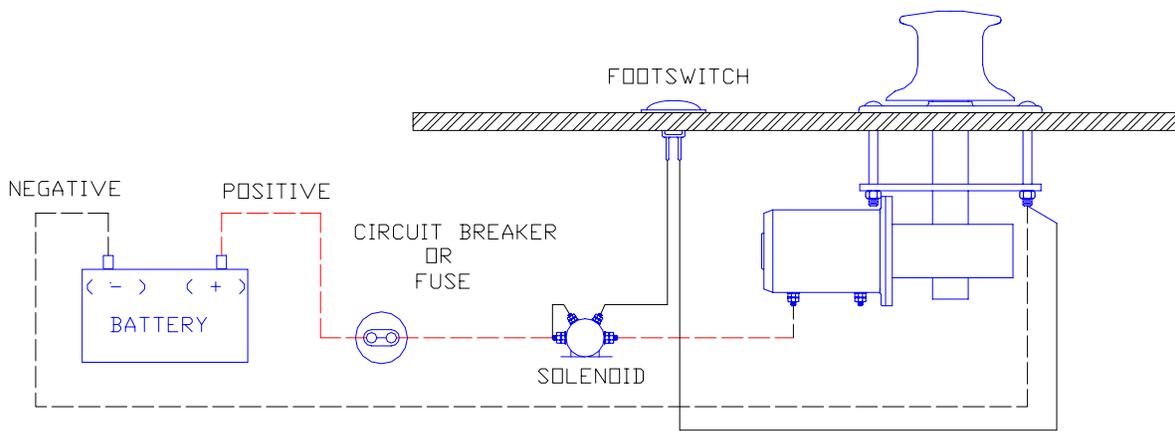


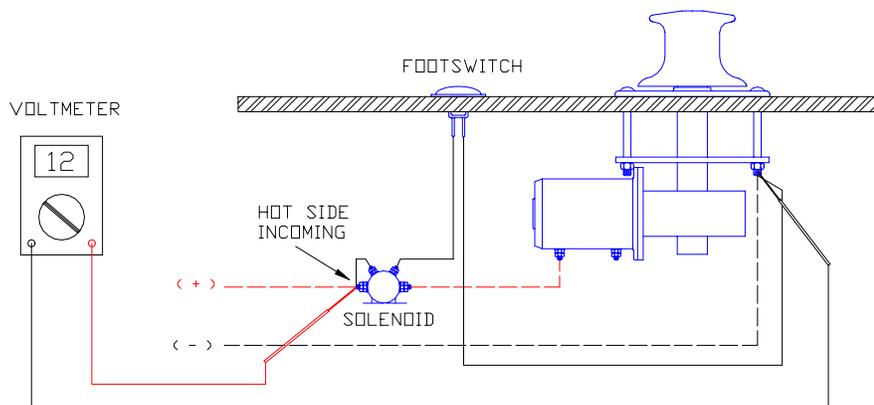
# Troubleshooting the basic windlass system

When you step on the footswitch and nothing happens it can be quite disturbing. The information below outlines the basic system and steps for troubleshooting. For simplicity we use a 12 volt non-reversing system as an example. If your windlass is reversing it simply has an additional footswitch, solenoid and lead to your motor. If your windlass is 24 or 32 volt the system is basically the same except the voltage is different and some will have 4 or even 6 solenoids. If your system is supplied by AC voltage it is similar, but unless you are a qualified electrician you should leave the troubleshooting to a professional. AC voltage is extremely dangerous and can cause severe injury or death.

**Overview:** The system has five basic components, a power source, electrical protection, a footswitch, a solenoid and a motor. The power source, a battery, supplies power to the system. The electrical protection, a fuse or a circuit breaker, protects the system from overload and in most cases also has a switch that energizes the system. The footswitch sends a signal to the solenoid, which then opens letting electricity flow to the motor running the windlass. See below.



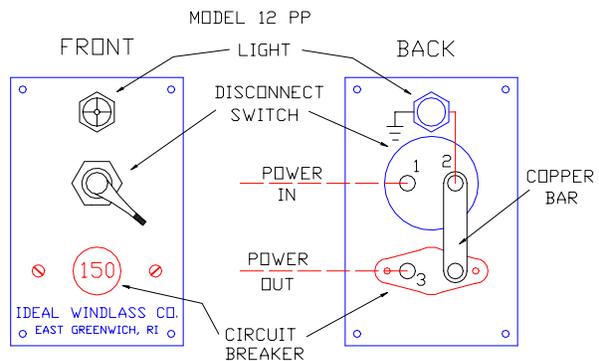
**Step 1:** Make sure the power is on. To test for power use a voltmeter putting the positive probe on the hot, or incoming side of the solenoid, and the negative probe on the ground. See below. If you have 12 volts here then your system is energized and power is flowing through any electrical protection to the solenoid. If you have voltage here proceed to step 2.



Almost all windlass systems originate at a battery. The cables running from the battery to your windlass are large, as large or larger than your index finger. Follow the positive cable forward to find the electrical protection device. The protection, either a fuse or a circuit breaker is installed breaking the positive cable at some point between the power source and the windlass motor.

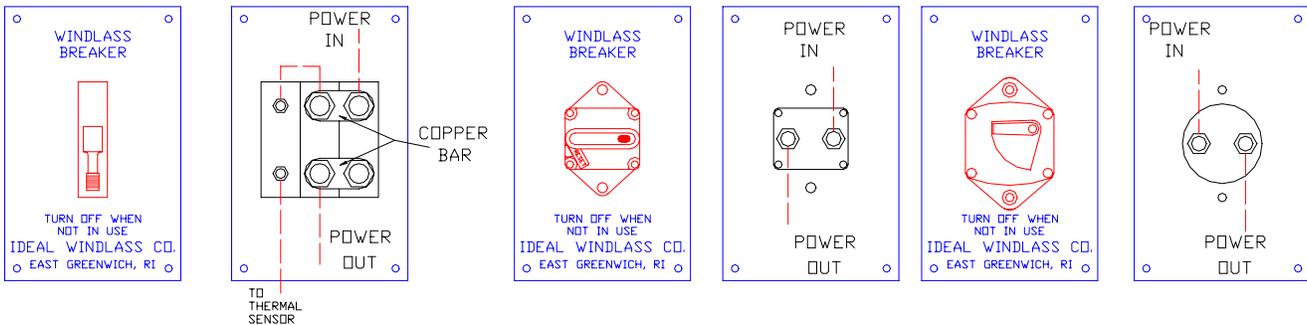
From the **1930's until the 1960's** most systems were protected by a large buse **fuse**, usually 200 AMPS. Often the fuse is close to the battery. If you find a fuse check the continuity using a voltmeter. If the fuse is blown replace it and check for voltage at the solenoid as described above. If the fuse is good continue along the cable looking for another protection device.

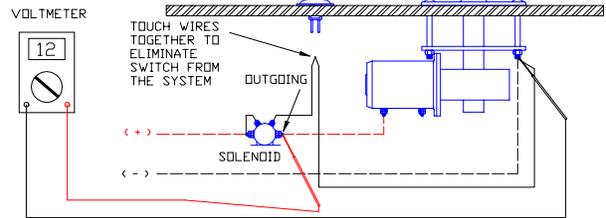
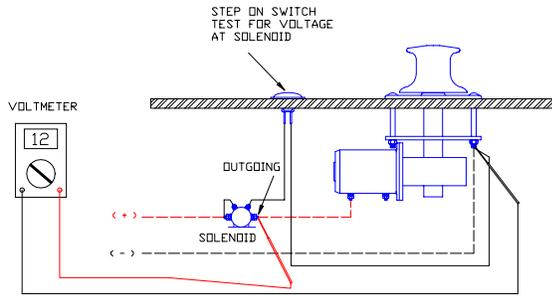
From the **1960's to the 1980's** a windlass **protector panel** was offered as an option, Model 12PP. The panel is 4 1/2" x 7" containing a light, a disconnect switch and a circuit breaker. The breaker is a round red button with 150 on it. Many powerboat manufacturers installed these devices in the engine room. Most installations used a protector panel, but some were done with the installer providing their own device. If you find a protector panel use a voltmeter to ensure power is getting to the disconnect switch. Put the positive probe on the hot side, or incoming side of the switch ( # 1 ) and the negative probe on the ground. If there is power here turn the disconnect switch on and using the voltmeter check to see if there is power coming out of the disconnect switch ( # 2 ). If so, then check to see if power is coming out of the circuit breaker ( # 3 ). If you have found that voltage is going through the disconnect switch, but not the circuit breaker try pushing the red button, if the breaker is working this will reset it. If this doesn't work you can remove the outgoing power lead from the breaker and attach it to the disconnect switch, **do this for troubleshooting only**. You will still have a switch, but no electrical protection. These circuit breakers are obsolete and the entire panel must be replaced.



From the **1980's to the late 2000's** a **circuit breaker**

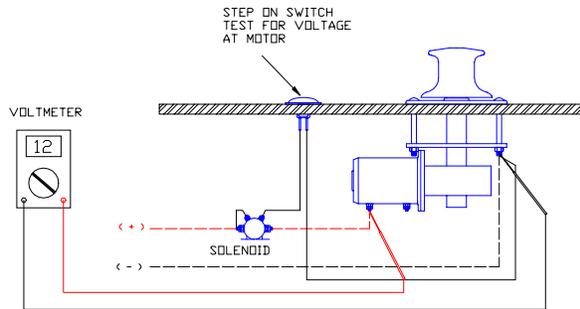
has been provided with the windlass. There are three types and most include thermal protection. See below. Check with a voltmeter to ensure power is getting to the hot, or incoming side of the breaker, then turn the breaker on and check for outgoing power. If there is voltage on the outgoing side of the breaker, you should have power at the solenoid. If there is no voltage the breaker is bad and must be replaced. For troubleshooting you can bypass the breaker by putting both leads on the same stud. This eliminates the breaker and any switch directly connecting the windlass system to the battery. **Do this for troubleshooting only**, testing if the windlass runs and the only problem is the breaker. Square breakers are obsolete and the entire panel must be replaced. Round breakers are replaceable.



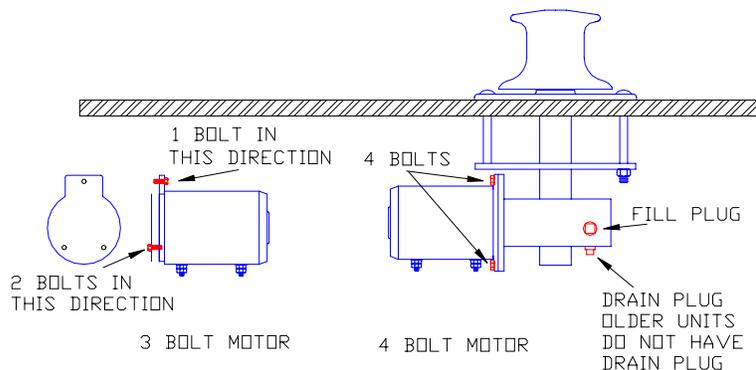
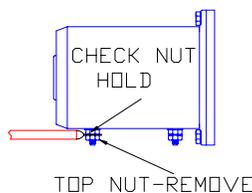


**Step 2:** Use a voltmeter to check for voltage coming out of the solenoid. Put the positive probe on the outgoing side of the solenoid, the side that leads to the windlass motor, and the negative probe on the ground. Have someone step on the footswitch. When stepping on the switch voltage should flow through the solenoid. If working you will hear a clunk from the solenoid when the switch is engaged. If voltage is found on the outgoing side of the solenoid proceed to step 3. If there is no voltage the problem is either the switch, or the solenoid. To eliminate the switch remove the two wires going to the switch and touch these wires together. Again, test with the voltmeter for voltage coming out of the solenoid while these two wires are together. If you have voltage then the switch is bad and must be replaced. See bulletin # 9240.1 for footswitch parts. If you have voltage proceed to step three. If not, replace the solenoid. You can bypass the solenoid by removing one of the large leads and touching it to the other large lead. This will bypass both the switch and solenoid wiring the windlass motor directly to the power source. **Do this for troubleshooting only** to test that the solenoid is the only problem.

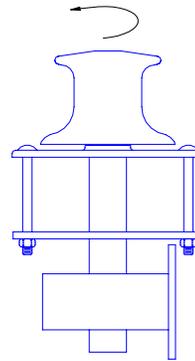
**Step 3:** Use a voltmeter to check for voltage at the windlass motor. Put the positive probe on the electrical stud on the motor, the negative probe on the ground and have someone step on the foot-switch. If voltage is present then you have one of two problems, a bad motor, or a frozen windlass that the motor cannot move.



**Step 4:** Remove the motor. The windlass gearbox has oil inside which must be removed before removing the motor. Older windlasses, windlasses with 3 bolt motors and horizontal windlasses do not have a drain plug. Vertical windlasses have a pipe plug on the side of the gearbox. Horizontals have a pipe plug in the front. Use a small oil-changing pump to remove the oil. Newer vertical windlasses have a drain plug on the bottom surface of the gearbox. See below. Before removing any wires either label them or draw a diagram showing the correct connections. When removing the wires from the motor be sure to hold the check nut in place while loosening the top nut. Failure to do this may ruin the motor. See below. Windlasses motors with a square flange have four bolts holding them to the gearbox. Remove the four bolts and pull the motor straight out. The motor has gasket sealant and you may have to break the seal by wiggling the rear end of the motor. Once the bolts are removed and the seal broken the motor will slide straight out. Windlass motors with a flange shaped somewhat like an old fashioned key hole have three bolts, one bolt going through the square end in one direction and the other two bolts 120 degrees apart going in the opposite direction.

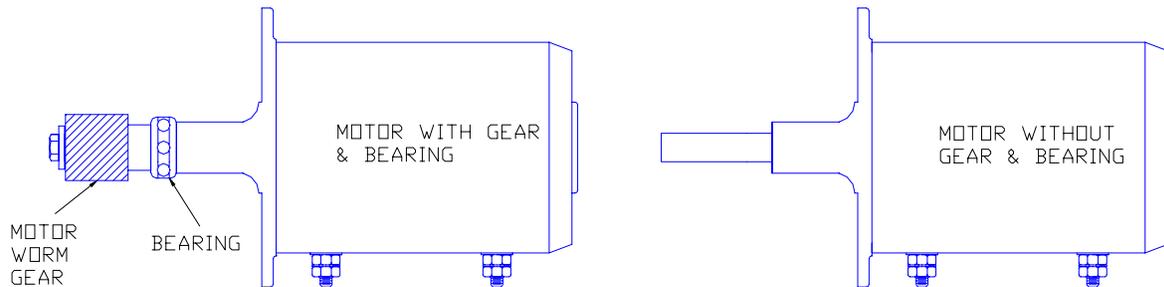


**Step 5:** With the motor removed attempt to turn the windlass by hand, you can do this by trying to turn the capstan. You should be able to turn it, not easily, but with two hands and without becoming red in the face. If you can turn it then the gearbox is not frozen and you should replace the motor. If you cannot turn it then the motor might not be the problem. If the windlass is frozen it probably needs to be removed and rebuilt.



TRY TURNING THE CAPSTAN BY HAND WITH THE MOTOR OFF

**Replacing the motor.** Replacement motors are available for all windlasses in all voltages. Motors are sold in two configurations. Complete with gear and bearing ready to bolt to the windlass gearbox. And without the gear and bearing utilizing the original parts. See below. If the old parts are worn, or if there is rust on the motor worm gear they should be replaced. A rusty motor worm gear will act like a file ruining the expensive bronze gear it mates with. AC motors are only available complete with gear & bearing.



Motor gaskets. 4 bolt motors use a fiber gasket along with permatex form a gasket. A gasket is provided with each motor. 3 bolt motors do not use a fiber gasket, only permatex form a gasket. When replacing motors all surfaces should be well cleaned before applying permatex and reassembling.

**Refilling the gearbox with oil.** All our windlasses use 90 WT gear oil. The oil used in the lower unit of outboard motors works well and is readily available. The proper level is up to the pipe plug fill hole. These are located on the side of the vertical gearboxes and the front of the horizontal gearboxes.

**Reattaching electrical connections.** Consult your labels or drawing. Be sure to hold the check nut in place while tightening the top nut. See previous page. Below are 2 of the most common 12 volt diagrams.

