



## Series 4 installation and operations manual updated February 2019

All Arid Bilge Systems are designed to remove trace amounts of residual bilge water typically left behind by the average bilge pump. Traditional high volume bilge pumps still need to be kept in service, to prevent sinking or changes in vessel trim, which can be brought about anytime a sudden inflow of undesired water occurs. The conventional bilge pump is still a necessary safety item, that the prudent mariner always verifies proper operation of, as part of a proper maintenance schedule.

### Installation . . .

Your new Series 4 dry bilge system can be mounted virtually anywhere aboard your boat, except in the bilge. The perfect installation would be to mount the box slightly above the discharge thru hull fitting on a bulkhead, similar to a battery charger. Please note the “up^” arrow on the upper right hand corner of the face plate for correct box orientation. All Arid Bilge Systems operate similar to the common wet vac and cannot be mounted on their side, as gravity does play a part in the system’s operation. If mounting aboard a sailboat, it is even more important that these guidelines are met, as the occasional heeling angle of the vessel will place the unit on that same angle. We do not provide mounting brackets with the Series 4 units. The boxes are made of ½” thick air injected PVC plastic. Eighth inch angle aluminum or quarter inch flat bar aluminum are usually the easiest to work with to fabricate mounting brackets. The aluminum is very inexpensive and available at any hardware or home improvement store. Angle aluminum can be cut into 5 to 10 inch lengths and secured to the sides or top and bottom of the unit and then to a bulkhead. When securing to the Series 4 unit, no predrilling is necessary, you simply turn the 5/8” long pan head Stainless Steel screw through the bracket into the box and the material is soft enough to accept the screw. Flat bar aluminum can also be placed across the back of the box so that it extends about ¾” beyond the sides of the box on both sides. Because there are no brackets and its so easy to secure screws to the box, this makes the installation very versatile. You can mount to unit to a shelf, bulkhead or ceiling. You can even

place brackets alongside and behind the unit and then mount it into a corner. We do not recommend drilling holes from the inside of the box to run screws through the box as there is limited access to open areas and there are sensitive electronics to damage.

The unit comes with a set of bilge pickups plus spares, and a minimum of two 100 foot bags of the 3/16" intake tubing. All intake tubes need to have a finished cut length of between 20 and 75 feet, so that the virtual float switch will operate correctly. If you were to cut the length of the intake tubing less than 20 feet, the system would not correctly recognize the fact that bilge water is present at the bilge pickup, and will prematurely cycle off. This would result in the bilge remaining wet. So please coil any excess intake tubing, if necessary, on runs under 20 feet, never cut it too short. The intake tubes can be different lengths.

The black 1/2" 90 degree barbed discharge fitting can be rotated in any direction as needed, and its best if turned clockwise when possible. Alternatively, this standard discharge fitting can be swapped for a 3/8" to a 1" barbed fitting, as long as it has a 1/2" NPT thread on the other end of the adaptor which will thread directly into the unit. A half inch Polybraid hose is the most commonly used discharge hose. This discharge should be under 12 feet in length, the shorter the better, and should not run uphill more than two feet above the unit, preferably down hill to the discharge, if at all possible. The other end of the discharge hose is usually T-connected to an existing overboard outflow. The unit is much more powerful in suctioning water up to twelve feet above the bilge, but it is not as efficient at pushing the water above the black 90 degree discharge port. Hatch drains, deck drains and sink drains are usually best to T-connect to, as they are both static and vented. If you must connect to an existing bilge pump outflow, it absolutely must have a riser loop. Most of the boat manufacturers today do place a riser (or anti-siphon) loop that runs above the thru hull fitting between it and the bilge pump. Its sole purpose is to prevent backflow from outside the vessel, back into the bilge through the bilge pump, if the vessel is overloaded and the thru hull were to become temporarily submerged. As long as the Arid Bilge discharge is T-connected between the peak of the riser loop and the thru-hull fitting, the discharge water should harmlessly travel overboard through the common shared thru-hull fitting. If, however, the T-connection were made between the bilge pump and the peak of the riser loop, then the bilge water will return to the bilge through the bilge pump. Why not place a check valve near the bilge pump to prevent this instead? Because then you will likely create a condition called: vapor lock. This is where the water that is on the thru-hull side of the check- valve remains, providing resistance to the bilge pump. Meanwhile, the bilge pump is sitting in a flooded bilge compartment attempting to prime itself. Visually, when this occurs, we see 10 to 20 minutes of run time on the submerged bilge pump, as small bubbles of air continue to escape from the pump housing. Finally, as the pump reaches prime, the water rushes overboard. So if you already have a check-valve in your bilge pump discharge hose, it might be a good time to remove it during the installation of an Arid Bilge System, as this system only increases the likelihood of vapor lock, whether or not the Arid Bilge is T-connected to the bilge pump discharge.

As with all overboard discharge devices, the vessel owner or Captain is responsible to see that hydrocarbons are not expelled from the vessel into the surrounding waters. Fortunately, at Arid

Bilge we do offer solutions for this issue as well. Once the Arid Bilge System is installed and running and the bilges remain parched, all leaks start to leave trails through the dry bilge back to the different sources. Now we can look for water, fuel, oil leaks etc. and actually find them. This is very different from the conventional wisdom, where a small lake exists in the bilge where all liquids are combined, sloshing around, preventing both identification and quantification of the liquids. At Arid Bilge, we also offer inexpensive oily water separators which we market as the "Eco Friendly Discharge Companion". These devices allow the bilge water to pass overboard while retaining virtually all of the Hydrocarbons.

The two-conductor power cord needs to be connected to a DC power source of either 12 or 24 volts depending on which voltage was ordered. The Series 4 units are voltage sensitive and will not accept either voltage. There is a label on the unit just above the power cord entry point on the side of the unit that designates 12 or 24 volt power. Please connect the red to positive and the black to negative. The power cord does need to be protected by a 5 to 10 amp fuse or circuit breaker. The unit does have an internal 3 or 5 amp fuse mounted in a fuse holder next to the negative terminals. This fuse protects all of the Arid Bilge System internals. The system draws approximately 80 milliamps in standby, and 0.9 of an amp at 12 volts when running on a single intake.

There are four styles of bilge pickups available for the Series 4 units. The 2" x 3" mini standard and the 2¾" x 4¼" standard bilge pickups are designed for flat bottomed bilges that are at least 2" or 2¾" wide respectively. The Offset and L shaped pickup wands are designed for V bottomed bilges. Six to twelve of these bilge pickups were provided with your Series 4 unit which includes a spare for every two zones. The intake tubing should be routed first and then pushed approximately 7/16" into the fittings at the pickup and the unit. When you start to feel resistance while inserting the tube into the fittings, you are only half inserted on your way to the proper locked and seated position for the intake tubing. **When the tube is not fully inserted, it creates a vacuum leak and your Arid Bilge will not be able to dry the bilge, as it would be suctioning air instead.** If you purchased the pinch valve upgrade, there will be soft walled tubes dangling out of the intake port holes instead. If this is the case, simply insert the hard walled intake tube from the bilge pickup into the soft walled tube and continue to massage the soft walled tube over the hard walled tubing until there is about a ½" overlap. You can place a small micro tie wrap over this connection point for added security. The tubing is removable both from the bilge pickup and the Arid Bilge System. Simply depress the brass ring that surrounds the tube where it enters the fittings fully, and hold. Next, pull out on the tube while continuing to hold the brass ring in, and the tube will release. If you have the soft walled tubes at the unit end, then simply pull back on the edges of the soft walled tubing, until it releases. Do not try to pull the two tubes apart. Securing the bilge pickups is usually not necessary, as it has a non-skid surface on the bottom side and a very low center of gravity. Initially, the unit should be run with the pickups loose in the bilge, to verify that they are at the lowest points. Excess intake tubing coiled near the bilge pickups will allow them to be easily relocated. Once the low points have been found and the bilges are absolutely dry, there are three different ways to secure the bilge pickups if needed. First, leave them loose and monitor to see if they do flip or move. Second, if they are not stable, you can tie-wrap the intake tubing

to something directly above the pickups. Pulling down on the tubing, as the tie wraps are pulled tight will exert additional pressure to help the bilge pickup stay in place. And third, if the pickup is still wandering, its time to purchase a 3/4" x 1/8" aluminum flat bar available at the local hardware stores. You then drill a 1/2" hole near one end, place a 90 degree bend about an inch from that same end and then cut your bracket to length. Drilling two smaller holes into the vertical portion of the bracket will allow you to secure it to whatever is available in the bilge area. The intake tube is removed from the pickup, the 1/2" hole is placed over/around the pickup's fitting, and the intake tube is then re-inserted. No downward pressure should be exerted on the pickup, as the pad underneath acts as a sponge and needs to breathe, in order to absorb water. If you purchased the pickup-wand instead, it has a vertical tube that is easily tie wrapped to whatever is available at its location. Make sure that the bottom of the L is pointed down, as it absorbs from under the L of the pickup-wand. Also, the wand is made of soft-walled copper, so you can hand bend the vertical black part of the L, but care must be taken to see that it is gently curved or radiused, not kinked.

#### Normal operation . . .

Once discharge, intake and power are all connected and power is applied, the Arid Bilge Series 4 will go through the following sequence: Five seconds after power is applied, the compressor starts running. The low vacuum and discharge cycle lights are lit. For the next five seconds, the unit will discharge any previously collected water. Then we hear a click, and for the next six seconds, the unit will pump air backwards through the active intake tube, while continuing to discharge any remaining water. If the bilge pickup is submerged it will likely be passing bubbles at this time. Then, we hear another audible click with a tonal change with the discharge light going out and the vacuum cycle light coming on. This is when the vacuuming of the collection chamber starts to occur. The low vacuum light goes out after 14 seconds of pump run time, and 6 seconds later, the high vacuum light comes on. As the chamber reaches a full vacuum level at 18", we hear the pump speed up, then shut off and this happens roughly 11 seconds later for a total pump run time of just 22 seconds. As the pump shuts off, an intake valve opens (zone 1 lights on the first cycle) and this is when water, oil or air starts to flow rapidly through the 3/16" intake tube. The pump is not running while water is being drawn out of the bilge. The length of the tube as well as the height of the unit above the bilge pickup all affect the timing. If it's pulling air or water or some combination thereof, the timing of this part of the cycle will also vary accordingly. Next, the unit will repeat this process for intake number 2, and on the third cycle for intake number 3 and so forth. If the unit finds three wet zones, i.e. both 1, 2 and 3 are pulling water, it will run cycles pulling from the three until one of them starts to pull air. Eventually, the unit will return to checking all of the ports and find that it's pulling air on them individually. It then enters a three hour siesta or rest mode, where the unit will be completely silent. The low vacuum and system power on lights remain lit. Hopefully, the siesta mode is where your Arid Bilge will spend most of its time. To wake the unit up at any time it's taking a siesta, simply turn power off for three seconds and then reapply.

## Processor Lights Legend . . .

If you want access to the inside of your unit, simply pull out on the lower corners of the face plate, which releases the Velcro.

X0 – low vacuum 8” or less

X2 – high vacuum 18” or greater, consider this light the system health check light, it needs to illuminate just before the pump shuts off every time.

X4 – System flooded

Y0 – Air pressure - discharging

Y1 – Intake #1 active

Y2 – Intake #2 active

Y3 – Intake #3 active

Y4 – Intake #4 active

Y5 – Vacuuming chamber

Green light – system power on

For hour-meter-equipped units, there will be an hour glass icon on the left side of the small LCD display with the hours’ run time indication to the right. The hour glass icon will blink off and back on when that zone is active.

## Alarms . . .

There are several different issues that can cause your Series 4 unit to produce an audio alarm. If it is alarming, try to read over the different scenarios to see which one matches best.

1. 1a. A blocked intake. The unit will run its normal cycles, pulling all but the affected zone dry. After the other zones are dry, the unit will alarm with the compressor running, as it is attempting to blow air backwards through the blocked intake. Series 4x4 units with only four intakes do not have a Piezo buzzer and will just blow air backwards through the affected zone for 2 minutes. Five through eight zone versions have Piezo buzzers that will be active at this time. Resetting power to the system at this point will cause it to run normal again. Now here is what we listen for – silence. The unit will run a cycle, pause for about 12 seconds on a normal dry zone and then restart. It will do this for the unaffected zones, but it will pause for 275 seconds which is 4½ minutes on the clogged zone. Once you have identified the zone that is causing this alarm, you now have three possibilities: The intake valve is not opening, or the intake tubing is clogged, crushed, kinked, or the bilge pickup pad is clogged. You should first visually inspect the pickup pad. If it looks like it is significantly clogged up, then remove and clean. You can depress the brass ring surrounding the tubing where it enters the fitting, and pull the tube out. To prove or disprove that the pickup is indeed the problem, place the bare intake tubing out in the air where it can’t come in contact with anything. Reset the system and let it run through its cycles, if it no longer pauses for 4½ minutes when it gets to that zone and it fails to alarm again, then we are certain that the pickup was the problem. The

pickups are easy to clean, just spray some degreaser on the pad, massage it a little, take it out on the dock and place a garden hose over the fitting so that the fitting completely disappears into the hose end. Turn the water on and back wash. Inspect the perimeter of the pad to make sure that it's not releasing or delaminating. Then reinstall if all looks good.

1b. If removing the pickup did not change anything, i.e. the unit is still pausing for 4½ minutes and the alarm is still sounding, then let's disconnect the tubing for that zone from the Series 4 unit and reset the power again. If the alarm has been cleared this time, then inspect the intake tubing as this will be the problem.

1c. If removing the intake tubing from the Series 4 unit still does not clear the alarm after the power reset, then the intake valve is no longer opening. We have a separate manual for servicing the valves, as we have installed four different brands of intake valves over the years and the procedure will be different for each one. The manual for servicing the valves will also apply to Series 2 & 9 systems.

2. 2a. A blocked discharge: The unit alarms immediately after a power reset with the pump running and the system flooded fault light is lit. If it's springtime and your boat has just been splashed and you are hearing this alarm, please check and see if the sea cock valve on the thru hull has been opened. I always get these calls at the start of every season. If you see this, then open the valve, reset power and your Series 4 unit, which will alarm one more time for 120 seconds, then resume normal operation. You should see the system flooded fault light go out almost immediately after the power reset.  
2b. The collection chamber is flooded and the seacock was not the problem. O.K., then get a big gulp cup or small bucket, remove the discharge hose from the black 90 degree barbed fitting. Hold the container under the fitting and reset power. If the unit alarms and discharges, then there is something else blocking the discharge that you need to locate.  
2c. If the unit still alarms after a power reset, and no water comes out of the discharge, and the system flooded fault light remains lit, then either the compressor or a three-way air valve is bad. In either event, you are probably best to call or email us and will likely be dismantling and shipping the unit in for repair.
3. If the compressor pump is not running, then the unit is probably not receiving power. Look at the narrow rectangular window and see if there are any lights lit on the processor. If you are seeing a light show after a power reset, i.e. you see the Y0 – Y5 lights going on and off with no pump running, then usually the compressor has reached the end of its useful life and will have to be replaced. Please call or email for assistance.
4. 4a. Internal leak(s). The unit runs cycles, then alarms (a 4-zone will click the valves in ascending order only, as it does not have a Piezo buzzer). You won't hear the pump speed up before it shuts off, and you will hear clicking noises while the alarm is sounding. The low vacuum light never turns off. If the Arid Bilge System helped you find your leaks aboard and it's no longer seeing any water, then there's a chance that the system may have lost its prime. The discharge check valve will usually seal even with a

dry discharge riser, but not always. The simplest check would be to remove the discharge hose from the black 90 degree discharge fitting. Reset the power and after 11 seconds of run time, there will be a second audible click. Place your thumb over the 90 degree fitting for the next several seconds and see if you feel any suction. Also see if the low vacuum light goes out, followed by the high vacuum light coming on. If you do feel suction and see the lights change as described, then you can try rotating the 90 degree discharge fitting so that the opening is pointed up. Next, pour a small amount of water in, maybe 9 ounces should do the trick. Run the system and see if operation is restored. If this is the case, you may consider washing one of your dry compartments every couple of weeks so that the Series 4 unit sees some water flow.

4b. If holding your thumb over the discharge does not cause you to feel suction and the pump does not speed up, and the low vacuum light does not transfer to high vacuum, then the internal leak could be caused by a stuck open intake valve, a failed fitting, a bad three-way air valve or some other leak point. We would disconnect the intake tubes at this point. If you have any of the intake tubing left over from the original installation, you can cut yourself two 4 inch pieces, one for every two zones if you have a 6 or 8 zone version. If you have an odd zone version with 5 or 7 zones, then you will have to cut an extra piece and block the end off or kink it, in order to block the odd intake port. Loop the short pieces of tubing into two of your intakes at a time so that they are sealed to each other. Reset power and listen to see if the pump now speeds up before shutting off. Does the high vacuum light come on? Does the unit pause for 4½ minutes with the different loops in place? If so, reset power and run the unit and just after the compressor shuts off, turn power off. Now, disconnect the looped tubes one at a time and see if there is any suction on any of the ports. If you do hear a hiss, then quickly place your fingers over the uncovered ports to determine which one has a leak. None of the ports should be suctioning air while the power is turned off. This will help you repair the problem faster, once you know which valve is the problem. We have a separate manual for the four types of intake valves that we have placed into our units, and the servicing will be different for each one. The intake valves can usually be serviced out in the field.

4c. If there is no leakage in any of the valves, discharge or intake, then there is probably an internal leak in the system, or a faulty vacuum sensor, or a bad compressor, or a bad three-way air valve. In this case, you should contact us and it's probably best to dismount the unit and prepare to ship it back for service.

#### Other issues . . .

This unit has a 11 GPH per hour total capacity, but 260 gallons per day sounds better. On any single zone you would probably not see more that 6 gallons per hour, or 140 gallons per day. If your vessel has a slow and continuous leak or leaks, they should be located and repaired. Obviously, if the volume generated by your leaks exceeds the capacity of the unit, the bilges will never become dry.

### Winterizing . . .

If the system is exposed to freezing, there is little damage potential, as it is pneumatically driven and water never goes through the pump. If the discharge has been installed above the unit, i.e. the black 90 degree discharge has been rotated 180 degrees and is pointed up, or the discharge hose loops above the unit, then the internal discharge riser could become completely filled with water and would then need to be protected as follows: About 8 ounces of biodegradable anti-freeze should be placed at the bilge pickup locations, and the system power should then be reset. Once the system re-enters the hibernation mode after running several cycles, and has removed all of the biodegradable antifreeze, you should shut the power off until spring. In the springtime, you should verify that the discharge thru hull valve, if so equipped, is open, before restoring power. Running the biodegradable anti-freeze through the unit also protects the stainless steel solenoid valves by keeping them lubricated.

### Shipping the unit . . .

Should it become necessary re-box and to ship the unit back to us, please follow these guidelines. Once the unit is dismounted, take the unit out on the dock and rotate it so that the black, 90 degree discharge fitting is at the lowest point, essentially rotating the entire box 135 degrees. Next, rock the unit so that it is sideways, and back to having the discharge fitting down. Every time you rock the unit you will see a small amount of water drip out of the discharge fitting. Please continue rocking the unit back and forth until no more water comes out. Next, take electrical tape and wrap the discharge fitting. You run the tape over the open discharge, then up over the 90 degree shoulder for a few wraps. Now when the unit is placed into a box, refrain from placing it into a sealed plastic bag. If any water escapes from the unit during shipping, it's far better to have a little wetness in the cardboard box, than to damage the system internals. We have received the occasional unit back, inside a plastic bag where water found its way into the processor, which runs the repair bill up considerably.

Questions or comments please call 954-328-9705 or 954-478-7066 or email us at [al@aridbilge.com](mailto:al@aridbilge.com)