

# LISST-DEEP

## Deep Submersible Particle Size Analyzer

### • Particle Size Distribution • Optical Transmission • VSF

The LISST-DEEP instrument obtains in-situ measurements of particle size distribution, optical transmission, and the optical volume scattering function (VSF). Using a red 670nm diode laser and a custom silicon detector, small-angle scattering from suspended particles is sensed at 32 specific log-spaced angle ranges. This measurement is post-processed to obtain

sediment size distribution, volume concentration, optical transmission, and VSF. The electronics and optical configuration in the LISST-DEEP are very similar to Sequoia's workhorse, the LISST-100X. However, because of the extreme difficulty associated with keeping alignment under high pressure, the LISST-DEEP hardware design is radically different

from the LISST-100X. This allows the LISST-DEEP to be deployed down to 3000 m and obtain reliable measurements of the *in situ* particle size distribution and volume concentration in waters with optical transmission up to 98.5%.



## FEATURES

- Small angle forward scattering laser diffraction technology
- Self contained with internal datalogger
- Externally powered
- RS232 connection to PC for programming, offloading and real-time size distribution displays
- Programmable, autonomous data collection
- Integrated depth and temperature sensor
- 32 size classes
- Optional external battery pack, rated to 3000 m depth
- Optional 80% path reduction module for higher concentrations
- Sea-Bird cable for powering from Sea-Bird CTD

## SPECIFICATIONS (subject to change without notice)

### Parameters measured

- Particle size distribution from 1.25-250µm or 2.5-500µm
- Depth (3000 m max depth @ 0.8 m resolution)
- Optical transmission @ 0.1 % resolution
- Volume concentration @ 0.1 µl/l resolution
- Volume scattering function (VSF)

### Operating concentration range

- Optical transmission from 0.3-0.985 (30-98.5%)
- Concentration range 1-800 mg/l (grain-size dependent); see table

### Technology

- Small-angle forward scattering
- 32-ring custom photodiode ring detector for small-angle VSF
- 50 mm optical path (10 mm with optional 80% PRM)

### Mechanical and electrical

- Dimensions 12.57 cm (4.95") Ø × 80.3 cm (31.6") L
- Weight: 17/8 kg (38/18 lbs) in air/water
- 3000 m depth rating
- External power input: 9VDC nominal, 6-24VDC
- Sampling rate: Up to 1 Hz
- 670 nm solid state diode laser
- Power drain: 145 mA / 8mA (measuring / quiescent)
- Data storage: 1 GB (~12,500,000 size distributions)

Material	Concentration [mg/l] 98% optical transmission	Concentration [mg/l] 30% optical transmission	D10 [µm]	D50 [µm]	D90 [µm]	SMD* [µm]
ISO Fine (ISO 12103-1,A2)	1	70	1.5	7	41	3
ISO Coarse (ISO 12103-1,A4)	5	150	4	38	99	10
20-30 µm glass beads	8	445	19	24	34	24
75-125 µm sieved sand	13	810	85	122	175	112

\*Sauter Mean Diameter: Particle volume / particle area



Detail of the LISST-DEEP optical path and laser cable



LISST-DEEP external battery case (optional)

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