

# HYCAT Autonomous Surface Vehicle

## Frequently Asked Questions (FAQs)

Whether you're interested in buying a HYCAT Autonomous Surface Vehicle or are just curious about how it works, we have some answers for you.

### Q - What is the difference between an Autonomous Surface Vehicle (ASV) and an Unmanned Surface Vehicle (USV)?

**A** - USV is a general category of unmanned vessel/boat systems. Simple remote control vessels/systems can be categorized as USVs. An ASV is a robotic marine vessel/boat that can monitor its status, position, and aspects of its operational environment to automatically navigate and acquire data without the need for continual operator oversight. ASVs are a subcategory of USVs.

### Q - What is the YSI HYCAT?

**A** - HYCAT is a multiparameter, portable survey ASV designed specifically to give surveyors access to data in remote areas that have previously been difficult, expensive, or impossible to acquire. YSI HYCAT can run without an operator in direct control.

### Q - Why HYCAT is a better solution than using a boat to collect data?

**A** - HYCAT offers advantages over manned boats that result in safe efficient surveying such as:



- **Unmanned.** Safety concerns regarding personnel on the water, and operating vessels are eliminated.
- **Small Size.** It does not require a trailer to transport (can fit in a standard pickup truck, or SUV) and it can be stored in an office space.
- **Launch Anywhere.** HYCAT does not require a boat ramp to launch—allowing remote and limited access areas to be surveyed.
- **0.5' Draft Pocket Thrusters.** Survey extremely shallow areas safely without fear of grounding or damaging sensitive marine habitats.
- **High Accuracy.** HYCAT has the ability to maintain a survey line cross-track error of 0.5-1' during transects—even the most experienced captains can't compete with that.
- **Efficiency.** All sensor offsets are fixed and preprogrammed. No need to measure ever again!
- **Best-in-Class Sensors.** HYCAT is tightly integrated from the factory with multiparameter sensors that collect a wide range of hydrographic data. The sensors can run simultaneously or quickly be added at any time. This results in efficient surveys and rapid mobilization.
- **Low Maintenance.** Because it is 100% electric, HYCAT requires virtually no maintenance.

### Q - Who can benefit from the HYCAT? Is this a vehicle that can be used in more than one industry?

**A** - The HYCAT can be used in water quality studies, source water volumetric calculations, pollutant identification and mapping, habitat mapping, general bathymetry, forensics/search and rescue, and more!

**Q - Is there anywhere that it cannot be used?**

**A** - HYCAT should not be operated in currents that exceed 6 knots and sea conditions that exceed Sea State 2. Best safe practices for small unmanned systems is to operate the vessel within visual contact. Telemetry range for the HYCAT is 1.5 km. For an additional fee, cellular and sat coms can be made available.

**Q - How many people does it take to deploy the HYCAT? And how long will it continuously operate?**

**A** - We designed HYCAT to be portable. If you transport the HYCAT loaded in the back of a pickup truck or in a van, it would take two people. We also offer a launch/recovery cart for the HYCAT, which can be placed on a small trailer or in the back of a flatbed—allowing one operator to launch and recover the vehicle on their own.

A fully loaded HYCAT has the following endurance:

- a. 8.5 hours @ 2 knots
- b. 6.0 hours @ 3 knots
- c. 2.8 hours @ 4 knots

**Q - What sensors are integrated into this system?**

**A** - The base boat can accommodate an ADCP (Sontek M9), multiparameter water quality sonde (YSI EXO2), sidescan sonar (BluePrint SubSea Starfish 453), and L1/L2 RTK GNSS (Hemisphere AtlasLink) receiver simultaneously. Any configuration of these sensors can be installed at any time. Because of this, one HYCAT platform is a perfect solution for habitat mapping, stream gauging, cartography, port inspections, infrastructure inspection, search and rescue, disaster response, volumetric studies, and contamination studies.

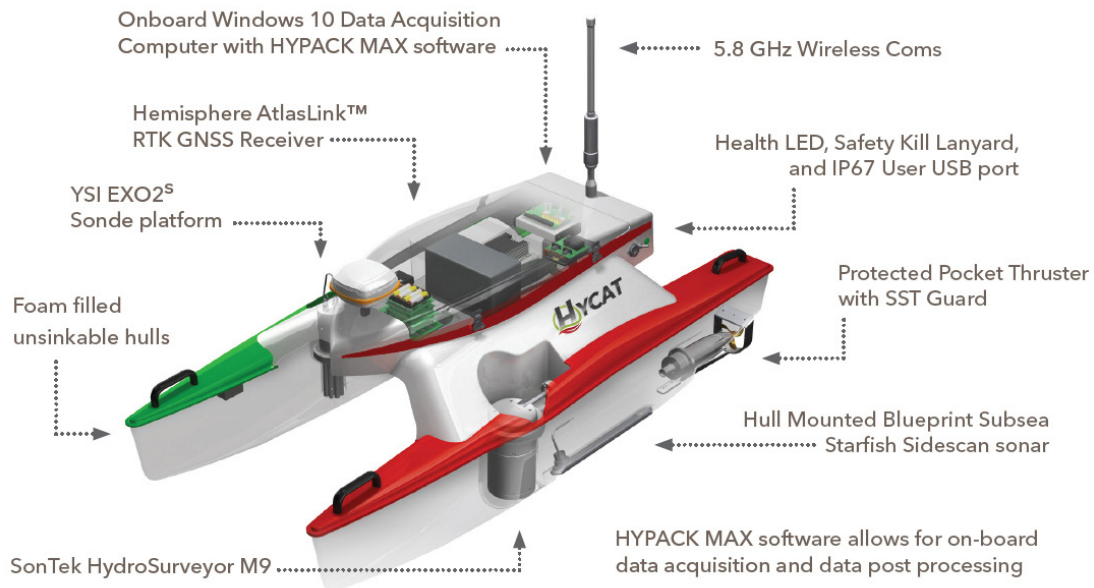


The base HYCAT includes:

- HYCAT Vehicle Assembly
- Camera (forward looking real-time)
- Thrusters (protected and pocketed with SST guard)
- Data Acquisition Computer (DAC)
- 5.8GHz Wireless communications
- Garmin 19x GPS
- Base Station with receiving antenna/modem with computer

**Q - Are we able to swap out these sensors for either instruments that I own rather than the ones that are specified or other third-party instruments?**

**A** - We can, but the base boat is specifically designed around the ADCP (Sontek M9), multiparameter water quality sonde (YSI EXO2), sidescan sonar (BluePrint SubSea Starfish 453), and L1/L2 RTK GNSS (Hemisphere AtlasLink). If there is a solution needed, we can work on integrating whatever system may be required.



**Q - How many software packages does it take to effectively run the HYCAT? And how difficult is it to run? Do we provide training on that?**

**A** - Only one software is required. The main interface is HYPACK, and training is recommended for those who are not familiar with HYPACK software. The main purpose of the training is to understand how to mission plan, utilize underway display/control and post mission data processing/visualization. Survey or Mission planning is relatively simple with HYPACK and the vehicle operation is also very straightforward.

**Q - What is different about the HYCAT compared to other ASV/USV on the market?**

Several attributes put HYCAT in a league of its own:

1. HYCAT has a dedicated ASV driver for HYPACK. This increases the safety and intuitiveness of HYCAT because there is only one interface for the system. Map-based survey plans can be created and executed in real time. All acquired data can be visualized in real time via the same interface. This simplifies training and reduces the overhead associated with learning how to operate this system.
2. HYCAT has an onboard Windows PC dedicated to data acquisition. This allows HYCAT to simultaneously store data onboard and stream it shoreside. Onboard data storage is a major advantage over systems that solely stream data shoreside or to the cloud. Data is lost when these systems experience communication drop outs and surveyors are required to recreate surveys to fill in data gaps. HYCAT is unaffected by loss of communications. The onboard computer allows HYCAT to continue following survey lines and collecting data even in the event of a drop in communications to the shoreside base station. It is important to note that while HYCAT data is stored onboard it can be visualized, edited, and even post processed in real time.
3. As a truly robotic system, HYCAT has many fail safes and processing that allows it to continually adjust its behaviors and report its status. Such parameter protections include but are not limited to: electronics temperatures, motor temperatures, system current, motor currents, under voltage, over voltage, GPS data quality, heading data quality, communications link quality, real time battery capacity, sensor on/off status, etc.

4. Safety Features. HYCAT has anti grounding capability, exit boundary fault monitoring, automatic return to user defined recovery position, station keeping, and acquired hydrographic data quality monitoring.
5. HYCAT is a catamaran specially designed to be efficient at survey speeds of 3-4 knots. It has a tall surface presence which allows it to remain efficient in elevated Sea States. Catamarans are inherently more stable in pitch and roll—an important feature when conducting surveys with sonar.
6. Sensors are seamlessly integrated into the hulls, reducing drag created by the sensors and allowing HYCAT to offer best in class endurance. It can operate at approximately an 8 knot top speed with an ADCP, multiparameter water quality sonde, and side scan sonar deployed simultaneously.
7. HYCAT has pocket thrusters and an extremely shallow draft (.5'). This allows HYCAT to be intentionally (or unintentionally) run aground, without fear of damaging a thruster. This also allows HYCAT to safely operate in extremely shallow uncharted waters.
8. HYCAT was designed to be robust. Its hydrographic sensors and thrusters are completely recessed into the hulls ensuring they can't be damaged in the event of a debris strike or grounding. It is foam filled and constructed with an FRP layup specifically designed to reinforce the entry, hull bottom, and transom. The bottom surface of the hulls are coated with a super slick abrasion resistant epoxy, designed to allow airboats to run over sand, rocks, asphalt, stumps, etc.
9. The thrusters are isolated from the hull volume. In the event the HYCAT was impacted hard enough to damage the hull, the foam-filled hull and isolated thruster will keep the HYCAT afloat and running to continue surveying.
10. Size. Designed to be portable, HYCAT can fit in the back of any standard size pickup truck, or SUV. No boat ramp, or hand dolly is required to launch this vessel.

### **Q - How much does the HYCAT cost?**

**A** - Variation in pricing is dependent on the particular configurations that you're looking for. If there is customization, the price will be determined by the type of sensor selected and the amount of labor to modify/integrate. Please request a quote from your local sales representative to determine requirements and receive accurate pricing.

### **Q - Can I rent a HYCAT?**

**A** - Currently we do not have a HYCAT available to rent. We are working on an option to rent and another option to have YSI Integrated Systems and Services provide "data as a service" in the future. Look for updates and information on our website at [YSI.com/systems](https://www.ysi.com/systems).

### **Q - When will the HYCAT be available? And what is the lead time we're looking to get a HYCAT?**

**A** - The HYCAT is currently available for purchase, with a typical lead time of 6 to 8 weeks. Please contact your local sales representative to get an accurate lead time.



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