

WiSenMeshWAN: Omni Tilt & Distance Node Wireless Monitoring System



This internally powered dual sensor node allows measurement of tilt in any axis from a horizontal plane and a distance to any surface upto 300m away without a reflector. With a full tilt range (360°any axis) and very high accuracy ($\pm 0.002^\circ$) and resolution ($\pm 0.0001^\circ$), in addition to distance measurement (0.05m~ 300m) with a high accuracy ($\pm 1\text{mm}$) and resolution ($\pm 0.1\text{mm}$). The omni-axis sensors can be installed in any orientation and automatically detect the horizontal plane.

The nodes also include an integrated temperature sensor and wireless mesh radio transmitter via the external antenna.

The battery lifespan is up to 6 years at hourly readings.

WiSenMeshWAN nodes communicate via bespoke encrypted mesh radio technology can be up to 1.5km from each other or the SmartGateway. The sensors mesh together and automatically form a network relaying data off each other (up to 6 sub mesh levels of data hop) and back to a central data hub called a SmartGateway which contains the data logging functions, radio mesh control systems and external communication to the WiSen cloud-based datacentre or local hosted system.

It is also available in a configuration designed specifically for rail track monitoring with an integrated internal antenna.

FEATURES

- WiSenMeshWAN Node
- Omni-axis tilt 360° range
- $\pm 0.002^\circ$ accuracy
- $\pm 0.0002^\circ$ precision
- $\pm 0.0001^\circ$ resolution
- Distance measurement 0.05m ~ 300m
- Distance resolution $\pm 0.1\text{mm}$
- Intelligent node/repeater
- Battery life up to 6 years
- 1 second to 1 hour variable readings
- End user configurable
- Rugged Housing
- IP66
- Gravity Orientation Sensor

WiSenMeshWAN: Omni Tilt & Distance Node

PHYSICAL PROPERTIES

Dimensions (L x W x H)	100mm x 100mm x 60mm (excluding antenna)
Weight	0.65kg
Casing and Painting Materials	Aluminium-Alloy & Epoxy Polyester Powder Coating
International Protection Mark Rating	≥IP66
Operating Temperature	-10 to +50°C

LOCAL STORAGE

Local Flash Memory Storage	Min. 450 Data Packets
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POWER

Primary DC Power	1 xER34615 Lithium D Cell Battery
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Battery Life Expectancy ^{1,2}

Sampling Time Interval - T	Duration (Days) ^{1,2}	Duration (Months) ^{1,2}	Duration (Years) ^{1,2}
1 Min	48	1.6	0.1
5 Mins	246	8.1	0.7
15 Mins	672	22.1	1.8
30 Mins	1268	41.7	3.5
1 Hour	2238	73.6	6.1

(1) Quoted battery life are best case scenarios with minimal hops. For example, a node taking 6 hops could lead to a reduction of 40%. Please contact WiSen for further advice.

(2) Laser Distance measurement duration greater >3.0 secs caused by non-reflective target surface or light pollution will affect battery performance.

Accuracy Stop Voltage	2.7VDC
Mesh Stop Voltage	2.1VDC
Battery Connection	Standard Aluminum Battery Holder
Working Current (DC)	Max. 500mA (Typically 220mA)

PRIMARY SENSOR – DISTANCE LASER

Sensor Type	Optical Laser Distance Sensor
Laser Class	Class II (655nm – Visible Red)
Range	0.05m-33m (6F07) 0.05m-100m (6F08) 0.05m-300m (6F09)
Accuracy	± 1mm
Precision	± 0.15mm (1 Sigma)
Resolution	± 0.1mm
Laser Lens Durability	>= 500Hrs@3Hz@50°C or 2500Hrs@3Hz@25°C
Laser Reading Time	Upto 2-3 seconds depending on conditions
Quantity of Samples per Reading	Typically, 5

SECONDARY SENSOR - TILT

Sensor Type	MEMS Triple-Axis Tilt Sensor
Range	± 90° per axis
Accuracy	For ± 0.0° to ± 2.0° ± 0.0020° 7.20" 0.0349mm/m (or mrad) For ± 2.0° to ± 90° ± 0.0050° 18.0" 0.0872mm/m (or mrad)
Precision	± <0.00020° 07.20" 0.00349mm/m (or mrad)
Resolution	± 0.0001° 0.36" 0.0017mm/m (or mrad)
Long Term Stability	@ 10 Years 0.014°
Vibration Resistance	Conformance to EN60068-2-64:2004 & EN50125-3:2003+COR R2010 Standards for railtrack vibration/shock acceleration for on sleeper placement associated to peak vibration 800m/s ² / 2ms or 81.6g
Impact Resistance ⁽²⁾	1000g (Powered Mode)

(2) The tilt sensor should not be subject to an impact greater than quoted number. Care and Consideration must be undertaken for this precise equipment.

RADIO SPECIFICATIONS

Protocol	WiSenMeshWAN® proprietary radio encryption
Radio Frequency	868MHz System

SERVICE INSPECTION

Inspection Period	Every 3 Years by Manufacture (or inspected by arranged methods)
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CERTIFICATION

Regional Conformity	UKCA
Network Rail	PADS Number: -

ACCESSORIES

Radio Antennas	
WA029-00040	WiSenMeshWAN Whip Mesh Antenna (+5dBi/195mm)
WA029-00046	WiSenMeshWAN High Gain Mesh Antenna with 0.3m Extension Lead (+8dBi/400mm)
WA029-00047	WiSenMeshWAN High Gain Mesh Antenna with 5.0m Extension Lead (+8dBi-400mm)
WM028-00192	WiSen Fixing Bracket for High-Gain or 50m GSM Antenna

Power Supply	
WB016-00016	3.6V ER34615 19Ahr D Cell Lithium Battery

Mounting	
WM028-00172	WiSen Pivot Bracket for Tilt & Distance Sensor Nodes*
WM028-00187	WiSen Flat Mounting Plates with U Clamps for Sensor Nodes*
*Compatible with magnet fixings for non-intrusive installations	

Target Plates	
WP026-00077	Target Plate (100x100mm) 33m Laser Version <i>Self-adhesive target to aid laser beam reflectivity strength</i>
WP026-00079	Target Plate (180x180mm) 100m Laser Version <i>Self-adhesive target to aid laser beam reflectivity strength</i>

INSTALLATION ORIENTATIONS AND ASSOCIATED X, Y & Z AXIS TILT RESULTANT VALUES

The below is from 'Load Sensing' Datasheets. I think it would be good to create similar. We would need to draw our node then orientate so we have same sign outcome as below

