

MiniUAC-1503

Omnidirectional Sonar

Overview



MiniUAC1503 Omnidirectional Multibeam Sonar is a versatile multibeam imaging sonar capable of **360° omnidirectional acoustic imaging**.

This sonar can operate as an **omnidirectional imaging sonar** for detecting **underwater and water-column targets**, fundamentally redefining the traditional use model of **forward-looking sonars**. During **underwater target search**, the platform can detect surrounding objects **without maneuvering or turning**. For **moving target monitoring**, the system supports **frame rates exceeding 30 fps**, enabling **simultaneous detection in all directions** and significantly improving overall **detection efficiency**.

The MiniUAC1503 offers **dual-frequency options (low and high frequency)**. The **low-frequency mode** provides a **longer detection range**, with a **larger vertical beamwidth** and **moderately lower resolution**, making it well suited for **SLAM, target detection**, and **situational awareness**.

The **high-frequency mode** features a **narrower vertical beamwidth** and **higher imaging resolution**, with a **shorter detection range**, and is recommended for **short-range, high-precision imaging** applications.

In addition to omnidirectional imaging, the sonar head integrates a **forward-looking collision-avoidance sensor**, capable of measuring the **distance to frontal obstacles**, enabling **collision avoidance and ranging** functions.

The MiniUAC1503 also provides a dedicated **pipeline inspection configuration**. In this mode, the sonar features an **approximately 2° vertical beamwidth**, allowing it to function as an **omnidirectional multibeam echosounder** for **high-speed sectional scanning**. By leveraging platform motion, the system can **reconstruct three-dimensional spatial models**. Typical applications include **pipeline inspection, tank inspection, and SLAM**.

Compared with conventional **mechanically scanned pipeline sonars**, the pipeline configuration achieves **frame rates up to 50 fps**, with **no trade-off between resolution and acquisition time**. This enables **high-speed, high-precision operation** of pipeline inspection robots, delivering **detection efficiencies hundreds of times higher** than mechanical scanning sonars. In **SLAM applications**, **AUVs/ROVs** can construct **full-surrounding environmental maps within tens of milliseconds**, rather than several seconds or even tens of seconds, greatly enhancing **real-time situational awareness and operational efficiency**.

Technical Specifications

Specification	A1218	A1218P (Pipeline)
Center Frequency	1.2 MHz or 1.8 MHz, software-switchable; other frequencies customizable	
Detection Range ⁽³⁾	50 m (1.2 MHz), 25 m (1.8 MHz)	
Operating Range	1–60 m, continuously adjustable	
Minimum Range Resolution	2.5 mm	
Horizontal Center Beamwidth ⁽¹⁾	1.5° (1.2 MHz), 1.0° (1.8 MHz)	
Horizontal Field of View	360°	
Vertical FOV (1.2 MHz) ⁽²⁾	20°	
Vertical FOV (1.8 MHz) ⁽²⁾	12°	2°
Frame Rate	Up to 30 Hz (1.8 MHz, range < 20 m)	Up to 50 Hz (1.8 MHz, range < 10 m)
Number of Beams	512	
Transmit Signal	CW or CHIRP, automatically selected	
Minimum Blind Zone	≤ 10 cm	
Max Operating Depth	300 m	
Max Operating Speed	6 knots(Operation above this speed does not affect functionality but may reduce detection range; design specification)	
Power Consumption	18–40 VDC, ~20 W (average)	
Communication Interface	1 × 100 Mbps Ethernet (sonar data and control)	
Dimensions	Ø65 (±1) × 204 (±2) mm (excluding connector and cable)	
Weight (Air / Water)	~0.95 kg (air) / ~0.30 kg (water), excluding cable	
Housing Material	Aluminum alloy(Titanium alloy or 316 stainless steel available on request)	
Data Interaction & Display Control	1. In-house software SapphireViewer: Full-featured sonar control, compatible with Windows, Linux, Mac OS 2. SDK Provided: Enables custom software development for sonar operation	

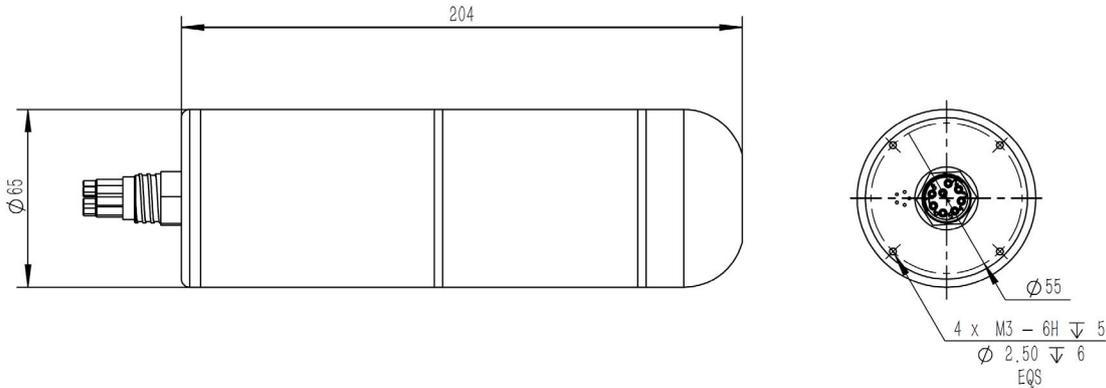
Notes:

- (1) Refers to the -3 dB horizontal angular width of the energy distribution for a point target located at the horizontal and vertical center of the sonar beam. A tolerance of +10% / -30% is allowed.
- (2) Defined as the sonar field of view (FOV). Large targets within this angular range can be detected; however, resolution, image clarity, and detection range at the edges may be lower than at the center.
- (3) Detection range specified for high-reflectivity targets (e.g., quay walls, bridge piers) in seawater under favorable acoustic conditions. Under similar conditions, the maximum detection range in freshwater is approximately 1–2 times that in seawater.

Collision Avoidance / Ranging Sonar Specifications

Specification	A2200
Center Frequency	2.2 MHz
Detection Range	20 m
Range Resolution	2°
Beamwidth	2.5 mm
Frame Rate	Up to 10 Hz
Minimum Blind Zone	≤ 30 cm

Structural Dimensions



Imaging Example

