Seismic Detector AP311

ELEVATOR CONTROL FOR SAFETY AND EARLY RECOVERY FROM EARTHQUAKE

OUTLINE

AP311 is a seismic detector developed to specialize in elevator controls.
AP311 is able to detect 3 kinds of seismic wave (Primary wave, low-Secondary wave, high-Secondary wave), and relay 3 kinds of contact-output to elevator controller .
AP311 has selectable setting by rotary switch which gives easy installation and setting appropriate to each elevator at site.

FEATURES

- **SIMPLE AND COMPACT**
  Compact size is achieved in AP311 by integrating a tri-axial acceleration sensor with a processer.
- **INDEPENDENT OUTPUT**
  3 independent contact-outputs after detecting seismic wave which corresponds to each preset value of acceleration against 3 kinds of waves, gives precise and appropriate control of elevators.
- **EASY SETTING**
  Using rotary switch, acceleration is selectable among 4 settings which are preset as default values when delivered.
- **SELF CHECK FUNCTION**
  Self-checking automatically starts at every power on. Error is reported to remote place by contact-output when abnormal condition detected.
- **REMOTE OPERATION**
  Reset and self-checking is controllable from a remote place.

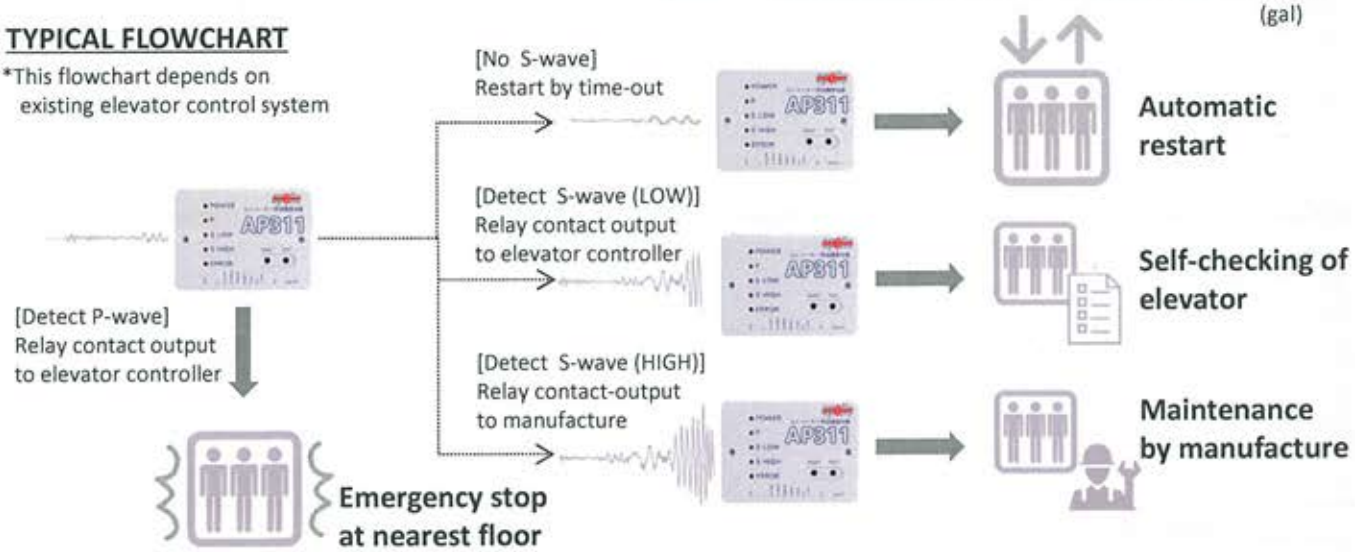
Preset accelerations (Changeable before delivery)

Switch No.	0	1	2	3	4	5	6	7
P	5	5	5	5	10	10	10	10
S LOW	80	100	120	200	80	100	120	200
S HIGH	120	120	150	300	120	120	150	300

(gal)

TYPICAL FLOWCHART

*This flowchart depends on existing elevator control system



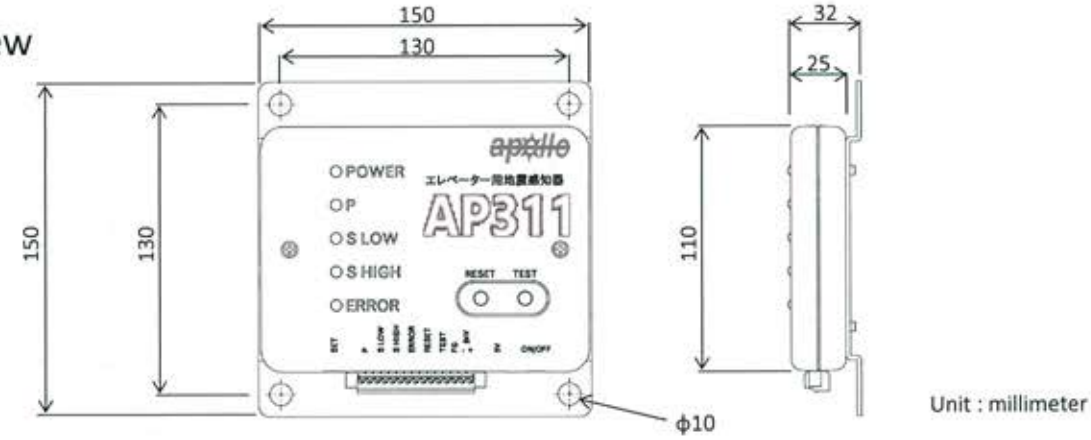
Specifications

Output relay contact	4 contacts (elevator Control 3, error alert 1), (A contact)
Output relay contact capacity	0.5A @CD60V and AC60V, 2Ω
Input signal	DC24V±20% (Non-polar), 2 contacts
Physical switch	2 switches (RESET, SELF TEST)
Relay contact connecter	MC1.5/15-STF-3.5, Connectable conductor cross section 0.14 to 0.15mm²
Sensor type	Capacitance
Setting acceleration range	2.5 to 500 gal (tri-axes: vertical axis, 2 horizontal axes)
A/D conversion	Delta-sigma
Resolution	16bit
Sampling rate	100Hz
Low pass filter	Butterworth filter (quartic), Cutoff frequency 5Hz (-3dB)
High pass filter	Cutoff frequency 0.01Hz (-3dB)
Power source	DC24V (normal), AC90 to 264V, 50/60Hz (optional)
Power consumption	9.5mA(Typical), 13mA(Maximum) @DC24V
Size	W150×H110×D25mm
Weight	600g (Anchor including)
Anchor bolt pitch	Anchor 150×150, Bolt pitch 130×130 ϕ10
Material	Case: Flame retardant ABS Anchor: Trivalent chromium plating iron
Operating temperature and humidity	-10 to 50℃, 20 to 80% (Non-condensing)

Function

Relay contact-control reset function	Push physical reset switch. Or P reset and S LOW reset are controllable by remote.
Test function	Push physical test switch. Or 3 kinds of self-testing are executable by input signal durations.
Maintenance (sensor check)	Push both physical reset and test switch.

Over view



Unit : millimeter

CAUTION

- Read "Manual" ahead of the use to use it correctly and safely.
- The specification and externals might change without a previous notice. Please acknowledge it beforehand.
- The product on catalog is a standard products. We will customize it according to customer's specification. Please ask in detail.
- Our company cannot assume the responsibility of any claim of the third party beforehand about damage and passive damages in money generated by using our products.
- The color of the product photography on catalog might be different from actual product because of the print.

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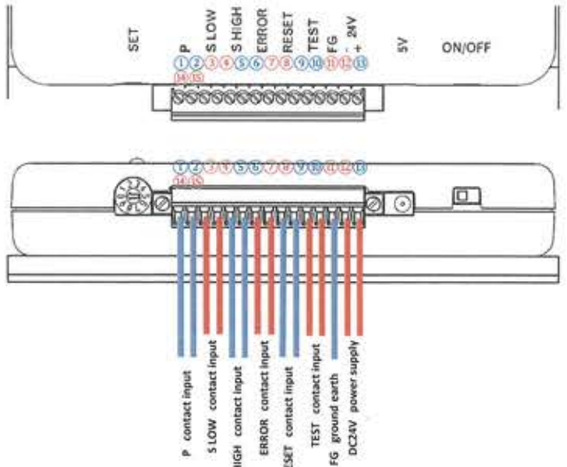
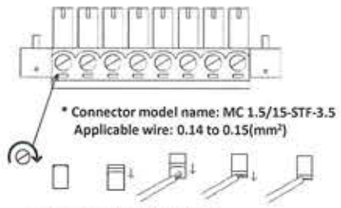
4. Connection example



1) Connect the external cable to the connector that is located at the bottom of the unit. The connector can be detached from the main unit.
2) Make sure that the earth (FG) is properly grounded.
3) When using the DC power supply, connect it to ⑭ and ⑮. *Be careful with the polarity.
4) When using the AC adapter, insert the plug into the AC adapter jack.



* Connector model name: MC 1.5/15-STF-3.5
Applicable wire: 0.14 to 0.15(mm²)

* Use the adjustment driver.

5. Installation

1) Install the product on a solid column or wall. The installation surface has to be a plane surface.
Specify the gal value of the sensor before installation. Set ⇒ of the rotary switch to the number to specify.
(The rotary switch is set to 0 upon shipment on the standard product.)
2) To install it on the rack, use four M8 screws, plain washers and spring washers and fasten the screws at torque of 140kgf·cm to 150kgf·cm (for stainless steel screws). (Install it within approx. 3 degrees of horizontal/ vertical)

6. Usage

1) Supply electricity from the control panel by DC 24V or the optional AC adapter.
2) Turn on the power switch located on the lower surface of the unit.
3) The normal operation is started when the blinking [POWER] LED lights up.
* The self-diagnosis is performed after the power is turned on until the input waveform becomes stable (for about 60 seconds).
The LED blinks during the self-diagnosis.

7. Operation test (same for the remote control)

1) Press and hold the [TEST] button on the front of the product when the [POWER] LED is on.
The contacts will operate in the following order. The [POWER] LED blinks during the operation test.
2 seconds: P (Primary wave) operation
4 seconds: S LOW (low-Secondary wave) operation
6 seconds: S HIGH (high-Secondary wave) operation
(Note) In case of the remote control, input a two second pulse, four second pulse and six second pulse at the voltage of at the voltage of DC+24V±6V.
2) Press the [RESET] button to recover. It will automatically restore the normal state in one minute after the end of operation.

8. Recovery after the tremor is detected

1) The recovery method for each contact operation after the tremor is detected is as follows (Not recovering automatically at S LOW or S HIGH):
P (Primary wave) contact recovery:
Recovery with the [RESET] button or a 3-seconds quiet (Automatic recovery; recovery through the remote control is not available)
S LOW (low-Secondary wave) contact recovery:
Recovery with the [RESET] button or the remote contact input (Recovery through the remote control is available)
S HIGH (high-Secondary wave) contact recovery:
Only with the [RESET] button (Recover manually after the state of equipment is confirmed. Recovery through the remote control is not available)

9. If you feel something is wrong .... the sensor test is also available.

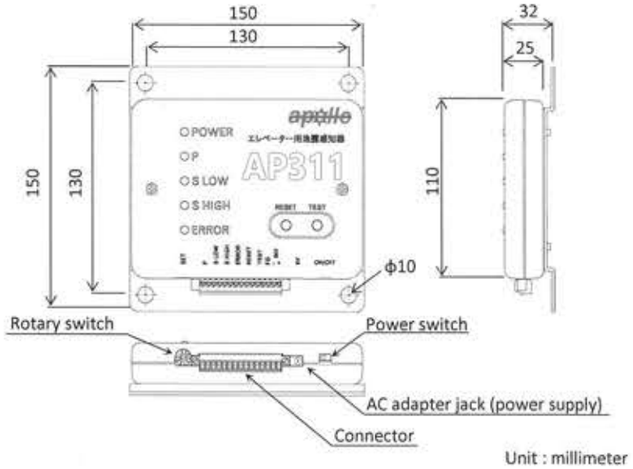
1) For the sensor test, press the RESET button and the TEST button at the same time.

	Normal state	Error state	Cause
POWER	Blink ○●	Blink ○●	
P	On ○	Off ●	Z component error
S LOW	On ○	Off ●	Y component error
S HIGH	On ○	Off ●	Z component error
ERROR	Off ●	Blink ○●	

2) For the sensor test, press the RESET button and the TEST button at the same time.
Normal: Press the RESET button. Or, it will recover after a one-minute quiet.

Seismic Detector AP311

Instruction Manual



Unit : millimeter

Features:

- AP311 can detect 3 kinds of seismic waves
(Primary wave, low-Secondary wave and high-Secondary wave)
- The gal value can be selected on site!
- DC & AC - 2 way power sources
- Remote test function
- Remote reset function
- Error notification function
- Simple in configuration, compact in size

Warranty Period:

- This product is warranted for one year from the date of purchase. For the warranty conditions, please refer to the Warranty Certificate.

Caution:

- This document is prepared based on the specifications as of May 2014.
- The product on this document is the standard specification product. It can be customized to your specifications. Please contact us for more information.
- The company will not be liable for any claim from a third party for monetary damage or lost profits caused by use of the product on this document.
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Follow the instructions for safe and correct use of this product.

⚠ WARNING This symbol indicates that failure to follow the instructions and misusing the product can lead to death or serious injury.

- ◆ Continued use of the product in an abnormal situation with smoke or abnormal smell arising may cause fire or electric shock. Turn off the power switch immediately. After confirming that smoke is no longer generated, contact the dealer, our branch office or sales representative to ask for repair. To avoid danger, do not try to repair the product by yourself.
- ◆ When the product is tumbled or damaged, turn off the power switch. Continued use of the product in such a condition could result in fire or electric shock.
- ◆ Do not touch the product with a wet hand or let water contact the product. Failure to follow this instruction may result in fire or electric shock.
- ◆ Do not handle the product with a wet hand. Failure to follow this instruction may result in electric shock.
- ◆ When water splashes on the product, turn off the power switch immediately and contact the dealer. Continued use of the product in such a condition could result in fire or electric shock.
- ◆ Never use accessories that didn't come with the product. Failure to follow this instruction may result in fire.
- ◆ Do not insert or drop metals or inflammables into the inside of the product through its ventilators or openings. Failure to follow this instruction may result in fire or electric shock.
- ◆ Never disassemble or alter the product. Failure to follow this instruction could result in fire or electric shock. (*A repair request for a disassembled or altered product may be rejected in some cases.)
- ◆ Never use the product at a voltage other than the specified power supply voltage. Failure to follow this instruction could result in fire or failure.
- ◆ Do not put liquid containers such as vases, potted plants, drinking cups, cosmetic bottles, medicine bottles, etc. on the product. Liquids spilt or penetrated into the product may cause fire, electric shock, or product failure.
- ◆ Do not break, damage, alter, forcibly bend, stretch or twist any power cords or cables of the product. Do not heat or put heavy objects on cables. Failure to follow this instruction may result in fire or electric shock.
- ◆ The heater and its surrounding area become hot. To avoid burn injury, do not touch hot areas.

⚠ CAUTION This symbol indicates that failure to follow the instructions and misusing the product can lead to injury or physical damage.

- ◆ Ground the product before starting to use it in a humid place.
- ◆ Do not put the product in an unstable location. In addition, do not put heavy objects on the main body of the product to prevent tumbling or falling. Failure to follow this instruction could result in injury.
- ◆ Do not block the ventilator of the product. Failure to follow this instruction may cause heat to accumulate inside the product and result in fire or failure.
- ◆ Be sure to use the specified type battery for the internal battery of the product. Do not throw batteries in fire. Do not disassemble or heat batteries. Failure to follow this instruction could result in fire.
- ◆ When inserting a battery in the product, set with correct polarity. Failure to follow this instruction could result in battery damage or cause injury or corrosion due to acid leakage. Do not touch the connections (metal portions) of connector terminals or terminal blocks with sweaty or dirty hands. Failure to follow this instruction could result in faults such as contact failure or result in electric shock.
- ◆ When using a stepladder for work, wear a helmet or the like for safety. Work in pairs if possible. Failure to follow this instruction may result in injury by dropping the product or falling off from the stepladder.

1. Outline

This product detects the preset acceleration value (gal) of seismic wave and outputs signals to three different contacts. It is designed to control the equipment, i.e. automatically stop or activate, upon an earthquake in combination with other control systems of various types of equipment including elevators.

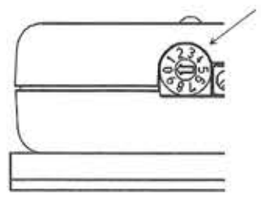
2. Product Specifications

Item	Specifications
Output relay contact	4 contacts (elevator Control 3, error alert 1), (A contact)
Output relay contact capacity	0.5A @CD60V and AC60V, 2Ω
Input signal	DC24V±20% (Non-polar), 2 contacts
Physical switch	2 switches (RESET, SELF TEST)
Relay contact connecter	MC1.5/15-STF-3.5, Connectable conductor cross section 0.14 to 0.15mm²
Sensor type	Capacitance
Setting acceleration range	2.5 to 500 gal (tri-axes: vertical axis, 2 horizontal axes)
A/D conversion	Delta-sigma
Resolution	16bit
Sampling rate	100Hz
Low pass filter	Butterworth filter (quartic), Cutoff frequency 5Hz (-3dB)
High pass filter	Cutoff frequency 0.01Hz (-3dB)
Power source	DC24V (normal), AC90 to 264V, 50/60Hz (optional)
Power consumption	9.5mA(Typical), 13mA(Maximum) @DC24V
Size	W150×H110×D25mm
Weight	600g (Anchor including)
Anchor bolt pitch	Anchor 150×150, Bolt pitch 130×130 ϕ10
Material	Case: Flame retardant ABS Anchor: Trivalent chromium plating iron
Operating temperature and humidity	-10 to 50℃, 20 to 80% (Non-condensing)

3. Functions

Item	Specifications
Detection direction	All horizontal directions, vertical directions
Operation display (LED)	POWER (power supply), P (primary wave), S LOW (low secondary wave), S HIGH (high secondary wave), ERROR (error)
	* "ERROR" blinks when the voltage of the battery added as an option is dropped
How to reset the contacts	Through the RESET switch of the main unit or the remote RESET operation. The remote RESET operation is only available with S LOW (low secondary wave).
How to check the operation	3 types of operation check are available through the TEST switch of the main unit or by duration of the control signal input of the remote TEST terminal
Operation inspection	Press the TEST switch and the RESET switch of the main unit at the same time to inspect the sensor operation.
Measure against power failure	Optional: 24-hour backup with the additional battery kit. (The additional battery kit is available upon ordering. It is recommended to replace it every 5 years)
Alarm output: preset acceleration	It can be specified in the range of 2.5 gal to 500 gal. The standard setting is as listed in the table below; the settings beyond the standard is optional.
	It can be selected with the rotary switch from the four different preset conditions of gal values. (See the table below)

Preset accelerations (Changeable before delivery)
* Use the adjustment driver when changing the setting.



List of the preset acceleration values (gal)

Switch No.	0	1	2	3	4	5	6	7
P	5	5	5	5	10	10	10	10
S LOW	80	100	120	200	80	100	120	200
S HIGH	120	120	150	300	120	120	150	300

(gal)

(Note) The setting is read when the power is turned on. Turn off/ on the power after any change is made.