



DIGITAL ULTRASOUND WATTMETER



USP-50SP

USER MANUAL

**BC BIOMEDICAL
USP-50SP ULTRASOUND WATTMETER
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WARNING - USERS

The USP-50SP is for use by skilled technical personnel only.

WARNING - USE

The USP-50SP is intended for testing only and should never be used in diagnostics, treatment or any other capacity where it would come in contact with a patient.

CAUTION - MODIFICATIONS

The USP-50SP is intended for use within the published specifications. Any application beyond these specifications or any unauthorized user modifications may result in hazards or improper operation.

CAUTION - SERVICE

The USP-50SP is intended to be serviced only by authorized service personnel. Troubleshooting and service procedures should only be performed by qualified technical personnel.

CAUTION - ENVIRONMENT

Exposure to environmental conditions outside the specifications can adversely affect the performance and accuracy of the USP-50SP. If the unit is outside the Operating Specifications, allow it to acclimate to specified conditions for at least 30 minutes before attempting to operate it.

CAUTION - INSPECTION

Inspect the USP-50SP before each use for wear. It should be serviced if any parts are in question.

CAUTION - LIQUIDS

Do not submerge or spill liquids on the USP-50SP.
Do not operate the USP-50SP if internal components not intended for use with fluids may have been exposed to fluid, as the internal leakage may have caused corrosion and be a potential hazard.

CAUTION - CLEANING

Do not immerse. The USP-50SP should be cleaned by wiping gently with a damp, lint-free cloth. A mild detergent can be used if desired.

NOTICE – SYMBOLS

<u>Symbol</u>	<u>Description</u>
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Center Negative



Per European Council Directive 2002/95/EC, do not dispose of this product as unsorted municipal waste.

NOTICE – ABBREVIATIONS

C	Celsius
°	degree
DUT	Device Under Test
F	Fahrenheit
g	gram(s)
IEC	International Electrotechnical Commission
kg	kilogram(s)
MHz	Megahertz
mm	millimeter(s)
mW	milliwatt(s)
PPM	Parts Per Million
Lbs	pounds
USA	United States of America
V	Volt(s)
VAC	Volt(s) Alternating Current
VDC	Volt(s) Direct Current
W	Watt(s)

NOTICE – DISCLAIMER

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NOTICE – CONTACT INFORMATION

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INTRODUCTION

The Model USP-50SP Ultrasound Power Meter is designed to measure the ultrasonic power output of diagnostic or therapeutic transducers up to 30 Watts. The principle of measurement is the radiant force method. The USP-50SP uses a positioning clamp to hold the transducer in degassed water above a conical target. The ultrasonic energy passes through the water to reflect off the target and is then absorbed by the rubber lining. The radiant power is directly proportional to the total downward force (weight) on the target. This force is then transferred through the target support assembly to the electro-mechanical load cell inside the scale. The cell is in a computer-controlled feedback loop and produces a digital readout; Watts of power (custom units) or grams of force. The choice of units (Watts or grams) is selected by front panel pushbuttons.

TEST SETUP

Water as a Measurement Medium*

The measurements are to be performed in water because ultrasound propagation in water closely approximates that in tissues. The ultrasonic attenuation in water can be taken as a lower limit on the attenuation that will be encountered in the body. Large areas in the body can consist of low attenuating material such as urine and amniotic fluid. The use of water prevents measurements in a more highly attenuating material, such as liver equivalent gels, from representing the highest possible intensities that might be encountered in the body.

* Ultrasound propagation in water closely approximates human tissue and degassed water is the generally accepted test medium for ultrasound transducers (see AIUM/NEMA Standards Publication #UL-1-1981, SAFETY STANDARD FOR DIAGNOSTIC ULTRASOUND EQUIPMENT).

Degassed Water

Ultrasound Power measurement accuracy is affected if the water contains more than 5-10 PPM of air. To degas, boil distilled water for 30 minutes, then seal the container tightly and place it in a refrigerator. An alternate method of degassing water is to heat the water to the boiling point, then pull a vacuum on it for five to ten minutes. The degassed water storage container should be made of glass or plastic. Polystyrene containers should not be used since they allow oxygen to permeate and degrade the water quality.

Before testing, pour water into tilted test tank with minimum amount of turbulence. The test tank water surface will absorb oxygen, therefore a change of degassed water is recommended before each test. Water temperature affects accuracy, so it is

recommended to use an ambient testing temperature of 24.0 ± 3.0 °C (75.2 ± 5.4 °F). Sonic energy agitates the water surface through heating and scattering. The time duration of each test should be limited to a few minutes. Prolonged testing, particularly at higher power levels, will show visible signs of air bubbles on the transducer, target, and the absorbing rubber surface.

Transducer Wetting and Placement

To avoid introducing air into the degassed water, insert the transducer at a 45° angle, then position so it is facing the target. Verify that the transducer surface is uniformly wetted, if not, wipe the surface clean using your finger. The transducer should be pointed toward and center-positioned directly above the cone target. Small measurement variations will occur due to placement of the transducer. Try various positions above the target to minimize the magnitude of error due to positioning.

LAYOUT



1. **On/Zero - Off** Button: Press to turn unit on or zero, press and hold until OFF is displayed then release to turn off.
2. **Unit Button**: Press and hold then release when desired unit is displayed.
 - "g" = grams
 - "c" = custom = Watts
3. 7 Segment, 6 digit display: Displays readings.
4. Stability Indicator: Displays once the scale is stabilized and ready to take a measurement.

TESTING

1. Place the USP-50SP on a stable and level surface. Avoid air currents and mechanical vibrations. Level the unit.
2. Loosen the transducer positioning clamp and move it out of the way. Position the tank on the rubber circle.
3. Fill the test tank to $\frac{1}{4}$ inch (6.4 mm) below the top of the tank liner with fresh degassed water at a temperature of 24.0 ± 3.0 °C (75.2 ± 5.4 °F).
4. Plug the AC Adapter into a power outlet, and plug the cord into the power jack at the rear of the unit (unless operating from battery power).
5. Lower the cone target into the concentric target support sleeve located behind the test tank (small tube inside of larger tube), while simultaneously placing the cone target into the tank. If the cone can swing in an arc, it is not down far enough. Tip the rod back and forth slightly to fully engage the rod. Press the **ON/Zero - Off** button to zero the unit.
6. To avoid introducing air into the degassed water, insert the transducer at a 45° angle. Then position so it is facing the target $\frac{1}{8}$ to $\frac{1}{4}$ inch (3.2 to 6.4 mm) below the water level, parallel to the water surface, and directly above the center of the cone. Check the transducer surface for uniform wetting (no air pocket or bubbles should be on its surface).
7. Allow 5 minutes for the scale to stabilize. With no ultrasonic power applied to the transducer, press the **ON/Zero - Off** button to zero the unit.
8. Check response by placing the 1 gram weight on the arm of the cone target (the flat part that is out of the water). The USP-50SP should read 1.00 ± 0.10 grams.
9. Remove the 1 gram weight.

10. After the display's stability indicator is shown, activate the DUT and record the measurement. It is a good practice to take three readings and average them. If measurement conditions are not stable, use the grams mode and multiply the readings by 14.65 to obtain Watts.
12. When finished, unplug the USP-50SP, empty the tank, and place the dry target cone in the tank for protection.

MANUAL REVISIONS

<u>Revision #</u>	<u>Revisions Made</u>
Rev 01	Origination
Rev 02	Misc. Edits, Format Updated
Rev 03	Misc. Edits, Format Updated, Pictures Updated

LIMITED WARRANTY

WARRANTY: BC GROUP INTERNATIONAL, INC. WARRANTS ITS NEW PRODUCTS TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP UNDER THE SERVICE FOR WHICH THEY ARE INTENDED. THIS WARRANTY IS EFFECTIVE FOR TWELVE MONTHS FROM THE DATE OF SHIPMENT.

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SPECIFICATIONS

ULTRASONIC POWER MEASUREMENT	
POWER RANGE	0 to 30 W
RESOLUTION	±50 mW
MINIMUM DETECTABLE POWER LEVEL	50 mW
ACCURACY	±3% + One Count Reading
DIGITAL FILTER	2.5 seconds Integration
DUT OPERATING FREQUENCY	0.5 to 10 MHz
DUT MAXIMUM TRANSDUCER SIZE	4.00 Inches (101.6 mm)
TEST MEDIUM	Degassed Water @ 24.0 ±3.0 °C (75.2 ±5.4 °F)

ELECTRICAL	
BATTERY	Quantity 4, AA (IEC LR6) Alkaline
BATTERY ELIMINATOR	12 VAC, 500 mA BC20-40337 (USA) BC20-40341 (EURO)

PHYSICAL & ENVIRONMENTAL		
DISPLAY	6-digit, Backlit LCD	
CONSTRUCTION	TANK LINING	0.5 Inch (12.7 mm) thick Neoprene
	CARRYING CASE	Molded Polyethylene
SIZE	OVERALL (Including case): 17.00 x 13.00 x 6.00 Inches (431.8 x 330.2 x 152.4)	
WEIGHT	OVERALL (Including case): < 10.0 Lbs (4.5 kg)	
OPERATING RANGE	15 to 30 °C (59 to 86 °F)	
STORAGE RANGE	-40 to 60 °C (-40 to 140 °F)	

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