WIRELESS TILT METER

MODEL EAN-95MW

OVERVIEW

The Encardio-rite model EAN-95MW wireless tilt meter is suitable for remote monitoring of small changes in inclination and vertical rotation of structures. The tilt meter combines high precision MEMS sensor with radio transmission network to provide accurate tilt data. The wireless mesh network used in the system, has an advantage of reliable data transfer over long distances, without any delay.

With the real-time data collected from EAN-95MW wireless tilt meter, the authorities can know about the slightest of change taking place in the project. This allows one to take timely decisions, increase safety, reduce project delays and be more cost effective.

FEATURES

- Standalone unit in weatherproof compact enclosure
- Provides reliable and high resolution readings with long term stability
- Innovative wireless mesh-based data collection protocol that provides seamless connectivity in large sites and tunnels
- Easy to install and monitor hard to access sites and tunnels remotely
- Wireless data transfer over long distances
- Battery life 6 – 60 months depending upon application.

APPLICATION

Tilt changes in structures may be caused due to construction activities such as excavation; tunneling and de-watering that affect the ground that supports the structure. Changes in tilt may also result from loading of a structure, such as loading of a dam during impoundment, loading of a diaphragm wall during excavation or loading of a bridge deck due to wind and traffic. Data from the tilt meter provides early warning of threatening deformations, allowing time for corrective action to be taken or if necessary, for safe evacuation of the area

DESCRIPTION

Model EAN-95MW wireless tilt meter consists of MEMS sensor with 4 V nominal output at ± 15°. This output can be transmitted through mesh wireless network over long distances without any signal degradation. Each unit is individually calibrated to provide high system accuracy and repeatability.

These tilt meters are fixed on to a vertical or horizontal surface either directly using 4 mounting screws or fasteners or using a mounting kit that allows more flexibility in mounting the tilt meter. Movement of the structure causes change in tilt of the tilt meter, which results in change in output of the sensor. Measurement can be made on horizontal or vertical surfaces. Subsequent sets of readings show how the structure is behaving and will give an indication of permanent deformation as time progresses.

APPLICATION

- Remote tilt monitoring of retaining walls and buildings
- Monitoring inclination and rotation of Metro stations, tunnels, etc.
- Monitoring stability of structures in landslide areas
- To evaluate performance of bridges and struts under load
- To monitor deformation of embankments, retaining walls etc.

Mounting variants

Model EAN-95MW tilt meter is supplied with standard mounting screws/fasteners bracket suitable for wall mounting/vertical surface. However, options are also available on request for mounting the tilt meter on a roof/ suspended from ceiling or on the floor.
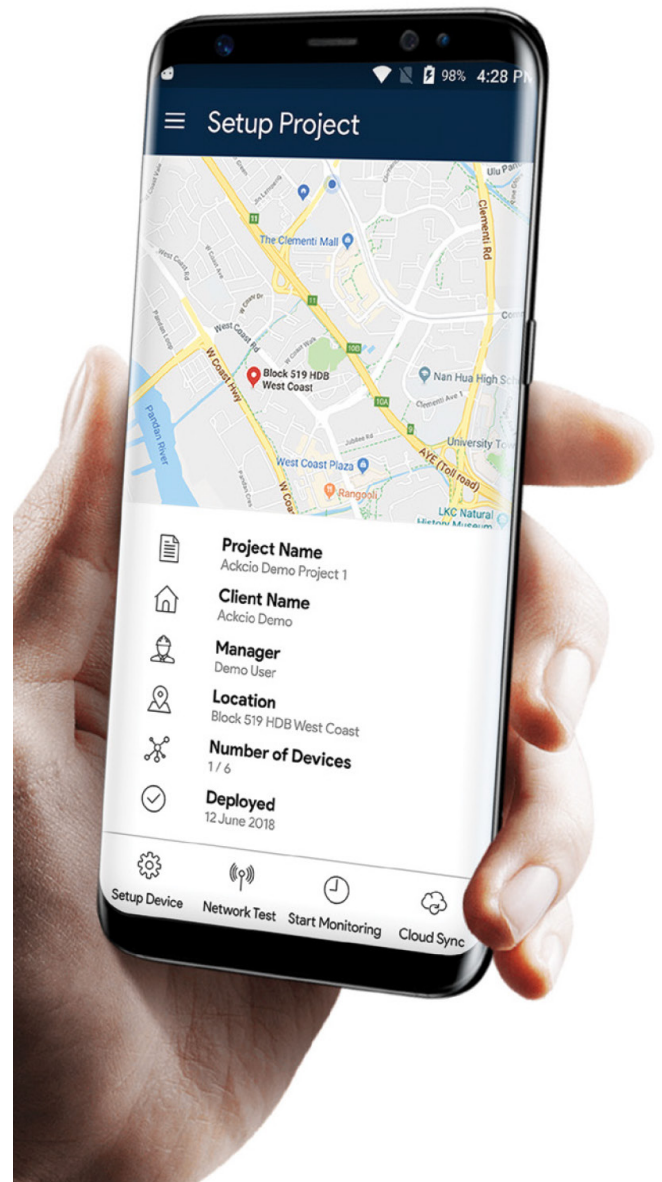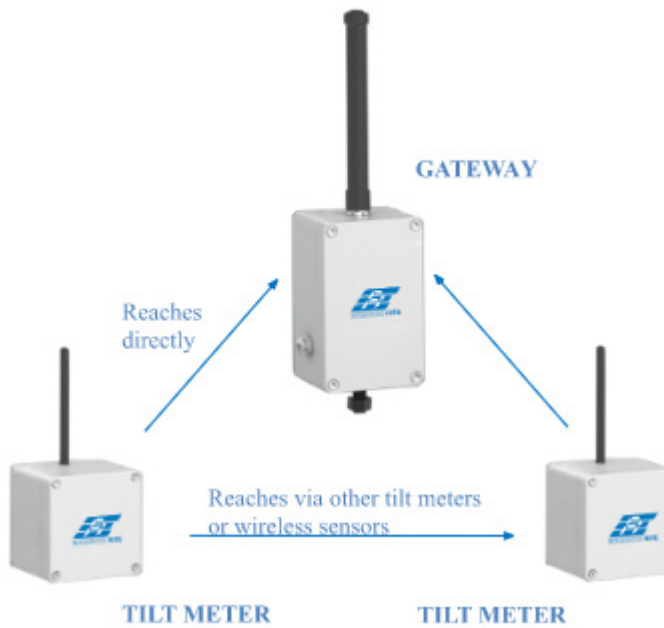
WIRELESS MESH NETWORK

The tilt meter is interfaced with the long range, low power wireless mesh network that allows tilt meter to send recorded data to the Gateway with over 99% reliability. The Gateway then uploads all the collected sensor data to the central/cloud server.

The innovative wireless mesh-based data collection network provides seamless connectivity in large sites and tunnels. The system is low-power and consists of long-range wireless radios that provide a range of up to 10 km in each hop of the mesh network.

A cloud-hosted data management and configuration software can be used to manage the network. The configuration can be done with an easy to use smartphone application that comes free with the system.

The application provides step by step instructions and displays whether the radio signals or battery strength is good enough.

The database management system allows analysis and visualization of the sensor data collected from project site/ installation locations. The data is accessible 24 x 7 to all the related authorities. The system can generate automatic

GATEWAY

Reaches directly

Reaches via other tilt meters or wireless sensors

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reports and provide automated alerts over SMS or email for any reading crossing the pre-defined alert levels.

In case a number of tilt meters are used at a site, our mesh network ensures that data from all the tilt meters are transferred without any delay. The beauty of mesh network is that even if a tilt meter cannot reach the gateway directly, it can still send its data to the gateway via other tilt meters in the network. The mesh network allows all tilt meters to talk to each other, thus allowing them to relay other tilt meter data to the gateway.

The system automatically mitigates well-known wireless problems like signal blockages and interference, allowing the tilt meters to reliably send their data to the gateway every time.

Every single radio transmission in the system is secured using AES-128 encryption to maximize security of the sensor data gathered by the system.

SPECIFICATIONS

Sensor	
Sensor	Uniaxial/Biaxial
Standard range	± 15°
Output (nominal)	4 V at 15° Proportional to Sin of angle

Sensitivity	± 10 arc second
Accuracy1	± 0.1% fs
Temperature limit	-20°C to 80°C

1As tested under laboratory conditions

SPECIFICATIONS

Radio Frequency	
Transmission distance	Up to 10 km (line of sight) Up to 4 km (cities, urban) Up to 3 km (tunnels, underground)
Radio bands	Sub-1 GHz band – complies with unlicensed ISM band specifications in most countriesound)
Link data speed	625 bps – 2.5 kbps variable bitrate
Data security	AES128 Encrypted end to end data
Gateway	
Power supply	12 V DC @ 2A nominal, Solar panel
Battery	1 D-cell Lithium Thionyl Chloride (Li-SOCl2) 3.6 V 19 Ah batteries.
Typical current drain	200 mA typical operating current
Internal connectivity	In-built 3G/4G modem, Ethernet

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