BeanAir
WIRELESS IIOT SENSORS

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

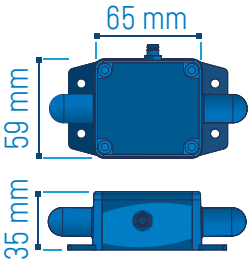
MADE IN GERMANY

2year Warranty

Wi Fi CERTIFIED

CE FC

R 001A-08148



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°
- 460000 data logs per sensor channel (streaming mode) - 3 for accelerometers, 2 for
- 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

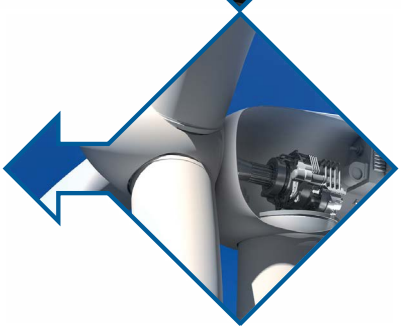
Structural Health Monitoring

Land Surveying

Ground Vibration Monitoring

Test and Measurment

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

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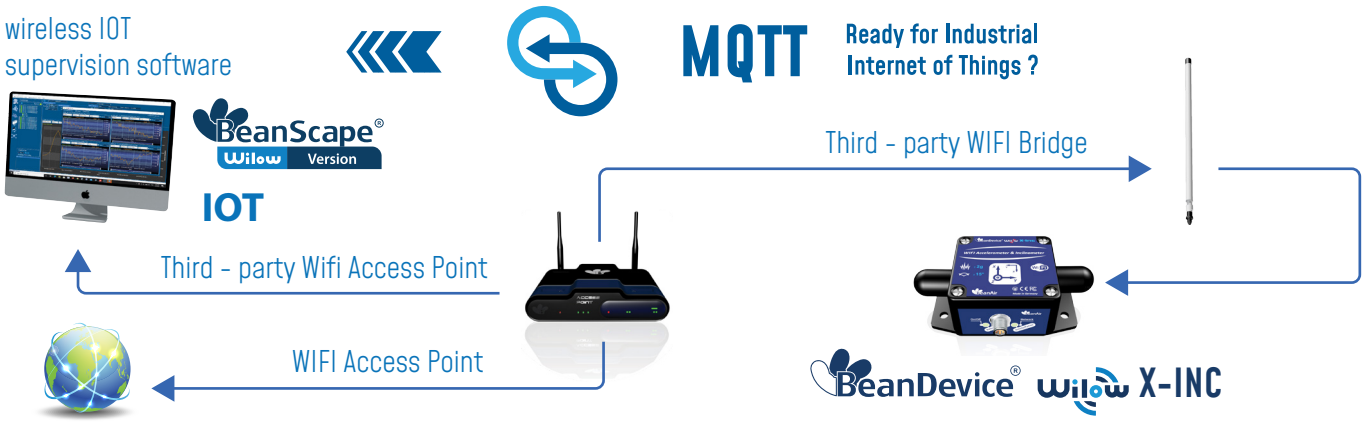
MQTT | OPEN-STANDARD INTERNET OF THINGS PROTOCOL.



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

A RELIABLE WIFI 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 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

TECHNICAL SPECIFICATIONS

PRODUCT REFERENCE

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

ACCMR- Measurement Range:	INCMR- Measurement Range:	EXPWR -Auxiliary External Power supply
2G: ±2g measurement range 10G: ±10g measurement range	15B : bi-axis ±15° 30B : bi-axis ±30°	EHR - Power supply compatible with solar energy harvesting 8-24VDC

MO - Mounting option	-HG - High Gain External Antenna 5dBi
BR - 90° Mounting bracket	If this field is left blank,Integrated Radome Antenna will be provided
M - Magnetic Mounting	

Example 1: BND-WILOW-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-10G-30B-M
- ULP Wifi Combo sensors accelerometer (measurement range ±10g) and Inclinometer (measurement range ±30° Bi-axis) with magnet mounting

Example 3: BND-WILOW-2G-15B-EHR-HG
- 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, High Gain ANtenna"

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 °/√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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RF SPECIFICATIONS	
Wireless Protocol Stack	IEEE 802.11 b/g/n
WSN Topology	Point-to-Point / Star / Cluster-Tree
Crypto Engine	WPA2, WPS2
Data rate	UDP: 16 Mbps TCP: 13 Mbps
RF Characteristics	ISM 2.4GHz. Antenna diversity designed by Beanair®
Rx Sensitivity	-95.7 dBm @1 DSSS -74.0 dBm @54 OFDM
Maximum Radio Range	With High Gain Antenna : 100-200m (L.O.S), 40-80m (N.L.O.S.) With Integarted Radome Antenna : 50-100m (L.O.S), 20-50m (N.L.O.S.) In both case Radio Range can be extended by adding Wifi Bridge/Repeater"
Antenna	Antenna diversity : High Gain Antenna : 2 x N-Type Antenna 5dBi Radome Antenna : 2 x Antenna 2,2 dBi
OTA	Over the air firmware upgrade via WIFI

EMBEDDED DATA LOGGER	
Storage Capacity	460000 data logs per sensor channel (streaming mode) - 3 for accelerometers, 2 for inclinometers
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

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)

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)

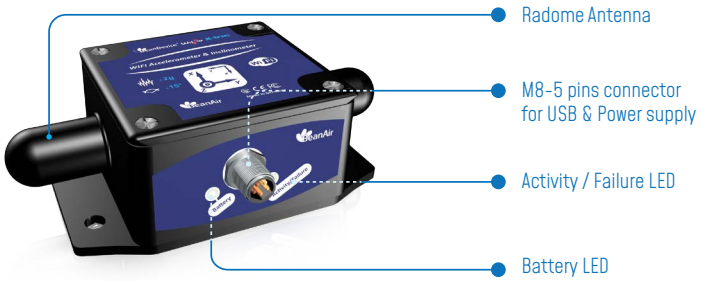
Conditions: Battery saver mode enabled Temperature 25degC	Battery Life with Fast Measurement Rate (Streaming Burst)- Internal Battery
Wakes up every 2 hours, Sample at 200Hz during 20s	49 days
Wakes up every 1 hour, Sample at 500Hz during 20s	29 days
Wakes up every 20 minutes, Sample at 200Hz during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

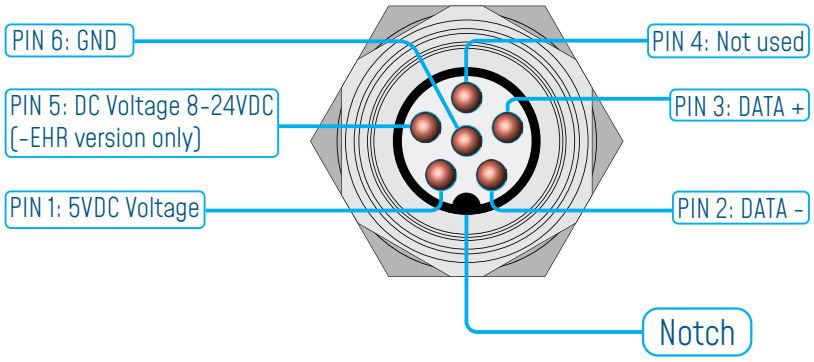
Conditions: 25degC	Internal Battery Life with Fast Measurement Rate (Continuous Streaming)-with X-SOLAR-7AH or X-SOLAR-14AH
Sampling Rate 10Hz to 2000Hz	>= 3 years (depends on battery cycle life)

BEANDEVICE® WILOW® FRONT VIEW



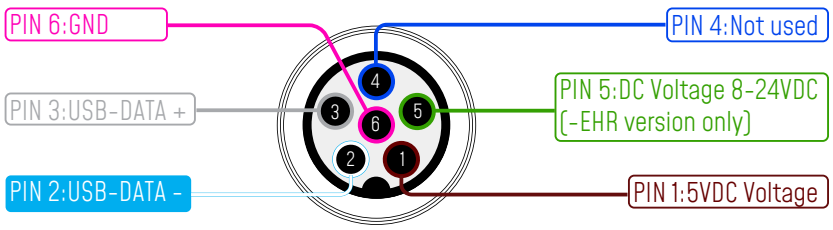
EXTERNAL POWER SUPPLY WIRING CODE

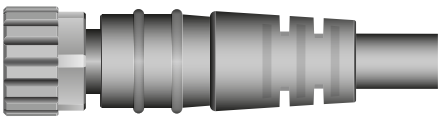
M8-6Pins socket (Male, A-Coding) - PIN ASSIGNATION



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





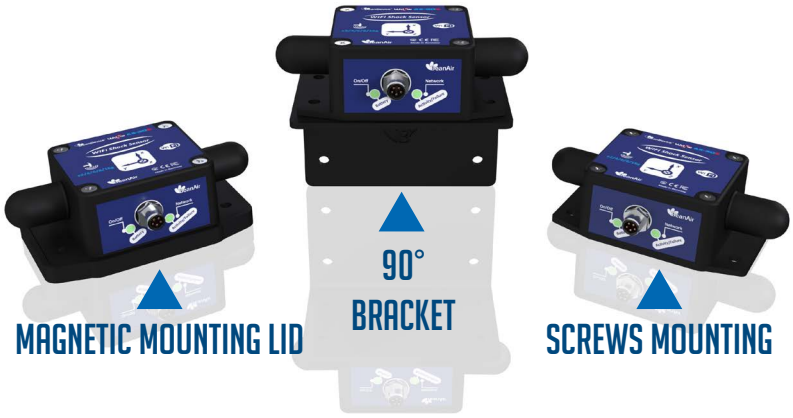
M8-6Pins Plug

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

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