BeanAir
WIRELESS IIOT SENSORS

Wilow

BeanDevice® WILOW® X-INC

ULP (ULTRA-LOW-POWER) WIFI IOT COMBO SENSORS (VIBRATION AND INCLINATION) WITH BUILT-IN DATA LOGGER

FEATURED VIDEO

USER GUIDE

QUICK START

MECHANICAL DRAWING

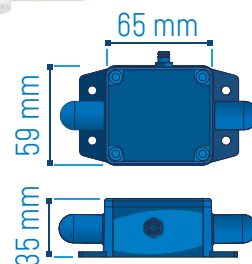STEP FILE

MQTT TOOLKIT FOR IOT SENSOR

2year Warranty

MADE IN GERMANY

CE FC ® 001A-08148

WiFi CERTIFIED®

220g

65 mm
59 mm
35 mm

MAIN FEATURES

- ULP (Ultra Low Power) Wifi technology

- First wireless combo sensors on the market integrating accelerometer/inclinometer/shock sensors

- High precision bi-axis inclinometer ±15° or ±30° with great measurement repeatability (±0.003° on full Scale for ±15B version).

- Waterproof (IP67|NEMA 6) and Rugged aluminum casing,

- High accuracy bi-axis inclinometer ±15° or ±30°

- Embedded data logger: up to 5 million data points (with events dating)

- Over the Air Firmware Upgrade via WIFI

- USB 2.0 link for device configuration (including firmware upgrade)

- Store and Forward+: lossless data transmission

- IIOT Ready: integrates MQTT data exchange, an open-source Internet of Things (IOT) protocol

- Excellent radio link relying on the radio antenna diversity developed by Beanair®

- Smart and Flexible power supply :
- Internal Rechargeable Lithium Battery (780 mAh)
- External 5VDC power supply compatible with both USB power and solar energy harvesting

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APPLICATIONS

Ground Vibration Monitoring
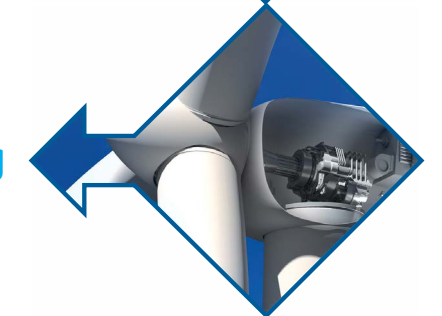
Structural Health Monitoring

Test and Measurment

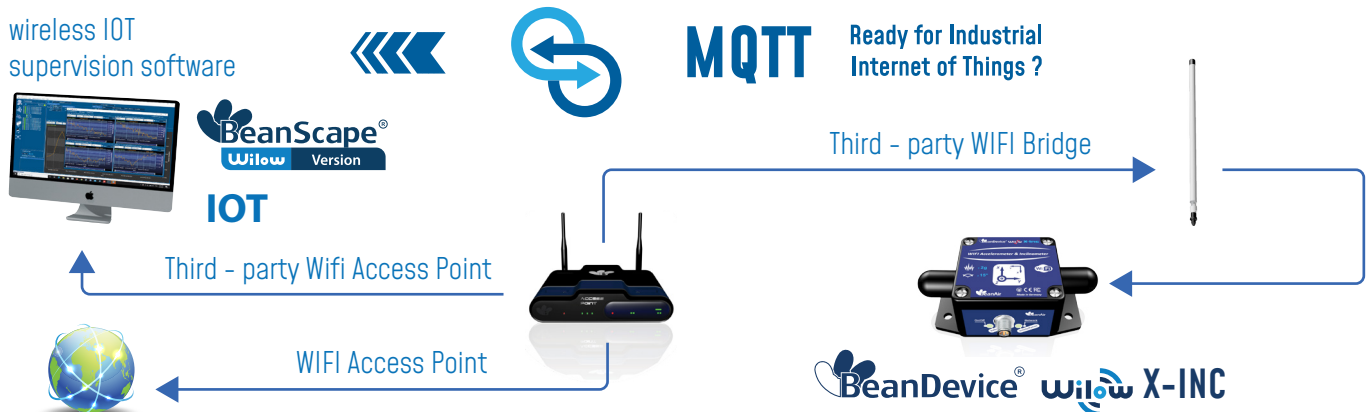Land Surveying

Condition Monitoring

AN OPEN-STANDARD & INDUSTRIAL WIFI TECHNOLOGY

- ULP (Ultra Low power) Wifi – IEEE 802.11 b/g/n
- Lower total cost of ownership-works with existing access points
- Large installed base and consequent broad-based familiarity with configuration, use and troubleshooting at the physical and link layers
- Easy provisioning & IT friendly : our ULP wifi sensors use IP-over-Ethernet networking environment

IoT

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MQTT | OPEN-STANDARD INTERNET OF THINGS PROTOCOL.

wireless IOT
supervision software

MQTT

Ready for Industrial
Internet of Things ?

BeanScape®
Wilow Version

IOT

Third - party WIFI Bridge

Third - party Wifi Access Point

WIFI Access Point

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EHR-AUXILIARY POWER SUPPLY COMPATIBLE WITH SOLAR ENERGY HARVESTING 8-24VDC

Third - party WIFI Bridge

OR

5V USB

BeanDevice®
Wilow X-INC

Third - party
Wifi Access Point

BeanScape®
Wilow Version

wireless IOT
supervision software

STORE &
FORWARD+

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

The store and forward technique works by storing the message transmitted by the BeanDevice® Wilow X-INC to a Wifi access point/ Wifi 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 Wifi Access Point/Wifi Receiver within the confines of a stringent deadline. It is automatically deleted if it failed to reach its destination within the allotted time span

BeanDevice® WILOW® X-INC

TECHNICAL SPECIFICATIONS

PRODUCT REFERENCE

BND-WILOW-WIFI-X-INC-ACCMR-INCMR-MO-EXPWR-HG

ACCMR- Measurement Range:	INCMR- Measurement Range:	MO - Mounting option	EXPWR -Auxiliary External Power supply
2G: ±2g measurement range 10G: ±10g measurement range	15B : bi-axis ±15° 30B : bi-axis ±30°	BR - 90° Mounting bracket	
-HG - High Gain External Antenna 5dBi		M - Magnetic Mounting	EHR - Power supply compatible with solar energy harvesting 8-24VDC

Example 1: BND-WILOW-WIFI-2G-15B-BR - ULP Wifi Combo sensors accelerometer (measurement range ±2g) and Inclinometer (measurement range ±15° Bi-axis) with 90° bracket mounting

Example 2: BND-WILOW-WIFI-2G-30B-M - ULP Wifi Combo sensors accelerometer (measurement range ±10g) and Inclinometer (measurement range ±30° Bi-axis) with magnet mounting

Example 3: BND-WILOW-WIFI-2G-15B-EHR - ULP Wifi Combo sensors accelerometer (measurement range ±2g) and Inclinometer (measurement range ±15° Bi-axis) , with auxiliary external Power supply compatible with Energy Harvesting 8-24VDC

Example 4: BND-WILOW-WIFI-2G-15B-HG - LP Wifi Combo sensors accelerometer (measurement range ±2g) and Inclinometer (measurement range ±15° Bi-axis) , with High Gain External Antennas

ACCELEROMETER SPECIFICTIONS	
Accelerometer technology	High precision accelerometer based on MEMS technology
Measurement range	±2g
Sensitivity	660 mV/g
Typical non-linearity	±0.1% FS
Analog to Digital converter	24-bit delta-sigma with temperature compensation Synhcronuous measurement channel. Data are transmitted in 12-bits format for better network management
Sensor frequency response (-3 dB)	DC to 800 Hz
Maximum sampling rate	2 kSPS per axis
Noise spectral density	45 µg/√Hz
Zero-g Offset Variation from RT over Temp	±0.2 mg/°C
Sensitivity Variation from RT over Temp	±0.01 %/°C (XY) , ±0.02 %/°C (Z)
Offset Ratiometric Error	4mg
Sensitivity Ratiometric Error	±1.25 % (X-Y) , ±0.2 % (Z)
Cross Axis Sensitivity	0.02

TECHNICAL SPECIFICATIONS

ADVANCED VIBRATION ANALYSIS TOOL (AVAILABLE ON BEANSCAPE® WILOW® PREMIUM AND RA)	
Software Filter	• Low-Pass Infinite Impulse Response Filter (IIR)
Fast Fourrier Transform (FFT)	• Online and Offline FFT • FFT Window Type (offline FFT only): Recangular/Hamming/Hann/Blackman/Blackman Harris/ Gaussian/Kaiser/Taylor/Triangular/Flattop/Bartlett Hann • Automatic FFT Report (Email Transmission) • Configurable Number of FFT points, 128 to 32768 points
Peak Particle de Velocity (PPV)	Available only on the BeanDevice® Wilow ® AX-3D with ±2g of range: • PPV Log file (Email Transmission) • Automatic DIN4150-3 report (Email Transmission)
Displacement measurement	Available only on the BeanDevice® Wilow® AX-3D with ±2g of range

INCLINOMETER SENSOR SPECIFICATIONS	
Inclinometer Technology	Inclinometer based on MEMS Technology
Measurement resolution (Bandwidth 10 Hz)	0.001° or 0.0174 mm/m or 3.6 arc seconds
Measurement Repeatbility (Full scale, @25°C, Static Measurement mode : LowDutyCycle or Alarm mode)	±15B Version: ±0.003° or ±0.052 mm/m or ±10.8 arc seconds ±30B Version: ±0.004° or ±0.070 mm/m or ±14.4 arc seconds
Noise spectral density DC to 100 Hz	$0.0004\ °/\sqrt{Hz}$
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
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

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 per axis Maximum: 2 kSPS per axis
Alarm Threshold	Three level of Alarms (Alert-Action-Alarm)
Power Mode	Battery Saver & Active power modes

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TECHNICAL SPECIFICATIONS

RF SPECIFICATIONS	
Wireless Protocol Stack	IEEE 802.11 b/g/n
WSN Topology	Point-to-Point / Star / Cluster-Tree
Data rate	UDP: 16 Mbps TCP: 13 Mbps
RF Characteristics	ISM 2.4GHz. Antenna diversity architecture designed by BeanAir®
Receiver Sensitivity	-95.7 dBm @1 DSSS -74.0 dBm @54 OFDM
Maximum Radio Range	200m (L.O.S), Radio range be extended by adding Wifi Bridge/Repeater
Antenna	Antenna diversity : 2 omnidirectional antenna with a gain of 2.8 dBi
OTA	Over the air firmware upgrade via WIFI

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):35x59x65 mm without antenna & eyelet, Weight (with internal battery, w/o mounting option) : 220g
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

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TECHNICAL SPECIFICATIONS

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-M8-6P-USB-2M
Magnet for power on/power off	1pcs Magnet. Ref : WL-MGN
Wall mounting kit	4 pcs M5 screws+ Locknut. Ref: WL-WIFI-SCMKIT

OPTIONS (NOT INCLUDED)	
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-2M) or 5 meters (Ref: WL-SLP-3W-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 linked to national and internatiional standards (DRAKKS) (Ref: WL-CERT-CAL)

TECHNICAL SPECIFICATIONS

OPTIONAL ACCESSORIES AND SERVICES	
Solar Panel	Polycrystalline Solar Panel for BeanDevice® Wilow® power supply Maximum Power : 5W , Optimum operating Voltage: 12 VDC Protection Frame: Aluminum Frame , Waterproof IP67 The 3W solar panel works only with LowDutyCycle & Survey/Alarm data acqusiition with battery saver mode enabled The 5W solar panel works only with LowDutyCycle, Survey/Alarm & streaming burst data acqusiition with battery saver mode enabled Country of origin: solar panel from China, assembled and tested in Germany REF: WL-SLP-5W-2M ,5W Solar panel with 2 meters of cable length REF: WL-SLP-5W-5M ,5W Solar panel with 5 meters of cable length
Calibration certificate	Calibration certificate provided by Beanair GmbH A static calibration method is used on a granite surface plate DIN876 Ref: WL-CERT-CAL

POWER SUPPLY	
Rechargeable battery	High density Lithium-Ion rechargeable battery with a capacity of 900 mAh
Integrated battery charger	Integrated Lithium-ion battery charger with high precision battery monitoring
Battery Life	see Battery life table herefater and battery life simulation toolkit available on our website
External power supply	• USB Power supply 5V • Optional auxiliary external Power Supply: 8VDC to 24VDC compatible with solar energy harvesting

Conditions: Battery saver mode enabled , Temperature 25degC, BeanDevice listening to new config every 18h	Battery Life with Slow Measurement Rate (LDCDA) Internal LiPO Battery
Battery Saver mode Enabled, Measurement Cycle every minute	31 days
Battery Saver mode Enabled, Measurement Cycle every 5 minutes	65 days
Battery Saver mode Enabled, Measurement Cycle every hour	87 days

Conditions: Battery saver mode enabled , Temperature 25degC, BeanDevice listening to new config every 18h	Battery Life with Slow Measurement Rate (LDCDA) External 5W Solar Panel (REF: WL-SLP-5W-2M) EHR Option
Battery Saver mode Enabled, Measurement Cycle 20s to 1 measurement per day	>= 3 years (depends on battery cycle life)

Conditions: Battery saver mode enabled Temperature 25degC	Battery Life with Fast Measurement Rate (Streaming Burst)- Internal Battery
Wakes up every 2 hours, Sample at 200Hz during 20s	49 days
Wakes up every 1 hour, Sample at 500Hz during 20s	29 days
Wakes up every 20 minutes, Sample at 200Hz during 20s	15 days

Conditions: Battery saver mode enabled Temperature 25degC	Battery Life with Fast Measurement Rate (Streaming Burst)- with X-SOLAR-7AH or X-SOLAR-14AH
All timing combinatios related to streaming burst option	>= 3 years (depends on battery cycle life)

Conditions: 25degC	Battery Life with Fast Measurement Rate (Continuous Streaming)- Internal Battery
Sampling Rate 2000Hz	9hours 10 minutes
Sampling Rate 1000Hz	10hours 32 minutes
Sampling Rate 100Hz	15hours 36 minutes

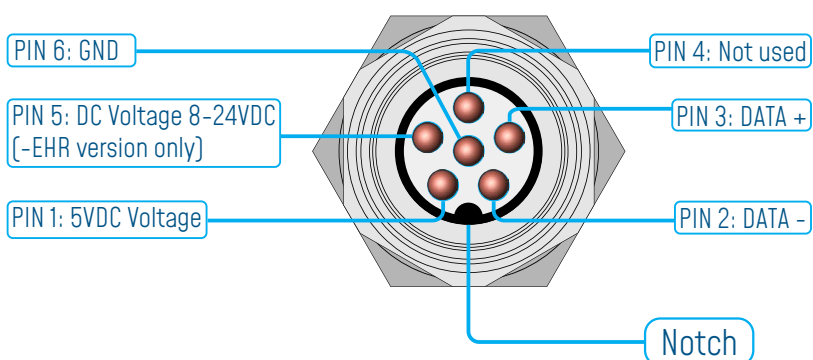| Conditions: 25degC	Internal Battery Life with Fast Measurement Rate (Continuous Streaming)-with X-SOLAR-7AH or X-SOLAR-14AH
Sampling Rate 10Hz to 2000Hz	>= 3 years (depends on battery cycle life)

BeanDevice® WILOW® X-INC

BEANDEVICE® WILOW® FRONT VIEW

- Radome Antenna
- M8-5 pins connector for USB & Power supply
- Activity / Failure LED
- Battery LED

EXTERNAL POWER SUPPLY WIRING CODE

M8-6Pins socket (Male, A-Coding) - PIN ASSIGNATION

PIN 6: GND
PIN 5: DC Voltage 8-24VDC (-EHR version only)
PIN 1: 5VDC Voltage

PIN 4: Not used
PIN 3: DATA +
PIN 2: DATA -

Notch

Interface Name	M8 Pin assignation
5VDC Voltage	PIN 1
DATA -	PIN 2
DATA +	PIN 3
Not used	PIN 4
DC Voltage 8-24VDC (-EHR version only)	PIN 5
GND	PIN 6

M8-6Pins Plug (Female, A-Coding) - PIN ASSIGNATION

PIN 6:GND
PIN 3:USB-DATA +
PIN 2:USB-DATA -

PIN 4:Not used
PIN 5:DC Voltage 8-24VDC (-EHR version only)
PIN 1:5VDC Voltage
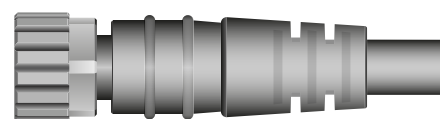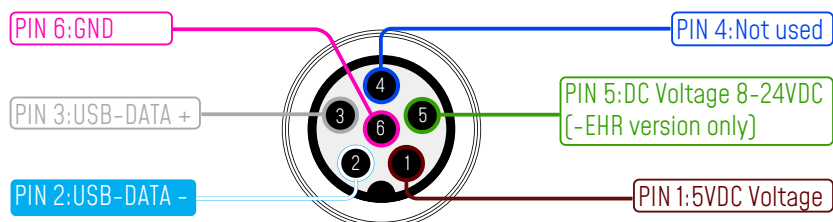
M8-6Pins Plug

Interface Name	5VDC Voltage	USB DATA -	USB DATA +	Not used	DC Voltage 8-24VDC (-EHR version only)	GND
M8 Pin assignation	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6
Wire Color (A-coding)	BROWN	WHITE	GREY	BLUE	GREEN	PINK

MECHANICAL MOUNTING OPTIONS

By default, the BeanDevice® Wilow® comes with a screw mounting lid.

Two other mounting options are available:
- Magnetic mounting , add the extension –M on your product reference
- 90° bracket, add the extension –BR on your product reference

Mechanical Mounting Options Video

VIDEO

SCREWS MOUNTING

90° BRACKET

Wilow

MAGNETIC MOUNTING LID

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