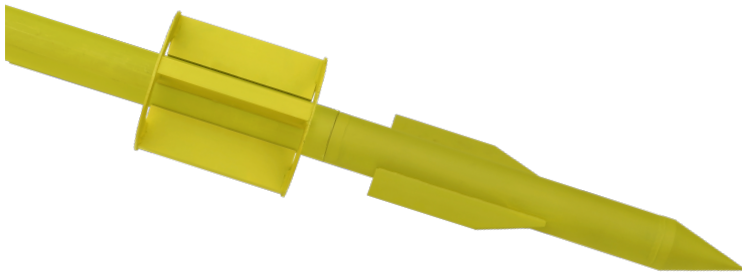# BRIDGE SCOUR MONITORING
SONAR SENSOR SYSTEM
MAGNETIC COLLAR/ PROBE SYSTEM

DATASHEET

MODEL EBSM-101S
MODEL EBSM-101M

EBSM-101M Magnetic collar/probe scour system
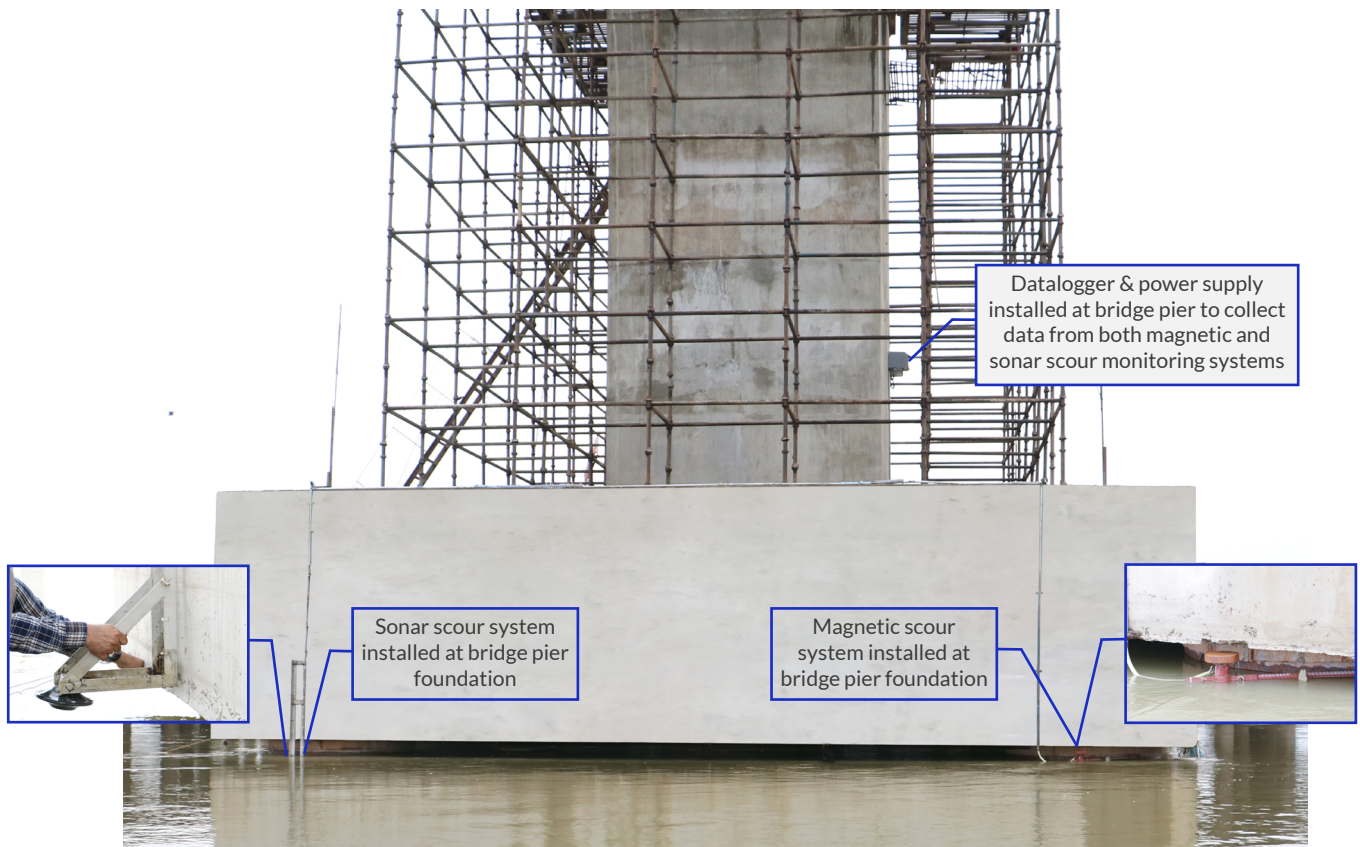

EBSM-101S Sonar sensor scour sytem

⚙ OVERVIEW

Bridges spanning rivers are architectural marvels, but their stability relies heavily on the piers embedded within the riverbed. These foundational elements, while robust, are susceptible to a phenomenon known as scouring. Scouring occurs when the supporting riverbed material around bridge support structures and abutments erodes due to the force of water flow. This erosion can be so severe that it exposes the piles or pier foundations to significant depths. Such exposure can compromise the very foundation of the bridge, leading to potential structural failures. Scouring has been the silent adversary behind numerous bridge collapses worldwide; therefore, the early detection and consistent monitoring of scour depth variations have become paramount. Stakeholders must be vigilant, ensuring that the bridge's structural integrity remains uncompromised.

Encardio Rite is a pioneer in offering state-of-the-art bridge solutions for scour monitoring. Our systems are designed to provide stakeholders with real-time data on sediment scour and aggregation dynamics. The Model EBSM-101M employs a magnetic collar on an embedded stainless steel tubular probe while Model EBSM-101S harnesses the precision of an active sonar sensor to measure the depth of the riverbed. Each system has its unique strengths, and the site's specific requirements dictate the choice between them. What is commendable is their rugged design, making them ideal for monitoring structures even in the most challenging conditions, be it high-current zones or deep-water environments. The safety and longevity of bridge structures hinge on proactive scour monitoring to ensure the continued health and stability of its foundation.

⊞ FEATURES

- **Robust design**: Ensures long-term reliability and watertight performance, even in high current zones and deep-water environments.

- **BSM-101 datalogger**: A compact, weatherproof datalogger tailored for scour applications. It captures and stores data at set intervals for online transmission. It supports magnetic sensors up to 200 m and sonar sensors up to 1 km away.

- **Flexible data transfer**: Transmit data to a central server via cellular network or Ethernet (through fibre-optics cable link or VSAT). Alternatively, download data through an RS-232 interface using a USB port.

- **User-centric interface**: Easily configure and oversee the datalogger using a mobile device, ensuring a seamless user experience.

- **Standalone capability:** Functions independently without the need for external systems.

- **Effortless setup**: Plug-and-play sensor installation with intuitive mobile configuration.

- **Real-time monitoring & alerts:** The system provides instant notifications via SMS or email when data surpasses set thresholds, ensuring prompt action during crucial events.

- **Environmental resilience**: It is engineered to withstand exposure to chlorides and carbonatization, critical elements in corrosion measurement.

- **Power flexibility**: Users can opt for battery, mains, or the eco-friendly solar power option (model ESP-12V-1A). For isolated locations, mains or solar power is recommended.

- **Cloud data management:** All sensor data is securely uploaded to the Proqio cloud platform, offering round-the-clock access, advanced analytics, and visualization capabilities.

Datalogger & power supply installed at bridge pier to collect data from both magnetic and sonar scour monitoring systems

Sonar scour system installed at bridge pier foundation

Magnetic scour system installed at bridge pier foundation

Scour monitoring system (magnetic and sonar with datalogger) installed at a bridge in India
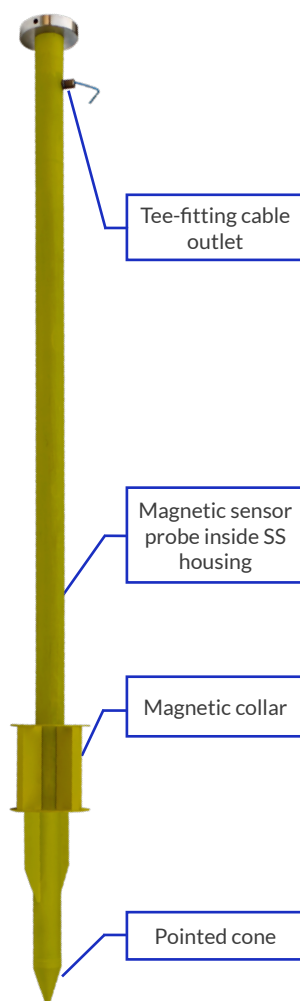
SONAR SCOUR MONITORING (EBSM-101S)

The EBSM-101S is a sonar scour monitoring system that accurately measures stream and river-bed depths using acoustic echo ranging.

Key Component:

- **Sonar sensor:** Utilizes acoustic pulses to determine bed elevation at predefined intervals, leveraging the speed of sound in water for precise measurements.

The sonar device employs an 8-degree beam, ensuring ample sonar beam clearance while simultaneously capturing reflected pulses effectively. The sensor is strategically mounted on a bracket to optimize performance. The angle of this mounting is adjusted based on site-specific conditions, ensuring it's positioned away from the pier and maintains a minimum height of 2 meters above the streambed. The sensor must always remain submerged in water to guarantee consistent performance and prevent potential failures.

Tee-fitting cable outlet

Magnetic sensor probe inside SS housing

Magnetic collar

Pointed cone

EBSM-101M Magnetic scour assembly

MAGNETIC SCOUR MONITORING (EBSM-101M)

The EBSM-101M is a specialized magnetic scour monitoring system designed to track accurately and record streambed depth variation.

Key Components:

- **Magnetic sensor probe assembly**: Features a switch array encased in durable stainless steel (SS) housing.

- **Magnetic collar**: Slides over the sensor probe's SS housing vertically embedded into the streambed.

- **SS support pipe**: Provides additional height to the assembly.

The system's robust design includes a pointed cone at the housing's bottom end, facilitating easy insertion into the streambed. A tee-fitting cable outlet is positioned at the top of the housing, and the entire assembly is securely affixed to the pier or foundation using an appropriate fixing arrangement.

As scouring occurs, the magnet resting on the streambed adjusts its position to match its level. The tubular magnetic switch assembly probe then tracks the magnetic collar's downward movement. When the magnetic collar nears a specific depth, the corresponding switch activates, recording the streambed's depth at that point.

Notably, if silt accumulates over a scoured area, the magnetic assembly retains its position at the deepest recorded point. This ensures the system captures the maximum scouring depth since its installation, providing invaluable data on streambed changes.

EBSM-101S Sonar sensor

EBSM-101 Datalogger

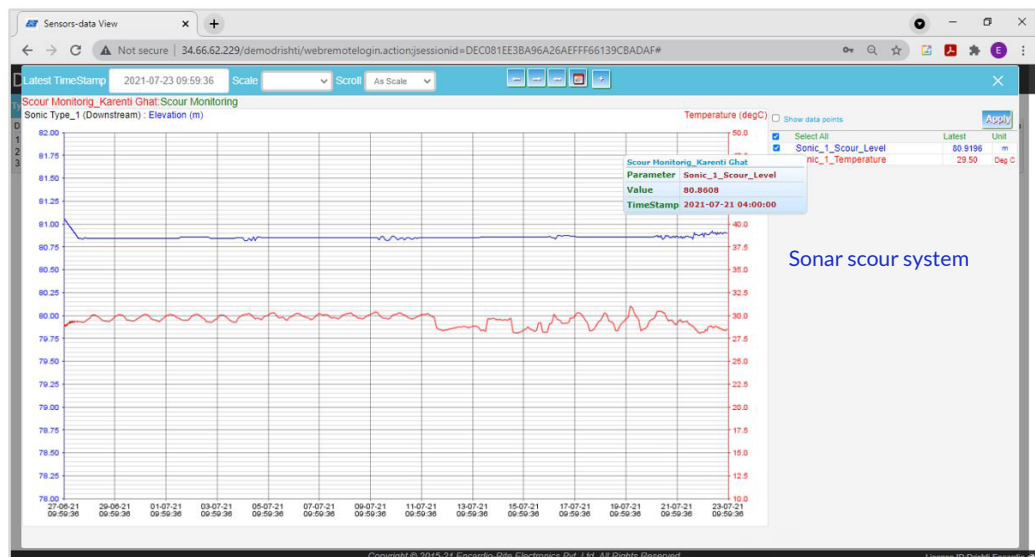## ⚙ SPECIFICATION

EBSM-101S Sonar scouring monitoring system

|	
Operating depth	20 m
Resolution	Better than 50 mm
Resonant frequency	200 kHz (Nominal)
Beam width	8° ±1°, Conical
Minimum depth of streambed from probe	2 m
Precaution	Probe should always remain immersed in water to avoid damage
Operating temperature range	0°C to +40°C
Protection	IP-68
Cable length	15 with sensor

⚙ SPECIFICATION

EBSM-101M Magnetic scouring monitoring system

Sensor	Magnetic switch array with switches at 45 mm intervals, inside SS housing, measuring range 2.4 m.
Resolution	45 mm
Level uncertainty	± 25 mm
Probe housing	SS housing, 60.3 mm diameter x 2.65 m long (without bottom cone section).
Support pipe	SS support pipes, 60.3 mm diameter x 2.65 m long. Quantity depends upon depth of riverbed.
Magnetic collar size	OD: 165 mm, ID: 63 mm and Height: 176 mm (typical)
Cable length	15 m with sensor

Sonar scour system
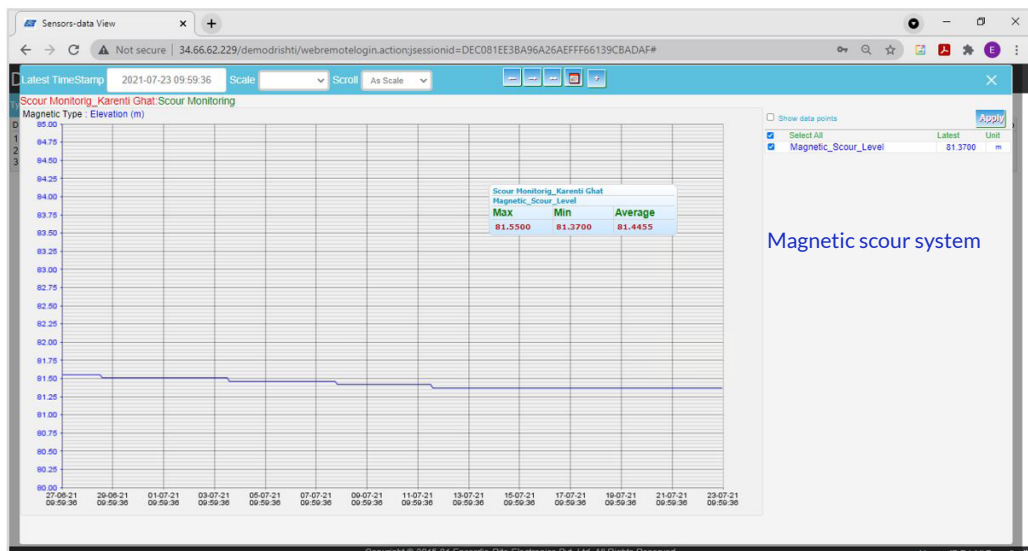
Magnetic scour system

Online data from magnetic and sonar scour system on our database management system

Follow us: 🐦 in 📷 f   📞 +91 522 2661039-42   ✉ info@encardio.com   🌐 www.encardio.com

# ⚒ ORDERING INFORMATION   ⚒ TYPICAL SCHEMES

To ensure a streamlined order process, kindly provide the following specifics:

- **Sensor selection:** Indicate the quantity of both (sonar and magnetic) sensors required.

- **SS support pipes**: Specify the number of additional SS pipes needed for the magnetic scour system.

- **Junction boxes:** Specify the required quantity of EJB-1-4-06 model junction boxes (1 box per sensor).

- **Datalogger proximity:** Specify the distances between the piers/sensors and dataloggers to ascertain the number of dataloggers and appropriate cable length.

- **Power supply:** Confirm if the ESP-12V1A solar power supply model is desired (1 per datalogger).

- **Proqio data management:** Indicate the preferred subscription duration (years) for the cloud-based Proqio data management system.
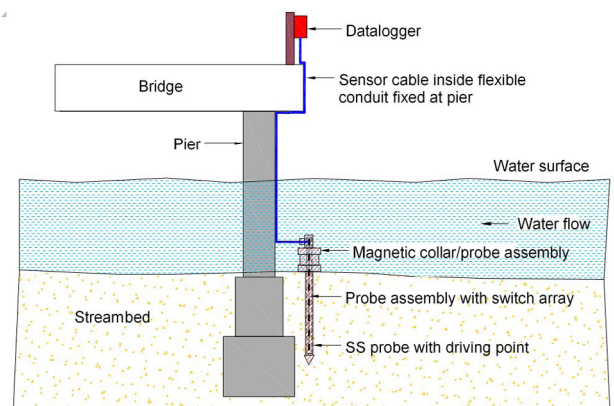
Note: Site-specific conditions determine fixtures for sensor installation. Users must source or create these fixtures as necessary.
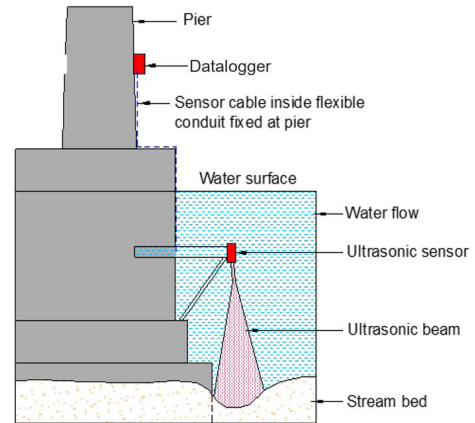
EBSM-101S Sonar scour system

EBSM-101M Magnetic scour system

| Dams | Mining | Tunnels | Transportation | Construction | Bridges | Landslides | Energy | Environmental Monitoring | Pipelines | Structural Health Monitoring | Smart Cities |