

VIBRATING WIRE STRAIN METER

DATASHEET

MODEL EDS-11V



OVERVIEW

The Encardio Rite model EDS-11V Vibrating Wire Strain Gage is a sophisticated instrument for measuring strain in structures. It is designed for both embedment in concrete or soil and surface mounting by welding on steel structures, providing essential quantitative data on compressive and tensile strain changes. The gage is particularly useful for studying stress distribution in underground cavities, tunnels, concrete and masonry dams, pressure shafts, and wye sections.

Each gage comprises a high tensile strength magnetic wire stretched between two end blocks and a sensor assembly, which houses a permanent magnet and a plucking coil. The stainless steel construction, sealed by electron beam welding under a vacuum of 0.001 Torr inside it, makes the sensor rugged and waterproof, suitable for hostile environments.

When the magnet coil assembly plucks the wire, it vibrates at its natural frequency, which is proportional to the tension in the wire. Structural strain causes the end blocks to move relative to each other, altering the wire's tension and its resonant frequency. The strain is proportional to the square of the frequency.

The readout or datalogger generates voltage pulses in the magnet/coil assembly to pluck the wire and measure its resonant frequency, displaying the strain in microstrain. The strain gages include a built-in thermistor for temperature data, aiding in the analysis of thermal effects.

FEATURES

- **High accuracy and stability:** Provides precise strain measurements with long-term stability, making it suitable for continuous monitoring.
- **Hermetic sealing:** The sensor is vacuum-sealed by generating a vacuum of 0.001 Torr inside it by electron beam welding to eliminate the effects of oxidation and environmental conditions.
- **Robust construction:** Features a stainless steel body, bellows for elasticity, and protection for varied applications.
- **High-tensile strength wire:** Ensures durability and accuracy in strain measurement.
- **Comprehensive installation and accessories:** Suitable for embedment in concrete or surface mounting on steel structures.

Includes spiders for strain rosettes, no-stress strain containers, and brackets for diverse mounting options.

- **Long-distance signal transmission:** Maintains signal integrity over long distances, ensuring accurate data collection.

- **Integrated temperature monitoring:** Enhances measurement accuracy by accounting for temperature variations.
- **Versatile datalogging:** Can be used with compatible VW readout units for manual data collection. For continuous monitoring, it can be connected to any suitable datalogger.

Encardio Rite offers a range of NexaWave dataloggers equipped with GSM/GPRS or RF communication capabilities, ensuring reliable and efficient data acquisition and transmission at desired frequencies.

- **Infrastructure data intelligence platform:** Transmit data to a local or cloud server hosting the **Proqio** platform for 24/7 insights. **Proqio** enables efficient data processing, analysis and real-time visualization. Benefit from instant alerts for critical events and automated reports, supporting informed decision-making.
- **Cross-compatibility:** The sensor can work with any manufacturer's Dataloggers and Data Management Systems.

SYSTEM COMPONENTS

EDS-11V Strain meter comes with accessories to offer comprehensive solution:

EDS-11 Strain meter

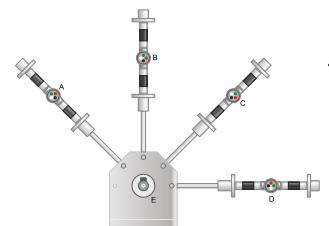
The coil-magnet assembly is housed inside a stainless steel enclosure, which is electron beam welded to two stainless steel tubes equipped with integral stainless steel bellows, rubberized for added protection. The bellows, a unique feature of Encardio Rite strain meters, are designed to reduce the modulus of elasticity, ensuring the strain meter accurately reflects the expansion and contraction of the concrete or steel structure it is embedded in or welded to. The ends of the tubes are electron beam welded to cylindrical end blocks, one of which features a 'V' groove. The vibrating wire is securely anchored to these end blocks. The cable connection is secured with a glass-to-metal seal connector, along with a cable joint housing and a suitable cable gland, ensuring reliable and robust connections.

EDS-12/13 Spider for strain rosettes

The precision-machined spiders are used to expedite alignment, simplify and speed up the installation of strain rosettes. The strain meters are fixed on the spiders, via 200 mm rods, at specific angular positions allowing for accurate measurement of strain at multiple angles.

EDS-12 (5-position spider):

Accommodates four strain meters at 0°, 45°, 90°, and 135° in one plane, and one strain meter perpendicular to that plane.



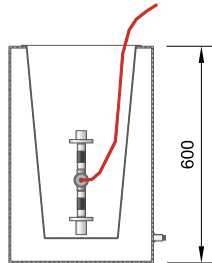
EDS-13 (13-position spider):

Features eight rods in the vertical plane at 0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°; four rods in a plane at 45° to the above plane at angular positions of 22.5°, 112.5°, 202.5°, 292.5° and one rod placed horizontally.

EDS-14 No stress-strain container

As concrete exhibits autogenous growth due to thermal effects, creep, chemical reaction and change in moisture content etc., stress measurement by strain meter needs to be corrected. To determine the effect of autogenous growth, an additional strain meter is mounted near the existing ones, in the EDS-14 container.

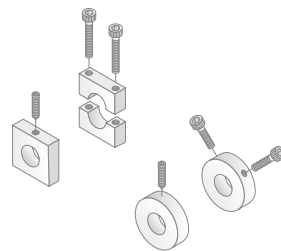
EDS-14 is a two-walled hollow cylinder (400 mm \varnothing x 600 mm height); with 2 mm thick mild steel outer wall, and 1 mm thick copper inner wall, separated by a 50 mm gap. The materials provide resistance to environmental conditions, while the gap prevents true stress in the surrounding concrete from acting on the strain meter.



By deducting the strain value of strain meter mounted inside the no stress container, from the other strain meter measurements, true stress is determined.

EDS-15/16 Brackets and flanges

EDS-15 mild steel brackets: Used for welding strain meters to steel structures or attaching them to concrete with saddle mounts to measure surface strains.



EDS-16 stainless steel flanges: Used for embedding the strain meter in concrete.

EDS-17 Dummy strain meter

It is used during the welding process to ensure correct distance and alignment of brackets before being replaced by the actual strain meter.

EDS-18 Extender

It increases the length and sensitivity of strain meter. It features a male M6 x 10 thread that fits into the strain meter's end block, extending the effective length to 280 mm and doubling the sensitivity.



SYSTEM SPECIFICATION

Type	Vibrating wire
Range	$\pm 1500 \mu$ strain
Sensitivity	1μ strain
Active gage length	140 mm
Total length	190 mm
Accuracy	$\pm 1\%$ fsd (combined effect of non-linearity + hysteresis + repeatability)
Temperature limit Operational	-10° to 80°C
Compensated	0° to 55°C
Over range limit	125 % of range
Over range effect	$\pm 0.1\%$ fsd upto 120%
Insulation resistance	500 M Ohm
Coil resistance	120-140 Ohm
Enclosure	Stainless steel
Protection	IP-68 (NEMA 6)
Sealing	Hermetically sealed by electron beam welding with a vacuum of 0.001 Torr. inside it
Vibration limit	2 g, 20-500 Hz
Humidity limit	100% RH
Thermistor	YSI 44005 or equivalent (3 kOhm at 25°C)
Cable connection	Glass to metal seal solder pin connector
Cable gland	PG-9 suitable for 6-8 mm \varnothing cable. Options available for different sizes.

*All specifications are subject to change without prior notice

DATASHEET | 1092-13 R03



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