



Oceanographic Buoys

A solution for each specific need



MSM Ocean's Oceanographic Buoys have been developed for the measurement of oceanographic, meteorological, and environmental parameters and their transmission in real time onshore. They are custom designed based on customers' requirements.

Our range of EBM-OC buoys incorporates the latest buoy's technology with an elastic float manufactured with a sheet of closed-cell polyethylene foam rolled with heat to provide a solid core covered with a layer of polyurethane elastomer. This provides a collision-resistant float that is virtually unsinkable and with no water absorption.

Our highly visible buoys incorporate several safety and anti-vandal systems to ensure the greatest protection to the equipment installed at sea.

Designed in accordance with IALA Recommendations



ELASTOMER
FLOAT



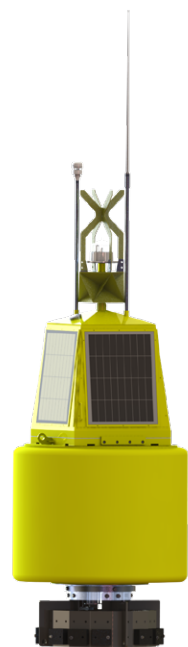
ANTI-VANDAL
SECURITY



IALA
INDUSTRIAL
MEMBER

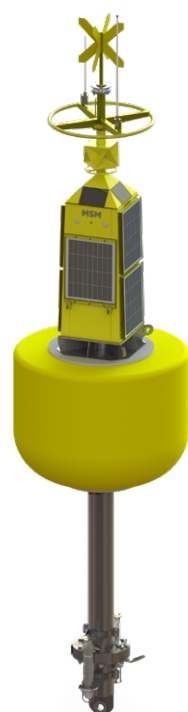
Our Standard Oceanographic Buoys

Other sizes available upon request



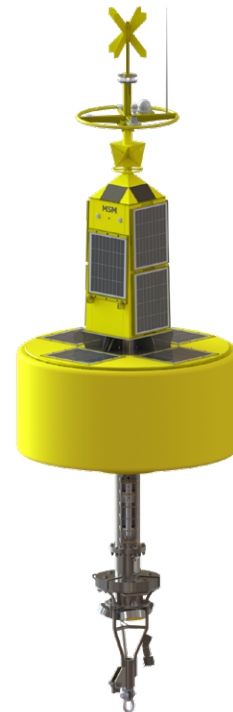
EBM12-OC
1.2m diameter buoy

Compact and light buoy recommended for applications in shallow depths and protected waters.



EBM20-OC
2.0m diameter buoy

Medium-size buoy for coastal applications. Allows incorporating additional sensors and bigger solar power system.



EBM24-OC
2.4m diameter buoy

Ocean buoy ideal for offshore applications. Ensures the highest visibility in open seas.

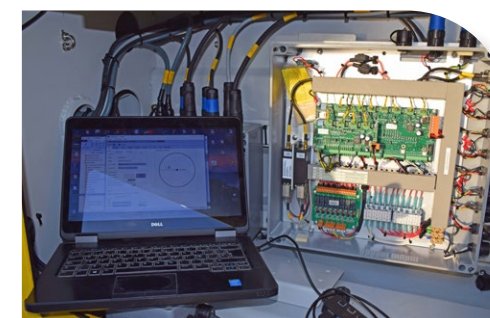
Main Characteristics



- 1 Resistance to impacts and collisions providing a virtually unsinkable buoy and guaranteeing the safety of the equipment onboard.



- 2 High-visibility superstructure to house all electronic equipment and batteries with no water ingress.



- 3 Buoy designed according to IALA Recommendations including LED lantern, radar reflector, top mark, AIS AtoN transponder (optional), etc.

- 4 Full remote control of the operational and navigation parameters of the buoy and of the sensors with user adjustments from the control centre.



- 5 Solar power system specially calculated and designed for each location based on the energy balance of the solution.

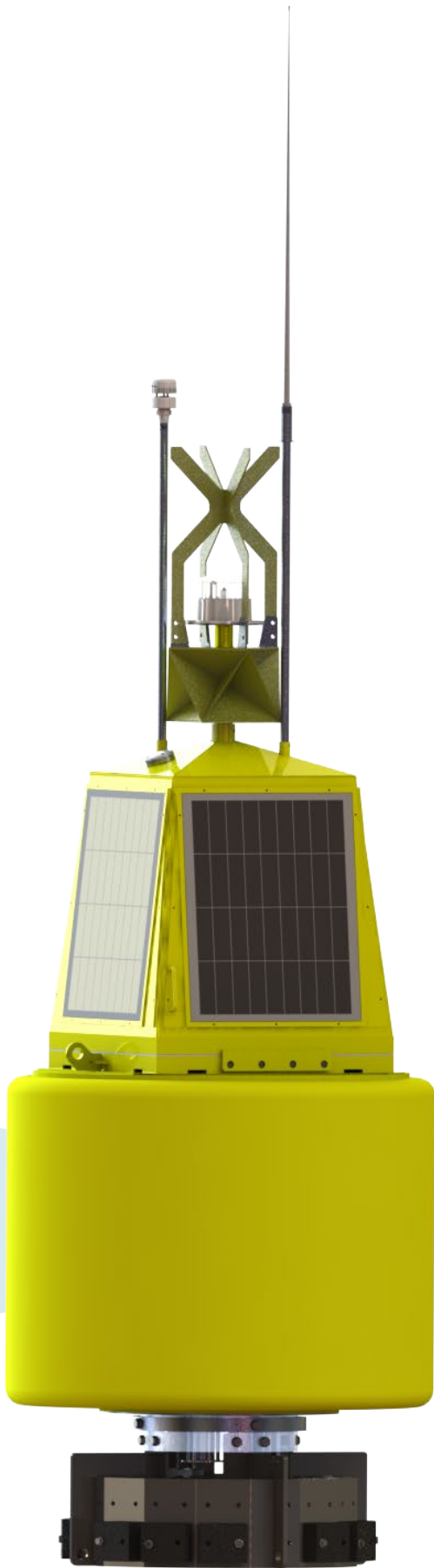
- 6 Mooring system calculated for the depth and sea conditions of each location.



- 7 Sensor Access from Surface (SAS) system for easier maintenance operations (optional).

EBM12-OC Oceanographic Buoy

1.2 m diameter buoy



Elastomer Float



Self-Contained LED Lantern



Datalogger and Telemetry



Automatic Weather Station



Wave Unit



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Underwater Sensors
(CTD, ADCP)

Materials:	Marine aluminium.
Coating:	Polyurethane marine paint resistant to UV light, colour according to IALA Recommendations.
Top mark:	According to IALA Recommendations.
Radar reflector:	10 m ² RCS (X band).
Marine lantern:	Self-contained lantern, model MCL100, with up to 4 nm luminous range (T=0.74). Other models available.
Solar modules:	Integrated with capacity up to 200 W.
Batteries:	Integrated with capacity up to 200 Ah.
Supports:	Antennas and sensors.
Transponder:	AIS AtoN Transponder (optional).

EBM20-OC Oceanographic Buoy

2.0 m diameter buoy



Elastomer Float



LED Marine Lantern



Datalogger and Telemetry



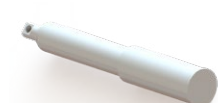
Automatic Weather Station



Wave Unit



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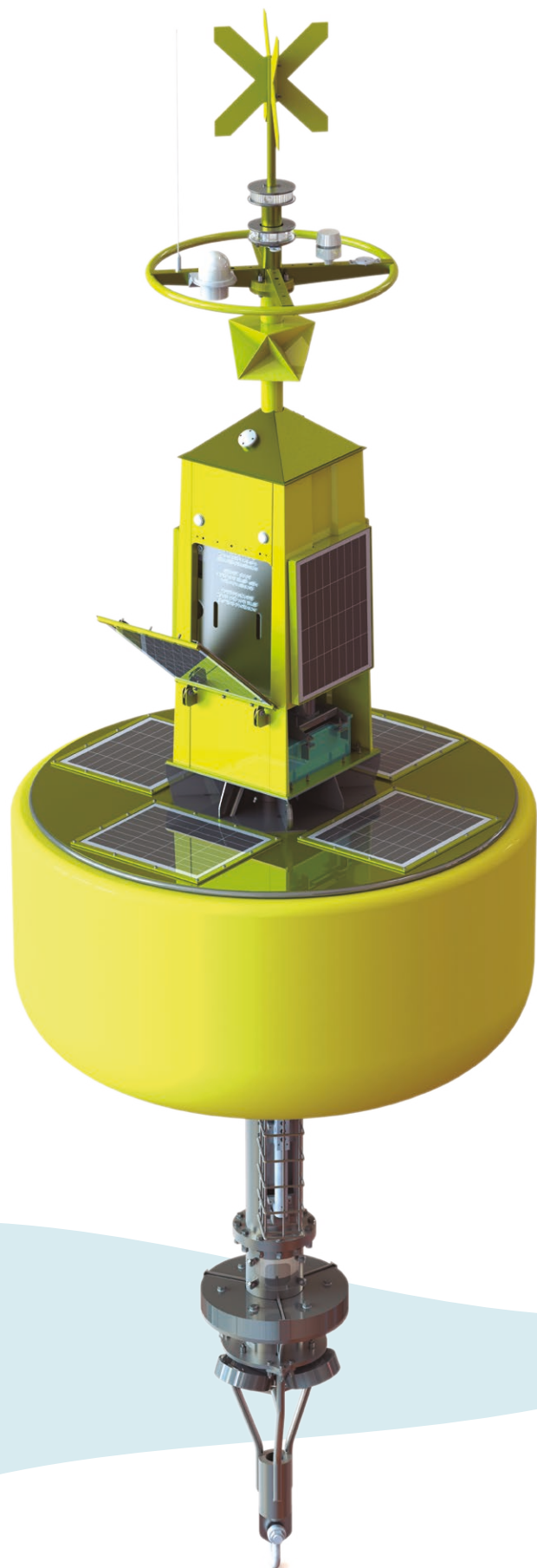


Underwater Sensors
(CTD, ADCP)

Materials:	Marine aluminium.
Coating:	Polyurethane marine paint resistant to UV light, colour according to IALA Recommendations.
Top mark:	According to IALA Recommendations.
Radar reflector:	10 m ² RCS (X band).
Marine lantern:	Integrated in the mast with 360° luminous output and up to 8 nm luminous range (T=0.74).
Solar modules:	Integrated with capacity up to 375 W.
Batteries:	Integrated with capacity up to 260 Ah.
Supports:	Antennas and sensors.
Transponder:	AIS AtoN Transponder (optional).

EBM24-OC Oceanographic Buoy

2.4 m diameter buoy



Elastomer Float



LED Marine Lantern



Datalogger and Telemetry



Automatic Weather Station



Wave Unit



Underwater Sensors (CTD, ADCP)



ANTI-VANDAL SECURITY

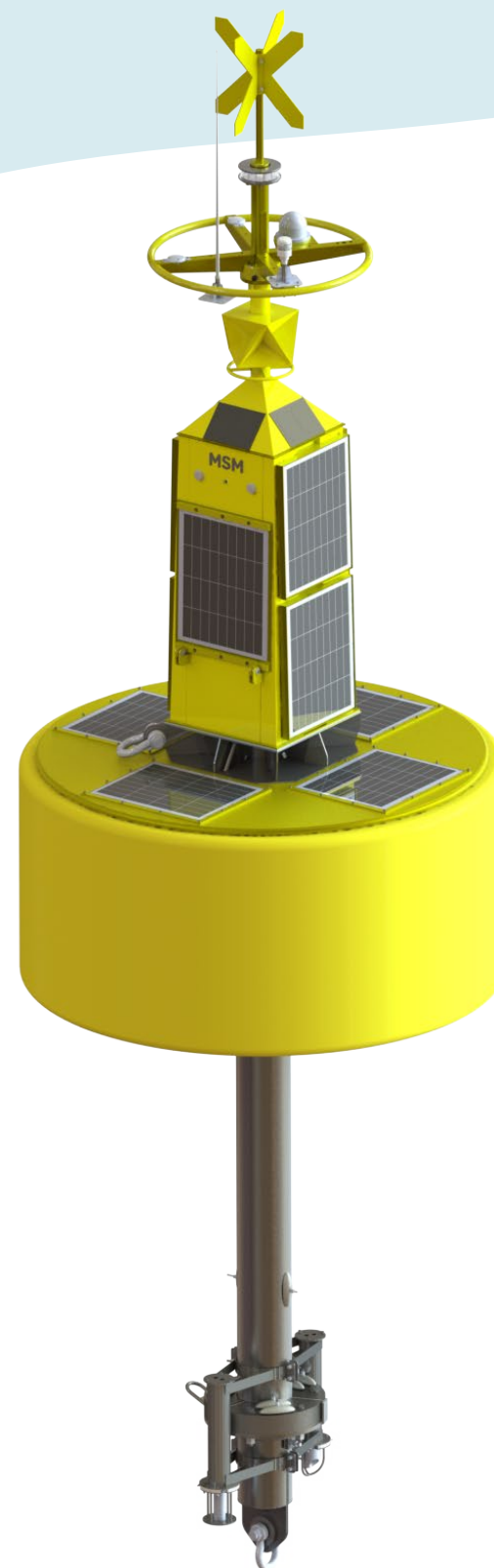
Materials:	Marine aluminium.
Coating:	Polyurethane marine paint resistant to UV light, colour according to IALA Recommendations.
Top mark:	According to IALA Recommendations.
Radar reflector:	10 m ² RCS (X band).
Marine lantern:	Integrated in the mast with 360° luminous output and up to 8 nm luminous range (T=0.74).
Solar modules:	Integrated with capacity up to 575 W.
Batteries:	Integrated with capacity up to 260 Ah.
Supports:	Antennas and sensors.
Transponder:	AIS AtoN Transponder (optional).

Options of equipment

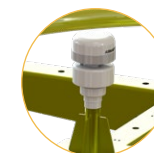


Our buoys are fully integrated systems that allow the combination of different sensors for the measurement of oceanographic, meteorological, and environmental parameters.

Our datalogger allows the acquisition, processing, management and transmission of the data in real time with different options of telemetry available. It incorporates automated routines that self-check the sensors' operation to increase the autonomy of the systems installed at sea.



ATMOSPHERIC PARAMETERS



- Wind speed and direction
- Air temperature
- Barometric pressure
- Others.

TELEMETRY



- Satellite
- GPRS
- AIS
- WiFi
- Others.

SURFACE PARAMETERS



- Wave
- Hydrocarbons and oil pollution
- Others.

UNDERWATER PARAMETERS



- Currents
- Sea temperature
- Conductivity
- pH
- Turbidity
- Dissolved Oxygen
- Others.

Areas of application



Metocean Research

Metocean buoys are key to study not only our oceans but also to provide valuable information for the study of climate and climate change.

Suggested configuration: Metocean buoys for scientific research are custom-designed based on the purpose of the research, the parameters to be studied and the proposed location of the buoy.

Port and Safety of Navigation

Instrumented buoys can provide key information required by vessels approaching a port, manoeuvring areas and other areas where the navigation conditions may present risks for mariners. This data can be transmitted in real time to vessel via AIS telemetry combined with GPRS communications to the Control Centre (or other depending on coverage such as Wi-Fi and satellite).

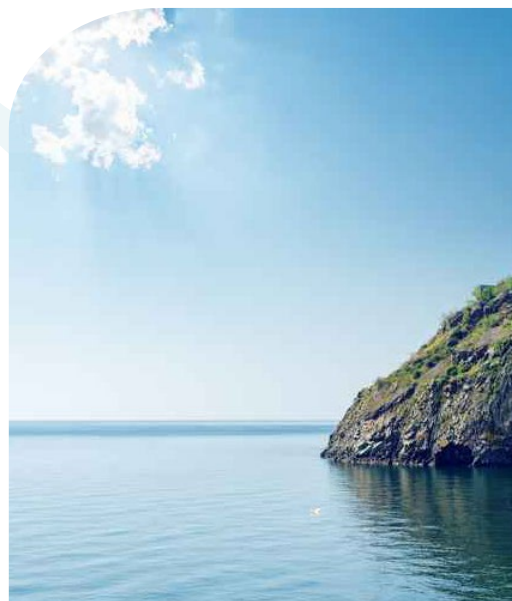
Suggested configuration: **EBM20-OC** buoy integrating Automatic Weather Station (measurement of wind speed, wind direction and gusts), wave sensor and ADCP (with measurement of surface current and current in the water column).



Water Quality Monitoring

Monitoring the impact of human activities on water quality is an increasing concern for coastal communities that want to keep track of the incidence of contamination and other indicators on coastal waters.

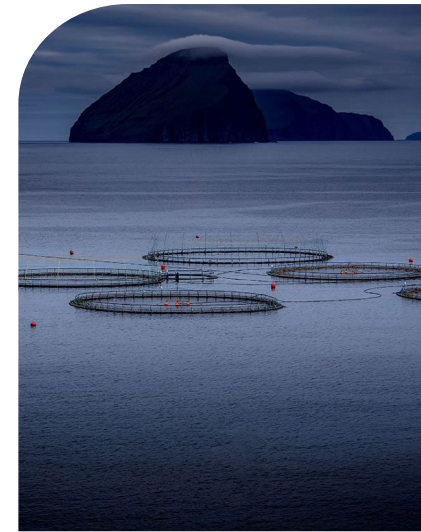
Suggested configuration: **EBM12-OC** buoy integrating multiparametric water probe measuring sea temperature, conductivity, pH, dissolved oxygen, cDOM/fDOM, chlorophyll and hydrocarbons.



Aquaculture

In aquaculture, monitoring water parameters provide key information to optimize the operation of the farms and maximise the output of fisheries. Additionally meteorological and oceanographic parameters can be of high interest as the conditions of wind, currents or waves may affect the maintenance tasks and other activities on the farms.

Suggested configuration: **EBM12-OC** buoy integrating multiparametric water probe measuring sea temperature, conductivity, pH, dissolved oxygen, fluorescence and turbidity with option to include wave sensor, ADCP and automatic weather station.



Oil and Gas

In Oil and Gas applications, there is a key concern for mitigating the impact of platforms' operation and detecting early any presence of hydrocarbons in the water. Additionally, Metocean buoys can be placed to provide key information in real time for the planification on any maintenance activities on platforms or SPM.

Suggested configuration: **EBM20-OC** buoy integrating sensors that detect the presence of hydrocarbons on the sea surface or in the water. They can be combined with and ADCP and/or anemometer providing useful data for modelling the direction of the hydrocarbons, and a wave sensor for planification of maintenance operations.



Offshore Wind

For Offshore Wind, instrumented buoys can be used from the pre-engineering phase to provide accurate data for the design of the project to the operational phase to guide maintenance operations and to monitor impact as well as meteorological and oceanographic conditions.

Suggested configuration: **EBM24-OC** buoy integrating automatic weather station with redundant vane anemometer, ADCP, wave sensor and CTD to measure sea temperature, conductivity and turbidity.



STUDY OF EL NIÑO IN SOUTH AMERICA



There is an increasing concern globally on climate change and the effects of the ever-increasing tropical storms strength. Understanding meteorological and oceanographic phenomenon such as El Niño, which affects the South American Pacific coast, is key. This project required a long-term deployment in deep ocean at 5,000m water depth, to study air temperature, wind and gust direction and speed, relative humidity, dew point, barometric pressure, currents in the water column up to 500m water depth, waves, and a profile of water temperature, conductivity and dissolved oxygen at different water depths up to 500m.

The solution provided included **four EBM24-OC buoys** to provide a sturdy platform for installation in high sea of an **automatic weather station**, MSM's **wave sensor**, MB Wave 3, an **ADCP** located in the tail of the buoy and **CTD array** suspended in the water column with inductive communication.

The **MMB03 datalogger** captures the data from all the sensors, processes it and packages it to send onshore via **redundant IRIIDIUM satellite communications**. It incorporates automated routines to control, check and correct if necessary the operation of the sensors in order to reduce the need for external intervention, which is key when buoy systems are installed so far away from the coast.

The **EBM24-OC** incorporates several **safety and anti-vandal systems** such as **GPS position** of the buoys and **tracking** if the buoy is located outside of its established swinging radius as well as a **360° camera** to take a picture in case an impact is detected, with a set delay in order to obtain an image of the vessel involved.

MSM Ocean specializes in designing mooring system for each application based on the water depth and sea conditions, including specific mooring systems for deep waters up to 7,000m.



PRE-ENGINEERING OFFSHORE WIND STUDY IN THE BALTIC SEA



This project was developed for a pre-engineering study for offshore wind in the Baltic Sea, in order to provide one year of data on the wind direction, wind speed, wind gust, air temperature, solar radiation, wave height, wave period and wave direction as well as current direction and speed in the water column up to 40m water depth.

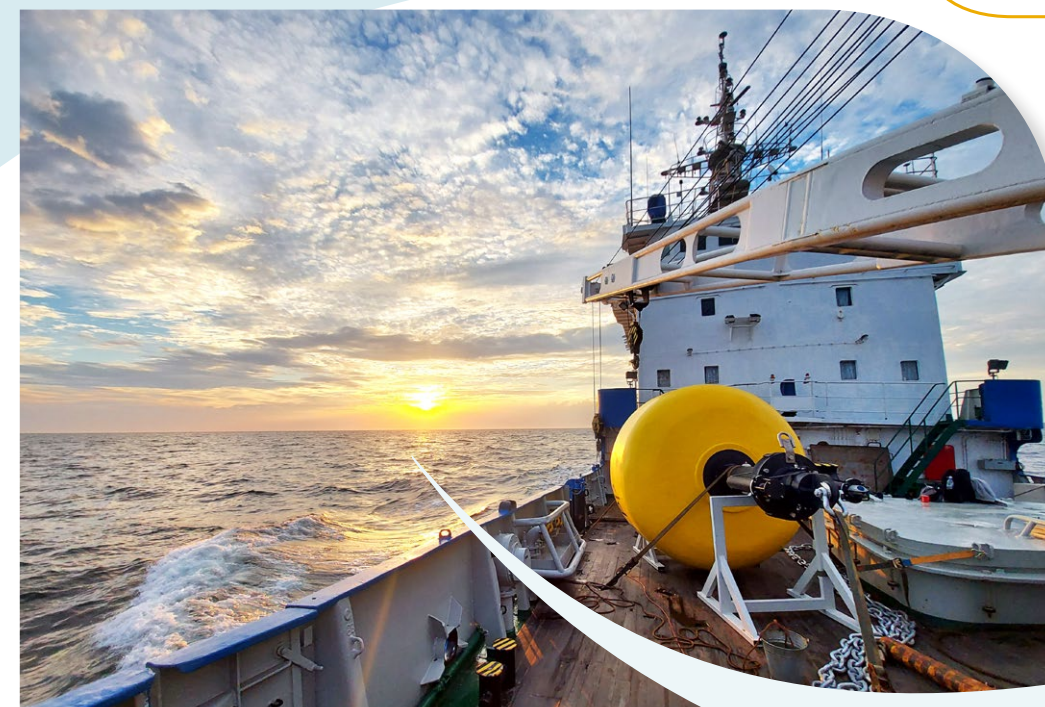
There was also a special concern for the security of the buoy since a similar system was lost in the past due to a collision with the vessel, with special emphasis being on the resistance of the system and the possibility of monitoring vessels activity in the surrounding of the buoy.

MSM Ocean provided an **EBM24-OC**, with **elastomer float**, integrating a solar power system designed to provide enough energy in low sun radiation conditions. The system incorporated an **automatic weather station with ultrasonic anemometer**, complemented with the **redundancy of the wind measurement with a vane-anemometer** resistant to extreme cold weather, as well as MSM's **wave sensor**, MB Wave 03, an **ADCP** and a **CTD**. The data collected was processed by MSM's **datalogger** to be packaged and send to the Control Centre near real time through **double redundant IRIIDIUM modems**.



For this application, MSM Ocean designed the **ShiPRAS solution (Ship Proximity Remote Alert and Surveyance)** to monitor vessels within an area of safety around the buoy established by the customer through AIS. This exclusive application provides valuable information when establishing responsibilities in the event that the buoy is collided with a ship, as well as in the event of vandalism.

The elastomer float provides a buoy that is virtually unsinkable allowing preserving the integrity of the equipment (sensors and electronics) integrated in the buoy.





@msmocean



SCAN TO
DOWNLOAD

Pol. Ind. Mas de Tous
C/ Oslo, 12
46185 La Pobla de Vallbona
Valencia, SPAIN
+34 96 276 10 22

www.msmocean.com
ocean@msmocean.com

