

OPERATION MANUAL

MODEL 205 ce
VIBRATION
METER

(INCLUDES MODEL 205M ce)

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Balmac assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained herein.

Specifications are subject to change without prior notice.

WARNING: Exercise extreme caution when performing any task on rotating machinery. Failure to do so may result in equipment damage or personal injury. Familiarize yourself with the equipment before attempting to perform any operation.

WARNING: ROTATING MACHINERY HAS POTENTIALLY DANGEROUS MOVING PARTS AND SHOULD BE GUARDED IN ACCORDANCE SAFETY TO SAFETY REGULATIONS.

This manual is for the Balmac Vibration Meters Models 205 ce and 205M ce.

SECTION 1 - INTRODUCTION

Description

The Balmac Model 205 ce Vibration Meter takes the guesswork out of machinery maintenance and vibration studies.

There are many factors that can cause excessive vibration in rotating machinery. These include worn bearings and couplings; pipe and foundation damage; broken mounting bolts; misalignment and unbalance.

Vibration measurements (or a vibration maintenance program) can help prevent these types of failures by detecting machine problems before anything serious happens. Vibration measurements provide a quick check of machinery condition. The readings from the Model 205 ce are used for analysis and trending.

The Model 205 ce Vibration Meter is easy to operate. It can be used by practically anyone for checking the overall (broadband) vibration level and vibration condition. The hand-held instrument is lightweight and battery powered. It measures the acceleration (g's), velocity (inches per second) and displacement (mils) of vibration. The Model 205M ce Vibration Meter is calibrated in METRIC units.

The Model 205 ce Vibration Meter Kit includes: (1) Model 205 ce Vibration Meter with Batteries; (1) Model 601 Accelerometer Vibration Pickup; (1) Model 059-5' Vibration Pickup Cable; (1) Model 052 Magnetic Base Clamp; (1 ea) Model 032A Carrying Case, Manual and Calibration Certificate (not shown).

SECTION 2 - FEATURES

Battery

The Balmac Model 205 ce Vibration Meters come equipped with 4 Size AA 1.5 Volt standard alkaline batteries. Alkaline batteries are recommended for maximum operation time.

LOW BATTERY - a low battery symbol "Lo-Bat" or "⚡", will display (with instrument power "ON") when the batteries needs replacement.

REPLACING BATTERIES - (procedure)

1. Turn the 205 ce "OFF".
2. Remove two #4-32 Phillips-head screws from back battery cover. Remove cover.
3. Locate battery holder and carefully remove old batteries.
4. Insert new batteries as indicated by outlines in bottom of battery compartment. Replace cover and tighten screws.

Controls

1. OFF/ON (Grey) - Self-latching button powers the Model 205 ce on and off.
2. DISP, VEL, ACC (Black) - Self-latching, vibration amplitude buttons (see Section 4 "Measurements" for a detailed explanation of the merits of each).
3. RANGE BUTTONS (200, 20, 2, Very Low Range) (White) - Self-latching Full Scale Range selector buttons. (205M ce = 2000, 200, 20 VLR).

Vibration Pickup

The Balmac Model 205 ce Vibration Meter uses the Model 601 Pickup. The Model 601 connects to the Model 059-5' Straight Pickup Cable (2-conductor, shielded cable). The 059-5' cable connects to the input connector at the top of the Model 205 ce.

It is recommended that the Model 601 Pickup be mounted on 1/4-28 UNF stud, or on the Model 052 Magnetic Base Clamp.

NOTE: DO NOT SLAM OR BANG THE PICKUP WHEN MOUNTING WITH THE MAGNETIC BASE. THIS CAN DAMAGE THE PICKUP.

SECTION 3 - OPERATION

1. Connect the Model 601 Pickup to the Model 059-5' Pickup Cable.
2. Select appropriate mounting accessory (Model 052 Magnetic Base Clamp) and connect to the Model 601 Pickup.
3. Connect cable and pickup assembly to the Model 205 ce.
4. Depress the OFF/ON switch to power the instrument "ON".
5. Select then depress one of the black Amplitude Measurement buttons:
ACC = Acceleration = g's (peak)(in/sec²) 205M ce = g's mm/sec²
VEL = Velocity = Inches Per Second (peak) 205M ce = Velocity = mm/sec
DISP = Displacement = Mils (peak to peak) 205M ce = Displacement = μm
6. Select then depress one of the gray Range buttons (2, 20, 200 or Very Low Range)(205M ce = 20, 200, 2000 or Very Low Range). Change the Range button to another range if necessary until the AMPLITUDE meter reads without indicating an overrange condition. (Over Range Display = 1 _ _ _ [1 with 3 blank digits]). Read vibration amount directly.

NOTE: The best recommended permanent mounting method is using a stud on a clean flat surface (like on the magnetic base).

CAUTION: The mounting stud must not extend into the pickup more than 0.2". Hand tighten the pickup. DO NOT WRENCH THE PICKUP ONTO THE MOUNTING. The pickup's axis of sensitivity is perpendicular to the mounting base. The pickup may be used and mounted in any direction (horizontal, vertical, axial). See Vibration Pickup specification on Page 11.

SECTION 4 - MEASUREMENTS

VELOCITY is the recommended setting for machinery severity vibration readings with the Model 205 ce Vibration Meter. The destructive forces generated in today's higher speed machines are more proportional to vibration velocity than either displacement or acceleration.

For example, it is very unusual for someone to arrive on the scene of an automobile accident and ask "How far did they come?" (Displacement), or "How fast did they stop?" (Acceleration). The common question is "How fast were they going when they hit?" (Velocity)

DISPLACEMENT is the peak to peak distance a part is moving measured in "mils." One mil equals one thousandth of an inch (.001"). When measuring in mils, the operating speed must be known to establish a vibration condition limit. (Example: a cooling tower fan operating at 175 RPM vibrating at 10 mils may be considered in good condition. An electric motor operating at 1750 and vibrating at 10 mils typically requires immediate attention.)

ACCELERATION - is useful for detecting the deterioration and defects or rolling element bearings and gears. An acceptable level for most machines is less than 0.5 g's. If the level is higher, the bearing may be defective and should be analyzed. An acceptable level of g's can be established by comparing similar machines and by studying vibration trends.

SECTION 5 - VIBRATION SEVERITY

For a free copy of Balmac's Vibration Severity Chart, please visit our website at www.balmacinc.com. Click on the Tab labeled "FAQs" (Frequently Asked Questions) and click on the link under "Where Can I Get a Free Vibration Severity Chart?"

SECTION 6 - TROUBLESHOOTING

The following is a list of troubleshooting questions:

- Are the pickup and cable in good condition and connected properly?
- Is the power ON? Is the battery good?
- Is the display on?
- Are the switches inoperative, or experiencing other switching problems?

TROUBLESHOOTING GUIDE

- Symptom: No Display
Possible Cause: No power or supply voltage
Solution: [1] Check power source (batteries). Replace if necessary.
[2] Check power OFF/ON switch.
- Symptom: No Indication on Meter Display
Possible Cause: No vibration signal
Solution: [1] Check vibration pickup and cable.
[2] Possible defective pickup.
[3] Possible defective display.
- Symptom: Amount Readings Unstable
Possible Cause: [1] Machine defect
[2] Improper setup (low range)
Solution: [1] Check vibration pickup for proper installation.
[2] Check for loose machine components.
[3] Verify pickup and cable connections.
[4] Signal to noise ratio is low (low range in displacement). Reduce noise, increase Amplitude range, or change Amplitude units.

SECTION 7 - SUPPORT

TECHNICAL SUPPORT - For additional technical information, contact Balmac. Additional information about vibration is available in our Vibration Analysis Training Manual and our "B" Book Series.

For information on vibration standards for ISO and ANSI, contact Balmac or check the Internet.

All questions and problems should be directed to the factory Monday through Friday, 8:00 A.M. to 5:00 P.M. Eastern Time at the following numbers:

Telephone: 614-873-8222

Email: sales@balmacinc.com

Ship To: BALMAC, INC.
8205 Estates Pkwy, Ste N
Plain City, OH 43064-8080

SERVICE SUPPORT - The instrument is warranted for a period of two years. It is recommended you contact Balmac before returning equipment for service. Instrumentation returned prepaid to Balmac during the warranty period will be repaired or replaced without charge if it has not been subjected to misuse. Return freight is chargeable. Equipment returned for service should be packed in a suitable shipping container.

SECTION 8 - PARTS

REPLACEMENT & OPTIONAL PARTS - are major assemblies identified by a Balmac Model Number. Most of these parts are field replaceable and do not affect the calibration of the instrument. Replacement Parts are also listed on Balmac's published Price List.

Model #	Part Description
205 ce	Meter (English)
205M ce	Meter (Metric)
601	Accelerometer Vibration Pickup
059-5'	Straight Pickup Cable MS3106 (female socket) to BNC (pin)
052	Magnetic Base Clamp (Mount) with 1/4-28 Thread Stud
032-A	Carrying Case

SECTION 9 - DISPOSAL

This product complies with the WEEE Directive (2012/19/EU) marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste. Product Category: with reference to the equipment types in the WEEE Directive Annex I, this product is classed as category 9 "Monitoring and Control Instrumentation" product. Do not dispose of this product as unsorted municipal waste. You can hand over your meter at your nearest community E-waste collection point or return the meter to Balmac Inc.

SECTION 10 - APPLICATIONS

The Balmac Model 205 ce Vibration Meter is used for machinery maintenance and vibration studies for:

- Fans
- Motors
- Pumps
- Compressors
- Condition Monitoring
- Rotating Machinery Preventive Maintenance

Vibration monitoring is useful in all types of industrial applications including:

- Manufacturing
- Commercial Buildings
- Processing Plants
- Pumping Operations
- Automotive Assembly
- Power Generation
- Engineering
- Marine Operations
- Research & Development

SECTION 11 - SPECIFICATIONS

AMPLITUDE RANGE:

English: (205 ce) mils pk-pk (peak-to-peak) Displacement
in/sec pk (peak) Velocity
g's pk (peak) Acceleration

Note: Very Low Range in units of 0.001 g's, 0,001 in/sec, & micro-inches

Metric: (205M ce) Displacement micrometers (μm) peak-to-peak
Velocity millimeters-per-second (mm/sec) peak

Acceleration g's millimeters-per-second squared (mm/sec²) peak

Note: Very Low Range in units of 0.001 g's, 0,001 mm/sec, & mm/sec²

RANGE: Four selectable ranges with over-range indication for each range

MODEL 205 English 205M Metric

High Range 200 = 0 to 199.9 2000 = 0 to 1999

Medium Range 20 = 0 to 19.99 200 = 0 to 199

Low Range 2 = 0 to 1.999 20 = 0 to 19

Very Low Range 0 to 199.9 0 to 199.9

SENSITIVITY:

Displacement: 0.000001 inch (0.001 mil) (1 micro-inch) (0.0254 μm)

Velocity: 0.001 inch/sec (0.02 mm/sec)

Acceleration: 0.001 G

ACCURACY: 5% Full Scale instrument [see performance specifications on pickup]

FREQUENCY RANGE: 600 to +420,000 rpm (10 to +7,000 Hz)

DISPLAY: 3 1/2 digit, numeric LCD (with Low Battery indicator)

INPUT: Industrial ICP Accelerometer (100 mV/g)

OUTPUT: Signal for Headphones 1/8" Mono jack

CONTROLS: Color-coded Function pushbuttons for all measurements

POWER: Four Size AA standard alkaline batteries 1.5 Volts

OPERATING

TEMPERATURE: 32° to 122°F (0° to 50°C)

ENVIRONMENTAL: Relative humidity 0-95% non-condensing

DIMENSIONS:

Model 205 ce 7.67" H x 3.97" W x 1.73" D (19.5 x 10.1 x 4.4 cm)

Carrying Case 13.5" H x 10.5" W x 4.5" D (34.3 x 26.7 x 11.4 cm)

WEIGHT: Unit & standard accessories 5 lbs (2.3 kg)

Unit & pickup <2 lbs (<1 kg)

Pickup Specification - Model 601

SENSITIVITY ($\pm 10\%$, 25°C) 100 mV/g

ACCELERATION RANGE: 80g peak

AMPLITUDE NON-LINEARITY 1%

FREQUENCY RESPONSE

$\pm 10\%$ 0.7 - 9,000 Hz

± 3 dB 0.4 - 14,000 Hz

RESONANCE FREQUENCY 30 kHz

TRANSVERSE SENSITIVITY 5% of axial

POWER REQUIREMENT 18 - 30 VDC

GROUNDING Case isolated, internally shielded

TEMPERATURE RANGE: -50° to +120°C

VIBRATION LIMIT 500 g peak

SHOCK LIMIT: 5000 g pk

SEALING Hermetic

WEIGHT 62 grams

CASE MATERIAL 316L Stainless Steel

MOUNTING 1/4-28 UNF tapped hole

CONNECTOR TYPE: 2-pin, MIL-C-5015 Connector

For Warranty and Service Information and Terms of Sale, see our website at www.balmacinc.com