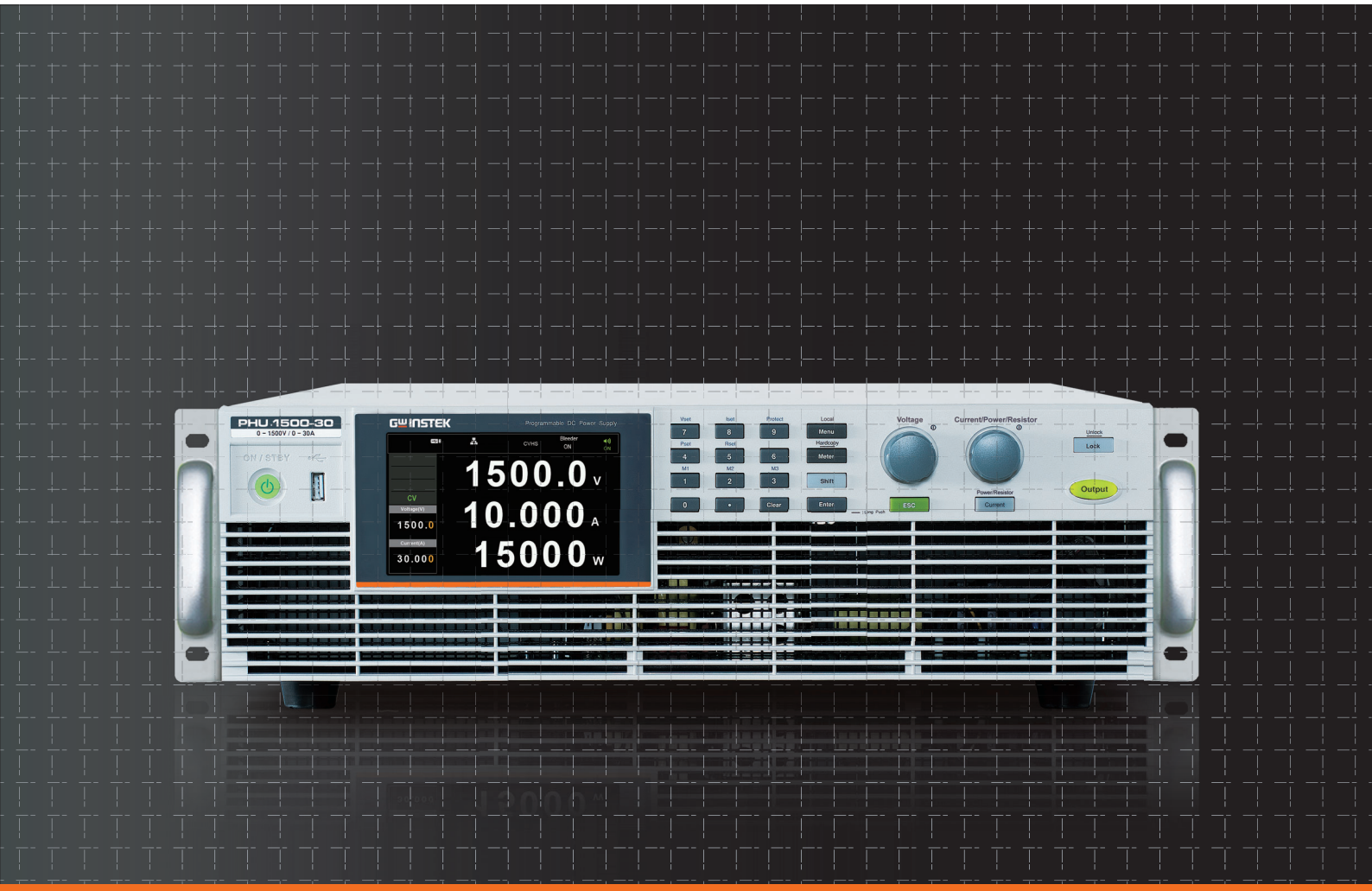



# PHU-Series

## Multi-Range High Power DC Source

## FEATURES

- Voltage Output : 80 V/200 V/500 V/750 V/1000 V/1500 V
- Power Output : 5 kW/10 kW/15 kW
- Maximum Current Output : 510 A
- C.V/C.C Priority Mode
- Adjustable Voltage/Current Rise and Fall Time
- AWS (Advanced Web Control)
- APC (Adaptive Parallel Connection)
- Parallel Connection (Maximum 10 Units)
- High Efficiency and High-power Density
- Bleeder Control Function
- Internal Resistance Function
- Panel Lock Function
- Three Sets of Preset Function
- Protection : OVP, OCP, OHP, UVL, AC Fail, FAN Fail
- Standard : USB, LAN, Isolated Analog Control
- Option: RS-232&485 or GPIB or CAN Bus or DeviceNet or Any Bus
- 3 U Height and 19” Rack Mount Size

GW INSTEK
Simply Reliable

# Prestige / Harmony / Universal

The PHU Series is a single channel programmable DC power supply with multi-range output feature which offers a wide range of voltage and current combinations for greater flexibility. The circuit design adopts SiC (silicon carbide) components to achieve high power density characteristics which can generate 15 kW high output and keep the compact size at just 3 U height.

PHU's wide voltage and current range, along with its high-power characteristics, can cover a broader range of testing applications such as photovoltaic systems, electric vehicles (EVs), and automotive electronics, etc. The launch of PHU high-power DC power supplies enhances the completeness of the DC power supply product line of GW Instek, and to provide customers with more comprehensive and integrated solutions.

The AWS (Advanced Web Server) function allows the user to operate devices directly through a web browser, without needing to install any complicated software or drivers. This functionality allows users to complete tasks more efficiently, saving time and increasing productivity.

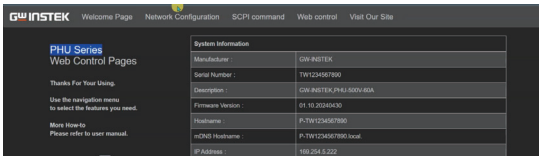
The unique APC (Adaptive Parallel Connection) feature offers adaptability in parallel connection, allowing users to make the best choice according to their needs. For instance, users can opt for a 15 kW model and a 10 kW model, to combine both to reach a 25 kW capacity within their budget constraints. Up to 10 PHU units can be connected to reach 150 kW without the need for additional power distribution for control.

For industry interface, PHU provides a variety of embedded industrial interface options to meet user needs, eliminating the need for users to prepare additional interfaces. The available ports including EtherCAT, CANopen, Modbus, Profinet and DeviceNet, etc. Except the standard built-in programmable sequence function, PHU also offers a variety optional functions including Datalogger, MPPT (Maximum Power Point Tracking), Solar Array Simulator, AH/WH Meter and Battery Simulation to meet customer's requirements.

There are a total of 18 models, consisting of 3 power capacities (5 kW/10 kW/15 kW) and 6 voltages (80 V/200 V/500 V/750 V/1000 V/1500 V) to meet all customer needs.

| Medium Voltage | | | | High Voltage | | | | High Current | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | V | A | W | Model | V | A | W | Model | V | A | W |
| PHU 500-30 | 500 | 30 | 5 kW | PHU 1000-15 | 1000 | 15 | 5 kW | PHU 80-170 | 80 | 170 | 5 kW |
| PHU 500-60 | 500 | 60 | 10 kW | PHU 1000-30 | 1000 | 30 | 10 kW | PHU 80-340 | 80 | 340 | 10 kW |
| PHU 500-90 | 500 | 90 | 15 kW | PHU 1000-45 | 1000 | 45 | 15 kW | PHU 80-510 | 80 | 510 | 15 kW |
| PHU 750-20 | 750 | 20 | 5 kW | PHU 1500-10 | 1500 | 10 | 5 kW | PHU 200-70 | 200 | 70 | 5 kW |
| PHU 750-40 | 750 | 40 | 10 kW | PHU 1500-20 | 1500 | 20 | 10 kW | PHU 200-140 | 200 | 140 | 10 kW |
| PHU 750-60 | 750 | 60 | 15 kW | PHU 1500-30 | 1500 | 30 | 15 kW | PHU 200-210 | 200 | 210 | 15 kW |

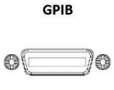
## A. AWS (ADVANCED WEB SERVER)

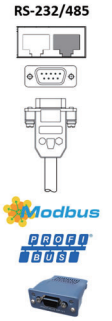





AWS is a powerful function that simplifies operations. With AWS, users can operate devices directly through a web browser,without needing to install any complicated software or drivers. This functionality allows users to complete tasks more efficiently, saving time and increasing productivity. Simply connect to the LAN port, enter the IP address through any web browser, and you can perform tasks such as device control, parameter settings, and function toggling without needing to install or learn any additional software.

## B. INDUSTRY INTERFACE



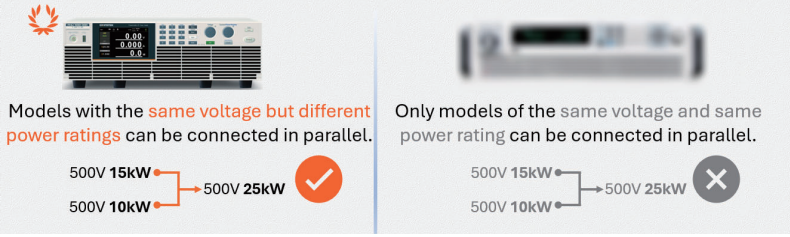







PHU provides a variety of embedded industrial interface options to meet user needs, eliminating the need for users to prepare additional interfaces.

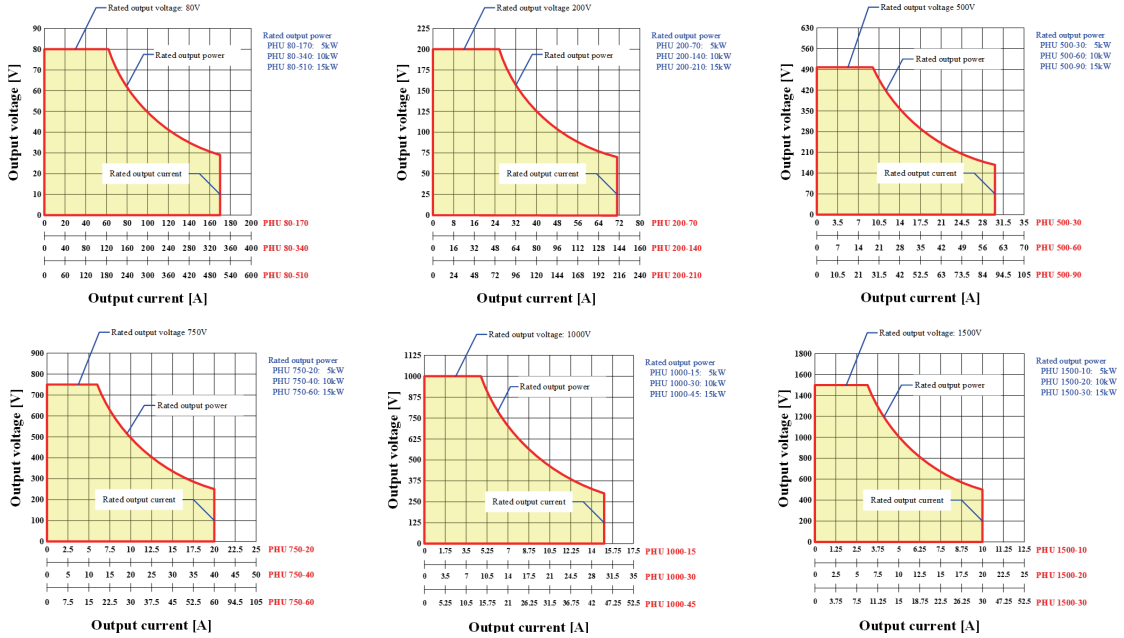
## C. APC (ADAPTIVE PARALLEL CONNECTION)




**It is easy to set up the master-slave in the parallel connection function.**

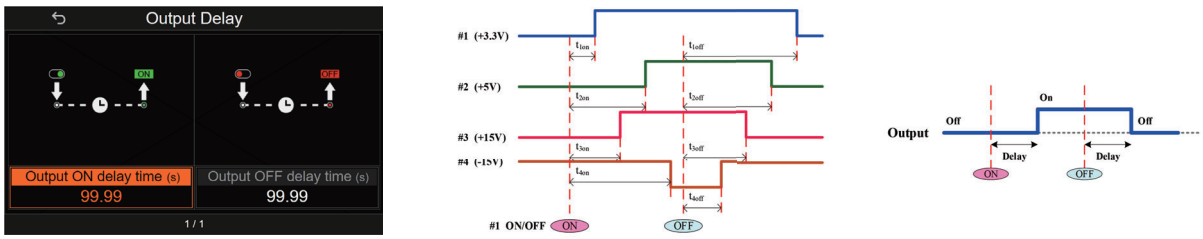

The unique APC (Adaptive Parallel Connection) feature offers adaptability in parallel connection, allowing users to make the best choice according to their needs. For instance, users can opt for a 15 kW model and a 10 kW model, to combine both to reach a 25 kW capacity within their budget constraints. Up to 10 PHU units can be connected to reach 150 kW without the need for additional power distribution for control.

## D. MULTI-RANGE OUTPUT



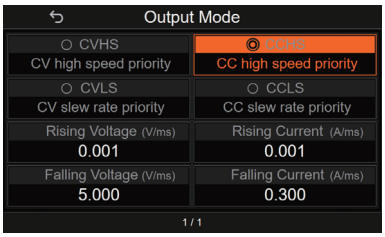

This feature enables the power supply to automatically adapt to higher output voltages when there is a smaller current or handle higher currents when there is a lower voltage. It allows the use of a single source to address multiple voltage and current combinations.

## E. OUTPUT ON/OFF DELAY

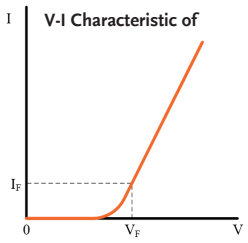



The output ON/OFF delay feature enables the setting of a specific time delay for output on after the power supply output is turned on, and a specific time delay for output off after the power supply output is turned off.

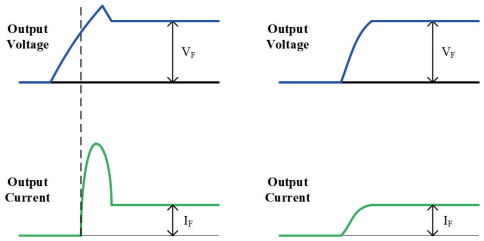
## F. CC/CV PRIORITY




**CV Priority**

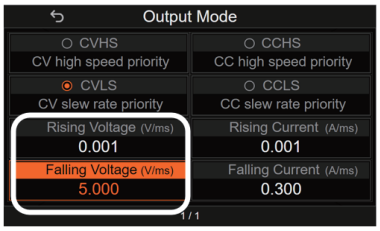


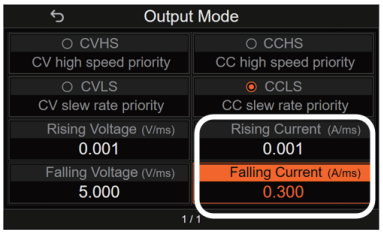

**CC Priority**

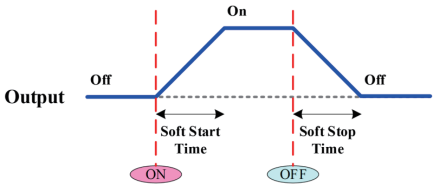


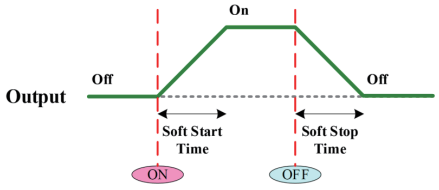

The PHU-Series has CV and CC priority modes. The CC priority mode can prevent inrush current and surge voltage from occurring at turn-on to protect DUT.

## G. SLEW RATE CONTROL (SOFT START/STOP)



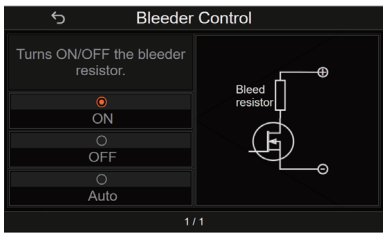



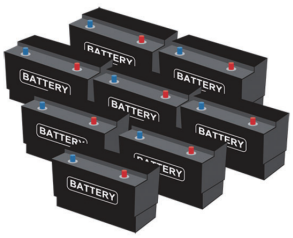

The default voltage (or current) rising speed when starting/stopping the output is set as the highest speed. PHU provides the function for the user to set the speed per their request for applications.

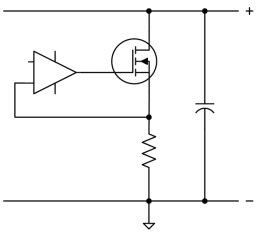
In CVLS (Constant Voltage Low Speed) mode, the user can set the parameter to control the voltage rising when starting the output and the voltage falling when stopping the output.

In CCLS (Constant Current Low Speed) mode, the user can set the parameter to control the current rising when starting the output and the current falling when stopping the output.

## H. BLEED CIRCUIT ON/OFF CONTROL



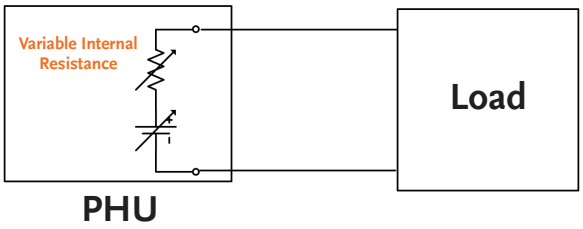



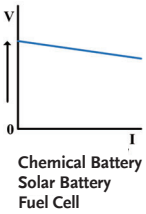



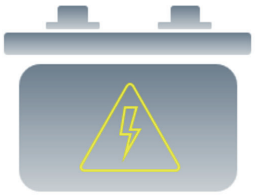

The bleeder circuit is a power supply circuit designed to discharge the electric charge stored in the power supply filter capacitors when the equipment is turned OFF, primarily for safety reasons to protect the DUT.

The bleed function can be disabled for specific purposes, such as battery applications.

## I. VARIABLE INTERNAL RESISTANCE

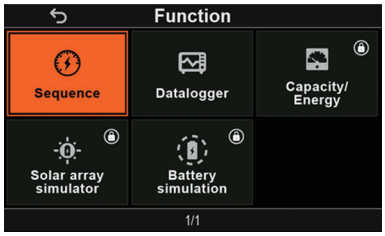


The internal resistance of the power supply can be user-defined in software. When the internal resistance is set it can be seen as a resistance in series with the positive output terminal. This allows the power supply to simulate power sources that have internal resistances such as lead acid batteries.

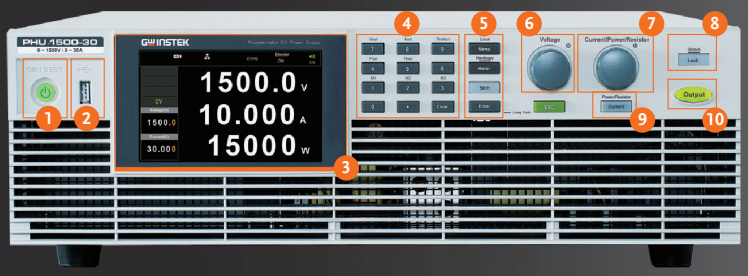
## J FUNCTION

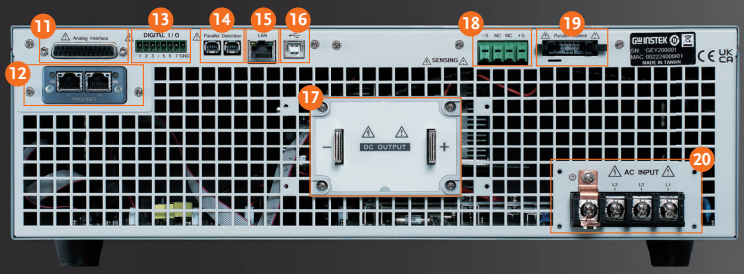



Except the standard built-in programmable sequence function, PHU also offers a variety of optional functions including Datalogger, Capacity/Energy, Solar Array Simulator, and Battery Simulation to meet customer's requirements.

## PANEL INTRODUCTION

CE | USB | GPIB | Analog Control | LAN | Digital I/O | RS-232C | RS-485 | CAN | Ether CAT | Profinet | Modbus | Devicenet




1. Power Switch
2. USB A Port
3. Display Area
4. Number Button
5. Function Button
6. Voltage Adjust Knob
7. Current/Power/Resistance Adjust Knob
8. Panel Lock
9. Current/Power/Resistance Switch
10. Output Switch
11. Analog Control
12. Anybus Connection Port
13. Digital I/O
14. Interconnect for Parallel Connection
15. LAN Port
16. USB B Port
17. DC Output Terminal
18. Remote Sense
19. Parallel Control
20. AC Input

## SPECIFICATIONS(PHU-5 kW Series)

| Model | | PHU | 80-170 | 200-70 | 500-30 | 750-20 | 1000-15 | 1500-10 |
|---|---|---|---|---|---|---|---|---|
| Rated output voltage (*1) | | V | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Rated output current (*2) | | A | 170 | 70 | 30 | 20 | 15 | 10 |
| Rated output power | | W | 5000 | 5000 | 5000 | 5000 | 5000 | 5000 |
| Output power ratio | | — | 2.72 | 2.8 | 3 | 3 | 3 | 3 |
| **Constant Voltage Mode** | | | | | | | | |
| Line regulation (*3) [0.01 % of Vo_rated] | | mV | 8 | 20 | 50 | 75 | 100 | 150 |
| Load regulation (*4) [0.02 % of Vo_rated] | | mV | 16 | 40 | 100 | 150 | 200 | 300 |
| Ripple and noise (*5) | p-p (*6) | mV | 200 | 300 | 350 | 800 | 1600 | 2400 |
| | r.m.s. (*7) | mV | 16 | 40 | 70 | 200 | 350 | 400 |
| Temperature coefficient | | ppm/°C | 100 ppm/°C from rated output voltage, following 30 minutes warm-up | | | | | |
| Remote snese compensation voltage | 5 % of Vo_rated | V | 4 | 10 | 25 | 37.5 | 50 | 75 |
| Rise time (*8) | Rated load | ms | 30 | 30 | 30 | 30 | 30 | 30 |
| | No load | ms | 30 | 30 | 30 | 30 | 30 | 30 |
| Fall time (*9) | Rated load | ms | 80 | 80 | 80 | 80 | 80 | 80 |
| | No load | ms | 1000 | 1000 | 1000 | 1200 | 1000 | 1200 |
| Transient response time (*10) | | ms | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| **Constant Current Mode** | | | | | | | | |
| Line regulation (*3) [0.05 % of Io_rated] | | mA | 85 | 35 | 15 | 10 | 7.5 | 5 |
| Load regulation (*11) [0.1 % of Io_rated] | | mA | 170 | 70 | 30 | 20 | 15 | 10 |
| Ripple and noise (*12) | r.m.s.(*7) | mA | 170 | 50 | 16 | 16 | 8 | 8 |
| Temperature coefficient | | ppm/°C | 100 ppm/°C from rated output current, following 30 minutes warm-up | | | | | |
| **Protection Function** | | | | | | | | |
| Over voltage protection (OVP) | Setting range | V | 5.00 V to 88.00 V | 5.00 V to 220.00 V | 5.00 V to 550.00 V | 5.0 V to 825.0 V | 5.0 V to 1100.0 V | 5.0 V to 1650.0 V |
| | Setting accuracy | mV | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Over current protection (OCP) | Setting range | A | 5.00 A to 187.00 A | 5.00 A to 77.00 A | 3.000 A to 33.000 A | 2.000 A to 22.000 A | 1.500 A to 16.500 A | 1.000 A to 11.000 A |
| | Setting accuracy | mA | 340 | 140 | 60 | 40 | 30 | 20 |
| Over power protection (OPP) | Setting range | W | 100 W to 5500 W | 100 W to 5500 W | 100 W to 5500 W | 100 W to 5500 W | 100 W to 5500 W | 100 W to 5500 W |
| | Setting accuracy | W | 50 | 50 | 50 | 50 | 50 | 50 |
| Over voltage limit (OVL) | Setting range | V | 0.00 V to 84.00 V | 0.00 V to 210.00 V | 0.00 V to 525.00 V | 0.0 V to 787.5 V | 0.0 V to 1050.0 V | 0.0 V to 1575.0 V |
| Under voltage limit (UVL) | Setting range | V | 0.00 V to 84.00 V | 0.00 V to 210.00 V | 0.00 V to 525.00 V | 0.0 V to 787.5 V | 0.0 V to 1050.0 V | 0.0 V to 1575.0 V |
| Over current limit (OCL) | Setting range | A | 0.00 A to 178.50 A | 0.00 A to 73.50 A | 0.000 A to 31.500 A | 0.000 A to 21.000 A | 0.000 A to 15.750 A | 0.000 A to 10.500 A |
| Under cuttent limit (UCL) | Setting range | A | 0.00 A to 178.50 A | 0.00 A to 73.50 A | 0.000 A to 31.500 A | 0.000 A to 21.000 A | 0.000 A to 15.750 A | 0.000 A to 10.500 A |
| Power unit fail (PUF) | Operation | | Turn the output off | | | | | |
| Incorrect sensing connection protection (SENSE) | Operation | | Turn the output off | | | | | |
| Low AC input protection (AC-FAIL) | Operation | | Turn the output off | | | | | |
| Shutdown (SD) | Operation | | Turn the output off | | | | | |
| Power limit (POWER LIMIT) | Operation | | Over power limit | | | | | |
| | Value (fixed) | | Approx. 102 % of rated output power | | | | | |
| **Other Functions** | | | | | | | | |
| Voltage Slew Rate | Setting range | V/s | 0.01 to 160.00 | 0.01 to 400.00 | 0.1 to 1000.0 | 0.1 to 1500.0 | 0.1 to 2000.0 | 0.1 to 3000.0 |
| | Resolution | mV | 10 | 10 | 100 | 100 | 100 | 100 |
| Current slew rate | Setting range | A/s | 0.01 to 340.00 | 0.01 to 140.00 | 0.001 to 60.000 | 0.001 to 40.000 | 0.001 to 30.000 | 0.001 to 20.000 |
| | Resolution | mA | 10 | 10 | 1 | 1 | 1 | 1 |
| Internal resistance | Setting range | Ω | 0.000 to 0.471 | 0.000 to 2.857 | 0.00 to 16.67 | 0.00 to 37.50 | 0.0 to 66.7 | 0.0 to 150.0 |
| | Resolution | mΩ | 1 | 1 | 10 | 10 | 100 | 100 |
| **Front Panel** | | | | | | | | |
| Display | | | TFT-LCD, 5", 800 pt x 480 pt | | | | | |
| Voltage accuracy [0.1 % of Vo_rated] | | mV | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Current accuracy [0.2 % of Io_rated] | | mA | 340 | 140 | 60 | 40 | 30 | 20 |
| Power accuracy [1 % of Po_rated] | | W | 50 | 50 | 50 | 50 | 50 | 50 |
| Voltage resolution | | V | 0.01 | 0.01 | 0.01 | 0.1 | 0.1 | 0.1 |
| Current resolution | | A | 0.01 | 0.01 | 0.001 | 0.001 | 0.001 | 0.001 |
| Power resolution | | W | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Buttons | | | Menu, Local, Exit, Clear, Enter, Lock, Current, Shift Output, Numeric Keypad | | | | | |
| Rotary knob | | | Turn the knob to increase or decrease the value | | | | | |
| USB port | | | Type A USB connector | | | | | |
| **Programming and Measurement (Digital Interface)** | | | | | | | | |
| Output voltage programming range | 0 % to 105 % | V | 0 to 84 | 0 to 210 | 0 to 525 | 0 to 787.5 | 0 to 1050 | 0 to 1575 |
| Output current programming range | 0 % to 105 % | A | 0 to 178.5 | 0 to 73.5 | 0 to 31.5 | 0 to 21 | 0 to 15.75 | 0 to 10.5 |
| Output power programming range | 0 % to 102 % | W | 0 to 5100 | 0 to 5100 | 0 to 5100 | 0 to 5100 | 0 to 5100 | 0 to 5100 |
| Output voltage programming accuracy [0.1 % of Vo_rated] | | mV | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Output current programming accuracy [0.2 % of Io_rated] | | mA | 340 | 140 | 60 | 40 | 30 | 20 |
| Output power programming accuracy [1 % of Po_rated] | | W | 50 | 50 | 50 | 50 | 50 | 50 |
| Output voltage programming resolution | | mV | 10 | 10 | 10 | 100 | 100 | 100 |
| Output current programming resolution | | mA | 10 | 10 | 1 | 1 | 1 | 1 |
| Output power programming resolution | | W | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Output voltage measurement accuracy [0.1 % of Vo_rated] | | mV | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Output current measurement accuracy [0.2 % of Io_rated] | | mA | 340 | 140 | 60 | 40 | 30 | 20 |
| Output power measurement accuracy [1 % of Po_rated] | | W | 50 | 50 | 50 | 50 | 50 | 50 |
| Output voltage measurement resolution | | mV | 10 | 10 | 10 | 100 | 100 | 100 |
| Output current measurement resolution | | mA | 10 | 10 | 1 | 1 | 1 | 1 |
| Output power measurement resolution | | W | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |

| SPECIFICATIONS(PHU-5 kW Series) | | | |
|---|---|---|---|
| **Input Characteristics for PHU-C Series** | | | |
| **Norminal input rating** | | | Single Phase, 3-Phase, 200 V models: 180 Vac to 265 Vac (Covers 200 Vac / 230 Vac) |
| **Input frequency range** | | | 47 Hz to 63 Hz |
| **Maximum input current** | **200 Vac** | **A** | 32 A (L1, L2) |
| **Inrush current** | **200 Vac** | **A** | Less than 50 A |
| **Maximum input power** | | **VA** | 6000 |
| **Power factor** | **Rated Power** | | > 0.95 |
| **Efficiency (*14)** | **200 Vac** | % | 86 to 94 |
| **Hold-up time** | | | 10 ms or greater |
| **Input Characteristics for PHU-D Series** | | | |
| **Norminal input rating** | | | 3-Phase, 400 V models: 342 Vac to 528 Vac (Covers 380/400/415/440/460/480 Vac) |
| **Input frequency range** | | | 47 Hz to 63 Hz |
| **Maximum input current** | **400 Vac** | **A** | 16 A (L1, L2) |
| **Inrush current** | **400 Vac** | **A** | Less than 25 A |
| **Maximum input power** | | **VA** | 6000 |
| **Power factor** | **Rated Power** | | > 0.95 |
| **Efficiency (*14)** | **400 Vac** | % | 87 to 94 |
| **Hold-up time** | | | 10 ms or greater |
| **Interface Capabilities** | | | |
| **USB** | | | Type A: Host, Type B: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class) |
| **LAN** | | | MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask |
| **Isolated Analog Control Interface** | | | $V_{set}$ / $I_{set}$ = 0 V to 5 V or 0 V to 10 V \| $V_{mon}$ / $I_{mon}$ = 0 V to 5 V or 0 V to 10 V |
| **Factory Option** | | | RS-232&485 or GPIB or CAN Bus or DeviceNet or Isolated Digital I/O |
| **Isolated Analog Control Interface** | | | |
| **Vout voltage programming** | | | 0 % to 100 %, 0 V to 5 V Accuracy: ± 1 % of rated $V_{out}$, or 0 V to 10 V Accuracy: ± 1 % of rated $V_{out}$ |
| **Iout voltage programming** | | | 0 % to 100%, 0 V to 5 V Accuracy: ± 1 % of rated $I_{out}$, or 0 V to 10 V Accuracy: ± 1 % of rated $I_{out}$ |
| **Pout voltage programming** | | | 0 % to 100%, 0 V to 5 V Accuracy: ± 1 % of rated $P_{out}$, or 0 V to 10 V Accuracy: ± 1 % of rated $P_{out}$ |
| **Internal resistance voltage programming** | | | 0 % to 100%, 0 V to 5 V Accuracy: ± 1 % of maximum $R_{int}$, or 0 V to 10 V Accuracy: ± 1 % of maximum $R_{int}$ |
| **Output voltage monitor** | | | 0 V to 5 V or 0 V to 10 V, Accuracy: ± 1 % |
| **Output current monitor** | | | 0 V to 5 V or 0 V to 10 V, Accuracy: ± 1 % |
| **Reference voltage** | | | Voltage reference for 0 V to 5V or 0 V to 10V |
| **Alarm Input** | | | Turn off the PHU output with a High (4.5 V to 5 V) |
| **Output on/off control** | | | Possible logic selections:<br>Turn the output on using a LOW (0 V to 0.5 V) or short-circuit, turn the output off using a HIGH (4.5 V to 5 V) or open-circuit<br>Turn the output on using a HIGH (4.5 V to 5 V) or open-circuit, turn the output off using a LOW (0 V to 0.5 V) or short-circuit |
| **Alarm clear control** | | | Clear alarms with a High (4.5 V to 5 V) |
| **CV/CC/CP/ALM/PWR ON/OUT ON indicator** | | | Photocoupler open collector output; Maximum voltage 30 V, maximum sink current 8 mA |
| **Environmental Conditions** | | | |
| **Operaing temperature** | | | 0 °C to 50 °C |
| **Storage temperature** | | | -25 °C to 70 °C |
| **Operating humidity** | | | 20 % to 85 % RH; No condensation |
| **Storage humidity** | | | 90 % RH or less; No condensation |
| **Altitude** | | | Maximum 2000 m |
| **General Specifications** | | | |
| **Weight** | **Main unit only** | **kg** | Less than 21 kg |
| **Dimensions (W×H×D)** | | **mm** | 442 mm × 130 mm × 675 mm |
| **Cooling** | | | Forced air cooling by internal fan |
| **EMC** | | | Complies with the European EMC directive 89/336/EEC for Class A test and measurement products |
| **Safety** | | | Complies with the European Low Voltage Directive 73/23/EEC and carries the CE-marking |
| **Withstand voltage** | | | Chassis and output terminal; chassis and AC input; AC input and output terminal: AC 1500 V or DC 2130 V 1 minute |
| **Insulation resistance** | | | Chassis and output terminal; chassis and AC input; AC input and output terminal: 100 MΩ or more (DC 500 V) |

Notes:
*1.Minimum voltage is guaranteed to maximum 0.2 % of the rated output voltage.
*2.Minimum current is guaranteed to maximum 0.4 % of the rated output current.
*3.At 180 Vac to 265 Vac or 342 Vac to 528 Vac, constant load.
*4.From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
*5.For 80 V, 200 V models: Measure with JEITA RC-9131B (1:1) probe. For 500 V, 750 V, 1000 V and 1500 V models: Measured with (100:1) probe.
*6.Measurement frequency bandwidth is 10 Hz to 20 MHz.
*7.Measurement frequency bandwidth is 5 Hz to 1 MHz.
*8.From 10 % to 90 % of rated output voltage, with rated resistive load.
*9.From 90 % to 10 % of rated output voltage, with rated resistive load.
*10.Time for output voltage to recover within 1 % of its rated output for a load change from 10 % to 90 % of its rated output current.
Voltage set point from 10 % to 100 % of rated output.
*11.For load voltage change, equal to the unit voltage rating, constant input voltage.
*12.The ripple is measured at 20 % to 100 % output voltage and full output current.
*13.For output power change from 10 % to 90 %, constant input voltage.
*14.At rated output power.

## SPECIFICATIONS(PHU-10 kW Series)

| Model | | PHU | 80-340 | 200-140 | 500-60 | 750-40 | 1000-30 | 1500-20 |
|---|---|---|---|---|---|---|---|---|
| Rated output voltage (*1) | | V | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Rated output current (*2) | | A | 340 | 140 | 60 | 40 | 30 | 20 |
| Rated output power | | W | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 |
| Output power ratio | | — | 2.72 | 2.8 | 3 | 3 | 3 | 3 |
| **Constant Voltage Mode** | | | | | | | | |
| Line regulation (*3) [0.01 % of Vo_rated] | | mV | 8 | 20 | 50 | 75 | 100 | 150 |
| Load regulation (*4) [0.02 % of Vo_rated] | | mV | 16 | 40 | 100 | 150 | 200 | 300 |
| Ripple and noise (*5) | p-p (*6) | mV | 200 | 300 | 350 | 800 | 1600 | 2400 |
| | r.m.s. (*7) | mV | 16 | 40 | 70 | 200 | 350 | 400 |
| Temperature coefficient | | ppm/℃ | 100 ppm/℃ from rated output voltage, following 30 minutes warm-up. | | | | | |
| Remote snese compensation voltage | 5 % of Vo_rated | V | 4 | 10 | 25 | 37.5 | 50 | 75 |
| Rise time (*8) | Rated load | ms | 30 | 30 | 30 | 30 | 30 | 30 |
| | No load | ms | 30 | 30 | 30 | 30 | 30 | 30 |
| Fall time (*9) | Rated load | ms | 80 | 80 | 80 | 80 | 80 | 80 |
| | No load | ms | 1000 | 1000 | 1000 | 1200 | 1000 | 1200 |
| Transient response time (*10) | | ms | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| **Constant Current Mode** | | | | | | | | |
| Line regulation (*3) [0.05 % of Io_rated] | | mA | 170 | 70 | 30 | 20 | 15 | 10 |
| Load regulation (*11) [0.1 % of Io_rated] | | mA | 340 | 140 | 60 | 40 | 30 | 20 |
| Ripple and noise (*12) | r.m.s. (*7) | mA | 340 | 100 | 32 | 32 | 22 | 22 |
| Temperature coefficient | | ppm/℃ | 100 ppm/℃ from rated output current, following 30 minutes warm-up. | | | | | |
| **Protection Function** | | | | | | | | |
| Over voltage protection (OVP) | Setting range | V | 5.00 V to 88.00 V | 5.00 V to 220.00 V | 5.00 V to 550.00 V | 5.0 V to 825.0 V | 5.0 V to 1100.0 V | 5.0 V to 1650.0 V |
| | Setting accuracy | mV | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Over current protection (OCP) | Setting range | A | 5.00 A to 374.00 A | 5.00 A to 154.00 A | 5.00 A to 66.00 A | 4.000 A to 44.000 A | 3.000 A to 33.000 A | 2.000 A to 22.000 A |
| | Setting accuracy | mA | 680 | 280 | 120 | 80 | 60 | 40 |
| Over power protection (OPP) | Setting range | W | 200 W to 11000 W | 200 W to 11000 W | 200 W to 11000 W | 200 W to 11000 W | 200 W to 11000 W | 200 W to 11000 W |
| | Setting accuracy | W | 100 | 100 | 100 | 100 | 100 | 100 |
| Over voltage limit (OVL) | Setting range | V | 0.00 V to 84.00 V | 0.00 V to 210.00 V | 0.00 V to 525.00 V | 0.0 V to 787.5 V | 0.0 V to 1050.0 V | 0.0 V to 1575.0 V |
| Under voltage limit (UVL) | Setting range | V | 0.00 V to 84.00 V | 0.00 V to 210.00 V | 0.00 V to 525.00 V | 0.0 V to 787.5 V | 0.0 V to 1050.0 V | 0.0 V to 1575.0 V |
| Over current limit (OCL) | Setting range | A | 0.00 A to 357.00 A | 0.00 A to 147.00 A | 0.00 A to 63.00 A | 0.000 A to 42.000 A | 0.000 A to 31.500 A | 0.000 A to 21.000 A |
| Under cuttent limit (UCL) | Setting range | A | 0.00 A to 357.00 A | 0.00 A to 147.00 A | 0.00 A to 63.00 A | 0.000 A to 42.000 A | 0.000 A to 31.500 A | 0.000 A to 21.000 A |
| Power unit fail (PUF) | Operation | | Turn the output off. | | | | | |
| Incorrect sensing connection protection (SENSE) | Operation | | Turn the output off. | | | | | |
| Low AC input protection (AC-FAIL) | Operation | | Turn the output off. | | | | | |
| Shutdown (SD) | Operation | | Turn the output off. | | | | | |
| Power limit (POWER LIMIT) | Operation | | Over power limit. | | | | | |
| | Value (fixed) | | Approx. 102 % of rated output power | | | | | |
| **Other Functions** | | | | | | | | |
| Voltage Slew Rate | Setting range | V/s | 0.01 to 160.00 | 0.01 to 400.00 | 0.1 to 1000.0 | 0.1 to 1500.0 | 0.1 to 2000.0 | 0.1 to 3000.0 |
| | Resolution | mV | 10 | 10 | 100 | 100 | 100 | 100 |
| Current slew rate | Setting range | A/s | 0.1 to 680.0 | 0.01 to 280.00 | 0.01 to 120.00 | 0.01 to 80.00 | 0.001 to 60.000 | 0.001 to 40.000 |
| | Resolution | mA | 100 | 10 | 10 | 10 | 1 | 1 |
| Internal resistance | Setting range | Ω | 0.000 to 0.235 | 0.000 to 1.428 | 0.00 to 8.33 | 0.00 to 18.75 | 0.00 to 33.33 | 0.0 to 75.0 |
| | Resolution | mΩ | 1 | 1 | 10 | 10 | 10 | 100 |
| **Front Panel** | | | | | | | | |
| Display | | | TFT-LCD, 5", 800 pt x 480 pt | | | | | |
| Voltage accuracy [0.1 % of Vo_rated] | | mV | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Current accuracy [0.2 % of Io_rated] | | mA | 680 | 280 | 120 | 80 | 60 | 40 |
| Power accuracy [1 % of Po_rated] | | W | 100 | 100 | 100 | 100 | 100 | 100 |
| Voltage resolution | | V | 0.01 | 0.01 | 0.01 | 0.1 | 0.1 | 0.1 |
| Current resolution | | A | 0.01 | 0.01 | 0.001 | 0.001 | 0.001 | 0.001 |
| Power resolution | | W | 1 | 1 | 1 | 1 | 1 | 1 |
| Buttons | | | Menu, Local, Exit, Clear, Enter, Lock, Current, Shift Output, Numeric Keypad | | | | | |
| Rotary knob | | | Turn the knob to increase or decrease the value | | | | | |
| USB port | | | Type A USB connector | | | | | |
| **Programming and Measurement (Digital Interface)** | | | | | | | | |
| Output voltage programming range | 0 % to 105 % | V | 0 to 84 | 0 to 210 | 0 to 525 | 0 to 787.5 | 0 to 1050 | 0 to 1575 |
| Output current programming range | 0 % to 105 % | A | 0 to 357 | 0 to 147 | 0 to 63 | 0 to 42 | 0 to 31.5 | 0 to 21 |
| Output power programming range | 0 % to 102 % | W | 0 to 10200 | 0 to 10200 | 0 to 10200 | 0 to 10200 | 0 to 10200 | 0 to 10200 |
| Output voltage programming accuracy [0.1 % of Vo_rated] | | mV | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Output current programming accuracy [0.2 % of Io_rated] | | mA | 680 | 280 | 120 | 80 | 60 | 40 |
| Output power programming accuracy [1 % of Po_rated] | | W | 100 | 100 | 100 | 100 | 100 | 100 |
| Output voltage programming resolution | | mV | 10 | 10 | 10 | 100 | 100 | 100 |
| Output current programming resolution | | mA | 10 | 10 | 1 | 1 | 1 | 1 |
| Output power programming resolution | | W | 1 | 1 | 1 | 1 | 1 | 1 |
| Output voltage measurement accuracy [0.1 % of Vo_rated] | | mV | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Output current measurement accuracy [0.2 % of Io_rated] | | mA | 680 | 280 | 120 | 80 | 60 | 40 |
| Output power measurement accuracy [1 % of Po_rated] | | W | 100 | 100 | 100 | 100 | 100 | 100 |
| Output voltage measurement resolution | | mV | 10 | 10 | 10 | 100 | 100 | 100 |
| Output current measurement resolution | | mA | 10 | 10 | 1 | 1 | 1 | 1 |
| Output power measurement resolution | | W | 1 | 1 | 1 | 1 | 1 | 1 |

| SPECIFICATIONS(PHU-10 kW Series) | | | |
|---|---|---|---|
| **Input Characteristics for PHU-C Series** | | | |
| Norminal input rating | | | 3-Phase, 200 V models: 180 Vac to 265 Vac (Covers 200 Vac / 230 Vac) |
| Input frequency range | | | 47 Hz to 63 Hz |
| Maximum input current | 200 Vac | A | 56 A (L1), 32 A (L2, L3) |
| Inrush current | 200 Vac | A | Less than 100 A |
| Maximum input power | | VA | 12000 |
| Power factor | Rated Power | | > 0.95 |
| Efficiency (*14) | 200 Vac | % | 86 to 94 |
| Hold-up time | | | 10 ms or greater |
| **Input Characteristics for PHU-D Series** | | | |
| Norminal input rating | | | 3-Phase, 400 V models: 342 Vac to 528 Vac (Covers 380/400/415/440/460/480 Vac) |
| Input frequency range | | | 47 Hz to 63 Hz |
| Maximum input current | 400 Vac | A | 28 A (L1), 16 A (L2, L3) |
| Inrush current | 400 Vac | A | Less than 50 A |
| Maximum input power | | VA | 12000 |
| Power factor | Rated Power | | > 0.95 |
| Efficiency (*14) | 400 Vac | % | 87 to 94 |
| Hold-up time | | | 10 ms or greater |
| **Interface Capabilities** | | | |
| USB | | | Type A: Host, Type B: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class) |
| LAN | | | MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask |
| Isolated Analog Control Interface | | | $V_{set}$ / $I_{set}$ = 0 V to 5 V or 0 V to 10 V \| $V_{mon}$ / $I_{mon}$ = 0 V to 5 V or 0 V to 10 V |
| Factory Option | | | RS-232&485 or GPIB or CAN Bus or DeviceNet or Isolated Digital I/O |
| **Isolated Analog Control Interface** | | | |
| Vout voltage programming | | | 0 % to 100 %, 0V to 5 V Accuracy: ± 1 % of rated $V_{out}$, or 0 V to 10 V Accuracy: ± 1 % of rated $V_{out}$ |
| Iout voltage programming | | | 0 % to 100 %, 0 V to 5 V Accuracy: ± 1 % of rated $I_{out}$, or 0 V to 10 V Accuracy: ± 1 % of rated $I_{out}$ |
| Pout voltage programming | | | 0 % to 100 %, 0 V to 5 V Accuracy: ± 1 % of rated $P_{out}$, or 0 V to 10 V Accuracy: ± 1 % of rated $P_{out}$ |
| Internal resistance voltage programming | | | 0 % to 100 %, 0 V to 5 V Accuracy: ± 1 % of maximum $R_{int}$, or 0 V to 10 V Accuracy: ± 1 % of maximum $R_{int}$ |
| Output voltage monitor | | | 0 V to 5 V or 0 V to 10 V, Accuracy: ± 1 % |
| Output current monitor | | | 0 V to 5 V or 0 V to 10 V, Accuracy: ± 1 % |
| Reference voltage | | | Voltage reference for 0 V to 5V or 0 V to 10V |
| Alarm Input | | | Turn off the PHU output with a High (4.5 V to 5 V) |
| Output on/off control | | | Possible logic selections:<br>Turn the output on using a LOW (0 V to 0.5 V) or short-circuit, turn the output off using a HIGH (4.5 V to 5 V) or open-circuit<br>Turn the output on using a HIGH (4.5 V to 5 V) or open-circuit, turn the output off using a LOW (0V to 0.5 V) or short-circuit |
| Alarm clear control | | | Clear alarms with a High (4.5 V to 5 V) |
| CV/CC/CP/ALM/PWR ON/OUT ON indicator | | | Photocoupler open collector output; Maximum voltage 30 V, maximum sink current 8 mA |
| **Environmental Conditions** | | | |
| Operaing temperature | | | 0 °C to 50 °C |
| Storage temperature | | | -25 °C to 70 °C |
| Operating humidity | | | 20 % to 85 % RH; No condensation |
| Storage humidity | | | 90 % RH or less; No condensation |
| Altitude | | | Maximum 2000 m |
| **General Specifications** | | | |
| Weight | Main unit only | kg | Less than 30.5 kg |
| Dimensions (W×H×D) | | mm | 442 mm × 130 mm × 675 mm |
| Cooling | | | Forced air cooling by internal fan |
| EMC | | | Complies with the European EMC directive 89/336/EEC for Class A test and measurement products |
| Safety | | | Complies with the European Low Voltage Directive 73/23/EEC and carries the CE-marking |
| Withstand voltage | | | Chassis and output terminal; chassis and AC input; AC input and output terminal: AC 1500 V or DC 2130 V 1 minute |
| Insulation resistance | | | Chassis and output terminal; chassis and AC input; AC input and output terminal: 100 MΩ or more (DC 500 V) |

Notes:
*1.Minimum voltage is guaranteed to maximum 0.2 % of the rated output voltage.
*2.Minimum current is guaranteed to maximum 0.4 % of the rated output current.
*3.At 180 Vac to 265 Vac or 342 Vac to 528 Vac, constant load.
*4.From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
*5.For 80 V, 200 V models: Measure with JEITA RC-9131B (1:1) probe. For 500 V, 750 V, 1000 V and 1500 V models: Measured with (100:1) probe.
*6.Measurement frequency bandwidth is 10 Hz to 20 MHz.
*7.Measurement frequency bandwidth is 5 Hz to 1 MHz.
*8.From 10 % to 90 % of rated output voltage, with rated resistive load.
*9.From 90 % to 10 % of rated output voltage, with rated resistive load.
*10.Time for output voltage to recover within 1 % of its rated output for a load change from 10 % to 90 % of its rated output current.
Voltage set point from 10 % to 100 % of rated output.
*11.For load voltage change, equal to the unit voltage rating, constant input voltage.
*12.The ripple is measured at 20 % to 100 % output voltage and full output current.
*13.For output power change from 10 % to 90 %, constant input voltage.
*14.At rated output power.

## SPECIFICATIONS(PHU-15 kW Series)

| Model | | PHU | 80-510 | 200-210 | 500-90 | 750-60 | 1000-45 | 1500-30 |
|---|---|---|---|---|---|---|---|---|
| Rated output voltage (*1) | | V | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Rated output current (*2) | | A | 510 | 210 | 90 | 60 | 45 | 30 |
| Rated output power | | W | 15000 | 15000 | 15000 | 15000 | 15000 | 15000 |
| Output power ratio | | — | 2.72 | 2.8 | 3 | 3 | 3 | 3 |
| **Constant Voltage Mode** | | | | | | | | |
| Line regulation (*3) [0.01 % of Vo_rated] | | mV | 8 | 20 | 50 | 75 | 100 | 150 |
| Load regulation (*4) [0.02 % of Vo_rated] | | mV | 16 | 40 | 100 | 150 | 200 | 300 |
| Ripple and noise (*5) | p-p (*6) | mV | 200 | 300 | 350 | 800 | 1600 | 2400 |
| | r.m.s. (*7) | mV | 16 | 40 | 70 | 200 | 350 | 400 |
| Temperature coefficient | | ppm/℃ | 100 ppm/℃ from rated output voltage, following 30 minutes warm-up. | | | | | |
| Remote snese compensation voltage | 5 % of Vo_rated | V | 4 | 10 | 25 | 37.5 | 50 | 75 |
| Rise time (*8) | Rated load | ms | 30 | 30 | 30 | 30 | 30 | 30 |
| | No load | ms | 30 | 30 | 30 | 30 | 30 | 30 |
| Fall time (*9) | Rated load | ms | 80 | 80 | 80 | 80 | 80 | 80 |
| | No load | ms | 1000 | 1000 | 1000 | 1200 | 1000 | 1200 |
| Transient response time (*10) | | ms | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| **Constant Current Mode** | | | | | | | | |
| Line regulation (*3) [0.05 % of Io_rated] | | mA | 255 | 105 | 45 | 30 | 22.5 | 15 |
| Load regulation (*11) [0.1 % of Io_rated] | | mA | 510 | 210 | 90 | 60 | 45 | 30 |
| Ripple and noise (*12) | r.m.s. | mA | 510 | 150 | 48 | 48 | 26 | 26 |
| Temperature coefficient | | ppm/℃ | 100 ppm/℃ from rated output current, following 30 minutes warm-up. | | | | | |
| **Protection Function** | | | | | | | | |
| Over voltage protection (OVP) | Setting range | V | 5.00 V to 88.00 V | 5.00 V to 220.00 V | 5.00 V to 550.00 V | 5.0 V to 825.0 V | 5.0 V to 1100.0 V | 5.0 V to 1650.0 V |
| | Setting accuracy | mV | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Over current protection (OCP) | Setting range | A | 5.00 A to 561.00 A | 5.00 A to 231.00 A | 5.00 A to 99.00 A | 5.00 A to 66.00 A | 4.5 A to 49.500 A | 3 A to 33.000 A |
| | Setting accuracy | mA | 1020 | 420 | 180 | 120 | 90 | 60 |
| Over power protection (OPP) | Setting range | W | 300 W to 16500 W | 300 W to 16500 W | 300 W to 16500 W | 300 W to 16500 W | 300 W to 16500 W | 300 W to 16500 W |
| | Setting accuracy | W | 150 | 150 | 150 | 150 | 150 | 150 |
| Over voltage limit (OVL) | Setting range | V | 0.00 V to 84.00 V | 0.00 V to 210.00 V | 0.00 V to 525.00 V | 0.0 V to 787.5 V | 0.0 V to 1050.0 V | 0.0 V to 1575.0 V |
| Under voltage limit (UVL) | Setting range | V | 0.00 V to 84.00 V | 0.00 V to 210.00 V | 0.00 V to 525.00 V | 0.0 V to 787.5 V | 0.0 V to 1050.0 V | 0.0 V to 1575.0 V |
| Over current limit (OCL) | Setting range | A | 0.00 A to 535.50 A | 0.00 A to 220.50 A | 0.00 A to 94.50 A | 0.00 A to 63.00 A | 0.000 A to 47.250 A | 0.000 A to 31.500 A |
| Under cuttent limit (UCL) | Setting range | A | 0.00 A to 535.50 A | 0.00 A to 220.50 A | 0.00 A to 94.50 A | 0.00 A to 63.00 A | 0.000 A to 47.250 A | 0.000 A to 31.500 A |
| Power unit fail (PUF) | Operation | | Turn the output off. | | | | | |
| Incorrect sensing connection protection (SENSE) | Operation | | Turn the output off. | | | | | |
| Low AC input protection (AC-FAIL) | Operation | | Turn the output off. | | | | | |
| Shutdown (SD) | Operation | | Turn the output off. | | | | | |
| Power limit (POWER LIMIT) | Operation | | Over power limit. | | | | | |
| | Value (fixed) | | Approx. 102 % of rated output power | | | | | |
| **Other Functions** | | | | | | | | |
| Voltage Slew Rate | Setting range | V/s | 0.01 to 160.00 | 0.01 to 400.00 | 0.1 to 1000.0 | 0.1 to 1500.0 | 0.1 to 2000.0 | 0.1 to 3000.0 |
| | Resolution | mV | 10 | 10 | 100 | 100 | 100 | 100 |
| Current slew rate | Setting range | A/s | 0.1 to 1020.0 | 0.01 to 420.00 | 0.01 to 180.00 | 0.01 to 120.00 | 0.01 to 90.00 | 0.001 to 60.000 |
| | Resolution | mA | 100 | 10 | 10 | 10 | 10 | 1 |
| Internal resistance | Setting range | Ω | 0.000 to 0.157 | 0.00 to 0.95 | 0.00 to 5.56 | 0.00 to 12.50 | 0.00 to 22.22 | 0.0 to 50.0 |
| | Resolution | mΩ | 1 | 10 | 10 | 10 | 10 | 100 |
| **Front Panel** | | | | | | | | |
| Display | | | TFT-LCD, 5", 800 pt x 480 pt | | | | | |
| Voltage accuracy [0.1% of Vo_rated] | | mV | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Current accuracy [0.2% of Io_rated] | | mA | 1020 | 420 | 180 | 120 | 90 | 60 |
| Power accuracy [1% of Po_rated] | | W | 150 | 150 | 150 | 150 | 150 | 150 |
| Voltage resolution | | V | 0.01 | 0.01 | 0.01 | 0.1 | 0.1 | 0.1 |
| Current resolution | | A | 0.01 | 0.01 | 0.01 | 0.001 | 0.001 | 0.001 |
| Power resolution | | W | 1 | 1 | 1 | 1 | 1 | 1 |
| Buttons | | | Menu, Local, Exit, Clear, Enter, Lock, Current, Shift Output, Numeric Keypad | | | | | |
| Rotary knob | | | Turn the knob to increase or decrease the value. | | | | | |
| USB port | | | Type A USB connector | | | | | |
| **Programming and Measurement (Digital Interface)** | | | | | | | | |
| Output voltage programming range | 0 % to 105 % | V | 0 to 84 | 0 to 210 | 0 to 525 | 0 to 787.5 | 0 to 1050 | 0 to 1575 |
| Output current programming range | 0 % to 105 % | A | 0 to 535.5 | 0 to 220.5 | 0 to 94.5 | 0 to 63 | 0 to 47.25 | 0 to 31.5 |
| Output power programming range | 0 % to 102 % | W | 0 to 15300 | 0 to 15300 | 0 to 15300 | 0 to 15300 | 0 to 15300 | 0 to 15300 |
| Output voltage programming accuracy [0.1 % of Vo_rated] | | mV | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Output current programming accuracy [0.2 % of Io_rated] | | mA | 1020 | 420 | 180 | 120 | 90 | 60 |
| Output power programming accuracy [1 % of Po_rated] | | W | 150 | 150 | 150 | 150 | 150 | 150 |
| Output voltage programming resolution | | mV | 10 | 10 | 10 | 100 | 100 | 100 |
| Output current programming resolution | | mA | 10 | 10 | 10 | 1 | 1 | 1 |
| Output power programming resolution | | W | 1 | 1 | 1 | 1 | 1 | 1 |
| Output voltage measurement accuracy [0.1 % of Vo_rated] | | mV | 80 | 200 | 500 | 750 | 1000 | 1500 |
| Output current measurement accuracy [0.2 % of Io_rated] | | mA | 1020 | 420 | 180 | 120 | 90 | 60 |
| Output power measurement accuracy [1 % of Po_rated] | | W | 150 | 150 | 150 | 150 | 150 | 150 |
| Output voltage measurement resolution | | mV | 10 | 10 | 10 | 100 | 100 | 100 |
| Output current measurement resolution | | mA | 10 | 10 | 10 | 1 | 1 | 1 |
| Output power measurement resolution | | W | 1 | 1 | 1 | 1 | 1 | 1 |

| SPECIFICATIONS(PHU-15 kW Series) | | | |
|---|---|---|---|
| **Input Characteristics for PHU-C Series** | | | |
| **Norminal input rating** | | | 3-Phase, 200 V models: 180 Vac to 265 Vac (Covers 200 Vac / 230 Vac) |
| **Input frequency range** | | | 47 Hz to 63 Hz |
| **Maximum input current** | **200 Vac** | **A** | 56 A (L1, L2, L3) |
| **Inrush current** | **200 Vac** | **A** | Less than 100 A |
| **Maximum input power** | | **VA** | 18000 |
| **Power factor** | **Rated Power** | | > 0.95 |
| **Efficiency (*14)** | **200 Vac** | % | 86 to 94 |
| **Hold-up time** | | | 10 ms or greater |
| **Input Characteristics for PHU-D Series** | | | |
| **Norminal input rating** | | | 3-Phase, 400 V models: 342 Vac to 528 Vac (Covers 380/400/415/440/460/480 Vac) |
| **Input frequency range** | | | 47 Hz to 63 Hz |
| **Maximum input current** | **400 Vac** | **A** | 28 A (L1, L2, L3) |
| **Inrush current** | **400 Vac** | **A** | Less than 50 A |
| **Maximum input power** | | **VA** | 18000 |
| **Power factor** | **Rated Power** | | > 0.95 |
| **Efficiency (*14)** | **400 Vac** | % | 87 to 94 |
| **Hold-up time** | | | 10 ms or greater |
| **Interface Capabilities** | | | |
| **USB** | | | Type A: Host, Type B: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class) |
| **LAN** | | | MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask |
| **Isolated Analog Control Interface** | | | $V_{set}$ / $I_{set}$ = 0 V to 5 V or 0 V to 10 V \| $V_{mon}$ / $I_{mon}$ = 0 V to 5 V or 0 V to 10 V |
| **Factory Option** | | | RS-232&485 or GPIB or CAN Bus or DeviceNet or Isolated Digital I/O |
| **Isolated Analog Control Interface** | | | |
| **Vout voltage programming** | | | 0 % to 100%, 0 V to 5 V Accuracy: ± 1 % of rated $V_{out}$, or 0~10 V Accuracy: ± 1 % of rated $V_{out}$ |
| **Iout voltage programming** | | | 0 % to 100 %, 0 V to 5 V Accuracy: ± 1 % of rated $I_{out}$, or 0 V to 10 V Accuracy: ± 1 % of rated $I_{out}$ |
| **Pout voltage programming** | | | 0 % to 100 %, 0 V to 5 V Accuracy: ± 1 % of rated $P_{out}$, or 0 V to 10 V Accuracy: ± 1 % of rated $P_{out}$ |
| **Internal resistance voltage programming** | | | 0 % to 100 %, 0 V to 5 V Accuracy: ± 1 % of maximum $R_{int}$, or 0 V to 10 V Accuracy: ± 1 % of maximum $R_{int}$ |
| **Output voltage monitor** | | | 0 V to 5 V or 0 V to 10 V, Accuracy: ± 1 % |
| **Output current monitor** | | | 0 V to 5 V or 0 to 10 V, Accuracy: ± 1 % |
| **Reference voltage** | | | Voltage reference for 0 V to 5 V or 0 V to 10 V |
| **Alarm Input** | | | Turn off the PHU output with a High (4.5 V to 5 V) |
| **Output on/off control** | | | Possible logic selections:<br>Turn the output on using a LOW (0 V to 0.5 V) or short-circuit, turn the output off using a HIGH (4.5 V to 5 V) or open-circuit<br>Turn the output on using a HIGH (4.5 V to 5 V) or open-circuit, turn the output off using a LOW (0 V to 0.5 V) or short-circuit |
| **Alarm clear control** | | | Clear alarms with a High (4.5V to 5V) |
| **CV/CC/CP/ALM/PWR ON/OUT ON indicator** | | | Photocoupler open collector output; Maximum voltage 30 V, maximum sink current 8 mA. |
| **Environmental Conditions** | | | |
| **Operaing temperature** | | | 0 ˚C to 50 ˚C |
| **Storage temperature** | | | -25 ˚C to 70 ˚C |
| **Operating humidity** | | | 20 % to 85 % RH; No condensation |
| **Storage humidity** | | | 90 % RH or less; No condensation |
| **Altitude** | | | Maximum 2000 m |
| **General Specifications** | | | |
| **Weight** | **Main unit only** | **kg** | Less than 40 kg |
| **Dimensions (W×H×D)** | | **mm** | 442 mm × 130 mm × 675 mm |
| **Cooling** | | | Forced air cooling by internal fan |
| **EMC** | | | Complies with the European EMC directive 89/336/EEC for Class A test and measurement products |
| **Safety** | | | Complies with the European Low Voltage Directive 73/23/EEC and carries the CE-marking |
| **Withstand voltage** | | | Chassis and output terminal; chassis and AC input; AC input and output terminal: AC 1500 V or DC 2130 V 1 minute |
| **Insulation resistance** | | | Chassis and output terminal; chassis and AC input; AC input and output terminal: 100 MΩ or more (DC 500 V) |

Notes:
*1.Minimum voltage is guaranteed to maximum 0.2 % of the rated output voltage.
*2.Minimum current is guaranteed to maximum 0.4 % of the rated output current.
*3.At 180 Vac to 265 Vac or 342 Vac to 528 Vac, constant load.
*4.From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
*5.For 80 V, 200 V models: Measure with JEITA RC-9131B (1:1) probe. For 500 V, 750 V, 1000 V and 1500 V models: Measured with (100:1) probe.
*6.Measurement frequency bandwidth is 10 Hz to 20 MHz.
*7.Measurement frequency bandwidth is 5 Hz to 1 MHz.
*8.From 10 % to 90 % of rated output voltage, with rated resistive load.
*9.From 90 % to 10 % of rated output voltage, with rated resistive load.
*10.Time for output voltage to recover within 1 % of its rated output for a load change from 10 % to 90 % of its rated output current.
Voltage set point from 10 % to 100 % of rated output.
*11.For load voltage change, equal to the unit voltage rating, constant input voltage.
*12.The ripple is measured at 20 % to 100 % output voltage and full output current.
*13.For output power change from 10 % to 90 %, constant input voltage.
*14.At rated output power.

## ORDERING INFORMATION

| 5 kW | |
|---|---|
| PHU 80-170 | 80 V, 170 A, 5000 W Programmable DC Power Supply<br>PHU 80-170-C (Input Voltage 3P3W 200 V)<br>PHU 80-170-D (Input Voltage 3P4W 380 V) |
| PHU 200-70 | 200 V, 70 A, 5000 W Programmable DC Power Supply<br>PHU 200-70-C (Input Voltage 3P3W 200 V)<br>PHU 200-70-D (Input Voltage 3P4W 380 V) |
| PHU 500-30 | 500 V, 30 A, 5000 W Programmable DC Power Supply<br>PHU 500-30-C (Input Voltage 3P3W 200 V)<br>PHU 500-30-D (Input Voltage 3P4W 380 V) |
| PHU 750-20 | 750 V, 20 A, 5000 W Programmable DC Power Supply<br>PHU 750-20-C (Input Voltage 3P3W 200 V)<br>PHU 750-20-D (Input Voltage 3P4W 380 V) |
| PHU 1000-15 | 1000 V, 15 A, 5000 W Programmable DC Power Supply<br>PHU 1000-15-C (Input Voltage 3P3W 200 V)<br>PHU 1000-15-D (Input Voltage 3P4W 380 V) |
| PHU 1500-10 | 1500 V, 10 A, 5000 W Programmable DC Power Supply<br>PHU 1500-10-C (Input Voltage 3P3W 200 V)<br>PHU 1500-10-D (Input Voltage 3P4W 380 V) |

| 10 kW | |
|---|---|
| PHU 80-340 | 80 V, 340 A, 10,000 W Programmable DC Power Supply<br>PHU 80-340-C (Input Voltage 3P3W 200 V)<br>PHU 80-340-D (Input Voltage 3P4W 380 V) |
| PHU 200-140 | 200 V, 140 A, 10,000 W Programmable DC Power Supply<br>PHU 200-140-C (Input Voltage 3P3W 200 V)<br>PHU 200-140-D (Input Voltage 3P4W 380 V) |
| PHU 500-60 | 500 V, 60 A, 10,000 W Programmable DC Power Supply<br>PHU 500-60-C (Input Voltage 3P3W 200 V)<br>PHU 500-60-D (Input Voltage 3P4W 380 V) |
| PHU 750-40 | 750 V, 40 A, 10,000 W Programmable DC Power Supply<br>PHU 750-40-C (Input Voltage 3P3W 200 V)<br>PHU 750-40-D (Input Voltage 3P4W 380 V) |
| PHU 1000-30 | 1000 V, 30 A, 10,000 W Programmable DC Power Supply<br>PHU 1000-30-C (Input Voltage 3P3W 200 V)<br>PHU 1000-30-D (Input Voltage 3P4W 380 V) |
| PHU 1500-20 | 1500 V, 20 A, 10,000 W Programmable DC Power Supply<br>PHU 1500-20-C (Input Voltage 3P3W 200 V)<br>PHU 1500-20-D (Input Voltage 3P4W 380 V) |

| 15 kW | |
|---|---|
| PHU 80-510 | 80 V, 510 A, 15,000 W Programmable DC Power Supply<br>PHU 80-510-C (Input Voltage 3P3W 200 V)<br>PHU 80-510-D (Input Voltage 3P4W 380 V) |
| PHU 200-210 | 200 V, 210 A, 15,000 W Programmable DC Power Supply<br>PHU 200-210-C (Input Voltage 3P3W 200 V)<br>PHU 200-210-D (Input Voltage 3P4W 380 V) |
| PHU 500-90 | 500 V, 90 A, 15,000 W Programmable DC Power Supply<br>PHU 500-90-C (Input Voltage 3P3W 200 V)<br>PHU 500-90-D (Input Voltage 3P4W 380 V) |
| PHU 750-60 | 750 V, 60 A, 15,000 W Programmable DC Power Supply<br>PHU 750-60-C (Input Voltage 3P3W 200 V)<br>PHU 750-60-D (Input Voltage 3P4W 380 V) |
| PHU 1000-45 | 1000 V, 45 A, 15,000 W Programmable DC Power Supply<br>PHU 1000-45-C (Input Voltage 3P3W 200 V)<br>PHU 1000-45-D (Input Voltage 3P4W 380 V) |
| PHU 1500-30 | 1500 V, 30 A, 15,000 W Programmable DC Power Supply<br>PHU 1500-30-C (Input Voltage 3P3W 200 V)<br>PHU 1500-30-D (Input Voltage 3P4W 380 V) |

### ACCESSORIES

AC Input terminal cover x 1, DC Output terminal cover x 1, Handle x 2, Sensing connector x 1, sensing connector cover x 1, Digital I/O control connector x 1, Parallel control dummy connector x 1, DC Output terminal screws x 2, Safety Guide

### OPTIONAL

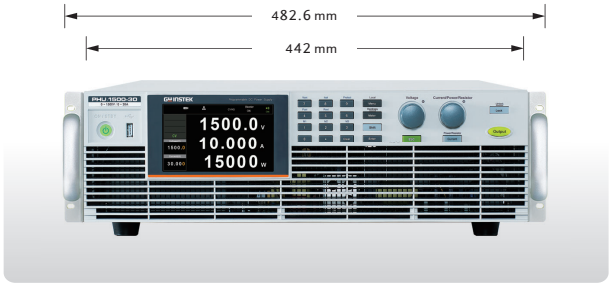
| | |
|---|---|
| PHU-IF01 | GPIB interface |
| PHU-IF02 | RS-232&RS-485 interface card (RJ45) |
| PHU-IF03 | Isolated Digital interface card |
| PHU-IF04 | CANbus interface card |
| PHU-IF05 | DeviceNet interface card |
| PHU-IF06 | Anybus Riser card |

### OPTIONAL ACCESSORIES

| | |
|---|---|
| PHU-PC01 | Parallel operation cable kit for 2 units x 1 |
| PHU-PC02 | Parallel operation cable kit for 3 units x 1 |
| PHU-PC03 | Parallel operation cable kit for 4 units x 1 |
| PHU-PC04 | Parallel operation cable kit for 5 units x 1 |
| PHU-PC05 | Parallel operation cable kit for 6 units x 1 |
| PHU-PC06 | Parallel operation cable kit for 7 units x 1 |
| PHU-PC07 | Parallel operation cable kit for 8 units x 1 |
| PHU-PC08 | Parallel operation cable kit for 9 units x 1 |
| PHU-PC09 | Parallel operation cable kit for 10 units x 1 |
| PHU-232 | RS232 cable with DB9 connector kit |
| PHU-485 | RS485 cable with DB9 connector kit |
| GPW-021 | Input power cord, 10 AWG/4C, 3 m, UL/CSA (PHU-C-5kW, PHU-D-5kW, PHU-D-10kW, PHU-D-15kW) |
| GPW-022 | Input power cord, 6 AWG/4C, 3 m, UL/CSA (PHU-C-10kW, PHU-C-15kW) |

| | |
|---|---|
| GTL-133 | Load cable, 1.5 m, 100 A |
| GTL-218 | Load cable, 1.5 m, 200 A |
| GTL-219 | Load cable, 3 m, 200 A |
| GTL-220 | Load cable, 1.5 m, 300 A |
| GTL-221 | Load cable, 3 m, 300 A |
| GTL-222 | Load cable, 1.5 m, 400 A |
| GTL-223 | Load cable, 3 m, 400 A |

Specifications subject to change without notice. PHU_E_BH1-202511

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