

SeaRay®



To address the growing demands of the geophysical industry for ever larger channel counts and greater layout flexibility, Sercel has expanded upon the well known 408UL system to include even greater capabilities and ownership value in the 428XL acquisition system with all new hardware and software specifically designed to meet these needs. Sercel's SeaRay® systems are new members of 400 series family specifically designed for redeployable four-component seabed seismic acquisition.

Designed to support most of today OBC operations down to 300 meters (500 meters with specific handling care), SeaRay® has also been designed with a smaller and lighter cable option capable of the same operations in water depths of less than 100 meters, where smaller and shallower draft vessels are commonly deployed.

The omni-directional, 3-component 428XL Digital Sensor Unit (DSU) that is the heart of SeaRay® provides superior sensor coupling and vector fidelity, and is insensitive to any tilt of the sensor package on the sea floor. With a system capacity of up to 100,000 seismic channels, proven hardware designs and a system architecture that incorporates built-in multi-route system power and data telemetry redundancy; SeaRay® provides unparalleled flexibility, efficiency, and reliability in the field.

SEARAY®



***SeaRay® has established
new standards of
operational flexibility,
efficiency and
productivity, and
reliability for seabed
seismic acquisition.***

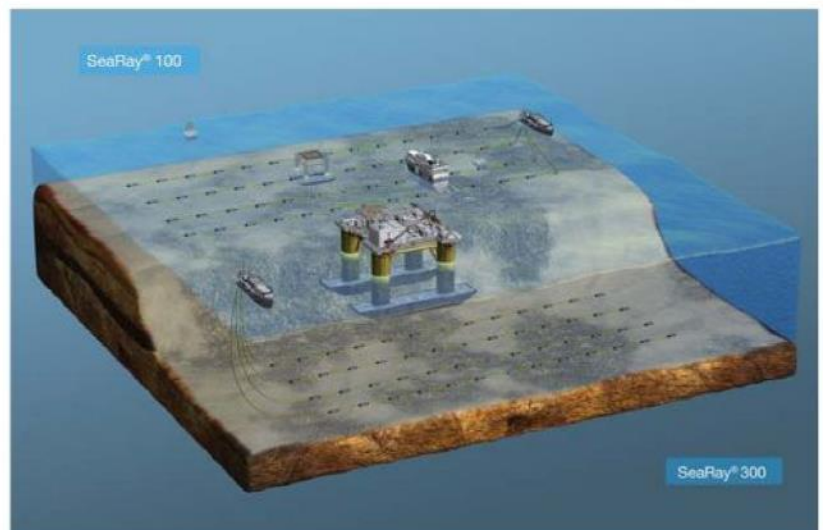
SEARAY® SYSTEM

As a member of the 428XL family, SeaRay® benefits from the most advanced software technology. To support the high system channel counts, the system application runs on a 64-bit Linux platform. The java-based user interface, however, may be run on either Windows or Linux. The Client/Server architecture allows the system to be fully accessible through the customer's intranet or via a secured internet login for monitoring purposes. This architecture also allows for the complete control of the seismic acquisition system remotely. For example, directly from the seismic source vessel.

SEARAY® SENSOR PACKAGE

The 428XL MEMS (Micro Electro Mechanical System) sensor technology used in SeaRay® brings broad bandwidth, low distortion and extended dynamic range to seabed seismic acquisition. Three orthogonally orientated, digital accelerometers (MEMS), and one hydrophone are integrated to form a single four-component sensor. These digital accelerometers are highly reliable sensors, and are independent of orientation because with each accelerometer there is a fully integrated tilt measurement.

In SeaRay®, each four-component sensor is packaged inside a customized aluminum-bronze casting, called a Flatpack. This protects the sensor and wiring from the operating environment and provides superior mechanical coupling of the sensor to the seabed. The flat profile and the weight of the Flatpack negates the potential to move or roll from its desired location once placed in-situ. Holes in the Flatpack body permit free flooding to ensure acoustic coupling of the hydrophone, but these also improve the mechanical coupling of the Flatpack in soft sands and soils.



From less than 100 meters of water to 500 meters of water

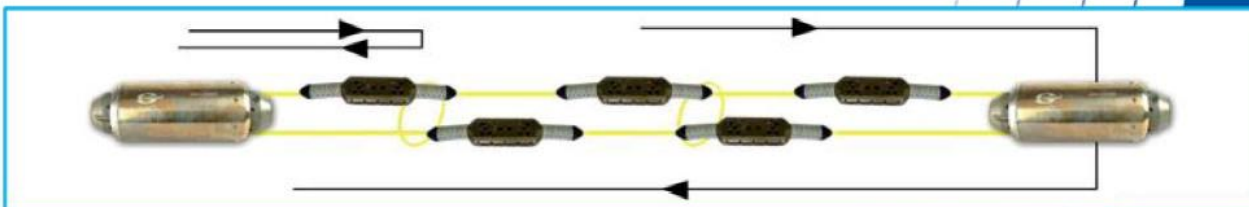
SEARAY® CABLE DESIGN

SeaRay®'s small diameter cable design is light enough for hand deployment and retrieval in shallow water and robust enough for traditional OBC handling systems. This flexibility makes it possible to utilize a smaller surface vessel or a slightly larger multi-purpose vessel with more cable storage capacity, whichever is the best fit operationally. No other seabed systems are as lightweight and flexible yet so tough, durable, and reliable. This is the result of more than ten years of direct experience in ocean-bottom cable design and operations, the latest in materials science, sophisticated operational and mechanical modeling, and the most rigorous testing regimen ever. As a result, SeaRay® 100 may be a good alternative to other shallow water system with no batteries to manage and light on board equipment.



On the other hand SeaRay® 300 takes benefits of a tougher design for operations in deeper area with the flexibility provided by the 400 series architecture.

The Sercel mechanical testing laboratory is the most extensive in the industry with custom equipment to test every of a SeaRay® cable must survive and be fully operational after the equivalent of a lifetime of use under maximum conditions. Every single specification and design parameter is tested. Tests include temperature cycling, pressure cycling, accelerated lifetime aging, cyclical tensile testing, fatigue testing over minimum bend radius at maximum load, waterblocking tests, cable deployment and retrieval with squirter testing, and many more. SeaRay® systems are designed and tested to assure reliable operation in the field. SeaRay® has established new standards of operational flexibility, efficiency and productivity, and reliability for seabed seismic acquisition.



One line failure tolerance between each Line Unit

SPECIFICATIONS

CENTRAL UNIT ARCHITECTURE

Based on 428 technology: client-server architecture with a client that can remotely access server through an Ethernet network, an intranet or the web

Server	PC running Linux Hed Hat WS4
Client	PC running Windows 2000, XP or Linux
LCI-428	2U 19" rack mountable unit, used to manage up to 2500 Receiver Points (RP) real time @ 2 ms
BCXU-428	2U 19" rack mountable unit, used for cable interface and high voltage generation (DC voltage adjustable up to 600 V). A BCXU-428 is able to manage up to 400 Receiver Points.
Maximum Line Lengths	19500 m @ 50 m, without full redundancy 10000 m @ 50 m, with full redundancy 10000 m @ 25 m, without full redundancy 5000 m @ 25 m, with full redundancy

SENSOR UNIT - AQDSU

GENERAL

Sensor Components:	3 Omni-tilt Digital Accelerometer and 1 Hydrophone
Receiver Point Spacing	User Custom-built: <ul style="list-style-type: none">• Up to 50 m without equalizer option• Up to 200 m with equalizer option
Sample Rates	4, 2, 1, 0.5, 0.25 ms
Word Size	24 bits
High-cut Filter	0.8 FN (linear or minimum phase)
Time Standard	True synchronous system
Phase Accuracy	20 μ s

DIGITAL ACCELEROMETER CHANNELS

Type	Omni-tilt DSU-428
Full Scale	5 m/s ²
Tilt Max Value	+/- 180°
Bandwidth	0 – 400 Hz (up to 1600 Hz with degraded specifications)
Distortion	-90 dB
Amplitude Calibration Accuracy	+/- 0.25%
Orthogonality Calibration Accuracy	+/- 0.25°

HYDROPHONE CHANNEL

Type	Charge-coupled piezoelectric cylinders
Bandwidth	3 – 1600 Hz
Electronic	
Instant dynamic range	124 dB
System dynamic range	136 dB
Distortion	-105 dB
CMRR	100 dB
Gain Accuracy	< 0.1%

PHYSICAL

Sensor Package	Flatpack
Maximum Outside Width	174 mm
Maximum Outside Height	71 mm
Stiff Length	392 mm
Weight in Air	14.15 kg
Weight in Seawater	10.88 kg
Operating Temperature	0 °C to +40 °C (-15 °C to +40 °C with degraded performances)
Storage Temperature	-40 °C to +60 °C

BULK CABLE

	SeaRay® 100	SeaRay® 300
Operating Depth	100 m**	300 m***
Cable Outside Diameter	21 mm	28.5 mm
Weight in Air	560 kg/km	786 kg/km
Weight in Seawater	205 kg/km	212 kg/km
Operational Linear Tension	4.5 kN	16.5 kN
Breaking Tension	22 kN	66 kN

* real time typical @ 2 ms sampling rate

** 150 m with specific handling care

*** 500 m with specific handling care