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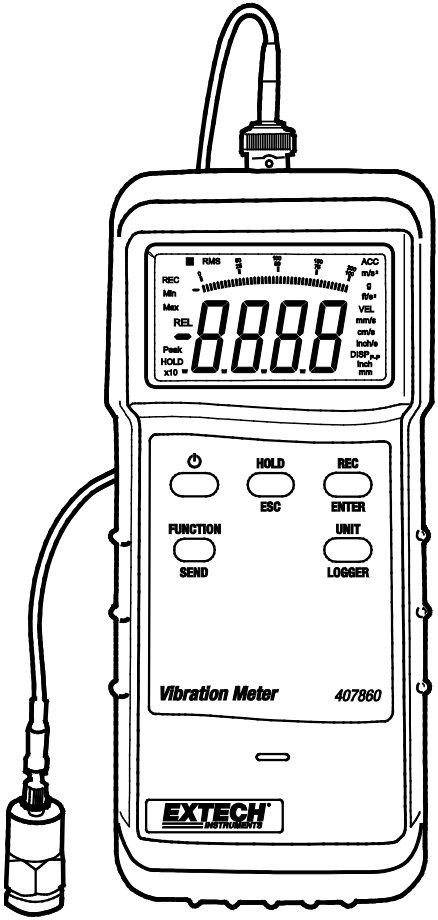
Find the *Extech Instruments 407860* at our website: *Click HERE*

EXTECH INSTRUMENTS

USER MANUAL

Heavy Duty Vibration Meter

Model 407860



Additional User Manual Translations available at www.extech.com

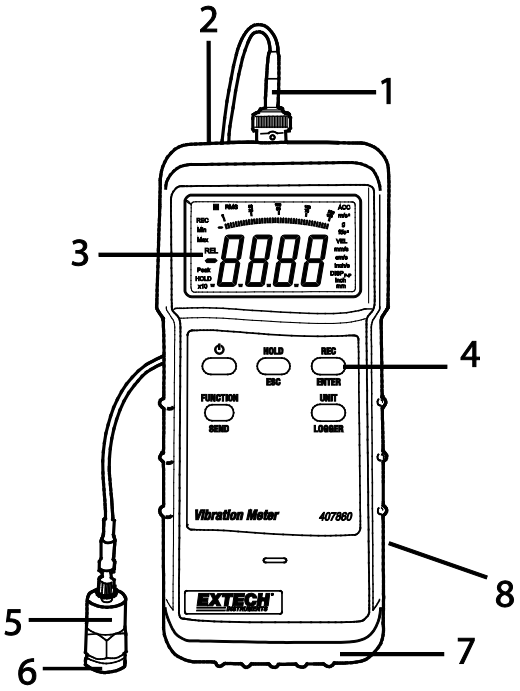
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Introduction

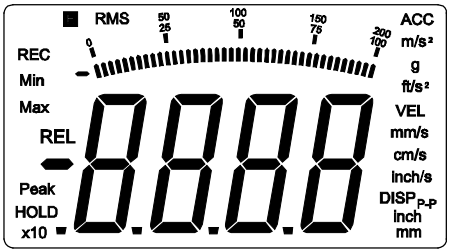
Congratulations on your purchase of the Extech 407860 Vibration Meter. The Model 407860 measures vibration levels in industrial machinery. Misalignment, poor balancing, structural compromises, and other factors can cause unwanted vibration increases. The Model 407860 has a frequency sensitivity that meets ISO-2954 and offers Displacement, Velocity and Acceleration features. This meter is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

Meter Description

1. Probe connector
2. RS-232 Connector
3. LCD Display
4. Function switches and pushbuttons
5. Probe
6. Magnetic base
7. Protective rubber meter jacket
8. Battery compartment (on rear)



Meter LCD Display

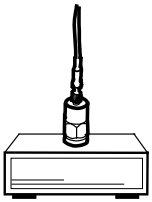


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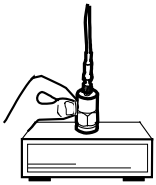
Meter Operation

Connecting the Probe

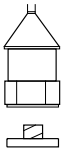
1. Note that this meter accepts only the supplied vibration probe.
2. Plug the BNC connector end of the probe cable onto the BNC connector at the top of the meter.
3. The probe can then be connected to the tested machinery in three ways.
   a. Attach the magnetic end of the probe to a ferrous material on the equipment under test as shown in the accompanying diagram.



   b. Manually hold the probe in place against the equipment under test as shown.



   c. Unscrew the magnet from the probe end (as shown in the diagram) and use the threaded mount to connect to a screw, bolt, or stud on the equipment under test.



POWER button and Auto Power OFF feature

1. Press the **POWER** button to turn the meter ON. If the meter does not turn on, check the 9V battery.
2. To turn the meter off, press and hold the **POWER** button until the meter beeps.
3. The meter is equipped with an Automatic Power OFF utility that conserves battery life. If the meter is left inactive for 10 minutes, it will automatically turn off.
   Note: Automatic Power OFF utility is disabled in the RECORD mode.

FUNCTION button

Press the **FUNCTION** button to select RMS, PEAK or MAX-HOLD.

1. RMS - Typical selection for vibration measurements
2. PEAK – For measurement of the peak value. Not available in the Displacement mode.
3. MAX_HOLD – Holds and displays the maximum value. The display will update only when a new maximum is measured. Not available in the Displacement mode.

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UNIT button

Press this button to select the measurement units desired.

Press and hold this button for > 5 seconds to switch from metric to imperial units.

Measurement	Metric Units	Imperial Units
Acceleration	m/s^2, G	Ft/s^2
Velocity	mm/s, cm/s	Inch/s
Displacement	mm	inch

HOLD button

Press this button to freeze the measured value in the display. HOLD will appear in the display. Press the button again to return to normal operation.

REC button

Use this feature to record the maximum and minimum measured values.

1. Press the **REC** button to begin recording. The REC symbol will appear on the display.
2. Press the **REC** button again to display the MAX recorded value. Both the REC and MAX symbols will appear on the display.
3. Press the **REC** button again to display the MIN recorded value. Both the REC and MIN symbols will appear on the display.
4. Press and hold the **REC** button for >2 seconds to exit the REC mode.

ZERO Adjustment

The meter may not indicate zero (or may indicate within a few digits of zero) with no signal applied to the meter (no vibration). Although this is usually not a problem, this procedure will bring the meter within a few digits of zero and improve measurement precision.

1. Connect the vibration sensor to the meter.
2. Turn the meter on and set the function to ACC and RMS.
3. Make sure the vibration sensor is perfectly still (no vibration).
4. Press and hold the **HOLD** button for > 5 seconds to allow the display to reach the zero value.

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Datalogging

The internal datalogger memory can hold up to 500 readings. Readings can be logged manually, with a button press, or automatically at a programmed sample rate.

Sample Rate

The sample rate can be set to 0 (manual), 1, 2, 5, 10, 30, 60, 600, 1800 or 3600 seconds.

1. With the meter OFF, Press and hold the **HOLD** and **REC** buttons.
2. Press the **POWER** button.
3. When the display shows the sample rate, release the **HOLD** & **REC** buttons.
4. Use the **UNIT** button to select the desired sample rate.
5. Press the **REC** button to save the selection. The meter will sound three tones indicating that the sample rate was successfully stored.
6. Follow the Auto or Manual Datalogging procedures in the next section.
7. To return to normal operation, simply cycle the meter's power.

Auto Data Logging

1. Set the desired sample rate as described (do not select '0').
2. Turn the meter off and back on.
3. Press the **REC** button to enter the datalogging function. The **REC** symbol will appear in the display (upper left-hand corner).
4. Press the **LOGGER** button to start logging data. The display will briefly indicate the sample rate and the **REC** indicator will flash
5. An audible tone will sound each time a reading is stored.
6. Press the **LOGGER** button for to pause/resume datalogging.
7. Press and hold the **REC** button > 2 seconds to exit the datalogging mode.

Manual Data Logging

1. Set the sample rate to '0' as described earlier.
2. Turn the meter off and back on.
3. Press the **REC** to enter the datalogging function. The **REC** symbol will appear in the display flashing.
4. Press the **LOGGER** button. The display will briefly indicate the '0' sample rate.
5. Press **LOGGER** again to log one data point. The **REC** indicator will flash and an audible tone will sound. Repeat this step to store the desired number of readings.
6. Press and hold the **REC** button > 2 seconds to exit the datalogging mode.

Clearing Memory

1. With the meter OFF, Press and hold the **HOLD** and **REC** buttons.
2. Press the **POWER** button.
3. When the display shows the sample rate, release the **HOLD** and **REC** buttons.
4. Press and hold the **REC** button for > 5 seconds. The display will indicate 0 when the memory is clear.
5. Cycle the meter power to return to normal operation.

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Memory Full Indication

The meter produces a continuous tone when the internal memory has been filled to capacity (500 readings). The data can be viewed, cleared, or downloaded to a PC.

Viewing Stored Data

1. With the meter OFF, Press and hold the **HOLD** and **REC** buttons.
2. Press the **POWER** button.
3. When the display indicates the existing sample rate, release the **HOLD** and **REC** buttons.
4. The **HOLD** and the **FUNCTION** buttons are used to scroll through the stored data. When either button is pressed, the data reference number will briefly appear and then the reading for the given memory location will be displayed. The **HOLD** button increments the data location number and the **FUNCTION** button decrements the data location number.

PC Interface

For streaming of data from the meter to the PC via the RS232 port, the optional 407001-USB cable is required. Contact Extech for the Software protocol for the data stream (Support@Extech.com).

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Battery Replacement

When the 9V battery weakens, the  indicator appears on the LCD. Follow these steps to replace the battery:

1. Turn the meter OFF.
2. Remove the probe and the RS-232 cable from the meter.
3. Remove the protective rubber jacket that encases the meter by stretching it over the bottom of the meter.
4. Open the battery compartment (located on the lower back of the meter) with a flat head screwdriver or coin.
5. Replace the 9V battery, replace the compartment cover, and affix the rubber jacket.



Never dispose of used batteries or rechargeable batteries in household waste. As consumers, users are legally required to take used batteries to appropriate collection sites, the retail store where the batteries were purchased, or wherever batteries are sold. **Disposal:** Do not dispose of this instrument in household waste. The user is obligated to take end-of-life devices to a designated collection point for the disposal of electrical and electronic equipment.

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Specifications

General Specifications

Display	3-1/2 digit LCD with bargraph
Frequency range	10Hz to 1KHz (frequency sensitivity meets ISO-2954)
Sampling time	One (1) second approx.
Data output	Isolated serial RS-232 PC Interface
Data Hold	Freezes displayed reading
Min/Max Memory	Meter stores highest and lowest readings for later recall
Data Logger	Store up to 500 readings
Data logger Sample Time	0 (manual), 1, 2, 5, 10, 30, 60, 600, 1800 and 3600 sec.
Pickup thread size	10-32 UNF
Auto Power OFF	Meter automatically shuts off after 10 minutes of inactivity
Low battery indication	Battery symbol appears on the LCD
Power supply	9V Battery
Power consumption	8mA DC approx.
Operating Temperature	0 to 50°C (32 to 122°F): Operating Humidity: 80% RH
Dimensions	Meter: 180 x 72 x 32mm (7.1 x 2.8 x 1.3")
	Probe: 18mm (0.75") diameter x 40mm (1.6")
Weight	Meter: Approx. 230g (0.5 lbs)
	Probe with magnetic base: 110g (0.24 lbs)

Functions, Units, Ranges, and Accuracy

Acceleration (RMS or Peak)	**Unit**	**Range**	**Accuracy (% of reading)**
	m/s^2	0.5 to 199.9m/s^2	±(5% + 2 digits)
	G	0.05 to 20.39G	
	ft/s^2	2 to 656ft/s^2	
	Acceleration peak range: 1.0 to 199.9m/s^2		
	Calibration point: 50 m/s^2 @ 160Hz		
Velocity (RMS or Peak)	mm/s	0.5 to 199.9mm/s	±(5% + 2 digits)
	cm/s	0.05 to 19.99cm/s	
	in/s	0.02 to 7.87in/s	
	Velocity peak range: 1.0 to 199.9mm/s		
	Calibration point: 50mm/s @ 160Hz		
Displacement (peak to peak)	mm	0.003 to 1.999mm	±(5% + 2 digits)
	inch	0.078in	
	Calibration point: 0.141mm @ 160Hz		
Note: Accuracy stated from 80 to 160Hz @ 23 ± 5°C			

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Appendix A: Machinery Classification

When evaluating machinery and equipment it is useful to know their classification range and group type. There are four machine groups and classification ranges recognized internationally (ISO 2372 and VDI 2056). The limits for vibration severity (mm/s) are shown in the Tables below:

GROUP K – Small Machinery up to 15KW (for example, production motors)

Testing Status	Vibration Severity (mm/s)
Good	0 to 0.71
Acceptable	0.72 to 1.80
Permissible	1.81 to 4.5
Dangerous	Greater than 4.5

GROUP M – Medium-sized Machinery up to 75KW (for example, electrical motors without special foundations)

Testing Status	Vibration Severity (mm/s)
Good	0.00 to 1.12
Acceptable	1.13 to 2.80
Permissible	2.81 to 7.10
Dangerous	Greater than 7.10

GROUP G – Large Machinery on Heavy Foundations

Testing Status	Vibration Severity (mm/s)
Good	0.00 to 1.80
Acceptable	1.81 to 4.50
Permissible	4.51 to 11.20
Dangerous	Greater than 11.20

GROUP T – Large Turbo Machinery on Special Foundations

Testing Status	Vibration Severity (mm/s)
Good	0 to 2.80
Acceptable	2.81 to 7.10
Permissible	7.11 to 18.00
Dangerous	Greater than 18.00

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Appendix B: Relative Sensitivity Table (ISO 2954)

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

Appendix C: Glossary

Vibration: Vibration is an oscillation or repetitive motion of an object around an equilibrium position.

Displacement: Displacement is the peak-to-peak distance from a reference position, or equilibrium point, of an object under test.

Peak to Peak Amplitude: Peak –to-peak amplitude is the displacement of an object (see above). It can be thought of as the distance from the maximum positive deviation point to the maximum negative deviation point with respect to an object's equilibrium position.

Velocity: Velocity is the *rate of change* of displacement. Velocity is measured in inches/second (mm/second) units.

Acceleration: Acceleration is the *rate of change* of velocity. Units of measure for Acceleration is feet per second squared (meters per second squared)

Peak Amplitude: Maximum deviation of an object from its equilibrium position.

RMS: Root Mean Square Amplitude (RMS) is the square root of the average of the squared values of a waveform. The RMS amplitude of vibration is 0.707 times the peak amplitude value The RMS value of a vibration signal is an important measure of its amplitude.

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