



Series 2 installation and operations manual updated March 2022

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 2 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 righthand corner of the face plate for correct box orientation. All Arid Bilge Systems operate like the common wet vac and **cannot be mounted on their side**. Gravity plays 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. There are six #8 mounting holes on the two mounting flanges which will work well for the average bulkhead mounting. If the unit needs to be shelf mounted, then it is easy to attach a pair of 1/8”x1”x7” flat aluminum bars to the bottom of the box (protruding out on both sides, similar to those existing mounting flanges). Then, the aluminum can in turn be secured to the shelf.

The unit comes with a set of bilge pickups plus one spare and a 100 foot bag of the 5/32” intake tubing. **All intake tubes need to have a finished cut length of between 20 and 50 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 would 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** and never cut it shorter than 20 feet. The intake tubes can be different lengths.

The brown/black ½" 90-degree barbed discharge fitting can be rotated in any direction as needed, but best if turned clockwise when possible. Alternatively, this standard discharge fitting can be swapped for a 3/8" to a 5/8" barbed fitting, as long as it has a ½"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 downhill to the discharge if possible. The other end of the discharge hose is usually T-connected to an existing 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/brown 90 degree discharge port. **Hatch drains, deck drains and sink drains are usually best to 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 III". This device allows 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 2 units are voltage sensitive and will not accept either voltage.** There is a label on the unit just above the power cord entry point that designates 12 or 24 volt DC power. Please connect the red to positive and the black to negative. **The power cord does need to be protected by a 3- to 10-amp fuse or circuit breaker.** The unit does have an internal 2 or 3 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 70 milliamps in standby, and 0.7 of an amp at 12 volts when running on a single intake.

There are three styles of bilge pickups available for the Series 2 units. The 2" x 3" mini standard bilge pickup is designed for flat bottomed bilges that are at least 2" wide. The larger offset pickup measures 2 ¾" x 4 ¼" and has the fitting along the suction edge of the pickup. The offset is designed to lay into and dry a V-shaped compartment. The third style is the L shaped pickup wand which is also designed for V-bottomed bilges and can fit into sharper narrow areas. Three or four of these bilge pickups were provided with your Series 2 unit which includes a single spare. **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 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 plastic ring that surrounds the tube where it enters the two fittings fully, and hold. Next, pull out on the tube while continuing to hold the plastic 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 mini standard or offset 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, it's time to purchase a ¾" x 1/8" aluminum flat bar available at the local hardware stores. You then drill a ½" 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 ½" 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 a pickup wand, 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 2 will go through the following sequence:

Five seconds after power is applied, the compressor starts running. For the next six seconds, the unit will discharge any previously collected water. Then we hear a click, and for the next five 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. This is when the vacuuming of the collection chamber starts to occur. As the chamber reaches a full vacuum level at 20", we hear the pump speed up and then shut off. This happens roughly 12 seconds later for a total pump run time of just 23 seconds. As the pump shuts off, an intake valve opens and this is when water, other liquids or air starts to flow rapidly through the 5/32" intake tube. 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 if equipped. If the unit finds two wet zones i.e. both 1 & 2 are pulling water, it will run cycles pulling from both in tandem until either of them starts to pull air. Eventually, the unit will return to checking the two or three ports and find that it's pulling air on all individually. It then enters a three hour siesta or rest mode, where the unit will be completely silent. 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.

Internal Processor Lights Legend . . .

In order to see the lights, you will need to remove the unit from its mounting so you can view the Series 2 unit from behind. You will notice eight Phillips Head screws that hold the back plate in place. If you remove this cover / mounting plate, you will be able to read the PLC microprocessor lights. Here is the legend:

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 – Systems flooded light

Y0 – Air pressure - discharging

Y1 – Intake #1 active

Y2 – Intake #2 active
Y3 – Pump running 2 zone (Intake #3 active 3 zone version)
Y4 – Alarm Buzzer
Y5 – Vacuuming chamber
Green light – system power on

Alarms . . .

There are several different issues that can cause your Series 2 unit to produce an audio alarm. If it is alarming, try to read over the different scenarios to see which one matches.

1. 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. 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 and then restart. It will do this for the unaffected zones, but it will pause for 120 seconds which is 2 minutes on the clogged zone. Once you have isolated which zone 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 plastic 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 two 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 garden 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 2 minutes and the alarm is still sounding, then let's disconnect the tubing for that zone from the Series 2 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 2 unit still does not clear the alarm, then the intake valve is no longer opening. We will 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.
2. A blocked discharge. The unit alarms immediately after a power reset with the pump running. 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 2 unit will alarm one more time for 90 seconds, then resume normal operation.

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, then either the compressor is bad, or there is a bad three-way air valve. In either event, you are probably best to call or email us and will likely be dismounting and shipping the unit in for repair.

3. If the compressor pump is not running, then the unit is probably not receiving power. Check the terminals with your volt meter and see if the correct 12 or 24 volts DC are present. If you see the correct voltage, then let's remove the back cover plate (see the prior paragraph that addresses the internal processor lights legend) 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. Internal leak(s). The unit runs two cycles in 90 seconds (135 seconds for a 3 zone) and then alarms. You won't hear the pump speed up before it shuts off and you will hear clicking noises while the alarm is sounding. If the Arid Bilge System helped you find your leaks aboard and it's no longer seeing 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 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. If you do feel suction, then you can try rotating the 90 degree fitting so that the opening is pointed up. Next, pour a small amount of water in, maybe 4 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 2 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, then the internal leak could be caused by a stuck open intake valve, a failed fitting 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 a 4 inch piece. If you have a three zone version, then you will have to cut a second piece and block the end off or kink it, to block the third intake port. Loop the short piece of tubing into two of your intakes 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 unit pause for two minutes with the loop in place? If so, reset power and run the unit and just after the unit shuts off, turn power off. Now disconnect the looped tube and

see if there is any suction on any of the ports. If you do hear a hiss and quickly place your fingers over the ports to determine which one has a problem, this will help you repair the problem faster. 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. In this case, it's probably best to dismount the unit and prepare to ship it back for service.

Other issues . . .

This unit has a 3.5 GPH per hour capacity, but 84 gallons per day sounds better. 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/brown 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 5 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.

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/brown, 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 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 plastic bag. If any water escapes from the unit during shipping, it's far better to have a little wetness in the cardboard box, then to damage the system internals. We have received the occasional unit back, inside a plastic bag where water found its way into the processor and this will run your repair bill up considerably.

Questions or comments please call 954-328-9705 or 954-478-7066 or email us at al@aridbilge.com