

ZBM-AC Series

Instruction Manual

BEFORE USING THE PRODUCT

Be sure to read this instruction manual thoroughly before using this product. Pay attention to all cautions and warnings before using this product. Incorrect usage could lead to an electrical shock, damage to the unit or a fire hazard.

DANGER

- Never use this product in locations where flammable gas or ignitable substances are present.

INSTALLATION WARNING

- When installing, ensure that work is done in accordance with the instruction manual. When installation is improper, there is risk of electric shock and fire.
- Installation shall be done by Service personnel with necessary and appropriate technical training and experience. There is a risk of electric shock and fire.
- Do not cover the product with cloth or paper etc. Do not place anything flammable around. This might cause damage, electric shock or fire.

WARNING on USE

- Do not touch this product or its internal components while circuit in operation, or shortly after shutdown. You may receive a burn.
- While this product is operating, keep your hands and face away from it as you may be injured by an unexpected situation.
- For products with no cover, do not touch them as there are high-voltage and high temperature parts inside. Touching them might cause injury such as electric shock or burn.
- There are cases where high voltage charge remains inside the product. Therefore, do not touch even if they are not in operation as you might get injured due to high voltage and high temperature. You might also get electric shock or burn.
- Do not make unauthorized changes to this product nor remove the cover as you might get an electric shock or might damage the product. We will not be held responsible after the product has been modified, changed or dis-assembled.
- Do not use this product under unusual condition such as emission of smoke or abnormal smell and sound etc. Please stop using it immediately and shut off the product. It might lead to fire and electric shock. In such cases, please contact us. Do not attempt repair by yourself, as it is dangerous for the user.
- Do not operate and store these products in environments where condensation occurs due to moisture and humidity. It might lead fire and electric shock.
- Do not drop or apply shock to this product. It might cause failure. Do not operate these products mechanical stress is applied.
- When necessary, this products is to be repaired only by us or our authorized agents. It is important that this product cannot be used in hazardous environments (facilities such as nuclear power control system or life support equipment) without our written consent.

CAUTION on MOUNTING

- Confirm connections to input/buffer output and signal terminals are correct as indicated in the instruction manual before switching on.
- This product can only be connected to the specified power supply, and ambient temperature and ambient humidity should be kept within specifications, otherwise the product will be damaged.
- Input line/buffer output, please use the wires as short and thick as possible.
- Do not use this product in special environment with strong electromagnetic field, corrosive gas or conductive substances and direct sunlight, or places where product is exposed to water or rain.
- Mount this product properly in accordance with the instruction manual, mounting direction and shall be properly be ventilated.
- Please shut down the input and ensure that the internal voltage of the product is low when connecting this product.
- When installing in environment where conductive foreign, dust and liquid may be present, please consider penetration of above foreign material in the power supply by installing filter, to prevent trouble or malfunction.
- Please check the connector is locked securely, and be careful the harness does not come off the connector after connecting.

 **CAUTION on USE**

- Product individual notes are shown in the instruction manual. If there is any difference with common notes individual notes shall have priority.
- Before using this product, be sure to read the catalog and instruction manual. There is risk of electric shock or damage to the product or fire due to improper use.
- Do not connect this product to anything other than the specified power supply. This might cause damage, electric shock or fire.
- This product can only be connected to the specified power supply, ambient temperature and ambient humidity should be kept within specifications, otherwise the product will be damaged, or cause electric shock or fire.
- If the built-in fuse is blown, do not use the product even after replacing the fuse, as there is risk of abnormality inside. Be sure to request repair to our company.
- For products without built-in protection circuit (element, fuse, etc.), insert fuse at the input to prevent smoke, fire during abnormal operation. As for products with built-in protection circuit, depending on usage conditions, built-in protection circuit might not work. It is recommended to provide separate proper protection circuit.
- This product was made for general purpose electronic equipment use and is not designed for applications requiring high safety (such as extremely high reliability and safety requirements. Even though high reliability and safety are not required, this product should not be used directly for applications that have serious risk for life and physical safety. Take sufficient consideration in fail-safe design (such as providing protective circuit or protective device inside the system, providing redundant circuit to ensure no instability when single device failure occurs).
- When used in environments with strong electromagnetic field, there is possibility of product damage due to malfunction.
- When used in environment with corrosive gas (hydrogen sulfide, sulfur dioxide, etc.), there is possibility that they might penetrate the product and lead to failure.
- When used in environments where there is conductive foreign matter or dust, there is possibility of product failure or malfunction.
- Provide countermeasure for prevention of lightning surge voltage as there is risk of damage due to abnormal voltage.
- Connect together the mounting holes and the ground terminal of the equipment for safety and noise reduction. If these ground is not connected together, there is risk of electric shock.
- Parts with lifetime specifications (built-in fan electrolytic capacitor) are required to be replaced periodically. Set the overhaul period depending on the environment of usage and perform maintenance. Also, note that there are cases when EOL products cannot be overhauled.
- Take care not to apply external abnormal voltage to the input/buffer output. Especially, applying reverse voltage or overvoltage more than the rated voltage to the input/buffer output might cause failure, electric shock or fire.
- This product is designed under condition Material group IIIb, Pollution Degree (PD): PD2, Over Voltage category (OVC): OVCII or III (Only EN62477-1) and Class of equipment: Class I. This product is designed to be accessible only to service technicians as part of indoor use device.
- This product contains a printed circuit board utilizing surface mounted devices. PCB stress such as bending, twisting etc, could cause damage. Therefore, please handle with care.
- When handling this product, hold the board edge and take care not to touch the component side. When installing this product in apparatus or equipment, mount it on spacers.
- The output power is considered to be a hazardous energy level (ES1). Therefore, the input/output of this product must be protected in the end use equipment to maintain ES1. It must not be made accessible to users. Protection must be provided for Service Engineers against indirect contact with the output terminals and/or to prevent tools being dropped across them. While working on this product, the AC input power must be switched off and the input and output voltage should be zero.

⚠ Note

- Take note that traces of sheet metal processing be left in our power supplies.
- When disposing product, follow disposal laws of each municipality.
- Published EMI (CE, RE) or immunity is the result when measured in our standard measurement conditions and might not satisfy specification when mounted and wired inside end-user equipment.
Use the product after sufficiently evaluating at actual end-user equipment.
- When exporting our products, apply for necessary permissions as required by rules and regulations of Foreign Exchange and Foreign Trade Control Act.
- Catalogue, contents of the instruction manual may be changed without a prior notice. Refer to latest catalogue or instruction manual.
- Reproduction or reprinting the instruction manual or its portion is forbidden without our permission.

⚠ LONG-TERM STORAGE METHOD AND LONG-TERM STORAGE PERIOD

- Please keep the product in carton box.
- Please do not apply excessive vibration, shock or mechanical stress applied directly to the product.
- Please keep away from direct sunlight.
- For long-term storage temperature and humidity, the following conditions shall be used as a guideline :
Temperature range : 5°C~30°C
Humidity range : 40% ~60%RH
Please keep away from the places where temperature and humidity can change drastically.
It can cause condensation on the product or deterioration.
- For long-term storage period, we recommend to use within 2 years after receiving the product.
There is tendency that the leakage current of an aluminum electrolytic capacitor may increase when stored without using for a long time. This phenomenon can be improved by applying voltage to the aluminum electrolytic capacitor to reduce the for reference, before using products that have been stored for a very long time, please warm-up first for 30 minutes or more without taking load. increased leakage current through the self-recovery effect of the electrolyte.

< Criterion of warm up voltage condition >

(1)Implementation period : 1 year or above after the delivery

(2)Electrical continuity condition

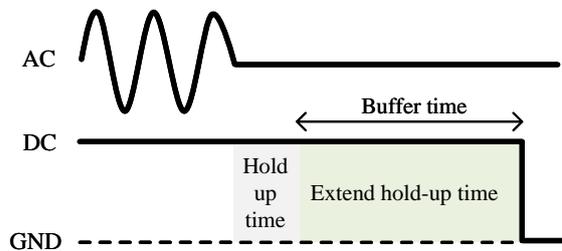
Input voltage	: Follow the connected power supply of this product.
Load	: 0A
Ambient temperature	: Normal temperature
Time	: 30 minutes or more

1. Product Explanation

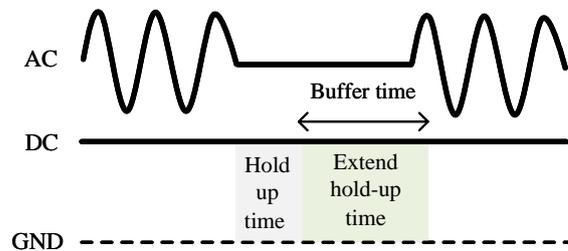
1-1. Outline

This product has built-in aluminum electrolytic capacitor to extend the hold-up time. It can be used by connecting to the specified power supply in the specification. This product alone cannot operate. When the input voltage to the power supply stop (i) or When the input voltage momentary drop of the power supply (ii), it supplies energy to the connected power supply.

(i) To extend the hold-up time after AC input off.



(ii) To hold the output voltage under AC brown out condition.



1-2. Features

- Back up the your system by increasing buffer time.
- The convection cooling method is quiet and reduced failure risk by foreign material.
- Safety standard certification IEC/UL/EN/CSA 62368-1, IEC/EN62477-1(OVCIII).
- Support hold-up time for SEMI-F47.

1-3. Applications

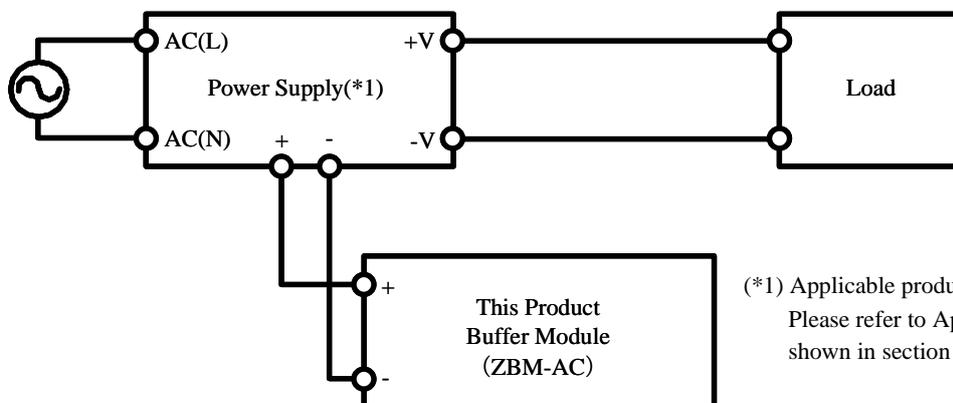
Applications

- FA/Robot controller
- Logistics/Transport
- Building management system
- Semiconductor manufacturing equipment

Usage

- Securing sufficient time for safely stop the drive unit.
- Securing sufficient time for data write.
- Keeping communication at input voltage momentary drop.
- Prevent system shut down at input voltage momentary drop.

1-4. System Configuration Example



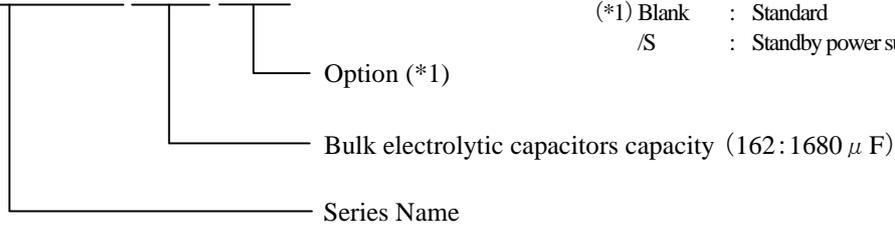
(*1) Applicable product of our specified.
 Please refer to Applicable product shown in section 1-5.

1-5. Applicable product of our specified

- ZWS300RC-*/BM
- ZWS300RC-*/RBM

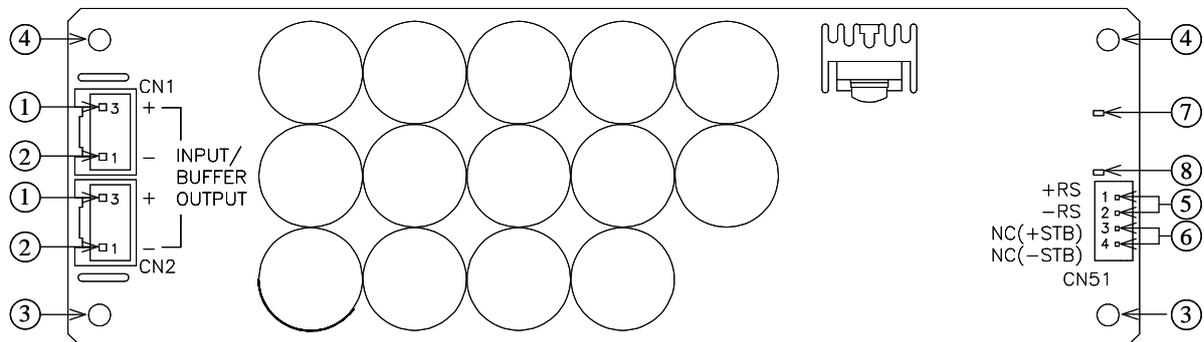
2. Model name identification method

ZBM-AC162 / □



(*1) Blank : Standard
 /S : Standby power supply model

3. Terminal Explanation

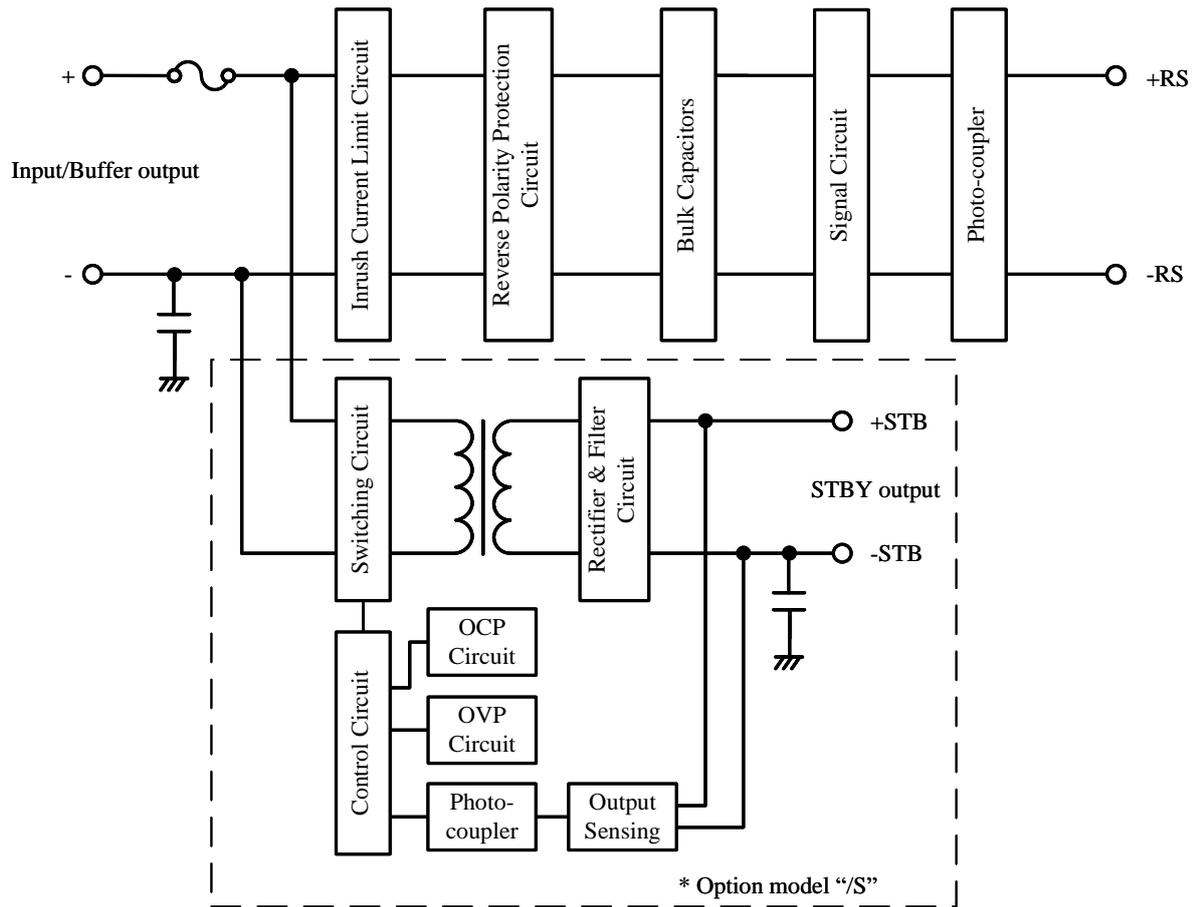


- ① + : +Input/Buffer output terminal
- ② - : -Input/Buffer output terminal
- ③ Earth mounting hole (hole diameter : $\phi 3.5\text{mm}$)

Must be connected to Chassis (Conductor) of the equipment by electrically conductive spacer.

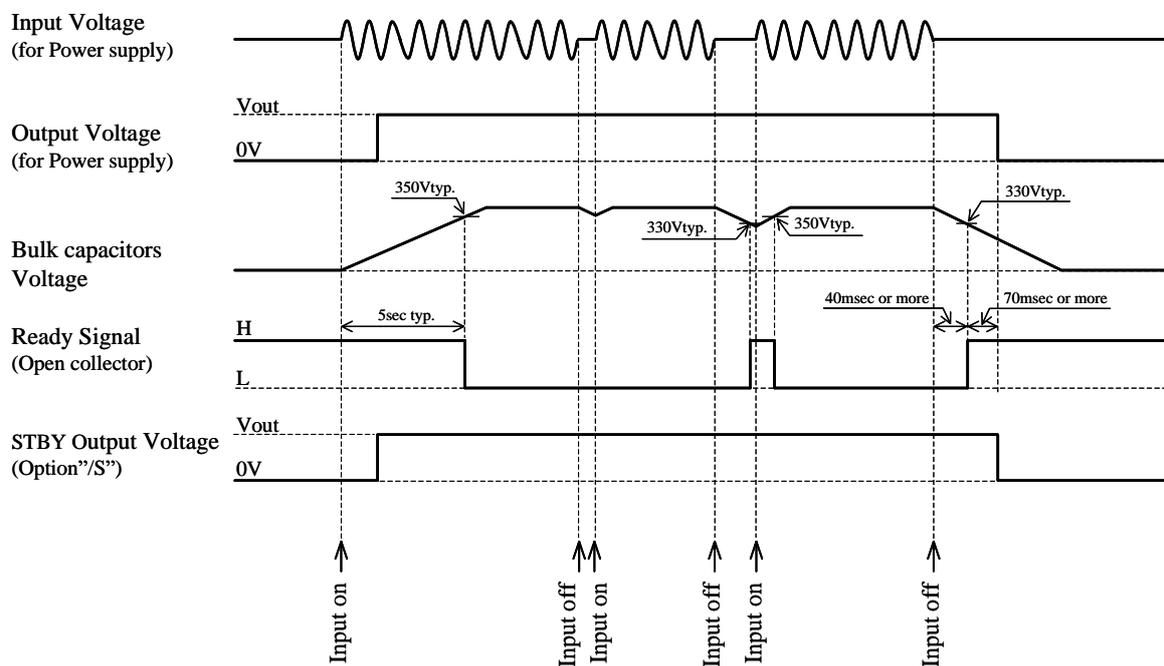
- ④ Mounting hole (hole diameter : $\phi 3.5\text{mm}$)
- ⑤ +/-RS : +/- Ready Signal
- ⑥ +/-STB : +/- STBY (Standby output voltage) (Option model "/S")
- ⑦ Red LED : Bulk electrolytic capacitors voltage monitoring indicator
LED is off when bulk electrolytic capacitor is less than 60V.
- ⑧ Green LED : Standby output monitoring indicator (Option model "/S")

4. Block Diagram



- Circuit topology, switching frequency (Option model "/>

5. Sequence time chart



6. Terminal Connection method

Pay attention to the input wiring. If it is connected to wrong terminal, the product will be damaged.

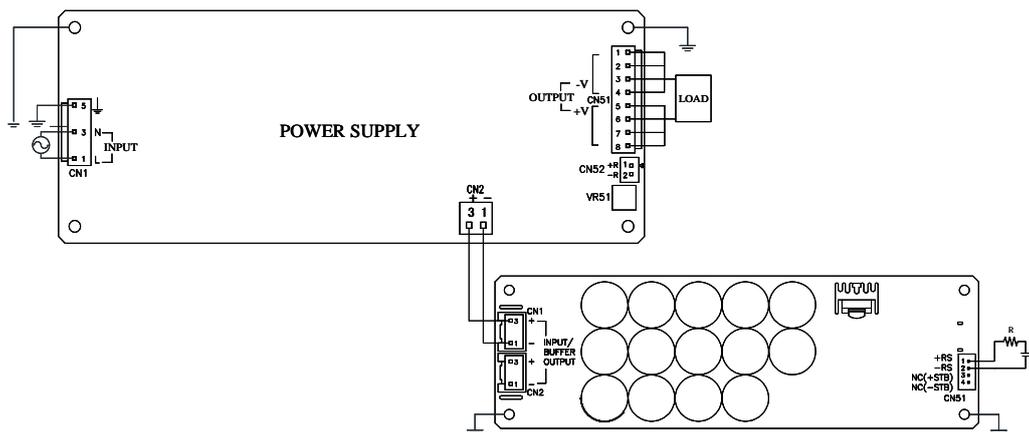
- Please shut down the input and ensure that the internal voltage of the product is low when connecting this product.
- Must be connected to Chassis (Conductor) of the equipment by electrically conductive spacer.
- Do not apply stress to PCB, when connecting or removing connector.
- Power supply should be fixed directly to the input/buffer output connector of the buffer module.

Please refer to wiring diagram shown in section 6-1 below.

6-1. Wiring for power supply and buffer module

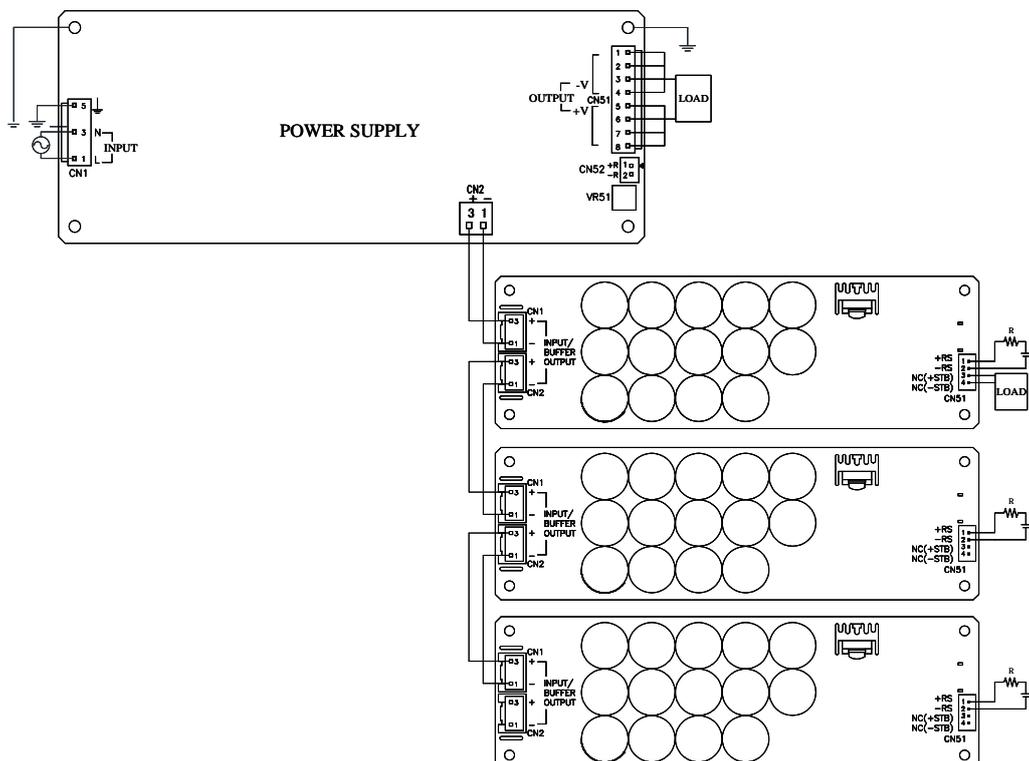
For the harness that connects the power supply and this product, it is necessary to use harness with withstand voltage of 400V or higher, equivalent to AWG18, and less than 30cm in length. Please be careful about insulation as this connection harness is on the primary side. An optional harness (sold separately) for connection is available. (HA-13-IN)

(1) General wiring



(2) Parallel of buffer modules

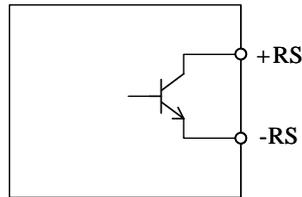
For the number of modules that can be connected, refer to the specification and instruction manual of the applicable product of our specified. When using multiple ZBM-AC, the maximum number of / S option is one, and connect to the beginning.



7. Explanation of Functions and Precautions

7-1. Ready Signal

The ready signal is "Low" when the internal Bulk electrolytic capacitors voltage is 350V typ or more, and "High" when the 330V typ or less. The maximum sink current of the ready signal is 1mA and external voltage at 30V or less.



$V_{CE\ max} = 30V$
 $I_C\ max = 1mA$

7-2. Red LED

The Red LED monitors the bulk electrolytic capacitor voltage. LED is off when bulk electrolytic capacitor is less than 60V.

7-3. Parallel Operation

This product can increase the buffer time by parallel operation. Please refer to wiring diagram shown in section 6-1(2).

Depending on the number of parallel, the output power derating of the connected power supply is required. For details on derating, please refer to the specifications of the specified power supply.

7-4. Standby Output (Option model "/S")

The output voltage of the standby power supply for signals is 24Vtyp (22.8V - 25.2V), and the maximum output current is 0.2A. The ground of the standby power supply terminal for signals is the -STB terminal. The STB terminal is isolated from the primary circuit.

Over Current Protection (OCP)

The OCP of the standby power output for signals is automatic recovery. When the output is short-circuited, it is hiccup operation. Never operate the unit under over current or shorted conditions, which may leads damage or insulation failure. OCP setting is fixed and not to be adjusted externally.

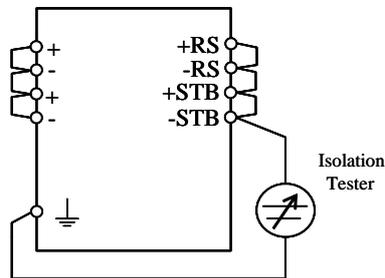
Over Voltage Protection (OVP)

The OVP of the standby power output for signals is output shut down method and manual reset type. To reset OVP, remove the input of the product, red LED off, and then re-input is required. The setting value of OVP is fixed and not adjustable. Never apply higher voltage externally to the standby power output for signals terminal to avoid the product failure. In case of inductive load, put protective diode in series to the output power line.

7-5. Isolation Test

Isolation resistance between Signal - \perp terminal is more than 100M Ω at 500VDC. For safety operation, voltage setting of DC isolation tester must be done before the test. Ensure that the product is fully discharged after the test.

- Signal - \perp terminal : 500VDC More than 100M Ω



7-6. Withstand Voltage

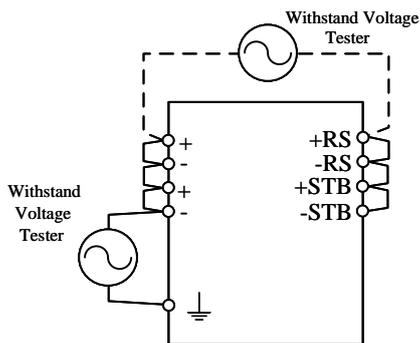
The product is designed to withstand 3.0kVAC between input/buffer output and signal, 2.0kVAC between input/buffer output and \perp terminal and 500VAC between signal and \perp terminal each for 1 minute.

When testing withstand voltage, set current limit of withstand voltage test equipment at 10mA (Signal - \perp terminal : 20mA).

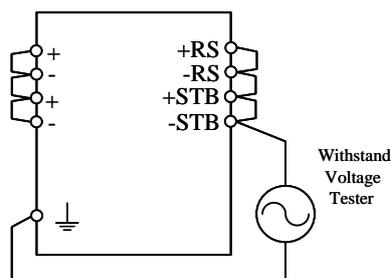
The applied voltage must be gradually increased from zero to testing value and then gradually decreased for shut down.

When timer is used, the product may be damaged by high impulse voltage at switch on and off timing. Connect input/buffer output and signal output as follows.

- Input/Buffer output - Signal (dotted line) : 3.0kVAC, 1min (10mA)
- Input/Buffer output - \perp (solid line) : 2.0kVAC, 1min (10mA)



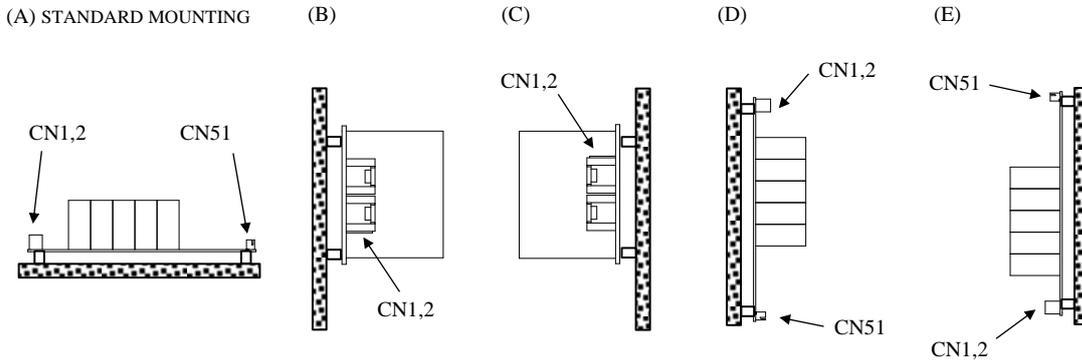
- Signal - \perp : 500VAC, 1min (20mA)



8. Mounting Method

8-1. Mounting Direction

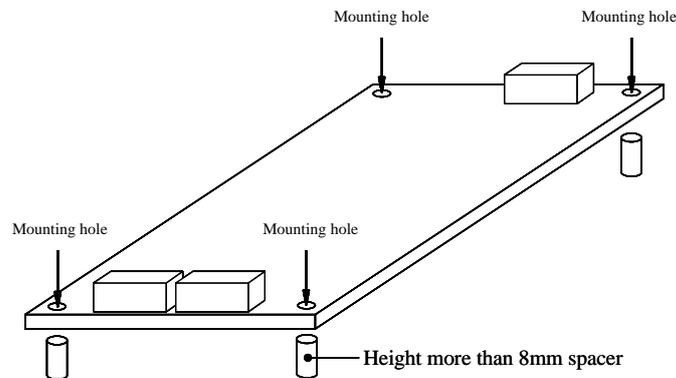
The standard mounting is direction (A). Possible mounting directions are (A), (B),(C), (D) and (E). Do not mount the product in any other directions.



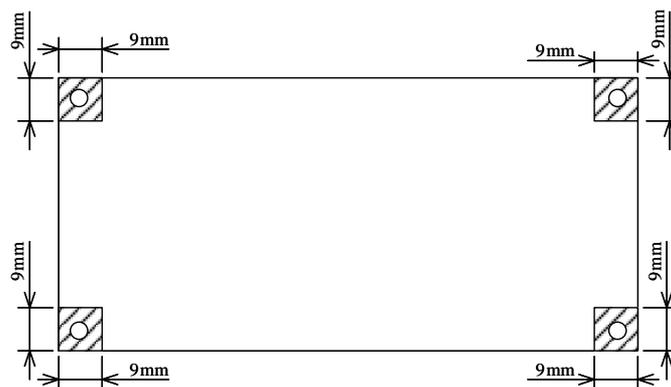
8-2. Mounting Method

Insert the spacer (Max ϕ 8) of height more than 8mm to lift the product. And use all mounting holes for the product installation.

- (1) Mounting Holes size
 4 holes ϕ 3.5mm

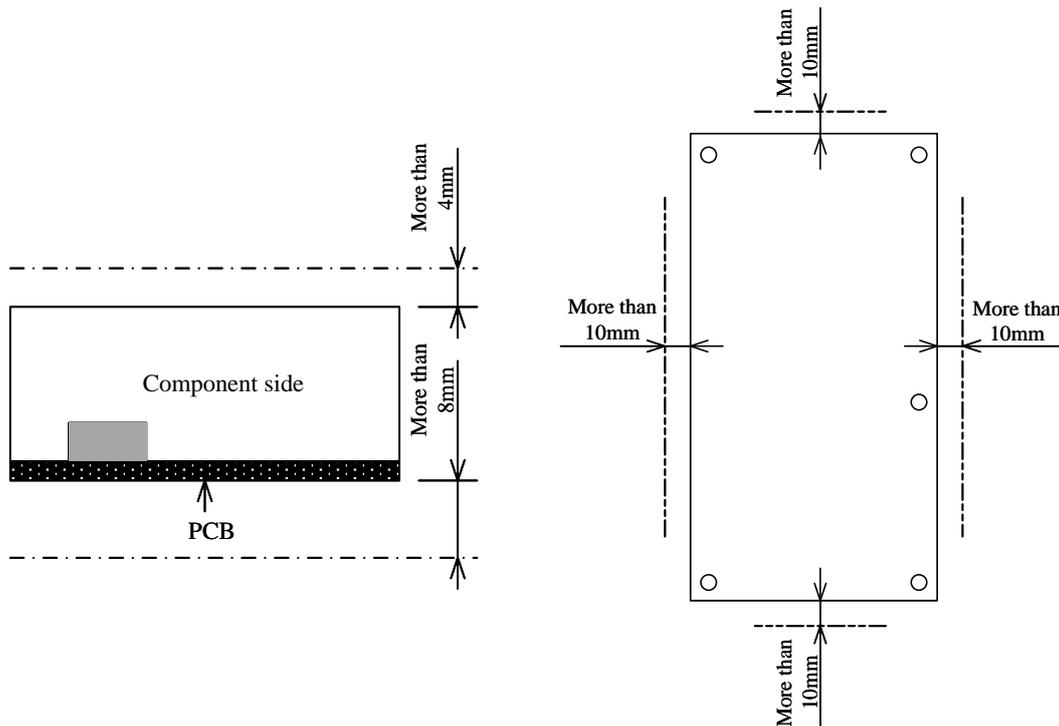


Allowable area by metal pieces is 9mm from each PCB corners. Refer to figure below.

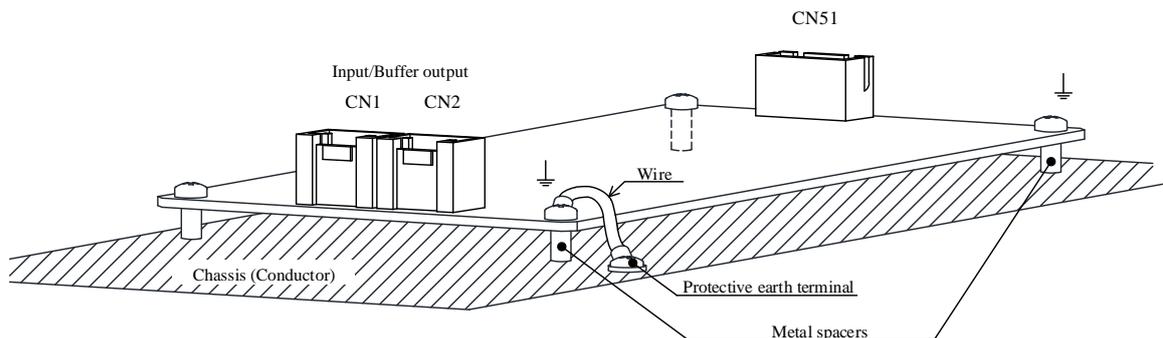


(2) Condition to meet Isolation , Withstand Voltage & Safety standard

If the space is not enough, the specification of isolation, withstand voltage and safety standard will not be satisfied.
Take the space in the product surroundings and the upper area of components to keep enough for convection cooling.



- (3) \perp must be connected to the Protective earth terminal of the equipment. Also 2 mounting holes are must be connected to the Chassis (Conductor) by Metal spacer. When screw clamping the mounting holes, please use the screw with spring washer. If not connect to the Chassis (Conductor), the conducted noise, radiation noise and output noise will increase. (The location of 2 mounting holes for Chassis connection is shown with \perp mark in below figure.)



9. Wiring Method

- (1) The input/buffer output load line and signal line shall be separated, and use all lines as thick and short as possible to make lower impedance. The input/buffer output load line and signal line shall be twisted or use shielded wire to improve noise sensitivity.
- (2) Input/buffer output lines shall be twisted.
- (3) Noise can be eliminated by attaching a capacitor to the STBY terminals.
- (4) For safety and EMI considerations, connect between \perp terminal of input connector and protective earth terminal firmly.
- (5) The recommended wire type, torque and crimp-type terminal.

Input/Buffer output : AWG#18
Signal output : AWG#26 ~ AWG#22

10. The life expectancy

The life of the this product depends on the life of the built-in aluminum electrolytic capacitor. The life is described in reliability data. The life of the aluminum electrolytic capacitor varies depending on the method of mounting the this product, the load current, and the ambient temperature. Please refer to "Electrolytic Capacitor Lifetime". Please do not use the product which passed over the life expectancy. There is a risk of unexpected output shutdown and specifications may not be satisfied. Please contact us for maintenance or exchange the product which passed over the life expectancy.

11. Before concluding that the product is at fault...

- (1) Check if using the specified power supply.
- (2) Check if the wiring of input/buffer output and signal terminal is correct.
- (3) Check if the wire size is not too thin.
- (4) Check if the output current and output power does not over specifications. (Option model "/S")
- (5) Audible noise can be heard during Dynamic-Load operation. (Option model "/S")

12. Warranty Period

This product is warranted for a period of 5 years from the date of shipment. For damages occurring at normal operation within this warranty period, repair is free of charge.

13. CE MARKING/UKCA MARKING

CE MARKING

CE Marking, when applied to a product or packing material for a product covered by this handbook, indicates compliance with the Low Voltage Directive, EMC Directive and RoHS Directive.

UKCA MARKING

UKCA Marking, when applied to a product or packing material for a product covered by this handbook, indicates compliance with the Electrical Equipment (Safety) Regulations, Electromagnetic Compatibility Regulations and Restriction of the Use of Certain Hazardous Substances in Electrical & Electronic Equipment Regulations.

14. Registered trademark : e-hold

"e-hold" is a registered trademark of TDK-Lambda Corporation.

