

**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
<b>Constant Voltage Mode</b>								
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 sense 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
<b>Constant Current Mode</b>								
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.					
<b>Protection Function</b>								
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 current 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					
<b>Other Functions</b>								
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
<b>Front Panel</b>								
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					
<b>Programming and Measurement (Digital Interface)</b>								
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
<b>Input Characteristics for PHU-B Series</b>								

Normal input rating			Single 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 (L, N)
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
<b>Input Characteristics for PHU-C Series</b>			
Normal 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
<b>Input Characteristics for PHU-D Series</b>			
Normal 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
<b>Interface Capabilities</b>			
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			$V_{set} / I_{set} = 0\text{ V to }5\text{ V or }0\text{ V to }10\text{ V} \mid V_{mon} / I_{mon} = 0\text{ V to }5\text{ V or }0\text{ V to }10\text{ V}$
Factory Option			RS-232&485 or GPIB or CAN Bus or DeviceNet or Isolated Digital I/O
<b>Isolated Analog Control Interface</b>			
Vout voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: $\pm 1\%$ of rated $V_{out}$ , or 0 V to 10 V Accuracy: $\pm 1\%$ of rated $V_{out}$
Iout voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: $\pm 1\%$ of rated $I_{out}$ , or 0 V to 10 V Accuracy: $\pm 1\%$ of rated $I_{out}$
Pout voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: $\pm 1\%$ of rated $P_{out}$ , or 0 V to 10 V Accuracy: $\pm 1\%$ of rated $P_{out}$
Internal resistance voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: $\pm 1\%$ of maximum $R_{int}$ , or 0 V to 10 V Accuracy: $\pm 1\%$ of maximum $R_{int}$
Output voltage monitor			0 V to 5 V or 0 V to 10 V, Accuracy: $\pm 1\%$ .
Output current monitor			0 V to 5 V or 0 V to 10 V, Accuracy: $\pm 1\%$ .
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: 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. 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
<b>Environmental Conditions</b>			
Operating temperature			0 °C to 50 °C
Storage temperature			-25 °C ~ 70 °C
Operating humidity			20 % to 85 % RH; No condensation
Storage humidity			90 % RH or less; No condensation
Altitude			Maximum 2000 m
<b>General Specifications</b>			
Weight	main unit only	kg	Less than 21 kg
Dimensions (WxHxD)		mm	442 mm x 130 mm x 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
<b>Constant Voltage Mode</b>								
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 sense 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
<b>Constant Current Mode</b>								
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/°C	100 ppm/°C from rated output current, following 30 minutes warm-up.					
<b>Protection Function</b>								
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 current 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					
<b>Other Functions</b>								
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
<b>Front Panel</b>								
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					
<b>Programming and Measurement (Digital Interface)</b>								
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
<b>Input Characteristics for PHU-B Series</b>								

Normal input rating			Single 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	64 A (L, N)
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
<b>Input Characteristics for PHU-C Series</b>			
Normal 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
<b>Input Characteristics for PHU-D Series</b>			
Normal 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
<b>Interface Capabilities</b>			
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			$V_{set} / I_{set} = 0\text{ V to }5\text{ V or }0\text{ V to }10\text{ V} \mid V_{mon} / I_{mon} = 0\text{ V to }5\text{ V or }0\text{ V to }10\text{ V}$
Factory Option			RS-232&485 or GPIB or CAN Bus or DeviceNet or Isolated Digital I/O
<b>Isolated Analog Control Interface</b>			
Vout voltage programming			0 % to 100 %, 0V to 5 V Accuracy: $\pm 1\%$ of rated $V_{out}$ , or 0 V to 10 V Accuracy: $\pm 1\%$ of rated $V_{out}$
Iout voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: $\pm 1\%$ of rated $I_{out}$ , or 0 V to 10 V Accuracy: $\pm 1\%$ of rated $I_{out}$
Pout voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: $\pm 1\%$ of rated $P_{out}$ , or 0 V to 10 V Accuracy: $\pm 1\%$ of rated $P_{out}$
Internal resistance voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: $\pm 1\%$ of maximum $R_{int}$ , or 0 V to 10 V Accuracy: $\pm 1\%$ of maximum $R_{int}$
Output voltage monitor			0 V to 5 V or 0 V to 10 V, Accuracy: $\pm 1\%$
Output current monitor			0 V to 5 V or 0 V to 10 V, Accuracy: $\pm 1\%$
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: 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. 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.
<b>Environmental Conditions</b>			
Operating 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
<b>General Specifications</b>			
Weight	main unit only	kg	Less than 30.5 kg
Dimensions (WxHxD)		mm	442 mm x 130 mm x 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
<b>Constant Voltage Mode</b>								
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 sense 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
<b>Constant Current Mode</b>								
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/°C	100 ppm/°C from rated output current, following 30 minutes warm-up.					
<b>Protection Function</b>								
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 current 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					
<b>Other Functions</b>								
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
<b>Front Panel</b>								
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					
<b>Programming and Measurement (Digital Interface)</b>								
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

Input Characteristics for PHU-C Series			
Normal 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			
Normal 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			$V_{set} / I_{set} = 0\text{ V to }5\text{ V or }0\text{ V to }10\text{ V} \mid V_{mon} / I_{mon} = 0\text{ V to }5\text{ V or }0\text{ V to }10\text{ V}$
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: $\pm 1\%$ of rated $V_{out}$ , or 0–10 V Accuracy: $\pm 1\%$ of rated $V_{out}$
Iout voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: $\pm 1\%$ of rated $I_{out}$ , or 0 V to 10 V Accuracy: $\pm 1\%$ of rated $I_{out}$
Pout voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: $\pm 1\%$ of rated $P_{out}$ , or 0 V to 10 V Accuracy: $\pm 1\%$ of rated $P_{out}$
Internal resistance voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: $\pm 1\%$ of maximum $R_{int}$ , or 0 V to 10 V Accuracy: $\pm 1\%$ of maximum $R_{int}$
Output voltage monitor			0 V to 5 V or 0 V to 10 V, Accuracy: $\pm 1\%$ .
Output current monitor			0 V to 5 V or 0 to 10 V, Accuracy: $\pm 1\%$ .
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: 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. 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			
Operating 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 (WxHxD)		mm	442 mm x 130 mm x 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.