RION

# Fault-Diagnosis Program VX-14D

## Instruction Manual

# Organization of This Manual

This manual describes the functions and operating procedures of the Fault-Diagnosis Program VX-14D and is organized into the following chapters.

- Overview of This Product
  Describes the main functions of the VX-14D.
- Preparation Before Use
  Describes the procedures for installing and uninstalling the VX-14D.
- Setting Menu
  Describes the various settings of the unit.

### Evaluation Function

- Reading the Screen (Evaluation)
  Describes how to read the Vibration meter (VM) mode screen that includes the Evaluation function.
- Settings (Evaluation)
  Describes the settings of the Vibration meter (VM) mode that includes the Evaluation function.
- Measurement (Evaluation)
  Describes measurement procedures in the Vibration meter (VM) mode that includes the Evaluation function.
- Recalling Stored Data (Evaluation)
  Describes how to recall data stored in the Vibration meter (VM) mode.
- Structure of Stored Data (Evaluation)
  Describes the folder organization and file structure of the stored data.
- Command (Evaluation)
  Describes the Evaluation commands used for communication with a computer.

### Fault-Diagnosis Function

- Reading the Screen (Fault-Diagnosis)
  Describes how to read the Fault-Diagnosis screens.
- Settings and Measurement (Fault-Diagnosis)
  Describes the settings and measurement procedures for the Fault-Diagnosis function.
- Recalling Stored Data (Fault-Diagnosis)
  Describes how to recall data stored by the Fault-Diagnosis function.
- Structure of Stored Data (Fault-Diagnosis)
  Describes the folder organization and file structure of the stored data.

## Specifications and Technical Data

- Specifications
  Lists the specifications of the VX-14D.
- Technical Data
  Provides technical information.

**You can download the instruction manual from our website:**

https://svmanual.rion.co.jp/va-14_e/

# Safety Precautions / Precautions for Use

## Safety precautions

The precautions shown here are provided to ensure the safe and correct use of this product and to prevent injury or damage to the user and others. Possible incidents resulting from incorrect handling are classified into two categories: “WARNING” and “CAUTION.” Be sure to follow all of these precautions, as they are important matters related to safety. For any questions concerning this product, please contact the dealer.

### Examples of pictorial indications

Specific prohibitions may be displayed in the illustrations.

|  | Prohibitions |  | Instructions |
|---|---|---|---|

| Display | Meaning |
|---|---|
| ⚠ WARNING | Indicates a possibility of death or serious injury due to incorrect handling. |
| ⚠ CAUTION | Indicates a possibility of personal injury or property damage due to incorrect handling. |
| Important | Failure to observe the precautions indicated by this may result in damage to the unit. |
| Note | Denotes special information that is helpful in utilizing the capabilities of the unit but that is not directly related to safety. |

# Usage License Agreement

**Important**

- Please read the following Usage License Agreement carefully before using this software product.

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2. RION may temporarily suspend the provision of the Software to you due to updates, maintenance, etc. of the Software as set forth in the preceding paragraph. However, RION shall not be liable for any damages incurred by you as a result of such temporary suspension.

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5. This Agreement shall be effective as long as you continue to use the Software.

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1. If the Software and the Product are taken from Japan to any other country, the Foreign Exchange and Foreign Trade Law, the United States Export Administration Act, and all other applicable laws and regulations of the country must be strictly observed.
2. This Agreement shall be exclusively governed by the laws of Japan.
3. In the event of any dispute arising in connection with this Agreement, the court with jurisdiction over the location of RION's head office shall be the exclusive court of first instance.

**Article 8 Changes to this Agreement**

RION reserves the right to change this Agreement at any time without notice. In this case, you will be deemed to have agreed to the revised Agreement at the time you use the Software after the change is made to the Agreement.

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# 1

# Overview of This Product

The Fault-Diagnosis Program VX-14D is an optional program that adds the Evaluation function and the Fault-Diagnosis function to the Vibration Analyzer VA-14 by installing it on the unit.

- Evaluation function

  Three threshold values can be set, and the judgment result for the vibration level of the Evaluation Target is displayed in four stages (A: Favorable, B: Acceptable, C: Unsatisfactory, D: Unacceptable).
  - Operating mode: Vibration Meter (VM) mode
  - Indication value: RMS

  Two types of Evaluation Criteria are available.
  - ISO 10816-1: Based on ISO 10816-1:1995 (JIS B 0906:1998), threshold values are set and the vibration velocity is evaluated.
  - User Setting: Threshold values can be set arbitrarily, and the excess over the threshold is evaluated for any of the vibration quantities: acceleration, velocity, or displacement.

- Fault-Diagnosis function

  The Fault-Diagnosis function performs diagnostic evaluation to determine the fault condition of rotating machinery and to identify the fault location.
  It simultaneously diagnoses wear-related faults such as bearing abnormalities and gear abnormalities, as well as structure-related faults such as unbalance, misalignment, and looseness.
  Each diagnostic result is presented in three fault stages (Good, Alert, Danger), and a fault level from 1 to 99 is displayed to indicate the degree of progression within each stage.
  Comments related to the suspected fault location are also shown based on the diagnostic results.
  The diagnostic results and the measurement data at the time of diagnosis (FFT store data and Wave files) can be recorded.

# 2

# Preparation Before Use

## 2.1 Installing

**Important**

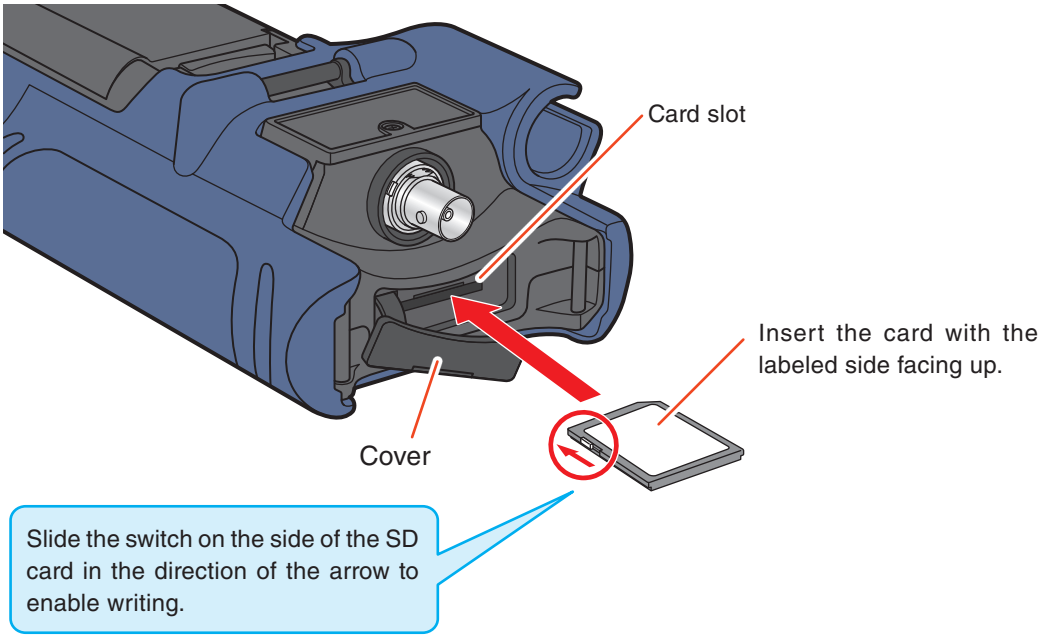
- Check that the power of the unit is turned off before inserting the program card.
- When installing, do so with sufficient battery power remaining, while supplying power via USB, or with the AC adapter connected.
- Never remove the program card during installation. Doing so may result in a malfunction.
- Never format the program card with SD card formatting software (such as SD Formatter). If formatted, the optional program stored on the card will be erased and the card will become unusable. Restoration of the erased program is not guaranteed.
- Upgrade the firmware of the unit to the latest version before installing the optional program. For the latest firmware version, check the “Download” section in the Support Room on the RION website (https://svmeas.rion.co.jp).

**Note**

- If you install the optional program on one vibration analyzer unit, you will not be able to install it on other units. To install the optional program on another unit, you will need to uninstall it from the unit on which it is currently installed.
- After installation is complete, the program card used for installation can be used as an SD card for storing data.

### 1 Open the card slot cover and insert the SD card (program card) to install the software.

With the label on the SD card facing up, insert it into the card slot located at the top of the unit until a clicking sound is made.

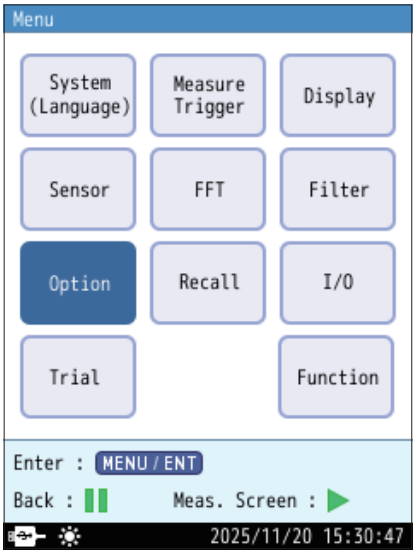



**Note**

- If the program card is write-protected, installation cannot be performed. Before starting the installation, make sure that the card is set to the write-enabled position.
- To remove the SD card, push it in until it makes a clicking sound. The SD card will pop out, so take it out.

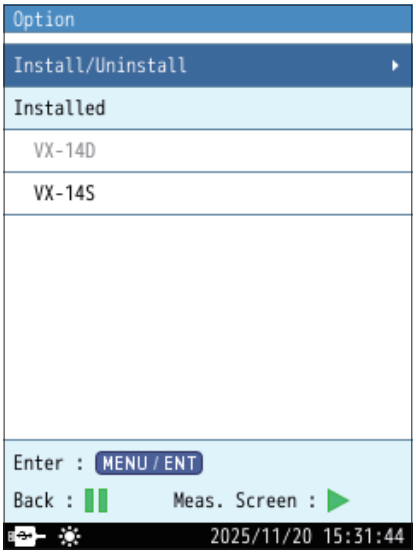
## 2 On the [Menu] screen, select [Option] and press the MENU/ENT key.

The [Option] screen appears.




## 3 On the [Option] screen, select [Install/Uninstall] and press the MENU/ENT key.

The option software installation screen appears.




## 4 Press the MENU/ENT key.

The selection screen appears.

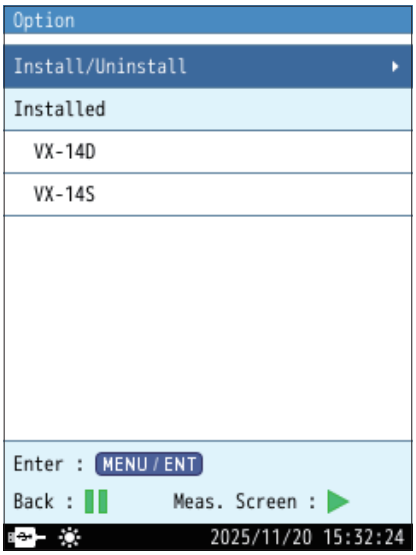


## 5 When the message “Do you want to install it?” appears, select [YES] and press the MENU/ENT key.

“The installation is complete. Restart.” will be displayed.
Press the MENU/ENT key to restart.




- You can check the installed programs in the [Option] section of the [Menu] screen.



# 2.2 Uninstalling

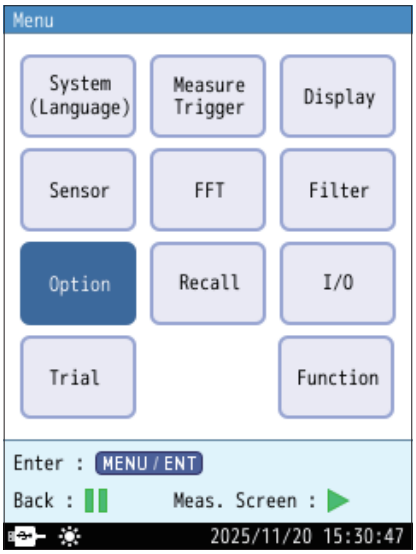
**Important**

- Ensure that the power of the unit is turned off before inserting the program card.
- Perform the uninstallation with sufficient battery power remaining, while supplying power via the USB cable, or with the AC adapter connected.
- Never remove the program card during uninstallation. Doing so may result in a malfunction.

**1** **Insert the program card into the card slot to uninstall the software on the program card.**

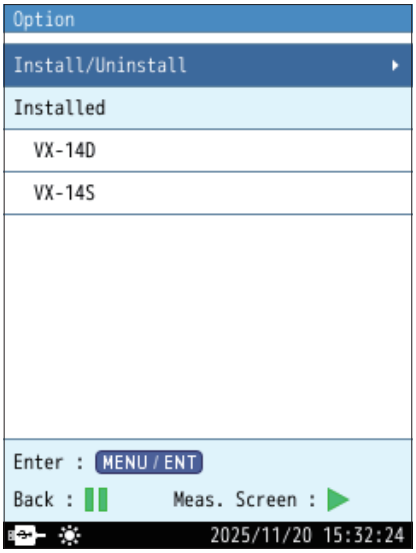
**2** **On the [Menu] screen, select [Option] and press the MENU/ENT key.**

The [Option] screen appears.




**3** **On the [Option] screen, select [Install/Uninstall] and press the MENU/ENT key.**

The option software installation screen appears.



## 4 Press the MENU/ENT key.

The selection screen appears.




## 5 When the message “Do you want to un-install it?” appears, select [YES] and press the MENU/ENT key.

“The un-installation is complete. Restart.” will be displayed.
Press the MENU/ENT key to restart.



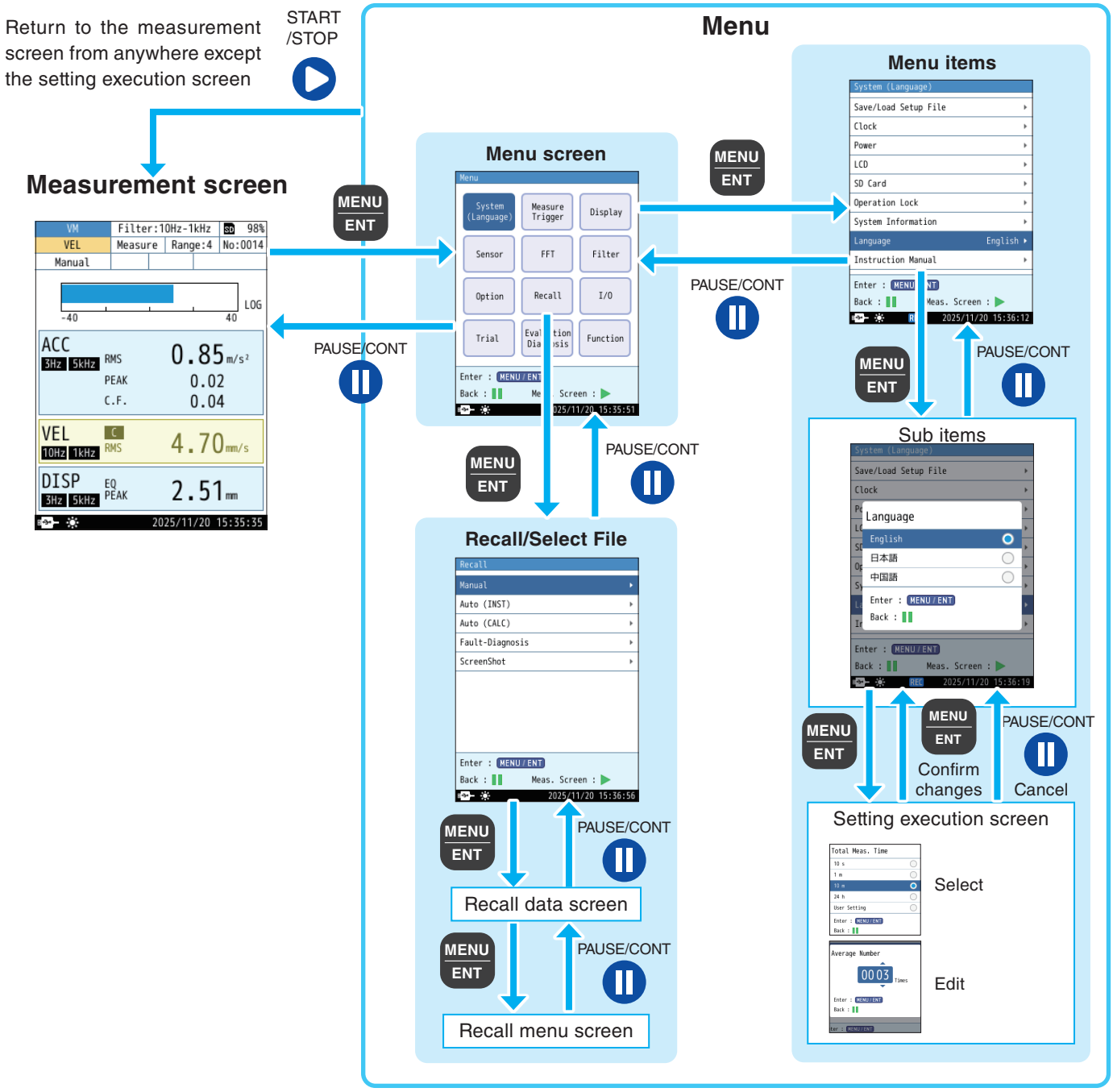
# 3 Setting Menu

**Note**

- Please refer to the “Vibration Analyzer VA-14 / Function Extension Program VX-14S Instruction Manual (Operation Guide)” for detailed information on the operation procedures and precautions for using the VA-14.

## 3.1 Menu flow diagram

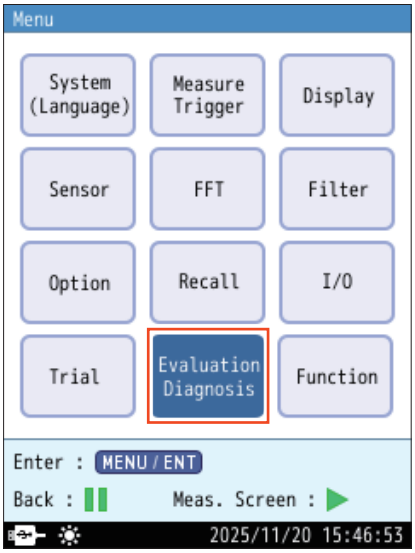
A diagram of the overall menu structure is shown below.
To reach the desired menu item, you must first access the menu screen.
To return directly to the measurement screen from any screen, press the START/STOP key.



# 3.2 Menu item “Evaluation/Diagnosis” VX-14D

When VX-14D is installed on the VA-14, “Evaluation/Diagnosis” is added to the menu screen.

To return to the previous level, press the PAUSE/CONT key.
To return directly to the measurement screen, press the START/STOP key.




[Menu] screen

| Menu item | | | Settings / Fixed values |
|---|---|---|---|
| Evaluation/ Diagnosis | Evaluation | | |
| | Evaluation Criteria | | Off / ISO 10816-1 / User Setting |
| | ISO 10816-1 | Class | Class 1 / Class 2 / Class 3 / Class 4 |
| | | Evaluation Target | Vel. |
| | | Vel.Threshold1 (A/B) | Threshold corresponding to the selected class |
| | | Vel.Threshold2 (B/C) | Threshold corresponding to the selected class |
| | | Vel.Threshold3 (C/D) | Threshold corresponding to the selected class |
| | | ISO 10816-1 Overview | – |
| | User Setting | Evaluation Target | Acc./Vel./Disp. |
| | | Acc. /Vel. /Disp. Threshold1 (A/B) | Any value within the following range can be set<br>Acc.Threshold: 0 to 999999 ($m/s^2$ or G)<br>Vel.Threshold: 0 to 999999 (mm/s or inch/s)<br>Disp.Threshold: 0 to 999999 (mm, um or mil) |
| | | Acc. /Vel. /Disp. Threshold2 (B/C) | |
| | | Acc. /Vel. /Disp. Threshold3 (C/D) | |
| | | ISO 20816-1 Overview | – |
| | Fault-Diagnosis | | |
| | Diagnosis Start | | – |
| | Diagnosis Store Name | | 0000 to 9999 |

## Default settings

The factory default settings for the main setting items are listed below.

| Item | | | Default value |
|---|---|---|---|
| Evaluation/Diagnosis | Evaluation | Evaluation Criteria | Off |
| | | Class | Class 1 |
| | | Evaluation Target | Vel. |
| | | Acc.Threshold1 | 0.00105 |
| | | Acc.Threshold2 | 0.00210 |
| | | Acc.Threshold3 | 0.00330 |
| | | Vel.Threshold1 | 1.4 |
| | | Vel.Threshold2 | 2.8 |
| | | Vel.Threshold3 | 4.5 |
| | | Disp.Threshold1 | 0.7 |
| | | Disp.Threshold2 | 1.4 |
| | | Disp.Threshold3 | 2.2 |
| | Fault-Diagnosis | Diagnosis Store Name | 0000 |

# Evaluation Function

# 4

# Reading the Screen (Evaluation)

**Note**

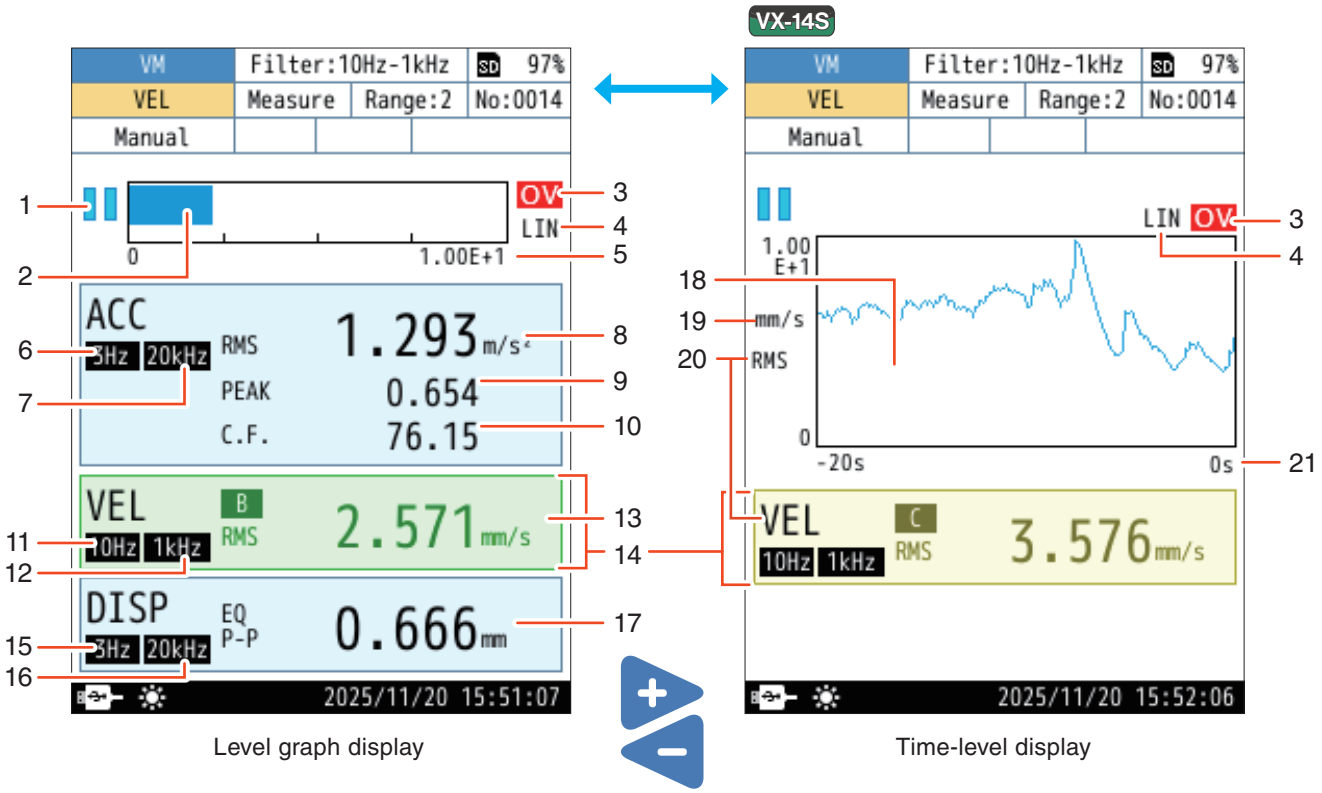
- Please refer to the “Vibration Analyzer VA-14 / Function Extension Program VX-14S Instruction Manual (Operation Guide)” for detailed information on the operation procedures and precautions for using the VA-14.

## 4.1 Vibration meter (VM) mode (Manual store)

The Evaluation function operates in Vibration Meter (VM) mode. The items displayed on the screen are as follows.

**Note**

- While the actual display will not look like the one shown in the figures below, the explanation is based on the assumption that all the text are displayed.
- Level Graph Display and Time-Level Display can be switched using the ◁/▷ keys.

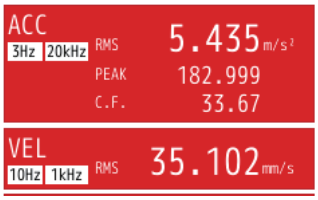



Level graph display

Time-level display

Switch with◁/▷key

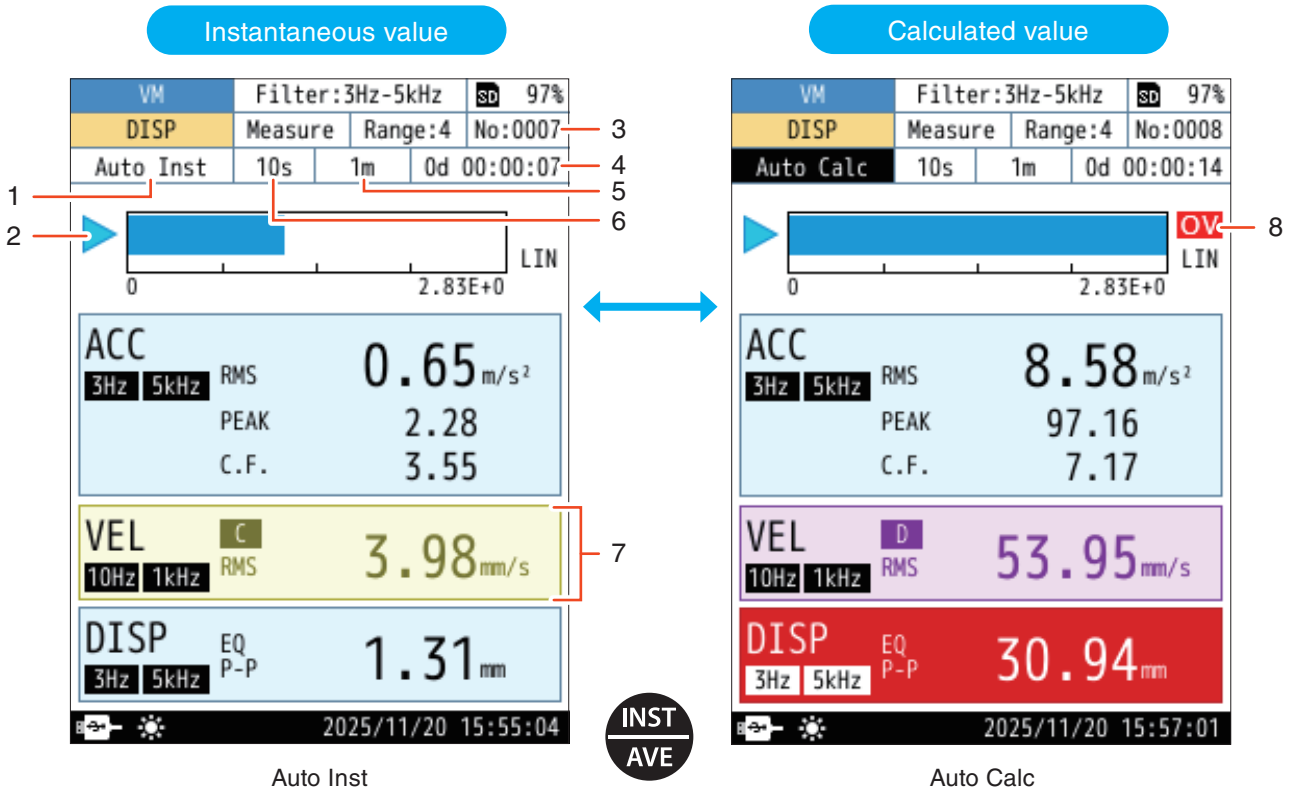
| No. | Name | Description |
|---|---|---|
| 1 | Operation status indicator | ⏸ Measurement pause (PAUSE/CONT key pressed) |
| 2 | Level bar | The level bar displays the value of the selected measurement data type (acceleration, velocity, displacement) based on the specified indicator characteristics.<br>The measurement data type can be switched using the ACC/VEL/DISP key.<br>The indicator characteristics can be switched for [Acc.], [Vel.], and [Disp.] on the display screen when [User Setting] is selected for [Display Characteristics] on the display screen.<br>**Note**<br>• In the pause condition (page 38) the measurement parameters cannot be changed. |
| 3 | Overload indicator | When an overload occurs, OV is displayed. |
| 4 | VM mode scale | The indication shows “LOG” if the selected level bar scale is logarithmic, or “LIN” if the scale is linear.<br>You can switch this from the [Menu] screen » [Display] » [VM Mode Scale]. |
| 5 | Upper and lower limit values of level bar | The right-side indication shows the upper limit value and the left-side indication shows the lower limit value.<br>The values depend on the measurement data type, input range, and vibration meter mode scale. |
| 6 | Acceleration high-pass filter | The high pass filter value for acceleration is shown here.<br>The following settings are available.<br>1 Hz* / 3 Hz / 10 Hz / 1 kHz<br>* When [Menu] screen » [Filter] » [Individual] is selected, 1 Hz becomes selectable. |
| 7 | Acceleration low-pass filter | The low pass filter value for acceleration is shown here.<br>The following settings are available.<br>1 kHz / 5 kHz / 20 kHz |
| 8 | Acceleration RMS value indication | The acceleration RMS value is displayed. |
| 9 | Acceleration peak value indication | The acceleration peak value (single amplitude maximum value) is shown here as a numeric indication. |
| 10 | Acceleration crest factor indication | The acceleration crest factor (peak value / RMS value) is shown here as a numeric indication. |
| 11 | Velocity high pass filter | The high pass filter value for velocity is shown here.<br>The following settings are available.<br>3 Hz / 10 Hz / 1 kHz |
| 12 | Velocity low pass filter | The low pass filter value for velocity is shown here.<br>The following settings are available.<br>1 kHz / 5 kHz / 20 kHz |
| 13 | Velocity indication | Among the velocity RMS, velocity equivalent PEAK, and velocity PEAK values, the value set on the display screen will be shown.<br>The velocity PEAK value is selectable only when the VX-14S is installed. VX-14S<br>Switching is performed in [Vel.] on the display screen when [Menu] screen » [Display] » [Display Characteristics] » [User Setting] is selected. |

<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>14</td><td>Evaluation result<br>VX-14D</td><td>The evaluation result of the Evaluation function is displayed in the area of the vibration quantity (ACC/VEL/DISP) selected in [Menu] screen » [Evaluation/Diagnosis] » [Evaluation] » [Evaluation Target].
<table>
<tr><td>A</td><td>Zone A: Favorable. The background turns blue.</td></tr>
<tr><td>B</td><td>Zone B: Acceptable. The background turns green.</td></tr>
<tr><td>C</td><td>Zone C: Unsatisfactory. The background turns yellow.</td></tr>
<tr><td>D</td><td>Zone D: Unacceptable. The background turns purple.</td></tr>
</table>
Note
<ul>
<li>When [Evaluation Criteria] » [ISO 10816-1] is selected, the Evaluation Target is fixed to “Velocity.”</li>
<li>When an overload occurs, the overload indication has priority in the measurement display area.</li>
</ul>

</td></tr>
<tr><td>15</td><td>Displacement high-pass filter</td><td>The high-pass filter value for displacement is shown here.<br>The following settings are available.<br>3 Hz / 10 Hz / 1 kHz</td></tr>
<tr><td>16</td><td>Displacement low-pass filter</td><td>The low pass filter value for displacement is shown here.<br>The following settings are available.<br>1 kHz / 5 kHz / 20 kHz</td></tr>
<tr><td>17</td><td>Displacement indication</td><td>Among the displacement equivalent P–P, displacement equivalent peak, displacement RMS, or displacement P–P values, the value set on the display screen will be shown. The displacement P–P value is selectable only when the VX-14S is installed. VX-14S<br>Switching is performed in [Disp.] on the display screen when [Menu] screen » [Display] » [Display Characteristics] » [User Setting] is selected.</td></tr>
<tr><td>18</td><td>Time-Level graph<br>VX-14S</td><td>A time–level graph from 20 seconds before the present is displayed for the selected vibration quantity (ACC/VEL/DISP).</td></tr>
<tr><td>19</td><td>Y axis units of time-level graph<br>VX-14S</td><td>If the level bar scale is set to logarithmic, “dB” is displayed. If the scale is linear, the unit corresponding to the measurement value is displayed.<br>Switching is performed in [VM Scale] when [Menu] screen » [Display] » [VM Scale] is selected.</td></tr>
<tr><td>20</td><td>Measurement values on the time-level graph<br>VX-14S</td><td>The values of the selected vibration quantity (ACC/VEL/DISP) are displayed based on the specified [Display Characteristics]. Switching the vibration quantity (ACC/VEL/DISP) is performed with the ACC/VEL/DISP key.</td></tr>
<tr><td>21</td><td>Upper and lower limit values of the X-axis for the time-level graph<br>VX-14S</td><td>The right-side indication shows the upper limit value and the left-side indication shows the lower limit value. Represents data from 20 seconds ago to the present.</td></tr>
</table>

# 4.2 Vibration meter (VM) mode (Auto store) VX-14S

**Note**

- For details common to Manual Store, refer to “Vibration meter (VM) mode (Manual store)” (page 20).




| No. | Name | Description |
|---|---|---|
| 1 | Instantaneous value / Calculated value | [Auto Inst] or [Auto Calc] is displayed. |
| 2 | Operation status indicator | ⏸ Measurement pause (PAUSE/CONT key pressed during instantaneous value measurement)<br>▶ Storing in progress |
| 3 | Store name | Shows the store name that will be used when storing data on the SD card. Pressing the START/STOP key with a store name that already contains data will prompt you to choose between [No], [Raise one store name], or [Overwrite and meas.] to start the store. |
| 4 | Elapsed time since the start of measurement | Displays the elapsed time since the start of measurement. |
| 5 | Total measurement time | Up to 200 hours can be set. |
| 6 | Calculated value store interval | Configured calculated value store interval is displayed. |
| 7 | Evaluation result VX-14D | The evaluation result of the Evaluation function is displayed in the area of the vibration quantity (ACC/VEL/DISP) selected in [Menu] screen » [Evaluation/Diagnosis] » [Evaluation] » [Evaluation Target] (page 22). |
| 8 | Overload display | This appears when an overload occurs during calculation and remains on the calculation result screen until the next calculation measurement begins.<br>OV (Inst. OV): When a momentary overload occurs, OV is displayed for one second.<br>OV (Calc. OV): After a momentary overload occurs, OV remains displayed until the calculation interval switches. However, OV has priority. |

# 5 Settings (Evaluation)

**Note**

- Please refer to the “Vibration Analyzer VA-14 / Function Extension Program VX-14S Instruction Manual (Operation Guide)” for detailed information on the operation procedures and precautions for using the VA-14.

## 5.1 Common settings

The measurement and display parameters for vibration meter (VM) mode and for the Evaluation function are as follows.

| | | Menu | Key operation | See page |
|---|---|---|---|---|
| Measurement parameters | Sensor information | Sensor | – | Page 25 |
| | Input range | – | RANGE△/▽ | Page 26 |
| | High pass filter<br>Low pass filter | Filter | – | Page 29 |
| | Evaluation | Evaluation/Diagnosis » Evaluation | – | Page 30 |
| | Store name | Measure/Trigger | – | Page 33<br>Page 34 |
| | Measurement data type (data shown as level bar) | – | ACC/VEL/DISP | Page 21 |
| Display parameters | Display Charastics | Display | – | Page 27 |
| | VM Scale | Display | – | Page 28 |
| | Unit | Display | – | Page 28 |

For information on menu structure and menu operation, see the “Setting Menu” (page 16).

**Note**

- While measurement is paused ( ❚❚ symbol shown on the left side of the screen), measurement parameters cannot be changed.

## 5.1.1 Configuring sensor settings

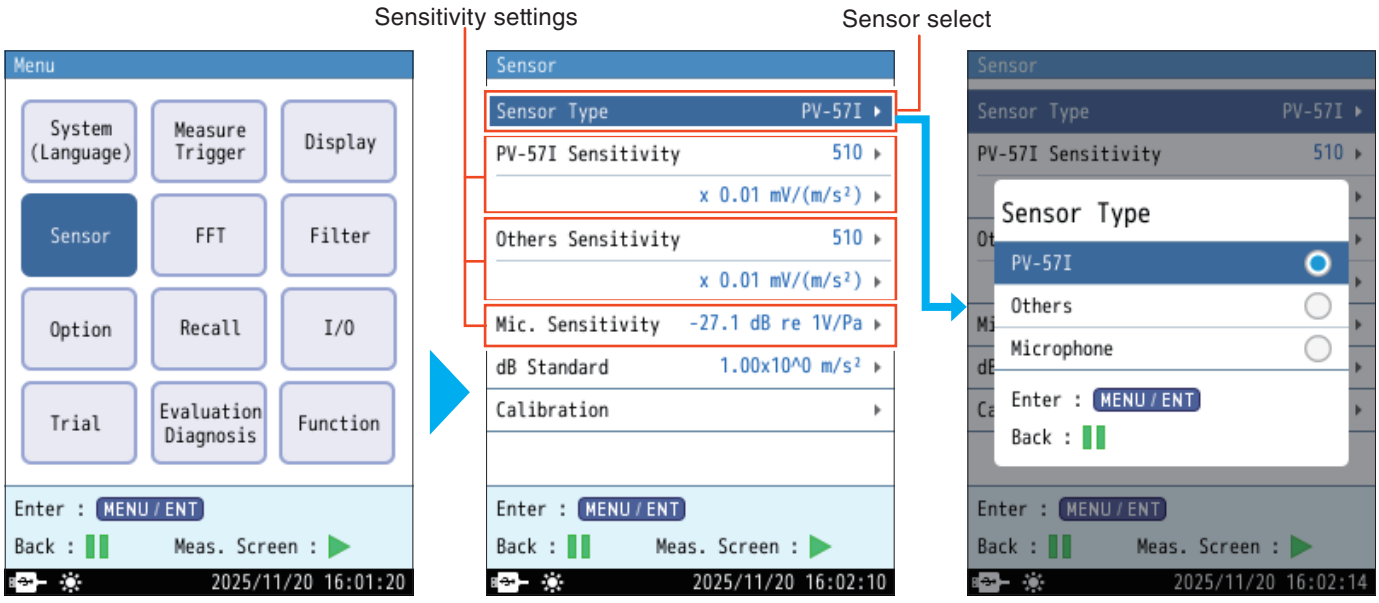
**Note**

- Because the Evaluation function and the Fault Diagnosis function perform analysis based on vibration data, do not set the [Sensor Type] to “Microphone” when using these functions.

Set the sensitivity according to the sensitivity calibration chart of the pickup to be used.

### 1 Select the sensor.

1) On the [Menu] screen » [Sensor] » [Sensor Type], press the MENU/ENT key.
2) On the [Sensor Type] screen, select [PV-57I] or [Others], and press the MENU/ENT key.




[Menu] screen [Sensor] screen [Sensor Type] screen

3) Confirm that the sensitivity of the accelerometer selected in step 2) matches the sensitivity value listed in the supplied sensitivity calibration chart. The sensitivity can be checked in the sensitivity settings on the [Sensor] screen.
If the values do not match, set the sensitivity according to the sensitivity calibration chart (see step 2).

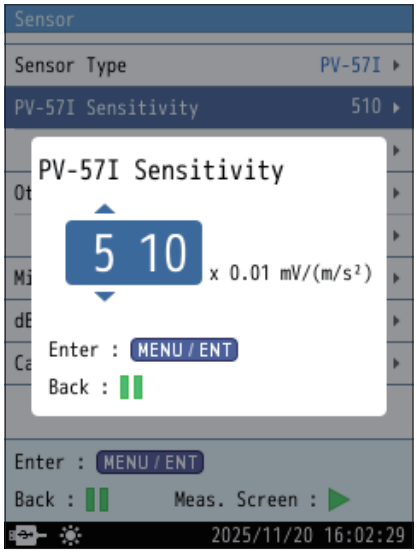
| Sensor type | Description | [Sensor] screen, Sensitivity settings area |
|---|---|---|
| PV-57I | The standard supplied accelerometer.<br>As a factory adjustment, the PV-57I sensitivity is set to the value listed in the supplied sensitivity calibration chart. | PV-57I Sensitivity |
| Others VX-14S | Accelerometers other than the PV-57I can be connected.<br>When [Others] is selected, Constant Current Line Drive (CCLD) can be set to On or Off. | Others Sensitivity |
| Microphone VX-14S | A microphone can be connected via a preamplifier.<br>• Do not select “Microphone” as the sensor type when performing measurements using the Evaluation or Fault-Diagnosis functions. | Mic. Sensitivity |

## 2 Adjust the sensitivity as required.

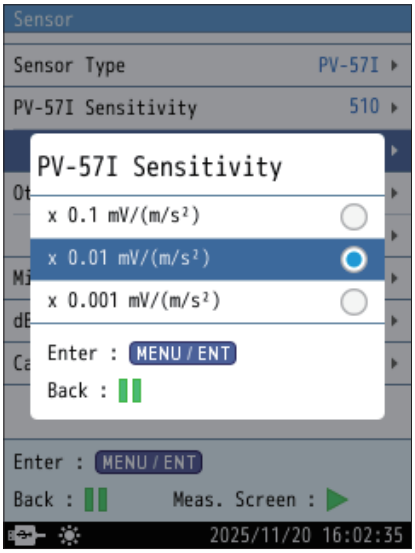
1) Select the Sensitivity settings item corresponding to the accelerometer selected in “Sensor Type” in Step 1 and press the MENU/ENT key.
2) Set the sensitivity and multiplier, and press the MENU/ENT key.

Use the △/▽ keys to select the item, and change the numeric value.
Holding down the key enables fast scrolling.

When the numeric value is set, press the MENU/ENT key to confirm.
To cancel without confirming, press the PAUSE/CONT key.
The cursor returns to the item name position, and the numeric value returns to its original value.



Sensitivity



Multiplier

**Note**

- When selecting [PV-57I], a popup window appears, asking whether you want to change the sensitivity setting.

## 5.1.2 Changing the input range

Set the input range to an optimum setting.
If overload occurs (measurement value display background is red, and OV appears on the right side of the display), the input range setting is too low. Use the RANGE △ key to increase the setting.

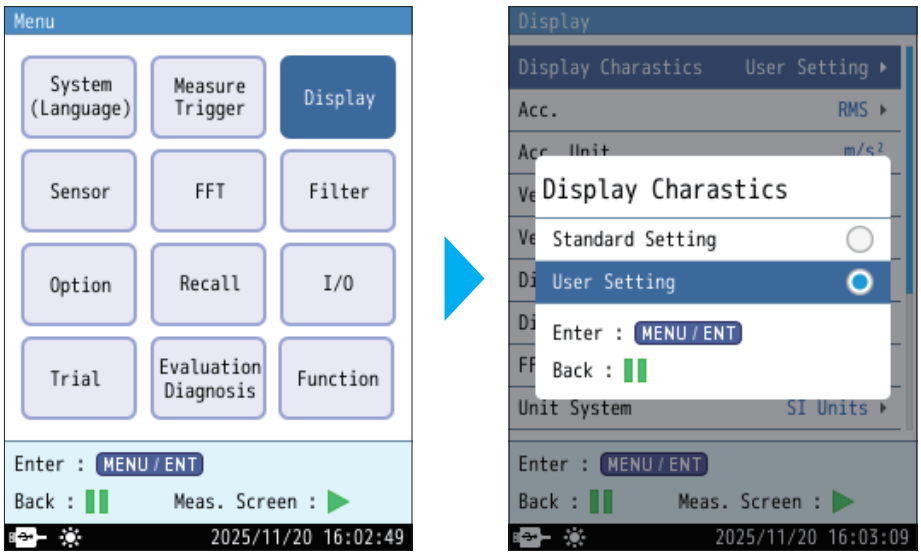
**Note**

- It is recommended to lower the range to a level that prevents overload, without increasing it more than necessary.

## 5.1.3 Set the unit for Display Characteristics

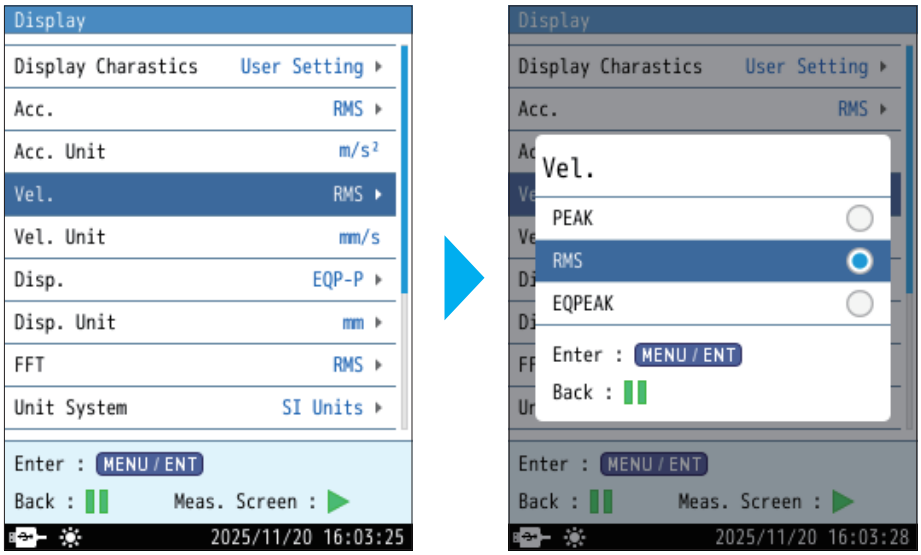
When performing Evaluation, set the Display Characteristics of the vibration quantity selected as the Evaluation Target to “RMS.”

**1** **Select [Menu] screen » [Display] » [Display Charastics] » [User Setting], and press the MENU/ENT key.**




**2** **Select “RMS” as the Display Characteristics for the vibration quantity used as the Evaluation Target, and press the MENU/ENT key.**

Example when the Evaluation Target is “Velocity.”




**Note**

- When performing Evaluation, the Display Characteristics for the Evaluation Target cannot be changed.
- If a value other than RMS is set for Display Characteristics, a message prompting you to change the Display Characteristics appears. If you allow the change, the setting will be changed to RMS, enabling Evaluation settings.

## 5.1.4 Selecting the vibration meter scale

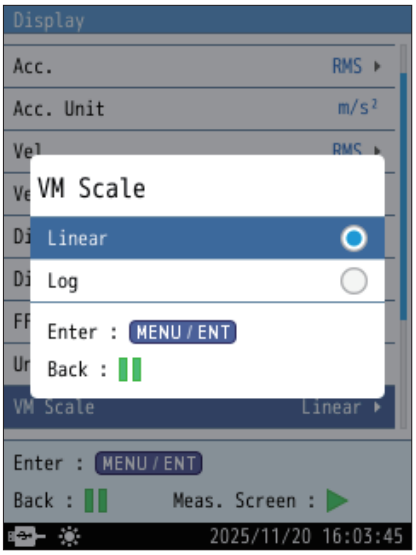
**1** **Select [Display] on the [Menu] screen and press the MENU/ENT key.**

**2** **Select [VM Scale] on the [Display] screen and press the MENU/ENT key.**

**3** **Select one of the following and press the MENU/ENT key.**

| | |
|---|---|
| Linear | Linear scale |
| Log | Logarithmic scale |

The scale on the measurement screen is changed.




## 5.1.5 Selecting the Unit System

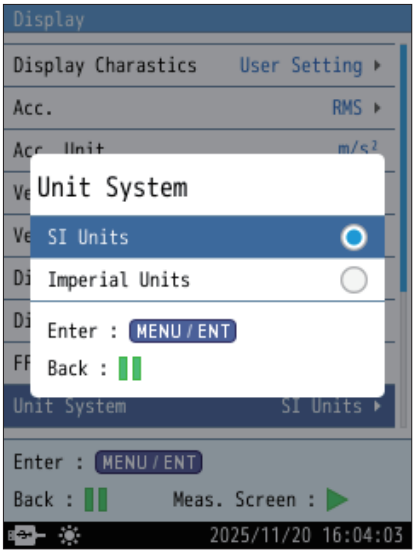
**1** **Select [Display] on the [Menu] screen and press the MENU/ENT key.**

**2** **Select [Unit System] on the [Display] screen and press the MENU/ENT key.**

**3** **Select one of the following and press the MENU/ENT key.**

| | |
|---|---|
| SI Unit | SI Unit is displayed |
| Imperial Units | Imperial Units are displayed |

The unit on the measurement screen is changed.



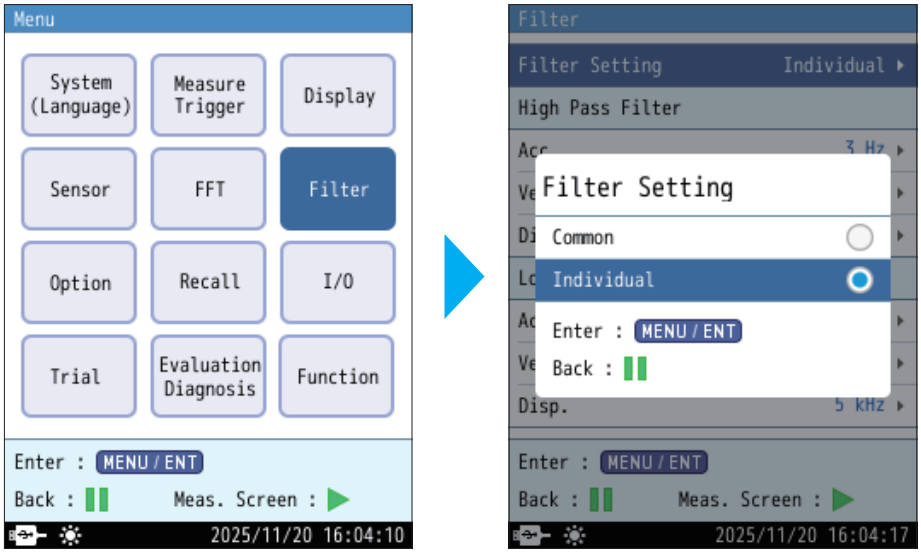

**Note**

- When the unit or unit system is changed, any threshold values that have already been set are automatically converted to the scale of the new unit.
  Example: When the displacement unit is changed from mm to µm (micrometers):
  Threshold value (Before): 1.0 mm
  Threshold value (After): 1000.0 µm
- If a converted threshold value exceeds the upper limit of the threshold setting range, the upper limit is applied. In addition, if any of the converted threshold values (1 to 3) become identical, a warning appears and the unit cannot be changed.

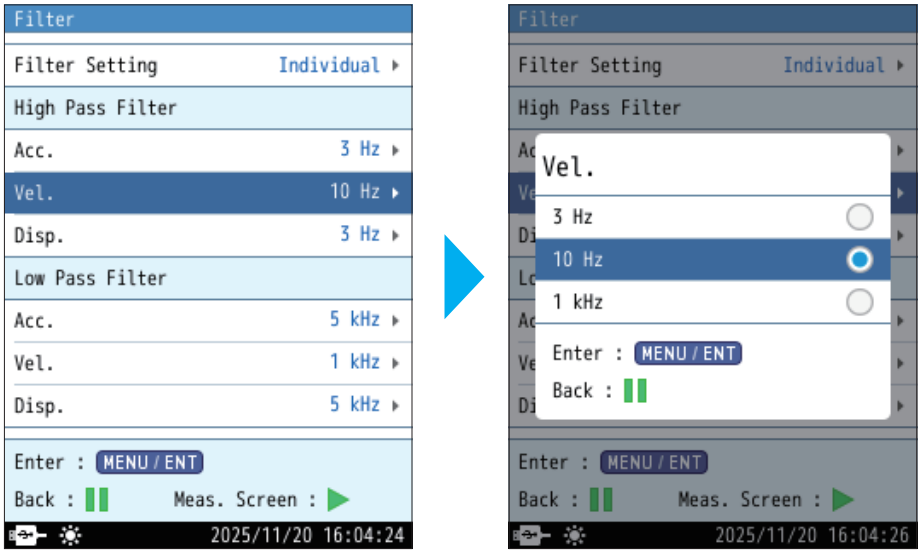
## 5.1.6 Selecting the filter

When the Evaluation Criteria is set to “ISO 10816-1” in Evaluation, set the filters as follows.

**1** **Select [Menu] screen » [Filter] » [Filter Setting] » [Individual], and press the ENU/ENT key.**




**2** **On the [Filter] screen, select “Vel.” under “High pass filter” and press the MENU/ENT key. Set the high pass filter for “Vel.” to “10 Hz.”**




**3** **Similarly, on the [Filter] screen, select “Vel.” under “Low pass filter” and press the MENU/ENT key.**

Set the low pass filter for “Vel.” to “1 kHz.”

**Note**

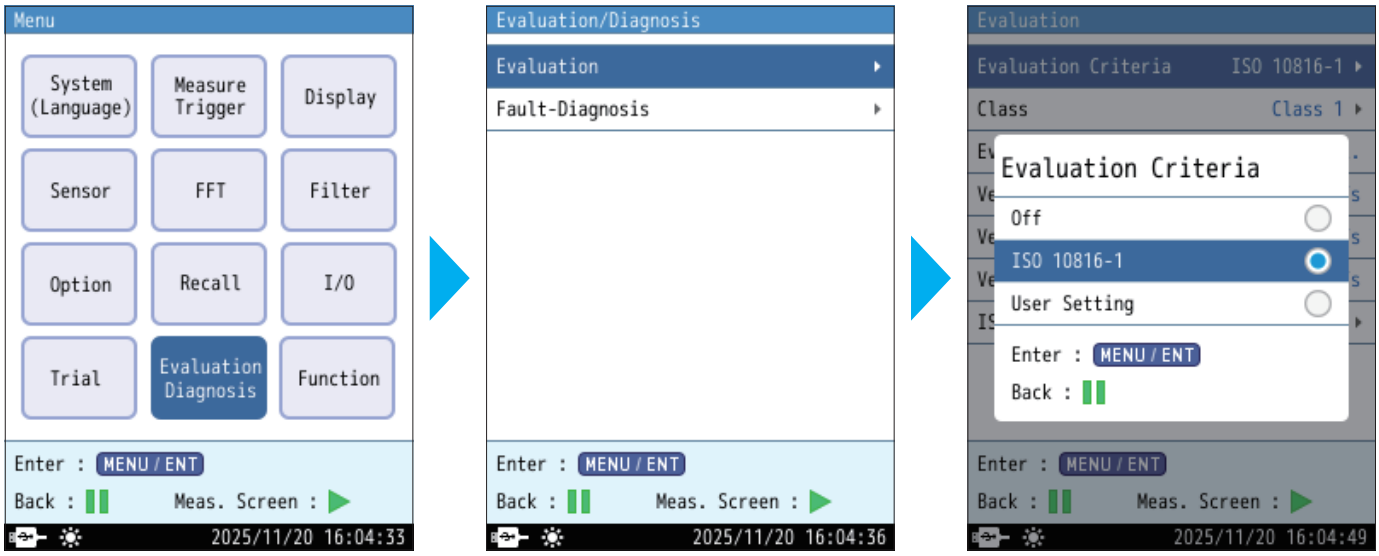
- When the Evaluation Criteria is set to “ISO 10816-1,” the high-pass and low pass filters (Vel.) cannot be changed.
- If filter settings other than those above are applied, a message prompting you to change the filters appears. If you allow the change, the filters are set to the values shown above, enabling Evaluation settings.

## 5.1.7 Configuration of the Evaluation VX-14D

Set the Evaluation function based on ISO.

### 1 Select the Evaluation Criteria.

1) Select [Menu] screen » [Evaluation/Diagnosis] » [Evaluation] » [Evaluation Criteria], and press the MENU/ENT key.
2) On the [Evaluation Criteria] screen, select “Off,” “ISO 10816-1,” or “User Setting,” and press the MENU/ENT key.




[Menu] screen [Evaluation/Diagnosis] screen [Evaluation Criteria] screen

| Evaluation Criteria | Description |
|---|---|
| Off | The Evaluation function is turned Off. |
| ISO 10816-1 | In Vibration meter mode, Class 1 to 4 is set according to the machine being measured.<br>Based on the Evaluation Criteria values defined in ISO 10816-1 for the zones (A: Favorable, B: Acceptable, C: Unsatisfactory, D: Unacceptable), the vibration velocity is evaluated. |
| User Setting | In Vibration meter mode, the vibration is evaluated based on user-defined Threshold 1 to 3 for the selected vibration quantity (acceleration, velocity, or displacement), and the zones (A: Favorable, B: Acceptable, C: Unsatisfactory, D: Unacceptable) is determined. |

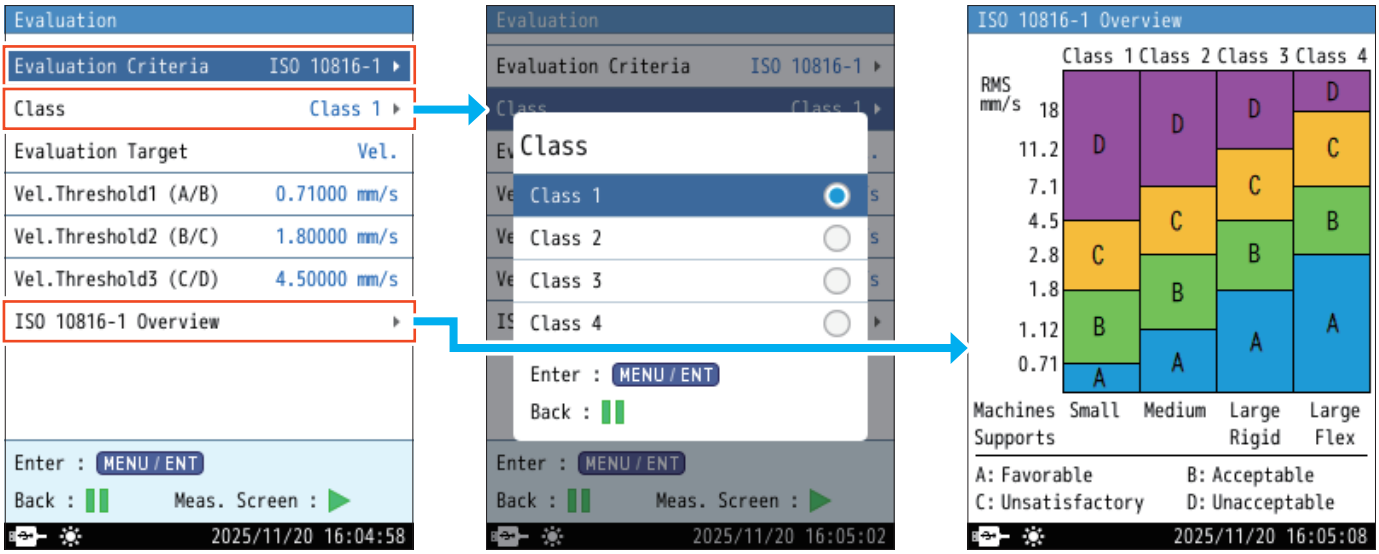
## 2 Organize the settings according to the selected Evaluation Criteria.

### When “ISO 10816-1” is selected in Evaluation Criteria

When “ISO 10816-1” is selected as the [Evaluation Criteria], set the Class (1 to 4) defined in ISO 10816-1. The Class is categorized according to the size and installation conditions of the machine.

1) On the [Evaluation] screen » [Class], press the MENU/ENT key.
   Set the appropriate Class 1 to 4 according to the machine being measured (refer to “• Machine Classifications”).

2) On the [Evaluation] screen » [ISO 10816-1 Overview], press the MENU/ENT key to display the reference chart.




[Evaluation] screen　[Class] screen　[ISO 10816-1 Overview] screen

### • Machine classifications

General Class selection should be made with reference to the information in the table below.
For details, refer to ISO 10816-1:1995 (JIS B 0906:1998).

| Class | Category | Description | Typical Examples |
|---|---|---|---|
| Class 1, Small (Class I) | Small machines | Small machines such as motors or engines integrated into the equipment | General-purpose electric motors of 15 kW or less |
| Class 2, Medium (Class II) | Medium machines | Medium-sized machines that do not require special foundations, or machines mounted on special foundations | Electric motors of 15 kW to 75 kW, machines of 300 kW or less |
| Class 3, Large Rigid (Class III) | Large machines (rigid support) | Large machines installed on rigid and hard-to-move foundations | – |
| Class 4, Large Flexible (Class IV) | Large machines (flexible support) | Large machines installed on flexible foundations that are more susceptible to vibration | Turbo-generator sets of 10 MW or greater, gas turbines |

**Note**

- When “ISO 10816-1” is selected in Evaluation Criteria, the Evaluation Target is fixed to “Velocity.”
- The Display Characteristics are fixed to RMS, the low pass filter to 10 Hz, and the high pass filter to 1 kHz.
- The values for Vel. Threshold 1 to 3 are displayed based on Class 1 to 4 in ISO 10816-1.
- In “ISO 10816-1 Overview,” you can check the classification and the threshold values for each Class.

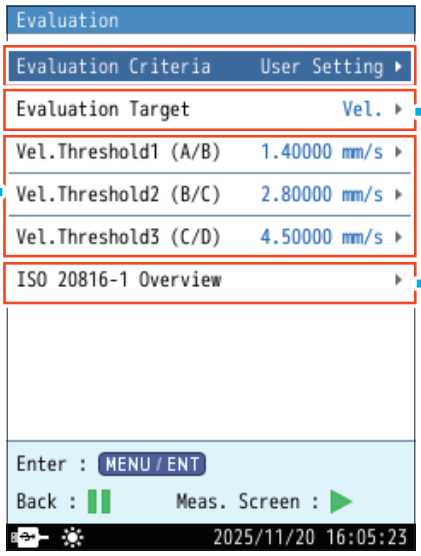
## When “User Setting” is selected in Evaluation Criteria

When “User Setting” is selected in [Evaluation Criteria], the vibration quantity and its thresholds (A/B, B/C, C/D) can be set as desired.

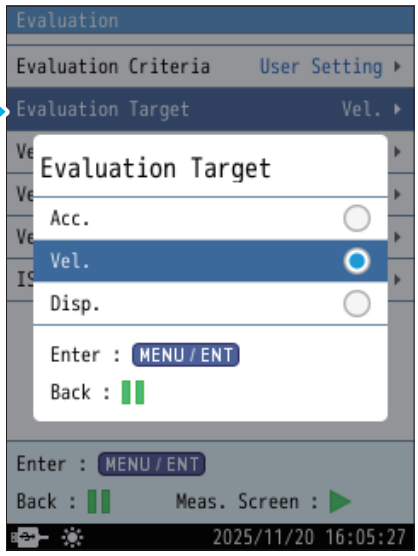
1) On the [Evaluation] screen » [Evaluation Target], press the MENU/ENT key.
   Select one of the vibration quantities: “Acc.”, “Vel.”, or “Disp.”

2) Set each threshold: Acc./Vel./Disp.Threshold1 (A/B), Acc./Vel./Disp.Threshold2 (B/C), and Acc./Vel./Disp. Threshold3 (C/D).
   Set the numeric value and the multiplier for each threshold.
   (The threshold names — Acc.Threshold, Vel.Threshold, or Disp.Threshold — vary depending on the vibration quantity selected in step 1).

3) On the [Evaluation] screen » [ISO 20816-1 Overview], press the MENU/ENT key to display the reference chart.



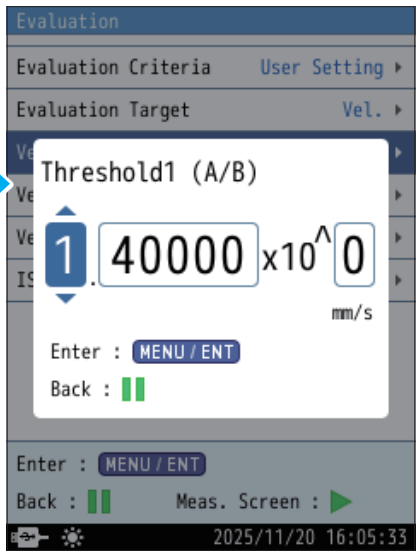

[Evaluation] screen



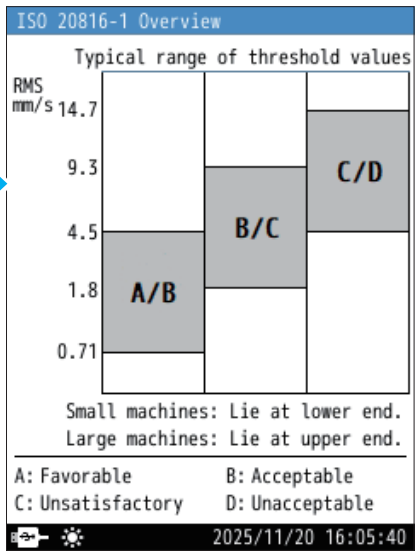

[Evaluation Target] screen

Thresholds 1 to 3 can be set to any value within the following ranges.

| Acc.Threshold |
|---|
| 0 to 999999 m/s² or G |
| Vel.Threshold |
| 0 to 999999 mm/s or inch/s |
| Disp.Threshold |
| 0 to 999999 mm, um or mil |




Threshold setting screen




[ISO 20816-1 Overview] screen

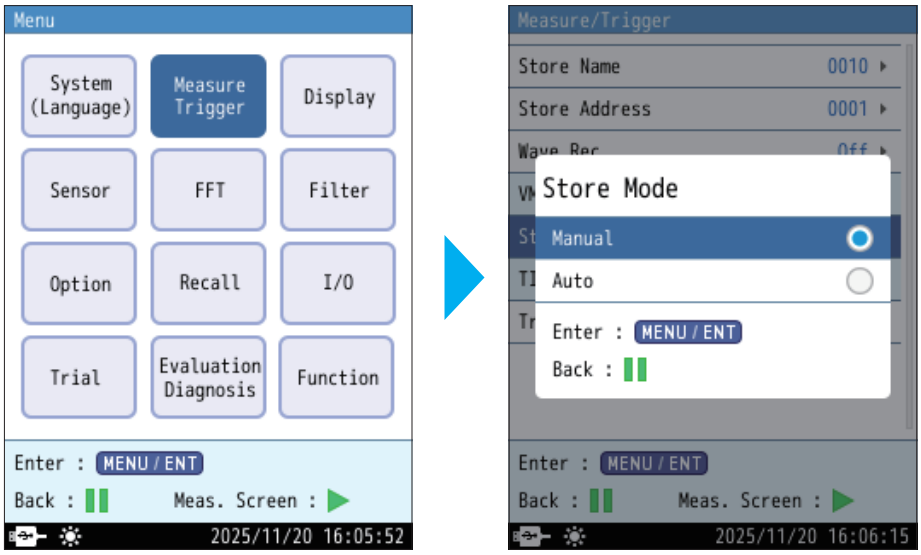
### Note

- The evaluation thresholds must satisfy the condition Threshold 1 < Threshold 2 < Threshold 3. If this condition is not met, an error message appears.
- In “ISO 20816-1 Overview,” you can check the representative zone boundary limits for each machine group described in ISO 20816-1:2016.

# 5.2 Settings (Manual store)

## 5.2.1 Set the store mode

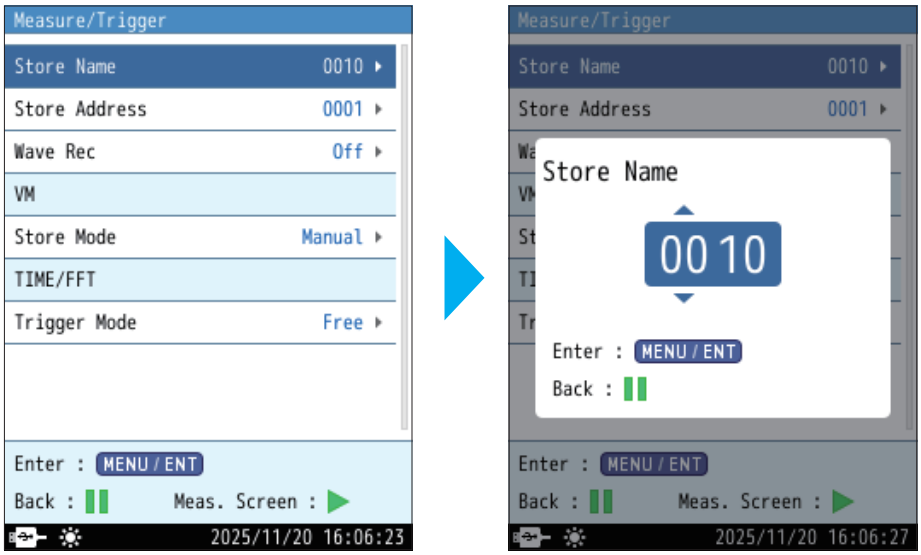
**On the [Menu] screen » [Measure Trigger] » [Store Mode] » [Manual], press the MENU/ENT key.**




## 5.2.2 Set the store name

**1** **Set the “Store Name” and press the MENU/ENT key.**

When saving measurement data, be sure to set a store name.
The store name can be entered as a four-digit number (0000 to 9999).
Measurement data is stored in the folder indicated by the store name (page 44).



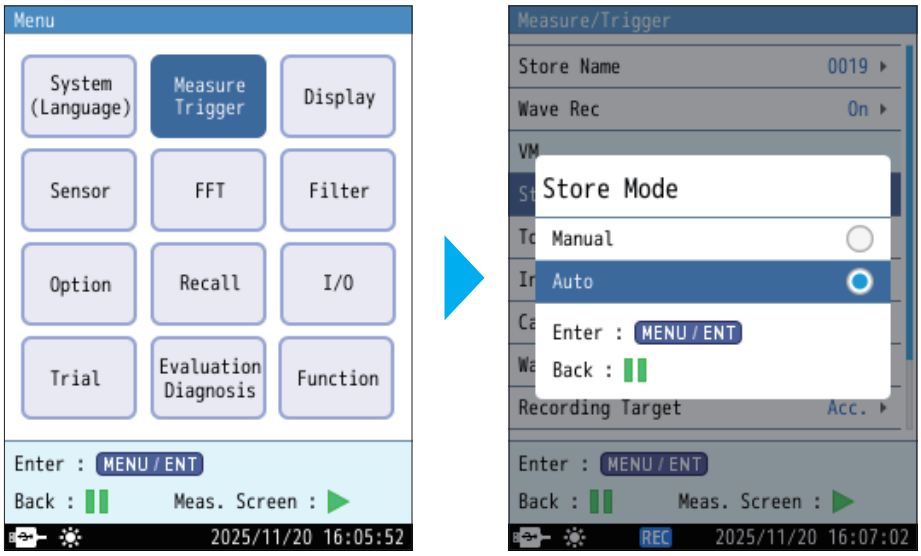

**2** **Similarly, set a four-digit number for “Store Address” and press the MENU/ENT key.**

The store address can be entered as a four-digit number (0001 to 1000)(page 44).

# 5.3 Settings (Auto store) VX-14S

## 5.3.1 Set the store mode

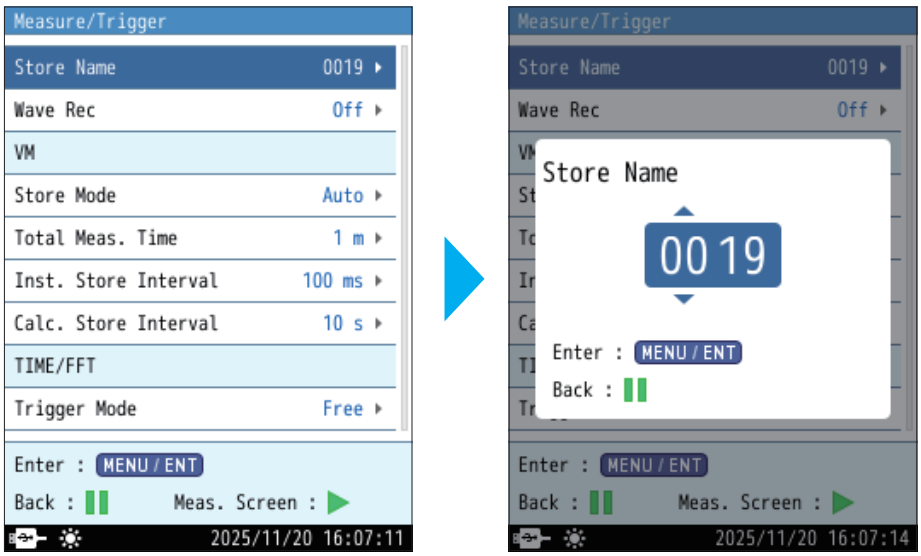
**On the [Menu] screen » [Measure Trigger] » [Store Mode] » [Auto], press the MENU/ENT key.**




## 5.3.2 Set the store name

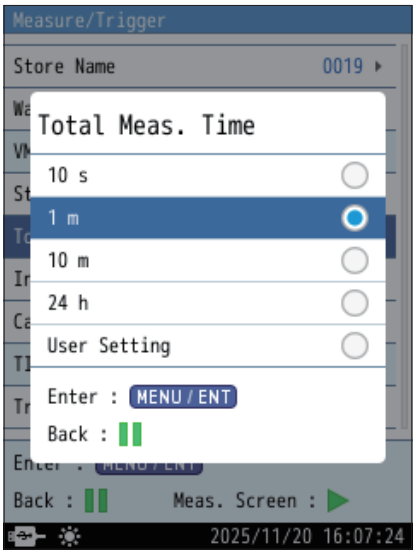
**Set the “Store Name” and press the MENU/ENT key.**

When saving measurement data, be sure to set a store name.
The store name can be entered as a four-digit number (0000 to 9999).
Measurement data is stored in the folder indicated by the store name (page 44).



## 5.3.3 Total measurement time

Calculation measurement can be performed according to the set measurement time.




**1** **On the [Menu] screen » [Measure/Trigger] » [Total Meas. Time], press the MENU/ENT key.**

**2** **Select one of the following times and press the MENU/ENT key:**

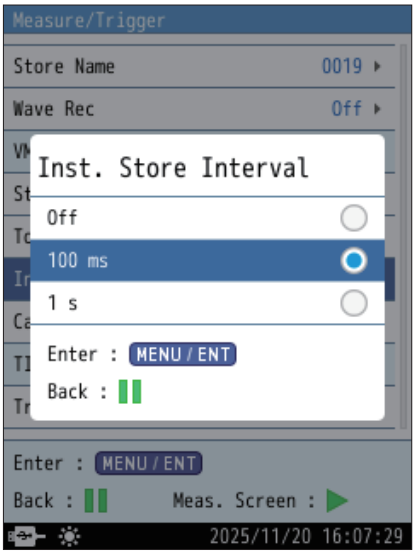
[10 s], [1 m], [10 m], [24 h], [User setting] (1 to 59 s, 1 to 59 m, 1 to 200 h)

**Note**

- Set the total measurement time to a value equal to or greater than the calculation value store interval.

## 5.3.4 Instantaneous value store interval

From the start of measurement until either measurement stops or the total measurement time is reached, continuously records the measurement values at the specified instantaneous value store interval.



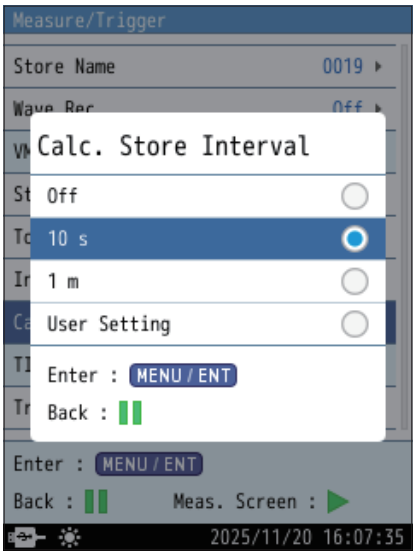

**1** **On the [Menu] screen » [Measure/Trigger] » [Inst. Store Interval], press the MENU/ENT key.**

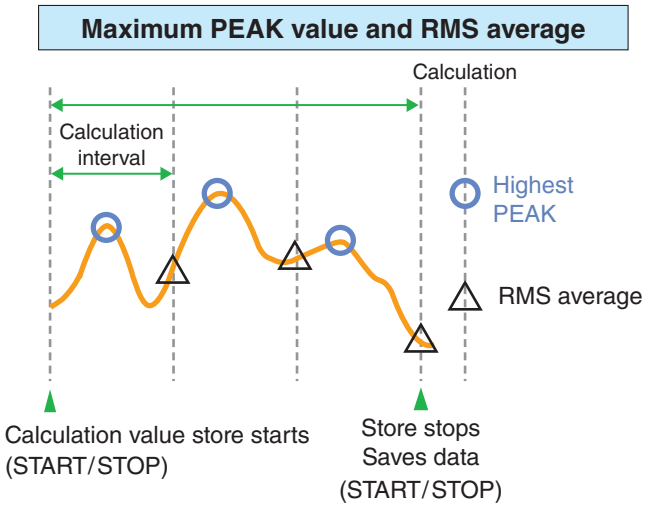
**2** **Select one of the following times and press the MENU/ENT key:**

[Off], [100 ms], [1 s]

## 5.3.5 Calculated value store interval

Calculation measurement can be performed according to the set measurement time.
From the start of measurement until either measurement stops or the total measurement time is reached, calculates and continuously records the calculated values at the specified calculated value store interval.
The calculated values vary depending on the indicator characteristics.
When acceleration, velocity, or displacement is set to “PEAK”, the maximum PEAK value during the measurement period is stored.
When set to anything other than “PEAK”, the average value is stored.




**1** **On the [Menu] screen » [Measure/Trigger] » [Total Measurement Time], press the MENU/ENT key.**

**2** **Select one of the following times and press the MENU/ENT key:**

[Off], [10 s], [1 m], [User Setting] (10 to 59 s, 1 to 59 m, 1 h).

When the Auto Store function is enabled, the address cannot be changed and the store name is displayed.
Data management is possible using the store name.

**Note**

- Measurement cannot be started when both the instantaneous value store interval and the calculation store interval are set to Off.
- The pause function cannot be used after measurement begins.

# 6

# Measurement (Evaluation)

**Note**

- Please refer to the “Vibration Analyzer VA-14 / Function Extension Program VX-14S Instruction Manual (Operation Guide)” for detailed information on the operation procedures and precautions for using the VA-14.

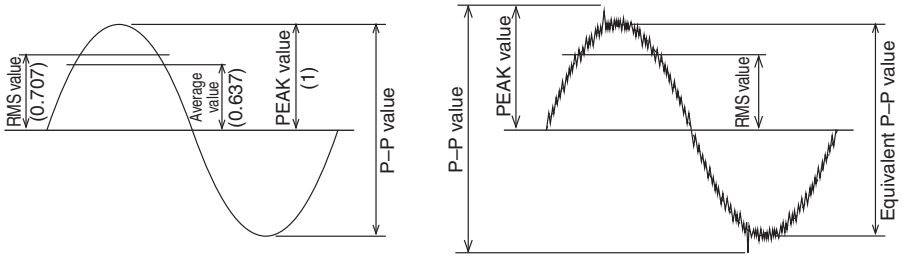
- Before starting a measurement, make sure that the current date and time of the instrument are correctly set.
- The level bar on the screen is updated every 100 ms, and the numerical values are updated every 1 second.
- For velocity and displacement, only the Display Characteristics specified on the display screen are shown as numerical values (page 21).
- Velocity PEAK and displacement PEAK values can be selected when VX-14S is installed (see “21.8 PEAK calculation function (velocity, displacement)” in the VA-14 / VX-14S Instruction Manual (Operation Guide).
- The Evaluation function operates in Vibration Meter (VM) mode.
- In addition to the simultaneous display of vibration quantities (acceleration, velocity, displacement), the Evaluation result is also shown.

The items displayed as numerical values are as follows.

| Item | Name | Evaluation VX-14D | |
|---|---|---|---|
| | | ISO 10816-1 | User Setting |
| ACC RMS | Acceleration RMS value | – | Evaluation * |
| ACC PEAK | Acceleration peak value | – | – |
| ACC C.F. | Acceleration peak crest factor | – | – |
| VEL RMS | Velocity RMS value | Evaluation * | Evaluation * |
| VEL PEAK VX-14S | Velocity PEAK value | – | – |
| VEL EQ PEAK | Velocity EQ PEAK value | – | – |
| DISP RMS | Displacement RMS value | – | Evaluation * |
| DISP P–P VX-14S | Displacement P–P value | – | – |
| DISP EQ PEAK | Displacement equivalent PEAK value | – | – |
| DISP EQ P–P | Displacement equivalent P–P value | – | – |

* When an Evaluation is performed, the judgment result is displayed as A: Favorable, B: Acceptable, C: Unsatisfactory, or D: Unacceptable.

The relationship between indicator characteristic values is shown in the diagram below.




Sine waveform General waveform

For a sine waveform, PEAK value equals the RMS value multiplied by $\sqrt{2}$, but this does not hold true for general waveforms.

# 6.1 Measurement (Manual store)

## 6.1.1 Pausing the measurement

To pause the measurement, press the PAUSE/CONT key.
During a pause, the ❚❚ symbol appears on the left side of the display, and the displayed values as well as the Evaluation result are held.
To resume the measurement, press the PAUSE/CONT key once more.

**Note**

- In the pause condition (❚❚ symbol shown on the left side of the display), the measurement parameters cannot be changed.
- In the pause condition, the Evaluation settings cannot be changed.

## 6.1.2 Storing measurement data

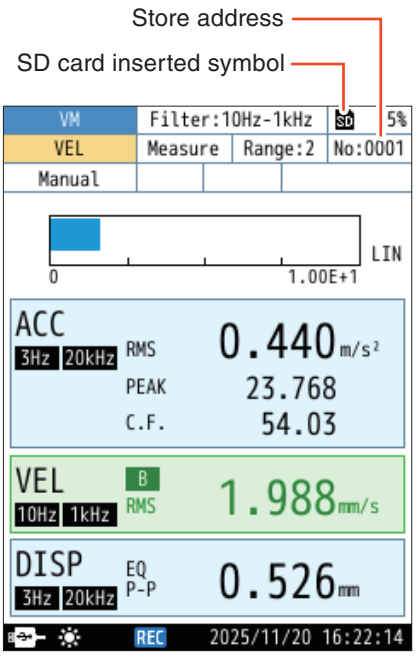
You can store measurement data on the SD card inserted in the instrument.
When an Evaluation is performed, the evaluation result is stored together with the corresponding measurement data.

**1 Verify that the SD card symbol is shown on the title bar.**

If no symbol is shown, insert an SD card (page 11).

**2 Check the store address shown at the right end of the title bar.**

**If the address is shown on a white background:**
Proceed to step 3.
**If the address is shown on a red background:**
This indicates that the store address already contains measurement data.
To overwrite the data, proceed to step 3.
If you do not overwrite the data, use the △/▽ keys to select a different store address that is shown on a white background.




**3 Press the STORE key.**

The popup indication “STORE XXXX” (where XXXX is the store address) appears, storing is carried out, and the LED indicator flashes in red.
When storing is complete, the store address is incremented by one. If the store address was 1000, the indication returns to 0001.

For information on how to view stored data, refer to “Auto Calc” (page 23).
For information on the folder structure of stored data, refer to “Structure of Stored Data (Evaluation)” (page 44).

# 6.2 Measurement (Auto store)

## 6.2.1 Key operations in Auto store

The main key operations in the Auto store are as follows.

| Name | Description |
|---|---|
| Store key | No function. |
| START/STOP key | Used to start and stop the measurement. |
| △/▽ keys | Invalid. |
| ◁/▷ keys | Switches between the level bar display and the time-level graph display on the instantaneous value store (Auto Inst) screen. |
| INST/AVE key | Switches between the instantaneous value store screen and the calculated value store screen. |

## 6.2.2 Starting and storing measurements

**1** **Press the START/STOP key on the measurement screen to start the measurement.**

- While measuring, the ▶ symbol flashes and the elapsed time is displayed. The indicator lamp also flashes purple.
- The measurement quantities are automatically stored each time the configured Instantaneous Store Interval or Calculated Store Interval elapses (see pages 35 and 36).
- When the configured Total Measurement Time elapses, the measurement automatically stops (see page 35).
- To stop the measurement manually, press the START/STOP key again.

START/STOP key




**2** **To perform another measurement, press the START/STOP key once more.**

If the same store name already exists, a message appears.
Select one of the following options: [NO], [Raise one store name], or [Overwrite and meas.]

# 7

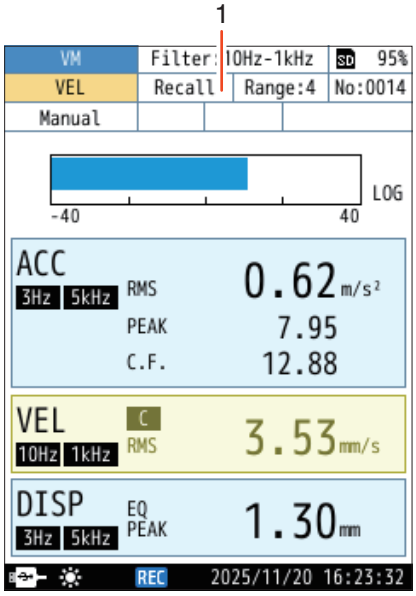
# Recalling Stored Data (Evaluation)

**Note**

- Please refer to the “Vibration Analyzer VA-14 / Function Extension Program VX-14S Instruction Manual (Operation Guide)” for detailed information on the operation procedures and precautions for using the VA-14.

## 7.1 Reading the recall screen

The display is essentially the same as that on the measurement screen, although some display-related settings are restricted.

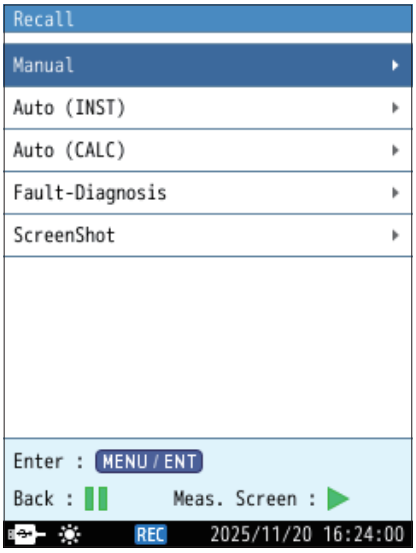



Recall screen (VM mode)

| No. | Name | Description |
|---|---|---|
| 1 | Measure / Recall | When in Recall mode, the title “Recall” is displayed. |

# 7.2 Recalling stored data

## 1 Select [Recall] on the [Menu] screen and press the MENU/ENT key.




**Manual store:**
Select [Manual] and press the MENU/ENT key. The selection screen for VM, TIME, and FFT will be displayed.

**Auto store:**
The instantaneous and calculated values are displayed.
For information on the folder structure, refer to “Structure of Stored Data (Evaluation)” (page 44).

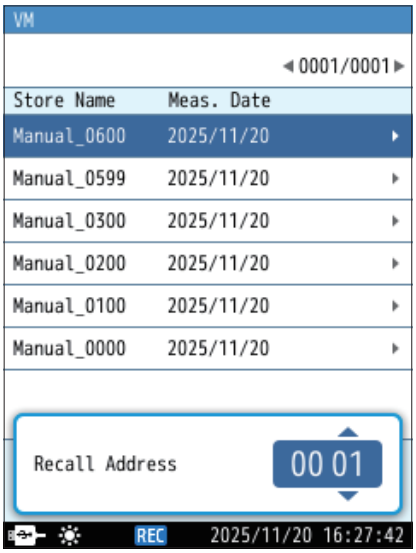
## 2 Select the store data file you want to display and press the MENU/ENT key.

## 3 Use the △/▽ keys to select the store name and press the MENU/ENT key.

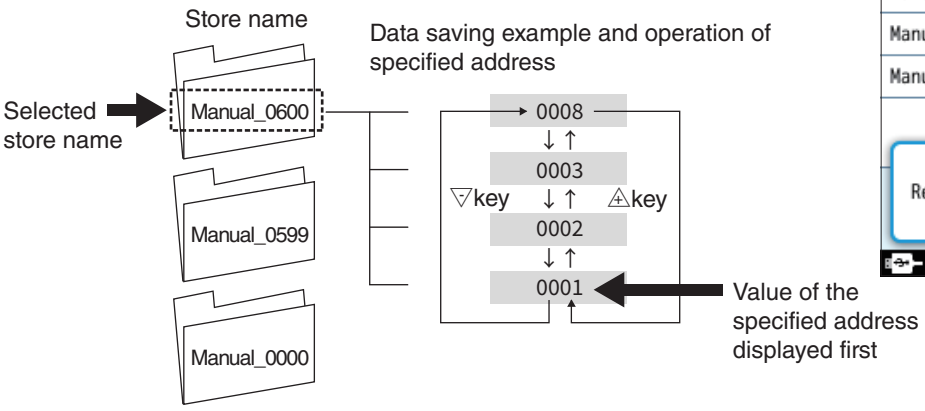
**Note**

- Insert the SD card, and the store names will be displayed. If no store names are shown, make sure that the SD card is properly inserted.
- Store data files stored with an index number different from the currently selected index number cannot be recalled.

## 4 At the bottom of the screen, the [Recall Address] selection box will appear.




**Manual store:**
Use the △/▽ keys to increase or decrease the specified address to select the recall data, then press the MENU/ENT key. Only addresses that actually contain saved data can be selected.




**Auto store:**
The minimum store address is displayed. There is no option to select a specific address.

## 5 On the selection screen for [Display] or [Delete], choose the appropriate option and press the MENU/ENT key.

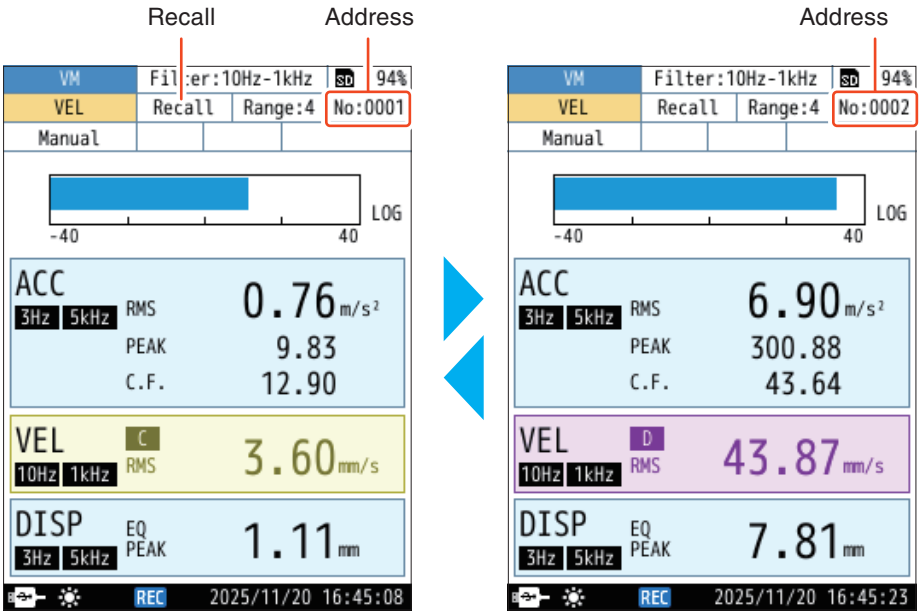
The selected data appears.




### Important

- It may take several seconds for the data to appear. While the indicator lamp is blinking rapidly, data is being saved or loaded. Do not turn off the power to the unit or remove the SD card. This may damage the SD card.

To change the address, press the △/▽ keys.



# 7.3 Deleting stored data

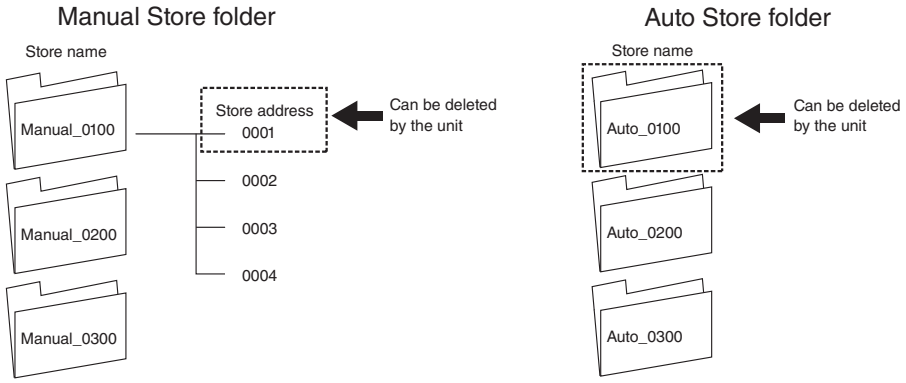
You can delete data stored on the SD card using the unit.

**Manual store:**

Specify the store name and address, then delete the address.

**Auto store:**

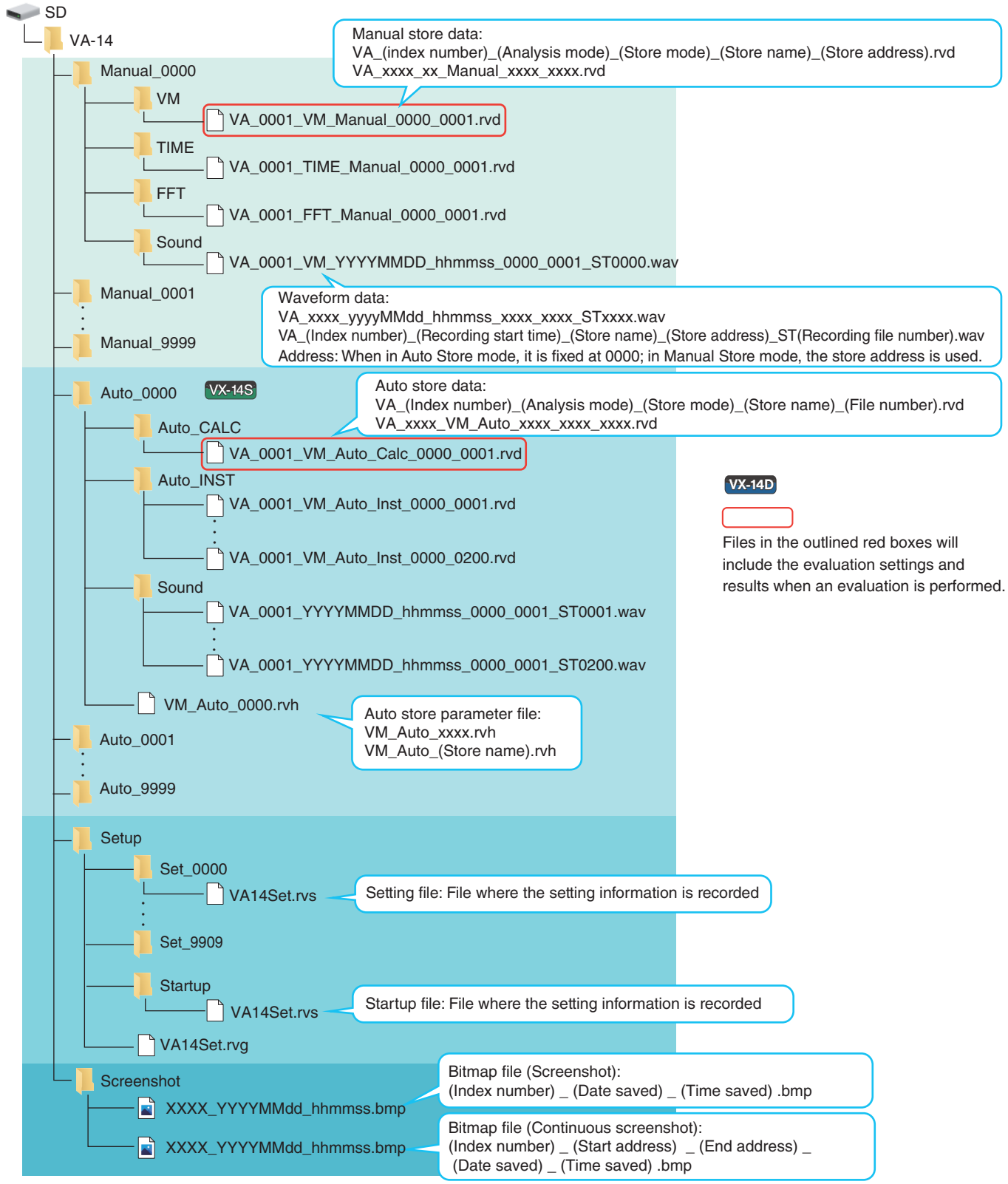
Select a store name and press the MENU/ENT key to delete.



# 8 Structure of Stored Data (Evaluation)

## 8.1 Folder structure

The folder structure of the data stored on the SD card is shown below.



The file types and their descriptions are as follows.

| Item | Extension | Description |
|---|---|---|
| Data file | .rvd | Created in both Manual and Auto Store modes.<br>The measurement values for the corresponding store (instantaneous values and calculated values), along with their overload information, are recorded. |
| Auto store parameter file | .rvh | Created in Auto Store mode. Records the setting information related to the corresponding store.<br>Not created in Manual Store mode. |
| Setting file (Startup file) | .rvs | Records the setting information related to the device itself.<br>It is also possible to load settings from a settings file. |
| Settings group file | .rvg | Records the names of the setting groups saved on the SD card. |
| Wave file | .wav | Records each waveform during waveform recording. |
| Bitmap file | .bmp | Files are created when a screenshot is taken. |

Among the data stored on the SD card, the following seven types of files are used to store measurement data.

| Item | | | Description |
|---|---|---|---|
| Manual | VM | VA_0001_VM_Manual_0000_0001.rvd | This file is stored when in Manual, vibration meter (VM) mode. |
| | TIME | VA_0001_TIME_Manual_0000_0001.rvd | This file is stored when in Manual, time waveform (TIME) mode. |
| | FFT | VA_0001_FFT_Manual_0000_0001.rvd | This file is stored when in Manual, FFT analysis mode. |
| Auto VX-14S | Auto_CALC | VA_0001_VM_Auto_Calc_0000_0001.rvd | This file is stored when in Auto mode with a calculation interval. |
| | Auto_INST | VA_0001_VM_Auto_Inst_0000_0001.rvd | This file is stored when in Auto mode with an instantaneous value. |
| | Auto store parameter file | VA_Auto_0001.rvh | An Auto mode setup file is stored. |
| Sound | | VA_0001_20240102_024833_0000_0001_ST0001.wav | This file is stored along with the FFT store data file when in FFT analysis mode and the waveform recording function is enabled. For details, refer to “Waveform recording function setting” (page 61). |

Stored data files (RVD files) can be opened in Microsoft Excel by changing the file extension to “CSV”.

# 8.2 Vibration meter (VM) mode (Manual store)

The data content is as follows.

- Each item is arranged in the order shown in the table and written in the format: "(field name),␣(content)(CR+LF)" ("␣" indicates a space.)
- When an Evaluation is performed, an [Evaluation] block is added.

| Item | Field name | Bytes | Content | Maximum Bytes | Description |
|---|---|---|---|---|---|
| | [Setting] | 9 | | | |
| | [Property] | 10 | | | |
| System version | System␣Version | 14 | x.x (major version.minor version) | 3 | |
| D option version | VX-14D␣Version | 14 | x.x (major version.minor version) | 3 | |
| S option version | VX-14S␣Version | 14 | x.x (major version.minor version) | 3 | |
| Serial number | Serial␣Number | 13 | 00000000 to 99999999 | 8 | |
| | [VA-14] | 7 | | | |
| Store Name | Store␣Name | 10 | 0000 to 9999 | 4 | |
| Store address | Store␣Address | 13 | 0001 to 1000 | 4 | |
| Store time | Store␣Start␣Time | 16 | YYYY/MM/DD hh:mm:ss | 19 | |
| Analysis contents | Analysis␣Mode | 13 | VM, TIME, FFT | 4 | |
| Acceleration indicated value | Display␣Characteristics␣(ACC) | 29 | RMS, PEAK | 4 | |
| Velocity indicated value | Display␣Characteristics␣(VEL) | 29 | RMS, PEAK, EQPEAK | 6 | |
| Displacement indicated value | Display␣Characteristics␣(DISP) | 30 | RMS, PEAK, EDQPEAK, EQp-p | 6 | When P–P is selected in the displacement indicated value settings on the [Display] screen, it is saved as PEAK |
| Acceleration unit | Display␣Unit␣(ACC) | 18 | m/s^2, G | 5 | |
| Velocity unit | Display␣Unit␣(VEL) | 18 | mm/s, inch/s | 6 | |
| Displacement unit | Display␣Unit␣(DISP) | 19 | mm, um, mil | 3 | |
| Acceleration high pass filter | High␣Pass␣Filter␣(ACC) | 22 | 1Hz, 3Hz, 10Hz, 1kHz | 4 | |
| Acceleration low pass filter | Low␣Pass␣Filter␣(ACC) | 21 | 1kHz, 5kHz, 20kHz | 5 | |
| Velocity high pass filter | High␣Pass␣Filter␣(VEL) | 22 | 3Hz, 10Hz, 1kHz | 4 | |
| Velocity low pass filter | Low␣Pass␣Filter␣(VEL) | 21 | 1kHz, 5kHz, 20kHz | 5 | |
| Displacement high pass filter | High␣Pass␣Filter␣(DISP) | 23 | 3Hz, 10Hz, 1kHz | 4 | |
| Displacement low pass filter | Low␣Pass␣Filter␣(DISP) | 22 | 1kHz, 5kHz, 20kHz | 5 | |
| Level range | Level␣Range | 11 | 1 to 7 | 1 | |
| Acceleration overload information | Overload␣(ACC) | 14 | ␣-, OV | 2 | |
| Velocity overload information | Overload␣(VEL) | 14 | ␣-, OV | 2 | |
| Displacement overload information | Overload␣(DISP) | 15 | ␣-, OV | 2 | |
| Manufacturer | Manufacturer | 12 | Rion | 4 | |
| Type | Type | 4 | VA-14 | 5 | |
| Index | Index␣Number | 12 | 1 to 9999 | 4 | |
| Sensor type | Sensor␣Type | 11 | PV-57I, Other, Mic. | 6 | |
| Sensitivity | Sensitivity | 11 | XXXXX mV/m/s^2<br>5 characters including the dot "." | 13 | |
| dB reference value | dB␣Standard | 11 | X.XXE±Y | 7 | |

| Item | Field name | Bytes | Content | Maximum Bytes | Description |
|---|---|---|---|---|---|
| Data | [Data] | 6 | | | |
| Acceleration RMS | ACC␣RMS | 7 | XXXXXX.X<br>Up to 7 characters including the dot "." | 7 | |
| Acceleration PEAK | ACC␣PEAK | 8 | XXXXXX.X<br>Up to 7 characters including the dot "." | 7 | |
| Acceleration crest factor | ACC␣C.F. | 8 | XXXXXX.X<br>Up to 7 characters including the dot "." | 7 | |
| Velocity | VEL | 3 | XXXXXX.X<br>Up to 7 characters including the dot "." | 7 | Measurement values corresponding to the velocity indicated value |
| Displacement | DISP | 4 | XXXXXX.X<br>Up to 7 characters including the dot "." | 7 | Measurement values corresponding to the displacement indicated value |
| VX-14D | [Evaluation] | 12 | | | |
| Evaluation Criteria | Threshold Analysis | 18 | ISO 10816-1, User Setting | 11 | |
| Evaluation Target | Target Data Type | 16 | Acc, Vel, Disp | 4 | |
| ISO 10816-1 Class setting | Class ISO10816-1 | 16 | Class1, Class2, Class3, Class4 | 6 | |
| Acc. Threshold | Acc Threshold 1 | 11 | XXXXXX.X<br>Up to 7 characters including the dot "." | 11 | |
| | Acc Threshold 2 | 11 | | 11 | |
| | Acc Threshold 3 | 11 | | 11 | |
| Vel. Threshold | Vel Threshold 1 | 11 | | 11 | |
| | Vel Threshold 2 | 11 | | 11 | |
| | Vel Threshold 3 | 11 | | 11 | |
| Disp. Threshold | Disp Threshold 1 | 11 | | 11 | |
| | Disp Threshold 2 | 11 | | 11 | |
| | Disp Threshold 3 | 11 | | 11 | |
| Evaluation result | Evaluation Result | 17 | A, B, C, D | 1 | |

Examples are shown below. Each unit corresponds to the unit that was displayed during the measurement.

| | | |
|---|---|---|
| | [Setting] | |
| | [Property] | |
| | System Version | 1.00 |
| | VX-14D Version | 1.00 |
| | VX-14S Version | 1.00 |
| | Serial Number | 12345680 |
| | [VA-14] | |
| | Store Name | 0000 |
| | Store Address | 0005 |
| | Store Start Time | 2025/8/26 9:09:02 |
| | Analysis Mode | VM |
| | [Data] | |
| | ACC RMS | 1.36700 |
| | ACC PEAK | 3.23100 |
| | ACC C.F. | 3.28000 |
| VX-14D | [Evaluation] | |
| | Threshold Analysis | ISO 10816-1 |
| | Target Data Type | Vel |
| | Class ISO10816-1 | Class1 |
| | Acc Threshold 1 | 0.00105 |
| | Acc Threshold 2 | 0.00210 |
| | Acc Threshold 3 | 0.00330 |
| | Vel Threshold 1 | 0.71000 |
| | Vel Threshold 2 | 1.80000 |
| | Vel Threshold 3 | 4.50000 |
| | Disp Threshold 1 | 0.70000 |
| | Disp Threshold 2 | 1.40000 |
| | Disp Threshold 3 | 2.20000 |
| | Evaluation Result | D |

Property

VA-14 settings

Measurement data

Evaluation settings and results

# 8.3 Vibration meter (VM) mode (Auto store)

The data content is as follows.

- Each item is arranged in the order shown in the table and written in the format: "(field name),␣(content)(CR+LF)" ("␣" indicates a space.)
- When an Evaluation is performed, the evaluation results are added to the [Evaluation] block in the Auto CALC file, and the evaluation settings are added to the [Evaluation] block in the Auto Store parameter file.

**Auto_CALC**

| Item | Field name | Bytes | Content | Maximum Bytes | Description |
|---|---|---|---|---|---|
| Data No. | Store␣Address | 13 | 1 to 7200000 | 7 | |
| Store time | Store␣Time | 10 | YYYY/MM/DD hh:mm:ss.sss | 23 | |
| Acceleration RMS_ Calculated value | ACC␣RMS | 7 | XXXXXX.X Up to 7 characters including the dot "." | 7 | |
| Acceleration PEAK_ Calculated value | ACC␣PEAK | 8 | XXXXXX.X Up to 7 characters including the dot "." | 7 | |
| Acceleration crest factor_ Calculated value | ACC␣C.F. | 8 | XXXXXX.X Up to 7 characters including the dot "." | 7 | |
| Velocity_Calculated value | VEL | 3 | XXXXXX.X Up to 7 characters including the dot "." | 7 | Measurement values corresponding to the velocity indicated value |
| Displacement_Calculated value | DISP | 4 | XXXXXX.X Up to 7 characters including the dot "." | 7 | Measurement values corresponding to the displacement indicated value When P–P is selected in the displacement indicated value settings on the [Display] screen, it is saved as PEAK |
| Acceleration overload information during calculation store interval | Overload␣(ACC) | 14 | ␣-, OV | 2 | |
| Velocity overload information during calculation store interval | Overload␣(VEL) | 14 | ␣-, OV | 2 | |
| Displacement overload information during calculation store interval | Overload␣(DISP) | 15 | ␣-, OV | 2 | |
| Evaluation result VX-14D | Evaluation␣Result | 17 | A, B, C, D | 1 | Added only when an Evaluation is performed |

An example is shown below.

| Store Address | Store Time | ACC RMS | ACC PEAK | ACC C.F. | VEL | DISP | Overload (ACC) | Overload (VEL) | Overload (DISP) | VX-14D Evaluation Result |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2025/8/26 9:20:30 | 0.39300 | 2.67400 | 5.45000 | 1.72100 | 1.77090 | - | - | - | B |
| 2 | 2025/8/26 9:20:40 | 0.24000 | 2.09200 | 3.92000 | 0.91800 | 1.08800 | - | - | - | B |
| 3 | 2025/8/26 9:20:50 | 1.05800 | 21.78000 | 6.28000 | 5.11300 | 3.43510 | - | - | OV | D |
| 4 | 2025/8/26 9:21:00 | 0.79200 | 21.78000 | 9.38000 | 3.87600 | 3.49790 | - | - | OV | C |
| 5 | 2025/8/26 9:21:10 | 0.22200 | 0.84400 | 3.91000 | 0.64700 | 1.49200 | - | - | - | A |
| 6 | 2025/8/26 9:21:20 | 0.13800 | 0.59300 | 3.77000 | 0.52000 | 0.85250 | - | - | - | A |

Evaluation results

## Auto_INST

| Item | Field name | Bytes | Content | Maximum Bytes | Description |
|---|---|---|---|---|---|
| Data No. | Store␣Address | 13 | 1 to 7200000 | 7 | |
| Store time | Store␣Time | 10 | YYYY/MM/DD hh:mm:ss.sss | 23 | |
| Acceleration RMS_ Instantaneous value | ACC␣RMS | 7 | XXXXXX.X Up to 7 characters including the dot "." | 7 | |
| Acceleration PEAK_ Instantaneous value | ACC␣PEAK | 8 | XXXXXX.X Up to 7 characters including the dot "." | 7 | |
| Acceleration crest factor_ Instantaneous value | ACC␣C.F. | 8 | XXXXXX.X Up to 7 characters including the dot "." | 7 | |
| Velocity_Instantaneous value | VEL | 3 | XXXXXX.X Up to 7 characters including the dot "." | 7 | Measurement values corresponding to the velocity indicated value |
| Displacement_Instantaneous value | DISP | 4 | XXXXXX.X Up to 7 characters including the dot "." | 7 | Measurement values corresponding to the displacement indicated value When P–P is selected in the displacement indicated value settings on the [Display] screen, it is saved as PEAK |
| Acceleration overload information during Instantaneous store interval | Overload␣(ACC) | 14 | ␣-, OV | 2 | |
| Velocity overload information during Instantaneous store interval | Overload␣(VEL) | 14 | ␣-, OV | 2 | |
| Displacement overload information during Instantaneous store interval | Overload␣(DISP) | 15 | ␣-, OV | 2 | |

An example is shown below.

| Store Address | Store Time | ACC RMS | ACC PEAK | ACC C.F. | VEL | DISP | Overload (ACC) | Overload (VEL) | Overload (DISP) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2025/8/26 9:20:30 | 0.32900 | 0.55500 | 1.69000 | 1.90700 | 1.88890 | - | - | - |
| 2 | 2025/8/26 9:20:30 | 0.32300 | 0.55500 | 1.72000 | 1.92500 | 1.80970 | - | - | - |
| 3 | 2025/8/26 9:20:31 | 0.42700 | 1.31000 | 3.07000 | 1.87300 | 1.77640 | - | - | - |
| 300 | 2025/8/26 9:21:00 | 3.59600 | 21.78000 | 6.06000 | 18.50300 | 14.67710 | - | - | OV |
| 301 | 2025/8/26 9:21:00 | 3.47900 | 21.78000 | 6.26000 | 17.69200 | 14.09950 | - | - | OV |
| 302 | 2025/8/26 9:21:00 | 3.35100 | 21.78000 | 6.50000 | 16.95000 | 13.67260 | - | - | OV |
| 598 | 2025/8/26 9:21:30 | 0.13400 | 0.30700 | 2.29000 | 0.59000 | 0.76110 | - | - | - |
| 599 | 2025/8/26 9:21:30 | 0.13000 | 0.30700 | 2.37000 | 0.61500 | 0.73660 | - | - | - |
| 600 | 2025/8/26 9:21:30 | 0.12400 | 0.30700 | 2.47000 | 0.61000 | 0.72930 | - | - | - |

### Note

- In the pause condition ( ⏸ symbol shown on the left side of the display), the measurement parameters cannot be changed.
- During a measurement pause, the Evaluation settings cannot be changed.
- The evaluation results are not recorded in the Auto INST (instantaneous value) store data file.

## Auto store parameter file

| Item | Field name | Bytes | Content | Maximum Bytes | Description |
|---|---|---|---|---|---|
| | [Setting] | 9 | | | |
| | [Property] | 10 | | | |
| System version | System␣Version | 14 | x.x (major version.minor version) | 3 | |
| D option version | VX-14D␣Version | 14 | x.x (major version.minor version) | 3 | |
| S option version | VX-14S␣Version | 14 | x.x (major version.minor version) | 3 | |
| Serial number | Serial␣Number | 13 | 00000000 to 99999999 | 8 | |
| | [VA-14S] | 8 | | | |
| Store Name | Store␣Name | 10 | 0000 to 9999 | 4 | |
| Analysis contents | Analysis␣Mode | 14 | VM, TIME, FFT | 4 | |
| Acceleration indicated value | Display␣Characteristics␣(ACC) | 29 | RMS, PEAK | 4 | |
| Velocity indicated value | Display␣Characteristics␣(VEL) | 29 | RMS, PEAK, EQPEAK | 6 | |
| Displacement indicated value | Display␣Characteristics␣(DISP) | 30 | RMS, PEAK, EQPEAK, EQp-p | 6 | When P–P is selected in the displacement indicated value settings on the [Display] screen, it is saved as PEAK |
| Acceleration unit | Display␣Unit␣(ACC) | 18 | m/s^2, G | 5 | |
| Velocity unit | Display␣Unit␣(VEL) | 18 | mm/s, inch/s | 6 | |
| Displacement unit | Display␣Unit␣(DISP) | 19 | mm, um, mil | 3 | |
| Acceleration high pass filter | High␣Pass␣Filter␣(ACC) | 22 | 1Hz, 3Hz, 10Hz, 1kHz | 4 | |
| Acceleration low pass filter | Low␣Pass␣Filter␣(ACC) | 21 | 1kHz, 5kHz, 20kHz | 5 | |
| Velocity high pass filter | High␣Pass␣Filter␣(VEL) | 22 | 3Hz, 10Hz, 1kHz | 4 | |
| Velocity low pass filter | Low␣Pass␣Filter␣(VEL) | 21 | 1kHz, 5kHz, 20kHz | 5 | |
| Displacement high pass filter | High␣Pass␣Filter␣(DISP) | 23 | 3Hz, 10Hz, 1kHz | 4 | |
| Displacement low pass filter | Low␣Pass␣Filter␣(DISP) | 22 | 1kHz, 5kHz, 20kHz | 5 | |
| Level range | Level␣Range | 11 | 1 to 7 | 1 | |
| Manufacturer | Manufacturer | 12 | Rion | 4 | |
| Type | Type | 4 | VA-14 | 5 | |
| Index | Index␣Number | 12 | 1 to 9999 | 4 | |
| Sensor type | Sensor␣Type | 11 | PV-57I, Other, Mic. | 6 | |
| Sensitivity | Sensitivity | 11 | XXXXX mV/m/s^2<br>5 characters including the dot “.” | 13 | |
| dB reference value | dB␣Standard | 11 | X.XXE±Y | 7 | |
| | [Store] | 7 | | | |
| Total measurement time | Measurement␣Time | 16 | User Setting | 12 | |
| Measurement time (Num) | Measurement␣Time␣(Num) | 22 | 200 | 3 | |
| Measurement time (Unit) | Measurement␣Time␣(Unit) | 23 | hour | 4 | |
| Inst store interval | Inst␣Store␣Interval | 19 | 100ms | 5 | |
| Calc store interval | Calc␣Store␣Interval | 19 | User Setting | 12 | |
| Calc store interval (Num) | Calc␣Store␣Interval␣(Num) | 25 | 10 | 2 | |
| Calc store interval (Unit) | Calc␣Store␣Interval␣(Unit) | 26 | hour | 4 | |

| Item | Field name | Bytes | Content | Maximum Bytes | Description |
|---|---|---|---|---|---|
| VX-14D | [Evaluation] | 12 | | | |
| Evaluation Criteria | Threshold Analysis | 18 | ISO 10816-1, User Setting | 11 | |
| Evaluation Target | Target Data Type | 16 | Acc, Vel, Disp | 4 | |
| ISO 10816-1 Class setting | Class ISO10816-1 | 16 | Class1, Class2, Class3, Class4 | 6 | |
| Acc.Threshold | Acc Threshold 1 | 15 | XXXXXX.X<br>Up to 7 characters including the dot "." | 7 | |
| | Acc Threshold 2 | 15 | | 7 | |
| | Acc Threshold 3 | 15 | | 7 | |
| Vel.Threshold | Vel Threshold 1 | 15 | | 7 | |
| | Vel Threshold 2 | 15 | | 7 | |
| | Vel Threshold 3 | 15 | | 7 | |
| Disp.Threshold | Disp Threshold 1 | 16 | | 7 | |
| | Disp Threshold 2 | 16 | | 7 | |
| | Disp Threshold 3 | 16 | | 7 | |
| | [Status] | 8 | | | |
| Measurement start Time | Measurement Start | 17 | yyyy/mm/dd hh:mm:ss.s | 21 | |
| Measurement stop time | Measurement Stop | 16 | yyyy/mm/dd hh:mm:ss.s | 21 | |
| Inst data count | Inst Data Number | 16 | 0 to 7200000 | 7 | |
| Calc data count | Calc Data Number | 16 | 0 to 72000 | 5 | |
| Total measurement time | Total Measurement | 17 | hhh:mm:ss | 16 | |

An example is shown below. The units are the same as those that were shown during measurement.

| | | | |
|---|---|---|---|
| | [Setting] | | |
| | [Property] | | |
| | System Version | 1.00 | Property |
| | VX-14D Version | 1.00 | |
| | VX-14S Version | 1.00 | |
| | Serial Number | 12345680 | |
| | [VX-14S] | | |
| | Store Name | 0010 | VA-14 settings |
| | Analysis Mode | VM | |
| | Display Characteristics (ACC) | RMS | |
| | [Store] | | |
| | Measurement Time | 1m | Auto Store measurement settings |
| | Measurement Time (Num) | 10 | |
| | Measurement Time (Unit) | min | |
| VX-14D | [Evaluation] | | |
| | Threshold Analysis | ISO 10816-1 | Evaluation settings |
| | Target Data Type | Vel | |
| | Class ISO10816-1 | Class1 | |
| | Acc Threshold 1 | 0.00105 | |
| | Acc Threshold 2 | 0.00210 | |
| | Acc Threshold 3 | 0.00330 | |
| | Vel Threshold 1 | 0.71000 | |
| | Vel Threshold 2 | 1.80000 | |
| | Vel Threshold 3 | 4.50000 | |
| | Disp Threshold 1 | 0.70000 | |
| | Disp Threshold 2 | 1.40000 | |
| | Disp Threshold 3 | 2.20000 | |
| | [Status] | | |
| | Measurement Start | 2025/8/26 6:20:30 | Status |
| | Measurement Stop | 2025/8/26 6:21:30 | |
| | Inst Data Number | 600 | |
| | Calc Data Number | 6 | |
| | Total Measurement | 000:01:00 | |

# 9 Command (Evaluation)

This section lists the additional commands available on the Vibration Analyzer VA-14 when the VX-14D is installed. For details on communication functions and other communication commands, refer to the “VA-14 / VX-14S Instruction Manual (Operation Guide)”.

## 9.1 Command list VX-14D

S: Setting command (used to configure the unit’s settings)
R: Request command (used to obtain information on the unit’s status and measurement results)

| | Commands | Function | See page |
|---|---|---|---|
| Evaluation/Diagnosis | Threshold Analysis | Evaluation (Evaluation Criteria)(S/R) | Page 53 |
| | Target Data Type | Evaluation Target(S/R) | Page 53 |
| | Class ISO10816-1 | ISO 10816-1 Class(S/R) | Page 53 |
| | Acc Threshold 1<br>Acc Threshold 2<br>Acc Threshold 3 | Acc.Threshold(S/R) | Page 54 |
| | Vel Threshold 1<br>Vel Threshold 2<br>Vel Threshold 3 | Vel.Threshold(S/R) | Page 54 |
| | Disp Threshold 1<br>Disp Threshold 2<br>Disp Threshold 3 | Disp.Threshold(S/R) | Page 54 |
| Data output<br>(with VX-14S installed)<br>VX-14S | DOD TH | Output displayed value (R) | Page 55 |
| | DLC TH | Final calculation result output (R) | Page 56 |
| | DRD1s TH | Continuous output (R) | Page 56 |

# 9.2 Command description VX-14D

## Evaluation/Diagnosis

| Threshold Analysis | |
|---|---|
| Function | Evaluation (Evaluation Criteria) (S/R) |
| Description | Sets or gets the Evaluation Criteria state to “Off”, “ISO 10816-1”, or “User Setting”. |
| Setting command | Threshold␣Analysis,p1 |
| Parameter | p1=“Off”, “ISO 10816-1”, “User Setting” |
| Request command | Threshold␣Analysis? |
| Response data | d1 |
| Returned value | Same as setting parameter |

| Target Data Type | |
|---|---|
| Function | Evaluation Target(S/R) |
| Description | Sets or gets the vibration quantity used as the Evaluation Target.<br>The setting values referenced when the Evaluation Criteria is set to “User Setting”. |
| Setting command | Target␣Data␣Type,p1 |
| Parameter | p1=“Acc”, “Vel”, “Disp” |
| Request command | Target␣Data␣Type? |
| Response data | d1 |
| Returned value | Same as setting parameter |

| Class ISO10816-1 | |
|---|---|
| Function | ISO 10816-1Class(S/R) |
| Description | Sets or gets the Class when “ISO 10816-1” is selected as the Evaluation Criteria. |
| Setting command | Class␣ISO10816-1,p1 |
| Parameter | p1=“Class1”, “Class2”, “Class3”, “Class4” |
| Request command | Class␣ISO10816-1? |
| Response data | d1 |
| Returned value | Same as setting parameter |

| **Acc Threshold 1<br>Acc Threshold 2<br>Acc Threshold 3** | |
|---|---|
| Function | Acc.Threshold(S/R) |
| Description | Sets or gets Acc. Threshold 1. |
| Setting command | Acc␣Threshold␣1,p1 |
| Parameter | p1=0 to 999999 |
| Request command | Acc␣Threshold␣1? |
| Response data | d1 |
| Returned value | Same as setting parameter |

* Acc. Threshold 1 is used as an example.

| **Vel Threshold 1<br>Vel Threshold 2<br>Vel Threshold 3** | |
|---|---|
| Function | Vel.Threshold(S/R) |
| Description | Sets or gets Vel. Threshold 1.<br>When the Evaluation Criteria is set to “ISO 10816-1”, the threshold cannot be set, and the Vel. Threshold corresponding to the selected Class is obtained. |
| Setting command | Vel␣Threshold␣1,p1 |
| Parameter | p1=0 to 999999 |
| Request command | Vel␣Threshold␣1? |
| Response data | d1 |
| Returned value | Same as setting parameter |

* Vel Threshold 1 is used as an example.

| **Disp Threshold 1<br>Disp Threshold 2<br>Disp Threshold 3** | |
|---|---|
| Function | Disp.Threshold(S/R) |
| Description | Sets or gets Disp. Threshold 1. |
| Setting command | Disp␣Threshold␣1,p1 |
| Parameter | p1=0 to 999999 |
| Request command | Disp␣Threshold␣1? |
| Response data | d1 |
| Returned value | Same as setting parameter |

* Disp Threshold 1 is used as an example.

**Note**

- The unit of each threshold is based on the unit set for the corresponding vibration quantity.

## Data output VX-14S VX-14D

- The data output commands (DOD TH, DLC TH, and DRD1s TH) that output the Evaluation result can be used only in Vibration meter (VM) mode.
- The return value formats of the data output commands are of fixed length.
- If no calculation result exists, invalid values are output.
- The Evaluation result is appended to the end of the response string of the data output command.
- If the Evaluation function is set to Off, or if the Evaluation Target value is invalid, invalid values are output.

Example of invalid values
Value: ␣␣␣␣-.-
OV: -
Evaluation result: -

* The symbol "␣" indicates a space.

| DOD TH (with VX-14S installed) VX-14S | | | |
|---|---|---|---|
| Function | Output displayed value (R) | | |
| Description | Outputs the displayed data and the Evaluation result in Vibration meter (VM) mode. | | |
| Request command | DOD,TH? | | |
| Response data | d0,d1,d2,…d8 | | |
| Returned value | VM | d0 | "xxxxxxxx" Acceleration RMS_Instantaneous value / calculated value |
| | | d1 | "xxxxxxxx" Acceleration PEAK_Instantaneous value / calculated value |
| | | d2 | "xxxxxxxx" Acceleration crest factor_Instantaneous value / calculated value |
| | | d3 | "xxxxxxxx" Velocity_Instantaneous value / calculated value |
| | | d4 | "xxxxxxxx" Displacement_Instantaneous value / calculated value |
| | | d5 | "0"/"1" Acceleration overload information (logical sum of instantaneous OV and calculated OV) |
| | | d6 | "0"/"1" Velocity overload information (logical sum of instantaneous OV and calculated OV) |
| | | d7 | "0"/"1" Displacement overload information (logical sum of instantaneous OV and calculated OV) |
| | | d8 | "-"/"A"/"B"/"C"/"D" Evaluation result |
| Note | • The numeric value (8 bytes) is output right-aligned, with any missing digits filled with spaces.<br>Example: ␣␣␣0.006,␣␣␣0.097,␣␣␣17.21,␣␣␣0.023,␣␣0.0037,0,0,0,D<br>• When the Evaluation result is invalid.<br>Example: ␣␣␣0.006,␣␣␣0.097,␣␣␣17.21,␣␣␣0.023,␣␣0.0037,0,0,0,- | | |

## DLC TH (with VX-14S installed) VX-14S

| | |
|---|---|
| Function | Final calculation result output (R) |
| Description | In Vibration Meter (VM) mode, outputs the latest Auto Store calculated values and Evaluation result. |
| Request command | DLC,TH? |
| Response data | d0,d1,d2,…d8 |
| Returned value | Data format: Auto store<br>VM d0 "xxxxxxxx" Acceleration RMS_Calculated value<br>d1 "xxxxxxxx" Acceleration PEAK_Calculated value<br>d2 "xxxxxxxx" Acceleration crest factor_Calculated value<br>d3 "xxxxxxxx" Velocity_Calculated value<br>d4 "xxxxxxxx" Displacement_Calculated value<br>d5 "0"/"1" Acceleration overload information (calculated OV)<br>d6 "0"/"1" Velocity overload information (calculated OV)<br>d7 "0"/"1" Displacement overload information (calculated OV)<br>d8 "–"/"A"/"B"/"C"/"D" Evaluation result |
| Note | • The numeric value (8 bytes) is output right-aligned, with any missing digits filled with spaces.<br>Example: ␣␣␣0.471,␣␣␣1.038,␣␣␣␣2.35,␣␣␣2.266,␣␣1.8059,0,0,0,C<br>• When the Evaluation result is invalid.<br>Example: ␣␣␣␣␣-.-,␣␣␣␣␣-.-,␣␣␣␣␣-.-,␣␣␣␣␣-.-,␣␣␣␣␣-.-,-,-,-,- |

## DRD1s TH (with VX-14S installed) VX-14S

| | |
|---|---|
| Function | Continuously outputs data at 1-second intervals (R) |
| Description | In Vibration Meter (VM) mode, continuously outputs data and Evaluation results at 1-second intervals. |
| Request command | DRD1s,TH? |
| Response data | d0,d1,d2,…d9 |
| Returned value | d0 "xxx" Counter (1–600)<br>VM d1 "xxxxxxxx" Acceleration RMS_Instantaneous value<br>d2 "xxxxxxxx" Acceleration PEAK_Instantaneous value<br>d3 "xxxxxxxx" Acceleration crest factor_Instantaneous value<br>d4 "xxxxxxxx" Velocity_Instantaneous value<br>d5 "xxxxxxxx" Displacement_Instantaneous value<br>d6 "0"/"1" Acceleration overload information<br>d7 "0"/"1" Velocity overload information<br>d8 "0"/"1" Displacement overload information<br>d9 "A"/"B"/"C"/"D" Evaluation result |
| Note | • The counter (3 bytes) and numeric values (8 bytes) are output right-justified, and any unused digits are padded with spaces.<br>Example: ␣␣1,␣␣␣0.043,␣␣␣0.187,␣␣␣␣4.35,␣␣␣0.353,␣␣0.1083,0,0,0,A<br>␣␣2,␣␣␣0.037,␣␣␣0.187,␣␣␣␣5.33,␣␣␣0.275,␣␣0.0807,0,0,0,A<br>␣␣3,␣␣␣0.090,␣␣␣0.395,␣␣␣␣4.50,␣␣␣0.750,␣␣0.1637,0,0,0,B<br>⋮<br>600,␣␣␣0.084,␣␣␣0.761,␣␣␣␣9.01,␣␣␣0.603,␣␣0.3711,0,0,0,A<br>• To stop the output, send the transmission code [SUB]. |

# Fault-Diagnosis Function

# 10

# Reading the Screen (Fault-Diagnosis)

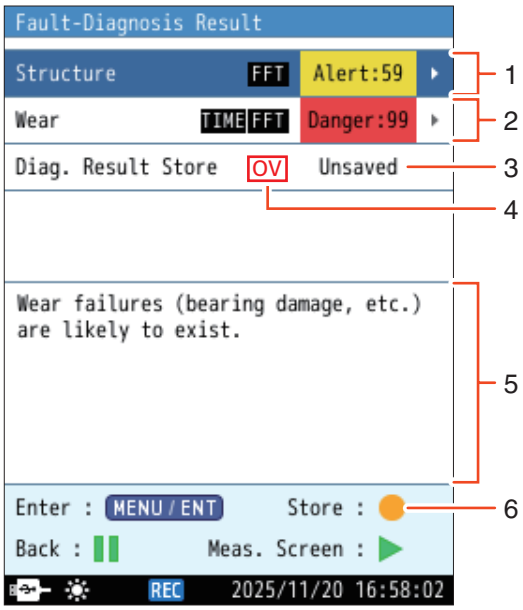
**Note**

- Please refer to the “Vibration Analyzer VA-14 / Function Extension Program VX-14S Instruction Manual (Operation Guide)” for detailed information on the operation procedures and precautions for using the VA-14.

## 10.1 Reading the screen

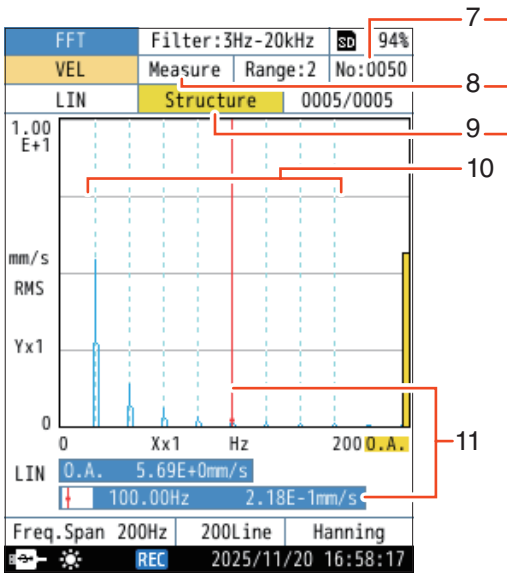
### Fault-Diagnosis Result screen

The Fault Diagnosis Result screen displays the Structure diagnosis result, the Wear diagnosis result, and diagnostic comments, and also allows the results to be saved.

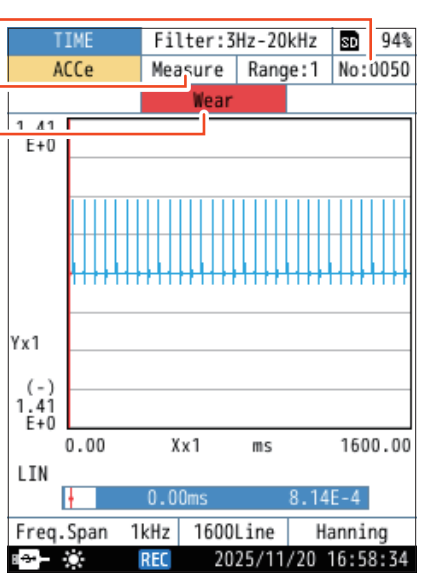



Fault-Diagnosis Result screen (Measure)

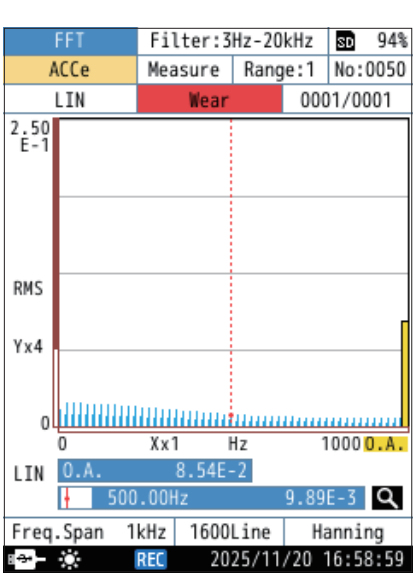
**Structure measurement data**




FFT analysis mode screen




TIME mode screen




FFT analysis mode screen

**Wear measurement data**

VM TIME FFT

Switch with [VM/TIME/FFT] key

<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>1</td><td>Structure diagnosis result</td><td>The diagnosis result of the Structure diagnosis is displayed. The FFT mode FFT is shown as the measurement mode. The diagnosis result (failure stage: failure level) is displayed, and the background color changes according to the failure stage.<br><table><tr><td>Good:26</td><td>Good: Failure levels from 1 to 29. The background turns green.</td></tr><tr><td>Alert:36</td><td>Alert: Failure levels from 30 to 59. The background turns yellow.</td></tr><tr><td>Danger:99</td><td>Danger: Failure levels from 60 to 99. The background turns red.</td></tr></table>When “Structure” is selected, press the MENU/ENT key to display the FFT mode screen for the Structure measurement data.</td></tr>
<tr><td>2</td><td>Wear diagnosis result</td><td>The diagnosis result of the Wear diagnosis is displayed. The TIME mode TIME and the FFT mode FFT are shown as the measurement mode. The diagnosis result (failure stage: failure level) is displayed, and the background color changes according to the failure stage.<br><table><tr><td>Good:26</td><td>Good: Failure levels from 1 to 29. The background turns green.</td></tr><tr><td>Alert:36</td><td>Alert: Failure levels from 30 to 59. The background turns yellow.</td></tr><tr><td>Danger:99</td><td>Danger: Failure levels from 60 to 99. The background turns red.</td></tr></table>When “Wear” is selected, press the MENU/ENT key to display the TIME mode screen for the Wear measurement data. Press the VM/TIME/FFT key to display the FFT mode screen for the Wear measurement data.<br>During recall, the TIME mode screen can be displayed only when waveform data has been saved.</td></tr>
<tr><td>3</td><td>Diagnosis result store status</td><td>Indicates the data store status (Unsaved / Saved) of the currently displayed diagnosis result. To save the data, press the STORE key.</td></tr>
<tr><td>4</td><td>Calc. OV</td><td>Displayed when an overload occurs in the measurement data used for either the Structure or Wear diagnosis.</td></tr>
<tr><td>5</td><td>Diagnostic comment</td><td>Displays diagnostic comments on the diagnosis results and the data used for the diagnosis.</td></tr>
<tr><td>6</td><td>Store icon</td><td>On the measurement screen, “Save: ●” is displayed (data can be saved using the STORE key). This icon is not displayed on the recall screen (page 66).</td></tr>
<tr><td>7</td><td>Diagnosis store name</td><td>Displays the diagnosis store name.</td></tr>
<tr><td>8</td><td>Display status</td><td>Indicates the data display status.<br>Measure: After diagnosis is completed<br>Recall: During recall</td></tr>
<tr><td>9</td><td>Failure stage</td><td>Displays the failure factor based on the measurement data.<br>The background color changes according to the failure stage.<br>Failure factor for the Structure diagnosis result: Structure (page 64)<br>Failure factor for the Wear diagnosis result: Wear (page 64)</td></tr>
<tr><td>10</td><td>Dominant frequency</td><td>Displays the most dominant frequency and its harmonics (up to the 8th order) as dashed lines.<br>• This is displayed only on the FFT mode screen of the Structure diagnosis.</td></tr>
<tr><td>11</td><td>Cursor / Cursor value</td><td>Displays the cursor position and the marker position on the cursor as numerical values. The X-axis value is shown on the left, and the Y-axis value on the right.<br>• On the recall screen, cursor values are not displayed on the TIME mode screen of the Wear diagnosis result. In addition, the Y-axis display cannot be zoomed in or out.</td></tr>
</table>

# 11

# Settings and Measurement (Fault-Diagnosis)

**Note**

- Please refer to the “Vibration Analyzer VA-14 / Function Extension Program VX-14S Instruction Manual (Operation Guide)” for detailed information on the operation procedures and precautions for using the VA-14.

## 11.1 Settings

The measurement and display parameters for the Fault Diagnosis function are as follows.

| | | Menu | See page |
|---|---|---|---|
| Measurement parameters | Sensor information | Sensor | Page 25 |
| | Waveform recording | Measure/Trigger | Page 61 |
| | Fault-Diagnosis (store name) | Evaluation/Diagnosis » Fault-Diagnosis | Page 62 |
| Display parameter | FFT analysis mode Y axis scale | Display | Page 61 |

For information on menu structure and menu operation, see the “Setting Menu” (page 16).

### Measurement settings at the time of diagnosis

Based on the measurement data at the time of diagnosis, the level range is switched automatically. Diagnosis is performed using the measurement results obtained with the following settings.

| | Structure diagnosis | Wear diagnosis |
|---|---|---|
| Operation mode | FFT | |
| Measurement data | Velocity | Acceleration envelope |
| High pass filter | 3 Hz | |
| Low pass filter | 20 kHz | |
| Window function | Hanning | |
| Operation type | LIN | |
| Average number | 5 | 1 |
| Frequency span | 200 Hz | 1 kHz |
| Number of lines | 200 | 1600 |
| Total Harmonic Distortion | Off | |

## 11.1.1 Configuring sensor settings

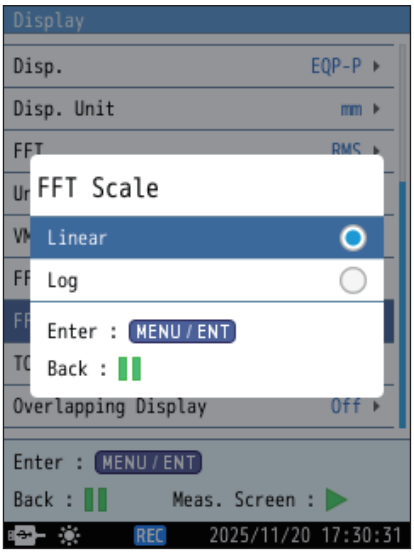
For Fault-Diagnosis measurements, always use the piezoelectric accelerometer PV-57I and the magnet attachment VP-53S. Refer to “5.1.1 Configuring Sensor Settings” (page 25) and set the Sensor Type to “PV-57I”.

**Note**

- Because the Evaluation function and the Fault Diagnosis function perform analysis based on vibration data, do not set the Sensor Type to “Microphone” when using these functions.

## 11.1.2 Setting the FFT mode Y-axis scale

**1** **On the [Menu] screen » [Display] » [FFT Scale], press the MENU/ENT key.**




**2** **Select one of the following and press the MENU/ENT key.**

| | |
|---|---|
| Linear | Linear scale |
| Log | Logarithmic scale |

The scale on the FFT analysis mode screen is changed. Additionally, the measurement data is stored using the set scale.

## 11.1.3 Waveform recording function setting

To use the waveform recording, the function must be enabled beforehand in the [Measure/Trigger] screen.

**1** **On the [Menu] screen » [Measure/Trigger] » [Wave Rec], press the MENU/ENT key.**

**2** **Select [On] and press the MENU/ENT key.**

The waveform recording icon is shown on the status bar. (Waveform recording is valid only during calculation.)



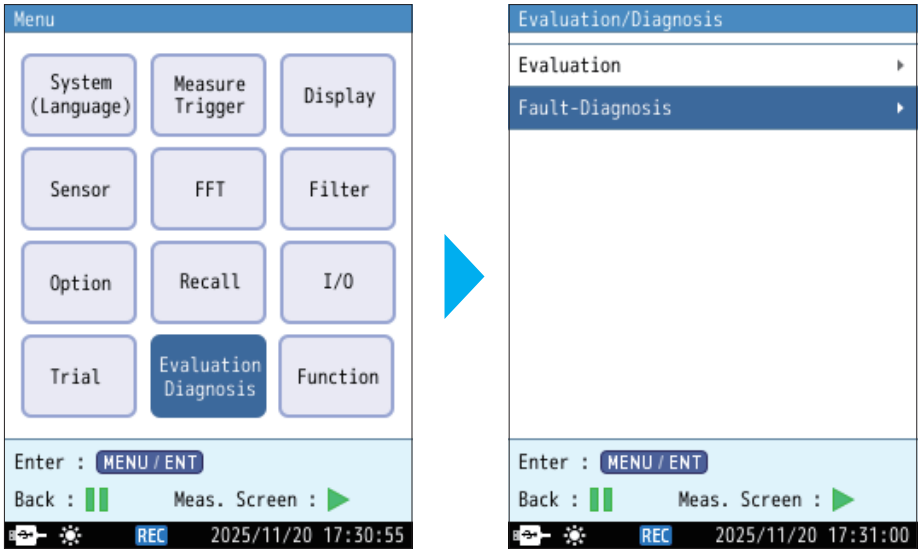

Waveform recording icon

**Note**

- To save waveform data used in Fault Diagnosis, set the waveform recording function to “On”.

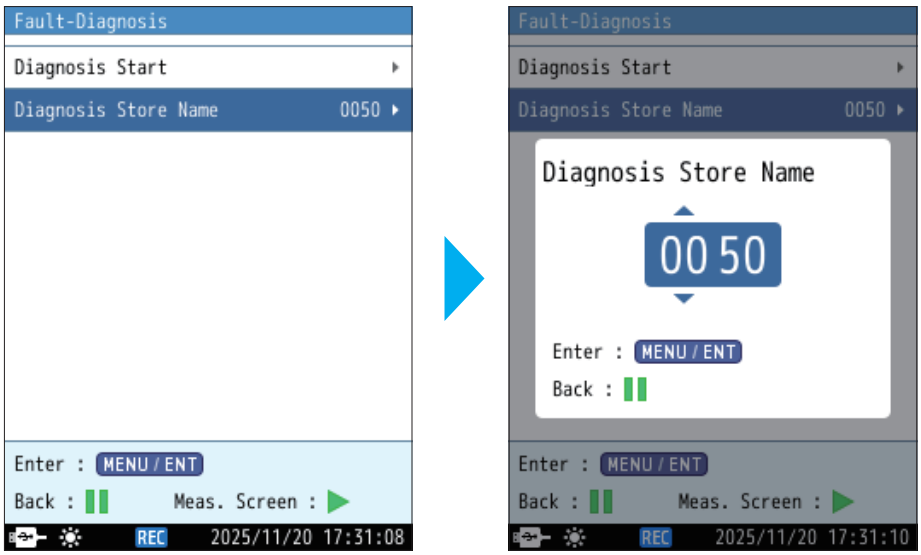
## 11.1.4 Set the store name

**1** **On the [Menu] screen » [Evaluation/Diagnosis] » [Fault Diagnosis], press the MENU/ENT key.**




**2** **Set the [Diagnosis Store Name], and press the MENU/ENT key.**

To save measurement data, set a store name.
The Diagnosis Store Name can be entered as a four-digit number (0000 to 9999).
Measurement data is stored in the folder indicated by the store name (page 70).




The approximate number of diagnosis stores on the SD card is as follows.

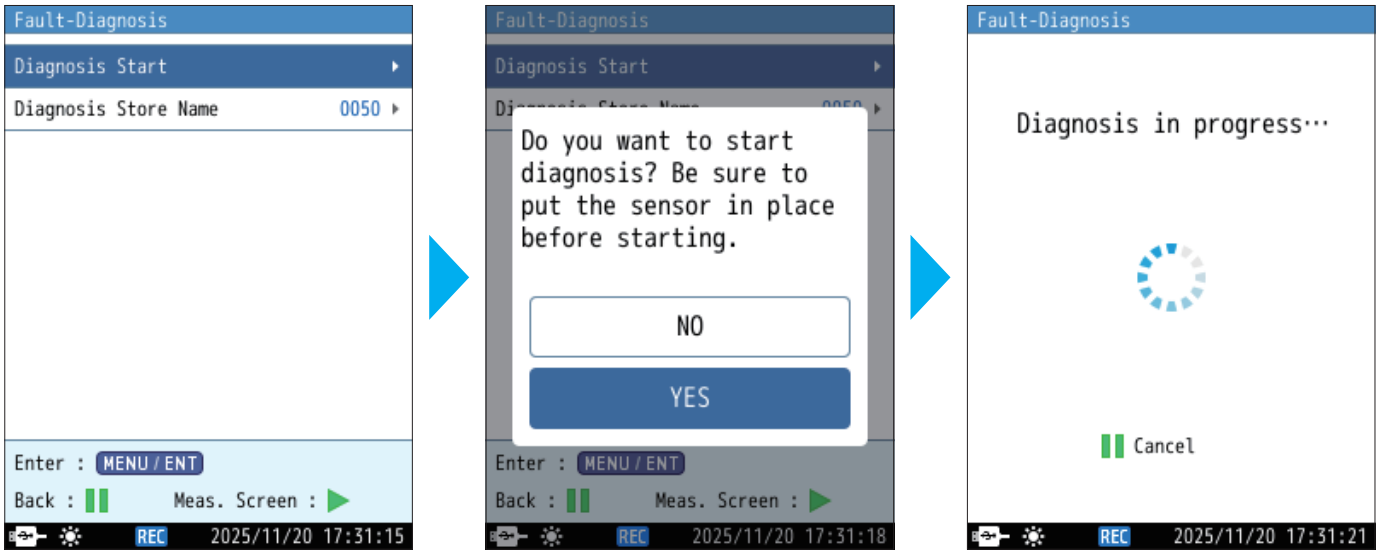
| Waveform recording function | SD card capacity | | |
|---|---|---|---|
| | 512 MB | 2 GB | 32 GB |
| Off | 2400 | 9000 | 9999 |
| On | 1600 | 6000 | 9999 |

# 11.2 Measurement

## 1 On the [Menu] screen » [Evaluation/Diagnosis] » [Fault-Diagnosis], press the MENU/ENT key.

## 2 Execute [Diagnosis Start] on the [Fault-Diagnosis] screen.

1) On the [Fault-Diagnosis] screen » [Diagnosis Start], press the MENU/ENT key. A confirmation message is displayed.
2) After attaching the piezoelectric accelerometer PV-57I (sensor) to the measurement target, select “Yes” and press the MENU/ENT key. “Diagnosis in progress…” is displayed, and measurement and diagnosis start.
3) To interrupt the diagnosis, press the PAUSE/CONT key.




[Fault-Diagnosis] screen　　Confirmation message　　Diagnosis in progress

**Note**

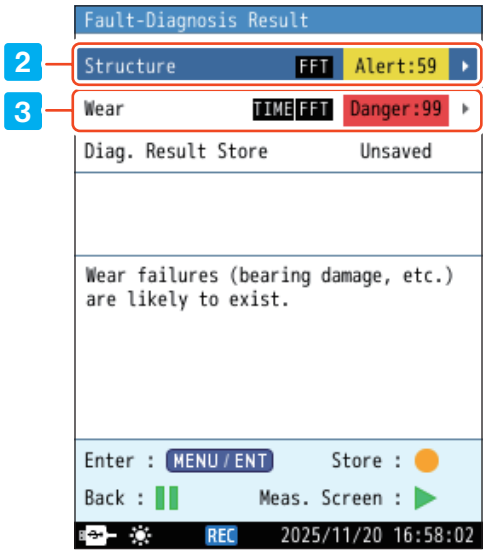
- If “Microphone” is selected for the Sensor Type, an error message is displayed and diagnosis cannot be started.
- If the battery level icon is flashing red, an error message is displayed and diagnosis cannot be started.

# 11.3 Viewing Fault-Diagnosis Result

## 1 When diagnosis is completed, the Fault-Diagnosis Result screen is displayed.

The relationship between the failure stage and level is as follows.

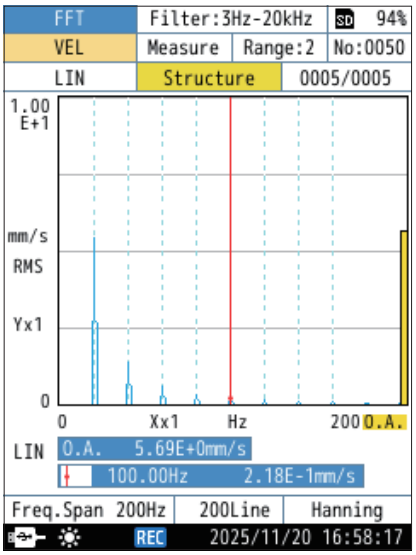
| | |
|---|---|
| Good:26 | Good: Failure levels from 1 to 29. The background turns green. |
| Alert:36 | Alert: Failure levels from 30 to 59. The background turns yellow. |
| Danger:99 | Danger: Failure levels from 60 to 99. The background turns red. |




[Fault-Diagnosis Result] screen (Measure)

## 2 Select [Structure] and press the MENU/ENT key.

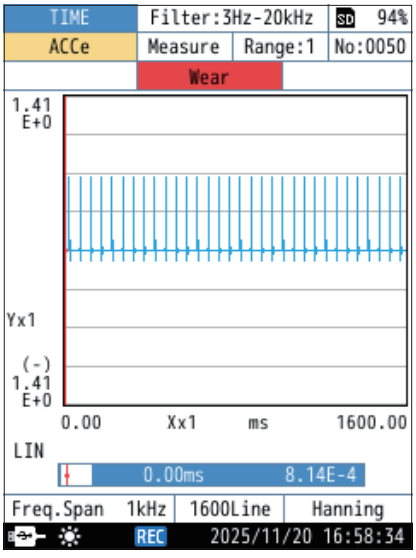
- The data measured by the Structure diagnosis is displayed on the FFT mode screen.
- To return to the [Fault-Diagnosis Result] screen, press the PAUSE/CONT key.



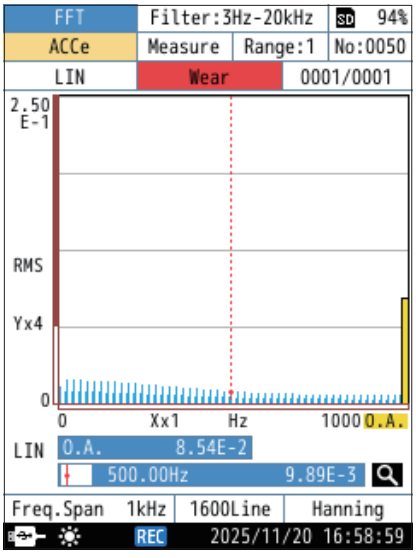

Structure, FFT Mode Screen

## 3 Select [Wear] and press the MENU/ENT key.

- The data measured by the Wear diagnosis is displayed on the TIME mode and FFT mode screens.
- Press the VM/TIME/FFT key to switch between the TIME mode and FFT mode displays.
- To return to the [Fault-Diagnosis Result] screen, press the PAUSE/CONT key.

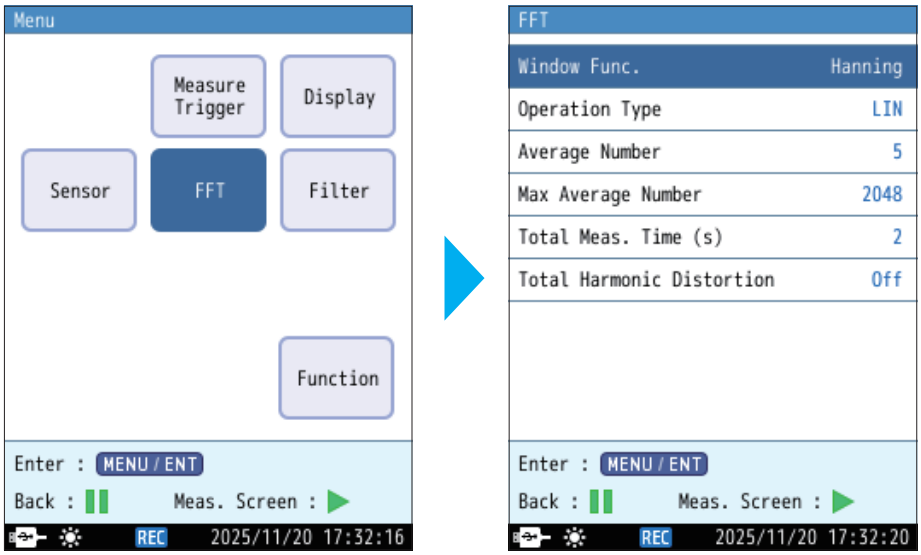



Wear, TIME Mode Screen




Wear, FFT Mode Screen

**4** **On the [TIME] or [FFT] screen, press the MENU/ENT key to view the settings used for Fault-Diagnosis.**




Settings view screen

## 11.4 Data store

**1** **After measurement, press the STORE key on the Fault-Diagnosis Result screen to store data.**

The Fault-Diagnosis Result and the measurement data used for diagnosis can be stored.




[Fault-Diagnosis Result] screen

Saved

**Note**

- If data is stored using a Diagnosis Store Name that already exists, a message appears. Select one of the following options: [NO], [Raise one store name], or [Overwrite].
- After storing the diagnosis results, the Diagnosis Store Name is automatically incremented by one.
- If there is insufficient free space on the SD card, data cannot be stored. The following free space is required:
  – When the waveform recording function is set to “Off”: 1 MB or more
  – When the waveform recording function is set to “On”: 10 MB or more

# 12

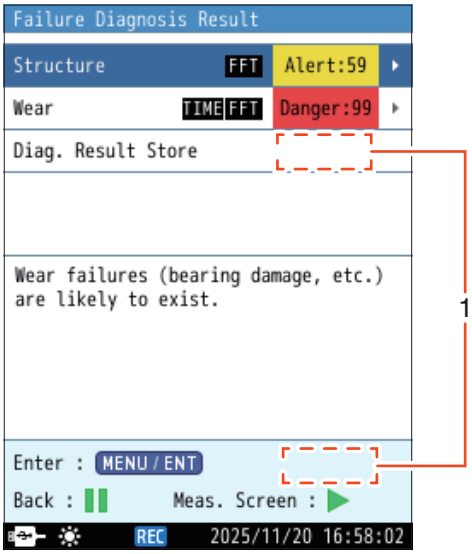
# Recalling Stored Data (Fault-Diagnosis)

**Note**

- Please refer to the “Vibration Analyzer VA-14 / Function Extension Program VX-14S Instruction Manual (Operation Guide)” for detailed information on the operation procedures and precautions for using the VA-14.

## 12.1 Reading the recall screen

The display is essentially the same as that on the measurement screen, although some display-related settings are restricted.




[Fault-Diagnosis Result] screen
(Recall)

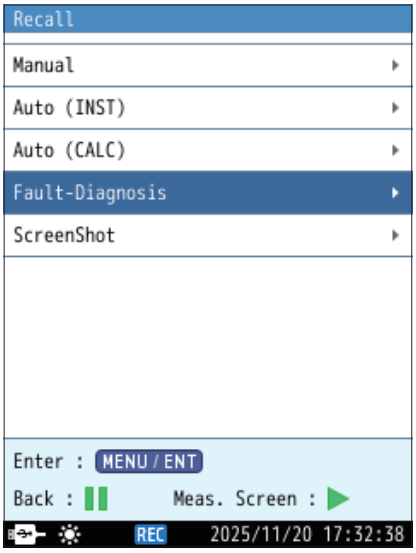
| No. | Description |
|---|---|
| 1 | On the recall screen, the diagnosis result store status (Unsaved/Saved) and the save icon (Save: ● ) are not displayed (page 59). |

# 12.2 Recalling stored data

## 1 Select [Recall] on the [Menu] screen and press the MENU/ENT key.

Select [Fault-Diagnosis] and press the MENU/ENT key. The store data folder list for Fault-Diagnosis is displayed.

For information on the folder structure, refer to “Structure of Stored Data (Fault-Diagnosis)” (page 70).




## 2 Select the store data folder (Diagnosis Store Name) you want to display and press the MENU/ENT key.

Use the △/▽ keys to make a selection.

**Note**

- Insert the SD card, and the diagnosis store names will be displayed. If no diagnosis store names are shown, make sure that the SD card is properly inserted.

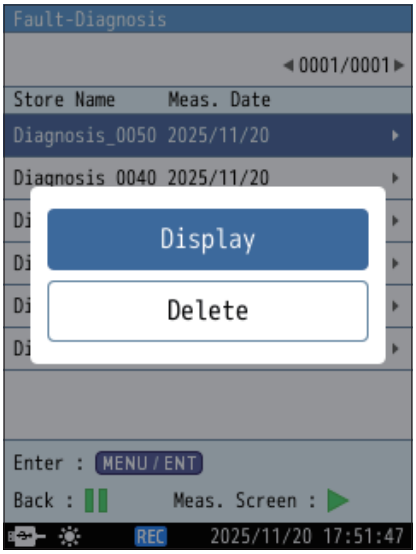



## 3 On the [Display/Delete] selection screen, select [Display] and press the MENU/ENT key.

The selected data appears.

**Important**

- It may take several seconds for the data to appear. While the indicator lamp is blinking rapidly, data is being saved or loaded. Do not turn off the power to the unit or remove the SD card. This may damage the SD card.

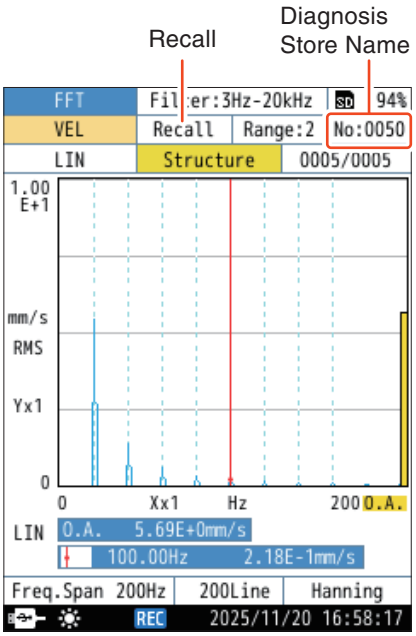


## 4 The recall screen is displayed.




## 5 Select [Structure] and press the MENU/ENT key.

- The data saved by the Structure diagnosis is displayed on the FFT mode screen.
- To return to the [Fault-Diagnosis Result] recall screen, press the PAUSE/CONT key.



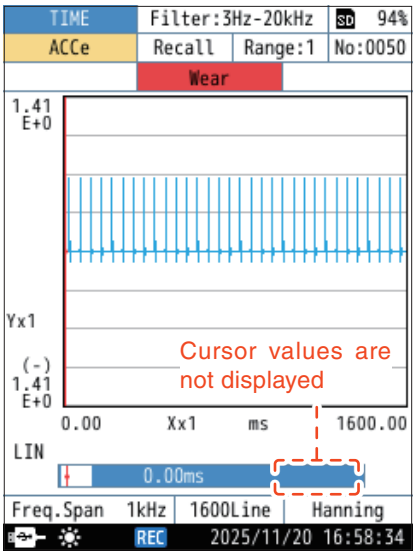

Structure, FFT Mode Screen

## 6 Select [Wear] and press the MENU/ENT key.

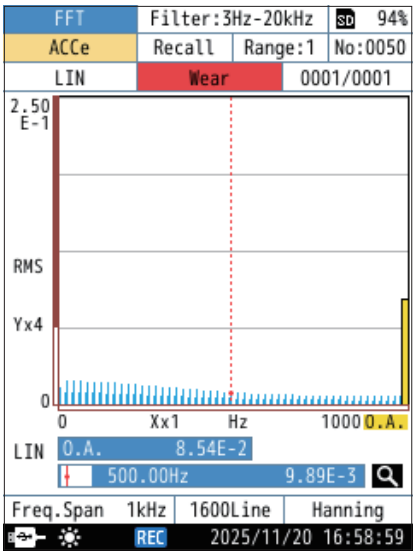
- The data saved by the Wear diagnosis is displayed on the TIME mode and FFT mode screens.
- Press the VM/TIME/FFT key to switch between the TIME mode and FFT mode displays.
- To return to the [Fault-Diagnosis Result] recall screen, press the PAUSE/CONT key.

**Note**

- The TIME mode screen is displayed only when recalling data stored with the waveform recording function set to "On".
- In addition, cursor values for the envelope waveform are not displayed in TIME mode.




Wear, TIME Mode Screen

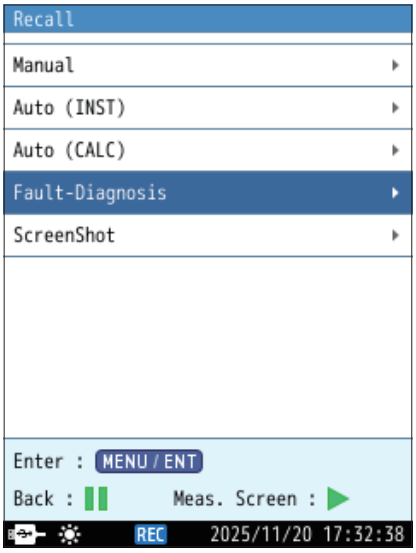



Wear, FFT Mode Screen

# 12.3 Deleting stored data

## 1 Select [Recall] on the [Menu] screen and press the MENU/ENT key.

Select [Fault-Diagnosis] and press the MENU/ENT key. The store data folder list for Fault-Diagnosis is displayed.




## 2 Select the store data folder (Store Name) you want to delete and press the MENU/ENT key.

Use the △/▽ keys to make a selection.




## 3 On the [Display/Delete] selection screen, select [Delete]. On the confirmation screen, select [Yes] and press the MENU/ENT key.

The selected store data folder is deleted.

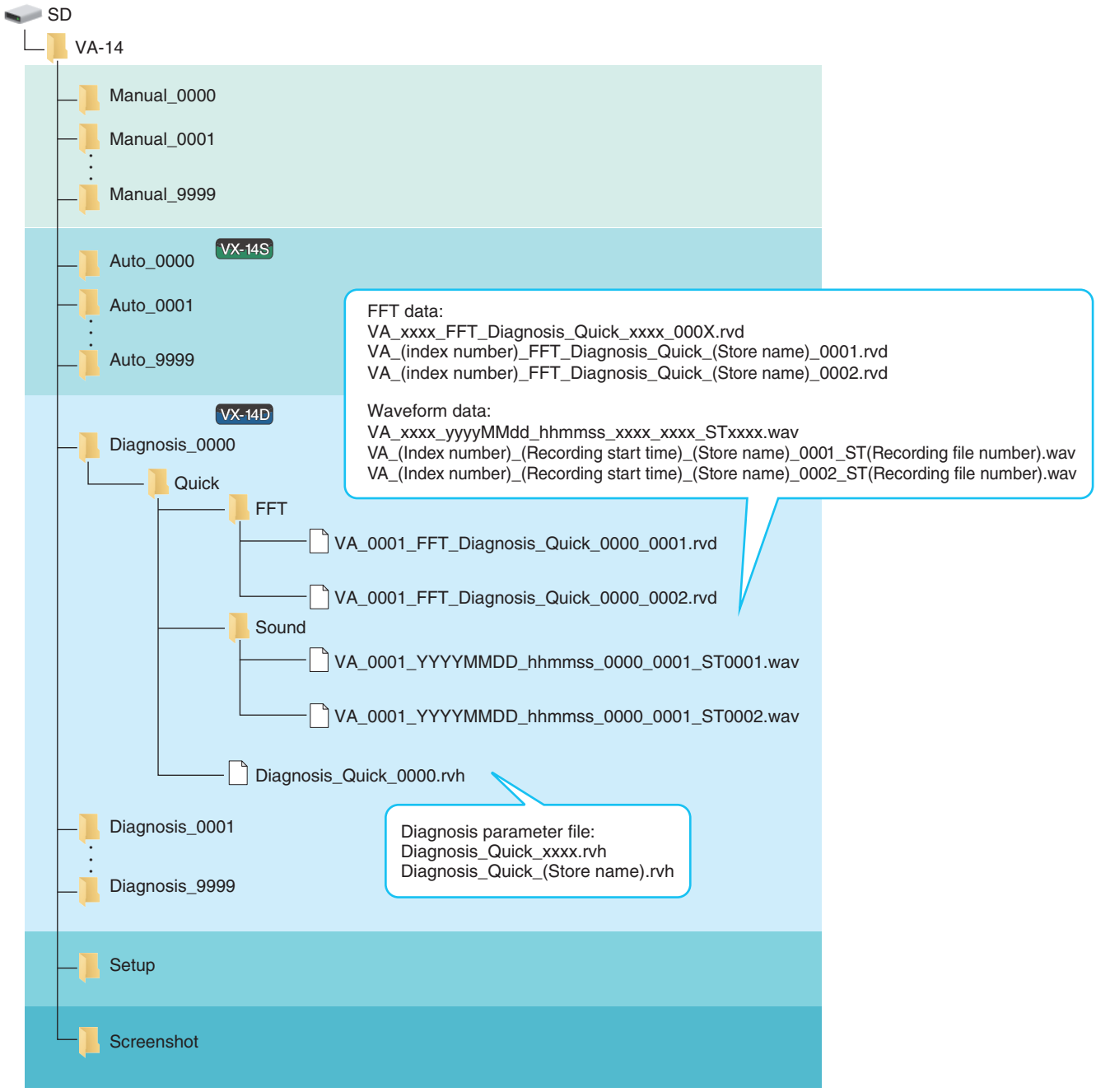


# 13

# Structure of Stored Data (Fault-Diagnosis)

## 13.1 Folder structure

The folder structure of the data stored on the SD card is shown below.



The file types and their descriptions saved by the Fault Diagnosis function are as follows.

| Item | Extension | Description |
|---|---|---|
| Data file | .rvd | Created when Fault Diagnosis results are stored.<br>Records the FFT measurement data used for each diagnosis.<br>The recorded content and file structure conform to the VA-14FFT mode Manual store data file. |
| Diagnosis parameter file | .rvh | Created when Fault Diagnosis results are stored.<br>Records the setting information related to the corresponding Diagnosis Store Name and the diagnosis results. |
| Wave file | .wav | When the waveform recording function is enabled, created when Fault Diagnosis results are stored. Records the waveform data used for each diagnosis. |

Among the data stored on the SD card, the following four types of files are used to store measurement data.

| Item | | Description |
|---|---|---|
| FFT | VA_0001_FFT_Diagnosis_Quick_0050_0001.rvd | The Structure diagnosis FFT store data file is saved (Manual store). |
| | VA_0001_FFT_Diagnosis_Quick_0050_0002.rvd | The Wear diagnosis FFT store data file is saved (Manual store). |
| Sound | VA_0001_20250929_172457_0050_0001_ST0001.wav | When the waveform recording function is set to “On”, a Wave file is saved together with the Structure diagnosis FFT store data file (page 61) |
| | VA_0001_20250929_172457_0050_0002_ST0001.wav | When the waveform recording function is set to “On”, a Wave file is saved together with the Wear diagnosis FFT store data file (page 61) |

Stored data files (RVD files) can be opened in Microsoft Excel by changing the file extension to “CSV”.

# 13.2 Parameter file structure

The data content is as follows.

- Each item is arranged in the order shown in the table and written in the format: “(field name),␣(content)(CR+LF)” (“␣” indicates a space.)

| Item | Field name | Bytes | Content | Maximum Bytes | Description |
|---|---|---|---|---|---|
| | [Setting] | 9 | | | |
| | [VA-14D] | 8 | | | |
| Diagnosis Store Name | Diagnosis Store Name | 20 | 0000 to 9999 | 4 | |
| Diagnosis type | Diagnosis Type | 14 | Quick | 5 | |
| | [Diagnosis] | 11 | | | |
| Failure Stage (Structure) | Quick Step(Structure) | 21 | Good, Alert, Danger | 6 | |
| Failure Level (Structure) | Quick Result(Structure) | 23 | 1 to 99 | 2 | 1 to 29, 30 to 59, 60 to 99 |
| Failure Stage (Wear) | Quick Step(Wear) | 16 | Good, Alert, Danger | 6 | |
| Failure Level (Wear) | Quick Result(Wear) | 18 | 1 to 99 | 2 | 1 to 29, 30 to 59, 60 to 99 |

An example is shown below.

VX-14D

| | |
|---|---|
| [Setting] | |
| [VX-14D] | |
| Diagnosis Store Name | 50 |
| Diagnosis Type | Quick |
| [Diagnosis] | |
| Quick Step(Structure) | Alert |
| Quick Result(Structure) | 55 |
| Quick Step(Wear) | Danger |
| Quick Result(Wear) | 99 |

Fault-Diagnosis settings and results

Good: Levels 1–29
Alert: Levels 30–59
Danger: Levels 60–99

# 13.3 FFT file structure

The data content is the same as that described in “11.2.3 FFT Store Data File (Manual)” of the Vibration Analyzer VA-14 / Function Extension Program VX-14S Instruction Manual (Operation Guide).

# Specifications and Technical Data

# 14

# Specifications

- Compatible model
  Vibration Analyzer VA-14

- Media
  2 GB SD Card

- Evaluation function
  Outputs four-level evaluation result for the vibration level of the selected evaluation target.

| | |
|---|---|
| Operating mode | Vibration Meter (VM) mode |
| Evaluation criteria | ISO 10816-1: Thresholds are set in accordance with ISO 10816-1:1995 (JIS B 0906:1998), and excess of the vibration velocity RMS threshold is evaluated.<br>User Setting: User-defined thresholds are set, and excess of the RMS value of acceleration, velocity, or displacement is evaluated. |
| Output of evaluation results | Measurement screen, Manual store, Auto store*, and data obtained via communication commands*<br>* Available when the VX-14S is installed |

- Fault-Diagnosis function
  Outputs diagnostic results for both structural failures and wear failures.

| | |
|---|---|
| Diagnosis | Structure failure diagnosis, Wear failure diagnosis |
| Diagnosis results | RMS |
| Diagnosis type | Failure stage: Good, Alert, Danger<br>Failure level: 1 to 99 |
| Output of diagnostic results | Diagnostic measurement result screen and stored diagnostic results (saved data).<br>FFT analysis data at the time of diagnosis are also saved.<br>(For wear failure diagnosis, waveform recording data are additionally saved when waveform recording is set to On.) |

- Dimensions
  32 mm (H) × 24 mm (W) × 2.1 mm (D)

- Weight
  Approx. 5 g

- Accessories
  Supplied Accessories and Inspection Certificate ×1

# 15 Technical Data

## 15.1 Evaluation function

- Definition of Vibration Severity

  Vibration severity is a quantity that comprehensively indicates the intensity of machine vibration. It is expressed by quantities such as the maximum value, average value, or root mean square (RMS) value of vibration, and is used to quantitatively assess the condition of a machine. Methods for the measurement and evaluation of machine vibration are specified in the international standard ISO 20816 (Mechanical vibration — Measurement and evaluation of machine vibration). For details, refer to our technical document “Measurement of Machine Vibration (5. Evaluation of Machine Vibration)”(https://svmeas.rion.co.jp/support/technical.html).

- Relationship between ISO 10816, ISO 7919, and ISO 20816

  ISO 10816-1 is a fundamental standard that provides general guidelines for the measurement and evaluation of machine vibration measured on non-rotating parts, such as bearing housings. The general evaluation criteria are expressed as vibration magnitudes related to condition monitoring and acceptance testing, taking into account machine integrity, operational safety, and long-term operation. Operating limits are also defined.

  The ISO 7919 series, on the other hand, specifies standards for the measurement and evaluation of shaft vibration in non-reciprocating rotating machinery. It covers both relative shaft vibration and absolute shaft vibration. When non-contact vibration pickup methods are required, the ISO 7919 series may be applied in conjunction with ISO 10816-1.

  The ISO 20816 series reorganizes and integrates the content of the ISO 10816 and ISO 7919 series and provides standards for the evaluation of machine vibration measured on non-rotating parts.

- Evaluation in VX-14D

  The VX-14D supports Evaluation based on both ISO 10816-1:1995 and ISO 20816-1:2016. This allows evaluation to be performed using either the former standard or the current standard.

  - Evaluation Based on ISO 10816-1:1995
    By setting [Evaluation/Diagnosis] » [Evaluation] » [Evaluation Criteria] » [ISO 10816-1] and specifying the Class, evaluation can be performed based on the Zone boundary values defined in ISO 10816-1:1995.
    The Zone boundary values for each class can be checked on the ISO 10816-1 Overview screen.

  - Evaluation Based on ISO 20816
    By setting [Evaluation/Diagnosis] » [Evaluation] » [Evaluation Criteria] » [User Setting] and specifying the Evaluation Target and Evaluation Threshold, evaluation can be performed according to the type of machine, installation conditions, and operating conditions.
    Therefore, the Evaluation Criteria values specified for particular machine types defined in ISO 20816-2 and later parts can also be applied. The range of Evaluation Criteria values shown in ISO 20816-1:2016 can be checked on the ISO 20816-1 Overview screen.

# 15.2 Fault-Diagnosis function

- Diagnostic Application Range
  This unit can perform Fault Diagnosis based on vibration analysis for machines with rotational speeds in the range of 180 rpm to 3000 rpm. The diagnosis is classified into two types: Structure diagnosis and Wear diagnosis, each of which analyzes different abnormal tendencies.

- Overview of Diagnosis
  Based on the results of vibration FFT analysis and vibration amplitude waveform information, abnormalities related to both structure and wear are analyzed. The diagnosis results and diagnostic comments are displayed on the screen. The diagnosis results can also be stored.

  - Structure Diagnosis
    The Structure diagnosis evaluates the degree of abnormalities caused by machine structure, such as unbalance, misalignment, and looseness. When structural abnormalities occur, vibration velocity spectrum components at the 1/n-th order and n-th order of the rotational frequency tend to increase.
    This unit determines structural abnormalities based on the magnitudes (dominance) of these components obtained from FFT analysis results. In addition, the rotational frequency is detected from the vibration velocity spectrum and reflected in the diagnosis.

  - Wear Diagnosis
    The Wear diagnosis evaluates abnormalities caused by wear or damage, such as bearing faults and gear faults. In a healthy machine, the amplitude probability density distribution of the vibration acceleration envelope waveform shows a shape close to a normal distribution. When wear-related abnormalities occur, this distribution deviates from a normal distribution.
    This unit diagnoses wear-related abnormal tendencies by analyzing differences in these distributions.

- Precautions During Diagnosis

  - General Precautions for the Fault-Diagnosis Function
    Before starting diagnosis, be sure to securely attach the piezoelectric accelerometer PV-57I to the diagnostic target. If the pickup is attached after diagnosis has started, there is a risk of impact vibration being input, which may affect the diagnosis results.
    For measurement, always use the piezoelectric accelerometer PV-57I and the magnet attachment VP-53S.

  - Precautions for Structure Diagnosis
    Depending on the measurement system, components other than vibration may be superimposed on the vibration waveform (for example, low-frequency fluctuations caused by ground loops). If such components are present, the rotational frequency may be incorrectly identified, and structural abnormalities may not be correctly evaluated. Before performing diagnosis, use the TIME and FFT analysis functions of the VA-14 to confirm that non-vibration signals are sufficiently small.

  - Precautions for Wear Diagnosis
    Depending on the rotational speed of the target machine and the type of abnormality, more stable results may be obtained by performing diagnosis multiple times. Since this unit performs diagnosis using vibration waveforms of approximately 1 to 2 seconds, abnormal waveforms may not be included in the measurement interval for abnormalities with a low occurrence frequency (for example, damage to rolling elements of rolling bearings, where vibration occurs only when the rolling element contacts the inner or outer race).
    In addition, when diagnosing machines with rotational speeds below 600 rpm, the frequency at which abnormal waveforms appear within the measurement interval decreases. As a result, the diagnosis results may vary, and there is a risk that signs of failure may be overlooked in a single diagnosis. In such cases, evaluate the machine condition comprehensively by reviewing multiple diagnosis results, together with FFT data and stored waveform data.

- Use the diagnosis results as an indicator for predictive maintenance, enabling early assessment of machine condition.

## Trademarks

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