

## INDEX

<b>Display-Type Seismometer</b>	
ADA Series	486
DAS Series	486
<b>Strong-motion Seismometer</b>	
SMAC Series	487
AJE Series	488
<b>Control-Type Seismometer</b>	
AJA Series	489
ASA Series	490
AEA Series	491
AJS Series	491
<b>Data Logger</b>	
GPL Series	492
<b>Underground Observation Equipment</b>	
ICBO Series	492
AMS Series	492
JTS Series	493
WTT/EXT Series	493
ABS Series	493
BLS Series	494
ABS-143	494



Display-Type  
Seismometer ADA-7



Strong-motion  
Seismometer SMAC-MDU



Control-Type  
Seismometer ASA



Data Logger  
GPL-6A3P



## New Products



ADA-7



GPL-6A3P



# ADA Series

## SERIES 830 — Display-type Seismometer

### FEATURES

ADA-7 is a display-type seismometer using a falling-ball type earthquake sensor. The product displays acceleration and seismic intensity, and raises an alarm. Checking the tremor scale display will at a glance reveal the severity of the earthquake. Thus, this seismometer is useful in evacuation and disaster prevention activities in places where many people gather, such as department stores and concourses. The product can also be used for various after-quake inspections

which depend on the seismic intensity scale. Using an alarm contact output unit will allow connection of this product to an automatic broadcast system.



### SPECIFICATIONS

Model No.	ADA-7
Earthquake sensor	7-stage falling-ball type
Display	Acceleration (Gal) and seismic intensity
Time display	LCD (hour, minute, and second)
Alarm sound	Electronic buzzer (selectable from 1-to-7 scale)
Alarm contact output	5 settings allowed (selectable from 1-to-7 scale)
Power supply	100 VAC±10% (50/60 Hz) 5 VA MAX, Built-in uninterruptible power supply
Dimensions (W x D x H) / Mass	Indicator: 290 x 79 x 185mm / 1.5 kg, Detector: ø188 x 148mm / 7 kg

# DAS Series

## SERIES 830 — Display-type Seismometer

### FEATURES

- When a tremor affects large manufacturing facilities, including chemical plants, it is essential to instantly disconnect their drive power sources and to isolate piping, in order to prevent secondary disasters.
- After an earthquake, it will also be necessary to restore manufacturing facilities. In public spaces such as department stores and underground shopping arcades, there is a need to direct people to safe places. To carry out these activities, it is necessary to take appropriate actions and measures corresponding to the extent of the damage.
- DAS-314E and -314D will show earthquake information and automatically give an alarm output when they detect that the seismic waves have an acceleration exceeding a preset level. Using this product together with a control-type seismometer will allow disconnection or control of various devices. DAS-314E not only displays earthquake information, but can print out the information almost instantly as an earthquake takes place.

- This series of seismometers uses a computing process conforming to the algorithm specified by the Japan Meteorological Agency's seismic intensity task force. The seismic intensity will be determined from the actual degree of earthquake disaster. The seismic intensity information shown in the display can be linked to a disaster prevention or safety manual.

### SPECIFICATIONS

Model No.	DAS-314D
Direction of earthquake detection	Any direction given by a composite vector of three components (X, Y, and Z)
Display accuracy	Displayed value ±(5%+1Gal)
Frequency characteristics	0.3 to 7Hz ±10%
Display	Max. acceleration and seismic intensity
Seismic intensity calculation	Conforms to the algorithm specified by Japan Meteorological Agency's Seismic Intensity Task Force.
Startup (display) triggered by	1 to 9Gal (in 1Gal increments) *Depends on the startup output setting 1.
Alarm display	5-scale indication using light-emitting red diodes
Alarm / electronic buzzer	Select one from the five alarm output settings. Automatic stop (30 seconds, adjustable in the range of 0.1 to 0.9 minute).
Output	Alarm output: 5-scale, Photo coupler output: 1 circuit Max. acceleration: BCD 3 digits (4bit x 3), Seismic intensity: BCD 1 digit (3bit x 1)
Memory function	Previous display value (max. acceleration and seismic intensity)
Power supply	100 VAC±10% 50/60Hz Approx. 30VA
Uninterruptible power supply	Power failure immunity time: 3 hours during standby, 1 hour during operation
Dimensions (W x D x H) / Mass	Indicator (wall type): 302 x 110 x 227mm / 7kg Indicator (rack type): 480 x 110 x 249mm / 9kg Detector: ø176 x 126mm / 4kg



# SMAC Series

## SERIES 830 — Strong-motion Seismometer

### Available Acceleration Sensors



#### JEP-4A3

This is a stationary detector that uses built-in force-balance type servo acceleration sensors. A vertical and two horizontal components are built into its drip-proof case. The case even withstands temporary flooding (immersion in water 3 m deep at max.).

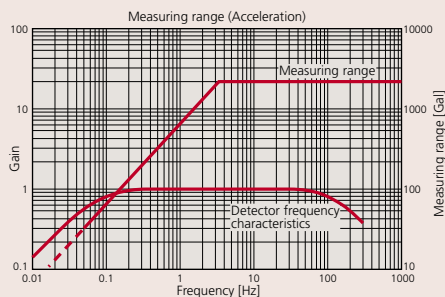
#### JEP-6A3

The JEP-6A3 is a portable seismometer that requires no power supply. Its battery-free sensor is an overdamped acceleration sensor and is housed in a drip-proof case. This is the best seismometer for earthquake observation in places where only limited power supply can be obtained, or for temporary permanent earthquake observation in places where no power supply is available.

#### JEP-4B3

This is a high-pressure underground detector, with one vertical and two horizontal sensor units built into its waterproof case. This detector can be used in water up to 300 m in depth. If to be used in water deeper than 300 m, the waterproof case can just be replaced with a higher pressure version.

### Frequency characteristics of JEP-6A3



Refer to the Seismological Instruments leaflet (E4288) for more details.

### FEATURES

SMAC-MDU can meet all needs for strong-motion observation. Additionally, when an earthquake occurs, its control mechanism works to instantly shut down facilities and equipment. Then, immediately after the earthquake, its alarm and display systems function. These signals can be used to conduct appropriate evacuation, safety assurance, and disaster prevention measures. The product also features an information collection function to capture detailed data including seismic waves. This function can be used to evaluate foundations, constructions, and building structures for a seismic design.



(Upper) Rack-mount type SMAC-MDU,  
(Lower) Stationary type SMAC-MDU



### SPECIFICATIONS

Model No.	SMAC-MDU
Measurement	
Input component	9 components as standard (up to 18 components: rack-mount type)
Measurement	$\pm 2097 \text{ Gal}$ ( $3\text{V}/9.8 \text{ m/s}^2$ full scale)
A/D converter	24bit
Dynamic range	114dB
Sampling	200Hz, 100Hz, 50Hz, 20Hz, 10Hz, 5Hz
Calculation	Seismic intensity: Conforms to the seismic intensity calculation specified by the Japanese Meteorological Agency SI and response values: Conform to the calculation specified by Ministry of Construction.
Display / operation / setting	
Indicator	6.5" TFT color LCD (640 x 480 dots), Touch-panel
Display	Max. seismic intensity (max. seismic intensity measurement), Max. composite acceleration of three components, Max. composite acceleration of horizontal components, Max. acceleration of each component, Response value, Equipment status, Present time, Startup time, SI value, Past earthquake information, Setting change screen
Recording	
Startup and stop levels	0.1 to 99.9Gal (Can be set in 0.1Gal increments.)
Card record	Acceleration waveform data of all channels (components), Startup time, Setting, Equipment status, Max. acceleration, SI value, Max. seismic intensity measurement of master channel
Record mode	Sequential mode: Continuously record on two cards Mirror mode: Record same data on two cards.
Recording media	Memory card (conforming to PCMCIA rev. 2.1)
Recording capacity	Expandable to 350Mbytes
Recording time	100 hours or more (85Mbyte x 2, 50Hz sampling, Three-component recording)
Clock	
Time correction	GPS or radio time correction (An optional GPS antenna and a receiver or FM/AM radio are required.)
Communications	
Communication port	RS-232C compatible x 2 ports Remote display port RS-485 compatible x 1 port
Alarm contact output	
Contact output	Can be freely selected and set. • At the time when the setting is exceeded. (seismic intensity, SI value, Composite acceleration of three components) • At the time when the equipment has failure.
Contact specification	4 no-voltage a-contact circuits
Capacity	AC125V 0.5A, DC 30V 1A
Operating temperature	
Temperature	-10 to 40°C (benchtop type) -10°C to 40°C (rack-mount type)
Humidity	Relative humidity 90% or less (non condensing) [stationary type] Relative humidity 80% or less (non condensing) [rack-mount type]
Power supply	
Power supply	100VAC 50/60Hz, 50 VA
Internal rechargeable battery	12 VDC (15A/h) [rack-mount type], 12 VDC (7.2A/h x 2) [benchtop type] Trickle charging Full charged battery maintains all functions for not less than 3 hours.
Dimension (W x D x H) / Mass	
Rack-mount type	480 x 441 x 199mm, Approx. 20kg, Supports JIS rack.
Benchtop type	398 x 418 x 210mm, Approx. 24kg, Hermetically sealed construction

# AJE Series

## SERIES 831 — Multi-channel Earthquake Recording Equipment

### FEATURES

The AJE-8200 is the most suitable instrument for strong motion observation in multiple locations on dams, large bridges, buildings, ground sites, and other objects. This product can also be used to monitor skyscrapers, not only for shaking caused by earthquake motions but also for movement induced by wind.

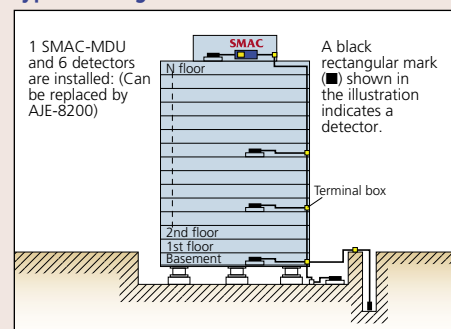


AJE-8200

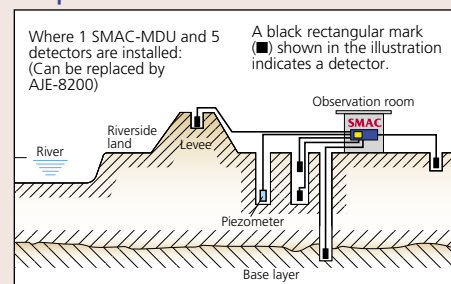
### SPECIFICATIONS

Model No.	AJE-8200
Measurement	
Input component	18 components as standard (Up to 99 components)
Measurement range	±2097Gal (3V/9.8 m/s <sup>2</sup> full scale)
A/D converter	24bit
Dynamic range	114dB
Sampling	200Hz, 100Hz, 50Hz, 20Hz, 10Hz, 5Hz
Calculation	Seismic intensity: Conforms to the seismic intensity calculation specified by the Japan Meteorological Agency SI and response values: Conform to the calculation specified by Ministry of Construction.
Display/operation/setting	
Indicator	6.5" TFT color LCD (640 x 480 dots), Touch-panel
Display	Max. seismic intensity (max. seismic intensity measurement), Max. composite acceleration of three components, Max. composite acceleration of horizontal components, Max. acceleration of each component, Response value, Equipment status, Present time, Startup time, SI value, Past earthquake information, Setting change screen
Recording	
Startup and stop levels	0.1 to 99.9Gal (Can be set in 0.1Gal increments.)
Card record	Acceleration waveform data of all channels (components), Startup time, Setting, Equipment status, Max. acceleration, SI value, Max. seismic intensity measurement of master channel
Record mode	Sequential mode: Continuously record on two cards Mirror mode: Record same data on two cards (Up to 63 channels can be used for 200Hz sampling)
Recording media	Memory card (conforming to PCMCIA rev. 2.1)
Recording capacity	20Mbyte as standard (Expandable to 175Mbyte)
Recording time	120 minutes or more (100Hz, 18 components, 20Mbyte x 2)
Clock	
Time correction	GPS or radio time correction (An optional GPS antenna and a receiver or FM/AM radio are required.)
Communications	
Communication port	RS-232C compatible x 2 ports, Remote display port: RS-485 compatible x 1 port
Alarm contact output	
Contact output	Can be freely selected and set. • At the time when the setting is exceeded. (Seismic intensity, SI value, Composite acceleration of three components) • At the time of inspection and initialization. • At the time when the equipment suffers failure.
Contact specification	4 no-voltage a-contact circuits
Capacity	AC125V 0.5A, DC 30V 1A
Operation temperature	
Temperature	-10 to 40°C
Humidity	Relative humidity 88% or less (Non condensing)
Power supply	
Power supply	100VAC 50/60Hz, 500W
Internal rechargeable battery	12VDC (15Ah) Full charged battery maintains all functions for not less than 15 minutes. (For 99 components)
Dimensions (W x D x H) / Mass	
Measurement processor	480 x 441 x 199mm, Approx. 17kg, Supports JIS rack.
Extended measuring instrument	480 x 492 x 249mm, Approx. 17kg, Supports JIS rack.

### Sample installation in an isolated-structure type building

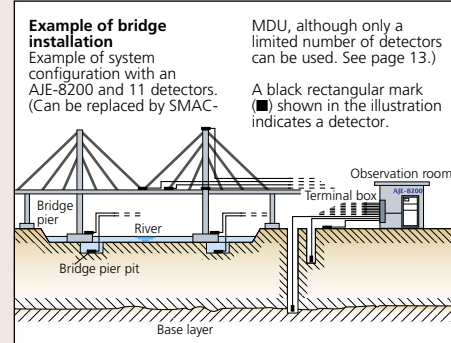
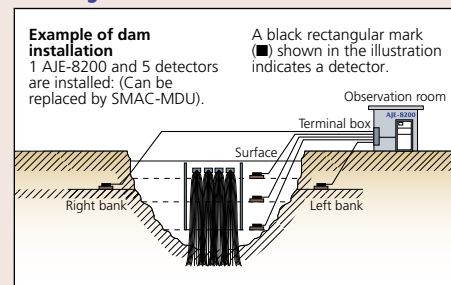


### Sample installation in levee



If you use this instrument for control purposes it is recommended that you use it in conjunction with control-type seismometers, such as the ASA or AJA series.

### Sample installation of strong-motion seismometer



When you use this instrument for the purpose of control, you are recommended to use the instrument in combination with control-type seismometers such as ASA, and AJA series.

# AJA Series

## SERIES 830 — Control-type Seismometer

### FEATURES

In factories and chemical plants, it is essential to prevent hazardous materials and other substances from spilling after an earthquake occurs. When the first nuclear plant was built in Japan, there arose a need to automatically conduct disaster prevention activities using seismometers. The AJA series was the control-type seismometer developed at the time for this purpose.

When an earthquake occurs, the AJA series control-type seismometer detects a tremor and quickly recognizes accelerations that exceed an operating sensitivity level (acceleration level) programmed into its built-in seismic sensor. The seismometer reliably shuts down or controls the plant's equipment and facilities, to minimize the

possible spread of secondary disasters. The typical way of using the product is that two seismometers with different sensing directions, for horizontal and vertical movements, are combined. Using these two types of seismometers together will further improve reliability. These seismometers are widely used in nuclear power plants, Shinkansen trains, skyscrapers, various plants, and other facilities. With a seismic mass (see page 27) used as an earthquake sensor, and a unique damping arrangement employed, this product series offers superior frequency characteristics.



AJA-2R

### SPECIFICATIONS

Model No.	AJA-3S2	AJA-2H	AJA-2HS	AJA-22H	AJA-2V	AJA-22V
Direction of earthquake detection	Five horizontal directions x 2	Any horizontal direction			Vertical direction	
Sensitivity setting	40 to 200Gal	50 to 200Gal	20 to 100Gal	100 to 500Gal	25 to 50Gal	50 to 200Gal
Frequency range	DC to 10Hz		DC to 7 Hz	DC to 10Hz		
Natural frequency	Approx. 15Hz	Approx. 10Hz	Approx. 7Hz	Approx. 15Hz	Approx. 10Hz	Approx. 15Hz
Control contact	Transfer contacts Low: one circuit High: one circuit 100VAC 3A 100VDC 0.7A	No-power contact signal A:B contact: 2 sets 110VAC 3A 24VDC 3A				
Power supply	100VAC 50/60Hz 10VA 12VDC, Alkali storage battery (trickle charging)					
Dimension (W x D x H)	550 x 320 x 400mm			550 x 320 x 340mm		
Mass	70kg					

Model No.	AJA-322T	AJA-4C
Direction of earthquake detection	For control alarm Any horizontal direction (high acceleration ) Five horizontal directions x 2 (low acceleration)	Two horizontal directions
Sensitivity setting	100 to 500Gal 40 to 200Gal	10 to 130Gal
Frequency range	DC to 10Hz	DC to 5Hz
Natural frequency	Approx. 10Hz and 15Hz	Approx. 8Hz
Control contact	No-power contact signal (max. acceleration) a:b contact: 1 set each 100VAC 3A 100VDC 0.7A Alarm buzzer and 3 lamp alarms	No-power contact signal a contact: 4 sets b contact: 13 sets 100VDC 0.2A
Power supply	100VAC 50/60Hz 10VA 12VDC, Alkali storage battery (trickle charging)	110VDC 88VDC to 143VDC
Dimension (W x D x H)	650 x 370 x 400mm	550 x 320 x 400mm
Mass	Approx. 80kg (main unit)	Approx. 45kg

Note: Please specify your desired sensitivity setting when ordering.



Refer to the Seismological Instruments leaflet (E4288) for more details.



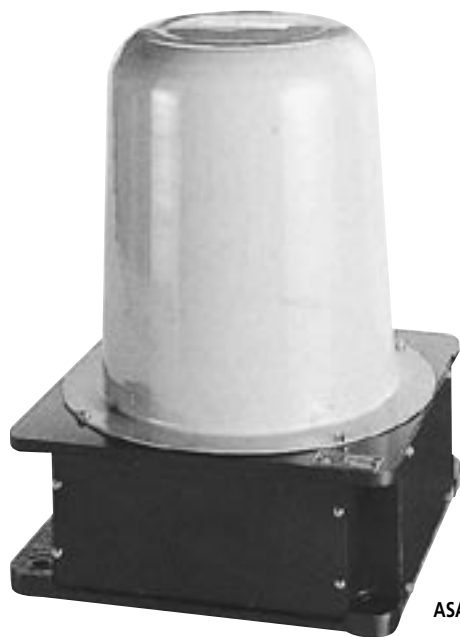
# ASA Series

## SERIES 830 — Earthquake Sensors for Emergency Shut-off Valve

### FEATURES

To prevent the spread of secondary disasters that may take place after an earthquake, it is vital to instantly shut off all drive power sources and to interrupt piping in chemical plants and large manufacturing facilities. The ASA series is the best seismometer for these purposes.

The ASA series is of a more compact structure than the AJA series, with reduced footprint area, and can be used in a variety of applications including emergency shut-off valve closure in high-pressure gas or water facilities. With a seismic mass sensor and a unique damping arrangement, the product offers excellent frequency characteristics.



### SPECIFICATIONS

Model No.	ASA-1	ASA-2
Direction of earthquake detection	All horizontal directions	
Acceleration setting*	150Gal (Selectable between 80 and 350Gal)	
Frequency range	0 to 10Hz (Rising characteristic above 10Hz)	
Operation environment	-10 to 50°C (Relative humidity 90% or less)	
Output signal	Type	No-voltage contact signal 2C
	Contact capacity	2A 30VDC
Operation display	Lamp (LED) display, red	
Power supply	100VAC±10%	External power supply 24VDC
Dimension (W x D x H) / Mass	Approx. 280 x 280 x 380mm, approx. 40kg	

\* Besides these models, special specification models with allowable acceleration setting between 25 and 80Gal are available too. For example, ASA-1S.



Refer to the Seismological Instruments leaflet (E4288) for more details.

# AEA Series

## SERIES 830 — Vertical Movement Earthquake Sensors

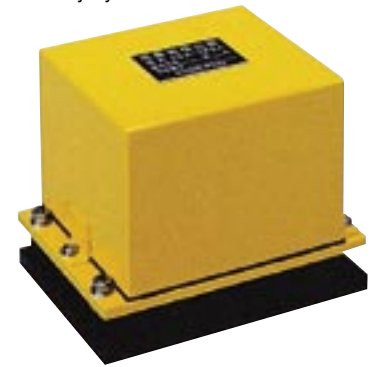
### FEATURES

When an earthquake takes place, there is first a fine, rattling, vertical vibration (P-waves) which continues for a while. Then, suddenly come the horizontal severe tremors (S-waves). The vertical movement sensor AEA-2P5A is a control-type seismometer dedicated to detection of vertical movement. It quickly detects the earlier P-waves and issues an alarm signal. This seismometer uses an electrodynamic velocity pick-up sensor and is designed to avoid accidental responses to miscellaneous vibrations other than earthquake motions.

Combining this seismometer with a horizontal movement sensing control-type seismometer (for S-waves), such as the AJA or AEA series products, will offer more effective seismic measures. Since P-waves trigger an alarm before the S-waves arrive, it is possible to arrange an earlier start-up of emergency generators for underground shopping arcades, department stores, airports, hospitals, and other public buildings. In factories, the alarm may be used to disconnect the power supply and to stop all operations, protecting machinery from damage and operating personnel from potential injury.

### SPECIFICATIONS

Model No.	AEA-2P5A
Direction of earthquake detection	Vertical direction
Acceleration setting	5 Gal (Factory default setting) *With another internal sensitivity setting selector plate inserted, the default setting can be replaced by 2.5 or 10Gal setting.
Output signal	No-voltage contact output Contact C, 1 circuit (1a or 1b) Resistance load: 110VAC 2A, 24 VDC 3A Inductive load: 110VAC 1A, 24 VDC 1.5A
Power supply	100 VAC 50/60 Hz 20 VA
Construction	Moisture-, drip-, and dust-proof type [secured to the floor or foundation with a M10 bolt (center)]
Dimensions (W x D x H)	Approx. 148 x 100 x 116mm
Mass	Approx. 3kg



# AJS Series

## SERIES 830 — Diffusion-type Sensor

### FEATURES

The diffusion-type sensor series AJS and AJA-6E are control-type seismometers with a falling-ball-type sensor mechanism. If this type of seismometer is connected to flame-using equipment or hazardous material facilities, it automatically shuts down the power when its sensor detects a tremor exceeding a preset level. This seismometer

can stop the supply of electricity and gas, or actuate fire extinguishing and alarm systems. Because of these features, this series of sensors is commonly used in hazardous material facilities.

### SPECIFICATIONS

Model No.	AJS-2A	AJA-6ES	AJA-6ES-F
Purpose of use	Power shut-down Flame-using apparatus, Hazardous material facilities	Power shut-down Flame-using apparatus, Hazardous material facilities	Power shut-down Flame-using apparatus, Hazardous material facilities
Earthquake detection	Falling-ball switch interlocking system	Falling-ball switch interlocking system	Falling-ball switch interlocking system
Acceleration setting	Horizontal vibration 125Gal	Horizontal vibration 240Gal	Horizontal vibration 135Gal
Output	Micro switch output	Micro switch output	Micro switch output
Frequency characteristics	Acceleration setting $\pm 10\%$ for time range of 0.3, 0.5, and 0.7 sec.	Acceleration setting $\pm 0.25\text{m/s}^2$ for time range of 0.3, 0.5, and 0.7 sec.	Acceleration setting $\pm 0.25\text{m/s}^2$ for time range of 0.3, 0.5, and 0.7 sec.
Contact output	10A 125 to 250 VAC	3A 125 VAC	3A 125 VAC
Dimension (W x D x H)	82 x 50 x 103mm	76 x 46 x 64mm	76 x 46 x 64mm
Mass	Approx. 300g	Approx. 80g	Approx. 80g



# GPL Series

## SERIES 831, 820 — Data Loggers

### FEATURES

The portable accelerometer data logger GPL-6A3P is a compact vibration waveform data logger with a built-in vibration detector. With the overdamping type accelerometer (frequency: 0.07 Hz to 100 Hz) used as its detector, this instrument is most suitable for detecting earthquake motions, ground vibration, and vibration characteristics (waveform) of buildings. The waveform data logger uses a high resolution A/D converter (24-bit A/D), enabling reproduction of waveforms with high accuracy.



# ICBO Series

## Combined Crust Activity Observation Equipment

### FEATURES

This seismometer is set up at the bottom of an underground observation bore hole. It is a multiple observation system in which several underground instruments listed in the configuration table have been integrated and connected to a ground system with a single cable.



# AMS Series

## Marine Seismometer

### FEATURES

Installing a seismometer directly on the sea bed enables observation of even micro earthquakes that have not been detectable in the past. This instrument continuously monitors in real time those earthquakes that occur

under the sea bed. The seismometer can be housed in a submarine cable relay. An attitude control device is built into the seismometer so that the internal Jimbal can maintain its horizontal position in response to any changes in seafloor slope.



Refer to the Seismological Instruments leaflet (E4288) for more details.



# JTS Series

## Borehole Type Tiltmeter

### FEATURES

This is a force balance, borehole type tiltmeter product series to measure the change in crust slope. The tiltmeter measures bedrock slope changes, ground slope changes around craters caused by the rise of magma, and other geographical changes. It is particularly useful in conducting research on earthquakes and volcanic eruptions.

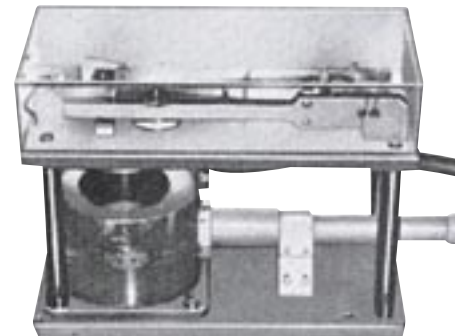


# WTT/EXT Series

## Water Tube Tiltmeter and Extensometer

### FEATURES

This is a water-tube tiltmeter and extensometer product series for horizontal pit observation. It is suitable not only for research on earthquakes and volcanic eruptions, but also for observation of slope changes, dilation, and shrinkage of layers in large dams or tunnels.



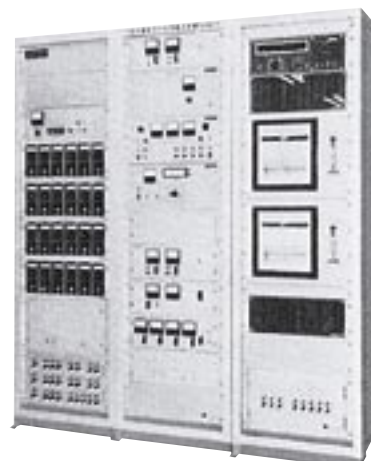
# ABS Series

## Deep, Medium, and Shallow Layer Observation Equipment

### FEATURES

It is indispensable for the detection of signs of an earthquake to continuously monitor geographical changes that occur in the earth's crust, including dilation, shrinkage, uplift, depression, and micro earthquakes. The ABS series are seismometers designed to be set up at the bottom of an observation

bore hole, and shallow (50 to 300 m depth), intermediate (300 to 2,000 m), and deep (more than 2,000 m) models are available. This seismometer can be used in combination with various detectors for specific observation purposes.



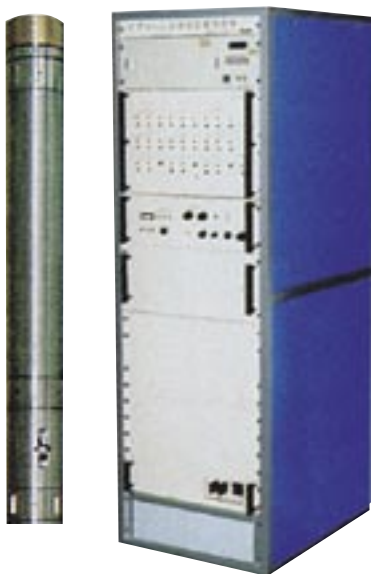
Refer to the Seismological Instruments leaflet (E4288) for more details.

# BLS Series

## Laser Strain Meter

### FEATURES

This is a laser strain meter product series. Conventional strain meters use oil, semiconductor, or other material sensors. However, this instrument transmits signals through an optical fiber cable and can be used even under high temperature and pressure environments.



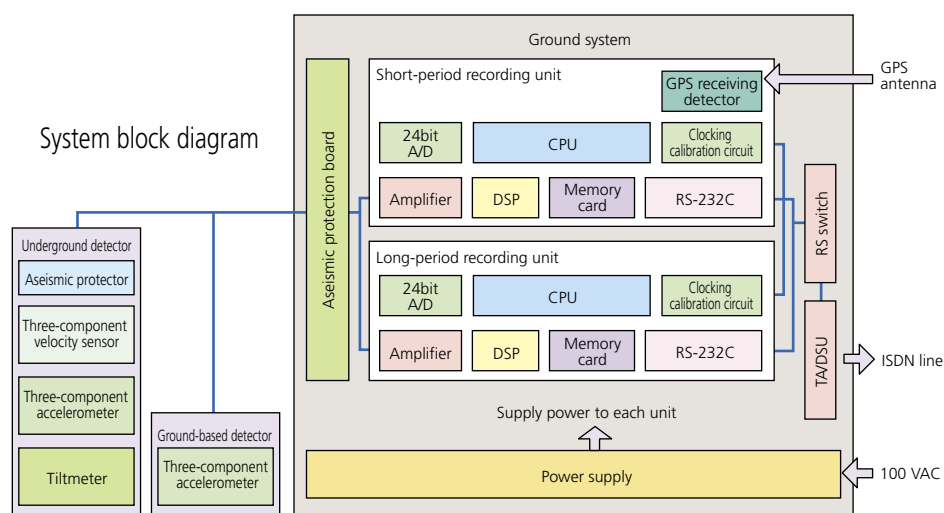
# ABS-143

## Shallow Crust Activity Monitor

### FEATURES

The shallow crust activity observation equipment, ABS-143, uses both ground-based and underground detectors. With this combined use of detectors, the equipment can recognize with high accuracy and sensitivity those earthquakes that are hard to detect with a ground-based detector. The equipment can also calculate how an earthquake motion travels. An underground detector is installed at the bottom of an observation bore hole of

the 300 m deep class, and an instrument to measure strong motions is installed at ground level. With this combination, both micro and strong earthquake motions can be measured and data can be collected by the equipment. This crust activity observation equipment can be used to calculate how the devastating phenomenon of an earthquake progresses in detail, helping to support a seismic measures from an academic viewpoint.



Note: The recording units shown above include a data logger, a controller, and an amplifier.



Refer to the Seismological Instruments leaflet (E4288) for more details.