

This specification applies to the following part numbers.
 Embedded type DC stabilized power supply with backup function at blackout: HN5P5-350P-S20-B0V.
 Set model with a dedicated RS232C signal unit (SU-RS): HN5P5-350P-S20-B1V
 Set model with a dedicated buzzer unit (SU-BU): HN5P5-350P-S20-B2V
 Set model with a dedicated USB signal unit (SU-US): HN5P5-350P-S20-B6V
 This unit provides DC output power while connected to a dedicated battery pack (built-in at the shipment) even at AC power failure.
 Items marked with “*1” in this specification apply to HN5P5-350P-S20-B1V.
 Items marked with “*2” in this specification apply to HN5P5-350P-S20-B2V.
 Items marked with “*3” in this specification apply to HN5P5-350P-S20-B6V.
 Provided at normal temperature and humidity unless otherwise specified.

General specification

Items		Specifications	Measurement conditions, etc.
AC Input	Rated voltage	100-240 VAC	Worldwide range
	Voltage range	85-264 VAC	(Note 1)
	Input current	2.9A typical at 100 VAC input / 1.2A typical at 240 VAC input	Rated output when charging
	Rated frequency	50 / 60 Hz	Frequency range: 47-63Hz
	Inrush current(Note 2)	50A peak max. at 100 VAC 100A peak max. at 240 VAC	With continuous rated output at cold start (25°C) AC input re-entry time interval 60s min.
	Power factor	96% min. (100 VAC input) / 90% min. (240 VAC input)	At rated output
	Efficiency	84% typical at 100 VAC input / 88% typical at 240 VAC input	Expect when charging
	Standby power	0.5W max.	(Note 3)
Battery	Battery voltage	18 Vdc	Lithium-ion battery
	Rating capacity	2500mAh	State of Charge at shipment: 30% max.
	Safety standard of battery	IEC62133, UN38.3	
Environment	Operating temp. /Humidity	0 to 60°C / 10 to 90% RH	No condensation (Note 4)
	Storage temp. /Humidity	-20 to 70°C / 10 to 90% RH	No condensation (Note 5)
	Vibration	2G, 10 to 55Hz, 10 sweep cycles in each X, Y, Z direction	JIS-C-60068-2-6 At no operation
	Mechanical strength	Lift one bottom edge 50mm high with the opposite edge placed on a test bench, and let it fall. Repeat 3 times on the other three edges as well, and no malfunction shall be observed	JIS-C-60068-2-31 At no operation

Note


- Note 1. Follow the derating conditions on another page regarding the lower limit of input voltage at continuous max and peak rating.
- Note 2. Charging current equal to or less than 100μs into X-capacitor in input filter circuit shall not be defined as Inrush current.
- Note 3. Rated input, PS_ON = 'H' with no load at 5VSB
- Note 4. Follow the derating conditions on another page when the ambient temperature exceeds 45°C.
- Note 5. Re-charging once at least per year (or 6 months if available) is required for 6 months or longer storage.
 When re-charging is not conducted beyond the period, the battery may not recover enough capacity.
 1 year or less storage : -20 to lower than +20°C/10 to 95%
 Within 90 days storage : -20 to lower than +40°C/10 to 95%
 Within 30 days storage : -20 to lower than +50°C/10 to 95%
 If the storage temperature exceeds 50°C, the battery shall be stored separately.
 When the input voltage is applied after long term storage, the power supply may charge the battery for about 8 hours.



Drawn by <i>Marumo</i>	Reviewed by <i>T. Nakamura</i>	Approved by <i>TTC</i> 22.9.07 有野	Series name: HN5P5-350P-S20-B*V	Drawing No. 6 2 2 4 - 0 1 - 4 - 5 2 0 1 / 10
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Items		Specifications	Measurement conditions, etc.
Insulation	Insulation resistance	50MΩ or more between input and FG/output	At 500 VDC
	Dielectric strength	AC1.5kV for one minute between input and FG/output	Cut-off current 10mA
	Leakage current	0.2mA max. at 100 VAC input, 0.4mA max. at 200 VAC input, 0.5mA max. at 240 VAC input	
EMS/EMI	Line noise immunity	±2,000V (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 in DC of output or no malfunction
	Surge immunity	IEC 61000-4-5 Installation Environment Class 3 compliant Common mode: ±2kV, Normal mode: ±1kV 5times for each	There shall be no malfunction or no failure At 100V/240V AC
	Electrostatic discharge immunity	IEC 61000-4-2 test level 3 compliant Contact discharge:10 times at ±6kV	There shall be no malfunction or no failure At 100V/240V AC
	Conducted emission	VCCI/FCC/CISPR22-B/EN55022 class B compliant	To be measured on the single power supply
	Harmonic current	IEC 61000-3-2 Class D compliant	At rated input and load
Others	Safety standard	UL62368, CSA62368 (c-UL), EN62368, CE marking, PSE compliant	Class I equipment: Embedded type power supply
	Cooling system	Forced air cooling by an internal fan	Fan speed changes according to operating temp. and load condition. Maximum rotation during backup operation.
	Dimensions	150 (W)×85(H)×140(D)	Excluding protrusions; refer to the outline drawing on another page
	Weight	1.7 kg typ.	Including battery
	Reliability grade	FA	Original design category
	Lifetime expectancy	10 years or longer (Limited lifetime component: electrolytic capacitors and fan motor)	Lifetime expectancy when operated at 100VAC, rated load, and 40 °C of the ambient temperature
	M.T.B.F.	50,000h min.	Based on EIAJ RCR-9102
	Warranty	3 years after delivery: if the defect is our responsibility, the defective unit shall be repaired or replaced at our cost	Except for the operation out of the specification, and battery life deterioration

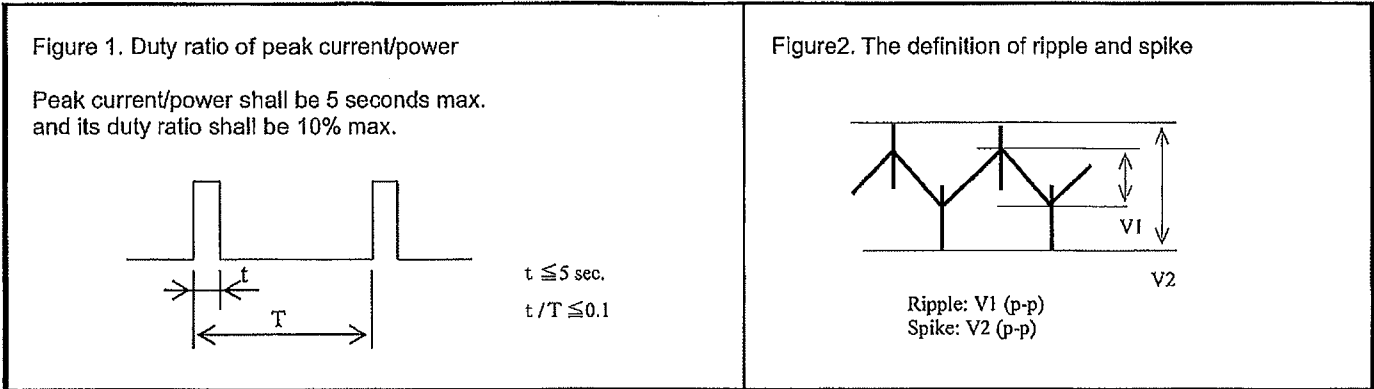


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Output specification								
(Voltage is measured at output connector terminals. A voltage drop of the load side due to contact resistance is not included)								
Items		CH1	CH2	CH3	CH4	CH5 (5VSB)	Measurement conditions, etc.	
Output rating (AC operation)	Rated voltage	+3.3V	+5V	+12V	-12V	+5V		
	Min. current	0A	0A	0A	0A	0A		
	Rating	Rated current	8A	8A	14A	0.5A	1.0A	Standard value at measuring of input/output characteristics
		Rated power	26.4W	40W	168W	6W	5W	
	Continuous max.	Max. current	12A	12A	20A	0.5A	1.0A	Continuous rating. The maximum total output power is 245.4W (See the derating conditions on another page)
		Max. power	66.4W		240W	6W	5.0W	
			240.4W					
	Peak rating	Peak current	22A	22A	28A	0.5A	2A	The momentary rating is within 5 seconds. Momentary total output power is 346W. (See Figure.1 and the derating conditions on another page)
		Peak power	113W		336W	6W	10W	
			336W					
Output rating (Backup operation)	Rating	Rated current	6A	6A	12A	0.5A	1.0A	
		Rated power	19.8W	30W	144W	6W	5W	
	Continuous max.	Max. current	12A	12A	16A	0.5A	2A	
		Max. power	66.4W		192W	6W	10W	
			200W				205W	10W
Output characteristics	Total voltage regulation	±5%	±5%	±5%	±10%	±5%	Accuracy against output voltage value including temperature and time-lapse drift as well as input /load regulation	
	Max. ripple voltage (mV _{p-p})	50 Max.	50 Max.	120 Max.	120 Max.	50 Max.	Connect an electrolytic capacitor (47μF) and a ceramic capacitor (0.1μF) on the test board and measure with an oscilloscope of 100MHz bandwidth.	
	Max. spike voltage (mV _{p-p})	100 Max.	100 Max.	200 Max.	200 Max.	100 Max.	The test board shall be separated from load wires and within 150mm from the output terminals.	
Protection	OCP1	OCP(A)	23 Min.	23 Min.	29 Min.	Short circuit protection		No loads except for the measured output
		Method	All outputs except CH5 shut down.			Hold-down current limiting	All outputs shut down	All outputs shut down if CH5 is short
		Recovery	Reclosing of AC input or PS_ON# signal.			Automatic recovery		AC input re-entry time interval: ≥270s.
	OCP2(Not 6)	OCP(A)	23 Min.	23 Min.	20 Min.	Short circuit protection		No loads except for the measured output
		Method	All outputs shut down.			Hold-down current limiting	All outputs shut down	All outputs shut down if CH5 is short (automatic recovery)
		Recovery	Reclosing of AC input or PS_ON# signal.			Automatic recovery	Reclosing of AC input	
	OVP	OVP(V)	3.7 to 4.3	5.7 to 7.0	13.4 to 15.6	—	—	
		Method	All outputs except CH5 shut down.			—	—	
		Recovery	Reclosing of AC input or PS_ON# signal.			—	—	AC input re-entry time interval: ≥270s.
	Insulation between GNDs of each output		Connection is common for all outputs				Common with the power supply chassis	




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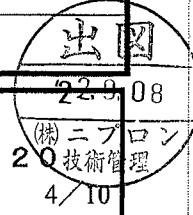


Note
Note 6. OCP 2 is a specification during a backup operation

Input/Output signal specification

	Item	Specification
Input signal	PS_ON#	CH1 to CH4 outputs will turn on at 'L' input. CH1 to CH4 and CH6 shut down at 'H' or 'OPEN' input (Battery connection shuts off when 'H' or 'OPEN' is received at backup operation.)
	+3.3V SENSE	Input terminal for voltage detection of CH1 (+3.3V); voltage drop of +side output cable is compensated when connected to load end.
	SHUT_DOWN_T	Battery connection shuts off at 'L' input with 60ms or longer. (Valid only at battery backup operation)
	SHUT_DOWN_R (*1)	Battery connection shuts off with 'positive (2.4V or higher)' input. (60ms or longer)
	FAN_C	Control terminal of a fan motor Fan motor operates at a maximum speed upon receipt of 'L'. (Disabled during battery backup operation)
Output signal	PWR_OK	'H' is delivered when CH2 (+5V) output is ON.
	FAN_M	Two pulses per rotation of individual motors are delivered. Duty ratio of square wave shall be 0.5 (typical). The signal stops 'L' or 'OPEN' when the fan stops operating due to malfunction.
	AC_FAIL_T	'OPEN' is delivered at low AC input voltage or power failure. (Detection voltage: 75VAC typical, Detection delay time: 16 to 40ms after AC power failure) (Note 7)
	AC_FAIL_R (*1)	'-9V typical' is delivered at low AC input or power failure detection. (Detection voltage: 75VAC typical, Detection delay time: 16 to 40ms after AC power failure) (Note 7)
	AC_FAIL_U (*3)	Data signal equivalent to 'Negative' of AC FAIL_R signal is delivered at low AC input or power failure detection. (Detection voltage: 75VAC typical, Detection delay time: 16 to 40ms after AC power failure) (Note 7)
	BATT_LOW_T	'OPEN' is delivered when battery terminal voltage falls down to 16V typical. ('OPEN' is delivered when a battery pack is not connected)
	BATT_LOW_R (*1)	'-9V typical' is delivered when battery voltage falls down to 16V typical. ('-9V typical' is delivered when a battery pack is not connected.)
	BATT_LOW_U (*3)	Data signal equivalent to 'Negative' of BATT LOW_R signal is delivered when battery voltage falls down to 16V typical. (Data signal equivalent to 'Negative' of BATT LOW_R signal is delivered when a battery pack is not connected.)
	Buzzer sound (*2)	Buzzer sounds at power failure. (Sound level is adjustable by a variable resistor.) (Note) The buzzer may sound for several seconds at AC power-on and AC power off.
	CHARGE	'L' is delivered when charging a battery.

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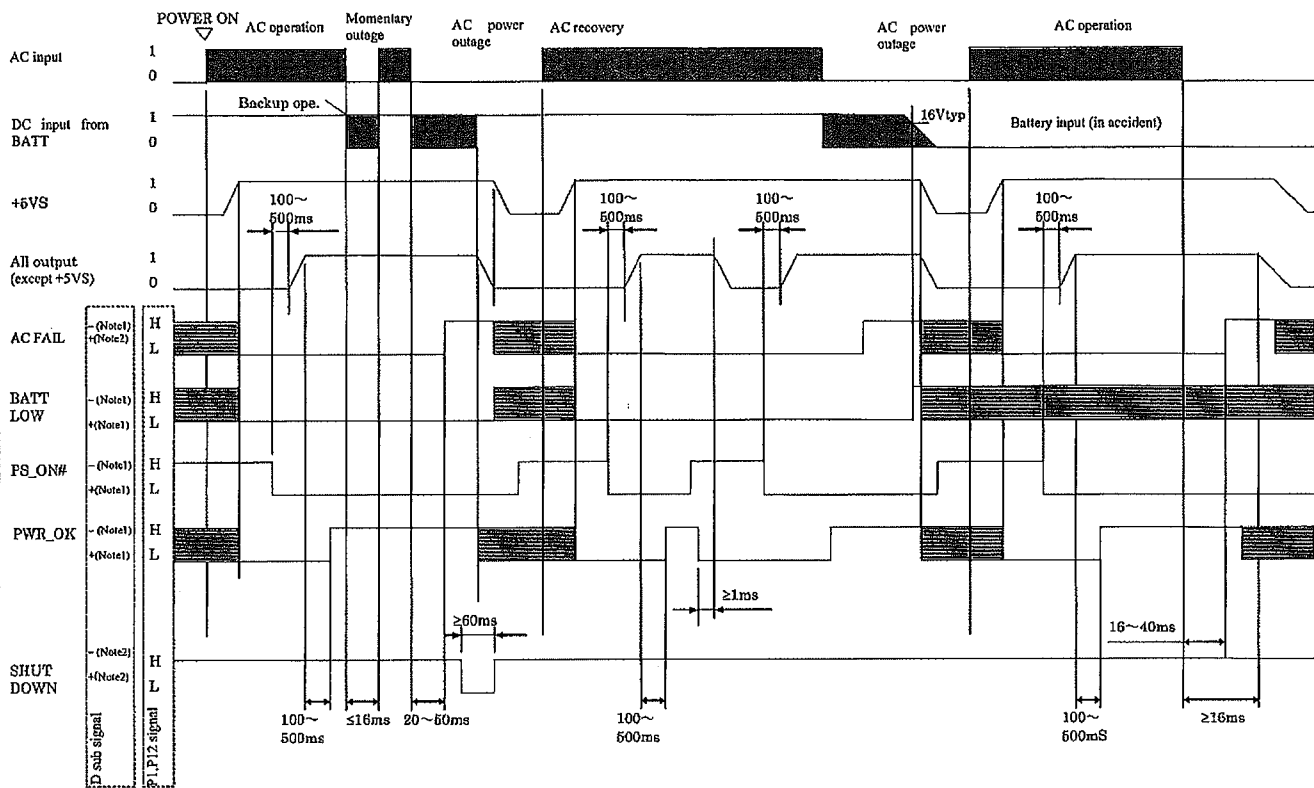
Input signal circuit	<p>PS_ON</p>	<p>SHUT DOWN_T</p>	<p>AC FAIL_R, BATT LOW_R</p> <p>ADM232AARN (Analog devices) or equivalent</p>	<p>FAN_C</p>
	<p>PWR_OK</p>	<p>AC FAIL_T, FAN_M, BATT LOW_T ,CHARGE</p>	<p>AC FAIL_U BATT LOW_U</p> <p>USB1.1 compliant (B type connector) *Special driver software is required. (Software such as UPS service that uses current RS232C signal can be run with USB signal.)</p>	

Note:
Note 7. At rated output



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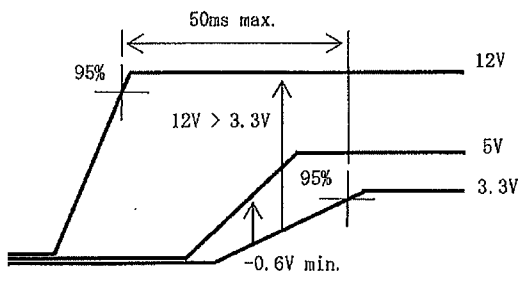
Signal input/output timing diagram (At rated input and output unless otherwise specified)



(Note 1)
 Negative (-) signal output: -9V typ.
 Positive (+) signal output: +9V typ.

(Note 2)
 Negative (-) signal output: +0.4V to -20V
 Positive (+) signal output: +2.8V to +20V

Indefinable area



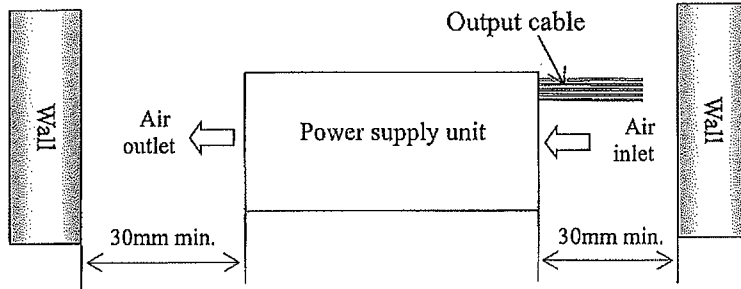
The rising time difference among outputs shall be 50ms max.
 The output voltage level at raising of CH3(+12V) shall be at or above that of CH1(+3.3V).
 Also, the difference in output voltage level between CH2(+5V) and CH1(+3.3V) shall be above -0.6V.
 However, the rising order of output voltage or the level difference of output voltage falling shall not be specified.
 The rise time of the PWR_OK signal shall be 10ms or less.
 (provided that capacitive load is not connected to PWR_OK signal output)
 Backup operation is enabled 3 seconds after the PWR_OK signal is "H".



Drawn by	Marumo	Reviewed by	<i>T. Wilson</i>	Approved by		Series name:	Drawing No.
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Installation conditions

1. This power supply unit should be installed with the clearance as shown below from the wall to its air inlet and outlet.
2. Temperature around the air inlet area of the power supply unit should not exceed the maximum operating temperature.



Derating Conditions

Follow clauses 1 and 2 below to derate output current and power in operation at high temperature and low input voltage or when a longer hold-up time is required. The load factor of each CH and the total value specified in the output specification shall be 100%.

1. When the ambient temperature adjacent to the air inlet exceeds 45°C, follow the load factor shown in Fig.1 for continuous and peak rating.
2. When the input voltage is 90V or less, follow the load factor in Fig. 2 below. When the ambient temperature exceeds 45°C, use the load factor found by multiplying the load factor in Fig. 2 and Fig. 1.

Figure1. Derating curve for temperature

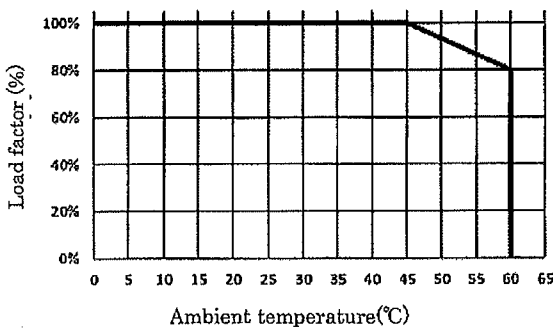
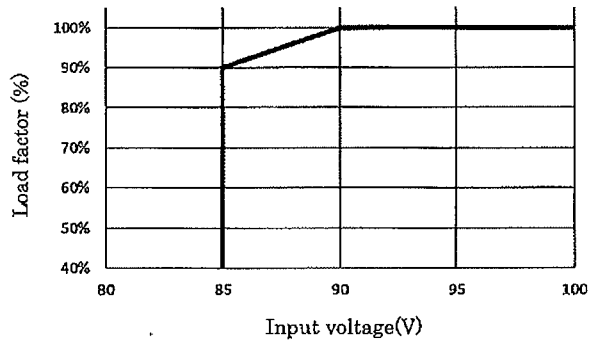


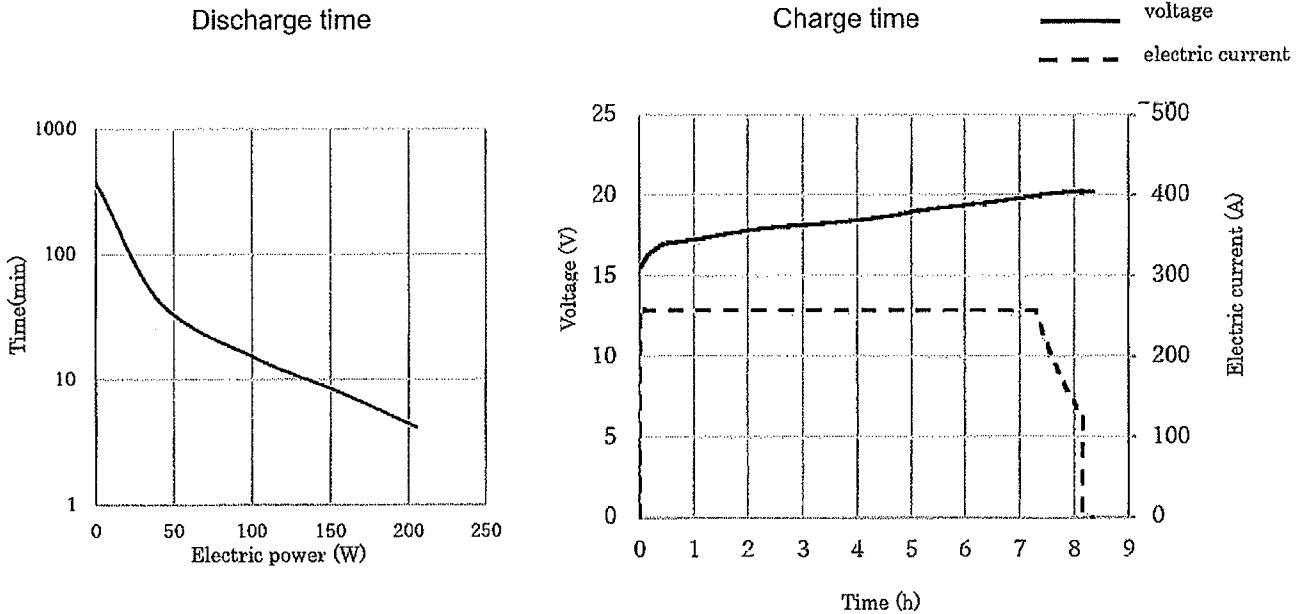
Figure2. Derating curve for input voltage



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Charge /discharge specifications

1. The battery is charged only while the PS_ON signal 'L' is input.
2. It is not charged when the battery temperature is below 10°C or above 50°C.
3. Discharge at an ambient temperature between 0°C and 50°C.



※Discharge time and charge time are examples of actual measurements and are not guaranteed values.

Battery replacement

• Replacement preparation

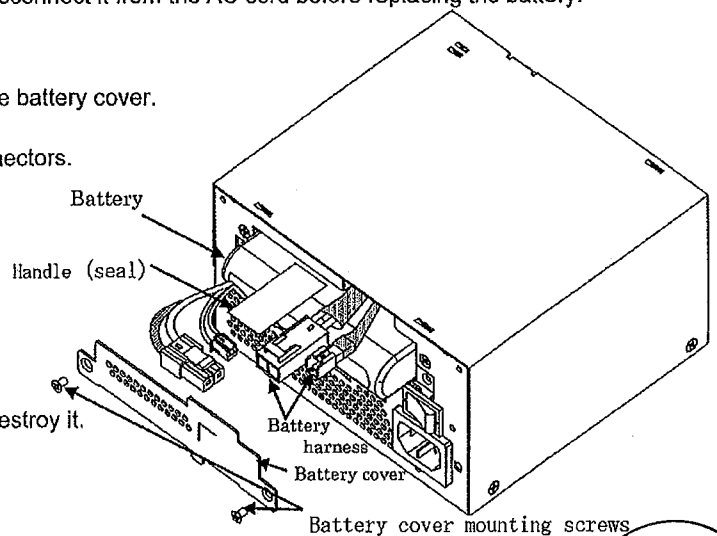
The battery is replaceable only when the unit is turned off (no output).
If the unit is in operation (outputting power), turn it off and disconnect it from the AC cord before replacing the battery.

• Battery replacement

- ① Use a screwdriver to remove the 2 mounting screws on the battery cover.
- ② Remove the battery cover.
- ③ Remove the battery connector and 2 battery harness connectors.
- ④ Grasp the handle (seal) and remove the battery.
- ⑤ Install the new battery by reversing the above procedure.

CAUTION: ⚠

Do not use a battery other than the specified one.
If the battery is leaking, do not touch the fluid.
Do not drop or give a strong impact on the battery.
Do not hold the harness when removing the battery.
Do not put the battery into the fire, decompose, modify, or destroy it.



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Current ratings of output connector pins

The maximum allowable continuous current for each of the output connector pins is shown in the table below.

The sum of the shared currents for the same output must be less than the maximum current specified for each output.

Connector	Pin	Output	Max. current(Peak)	Note	
MAIN1 (Output 1)	1	+3.3V	6.0A (8.4A)		
	2	+3.3V SENSE	-	+3.3V Sensing input	
	3	+12V	6.0A (8.4A)		
	4	+5V	6.0A (8.4A)		
	5	+5V	6.0A (8.4A)		
	6	COM	6.0A (8.4A)		
	7	COM	6.0A (8.4A)		
	8	COM	6.0A (8.4A)		
	9	COM	6.0A (8.4A)		
	10	-12V	0.5A		
	11	+5VSB	2.0A (3.0A)		
	12	+3.3V	6.0A (8.4A)		
	13	+3.3V	6.0A (8.4A)		
	14	+12V	6.0A (8.4A)		
	15	+5V	6.0A (8.4A)		
	16	+5V	6.0A (8.4A)		
	17	COM	6.0A (8.4A)		
	18	COM	6.0A (8.4A)		
	19	COM	6.0A (8.4A)		
	20	COM	6.0A (8.4A)		
	MAIN2 (Output 2)	21	PWR_OK	10mA	Signal output
		22	PS_ON	10mA	Signal input
12V (Output 3)	1	+5V	6.0A (8.4A)		
	2	+3.3V	6.0A (8.4A)		
	1	COM	6.0A (8.4A)		
	2	COM	6.0A (8.4A)		
	3	COM	6.0A (8.4A)		
	4	COM	6.0A (8.4A)		
	5	+12V	6.0A (8.4A)		
	6	+12V	6.0A (8.4A)		
HD (Output 4)	7	+12V	6.0A (8.4A)		
	8	+12V	6.0A (8.4A)		
	1	+3.3V	6.0A (8.4A)		
	2	+5V	6.0A (8.4A)		
	3	COM	6.0A (8.4A)		
	4	COM	6.0A (8.4A)		
	5	+12V	6.0A (8.4A)		
	6	+3.3V	6.0A (8.4A)		
	7	+5V	6.0A (8.4A)		
	8	COM	6.0A (8.4A)		
SIG (Output 5)	9	COM	6.0A (8.4A)		
	10	+12V	6.0A (8.4A)		
	1	AC_FAIL_T	5.0mA	Signal output	
	2	SHUT_DOWN_T	1.0mA	Signal input	
	3	BATT_LOW_T	5.0mA	Signal output	
	4	FAN_C	-	Signal input	
	5	FAN_M	5.0mA	Signal output	
	6	PS_ON	1.0mA	Signal input	
	7	COM	1.0A		
	8	CHARGE	5.0mA	Signal output	
	9	NC	-		
	10	5VSB	1.0A		
11	NC	-			
12	NC	-			

Concentration of current on specific pins may cause heat generation.
Please perform sufficient evaluation on the actual device so that the effective value and peak value of the current flowing to each pin do not exceed the specified values.



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Warnings and cautions on operation

WARNING: ⚠

- Grounding
This power supply is designed as a safety class I apparatus. For operator safety, be sure to ground the power supply by connecting the earth terminal to earth ground.
- Electrical shock hazards
This power supply is designed for embedding in a device. High voltage exists inside the power supply. Embed it into a device in an appropriate procedure to avoid electrical shock hazards.
- Output shortage
Do not make the output terminals shorted. When shorted, internal capacitors discharge at once and cause a serious accident due to spark, etc. resulting in shortening lifetime of this unit.

CAUTION: ⚠

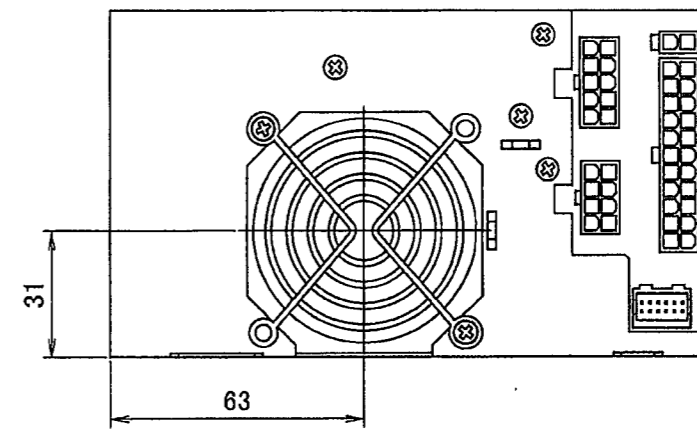
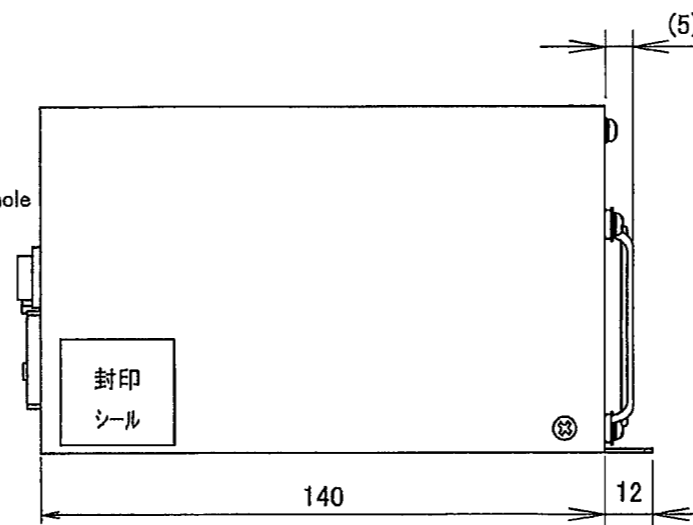
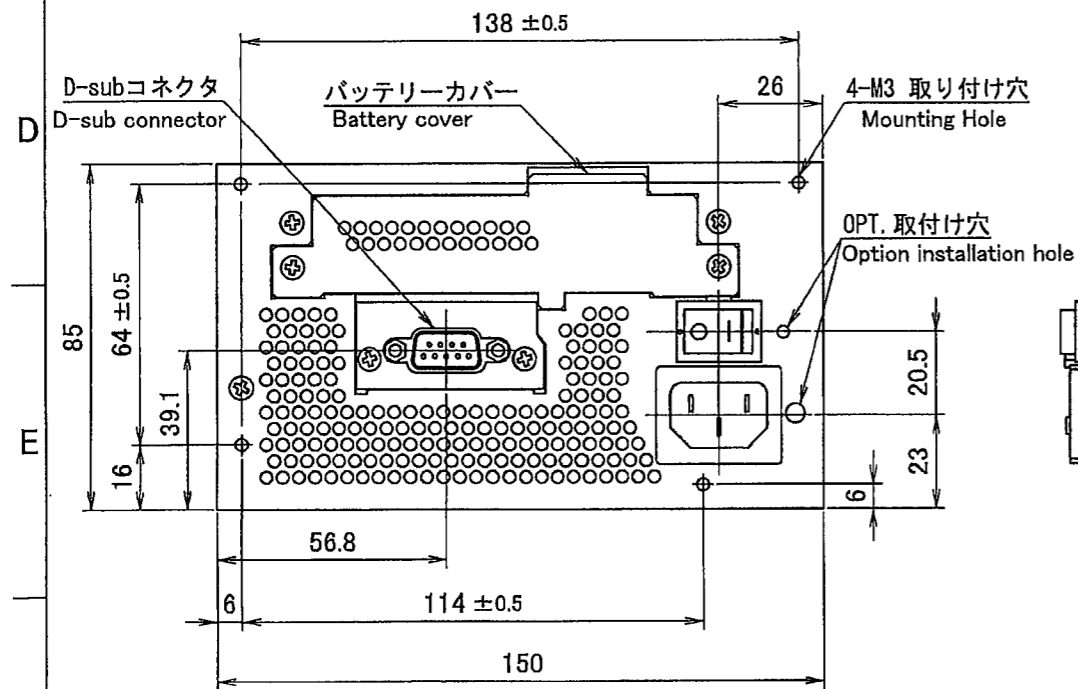
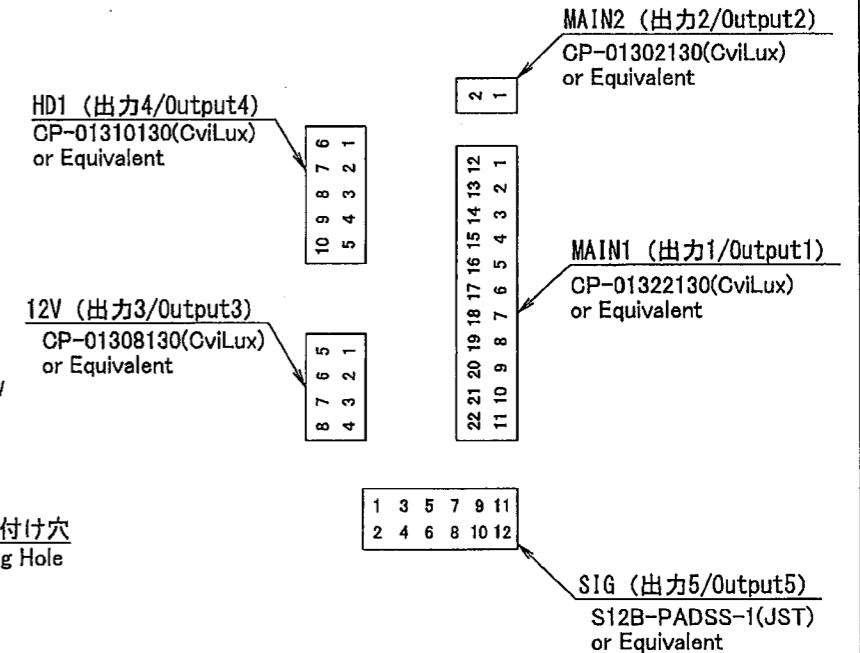
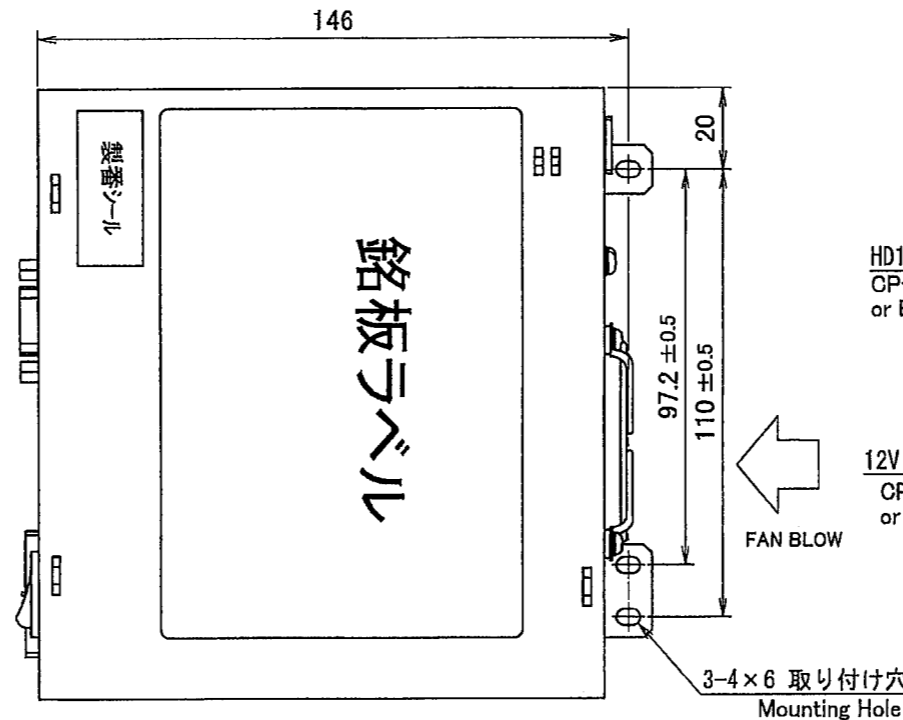
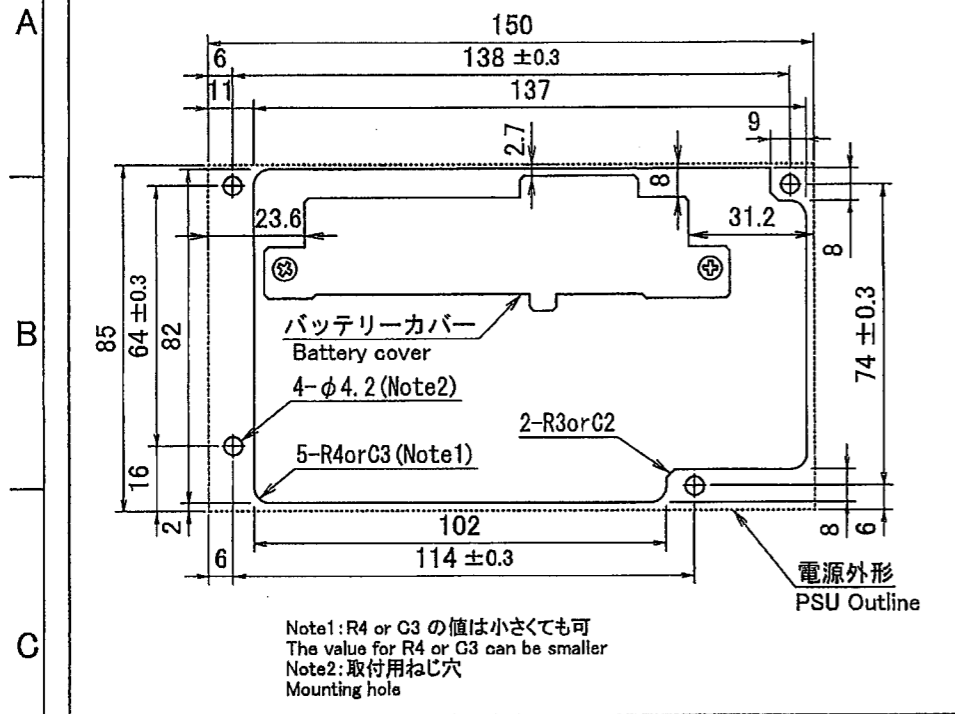
- Inrush current limiting circuit
Inrush current limiting circuit is embedded in this unit to limit surge current to smoothing capacitors when AC input is input.
When AC input is input shortly after AC shutdown, the inrush current limiting circuit may not work, and excess surge current may flow. Since it may damage the unit, make sure to re-input AC after the specified interval.
- Output cable handling
Do not grab only output cables to move or carry this unit. Make sure to hold the main body while moving or carrying.
- Retention time of the internal power supply
Due to low standby power, electricity remains for a long time on CH5 (5VSB) even after the input is shut off. Before inserting or removing output connectors, make sure that all outputs are completely stopped after the period shown below.
100VAC: 45 seconds 200VAC: 150 seconds 240VAC: 180 seconds
- Low input voltage exceeding the specification range
At low input exceeding the specification range, the unit may start and stop repeatedly, depending on the load.
- Acoustic noise at power-on
Low frequency acoustic noise may be heard at turn-on of input or power-on by REMOTE ON/OFF signal. This noise is caused by low frequency transient vibration of choke coils for harmonic measures. This will not affect performance or lifetime at all.
- ON/OFF of AC switch
When "L" is input to the PS_ON signal, turning off the AC switch causes the unit to detect a power failure. It will start backup operation.
To stop the output, input "H" to the PS_ON signal and then turn off the AC switch.
- Characteristics in a low and high-temperature environment
The time of charging and discharging varies according to temperature. In addition, satisfactory charge/discharge characteristics may not be obtained under extreme temperature conditions.
- Usage this power supply unit
This product has a built-in lithium-ion battery. When embedding it into the final product, label it appropriately for the intended use.



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推奨電源取り付け穴加工図

How to process the mounting holes(Recommended)



*1 特に指示がない寸法公差は ±1mm とする
Dimensional tolerance shall be ±1mm unless otherwise specified.
*2 取り付けビスの電源内部長さは 5mm MAX.
The screw depth of penetration into PSU is 5mm MAX.

DRAWN BY	CHECKED BY	CHECKED BY	APPROVED BY	SCALE	MATERIALS	TITLE	DRAWING No.
森	石川	狩野	FTC 24.7.21 有野	UNITS m/m			
ISSUED	2021.06.23			3RD ANGLE PROJECTION	FINISH	HNSP5-350P-S20-B1V	6224-01-3-050