STEP 5 – Secure the Moisture Pick-up Strips

Separate the pair of wires for the brass moisture pick-up strips by pulling on the separated pair. Move the wires so the strips are in the location you have chosen. Remove the backing from the included high-bond, double-stick tape to secure the strips to the bottom of the housing. The brass strips can be trimmed as desired with a pair of scissors. Be sure there is no battery installed when cutting. If you think the wires are too long and you have the skills and proper tools, you can shorten the length of the wires and re-solder them to the pick-up strips.

STEP 6 – Install the Battery

The Housing Sentry box includes a CR-2023 battery. It is important that no body oils are deposited onto the battery during the installation so it is recommended that you wear gloves or use a paper towel when handling the battery. Remove the battery from the packaging and slide it into the battery holder on the electronic circuit board assembly with the positive side of the battery (the totally flat side) away from the circuit board. To quickly check the battery, add moisture to your finger and then touch the moisture pick-ups strips. After a short time, the red LEDs should begin to blink at a fast rate.

CONGRATULATIONS!
You have successfully installed the Housing Sentry

Reminder: Return the Housing Sentry self-install kit to:

UnderWater Camera Stuff
4349 Clifford Road
Cincinnati, OH 45236 USA

unsure that the o-rings are seating properly in your test hole, thread the vacuum connector into the properly machined sample hole so you can see how they should fit.

To remove the vacuum connector from the test piece of acrylic, turn the connector ½ turn counter-clockwise then ¼ turn clockwise and repeat until the o-rings are clear of the acrylic. This backward and forward movement is needed to coax the o-rings out of the tight hole.

Repeat all parts of Step 2 to make test holes in the practice piece of acrylic until you are comfortable with the process. Then, you are ready to follow this procedure to make the hole in your housing.

STEP 3 – Install Electronic Circuit Board Assembly

There are three pieces of a high-bond, double-stick tape under the battery package in the Housing Sentry box. Use one of those pieces to secure the electronic circuit board assembly in the chosen position within the housing.

STEP 4 – Route the LED Wires

Separate the pair of wires for the two green and two red LEDs by pulling on the pre-separated pairs. Move the wires into the position(s) you have previously identified. The stiffness of the wires will not hold them in place however you could use hot glue or the provided high-bond, double-stick tape to assure they stay in the desired position(s). If you have the skills and proper tools, you can shorten the length of the wires and re-solder them to the LEDs if they are too long.

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TOOLS and SUPPLIES NEEDED:

Housing Sentry self-install kit that includes:

- 17/64" drill bit
- 8mm x 1.25mm tap
- Chamfer tool
- Custom counter-bore tool
- Practice piece of acrylic with an example of a properly machined hole

Drill Press or, preferably, a Milling Machine

7/16" Wrench that is very thin (0.19" / 4.83mm thick or less)

Silicone lubricant (o-ring lub)

STEP 1 – Determine Best Location for the Parts

Install your camera in the housing and observe the areas where there is extra space. You will need to identify the best location to install:

PART	SPACE REQUIRED
Vacuum Connector	Length: 1.08" / 27.44mm Diameter: 0.521" / 13.24mm
Electronic Circuit Board Assembly	2.01" x 1.01" x 0.290" 51.06mm x 25.65mm x 7.51mm
LEDs with wires	
Moisture Pick-up Strips with wires	

You can view photos of the Housing Sentry installed in two different housings displayed on the website at http://www.uwcamerastuff.com/housing_sentry_installs.htm.

Vacuum Connector – 1.08" (27.44mm) of the fitting's length protrudes on the outside of the housing. The preferred location is a spot that is convenient for hooking up the pump, does not impede normal use and is not likely to get bumped.

minimal stretch and avoids the possibility of the threads cutting the o-rings as can happen when the o-rings are turned onto the fitting. Extra o-rings are included in the Housing Sentry kit should you happen to damage one during the trial installation process.

Roll two o-rings over the threaded area of the vacuum connector so the o-rings set next to each other in the smooth area above the threads.

F. Test-Fit the Vacuum Connector

Liberally apply silicone grease (o-ring lub) to the o-rings, vacuum connector shaft and around the hole in the acrylic.

Insert the vacuum connector into the hole and manually thread until the o-rings make contact.

Turn the connector ½ turn in then ¼ turn out. Keep repeating this in and out movement to help get the o-rings to slide into the hole.

Use a wrench to finish tightening the vacuum connector. Because there is a restriction on the fitting, you will need an extra-thin wrench (0.19" / 4.83mm thick or less) to get the vacuum connector sufficiently tightened. A thicker wrench will bind between the fitting and the housing. You need the connector tight but it is important to not over-tighten.

Once the vacuum connector is installed, you should be able to look through the side of the acrylic and see that both o-rings are seated. It should be evident that the o-rings are making contact with the counter-bore section of the hole. When you look through the back of the hole, you should clearly see the fitting flange but not the o-rings. If you are

help to clear loose debris out of the hole. Keep alternating the forward and back movements until about ¾" of the tap has been run through the hole. Remove the tap from the hole by manually turning the chuck counter-clockwise.

Remove the tap from the drill press/milling machine

Clean all debris out of the hole and threads.

Inspect the hole from the side – it should be semi-transparent. Compare your hole to the sample hole in the practice piece of acrylic. If your hole looks more white than semi-transparent, it means the acrylic has melted from using too high a speed, too little lubricant and/or too fast of a feed. It may not provide a satisfactory seal if the melting has occurred in the o-ring area.

D. Chamfer the Counter-Bore Portion of the Hole

Mount the chamfer tool into the drill press/milling machine.

While turning the chuck by hand, chamfer the hole to create a 45° bevel on the counter-bore area. This step will help the o-rings to more easily start sliding into the hole. Check out the example hole in the practice piece of acrylic that is part of the self-install kit.

Remove the chamfer tool from the drill press/milling machine.

E. Installing O-Rings on Vacuum Connector

The o-rings are standard 2-010 or 6.07mm x 1.78mm o-rings. Our testing shows that it is best to roll the o-rings over the threads of the vacuum connector. This produces

Electronic Circuit Board Assembly – The preferred location is an area as high in the housing as possible and where the battery holder can be easily accessed for replacement of the battery. It is also important to choose a place that is within seven inches (177.8mm) of the position(s) you choose for the LEDs since that is the length of the attached LED wires.

LEDs – You can separate the pairs of wires for the LEDs so the lights can be in two different areas of the housing. For example, one green and one red can be positioned so they are easily visible through the housing with the other two positioned so they can be seen through the eyepiece. The LEDs will need to be positioned within seven inches (177.8mm) of the electronic circuit board assembly due to the length of the LED wires. If you choose to only use one set of the LEDs, the other leads may be cut off before the battery is installed.

Moisture Pick-up Strips – The brass strips should be placed at the bottom of the inside of the housing and within the reach of the wires that are connected to the electronic circuit board assembly. You want the pick-up strips at the bottom of the housing as that is where any moisture in the housing will gather when the camera is in its normal photo-taking position. The brass strips may be shortened by cutting with scissors before the battery is installed.

Bear in mind that the circuit board, LEDs and Moisture Pick-up Strips are all connected so they must be installed in the same half of the housing.

STEP 2 – Install Vacuum Connector

To install the vacuum connector, you will need access to a drill press or, preferably, a milling machine. The hole must be made at exactly 90° to the surface of the housing. Tolerances

on the installation hole are held very tight so the o-rings fit very snugly in order to prevent water invasion. Because of the precision required, the installation of the vacuum connector can be difficult.

The self-installation kit includes a test piece of acrylic so you can practice making vacuum connector holes until you are comfortable with the process BEFORE you start the steps on your housing as you are taking these steps totally at your own risk. As always, follow all safety precautions for power tools.

A. Drill hole

Mount the drill bit from the Housing Sentry Self-Install Kit into the drill press or milling machine.

While drilling the hole, you must use a lubricant and testing shows that soapy water is safe and works very well for this application.

The drill press/milling machine should be set at a slow speed of approximately 300 rpm. The feed should also be very slow and cautious to avoid melting the acrylic. The liberal use of the lubricant is recommended.

With the drill press/milling machine operating at a slow speed, the liberal use of lubricant and at a very slow and cautious pace, drill a hole completely through the acrylic. After the hole has been successfully drilled, remove the drill bit from the drill press/milling machine.

B. Create Counter-Bore

Mount the custom counter-bore tool in the drill press/milling machine.

Position the acrylic on the supporting table so the bottom of the counter-bore tool is in the drilled hole. Machine at a slow speed and use plenty of lubricant. Lower the tool to take a light cut then slightly raise but never raise to the point that the counter-bore tool is totally out of the hole. Continue to lubricate the hole so the temperature is kept low and debris moves out of the hole. It is also important to keep the "teeth" of the counter-bore tool clear of acrylic waste. Continue with the "up and down" movement until the black part of the counter-bore tool bottoms out on the acrylic. The counter-bore will be approximately 0.16" deep when finished.

When completed, remove the counter-bore tool from the drill press/milling machine.

Inspect the hole from the side – it should be semi-transparent. Compare your hole to the sample hole in the practice piece of acrylic. If your hole looks more white than semi-transparent, it means the acrylic has melted from using too high a speed, too little lubricant and/or too fast of a feed. It may not provide a satisfactory seal if the melting has occurred in the o-ring area.

C. Tap the Hole

Mount the provided tap into the drill press/milling machine.

Align the acrylic so the tap is in the center of the drilled hole.

While keeping downward pressure, manually turn the drill press/milling machine chuck clockwise to thread the tap forward into the hole. For every ½ turn forward, back the tap out a ¼ turn by turning counterclockwise. This will