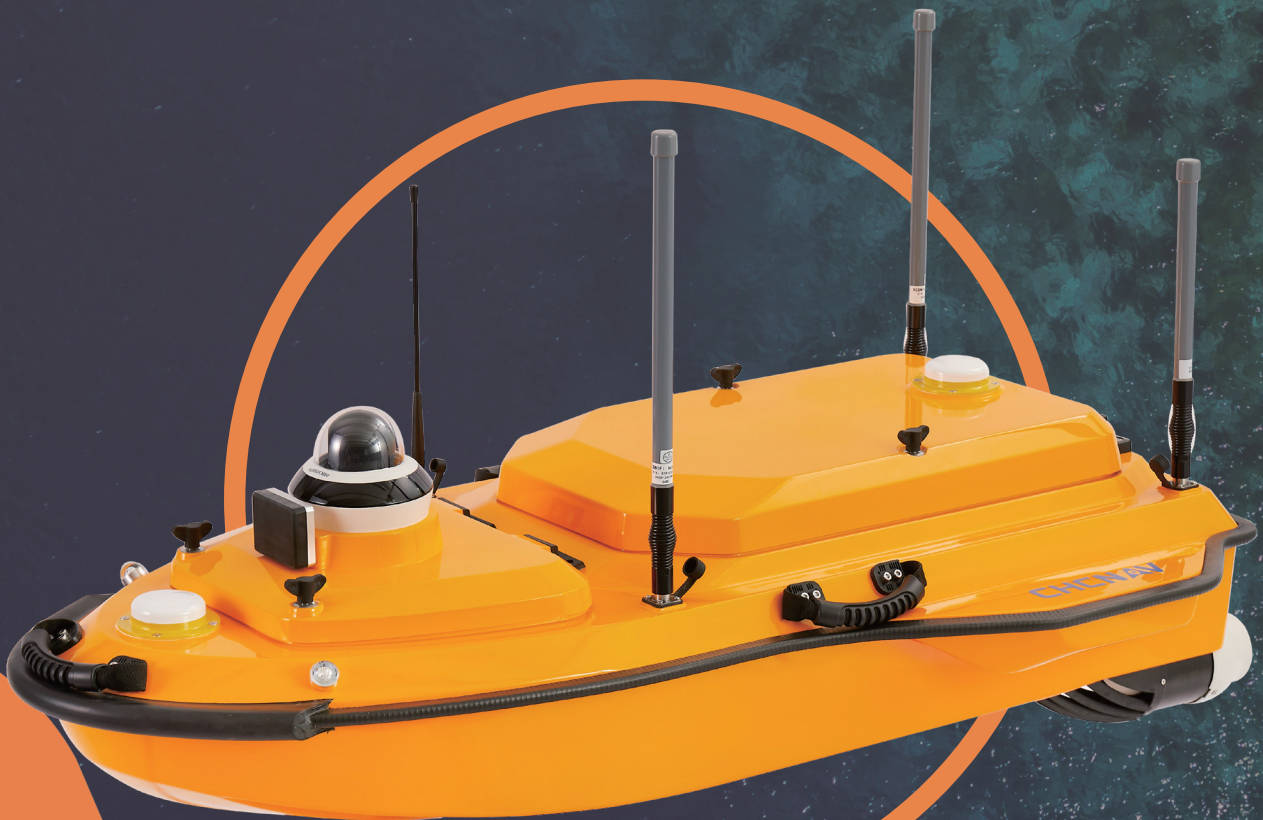


CHCNAV

APACHE 4

**AUTONOMOUS HYDROGRAPHIC
SURVEY USV**



**MARINE SURVEY
& CONSTRUCTION**

AUTONOMOUS HYDROGRAPHIC SURVEY USV

The Apache 4 is an advanced Unmanned Surface Vessel (USV) specifically designed for hydrological survey and Bathymetric survey, combining the best of high accuracy positioning and automated navigation control technology. APACHE 4 USV builds around the operator's habits when conducting ADCP (Acoustic Doppler Current Profiler) hydrographic cross-section flow measurements, compatible with mainstream underway ADCP systems on the market.

The lightweight design of the double-layered hull, with real-time video and data feedback in Android remote control, makes survey easy, safe and accurate. It is equipped with automatic navigation, adaptive straight-line water flow technology, and hover technology, significantly improving the accuracy of flow rate estimation.

Even when GNSS positioning might be degraded by obstructed environments, the internal GNSS+IMU module continues to provide reliable position and heading for the ADCP and autopilot controller.

The Apache 4 USV also supports CHC integrated compact multibeam echosounder and other instruments, providing various perfect integrated solutions. It can be applied in the fields of hydrological flow measurement, underwater topographic survey, emergency disaster monitoring, port and waterway construction and other areas.

ADVANCED NAVIGATION CONTROLLER

Integrated adaptive water flow straight-line and hovering technology.

The automatic control system allows the APACHE 4 to navigate in a straight line along the cross section safely according to the profile view as the flow, turbulence, etc. changes by stable position and heading provided by GNSS+IMU. The hovering technology ensures that the APACHE 4 hovers stably in the turbulent flow at the start and end points of the ADCP observation, improving the accuracy of the flow estimation.

ANDROID INTELLIGENT CONTROL

Android remote control makes work more efficient

Ensure reliable data transmission with the combination of 4G and 2.4GHz Android remote control communication. Easysail app is developed independently by CHCNAV for hydrographic and bathymetric Surveys. It supports route planning, Real-time feedback on data and video, data collection and data post-processing and other functions, which makes operations more efficient and convenient.

BUILT-IN SINGLE-BEAM ECHO SOUNDER

Expand your unmanned survey capability.

Single beam sounding data can be used to verify the accuracy of ADCP bottom tracking data, and even fed directly into the ADCP flow measurement software to compensate for the unavailability of ADCP data, extending the depth range of ADCP measurements. And at the same time provide water depth profile data associated with the flow velocity profile measurement.

COMPATIBLE WITH MOST COMMON ADCPS

Versatile. Carries up to 35kg of payload

The APACHE 4 central access shaft design provides unmanned cross-sectional flow measurement solutions for the leading ADCPs on the market. The Apache4 is particularly suited for hydrologists using ADCP sensors such as the CHC Riverstar, M9, RTDP 1200, RiverPro, and RiverRay who are looking for an integrated, portable, and affordable unmanned solution. It does not only carry the ADCP, but also provides its positioning, orientation, power, waterproofing, network and 4G transmission solutions. CHC HQ-400 compact multibeam echosounder, side scan sonar, water quality monitor and other various integrated solutions.



EFFICIENT
HYDROGRAPHIC
SURVEY USV



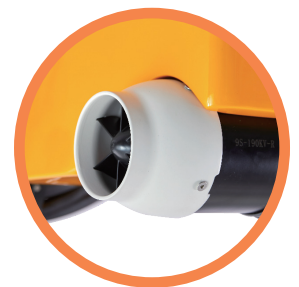
Android remote control



Transducer



ADCP access shaft



Semi-embedded motor

SPECIFICATIONS

Physical	
Hull Dimension (L x W x H)	1.2 m x 0.75 m x 0.4 m
Material	Macromolecule polyester carbon fiber
Weight (w/o instrument and battery)	13 kg
Maximum Payload	35 kg
Anti-Wave & Wind	3 rd wind level and 2 nd wave level
Hull Design	Triple-hull vessel
GNSS	Internal GNSS dual antenna
Waterproof	IP67
Draft	12 cm (unladen)
Indicator Light	Two-color light (Display satellite and positioning status)
Camera	360° omnidirectional video
ADCP Mounting Hole	240 mm
ADCP Compatibility	Compatible with M9, RiverPro, RiverRay, RioGrande, RCP and other navigable ADCP
Available Instrumentation	ADCP, Integrated compact multibeam echosounder, side scan sonar, water quality monitor, Sampling bucket
Safety	Millimeter wave automatic obstacle avoidance, equipped with bumper and double hull design, auto-return while low battery or signal loss,
Obstacle Avoidance Distance & Range	0.2~40m (horizontally & vertical angle:112°x 14°)

Propulsion	
Type	Electric
Propeller Type	Brushless DC
Direction Control	Veering without steering engine
Maximum Motor Power	1000W
Maximum Motor Speed	7200 rpm
Motor Installation	Pluggable
Li-ion Battery Capacity	32.4V 23.1Ah*4 rechargeable lithium battery
Power Supply	Support single battery independent power supply or dual battery balanced power supply
Battery Endurance	8 hours @ 1.5 m/s(running on 2 battery sets, support hot-swap)
Maximum Speed	6 m/s

Remote control	
Display Screen	1000nit luminance
Resolution Ratio	1920*1200
Internal Storage	RAM 4GB, Storage 64GB
Endurance	5h
Communication Frequency	2.4 GHz
Peripheral Interface	USB port, Nano SIM card slot, TF card maximum support 128GB, Type-C

Communications	
Data Communication	Standard 4G and Remote control
Remote Control Communication	4G and 2.4 GHz Remote control
Remote Control Range	Remote control: 1 km and 4G: unlimited
SIM Card Slot	Nano SIM
Interface	2x RJ45 port; 3x RS232 serial port 1x RS485 serial port

Navigation Mode	Manual or Auto-Pilot
Waterproof of Master Control	IP67
Data Storage	Local storage (multi-channel storage) & Remote storage

Software	
Easysail	Route planning and autonomous navigation.Total mileage statistics, remaining mileage reminder, multi-angle video and online map display. hull parameter control, physical & virtual joysticks, hover control, system self-check at power-on. Data collection and post-processing. post-processing support waveform overlay and attitude correction. support coordinate conversion, trajectory, water depth, waveform and hull parameter real-time display. software and firmware push upgrades online. export results by USB flash drive and Type-C cable.

Positioning	
Satellite System	BDS B1I/B2I /B3I、 GPS L1C/A/L2P(Y)/ L2C/L5、 Galileo E1/E5a/E5b、 GLONASS L1/L2、 QZSS L1/L2/L5
Channel	1408
Single Point Position (RMS)	Horizontal: 1.5 m Vertical: 2.5 m
DGNSS Positioning Accuracy	Horizontal: 0.4 m + 1 ppm Vertical: 0.85 m + 1 ppm
RTK Positioning Accuracy	Horizontal: ±8 mm + 1 ppm Vertical: ±15 mm + 1 ppm
Radio Protocols	Satel 3AS protocol, CHC protocol (1), TT450 protocol, Transparent Transport Protocol
Heading Accuracy	0.1 ° @0.915 m baseline
Inertial Navigation Stability	6°/h (Accuracy attenuation 1 m after 20 s)
IMU Update Rate	200 Hz

D270 Single beam Echo Sounder	
Data Type	CHCGD ⁽¹⁾ , NMEA SDDPT/SDDBT, original waveform
Operating system	Linux
Weight	0.84 kg
Sounding Range	0.15 m to 200 m
Sounding Accuracy	±0.01 m + 0.1% x D (D is the depth of water)
Resolution	0.01 m
Maximum Sampling Rate	30Hz
Frequency	200 kHz
Beam Angle	6.5° ± 1°
Sound Velocity Adjustment Range	1400m/s~1700m/s
Supply Voltage	10-36V DC
Waterproof	IP67
Integrated Water Temperature Sensor	-55°C~+100°C, real-time correction of the sound speed
Maximum Transmit Power	300W
Power Consumption	10W



*Specifications are subject to change without notice.

(1) CHCGD & CHC protocol is CHCNAV format.

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