There is a wide range of situations in which vibration-based judgments must be made, such as product quality judgment, machinery operation monitoring, facilities diagnosis, and damaged cutting tool detection. ONO SOKKI caters to all your needs with respect to vibration detection, measurement, and judgment.
The VC-2200 and VC-3200 Vibration Comparators are high-performance digital signal processors that offer three basic functions: detection, measurement, and judgment. The comparators accept signals from accelerometers to detect abnormalities in machines (detection), monitor vibration levels (measurement), and judge vibration levels based on measurements (judgment).

In contrast with conventional measurement devices such as vibrometers, the VC-2200 and VC-3200 can simultaneously process two frequency bands and thus quantify sensory inspection results, which has been difficult previously. Not only for continuous monitoring applications, the comparators can also be used as vibrometers.

*The NP-3331N20 accelerometer, the NP-0143 Signal Cable (5 m), and the NP-0100 Magnetic Base (in the photos) are sold separately.

**VC-2200/3200 Series**

**Extracting necessary information from entire vibration data**

**Frequency band setting function**

Extracting abnormalities specific to workpieces enables accurate level judgment. Two different frequency bands can be set, and rms and peak values can be selected for each band. Simultaneous measurement and judgment is also possible.

**Look and judge**

**Digital display function**

In addition to displaying the vibration values digitally, a bar chart provides a visual presentation of the vibration condition, enabling use as needle-indicating vibrometer used in the past. The function allows numerical value management of vibration, and helps quality improvement.

**Condition memory and data memory function**

**Memory function (VC-3200 only)**

Enables to memorize up to 5 judgment conditions depending on each product by means of the condition memory function. The data memory function contributes to store shipping and inspection data.

**Judgment based on quantitative values**

**Judgment function (comparator output)**

Quantitative judgment is made based on measured values, and a judgment (NG) signal is output. This feature is useful in line inspection and for remote monitoring using PLCs.

**Listen and judge Abnormal sound will alert you**

**Headphone output**

Vibration sound of each specified band can be clearly heard by connecting commercially available headphones. Identification of an abnormal sound, a skilled task, can be performed by inexperienced workers.

**Able to perform further analysis**

**Analog output**

An AC signal and a DC signal are output simultaneously for each set band, enabling use in combination with analysis equipment such as an FFT analyzer, and connection to a recorder.

**Detects necessary information in a timely manner**

**Comparator gate input**

By controlling the measurement timing, it is possible to measure and judge vibrational level of interest. Can be used for automatic OK/NG judgment on a production line.

**There is a time-delay feature**

**Comparator delay time setting**

A comparator output is made when the vibration exceeds a comparison level for more than a set period of time. This prevents misoperation caused by human errors, such as when an operator accidentally strikes a sensor.

**Ideal for automation and multiple production inspections**

**RS-232C interface**

This feature enables connection to a PC and offers superior extensibility. You can change various setting conditions and collect data via RS-232C.

**Easy to install into a control panel**

**Compact 96 x 96 (DIN) size**

The VC-2200/3200 are packaged for easy mounting into a control panel. DIN standards are used in many control panels.
New Functions

**TEDS function**

No more sensor setting errors! Saves you time and effort of measurement preparation!

TEDS function - Available when it is connected to an accelerometer with TEDS function.

TEDS key

TEDS calibration display

**Headphone volume MUTE function**

Ear protection from an impact noise when mounting a sensor

Headphone volume MUTE function

**Bar chart display function**

Easier-to-read bar chart for small level vibrations!

Bar chart display function - (linear/logarithmic selectable)

**Setting/reading of measurement conditions by one command**

You can change from one condition setting to another to inspect a different kind of product

Setting/reading of measurement conditions by one command

**Power Average Calculation/Judgment Function**

**Feature analysis**

Data collection of multiple good products and defective products

Feature extraction using an FFT analyzer (power average calculation)

OA value* of good product 0.40 m/s²

OA value* of defective product 1.13 m/s²

Value of defective product

OA value* of good product 0.40 m/s²

OA value* of defective product 1.13 m/s²

Dispersion of the value of good products

Judgment value

Value of good product

Dispersion of the value of good products

Judgment using the VC-3200

(Power average judgment)

NG indicator lights up Comparator signal is output

**ISO 2954: 2012 conforming filter**

Conforms to ISO 2954: 2012 “Mechanical vibration of rotating and reciprocating machinery”
The frequency band in which vibration occurs depends on the nature of the phenomenon that causes the vibration. The VC-2200/3200 use digital filtering to set the frequency band in which particular types of vibration might occur, thereby enabling independent monitoring and diagnosis for each phenomenon.

Why bands?

The relationship between vibration parameter and mode

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency range</th>
<th>Parameter</th>
<th>Mode</th>
<th>Example of the abnormal cause</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low frequency</td>
<td>Several to 100 Hz</td>
<td>Displacement*</td>
<td>PEAK (total amplitude)</td>
<td>Related to the amount of displacement or magnitudes of movement</td>
<td></td>
</tr>
<tr>
<td>Middle frequency</td>
<td>Dozens of Hz to several kHz</td>
<td>Velocity*</td>
<td>RMS</td>
<td>Related to the amount of vibration energy or fatigue</td>
<td></td>
</tr>
<tr>
<td>High frequency</td>
<td>1 to 10 kHz</td>
<td>Acceleration</td>
<td>PEAK (half amplitude)</td>
<td>Related to impact forces due to flaws or defects</td>
<td></td>
</tr>
</tbody>
</table>

* The VC-0423 Integration Software is required for the measurement of displacement and velocity.

What is “the peak/maximum rms value factor” (peak/maximum rms value)?

In order to judge the degree of bearing’s flaw, the peak/maximum rms value factor is effective. It is calculated with a peak value/maximum rms value. A vibration value also varies by the sizes of bearing in a peak value or rms value. The peak/maximum rms value factor has the feature which is not influenced by the size of bearing but can measure the degree of a flaw.

The vibration of bearing 1 has a large amplitude, but is stable (good product). The vibration of bearing 2 has a small amplitude, but shock waves due to flaws or foreign matter are observed (defective product). Since peak and rms values are larger in bearing 1, judgment is not possible in these measurement modes. Judgment based on the peak/maximum rms value factor is effective in such cases.
**Measurement System**

**VC-2200/3200 Series**

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**Peripherals**

**Signal Cable for NP-3331N20/NP-3331B** * NP-0146 and NP-0148 are made to order.

<table>
<thead>
<tr>
<th>Model</th>
<th>Length</th>
<th>Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP-0143</td>
<td>5 m</td>
<td></td>
</tr>
<tr>
<td>NP-0144</td>
<td>10 m</td>
<td></td>
</tr>
<tr>
<td>NP-0146</td>
<td>20 m</td>
<td></td>
</tr>
<tr>
<td>NP-0148</td>
<td>30 m</td>
<td></td>
</tr>
</tbody>
</table>

**Miniature/BNC Conversion Adapter**

<table>
<thead>
<tr>
<th>Model</th>
<th>Outer dimensions</th>
<th>Example of use</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP-0021</td>
<td></td>
<td>Connected to VC-2200/3200</td>
</tr>
</tbody>
</table>

The sensor input of VC-2200/3200 is a BNC connector. To connect a sensor with a miniature connector to the VC-2200/3200, the NP-0021 is required.

**Magnetic Base**

<table>
<thead>
<tr>
<th>Model</th>
<th>Outer dimensions</th>
<th>Example of use</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP-0100</td>
<td></td>
<td>Magnetic Base for NP-3331N20/NP-3331B</td>
</tr>
</tbody>
</table>

**Accelerometer (sold separately)** NP-3331N20 (TEDS)/NP-3331B

- Feature: Insulated, water-resistance processing*, CE conformity
- Structure: Shear-type
- Sensitivity: 5.0 mV/V (m/s)^2 ±10 %
- Resonance frequency: 25 kHz or higher
- Frequency range: 2 Hz to 4 kHz ±5 %
- 2 Hz to 10 kHz ±3 dB
- Lateral sensitivity: 5 % or less
- Max. allowable acceleration: 700 m/s^2
- Max. shock resistance: 10,000 m/s^2
- Operating temperature range: -20 to +85 °C (NP-3331N20), -20 to +110 °C (NP-3331B)
- TEDS standard: IEEE1451.4-2004 (Ver.1.0)
- Output impedance: 300 Ω or less (NP-3331N20), 100 Ω or less (NP-3331B)
- Detector noise: 20 μVrms or less
- Power requirement: 0.5 to 5 mA
- Weight: Approx. 50 g
- Case material: Stainless (SUS303)
- Outer dimensions: 17Hex × 37.5H (mm)
- Connector: TNC connector (from top)
- Detector mounting: M5, depth 5, female thread

* For the water-resistance modification (IPX7; standard additional charge is required.

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Brochures on the NP series, CF series, and DS series are available. Please contact your nearest distributor or contact us at overseas@tonosokki.co.jp

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*1 The VC-2200 provides 2 bands (A, B), and the VC-3200 provides 3 bands (A, B, C).

*2 If an accelerometer other than the NP-3331N20 or NP-3331B is used, insulation of the sensor mount and cable routing must be performed carefully to avoid interference of noise.
Total Support for Detection, Measurement, and Diagnosis

"Band variable processing function" detects bearing damage and wear in a single pass.

**Actual size**

- **Compact size**
  - DIN 96×96 mm
  - 2-band judgment function is packed into this compact size body.

- **RS-232C interface**
  - Enables to connect to the PC and allows extension.

- **Superb diagnosis capability using rms and peak values**
  - The rms and peak values can be used for diagnosis in each band individually, enabling enhanced precision diagnosis of complex machine vibrations.

- **TEDS key**
  - Avoids errors of sensor sensitivity setting and helps you sensor exchange.

- **Verification of vibration sound**
  - By connecting commercially available headphones, it is possible to monitor the vibration sound. An output is provided of the vibration sound for each band, enabling verification of particular vibration phenomena.

- **Easy operation**
  - Frequently used conditions can be directly set, enabling the optimum settings to be made while observing the vibration condition.

  - Measurement mode selecting: RMS, PEAK, MAX HOLD (maximum rms value hold), and PEAK HOLD (peak value hold).
  - Measurement screen switching and band setting.
  - Comparator level setting: setting is possible to suit a diagnosis criterion.
  - Bar chart scale modification.
  - Input range setting: optimum range setting to suit the vibration condition.

**Features**

- Provides essential sophisticated features
  - Measurement and diagnosis of vibration is a complex process, and demands highly precise results. The VC-2200/3200 provide that high-level of precision, enabling detailed conditions settings, in addition to meeting other tough measurement and diagnosis requirements.

**Digital and bar chart display of vibration values**

- High-accuracy analysis is performed in accordance with analysis conditions, and a display is presented of vibration values and vibration condition (bar chart display). By displaying measurement screens for each band separately, it is possible to collect the required data.

**Compact size**

- DIN 96×96 mm
- Actual size 96 mm x 96 mm

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Automated Data Collection Made Easier

Wiring diagram (VC-2200)

VC-2200/3200 Series

Recommended interface circuit

External signal input

Comparator output

NP-3331N20 / NP-3331B Outer dimensions (unit: mm) (Sold separately)

Panel cut out dimensions (for built-in of several units)
## Specifications

### VC-2200/3200 Series

#### VC-2200

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type code</td>
<td>2</td>
</tr>
<tr>
<td>Band filter</td>
<td>High-pass filter: 10 Hz, low-pass filter: 1 kHz</td>
</tr>
<tr>
<td>Signal range</td>
<td>0-10 V (Low) and 1-5 V (High) (conforms to ISO2954-2012 (VC-3200 only))</td>
</tr>
</tbody>
</table>

### VC-3200

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<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type code</td>
<td>3</td>
</tr>
<tr>
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</tr>
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<td>0-10 V (Low) and 1-5 V (High) (conforms to ISO2954-2012 (VC-3200 only))</td>
</tr>
</tbody>
</table>

### General Specifications

- **Power supply voltage**: 24 VDC ±10 %
- **Current consumption**: 0.2 A or less
- **Insulation resistance**: Between power supply +/- and ground terminal: 10 MΩ or more (at 500 VDC megger)
- **Withstand voltage**: Between power supply +/- and ground terminal: 350 V AC (50/60 Hz)
- **Vibration resistance**: 19.6 m/s² (frequency 10 to 150 Hz, 150 Hz, X-Y-Z directions)
- **Impact resistance**: 360 m/s² (reaction time 13 ms)
- **Operating temperature and humidity range**: 0 to +50°C, 85 % RH or less (with no condensation)
- **Storage temperature and humidity range**: -5 to +55°C, 85 % RH or less (with no condensation)

### Other Averaging function

- **Tachoval value**: TAVS: displays maximum value in 500 ms.
- **Number of times of average processing**: OFF/4/8/16/32/64 times (selectable)
- **VC-2200**: 100,000 Hz, 1V ±3 % from THOR AC/DC output terminal.
- **VC-3200**: 100,000 Hz, 1V ±3 % from THOR AC/DC output terminal.

### Comparator Output

- **Function**: Independent judgment for each band
- **VC-2200**: Comparator level setting: 0 to 100 % of the full scale range (in 1 % steps)
- **VC-3200**: Comparator level setting: 0 to 100 % of the full scale range (in 1 % steps)

### Display Section

- **Display**: LCD with backlight
- **Measurement value display**: 4-digit digital display
  - Update time: 0.5 seconds
- **Bar chart display**: Selectable from linear/logarithmic display
  - Update time: 0.1 seconds
- **Comparator level display**: ON/OFF indicator: Lights in green while comparator is active

### Condition backup

- **Capable of preserving setting values while the power supply is off.**
- **VC-2200**: Power supply/terminals and ground terminal: 10 MΩ or more (at 500 VDC megger)
- **VC-3200**: Power supply/terminals and ground terminal: 350 V AC (50/60 Hz)

### Measurement mode

- **VC-2200**: Can display results separately for each measured band.
  - (Select from below)
  - Root mean square value
  - dBm
  - Peak value
  - Absolute peak value of time waveforms
  - MAX hold
  - MIN hold
  - RMS hold
  - Peak hold
  - Hold(s) maximum rms value

- **VC-3200**: Can display results separately for each measured band.
  - (Select from below)
  - Root mean square value
  - dBm
  - Peak value
  - Absolute peak value of time waveforms
  - MAX hold
  - MIN hold
  - RMS hold
  - Peak hold
  - Hold(s) maximum rms value

### Other

- **Condition memory**: Up to five conditions can be saved.
  - (VC-3200)
- **Data memory**: Capable of storing the data of up to 500 measurement values for each condition. (judgment result data only) (VC-3200)

### Accessories

- **Panel mounting fixtures (2 pcs.)**, instruction manual, and quick reference manual
Product inspection

In shipping inspection of products, sensory inspections by operators such as touching with the hands and listening for abnormal sounds are often used for making judgments. However, these types of inspections suffer from variability in quality, higher labor costs, and lack of quantitative values, leading to different judgments among inspectors. As a result, the entire lot must be replaced when a defect is found. The VC-2200 and VC-3200 enable quantitative judgment, thus improving product quality and reducing labor cost.

**Inspection of motors before delivery (inspection of abnormality)**

The VC-2200/3200 enable automatic inspection of products by replacing the sensory inspection (especially for the listening check) by operators. Can make OK/NG determination by overall vibration value of motor as well as detecting the problem of internal bearings by specifying and taking measures of the frequency band which leads to the abnormality.

**Inspection of pumps before delivery (inspection of rattling/abnormal sound)**

As an inspection of pumps or the like before delivery, visual checking by vibrometer and listening check using stethoscope probe are popular. The VC-2200/3200 enable automatic inspection according to the numerical values. Also enable to make OK/NG determination by overall vibration values (velocity and displacement) of the pump as well as inspection of the wrong assembly of internal bearings.

**Inspection of compressor (inspection of abnormal sound)**

As an inspection of abnormal sound from compressor, listening check by operator is popular. You could choose another method using sound level meter etc. because it is an inspection by sound, but it requires enough space and much cost for anechoic box in order to reduce the influence of the background noise. As an alternative to these methods, the inspection which is focused on the vibration is performed. Processing the band-limited frequency allows the detection of abnormal sound and automatic determination.

**Inspection of chipped resin gear teeth**

This example shows how to detect the damages (deformation, flaws) to resin gear teeth and foreign objects trapped inside equipment such as audio-visual systems and office automation apparatus. This system using the VC-2200/3200 vibration comparator allows quantification of the abnormalities and automatic determination, instead of the listening check by operators. Also it ensures that all products are inspected for consistent quality on production line.
**Inspection of a nick on gear boxes**

As an inspection whether there is a nick or not on the gear box, sensory test by operators (touching with hand, listening the difference with stethoscope probe) is popular. This way of inspection cannot avoid human-error and variation in quality. The determination by quantitative value is necessary in order to improve the quality and stable supply of product. The VC-3200 can detect whether there is a nick or not on the product and make determination by quantitative value.

**Detection of abnormal sound of steering pumps**

Abnormal sound during steering wheel operation may be caused by the steering pump or vibration of rubbing parts. Inspection before delivery is normally performed by operators installing the pump on a jig and listening to the sound generated when the steering wheel is operated. The VC-3200 detects abnormal sounds using vibrations from a sensor attached to the workpiece. Detecting the required vibration with band-pass filters for level judgment allows quantitative discrimination, which helps achieve stable product quality. Since there is a specific timing of abnormal sound due to the structure of the pump, the measurement timing is controlled using gate signals.

**Inspection of engines before delivery (smoking and abnormal sound checking)**

One of the inspection items before delivery for engines is checking for abnormal sound. There are many factors that may cause an abnormal sound including imbalance of components, electrical sound, and knocking. Currently, this inspection is typically performed by operators listening with a stethoscope probe. Since acoustic judgment for abnormal sounds using a microphone is difficult in some work environments, a vibration-based detection method using a vibration comparator is becoming popular. This method enables quantitative judgment through detection and level judgment using band-pass filters. It also allows acoustic inspection through headphone output, which facilitates comparison with the conventional inspection method to check if level judgment is made by actually detecting abnormal sound.

**Detection of abnormal sound from actuators for side mirror**

The cause of abnormal sound from actuators for side mirror might be a deformation or missing of the resin gear teeth, grease with foreign material or motor itself. The VC-2200/3200 can be used for these inspections.

**Inspection of rattling from laundry machines**

The vibration from laundry machines greatly affects the product value. For an inspection of vibration, they use equipment such as sensors or vibrometers; however, the determination is made by operators with visual check. In this example, the VC-5423 Integration Software (option) enables direct reading of the amplitude value and automatic determination. It contributes to the cost reduction and stable quality.
**Inspection of rice cookers before delivery**

In this example, the VC-2200/3200 detects the vibration of pressure adjustment valve in rice cookers for the operation check. In a conventional inspection method, operators have to listen carefully the abnormality from operated sound of the pressure adjustment valve. The determination by vibration value reduces the strain on ears of operators and the time for inspection process. The OK/NG determination is made by the deference of vibration value. The control by value and checking of vibration sound by headphones can be performed at the same time.

**Detection of cracks in products during the press process**

Inspection of cracks in pressed products is normally done by operators after the press process. If a defect is found in an inspection after the process, the products in the entire lot may have to be rejected. In addition, visual inspection of a huge number of products takes time and effort, and so operators may make mistakes during checking. Since overlooking cracks in this process greatly affects the quality of the subsequent products, it is important to detect cracks during the process and prevent defects from going down the production line. The VC-3200 detects vibrations generated from a crack and makes an OK/NG judgment, thus improving process efficiency and preventing products with cracks from going to the subsequent processes.

**Detection of abnormal sound from camcorders or digital cameras**

Abnormal sound from camcorders or digital cameras might be caused from a built-in motor, damaged gears, foreign material, or an operation section etc. In the inspection of products before delivery, operators actually operate products and inspect by listening. You could choose another method using a microphone as it is an inspection of abnormal sound, but it requires enough space and much cost for sound insulating box to reduce the influence of the background noise. The VC-3200 can capture these components of abnormal sound and make determination by quantitative value.

**Inspection of bearings before delivery**

At an inspection of bearings before delivery, scratch, foreign material and rattling from inside of bearings by bad installation are inspected. The figure below shows an example of the inspection using the VC-2200/3200. The VC-2200/3200 can detect smaller scratch assuredly by measuring peak/maximum rms value factor in addition to peak and rms values.

**Inspection of small fans before delivery**

Inspection of small fans before delivery is mostly performed in the form of sensory inspection by operators. Judgment of rattling and abnormal sounds at the rated rotation speed is dependent on the operators’ sense. In recent years, quantitative judgment has become necessary to achieve stable product quality, particularly as manufacturing plants have been transferred overseas. The illustration below shows a sample setup of attaching sensors in the radial and thrust directions of a fan to detect rattling and abnormal sounds for level judgement. There are two methods of attaching sensors to a fan: pressing the sensors against the fan using a jig or installing them on a jig in advance. The latter method detects vibrations transferred to the jig, which is used when it is difficult to build a mechanism to press the sensors against the workpiece.
Monitoring for abnormal machine operations

Abnormal vibrations (such as chattering of machines) during machining processes greatly affect the accuracy of finished products. If an abnormal vibration occurs in an endurance test of products, the testing equipment must be stopped immediately to prevent serious damage. It is therefore important to monitor the operation of the equipment and to stop it when an abnormal operation occurs. The VC-2200 and 3200 allow monitoring of abnormal operation. They also enable the testing equipment to be emergency-stopped by using comparator output in the event of abnormal operation.

Endurance test of engines

When an abnormal vibration is generated during a knocking test or an endurance test of engines, the operation must be stopped. In particular, an abnormal vibration in unattended operation or unexpected abnormality might cause serious damage of system etc. Therefore, monitoring vibrations is necessary to avoid that kind of accident. This application enables control of machinery by constantly monitoring vibrations in unattended operation. For example, the VC-3200 outputs NG signal to bring an emergency stop of operation when abnormal vibration is generated.

Endurance test of hub unit (bearing)

The endurance test of a bearing is conducted by applying a load to the bearing which is rotated for a long period of time. Damage inspection is performed either by removing the bearing after a certain period of operation and visually checking for damage, or through judgment based on the sound and vibration during operation. However, these tests mostly consist of unattended operation, and the testing equipment may be damaged if an abnormality in the bearing is not noticed. The VC-3200 allows bearing vibrations to be monitored at all times. If an abnormal vibration occurs, it outputs an NG signal, enabling the testing equipment to be emergency-stopped, for example.

Endurance test for a transmission (gear)

For a transmission, endurance test is necessary because of its hard usage. The endurance test is performed under high load over long operation. As damage of gear or bearing can lead to destruction of tester, abnormality must be detected to stop system urgently. The VC-3200 enables control of machinery such as an emergency stop by constantly monitoring vibration from bearing and outputs NG signal when abnormal vibration is generated.

Monitoring for abnormal vibrations during gear machining process

Abnormal vibrations generated during gear machining are a major cause of defects. The vibrations may be caused by worn or chipped cutters or failure of the machine itself. Machined gears are inspected visually by operators or by using dedicated equipment. However, 100% inspection by these methods takes much time and effort. The VC-3200 can simultaneously monitor abnormalities in rotation of first order (rattling of the machine) and abnormalities due to damaged cutters (vibrations in the high-frequency range) by using band-pass filters. This prevents defective products from being produced and going to the subsequent processes, and also facilitates 100% inspection, thus greatly improving quality and reducing labor cost.
**Monitoring for abnormal vibrations during production process of a liquid crystal cell (monitor)**

Liquid crystal cell is produced with delicate work from forming polarity to injection of liquid crystal. Vibrations during a production process affects on product quality. Though yield rate greatly affects on production cost, you cannot know performance of product until you actually power it on at the time of final inspection in many cases. The VC-2200/3200 detect and determine vibrations during production process. This application helps to prevent NG product or its outflow as well as stable production in quality.

**Monitoring for abnormal vibrations of a wafer carrier system**

At semiconductor plant, abnormal vibrations during carrying conveyance between processes or in-process lead to damage of wafer in the conveyance. This application including the VC-2200/3200 monitors vibrations which are generated during carrying a conveyance and enables control such as stopping the carrying. It also can be used for monitoring of vibrations other than carrying such as detecting crack of wafer in each process.

**Detection of fin-breaking in a diffuser**

Diffuser is operated for 24 hours and used very hard. In particular, fin-breaking will lead to a serious accident. In this example, the VC-3200 constantly monitors the equipment, and it is helpful for predictive maintenance such as prevention from an accident caused for wear by detecting an abnormal vibration earlier. This application is promising on an emergency situation including unexpected fin-breaking.

**Detection of a cracked material during torsional testing**

To evaluate tolerance of material against torsion, a torsion tester is used. This example shows how to detect cracks on material by vibration. The vibration sensor is mounted on around a bearing of chuck (stationary side). The difference of frequency band between vibration in rotor rotation and vibration from cracked material can be used for monitoring of vibration by using the band variable processing function of the VC-3200.

**Monitoring a sieve operation (chemical plant)**

When powder is sifted through a sieve, the sieve vibrates at smaller amplitude if it is clogged. However, a sieve vibrates at larger amplitude if there is any abnormality in a way of installing equipment or motor. With the VC-2200/3200, you can constantly monitor the sieve whether the vibrations are in normal range.
**Facility Monitoring**

Monitoring vibration to detect abnormality of bearings, gears and other parts of production facilities without attendance. Facility diagnosis used to take a lot of work and time. Operators must measure and keep watching vibration from the facilities (bearing box, etc.) because the vibration change gives an indication to know the timing of parts replacement or even abnormality. Moreover, unexpected abnormality may cause the serious breakage of the facilities. The VC-2200 and VC-3200 can continuously monitor vibrations to detect unusual movement, prevent them from serious breakage and save the labor. The frequency band can be specified that might indicate the abnormality.

**Monitoring vibrations of motors and pumps**

This example shows continuous monitoring of a motor in equipment. In this case, parts such as bearings in the equipment used to be replaced early to prevent accidents such as production line interruption. Periodical inspection using a vibrometer also incurred a high cost and required much labor. By using the VC-3200, it is possible to accurately determine the parts replacement time, thus saving time. The comparator also plays an important role in preventing accidents caused by sudden failures thanks to its ability to detect abnormality of the equipment and wear of parts based on changes in vibration values. Value-based management and vibration sound checking using headphones can be done simultaneously.

**Monitoring vibrations from rolling mills**

This example shows how to perform constant monitoring of a rolling mill. Periodical control by operators cannot avoid unexpected abnormality. This application helps to prevent that kind of accident by detecting abnormality immediately. They can be set up externally and used in small/medium monitoring system.

**Monitoring vibrations from broken runner vane/corn of water-wheel (dam)**

When a water-wheel, which is a heart of hydropower generation, is broken, it causes decrease in power generation efficiency as well as breakage in other parts. Early detection of abnormality and maintenance are important. As abrasion or breakage appears in abnormal vibrations, monitoring vibrations is an effective way to detect abnormality. The VC-3200 vibration comparator can monitor vibrations periodically, detect abnormal vibrations and output alarm signal. This application is helpful for predictive maintenance such as prevention of an accident.

**Monitoring for abnormality in main shaft of machine tool**

Deterioration of a bearing that supports the main shaft of a machine tool significantly affects the accuracy of parts machining. Even if maintenance such as greasing the bearing is conducted periodicaly, the deterioration time largely depends on the frequency of use. By using the VC-3200 to monitor the vibration of the main shaft, failures in the bearing can be detected in the early stages. Since bearing failures may not be accurately detected during machining due to vibrations in cutting operation, monitoring is performed at specific timings when the machine is running at idle.
Detection of broken or worn machine tools

Detection of broken or worn drills

This example shows how to monitor a drill of machine tool constantly to detect defect (breakage or chip etc.). This application can reduce defective products and improve product quality.

Detection of wear of grinding wheels

In parts grinding processes, wear of grinding wheels is one of the factors that reduce the accuracy of finished products. Currently, the maintenance of grinding wheels is based on the number and period of machining operations, so even good cutters are subject to periodic inspection. On the other hand, if abnormal wear occurs for some unknown reason, defective parts may be produced. Users typically want to effectively use cutters until the end of their service life to reduce cost. The VC-2200/3200 can detect imbalance caused by wear based on vibrations, which helps to improve product quality and reduce costs.

Detection of broken blades of textile cutting machines

If a cutter blade is broken, all textile of the lot should be thrown away because the broken cutter blade may be remained in textile. Detecting a breakage of cutter blade is indispensable to prevent such a large loss. Today, metal detector or the like monitors whether a broken edge is mixed in textile or not. The VC-3200 detects abnormal vibration to find breakage of a cutter blade. This application gives an alert with signal tower when it detects the breakage.

Detection of chip during fillet roll processing

The engine’s crank shaft is said to be the heart of an engine, and its strength depends on fillet roll processing. Chipping during the fillet roll processing has not only a big influence on the product’s quality (rattling or other abnormal sounds etc.) but may also cause defects. The VC-2200/3200 detect abnormalities during fillet roll processing. The band variable processing function of the VC-2200/3200 is useful for detecting the impact vibration of chipping during processing.
Main unit

<table>
<thead>
<tr>
<th>Model</th>
<th>Product name</th>
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<tbody>
<tr>
<td>VC-2200</td>
<td>Vibration Comparator</td>
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<tr>
<td>VC-3200</td>
<td>High Function Vibration Comparator</td>
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Detector

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<tr>
<th>Model</th>
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<tbody>
<tr>
<td>NP-3331N20</td>
<td>Accelerometer with Built-in Preamp</td>
</tr>
<tr>
<td>NP-3331B</td>
<td>Accelerometer with Built-in Preamp</td>
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Option

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<tr>
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<tr>
<td>VC-0321</td>
<td>Low Frequency Band-pass Filter</td>
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<tr>
<td>VC-0322</td>
<td>Intermediate Frequency Band-pass Filter</td>
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<td>VC-0323</td>
<td>High Frequency Band-pass Filter</td>
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<tr>
<td>VC-0423</td>
<td>Integration software</td>
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Others

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<tbody>
<tr>
<td>NP-0021</td>
<td>Miniature/BNC Conversion Adapter</td>
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<tr>
<td>NP-0100</td>
<td>Magnetic Base</td>
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<td>AX-5022</td>
<td>RS-232C Signal Cable 2 m (for PC connection)</td>
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<tr>
<td>VC-0352</td>
<td>AC/DC Converter Set</td>
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Signal Cable for NP-3331N20/NP-3331B

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<td>30 m</td>
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* Outer appearance and specifications are subject to change without prior notice.

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