



SEISMIC SENSOR IMMUNE TO MAGNETIC FIELDS FOR PARTICLE BEAM FOCUSING IN SUPERCOLLIDERS

LC501



This unique instrument has been developed for the US Department of Energy for use as a wide passband highly sensitive vibration sensor in the beam focusing servo-system of linear super-colliders (very high energy particle accelerators). As such this sensor has been highly radiation hardened and designed to function normally in extremely strong magnetic fields – up to 6 Tesla.

PMD Scientific electrochemical seismic sensors are the only among all known highly sensitive devices that can perform adequately in such environment. The sensors were successfully tested in high strength magnetic fields at the Stanford Linear Accelerator Center (SLAC) and demonstrated complete immunity to the field. Presently several pilot seismometers are tested by the

International Linear Collider team in France where there are going to be used when the construction of the accelerator is completed.

Each seismometer has a single component sensor which can work readily as either horizontal or vertical with the sensitivity axis always looking along the direction indicated by the arrow. Moreover, this sensor is essentially isotropic – i.e. it will perform equally well in any random orientation. Its extremely small dimensions fully answer severe space limitations imposed by the linear colliders focusing systems.

The sensor is equipped with a built-in magneto-hydrodynamic calibrator that allows for monitoring of its parameters to account for any possible changes due to the hard radiation environment.

PMD is working on further improvement of the **SP501** characteristics, in particular, increasing its sensitivity and extending frequency response toward very long periods.

SP501 Specifications

Operating principle:	Electrochemical motion transducer with high damping coefficient
Output signals	Velocity-flat response
Output signal swing	±10V (±20 V p-p differential)
Dynamic Range	130 dB @ 1Hz
Bandwidth	0.1 – 50 Hz; <i>Optional:</i> 0.01 – 75 Hz
Sensitivity	0.2 nm·√Hz @ 1 Hz
Generator constant	<i>Standard:</i> 2000 V/m/s; <i>Opt.:</i> 350 – 20,000 V/m/s
Mass Lock	NONE REQUIRED
Mass Centering	NONE REQUIRED
Maximum installation tilt	Fully operational at any random orientation
Mechanical resonances	>200 Hz
Temperature range	Standard: -12 to + 55 °C
Dimensions	50 x 100 x 150 mm ¹
Weight (Al housing)	~0.75 kg
Power – Standard	10 – 15 Vdc; 12 Vdc nominal
Supply current	8 mA
Connector	14-pin circular or customized

¹ Model without internal MHD calibrator