WiSenMeshNET:
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 (±0.002°)and resolution (±0.0001°), in addition to distance measurement (0.05m~ 300m) with a high accuracy (±1mm) and resolution (±0.1mm). 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 5 years at hourly readings.

WiSenMeshNET nodes communicate via bespoke encrypted mesh radio technology can be up to 400m from each other or the SmartGateway. The sensors mesh together and automatically form a network relaying data off each other (up to 10 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

- WiSenMeshNET Node
- Omni-axis tilt 360° range
- ±0.002° accuracy
- ±0.0002° precision
- ±0.0001° resolution
- Distance measurement 0.05m ~ 300m
- Distance resolution ±0.1mm
- Intelligent node/repeater
- Battery life up to 5 years
- 1 second to 1 hour variable readings
- End user configurable
- Rugged Housing
- IP66
- Gravity Orientation Sensor

WiSenMeshNET: 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
POWER	
Primary DC Power	1 xER34615 Lithium D Cell Battery

Battery Life Expectancy [1, 2]

Sampling Time Interval - T	Duration (Days) [1, 2]	Duration (Months) [1, 2]	Duration (Years) [1, 2]
1 Min	46	1.5	0.1
5 Mins	179	5.8	0.5
15 Mins	538	17.7	1.5
30 Mins	981	32.2	2.7
1 Hour	1937	63.7	5.3

(1) Quoted battery life are best case scenarios with minimal hops. For example, a node taking 9-10 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 (**1F07**) **|** 0.05m-100m (**1F08**) **|** 0.05m-300m (**1F09**)
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/s² / 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	WiSenMeshNET® proprietary radio encryption
Radio Frequency	2.4GHz System
SERVICE INSPECTION	
Inspection Period	Every 3 Years by Manufacture (or inspected by arranged methods)
CERTIFICATION	
Regional Conformity	UKCA

Network Rail	PADS Number: -
London Underground	Reg Number: -

ACCESSORIES

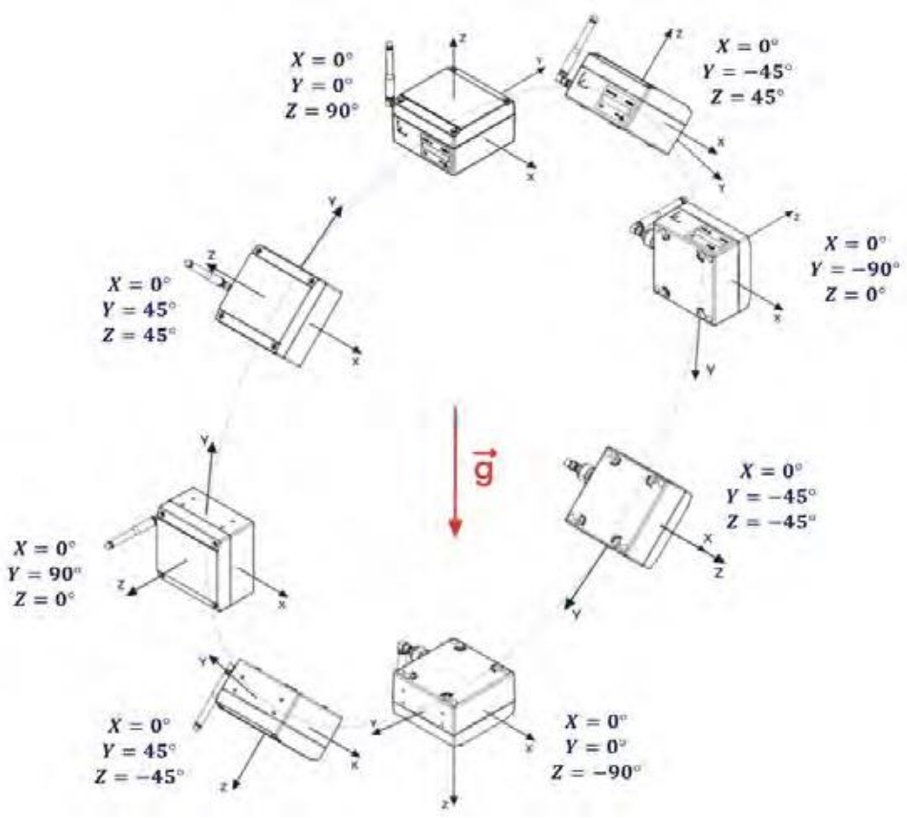
Radio Antennas	
WA029-00002	WiSenMeshNET Whip Mesh Antenna (+5dBi/195mm)
WA029-00039	WiSenMeshNET Whip Mesh Antenna (+10dBi/395mm)

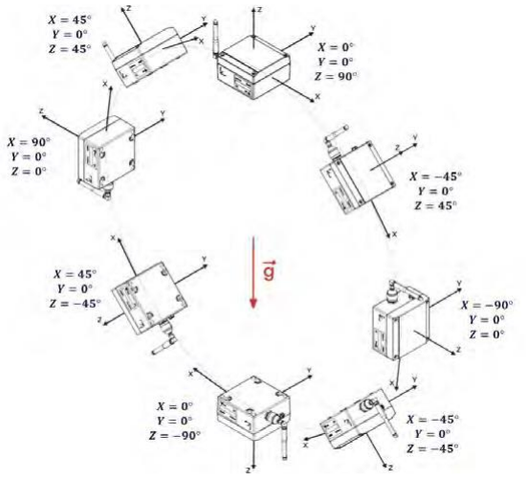
Power Supply	
WB016-00016	3.6V ER34615 19AHr D Cell Lithium Battery

Mounting	
WM028-00155	WiSen L-Bracket for Tilt Sensor Node*
WM028-00187	WiSen Flat Mounting Plates with U Clamps for Sensor Nodes*
WM028-00203	WiSen Railway Two-Part Aluminium Mounting Plate
*Compatible with magnet fixings for non-intrusive installations	

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




X = 45°
Y = 0°
Z = 45°
X = 0°
Y = 0°
Z = 90°
X = 90°
Y = 0°
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X = −45°
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X = −90°
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X = −45°
Y = 0°
Z = −45°