Dolphin III-A underwater robot Product Introduction

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1 Dolphin III-A Introduction

The Dolphin III-A is latest operational-grade underwater robot. It has an operating depth of 1000m , a bare-metal weight of 720kg , and a payload of 80kg .

A is equipped with eight thrusters, four of which are mounted horizontally, providing propulsion for forward, reverse, sideways movement, and bow rotation. The remaining four thrusters are mounted vertically, providing ascent and descent propulsion. These four vertical thrusters also provide the Dolphin III- A with sufficient pitch and roll attitude-keeping capabilities. The Dolphin III-A boasts excellent maneuverability, achieving a maximum forward speed of 3.5 knots and a maximum sideways speed of 2.5 knots .

The Dolphin III-A uses an optoelectronic composite umbilical cable with an inner Kevlar tensile layer. The outer sheath of the umbilical cable makes the cable's density approach that of water, allowing it to float underwater. The Dolphin III-A umbilical cable utilizes fiber-optic communication and is capable of carrying any optical, acoustic, or other sensors.

The Dolphin III-A is equipped with a 25x zoom 4K HD camera, a fixed-focus 1080P HD camera, and eight 10,000 lumens underwater lights. The 25x zoom 4K HD camera is mounted on a two-axis gimbal to increase the camera's field of view.

Dolphin III -A is powered by three-phase AC 380 V and has an underwater power of 50 kW .

Dolphin III-A is equipped with a variety of hardware and software protection mechanisms, such as thruster overvoltage protection, thruster overcurrent protection, thruster temperature abnormality alarm, water leakage detection, compensator liquid level detection, insulation detection, etc., which effectively protect the safety of operators and equipment.

The Dolphin III-A is equipped with R OP integrated control software. R OP has multiple modules, including driving, sonar, video, monitoring, and mapping, which can work independently or collaboratively through the network.

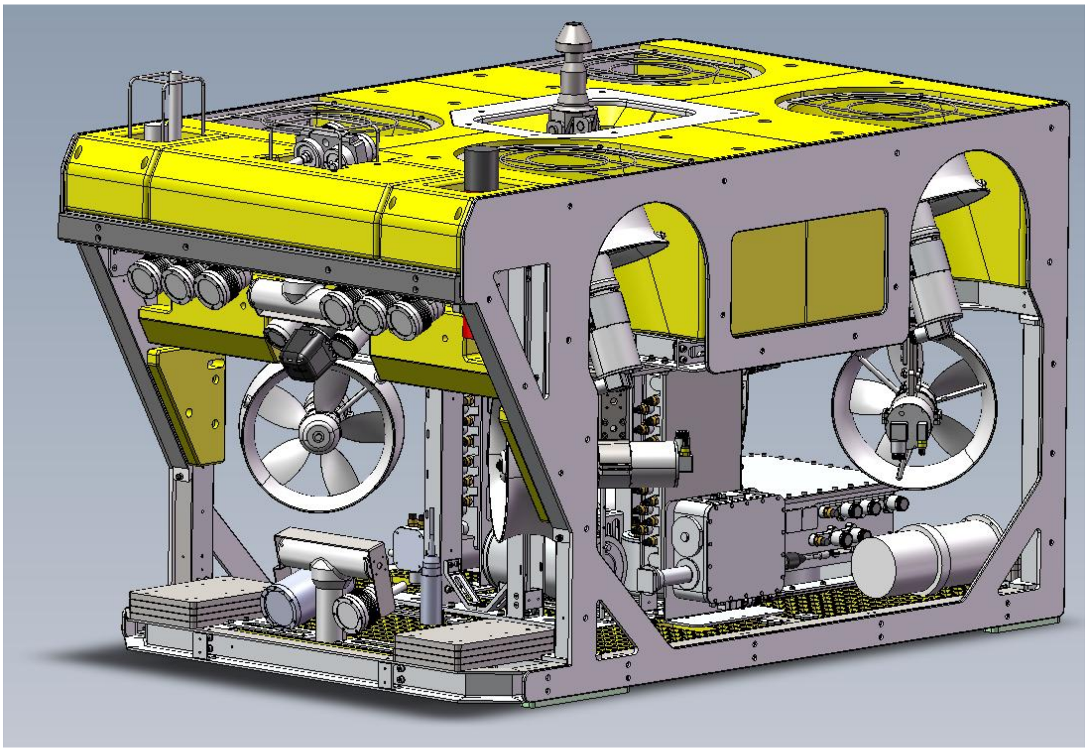
Depending on the mission, the Dolphin III II-A supports a range of tools and sensors, including:

- Hydraulic power unit and valve group;
- Dual manipulator configuration (Hydro-Lek, Schilling, etc.);
- Cleaning gun and cleaning brush
- emergency strobe lights, Iridium satellite, VHF radio;
- Multibeam imaging sonar, mechanical scanning sonar, 3D sonar or laser scanner;
- Ultra-high-definition cameras, low-light cameras;
- fiber optic equipment expansion;
- Electronics bay expansion, thruster expansion × 2;

- Pipe/cable tracking equipment;
- Integrated navigation system, including USBL , DVL, fiber optic gyroscope, depth sensor and altimeter;
- multibeam depth sounder, side-scan sonar;
- cutting tools, cutting discs;
- NDT tools, including FMD, CP, and UT;
- Dredging and pumping tools.

2 Dolphin III-A underwater robot composition

2.1 Underwater robot body



2.1.1 Structural framework

The design of the Dolphin III-A underwater robot follows years of experience in underwater robot industrial design. The overall structure adopts a frame design. The appearance has been beautified through specialized industrial design and optimized cable layout.

The Dolphin III-A's robot frame is welded from aluminum alloy. The main lifting section has a safe working load of up to 2 tons , and boasts a three- fold safety factor, ensuring safe operation even in harsh sea conditions. Furthermore, the Dolphin III -A supports an extended chassis with a maximum weight of 1 ton for carrying heavy tools and equipment.

The buoyancy material is glass microbeads with a density of 0.38g/cm³. The same weight of buoyancy material can provide the underwater robot with the greatest possible buoyancy.

2.1.2 cabin

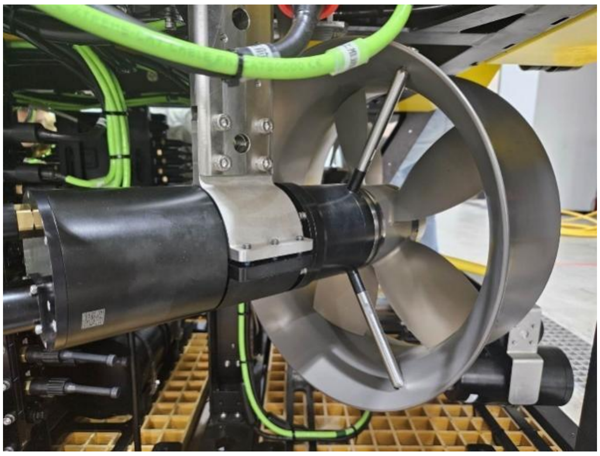
The Dolphin III-A's cabins are all constructed of 6061 aluminum. The inertial navigation and battery compartments are dry-tank designs, offering a pressure resistance of 1,000 meters underwater . The power, electronics, and decoupling compartments are wet-tank designs, equipped with two compensators for liquid level compensation.

The Dolphin III-A's underwater power module converts the 2000VDC input from the umbilical cable into 400VDC , supplying power to high-voltage DC equipment such as thrusters, electronic modules, manipulators, and hydraulic pumps.

The Dolphin III-A's underwater electronics compartment provides power for low-voltage DC devices such as cameras, gimbals, and sonar. The compartment also houses a high-precision attitude sensor, providing the operator with the most accurate driving parameters.

Dolphin III -A are made of internationally renowned brands with long service life and stable quality.

2.1.3 thrusters



T G980C thruster

The Dolphin III-A utilizes eight TG980C thrusters, four of which are vectored in the horizontal direction. The TG980C is a magnetically coupled thruster independently developed and providing the Dolphin III -A with 368 kgf of forward and backward thrust, 309 kgf of lateral thrust, and 435 kg of thrust for ascent and descent.

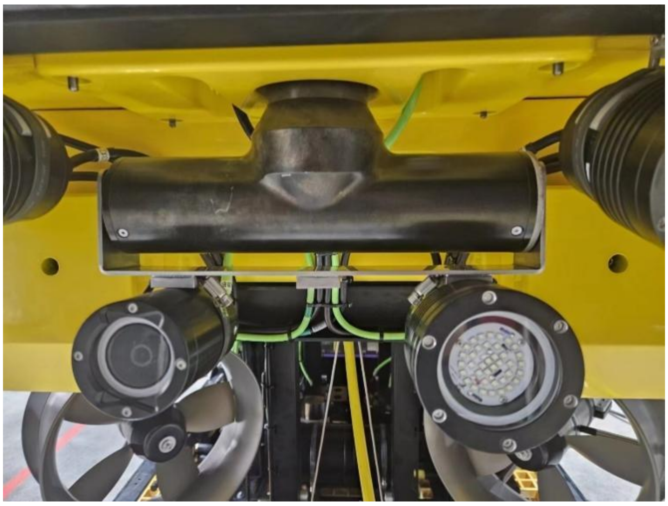
A single TG980C thruster has a power of 3600W and a thrust of 120kg . Combined with unique propeller optimization technology, the TG980C has greater thrust than other thrusters of the same power.

The TG980C uses a 6061 aluminum shell design, stainless steel propellers, and weighs 11.5 kg in air.

The TG980C thruster is designed with multiple alarm functions such as overpressure, overcurrent, and temperature alarms, which effectively improves the safety of the thruster.

2.1.4 Observation system

PTZ



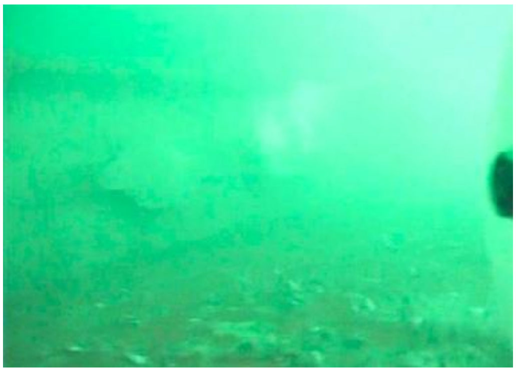
The Dolphin III-A is equipped with two dual-axis gimbals, which expand the horizontal and vertical viewing angles of underwater cameras, lights, and sonar equipment. One is mounted on the upper portion of the device, primarily for navigation and observation. The other is mounted on the lower portion, primarily for operational observation.

Camera

The Dolphin III-A is equipped with three HD cameras, one of which is a HD zoom camera and the other two are HD fixed-focus cameras.

The high-definition zoom camera uses a 25x zoom movement, has a resolution of 4K , and is installed on an operation observation platform.

The high-definition fixed-focus cameras use imported movement and have a focal length of 2.8mm. The resolution of the cameras is 1080P . One camera is installed on the navigation observation platform, and the other is installed on the top float of the ROV to observe the umbilical cable.

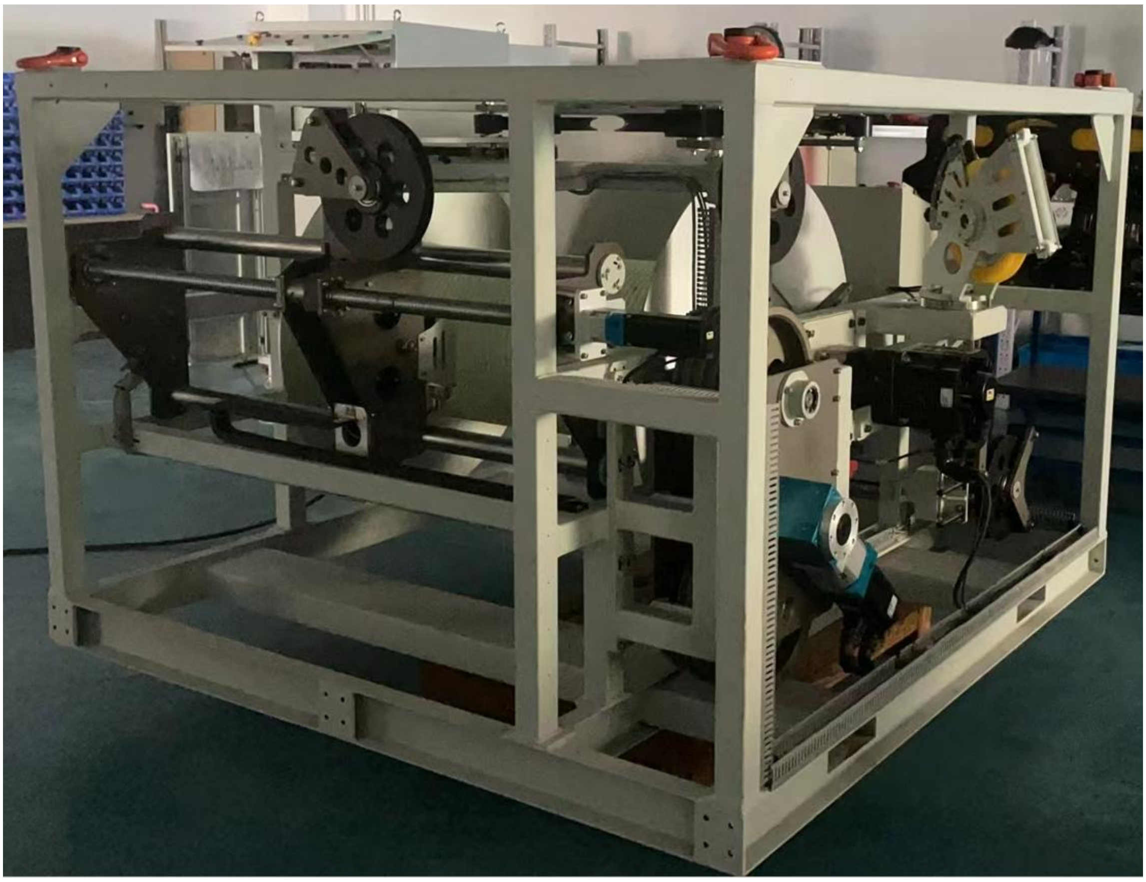


Comparison of color and black and white cameras in turbid water environment

lighting

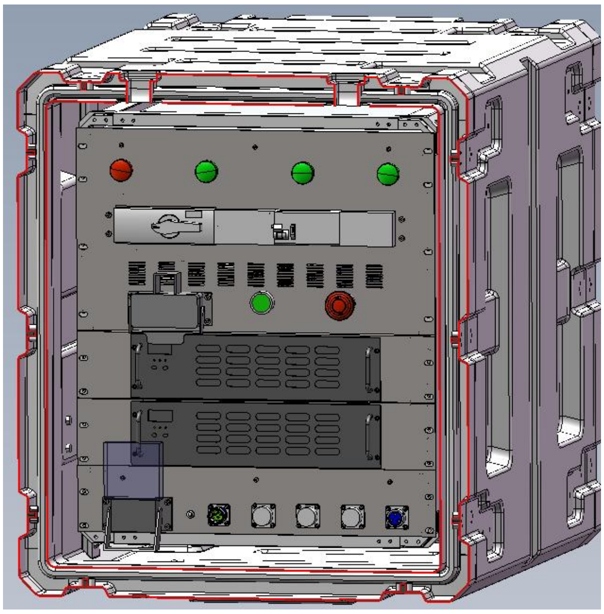
The Dolphin III-A comes standard with eight floodlights, each with a power of 100W , providing 10,000 lumens of illumination. Six of these floodlights are mounted on the top of the underwater robot's frame, with the remaining two mounted on the navigation observation platform and the operational observation platform. The floodlights have a wide viewing angle, providing illumination across the widest possible range for the underwater robot. They utilize imported LEDs, offering high brightness and low power consumption.

2.2 Constant tension winches and umbilicals

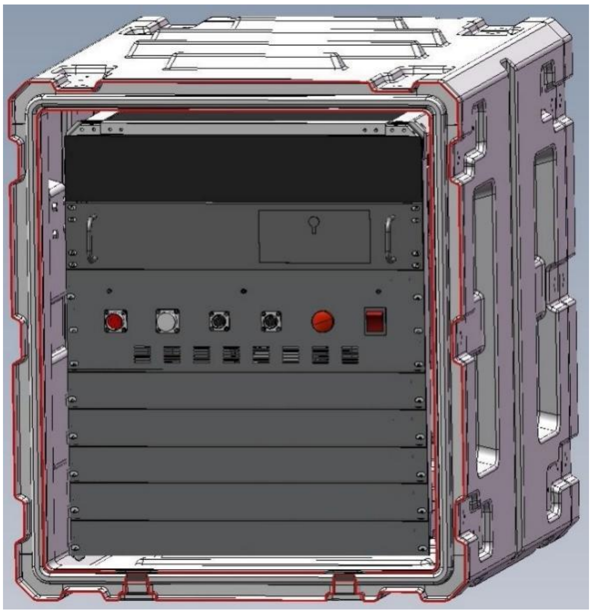


The Dolphin III-A constant tension cable spool is strong and corrosion-resistant, making it ideal for offshore operations. It can provide 600 kg of pull to assist in equipment recovery.

2.3 Control Terminal



Power Box



control box

The Dolphin III-A onshore control terminal consists of a power supply box and a control box. The power supply box converts three-phase 380V power to 2000VDC to power the underwater robot. It also has a built-in AC transformer that provides power to the 220V AC devices in the power supply box and the control box .

The control box, which includes a three-screen display, an interface unit, and an industrial computer, primarily controls the underwater robot. It also has multiple expansion slots for future functional expansion, including UPS and USB deck units. The control box can be connected to a handheld remote control to control the underwater robot.

P CU 6 handheld remote control

The power box and control box both adopt a 12 U rack-mount design, and the outer shell is a roto-molded box, which is sturdy and durable.

2.4 Dolphin III-A underwater robot technical parameters

Underwater robot specifications	
Dimensions (length × width × height)	1975mm× 1220mm ×1145mm
Underwater power	50 kW
Operation Depth	10 00 m
Weight in air	720 kg
Payload	80 kg
Structural form	Open framework
Buoyancy materials	Glass beads
Powertrain	
Horizontal direction	4 thrusters with a thrust of 120 kg
vertical direction	4 thrusters with a thrust of 120 kg
Sailing speed	Forward 3.5 knots
System thrust	68 kg forward , 4 35 kg downward
Observation system	
Resolution	1920×1080
Camera	Fixed focus and 2-5x zoom
PTZ activity range	±60°
Number of lights	8
Lamp power	100W ×8 high brightness LED
Single lamp illumination	10 000lm
sensor	
course	Resolution 0.1°, accuracy ±2°
attitude	Resolution 0.1°, accuracy ±1°
depth	Measuring range 1000m (standard), accuracy ±0.01 % FS
Outside temperature	Resolution 0.01°C, accuracy ±0.5%FS
umbilical cable	
Umbilical cable diameter	21 mm
Umbilical cable length	Maximum 2000m