

C3000H SERIES

HIGH Precision PROGRAMMABLE DC POWER SOURCE

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CONTENTS

1 Summary	1
2 External Conditions	1
3 Product Features	3
4 Typical Application	3
5 Product Specifications	5
6 Product Introduction	7
7 Product Design	8
8 Parallel Solutions	11
9 Reference Standards	16

1 Summary

C3000H High-precision Programmable DC Power Source (hereinafter called C3000H) is a high voltage output high-performance programmable DC power supply, providing a stable output voltage range of up to 1500V and stand-alone output power range of up to 18kW. The maximum power can be extended to 180kW through parallel connection. The DC power supply consists of three main components: the input controlled rectifier AC-DC circuit, the DC-DC circuit and the control communication circuit. Adopt phase-shifted full-bridge soft switch technology design, so that the power supply has high power density and efficiency up to 95%. Provide a variety of standard control interfaces, enrich human-computer interaction experience, compact 3U high power density design, meet customer requirements for test sites, and can be widely used in automotive electronics, semiconductor testing, electrical device testing and other general tests.



C3000 Series Appearance

2 External Conditions

To ensure that the equipment has suitable ambient conditions, the following items need to be met:

- **Installation environment**

The equipment protection level is IP20, please find a suitable place, and avoid dusty, dripping and raining. The installation site needs to consider load bearing and size issues.

- **Temperature**

The storage temperature is $-10^{\circ}\text{C} \sim +70^{\circ}\text{C}$, and the ambient temperature is $0^{\circ}\text{C} \sim +40^{\circ}\text{C}$. Please ensure that the space has good ventilation conditions.

- **Humidity**

The equipment should be used in a humidity environment of $0\sim 90\%RH$, 25°C without condensation.

- **Altitude**

The equipment should be used at an altitude lower than 2000m. For high altitude applications, it may cause overheating protection, which requires derating operation.

- **Grid parameters**

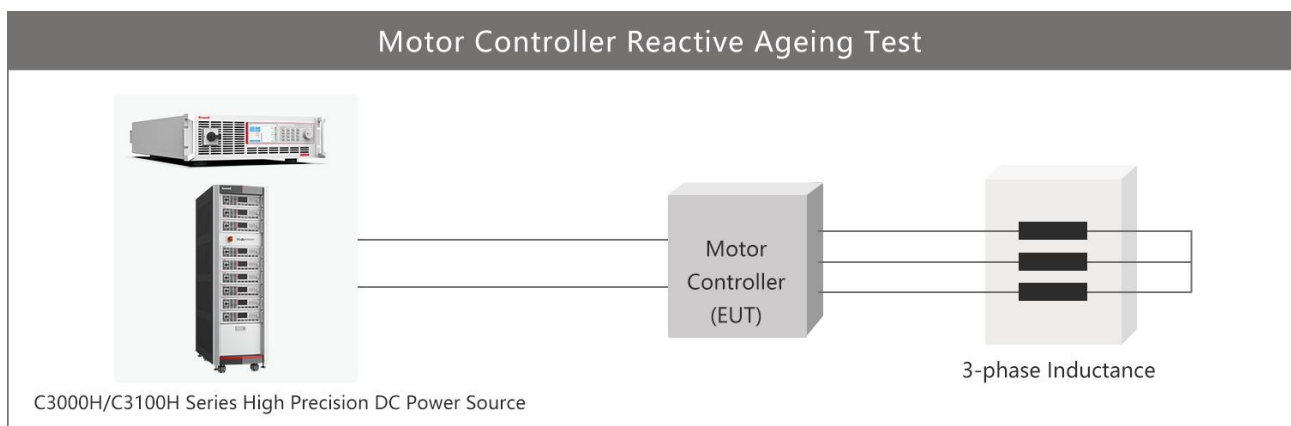
Three-phase four-wire system, rated voltage 342 ~ 462Vac, grid frequency 45Hz ~ 65Hz, grid capacity needs to meet the peak power of test power supply and auxiliary equipment.

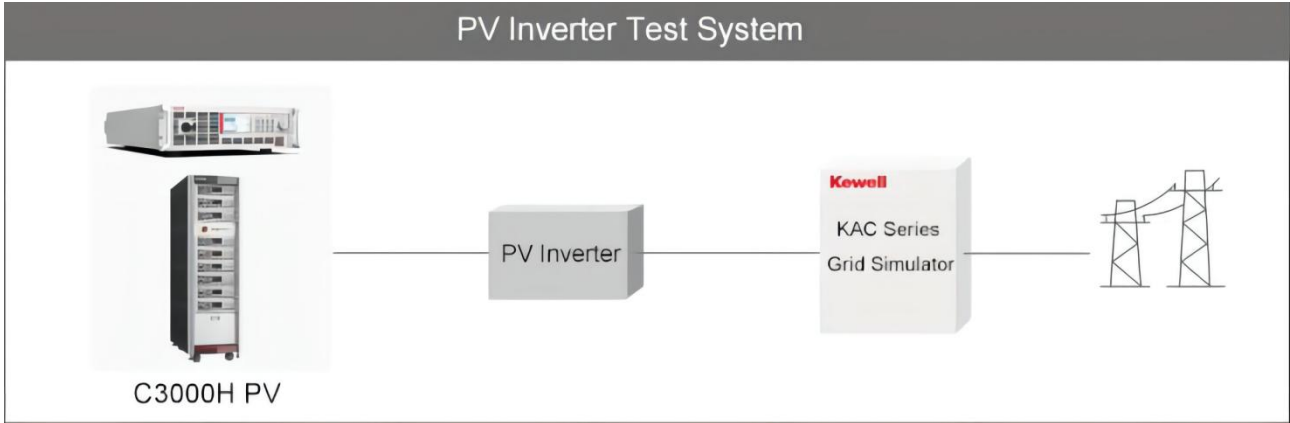
3 Product Features

- Power output range: 0~ 18kW, which can be extended to 180kW
- Current output range: 0 ~ 35A, which can be extended to 350A
- Voltage output range: 0 ~ 1500V
- 3U/18kW high power density
- 16-bit AD sampling, high control accuracy
- Accurate measurement of voltage and current
- High speed programmable control interface
- Comprehensive protection features, support OVP/OCP/OTP/OPP
- Built-in standard RS485/LAN/USB/CAN communication interface
- Voltage drop compensation

4 Typical Application

The C3000H high precision programmable DC power supply can perform high voltage supply tests, reactive power ageing tests on motors and motor controllers, etc.





5 Product Specifications

The specifications of the C3000H High Precision Programmable DC Power Source are as follows:

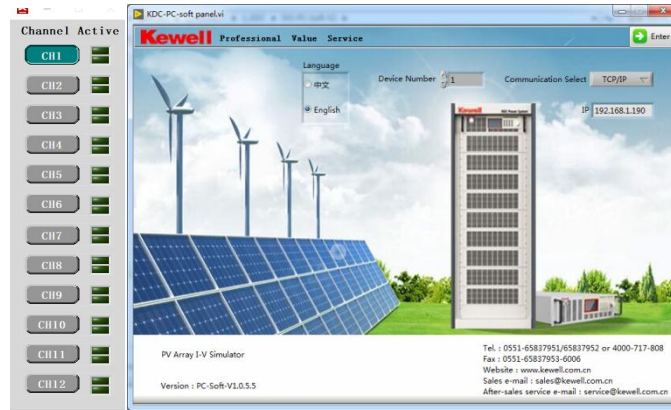
Model		C3000H-15K-1000-0 035-G	C3000H-18K-1000-0 030-G	C3000H-15K-1500-0 035-G	C3000H-18K-1500-0 030-G
Rated	Voltage	1000V	1000V	1500V	1500V
	Current	35A	30A	35A	30A
	Power	15kW	18kW	15kW	18kW
Load Regulation	Voltage	≤0.02%+300mV			
	Current	≤0.05%+20mA			
Line Regulation	Voltage	≤0.01%+150mV			
	Current	≤0.05%+20mA			
Set Resolution	Voltage	0.1V			
	Current	0.01A			
Readback Resolution	Voltage	0.001V			
	Current	0.001A			
Set Value Accuracy	Voltage	0.05%FS+5dgt			
	Current	0.2%FS+5dgt			
Readback Accuracy	Voltage	0.05%FS+5dgt			
	Current	0.2%FS+5dgt			
Ripple	Voltage	≤400mV (rms) & 2.4V (p-p)			
	Current	≤26mA (rms)			
Constant Current / Constant Voltage Temperature Coefficient	Voltage	0.03% /°C			
Rise Slew Rate (no load)	Voltage	0.001V/ms ~ 10V/ms			
Rise Slew Rate (full load)	Voltage	0.001V/ms ~ 10V/ms			
Fall Time(no load)	Voltage	≤2s			
Dynamic Response Time		≤1.5ms			
AC Input	Voltage	342 ~ 462Vac			
	Frequency	45Hz ~ 65Hz			
Efficiency		95%			
Power Factor		0.99			
Maximum Input Current		26A	32A	26A	32A
Maximum Input Apparent Power		17kVA	21kVA	17kVA	21kVA
Storage Temperature		-10°C ~ 70°C			
Protection		OVP、OCP、OPP、OTP、Under-voltage protection			

Communication Interface	RS485/LAN/USB/CAN
Other Interfaces	Remote sampling port / RJ-45 parallel current sharing port
Ambient Temperature	0 ~ 40°C
Dimensions (mm)	736(D)*445(W)*132.5(H)
Weight	46kg

*The above specifications are subject to change without notice.

6 Product Introduction

- Multi-control in one machine



The upper computer can control multiple power supplies with independent outputs. Communication is achieved by connecting all devices via a switch.

- DC source function

Provides stable output voltage range up to 1800V and auto-ranging output power up to 18kW.

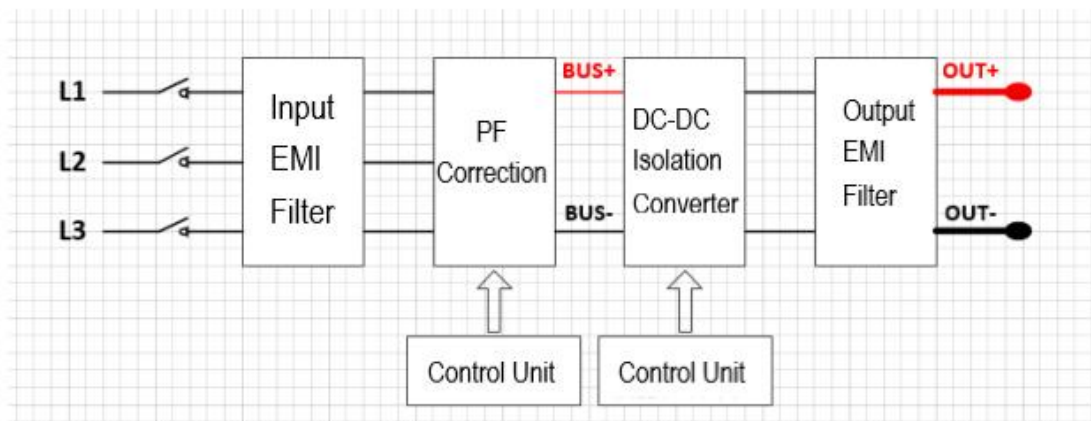


Multi-step operation: Up to 999 work steps editable, work steps can be set in cycles.

7 Product Design

7.1 Main Electrical Units

The system topology is divided into four stages. From left to right, are input EMI filter unit, power factor correction unit, DC-DC converter unit and output EMI filter unit.



7.1.1 Input EMI Filter Unit

The input EMI filter circuit includes anti-inrush devices, differential mode, common mode filters, etc. In the event of lightning strikes or other high-voltage inrush, varistors and transient voltage suppressors can protect the converter from it. The differential mode filter and common mode filter can effectively suppress the high-frequency noise generated inside the module, prevent the interference from the input side from affecting the operation of the unit.

7.1.2 Power Factor Correction Unit

The C3000H power factor calibration unit adopts a 3-way single-phase PFC circuit to achieve a high power factor at full power operating conditions by changing the phase on the inverter side: $PF > 0.99$.

7.1.3 DC-DC Converter Unit

The DC-DC isolated converter uses a phase shifted full bridge control method to maximise power density, improve output ripple and reduce output leakage voltage.

7.1.4 Output EMI Filter Unit

The multi-level LC parallel structure and the multi-level EMC filter circuit are configured on the output EMI filter board, which can achieve voltage ripple less than 400mV (RMS) and current ripple less than 26mA (RMS).

7.2 Software Introduction

The power supply has multiple operation modes like: local operation, remote operation and integrated control (via communication protocol).

7.2.1 Local Operation

The power supply is equipped with 4.3" LCD screen. The operation modes include DC power supply, etc. After the device is powered on normally, it will enter the main interface of the DC power supply:



Running Interface

Function Interface

7.2.2 Remote Operation

The power source is equipped with an Ethernet interface and the software adopts the Modbus TCP/IP communication protocol. Seamless connection to software based on the standard Modbus communication protocol.

The power source is equipped with RS-485/USB interface and the software adopts the Modbus RTU communication protocol. Seamless connection to software based on the standard Modbus communication protocol.

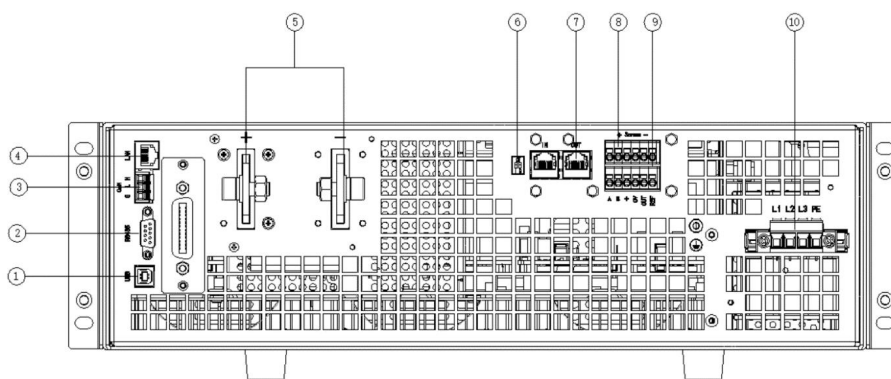
The Controller Area Network (CAN) is a serial communication protocol bus for real-time applications that uses twisted pair cables to transmit signals and is one of the most widely used fieldbuses in the world. The standard CAN communication interface allows the user to configure the functional parameters of the power source for remote control.





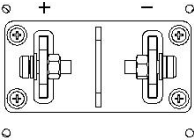
The power source supports the standard CAN 2.0 communication protocol using the extended frame type (CAN data frames using 29 bit identifiers). The data communication format is Intel format (that is, the low byte comes first and the high byte comes second). The protocol is divided into two main types of data forms: status information uploaded by the communication board at regular intervals and parameters set by remote control via the upper computer.


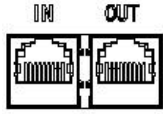

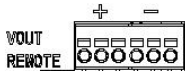
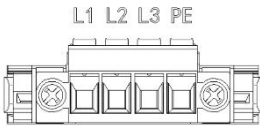
The operating system's upper computer software is suitable for running on platforms such as Microsoft Windows, including Windows 7, Windows 10, etc.

7.3 Interface Introduction

The C3000H High Precision Programmable DC Power Source interfaces as follows:

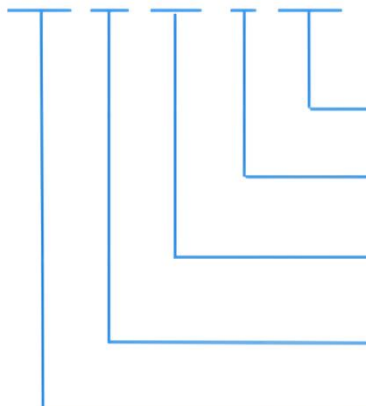


No.	Interface Figure	Description
1	<p>USB</p> 	USB Communication Interface
2	<p>RS485</p> 	RS485 Communication Interface
3	<p>CAN H L G</p> 	CAN Communication Interface
4	<p>LAN</p> 	LAN Communication Interface
5		DC Output

6		DIP Switch
7		Parallel Network Interface
8		Program Serial Port Burn-in
9		Remote Sensing Interface
10		AC Input

8 Parallel Solutions

C3000H -PPP-UUUU-III-NNXX



Function version NN: Standard, omit; F0: IV simulation
Max. output current(A) 0035: 35A; 1000: 1000A
Max. output voltage(V) 0500: 500V; 1800: 1800V
Output power(W) 3K3: 3.3KW; 15K: 15KW
Model: C3000H

C3000H naming rule

Model	Voltage U	Current A	Power kW	Dimension
C3000H-15K-1500-0035	1500	35	15	3U
C3000H-15K-1000-0035	1000	35	15	3U
C3000H-18K-1000-0030	1000	30	18	3U
C3000H-18K-1500-0030	1500	30	18	3U

C3000Hseries stand-alone model

Model	Specification	Application
Cabinet	HK-15U Cabinet	for 2-4 parallel

Cabinet	HK-29U Cabinet	for 5-8 parallel
Cabinet	HK-42U Cabinet	for 9-10 parallel

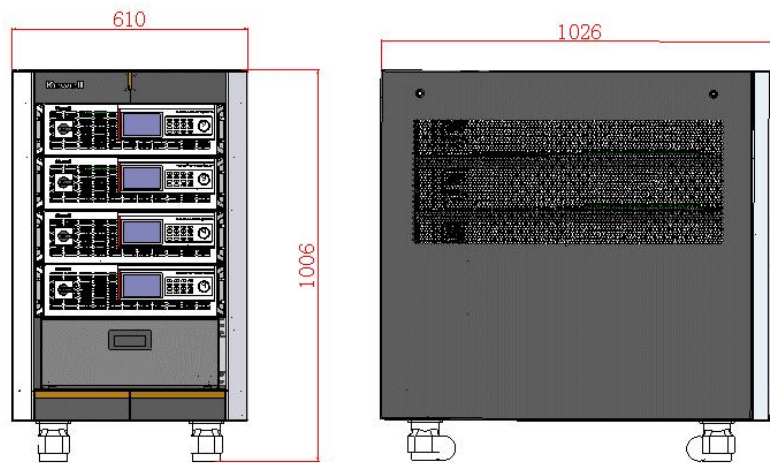
C3000H parallel specifications

*Take C3000H-15K-1500-0035 as an example

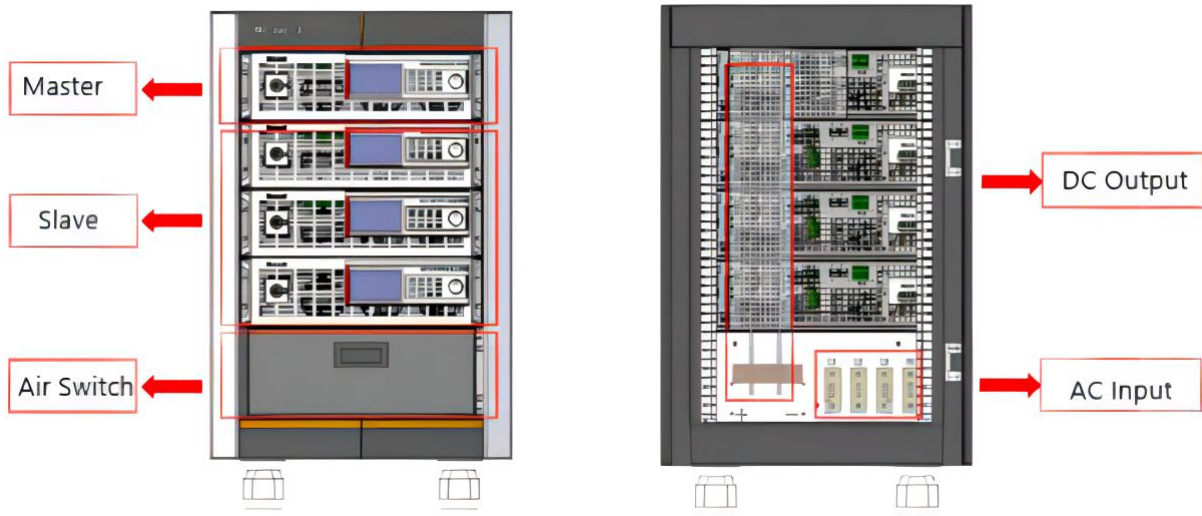
- Four devices in parallel

This solution consists of four C3000H and one HK-15U cabinet, total power 60kW and current up to 140A.

Component	Model	Quantity	Note
High-precision Programmable DC Power Source	C3000H-15K-1500-0035	4	Voltage: 1500V Current: 35A Power: 15kW
Cabinet	HK-15U Cabinet	1	for 2-4 parallel



4 devices in parallel cabinet size
610mm*1006mm*1026mm(WHD)
Weight: 130kg

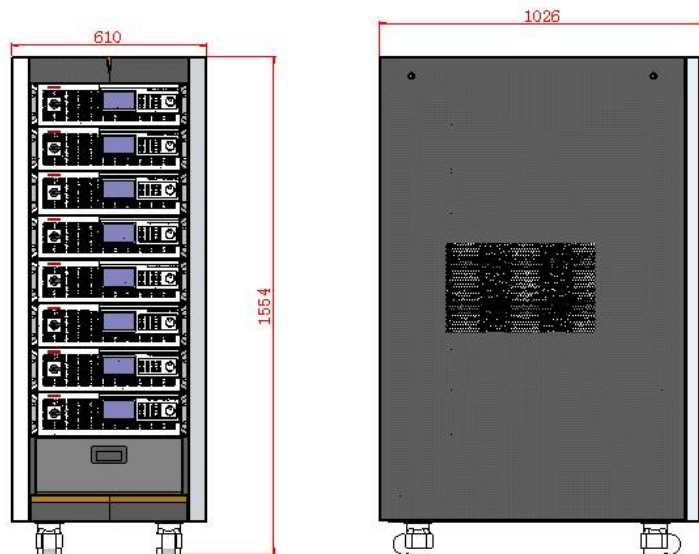


15U Cabinet (front & rear)

- Eight devices in parallel

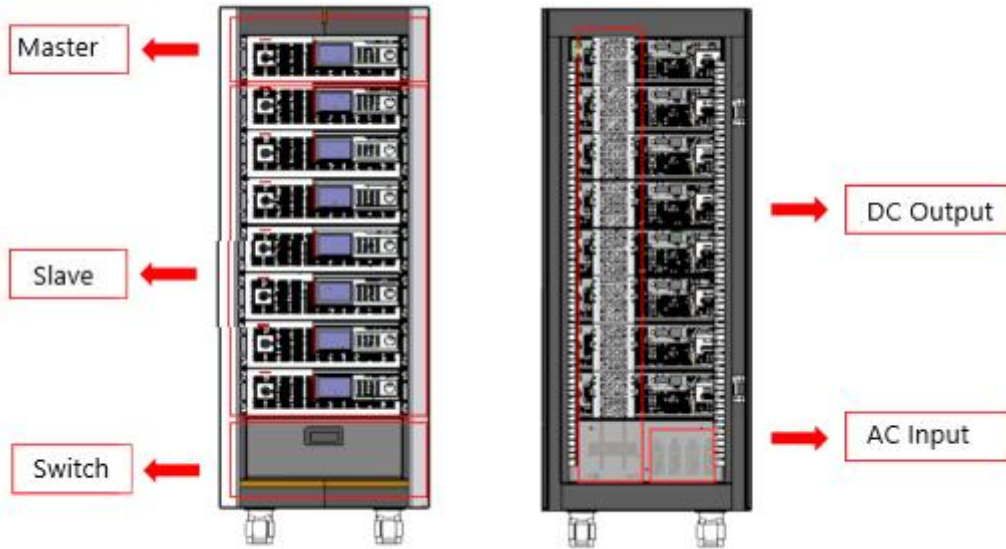
This solution consists of eight C3000H-15K and one HK-29U cabinet, total power 120kW and current up to 280A.

Component	Model	Quantity	Note
High-precision Programmable DC Power Source	C3000H-15K-1500-0035	8	Voltage: 1500V Current: 35A Power: 15KW
Cabinet	HK-29U Cabinet	1	for 5-8 parallel



8 devices in parallel cabinet size
610mm*1554mm*1026mm(WHD)

Weight: 220kg

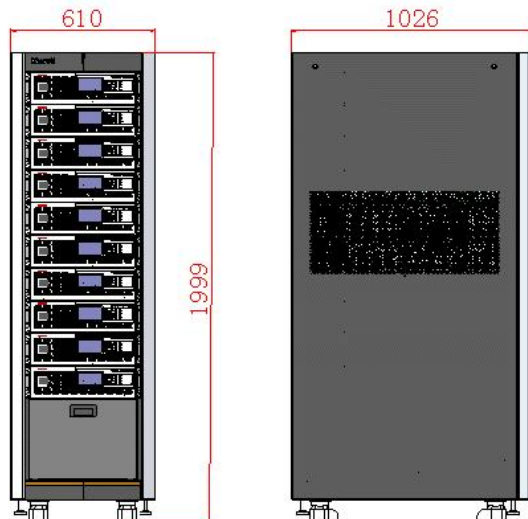


29U Cabinet (front & rear)

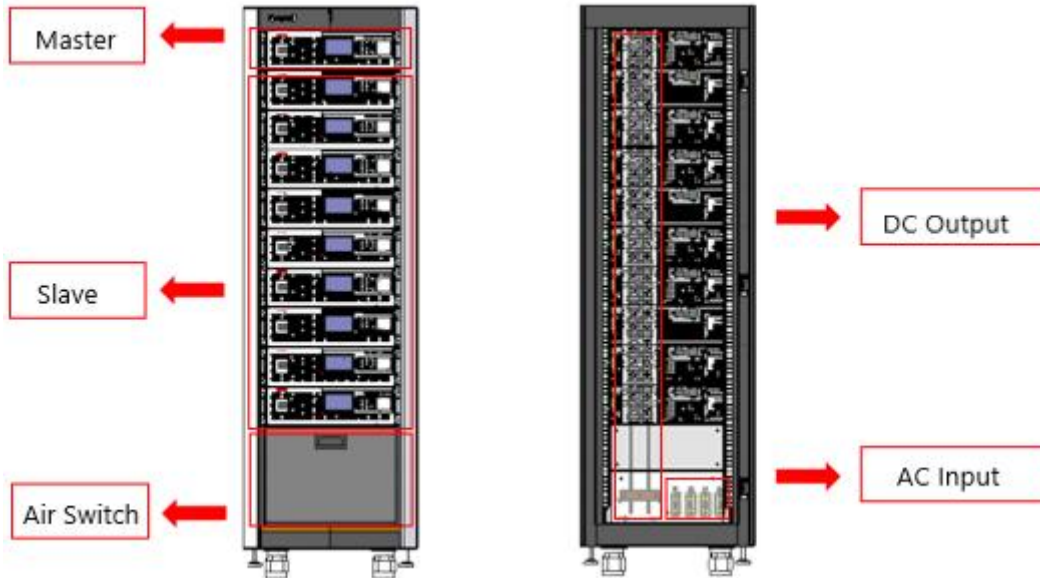
- Ten devices in parallel

This solution consists of ten C3000H-15K and one HK-42U cabinet, total power 150kW and current up to 350A.

Component	Model	Quantity	Note
High-precision Programmable DC Power Source	C3000H-15K-1500-0035	10	Voltage: 1500V Current: 35A Power: 15KW
Cabinet	HK-42U Cabinet	1	for 9-10 parallel



10 devices in parallel cabinet size
610mm*1999mm*1026mm
Weight: 280kg



42U Cabinet (front & rear)

Note: If you need more than 10 devices in parallel, please contact Kewell.

9 Reference Standards

No.	Standard/Document Number	Standard / File name
1	GB 50055-2011	Code for Design of Electric Distribution of General-purpose Utilization Equipment
2	GB 50054-2011	Code for Design of Low Voltage Electrical Installations
3	GB/T 4798	Environmental Conditions Existing in the Application of Electric and Electronic Products-Storage
4	GB/T 3859.1-2013	Semiconductor Convertors Specification of Basic Requirements
5	GB/T 3859.2-2013	Semiconductor Convertors Application Guide
6	GB/T 3859.3-2013	Semiconductor Convertors Transformers and Reactors
7	NB/T 32004-2018	Technical Specifications of PV Grid-connected Inverter
8	GB/T 24343-2009	Electrical Equipment of Industrial Machines Insulation Resistance Test Specifications
9	GB 4208-2008	Degrees of Protection Provided by Enclosure
10	GB/T 20850-2014	Safety of Machinery- Guidelines for the Understanding and Use of Safety of Machinery Standards
11	BSEN 62477-1-2012+A11-2014	Safety Requirements for Power Electronic Convertor Systems and Equipment
12	EN ISO 13849-1-2015	Safety of Machinery - Safety-related Parts of Control Systems - Part 1: General Principles for Design
13	EN IEC 61000-6-2:2019	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards –Immunity for industrial environments
14	IEC 61000-6-4-2019	Electromagnetic Compatibility (EMC) - Part 6-4: Generic Standards - Emission Standard for Industrial Environments
15	IEC 61000-6-3:2011	Electromagnetic Compatibility (EMC) - Part 6-3: Generic Standards - Emission Standard for Industrial Environments
16	IEC/EN 61010-1-2020	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use- Part 1: General Requirements
17	IEC 61010-2:2010	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use- Part 2: General Requirements
18	IEC 60204-1-2016	Safety of Machinery- Electrical Equipment of Machines- Part 1: General Requirements
19	IEC/EN 62477-1:2012	Safety requirements for power electronic converter systems and equipment-Part 1:General
20	IEC 61000-2-4:2002	Electromagnetic compatibility(EMC) — Part 2-4: Environment-Compatibility levels in industrial plants for low-frequency conducted disturbances
21	EN 61800-3:2004+A1:2012	Adjustable speed electrical power drive systems — Part 3: EMC requirements and specific test methods
22	EN 62040-1:2008+A1:2013	Safety of machinery-Electrical requirement of machines-Part 1: General

		requirements
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