



# Accelerometers

## NP Series



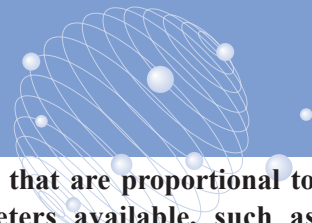
Accelerometer

Sensor Amplifier

Calibrator

Peripherals

# NP Series Accelerometers

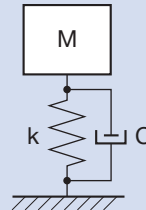


An accelerometer is a sensor that converts mechanical vibrations into electrical signals that are proportional to the vibratory acceleration. There are several different types of NP Series accelerometers available, such as an ultra-compact type that weighs a mere 0.2g, a tri-axial type for simultaneous measurement of acceleration in the X, Y, and Z directions, a waterproof type, and a high-sensitivity type. Select the type that best meets your application needs. These purpose-designed sensors are capable of high-sensitive detecting mechanical vibration.

## Features

### All the NP Series are Piezoelectric Accelerometers.

1. The NP Series accelerometers are seismic\* vibration detectors, and therefore do not require a reference point for measurement. Measurement is performed simply by mounting the accelerometer to the measured object.
2. Compared to other vibration sensors, the NP Series accelerometers are compact and lightweight, thereby facilitating mounting to a test object. Their small size makes them easy to handle.
3. The wide dynamic range enables the measurement of even ultra-small acceleration levels.
4. The NP Series accelerometers are mechanically robust, and are therefore ideal for measuring a large acceleration and for shock acceleration measurement applications.
5. In general, the high resonance frequency and the wide measurement frequency range enable measurement with minimal distortion, even of waveforms containing wideband frequency components.
6. A wide range of accelerometers with the performance capabilities to suit various applications and environmental conditions is available.



\*: A vibration system where M is the mass, k is the spring constant, and C is the viscosity resistance.

## Piezoelectric Elements and Piezoelectric Accelerometers

### ■ Piezoelectric Element

When force is applied to a single crystal or to barium titanate, an electric charge is generated on its surface. This is called the piezoelectric effect. Materials which exhibit the piezoelectric effect are called piezoelectric materials (piezoelectric elements).

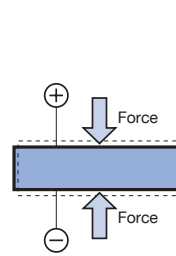
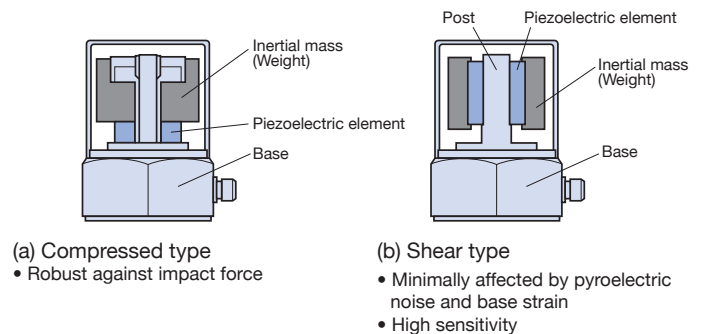
### ■ Piezoelectric Accelerometer

A piezoelectric accelerometer is a sensor that utilizes a piezoelectric element both as a seismic spring and as an electromechanical transducer at the same time. Electrical signals are output in direct proportion to the vibratory acceleration.

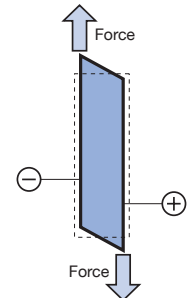
### ■ Accelerometer Types: Compressed and Shear

Piezoelectric accelerometers can be basically divided into two types, compressed and shear, according to the different methods of applying force to the piezoelectric element. Figure 1 shows the respective construction for each of the two types. With the compressed type (a), the piezoelectric element is sandwiched between the sensor base and the inertial mass. With the shear type (b), the piezoelectric element is fixed in place between a post that is placed vertically on the base and the inertial mass. The compressed type was the type that was conventionally used in the past, but recently use of the shear type, which is minimally affected by base strain and sudden variations in temperature, has become more widespread.

Figure 1 : Piezoelectric Accelerometer Structure



An electric charge is generated when either a compressing force or a pulling force is applied to the piezoelectric element in the axial direction.



An electric charge is generated when force is applied to the piezoelectric element in the shear directions.

## Helpful Purchasing Guidelines

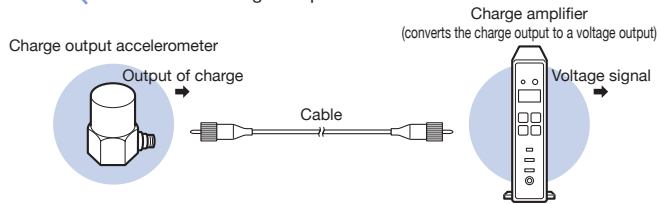
### How to choose between a charge output accelerometer and an accelerometer with built-in preamplifier

The selection of the most suitable sensor will depend on your measurement application.

Use the descriptions provided below to help you make the correct choice between a charge output accelerometer and one with built-in preamplifier.

#### Charge output accelerometer

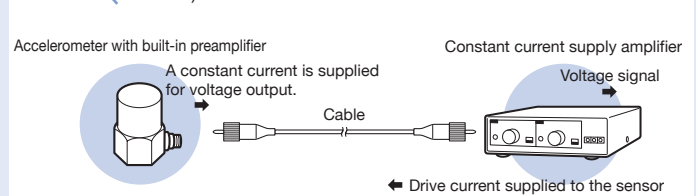
This type of accelerometer is used for the measurement of collision, drop test, and other similar impact vibrations, and for vibration measurement at high temperatures.



Device	Features
Sensor NP-2000 Series	<ul style="list-style-type: none"> <li>High performance against external shock and impact force.</li> <li>Can be used at high temperatures.</li> </ul>
Cable	<ul style="list-style-type: none"> <li>Low-noise cable used.</li> <li>Care must be taken with the way the cable is fixed (noise countermeasure).</li> <li>The cable length can be extended up to approx. 100m. Care must be taken, however, with countermeasure against noise interference.</li> </ul>
Amplifier	<ul style="list-style-type: none"> <li>Sensitivity settings are required for each sensor.</li> <li>Care must be taken with the storage location (temperature, humidity, etc.).</li> <li>Comparatively expensive.</li> </ul>

#### Accelerometer with built-in preamplifier

This type of accelerometer is used for the measurement of general mechanical vibrations (diagnostic tests on plant equipment and so forth).



Device	Features
Sensor NP-500*/600* /3000/7000 Series	<ul style="list-style-type: none"> <li>Compact design, high sensitivity.</li> <li>Comparatively high noise-withstand capability.</li> </ul>
Cable	<ul style="list-style-type: none"> <li>Comparatively little affected by noise which is caused by the shake of cable.</li> <li>The cable length can be extended up to approx. 100m.</li> </ul>
Amplifier	<ul style="list-style-type: none"> <li>Extremely easy to handle.</li> <li>Ready to use as soon as the power is turned on.</li> <li>Compact, lightweight design.</li> </ul>

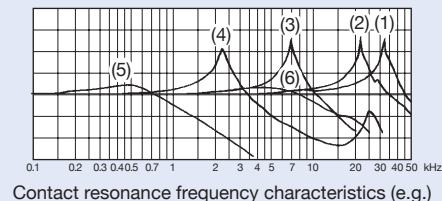
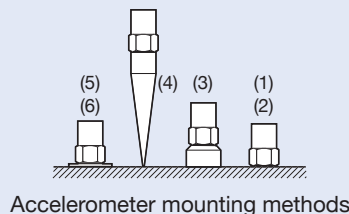
※ Series marked with \* have been already discontinued.

### The Effect of Each of the Different Mounting Methods on the Frequency Characteristics

There are several different methods of mounting the accelerometer on the measured object: screw mount, magnetic base, adhesive, and so forth. Depending on the mounting method selected, however, the frequency characteristics may be adversely affected.

The figure below shows examples of the frequency characteristics for the various methods that can be used to mount an accelerometer on the measured object.

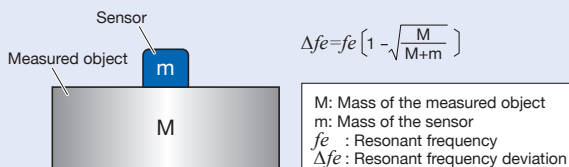
- (1) Screw mount + silicon oil
- (2) Screw mount
- (3) Magnetic base
- (4) Search needle
- (5) Thick double-sided tape
- (6) Thin double-sided tape



Contact resonance frequency characteristics (e.g.)

### What is mass effect?

The mass effect is the change in natural frequency of the measured object which has been affected by the sensor mass mounted on it.



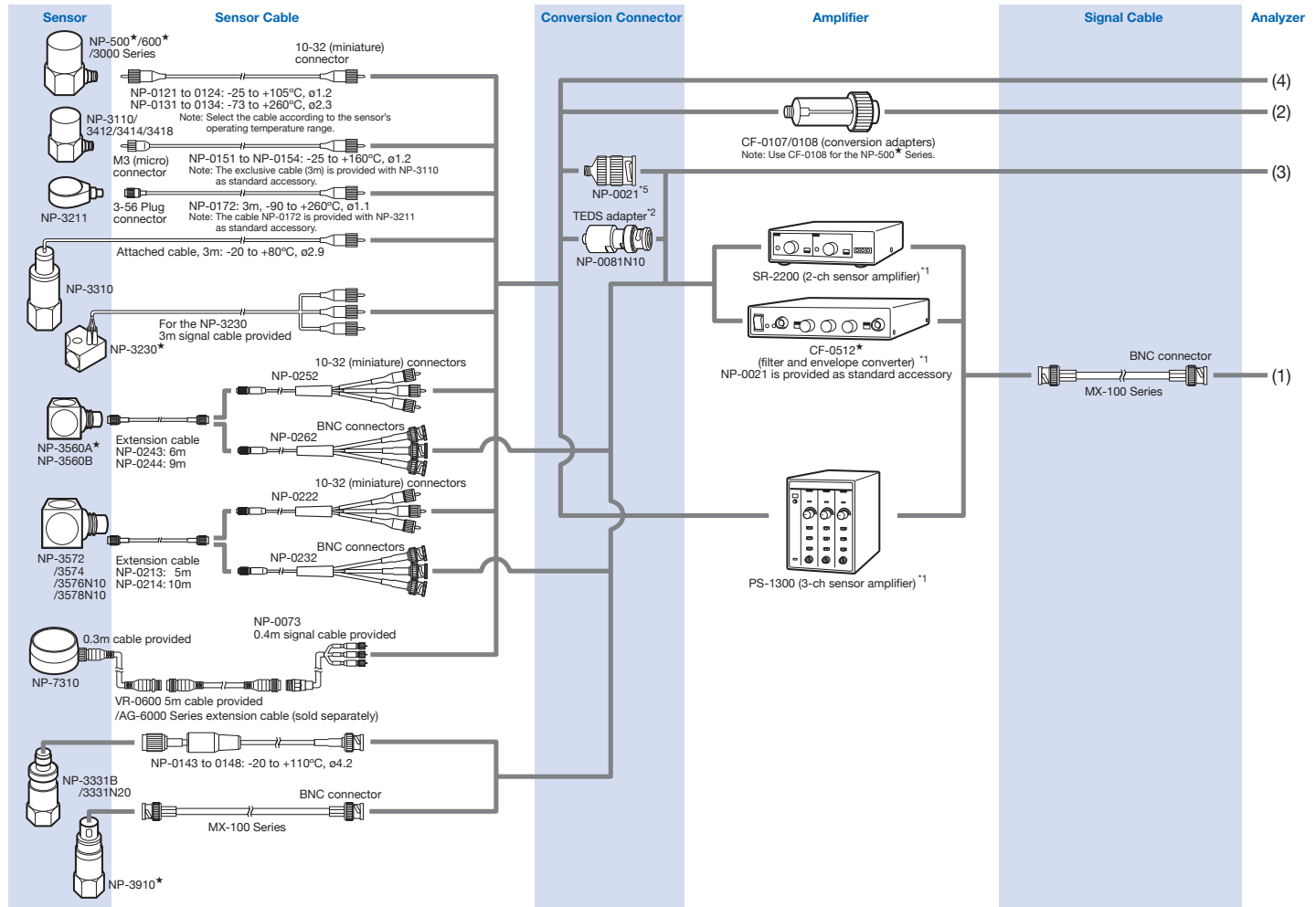
Mass effect refers to the sensor mass ability to affect an object's natural frequency. Because natural frequency depends on mass, an object to which sensor is attached will have a lower natural frequency than that of the object itself. If a sensor mass is too large, the sensor will decrease the object's natural frequency, thus resulting in measurement error. It is recommended that the sensor mass is under one-fiftieth or hundredth of the object's mass. Note that mass is not the mass of the whole object but the mass of the part to which the sensor will be attached. The part may be unexpectedly light.

# Vibration Measurement Systems

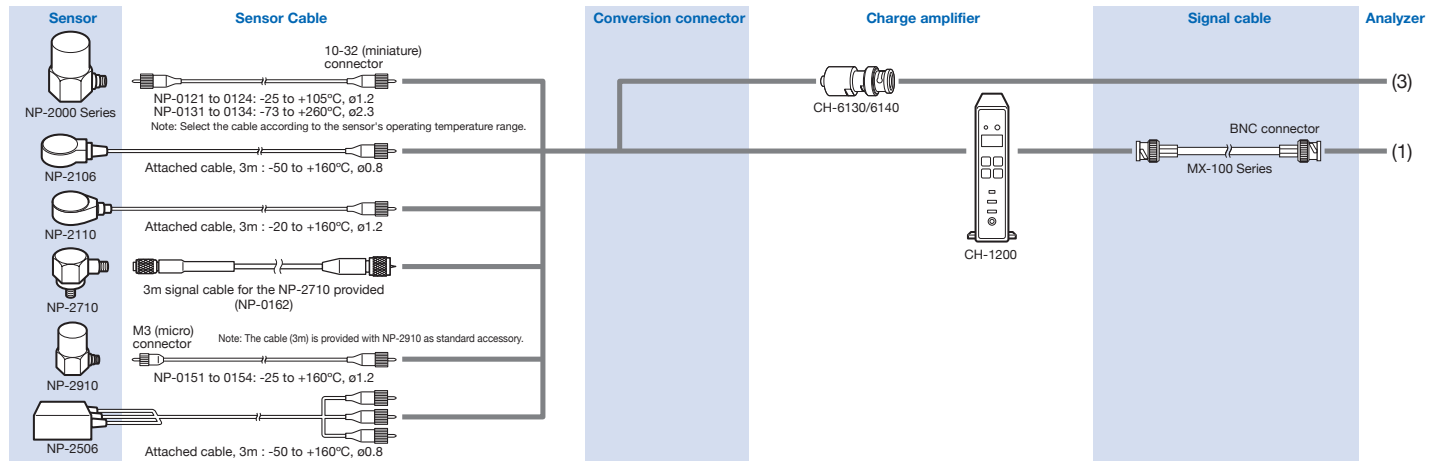
## System Configuration

Models with ★ have been already discontinued.

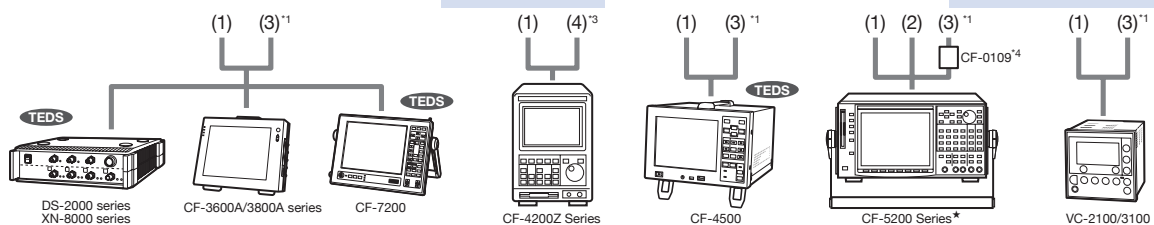
### NP-500\*/3000/7000 Series



### NP-2000 Series



### Analyzers



(1) Voltage input (BNC connector) (2) Sensor input (6-pin connector) (3) Sensor input (BNC connector)\*<sup>1</sup> (4) Sensor input (10-32 (Miniature) connector)

\*1: Can not be used with the NP-500\* series (there are some exceptions).

\*2: NP-0081N10 connects TEDS amplifier and the sensor which is not applicable to TEDS.

\*3: CF-4215Z and CF-4220Z can be connected.

\*4: BNC - 6-pin connector conversion adapter [for sensor input]


\*5: BNC conversion adapter

What is TEDS?

TEDS, an abbreviation for Transducer Electronic Data Sheet, is an information description format for sensor-specific information.

Manufacturer ID:53=ONO SOKKI  
Model number:3578N10  
Serial number:123456

Sensitivity:10.02mV/(m/s<sup>2</sup>)  
Axial direction:Z  
Output polarity:Positive



Writable in USER area  
Measurement location ID:0021

Calibration date:2009/10/01  
Calibration frequency:159.2Hz  
Calibration temperature:23.3°C

Benefits of TEDS

- It reduces initial setting time of the sensor sensitivity with manual data entry.
- TEDS sensor features auto-setting which minimizes human-errors such as miss-entry, giving sensor's information including sensitivity and axial direction.
- As it is not required to control of data-sheet for each sensor, the work is simplified.

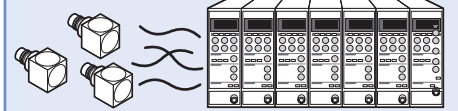
TEDS facilitates your measurement process!

TEDS is very helpful not only for the multi-channel, but also single-channel measurement. TEDS prevents from occurring serious human-error at the time of setup such as sensitivity setup.

Conventional procedure of the measurement

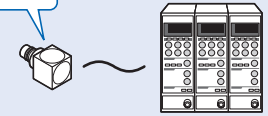
- 1) Make the correspondent table of measurement points and sensor sensitivities while mounting sensors.
- 2) Tag the both side of cables with careful attention not to make a wrong connection.
- 3) Lay the cables and check the disconnection.
- 4) Connect sensors to amplifiers in order while checking the each tag.
- 5) Setup the sensitivity of amplifier or analyzer.
- 6) Start measurement.

Do you figure out the each connection of measurement point and sensor?



At multipoint measurement, TEDS greatly helps to save the setup time.

Is the sensitivity setup correct?



Also it is effective at single point measurement.

Preparation for measurement using TEDS applicable sensors

- 1) Lay the cables.
- 2) Read TEDS information to complete the checking disconnection and setting the sensitivity.
- 3) Start measurement.

Alternative solutions to make the existing sensor applicable to TEDS

NP-0081N10 TEDS Adapter



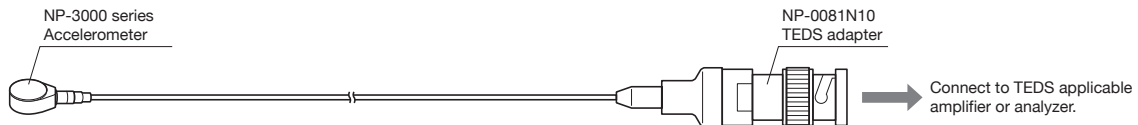
The NP-0081N10 adapter makes an accelerometer with built-in preamplifier applicable to TEDS. You can use the existing sensor as TEDS applicable sensor only by adding sensor's information such as sensitivity on this adapter. TEDS function is available just by using

NP-0081N10 adapter between the accelerometer and TEDS equipments.

- This adapter enables an accelerometer with built-in preamplifier being used as TEDS applicable sensor easily.
- By using this adapter, there is no need to embed TEDS tip in the sensor itself. You can use the sensor as TEDS applicable one while optimizing the features of each sensor such as ultra compact and lightweight.




Specifications

Item	NP-0081N10
Applicable sensor	NP-3000 series (CCLD sensor with built-in preamplifier)
TEDS standard	IEEE 1451.4-2004 Template Ver. 1.0
Connector	Sensor side: 10-32 Coaxial (miniature connector) Measurement instrument side: C02 (BNC)
Operating temperature range	-40 to +85°C
Operating humidity range	85%RH or less
Outer dimensions	ø15×40mm
Weight	Approx. 20g







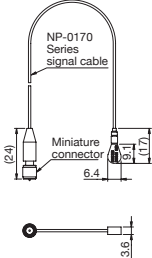
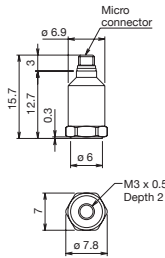
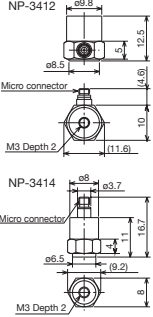
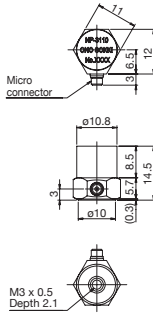
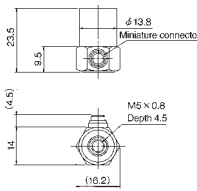
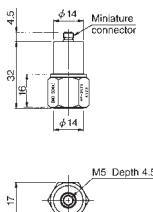


\*The sensor is delivered after matching with NP-0081N10 adapter.

TEDS applicable analyzers

Analyzers		
DS-2000 series	CF-7200	CF-4500
Multi-channel data station	Portable 2-channel FFT analyzer	1-channel FFT analyzer
		

# NP-3000 Series Accelerometers with Built-in Pre-amplifier

Features	Ultra-compact and lightweight	Compact and lightweight	Compact and lightweight	Compact and general-purpose usage	General-purpose usage	General-purpose usage and floating
Structure	Shear type	Shear type	Shear type	Shear type	Shear type	Shear type
Model name	NP-3211	NP-3418	NP-3412-3414	NP-3110	NP-3120	NP-3121
Appearance						
Sensitivity *1	1.02mV/ (m/s <sup>2</sup> ) ±15%	1.0mV/ (m/s <sup>2</sup> ) ±10%	1.0mV/ (m/s <sup>2</sup> ) ±1dB	0.5mV/ (m/s <sup>2</sup> ) ±1dB	1.0mV/ (m/s <sup>2</sup> ) ±1dB	1.0mV/ (m/s <sup>2</sup> ) ±1dB
Resonance frequency	50kHz or more	Approx. 40kHz	Approx. 40kHz	Approx. 45kHz	Approx. 50kHz	Approx. 50kHz
Frequency response range	1Hz to 10kHz ±5%	2Hz to 6kHz ±0.5dB	2Hz to 8kHz ±0.5dB	5Hz to 6kHz ±0.5dB	5Hz to 5kHz ±0.5dB	5Hz to 5kHz ±0.5dB
	0.3Hz to 20kHz ±3dB	0.8Hz to 16kHz ±3dB	0.8Hz to 16kHz ±3dB	5Hz to 15kHz ±3dB	5Hz to 12kHz ±3dB	5Hz to 10kHz ±3dB
Maximum allowable acceleration	4,900m/s <sup>2</sup>	2,200m/s <sup>2</sup>	2,200m/s <sup>2</sup>	4,400m/s <sup>2</sup>	2,200m/s <sup>2</sup>	2,200m/s <sup>2</sup>
Maximum shock resistance	98,000m/s <sup>2</sup>	10,000m/s <sup>2</sup>	10,000m/s <sup>2</sup>	100,000m/s <sup>2</sup>	100,000m/s <sup>2</sup>	10,000m/s <sup>2</sup>
Operating temperature range	-54 to +125°C	-30 to +110°C	-30 to +110°C	-20 to +110°C	-20 to +110°C	-20 to +110°C
Output impedance	300Ω or less	100Ω or less	100Ω or less	100Ω or less	100Ω or less	100Ω or less
Detector noise	Approx. 20μVrms Approx. 0.02m/s <sup>2</sup> rms	20μVrms or less 0.02m/s <sup>2</sup> rms or less	20μVrms or less 0.02m/s <sup>2</sup> rms or less	20μVrms or less 0.04m/s <sup>2</sup> rms or less	20μVrms or less 0.02m/s <sup>2</sup> rms or less	20μVrms or less 0.02m/s <sup>2</sup> rms or less
Power requirement	18 to 30VDC 2 to 20mA Constant current drive	15 to 25VDC 0.5 to 5mA Constant current drive	15 to 25VDC 0.5 to 5mA Constant current drive	12 to 25VDC 0.5 to 5mA Constant current drive	15 to 25VDC 0.5 to 5mA Constant current drive	15 to 25VDC 0.5 to 5mA Constant current drive
Weight	0.5g	1.9g	NP-3412: 5.5g NP-3414: 3.5g	5.4g	20g	34g
Ground/Insulation	Case ground (anode oxidation used for surface insulation)	Case ground	Case ground	Case ground	Case ground	Mounting surface insulation
Case material	Aluminum	Titanium	SUS303	Titanium	SUS303	SUS303
Connector	3-56 coaxial Side	M3 coaxial (micro connector) Top	M3 coaxial (micro connector) NP-3412: Side NP-3414: Top	M3 coaxial (micro connector) Side	10-32 coaxial (miniature connector) Side	10-32 coaxial (miniature connector) Top
Compatible cable	NP-0172 (provided)	NP-0150 Series	NP-0150 Series	NP-0150 Series (exclusive 3m cable provided)	NP-0120/0130 Series	NP-0120/0130 Series
Attachment	Adhesive	M3 female screw	M3 female screw	M3 female screw	M5 female screw	M5 female screw
Accessories	NP-0172 (3m cable) NP-0021 (BNC to 10-32 conversion adapter) Tool for scooping out, mounting wax Instruction manual, data sheet	M3 steel stud Instruction manual Data sheet	M3 steel stud Instruction manual Data sheet	M3 steel stud Exclusive 3m cable Instruction manual Data sheet	M5 steel stud Instruction manual Data sheet	M5 steel stud Instruction manual Data sheet
Outer dimensions	6.4 × 11.4 × 3.6	7Hex × 11.5H	NP-3412: 10Hex × 12.5H NP-3414: 8Hex × 11H	11Hex × 14.5H	14Hex × 23H	17Hex × 32H
						

\*1: The sensitivity varies from model to model (individual differences). The values given in the above table are the standard values at the time of shipment, not the measurement accuracy values. Performing calibration for each of the sensors according to its respective sensitivity value enables measurement to be performed under the same conditions and with the same accuracy, irrespective of the sensor type.

High-sensitivity	High sensitivity and floating	Floating and water resistance type*2	Floating and water resistance type*2 (TEDS*3)	Waterproof *5
Shear type	Shear type	Shear type	Shear type	Shear type
NP-3130	NP-3131	NP-3331B	NP-3331N20	NP-3310
				
10mV/ (m/s <sup>2</sup> ) ±1dB	10mV/ (m/s <sup>2</sup> ) ±1dB	5.0mV/ (m/s <sup>2</sup> ) ±10%	5.0mV/ (m/s <sup>2</sup> ) ±10%	1.0mV/ (m/s <sup>2</sup> ) ±1dB
Approx. 25kHz	Approx. 25kHz	Approx. 25kHz	Approx. 25kHz	Approx. 35kHz
5Hz to 4kHz ±0.5dB	5Hz to 4kHz ±0.5dB	2Hz to 4kHz ±5%	2Hz to 4kHz ±5%	5Hz to 5kHz ±0.5dB
5Hz to 10kHz ±3dB	5Hz to 8kHz ±3dB	2Hz to 10kHz ±3dB	2Hz to 10kHz ±3dB	5Hz to 10kHz ±3dB
220m/s <sup>2</sup>	220m/s <sup>2</sup>	700m/s <sup>2</sup>	700m/s <sup>2</sup>	2,200m/s <sup>2</sup>
100,000m/s <sup>2</sup>	5,000m/s <sup>2</sup>	10,000m/s <sup>2</sup>	10,000m/s <sup>2</sup>	10,000m/s <sup>2</sup>
-20 to +110°C	-20 to +110°C	-20 to +110°C	-20 to +85°C	-20 to +80°C
100Ω or less	100Ω or less	100Ω or less	300Ω or less	100Ω or less
20μVrms or less 0.002m/s <sup>2</sup> rms or less	20μVrms or less 0.002m/s <sup>2</sup> rms or less	20μVrms or less 0.004m/s <sup>2</sup> rms or less	20μVrms or less 0.004m/s <sup>2</sup> rms or less	20μVrms or less 0.02m/s <sup>2</sup> rms or less
15 to 25VDC 0.5 to 5mA Constant current drive	15 to 25VDC 0.5 to 5mA Constant current drive	15 to 25VDC 0.5 to 5mA Constant current drive	18 to 25VDC 0.5 to 5mA Constant current drive	15 to 25VDC 0.5 to 5mA Constant current drive
46g	69g	50g	50g	59g *6
Case ground	Mounting surface insulation	Case ground	Case ground	Case ground
SUS303	SUS303	SUS303	SUS303	SUS303
10-32 coaxial (miniature connector) Side	10-32 coaxial (miniature connector) Top	TNC Top	TNC Top	Attached to the cable 10-32 coaxial plug (miniature connector)
NP-0120/0130 Series	NP-0120/0130 Series	NP-0140 Series	NP-0140 Series	-
M5 female screw	M5 female screw	M5 female screw	M5 female screw	M5 female screw
M5 steel stud Instruction manual Data sheet	M5 steel stud Instruction manual Data sheet	M5 steel stud Instruction manual Data sheet	M5 steel stud Instruction manual Data sheet	M5 steel stud Instruction manual Data sheet
17Hex x 32H	21Hex x 37.5H	17Hex x 37.5H	17Hex x 37.5H	17Hex x 59H
				

\*2: When the sensor is used in the place where there is splash or spilled water, please refer to the lowermost section of page12 for water-resistant processing.







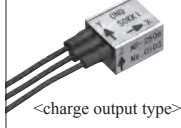
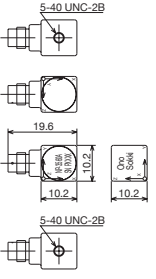
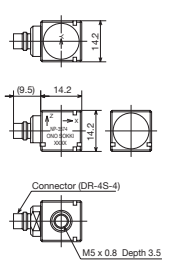
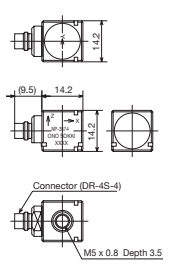
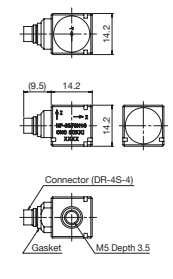
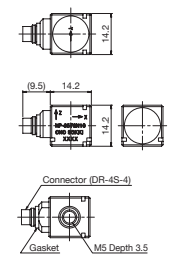
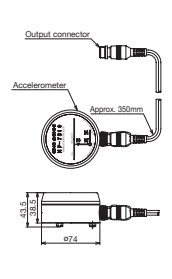
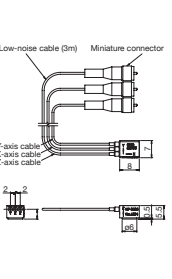
\*3: Conforms to IEEE1451.4-2004 Template ver. 1.0

\*4: Applicable standard EN61326:1997,A1 1998, A2:2001, A3 2003.

\*5: Conforms to JIS C 0920 Protection Class 7.

\*6: The cable is not included.

# Tri-axial Accelerometers with Built-in Pre-amplifier / Charge Output Type

Features	Compact and tri-axial measurement	General-purpose and tri-axial measurement	General-purpose and tri-axial measurement	General-purpose and tri-axial measurement (TEDS*2)	General-purpose and tri-axial measurement (TEDS*2)	Waterproof/dustproof*3	Ultra-compact and tri-axial measurement
Structure	Shear type	Shear type	Shear type	Shear type	Shear type	Shear type	Shear type
Model name	NP-3560B	NP-3572	NP-3574	NP3576N10	NP3578N10	NP-7310	NP-2506
Appearance							
Sensitivity *1	1.02mV/ (m/s <sup>2</sup> ) ±10%	1.0mV/ (m/s <sup>2</sup> ) ±10%	10mV/ (m/s <sup>2</sup> ) ±10%	1.0mV/ (m/s <sup>2</sup> ) ±10%	10mV/ (m/s <sup>2</sup> ) ±10%	100mV/ (m/s <sup>2</sup> ) ±2.5% 31.5Hz	0.04pC/(m/s <sup>2</sup> ) ±20% (at 159.2Hz)
Capacitance	—	—	—	—	—	—	580pF ±20% (including cable)
Resonance frequency	Approx. 55kHz	Approx. 40kHz		Approx. 35kHz		—	60kHz or more
Frequency response range	2Hz to 10kHz ±5% (Y, Z axis) 2Hz to 5kHz ±5% (X axis)	1Hz to 8kHz ±1dB (Z axis) 1Hz to 5kHz ±1dB (X, Y axis)		1Hz to 5kHz ±1dB (X axis) 1Hz to 8kHz ±1dB (Y, Z axis) 0.8Hz to 8kHz ±3dB (X axis) 0.8Hz to 10kHz ±3dB (Y, Z axis)		<Common to X, Y, Z axis> 0.4 to 100Hz ±2.5% 0.25 to 200Hz ±1dB 0.1 to 400Hz +1dB/-3dB	fc to 1kHz (±5%) fc to 5kHz (±10%) fc to 20kHz (±3dB)
Maximum allowable acceleration	4,900m/s <sup>2</sup>	4,000m/s <sup>2</sup>	400m/s <sup>2</sup>	3,600m/s <sup>2</sup>	360m/s <sup>2</sup>	35m/s <sup>2</sup>	25,000m/s <sup>2</sup>
Maximum shock resistance	98,000m/s <sup>2</sup>	30,000m/s <sup>2</sup>		30,000m/s <sup>2</sup>		500m/s <sup>2</sup>	50,000m/s <sup>2</sup> or more
Operating temperature range	-54 to +121°C	-50 to +110°C *4		-40 to +85°C		-10 to +50°C	-50 to +160°C
Output impedance	200Ω or less	1kΩ or less		400kΩ or less		100Ω or less	—
Detector noise	0.03m/s <sup>2</sup> rms (typ)	40μVrms or less 0.04m/s <sup>2</sup> rms or less	40μVrms or less 0.004m/s <sup>2</sup> rms or less	40μVrms or less 0.04m/s <sup>2</sup> rms or less	40μVrms or less 0.004m/s <sup>2</sup> rms or less	2.8μVrms or less LPF=200Hz, -24dB/oct Sensitivity conversion acceleration: 28μm/s <sup>2</sup> rms	—
Power requirement	18 to 30VDC 2 to 20mA Constant current drive	21 to 30VDC 0.5 to 5mA Constant current drive		18 to 25VDC 0.5 to 5mA Constant current drive		15 to 25VDC 2 to 5mA Constant current drive	—
Insulation resistance	—	—	—	—	—	—	10,000MΩ or more (50VDC)
Weight	5.3g	8.1g		11.1g		500g	Approx. 1.2g (not including cable)
Ground/Insulation	Case ground	Case ground		Case ground		Case ground	Case ground
Case material	Titanium	Aluminum		Titanium		Aluminum, Alumite surface coating	Titanium
Connector	1/4-28 (4-pin) connector Side	DR-4S-4 Side		DR-4S-4 Side		R04-R8M Side	Attached to the cable (3m, 3pcs.) 10-30 coaxial plug (miniature connector)
Compatible cable	NP-0252, 0262	NP-0222, 0232		NP-0222, 0232		VR-0600 (provided), AG-6000 Series extension cable	—
Attachment	Adhesive or 5-40UNC female screw	Adhesive or M5 female screw		Adhesive or M5 female screw		3-prong adapter (attached)	Adhesive
Accessories	5-40UNC/M3 Conversion screws (two) Mounting wax Mounting base (NP-0035) Instruction manual, data sheet	M5 steel stud Mounting wax Mounting clip (NP-0061) Instruction manual, data sheet		M5 steel stud Mounting wax Mounting clip (NP-0061) Instruction manual, data sheet		VR-0600 (5m) NP-0073 (3-branch cable) Instruction manual, data sheet	Instruction manual Data sheet
Outer dimensions	10.2(W) × 10.2(D) × 10.2(H) (not including protruded section)	14.2(W) × 14.2(D) × 14.2(H) (not including protruded section)		14.2(W) × 14.2(D) × 14.2(H) (not including protruded section)		ø74(D) × 38.5(H) (not including protruded section)	8(W) × 7(D) × 5.5(H) (not including protruded section)
							

\*1: The sensitivity varies from model to model (individual differences). The values given in the above table are the standard values at the time of shipment, not the measurement accuracy values.








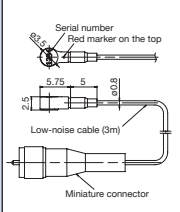
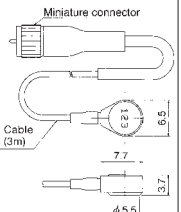
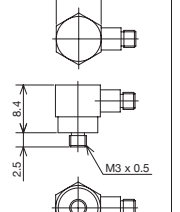
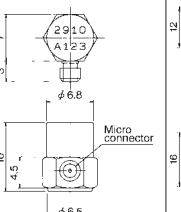
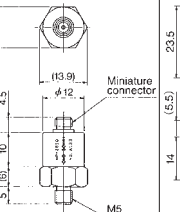
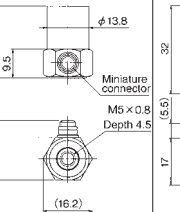
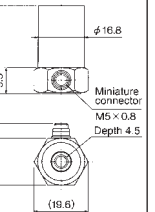
Performing calibration for each of the sensors according to its respective sensitivity value enables measurement to be performed under the same conditions and with the same accuracy, irrespective of the sensor type.

\*2: Conforms to IEEE1451.4-2004 Template ver. 1.0

\*3: Conforms to the JIS C 0920 Safety Protection Class IP66.

\*4: The operating temperature range is available for sensor itself. The operating range when the cable is included is -25 to +105°C.

# NP-2000 Series Charge Output Accelerometers

Features	Ultra-compact and lightweight	Compact and lightweight	Compact and high-temperature proof	Compact and general-purpose usage	Compact	General-purpose usage	General-purpose usage and high sensitivity
Structure	Shear type	Shear type	Shear type	Shear type	Shear type	Shear type	Shear type
Model name	NP-2106	NP-2110	NP-2710	NP-2910	NP-2810	NP-2120	NP-2130
Appearance							
Sensitivity *1	0.035pC/ (m/s <sup>2</sup> ) ±20%	0.16pC/ (m/s <sup>2</sup> ) ±2dB	0.306pC/ (m/s <sup>2</sup> ) ±10%	0.3pC/ (m/s <sup>2</sup> ) ±2dB	1.2pC/ (m/s <sup>2</sup> ) ±2dB	5pC/ (m/s <sup>2</sup> ) ±2dB	10pC/ (m/s <sup>2</sup> ) ±2dB
Capacitance	580pF ±20% (including cable)	700pF ±20%	Approx. 340pF	500pF ±20%	750pF ±20%	3,500pF ±20%	3,500pF ±20%
Resonance frequency	60kHz or more	Approx. 40kHz	Approx. 50kHz	Approx. 60kHz	Approx. 40kHz	Approx. 30kHz	Approx. 25kHz
Frequency response range *2	fc to 1kHz ±5% fc to 6kHz ±10% fc to 20kHz ±3dB	fc to 10kHz ±0.5dB fc to 20kHz ±3dB	fc to 10kHz ±5% fc to 20kHz ±3dB	fc to 10kHz ±0.5dB fc to 20kHz ±3dB	fc to 6kHz ±0.5dB fc to 15kHz ±3dB	fc to 5kHz ±0.5dB fc to 12kHz ±3dB	fc to 5kHz ±0.5dB fc to 10kHz ±3dB
Maximum allowable acceleration	100,000m/s <sup>2</sup>	10,000m/s <sup>2</sup>	22,600m/s <sup>2</sup>	50,000m/s <sup>2</sup>	20,000m/s <sup>2</sup>	8,000m/s <sup>2</sup>	5,000m/s <sup>2</sup>
Maximum shock resistance	100,000m/s <sup>2</sup> or more	100,000m/s <sup>2</sup>	98,000m/s <sup>2</sup>	100,000m/s <sup>2</sup>	30,000m/s <sup>2</sup>	16,000m/s <sup>2</sup>	10,000m/s <sup>2</sup>
Operating temperature range	-50 to +160°C	-20 to +160°C	-70 to +260°C	-20 to +160°C	-20 to +160°C	-20 to +160°C	-20 to +160°C
Insulation resistance	10,000MΩ or more (50VDC)	10,000MΩ or more	1,000GΩ or more	10,000MΩ or more	10,000MΩ or more	10,000MΩ or more	10,000MΩ or more
Weight	Approx. 0.2g (not including cable)	0.6g *3	2g	2g	12g	25g	42g
Ground/Insulation	Case ground	Case ground	Case ground	Case ground	Case ground	Case ground	Case ground
Case material	Titanium	Titanium	Titanium	Titanium	SUS303	SUS303	SUS303
Connector	Attached to the cable (3m) 10-32 coaxial plug (miniature connector)	Attached to the cable (3m) 10-32 coaxial plug (miniature connector)	5-44 coaxial Side	M3 coaxial (micro connector) Side	10-32 coaxial (miniature connector) Top	10-32 coaxial (miniature connector) Side	10-32 coaxial (miniature connector) Side
Compatible cable	-	-	NP-0160 Series (NP-0162 (3m) provided)	NP-0150 Series (exclusive 3m cable provided)	NP-0120/0130 Series	NP-0120/0130 Series	NP-0120/0130 Series
Attachment	Adhesive	Adhesive	M3 male screw	Adhesive	M5 male screw	M5 female screw	M5 female screw
Accessories	Instruction manual Data sheet Tool for scooping out	Instruction manual Data sheet	NP-0162 (3m cable) Instruction manual Data sheet	Exclusive 3m cable Instruction manual Data sheet	Exclusive cap nut Instruction manual Data sheet	M5 steel stud Instruction manual Data sheet	M5 steel stud Instruction manual Data sheet
Outer dimensions	ø3.5 × 2.5mm 	ø6.5 × 3.7H 	7.9Hex × 8.4mm 	7Hex × 10H 	12Hex × 16H 	14Hex × 23.5H 	17Hex × 32H 





\*1: The sensitivity varies from model to model (individual differences). The values given in the above table are the standard values at the time of shipment, not the measurement accuracy values. Performing calibration for each of the sensors according to its respective sensitivity value enables measurement to be performed under the same conditions and with the same accuracy, irrespective of the sensor type.

\*2: The fc value is determined by the time constant with respect to the charge amplifier. For example, when using the NP-2120 together with the CH-1200, the fc value is 1Hz (±0.5dB range).

\*3: The cable is not included.

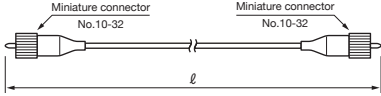
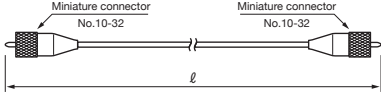
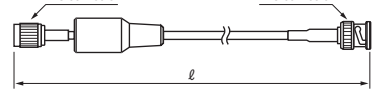
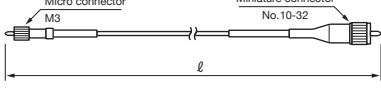
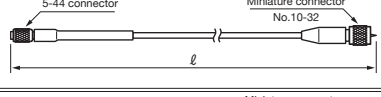
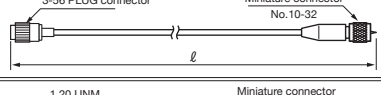
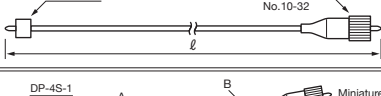
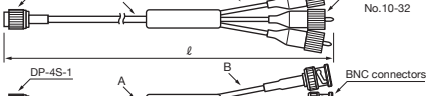
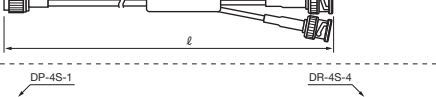
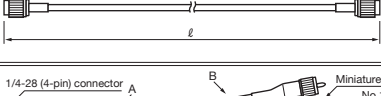
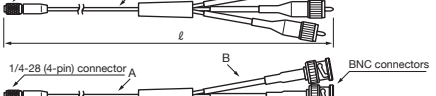
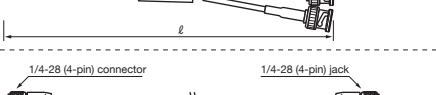
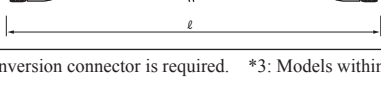
• The noise specification for the NP-2000 Series accelerometers is the input conversion noise level of the CH-1200 or other charge amplifier used.

## Compatible sensor amplifiers

NP-3000/7000 series		NP-2000 series	
Constant current drive amplifier		Charge amplifier	
SR-2200	PS-1300	CH-6130/6140	CH-1200
			

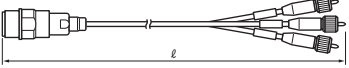
# Accessories

## ■ Sensor Signal Cables

Model name	Length	Specifications	Outer dimensions	Compatible Sensor Models
NP-0121	1.5m	Operating temperature range -25 to +105°C Cable diameter: $\phi$ 1.2mm Type: Low-noise cable		NP-3120, 3121, 3130, 3131, 2120, 2130, 2810 (NP-510, 510I, 520, 520I, 550, 560*2, 602*1, 3910*2)*3
NP-0122	3m			
NP-0123	5m			
NP-0124	10m			
NP-0131	1.5m	Operating temperature range -73 to +260°C Cable diameter: $\phi$ 2.3mm Type: Low-noise cable		NP-3120, 3121, 3130, 3131, 2120, 2130, 2810 (NP-510, 510I, 520, 520I, 550, 560*2, 602*1, 3910*2)*3
NP-0132	3m			
NP-0133	5m			
NP-0134	10m			
NP-0143	5m	Operating temperature range -20 to +110°C Cable diameter: $\phi$ 4.2mm		NP-3331B, 3331N20 (NP-3331, 3331A)*3
NP-0144	10m			
NP-0146	20m			
NP-0148	30m			
NP-0151	1.5m	Operating temperature range -25 to +160°C Cable diameter: $\phi$ 1.2mm Type: Low-noise cable		NP-2910*1, 3110*1, 3412, 3414, 3418
NP-0152	3m			
NP-0153	5m			
NP-0154	10m			
NP-0162	3m	Operating temperature range -90 to +260°C Cable diameter: $\phi$ 2.0mm Type: Low-noise cable		NP-2710
NP-0164	9m			
NP-0172	3m	Operating temperature range -90 to +260°C Cable diameter: $\phi$ 1.1mm		NP-3211*1
NP-0200	3m	Operating temperature range -50 to +125°C Cable diameter: $\phi$ 0.9mm		(NP-3210*1)*3
NP-0222	3m	Operating temperature range Section A: -50 to +125°C Section B: -20 to +60°C Cable diameter Section A: $\phi$ 2.6mm Section B: $\phi$ 1.5mm		NP-3572, 3574, 3576N10, 3578N10 (NP-3560)*3
NP-0232				
NP-0213	5m	Operating temperature range -50 to +125°C Cable diameter: $\phi$ 2.6mm		Extension cable for NP-3572, 3574, 3576N10, 3578N10 (NP-3560)*3
NP-0214	10m			
NP-0252	3m	Operating temperature range -90 to +200°C Cable diameter Section A: $\phi$ 2.54mm Section B: $\phi$ 1.96mm		NP-3560B (NP-3560A)*3
NP-0262				
NP-0243	6m	Operating temperature range -90 to +200°C Cable diameter: $\phi$ 2.54mm		Extension cable for NP-3560B (NP-3560A)*3
NP-0244	9m			

\*1: The cable is provided with the sensor as standard. \*2: The NP-0021 Miniature/BNC conversion connector is required. \*3: Models within parentheses ( ) have been already discontinued.

## ■ The signal branch cable for NP-7310

Model name	Length	Outer dimensions	Compatible Sensor Model
NP-0073	0.4m		NP-7310

### [ Application ]



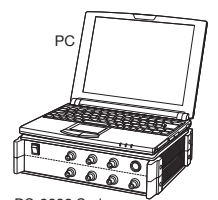
Exclusive cable: 0.35m

VR-0600: 5m

NP-0073: 0.4m

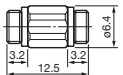

\*The three cables above are provided with the NP-7310 as standard accessory.

NP-0021


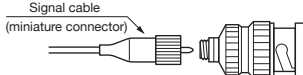


\* Models marked with an asterisk have been already discontinued.

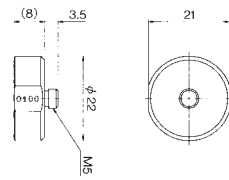
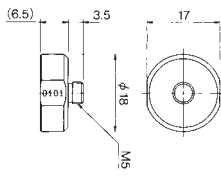
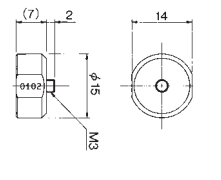
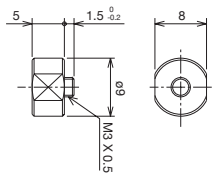
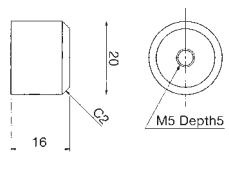
### Signal Cable Extension Adapter

Model Name	Outer dimensions	Usage Example
NP-0020		 <p>Use the adapter to connect two cables together to form an extension cable.</p>

### Miniature/BNC Conversion Connector

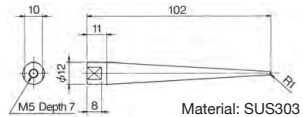
Model Name	Outer dimensions	Usage Example
NP-0021		 <p>Input to the CF-7200/4500/3600A/3800A etc. or the DS-2000 Series</p>

### Magnetic Base

Model Name	NP-0100	NP-0101	NP-0102	NP-0103	NP-032
Outer dimensions					
Specifications	Weight: 22g Force: 117.6N	Weight: 12g Force: 29.4N	Weight: 10g Force: 29.4N	Weight: 2.2g Force: 4.0N	Weight: 35g Force: 39.2N
Compatible Sensors	NP-2130, 3130, 3131, 3310, 3331B, 3331N20, 4120 (NP-520, 520I)*	NP-2120, 3120, 3121, 3572, 3574, 3576N10, 3578N10 (NP-3910, 510, 510I)*	NP-3110, 3412, 3414, 3418 Note: If the NP-0042 flat table is used, the NP-0102 magnetic base can also be used with the NP-3211, 3560B, 2110, 2910 (3210, 602, 3560A)* sensors.	NP-3412, 3414, 3418	NP-2120, 2130, 2810, 3120, 3121, 3130, 3131, 3310, (NP-3910, 510, 510I, 520, 520I)*

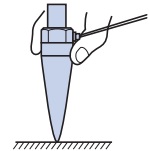
Note : Operating temperature range: -20 to +100°C

### Search Needle

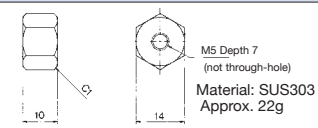
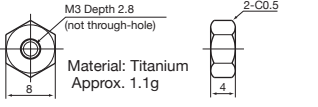
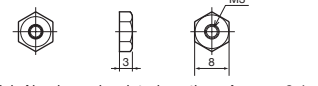
Model Name	Outer dimensions	Compatible Sensors
NP-033		NP-500*/2000/3000 Series (excluding the NP-2106, 2506, 3110, 3210, 3211, 3230, 3412, 3414, 3418, NP-3000 series tri-axial type, 2110, 2710, 2910 models)

#### [ Application ]

Use the NP-033 Search needle when there are multiple measurement points; when area for mounting a sensor is too confined; or when there are other difficulties faced when performing measurement.

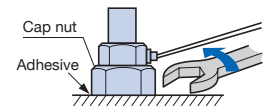


### Mounting Base

Model Name	Outer dimensions	Compatible Sensors
NP-031		NP-500*/2000/3000 Series (excluding the NP-2106, 2506, 3110, 3210, 3211, 3230, 3412, 3414, 3418, 3560*, 3560A*, 3560B, 2110, 2710, 2910 models)
NP-0032		NP-2710, 3418 NP-3560A*, 3560B
NP-0035		NP-2710, 3418 NP-3560A*, 3560B

#### [ Application ]

Use a mounting base when you want to protect the bottom surface of a sensor. The base enables a sensor to be mounted on and removed from a test object without scratching the bottom of the sensor.



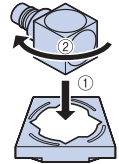
\* Models marked with an asterisk have been already discontinued.

### ■ Mounting clip

Model Name	Outer dimensions	Compatible Sensors
NP-0061		NP-3572, 3574, 3576N10, 3578N10

#### [ Application ]

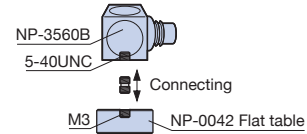
Using mounting clip prevents from accidents that threaded screw hole is filled with adhesive or NP-3574 is broken by the excessive load at the time of dismount. Also mounting clips at several points on the measurement object makes NP-3574 easy to move over and results in reducing setup time.



### ■ Conversion Screw

Model Name	Outer dimensions	Compatible Sensors
NP-0051		NP-3560B, 3560A*

#### [ Application ]

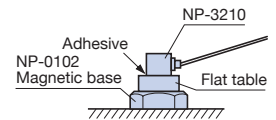


### ■ Flat Table

Model Name	Outer dimensions	Compatible Sensors
NP-0042		NP-3211, 3560B, 2110, 2910 (3210, 602, 3560A)*

#### [ Application ]

Use the flat table when you want to mount the NP-3211, 3560B, 2110, 2910 (3210, 602, 3560A)\* sensors on a magnetic base.

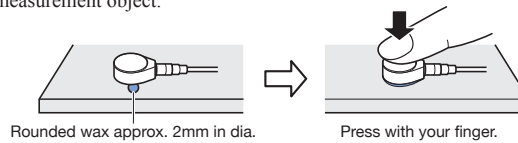


### ■ Mounting Wax

Model Name	Appearance
NP-0010	

#### [ Application ]

Use the wax to mount the sensor on the measurement object.



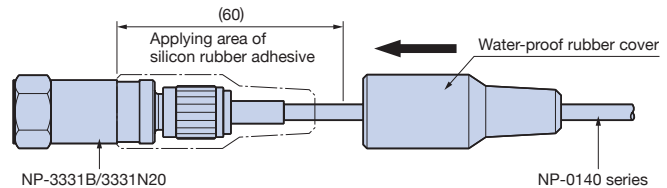
- The frequency characteristics will vary according to the mounting method of wax. Please contact your nearest distributor or our sales office nearby for further details.
- Please use the wax at room temperature. The wax may be meltdown at high temperature and it causes adhesion failure.

### ■ For the water-resistance processing of NP-3331B/3331N20

When NP-3331B/3331N20 are used in where the sensor may be splashed or spilled water, please refer to the procedure to handle as follows. (Equivalent of IPX 7)

**Attention: Please make this modification at your own responsibility. The failures or troubles occurring through modification will be handled on a fee basis even during the warranty period. For modification (fare-paying service), contact your nearest distributor or our sales office nearby.**

- 1) Attach the TNC plug of exclusive cable (NP-0140 series) to the sensor.
- 2) Apply entirely the silicon rubber adhesive (sealing agent) to the cable part where is put on a rubber cover of NP-0140, connector part and sensor part.
  - Recommended manufacture of sealing agent: Shin-Etsu Chemical Co., Ltd
- 3) Shift the water-proof rubber cover to the specified position.
- 4) Harden the sealing agent adequately.



# Peripherals for NP Series Accelerometers (Options)

## ■ Sensor Amplifier (Adapter Type)

### ■ For the NP-2000 Series

CH-6130/6140



The CH-6130/6140 models are simple charge amplifiers that enable charge signals to be converted into voltage signals. Using these charge converters with the VC-2100/3100 vibration comparators and the CF-7200/4500/3600A/3800A etc. and DS-2000 Series FFT analyzers enable charge output accelerometers to be connected directly to measuring instruments (those that can accept input from a constant current drive) without need for a separate charge amplifier.

- Compact, lightweight, simple charge amplifiers
- Can be easily connected to a sensor input connector (BNC).
- Charge output accelerometers can be connected directly to measuring instruments (those that can accept input from a constant current drive) without need for a separate charge amplifier.
- There are two models available, the CH- 6130 with a conversion coefficient of 1 mV/pC (converts a 1-pC charge signal to a 1-mV voltage signal), and the CH-6140 with a conversion coefficient of 10 mV/pC. Make your selection according to the sensitivity of the input sensor.

### ■ Specifications

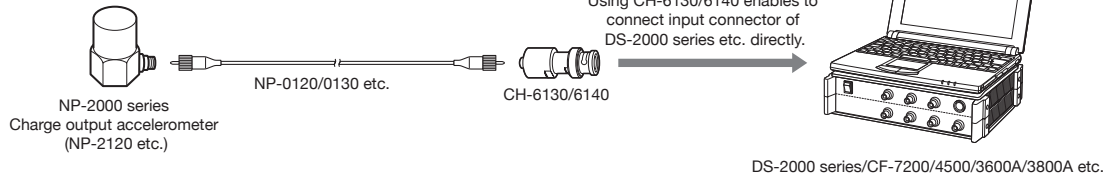
Item	CH-6130	CH-6140
Gain	1.0mV/pC*1	10mV/pC*1
Frequency range	2Hz to 45kHz (±3dB)*2, 5Hz to 15kHz (±0.5dB)*2	
Maximum output voltage	10Vp-p or more	
Output bias	10 ±2VDC	
Input conversion noise	0.05pC (rms) or less	
Drive power supply	Voltage: 18 to 24VDC, constant current: 2.0 to 20mA	
Connector configuration	Input: Miniature connector, No. 10-32UNF screw Output: C02 plug (BNC plug)	

### General Specifications

Structure	Input/output connector connections, case ground
Case material	Stainless (SUS-303)
Operating temperature range	0 to +50°C
Operating humidity range	85% RH or less (with no condensation)
Outer dimensions	ø15 x 40mm
Weight	Approx. 20g

\*1: At 160Hz \*2: When the gain is 0 dB at 160Hz. Note: The output polarity is turned over.

### < CH-6130/6140 connection diagram >



## ■ Compatible FFT Analyzers

Model	DS-2000/XN-8000	CF-3600A/3800A	CF-7200	CF-4500	CF-4210Z/4215Z/4220Z
Appearance					
Number of channels	2 to 32ch	4ch or 8ch	2ch	1ch	1ch
Frequency range	4mHz to 40kHz	4mHz to 40kHz	10mHz to 100kHz	1Hz to 40kHz	1Hz to 40kHz
Dynamic range	100dB or more	100dB or more	90dB or more	90dB	85dB or more
Weight	Approx. 2.3kg to 11kg	Approx. 10kg/11kg	Approx. 3.5kg	Approx. 3.3kg	Approx. 5.0kg (CF-4210Z/4215Z) Approx. 5.2kg (CF-4220Z)
Feature	The number of channels can be changed depending on your application. PC-based easy operation.	Greatly improved operability at field measurement with built-in touch panel PC.	Highly-compatible with PC and pursuing on-site measurement.	The CF-4500 is a high-functioned and 1ch FFT analyzer which is suitable for determination on a production line. The OK/NG determination not only by time-axis waveform or tracking data but also block data can be made.	Even though CF-4210Z /4215Z/4220Z provide 1 channel, they excel in basic performance and also have satisfying functions for the OK/NG determination (optional function) on a production line.

# Charge amplifier

## ■ CH-1200 Charge amplifier



CH-1200 is a charge amplifier which is used in combination with NP-2000 series charge output accelerometers.

It is fully-featured performance and functionality necessary for vibration measurement such as high-pass filter, low-pass filter, CAL signal output and setting of output sensitivity in 10dB steps.

- Compact and cost-effective amplifier focused on vibration and acceleration measurements.
- Can be used with charge output accelerometers.
- Output sensitivity range can be set at each 10dB steps. It is suitable for an output to data recorder and so on.
- Low-pass and high-pass filters are incorporated to get rid of unwanted noise.
- Oscillator for calibration is built in a main body.
- It works with 12VDC power supply. AC adapter and battery unit are ready as options.
- Integral function is provided. It measures acceleration and displacement (can be changed at each channel).

### ■ Specifications

Item	CH-1200
Maximum input charge	±50,000 pC
Input connector	Miniature connector (Model C25 by Tajimi Electronics Co., LTD, or equivalent)
Charge condenser	100pF, 1,000pF, 10,000pF
Leak resistance	10GΩ, 1GΩ, 100MΩ
Frequency response function	Acceleration: 1.0Hz to 15kHz ±0.5dB, 0.2Hz to 50kHz ±3dB Velocity : 3.0Hz to 3kHz ±0.5dB Displacement: 3.0Hz to 500Hz ±1dB (However, the frequency at 160Hz to be 0dB)
Accuracy	Acceleration: ±2% Velocity : ±3% Displacement: ±5% (160Hz at 25±3°C)
Rated output voltage	±5 V
Maximum output load	3mA, 1500pF
Output connector	C02 (BNC)
Input conversion noise level	0.05pC (rms) or less
Output offset	±5mV or less
Sensitivity	0.01 to 999pC/EU*1
Filter	HPF: Through, 3Hz, 10Hz(-18dB/oct), LPF: Through, 1kHz, 10kHz (-18dB/oct)
CAL signal	160Hz ±5%, 1Vo-p ±2.0%, sine wave(25°C±3°C)
Maximum input alarm display function	OFF : [-10dB/OVER] indicator blinks in red when output exceeds ±5V. The blinks will stop when the output goes within ±5V. ON : The blinking in red continues unless [▲/RST] switch is pushed when the output exceeds ±5V.
Output sensitivity*2	0.01, 0.0316, 0.10, 0.316, 1.00, 3.16, 10.0, 31.6, 100, 316, 1000mV/EU*1
Auto power save	Only the decimal point will be displayed on main display when there is no input from each switch for approx. 2 minutes or more.
Other function	
Output level indicator	It blinks in green at -10dB/F.S., blinks in red at F.S. over.
Condition memory	The measurement conditions are stored even though the power is OFF.
Power requirement	10 to 15VDC
Current consumption	100mA or less at 12VDC IN (When the value of 1.00 is shown at displayed device.)
Connection	Maximum of 8 units can be connected for one AC adapter.
Outer dimensions	28(W) x 121(H) x 210(D)mm
Weight	Approx. 510g
Operating environment	-10 to +50°C 90% or less (with no condensation)
Storage environment	-10 to +50°C 90% or less (with no condensation)
Accessories	Joint cable x 1pc., stabilizer x 1 pc., linking fitting x 2pcs., instruction manual x 1 copy

\*1: EU:Engineering unit \*2: Output sensitivity;Output power per 1EU Note: The output polarity is turned over.

### ■ Option

Model	Product name	Model	Product name
CH-0100	Battery unit	CH-0001	Accessory set (joint cable x 1 pc., stabilizer x 1 pc., linking fitting x 2 pcs.)
CH-0011	AC adapter (for 100VAC input)		
—	AC adapter (100 to 240VAC) (PE1821047)		

## ■ CH-0100 Battery unit



(CH-0100 with CH-1200 x 3)

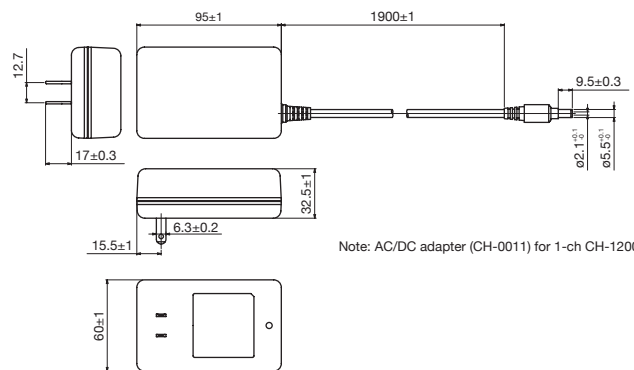
### Battery unit for CH-1200

- Performance specifications
- Input power source: 8 pcs. of size C battery or AC adapter (CH-0011) (AC adapter has priority over battery.)
- Battery life: Approx. 8 hours continuously
- Display: Low battery display; The available operating time after pointer of monitor comes in a red zone is

approx. 30 minutes. (When alkaline batteries are used, three units of CH-1200 connected, at 20°C)  
The number of operating CH-1200: 3 units max.

- General specifications
- Operating temperature range: 0 to +40°C
- Operating humidity range: 90% RH or less
- Storage temperature range: -10 to +50°C
- Storage humidity range: 90%RH or less
- Outer dimensions: 45(W) x 121(H) x 194(D)mm (not including protruded section)
- Weight: Approx. 650g (not including batteries)
- Accessories: Battery cell x 8 pcs., (size C alkaline batteries), joint cable x 1 pc., stabilizer x 1 pc. (already mounted on a main body), linking fitting x 2 pcs., instruction manual x 1 copy

## ■ CH-0011 AC adapter



Note: AC/DC adapter (CH-0011) for 1-ch CH-1200

- Specifications
- Outer dimensions: 60(W) x 95(D) x 32.5(H)mm
- Weight: 190g
- Input voltage: 100VAC

- Rated output voltage/current: 12VDC, 2A
- Operating temperature range: 0 to +40°C

## ■ VX-1100 Sensitivity Calibrator for Piezoelectric Accelerometers (Battery Drive and Simple type)



Piezoelectric accelerometers are widely used in vibration measurements. In order to obtain appropriate data, it is necessary to check the operation (sensitivity) of sensor before usage. The VX-1100 is a simple sensitivity calibrator that is designed for use with piezoelectric accelerometers. Since an exciter, sensor amplifier and display unit are all built into the calibrator, the sensitivity value can be read directly on the display simply by connecting an accelerometer directly to the VX-1100. The VX-1100 excites an accelerometer with sine wave of 159.2Hz and 10m/s<sup>2</sup> (rms) so that the output can be used as calibration signal for vibration measurement system.

- The exciter, sensor amplifier and display functions have all been integrated into one device for user convenience.
- The VX-1100 can be used with both charge output accelerometers and accelerometers with built-in amplifier. (0.5mA/0.2mA/Charge amplifier)
- Sensitivity value can be read directly on the built-in digital display unit.
- Long-term continuous operation is enabled (approx. 20hours).
- Compact and light-weighted.
- A carrying case is provided as standard to make carrying easy.
- Basic accessories necessary to measure are provided as standard.

### ■ Specifications

Excitation frequency:	159.2Hz ±1%
Excitation acceleration:	10m/s <sup>2</sup> (rms) ±3%
Excitation velocity:	10mm/s (rms) ±4%
Excitation displacement:	10µm (rms) ±5%
Harmonic distortion:	3% or less
Sensitivity display range:	0.01 to 19.99mV/(m/s <sup>2</sup> ) 0.01 to 19.99pC/(m/s <sup>2</sup> )
Sensitivity display accuracy:	±3% ±1digit
Compatible accelerometer:	110g or less weight

Sensor power supply:	0.5mA or 2mA switching voltage: 15V
Power requirement:	Type AA battery (LR6) x 4 pcs.
Battery life:	Approx. 20hours
Operating temperature range:	+10 to +40°C
Operating humidity range:	90% RH or less (with no condensation)
Weight:	Approx. 1kg
Outer dimensions:	120 (W) x 140 (D) x 50 (H) mm
Accessories:	Low-noise cable (50-cm length, BNC/Miniature connector) Conversion screws (M5-M3, M5-M6, M5-flat (magnetic attachment possible) M5-No.10-32UNF)

Note: Depending on the model of sensor used, a BNC/Miniature conversion adapter (NP-0021) may be required. Please contact your sales representative for details.

\* The VX-1100 cannot be used for NP-2106, 2506, 3572, 3574, 3576N10, 3578N10, 3560B and NP-7310.

## ■ SR-2200 2-channel Sensor Amplifier



The SR-2200 2-channel sensor amplifier can measure vibration in combination with NP-3000 series accelerometers and sound pressure level in combination with MI-3111 preamplifier (microphone: MI-1432, 1234) at the same time.

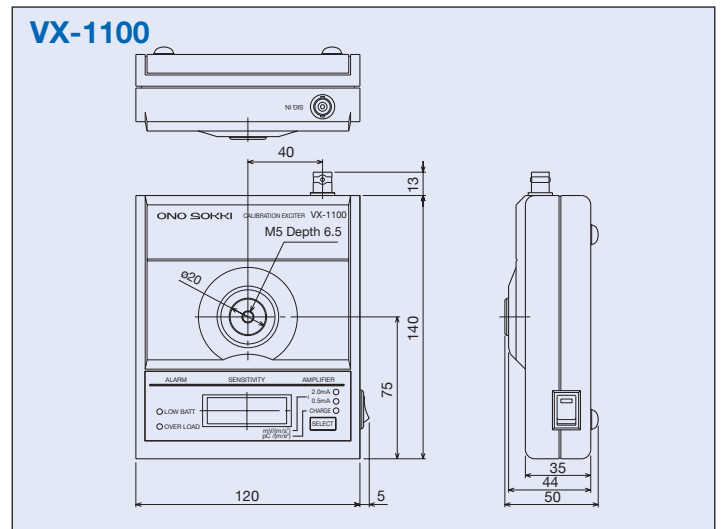
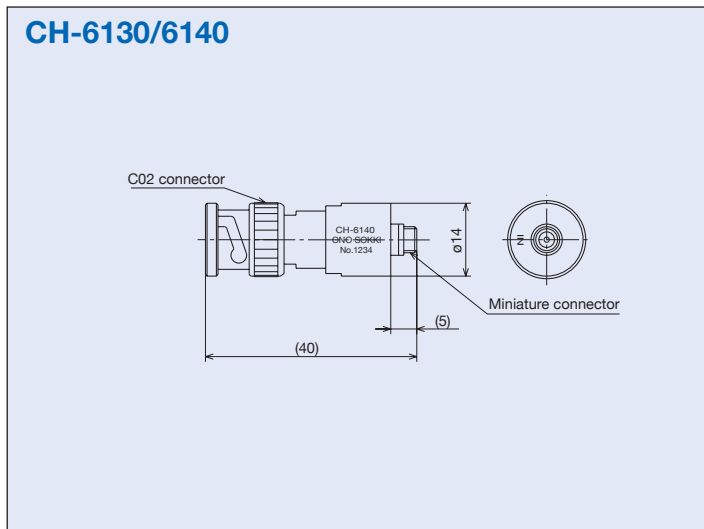
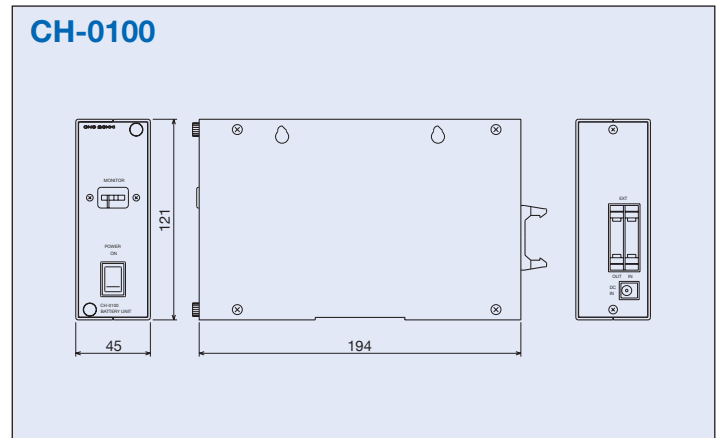
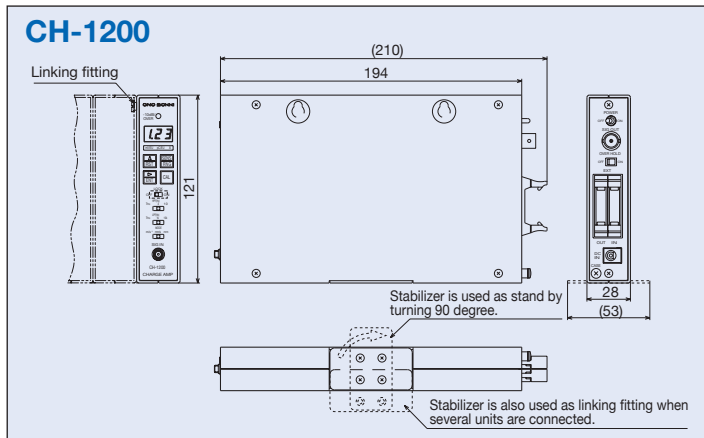
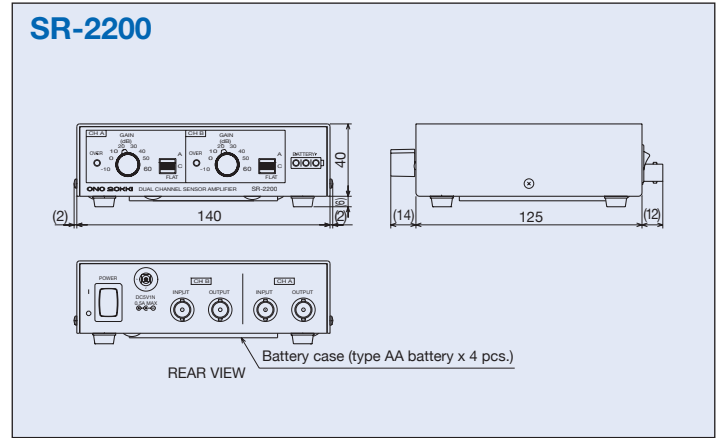
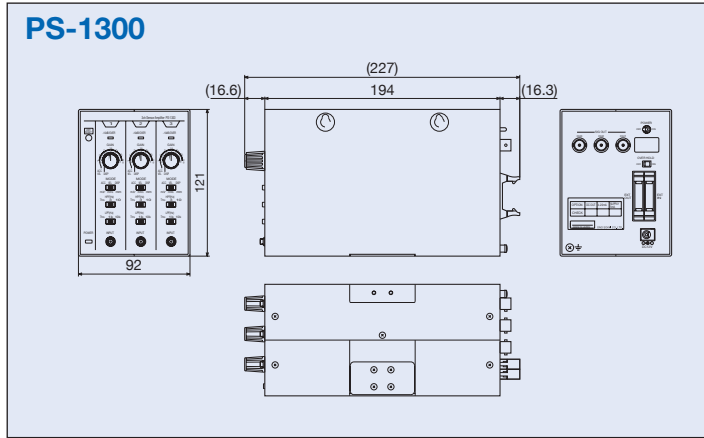
- Two input channels for simultaneous measurement of either sound pressure level and vibration, or sound insulation measurement.
- Providing following weighting: Flat, A or C (filter for measurement of sound pressure level).
- Stackable for multiple channels.

### ■ Specifications

Item	SR-2200		
Input Section	Constant current power supply	Current : 2.4mA (±20%) Applied voltage : approx. 18VDC	
	Number of channels	2	
	Operating frequency range	1Hz to 20kHz (±0.5dB) Load impedance 100kΩ or more	
	Input impedance	1MΩ ±0.5%	
	Input cutoff frequency	Approx. 0.16Hz	
	Input voltage range	12.5dBVrms max. (±6V)	
	Gain	-10, 0, 10, 20, 30, 40, 50, 60dB, 8 stages selectable in 10dB steps, ±0.2dB	
	Frequency weighting	A/C/FLAT Conforming standards: IEC 651 Type 1, JIS C 1505	
	Output cutoff frequency	Approx. 0.2Hz (load impedance : 100kΩ or more.) Approx. 0.4Hz (load impedance : 50kΩ or more.)	
	Input-converted self noise	A	-105dBVrms or less
		C	-100dBVrms or less
		FLAT	-95dBVrms or less
	Input / output connector	C02 (BNC)	
Output Section	Output voltage range	12.6dBVrms max (±6V)	
	Max. output cable length	30m or less	
General Specifications	Power requirement	Type AA battery x 4 pcs.	
	Battery life	Approx. 20 hours or more (When 4 pcs. of type AA alkaline battery LR6 are used.)	
	Operating temperature range	-10 to +50°C	
	Operating humidity range	30 to 90% RH (with no condensation)	
	Storage temperature range	-20 to +60°C	
	Storage humidity range	10 to 90% RH (with no condensation)	
	Outer dimensions	140(W) x 40(H) x 125(D)mm (not including protruded section)	
	Weight	Approx. 500g (including batteries)	
	Accessories	Instruction manual x 1 copy, battery (LR6) x 4 pcs.	

## Outer dimensions

(Unit:mm)



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