

# TSUNAMI RELAY BUOY ENVIRTECH MKIII SPAR BUOY

## SYSTEM OVERVIEW

### DEEP OCEAN MONITORING AND TSUNAMI WARNING

*Envirtech MKIII Data Buoys* are tall, thin buoys that float upright in the water and are characterized by a small water plane area and a large mass. Because they tend to be stable ocean platforms, spar buoys are popular for making oceanographic measurements. In Envirtech ocean data acquisition systems, spar buoys are used to collect data from the sea bottom and to relay this data using satellites, such as Inmarsat or Iridium, to a control centre on shore. The buoy assures a very stable platform for bidirectional communications to/ from the ocean bottom, and allows total remote control of deployed devices. Together with an Envirtech Tsunameter the MKIII is a reliable part of any marine tsunami warning system.

### WHAT IS A TSUNAMI?

Tsunamis are large water waves created by seismic activity, landslides, volcanic activity, or by any vertical disturbance of water. Historically, tsunamis have killed hundreds of thousands of people and have caused significant damage to many coastal areas of the world.

### TSUNAMI WAVES

Tsunamis differ from normal wind-generated waves in that wind-generated waves have a shorter period and wavelength. A tsunami can have a wavelength in excess of 100 km over a period of hours. Tsunamis can travel at hundreds of kilometers per hour for great distances, with a very low attenuation.

### HOW TO MEASURE TSUNAMI WAVES

To give an early warning to coastal populations, tsunamis are measured in the open sea using underwater modules deployed on the sea bottom and communicating with a surface buoy moored above them.

## ENVIRTECH TSUNAMI BUOY TECHNICAL DESCRIPTION

The Envirtech buoy MKIII is composed of three main parts:

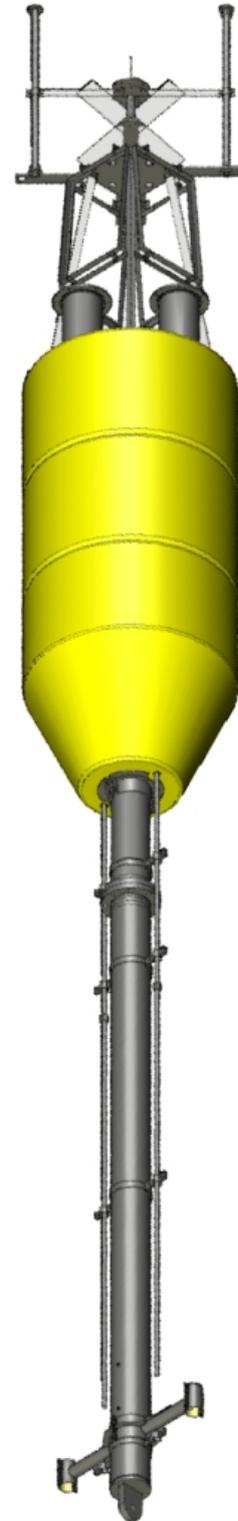
- A subsurface pole;
- A float (cone + cylinder) in the middle;
- A turret on the top.

The main advantages of this configuration for specific data relay applications are the following:

- The lower pole provide a reliable mechanical support for the acoustic modems and related cables: the acoustic transducers can be mounted at a depth of least 5-6m to get a reliable acoustic link.
- The top, central part of the float can contain the battery and electronic unit with related connectors.
- The turret on the top allows the mounting of solar panels, the satellite modems and additional devices such as a Wi-Fi interface, meteorological station, etc.
- The hydrodynamics of the buoy are characterised by small tilt movements: this provides a vertical, stable platform to optimise the performance of the acoustic link between the buoy and the underwater module that transfers the data related to the tide and tsunami detection.

The buoy can be optionally supplied with further payloads such as:

- A complete meteorological station (single or double)
- An ADCP for multi-cell current data collection
- Water quality multi-parameter probe



### HIGH RELIABILITY

The Envirtech MKIII consists of rotationally molded, foam-filled polyethylene floats, and an AISI316 stainless steel structure.

The MKIII has been built to remain operational during super typhoons, with sea conditions up to Beaufort 14. In 2010, the buoy proved its great strength when the super typhoon Megi crossed its mooring position in the South China Sea.

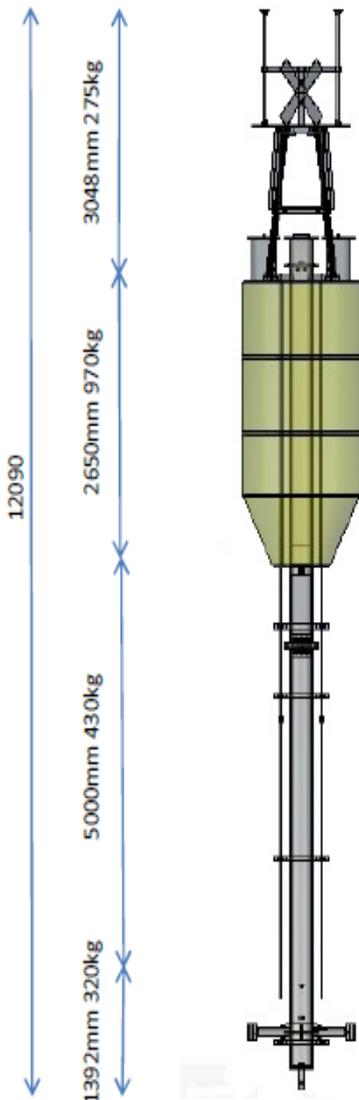
The MKIII has a redundant payload. This means it has double CPUs, double acoustic modems and double satellite transceivers. *Inmarsat* mini-C and *iridium* are standard communications systems but optional alternative payloads can be supplied for *Beidou* (only for Chinese end-users) and *Insat*.

The buoy is also available in the *ETD* (Easy To Deploy) configuration with reduced dimensions of all metallic parts and powered by lithium batteries instead of solar panels.

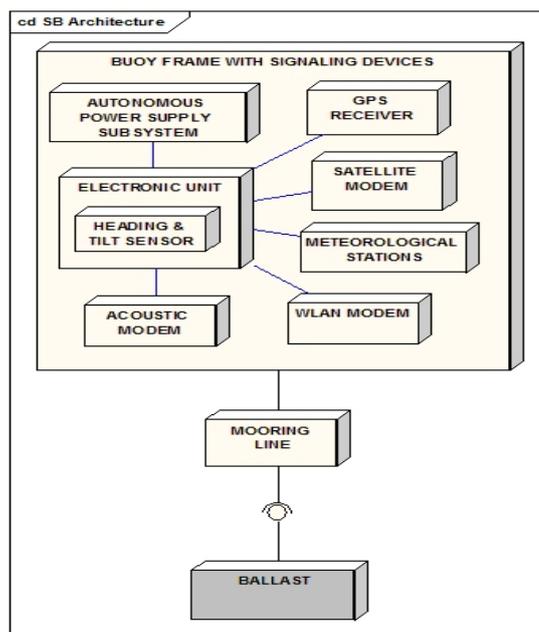


Envirtech is a private Italian company that is completely owned by its management. It invests more than 30% of its annual revenue in research. Envirtech manufactures according to strict standards of quality control and is ISO9001-2000 certified.

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GENERAL INFORMATION MKIII	
<b>Dimensions</b>	Float 2650 x 1450 mm Overall Length 12090 mm
<b>Construction</b>	Rotationally molded Polyethylene, foam filled float + AISI 316L Stainless steel
<b>Instrument case</b>	Aluminum
<b>Weight in air</b>	1995 Kg
<b>Operational Temperature</b>	-4°C +60°C (standard)
<b>Extended Operational Temperature</b>	-20°C +70°C (optional)
<b>Operational</b>	Beaufort Extended Scale: 14 (Tropical Cyclones)



STANDARD FEATURES	
<b>CPU</b>	16 or 32 bit Ram 1024 Kb Very low power consumption
<b>Telemetry</b>	2 x Spread Spectrum Acoustic Modems <ul style="list-style-type: none"> <li>• Acoustic link max 8,500 bps</li> <li>• Operating Frequency: 12.75 to 21.25 KHz</li> </ul> 1 x WIFI (to be used during commissioning and maintenance)
<b>Satellite</b>	2 x Inmarsat- mini C or 1 Iridium + 1 Inmarsat mini-C Option: Beidou or Insat GPS 12 channels for buoy tracking
<b>Datalogger</b>	NVRAM - 32 GB
<b>Power</b>	4 x 50 Watt solar panels 4 x 110 Ah Gel batteries
<b>Navigation Aids</b>	Obstruction light 3-5 NM Radar Reflector 10 m <sup>2</sup> equiv.
<i>Specifications can change without notice</i>	

MKIII ETD – Easy to Deploy	
<b>Dimensions</b>	Float 2650 x 1450 mm Overall Length 4000 mm
<b>Weight in air</b>	1850 Kg
<b>Operational Temperature</b>	-4°C +60°C (standard)
<b>Operational</b>	Beaufort Scale: 10
<b>Power</b>	Lithium battery pack