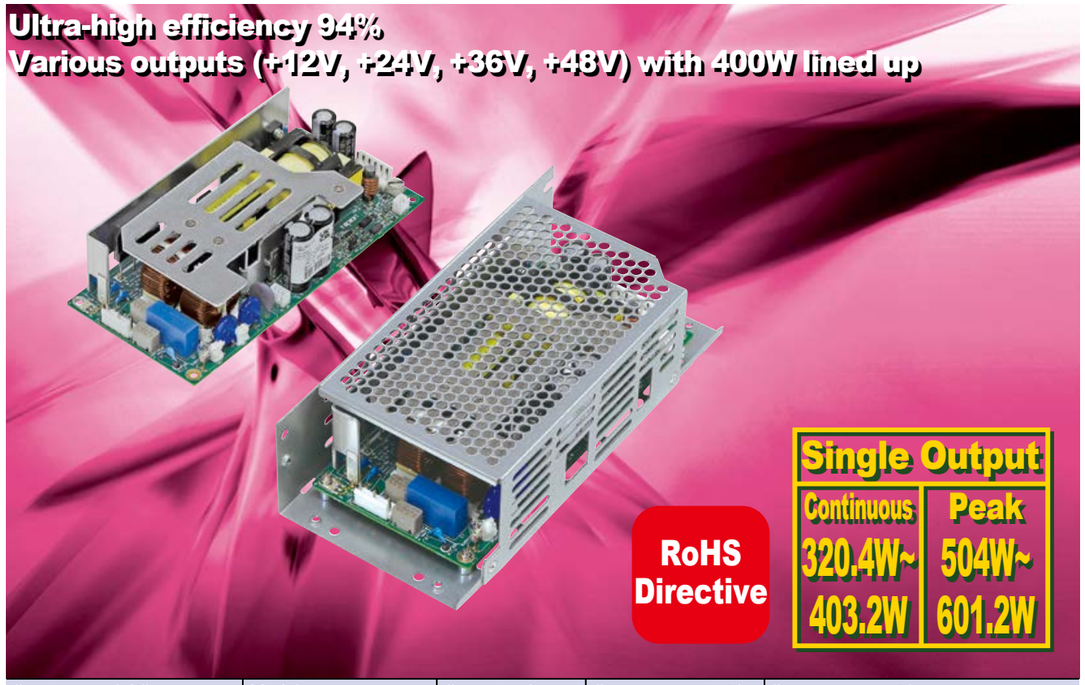
Single Output Power Supply UZP-400 series



Structure and I/O connector	Model	Output voltage	Output current *1	Output power *1
Open frame type/ Nylon connector	UZP-400-A12-JBH	+12V	26.7A (42A)	320.4W (504W)
	UZP-400-A24-JBH	+24V	16.8A (25A)	403.2W (600W)
	UZP-400-A36-JBH	+36V	11.2A (16.7A)	403.2W (601.2W)
	UZP-400-A48-JBH	+48V	8.4A (12.5A)	403.2W (600W)
Structure	Description			
With chassis	'-C' is added after open frame model name (Ex: UZP-400-A12-JBH-C)			
With chassis and cover	'-K' is added after open frame model name (Ex: UZP-400-A12-JBH-K)			
Input/Output connector type	Model			
Screw terminal block	'J' in the nylon connector model become 'T' (Ex: UZP-400-A12-TBH)			

■ Model name coding

UZP-400-A**-JBH*-*
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

① Series name
② Peak output
③ Output power
④ Arrestor A: With arrestor
⑤ 12:12V 24:24V 36:36V 48:48V
⑥ Input/Output connector type J: Nylon connector T:Screw terminal block
⑦ Optional joint connector B: With backup connector
⑧ Presence or absence of function H: High-efficiency type
⑨ Modification
⑩ Blank:Without chassis and cover C:With chassis K:With chassis and cover

*1 Values in ( ) above show peak current and power.

Features

- Backup for blackout and momentary power failure is available
- The built-in arrestor to avoid/mitigate the risk of lightning damage
- Equipped with a variable resistor to adjust output voltage
- Low noise and low leakage current eliminates the need for an external noise filter.

An amazing high level of efficiency 94%* has been achieved for a 24V output type*
(*At 230V AC input)
Peak power output, approx. 150% higher than continuous max.

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

●Function

TTL PFC RoHS Directive

●Input

AC input	85-264V AC (Worldwide range)

●Dimension

W×H×D (mm)	Without chassis and cover	84×45×180
	With chassis and cover	97.2×57.5×212

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	100VAC	90% typ (12V output), 92% typ (24V,36V,48V output)				At 300W load *Characteristic data: Fig.5
		200VAC	92% typ (12V output), 94% typ (24V,36V,48V output)				
	Power Factor	100VAC	99% typ				At rated output (convection cooling) *Characteristic data: Fig.6
		200VAC	92% typ(12V output), 94% typ (24V,36V,48V output)				
	Inrush Current	100VAC	18A typ				Power thermistor system at cold start (25°C) *Characteristic data: Fig.7
		200VAC	35A typ				
	Input Current	100VAC	3.6A typ (12V output at convection cooling), 4.4A typ (24V,36V,48V output at convection cooling)				At rated output
			5.0A typ (12V output at forced air cooling), 5.5A typ (24V,36V,48V output at forced air cooling)				
		200VAC	1.9A typ (12V output at convection cooling), 2.4A typ (24V,36V,48V output at convection cooling)				
			2.6A typ (12V output at forced air cooling), 3.0A typ (24V,36V,48V output at forced air cooling)				
Output	Model		UZP-400-A12	UZP-400-A24	UZP-400-A36	UZP-400-A48	
	Rated Voltage		+12V	+24V	+36V	+48V	
	Continuous Rated Output1 (convection cooling)		26.7A	16.8A	11.2A	8.4A	At rated input Refer to <Fig.4> output derating on the next page.
			320.4W	403.2W	403.2W	403.2W	
	Continuous Rated Output2 (forced air cooling)		36A	21A	14A	10.5A	
			432W	504W	504W	504W	
	Peak Current/Power		42A	25A	16.7A	12.5A	*Refer to peak output power condition on the next page. Convection cooling and forced air cooling
			504W*	600W*	601.2W*	600W*	
	Factory Setting		12V±2%	24V±2%	36V±2%	48V±2%	At continuous rated output1
	Adjustable Voltage Range		-5%,+10%	-5%,+10%	-5%,+10%	±5%	
	Static Input Regulation		48mV max.	94mV max.	144mV max.	192mV max.	
	Static Load Regulation		100mV max.	150mV max.	220mV max.	300mV max.	
	Temperature Regulation		0.02%/°C max.				
	Ripple Voltage	0-70°C	120mV max.			150mV max.	Connect 150mm max. lead wire to output connectors, and then connect a 10uF electrolytic capacitor with a 0.1uF ceramic capacitor in parallel to the other ends of the wires to measure by an oscilloscope with 100MHz frequency band. At rated output
		-10-0°C	160mV max.			200mV max.	
	Spike Noise Voltage	0-70°C	150mV max.			250mV max.	
		-10-0°C	180mV max.			400mV max.	
Protection	Over Current Protection	OCP point (A)	101% min. of peak rated current				
		Method	Blocking oscillation *Characteristic data: Fig.20				
		Recovery	Automatic recovery				
	Over Voltage Protection	OVP point (V)	13.8-16.2V	30.0-35.0V	41.4-49.4V	55.2-64.8V	
		Method	Output shutdown				
		Recovery	Reclosing of AC input				
Environment	Operating Temp./ Humidity	Open Frame	-10-70°C (at convection cooling), -10-70°C (at forced air cooling)*/20-90%RH				*Refer to <Fig.3> the guideline of forced air cooling and <Fig.4> output derating on the next page.
		With Chassis and Cover	-10-60°C (at convection cooling), -10-70°C (at forced air cooling)*/20-90%RH				
	Storage Temp./Humidity		-20-75°C/10-95%RH				There shall be no condensation
	Vibration		To endure the vibration acceleration of 2G with vibration frequency of 10 to 55Hz for 10 sweep cycles in each X, Y, Z direction.				Follow JIS-C-60068-2-6 at no operation
	Mechanical Shock		Lift one bottom edge of the unit 50mm high with the opposite edge placed on the test bench, and let it fall. Repeat 3times for each of four bottom edges, and no malfunction shall be observed.				Follow JIS-C-60068-2-31 at no operation
Insulation	Dielectric Strength		1.5kVAC/1minute between input and output/RC (*1)	3kVAC/1minute between input and output/RC		1.5kVAC/1minute between input and output/RC (*1)	Cut-off current 10mA
			1.5kVAC/1minnute between input and FG (*2)				Cut-off current 10mA
			500VAC/1minute between each output /RC/FG				Cut-off current 10mA
	Insulation Resistance		50MΩmin. between each input/output/RC/FG				At 500VDC
	Leakage Current		0.06mA typ (100VAC), 0.12mA typ (200VAC) *Characteristic data: Fig.8				
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)				There shall be no fluctuation of DC output or malfunction.
	Electrostatic Discharge		EN61000-4-2 compliant				Apply to FG and case. There shall be no malfunction, nor failure.
	Radiated, Radio-Frequency, Electromagnetic Field		EN61000-4-3 compliant				
	Fast Transient Burst		EN61000-4-4 compliant				
	Lightning Surge		EN61000-4-5 compliant				With arrestor
	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 Emmision		VCCI-B, FCC-B, CISPR32-B, EN55032-B compliant *Characteristic data: Fig.9, 10				At rated input and rated output (convection cooling), with chassis
	Harmonic Current Regulations		IEC61000-3-2 (edition 2.1) classA, EN61000-3-2 (A14) classA compliant				At rated input and rated output (convection cooling)
Others	Safety Standards		UL62368-1, CSA62368-1(c-UL)certified, CE Marking, UKCA Marking EN62477-1, OVCⅢ, PSE (ordinance clause 2) compliant				
	Cooling System		Convection cooling/ forced air cooling				
	Output Grounding		Capacitor grounding				
	Output Hold-up Time		Refer to <Fig.15> Output Hold-up Time vs. Output Power				
	Reliability Grade		FA (Industrial equipment grade to use double-sided PCB with plated through hole)				Following our standard
	Weight		550g typ (without chassis and cover), 870g typ (with chassis and cover)				
	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.

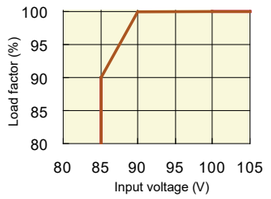
*1 The dielectric strength between input and output/RC is 3kV AC for 1 min, but please refer to the above specifications to prevent the arrester from operating due to the voltage dividing effect of the grounding capacitor's capacitance (between input, FG/output, and FG).

*2 The dielectric strength between input and FG is 2kV AC for 1min, but please refer to the above specifications because an arrester is installed between input and FG.

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

<Fig.1> Low input voltage derating

Follow the derating below to derate rated current/power.

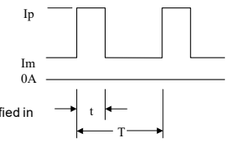


Peak output power condition

- Duty ratio of peak current shall be 30% or less.
- Energized period of peak current shall be 10 seconds or less.
- In the case that the ambient temperature is 50°C or higher with convection cooling, the energized period of peak current shall be 5 seconds or less.
- The value resulting from the formula below shall not exceed the continuous rated current, Io, after derating specified in the clause, "Output derating."

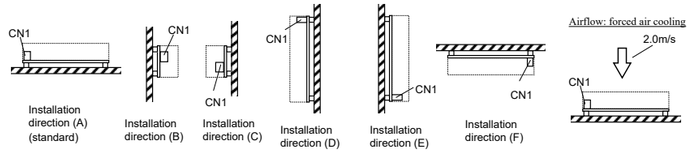
$\sqrt{((Ip^2 \times D)+(Im^2 \times (1-D)))} \leqq Io$

Ip=Peak current value
Im= Min. current value
D= Duty ratio, t/T
t= Pulse width of peak current
T= Cycle
Io= Continuous rated current specified in the clause"Output derating"



(Note) If the temperature of the power thermistor for limiting inrush current does not rise enough (and its resistance value is too large), such as when the normal average load power is small, the output voltage at peak output might drop about 100 ms. If this might cause any problem, please check the output voltage waveform while the power supply is installed on an actual device at operation.

<Fig.2> installation direction and cooling condition



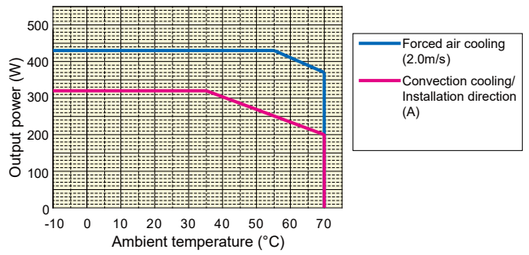
<Fig.3> Guideline for forced air cooling

Please contact us about the guideline for temperature rise of each component at forced air cooling.

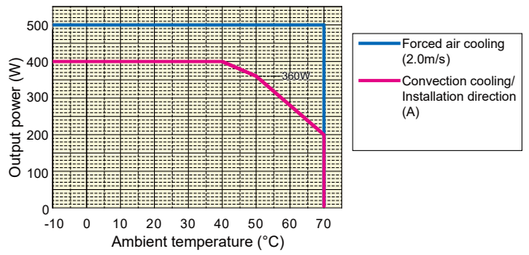
<Fig.4> Output derating

Follow the derating diagram below for output according to ambient temperature and installation direction.
For the mounting direction (A), follow the derating diagram below depending on the ambient temperature of the power supply.
For the mounting direction (B)-(E), please contact us. Also, the airflow shall be 2.0m/s for the forced air cooling as shown <Fig.2>.

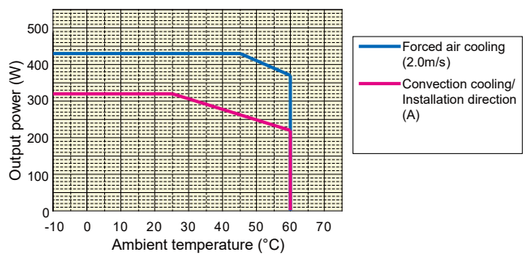
For open frame (12V)



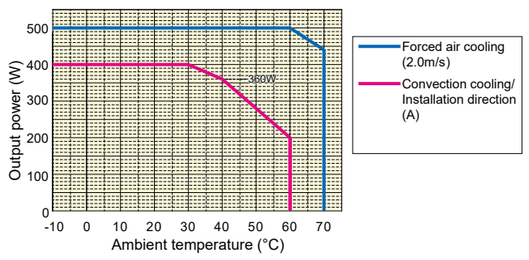
For open frame (24/36/48V)



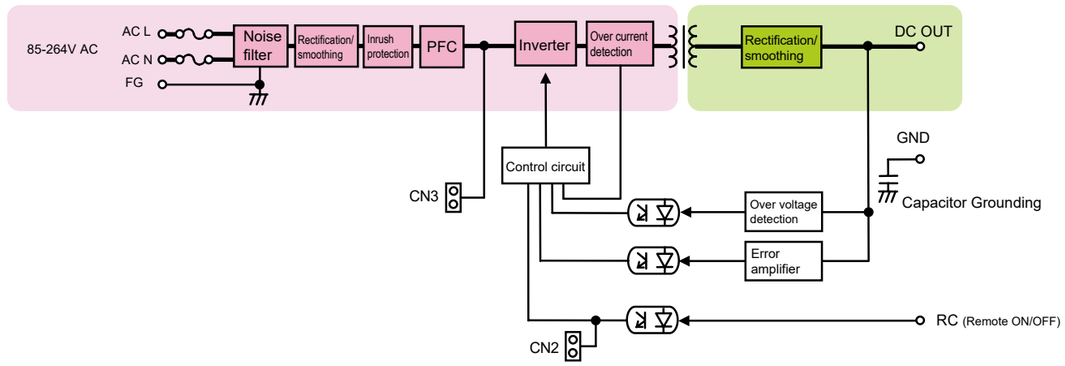
With chassis and cover (12V)



With chassis and cover (24/36/48V)



Block Diagram



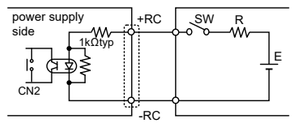
Signal Input/Output Specification (Items are provided at normal temperature and humidity unless otherwise specified.)

	Items	Specification	Note
Input Signal	Output ON/OFF control signal (RC signal)	Operating mode Between +RC and -RC: Output SW ON (4.5V or higher): ON SW OFF (0.8V or lower): OFF External power supply and Load-limiting resistor External power supply: E / Load-limiting resistor: R 4.5 - 12.5Vdc: Not required 12.5 - 30Vdc: 1.5kΩ 30 - 48Vdc: 8.2kΩ	Shorting Plug With shorting plug (CN2) connected, output starts up when AC input is applied regardless of RC signal. To control Start/Stop of output by RC signal, uncap shorting plug of CN2. Note: Shorting plug (CN2) is primary circuit components. Make sure to operate the plug after the AC input is turned off.

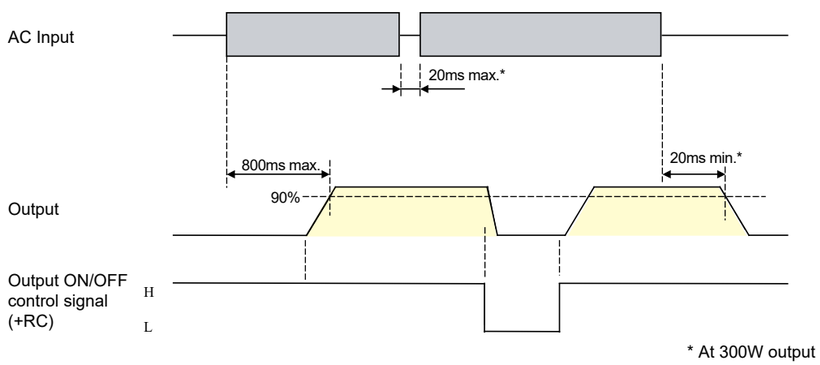
Signal Circuit

Input Signal Circuit

(RC signal)
Connection example:
using external power supply



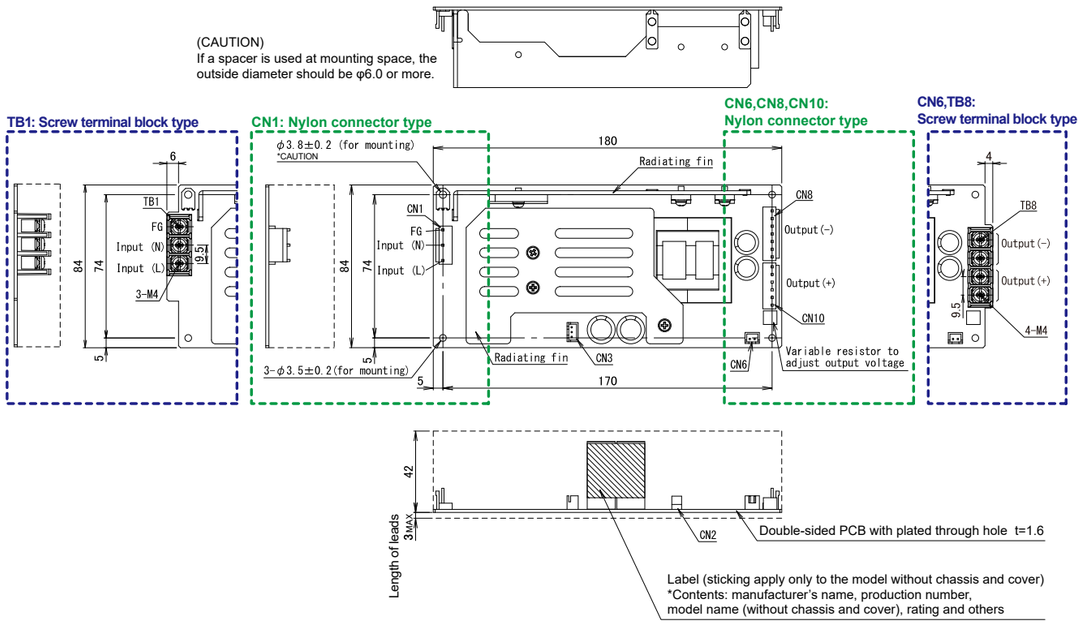
Sequence Timing Chart



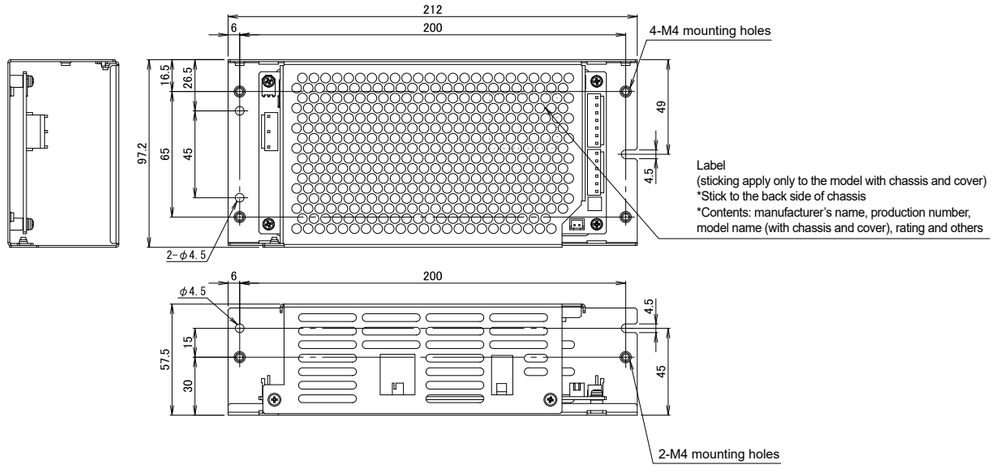
* At 300W output

Outline Drawing

■ PCB type (open frame) model



■ With chassis and cover



■ Connector pin allocation

Nylon connector type	Screw terminal block type	Common
CN1 (Input) — PIN No. 1–5, FUNCTION: AC(L), AC(N), FG; CONNECTOR TYPE: B3PS-VH (JST) *CN1 Applicable housing: VHR-5N (JST) Applicable terminals: Reel: SVH-21T-P1.1 (JST) Bulk: BVH-21T-P1.1 (JST)	TB1(INPUT) See the upper outline drawing	CN3 (Capacitor package Input/Output) — PIN No. 1–3, FUNCTION: 380V(Pin1), 0V(Pin3); CONNECTOR TYPE: B3B-XH-A (JST) *CN3 Applicable housing: XHP-3 (JST) Applicable terminals: Reel: SXH-001T-P0.6 (JST) Bulk: BXH-001T-P0.6 (JST) CN6 (ON/OFF Control) — PIN No. 1–2, FUNCTION: +RC, −RC; CONNECTOR TYPE: B2B-XH-A (JST) *CN6 Applicable housing: XHP-2 (JST) Applicable terminals: Reel: SXH-001T-P0.6 (JST) Bulk: BXH-001T-P0.6 (JST)
CN10 (Output) — PIN No. 1–6, FUNCTION: +DC; CONNECTOR TYPE: B6P-VH (JST) *CN10 Applicable housing: VHR-6N (JST) Applicable terminals: Reel: SVH-41T-P1.1 (JST) Bulk: BVH-41T-P1.1 (JST) CN8 (Output) — PIN No. 1–7, FUNCTION: -DC; CONNECTOR TYPE: B7P-VH (JST) *CN8 Applicable housing: VHR-7N (JST) Applicable terminals: Reel: SVH-41T-P1.1 (JST) Bulk: BVH-41T-P1.1 (JST)	TB8(OUTPUT) See the upper outline drawing	

Options (Sold separately)

Cable

Photos	Model	Category	Description
	WH-C05VH-800	Input harness	For nylon connector models
	WH-C05VH-800-01	Input harness (with ferrite core)	For nylon connector models
	WH-C06VH-500	Output (+) harness	Output (+) harness For nylon connector models
	WH-C07VH-500	Output (-) harness	Output (-) harness For nylon connector models
	WH-02XH02XH-500	Signal harness for RC signal	For using the output ON/OFF control signal (RC signal)
	WH-03XH03XH-115	Power harness for the capacitor unit	For connecting the power supply to the capacitor unit (CB03A-EC400/801F). Length: 115mm
	WH-03XH03XH-350	Power harness for the capacitor unit	For connecting the power supply to the capacitor unit (CB03A-EC400/801F). Length: 350mm
	WH-09ELP03XH-200	Power harness for connecting the battery pack	For connecting the power supply to the battery pack (BS28A-H350/2.5L).

Capacitor pack and Battery pack

Photos	Model	Type	Description
	CB03A-EC400/801F	Capacitor unit	
	BS28A-H350/2.5L	Ni-MH	5 inch bay size

Connection in Series and Parallel

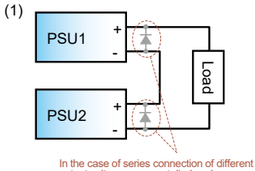
■ Series operation

Series connection is available as in figure (1) and (2) on the right.
Series connection between different output voltages is available, such as 12 V and 24 V.

Note: In the case that different voltages are connected in series as in figure (1) on the right;

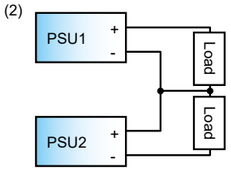
1. The output current shall be the rated current or less of the smaller rated current among the PSU1 and PSU2 connected in series.
2. Connect diodes for protection as show in the figure (1).
   The rated current of the diodes shall be 1.5 times or more of the peak output current of the power supply which has larger peak output current among PSU1 and PSU2.
   Also, use Schottky diodes whose forward voltage is lower than the forward voltage of the diodes used in the PSU.

(1)



In the case of series connection of different output voltages, connect diodes shown as above.

(2)

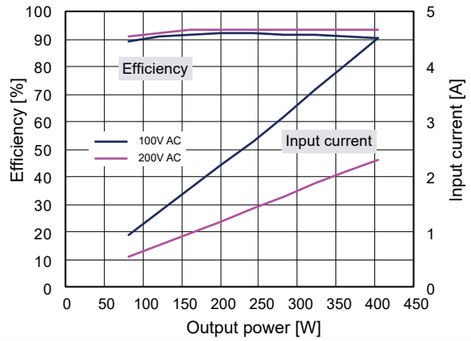


■ Parallel operation

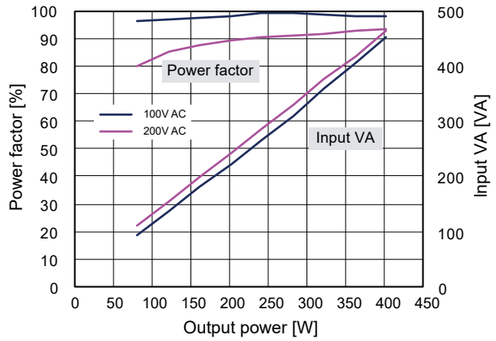
Parallel operation is not possible.

Characteristics Data (Typical features of the product series) UZP-400-A24 (Examples of actual measurements)

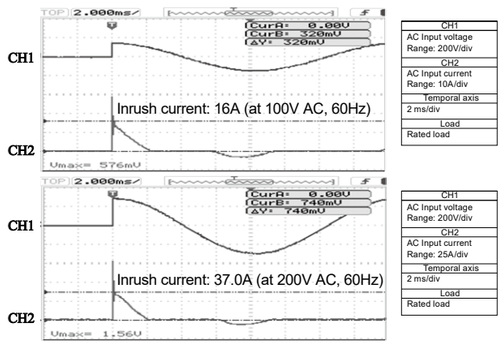
● Fig.5 Efficiency/Input Current vs. Output Power



● Fig.6 Power Factor/Input VA vs. Output Power



● Fig.7 Inrush Current



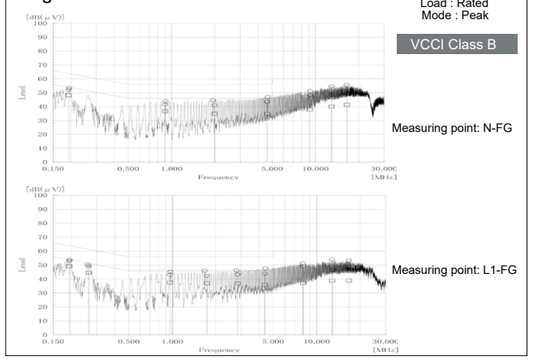
● Fig.8 Leakage Current

Input : 100, 200V AC
Load : Rated load and Min. load

	Rated load	Min. load
100V AC	0.05 mA	0.05 mA
200V AC	0.11 mA	0.11 mA

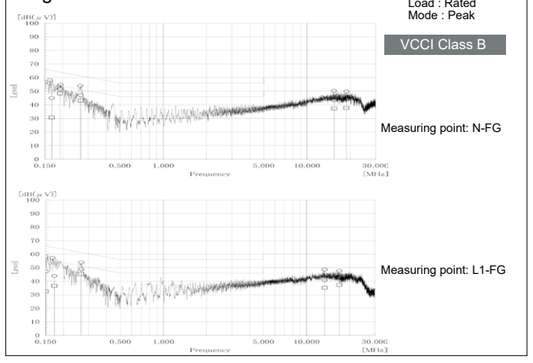
● Fig.9 Conducted Emission at 100V AC

Input : 100V AC
Load : Rated
Mode : Peak



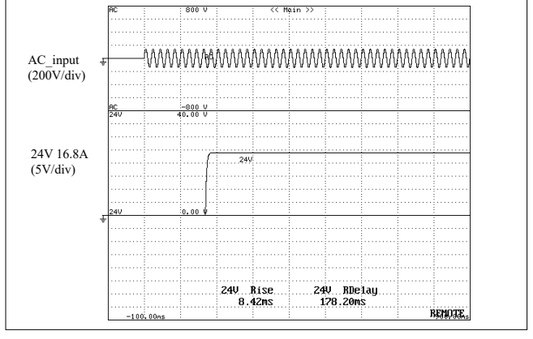
● Fig.10 Conducted Emission at 230V AC

Input : 230V AC
Load : Rated
Mode : Peak



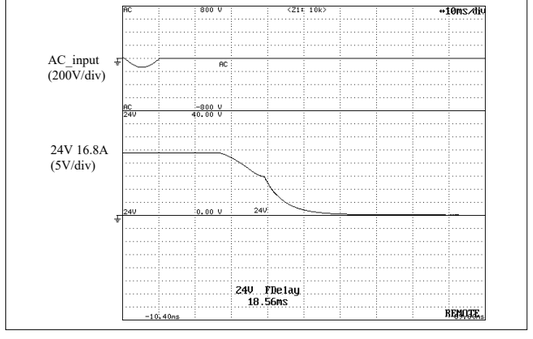
● Fig.11 Rising Characteristics at 100V AC

Input : 100V AC
Load : Rated
Time axis : 100 ms/DIV



● Fig.12 Falling Characteristics at 100V AC

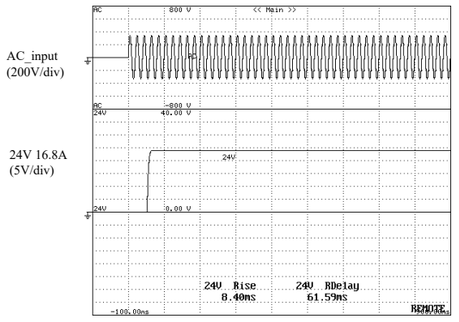
Input : 100V AC
Load : Rated
Time axis : 10 ms/DIV



Characteristics Data (Typical features of the product series) UZP-400-A24 (Examples of actual measurements)

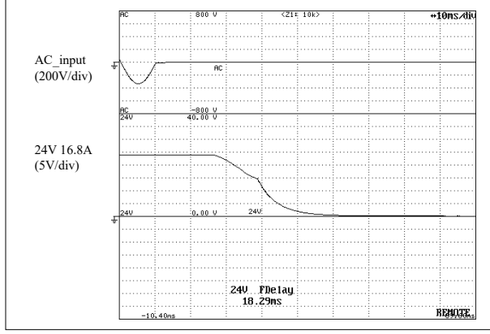
● Fig.13 Rising Characteristics at 240V AC

Input : 240V AC
Load : Rated
Time axis : 100 ms/DIV

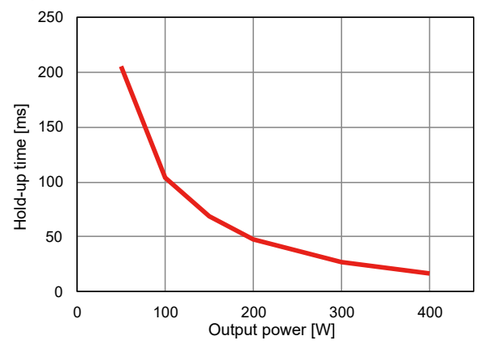


● Fig.14 Falling Characteristics at 240V AC

Input : 240V AC
Load : Rated
Time axis : 10 ms/DIV

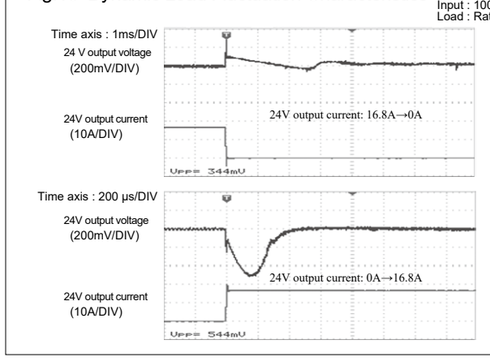


● Fig.15 Output Hold-up Time vs. Output Power

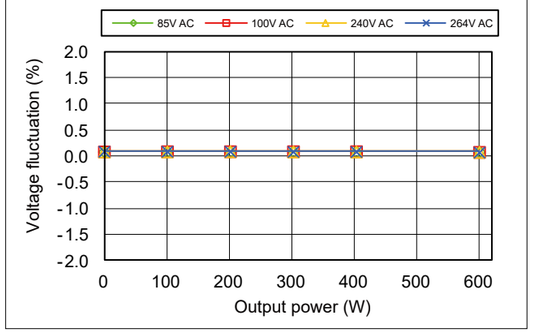


● Fig.16 Dynamic Load Fluctuation Characteristics

Input : 100V AC
Load : Rated



● Fig.17 Output Voltage Regulation (Load Fluctuation)

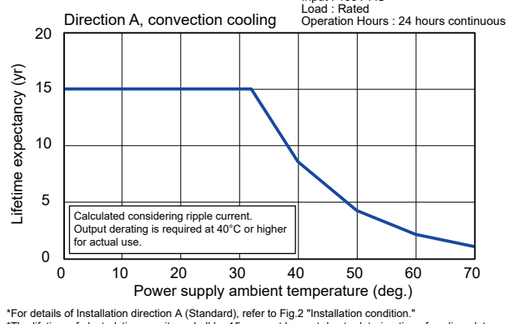


● Fig.18 Ripple and Spike Voltage

Temperature	AC Input voltage	CH1 24V					
		Minimum load		50% load		Rated load	
		Ripple(mV)	Noise(mV)	Ripple(mV)	Noise(mV)	Ripple(mV)	Noise(mV)
-15°C	85V	3.5	7.7	13.2	24.9	23.8	43.2
	100V	3.6	7.8	12.6	24.9	23.3	42.1
	240V	3.3	7.9	11.7	21.7	21.8	38.9
	264V	3.4	8.0	11.4	22.0	21.8	38.9
25°C	85V	3.1	7.0	11.0	24.4	16.7	35.8
	100V	3.2	7.0	11.2	24.8	16.7	33.6
	240V	3.0	9.5	10.9	22.0	16.2	30.1
	264V	3.0	9.3	10.5	22.5	16.2	30.4
45°C	85V	3.2	7.0	10.4	25.0	18.7	39.2
	100V	3.2	6.5	10.6	23.5	19.1	37.7
	240V	3.1	6.9	11.2	23.7	18.4	34.0
	264V	3.1	7.0	11.4	23.1	17.5	32.6
55°C	85V	3.2	7.0	10.3	22.6	17.1	32.2
	100V	3.1	7.1	10.3	22.9	15.4	33.0
	240V	2.9	6.4	9.8	21.2	15.1	27.6
	264V	3.0	6.5	9.9	21.0	15.1	27.5
75°C	85V	3.0	7.0	6.3	14.5	12.4	26.6
	100V	3.1	6.5	6.4	14.3	12.5	26.0
	240V	3.0	6.4	6.2	13.7	12.0	24.6
	264V	3.0	6.3	6.1	13.7	12.5	24.4

● Fig.19 Ambient Temperature vs. Lifetime Expectancy

Input : 100V AC
Load : Rated
Operation Hours : 24 hours continuous



*For details of Installation direction A (Standard), refer to Fig.2 "Installation condition."
*The lifetime of electrolytic capacitors shall be 15 years at longest due to deterioration of sealing plates.

●Fig.20 Overcurrent Protection Characteristics (V - I Characteristics)