Digital Vibration Tester

Model No. DVM-1000

Operation Manual

Features:

The DVM-1000 is a compact and simple to operate vibration tester. It's an ideal tool for obtaining balance and alignment data for all types of rotating objects such as heavy-duty machinery or any fixture that uses a motor as a source of power.

The high temperature piezoelectric sensor has a removable mounting base for attachment of a supplied stinger probe. It also is equipped with AC output socket for easy headphone hook up.
The DVM-1000 has a large 18mm LCD that will display the data in four (4) measurement modes; Acceleration, Velocity(RMS), Displacement and RPM. Auto shut-off will conserve batteries and will still save all previous stored data.

Specifications:

Acceleration	***Peak Value:*** 0.1 – 200 m/s or 0.3-656 ft/m/s	Frequency Range: 10Hz-1KHz Frequency Range: 10Hz-10KHz
Velocity(RMS)	***RMS:*** 0.01-400 (mm/s) ***or*** 0.004 -16.0 inch/s	Frequency Range: 10Hz-1KHz
Displacement	***Peak to Peak*** 0.001 – 4.00(mm) *or* 0.04-160mil	Frequency Range: 10Hz-500Hz
RPM (revolution)	***60-999,990 r/min*** ***(readings should be multiplied by 10 if the display is set for "10"***	
Frequency	***1 – 20KHz***	
Accuracy	***+/-5% +2 digits***	
Operating Temperature/Humidity	***0-50°C / below 90%RH***	
Operating Output	***AC output 2.0V peak full scale***	Load resistance: above 10k
Power Supply	***4-AAA Batteries***	
Dimensions	***124 x 62 x 30mm (4.9 x 2.4 x 1.2:)***	
Weight	***120g (not including batteries)***	

The DVM-1000 Kit includes:

1pc Powerful Earth Magnet
1pc Accelerometer
1pc Stinger Probe (Cone)
1pc Stinger Probe (Ball)
Operation Manual & Carry Case

Front Panel Descriptions:

3.1	**Accelerometer (Probe)**
3.2	**LCD**
3.3	**Probe Connector**
3.4	**Hold Key**
3.5	**Power Key**
3.6	**Inch/Metric Conversion**
3.7	**Function Key**
3.8	**Filter Key**
3.9	**Volume Key**
3.11	**Stinger Probes**
3.12	**Magnetic adapter**

Set Up Procedure:

1. Connect the accelerometer to the input connector on the right side of the unit by threading the socket gently until it locks in place.
2. Press the **Power** Button to turn unit on.
3. Place the accelerometer, with the magnetic base firmly attached to the machine. You should allow a few seconds for the readings to stabilize before taking a reading. Machine vibration may vary with time, in which case the maximum and minimum readings may be recorded. The machine surface must be sufficiently flat to permit the magnetic base to solidly attach to it. If the magnetic base is not attached properly, you will not be able to obtain accurate readings at higher frequencies. If the measurement surface is not magnetic or if the space is limited, the "Stinger" probes can be used in place of the magnetic base. When using the Stinger probe hold the tip against the machine with just enough force to prevent chattering. The stinger must be positioned perpendicular to the desired measurement surface.
   A steel disc or washer may be cemented to a non-magnetic surface to permit usage of the magnetic base. For Maximum accuracy of Acceleration (g) measurements, the accelerometer should be temporarily mounted on the machine surface with the supplied (M5) threaded mounting stud.
   Measurements made in more than one vibration mode can reveal something of the nature of the vibration signal. A high acceleration reading combined with a low displacement reading is indicative of a high frequency vibration. Conversely, a low acceleration reading combined with a high displacement reading is indicative of a low frequency vibration. Velocity is usually the preferred measurement when a single reading is to be recorded. Consult the machines operation manual or the manufacturer if you are in doubt of the measurements to be made.

   The supplied vibration chart should be used as a guideline for determining machine condition. The best indicator of machine condition is a carefully collected and recorded history database. Changes in machine condition over time become readily apparent and permit repairs to be made prior to machine failure.

4. Press the **Function** button to toggle through the 3 main measurement parameters; as well as RPM and Frequency readings. The three main measurement scales are typically used for vibration testing.
    a) **Acceleration**: Normally measured in m/s^2 has excellent high frequency capabilities and is therefore very effective in determining faults in bearings or gear drives.
    b) **Velocity**: The most commonly used vibration parameter. It's used for vibration severity measurements in accordance with ISO 2372 which contains guidelines for acceptable vibration levels of machinery under different power categories. These guidelines are presented in a table in the back of this manual. Velocity is typically measured in cm/s or Inch/s RMS (centimeters or millimeters per second). **Note**: this instrument measures in cm/s. If you are more familiar with measurements in mm/s or need to compare your measured values directly with the vibration severity chart in this manual, you must multiply the value by 10.
    c) **Displacement**: This parameter is typically used on low speed machines because of it's good low frequency response. This is NOT recommended for monitoring bearings. Units are measured in Mil or mm equivalent peak-peak.

Calibration:

The DVM does not need a scheduled (daily, weekly, monthly) calibration performed however, the calibration should be verified yearly by Phase II or a qualified calibration facility.

Battery Replacement:

When the battery symbol appears on the display, its time to replace the batteries.
Slide the back cover off and remove and properly dispose of the old batteries. Replace with fresh set of batteries paying careful attention to the polarity.

Maintenance:

Be sure to keep this unit free of dirt, dust, liquids or viscous fluids. Its also best to store this unit in a temperature controlled environment when not in use for a long period of time.
If the DVM-1000 malfunctions, contact Phase II tech support directly for instructions. Any attempt at internal repair will void any stated or implied warranties.

Vibration Charts:

ISO 10816

This recommendation, release in August 2000, establishes the general conditions and procedures for the measurement and evaluation of vibrations using measurements made on the non-rotating parts of a machine. It also provides general evaluation criteria related to both operational monitoring and acceptance testing established primarily with regard to securing reliable long term operation of the machine.

ISO 10816-3 separates the working conditions into four zones:

- Zone A (Green): Vibration values from machines just put into operation
- Zone B (Yellow): Continuous operation without any restrictions
- Zone C (Orange): Condition is acceptable only for a limited period of time
- Zone D (Red) Dangerous vibration values-Damage could occur at any time.

It also defines four groups of machines, according to their size, base and purpose.

ISO 10816 Chart

Vibration Velocity IPS (RMS)	Group 4 Integrated Driver		Group 3 External Driver		Group 2 Motors $160 \leq H < 315$ mm		Group 1 Motors $H \geq 315$ mm	
	Rigid	Flexible	Rigid	Flexible	Rigid	Flexible	Rigid	Flexible
0.71								
0.43								
0.28								
0.18								
0.14								
0.11								
0.09								
0.06								
0.03								

Vibration Magnitude is defined within this group of standards as the maximum value of the broadband rms velocity in the specified frequency range (typically from 10 to 1,000 Hz), as evaluated on the structure at prescribed points. Note that other quantities such as displacement or acceleration and peak values instead of rms values are permitted, but may not easily correlate to criteria based on rms values. Evaluation criteria to assess vibration severity include both vibration magnitude and changes in vibration magnitude. As shown in Figure 3 and Table 3, below, evaluation zones are defined to permit a qualitative assessment of the vibration, and to provide guidelines on possible actions.

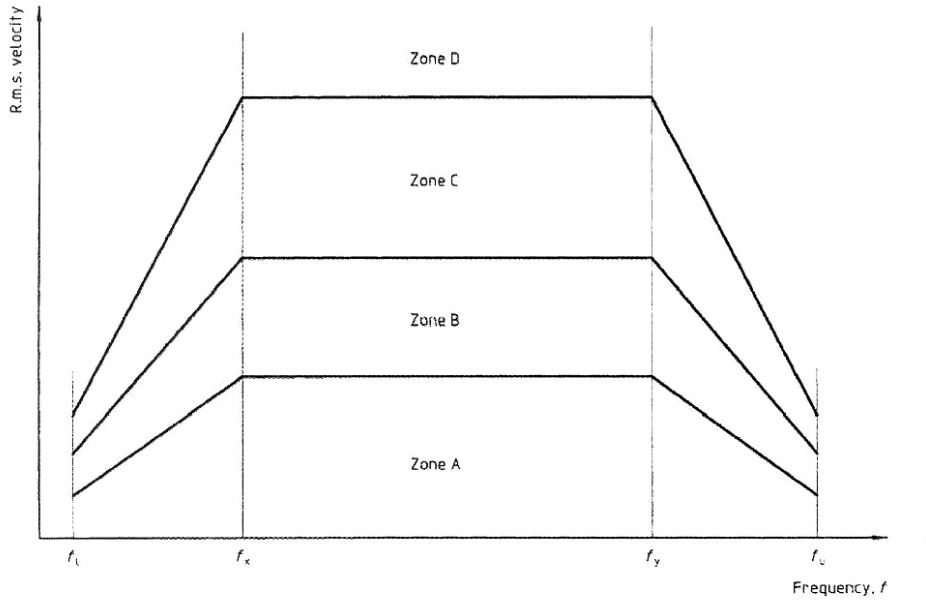


Figure 3 • General Form of Vibration Evaluation Criteria

R.m.s. vibration velocity mm/sec	up to 15 kW Class I	15 to 75 kW Class II	> 75 kW (rigid) Class III	> 75 kW (soft) Class IV
0,28	A	A	A	A
0,45				
0,71				
1,12	B			
1,8		B		
2,8	C		B	
4,5		C		B
7,1	D		C	
11,2		D		C
18			D	
28				D
45				

Table 3 • Typical Evaluation Criteria Zone Vibration Magnitude

Ranking:

A=Vibration values from machines just put into operation

B= Continuous operation without any restrictions

C = Condition is acceptable only for a limited period of time

D = Dangerous vibration values-Damage could occur at any time

NEMA MG1-12.05

(Maximum vibration of motor that generates more than 1 horsepower)

RPM (Rev)	Displacement (p-p) (μm)
3000-4000	25.4
1500-2999	38.1
1000-1499	50.8
<999	63.6

NEMA MG1-20.52

(Maximum vibration of high power induction motor)

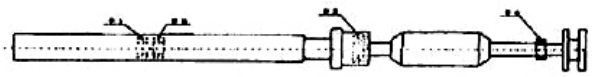
RPM (Rev)	Displacement (p-p) (μm)
>3000	25.4
1500-2999	50.8
1000-1499	63.6
<999	76.2

Example of Analysis chart: *it's highly suggested that you design your own chart based upon your testing procedure and applicati*

Table 1 Inspection results on the bearing

W/D No.		# I		# II	
Spindle		sp A	sp B	sp A	sp B
Brg position (from top)	#1	○	○	○	△
	#2	○	★	△	★
	#3	△	○	△	△~★
	#4	★	△	○	○

○ ; normal、△ ; a little abnormal、★ ; abnormal



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