I. Structural diagram:

- LCD display area
- Battery CR2032*2
- Sensor
- Unit conversion key
- Startup measurement key
- Battery cover

II. Main features:

- Its function is comprehensive. It can measure such three parameters as acceleration, speed and displacement.
- Its volume is not large. It is light and easy to carry.
- You can control the meter with two keys. The operation is simple.
- The meter has the function of automatic shutdown. It can save electricity consumption.

III. Application principles:

When using the meter, you should point the sensor to the tested part vertically and try to maintain that the vibration pen is perpendicular to the tested surface. The sensor should tightly touch the surface of the tested object. The pressure is about 5~20N. Thus, vibration of the tested object is made to accurately transmit to the sensor. Bearing and bearing support should be selected as measure points. Other structural units response obviously to momentum and can demonstrate global vibration performance of the machine. Such structural units should also be selected as measure points to undertake measurement. This meter has no function of data memory. If you need keep test data, you need keep written records.

IV. Application method:

1. Take out the battery door. Lithium batteries of CR2032 are installed according to + pole. Then the door is fastened.
2. Press startup measurement key " " to start up. The meter is then in the state of measuring acceleration, as figure 1 demonstrates.

V. Performance index:

1. Measurement parameters:
   - Acceleration
   - Speed
   - Displacement

2. Measurement ranges:
   - Acceleration: 0.01~199.9m/s² (peak value)
   - Speed: 0.01~199.9mm/s (effective value)
   - Displacement: 0.001~1.998mm (peak-peak value)
3. Frequency range:
- Acceleration: 10 Hz to 1 kHz.
- Speed: 10 Hz to 1 kHz.
- Displacement: 10 Hz to 500 Hz.

4. Relative error:
- Uncertainty of referred sensitivity ≤ ±3%.
- Amplitude linear relative error ±5% ± 2.
- Relative error of frequency response:
  - When frequency is 10 Hz < f < 20 Hz, relative error is ±10% to 20%.
  - When frequency is 20 Hz ≤ f < 1000 Hz, relative error is ±5%.

5. Display way: LCD display showing numbers from 0 to 9 and with the use of decimal points. Its display period is about 1 second.
6. Power supply voltage: 2 button cells (CR2032).
7. Battery life: If the meter works non-stop, its life is about 5 hours; when it is standby, its life is about 1 year.
8. Working environment: The temperature ranges from 0°C to 40°C; relative humidity ≤ 85%.
9. Dimension: 154 mm x 23.5 mm x 18.7 mm.
10. Weight of the meter: about 40 g (including 2 cells).

Appendix: vibration standards:

1. ISO/IS2373 is electromotor quality standard based upon vibration speed amplitude.

<table>
<thead>
<tr>
<th>Value of vibration speed (mm/s)</th>
<th>Type I</th>
<th>Type II</th>
<th>Type III</th>
<th>Type IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.28</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>0.45</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>0.71</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>1.12</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>1.6</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>2.8</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>4.5</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>7.1</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>11.2</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>15.6</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>28</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>45</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
</tbody>
</table>

Note: For AC electromotor, it uses the maximum synchronous speed; for DC electromotor, it uses the biggest power and speed; for series and multi-purpose electromotor, it uses working speed.

3. The maximum permitted vibration of large-scale induction machine (REMA MG-20, 52).

<table>
<thead>
<tr>
<th>Synchronous speed (RPM)</th>
<th>Displacement amplitude among peaks (μm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3000-4000</td>
<td>25.4</td>
</tr>
<tr>
<td>1500-2999</td>
<td>38.1</td>
</tr>
<tr>
<td>1000-1499</td>
<td>50.8</td>
</tr>
<tr>
<td>999 &amp; blow</td>
<td>63.6</td>
</tr>
</tbody>
</table>

Note: The above two standards are made by National Electrical Manufacturers Association (REMA).

4. The maximum permitted vibration of preformed winding squirrel-cage induction motor (API STD541).

<table>
<thead>
<tr>
<th>Synchronous Speed (RPM)</th>
<th>Displacement amplitude among peaks (μm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>720-1499</td>
<td>50.8</td>
</tr>
<tr>
<td>1500-2999</td>
<td>38.1</td>
</tr>
<tr>
<td>3000 &amp; above</td>
<td>25.4</td>
</tr>
</tbody>
</table>

This standard is made by American Petroleum Institute (API).

5. The vibration separation form of ISO2372 machine (NEMA MG-12, 05).

VI. Maintenance:

- The pen vibration meter is a precise instrument. It should strictly avoid collision, moist, strong electromagnetic field, grease, dirt, and dust.
- When replacing battery, you should pay attention to its positive pole should be upward.
- If the meter is not used for a long time, you should take the battery out. In case, leakage may damage the meter.
- Please do not tear down the vibration pen at will, in case that internal circuit is damaged.
- Alcohol and diluents have a corrosive effect on the chassis, especially the window. Thus, when cleaning it, you just use cotton silk to get a little clear water and to lightly scrub it.
- Should any problem happens, please consult local dealers and contact maintenance.

Non-guaranteed parts list: chassis, probes, battery, random accessory.

Note: Damage due to users' misuse is beyond the guarantee range.