Nipron GAZE into the future

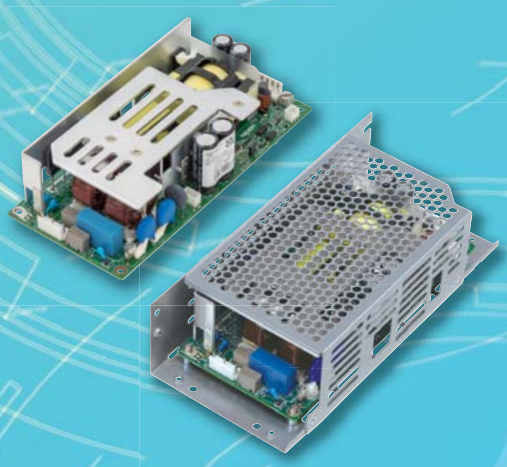
MEDICAL
Medical Standard Certified

2025 May

Medical Standard Certified Single Output Power Supply II

mFZP-075 series/mUZP series

mFZP-075 series



mUZP-400 series

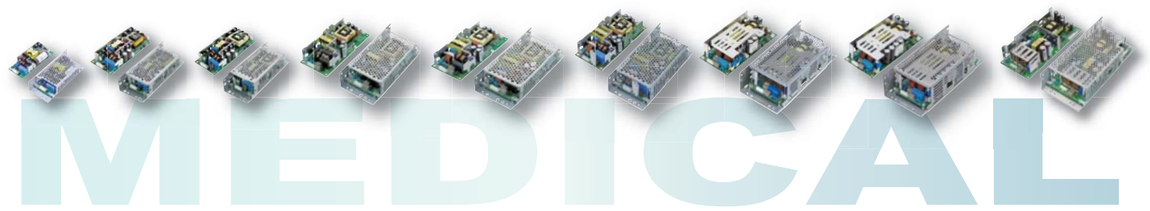
mUZP-400/1200P series

Nipron Guard
www.nipron.co.jp

Nipron Co., Ltd.

Power supply for electrical devices in the medical sector

mFZP / mUZP / mOZP series



Nipron Medical Solutions

About medical standards

In the medical sector, electrical devices are required to conform to each country's medical standards in accordance with IEC 60601-1, the technical standard for medical electrical equipment published by the International Electrotechnical Commission (IEC). Because of the emphasis on safety, the required specifications are quite strict in comparison with IEC 60950-1, the standard for safety of information processing equipment.

Benefits of using certified power supplies in medical equipment

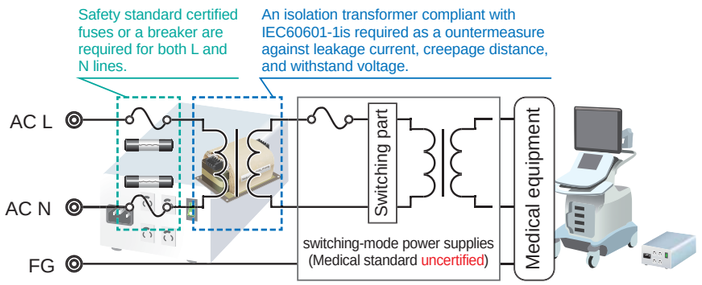
In order to obtain certification of compliance with a medical standard, a company must apply to a certification agency and undergo an examination. If one of that company's products includes a power supply that has not yet been certified as conforming to the standards for medical electrical equipment, the power supply undergoes testing that entails high costs and a very long waiting period from submission of the application until certification is obtained. If the product incorporates a power supply that has been certified as conforming to the standards for medical electrical equipment, testing of the power supply is essentially unnecessary, resulting in a reduction in the application period and application costs.
To be clear, a power supply listed as certified according to the medical standard must incorporate features such as integrated fuses in both the L and N lines, compatibility with reinforced insulation, and low leakage current characteristics. This eliminates the need for preparation of expensive separate medical isolation transformers, fuses, and breakers, resulting in low-cost, secure, and safe medical electrical equipment.

▶ Medical standard uncertified power supply

It is necessary to provide separately a fuse, a transformer, etc.

A fuse and a transformer shall be installed separately from a power supply unit.

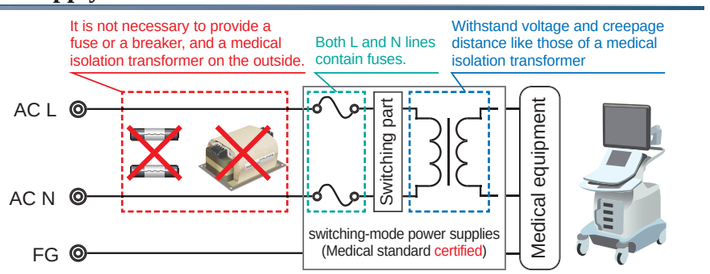
The system becomes enlarged and more expensive.



▶ Medical standard certified power supply

It is not necessary to provide separately a fuse, a transformer, etc.

The system becomes miniaturized and less expensive.



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Products lineup

mFZP-075 series
Small-sized, high peak power
Board-type, single-output power supplies
IEC60601-1 Ed.3.2 (MOOP,MOPP) certified
Output voltage (single output) +5V +12V +15V +24V
Continuous output 50–75W Peak output 75–150W P5–

mUZP-400 series
High efficiency 94%
Board-type, single-output power supplies
IEC60601-1 Ed.3.2 (MOOP,MOPP) certified
Output voltage (single output) +12V +24V 36V +48V
Continuous output 320.4–403.2W Peak output 504–601.2W P13–

mUZP-400/1200P series
High peak power
Board-type, single-output power supplies
IEC60601-1 Ed.3.2 (MOOP,MOPP) certified
Output voltage (single output) +24V +48V
Continuous output 403.2W Peak output 1200W P19–

mUZP-120 series
Featured in Medical Standard Certified Single Output Power Supply I
Small-sized, ultra-high efficiency 94%
Board-type, single-output power supplies
IEC60601-1 Ed.3.2 (MOOP) certified
Output voltage (single output) +12V +24V
Continuous output 100.8–120W Peak output 200.4–201.6W

mUZPT-120 series
Featured in Medical Standard Certified Single Output Power Supply I
Small-sized, ultra-high efficiency 94%
Board-type, single-output power supplies
IEC60601-1 Ed.2&Ed.3.2 (MOOP,MOPP) certified
Output voltage (single output) +12V +15V +24V
Continuous output 100.5–120W Peak output 200.4–201.6W

mUZP-150 series
Featured in Medical Standard Certified Single Output Power Supply I
High efficiency 92%
Board-type, single-output power supplies
IEC60601-1 Ed.2&Ed.3.2 (MOOP,MOPP) certified
Output voltage (single output) +12V +18V +24V +48V
Continuous output 150–153.6W Peak output 400.8–403.2W

mUZP-220 series
Featured in Medical Standard Certified Single Output Power Supply I
Ultra-high efficiency 94%
Board-type, single-output power supplies
IEC60601-1 Ed.2&Ed.3.2 (MOOP,MOPP) certified
Output voltage (single output) +12V +18V +24V +48V
Continuous output 180–220.8W Peak output 400.8–401.4W

mUZP-220/520P-24S05
High peak power
Board-type, single-output power supplies
IEC60601-1 Ed.3.2 (MOOP) certified
Output voltage (single output) +24V (5VSB)
Continuous output 220.8W
Peak output 520.8W
Featured in Medical Standard Certified Single Output Power Supply I

mOZP-350 series
Featured in Medical Standard Certified Single Output Power Supply I
High efficiency 95%
Board-type, single-output power supplies
IEC60601-1 Ed.2&Ed.3.2 (MOOP) certified
Output voltage (single output) +12V +15V +24V +30V +36V +48V
Continuous output 300–352.8W Peak output 504–601W

List of compatibility with standard

× : Not certified to medical standards ✓: Certified to medical standards

Series	IEC60601-1 Ed.2	IEC60601-1 Ed. 3.1 2MOPP	IEC60601-1 Ed. 3.1 2MOOP	IEC60601-1 Ed. 3.2 2MOPP	IEC60601-1 Ed. 3.2 2MOOP	Backup (capacitor) for momentary power failure	Backup (battery) for blackouts	Output voltage (single output)	Continuous output	Peak output
mFZP-075	×	✓	✓	✓	✓	✓	Note 3	5, 12, 15, 24V	50-75W	75-150W
mUZP-120	×	×	✓	×	✓	Note 3	Note 3	12, 24V	100.8-120W	200.4-201.6W
mUZPT-120	✓	✓	✓	✓	✓	Note 3	Note 3	12, 15, 24V	100.5-120W	200.4-201.6W
mUZP-150	✓	✓	✓	✓	✓	Note 3	×	12, 18, 24, 48V	150-153.6W	400.8-403.2W
mUZP-220	✓	✓	✓	✓	✓	✓	Note 3	12, 18, 24, 48V	180-220.8W	400.8-401.4W
mUZP-220/520P-24S05	×	✓	×	✓	×	✓	Note 3	24V	220.8W	520.8W
mOZP-200	×	×	Ed.3 *1	×	×	Note 3	Note 3	3.3, 5, 12, 15, 24, 36, *2 48V	132-201.6W	198-403.2W
mOZP-350	✓	✓	×	✓	×	✓	Note 3	12, 15, 24, 30, 36, 48V	300-352.8W	504-601W
mUZP-400	×	×	×	✓	✓	✓	✓	12, 24, 36, 48V	320.4-403.2W	504-601.2W
mUZP-400/1200P	×	×	×	✓	✓	×	×	24, 48V	403.2W	1200W

*1 Certified with IEC60601-1 Ed. 3, not Ed. 3.1 or Ed. 3.2 *2 The 36V output is adjustable to 30V with a variable resistor
*3 Possible, but not certified to medical standards. (Please contact us for details.)

Protective measures

- MOOP (Means of Operator Protection)
  ⇒ Protective measures to reduce the risk of electric shock to people other than the patient.
- MOPP Means of Patient Protection
  ⇒ Protective measures to reduce the risk of electric shock to the patient. The criteria for certification are harder than MOOP.

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Medical standard certified
AC-DC
switching power supply

mFZP-075 series

IEC60601-1 Ed.3.2(MOPP, MOOP) certified

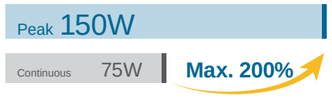
mFZP-075 Series

Continuous: 50-75W
Peak: 75-150W
Output voltage: 5/12/15/24V

Efficiency (mFZP-075-24)
At 100 V AC: **86.9%**
At 230 V AC: **88.8%**
*An example measurement

Supports a high peak approx. 200% higher than the continuous power

The unit can supply power 200% the continuous power for the predefined time (5s) (except for the 5V type). This eliminates the need to select a power supply unit with a large continuous power rating matching the peak load and enables a reduction in the PSU size, leading to many benefits.



Low leakage current

Low leakage current both at 100V AC and 200V AC

[Conducted emissions: mFZP-075-24 (An example measurement)]

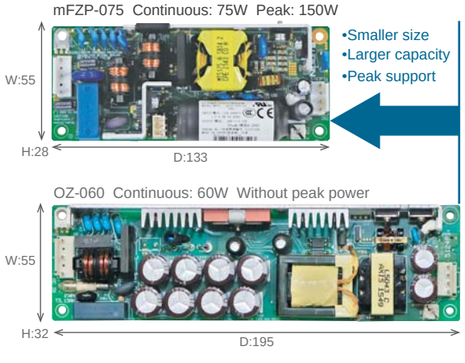
Input condition	Rated load	Min. load
100V AC	0.13mA	0.12mA
200V AC	0.25mA	0.24mA

Achieved high efficiency and low-level heat generation

Achieved efficiency 88.8% typ with a 24 V output type. The variable operating frequency system maintains high efficiency even at low loads. This high-level efficiency reduces heat generation, while also allowing a smaller size and a longer service life.

Smaller size with higher capacity

Compared with Nipron's past models of the OZ-060, offers 125% larger continuous capacity and a 40% smaller size.



The power supply unit clears VCCI Class B for conducted emissions

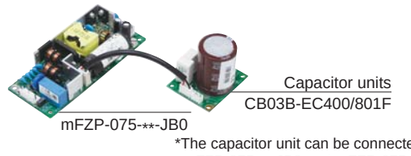
The power supply unit clears VCCI Class B for conducted emissions. No need for an external noise filter, helping to save associated work and costs.

There is no need for an external noise filter!

Backup for momentary power failure

Connecting capacitor units creates a backup for momentary power failure by extending the output holding time. Doing so contributes to the improved reliability of embedded devices.

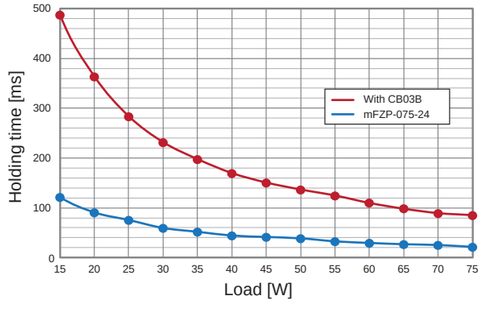
[Connection concept]



*The capacitor unit can be connected with mFZP-075-**-JB0 and mFZP-075-**-JB0-C

Output holding time graph: mFZP-075-24 (an example measurement)

[Measurement condition input: 100V AC]



Other features

- With chassis or with chassis and cover versions are available
- Equipped with a variable resistor to adjust the output voltage

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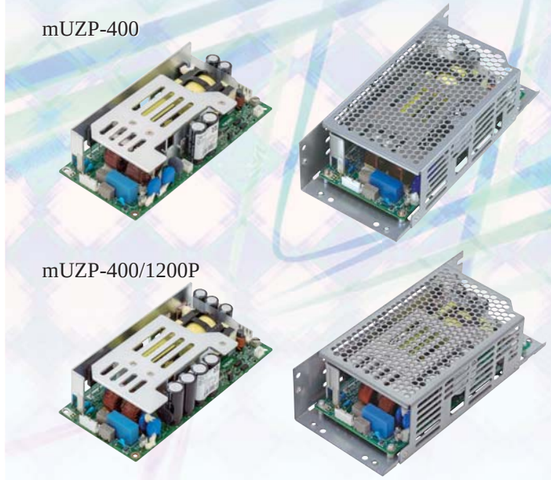
Medical standard certified
AC-DC
switching power supply

mUZP-400 series



Standard model
IEC60601-1 Ed.3.2 (MOOP,MOPP) certified

mUZP-400 Series

Continuous: **320*/400W**
Peak: **500*/1200W**
Output voltage: **12/24/36/48V**
*12 V output model

High peak power model
IEC60601-1 Ed.3.2 (MOOP,MOPP) certified

mUZP-400/1200P Series

Continuous: **400W**
Peak: **1200W**
Output voltage: **24/48V**

Supports high peak power

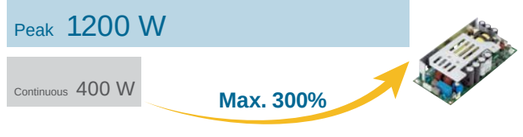
It is optimal for devices requiring an inrush current, such as motors. No need to select a large power supply with a continuous rated output that matches the peak load.
It also offers the advantage of enabling fanless system designs by replacing power supplies with built-in fans.

■ mUZP-400 series

The mUZP-400 series is designed to support peak output (up to 1.5 times the continuous rated output) for a duration of up to 10 seconds.

■ mUZP-400/1200P series

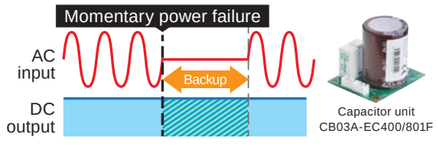
The mUZP-400/1200P series supports high peak power, delivering up to 3 times the continuous rated output for up to 10 seconds.



Backup for momentary power failure

(mUZP-400 series only)

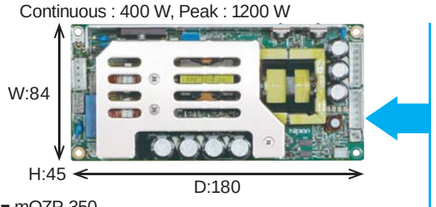
Connecting capacitor units creates a backup for momentary power failure by extending the output holding time.
(An additional connection harness required to connect the capacitor unit.)



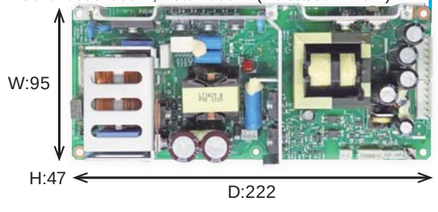
Smaller with higher capacity

Compared with Nipron's conventional models of the mOZP-350 series, the mUZP-400 series and mUZP-400/1200P series offer a 50W increased continuous capacity and a 30% smaller size.

■ mUZP-400/1200P Series
Continuous : 400 W, Peak : 1200 W



■ mOZP-350
Continuous: 350W, Peak: 600W (Released in 2012)



Other features

- **Clears VCCI Class B for conducted emissions**
  Contributes to reducing the cost and man-hours required. No need to install an external noise filter as this power supply unit clears VCCI Class B for the conducted emission
- **Blackout backup support (optional)**
- **Remote ON/OFF function**
- **Enhanced resistance to external surges caused by lightning or other sources through the incorporation of an arrestor and varistor as surge protectors.**
- **Variable resistor for adjusting the output voltage**
- **With chassis or with chassis and cover versions are available**

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Single Output Power Supply mFZP-075 series

Structure and I/O connector	Model	Output voltage	Output current *1	Output power *1
Open frame type/ Nylon connector	mFZP-075-5-JB0	+5V	10A(15A)	50W(75W)
	mFZP-075-12-JB0	+12V	6.25A(12.5A)	75W(150W)
	mFZP-075-15-JB0	+15V	5A(10A)	75W(150W)
	mFZP-075-24-JB0	+24V	3.13A(6.25A)	75W(150W)

Structure	Description
With chassis	'-C' is added after open frame model name (Ex: mFZP-075-5-JB0-C)
With chassis and cover	'-K' is added after open frame model name (Ex: mFZP-075-5-JB0-K)

■ Model name coding

mFZP-075-**-JB*-*
① ② ③ ④ ⑤ ⑥ ⑦

① Series name
② Output power
③ 5:5V
12:12V
15:15V
24:24V
④ Input/Output connector type
J: Nylon connector
⑤ Connector for backup
B: With connector
⑥ Modification
⑦ Blank:Without chassis and cover
C:With chassis
K:With chassis and cover

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

Features

- Supports smaller size with larger capacity and high peak
- Low noise and low leakage current eliminates the need for an external noise filter.
- Backup for momentary power failure is available

Medical standards IEC60601-1 Ed.3.2 (MOPP-, MOOP-) certified

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

●Function

TTL PFC RoHS Directive

●Input

AC input	85-264 VAC (Worldwide range)

●Dimension

W×H×D (mm)	Without chassis and cover	55×28×133
	With chassis and cover	65×36×163

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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> Input voltage derating.
	Input Frequency		50-60Hz				Frequency range 47-63Hz
	Efficiency *1	100VAC	80% typ (5V output), 84% typ (12V output), 85% typ (15V output), 86% typ (24V output)				At rated input *Characteristic data: Fig.5
		200VAC	82% typ (5V output), 86% typ (12V output), 87% typ (15V output), 88% typ (24V output)				
	Power Factor		*Characteristic data: Fig.6				
	Inrush Current *2		30A typ (100VAC), 60A typ (200VAC) *Characteristic data: Fig.7				Power thermistor system at cold start
	Input Current		1.2-0.8A typ (5V output), 1.5A-0.9A typ (12V/15V/24V output)				At rated input *Characteristic data: Fig.5
Output	Model		mFZP-075-5	mFZP-075-12	mFZP-075-15	mFZP-075-24	
	Rated Voltage		+5V	+12V	+15V	+24V	
	Continuous Rated Output		10A	6.25A	5A	3.13A	At rated input Refer to <Fig.4> output derating on the next page.
			50W	75W	75W	75W	
	Peak Current/Power		15A	12.5A	10A	6.25A	Peak current is within 5 seconds or less. Average power when passing repetitive peak current is within continuous rated power.
			75W	150W	150W	150W	
	Factory Setting		5V±0.1V	12V±0.24V	15V±0.3V	24V±0.48V	At rated input, 50% load
	Adjustable Voltage Range		±10%				
	Total voltage accuracy (1)		±225mV max.	±540mV max.	±675mV max.	±1080mV max.	The total variation of the rated output voltage value, which is affected by input and load fluctuations and setting tolerance.
	Total voltage accuracy (2)		±5% max.	±5% max.	±5% max.	±5% max.	The total constant voltage accuracy, including temperature and drift over time in the total variation (1)
	Ripple Noise (1) *3		120mV max.	150mV max.	180mV max.	200mV max.	Measure on the measurement board with a 20MHz oscilloscope. Connect a capacitor (47μF) to the measurement board, separate it from the load wire, and install it within 150mm from the output terminal. *Characteristic data: Fig.18
	Ripple Noise (2) *4		240mV max.	280mV max.	280mV max.	280mV max.	
Protection	Over Current Protection	OCP point (A)	101% min. of peak rated current				Current value when output voltage goes down by 10%.
		Method	Blocking oscillation *Characteristic data: Fig.20				Rapid shortage, longtime over current or shortage shall be avoided as it may shorten lifetime.
		Recovery	Automatic recovery				
	Over Voltage Protection	OVP point (V)	5.75-7.25V	13.8-16.8V	17.25-21.0V	27.6-33.6V	
		Method	Output shutdown (Latch shutdown)				
		Recovery	Reclosing of AC input				Input re-entry time interval is 60s or longer
Environment	Operating Temp./Humidity		-10 to 70°C/20 to 90%RH				*Refer to <Fig.4> output derating.
	Storage Temp./Humidity		-20 to 75°C/10 to 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.				JIS-C-60068-2-6 compliant Tested with chassis and cover
	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 once for each of four bottom edges, and no malfunction shall be observed.				JIS-C-60068-2-31 compliant / no operation Tested with chassis and cover
Insulation	Dielectric Strength		4kV AC/1minute between input and output (2MOPP)				1 sec at production line Cut-off current 20mA max, at normal temp. and humidity
			2kV AC/1minnute between input and FG				
			0.5kV AC/1minute between each output and FG				
	Insulation Resistance		100MΩ min. between each input and FG/outputs connected all together, outputs connected all together and FG				At 500V DC and normal temp. and humidity
	Leakage Current		0.2mA max. (100VAC), 0.5mA max. (264VAC) *Characteristic data: Fig.8				Compliant with IEC, at normal temp. and humidity
EMC	Electrostatic Discharge		EN61000-4-2 compliant (constant discharge 6kV / air discharge 8kV: criterion A)				At 100/200VAC input, rated output
	Radiated, Radio-Frequency, Electromagnetic Field		EN61000-4-3 compliant				There shall be no malfunction, nor failure.
	Fast Transient Burst		EN61000-4-4 compliant (Power ports 2kV: criterion A)				At 100/200VAC input, rated output
	Lightning Surge		EN61000-4-5 compliant (Between L and N: 2kV /Between L and FG, Between N and FG: 4kV: criterion A)				At 100/200VAC input, rated output
	Radio Frequency Conducted Immunity		EN61000-4-6 compliant				
	Power-Frequency Magnetic Field Immunity		EN61000-4-8 compliant				
	Voltage dips/Regulation		IEC61000-4-11 compliant 30%DIP 25T (criterion A:at rated load), 60%DIP 5T (criterion A:at load factor 40%)/(criterion B: at rated load), 100%DIP 0.5T(criterion A: at rated load)				At 100VAC input
	Conducted Emmision		VCCI/FCC/CISPR 32/EN55032 class B compliant *Characteristic data: Fig.9,10				Measured with chassis and cover
Others	Safety Standard		IEC/EN60601-1 Ed3.2(CB/CE Marking), ANSI AAMI ES60601-1 Ed3.2(UL), CSA60601-1 Ed3.2(cUL), IEC/EN62368-1 2nd(CB/CE Marking), UL/CSA62368-1 2nd(UL/cUL),GB4943.1(CCC), PSE (ordinance clause 2) compliant				Class 1 equipment, built-in type PSU (Pollution degree 2, Overvoltage Category II)
	Cooling System		Convection cooling or forced air cooling with external fan				
	Output Grounding		Capacitor grounding				
	Output Hold-up Time		10ms min (at 100V input)/60ms min (at 200V input)				Time to reach 90% of the rated output voltage at rated load (resistor) after input voltage is turned off.
	Reliability Grade		FA (Industrial equipment grade to use double-sided PCB with plated through hole)				Following our standard
	Weight		160g typ (without chassis and cover), 330g 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.

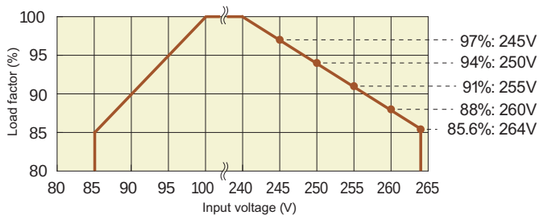
*1 The measurement is performed 30 minutes after the input is turned on at normal temperature. The input/output voltage measurement point is the soldered part of the input/output terminals.

*2 The inrush current shall be the primary inrush current. Charging current equal to or less than 200μs into X-capacitor in input filter circuit shall not be defined as inrush current.

*3 In case of from 35 to 100 % of Continuous Rated Current

*4 In case of light load (Below 35% of Continuous Rated Current) * Please be requested to use this power supply after verification of real machine due to increased Ripple Noise Voltage after transition to intermittent operation mode in case of light load

<Fig.1> Input voltage derating



When using with a low input voltage of less than 100V AC or a high input voltage of more than 240V AC, the following input voltage derating diagram and the temperature derating apply the value multiplied by the load factor shown in the figure.
Application example 1: 24V/board type/ convection cooling /mounting Ⓐ/ambient temperature 40°C/input voltage 85V AC,load factor is 100% × 85% = 85%
Application example 2: 24V/board type/ convection cooling /mounting Ⓐ/ambient temperature 60°C/input voltage 264V AC, load factor is 70% × 85.6% = 59.9%

* The power thermistor for suppressing the input inrush current becomes high resistance (= insufficient input voltage state) when left with no load or a light load in a low input voltage of less than 100VAC and a low-temperature environment of less than 10°C. If the input is turned on in this state, or if the load is suddenly changed from a light load to a heavy load, the output may repeatedly start/stop due to insufficient input voltage, so please use it after verifying the actual machine.

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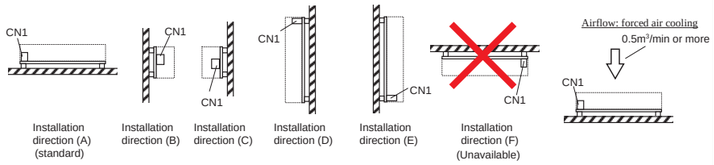
General Specification (Items are provided at normal temperature and humidity unless otherwise specified.)

<Fig.2> installation direction and cooling condition



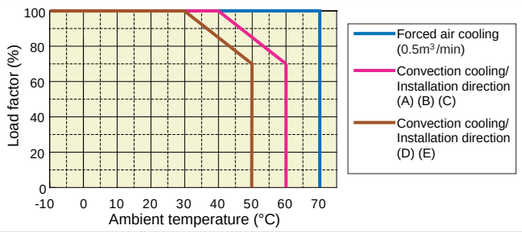
<Fig.3> Guideline for forced air cooling

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

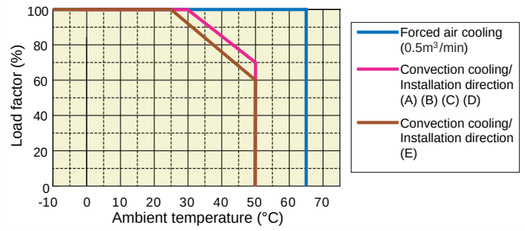
<Fig.4> Output derating

Depending on the installation conditions (mounting direction, cooling method, presence/absence of cover, input voltage, output voltage), reduce the load factor according to the temperature derating diagram for each output voltage model described on the following pages. However, the load factor is 100% with the rated continuous current / rated continuous power value specified in the output specifications. Applicable when the input voltage is 100V AC or more and 240V AC or less.

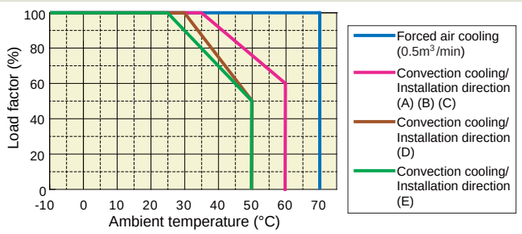
For open frame / with chassis (5V)



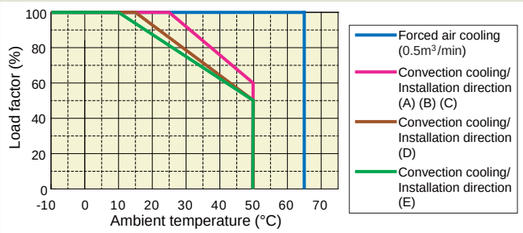
With chassis and cover (5V)



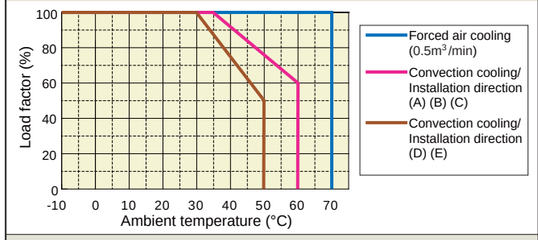
For open frame / with chassis (12V)



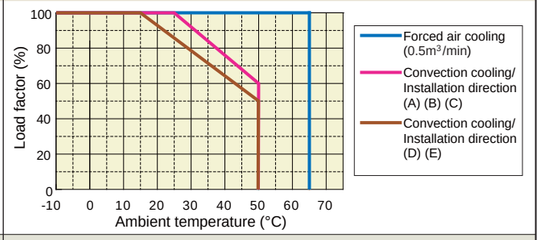
With chassis and cover (12V)



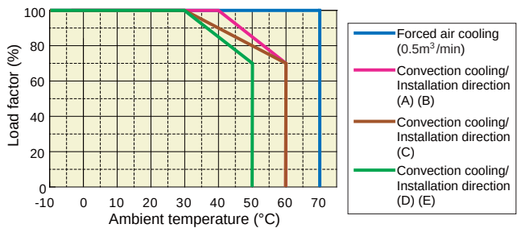
For open frame / with chassis (15V)



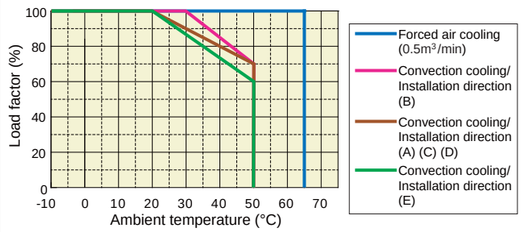
With chassis and cover (15V)



For open frame / with chassis (24V)



With chassis and cover (24V)



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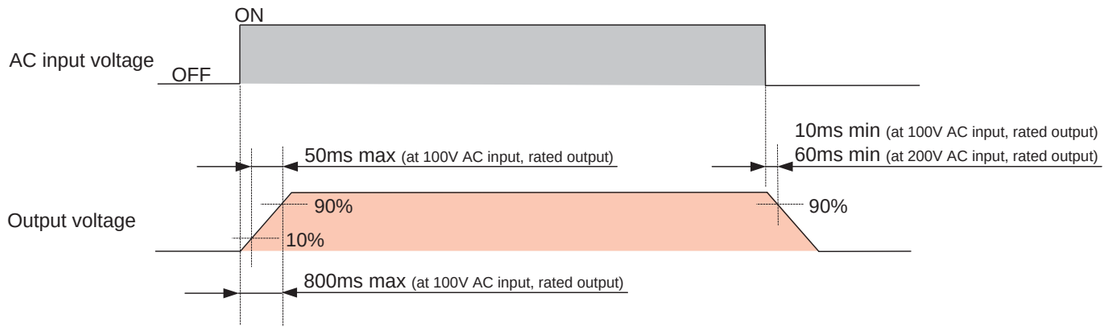
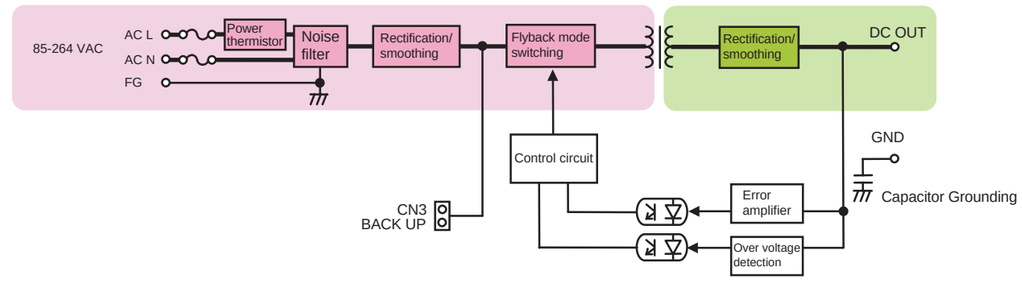
Sequence Timing Chart



Block Diagram



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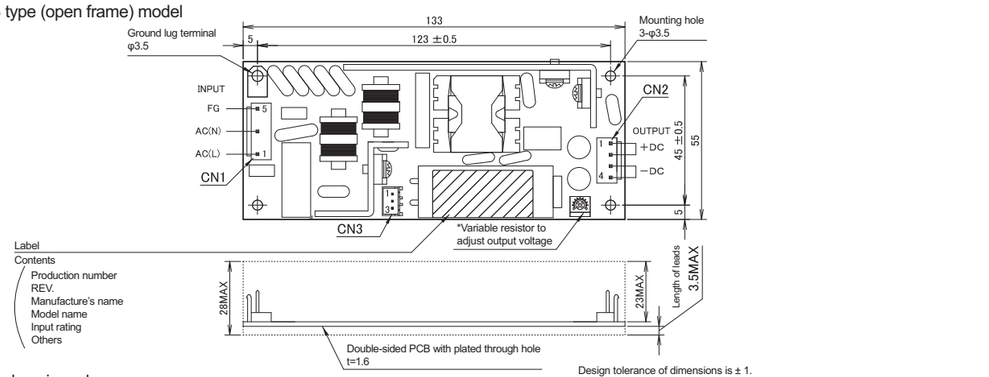
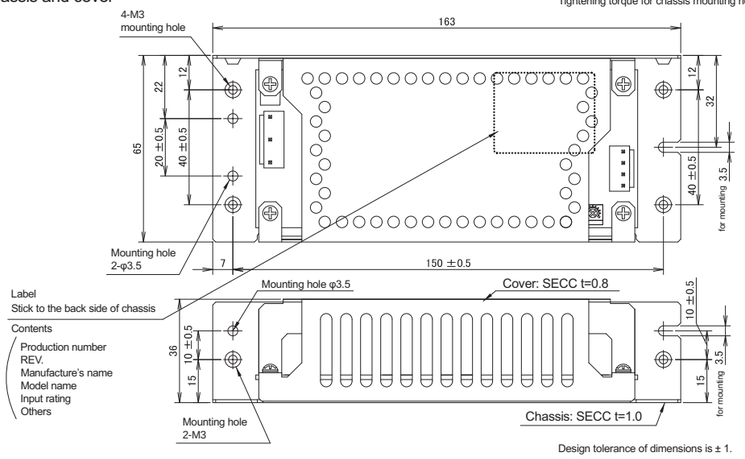
Outline Drawing

■ PCB type (open frame) model



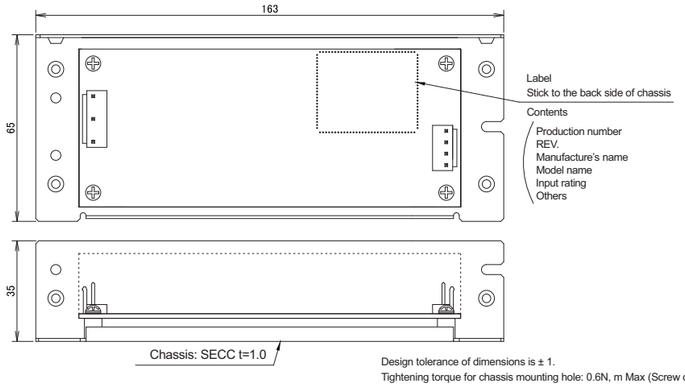
Design tolerance of dimensions is ± 1.
Tightening torque for chassis mounting hole: 0.6N, m Max (Screw diameter for use 3mm)

■ With chassis and cover



Design tolerance of dimensions is ± 1.
Tightening torque for chassis mounting hole: 0.6N, m Max (Screw diameter for use 3mm)

■ With chassis



Design tolerance of dimensions is ± 1.
Tightening torque for chassis mounting hole: 0.6N, m Max (Screw diameter for use 3mm)

■ Connector pin allocation

CN1 : INPUT

PIN No.	FUNCTION	COONCTOR TYPE
1	AC(L)	B3P5-VH (JST)
2		
3	AC(N)	
4		
5	FG	

*Applicable housing:
VHR-5N (JST)
*Applicable terminals:
Reel: SVH-21T-P1.1
Bulk: BVH-21T-P1.1

CN2 : OUTPUT

PIN No.	FUNCTION	COONCTOR TYPE
1	+DC	B4P-VH (JST)
2		
3	−DC	
4		

*Applicable housing:
VHR-4N (JST)
*Applicable terminals:
Reel: SVH-21T-P1.1
Bulk: BVH-21T-P1.1

CN3 : Capacitor package Input/Output

PIN No.	FUNCTION	COONCTOR TYPE
1	CAP+	BH3B-XH-2 (JST)
2		
3	CAP−	

*Applicable housing:
XHR-3N (JST)
*Applicable terminals:
Reel: SVH-001T-P0.6
Bulk: BVH-001T-P0.6

* CN2 should be used with continuous 5A or less per a pin.

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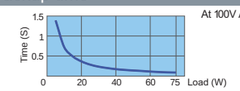
Options (Sold separately)

Cable

Photos	Model	Category	Description
	WH-C05VH-800	Input harness	Unterminated
	WH-C05VH-800-01	Input harness (with ferrite core)	Unterminated
	WH-C04VH-800-01	Output harness	Unterminated
	WH-03XH03XH-115	Power harness for the capacitor unit	For connecting the power supply to the capacitor unit (CB03B-EC400/801F). Length: 115mm
	WH-03XH03XH-350	Power harness for the capacitor unit	For connecting the power supply to the capacitor unit (CB03B-EC400/801F). Length: 350mm

Capacitor packs

Photos	Model	Type	Description	Backup time*
	CB03B-EC400/801F	Capacitor unit	W×H×D(mm)=60×50×50	

*Backup time is just a guideline for first use, and not guaranteed.

Connection in Series and Parallel

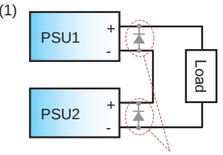
■ Series operation

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;

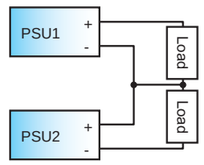
1. The output current shall be the rated current or less of the smaller rated current among the PSU1 and PSU2 connected in series.
2. Connect diodes for protection as show in the figure (1).
   The rated current of the diodes shall be 1.5 times or more of the peak output current of the power supply which 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.

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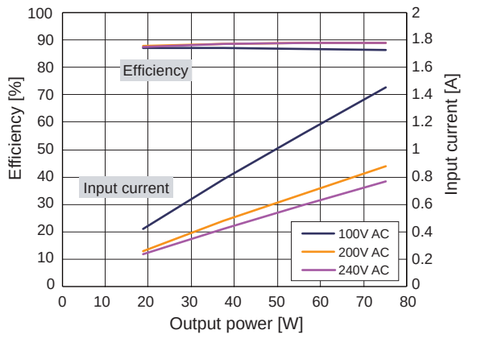
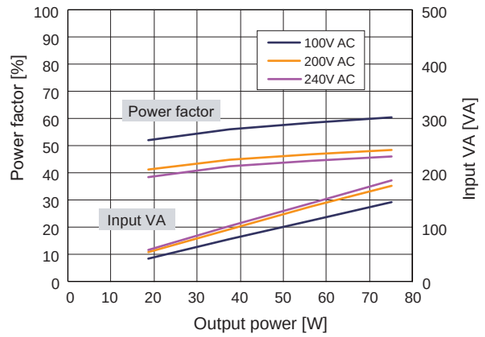
Characteristics Data (Typical features of the product series) mFZP-075-24 (Examples of actual measurement)

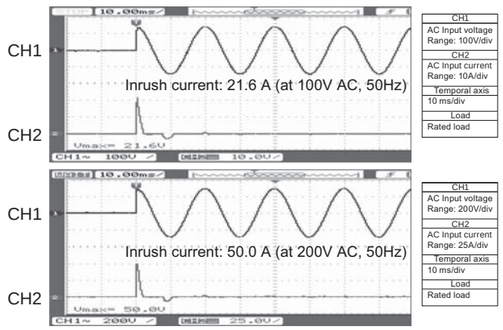
● Fig.5 Efficiency/Input Current vs. Output Power



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



● Fig.7 Inrush Current



● Fig.8 Leakage Current

Input : 100, 110, 240, 264V AC,
Load : Rated load and Min. load

	Rated load	Min. load
100V AC	0.13mA	0.12mA
110V AC	0.13mA	0.13mA
200V AC	0.25mA	0.24mA
264V AC	0.30mA	0.34mA

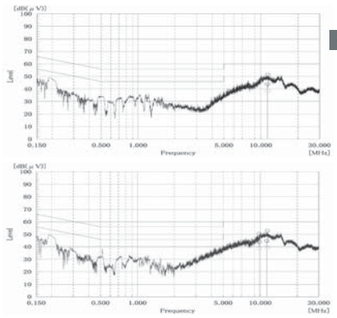
● Fig.9 Conducted Emission at 100V AC

Input : 100V AC
Load : Rated
Mode : Peak

CISPR 22/85(ITE) Class B

Measuring point: N-FG

Measuring point: L-FG



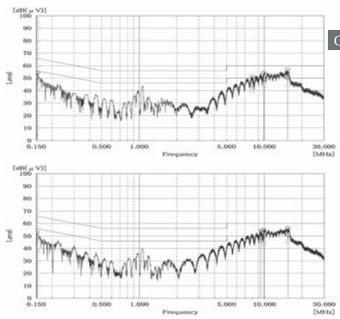
● Fig.10 Conducted Emission at 240V AC

Input : 240V AC
Load : Rated
Mode : Peak

CISPR 22/85(ITE) Class B

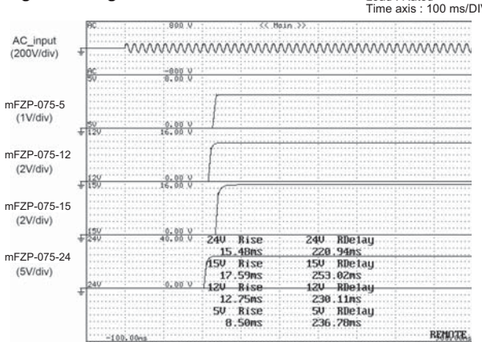
Measuring point: N-FG

Measuring point: L-FG



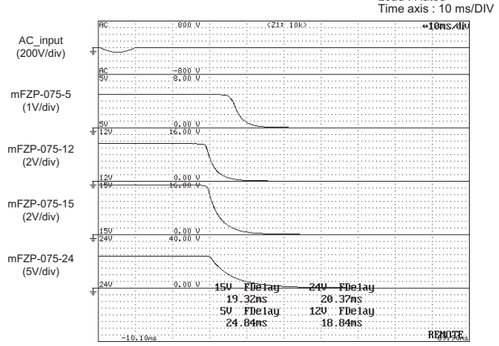
● Fig.11 Rising Characteristics at 100V AC

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



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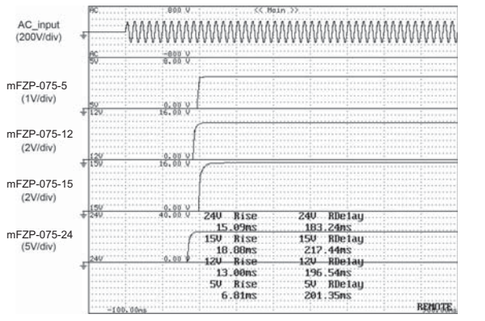
Characteristics Data (Typical features of the product series) mFZP-075-24 (Examples of actual measurement)

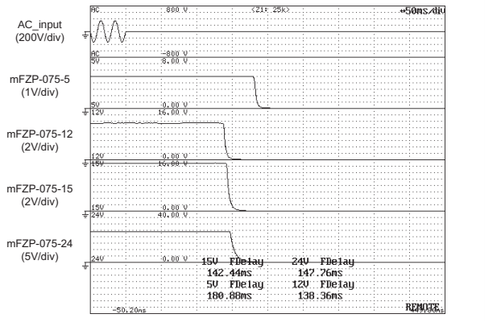
● Fig.13 Rising Characteristics at 240V AC

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



● Fig.14 Falling Characteristics at 240V AC

Input : 240V AC
Load : Rated
Time axis : 50 ms/DIV



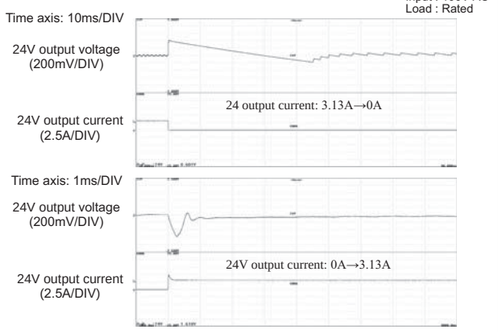
● Fig.15 Output Hold-up Time

Load : Rated
(65°C: 70% load)

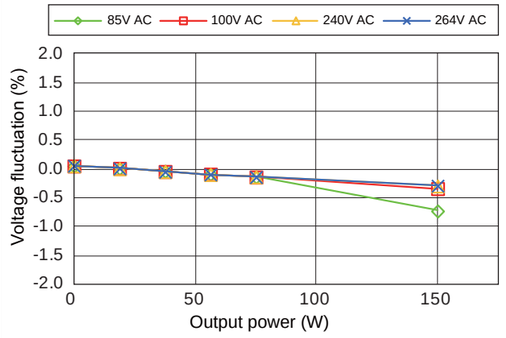
Temp.	Input voltage	Output holding time
-15°C	100V AC	18.55ms
	240V AC	138.74ms
25°C	100V AC	20.37ms
	240V AC	147.76ms
45°C	100V AC	21.10ms
	240V AC	153.10ms
65°C (70% load)	100V AC	31.77ms
	240V AC	220.70ms

● Fig.16 Dynamic Load Fluctuation Characteristics

Input : 100V AC
Load : Rated



● Fig.17 Output Voltage Regulation (Load Fluctuation)



● Fig.18 Ripple and Spike Voltage

Temp.	AC Input voltage	Min load	50% load	Rated load
		Ripple(mV)	Ripple(mV)	Ripple(mV)
-15°C	100V	94.4	84.2	99.2
	240V	96.2	85.3	84.6
25°C	100V	95.2	76.0	95.3
	240V	96.7	78.3	85.6
45°C	100V	90.5	82.4	88.6
	240V	102.6	77.5	87.3
65°C	100V	19.5	21.8	28.6
	240V	20.7	22.4	24.3

● Fig.19 Ambient Temperature vs. Lifetime Expectancy

Input : 100V AC
Load : Rated

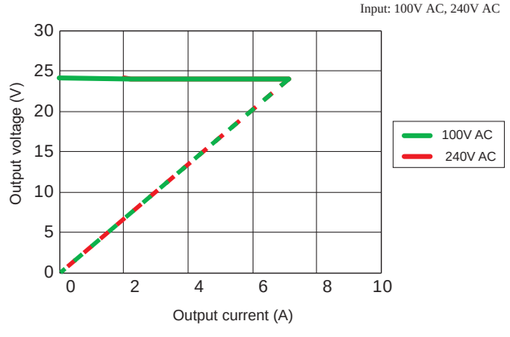
■Electrolytic capacitors

Ambient temperature	30°C	35°C	40°C
Lifetime expectancy	Approx. 24.96 years	Approx. 17.65 years	Approx. 12.48 years

* The lifetime shall be 15 years at longest due to deterioration of the sealing rubber characteristics.

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

Input: 100V AC, 240V AC



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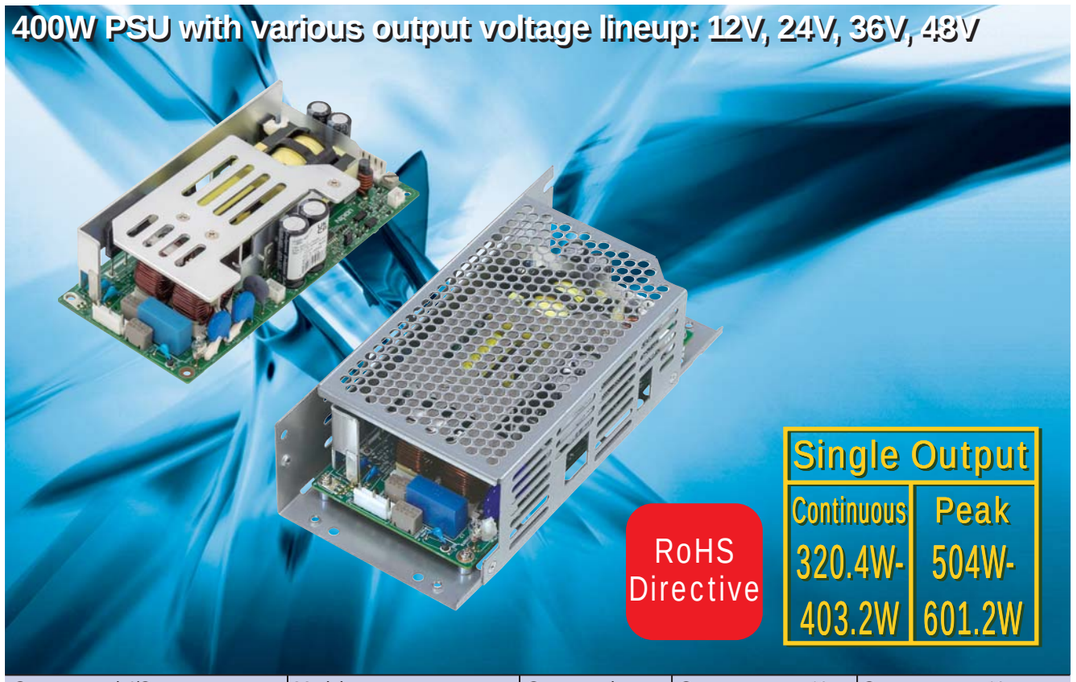
Single Output Power Supply mUZP-400 series



Structure and I/O connector	Model	Output voltage	Output current *1	Output power *1
Open frame type/ Nylon connector	mUZP-400-A12-JBH	+12V	26.7A(42A)	320.4W(504W)
	mUZP-400-A24-JBH	+24V	16.8A(25A)	403.2W(600W)
	mUZP-400-A36-JBH	+36V	11.2A(16.7A)	403.2W(601.2W)
	mUZP-400-A48-JBH	+48V	8.4A(12.5A)	403.2W(600W)

Structure	Description
With chassis	'-C' is added after open frame model name (Ex: mUZP-400-A12-JBH-C)
With chassis and cover	'-K' is added after open frame model name (Ex: mUZP-400-A12-JBH-K)

■ Model name coding

mUZP-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
⑦ Connector for backup
B: With connector
⑧ Feature
H:High eff. 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 available against momentary power failure and blackout
- ●The built-in arrestor to avoid/mitigate the risk of lightning damage
- ●Equipped with a variable resistor to adjust the output voltage
- ●Due to low noise and low leakage current, there is no need for an external noise filter

Medical standards IEC60601-1 Ed.3.2 (MOPP-, MOOP-) certified

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

●Function

TTL PFC RoHS Directive

●Input

input	85-264 VAC (Worldwide range)

●Dimension

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

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

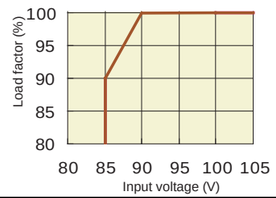
	Items		Specification				Measurements conditions, etc.
AC Input	Rated Voltage		100-240VAC (85*-264VAC)				Worldwide range *See <Fig.1> Input voltage derating.
	Input Frequency		50-60Hz				Frequency range 47-63Hz
	Efficiency	100VAC	90% typ(12V output) 92% typ(24V,36V,48V output)				At 300W output *Characteristic data: Fig.5
		200VAC	92% typ(12V output) 94% typ(24V,36V,48V output)				
	Power Factor	100VAC	99% typ				At continuous rated output 1 (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	3.6 A typ. (12 V,) 4.4 A typ. (24 V, 36 V, 48 V) at convection cooling				At rated input
			5.0 A typ. (12 V,) 5.5 A typ. (24 V, 36 V, 48 V) at forced cooling				
		200VAC	1.9 A typ. (12 V,) 2.4 A typ. (24 V, 36 V, 48 V) at convection cooling				
			2.6 A typ. (12 V,) 3.0 A typ. (24 V, 36 V, 48 V) at forced cooling				
Output	Model		mUZP-400-A12	mUZP-400-A24	mUZP-400-A36	mUZP-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 below. Convection cooling and forced air cooling
			504W*	600W*	601.2W*	600W*	
	Factory Setting		12V±2%	24V±2%	36V±2%	48V±2%	At rated output
	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.
		-10-0°C	160mV max.			200mV max.	
	Spike Voltage	0-70°C	150mV max.			250mV max.	
		-10-0°C	180mV max.			400mV max.	At rated input
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	Without chassis and cover	-10-70°C (at convection cooling), -10-70°C (at forced air cooling) */20-90%				*<Fig.3> on the next page shows the guideline of forced air cooling. Refer to <Fig.4> output derating.
		With chassis and cover	-10-60°C (at convection cooling), -10-70°C (at forced air cooling) */20-90%				
	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		2kVAC/1minute between input and output/RC (*2)	2.5kVAC/1minute between input and output/RC		2kVAC/1minute between input and output/RC (*2)	Cut-off current 10mA max
			1.5kVAC/1minnute between input and FG (*3)				Cut-off current 10mA max
			500VAC/1minute between each output /RC/FG				Cut-off current 10mA max
	Insulation Resistance		50MΩmin. between each input/output/RC/FG				At 500VDC
	Leakage Current		0.06mA typ(AC100V), 0.12mA typ(AC200V) *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				Rated input and output at convection, with chassis
	Harmonic Current Regulations		IEC61000-3-2 (edition 2.1) class A, EN61000-3-2 (A14) class A compliant.				At rated input and rated output (convection cooling)
Others	Safety Standard		ANSI AAMI ES 60601-1 approved, CE and UKCA marking EN 62477-1 OVCIII , PSE (ordinance clause 2) compliant				IEC60601-1 (Ed.3.2, MOPP,MOOP)
	Cooling System		Convection cooling/Forced air cooling				
	Output Grounding		Capacitor grounding				
	Output Hold-up Time		160g typ (without chassis and cover), 330g typ (with chassis and cover)				
	Reliability Grade		FA (Industrial equipment grade to use double-sided PCB with plated through hole)				Following our standard
	Weight		Weight 550 g typ (without chassis and cover), 870 g 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 3k VAC 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 2k VAC for 1 min., but please refer to the above specifications because an arrester is installed between input and FG

<Fig.1> Input voltage derating

Follow the derating below to derate rated current/power.

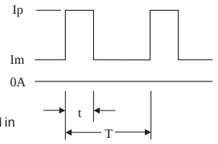


Peak output power condition

- ●Duty ratio of peak current shall be 30% or less.
- ●Energized period of peak current shall be 10 seconds or less.
- ●Energized period of peak current shall be 5 seconds or less at convection cooling and 50 deg. or higher of ambient temperature.
- ●The value resulting from the formula below shall not exceed continuous rated current, Io, after derating specified in the output derating on the following page.

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

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 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.

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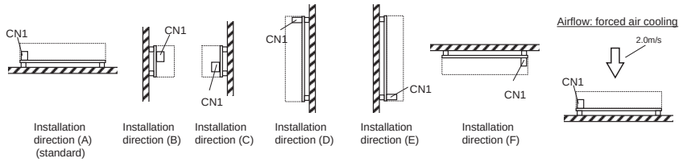
General Specification (Items are provided at normal temperature and humidity unless otherwise specified.)

<Fig.2> Installation and cooling conditions



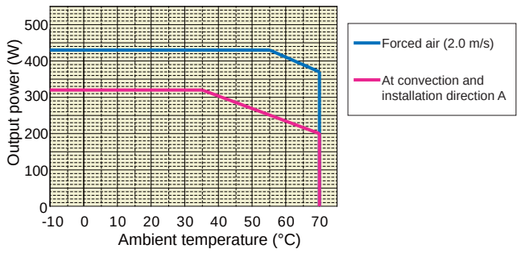
<Fig.3> Guideline for forced air cooling

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

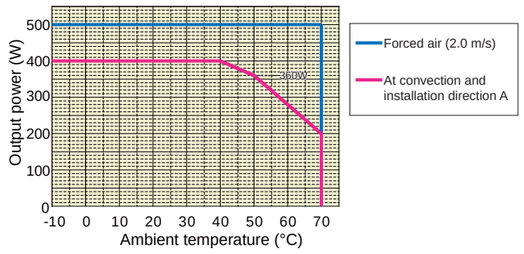
<Fig.4> Output derating

Refer to the derating diagram below depending on 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)-(F), please contact us. Also, the airflow shall be 2.0m/s for the forced air cooling as shown in Fig.2.

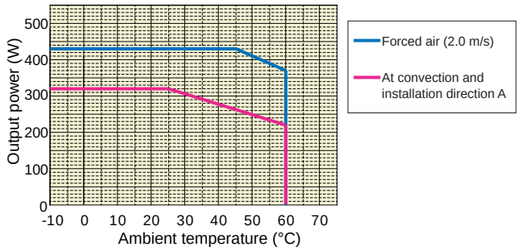
For open frame (12 V)



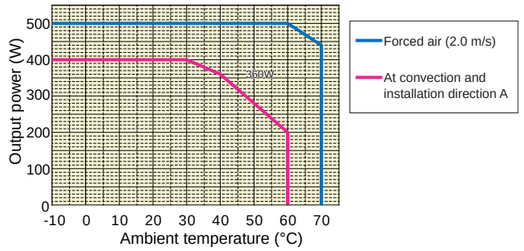
For open frame (24/36/48 V)



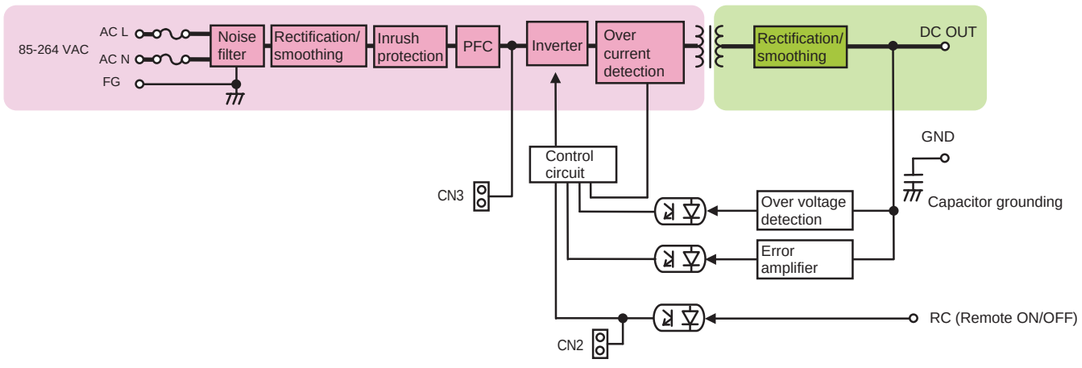
With chassis and cover (12 V)



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



Block Diagram



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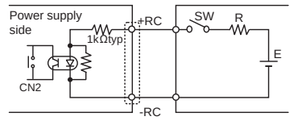
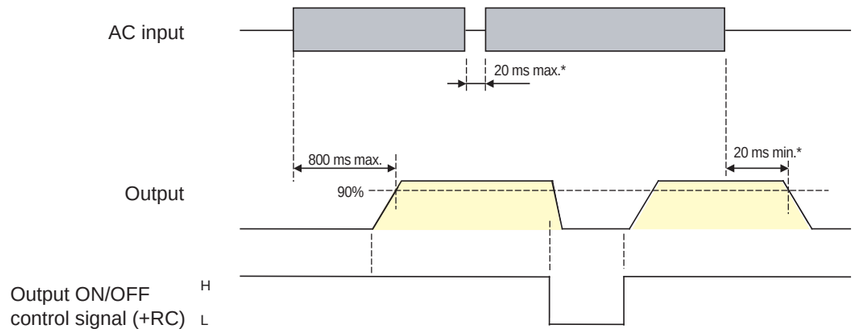
Signal Input/Output Specification (Items are provided at normal temperature and humidity unless otherwise specified.)

	Items	Specification	Note
Input Signal	Output ON/OFF control signal (RC signal) *Remove the shorting plug of CN2 in using 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 PSU: E / Load-limiting resistor: R 4.5–12.5Vdc: Not required 12.5–30Vdc: 1.5kΩ 30 –48Vdc: 8.2kΩ	Shorting Plug If the shorting plug (CN2) is connected, the output starts when AC input is applied regardless of the status of the RC signal. To control start/stop of output via the RC signal, remove the shorting plug from CN2. Note: The shorting plug (CN2) is part of the primary circuit. Make sure to handle it only after the AC input has been disconnected.
Input Signal Circuit	Signal Circuit (RC signal) Connection example: using external power supply		

Sequence Timing Chart



*At 300 W output

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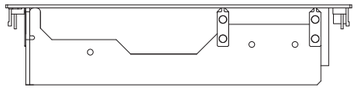
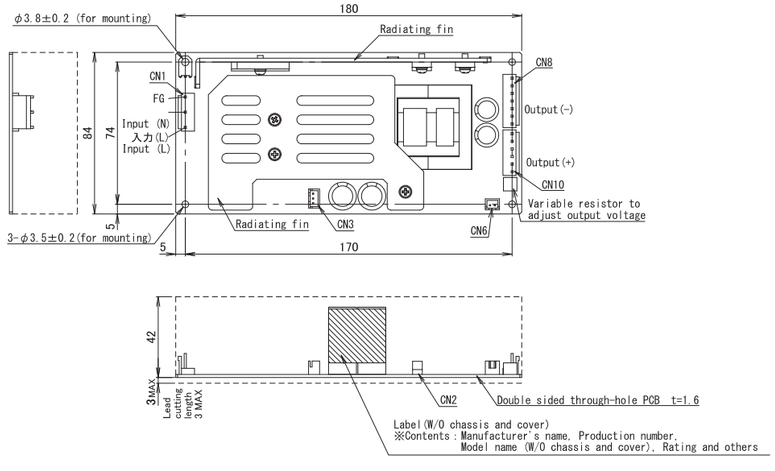
Outline Drawing

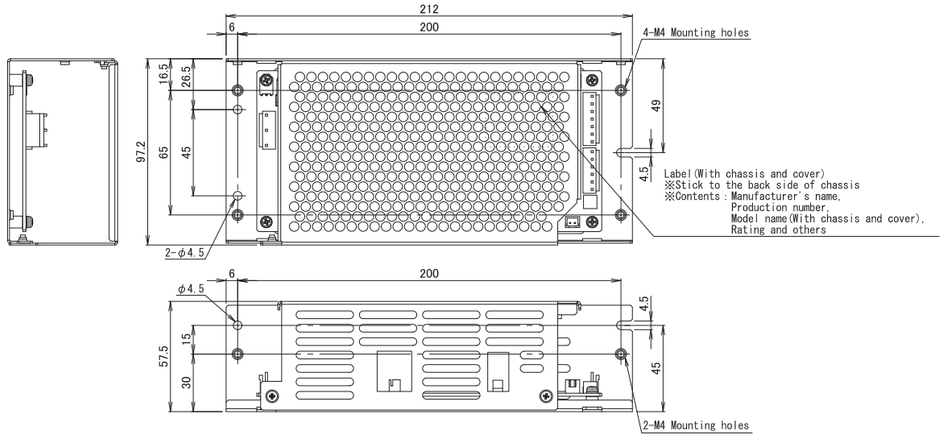
■ PCB type (open frame) model

(CAUTION)
If spacers are used to mount the power supply,
the outer diameter should be φ6.0 or more.

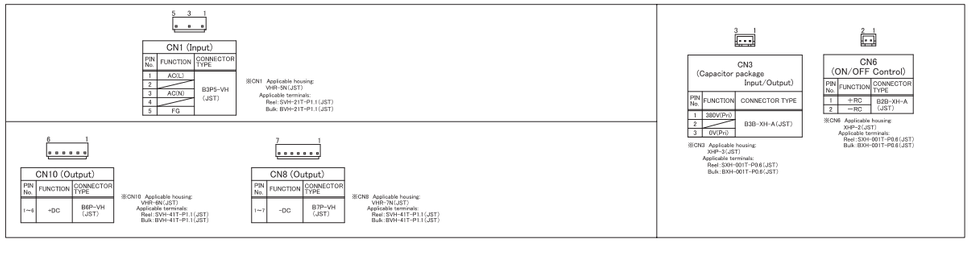




■ With chassis and cover



■ Connector pin allocation



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Options (Sold separately)

Cable

Photo	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	Power harness for the capacitor unit For connecting the power supply to the capacitor unit (CB03A-EC400/801F) Length: 115 mm
	WH-03XH03XH-350	Power harness for the capacitor unit	Power harness for the capacitor unit For connecting the power supply to the capacitor unit (CB03A-EC400/801F) Length: 350 mm

Capacitor pack/battery pack

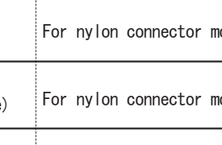
Photo	Model	Category	Description
	CB03A-EC400/801F	Capacitor unit	

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.

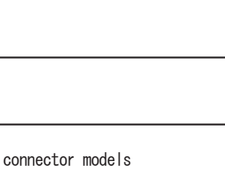
Note: In the case that different voltages are connected in series as in figure (1) on the right;
1. The output current shall be the rated current or less of the smaller rated current among the PSU1 and PSU2 connected in series.
2. Connect diodes for protection as show in the figure (1).
The rated current 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.

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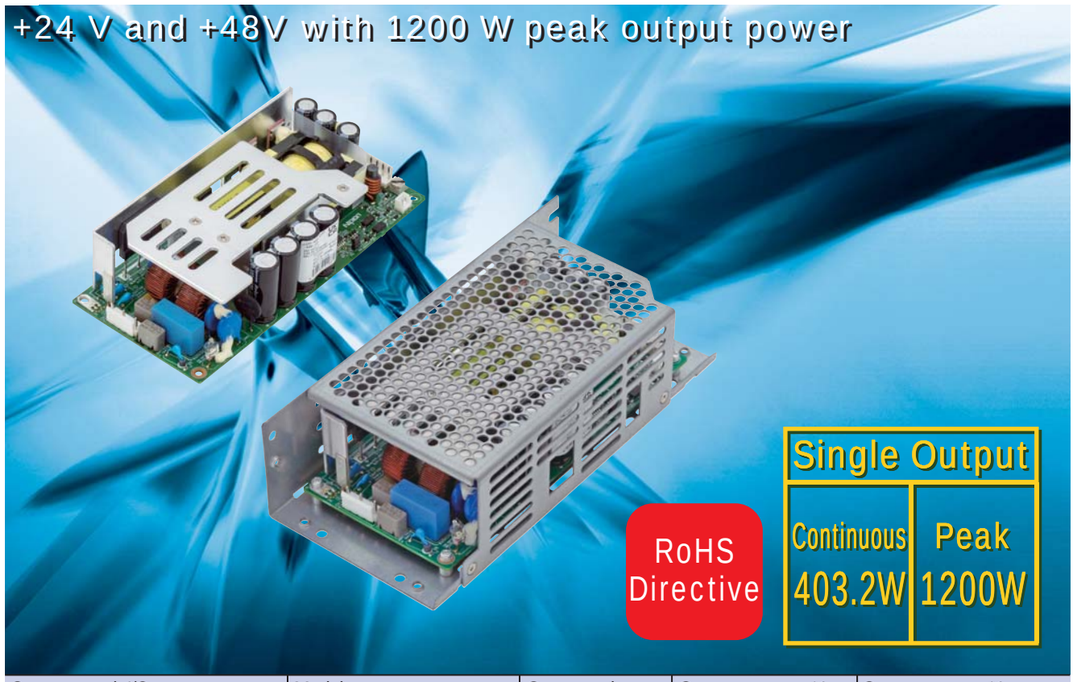
Single Output Power Supply mUZP-400/1200P series



Structure and I/O connector	Model	Output voltage	Output current *1	Output power *1
Open frame type/ Nylon connector	mUZP-400/1200P-A24-J0H	+24V	16.8A(50A)	403.2W(1200W)
	mUZP-400/1200P-A48-J0H	+48V	8.4A(25A)	403.2W(1200W)

Structure	Model
With chassis	'-C' is added after open frame model name (Ex: mUZP-400/1200P-A24-J0H-C)
With chassis and cover	'-K' is added after open frame model name (Ex: mUZP-400/1200P-A24-J0H-K)

■ Model name coding

mUZP-400/1200P-A**-J0H*-*

① ② ③ ④ ⑤ ⑥ ⑦⑧⑨⑩ ⑪

① Series name
② Peak output
③ Output power
④ Peak output power
⑤ Arrestor
A: With arrestor
⑥ 24:24V
48:48V
⑦ Input/Output connector type
J: Nylon connector
⑧ Connector for backup
B: With connector
⑨ Feature
H:High eff. type
⑩ Modification
⑪ Blank:Without chassis and cover
C:With chassis
K:With chassis and cover

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

Features
- Peak output up to three times the continuous power.
- 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.

Medical standards IEC60601-1 Ed.3.2 (MOPP-, MOOP-) certified

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

●Function

TTL PFC RoHS Directive

●Input

input	170V-264VAC

●Dimension

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

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

	Items		Specification		Specification
AC Input	Rated Voltage		200-240VAC (170*-264VAC)		
	Input Frequency		50-60Hz		Frequency range 47-63Hz
	Efficiency	200VAC	94% typ		At 300W output *Characteristic data: Fig.4
	Power Factor	200VAC	96% typ		At continuous rated output 1 (convection cooling) *Characteristic data: Fig.5
	Inrush Current	200VAC	57A typ		Power thermistor system at cold start (25°C) *Characteristic data: Fig.6
	Input Current	200VAC	2.3A typ		At continuous Rated Output1 (convection cooling)
			2.8A typ		At continuous Rated Output2 (forced air cooling)
Output	Model		mUZP-400/1200P-A24	mUZP-400/1200P-A48	
	Rated Voltage		+24V	+48V	
	Continuous Rated Output1 (convection cooling)		16.8A	8.4A	At rated input Refer to <Fig.3> output derating on the next page.
			403.2W	403.2W	
	Continuous Rated Output2 (forced air cooling)		21A	10.5A	
			504W	504W	
	Peak Current/Power		50A	25A	*Refer to peak output power condition below. Convection cooling and forced air cooling
			1200W*	1200W*	
	Factory Setting		24V±2%	48V±2%	At rated output
	Adjustable Voltage Range		24V±5%	48V±5%	
	Static Input Regulation		94mV max.	192mV max.	
	Static Load Regulation	Rated load	150mV max.	300mV max.	
		Peak load	250mV max.	500mV 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 input
		-10-0°C	160mV max.	200mV max.	
	Spike 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.15		
		Recovery	Automatic recovery		
	Over Voltage Protection	OVP point (V)	28.0-35.0V	55.2-64.8V	
		Method	Output shutdown		
		Recovery	Reclosing of AC input		
Environment	Operating Temp./Humidity	Without chassis and cover	-10-70°C (at convection cooling), -10-70°C (at forced air cooling) */20-90%		Refer to <Fig.3> 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%		
	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		2kVAC/1minute between input and output/RC (*2)		Cut-off current 10mA max
			1.5kVAC/1minnute between input and FG (*3)		Cut-off current 10mA max
			500VAC/1minute between each output /RC/FG		Cut-off current 10mA max
	Insulation Resistance		50MΩmin. between each input/output/RC/FG		At 500VDC
	Leakage Current		0.12mA typ(AC200V) *Characteristic data: Fig.7		
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.8,9		Rated input and output at convection, with chassis,
	Harmonic Current Regulations		IEC61000-3-2 (edition 2.1) class A, EN61000-3-2 (A14) class A compliant.		At rated input and rated output (convection cooling)
Others	Safety Standard		ANSI AAMI ES 60601-1 approved, CE and UKCA marking EN 62477-1 OVC III, PSE (ordinance clause 2) compliant		IEC60601-1(Ed.3.2, MOPP,MOOP)
	Cooling System		Convection cooling/Forced air cooling		
	Output Grounding		Capacitor grounding		
	Output Hold-up Time		50 ms min. *Characteristic data: Fig.10		At 300 W output
	Reliability Grade		FA (Industrial equipment grade to use double-sided PCB with plated through hole)		Following our standard
	Weight		Weight 550 g typ (without chassis and cover), 870 g 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 3k VAC 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).

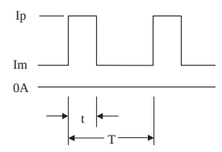
*2 The dielectric strength between input and FG is 2k VAC for 1 min., but please refer to the above specifications because an arrester is installed between input and FG

Peak output power condition

- Duty ratio of peak current shall be 50% or less.
- Energized period of peak current shall be 10 seconds or less.
- The value resulting from the formula below shall not exceed continuous rated current, Io, after derating specified in the output derating on the following page.

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

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 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.

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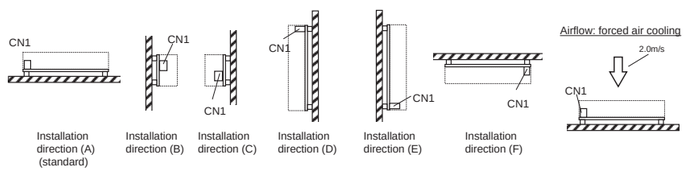
General Specification (Items are provided at normal temperature and humidity unless otherwise specified.)

<Fig.1> Installation and cooling conditions



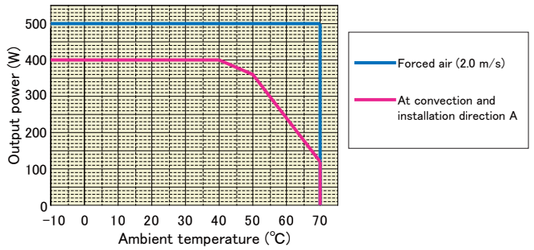
<Fig.2> Guideline for forced air cooling

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

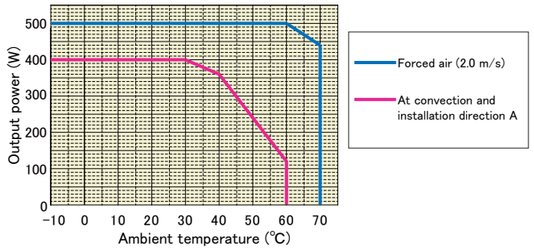
<Fig.3> Output derating

Refer to the derating diagram below depending on 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)-(F), please contact us. Also, the airflow shall be 2.0m/s for the forced air cooling as shown in Fig. 1.

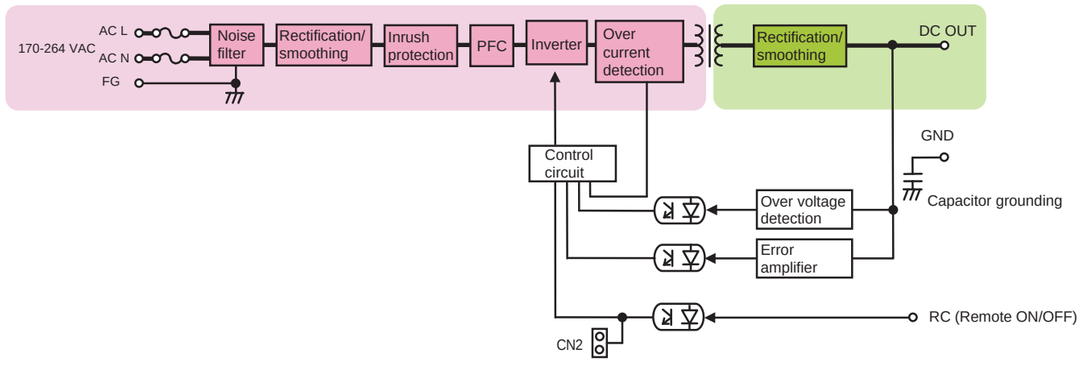
For open frame (24/48 V)



With chassis and cover (24/48 V)



Block Diagram



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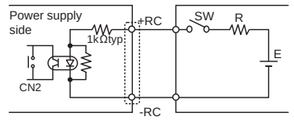
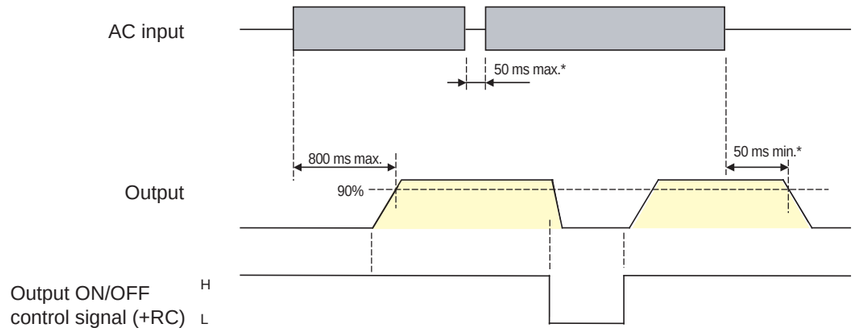
Signal Input/Output Specification (Items are provided at normal temperature and humidity unless otherwise specified.)

	Items	Specification	Note
Input Signal	Output ON/OFF control signal (RC signal) *Remove the shorting plug of CN2 in using 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 PSU: E / Load-limiting resistor: R 4.5–12.5Vdc: Not required 12.5–30Vdc: 1.5kΩ 30 –48Vdc: 8.2kΩ	Shorting Plug If the shorting plug (CN2) is connected, the output starts when AC input is applied regardless of the status of the RC signal. To control start/stop of output via the RC signal, remove the shorting plug from CN2. Note: The shorting plug (CN2) is part of the primary circuit. Make sure to handle it only after the AC input has been disconnected.
Input Signal Circuit	Signal Circuit		
	(RC signal) Connection example: using external power supply		

Sequence Timing Chart



*At 300 W output

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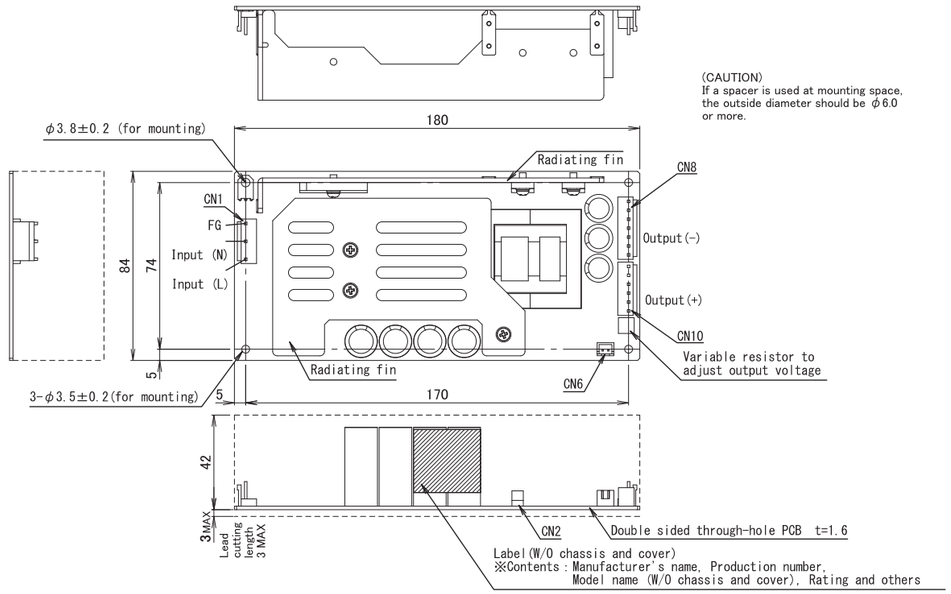
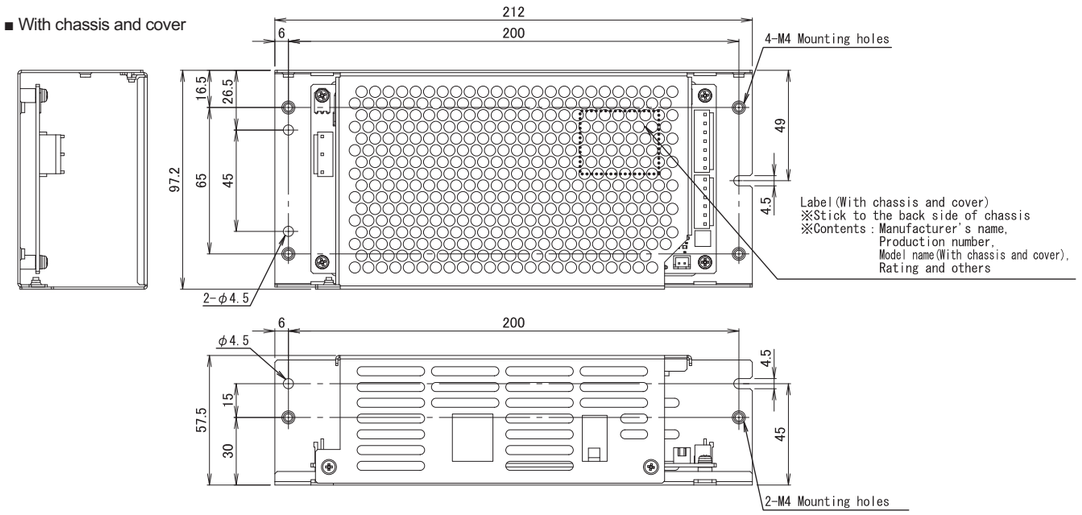
Outline Drawing

■ PCB type (open frame) model



■ With chassis and cover



■ Connector pin allocation

CN1 (Input)		
PIN No.	FUNCTION	CONNECTOR TYPE
1	AC(L)	B3P5-VH (JST)
2		
3	AC(N)	
4		
5	FG	

※CN1 Applicable housing: VHR-5N(JST)
Applicable terminals: Reel: SVH-21T-P1.1(JST) Bulk: BVH-21T-P1.1(JST)

CN10 (Output)		
PIN No.	FUNCTION	CONNECTOR TYPE
1~6	+DC	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.	FUNCTION	CONNECTOR TYPE
1~7	-DC	B7P-VH (JST)

※CN8 Applicable housing: VHR-7N(JST)
Applicable terminals: Reel: SVH-41T-P1.1(JST) Bulk: BVH-41T-P1.1(JST)

CN6 (ON/OFF Control)		
PIN No.	FUNCTION	CONNECTOR TYPE
1	+RC	B2B-XH-A (JST)
2	-RC	

※CN6 Applicable housing: XHP-2(JST)
Applicable terminals: Reel: SXH-001T-P0.6(JST) Bulk: BXH-001T-P0.6(JST)

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Options (Sold separately)

Cable			
Photo	Model	Category	Description
	WH-C05VH-800	Input harness	Unterminated
	WH-C05VH-800-01	Input harness (with ferrite core)	Unterminated
	WH-C06VH-500	Output (+) harness	Output (+) harness, unterminated
	WH-C07VH-500	Output (-) harness	Output (-) harness, unterminated
	WH-02XH02XH-500	Signal harness for RC signal	For using the output ON/OFF control signal (RC signal)

Connection in Series and Parallel

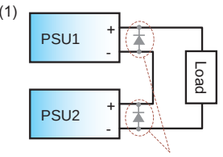
■ Series operation

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;

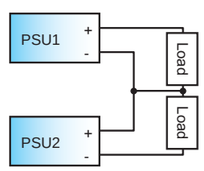
1. The output current shall be the rated current or less of the smaller rated current among the PSU1 and PSU2 connected in series.
2. Connect diodes for protection as show in the figure (1).
   The rated current of the diodes shall be 1.5 times or more of the peak output current of the power supply which 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.

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Capacitor Board CB03*-EC400/801F

Model	Description
CB03-EC400/801F	—
CB03B-EC400/801F	with blackout detection signal (AC_FAIL)

■Model name coding

CB03 B - EC 400 / 801F
① ② ③ ④ ⑤

① Series name
② Modification B: with blackout detection signal
③ Electrolytic capacitor
④ Output voltage
⑤ Capacity

Compatible Power Supply

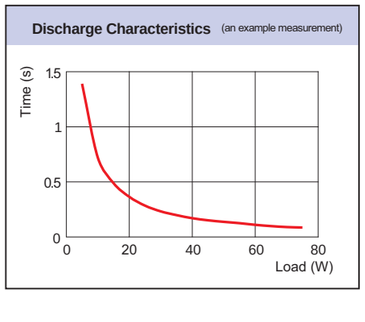
(Please contact about the combination with CB03-EC400/801F.)

●mFZP-075 series (CB03B-EC400/801F)

Capacitor Discharge Characteristics

(Measured with mFZP-075-24, 100V AC input)

(Be aware that it is a reference value at initial use of the capacitor board; it is not a guaranteed value.)



Features

●About 15 years expected life (at 40°C)
Maintenance free (periodic replacement not required)
●Low and high operating temperature (-10°C to 70°C)

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

Items	Specification	Measurement condition, etc.
Capacitor	420V 800uF typ	2000 hrs. used at 105°C
Operating Temp./Humidity	-10°C to 70°C/20 to 90% RH	There shall be no condensation
Storage Temp./Humidity	-20°C to 75°C/10 to 95%RH	There shall be no condensation
Weight	90g typ	
Capacitor Charging Time	0.5s max. (CB03-EC400/801F) 5s max. (CB03B-EC400/801F)	Time until the capacitor reaches 340V after the power supply is turned on.
Self-discharge Time	About 5 min	Time until the capacitor voltage decreases to 60V in the case that the connection with the power supply goes open at full charge.
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 three times for each of four bottom edges.	Follow JIS-C-60068-2-31 at no operation
Insulation Resistance (only for CB03B-EC400/801F)	50MΩ min. between each input and AC_FAIL and FG	At 500V DC
Dielectric Strength (only for CB03B-EC400/801F)	3kV AC/1minnute between input and AC_FAIL *1	Cut-off current 10mA
	2kV AC/1minnute between input and FG *2	Cut-off current 10mA
Reliability Grade	FA (Industrial equipment grade to use double-sided PCB with plated through hole)	Following our standard
Expected Life*	About 15 years	Environmental temperature: 40°C Based on the calculation of the actual life of an electrolytic capacitor.
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.

* Be aware that expected life is a reference value; it is not a guaranteed value.
(*1) Input should be primary side and AC_FAIL should be secondary side. (*2) FG shall be the mounting holes on the 4 corners of the board.

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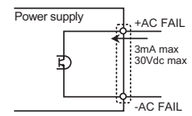
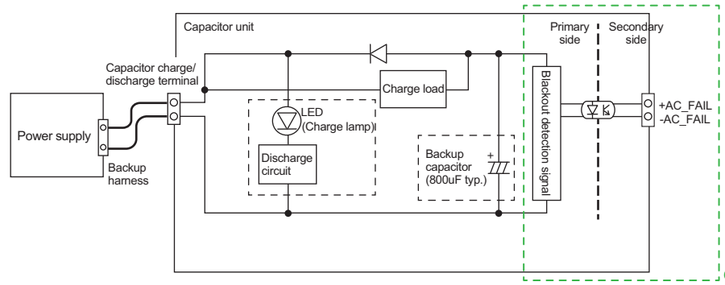
Signal Input/Output Specification (Items are provided at normal temperature and humidity unless otherwise specified.)

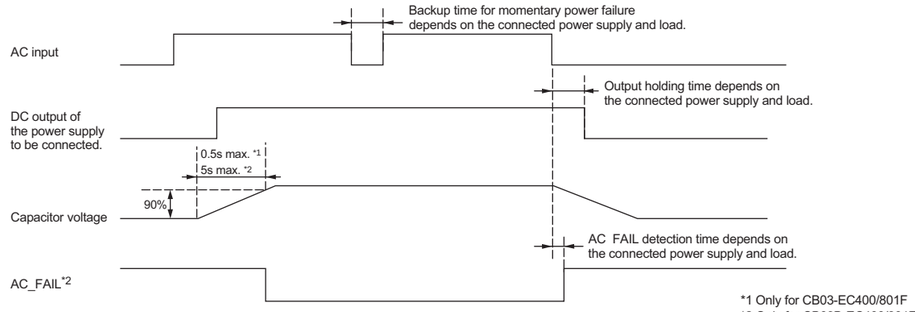
	Items	Specification	Signal Circuit
Output Signal	Blackout detection signal* (AC_FAIL)	The signal goes "OPEN" at low AC input voltage and power failure detection. However, when the RC signal is OFF, the output is OPEN regardless of the presence or absence of input voltage. (Detects a drop in voltage of the input smoothing capacitor inside the power supply, short and long of the detection time depends on small and big of the output power.)	

* Only for CB03B-EC400/801F

Block Diagram



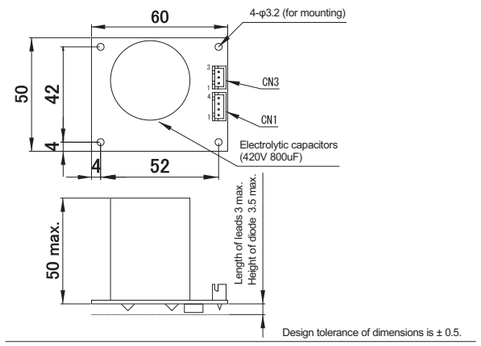
Sequence Timing Chart



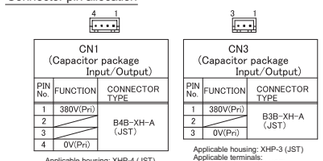
*1 Only for CB03-EC400/801F
*2 Only for CB03B-EC400/801F

Outline Drawing

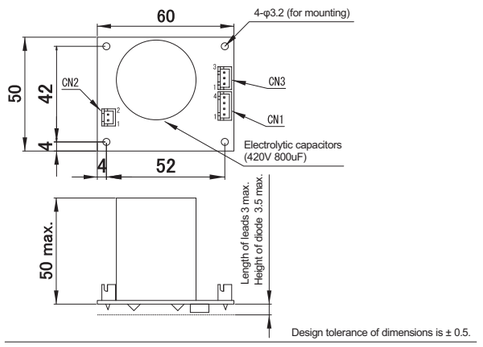
● CB03-EC400/801F



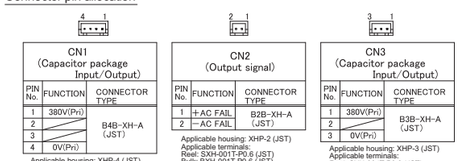
Connector pin allocation



● CB03B-EC400/801F



Connector pin allocation



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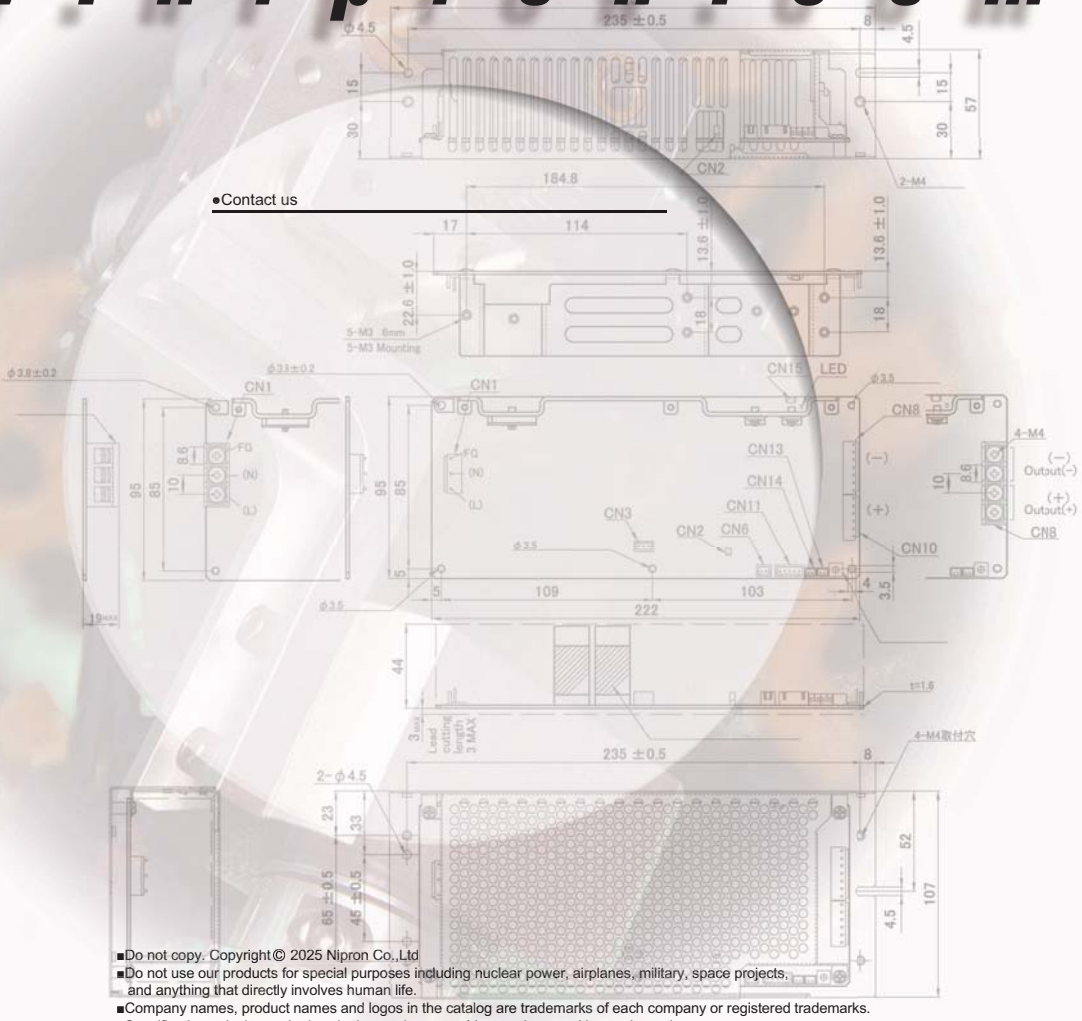
Nipron Co.,Ltd.

●Sales department and R&D department
1-3-30, Nishinagasu-cho, Amagasaki-city, Hyogo, 660-0805, Japan.
TEL: +81-6-7220-3657 FAX: +81-6-6487-2212
URL: http://www.nipron.com/

www.nipron.com

●Contact us



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