

# SES70

## Intelligent Earthquake Sensor

### Overview

Using the SES70 Intelligent Earthquake Sensor, the amount of damage caused by earthquake motion can be estimated. Based on signals generated by its built-in accelerometer, the SES70 Intelligent Earthquake Sensor calculates and outputs seismic intensity (SI, from which structural damage can be estimated), Japan Meteorological Agency (JMA) seismic intensity scale (shindo scale) equivalent value, or the maximum synthesized acceleration value (selectable). Additionally, this unit makes a judgment regarding ground liquefaction based on the acceleration waveform characteristics, and outputs the results.

### Features

- Uses a 3-axis high-accuracy servo accelerometer.
- Incorporates measurement and calculation components to achieve a compact size at a low price.
- Synthesizes the measured acceleration signals as vectors, and can output the maximum value as a 4-20 mA analog signal.
- Calculates seismic intensity (SI) based on the measured acceleration signals, and outputs the results.
- Calculates a value equivalent to the JMA shindo earthquake scale value based on the measured acceleration signals and SI value, and outputs the results.
- Turns ON the liquefaction detection output using the liquefaction detection algorithm.
- Turns a vibration detection contact output signal on or off according to the results of calculation and according to the following four conditions with AND or OR relationships:
  - When the synthesized AC acceleration value exceeds a preset value
  - When the SI value exceeds a preset value
  - When the JMA seismic intensity scale equivalent value exceeds a preset value
  - When liquefaction is detected
- Diagnoses various of its functions during operation, and outputs error information categorized as a serious or a minor failure.
- In conjunction with a digital input signal or PC loader, executes a comprehensive self-diagnosis, including the accelerometer.
- A PC loader (Smart Loader Package) is available which allows the user to change various settings and to monitor operation of the unit.
- The casing has a pressure-resistant explosion-proof construction and an IP67 seal.



### Specifications

	Item	Description
Basic specifications	Explosion-proof standard	Exd II BT4 (TIIS pressure-resistant explosion-proof construction)
	Rated acceleration range	±2000 Gal (in x, y, and z directions)
	Acceleration measurement range	±2200 Gal (in x, y, and z directions)
	Acceleration measurement resolution	1 Gal (at static acceleration)
	FSG sensitivity	±2%FSG (±980 Gal) in x, y, and z directions *1
	FSG middle point	±3%FSG in x, y, and z directions *1
	Measurement accuracy	±2% of measured value (at 0-50 °C, at 100 Gal span min., in DC measurement), ±2 Gal (at 0-50 °C, at less than 100 Gal span, in DC measurement) in x, y, and z directions
	Output linearity	±2%FSO (+2000 Gal), ±2%FSO (-2000 Gal) in x, y, and z directions *1
	Sensitivity in other axial directions	±3% in x, y, and z directions
	Electrical noise	2 Gal (acceleration filter: 30Hz) in x, y, and z directions
	Acceleration sampling	10ms sampling
	Acceleration waveform recording	10ms sampling for 360s, waveforms in x, y, and z directions, 10 waveforms
	Analog output accuracy	±0.2%FS

	Item	Description
<b>Electrical specifications</b>	<b>Rated voltage</b>	12Vdc $\pm$ 10 % or 24Vdc $\pm$ 10 %
	<b>Current consumption</b>	500/260mA (12/24Vdc)
	<b>Power ON inrush current</b>	30A for 50 $\mu$ s max.
	<b>Contact output (vibration detection outputs 1, 2, 3)</b>	Relay 1a, 30Vdc, 0.5A max.
	<b>Digital output 1 (minor failure detection output)</b>	Transistor output (Nch open drain): 30Vdc, 50mA max. (ON in case of a minor failure, ON/OFF action in any mode other than measurement mode)
	<b>Digital output 2 (serious failure detection output)</b>	Transistor output (Nch open drain): 30Vdc, 50mA max. (default setting: ON in case of a serious failure)
	<b>Digital output 3 (noise protection output)</b>	Transistor output (Nch open drain): 30Vdc, 50mA max. (ON in case of noise protection detection)
	<b>Digital output 4 (liquefaction detection output)</b>	Transistor output (Nch open drain): 30Vdc, 50mA max. (default setting: ON in case of a serious failure)
	<b>Analog output 1</b>	4-20mA current source (default setting: synthesized AC acceleration = 0-2000 Gal) *2
	<b>Analog output 2</b>	4-20mA current source (default setting: SI value = 0-200 kine) *2
	<b>Analog output load resistance</b>	300 $\Omega$ max.
	<b>Digital input (diagnostic input)</b>	Photocoupler input current source, 9mA max.
	<b>Communication</b>	Loader communication: TTL, 115200bps RS-485 communication: 3-wire system, 38400/19200/9600 bps
	<b>Dielectric Strength</b>	500Vac for 1min or 600Vac for 1s
	<b>Insulation resistance</b>	100M $\Omega$ min. with 500Vdc megger
<b>Mechanical specifications</b>	<b>Material</b>	Case and cover: aluminum alloy casting
	<b>Mounting angle</b>	Within $\pm$ 3° from horizontal
	<b>Cable gland type</b>	G3/4 flameproof packing
	<b>Mass</b>	1.9kg
<b>Environmental specifications</b>	<b>Operating ambient temperature</b>	-10 to +60 °C (without freezing)
	<b>Guaranteed accuracy ambient temperature</b>	0 to +50 °C (without freezing)
	<b>Storage temperature</b>	-20 to +70 °C
	<b>Operating humidity</b>	90%RH max. (without condensation)
	<b>Waterproofing and dust-proofing</b>	IP67 (1m under water for 30min), JIS C 0920 watertight (unless conduit is used without cable gland) *3
	<b>Vibration resistance</b>	19.6m/s <sup>2</sup> max.
<b>Shock resistance</b>	490m/s <sup>2</sup> max.	
<b>Accessories</b>	2 sets of flameproof packing (different types) Flameproof packing (1) and washers (2) for 10-12mm outer diameter cable Flameproof packing (1) and washers (2) for 12-14mm outer diameter cable Cable gland set (cable gland, cable clamp, lock nut) Battery (life: 10 years min. when power is supplied, 6 months when no power is supplied, at 20 °C) 3 hexagon socket bolts (M6 $\times$ 10mm) Cross-slot head screws with captive washer (3 each of M5 $\times$ 30mm and M5 $\times$ 20mm) User's manual, No. CP-SP-1393E	
<b>Accessories (sold separately)</b>	SLP-SE7 Smart Loader Package for SES70 Intelligent Earthquake Sensor	
<b>Replacement parts</b>	Replacement battery Part No. 81446431-001 Manufacturer: Azbil Corporation Electrochemical: Manganese dioxide lithium battery Nominal voltage: 3V Rated capacity: 240mAh	

\*1 Measurement conditions

- Supply voltage: 12 or 24Vdc  $\pm$ 10 %
  - Ambient temperature: 0 to 50 °C
  - Humidity: 50  $\pm$ 20 % RH
- % FSG: percentage of the 1960 Gal span  
 % FSO: percentage of the 4000 Gal span

\*2 Output of synthesized AC acceleration, SI value, or JMA seismic intensity scale value can be selected.

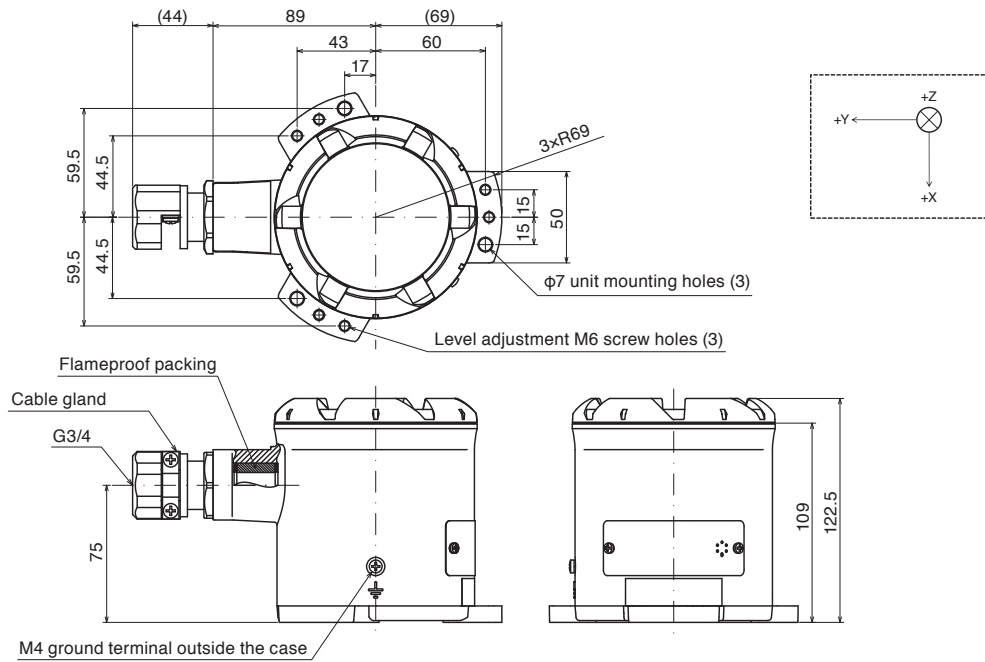
\*3 Waterproofing and dust-proofing are not tested by TIIS.

## Model No.

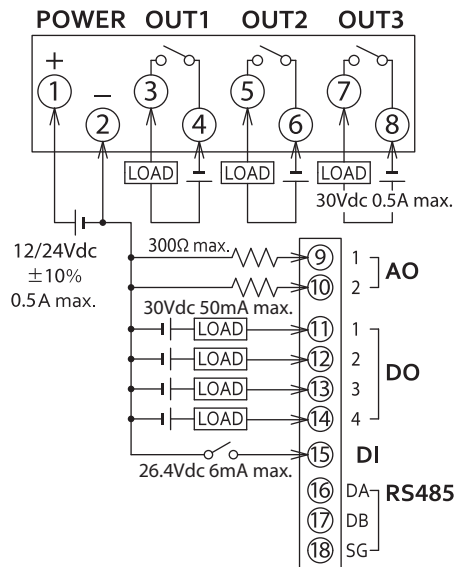
Model No.	Product	Notes
SES70AV320-1110	Intelligent Earthquake Sensor	Standard model
SES70AV320-111D	Intelligent Earthquake Sensor	With inspection report
SES70AV320-111Y	Intelligent Earthquake Sensor	Inspection report + traceability certificate
SLP-SE7J90	Smart Loader Package	
81446431-001	Replacement battery	

## External dimensions

Unit: mm



## Terminal connection diagram



- Note:
- Terminal SG (for RS-485) is connected to terminal 2 in the terminal block inside the unit.
  - Do not connect the DO to the RS-485 terminals.

## Installation Precautions

● Avoid installing the device where it will be subject to conditions such as the following.

- (1) Ambient temperature below -10 °C or above +60 °C
- (2) Humidity higher than 90 % RH
- (3) Sudden temperature fluctuations causing condensation
- (4) Corrosive or combustible gas.
- (5) Large amounts of conductive substances (e.g., dust, salt, or iron powder) or organic solvents
- (6) Direct shock or vibration other than earthquake motion
- (7) Direct sunlight
- (8) Large amounts of water or rain
- (9) Splashing by fluids (e.g., oil or chemicals)
- (10) Strong magnetic or electrical fields

Please read "Terms and Conditions" from the following URL before ordering and use.

<http://www.azbil.com/products/factory/order.html>

*Specifications are subject to change without notice.*



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