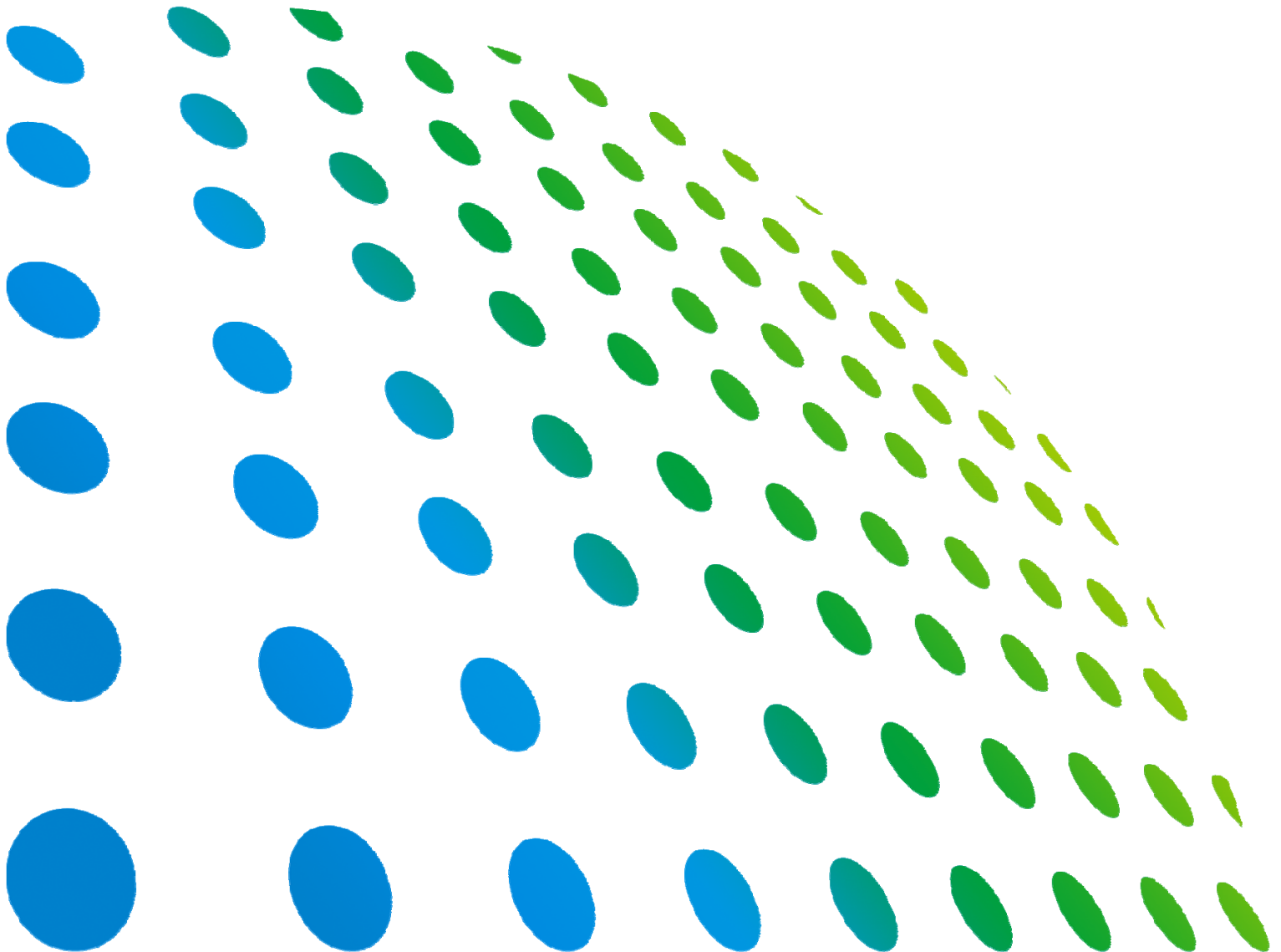




Programmable Charge/Discharge Tester Frame

17200-5-10

User's Manual



Programmable Charge/Discharge
Tester Frame
17200-5-10
User's Manual



Version 1.2
August 2013

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CHROMA ATE INC.

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Material Contents Declaration

The recycling label shown on the product indicates the Hazardous Substances contained in the product as the table listed below.



: See <Table 1>.



: See <Table 2>.

<Table 1>

Part Name	Hazardous Substances					
	Lead	Mercury	Cadmium	Hexavalent Chromium	Polybrominated Biphenyls	Polybromodiphenyl Ethers
	Pb	Hg	Cd	Cr ⁶⁺	PBB	PBDE
PCBA	○	○	○	○	○	○
CHASSIS	○	○	○	○	○	○
ACCESSORY	○	○	○	○	○	○
PACKAGE	○	○	○	○	○	○

“○” indicates that the level of the specified chemical substance is less than the threshold level specified in the standards of SJ/T-11363-2006 and EU 2005/618/EC.

“×” indicates that the level of the specified chemical substance exceeds the threshold level specified in the standards of SJ/T-11363-2006 and EU 2005/618/EC.

Disposal

Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities. Contact your local government for information regarding the collection systems available. If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being. When replacing old appliances with new one, the retailer is legally obligated to take back your old appliances for disposal at least for free of charge.



<Table 2>

Part Name	Hazardous Substances					
	Lead	Mercury	Cadmium	Hexavalent Chromium	Polybrominated Biphenyls	Polybromodiphenyl Ethers
	Pb	Hg	Cd	Cr ⁶⁺	PBB	PBDE
PCBA	×	○	○	○	○	○
CHASSIS	×	○	○	○	○	○
ACCESSORY	×	○	○	○	○	○
PACKAGE	○	○	○	○	○	○

“○” indicates that the level of the specified chemical substance is less than the threshold level specified in the standards of SJ/T-11363-2006 and EU 2005/618/EC.

“×” indicates that the level of the specified chemical substance exceeds the threshold level specified in the standards of SJ/T-11363-2006 and EU 2005/618/EC.

1. Chroma is not fully transitioned to lead-free solder assembly at this moment; however, most of the components used are RoHS compliant.
2. The environment-friendly usage period of the product is assumed under the operating environment specified in each product’s specification.

Disposal

Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities. Contact your local government for information regarding the collection systems available. If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being. When replacing old appliances with new one, the retailer is legally obligated to take back your old appliances for disposal at least for free of charge.



Safety Summary

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or specific WARNINGS given elsewhere in this manual will violate safety standards of design, manufacture, and intended use of the instrument. *Chroma* assumes no liability for the customer's failure to comply with these requirements.



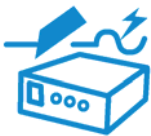
BEFORE APPLYING POWER

Verify that the power is set to match the rated input of this power supply.



PROTECTIVE GROUNDING

Make sure to connect the protective grounding to prevent an electric shock before turning on the power.



NECESSITY OF PROTECTIVE GROUNDING

Never cut off the internal or external protective grounding wire, or disconnect the wiring of protective grounding terminal. Doing so will cause a potential shock hazard that may bring injury to a person.



FUSES

Only fuses with the required rated current, voltage, and specified type (normal blow, time delay, etc.) should be used. Do not use repaired fuses or short-circuited fuse holders. To do so could cause a shock or fire hazard.



DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the instrument in the presence of flammable gases or fumes. The instrument should be used in an environment of good ventilation.



DO NOT REMOVE THE COVER OF THE INSTRUMENT

Operating personnel must not remove the cover of the instrument. Component replacement and internal adjustment can be done only by qualified service personnel.

Safety Symbols



DANGER – High voltage.



Explanation: To avoid injury, death of personnel, or damage to the instrument, the operator must refer to an explanation in the instruction manual.



High temperature: This symbol indicates the temperature is now higher than the acceptable range of human. Do not touch it to avoid any personal injury.



Protective grounding terminal: To protect against electrical shock in case of a fault. This symbol indicates that the terminal must be connected to ground before operation of equipment.



The **WARNING** sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a **WARNING** sign until the indicated conditions are fully understood and met.



The **CAUTION** sign denotes a hazard. It may result in personal injury or death if not noticed timely. It calls attention to procedures, practices and conditions.



The **Notice** sign denotes important information in procedures, applications or the areas that require special attention. Be sure to read it carefully.



Keep hands off: This label indicates danger. Do not put your hand in that area when the device is running! It is to remind the user that the mechanical movement may cause personnel injury if proper operation is not followed. Do not ignore this label and continue the operation before precautions are fully understood and taken care of.



Hazard to Electric Shock: This label indicates danger. Please be very careful when operating it as the labeled area contains hazard voltage! It could cause personnel injury or death if not noticed timely.

Revision History

The following lists the additions, deletions and modifications in this manual at each revision.

Date	Version	Revised Sections
Jul. 2012	1.0	Complete this manual.
Sep. 2012	1.1	Modify the procedures in the section of “ <i>Replacing Failure Module</i> ” Add a new section “ <i>Simple Specification Verification</i> ”
Aug. 2013	1.2	Add the following: <ul style="list-style-type: none">– A new model “17202-5-30” along with its specification and related descriptions– Waveform, capacitance and DCR notes in the section of “<i>Specifications</i>” Modify the following: <ul style="list-style-type: none">– “<i>Specifications</i>” section in the chapter of “<i>Hardware Specification</i>”– “<i>Table for Recipe Parameter Settings</i>” section in the chapter of “<i>System Setup & Configuration</i>”

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1. Overview

In order to fully utilize the 17200-5-10 Programmable Charge/Discharge Tester Frame, be sure to read this manual carefully before using it.

1.1 Introduction

The function of 17200-5-10 Programmable Charge/Discharge Tester Frame is to charge and discharge the battery in “Constant Current”, “Constant Voltage” or “Constant Power” mode. It has voltage and current measurement functions; in addition it can receive IPC real-time commands as well as store the measured values temporary and return to IPC.

1.1.1 Standard Accessories

Item	Qty	Remark
Rainbow Wire	1	XH-4P/XH-4P 10CM UL1007#24 dual head different direction (power cord from module to the main frame)
Grey Flat Cable	5	1.27X2.54IDC-20PX2-12CM (communication cable from module to the main frame)
Quick Start Guide	1	Chinese version
User's Manual CD	1	Chinese & English version

Notice

1. Be sure to keep all package material in case the device needs to be returned for repair.
2. Do not return the device to Chroma without having prior approval from Chroma RMA.

1.1.2 Inspection

Before shipment, this instrument was inspected and found to be free of mechanical and electrical defects. As soon as the instrument is unpacked, inspect for any damage that may have occurred in transit. Save all packing materials in case the instrument has to be returned. If damage is found, please file claim with carrier immediately. Do not return the device to Chroma without prior approval.

1.2 Basic Composition Unit

Main Frame: 17200-5-10 Programmable Charge/Discharge Tester Frame
 Module: 17202-5-20 / 17202-5-30 Programmable Charge/Discharge Tester Module

Notice

- 17202-5-20 and 17202-5-30 cannot mix for use in the same Main Frame.

Item	Main Frame	Module
Quantity	1	5

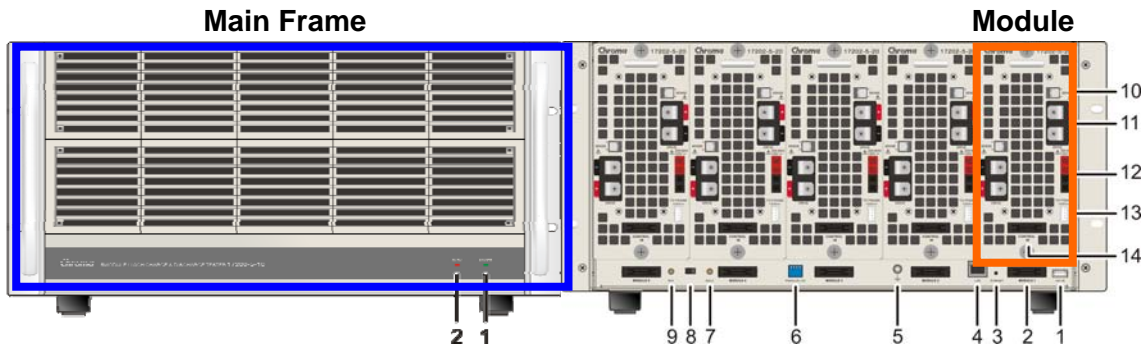


Figure 1-1 Outward Appearance of Tester Frame

1.3 Unit Configuration

1. "17011Battery Pro Software" is used as the operating user interface.
2. The Main Frame is a single unit controller with frame to provide 5 slots and control signals for Module use.
3. The Main Frame does not require filling with Modules but they need to be inserted following the number labeled in sequence.
4. The Main Frame is communicating with IPC through Internet.
5. Maximum 1 set of IPC to 10 sets of Main Frame.
6. Each module has to connect to 24V separately for action.
7. Each module is communicating with the Main Frame through flat cable.
8. The 24Vout of 1st Module provides the working power source for Main Frame.
9. Each module has two channels and the function of each channel is separate for recipe execution without running, pausing or ending at the same time.
10. The charge/discharge tester has EDLC & Battery two types of UUT test functions and can be switched by Dip Switch. ※ Once the function is changed, it is necessary to reset the Frame by rebooting again.
11. Both of Main Frame and Module have no power On/Off design.
12. Since the Module is in modular design, it can be swapped separately for 24Vdc when under "no output" standby state. (See 4.2.2 for swap procedure.)

1.4 Hardware Specification

The operating specifications of 17202-5-20 and 17202-5-30 are listed in the tables below.
(Test Condition: 23 ±5°C, ≤ 70% RH)

1.4.1 Function 1 – Battery test

□ Model Name	17202-5-20	17202-5-30
□ Channels	5 modules (Maximum)	5 modules (Maximum)
□ Input Voltage	DC 24V±0.5V	DC 24V±0.5V
□ Input Current	Max 90A _{dc}	Max 135A _{dc}
□ Power Consumption	Max 2.2kW	Max 3.3kW
□ Control Method	Charge	CC –CV and CC and CP and CP-CV
	Discharge	CC –CV and CC and CP and CP-CV

	DCIR 1 (Note 3)	
	DCIR 2 (Note 3)	
	Rest (Note 4)	
	SD (Note 5)	
	WAVEFORM (Note 6)	
Constant Voltage		
Setting Range	0mV~5000mV	0mV~5000mV
Accuracy	$\pm(0.02\%$ of setting+0.02% of full scale)	$\pm(0.02\%$ of setting+0.02% of full scale)
Setting Resolution	1mV	1mV
Reading Range	0~5199.9mV	0~5199.9mV
Accuracy	$\pm(0.02\%$ of reading+0.02% of full scale)	$\pm(0.02\%$ of reading+0.02% of full scale)
Reading Resolution	0.1mV	0.1mV
Constant Current		
Setting Range	1mA ~ 3A	1mA ~ 4A
Accuracy	$\pm(0.02\%$ of setting +0.02% of range)	$\pm(0.04\%$ of setting +0.04% of range)
Setting Resolution	1mA	1mA
Reading Range	0mA ~ 3.15 A	0mA ~ 4.2 A
Accuracy	$\pm(0.02\%$ of reading+0.02% of range)	$\pm(0.04\%$ of reading+0.04% of range)
Reading Resolution	0.1mA	0.1mA
Setting Range	0.01A ~ 20A	0.01A ~ 30A
Accuracy	$\pm(0.03\%$ of setting +0.03% of range)	$\pm(0.05\%$ of setting +0.05% of range)
Setting Resolution	10mA	10mA
Reading Range	0mA ~ 21 A	0mA ~ 31.5 A
Accuracy	$\pm(0.03\%$ of reading+0.03% of range)	$\pm(0.05\%$ of reading +0.05% of range)
Reading Resolution	1mA	1mA
Constant Power		
Setting Range	10mW ~ 15W (Note 1)	10mW ~ 20W (Note 1)
Accuracy	$\pm(0.04\%$ of setting +0.04% of range)	$\pm(0.06\%$ of setting +0.06% of range)
Setting Resolution	1mW	1mW
Reading Range	0 ~ 15.6W	0 ~ 21W
Accuracy	$\pm(0.04\%$ of reading+0.04% of range)	$\pm(0.06\%$ of reading+0.06% of range)
Reading Resolution	0.1mW	0.1mW
Setting Range	50mW~ 100W (Note 1)	50mW~ 150W (Note 1)
Accuracy	$\pm(0.05\%$ of setting +0.05% of range)	$\pm(0.07\%$ of setting +0.07% of range)
Setting Resolution	10mW	10mW
Reading Range	0 ~ 104W	0 ~ 160W
Accuracy	$\pm(0.05\%$ of reading+0.05% of range)	$\pm(0.07\%$ of reading+0.07% of range)
Reading Resolution	1mW	1mW
DCIR		
Reading Range	0.01 ~ 99999 m Ω	0.01 ~ 99999 m Ω
Reading Resolution	0.01m Ω	0.01m Ω

Current Rise/fall Times	500us (condition: 0A to 20A @75cm Wire)	500us (condition: 30A 10%~90% @Standard 5m Power Line)
Charging & Discharging time	Setting range: 1s~999h Resolution: 100ms	
Data Storage	To record the voltage, current, capacity and step in the flow. (Note 2)	

1.4.2 Function 2 – Super Capacity Test

□ Model Name	17202-5-20	17202-5-30
□ Channels	(Maximum) , 5 modules	(Maximum) , 5 modules
□ Input Voltage	DC 24V±0.5V	DC 24V±0.5V
□ Input Current	Max 90Adc	Max 135Adc
□ Power Consumption	Max 2.2kW	Max 3.3kW
Control Method	Charge	CC –CV and CC and CP and CP-CV
	Discharge	CC –CV and CC and CP and CP-CV
	Rest (Note 4)	
	SD (Note 5)	
	WAVEFORM (Note 6)	
	C and DCR (Note 7, 8)	
Constant Voltage		
Setting Range	0mV~5000mV	0mV~5000mV
Accuracy	±(0.02% of setting +0.02% of full scale)	±(0.02% of setting +0.02% of full scale)
Setting Resolution	1mV	1mV
Reading Range	0~5199.9mV (Note 3)	0~5199.9mV
Accuracy	±(0.02% of reading +0.02% of full scale)	±(0.02% of reading +0.02% of full scale)
Reading Resolution	0.1mV	0.1mV
Constant Current		
Setting Range	1mA ~ 3A	1mA ~ 4A
Accuracy	±(0.06% of setting +0.06% of range)	±(0.06% of setting +0.06% of range)
Setting Resolution	1mA	1mA
Reading Range	0mA ~ 3.15 A	0mA ~ 4.2 A
Accuracy	±(0.06% of reading +0.06% of range)	±(0.06% of reading +0.06% of range)
Reading Resolution	0.1mA	0.1mA
Setting Range	0.01A ~ 20A	0.01A ~ 30A
Accuracy	±(0.06% of setting +0.06% of range)	±(0.06% of setting +0.06% of range)
Setting Resolution	10mA	10mA
Reading Range	0mA ~ 21 A	0mA ~ 31.5 A
Accuracy	±(0.06% of reading +0.06% of range)	±(0.06% of reading +0.06% of range)
Reading Resolution	1mA	1mA

Constant Power		
Setting Range	10mW ~ 15W (Note 1)	10mW ~ 20W (Note 1)
Accuracy	±(0.08% of setting +0.08% of range)	±(0.08% of setting +0.08% of range)
Setting Resolution	1mW	1mW
Reading Range	0 ~ 15.6W	0 ~ 21W
Accuracy	±(0.08% of reading +0.08% of range)	±(0.08% of reading +0.08% of range)
Reading Resolution	0.1mW	0.1mW
Setting Range	50mW ~ 100W (Note 1)	50mW ~ 150W (Note 1)
Accuracy	±(0.08% of setting +0.08% of range)	±(0.08% of setting +0.08% of range)
Setting Resolution	10mW	10mW
Reading Range	0 ~ 104W	0 ~ 160W
Accuracy	±(0.08% of reading +0.08% of range)	±(0.08% of reading +0.08% of range)
Reading Resolution	1mW	1mW
Current Rise Times	50us(condition: 0A to 20A @75cm Wire)	500us (condition: 30A 10%~90% @Standard 5m Power Line)
Charging & Discharging time	Setting range: 1s~19m59s Resolution: 10ms	
Data Storage	To record the voltage, current in the flow. (Note 2)	

1.4.3 Function 3 –Others

Other Specifications	
Input Resistance	> 1MΩ
Communication mode	Ethernet interface
Protection function (Using 17011 Battery Pro software)	
OTP	The module measured temperature is over the safety operating temperature (device temperature: 80°C±5°C.)
OCP	The UUT measured current is over the high limit current set on the software.
OVP	The UUT measured voltage is over the high limit voltage set on the software.
OQP	The UUT measured capacity is over the high limit capacity set on software.
Channel Error 1	The system will measure the channel voltage in time and calculate the voltage difference ΔV within fixed time when executing the recipe. It uses the logic judgment of charge and discharge to determine channel error and stop executing the recipe when reverse ΔV is over 50mV.
Channel Error 2	The system will follow the high limit of “voltage or current variation/unit of time” set by the user to compare the measured voltage (current) when executing the recipe. Once $\Delta V/\Delta T$ or $\Delta I/\Delta T$ exceeds the setting, the channel will prompt an error message and stop executing recipe/step. ※ The loading current instant does not perform this judgment (500ms).

Emergency Off	It protects emergency stop.
FAN Fail Warning	It may cause the device too hot if keeps running without fan. ※ Warning does not stop the Tester but triggers OTP.
Loop Impedance (Ro overall circuit)	The system will follow the measured voltage and current to calculate the wire resistance (Ro) between output terminal and UUT when executing the recipe. When the Ro value is greater than the user's setting, the channel will prompt an error message. ※ No calculation when the voltage or current is smaller than 20mV/I.
□ Other function (Using 17011 Battery Pro software)	
Polarity Check	a. When the UUT Sense wire is connected reversely, dual end fell off or positive end fell off, the channel will prompt an error message to stop executing the recipe steps. b. When the battery is connected to ±Drive / ±Sense wire and before executing the recipe, the characteristics of some charge bias on the battery prior formation is used to measure and judge if the battery polarity is correct. If the battery polarity is incorrect, the channel will not charge or discharge. (It does not support EDLC.) ※ Since the GND of each channel can be treated as concurrent, if one of the channels ±Drive wire is connected reversely in parallel mode, it may cause the UUT positive/negative instant short circuit and unable to activate protection.
Contact Check (Rm battery internal resistance)	Before executing the recipe, the system will follow the user's selection to detect if the connection (clamp) with UUT is correct. Contact check PASS is determined to run the recipe when within the specification. The channel will prompt an error message to stop executing the recipe steps when fail is determined. (It does not support EDLC.) ※ Since the GND of each channel can be treated as concurrent, if one of the channels ±Drive wire is connected reversely in parallel mode, it may cause the UUT positive/negative instant short circuit and unable to activate protection.
PC Error Allowed	When the PC is down or the network connection is having error, the channel of single unit can run independently and retrieve or recover the data after the PC connection is back to normal. If the not returned data is about to full, a warning "Memory limitation" will prompt and stop the test. Do not overwrite the data to keep its integrity.
Output Circuit Compensated Voltage	The output circuit compensated voltage is 2V (max.)
□ Working Environment	
Operable Environment	5°C ~45°C, 20%~90% RH

1.4.4 Specifications

1. When the channels are paralleled for use, the current accuracy specification (Setting & Reading) adds 0.005% of range no matter how many channels are paralleled.
2. Accuracy for 0°C to 40°C (SPC): multiply the accuracy by the following multipliers.

Temperature(°C)	0~10	10~20	20~30	30~40
	x3	x2	x1	x2

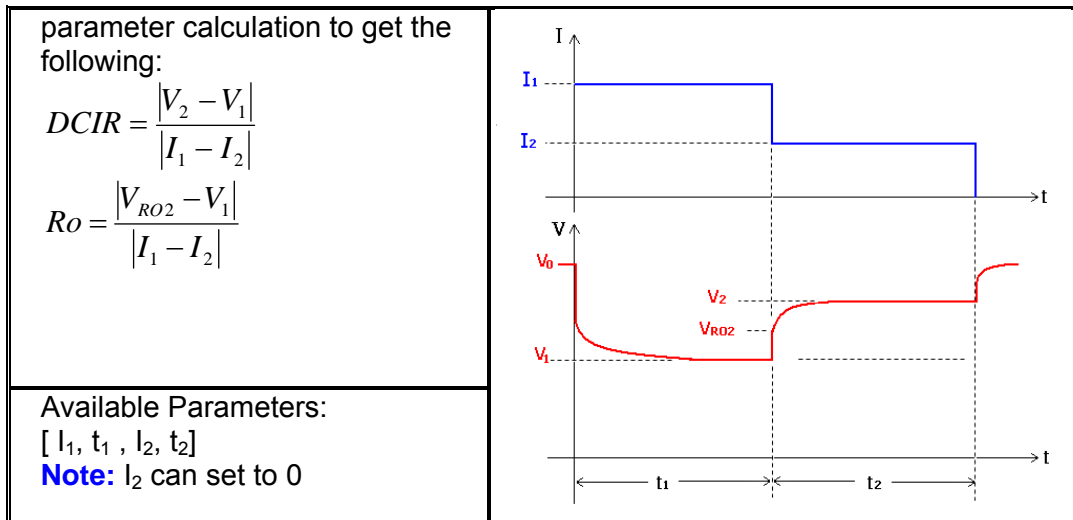
- Note**
- CP Mode can set the maximum high limit current: power divided by voltage determines the control current of CP and when the operation value is larger than the current setting, the current uses the setting to output. ※ The current range is decided by the current set in the step. No range is switched in a single step.
 - For measured data recording, besides regular time recording the user can set the recording point and the data recoding cycle can be determined by Δt , ΔV , ΔI , ΔQ conditions. When any of the conditions is met, the channel data is recorded. ※ The settings exceed the operation total time, voltage, current or capacity change will not get data; also the recorded data cannot exceed the PC hard drive remaining capacity.
 - DCIR:
 - DCIR measurement function is to measure/calculate the internal resistance (R_p) and external loop impedance (R_o) of UUT.
 - ※ (R_o+R_p) is called DCIR
 - DCIR measurement function is a unique recipe not limited to Battery or EDLC mode. The electrical measurement follows EDLC specification.

<DCIR 1>

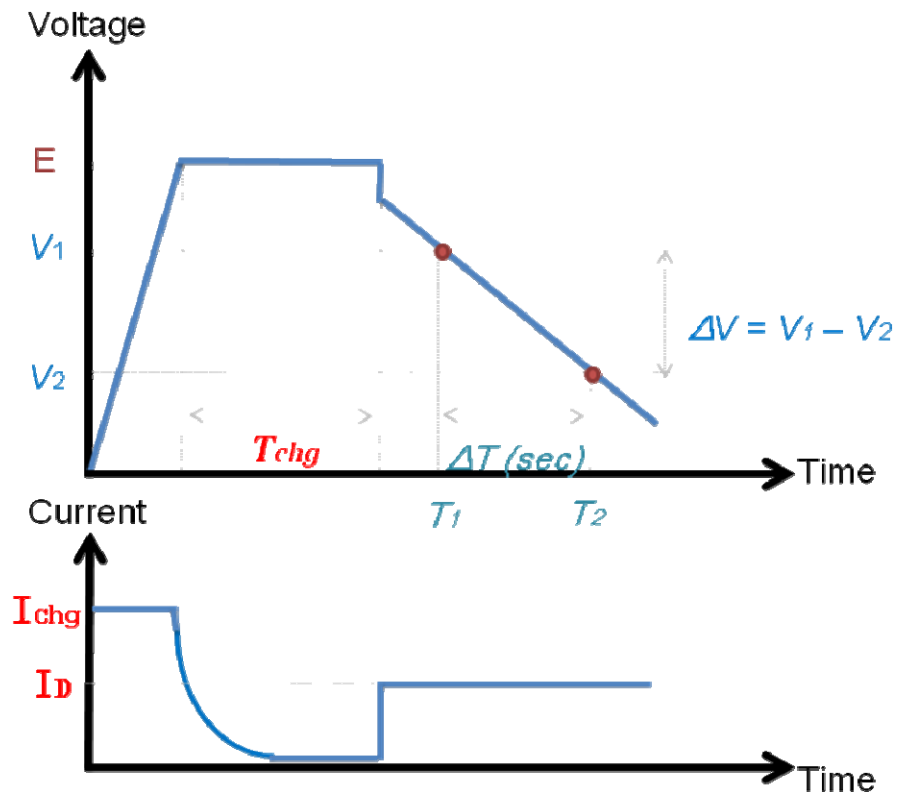
<p>Action description: The user sets a current I_1 to charge (or discharge) the battery, the battery voltage will drop (or rise) instantly and measure the sudden dropped voltage V_{RO1} and V_1 after t_1 time. The test ends at t_e and calculates it with the origin voltage V_0 can get the following:</p> $DCIR = \frac{ V_0 - V_1 }{I_1}$ $R_o = \frac{ V_{RO1} - V_0 }{I_1}$	
<p>Available Parameters: [I_1, t_1, t_e]</p>	

<DCIR 2>

<p>Action description: The user sets a current I_1 to charge (or discharge) the battery, the battery voltage will drop (or rise) instantly and measure V_1 after t_1 time. Next, output I_2, the voltage is read when the device current setting is done and it can measure the sudden drop (or rise) voltage V_{RO2}. At last, read V_2 after passed t_2 and use the</p>	
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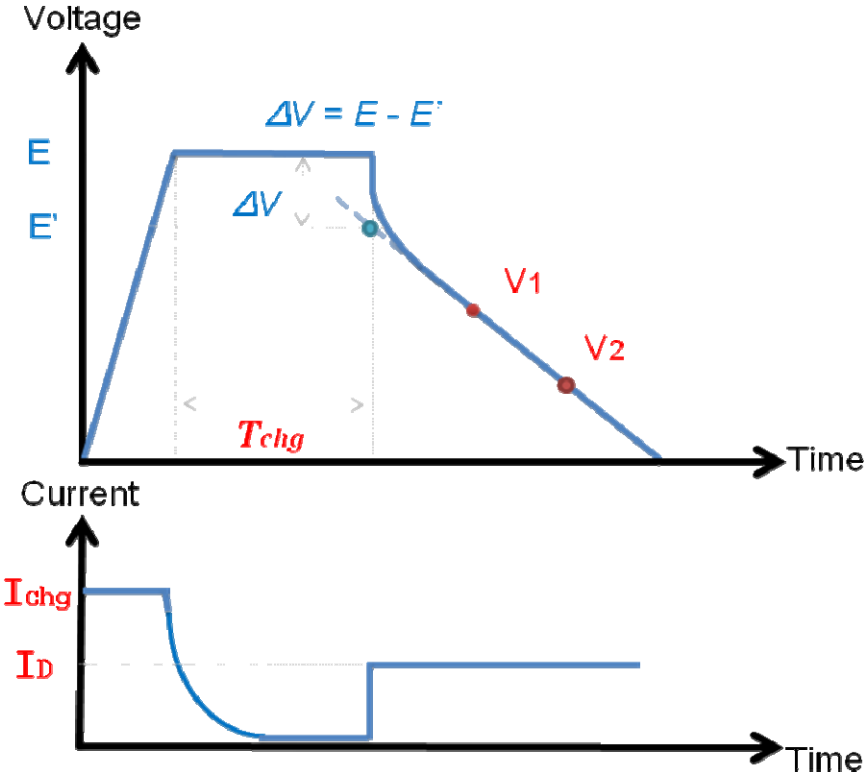
4. Rest: No charge or discharge can be done when executing step. Only voltage and time are recorded.
5. SD: It records the start and end voltage only when executing step. The battery and circuit are open during the process to avoid leakage current due to placing for a long time.
6. Waveform (pattern): This function needs to work with Battery Pro software. The customer can import the data logs via Excel file format to the device for testing. These data logs are a series of current loading records for battery application, which is the battery usage behavior saved by the recorder. The device simulates the same output for battery characteristic test repeatedly to evaluate the battery's performance.
7. EDLC Function Capacitance test:
Follow the EIAJ RC2377 standard to test the capacitance of EDLC:



- (1) First charge to the rated voltage E (2.5V) via the CC-CV step and retain T_{chg} for CV charge time.
 Note: The time of T_{chg} defined in the standard is 30min.
- (2) Use the standard defined current I_D for CC discharge to cut off voltage.
- (3) Calculate the 80% (V1) and 40% (V2) of rated voltage for capacitance.

The formula is $C = \frac{I_D \times \Delta T}{\Delta V}$.

- 8. EDLC Function DCR test:
 Follow the EIAJ RC2377 standard to test the DCR of EDLC:



- (1) First charge to the rated voltage E (2.5V) via the CC-CV step and retain T_{chg} for CV charge time.
 Note: The time of T_{chg} defined in the standard is 30min.
- (2) Measure voltage E and use the standard defined current I_D for CC discharge to cut off voltage.
- (3) Calculate the 80% (Va) and 40% (Vb) of rated voltage for capacitance.

The formula is $DCR = \frac{\Delta V}{I_D}$.

Note: It can also use 70%, 30% for calculation.

2. Outward Appearance & LED Description

2.1 Front View of Charge/Discharge Tester Frame

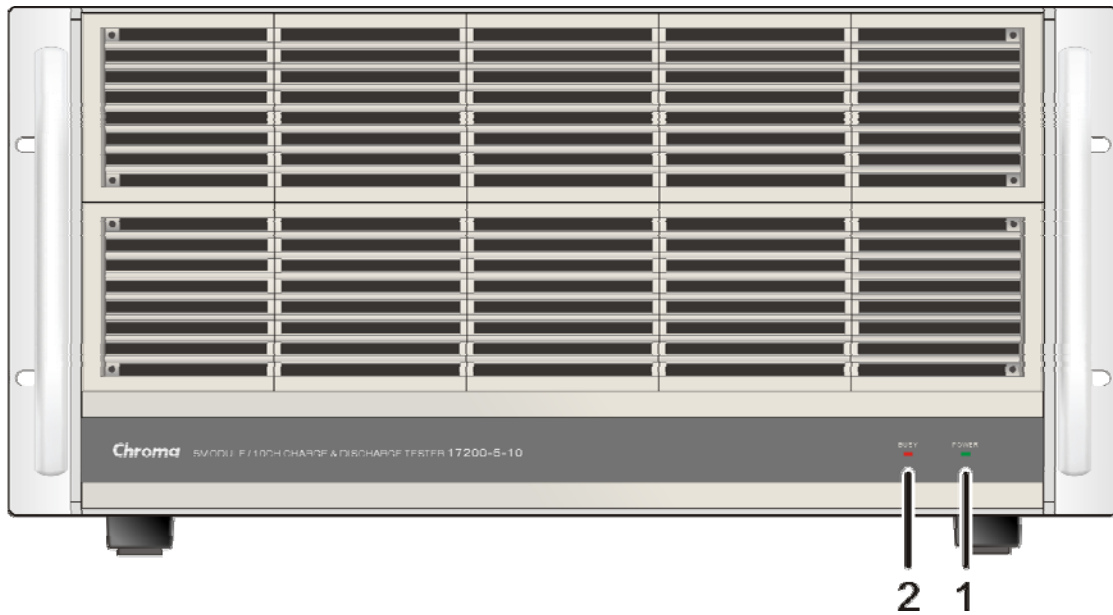




Figure 2-1 Front View

No.	ICON	Name	Function Description	
1		System Power LED	Off	It indicates the device is turned off.
			Always On	It indicates the device is turned on.
2		Communication ERROR LED	Off	It indicates the network module is having error.
			Always On	It indicates the network module is working normal.
			Blink	It indicates the device ID function is enabled.

2.2 Rear View of Charge/Discharge Tester

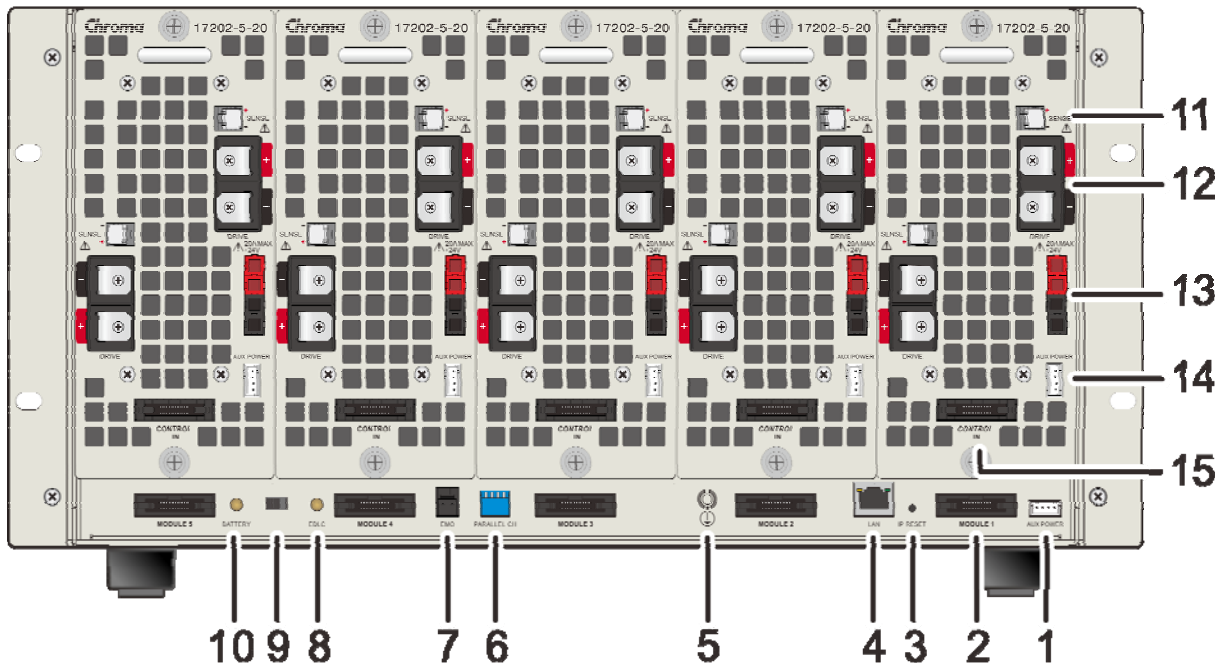






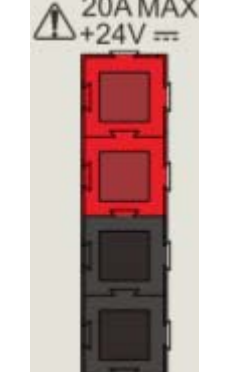
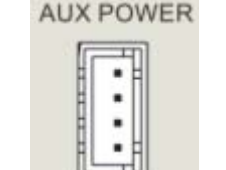
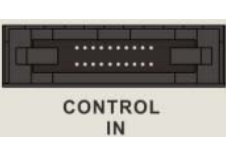


Figure 2-2 Rear View

No.	ICON	Name	Function Description
1		Frame Power Input Terminal	No power on/off switch design. The on/off of 17200-5-10 is determined by if power is inputted through this terminal. The default is to input from the first module.
2		Module Mapped Control Terminal	The cable connecting the terminals on the frame to the modules determines the amount and sequence of module.
3		IP Reset	It resets the IP to factory default.
4		Network Connection Port (RJ45)	It is the network connection port to connect with IPC. The LED is on when the connected correctly.
5		Grounding Terminal	It is provided for the user to do earth grounding.
6		Parallel Dip Switch	a. It is the switch to set the channel for parallel in binary. It is "1, 2, 4, 8" from left to right and ON when switched down. Ex: When SW1 and SW3 are switched to ON, it indicates 5 channels are paralleled.

			<p>b. The set number should be the greatest common divisor of connected channel on the Frame. Ex: If 4 channels are connected to Frame, the parallel mode can set to no parallel, 2 channels parallel or 4 channels parallel except 3 channels parallel.</p> <p>※ The Frame hardware configuration needs to be reset when parallel mode is changed.</p>	
7		Emergency Stop Terminal	When emergency happens, short the terminal two PINs can stop the execution of all steps.	
8		Test Mode Switch	<p>It is the Battery or EDLC mode function switch.</p> <p>※ The Frame needs to restart when the function is switched.</p>	
9		EDLC Mode LED	Off	<p>The function is not activated.</p> <p>The EDLC Test LED is always off in Battery Test Mode.</p>
			Always On	EDLC Test Mode is powered on and ready.
			Blink	<p>The Battery Test LED blinks when the DSP program is updating. It turns to always on when the update is done and prompt for reboot.</p> <p>The 17200-5-10 system is turning on and alternate blinking with Battery Test LED.</p>
10		Battery Mode LED	Off	<p>The function is not activated.</p> <p>The Battery Test LED is always off in EDLC Test Mode.</p>
			Always On	Battery Test Mode is powered on and ready.
			Blink	<p>The EDLC Test LED blinks when the DSP program is updating. It turns to always on when the update is done and prompt for reboot.</p> <p>The 17200-5-10 system is turning on and alternate blinking with EDLC Test LED.</p>
11		Sense Terminal	<p>It is the UUT sense terminal of the channel that needs to be used with output copper terminals.</p> <p>※ Do not mix, reverse or break the connection with other channels when in use.</p>	

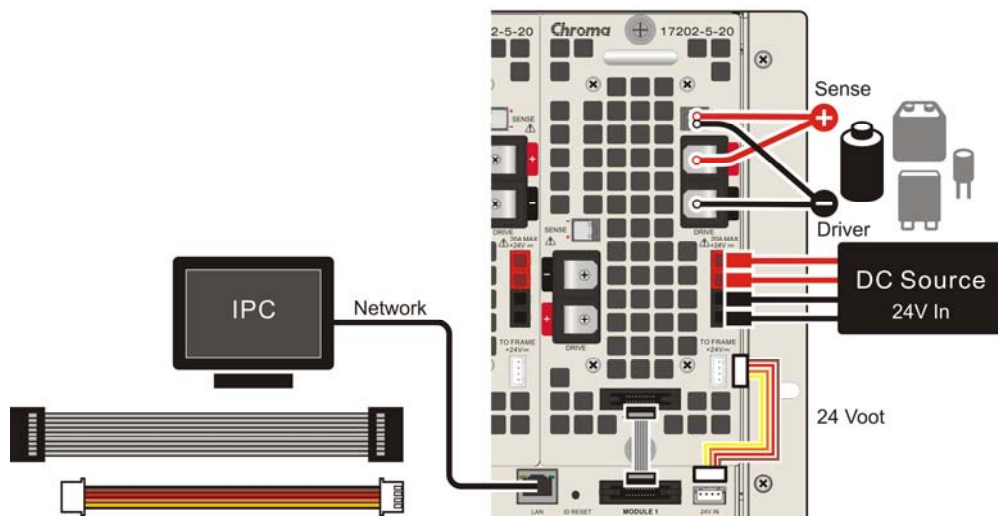
12	 <p>DRIVE</p>	Output Copper Bar	<p>The output copper bar is the large current output path of each channel. Please be noted of the positive and negative polarities are “reversed” for the adjacent two channels.</p> <p>※ Do not mix, reverse or break the connection with other channels when in use.</p>
13	 <p>20A MAX +24V</p>	Module Power Input Terminal	<p>It is the module working power input and the maximum current required for each module is 16A. Be aware of the current size and withstand current of wire when providing the module current.</p> <p>※ Do not mix, reverse or break the connection with other channels when in use.</p>
14	 <p>AUX POWER</p>	Output to Frame AC Line In	<p>It is the power output terminal of 17200-5-10. The default is to provide power from the first module.</p>
15	 <p>CONTROL IN</p>	Module Control Ribbon Cable Input Terminal	<p>It is the module input control terminal.</p>

3. System Setup & Configuration

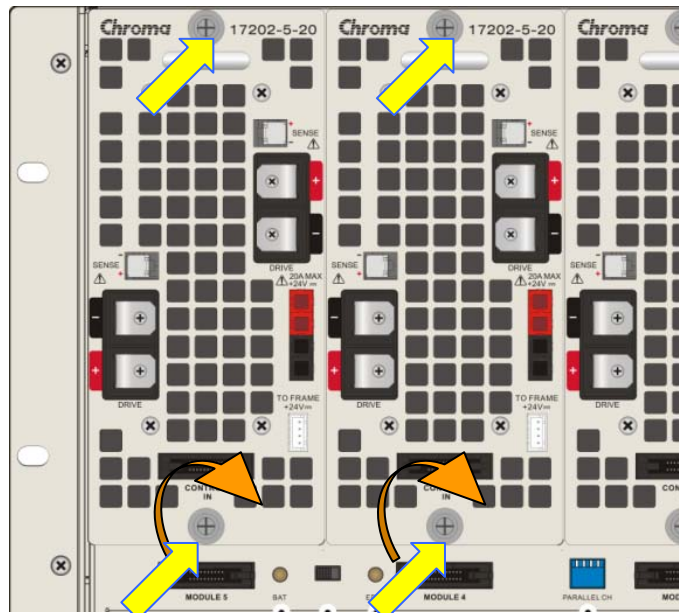
3.1 System Wiring Configuration

Please refer to 2.2 along with the figure below to set up the Charge/Discharge Tester Frame.

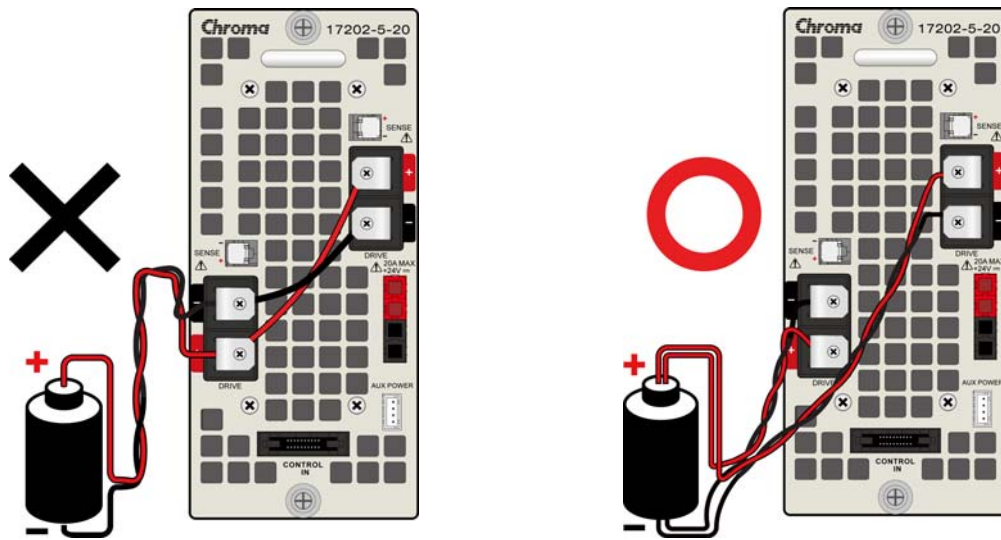
⚠ WARNING If the input voltage exceeds the input range, it could cause the hardware components to be damaged.



⚡ CAUTION Make sure the 24V DC INPUT is plugged in firmly and the screws of Module panel and Frame Case are secured before operation.



⚡ CAUTION To parallel the channels, the Drive wire of single channel should cross strand the positive and negative ends first and then connect to UUT with other channel's Drive wire. Do not use module Drive output as the connecting point.



⚡ CAUTION : The metal wire connected to the grounding terminal has to be grounded to earth to protect the operator. No matter what the circumstances are, do not operate the Tester without proper grounding.

⚡ CAUTION : The 24Vdc input power of a 17200-5-10 (containing Module) needs to be the same power supply.

3.2 DC Source

17200-5-10 / 17202-5-20 / 17202-5-30 needs to work with Chroma 62000B Series or equivalent DC power supply to provide $24V \pm 0.5V$ working power to Charge/Discharge Tester.

3.3 IPC

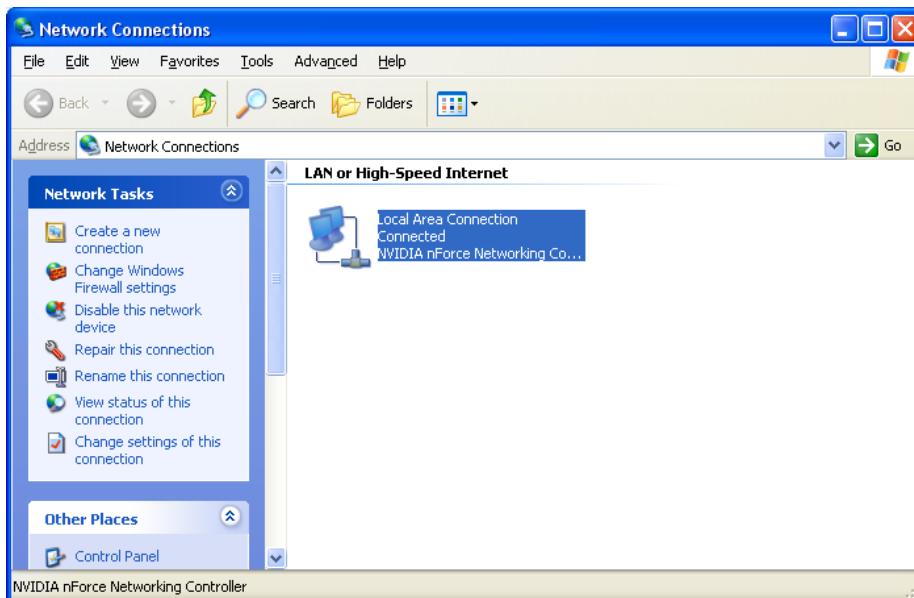
17200-5-10 uses Battery Pro to communicate with, control, download and retrieve test data from IPC via Ethernet Interface. The minimum specification requirements for IPC are suggested as below:

1. Operating System Win XP (SP2 or above)
2. Mouse, keyboard, CD or DVD drive, USB port
3. Screen resolution 1280x1024 (4:3)
4. .NET Framework 3.5 SP1 or above
5. CPU speed Intel Core 2 Due 2.00G or above
6. Memory 4G at least
7. Minimum 1G disk space available, 320GB or above hard disk is suggested
8. Battery Pro software application, see "17011 Software User's Manual" for the basic installation program

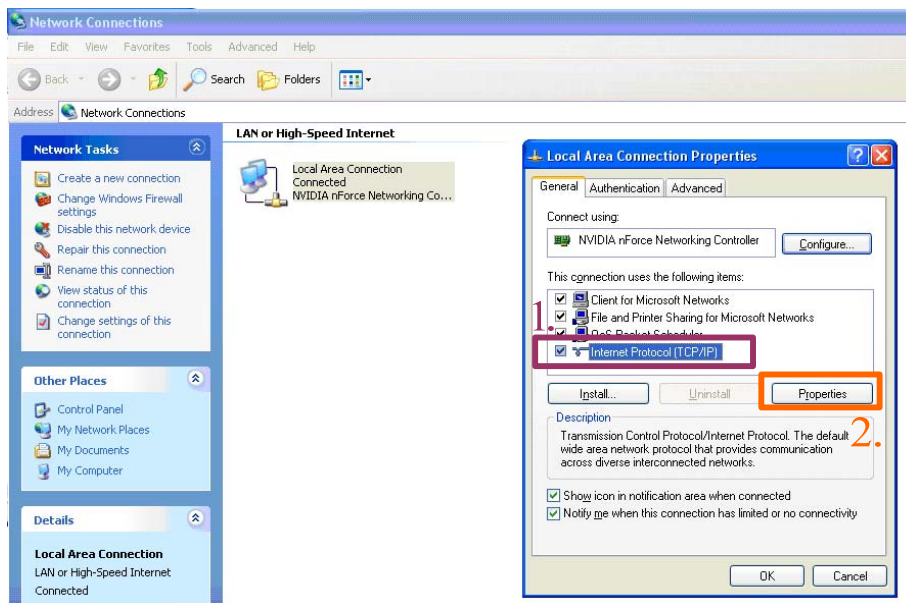
3.3.1 Setting Network Environment - PC

When starting to connect with the 17200 Tester, it is necessary to set the network environment following the procedure listed before for the IPC in use.

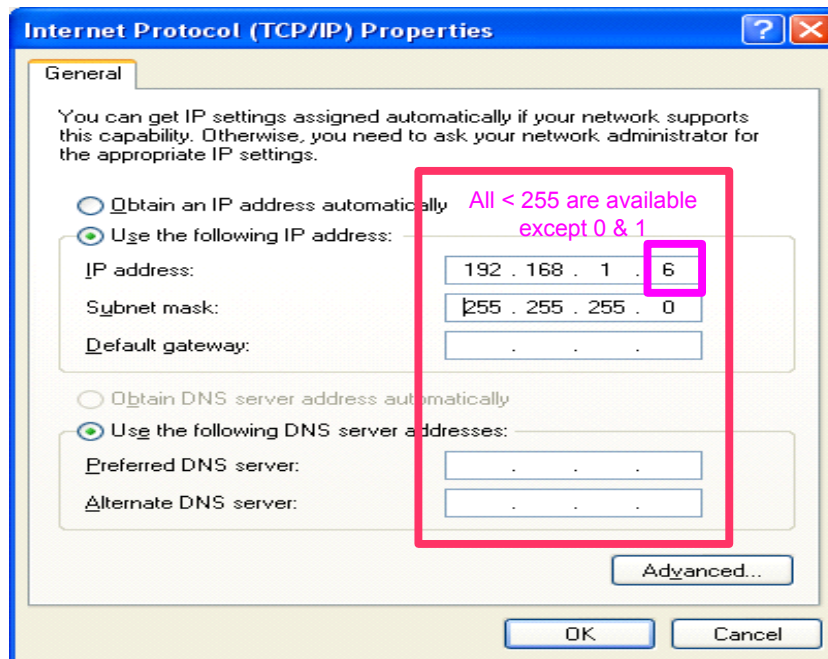
1. Click **[Control Panel]** → **[Network Connections]** → **[Local Area Connection]** and right click it to pop a drop-down menu and select **[Properties]**.



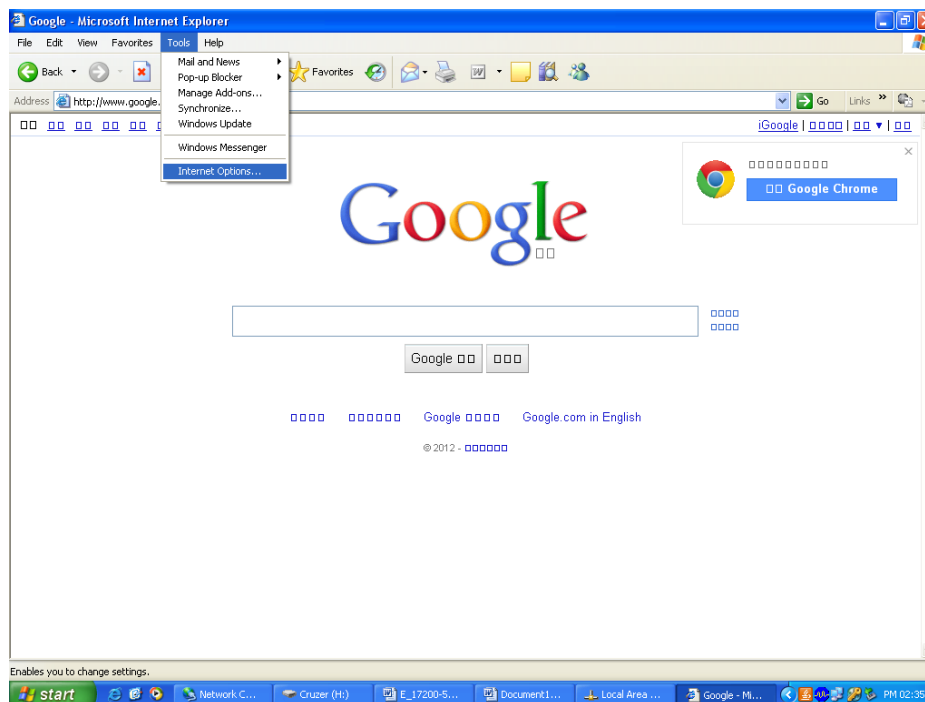
2. Select **“Internet Protocol (TCP/IP)”** in **“General”** tab page and click **Properties**.



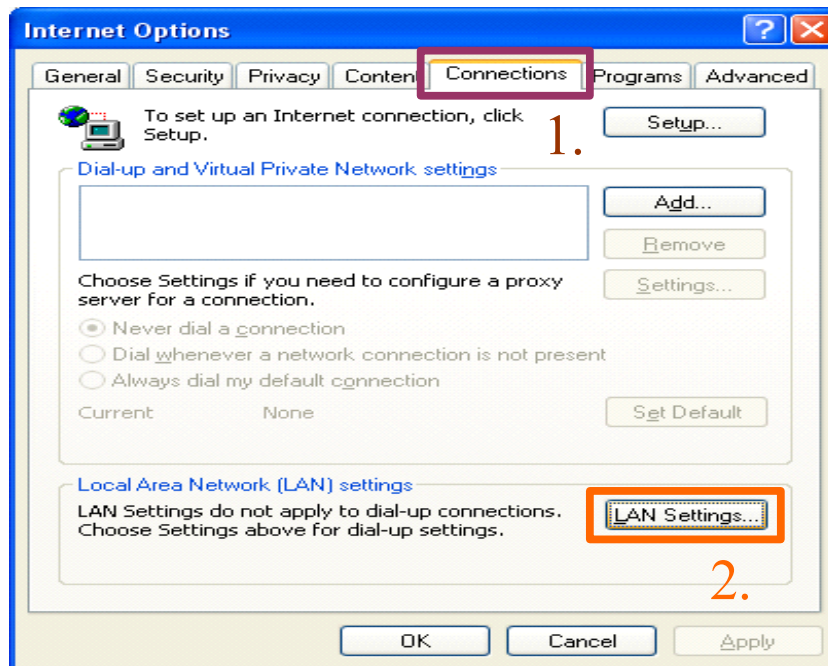
3. Set the IP address as the figure shown below and close the window when done.



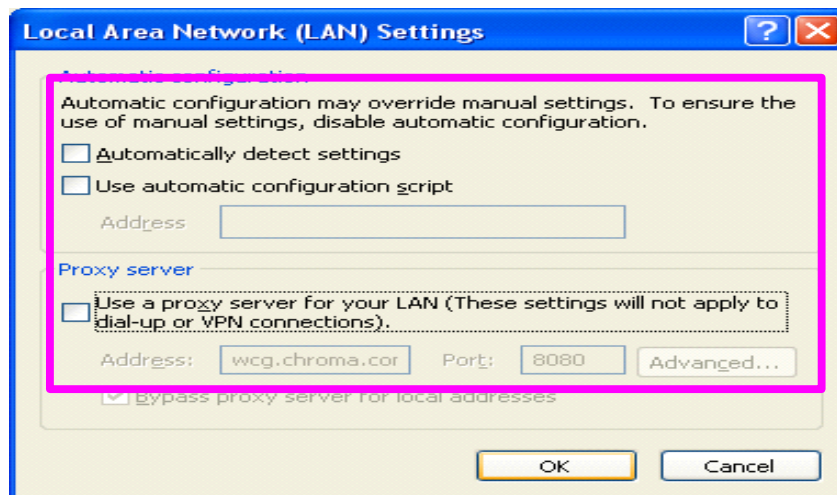
4. Open IE and click **[Tools]** → **[Internet Options]**.



5. Select [**Connections**] and click **LAN Settings(L)**.



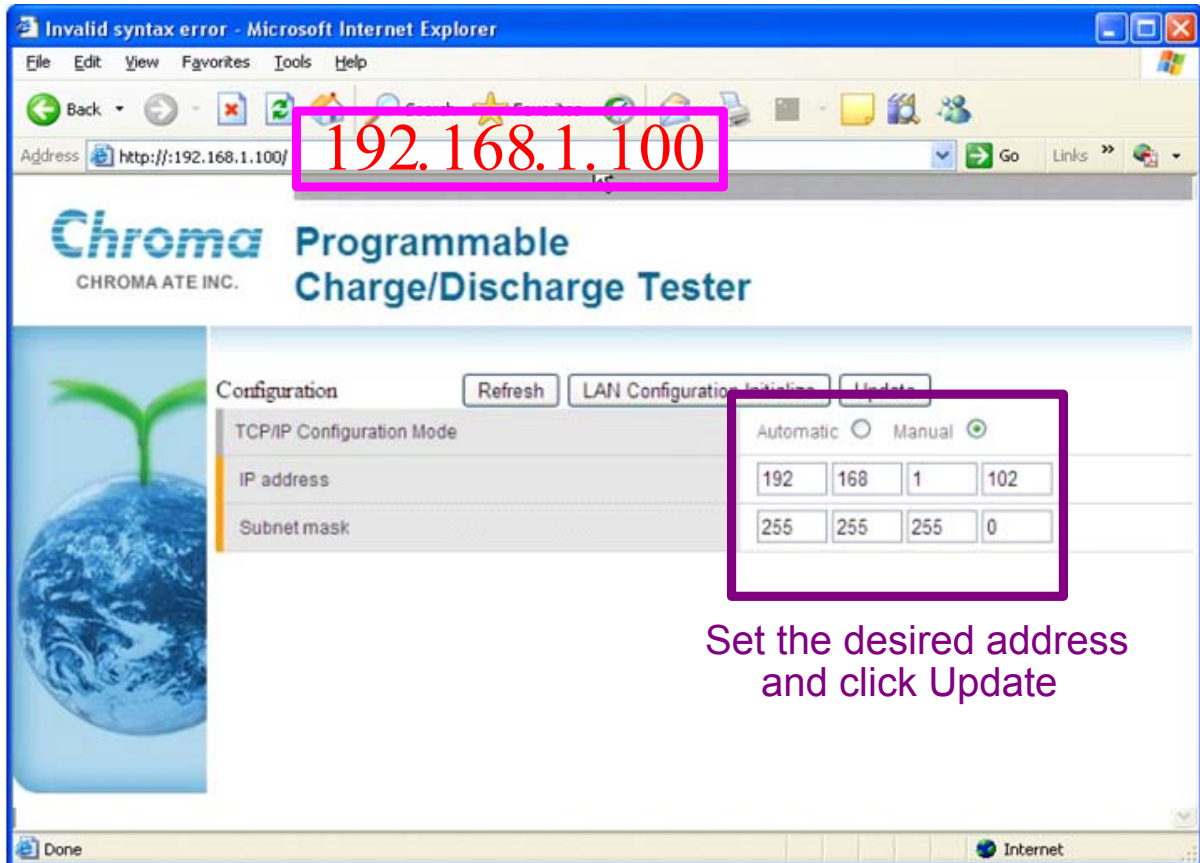
6. Ensure the items in the boxed area are not selected and click **OK** to close the window.



3.3.2 Setting 17200-5-10 Network IP

17200-5-10 supports setting IP statically with built-in web page to change the network IP address. If it is unable to get the device IP address, press **IP RESET** button as described in section 2.2 for 3 seconds and then follow the steps below to set the desired IP address.

1. Ensure the network environment of the IPC desired for connection is set as 3.3.1 described.
2. Open IE and enter 192.168.1.100 (Default) or the present IP address in the Address line. Click **Update** when done to complete the update.



3.4 Operating Software

See "17011 Software User's Manual" for operating Battery Pro software (optional.)

3.5 Parameter Settings for Software Recipe

Name	Description
Constant Voltage(V)	CV mode "Constant Voltage" parameter setting column
Constant Current(A)	CC mode "Constant Current" parameter setting column
Constant Power(W)	CP mode "Constant Power" parameter setting column
DCIR Current1(A)	DCIR1 "Current" parameter setting column
DCIR Current2(A)	DCIR2 "Current" parameter setting column
CP to CC Current Limit(A)	CP mode "High Limit Current" parameter setting column
Cut-off Time(sec)	Step cut-off condition "Time" parameter setting column
Cut-off capacity(Ah)	Step cut-off condition "Capacity" parameter setting column
Cut-off Voltage(V)	Step cut-off condition "Voltage" parameter setting column
Cut-off Current(A)	Step cut-off condition "Current" parameter setting column
DCIR T1(sec)	DCIR1 and DCIR2 "V1 Voltage Sampling Time" parameter setting column
DCIR T2(sec)	DCIR2 "V2 Voltage Sampling Time" parameter setting column
DCIR Tend(sec)	DCIR1 "Step Cut-off Time" parameter setting column

Over Voltage Protection(V)	Step protection for “High Limit Voltage” parameter setting column
Under Voltage Protection(V)	Step protection for “Low Limit Voltage” parameter setting column
Over Current Protection(A)	Step protection for “High Limit Current” parameter setting column
Over Capacity Protection(Ah)	Step protection for “High Limit Capacity” parameter setting column
Over Watt Protection(Ah)	Step protection for “High Limit Energy” parameter setting column
Over Temperature Protection(°C)	Step protection for “High Limit Temperature” parameter setting column
Delta Voltage Protection(+)(V)	Step protection for “High Limit Voltage Change” parameter setting column
Delta Voltage Protection(-)(V)	Step protection for “Low Limit Voltage Change” parameter setting column
Delta Current Protection(-)(A)	Step protection for “High Limit Current Change” parameter setting column
Delta Current Protection(-)(A)	Step protection for “Low Limit Current Change” parameter setting column
Over Resistance Check(Ohm)	Step protection for “High Limit Loop Impedance” parameter setting column
CC to CV Transition Time(sec)	Step protection for “High Limit CC to CV Transition Time” parameter setting column
Step Sampling Time(ms)	1. “Data Sampling Time” parameter setting column 2. High/Low limit voltage/current change “Sampling Time” parameter setting column
Sampling Delta Voltage	“Voltage Change Data Sampling” parameter setting column
Sampling Delta Current	“Current Change Data Sampling” parameter setting column
Sampling Delta Capacity	“Capacity Change Data Sampling” parameter setting column

3.6 Table for Recipe Parameter Settings

Item	CC C/DHG	CC-CV C/DHG	CP C/DHG	CP-CV C/DHG	DCIR1/2 CHG	DCIR1/2 DHG	Self DHG	REST
Setting								
Constant Voltage(V)		•		•				
Constant Current(A)	•	•						
Constant Power(W)			•	•				
DCIR Current1(A)					•	•		
DCIR Current2(A)						•		
CP to CC Current Limit(A)			•	•				
Step Sampling Time(ms)	•	•	•	•	•	•		•
Sampling Delta Voltage	•	•	•	•				•
Sampling Delta Current	•	•	•	•				
Sampling Delta Capacity	•	•	•	•				
Cut-off								
Cut-off Time(sec)	•	•	•	•			•	•
Cut-off capacity(Ah)	•	•	•	•				
Cut-off watt (Wh)	•	•	•	•				

Cut-off temperature(°C)	•	•	•	•				•
Cut-off Voltage(V)	•		•	•				
Cut-off Current(A)		•		•				
DCIR T1(sec)					•	•		
DCIR T2(sec)						•		
DCIR Tend(sec)					•			
Protection								
Over Voltage Protection(V)	•	•	•	•	•	•		•
Under Voltage Protection(V)	•	•	•	•	•	•		•
Over Current Protection(A)	•	•	•	•	•			
Over Capacity Protection(Ah)	•	•	•	•				
Over Watt Protection(Wh)	•	•	•	•				
Over Temperature Protection(°C)	•	•	•	•				•
Delta Voltage Protection(+)(V)	•	•	•	•				•
Delta Voltage Protection(-)(V)	•	•	•	•				•
Delta Current Protection(-)(A)	•	•	•	•				
Delta Current Protection(-)(A)	•	•	•	•				
Over Resistance Check(Ohm)	•	•	•	•	•	•		
CC to CV Transition Time(sec)		•		•				

4. Notices

4.1 Disassembling a Single Module

If a single module is purchased, the module is packed with protection rackets in the front and rear. Please follow the steps below to disassemble them.

1. The front protection racket is divided into up and down two pieces. Loosen the panel spring screws and the middle of back-end screws as Figure 4-1 shows.
2. To remove the rear protection racket, loosen the 4 screws on the left and right sides as Figure 4-1 shows.
3. Remove the protection rackets as Figure 4-2 shows.
4. Keep the protection rackets properly for repeat use.

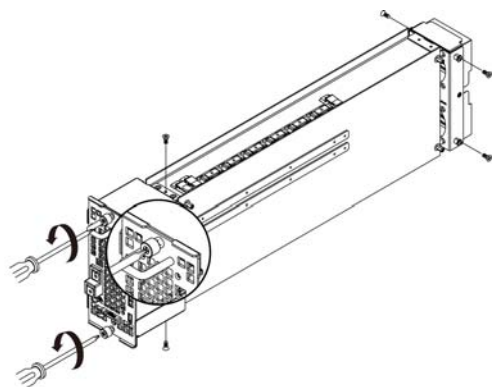


Figure 4-1

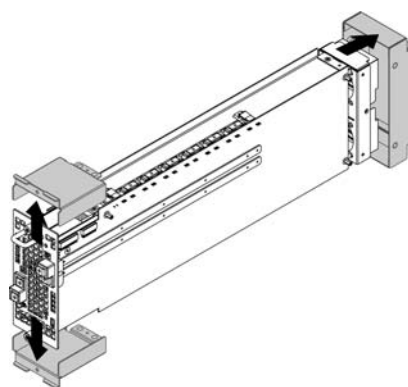


Figure 4-2

4.2 Troubleshooting

When the software sends out an error message, refer to the list below to identify the cause. If the cause is not “software operation error” or “hardware configuration error”, please contact Chroma or its local agent. Do not perform maintenance on your own to avoid unnecessary danger from occurring or causing greater damage to the device. Do not return the device to Chroma without having prior approval from Chroma RMA.

4.2.1 Common Error Messages List

Error Message	Description
OCP	Over Current Protection.
OTP	Over Temperature Protection.
OVP	Over Voltage Protection
Over Capacity	Over high limit capacity
UVP	Under Voltage Protection
ODPV	Over + Δ voltage setting
ODNV	Over - Δ voltage setting
ODPC	Over + Δ current setting

ODNC	Over $-\Delta$ current setting
SNE	Sense error protection
FAN	Fan fail protection
Frame	Module error protection
Over CC To CV	Transition over CC to CV time limit
Mode Error	Recipe mode and Battery Test or EDLC does not match
Error Load TP	Recipe error
Checking fail	Contact check fail
No Recipe	No recipe is specified
Over Resistor	Over loop impedance high limit setting
Check time out	Contact check exceeds the setting time
Check stop	Contact check stops
No Touch	Status of contact check is no touch
Detect Error	Error occurs during contact check
Polarity Empty	No channel for polarity check
Polarity Error	Polarity check error
Channel Report	Channel report error
Cut off Report	Cut off report error
Module Error	Error occurs to module
Recipe Error	Recipe is wrong
Command	Command is wrong
Execute Error	Execution is wrong
Emergency Off Stop	Stop emergently
Channel Config Error	Channel setting error

4.2.2 Replacing Failure Module

When more than two Main Frames are sharing the same 24V power, if one of the Main Frames is having module failure on the 17202-5-XX, it can follow the steps below to troubleshoot the problem. The rest of the Main Frames can continue the recipe execution.

1. Stop all channels on the Main Frame that has problem.
2. Make sure there is no output on all channels and remove the 24V power wires on the Main Frame and all modules.
3. Remove the communication SPI cables that connect the module and Main Frame.
4. Remove all UUTs connected to the failure module.
5. Remove the failure module.
6. Remove the failure module and replace it with a spare 17202-5-XX if available.
 - a. Reconnect the Module and Main Frame with the communication SPI cable.
 - b. Next, connect the 24V power to the Main Frame.
 - c. At last, connect the 24V power to Module 1.
 - d. When the Main Frame is powered on, refer to the "17011 Software User's Manual" to perform recovery and continue to execute the recipe.
7. If there is no spare module, insert the remaining module into the Main Frame in sequence (1~N).
 - a. Reconnect the Module and Main Frame with the communication SPI cable.
 - b. Reconnect the 24V power to Module 2~ Module N.
 - c. Next, connect the 24V power to the Main Frame.
 - d. At last, connect the 24V power to Module 1.
 - e. When the Main Frame is powered on, refer to the "17011 Software User's Manual"

- to reset the channel number.
 - f. Once the hardware setting is done, refer to the “17011 Software User’s Manual” to perform recovery and continue to execute the recipe.
8. Delivery the failure module to originally purchased distributor or Chroma for repair.

4.3 Simple Specification Verification

Following lists the simple specification verification procedure to validate the product. If the verification results do not meet the specification (as listed in section 1.4), please contact the agent or Sales Rep. of Chroma for further information.

1. The procedure below explains the way to verify constant current and voltage. Since constant power is the product constant voltage constant current, no explanation is made here.
2. Constant current verification:
 - a. Connect the UUT to 17202-5-XX module. (The UUT can be replaced by battery or DC Source/DC Load.)
 - b. Prepare a Current Shunt with accuracy more than twice as 17202-5-XX module (recommended minimum: $\pm 0.01\%$ of reading + 0.01% of full scale) and connect the module to the positive drive path in the middle of UUT in series.
 - c. Next, prepare a Meter with accuracy more than twice as 17202-5-XX module (recommended minimum: $\pm 0.01\%$ of reading + 0.01% of full scale) and connect to both two ends of Current Shunt in parallel for current reading.
 - d. Start Battery Pro and edit the CC-Charge or CC-Discharge steps. When the current desired for verification is set, execute the recipe. (For instance, be sure to set the voltage/current of DC Source/DC Load if they are used as the Unit Under Test.)
 - e. Record the measured currents displayed on the Meter and PC screen, and then verify them with the specifications in section 1.4.
3. Constant voltage verification:
 - a. Connect the UUT to 17202-5-XX module. (The UUT can be replaced by battery or DC Source/DC Load.)
 - b. Prepare a Meter with accuracy more than twice as 17202-5-XX (recommended minimum: $\pm 0.01\%$ of reading + 0.01% of full scale) and connect to both two ends of UUT for voltage reading.
 - c. Start Battery Pro and edit the CC-Charge or CC-Discharge steps. When the voltage desired for verification is set, execute the recipe. (For instance, be sure to set the voltage/current of DC Source/DC Load if they are used as the Unit Under Test.)
 - d. Record the measured voltages displayed on the Meter and PC screen, and then verify them with the specifications in section 1.4.

4.4 Cleaning & Maintenance

Remove all connected wires and cables on the device before cleaning. Use a brush to clean the dust on it and if there are stains on the chassis that cannot be removed by brush, wipe it with volatile liquid. Do not use any corrosive liquid to avoid damaging the chassis. Use a damp cloth with soap water or soft detergent to clean the LCD front panel. For internal cleaning, please contact Chroma agents for cleaning. Do not open the chassis arbitrarily.



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