

System Rack Power Supply HPCFL-400P-X2S

High efficiency and low standby power
Fanless power supply for PC



Model	Description
HPCFL-400P-X2S	-

Model Name Coding
HPCFL-400P-X2S
 ① ② ③ ④ ⑤ ⑥

① Series name	④ ATX output
② Output power	⑤ +3.3V output equipped
③ Peak power available	⑥ Standard

- Features**
- Long life design with fanless power supply and expected life of more than 10 years (30°C, 170W, 24 hours continuous operation)
 - High efficiency and low heat generation
 - Min. load current is 0A for all outputs, supporting any kinds of loads.
 - 1U rack size
 - Backup functions by connecting battery pack.
 - Capacitor pack supports instantaneous power failure.(optional)
 - Continuous max. output power 305W with forced air cooling (power connector for fan contained)
 - Detachable harness

Safety standard	UL	CSA	EN	CE	CQC
Reliability grade	HFA	FA	HOA	OA	

● **Function**

DC start RS 232C USB TTL PFC Silence 5VSB FAN TSFC FAN Connection RoHS

● **Input**

AC input	85-264 VAC (Worldwide range, with PFC)
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● **Output**

Output voltage	+3.3V	+5V	+12V	-12V	+5VSB
Natural air cooling	10A	10A	14A	0.2A	1A
	Total 83W		168W	2.4W	5W
	Total 170W				
Forced air cooling	16A	16A	25A	0.5A	1.5A
	Total 90W		300W	6W	7.5W
	Total 300W				
Peak current/ peak power (within 5s)	20A	20A	30A	0.5A	2A
	Total 120W		360W	6W	10W
	Total 390W				
Min. current	Total 400W				
	0A	0A	0A	0A	0A

● **Dimension**

W×H×D (mm)	106×37×225
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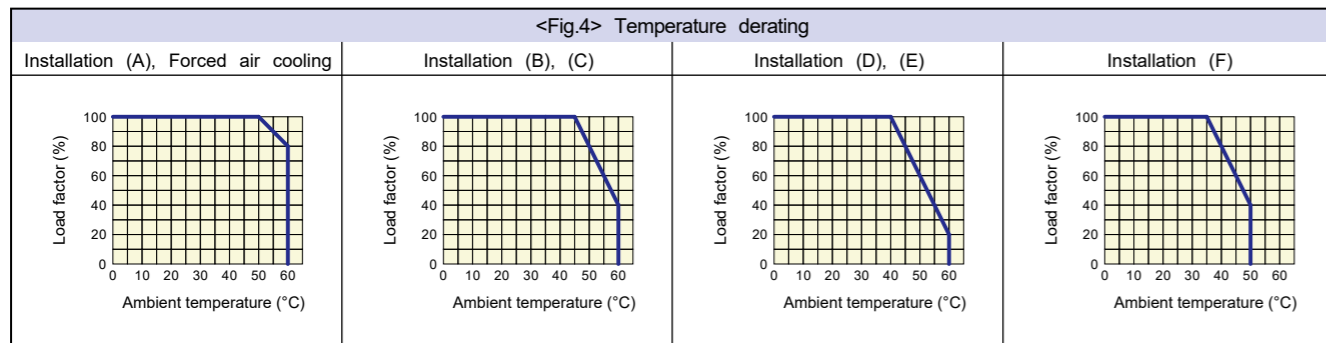
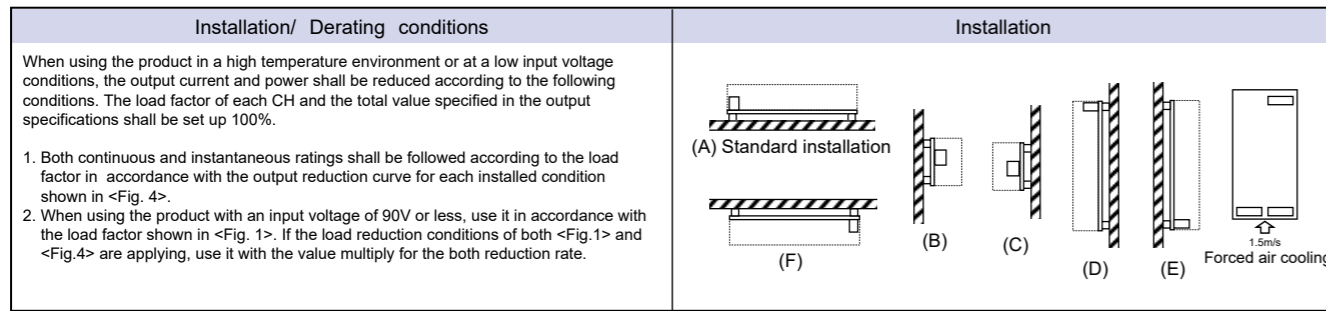
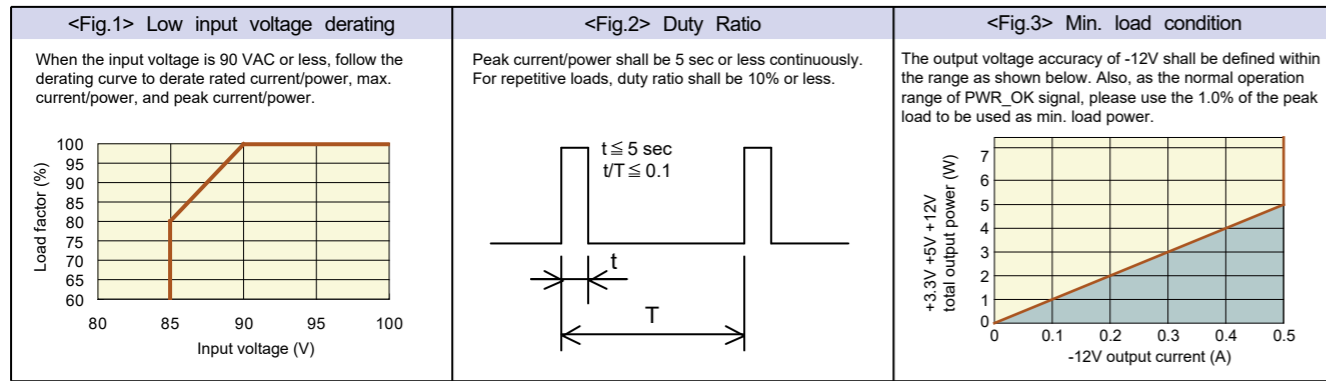
● **Output connector (optional component)**

Main 20+4pin Main 24pin Main 20pin AT AUX 12V 4pin 12V 8pin PCI-E 6pin PCI-E 8+2pin HDD S-ATA FDD

General Specification (Items are provided at normal temperature and humidity unless otherwise specified.)

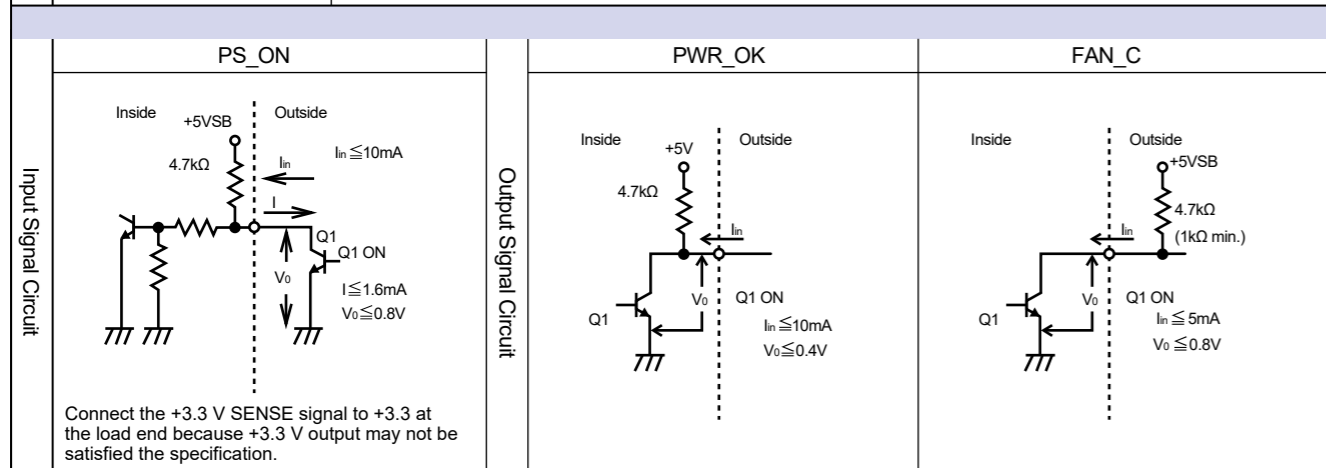
Items	Specification	Measurements conditions, etc.						
AC Input	Rated Voltage	100-240VAC (85~264VAC)	Worldwide range *See <Fig.1> Low input voltage derating.					
	Input Frequency	50/60Hz	Frequency range 47-63Hz					
	Efficiency	85% typ (100VAC), 88% typ (240VAC) *Characteristic data: Fig.5	305W at rated input/output					
	Power Factor	96% min. (100VAC), 90% min. (240VAC) *Characteristic data: Fig.6						
	Inrush Current	31A peak (100VAC), 75A peak (240VAC) *Characteristic data: Fig.7	Rated input/output, cold start (25°C) Reclosing input interval shall be 10s min.					
	Input Current	3.8A typ (100VAC), 1.6A typ (240VAC) *Characteristic data: Fig.5	At rated output					
Output	Natural air cooling	Rated Voltage	+3.3V	+5V	+12V	-12V	+5VSB	Reference value at measurement of input/output characteristics. At natural air cooling, continuous rated Max. output power: 170W Refer to <Fig.1> <Fig.4> the derating condition
		Rated Current	8A	8A	8A	0.2A	1A	
		Rated Power	26.4W	40W	96W	2.4W	5W	
		Max. Current / Power	10A	10A	14A	0.2A	1A	
			83W max.		168W	2.4W	5W	
	168W max.					170W max.		
	305W max.							
	Forced air cooling	Rated Current	8A	8A	19A	0.5A	1A	Reference value at measurement of input/output characteristics. At forced air cooling, continuous rated Max. output power: 305W Refer to <Fig.1> <Fig.4> the derating condition
		Rated Power	26.4W	40W	228W	6W	5W	
		Max. Current / Power	16A	16A	25A	0.5A	1.5A	
90W max.			300W	6W	7.5W			
300W max.					6W	7.5W		
305W max.								
Peak Current / Power	20A	20A	30A	0.5A	2A	Peak output power 400W Time: 5 sec or less Refer to <Fig.2> duty ratio of repetitive load: 10% or less		
	120W max.		360W	6W	10W			
	390W max.							
400W max.								
Min. Current	0A	0A	0A	0A	0A	Refer to <Fig.3> Min. load condition		
Total Voltage Accuracy (%)	±5 max.	±5 max.	±5 max.	±5 max.	±5 max.	Accuracy against output voltage value including temperature and time lapse drifts as well as input/load regulation.		
Max. Ripple Voltage (mVp-p)	50 max.	50 max.	120 max.	120 max.	50 max.	Two wires are coming out from the output connector and connected into one at the edge. 47µF electrolytic capacitor and 0.1µF ceramic capacitor are placed on it and it is measured.*Characteristic data: Fig. 18		
Max. Spike Voltage (mVp-p)	100 max.	100 max.	170 max.	170 max.	100 max.			
Protection	Over Current Protection	OCP point (A)	21 min.	21 min.	31 min.	Short protection		
		Method Recovery	All outputs except +5VSB are shut down.			Hold down current limiting	All outputs shut down	Measurements done with no load except for the voltage measurement All outputs shut down with a +5VSB short-circuit (automatic recovery)
	Over Voltage Protection	OVP point (V)	3.76-4.3	5.74-7.0	13.4-15.6	—	7.0	AC reclosing period of 120s or longer
Environment	Operating Temp./ Humidity	0-60°C/10-90%					Refer to <Fig.4> Temperature derating below. There shall be no condensation	
		-20-70°C/10-95%						
	Storage Temp./Humidity	-20-70°C/10-95%					There shall be no condensation	
	Vibration	Acceleration amplitude: 2G (10-55Hz), Sweep cycles: 10 times in the X-, Y-, and Z-axes					Follow JIS-C-60068-2-6 at no operation	
Mechanical Shock	Lift one bottom edge up to 50mm and let it fall. Number of bumps: 3 each of 4 edges					Follow JIS-C-60068-2-31 chassis fixed state at no operation		
Insulation	Dielectric Strength	AC input - FG/DC output: 1500 VAC for 1 minute					Cut-off current 10mA	
		AC input - FG/DC output: 50MQ min.					At 500VDC	
	Leakage Current	0.2mA max. (100VAC)/0.4mA max. (200VAC)/0.5mA max. (240VAC) *Characteristic data: Fig.8					IEC60950 compliant	
EMC	Line Noise Immunity	±2000V (pulse width of 100/1000ns, cycle period of 30 to 100Hz, Normal/Common mode with Positive/Negative polarity for 10 minutes)					Measured by INS-410 There shall be no fluctuation of DC output or malfunction.	
		Electrostatic Discharge					EN61000-4-2 compliant	
	Radiated, Radio-Frequency, Electromagnetic Field					EN61000-4-3 compliant		
	Fast Transient Burst					EN61000-4-4 compliant		
	Lightning Surge					EN61000-4-5 compliant		
	Radio Frequency Conducted Immunity					EN61000-4-6 compliant		
	Power-Frequency Magnetic Field Immunity					EN61000-4-8 compliant		
	Voltage dips/Regulation					EN61000-4-11 compliant		
Conducted Emmission	VCCI-B, FCC-B, CISPR22-B, EN55022-B compliant *Characteristic data: Fig. 9,10					Measured by single unit		
	Harmonic Current Regulations					IEC61000-3-2 classD compliant At rated input/output		
Others	Safety Standard	UL60950, CSA60950 (c-UL) approved, PSE (Ordinance item 2) compliant, CE Marking (IEC62368-1)					Class I equipment and build-in type power supply, standard installation A and natural air cooling	
	Cooling System	Natural air cooling (170W) or forced air cooling (305W) by external fan					Refer to Installation, derating condition	
	Output Grounding	Connected chassis (FG)						
	Output Hold-up Time	AC cut-off → PWR_OK holds up 16ms min. *Characteristic data: Fig.15					At rated output	
	Reliability Grade	FA (Industrial equipment grade to use double-sided PWBs with through holes)					Following our standard	
	MTBF	100,000 H min					Based on EIAJ RCR-9102	
	Weight	0.65kg typ						
Warranty	Three years after delivery. If any defects belong to us, the defective unit shall be repaired or replaced at our cost.					Except for errors caused by operation not specified in this specification.		

Signal Input/Output Specification (Items are provided at normal temperature and humidity unless otherwise specified.)

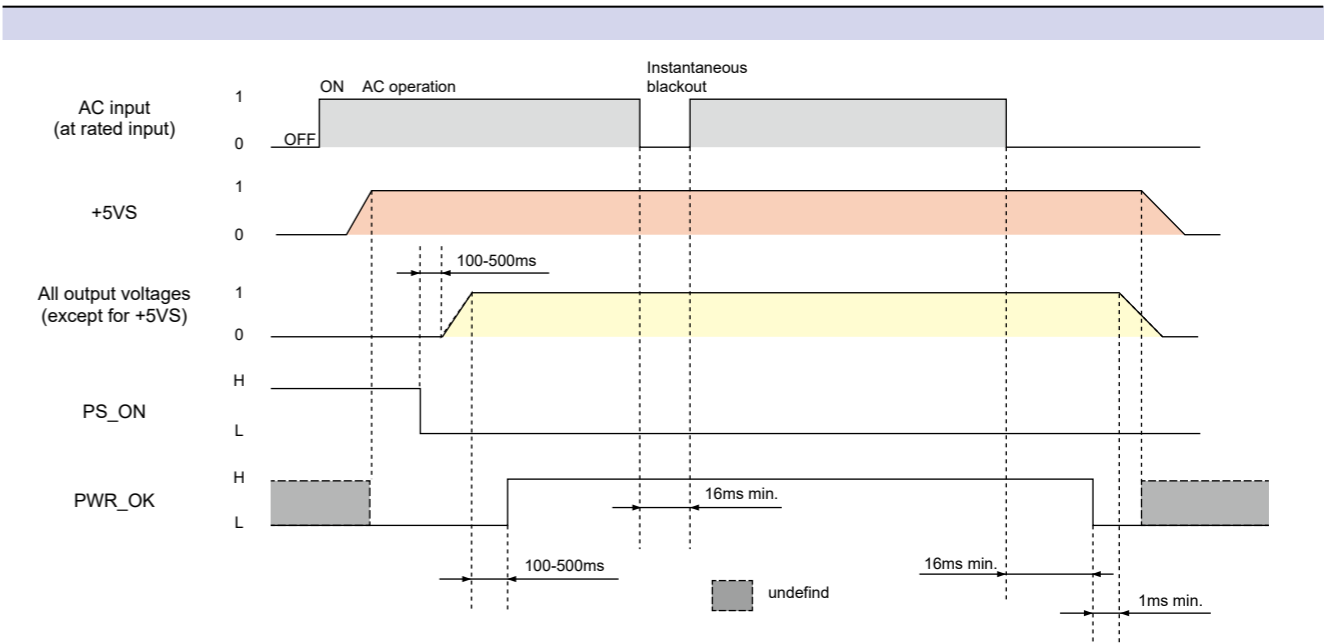


Signal Input/Output Specification (Items are provided at normal temperature and humidity unless otherwise specified.)

Items	Specification
Input Signal	
PS_ON	+3.3V, +5V, +12V and -12V outputs are delivered with 'L' input. +3.3V, +5V, +12V and -12V outputs shutdown with 'H' or 'OPEN' input.
+3.3V SENSE	The input terminal to detect the voltage of CH1 (+3.3V) output; by connecting to the load terminal, only the line drop of the + side of the output cable is compensated.
Output Signal	
PWR_OK	'H' signal is delivered when CH2 (+5V) output is normal.
FAN_C	PWM signal for external fan control Outputs 0-100% in 10 steps depending on temperature rise

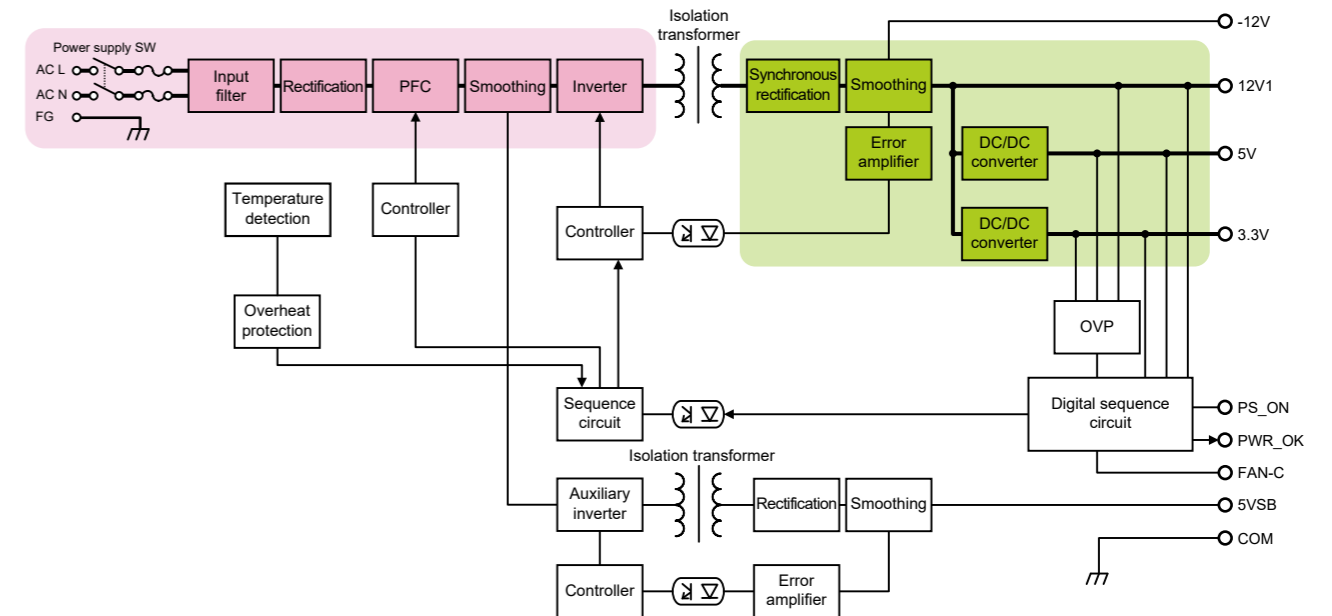


Sequence Timing Chart

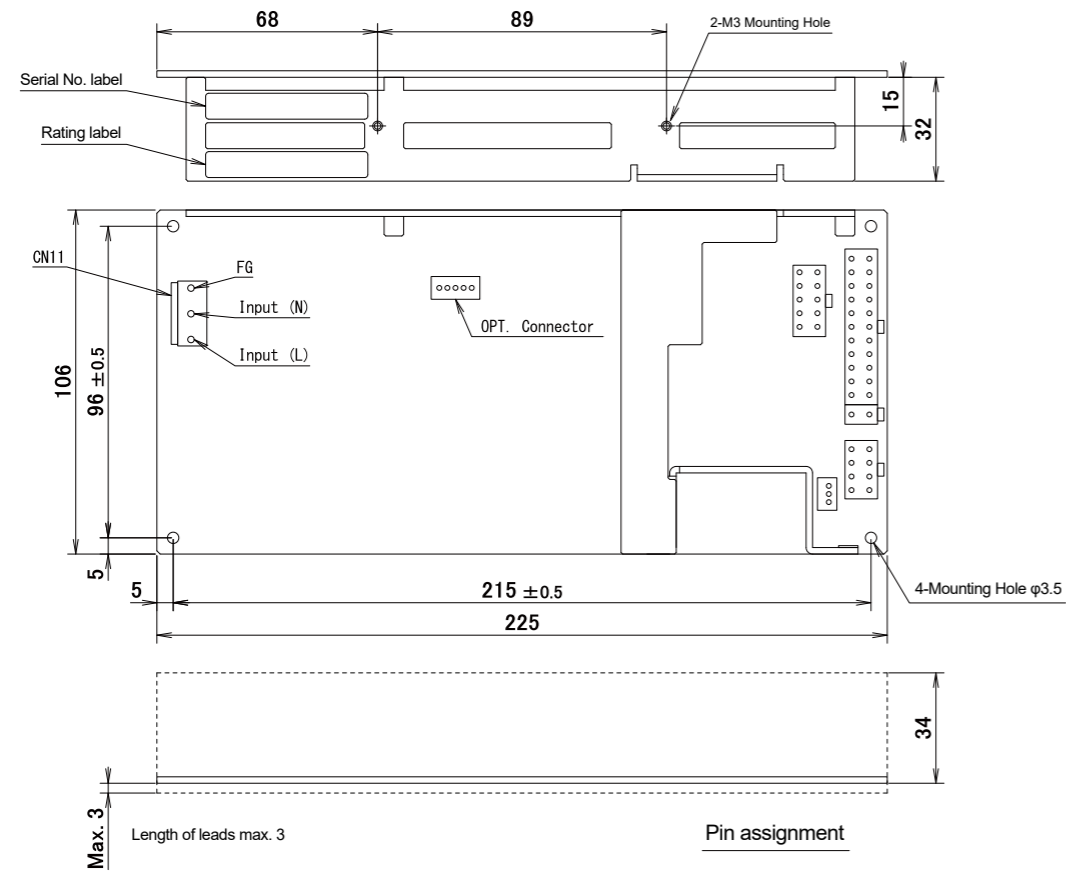


- *1 Rise time difference among outputs shall be 50ms max.
The order and difference in level of output voltage for each output voltage at falling shall not be specified.
- *2 Rise time of PWR_OK signal shall be 10ms or less.
(provided that capacitive load is not connected to PWR_OK signal output)

Block Diagram



Outline Drawing



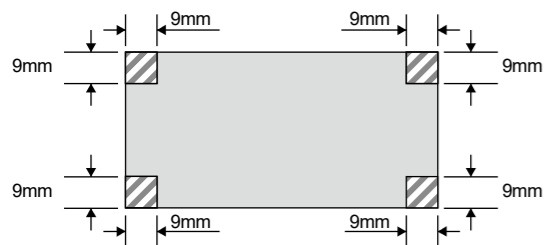
*1 Dimensional tolerance shall be ± 1 mm unless otherwise specified.
 *2 The screw depth of penetration into PSU is 5mm max.

Installation

In order to fulfill the insulation and dielectric strength standard, set up within the dimensions below.



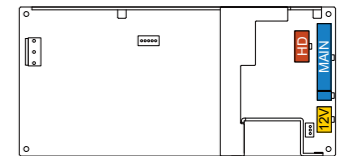
To suppress temperature rise around power supply, pay attention to set up to avoid poor convection or ventilation. The unit shall be fixed by using 4-mounting holes on PCB within the diagonal range below.



The unit shall be installed with the condition that can have enough conduction on the same metal plate. In case of not taking the conduction, you may not expect enough performance in noise characteristics.

Options (Sold separately)

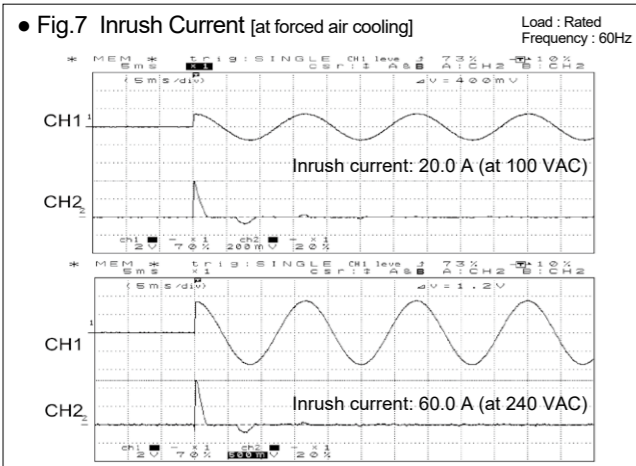
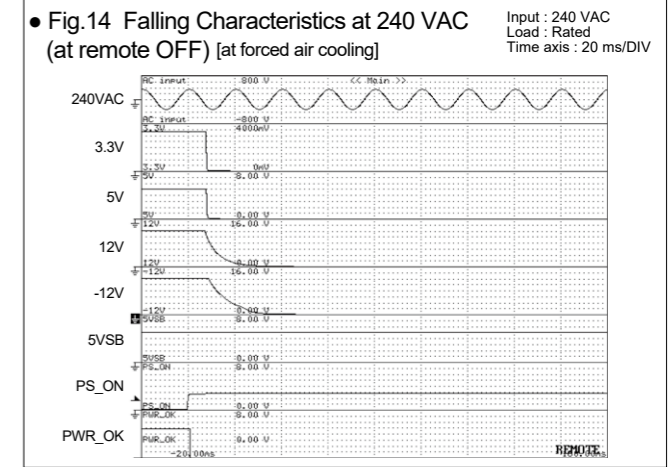
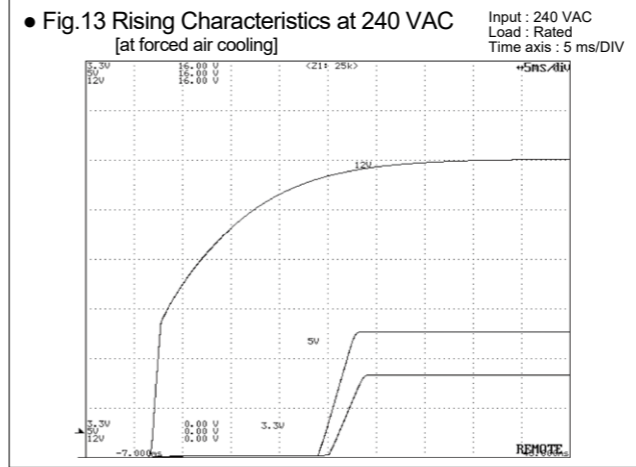
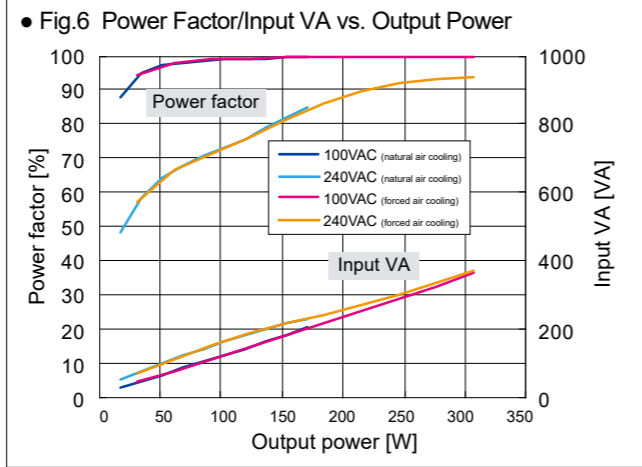
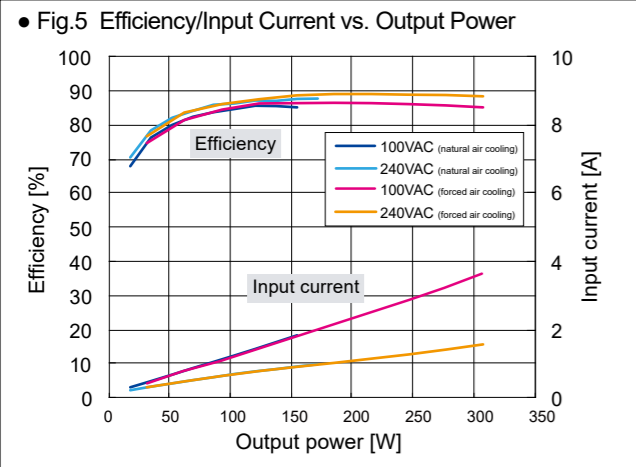
Detachable output harness		Length and type of connector		Output port allocation	
Model					
Main power cable MAIN					
WH-M2022-300		300±10	20Pin		
WH-M2022-500		500±10	20Pin		
WH-M2422-500		500±10	24Pin		
12V power cable 12V					
WH-V0408-500		500±15	12V 4Pin		
WH-V0808-500		500±15	12V 8Pin		
WH-VV208-500-02		500±10	12V 8Pin 12V 8Pin		
WH-VG208-500-02		500±10	12V 8Pin 12V 6Pin		
WH-VG208-500		500±15	12V 4Pin 12V 6Pin		
HD power cable HD					
WH-PP610-850		550±15	150±15 150±15		
WH-PS610-850		550±15	150±15 150±15		
WH-PS710-850		550±15 850±15	150±15 150±15		
WH-PS810-1000		550±15	150±15 150±15 150±15		



Acceptable cables
MAIN HD 12V
 1 model 1 model 1 model

Capacitor package and Battery package			
Photos	Model	Category	Description
	BS27A-P350/12V	Charging/discharging board for lead-acid battery	Supported a lead acid battery of up to 12V 5Ah
	BS28A-H350/2.5L	Ni-MH	5 inch bay size

Cable			
Photos	Model	Category	Description
	WH-C05VH-800	Input harness	
	WH-06XH09ELR-200	Power harness for connecting BS27A battery pack	Connect between HPCFL-400P-X2S and WH-09ELP05XA-200
	WH-09ELP05XA-200	Power harness for connecting BS27A/BS28A battery pack	Connect between HPCFL-400P-X2S and BS28A-H350/2.5L Connect between WH-06XH09ELR-200 and BS27A-P350/12V



• Fig.8 Leakage Current [at forced air cooling]

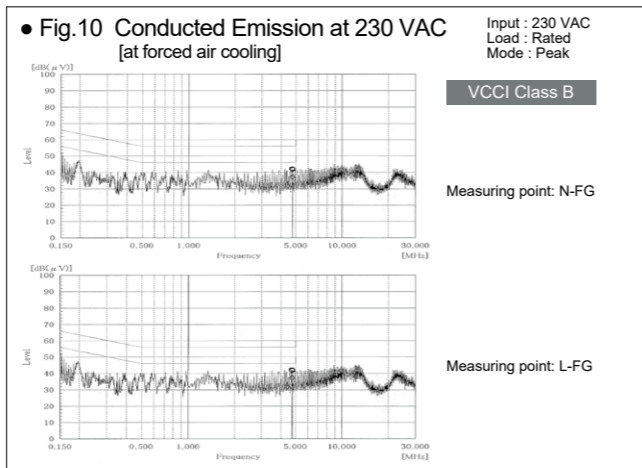
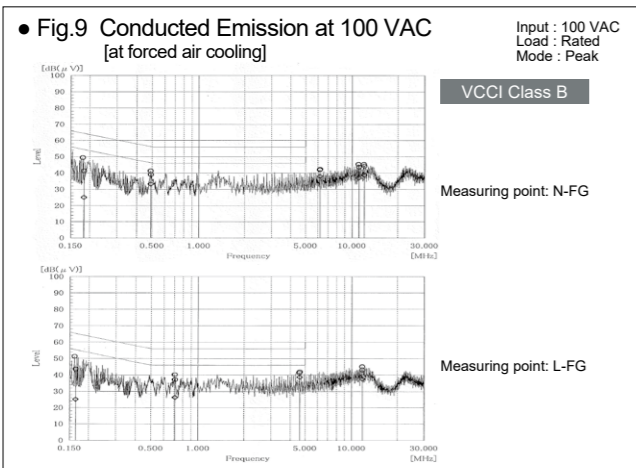
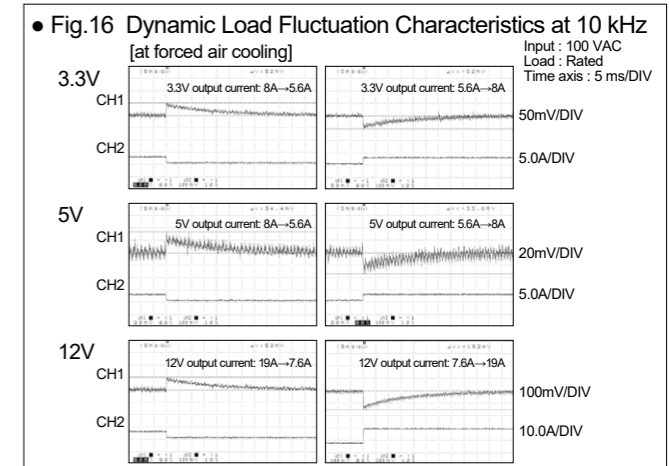
Input : 100, 200, 240 VAC
Load : Rated load and Min. load

Input Voltage	Rated load	Min. load
100 VAC	0.09mA	0.09mA
200 VAC	0.23mA	0.23mA
240 VAC	0.28mA	0.28mA

• Fig.15 Output Hold-up Time vs. Output power [at natural air cooling]

PWR_OK: the point that PWR_OK signal "L" is delivered.
Output voltage: the point that output voltage except 5VSB falls down to 95%.

Temp.	Input voltage	Hold-up time	
		PWR_OK	Output voltage
-5°C	100 VAC	60.77ms	39.05ms
	240V AC	60.57ms	38.78ms
25°C	100V AC	63.65ms	41.38ms
	240V AC	63.79ms	41.48ms
55°C	100V AC	66.70ms	43.77ms
	240V AC	67.03ms	43.95ms
65°C	100V AC	94.84ms	62.03ms
	240V AC	95.45ms	62.96ms



• Fig.17 Output Voltage Regulation (Load Fluctuation) [at natural air cooling]

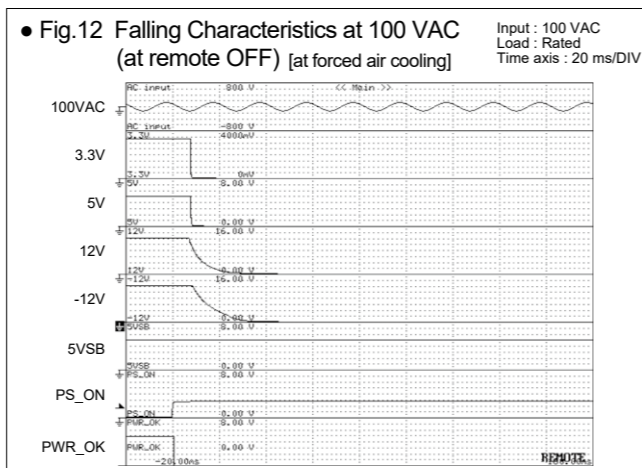
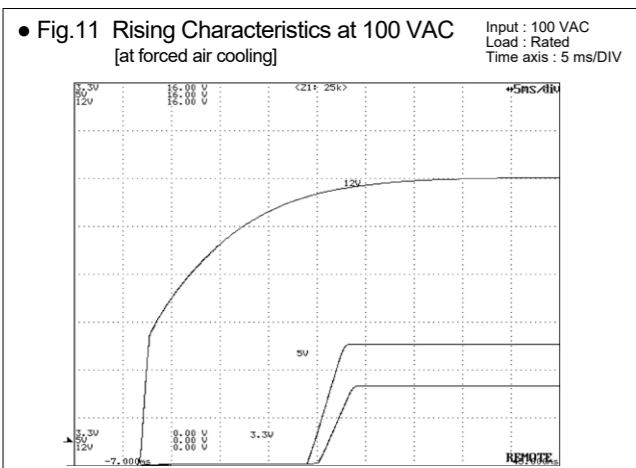
AC input	Output	
	Min. load	Rated load
85V	0A	8A
100V	0A	8A
240V	0A	8A
264V	0A	0.2A

AC input	85V	100V	240V	264V
3.3V output (min.)	3.305V	3.318V	3.318V	3.318V
3.3V output (rated)	3.326V	3.326V	3.326V	3.326V
5V output (min.)	5.098V	5.098V	5.098V	5.098V
5V output (rated)	5.070V	5.070V	5.069V	5.069V
12V output (min.)	12.104V	12.104V	12.103V	12.103V
12V output (rated)	12.095V	12.096V	12.096V	12.096V
-12V output (min.)	-12.214V	-12.216V	-12.217V	-12.217V
-12V output (rated)	-12.207V	-12.206V	-12.205V	-12.204V

• Fig.18 Ripple and Spike Voltage

Load: Rated

Temp	AC Input voltage	+3.3V Ripple (mV)	+3.3V Noise (mV)	+5V Ripple (mV)	+5V Noise (mV)	+12V Ripple (mV)	+12V Noise (mV)	-12V Ripple (mV)	-12V Noise (mV)	+5VSB Ripple (mV)	+5VSB Noise (mV)
-5°C	100V	10.5	25.8	22.5	55.0	49.9	91.8	15.0	47.5	5.9	22.6
	240V	9.8	22.5	21.6	51.4	49.0	80.0	12.8	45.1	5.8	16.6
25°C	100V	10.5	26.8	20.3	52.4	37.6	85.8	15.1	49.4	7.8	27.2
	240V	9.7	22.1	19.1	49.2	36.9	66.1	12.8	43.4	7.6	21.6
55°C	100V	12.1	28.0	19.1	49.8	33.6	84.3	14.6	46.4	8.5	27.3
	240V	11.5	21.9	17.8	45.3	32.8	58.3	11.6	40.9	7.8	21.6
65°C	100V	10.2	22.3	18.2	43.9	24.0	52.8	12.4	40.0	2.4	13.2
	240V	9.8	19.6	16.6	41.3	23.7	41.8	11.0	37.4	2.4	9.3



• Fig.19 Ambient Temperature vs. Lifetime Expectancy

Input : 100 VAC
Load : Rated

■ Electrolytic capacitors

Power supply intake temperature	25°C
Lifetime expectancy (about)	18 years

*The lifetime shall be 15 years at longest due to deterioration of sealing plates.

