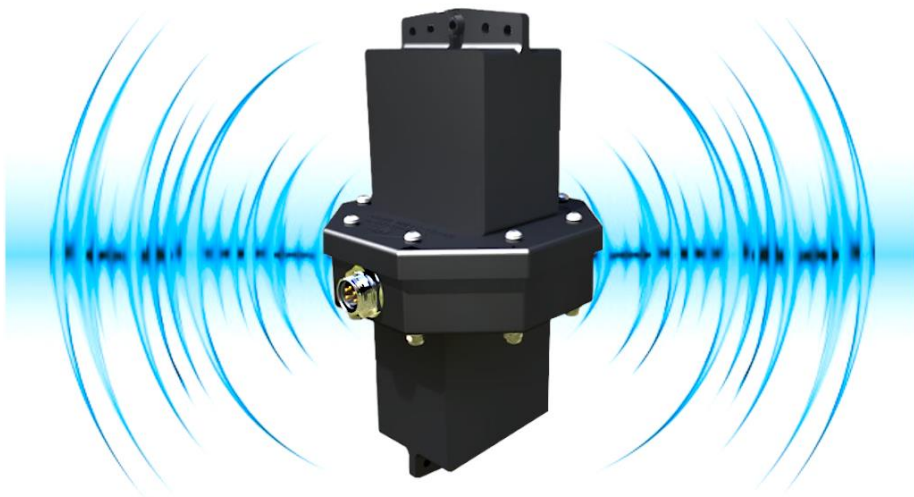




HYDRO BIOSCIENCE[®]

Eco Driven Solutions[®]

Ultrasonic Transducer Algae Control System **AC and DC Powered Mezzo-DB™/Quattro-DB[®]** **Assembly and Operations Manual**



EPA Co. No. 95328
Patent No. 10399867



For direct access to the latest copy of this manual, please snap this QR Code or refer to the *Product Manuals* section at:

www.AlgaeManagement.com or
www.DPIpower.com

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Congratulations on your purchase of a Hydro-BioScience® Algae Management System which uses a patented configuration of ultra-high frequency sound pressure waves to manage algae.

IMPORTANT:

Please read this manual before assembly and operation. Failure to follow these instructions may result in non-warranty product failure.

NOTE: Some user supplied components, such as AC Line Surge Suppressor Protection and Anchor are required.

General Safety Precautions



Look for this symbol throughout this manual. It means 'BE ALERT – YOUR SAFETY IS INVOLVED'.



This symbol represents important instructions

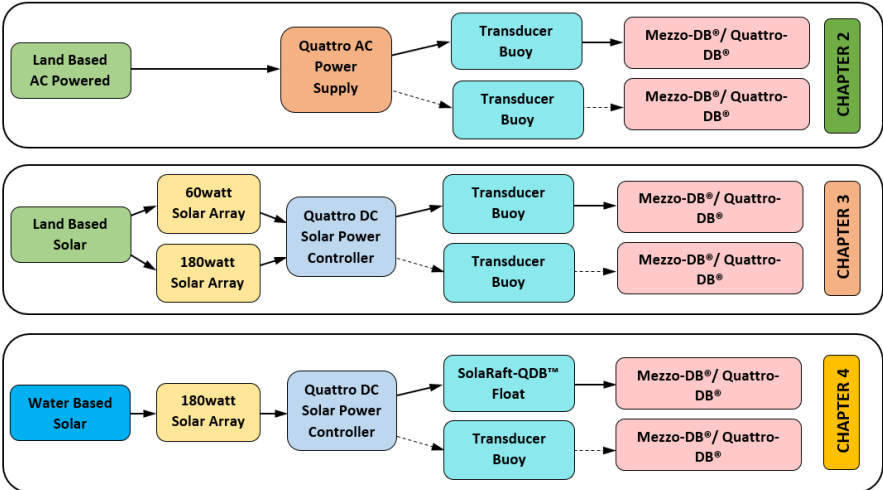
- Do not operate the AC Power Supply or Solar Power System if it has received a sharp blow, been dropped, or otherwise damaged in any manner. Refer to a qualified service agent.
- A/C Power Supply and Solar Power System contain no serviceable parts. If the power supply fails during its warranty period, contact Diversified Power International, LLC at 423-299-0011 or visit DPI's website, www.AlgaeManagement.com for information concerning a warranty replacement or repair.
- Before attempting any maintenance or cleaning, unplug AC Power Supply from wall outlet or, for solar systems shut down the Solar Power System Charger and Solar Junction Box Power via their power on/off switches. For external cleaning use a clean damp towel. Clean solar panels with water only.
- 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.
- Whenever removing AC Plug from the receptacle, pull from the Plug Body; not from the cord.
- Do not operate the AC Power Supply or Solar Power System or any component attached to it if it is malfunctioning. Personal injury or property damage could result.

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1.0 INTRODUCTION

Your new Hydro-BioScience® Algae Management System can be powered by either AC Power, DC Power, or a solar panel. Please refer to the sections that pertain to the type of input power employed at the installation site and disregard the sections pertaining to other power supply types.

1.1 CONFIGURATION GUIDE



COMPONENT DESCRIPTION

SOLAR PANEL:

Panel Arrays are organized as 60watt or 180watt arrays. DC power, generated from the solar panel, is then controlled by the Quattro-DB® Solar Power Controller and stored in a 24V battery pack.

POWER CONTROL:

Quattro-DB® AC Power Controller: AC/DC inputs include 24Vac, 24Vdc, 100/120Vac and 230/240Vac service at 50 or 60 Hz.

Quattro-DB® DC Solar Controller: DC input is 40Vdc via solar panels and 24V batteries (typically, two 12V batteries in series) during dark times.

TRANSDUCER:

This module contains the electronics which produce the ultrasonic output. There are two versions available, the Mezzo-DB™ and Quattro-DB®.

BUOY ASSEMBLY:

Provides buoyancy for the transducer. The hardware kit and optional warning flag combine with a customer supplied anchor to position the desired location.

PONTOON FLOAT:






This is an anchored floating solar panel assembly that allows it to be free of both land based solar panels or land-based AC-utility connections.

2.0 LAND BASED AC POWERED SYSTEM - OVERVIEW



The Land Based AC configuration receives power from the customers local grid. Carefully unpack contents from their shipping skids and cartons and verify contents against the corresponding packing list received. Save skids and cartons in the event a return, exchange, or warranty is required.

2.1 LAND BASED AC POWERED SYSTEM - SAFETY WARNINGS


AC POWER WARNINGS

-  **IMPORTANT: SURGE SUPPRESSOR PROTECTION DEVICE MUST BE USED.**
A/C-Line surges can be 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 600J or greater. These devices are readily available from most any retail outlet.
-  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.
-  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 drops that can severely affect the product connected to that same power circuit.
-  If making an electrical connection to a receptacle located near the body of water intended to be treated, install both the customer supplied GFCI protected receptacle and AC Power Supply in a covered weatherproof utility box or container and secure the AC Power Supply using the Mounting Hardware Kit – supplied.
-  If installing underground electric utility power to a receptacle near a body of water such as a pond, lake, pool or reservoir, a customer supplied armored cable run through conduit must be used to minimize risk of damage and installed in accordance with Country, State and Local regulations.

SAFE GROUNDING WARNINGS


-  **WARNING:** Risk of Electric Shock. Install AC Power Supply only to a Class A customer supplied GFCI (EU/UK Earthed Power Supply Source) and in accordance with Country, State and Local regulations. Customer supplied GFCI Receptacle must have an enclosure that is weatherproof.
-  **Do not remove Ground Pin from AC Power Supply’s AC 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.**

EXTENSION CORD REQUIREMENTS



-  The rating of the input AC 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.

**RECOMMENDED MINIMUM AWG SIZE FOR
EXTENSION CORDS FOR AC POWER SUPPLY**


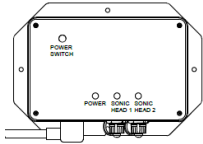


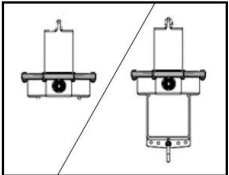

Length of cord (feet):	25	50	100	150
AWG size of cord:	16	16	16	16

-  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.

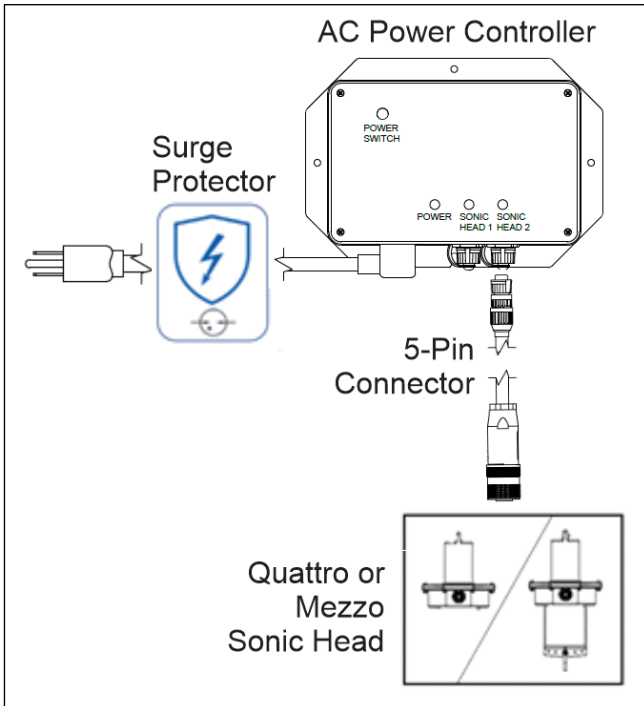
TRANSDUCER SAFETY INSTRUCTIONS

-  **WARNING:** DO NOT place the Transducer against your skin or body, nor touch the Transducer while the Transducer is powered. The Transducer emits powerful vibratory energy which can cause harm.
-  Use caution in location of the transducer cable to avoid damage by vehicles, pedestrians, mowers, wildlife, etc. For areas that present risk of damage to the transducer cable, it is recommended to use a braided nylon sheath and/or bury the line about 6in (15cm) below surface.

2.2 AC POWERED SYSTEM MAIN COMPONENTS

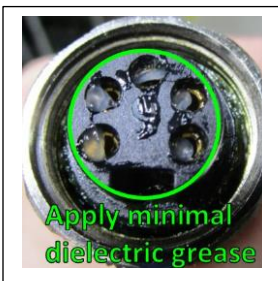
Component	Description	Image
Surge Protector	(Customer Supplied) Must be capable of withstanding 600J or greater.	
Quattro-DB® AC Power Supply	Connects to 120/230Vac input and sonic transducer unit(s). 24Vac/dc unit can connect to 24V circuits AC or DC ONLY.	
Power Cable for Sonic Head	Transfers power from solar controller to Sonic Head. (Cable length is customer order dependent)	
Transducer Float Assembly	Attaches to sonic head and suspends it under water. (1 or 2 available)	
Mezzo-DB™ or Quattro-DB® Sonic Transducer head	Transmits sonic vibrations through water eliminating algae growth. (1 or 2 available)	
Anchor for Float	(Customer Supplied) 5 to 8 lb. (2.3-3.6 kg) anchor with poly rope for positioning the sonic head.	

2.3 AC POWERED SYSTEM SETUP



- !** Never connect or disconnect Transducer and its Power Cable to or from the AC Power Supply or the Solar DC power Supply while they are powered. Transducer connector may not be present
- Firmly hand-tighten all cable connections but do not over tighten with wrenches or pliers. Transducer connector may not be present.
 - Do as much of the work as possible on shore. Once you are in the water, work and assembly become much more difficult.

ASSEMBLING PINNED CONNECTIONS



If a connector is supplied, apply a **pea sized** spot of dielectric grease to all pinned cable connections, this prevents corrosion and protects plug from moisture and dirt. Any anti-seize, dielectric grease, lubricants or cleaners used on this product must conform to NSF-61 Marine Grade standards.

▲ **Do not** apply excess non-conductive dielectric grease, it can cause damage to the connector.

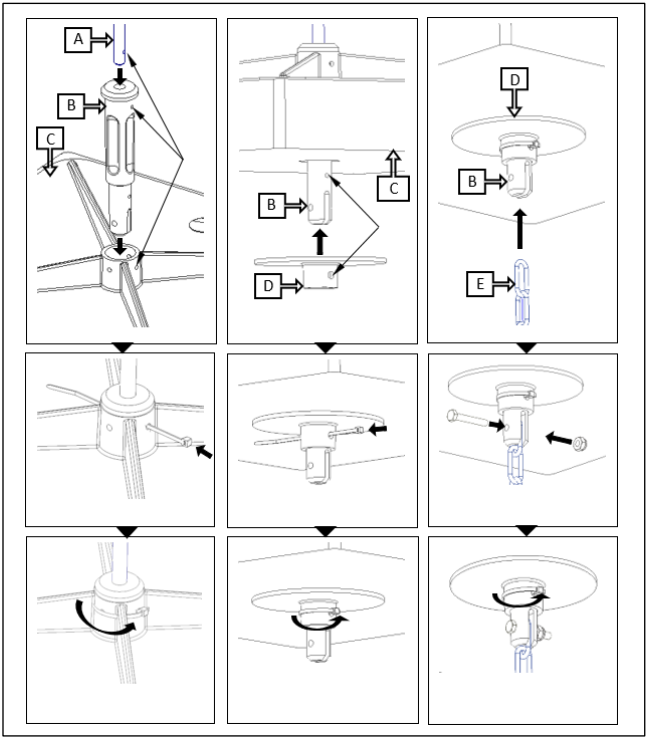
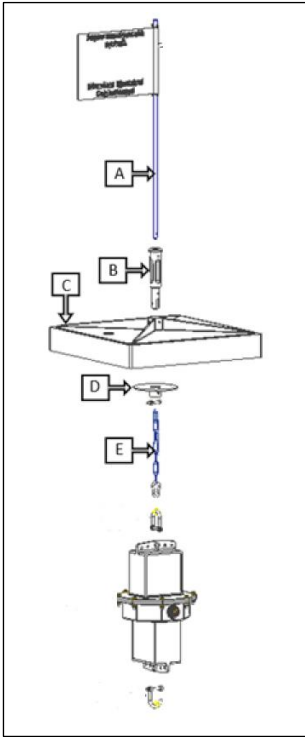
2.4 CONNECTING TO POWER SUPPLY

▲ **To avoid non-warranty damage to connector pins, the Power Supply's On/Off Power Switch MUST be put into the 'OFF' position any time Transducer Power Cable is being connected or disconnected. DO NOT TURN Power switch 'ON' until instructed to do so.**



- Power/Fault LED
 - **Green** when connected to AC Power and **Red** when system has a fault.
 - For fault code chart refer to trouble shooting section.
- Sonic Transducer Head LED-1 and LED-2
 - **Blue** when signal is being sent to the sonic transducer heads
 - If not flashing – refer to the Troubleshooting Section to diagnose

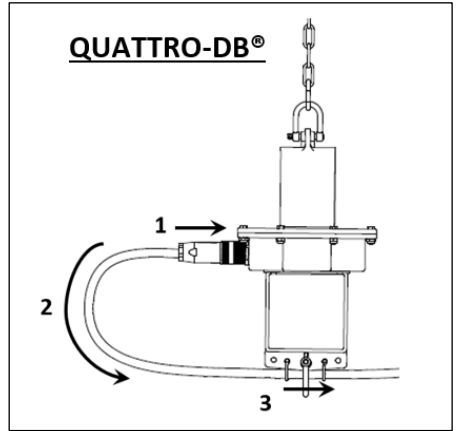
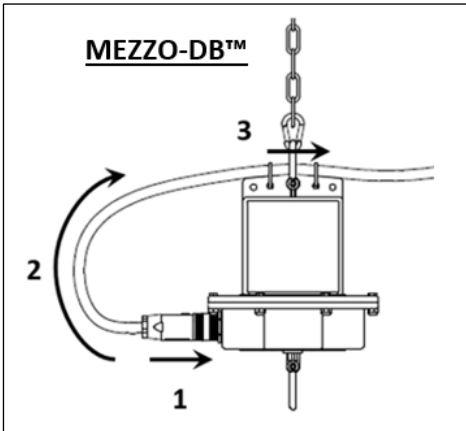
2.5 SONIC HEAD FLOAT ASSEMBLY



A	Flag Pole
B	Float Anchor Pin
C	Top Plate
D	Bottom Lock Ring
E	Chain

1. Align holes of flag pole (A), float anchor pin (B), and top plate (C). Insert components (A-B-C) until holes align and thread Zip Tie through all three, then wrap Zip Tie around and trim off excess.
2. Align holes of float anchor pin (B) and bottom locker ring (D). Insert components (B-D) until holes align and thread Zip Tie through both, then wrap Zip Tie around and trim off excess.
3. Insert chain (E) into float anchor pin (B). Place the 10-32 retaining bolt through both components and securely tighten the lock nut.

2.6 CONNECTING TO SONIC HEAD



IMPORTANT

! CONNECTOR SHOWN MAY NOT BE PRESENT. NEVER USE THE STRAIN RELIEF LOOP OR THE POWER CONNECTOR AS A HANDLE. ALWAYS USE THE CHAIN ON THE TOP OF THE UNIT WHEN LIFTING THE TRANSDUCER.

1. Apply pea-sized non-conductive dielectric grease to end of the 5-Pin Transducer Power Cable and match the key-notch in the receptacle, push in, and rotate outer ring and FIRMLY HAND TIGHTEN into place.
2. Make a strain relief loop for the Power Cable by making a radial bend and securing it to bottom holes of Transducer with cable ties (as shown above). Clip off excess cable tie straps with flush cut trimmers or scissors.
3. Attach the D-shackle to the center mounting hole on the transducer.

NOTE:

- Mezzo-DB™ transducers route the cable on the top of the device
 - Quattro-DB® transducers route the cable on the bottom of the device
 - If using a PONTOON FLOAT SYSTEM with either transducer, route cable on top of device.
4. Attach the top chain that connects the float assembly to the transducer.
 5. Connect the bottom D-shackle to the customer supplied anchor. Adjust the anchor rope or chain so the anchor is laying on the bottom and there is some slack in the line to allow for wave action.

2.7 24VAC–24VDC GOLF COURSE POWER SYSTEM CONNECTION

The 24Vac/dc Power Supply is visually identical to the 120Vac/230Vac Power Supplies except that the input (and label) is '24Vac-24Vdc input. Applying any voltage above 30Vac or 40Vdc will cause non-warranty permanent damage. The input cord supplied with the 24Vac/dc power supply is special and shown in the following figure:



The input is NOT polarity sensitive. Black or white wire can connect to Positive or negative post of a 24V battery pack or to a 24Vac transformer. Green is connected to Chassis common if NIST codes require it – otherwise, cap the exposed conductors coming out from the green wire insulation.

2.8 AC POWERED SYSTEM STARTUP


- ! It is important to refer to the section in this manual on Installation and Operation Guide to get the best performance (see chapter 5)
1. Place the Transducer/Float Assembly(s) in the predetermined location of the body of water being treated. Attach the anchor to the D-Shackle on the bottom of the transducer.
 2. Adjust the anchor rope or chain so the anchor is laying on the bottom and there is some slack in the line to allow for wave action.
 3. With all connections now complete, depress the power switch to turn on the power supply. The LED's will now become active.
 4. The Blue LED(s) representing the sonic head on the controller will blink at a rate of approximately once per second to indicate that power is being sent to the transducer(s).

3.0 LAND BASED SOLAR POWERED SYSTEM OVERVIEW

The Land Based Solar configuration receives power from a solar panel that is mounted on the shore. Carefully unpack contents from their shipping skids and cartons and verify contents against the corresponding to the packing list received. Save skids and cartons in the event a return, exchange, or warranty is required.

3.1 LAND BASED SOLAR POWERED SYSTEM - SAFETY WARNINGS

BATTERY SAFETY WARNINGS

 **WARNING – RISK OF EXPLOSIVE GASES:** Rechargeable batteries develop explosive gasses during normal operation and can be dangerous. Follow the safety and operating instructions in this manual at all times.

- Follow all safety instructions published by the battery manufacturer. Review cautionary markings on vehicle or equipment containing the battery.
- Do not use an attachment not recommended or sold by the battery charger manufacturer to avoid risk of fire, electric shock or injury to persons.
- NEVER charge a frozen battery. Thaw it out for safe charging.
- Wear eye and clothing protection and avoid touching eyes. Keep plenty of fresh water and soap nearby in case battery acid contacts your skin, clothing or eyes.
- NEVER smoke or allow a spark or flame in vicinity of battery.
- Avoid bringing metallic objects into contact with the battery which could cause a short circuit. Remove personal items such as rings, necklaces or watches which could come in contact with the battery.

SOLAR CONTROLLED WITH CHARGER SYSTEM WARNINGS

- ⚠ WARNING** – Chargers can ignite flammable materials and vapors. Do not use near fuels, grain dust, solvents, or other flammables.
- 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.
 - Charger contains no serviceable parts. If it fails during its warranty period, contact Diversified Power International, LLC at 423-299-0011 or visit DPI's website, www.AlgaeManagement.com for information concerning how to obtain a warranty replacement.
 - For external cleaning use a clean damp towel.
 - 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.
 - Do not operate the charger if it is malfunctioning. Personal injury or property damage could result.

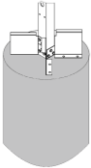
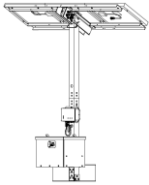
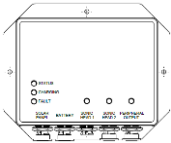
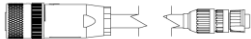

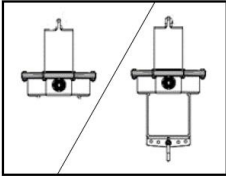

SONIC HEAD SAFETY INSTRUCTIONS

- ⚠ WARNING: DO NOT** place the Sonic Transducer Head against your skin or body, nor touch the Transducer while the transducer is powered. The Transducer emits powerful vibratory energy which may cause harm.
- ⚠** Use caution in locating the transducer cable to avoid damage by vehicles, pedestrians, mowers, wildlife, etc. For areas that present risk of damage to the transducer cable, it is recommended to use a braided nylon sheath and/or bury the line approximately 6inches (15cm) below surface.

SOLAR PANEL SAFETY GUIDELINES

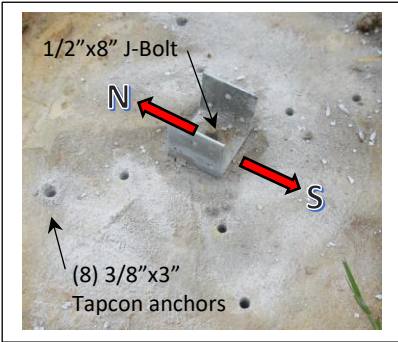
- Erecting a solar panel is not a job for one person. Some components of the solar panel system are heavy and/or awkward to handle.
- Follow all local zoning ordinances, building codes and regulations when constructing the concrete base.
- It is important the entire mounting surface of the concrete pad be level and flat. If you are not practiced at working concrete – enlist the help of a contractor or professional to ensure proper installation.

3.2 LAND BASED SOLAR POWERED SYSTEM MAIN COMPONENTS

Component	Description	Image
Concrete Base	(Customer Supplied) In ground concrete base with mounting hardware.	
Solar Panel Stand Assembly	Shipped with frame, battery box, solar junction box, and solar controller attached	
Quattro-DB® DC Solar Controller	Connects to solar panels, batteries and sonic transducer unit(s).	
Power Cable for Sonic Head	Transfers power from solar controller to sonic transducer. (Cable length is customer order dependent)	
Transducer Float Assembly	Attaches to sonic head and suspends it under water. (1 or 2 available)	
Mezzo-DB™ or Quattro-DB® Sonic Transducer head	Transmits sonic vibrations through water eliminating algae growth. (1 or 2 available)	
Anchor for Float	(Customer Supplied) 5 to 8 lb. (2.3-3.6 kg) anchor with poly rope for positioning the sonic head.	

3.3 SOLAR PANEL INSTALLATION GUIDELINES

The Instructions in this section apply to both the 60w and 180w Solar/Power Battery Backup Systems. The user will need to install a concrete base and supply concrete fasteners for bolting the assembly on to the concrete base.



USER REQUIRED ITEMS

Concrete

(1) 1/2" x 8" J-bolt

(8) 3/8" x 3" Tapcon® anchors

3/8" Masonry Drill Bit

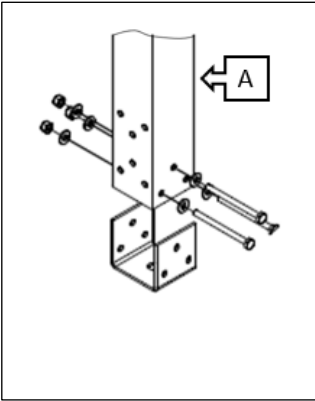
Compass

CONCRETE BASE CONSTRUCTION

- Make hole for concrete base 14" in diameter and 36" deep.
- Make sure the top surface of the concrete is level and flat.
- Secure the center J-Bolt in position while the concrete is still wet with 1-1/4in (32mm) of the threads extending above the surface.
- ▲ NOTE: Be sure to follow the concrete manufacturers recommendations for cure time before mounting hardware to the concrete base.
- Align the column bottom bracket on the J-bolt oriented in the North South direction using a compass.
- ▲ NOTE: Due to variations in the Earths magnetic fields a compass may not provide the most accurate direction. It is recommended that a Magnetic Declination Calculator* be used to ensure that the panel is receiving the greatest amount of sunlight.
- *Magnetic Declination Calculator <https://www.ngdc.noaa.gov/geomag-web/>
- With the bottom bracket aligned and tightened into place, temporarily set the support post in place with the battery box facing North and mark the 8 holes to be drilled.
- Drill the 8 mounting holes into the concrete. Follow instructions included with the Tapcon® concrete anchors for drill bit size and hole depth.

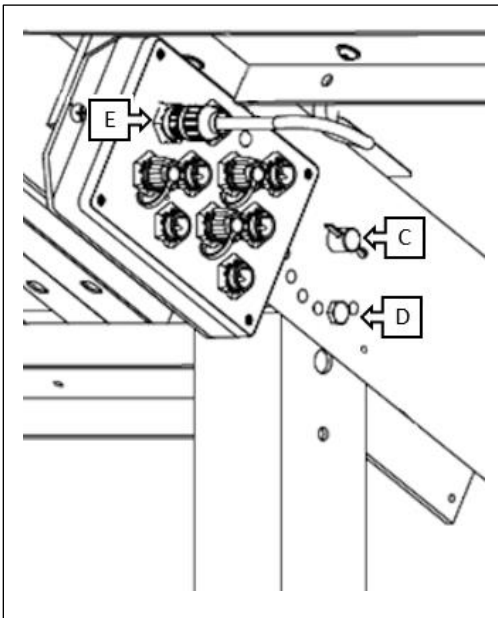
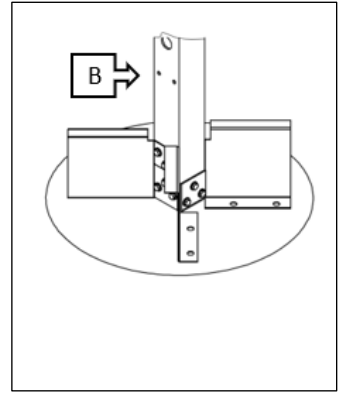
3.4 SOLAR PANEL MOUNTING GUIDELINES

- ▲ Use a minimum of 3 people** when setting the solar panel assembly down over the top of the support post. Use caution to avoid breaking the glass solar panels. **DO NOT** allow the back of the solar panel to fall onto or rest directly on top of the support post as damage will occur.
- ▲ Verify that the Battery-Cutoff power switch** located on the battery box is in the **OFF** position. **Do NOT** make any electrical connections while the power switch is in the **ON** position.

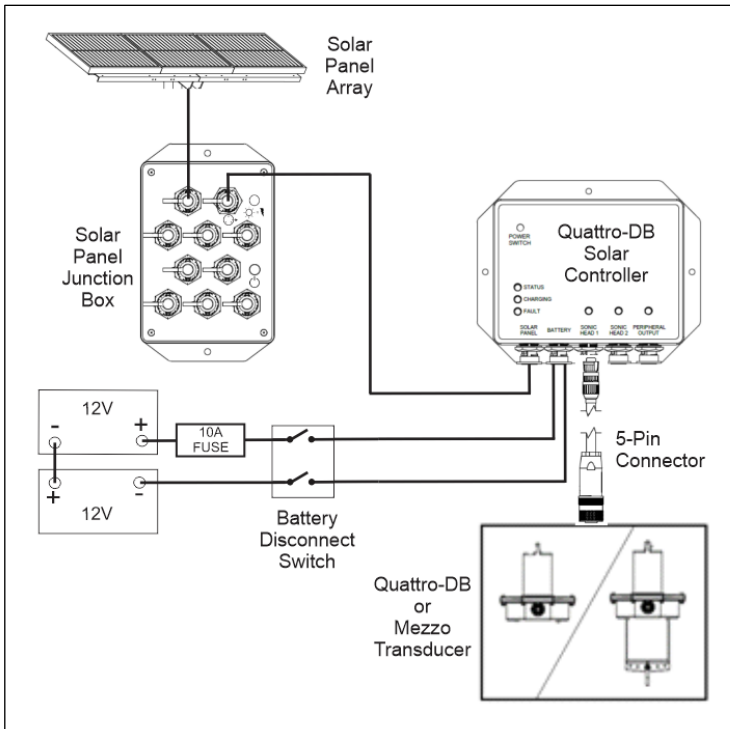


(A) - Place the post in the bottom cap and connect the two using (3) 1/4-in. X 3-in. hex head bolts.

(B) - Bolt the support post feet to the concrete pad using (8) 3/8-in. x 3-in. Tapcon® concrete anchors.



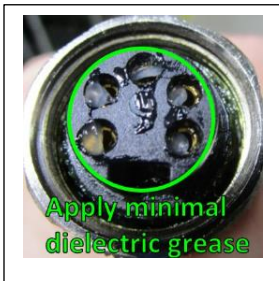
- (C) - Secure the panel to the support post with the 1/2-in. clevis pin and cotter key.
- (D) - Adjust the panel's tilt angle to point it directly up at the sun at mid-day at your location. Insert the 1/4-in. bolt in the angle adjust bracket and tighten the nut in place to lock in the panel angle.
- (E) - Connect the Charger Controller Cable to the Solar Junction Box output labeled "Solar Panel".
- (F) Junction Box may be supplied with an ON/OFF switch. Leave in OFF position till all connections are made. Then Turn ON.



3.5 SOLAR POWERED SYSTEM SETUP GUIDELINES

- ⚠ Never connect or disconnect the transducer and its power cable to or from the Solar DC power Supply while they are powered on.
- Firmly hand-tighten all cable connections but do not over tighten with wrenches or pliers.
- Do as much of the work as possible on shore. Once you are in the water, work and assembly become much more difficult.

ASSEMBLING PINNED CONNECTIONS



If a connector is supplied, apply a **pea sized** spot of dielectric grease to all pinned cable connections, this prevents corrosion and protects plug from moisture and dirt. Any anti-seize, dielectric grease, lubricants or cleaners used on this product must conform to NSF-61 Marine Grade standards.

⚠ **Do not** apply excess non-conductive dielectric grease, it can cause damage to the connector.

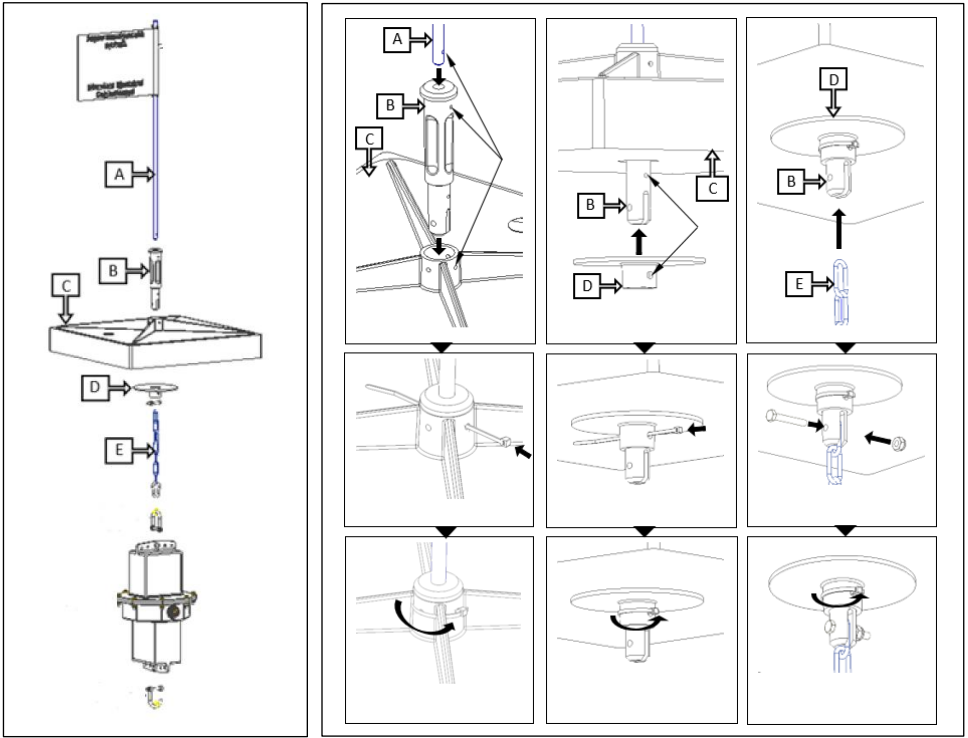
3.6 CONNECTING TO SOLAR CONTROLLER

POWER SUPPLY MODULE: DC input is 40Vdc via solar panels and 24V batteries (typically, two 12V batteries in series.) The DC power supply converts solar energy to 40Vdc to power the sonic head and charge the batteries for overnight operation. Each power supply has two output connectors labeled **Sonic Head 1** and **Sonic Head 2** and each will power a Mezzo-DB™, Quattro-DB® or combination of transducers.



- **Power LED**
 - **Green** when power button is in ON position
- **Status LED**
 - Flashes in sequence to show power mode
 - * See error/fault matrix to interpret pulse code
- **Charging LED**
 - Blinks once when starting
 - Stays lit until batteries have reached full charge
 - May turn off when charging is limited (poor sun light)
- **Fault LED**
 - Flashes **Red** when system has a fault
 - * See error/fault matrix to interpret pulse code
- **Sonic Head LED (1&2)**
 - **Blue** when signal is being sent to the sonic transducer heads
 - * If not flashing – refer to the Troubleshooting Section to diagnose
- **Peripheral output LED**
 - Flashes white approximately once per second when controller is powered up

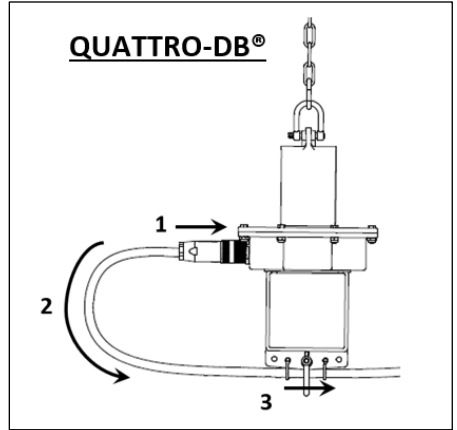
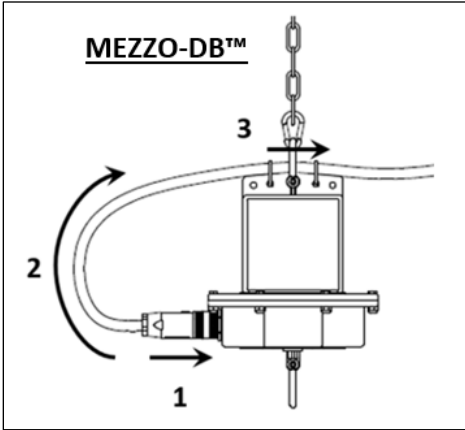
3.7 SONIC HEAD FLOAT ASSEMBLY



A	Flag Pole
B	Float Anchor Pin
C	Top Plate
D	Bottom Lock Ring
E	Chain

1. Align holes of flag pole (A), float anchor pin (B), and top plate (C). Insert components (A-B-C) until holes align and thread Zip Tie through all three, then wrap Zip Tie around and trim off excess.
2. Align holes of float anchor pin (B) and bottom locker ring (D). Insert components (B-D) until holes align and thread Zip Tie through both, then wrap Zip Tie around and trim off excess.
3. Insert chain (E) into float anchor pin (B). Place the 10-32 retaining bolt through both components and securely tighten the lock nut.

3.8 CONNECTING TO SONIC HEAD



! To avoid a non-warranty claim, follow the installation instructions below.

IMPORTANT

! **CONNECTOR SHOWN MAY NOT BE PRESENT.** **NEVER USE THE STRAIN RELIEF LOOP OR THE POWER CONNECTOR AS A HANDLE.** **ALWAYS USE THE CHAIN ON THE TOP OF THE UNIT WHEN LIFTING THE TRANSDUCER.**

6. Apply pea-sized dielectric grease to end of the 5-Pin Transducer Power Cable and match the key-notch in the receptacle, push in, and rotate outer ring and **FIRMLY HAND TIGHTEN** into place.
7. Make a strain relief loop for the Power Cable by making a radial bend and securing it to bottom holes of Transducer with cable ties (as shown above). Clip off excess cable tie straps with flush cut trimmers or scissors.

8. Attach the D-shackle to the center mounting hole on the transducer.

NOTE:

- Mezzo-DB™ transducers route the cable on the top of the device
 - Quattro-DB® transducers route the cable on the bottom of the device
 - If using a PONTON FLOAT SYSTEM for either transducer, route cable on top of device as shown above in the MEZZO Head illustration.
9. Attach the top chain that connects the float assembly to the transducer.
 10. Connect the bottom D-shackle to the customer supplied anchor. Adjust the anchor rope or chain so the anchor is laying on the bottom and there is some slack in the line to allow for wave action.

3.9 SOLAR POWERED SYSTEM STARTUP

- ❗ The Hydro-BioScience® solar system batteries are fully charged when they leave the factory but over time the batteries will begin to discharge. Before proceeding, use a standard 12v car-battery-type charger to bring the batteries back up to a full charge. Charge each battery separately before proceeding to system startup.
 - ❗ Ensure all connections are securely hand-tightened and dielectric grease has been applied before continuing to system startup.
1. Place the Transducer/Float Assembly(s) in the predetermined location of the body of water being treated. Attach the anchor to the D-Shackle on the bottom of the transducer.
 2. Adjust the anchor rope or chain so the anchor is laying on the bottom and there is some slack in the line to allow for wave action.
 3. Open the lid to the battery box by cutting the two zip-ties. Remove the supplied fuse and insert it into the fuse holder then snap the two halves together. Replace the lid and secure it with zip ties (or two customer-supplied padlocks).
 4. Confirm that the cable on the Solar Junction Box output labeled “Solar Power Output” is securely connected.
 5. With all connections now complete, flip the Battery Disconnect Switch up to the on position.
 6. Depress the power switch on the Quattro-DB® Solar Controller, the LED’s will now become active.
 7. Turn on the solar panel junction switch to send solar power to the solar controller.
 8. The Blue LED(s) representing the sonic head on the controller will blink at a rate of approximately once per second to indicate that power is being sent to the transducer(s).

NOTE: When shutting the system down reverse steps 5,6,7, (i.e. 7,6,5)

- ❗ For optimum performance the panel’s tilt angle should be realigned 3 – 4 times per year to accommodate the sun’s seasonal angle changes. For a more in-depth understanding of solar panel tilt adjustment please refer to <https://www.solarpaneltilt.com/>
- ❗ It is important to refer to the section in this manual on Installation and Operation Guide to get the best performance (see chapter 5).



4.0 PONTOON FLOAT SYSTEM OVERVIEW

The Hydro BioScience® Pontoon Float System receives power from a solar panel that is mounted on a pair of floatation devices. The pontoon assembly is shipped partially assembled and requires a minimal setup.

Carefully unpack contents from their shipping skids and cartons and verify contents against the corresponding packing list received. Save skids and cartons in the event a return, exchange, or warranty is required.

4.1 PONTOON SYSTEM - SAFETY WARNINGS

BATTERY SAFETY WARNINGS

- ⚠ WARNING – RISK OF EXPLOSIVE GASES:** Rechargeable batteries develop explosive gasses during normal operation. are dangerous. Follow the safety and operating instructions in this manual at all times.
- Follow all safety instructions published by the battery manufacturer. Review cautionary markings on vehicle or equipment containing the battery.
 - Do not use an attachment not recommended or sold by the battery charger manufacturer to avoid risk of fire, electric shock or injury to persons.
 - NEVER charge a frozen battery. Thaw it out for safe charging.
 - Wear eye and clothing protection. Avoid touching eyes. Keep plenty of fresh water and soap nearby in case battery acid contacts your skin, clothing or eyes.
 - NEVER smoke or allow a spark or flame in vicinity of battery.

- Avoid bringing metallic objects into contact with the battery which could cause a short circuit. Remove personal items such as rings, necklaces or watches which could come in contact with the battery.

SOLAR CONTROLLED SYSTEM WARNINGS

- ⚠ **WARNING** – chargers can ignite flammable materials and vapors. Do not use near fuels, grain dust, solvents, or other flammables.
- 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.
- Charger contains no serviceable parts. If it fails during its warranty period, contact Diversified Power International, LLC 423-299-0011 or visit DPI's website, www.AlgaeManagement.com for information concerning how to obtain a warranty replacement.
- For external cleaning use a clean damp towel.
- 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.
- Do not operate the charger if it is malfunctioning. Personal injury or property damage could result.

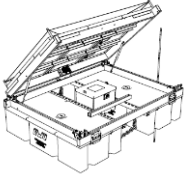
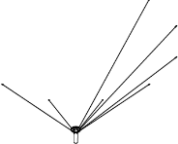
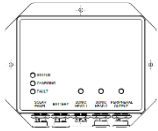


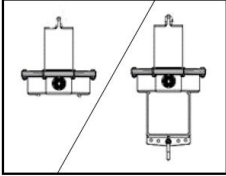

SONIC HEAD SAFETY INSTRUCTIONS

- ⚠ **WARNING: DO NOT** place the Sonic Transducer Head against your skin or body, nor touch the Transducer while the transducer is powered. The Transducer emits powerful vibratory energy which can cause harm.
- ⚠ Use caution in locating the transducer cable to avoid damage by vehicles, pedestrians, mowers, wildlife, etc. For areas that present risk of damage to the transducer cable, it is recommended to use a braided nylon sheath and/or bury the line about 6 inches (15cm) below surface.

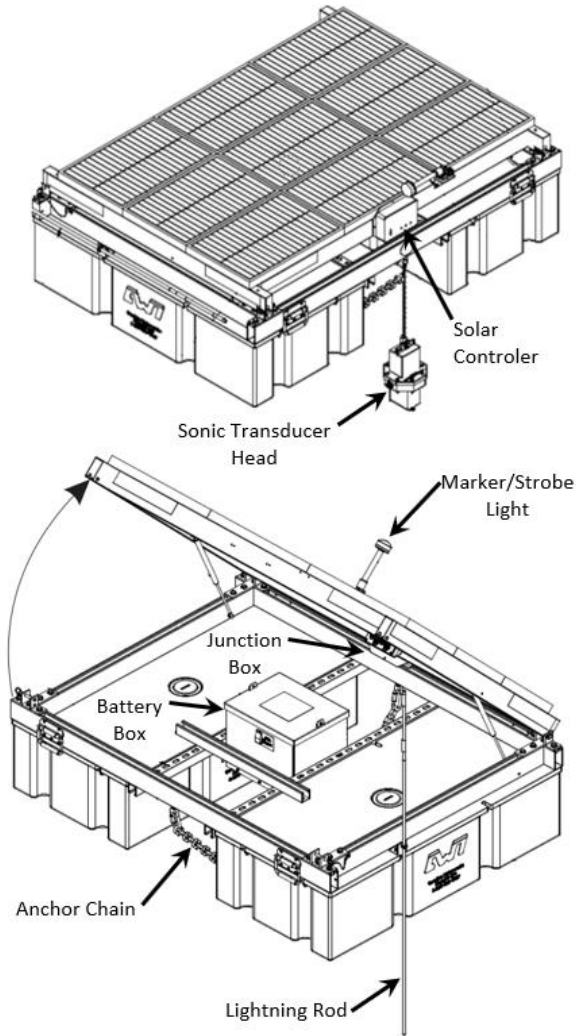
PONTOON FLOAT SAFETY GUIDELINES

- Installing the PONTOON Float System is not a job for one person. A minimum of four people should be used when lifting and placing the assembly.
- Be sure to use the four handles attached to the aluminum frame when lifting the assembly.

4.2 PONTOON FLOAT SYSTEM MAIN COMPONENTS

Component	Description	Image
Hydro BioScience® PONTOON FLOAT SYSTEM	Shipped with solar panel, floatation frame, battery box, solar junction box, and solar controller attached	
Bird Deflector	Shipped with four deflector devices (one per corner).	
Quattro-DB® DC Solar Controller	Connects to solar panels, batteries and sonic transducer unit(s).	
Power Cable for Sonic Head	Transfers power from solar controller to sonic transducer.	
Transducer Float Assembly	Attaches to sonic head and suspends it under water. (1 or 2 available)	
Mezzo-DB™ or Quattro-DB® Sonic Transducer head	Transmits sonic vibrations through water eliminating algae growth. (1 or 2 available)	
Anchor for Float	(Customer Supplied) 5 to 8 lb. (2.3-3.6 kg) anchor with poly rope for positioning the Pontoon Float System.	

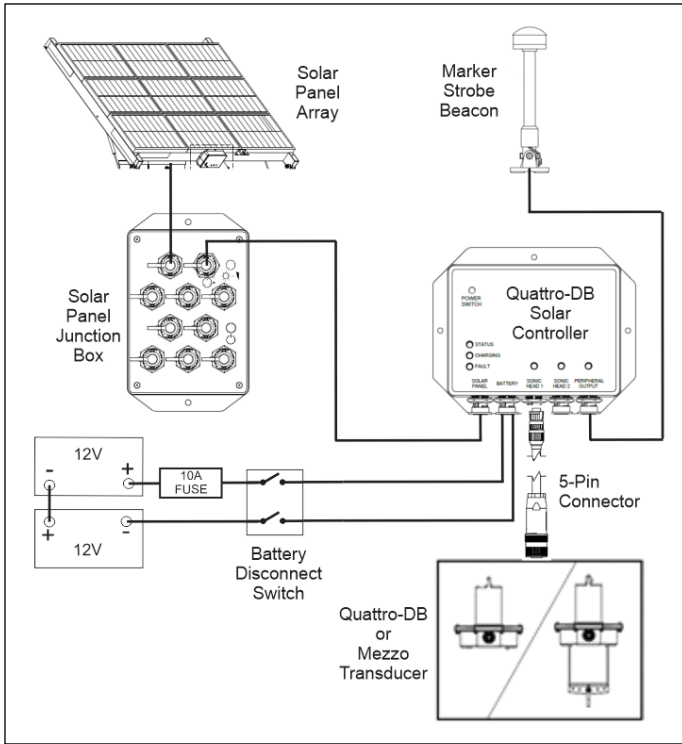
PONTOON FLOAT SYSTEM SETUP



UNPACKING AND SET UP

- Pull out the protective cardboard and cut the two zip-ties securing the anchor chain. Cut the 2 packing straps holding the system to the shipping pallet.
- Pull out the two Solar Panel Locking Pins on the rear of the Solar Panel Frame. Grasp the Solar Panel from the center and allow the pneumatic cylinders to hold the panel in the upright position.

NOTE: Do not raise the Lightning Rod and Strobe Light until system startup.



ASSEMBLY GUIDELINES

- ⚠ Never connect or disconnect the transducer and its power cable to or from the Solar DC power Supply while they are powered on.
- Firmly hand-tighten all cable connections but do not over tighten with wrenches or pliers.
- Do as much of the work as possible on shore. Once you are in the water, work and assembly become much more difficult.

ASSEMBLING PINNED CONNECTIONS



If a connector is supplied, apply a **pea sized** spot of dielectric grease to all pinned cable connections, this prevents corrosion and protects plug from moisture and dirt. Any anti-seize, dielectric grease, lubricants or cleaners used on this product must conform to NSF-61 Marine Grade standards.

- ⚠ **Do not** apply excess dielectric grease, it can cause damage to the connector.

4.4 CONNECTING TO SOLAR CONTROLLER

POWER SUPPLY MODULE : DC input is 40Vdc via solar panels and 24V batteries (typically, two 12V batteries in series.) The DC power supply converts solar energy to power the sonic head and charge the batteries for overnight operation. Each power supply has two output connectors labeled **Sonic Head 1** and **Sonic Head 2** and each will power a Mezzo-DB™, Quattro-DB® or combination of transducers.

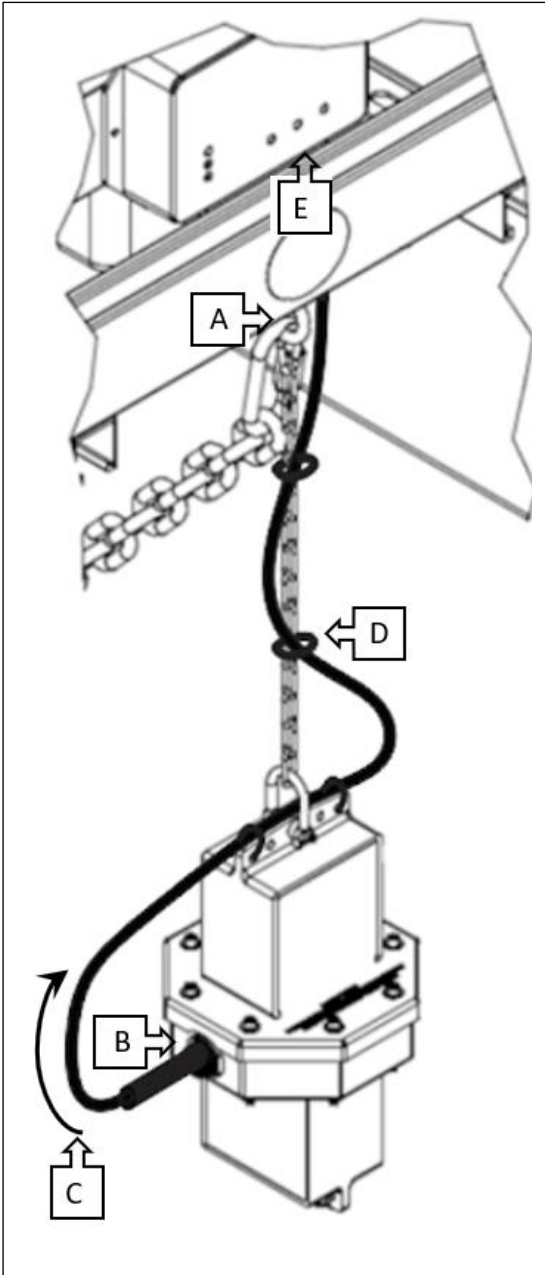


- **Power LED**
 - **Green** when power button is in ON position
- **Status LED**
 - Flashes in sequence to show power mode
 - * See error/fault matrix to interpret pulse code
- **Charging LED**
 - Blinks once when starting
 - Stays lit until batteries have reached full charge
 - May turn off if when charging is limited (poor sun light)
- **Fault LED**
 - Flashes **Red** when system has a fault
 - * See error/fault matrix to interpret pulse code
- **Sonic Head LED (1&2)**
 - **Blue** when signal is being sent to the sonic transducer heads
 - * If not flashing – refer to the Troubleshooting Section to diagnose
- **Peripheral output LED**
 - Flashes white approximately once per second and sends signal to navigation beacon when connected

4.5 SONIC HEAD FLOAT ASSEMBLY

IMPORTANT

! **NEVER USE STRAIN RELIEF LOOP OR POWER CONNECTOR AS A HANDLE. ALWAYS USE CHAIN ON THE TOP OF UNIT WHEN LIFTING TRANSDUCER.**



(A)- Snap the carabiner at the end of the chain attached to the sonic head to the eye bolt on the float frame.

(B)- If a connector is supplied, apply a small amount of dielectric grease to the contacts of the connector on the Transducer Power Cable and match the key-notch in the receptacle, push in, and rotate outer ring and **FIRMLY HAND TIGHTEN** into place.

(C)- Make a strain relief loop for the Power Cable by making a radial bend and securing it to top holes of sonic head with cable ties.

(D)- Secure the Power Cable to the chain connecting the sonic head to the float frame as shown.

(E)- Connect the Power cable to the Sonic Head port on the Solar Controller.

4.6 PONTOON SYSTEM STARTUP

- ❗ The Hydro-BioScience® solar system batteries are fully charged when they leave the factory but over time the batteries will begin to discharge. Before proceeding, use a standard 12V car-battery-type charger to bring each 12V battery up to a full charge. Charge each battery separately before proceeding to system startup.
 - ❗ Ensure all connections are securely hand-tightened and dielectric grease has been applied before continuing to system startup.
1. Open the lid to the battery box by cutting the two zip-ties. Remove the supplied fuse and insert it into the fuse holder then snap the two halves together. Replace the lid and secure it with zip ties (or two customer supplied padlocks).
 2. With all connections now complete, flip the Battery Disconnect Switch up to the on position.
 3. Depress the power switch on the Quattro-DB® Solar Controller, the LED's will now become active.
 4. Turn on the solar panel junction switch to send solar power to the solar controller.
 5. The Blue LED(s) representing the sonic head on the solar controller will blink at a rate of approximately once per second to indicate that power is being sent to the transducer(s).
 6. Return the solar panel to the folded down position and insert both locking pins.
 7. Place the Pontoon Assembly(s) in the predetermined location of the body of water being treated.
 8. Attach the customer supplied anchor to the center link of the pontoons anchor chain. Adjust the anchor rope or chain so the anchor is laying on the bottom and there is some slack in the line to allow for wave action.
 9. Move marker light to the upright position and tighten the bottom knob.
 10. Remove the Tie Wraps securing the Lightning Rod and its Extension and screw the Extension into the Lightning Rod until hand tight. Loosen the bolt holding the Lightning Rod in place and rotate it so the extension end with reflective tape is standing up and the other end of the rod extends down into the water. Retighten the bolt securing the Lightning Rod.
- ❗ It is important to refer to the section in this manual on Installation and Operation Guide to get the best performance (see chapter 5).

5.0 INSTALLATION AND OPERATION GUIDE

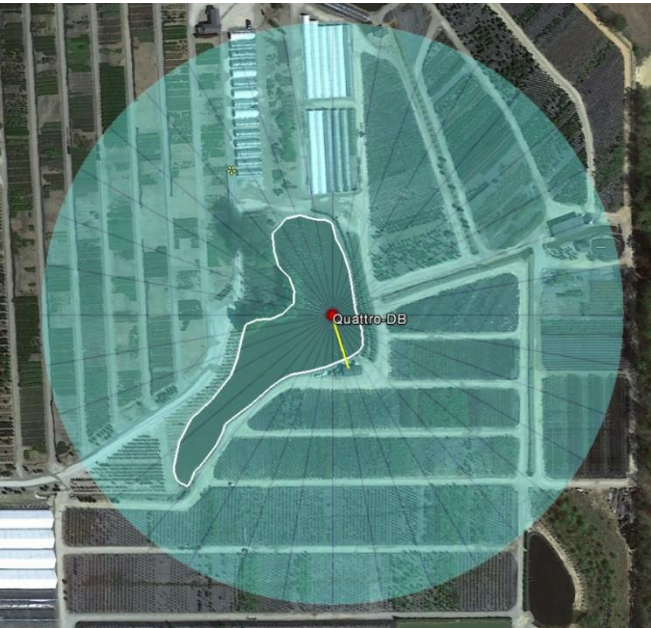
PLACEMENT OF THE DEVICE:

- 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.
- 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's ability to maintain internal fluid pressure which causes it to begin to die.
- The range capability for blue-green algae with gas vesicles (easily broken gas tubes in the algae cells) is approximately 400 meters (1310 ft) in all directions. In this range the cells lose buoyancy and sink to the bottom. The high frequency bandwidth of the device helps to break up the colonial forms of these blue-green algae which will speed up their control. In the absence of sunlight, algae begins to lose the ability to create sufficient nitrogen supply which causes them to eventually die.
- 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. Ponds with irregular shapes require strategy to determine the placement point. Some examples showing best placement of the device are shown on the following page.

Installation Site Example 1:



Installation Site Example 2:



6.0 WHAT TO EXPECT AFTER INSTALLATION

Most Blue-Green algae (and cyanobacteria) will have lost their buoyancy and should be on, or settling, to the pond bottom within 3-4 days. The cells can be re-suspended via aeration bringing them up to the light which may prolong the time it takes for them to fully die off. Therefore, please note that a subsequent “bloom” is not uncommon, and it could take multiple cycles before a thorough algae remediation can occur.

Green algae (filamentous types) and colonial types require up to 3+ weeks before the damage results in them turning brown, depending on the kind (genus) of algae. They will normally float to the surface at this time due to the bacterial digestion process breaking them down. It takes about 7-10 days from that point before they are sufficiently digested to lose buoyancy and sink. Some users rake them out as the die-off begins or you may 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.

For Bio-Film Control and prevention for water processing or treatment equipment, the ultrasound will be sensed by anaerobic bacteria as water turbulence. This will prevent the anaerobes from attempting colonization in a treated zone. Anaerobes start the process by forming a base layer of biofilm that the aerobic bacteria attach themselves to. Without this layer the bacteria cannot accumulate which, in turn, keeps the equipment walls cleaner for longer periods of time.

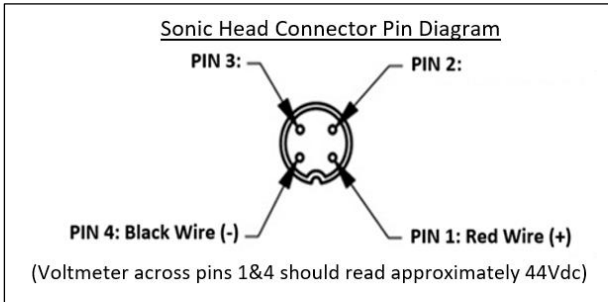
7.0 SYSTEM MAINTENANCE

- The Hydro BioScience® ultrasound algae management system is designed to limit calcium carbonate crystal formation on the sound emitting surfaces so it forms slowly. But, over time, buildup will occur depending on how hard the water is where you live. **Check the system for any Calcium Carbonate buildup after the first month of operation.** If you see significant crystalline formation, use a Calcium Lime Rust remover to wipe it away. Adjust your cleaning cycle based on how quickly the buildup returns.
- Early field results show that biofilm formation on the device is likely. This has been seen on other ultrasonic devices in that the sound they emit away from the device tends to prevent biofilm everywhere except for directly on the device (ground zero for the sound emission). For water treatment facilities, it is recommended that the Sonic Head gets wiped or brushed off monthly to remove any accumulated biofilm. The biofilm has not been shown to cause loss of output from the Sonic Head because ultrasound seems to easily pass through the film (it is about 99% water.)
- The “Sonic Head” blinking blue LED light on the Power Supply indicates that the output driver for the sonic head is working normally. If the blue light on the AC Power supply stops blinking, check the AC outlet and any extension cord(s) to verify that power is available, check the cable connections to see that they are securely connected and check the cable itself for any cuts or nicks. On the Solar Powered DC system, verify each of the batteries is charged up to at least 12Vdc and the fuse is not blown – then verify cable connections are good and cable has no cuts or nicks. For additional troubleshooting info see Section 8 below. If no reason for the fault can be found, please contact Diversified Power International, LLC at 423-299-0011.
- Winterization: If your pond ices over during the winter, it is best to pull the transducer and float assembly out of the water to prevent ice buildup from damaging the cable or other system components. Thoroughly dry all components before storing. Reapply dielectric grease (included with the Transducer assembly) grease to any cable ends that were disconnected.

8.0 SYSTEM TROUBLESHOOTING

Condition: AC Power Supply – Blue “Sonic Head” LED light is not blinking.

- 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 AC line power is on, then plug in the Quattro-DB® power supply and go to the next step.
- Verify the Quattro-DB® Power Supply is turned off, then disconnect the Sonic Head cable from the power supply.
- With Sonic Head cable disconnected, turn the Power Supply back on. Use a voltmeter to check the output voltage by measuring across pins 1 and 4 at Sonic Head 1 and Sonic Head 2. (Refer to pin diagram below.) Verify that the output voltage from the power supply reads approximately 39-44Vdc. If no output voltage measured at the Sonic Head Connectors and AC voltage is present, return the unit for service or warranty repair. Do NOT open the power supply - no user serviceable parts inside. **OPENING THE POWER SUPPLY ENCLOSURE VOIDS THE WARRANTY!** If you are returning a unit for service you MUST call our RMA department in advance to receive an RMA tracking number.



Condition: AC Power Supply tripping circuit breaker.

- Disconnect the Sonic Head power cable(s) from the power supply and reset the circuit breaker. If the breaker trips, the problem is in the power supply or the Surge Protector/Extension Cord. Plug the power supply directly into the outlet and reset the breaker. If the breaker stays “ON” the Surge Protector/Extension Cord is bad and should be replaced.
- If the breaker continues to trip, the power supply is bad and should be returned for warranty replacement or repair. See Section 10 for more info on the warranty and return instructions.
- If the breaker doesn’t trip after the Sonic Head is disconnected check the voltage on Pins 1 & 4 as shown in the diagram above. If the voltage output from the Power Supply is approx. 44Vdc then the fault lies with the Sonic Head itself or the cable that attaches it to the Power Supply. See chapter 10 for Customer Service contact info.

Condition: Solar Controller – Blue “Sonic Head” LED light is not blinking.

- Verify that the Green “Status” light on the Solar Controller is illuminated. If not, then the batteries are completely discharged or the power cable from the battery box to the Solar Controller is not working.
- Using a voltmeter, check across the output terminals of each battery and verify that each individual battery has a voltage level of at least 11 Vdc.
- If the batteries are discharged below 11v use a standard automatic type car battery charger connected across one battery at a time to bring them both back up to a full charge.
- If the batteries are properly charged but the Green Status Light is not on and the blue “Sonic Head” light is still not flashing then the problem lies with the Transducer Power Cable, the Solar Controller or the Transducer Assembly, or Power On/Off Switches were not turned ‘ON’.

8.1 A/C AND DC CONTROLLER LED CODES**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 (refer to LED Code Matrix below).

- If an Error is in effect, it may be due to a fault in the solar panel input power section, the battery charging system, or load management where the loads have over-discharged the battery pack.
- 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 overheated.
- A temperature sensor MAY be 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.

Solar Controller Status/Fault LED Code Matrix

Status LED codes (3.5 second period)

Charger status	Status LED (green)	Fault LED (red)	Description
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 complete	On	Off	Charging complete

Fault LED codes (3.5 second period)

Battery present detection	1-Flash per 3.5s	1-Flash per 3.5s	Battery over temp.
Invalid battery temperature	1-Flash per 3.5s	2-Flash per 3.5s	Temp. sensor
Charge timer expire	1-Flash per 3.5s	3-Flash per 3.5s	Charger timer fault
Battery under voltage	1-Flash per 3.5s	4-Flash per 3.5s	Battery over discharge

9.0 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 starting at just above the normal hearing range of human beings
 - Bandwidth 2: High ultrasonic range
 - Total Frequencies per cycle is greater than 1,000 frequencies
- 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.

10.0 LIMITED WARRANTY

IMPORTANT!

As with any electronics, protect against AC Power Line Transients with a surge protector. Warranty does not cover damage arising from AC Power Surges or Brown-Outs. A Power Conditioning Unit such as Uninterruptable Power Supplies, most likely does not have surge suppression and are not recommended to replace 'Surge Protectors'.

Diversified Power International LLC (DPI) warrants exclusively to the original purchaser, products will be replaced or repaired, at DPI'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-DB™ and Quattro-DB® Transducer Products, including Wire and Cable Assemblies:
 - 36 months from date of purchase
- Mechanical (non-electrical) Type Products:
 - 60 months from date of purchase
 - Includes Floats, Hardware, etcetera
- Power Supply (Electronic) Products:
 - 24 months from date of purchase
 - Includes AC Power Supplies & DC Solar Controller

In order for a claim to be processed, you must call Diversified Power International, LLC at 423-299-0011 to obtain a Return Material Authorization (RMA) number and accompanying RMA form. The product then can be returned to DPI (i) with all transportation charges prepaid, (ii) accompanied by an acceptable proof of purchase, and with a Return Material Authorization (RMA) number 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 DPI except for the breach of an express warranty stated herein.

DPI 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, DPI 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.**

For Customer Service, and to request an RMA or obtain Return Information, please call Diversified Power International, LLC at 423-299-0011.

For all returns, please clearly mark the RMA # on the outside of the packaging and send to:

Diversified Power International
414 Century Court
Piney Flats, TN 37686
RMA # _____

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

www.AlgaeManagement.com