

SEAL 428 Specifications

GLOBAL ARCHITECTURE

Flexible architecture	<ul style="list-style-type: none"> • Redundant data transmission modes • Data transmission reconfiguration on line failure
Upmost electronics integration	<ul style="list-style-type: none"> • ASICS technology • 24 bit, Sigma /Delta • Individual A/D converter per channel
<ul style="list-style-type: none"> • Active streamers sections with distributed electronics • Multi-boats capability • Fully integrated acquisition system • High redundancy 	

Shipboard Equipment

RECORDING (BASIC CONFIGURATION)

Format	4 byte, SEG-D Rev. 1.0 or 2.1 demultiplexed, 32 bit IEEE, code 8058
Tape media	Up to 6 drives, simultaneous and alternated modes Drive model: 3592
Ethernet media	NFS protocol
Maximum number of streamers	64
Maximum number of seismic channels	32,000 with zero dead time
Maximum recording capacity per streamer (with zero dead time and telemetry redundancy)	<ul style="list-style-type: none"> • 960 channels @ 12.5 m, Typical @ 2 ms* • 480 channels @ 12.5 m, Typical @ 1 ms*
Maximum record length	Unlimited in continuous acquisition mode (depending on server hardware configuration)
Sampling rate	1/2 ms, 1ms, 2 ms, 4 ms
Maximum number of auxiliary channels	60 analog. Unlimited digital auxiliary channels

DCXU-428

Functions	<ul style="list-style-type: none"> • Ethernet connection to the server • Built-in high-voltage converter (power supply to streamer) • Remote or local operations • Connection to Deck safety devices (Emergency stop, warning lights) • Connection to the Streamer through a 2-m Deck cable Adaptor • Propagation of the GPS reference time • Auxiliary pair connection (bird, acoustic, modem, ...) • NAUTILUS® connection
Electrical specifications	<ul style="list-style-type: none"> • Output voltage : from 100 VDC to 600 VDC (limited to 365 VDC by the Seal 428 software) • Output current : Max. 2.5 A • Safety features : Current limitation, High Voltage leakage measurement
Physical specifications	<ul style="list-style-type: none"> • Weight : 18 kg • Length : 580 mm (without the rear panel connectors) • Width : 19" (482.6 mm) • Height : 2U (89 mm)

* minimum compression ratio required : 53 % (the figures depend on signal type, sea and environmental conditions and cannot be predicted)

LCI-428

Functions	<ul style="list-style-type: none"> • Ethernet connection to the server • Receiving navigation message (if using serial communications) • Receiving a physical T0 (pulse) • Low Line port for connecting an auxiliary line (AXCU) • Synchronized with GNSS time server connected to XDEV2 connector.
Physical specifications	<ul style="list-style-type: none"> • Weight : 4.1 kg • Length : 420 mm • Width : 19" (482.6 mm) • Height : 2U (89 mm)

GNSS TIME SERVER

Functions	<ul style="list-style-type: none"> • Acquisition synchronization between streamers. • Synchronization of acquisition and navigation systems in continuous acquisition mode
Physical specifications	<ul style="list-style-type: none"> • Length : 320 mm • Width : 19" (482.6 mm) • Height : 1U (44.5 mm)

DECK CABLES

Length	Up to 100 m
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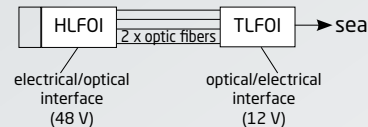
STORAGE AND OPERATING CONDITIONS (SHIPBOARD)

Operating temperature	+5°C to +40°C (41° to 104°F)
Storage temperature	-15°C to +55°C (5° to 131°F)
Operating humidity	10 to 90% relative humidity, non-condensing
Storage humidity	5 to 95% relative humidity Sercel recommends storing the DCXU-428 in dry conditions for about 24 hours before power on

In-Sea Equipment

LEAD-IN CABLE

Functions	<ul style="list-style-type: none"> • Optical data transmission
Physical specifications	<ul style="list-style-type: none"> • Cable Breaking strength : 300 kN ; 470 kN ; 570 kN • Maximum length : 1 900 m



HAU-428

Functions	<ul style="list-style-type: none"> • 50 VDC (\pm 25 VDC) power supply for active channels for the two lines. • Tensile load measurement (0 to 60 kN) • High Voltage Lines and telemetry switches • High Voltage Lines mix
Physical specifications	<ul style="list-style-type: none"> • Weight in sea water : 2.26 kg (4.98 lbs) • Outside diameter : 81 mm • Length : 277 mm • Connectors : standard Seal dia. 70 mm

HAPU-428

Functions	<ul style="list-style-type: none">• 50 VDC (± 25 VDC) power supply for active channels for the two lines.• Tensile load measurement (0 to 60 kN).• High Voltage Lines and telemetry switches.• High Voltage Lines mix.• Factory-configurable Head Buoy Connector pin-out• Head buoy power supply :<ul style="list-style-type: none">- 50 VDC / 32 W or 28 V / 32 W output power- Current measurement- ON/OFF by remote operations
Physical specifications	<ul style="list-style-type: none">• Weight in sea water : 4.46 kg (9.83 lbs)• Width : 165 mm• Length : 277 mm• Connectors : standard Seal dia. 70 mm

LAUM-428

Functions	<ul style="list-style-type: none">• Data pre-processing• Data routing• Power distribution				
Physical specifications	<table border="1"><thead><tr><th>LAUM-428 50 mm</th><th>LAUM-428 70 mm</th></tr></thead><tbody><tr><td><ul style="list-style-type: none">• Weight in sea water : 1.4 kg (3.08 lbs)• Outside diameter: 59.7 mm• Length: 256.5 mm• Connectors : standard Seal dia. 50 mm</td><td><ul style="list-style-type: none">• Weight in sea water : 2.02 kg (4.45 lbs)• Outside diameter: 72.5 mm• Length: 274.5 mm• Connectors : standard Seal dia. 70 mm</td></tr></tbody></table>	LAUM-428 50 mm	LAUM-428 70 mm	<ul style="list-style-type: none">• Weight in sea water : 1.4 kg (3.08 lbs)• Outside diameter: 59.7 mm• Length: 256.5 mm• Connectors : standard Seal dia. 50 mm	<ul style="list-style-type: none">• Weight in sea water : 2.02 kg (4.45 lbs)• Outside diameter: 72.5 mm• Length: 274.5 mm• Connectors : standard Seal dia. 70 mm
LAUM-428 50 mm	LAUM-428 70 mm				
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TAPU-428 & TAPU-428 HVS

Functions	<ul style="list-style-type: none">• Termination of transmission lines• Tail buoy power supply (50V/32W).• Nautilus HV switch function for the TAPU-428 HVS version
Physical specifications	<ul style="list-style-type: none">• Weight in sea water : 1.71 kg (3.77 lbs)• Outside diameter: 59.7 mm• Length: 337.5 mm• Connectors : standard Seal dia. 50 mm

FDU2F/FDU2M

Functions	<ul style="list-style-type: none">• Data transmission with CRC control 24 bits A/D conversion• D/A conversion with programmable bit stream
Full Scale Input Levels	@ G1600: 1.6 V RMS @ G400: 400mV RMS
Offset	0 (digitally zeroed)
High Cut Filter	0.8 FN (linear or minimum phase)
Stop Band Attenuation	> 120 dB (above Nyquist)
Sample Rate	4, 2, 1, 0.5 ms
Word Size	24 bits

PERFORMANCE*

Time Standard	True synchronous system
Noise (3-200 Hz)	@ G1600: 700 nV RMS @ G400: 200 nV RMS
Instant Dynamic Range	124 dB
System Dynamic Range	136 dB
Distortion	-105 dB
Gain Accuracy	<0.1%
Phase Accuracy	20 μ s
CMRR	110 dB

* Typical @ 2 ms

SENTINEL® SD & RD SOLID STREAMERS

Field Digitizing Units (FDUs) Arrangement Functions	2 hydrophone channels per Unit A/D conversion, data digitizing, and tests	
FDUs per active section Spacing	12.5 m spacing 6 (2 FDUs per location) 50 m	6.25 m spacing 12 (2 per location) 25 m
Hydrophones Standard model Nominal capacitance Nominal sensitivity	Sercel Flexible Hydrophone (SFH) or Exportable SFH ⁽¹⁾ 32.5 nF ± 10% @ 20° C -192.9 dB ref to 1 V/μPa ± 1.5 dB (22.65 V/bar) @ 20° C	
Hydrophone Array Cutoff frequency	2 Hz or 3 Hz	
Groups per section Hydrophones per group Group capacitance (nominal) Group sensitivity	12.5 m spacing 12 8 260 nF ± 10% @ 20° C -194.1 dB ref to 1 V/μPa ± 1.0 dB (19.7 V/bar) @ 20° C	6.25 m spacing 24 4 130 nF ± 10% @ 20° C -195.15 dB ref to 1 V/μPa ± 1.0 dB (17.5 V/bar) @ 20° C
Maximum Length⁽²⁾ (without power/telemetry line redundancy, with 950 m lead-in)	<ul style="list-style-type: none"> • 15750 m/1260 channels (2D operation) • 12000 m/ 960 channels (3D operation) 	
Communication Coils	2 or 4	
Physical Specifications Section length Stress member Connector diameter Jacket material	150 m (measured at 6700 Newtons tension) Twaron/Vectran 70 mm or 50 mm Polyurethane 3.5 mm thick (5.2 mm over hydrophones)	
Cable diameter Section weight in air	SD 59.5 mm 419 kg	RD 55.0 mm 362 kg
Environmental Specifications Operating temperature Storage/shipping temperature Maximum operating depth Maximum survival depth	-10° C to +40° C -35° C to +50° C Unrestricted 50 m 250 m (5 days cumulative)	
	Depth restricted 22 m 150 m (5 days cumulative)	

Notes:

(1) For use in depth-restricted streamers

(2) 12.5 m spacing only

ACQUISITION LINE SECTION (ALS)

	ALS	ALS Depth restricted
Field Digitalization Unit (FDU2M) Unit arrangement Unit spacing (Typical) Functions	one for two channels 25 m A/D conversion, data digitizing, tests	one for two channels 25 m A/D conversion, data digitizing, tests
Hydrophone specifications Standard model Nominal capacitance Nominal sensitivity	SLH 20 or Geopoint 16 nF @ 20°C ± 10% -194 dB re 1 V/μPa ± 1,5 dB (20 V/bar) @ 20°C	Exportable SLH 20 or Geopoint 16 nF @ 20°C ± 10% -194 dB re 1 V/μPa ± 1,5 dB (20 V/bar) @ 20°C
Hydrophones array arrangement (*) (Typical) Hydrophones per group Group capacitance Group sensitivity (electronics included) Analog filter low-cut frequency	12.5 m 16 256 nF @ 20°C 17.4V/bar @ 20°C 3 Hz	12.5 m 16 256 nF @ 20°C 17.4V/bar @ 20°C 3 Hz
Maximum length without power line nor telemetry line redundancy and with a 950 m long lead in	12000 m / 960 ch	11250 m / 900 ch
Physical specifications Nominal section length Cable diameter Stress members Groups per section(*) Typical group spacing(*) Jacket	150 m 50 mm (1.97 in) Two Vectran ropes 12 12.5 m Polyurethane, 3.3 mm wall	150 m 52 mm (2.05 in) Two Vectran ropes 12 12.5 m Polyurethane, 3.3 mm wall
Environmental specifications Operating temperature Storage temperature Maximum operating depth Maximum survival depth Filled section weight in air	-10° to +40°C -35° to +60°C 30 m 250 m 320 kg	-10° to +40°C -35° to +60°C 17 m 150 m 325 kg
Mechanical specifications(**) Terminated UTS Operating tension Streamer length @ 5 knots Ballast fluid capacity Drag of a 12 km Streamer Maximum Retrieval Tension	> 100 kN up to 30 kN up to 12 km 200 l 30 kN @ 5 knots < 20 kN	> 100 kN up to 30 kN up to 12 km 200 l 30 kN @ 5 knots < 20 kN

(*) Other configurations available on request

(**) See operational model for more details

Note: Sercel reserves the right to change its specifications without prior notice.
All specifications are typical at 20°C

Sercel - France

16 rue de Bel Air
B.P. 30439 - 44474 CARQUEFOU Cedex
Téléphone: (33) 2 40 30 11 81
Fax: (33) 2 40 30 19 48
E-mail: sales.nantes@sercel.com
SAS au capital de 2 000 000 €
Siège Social: 16 rue de Bel Air - 44470 CARQUEFOU
378.040.497 R.C.S. Nantes Code APE 2651B

Sercel Inc. - U.S.A.

17200 Park Row
Houston, Texas 77084
Telephone: (1) 281 492 6688
Fax: (1) 281 579 7505
E-mail: sales.houston@sercel.com

www.sercel.com
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Ahead of the CurveSM