

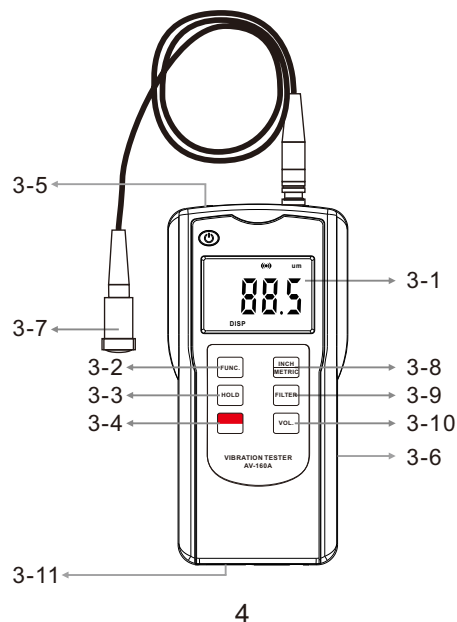
VIBRATION TACHOMETER

AV-160T

This Vibration Tachometer is small in size, light in weight, easy to carry, it is convenient to use and operate. Its ruggedness will allow many years of use if proper operating techniques are followed. Please read the following instructions carefully and always keep this manual within easy reach.

- * USB Cable and software
- * Bluetooth Adapter and software

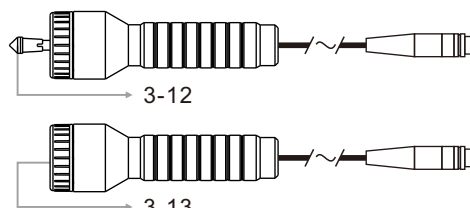
3. FRONT PANEL DESCRIPTIONS



1. FEATURES

- * In accordance with ISO 2954, used for periodic measurements, to detect out-of-balance, misalignment and other mechanical faults in rotating machines.
- * specially designed for easy on site vibration measurement of all rotating machinery for quality control, commissioning, and predictive maintenance purposes.
- * Multifunctional, one instrument combines Photo Tachometer & Contact Tachometer. Be able to measure rotation rate RPM(r/min) & Frequency Hz.
- * Individual high quality accelerometer for accurate and repeatable measurements
- * Bearing condition monitoring function
- * LCD digital display
- * Lightweight and easy to use.
- * Wide frequency range (10Hz. To 10kHz.) in acceleration mode.
- * AC output socket for headphones and recording.
- * Optional headphones for use as electronic stethoscope.
- * Can communicate with PC computer for statistics and printing by the optional cable and the software for RS232C interface.

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- 3-1 LCD display
- 3-2 Function key
- 3-3 Hold key
- 3-4 Power key
- 3-5 USB data line jack
- 3-6 Battery Cover
- 3-7 Vibration sensor
- 3-8 Metric/Imperial conversion key
- 3-9 Filter key
- 3-10 Sound key
- 3-11 Headphone jack
- 3-12 Contact tachometer sensor
- 3-13 Photo tachometer sensor

4. VIBRATION MEASURING PROCEDURE

4.1 Connect the Vibration sensor to the input connector and turn it until the connector locks in position.

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2. SPECIFICATIONS

Display: 4 digit LCD backlit

Accuracy: $\pm 5\%$ of reading + 2 digits

Measurement Range:

Displacement	0.001-4.000mm Equivalent Peak-Peak;	0.04-160.0 mil
Velocity	0.1-400.0mm/s True RMS;	0.004-16.00 inch/s
Acceleration	0.1-400.0m/s ² Equivalent Peak;	0.3-1312 ft/s ² 0.0-40g

Frequency Range:

Displacement: 10Hz. ~ 1kHz.

Acceleration: 10Hz. ~ 10kHz

Velocity: 10Hz. ~ 1kHz.

Rotation Rate Range: 60~99,990RPM(r/min)
(Reading should be multiplied by 10 if the display shows '10')

Frequency: 1~20,000Hz
(Reading should be multiplied by 10 if the display shows '10')

Metric/ Imperial conversion

Analogue Output: AC output 0~2.0V peak full scale (load resistance: above 10k)

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4.2 Mount the accelerometer at the measurement point using the powerful magnet supplied, ensuring that the mounting surface is clean and flat, or use direct stud (M5) mounting if this is available.

4.3 Depress the power key and release to power on the meter.

4.4 Each time the Function key is depressed and released quickly, the meter will step to the next vibration measurement parameter with the corresponding unit showing on the display.

4.5 Each time the Metric/Imperial key is depressed and released quickly, the measurement unit will be changed to the other measurement system.

4.6 When several machinery or bearings are used under the same operating conditions, evaluation can be carried out by listening to the audio signals to determine changes. This method will help to locate the defective machinery or bearing quickly. Measure all machines at the same points and compare the results. The sound volume can be adjusted by Sound key. There are 8 levels from 1 to 8. Every time depressing and releasing the sound key quickly, the sound

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With Max. value hold and low battery indication.

PC interface: USB (Cable and software is not included)

Operating conditions:

Temperature: 0~50°C (32~122°F)

Humidity: <90%RH

Power supply: 4x1.5vAA (UM-4) Battery

Size (Main Unit): 140x70x31mm

5.5x2.8x1.2inch

Weight (Main Unit): 130g (Not including Batteries) 4.59oz

Standard Accessories:

- * Powerful rare earth magnet
- * Stinger probe (Cone)
- * Stinger probe (Ball)
- * Vibration Sensor
- * Contact Tachometer Sensor
- * Photo Tachometer Sensor
- * Reflective Tape Marks (350mm)
- * Carrying case
- * Operational Instruction Manual

Optional Accessories:

- * Headphones

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level will increase 1. The larger the sound level number, the louder the listening sound.

5. PHOTO TACHOMETER MEASURING PROCEDURE

5.1 Connect the Photo tachometer sensor to the input connector and turn it until the connector locks in position.

5.2 Apply a reflective mark to the object being measured.

5.3 Press the Function key, when 'RPM' or 'Hz F' is displayed, it is in rotation rate measurement or frequency measurement. The Photo tachometer sensor emits a visible light beam. Align the visible light beam with the applied target, the reading is on the display.

6. CONTACT TACHOMETER MEASURING PROCEDURE

6.1 Connect the Contact tachometer sensor to the input connector and turn it until the connector locks in position.

6.2 Press the Function key, when 'RPM' or 'Hz F' is displayed, it is in rotation rate measurement or frequency measurement. lightly pressing the RPM Adapter against the center hole on the rotating hole, the reading is on the display.

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7. CONSIDERATIONS

7.1 Which Parameters Should be Measured?

* Acceleration, velocity, and displacement are the three tried and tested parameters, which give accurate and repeatable results.

* Acceleration is normally measured in m/s² peak (meters per second squared) or ft/s², has excellent high frequency measurement capabilities, and is therefore very effective for determining faults in bearings or gearboxes.

* Velocity is the most commonly used vibration parameter. It is used for vibration severity measurements in accordance with ISO 2372, BS 4675 or VDI 2056, which are guidelines for acceptable vibration levels of machinery in different power categories. These are presented as a table in section 4 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 wish to compare your measured values directly with the vibration severity chart in section 4, multiply the displayed value by 10.

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C. Maximum vibration of motor that power larger than 1 horsepower. (NEMA MG1-12.05)

Rev (rpm)	Displacement (P-P) (um)
3000~4000	25.4
1500~2999	38.1
1000~1499	50.8
≤999	63.6

For AC motor, rev is maximum synchronous rev. For DC motor, it is maximum power rev. For motor in series, it is work rev.

D. Maximum vibration of high power induction drive motor. (NEMA MG1-20.52)

Rev (rpm)	Displacement (P-P) (um)
≥3000	25.4
1500~2999	50.8
1000~1499	63.6
≤999	76.2

National Electric Manufacturers Association (NEMA) Establishes two standards above.

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* Displacement is typically used on low-speed machines because of its good low frequency response, and is relatively ineffective when monitoring bearings. Units are over a period of time, the resulting graph shows the progress or deterioration of a particular machine.

* Typically this will have the general shape shown in the diagram below, regardless of the type of machine being considered. For a short time after installation, whether it is a new or a repaired machine, vibration levels may fall slightly as the machine is run in, followed by a long period of unchanging levels during the machine's normal operating lifetime. Then comes a period of rising levels as machine parts wear out prior to failure. Such a trend enables the maintenance engineer to predict the time of failure and maximize use of the machine, while ordering spares and planning its maintenance for a time convenient to the production schedule.

8. BATTERY REPLACEMENT

8.1 When the battery symbol appears on the display, it is time to replace the battery.

8.2 Slide the Battery Cover away from the instrument and remove the battery.

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8.3 Install batteries paying careful attention to polarity.

9. Appendix: Vibration standards
A. Rank of machine vibration (ISO 2372)

Vibration Amplitude	Machine sort			
Vibration Velocity V rms (mm/s)	I	II	III	IIII
0~0.28	A	A	A	A
0.28~0.45				
0.45~0.71				
0.71~1.12	B	B	B	B
1.12~1.8				
1.8~2.8	C	C	C	C
2.8~4.5				
4.5~7.1	D	D	D	D
7.1~11.2				
11.2~18				
18~28				
28~45				
>45				

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Note:

(1) Class I is small motor (power less than 15 kw). Class II is medium motor (power between 15 ~75kw). Class III is high power motor (hard base). Class IV is high power motor (stretch base)

(2) A, B, C, D are vibration Rank. “A” means good, “B” means satisfying, “C” means not satisfying, “D” means forbidden. Vibration velocity should be taken from the three perpendicular axes on the motor shell.

B. ISO/IS2373 Motor quality standard according as vibration velocity

Quality rank	Rev (rpm)	H: high of shaft (mm) Maximum vibration velocity (rms) (mm/s)		
		80 < H < 132	132 < H < 225	225 < H < 400
Normal	600~3600	1.8	2.8	4.5
Good (R)	600~1800	0.71	1.12	1.8
	1800~3600	1.12	1.8	2.8
Excellent (S)	600~1800	0.45	0.71	1.12
	1800~3600	0.71	1.12	1.8

Limit of rank “N” is suitable for common motor. When the request is higher than that in the table, limit can be gotten by dividing the limit of rank 'S' with

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