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Clean Your  
Engine Room  
And Bilge  
The Easy Way

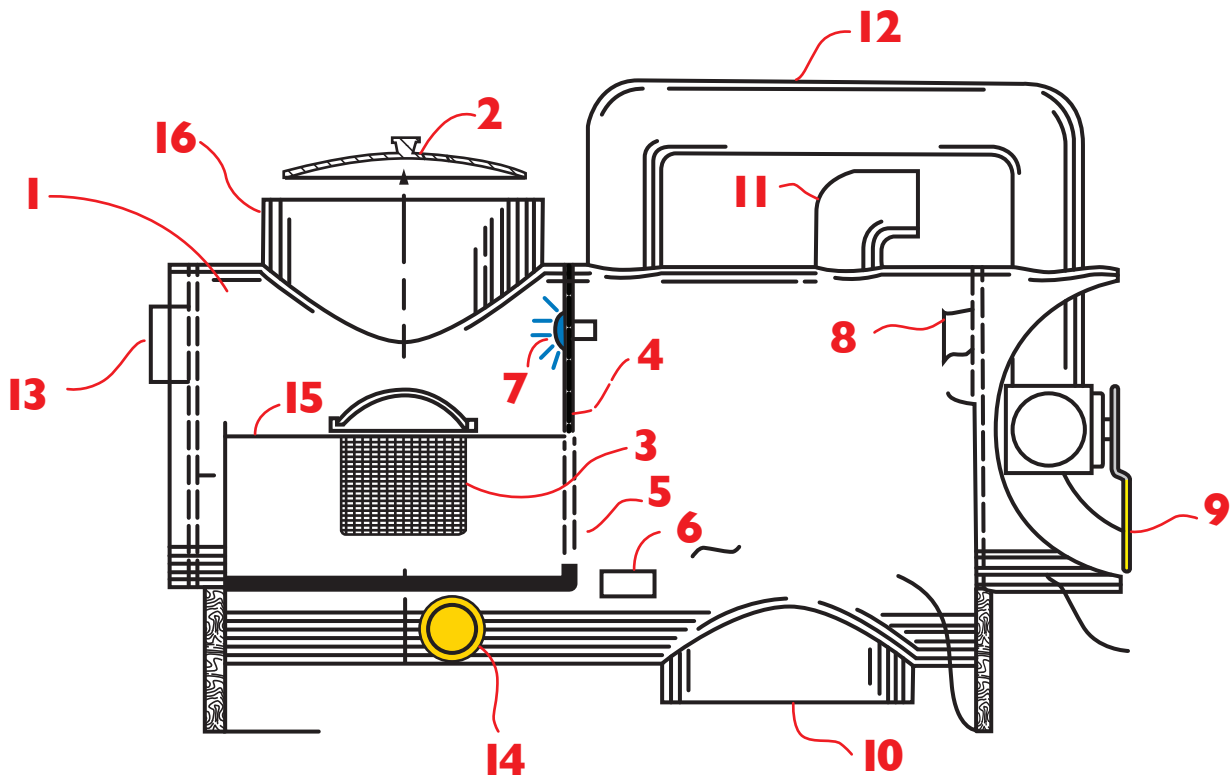
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Installation, Operation, and Troubleshooting Manual



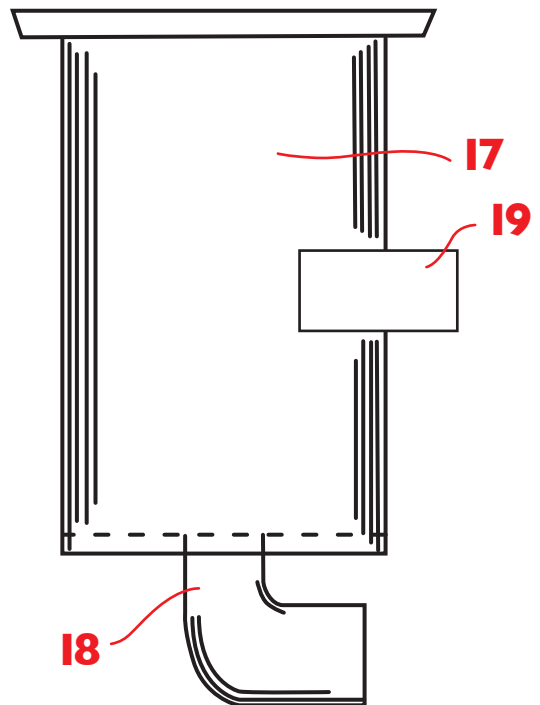
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**Figure 1: Legend for Pump Assembly**

1. **Sump Assembly Housing**
2. **Lid**
3. **Strainer Basket**
4. **Solid ½ Wall**
5. **Perforated ½ Wall**
6. **Sensor #1**
7. **Blue LED Light**
8. **Sensor #2**
9. **Diverter Valve**
10. **Pump Access**
11. **Air Outlet Fitting (To Vacuum Motor)**
12. **U-Tube**
13. **Inlet Fitting**
14. **Sump Drain**
15. **Perforated Shelf**
16. **Strainer Access**



**Figure 2: Legend for Vacuum Motor**

17. **Vacuum Motor Housing**
18. **Vacuum Inlet Fitting (From Sump Assembly)**
19. **Air Discharge**

## GETTING STARTED

### Determine the Location of the Parts

Before you start the installation process, familiarize yourself with all the Willy Vac components and what they do. Every boat is different, and every captain's needs are different.

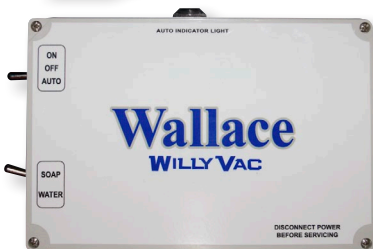
**NOTE:** Plan the hose and wire routing as you decide on your equipment locations.



**a. Sump Assembly:** Should be installed as low as possible, but no higher than 30 inches from the lowest section of the keel from which you will be vacuuming. You also want to have easy access to the lid/strainer basket, the drain, and the diverter valve. The sump assembly comes with a 20 ft wiring harness.



**b. Vacuum Motor:** Should be installed as high as possible; it is usually mounted on the ceiling in the engine room or pump room. This vacuum motor does not have to be located next to the sump assembly. We recommend selecting an out-of-the-way location that will allow the discharge-air to be easily plumbed into the engine room air box. (On occasion the Willy Vac will spit small amounts of water, and plumbing the vacuum motor to the air box prevents this water from ending up in the engine room. In addition, plumbing the vacuum motor to the air box makes the system quieter.) The vacuum motor comes with a 20 ft wiring harness.



**c. Relay Box:** Mount the relay box in a dry location. If possible, mount the box so it is visible from the engine room light switch/door. (This aids in seeing the blue auto-mode LED as you leave the engine room.) The relay box comes with a 20 ft. power cord with a molded 115V, 15A molded plug; *it must have a GFCI inline.*



**d. Bilge Sensor and Bilge Pickup:** These two must be mounted very close to one another! They are typically installed at the lowest point in the bilge while the boat is at rest. Mount the bilge sensor as close to the bottom as possible leaving enough room for a finger to get between it and the keel for cleaning. Mount the pickup as close to the bottom as possible but not so close that it chokes down the water flow to the Willy Vac. (This may take some little trial and error. It should be around  $1/4"$  to  $3/8"$ .) The bilge sensor comes with a 25 ft wiring harness.

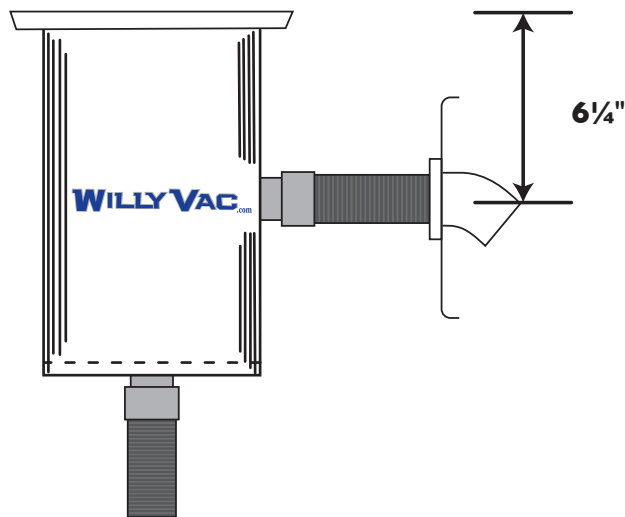
- e. **Hose and Wire Routing:** Keep the vacuum hose as low as possible. Because the higher the unit has to lift the water, the slower it works. Strap your wires up and out of the water.
- f. **Plumb the diverter valve of one discharge overboard:** either through its own thru-hull, or an existing thru-hull. Make sure the thru-hull is large enough to accommodate the flow of water. Especially if the thru-hull is accommodating components like an air conditioner and the Willy Vac. Remember that the Willy Vac can pump 1000 GPH.

## INSTALLATION

Once the location has been determined for the above components, mount them firmly in place and plug in the components to the relay box.

- i. **Vacuum Motor and Air Box Fitting:** It is usually recommended to determine the approximate location of the vacuum motor first. Then, drill a 2½" hole and install the air box dump fitting into the end of the air box, making sure that the elbow is pointing downward. Next, align the vacuum motor to the dump fitting and mount the vacuum motor.

**Figure 3: Vacuum Motor and Air Box Fitting**



**NOTE:** *The vacuum motor will probably be the most difficult component to mount. It will take some measuring and some patience, a helper would be nice as well.*

**Figure 4: Vacuum Motor, Installed**



**TIP:**

**If a helper is not available:** mark the ceiling outer perimeter of the location for the vacuum motor with masking tape, get the drill bits and screws ready. Apply a bead of quick dry 5200 around the outer edge of the vacuum motor mounting flange. Using a hot glue gun, apply a liberal amount of hot glue to center of the mounting flange working towards the outside. Now quickly hold the vacuum motor up moving it and pressing it in to place. Hold the motor very still for a couple of minutes until the hot glue has cooled. This will help hold the vacuum motor in place until you can get some screws in it. (Work quickly!)

**⚠ WARNING**

**DO NOT LEAVE THE VACUUM MOTOR SUSPENDED  
WITHOUT SCREWS. IT WILL FALL!**

- 2. Bilge Sensor and Pickup:** using your wet vac, vacuum out all the water in the bilge and dry the bilge as best you can. Keep in mind that this is the last time you have to deal with your portable wet vac!

Use screws and 5200 to mount the bilge sensor and pickup.

**Figure 5: Bilge Pickup**



- 3. Sump Assembly:** using the mounting feet provided, screw down the sump assembly; it is advisable to install sealant under the feet *but not 5200*, as the unit will need to be removed and turned upside down if the pump needs to be accessed in the future.

**Figure 6: Sump Assembly**





- 4. Manifold Assembly (Optional):** If installing the optional suction valve manifold, once again, mount this as low as possible.

**NOTE:** *Still only one valve at a time should be open.*

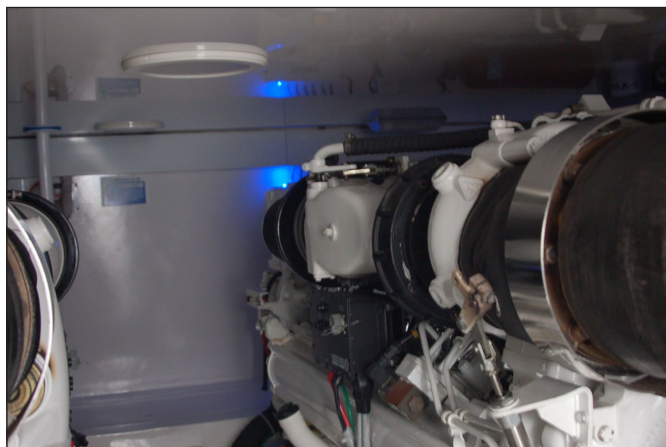
**Figure 7: Manifold Assembly**



- 5. Relay Box:** Mount the relay box and plug in the components. The relay box must be connected to a 120 volt 20 amp GFCI receptacle. You can plug the unit into an engine room outlet or hard wire but *it must have a GFCI inline.*

Once power is supplied to the relay box, the blue LED inside the sump assembly will illuminate. (This light will remain on as long as the relay box has power.)

**Figure 8: Relay Box with Blue LED**



In addition to the ON/OFF/AUTO switch, note that the relay box has a WATER/SOAP switch. This switch should *always* be in the **WATER** position unless you are vacuuming soap suds.

**Figure 9: Relay Box**



**NOTE:** *This SOAP switch should only be used in the manual mode and for a limited amount of time.*

The purpose of the SOAP switch is this: the controlling sensors inside the sump assembly think that the soap is water. Once the soap enters the sump assembly and foams up to the top, the sump assembly responds the same as if it were full of water: the vacuum motor shuts down. Now, because the sump assembly has difficulty pumping suds, the vacuum motor will not restart until the suds have left the upper sensor; which could take a considerable amount of time. The WATER/SOAP switch bypasses these sensors and forces the sump assembly and vacuum motor to run continuously.

In SOAP mode, the vacuum motor is doing most of the work; it is vacuuming the suds and discharging them out of the air outlet of the vacuum motor.

This SOAP mode should only be used for a very short period of time. Continual use of this mode will shorten the life of the vacuum motor.

Once the soap has been vacuumed up and the sump assembly and vacuum motor have dispelled the soap and water, return the switch to the water mode.

**NOTE:** *Do not leave the switch in the soap position!  
The unit will not work properly and cause premature vacuum motor failure.*

**⚠ CAUTION**

**DO NOT SUPPLY POWER TO THE RELAY BOX UNTIL ALL COMPONENTS ARE MOUNTED AND PLUGGED IN.**

## OPERATION

### Manual Operation

**In Manual Mode, the Willy Vac will work like a wet vac.**

1. If your system is equipped with the suction valve manifold, open the valve that corresponds to the desired bilge to be vacuumed.

**Figure 10: Willy Vac Manifold**



2. Locate the diverter output valve on the sump assembly and turn the handle to the desired outlet location. (Keep in mind that one of the outlets is plumbed to send the contents overboard.)

**Figure 11: Diverter Valve**



3. Make sure the strainer basket and Plexiglas lid on the sump assembly are properly in place.

**NOTE:** *There is no latch to hold the lid in place, it is critical that the gasket remain free of debris that would prevent the lid from sealing when vacuum is applied.*

**Figure 12: Strainer Basket and Plexiglas Lid**



4. Switch the toggle switch located on the relay box to the ON position.

The vacuum motor will run as long as this switch is ON. However; the liquid pump inside the sump assembly will run only when enough water is present to be picked up and discharged.

On initial start up or after the unit has been drained, it is common for the Willy Vac to take a couple more seconds than usual to purge itself. This is realized by the vacuum motor stalling during liquid vacuuming. Once the pump has purged itself, the vacuum motor will resume running and the system will be fully operational.

**NOTE:** *This could be critical information to remember to prevent a mess if you are using the Willy Vac to keep up with a leak or if you are draining fluid directly into the vacuum hose. We strongly recommend to pre-purge the Willy Vac with some fluid initially to prevent a long delay in the vacuuming process causing a fluid spill.*

**Figure 13: Toggle ON/OFF Switch**



**NOTE:** It is normal for the **vacuum** motor to cycle on and off during maximum water / liquid transferring.

## Automatic Operation

**In this mode the unit will operate like a bilge pump. Use this mode during normal boat storage and operation.**

- a. Open the valve (located on the suction valve manifold) that corresponds with the bilge area fitted with the auto water sensor.

**NOTE:** Be sure that only one manifold valve is open at any time.

- b. Locate the diverter valve on the sump assembly, turn the handle to the overboard discharge position. See “Figure 14: Diverter Valve” on page 13.

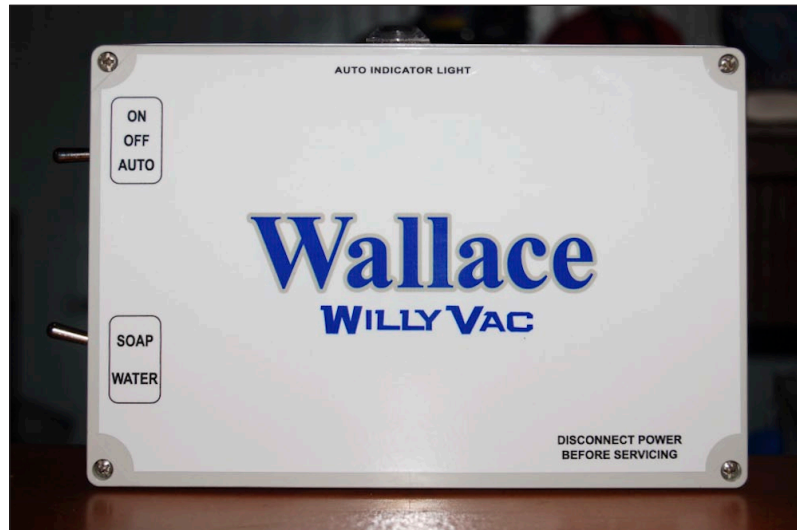
**Figure 14: Diverter Valve**



Overboard Discharge

- c. Switch the relay box ON/OFF toggle switch down to the auto position. The unit should turn on and run for approximately one second and then turn off. At the same time, the blue LED light on the top of the relay box should illuminate. The SOAP/WATER switch should be switched to the WATER position.

**Figure 15: Relay Box**



If there is water in the bilge compartment that is being monitored, the unit will not turn off until:

- This water has been vacuumed from the bilge, *OR*
- The unit has run continuously in AUTO for 15 minutes.

Once the water has been removed from the water sensor, the Willy Vac will continue to run for approximately 45-60 seconds. This should be adequate time to vacuum the remaining water from the bilge and suction hose to prevent the water from draining back down the hose and into the bilge.

## TROUBLESHOOTING

**First things first, now tell me, exactly what were you doing when you broke it? Maybe you should not have done that.**

### *Sensors—Overview*

Most problems encountered with the Willy Vac are due to dirty sensors, and are quickly remedied just by cleaning the sensors.

The Willy Vac uses three highly sensitive liquid sensors. Two are located in the sump assembly and one is located in the bilge. (These are not float switches, they are sensors with no moving parts.) The sensors are designed to be trouble free and last a very long time, but you **WILL** need to keep them clean.

These sensors are *intentionally designed to not recognize oil or fuel* to prevent the system from pumping fuel or oil overboard automatically.

When oily water is vacuumed up and run through the system, a filmy residue can form on the sensors and cause them to send false information to the relay box. Therefore, it is important that you know where these sensors are located and how to clean them.

Running small amounts of soap through the Willy Vac from time to time is a good practice. However, be sure to not use too much soap at one time, as the system sees soap suds as water.

## How to Clean the Sensors

**Sensor #1** is the hardest to clean but fortunately, it is the least likely to get dirty.

It is located in the lower section of the sump assembly just behind the lower perforated wall. See [“Figure 1: Legend for Pump Assembly” on page 4](#).

To clean this sensor, remove the strainer basket and spray the wall with Spray Nine or a similar product (something that cuts grease). While the lid and strainer basket are removed, turn on the unit and spray the wall with a water hose, directing most of the spray to the bottom and to the back of the unit.

**NOTE:** *It is important to turn on the system while you are hosing, so that the Willy Vac will pump the water out as you hose.*

**Sensor #2** is located in the upper section of the sump assembly under or just behind the large hose connecting to the top of the sump assembly. See [“Figure 1: Legend for Pump Assembly” on page 4](#).

To clean this sensor, remove the vacuum hose from the hose barb on the sump. Then loosen the wing nut on the yellow plug and remove it. (This plug looks identical to the one at the bottom of the sump assembly.) Using an old toothbrush or a similar tool, clean the sensor with Spray Nine and rinse.

It is not necessary to run the unit when cleaning this sensor.

**Sensor # 3** is located in the bilge very near the pickup.

Because this sensor controls the on and off when the Willy Vac is in AUTO mode, this sensor is the most important to keep clean. So, be sure to keep this sensor clean!

To clean this sensor, wipe the bottom of the sensor with a soapy rag or small brush and rinse.

If, after cleaning all of the sensors and you are confident that power is supplied to the Willy Vac relay box, and the system still fails to work properly, please call Willy Vac Tech support at (843) 693-4336. We will assist you in getting your Willy Vac up and running as soon as possible.

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## PLUMBING AND WIRING OVERVIEW

### Vacuum Motor

Mount to the ceiling at least 16" above the sump assembly, as close as possible to the engine air box intake (but no less than 6").

### Engine Air Box

The vacuum motor air is exhausted into here via a 45 degree elbow. This elbow prevents seawater spray from entering the vacuum motor in rough seas.

### Relay Box

Mount this box on the bulkhead just above the top of the engines so that the blue light is visible from the engine room entrance.

### Blue LED

Indicates that the unit is in standby mode.

### Valve Manifold

Mount no higher than 30 inches above the bottom of the boat.

A/C Volts  
120 only  
GFI  
In

### Remote Switch (Optional)

### Overboard Discharge

### Bilge Pick-Ups

Three pick-ups are shown, but there can be as many as desired; however, only one will vacuum at a time.

### Sump Assembly

This unit can be mounted in the bilge (no higher than 30 inches above the bottom of the boat), or on a shelf; you just will need to be able to access the drain basket and valve.

### Bilge Auto Sensor

Mount this sensor at the lowest point that the water pools in the bilge, very near the bilge pickup that has the valve position sensor.

### Pipe and Hose Sizes

For long horizontal runs, it is acceptable to use 1 1/4" PVC schedule 40 pipe. The flexible vacuum and discharge hose is 1 1/4" pipe. However, the hose that attaches to the sump assembly to the vacuum motor is 1 1/2" hose.