



SS-3B Seismic Switch Description

The SS3B is the second generation of the seismic switch that Eentec offers. This model replaces the SS-3 and features all currently available options plus additional acceleration trigger level steps, lower operating current, optional two additional sets of relay contacts, improved battery management system and the ability to be hard wired into a protection system.

The SS-3B is an acceleration triggered switch used to mitigate damage to equipment that can be harmed by excess vibration from natural or man made sources. The switch is normally mounted near the equipment to be protected. The SS-3B continuously monitors site acceleration in three orthogonal axes using a highly stable MEMS technology accelerometer. Whenever acceleration exceeds the user selected trigger threshold on any one or more of the axes, the switch operates by powering down a dual contact

relay. Precise leveling of the switch is not required, and the switch and optional display will provide full functionality with an installed tilt of up to 15 degrees.

A blue led on the front panel indicates that the switch is receiving power from either the internal battery or wall mount power supply unit.

A lit red LED on the front panel of the switch indicates that the switch has been triggered. The switch has two sets (optionally four) of form C relay contacts, thus providing 2 (4) isolated sets of normally open or normally closed relay contacts. The relay contacts can be operated in either latched or momentary mode. Mode selection is by means of a dip switch located on the upper PC Board, accessible when the cover is removed.

In the latched mode, an acceleration on any axis greater than the selected trigger level causes the switch to trigger and the state of the relay contacts to change. The switch will remain in this state until the unit is manually reset by depressing a small switch located behind a seal screw on the top of the case. Provision is also made to allow the SS-3B to be reset from a remote location by means of a contact closure wired to this input.

If the switch is used in the timed mode, an acceleration on any axis greater than the selected trigger level will cause the switch to trigger and the relay contacts to change state. The relay contacts will remain in the changed state for the duration of the time selected by adjustment of a pot located under a seal screw on the front panel. The duration of this triggered state can be 1-12 seconds.

The SS3B will also switch to the triggered state when first powered up.

A small internal backup battery provides up to 12 hours of operating power to the unit should the main AC power source fails. The internal battery is only connected when the external power plug (with wired shunt) is connected to the unit. This protects the battery from deep discharge during shipping or prior to installation.

The SS3B is housed in a powder coated diecast aluminum enclosure. If the unit is installed in an outdoor location, it should be protected from the elements. The unit requires a DC power source of 12 VDC. The standard unit is supplied with a 12VDC, universal AC input power supply.

Seismic Trigger Specifications

Ac power supply: 100-240 VAC 50/60 Hz (with A/C universal external power supply) 20W Max

Operating Voltage: 9-14 VDC

DC Operating Current: 200 mA max.(Charging), 50mA (Triggered (1 relay)), 20 mA quiescent

Outputs: 2 form C (DPDT) contacts rated 120VAC 2A max

Acceleration Trigger levels: 0.01, 0.025, 0.05, 0.1, 0.15, 0.2, 0.25, 0.3, 0.35, 0.4, 0.5 and 1.0 G

Accuracy: 5%

Output duration: latched, momentary 1-12 Seconds

Actuating Acceleration Bandwidth: 0.5 to 15 Hz

Indicators: Power, Trigger

Power Connector: 6 Pos Military style Screw Lock MS3106A-14S-6P

Output Connector(s): 6 Pos Military style Screw Lock MS3106A-14S-6S

Internal Standard battery: 500mAHr lead acid (12 hours typical)24 Hours Max.

Case Size: 5" x 5" x 2.5"

Case type: Powder Coated, Diecast Aluminum

Power Connector

The power connector requires a MS3106A-14S-6P mating connector. The connector is prewired for the universal power supply and battery connecting shunt, and is supplied with the SS3B. The pin out of the connector is as follows. A jumper is installed between pins C and D in the mating connector to connect the internal battery. Whenever the unit is to be shipped or stored for more than a few hours, the power connector should be removed to prevent discharging the internal battery. Failure to remove the power connector during storage could damage the internal battery. The internal battery is protected by a low voltage disconnect that removes power to the switch when the battery is 90-95% discharged.

Pin	Function
A	Power (+) 9 to 15 VDC
B	Power common
C	Battery operation jumper (connected to pin D in connector)
D	Battery operation jumper (connected to pin C in connector)
E	Remote reset (+)
F	Remote reset (-)

Relay Outputs

The output connector requires a MS3106A-14S-6S mating connector(s) supplied with the SS3B. The pin out of this connector is as follows. There are two (four) isolated form C contacts. The NO contact will close, and the NC contact will open whenever the preset acceleration is exceeded. Operating mode of the relay contacts is controlled by a DIP switch

A	Common contact relay 1
F	Normally open contact relay 1
B	Normally closed contact relay 1
D	Common contact relay 2
C	Normally closed contact relay 2
E	Normally open contact relay 2

SS-3 Switch mounting

The SS-3 switch is normally mounted base down to a horizontal or vertical surface near the equipment to be protected. It is important that the switch not rattle on the mounting surface or false triggering may occur. The switch should be mounted securely to the surface by means of commercially available anchors. Alternately a double sticky foam mounting tape may be used between the switch and the surface if a non-marring mounting is required. Use sufficient tape so that the switch is securely mounted to the surface.

If the SS-3 switch is mounted to a vertical surface it will retain full triggering functionality.

Operating Power

The unit will operate and the internal battery will be float charged by the supplied DC wall mount power supply. The unit will also operate satisfactorily from any DC source of 9 to 14 VDC. Maximum operating current is approximately 200mA (battery under full charge). Normal operating current with output relay powered is 50mA and 20mA with the relay unpowered (untriggered).

The SS-3 is protected from overload or reverse polarity connection by a resettable fuse. If the unit has been subjected to these conditions, wait approximately 5 minutes, correct the problem and reconnect power.

Manual Reset Switch

The manual reset switch is a miniature push button switch located behind a sealing screw on the top of the SS-3B adjacent to the sensitivity switch. Remove the sealing screw and use a paper clip or pencil point to depress the switch to reset the SS-3.

Remote Reset

The SS-3 may be remotely reset by closing a N.O. contact closure between pins E and F of the power connector. Alternately an NPN solid state open collector switch may be used for this function, in which case Pin E is (+) and connected to the collector and pin F is (-) and connected to ground. The remote reset is optically coupled to the SS-3 circuitry to prevent damage from transients

Circuit operation

External DC power is used to float charge an internal battery and provide normal operating power for the switch. This power is then regulated and applied to a multi stage regulator to provide operating power for all of the electronics of the switch. The signal processing circuits operate in single ended fashion with 2.5V being circuit common.

Each accelerometer output channel is provided with a null adjustment to remove offsets from the accelerometer. Each accelerometer channel is also provided with a variable gain adjustment to precisely scale the accelerometer output to the desired levels required by the triggering circuits.

The outputs of the accelerometers are low pass filtered by a third order Bessel filter at 15 Hz in order to prevent false triggering by high frequency noise sources outside of the damaging frequencies produced by most earthquakes. A high pass filter at 0.5Hz eliminates drifts due to temperature component aging and tilt. The filtered accelerometer outputs are applied to bipolar comparators whose thresholds are set by the trigger sensitivity switch. In this manner, positive and negative accelerations are treated equally in the triggering process. Any acceleration generating a voltage greater than the threshold voltage will generate a trigger signal and change the states of the output relay.

Setup Instructions

1. Mount switch solidly near equipment to be protected. If mounted outside, protect the SS3B from dirt and moisture.
2. Make necessary connections to relay contacts to protect monitored equipment
3. Set desired acceleration threshold (normally between .05 and 1.0 G), more sensitive settings may be required for some very sensitive equipment, however the more sensitive the setting, the more likely the switch is to false trigger on a non damaging man made disturbance.
4. Connect power plug to SS-3. The blue LED should light.

OPERATIONAL VERIFICATION

As supplied, the relay contacts are configured for momentary 1 second operation. The switch can be tested very simply by setting the trigger level to 1.0 and setting the switch on a flat horizontal surface. Rapidly rotate the sensor from the horizontal position to a vertical position in any direction. The red LED should light indicating that the SS3B has triggered. This simple test confirms that the internal circuits are operating properly.

CONVERSION TO LATCHED OPERATION

To convert the relay contact operation to latched, remove the knob and the four outer screws in the base. Remove the switch cover, set the dip switch to the off position. Reinstall the cover and knob.

