BeanAir

Wilow

LoRaWAN™ Hi-Inc

Tilt | Inclination | Slope Sensor

±15° or ±30°

Wilow **DATASHEET**

LoRa

www.beanair.com

Inclinometer Sensor

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MADE IN GERMANY

Product Video

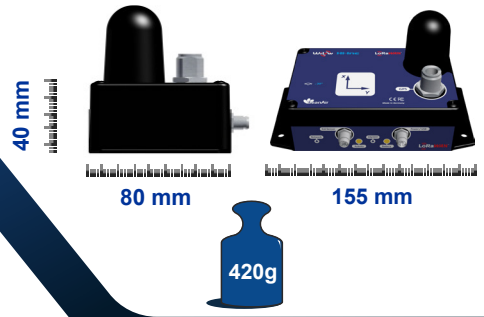
User Guide

Quick Start

Mechanical Drawing

STEP File

MQTT Toolkit for IOT Sensors



APPLICATIONS

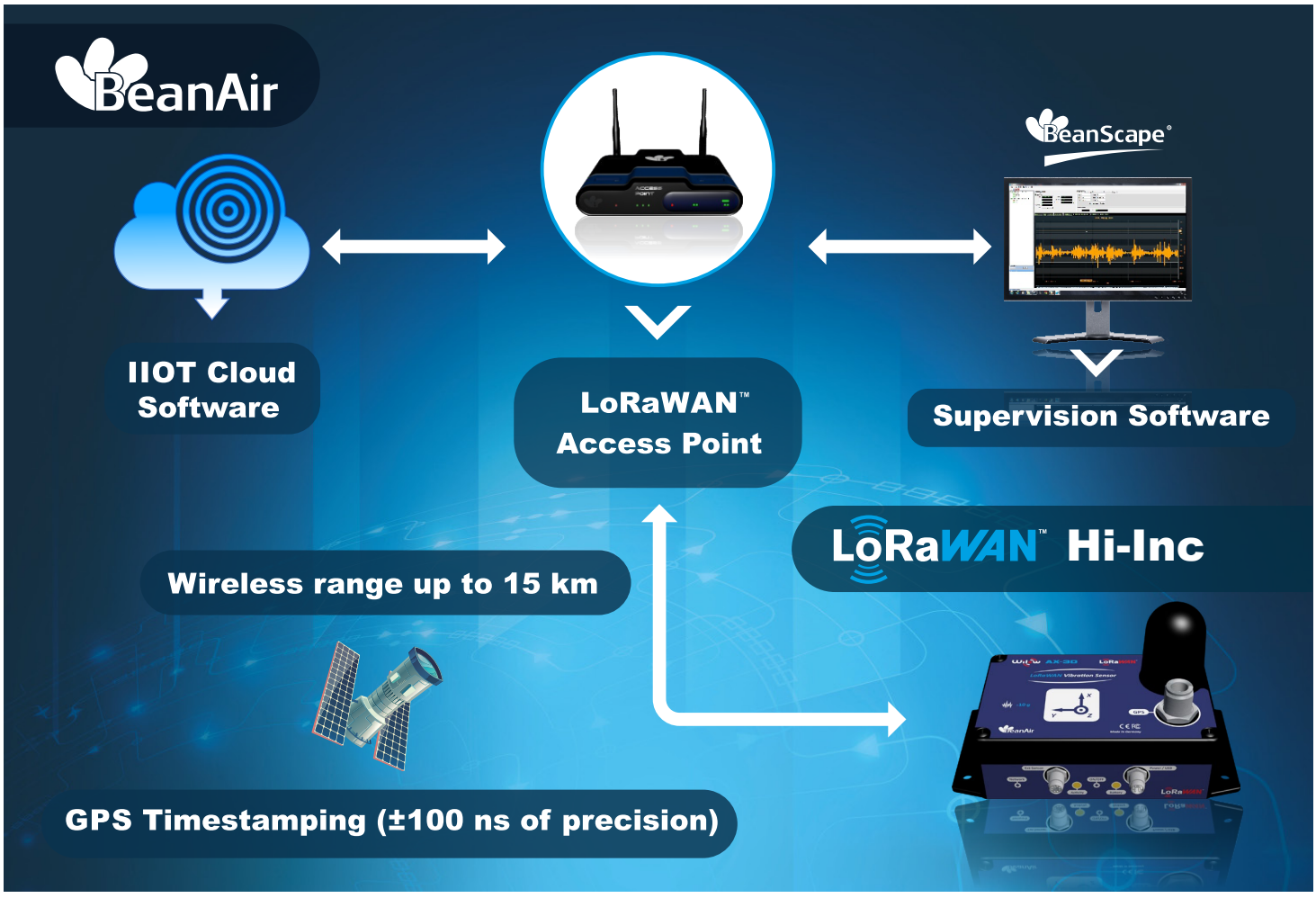
- Structural Health Monitoring
- Platform Leveling and stabilization
- Built-in test equipment
- Oil drilling
- Axial rotor measurement

Inclinometer Sensor

Wilow LoRaWAN™ Hi-Inc

Main Features

- ULP (Ultra Low Power) LoraWan (up to 15km of wireless range)
- Smart and flexible power supply, compatible with USB and Solar power sources.
- Rugged aluminum enclosure: Waterproof IP67 |NEMA 6
- Embedded data logger (10 millions Logs)
- SSD (Smart Shock Detection) allows to trigger data acquisition on a shock detection
- USB 2.0 for device configuration (including firmware update)
- Industrial temperature range -40 °C to +65 °C
- Built-in smart sensors : Inclination, vibration and shock/impact
- IOT Ready: integrates MQTT data exchange, an open-source Internet of Things (IOT) protocol
- Store and Forward+: Lossless data transmission with hard real-time
- Options for connecting external sensors : -Temperature and Humidity sensor, -Accurate Temperature sensor
- Accurate Time-stamping (±100ns) thanks to GPS option



Inclinometer Sensor

Wilow LoRaWAN™ Hi-Inc

Open-standard, Ultra-Low Power and reliable « Internet of Things » sensors

Our innovative and open-standard **Wilow®** series is now extended with **LoRaWAN**, an ultra long-range (15km) and very low-power wireless technology, and integrates the latest smart sensor technologies (**vibration, inclination, shock**) .
LoRaWAN wireless protocol is more suitable for static monitoring (slow measurement heart-beat) but can reach a long distance (15 km in Line of Sight, 1.6km in urban areas) without using a repeater.

A RELIABLE LoRaWAN TECHNOLOGY THANKS TO OUR " STORE AND FORWARD+ " FUNCTION

STORE & FORWARD+

The store and forward technique works by storing the message transmitted by **the BeanDevice® Wilow LoRaWAN** (wireless DAQ/sensor) to a LoRaWAN access point receiver. If the message is not received due to a network disruption, it will be retransmitted on the next transmission cycle. This technique allows to bring a lossless data transmission.

User can also enable the Hard real-time option; i.e. the message must be received by the LoRaWAN Access Point Receiver within the confines of a stringent deadline. It is automatically deleted if it failed to reach its destination within the allotted time span

Inclinometer Sensor

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Product reference	
BND-WILOW-LORA-HI-INC-MR-CY	
MR*– *Measurement Range: ***15B*** : bi-axis ±15° ***30B*** : bi-axis ±30°	**CY - Country** **US** - USA, Canada, Australia **CN**- China **EU**- Europe
Example 1: **BND-WILOW-LoRaWAN-HI-INC-15B-CN** LoRaWan bi-axis inclinometer (measurement range ±15°) for China ***Example 2***: **BND-WILOW-LoRaWAN-HI-INC-30B-EU** LoRaWan bi-axis inclinometer (measurement range ±30°) for Europe ***Example 3:*** **BND-WILOW-LoRaWAN-HI-INC-15B-US** LoRaWan bi-axis inclinometer (measurement range ±15°) for USA	

	Inclinometer sensor specifications
Inclinometer Technology	Inclinometer based on MEMS Technology
Measurement resolution (Bandwidth 10 Hz)	0.001°
Noise density	0.0004 °/√Hz
Accuracy (Full scale)	±0.05° (±0.02° on customer request)
Offset temperature dependency (temperature range –25°C to +85°C)	±0.002 °/°C
Sensitivity temperature dependency (temperature range –25°C to +85°C)	±0.005 %/°C with temperature compensation
	±0.013 %/°C without temperature compensation
Long term stability (@23°C)	< 0.004 °
Analog to Digital converter	24-bit delta-sigma analog-to-digital with temperature compensation Synchronous measurement channel
Sensor frequency Response (-3dB)	DC to 28 Hz
Noise spectral density DC to 100 Hz	0.0004 °/ √Hz
Onboard temperature sensor	Range -40°C to +65°C , accuracy ±1°C

	Remote configuration parameters
Data Acquisition mode (**SPS** = sample per second)	Low Duty Cycle Data Acquisition (LDCDA) Mode: 1s to 24 hour
	Alarm -Low duty cycle: 1s to 24 hour
	Streaming mode : 100 SPS by default
	Streaming with event-trigger (SET) Mode : 100 SPS by default
Sampling Rate (in streaming packet mode)	Minimum: 1 SPS Maximum: 100 SPS
Alarm Threshold	High and Low Levels alarms
Power Mode	Sleep & Active power modes

	RF Specifications
Wireless Protocol Stack	Lorawan
WSN Topology	Point-to-Point / Star
Crypto Engine	WPA2, WPS2
Data rate	up to 62.5 kbps LoRA
RF Characteristics	868 MHz for Europe 915 MHz for USA, Canada and Australia 490 MHz and 780 MHz for China
TX Power	+22dBm maximum
Rx Sensitivity	Down to-148 dBm
Maximum Link Budget	170 dB
Maximum Radio Range	15km (L.O.S)
Antenna	Omnidirectional radome antenna with a gain of 2 dBi

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	Embedded Data logger
Storage capacity	up to 5 million data points
Wireless data downloading	3 minutes to download the full memory (average time)

	Environmental and Mechanical
Casing	Aluminum casing Dimensions in mm (LxWxH):155x80x40 mm without antenna & eyelet, Weight (with internal battery, w/o mounting option) : 420g
IP|NEMA Rating	IP67 | Nema 6
Shock resistance	100g during 50 ms
Operating Temperature	-40 °C to +65 °C
Norms & Radio Certifications	. CE Labelling Directive R&TTE (Radio) ETSI EN 300 328 (Europe) . FCC (North America) . ARIB STD-T66 Ver. 3.6 (Japan) . ROHS - Directive 2002/95/EC

	Power supply
Rechargeable battery	High density Lithium-Ion rechargeable battery with a capacity of 6500 mAh
Integrated battery charger	Integrated Lithium-ion battery charger with high precision battery monitoring
Current consumption @ 3,3V	· During data acquisition : 20 to 30 mA · During Radio transmission : 118 mA at 868 MHz/915 MHz 107 mA at 490 mA · During sleep power mode : < 100 µA
External power supply	Two power supplies available: . USB Power supply 5V . 2.5VDC to 17VDC compatible with solar energy harvesting

	Included accessories
M8 plastic cap	1pcs, Ref: WL-PC
M8 to USB cable	1pcs M8-6pins to USB Cable, 2 meters length. Ref:WL-CBL-M8-USB-2M
Magnet for power on/power off	1pcs Magnet. Ref: WL-MGN
Wall mounting kit	4 pcs M5 screws+ Locknut. Ref:WL-SCMKIT

	Options (not included)
Power-supply	Wall plug-in, Switchmode power Supply 12V @ 1,25A with USB plug **Ref: WL-USB-5V-PWR**
M8 Cable	M8-5Pins Cable , cable length : - 2 meters. **Ref: WL-CBL-M8-6P-2M** - 5 meters.**Ref: WL-CBL-M8-6P-5M**
Solar Panel	Polycrystalline Solar Panel for BeanDevice® Wilow® power supply Maximum Power : 3W Optimum operating Voltage: 12 VDC Dimension: 235 mm x 135 mm x 17mm Protection Frame: Aluminum Frame , Waterproof IP67 Length : 2 meters (**Ref: WL-SLP-3W-6P-2M**) or 5 meters (**Ref: WL-SLP-3W-6P-5M**) with M8 plug for a direct to connection to the BeanDevice® Wilow® Country of origin: solar panel from China, assembled and tested in Germany
Calibration certificate	Calibration certificate provided by Beanair GmbH A static calibration method is used on a granite surface plate DIN876 (Ref: WL-CERT-CAL)

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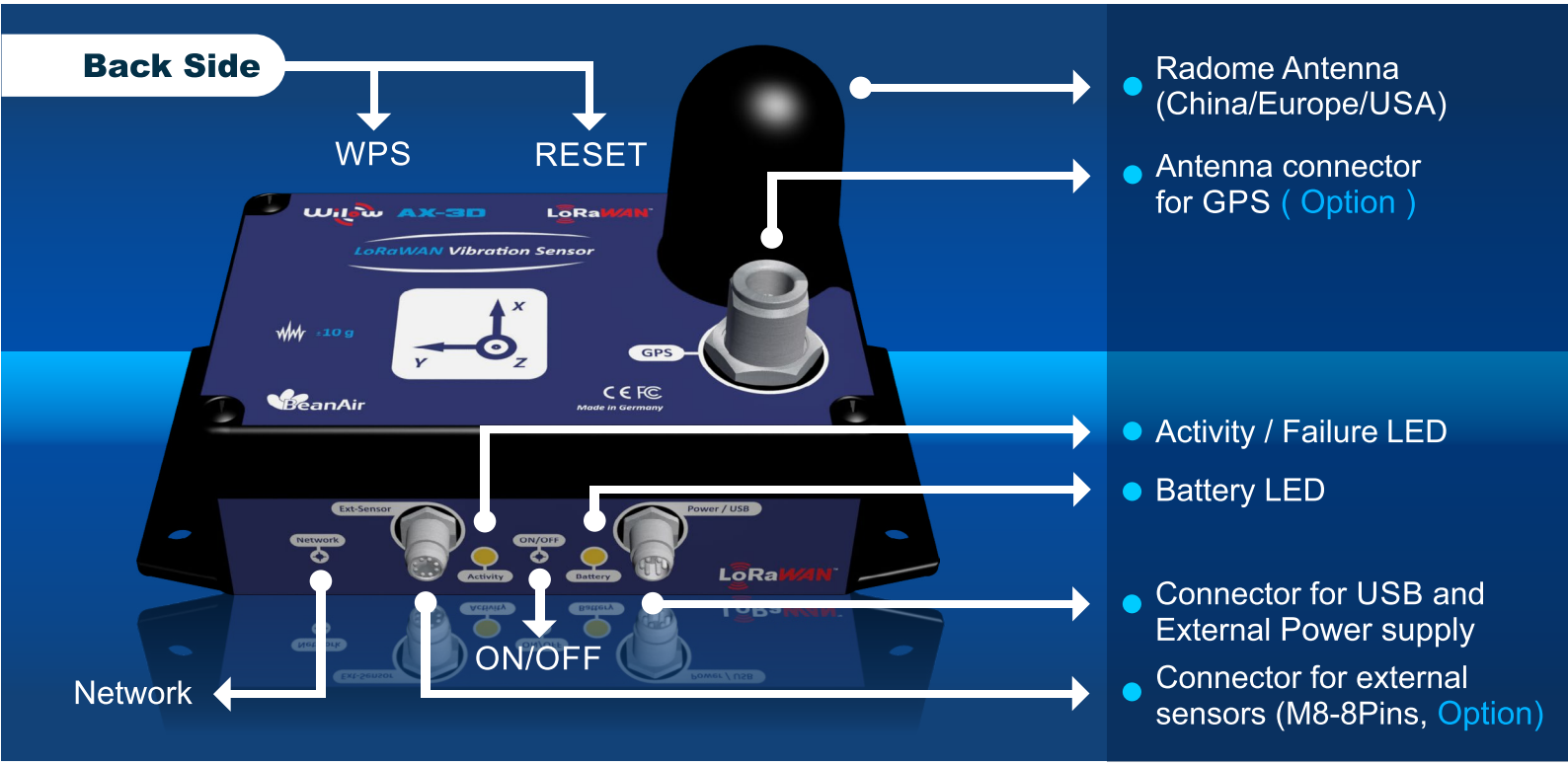

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