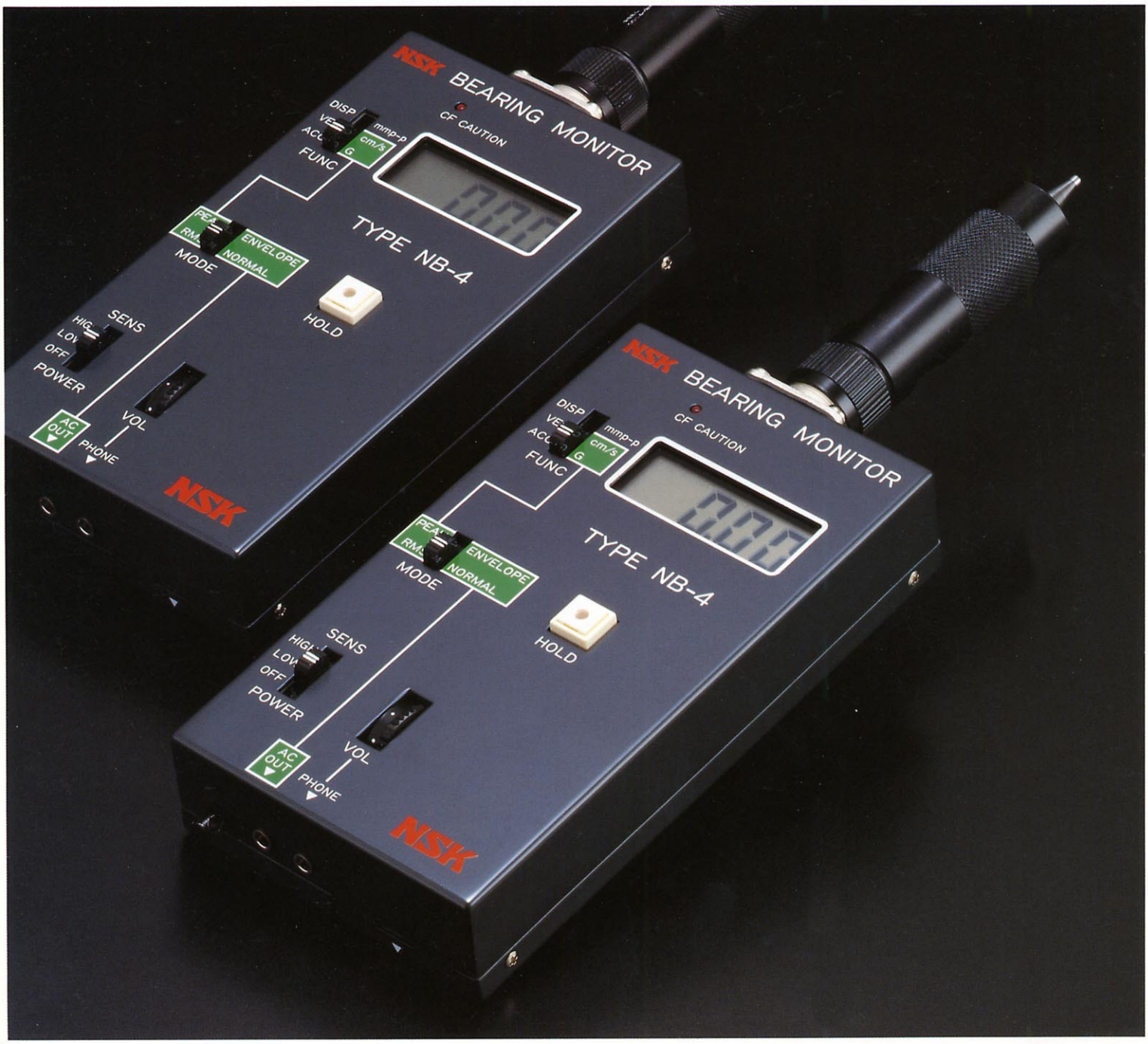
MOTION & CONTROL

NSK

Extra-Compact Bearing Monitor Model NB-4

It's no bigger than your hand, but the NB-4 bearing monitor can give you early warning of trouble in bearings and other machine parts



High Performance in a Small Package

Micro-electronics allows the NB-4 Bearing Monitor to be condensed to a conveniently portable size, but there is no sacrifice of performance. With a variety of functions built in, it can quickly and reliably sense unusual vibration in bearings or machines and warn of possible trouble.

Features

Extra-Small Size

No bigger than your hand, the NB-4 Bearing Monitor can be easily carried around shops to check the condition of bearings – with or without a connecting cable for the pickup.

Easy Detection of Trouble

An LED warning light immediately indicates the presence of significant localized flaws such as flaking. A simple criteria for evaluating vibration, which was devised by NSK, allows easy evaluation of operating condition without reference to past data.

Usable as a General-Purpose Vibration Instrument

Vibrational displacement, velocity, and acceleration can all be measured allowing the NB-4 to be used for a variety of purposes. Velocity measurements are recommended for checking various machines, while acceleration measurements are preferred for rolling bearings.

Versatility

Selection of either a high or low sensitivity range is possible. Also, either effective (rms) or peak vibration can be measured; therefore, the NB-4 can be used for a wide range of bearing applications irrespective of their size or speed.

Easy-to-Read Digital Display

Data appear as large figures on a liquid-crystal display which may be "frozen" at any time to simplify reading it. Also, the decimal point shifts automatically when the sensitivity range is switched eliminating the possibility of error.

Greatly Improved Vibration Pickup

The newly-developed piezoelectric pickup has greatly improved high-frequency response that provides a more reliable waring of possible bearing trouble.

Signal Output Terminals

Output terminals are provided for the recording and more precise evaluation of vibration. Either the actual vibration signal or its wave-form envelope is available as well as an audio output for earphones.

Evaluation Criteria

(A) Machine Vibration

Many common problems in machines such as unbalance, play, misalignment, etc. can best be evaluated by measuring vibrational displacement or velocity. Japanese Industrial Standards (JIS B 8330, JIS B 8340, etc.) recommend criteria for evaluating displacement, and ISO Standards are used for vibrational velocity. The ISO criteria for large machines operating at speeds between 600 and 12,000 rpm are shown for reference in Table-1.

(B) Bearing Vibration

The vibration of rolling bearings can be evaluated in several ways. In cases where records are kept so the vibration of each mounted bearing is known when new, the vibrational acceleration should be compared with the original level, as shown in Fig. 1, to evaluate performance. However, if the vibration when new is unknown, the criteria in Fig. 2 can be used.
Besides these two methods, the NB-4 Bearing Monitor contains an LED warning lamp that lights to indicate repetitive vibration peaks which often signify flaking or other flaws in bearings.

Table-1 Criteria for Evaluating Vibration in Large Machines ISO 3945 (600 rpm ~ 12,000 rpm)

Evaluation	Vibrational Velocity [cm/s] rms	
	Rigid supports	Flexible supports
Good	Less than 0.18	Less than 0.28
Satisfactory	0.18 ~ 0.46	0.28 ~ 0.71
Unsatisfactory	0.46 ~ 1.12	0.71 ~ 1.8
Unacceptable	More than 1.12	More than 1.8

Fig-1

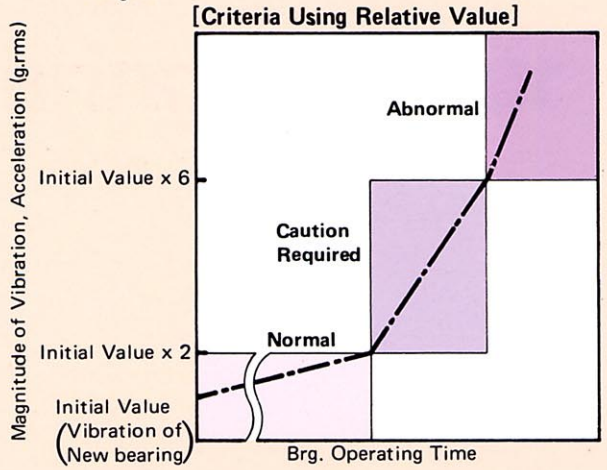
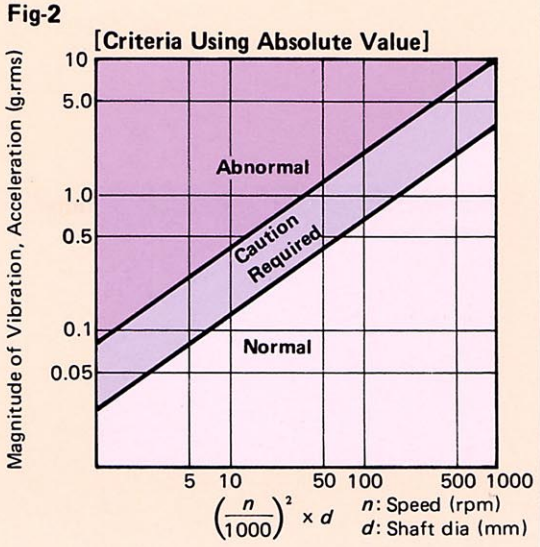


Fig-2



Newly-Developed NSK Probe-Type Pickup

NSK has recently designed a new hand-held vibration pickup with superior frequency response characteristics. As shown in Fig. 3, previous hand-held pickups were overly sensitive in the range from 1,000 to 2,000 Hz and became ineffective over 5,000 Hz. On the other hand, NSK's new pickup remains sensitive up to frequencies around 20,000 Hz in cases where optional test studs (NB-P100-U) are used.

For measuring vibrational acceleration, the use of such studs attached to the machines is recommended, or simple conical or spherical dimples can be formed (refer to Fig. 4).

* When measuring vibrational displacement or velocity, such studs or dimples are unnecessary. NSK's greatly improved new pickups make early warning of bearing trouble more reliable, and with their wide-range frequency response, they also serve as excellent general-purpose vibration measuring instruments.

Fig-4 Surface Dimples for Probe Tips

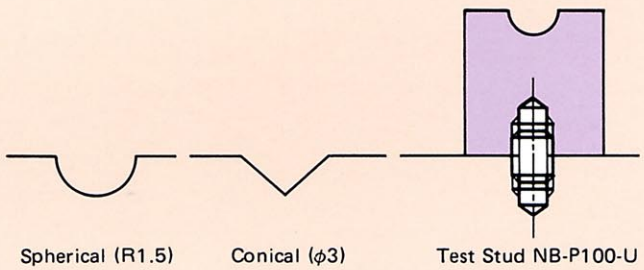
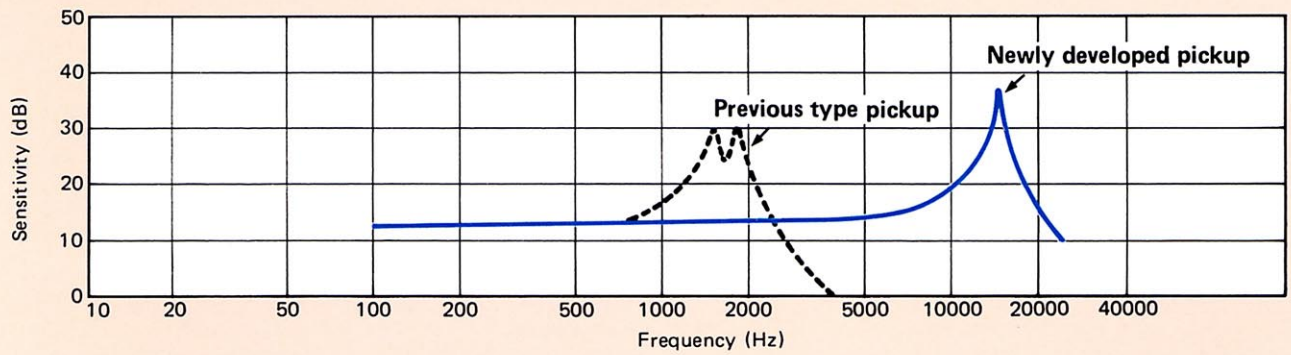


Fig-3 Frequency Response of New and Previous Hand-held Pickups



Standard Components

Storage case containing (counterclockwise from lower left): ❶main body ❷vibration pickup ❸output cable ❹battery ❺pickup connecting cable ❻magnetic vibration pickup (optional)

Optional Accessories

NB-4-LC Carring Case

Accessories (from the left): ❶magnetic vibration pickup (NB-P101) ❷test stud (NB-P100-U) ❸earphones (NB-H4)

Specifications

Vibration Pickup	Model		NB-P100	NB-P101
	Type		Hand-held probe	Fixed with magnet or screw
	Working temp. range		−10°C ~ +80°C	−20°C ~ +80°C
	Dimensions		ϕ20 x 97(L)mm	14(HEX) x 44(L)mm
	Weight		60gm (excluding cable)	Main body 32gm, Magnet 23gm
	Type		Piezoelectric acceleration type (preamplifier built-in)	
	Sensitivity		26mV/g	
	Cable		ϕ4.5 helical cord (about 2.5m when extended)	
NB-4 Main Body	Functions		Displacement, velocity, acceleration (selectable)	
	Readings		Effective (rms) value, peak value (selectable)	
	Frequency range	Displacement, velocity		10Hz ~ 1kHz
		Acceleration		1kHz ~ 15kHz
	Sensitivity range	High range	Displacement	0.001 ~ 1.999mm p-p
			Velocity	0.001 ~ 1.999cm/s pk, rms
			Acceleration	0.001 ~ 1.999g pk, rms
		Low range	Displacement	0.01 ~ 19.99mm p-p
			Velocity	0.01 ~ 19.99cm/s pk, rms
			Acceleration	0.01 ~ 19.99g pk, rms
	Output	Vibration waveform signal		About 1 Vrms full scale
		Envelope signal		About 0.5 Vrms full scale
		Earphone output		About 5mW
	Indications	Display		3½ digit LCD
		Low battery voltage		"BATT" indicated
		Excessive input		"OVER" indicated
		PEAK mode selected		LCD decimal pt. flashes
		Crest factor warning		LED flashes (pk/rms >7)
		Data display on HOLD		HOLD LED flashes
	Power source		Dry battery, 006P (9V), Continuous serivce time, about 10hrs	
	Ambit temp. range		−5°C ~ +45°C	
	Dimensions		150(H) x 80(W) x 29(T)mm	
	Weight		400gm	

NSK Extra-Compact Bearing Monitor—Model NB-4

NB-4 Main Body

Warning Light
LED flashes when isolated bearing flaws exist.

Function Switch
Selection of displacement, velocity, or acceleration.

Mode Switch
Selection of rms or peak readings and output signals.

Sensitivity Switch
Selection of high or low sensitivity or power off.

Liquid Crystal Display
Vibration data are shown. Low battery voltage, excessive input, and PEAK mode selection are also indicated.

Hold Button
Displayed vibration data (LCD) is held constant.

Earphone Output
Vibrational sound may be heard using earphones and the volume controller.

Output Terminal
Either the vibration wave form or waveform envelope signal is output.

Probe Type Pickup

Hand-held Vibration Pickup
Superior high-frequency response allows early detection of trouble in bearing and other machine parts.

NB-4 Main Body
Because of its small size and ability to connect the pickup directly, it can be conveniently used as a single unit.

Helical Cable
A tangle-free, extendable cable may be used to connect the vibration pickup or it can be connected directly to the main body.

Helical Cable connected to hand-held probe

Optional fixed pickup
(waterproof) held by magnet or screw.