

*Acceleration/Velocity/Displacement*

# VIBRATION METER

Model : VB-8220



Your purchase of this VIBRATION METER marks a step forward for you into the field of precision measurement. Although this METER is a complex and delicate instrument, its durable structure developed. Please read the following instructions carefully and always keep this manual within easy reach.

**OPERATION MANUAL**

## TABLE OF CONTENTS

1	FEATURES.....	1
2	SPECIFICATIONS.....	2
3	FRONT PANEL DESCRIPTION.....	4
3-1	Display.....	4
3-2	Input socket of meter.....	4
3-3	RS-232 output terminal.....	4
3-4	RMS/PEAK switch.....	4
3-5	Acceleration/Velocity/Displacement switch.....	4
3-6	Data hold button.....	4
3-7	Power button.....	4
3-8	RECORD button.....	4
3-9	RECALL button.....	4
3-10	Battery compartment/cover.....	4
3-11	Cable plug.....	4
3-12	Vibration sensor.....	4
3-13	Magnetic base.....	4
4	MEASURING PROCEDURE.....	5
5	ZERO ADJUSTMENT PROCEDURE.....	8
6	POWER MANAGEMENT .....	10
7	RS232 PC SERIAL INTERFACE.....	10
8	BATTERY REPLACEMENT.....	12
9	OPTIONAL ACCESSORIES.....	12
10	CLASSIFICATION RANGES.....	13
11	SENSITIVITY RELATIVE TABLE ACCORDING ISO 2954.....	14

# 1. FEATURES

- \* Applications for industrial vibration monitoring :  
All industrial machinery vibrates. The level of vibration is a useful guide to machine condition. Poor balance, misalignment & looseness of the structure will cause the vibration level increase, it is a sure sign that the maintenance is needed.
- \* Frequency range 10 Hz - 1 kHz, sensitivity relative meet ISO 2954.
- \* Professional vibration meter supply with vibration sensor & magnetic base, full set.
- \* Velocity measuring range : 200 mm/s.
- \* Acceleration measuring range : 200 m/s<sup>2</sup>
- \* Displacement measuring range : 2 mm ( p-p ).
- \* RMS & Peak measurement.
- \* Wide frequency range.
- \* Data hold button to freeze the desired reading.
- \* Memory function to record maximum and minimum reading with recall.
- \* Separate vibration probe, easy operation
- \* RS 232 computer interface.
- \* Optional data acquisition software for data record & datalogger.
- \* Super large LCD display.
- \* Microcomputer circuit, high performance.
- \* Auto shut off saves battery life.
- \* Built-in low battery indicator.
- \* Heavy duty & compact housing case.
- \* Complete set with the hard carrying case.

## 2. SPECIFICATIONS

Display	61 mm x 34 mm supper large LCD display. 15 mm ( 0.6" ) digit size.	
Measurement	Velocity, Acceleration, Displacement, RMS value, Peak value, Data hold, Max. & Min. value.	
Range	<i>Velocity :</i> 200 mm/s : 0.5 to 199.9 mm/s	
	<i>Acceleration :</i> 200 m/s <sup>2</sup> : 0.5 to 199.9 m/s <sup>2</sup>	
	<i>Displacement ( p-p ) :</i> 2 mm : 0.005 to 1.999 mm <i>* p-p : Peak to Peak</i>	
Frequency range	10 Hz to 1 KHz <i>* Sensitivity relative during the the frequency range meet ISO 2954 Refer to table 1, page 14.</i>	
Accuracy	± ( 5 % + 2 d ) reading , 160 Hz, 80 Hz. <i>* 23 ± 5 °C</i>	
Calibration point	Velocity	50 mm/s ( 160 Hz )
	Acceleration	50 m/s <sup>2</sup> ( 160 Hz )
	Displacement ( p-p )	0.05 mm ( 160 Hz )
Circuit	Exclusive microcomputer circuit.	
Data hold	Freeze the desired reading.	
Peak measurement	To measure the peak value.	
Memory	Maximum & Minimum value.	
Power off	Auto shut off, saves battery life, or manual off by push button.	

Sampling time	Approx. 1 second.	
Data output	RS 232 serial output.	
Operating temperature	0 to 50 °C ( 32 to 122 °F ).	
Operating humidity	Less than 80% RH.	
Power supply	Alkaline or heavy duty type, DC 9V battery, 006P, MN1604 (PP3) or equivalent.	
Power consumption	Approx. DC 8 mA.	
Weight	Meter	230 g/0.50 LB
	Probe with magnetic base	110 g/0.24 LB
Dimension	Meter : 180 x 72 x 32 mm ( 7.1 x 2.8 x1.3 inch ). Vibration sensor probe: Round 18 mm Dia. x 40 mm.	
Accessories included	Instruction manual..... 1 PC. Vibration sensor ( VB-82 )..... 1 PC. Cable..... 1 PC. Magnetic base..... 1 PC. Carrying Case..... 1 PC.	
Optional accessories	* Software ( Windows version, data record & data acquisition ) .....SW-U801-WIN * RS232 cable .....UPCB-01	

### 3. FRONT PANEL DESCRIPTION

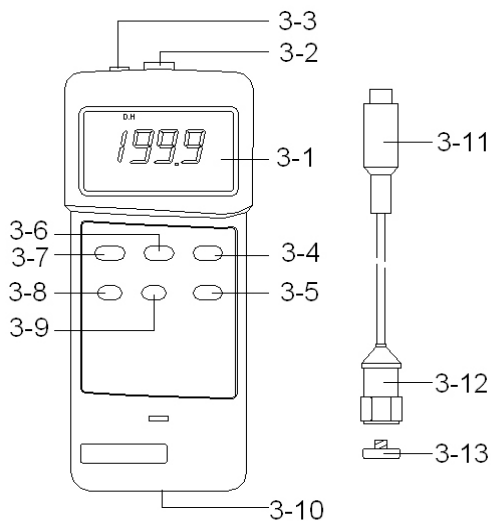


Fig. 1

- 3-1 Display
- 3-2 Input socket of meter
- 3-3 RS-232 output terminal
- 3-4 RMS/PEAK switch
- 3-5 Acceleration/Velocity/Displacement switch
- 3-6 Data hold button
- 3-7 Power button
- 3-8 RECORD button
- 3-9 RECALL button
- 3-10 Battery compartment/cover
- 3-11 Cable plug
- 3-12 Vibration sensor
- 3-13 Magnetic base

## 4. MEASURING PROCEDURE

- 1) Plug in the " Cable plug " ( 3-11, Fig. 1 ) to the " Input socket of meter " ( 3-2, Fig. 1 ).
- 2) a. For the Acceleration measurement, select the " ACC./VEL./DSP(P-P) switch " ( 3-5, Fig. 1 ) to the " ACC. " position.  
b. For the Velocity measurement, select the " ACC./VEL./DSP(P-P) switch " ( 3-5, Fig. 1 ) to the " VEL. " position.  
c. For the Displacement ( peak to peak ) measurement, select the " ACC./VEL./DSP(P-P) switch " ( 3-5, Fig. 1 ) to the " DSP(P-P) " position.

*Note :*

*For general applications of industrial vibration monitoring, select " Velocity measurement " typically.*

- 3) Select the " RMS/PEAK switch " ( 3-4, Fig. 1 ) to the " RMS " position.

*Note :*

*No matter the " RMS/PEAK switch " set to " RMS " or " PEAK ", for the Displacement measurement always measure the Peak to Peak value.*

- 4) Power on the meter by pushing the " Power button " ( 3-7, Fig. 1 ) once.

- 5) If the surface material of measuring article is not the ferrous material, hold the vibration sensor by hand & touch the sensor to the surface of the measuring article, refer the Fig. 2.

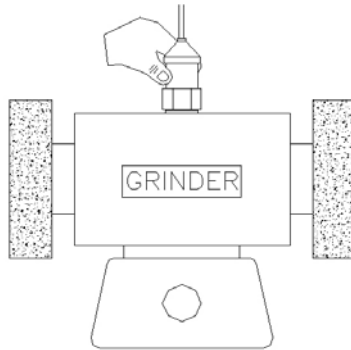


Fig. 2

- 6) If the surface material of measuring article is the ferrous material, connect " Vibration sensor " ( 3-12, Fig. 1 ) with the " Magnetic base " ( 3-13 ), refer Fig. 3. Put the whole unit ( Vibration sensor & Magnetic base ) to the surface of measuring article, refer Fig. 4.

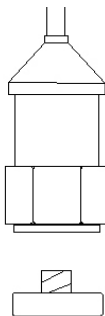


Fig. 3



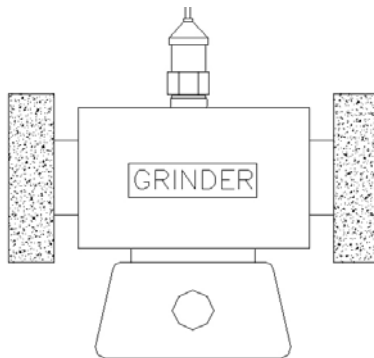


Fig. 4

#### 7) **PEAK value measurement**

Before the measurement if select the " RMS/PEAK switch " ( 3-4, Fig. 1 ) to the " PEAK " position. The Acceleration and the Velocity measurement, the display will display the peak value. However the Displacement measurement will display the Peak to Peak value no matter the " RMS/PEAK switch " set to " RMS " or " PEAK " position.

#### 8) **Data Hold**

During the measurement, push the " Data hold button " ( 3-6, Fig. 1 ) will hold the measured value & the LCD will indicate " D.H." symbol. Push the " Data hold button " again to release the data hold function.

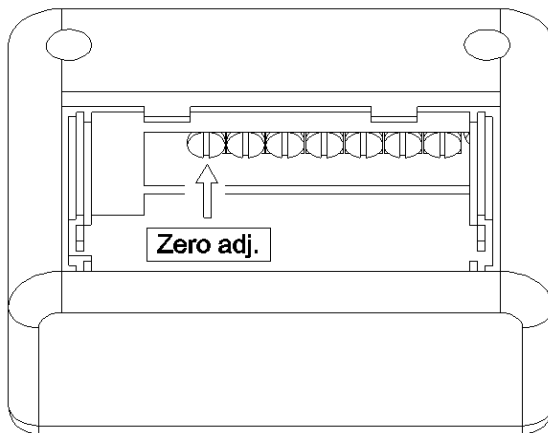
9) Data Record ( Max., Min. reading )

- \* The DATA RECORD function displays the maximum, minimum and average readings. To start the DATA RECORD function, press the " RECORD Button " ( 3-8, Fig. 1 ) once. " REC " symbol will appear on the LCD display.
- \* With the " REC " symbol on the display :
  - (a) Push the " RECALL button " ( 3-9, Fig. 1 ) once, the " Max " symbol along with the maximum value will appear on the display.
  - (b) Push the " RECALL Button" again, the " Min " symbol along with the minimum value will appear on the display.
  - (c) To exit the memory record function, push the " RECORD " button once again. The display will revert back to the current reading.

## **5. ZERO ADJUSTMENT PROCEDURE**

Due to drift of environment temperature value, battery power change or, meter used for a long time or other reasons. The display value may exist not zero value ( few digits ) in case of no signal into the " Vibration Sensor ". General speaking those not zero value will not effect the measurement typically. However if intend to make the precision measurement, the following zero adjustment procedures should be executed as :

- 1) Select the " Acceleration/Velocity Switch " to the " Acceleration " position.
- 2) No signal into the vibration sensor.
- 3) Open the battery cover.
- 4) Use a convenient screw driver to adjust " Zero adjust VR " until the display reach the zero value.



## 6. POWER MANAGEMENT

The meter is built the " Auto power shut off " to saves battery life. If not any function button be pushed within approx. 10 minutes, the power will be off automatically.

If the user intend to disable the " Auto Power off " function, it should take the following procedures :

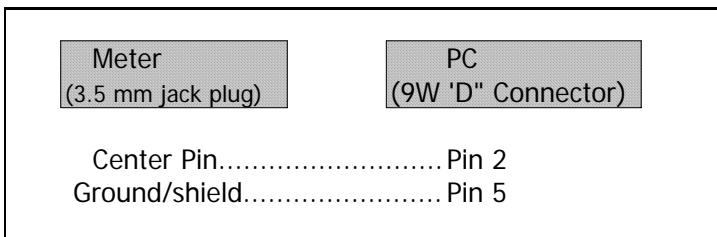
During the measurement, push the " Record Button " ( 3-8, Fig. 1 ) to execute the memory record function.

## 7. RS232 PC SERIAL INTERFACE

The instrument features an RS232 output via 3.5 mm Terminal ( 3-3, Fig. 1 ).

The connector output is a 16 digit data stream which can be utilized to the user's specific application.

An RS232 lead with the following connection will be required to link the instrument with the PC serial input.



The 16 digit data stream will be displayed in the following format :

D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0

Each digit indicate the following status :

D0	End Word
D1 to D4	Upper Display reading, D1=LSD, D4=MSD
D5 to D8	D5 = ? D6 = ? D7 = ? D8 = ?
D9	Decimal Point ( DP) for display. 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP
D10	D10 = 0
D11	D11 = 0
D12	D12 = 0
D13	D13 = 0
D14	D14 = 0
D15	Start Word

**RS232 setting**

Baud rate	9600
Parity	No parity
Data bit no.	8 Data bits
Stop bit	1 Stop bit

## 8. BATTERY REPLACEMENT

- 1) When the left corner of LCD display show " LBT ", it is necessary to replace the battery. However, in-spec measurement may still be made for several hours after low battery indicator appears before the instrument become inaccurate.
- 2) Use the coining or " - " screw driver to open the " Battery Cover " ( 3-10, Fig. 1 ) away from the instrument and remove the battery.
- 3) Install a 9 V battery ( Alkaline or heavy duty ) and replace the cover.

## 9. OPERATIONAL ACCESSORIES

RS-232 cable, Model : UPCB-01	RS-232 cable, used for connecting the vibration meter & the computer.
Application Software  SW-U801-WIN	After setup whole hardware  Vibration meter + RS-232 cable + Computer + software ( SW-U801-WIN )  whole system can execute as a data logger, data recorder.... record data can be retrieved for EXCEL, LOTUS-123.....

## 10. CLASSIFICATION RANGES

For the valuation of machines and equipment in the ISO 2372 and VDI 2056, four different kinds of machine groups with four classification ranges and their limits for vibration severity ( mm/s ) are determined.

The classifications for each machine group are specified as follows :

### **Small machines, especially production electrical motors of up to 15 KW ( Group K )**

Good	0 to 0.71 mm/s
Acceptable	0.72 to 1.80 mm/s
Still permissible	1.81 to 4.5 mm/s
Dangerous	> 4.5 mm/s

### **Medium sized machines, especially electrical motors with 15 up to 75 KW output, without special foundations ( Group M )**

Good	0 to 1.12 mm/s
Acceptable	1.13 to 2.80 mm/s
Still permissible	2.81 to 7.1 mm/s
Dangerous	> 7.1 mm/s

### Large machines on heavy foundations ( Group G )

Good	0 to 1.80 mm/s
Acceptable	1.81 to 4.50 mm/s
Still permissible	4.51 to 11.2 mm/s
Dangerous	> 11.2 mm/s

### Largest machines and turbo machines with a special foundations ( Group T ).

Good	0 to 2.80 mm/s
Acceptable	2.81 to 7.10 mm/s
Still permissible	7.11 to 18.0 mm/s
Dangerous	> 18 mm/s

## 11 SENSITIVITY RELATIVE TABLE ACCORDING ISO 2954

Frequency Hz	Relative sensitivity		
	Normal value	Minimum value	Maximum value
10 Hz	1.0	0.8	1.1
20 Hz	1.0	0.9	1.1
40 Hz	1.0	0.9	1.1
80 Hz	1.0	1.0	1.0
160 Hz	1.0	0.9	1.1
500 Hz	1.0	0.9	1.1
1000 Hz	1.0	0.8	1.1

Table 1