

Capsule Contact High Voltage Cut-off Switch

EV SWITCHES

<Protective construction>
Capsule contact



(Unit: mm inch)

RoHS compliant

FEATURES

- **High reliability with capsule contact technology**
Since the contact portion is sealed in hydrogen gas, there is no contact oxidation. It is also dustproof and waterproof.
- **High voltage manual cut-off performance**
To realize manual cutoff with high voltage DC, hydrogen gas, which has superior arc cooling capability, is sealed in the capsule contact chamber. At the same time, superior safety is achieved owing to an explosion-proof construction that prevents arc leakage.
- **Safety function**
Designed with interlock button to prevent false energization

TYPICAL APPLICATIONS

- This safety switch is for cut-off the battery power from the system circuit when maintaining electric vehicles (HEV, PHEV, BEV), etc.

ORDERING INFORMATION

AEVD

Contact arrangement

1: 1 Form A

Current carrying capacity

1: 80 A

Rated voltage

1: 400V DC

EV SWITCHES (AEVD)

TYPES

Contact arrangement	Current carrying capacity	Part No.	Packing
			Case
1 Form A	80 A	AEVD111	20 pcs. (Packed with 20 pcs/1 tray)

RATING

Specifications

Item		Specifications	
		80 A type	
Contact data	Contact arrangement	1 Form A	
	Rated voltage	400 V DC	
	Max. carrying current	80 A continuity 120 A 600s 5,560A 0.03s (20 mm ²)	
	Contact voltage drop (initial)	Max. 0.16 V (at 80 A)	
Insulation resistance (initial) (Between open contacts, Between contacts and lever surface)		Min. 100 MΩ (at 500 V DC Megger)	
Breakdown voltage (initial) (Between open contacts, Between contacts and lever surface)		2,500 Vrms for 1 min. (Detection current: 10 mA)	
Lever operation force		<OFF ⇒ ON> 10 to 25N (Measurement position: center of lever) <ON ⇒ OFF> 3 to 9N (Measurement position: tip of lever)	
Interlock button operation force (when canceling a lock)		4 ± 1N	
Shock resistance (Switch: ON condition)	Functional	Min. 490 m/s ² {approx. 50 G} (Half-wave pulse of sine wave: 11 ms; detection time: 10 μs)	
	Destructive	Min. 790 m/s ² {approx. 80.6 G} (Half-wave pulse of sine wave: 6 ms)	
Vibration resistance (Switch: ON condition)	Functional	20 to 200 Hz, acceleration: 44 m/s ² {approx. 4.5 G} (Detection time: 10 μs)	
	Destructive	20 to 200 Hz, acceleration: 44 m/s ² {approx. 4.5 G} X, Y, Z direction: 4 hours each	
Expected life	Mechanical life		
	Switch-off life*1, 2	Forward direction	400 A 400 V DC, Min. 5 times
		Reverse direction	–120 A 200 V DC, Min. 5 times
Conditions	Conditions for usage, transport and storage	Ambient temperature: –40 to +80°C –40 to +176°F Humidity: 5 to 85% R.H. (Please avoid icing or condensation)	
Weight		Approx. 230 g 8.11 oz	

Notes: *1. No-load application when ON.

*2. at L/R ≤ 1ms

DESCRIPTION OF USAGE

1. Application

EV switch is a safety switch for cut-off a battery power supply from a system circuit, in order to protect a human body from the electric shock accidents at the time of a maintenance, etc.

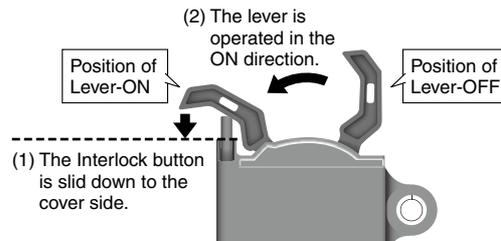
2. How to use

1) When the switch is turned ON and OFF, in principle the battery power is already cut-off by the system side (no current-passing condition). Please turn the lever to the ON side and the OFF side. Do not switch current by contact turning ON. However, the switch can cut-off the power directly, even when power is not cut-off by the system. Please refer to the specification regarding the cut-off performance.

2) When turning the switch ON, the product is designed to prevent malfunction by not allowing it to turn ON unless the interlock button is pressed when the lever is operated.

*1: At the time of OFF operation, the lever can change to OFF position without operation of the interlock button.

*2: Please operate the lever after making the interlock button slide down completely to the side of the cover.



[If contact welding occurs]

Contact welding may occur if current is switched by contact turning ON or if current that exceeds the specifications is continuously applied when the power is ON. This switch indicates contact welding by doing (1) and (2), below.

(1) The lever will not go all the way to the OFF position when you try to turn it off, and when you release the lever it returns to the window that displays "RED".

(2) The interlock button does not return.

*Please be careful. In this state the switch's contacts are not OFF.



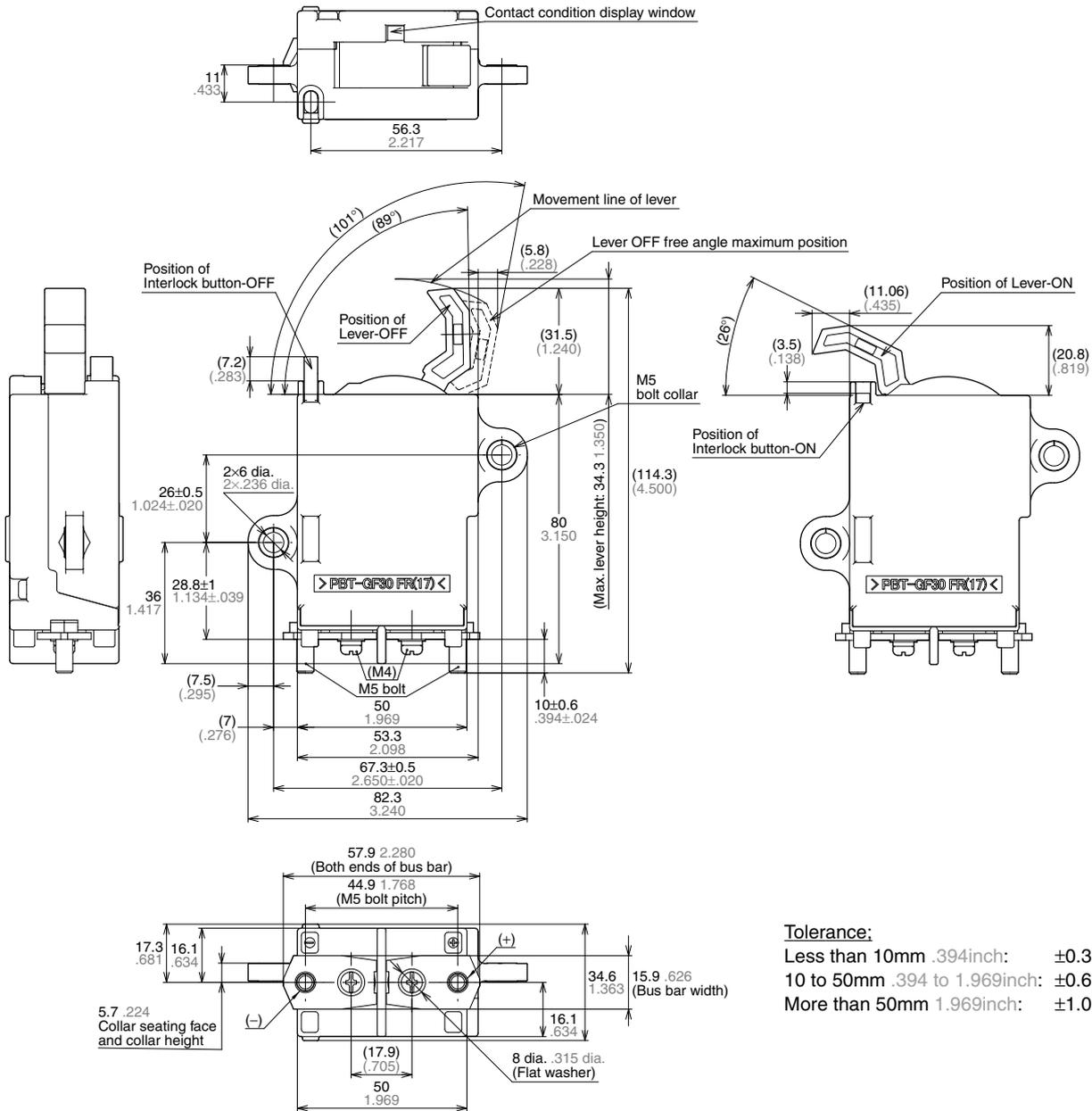
EV SWITCHES (AEVD)

DIMENSIONS (mm inch)

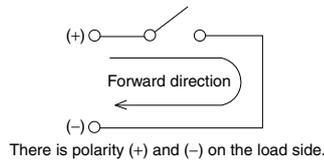
The CAD data of the products with a **CAD** mark can be downloaded from: <http://industrial.panasonic.com/ac/e/>

CAD

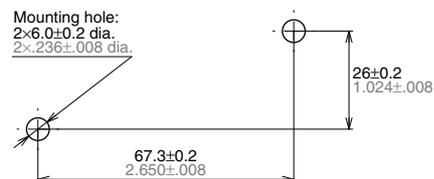
External dimensions



Schematic (TOP VIEW)



(Reference) Mounting dimensions



NOTES

1. Usage, transport and storage conditions

1) Temperature: -40 to $+80^{\circ}\text{C}$ -40 to $+176^{\circ}\text{F}$

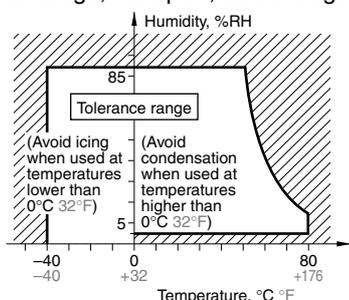
2) Humidity: 5 to 85% RH

(Avoid icing and condensation.)

The humidity range varies with the temperature. Use within the range indicated in the graph below.

3) Air pressure: 86 to 106 kPa

[Temperature and humidity range for usage, transport, and storage]



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.

Panasonic Corporation*3 does not guarantee the failures caused by condensation.

5) Low-temperature, low-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.

6) Icing

Please check the icing when an ambient temperature is lower than 0°C $+32^{\circ}\text{F}$. Water drop adheres to the relay by the condensation or the abnormal high humidity and is frozen to the ice when the ambient temperature becomes lower than 0°C $+32^{\circ}\text{F}$. The icing causes the sticking of movable portion, the operation delay and the contact conduction failure etc.

Panasonic Corporation does not guarantee the failures caused by the icing.

The heat conduction by the equipment may accelerate the cooling of relay itself and the icing may occur. Please confirm no icing in the worst condition of the actual usage.

7) Storage

Do not keep under high-temperature and high-humidity.

2. When installing the switch, always use washers to prevent the screws from loosening.

Regarding the torque value for contact terminal, it is intended that secure an electrical connection stability by getting enough contact pressure (Axial force) of fixing part. Therefore, please do not use the screw (a bolt and a nut) preventing looseness needing running torque (Prevailing torque type and Self lock type) because enough tightening force in axial direction may not be secured.

In addition, there is high possibility that a case of a switch may be broken if users use the nut for EV switch.

Because excessive torque is applied to a case of a switch before generation of contact pressure. (Axial force).

Regarding the torque value for the main body of a switch, please use suitable screw on own verification.

3. Attachment environment

<Attached position>

- Same as the automotive vehicle interior environment
- Please consider the prevention of dew condensation and dusts.

<Mounting arrangement>

Body: Fastening and fixing with a bolt. ($M5 \times 2$)

Terminal: Fastening and fixing with a nut. ($M5 \times 2$)

<Screw-fastening torque>

Body: 3.5 ± 0.5 N·m

Terminal: 3.5 ± 0.5 N·m

4. Please do not remove the assembly screw of the switch. Otherwise the performance cannot be guaranteed.

Moreover, in order to prevent from removing the assembly screw easily, please attach the assembly screw showing its backside.

5. Please note the polarity of the terminal. Please abide by the connection of polarity described to this catalog. The performance cannot be satisfied when reversely connected. It becomes a cause of the accident.

6. The switch should not be installed near strong magnetic fields (transformers, magnets, etc.) and should not be installed near heat source.

7. If the several switches are mounted closely or a heat-generation object is close to the switch, take care to check the abnormal temperature-rise and the insulation distance between the terminals outside of the switch.

8. The switch contacts are encapsulated type filled with gas. Therefore, care must be exercised when the switch is to be used or stored at high ambient temperature.

9. If the switch is used for an inductive load (L load) such that $L/R > 1$ ms, add surge protection in parallel with the inductive load. If this is not done, the electrical life will decrease and cut-off failure may occur.

10. When the short-circuit current is large, there is possibility that the switch will be destroyed by the time the power supply is intercepted with the fuse. Therefore, please confirm it enough with the system.

11. There is a possibility of performance change due to transfer effect through terminal from connected components and radiation heat (e.g. fuse) around the switch.

12. Please consider the layout which avoids conductive liquid on solvent such as water etc. from the switch for the prevention of electric shock.

13. If the switch is used exceeding the contact rating or cycle lifetime, this may result in the risk of overheating.

EV SWITCHES (AEVD)

14. Contact welding may occur if current is switched by contact turning ON or if current that exceeds the specifications is continuously applied when the power is ON.

The switch indicates 'RED' on the display window if contact welding occur. (Please refer to 'Description of usage')

However when abnormalities such as fuse disconnection etc. occurred, even if the display window does not become RED, please check the OFF state of the contact with a tester etc. and be sure to wear protective equipment before operating.

15. Please consider safety measures such as detection of ON/OFF state of a high voltage circuit, earth fault detection, and temperature detection by a system for high voltage circuit. Moreover, please consider safety measures that high voltage part work cannot be performed, if it is not in a high voltage circuit OFF state with a system or structure, when operating high voltage part work.

16. If the switch is dropped, it should not be used again.

17. Take care to avoid cross connections as they may cause malfunctions or overheating.

18. Use the suitable wire/bus bar according to the current.

*Recommendation: more than 20 mm²

Moreover, please consider the layout that the wire/bus bar can fix to the plate and please do not free the load-side electric wire/bus bar linked to a switch.

When terminal of switch and load-side wire/bus bar have a clearance gap, please do not carry out Screw-fastening with force. Please set up the order of fixation and layout which can make the smallest clearance gap at the time of screw-fastening.

19. 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 caustic soda) might be adhered to this product.

20. Although the gas enclosure type seal contact is used inside the switch (capsule contact), since the product itself is not a seal type, please do not use it under dust environment or the environment where direct water and a solvent adhere to the product.

21. Be careful that oil or foreign matter do not stick to the main terminal part because it is likely to cause the terminal part to give off unusual heat.

22. Do not make additional manufacturing upon the switch housing.

23. For AC cut-off these is no contact polarity, but confirm the electric life using the actual load.

For general cautions for use, please refer to the "Automotive Relay Users Guide".

Please contact

Panasonic Corporation

Electromechanical Control Business Division

■ 1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan
industrial.panasonic.com/ac/e/

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