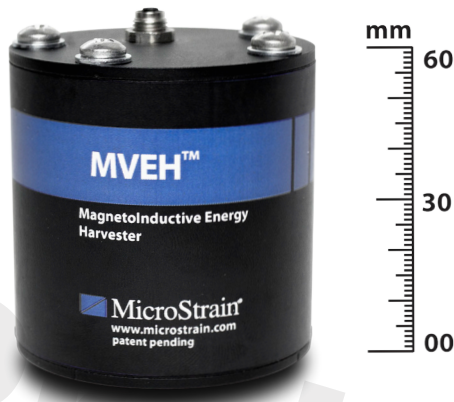


MagnetoInductive Vibration Energy Harvester



Introduction

Designed to harvest relatively low frequency vibrational energy inherent in machines and structures, the **MicroStrain®** Magneto-Inductive Vibration Energy Harvester (**MVEH™**) provides a regulated 3.2 VDC output at ~4 mW from input vibrations of 200 mg amplitude when tuned from 15-60 Hz. Factory tuning is accomplished by adjusting precision flexure elements, which resonate small coils around rare-earth magnets to create energy.

MVEH™ provides an elegant and infinitely renewable source of power to replace conventional batteries in wireless sensor nodes. Integrating a compact harvester with leading-edge power conversion microelectronics and a super capacitor for energy storage, when sufficient energy has been stored, a nanopower comparator switch allows the wireless sensor node to draw power. This insures operation under conditions when ambient vibrations are at relatively low levels or are intermittent.

Features & Benefits

- Produces 4 mW @ 3.2 VDC with only 0.2 g input vibrations @ 20Hz.
- Factory tunable from 15 - 60Hz, including typical line frequencies (50 & 60 Hz) and multi-pass blade frequencies for rotorcraft (15-28 Hz).
- Integrated 4-pin connector provides simple connection to sensor and flexibility for additional storage capacity.
- Anodized aluminum housing with integrated 1/4-28 threaded stud provides a light, rugged, easy to mount device.
- Easily combined with MicroStrain® wireless sensors to provide multiple sensing options
- Leading-edge power conversion microelectronics and a super capacitor for energy storage provides stable DC power.

System Overview

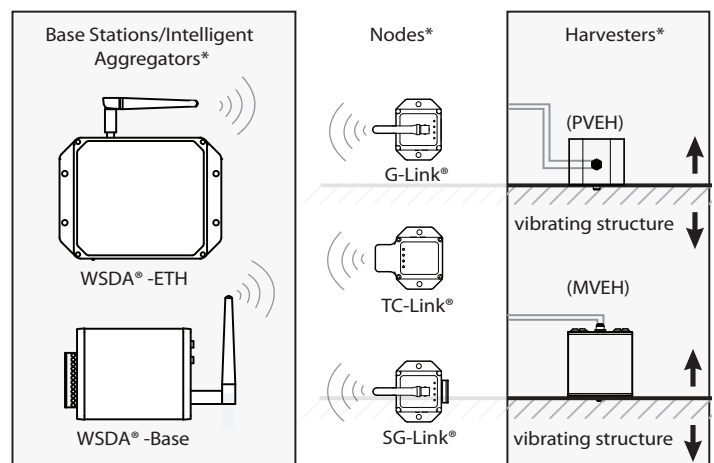
MVEH™ is factory-tuned to the dominant vibration frequencies of the ambient environment and is directly mounted to the vibrating structure to create power. A power cable runs from MVEH™ to supply the power to the sensor node, which collects data (strain, load, torque, acceleration, temperature, humidity, etc.) and transmits these data wirelessly to a base station where it is collected, viewed and analyzed.

Wireless sensor nodes that can be user-programmed to support relatively high data sampling rates in bursts as well as relatively low data sampling rates at intervals are good sensor choices, because energy is conserved with these approaches. Examples include MicroStrain® **SG-Link®**, **TC-Link®**, and **G-Link®** products. We also provide wireless vibration survey tools and customized energy harvesting wireless sensor solutions for your specific applications.

Applications

Provides a maintenance free power source for wireless sensors used in:

- Industrial Monitoring Wireless Sensor Networks (MicroStrain's WSDA)
- Rotorcraft Health Monitoring
- Refinery Equipment Monitoring
- Civil Structure Monitoring

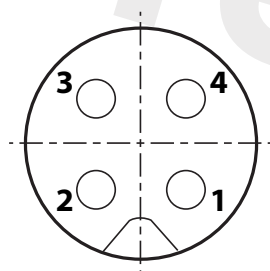


*Diagram does not represent a complete list of compatible nodes, base-stations and harvesters. For more information, go to www.microstrain.com

Specifications

Operating temperature	-20 to +85 °C
Power output	4 mW @ 0.2 g, 20 Hz input
Output voltage	3.2 VDC $\pm$.2
Energy storage	0.1F supercapacitor
Charge time from off (2.2 V) to on (5.5 V)	8:50 min, 18Hz @ .15 g
Storage capacity	330 mJ
Converter circuit	input protected Buck/Boost with max input voltage of 5.5 VAC
Device bandwidth	-3 dB @ $\pm$ 5 % from tuned frequency
Acceleration range	0.1 – 0.5 g
Mounting stud	¼-28 x 0.25"
Dimensions	2.25" x 2.56" tall
Weight	216 grams
Housing material	anodized aluminum
Connector	Binder #09-3112-86-04 (see pinout below)
Cable	7931073504 or 7931093204 (90 deg): (see color code below)

Connector Pinout



- Pin 1 (brown): DC+(3.2 V)
- Pin 2 (white): Cap-
- Pin 3 (blue): DC-
- Pin 4 (black): Cap+ (0 to 6 V)

Normalized MVEH Output Versus Frequency

