

Sensors | Industrial Applications

THE ION GEOPHONE ADVANTAGE

ION geophones provide significant advantages for vibration detection and monitoring applications:

- **Rugged performance:** e.g. the SM-24 geophone can sustain impact shocks of up to 1500 g.
- **Passive device:** Most geophones require no external power source – this simplifies installation and use, especially in remote or difficult to access locations. Note: certain specialised geophones do require a low-voltage supply
- **Exceptional sensitivity:** A large dynamic range together with an exceptionally low intrinsic noise make ION geophones suitable for detecting nanometre disturbances (micro-fractures, footsteps and even heartbeats at a distance).
- **Wide temperature range:** Most ION geophones are designed to operate reliably from -40° to $+100^{\circ}$ C with the high-temperature geophones routinely working in environments with temperatures as high as $+200^{\circ}$ C.
- **Temperature readings:** Calculation of environmental temperature is possible.
- **Cases, cables, connectors, and spares:** A full range of ancillary equipment is available to ensure optimal performance of the geophones.
- **Technical support:** ION can provide engineering support and assistance for individual modifications and development of new applications.



CONTINUING RESEARCH

ION's leading position in the manufacture of precision geophones is based on over 50-years of continual investment in sensor research and development. Recent products include new low-frequency vertical and horizontal geophones and high-sensitivity versions of existing geophones.

CHOOSE THE SENSOR THAT IS RIGHT FOR YOU

Welcome to ION, a leader in the manufacture and supply of precision velocity transducers for motion detection and vibration monitoring applications, with production facilities and service support in The Netherlands, USA, and China. Since 1967, Sensor (now ION) geophones have been widely used in the seismic industry for oil and gas exploration – today, our clients also use geophones for an increasing range of industrial engineering, security and research applications, where precise vibration and movement measurements are required.

ION's transducers are found monitoring construction sites and rotating machinery, down boreholes, on security fences, and in the railway and windfarm industries. Our geophones are at work every day, in a multitude of environments from the frozen Arctic tundra to the searing heat of the desert and from seismic research vaults to the ocean floor.

ION geophones are uniquely designed with a rotating coil which reduces harmonic distortion and greatly extends the working life of the sensor. Competitor products often employ 'pigtail' springs to connect the suspended coil to the external connectors – a design that is highly susceptible to multi-directional vibration damage.

QUALITY AND RELIABILITY GUARANTEED

ION geophone products built to ISO 9001:2015 standards and are known for their rugged and effective performance and reliability.

SINGLE UNIT SENSOR

Where single-axis vibration measurements are required, a single unit consisting of a geophone, a plastic, aluminium, or stainless-steel case together with cable and connectors is the ideal configuration. These single unit strings can be supplied with either vertical, horizontal, or omni-directional geophones as required, with a selection of mounting options, cable types and connectors available.

STRING OF GEOPHONES

Where some form of location-finding is required, for example in security applications, multiple geophones placed a known distance apart can be employed, with the varying arrival time of the signal at each geophone aiding in the calculation of the sound source location. A broad range of mounting options, connectors and spacing intervals are available.

MULTI-COMPONENT CASE

If vibration measurements in more than one axis are required, a multi-component case housing three geophones, one vertical and two horizontal, is available with a range of cable lengths and connector types.

OMNI-DIRECTIONAL GEOPHONES

All ION geophones with a natural frequency above 15 Hz will function correctly regardless of the angle of deployment.

WIDE RANGE OF APPLICATIONS

- **Military/security:** Both buried, and fence-mounted geophones are effective for surveillance and protection uses.
- **Structural vibration:** Geophones are the ideal sensor for use at locations where heavy construction, mining, blasting and other potentially disruptive industrial activity may cause collateral damage.
- **Machinery vibration:** Geophones provide a practical, easy-to-install form of condition monitoring for moving machinery and equipment with no separate power supply requirements.
- **Construction/piling integrity:** During construction, geophones provide a convenient way to check the integrity of concrete piles, pads, and structures.
- **Boreholes:** Geophones can provide key measurements during drilling activities, including high temperature/high pressure environments.



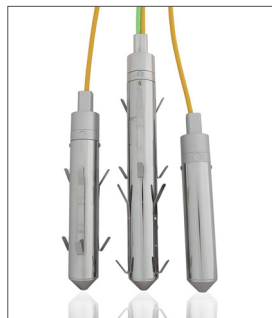
Multi-component case



Photo courtesy of Bently Nevada



Photo courtesy of Network Rail



Geophones packaged for mining applications



Land streamer applications

Model	Natural Frequency	Typical Spurious Frequency	Max Tilt	Angle Distortion	Open Circuit Damping	Coil Resistance	Sensitivity	Max Coil Excursion	Outside Dimensions (mm)	Weight	Temperature Range
SM-24	10 Hz upright	240 Hz	10°	<0.10%	0.25	375 Ω	28.8 V/m/s	2 mm	25.4 mm diameter 32.0 mm height	74 g	-40°C to +100°C
	10 Hz horizontal			<0.15%							
SM-5	5 Hz upright	5 Hz	10°	<0.1%	0.60	1850 Ω	80 V/m/s	3 mm	30.5 mm diameter 41.5 mm height	140 g	-40°C to +100°C
	5 Hz horizontal		3°	<0.15%							
SM-6 ¹	4.5 Hz	140 Hz	0°	<0.3%	0.265	375 Ω	28.8 V/m/s	4 mm	25.4 mm diameter 36.0 mm height	81 g	-40°C to +100°C
	8 Hz	150 Hz	15°	<0.2%	0.315						
	10 Hz	170 Hz	20°		0.250						
	14 Hz	190 Hz	20°		0.180						
SM-7 ¹	10 Hz	340 Hz	25°	<0.2%	0.25	375 Ω	28.8 V/m/s	2 mm	25.4 mm diameter 32.0 mm height	74 g	-40°C to +100°C
	14 Hz	420 Hz			0.18						
	30 Hz ²	500 Hz	360°		0.65	370 Ω	12.8 V/m/s	>1 mm			
	50 Hz ²	570 Hz			0.70		17.2 V/m/s	2 mm	26.6 x 32	89 g	
					Supply			Noise			
LF-24	0.3 Hz	240 Hz	10° (Vert)	0.1% (V)	N/A	±11 to ±25 V DC	15 V/m/s (0.38 V/in/s)	300 nm/s. sqrt(Hz) (above 10Hz)	39.5 mm diameter 36.0 mm height	82.5 g	-20°C to +60°C
	1 Hz		5° (Hor)	0.15% (H)							

- 1 - Tilt for UB (Upright Basic unit) only
- 2 - Omni-directional

About ION

ION has been a technology leader for over 50 years with a strong history of innovation. Leveraging innovative technologies, ION creates value through data capture, analysis and optimization to enhance companies' critical decision-making abilities and returns. Our offerings are focused on improving E&P decision-making, enhancing reservoir management and optimizing offshore operations.