

# BeanDevice® WILLOW® AX-3DS

## ULP (ULTRA-LOW-POWER) WIRELESS IOT SHOCK SENSOR

MADE IN GERMANY

2year  
Warranty

WiFi  
CERTIFIED

CE FC

001A-08148

PRODUCT VIDEO



USER GUIDE



QUICK START



MECHANICAL DRAWING



STEP FILE



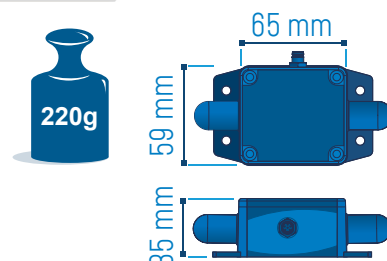
MQTT TOOLKIT FOR IOT  
SENSOR



### MAIN FEATURES

- ULP (Ultra Low Power) Wifi technology
- Scalable shock measurement range:  $\pm 2/4/8/16g$
- 772900 data logs per sensor channel (streaming mode)
- SSD (Smart Shock Detection) allows to trigger data acquisition on a shock detection
- Waterproof (IP67/NEMA 6) and Rugged aluminum casing,
- Over the Air Firmware Upgrade via WIFI
- Virtual Inclinometer

- USB 2.0 link for device configuration (including firmware upgrade)
- Store and Forward+: lossless data transmission
- Excellent radio link relying on the radio antenna diversity designed by Beanair®
- IIOT Ready: integrates MQTT data exchange, an open-source Internet of Things (IIOT) protocol
- Smart and Flexible power supply :
  - Internal Rechargeable Lithium Battery (780 mAh)
  - External 5VDC power supply compatible with both USB power and solar energy harvesting

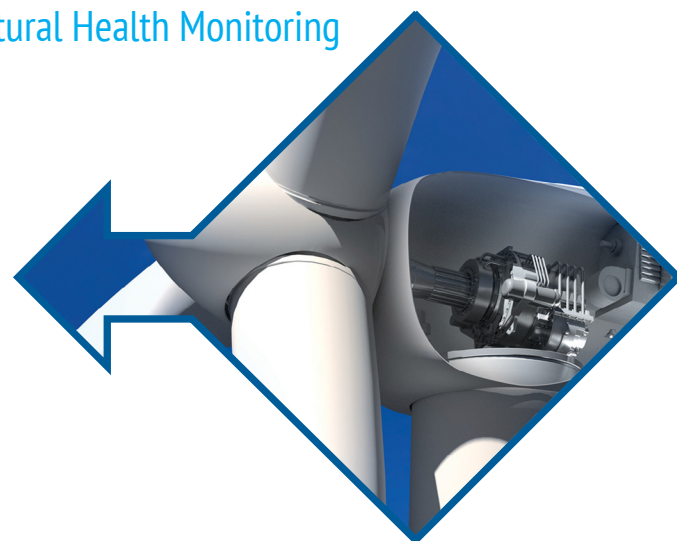


## APPLICATIONS



Structural Health Monitoring

Condition Monitoring



Test and Measurement



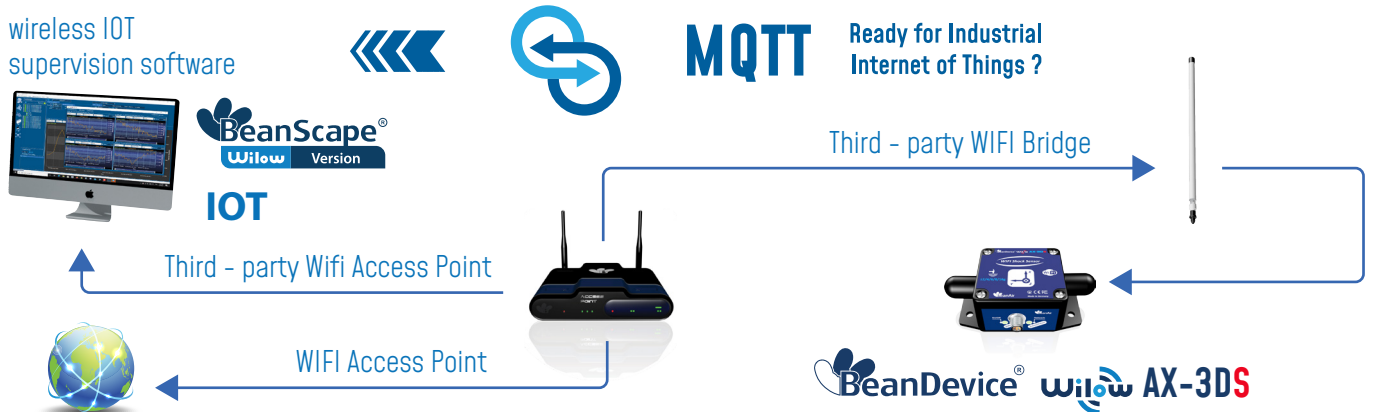
## AN OPEN-STANDARD & INDUSTRIAL WIFI TECHNOLOGY

- 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



**BeanDevice® WILOW® AX-3DS**

**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**



The store and forward technique works by storing the message transmitted by the **BeanDevice® Wilow** (wireless DAQ/sensor) 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-AX3DS-**(MO)**-**(EXPWR)**-**(HG)**

##### MO - Mounting option

EHR – Energy-harvesting power option, compatible with solar input (8–24 VDC).  
Leave blank if not required. Without the EHR option, the sensor can be powered using an external +5 VDC supply.

##### -HG - High Gain External Antenna 5dBi

Leave it blank if Low Profile Radome Antenna is requested

##### BR - 90° Mounting bracket

##### M - Magnetic Mounting

##### Example 1: BND-WILOW-AX3DS-BR

Wireless Shock sensor with 90° Mounting bracket

##### Example 2: BND-WILOW-AX3D-M

Wireless Shock sensor with magnet mounting

##### Example 3: BND-WILOW-AX3D-EHR-HG

Wireless Shock sensor , with auxiliary external Power supply compatible with Energy Harvesting 8-24VDC, High Gain Antenna

### SHOCK SENSOR SPECIFICATIONS

|                                                          |                                                                                                                                           |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Shock Sensor technology                                  | MEMS technology                                                                                                                           |
| Shock sensor range                                       | ±2g/±4g/±6g/±8g/±16g dynamically selectable from the BeanScope® Wilow® software                                                           |
| Sensitivity                                              | ±2g range: 0.06 mg/digit<br>±4g range: 0.12 mg/digit<br>±6g range: 0.18 mg/digit<br>±8g range: 0.24 mg/digit<br>±16g range: 0.48 mg/digit |
| Typical non-linearity                                    | ±0.15% on the FS                                                                                                                          |
| Analog to Digital converter                              | 16-bit with temperature compensation                                                                                                      |
| Sensor frequency response (-3 dB)                        | DC to 800 Hz                                                                                                                              |
| Maximum sampling rate                                    | 1.6 kSPS per axis                                                                                                                         |
| Noise spectral density                                   | 150 µg/√Hz                                                                                                                                |
| Sensitivity change Vs temperature                        | ±0,01% /°C                                                                                                                                |
| Zero-g level change vs temperature (max delta from 25°C) | ±0.5 mg/°C                                                                                                                                |
| Typical zero-g level offset accuracy                     | ±40 mg                                                                                                                                    |
| Anti-aliasing Hardware filter                            | Butterworth 2th order filter                                                                                                              |

### ADVANCED VIBRATION ANALYSIS TOOL (AVAILABLE ON BEANSOPE® WILOW® PREMIUM AND RA)

|                              |                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Software Filters             | <ul style="list-style-type: none"> <li>• Low-Pass Infinite Impulse Response Filter (IIR)</li> </ul>                                                                                                                                                                                                                                                                 |
| Fast Fourier Transform (FFT) | <ul style="list-style-type: none"> <li>• Online and Offline FFT</li> <li>• FFT Window Type ( offline FFT only):<br/>Recangular/Hamming/Hann/Blackman/Blackman Harris/<br/>Gaussian/Kaiser/Taylor/Triangular/Flatop/Bartlett Hann</li> <li>• Automatic FFT Report (Email Transmission)</li> <li>• Configurable Number of FFT points , 128 to 32768 points</li> </ul> |

## TECHNICAL SPECIFICATIONS

### REMOTE CONFIGURATION PARAMETERS

|                                                    |                                                                                                                                                                                                                                                                                        |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data Acquisition mode<br>(SPS = sample per second) | <ul style="list-style-type: none"> <li>• Low Duty Cycle Data Acquisition (LDCDA) Mode: 1s to 24 hour</li> <li>• Alarm -Low duty cycle: 1s to 24 hour</li> <li>• Streaming mode : 100 SPS by default</li> <li>• Streaming with event-trigger (SET) Mode : 100 SPS by default</li> </ul> |
| Sampling Rate (in streaming mode)                  | Minimum: 1 SPS<br>Maximum: 1.6 kSPS per axis                                                                                                                                                                                                                                           |
| Alarm Threshold                                    | High and Low Levels alarms                                                                                                                                                                                                                                                             |
| Power Mode                                         | Battery Saver & Active power modes                                                                                                                                                                                                                                                     |

### 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<br>TCP: 13 Mbps                                                                                                                                                                                    |
| RF Characteristics      | ISM 2.4GHz. Antenna diversity designed by Beanair®                                                                                                                                                              |
| TX Power                | 18 dBm @ 1 DSSS<br>14.5 dBm @ 54 OFDM                                                                                                                                                                           |
| Rx Sensitivity          | -95.7 dBm @1 DSSS<br>-74.0 dBm @54 OFDM                                                                                                                                                                         |
| Maximum Radio Range     | With High Gain Antenna : 100-200m (L.O.S), 40-80m (N.L.O.S.)<br>With Integrated Radome Antenna : 50-100m (L.O.S), 20-50m (N.L.O.S.)<br>In both case Radio Range can be extended by adding Wifi Bridge/Repeater" |
| Antenna                 | Antenna diversity :<br>High Gain Antenna : 2 x N-Type Antenna 5dBi<br>Radome Antenna : 2 x Antenna 1.9 dBi                                                                                                      |
| OTA                     | Over the air firmware upgrade via WIFI                                                                                                                                                                          |

### USB SPECIFICATIONS

|                   |                                                                                                                                                                    |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| USB standard      | USB 2.0                                                                                                                                                            |
| Data Rate         | Full speed operation(12MB/s)                                                                                                                                       |
| Related functions | <ul style="list-style-type: none"> <li>• Firmware update</li> <li>• Measurement logs download</li> <li>• Wifi &amp; Data Acquisition mode configuration</li> </ul> |

## TECHNICAL SPECIFICATIONS

### EMBEDDED DATA LOGGER

|                           |                                                      |
|---------------------------|------------------------------------------------------|
| Storage Capacity          | 772900 data logs per sensor channel (streaming mode) |
| Wireless data downloading | 3 minutes to download the full memory (average time) |

### ENVIRONMENTAL AND MECHANICAL

|                              |                                                                                                                                                                                                                                     |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Casing                       | Aluminum casing<br>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 | <ul style="list-style-type: none"> <li>• CE Labelling Directive R&amp;TTE (Radio) ETSI EN 300 328(Europe)</li> <li>• FCC (North America)</li> <li>• ARIB STD-T66 Ver. 3.6 (Japan)</li> <li>• ROHS - Directive 2002/95/EC</li> </ul> |

### 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 hereafter and battery life simulation toolkit available on our website                                                                                      |
| External power supply      | <ul style="list-style-type: none"> <li>• USB Power supply 5V</li> <li>• Optional auxiliary external Power Supply: 8VDC to 24VDC compatible with solar energy harvesting</li> </ul> |

## TECHNICAL SPECIFICATIONS

### INCLUDED ACCESSORIES

|                               |                                                                                          |
|-------------------------------|------------------------------------------------------------------------------------------|
| M8 plastic cap                | 1pcs, <a href="#">Ref: WL-PC</a>                                                         |
| M8 to USB cable               | 1pcs M8-6pins to USB Cable, 2 meters length.<br><a href="#">Ref: WL-CBL-M8-6P-USB-2M</a> |
| Magnet for power on/power off | 1pcs Magnet. <a href="#">Ref: WL-MGN</a>                                                 |
| Wall mounting kit             | 4 pcs M5 screws+ Locknut. <a href="#">Ref: WL-WIFI-SCMKIT</a>                            |

### OPTIONS (NOT INCLUDED)

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power-supply                           | Wall plug-in, Switchmode power Supply 12V @ 1.25A with USB plug <a href="#">Ref : WL-USB-5V-PWR</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| M8 Cable                               | M8-5Pins Cable , cable length :<br>- 2 meters. <a href="#">Ref: WL-CBL-M8-6P-2M</a><br>- 5 meters. <a href="#">Ref: WL-CBL-M8-6P-5M</a>                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| WIFI AP/Repeater (wifi link extension) | -Wireless AP/Repeater with an integrated N-Type RF connector + High Gain Antenna<br>-Casing : Polycarbonate Waterproof casing<br>-Dimensions: 190 x 46 mm<br>Weight: 196 g<br>-Antenna Connector: N-Type Connector (male)<br>-Power Supply: 24V, 0.5A PoE Adapter (included)<br>-Power Method: Passive Power over Ethernet<br>-Max. Power Consumption: 6 Watts<br>-Operating Temperature: -40 to 80° C<br>-Shock and Vibration: ETSI300-019-1.4<br><a href="#">Ref: WL-AP-UBIQ-TIT-7DBI</a> for 7dBi Antenna<br><a href="#">Ref: WL-AP-UBIQ-TIT-9DBI</a> for 9dBi Antenna |
| Solar Panel                            | Polycrystalline Solar Panel for BeanDevice® Wilow® power supply<br>Maximum Power : 3W<br>Optimum operating Voltage: 12 VDC<br>Dimension: 235 mm x 135 mm x 17mm<br>Protection Frame: Aluminum Frame , Waterproof IP67<br>Length : 2 meters ( <a href="#">Ref: WL-SLP-3W-2M</a> ) or 5 meters ( <a href="#">Ref: WL-SLP-3W-5M</a> ) with M8 plug for a direct to connection to the BeanDevice® Wilow®<br>Country of origin: solar panel from China, assembled and tested in Germany                                                                                        |
| Calibration certificate                | Calibration certificate provided by Beanair GmbH<br>A static calibration method is used on a granite surface plate DIN876 ( <a href="#">Ref: WL-CERT-CAL</a> )                                                                                                                                                                                                                                                                                                                                                                                                            |

## TECHNICAL SPECIFICATIONS

### OPTIONAL ACCESSORIES AND SERVICES

#### Solar Panel

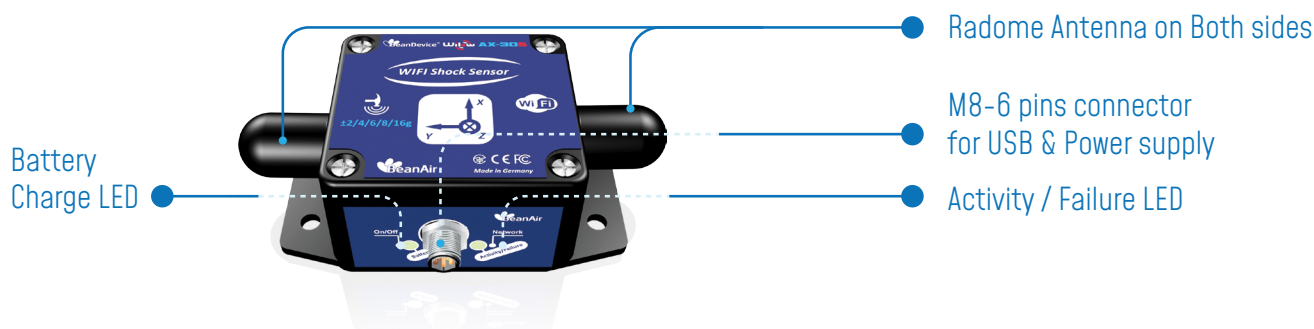
Polycrystalline Solar Panel for BeanDevice® Willow® power supply  
Maximum Power : 5W , Optimum operating Voltage: 12 VDC  
Protection Frame: Aluminum Frame , Waterproof IP67  
The 3W solar panel works only with LowDutyCycle & Survey/Alarm data acquisition with battery saver mode enabled  
The 5W solar panel works only with LowDutyCycle, Survey/Alarm & streaming burst data acquisition 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](#)

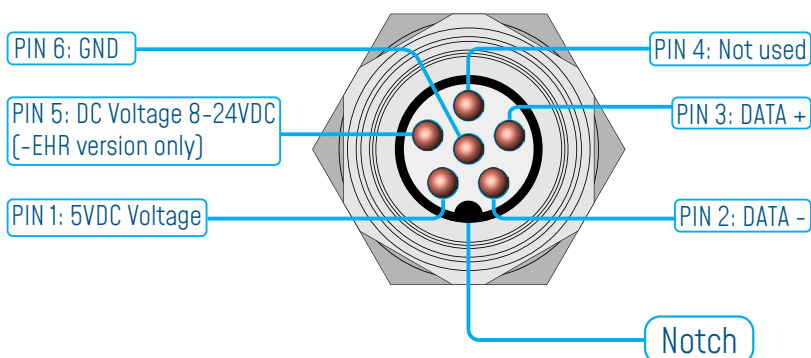
**BeanDevice® WILOW® AX-3DS**

**BEANDEVICE® WILOW® FRONT VIEW**



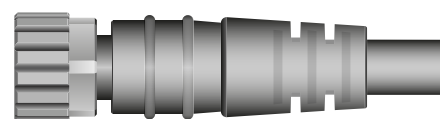
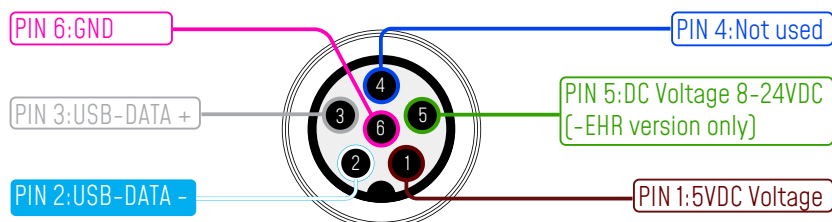
**EXTERNAL POWER SUPPLY WIRING CODE**

**M8-6Pins socket [ Male, A-Coding] - PIN ASSIGNATION**



| Interface Name                         | M8 Pin assignment |
|----------------------------------------|-------------------|
| 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**

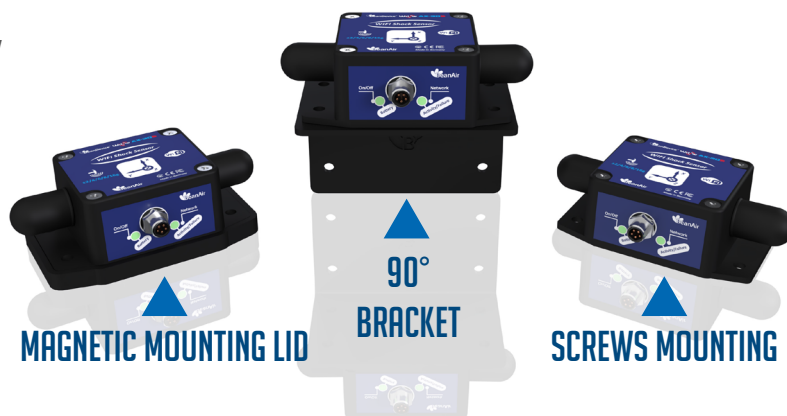
| Interface Name        | 5VDC Voltage | USB DATA - | USB DATA + | Not used | DC Voltage 8-24VDC [-EHR version only] | GND   |
|-----------------------|--------------|------------|------------|----------|----------------------------------------|-------|
| M8 Pin assignment     | PIN 1        | PIN 2      | 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



## CONTACT US

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