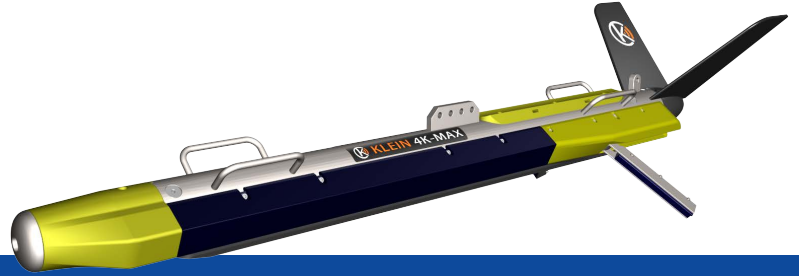




KLEIN
MARINE SYSTEMS



KLEIN 4K-MAX

High Resolution Side Scan Sonar with Integrated Nadir Gap-Filler for Professional Surveys

Klein 4K-MAX is a professional series side scan sonar which combines the patented gap-filling technology of the MA-X View 600 sonar with the enhanced bottom tracking accuracy of a Tru-Bottom™ Tracking dedicated altimeter and an improved nadir gap-filler processing algorithm. The 4K-MAX delivers unprecedented focused 600kHz imagery (equivalent to 900kHz resolution) at an optimized range of 50 meters per side (maximum range of 120 meters per side) with co-registered 850kHz nadir gap-fill data. This is a powerful solution for professional underwater surveys.

Problem: Traditional side scan sonar systems have a blind spot directly below the vessel, known as the nadir gap. Surveying this area requires additional time and effort, impacting efficiency and cost.

Solution: MA-X Technology addresses this issue by providing:

- Imaging of the nadir zone: It fills the gap in sonar coverage directly beneath the towfish.
- MA-X is TRUE grazing angle sonar: This allows for consistent analysis and interpretation of data across the entire surveyed area owing to the excellent shadow casting and high resolution.
- Reduces the need for ensonifying the nadir area on adjacent lines: This eliminates the need for extra passes or maneuvers to cover the gap, saving time and money.

Key Features

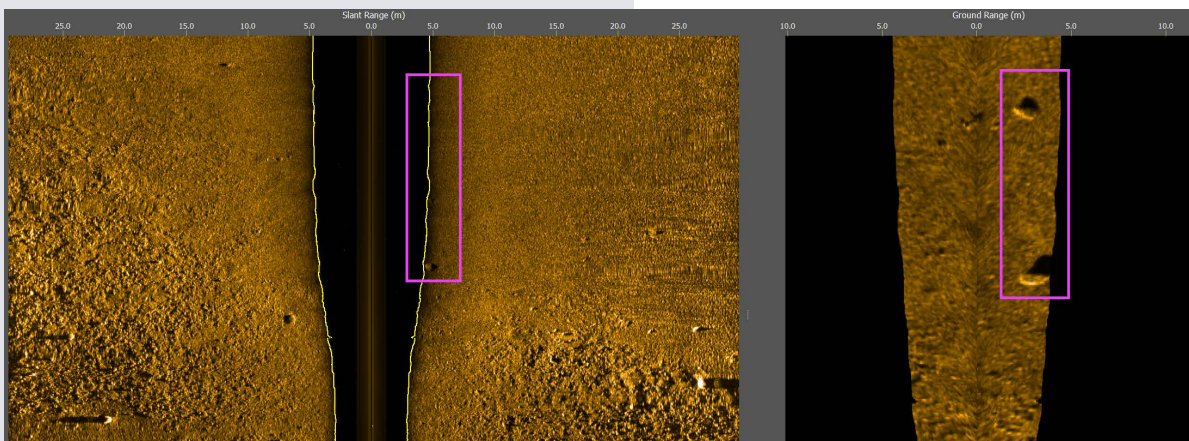
- Complete Nadir Coverage
- 40% increase in survey efficiency
- Focused 600 kHz Side Scan/850 kHz Nadir Gap-Filler
- Enhanced Motion Tolerance
- Tru-Bottom™ Tracking
- Broadband CHIRP
- Klein BLUE TECHNOLOGY for superior imaging performance
- Depth Rated to 300 m

Benefits:

- Improved survey efficiency
- Reduced Vessel fuel savings
- Surveys completed approximately 40% faster

Applications:

- Offshore Renewable Energy and Oil/Gas Surveys
- Mine Countermeasures (MCM) type Surveys
- Cable Route Surveys
- Engineering Site Surveys
- Habitat Mapping Surveys



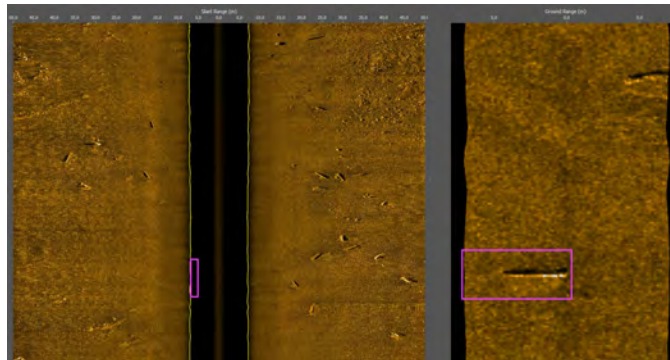
Near nadir boulders imaged on the starboard side.

4K-MAX Sonar Specifications

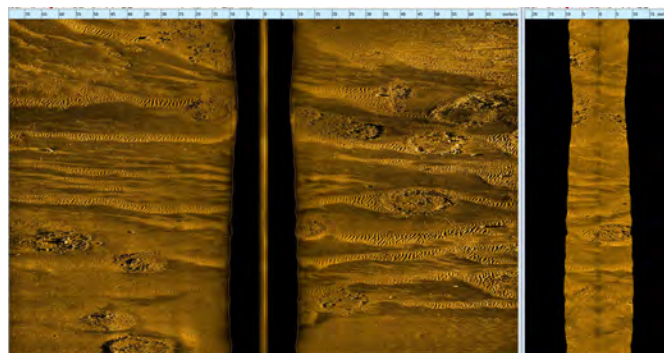
Technology	Klein Blue Focused Transducer Technology
Frequency	600 kHz (SSS) 850 kHz (Nadir MA-X)
Pulse Type	FM CHIRP
Horizontal Beamwidth	0.23° @ Focused 600 kHz
Vertical Beamwidth	50°
Across Track Resolution	2.4 cm @ Focused 600 kHz
Max Range (Per Side)	120 m @ 600 kHz (environment dependent)
Vertical Beam Center	Tilted down 15° from Horizontal (SSS)
Output Data Format	SDF or XTF or both
Altimeter	360 kHz: Up to 100 m (environment dependent)

4K-MAX General Specifications

Construction	Electro-Polished 316 Stainless Steel
Body Length	1.45 m (57 in)
Outer Diameter	8.9 cm (3.5 in)
Weight	30.4 kg (67 lb) (in air) 16.8 kg (37 lb) (in water)
Depth Rating	300 m
Standard Accessories	<ul style="list-style-type: none"> Heading, Roll and Pitch Sensor Depth (Pressure) Sensor: 0-300 m Water Temp. Sensor: 0-35° C Safety Cable
Optional Accessories	<ul style="list-style-type: none"> K Wing I or II Depressor Wings Keel Weight Magnetometer interface Responder Interface Winch, Launch & Recovery System



The Torpedo was missed in the SSS data but was captured in the nadir gap-fill data. This highlights the limitations of traditional side scan sonar systems.



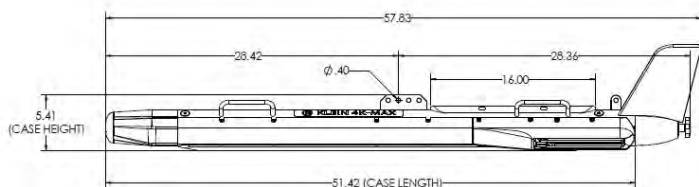
Seafloor geology and dredge spoil imaged in the side scan sonar and gap-fill data.

Klein's innovative focused BLUE TECHNOLOGY™ transducer technology offers several key advantages as listed here:

- **Improved Along-Track Resolution:** This technology allows Klein sonars to achieve high-resolution images comparable to sonars operating at much higher frequencies. This translates to capturing finer details and clearer imagery of underwater features.
- **Extended Operational Range:** Despite offering high resolution, Klein sonars boasts a 33% greater operational range compared to competing sonars using higher frequencies. This allows surveyors to cover larger areas while maintaining high image quality.
- **Motion-Tolerant Design:** Klein's transducer design is engineered to be motion-tolerant, resulting in up to 30% improvement in along-track resolution compared to competing sonars. This is crucial for maintaining image clarity even when operating in rough sea conditions or when the vessel experiences significant motion.

Klein's focused transducer technology provides a powerful combination of high resolution, extended range, and improved motion tolerance. This enables high resolution imagery to be acquired even in challenging environments.

Compliant for Offshore Renewable/Oil/Gas, BOEM, NOAA, USACE, IHO & certain Mine Warfare specification surveys.



Klein Marine is deeply committed to customer support. We are currently servicing valued customers in 80 countries, and relying on a network of competent International Representatives to meet and exceed the service needs of our customers around the world. We provide 24 hour / 7 day a week support.

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