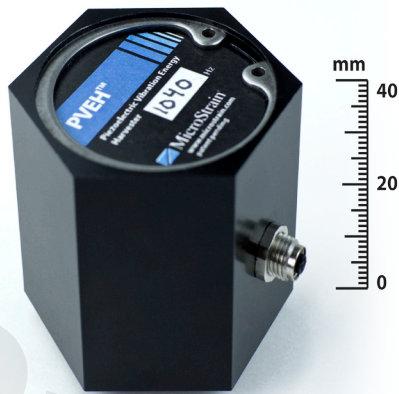


Piezoelectric Vibration Energy Harvester



Introduction

Designed to harvest relatively high frequency vibrational energy inherent in rotating transmission systems and gearboxes, the **MicroStrain® Piezoelectric Vibration Energy Harvester (PVEH™)** provides a regulated 3.2 VDC output at ~30 mW from input vibrations of 1.5 g amplitude when tuned to 1000 Hz. Factory tuning is accomplished by changing mass and/or stiffness of a precision micro-machined frame, which resonates a piezoelectric stack in compression to create energy.

PVEH™ 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 30mW @ 3.2 VDC with 1.5 g input vibrations @ 1000Hz.
- Integrated 4-pin connector provides simple connection to sensor and flexibility for additional storage capacity.
- Anodized aluminum housing with integrated ¼-28 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.

Applications

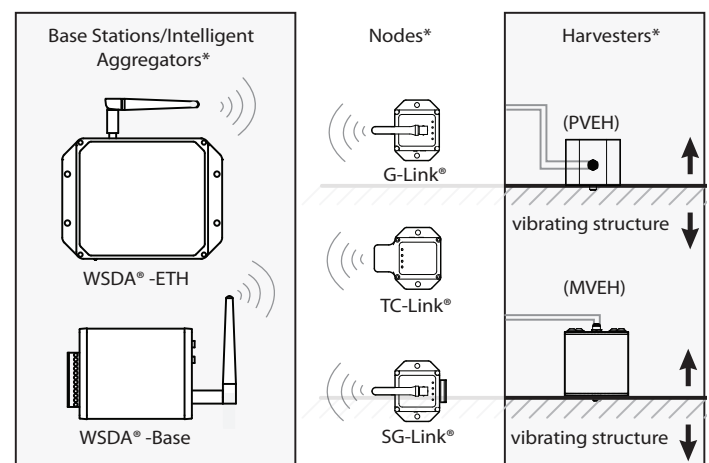
Provides maintenance free power sources for wireless sensors used for:

- conditioned based maintenance (CBM) of rotary machinery
- structural health monitoring (SHM)
- HVAC
- building automation
- monitoring industrial processes

System Overview

PVEH™ 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 PVEH™ 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.

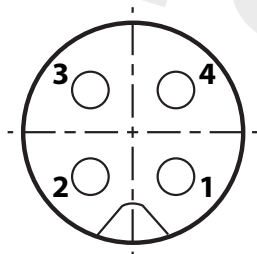


*Diagram does not represent a complete list of compatible nodes, base-stations and harvesters. For more information, go to www.microstrain.com

Specifications

Operating temperature	design temperature $\pm 20^{\circ}\text{C}$
Power output	30 mW @ 1.5 g, 1 kHz input
Output voltage	3.2 VDC $\pm .2$
Energy storage	0.55F supercapacitor
Charge time from off (2.0 V) to On (4.8 V)	6:00 min, 1000 Hz @ 1.5 g
Storage capacity	1500 mJ
Converter circuit	input protected Buck/Boost with max input voltage of 5.5 VAC
Device bandwidth	-3 dB @ $\pm 1\%$ from tuned frequency
Acceleration range	0.5 – 2.5 g
Mounting stud	$\frac{1}{4}$ -28 x 0.25"
Dimensions	1.75" hex x 1.87" tall
Weight	185 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 PVEH Output Versus Frequency

