

INSTRUCTION MANUAL

Marine Vibration Card

VX-54WS



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Organization of this manual

This manual describes operation of the 3-Axis Vibration Meter VM-54 when the program supplied on the Marine Vibration Card VX-54WS has been installed.

The manual contains the following sections.

Outline

Gives basic information on the Marine Vibration Card VX-54WS.

Controls and Functions of VM-54

Identifies and explains the name and function of keys, connectors and other parts of the VM-54.

Preparations

Explains how to connect the accelerometer and make printer settings.

Reading the Displays

Explains graphics and character-based information that appears on the main display and sub display of the unit.

Power-On/Off

Explains how to turn the unit on and off.

Measurement

Describes the basic steps for measurement.

Memory Card

Explains how to store use the memory card for data storage.

Store Operation

Explains how to store and recall measurement data.

Output Connectors

Explains the output connectors of the unit.

Printing

Explains how to print out measurement data.

Reference Information

Provides information on external power switching, the Input connector, and the frequency response characteristics of the system.

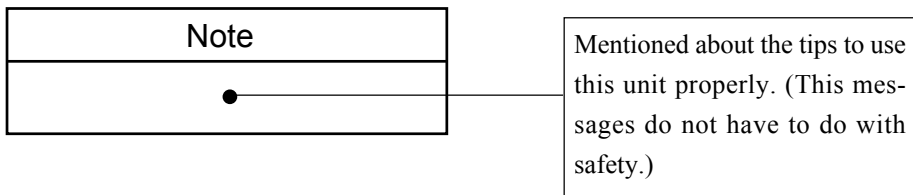
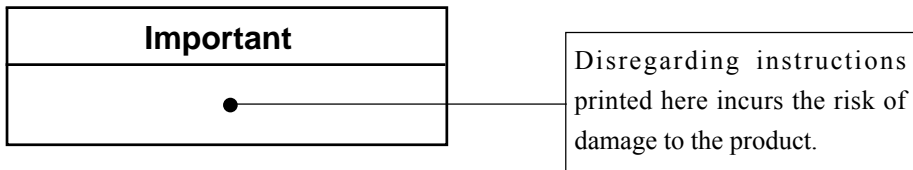
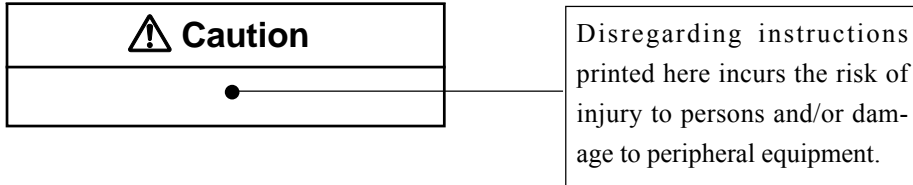
Specifications

Lists the technical specifications of the unit.

Company names and product names mentioned in this manual are usually trademarks or registered trademarks of their respective owners.

FOR SAFETY

In this manual, important safety instructions are specially marked as shown below. To prevent the risk of death or injury to persons and severe damage to the unit or peripheral equipment, make sure that all instructions are fully understood and observed.



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8. Jurisdiction

Any disputes or litigation arising from this agreement will be under the jurisdiction of the Tokyo District Court.

Precautions

- Operate the card only as described in this manual.
- Take care not to drop the card and protect it from shocks and vibration.
- The permissible ambient temperature and humidity range for operation of the card is -10 to +50°C, 90% RH.
Do not use or store the card in locations that may be subject to extreme temperature or humidity, to splashes of water, high levels of dust, or to direct sunlight. Also avoid air with high salt or sulphur content, gases, and the vicinity of stored chemicals.
- Do not initialize the card in a computer.
- Exposure of the card to static electricity or to water may result in loss of program data and stored data. If there is a possibility that your body carries static electricity, first touch a grounded metal object or discharge static electricity by other suitable means before handling the card.
- Never insert any object such as pieces of wire, conductive plastic etc. into the card connector, to prevent the risk of damage.
- Do not try to disassemble or modify the card.
- Do not disassemble the unit or attempt internal alterations.
If you suspect that there is a problem with the unit, contact your supplier.
- The supplied 3-axis accelerometer PV-83CW is a precision product. Take care not to drop it and protect it from shocks. Otherwise there is a risk of damage.

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Outline

This product is an option program card for the 3-Axis Vibration Meter VM-54. By installing the program data in the VM-54, the vibration meter can be used to make vibration measurements in the accommodation sections of ships. The measurements are compatible with ISO 6954: 2000 (Guidelines for the measurement, reporting and evaluation of vibration with regard to habitability on passenger and merchant ships) and JIS F 0907:2003 (Guidelines for overall evaluation of vibration in accommodation part of merchant ships).

The 3-axis accelerometer PV-83CW is supplied with this product, enabling acceleration and velocity measurements in three axes.

Measurement data can be stored on memory card (CompactFlash card), which makes it easy to collect data from multiple locations and process the data on a computer. Data files are in CSV format and include 3-axis measurement values (instantaneous rms values with $t = 1$ s, measurement period rms values, maximum and minimum instantaneous values in measurement period), address information, store date and time information, and level range information. These data can be processed using third-party spreadsheet software such as Microsoft Excel. An Excel macro for generating reports based on collected measurement data is also included on the Marine Vibration Card VX-54WS. This greatly facilitates data management on a computer.

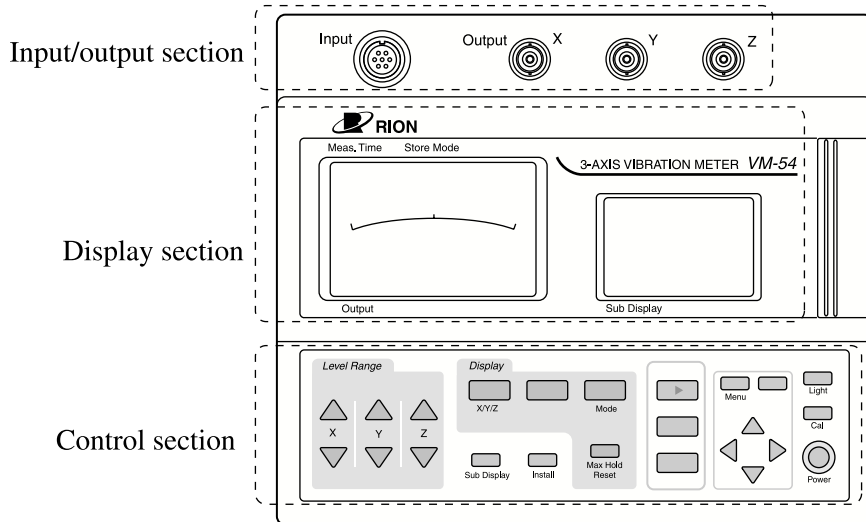
BNC output connectors provide AC signals for the three axes which can be used for monitoring on external equipment.

A soft carrying case with shoulder strap is also supplied, which helps to protect the unit from oil or water and facilitates on-site use in harsh environments.

Controls and Functions of VM-54

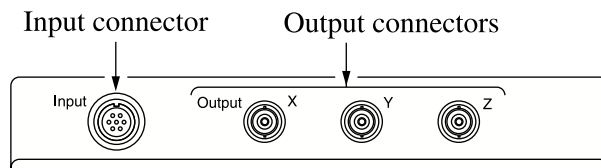
This section explains the controls and functions of the VM-54 with the template sheet supplied with the VX-54WS attached.

Front panel



Input/output section

Input connector

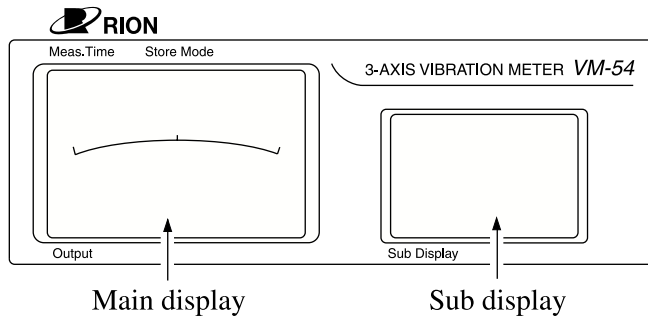


The 3-axis accelerometer PV-83CW is to be connected here, using the EC-54 cable. An extension cable of the EC-04 series can also be used. The separately available accelerometer PV-57/PV-57A can also be connected. (See pages 13 to 15 in "Preparations".)

Output connectors

These are BNC connectors which carry an AC output signal for the X, Y, and Z axis.

Display section



Main display

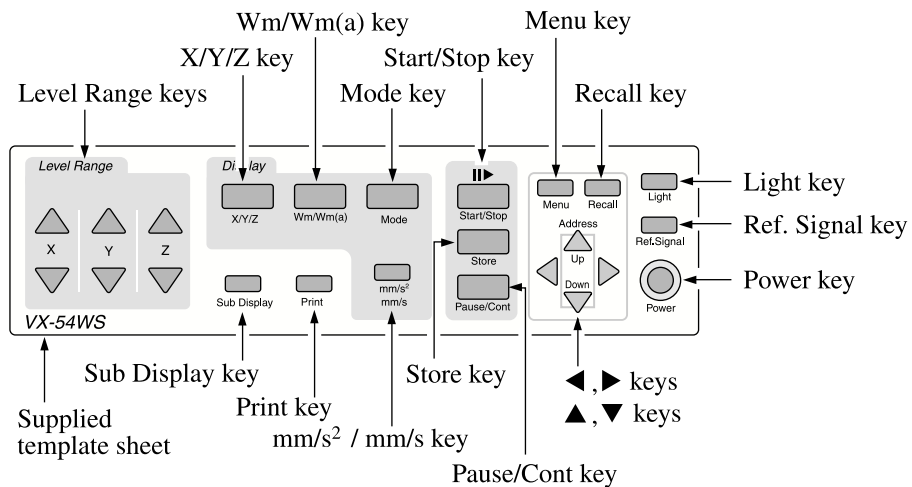
Shows the measurement value and setting information.

Sub display

Shows the 3-axis bar graph screen, 3-axis numeric screen, processing value screen, and other measurement screens, as well as menus and the recall screen.

Control section

Operate the VM-54 with the template sheet supplied with the VX-54WS attached. See "Preparations" on page 11.



Note

Protective film

The unit is shipped with a protective film covering the operation panel. When using the unit, you can remove this film.

Level Range keys

These keys control the level range for the X, Y, Z axis.

The ▲ key switches the level range up, and the ▼ key switches the level range down.

X/Y/Z key

Switches the vibration axis to be shown on the display.

With each push of the key, the display cycles through the settings in the order X → Y → Z → X etc.

Wm/Wm(a) key

Serves to select the frequency weighting characteristics.

Wm: Wm type frequency weighting as specified in ISO 2631-2

Wm(a): Wm type bandwidth limiting filter as specified in ISO 2631-2

With the PV-57(A), a setting other than Wm gives approximately flat response from 1 Hz to 1 kHz.

For vibration measurements in the accommodation sections of ships, the Wm frequency weighting is normally used.

By pressing the Wm/Wm(a) key immediately after power-on, while the initialization screen is still shown, information on applicable standards is displayed.

Mode key

Switches the measurement mode.

Each push of the key cycles through instantaneous value → processing value (RMS) → maximum value (max) → minimum value (min) → instantaneous value ...switches the display mode.

Start/Stop key

Serves to start and stop the measurement. During processing, the ► symbol is shown on the display. If you stop processing and then start measurement again, the elapsed time is reset to 00 seconds.

Menu key

Pressing this key brings up a menu screen on the sub display.

Each push of the key cycles through menu screens 1/5, 2/5, ... 5/5. Pressing the key again at menu screen 5/5 closes the menu display.

The menu can also be closed by pressing any other key except the Light key, Power key, ▲, ▼, ◀, ▶ keys, and Print key.

Recall key

This key serves to call up data stored on memory card.

Light key

This key turns the backlight for the main display and sub display on. This is convenient when using the unit in a dark location. To turn the backlight off, press the key again.

When the unit is operating on battery power, the backlight will be automatically turned off after 10 minutes. When the unit is powered from an external power supply, the backlight will not be automatically turned off.

Battery current consumption increases by a factor of about 2 when the backlight is on.

Ref. Signal key

This key serves for level matching between the unit and equipment connected to the Output connectors. The reference signal level is as shown below.

AC: 15.915 Hz 1 Vrms

By pressing the Ref. Signal key immediately after power-on, while the initialization screen is still shown, the software version of the VM-54 will be displayed.

Power key

Serves to turn the unit on and off.

Hold down the key for at least one second to turn power on or off.

After switching the unit off, wait at least five seconds before turning power back on again. Otherwise the unit may not start up properly.

▲, ▼ keys

These keys serve to select the address for storing data.

When the sub display is showing a menu screen, the keys serve to select a menu item.

◀, ▶ keys

When the sub display is showing a menu screen, these keys serve to change the setting of the selected item.

Pause/Cont key

Serves to pause and resume the measurement.

Store key

This key serves to store instantaneous value data and processing result data on a memory card. The stored data reflect the frequency weighting characteristics selected with the Wm/Wm(a) key.

mm/s² / mm/s key

When the measurement mode is instantaneous value measurement, this key selects acceleration or velocity measurement.

mm/s²: Acceleration

mm/s: Velocity

When PV-57(A) is used

m/s²: Acceleration

mm/s: Velocity

When you switch between acceleration and velocity, the measurement results up to that point are cleared.

Print key

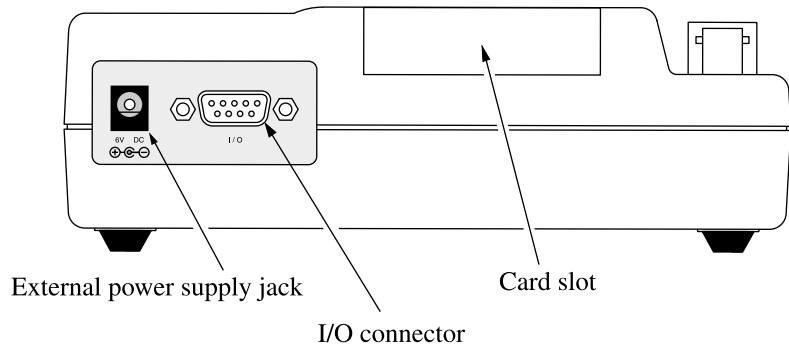
This key serves for printing out measurement on a separately available printer.

Sub Display key

Switches the function mode of the sub display.

With each push of the key, the display cycles through the bar graph screen, 3-axis measurement screen, and other screens.

Right side view



External power supply jack

The optional AC adapter NC-98 (for 100 to 240 V AC) can be connected here to power the unit from an external source.

I/O connector

The separately available printer DPU-414, CP-10, or CP-11 can be connected here, using a special cable.

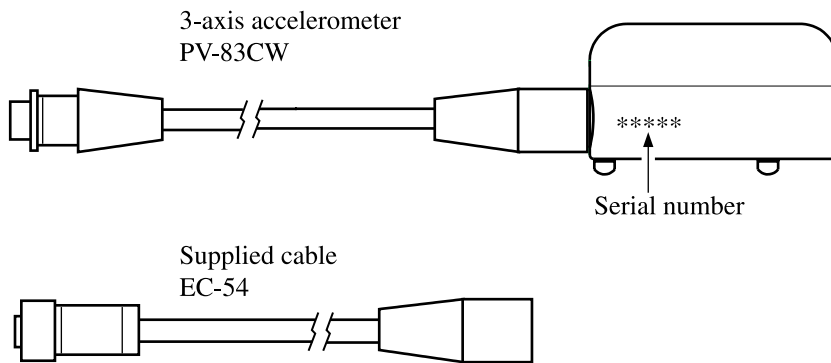
Card slot

The program card VX-54WS and other memory cards can be inserted in this slot.

Accelerometer and extension cable

To carry out measurement, plug the supplied cable EC-54 into the supplied 3-axis accelerometer PV-83CW and plug the other end of the cable into the Input connector on the VM-54.

For details on connection and accelerometer placement, see page 12 in the section "Preparations".



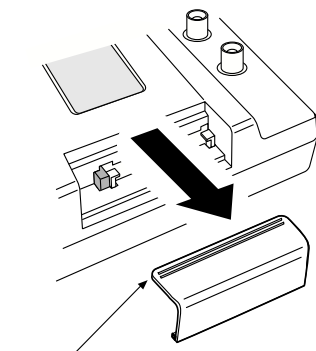
Preparations

Installing the Marine Vibration Card VX-54WS

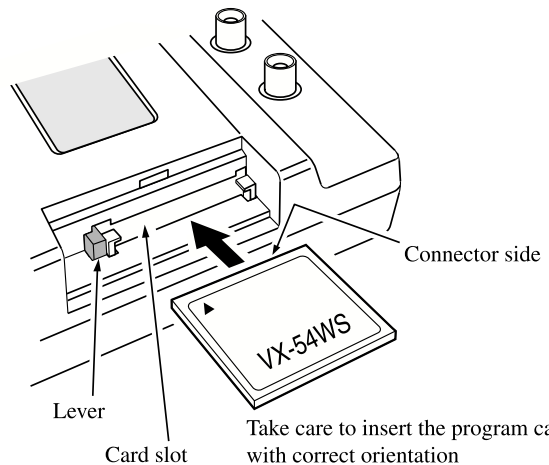
Important

Make sure that power is turned off before inserting the program card.

If the power is interrupted during installation or uninstallation, the unit may malfunction. When performing the procedure while powering the VM-54 from batteries, make sure that the batteries are fresh. When performing the procedure while powering the VM-54 from the AC adapter, make sure that batteries are inserted as a backup power supply. Also note that a strong shock may result in the power being cut off. Handle the unit with care at all times.



Lightly press the striped section and slide the lid to the right to remove.

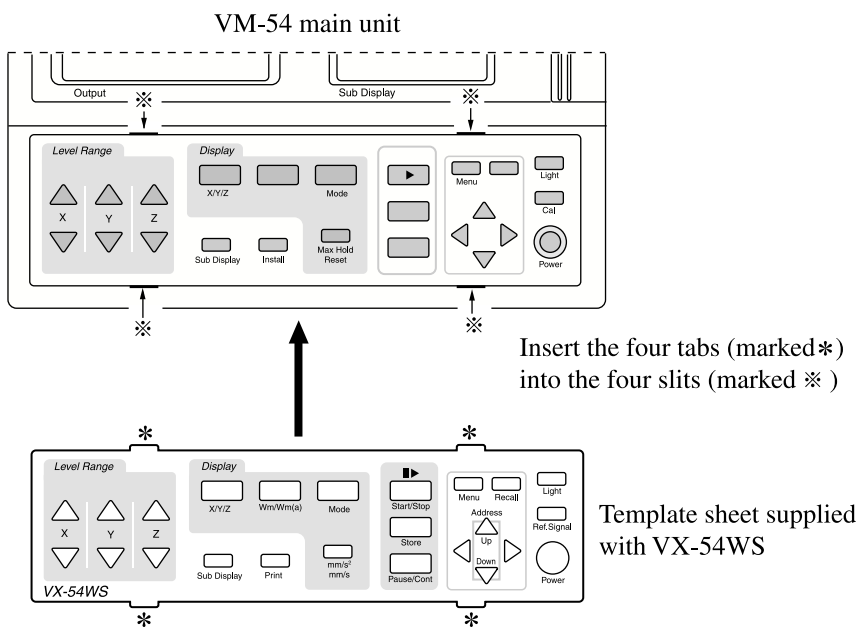


1. Open the lid of the card slot and insert the program card.
2. While holding down the Install key (labeled Print key on the template sheet), press the Power key to turn the unit on.
3. The screen for installing an option program appears.
4. Press the Mode key to start the installation.

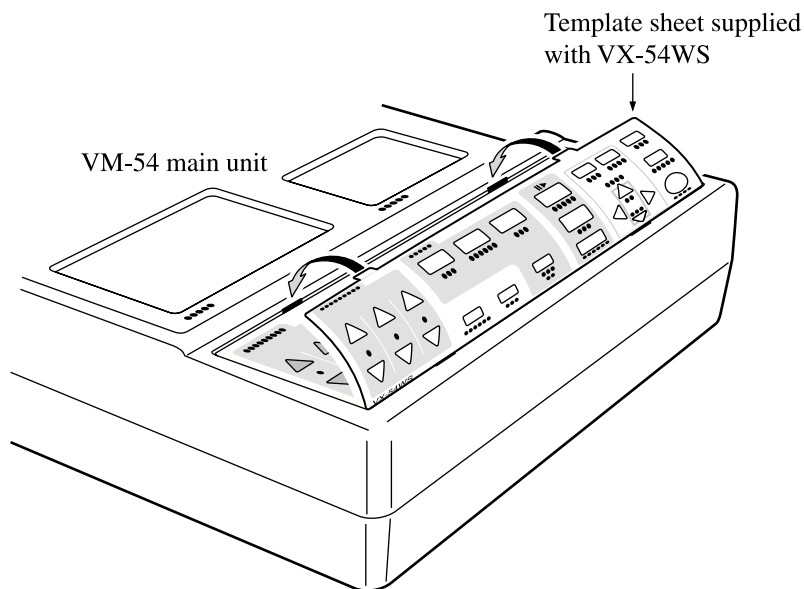
For details, see the section "Option Program Installation/Uninstallation" in the instruction manual of the 3-Axis Vibration Meter VM-54.

Attaching the template sheet

Install the template sheet supplied with the VX-54WS on top of the operation panel of the VM-54.



Slightly bend the template sheet as shown below.



3-axis accelerometer PV-83CW placement and connection

3-axis accelerometer PV-83CW placement

Hard surfaces

Select a level area and carefully place the accelerometer on it.

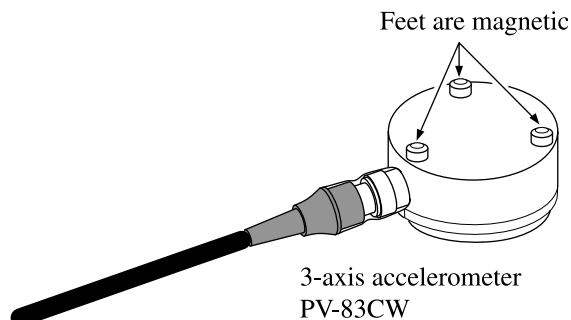
Soft surfaces

Do not place the accelerometer on a soft surface.

Important
Avoid locations subject to drastic temperature fluctuations or exposed to direct sunlight. Otherwise correct measurement results are not assured.

Iron or steel surfaces

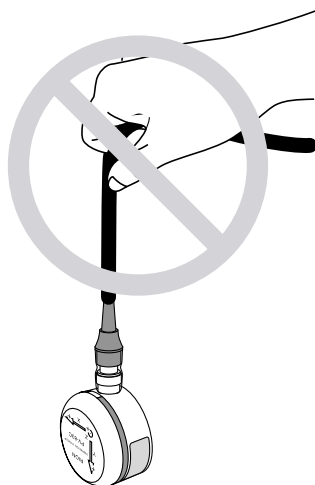
⚠ Caution
The magnets are only for horizontal surfaces such as a floor. Do not use on walls or ceiling. Otherwise the accelerometer may drop and cause injury.



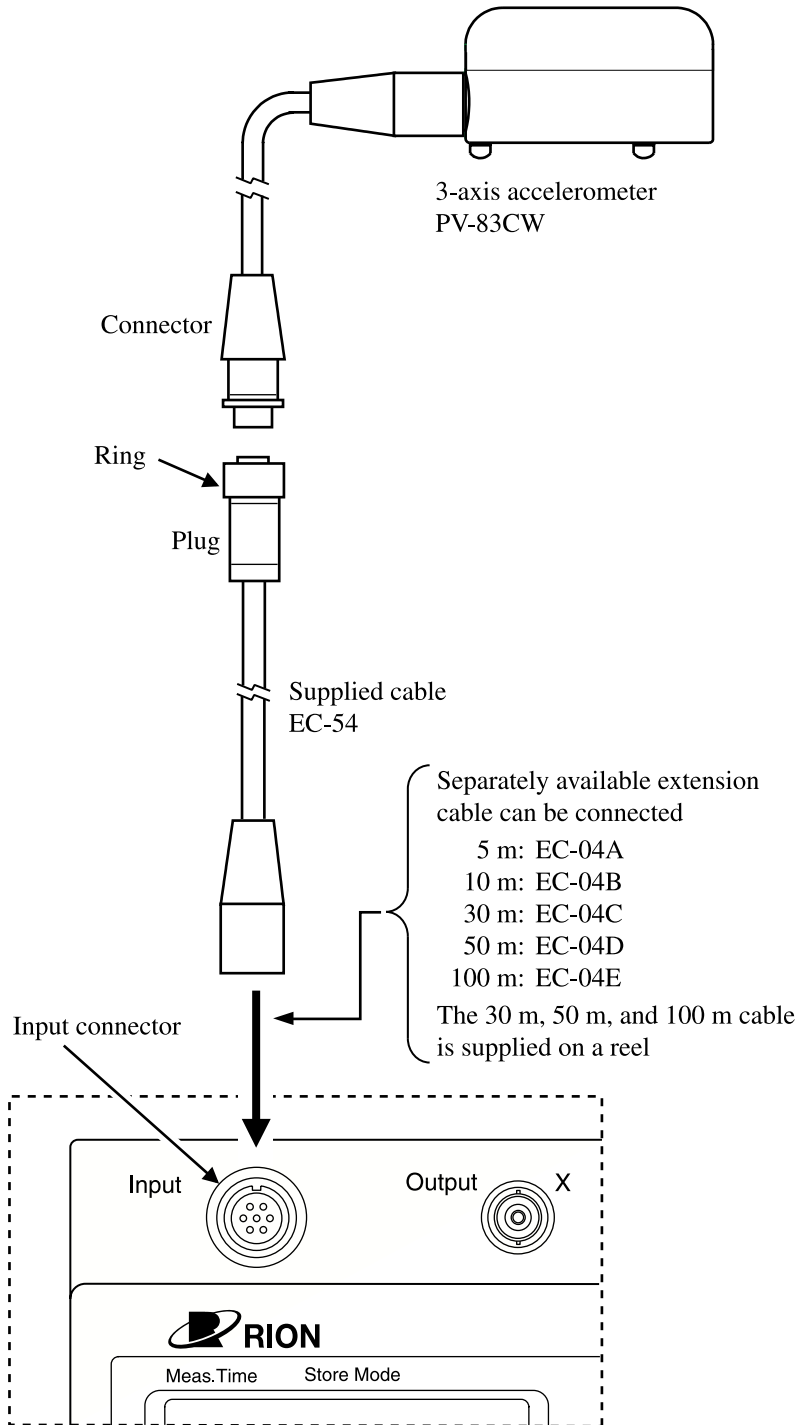
3-axis accelerometer PV-83CW connection

1. Insert the plug of the supplied cable EC-54 into the connector on the tip of the accelerometer, aligning the guide on the plug with the connector. Turn the locking ring clockwise to fasten the plug.
2. Insert the plug at the other end of the cable into the Input connector on the VM-54. Turn the locking ring clockwise to fasten the plug. (See next page.)

Important
The accelerometer is a precision device. Never drop it or subject it to shocks.
Never suspend the accelerometer by its cable or pull at the cable. Otherwise cable breaks may occur.



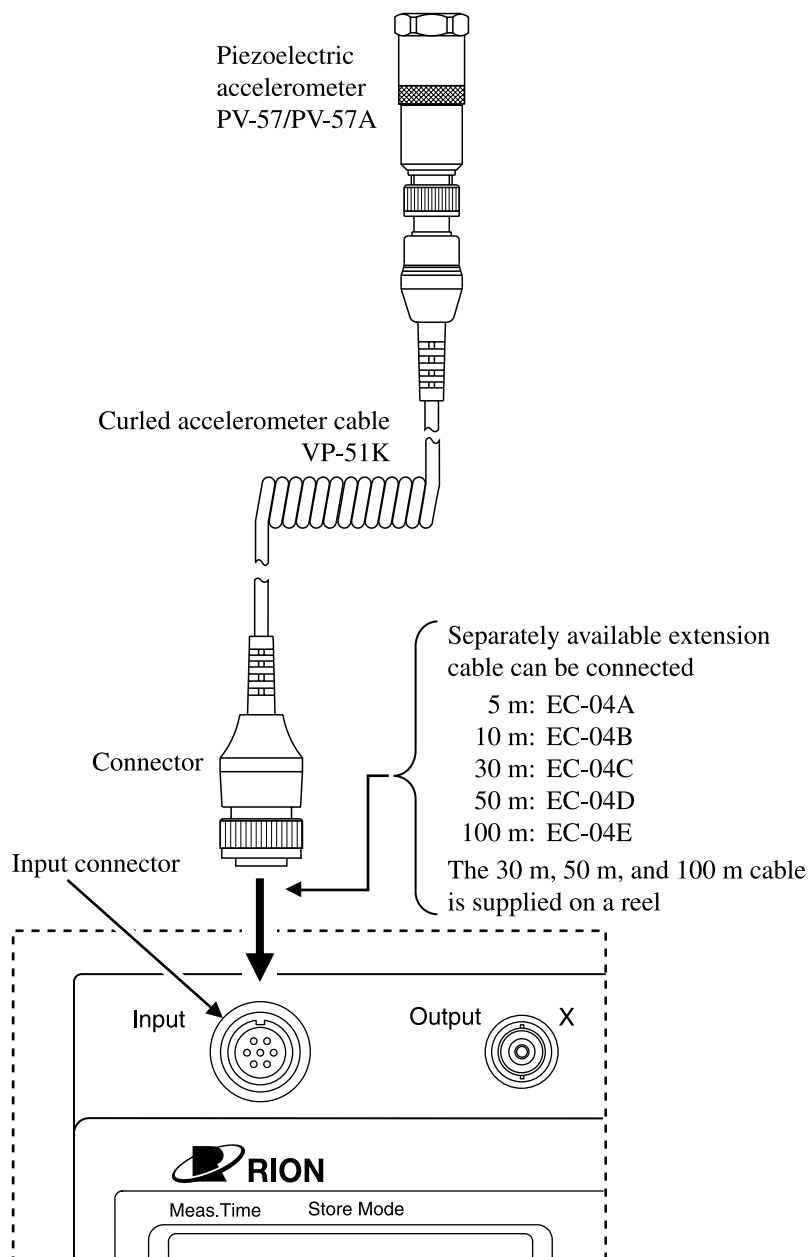
Extension cable



Using the separately available PV-57/PV-57A

Note

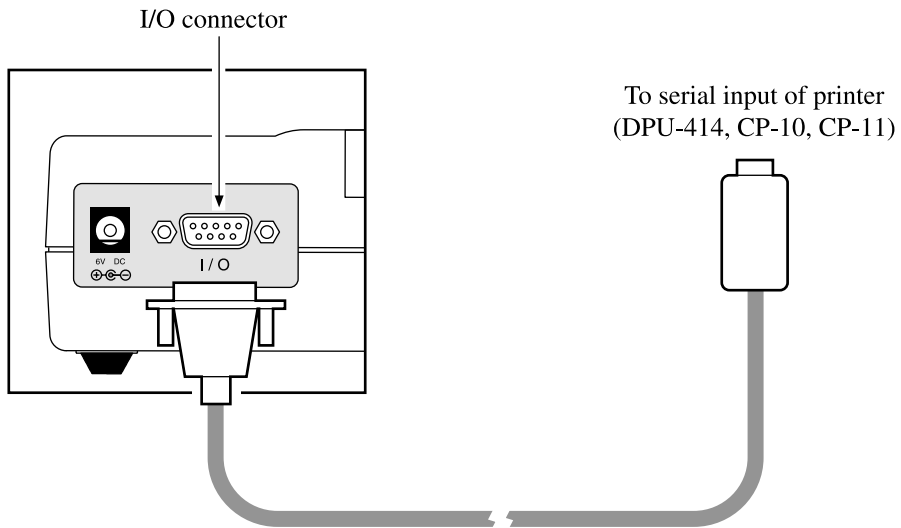
When performing measurement with the PV-57/
PV-57A, the measurement result is displayed in
the Z channel.



Connection to a printer (DPU-414, CP-10, CP-11)

The printer is available separately.

Use a commercially available serial cable (straight cable) to connect the I/O connector on the side of the VM-54 to the serial input of the printer (DPU-414, CP-10, CP-11).



Cable:	Straight serial cable(commmercially available)
Connector on VM-54:	D-sub 9-pin male
Connector on printer:	D-sub 25-pin female (For DPU-414, conversion adapter supplied with DPU-414 must be used.)

Setting the VM-54 for the connection with DPU-414

Use the menu 3/5 to set the baud rate of this unit to 19200 bps.

Setting the software DIP switches of the DPU-414

Set the power switch to ON while keeping the ON LINE switch.

When printing starts, release the switch. The current settings are printed out.

To choose the "ON" setting, press the ON LINE switch.

To choose the "OFF" setting, press the FEED switch.

You should also refer to the instruction manual for the thermal printer DPU-414.

The procedure for changing DIP switches settings is described below.

Dip SW-1

1 (OFF)	:	Input = Serial
2 (ON)	:	Printing Speed = High
3 (ON)	:	Auto Loading = ON
4 (OFF)	:	Auto LF = OFF
5 (ON)	:	Setting Command = Enable
6 (OFF)	:	Printing
7 (ON)	:	Density
8 (ON)	:	100 %

Dip SW-2

1 (OFF)	:	Printing Columns = 80
2 (ON)	:	User Font Back-up = ON
3 (ON)	:	Character Select = Normal
4 (ON)	:	Zero = Normal
5 (ON)	:	International
6 (ON)	:	Character
7 (ON)	:	Set
8 (ON)	:	=Japan

Dip SW-3

1 (ON)	:	Data Length = 8 bits
2 (ON)	:	Parity Setting = No
3 (OFF)	:	Parity Condition = Even
4 (OFF)	:	Busy Control = XON / XOFF
5 (OFF)	:	Baud
6 (ON)	:	Rate
7 (ON)	:	Select
8 (OFF)	:	= 19200 bps
Continue ?	:	Push'-line SW'
Write ?	:	Push' Paper feed SW'

DIP SW setting complete !!

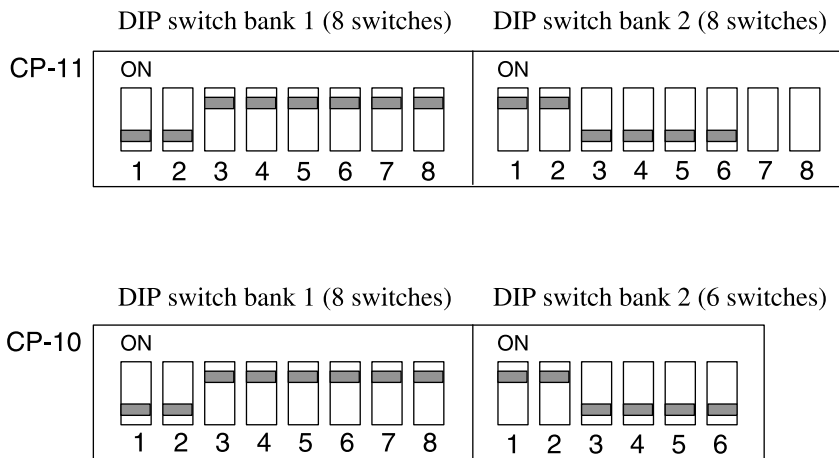
For details, please refer to the documentation of the DPU-414.

Setting the VM-54 for the connection with CP-11/CP-10

Use the menu 3/5 to set the baud rate of this unit to 9600 bps.

Setting the DIP switches of the CP-11/CP-10

Set the DIP switches show below.



Important

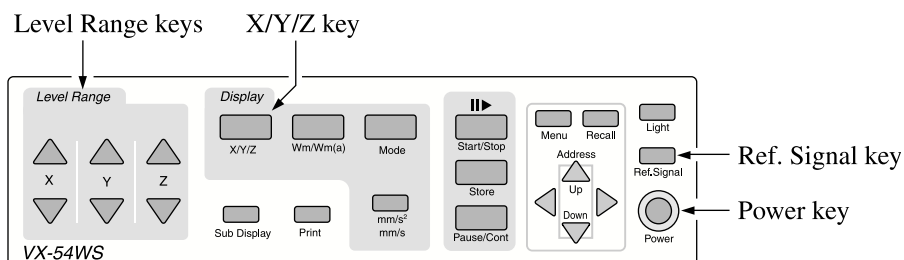
Switches 7 and 8 of DIP switch bank 2 of printer CP-11 are set at the factory and should not be changed.

Otherwise correct printing may not be possible.

Supplying a reference signal to external equipment

Before recording measurement values on external equipment, supply a reference signal as follows.

1. Press the Power key to turn the unit on.



2. Press the Ref. Signal key.

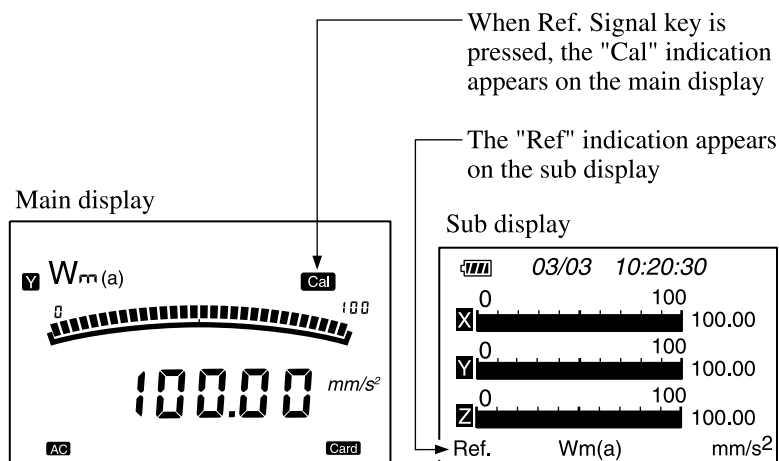
The main display and sub display show the reference signal output screen.

On the main display, you can use the X/Y/Z key to switch the vibration axis for checking.

The sub display is fixed to the 3-axis bar graph screen, which lets you check all three axes simultaneously.

Note

While the reference signal is being output, the level range cannot be changed.



Reference signal output screen example

During reference signal output, the Output connectors carry the following signal, which corresponds to the range full-scale output.

15.915 Hz, 1 Vrms (AC)

Use this signal to calibrate an external device such as a level recorder or analyzer that is to be used for measurement.

3. Press the Ref. Signal key once more to cancel the reference signal output screen.

Note
When the level range setting is 30, 300, or 3000, the range full scale value is 31.624, 316.24, and 3162.4 respectively.

Reading the Displays

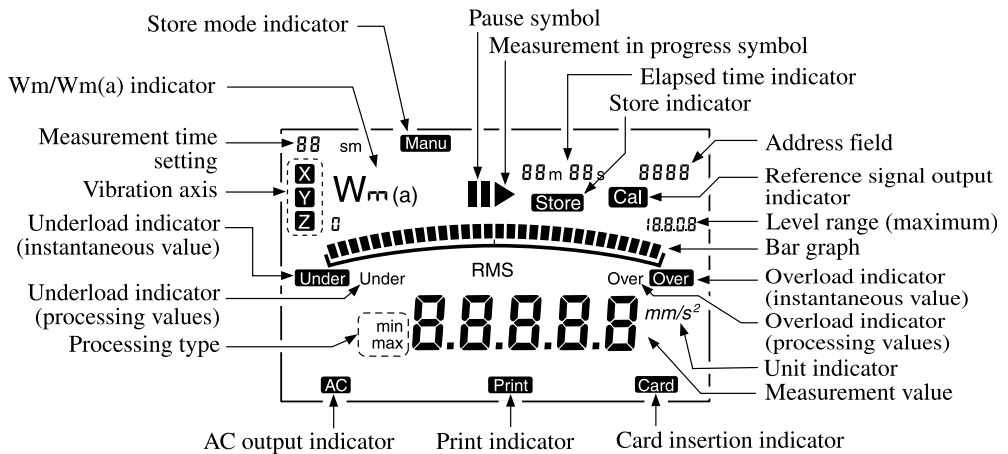
The VM-54 has two LCD panels. The left-side panel is the main display and the right-side panel is the sub display.

The main display shows the measurement value (instantaneous value, processing value) for the selected vibration axis (X, Y, Z), as well as setting information.

For the sub display, 3-axis bar graph, 3-axis numeric screen, menu screens, and recall screen can be selected, depending on the measurement mode.

Main display

The illustration below is for demonstration purposes only. In actual use, not all display elements will be visible at the same time.



Store mode indicator

The indication **Manu** appears here, showing that manual store is used.

Pause symbol

Appears when the unit is in pause mode.

Measurement in progress symbol

Flashes during measurement.

Elapsed time indicator

Shows the elapsed time during measurement.

Store indicator

Appears when data are being stored on memory card.

Address field

Shows the address.

Reference signal output indicator

Appears when the Ref. Signal key was pressed and the reference signal is being output.

Level range (maximum)

Shows the maximum (full-scale) value for the bar graph, as set with the level range keys.

When the level range setting is 30, 300, or 3000, the range full scale value is 31.624, 316.24, and 3162.4 respectively.

Bar graph

A bar graph corresponding to the measurement value is shown here.

The display is based on the exponential average using a time constant of 1 second, and the display update frequency is 100 ms.

Overload indicator (instantaneous value)

Appears when overload in the instantaneous value was detected.

Overload indicator (processing values)

Appears when overload during processing was detected. The indication remains on until the start of the next processing measurement.

Unit indicator

Shows the unit for acceleration or velocity.

Acceleration: mm/s^2 when PV-83CW is used
 m/s^2 when PV-57(A) is used

Velocity: mm/s

Measurement value

The measurement result is shown here. The display update frequency is 1 s. The indication represents the rms value of the instantaneous value with $\tau = 1$ s.

Card insertion indicator

Appears when a memory card is inserted in the card slot.

Print indicator

Flashes while data are being sent to the printer.

AC output indicator

Shows that the outputs supply an AC signal.

Processing type

Shows the kind of processing function that has been selected with the Mode key.

RMS:	RMS value of measurement interval (measurement duration governed by processing function)
min:	Minimum of instantaneous value (rms with $\tau = 1$ s) within measurement time
max:	Maximum of instantaneous value (rms with $\tau = 1$ s) within measurement time

Underload indicator (processing values)

Appears when underload during processing was detected. The indication remains on until the start of the next processing measurement.

Underload indicator (instantaneous value)

Appears when underload in the instantaneous value was detected.

Vibration axis

Shows which vibration axis is currently selected for measurement value display.

The axis is selected with the X/Y/Z keys.

Measurement time setting

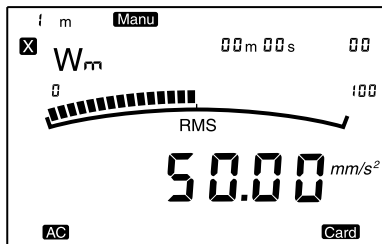
Shows the time set with the "Meas. time" item on menu screen 1/5. Available settings are 10 seconds, 1 minute, 2 minutes, and 10 minutes.

Wm/Wm(a) indicator

Wm: Wm type frequency weighting as specified in ISO 2631-2: 2003.

Wm(a): Wm type bandwidth limiting filter as specified in ISO 2631-2: 2003 (approximately flat response in 1 to 80 Hz range)

When PV-57(A) is used, response is approximately flat from 1 Hz to 1 kHz when Wm is not used. Wm(a) is not displayed.



Main display screen example

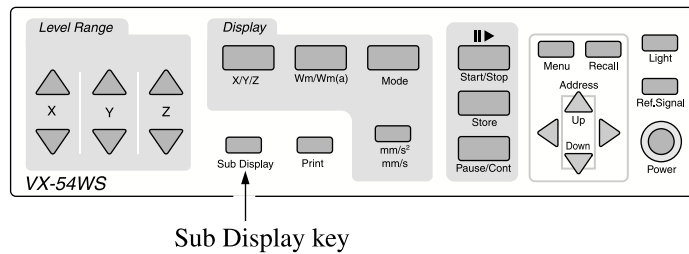
Note

When performing measurement with the PV-57/PV-57A sensor (menu screen 2/5 described on page 29 set to PV-57/PV-57A), the measurement result is displayed in the Z channel.

Sub display

The sub display employs a dot-matrix type LCD which allows various display functions.

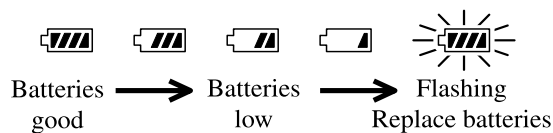
The Sub Display key serves to switch between these functions. The screen also changes according to the operation mode.



The battery capacity and date/time indications also appear on the sub display.

Battery capacity indication

When the unit is operating on battery power, you should periodically check the battery capacity indicator. The number of black segments decreases as the batteries get weaker. When the display starts to flash, correct measurement is no longer possible. Replace the batteries with a fresh set. While the unit is powered from the AC adapter, the battery capacity indication is always at maximum.

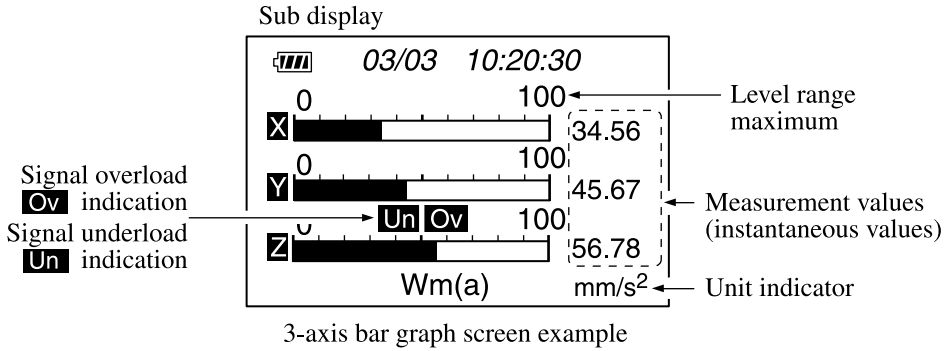


During measurement

You can select 3-axis bar graph screen, 3-axis numeric screen, processing value screen, or settings check screen.

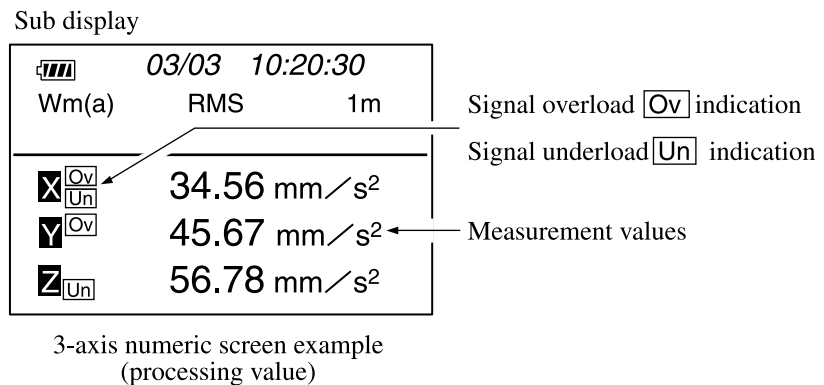
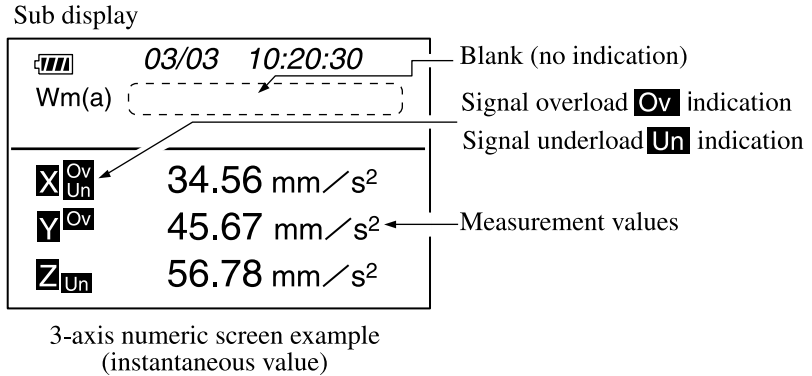
3-axis bar graph display

This screen shows bar graphs for all three axes and the instantaneous values simultaneously. Processing values are not shown.



3-axis numeric screen

The measurement values for the 3 vibration axes are shown as a numeric readout. The Mode key serves to switch between instantaneous value and processing values (RMS, max, min).





- Blank: RMS of instantaneous value ($\tau = 1$ s)
- RMS: RMS value of measurement interval (measurement duration governed by processing function)
- min: Minimum of instantaneous value (rms with $\tau = 1$ s) within measurement time
- max: Maximum of instantaneous value (rms with $\tau = 1$ s) within measurement time

Processing value display

Shows the processing values for the selected channel.

Sub display

	03/03 10:20:30
Wm(a)	1m
	03/03 10:14:22
<input checked="" type="checkbox"/>	RMS : 100.00 mm/s ²
	max : 152.57 mm/s ²
	min : 81.23 mm/s ²

Processing value screen example


Note

Unless the Start/Stop key is pressed, the processing value display will be zero.

Settings screen

The settings for sensor, level range etc. are shown on this screen, for confirmation.

Sub display

	03/03 10:20:30
VX-54WS	PV-83CW
Wm(a)	
Level Range	X: 100
	Y: 100
	Z: 100
Meas. time:	1min

Settings screen example

Menu screens

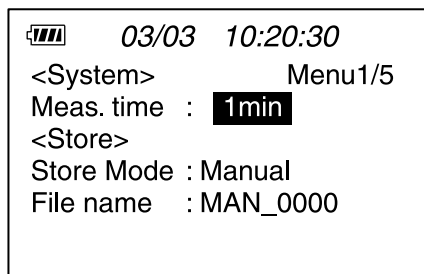
The VM-54 has five menu screens which are shown on the sub display and are numbered 1/5 to 5/5. The Menu key lets you cycle through the screens.

To select an item on a menu screen, you use the ▲ and ▼ keys.

To change the setting of an item, you use the ◀ and ▶ keys.

Menu screen 1/5

Sub display



Menu screen 1/5

Meas. time (Measurement time)

Selects the measurement time. Available settings are 10 sec, 1 min, 2 min, and 10 min.

For vibration measurements in the accommodation sections of ships, the 1 min setting is normally used.

Regardless of the measurement time setting, the Start/Stop key can always be used to stop the measurement.

Store Mode

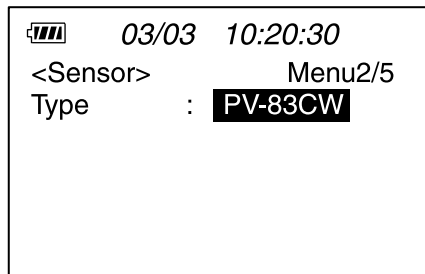
This shows the store mode. The Marine Vibration Card VX-54WS only allows manual store.

File name

A four-digit number can be specified as file name. The setting is changed two digits at a time.

Menu screen 2/5

Sub display



Menu screen 2/5

Type (accelerometer type)

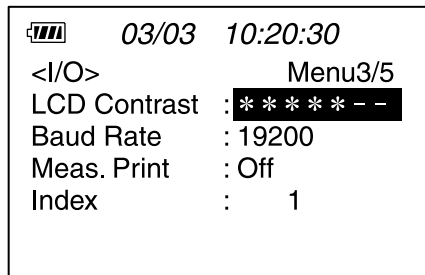
Selects the connected accelerometer. When the 3-axis accelerometer PV-83CW is connected, select "PV-83CW". When the PV-57 or PV-57A is connected, select "PV-57(A)".

Note

If the accelerometer type has been set incorrectly, correct measurement is not possible. Be sure to check this setting before starting a measurement.

Menu screen 3/5

Sub display



Menu screen 3/5

LCD Contrast (Sub display contrast)

The number of asterisks corresponds to the contrast setting.

Baud Rate (Printer transfer speed)

Sets the speed for data transfer to a printer.

Available settings are 4800 bps, 9600 bps, and 19200 bps. (See pages 16 to 18.)

Meas.Print (Print during processing)

Sets the printing function to On or Off.

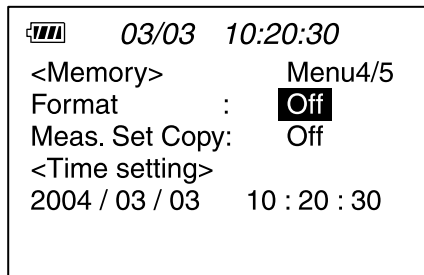
When the setting is "On", instantaneous value data will be printed automatically every 2 seconds after processing was started with the Start/ Stop key. The processing result is also printed when processing is completed. (See pages 56 to 58.)

Index

Sets an index number from 1 to 255. This can be used to identify the unit when multiple VM-54 units are used in a system.

Menu screen 4/5

Sub display



Menu screen 4/5

Format

When a memory card is inserted, this option clears all data on the card. (This does not perform a physical format.) See "Clearing data stored on a memory card" on page 53.

Meas. Set Copy

This option lets you copy setting information about level range, Wm/Wm(a) etc. onto a memory card. This information can later be used to start the VM-54 with these settings. (For details, see "Reference Information" on page 64.)

Time setting (Date/time setting)

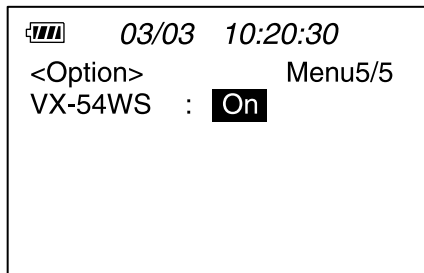
Lets you set the year, month, day, hours, minutes, and seconds.

When you press the Start/Stop key, the internal clock is set to the selected date and time and starts to run.

Settings will not become active unless the Start/Stop key is pressed.

Menu screen 5/5

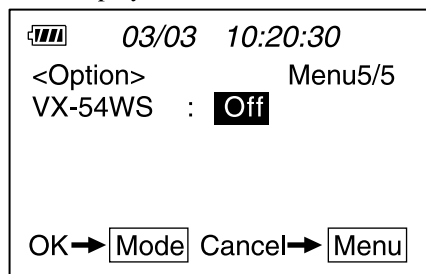
Sub display



Menu screen 5/5

Use the ◀ or ▶ key to set the VX-54WS option to On or Off. The display changes as follows.

Sub display



Menu screen 5/5

Off: The VM-54 will start up with its standard program.

If this is the setting you want, press the Mode key. (See next page.)

To cancel the setting, press the Menu key.

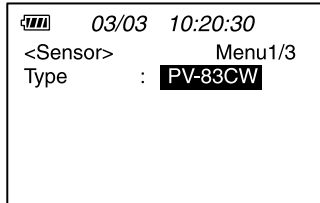
Note

When you change from the VX-54WS to the VM-54 standard program, or from the VM-54 to the VX-54WS program, level range and other settings will be initialized.

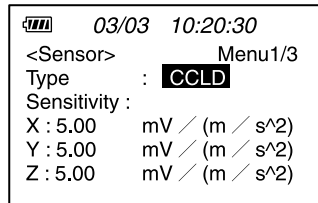
When the "VX-54WS" item was set to Off and the Mode key was pressed to start the 3-Axis Vibration Meter VM-54 with its standard program, the menu configuration will be as shown below.

On menu screen 3/3, setting the "VX-54WS" item to On and pressing the Mode key will cause the unit to start up with the VX-54WS program after the initialization screen is shown.

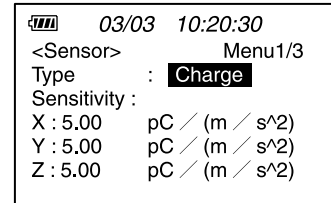
Sub display



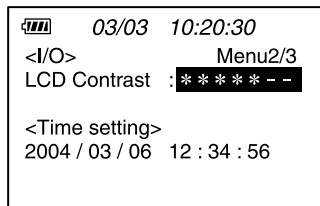
Menu screen 1/3



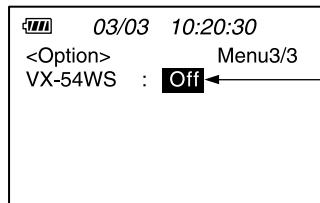
Menu screen 1/3



Menu screen 1/3



Menu screen 2/3



Menu screen 3/3

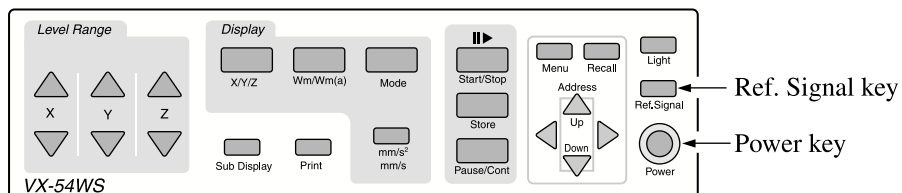
Set to "On" and press Mode key to start with VX-54WS program

Power-On/Off

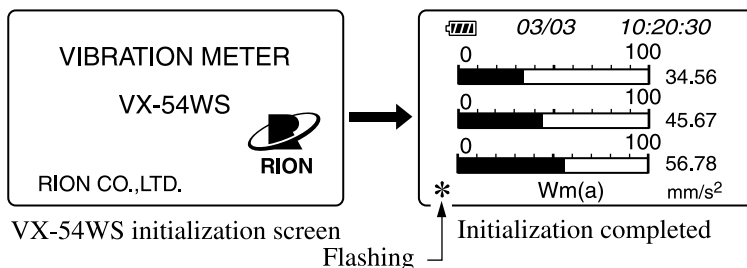
Power-on

Hold down the Power key for about 1 to 2 seconds until the sub display shows the power-on screen. When the screen appears, release the Power key.

After the initialization screen was shown, the measurement screen appears.



Sub display



VX-54WS initialization screen

Flashing

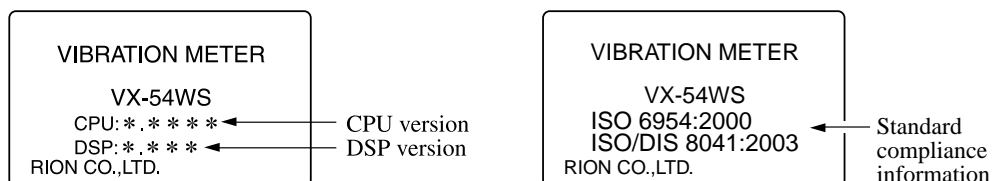
Initialization completed

Note

During initialization, the * symbol in the lower left corner of the sub display flashes (for about 30 seconds). When the circuits of the unit have stabilized and regular measurement is possible, the flashing stops. (This is called the warm-up time.)

If you press the Ref. Signal key immediately after pressing the Power key, CPU and DSP version information is shown for several seconds, and then the above initialization screen appears.

If you press the Wm/Wm(a) key immediately after pressing the Power key, standard compliance information is shown.



Power-off

Hold down the Power key for about 1 to 2 seconds until the sub display shows the power-off screen. When the screen appears, release the Power key.



Sub display screen during power-off

Note
After turning the unit off, wait at least 5 seconds before turning power back on again.

Measurement

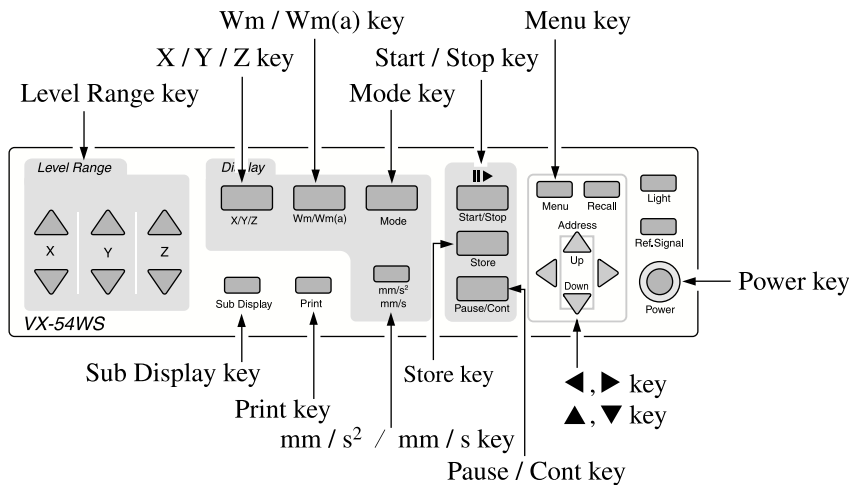
This product allows vibration measurements in the accommodation sections of ships, according to ISO 6954: 2000 and JIS F 0907:2003.

The recommended measurement time for such measurements is 1 minute (2 minutes if there are significant frequency components under 2 Hz). The procedure for measurement is described below.

Vibration measurement using the 1 minute setting

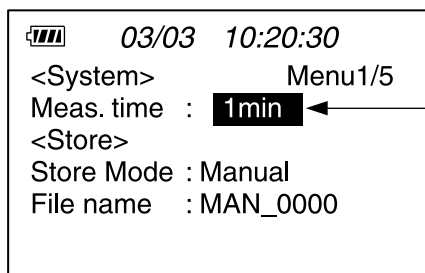
The explanation below assumes that preparations for measurement have been completed. The sensor to use is the PV-83CW. If wishing to store data on memory card, insert a memory card before turning power to the unit on.

1. Press the Power key to turn the unit on.



2. Press the Menu key to call up menu screen 1/5.
3. Normally, the "Meas. time" (measurement time) item should be set to "1 min".

Sub display

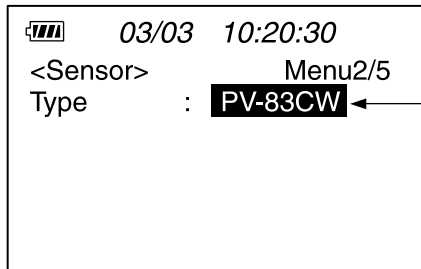


Set Meas. time to 1 min
 Move cursor with ▲, ▼ keys
 Select setting with ◀, ▶ keys

Menu screen 1/5

4. Press the Menu key to call up menu screen 2/5.
5. Set the "Type" item to "PV-83CW".
Verify that the accelerometer connected to the Input connector is the PV-83CW.

Sub display



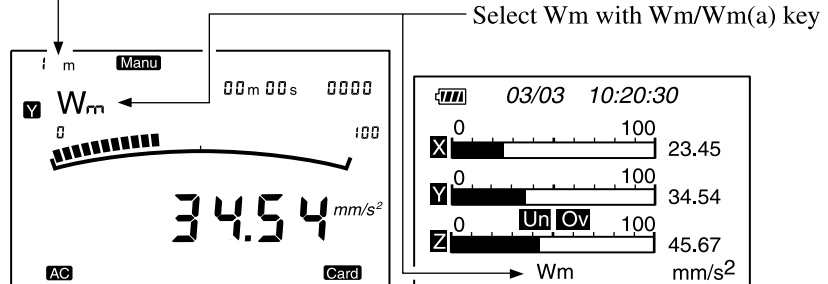
Set to PV-83CW
Move cursor with ▲, ▼ keys
Select setting with ◀, ▶ keys

Menu screen 2/5

6. Close the menu screen and go to the instantaneous value measurement screen by pressing the Mode key.
7. Use the Sub Display key to select the screen to be shown on the sub display. Normally, select the 3-axis bar graph screen.
8. Use the Wm/Wm(a) key to select the frequency weighting characteristics. Normally, select "Wm".

Wm: Wm type frequency weighting as specified in ISO 2631-2
Wm(a): Wm type bandwidth limiting filter as specified in ISO 2631-2
When PV-57(A) is used, response is approximately flat from 1 Hz to 1 kHz when Wm is not used. Wm(a) is not displayed.

Measurement time selected in step 3 is shown here



Main display

Sub display

Note

Simultaneous measurement using Wm and Wm(a) is not possible.

- Use the mm/s² / mm/s key to select acceleration or velocity measurement.

mm/s²: Acceleration

mm/s: Velocity

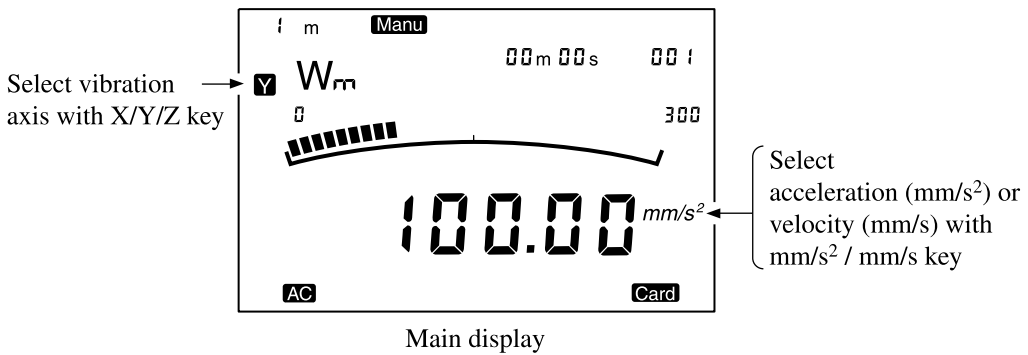
When PV-57(A) is used

m/s²: Acceleration

mm/s: Velocity

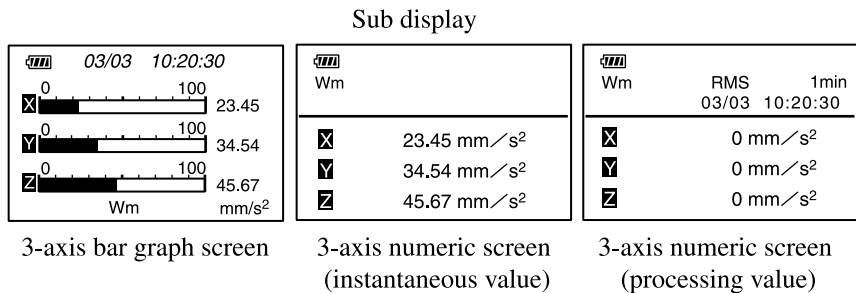
When you switch between acceleration and velocity, the measurement results up to that point are cleared.

- Use the X/Y/Z key to select the vibration axis to be shown on the main display.



Note

Simultaneous measurement of acceleration and velocity is not possible.

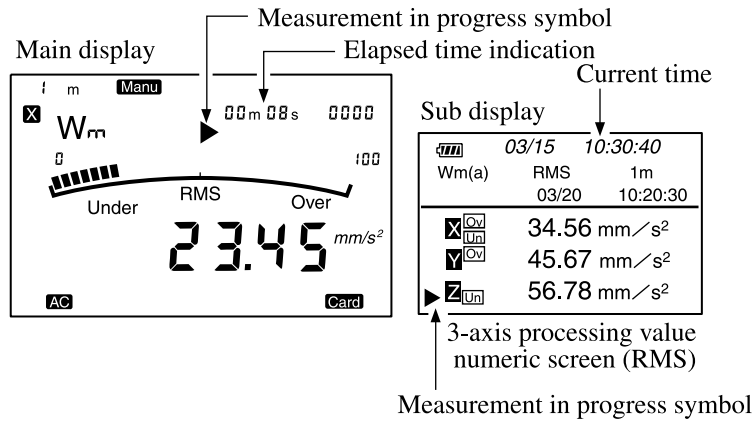


- Use the Level Range keys to select the level range. If Ov (Over) or Un (Under) is displayed, change the level range setting. The level range setting affects the 3-axis bar graph screen.

12. When you press the Start/Stop key, processing starts. At the same time, the sub display switches to the 3-axis numeric screen showing RMS values. During processing, the ► symbol flashes and the elapsed time is displayed. When the measurement time set in step 3 has elapsed, the measurement is terminated automatically. It is also possible to stop the measurement before that by pressing the Start/Stop key.

Note

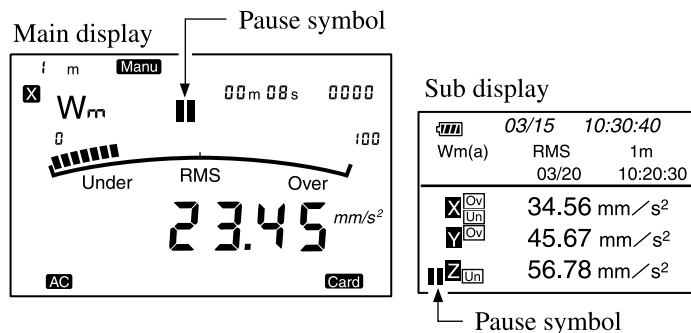
When a processing measurement is started, previous processing data are cleared.



Note

Pause

By pressing the Pause/Cont key during measurement, you can pause and resume the measurement. While the unit is in pause mode, a pause symbol (||) is shown.



13. The RMS values are suitable for evaluation of vibration in the accommodation sections of ships. The Mode key or Sub Display key can be used to select maximum, minimum, and processing list display. If "Ov" (Over) is shown, the result comprises overload data. If "Un" (Under) is shown, the result comprises underload data.


Note

During processing, the effective value (RMS) for the measurement time is measured, along with the maximum value (max) and minimum value (min) for the three vibration directions. The Mode key can be used to switch the display between these.


Switching the sub display function

Pressing the Sub Display key toggles the sub display between 3-axis processing value numeric display and processing value list display.

Sub display

	Wm	RMS	1min
		03/03	10:20:30
<input checked="" type="checkbox"/> Ov Un	23.45	mm/s ²	
<input checked="" type="checkbox"/> Ov	34.54	mm/s ²	
<input checked="" type="checkbox"/> Un	45.67	mm/s ²	

3-axis processing value numeric display example

	Wm	1min
Ov Un	03/03	10:20:30
<input checked="" type="checkbox"/>	RMS	: 34.56 mm/s ²
	max	: 45.67 mm/s ²
	min	: 23.45 mm/s ²

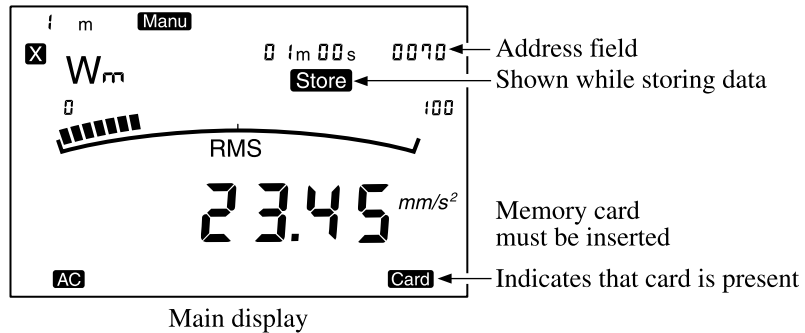
Processing value list display example

Note

Overload and underload for the instantaneous value are shown on the display as **Over**, **Under**, **Ov**, or **Un**. Overload and underload in the processing results are shown on the display as Over, Under, Ov or Un.

14. To store measurement data, press the Store key. The indication **Store** appears on the main display, and the 3-axis processing result data (RMS, max, min) are stored instantly on the memory card. If no memory card is inserted, data are not stored.

For details on storing data, see page 46.



Main display

Note

The address setting range for each file is 1 to 100. If an address with existing data is specified, data will be overwritten. To prevent losing data that you want to keep, change the address specification.

If the store procedure is carried out while processing is stopped with the Start/Stop key, only the instantaneous value data are stored. The processing value fields are all zero.

The stored data (instantaneous value data and processing value data) reflect the frequency weighting selected with the Wm/Wm(a) key.

For evaluation of the accommodation sections of ships, use the PV-83CW.

Memory Card

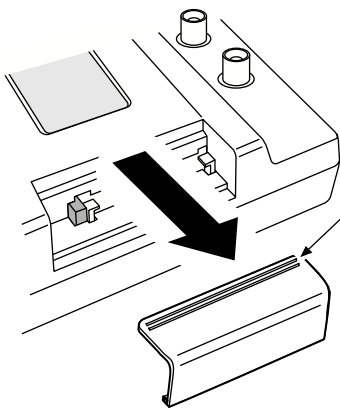
Inserting and removing the memory card

Open the cover of the card slot and insert the memory card.

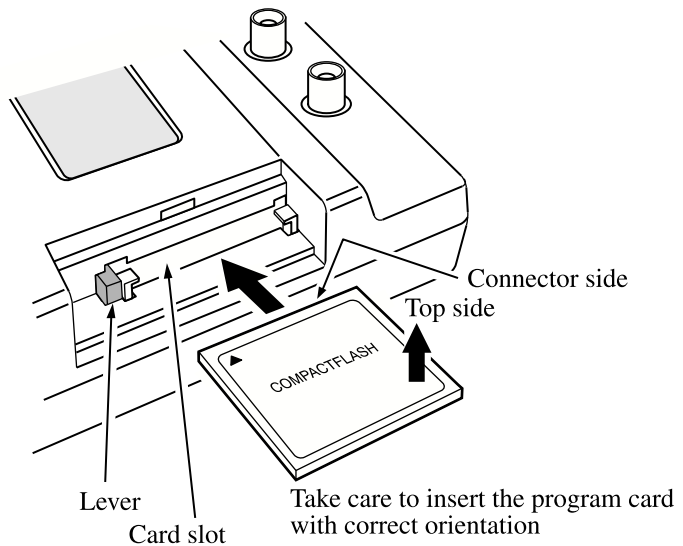
To remove, press the lever in until the card pops out.

Important

Make sure that power is turned off before inserting or removing the card.



Lightly press the striped section and slide the lid to the right to remove.



To remove the program card, press the lever.

Storing

The VX-54WS allows only manual store (instantaneous value and processing value data at the store point). One file can contain up to 100 data sets and takes up about 30 kB.

File names can be specified, which allows storing large volumes of data. The file size does not change, regardless of the number of actual data sets in the file.

Memory cards

For this unit, you should use the memory cards that are available separately from Rion.

The type of memory card used in the VX-54WS is called CompactFlash™ card.

Memory cards even from the same manufacturer and of the same type can differ in specifications. Some memory cards may therefore not function properly in the VX-54WS. Be sure to use memory cards supplied by Rion.

Important
The Marine Vibration Card VX-54WS contains an Excel macro for generating reports based on collected measurement data. If you use this card for storing data and erase the stored data, the Excel macro will also be erased.

Note
Do not format the memory card in a computer.

Memory card store data format

The data stored on the memory card are in CSV format. A structure of folders and files is created on the memory card.

The file and folder structure is as shown below.

CompactFlash card — \VX54WS — \MAN_**** — \MAN_****.csv

**** stands for a number specified via a menu item

File description

Model		Software version		Index number set with menu screen 3/5							
VX-54WS	CPUV*.****	DSPV*.***	INDEX001								
Address	Inst/MaxHold	Frequency-weight	Time-weight	mm/s ² / mm/s	Store time						
1	Inst	Wm		mm/s ²	2004/5/17 20:36:27						
2	Inst	Wm		mm/s ²	2004/5/17 20:36:40						
3	Inst	Wm		mm/s ²	2004/5/17 20:45:04						
5	Inst	Wm(a)		mm/s	2004/5/17 20:46:43						
Address			Spare	Unit	Instantaneous value store date/time						
Instantaneous value indication											
Instantaneous value store data											
X_Range	X	Over	Under	Y_Range	Y	Over	Under	Z_Range	Z	Over	Under
100	72.85			100	85.49			300	124.1		
300	120.26	Over		300	145.14	Under		1000	148.1		
100	74.35			100	64.63			300	94.53		
10	1.853			10	2.232			30	1.948		
X channel instantaneous value data				Y channel instantaneous value data				Z channel instantaneous value data			
Instantaneous value store data											
Frequency-weight	Time-weight	mm/s ² / mm/s		Beginning time		Time setting					
Wm		mm/s ²		2003/1/1 0:00:00		10 sec					
Wm		mm/s ²		2003/1/1 0:00:00		10 sec					
Wm		mm/s ²		2004/5/17 20:36:49		1 min					
Wm(a)		mm/s		2004/5/17 20:46:08		1 min					
		Spare		Unit		Measurement start date/time	Meas. time set with menu screen 1/5				
Instantaneous value store data											

Frequency-weight	Time-weight	mm/s ² / mm/s	Beginning time	Time setting
Wm		mm/s ²	2003/1/1 0:00:00	10 sec
Wm		mm/s ²	2003/1/1 0:00:00	10 sec
Wm		mm/s ²	2004/5/17 20:36:49	1 min
Wm(a)		mm/s	2004/5/17 20:46:08	1 min

Spare
 Unit
 Measurement start date/time
 Meas. time set with menu screen 1/5

-----> Processing value store data

Measurement time	X_Range	X_RMS	X_max	X_min	Over	Under
0:00:00	10000	0	0	0		
0:00:00	10000	0	0	0		
0:01:00	100	71.35	84.53	53.97	Over	
0:00:34	10	1.859	2.239	1.257		

Actual processing time X channel processing value data

-----> Processing value store data

Y_Range	Y_RMS	Y_max	Y_min	Over	Under
10000	0	0	0		
10000	0	0	0		
100	77.2	82.15	67.44		
10	2.045	2.598	1.221		

Y channel processing value data

-----> Processing value store data

Z_Range	Z_RMS	Z_max	Z_min	Over	Under	Pause
10000	0	0	0			
10000	0	0	0			
300	90.3	96.51	81.54			
30	2.465	2.853	1.399			Pause

Z channel processing value data

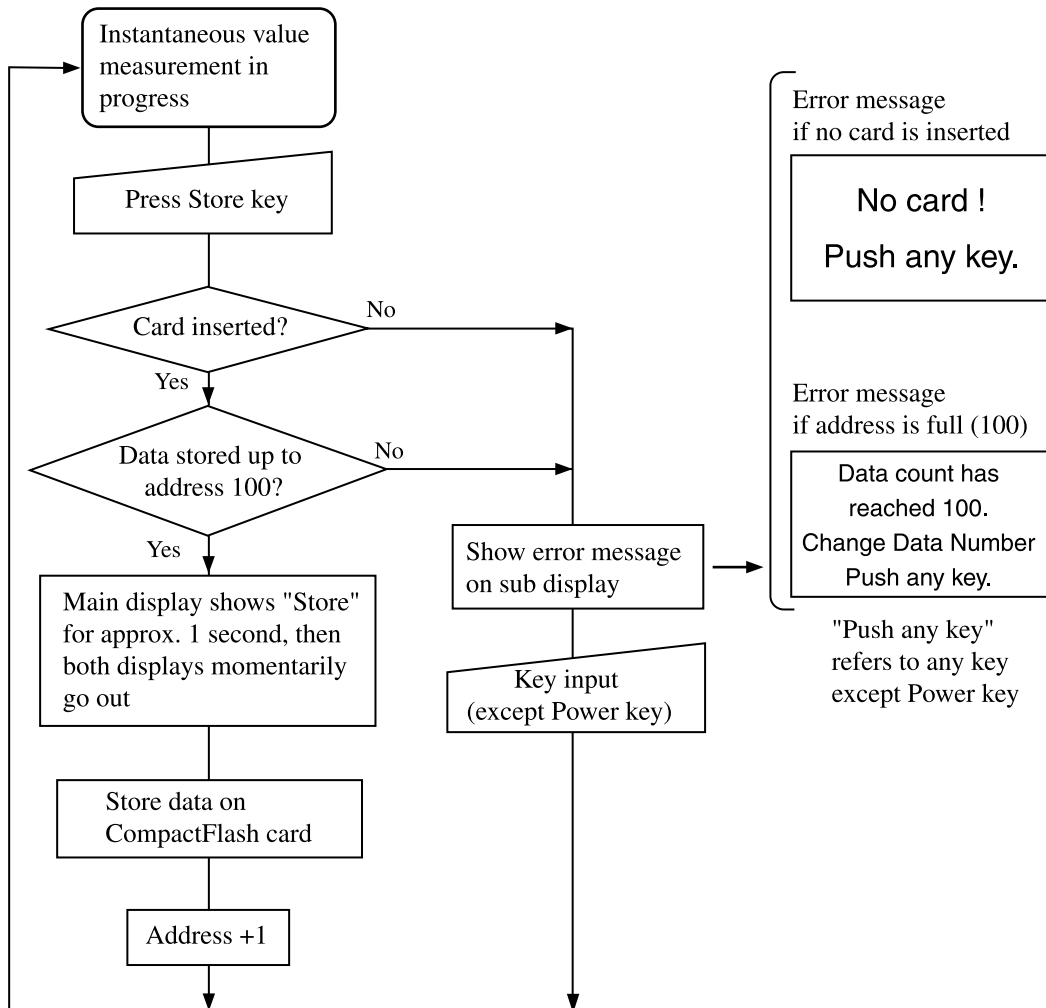
Pause information

-----> Processing value store data

Store Operation

Store operation

During normal measurement, press the Store key to initiate manual store.

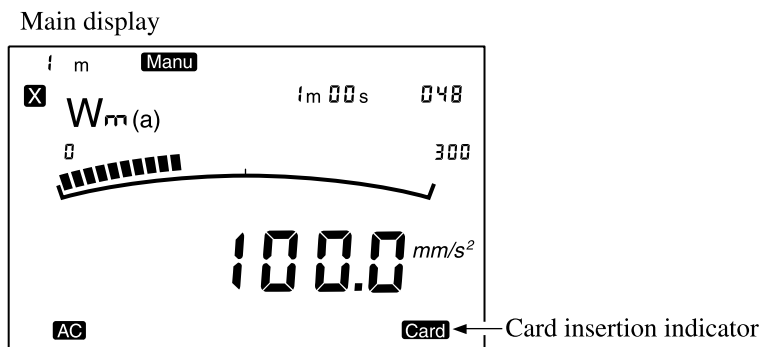


Store

3-axis instantaneous value and processing value data at the point when the Store key is pressed, along with setting information data, are stored in the specified address. The data are stored on the memory card. There is no provision for storing data in internal memory.

1. Insert the memory card into the card slot.

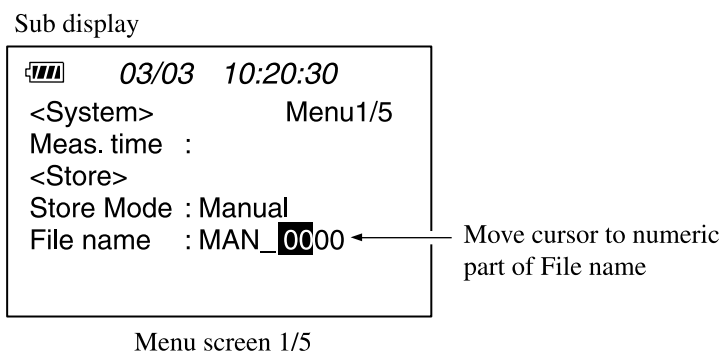
The card insertion indicator appears on the main display.



2. Use the Menu key to bring up menu screen 1/5.

3. Select a 4-digit number for the File name item.

Move the reverse-display cursor to "File name" with the ▲, ▼ keys and change the setting with the ◀, ▶ keys.

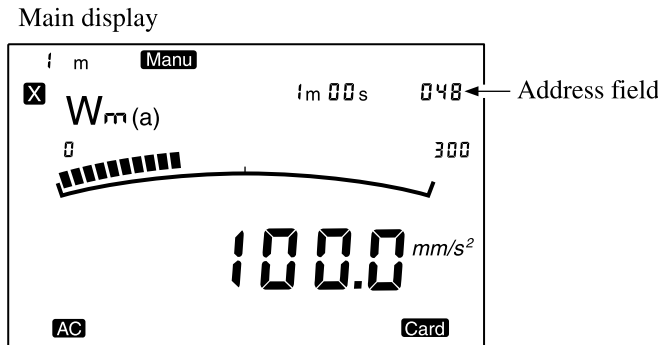


4. Press the Menu key to return to the measurement screen.

5. Select the address number for storing data.

The address number can be selected with the ▲, ▼ keys in the range from 1 to 100.

If an address with existing data is specified, data will be overwritten. (Previous data are erased and new data only are stored.)

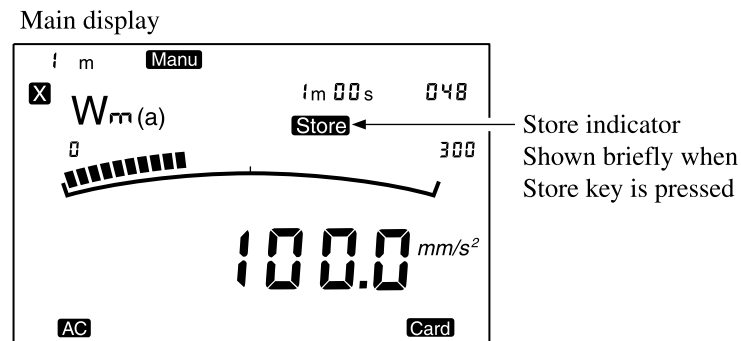


6. Press the Store key.

The instantaneous value data and processing value data for the three directions at the point when the Store key was pressed are stored in one operation. If no processing is being carried out, the processing value fields are all zero.

After about 1 second, the store process is complete and the address number is incremented by 1. The indication **Store** appears briefly as shown in the illustration below. Pressing the Store key repeatedly will store data progressively in subsequent address numbers.

The stored data include instantaneous values for all three axes, the date and time when the Store key was pressed, the date and time when the various processing functions started, the measurement time, and the processing results.



Note

The unit does not check if there are data to store. When the Store key is pressed, the data in the displayed address number are overwritten.

When the address number 100 is reached, the unit does not proceed to 101 or 1. When you press the Store key in this condition, the message shown below appears, and the key has no effect.

Press any key except the Power key to cancel the message and then use the ▲ or ▼ key to change the address number. It then becomes possible to store data in the selected address.

Sub display

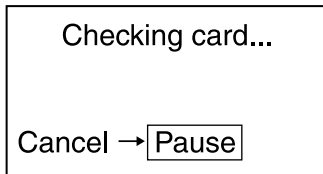
Data count has
reached 100.
Change Data Number
Push any key.

Reading data stored on memory card

Data stored on the memory card can be called up on the sub display as follows. Make sure that a memory card is inserted.

1. Turn power on.
2. Press the Recall key.
The message "Checking card" appears, and then the card recall menu is shown on the sub display.

Sub display



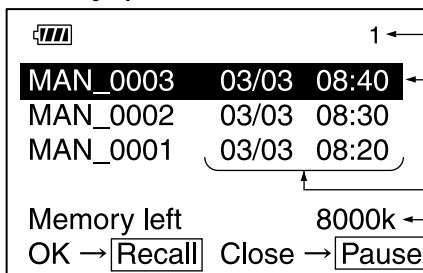
Flashes while memory card data are read
(Duration depends on memory card capacity)

Note

The duration for which the above message is shown depends on the capacity of the memory card. In some cases, the message may only be shown very briefly.

3. Use the ▲ and ▼ keys or the Sub Display key to change the recall menu page number, until the page with the desired recall data is shown.

Sub display



Recall menu page number

Four-digit number shown as file name

Store date/time

Remaining capacity (Byte)

Recall menu screen

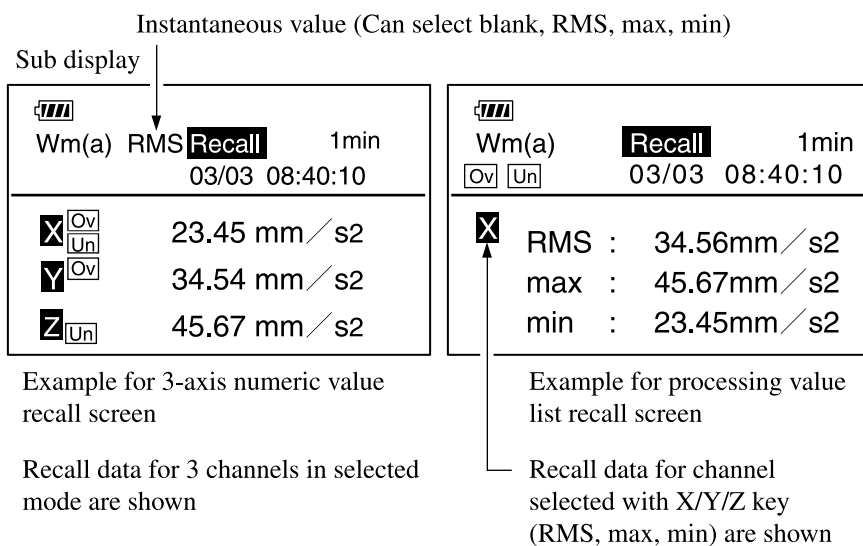
Note

When there are no data that can be recalled, the message shown below appears.
Press any key except the Power key to cancel the message.

Sub display

No recall data!!
Push any key.

4. Use the ▲ and ▼ keys to select the desired recall data (file name), and press the Recall key.
The selected recall data are shown on the sub display.
5. Use the ▲ and ▼ keys to select the address number in which the desired data are stored.
The stored measurement data appear on the sub display.
If there are no data, "--.-" or "zero" is shown.
6. Use the Sub Display key and the Mode key to read the various measurement data.
7. The Sub Display key calls up the processing value list screen. The X/Y/Z key selects the vibration axis for display of measurement data.



8. To terminate the Recall mode, press the Recall key once more or press the Pause/Cont key.

On the recall menu screen, press the Pause/Cont key.

Clearing data stored on memory card

To clear all data stored on a memory card, proceed as follows. Make sure that a memory card is inserted in the card slot.

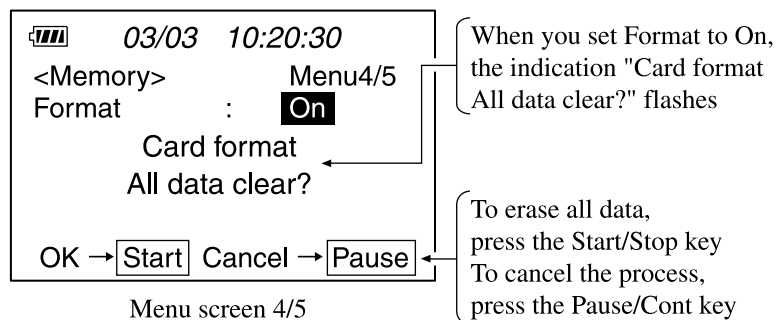
Important

The Marine Vibration Card VX-54WS contains an Excel macro for generating reports based on collected measurement data. If you use this card for storing data and erase the stored data, the Excel macro will also be erased. Be sure to copy the Excel macro file to a computer first.

1. Turn power on.
2. Use the Menu key to bring up a menu screen on the sub display panel.
3. Use the Menu key to bring up menu screen 4/5.
4. Set the "Format" item to "On".

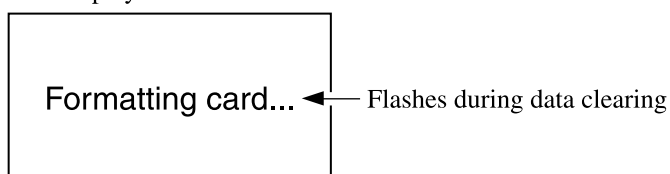
If it is OK to proceed with the data clearing process, press the Start/Stop key.

Sub display



During the clear operation, the message shown below appears.

Sub display



When the operation is completed, the message disappears and the "Format" item on menu screen 4/5 returns to "Off".

Note
It is not possible to clear only specified address data or specified file data. Only bulk clearing (formatting) of all data on memory card is possible. This process does not perform a physical format.

Output Connectors

AC Output

These connectors provide an AC output signal.

Output voltage:	1 Vrms±20 mVrms (at range full-scale)
Output impedance:	approx. 100 Ω
Load impedance:	10 kΩ or higher
Output connector type:	BNC
Suitable cable:	BNC-BNC cable NC-39A (1.5 m), available separately

The output in reference signal output mode is 15.915 Hz, 1.0 Vrms. See the section "Preparations" on page 19.

I/O connector

The I/O connector allows data output to a printer.

The specifications for the connection cable are listed below.

Cable type:	Generic straight serial cable
Connector on VM-54:	D-sub 9-pin male
Connector on printer:	D-sub 25-pin female (for DPU-414, using connector supplied with DPU-414)
Compatible printers:	DPU-414, CP-11, CP-10 (optional)

Printing

A separately available printer (DPU-414, CP-11, or CP-10) can be connected to the unit to produce hard copy of measurement values.

Available functions include printing of instantaneous value data every two seconds, printing of instantaneous value data and processing result data every two seconds, recall data printing, and sub display hard copy printing.

For details on using the printer, please refer to the documentation of the respective model. The following explanation assumes that preparations as described in the chapter "Preparations" have been completed.

Printing instantaneous value data every 2 seconds and processing result data

When the "Meas. Print" item on the menu screen is set to "On", pressing the Start/Stop key will cause printing of instantaneous value data and processing result data.

1. Turn power to the printer on and set it to the online state.
2. Press the Power key of the VM-54 to turn the unit on.
3. Use the Menu key to bring up menu screen 3/5, and set the "Meas. Print" item to "On".

Sub display

```
▣▣▣▣ 03/03 10:20:30
<I/O>      Menu3/5
LCD Contrast : * * * * * - -
Baud Rate   : 19200
Meas. Print : On
Index       : 1
```

Set Meas. Print
to On

Menu screen 3/5

4. Perform processing measurement as described in the section "Measurement" starting on page 36.

5. When processing measurement starts, the instantaneous value data are printed every 2 seconds. When processing is completed, the processing results are printed.

Note

Also if the "Meas. Print" item is set to "Off", pressing the Print key will activate printing of instantaneous value data every 2 seconds.
--

Sample printout for instantaneous value printing every 2 seconds during measurement

VX-54WS	2004 3/03 12:08	← Printing start date/time
mm/s ² Wm		
Level Range	X=300	
	Y=300	
	Z=300	
		O : Over
		U : Under
		W : Over / Under
X	Y	Z
100.00	155.00O	124.00
75.00	23.00U	87.00
	⋮	
88.00	133.00	45.00
99.00	110.00	91.00
107.00	105.00	104.00
77.00	103.00	99.00
	⋮	

Printed every 2 seconds (30 data per minute)

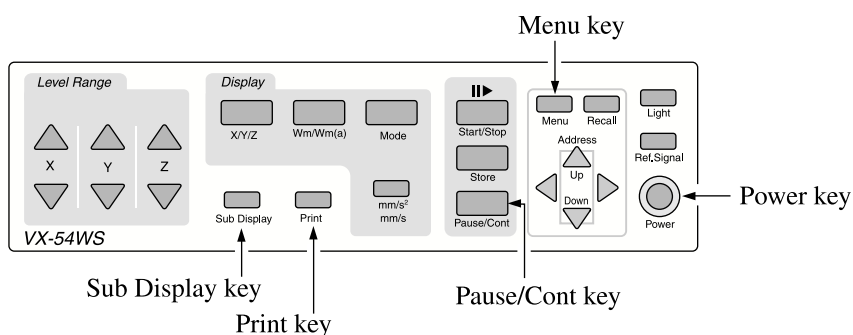
Blank line separates data for next minute (30 data)

Sample printout for measurement result printing

VX-54WS	2004 3/03 12:08	← Printing start date/time
X	Over	
	RMS	max min
	111.00	124.00 84.00
Y	Over	
	RMS	max min
	135.00	157.00 88.00
Z	Over	
	RMS	max min
	90.00	106.00 77.00

Sub display hard copy

1. Turn power to the printer on and set it to the online state.
2. Press the Power key of the VM-54 to turn the unit on.
3. Press the Sub Display key to bring up the sub display screen you want to print. You can select the 3-axis bar graph screen, 3-axis numeric screen, processing value screen, or parameter setting check screen.
If you want to print the menu screen, press the Menu key to bring up the menu screen.
If you want to print the recall screen, press the Recall key to bring up the recall screen.
4. Press the Pause/Cont key to set the unit to pause mode.
If the menu screen or recall screen is displayed, this step is not necessary.
5. Press the Print key to produce a hard copy of the sub display screen.



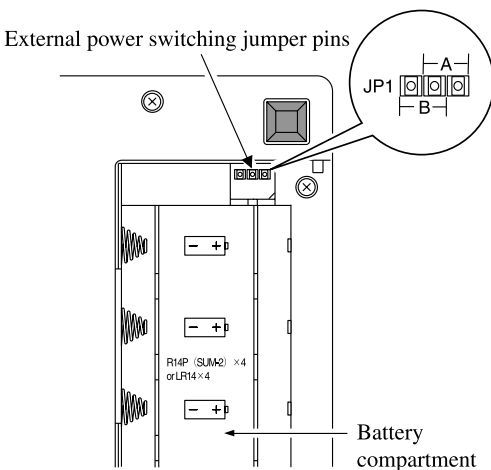
Reference Information

About the external power switching jumper pins


The VM-54 is turned on by holding down the Power key for at least one second, but the on/off status can also be controlled by an external power supply without using the Power key.

Changing the setting of the external power switching jumper pins


1. Turn power off and disconnect the AC adapter or remove the batteries.
2. Open the battery compartment lid on the bottom panel.
3. Change the position of the jumper on the external power switching jumper pins from position A to position B.



Jumper pin position

Side A: 

Normal position (unit on/off is controlled by Power key)

Side B: 

Unit operates in conjunction with external power supply

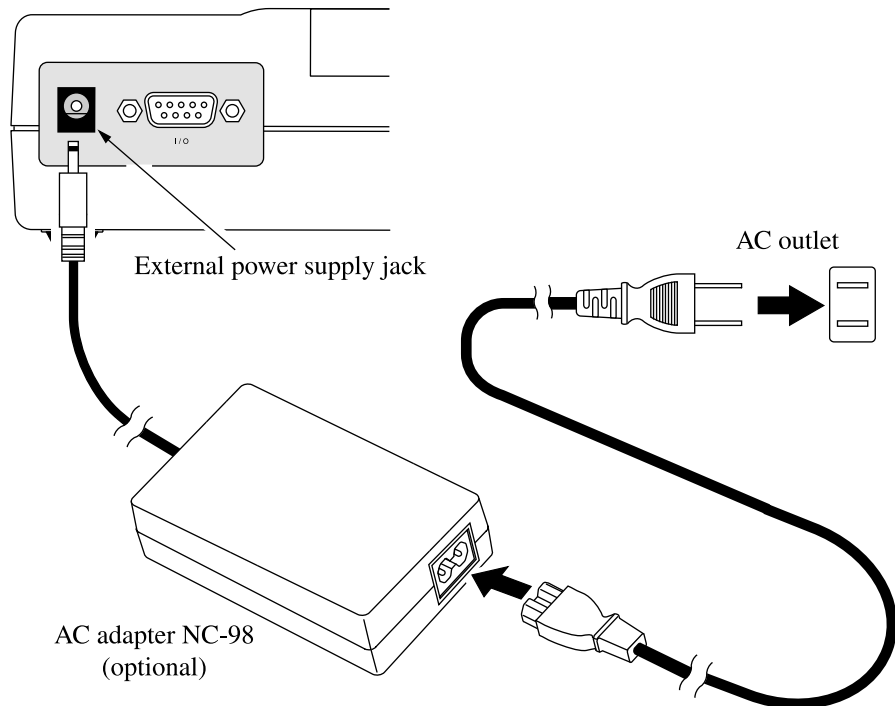
Caution

The external power switching jumper pins are small and pointed. Take care not to hurt your fingers.

Important

Never connect any equipment to the external power switching jumper pins. Otherwise damage may occur.

- When you connect the AC adapter (option) and thereby supply power to the VM-54, the unit will automatically be turned on.
This also applies when the unit is powered from batteries.

**Note**

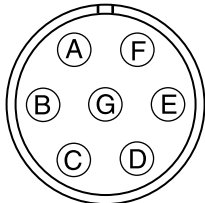
The optional AC adapter NC-98 is for 100 to 240 V AC.

Important

Do not use any other kind of AC adapter except the NC-98. Otherwise damage may occur.

Input connector

The input connector is a Tajimi Electronics connector 1108-23A10-7F wired as shown below.

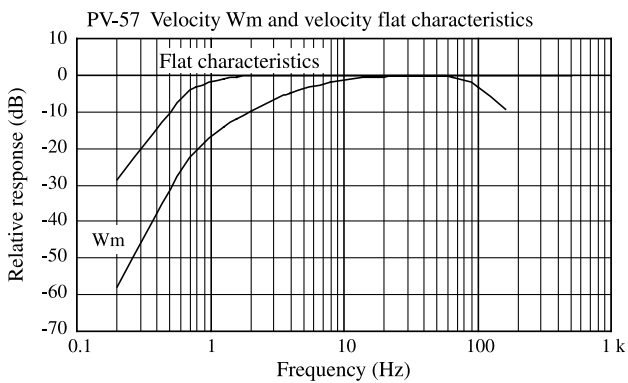
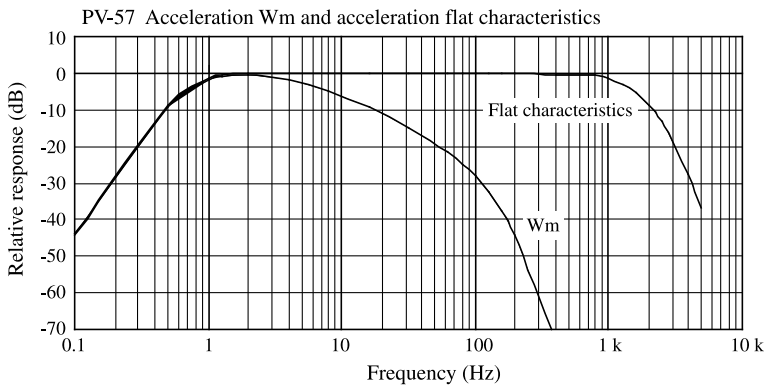
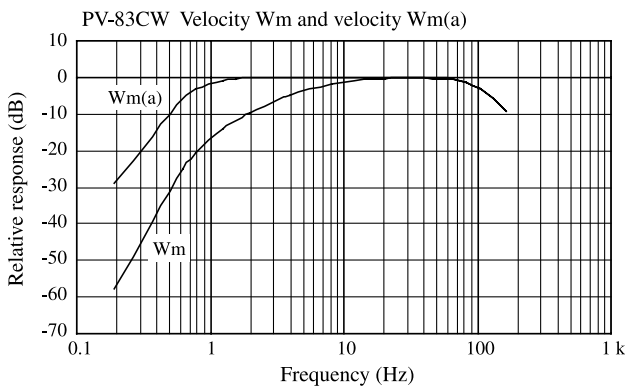
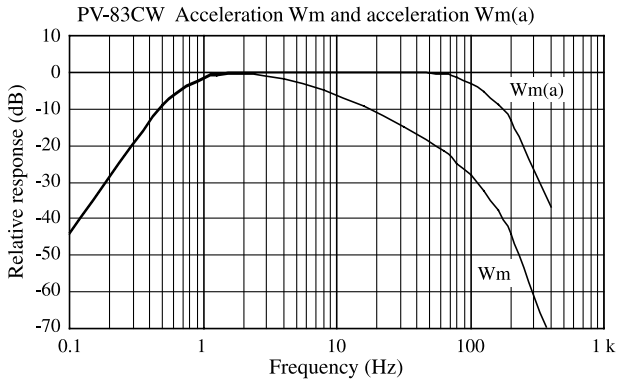


Top view

- A: +12 V
- B: Ground
- C: Z channel signal input
- D: -12 V
- E: X channel signal input
- F: Y channel signal input
- G: Power supply output from unit (AC adapter or batteries), or +7 V (when PV-83CW is selected)

Important
Do not connect anything else besides the 3-axis accelerometer PV-83CW, another accelerometer, 3-ch preamplifier, or extension cable to this connector. Otherwise damage may occur.

Frequency characteristics



Measurement setting information copy (Meas. Set Copy)

This function lets you store settings made with the menus of the unit on a memory card.

Such settings can then later be read back into the VM-54 at power-up. In a system with multiple VM-54 units, this makes it easy to set all units to the same condition. It also helps to save time and prevent setup mistakes. A stored set of settings can be used at a later time to establish the same condition as when a measurement was made. Setting information saved during use of the unit in the field can be stored and managed centrally on a computer.

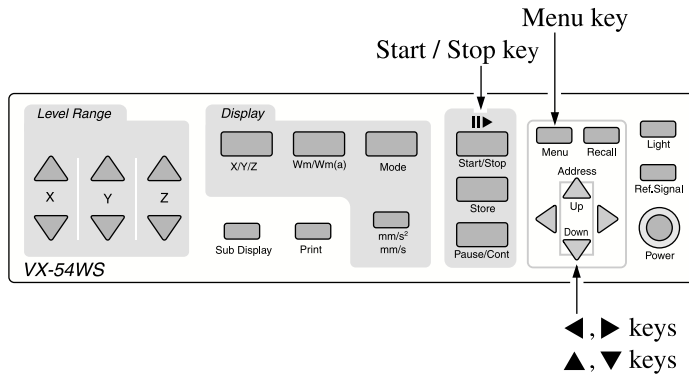
Settings stored on memory card

- Display channel
- Wm/Wm(a) setting
- mm/s² / mm/s setting
- Level range X
- Level range Y
- Level range Z
- Sub display screen selection
- Measurement time (Meas. time)
- Baud rate

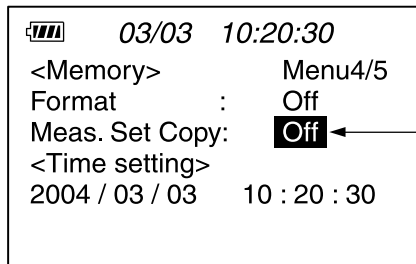
How to store settings on a memory card

To store the settings for the parameters listed on the preceding page on a memory card, proceed as follows.

1. Use the Menu key to bring up menu screen 4/5.
2. Use the ▲ and ▼ keys to move the cursor to the **Off** setting for the "Meas. Set Copy" item.



Sub display

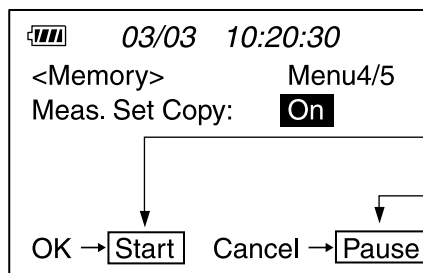


Move cursor to "Off" for "Meas. Set Copy"

Menu screen 4/5

3. Use the ◀ and ▶ keys to change the setting to "On".
4. To start copying settings, press the Start/Stop key.

Sub display

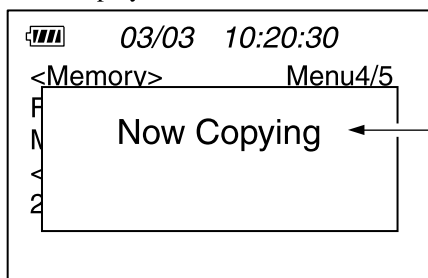


Press Start/Stop to copy settings

Press Pause to cancel operation

Menu screen 4/5

Sub display



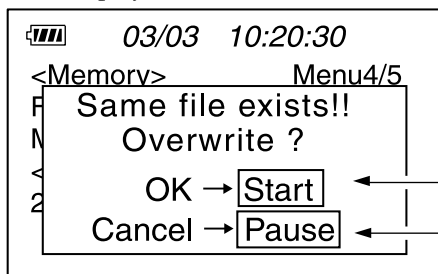
Setting copy indication
(alternates between normal
and reverse)

Menu screen 4/5

Note

When you attempt to copy setting information to a memory card where setting information already exists, the following message appears. To overwrite the existing information, press the Start/Stop key. To cancel the operation, press the Pause/Cont key.

Sub display



Press Start/Stop to
overwrite settings

Press Pause/Cont to
cancel operation

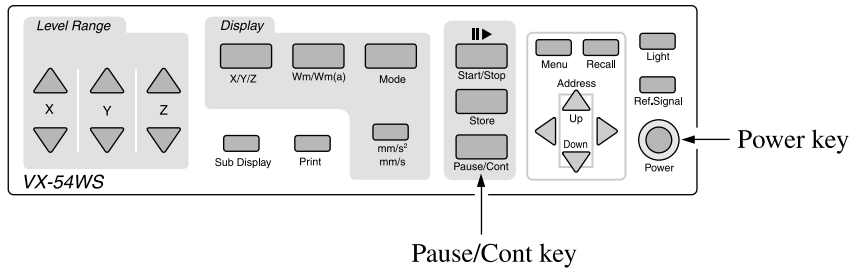
Menu screen 4/5

Note

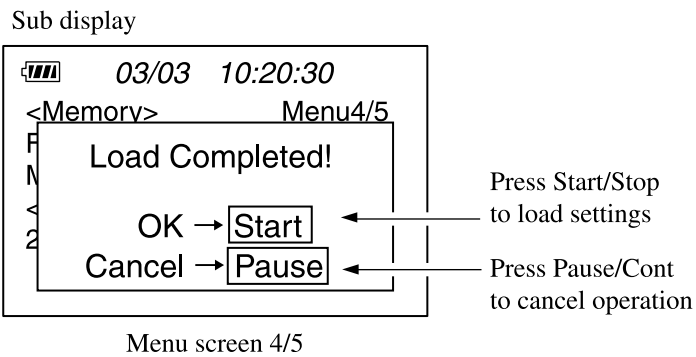
Only one set of settings can be stored on a memory card.

Loading settings stored on a memory card

1. Press the Power key to turn the unit off.
2. Insert the memory card with the desired setting information.
3. Press the Power key while holding down the Pause/Cont key.



4. When the indication shown below appears, press the Start/Stop key.



5. After the initialization screen is shown, the unit will start up with the stored settings.

Measurement values with VX-54WS

Instantaneous value:

rms with $\tau = 1$ s

$$a_w(t_0) = \left[\frac{1}{\tau} \int_{t_0-\tau}^{t_0} a_w^2(t) dt \right]^{\frac{1}{2}}$$

- $a_w(t)$: Instantaneous value
 τ : Shift average integral time (s)
 t : Time (integral variable)
 t_0 : Observation time (instantaneous value time)

Based on $\tau = 100$ ms, the unit calculates the instantaneous value as the rms value with $\tau = 1$ second.

Bar graph: Exponential average of time constant = 1 second

Processing value RMS:

RMS value of measurement time T (measurement duration for processing)

$$a_w = \left[\frac{1}{T} \int_0^T a_w^2(t) dt \right]^{\frac{1}{2}}$$

- $a_w(t)$: Processing value RMS
 T : Measurement time (s) (Max. 10 min)

Processing value max:

Maximum of rms value for integral time ($\tau = 1$ s) in measurement interval (measurement duration for processing)

Processing value min:

Minimum of rms value for integral time ($\tau = 1$ s) in measurement interval (measurement duration for processing)

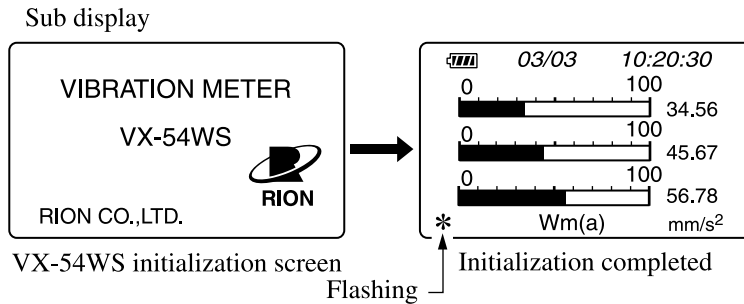
Inherent noise in reference environment conditions (23°C, 50% RH)

Unit	Wm/Wm(a)	Inherent noise
mm/s ²	Wm	0.1 mm/s ² or less
	Wm(a)	0.15 mm/s ² or less
mm/s	Wm	0.003 mm/s or less
	Wm(a)	0.03 mm/s or less

Inherent noise with PV-83CW connected (23°C, 50% RH)

Warmup time

This unit requires a warmup time of about 30 seconds after power-on. During warmup, a * symbol is flashing in the lower left corner of the sub display.



During the warmup period, correct measurement is not possible.

Linearity range at reference frequency 15.915 Hz for various level range settings
(with PV-83CW, acceleration measurement)

Level range (mm/s ²)	Wm		Wm(a)	
10000	9~12500	Approx. 62 dB	9~30000	Approx. 70 dB
3000	2.8~3950.0	Approx. 62 dB	2.8~9450.0	Approx. 70 dB
1000	0.9~1250.0	Approx. 62 dB	0.9~3000.0	Approx. 70 dB
300	0.28~395.00	Approx. 62 dB	0.28~945.00	Approx. 70 dB
100	0.09~125.00	Approx. 62 dB	0.09~300.00	Approx. 70 dB
30	0.028~39.500	Approx. 62 dB	0.028~94.500	Approx. 70 dB

Specifications

Marine Vibration Card VX-54WS

Software format and media

Check-in/out principle (after program installation, Marine Vibration Card VX-54WS may be removed from 3-Axis Vibration Meter VM-54)

Media: CompactFlash

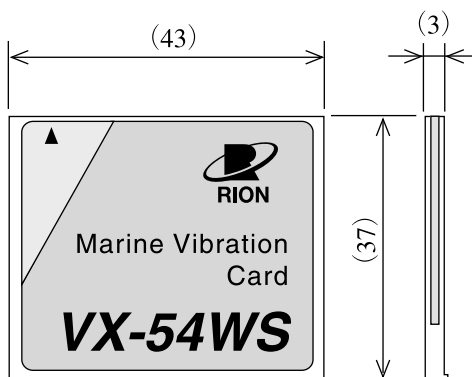
Supplied accessories

3-axis accelerometer	PV-83CW	1
VM-54/PV-83C cable	EC-54	1
Template sheet		1
Soft carrying case with shoulder strap		1
Instruction manual		1
Inspection certificate		1

Optional accessories

Storage case

Piezoelectric accelerometer	PV-57
	PV-57A
Curled accelerometer cable	VP-51K
3-Axis Vibration Meter	VM-54



Unit: mm

(Approximate dimensions for reference)

Dimensional drawing of Marine Vibration Card VX-54WS

Specifications for 3-Axis Vibration Meter VM-54 with Marine Vibration Card VX-54WS program installed

Applicable standards

ISO 6954: 2000
 JIS F 0907: 2003
 ISO/DIS 8041: 2003

Input

3-axis accelerometer PV-83CW or piezoelectric accelerometer PV-57/PV-57A
 For PV-83CW, dedicated cable EC-54 is used

Measurement frequency range

1 to 80 Hz
 With PV-57(A) and flat characteristics 1 Hz to 1 kHz

Frequency weighting

W_m: ISO 2631-2: 2003
 W_{m(a)}: W_m bandwidth limiting filter as specified in ISO 2631-2: 2003

Measurement functions

Acceleration (mm/s² or m/s²) or Velocity (mm/s)
 Instantaneous value: rms with integral time 1 s ($\tau = 1$ s)
 3-channel simultaneous measurement

Processing functions

RMS: rms value of measurement time (measurement duration for processing)
 max: Maximum of rms with integral time 1 s ($\tau = 1$ s)
 min: Minimum of rms with integral time 1 s ($\tau = 1$ s)

Measurement time settings

10 sec, 1 min, 2 min, 10 min

Level range

PV-83CW
 Acceleration: 30, 100, 300, 1000, 3000, 10000 mm/s²
 Velocity: 1, 3, 10, 30, 100, 300 mm/s
 PV-57/PV-57A
 Acceleration: 0.3, 1, 3, 10, 30, 100, 300, 1000 m/s²
 Velocity: 10, 30, 100, 300, 1000, 3000 mm/s

Reference level range	1000 mm/s ² (with PV-83CW)
Reference level	60 mVrms
Reference frequency	15.915 Hz
Measurement value detection circuit	Digital processing type
Displays	Main display (segment type LCD) Instantaneous value or processing value for one axis, display update cycle 1 s Bar graph, display update cycle 100 ms Sub display (128 × 64 dot matrix LCD) 3-axis instantaneous value, processing value, process- ing result, menu, recall data
Data storage	Manual store on CompactFlash card Internal memory is not used
Resume function	Yes
Signal output connectors	BNC connectors X, Y, Z output: AC output Range full scale: 1 Vrms Maximum output voltage 3 Vrms Distortion: 1% or less (range 1000 mm/s ² , 15.915 Hz, 60 mVrms input)
Sensitivity fluctuation due to usage environment	±2% (main unit only, range 1000 mm/s ² , 15.915 Hz, 60 mVrms input)

I/O connector	9-pin D-sub male When Marine Vibration Card is used, the connector serves as printer output. Printer functions Printing of instantaneous value data every 2 seconds, hard copy of sub display during menu, pause, and recall display
Ambient conditions for use	-10 to +50°C, max. 90% RH (no condensation)
Power supply	IEC R14 (size "C") batteries or AC adapter NC-98 (available separately) Operation voltage range 4.2 to 6.7 V
Battery life	20 hours or more continuous operation (with PV-83CW connected, backlight off, at room temperature)

Specifications for supplied PV-83CW

Principle	Piezoelectric accelerometer, bolt mounting plate shear type
Reference sensitivity on axis	60 mV/(m/s ²)
Number of channels	3 (X: horizontal, Y: horizontal, Z: vertical)
Transverse sensitivity	10% or less
Ambient conditions for use	-10 to +50°C (no condensation)
Waterproof specifications	JIS C 0920, class 7 (watertight)

