
	CV mode accuracy	0.1%+0.05% F.S.	0.1% . + 0.05% F.S.	0.1%+0.05% F.S.	0.1%+0.05% F.S.	0.1%+0.05% F.S.
	Voltage Resolution	1mV	0.5mA	0.5mV	0.5mV	0.5mV
	CP mode accuracy	0.2% stg. +0.1% F.S.	0.2% + 0.1% F.S.	0.2% stg. +0.1%F.S.	0.2% stg. +0.1%F.S.	0.2% + 0.1% F.S.
Measurement	Power Resolution	0.1W	0.2W	0.2W	0.2W	0.2W
	V/I sampling rate *1	20us				
	Voltage range	0~60V	0~60V	0~60V	0~60V	0~100V
	Voltage accuracy	0.02% rdg.+0.02% F.S.	0.1% rdg.+0.05% F.S.	0.1% rdg.+0.05% F.S.	0.1% rdg.+0.05% F.S.	0.1% rdg.+0.05% F.S.
	Voltage resolution	1mV	1mV	1mV	1mV	2mV
	Current range	4.8A/12A	24A/60A	24A/60A	24A/60A	24A/60A
	Current accuracy	0.05% rdg+0.05% rng	0.1% rdg. + 0.05% rng.	0.1% rdg. + 0.05% rng.	0.1% rdg. + 0.05% rng.	0.1% rdg. + 0.05% rng.
	Current resolution	1mA	5mA	5mA	5mA	5mA
	Power accuracy	0.08% rdg+0.08% rng.	0.2% rdg. + 0.1% rng.	0.2% rdg. + 0.1% rng.	0.2% rdg. + 0.1% rng.	0.2% rdg. + 0.1% rng.
	Power resolution	0.1W	0.2W	0.3W	0.3W	0.5W
	Temperature range	0~90°C	0~90°C	0~90°C	0~90°C	0~90°C
	Temperature accuracy	± 2°C	± 2°C	± 2°C	± 2°C	± 2°C
Temperature resolution	0.1°C	0.1°C	0.1°C	0.1°C	0.1°C	
Others	Protection	UVP, OCP, OPP, OTP, FAN, Short				
Temperature Coefficient	Voltage / Current	50ppm/°C				
Dimension (H x W x D)		177 x 428 x 600.7mm / 7.0 x 17 x 24 inches	177 x 428 x 700mm / 7.0 x 17 x 28 inches	177 x 428 x 700mm / 7.0 x 17 x 28 inches	177 x 428 x 700mm / 7.0 x 17 x 28 inches	177 x 428 x 700mm / 7.0 x 17 x 28 inches
Weight		38.6kg / 85lbs	37kg / 82lbs	37kg / 82lbs	37kg / 82lbs	37kg / 82lbs

Model A691101 DC/AC Bi-direction Converter

Phase	Single Phase	
Regenerative Bi-Direction Power	Output Voltage Range	190-250Vac
	Output Current Range	45A
	Output Current THD	< 5% at Related Power
	Output Power Factor	> 0.9 at Related Power
Others	Protection	UVP, OCP, OPP, OTP, FAN, Short
Dimension (H x W x D)	83.94 x 425.8 x 696 mm / 3.3 x 16.8 x 27.4 inch	
Weight	25kg / 55.2lbs	

Model 69200-1 Battery Charge/Discharge Controller

Data Acquisition Rate to PC	Minimum 40ms@17020 (4CH), 600ms@17020(60CH)
PC Interface	Ethernet
Dimension (H x W x D)	88.1 x 428 x 420mm / 3.5 x 16.9 x 16.5inch
Weight	9.4kg / 21lbs

Specifications

Temperature	Operation	0°C ~ 40°C
	Storage	-40°C ~ 85°C
Safety & EMC		CE
Input AC Power	Voltage range	AC 90V – 250V, <120VA

* All specifications are subject to change without notice. Please visit our website for the most up to date specifications.

Note*1: 20us sampling rate for calculating battery capacity and energy.

ORDERING INFORMATION

17020 Regenerative battery pack test system (battery charge/discharge controller, DC/AC Bi-direction Converter ,Regenerative Charge/Discharge Tester)

A170201 : IPC for battery test system

A692003 : Thermal sensor(0~90°C) · sensor cable (30cm)

51101-64 : Data logger - 64 channel

Developed and Manufactured by :

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