



CHCNAV APACHE 3 Pro USV

Frequently Asked Questions (FAQ)



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Make your work more efficient

1. What is APACHE 3 Pro USV?

APACHE 3 Pro is a compact professional USV for autonomous bathymetric surveys in shallow waters. Its double-layered, all-carbon fiber hull makes it unsinkable. The APACHE3 Pro's IP67 dust and waterproofing secures onboard instrumentation throughout survey and mapping projects, regardless of operating conditions. By combining a semi-recessed propeller and a hull with optimized hydrodynamic performance, the 6m/s speed enables accurate measurements even in rivers with strong currents.

Professional level of GNSS RTK + inertial navigation provides high accuracy measurements even when GNSS signals are temporarily interrupted, for example under a bridge. The built-in CHCNAV D270 echo sounder always provides the most reliable and accurate depth measurements because of the real-time correction of water sound velocity in the function of water temperature.

The 4G network modem enables data transmission anytime, anywhere. The GNSS PPK post processing backup capability ensures accurate positioning in areas when 4G network is not available. The APACHE 3 Pro smart power management maintains a regular battery discharge and supports battery hot swapping for continuous measurements around the clock.

The APACHE 3 Pro addresses growing customers' requirements for:

- Complete solution for channel, inland river or riffle hydrographic surveying projects.
- Easy-to-use survey solution.
- Highly integrated and portable USV solution to ensure timely project completion.
- User-friendly software to set up courses, data recording and processing.

1. Which market segments are addressed by APACHE 3 Pro?

The APACHE 3 Pro is a versatile bathymetric USV that meets various applications such as bathymetric surveying and mapping, channel surveying, river dredging, site selection of dam or hydro power station, underwater infrastructure,

2. What are the key features of APACHE 3 Pro?

Features	Description	Benefits	Values
Portable	Weight: < 10 kg w/o instrument < 30 kg with instrument	Single person operation	Improved efficiency in measurement tasks and saved labor costs.
	Size: 105cm x 55 cm x 39cm	Easy to carry by vehicles and other convenient ways to remote mission areas.	
Professional single beam transducer	$\pm 0.01 \text{ m} + 0.1\% \times D$ (water depth)	High accuracy measurements	Ensure the survey grade result of the bathymetric survey
Powerful motor and engine	Propeller Power: 800 W Brushless Engine	Maximum speed: 6 m/s Cruise speed: 2 m/s	Improved the operation efficiency and time to complete the survey project
Absolute linear technology	Integrated navigation technology to maintain navigation course set	Automatic navigation control system even in complex current condition.	Provide accurate positioning and echo sounder data according to the mission planning cruise.
Obstacle avoidance function	Millimeter wave automatic obstacle avoidance	It can identify obstacles within an angle of 110° in front of the boat and take autonomous detours to avoid obstacles	Reduce the risk of impact damage during the work of the USV
Power supply scheme	Power management balanced power supply technology,	The power box adds a power management function, which can manage the power of two batteries and give priority to the battery with more power	Supporting battery replacement without shutting down

3. What equipment can be mounted on APACHE 3 Pro?

The Apache 3 Pro standard is equipped with a single-beam sounder and GNSS positioning, which is mainly used for underwater terrain mapping, and does not support third-party sensors.

4. What are the APACHE 3 Pro main users' benefits?

- **Millimeter wave automatic obstacle avoidance.** APACHE 3 Pro comes standard with millimeter wave obstacle avoidance, It can identify obstacles within an angle of 110° in front of the boat and take autonomous detour to avoid obstacles, to reduce the risk of damage during the work.
- **Lightweight design.** APACHE 3 Pro is made of macromolecule polyester carbon fiber and Kevlar fiberglass (weighting 10 kg without sensors). It allows one operator to cope with most remote deployment conditions.
- **Make survey possible in all water conditions.** The semi-embedded motor and the new internal rotor motor design protect the motor from damage and improve the machine's service life. It also enables the USV to have a shallower draft.
- **Maintain high accuracy under bridge.** Accurate position and attitude data to compensate for the hull sway on surveying results. Automatic bridge crossing during GNSS outage with continuously output of high-precision positions. Avoid outliers thanks to tight integration of GNSS and INS data. Save costs with embedded 4G and UHF modems.
- **Real-time data to boost safety and productivity of project.** Data privacy on CHCNAV server. Reliable communication combining SIM + network bridge and automatic switching. Cloud based remote tracking to ensure the Apache safety status in real-time. 4G / 2.4G network communication with no distance restrictions.

6. What is the difference between the APACHE 3 Pro and APACHE 3?

- **APACHE 3 Pro has a better power management system.** The power box adds a power management function, which can manage the power of two batteries and give priority to the battery with more power, support battery replacement without shutting down.
- **Intelligent echosounder.** APACHE 3 Pro is equipped with D270 intelligent echosounder, APACHE 3 is equipped with D230 portable echosounder. D270 intelligent echosounder is a built-in Linux operating system, that supports Bluetooth Wi-Fi wireless transmission. The built-in temperature sensor senses water temperature and corrects sound velocity.
- **Millimeter wave automatic obstacle avoidance.** The APACHE 3 Pro supports autonomous detour and fully automatic measurement of obstacle avoidance, and the A3 supports obstacle recognition and autonomous interruption.

7. What is the APACHE 3 Pro data transfer scheme?

The APACHE 3 Pro offers two options for data transmission: a 2.4 GHz network bridge or 4G mobile network transmission. The range of network bridge data transmission distance is up to 1 km and 4G is unlimited.

8. Which software is available with the APACHE 3 Pro?

- CHCNAV Auto Planner software: APACHE 3 status and mission planning
- CHCNAV Hydro Survey software: a real-time record of echo sounder data and set RTK and echo sounder parameters and post process data.

9. What software is required for data collection and post-processing?

Real-time depth sounding data filtering and post-processing, and the CSV export of the bathymetric results are fully managed through the embedded Hydro Survey software. Further analysis and processing volume computation, cross-sections and depth contour lines can be obtained using a third-party software such as HYPACK.

10. What is the accuracy of APACHE 3 Pro single beam Echosounder solution?

The accuracy of APACHE 3 Pro is $0.01\text{m} + 0.1\% \times D$ (depth of water). The D270's specification is shown below:

- Data Type: CHCGD, NMEA SDDPT/SDDBT, original waveform
- Measure Range: 0.15 m to 200 m
- Frequency: 200 kHz
- Resolution: 0.01 m
- Pulse Power: 300 W



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