

**DSU3-428**

**DIGITAL SENSOR UNITS**



Ahead of the Curve<sup>SM</sup>

## DSU3-428

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The 428XL offers all new hardware and software which is specifically designed to address the growing demands of the geophysical industry for even larger channel counts, high performance digital receivers, and greater layout flexibility. With the introduction of the 428XL, the DSU3-428 has been introduced with enhanced capabilities. The Digital Sensor Unit (DSU) enhancements include: insensitivity to tilt, reduced power consumption and redesigned packaging to move sensors deeper into the ground when planted, lowering the profile of the DSU3-428 and improving coupling.

# DSU (DIGITAL SE

## **THREE COMPONENT DIGITAL SENSORS**

The DSU3-428 is an integrated package made up of station electronics and three digital accelerometers based on MEMS (Micro-machined Electro-Mechanical Sensor) technology with low power consumption and full functionality at any tilt angle. The DSU has proven to be high-performance, power-efficient and reliable in all operations.

The DSU3 digitizes data from a single ground station and its three orthogonal components allow it to accurately record the ground motion on all three axes. This is a significant improvement over traditional analog P-wave geophones that only record the vertical component. Utilization of the full seismic wave field, when accurately recorded and processed, enhances the seismic interpretation and reservoir characterization to help reduce F & D costs.

## **EXCELLENT COMPATIBILITY**

Links of DSUs are designed to be used in conjunction with the 400 Series family of field systems. Links of FDUs with analog sensors and DSUs with digital accelerometers may be mixed within the same recording spread under the control of a single central unit, and without additional specific hardware. The DSU is fully supported by all software functions and telemetry flexibility in the 428XL.

## **FULL SENSOR TESTABILITY**

The DSU3, as is the case with all electronics in the 400 Series family, is fully field testable. Thanks to the built-in accelerometer, the sensor can be tested for distortion, gain, phase accuracy and crosstalk as well as for gravity, noise and tilt. This full set of tests can be cycled automatically and on a continuous basis throughout the production day thus ensuring the highest quality signal on every shot. Results are recorded and time stamped on the header information of the seismic records.

## **APPLICATIONS OF DSU TECHNOLOGY**

Field proven to great effect worldwide in reservoir monitoring projects, DSUs are providing information with regard to the structure and fracture characteristics of producing fields that were not available with the previous generations of equipment. Existing fields believed to be exhausted can once again become strong producers through new generations of full wave digital sensors providing improved characterization, higher resolution images and as a result, greater recovery. No matter the difficulty of the terrain to image or the challenge of the target to reach; the high fidelity and broader bandwidth achieved from DSU point receivers, recording the full range of compressional and shear wave motion, allow for a higher quality image at a lower acquisition cost.

For 50 years Sercel has been at the cutting-edge of seismic technology and innovation. Whether the job calls for acquisition systems, digital sensors, vibrators or associated QC software, Sercel equipment is fully integrated to form a complete seismic acquisition package. Designed to integrate with future evolutions, these systems will fulfill all of today's needs, and will continue to meet them far into the future.

As customers demand more accurate, higher-resolution data, make sure you're Ahead of the Curve with the best possible system in the industry.

Omni-directional sensors, minimal battery use, and ease of deployment all result in highly productive seismic field operations.

## GEOPHYSICAL BENEFITS

- Excellent vector fidelity
- Broad bandwidth
- Shear wave structural imaging
  - Structures below gas clouds
- Improved reservoir characterization
  - Lithology delineation
  - Discriminate lithology & saturation effects
  - Monitor fluid variations (pressure, saturation)
  - Open fracture trends & density
- High frequency preservation: no intra-array statics
- Noise attenuation potential with polarization filtering
  - no unaliased ground-roll required
- Isotropic recording: no array filtering

## OPERATIONAL BENEFITS

- Low system weight
- Omni-tilt
- Better plants with improved coupling since leveling is not required
- Reduced effort field deployment
- Fewer connections required
- Reduced possibility of wiring errors
- Reduced power consumption
- Sensor quality control

## DSU3-428

Functions:	<ul style="list-style-type: none"><li>• Acceleration measurement and data transmission with CRC control</li><li>• 24 bits digital acquisition</li></ul>
Full scale:	5 m/s <sup>2</sup>
Tilt max value:	+/- 180°
Noise (10-200Hz):	0.4 $\mu\text{m/s}^2/\sqrt{\text{Hz}}$
System dynamic range:	120 dB @ 4 ms
Sampling rate:	4, 2, 1, 0.5, 0.25 ms
Bandwidth:	0 - 800 Hz (up to 1600 Hz with degraded specifications)
Distortion:	-90 dB
Amplitude calibration accuracy:	+/- 0.25%
Orthogonality calibration accuracy:	+/- 0.25%
Power consumption:	285 mW @ 8 Mbps, 300 mW @ 16 Mbps
Static sensor tests:	Tilt, gravity, noise
Dynamic sensor tests:	Distortion, gain, phase
Dimensions (HxWxD):	159.2 x 70 x 194 mm (6.2 x 2.7 x 7.6 in.)
Weight:	0.43 kg (0.9 lbs.)
Operating temperatures:	-40° to +70° C
Storage temperatures:	-40° to +70° C
Water depth:	15 m (for WPSR) 1 m (for ST+)

# DSU 3-428

## NEW FEATURES AND BENEFITS



*The DSU has proven to be high-performance, power-efficient and reliable in all operations.*

### OMNI-TILT

New features of the DSU3-428 include insensitivity to tilt, improved packaging, and reduced power consumption.

The orthogonally configured digital sensors inside the DSU3 make it possible for them to be deployed in snow, desert, on hills, or wherever at any tilt angle. The sensors detect the effects of earth's gravitational pull on each sensor allowing them to identify their orientation in relation to a vertical plane, and make the appropriate corrections.

### REDESIGNED PACKAGING

The packaging of the DSU3-428 has been redesigned to move the sensors deeper into the ground when planted. Lowering the profile of the unit provides greater protection from surface wind noise susceptibility and optimal ground coupling.

### REDUCED POWER NEEDS

Very low power consumption (as low as 265mW for the 3 sensors and the associated data transmission and test circuitry package) allows seamless deployment of thousands of units and fewer trips back to the field during operations for battery maintenance and recharging. Efficient power management with only one battery required for every 40 3C stations in the ground improves crew logistics (A 10,000 station, 30,000 channel crew uses only 250 batteries.) The batteries used may be any 12V battery whose size and type can be selected to suit the local environment or temperature.

Omni-directional sensors, minimal battery use, and ease of deployment all result in highly productive seismic field operations.



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