

VW-3100

ONOSOKKI

Portable Vibration Meter

Listening to the Voice of Machines



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Listening to the Voice of Machines

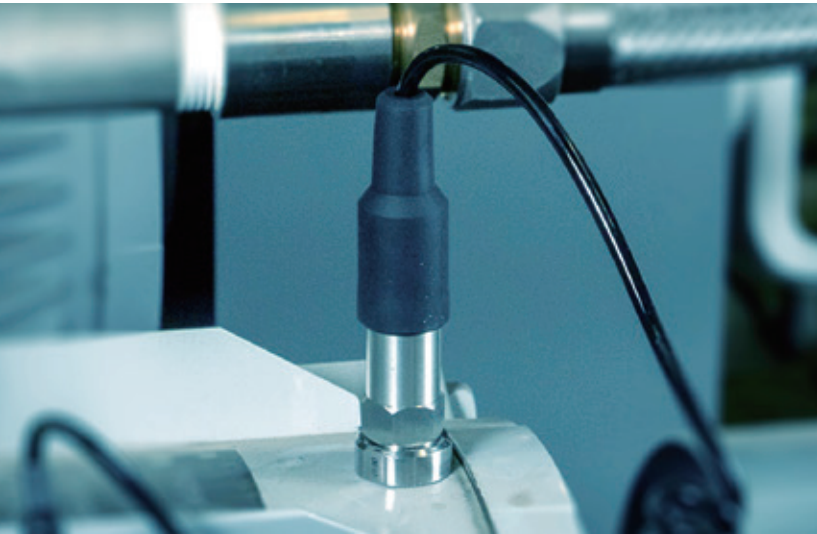
The VW-3100 is a portable vibration meter that realizes all the functions required for on-site vibration measurement: listening, measuring, and judging, all in one device. As a measurement instrument manufacturer, Ono Sokki can provide vibration sensing and signal processing technologies to solve your problems.

The VW-3100 provides you 3 **V**s:

Vibration

Measures Vibrations

It can measure three physical quantities of vibration at once: acceleration, velocity, and displacement.



Variable

Identifies abnormalities with the Variable filter

Three bandpass filters with arbitrarily variable frequency bands.

Voice

Listens to the Voice of machines (vibration sounds)

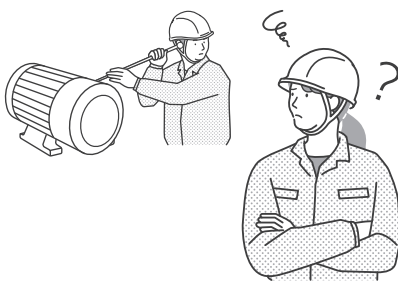
It captures vibration sounds in combination with a variable filter to extract anomalies.



1 Listen

Even when listening, difficult to identify abnormal sounds.

Distinguishing abnormal sounds with the V3 band*1 and listening function 



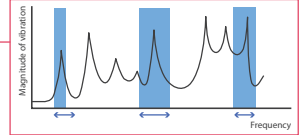
Adjust frequency

BAND 1 kHz ~ 10 kHz

00:07 M 0002

VOLUME BAND HOME

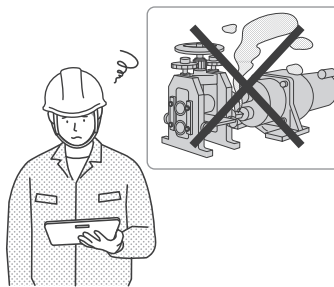
Switch ON/OFF



2 Measure

Measured value is normal, but machine is functioning abnormally.

Grasping the condition of machine accurately with the V3 band*1 and physical quantities



V1: Acceleration V1 ACC 0.590 m/s² PEAK IST Bearing abnormality

V2: Velocity V2 VEL 1.601 mm/s RMS IST Looseness

V3: Displacement V3 DISP 0.031 mm EQD HLD Unbalance

3 Judge

Difficult to determine judgment criteria.

Evaluating based on ISO standards



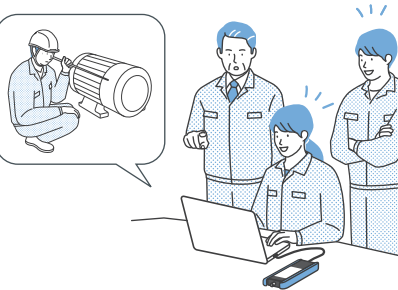
ISO 20816-1:2016		ISO 20816-3:2022 (Vibration velocity RMS (mm/s))			
		Group 2		Group 1	
		Rigid	Flexible	Rigid	Flexible
A/B	0.71	1.4	2.3	2.3	3.5
	1.8				
B/C	4.5	2.8	4.5	4.5	7.1
	14.7	9.3	7.1	7.1	11

Absolute and relative value evaluation based on standards

4 Share

Gathering on site to discuss takes effort.

Recording*2 on-site problem sounds to share for remote review.



Record vibration sounds while measuring (ORF/WAV). Analyze with O-Solution, etc.

*1: Refer to P4. *2: Optional function

Standard functions

Ensure accurate vibration listening and measurement

Simultaneous measurement of arbitrary vibration values

Even though regular inspections are carried out, the machine breaks down. Machine abnormalities are not fully detected.

To identify machine failures, it is necessary to measure three vibration values (acceleration, velocity, and displacement). The VW-3100 can simultaneously calculate and display these values using the **V3 band**. This allows you to accurately identify abnormalities and improve work efficiency.

Extracting abnormal sounds and signs of deterioration

Difficult to identify which sound is abnormal. No differences in vibration values between good and bad.

With a variable band pass filter, it is possible to set the frequency range of the band arbitrarily and extract it.

Capable of listening to vibration sounds

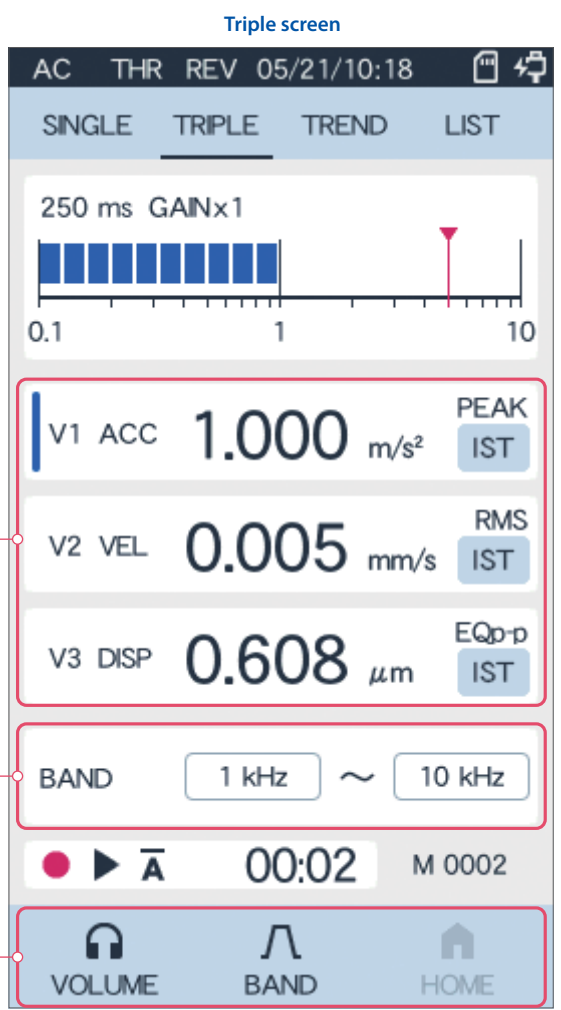
It is difficult to pass down the experience of skilled workers or share the sounds heard through an auscultation rod with other operators.

The sensor signal can be converted into sound and listened to. By narrowing the frequency band with a variable filter, it becomes easier to detect abnormal sounds. It can also be used as a tool to listen to "vibration sounds" instead of an auscultation rod.

Easily switch between four types of screen displayed

You can better understand phenomena and the measurement efficiency is improved.

- Single**: Check vibration value, rotation speed, and equipment name
- Triple**: Measure three vibration values simultaneously
- Trend**: Understand the fluctuation of vibration values
- List**: Grasp all measured values at once



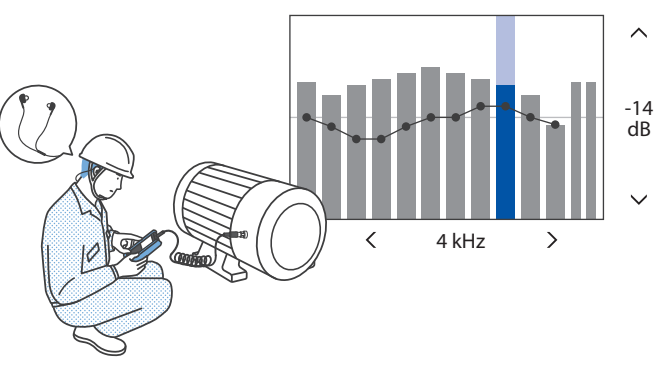
Options

Solve problems in measurement operation

VW-0310 Equalizing function

It is difficult to distinguish abnormal sounds from the various noises like a skilled worker.

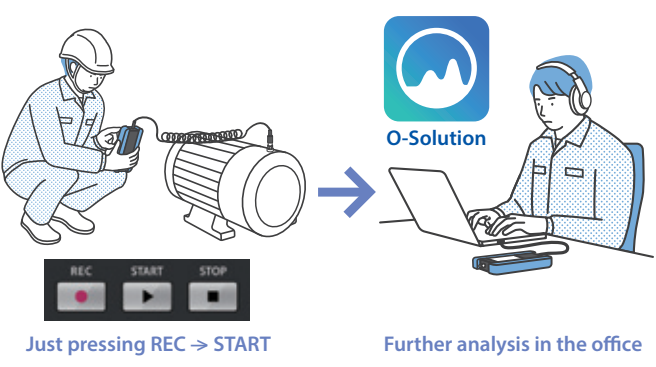
The amplitude of vibration sound can be adjusted in increments of 1/1 octave. By emphasizing only the distinctive sounds and reducing unnecessary ones, it enables to reproduce how experienced workers "listen" and pass on their sense of critical points.



VW-0320 Recording function

Hassle to prepare a separate recording device. Hassle to gather all on-site to check abnormal sounds.

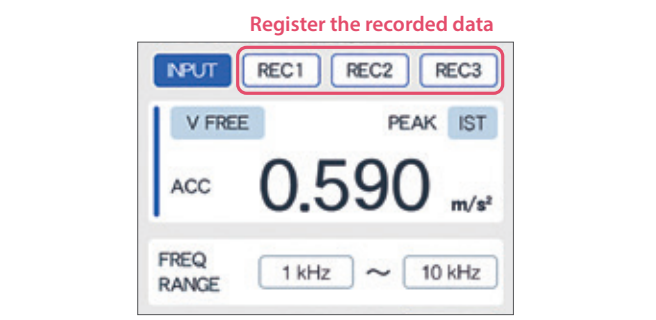
You can record vibration sounds while performing measurements and inspections, and then take the recorded data back to the office, listen to it again, or perform detailed analysis with the O-Solution, etc. It is useful for technical transfer.



Comparison function

Hard to know if the vibration sound has changed. Compare the sound when an abnormality occurs.

You can instantly switch between the vibration sound measured on-site and the pre-recorded sound and compare them. Further, using V3Band makes it easier to determine whether there are any abnormalities.



VW-0330 Filter expansion function

Capture accurately abnormal phenomena. Avoid the influence of noise on measurements.

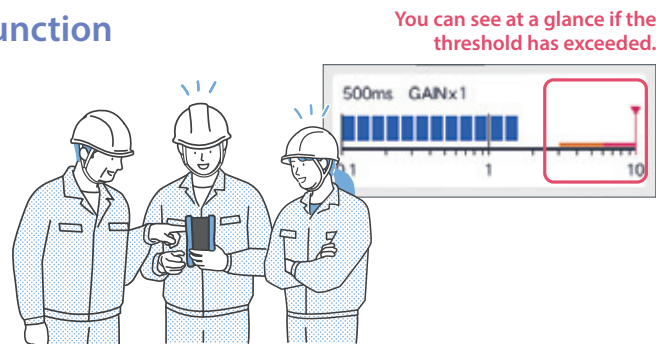
In addition to the standard bandpass filters, you can select more finer frequencies.

HPF • LPF, cutoff frequency [Hz]									Expand
10	20	30	40	50	60	70	80	90	
100	200	300	400	500	600	700	800	900	
1k	2k	3k	4k	5k	6k	7k	8k	9k	
10k	20k	OFF							

VW-0340 ISO Evaluation and Judgment Function

Eliminating reliance on experience-based maintenance. Evaluate appropriately while monitoring vibration values.

The judgment method can be selected from absolute value and relative value evaluation. Able to assess the condition of equipment using evaluation criteria compliant with ISO and JIS standards.



Options Pursue measurement efficiency and assist data management

VW-0350 VW-0360 Vibration Diagnosis Assist Tool

Assistance with measurement and data management using the VW-3100

For those who are starting to measure vibration
When changing conditions for each machine

Prevent errors caused by manual recording and management.
Manage several pieces of equipment and machines.

VW-0350 Assist Tool Communication function*

- No need to set conditions on-site
- Capable of measurement under machine-specific conditions
- Route inspection is also available

*The VW-0360 is required for using the VW-0350.

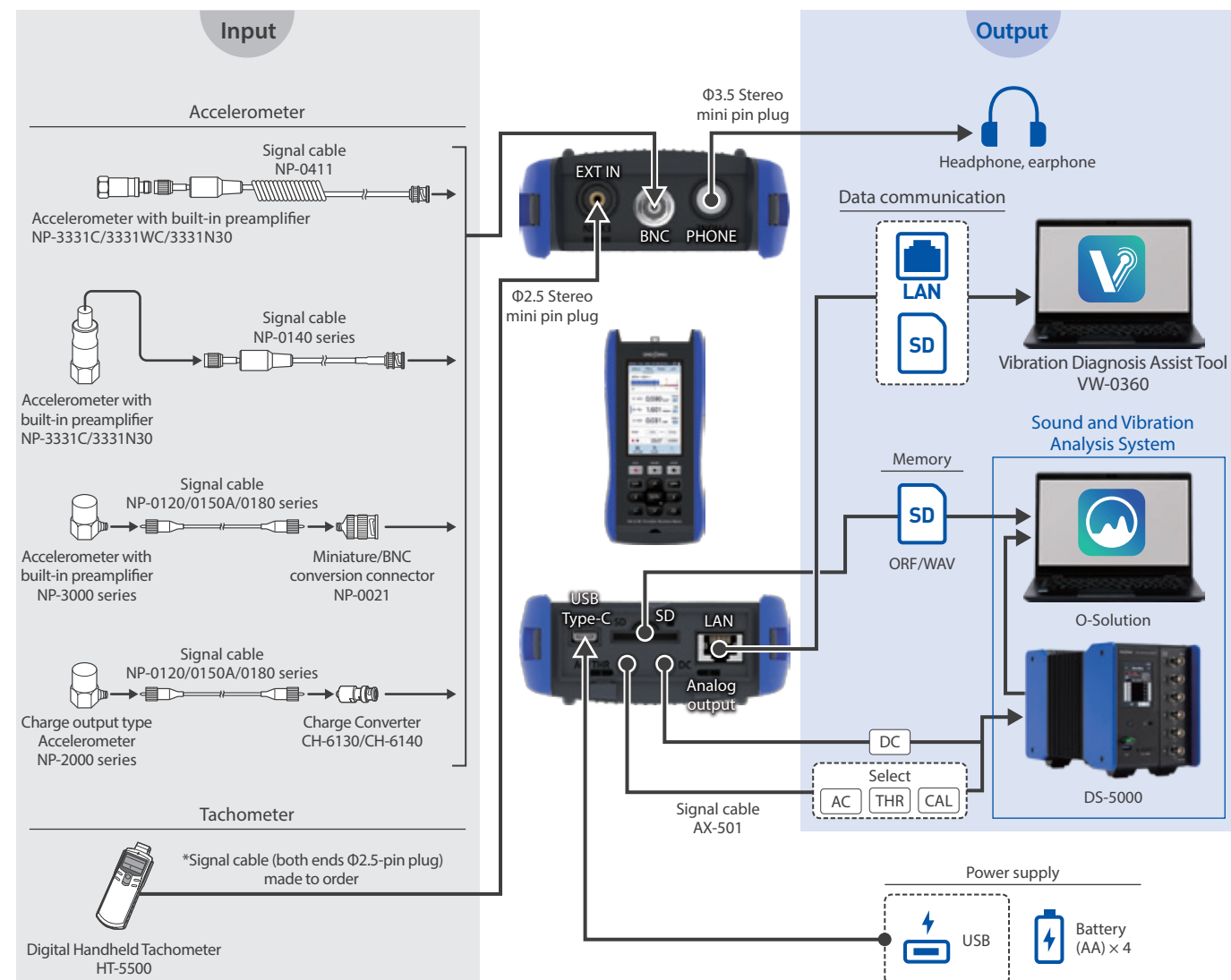
VW-0360 Vibration Diagnosis Assist Tool

- Register and send measurement conditions
- Trend management graph display
- Playback of vibration sound (when recorded data is available)

Sending measurement conditions to the vibration meter

Sending measurement data to the PC

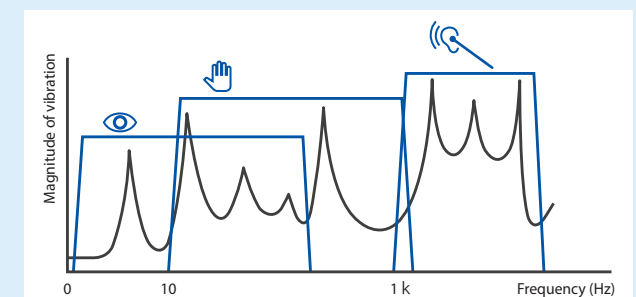
System configurations & sensors



All about measurement

What is Acceleration, Velocity and Displacement?

Abnormal vibrations in rotating machinery appear in different frequency bands depending on their cause. In vibration measurement, different physical quantities - acceleration, velocity, and displacement - are used depending on the frequency range. For example, shaft misalignment or looseness is more easily detected in the low-frequency range using displacement. Overall machine deterioration is typically observed in the mid-frequency range using velocity, while bearing defects or damage are best captured in the high-frequency range using acceleration.



	Displacement	Velocity	Acceleration
Cause of the abnormality	Displacement and movement itself	Vibration energy and fatigue level	The magnitude of impact force, etc.
Type of the abnormality	•Vibration of machine chattering •Looseness of rotating equipment •Unbalance •Misalignment	•General rotating machinery vibration •Vibration of belt devices, etc. •Gear abnormality	•Rubbing bearing •Rolling bearings (scratches, poor lubrication) •Cavitation

What is Vibration Severity?

It is a practical index of the magnitude of vibration in rotating equipment and assessed based on the rms value (mm/s) of vibration velocity between 10 Hz and 1 kHz. (good/alert/danger) The VW-3100 is equipped with a filter that complies with vibration severity ISO2954:2012 and complies with the following standards.

Applicable standards (A/B/C/D evaluation criteria)

ISO 20816-3:2022
ISO 20816-1:2016
JIS B0906:1998

(Vibration velocity RMS (mm/s))

ISO 20816-1 :2016		ISO 20816-3:2022			
		Group 2		Group 1	
		Rigid	Flexible	Rigid	Flexible
A/B	0.71	A	1.4		
	1.8		2.3	2.3	
	4.5		4.5	4.5	3.5
	9.3		7.1	7.1	7.1
C/D	14.7	D			11

Application examples

This portable vibration meter is useful in a variety of situations, including inspection, testing, and troubleshooting.

Simple equipment diagnosis



Quality inspection on the production line



Inspection of test equipment



On-site troubleshooting of equipment problems



Specifications

■ Sensor input		
Signal input	Accelerometers with built-in preamplifier (NP-3000 series, etc) External voltage signal input (switching)	
Number of channels	1	
Input terminal	BNC (C02 type), waterproof (with sensor connected)	
Input coupling	AC/DC switching	
Input voltage range	±5 V	
Constant current drive for sensor	23 V to 26 V / 4 mA ± 25 % (25 °C)	
Absolute maximum input voltage	±30 V(peak)	
Disconnection notification	Available only when Input type is set to CCLD.	
TEDS	IEEE 1451.4 Ver.0.9/1.0 Accelerometers	
Measurement range setting	0.100 m/s² to 50000 m/s² (The measurement range setting varies depending on the sensor sensitivity.)	
Unit calibration function	Selectable from m/s² or EU	
EU Type	• mV/EU • V/EU • EU/V • EU/mV	
Sensor sensitivity setting	000.0100 to 999.9999	
Analog filter	Low cut (High-pass filter)	OFF / 1 Hz/3 Hz / 10 Hz
		Cutoff frequency: −3 dB (±1 dB), −18 dB/oct
	High cut (Low-pass filter)	OFF / 1 kHz / 10 kHz Cutoff frequency: −3 dB (±1 dB), −18 dB/oct
Input frequency characteristics	3 Hz to 15 kHz ±0.5 dB 1.5 Hz to 20 kHz ±3.0 dB *80 Hz reference value	

■ External signal input	
Function	Rotational speed input / Trigger input (switching)
Number of channels	1
Input terminal	φ2.5 mm mini jack
Input coupling	DC
Input impedance	1 MΩ
Trigger level	Adjustable
Trigger slope	Selectable + (rise) or − (fall)
No. of rotational pulses	0.5 to 360 P/R (in increments of 0.5)

■ Analysis section		
A/D conversion resolution	24 bit	
Sampling frequency	64 kHz	
Number of setting bands	3 bands	
Digital filter	High-pass filter/Low-pass filter	OFF / 10 Hz / 30 Hz / 50 Hz / 100 Hz / 300 Hz / 500 Hz / 1 kHz / 3 kHz / 5 kHz / 10 kHz/ 20 kHz
		Cutoff frequency: −3 dB (±1 dB), −48 dB/oct
	Vibration severity filter	ISO 2954:2012 compatible filter (HPF: 10 Hz, LPF: 1 kHz)
Measureable frequency range	• Acceleration: 1.5 Hz to 20 kHz • Velocity: 3 Hz to 3 kHz • Displacement: 3 Hz to 500 Hz	

■ Calculation section		
Measurement items	RMS	RMS value with time constant
		Time constant 8 ms / 16 ms / 32 ms / 63 ms / 125 ms / 250 ms / 500 ms / 630 ms / 1 s
	PEAK	Maximum absolute value of time axis waveform
	P-P	2 times the PEAK value
	CF	Ratio between maximum RMS value and maximum PEAK value at 500 ms intervals (PEAK/RMS)
	EQpeak	√2 times the RMS value
Calculation items	2 times of the Eqpeak value	
	*EQp-p can be measured only when [MODE] in [V3 Band Condition] is set to [DISP].	
Calculation items	Instantaneous value / maximum value / average value	
	* These items are calculated simultaneously for a measurement item.	

■ Output section		
Analog output	AC/THR connector	AC/THR output (switching)
	DC connector	DC output
	Output impedance	50 Ω
AC/THR output	Output target	AC: Signal after performing calculation for the selected 1 band THR: Signal just before performing the digital processing
	Output terminal	φ2.5 mm mini jack
	Applicable cable	AX-501
	Output voltage range	±5 V
	Offset voltage	Within ±20 mV
	Output accuracy	±3 % FS (with 160 Hz output)
	Amplitude linearity	±0.4 % FS (with 160 Hz output)
DC output	Output target	Effective value calculation data for the selected 1 band
	Output terminal	φ2.5 mm mini jack
	Applicable cable	AX-501
	Output voltage range	0 to +5 V
	Offset voltage	Within ±20 mV
	Output accuracy	±3 % FS (with 160 Hz output)
	Amplitude linearity	±0.4 % FS
PHONE output	Output target	Signal before/after passing the band-pass filter for any 1 band
	Output terminal	φ3.5 mm mini jack × 1 *Connected to earphones / headphones with φ3.5 mm stereo mini-plug (3 pole)
	Maximum output	18 mW (representative value at load of 20 Ω)
	Adjusting volume	20 level
	Applicable cable	AX-501
CAL output	Output signal (AC)	Sine wave 160 Hz Amplitude 1.0 V (peak) ±3 %
	Output signal (DC)	0.707 V ±3 % *DC offset voltage excluded
Band gain	× 1 / × 2 / × 5 / × 10 / × 20 / × 50 / × 100	

■ Display section		
Display	4.3-inch transmissive LCD (with capacitive touch panel)	
Backlight	White LED Brightness adjustable: 5 levels	
Display update	Calculated value	500 ms/1 s
	Bar graph	100 ms

■ External interface section		
LAN	RJ45 connector	1 port
	Function	Transmission/receipt of measurement condition/measurement data *Available only when the VW-0350 Assist Tool Communicationfunction is installed.
USB	USB Type-C	1 port
	Function	Power input only (USB PD not supported)
SD card	Number of slots	1 slot
	Compatible card	SD, SDHC, SDXC (max. 64 GB)

■ General specifications		
Battery	Type	AA-size alkaline batteries (LR6) or nickel-metal hydride rechargeable batteries (HR6), 4 pieces
	Continuous operating time	LR6: 4 hours or more
		• Main unit setting: Current condition initialized (vibrometer mode).
		• Sensor: NP-3331C • Analog output and output to earphones/headphones are off. • Measured with EVOLTA NEO manufactured by Panasonic.
USB bus power	Operation input voltage range	DC 4.75 V to 5.25 V
	Absolute maximum input voltage	DC 6.5 V
	Consumption current	900 mA or less at 5 V supply
	Mobile battery	Operating only with power supplies that meet the above specifications.
Bakup battery for clock		
Operating temperature range		
Operating humidity range		
Storage temperature rage		
Storage humidityrage		
Outer dimensions		
Weight		
Waterproof/ dustproof		
Conforming standard		
Accessories		

Software options

■ VW-0310 Equalizing Function	
Time weighting characteristic	Fast (125 ms)
Band gain adjustment	−10 dB to +10 dB (resolution: 1 dB)
Sampling frequency	64 kHz
Center frequency	16 Hz to 16 kHz (11 bands) / Overall / Allpass

■ VW-0320 Recording / Comparison Fuction		
Recording	Recorded data	Sensor input / rotation information / trigger information
	Sampling frequency	64 kHz
	Continuous recording time	Maximum 30 minutes
	File format	ORF / WAV • Only ORF is supported when recording rotation / external trigger information.
Comparison	Number of registered files	3 files
	Files that can be registered	ORF • Only the files recorded by this instrument
	Number of setting bands	1 band
	Integration / digital filter	Refer to Analysis section.

■ VW-0330 Filter Expansion Function		
Additional cutoff frequency	Hi-pass filter / Low-pass filter	Low-cut frequency [Hz]: 10 to 90 (10 Hz increments)
		Middle-cut frequency[Hz]: 100 to 900 (100 Hz increments)
		High-cut frequency [Hz]: 1 k to 10 k (1 kHz increments)
Filter characteristics	Cutoff frequency: −3 dB (±1 dB), −48 dB/oct	

■ VW-0340 ISO Evaluation and Judgment Fuction		
Result display	3 stages of "normal", "caution", and "danger" • Output to a measurement data file (.csv) • Displayed on the screen	
ISO/JIS evaluation	ISO standard	The groups specified by ISO 20816-1:2016 and ISO 20816-3:2022 are set, and evaluation results are output with reference to the appropriate evaluation standards for the groups.
	JIS	The classes specified by JIS B 0906:1998 are set, and evaluation results are output with reference to the appropriate evaluation standards for the classes.
Optional evaluation	Evaluation method	Multiplying factor/absolute value
	Evaluation target	1 type selected from measurement items.
	Multiplier evaluation	A reference value is registered, and multiplying factors for evaluating the state of "caution" and "danger" are set for it.
	Absolute evaluation	Judgment value: Measured values judged to be "caution" and "danger" are set.

Product list

■ Hardware		■ Software options		■ Other items	
Model name	Product name	Model name	Product name	Model name	Product name
VW-3100	Portable Vibration Meter	VW-0310	Equalizing Function	VW-0010	Accessories for VW-3100
		VW-0320	Recording/Comparison Function	CC-0024	Soft carrying case for VW-3100
		VW-0330	Filter Expansion Function	NP-3331C	Accelerometer
		VW-0340	ISO Evaluation and Judgment Function	NP-3331WC	IP Dust and Water Accelerometer (with coiled cable)
		VW-0350	Assist Tool Communication Function	NP-0411	Coiled cable for NP-3331C
		VW-0360	Vibration Diagnosis Assit Tool	NP-0100	Magnet base
				NP-033	Search needle

* For the specifications for accelerometers, please refer to our website or brochure.

Accessories

Accessory for VW-3100
VW-0010
hand belt, 1 pc
neck strap, 1 pc

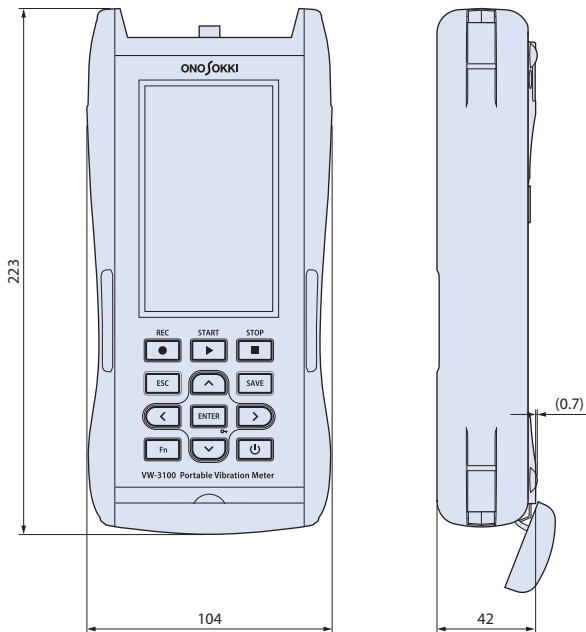


Soft carrying case
CC-0024

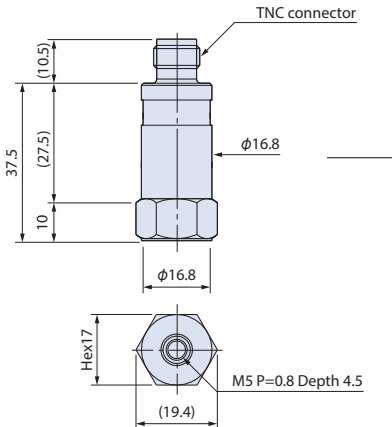


Outline drawings

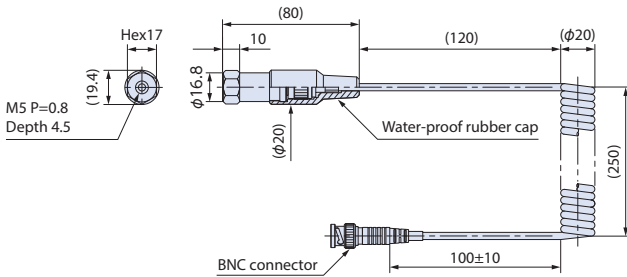
VW-3100



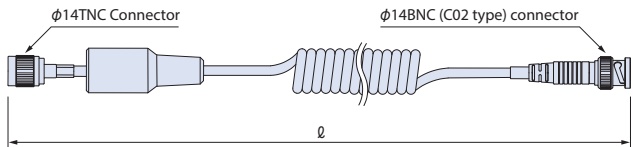
NP-3331C



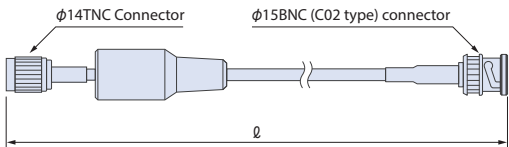
NP-3331WC



NP-0411

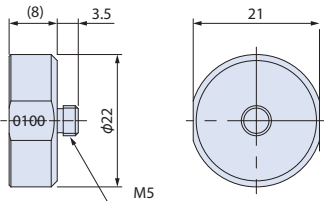


NP-0140 series



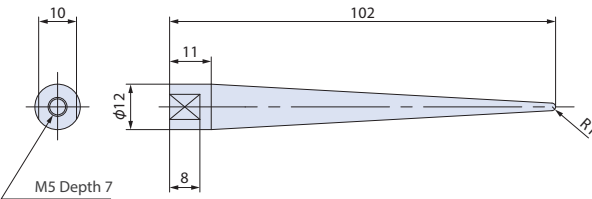
NP-0100

Weight: 22 g
Force : 120 N



NP-033

Material: SUS303



Other related products

Accelerometer NP-2000/3000 series

Sensors of different sizes are available for the built-in preamplifier type (3000 series) and the charge output type (2000 series), each of which can be selected according to the target.



Sensitivity Calibrator VX-1100A

It is a simple type sensitivity calibrator that is designed for use with piezoelectric accelerometers. The sensitivity value can be read directly by connecting an accelerometer to the VX-1100A.



Digital Handheld Tachometer HT-5500

Both contact and non-contact types are supported, and highly accurate rotation measurements can be performed with simple operations. Both analog and pulse output are equipped as standard.



Simple diagnosis

Vibration Comparator VC-2200/3200

This is a stationary type, high-performance signal processor used for monitoring machinery abnormalities and assessing product quality.



1-ch
Vibration

Precise diagnosis

FFT Comparator CF-4700A

This is a stationary type, judgment system equipped with FFT-based frequency analysis, capable of identifying characteristic frequencies from abnormal sound or vibration and making accurate pass/fail judgment.



1-ch
Vibration
Sound
Rotation

Cause analysis

Sound and Vibration Measurement System O-Solution/DS-5000

It measures sound and vibration phenomena with high precision and even carries out detailed analysis on the spot.



Multi-ch
Vibration
Sound
Rotation

Portable FFT Analyzer CF-9200A/9400A

They are all-in-one portable FFT analyzers, which can be performed with the integrated hard keys and touch panel without an external PC for analysis.



2,4-ch
Vibration
Sound
Rotation

JCSS Calibration Service

Ono Sokki provides reliable and high level calibration results, based on the international reference "General requirements for the competence of testing and calibration laboratories" and the skills and know-how of quality assurance system that has been acquired through many years of practices.

Under the JCSS of calibration laboratory accreditation system, Ono Sokki is assessed and accredited as Accredited Calibration Laboratories to meet the requirements of the Measurement Law, relevant regulations and ISO/IEC.

We support 7 accreditation scopes, which is industry-leading in measurement instruments manufacturers.

*1 JCSS: Japan Calibration Service System

*2 ilac: International Laboratory Accreditation Conference

*3 MRA: Mutual Recognition Arrangements

Accreditation Scope

- Acoustics & Ultrasound
- Electricity (Direct Current & Low Frequency)
- Acceleration
- Speed
- Torque
- Time & Frequency & Rotational speed
- Fluid flow



Ono Sokki can issue the calibration certificates with the JCSS accreditation symbol, which assures the traceability to National Measurement Standards as well as a laboratory's technical and operational competence, and is acceptable in the world through the ilac^{*2}-MRA^{*3}. (Under the calibration laboratory accreditation system JCSS, Ono Sokki is officially certificated by NITE.)

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