Single Channel or Multi Channel Underwater Acoustic Recorder
TECHNICAL DATASHEET

FEATURES

- Up to 512 kSPS @ 24 Bit
- 24 or 16 Bit sampling resolution
- TCVCXO based reference clock for long term stability. Optional CSAC clock source.
- Up to 4-Channel synchronized recording with full sampling rate and sampling resolution
- Programmable input amplifier and recording schedule
- Up to 36 TB Storage
- Rated up to 6000 m depth
- Magnet operated power switch
- Active or passive hydrophones possible
- For use with lithium D-size (LR20) primary cells, integrated undervoltage protection
- EIA-232 (RS-232) for configuration and interfacing
- Integrated pressure relief valve
- Live ethernet audio streaming
- OEM variant on request
- PPS time synchronisation to GPS source
- Pressure tested according to API 17F and delivered with test protocol & pressure test certificate
- Calibration certificate for input signals

APPLICATIONS

- Marine biology and environmental observation
- Underwater noise monitoring
- Leakage monitoring

DEFAULT HYDROPHONES

- Neptune Sonar T437 (D/60 variant)
- HIGH TECH, INC. HTI-99-UHF
- HIGH TECH, INC. HTI-96-MIN exportable

DESCRIPTION

The Sono.Vault **SubMAReS** (**Sub**bsea **M**odular **A**coustic **Re**cording **S**ystem) is a highly configurable, low power acoustic recorder, capable of recording one hydrophone or synchronous recording of multiple hydrophones. The integrated battery container allows continuous long-term recordings, which are further extendable with additional external battery containers. The base recording system includes up to 4 TB storage, which can be extended by additional storage boards to support long-term deployments. The Sono.Vault features an internal pressure sensor for vacuum testing and an accelerometer. The serial interface can be used to communicate with the unit, with external devices or to sample additional connected sensors.

RECORDING CHARACTERISTICS

Available sampling rates (kSPS)	4, 6, 6.4, 8, 12, 12.8, 16, 24, 25.6, 32, 48, 51.2, 64, 96, 128, 192, 256, 384, 512
Sampling resolution	16 bit, 24 bit
Maximum -3dB frequency range (without hydrophone)	2 Hz to 230 kHz
Selectable gain (V/V) Selectable gain (dB)	1, 2, 4, 8, 16, 32, 64 0, 6, 12, 18, 24, 30, 36
Recording format	WAV
Maximum SPL With HTI-99-UHF (active, preamp gain 40dB, selectable gain setting 0dB) With HTI-96-MIN (active, preamp gain 30dB, selectable gain setting 0dB) With Neptune Sonar T437 (passive[1], selectable gain setting 0dB)	 169 dB re µPa 170 dB re µPa 174 dB re µPa

Table 1: Acoustic recording characteristics

INPUT SIGNAL CHARACTERISTICS

	Active Signal Input	Passive Signal Input
Peak input voltage (Peak-Peak, selectable gain 0dB)	2.5 Vpp	255 mVpp
Peak input voltage (RMS, selectable gain 0dB)	884 mVrms	90 mVrms

Table 2: Input signal characteristics

ELECTRICAL CHARACTERISTICS

	MIN	MAX	UNIT
Supply voltage (Internal electronics)	6.5	50	V
Quiescent current (shutdown)		<0.1	µA
Internal pressure sensor range	0.03	1.25	bar
Internal pressure sensor accuracy		± 0.3	mbar
Internal temperature sensor range	-40	85	℃
Internal temperature sensor accuracy		± 0.5	℃

Table 3: Electrical characteristics

ENVIRONMENTAL CONDITIONS

	MIN	MAX	UNIT
Operating water temperature	-5	40	℃
Storage temperature	-40	60	℃

Table 4: Environmental characteristics

[1] passive input features a permanent 20.9dB gain before the additional selectable gain

EXTERNAL PRESSURE SENSOR

The SubMAReS can be ordered with an external pressure and temperature sensor.

	MIN	MAX	UNIT
External pressure sensor range (absolute)			
Shallow water	0	30	bar
Deep water	0	600	bar
External pressure sensor accuracy			
Shallow water		±0.15	%FS
Deep water		±0.25	%FS
External temperature sensor range	-10	80	℃
External temperature sensor accuracy		±2	℃

Table 5: Optional pressure & temperature sensor characteristics

BATTERY ENDURANCE

The Sono.Vault SubMAReS can record over 2 years with its biggest battery configuration.
Figure 1 shows the recording endurance in days when using different possible sample rates. The storage limit marks the line when the storage fills up at that specified sample rate with a maximum storage of 36 TB. The available storage endurance can be extended by 33% by choosing to record at 16 bit resolution, the battery endurance will not be affected. The shallow water (SW.POM) housing supports only battery configuration 7S8P, see chapter HOUSINGS & BATTERY CONTAINERS.

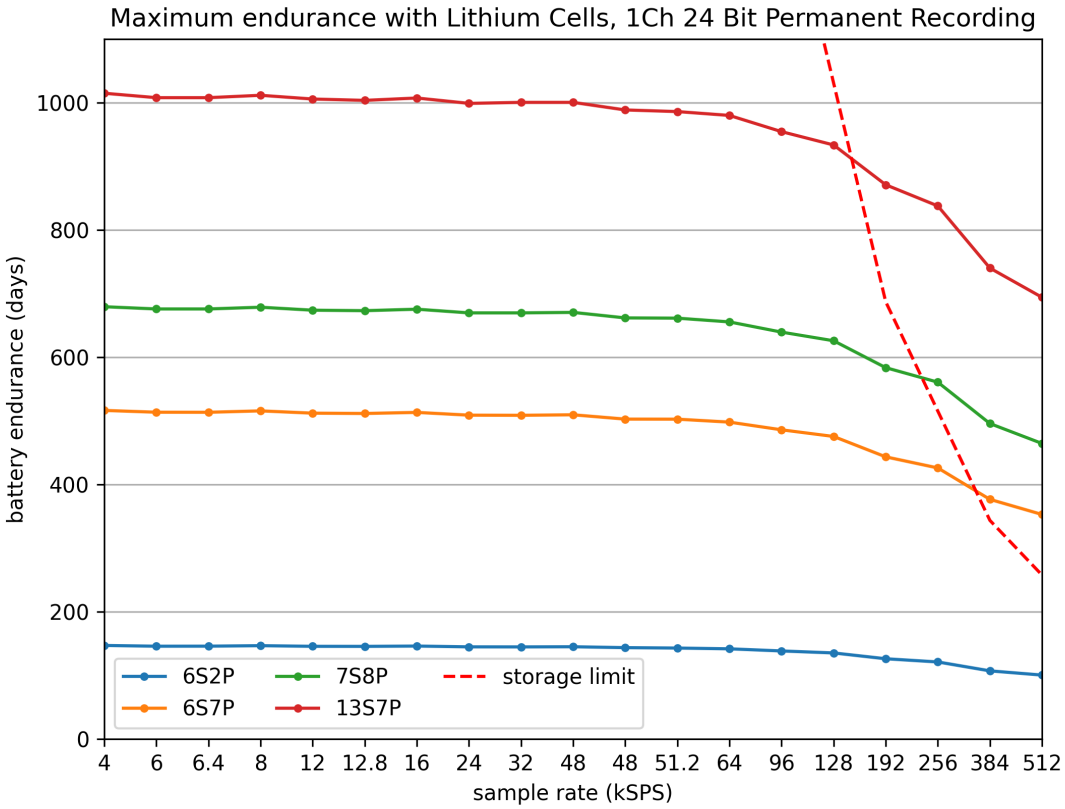


Figure 1: Maximum Endurance with SAFT LS33600 Lithium primary cells and a single passive hydrophone at 24 bit sampling resolution

CONFIGURATION OPTIONS

The Sono.Vault SubMAReS is a highly modular system with extendable storage and diverse housings with integrated battery containers. The following sections guide through all configuraiton options

RECORDING SYSTEM

The Sono.Vault SubMAReS can be ordered in a single or in a multi-channel variant with four initial storage card slots. This can be extended by up to two storage modules. Each storage module can house up to 16 storage cards featuring each up to 1 TB of storage space. Storage cards with smaller storage capacities are generally more energy efficient, resulting in a more energy efficient recording system. It is recommended to use smaller storage cards for the same storage size than fewer high-capacity cards.

Storage Modules	Storage Card slots	Max Capacity
0	4	4 TB
1	20	20 TB
2	36	36 TB

Table 6: Recording storage configurations

HOUSINGS & BATTERY CONTAINERS

The dimensions of the housing is mostly dependent on the sizing of the internal battery container. All containers are designed for use with LR20 D-size battery cells. The battery container configuration is defined by the amount of cells in series, which will define the maximum system voltage, and how many strings are in parallel. For example a container in the 6S7P variant will have 7 strings of batteries in parallel with each string containing 6 batteries, resulting in a total amount of 42 battery cells. All housings feature a magnet operated power switch. Housing design is performed according to AD2000 methodology, every housing is pressure tested according to API 17F with pressure test certificate issued.

Housing	Battery Configuration	Depth Rating	Material
DW.TH 0.5	6S2P	6000 m	Titanium Grade 5
DW.TH Standard	6S7P	6000 m	Titanium Grade 5
DW.TH 2.0	13S7P	3000 m	Titanium Grade 5
SW.POM	7S8P	200 m	POM-C

Table 7: Housing configurations

HYDROPHONES

Please note that hydrophones other than Neptune Sonar T437 may be export controlled. The T437 is part of the recording system and may not be sold separately.
Each Sono.Vault will be delivered with the manufacturer's calibration sheet specific for each hydrophone.
Pistonphone adapters for most hydrophone models are available on request.
All passive inputs feature a permanent 20.9 dB pre-amplifier before the software configurable amplifier.

Hydrophone	Type	Frequency range	Depth Rating
Neptune Sonar T437 (D/60 variant)	Passive	10Hz-70kHz	6000m
HIGH TECH, INC. HTI-99-UHF	Active	2Hz-250kHz	2000m
HIGH TECH, INC. HTI-96-MIN exportable	Active	2Hz-30kHz	500m

Table 8: Hydrophone selection

Neptune Sonar T437 specifications

The Neptune Sonar T437 is a custom development for DEVELOGIC for use in the Sono.Vault acoustic recorder series with the following typical sensitiviy curve.

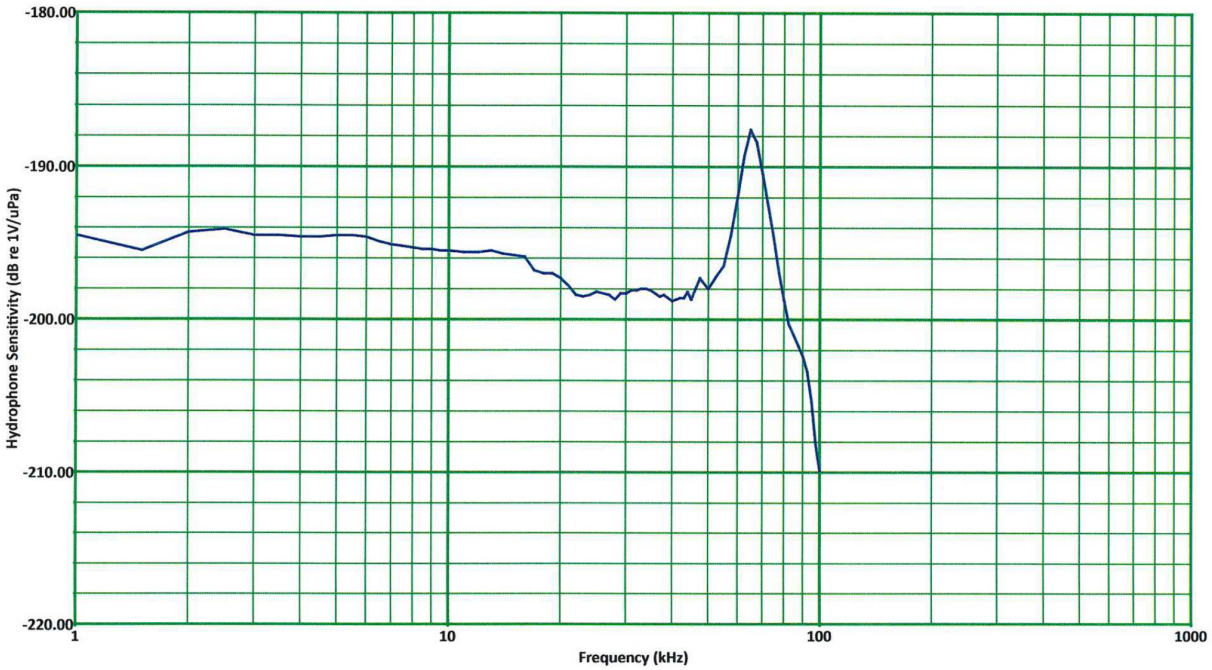
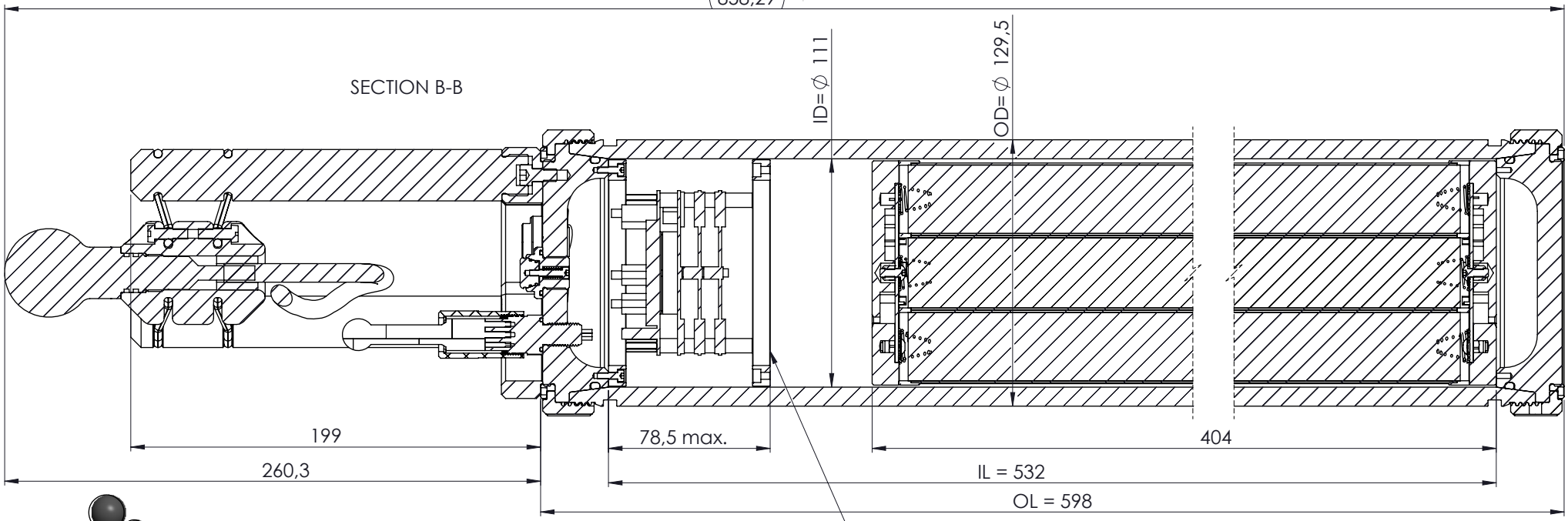
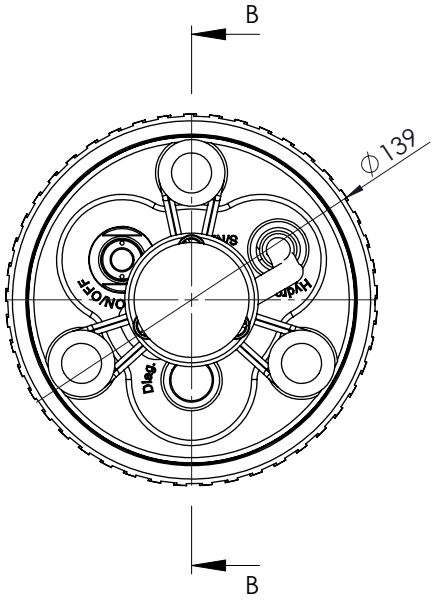


Figure 2: Neptune T437 hydrophone sensitivity plot





Notes:

- Displacement: 8,6L
- No Batteries:
  - Dry Weight: 13,2kg
  - Submerged Weight: 4,6kg
- with x42 typical lithium spiral primary batteries
  - Dry Weight: 17,7kg
  - Submerged Weight: 9,1kg

Rev	Revision note	Name	Date
01	released for assembly		20240904
02	Updated O-rings for front and rear cap		20241024

+0,3 -0,3

THIRD ANGLE PROJECTION

DEVELOGIC SUBSEA TECHNOLOGY

Tolerances ISO 2768-mK

	Date	Name
Drawn by	20241024	heinze
Checked	20250307	taylor
Approved	20250310	nord

Customer:

Project:

Material:

Weight in kg: 17.73

Drawing

1010-A-0013-
Sonovault.Standard_D.60_6000m

Xentral ID

A9000059

A3

Scale: 1:2

STANDARD CONFIGURATIONS

Order Number	Channels	Hydrophones	Housing	Battery config
A9000071	1	Neptune T437	DW.TH 0.5	6S2P
A9000179	1	Neptune T437	DW.TH 0.5	14S1P
A9000059	1	Neptune T437	DW.TH Standard	6S7P
A9000073	1	Neptune T437	DW.TH 2.0	13S7P
A9000074	4	1x Neptune T437[1]	DW.TH Standard	6S7P
A9000062	4	1x Neptune T437[1]	DW.TH 2.0	13S7P
A9000075	1	HTI-99-UHF	DW.TH Standard	6S7P
A9000076	1	HTI-99-UHF	DW.TH 2.0	13S7P
A9000070	1	HTI-99UHF	SW.POM	7S8P
A9000077	1	HTI-96-MIN exportable	SW.POM	7S8P

Table 9: Order numbers for standard configurations

[1] 4 Channel variant does not have an integrated hydrophone mounting to the pressure housing. Additional hydrophones can be ordered separately.

Other combinations and requests are possible, please contact sales@develogic.com for more information.

ACCESSORIES

Order Number	Description
A9000063	Sono.Vault Storage Module
3000241-1	Storage card 1TB
3000039-1	Storage card 512GB
A9000078	Mooring frame for Sono.Vault DW.TH 0.5
A9000052	Mooring frame for Sono.Vault DW.TH Standard
A9000064	Mooring frame for Sono.Vault DW.TH 2.0
A9000079	Mooring frame for Sono.Vault SW.POM
A9000169	Reusable Instrument Case

Table 10: Order numbers for accessories

Revision History

Revision	Date	Author(s)	Description
1	09/24	MSC	Initial Release
2	09/24	MSC	Changed battery configuration for DW.TH Half housing
3	11/24	MSC	Changed Order number for 1ch T437 Standard
4	03/25	MSC	Added Drawing
5	03/25	MSC	Reviewed Document, Formatting and more characteristics
6	05/25	MSC	Added footnote for passive input gain and new variant

IMPRESSUM

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Specifications subject to change without notice.