BeanAir
WIRELESS IIOT SENSORS

BeanDevice® WILOW® HI-INC

ULP (ULTRA-LOW-POWER) WIRELESS IOT INCLINOMETER

PRODUCT VIDEO

USER GUIDE

QUICK START

MECHANICAL DRAWING

STEP FILE

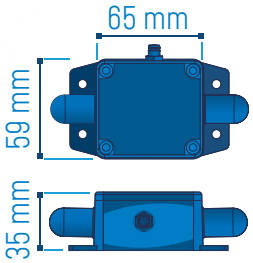
MQTT TOOLKIT FOR IOT SENSOR

2year Warranty

MADE IN GERMANY

001A-08148

WiFi CERTIFIED



MAIN FEATURES

- ULP (Ultra Low Power) Wifi technology
- High precision bi-axis inclinometer ±15° or ±30° with great measurement repeatability (±0.003° on full Scale for ±15B version)
- Embedded data logger: up to 5 million data points (with events dating)
- Waterproof (IP67|NEMA 6) and Rugged aluminum casing,
- Over the Air Firmware upgrade via WIFI
- 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 (IOT) protocol
- USB 2.0 link for device configuration (including firmware upgrade)
- 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

Land Surveying

Test and Measurment

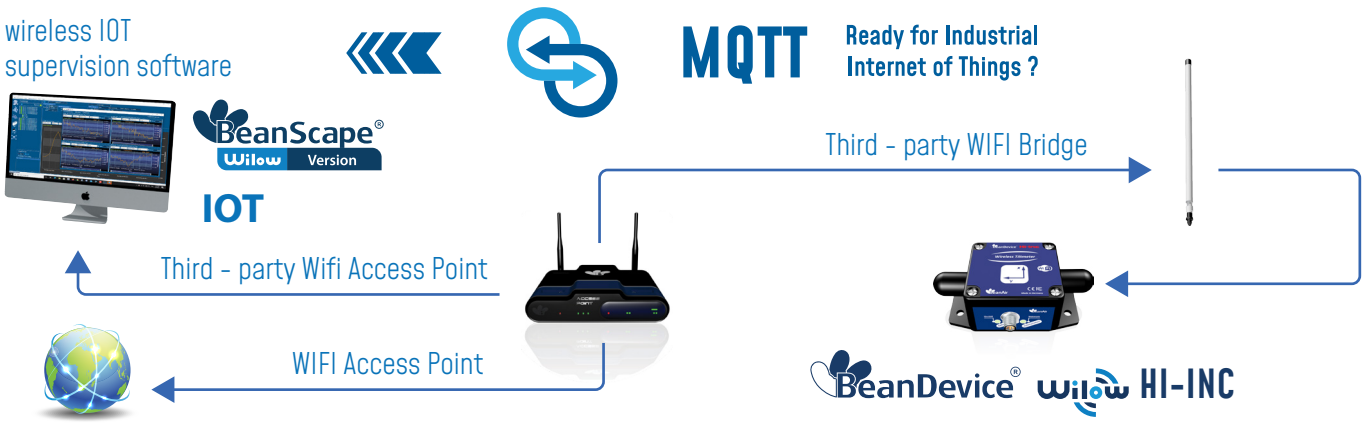
Structural Health Monitoring

AN OPEN-STANDARD & INDUSTRIAL WIFI TECHNOLOGY

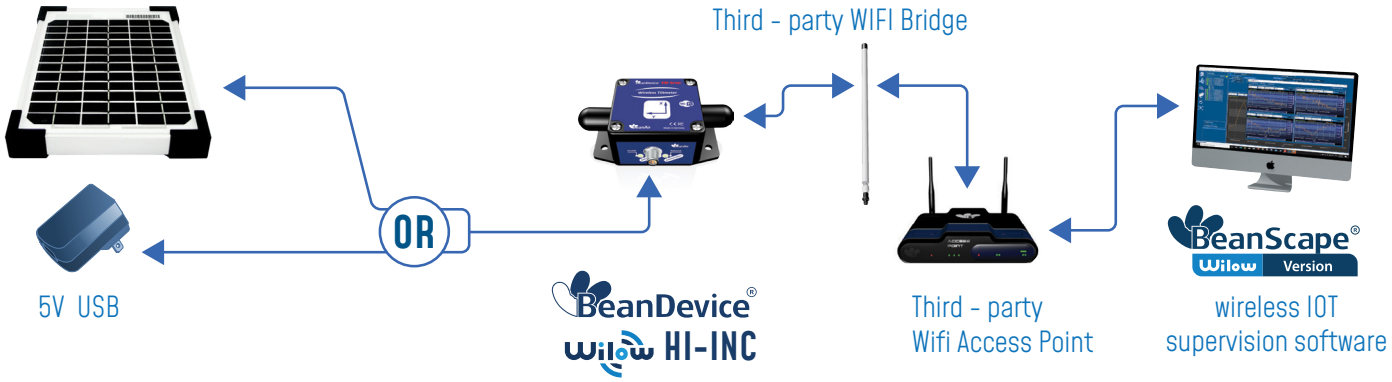
- ULP (Ultra Low power) Wifi – IEEE 802.11 b/g/n
- Lower total cost of ownership-works with existing access points
- Large installed base and consequent broad-based familiarity with configuration, use and troubleshooting at the physical and link layers
- Easy provisioning & IT friendly : our ULP wifi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

BeanDevice® WILOW® HI-INC

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 HI-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-Hi-INC -MR-MO-EXPWR

MR - Measurement Range:	MO - Mounting option	EXPWR -Auxiliary External Power supply
15B: bi-axis ±15°	BR - 90° Mounting bracket	
30B: bi-axis ±30°	M - Magnetic Mounting	EHR - Power supply compatible with solar energy harvesting 8-24VDC

Example 1: BND-WILOW-WIFI-HI-INC-15B-BR - ULP WIFI bi-axis inclinometer (measurement range ±15°) with 90° bracket mounting
Example 2: BND-WILOW-WIFI-HI-INC-30B-M - ULP WIFI bi-axis inclinometer (measurement range ±30°) with magnetic mounting
Example 3: BND-WILOW-WIFI-HI-INC-15B-EHR - ULP WIFI bi-axis inclinometer (measurement range ±15°) with auxiliary external Power supply compatible with Energy Harvesting 8-24VDC

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
Calibration	Factory calibrated with calibration settings backed up on the sensor Flash memory. Calibration method used : Back-to-back calibrated with a reference sensor. Sensors can be re-calibrated by the user.

TECHNICAL SPECIFICATIONS

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: 2 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 TCP: 13 Mbps
RF Characteristics	ISM 2.4GHz. Antenna diversity designed by Beanair®
TX Power	18 dBm @ 1 DSSS 14.5 dBm @ 54 OFDM
Rx 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)

TECHNICAL SPECIFICATIONS

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

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

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-SCMKIT

OPTIONAL ACCESSORIES AND SERVICES	
Power-supply	Wall plug-in, Switchmode power Supply 12V @ 1,25A with USB plug. Provided with power adapter: North America/Japan/China or Europe or UK or Australia REF: WL-USB-5V-PWR
M8 Cable	M8-6Pins Cable, Waterproof (IP67) and shielded cable , cable length : • 2 meters. Ref: WL-CBL-M8-6P-2M • 5 meters. Ref: WL-CBL-M8-6P-5M
WIFI AP / Repeater / Bridge (wifi link extension)	Wireless AP/Repeater with an integrated N-Type RF connector + High Gain Antenna Wifi Access Point/Bridge/Repeater Integrated N-Type RF connector + High Gain Antenna with 9 dBdi of Gain. Casing : Outdoor UV Stabilized Plastic, Dimensions (w/o antenna): 190 x 46 mm, Weight: 196 g Antenna Connector: N-Type Connector (male), Power over Ethernet power supply (24VDC) Max. Power Consumption: 6 Watts , Operating Temperature: -40 to 80° C Shock and Vibration: ETSI300-019-1.4 Included: 1 x AC to 24VDC POE Power supply 1 x High Gain Antenna 9dBi 1 x Power adapter (EU or UK or US) Ref: WL-AP-UBIQ-TIT-7DBI for 7dBi Antenna Ref: WL-AP-UBIQ-TIT-9DBI for 9dBi Antenna
Standalone solar power system	High efficiency solar panel with Solar charging controller and Lead-acid battery Ref.: X-SOL-7AH-20W-5V-5M for USB power Ref.: X-SOL-7AH-20W-12V-5M for- EHR VERSION Ref: X-SOL-14AH-20W-4CH-5V-5M for USB power Ref: X-SOL-14AH-20W-4CH-12V-5M for -EHR VERSION Ref: X-SOL-14AH-80W-4CH-5V-5M for USB power Ref: X-SOL-14AH-80W-4CH-12V-5M for -EHR VERSION More options and references are available on X-SOLAR datasheet
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

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	32 days
Battery Saver mode Enabled, Measurement Cycle every 5 minutes	66 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	50 days
Wakes up every 1 hour, Sample at 500Hz during 20s	33 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)

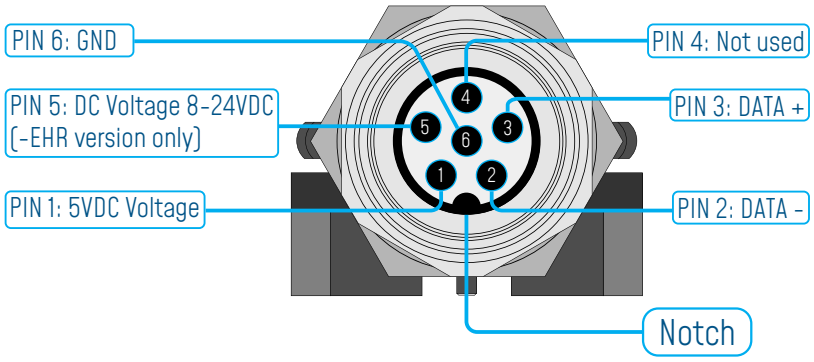
Conditions: 25degC	Battery Life with Fast Measurement Rate (Continuous Streaming)- Internal Battery
Sampling Rate 2000Hz	11hours 7 minutes
Sampling Rate 1000Hz	12hours 32 minutes
Sampling Rate 100Hz	16hours 28 minutes

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

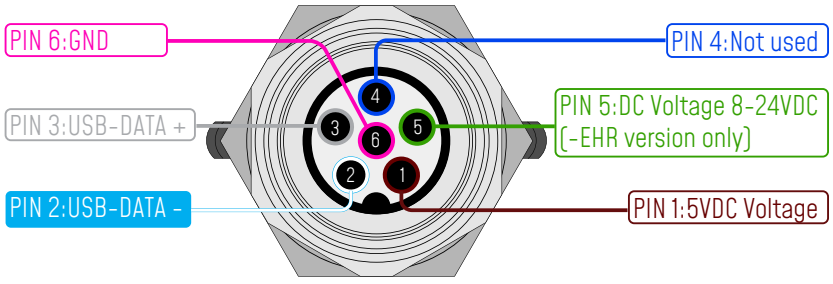
EXTERNAL POWER SUPPLY WIRING CODE

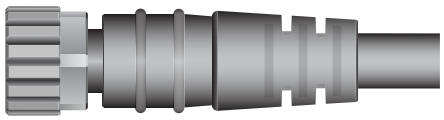
M8-6Pins socket (Male, A-Coding) - PIN ASSIGNATION



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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