

## MODEL 62000D SERIES

### KEY FEATURES

- Voltage rating : 0~100V/600V/1200V/1800V
- Current rating : 0~540A
- Power rating : 6kW/12kW/18kW
- Two quadrant operation for power supply and load Two-in-one bidirectional DC power supply
- High power density: 18KW in 3U
- Easy master/slave parallel & series operation up to 180kW
- Wide range of voltage & current combinations in constant power
- Auto sequencing programming
- Voltage & current slew rate control
- High speed transient response
- Low output noise and ripple
- CV/CC priority modes
- Intuitive and user-friendly touch control screen
- Standard USB/LAN/LXI/APG interfaces, optional CAN/GPIB interfaces
- 3 Phase 4 wire universal AC power: 200~480Vac

### APPLICATIONS

- Charge/discharge testing and life cycle testing, including BOBC, DC-DC conversion, and PCS
- Motor driver testing
- Pre-compliant with LV123 and LV148 standards on electrical car components testing
- Used as battery simulation source for microgrid applications



# Chroma



## BIDIRECTIONAL DC POWER SUPPLY MODEL 62000D SERIES

Chroma 62000D programmable bidirectional DC power supply series has power source and load characteristics, is two quadrant operated, allows feedback of the power from the DUT, and is used for testing renewable energy power systems, including PV/storage hybrid inverters, power conversion system (PCS) on charging/discharging and as a battery simulator. 62000D also fits power components used in electric vehicles, such as bidirectional on-board charger (BOBC), bidirectional DC convertor, and DC-AC motor driver, so replacing power conversion simulation tests of batteries in both directions.

For a traditional DC power supply to perform a motor driver test, it needs an additional protection diode and resistance to process the reverse current. One single 62000D bidirectional DC power supply device can offer both DC power supply output and regenerative DC load, so it not only performs motor driver testing, while saving space and being easy to configure, but also saves energy by efficiently backfeeding to the grid. At the same time, to increase the cross-quadrant transient response, the 62000D high speed transient response time is less than 1.5ms (-90% to +90%).

62000D bidirectional DC power supply series contains 8 different models with industry-leading power density at 18kW in a 3U rack. One single device has an output power rating of 6kW to 18kW, output current rating up to  $\pm 540\text{A}$ , and voltage rating up to 1800V. The master/slave control easily shares current with ten 62000D devices and reaches 180kW for high power use.

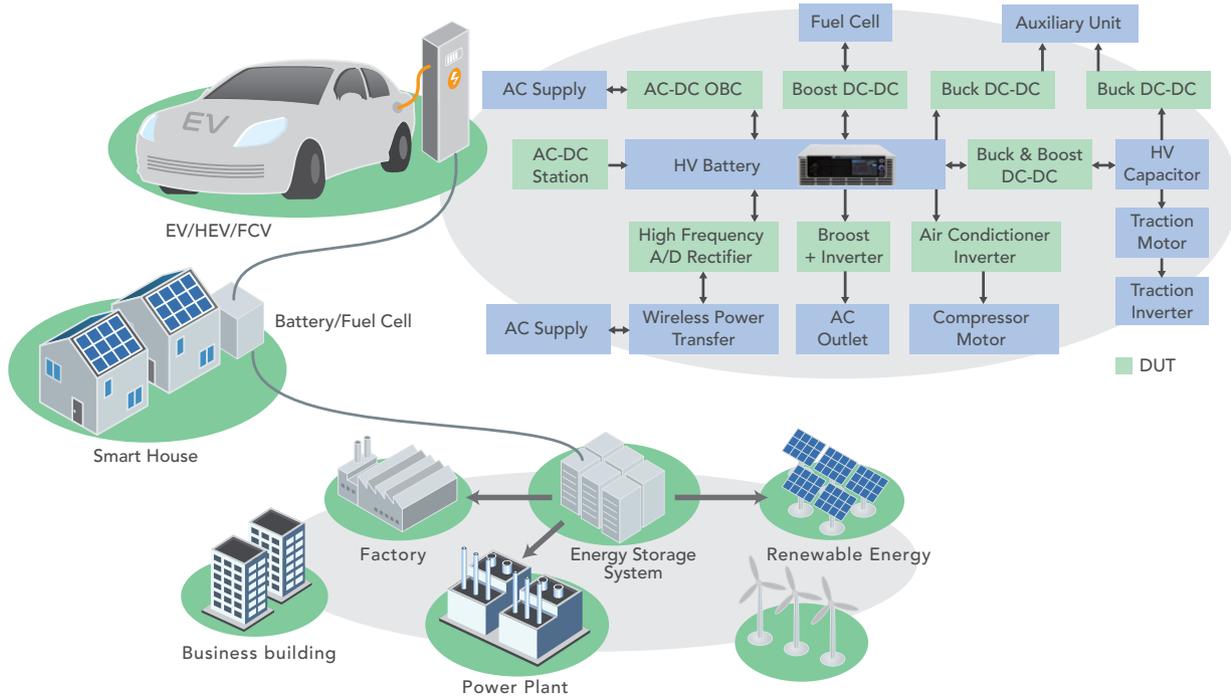
62000D series is equipped with 100 programmable settings; the user can program their output waves through List Mode. The high response slope control fulfills many testing needs, including the LV123 and LV148 standards on new energy vehicle components. When combined with the Chroma Softpanel, the user can even conduct the tests with one click.

62000D series can easily be used in any region, with a wide input range of 200-480 Vac and an active PFC low-current harmonic feed to grid, which can save power consumption, power system configuration, and ambient temperature changes under high-power testing. The user can choose various control methods and use them through digital USB, LAN (LXI), CAN, and GPIB as well as analog APG interfaces.



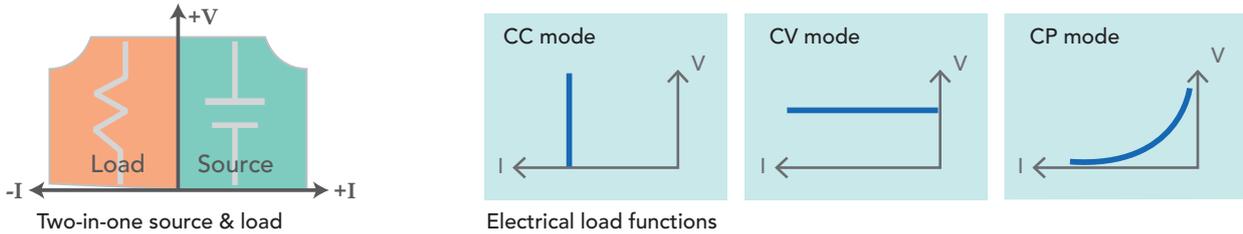
## POWER CONVERSION TESTING OF ELECTRIC VEHICLES AND MICROGRID STORAGE

Renewable energy sources such as PV, EV, fuel cell, and battery are the market trend as the replacement of traditional energy sources (coal, oil, etc.). Yet, the subsequent rising need for electricity will actuate the faster commercialization of distributed energy storage in microgrids. The bidirectional design of power conversion devices urges battery applications to achieve high efficiency, high voltage conversion, and high power density direction, which prompts the need for battery simulation (bidirectional power supply) testing designs.



## TWO-IN-ONE: BIDIRECTIONAL DC POWER SUPPLY AND LOAD

Chroma 62000D has a bi-directional switch power supply design that offers two-quadrant operation with positive current/positive voltage as well as negative current/positive voltage, enabling both DC power supply output and regenerative DC load. The absorbed energy feeds back to the grid with a conversion efficiency up to 93% and can operate in constant voltage, constant current, and constant power modes. Compared to traditional power supply and load, the 62000D two-in-one bidirectional DC power supply saves space, reduces energy loss and heat dissipation, and is easier to wire and configure.



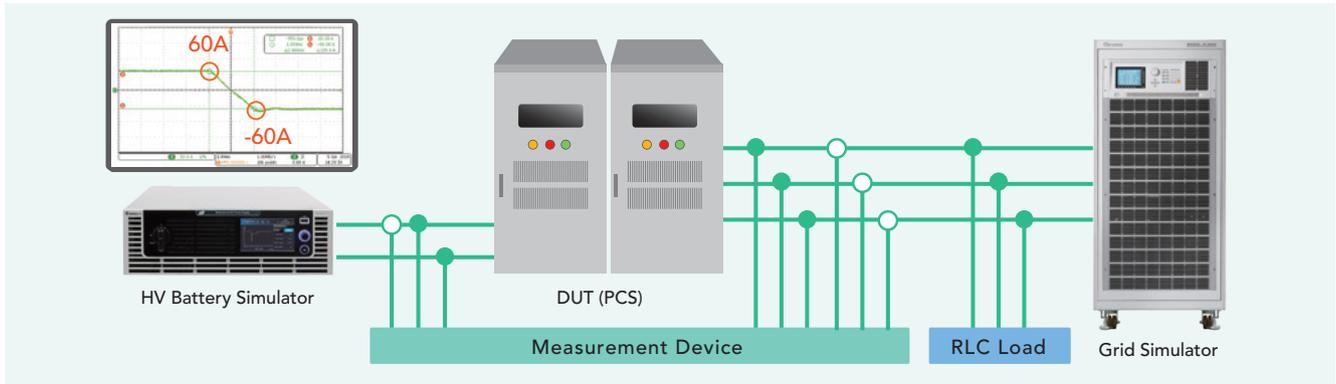
With the current spread of electric cars, their on-board chargers are controlled through back and forth energy supply to V2G (Vehicle to Grid), V2L (Vehicle to Load), and V2H (Vehicle to Home). The regenerative load modes of the 62000D models include constant current (CC), constant voltage (CV), and constant power (CP) and simulate battery charging activity during developing and testing of the car. Where conventional methods needed one apparatus for DC power supply and another for regenerative DC load, one single Chroma 62000D can now fulfill both charging and discharging tests on its own.



Bidirectional on-board charger testing configuration

## HIGH VOLTAGE 1800V PCS TESTING

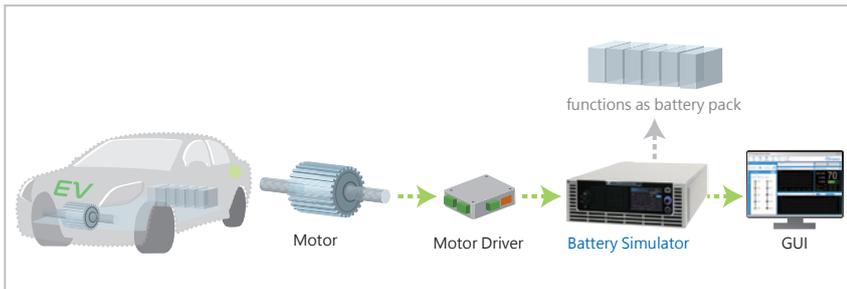
A power conversion system (PCS) serves to realize bidirectional power conversion between the battery system and the grid with the terminal battery voltage of the newest devices reaching up to 1500V and having a charge/discharge function, active power control, reactive power regulation, and off-grid switch. A common issue for users is how to prepare an actual high voltage battery test for testing the charge/discharge transition (with a standard <math><100\text{ms}</math>) performance of this PCS and it is impossible to use R&D verification and manufacture with fast reproducibility, controllability, and safety. The high voltage 62180D-1800 (1800V/40A/18kW) model can be connected in parallel to reach 180kW/1800V/400A, so replacing the real battery simulation as power supply or regenerative power load to carry out this charge/discharge transition with a seamless switch.



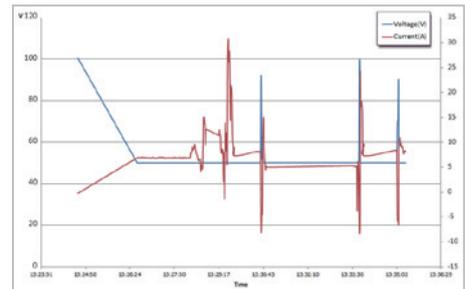
## HIGH TRANSIENT RESPONSE <math><1.5\text{MS}</math>

Chroma 62000D allows seamless current conversion between the two quadrants of supply and electrical load without changing the output characteristics or causing damage. To use this in many bidirectional DC-DC and DC-AC battery charge/discharge tests requires very fast charge/discharge conversion. To increase this transient responsiveness, the 62000D bidirectional DC power supply has a high speed transient response time of less than 1.5ms (-90% to +90%) and gives stable voltage output.

To test the acceleration and braking of the motor driver under driving conditions, the conversion between the battery and power components will encounter supply and recharge of electrical energy. The very fast transient response of the 62000D two quadrant can simulate the battery and convert according to the actual needs of the motor, offering stable voltage and allowing current recharge during braking.



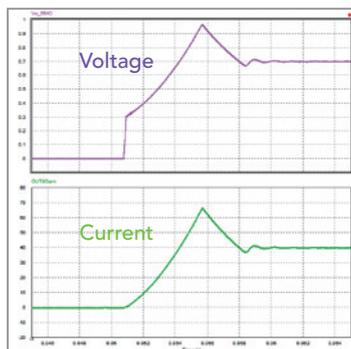
Start-stop system motor driver test application



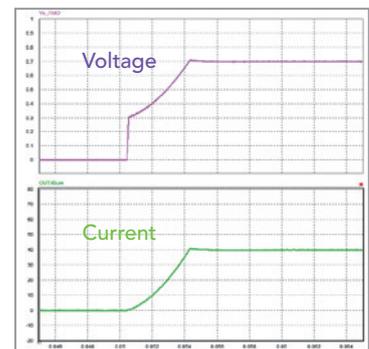
Simulation of actual driving conditions

## CV/CC PRIORITY MODE

62000D series offer constant voltage (CV) and constant current (CC) priority modes, so that the user can switch priority output modes in line with the DUT application requirements. When using traditional CV controlled DC power supplies for battery charge/discharge tests, laser diode, LED, and other component tests, the supply needs a procedure to change CV to CC which causes current surge and damages the DUT. When switching the 62000D power output from CV to CC, the CC priority mode avoids a current surge and satisfies diverse testing needs.



Traditional CV-CC current surge



CC priority mode: no current surge

\* Call for availability.

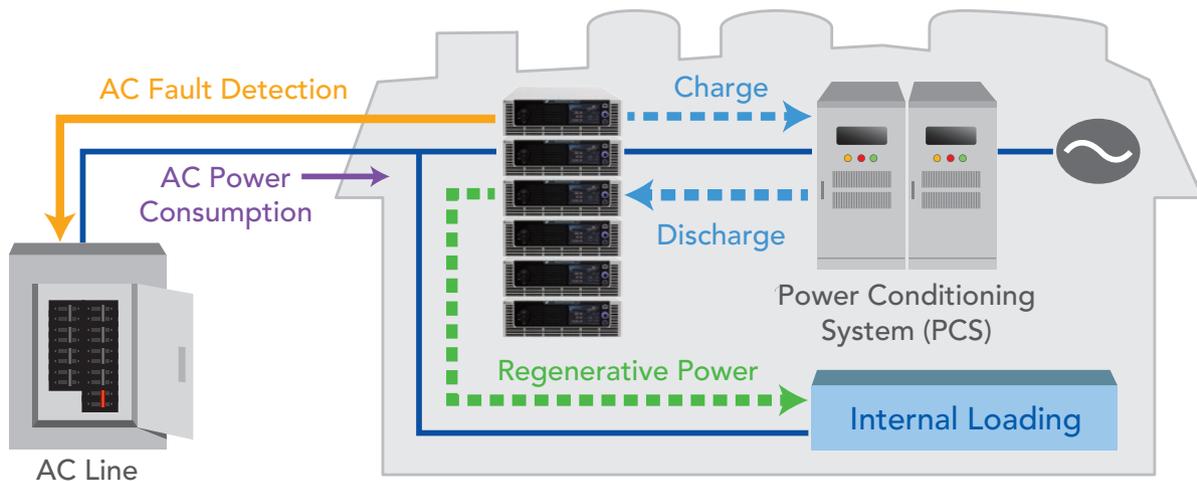
## TESTING STANDARDS LV123 AND LV 148

Along with the global energy efficiency and carbon emission reduction trends, the car industry have established technical development standards for new energy vehicles, which define tests for a variety of electric vehicles. The LV123 guidelines specify the vehicle's electrical characteristics and safety of high-voltage components, whereas the LV148 standard covers tests for electric and electronic components in 48V electrical system motor vehicles. Chroma 62000D has a high-speed CV dynamic response slope that can be controlled up to 180V/ms, which is applicable to the electrical characteristics tests of many vehicle guidelines. When combined with the Chroma Softpanel, the user can even conduct the tests at the push of a button.



## SAFETY AND AC FAULT PROTECTION

Chroma 62000D bidirectional power supplier is set up with OVP, OCP, OPP, OTP, AC Fault, and Fan Fail protection circuits. Under the energy recycling function that returns energy into the grid, the A/D design serves to identify input voltage and frequency anomalies. When detecting any anomalies, the power supply equipment will automatically turn off the D2D power output to ensure safe use of the grid.



## UNIVERSAL AC POWER RANGE 200-480VAC

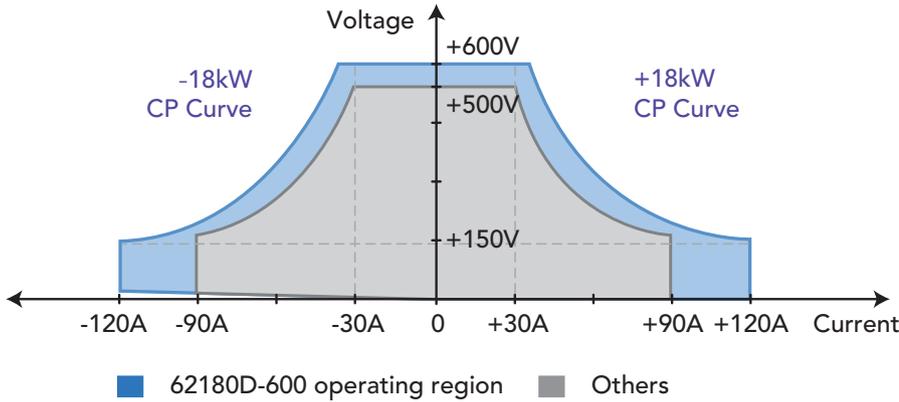
Chroma 62000D bidirectional DC power supply is equipped with an active PFC >0.98 for low energy consumption and high conversion efficiency. Moreover, to fit the universal AC power input range, the 62000D series has a very wide input power range of three-phase 200Vac to 480Vac input. The user can buy one single device without having to configure it for use in other areas.

## REMOTE INTERFACES

Chroma 62000D supports various remote interfaces, enabling the user to control the PC through the standard USB and Ethernet (LXI) or optional GPIB interfaces. Moreover, the optional CAN interface as frequently used in the automobile industry, is compliant with the CAN2.0 A 11-bit and CAN2.0 B 29-bit identifiers and has a V/I/P cycle time of up to 10ms.

## FOUR TIMES AUTO-RANGING OUTPUT

Chroma 62000D series has a four times auto-ranging operation range. The 62180D-600 model has an 18kW/600V/120A output and operates flexibly in various combinations as the figure shows. Compared with the three times output range of competitors, the 62000D can give much greater current at low voltage. This offers an even wider coverage of low voltage/high current and high voltage/low current DUTs that other DC power supplies can test. When used into a standard ATE system and in a laboratory, one 62000D can replace multiple DC power supplies to significantly save space and costs.



When testing high power 10kW-180kW conversion components (e.g. PCS, ESS, Charger, Inverter), users need to consider small volume, light weight, utilization rate, flexible assembly and disassembly for operation of various power systems, and influence of R&D during system failure and maintenance. The 62000D Series has a smart master/slave control mode that can connect 2-10 devices, enabling fast and simple series/parallel operation for use by R&D, QC, and at the production line. In this mode, the master scales values and downloads data to slave units so programming is as simple as using a single unit, and the digital current sharing is highly stable and without noise interference.



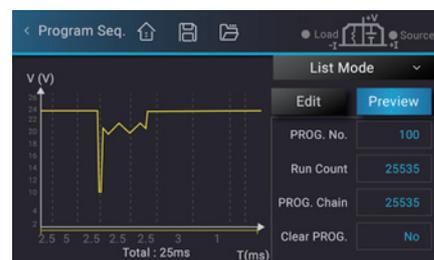
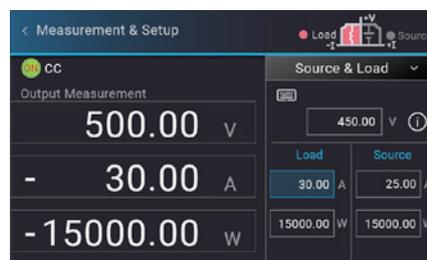
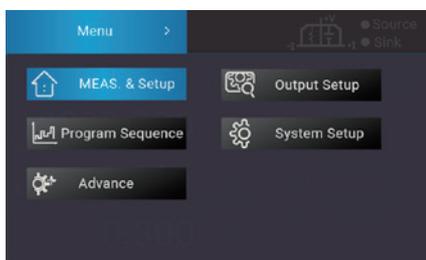
Master/slave parallel operation up to 180kW  
\* Call for availability

## USER-FRIENDLY INTUITIVE CONTROL INTERFACE

Chroma 62000D has a next generation human-machine control interface with an intuitive and user-friendly touch screen. Operation of the apparatus is as easy as using a smartphone, with its intelligent and convenient user interface; through icons on the touch screen, the user can complete any voltage/current settings and measurements, Program Sequence control settings, preview output waveforms, etc.



Control interface



## SPECIFICATIONS - 1

Model	62060D-100	62120D-100	62180D-100	62060D-600	62120D-600	62180D-600	62180D-1200	62180D-1800
<b>Source/Sink Ratings</b>								
Source/Sink Voltage	0~100V			0~600V			0~1200V	0~1800V
Source/Sink Current	±180A	±360A	±540A	±40A	±80A	±120A	±40A	±40A
Source/Sink Power *1	±6000W	±12000W	±18000W	±6000W	±12000W	±18000W	±18000W	±18000W
<b>Line Regulation</b>								
Voltage	±0.01% F.S.							
Current	±0.05% F.S.							
<b>Load Regulation</b>								
Voltage	±0.02% F.S.							
Current	±0.1% F.S.							
<b>Voltage Measurement</b>								
Range	20V / 100V			120V / 600V			240V / 1200V	360V / 1800V
Accuracy	0.05% + 0.05%F.S.							
<b>Current Measurement</b>								
Range	36A / 180A	72A / 360A	108A / 540A	8A / 40A	16A / 80A	24A / 120A	8A / 40A	8A / 40A
Accuracy	0.1% + 0.1%F.S.							
<b>Output Noise &amp; Ripple</b>								
P-P (20MHz)	150 mV			420mV			1260mV	1260mV
rms (Voltage)	25 mV			85mV			255mV	255mV
rms (Current)	150mA	300mA	450mA	30mA	60mA	90mA	30mA	30mA
<b>Programming Response Time</b>								
Rise Time (Full Load)	10 ms			20ms			20ms	20ms
Rise Time (No Load)	10 ms			10 ms			10 ms	10 ms
Fall Time (Full Load)	10 ms			20ms			20ms	20ms
Fall Time (No Load)	10 ms			10 ms			10ms	10ms
<b>Slew Rate Control</b>								
Voltage slew rate range (No Load)	0.001V/ms~ 10V/ms			0.001V/ms~60V/ms			0.001V/ms~180V/ms	
Voltage slew rate range (Full Load)	0.001V/ms~10V/ms			0.001V/ms~30V/ms			0.001V/ms~90V/ms	
Current slew rate range (No Load)	0.001A~10A/ ms, or INF	0.001A~20A/ ms, or INF	0.001A~30A/ ms, or INF	0.001A~20A/ ms, or INF	0.001A~40A/ ms, or INF	0.001A~60A/ ms, or INF	0.001A~20A/ ms, or INF	0.001A~20A/ ms, or INF
Current slew rate range (Full Load)	0.001A~10A/ ms, or INF	0.001A~20A/ ms, or INF	0.001A~30A/ ms, or INF	0.001A~10A/ ms, or INF	0.001A~20A/ ms, or INF	0.001A~30A/ ms, or INF	0.001A~10A/ ms, or INF	0.001A~10A/ ms, or INF
Minimum transition time (CV)	0.5ms			0.5ms			0.5ms	
Transient Response Time (CV)	Recovers within 500μs to ±0.75% of steady-state output for a 50% to 100% or 100% to 50% load change (1A/μs)							
<b>Operating Mode</b>								
Source	CC、CV、CP							
Load	CC、CV、CP							
Efficiency (Typical)	Source > 0.91 Sink > 0.91			Source > 0.91 Sink > 0.93			Source > 0.85 Sink > 0.85	Source > 0.91 Sink > 0.93
<b>Drift (30 minutes)</b>								
Voltage	0.04% of Vmax			0.04% of Vmax			0.06% of Vmax	0.04% of Vmax
Current	0.06% of Imax			0.06% of Imax			0.06% of Imax	
<b>Drift (8 hours)</b>								
Voltage	0.02% of Vmax			0.02% of Vmax			0.03% of Vmax	0.02% of Vmax
Current	0.04% of Imax			0.04% of Imax			0.04% of Imax	
<b>Temperature Coefficient</b>								
Voltage	0.04% of Vmax/°C			0.04% of Vmax/°C			0.06% of Vmax/°C	0.04% of Vmax/°C
Current	0.06% of Imax/°C			0.06% of Imax/°C			0.06% of Imax/°C	

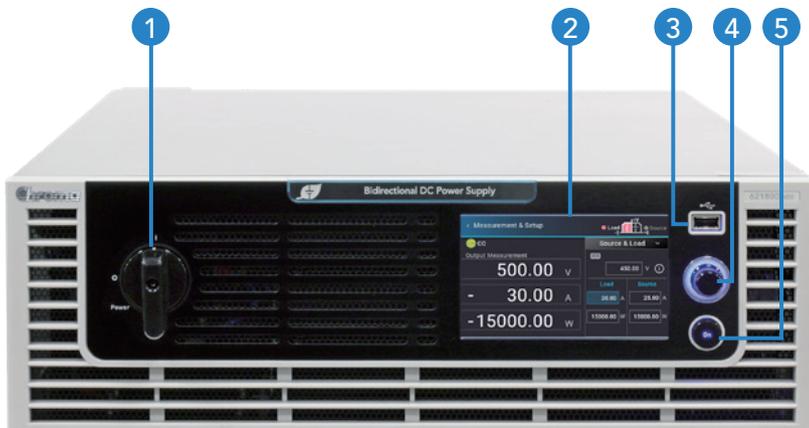
Note \*1: When input at low voltage 200Vac-340Vac, output power rate derates to 67%; when input at high voltage 341Vac-480Vac, output power is a full 100%. (Example: 18kW derates to 12kW at 200Vac-340Vac.)

## SPECIFICATIONS - 2

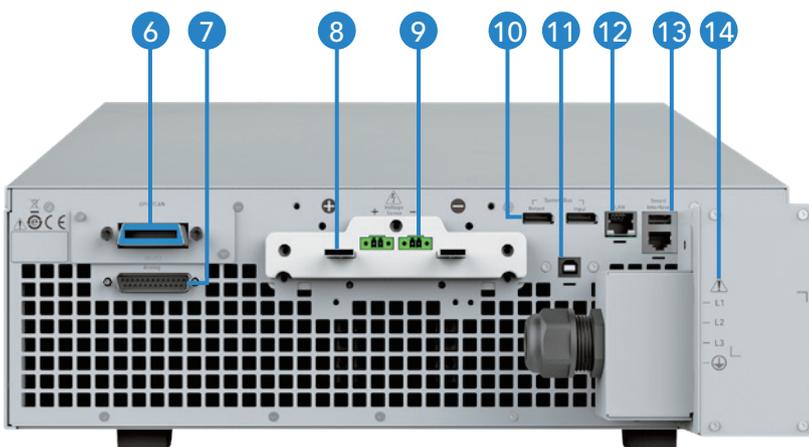
Model	62060D-100	62120D-100	62180D-100	62060D-600	62120D-600	62180D-600	62180D-1200	62180D-1800
<b>Programming &amp; Measurement Resolution</b>								
Voltage (Front Panel )	10 mV	10 mV	10 mV	10 mV	10 mV	10 mV	100 mV	100 mV
Current (Front Panel)	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA
Voltage (Digital Interface)	0.002% of Vmax			0.002% of Vmax			0.003% of Vmax	0.002% of Vmax
Current (Digital Interface)	0.004% of Imax			0.004% of Imax			0.004% of Imax	
Voltage (Analog Interface )	0.04% of Vmax			0.04% of Vmax			0.06% of Vmax	0.04% of Vmax
Current (Analog Interface )	0.04% of Imax			0.04% of Imax			0.004% of Imax	
<b>Programming Accuracy</b>								
Voltage (Front Panel and Digital Interface)	0.1% of Vmax			0.1% of Vmax			0.1% of Vmax	
Current (Front Panel and Digital Interface)	0.3% of Imax			0.3% of Imax			0.3% of Imax	
Voltage (Analog Interface)	0.2% of Vmax			0.2% of Vmax			0.2% of Vmax	
Current (Analog Interface)	0.3% of Imax			0.3% of Imax			0.3% of Imax	
<b>APG Measure Accuracy</b>								
Voltage (Analog Interface)	0.5% of Vmax			0.5% of Vmax			0.5% of Vmax	
Current (Analog Interface)	0.75% of Imax			0.75% of Imax			0.75% of Imax	
<b>Analog Interface (I/O)</b>								
Voltage and Current Programming inputs (I/P)	Voltage : 0~10Vdc of F.S. Current : -10~10Vdc of F.S.							
Voltage and Current monitor output (O/P)	Voltage : 0~10Vdc of F.S. Current : -10~10Vdc of F.S.							
External ON/OFF (I/P)	TTL: Active Low or High (Selective)							
DC_ON Signal (O/P)	TTL: Active High (Time delay=1ms at voltage slew rate of 10V/ms.)							
CV or CC mode Indicator (O/P)	TTL Level High=CV mode ; TTL Level Low=CC mode							
OTP Indicator (O/P)	TTL: Active Low							
System Fault indicator (O/P)	TTL: Active Low							
Safety interlock (I/P)	Time accuracy: <100ms							
Remote inhibit (I/P)	TTL: Active Low							
<b>OVP Adjustment Range</b>								
Range	0~110% programmable							
Accuracy	± 1% of full scale output							
<b>Auto Sequencing (List mode)</b>								
Number of program	10							
Number of sequence	100							
Dwell time Range	1ms~15000s							
Trig. Source	Manual / Auto / External							
<b>Auto Sequencing (Step mode)</b>								
Start voltage	0 to Full scale							
End voltage	0 to Full scale							
Run time	hh : mm : ss.sss ( 00 : 00 : 00.001 to 99 : 59 : 59.99 )							
Trig. Source	Auto							
Series & Parallel operation	Master / Slave control via CAN for 10 units. (Series: 2 units / Parallel: 10 units)							
<b>Input Specification</b>								
AC input voltage 3phase, 3wire + ground (w/o Neutral)	3 $\Phi$ 200Vac~480Vac $\pm$ 10% (67% output power@200~340Vac input, 100% output power@341~480Vac input)							
AC frequency range	47~63 Hz							
Power Factor	>0.98							
<b>General Specification</b>								
Maximum Remote Sense Line Drop Compensation	2.5% of full scale voltage per line (5% total)			2% of full scale voltage per line (4% total)				
Operating Temperature Range	0°C~40°C							
Storage Temperature Range	-40°C~70°C							
Dimension Size (HxWxD)mm	132 x 428 x 671 mm / 5.20 x 16.85 x 26.41 inch							
Weight (kg)	24kg / 52.7lbs	31kg / 68.3lbs	38kg / 83.7lbs	24kg / 52.7lbs	31kg / 68.3lbs	38kg / 83.7lbs		

\* All specifications are subject to change without notice.

## PANEL DESCRIPTION



1. POWER Switch
2. TFT Control Interface  
Displays: measurements, setup, control, and status
3. USB HOST (not yet supported)  
Programming: program fetching, data downloading, firmware updates, etc.
4. Pushable Rotary Switch  
Rotate to edit screen and set values; after configuration, push to confirm input
5. OUTPUT ON Key  
Press the ON key: light indicates Output ON, dark indicates Output OFF



6. GPIB & CAN Interfaces Shared Slot (choose one)
7. Analog Programming Interface  
For analog level to program and monitor output voltage & current
8. DC Output Terminal
9. Remote Sense Terminal
10. Current Sharing Terminal  
Connect the cable to slave unit
11. USB Interface (standard)
12. LAN Interface (standard)
13. SMART Interface (not yet supported)
14. AC Input Terminal

## ORDERING INFORMATION

- 62000D Series : Programmable Bidirectional DC Power Supply
- 62060D-100 : Programmable Bidirectional DC Power Supply 100V/180A/6kW \*2
- 62120D-100 : Programmable Bidirectional DC Power Supply 100V/360A/12kW \*2
- 62180D-100 : Programmable Bidirectional DC Power Supply 100V/540A/18kW \*2
- 62060D-600 : Programmable Bidirectional DC Power Supply 600V/40A/6kW \*2
- 62120D-600 : Programmable Bidirectional DC Power Supply 600V/80A/12kW \*2
- 62180D-600 : Programmable Bidirectional DC Power Supply 600V/120A/18kW \*1
- 62180D-1200 : Programmable Bidirectional DC Power Supply 1200V/40A/18kW \*2
- 62180D-1800 : Programmable Bidirectional DC Power Supply 1800V/40A/18kW \*2

\*1: Release planned in Oct., 2019

\*2: Call for availability

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Search Keyword

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