

Product Data Sheet: FlatMesh Triaxial Tilt Sensor Node

The FlatMesh Triaxial Tilt Sensor Node is an extremely high precision and exceptionally stable three axis tilt sensor which reports its measurements through Senceive's FlatMesh wireless communications network to a FlatMesh Gateway.

It has been successfully applied in many applications, including those measuring:

- Tunnel distortion
- Tunnel heave/settlement
- Embankment slippage
- Structural movement
- Rail track heave/settlement
- Rail track bed cant and twist



Key Features

- Integrated triaxial tilt sensor
- Extremely low noise performance
- Resolution of 0.0001° (0.0018mm/m) and repeatability of $\pm 0.0005^\circ$ ($\pm 0.009\text{mm/m}$)
- Integrated long life battery
- 12-15 year battery life, including when acting as a relay node within the mesh communications network
- Integrated temperature sensor
- Versatile mounting options
- Waterproof to IP66 / IP67 / IP68
- Firmware is remotely upgradeable over the air via the gateway reducing costly site visits

Physical Specifications

| Parameter | Value |
|---|--|
| Dimensions excluding antenna | 90 x 90 x 60 mm 90 x 96 x 60 mm (including vent) |
| Total Mass | 0.6 kg (approx.) |
| Housing Material | Die cast aluminium |
| Protection (BS EN 60529: 1992 + A2: 2013) | IP66 / IP67 IP68 at 1m for 24 hours |
| Mounting Options | Clearance holes for M4 socket head screw in bottom, M4 blind holes in side Plates and brackets available for magnetic fixing, track bed, stake and pole mounting, and many other applications |
| Operating Temperature Range | -40°C to +85°C |

FlatMesh Radio Specifications

| Parameter | Value |
|--|---|
| Communication Type | Proprietary FlatMesh v3 Mesh Networking Protocols IEEE 802.15.4 compliant |
| Frequency Band | 2400 – 2485 MHz ISM Band |
| Maximum Transmit Power (EN 300 328 v1.8.1) | 6.5dBm |
| Maximum Permitted Antenna Gain | 2.2dBi |
| Range | Up to 300m depending on the environment Consult with Senceive for your application |
| RF Module | Senceive FM3Node |

Tilt Sensor Specifications

| Parameter | Value |
|----------------------|------------------------|
| Resolution | 0.0001° (0.00175mm/m) |
| Repeatability | ±0.0005° (±0.0087mm/m) |
| Range | ±90° |

Internal Battery

| Parameter | Value |
|-----------------------------|---|
| Battery Type | Lithium Thionyl Chloride |
| Nominal Voltage | 3.6V |
| Nominal Capacity | 19000mAh |
| Typical Battery Life | 12-15 years at 20-30minute reporting intervals, including when acting as a relay node Consult with Senceive for your application |

Certifications

- Tested to conformity with all the essential requirements of R&TTE Directive 1999/5/EC and RoHS Directive 2011/65/EU

Ordering Information and Accessories

| Model | Description |
|------------|---|
| FM3N-IX | FlatMesh 3 Triaxial Inclinometer |
| FF-MP-S360 | Swivel mounting kit with 360-degree adjustment range <ul style="list-style-type: none">- screw directly to vertical walls |
| FF-MP-V | Vertical mounting plate <ul style="list-style-type: none">- use U-bolts to fix to poles or stakes- use glue to fix to walls where drilling is not permitted Use with FF-MP-S360 |
| FF-MP-RA | Right angle mounting bracket <ul style="list-style-type: none">- screw to concrete tunnel linings and inclined walls Use with FF-MP-S360 |
| FF-MP-T2 | Track bed mounting plate kit |
| FF-MP-M2 | Magnetic mounting kit High degree of adjustability, perfect for cast iron lined tunnels |
| FF-BK-xxxx | Tilt beam kit |
| FF-BE | See separate datasheet for more information |
| FA-FM-WPS | Waterproof straight antenna Overall node height 168mm (approx) when fitted Maximum gain +1.1dBi |
| FA-FM-LPS | Waterproof low profile straight antenna Minimum overall node height, perfect for track bed and tight spots Overall node height 92mm (approx) when fitted Maximum gain 0dBi |
| FA-FM-ADJ | Adjustable angle antenna Flexible installation, perfect for use in tunnels and indoor environments Overall node height 202mm (approx) when fitted and upright Overall node height 102mm (approx) when fitted and at 90-degree angle Maximum gain +2dBi |
| FC-NC | Antenna cover kit Use with FA-FM-LPS antenna Overall node height 96mm (approx) when fitted |