SKF MicroVibe P™

CMVL 3860-ML
Portable Vibration Meter

User Manual P/N 32178100-EN

Revision A

User Manual

⚠ ***WARNING!*** Not certified for use in hazardous locations.
Read this manual before using this product. Failure to follow the instructions and safety precautions in this manual can result in serious injury. Keep this manual in a safe location for future reference.

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SKF Reliability Systems

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TSG-EMEA@skf.com for customers in EMEA region (Europe, Middle East, and Africa)

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Please take a moment to register your product at www.skf.com/cm/register to receive exclusive benefits offered only to our registered customers, including receiving technical support, tracking your proof of ownership, and staying informed about upgrades and special offers. (Please visit our website for more details on these benefits.)

Tell us how we're doing!

It's important that you're satisfied with the quality of our product user manuals. We appreciate your feedback; if you have comments or suggestions for improvement, please tell us how we're doing!

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SKF Reliability Systems Limited Warranty

WARRANTY

Subject to the terms and conditions contained herein, SKF warrants to the Buyer that for the warranty period indicated below the products sold by SKF that are listed below (the "Products"), when properly installed, maintained and operated, will be free from defects in material and workmanship and shall be fit for the ordinary purposes for which the Products are designed.

BUYER'S LIMITED REMEDIES

This limited warranty defines SKF's sole and exclusive liability and Buyer's sole and exclusive remedy for any claim arising out of, or related to, any alleged deficiency in any Product sold by SKF, even if such claim is based on tort (including negligence or strict liability), breach of contract, or any other legal theory.

If the Product does not conform to this limited warranty, Buyer must notify SKF or SKF's authorized service representative within thirty (30) days of discovery of the nonconformity; provided, however, that SKF shall not be liable for any claim for which notice is received by SKF more than thirty (30) days following the expiration of the applicable warranty period for the Product. Upon receipt of timely notification from Buyer, SKF may, at its sole option, modify, repair, replace the Product, or reimburse Buyer for any payment made by Buyer to SKF for the purchase price of the Product, with such reimbursement being pro rated over the warranty period.

WARRANTY PERIOD

Except as expressly provided below, the warranty period for each Product shall commence on the date the Product is shipped by SKF to Buyer.

90-DAY WARRANTY

Products warranted for ninety (90) days by SKF are as follows: cable assemblies, MARLIN QuickConnect (MQC), magnetic temperature probes, and all refurbished equipment.

ONE-YEAR WARRANTY

Products warranted for one (1) year by SKF are as follows: all Microlog products and accessories, all MARLIN data managers (MDM), all MARLIN Condition Detectors (MCD), all Wireless Machine Condition Detectors (WMCD), all Multilog Condition Monitoring Units (CMU, TMU), Multilog Local Monitoring Units (LMU), all Wireless Monitoring Systems V/T, all Vibration PenPlus, all transmitters, all SKF software, all Monitor Interface Modules (MIM), all Machine Condition Transmitters (MCT), MicroVibe P and Custom Products with the prefix of CMCP (with the exception of any consumable or expendable items).

TWO-YEAR WARRANTY

Products warranted for two (2) years by SKF are as follows: all standard Eddy Probes, Eddy Probe Drivers, and Eddy Probe Extension Cables, Multilog On-line Monitoring system (DMx), and all M800A and VM600 Machinery Monitoring Systems.

For all On-line Systems that have satisfied Criteria 1 and 2 below, the warranty period shall be either thirty (30) months from the date the On-line System is shipped by SKF to Buyer, two (2) years from the date the On-line System is installed and commissioned by SKF, or two (2) years from the date on which the installation of the On-Line System has been audited and commissioned by SKF or its authorized service representative, whichever period ends first.

Criteria 1.

Devices used with a Multilog Condition Monitoring Unit (CMU), Multilog Local Monitoring Unit (LMU), including, but not limited to, the sensing device, the interconnect cabling, junction boxes, if any, and the communications interface, must consist only of SKF-supplied or

SKF-approved devices and/or components. The computer provided by Buyer must meet the requirements stipulated by SKF.

Criteria 2.

SKF or its authorized service representative has installed the On-line System or has audited the installation and commissioned the On-line System.

"On-line Systems" are defined as systems consisting of Multilog Condition Monitoring Unit(s) (CMU), Multilog Local Monitoring Unit(s) (LMU), and any sensing or input devices, the interconnect cabling between the sensing or input devices and the Multilog Condition Monitoring Unit(s) (CMU), Multilog Local Monitoring Unit(s) (LMU), and the cabling between the Multilog Condition Monitoring Unit (CMU), Multilog Local Monitoring Unit (LMU) and the proprietary SKF communications interface with the host computer.

FIVE-YEAR WARRANTY

Products warranted for five (5) years by SKF are as follows: all standard seismic sensors (accelerometers and velocity transducers).

OTHER SKF PRODUCTS

Any SKF product supplied hereunder but not covered by this limited warranty shall be either covered by the applicable SKF limited warranty then in place for such product or, if no such warranty exists, shall be covered by the 90-day warranty stated above.

THIRD PARTY PRODUCT WARRANTIES

For any third party products sold to Buyer by SKF, SKF will transfer to Buyer any warranties made by the applicable third party product vendor to the extent such warranties are transferable.

CONDITIONS

As a condition to SKF's warranty obligations hereunder and if requested or authorized in writing by SKF, Buyer shall forward to SKF any Product claimed by Buyer as being defective. Buyer shall prepay all transportation charges to SKF's factory or authorized service center. SKF will bear the cost of shipping any replacement Products to Buyer. Buyer agrees to pay SKF's invoice for the then-current price of any replacement Product furnished to Buyer by SKF, if the Product that was replaced is later determined by SKF to conform to this limited warranty.

SKF shall not be obligated under this limited warranty or otherwise for normal wear and tear or for any Product which, following shipment and any installation by SKF (if required by the contract with the Buyer), has, in SKF's sole judgment, been subjected to accident, abuse, misapplication, improper mounting or remounting, improper lubrication, improper repair or alteration, or maintenance, neglect, excessive operating conditions or for defects caused by or attributable to the Buyer, including without limitation Buyer's failure to comply with any written instructions provided to Buyer by SKF.

SKF shall be free to conduct such tests, investigations and analysis of the Products returned to SKF, as it deems reasonable and proper in the exercise of its sole judgment. As a further condition to SKF's obligations hereunder, Buyer shall offer its reasonable cooperation to SKF in the course of SKF's review of any warranty claim, including, by way of example only, Buyer's providing to SKF any and all information as to service, operating history, mounting, wiring, or re-lubrication of the Product which is the subject of the Buyer's warranty claim.

EXCEPT WARRANTY OF TITLE AND FOR THE WARRANTIES EXPRESSLY SET FORTH IN HEREIN, IT IS UNDERSTOOD AND AGREED THAT: (a) SKF MAKES NO OTHER WARRANTY, REPRESENTATION OR INDEMNIFICATION, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED

WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT; (b) IN NO EVENT SHALL SKF BE LIABLE OR OBLIGATED FOR SPECIAL, EXEMPLARY, PUNITIVE, INCIDENTAL, DIRECT, INDIRECT, GENERAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BY WAY OF EXAMPLE ONLY, LOST PROFITS OR SAVINGS, LOSS OF BUSINESS OR LOSS OF USE) OR ANY OTHER LOSS, COST OR EXPENSE IN CONNECTION WITH THE PRODUCTS AND RELATED SERVICES, IF ANY, PROVIDED BY SKF, AND THIS DISCLAIMER SHALL EXTEND AS WELL TO ANY LIABILITY FOR NONPERFORMANCE CAUSED BY SKF'S GROSS OR ORDINARY NEGLIGENCE, AND IN ALL CASES REGARDLESS OF WHETHER OR NOT ANY OF THE FOREGOING WERE FORESEEABLE OR THAT SKF WAS ADVISED AS TO THE POSSIBILITY OF SUCH DAMAGES, LOSS, COST, OR EXPENSE; AND (c) NO PERSON HAS BEEN AUTHORIZED BY SKF TO MAKE ANY FURTHER OR CONTRARY INDEMNITIES, REPRESENTATIONS OR WARRANTIES ON BEHALF OF SKF. THE FOREGOING LIMITATIONS AND DISCLAIMERS OF LIABILITY SHALL BE MADE APPLICABLE TO THE SALE OF ANY PRODUCT BY SKF TO THE FURTHEST EXTENT PERMITTED BY APPLICABLE LAW.

The exclusive remedies provided in this limited warranty shall not be deemed to have failed of their essential purpose so long as SKF is willing and able to perform to the extent and in the manner prescribed in this limited warranty.

CM-F0001
(Revision P, 12-07)

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Thank you for purchasing SKF Reliability Systems' MicroVibe P™ portable vibration meter.

Reference the Safety Practices section in this user manual for important safety information.

Read the Pocket PC user manual before using the MicroVibe P. Master the basic operations, perform the initial setup, then prepare to operate the MicroVibe P.

The following topics are described in this User Manual:

- How to use the MicroVibe P
- Vibration Measuring Methods
  - This user manual is written assuming you have mastered the basic operations of the Pocket PC unit. Refer to the Pocket PC user manual for more information. For ActiveSync details, (synchronization application to transfer the data between Pocket PC and PC), install the Pocket PC accessory ActiveSync CD-ROM for and refer to the ActiveSync **Help** menu.

For questions regarding the MicroVibe P system or this User Manual, contact SKF's Technical Service Group or your SKF Service Representative.

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TSG-Americas@skf.com
or
TSG-EMEA@skf.com for customers in Europe, Middle-East, and Africa

For questions regarding the Pocket PC, contact your device manufacturer.

For questions regarding ActiveSync, contact the Microsoft Corporation.

- Print and keep this User Manual with the MicroVibe P unit.
- Copying software and documentation is prohibited by the Copyright Act.
- Rental of software is prohibited by the Copyright Act.
- SKF Reliability Systems is not responsible for damage, profit loss, or any other claims from third parties or use of accessory software.
- The contents saved in Pocket PC Memory (Built-in memory, Memory card etc.) is not covered by our warranty irrespective of the cause of fault and trouble.
- It is recommended to perform a backup of the saved contents periodically.
- Accessory software is not available for units other than the CMVL 3860 MicroVibe P.
- The technical specification of this unit and software may be changed without notice.
  - Microsoft, ActiveSync, Windows logo, and PocketACCESS are registered trademarks of Microsoft Corporation in USA or sister company.

- The formal name of Windows is Microsoft Windows Operating System.
- Compact Flash Card is referred to as CF Card in this User Manual.

The system name and product names shown in the User Manual are registered trademarks of the respective manufacturers.

⚠Safety Practices

Observe the following safety practices when using the MicroVibe P:

- When measuring a hot machine or near a rotating shaft or moving components, if possible, attach the vibration sensor with the machine stopped, then start the machine, bring it up to nominal speed, and perform the measurement. If you must measure in dangerous conditions, avoid burns and be careful not to catch yourself or the MicroVibe P cable in rotating machine components.
- Do not allow water or foreign material to enter the MicroVibe P unit.
- If the MicroVibe P is not operating properly, contact your SKF Reliability Systems Representative for troubleshooting assistance.
- Do not open the cover. If the MicroVibe P's outer cover is opened or modified, it may cause serious damage and void any warranty. Contact your SKF Reliability Systems Representative for inspection and repairs.
- Use the specified sensor cable only. The use of any other cable may cause damage to the MicroVibe P unit.
- Ensure the MicroVibe P connector is attached to the Pocket PC properly.
- Do not allow metal chips to enter the connector area, else a short circuit may occur between the pins and present a fire hazard.
- Insert the MicroVibe P module straight into the Pocket PC unit when connecting. If the connector is misaligned when inserted, it may cause a short circuit and present a fire hazard.

Table of Contents

1
Introduction

Overview

The SKF MicroVibe P is a portable vibration meter expansion module that fits into a Pocket PC's CF card slot (Type II). The MicroVibe P system consists of the MicroVibe P module, the MicroVibe P Pocket PC application (firmware), and the MicroVibe P Data Management Software application.

- Supported Pocket PCs with Windows Mobile 2003: The MicroVibe P has been tested to work with Hewlett Packard iPAQ hx2200 and HP iPAQ hx2700.
- Supported Pocket PCs with Windows Mobile 2005: The MicroVibe P has been tested to work with HP iPAQ hx2790, HP iPAQ hx2490/2495.
- Supported Pocket PCs with Windows Mobile 2006: The MicroVibe P has been tested to work with HP iPAQ 210, 211, 212.

SKF cannot guarantee the compatibility with other models or operating systems.

- The list of supported Pocket PCs will expand as new Pocket PCs become available. Please contact your SKF representative for the most current list.

Basic Features

- Conforms to the CF card expansion slot (Type II)
- Highly expandable
- Versatile – Provides vibration measurements and all other Pocket PC functions.
- Compact and light weight
- Abnormal vibration analysis
- Abnormal judgment function by vibration severity (ISO-10816)
- Simultaneous measurement of overall vibration level, multi-mode
- Earphone function allows audio analysis
- Low to high frequency measurements
- Use with accelerometer, electro-dynamic velocity sensor
- Selects sensor best suited for measurement type
- Vibration terminology dictionary included

Advanced Features

- FFT spectrum analysis

- Time waveform analysis
- Saved data is transferred to host computer using ActiveSync
- Data analysis and data record available when data is stored in common host computer
- Abnormal bearing judgment function by enveloped acceleration (E3) mode

MicroVibe P Kit Components (Model CMVL 3860-ML)

The MicroVibe P Kit contains the following components:

Description	Q'ty	Model	Remark	
MicroVibe P module	1	CMVL 3860		
Accelerometer with 5 ft integral cable, plug and Stinger	1	CMSS 3811		
Two-Bar Magnet	1	CMAC 3825		
Earphones	1	CMAC 3830		
Data Management Software (CD) and MicroVibe P application	1	CMAC 3860	Includes: MicroVibe P Documentation 3 PDFs manuals	
Hard Copy CE Declaration of Confirmation	1 each			
Carrying Case	1			
OPTIONAL Velocity Sensor, with 5 ft (1.5 m) integral cable and plug, Sensitivity: 20 mV/in/sec,	Optional	CMSS 3812	Optional	

- The Pocket PC unit and Velocity Sensor (CMSS 3812) are not included.

Figure 1.
MicroVibe P Kit Components.

2
Preparation

MicroVibe P Overview

Pocket PC with Installed MicroVibe P Module

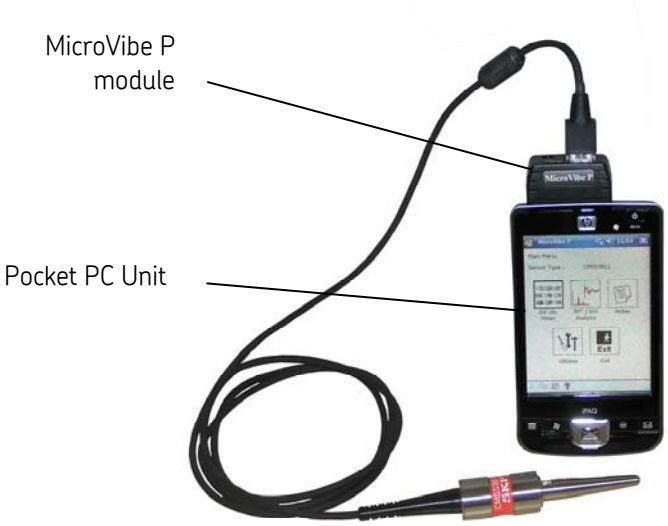


Figure 2.
Example Pocket PC With MicroVibe P Installed.

View of the MicroVibe P

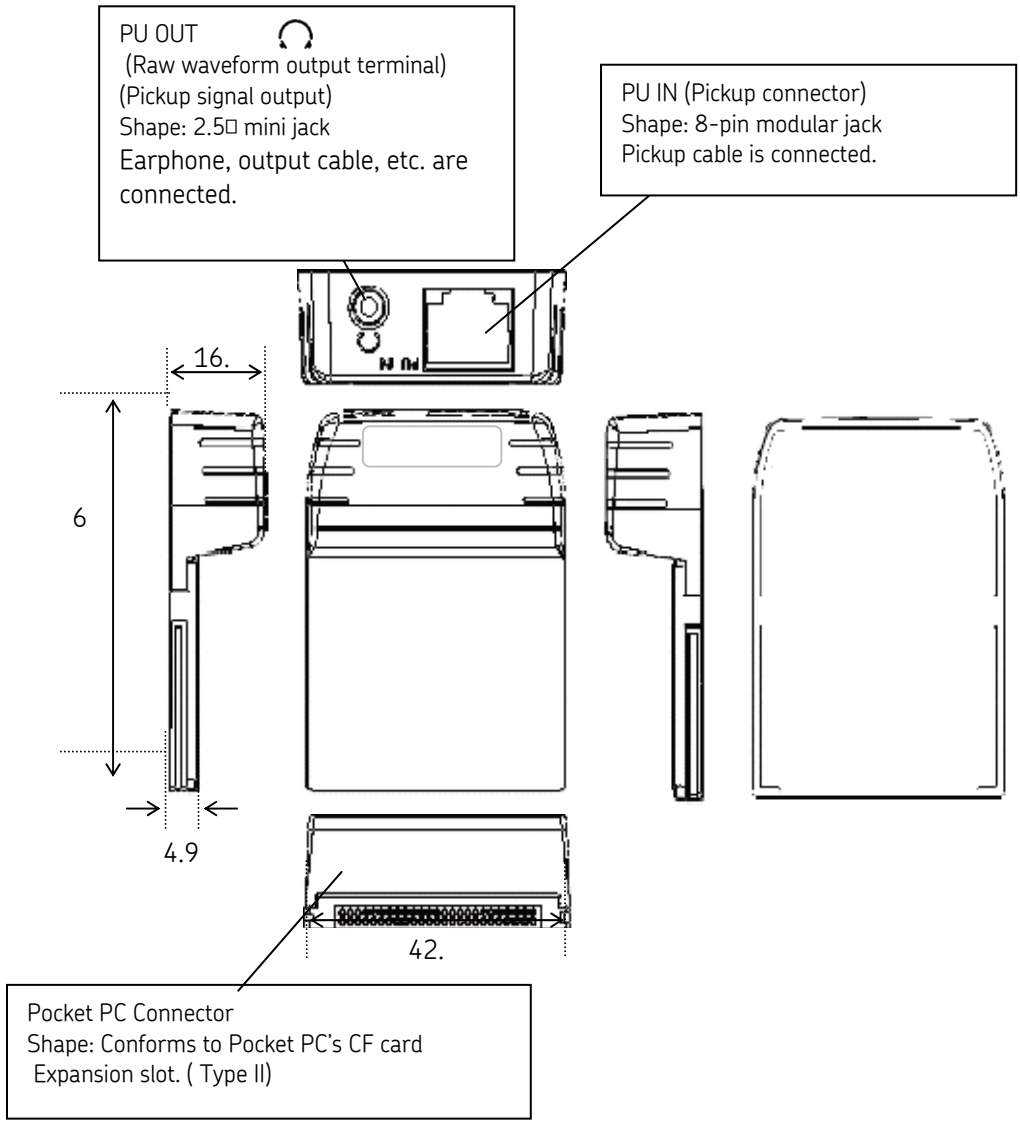
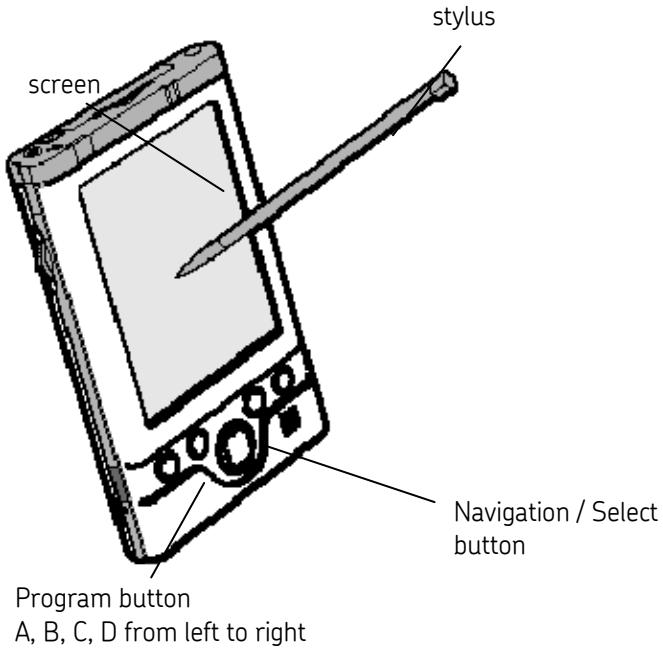


Figure 3.
MicroVibe P / Pocket PC Diagram.

View of the Pocket PC

Important: The button arrangement shown below depends on the type of Pocket PC used. Refer to your Pocket PC user manual for specific information.

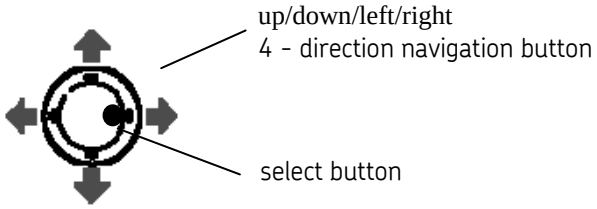


Program button

Press the program button to start the assigned program. The program starts even if the unit's power is off. A typical program button configuration is Calendar / Tasks / Home / Contacts, depending on the type of Pocket PC. The program button can be assigned to the MicroVibe P program. Refer to the Pocket PC user manual for more information.

Navigation button

Press the four-direction cursor button up, down, left, or right to navigate the cursor focus on the screen.



The cursor button's center button is the select button.

To use the stylus:

Use the stylus to use the menus and to input data on the Pocket PC's touch screen.

Tap	Touch once on the screen to select a screen menu, icon, or button.
Tap & Hold	Touch and hold an icon or item on the screen.
Drag	Tap and drag with the stylus to move icons, perform manual input, and draw on the screen.

Installing the MicroVibe P Pocket PC Application

ActiveSync Partnership

The MicroVibe P system requires an ActiveSync **standard** partnership between the Pocket PC and the Personal Computer (desktop or laptop computer).

The Pocket PC cradle and ActiveSync software allow you to synchronize the Pocket PC to your Personal Computer (PC). You must install the ActiveSync software (version 3.7 or higher) on the PC before placing the Pocket PC in the cradle, or connecting the cradle to the PC. Run the ActiveSync installation program and follow the onscreen instructions.

IMPORTANT
When running the ActiveSync installation, be sure to select a standard partnership.

- Use the cradle to connect the personal computer to the Pocket PC.

IMPORTANT
Do not insert MicroVibe P's card in Pocket PC until firmware installation is complete.

MicroVibe P Application Installation

Installing MicroVibe P Application

- Place the Pocket PC in the cradle, and connect the USB cable to your personal computer.
- Turn on the Pocket PC.
- With your PC running in Microsoft Windows 2000 or Windows XP, insert the MicroVibe P CD into your CD drive. The install program automatically launches.
- Select the appropriate language from the displayed menu.
- Select the ActiveSync version installed on the computer. Click **Go**.
  - For details about checking the version of ActiveSync, reference **Checking ActiveSync Version** section.
- Click the MicroVibe P firmware **Install** button. Double-click the **setup.exe** file, as instructed, to launch the installation wizard.
- Follow the on-screen instructions to install MicroVibe P firmware.

Checking ActiveSync Version

- Locate the ActiveSync icon on the taskbar and double-click to launch ActiveSync.
- Click **Help** / **About Microsoft ActiveSync**. The **About Microsoft ActiveSync** dialog displays.

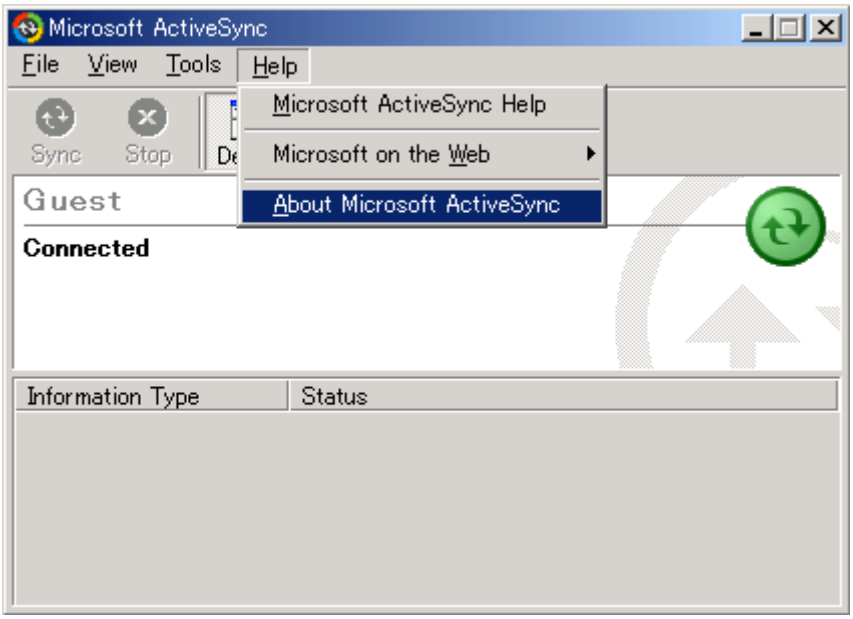


Figure 4.
ActiveSync's Help Menu.

- On the **About Microsoft ActiveSync** dialog, confirm the version number. If the version is 3.xx.x, then install ActiveSync 3.x at Setup selection.

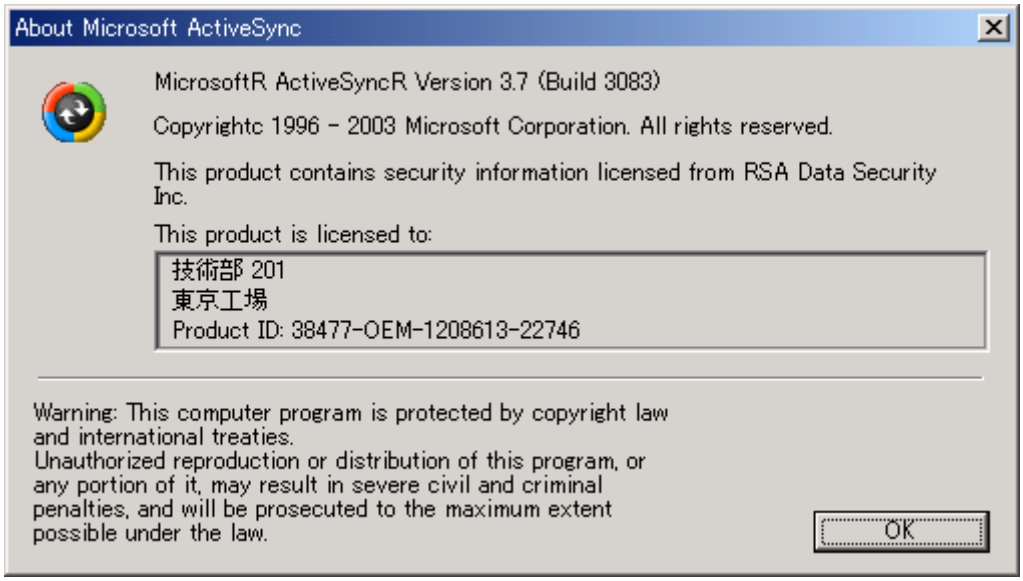


Figure 5.
ActiveSync's About Microsoft ActiveSync Dialog for Version 3.x.x.

- If 4.xx.x is shown, then install 4.xx at **Setup** selection.

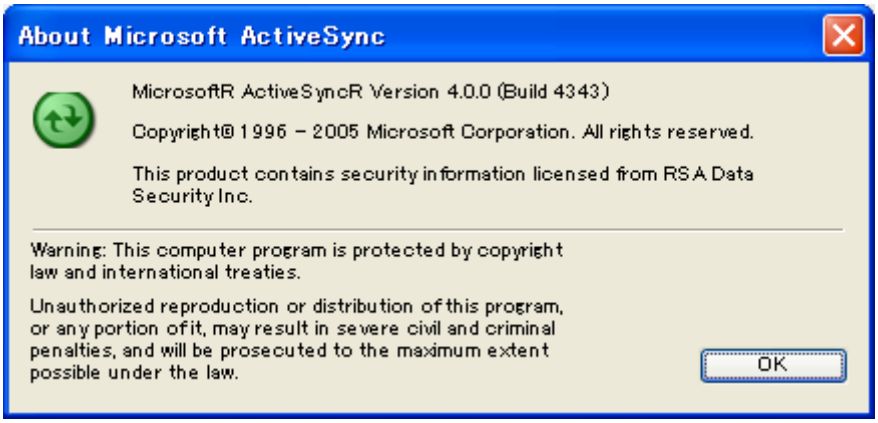


Figure 6.
ActiveSync's About Microsoft ActiveSync Dialog for Version 4.x.x.

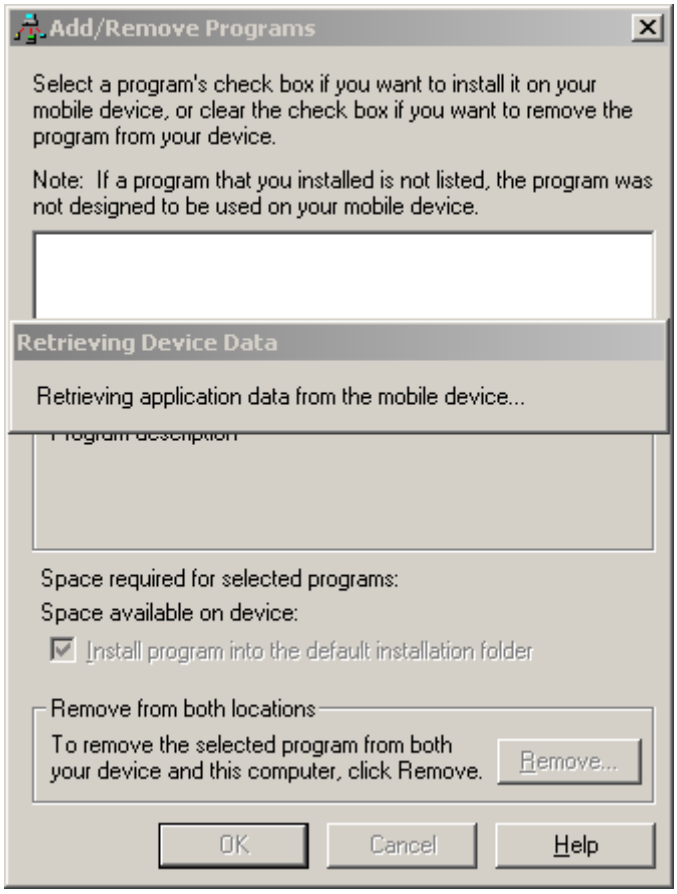


Figure 7.
Installation Screen 1.

The installation process begins and the first installation screen displays.

- Click **OK** to continue installing MicroVibe P.

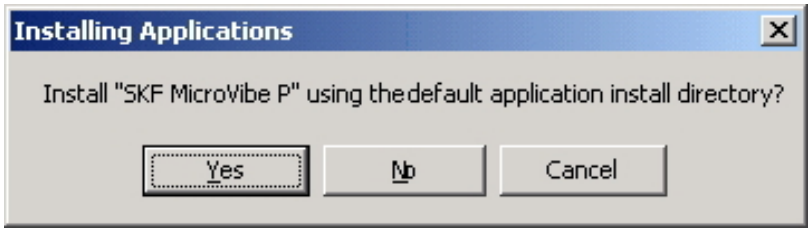


Figure 8.
Installation Screen 2.

- When prompted, click **Yes** to install SKF MicroVibe P in the default directory.

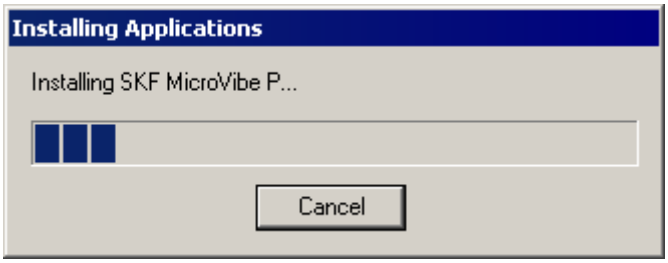


Figure 9.
Installation Progress Screen.

Figure 10.
Installation Screen 3.

- When prompted, check your Pocket PC's screen and perform any necessary additional steps. Click **OK** to continue.

If a previous version of MicroVibe P is detected on the Pocket PC, the following screen displays.

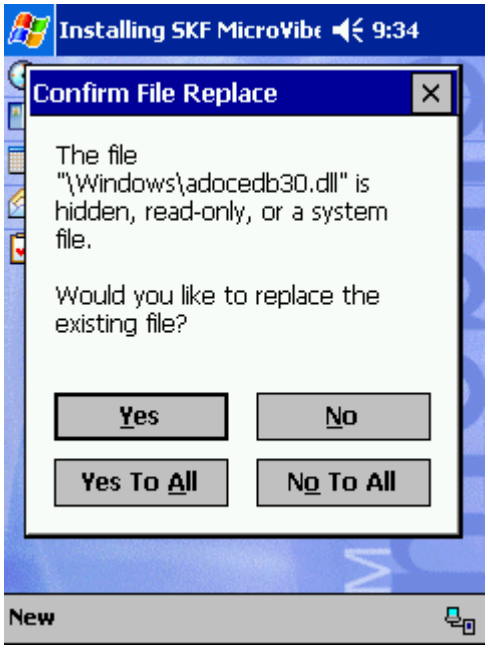


Figure 11.
Pocket PC's Confirm File Replace Screen.

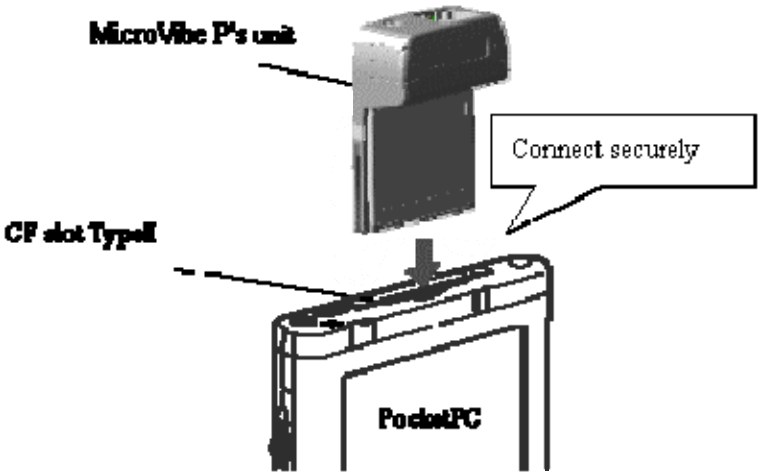
- When prompted, click **Yes** or **Yes To All** to replace previous MicroVibe P files with the new installation.

- Reset your Pocket PC. Refer to your Pocket PC User Manual for instructions on performing a reset.

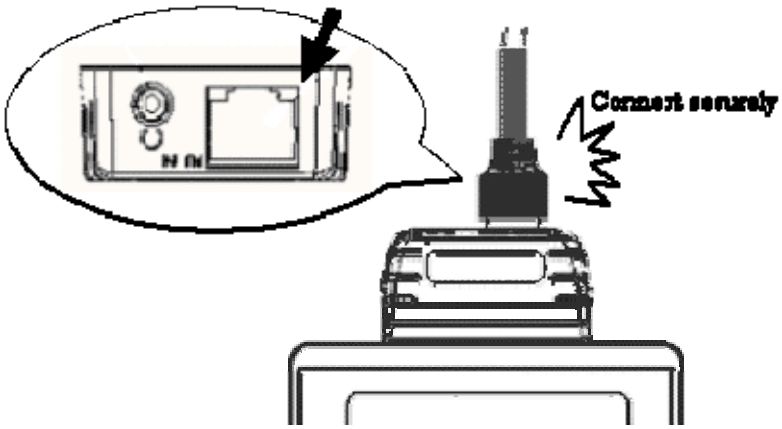
The installation procedure is now complete.

To start the MicroVibe P Pocket PC Application:

- Turn the Pocket PC off.
  - Refer to your Pocket PC user manual for information on proper handling of CF cards for your device.
- Insert the MicroVibe P card in CF slot.
  - Some Pocket PCs automatically turn on when the card is inserted.



- Connect the sensor cable to the PU IN connector.



- If it is not already turned on, turn on the Pocket PC.
- Locate the MicroVibe P icon in the **Start** menu's **Programs** directory.
- With the stylus, tap the MicroVibe P icon .

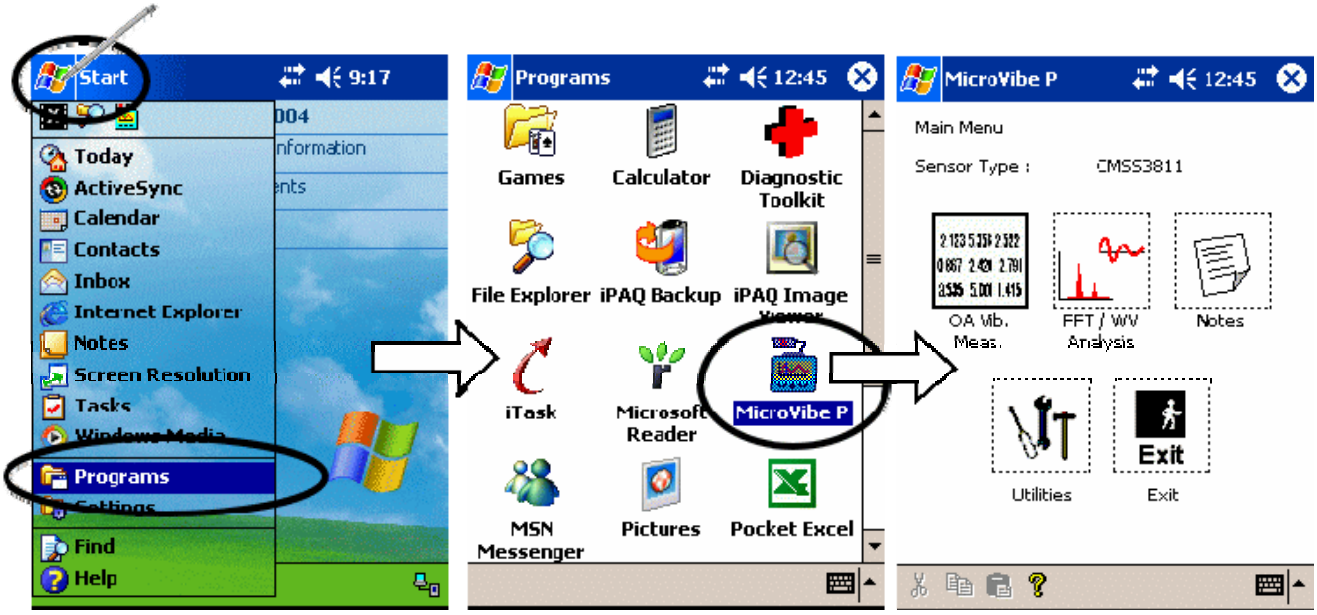


Figure 12.
Launching MicroVibe P.

➢ Ensure MicroVibe P is the only program running on the Pocket PC. Additional running programs may interfere with MicroVibe P's operation.

Sensor Setting

- Set the sensor sensitivity in the **Utility Menu**'s **Sensor/Sensor Sensitivity Setting** screen.
  Refer to the **Using the Utility Menu / Sensor** section later in this manual for more information on sensor use.

Additional Setup Procedures

- Use the **Utility Menu**'s **Units** option to select either **English** or **Metric** measurement units.
- Use the **Utility Menu**'s **Accel fmax** option to set fmax for acceleration overall vibration (the measurement upper frequency limit).
  ➢ FFT measurements provide an fmax setup option.

3
General Operation

MicroVibe P Main Menu

When launched, the MicroVibe P's **Main Menu** screen displays.

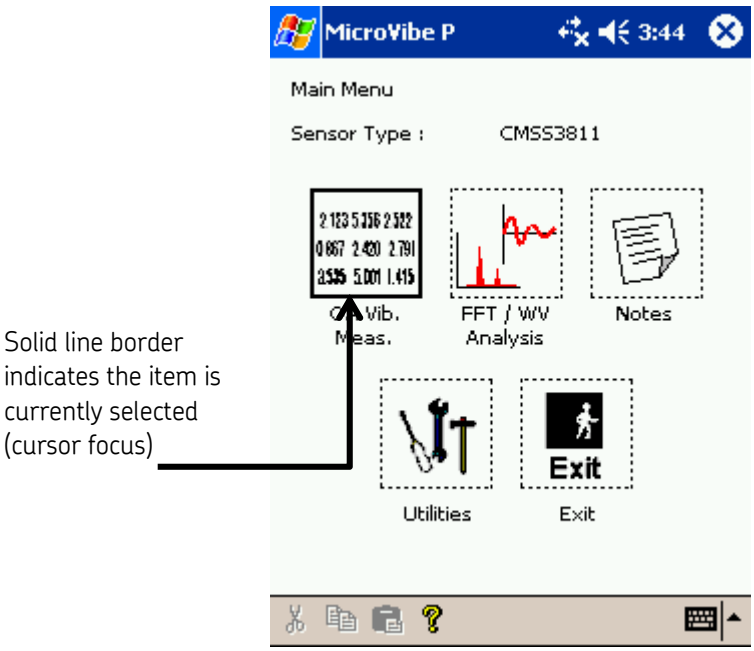


Figure 13.
MicroVibe P's Main Menu **Screen.**

The **Main Menu** displays the current Sensor Type at the top of the display. If necessary, set the sensor type and sensitivity using the **Utility Menu's Sensor** option. Refer to the Using the **Utility Menu** / **Sensor** section later in this manual for more information on sensor settings.

To navigate MicroVibe P screens:

- Use the navigation button to move the cursor focus left, right, up, or down. Press the navigation button's center button to select the current item.

Main Menu Overview

- ➢ Each **Main Menu** option is explained in detail later in this user manual.

OA Vib. Meas. (Overall Vibration Measurements)

- Tap the **OA Vib. Meas**. button to display the vibration level (overall value) measurement screen.

FFT / WV Analysis (Fast Fourier Transformation Spectrum Analysis / Waveform Value Analysis)

- Tap the **FFT WV Analysis** option to display the frequency analysis measurement / waveform value screen.

Notes

- Tap the **Notes** button to add notes to hierarchy list items.

Utility

- Tap the **Utility** option to display the **Utility Menu**.

Exit

- Tap the Exit option to exit the MicroVibe P program.

Using the Vibration Sensor

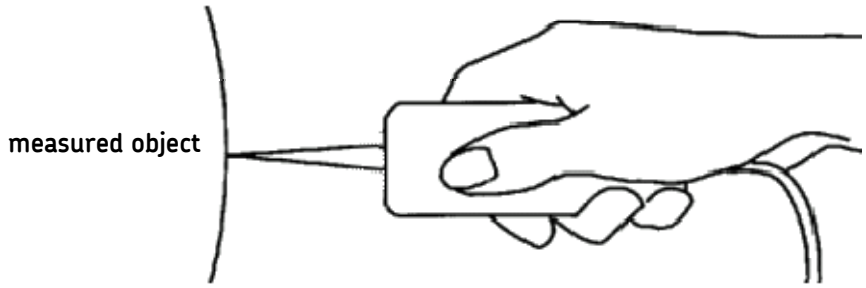
The MicroVibe P supports two types of sensors:

CMSS 3811 Accelerometer

CMSS 3812 Electro-Dynamic Velocity Sensor (optional)

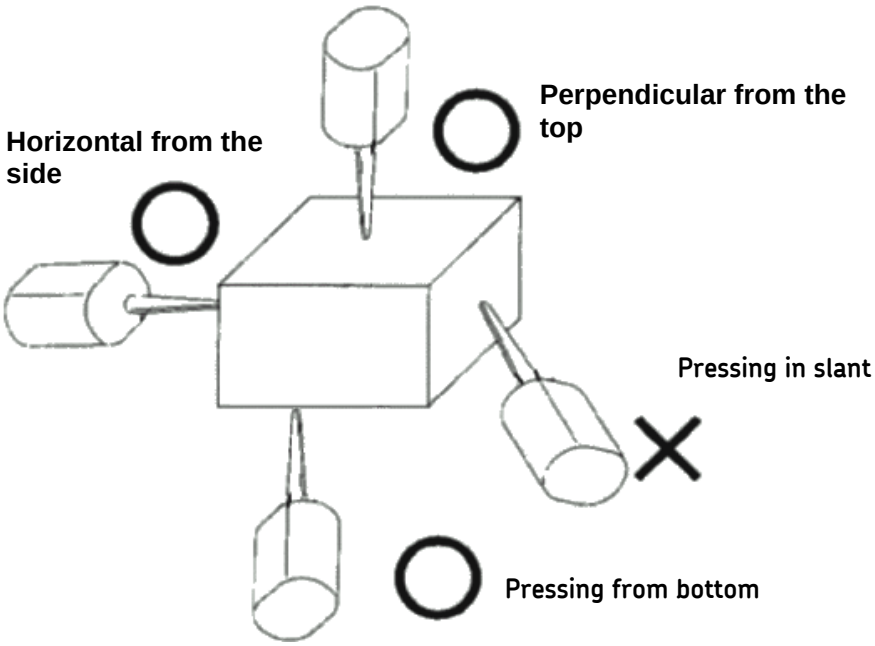
Observe Proper Sensor Orientation

Hold the vibration sensor against the object to be measured. Tap the MicroVibe P's measurement **Start** button to initiate measurement collection.



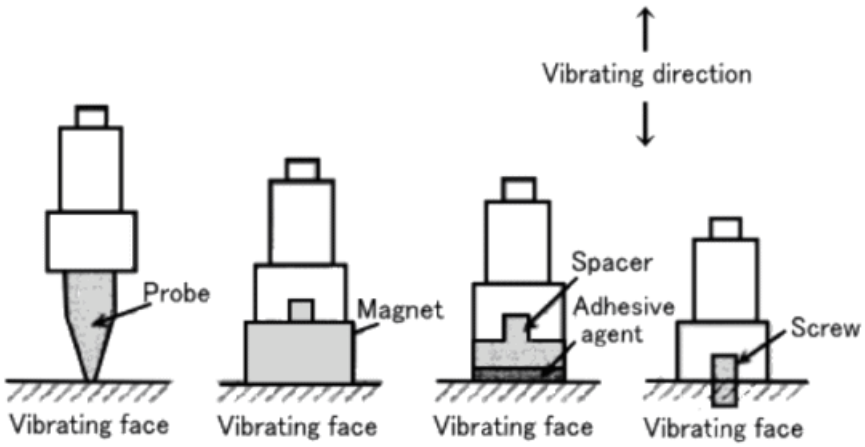
Proper Way to Hold Vibration Sensor Against Object.

- ➢ Ensure the correct direction and angle of the sensor.



Examples of Proper and Improper Ways to Hold Sensor Against Object.

- SKF Reliability Systems recommends the use of a magnet for waveform measurement and long term frequency analysis.
  - Do not move sensor during measurement.



Vibration Practices, Most Effective to Least Effective from Left to Right.

Using the PU OUT Connector

- Connect optional earphones or output cable to the PU OUT connector.
- Tap the Measurement screen's **Start** button to enable sound output.

The output is a voltage in which the sensor input voltage is amplified by the magnification of the measured range.

Working with the Hierarchy

An equipment hierarchy consists of plants, machines, and points you create to organize your measurement data. Use the **Hierarchy** to associate your performed measurements with points. Data must be associated with hierarchical points to upload to the MicroVibe P Data Management software.

IMPORTANT
If you intend to use the MicroVibe P Data Management software on a desktop PC, you must create and edit all hierarchy information on the desktop computer and not on the Pocket PC unit. All downloads initiated from the data management software override information stored on the Pocket PC. Therefore, any hierarchies created on the Pocket PC unit are deleted when a download is performed. If you do not intend to use the data management software, hierarchies may be created and edited on the Pocket PC device. Plants, machines, and points created on the Pocket PC are identified by an asterisk (*) in the **Edit Hierarchy** screen's selection window.

Tap the Hierarchy button to display the **Hierarchy** screen. This screen can be displayed using the Hierarchy button from either the **Measurement** screen or the **Save Data** screen.

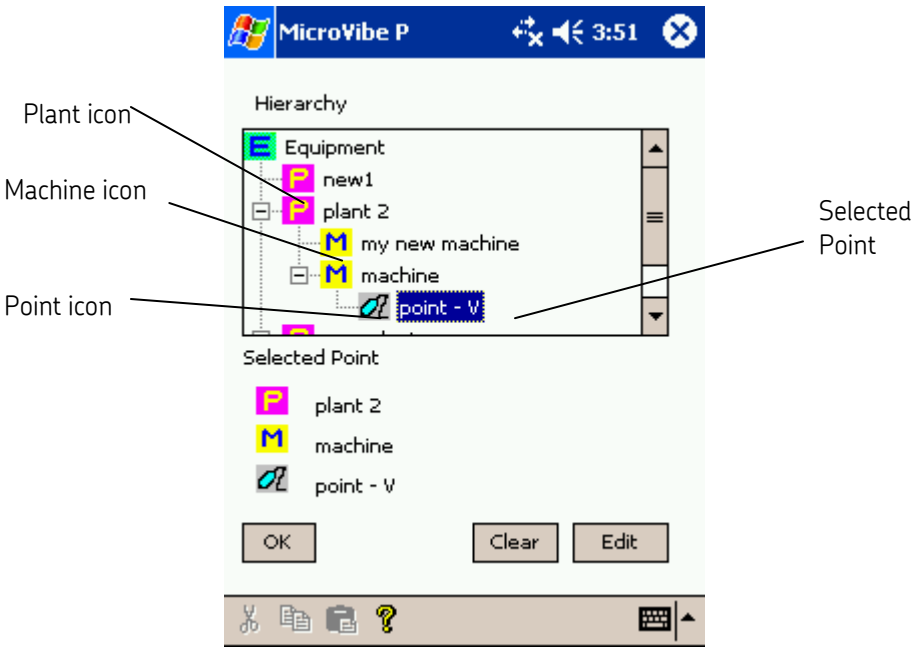


Figure 14.
The Hierarchy List Screen.

From the hierarchy list, select the point with which you wish to associate your current measurement data.

Hierarchy List

Displays all hierarchy items including plant name, machine name, and point name.

Hierarchy Items

Hierarchy list items are identified by the following icons:

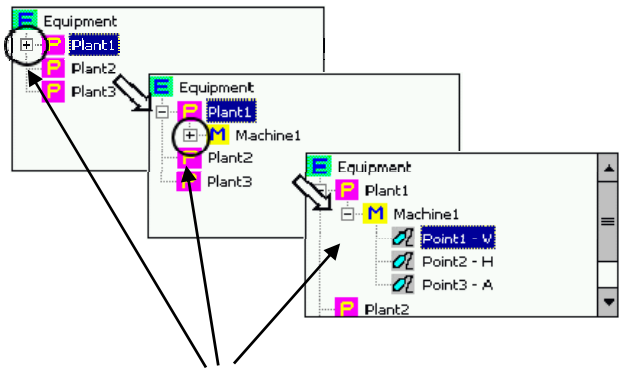
 Plant

 Machine

 Point

Plants must branch from the **Equipment** (top-level) hierarchy item. Machines must branch from plants, and points must branch from machines.

When working with the hierarchy, you must first indicate the appropriate hierarchy mode using the hierarchy item icons. To work with plants, tap the plant icon, then tap the **Equipment** level to see all available plants. Similarly, tap the machine icon and then select the appropriate "parent" plant to work with machines. Tap the point icon, then select the appropriate "parent" machine to work with points.



Using the stylus, tap the + or – icons to expand or contract the active hierarchical structure.

To select a point:

- Using the stylus, tap the point icon. Since points must branch from machines, tap to select the "parent" machine.

- Tap on the point in the hierarchy list. The selected point displays in the **Selected Point** area. The plant and machine from which the selected point branches also display.

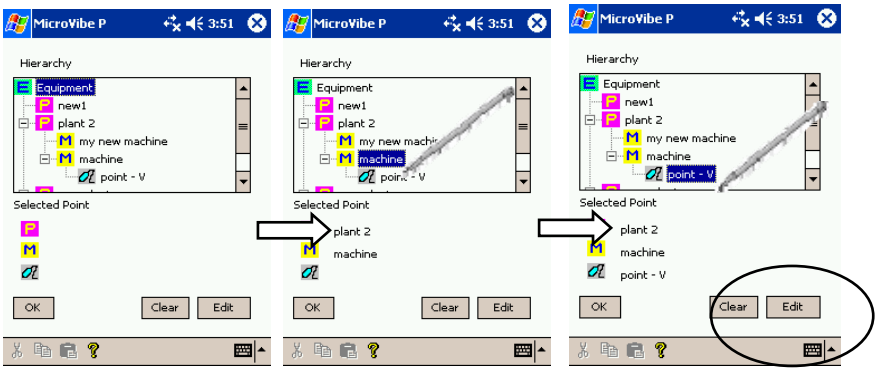


Figure 15.
Selecting a Point from the Hierarchy List.

Select

- Tap **Select** to select the point currently highlighted from the hierarchy list
  - ➢ The select button only selects the point on this screen. You must tap the **OK** button to select the current point to be associated with your current measurement.

Clear

- Tap to clear the measurements associated with the selected point.

Edit

The **Edit** option allows you to edit individual hierarchy items created on the Pocket PC only.

- Tap to edit the hierarchy list. Use the plant, machine, and point icons to select which hierarchy item type you wish to edit.
- Select the hierarchy item (of the selected type) you wish to edit from the lower window's item list. Items created on the Pocket PC are identified by an asterisk (*). Only items created on the Pocket PC allow editing from the Pocket PC. All other hierarchy items must be edited using MicroVibe P Data Management software on a desktop PC.
- Tap the **Edit** button and edit any necessary fields. Tap **OK** to save changes, or **Cancel** to return to the hierarchy screen without saving changes.

Hard Key Operation

A button Same as **OK** button

B button – Same as **Cancel** button.

C button – Same as **Clear** button.

D button – Same as **Edit** button.

4

Performing and Saving Measurements

Overall Vibration Measurements

➢ The **Main Menu** displays the **Sensor** type at the top of the display. If necessary, set the sensor type and sensitivity with the **Utility Menu**'s **Sensor** option. Refer to the **Using the Utility Menu / Sensor** section later in this manual for more information on sensor settings.

To perform an overall vibration measurement:

- Tap the **Main Menu's OA Vib. Meas**. option. The Overall Vibration Measurement screen displays.

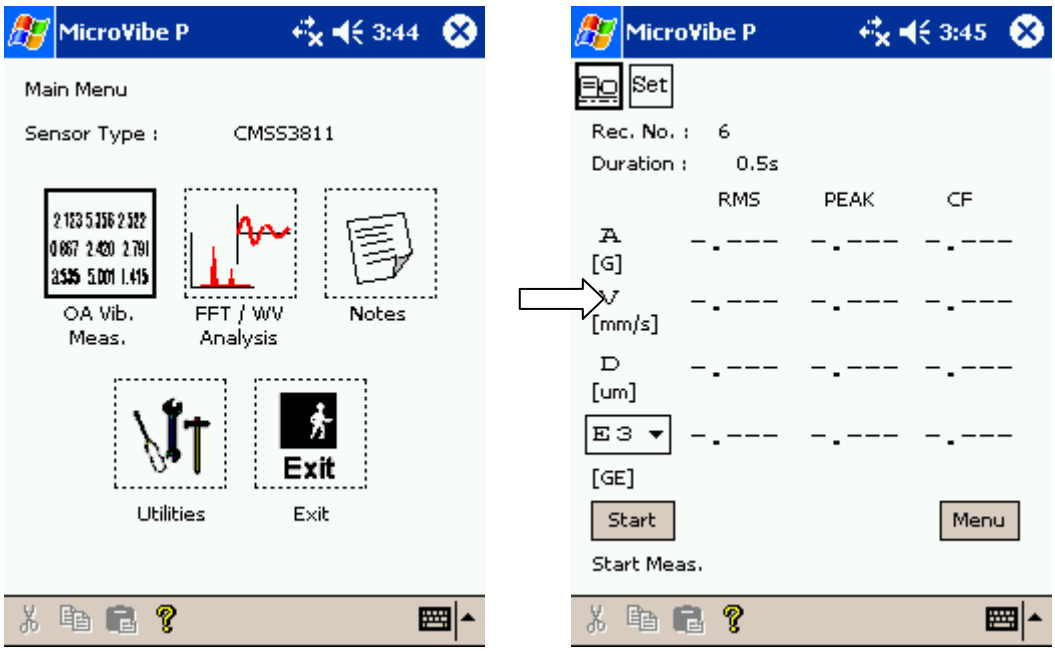


Figure 16.
Selecting the Overall Vibration Measurement Screen.

Overall Measurement screen

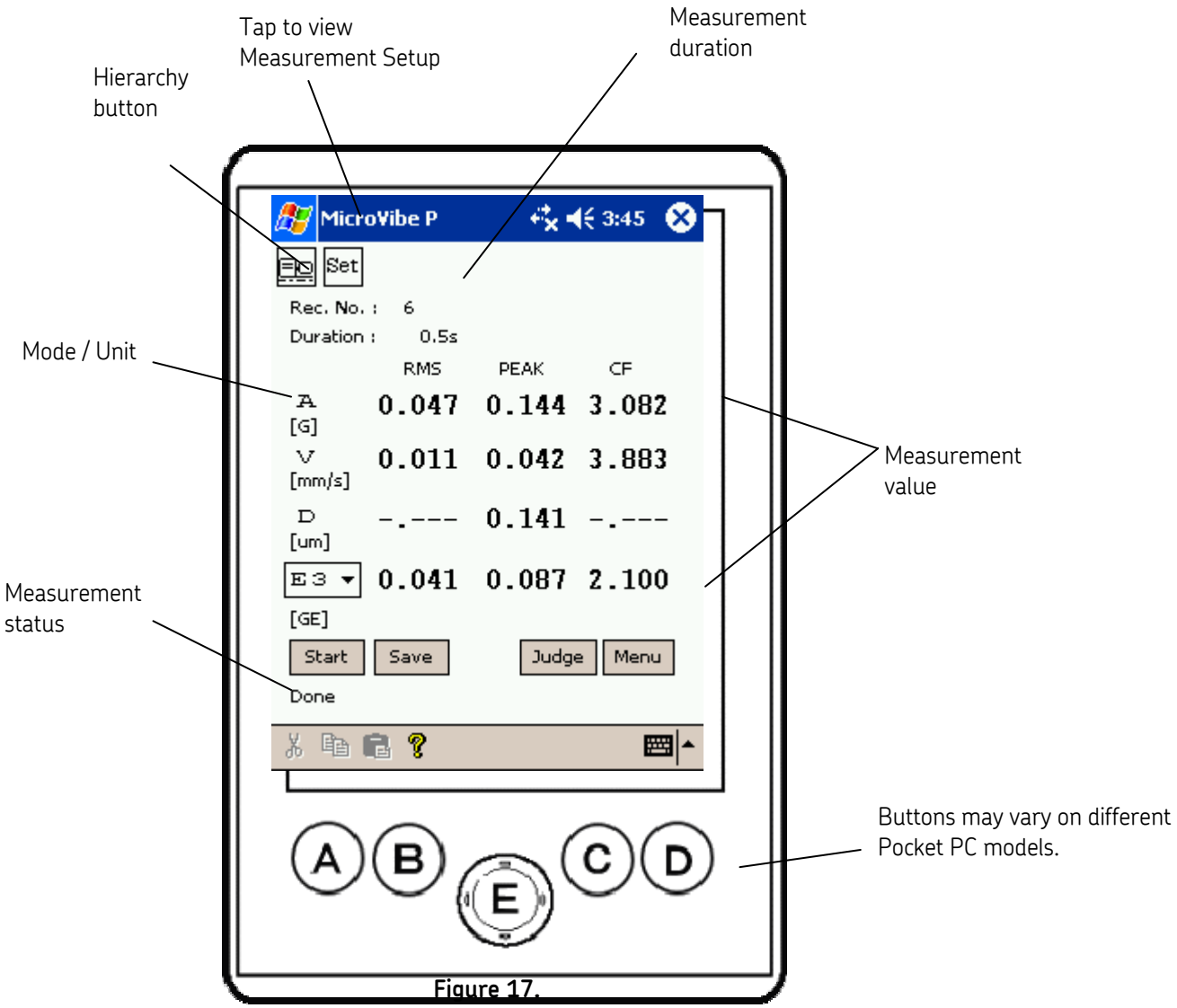


Figure 17.
The Overall Measurement Screen.

Information on the Overall value measurement screen includes:

Hierarchy Button

Tap to display the equipment hierarchy.

Set

Tap to display the **Meas. Setup** screen.

Rec. No.

Displays the measurement data's assigned record number. The number is automatically sequentially assigned.

Duration

Displays the measurement duration. This value may be entered on the Measurement Setup screen.

Mode Unit

A – acceleration, V - velocity, D - displacement, E1 – Envelope Detection (5Hz – 100Hz), E2 – Envelope Detection (50Hz – 1000Hz), E3 – Envelope Detection (500Hz – 10kHz), E4 – Envelope Detection (5kHz – 20kHz) –

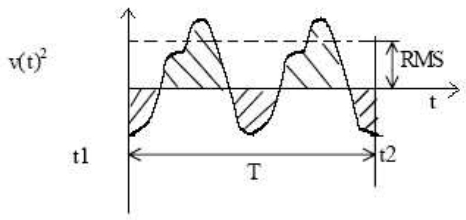
- Specify the measurement type, units, and detection.
  - The default setting for the CMSS 3811 sensor is (**A**) acceleration.
  - The default setting for the CMSS 3812 sensor is (**V**) velocity.
  - Measurement units are determined using the **Utility Menu's Units** option.
  - If a velocity sensor is specified, only V and D measurements are available.

	Metric	**English**
Acceleration	**G (RMS·PEAK·CF)**	**G (RMS·PEAK·CF)**
Velocity	**mm / sec (RMS·PEAK·CF)**	**inch / sec (RMS·PEAK·CF)**
Displacement	**μm – (PEAK to PEAK)**	**mils – (PEAK to PEAK)**
Enveloped Acceleration	**GE (RMS·PEAK·CF)**	**GE (RMS·PEAK·CF)**

RMS (root mean square value)

Displays the Root mean square value. The square root of the average of the squared values of each momentary measured value during measurement time (range).

$$Vrms = \sqrt{\frac{1}{T}\int_{t1}^{t2} V(t)^2\, dt}$$



PEAK (peak value)

Displays the Peak Value; the maximum value in measurement time (range).

$$Vpeak = |V(t)|\max$$

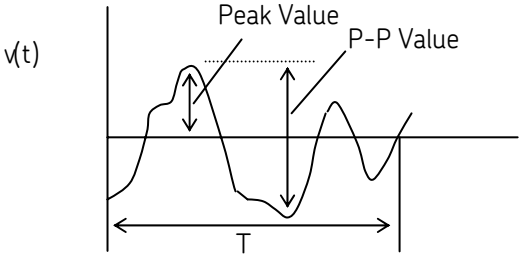


Fig: Peak

CF (Crest Factor)

Displays the Crest factor; the ratio of Peak value to RMS value. Crest Factor is used to identify impulsive response

$$CF = \frac{Peak}{RMS}$$

Measurement Value

Displays the Measurement value.

E1 / E2 / E3 / E4 drop down list

Use to select the appropriate pre-configured Enveloped Acceleration setting among **E1/E2/E3/E4**, and perform the measurement.

- By default, the most common filter band, **E3**, is selected.
- Only a Bearing Evaluation judgment is available if **E3** is selected.

Start button

Starts the measurement.

Save button

Displays the Save Data screen, allowing you to specify how to save the measurement data.

Judge button

Displays the judgment selection menu screen allowing you to select to view the **ISO Vibration Evaluation Standard** for velocity measurements or the **Bearing Evaluation** for enveloped acceleration (E3) measurements.

Menu button

Displays the main menu screen.

Measurement Status

Displays the Measurement Status.

Start Tap the **Start** button to begin the measurement.

Busy... Displays while the MicroVibe P is performing the measurement.

Done Displays when the measurement is complete.

Hard Key Operation

A button :Starts measurement (Measurement button)

B button :Displays the **Save Data** screen (Save button)

C button :Displays the **Judge** option's menu screen (Judge button)

D button :Displays the **Main Menu** screen (Menu button)

Measurement Setup – Overall Value Measurements

To set up the OA Vib. Measurement:

Set

Tap the OA Vib.Measurement display's Set button. The **Meas. Setup** screen displays.

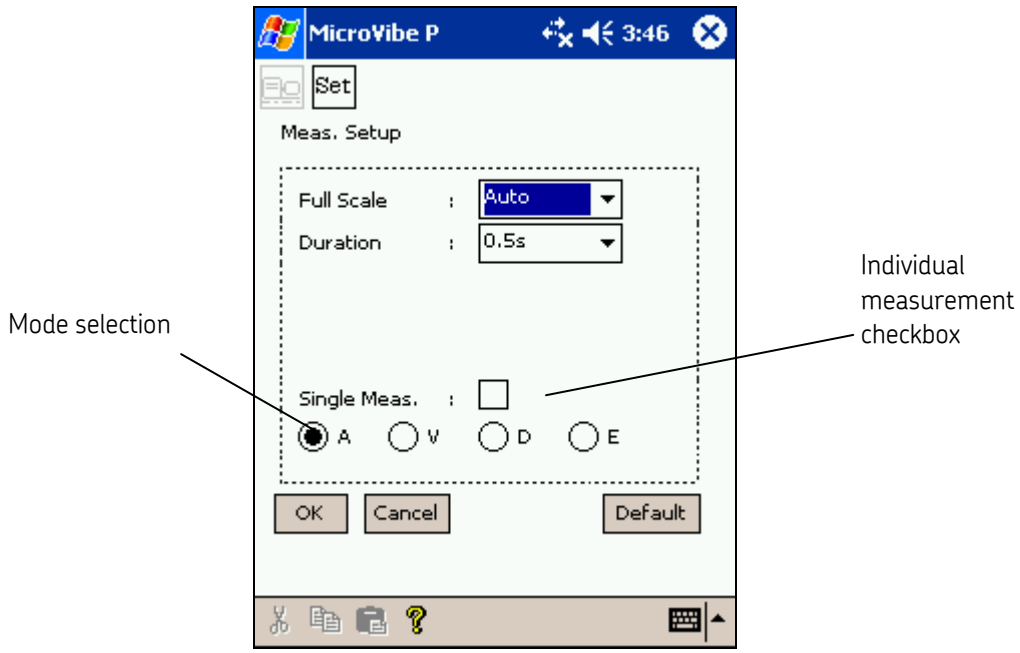


Figure 18.
Overall Value Measurement Setup.

Full Scale

The MicroVibe P is equipped with an autorange function that automatically determines the suitable full scale value before the measurement is performed.

Duration

Select the appropriate measurement duration, in seconds from the drop down list (0.1s, 0.5s. or 1 s)

- The default setting is 0.1s.

Single Measurement checkbox

The single measurement checkbox allows you to perform only one type of measurement. The mode selection buttons beneath allow you to specify which single measurement type to perform. Available single measurement modes are Acceleration (**A**), Velocity (**V**), Displacement (**D**), and Enveloped Acceleration (**E**).

For example, if you are only interested in the velocity measurement, click the checkbox to enable single measurement, and then select the **V** mode selection button to specify velocity.

➢ By default, the Single Measurement setting is not enabled.

Default

Tap to reset all **Meas. Setup** fields to the default values.

- Click **OK** to save measurement setup settings and return to the overall value measurement screen
- Click **Cancel** to return to the overall value measurement screen without saving your setup settings.

Hard Key Operation

A button Same as **OK** button.

B button :Same as **Cancel** button.

D button :Same as **Default** button.

Performing the Overall Measurement

- Place the vibration sensor in the correct measuring position and tap the **Start** button or press the hardkey button A on the Pocket PC's bottom left to begin the measurement.
  - ➢ The measurement process begins immediately once the **Start** button is pressed. Ensure the sensor is properly placed before pressing the **Start** button.

The measurement status area displays measurement status as either **Busy...** (the MicroVibe P is performing the measurement) or **Done** (the measurement is complete). When complete, the measurement results display.

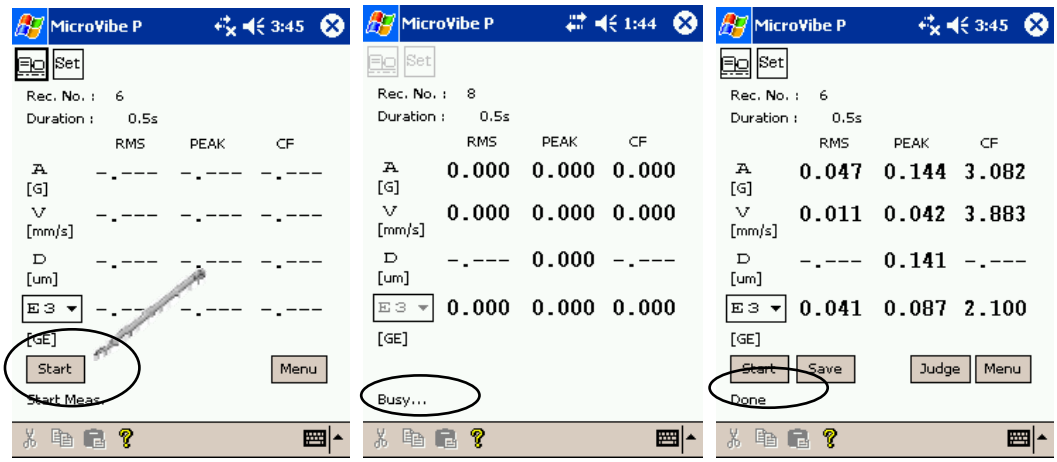


Figure 19.
The Measurement Status Area.

Measurement Results Numerical Display

The numerical display shows the measurement's numerical values and measurement units. Measurement results are displayed as RMS, Peak, and C.F. (crest factor).

Vibration Level Judgment

The **Judge** button displays when the measurement results in a condition that prompts the abnormal judgment function. Two types of abnormal Judgments are available, depending on the vibration measurement type:

ISO Evaluation – available for Velocity measurements.

Bearing Evaluation – available for Enveloped Acceleration (E3) measurements.

- If the performed measurement is for an individual measurement other than a velocity or enveloped acceleration measurement, the **Judge** button does not display.

To perform a vibration evaluation:

- Tap the Judge button. The Select Vibration Standard Evaluation screen displays.

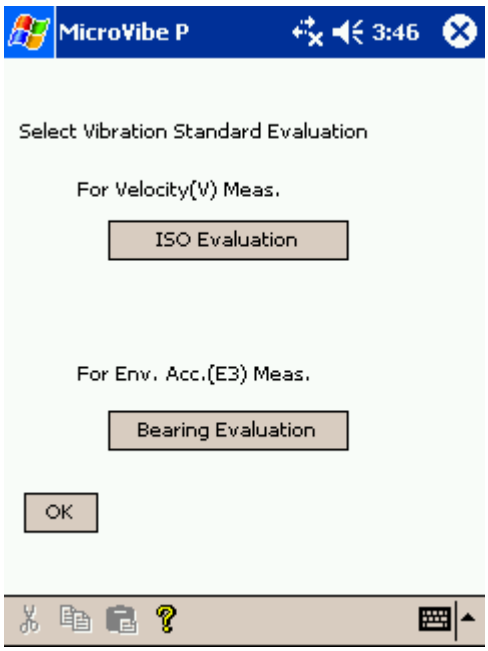


Figure 20.
The Select Vibration Standard Evaluation Screen.

ISO Evaluation option

- Tap to display the **ISO Vibration Evaluation** screen.
  - Available for velocity measurements only.

Bearing Evaluation option

- Tap to display the **Bearing Evaluation** screen.
  - Available for enveloped acceleration measurements only.

Machinery Vibration Level Judgment

ISO Vibration Evaluation

The **ISO Vibration Evaluation** screen displays the judgment condition based on the measurement value and the machinery classification.

Use the class selection buttons to specify the machinery classification for your machinery vibration measurement. The judgment ranges update for the selected machine class.

- If unsure of the proper machinery classification, press the Information (?) button for a more detailed description of the ISO standard.

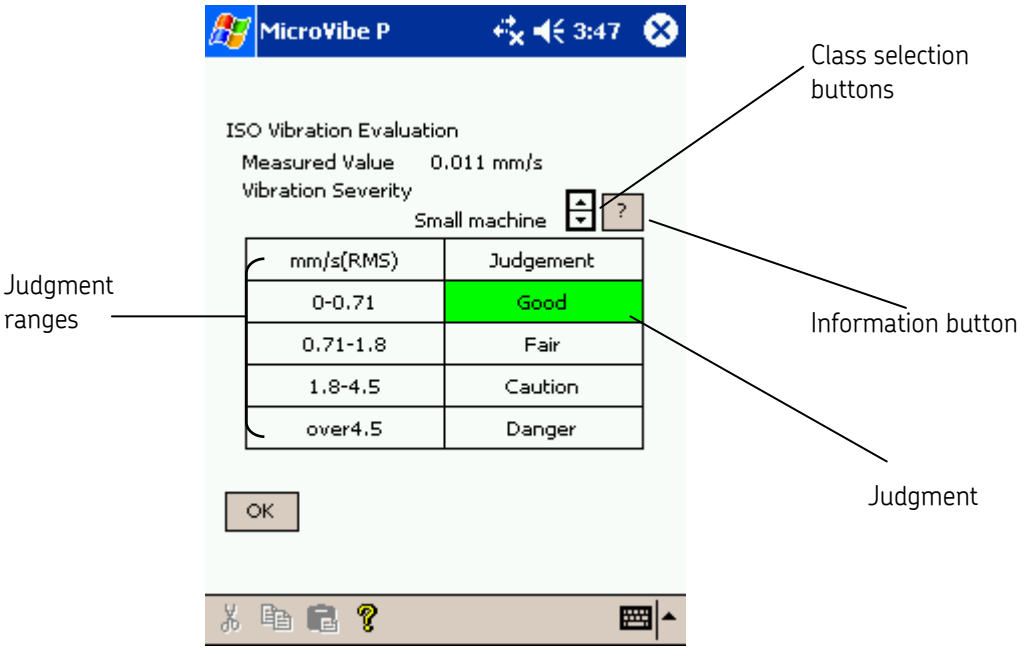


Figure 21.
The ISO Vibration Evaluation Screen.

Measured Value

Displays the RMS velocity.

Class selection buttons

Use the class selection buttons to specify the machinery classification for your machinery vibration measurement. Click to scroll up and down through the available options: **Small Machine/Medium Machine/Large Machine A/Large Machine B**

Judgment

Displays the judgment result. The corresponding column of the ISO table is highlighted in the color appropriate to the result.

Information button

If unsure of the proper machinery classification use the Information button (?) button for a more detailed description of the ISO standard.

Hard Key Operation

A button Same as **OK**

ISO Severity Judgment:

Vibration evaluation standard by ISO-10816 (JIS-B-0906).

1.Applied standard

600-12000rpm

2.Measuring point

Point where vibration energy is transmitted to the resilient mountings.

(bearings and mountings points of the machine)

3.Rotor classification

(a)Small machine(Class 1)

Machine of which electrical motor up to 15kW

(b)Medium-sized machine(Class 2)

Machine of which electrical motor with 15-75kW or up 300kW on special foundations

(c)Large Machine A (Class 3)

Large machine mounted on rigid and heavy foundations

(d)Large Machine B (Class 4)

Large machine mounted on found which are relatively soft in the direction of vibration measurement

Bearing Evaluation

The **Bearing Evaluation** screen displays the judgment condition based on the measurement value and the machinery classification.

Select the Classification according to the inner diameter of bearing and the rotational number of the shaft.

- If unsure of the proper machinery classification, press the Information (?) button for a more detailed description of the Bearing Evaluation.

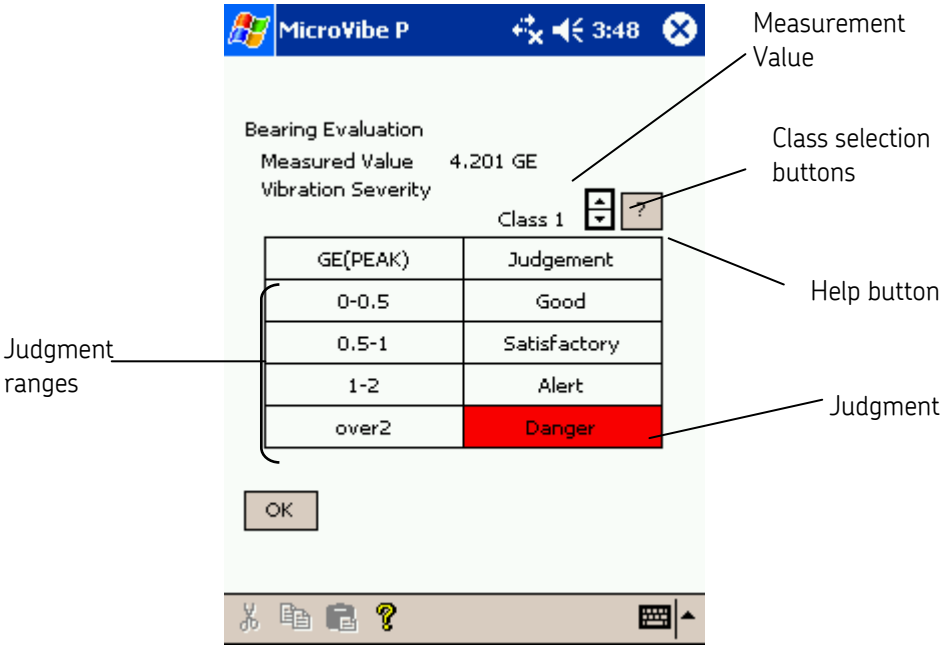


Figure 22.
The Bearing Evaluation Screen.

Measurement value

Displays the PEAK enveloped Acceleration E3 (GE).

Class selection buttons

Use the class selection buttons to specify the machinery classification for your bearing vibration measurement. Click to scroll up and down through the available options:

(a) Class1

bearing bore diameter

:Dia. between 200 and 500 mm

shaft speed

:Speed<500rpm

(b) Class2

bearing bore diameter

:Dia. between 50 and 300 mm

shaft speed

:Speed between 500 and 1800 rpm

(c) Class3

bearing bore diameter

:Dia. between 20 and 150 mm

shaft speed

:Speed is either 1800 or 3600 rpm

Judgment

Displays the judgment result. The corresponding column of the Bearing Evaluation table is highlighted in the color appropriate to the result..

Information button

If unsure of the proper machinery classification use the Information button (?) button for a more detailed description of the Bearing Evaluation.

Hard Key Operation

A button Same as **OK**

Saving Overall Measurement

To save the measurement results:

- From the overall value measurement screen, tap the **Save** button to display the **Save Data** screen.

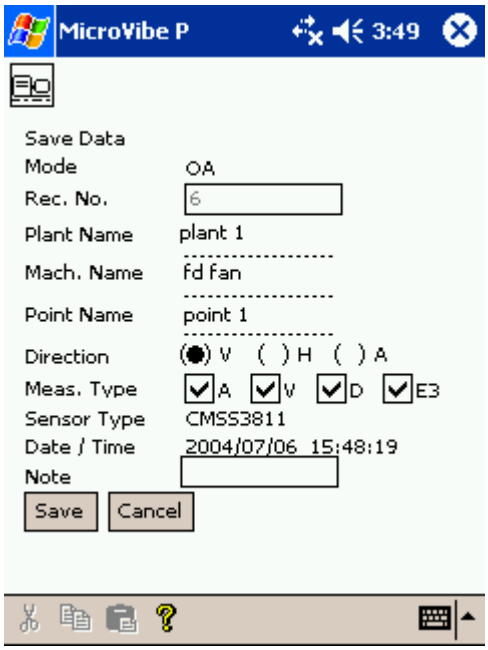


Figure 23.
The Save Data – Overall Measurement Screen.

Mode

Displays the measurement mode. (Overall Value measurement is displayed as **OA**.)

Rec. No.

Displays the measurement data's assigned record number. The number is automatically sequentially assigned.

Plant Name

Use the stylus and Pocket PC keyboard to enter the plant name you wish to associate with the saved data, if applicable, or tap the **Hierarchy** button to select the plant from the hierarchy list.

Mach. Name

Use the stylus and Pocket PC keyboard to enter the machine name you wish to associate with the saved data, if applicable, or tap the **Hierarchy** button to select the machine from the hierarchy list.

Point Name

Use the stylus and Pocket PC keyboard to enter the point name you wish to assign to the saved data, if applicable, or tap the **Hierarchy** button to select the point from the hierarchy list.

Direction

Select the appropriate detection direction for the data. Options include **V** (vertical), **H** (horizontal), and **A** (axial).

Meas. Type

Select the appropriate measurement type(s) to save. Options include **A** (acceleration), **V** (velocity), **D** (displacement), and **E3**(enveloped acceleration).

- By default, all measurement types are selected to be saved.

Sensor Type

Displays the type of sensor used.

Date / Time

Displays the measurement's date and time.

Note

Enter a note to store with the data (e.g. noisy, odor, leak, etc.).

- Notes are limited to 50 bytes.

Save

Press to save data into the database.

Cancel

Exits **Save Data** screen without saving.

Hard Key Operation

A button Same as **Save** button

B button – Same as **Cancel** button.

FFT Spectrum and Waveform Analysis

- FFT measurements and waveform measurements are performed simultaneously. Tap the FFT / Waveform icon to toggle between the two types of graphical displays.
- Before performing the measurement, ensure the correct sensor settings are entered in the **Utilities** menu's **Sensor** screen. Refer to the **Utility Menu** / **Sensor** section later in this manual for more information on sensor settings.

To perform simultaneous measurement and analysis:

- Tap Main Menu's FFT WV Analysis option.

- Tap either the FFT or waveform icon  to perform the measurement and analysis simultaneously.

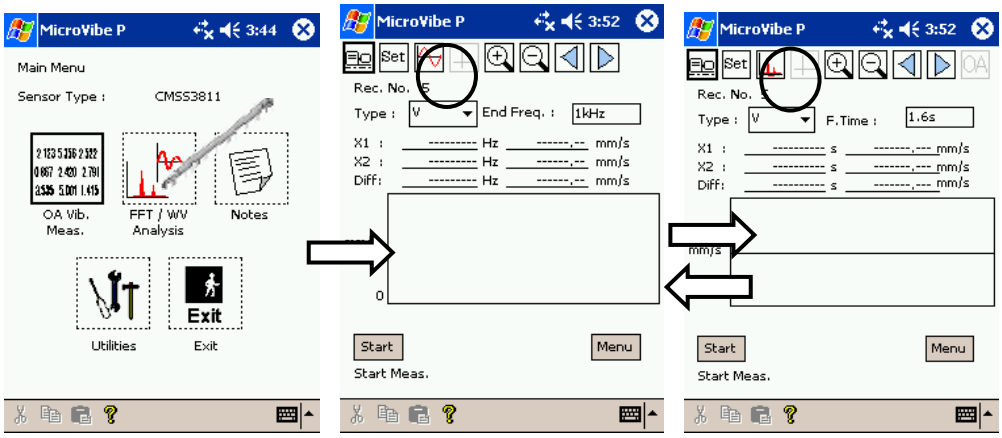


Figure 24.
Displaying the FFT / Waveform Analyses Screens.

To set up the FFT Spectrum and Waveform analysis measurement:

Set

Tap the measurement screen's **Set** button to display the **Meas. Setup** screen for FFT WV analysis.

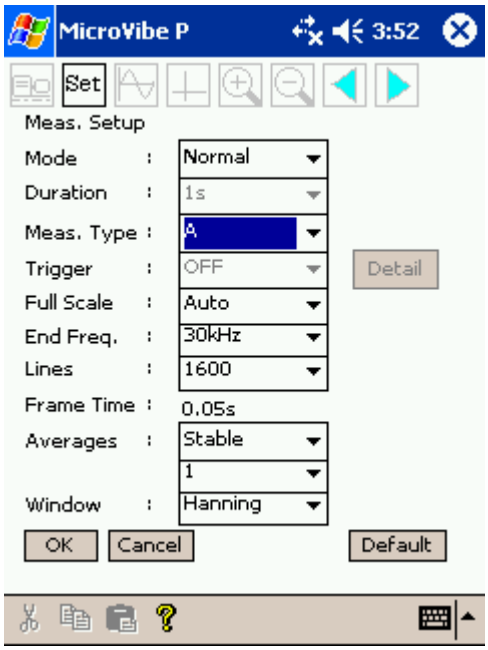


Figure 25.
The FFT Measurement Setup Screen.

Mode

Select the appropriate mode. Options include:

Normal

The waveform data's recording time is determined by the FFT analysis settings (end frequency, number of lines). The FFT executes the measurement of the specified average cycle and records the waveform (1 frame time).

Recorder

Records the waveform for the specified recording time (1,2,5, or 10 seconds). The average FFT cycle is 1-time.

Post Process

Performs the calculation using raw waveform data prior to recording (temporarily saved data). This mode is available when **Normal** or **Recorder** mode is selected. The average FFT cycle is 1-cycle.

- When **Post Processing** mode is selected, the **Full Scale** and **Trigger** options are unavailable.

Duration

Select the recording duration from the drop down list. Options include 1s, 2s, 5s, 10s.

- The **Duration** field is only available if the **Mode** setting is **Recorder.**

Meas. Type

Select the appropriate measurement type from the drop down list. Options include: **A** (acceleration), **V** (velocity), **D** (displacement), **E1, E2, E3, E4** (enveloped acceleration).

- For the CMSS3811 sensor, the default setting is **A** (acceleration). For the CMSS3812 sensor, the default setting is **V** (velocity)

Trigger

Enable or disable the measurement trigger by selecting **On** or **Off.** The trigger type is the input trigger signal.

- Select a fixed full scale value to use the trigger function. The trigger function is not available when **Autorange** is selected.

Detail Button

- Tap the **Details** button to display the **Trigger Detail Setting** screen allowing you to set up the measurement trigger.

Threshold (% Full Scale) – Select the appropriate trigger level from the drop down list **(0-90%**). The trigger level should be high enough to avoid triggering on random noise. The trigger level is set as a percentage of your specified full scale range.

Delay (% Meas. Time) – Set the trigger delay from the drop down list (**0-50%**). The trigger delay is set as a percentage of your specified measurement waveform time.

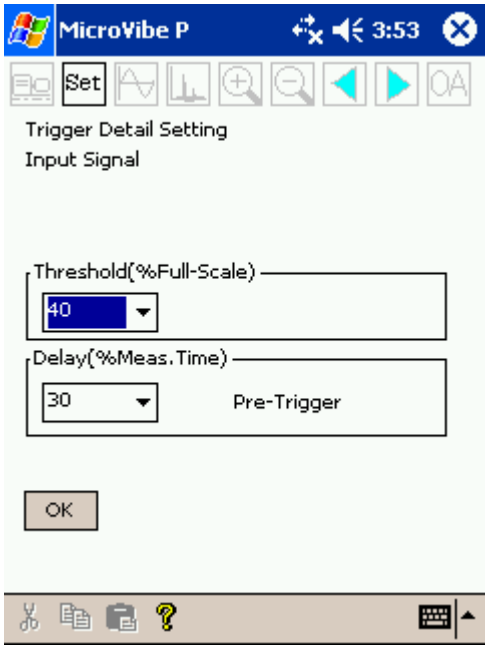


Figure 26.
The Trigger Detail Setting Screen.

Full Scale
Select the appropriate full scale range from the drop down list. Options include **Auto** (Autorange), and four fixed full scale values. The full scale units are determined by the selected measurement mode.

- The default setting is **Auto** (Autorange).

End Freq.

Select the appropriate end frequency from the provided predefined values. The MicroVibe P saves the three most frequently selected end frequency values in the **End Freq.** drop down list. Tap the **Default** button to clear the drop down list and display all available values.

- The available fmax settings are determined by the specified mode.

Lines

Select the number of spectral lines for the measurement from the drop down list (**400**,**800**, or **1600**). A higher setting provides higher measurement resolution, but extends measurement time.

- The default setting is 1600 lines.

Frame Time

Displays the waveform time frame for 1-cycle (average) FFT measurement. The frame time is calculated using the following formula:

$$\text{Frame time} = \frac{\text{number of lines}}{\text{end frequency}} \times \text{number of averages}$$

Frame time equals the number of lines divided by the end frequency multiplied by the number of averages.

Averages

Select the appropriate averages mode from the drop down list. Options include **Stable, Exponential**, and **Peak Hold**. Then, set the number of spectrum averages from the drop down list (**1,2,4,** or **8**). More averages provide more reliable data, but extend measurement time.

- The default number of averages is 1.

Window

- The default FFT processing window type is Hanning.

OK

Press to accept your entered settings and return to the measurement screen.

Sets the measuring condition and returns to measurement screen.

Cancel

Press to return to the measurement screen without saving entered settings.

Default

Press to return all setup fields to their default values.

Hard Key Operation

A button Same as **OK** button

B button – Same as **Cancel** button.

D button – Same as **Default** button.

To start the FFT & Waveform analysis measurement:

- Place the vibration sensor in the correct measuring position and tap the **Start** button or press the **A** hardkey button on the Pocket PC's bottom left to begin the measurement. "**Busy"** appears in the screen's status area while the analysis is being performed. When complete, **"Done"** displays in the status area.
  - The measurement process begins immediately once the **Start** button is pressed. Ensure the sensor is properly placed before pressing the **Start** button.

FFT Spectrum analysis

Information on the FFT analysis screen includes:

FFT Spectrum analysis screen

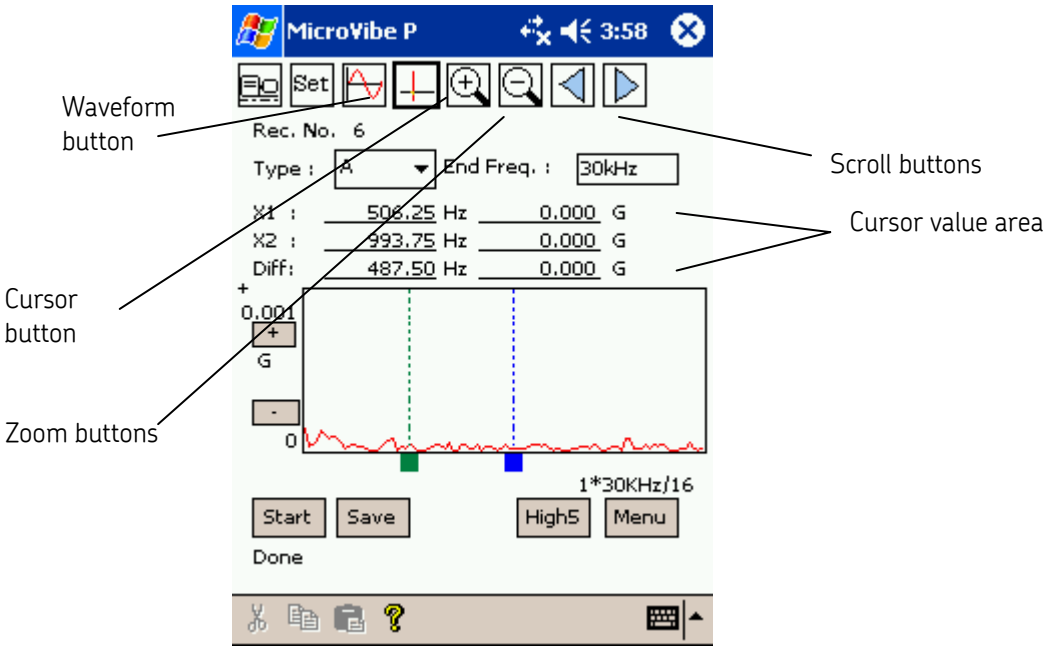


Figure 27.
The FFT Analysis Screen.

Hierarchy button

Tap to display the equipment hierarchy.

Set button

Tap to display the **Meas. Setup** screen.

Waveform button

Tap to display the WV analysis screen.

Cursor button

Tap to display two line cursors. The cursor values display in the **X1**and **X2** fields.

Zoom Display buttons

Use these buttons to change the X-axis scale magnification.

button magnifies the graph to x 2.

button reduces the graph to x 1/2.

Right/ Left Scroll button

Use these buttons to scroll the graph to the right or left. The scroll buttons are only active when the graph is magnified.

button scrolls the graph to the left.

button scrolls the graph to the right.

Rec. No.

Displays the measurement data's assigned record number. The number is automatically sequentially assigned.

Type

Select the appropriate measurement type from the drop down list. Options include: **A** (acceleration), **V** (velocity), **D** (displacement), **E1, E2, E3, E4** (enveloped acceleration).

End Freq.

Displays the end frequency corresponding to the selected measurement **Type**.

Cursor Value Area

Displays the value corresponding with the cursor positions.

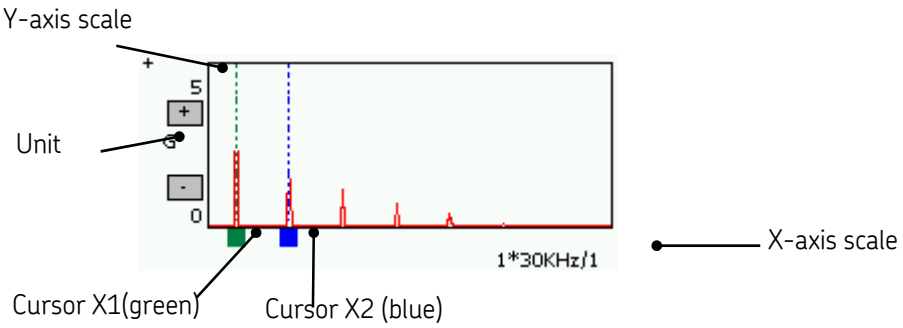
X1 Green cursor value

X2 Blue cursor value

Diff Displays the difference between the **X1** value and **X2** value.

FFT Graph

Displays the FFT graph. The X-axis indicates the frequency and Y-axis is determined by the selected measurement mode.



X - axis scale - Displays the displayed spectrum's x-axis frequency range.
Y – axis scale - Displays the spectrum's y axis amplitude range.

To change the Y-axis Scale

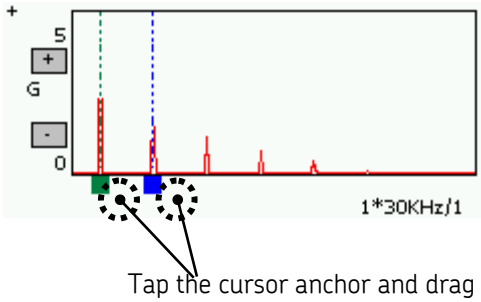
- Use the y-axis plus and minus buttons to change the y-axis scale.

[+] Magnify scale.

[-] Reduce scale

To move the cursor:

- Use the stylus to tap the cursor anchor and drag the cursor to the desired location. The cursor position value displays in the **X1** or **X2** field.



Tap the cursor anchor and drag cursor to desired location.

Start button

Tap to start the measurement.

Save button

Tap to displays the **Save Data** screen.

High5 button

Tap to display the **High5** screen, displaying the FFT's five highest amplitude frequency components.

Menu button

Tap to return to the **Main Menu**.

Status Display

Displays the measurement status as either **Busy** (performing measurement) or **Done** (measurement complete).

Hard Key Operation

A button Same as **Start** button

B button – Same as **Save** button.

C button – Same as **High 5** button

D button – Same as **Menu** button.

Displaying the Highest Five Frequency Components (High5 Feature)

The FFT Measurement screen's **High5** feature identifies and displays frequency and amplitude information for the FFT's five highest amplitude frequency components, and allows you to quickly place FFT cursors at these frequencies.

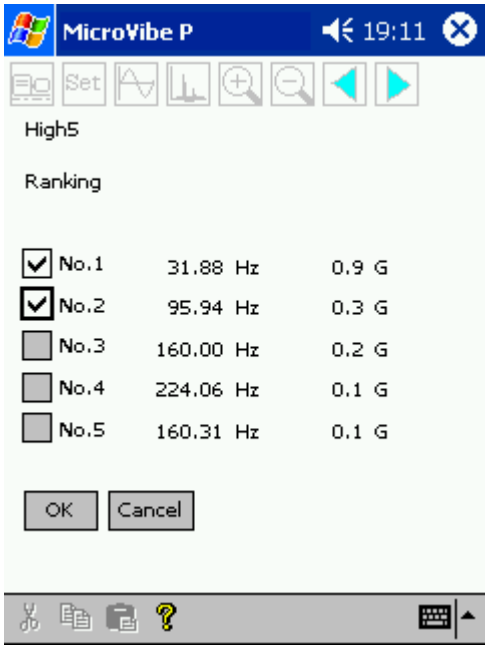


Figure 28.
The High5 Screen.

High5 Ranking

Lists the frequency and amplitude information for the FFT's five highest amplitude frequency components.

Numbered Check Boxes

On the **High5** screen, enable the checkbox next to the frequency on which you wish to place the cursor, and tap **OK**. The FFT measurement screen displays again, with the cursor automatically positioned on the specified peak.

- You can display any **two** of the available **five** frequencies at one time, using the two available cursors.

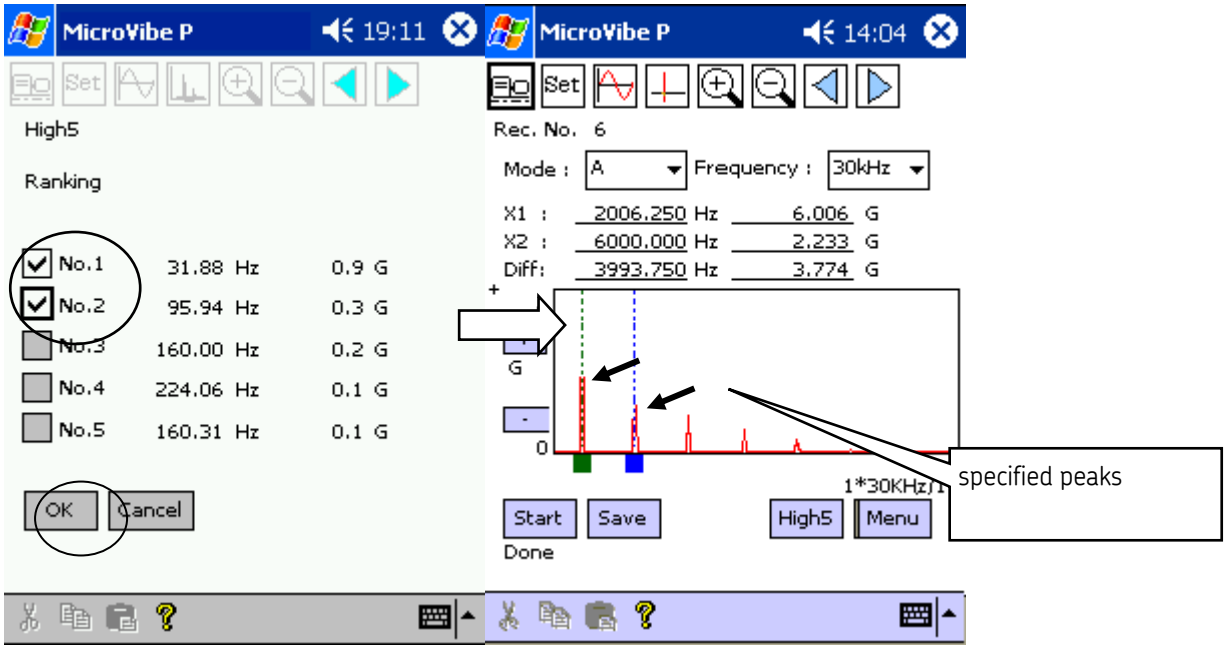


Figure 29.
Displaying the Selected High5 Peaks on the FFT Graph.

OK button

Returns to the FFT measurement screen. Cursors move to the specified frequency, if the corresponding checkbox is enabled.

Cancel button

Returns to the FFT measurement screen without moving cursor positions.

Hard Key Operation

A button - Same as **OK** button

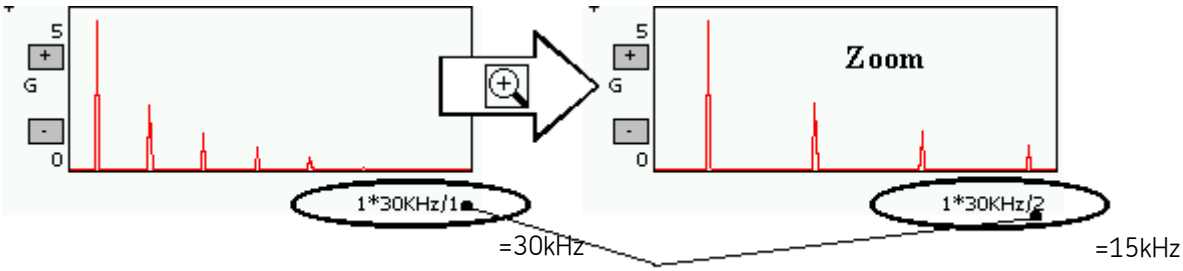
B button – Same as **Cancel** button.

Using Zoom to Change X – Scale

Tap the zoom in button to magnify the graph to x2 times.

- Each time you tap the Zoom In button, the graph is magnified x2.

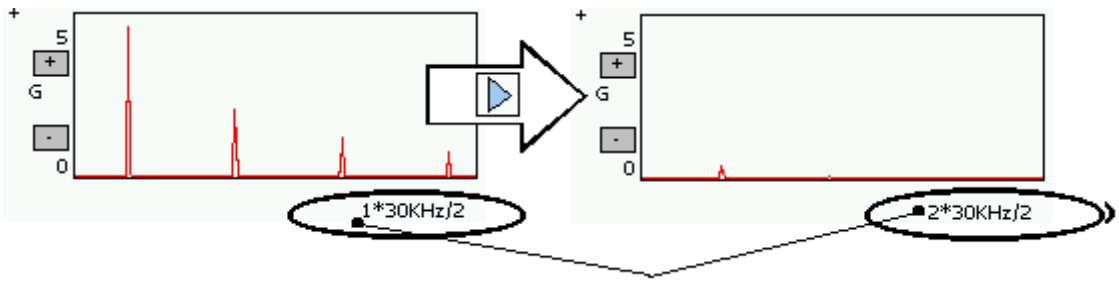
For example;



[/ 2] indicates the doubled graph is divided into 2 graphs.

Tap the scroll button while the graph is magnified to display the hidden part of graph by scrolling to the right.

For example.



[2*] indicates this is the 2nd screen graph.

Similarly, the zoom out button reduces the graph x1/2 times, and the scroll button scrolls the graph to the left.

To change the Y-axis Scale

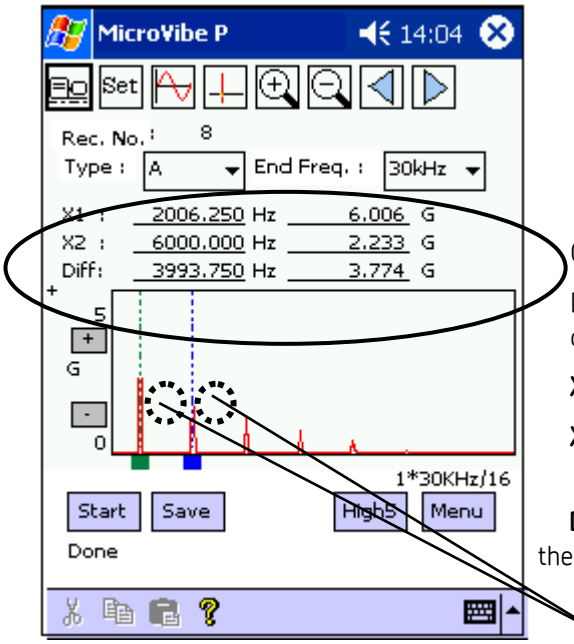
- Use the y-axis plus and minus buttons to change the y-axis scale.

+ Magnify scale.

- Reduce scale

Using the FFT Spectrum Dual Cursor

- Tap the cursor button to display the cursor and confirm the indicated cursor position value.



Cursor Value Area

Displays the value corresponding with the cursor positions.

X1 Green cursor value

X2 Blue cursor value

Diff Displays the difference between the

Drag this part to move the cursor.

Figure 30.
FFT Dual Cursor Display.

Saving the FFT Measurement

To save the FFT measurement results:

- Tap the **Save** button to save the measurement data after completion of the measurement and save from the **Data Save** screen.

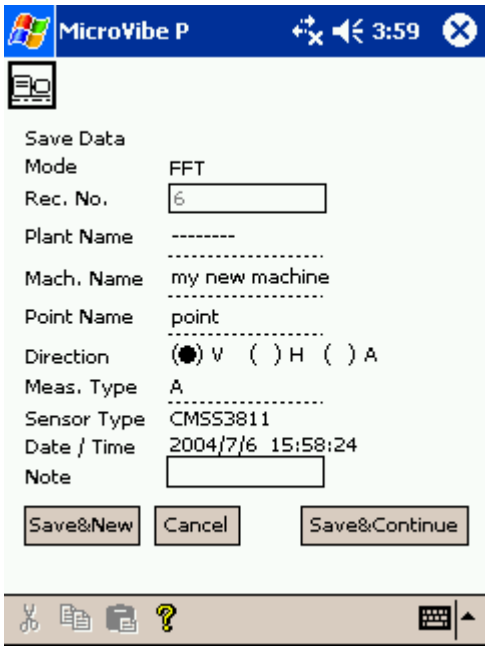


Figure 31.
The Save Data – FFT Measurement Screen.

Mode

Displays the measurement mode (FFT analysis is displayed as **FFT**).

Rec. No.

Displays the measurement data's assigned record number. The number is automatically sequentially assigned.

Plant Name

Use the stylus and Pocket PC keyboard to enter the plant name you wish to associate with the saved data, if applicable, or tap the **Hierarchy** button to select the plant from the hierarchy list.

Mach. Name

Use the stylus and Pocket PC keyboard to enter the machine name you wish to associate with the saved data, if applicable, or tap the **Hierarchy** button to select the machine from the hierarchy list.

Point Name

Use the stylus and Pocket PC keyboard to enter the point name you wish to assign to the saved data, if applicable, or tap the **Hierarchy** button to select the point from the hierarchy list..

Direction

Select the appropriate detection direction for the data. Options include **V** (vertical), **H** (horizontal), and **A** (axial).

Meas. Type

Select the appropriate measurement type(s) to save. Options include **A** (acceleration), **V** (velocity), **D** (displacement), and **E3**(enveloped acceleration).

- By default, all measurement types are selected to be saved.

Sensor Type

Displays the type of sensor used.

Date / Time

Displays the measurement's date and time.

Note

Enter a note to store with the data (e.g. noisy, odor, leak, etc.).

- Notes are limited to 50 bytes.

Save & New button

Tap this button to save the measurement into the database, and display the measurement screen, allowing you to perform a new measurement.

Cancel

Exits **Save Data** screen without saving.

Save & Continue button

Tap this button to save the measurement into the database, and return to the measurement results screen.

Hard Key Operation

A button Same as **Save & New** button

B button – Same as **Cancel** button.

D button – Same as **Save & Continue** button.

Waveform Analysis

Information on the WV analysis screen includes:

Waveform analysis screen

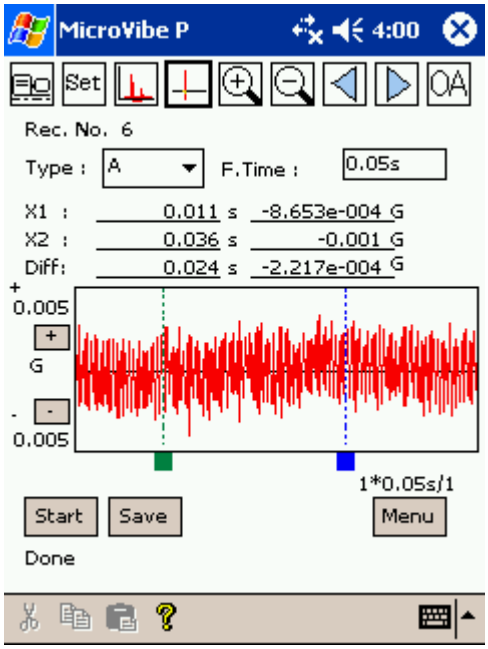


Figure 32.
The Waveform Analysis Screen.

Hierarchy button

Tap to display the equipment hierarchy.

Set button

Tap to display the **Meas. Setup** screen.

FFT button

Tap to display the FFT analysis screen.

Cursor button

Tap to display two line cursors. The cursor values display in the **X1**and **X2** fields.

Zoom Display buttons

Use these buttons to change the X-axis scale magnification.

button magnifies the graph to x 2.

button reduces the graph to x 1/2.

Right/ Left Scroll button

Use these buttons to scroll the graph to the right or left. The scroll buttons are only active when the graph is magnified.

 button scrolls the graph to the left.

 button scrolls the graph to the right.

Rec. No.

Displays the measurement data's assigned record number. The number is automatically sequentially assigned.

Type

Select the appropriate measurement type from the drop down list. Options include: **A** (acceleration), **V** (velocity), **D** (displacement), **E1, E2, E3, E4** (enveloped acceleration).

F. Time

Displays the measurement time (frame time).

Cursor Value Area

Displays the value corresponding with the cursor positions.

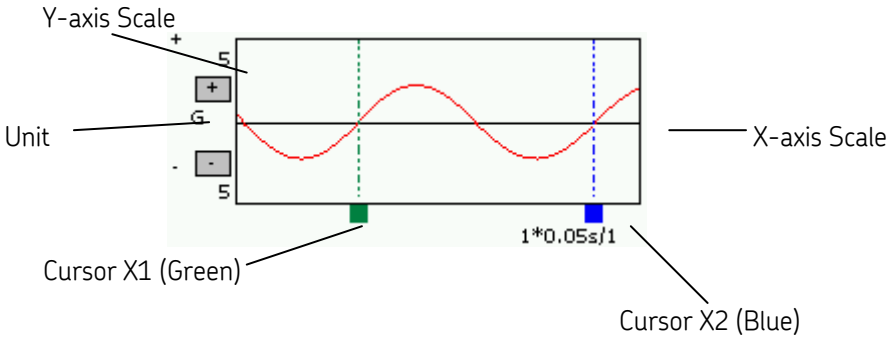
X1 Green cursor value

X2 Blue cursor value

Diff Displays the difference between the **X1** value and **X2** value.

WV Graph Area

Displays waveform graph. The X-axis shows the time and Y-axis is determined by the selected measurement mode.



X – Scale - Displays the horizontal range of the displayed data.
Y – Scale - Displays the amplitude range of the displayed data.

To change the Y-axis Scale

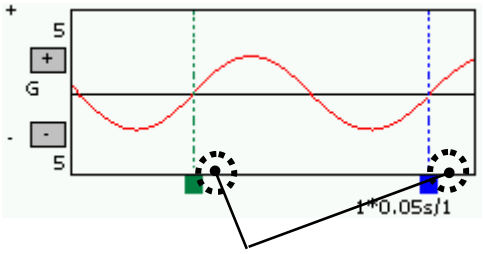
- Use the y-axis plus and minus buttons to change the y-axis scale.

 Magnify scale.

 Reduce scale

To move the cursor:

- Use the stylus to tap the cursor anchor and drag the cursor to the desired location. The cursor position value displays in the **X1** or **X2** field.



Tap the cursor anchor and drag the curor to the desired position.

Start button

Tap to start the measurement.

Save button

Tap to displays the **Save Data** screen.

Menu button

Tap to return to the **Main Menu**.

Status Display

Displays the measurement status as either **Busy** (performing measurement) or **Done** (measurement complete).

Hard Key Operation

A button Same as **Start** button

B button – Same as **Save** button.

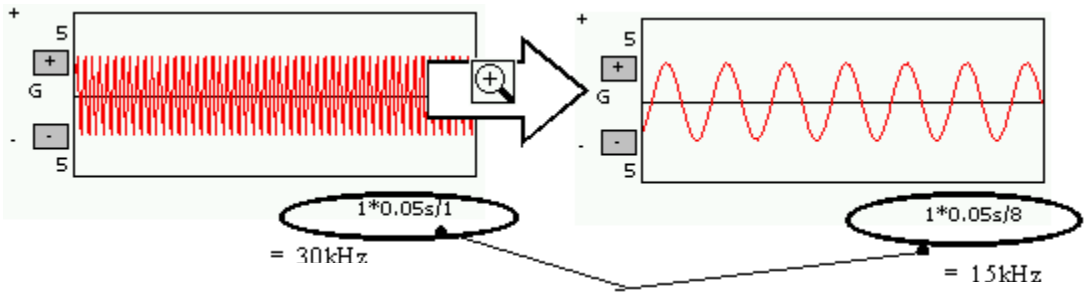
D button – Same as **Menu** button.

Using Zoom to Change X – Scale

Tap the zoom in button  to magnify the graph to x2 times.

- ➢ Each time you tap the Zoom In button, the graph is magnified x2.

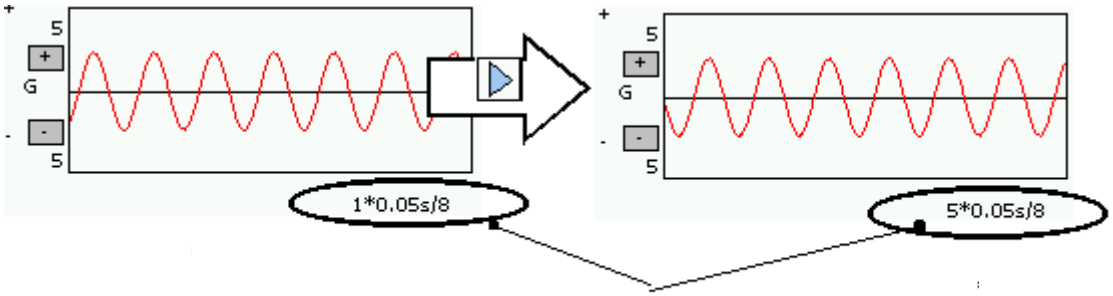
For example;



[/ 8] indicates the doubled graph is divided into 8 graphs.

Tap the scroll button while the graph is magnified to display the hidden part of graph by scrolling to the right.

Ex.



[5*] indicates this is the 5th screen graph.

Similarly, the zoom out button reduces the graph x1/2 times, and the scroll button scrolls the graph to the left.

To change the Y-axis Scale

- Use the y-axis plus and minus buttons to change the y-axis scale.

+ Magnify scale.

- Reduce scale

Using the Waveform Dual Cursor

- Tap the cursor button to display the cursor and confirm the indicated cursor position value.

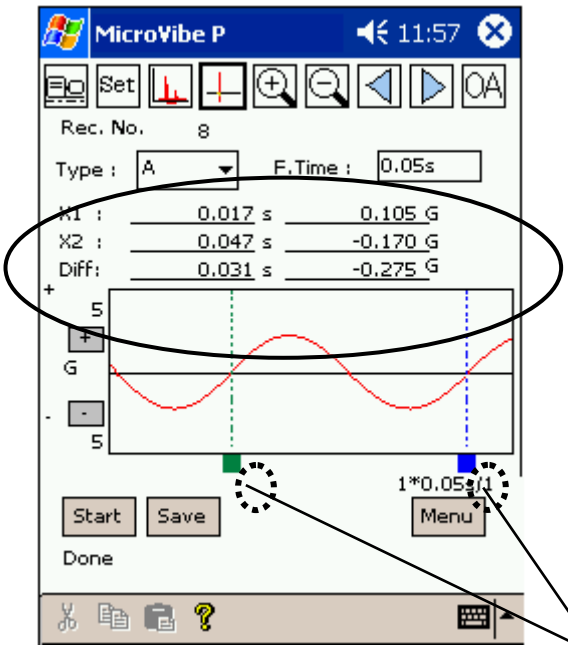


Figure 33.
Waveform Dual Cursor Display.

Displaying the Overall Value Between Cursors

- With cursors displayed at the desired locations, tap the OA button to display the overall value between the X1 and X2 cursors.

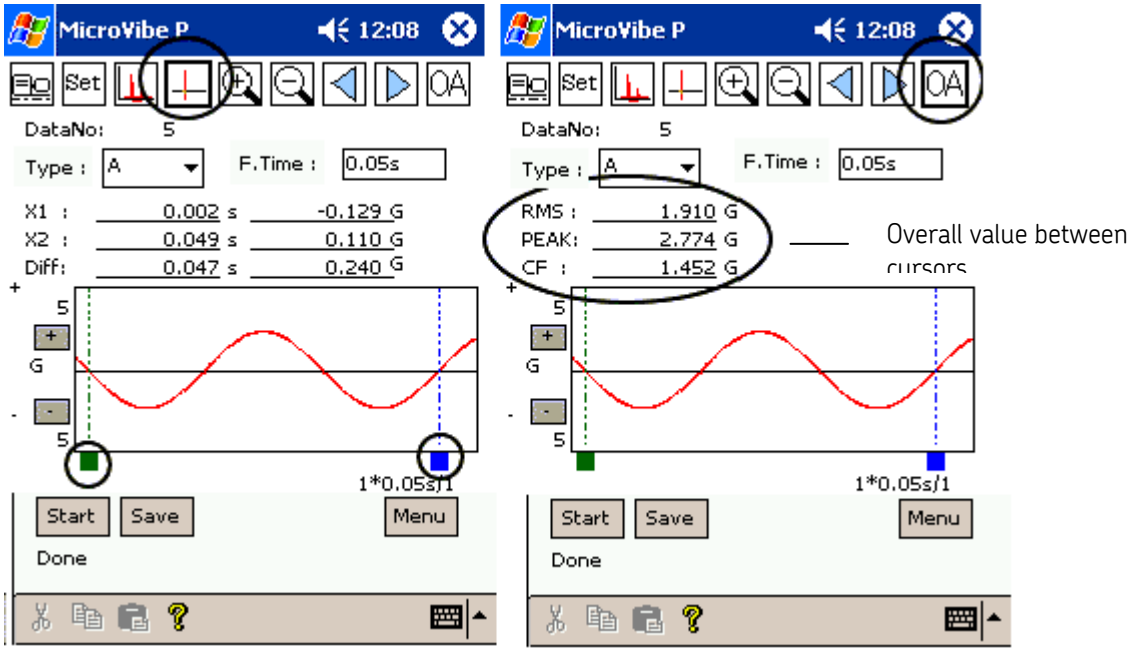


Figure 34.
Waveform with Overall Value Between Cursors Displayed.

Saving the Waveform Measurement

To save the waveform measurement results:

- Tap the **Save** button to save the measurement data after completion of the measurement and save from the **Data Save** screen.

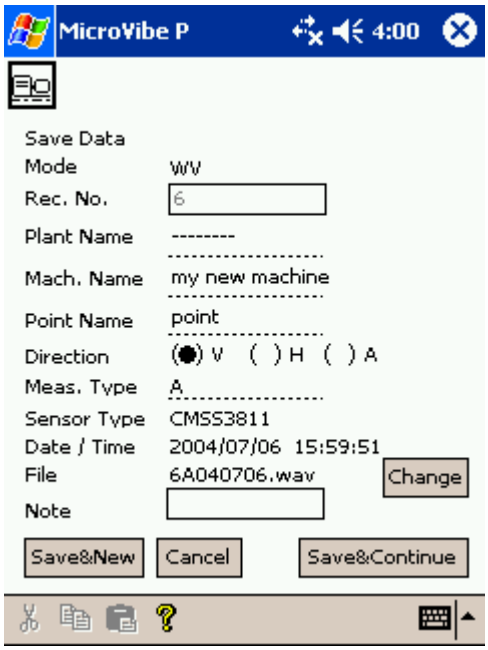


Figure 35.
Save Data – Waveform Measurement Screen.

Mode

Displays the measurement mode (FFT analysis is displayed as **FFT**).

Rec. No.

Displays the measurement data's assigned record number. The number is automatically sequentially assigned.

Plant Name

Use the stylus and Pocket PC keyboard to enter the plant name you wish to associate with the saved data, if applicable, or tap the **Hierarchy** button to select the plant from the hierarchy list.

Mach. Name

Use the stylus and Pocket PC keyboard to enter the machine name you wish to associate with the saved data, if applicable, or tap the **Hierarchy** button to select the machine from the hierarchy list.

Point Name

Use the stylus and Pocket PC keyboard to enter the point name you wish to assign to the saved data, if applicable, or tap the **Hierarchy** button to select the point from the hierarchy list.

Direction

Select the appropriate detection direction for the data. Options include **V** (vertical), **H** (horizontal), and **A** (axial).

Meas. Type

Select the appropriate measurement type(s) to save. Options include **A** (acceleration), **V** (velocity), **D** (displacement), and **E3**(enveloped acceleration).

- By default, all measurement types are selected to be saved.

Sensor Type

Displays the type of sensor used.

Date / Time

Displays the measurement's date and time.

File (Save File Name)

Displays the file name of the waveform data to be saved. A default name is automatically generated using the record number, measurement mode, and date.

For example, a waveform with the following information

Rec. No.	8
Mode	A
Measured date	2003/09/17 (September 17,2003)

is, by default, saved with the filename **8A030917.wav**.

To save the file with a different name, tap the **Change** button and enter in the new name

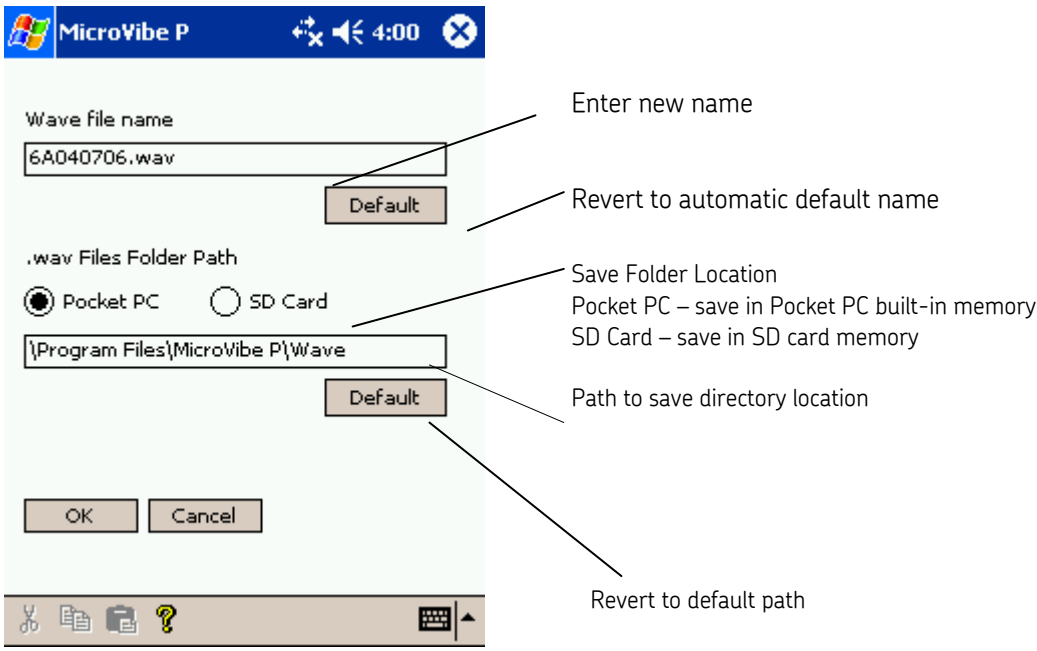


Figure 36.
Waveform File Storage Selection Screen.

IMPORTANT
To save waveform data, you must tap the **Save & New** or **Save & Continue** button on the **Data Save** screen. Tapping **OK** on the Wave file name setup screen does not save the data, only the name and save location.

Note

Enter a note to store with the data (e.g. noisy, odor, leak, etc.).

- Notes are limited to 50 bytes.

Save & New button

Tap this button to save the measurement into the database, and display the measurement screen, allowing you to perform a new measurement.

Cancel

Exits **Save Data** screen without saving.

Save & Continue button

Tap this button to save the measurement into the database, and return to the current measurement's results screen.

Hard Key Operation

A button Same as **Save & New** button

B button – Same as **Cancel** button.

D button – Same as **Save & Continue** button.

5
Notes

MicroVibe P Notes Feature

The MicroVibe P's **Notes** feature allows you to assign notes to machines and points, and store these notes in the database.

To create and assign a new note:

- Tap the Main Menu display's **Notes** button. The **Notes** screen displays.

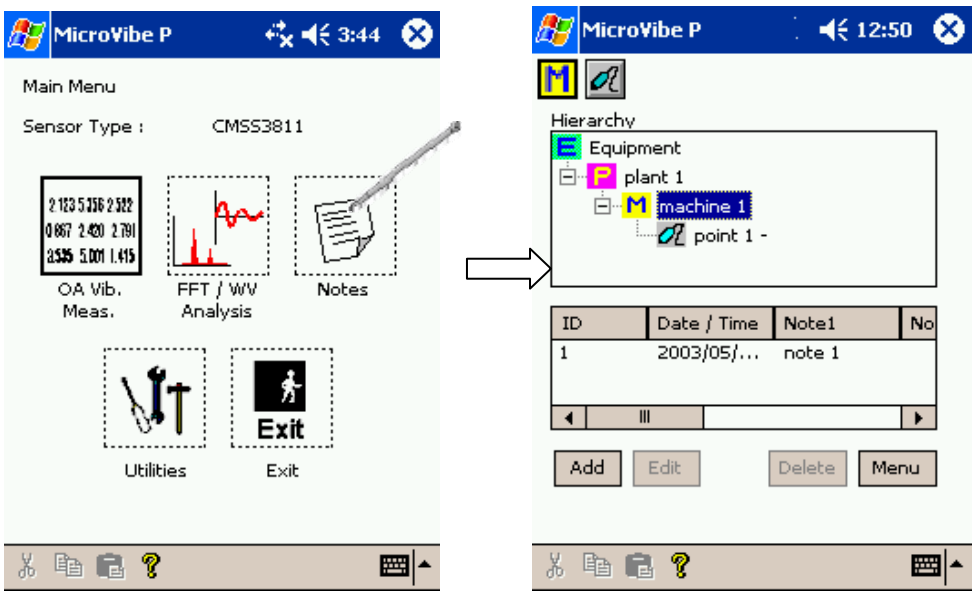
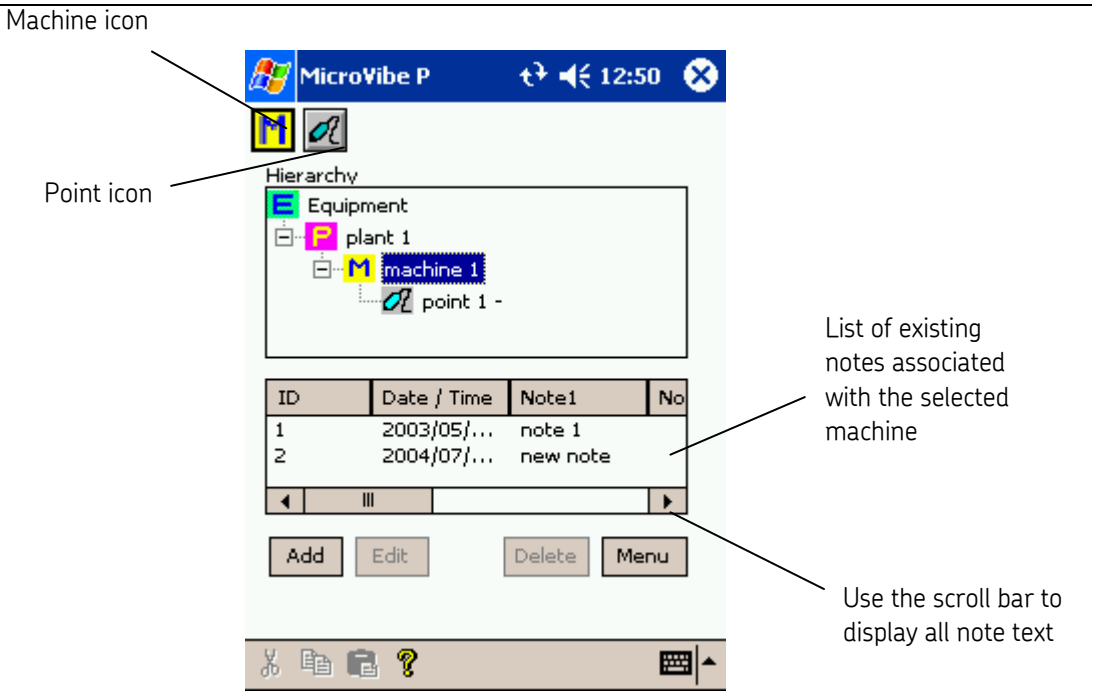
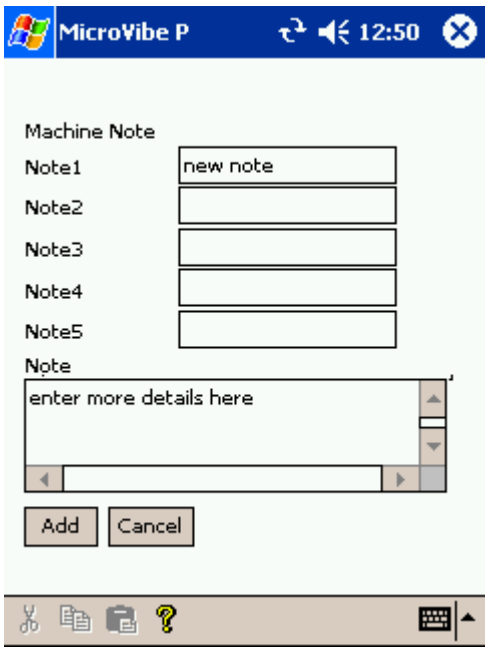


Figure 37.
Displaying the **Notes** Screen.



- Tap the machine icon or point icon to specify whether you want to create a machine note or point note.
- From the hierarchy list, tap the machine or point to which you wish to assign the new note.
- Tap the **Add** button. The **Add Note** screen displays.



- Use the stylus and Pocket PC keyboard to enter up to five notes in the notes fields. Use the larger **Note** window to enter longer, more descriptive notes as necessary.
- Tap the **Add** button to save the note and assign it to the selected machine or point.

To view an existing note:

- Tap the machine icon or point icon.
- From the hierarchy list, tap the appropriate machine or point with the assigned note.
- All notes assigned to the selected machine or point display in the lower area, identified by an automatically assigned ID number, and the note text. Use the scroll bar to view all note text.

To edit an existing note:

- Tap the appropriate note's **ID** number to select it.
- Tap the **Edit** button. Use the stylus and Pocket PC keyboard to edit the note as necessary.
- Tap the **OK** button to save your changes.

To delete an existing note:

- Tap the appropriate note's **ID** number to select it.
- Tap the **Delete** button.
- Confirm the deletion when prompted.

Hard Key Operation

A button Same as **Add** button.

B button – Same as **Edit** button.

C button – Same as **Delete** button.

D button – Same as **Cancel** button.

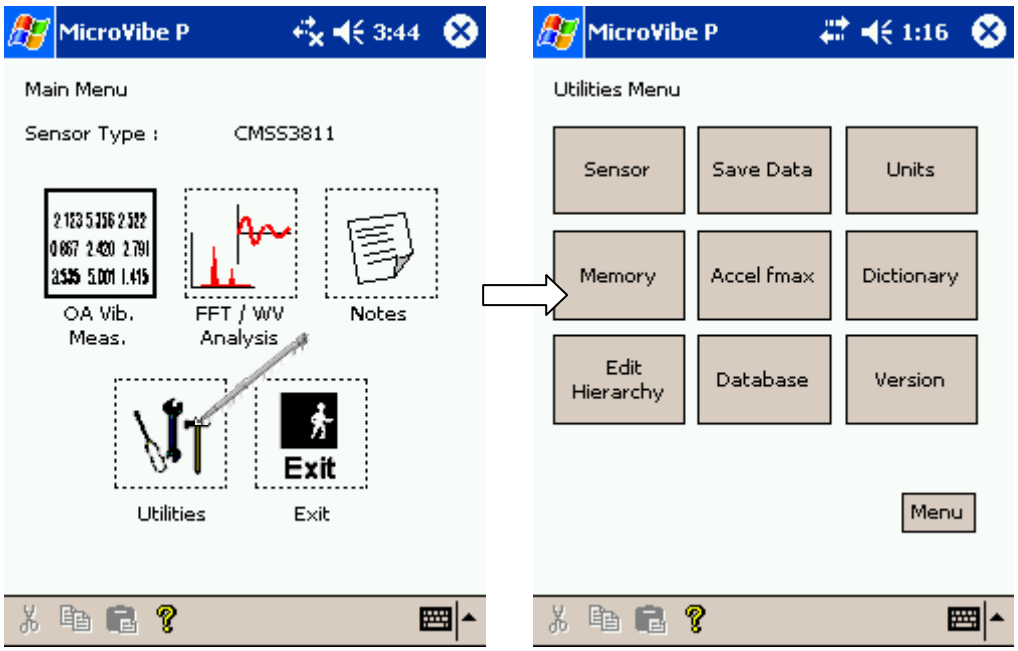
6
MicroVibe P Utilities Menu

Using the Utilities Menu

Use Utility Menu options to access various system setup screens, and to use MicroVibe P accessory applications.

To access the Utility Menu:

- Tap the **Main Menu's Utility** button. The **Utility Menu** displays.



Sensor

- Tap **Sensor** to display the **Sensor / Sensitivity Setting** screen, which allows you to enter the sensor type and sensitivity.

Memory

Tap to display the **Memory Info** screen, which provides information about available memory.

Edit Hierarchy

Tap to display the **Edit Hierarchy** screen, which allows you to add, edit, or delete hierarchy items.

Save Data

Tap to display the **Saved Data List** screen.

Accel Fmax

Tap to display the **Accel Fmax** screen, allowing you to specify the fmax for overall vibration acceleration measurements.

Database

Tap to display the **Database Folder Path** screen, allowing you to specify the database directory path and .wav file save location.

Units

Tap to display the **Units** screen, allowing you to select either Metric or English units.

Dictionary

Tap to display the vibration terms mini-dictionary.

Version

Tap to displays information about the MicroVibe P, including version information.

Menu button

Tap to return to the **Main menu** screen.

Hard Key Operation

D button – Same as **Menu** button.

Sensor

The **Sensor** utility allows you to specify the attached vibration sensor type and its sensitivity.

Sensor Sensitivity Setting screen

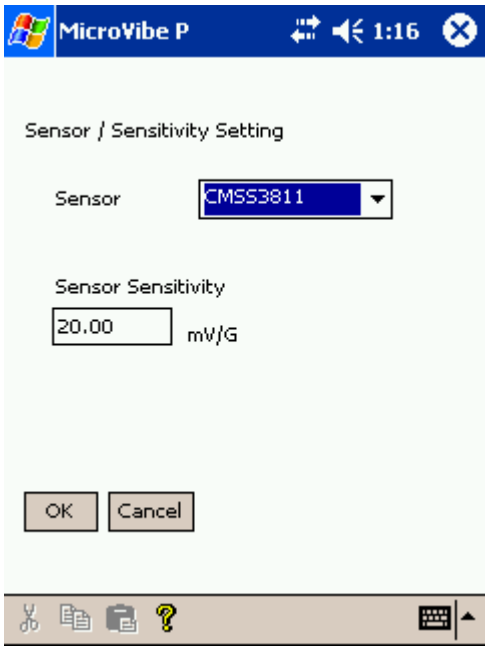


Figure 38.
The Sensor Sensitivity Screen.

To enter sensor settings:

Sensor

- Select the appropriate sensor type from the **Sensor** drop down list.

CMSS 3811 Accelerometer	20 mV/(G)
CMSS 3812 Velocity Sensor	4.0 mV/(mm/s)

Sensor Sensitivity

- Set the specified **Sensor Sensitivity** by entering the voltage value per unit using the stylus and Pocket PC keyboard. Refer to the sensor's documentation for specific sensor sensitivity settings.

Hard Key Operation

A button – Same as **OK** button.

B button – Same as **Cancel** button.

Memory

The **Memory** utility allows you to view the available memory, and the number of stored OA, FFT, and WV measurements.

Memory Check Screen

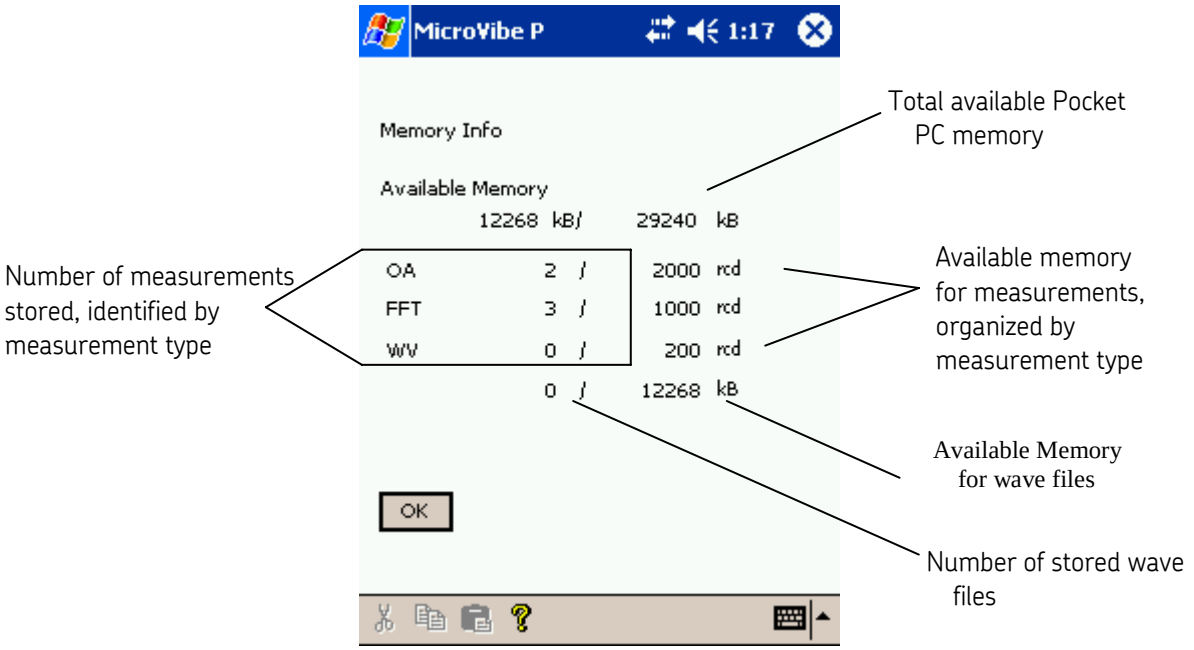


Figure 39.
The Memory Screen.

Available Memory

Displays the Pocket PC's available built-in memory.

OA, FFT, WV Memory

Displays the record number of stored OA, FFT, WV measurement vs. the total records of each.

For example, FFT 3/1000 rcd indicates the MicroVibe P has three FFT measurement stored out of a possible 1000 FFT measurement capacity.

Hard Key Operation

A button – Same as **OK** button.

Edit Hierarchy

The **Edit Hierarchy** utility allows you to view the equipment hierarchy, and add, edit, or delete plants, machines, and measurement points.

Plants must branch from the equipment (top-level) hierarchy item. Machines must branch from plants, and points must branch from machines.

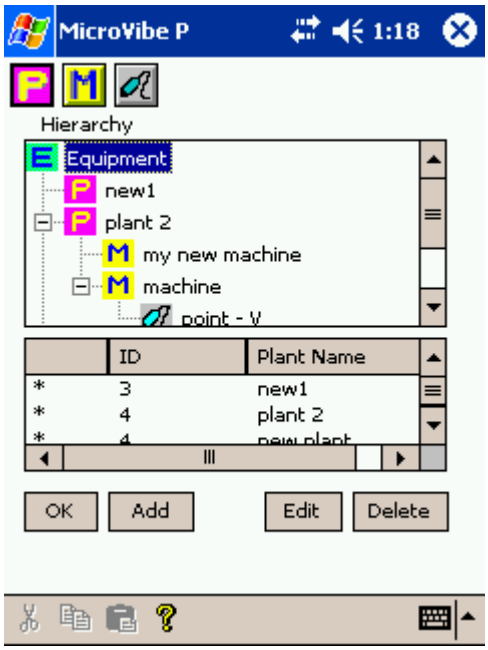


Figure 40.
The Edit Hierarchy Screen.

The **Edit Hierarchy** screen's three hierarchy item icon buttons allow you to select the appropriate mode for your hierarchy editing.

IMPORTANT
If you intend to use the MicroVibe P Data Management software on a desktop PC, you must create and edit all hierarchy information on the desktop computer and not on the Pocket PC unit. All downloads initiated from the data management software override information stored on the Pocket PC. Therefore, any hierarchies created on the Pocket PC unit are deleted when a download is performed. If you do not intend to use the data management software, hierarchies may be created and edited on the Pocket PC device. Plants, machines, and points created on the Pocket PC are identified by an asterisk (*) in the **Edit Hierarchy** screen's selection window.

To work with plants, select the plant icon .

To work with machines, select the machine icon

To work with plants, select the point icon .

To add a new hierarchy item:

- Tap the appropriate icon to select the appropriate mode (plant, machine, or point).
- In the hierarchy list, tap on the existing hierarchy item from which the new item will branch. For example, to add a new plant, tap on the **Equipment** level hierarchy item. To add a new point, tap on the appropriate machine level hierarchy item.
- Tap the **Add** button.

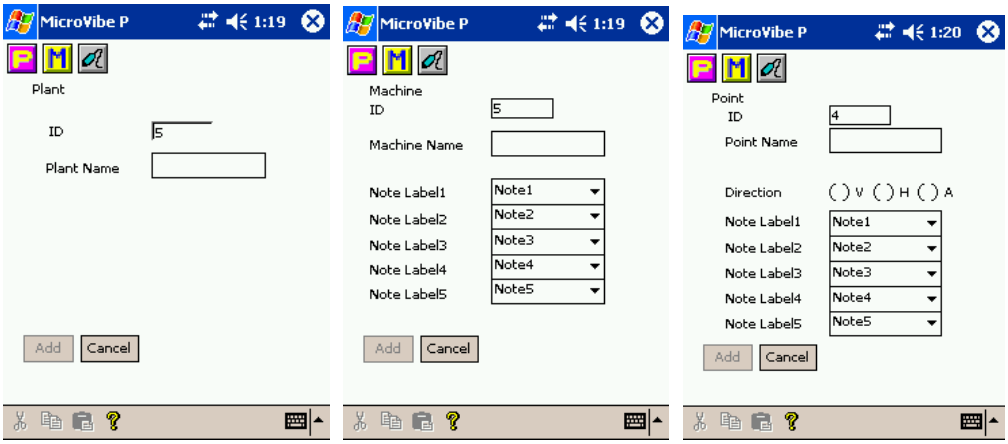


Figure 41.
The Add/Edit Plant, Machine, and Point Screens.

- Enter the item name in the name field, and all other appropriate information (direction, note, etc.) and tap the **Add** button. The new hierarchy item is added to the hierarchy list.

To edit an existing hierarchy item:

- Tap the appropriate icon to select the appropriate mode (plant, machine, or point).
- In the hierarchy list, tap on the existing hierarchy item from which the item requiring editing branches. For example, to edit a plant, tap on the **Equipment** level hierarchy item. To edit a point, tap on the appropriate machine level hierarchy item.

All items branching from the selected hierarchy item (of the selected mode) display in the screen's lower area.

- From the **lower** area, tap the hierarchy item you wish to edit.
- Tap the **Edit** button.
- Perform necessary edits and tap **OK** to save your changes.

To delete a hierarchy item:

- Tap the appropriate icon to select the appropriate mode (plant, machine, or point).
- In the hierarchy list, tap on the existing hierarchy item from which the item requiring deletion branches. For example, to delete a plant, tap on the **Equipment** level hierarchy item. To delete a point, tap on the appropriate machine level hierarchy item.

All items branching from the selected hierarchy item (of the selected mode) display in the screen's lower area.

- From the **lower** area, tap the hierarchy item you wish to delete.
- Tap the **Delete** button.
- Confirm the deletion when prompted.

Hard Key Operation

A button – Same as **OK** button.

B button – Same as **Add** button.

C button – Same as **Edit** button.

D button – Same as **Delete** button.

Save Data

The **Save Data** utility allows you to view and re-display all saved measurements. All saved measurements are listed sequentially on the MicroVibe P's **Saved Data List**.

Save Data Screen

Tap measurement's record number to review data results

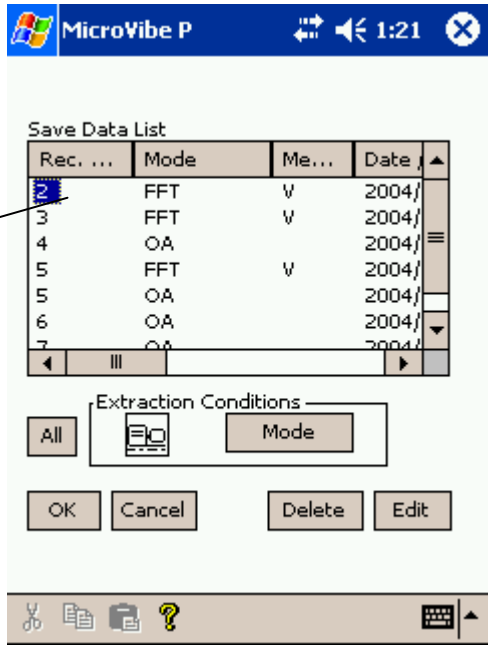


Figure 42.
The Save Data (Save Data List) Screen.

Save Data List

For each saved measurement, the Save Data List displays the measurement's Rec. No, Mode, Measurement Type, Date Time, Machine Name, Point Name, and Direction.

Extraction Condition

The extraction feature allows you to filter the Save Data list to display data of the specified type only. The selected extraction conditions determine the type(s) of data to display. You can display data of a specific measurement mode only, data from particular hierarchy items only, or a combination of both.

Mode – Tap the **Mode** button to select the measurement type you wish to view. Available options include **OA** (overall vibration), **WV** (waveform), and **FFT**. For example, if you select **FFT**, only FFT measurements will display in the Save Data list until the setting is cleared.

Hierarchy - Tap the hierarchy icon to display the hierarchy list. From the hierarchy list, select a hierarchy item and tap the **Select** button. The selected hierarchy item displays in

the screen's lower area, identified by its hierarchy type (plant, machine, or point) and name. Continue selecting hierarchy items to include in the Save Data List as necessary. When finished, tap the **OK** button.

All – Tap the **All** button to clear you extraction conditions and display all data in the Save Data List.

To review data results:

- Tap the data's **Rec. No** to select it.
- Tap the **OK** button. The measurement screen displays allowing you to review the data.

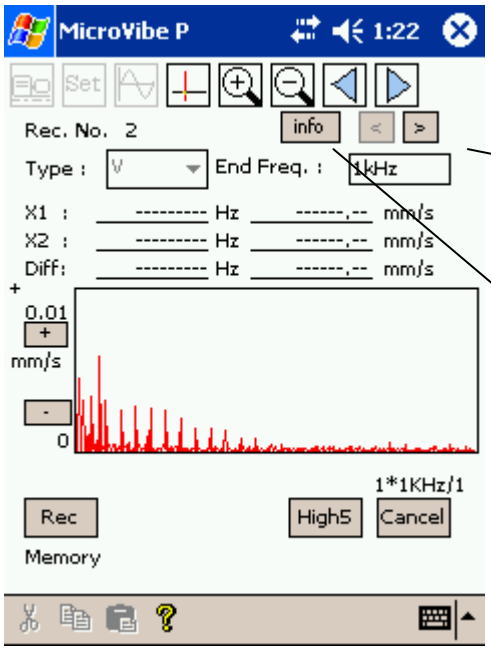


Figure 43.
The Saved Data's Measurement Screen.

- Use the left and right arrow buttons [<] [>] to scroll through the saved measurements.
- Tap the [**info**] button to display the **Data Information** for the current measurement.

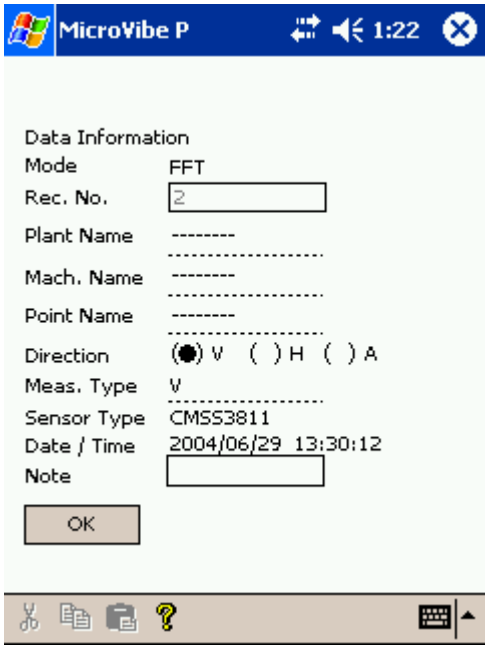


Figure 44.
The Data Information Screen.

- Tap the **Cancel** button to return to the Save Data List.

To edit data settings:

- Tap the data's **Rec. No** to select it.
- Tap the **Edit** button. Edit the data as necessary.

To delete data:

- Tap the data's **Rec. No** to select it.
- Tap the **Delete** button. Confirm the deletion when prompted.

Hard Key Operation

A button – Same as **OK** button.

B button – Same as **Cancel** button.

Accel Fmax

The **Accel Fmax** utility allows you to set the fmax for acceleration (A) overall vibration (the measurement upper frequency limit).

➢ FFT &WV measurements allow fmax setting.

To set the Accel Fmax:

- Tap the **Utility** menu's **Accel Fmax** button. The **Accel Fmax Setting** screen displays.

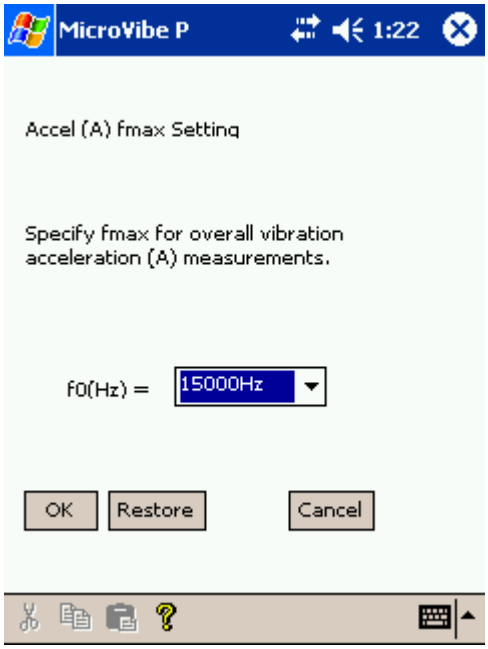


Figure 45.
The Accel Fmax Screen.

- Select the appropriate fmax from the drop down list. Options include 1,000 Hz – 20,000 Hz).
  - The default value is 15,000 Hz.

Restore

- Tap to return to the default value of 15,000Hz.

Hard Key Operation

A button – Same as **OK** button.

B button – Same as **Restore** button.

C button – Same as **Cancel** button.

Database

The **Database** utility allows you to specify the database location and .wav file storage location.

Database Screen

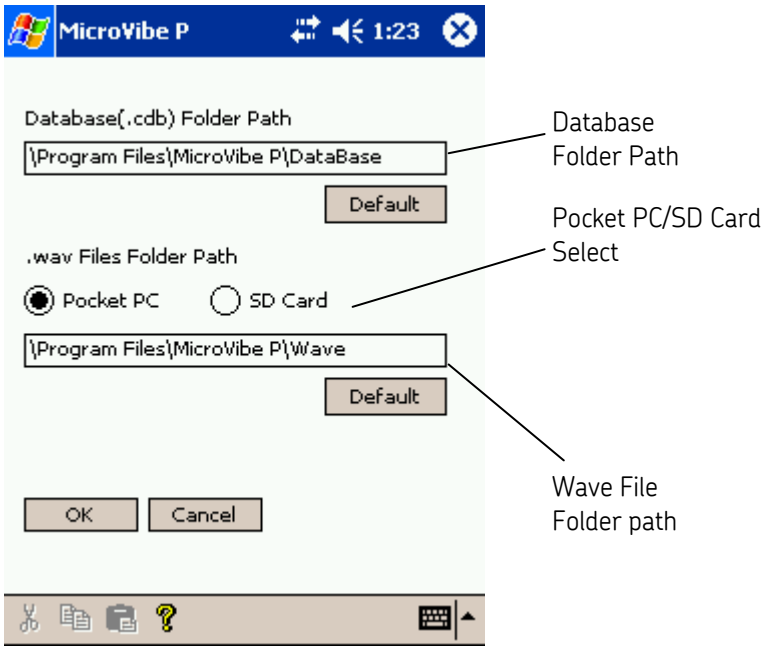


Figure 46.
The Database Screen.

Database Folder Path

- Use the stylus and Pocket PC keyboard to enter the folder path where database files cvndb1.cdb,cvndb2.cdb are saved.
  - ➢ The default location is \Program Files\MicroVibe P\DataBase.

Default button

- Tap to return the Database folder path to \Program Files\MicroVibe P\DataBase.

Pocket PC/SD Card

Select to save .wav files to either the Pocket PC's main built-in memory or the SD Card memory.

Wave file folder path

- Use the stylus and Pocket PC keyboard to enter the path where .wav files are stored.
  - ➢ The default location is \Program Files\MicroVibe P\Wave

Default button

- Tap to return the Database folder path to \Program Files\MicroVibe P\Wave.

Hard Key Operation

A button – Same as **OK** button.

B button – Same as **Cancel** button.

Units

The **Units** utility allows you to specify either Metric or English vibration measurement units.

- ➢ The default setting is Metric.

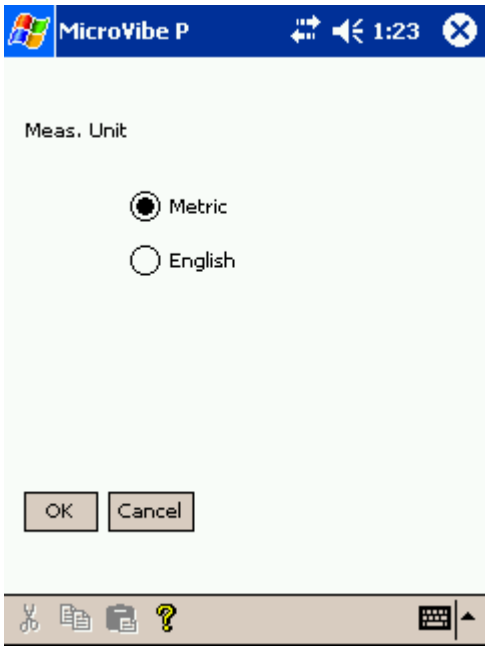


Figure 47.
The Units Screen.

Hard Key Operation

A button – Same as **OK** button.

B button – Same as **Cancel** button.

Dictionary

The **Dictionary** utility allows you to view a vibration term dictionary.

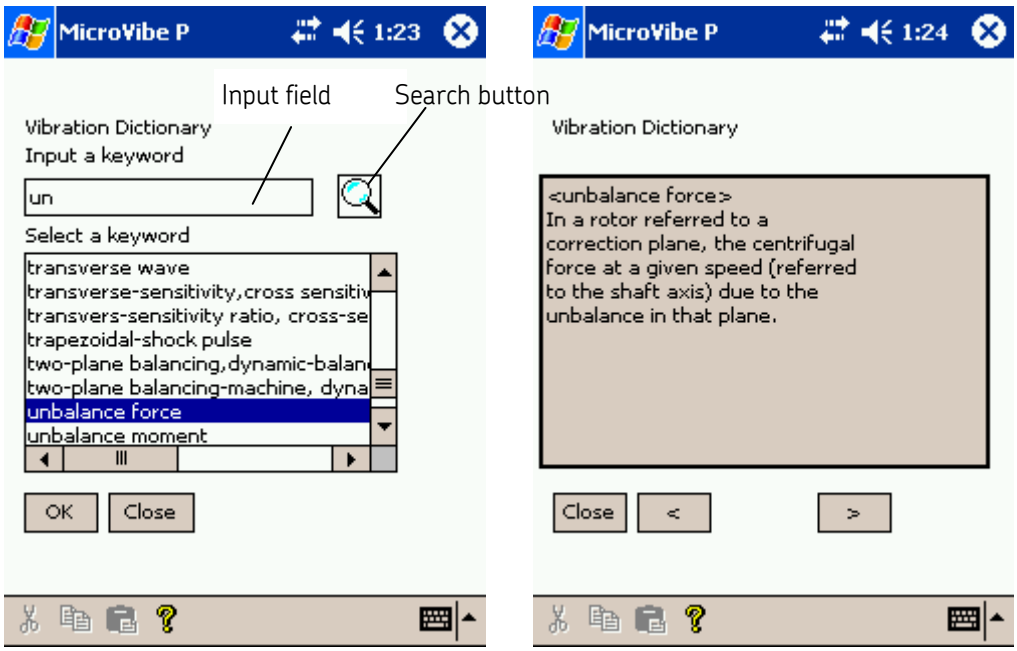


Figure 48.
The Dictionary Search and Results Screens.

To search the dictionary for a specific term:

- Use the stylus and Pocket PC keyboard to type in the term.
- Tap the search button. The dictionary displays the matching item(s).

To narrow the topic list:

- Enter the first letter of the topic you wish to explore. All topics beginning with the entered letter display.

To browse through search results:

- Tap the [>] or [<] buttons to sequence through matching topics..

Version

The **Version** utility allows you to view the MicroVibe P's version number.

Figure 49.
The MicroVibe P Version Screen.

7
Troubleshooting

Troubleshooting

Pocket PC does not respond.

- Charge the Pocket PC's battery.
- Remove the MicroVibe P and attempt to turn power on.
- Push the reset button using the tip of a paper clip.
  - ➢ Refer to the Pocket PC user manual for detailed explanations of Pocket PC operations.
- If necessary, perform a hard reset following your Pocket PC user manual instructions.

> ***IMPORTANT***
>
> ***Performing a hard rest causes the Pocket PC to lose all stored data, installed applications including MicroVibe P, and returns the device to its original factory state.***

MicroVibe P does not operate when inserted into Pocket PC Unit

- If the message "**No communication with card**." is displays, ensure card and sensor are connected to the Pocket PC correctly.

Abnormal Measurement Value (Too Low or Over Range)

- ➢ Too low of a measurement or an over range measurement both result in the same error indicator.
- Ensure the sensor cable's modular connector is inserted correctly.
- Ensure the sensor in use matches the sensor specified in the **Utility Menu**'s **Sensor Sensitivity Setting**.
- Ensure the sensor sensitivity is set to the correct value.

User Notes

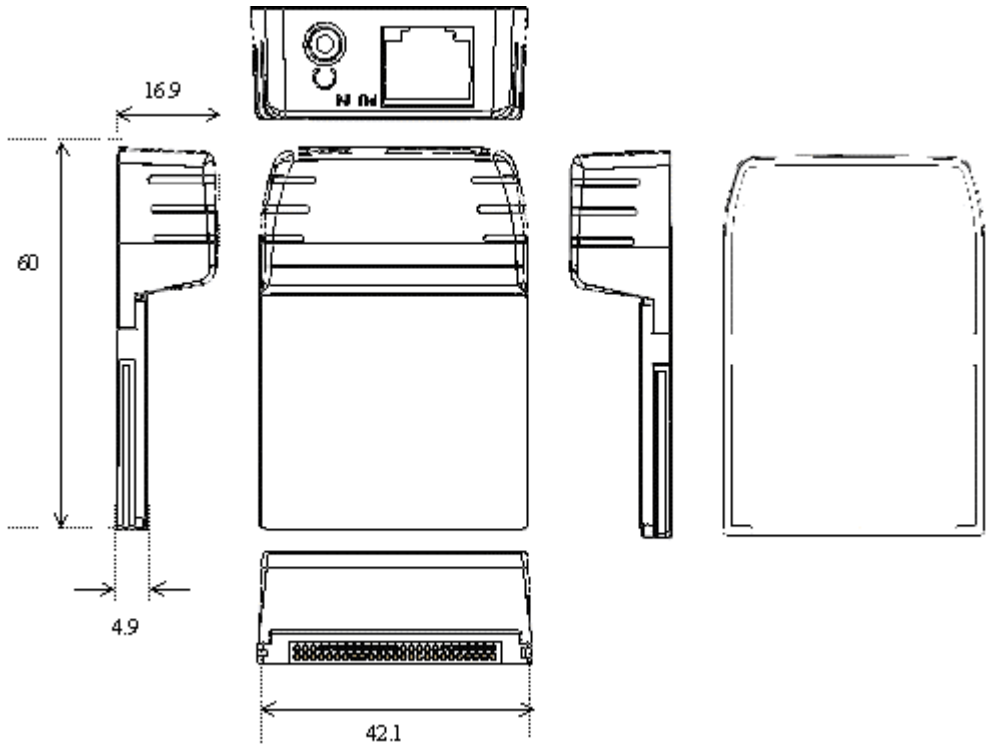
8
Specifications

General Specification

Item	Specifications
Suiting PDA	Conforms to the Pocket PC Indispensable specification OS: Pocket PC with Windows Mobile 2003 / 2005 / 2006 Processor: ARM Processor Interface: Compact Flash TYPE II Slot 3.3 V only Recommendation specification Processor: PXA255 400 MHz (or higher) Memory(RAM): 64 MB or more
Interface with Pocket PC	Compact Flash TYPE II Slot 3.3V only
Power supply	+3.3 V (Supplied from Pocket PC.)
Current	Standby : 44 μA Under measurement : 48 mA
Sensor Input (PU IN)	AC voltage signal Max±2.5V Input Terminal: 8-pin modular jack(RJ-45) (*1)
Raw Waveform Output (PU OUT)	AC voltage signal Max±2.5V Output Terminal: 2.5□ mini-jack
Sampling Frequency	MAX. 76.8 kHz (Changes according to Mode.) 76.8 kHz / 38.4 kHz
Aliasing Filter	20 kHz / 2 kHz (Changes according to Mode and Sampling Frequency.)
A/D	16 bit
Temperature Range	0 ~ + 45º C
Humidity Range	30 ~ 90% RH not due condensation
Weight	25 g approx. (Only the card)
Dimensions	60.0 x 42.1 x 16.9 (mm), See next page
Shape	Conforms to CF Card TYPE II , Card Type, See next page
Color	Black

*1: ICP type pre-amp built-in accelerometer is not connected.
When accelerometer (charge output) is used, connect via charge amplifier.

Dimensions



Measurement Specifications

CMSS3811 is used

Item	Specifications
Frequency Range	
A	Acceleration 10~15kHz (*1)
V	Velocity 10~1000Hz
D	Displacement 10~150Hz
E1	Envelope Detection 5~100Hz
E2	Envelope Detection 50~1kHz
E3	Envelope Detection 500~10kHz
E4	Envelope Detection 5k~20kHz
Sampling Frequency	A,E3,E4: 76.8 kHz E1,E2,V,D: 38.4 kHz
Aliasing Filter	A, E3, E4: 20kHz E1, E2, V, D: 2kHz
Range	
A,E1,E2,E3,E4	0~ 1G (x100 range) 0~ 5G (x20 range) 0~ 20G (x5 range) 0~100G (x1 range)
V	0~ 10mm/s (x100 range) 0~ 50 mm/s (x20 range) 0~ 200 mm/s (x5 range) 0~1000 mm/s (x1 range)
D	0~ 50μm (x100 range) 0~ 250μm (x20 range) 0~1000μm (x5 range) 0~5000μm (x1 range)

*1: The upper bound frequency can be changed by Utility Menu's A Filter.

Item	Specifications
Overall Value Simultaneous measurement	Simultaneous measurement of overall vibration level, multi-mode (A, V, D, E1~E4) Range = Auto Measuring time = 0.1s/0.5s/1.0s Measurement Data = RMS value, PEAK value, C.F value Measured value display digit : Significant figure 4digit Ex.9999/999.9/99.99/9.999 Status display (under measurement, measurement end)
Judgment	Abnormal judgment by vibration severity standard (ISO-10816 [JIS-B-0906] standard) Abnormal bearing judgment by Enveloped Acceleration E3 mode

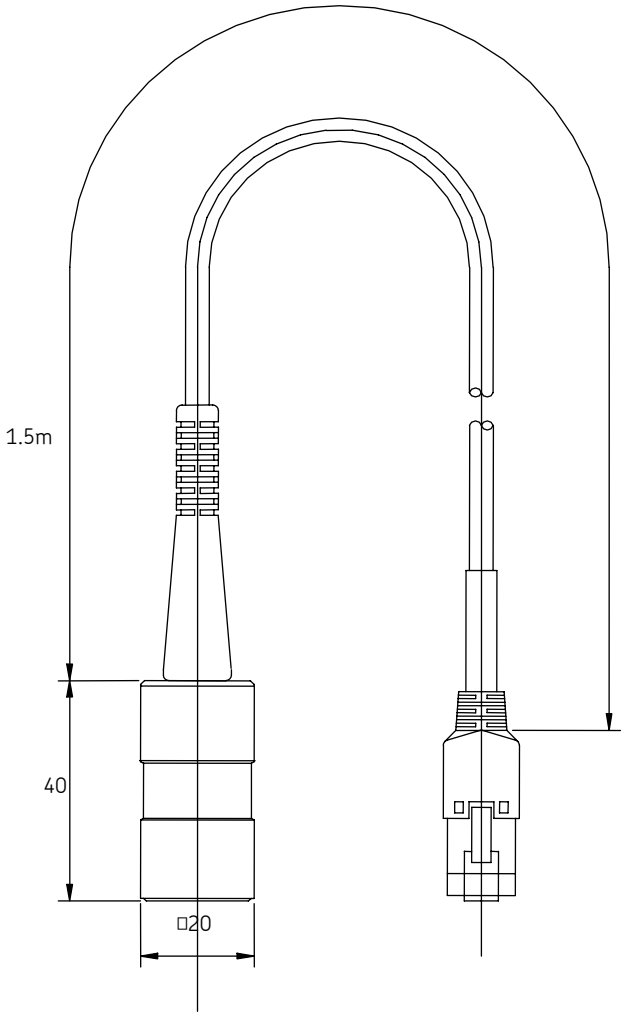
Item	Specifications
FFT, Waveform Analysis	Mode = A/V/D/E1/E2/E3/E4 Range = Fixed/Auto FFT measurement condition Analysis frequency : Selectable list A :250/500/1k/2k/5k/10k/15k/30k Hz V :250/500/1k Hz D :250/500 Hz E1:50 Hz E2:250/500 Hz E3:250/500/1k/2k/5k Hz E4:250/500/1k/2k/5k/10k Hz Lines of Resolution : 1600/800/400 Averaging : Stable/ Exponential/ Peak Hold 1/2/4/8 times Window: Hanning Measured Type : Normal/Recorder/Post Process Measured Type: Normal type: Recording time of waveform data is determined by FFT measurement condition (analysis frequency, line number). Executes the measurement for average cycle in FFT and records the waveform for frame time (final frame time.) Recorder type: Records the waveform of specified time by Rec.time. Average cycle of FFT is 1-time. (but it is impossible to specify the FFT measurement condition which the specified Rec.time is less than frame time.) Rec.Time:1/2/5/10 sec PostProccess type: Performs the calculation using raw waveform data prior to recording (temporarily saved data). This mode is available when **Normal** or **Recorder** mode is selected. The average FFT cycle is 1-cycle. When **Post Processing** mode is selected, the **Full Scale** and **Trigger** options are unavailable. Trigger Function Trigger: Input signal trigger Trigger level :0/10/20/30/40/50/60/70/80/90 % Specify % of the used range Delay :0/10/20/30/40/50 % Specify % of the specified waveform measurement time Status Display: During measurement, Measurement end

Graph Display	FFT graph Dominant frequency component highest High5 display Cursor indication value display Zoom scroll value display Waveform graph Cursor indication display Zoom. scroll display

CMSS 3811 - Accelerometer

Item	Specifications
Detecting Method	Pre-amp is built-in. Compression type, shear type
Power Supply	DC±5V
Voltage Sensitivity	20 mV/G
Resonance Frequency	20 kHz approx.
Frequency Range	3 ~ 10,000 Hz
Max. Acceleration	500 m/s^2
Max. Allowable Acceleration	5000 m/s^2
Max. Output Voltage	±1 V
Output Impedance	Below 100 Ω
Used Temperature	~20º ~ 80º C
Material	SUS
Weight	60 g approx.
Mounting Screw	M6, P=1, depth 5, internal thread
Cable	Direct leading□4, 1.5 m
Connector	8-pin modular plug
Dimensions	See next page
Structure	Dust-proof, spray-proof

CMSS 3811 - Dimensions



When CMSS3812 is used

Item	Specifications
Frequency Range V D	 Velocity 10~1000Hz Displacement 10~1000Hz
Sampling Frequency	V, D: 38.4 kHz
Aliasing Filter	V, D: 2kHz
Range V	 0~ 5 mm/s (x100 Range) 0~ 25 mm/s (x 20 Range) 0~ 100 mm/s (x 5 Range) 0~ 500 mm/s (x 1 Range)
D	0~ 25 µm (x100 Range) 0~ 125 µm (x 20 Range) 0~ 500 µm (x 5 Range) 0~2500 µm (x 1 Range)
Overall Value Simultaneous measurement	Simultaneous measurement of overall vibration level, multi-mode (V, D) Range = Auto Measuring time = 0.1s/0.5s/1.0s Measurement Data = RMS value, PEAK value, C.F value Measured value display digit: Significant figure 4digit Ex.9999/999.9/99.99/9.999 Status display (under measurement, measurement end)
Judgment	Abnormal judgment by vibration severity standard (ISO-10816 [JIS-B-0906] standard)

Item	Specifications
FFT, Waveform Analysis	Mode = V/D Range = Fixed/Auto FFT measurement condition Analysis frequency: Selectable list V :250/500/1 k Hz D :250/500/1 k Hz Lines of Resolution: 1600/800/400 Averaging: Stable/ Exponential/ Peak Hold 1/2/4/8 times Window: Hanning Measured type: Normal/Recorder/Post Process Measured type: **Normal**: The waveform data's recording time is determined by the FFT analysis settings (end frequency, number of lines). The FFT executes the measurement of the specified average cycle and records the waveform (1 frame time). **Recorder** Records the waveform for the specified recording time (1,2,5, or 10 seconds). The average FFT cycle is 1-time. **Post Process** Performs the calculation using raw waveform data prior to recording (temporarily saved data). This mode is available when **Normal** or **Recorder** mode is selected. The average FFT cycle is 1-cycle. When **Post Processing** mode is selected, the **Full Scale** and **Trigger** options are unavailable. Trigger Function Trigger: Input signal trigger Trigger level :0/10/20/30/40/50/60/70/80/90 % Specify % of the used range Delay :0/10/20/30/40/50 % Specify % of the specified waveform measurement time Status Display: During measurement, Measurement end

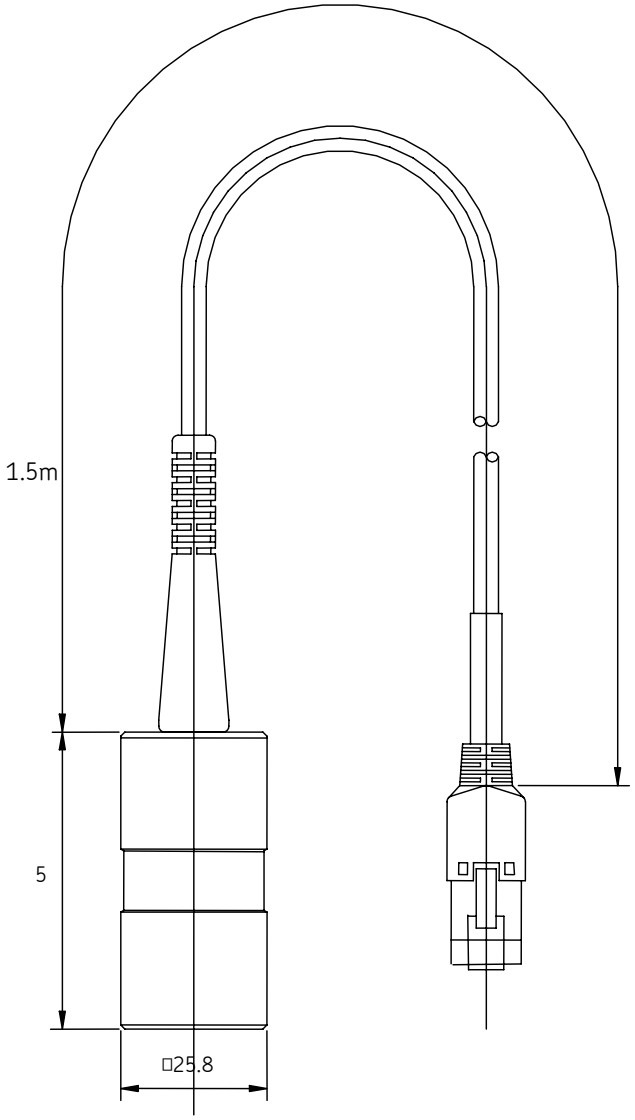
Graph Display	FFT graph Dominant frequency component highest High5 display Cursor indication value display Zoom scroll display Waveform graph Cursor indication value display Zoom.scroll display

CMSS 3812 - Velocity Sensor

Specifications

Item	Specifications
Detecting Method	Electro-dynamic velocity sensor
Detecting Direction	Horizontal or Vertical
Voltage Sensitivity	4.0 [mV/(mm/s)]
Natural Frequency	14 Hz
Frequency Range	10 ~ 1000 Hz
Max. Tolerable Acceleration	100 m/s^2
Max. Measuring Displacement	1000 μmP-P
Usable Temperature	-10~50° C
Material (case)	SUS
Weight	140 g approx.
Mounting Screw	M6,P=1,depth, 5、internal thread
Cable	Direct leading □ 4, 1.5 m
Connector	8-pin modular plug
Dimensions	See next page
Structure	Dust-proof, spray-proof

CMSS 3812 - Dimensions



Vibration Evaluation Standard

Vibration Evaluation Standard

Evaluation Standard	Sensor		Measurement Type
ISO Vibration Evaluation Standard (Vibration Severity)	Accelerometer (CMSS 3811)	Electro-dynamic Velocity Sensor (CMSS 3812)	Vibration level (OA value*) measurement Velocity (V) value
IMD Vibration Velocity Standard	Accelerometer (CMSS 3811)	Electro-dynamic Velocity Sensor (CMSS 3812)	Vibration level (OA value) measurement Velocity (V) value
IMD Roller Bearing Vibration Evaluation	Accelerometer (CMSS 3811)		Vibration level (OA value) measurement Velocity (B) value

ISO Vibration Evaluation Standard – Vibration Evaluation Standard by Vibration Severity

Vibration evaluation standard for machine operating with rotational speed between 600 ~12,000 RPM. The standard vibration is the vibration generating on machine surface or bearing. The frequency range is limited to 10 ~1,000 Hz.

Ranges of Vibration Severity		Example of quality judgment for separate classes of machine			
Range	RMS-velocity (mm/s) at the range limits	Class I	Class II	Class III	Class IV
0.28		A	A	A	A
0.45					
0.71					
1.12		B			
1.8			B		
2.8		C		B	
4.5			C		B
7.1		D		C	
11.2			D		C
18				D	
28					D
45					
71					

Appendix A
Vibration Severity

Class I	Small machine
Class II	Medium size machine
Class III	Large machine
Class IV	Turbo machine

Additional Product Information

FCC Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Information to user:

Any changes or modifications without the express approval by the party responsible for compliance could void the user's authority to operate the equipment.

- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.