

IN3005 Handheld Digital Acoustic Intensity Meter

The Sonolator™
High-Pressure Ultrasound Mixing and Homogenizing Systems
Operating Manual



Principle

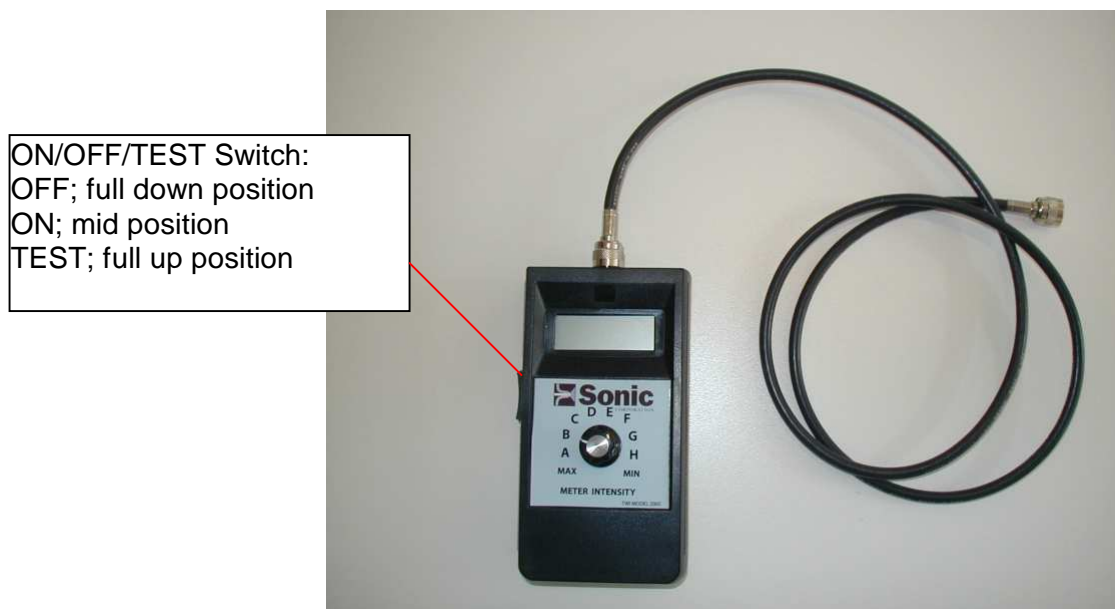
The Acoustic Intensity Meter is designed to measure the pitch amplitude generated within the Sonolator™ mixing chamber as process fluid flows at high velocity over our patented Blade. As described in our Sonolator™ System manual, process material is subjected to high levels of pressure and shear as it is forced through a specially engineered Orifice. Material is then projected at high speed over the knife-like Blade, which acts as a foil to create extreme cavitation. The cavitation field of shedding vortices, which is formed along the edges of the blade, create a steady oscillating pitch which is read by the Probe mounted over the Sonolator™ mixing chamber. The Probe sends a signal to the Meter, which in turn indicates the level of cavitation energy. It is the **high pressure** and **cavitation energy** that emulsify, disperse and homogenize a wide range of Chemical, Personal Care, Pharmaceutical and Food & Beverage materials.

When processing any material in our Sonolator™ Homogenizing Systems, an operating pressure must first be established. Once set and running at steady pressure, the Sonolator™ must be **tuned** to create maximum cavitation level; this manual details procedures for doing this. Bear in mind that the Meter provides only **qualitative data**; it is to be used only to locate the peak cavitation level obtainable for a given pressure and flow rate.

The cavitation level within the Sonolator™ can be adjusted, or tuned, in two ways. Enhancing the cavitation field around the blade can be accomplished by optimizing the amount of material that impinges on the Blade. Basically, when material is forced through our Orifice, or through any restriction, the resulting liquid stream twists and eventually breaks apart as it moves away from the Orifice or restriction. Our Back-pressure tuning valve helps reduce the extent to which the stream twists, thereby maximizing impact with the Blade. Our Blade-to-Orifice adjustment allows you to position the Blade at just the right point within the liquid stream prior to its breaking up. **Neither adjustment should affect the Sonolator™ System operating pressure established by the Orifice.**

Tuning Procedures

1. Connect the Meter Cable to the Meter and Probe on the Sonolator™.
2. Test the Battery by putting the ON/OFF/TEST Switch in the upper most position:



3. The Meter should display a reading of between 0.900 and 1.00. If the readout fails to reach the top of the scale, replace the battery or check voltage connection to ensure proper power is supplied to the meter. Otherwise, return Meter for repair.

4. Turn on the Meter using the switch on the left side of the Meter; this lever has 3 settings: OFF (down position), **ON (middle position)**, and Battery Test (full up position)
5. Turn the Sensitivity or Attenuation Knob to the maximum position; this is clockwise toward H.
6. Ensure that the Back-pressure tuning valve on the Sonolator is fully open and the Blade is fully retracted from the Orifice. Full open and full back positions are achieved by rotating knobs counter-clockwise. The Back-pressure tuning valve handle will rotate out and the Blade Holder will retract back away from the gauge and sleeve area.
7. Establish desired operating pressure and flow rate while system is running. The Orifice should yield your desired pressure and hold steady.
8. Once pressure has been established via the Orifice, begin closing the Back-pressure tuning valve.
9. As the readout on the Meter rises toward the tip of the scale, desensitize the Meter by clicking the Sensitivity Knob toward minimum one click at a time.
10. Continue to close the valve until a maximum reading is obtained on the Meter; you will notice that as the valve is closed to within 2 turns from closed that the Meter reading will drop off. **Note:** The Back-pressure tuning valve should never be used to generate any pressure within the system; when the operating pressure increases due to valve position, open the valve slightly to relieve excess pressure.
11. Once the valve position has been established, turn the Blade adjusting wheel clockwise to move the Blade closer to the Orifice.
12. Note the increase on the Meter reading.
13. As the readout on the Meter rises toward the tip of the scale, desensitize the Meter by clicking the Sensitivity Knob toward minimum.
14. Do this until a maximum reading is obtained.

It is NOT necessary to tune the Sonolator™ again unless changes in the following are made:

- Viscosity
- Installation of new Blade or Orifice

Do not expend too much time trying to obtain an exact maximum reading on the Meter. The difference in mixing efficiency between a few units on the Meter Panel is negligible and not detectable in the finished product.

During operation and tuning, the Meter readout may fluctuate somewhat due to pressure surges, vibrations and other causes, and is no cause for alarm; this is normal.

As you tune the Sonolator™ you will notice a distinct whistling sound. This whistle may increase and decrease during tuning and operation and is no cause for alarm. Generally, the sound is related to maximum cavitation within the Sonolator™, however, tuning should be accomplished via the Meter as it is designed to detect sound levels from 10 to 100,000 Hertz and at times the best tune on the Sonolator™ will generate noises well above audible range.

Power

All Meters are designed to operate on a 9 volt battery or 110 volts 50/60 Hz or 220 volts 50/60 Hz. The meter is shipped from the factory wired for the voltage specified.

If conversion from 9 VDC to 110 VAC is desired, or vice versa, the meter should be returned to the factory, as modifications to the internal circuitry are required.

If the meter is wired for AC. Operation, the power source used may be 110 volts or 220 volts without any adjustment.

Care & Handling

Although the IN-3005 Series Meters are much more rugged than earlier designs, they are still precision instruments and should be treated accordingly. Transducers should also be handled with care, as the crystal may be broken or cracked if dropped.

Troubleshooting

1.

Unit doesn't respond to Test Button—Check battery or power source.

2.

Unit doesn't register, although Test Button sends readout to full scale—

Range Control Knob set to high.

Cable not tightly connected to meter or probe.

Water or dirt in probe connector.

Cable broken or pinched.

Probe broken, cracked, or over pressured (noticeable dimple in detecting surface.)

Fluid pressure may be lower than 250 psi which usually is too low to generate cavitation.

Fluid viscosity may be so high that sound is completely damped out or absorbed. This usually occurs with dispersions having very high solids loading.

3.

Meter reading not consistent from day to day—

Condition is normal and no cause for concern. Frequently a Sonolator will tune with, say, a reading of 0.7 in the third range. When the unit is turned on the following day under seemingly identical circumstances, the meter can be peaked at only .3 in the third range. It is true that something has changed, but change could be battery voltage, slight orifice wear, product temperature, and is probably not significant so long as the orifice pressure is the same.

THE METER IS EXTREMELY SENSITIVE AND IS USED ONLY FOR RELATIVE PEAKING PURPOSES TO TUNE THE SONOLATOR. IT DOES NOT PROVIDE AND IS NOT INTENDED TO PROVIDE ANY ABSOLUTE MEASUREMENT OF ACOUSTIC INTENSITY.