

Scope

This specification applies to built-in DC Stabilized power supply, mOZP-200-12-**E*-, mOZP-200-15-**E*-, mOZP-200-24-**E*-, mOZP-200-36-**E*-, and mOZP-200-48-**E*-.

This power supply provides DC output at AC input instantaneous power failure by connecting dedicated capacitor package (+380 VDC)

In addition, all items in this specification shall be provided at nominal temperature and humidity unless otherwise specified.

Model Name Coding

Example: **m O Z P - 2 0 0 - 2 4 - J S E - C**

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

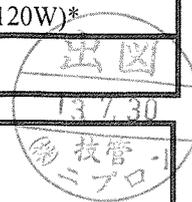
- ① Series Name....."mOZ": mOZ series
- ② Peak power....."P": Corresponding to Peak power
- ③ Continuous output power....."200": 200W
- ④ Output voltage....."12":12V, "15":15V, "24":24V, "36":36V, "48":48V
- ⑤ Input / output connector type....."J": Nylon connector, "T": Block terminal
- ⑥ Current balance function....."0": Without current balance function, "S": With current balance function
- ⑦ Low standby power....."E": Low standby power type
- ⑧ Modification....."0": Standard,"1 to 9"or "A to Z": Modification symbol
- ⑨ Chassis....."C": With Chassis, "K": With Chassis and Cover, "Blank": Without Chassis and Cover.

General Specification

Items	Specification					Measurements conditions, etc.	
	mOZP-200-						
	12	15	24	36	48		
Rated voltage	100 - 240 VAC					Worldwide range	
Voltage Range	85 - 264 VAC					Load factor shall be 90-100% at 85-95 VAC range.	
Current	At 100VAC	2.3A typ.					At rated output (Natural air cooling)
		2.8A typ.					At rated output (Forced air-cooling)
	At 200VAC	1.2A typ.					At rated output (Natural air cooling)
		1.4A typ.					At rated output (Forced air-cooling)
Rated frequency	50 / 60 Hz					Frequency range 47 - 63Hz	
Inrush current	At 100VAC	17A typ.					Power thermistor system Rated output power With cold start at 25°C
	At 200VAC	34A typ.					
Efficiency	At 100VAC	87 % typ.	88 % typ.	87 % typ.	87 % typ.	88 % typ.	At rated output (Natural air cooling)
	At 200VAC	90 % typ.	91 % typ.	90 % typ.	90 % typ.	91 % typ.	
Power factor	At 100VAC	99 % typ.					At rated output (Natural air cooling)
	At 200VAC	95 % typ.					
Zero load power	At 100VAC	1.3W typ.	1.3W typ	1.4W typ	1.4W typ	1.7W typ	Power consumption at zero load
	At 200VAC	1.3W typ.	1.3W typ	1.4W typ	1.4W typ	1.7W typ	
Standby Power	At 100VAC	60mW typ.					Power consumption at RC signal OFF
	At 200VAC	200mW typ.					
Holding Time	25msec typ.					At rated load (200W)	
Input Voltage	70 VAC / 500msec					At rated load (200W)*	
Momentary Fluctuation	40 VAC / 100msec					At 60% load (120W)*	

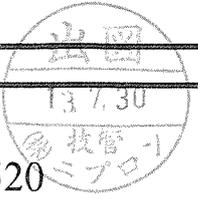
Note *The condition shall be higher than 0°C ambient temperature and later than 10sec after the start-up.

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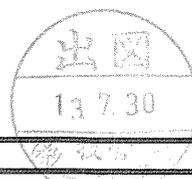


Items			Specification					Measurements conditions, etc.
			mOZP-200-					
			12	15	24	36	48	
Environment	Operating Temp.	Natural Air	-10 to 60°C (Open frame)					Refer to "Output derating specification".
		Cooling	-10 to 55°C (With chassis and cover)					
		Forced Air	-10 to 70°C (Open frame)					Refer to "Output derating specification".
		Cooling	-10 to 70°C (With chassis and cover)					
	Operating Humidity		20 to 90%RH					
	Storage Temp. / Humidity		-20 to 75°C / 10 to 95 %RH					There shall 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. (1G for power supply heat releasing fin side (label attached side))					Follow JIS-C-60068-2-6 At no operation
Surface Dropping		Left one bottom edge of the unit 50mm high with the opposite edge placed on the test bench, and let it fall. Repeat 3 times for each of four bottom edges, and no malfunction shall be observed.					Follow JIS-C-60068-2-31 At no operation	
Insulation	Dielectric Strength		3kVAC/1min between input and output/RC/AC_FAIL*1					Cut-off current 10mA
			2kVAC/1min between input and FG					Cut-off current 10mA
			500VAC/1min between each output-RC-AC_FAIL-FG					
	Insulation Resistance		50MΩ min. between each input-output-RC-AC_FAIL-FG					At 500 VDC
Leakage Current		Refer to page 8						
Others	Electrostatic discharge		IEC61000-4-2 test level 3 compliant (Contact discharge: ±6kV, 10 times)					Apply to FG and case. There shall be no malfunction, nor failure.
	Line noise immunity		±2000V (pulse width of 100/1000nsec, cycle period of 30 to 100Hz, Normal/Common mode with Positive/Negative polarity for 10 minutes)					To be measured with INS-410. There shall be no output voltage fluctuation in DC component nor malfunction.
	Impulse voltage immunity		IEC-61000-4-5 (Installation environment 3, 4) compliant; apply 5 times each of Common mode ±4kV and Normal mode ±2kV					There shall be no malfunction, nor failure.
	Conducted emission		VCCI, FCC, CISPR22, and EN55022 Class B compliant					At rated input and output (natural cooling), with chassis
	Harmonic current regulations		IEC61000-3-2 (edition 2.1) class D, EN61000-3-2 (A14) class D compliant.					At rated input and output
	Safety Standard		ANSI/AAMI ES60601-1, UL60950-1, CSA60950-1(c-UL), CE marking approved, PSE (Ordinance item 2) compliant					IEC60601-1 (3rd, MOOP)
	Cooling system		Natural air cooling					
	Dimensions and Weight		73×40×222 (W×H×D)/530g typ					Without Chassis and Cover
			83.8×51×252 (W×H×D)/830g 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.					The unit shall be operated at normal temperature and humidity. Except for lifetime of electrolytic capacitors due to operating environment.	

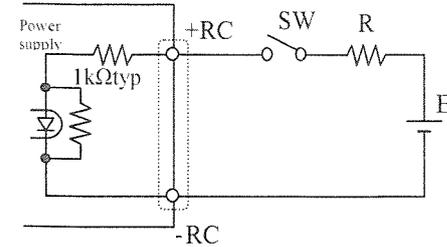
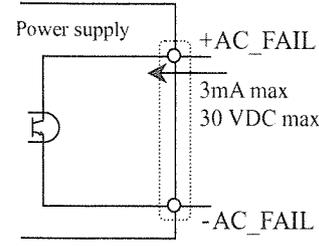
Note *1. Actual dielectric strength is 4kV between AC input and DC output, but there could be a possibility of deterioration applying 4kV at finished goods inspection. Therefore the value is set as 3kV.

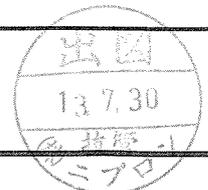
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Output Specification									
Items		Specification					Measurement conditions, etc.		
		mOZP-200-							
		12	15	24	36	48			
Output Rating	Rated Voltage		12V	15V	24V	36V	48V	At rated input Refer to "Output derating specification"	
	Continuous rating (natural air cooling)	Current	16.7A	13.4A	8.4A	5.6A	4.2A		
		Power	200.4W	201W	201.6W	201.6W	201.6W		
	Continuous rating (forced air cooling)	Current	20A	16A	10A	6.7A	5A		
		Power	240W	240W	240W	241.2W	240W		
Peak rating (10 seconds or less)	Current	33.4A	26.7A	16.7A	11.2A	8.4A	At rated input/output. Refer to "Peak output specification" Natural and forced air cooling.		
	Power	400.8W	400.5W	400.8W	403.2W	403.2W			
Output Characteristics	Factory setting		12V ±2%	15V ±2%	24V ±2%	36V±2%	48V±2%	At rated output	
	Adjustable voltage range		12V+10% /-25%	15V+15% /-20%	24V+20% /-20%	36V+15% /-20%	48V+15% /-15%	At more than rated voltage setting, use it within rated output power.	
	Static input regulation		48mV max.	60mV max.	94mV max.	144mV max.	192mV max.		
	Static load regulation		100mV max.	120mV max.	150mV max.	220mV max.	300mV max.		
	Temperature regulation		0.02%/°C max.						
	Ripple voltage	0 to 70°C	120mV max.				150mV max.	Connect 150mm max. lead wire to output connectors, and then connect a 10µF electrolytic capacitor with a 0.1µF ceramic capacitor in parallel to the other ends of the wires to measure by an oscilloscope with 100MHz frequency band.	
		-10 to 0°C	160mV max.				200mV max.		
Spike voltage	0 to 70°C	150mV max.				250mV max.			
	-10 to 0°C	180mV max.				400mV max.			
Protection Circuit	Overcurrent protection	OCP point	101% min. of peak rated current						
		Method	Hold-down current limiting → Blocking oscillation						
		Recovery	Automatic recovery						
	Overvoltage protection	OVP point	13.8-16.2V	17.3-20.3V	30.0-35.0V	43.2-49.4V	56.2-63.0V	For 12V and 15V type, do not apply external voltage to output terminal.	
Method		Output shutdown							
	Recovery	Reclosing of AC input or RC signal OFF → ON							
Backup specification	By connecting the dedicated capacitor package (sold separately) with the dedicated connection harness (sold separately) to CN3, the output power will be backup during the following time at AC input failure.		Capacitor package model name	Output power at back-up operation				(Note) Back-up time shown left is indication value, not guaranteed value.	
					50W	100W	150W		200W
			BS13A-EC400/422F (Charge time: 1 minute typ.)	2.8 sec.	1.3 sec.	0.8 sec.	0.5 sec.		
Note									



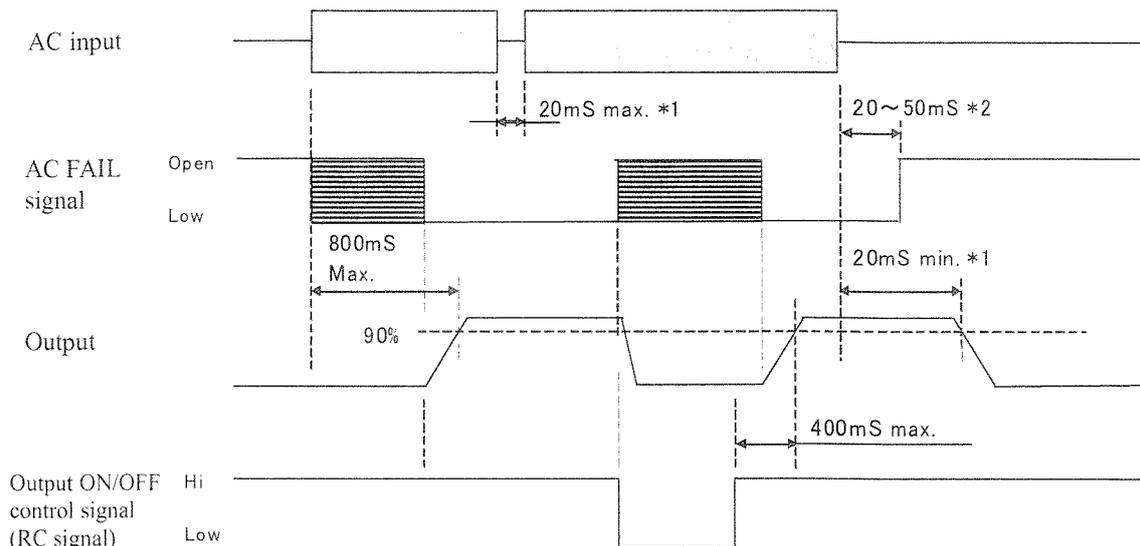
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Signal Input/Output specification																						
Items	Specification					Signal input/output circuit diagram/ Other																
	mOZP-200-																					
	12	15	24	36	48																	
Input signal	Output ON/OFF control signal (RC signal) 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.	Operating mode <table border="1"> <tr> <td>between +RC and -RC</td> <td>Output</td> </tr> <tr> <td>SW ON (4.5V min.)</td> <td>ON</td> </tr> <tr> <td>SW OFF (0.8V max.)</td> <td>OFF</td> </tr> </table>			between +RC and -RC	Output	SW ON (4.5V min.)	ON	SW OFF (0.8V max.)	OFF	External power supply and Load-limiting resistor <table border="1"> <tr> <td>External power supply: E</td> <td>Load-limiting resistor: R</td> </tr> <tr> <td>4.5-12.5 VDC</td> <td>Not required</td> </tr> <tr> <td>12.5-30 VDC</td> <td>1.5kΩ</td> </tr> <tr> <td>30-48 VDC</td> <td>8.2kΩ</td> </tr> </table>		External power supply: E	Load-limiting resistor: R	4.5-12.5 VDC	Not required	12.5-30 VDC	1.5kΩ	30-48 VDC	8.2kΩ	Circuit diagram  <p>Note: Shorting plug (CN2) and radiating fin next to it are primary circuit components. Make sure to operate the plug after the AC input is turned off.</p>	
	between +RC and -RC	Output																				
	SW ON (4.5V min.)	ON																				
	SW OFF (0.8V max.)	OFF																				
External power supply: E	Load-limiting resistor: R																					
4.5-12.5 VDC	Not required																					
12.5-30 VDC	1.5kΩ																					
30-48 VDC	8.2kΩ																					
Remote Sensing signal (RS signal)	Input terminal for the detection of output voltage. Line-drop at positive side of output cable shall be covered by connecting RS signal to positive side of devices.																					
Current balance signal (CB signal) <i>*Only for "mOZP-200-*SE*"</i>	Input terminal on current balance circuit During parallel running, connect CB terminals of each power supply.					Total output current at connecting N units in parallel shall be within "rated output current x N x 0.9"A. (N ≤ 5)																
Voltage balance signal (VB signal) <i>*Only for "mOZP-200-*SE*"</i>	Input terminal on voltage balance circuit During parallel running, connect VB signal terminal of each power supply.					Higher VR setting value of output voltage shall be preferential.																
Output signal	Blackout detection signal (AC_FAIL)	To go "OPEN" when AC input voltage goes down and power failure is detected. However, it is undefined at RC signal OFF Detection voltage: 80 VAC typ. Detection delay time: 20 - 50ms after AC failure			Circuit 																	
	LED drive output	Delivers "Hi" when main inverter circuit is operating and an external LED will light. The LED light turn off during main inverter circuit is shut down, such as circuit failure, AC fail, or OFF operation by "output ON/OFF control signal".			Open voltage: 10V max. Max current: 14mA max. (Built-in 680Ω) (Note) There may be LED light darken or flickering at output power is with light load (10% or less) or pulse load even if main inverter circuit is operating.																	
Note:																						



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●Sequence Timing diagram (W/O Capacitor package connected)



Undefined

*1: At rated input, and rated 200W output. However, in the case of 15V output, it shall be at 170W output.
 *2: When output power is 10% or less of rated power, the period shall be 70ms or less provided that input voltage is AC 150V or higher.

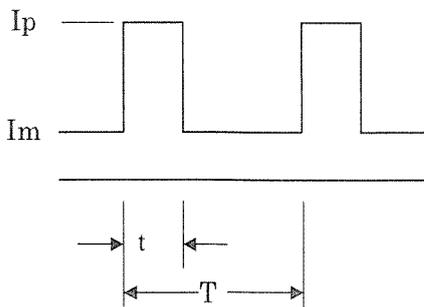
●Peak output specification

Peak output current shall meet the specification below.

- Duty ratio of peak current shall be 45% 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 natural air 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, I_o, after derating specified in "Output derating" item.

$$\sqrt{((I_p^2 \times D) + (I_m^2 \times (1-D)))} \leq I_o$$

I_p=Peak current value
 I_m=Min. current value
 D=Duty ratio, t/T
 t=Pulse width of peak current
 T=Cycle
 I_o=Continuous rated current specified in "Output derating" item.



Note:

In case of temperature of power thermistor for prevention of inrush current will not go up enough, such as the amount of average load power is small, (Resistance value is high), output power at peak power might drop for about 100ms.
 If this might cause any problem, please check output voltage waveform equipping and operating the power supply with actual device.

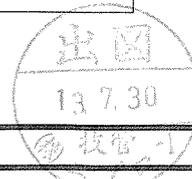
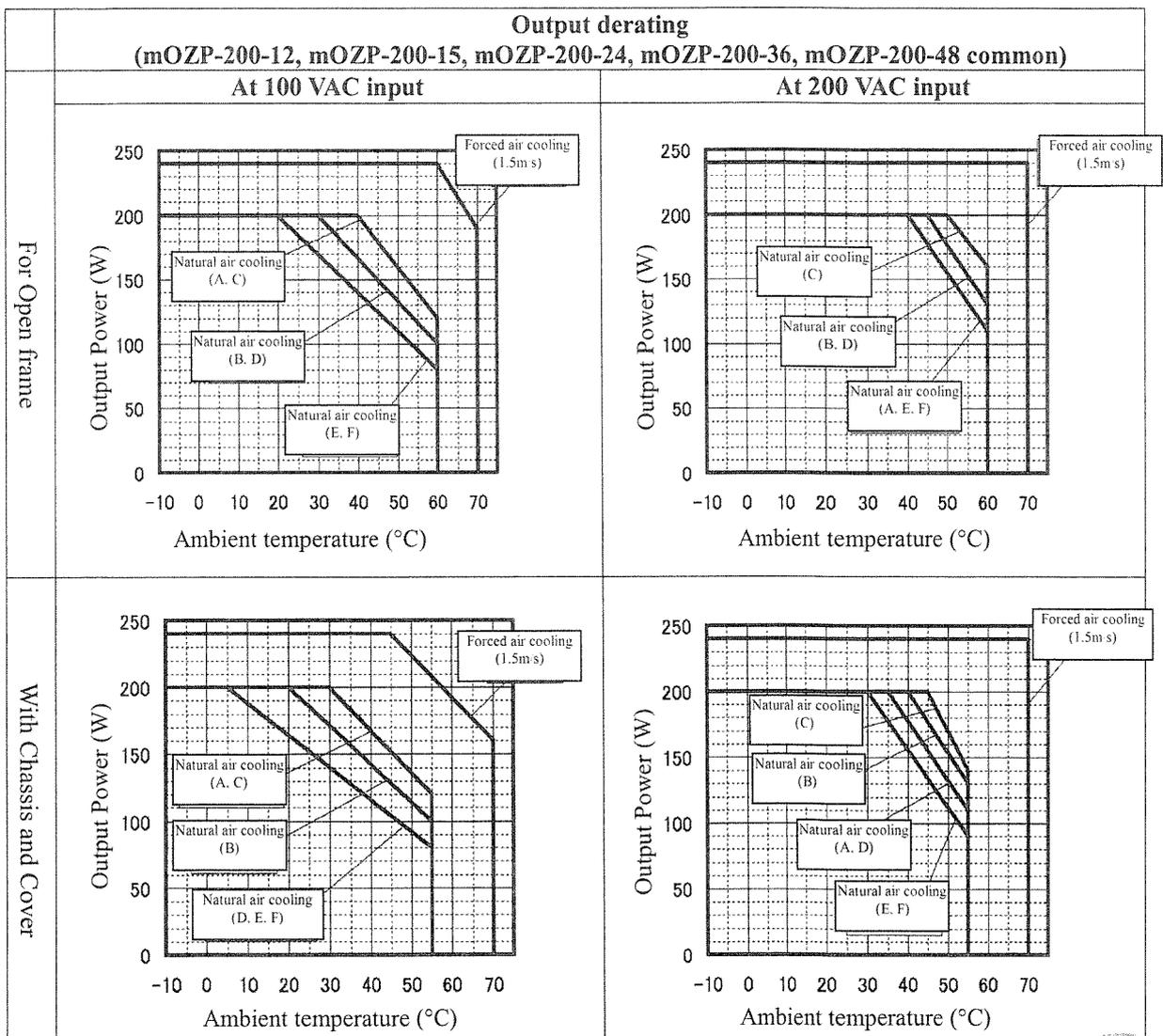
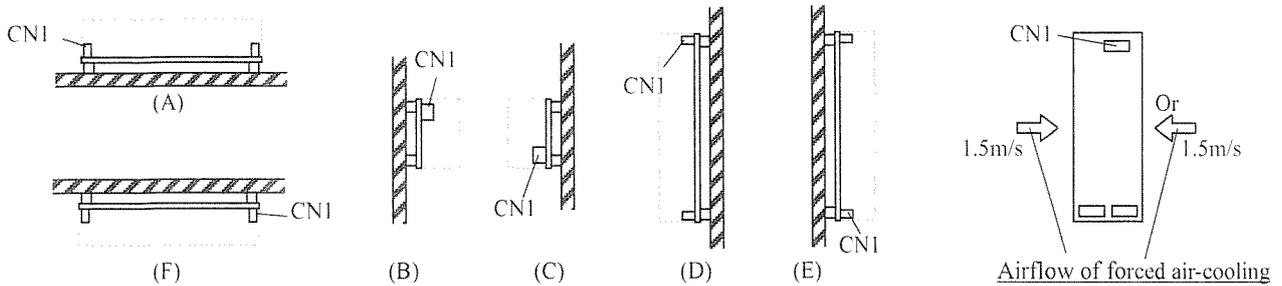
Note



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●Output derating based on ambient temperature, installation direction and cooling condition

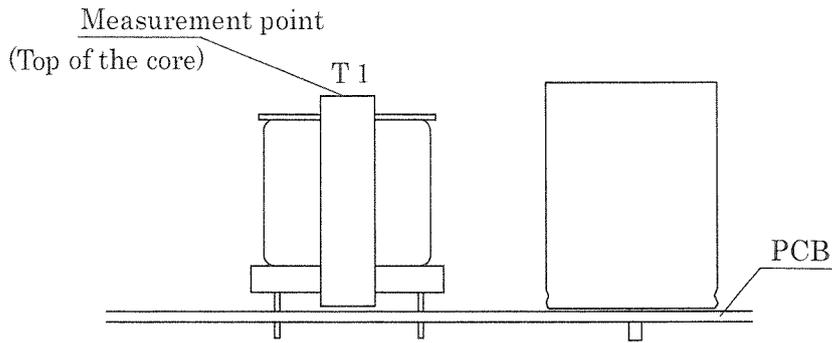
Follow the derating diagram below for output according to the ambient temperature and installation direction. In addition, for the unit with chassis and cover, input voltage shall be 90 VAC or higher. Also, the condition of forced air-cooling shall be 1.5m/s, direction indicated in arrows below.



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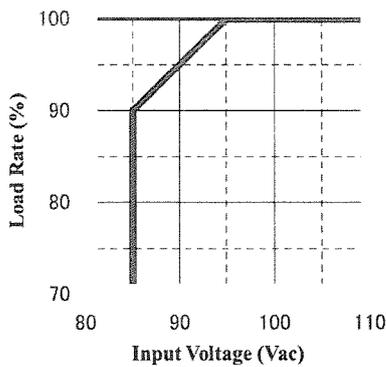
Guideline for forced air cooling

Set the core surface temperature of the transformer (T1) to 80°C or lower.



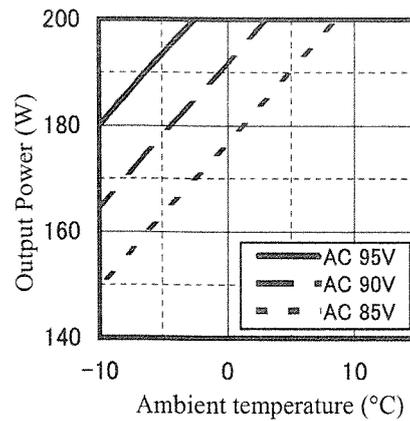
● Output derating vs. Input voltage

When input voltage is 95 VAC or lower, follow the derating diagram below to reduce the continuous rated current and power.

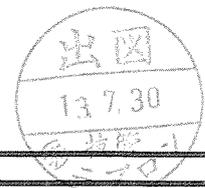


● Output derating for startup at low temperature

When power supply is operated at lower temperature, follow the derating diagram below to reduce the output power for startup.



Note



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●Precautions for parallel operation

By connecting the outputs of “N” power supplies in parallel, output capacity “Rated output x N units x 0.9” will be obtained. In this case, please pay attention to the points written below. (N≦5)

(Connection)

- Please connect the dedicated cable (Model type: WH-02PH02PH-200) between the connectors “CN13” or “CN14” on the PCB of both power supplies connected in parallel. By connecting between these connectors, output current balance for each power supply is controlled to be equal.
- Load wires from each power supplies should be wired to make both impedance equal as much as possible.

(Output voltage adjusting)

- When adjusting the output voltage, set either one of the potentiometer to the minimum (to the leftmost), and adjust the output voltage using the potentiometer of the other power supply.

(Temperature increase)

- There might be heat increasing caused by installation interval, direction, and any shielding materials around power supply units when you connect in parallel. To avoid temperature increase, please check temperature increasing with equipping actual device and operate. In case of the temperature of transformer (T1) exceeds 80°C (indication value), please change the installation interval, direction, or cut down the output power to avoid temperature increasing.

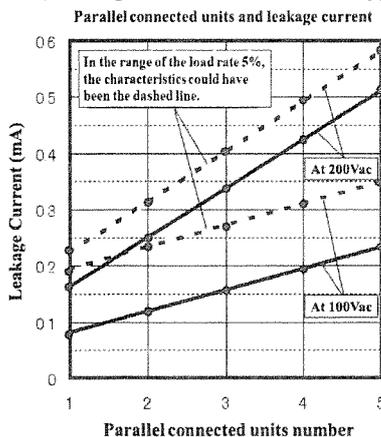
(LED indication)

- LED on the PCB lights green when the main inverter circuit is operating, and blacks out at circuit failure, AC input failure, or with main inverter circuit stopped by turning off “Output ON/OFF control signal”. Also, there may be LED light darken or flickering at output power is with almost no load (approx. 5W or less) or pulse load even if main inverter circuit is operating.

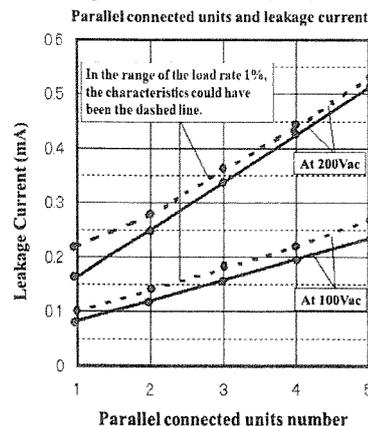
(Leakage Current)

- Please refer to the below for leakage current value at parallel connecting.

(Leakage current for 12, 15V type)



(Leakage current for 24, 36, 48V type)



(Others)

- Because it does not include O Ring diode in the output terminal, output power does not remain when one of the power supplies is damaged due to short mode etc. In addition, output power does not remain normally when power supply in operation is connected to the one in shutdown condition in parallel.

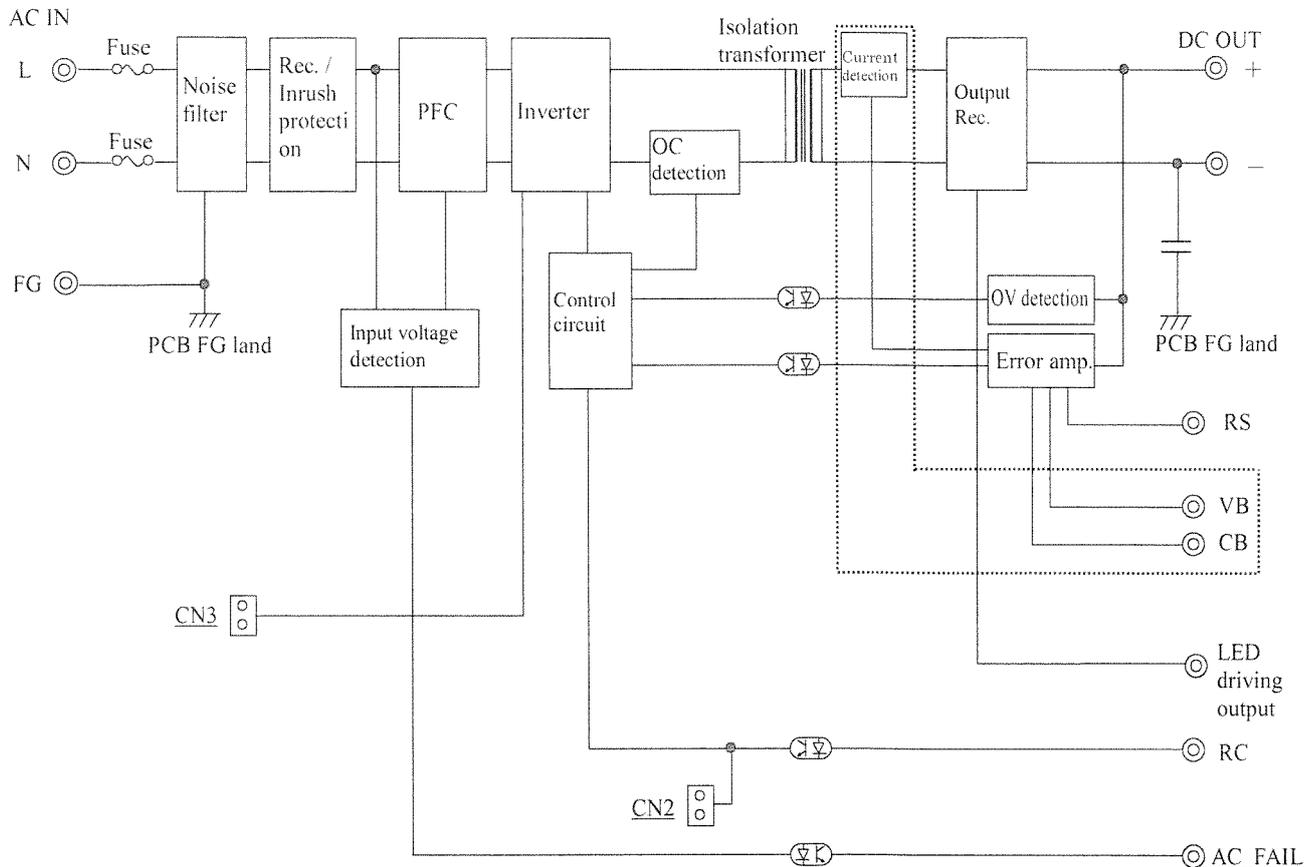
Note



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Circuit block diagram

(is applied to mOZP-200-*-*SE*-* model only)



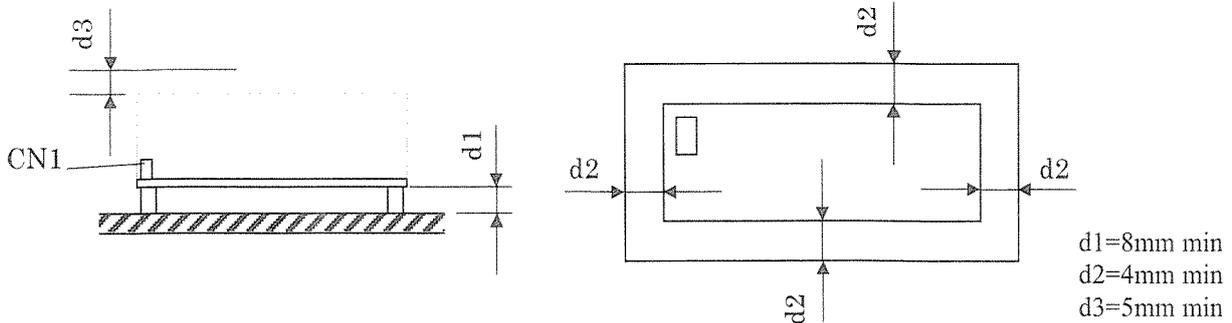
Note



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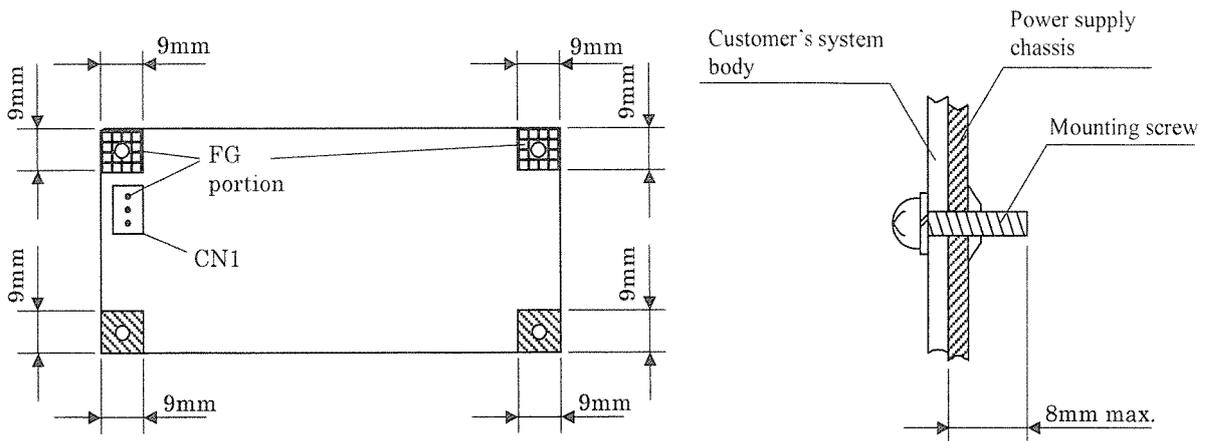
Power supply installation

- To meet the safety standard for Insulation and dielectric withstand, install the power supply to keep the dimensions, d1, d2, and d3, shown in the drawings below.
- Install the power supply so that natural air convection and air ventilation is expected to keep the temperature rise around the power supply low.

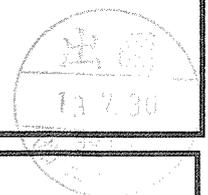


Mounting screws and grounding of power supply

- Fix all four screws firmly at power supply mounting holes.
- Use 3mm diameter screws for mounting power supply.
- In mounting, do not use any metal parts that exceed the hatched area shown below.
- In mounting the unit with Chassis and Cover, do not use any screws that exceed the area shown below.
- Make sure to connect FG terminal of CN1 or FG portion of PCB to customer's safety grounding. Also, make sure to connect FG terminal of CN1 to the safety ground of the customer's system in the case of safety standard application.
- Be recommended to connect the FG portion of solder face of PCB to customer's metal system body with metal parts such as metal spacers to reduce noise.



Note



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Precautions before use

1. Grounding - ⚠ Warning
This unit is designed and produced to meet Class 1 equipment. Make sure to connect the grounding terminal of the unit to grounding in a proper way for safety.
2. Electric shock - ⚠ Warning
This unit is designed and produced as built-in equipment and has high-voltage part inside. Make sure to securely install in the equipment in a proper way to prevent electric shock. Also, shorting plug (CN2) for RC signal setting and radiating fin next to it are primary circuit components. When the plug is handled, make sure to turn off AC input before the handling of the plug.
3. PCB handling - ⚠ Caution
In handling, use the edge of the PCB so as not to touch the component sides. Lift the PCB from the equipment with filter pieces in installation. Besides, handle the PCB with care to prevent twisting or bending of the PC board as it has SMT components on it.
4. Output short circuit - ⚠ Caution
Prevent shorting outputs. When output is shorted, capacitors inside the power supply rapidly discharge leading to fire and/or spark resulting in serious accident. It also shortens the lifetime of the power supply.
5. Applying external voltage to output terminal- ⚠ Caution
Applying external voltage to power supply's output terminal, parallel connection of output power without connecting voltage and current balance signal (CN13 or CN14), parallel connection of power supplies with different output (12V output and 15V etc.) may lead to the failure of power supply.
6. Inrush current control circuit - ⚠ Caution
To prevent inrush current into smoothing capacitors when AC input is turned on, a power thermistor is used. When AC input is turned on before the temperature of the thermistor goes low after turning off, huge inrush current may occur. Make sure to keep 60-second period at least before reclosing of AC input.
7. Output energy - ⚠ Caution
The output energy of this unit is 240VA or more, and regarded as dangerous. Any operators must not touch the unit. Besides, apply necessary measures to prevent service personnel or service tools to touch accidentally the equipment with this unit installed. Make sure that the output voltage of this unit goes down to the safe level before servicing after the input voltage is turned off.



Drawn by	ishib	Checked by	yamad	Approved by	yamam	Model name: mOZP-200-12 (15,24,36,48)-**E*-*	Drawing No. 3165-13-4-520
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