A/C And D/C Powered Quattro-DB® Sonic Transducer System
Assembly and Operations Instructions Manual

ECO DRIVEN SOLUTIONS®

IMPORTANT:

Read entire manual before assembling. Failure to follow these instructions, and in the order presented, may result in non-warranty product failure.

Some User Supplied Components, such as A.C. Line Surge Suppressors are required.

Printed material may not represent the latest information available. Please contact Devon Assael at devon@sonicsolutionsllc.com for updates.

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SONICSOLUTIONS® LLC
Algae Control Without Chemicals

Congratulations on your purchase of an environmentally safe Mezzo & Quattro-DB ultrasound units which uses a patent pending configuration of ultra-high frequency sound pressure waves to manage algae without harm to aquatic life such as fish and or animals.

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1. ITEM AND RECEIVABLE PARTS LISTS

Carefully unpack contents from their shipping skids and cartons and verify contents against one of the lists below, corresponding to the Product Purchase you received. Save skids and cartons in the event a return, exchange, or warranty is requested.

1.1. SINGLE QUATTRO-DB® TRANSDUCER SYSTEM

ITEM DESCRIPTION	QTY
• BLACK FLOATATION KIT ASSEMBLY	1
○ Float	1
○ Flag And Flag Pole – Region and Language Specific	1
○ Chain-Link Mount Hardware Kit (nut and screw bolt)	1
• QUATTRO-DB® SONIC TRANSDUCER KIT ASSEMBLY	1
○ Stainless Steel D-Shackles	2
○ 6 inch (152mm) Stainless Steel Chain	1
○ Stainless Steel Carabiner Clip	1
○ Nylon Cable Ties	4
• 120V OR 230V A/C POWER SUPPLY	1
○ Power Supply Mounting Hardware Kit	1
○ **Line Surge Suppressant (User Supplied)**	1
• QUATTRO-DB® TRANSCUDER POWER CABLE	1
○ Length of cable is customer order dependent	1

1.2. DUAL QUATTRO-DB® TRANSDUCER SYSTEM

ITEM DESCRIPTION	QTY
• BLACK FLOATATION KIT ASSEMBLY	2
○ Float	2
○ Flag And Flag Pole – Region and Language Specific	2
○ Chain-Link Mount Hardware Kit (nut and screw bolt)	2
• QUATTRO-DB® SONIC TRANSDUCER KIT ASSEMBLY	2
○ Stainless Steel D-Shackles	4
○ 6 inch (152mm) Stainless Steel Chain	2
○ Stainless Steel Carabiner Clip	2
○ Nylon Cable Ties	8
• 120V OR 230V A/C POWER SUPPLY	1
○ Power Supply Mounting Hardware Kit	1
○ **Line Surge Suppressant (User Supplied)**	1
• QUATTRO-DB® TRANSCUDER POWER CABLE	2
○ Length of cable is customer order dependent	2

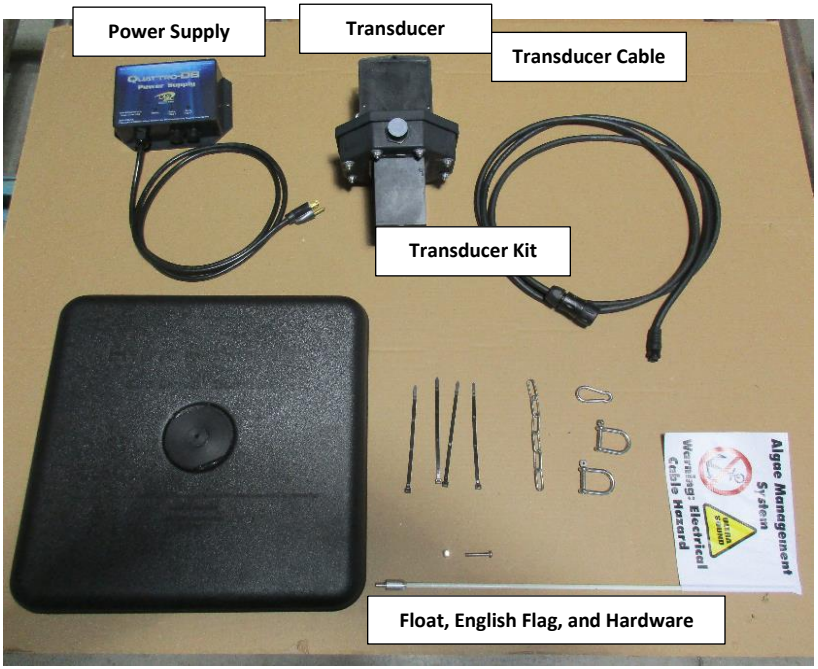
Note: Up to two QUATTRO-DB® Transducers can be installed to operate from one A/C Power Supply. Therefore, only one Power Supply is included.

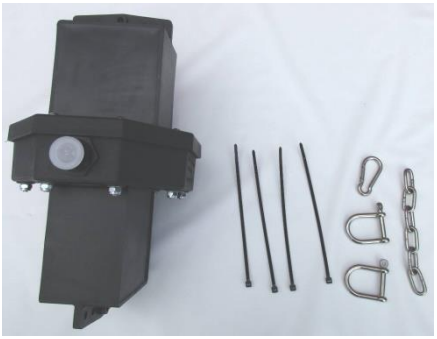
1.3. MEZZO-QUATTRO® TRANSDUCER SYSTEM

ITEM DESCRIPTION	QTY
• BLACK FLOATATION KIT ASSEMBLY	1
○ Float	1
○ Flag And Flag Pole – Region and Language Specific	1
○ Chain-Link Mount Hardware Kit (nut and screw bolt)	1
• MEZZO-QUATTRO-DB® SONIC TRANSDUCER KIT ASSEMBLY	1
○ Stainless Steel D-Shackles	2
○ 6 inch (152mm) Stainless Steel Chain	1
○ Stainless Steel Carabiner Clip	1
○ Nylon Cable Ties	4
• 120V OR 230V A/C POWER SUPPLY	1
○ Power Supply Mounting Hardware Kit	1
○ **Line Surge Suppressant (User Supplied)**	1
• QUATTRO-DB® TRANSCUDER POWER CABLE	1
○ Length of cable is customer order dependent	1

Note: A Mezzo-Quattro-DB® Transducer emits only in 2 directions and is approximately half the size of a Quattro-DB® Transducer.

1.4. SINGLE QUATTRO-DB® TRANSDUCER SYSTEM PHOTO





Quattro-DB® Sonic Transducer with Dust Cover and Hardware

Float with Flag and Hardware

120V A/C Power Supply With 3 Meter Transducer Power Cable

2. PRODUCT REGISTRATION

Upon removing from packaging, record the following information here for convenient reference, or if an adhesive label was supplied with your kit, affix that label within the box:

Purchase Date: _____
Purchased From: _____
A.C. Power Supply Part Number: _____
A.C. Power Supply Serial Number: _____
Transducer Part Number: _____
Transducer #1 Serial Number: _____
Transducer #2 Serial Number: _____

3. USER SAFETY OPERATIONS GUIDE

⚠ **Look for this symbol throughout this manual. It means 'BE ALERT – YOUR SAFETY IS INVOLVED'. If you do not follow these safety instructions, personal injury or property damage may occur.**

3.1. USER SAFETY GUIDE – A/C POWERED SUPPLIES AND A/C POWERED BATTERY CHARGERS (IF SUPPLIED)

3.1.1. Both the Mezzo and Quattro-DB® Transducers (that device which is suspended in the body of water) is power by a safe low voltage source. Notwithstanding the low voltage source, the entire electronics are fully isolated from contacting the body of water. The method by which algae is treated in the body of water is also, not reliant on conducting any electric currents through the water.

3.1.2. Do not operate the A/C Power Supply or Battery Charger if it has received a sharp blow, was dropped or otherwise damaged in any manner. Refer to a qualified service agent.

3.1.3. A/C Power Supply and Battery Charger contains no serviceable parts. If it fails during its warranty period, contact your dealer OEM Supplier or contact SonicSolutions LLC at 413-247-9423 for information concerning how to obtain a warranty replacement.

3.1.4. To reduce risk of electric shock, unplug A/C Power Supply or Battery Charger from AC outlet before attempting any maintenance or cleaning.

3.1.5. For external cleaning use a clean damp towel.

3.1.6. Have your distributor, dealer or other qualified service agent, repair or replace worn or damaged parts immediately. Repairs should not be attempted by people who are not qualified.

3.1.7. Whenever removing AC Plug from the receptacle, pull from the Plug Body; not from the cord.

3.1.8. Do not operate the A/C Power Supply or Battery Charger or any component attached to it if it is malfunctioning. Personal injury or property damage could result.

3.2. A.C. AND UTILITY REQUIREMENTS

3.2.1. The use of an improper extension cord could result in a risk of a fire or electric shock. If an extension cord must be used, it must be UL and/or CSA approved. Locate all cords so that they will not be stepped on, tripped over or otherwise subjected to damage or stress. Extension cord must be properly wired and in good electrical condition, and large enough for the A/C rating of the Power Supply as specified in this TABLE:

RECOMMENDED MINIMUM AWG SIZE FOR EXTENSION CORDS FOR A/C POWER SUPPLY

Length of cord (feet):	25	50	100	150
AWG size of cord:	16	16	16	14

3.2.2. Refer to the Product ID Label affixed to the product and identify the input requirements such as '120Vac, 60Hz, 2Amps'. Ensure that the product will be connected to a matching utility power rating. For example; if product is rated at 60Hz, do not connect to a 50Hz utility.

3.2.3. The rating of the input A.C. Cord, if replaced by a certified technician, must not be less than 18Ga, 300V for 100Vac or 120Vac utilities and not less than 18Ga, 300V for 230Vac or 240Vac utility power. Cord must be hard usage SJT type or better, UL/CSA approved.

3.2.4. Do not connect product to AC receptacles that share power with any other moderate to heavy loads such as air conditioners, motors and other common appliances. Most appliances turn on/off at random and cause power surges and power droops that can severely affect the product connected to that same power circuit.

3.2.5. Inspect AC Receptacles for general wear, including loose or hanging receptacles and be very aware of potentially worn contacts. If any heat is felt in and around the receptacle while the A/C Power Supply is operating, this is an immediate indication of danger caused by a worn receptacle.

3.2.6. If making an electrical connection to a receptacle located near the body of water intended to be treated, install both the GFCI protected receptacle and A/C Power Supply in a covered weatherproof utility box or container and secure the A/C Power Supply using the Mounting Hardware Kit – supplied.

⚠ **IMPORTANT: SURGE SUPPRESSANT DEVICE MUST BE USED.**

AC-Line surges are real and are generated from nearby equipment and weather-related phenomena and can cause NON-WARRANTY failure of the Power Supply. User must supply and install a surge suppressor rated at 1500J or greater. These devices are readily available from any retailer outlet.

3.3. SAFE GROUNDING AND GFCI INSTALLATION INSTRUCTIONS

3.3.1. Do not remove Ground Pin from A/C Power Supply's A.C. Plug, or connect to utility power via an adaptor that bypasses the product's ground pin connection. The product must be grounded at all times when connected to utility power.

3.3.2. This battery charger must be grounded to reduce the risk of electric shock. This charger is equipped with an AC cord set having an equipment-grounding conductor. This AC cord set must be connected to an appropriate receptacle that is properly installed and grounded in accordance with the National Electrical Code and all local codes and ordinances.

3.3.3. The conductor with insulation having an outer surface that is green, with or without yellow stripe(s), is the equipment-grounding conductor. If repair or replacement of the A/C Power Supply's AC cord set is necessary, refer to a qualified service agent, and do not connect the equipment-grounding connector to a live terminal.

3.3.4.  **WARNING: IMPROPER CONNECTION OF THE EQUIPMENT-GROUNDING CONDUCTOR CAN RESULT IN A RISK OF AN ELECTRIC SHOCK.**

3.3.5.  **WARNING: Risk of Electric Shock. Install A/C Power Supply only to a Class A GFCI (EU/UK Earthed Power Supply Source) and in accordance with Country, State and Local regulations. GFCI Receptacle must have an enclosure that is weatherproof with an attachment plug cap inserted or removed.**

3.4. USER SAFETY OPERATIONS GUIDE – BATTERIES AND BATTERY CHARGERS

WARNING – RISK OF EXPLOSIVE GASES.

WORKING WITH RECHARGEABLE BATTERY(s) IS DANGEROUS. EXPLOSIVE GASES DEVELOP DURING NORMAL BATTERY OPERATION. READ THIS MANUAL EACH TIME AND MAKE CERTAIN YOU FULLY UNDERSTAND IT AND FOLLOW THE SAFETY AND OPERATING INSTRUCTIONS AT ALL TIMES.

3.4.1. To reduce risk of battery explosion, follow all safety instructions below and those published by the battery manufacturer. Review cautionary markings on vehicle or equipment containing the battery.

3.4.2. Use of an attachment not recommended or sold by the battery charger manufacturer may result in a risk of fire, electric shock or injury to persons.

3.4.3. Do not operate this charger if it has received a sharp blow, was dropped or otherwise damaged in any manner. Refer to a qualified service agent.

3.4.4. Charger contains no serviceable parts. If it fails during its warranty period, contact your dealer OEM Supplier or contact SonicSolutions LLC at 413-247-9423 for information concerning how to obtain a warranty replacement.

3.4.5. To reduce risk of electric shock, unplug charger from AC outlet before attempting any maintenance or cleaning.

3.4.6. For external cleaning use a clean damp towel.

3.4.7. Have your distributor, dealer or other qualified service agent, repair or replace worn or damaged parts immediately. Repairs should not be attempted by people who are not qualified.

3.4.8. Whenever removing AC Plug from the receptacle, pull from the Plug Body; not from the cord.

3.4.9. Do not operate the charger if it is malfunctioning. Personal injury or property damage could result.

3.5. Personal Precautions While Working With Batteries

3.5.1. Have someone within range of your voice to come to your aid if needed.

3.5.2. Have plenty of fresh water and soap nearby in case battery acid contacts your skin, clothing or eyes. Wear eye and clothing protection and avoid touching eyes.

3.5.3. If battery acid contacts skin or clothing, wash immediately with soap and water.

3.5.4. If acid enters eye, immediately flush eye with running cold water for at least 10 minutes. Get medical attention immediately.

3.5.5. NEVER smoke or allow a spark or flame in vicinity of battery.

3.5.6. Be extra cautious not to drop a metal tool onto battery. It might spark or short circuit battery or other electrical part that may cause an explosion.

3.5.7. Remove personal metal items such as rings, necklaces, watches, etc. Batteries can produce short-circuit currents high enough to weld such items causing a severe burn.

3.5.8. NEVER charge a frozen battery. Thaw it out for safer and more efficient charging.

⚠ **WARNING –** CHARGERS CAN IGNITE FLAMMABLE MATERIALS AND VAPORS. DO NOT USE NEAR FUELS, GRAIN DUST, SOLVENTS, OR OTHER FLAMMABLES.

3.6. TRANSDUCER PRODUCT USER SAFETY INSTRUCTIONS

3.6.1. ⚠ **WARNING: The Transducer emits powerful vibratory energy – DO NOT place the Transducer against your skin or body, nor touch the Transducer while the Transducer is powered**

3.6.2. ⚠ **WARNING: Locate/route all cords where they will not be tripped over or damaged by vehicles or equipment with cutting blades such as lawn mowers and hedge clippers and away from vehicle traffic to prevent being driven over. If you have water animals (beavers, minks, nutria, otters, muskrats, turtles, etc.) in your water system, additional cable protection is recommended such as a nylon or polyester braided sheath from the surface down to about 2 meters (6 feet) depth.**

3.6.3. ⚠ **WARNING: If installing underground electric utility power to a receptacle near a body of water such as a pond, lake, pool or reservoir, an armored cable run through conduit must be used to minimize risk of damage and installed in accordance with Country, State and Local regulations.**

3.6.4. ⚠ **WARNING: Never connect or disconnect Transducer and its Power Cable to or from the A/C Power Supply while A/C Power Supply is on and putting out power. Doing so will cause the contact pins to arc and disfigure causing potentially non-warranty damage to the connection pins.**

3.6.5. Do NOT attempt to force connections. Each connector should only fit one way by aligning the letters or notches described, then turn the outer ring on connectors until it clicks and tightens in place.

4. TOOLS AND MATERIALS LIST

1. Philips Head Screwdriver
2. 3/8" Open Ended Wrench
3. Flush Cut (Side-Cutter) Trimmers
4. Electrical Contact Lubricant / Dielectric Grease – **NSF-61 Marine Grade ONLY**
5. NSF61- Marine Grade Only Anti Seize
6. Paint Brushes for material application

5. ALGAE MANAGEMENT SYSTEM ASSEMBLY INSTRUCTIONS

5.1. ATTACH TRANSDUCER TO THE FLOAT ASSEMBLY

5.1.1. Remove the dust cover on Transducer 5-Pin Male Connector.

5.1.2. Locate the Transducer Power Cable and attach its 5 Pin Female Connector to the Transducer 5-Pin Male Connector. Align and match the key-notch plug and receptacle, push in, and rotate the outer ring until it is FIRMLY HAND TIGHT THREADED into place - Figure 1.

5.1.3. Attach D-Shackles to the center holes at the top and bottom of the Transducer – Figure 2.

5.1.4. Attach Carabiner Clip (aka Snap Clip) to top D-Shackle – Figure 3.

5.1.5. Attach one end of Chain to Stainless Steel Carabiner Clip – Figure 3.

5.1.6. Attach other end of Chain to hardware on bottom of Float Assembly – Figure 3, using Philips Head Screwdriver and 3/8" Open-End Wrench.

5.1.7. Create a strain relief by making a radial bend with the cable, securing it to the remaining bottom holes of the Transducer with Cable Ties. Cut the excess of the cable ties with flush cut trimmers – Figure 4 and Figure 5.

5.1.8. Attach customer-supplied anchor to bottom D-Shackle.

5.1.9. Screw Flag Assembly into top of Float Assembly.

5.1.10. The assembly of Quattro-DB® Transducer to Float is complete

Figure-1

Figure-2

Figure-3

Figure-4

Figure-5

5.2. ATTACH TRANSDUCER/FLOAT TO A/C POWER SUPPLY

IMPORTANT!

To avoid non-warranty damage to connector pins, A/C Power Supply MUST be disconnected from A.C. Utility Power while Transducer Power Cable is being connected or disconnected from A/C Power Supply connectors. Do NOT plug in the Power Supply until instructed to do so.

5.2.1. With the Transducer Power Cable already connected to the Transducer, locate the other end of the Transducer Power Cable. It will be terminated with a 4-Pin Male Connector.

5.2.2. Connect the 4-Pin Male connector (Figure 6) to the A/C Power Supply Connector Port labeled **"Sonic Head 1"**. If your system is a Dual QUATTRO-DB® product, a second Transducer was included with your product. Repeat this step with the second Transducer by connecting its 4-Pin Connector to the A/C Power Supply Connector Port labeled **"Sonic Head 2"**.

5.2.3. **Make sure that all connections are secure before continuing - Figure 7**.

5.2.4. Place the Transducer/Float Assembly(s) in the predetermined location of the body of water to be treated.

5.2.5. Plug in the 120V or 230V A/C Power Supply to a grounded and properly installed GFCI receptacle outlet.

5.2.6. The Red "Power" LED will illuminate to indicate the A/C Power Supply is receiving utility power from the receptacle.

5.2.7. The blue LED above "Sonic Head 1" on the A/C Power Supply will blink at a rate of approximately once per second to indicate that the Transducer is operational.

Figure 6

Figure 7

5.3. ATTACH TRANSDUCER/FLOAT TO D/C BATTERY CHARGER CONTROLLER

IMPORTANT!

To avoid non-warranty damage to connector pins, Battery Charger Controller's On/Off Power Switch MUST be put into the 'OFF' position while Transducer Power Cable is being connected or disconnected from Battery Charger Controller Supply connectors. Do NOT switch On/Off Power Switch to 'ON' until instructed to do so.

5.3.1. Review the figure depicting 'CHARGER CONTROLLER INTERCONNECTION AND SYSTEM SCHEMATIC', below – Figures 8 and 9.

5.3.2. With the Transducer Power Cable already connected to the Transducer, locate the other end of the Transducer Power Cable. It will be terminated with a 4-Pin Male Connector.

5.3.3. Connect the 4-Pin Female connector (Figure 8) to the **Battery Charger Controller** 4-Pin Female Connector Port labeled **"Sonic Head 1"**. If your system is a Dual QUATTRO-DB® product, a second Transducer was included with your product. Repeat this step with the second Transducer by connecting its 4-Pin Connector to the **Battery Charger Controller** Connector Port labeled **"Sonic Head 2"**.

5.3.4. **Ensure all connections are secure before continuing**.

5.3.5. Place the Transducer/Float Assembly(s) in the predetermined location of the body of water to be treated.

5.3.6. Connect **Battery-To-Charger Controller Cable** to the **Charger Controller** 4-Pin Male Connector labeled 'Battery', first – Figures 8 and 9.

5.3.7. Connect the other end of **Battery-To-Charger Controller** Cable flying leads to the battery pack (Also, refer to Figure 9):

5.3.7.1. Red Ring Terminal lead with in line fuse connects to the Battery Pack Positive (+, POS) terminal.

5.3.7.2. Black Ring Terminal lead without in-line fuse connects to the Battery Pack Negative (-, NEG) terminal.

5.3.7.3. A separately supplied fuse now needs to be inserted into the In-Line Fuse Holder

5.3.8. With all connections now made, switch the **Battery Charger Controller's On/Off Power Switch** to 'ON'.

5.3.9. The **Battery Charger Controller's** LED's will now become active. Refer to the section detailing **Battery Charger Controller's** operation for a description of LED status and error display.

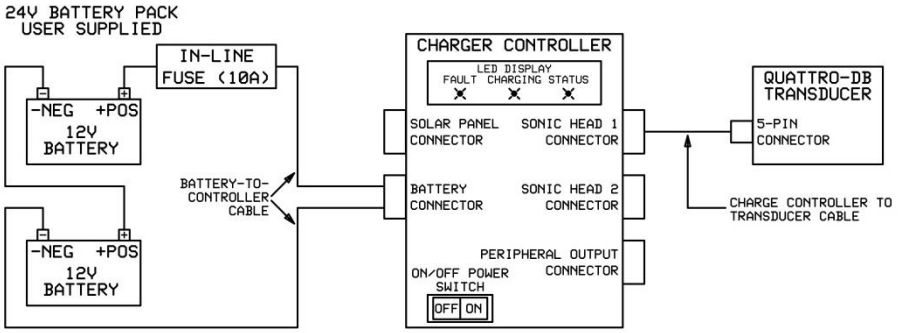
5.3.10. The Blue LED above "Sonic Head 1" on the Battery Charger Controller will blink at a rate of approximately once per second to indicate that the Transducer is operational.

Figure 8

Connector names from left to Right:

SOLAR PANEL 3-Pin Male	BATTERY 4-Pin Male	SONIC HEAD-1 4-Pin Female	SONIC HEAD-2 4-Pin Female	PERIPHERAL O/P 3-Pin Female

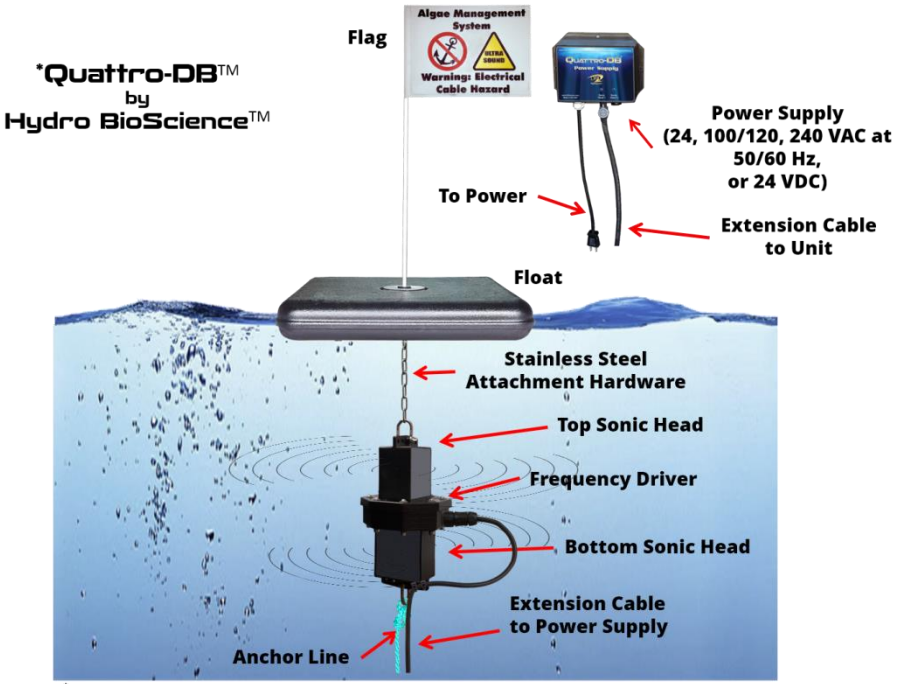
FIGURE-9 CHARGER CONTROLLER INTERCONNECTION AND SYSTEM SCHEMATIC



6. USERS GUIDE TO INSTALLING AND USING THE MEZZO & QUATTRO-DB ALGAE MANAGEMENT SYSTEM

6.1. Any anti-seize, dielectric grease, lubricants and cleaners used, must conform to NSF-61 Marine Grade. Installing the Quattro-DB®

The Quattro-DB® essential parts and basic configuration:



*Patent Pending

6.1.1. **POWER SUPPLY MODULE:** This can be AC or DC electrical input. AC inputs include 24Vac, 100/120Vac and 230/240Vac service at 50 or 60 Hz. DC input is 24Vdc via solar or batteries (typically two 12Vdc batteries in series. The power supply converts input power to 40Vdc needed to power the sonic head. These modules are water resistant, but would be best placed in a covered enclosure. Each power module has two outlets and can power a single or a dual output labeled **Sonic Head 1** and **Sonic Head 2**. Connected outlet Blue LED will blink approximately once every second.

Blinking Blue LED Lights indicate sonic head has power and is operating correctly.

Output cable connector to Sonic Head.

6.1.2. **Sonic Head:** This contains the electronics which produce the ultrasonic output signal via the top and bottom emitters. Serial # is etched on the octagonal box.

6.1.3. **Float:** This provides buoyancy for the sonic head (transducer) and cable. The placement of the device is normally away from the bank so that there is a line of sight from the device to as much of the shoreline as possible. An optional flag is included for warning boat traffic if applicable. The flag screws into the top of the float.

6.1.4. **Attachment Hardware:** A stainless steel chain, carabiner and shackles are provided to connect the float to the Quattro-DB® sonic head. Zip ties are provided to secure cable to bottom rail of sonic head.

SS Chain. Top link to SS bolt on float bottom. Carabiner on last chain link and attached to top shackle.

6.1.5. **Anchor:** To keep the device in place in a body of water, a small anchor/weight must be purchased separately. A 5 to 8 lb. (2.3-3.6 kg) anchor will be adequate. Use a twisted or hollow braid poly rope to connect to the float or bottom of the sonic head. If waters can be rough, use 3-6 feet (1-2 meters) of galvanized chain to better secure the anchor and to allow the chain to buffer the up and down wave motion.

6.2. Placement of the Device:

6.2.1. The Quattro-DB® unit will typically best operate near the center of the pond or from a point in the pond where all the cove banks can be seen in a line of sight. The ultrasonic sound waves leave the device in a near radial pattern that would form a circle around it.

6.2.2. The range capability for the device for green algae and diatom type algae is 150 meters (490 ft) in all directions. In this range the typical action on these algae types is to cause a tear between the fluid pressure control and the inner bladder wall called a plasmalemma. This disables the algae to maintain internal fluid pressure which causes it to begin to die.

6.2.3. The range capability for blue-green algae with gas vesicles (easily broken gas tubes in the algae cells) is 400 meters (1310 ft) in all directions. In this range the cells will lose buoyancy and sink to the bottom. The high frequency bandwidth of the device will help break up the colonial forms of these blue-green algae which will speed up their control. Out of light, these algae will begin to lose the ability to create sufficient nitrogen supply and will cause them to fail.

6.2.4. The sound will not penetrate natural barriers such as islands or weed beds which will limit its capability behind such objects. The logical placement point for most ponds is in the center, so that the sound can travel to all banks with equal intensity. Oddly shaped ponds require a strategy to determine the placement point. Some examples showing best placement of the device are shown below: Placement of the Device:

6.2.5. Connect the cable ends to the power supply module and to the Quattro-DB® as indicated in the previous instructions. Place the unit at the optimum point for your application. If unsure, please contact or email customer support. Contact details are found in the Warranty Section. Anchor the device by leaving some slack in the anchor to account for any level changes that are typical for your water system. If this is a water treatment plant application, please contact us for recommendations for placement in your type of equipment.

6.3. Installation Site Example 1

6.4. Installation Site Example 2:

6.5. What To Expect After Installation

In 3-4 days, most blue-green algae will have lost their buoyancy and should be on or settling to the pond bottom. They can be re-suspended via aeration bringing them up to the light which can slow down the time it takes for them to fully die.
Green algae (filamentous types) and colonial types require 2-3 weeks before the damage results in them becoming brown. They will normally float to the surface at that point in the process due to bacteria invading their cells and beginning to gas them up like a cadaver. It takes about 7-10 days from that point before they are digested to the point that they lose buoyancy and sink. Some users will rake them out at that point or just let them settle to the bottom. If you do the latter, bioaugmentation can speed up the digestion process and help remove the biomass.

Diatoms react similarly to Green algae, but lose mobility quickly which hastens their dying process.

In water processing equipment, the ultrasound will be sensed by anaerobic bacteria as water turbulence. This will prevent the anaerobes from attempting colonization in a treated zone. Since the anaerobes start the process by forming the base layer of most biofilm colonies that include aerobic bacteria that are attracted to the anaerobic layer, this can be used to keep the equipment walls clean for long periods of time.

6.6. Power Supply And Charger Controller Operation:

IMPORTANT!

To avoid non-warranty damage to connector pins and sockets on the power supplies and cables – DO NOT DISREGARD THIS WARNING. The Mezzo And Quattro-DB® Transducers do not have a power switch in which to shut off power delivered to them because they are intended to be submerged in water. An ON/OFF Power Switch is located on the power supplies and must be in the 'OFF' position while making connections to, or removing connections from the power supplies. Otherwise, in-rush currents, while making Transducer connections, will cause non-warranty arcing and burning at the connector pins and sockets and permanently rendering the connection non-functional.

6.6.1. A.C. Input Type Power Supply Modules

- Red Power LED: Illuminates when connected to A.C. Power.
- Blue Sonic Head-1, 2 LED: Illuminates when its associated Sonic Transducer Head is operation. The Sonic Transducer sends a signal back to the Power Supply to communicate its state of health. If not flashing – refer to the Troubleshooting Section to diagnose inoperability.

6.6.2. D.C. Input Type Charger Controller Supply Modules

- Blue Sonic Head-1, 2 LED: Illuminates when its associated Sonic Transducer Head is operation. The Sonic Transducer sends a signal back to the Power Supply to communicate its state of health. If not flashing – refer to the Troubleshooting Section to diagnose inoperability.

- Peripheral Output LED: This is a flashing Beacon Light to help locate a floatation system after sunset, when dark and it flashes at a rate of approximately once per second. Also, through its associated connector, a constant current output source is available as an output to drive a much brighter LED Beacon/Warning Light accessories as used on floatation systems in large water body installations. Contact Customer Service for illumination device accessory selections.

- Charging And Error Status LEDs:
  - Orange Charging Power Level LED:
    - Blinks once when powering up
    - Illuminates continuously while charging and will remain illuminated until the batteries have reached full charge

- If, while charging and sunlight has diminished below a threshold where charging is severely limited, this indicator will turn off. Charging may still continue, but at a very slow rate.

- Red Fault LED and Green Status LED :
  - Illumination and or Flashing of either of these LEDs would indicate a particular mode of charging and or presence of an Error Condition.
  - If an Error is in effect, it may be due to a fault in the solar panel input power section, or battery charging system or load management where the loads have over discharged the battery pack and load was disconnected.
  - Battery Under-voltage – load has over discharged the battery. Possible contributors include: dirty solar panels, broken or loose interconnects in the wiring, or loss of input power due to lack of sunlight (weather).
  - Battery Over or Under-Temperature. Possible contributors include operation in very cold winter or a failed battery that is overheating.
  - A temperature sensor is installed on the battery pack – the cabling to the sensor may have been broken or disconnected
  - Other conditions may contribute to this error – refer to the Troubleshooting section and Customer Service for help
- The following chart explains the relationship between Fault and Status LEDs:

6.6.2.1. CONTROLLER STATUS / FAULT LED INDICATORS

CHARGER-STATUS	LED PULSES DURING A 3.5s PERIOD		DESCRIPTION
	STATUS LED	FAULT LED	
Stage 0 Charging	1-Flash per 3.5s	OFF	Battery Charging
Stage 1 Charging	1-Flash per 3.5s	OFF	Battery Charging
Stage 2 Charging	2-Flashes per 3.5s	OFF	Battery Charging
Stage 3 Charging	3-Flashes per 3.5s	OFF	Battery Charging
Charging Finished	ON	OFF	Charging Complete
Battery Present, but Detection Fault	1-Flash per 3.5s	1-Flash per 3.5s	Battery Temperature
Invalid Battery Temperature Fault	1-Flash per 3.5s	2-Flash per 3.5s	Temperature Sensor
Charge Timer Expiration	1-Flash per 3.5s	3-Flash per 3.5s	Charge Timer Fault
Battery Under-Voltage Fault	1-Flash per 3.5s	4-Flash per 3.5s	Battery Over Discharge

7. Maintenance Guide

7.1. The unit was designed to limit calcium carbonate crystal formation on the sound emitting surfaces. Some early field results show that biofilm formation on the device is possible. This has been seen on other ultrasonic devices in that the sound they emit away from the device tends to prevent biofilm everywhere but directly on the device (ground zero for the sound emission). For water treatment facilities, this may mean that you will need to wipe or brush off the unit periodically to remove biofilm from it. The biofilm has not been shown to cause loss of output of the device because it seems to pass through it easily (it is about 99% water) versus calcium carbonate formation (a water hardness crystal) that can begin to interrupt the sound emission by attenuating or distorting the sound.

7.2. The unit power module blinking blue LED light indicates that the frequency driver of the sonic head is working normally. If it stops blinking, check the line power supply to be sure the power is available, check the cable connections to see that they are securely connected and check the cable itself for any cuts or nicks. If no reason can be found to the non-operation, please contact SonicSolutions directly at 413-247-9423 for consultation on how to proceed.

7.3. Winterization: If your pond ices over during the winter, it is best to pull it out to prevent flowing ice from damaging the cable.

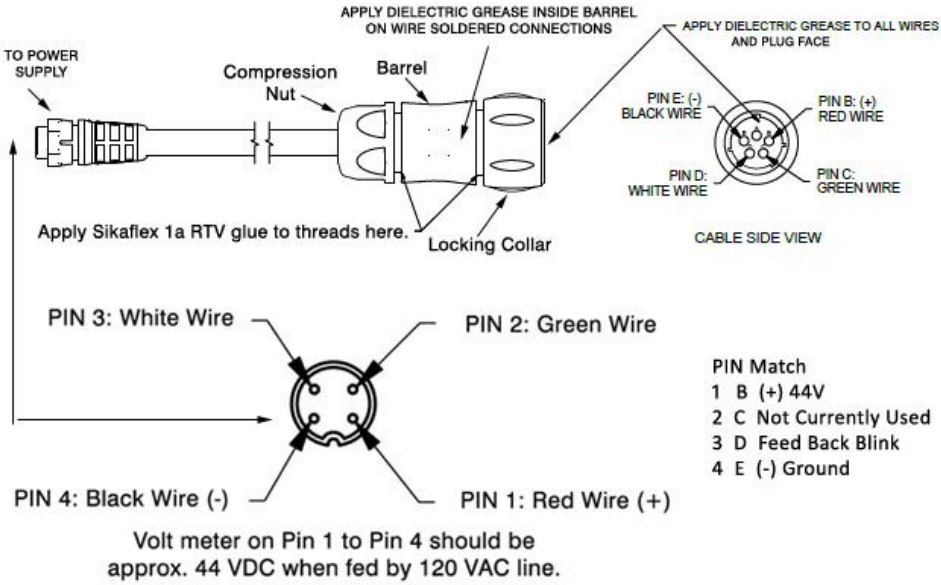
7.4. <u>Any anti-seize, dielectric grease, lubricants and cleaners used, must conform to NSF-61 Marine Grade.</u>

8. Troubleshooting Guide

8.1. Condition: Blue LED light is not blinking.

8.1.1. Check to see if power is available at 120 vac (or other line voltage) plug using a voltmeter, tester, plug in lamp or other means. If power is on, then plug in the Quattro-DB® power supply and go to the next step.

8.1.2. With the Quattro-DB® plugged in disconnect the cable that connects the power supply to the Quattro-DB® head. With a volt meter check the output voltage of the power supply by checking pins 1 and 4 (refer to the diagram below). The volt meter should be set for DC volts at a setting that will read approximately 42 to 44 Vdc.



9. Technical Specifications:

- Green Algae and Diatom Algae Control Range: 150 meters radially from the device or about 7 hectare or 17.5 acres.
- Blue-green Algae with gas vesicles Control Range: 400 meters radially from the device or about 50 hectare or 124 acres.
- Frequency ranges:
  - Bandwidth 1: Low ultrasonic range 24-58 kHz (1565 frequencies per cycle)
  - Bandwidth 2: High ultrasonic range 195-205 kHz (459 frequencies per cycle)
  - Total Frequencies per cycle: 2024
- Time per cycle: about 34 minutes
- Power consumed: 11.2 watts average on 120 volts AC (about $15 per year at $0.15/kwh)
- Peak instantaneous power - 50 watts.

10. LIMITED WARRANTY

IMPORTANT!

As with any electronics, protect against A.C. Power Line Transients with a surge protector or Uninterruptable Power Supply (UPS). Warranty does not cover damage arising from AC Power Surges or Brown-Outs.

SonicSolutions LLC warrants exclusively to the original purchaser, products will be replaced or repaired, at SonicSolutions LLC's option, if it fails during the warranty period beginning upon date of purchase due to a defect in material or workmanship. Warranty offered is as follows:

- Mezzo And Quattro-DB® Transducer Products, including Wire And Cable Assemblies:
  - 36 months of operation
- Mechanical (non-electrical) Type Products:
  - 60 months of operation
  - Includes Floats, Hardware, etcetera
- Power Supply (Electronic) Products:
  - 24 months
  - Includes A/C Power Supplies, D/C Power Supplies

In order for a claim to be processed the product must be returned to SonicSolutions LLC (i) with all transportation charges prepaid, (ii) accompanied by an acceptable proof of purchase, and with a Return Material Authorization (RMA) number, previously obtained from SonicSolutions LLC printed and clearly visible on the outside of the shipping container.

This warranty does not apply if the product has been modified, abused, or damaged or improperly or negligently used, connected, maintained, or operated in any manner contrary to the instructions stated in this manual or affixed to the product's enclosure. Repair or replacement as provided under this warranty is the exclusive remedy of the purchaser, and the purchaser shall have no claim against SonicSolutions LLC except for the breach of an express warranty stated herein.

SonicSolutions LLC shall not be liable for any incidental, consequential, or special damages for breach of any expressed or implied warranty. Except to the extent required by applicable law any implied warranty of merchantability or fitness for a particular purpose is limited in duration to the warranty period. Some states do not allow the exclusion or limitation of incidental or consequential damages or allow limitations on how long an implied warranty lasts, so the above limitations or exclusion may not apply to you.

This limited warranty gives you specific legal rights, and you may also have other rights which vary from state to state. APART FROM THE WARRANTIES SET FORTH ABOVE, SONICSOLUTIONS LLC MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO THE SUITABILITY OR MERCHANTABILITY OF THIS PRODUCT, THE FITNESS OR THIS PRODUCT FOR ANY SPECIFIC USE OR PURPOSE, OR ANY OTHER MATTER PERTAINING TO THIS PRODUCT.

Customer Service Contact, Request for RMA, Return Information:
:

SonicSolutions LLC
2 Bay Road, Suite 101
Hadley, MA 01035
RMA # _____

For further information, product updates, technical information, or general inquiries, please also visit our web site at:

www.SonicSolutionsllc.com