



PREMIUM
PROACTIVE
ENGINEERING

CMS
CONDITION
MONITORING
SYSTEM

Portable Vibration Analysis System

Kenjin



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PREMIUM
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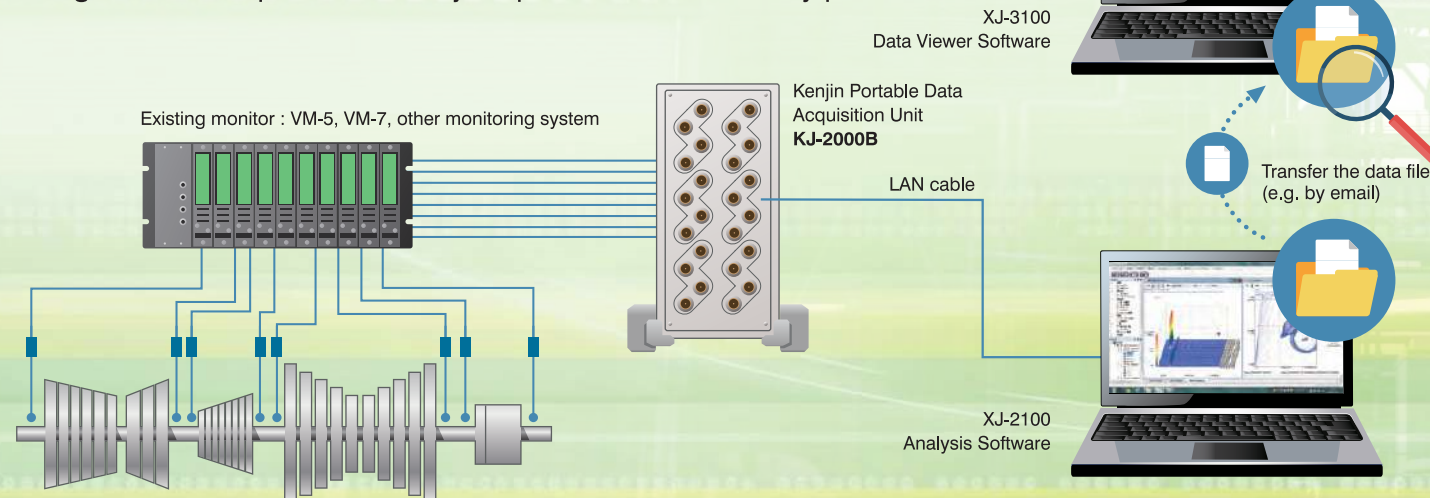
Easy to carry, easy to install. Get real-time data acquisition with sophisticated off-line analysis system in a transportable package.

Kenjin is compact, lightweight, and transportable making it an excellent choice for vibration analysis on plant assets without permanent analysis system, and also for acquisition of transient data during startup/shutdown. This system can save time and money due to ease of use.



System Configuration

Simple configuration composed of a portable data acquisition unit and a laptop PC. Ability to connect to existing vibration monitoring systems using buffered outputs make Kenjin a perfect solution for any plant.



Features

1 Compact, lightweight, transportable

Dimensions : 96 (W) x 224 (H) x 163 (D) mm Weight : 2.6 kg

2 Instant setup and on-site data analysis

This simple system is user friendly and efficiently provides the necessary information to analyze conditions of your critical assets.

3 High-speed data acquisition

Fast data acquisition intervals of trend data 0.1 sec and waveform data 0.1 sec.

* Time may vary, depending on the number of inputs and FFT lines (resolution).

4 Sophisticated data analysis and various graphs

The software provides a variety of analytical graphs which are optimized for the type of machinery and condition, satisfying stringent demands of vibration analysts and other plant personnel.

5 User-friendly operability and plotting functions

Intuitively software interaction with drag & drop graph display manipulation, graph area switching tab, etc.

6 Process data input functions

Process data such as temperature and pressure can be input as voltage signals, scaled to the process value and recorded.

7 Data sharing with Date Viewer Software

From the data collected by Kenjin, you can extract as much data as you need as a partial backup file*. By transferring the extracted data from the site to PCs with the Data Viewer Software (viewing only) installed, you can share your analysis data with experts.

* The data contained in the file are extracted from the selected channels and time range.

Advantages

- Simple setup
- Fast data acquisition
- On-site analysis of the machine condition during startup/shutdown.
- Abnormal machine conditions are easily identified to help prevent damage and catastrophic failures.
- Can be used for extended time period monitoring on BOP equipment.

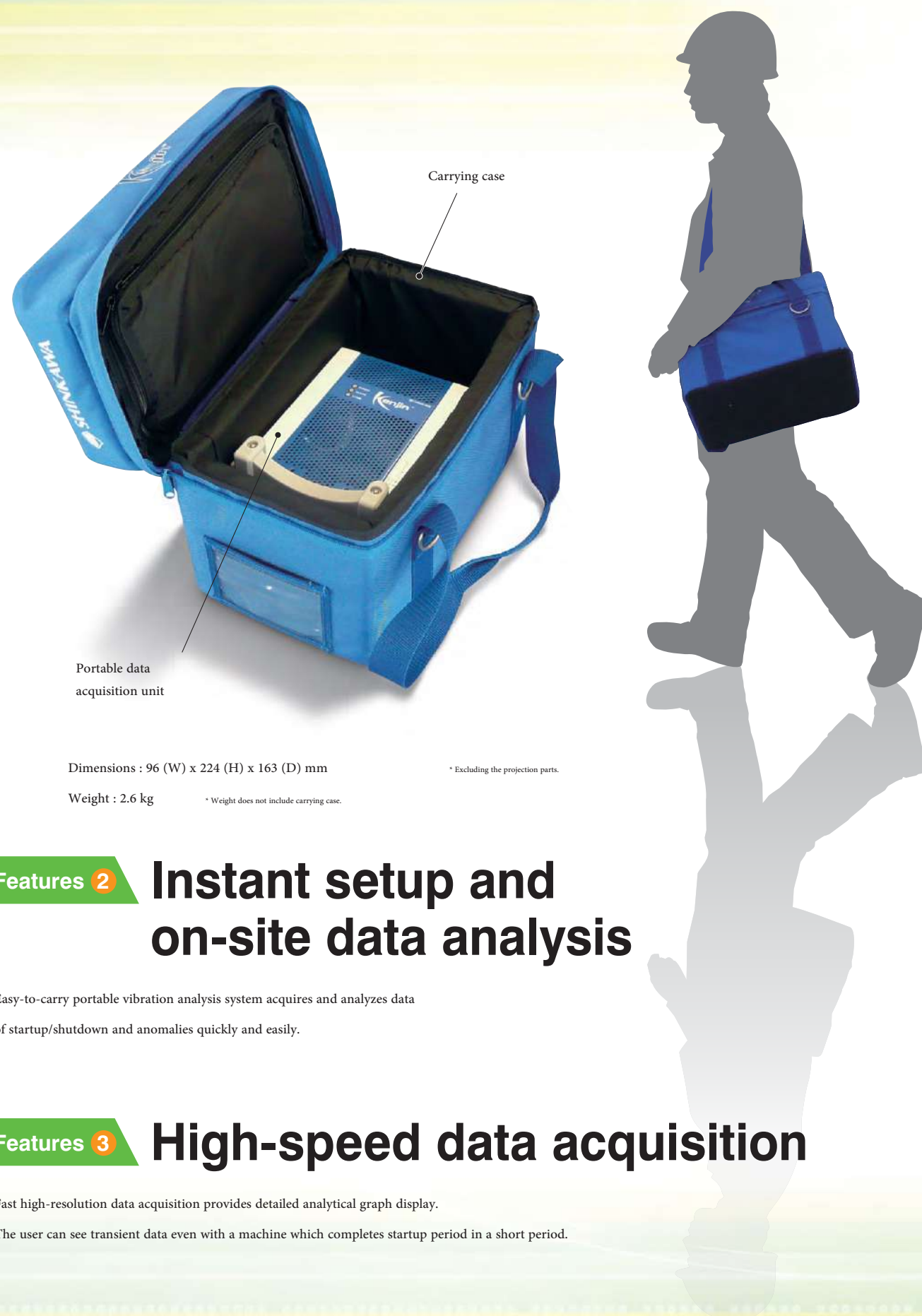
Applications



- Steam turbines ➤ Gas turbines ➤ Electric generators ➤ Feed pumps ➤ Fans
- Blowers ➤ Compressors ➤ BOP machinery ➤ Rotating equipment critical to your facility

Features 1 Compact, lightweight, transportable

Compact, easy to carry anywhere.



Carrying case

Portable data acquisition unit

Dimensions : 96 (W) x 224 (H) x 163 (D) mm

* Excluding the projection parts.

Weight : 2.6 kg

* Weight does not include carrying case.

Features 2 Instant setup and on-site data analysis

Easy-to-carry portable vibration analysis system acquires and analyzes data of startup/shutdown and anomalies quickly and easily.

Features 3 High-speed data acquisition

Fast high-resolution data acquisition provides detailed analytical graph display.

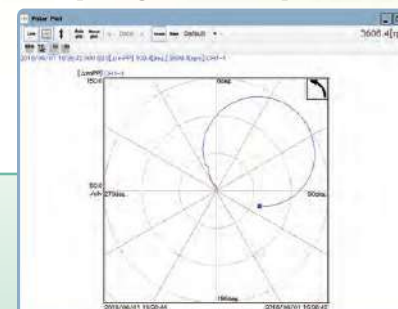
The user can see transient data even with a machine which completes startup period in a short period.

Features 4 Sophisticated data analysis and various graphs

Provides analysis/plotting functions required by vibration analysts certified in accordance with ISO 18436-2.

* ISO18436-2 : Condition monitoring and diagnostics of machines - Requirements for training and certification of personnel - Part 2 : Vibration condition monitoring and diagnostics

Data display examples

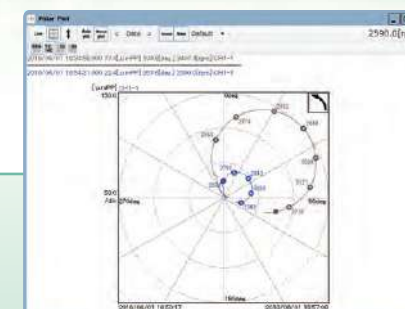


Polar Plot

This shows the vibration vector at the time of critical startup/shutdown of the machine. From this plot, the user can observe the balancing condition, vibration levels and critical speed during the startup/shutdown of the machine.

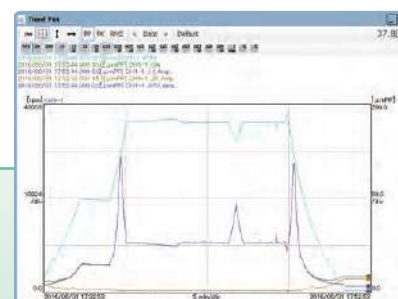
Displayed data (Switchable display): 1X, 2X

This allows over lay of current data on top of past data.



Polar Plot (reference superimposition and speed indication)

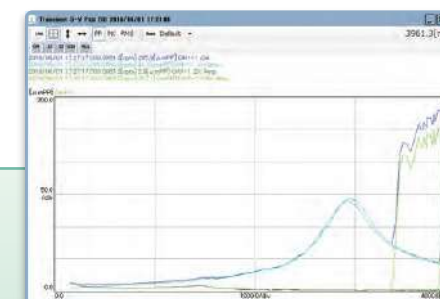
For easy comparison, the data set as the base line is plotted over the current or selected data. The rotation speed of multiple clicked points can be labeled on the field while the RPM (speed) button is active. At other times, the speed is displayed while the cursor is over the point.



Trend Plot

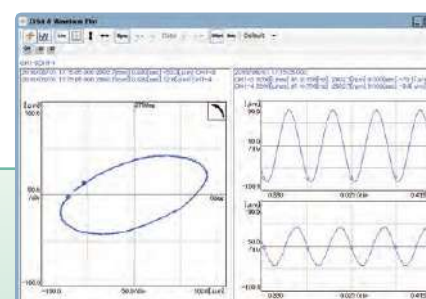
This plot displays short term and long term chronological changes using a line chart.

Displayed data (multiple selections are allowed): Rotation speed, GAP, OA, 0.5 X amplitude, 0.5 X phase, 1X amplitude, 1X phase, 2X amplitude, 2X phase, Not-1X amplitude, nX1 to nX4 amplitude and phase, Smax amplitude, various alarm setting values.



S-V Plot

A Speed - Vibration (S-V) trend plot shows the change in the vibration amplitude with rotation speed. The user can select multiple amplitude types from overall (OA), 0.5X, 1X, 2X, to display in the same field for understanding the critical speed or vibration condition during startup and shutdown of the rotating machinery.



Orbit and Waveform Plot

This plot composes signals from each X and Y sensor and displays the dynamic motion of the center of a rotating shaft. The Orbit plot helps to identify any abnormal status including imbalance, misalignment, oil whirl and oil whip.



Bode Plot

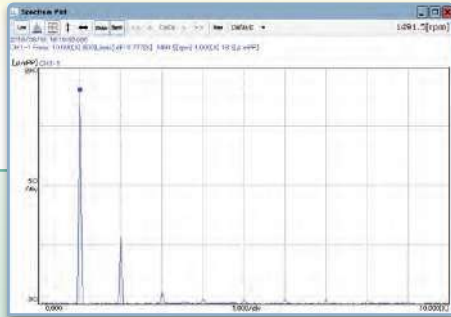
This plot displays the amplitude and phase in separate graphs with rotation speed used as the horizontal axis. From this plot, the user can see the vibration status and critical speed during the startup/shutdown of the machine.

Displayed data (Switchable display): 1X, 2X

This allows over lay of current data on top of past data.

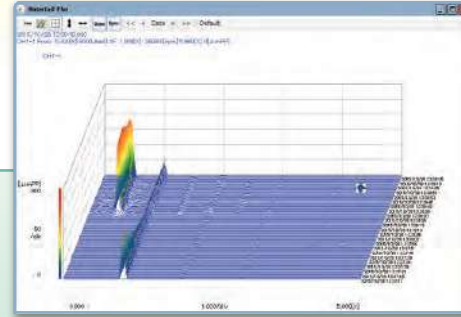
Features 4 Sophisticated data analysis and various graphs

Data display examples



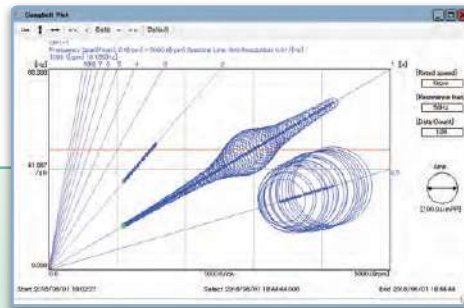
Spectrum Plot

This plot shows the frequency analysis of the vibration data. The X-axis represents the frequency or the order; the Y-axis shows the amplitude of each frequency component. The graph identifies the frequencies and the orders to help determine the cause of the abnormal condition of the rotating machinery.



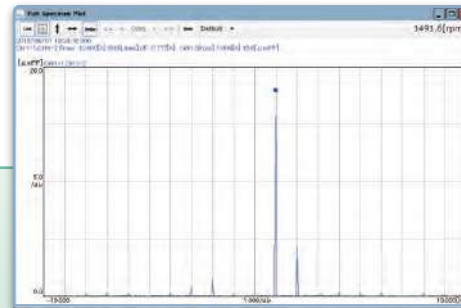
Waterfall Plot

This plot is used to analyze changes in frequency components that occur over time. Cascade plot can also be displayed with width (z-axis) as rotation speed to analyze changes in frequency components in relation to changes in rotation speed.



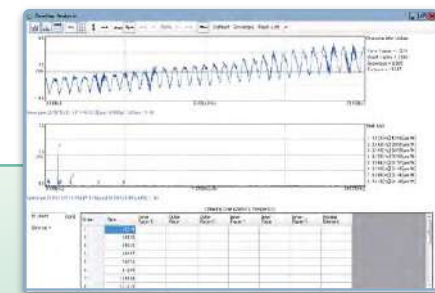
Campbell Plot (Optional)

The X-axis shows the rotation speed; the Y-axis expresses the vibration frequency; the radial lines indicate each order; the size of the circle represents the vibration amplitude. This shows the vibration level relative to the change in the rotation speed. Whether or not a sequence of vibration is accompanying a specific order or it is of a certain frequency component can be seen visually.



Full Spectrum Plot (Optional)

A spectrum plot that separately depicts the forward whirling motion and backward whirling motion of the rotating machine rotor. The X-axis is the frequency of the whirling motion (positive for forward, negative for backward), and the Y-axis is the amplitude of each frequency component or order.



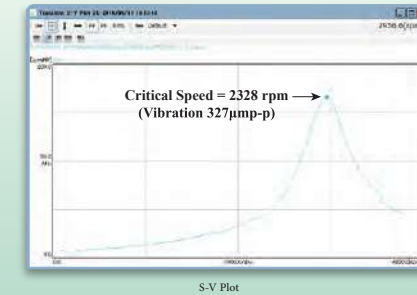
Bearing Analysis (Optional)

This window collectively displays the plots necessary for rolling bearing diagnosis. The following analysis functions are available per additional specification code, "/RB1" and "/RB2". /RB1 ... Peak value analysis, order analysis, sideband analysis /RB2 ... Crest factor, form factor, kurtosis, skewness, envelope.

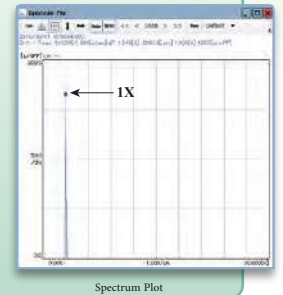
Case Studies

Unbalanced Vibration

The most common abnormal vibration is due to the mismatch between shaft center and mass center, due to manufacturing error or machine components missing. The characteristic of the vibration generates the rotation synchronous component (1X), which is sine wave or similar. Vibration becomes largest at critical speed.



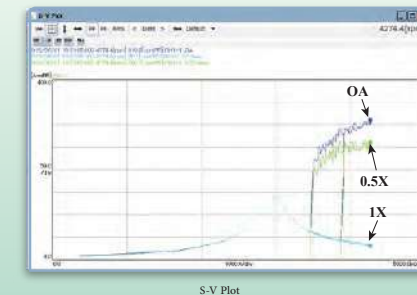
S-V Plot



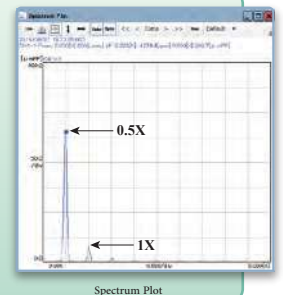
Spectrum Plot

Oil Whirl Vibration

Self-excited, unstable vibration typical for sleeve bearing supported rotating machinery. Possible causes include effects from the shape of the sleeve bearing, oil film characteristics, etc. Normally, this vibration appears at two or less times lower than the critical speed, and the frequency is around half the rotation synchronous frequency (0.5X).



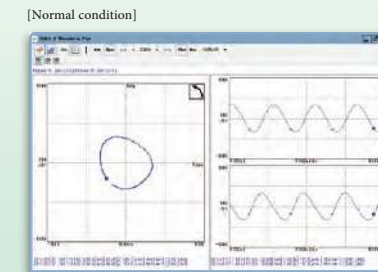
S-V Plot



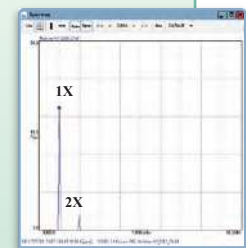
Spectrum Plot

Misalignment Vibration

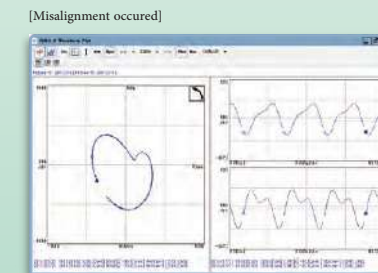
Vibration that occurs when the shaft centers of driving rotating machinery and its associated driven rotating machinery are not properly aligned. Typically the vibration includes rotation synchronous frequency (1X) and harmonic components (2X, 3X).



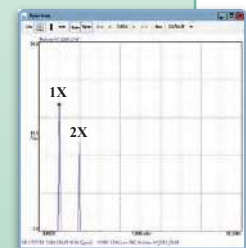
Orbit & Waveform Plot



Spectrum Plot



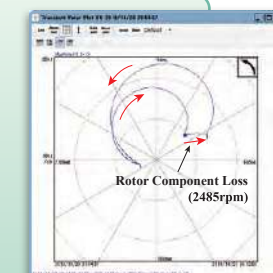
Orbit & Waveform Plot



Spectrum Plot

Loss of Rotor Component

When a rotor component is lost or flies off, the vibration conditions suddenly change. The typical phenomenon includes sudden changes in the amplitude and phase angle (vibration vector) of the rotation synchronous frequency component (1X).

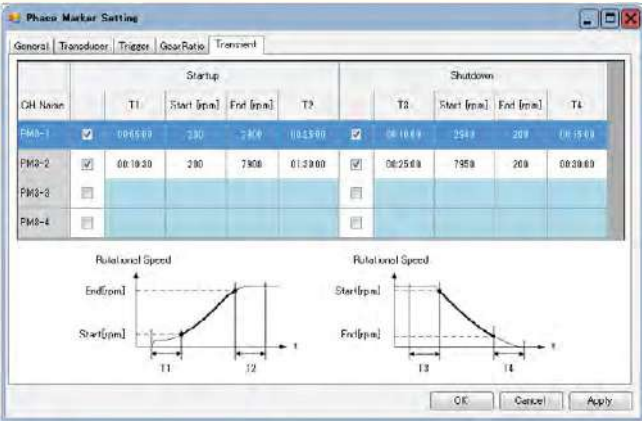


Polar Plot

Features 5

User-friendly operability and plotting functions

Kenjin configuration screen example



Base setting screen example (general)

Settings for;
phase marker allocations corresponding to each of the vibration channels, pair channel for X-Y installed vibration sensors, and installation angle of vibration sensors.

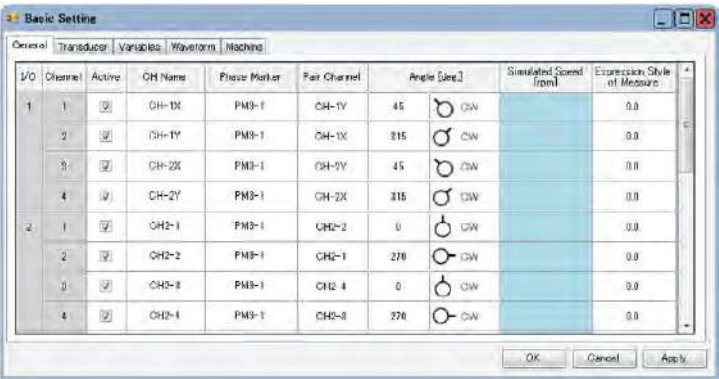
With the installation angle setting, when a numerical value is entered, corresponding installed angle image appears on the screen and visually seen, thus preventing setting errors by phase delay/progression etc. .

Phase marker setting screen example (transient setting)

Data extent is set by starting speed, ending speed, and pre-trigger time, and elapsed time for the increasing/decreasing speed during the machine start-up/shut-down. This can be later on easily retrieved, and displayed as a series of transient data from the transient list.

Transient data storage setting extent.

At start-up: T1 + starting rpm to ending rpm + T2
At shut-down: T3 + starting rpm to ending rpm + T4
T1 : 0 to 60 mins. T2: 0 to 180 mins.
T3: 0 to 60 mins. T4 : 0 to 60 mins.



Data storage starting/ending button and indicator

Data storage starting/ending button

CONNECT/DISCONNECT indicator

RECORD/VIEW ONLY indicator

Kenjin Analysis Software [RotorKit_XJ2100_160524]

File Connection Setting Save Graph Tools View Window Help

DISCONNECT VIEW ONLY SHINKAWA

OFF LINE data un-acquired state

Kenjin Analysis Software [RotorKit_XJ2100_160524]

File Connection Setting Save Graph Tools View Window Help

CONNECT VIEW ONLY SHINKAWA

ON LINE data storage off state

Kenjin Analysis Software [RotorKit_XJ2100_160524]

File Connection Setting Save Graph Tools View Window Help

CONNECT RECORD SHINKAWA

ON LINE data storage on state

Kenjin Analysis Software XJ-2100

System requirements	
Processor	Intel® Core i5 or higher *1
Memory	16 GB or more recommended
Display	1366×768 or higher-resolution video adapter and monitor
HDD	250 GB of available hard-disk space
Drive	DVD-ROM drive
Network	Ethernet 100 Base-TX or higher
OS	Refer to the SHINKAWA website or date sheets.
Connection	
Connectable units	KJ-2000B Portable Data Acquisition Unit
Number of connectable units	1
Display	
Displayable graphs :	Trend Plot, Long Term Trend Plot, Bar Graph, Spectrum Plot, Waveform Plot, Orbit and Waveform Plot, Waterfall Plot, Polar Plot, Shaft Centerline Plot, X-Y Plot, S-V Plot, Bode Plot (Optional plots : Cascade Plot, Full Spectrum Plot, Full Waterfall Plot, Full Cascade Plot, Campbell Plot)
List view :	List of Current Values, Event History

*1 Intel is a registered trademark of Intel Corporation or its subsidiaries in the United States and other countries.
*2 Weight does not include the AC adapter and the carrying case.

Kenjin Portable Data Acquisition Unit KJ-2000B

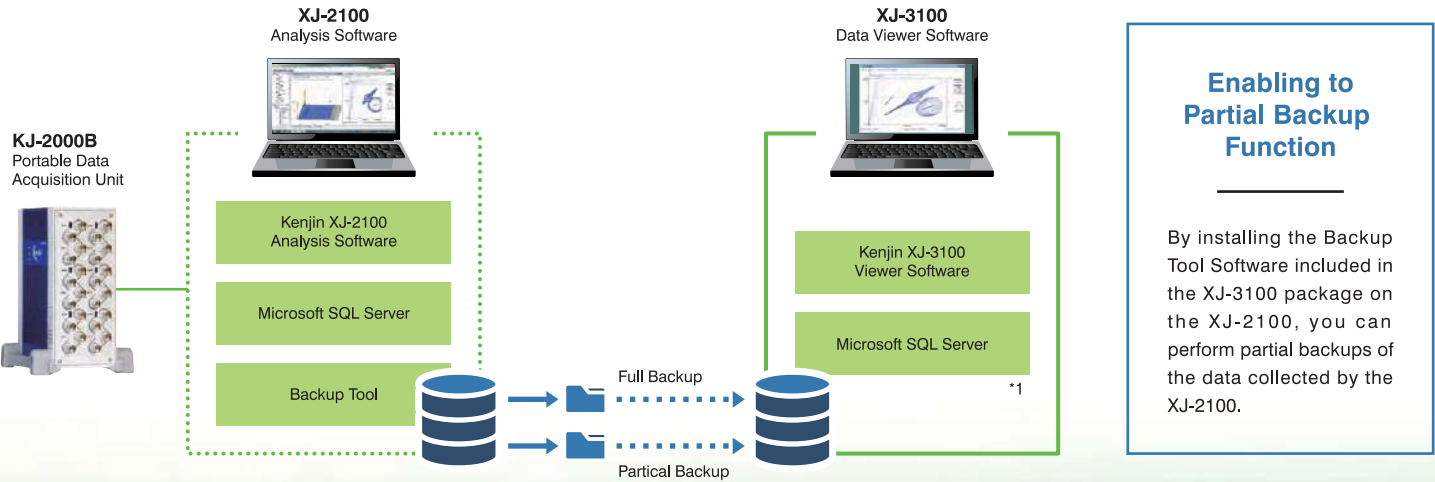
Dimensions	96 (W) x 224 (H) x 163 (D) mm (Excluding the projection parts)
Weight	Maximum 2.6 kg *2
Environmental condition	
Operating temperature	-10°C to +45°C
Relative humidity	20 to 90% RH (non-condensing, non-submerged)
Power	85 to 264 VAC (using dedicated AC adapter)
Interface	
Communication	Ethernet 100 Base-TX
Connector	RJ-45
Input	
Number of inputs	up to 20 (Vibration and Process data)
Number of phase mark signal inputs	none, 4
Input voltage range	±20 V
Sensors supported	non-contact displacement / velocity / acceleration / phase mark
Connector	BNC connector
Sampling	
A / D resolution	24 bit
Sampling frequency	up to 51.2 kHz
Number of FFT lines	400 / 800 / 1600 / 3200
Communication	
Acquisition interval Trend data	0.1 sec (fastest) *3
Waveform data	0.1 sec (fastest) *3
Output	
Trend data	Rotation speed, GAP, OA amplitude, 0.5X amplitude / phase, 1X amplitude / phase, 2X amplitude / phase, nX amplitude*4 / phase, Not 1X amplitude, 1X amplitude, Sp-p max amplitude
Waveform data	Synchronous sampling waveform, asynchronous sampling waveform

*3 Actual acquisition interval may differ depending on the number of channels and / or system requirements.
*4 "n" of "nX" can be set to any number between 0.01 and 10.00 in 0.01X step.

Kenjin Data Viewer Software XJ-3100

By importing the full backup or partial backup files containing the data acquired by the Kenjin KJ-2000B and XJ-2100 to PCs with the XJ-3100 Data Viewer Software installed, the data can also be displayed and analyzed by the XJ-3100 Data Viewer Software.

Note: The XJ-3100 Data Viewer Software has the same data display and analysis functions as the XJ-2100 Analysis Software, but it cannot directly acquire data by connecting the KJ-2000B Data Acquisition Unit.



*1 1 For the Express Edition version of Microsoft SQL Server, the maximum loadable file size is 10 GB.