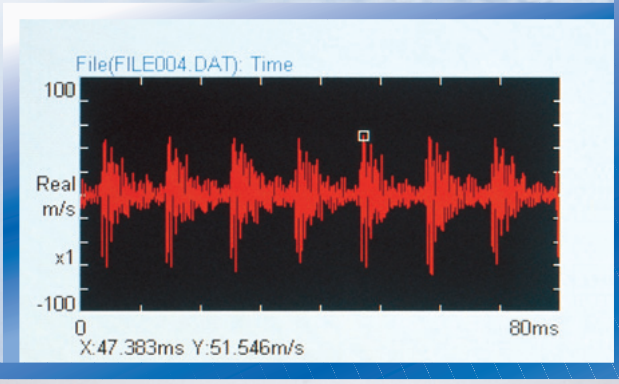
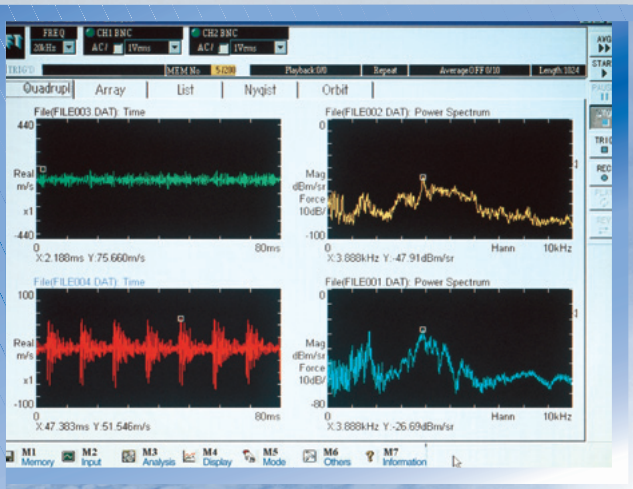
NP-series
SELECTION GUIDE
Vibration Sensing

NP Series Accelerometers





The NP Series accelerometers detect the complex vibrations of a test object with high accuracy.
Total signal analysis can be performed by the combination of accelerometer, amplifier and analyzer depends on the purpose of the measurement and testing.

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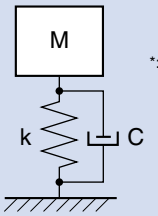
NP Series Accelerometers

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 0.5 g, 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 detecting virtually every type of mechanical vibration.

Features

All the NP Series Accelerometers 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 attaching the accelerometer to the test 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).

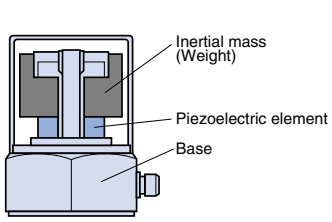
■ Piezoelectric Accelerometer

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.

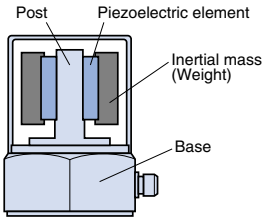
■ Accelerometer Types: Compressed and Shear

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.

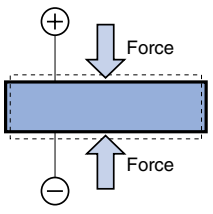
Figure 1 Piezoelectric Accelerometer Structure



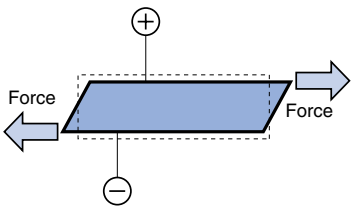
(a) Compressed type
- Easily affected by pyroelectric noise and base strain
- Robust against impact force



(b) Shear type
- Minimally affected by pyroelectric noise and base strain
- High sensitivity



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.

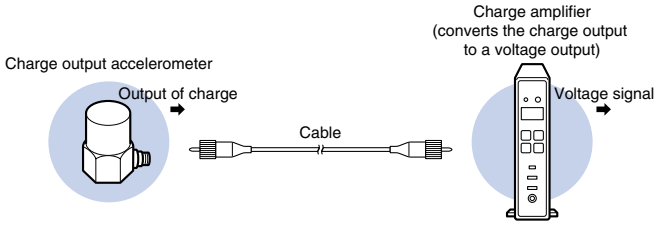
Helpful Purchasing Guidelines

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

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 a built-in amplifier.

Charge output accelerometer

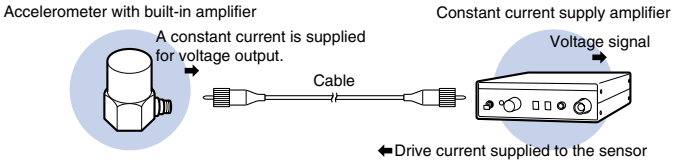
This type of accelerometer is used for the measurement of collision, drop test, and other similar impact vibrations, and for vibration measurement at high temperatures.



Device	Features
Sensor NP-2000 Series	• High performance against external shock and impact force. • Can be used at high temperatures.
Cable	• Low-noise cable used. • Care must be taken with the way the cable is fixed (noise countermeasure). • The cable length can be extended up to around 100 m. Care must be taken, however, with countermeasures against noise interference.
Amplifier	• Sensitivity settings are required for each sensor. • Care must be taken with the storage location (temperature, humidity, etc.). • Comparatively expensive.

Accelerometer with built-in amplifier

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

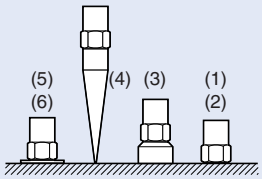


Device	Features
Sensor NP-500/600 /3000/7000 Series	• Compact design, high sensitivity. • Comparatively high noise-withstand capability.
Cable	• Comparatively little affected by noise which is caused by the shake of cable. • The cable length can be extended up to around 100 m.
Amplifier	• Extremely easy to handle. • Ready to use as soon as the power is turned on. • Compact, lightweight design.

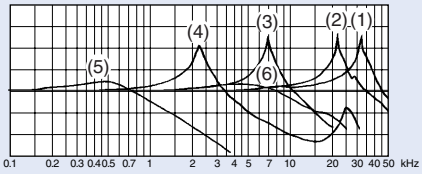
The Effect of Each of the Different Mounting Methods on the Frequency Characteristics

There are several different methods of mounting the accelerometer on the test 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 test 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



Accelerometer mounting methods



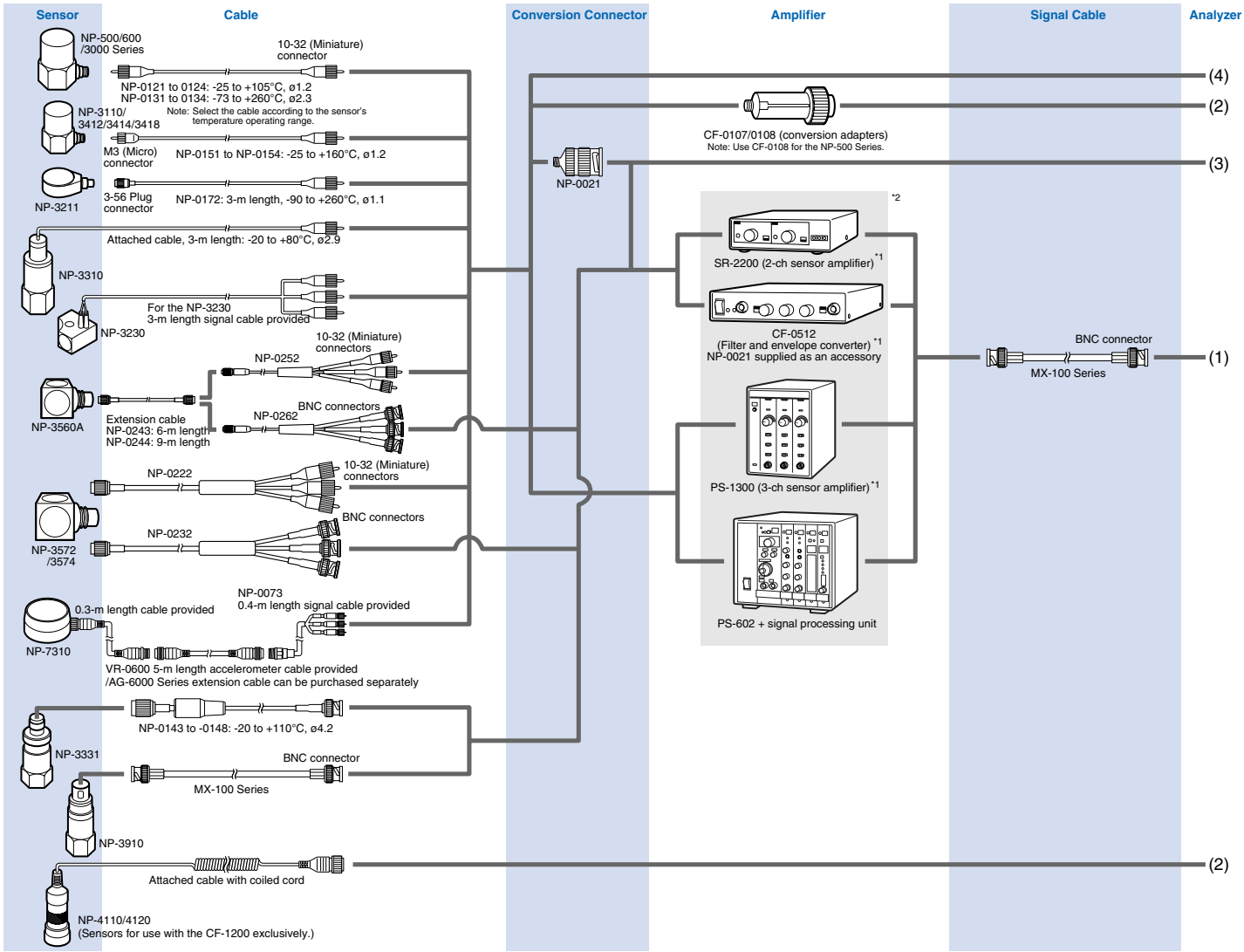
Contact resonance frequency characteristics

Vibration Measurement Systems

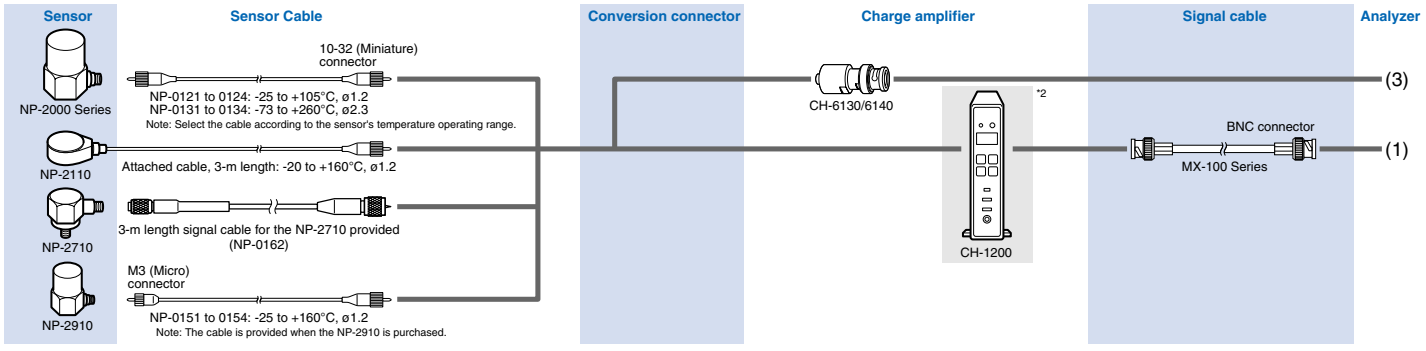
Configuration Diagrams

Note: The NP-3230/NP-600 series have been already discontinued.

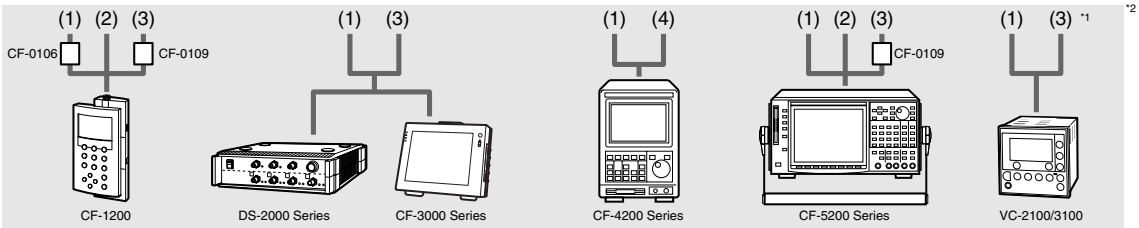
NP-500/3000/7000 Series



NP-2000 Series



Analyzers

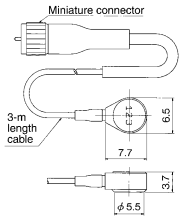
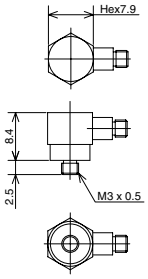
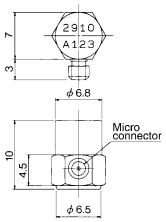
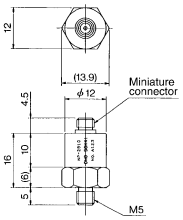
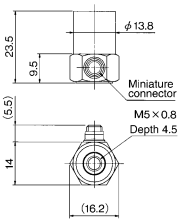
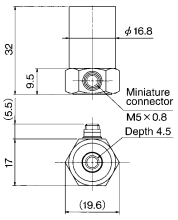


(1) Voltage input (BNC connector) (2) Sensor input (6-pin connector) (3) Sensor input (BNC connector) (4) Sensor input (10-32 (Miniature) connector)

CF-0106: BNC – 6-pin connector conversion adapter [for voltage input] (provided with the CF-1200)
CF-0109: BNC – 6-pin connector conversion adapter [for sensor input]
NP-0021: BNC conversion adapter

***1: Can not be used with the NP-500 series (there are some exceptions).**
***2: The detailed specifications of the models, which are covered by black area should be referred to the other exclusive catalogues.**

NP-2000 Series Charge Output Accelerometers

Features	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
Model name	NP-2110	NP-2710	NP-2910	NP-2810	NP-2120	NP-2130
Appearance						
Sensitivity *1	0.16 pC/ (m/s²) ±2 dB	0.31 pC/ (m/s²) ±10%	0.3 pC/ (m/s²) ±2 dB	1.2 pC/ (m/s²) ±2 dB	5 pC/ (m/s²) ±2 dB	10 pC/ (m/s²) ±2 dB
Capacitance	700 pF ±20%	Approx. 340 pF	610 pF ±20%	750 pF ±20%	3500 pF ±20%	3500 pF ±20%
Resonance frequency	Approx. 40 kHz	Approx. 50 kHz	Approx. 60 kHz	Approx. 40 kHz	Approx. 30 kHz	Approx. 25 kHz
Frequency response range *2	fc to 10 kHz ±0.5 dB fc to 20 kHz ±3 dB	fc to 10 kHz ±5 % fc to 20 kHz ±3 dB	fc to 10 kHz ±0.5 dB fc to 20 kHz ±3 dB	fc to 6 kHz ±0.5 dB fc to 15 kHz ±3 dB	fc to 5 kHz ±0.5 dB fc to 12 kHz ±3 dB	fc to 5 kHz ±0.5 dB fc to 10 kHz ±3 dB
Transverse sensitivity	Within 5%	Within 5%	Within 5%	Within 5%	Within 5%	Within 5%
Maximum allowable acceleration	10,000 m/s²	22,600 m/s²	50,000 m/s²	20,000 m/s²	8000 m/s²	5000 m/s²
Maximum shock resistance	100,000 m/s²	98,000 m/s²	100,000 m/s²	30,000 m/s²	16,000 m/s²	10,000 m/s²
Operating temperature range	-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	At least 10,000 MΩ	At least 1000 MΩ	At least 10,000 MΩ	At least 10,000 MΩ	At least 10,000 MΩ	At least 10,000 MΩ
Weight	0.6 g *3	2 g	2 g	12 g	25 g	42 g
Ground/Insulation	Case ground	Case ground	Case ground	Case ground	Case ground	Case ground
Case material	Titanium	Titanium	Titanium	SUS303	SUS303	SUS303
Outer dimensions	ø6.5 x 3.7 H	7.9 Hex x 8.4 H	7 Hex x 10 H	12 Hex x 16 H	14 Hex x 23.5 H	17 Hex x 32 H
Connector	Attached to the cable 10-32 coaxial plug (Miniature connector)	5-44 coaxial Right angle	M3 coaxial (Micro connector) Right angle	10-32 coaxial (Miniature connector) Top	10-32 coaxial (Miniature connector) Right angle	10-32 coaxial (Miniature connector) Right angle
Compatible cable	–	NP-0160 Series (NP-0162 (3-m length) provided)	NP-0150 Series (special 3-m length cable provided)	NP-0120/0130 Series	NP-0120/0130 Series	NP-0120/0130 Series
Mounting screw	Adhesive	M3 male screw	Adhesive	M5 male screw	M5 female screw	M5 female screw
Accessories *4	–	NP-0162 (3-m length cable)	Special 3-m length cable	Special cap nut	M5 socket set screw	M5 socket set screw
Dimensional diagrams						

*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 1 Hz (±0.5 dB range).
*3: The cable is not included.
*4: Test data sheets and a user's manual are provided with each sensor.
* The noise specification for the NP-2000 Series accelerometers is the input conversion noise level of the CH-1200 or other charge amplifier used.

NP-4110

For use with the CF-1200 FFT Analyzer only

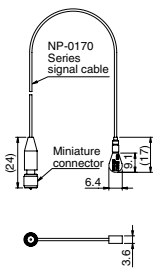
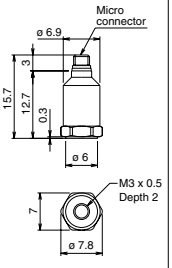
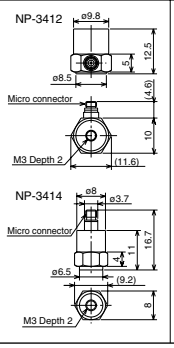
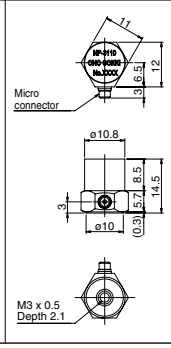
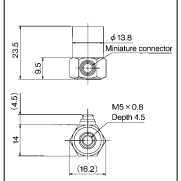
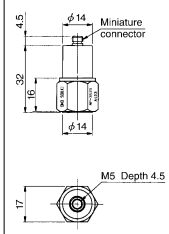
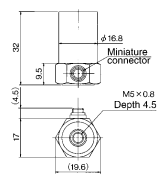
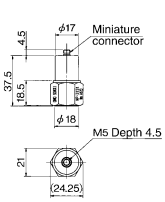
Attachment	Hand-held type
Sensitivity	10 mV (m/s²) ±5%
Frequency response range	100 Hz to 5 kHz ±3 dB
Maximum allowable acceleration	500 m/s²
Operating temperature range	0 to +40°C
Detector noise	500 μVrms 0.05 m/s²·rms
Weight	55 g (excluding the cable)
Outer dimensions	ø18.5 x 150.3H

NP-4120

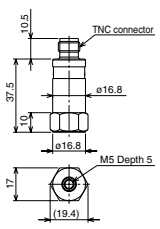
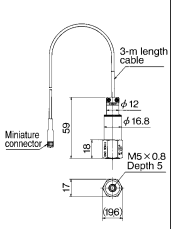
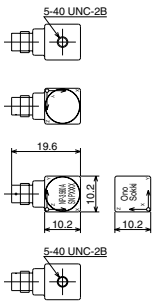
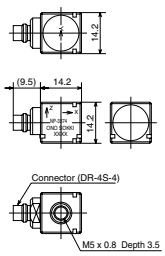
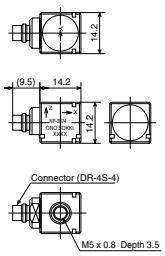
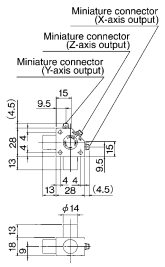
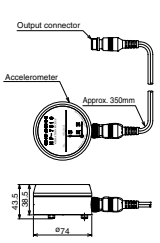
For use with the CF-1200 FFT Analyzer only

Attachment	Magnetic type
Sensitivity	10 mV (m/s²) ±5%
Frequency response range	5 Hz to 5 kHz ±0.5 dB 1 Hz to 10 kHz ±3 dB
Maximum allowable acceleration	500 m/s²
Operating temperature range	-20 to +70°C
Detector noise	500 μVrms 0.05 m/s²·rms
Weight	71 g (excluding the cable)
Outer dimensions	19 Hex x 72H

NP-500/3000/7000 Series Accelerometers with a Built-in-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	High-sensitivity	High sensitivity and floating
Structure	Shear type	Shear type	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	NP-3130	NP-3131
Appearance								
Sensitivity *1	1.02 mV/ (m/s²) ±15%	1.0 mV/ (m/s²) ±10%	1.0 mV/ (m/s²) ±1 dB	0.5 mV/ (m/s²) ±1 dB	1.0 mV/ (m/s²) ±1 dB	1.0 mV/ (m/s²) ±1 dB	10 mV/ (m/s²) ±1 dB	10 mV/ (m/s²) ±1 dB
Resonance frequency	At least 50 kHz	Approx. 40 kHz	Approx. 40 kHz	Approx. 45 kHz	Approx. 50 kHz	Approx. 50 kHz	Approx. 25 kHz	Approx. 25 kHz
Frequency response range	1 Hz to 10 kHz ±5%	2 Hz to 6 kHz ±0.5 dB	2 Hz to 8 kHz ±0.5 dB	5 Hz to 6 kHz ±0.5 dB	5 Hz to 5 kHz ±0.5 dB	5 Hz to 5 kHz ±0.5 dB	5 Hz to 4 kHz ±0.5 dB	5 Hz to 4 kHz -0.5 dB
	0.3 Hz to 20 kHz ±3 dB	0.8 Hz to 16 kHz ±3 dB	0.8 Hz to 16 kHz ±3 dB	5 Hz to 15 kHz ±3 dB	5 Hz to 12 kHz ±3 dB	5 Hz to 10 kHz ±3 dB	5 Hz to 10 kHz ±3 dB	5 Hz to 8 kHz ±3 dB
Transverse sensitivity	Within 5%	Within 5%	Within 5%	Within 5%	Within 5%	Within 5%	Within 5%	Within 5%
Maximum allowable acceleration	4900 m/s²	2200 m/s²	2200 m/s²	4400 m/s²	2200 m/s²	2200 m/s²	220 m/s²	220 m/s²
Maximum shock resistance	98,000 m/s²	10,000 m/s²	10,000 m/s²	100,000 m/s²	100,000 m/s²	10,000 m/s²	100,000 m/s²	5000 m/s²
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	-20 to +110°C	-20 to +110°C
Output impedance	300 Ω or less	100 Ω or less	100 Ω or less	100 Ω or less	100 Ω or less	100 Ω or less	100 Ω or less	100 Ω or less
Detector noise	Approx. 20 μVrms Approx. 0.02 m/s²rms	Within 20 μVrms Within 0.02 m/s²rms	Within 20 μVrms Within 0.02 m/s²rms	Within 20 μVrms Within 0.04 m/s²rms	Within 20 μVrms Within 0.02 m/s²rms	Within 20 μVrms Within 0.02 m/s²rms	Within 20 μVrms Within 0.002 m/s²rms	Within 20 μVrms Within 0.002 m/s²rms
Power requirement	18 to 30 VDC 2 to 20 mA Constant current drive	15 to 25 VDC 0.5 to 5 mA Constant current drive	15 to 25 VDC 0.5 to 5 mA Constant current drive	12 to 25 VDC 0.5 to 5 mA Constant current drive	15 to 25 VDC 0.5 to 5 mA Constant current drive	15 to 25 VDC 0.5 to 5 mA Constant current drive	15 to 25 VDC 0.5 to 5 mA Constant current drive	15 to 25 VDC 0.5 to 5 mA Constant current drive
Weight	0.5 g	1.9 g	NP-3412: 5.5 g NP-3414: 3.5 g	5.4 g	20 g	34 g	46 g	69 g
Ground/Insulation	Case ground (anode oxidantion used for surface insulation)	Case ground	Case ground	Case ground	Case ground	Mounting surface insulation	Case ground	Mounting surface insulation
Case material	Aluminum	Titanium	SUS303	Titanium	SUS303	SUS303	SUS303	SUS303
Outer dimensions	6.5 x 11.4 x 3.6	7 Hex x 11.5 H	NP-3412: 10 Hex x 12.5 H NP-3412: 8 Hex x 11 H	11 Hex x 14.5 H	14 Hex x 23 H	17 Hex x 32 H	17 Hex x 32 H	21 Hex x 3.75 H
Connector	3-56 coaxial Right angle	M3 coaxial (Micro connector) Top	M3 coaxial (Micro connector) NP-3412: Right angle NP-3414: Top	M3 coaxial (Micro connector) Right angle	10-32 coaxial (Miniature connector) Right angle	10-32 coaxial (Miniature connector) Right angle	10-32 coaxial (Miniature connector) Right angle	10-32 coaxial (Miniature connector) Right angle
Compatible cable	NP-0172 (provided)	NP-0150 Series	NP-0150 Series	NP-0150 Series (Exclusive 3-m length cable provided)	NP-0120/0130 Series	NP-0120/0130 Series	NP-0120/0130 Series	NP-0120/0130 Series
Mounting screw	Adhesive	M3 female screw	M3 female screw	M3 female screw	M5 female screw	M5 female screw	M5 female screw	M5 female screw
Accessories *6	NP-0172 (3-m length cable) NP-0021 (BNC to 10-32 conversion adapter) Wax Tool for scooping out/applying wax	M3 socket set screw	M3 socket set screw	M3 socket set screw Special 3-m length cable	M5 socket set screw	M5 socket set screw	M5 socket set screw	M5 socket set screw
Dimensional diagrams								

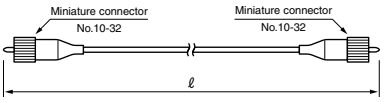
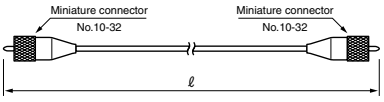
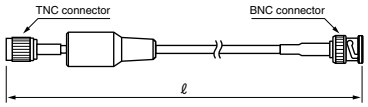
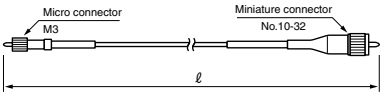
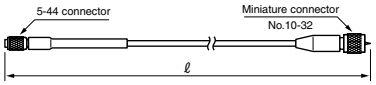
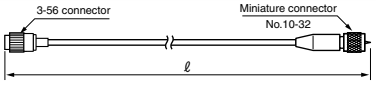
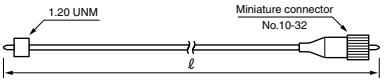
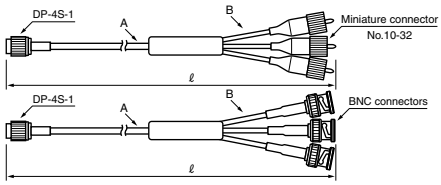
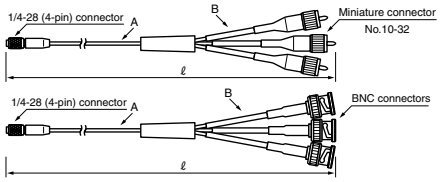
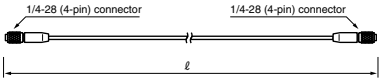
*1: The sensitivity varies from model to model (individual differences). The values given in the above table are the standard values at the time of shipment, not the measurement accuracy values.
Performing calibration for each of the sensors according to its respective sensitivity value enables measurement to be performed under the same conditions and with the same accuracy, irrespective of the sensor type.
*2: Conforms to JIS C 0920 Protection Class 7.
*3: The operating temperature range is for the main unit only. The operating range when the cable is included is -25 to +105°C.
*4: NP-550 models with a production code number earlier than F468 can only be operated at 0.56mA.

Floating and water resistance type	Waterproof *2	Compact and tri-axial measurement usage	General-purpose and tri-axial measurement	General-purpose and tri-axial measurement	Compact and tri-axial measurement	Waterproof/dustproof *7 and tri-axial measurement
Shear type	Shear type	Shear type	Shear type	Shear type	Conpressed type	Shear type
NP-3331	NP-3310	NP-3560A	NP-3572	NP-3574	NP-550	NP-7310
						
5.0 mV/ (m/s²) ±1 dB	1.0 mV/ (m/s²) ±1 dB	1.02 mV/ (m/s²) ±10%	1.0 mV/ (m/s²) ±10%	10 mV/ (m/s²) ±10%	1.0 mV/ (m/s²) ±20%	100 mV/ (m/s²) ±2.5% 31.5 Hz
Approx. 25 kHz	Approx. 35 kHz	Approx. 55 kHz	Approx. 40 kHz	Approx. 40 kHz	35 kHz (Z axis)	–
2 Hz to 4 kHz ±0.5 dB	5 Hz to 5 kHz ±0.5 dB	2 Hz to 10 kHz ±0.5 dB (Y, Z axis) 2 Hz to 7 kHz ±0.5 dB (X axis)	1 Hz to 8 kHz ±1 dB (Z axis) 1 Hz to 5 kHz ±1 dB (X, Y axis)	1 Hz to 8 kHz ±1 dB (Z axis) 1 Hz to 5 kHz ±1 dB (X, Y axis)	5 Hz to 4 kHz ±0.5 dB (Z axis)	0.4 Hz to 100 Hz ±2.5% 0.25 to 200 Hz ±1 dB 0.1 to 400 Hz +1 dB/-3 dB
2 Hz to 10 kHz ±3 dB	5 Hz to 10 kHz ±3 dB	–	–	–	5 Hz to 10 kHz ±3 dB (Z axis)	–
Within 5%	Within 5%	Within 5%	Within 5%	Within 5%	Within 5%	Within -30 dB
700 m/s²	2200 m/s²	4900 m/s²	4000 m/s²	400m/s²	1500 m/s²	35 m/s²
10,000 m/s²	10,000 m/s²	98,000 m/s²	30,000 m/s²	30,000 m/s²	5000 m/s²	500 m/s²
-20 to +110°C	-20 to +80°C	-54 to +121°C	-50 to +110°C *3	-50 to +110°C *3	-20 to +110°C	-10 to +50°C
100 Ω or less	100 Ω or less	200 Ω or less	1k Ω or less	1k Ω or less	300 Ω or less	100 Ω or less
Within 20 μVrms Within 0.004 m/s²rms	Within 20 μVrms Within 0.02 m/s²rms	0.03 m/s² rms (typ)	Within 40 μVrms Within 0.04 m/s²rms	Within 40 μVrms Within 0.004 m/s²rms	Within 20 μVrms 0.02 m/s²rms	Within 2.8 μVrms LPF=200 Hz, -24 dB/oct Sensitivity conversion acceleration: 28 μm/s² rms
15 to 25 VDC 0.5 to 5 mA Constant current drive	15 to 25 VDC 0.5 to 5 mA Constant current drive	18 to 30 VDC 2 to 20 mA Constant current drive	21 to 30 VDC 0.5 to 5 mA Constant current drive	21 to 30 VDC 0.5 to 5 mA Constant current drive	15 to 25 VDC 0.5 to 5 mA *4 Constant current drive	15 to 25 VDC 2 to 5 mA Constant current drive
49 g	59 g *5	5.3 g	8.1 g	8.1 g	50 g	500 g
Case ground	Case ground	Case ground	Case ground	Case ground	Case ground	Case ground
SUS303	SUS303	Titanium	Aluminum	Aluminum	Aluminum	Aluminum, alumite surface coating
17 Hex x 37.5 H	17 Hex x 59 H	10.2(W) x 10.2(D) x 10.2(H) Excluding protuberances	14.2(W) x 14.2(D) x 14.2(H) Excluding protuberances	14.2(W) x 14.2(D) x 14.2(H) Excluding protuberances	41(W) x 41(D) x 31(H)	ø74(D) x 38.5(H) Excluding protuberances
TNC Top	Attached cable 10-32 coaxial plug (Miniature connector)	1/4-28 (4 pin) connector Right angle	DR-4S-4 Right angle	DR-4S-4 Right angle	10-32 coaxial (Miniature connector) Right angle	P04-R8M Right angle
NP-0140 Series	–	NP-0252, 0262	NP-0222, 0232	NP-0222, 0232	NP-0120/0130 Series	VR-0600 (provided), AG-6000 Series extention cable
M5 female screw	M5 female screw	Adhesive or 5-40UNC female screw	Adhesive or M5 female screw	Adhesive or M5 female screw	M5 female screw	3-prong adapter (attached)
M5 socket set screw	M5 socket set screw	5-40UNC/M3 conversion screws (two) Wax Mounting base	M5 socket set screw Mounting wax Mounting clip	M5 socket set screw Mounting wax Mounting clip	M5 socket set screw	VR-0600 (5-m length) NP-0073 (3-branch cable)
						

*5: The cable is not included.
*6: Test data sheets and a user's manual are provided with each sensor (test data sheets only for the NP-550).
*7: Conforms to the JIS C 0920 Safety Protection Class IP66.

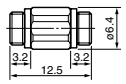
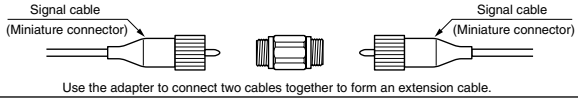
Accessories

■ Sensor Signal Cables

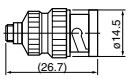
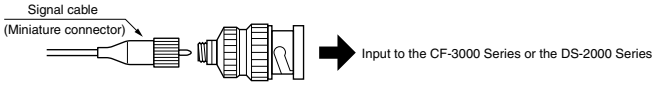
Model name	Length	Specifications	External Diagram	Compatible Sensor Models
NP-0121	1.5m	Operating temperature range -25 to +105°C Cable diameter: ø1.2 mm Type: Low-noise cable		NP-3120, 3121, 3130, 3131, 3910*2, 2120, 2130, 2810, 550 (NP-510, 510I, 520, 520I, 560*2, 602*1)*3
NP-0122	3m			
NP-0123	5m			
NP-0124	10m			
NP-0131	1.5m	Operating temperature range -73 to +260°C Cable diameter: ø2.3 mm Type: Low-noise cable		NP-3120, 3121, 3130, 3131, 3910*2, 2120, 2130, 2810, 550 (NP-510, 510I, 520, 520I, 560*2, 602*1)*3
NP-0132	3m			
NP-0133	5m			
NP-0134	10m			
NP-0143	5m	Operating temperature range -20 to +110°C Cable diameter: ø4.2 mm		NP-3331
NP-0144	10m			
NP-0146	20m			
NP-0148	30m			
NP-0151	1.5m	Operating temperature range -25 to +160°C Cable diameter: ø1.2 mm 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: ø2.0 mm Type: Low-noise cable		NP-2710
NP-0164	9m			
NP-0172	3m	Operating temperature range -90 to +260°C Cable diameter: ø1.1 mm		NP-3211
NP-0200	3m	Operating temperature range -50 to +125°C Cable diameter: ø0.9 mm		(NP-3210)
NP-0222	3m	Operating temperature range Section A: -50 to +125°C Section B: -20 to +60°C Cable diameter Section A: ø2.6 mm Section B: ø1.5 mm Type: Low-noise cable		NP-3572 NP-3574 (NP-3560)
NP-0232				
NP-0252	3m	Operating temperature range -90 to +200°C Cable diameter Section A: ø2.54 mm Section B: ø1.96 mm		NP-3560A
NP-0262				
NP-0243	6m	Operating temperature range -90 to +200°C Cable diameter: ø2.54 mm		Extension cable for NP-3560A
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.

■ Signal Cable Extension Adapter

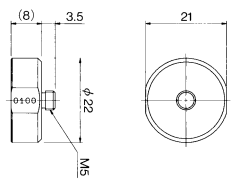
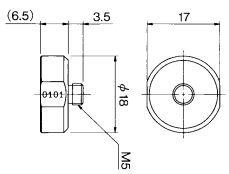
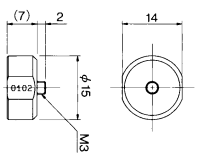
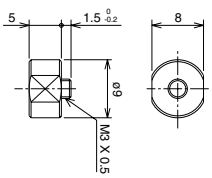
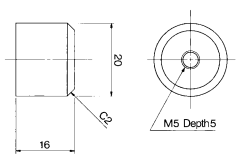
Model Name	Dimensional Diagram	Usage Example
NP-0020		 Use the adapter to connect two cables together to form an extension cable.

■ Miniature/BNC Conversion Connector

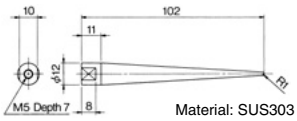
Model Name	Dimensional Diagram	Usage Example
NP-0021		

* Models marked with an asterisk have been already discontinued.

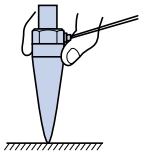
■ Magnetic Base

Model Name	NP-0100	NP-0101	NP-0102	NP-0103	NP-032
External Dimensions					
Specifications	Weight: 22 g Adhesion force: 117.6 N	Weight: 12 g Adhesion force: 29.4 N	Weight: 10 g Adhesion force: 29.4 N	Weight: 2.2 g Adhesion force: 4.0 N	Weight: 35 g Adhesion force: 39.2 N
Compatible Sensors	NP-2130, 3130, 3131, 3310, 3331, 4120 (NP-520, 520I)*	NP-2120, 3120, 3121, 3910, 3572, 3574 (NP-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, 3560A, 2110, 2910 (3210, 602)* sensors.	NP-3412, 3414, 3418	NP-2120, 2130, 2810, 3120, 3121, 3130, 3131, 3310, 3910 (NP-510, 510I, 520, 520I)*

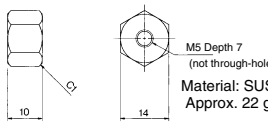
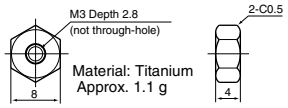
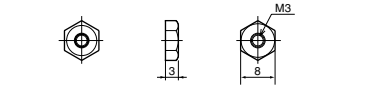
■ Search Needle

Model Name	External Dimensions	Compatible Sensors
NP-033		NP-500/2000/3000 Series (excluding the NP-3110, 3210, 3211, 3230, 3412, 3414, 3418, 3560A, 2110, 2710, 2910 models)

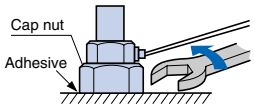
[Application]
Use the NP-033 Search needle when there are multiple measurement points; when the area for mounting the sensor is too confined; or when there are other difficulties faced when performing measurement.



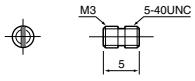
■ Mounting Base

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

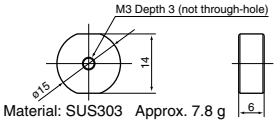
[Application]
Use a mounting base when you want to protect the bottom surface of the sensor. The base enables the sensor to be mounted on and removed from the test object without scratching the bottom of the sensor.



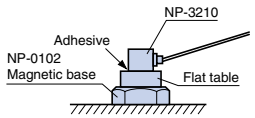
■ Conversion Screw

Model Name	External Dimensions	Compatible Sensor
NP-0051		NP-3560A

■ Flat Table

Model Name	External Dimensions	Compatible Sensors
NP-0042		NP-3211, 3560A, 2110, 2910 (3210, 602)*

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



■ Mounting Wax

Model Name	Appearance
NP-0010	

[Application]
Use the wax to mount the sensor (NP-3210, 3211, 2110, 2910, 602*, 3230, 3560A, 3572, 3574) on the test object.

■ The frequency characteristics will vary according to the mounting method used. Please consult your sales representative for further details.

Peripherals for NP Series Accelerometer (Options)

■ Sensor Amplifier (Adapter Type)

■ For the NP-500, 600, 3000 Series

CF-0107/0108/0109

These sensor amplifiers enable direct input to the CF-1200/5200 Series FFT Analyzers from accelerometers with a built-in amplifier.

Compatible sensors

CF-0107: For the NP-600/3000 Series (for use with a 2 mA constant current drive)
Input connector: Miniature connector

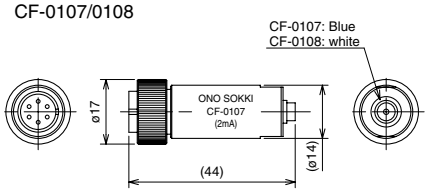
CF-0108: For the NP-500 Series (for use with a 0.56 mA constant current drive)
Input connector: Miniature connector

CF-0109: For the NP-3331/3910, GK-3100 models (for use with a 2 mA constant current drive)
Input connector: C02 (BNC)

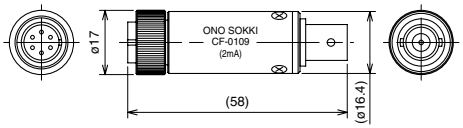
*NP-600 series have been already discontinued.

■ Dimensional diagram

CF-0107/0108



CF-0109



■ 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-3000 Series and DS Series FFT analyzers enables charge output accelerometers to be connected directly to measuring instruments (those that can accept input from a constant current drive) without the need for a separate charge amplifier.

- Compact, lightweight, simple charge amplifiers
- Can be easily connected to the sensor input connector (BNC) of the VC-2100/3100 and DS-2000 Series models
- Charge output accelerometers can be connected directly to measuring instruments (those that can accept input from a constant current drive) without the 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.

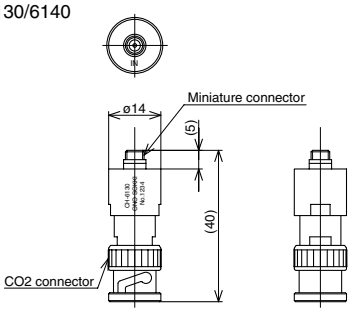
■ Specifications

Item	CH-6130	CH-6140
Gain	1.0 mV/pC*1	10 mV/pC*1
Frequency range	2 Hz to 45 kHz (±3dB)*2, 5 Hz to 15 kHz (±0.5 dB)*2	
Maximum output voltage	Up to 10 Vp-p	
Output bias	10 Vdc ±2 Vdc	
Input conversion noise	Within 0.05 pC (rms)	
Drive power supply	Voltage: 18 to 24V, constant current: 2.0 to 20 mA	
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	Up to 85% RH (No condensation)	
External dimensions	ø15 x 40mm	
Weight	Approx. 20 g	

*1: At 160 Hz *2: When the gain is 0 dB at 160 Hz.

■ Dimensional diagram

CH-6130/6140



■ GK-3100 Impulse-force Hammer Kit (Battery Drive)

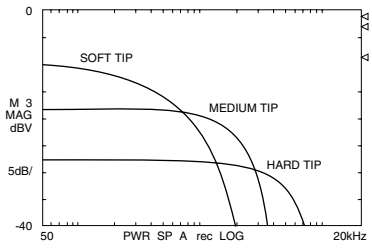
An impulse-force hammer is used together with an FFT analyzer in order to measure the frequency response functions of a mechanical structure.
As shown in the figure below, an accelerometer is mounted on the test structure and the hammer used to strike the structure. The excitation force signals from the impulse-force hammer and the response acceleration signals from the accelerometer are input to an FFT analyzer to enable measurement of the Frequency Reponse Function (measurement of the characteristic number of vibrations). Moreover, if the Frequency Reponse Function data is sent to a personal computer in which modal analysis software has been installed, further high-level modal analysis can be performed.

- The impulse-force hammer is a general-purpose type that can be easily used by anyone to create a vibration.
- A preamplifier incorporated in the hammer enables the hammer to be used simply by connecting it to a compact power supply unit.
- The hammer can also be used for direct input to the CF-3000 Series and DS Series models.
- A selection of interchangeable impact tips enables easy matching to the test structure.
- C02 (BNC) connectors are used for the hammer and amplifier input/output connectors.

■ Specifications

Frequency response:	Up to 8 kHz
Measurement range: (5V output)	2200 N
Sensitivity:	2.3 mV/N
Resonance frequency:	31 kHz
Hammer weight:	140 g
Head diameter:	15 mm
Tip diameter:	6.4 mm
Handle length:	203 mm

■ Frequency Response Characteristics According to Tip Type

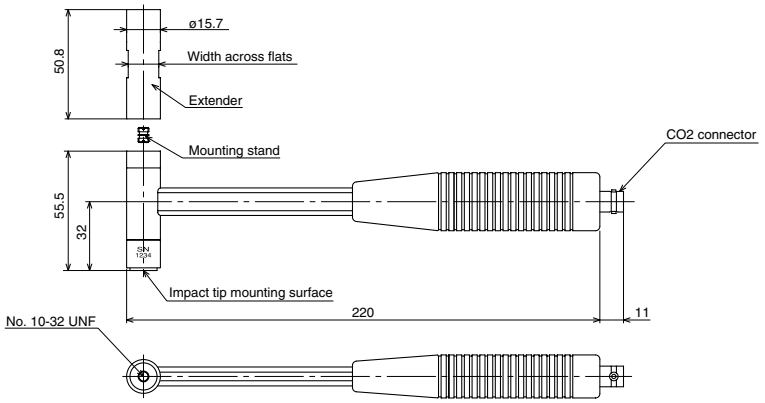


■ GK-3100 Kit Configuration

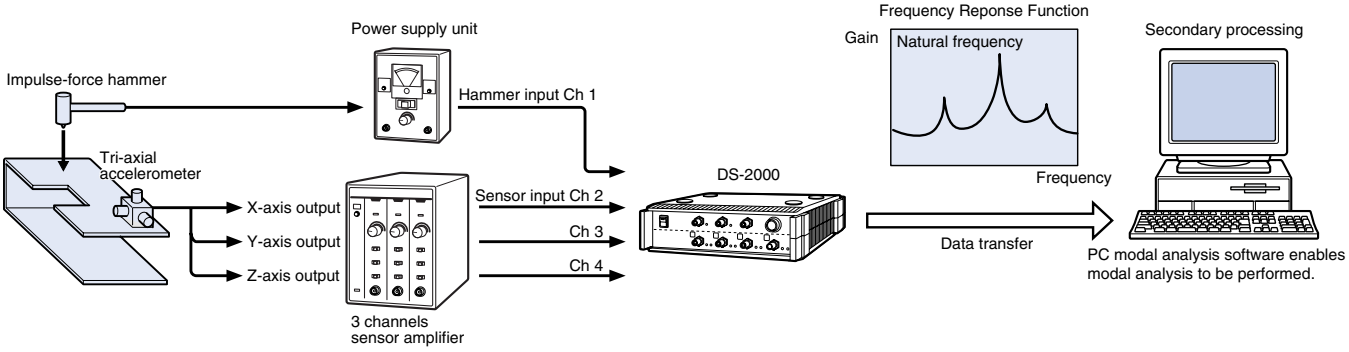
- Impulse-force hammer
- Extender
- Power supply unit*1
- Cable for the hammer (3-m length)*2
- Signal output cable (0.9-m length)
- Impact tip set*3
  Super-soft tip*4, Soft tip*4, Medium tip*5, Hard tip, tip cover
- Carrying case

*1: Three 006P 9-V dry cell batteries are provided as standard.
*2: This cable can be purchased separately for maintenance purpose as model GK-0122.
*3: This impact tip set can be purchased separately for maintenance as model GK-0501.
*4: The super-soft tip and soft tip (10 pcs. of each model) together can be purchased separately for maintenance purpose as model GK-0502.
*5: This medium tip (1 pc.) can be purchased separately for maintenance as model GK-0503.

■ Dimensional diagram



■ Measurement System Configuration Diagram



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

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 the VX-1100 directly to the accelerometer.

- The exciter, sensor amplifier, and display functions have all been integrated into one device for user convenience.
- TheVX-1100 can be used with both charge output accelerometers and accelerometers with a built-in amplifier.
- The sensitivity value can be read directly on the built-in digital display unit.
- Long-term continuous operation is enabled (approx. 20 hours).

■ Specifications

Excitation frequency:	159.2 Hz ±1%
Excitation acceleration:	10 m/s^2 (rms) ±3%
Excitation velocity:	10 mm/s (rms) ±4%
Excitation displacement:	10 mm (rms) ±5%
Harmonic distortion:	Within 3%
Sensitivity display range:	0.01 to 19.99 mV/(m/s^2) pC/(m/s^2)
Sensitivity display accuracy:	±3% ±1 digit
Compatible accelerometer:	Up to 110 g weight
Sensor power supply:	0.5 mA, 2 mA, switching; voltage: 15 V
Power supply:	Four AA –type LR6 dry cell batteries
Battery life:	Approx. 20 hours
Operating temperature range:	+10 to +40°C
Operating humidity range:	Up to 90% RH (non-condensing)
Weight:	Approx. 1 kg
External dimensions:	120 (W) x 140 (D) x 50 (H) mm
Accessories:	Low-noise cable (50-cm length, BNC/Miniature connectors) Conversion screws (M5-M3, M5-M6, M5-flat (magnetic attachment possible) M5-No.10-32UNF)

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

ONO SOKKI

∗Outer appearance and specifications are subject to change without prior notice.

URL: http://www.onosokki.co.jp/English/english.htm

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