

## Velocity Type Strong Motion Seismometer

# TSM-1

### General

The TSM-1 Velocity Type Strong-Motion Seismometer incorporates three built-in seismic sensors including two for horizontal direction and one for vertical direction. The TSM-1's wide frequency and dynamic range capability can handle the full spectrum of seismic disturbances, from microtremors to large earthquakes. The Seismometer's highly sensitive, all-purpose enclosed triaxial design provides superior mobility, which makes it easy to set up at temporary observation stations.

### Applications

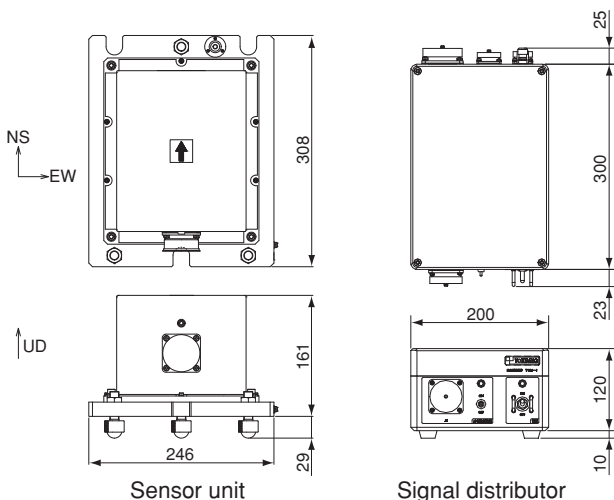
- Strong earthquake and aftershock observation
- Earthquake measurement, monitoring, alarm warnings
- Monitoring of structural sway caused by long-period ground motion
- Volcano observation

### Features

- 1) Triaxial design simplifies installation.
- 2) Force balance torquer arrangement requires no on-site adjustment.
- 3) Capability to cope with long-period, large amplitude motion with room to spare.
- 4) High output voltage simplifies data logging and signal processing.
- 5) Simple construction, high reliability.

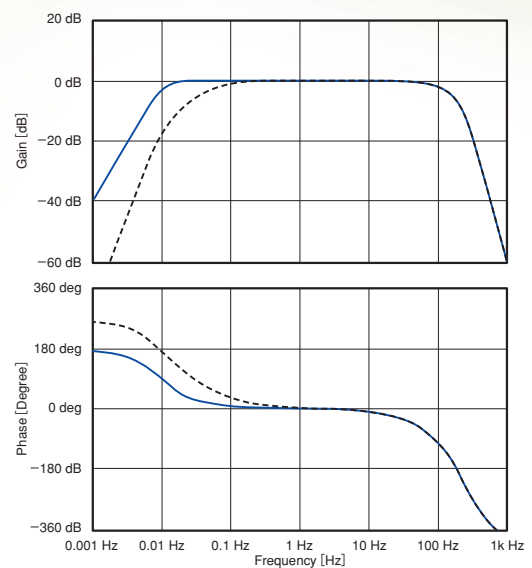
### External Dimensions

(Unit : mm)

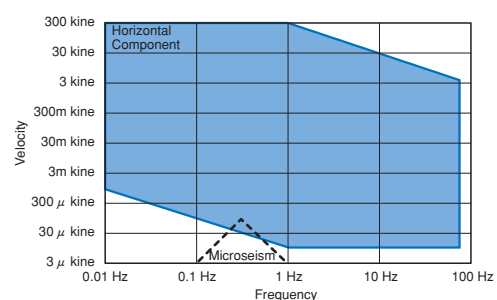


Sensor unit

### Frequency Response



### Measurement Range



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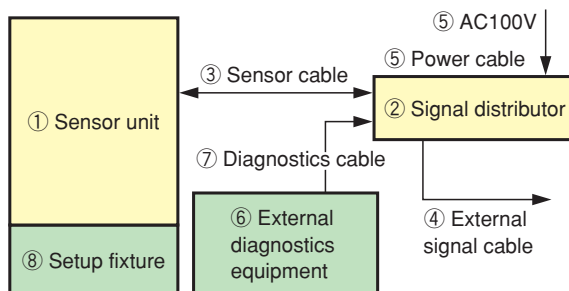
## Specifications

Composition	Horizontal direction, 2 + Vertical direction, 1	
Output signal	Velocity (Temperature range 25°C±15°C stable temperature)	Acceleration (reference)
Measurement range	±3 m/S (±300kine) [see Note 1]	±20 m/S <sup>2</sup> (±2000gal)
Dynamic range	145dB@1Hz Typ.	—
Frequency response(±3dB)	0.01~80Hz±10%	—
Output sensitivity	6 V/(m/S)±5% [60mV/kine] (Equilibrium output)	1 V/(m/S <sup>2</sup> )±5% [10V/ (9.8m/S <sup>2</sup> )] (Equilibrium output)
Scalefactor temperature coefficient	700ppm/°C or less (Design value)	200ppm/°C or less
Output sensitivity linearity (9.8m/S <sup>2</sup> standard)	0.02%	0.02%
Bias	±1×10 <sup>-3</sup> m/S or less [±100×10 <sup>-3</sup> kine] Typ.±0.3×10 <sup>-3</sup> m/S [±30×10 <sup>-3</sup> kine]	±50×10 <sup>-3</sup> m/S <sup>2</sup> or less [±5gal]
Bias temperature coefficient	40×10 <sup>-6</sup> m/S/°C or less [4×10 <sup>-3</sup> kine/°C] (Design value) Typ.4×10 <sup>-6</sup> m/S/°C [0.4×10 <sup>-3</sup> kine/°C]	±1.5×10 <sup>-3</sup> m/S <sup>2</sup> /°C or less [150×10 <sup>-3</sup> gal/°C]
Resolution	180×10 <sup>-9</sup> m/S@1Hz Typ. [18×10 <sup>-6</sup> kine] (-135dB@1Hz Typ.)	—
Cross-sensitivity	0.5% or less	
Operating temperature	-20°C~+60°C	
Enclosure rating	JIS C 0920 (IP65) : dust-tight; water jet protection	
Power	AC100V [see Note 2] or DC12 to 24V	
Power consumption	AC100V : 100mA or less DC12 to 24V : 10W or less	
Mass (Unit : mm)	Sensor unit : 10kg or less Signal distributor : 6kg or less	

Note 1 : upper limit of measurement range guaranteed by electrical current input to torquer equivalent to the maximum amplitude.

Note 2: The power customized to any voltage.

## Composition



No.	Name	Model No.	Description
①	Sensor unit	TSM-1-S	
②	Signal distributor	TSM-1-D	
③	Sensor cable	TSM-1-W1	Standard 10m
④	External signal cable	TSM-1-W2	Standard 2m
⑤	Power cable	TSM-1-W3	Standard 2m

Cable customized to any length

## Options

No.	Name	Model No.	Description
⑥	External diagnostics equipment	TSM-1-T	Available options *Test signal generation *Integrated response check *External signal input *Electric power from signal distributor
⑦	Diagnostics equipment cable	TSM-1-W4	Used for ⑥ Standard length 2m
⑧	Setup fixture	TSM-1-M*	Used for ① *Nos 1、2、3 etc

Design and specifications are subject to change without prior notice, and without any obligation on the part of the manufacturer.

**CAUTION** Before operating this equipment, you should first thoroughly read the operator's manual.

**TOKYO KEIKI**

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