güralp

ORCUS

CABLED, REAL-TIME, MULTIDISCIPLINARY OCEAN BOTTOM OBSERVATORY WITH SEISMOMETER AND ACCELEROMETER

A multidisciplinary observatory for real-time monitoring of offshore seismic events and other environmental parameters.

KEY FEATURES

> Titanium sphere housing
> Instrumented with a 3T seismometer, a Fortis accelerometer and choice of Affinity or Minimus+ digitiser
> Suitable for depths of up to 6000 m (19,685 ft)
> Robust self-levelling system (Gimbals)
> Includes pressure, temperature and current sensors with capacity for two additional environmental sensors

APPLICATIONS

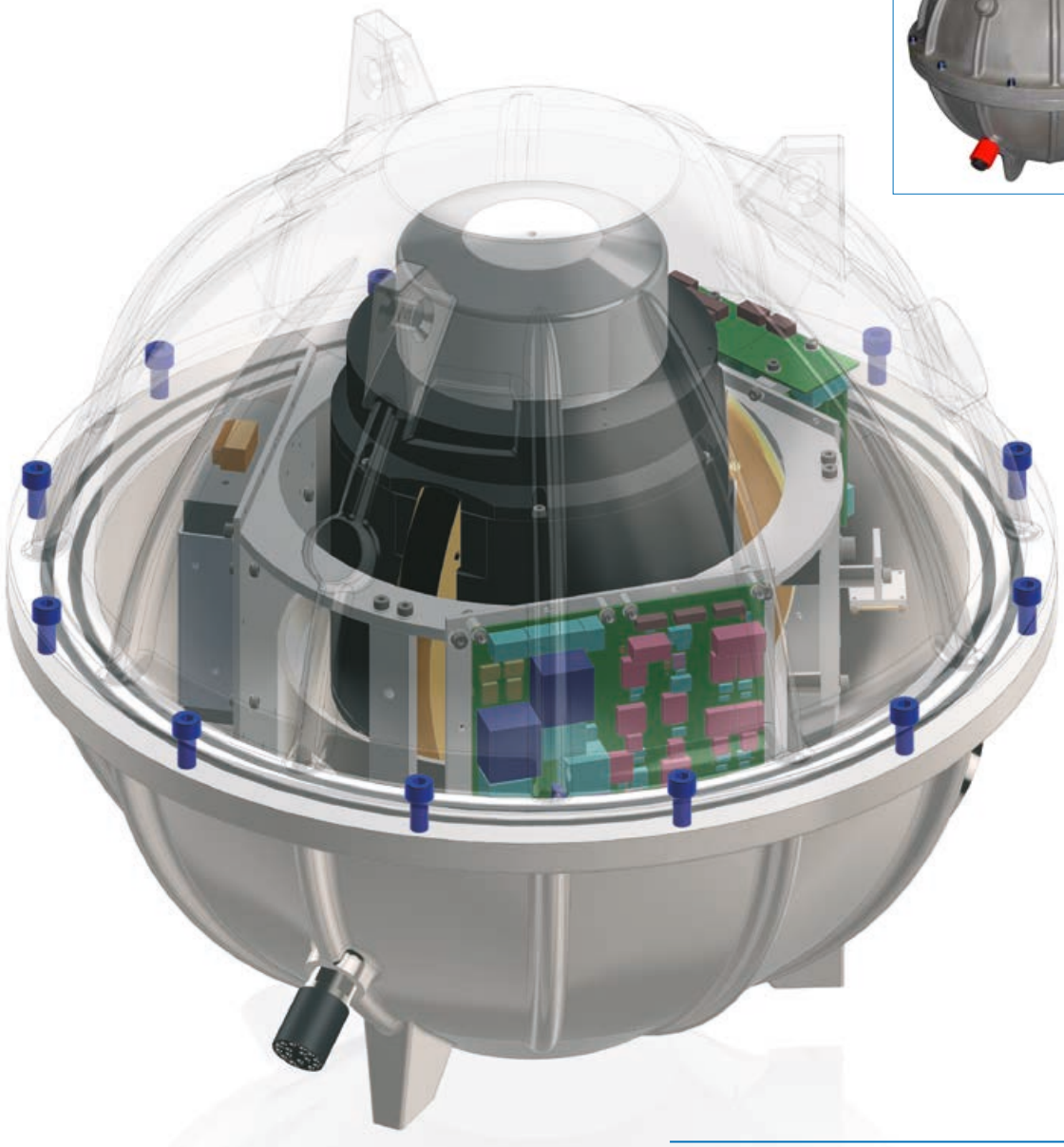
> Permanent ocean observatory
> Earthquake and Tsunami Early Warning systems
> Long-term reservoir monitoring

Orcus

The Orcus is suitable for depths of up to 6000 m or 19,685 ft and is suitable for cable-to-shore or cable-to-buoy systems for real-time data streaming.

DIMENSIONS

NOMINAL OUTER DIAMETER ACROSS THE EQUATOR: 456 MM
HEIGHT: 429 MM



Above: CAD diagram of the Güralp Orcus Ocean Bottom Seismometer

A multidisciplinary observatory for real-time monitoring of offshore seismic events and other environmental parameters.

The Orcus houses a 3T broadband seismometer, a Fortis accelerometer and your preferred selection of either an Affinity or a Minimus+ data acquisition system.

Affinity is an ultra-low-noise, 31-bit resolution, Linux-powered unit that supports Elliptic Curve Digital Signature Algorithm (ECDSA) scheme data authentication.

Minimus+ is an advanced 'smart' 24-bit digitiser that offers advanced networking capabilities and access to instrument state of health. Industry standard triggering algorithsm (STA/LTA) combined with ultra-low-latency processing makes this the ideal choice for Earthquake Early Warning applications.

The instrumentation is enclosed within a titanium sphere rated for deployment at up to 6000 m depth.

The system provides inputs for two additional environmental sensors (e.g. long period hydrophones) and one sensor with serial output.

The unique hybrid design allows for simultaneous monitoring of both weak or distant seismic events, and near-field, high intensity shaking, in a single system.

The innovative spherical shape of the casing protects the instrument at high pressures, and an underlying metal plate ensures optimum ground coupling.

For areas where trawling is prevalent, an optional concrete dome can be supplied that both reduces noise and protects against disturbance. See image below.

Key features

- Titanium sphere housing containing the seismometer, accelerometer and digitiser
- 3T broadband triaxial seismometer
- Fortis force-feedback triaxial accelerometer
- Select either the Affinity or Minimus+ for data acquisition
- Depth up to 6000 m (19,685 ft)
- Robust self-levelling system (Gimbals)
- Heading and tilt sensors
- Optional additional sensors: Hydrophone, pressure sensor, current meter
- Timing synchronised with NTP or PTP protocols
- Auxiliary Ethernet and power output
- Ethernet or fibre optic communications for real-time data streaming
- Optional concrete dome to reduce noise and protect against trawling
- Range of mating connectors available
- Customer power solutions available

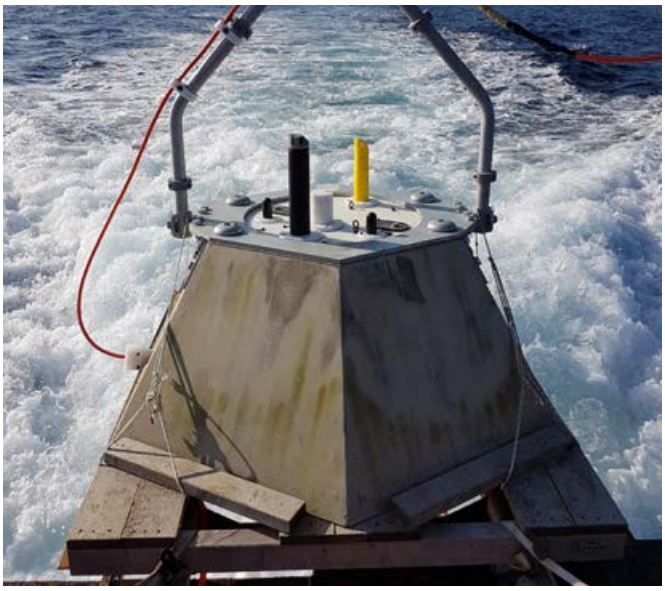
Applications

> Permanent ocean observatory

> Earthquake and Tsunami Early Warning systems

> Long-term reservoir monitoring

> Plate tectonic studies



Right: An optional concrete dome reduces noise and protects against disturbance

Orcus

CABLED OCEAN BOTTOM SEISMOMETER

SPECIFICATIONS

OBS SYSTEM PHYSICAL CHARACTERISTICS	
Sphere casing	Titanium - nominal gauge of the area with no ribs: 10 mm
Sphere dimensions	Nominal outer diameter across the equator: 456 mm Height: 429 mm
Levelling system	Gimballed (± 26°)
Deployment depth	Up to 6000 m
Sensor Orientation	Compass, tiltmeter
Connectors	SubConn Circular Series (rated 6000 m) Hybrid connector with copper and fibre optics (rated 6000 m). Other options available.
Weight with ballast ring and 3 × anodes*	In air: 97.9 Kg Displacement: 45.0 L / 46.1 Kg In water: 51.8 Kg *Actual weight will depend on final specification
BROADBAND SEISMOMETER: 3T	
Configuration / Topology	Triaxial orthogonal (ZNE)
Frequency response	120 seconds (0.008 Hz) - 50 Hz (option of 360 s (0.0028 Hz) to 50 Hz)
Output sensitivity	1500 V/ms^{-1} (2 x 750 V/ms^{-1}) differential standard output (full-scale clip level of 13 mm/s) Other options available
Sensor dynamic range	167 dB at 1 Hz
Self noise below NLNM (New Low Noise Model; Peterson, 1993, USGS)	Crosses the long-period at 166 s (0.006 Hz) and remains below the high frequency limit of the NLNM at 10 Hz
STRONG MOTION ACCELEROMETER: Fortis	
Configuration / Topology	Triaxial orthogonal (ZNE)
Frequency response	DC to 100 Hz
Sensitivity	±2g, other options available
Self-noise below NHNM	> 0.6 Hz (< 17 seconds)
Self-noise below AHNM	DC to 100 Hz
Self-noise below ALNM	0.8 to 45 Hz
Dynamic range	> 160 dB

OPTIONS	
Additional sensors	Hydrophone, pressure sensor, current meter
DIGITISER OPTION: AFFINITY	
Resolution	31-bit ADC
Channels	8 primary differential 40 V peak-to-peak (± 20 V). 16 multiplexed single-ended environmental channels
Dynamic range	138 dB at 100 sps
Sample rate	4000 sps to 1 sps
Timing	Absolute time provided by NTP or PTP
Operating system	Platinum (Linux based)
Seismic Network Protocols	Scream! (GCF), GDI-link, CD1.0/1.1, SEEDlink and others
DIGITISER OPTION: MINIMUS+	
Resolution	24-bit ADC
Channels	8 primary differential 40 V peak-to-peak (± 20 V). 6 secondary analogue channels for sensor mass positions, two internal calibration channels
Dynamic range	142 dB at 100 sps
Sample rate	1 sample per hour up to 5000 samples per second for primary channels, user-selectable Multiple independent data streams at different sample rates for all channels (transmission and recording) Up to 500 samples per second for environmental channels
Timing	PTP (Precision Time Protocol) or NMEA/PPS
Operating system	Windows and Linux compatible
Seismic Network Protocols	Streaming: GCF (Scream!), GDI-link1 and SEEDlink[1] ([1]metadata sent in RESP, StationXML and dataless SEED file formats) Recording: miniSEED (metadata stored in dataless SEED format)

Güralp Systems Limited
Midas House
Calleva Park
Aldermaston
Reading
RG7 8EA
United Kingdom

T +44 118 981 9056
F +44 118 981 9943
E sales@guralp.com

www.guralp.com

DAS-ORC-0001 Issue D