

AUTOMOTIVE HIGH VOLTAGE DC RELAY USER'S MANUAL

【Safety precautions】

The possibility of defect cannot be eliminated entirely even though EM Devices Corporation has been making continuous effort to enhance the reliability of high voltage DC relays. To minimize the risks of damage or injury to persons or property arising from a defect in high voltage DC relay, customer must incorporate sufficient safety measures in its design; such as redundancy, fire-containment and anti-failure features. For proper use of the relay, please check your product with actual load and actual application under actual operating conditions.

【General】

For general cautions of relay usage, please refer to the “Automotive Power Relay User’s Manual”.

1. Usage and Storage conditions**(1) Ambient temperature**

When the relay is used at an ambient temperature exceeding or below the range that is shown in the datasheet and catalog, the performance of the relay may be degraded and the life may be extremely shortened.

(2) Humidity

Under a high humidity (RH85% or higher) environment for a long time, moisture may penetrate inside the relay. This moisture may combine with NO_x or SO_x generated by glow discharges to produce nitric acid or sulfuric acid. In this case, the acid produced may corrode the metal that forms the relay, and it may cause operation troubles in the relay.

(3) Low temperature and humidity atmosphere

If the relay is exposed to a low-temperature, low-humidity atmosphere for a long time, its plastic parts may become brittle and fragile.

(4) Water condensation

Water condensation occurs when the ambient temperature drops suddenly from a high temperature and humidity, or the relay is suddenly transferred from a low ambient temperature to a high temperature and humidity. Condensation causes the failures like insulation deterioration, wire disconnection and rust etc. Please evaluate in the actual usage.

(5) Icing

Icing means, the moisture contained in the surrounding environment and inside the relay freezes when the ambient temperature falls below the freezing point.

The icing causes the sticking of movable portion, the operation delay and the contact conduction failure etc. Please evaluate in the actual usage.

(6) Atmospheric pressure

The relay supposes to use under normal pressures (810 to 1200hPa). However, if it is used under other pressure conditions, its performance may be destroyed and the relay may be deformed. This can cause functional troubles with the relays. Be sure to use the relay under normal pressure conditions.

(7) Vibration and Shock

The use of the relay under conditions that are not specified may cause malfunction or damage. Excessive vibration and shock during contact load current carrying may cause considerable damage or wear of the contacts.

Please absolutely avoid the ultrasonic and high frequency vibration to the relay that adversely affects its performance.

(8) Influence of magnetic fields

Under the influence of magnetic flux leaking from a transformer, speaker, or magnet placed near the relay; the operate and release voltage; operate and release time, and other dynamic characteristics may change. In applications where these characteristics changes can cause problems, it is necessary to take measures such as magnetic shielding.

(9) Plastic molding for relay body

Please do not use this product in such atmosphere where any kind of organic solvent (as benzene, thinner and alcohol) and the strong alkali (as ammonia and caustic soda) may be adhered to this product.

(10) Fixing contact terminal

Please be careful that oils and fats kind don't stick to the fixing contact terminal portion because it is likely to cause terminal portion to give off unusual heat.

(11) Insulation around installing area

Please check the insulation distance between each terminal and ground.

(12) Storage

Please do not keep under high temperature and humidity.

2. Installing the relay

(1) Condition

- As for the screws of fixing relay-body and screws of fixing contact terminal, the tightening torque must be within the specified range.
Tightening torque for fixing contact terminals (M6): 6Nm~8Nm
Tightening torque for fixing relay body (M5): 3Nm~4Nm
- When installing the relay, always use washers to prevent the screws from loosening.
- For fixing contact terminal, please do not use the screws (bolts and nuts) which require rotation torque of locking type (prevailing torque type).
- Regarding the screw for fixing relay body, please use suitable screws after adequate verification at user's side.

(2) Load applied to the terminal

Avoid excessive load applied to the terminal in case of installing such as a bus bar etc.
It might adversely affect the switching performance.

3. Electrical life

- The fixing contact terminals of the relay are polarized, so follow the connection schematic when installing the relay.
- This relay is a high-voltage direct-current switch. In its final breakdown mode, it may lose the ability to provide the proper switch-off. Therefore, do not exceed the indicated switching capacity and life. Please treat the relay as a product with limited life and replace it when necessary. Electrical life is based on the resistive load, so please evaluate in the actual usage when load type is an inductive load.
In the event that the relay loses switch-off ability, there is a possibility that burning may spread to surrounding parts, so configure the layout so that the power is turned off.
- In case using a capacitive load, please take a countermeasure as pre-charging to the capacitive load. The relay may have a contact welding by the excessive inrush current without such countermeasure. Please evaluate in the actual usage.

4. Coil drive circuit

(1) Coil surge absorber

Please do not have a parallel connection with diode for the purpose of coil surge absorber.

If only diode is connected in parallel to the relay coil, break performance of relay cannot be assured because contact release speed becomes slower. So do not use such a circuit. Instead of diode, a Varistor or Zener diode (ZD) when clamp voltage is 150% larger than the rated voltage (Min. 18 V for the rated 12 V relay), shall be used for the absorber.

(2) Power supply

When applying current which includes precipitous changes or ripple, the relay may generate buzzing sound. Please confirm with the actual load.

5. Others

(1) Please do not make additional manufacturing upon the relay housing.

(2) Busbars on the fixing contact terminal side should be selected in consideration of current capacity and temperature rise under mounting conditions. If the cross-sectional area is small, the maximum allowable contact current cannot be guaranteed.

(3) The guaranteed range of overcurrent exceeding the rated current is limited to single-shot energization. In case of repeated energization at the current value within the range specified as interrupting performance, allow cooling time for each part temperature to return below the maximum operating temperature, since there is a possibility of failure due to heat generation.

The information in this document is based on documents issued in July 2023. The information is subject to change without notice. For actual design-in refer to the latest publications of data sheets, etc., for the most up-dated specifications of the device.

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of EM Devices Corporation. EM Devices Corporation will not be responsible for any errors which may appear in this document.

EM Devices Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied; otherwise, it is granted under any patents, copyrights or other intellectual property rights of EM Devices Corporation or others.

The possibility of defects cannot be eliminated entirely even though EM Devices Corporation has been making continuous effort to enhance the reliability of miniature power relay. To minimize the risks of damage or injury to persons of property arising from a defect in an EM Devices' products, customer must incorporate sufficient safety measures in its design; such as redundancy fire-containment and anti-failure features.

EM Devices products are classified into three quality grades: Standard, Special, and Specific.

The Specific quality grade applies only to devices that are developed based on a customer designated Quality Assurance program for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade for each device before using it in a particular application.

Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control system, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

The quality grade of EM Devices products is considered as Standard, unless otherwise it is specified in EM Devices Datasheets or Data Books. If customers intend to use EM Devices' products for applications other than those specified for Standard quality grade, they should contact an EM Devices sales representative in advance.

The quality grade of the products described in this document is considered as Special.