TENMARS

**ST-140 Vibration Meter
ST-140D Datalogging Vibration Meter
User's Manual**

CE

HB2ST1400001

CONTENTS

TENMARS
ST-140/ST-140D

1 Introduction

This meter measures the vibrations of the rotating and reciprocating machines, as well as bearing damage, measurement items are acceleration, speed, displacement, which can check if the machine is to be repaired or upgrade.

2 Accessories

1	Meter
1	User manual
1	Accelerometer
1	Low noise cable
1	Magnetic base
6	1.5V UM4/AAA battery
1	Carrying case
1	9V AC to DC adaptor
1	USB cable and Installation disk (ST-140D)
1	Handheld probe + round probe + pointed probe

3 Safety Precaution

⚠	Note! Please refer to this manual. Improper use may damage the meter and its components.
CE	Complies with European Directive.

- Do not operate in environments with flammable gas or humid environments.
- Operating altitude: up to 2000M.
- Operating environment: Indoor use; Pollution degree 2.
- Clean with soft cloth when dirty, such as glasses cloth. Do not clean with chemicals and other solvents.
- EMC: EN61326-1:CISPR 11:Group 1, Class B
- ✧ **Class B** – Equipment for use in all establishments other than domestic.
- ✧ **Group 1** – RF energy generated is needed for internal functioning.

4 Meter Description
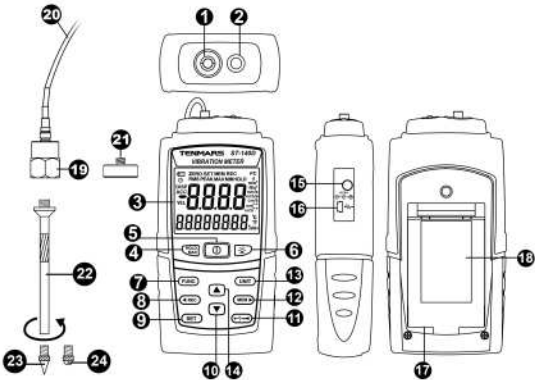
1. Accelerometer input terminal
2. LED work light.
3. LCD display screen
4. Maximum hold and data hold button
5. Power switch button
6. Backlight button
7. Function selection button
8. Left button/REC record button
9. Settings function button
10. Down button
11. Confirm button/LED work light control button
12. Right button/MEM view record value button
13. UNIT unit selection button
14. Up button
15. External power DC 9V input
16. USB data output jack (ST-140D)
17. Battery installation
18. Battery cover and stand
19. Accelerometer
20. Low noise cable
21. Magnetic base
22. Handheld probe
23. pointed probe
24. round probe

5 Operation

1. Connect the accelerometer with the magnetic base and lock one side of the cable; connect the other end of the cable with the accelerometer input terminal of the meter, and then attach the accelerometer to the test object.

2. Another measuring method is to connect the accelerometer with the handheld probe and lock one end of the cable, and then connect the other end of the cable with the accelerometer input terminal of the meter and use the handheld probe to test the test object.

3. Press the 🔲 button once to turn it ON or OFF; pressing the 🔲 button for over 2 seconds under power ON status will cancel automatic shutdown and turn OFF the automatic shutdown symbol on the LCD.
   * The power cannot be turned OFF under SETUP mode; please exit SETUP mode first.

4. The (FUNC) button selects the measuring status: acceleration (ACC) real value (RMS) → acceleration (ACC) peak value (PEAK) → velocity (VEL) real value (RMS) → velocity (VEL) peak value (PEAK) → displacement (DISP) peak to peak value (P-P). The measuring status changes once every time the (FUNC) button is pressed.

5. The (▲) or (▼) button can be used under acceleration (ACC) measurement status to select HI or LO gear (the measuring frequency of the HI gear is 10Hz~5KHz, and the measuring frequency of the LO gear is 10Hz~1KHz (after filtering circuit; complies with ISO 2954).

6. The (UNIT) button selects the measuring unit; the measuring unit changes once every time the (UNIT) button is pressed.

7. Reading measured value on LCD.

8. If you are at a dark location, you can press the (←|→) button for over 2 seconds to turn ON the LED to use as auxiliary lighting; to cancel this function, press the (←|→) button for over 2 seconds again.

5.1 Turn ON backlight

Under power ON status, press the 🔅 button to turn ON the backlight, and then press the 🔅 button again to turn OFF the backlight function directly.

*The backlight will automatically turn OFF after being lit for 15seconds.

5.2 Datalogging Single Sata Entry Manually:

Press the ◀REC button to save 1 data entry; the "REC" symbol and entry number will be displayed on the LCD. For example: 0001; every time the button is pressed, this number will increase by 1.

5.3 Reading Record Data In Memory:

To read the data recorded on this instrument, please first press the MEM▶ button; now the "MEM" symbol will appear on the LCD and it has now entered memory data reading mode. To read other memory data entries, you can press the ▼ button and the number of entry will increase, or press the ▲ button and the entry number will decrease. When you want to exit the memory data reading mode, please press the MEM▶ button for over 2 minutes to exit this mode.

5.4 Data Hold And Maximum Read Value:

To lock the read value on the LCD while measuring, press the HOLD/MAX button to lock the read value; now the "HOLD" symbol will be displayed on the LCD. Press the HOLD/MAX button again to lock the maximum read value; now the "MAX HOLD" symbol will be displayed on the LCD. To exit this function, please press the HOLD/MAX button for over 2 seconds.

5.5 Auto Power Off:

Press the HOLD/MAX button more than 2 seconds to turn on or turn off auto power off.

5.6 Accelerometer Installation:

When a permanent measuring point needs to be created on a machine but you do not want to drill holes on the machine, bonding studs can be used. These studs can be fixed on the measuring point using hard adhesives; we recommend using epoxy and cyanoacrylate agents because soft adhesives will reduce the useful frequency range of the accelerometer significantly.
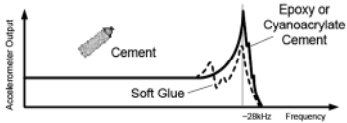
When the measuring point is a flat surface, a permanent magnet seat can be used for simple installation. This method will reduce the resonant frequency of the testing accelerometer to 7KHz; therefore, it cannot be used for measurements much higher than 2KHz. The suction of the magnet can tolerate up to 1000 to 2000m/s² vibration force, depending on the size of the accelerometer.
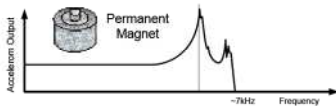
Installing the accelerometer on top of a handheld probe is convenient for quick checks, but it will cause considerable measurement errors due to the decrease in overall firmness, so do not expect repeatable results. A low-pass filter should be used in order to restrict the measuring range to approximately 1000Hz.

Put on the sensor with the magnetic base to the measuring point like shown in below by gently rolling it over the edges. Avoid magnet breakdown.
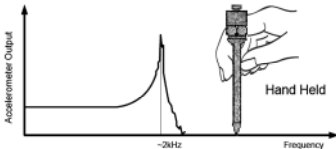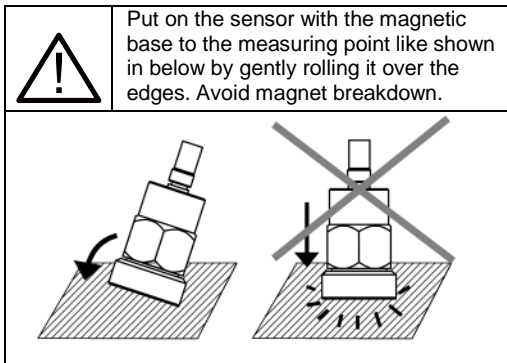
5.7 Function Settings: Step 1~Step 6

Press the (SET) button for over 2 seconds to enter the Step1~Step 7 settings.

STEP 1.   Setting date and time:

1.   Entering date and time setting mode.

2.   Press the (◄REC) or (MEM►) button to select the item to change; the number of the selected item will start flashing.
3.   Then press the (▲) or (▼) buttons to change the preset value.
4.   To exit this setting function, press the (←|←►) button for over 2 seconds to save the settings and exit this mode.
5.   Then press the (SET) button to enter Step 2.

STEP 2.   Setting automatic shutdown time:

1.   Set automatic shutdown mode; now the number will now start flashing.

2.   Then press the (▲) or (▼) buttons to change the value (the unit is 01~99 minutes).
3.   Then press the (SET) button to enter Step 3.

STEP 3.   Setting automatic record time:

1. Set whether to enable automatic record time mode; now OFF or ON will start flashing on the LCD.

2. Then press the ▲ or ▼ buttons to change whether to turn the automatic record mode ON or OFF.
3. Press the ◀REC or MEM▶ buttons to select the item to change.
4. Then press the ▲ or ▼ button to change the automatic record time.
5. To turn OFF automatic record mode after it is turned ON, please return to Step 3 and change ON to OFF.
6. Then press the SET button to enter Step 4.

STEP 4.   Clearing single memory record data entry:

1. Steps 4 and 5 will not appear if there is no recorded data, and it will skip directly to Step 7.
2. Enter clear single memory record data entry mode; now the entry number will be displayed on the LCD and onE will start flashing.

3. Press the ◀─┤─► button and the entry number displayed on the LCD will be reduced by one, and onE will flash; press the ◀─┤─► button again to clear the next data entry.
4. Then press the SET button to enter Step 5.

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STEP 5. Clear all recorded memory data (ALL):
1. Steps 4 and 5 will not appear if there is no recorded data, and it will skip directly to Step 7.
2. Enter clear all memory record data mode (ALL); now the number of data entries will be displayed on the LCD and ALL will start flashing.

```
     SET MEM

    0010

     ALL
```

3. Press the ⊕|⊕ button once and the number of data entries will be displayed on the LCD and CLr will start flashing; press the FUNC button again to confirm and enter Step 6.

STEP 6. Resetting to zero
1. Enter connection interface setting mode; now the SET and ZERO symbols will be displayed on the LCD and "oFF" will start flashing.

```
   ZERO SET
   RMS              g

   ACC  0.00

        oFF
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2. Press the FUNC button to select the function to reset and press the UNIT button to select the unit to reset to zero.
3. Press the ▲ or ▼ button to select ON or OFF; ON must be selected to perform the reset action and it will start flashing when selected.
4. Press the ⊕|⊕ button and this meter will automatically read the value to reset to zero and display it on the LCD.
5. Press SET to exit setting mode and enter measuring mode.

6 Software Installation

Supported operating systems: XP/Windows7/Windows 8.1/Windows10

Downloading PL-2303 execution software:

- Place the CD included with this meter into the CD/DVD-ROM drive of the PC to connect to and install the desktop program:
- Execute the PC desktop software program:

- Connect the USB cable included with this meter to the PC, as shown in the figure below.


- Double-click the left mouse button on the desktop program (Thermometer Meter) to execute the desktop program.

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7 General Specifications

- The maximum display of the LCD is 1999.
- Measurement item: VEL (velocity) / ACC (acceleration) / DISP (displacement).
- Function: Acceleration (RMS, PEAK, MAX HOLD, HOLD).
  Velocity (RMS, PEAK, MAX HOLD, HOLD).
  Displacement (P-P, MAX HOLD P-P, HOLD).
- Unit: Acceleration: m/s², g, ft/s². Velocity: mm/s, cm/s, inch/s. Displacement: mm, inch.
- Frequency features: LO range: 10Hz～1KHz. Complies with international specification ISO 2954-2012.
  HI range: 10Hz～5KHz.
- Auto power (15 minutes) and disable auto power off.
- Overload display: "OL".
- Manual 200 records.
- Datalogging capacity 9999 records. (ST-140D)
- Low battery detection "▭".
- Battery: 1.5V×6 (LR03 SIZE AAA 1.5V).
- Battery life: Approximately 100 hours.
- Power consumption: Approximately less than 15mA.
- Accelerometer operating temperature: -20°C to 70°C.
- Operating temperature and humidity of meter: -10°C to 50°C, relative humidity under 90%.
- Storage temperature and humidity: -10°C to 50°C, relative humidity under 70%.
- Weight: Approximately 400 grams (including holster and accelerometer).
- Dimensions: 156 (L) x 73 (W) x 35 (H) mm.
- **AC to DC Adaptor**
  External AC 100~240V to DC 9V/0.5A power supply.
  Plug: The pin in the center connects to the positive electrode and the outer case is negative electrode.
  Diameter: 5.5mm; internal diameter: 2.1mm.
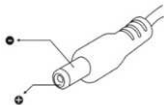
8 Electrical Specifications:

Accurate environmental conditions are: 23°C ± 3°C and RH <80%

Acceleration (RMS,PEAK,MAX HOLD)   1g=9.81m/s2

Range	0.5~199.9 m/s²	0.05~20.39 g	2～656 ft/s²
Resolution	0.1 m/s²	0.01g	1 ft/s²
Accuracy	± (5%+5d) @79.4Hz and158Hz	± (5%+5d) @79.4Hz and158Hz	± (5%+5d) @79.4Hz and158Hz
Calibration point	50m/s² (158Hz)	50m/s² (158Hz)	50m/s² (158Hz)

Velocity VEL (RMS, PEAK, MAX HOLD)

Range	0.5~199.9 mm/s	0.05~19.99 cm/s	0.02~7.87 inch/s
Resolution	0.1 mm/s	0.01cm/s	0.01 inch/s
Accuracy	± (5%+5d) @79.4Hz and158Hz	± (5%+5d) @79.4Hz and158Hz	± (5%+5d) @79.4Hz and158Hz
Calibration point	50mm/s (158Hz)	50 mm/s (158Hz)	50 mm/s (158Hz)

Displacement DISP (P-P, MAX HOLD P-P)

Unit	mm	inch
Range	0.005~1.999 mm	0.002~0.078 inch
Resolution	0.001 mm	0.001 inch
Degree of error	± (5%+5d) @79.4Hz and158Hz	± (5%+5d) @79.4Hz and158Hz
Calibration point	0.141mm (158Hz)	0.141mm (158Hz)

9 Maintenance or Repair

1. When the When "⊟" symbol is displayed on the LCD, it means that there is insufficient power; please change the battery immediately in order to ensure its accuracy.
2. Do not place the meter in locations that have high temperature, humidity or that are exposed to direct sunlight.
3. Remember to turn off the power after usage; remove the battery if not used for a long period of time in order to prevent battery leakage and causing damages to internal components.
4. When the instrument failure, only by the authorized service provider or return the original repair.

10 Battery Replacement

1. Turn off the power.
2. Open the frame and battery cover at the back of the meter, remove the batteries.
3. Please insert six new AAA 1.5V batteries according to the polarities.
4. Put the battery cover and frame back in place.

11 End of Life Disposal

Note: This symbol indicates that the meter and its accessories must be separated and processed properly.