

Instruction manual

Real-time seismograph Seismic wave catcher



Model number: BS-ES4571J

The leading company of Early Earthquake Warning



J CORPORATION



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➤Warranty

Thank you for purchasing our seismograph. We kindly ask for your long and continued use. This instruction manual explains the precautions for safe handling, operation method, and specifications of the seismograph. Please carefully read this manual and understand the contents before use, and keep it in a safe place.

Precautions for use (important)

1. The seismograph measures seismic intensity in real time and outputs warnings, etc. It outputs real-time seismic intensity, which can be slightly different from that the Japan Metrological Agency (JMA) does. This is because the calculation methods are different.
2. The shaking of earthquakes contains many frequency components. The sensor measuring the shaking of earthquakes does not always have the flat characteristics against frequencies. This can cause the seismograph to output seismic intensity values different from those the JMA announces.
3. Observed seismic intensity values can vary greatly, depending on how and where the seismograph is installed. This can cause an error in calculation of seismic intensity.
4. Note that we will not take any responsibility for loss, damage, accidents, etc. caused by e. g. malfunction.
5. If the seismograph is installed in a place always shaking or vibrating, it cannot sometimes normally operate because internal calibration is impossible. Start up the seismograph in a stable place.
6. The contents of the instruction manual are subject to change for improvement of the seismograph without notice. If you are interested in buying the seismograph, ask us whether the information stated in the instruction manual is latest.
7. Reproducing or copying all or any part of the contents of the instruction manual is prohibited without our approval.



Website of real-time seismograph

Warning

Do not use the seismograph in places where it is exposed to volatile gas.

This may result in explosion.

If the seismograph smokes, or makes strange smell or noises, immediately turn off its power supply and unplug the power supply plug.

Using the seismograph in this condition may result in electrical shock or fire. Contact us for repair. Never attempt to repair by yourself as it is dangerous.

Do not let water flow into the seismograph or wet.

If you use the wet seismograph, it may cause electrical shock or fire. If water flows into the seismograph, contact us for repair.

Do not touch the power supply connector or cable with wet hands.

This may result in electrical shock.

Do not place the seismograph in unstable places, such as a shaky table or tilted surface.

If the seismograph falls off or over, it may cause electrical shock, injury, or fire. If the cover is damaged, contact us for repair.

Use the specified power supply connector.

Do not put metal or combustible foreign matter into the seismograph.

This may cause electrical shock, fire, or malfunction. If foreign matter enters, after turning off the power and unplugging the power supply plug, contact us for repair.

Use the seismograph with the specified power supply voltage.

Failure to do so may result in electrical shock, fire, or malfunction.

Do not remove the cover or panel.

If you touch internal areas with high voltage, it may result in electrical shock. If you want to check and calibrate, or repair, contact us.

Do not modify the seismograph.

It may result in electrical shock, fire, or malfunction. We may not accept the modified seismograph for repair.

Strictly observe the following precaution for handling the power supply code and the connection cable.

Do not tie together, modify, pull, heat, wet, or twist them.

Caution

Be sure to connect the specified connection cable to the input/output connector.

Do not use the seismograph for operation or control of external devices related to human life.

Ground or apply voltage to the specified terminals of the input/output connector.

Failure to do so may damage the circuit or cause burn or fire.

Do not place anything on the seismograph.

It may cause the cover to touch the internal circuit, resulting in electrical shock, fire, or malfunction.

Do not use the malfunctioning seismograph.

It may result in electrical shock or fire. Contact us for repair.

Do not place the seismograph in moist or dusty places.

It may result in electrical shock or fire.

Use the seismograph in the specified operating range.

Failure to do so may result in malfunction. The operating temperature range is specified in the specifications. Do not expose the seismograph to direct sunlight.

If you do not use the seismograph for a long time, unplug the power supply plug for safety.

Do not use a damaged cable or adaptor.

It may result in electrical shock or fire.

Pack the seismograph in the original package, or equivalent or better when it is transported.

If great vibration or shock is applied to the seismograph when it is transported, it may malfunction, causing fire. Use an appropriate package and cushion material. When you use a carrier to transport, indicate on the box that it contains a precision device.

1 Overview

The purpose of the real-time seismograph is to reduce damage from earthquakes by the following: The 3-axis accelerometer measures seismic intensity in real time. When a set seismic intensity value is obtained, a warning is issued with LED lighting, buzzer sound, and external output.

The seismograph can be used for purposes such as determination of whether emergency evacuation is required, control of external devices, coping with of epicentral earthquakes, and prevention of false warnings by using early earthquake warnings.

2 Real-time seismic intensity

The Japan Meteorological Agency (JMA) announces how to calculate seismic intensity. The method is based on the degree of damage of houses. Since seismic intensity is measured after earthquake stop, warnings cannot be issued in advance.

Real-time seismic intensity is obtained by measuring earthquake shaking in real time. The method takes over almost the same calculation method used by the JMA.

Since seismic intensity is calculated in real time, it can be slightly lower than measured seismic intensity issued by the JMA.

3 Precautions for installation

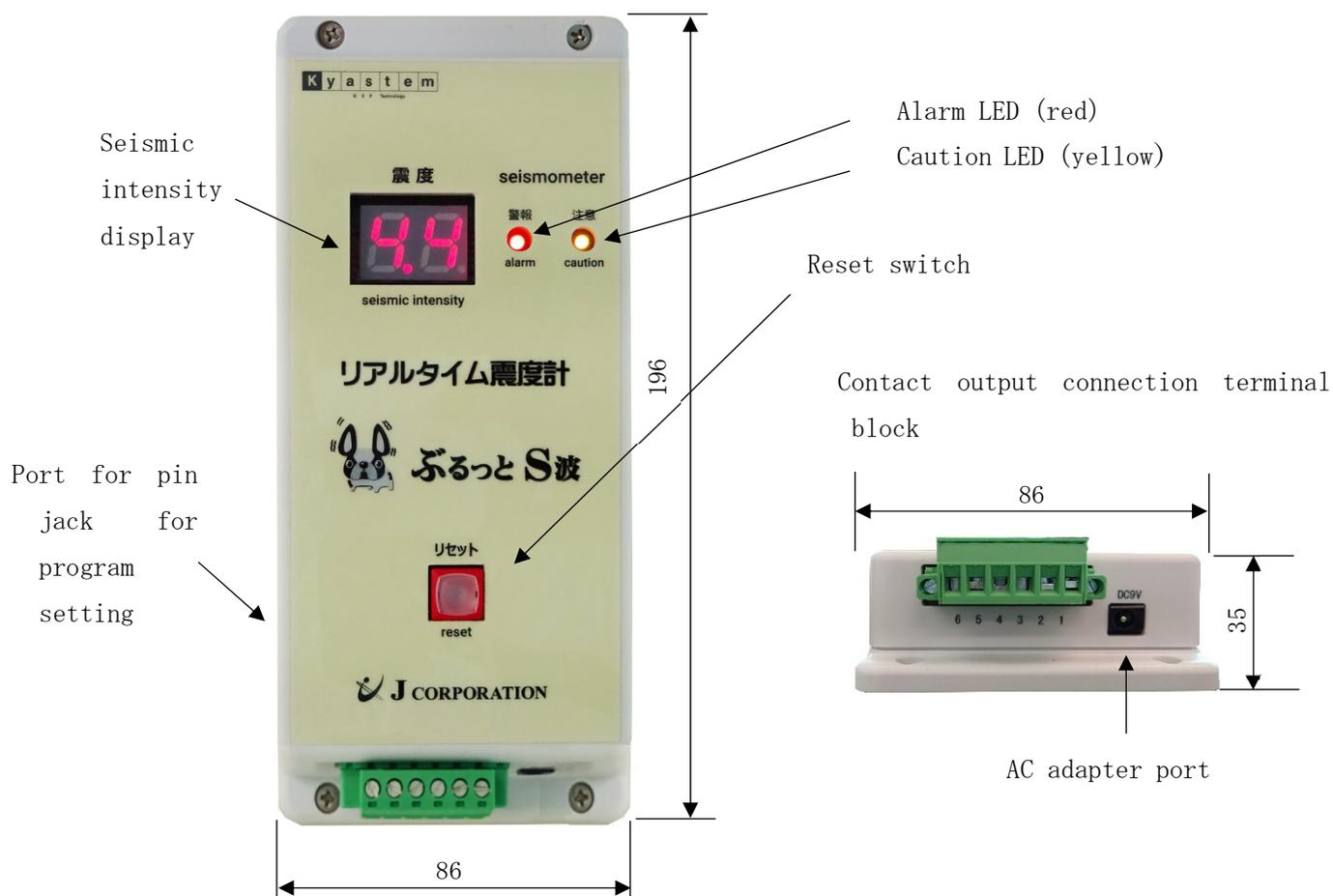
The seismograph measures earthquake shaking and issues warnings. Note the following to correctly measure earthquake shaking:

1. Be sure to fix the seismograph on a strong surface, such as a strong wall, to correctly measure earthquake shaking.
2. Ensure that the place where the seismograph is fixed does not pick up unnecessary shaking, except for earthquake shaking. Install the seismograph in places where shaking from moving of humans or heavy goods is not picked up.
3. The seismograph can be fixed in any direction. Considering the visibility of the display and easiness of pressing the switches, however, we recommend that it be installed on a vertical strong wall.

4 Accessories

- AC adapter
- Contact output connection terminal block
- Instruction manual

5 External view and names



Seismic intensity display

Displays the observed seismic intensity in 1 digit and 1 decimal place in real time. When seismic intensity exceeds Warning, the display flashes.

Alarm LED (red), Caution LED (yellow)

Lights up when seismic intensity exceeds Warning/Advisory. Goes off when seismic intensity becomes lower than Cancel.

Reset switch

Cancels relay operation, stops buzzer sound, displays or clears the maximum seismic intensity.

Contact output connection terminal block

Connect the contacts of the warning relay, advisory relay, and cancel relay.

Port for the pin jack for program setting (optional)

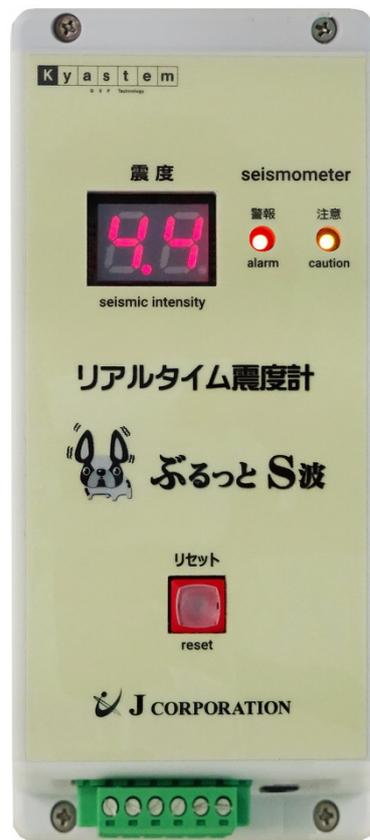
Interface for setting the seismograph. The settings of the seismograph can be checked and the settings of functions can be changed with the dedicated setting program.

AC adapter port

Connect the dedicated AC adapter.

*The appearance is subject to change without notice.

6 How to use



AC adapter



1. Connect the dedicated AC adapter.
2. Start operation by supplying power to the AC adapter.
3. Start up the seismograph in places without shaking or vibration. Note that it will not start up when installed in a place constantly shaking.
4. Immediately after the power is on, the seismic intensity display shows “-
-.” This indicates that the seismograph is detecting the direction in which it is installed. Then, seismic intensity is displayed and the seismograph becomes active.
5. Even if there is no earthquake shaking, numbers change. This is due to slight vibration caught by the seismograph or noise of the accelerometer, not malfunction.

7 Functions of controls

This section explains the functions of controls. Some of the functions can be changed with the setting program sold separately.

7-1 Setting of seismic intensity

There are 3 levels of seismic intensity.

1. Seismic intensity requiring the issuance of warnings (Warning)
2. Seismic intensity requiring the issuance of advisories (Advisory)
3. Seismic intensity requiring the cancellation of warnings/advisories (Cancel)

Set 1 digit and 1 decimal place for seismic intensity (e.g. 3.4).

The measurement range of seismic intensity is 0.0 to 7.9. Set seismic intensity, following the rule below. (The settings can be changed with the setting program.)

1. Be sure to set values for Warning, Advisory, and Cancel.
2. Warning should be greater than Advisory.
3. Advisory should be greater than Cancel.
4. The difference between seismic intensity values should be 0.5 or more.
5. Set 1.0 or greater for Cancel. Measurement of seismic intensity less than 1.0 is unstable.

Warning > Advisory > Cancel \geq 1.0

The difference between Warning and Advisory, and Advisory and Cancel should be 0.5 or more to ensure stable control.

Set 1.0 or more for Cancel.

7-2 Seismic intensity display

Observed seismic intensity is displayed in real time.

Select a method for displaying seismic intensity from the following (the settings can be changed with the setting program):

1. 最大震度保持 (Retain maximum seismic intensity)

When seismic intensity exceeds Warning, the maximum seismic intensity flashes. It is kept displayed even after the shaking stops.

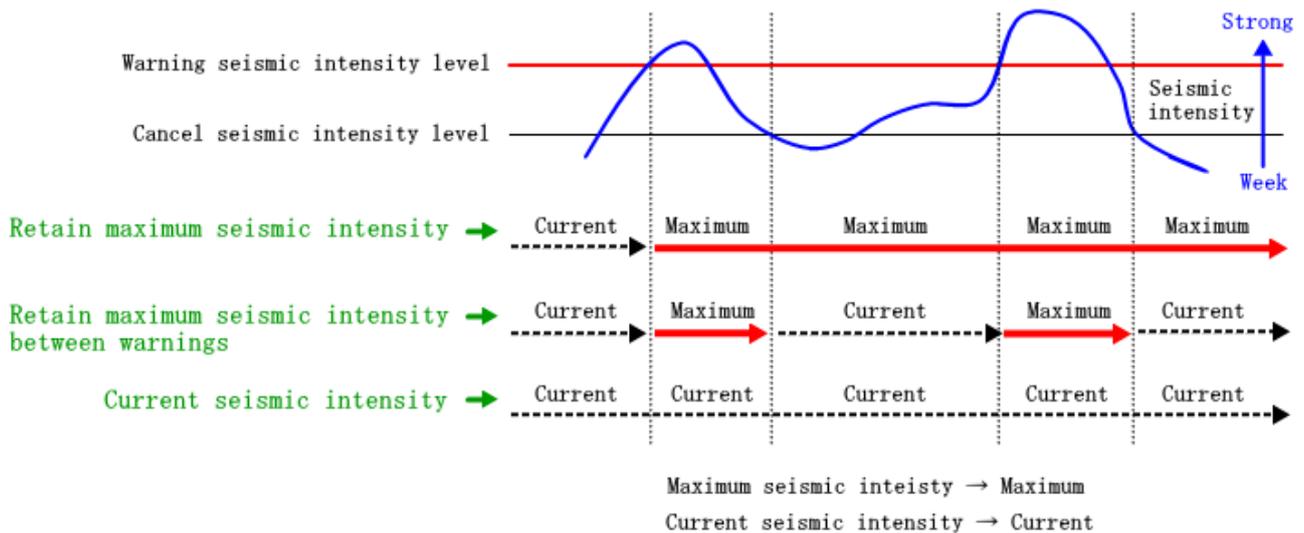
2. 警報間保持 (Retain maximum seismic intensity between warnings)

When seismic intensity exceeds Warning, the maximum seismic intensity flashes. When seismic intensity becomes lower than Cancel, real-time seismic intensity is displayed.

3. 現在震度 (Current seismic intensity)

Real-time seismic intensity is always displayed.

Relationship between seismic intensity and display



7-3 Retaining of maximum seismic intensity

Observed maximum seismic intensity is retained.

The maximum seismic intensity is retained until an earthquake greater than it occurs.

The retained maximum seismic intensity is cleared when the reset switch is held down for an extended long time, a week passes after it is recorded, or the power is off.

If you hold down the reset switch, the maximum seismic intensity is displayed. For details about holding down of the reset switch for a long or extended long time, refer to “Reset switch.”

7-4 Alarm LED (red)

The LED turns on when seismic intensity exceeds Warning and off when it becomes lower than Cancel.

7-5 Caution LED (yellow)

The LED turns on when seismic intensity exceeds Advisory and off when it becomes lower than Cancel.

7-6 Relay 1 (Warning relay)

Select a relay operation from the following (the settings can be changed with the setting program):

1. 警報震度から解除震度の間 (Warning to Cancel)

The relay is on when seismic intensity exceeds Warning and off when it becomes lower than Cancel.

2. 警報震度からリセットスイッチの間 (Warning to reset switch)

The relay is on when seismic intensity exceeds Warning and off when the reset switch is pressed.

3. 警報震度から1秒間 (1 second after Warning)

The relay is on for a second when seismic intensity exceeds Warning and then off. Unless seismic intensity becomes lower than Cancel, it will not become on even when seismic intensity exceeds Warning again.

4. 使用しない (Not use)

7-7 Relay 2 (Advisory relay)

Select a relay operation from the following (the settings can be changed with the setting program):

1. 注意震度から解除震度の間 (Advisory to Cancel)

The relay is on when seismic intensity exceeds Advisory and off when it becomes lower than Cancel.

2. 注意震度からリセットスイッチの間 (Advisory to reset switch)

The relay is on when seismic intensity exceeds Advisory and off when the reset switch is pressed.

3. 注意震度から1秒間 (1 second after Advisory)

The relay is on for a second when seismic intensity exceeds Advisory and then off. Unless seismic intensity becomes lower than Cancel, it will not become on even when seismic intensity exceeds Advisory again.

4. 使用しない (Not use)

7-8 Relay 3 (Cancel relay)

Select a relay operation from the following (the settings can be changed with the setting program):

1. 警報後解除震度で1秒間 (1 second at Cancel after Warning)

The relay is on for a second when seismic intensity exceeds Warning and becomes lower than Cancel.

2. 注意後解除震度で1秒間 (1 second at Cancel after Advisory)

The relay is on for a second when seismic intensity exceeds Advisory and becomes lower than Cancel.

3. 使用しない (Not use)

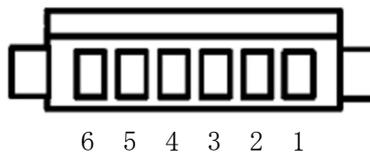
7-9 Contact output

There are 3 contact outputs: Warning relay contact output, Advisory relay contact output, and Cancel relay contact output.

There is no polarity.

No.	Relay
1	Warning relay
2	
3	Advisory relay
4	
5	Cancel relay
6	

Contact output connection terminal block



Contact rating DC : 24 V max. 250 mA or less AC: 100 V max. 200 mA or less

7-10 Relay test

Relays 1, 2, and 3 can be tested (output test) with the setting program sold separately. Relay tests cannot be performed from the main body.

7-11 Buzzer operation

Select a buzzer operation from the following (the settings can be changed with the setting program).

1. リレー1がONの間 (When relay 1 is on)

The buzzer sounds when relay 1 (Warning relay) is on.

2. リレー2がONの間 (When relay 2 is on)

The buzzer sounds when relay 2 (Advisory relay) is on.

3. 警報震度から指定された時間 (Specified time from Warning)

The buzzer sounds for a specified time when seismic intensity exceeds Warning.

4. 注意震度から指定された時間 (Specified time from Advisory)

The buzzer sounds for a specified time when seismic intensity exceeds Advisory.

5. 鳴らさない (Not sound)

7-12 Buzzer duration time

Buzzer duration time can be set between 5 to 150 seconds by 5 (the settings can be changed with the setting program).

7-13 Reset switch

The reset switch has 3 functions, depending on how it is pressed.

Pressed for a short time

Cancels the relay operation.

When the reset switch is pressed for a short time, a short beep sounds, the relay operation is canceled, and the buzzer sound stops.

Held down for a long time

Displays the maximum seismic intensity during a retention period. For details about a retention period, refer to “Retain maximum seismic intensity.”

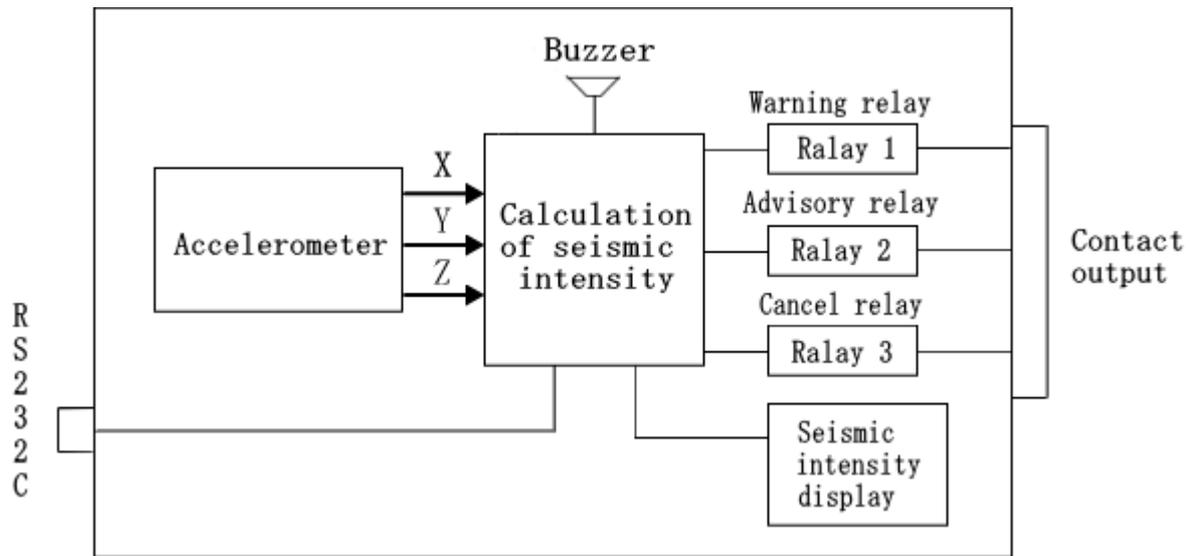
When the reset switch is held down for 2 seconds or more, a short beep sounds and the observed maximum intensity is displayed.

Held down for an extended long time

Clears the maximum intensity.

When the reset switch is kept held down, a short beep sounds twice and the maximum seismic intensity is cleared.

8 Block diagram



9 Main specifications

Item	Spec.	Description
Product name	Seismic wave catcher	Real-time seismograph
Model No.	BS-ES4571J	
Sensor	MEMS	MEMS semiconductor accelerometer
Sampling frequency	100 Hz	Frequency read from the accelerometer
Calculation cycle of seismic intensity	100 Hz	Calculation cycle of seismic intensity (same as the sampling frequency)
Calculation accuracy of seismic intensity	1 decimal place	Round off to 1 decimal place
Calculation range of seismic intensity	0.0 - 7.9	Complied with JMA's measured seismic intensity
Calculation of seismic intensity		Real-time seismic intensity for a second
Contact output	Relay contact	Output when seismic intensity exceeds Warning or Advisory, or becomes lower than Cancel
Maximum contact capacity	24 V DC, 250 mA 100 V AC, 250 mA	The maximum values on the left shall not be exceeded.
Power supply	100 V AC	Use the included AC adapter.
Power consumption	1.0 W or less	Stand-by: (The relays, Alarm LED, and Caution LED are inactive.)
Operating temperature	-5°C - 40°C	No condensation
Dimensions (approx.)	196×86×35	Length mm×Width mm×Height mm Excluding protruding objects
Weight (approx.)	220 g	Main body only

1 0 Seismic intensity scale and measured seismic intensity

JMA provides the following correspondence table of measured seismic intensity and seismic intensity scales.

Seismic intensity scale	Measured seismic intensity	Human perception and reaction
0	Less than 0.5	Imperceptible to people. Detected by seismographs.
1	0.5 to less than 1.5	Felt slightly by some people keeping quiet in buildings.
2	1.5 to less than 2.5	Felt by many people keeping quiet in buildings. Some sleeping people awake.
3	2.5 to less than 3.5	Felt by most people in buildings and some walking people. Most sleeping people awake.
4	3.5 to less than 4.5	Most people are startled. Felt by most walking people. Most sleeping people awake.
5 Lower	4.5 to less than 5.0	Most people are frightened and feel the need to hold onto something stable.
5 Upper	5.0 to less than 5.5	Most people feel interfered with their behavior. e.g. Find it difficult to walk without holding onto something stable.
6 Lower	5.5 to less than 6.0	It is difficult to remain standing.
6 Upper	6.0 to less than 6.5	It is impossible to remain standing and move without crawling. At the mercy of shaking. Cannot move. People may be thrown through the air.
7	6.5 or more	

Source: JMA' s website

11 Setting program (optional)

The setting program can change the following items:

Item	Description
Seismic intensity	Changes values for seismic intensity. 1. 警報震度 (Warning) 2. 注意震度 (Advisory) 3. 解除震度 (Cancel)
Seismic intensity display	Selects a display method. 1. 最大震度表示 (Retain maximum seismic intensity) 2. 警報間保持 (Retain maximum seismic intensity between warnings) 3. 現在震度 (Current seismic intensity)
Relay 1 (Warning relay)	Selects a method of contact output taken when seismic intensity exceeds Warning. 1. 警報震度から解除震度の間 (Warning to Cancel) 2. 警報震度からリセットスイッチの間 (Warning to reset switch) 3. 警報震度から1秒間 (1 second after Warning) 4. 使用しない (Not use)
Relay 2 (Advisory relay)	Selects a method of contact output taken when seismic intensity exceeds Advisory. 1. 注意震度から解除震度の間 (Advisory to Cancel) 2. 注意震度からリセットスイッチの間 (Advisory to reset switch) 3. 注意震度から1秒間 (1 second after Advisory) 4. 使用しない (Not use)
Relay 3 (Cancel relay)	Selects an operation taken when seismic intensity becomes lower than Cancel. 1. 警報後解除震度で1秒間 (1 second at Cancel after Warning) 2. 注意後解除震度で1秒間 (1 second at Cancel after Advisory) 3. 使用しない (Not use)
Relay test	Output tests can be performed for contacts. 1. リレー1 (Relay 1, Warning relay) 2. リレー2 (Relay 2, Advisory relay) 3. リレー3 (Relay 3, Cancel relay)
Buzzer operation	Selects a buzzer operation. 1. リレー1 (警報リレー) がONの間 (When relay 1 (Warning relay) is on) 2. リレー2 (注意リレー) がONの間 (When relay 2 (Advisory relay) is on) 3. 警報震度から指定された時間 (Specified time from Warning) 4. 注意震度から指定された時間 (Specified time from Advisory) 5. 鳴らさない (Not sound)
Buzzer duration time	Sets duration time between 5 and 150 seconds by 5.

Warranty

Warranty policy

We warrant our products against defects in workmanship or materials under ordinary use during the warranty period.

If an abnormality occurs and the seismograph needs to be inspected within the warranty period, contact us for inspection and present the warranty.

The customer is responsible for detachment work fee and other associated costs, such as transportation and shipping costs, when requesting inspection.

We will not compensate for any loss or costs caused by failure to receive earthquake information during the period when the seismograph cannot be used due to inspection or repair under warranty.

Note that the warranty does not cover the following cases listed below:

- ① When there is no user registration or the warranty is not presented
- ② When the mandatory fields in the warranty are not filled in or were changed, or the user or the installation address registered at the time of purchase was changed
- ③ Accidents, malfunction, or damage caused by use other than that stated in the instruction manual
- ④ Accidents, malfunction, or damage caused by failure to observe the precautions stated in the instruction manual
- ⑤ Accidents, malfunction, or damage caused by a mistake during use (spilt liquid, dropped, fell in water) or alternation
- ⑥ Accidents, malfunction, or damage caused by an error in external control devices used with the seismograph or incorrect installation
- ⑦ Change in the appearance resulting from normal use, such as scratches and damaged paint, or any change in the surface treatment caused by adhesion of chemicals
- ⑧ Accidents, malfunction, or damage due to dropping or shock during transportation or transfer after purchase
- ⑨ Accidents, malfunction, or damage caused by fire, earthquakes, winds, flooding, lighting strikes, or other natural disasters, or public pollution, smoke damage, foreign matter entry, salt damage, theft, etc.
- ⑩ Parts with limited life and consumables needing replacement due to natural wear and tear, deterioration, etc.
- ⑪ When the root cause of malfunction or damage does not reside in the seismograph
- ⑫ Accessories
- ⑬ Malfunction or damage caused by the customer's negligence. Accidents, malfunction, or damage for which we are not responsible.

Note that we will not take any responsibility for any impact on others caused by malfunction of the seismograph (damage or accidents of other than the seismograph, loss due to failure to receive earthquake warnings, etc.).

- The warranty will not be reissued in any case. Keep it securely.
- On-site repair is not available even within the warranty period.
- The warranty is valid only for the registered customer. Personal information is mentioned on the warranty. Keep it at your own risk.
- The warranty does not limit your legal responsibilities.
- The specifications and appearance of the seismograph are subject to change for improvement without notice.

The warranty promises free repair in the range specified here.

Model	Product: Seismic wave catcher	Model No. BS-ES4571J
Warranty period	1 year from DDMMYY	Serial number

◀MEMO▶

The leading company of Early Earthquake Warning



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