

UNA350P

Instruction Manual

Safety Warnings

Be sure to read the following precautions thoroughly before using this power supply unit and battery unit.

This instruction manual describes the important operating instructions that you should follow during installation and maintenance of the power supply unit (UNA350P) and the battery unit (UNA-BT242R3).

Improper usage may cause electric shock, damage to the unit or fire hazard.

Detailed description of the battery unit in this instruction manual is based on the technical data and manual issued by the batteries manufacturer.

⚠ Danger

- Never use this unit in places with flammable gas or ignitable substances. There are risks of igniting these substances and exploding by an arcing.
- Never dispose of batteries of this product in a fire. There is risk of exploding or blowing up.
- A small amount of gas is emitted from the battery. There is not only concerns for bad influences to other equipment but also the risk of exploding when arcing occur. Do not use this product in a sealed room.

⚠ Warning

- Don't make unauthorized changes to power supply unit and battery unit, otherwise damage may occur to your equipment and void your warranty.
- There are high voltage and high temperature areas within this product. If you touch that part, you may have electric shock or burns.
- Keep your hands and face away from the unit, when unit is operating. You may be injured by accident.
- Don't use unit under unusual condition such as emission of smoke or abnormal smell and sound etc. It might cause fire and electric shock.
 In such case, please contact us, don't repair by yourself, as it is dangerous for the user.
- Don't insert anything from the aperture or drop the unit. It might cause failure and fire, when using the unit under such condition.
- Don't operate these units at the condition of condensation. It may cause fire and electric shock.
- This power supply unit has built-in blower for air-cooling. Don't block air intake and exhaust. It might cause fire.
- Don't install the battery unit at places where it will be contacted with water. It might cause electric shock or fire.
- Don't short positive terminal and negative terminal of the battery unit with wire and so on.

DWG NO. : DA003-04-01G		
APPD	CHK	DWG
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20. Oct. '11	19. Oct. '11	19. Oct. '11

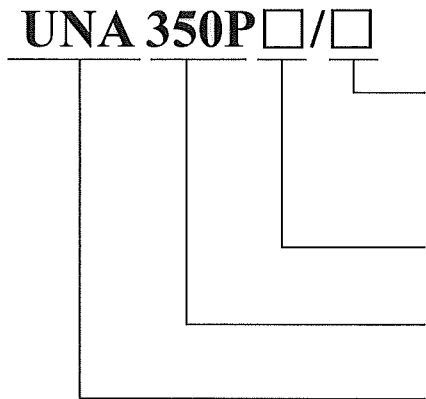
⚠ Warning

- Batteries are used in this equipment for short time power-failure and etc. As lead and diluted sulfuric acid (thinned sulfuric acid) are used in batteries, please pay special attention to handling of the battery unit.
- The life expectancy of batteries is shown in Chapter12 (Battery Life). Periodical replacement of batteries is required. In cases when ambient temperature is more than 25°C , or many times of discharging have been occurred, or high current discharge has been generated, batteries lifetime becomes short. (lifetime is about 1.8 years at ambient temperature 40°C). Therefore short interval replacement is recommended. Batteries used beyond their lifetime have a risk of smoke and fire.
- Prolonged use of this equipment without regular replacement of batteries might cause leakage of liquid from deteriorated container of battery. As leaked liquid is contained with sulfuric acid, it might cause smoke and fire. In case sulfuric acid from the battery happens to come in contact with your skin or eyes, immediately wash with running water and then consult a doctor for medical care, otherwise you might be burned skin or lose your eyesight.
- Don't short positive terminal and negative terminal of the batteries with wire and so on.
- Don't disassemble or break up the battery.
- Battery unit can present a risk of electric shock or burn from high short-circuit current. You may get burnt or become blind by arcing or a leaked liquid.

⚠ Caution

- This power supply unit is designed for industry machines.
- Input voltage, Output current, Output power, ambient temperature and ambient humidity should be used within specifications, otherwise the unit will be damaged.
- The unit might be broken down by accident or unexpected situation. For application equipment which requires very high reliability (nuclear related equipment, traffic control equipment, medical equipment, etc.), please provide fail safety function in the equipment.
- Do not use in special environment such as strong electromagnetic field, gas etc, or any environment where conductive foreign substance may enter.
- Cable for connecting battery should not be removed during battery back up operation. Connected devices and the instrument might be damaged.
- Do not remove the cover to change the variable resistor inside a power supply as this will cause failures.
- When carrying the body of this power supply unit and the battery unit, be sure to hold the bottom side (side of the base bracket) of it's body. Do not hold cable as it may cause damage.
- Don't make an improper wiring to connectors. It may cause damage.
- The output voltage of this power supply unit is considered to be a hazardous energy level (The voltage is 2V or more and the electric power is 240VA or more). Prevention from direct contact with output terminal is highly necessary. While installing or servicing this power supply unit, avoid dropping tools by mistake or direct contact with output terminal. This might cause an electric shock. While repairing this power supply unit, the AC input power must be switched off and the input and output voltage should be level.

1. Model name identification method



D: D-Sub connector (only for PB model)
 CON: Connector (AMP 1-178136-5) is mounted for AC INLET instead of IEC320 type

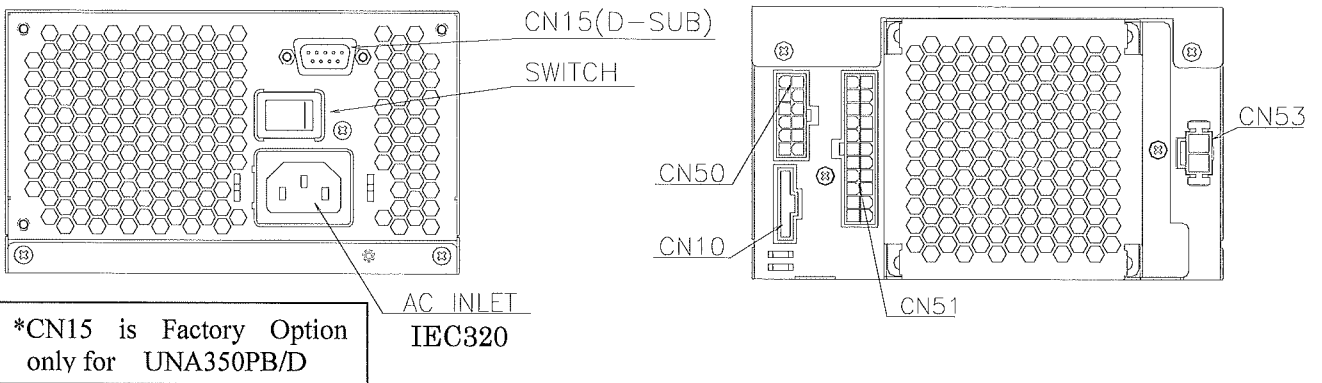
B: Battery Backup
 N: No Battery Backup

Output Power type

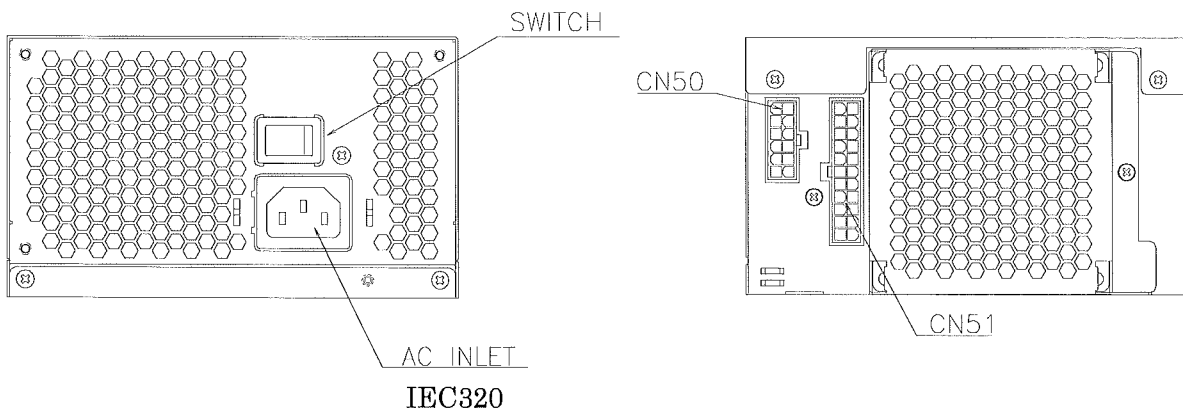
Series name

2. Terminal Explanation

UNA350PB



UNA350PN



※Output wire harnesses are optional parts.

• UNA 350P □ / CON Optional AC INLET Connector pin configuration

PIN No.	1	2	3
Function	AC(L)	FG	AC(N)

UNA350PB

USING CN	53103-0830 (MOLEX) or 70553-0007(MOLEX)							
CN NO.	CN10							
PIN NO.	1	2	3	4	5	6	7	8
FUNCTION	COM	Shut Down (TTL)	AC Fail (TTL)	BATT Low (TTL)	FAN ALM	Shut Down (RS232C)	AC Fail (RS232C)	BATT Low (RS232C)

USING CN	D sub-9P (JST) *1									
CN NO.	CN15									
PIN NO.	1	2	3	4	5	6	7	8	9	
FUNCTION	BATT Low	NC	NC	Shut Down	COM	NC	NC	AC Fail	NC	

USING CN	5566-12A (MOLEX)					
CN NO.	CN50					
PIN NO.	1	2	3	4	5	6
FUNCTION	+5V	COM	COM	+12V	COM	COM
PIN NO.	7	8	9	10	11	12
FUNCTION	+5V	COM	COM	+12V	+12V	+12V

USING CN	5566-22A (MOLEX)											
CN NO.	CN51											
PIN NO.	1	2	3	4	5	6	7	8	9	10	11	
FUNCTION	+3.3V	+3.3V	COM	+5V	COM	+5V	COM	PWR_OK	+5VSB	+12V	NC	
PIN NO.	12	13	14	15	16	17	18	19	20	21	22	
FUNCTION	+3.3V	-12V	COM	PS_ON#	COM	COM	COM	NC	+5V	+5V	+3.3V SENSE	

USING CN	VLR-02V(JST)	
CN NO.	CN53	
PIN NO.	1	2
FUNCTION	BATT (+24V)	BATT (G)

Note: *1 Factory Option :UNA350PB/D Only

UNA350PN

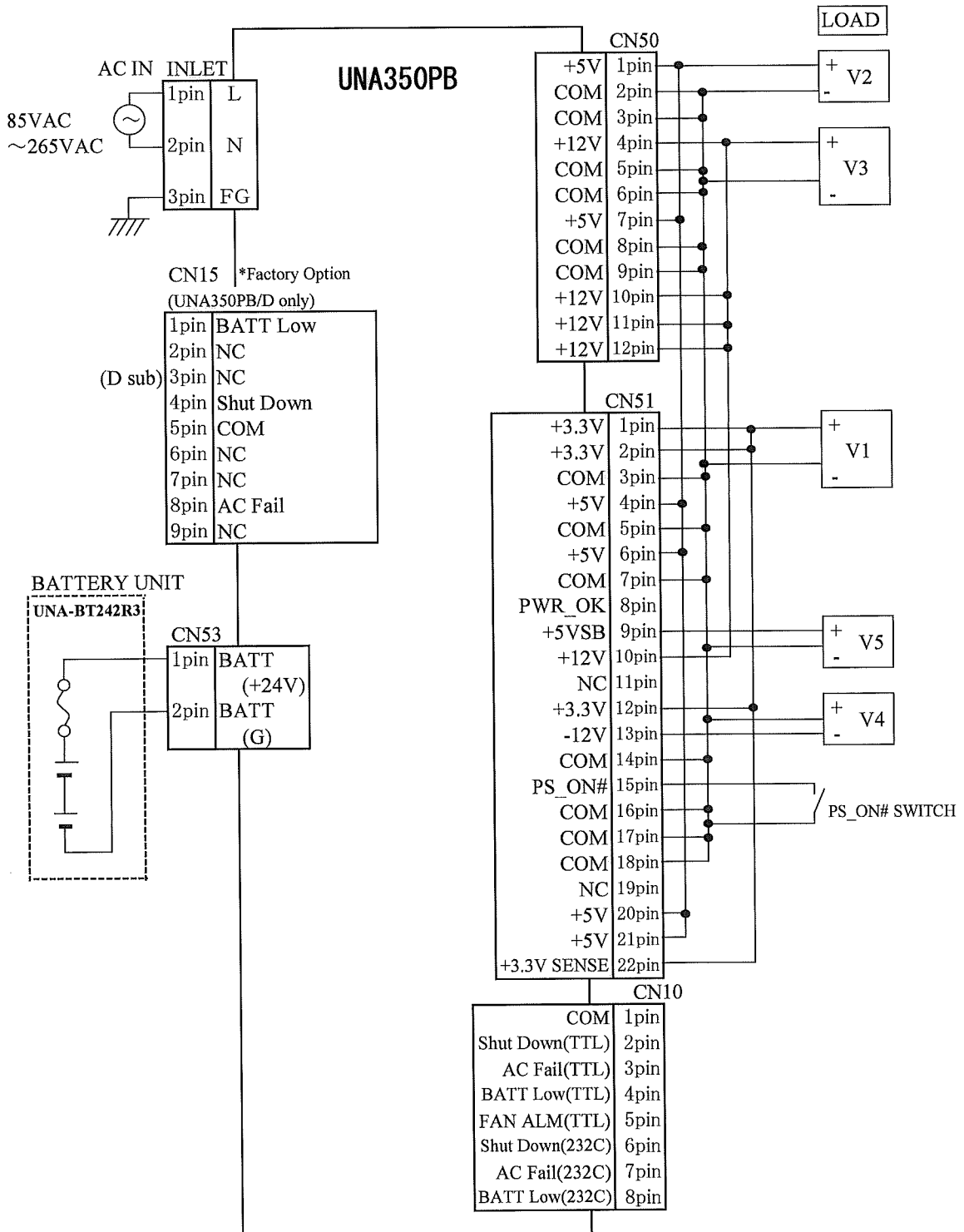
USING CN.	5566-12A (MOLEX)					
CN NO.	CN50					
PIN NO.	1	2	3	4	5	6
FUNCTION	+5V	COM	COM	+12V	COM	COM
PIN NO.	7	8	9	10	11	12
FUNCTION	+5V	COM	COM	+12V	+12V	+12V

USIN CN.	5566-22A (MOLEX)											
CN NO.	CN51											
PIN NO.	1	2	3	4	5	6	7	8	9	10	11	
FUNCTION	+3.3V	+3.3V	COM	+5V	COM	+5V	COM	PWR_OK	+5VSB	+12V	NC	
PIN NO.	12	13	14	15	16	17	18	19	20	21	22	
FUNCTION	+3.3V	-12V	COM	PS_ON#	COM	COM	COM	NC	+5V	+5V	+3.3V SENSE	

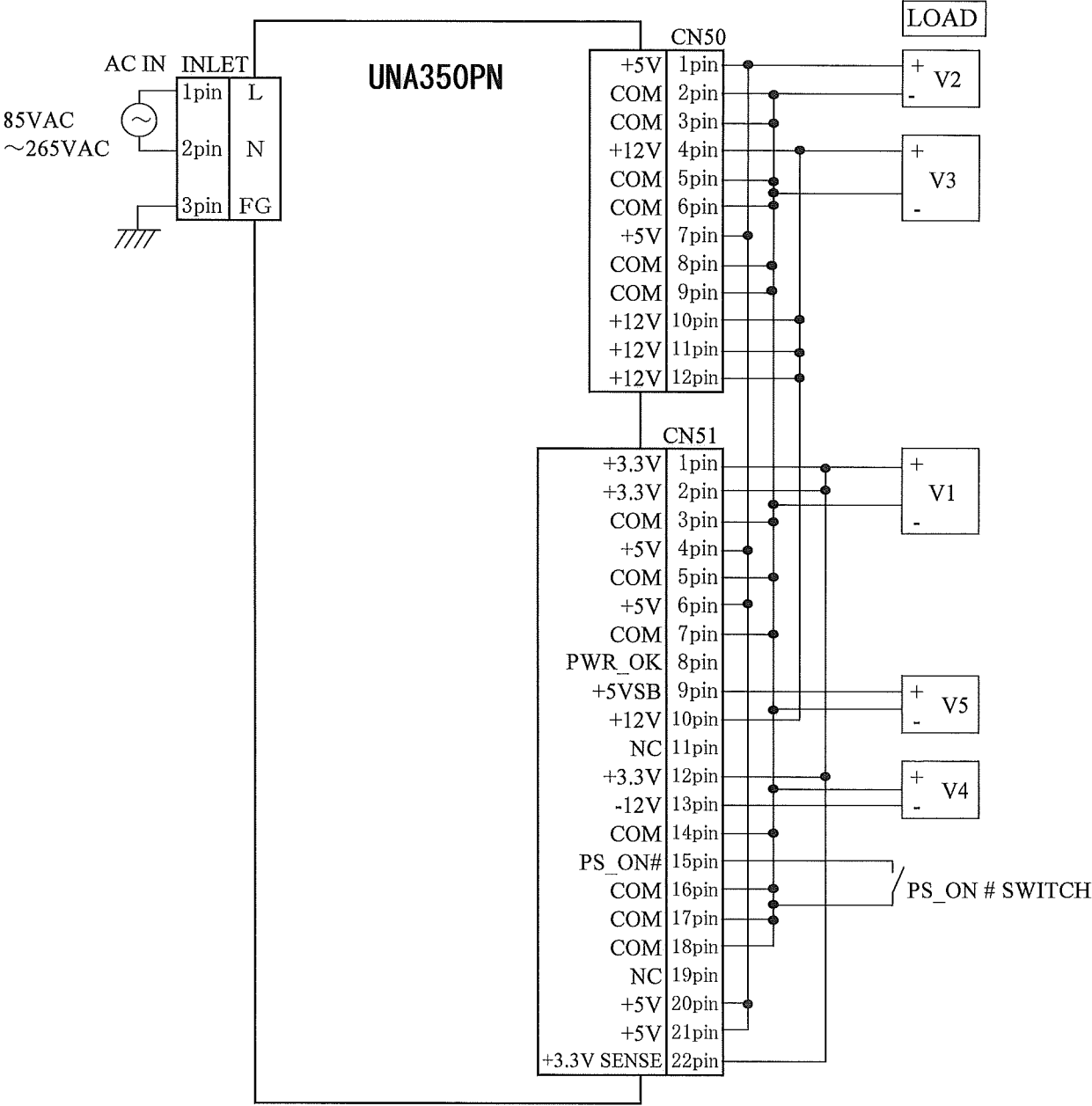
3. Connecting method

Please pay special attention to connecting input and output wiring. Incorrect connection will damage the power supply.

- When connecting input and output wiring, input AC-Line should be off.
- To minimize shock hazard, the instrument chassis must be connected to an electrical ground(FG).
- Input wiring and output wiring shall be separated, otherwise noise susceptibility power supply unit will be weak.
- 3.3V SENSE(CN51 22pin) must be connected to CN51 1,2 or 12pin even when V1 is not in use.



DENSEI-LAMBDA
UNA350P
 Instruction Manual



4. Explanation of Functions and Precaution

4-1. Input Voltage

Input voltage range is single phase 85 ~ 265VAC (47 ~ 63Hz). Operating beyond the input voltage range may cause unit damage. For cases where conformance to various safety specifications are required, input voltage range will be 100 ~ 240VAC (50/60Hz).

There might be +5VSB output only depending on the input voltage even though PS_ON# is on conditions. Be sure to apply input voltage within rated input voltage range.

4-2. Inrush Current

This power supply unit has a circuit to limit input surge current when AC power is applied. Since this circuit has power thermistor, the surge current increases during operation at high temperature, or AC power is cycled during operation. Be careful to select input switch and fuse. Specific detail is shown in "7, External Fuse Rating"

4-3. Over Voltage Protection (OVP)

OVP function (Inverter shut down method, manual reset type) is provided. OVP function operates within the range of OVP specification. When OVP triggers, the output will be shut down. When OVP function operating of +3.3V, 5V, +12V output, AC power shall be removed and cycled after 10 seconds to reset the protection circuit. When OVP function for +5VSB output operating, AC power input shall be removed and recycled after 60 seconds to reset the protection circuit. Threshold level of OVP on each output is not adjustable but fixed.

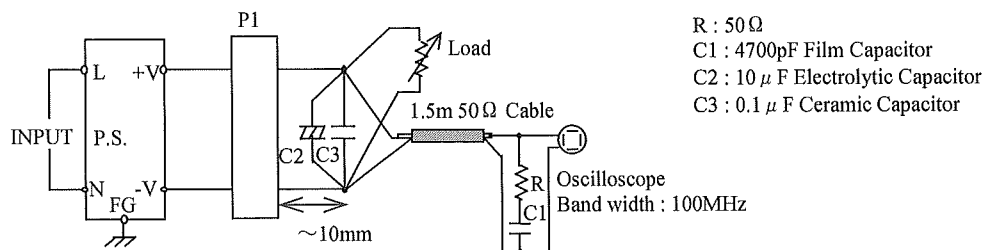
4-4. Over Current Protection (OCP)

- 1) For +3.3V, +5V and +12V output, the OCP function (Inverter shut down method, manual reset type) is provided. OCP function operates when the output current exceeds more than 110% of the maximum output current, all output except +5VSB will be shut down. AC power shall be removed and cycled after 10 seconds to reset protection circuit, or PS_ON terminal shall be turn H Level for a few seconds, and turn L Level to reset protection circuit.
- 2) For -12V output, the OCP function (Foldback limiting, automatic recovery) is provided. Only the output with excessive load will drop down. OCP function operates when the output current exceeds more than 110% of the maximum output current The output will be automatically recovered when the overload condition and short condition is released.
- 3) For +5VSB output, the OCP function (Drooping characteristic, automatic recovery) is provided. OCP function operates when the output current exceeds more than 110% of the maximum output current, all output will be shut down. For +5VSB output, the output will be automatically recovered when the overload condition and short condition is released. For other output, the output will be recovered with same operation as 1).

4-5. Output Ripple & Noise

The standard specification for maximum ripple & noise voltage value should be measured by measurement circuitry specified in JEITA: RC-9131 as shown below. Long lead line causes larger ripple & noise voltage. In this case, electrolytic capacitor, film capacitor, etc. might be necessary to add across terminals of the load.

Exact measurement cannot be achieved when using very long grounding lead of oscilloscope.



4-6. Over Temperature Protection (OTP)

This power supply unit is equipped OTP function. This function operates and shut down all output except +5VSB when the ambient temperature or temperature of the unit rises abnormally. When OTP is triggered, AC power input shall be cycled after sufficient cooling down to reset the OTP function.

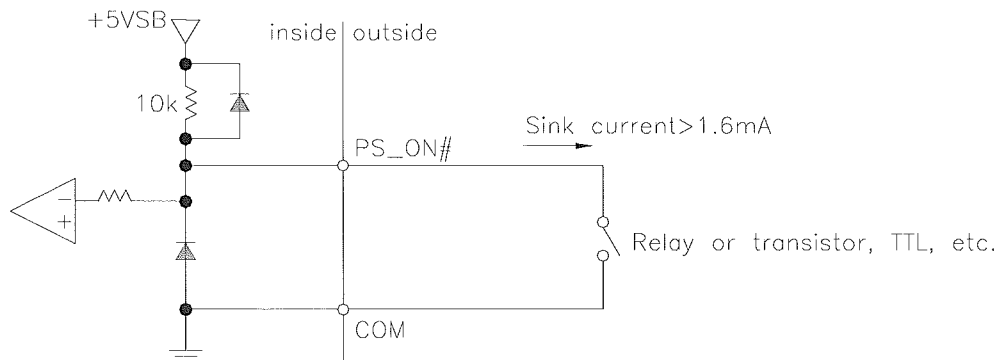
4-7. PS_ON#

When the PS_ON# is pulled to TTL low, the power supply turn on the main DC output rails (+12V, +5V, +3.3V, -12V) and the battery charger output. When PS_ON# is pulled high or open-circuited, the DC output rails cannot deliver current and hold zero potential with respect to ground (COM). Only UNA350PB model has Battery charger circuitry. PS_ON# has no effect on the +5VSB output, which is always enabled whenever the AC power is present. PS_ON# signal characteristics are shown in this table as below.

(CN51-15pin)

PS_ON Level to COM	Output Status (except +5VSB)
H Level ($2V \leq H$ or Open)	OFF
L Level ($L \leq 0.8V$ or Short to COM, Sink current 1.6mA and less)	ON

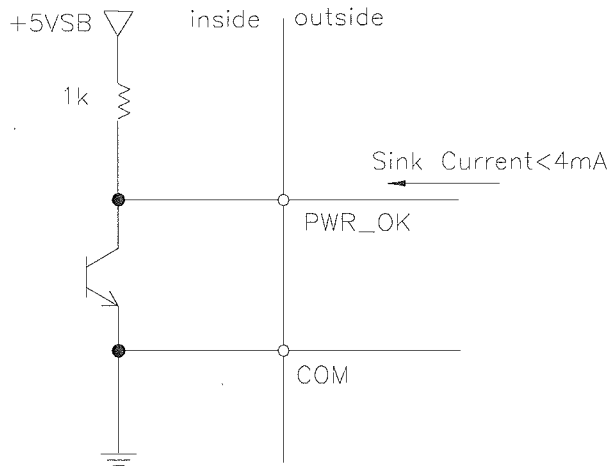
The maximum PS_ON# terminal voltage is less than 5VSB, Maximum reverse voltage is -0.7V.



4-8. PWR_OK

This signal turns high by the power supply to indicate that the +12V, +5V, and +3.3V outputs reach the under voltage thresholds and signifies the output is Good.

+3.3V,+5V and +12V output	PWR_OK Level to COM
All output is Good.	H Level
Output is stop.	L Level ($L \leq 0.4V$, Sink current less than 4mA)

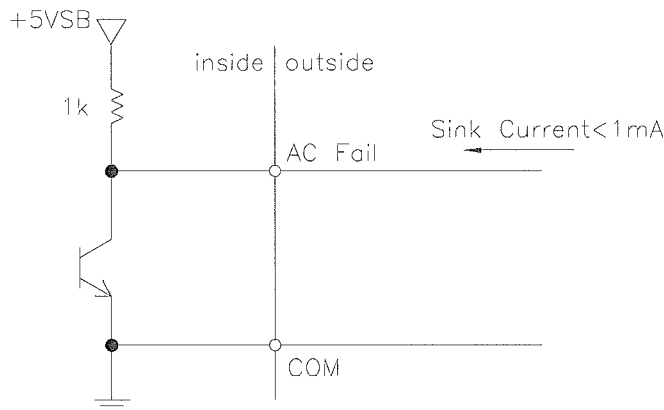


4-9. Input Voltage Abnormal Detection (AC FAIL)

When input voltage falls or the input is cut off, the AC FAIL signal is sent as follows.

(CN10-3pin) TTL Signal

Input Voltage	AC FAIL Level to COM
$85V \leq V_{in} \leq 265V$	L Level ($L \leq 0.4V$, Sink current less than 1mA)
$V_{in} < 85V$	H Level



(CN10-7pin & CN15-8pin) RS232C Signal level

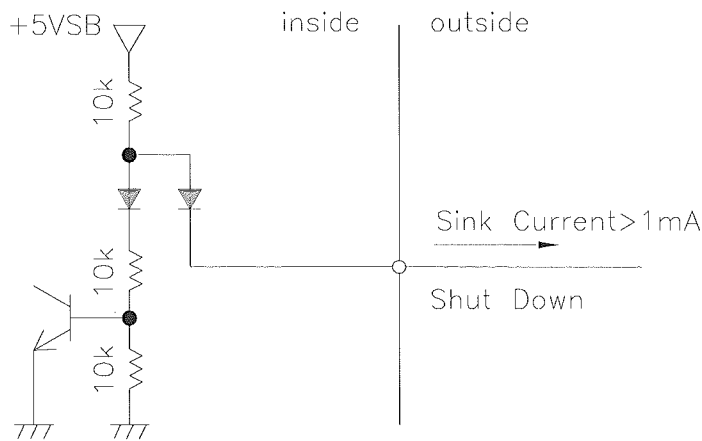
Input Voltage	AC FAIL Signal Level (Standard)
$85V \leq V_{in} \leq 265V$	L Level ($-5V \geq L \geq -15V$ with $3K \Omega$ to COM)
$V_{in} < 85V$	H Level ($+5V \leq H \leq +15V$ with $3K \Omega$ to COM)

4-10. SHUT DOWN

All output shut down by inputting this signal during battery backup operating. Even if shutdown signal is inputted when the AC input operates, the output does not stop.

(CN10-2pin) TTL Signal

SHUT DOWN Level to COM	Output status (All output)	
	Battery backup operating	AC operating
H Level ($2.7V \leq H$, or Open)	ON	ON
L Level ($L \leq 0.7V$ or Short to COM, Sink current 1mA and Over)	OFF	ON



(CN10-6pin & CN15-4pin) RS232C Signal level

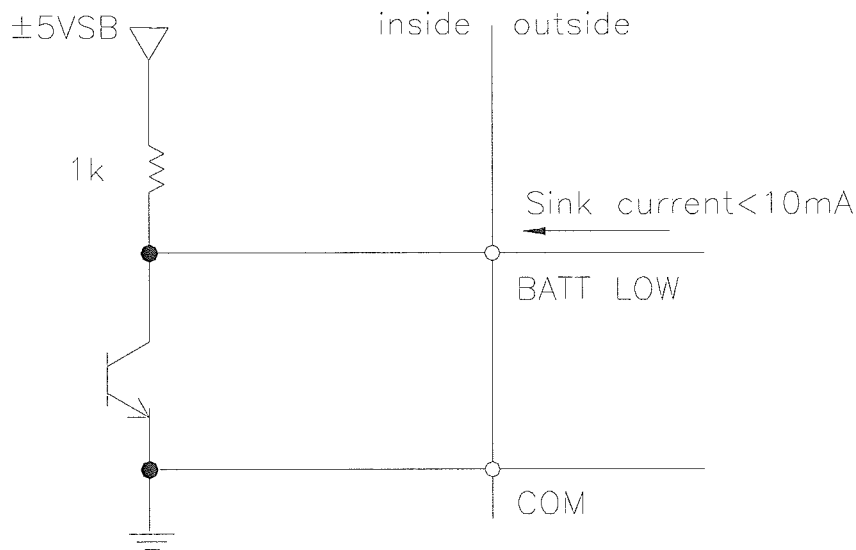
SHUT DOWN Level to Signal GND	Output status (All output)	
	Battery backup operating	AC operating
H Level ($+5V < H < +30V$)	OFF	ON
L Level ($-5 > L > -30V$)	ON	ON

4-11. BATT LOW

When the battery unit voltage falls down to $19 \pm 1V$ during batteries charging and discharging, the BATT LOW signal is sent as follows. Moreover when battery unit voltage falls to $17 \pm 1V$, all output will stop.

(CN10-4pin) TTL Signal

Battery Voltage	BATT LOW Level to COM	Output status (All output)
$20V < VBATT$	L Level ($L \leq 0.4V$ Sink current less than $1mA$)	ON
$18V < VBATT \leq 20V$	H Level	ON
$VBATT \leq 18V$	H Level	OFF



(CN10-8pin & CN15-1pin) RS232C Signal level

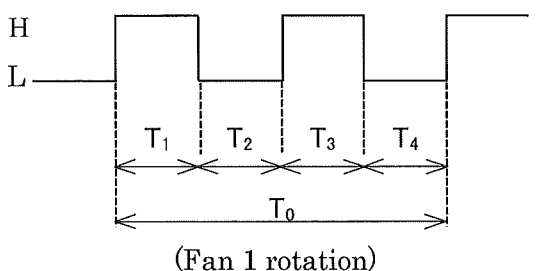
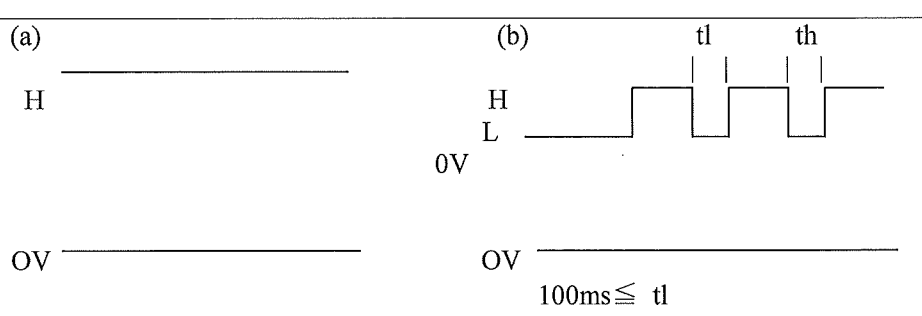
Battery Voltage	BATT LOW Level Signal (Standard)	Output status (All output)
$20V < VBATT$	H Level ($+5V \leq L \leq +15V$ with $3K\Omega$ to COM)	ON
$18V < VBATT \leq 20V$	L Level ($-5V \geq L \geq -15V$ with $3K\Omega$ to COM)	ON
$VBATT \leq 18V$	L Level ($-5V \geq L \geq -15V$ with $3K\Omega$ to COM)	OFF

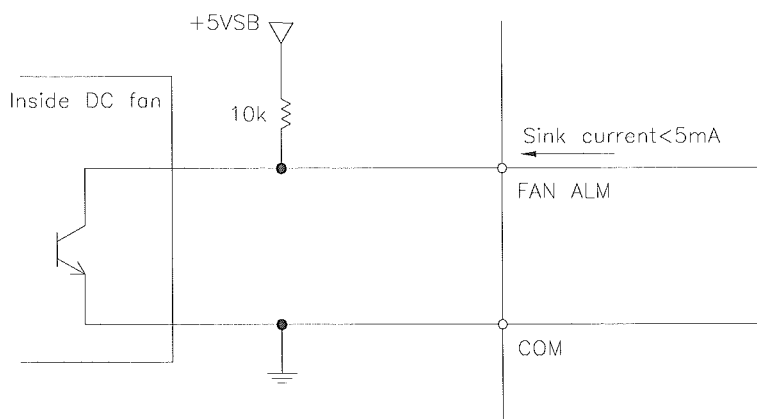
4-12. FAN ALM

When fan rotation stops, the transistor of FAN ALM synchronizes with operation of the protection circuit of a motor and will be in an OFF state. Output of FAN ALM becomes waveform (a) or (b) depend on stop position of Fan.

(CN10-5pin)

FAN ALM Level to COM
H Level
L Level (Less than 0.4V, Sink current less than 5mA)

Fan Rotation	Output waveform
Normal rotation	 <p> $T_{1\sim4} \doteq (1/4)T_0$ $\doteq 5.9\text{ms (typ)}$ (low-speed) $T_{1\sim4} \doteq (1/4)T_0 = 60/4N(\text{sec})$ $N = \text{Fan rotation (min}^{-1}\text{)[r.p.m]}$ </p> <p>(Fan 1 rotation)</p>
Blade lock	 <p> $100\text{ms} \leq t_l$ $t_l : t_h \doteq 1 : 5$ </p>



4-13. Minimum load current

Even if there is momentary current value drop less than required minimum load current, output voltages will shutdown under 0.5A except the +5VSB channel. Minimum load current of the +5V should be over 0.5A. Output voltage except +5VSB will shutdown when the minimum load current is under 0.5A.

4-14. Input AC Power Interruptions

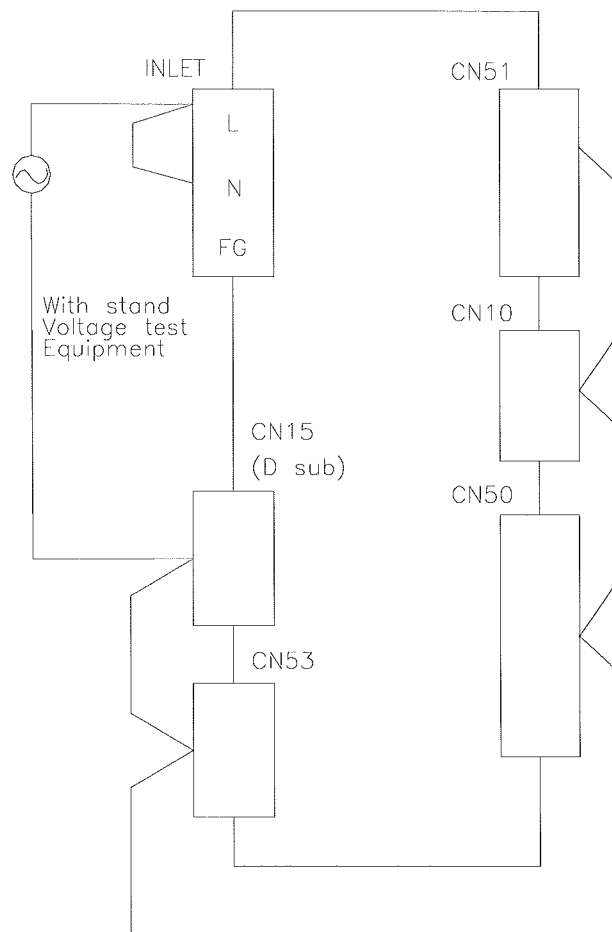
When used without connecting UNA-BT242R3, output voltage except +5VSB channel might not recover even when input line is restored after AC line interruptions

To recover output voltage, turn off main line and re-input after more than 10 seconds, or momentary release High Level condition of PS-ON# terminal and Low Level again.

4-15. Withstand Voltage

This product is designed to withstand 3.0kVAC between input and output, for 1 minute. When testing withstand voltage, set current limit of withstand voltage test equipment to 15mA. The applied voltage must be gradually increased from zero to the testing value and then gradually decreased for shut down. When timer is used, the power supply may be damaged by high impulse voltage at timer switch on and off. Connect input and output as follows.

Input-Output
 3kVAC 1min (15mA)

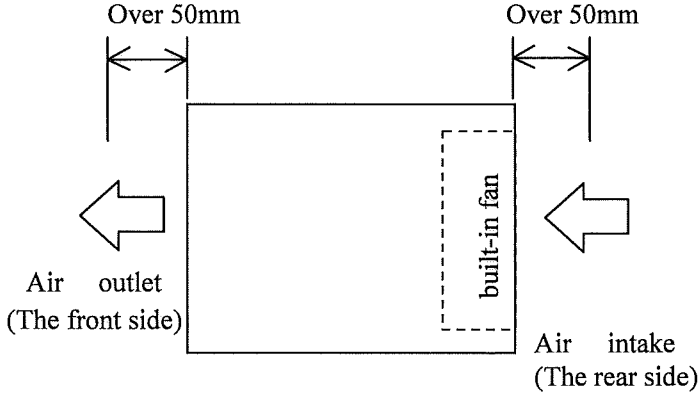
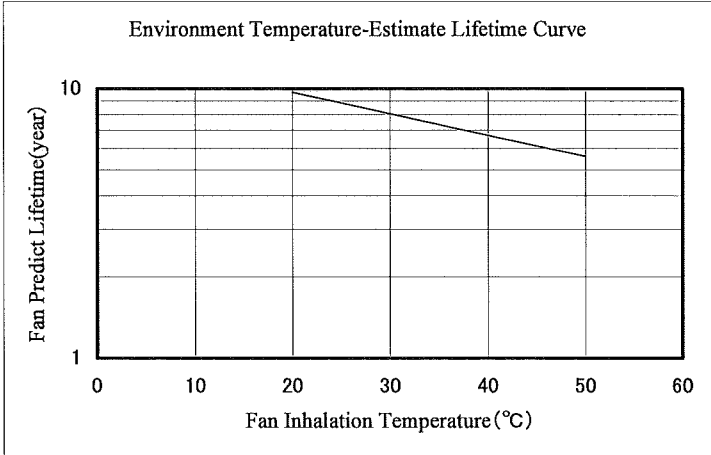


INLET, CN50 and CN51; UNA350PB, UNA350PN common
 CN10, CN15 (D sub), CN53; UNA350PB only

5. Mounting

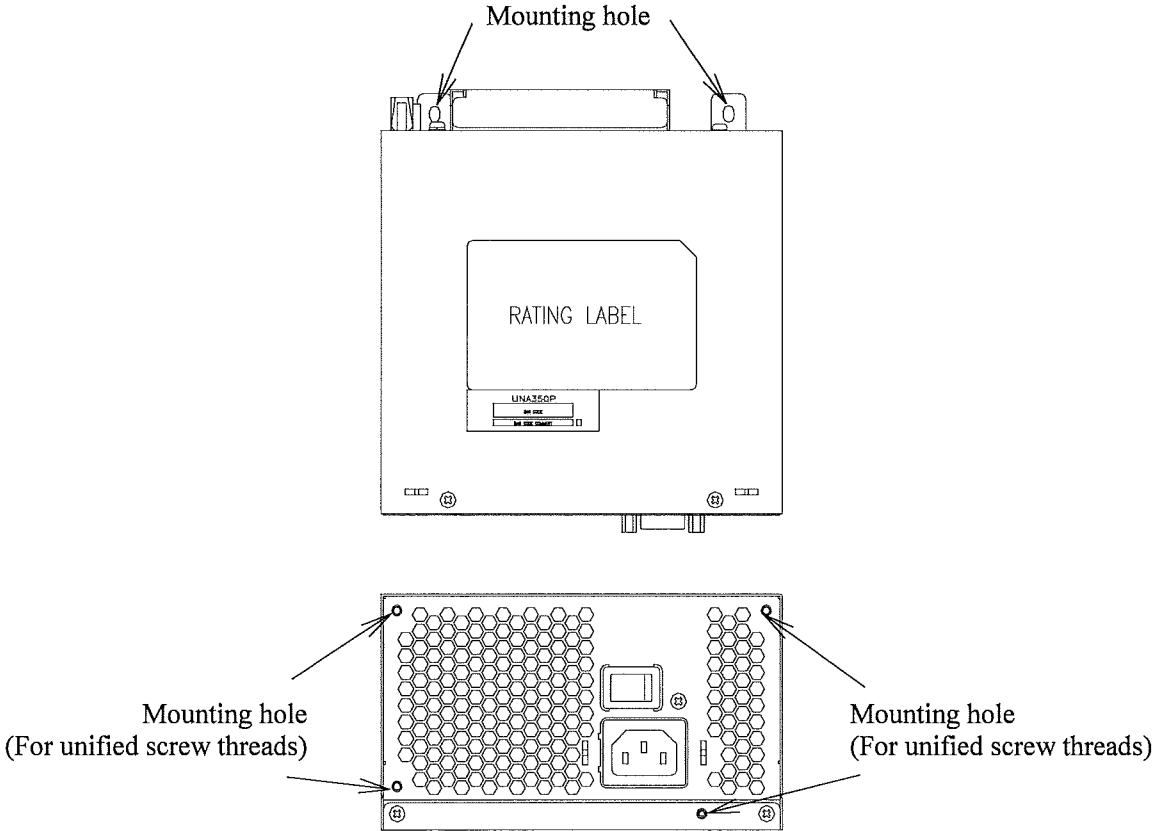
5-1. Cooling

This power supply is a forced air cooling system with a built-in blower. Please allow following Fig. Minimum clearances (50mm) are required for cooling air intake and air outlet. Furthermore, note that poor ventilation result due to fan clogging at dusty environment. Built-in blower is a component with lifetime.



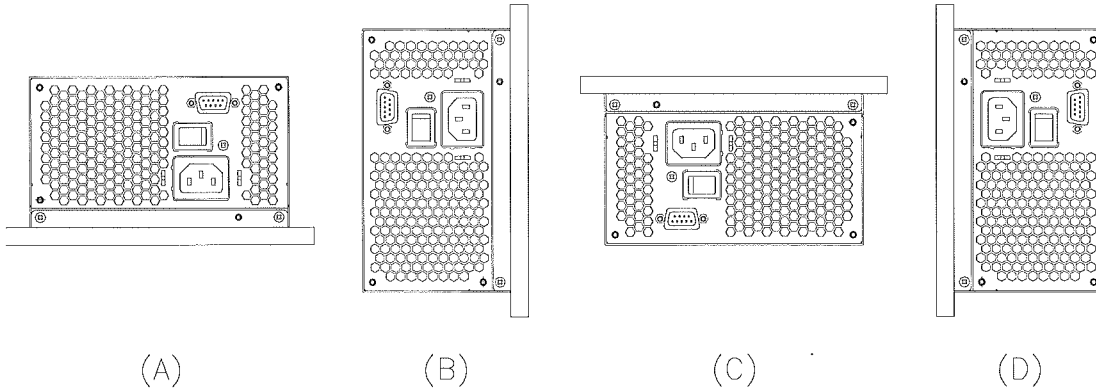
5-2. Mounting

Six mounting holes should be used for installation of this power supply unit. These 6 mounting screws should be kept length as 6mm or less. Unified screw threads (#6-32UNC) should be used for mounting. Recommended tightening torque for mounting screw : 0.85N·m (8.6kgf·cm)



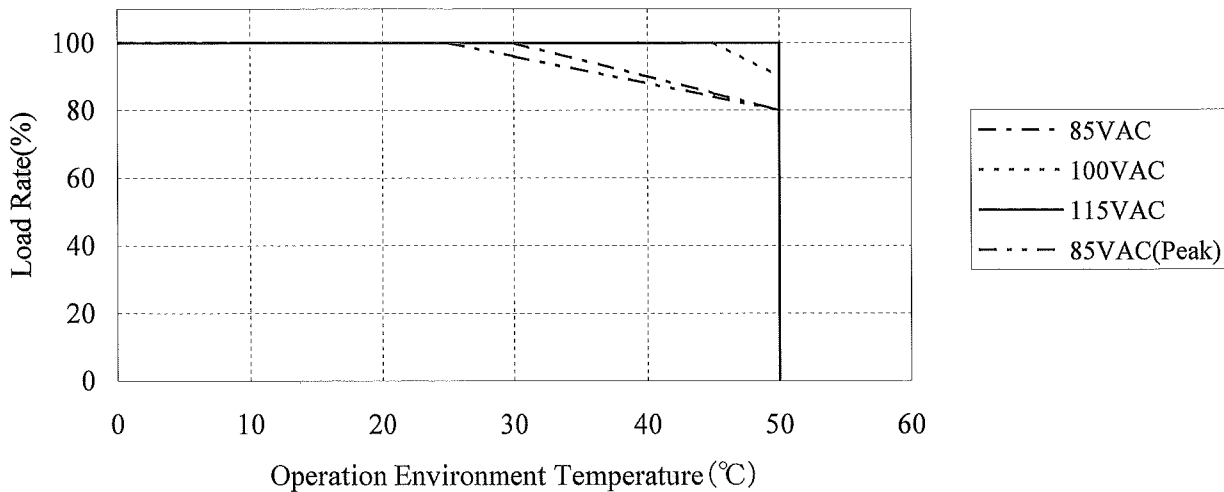
5-3. Mounting Directions and Output Derating

Recommended standard mounting method is (A). Method (B), (C) and (D) are also available.



Output Derating Curve

Use this power supply unit within this Output Derating Curve.



6. Wiring

- (1) The output load line and input line shall be separated and twisted to improve noise sensitivity.
- (2) Use all lines as thick and short as possible to make lower impedance.
- (3) It is effective for reducing of noise to attach some capacitors in the load terminal.
- (4) It is effective for reducing EMI to add some toroidal or clamp magnetic cores on the wiring.
- (5) For safety and EMI considerations, connect FG terminal to electric ground terminal of equipment with a thick wire.

7. External Fuse Rating

When you use the external fuse for input protection of power supply unit, please use the fuse of rated 8A. Input surge current flows when AC input turns ON. Slow-blow or time-lag fuse must be used. Don't use fast-blow fuse. Fuse rating is specified by in-rush current value at line turn-on.

The input current values (rms.) under your actual load conditions must not select the rating of fuse.

8. Before considering failure

Before concluding failure, please make sure to perform the following checks.

- (1) Check if the rated input voltage is connected.
- (2) Check if the wiring of input and output is correct.
- (3) Check if the wire material is not too thin.
- (4) Check if the built-in fan stops. Check if foreign materials or dust stops the fan. When the cooling-fan stops continuously and temperature of the internal power supply rises, OTP function operates and shuts down the output. Cooling-fan is a component with lifetime.
- (5) The front side and the rear side of a power supply are the air intake and the air outlet for cooling. Check if foreign materials or dust causes the ventilation trouble.
- (6) Check if temperature of the power supply raises abnormally. After cooling down sufficiently, turn the input on again. The output is shut down when OTP is triggered.
- (7) Check if the output current and output wattage do not over specification.
- (8) Check if the normal battery is used. It's not activation, when used decline batteries as operating protection circuit. Please change the normal battery.

9. Batteries recycling

The lead acid storage batteries are used in this battery unit. Lead acid batteries are recyclable precious resources. Please cooperate to recycling on replace of a lead acid batteries and disposal of a used product.

Recycling waste management methods of lead acid batteries are shown to the following.

1. Request to a Waste service company for a waste management (collection).
2. Request to a lead acid battery manufacture for a waste management (collection).
3. Request to our company for a waste management (collection).

In addition, please understand that a user's expense burden follows on waste management of batteries.

10. Battery Charge

Batteries are not charged when UNA350PB is in standby. When the PS_ON# is pulled to TTL low (less than 0.7V to COM, or short to COM) the power supply unit starts to charge batteries.

11. Storage and Supplementary charge

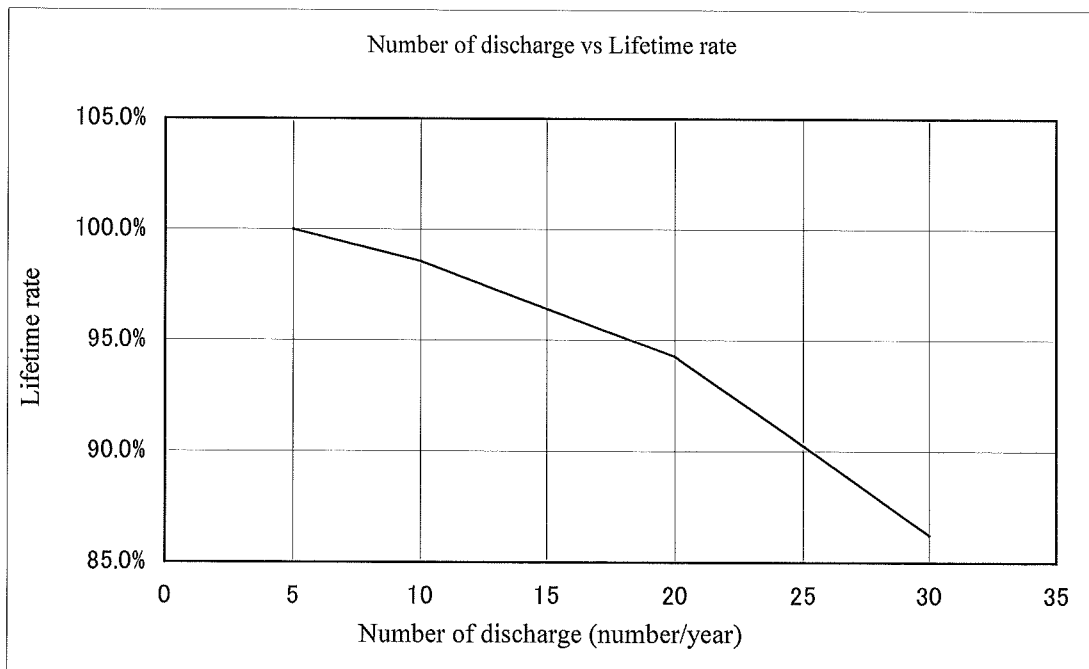
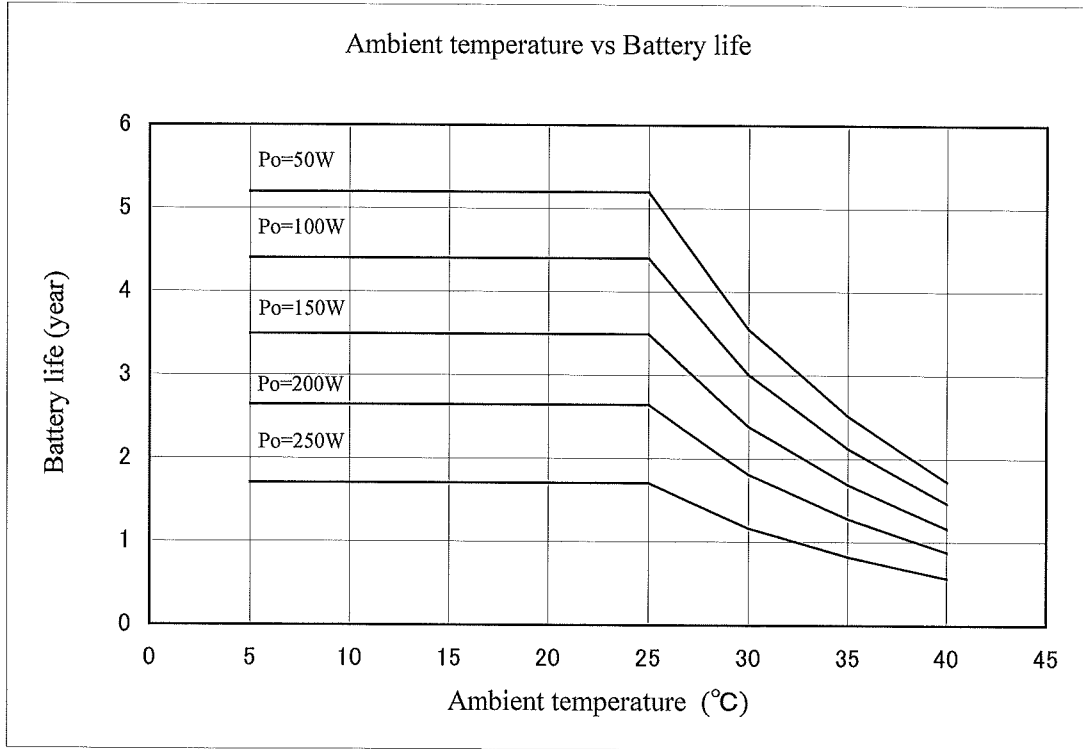
Please store at an arid, low temperature and an airy place in the state when packing up, or installing. Since a battery deteriorates also during storing, please use it as soon as possible.

The storable period is as follows. Please get recharged when storing continues for a long term.

Supplementary charge is needed for more than 72 hours by UNA350PB (in PS_ON# status).

Storage temperature	Interval of recharge
Less than 25°C	6 months
Less than 30°C	4 months
Less than 40°C	2 months

12. Battery Life (Typical Characteristics)



When the number of times of electric discharge exceeds 5 times a year, an expected battery life becomes value which carried out the multiplication of the Battery life and Lifetime rate. In addition, these graphs do not show guarantee values but show the typical characteristics.