

Wilow[®] wireless sensors

	DOCUMENT			
Document ID	UM_RF_07	Version	V3.6.2	
External reference		Date	12/11/2021	
Author	Fahd ESSID, Application/Support E	ngineer		
		Project Code		
Document's name	Wilow WIFI sensor User Manual			

	VALIDATION		
Function	Destination	For validation	For info
Writer	Fahd ESSID	✓	
Reader	Farouk Bouali	✓	
Validation	Antje Jacob		\checkmark

DIFFUSION			
Function	Destination	For action	For info
Reader n°1	Antje Jacob, Production Manager	✓	
Reader n°2	Fahd Essid, Application Engineer	✓	

			UPDATES
Version	Date	Auteur	Evolution & Status
1.0	12/10/2016	Mootaz Amouri	First version of the document
1.1	21/05/2017	Mohamed-Yosri Jaouadi	 Info about datalogger added
1.2	08/06/2017	Aymen jegham	 SNTP description MQTT description Log file
1.3	17/07/2017	Aymen jegham	Power Mode management
1.4	09/08/2017	Aymen jegham	 SMTP FFT Store & Forward+
1.5	04/09/2017	Aymen jegham	Stand Alone option
1.6	08/07/2018	Youssef Shahine	More descriptions added about FFT

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	UPDATES			
1.7	23/07/2018 15/10/2018	Aymen jegham Fahd Essid	 Information about BeanDevice[®] X-INC added Appendix 1: DAQ mode deleted Online and offline data analysis tool added LEDS Description updated Troubleshooting update 	
1.9	14/12/2018	Youssef Shahine	 New Wiring code update (M8-6Pins specified) 	
2.0	18/02/2019	Fahd Essid	 Vocabulary update Commissioning mode deleted Offline & Online Data analyses updated SNTP information updated Alarm management updated Right-click functionality added Network configuration updated Graphical display added Sensor channel configuration updated Last will testament deleted Subscribe/Clear session deleted Screenshots updates 	
2.0.1	29/04/2019	Mohamed Bechir Besbes	Weblinks update	
2.0.2	16/05/2019	Mohamed Bechir Besbes	Power Supply description update	
2.1	13/06/2019	Fahd Essid	 Vocabulary update Online Data analysis updated Real Time FFT/Velocity updated WiFi RF Region update Shock Sensor specification update 	
2.2	27/06/2019	Fahd Essid	Offline Data Analysis updated	
2.3	19/09/2019	Bassem YAHYA	Time out error during configuration descriptionthe Data acquisition duration section update	
2.3.1	02/10/2019	Bassem YAHYA	Alarm and alert order update	
2.3.2	08/10/2019	Bassem YAHYA	IIR Filters further notes	
2.4	23/10/2019	Bassem YAHYA	 Math result feature Configuring the sensor wirelessly (AP mode) 	
2.5	11.11.2019	Shimon Abadi	 Wiring code updated (M8 Plug and Socket) 	

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	UPDATES				
2.6	21/02/2020	Seddik ATTIG	 Display more info about the Gmail and Hotmail emails configuration 		
2.7	30/03/2020	Seddik ATTIG	 Software filters SSL/TLS Configuration over MQTT Screenshot's update 		
2.8	02/04/2020	Seddik ATTIG	 Alarm Management Notification Management Power management 		
2.9	03/04/2020	Seddik ATTIG	Online/Offline Data Analysis		
3.0	06/04/2020	Seddik ATTIG	Tools Tab		
3.1	20/04/2020	Seddik ATTIG	Videos links update		
3.2	29/06/2020	Seddik ATTIG	PPV Restrictions		
3.3	27/10/2020	Seddik ATTIG	 Online Data Analysis tool BeanDevice[®] Wilow[®] Wiring code updated 		
3.4	28/05/2021	Seddik ATTIG	Update the Devices technical specifications		
3.5	19/08/2021	Seddik ATTIG	Advanced Calibration process		
3.6	02/09/2021	Seddik ATTIG	Virtual Tilt Calibration & features		
3.6.1	27/09/2021	Seddik ATTIG	Update the advanced calibration sectionAdd import option to the calibration section		
3.6.2	12/11/2021	Seddik ATTIG	Links updated		

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1. TECHNICAL SUPPORT

For general contact, technical support, to report documentation errors and to order manuals, contact *Beanair Technical Support Center* (BTSC) at:

tech-support@Beanair.com

For detailed information about where you can buy the Beanair equipment/software or for recommendations on accessories and components visit:

www.Beanair.com

To register for product news and announcements or for product questions contact Beanair's Technical Support Center (BTSC).

Our aim is to make this user manual as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Beanair appreciates feedback from the users of our information.

2. VISUAL SYMBOLS DEFINITION

Symbols	Definition
	<u>Caution or Warning</u> – Alerts the user with important information about Beanair wireless sensor networks (WSN), if this information is not followed, the equipment /software may fail or malfunction.
	<u>Danger</u> – This information MUST be followed if not you may damage the equipment permanently or bodily injury may occur.
1	<u>Tip or Information</u> – Provides advice and suggestions that may be useful when installing Beanair Wireless Sensor Networks.

3. ACRONYMS AND ABBREVIATIONS

AES	Advanced Encryption Standard
ССА	Clear Channel Assessment
CSMA/CA	Carrier Sense Multiple Access/Collision Avoidance
GTS	Guaranteed Time-Slot
Ksps	Kilo samples per second
LLC	Logical Link Control
LQI	Link quality indicator
LDCDA	Low duty cycle data acquisition
МАС	Media Access Control
PAN	Personal Area Network
PER	Packet error rate
RF	Radio Frequency
SD	Secure Digital
WSN	Wireless sensor Network

4. DOCUMENT ORGANISATION



5. BEANDEVICE® WILOW® PRODUCT LINE DESCRIPTION



- It is highly recommended to read all the user manual related to Beanair software & equipment (BeanScape® and BeanDevice® Wilow®) before getting start your BeanDevice® Wilow®.
- ✓ Use only accessories supplied by Beanair (batteries, power supply unit, and antenna). Use of other materials may damage the BeanDevice[®] Wilow[®];
- ✓ Only Beanair is qualified to make changes on the BeanDevice[®] WiLow[®];
- ✓ Don't try to remove the adhesive label on the product; it contains important information such as the MAC address or sensor measurement range

5.1 ABOUT WILOW[®] PRODUCT LINE

WiLow[®] product line is designed for Structural Health monitoring (SHM), Condition Maintenance Monitoring (CMS) and Test and Measurement.

It comes with different types of sensor for dynamic measurements:

- BeanDevice[®] WiLow[®] AX-3D: WIFI Ultra Low Power accelerometer for vibration measurement
- BeanDevice[®] WiLow[®] HI-INC: WIFI Ultra Low Power inclinometer for tilt/slope measurement
- BeanDevice[®] WiLow[®] AX-3DS: WIFI Ultra Low Power shock sensor for shock monitoring
- BeanDevice[®] WiLow[®] X-INC: WIFI Ultra Low Power combo sensors (accelerometer, inclinometer and shock)

5.1.1 BeanDevice[®] WiLow AX-3D (WIFI Low Power accelerometer)

5.1.1.1 Main Features



Integrating the latest ULP (Ultra Low Power) Wi-Fi technology, the BeanDevice[®] WiLow AX-3D comes with outstanding features:

- ULP (Ultra Low Power) Wi-Fi Triaxial accelerometer based on MEMS Technology
- \bullet Open standard Wi-Fi technology IEEE 802.11 b/g/n (2.4 GHz frequency band)
- Maximum Radio Range: 200 m (L.O.S)
- Excellent radio link budget thanks to our antenna diversity innovative design
- Measurement range: ±2g or ±10g
- Very Low Noise density: 45 μg/VHz (±2g version), 100 μg/VHz (±10g version)
- Maximum sampling rate: 2 KSPS per axis

 \bullet 24-bit delta-sigma analog-to-digital with synchronous measurement channel and temperature compensation

- Non-contact actuation for faster and safer installation
- Embedded Data Logger: up to 5 million data points (with events dating)
- Integrated lithium-polymer rechargeable battery with industrial battery charger (USB-5V and 4.8-17.8VDC)
- Waterproof (IP67 | Nema 6) aluminum casing (dimensions Lxlxh: TBD, weight:TBD)
- USB 2.0 for device configuration and 5V power supply
- Automatic report meeting the DIN4150-3 standard (Excel, PDF and Word) with FFT, PPV and Velocity values
- Store and Forward+: Lossless data transmission with hard real-time

5.1.1.2 Applications

- ✓ Structural health monitoring
- ✓ Vibration analysis
- ✓ Inertial measurement
- ✓ Movement and Shock detection
- ✓ Test and Measurement

5.1.2 BeanDevice[®] WiLow[®] HI-INC (Wi-Fi Low Power Inclinometer)

5.1.2.1 Main features



Integrating the latest ULP (Ultra Low Power) Wi-Fi technology, the BeanDevice[®] WiLow[®] HI-INC comes with outstanding features:

- ULP (Ultra Low Power) Inclinometer based on MEMS Technology
- Open standard Wi-Fi technology IEEE 802.11 b/g/n (2.4 GHz frequency band)
- Maximum Radio Range: 200 m (L.O.S)
- Excellent radio link budget thanks to our antenna diversity innovative design
- Measurement range: ±15° or ±30° bi-axis
- MEMS Inclinometer with a high resolution 0.001° and a very high accuracy (±0.003° for ±15° version)
- Maximum sampling rate: 100 SPS per axis
- 24-bit delta-sigma analog-to-digital with synchronous measurement channel and temperature compensation
- Non-contact actuation for faster and safer installation
- \bullet Current consumption in sleep mode: 60 μA
- Embedded Data Logger: up to 5 million data points (with events dating)
- Integrated lithium-polymer rechargeable battery with industrial battery charger (USB-5V and 4.8-17.8VDC)
- Waterproof (IP67 | Nema 6) aluminum casing (LxWxh: 65x59x35mm, 220g)
- USB 2.0 for device configuration and 5V power supply
- Store and Forward+: Lossless data transmission with hard real-time

5.1.2.2 Applications

- ✓ Structural Health Monitoring
- ✓ Crane Monitoring
- ✓ Rail sleepers monitoring
- ✓ Test and measurement

5.1.3 BeanDevice® WiLow® AX-3DS (Wi-Fi Low Power Wireless shock sensor)

5.1.3.1 Main features



Integrating the latest ULP (Ultra Low Power) Wi-Fi technology, the BeanDevice[®] WiLow[®] AX-3DS comes with outstanding features:

- ULP (Ultra Low Power) Wi-Fi accelerometer sensor dedicated to shock detection with built-in data logger
- \bullet Open standard Wi-Fi technology IEEE 802.11 b/g/n (2.4 Ghz frequency band)
- Maximum Radio Range: 200 m (L.O.S)
- Excellent radio link budget thanks to our antenna diversity innovative design
- Scalable measurement range: ± 2/4/8/16g
- Maximum sampling rate: 1.6 KSPS per axis
- Very Low Noise density: 150 μg/√Hz
- Non-contact actuation for faster and safer installation
- Current consumption in sleep mode: 120 uA
- Embedded Data Logger: up to 5 million data points (with events dating)
- Integrated lithium-polymer rechargeable battery with industrial battery charger (USB-5V and 4.8-1VDC)
- Waterproof (IP67 | Nema 6) aluminum casing (dimensions Lxlxh: 59x65x35)
- USB 2.0 for device configuration and 5V power supply

5.1.3.2 Applications

- Health and usage monitoring systems (HUMS)
- ✓ Shock measurement on vehicles & trains
- Transportation Monitoring
- ✓ Drop testing
- Crash and impact testing
- ✓ Ride Quality Measurement

5.1.4 BeanDevice[®] WiLow[®] X-INC (Wi-Fi Low Power combo sensors: accelerometer, inclinometer and shock sensor)



5.1.4.1 Main features

Integrating the latest ULP (Ultra Low Power) Wi-Fi technology, the BeanDevice[®] WiLow[®] X-INC comes with outstanding features:

- ULP (Ultra Low Power) Wi-Fi accelerometer sensor dedicated to shock detection with built-in data logger
- Open standard Wi-Fi technology IEEE 802.11 b/g/n (2.4 GHz frequency band)
- Maximum Radio Range: 200 m (L.O.S)
- Excellent radio link budget thanks to our antenna diversity innovative design
- Maximum sampling rate: 2 KSPS per axis (acceleration)
- Very Low Noise density: 45µg/VHz(acceleration)
- Non-contact actuation for faster and safer installation
- Current consumption in sleep mode: <100 ua
- Embedded Data Logger: up to 5 million data points (with events dating)
- Integrated lithium-polymer rechargeable battery with industrial battery charger (USB-5V and 4.8-1VDC)
- Waterproof (IP67 | Nema 6) aluminum casing (dimensions Lxlxh: 59x65x35)
- USB 2.0 for device configuration and 5V power supply

5.2 ACCESSORIES DESCRIPTION

In addition to the BeanDevice[®] WiLow[®] you will find inside the packet a list of accessories.

- ✓ USB to M8-5pin cable adapter
- ✓ Magnet
- ✓ 4 screws + Locknut
- ✓ Plastic cap



5.2.1 USB to M8 Cable

The cable contains on the first side a M8-5 Pins standard plug that is used for connecting the USB cable to the BeanDevice[®] Wilow[®] and on the second side a USB connector to be inserted on the PC.



Figure 1 : M8 to USB cable (2 meters Length)

✓ USB power supply
✓ USB data link
✓ 2 meters of length

USB interface is dedicated to:

- Firmware update
- Power supply the BeanDevice[®] through the USB power line (+5VDC)

M8 to USB cable is provided with your BeanDevice® WiLow®:



Figure 2: M8 to USB Cable

5.2.2 Magnet (for Power ON/Power OFF and Network operation)

A magnet is used to command the BeanDevice[®] WiLow[®]:

- Power ON / Power Off the BeanDevice[®]
- Perform a network reset

All what you have to do is to hold the magnet close to one of the two white circles as shown on the next picture:



Figure 3 : Power ON/Power off and Network positions

5.2.3 Screws and Locknut

Inside the packet, you have to find 4 screws and 4 locknuts that you can use to mount the BeanDevice[®] WiLow[®] on your structure.



Figure 4: Screws and Locknut

5.3 TECHNICAL SPECIFICATIONS

5.3.1 BeanDevice[®] WiLow[®]: AX-3D Sensor Characteristics

5.3.1.1 Accelerometer sensor specifications

Main accelerometer specifications	
Accelerometer technology	High precision accelerometer based on MEMS technology
Measurement range	Two versions: ±2g and ±10g
Sensitivity	±2g Version : 660 mV/g ±10g version: 200 mV/g
Typical non-linearity	±0.1% FS
Analog to Digital converter	24-bit delta-sigma with temperature compensation Synhcronuous measurement channel
Sensor frequency response (-3 dB)	DC to 800 Hz
Maximum sampling rate	2 kSPS per axis
Noise spectral density	±2g Version : 45 μg/√Hz ±10g version: 100 μg/√Hz
Zero-g Offset Variation from RT over Temp	±2g Version : ±0.2 mg/°C ±10g version: ±0.1 mg/°C
Sensitivity Variation from RT over Temp	±2g Version : ±0.01 %/°C (XY) , ±0.02 %/°C (Z) ±10g version: ±0.01 %/°C
Offset Ratiometric Error	±2g Version : 4mg ±10g version: ±0.2% (XY) , ±0.1% (Z)
Sensitivity Ratiometric Error	±2g Version : ±1.25 % (X-Y) , ±0.2 % (Z) ±10g Version : ±1.6% (X-Y) , ±0.2 % (Z)
Cross Axis Sensitivity	0.02
Onboard temperature sensor	Range -40°C to +65°C , accuracy ±1°C
Anti-aliasing Hardware filter	Butterworth 2th order filter

Table 1 : Accelerometer Sensor Specifications

5.3.1.2 <u>Sensor architecture</u>



Figure 5: Accelerometer sensor design

The Shock sensor is only available on the AX-3D which comes with a Hardware version 2.0 There is no Shock sensor on the AX-3D which comes with a Hardware version 2.1

5.3.1.3 MEMS Accelerometer

The BeanDevice[®] WiLow[®] AX-3D integrates a tri-axis, silicon micromachined accelerometer with a full-scale output range of ±2g, ±10g.

Acceleration sensing is based on the principle of a differential capacitance arising from accelerationinduced motion of the sense element, which further utilizes common mode cancellation to decrease errors from process variation, temperature, and environmental stress. The sense element is hermetically sealed at the water level by bonding a second silicon lid wafer to the device using a glass frit.

5.3.2 BeanDevice[®] WiLow[®] HI-INC: Sensor Characteristics

5.3.2.1 Inclinometer sensor specifications

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

Table 2: Inclinometer sensor specifications

5.3.2.2 <u>Sensor Architecture</u>



Figure 6: BeanDevice® WILO® HI-INC - MEMS Sensor Architecture

The BeanDevice[®] WiLow[®] HI-INC integrates a 3D-MEMS-based single axis inclinometer that uses the differential measurement principle. The high calibration accuracy combines extremely low temperature dependency, high resolution and low noise together with a robust sensing element design, to make the BeanDevice[®] WiLow[®] HI-INC an ideal choice for high accuracy leveling instruments.

The inclinometer used on the BeanDevice[®] WiLow[®] HI-INC ±15° and ±30° provides a differential output: the measuring axes of the sensing elements are mutually opposite in direction, thus providing two inclination signals which can be differentiated externally by our wireless processor.

The differential measurement principle removes all common mode measurement errors. Most of the error sources have similar effects on both sensing elements. These errors are removed from measurement result during signal differentiation. The differential measurement principle gives very efficient noise reduction, improved long term stability and extremely low temperature dependency.

5.3.2.3 Accuracy considerations

Main error components are:

Zero Point Error

In most cases the most significant error component is the zero-point error. In the range -25 ... +85°C it is $\pm 0.057^{\circ}$ (6 δ limit) and the temperature dependence is typically $\pm 0.002^{\circ}/^{\circ}$ C. The room temperature variation can be reduced by calibration at the instrument level and the effects of the temperature dependence dealt with by using temperature compensation.

Error Caused by the SIN Function:

When used as an inclinometer, the output of the accelerometer is proportional to 1g * SIN (Phi + Phi0), where Phi is the inclination angle and Phi0 the internal mounting error. The internal mounting error is a maximum of $\pm 2.9^{\circ}$, corresponding to ± 50 mg. This error is of importance when using large inclination angle amplitudes and is seen as an addendum to the non-linearity (Typically ± 5 mg in ± 0.5 g and ± 10 mg in ± 1 g).

Cross-axis Sensitivity

The cross-axis sensitivity (4%) shows how much perpendicular acceleration or inclination is coupled to the signal.

Rectification of Vibration

The effect of high frequency vibration is strongly suppressed by the over-damped sensing element (upper cut-off freq. $f_{-3dB} = 0 \dots 10$ Hz). In an extreme case, high amplitude vibrations (>5g) may cause a measurable zero-point shift.

5.3.2.4 Offset & temperature dependencies

To achieve the best possible accuracy, an internal temperature sensor is used for sensitivity temperature dependency compensation. By using an additional 3rd order polynomial compensation curve based on average sensitivity temperature dependency curve and temperature measurement information, it is possible to reduce sensitivity temperature dependency from:

✓ 0.013%/°C down to 0.005%/°C for the BeanDevice[®] HI-INC WiLow[®] ±15°and ±30° versions

Typical offset and sensitivity temperature dependencies of the inclinometer sensor are presented in following diagrams. These results represent the typical performance of inclinometer sensor components. The mean value and 3 sigma limit (mean ± 3× standard deviation) and specification limits are presented in following diagrams. The 3 sigma limits represent 99.73% of the inclinometer sensor population.



Temperature dependency of the inclinometer sensor offset (differential output)



5.3.3 BeanDevice® WiLow® AX-3DS: Sensor Characteristics

5.3.3.1 Shock detection sensor specifications

Shock sensor specifications	
Shock Sensor technology	MEMS technology
Shock sensor range	±2g/±4g/±6g/±8g/±16g dynamically selectable from the BeanScape Wilow software
Sensitivity	±2g range: 0.06 mg/digit ±4g range: 0.12 mg/digit ±6g range: 0.18 mg/digit ±8g range: 0.24 mg/digit ±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/VHz
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

Figure 8: Shock sensor specifications

5.3.3.2 Mems Sensor architecture



Figure 9: BeanDevice® WiLow® AX-3DS - MEMS Sensor Architecture

When configured with the "*Smart shock detection*" data acquisition mode, the BeanDevice[®] WiLow[®] AX-3DS wakes up when a threshold is reached.

5.3.3.3 <u>BeanDevice[®] current consumption in sleeping mode with SSD activated (Smart shock detection)</u>

When SSD is activated, the BeanDevice will wake up if a shock is detected. During the sleeping mode, the sensors will continue to track a shock event.

Depending on the shock sensor sampling rate during the sleep mode, the BeanDevice[®] WiLow[®] current consumption can change:

Accelerometer sampling rate during sleeping	BeanDevice [®] WiLow [®] AX3DS Current consumption
0,5 Hz	130 μΑ
1 Hz	200 μΑ
2 Hz	250 μΑ
5 Hz	300 μΑ
10 Hz	300 μΑ
50 Hz	400 μΑ
100 Hz	400 μΑ
400 Hz	500 μΑ
1000 Hz	600 μΑ

Table 3 : BeanDevice[®] WiLow[®] AX-3DS power consumption for a given sampling rate

For further information about the SSD (Smart Shock Detection) measurement mode, read the technical note <u>TN-RF-18-Wilow-Wifi-Sensor-data-acquisition-modes.pdf</u>

5.3.4 BeanDevice[®] WiLow[®] X-INC: Combo Sensor accelerometer, inclinometer and shock sensor)

5.3.4.1 Accelerometer specifications

	Accelerometer specifications
Accelerometer technology	High precision accelerometer based on MEMS technology
Measurement range	Two versions: ±2g and ±10g
Sensitivity	±2g Version : 660 mV/g ±10g version: 200 mV/g
Typical non-linearity	±0.1% FS
Analog to Digital converter	24-bit delta-sigma with temperature compensation Synhcronuous measurement channel
Sensor frequency response (-3 dB)	DC to 800 Hz
Maximum sampling rate	2 kSPS per axis
Noise spectral density	±2g Version : 45 µg/VHz
Zero-g Offset Variation from RT	±2g Version : ±0.2 mg/°C
over Temp	±10g version: ±0.1 mg/°C
Sensitivity Variation from RT over	±2g Version : ±0.01 %/*C (XY) , ±0.02 %/*C (Z)
Тетр	±10g version: ±0.01%/°C
Offset Ratiometric Error	±2g Version : 4mg
Sensitivity Ratiometric Error	±2g Version : ±1.25 % (X-Y) , ±0.2 % (Z)
Cross Axis Sensitivity	0.02

Figure 10: Accelerometer sensor specifications

5.3.4.2 Inclinometer specifications

	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

Figure 11: Inclinometer sensor specifications
5.3.4.3 Sensor Architecture



5.3.5 Common technical specifications

5.3.5.1 <u>Remote configuration parameters</u>

Table 4: Remote configurations specifications

Remote configuration parameters			
	Low Duty Cycle Data Acquisition (LDCDA) Mode: 1s to 24 hour		
Data Acquisition mode (SPS = sample per second)	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 mode)	Minimum: 1 SPS per axis		
	Maximum: 2 kSPS per axis		
Alarm Threshold	High and Low Levels alarms		
Power Mode	Battery Saver & Active power modes		

5.3.5.2 <u>RF specifications</u>

Table 5: RF specifications table

	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	
ΟΤΑ	Over the air firmware upgrade via WIFI	

5.3.5.3 USB specifications

Table 6: USB specifications

USB specifications		
USB standard USB 2.0		
Data Rate Full speed operation(12MB/s)		
Related functions	. Firmware update . Wifi & system configuration	

5.3.5.4 Embedded data logger

Table 7: Datalogger specifications

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

5.3.5.5 Environmental and Mechanical

Table 8: Mechanical 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		
P 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		

5.3.5.6 Power Supply

Table 9: Power supply specifications

Power supply			
Rechargeable battery	High density Lithium-Ion rechargeable battery with a capacity of 780 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 : 1 DSSS - 278 mA 54 OFDM - 229 mA During battery saver mode : < 100 μA 		
External power supply	. USB Power supply 5V . Optional auxiliary external Power Supply : 6VDC to 24VDC compatible with solar energy harvesting		

5.3.5.7 Included accessories

Table 10: Included accessories

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

5.3.5.8 <u>Options</u>

Table 11: Optional accessories

Optional Accessories and Services			
Power-supplyWall plug-in, Switchmode power Supply 12V @ 1,25A wi 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: <i>WL-CBL-M8-6P-2M</i> 5 meters.Ref: <i>WL-CBL-M8-6P-5M</i>		
WIFI AP/Repeater/Bridge (wifi link extension)	Wireless AP/Repeater with an integrated N-Type RF connector + High Gain Antenna Wifi Acess 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: 1x AC to 24VDC POE Power supply 1x 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		
X-Solar Wilow series	X-SOLAR: Stand-alone solar power systems Includes : - Solar Panel 20W (cable length 5 meters or 10 meters) Solar Panel Specifications: - Solar charging controller with 5VDC of Voltage Output, Number of Power Outputs: x4 (M8-3Pins Socket)- Provided without M8-3pins Plug or M8 cable adapter (see options) - Battery Technology: Valve regulated lead acid battery, Capacity: 12Ah Can be used with Wilow Sensors Operating in Streaming Mode & Works with 5V powered USB Beandevice Wilow <u>REF:</u> X-SOL-WILOW-12AH-20W-4CH-5V-5M (5 meters of cable), X-SOL-WILOW-12AH-20W-4CH-5V-10M (10 meters of cable) Not adapted to our 2.4GHz Sensor series		

	Polycrystalline Solar Panel for BeanDevice [®] Wilow [®] power supply	
	Maximum Power : 3W or 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 &	
Solar nanel	streaming burst data acqusiition with battery saver mode enabled	
	Country of origin: solar panel from China, assembled and tested in	
	Germany	
	REF: WL-SLP-3W-2M, 3W Solar panel with 2 meters of cable length	
	REF: WL-SLP-3W-5M ,3W Solar panel with 5 meters of cable length	
	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 provided by Beanair GmbH	
Calibration certificate	A static calibration method is used on a granite surface plate DIN876	
	REF: WL-CERT-CAL	

5.4 MQTT: READY FOR INDUSTRIAL INTERNET OF THINGS



Ready for Industrial Internet of things (IIOT) applications, WiLow[®] sensors integrate natively **MQTT** (Message Queuing Telemetry Transport) data frame, a lightweight and open-source (OASIS & ISO/IEC 20922:2016 standards) Internet of Things protocol.

MQTT is based on publish/subscribe paradigm, therefore user can easily connect, configure and manage several WiLow[®] sensors at the same time from a unique IOT software platform.

Users looking for a high level of security can count on a mechanism to notify interested parties to an abnormal disconnection of a client using the Last Will and Testament feature.

No need to spend several months to develop a specific and complex supervision software, user can easily integrate WiLow[®] sensors in a third-party IOT Cloud platform (Amazon web services, IBM Watson, Microsoft Azure, Facebook Messenger, Alibaba Cloud....).

Non-developer users can still use the <u>BeanScape® software</u> to setup a quick and affordable WIFI sensor network.



For more info:

- Read our technical note about MQTT communication protocol: <u>click here</u>
- Download our MQTT client for Android: click here
- Visit MQTT Organization website: <u>http://mqtt.org/</u>

5.5 STORE AND FORWARD+

The store and forward technique work by storing the message transmitted by WiLow[®] sensors to a Wi-Fi access point/ Wi-Fi receiver. If the message is not received due to a network disruption, it will be retransmitted on the next transmission cycle. This technique allows bringing a lossless data transmission.

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



5.5.1 Configuration

To configure the Store & forward+ option on your Wilow go to your BeanDevice configuration panel and click on Data Acq. Config tab!

	Display configuration Notes Data Acq. config. Shock Sensor Config Online Data A	
	Data Acq. mode : LowDutyCycle V Start	
	Data Acq. cycle: ddd, hh:mm:ss Stop	
	TX_Ratio:	
	Data Acq duration: ddd, hh:mm:ss	
	Data acquisition mode options	
	◯ Tx Only ◯ Log Only	
	Streaming Packet Options	
	Continuous Monotoring Burst One Shot	
	Store and Forward	
	SF Enabled Data Aging: 30	
	Figure 14: Store & Forward configuration frame	
Check SF Enabled to	o enable Store & Forward+	
	Store and Forward	
	SF Enabled Data Aging: 30	

Enter Data aging value which is the duration of validity of non-transmitted data before its deletion and validate.

- Syste Diag List	em Information nostic cycle : ening Cycle :	00:00:40 NA	ddd, hh:m	m:ss
	Data Aging:	140	ms	
Store a	and Forward	Data Aging:	142	¢

Data aging will then be displayed on the System frame.

30 ms is the minimum value possible and 65535 ms is the maximum value, when 65535 is entered, Rollover is displayed.

- System Ir Diagnost	nformation ic cycle :	00:00:40	ddd, hh:mm:ss
Listenir	ng Cycle :	NA	
Da	ata Aging:	RollOver	ms
Store and	Forward		
SF End	abled	Data Agir	ng: 65535 🚖

Store & Forward+ will efficiently decrease data loss and PER.

Wilow[®] wireless sensors

5.6 PRODUCT FOCUS



5.6.1 Casing description

Number	Function	Description
1	M8-5 Pins Contacts Socket (USB 2.0 and DC Power Supply)	4.8-17.8VDC power supply. The socket sealing is assured with a screw cap. Don't forget to protect the M8 socket with a M8 protection cap provided with your product if it's not used.
2	Radome antenna	Waterproof IP67 Radome antenna
3	MAC ID Label	Unique identifier assigned to the BeanDevice® Wilow® (64-bit) Every WiLow® device must have a 64-bit MAC address that allows unique identification of the device within a global network.
4	BeanDevice [®] Wilow [®] product version label	 Three label version are available : ✓ BeanDevice[®] WiLow[®] AX-3D: measurement range (±2g and ±10g) and the three axis are displayed on the Label ✓ BeanDevice[®] WiLow[®] HI-INC: measurement range (±15° and ±30°) and the two axis are displayed on the Label ✓ BeanDevice[®] WiLow[®] AX-3DS: measurement range and the three axis are displayed on the Label
5	Acceleration/inclination axis	Indicates acceleration/inclination on X/Y/Z axis
6	"Network " non-contact button	"Network context" non-contact button restores the factory settings on the BeanDevice [®] . Point the pole of the Neodymium magnet that was provided with your BeanDevice [®] towards the "Network" label circle. If the BeaDevice [®] is in Active power mode, hold the magnet for approximately 10s, if the BeanDevice [®] is in sleep mode, hold the magnet for approximately 15s
7	"Activity/Failure LED"	This bi-color GREEN / RED Led represents the BeanDevice [®] : Cf. table below for led description
8	ON/OFF Non- contact button	Allows to power up/power off the BeanDevice [®] . Point the pole of the Neodymium magnet that was provided with your BeanDevice towards the "ON/OFF" label circle. Hold the magnet for approximately 2s to power on the device.

		To power off the BeanDevice [®] , hold the magnet for 5s if the device is in Active power mode , otherwise if the BeanDevice is in sleep mode , hold the magnet for 10s
9	Battery charge indicator LED	This bi-color GREEN / RED Led indicates battery charge status: Cf. table below for led description

5.6.2 LEDs description

Operating status	Network LED	Battery Charge LED
The BeanDevice [®] WiLow [®] is power off	LED OFF	<u>No external power supply</u> is connected:
The BeanDevice [®] WiLow [®] is power	Green LED: Wireless Network Activity	
on with wireless TX/RX activity	Red LED: Wireless transmission failure	External power supply is connected:
The BeanDevice [®] WiLow [®] is power on	Green led blinks twice	Green LED ON: Battery charged
The BeanDevice [®] WiLow [®] is power off (was power on before)	Red LED ON during 2s	Red LED ON: Battery not charged
The BeanDevice [®] WiLow [®] is power on & a network Reset is performed	Red LED ON during 2s then Green LED blinks twice (Repeated twice)	Green+Red LED ON: Battery is charging
The BeanDevice [®] WiLow [®] is power on & waits for a network activity	Green LED blinks every 10s	



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5.6.4 Mechanical drawing

The BeanDevice[®] Wilow[®] comes with an *IP67* rating without corrosion protection. So, do not install the BeanDevice[®] Wilow[®] in a marine environment with high turbulence.



Figure 18: Mechanical drawing - BeanDevice® WiLow® AX-3D/HI-INC/INC/X-INX

Drawing is available on the following web link: <u>Click here</u> Step File is available on the following web link: <u>Click here</u>

5.6.5 Antenna diversity

Antenna diversity is a technique that maximizes the performance of an antenna system. It allows the radio to switch between two antennas that have very low correlation between their received signals. Typically, this is achieved by spacing two antennas around 0.25 wavelengths apart or by using two orthogonal polarizations. So, if a packet is transmitted and no acknowledgement is received, the radio system can switch to the other antenna for the retry, with a different probability of success.

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The diagram below provides information on the radome antenna performance:

Figure 19 : Radome antenna performances

The radome antenna radio used on BeanDevice[®] WiLow[®] product is a tamper resistant and unobtrusive.

5.6.6 Radome antenna

Electrical specifications	
Picture	
Center Frequency	2,45 GHz
Gain	2,5 dBi
Wavelength	¼ -wave
VSWR	<1.9 typ. At center
Impedance	50 Ω
Size	Diameter: 27mm
	Height: 11 mm



5.6.7 Mounting Guidelines

- ✓ For vibration measurement, the mass of the wireless accelerometer must be <1/10 of the mass of the object under study.</p>
- ✓ Mounting surfaces need to be clean, free of any residue from epoxies, waxes, paint or other foreign materials.
- ✓ Mounting surface should be flat.
- ✓ The mounting hole must be checked to ensure it is longer than the mounting screw so as to prevent "bottoming out".
- ✓ Use a torque wrench for tightening screws to the manufacturer's specifications. Do not use electric tools as their frequencies may damage the accelerometer.
- ✓ Spread mating surface with a light coating of silicone grease, heavy machine oil or bees wax to ensure contact issecure thereby maximizing the usable frequency range.
- ✓ Secure the cable using clamps, o-rings, tape or other materials most suited to the application. Ensure that you have sufficient slack to allow for free movement of the sensor.
- ✓ Inspect mounting holes and remove any debris, burrs or other foreign materials.

5.6.8 Wireless inclinometer special instructions (BeanDevice® WiLow® HI-INC)

The BeanDevice[®] WiLow[®] HI-INC is designed for a horizontal mounting, i.e. the base plate of the inclinometer needs to be placed on the horizontal plane of the object to be measured.

Avoid shock and vibration during measurement, as these could corrupt the measurement results. Inclination sensors that base on a fluidic measurement principle are optimal for static measurements and suitable to only a limited extent of dynamic measurement.

5.6.9 Mechanical Mounting Options

By default, the BeanDevice[®] Wilow[®] comes with a screw mounting lid. But two other mounting options are available, for example if you are going to monitor the tilt of a pole or a vertical structure, you will have to use a 90° bracket.

In other cases when the use of the BeanDevice[®] Wilow[®] is on a metallic structure and will not be for a long term or making mounting holes in the structure is not allowed we can go for the Magnet mounting which is a magnetic extension to glue the BeanDevice[®] Wilow[®] to the metallic structure.



See our video to choose the right mounting procedure for your Wilow[®] BeanDevice[®]

5.7 POWER SUPPLY DESCRIPTION

WiLow[®] sensors can be power supplied from different power sources:

• Internal rechargeable Lithium-Polymer battery

• USB or External Power 5VDC power supply, therefore compatible with Industrial USB power supply available on the market

Lithium-Ion Battery		
Charge/discharge efficiency	80–90%	
Self-discharge rate	0.35% to 2.5% per month depending on state of charge	
Cycle durability	400–500 cycles	
Nominal cell voltage	3.6 V	

Lead-acid car battery		
Charge/discharge efficiency	50–95%	
Self-discharge rate	3–20%/month	
Cycle durability	<350 cycles	
Nominal cell voltage	2.1 V	
Charge temperature interval	Min. –35 °C, max. 45 °C	



Figure 21 : Smart and Flexible Power supply



If you are using a USB Power Bank, make sure that your power bank doesn't switch off when the BeanDevice Wilow[®] battery is fully charged.

The power bank should be only used to charge the BeanDevice Wilow battery, don't use it for long term monitoring.

Alternative external power supply should be considered for long term monitoring.

5.7.1 Integrated Lithium-ion Rechargeable battery

The BeanDevice® WiLow® integrates a Lithium-Ion rechargeable battery:

Battery Capacity @25°C	Nominal Voltage @25°C	Charge/Discharge cycle @25°C	Full charge duration
750 mAh	4,2V	370	3h maximum



The rechargeable battery can be used as an UPS (uninterruptible power supply) battery on your BeanDevice® WiLow®. It provides an emergency power when the external power source, typically the utility mains, fails.

Do not try to change the integrated battery. This action may void the product warranty.

5.7.2 USB/Power supply cord

This accessory is provided as an option:



Figure 22: M8-5Pin/M8-6Pin cable

M8 5pin Plug- Pin assignation





Interface Name	M8 Pin assignatio n	Wire (A-coding)	Color
Not Used	PIN1	RED/BROWN	
5VDC Voltage	PIN2	WHITE	
USB-DATA -	PIN3	BLUE	
USB-DATA +	PIN4	BLACK	
GND	PIN5	GREY	

Figure 23: M8-5Pin Plug Assignation and Wiring Color

M8 6pin Plug- Pin assignation





Interface Name	M8 Pin assignation	Wire Color (A-coding)
5VDC Voltage	PIN1	BROWN
USB-DATA -	PIN2	WHITE
USB-DATA +	PIN3	GREY
Not used	PIN4	BLUE
DC Voltage 6-24VDC (-EHR version only)	PIN5	GREEN
GND	PIN6	PINK

Figure 24: M8-6Pin Plug assignation and Wiring Color (since December 2018)

5.7.3 FTDI Driver

In some costumer cases, the Operating System cannot recognize automatically the COM port connection. It is recommended to update manually the FTDI driver. To download the FTDI driver, please visit our FTP support server <u>https://beanair.com/firmware-for-wilow-industrial-iot-sensors.html</u>

or download it directly from:

https://www.ftdichip.com/Drivers/CDM/CDM%20v2.12.28%20WHQL%20Certified.zip

5.7.4 USB Power supply

USB Voltage	Minimum current
5VDC	200 mA

If you are using a USB Power Bank, make sure that your power bank doesn't switch off when the BeanDevice Wilow[®] battery is fully charged.

5.7.5 How to extend the battery life

Battery autonomy depends on several parameters:

- The environment where the BeanDevice® WiLow®
- Data acquisition mode

The following table provides a list of recommendations in order to extend the battery life of your BeanDevice[®] WiLow[®]:

Influence factors on battery life	Observations	Recommendations
Sleep mode	Sleep mode can be configured from the BeanScape [®] software	By activating this power mode on your BeanDevice [®] , you will increase the battery autonomy of your BeanDevice [®] . By activating sleeping power mode, the BeanDevice [®] current consumption can decrease from 30 mA to 10-45 microamperes.
Sampling rate in streaming mode	Power consumption will grow with the sampling rate.	Choose the right sampling rate on your BeanScape [®] interface.
Packet Error Rate (PER)	A high packet error rate can cause a higher retransmission data and this increase the current consumption.	Try to replace your BeanDevice [®] in an area where the radio link is much better (see Link Quality Indicator value).

5.8 SENSOR CALIBRATION

5.8.1 Factory Calibration procedure

5.8.1.1 BeanDevice[®] WiLow[®] HI-INC (WIFI Low Power inclinometer)

The calibration procedure is based on a side-by-side comparison with a reference tilt meter. For better measurement stability, the two tilt meters are mounted on a sinus table.

5.8.1.2 <u>BeanDevice[®] WiLow[®] AX-3D/AX-3DS (WIFI Low Power Accelerometer)</u>

A static calibration method is used to calibrate the sensor.

5.8.2 How often to recalibrate the BeanDevice[®] WiLow[®]?

Depending on the operating environmental conditions, the following table summarize how often user should recalibrate its sensor:

BeanDevice [®] Wilow [®] version	Operating temperature < 40°C	Operating temperature > 40°C
BeanDevice [®] WiLow [®] AX-3D	6 years	3 years
BeanDevice [®] WiLow [®] AX-3DS	3 years	2 years
BeanDevice [®] WiLow [®] HI-INC	6 years	3 years

Table 12: BeanDevice® WiLow® re-calibration

6. CONNECTION TO YOUR WIFI NETWORK

6.1 WIFI NETWORK CONFIGURATION

6.1.1 Direct connection to PC/Laptop

If you decide to connect directly your PC/Laptop/Smartphone to your **BeanScape® WiLow®**:

- If you use a smartphone: enable the WIFI Hotspot on your smartphone (for more information consult your smartphone user guide)
- If you use a PC/Laptop: enable the WIFI Hotspot on your PC. If you are familiar with DOS environment, launch DOS and use these scripts:
 - netsh wlan set hostednetwork mode=allow ssid=YourHotSpotName key=Yourpassword
 - Then start your hosted network: netsh wlan start hostednetwork



Some WIFI chipset cannot accept a Hotspot configuration; we will suggest you to use a Wi-Fi AP to establish a connection between your BeanDevice[®] Wilow[®] and your BeanScape[®] software



Figure 25: Direct connection to a PC/Laptop

6.1.2 Connection to a WIFI AP

If you decide to connect your **BeanScape® WiLow®** to a WIFI AP, the network architecture will come as follow:



6.2 BEANDEVICE[®] WILOW[®] CONFIGURATION

Along this part we have to follow the next steps:

- 1. Firstly, install **BeanScape® WiLow®**, then move to the icon on the desktop and double click on it to start the software
- Connect your BeanDevice WiLow[®] to your PC by using the M8 to USB Cable provided with your device,
- 3. Power on your **BeanDevice**[®] WiLow[®] by holding the magnet on the ON/OFF label, you will see the Network led blinking in green color,
- 4. Select Tools on the BeanScape® menu and choose "LAN/WAN Config"



5. The following window should appear:

COM port	O UDP
Configuration via COM Port	Configuration via UDP (Network reconnection)
Select PC WLAN/LAN IP: < Select >	✓ Select PC WLAN/LAN IP: < Select > ✓ Localize
COM port : < Select >	< Empty >
Configuration	
BeanScape Tcp/IP configuration	Wifi Configuration
	SSID : PHOENIX TECH
	Paceword ·
IP address :	assivita .
Sub network mask :	Security type : None V
Default gateway IP :	RF Region: REGION_EU 🗸
BeanScape	Validate
Port : 5313	
IP Address :	
Domain name :	

Figure 28: WiFi network setting window

6. On LAN/WLAN config select your PC IP Address sharing the same WIFI Hotspot/Access Point with your BeanDevice[®] WiLow[®].

💎 Wilow WIFI configuration		
Configuration COM port or UDP COM port		O UDP
Configuration via COM Port		Configuration via UDP (Netwo
Select PC WLAN/LAN IP:	< Select >	Select PC WLAN/LAN
COM port :	192.168.56.1 169.254.103.95 169.254.232.168	< Empty >
Configuration BeanScape Tcp/IP configuration DHCP Enabled	192.168.1.245 169.254.97.223 192.168.29.1 192.168.13.1 192.168.1.50	Wifi Configuration Enabled SSII
Figure 29: CO	M/LAN Port setting	

After selecting the right IP Address, the field "TCP/IP configuration is automatically filled out.

BeanDevice [®]	Wilow®	User N	/Ianual
-------------------------	--------	--------	---------

) COM port		O UDP					
Configuration via COM Por	t	Configu	iration via UD	DP (Network re	connection) —		
Select PC WLAN	I/LAN IP: 192.168	.1.245 ~	Select PC W	LAN/LAN IP:	< Select >	~	Localize
C	OM port : < Select	> ~	< Empty >			~	
Configuration							
BeanScape Tcp/IP configu	uration	Configuration	Vifi Configura	tion	_	_	
DHCP Enabled		BeanScape Tcn/		ation		- 7	
IP address :	192.168.1	DHCP Enable	d			j.	
Sub network mask :	255.255.255.0	Wilow Tcp/IP -					
Default gateway IP :	192.168.11_	IP a	ddress :	192.168.1			
BeanScape		Sub network	k mask :	255.255.2	55.0		
Port	5313	Default gate	way IP -	192 168 1	1		
IP Address	: 192.168.1245	berdait gate	indy in .	102.100.1			
Domain name	:						

Figure 30: BeanDevice® WiLow IP setting

7. Select the right Serial Port number (COM Port) used to connect your BeanDevice® WiLow®

💗 Wilow WIFI configuration			
Configuration COM port or UDP			
COM port		С) UDP
Configuration via COM Port			Configuration via UDP (Netwo
Select PC WLAN/LAN IP:	192.168.1.245	~	Select PC WLAN/LAN
COM port :	< Select >	~	< Empty >
Configuration BeanScape Tcp/IP configuration DHCP Enabled Wilow Tcp/IP	COM7		Wifi Configuration Enabled SSIE

Figure 31: COM port selection

8. Configurate your IP settings, if you choose to use a Dynamic IP allocation, **Check DHCP Box**, otherwise to set a Static IP, you have to **Uncheck the DHCP Box** and configurate the Network settings.

Configuration		
BeanScape Tcp/IP configur	ation	Configuration
DHCP Enabled		BeanScape Tcp/IP configuration
Wilow Tcp/IP		DHCP Enabled
IP address :	192.168.1	Wilow Tcp/IP
Sub network mask :	255.255.255.0	IP address : 192.168.1
	1001001	Sub network mask : 255.255.255.0_

Figure 32: BeanDevice® WiLow® DHCP/Static IP

9. Enter your WIFI settings (SSID, password and security type), which will be used to connect the BeanDevice[®] WiLow[®] to your Wireless Network.

Wifi Configuration			
SSID :	AccessPoint	~	
Password :	•••••		
Security type :	WPA2	~	
RF Region:	REGION_EU	~	
	REGION_EU REGION_US REGION_JP		Validate

Figure 33: BeanDevice® WiLow® WiFi setting

UIt is mandatory to precise the RF Region information used in your Access Point/Router. Some of the RF Channels are denied to use in some countries. By default, the RF Region is REGION_EU

10. To finish the configuration, Click on Validate. A pop-up window will display "*Operation completed successfully*".



Figure 35:BeanScape® WiLow configuration error

Please make sure that the device is ON
Point your magnet toward The On/Off non-contact button of your BeanDevice to power it On.
A green led will blink if it's on.
A red led will blink if it's off.

On/Off Non Contact Button

 To start the server, click directly on the Start button on the Menu bar, or go to Server then select Start the Server

File Server Tools Off. Data A	File	Senver	Tools	Off Dat	a Analysis
	The	JEIVEI	TOOIS	UII. Dai	
Start the server		Sta	art the se	ver	
		Se	rver wind	ow	
		_			

Figure 36: Start Server

You will see your **BeanDevice**[®] WiLow[®] profile displayed as follow:

👐 BeanScape		
File Server Tools Off. Data Analysis BeanDevice Help		
ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا		
	Main Profile	Wilow® BeanDevice
- Ch_X - Ch_Y - Ch_Z - Ch_Z	Identity Mac Id : F4B85E00A14B0000	Network Quality :
	SSID: Inksys IP Addr : 192.168.1.92	PER: 0.00 × LED Status:
	Label : MAC_ID : 0 x F4B85E00A Version HW Version: V2R0	Al Time Soupy Disagnostic TimeZone: 0 TimeZone: 24 Time nit.gov/123 Power supp): Mans
	SW Version: V3R1	Power mode : scilve System Information Battery voltage : 4.165 Diagnostic cycle : 00.00:20 det.hh.mm.ss
	Max SR : 2000 Hz Max TX_Ratio: 9	Battery level : Good xx Listening Cycle : NA DiagDate : 25-Jan-19 11:25:15 Data Aging : NA
	BeanDevice DataL Platform : AX 3D Full	Status: STOPPED Download Strategy: NONE ull Mem. Mngmnt: STOP_KEEP_DAQ Memory Used: 0 *
	Current data acquisition mode	Display configuration Notes Data Acq. config. Shock Sensor Config Online Data Analysis
	DAQ Status : Started	
	Data Acq. mode : LowDutyCycle	Type : PLATFORM_TYPE
	Data Acq. cycle : 00:00:10	ddd,hh:mm:ss Reference : PLATFORM_REF
	TX Ratio : 1	Label : MAC_ID : 0 x F4B85E00A14B00
	Sampling rate : NA	Hz Log Folder: FdB85F00A1480000
	Data Acq. duration : NA	ddd,hh:mm:ss
		Validate
		Ö
Component List		

Figure 37: BeanScape® WiLow® Dashboard

See our Technical video Getting started with BeanDevice® Wilow

6.3 CONFIGURING THE SENSOR WIRELESSLY (AP MODE)

This feature allows the user to configure its BeanDevice[®] WiLow[®]. without the usage of the USB cable. First of all we must set the device in Access point mode.

In order to do that we need to:

- 1. Turn the device off.
- Keep the magnet on the (On/off) sign for 10 seconds until the Network led blinks in orange color (Green Red)



Figure 38 Setting the BeanDevice® WiLow®. as an access point



The device will in Access point mode for 5 min

After that the device will appear in your Network list with its mac Id as you see in the following picture



Figure 39: Device set as AP

we Rear Scane

Connect to it the password is "beanairwilow".

Once connected, you have to Select Tools on the BeanScape® menu and choose "LAN/WAN Config":

1. On LAN/WLAN config select WIFI BeanDevice[®] WiLow[®].

ensor configuration: CON I port uration via COM Port elect PC WLAN/LAN IP:	Pot, UDP or WIFI	O UDP Configuration via UDP (Network record	nection)	Wi-Fi Configuration via Wi-Fi		
uration via COM Port elect PC WLAN/LAN IP:		Configuration via UDP (Network recor	nection)	Configuration via Wi-Fi		
elect PC WLAN/LAN IP:						
	< Select > <	Select PC WLAN/LAN IP: < Select	d> V Localize	Select PC WLAN/LAN IF		
COM port :	< Empty >	< Emoty >		Connection Status	sconnected	
	(unpa) /					
				Config Status		
					Connect	Disconne
ICP Enabled v Tcp/IP		BeanScape		Enabled SSID :	C4BE847470)FG \sim
IP address :		Port : 531	3	Password :		
Sub network mask :		IP Address :		Security type :	None	\sim
		Damain name :				
	COM port : ation appe Tcp/IP configuratio CP Enabled IP address : iub network mask :	COM port : < Empty >	COM port : <	COM pot : <	COM port : < Empty > < Connection Status Config Status ation CP Enabled Tcp/IP IP address : IP address : IP address : IP Address : Security type :	COM port: Connection Status Connection Status Config Status Config Status Connection Connection Status Connection Connection Status Connection C

Figure 40 : Configurations of the BeanDevice

- 2. Select your WLAN/LAN ip and press on connect
- 3. Enable WIFI connection settings and enter the:

SSID Password Security type

RF Region

Configuration via Wi-Fi Select PC WLAN/LAN IP: 192.168.1.2 Connection Status Connected Config Status WA Connect Disconnect WI-FI connection settings ✓ Enabled SSID : Teltonika_Route ∨ Password : 12345678 Security type : WPA2 RF Region: REGION_EU	S min		
Select PC WLAN/LAN IP: 192.168.1.2 Connection Status Connected Config Status NA Connect Disconnect WI-FI connection settings VI-FI connection settings Password : 12345678 Security type : WPA2 RF Region: REGION_EU VI-FI CONNECTION SETTING Security type : WPA2 VI-FI CONNECTION SETTING Security type : WPA2 VI-FI CONNECTION SETTING VI-FI CO	Configuration via Wi-Fi		
Connection Status Config Status Config Status Connect Disconnect WI-FI connection settings C Enabled SSID : Tettonika_Route \ Password : 12345678 Security type : WPA2 \ RF Region: REGION_EU \	Select PC WLAN/LAN	IP: 192.1	68.1.2
Config Status WI-FI connection settings Image: Connection settings	Connection Status	Connected	
Connect Disconnect WI-FI connection settings Image: Connect Con	Config Status	VA	
WI-FI connection settings Enabled SSID : Tettonika_Route ~ Password : 12345678 Security type : WPA2 ~ RF Region: REGION_EU ~		Connect	Disconnec
	SSID :	Teltonika_R	oute ∨

Figure 41 WIFI settings

4. Type your PC ip in this field:

(You can check it by selecting command prompt and typing ipconfig)

BeanScape	
Port :	5313
IP Address :	192.168.1128
Domain name :	

Figure 42 Ip Address field

- 5. Validate and connect on the same WIFI that you selected the parameters of, in step 3.
- 6. Start the server

File Server Tools Off. Data A	👐 BeanScape				
🚽 🖾 🚾 🌚 🖉	File	Server	Tools	Off. Data	Analysis
Start the server	i 🛃	Start the server			
		Server window			

Figure 43 : Server Launching

The device is now Connected.

- MAC ID - 0x C48E947470E60000	ReanDevice® Status @ Wilow® Rean	evice .		
	Identity Network Diagnostic	Base Property States Street Street States		
	Mac Id : REPEARANDISCOUNT Network quality :	In the second status senser the second status		
	SSID: Televise Rooter PER TRAVE	Config Status:		
	P Addr 1921531.41	LED Status:		
	Label Designation Power Supply Diagnostic	Tružna I		
	Victor Temperature :	te NTP UPL: transmission poer 122		
	HW Version: With Power supply :			
	SW Version: Pawer mode Date	System Information		
	DAQCapability Battery voltage : 1007	V Dagnostic cycle : 00.00 02 Minercau		
	Max SR : 200 Hz Battery level : 5000	Listening Cycle : II Annum an		
	Max TX_Rato: DiegDate : DiegDate : DiegDate :	333/67 F Data Aging: VA. mg		
	BeanDevice DataLogger			
	Plation : Boline Status: MEMORY EMP	Download Strategy: NOVE		
	Full Mem. Mrgmnt: STOP REEP C	Memory Used:		
	Current data acquisition mode Display cont	ration Nates Data Aca. config. Shock Sensor Config. Online Data Analysis * *		
	D40 9 mm			
		DIATEODIA TVDE		
	Data Acq. mode : 19	PLATFORM_TIPE		
	Data Aog. cycle :	PLATFORM_REF 050 TESTAPHAK	ogo testiptick	
	TX_Rato: 14	MAC_ID: 0xC48E84747DF600		
	Sampling Rate: 14	Folder C48E84747DF60000		
	Data Acq. duration : Add Ath more as	Ce Teltonika_Router		
		Valdate Connected, secured		
	Tx Log	Dependent		
	0 0	Properties		
			Disconnect	
			Disconnect	
		C48E84747DF60000		
		Secured		
Component List		Gr. Convert		
Sat 🕀 🖃		Section		
		< DITISO 14/8		
		In Spourd		
in				
		9- 101		
		Network & Internet settings		
		records of interact seconds		

Figure 44: Device connected

<u>See our technical video "Overview of WIFI Access Point Mode for Wilow IOT Sensors." on</u> <u>YouTube</u>

6.4 LOCALIZE A BEANDEVICE[®] WILOW[®]

To localize a BeanDevice[®] Wilow[®] already configured and connected to the same Network, you have to Select Tools on the BeanScape[®] menu and choose **"LAN/WAN Config"**:

7. On LAN/WLAN config select your PC IP Address sharing the same WIFI Hotspot/Access Point with your BeanDevice[®] WiLow[®].

UDP							
Configuration via UDP (Network reconnection)							
Select PC WLAN/LAN IP:	192.168.1.245 🗸	Localize					
< Empty >	192.168.56.1 169.254.103.95						
Wifi Configuration Enabled SSID :	169.254.232.168 192.168.1.245 169.254.97.223 192.168.29.1 192.168.13.1 192.168.1.50						

Figure 45: BeanDevice® WiLow® UDP Localization

8. Click on Localize and select the BeanDevice® Wilow that you like to use from the list:



Figure 46: Successful BeanDevice® WiLow® Localization

7. SUPERVISION FROM THE BEANSCAPE® WILOW® SOFTWARE

For more information about the BeanScape®, please read the BeanScape® User Manual.

It is recommended to install MATLAB MCR to ensure running the Online/Offline Data analysis

MATLAB MCR 64 bits download link

http://ssd.mathworks.com/supportfiles/downloads/R2015a/deployment_files/R2015a/installers/win 64/MCR_R2015a_win64_installer.exe

MATLAB MCR 32 bits download link

http://ssd.mathworks.com/supportfiles/downloads/R2015a/deployment_files/R2015a/installers/win 32/MCR_R2015a_win32_installer.exe

7.1 STARTING THE BEANSCAPE®

The BeanScape[®] is a supervision software monitor fully dedicated to Beanair WSN (Wireless Sensor Networks):

1. Start the BeanScape® by double-clicking on the BeanScape® icon



- 2. Make sure that your BeanDevice® WiLow® is connected to your WIFI Network
- 3. Click on the button « start » 🛛 📷
- 4. All the BeanDevice[®] WiLow[®] connected to your Wi-Fi Hotspot will appear on your left window
- 5. Select the BeanDevice[®] Wilow or its related sensor channel you want to configure.



You can configure your BeanDevice[®] Wilow from the page "*BeanDevice[®] WiLow[®] System Profile*". This page is composed of two parts:

- ✓ BeanDevice[®] Wilow information display;
- ✓ BeanDevice[®] configuration;





7.2 SYSTEM PROFILE

You will find below a description of the data information fields making up for each frame.

7.2.1 Identity frame


7.2.2 Wireless Network Diagnostic frame



Figure 50: BeanDevice® network-link status

Number of bars	Color	Link quality indicator
5 to 6 bars	Green	Very good
4 bars	Green	Good
3 bars	Red	medium
to 2 bars	Red	bad

Figure 51 : Network Quality Indication

7.2.3 Power supply diagnostic frame



Figure 52: BeanDevice[®] power supply information

The BeanDevice® Wilow integrates an internal temperature sensor, it enables the following functions:

- ✓ Battery temperature monitoring during charging
- Temperature compensation on measurement
- ✓ Alarm notification transmission to WIFI Network if the internal temperature is abnormally high

Power supply status is updated when the BeanDevice® Wilow® is plugged/unplugged from external power supply.

If your battery level is low, it is highly recommended to recharge your battery. Your BeanDevice® Wilow® integrates a battery charger.





Figure 53: BeanDevice® Power modes





7.2.8 Device configuration

The Device configuration's information is sorted in 3 tabs displayed on Top-right of the dashboard. The first tab displays the **BeanDevice® config. Status** the second displays the **BeanSensor Info.** And the third one is for **Shock Sensor Status.** Using the navigation buttons facilitate the navigation between the tabs.

BeanDevice® config. Status	BeanSensor Info.	•
Config Status:		
LED Status:	Ŏ	
TimeZone:		1
NTP url:	me.nist.gov:123	Ì

Figure 58:BeanDevice®Configuration Multi frame

7.2.8.1 <u>BeanDevice[®] config. Status</u>



The information related to the time zone and the NTP configuration is to set from the main configuration frame.

Diagnostic Cycle
Ratio : 1 🗘 00:00:10 Validate Reboot
NTP Config.
Time Zone: 0 imin
Port :
IP address:
NTP server:
Validate

Figure 60: NTP system configuration frame

7.2.8.2 <u>BeanSensor® Info.</u>



Figure 61: BeanSensor® Info frame

7.2.8.3 Shock Sensor Status



Figure 62: Shock Sensor status frame

The information displayed on Shock sensor Status tab can be set from the main configuration frame, from the Shock Sensor Config tab.

Shock.Sensor Range:	< selection >	~	-2.000 /	+2.000
Sampling Rate:	< selection >	~	100	
Shock Thresholds:		m	w 1966	
				Validate

7.2.9 Product Version frame



Figure 64: BeanDevice Hardware/Software version

V (version) related to a major modification of the embedded software.

R (*Release*) related to a minor modification of the embedded software



These ID versions should be transmitted to our technical support center when you encounter a material or software dysfunction.

7.2.10 Current Data Acquisition mode frame

This frame displays all the information returned by the BeanDevice[®] WiLow[®] on its actual data acquisition mode:



Figure 65: Frame curent data acquisition mode

Please read the following section for more information about Data acquisition modes: "<u>click here</u>"

7.3 BEANDEVICE® WILOW® CONFIGURATION



Figure 66: BeanDevice® configuration frame

Move down to the configuration frame which is composed of several Tabs and includes BeanDevice[®] OTAC (Over the Air Configuration) Parameters:

Tab	Description
BeanDevice® WiLow® Label	Customize the BeanDevice [®] WiLow [®] label
Notes	This area contains the notes related to the BeanDevice [®] WiLow [®] .
Data Acquisition configuration	Configure the Data acquisition mode on your BeanDevice [®] WiLow [®] , set the acquisition cycle or the sampling rate, enable/disable the datalogger function.
Shock configuration	Smart Shock Detection configuration (available only on BeanDevice [®] WiLow [®] AX-3D and BeanDevice WiLow [®] AX-3DS)
Datalogger	Onboard datalogger configuration
System configuration	Configure the diagnostic cycle
Power Mode Management	Configure the Power mode on your BeanDevice [®] Wilow (Active mode, Sleep mode)

7.3.1 Display configuration

Display configuration	Notes	Data Acq. config.	Shock Sensor Config	Online Data Analysis	4
Type :	PLA	TFORM_TYPE			
Reference :	PLA	TFORM_REF			
Label :	MA	C_ID : 0 x F4B85E0	DA14B00		
Log Folder:	Fold	ler F4B85E00A14B0	0000		
		Valida	ate		

Figure 67: BeanDevice [®] Display configuration tab

Parameter	Description
Туре	You can enter here the type of BeanDevice® WiLow® you want to use
Reference	You can assign an internal reference to the BeanDevice [®] WiLow [®] you have purchased.
Label	You can assign any sort of Label to your BeanDevice [®] WiLow [®] . Therefore, the user can easily associate the BeanDevice [®] with its equipment (example: Room_N521_Second_Floor)
Log Folder	Specify the log folder where the received measurement logs should be backed up

Click on "*Validate*" if you want to validate your configuration.

7.3.2 Notes Tab

Display configuration	Notes	Data Acq. config.	Shock Sensor Config	Online Data Analysis	• •
	0				
Validate	Clear	(±)			

Figure 68: Tab: Notes

This field contains your notes concerning the BeanDevice[®]. To change this field, enter your text and click on « *Validate* » button. To back up your text, press the icon

Example: Machine failure n°XX, requested intervention.

7.3.3 Data acquisition configuration Tab

splay configuration Notes	Data Acq. config.	Sensor Config	Online Data An	alysis DataLo
Data acquisition mode confi	guration			
Data Acq. mode : Lo	wDutyCycle	~	Start	
Data Acq. cycle :	ddd, hh:n	nm:ss	Stop	
TX_Ratio:				
Math Notif. ratio				
Math Notif. cycle will be : N	lA ons			
Tx Only O Log C	nly 🔿 Tx	& Log		
Streaming Packet Options				
Continuous Monitoring	 Burst 	\bigcirc	One Shot	
Store and Forward	_	- 1 1		
SE Enabled	Data Aging: 3	0		

Figure 69: Data Acquisition configuration tab

Parameter		Description	
les	Low duty cycle Data Acquisition (LDCDA)	Low duty cycle data acquisition is adapted for static measurement (tilt, pressure, temperature) requiring a low power consumption on your BeanDevice [®] . The duty cycle can be configured between 1 data acquisition & transmission per second to 1 data acquisition & transmission per day.	
ata Acquisition moc	Alarm	 A data acquisition is transmitted Whenever an alarm threshold (fixed by the user) is reached (4 alarm threshold levels High/Low). A transmission cycle is reached, the transmission cycle is configurable through the BeanScape[®] 1s to 24h 	
Õ	Streaming	Streaming is more suitable for users requiring a high data sampling rate (maximum 2 KHz). In order to achieve these performances, data sampling are transmitted by packet;	

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	Shock Detection	If a shock threshold is detected, the BeanDevice [®] starts to transmit all the Data acquisition to the WIFI Network
	S.E.T	The streaming with event trigger mode allows user to receive notification via email when the measurement reaches the preconfigured thresholds, the measurement is in streaming mode with high sampling rates (up to 200 Sps) unlike in the alarm mode.
Data acquisition Cycle	Select the Data acquisi The format is: Day : Ho	tion cycle between 1s and 24hours. our : Minute :Second
Sampling rate	Select the sampling rate Samples per second at This field is available in Choose carefully the Sa ✓ The PER (Packet BeanDevice®. Fo <u>Network capace</u> ✓ Power consump	e of your BeanDevice® between 1 sample per second and 2000 maximum. streaming mode: mpling rate value: E Error Rate) can increase if the Sampling rate is high on your or further information read the technical note <u>TN_RF_014 - "Wireless</u> ity".
Data acquisition duration	Data acquisition duratio The format is Day: Hou The Data acquisition du	on in streaming mode. r: Minute: Second rration value cannot be higher than Data acquisition cycle.
Options	<i>TX only</i> : Real-time data <i>Log only</i> : Real-time dat <i>TX & Log</i> : Real-time dat <i>SA: Standalone:</i> The Be Wireless network	transmission is enabled a logging is enabled ta transmission and data logging are enabled eanDevice® WiLow® logs all the data acquisition with no need of

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tions	No survey: Survey:
ning opt	One shot: streaming continuously for a predefined duration
Strean	<i>Continuous Monitoring</i> : streaming continuously <i>Burst</i> : Streaming data every predefined cycle and for a predefined duration
Store and Forward+	SF Enabled: enable Store and forward option



For further information about the Shock detection mode please refer to this technical note TN RF 018 – "Data acquisition modes available on the BeanDevice®"



See our technical video "Stop Button Overview" on YouTube

Wilow[®] wireless sensors

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All the modifications are displayed on "Current data acquisition mode" frame:



Figure 70: Current data acquisition mode display

For further information, please read the technical note <u>TN_RF_018 – "Data acquisition modes</u> available on the BeanDevice[®]"

7.3.4 Shock Sensor Config Tab

Display configuration Notes	Data Acq. config	Shock Sen	sor Config Online Data Ar	alysis 💶 🕨
Schock Sensor Config				
Shock Sensor Range:	< selection >	\sim	-2.000 / +2.000	
Sampling Rate:	< selection >	\sim	100	
Shock Thresholds:		mg	1966	
			Validate	

Figure 71: Shock Sensor Config tab

Shock Sensor Range: This option allows the user to change the Shock sensor range from the list, as displayed below. The available Shock Ranges are +/-2g, +/-4g, +/-6g, +/-8g or +/-16g.

The selected value will be displayed on the black case.



Sampling Rate: This option allows to change the Sampling Rate of the Shock Senor from the listed values: 25Hz, 50Hz, 100Hz, 400Hz, 800Hz or 1600Hz.

The selected value will be displayed on the black case.

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поск осньог панус.	< selection >	~	2.0007 42.000
Sampling Rate:	< selection >	\sim	100
Shock Thresholds:	< selection > 25 HZ 50 HZ	mg	1966
	400 HZ 800 HZ 1600 HZ		Validate

Shock Thresholds: This input is used to change the Shock Thresholds. The value should be written manually.

The Unit of the Shock Thresholds is "mg". The selected value will be displayed on the black case.

Sampling Rate:	< selection >	\sim	100
Shock Thresholds:		mg	1966

7.3.5 Online Data Analysis Tab (only available on the BeanDevice® Wilow® AX-3D)

In signal processing tab, we setup the real time FFT and real time velocity (PPV & PVS), as well enable/disable the IIR filter.

Data Acq. config.	Shock Sensor Config	Online	Data Analysis	DataLogger	System config.	F + F
Online FFT Co	enfiguration FFT	\$	Online Velo	o <mark>city configu</mark> Online Velocity	ration	à
Automatic FF	T Report(S.E.T) .og file		Automat	tic DIN Report Velocity Log file PPV Log file	(S.E.T) e	
Number of points Manual The number of the	(Streaming) SR/0.1 e current point SR/0.1	24	Software F	i <mark>lters</mark> IR Filter		
			Valida	ite		

Figure 72: Signal Processing Tab

Parameter	Description
Online FFT Configuration	 Enable Online FFT: check to enable real time FFT processing Automatic FFT Report (Set Mode): check for automatically sending the FFT report by email when alarm occurs on streaming with event-trigger(set) mode
	Enable FFT Log file: check to create FFT folder and log all real time FFT data
	check to modify the FFT Advanced Configuration settings
Online Velocity	Enable Online Velocity: check to enable real time velocity processing
configuration	• Automatic DIN Report (Set Mode): check for automatically sending the DIN 4150-3 report by email when alarm occurs on streaming with event-trigger(set) mode
	• Enable Velocity Log file: check to create Velocity folder and log all real time Velocity
	Enable PPV Log file: check to create PPV Log file
	check to modify the Velocity Advanced Configuration settings

BeanDevice [®] Wilow [®] Use	er Manual	Wilow [®] wireless sensors
Software filters	• Enable IIR Filter: check to er High sampling rate acquisition	nable the IIR (infinite impulse response) filter for the on modes.
Number of points(Streaming)	 Manual: check to configure manually. : check to modify the F 	the number of points related to the Sreaming FT Spectral Resolution Converter
c	lick on " <i>Validate</i> " if you want to	validate your configuration.
For streaming v configured on tools -> ala	with event trigger (S.E.T mod Irm management	le), notification by email configuration should be
In order to use R	teal time PPV, you should use	high sampling rate to provide good PPV values.
You need to sam	ple at 200Hz at least to provid	de good PPV values.
By using SET mod to enter a DAQ duration H	de, you need to choose the hig nigher than 10s.	hest sampling rate which is 200Hz and don't forget
For Streaming m provide good PPV measure	iode, choose at least 500Hz ar rement.	nd above with a minimum DAQ duration of 10s, to
For further inform	nation about the Shock detect iisition modes available on th	<u>tion mode please refer to this technical note</u> <u>e BeanDevice®"</u>

7.3.6 DataLogger Tab

DataLogger				
DataLogge	rstatus:			
Download p	rogress: 0 %			
Download	status:			
DataLogger Manager				
Databogger Manager				
Stop		Eras	e	
Download manager				
Download	Download then e	rase Cano	el	
Download	bowniodd them e	idae odino		
Stop I	AQ, Download t	hen Erase		
	Stop DAQ Dowr	bload		
	otop brind, boin	liodd		

Figure 73 : Datalogger tab

The DataLogger tab is composed of four different fields:

- **Datalogger Status**
- Datalogger manager
- Download manager
- Datalogger memory configuration

7.3.6.1 Datalogger status

DataLogger status:	
Download progress: 0 % Download status:	

- **Datalogger status**: Displays loggers' status, four status are available:
 - o *Ready*: the Datalogger is ready to register data
 - o NotInit: the Datalogger is not initialized
 - Active logs only: Data acquisition is logged only
 - Active TX and Log: Data acquisition is logged & transmitted by Radio
 - o Stopped: Datalogger is stopped
- Download progress: Displays the download process 0 to 100%. If 100%, all the data logs are successfully downloaded on your PC.







7.3.7 System configuration Tab

Data Acq. config.	Shock Sensor Config	Online Data Analysis	DataLogger	system coring.
Ratio : 1	NA NA	Validate	Reboot	
NTP Config.				
Time Zone:	m m	in		
Port :				
IP address:				
NTF Server.	1	V	alidate	
N	P Config			
	Figure 74: S	ystem configu	ration ta	<u>b</u>

Parameter	Description						
Diagnostic cycle	You can set the BeanDevice [®] Wilow [®] diagnostic cycle (Battery status, LQI, PER). Diagnostic cycle is a ratio of the data acquisition transmission cycle. <i>Ex</i> : If you try to set the diagnostic cycle ratio at 2 while the data acquisition cycle is set at 5s, the diagnostic cycle will be settled to 10s ;						
Reboot	Restarts your BeanDevice [®] Wilow [®] from BeanScape [®] software.						
NTP config	 NTP (Net Time protocol) configuration The BeanDevice® Wilow® comes with an embedded SNTP Client, by default this device is working with UTC +0 Time Zone User can specify: Time Zone with minutes resolution NTP server: If DNS is activated: enter the port ID and the NTP server address If DNS is not enabled: enter the port ID and the NTP server IP We recommend you to use time.nist.gov (PORT ID :123) NTP server 						



<u>See our technical video "Wilow - Wi-Fi Sensors-Diagnostic cycle on BeanDevice® Wilow" on</u> <u>YouTube</u>



<u>See our technical video "Wilow - Wi-Fi Sensors-NTP Net Time Protocol configuration" on</u> <u>YouTube</u>

7.3.8 Remote Configuration

Online Data Analysis Remote Configura Lock Remote	DataLogger ation Configuration e Leds	System config.	Remote Configuration	Power mode Configu	
I	<u>Figu</u>	re 75: Remo	<u>te Configuration</u>		
ir GmbH			"Re	ethinking sensing technology"	9



 ✓ « ACTIVE» POWER MODE: In active power mode, the BeanDevice[®] is active every time. The Wi-Fi link between the BeanDevice[®] and the router is always conserved.



If your BeanDevice[®] is set to "Active" power mode, your battery may drain quickly. If you want to extend your battery autonomy, you must configure your BeanDevice[®] in "sleep" power mode.

In active mode, your BeanDevice[®] is always active; it will receive instantly your OTAC command

✓ SLEEP POWER MODE:

When the BeanDevice[®] operates in "**sleep mode**", it sends periodically a request (called listening cycle) to the router for an OTAC command.

The user can easily configure the listening cycle depending on the data acquisition low duty cycle. In sleep mode, it is possible to remotely transmit an OTAC configuration to the BeanDevice[®] without sacrificing its ultra-low power consumption.

Example 1: The Data Acquisition Cycle in Low Duty Cycle mode doesn't affect the Listening Cycle of the Sleep Mode. The BeanDevice[®] will receive OTAC After the Listening Cycle.

If the Data Acquisition Cycle is 15 seconds and the Listening Cycle is 60 seconds, the OTAC will be received every 60 seconds.





POWER MODE MANAGEMENT FROM THE BEANSCAPE[®]

Power mode Status				
Power Supply Di emperature	iagnostic : NA *c	TimeZo NTP	ne: 0 url: gr.pool.ntp.org:15	
Power mode Battory voltage	sleep with list	System Information Diagnostic cycle :	Lis	tening Ratio
Battery level DiagDate	: Good %	Listening Cycle : Data Aging:	RollOver ms	
Status: ME em. Mngmnt: ST	MORY FULL OP_DAQ Detail access	Download Strategy: Memory Used:	IONE %	
Power mode Status	Power Mode Configuration Status: Enabled Disable sleep mode	Nemote Configuration		
Hz ddd bh mm ss	Enable sleep mode Listening Cycle : 25	Validate		
		_		
Figure 76:	Power mode man	Power mode of agement (disp	configuration tab Ilay features)	



Enable sleep mode: To enable the Sleep mode, the user should select the radio button "Enable sleep mode" and set the Listening Ratio. To confirm the configuration, click on validate.

Power Supply D	Diagnostic	TimeZ	one:
Temperature	: 23	° NTF	one: url: ar pool ntp.org
Power supply	: Mains		
Power mode	: active	System Information	
Battery voltage	: 4.079	V Diagnostic cycle :	00:00:04 ddd, hl
Battery level	: Good 5	% Listening Cycle :	NA
DiagDate	e: 13/02/2019 16:09:00	Data Aging:	RollOver ms
er Status: Mi	EMORY FULL	Download Strategy:	NONE
n. Mngmnt: ST	TOP_DAQ	Memory Used:	100 %
	DataLogger System co	onfig. Remote Configuration	Power mode Config
)	Power Mode Configura	ation	
]	Status: Disabled		
ddd,hh:mm:ss	Disable sleep mode	•	
	Enable sleep mode	1]
Hz	Listening Cycle : 2	5 ≑ Validate	
ddd,hh:mm:ss			

Figure 78: Enable sleep mode



Figure 80: Disable sleep mode

*

Validate

Power Mode Configuration
Status: Enabled

Disable sleep mode

Enable sleep mode

Listening Cycle : 25

ddd,hh:mm:ss

ddd,hh:mm:ss

Hz

7.3.10 Right Click functionalities

BeanScape[®] offers access to quick functionalities in relation with BeanDevices[®] WiLow[®]. By using the mouse, Right Click on the BeanDevice[®] WiLow[®] profile then you can quickly

Change the Device I	.abel			
Restart the Device				
Remove the Device				
^{سيف} Bear	nScape			
File	Server Tools	Off. Data Analysis	BeanDevice	Help
	📓 😈 I 💿 I 🧕			
E	MAC_ID : 0 x 5C313	3E06A9A70000	hanna Davias I.	- h - l
			nange Device L	abei
	Ch_Z	Re	estart Device	
		Re	emove Device	
	<u>Figure 81: Ri</u>	i <mark>ght Click on Bear</mark>	nDevice® Pro	ofile

Change the Device Label: Used to change the BeanDevice[®] WiLow[®] Label directly instead to use the main configuration frame.

	ChangeLabel			
	Device Label:	Change Device Labe MAC_ID : 0 x 5C313E06A9 Validate	el A70000 Cancel	
Figure 82: Right click-	change label			

Restart Device: Used to restart the BeanDevice® WiLow®

Remove Device: Used to remove the BeanDevice[®] WiLow[®] from the list. By selecting this option the BeanScape[®] will ask the user to Localize the BeanDevice[®] WiLow on the Network before finishing the Remove operation.

Delete BeanDevice Delete BeanDevice Select PC WLAN/LAN IP: 192.168.1.251 Localize Validate	
Delete BeanDevice Image: Comparison of the second sec	
Delete BeanDevice	

BeanScape[®] offers also the access to quick functionalities in relation with BeanSensor[®] By using the mouse, Right Click on the sensor channel then you can quickly

- Change State to ON/OFF
- Change Sensor Label
- Disable/Enable log



Figure 84: Right click on sensor channel

Change state to ON/OFF: Used to disable or enable the sensor channel. User can also use the State button on the sensor profile dashboard.



Figure 85: Change Sensor state functionality

Change sensor label: Used rename the sensor channel.



Figure 86: Change sensor label functionality

Disable/Enable log: Used to disable or enable the log on a specific channel. By using this functionality, the log file will not record data from that channel. Disable/Enable log functionality can be used also from the BeanSensor menu.

	© . 2 D : 0 x 5C313E06A9A70000 ndom name_X	MAC_ID : 0: Random Ch_Y	x 5C313E06A9A70000 name_X
	Change State to : Off	···· C	Change State to : Off
-	Change Sensor Label		Change Sensor Label
	Disable log		Enable log
Off. Data Analysis	BeanSensor Help	sis	BeanSensor Help
	Disable log		Enable log
06A9A70000	Buffer Reset		Buffer Reset
	Open the graph in a new window		Open the graph in a new window

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<u>The Right click functionalities are available also when using MQTT, the only exception is the</u> <u>"Remove functionality". With MQTT user will not be asked to localize the device, he clicks on remove</u> <u>and the device will be directly deleted from the list.</u>



Figure 88: Right click remove functionality (MQTT)

7.4 SENSOR CHANNEL PROFILE



The screen « Sensor channel profile » consists of three parts:

General information about the measurement channel;

Measurement channel configuration;

A graph which displays in real-time data measurements transmitted by BeanDevice® Wilow®

1

2

3



Figure 89: Overview: Sensor channel profile

7.4.1 Sensor channel status

7.4.1.1 Frame: General information





- o g for the BeanDevice® WiLow® AX-3D & AX-3DS
- ° for the BeanDevice[®] WiLow[®] HI-INC

7.4.2 Sensor channel configuration

Here you can see that for each Sensor its own configuration frame accessible by clicking on the sensor's channel to setup.



This frame contains a set of 6 tabs:

Custom Display	 Allows the end user to customzie the sensor
Notes	 Contains notes relating to the BeanDevice[®] Wilow sensor
Measurement conditioning calibration	 Sensor channel calibration interface
MQTT Conf	 Contains information about Mqtt status
Log config	 Logs configuration on the BeanScape[®]
Alarm and S.E.T config	 Allows The user to configure the alarm thresholds related to the sensor

7.4.2.1 Tab: Custom display

These parameters allow the user to customize his sensor:

	Custom dis	play	Notes	Meas	urement cond	ditionning calibration	MQTT Conf	Log config.	Alarm and
	Ratio :	1			Offset :	0	Zeroi	ng sensor cha	innel
l	Unit :	g			Type :	SENSOR_TYPE]	Apply	
l	Ref :	SEN	ISOR_R	EF	Label :	Ch_X]		
						Validate			

Figure 93: Sensor channel custom display tab

- ✓ Type: Describe the sensor type (ex: load cell, pressure, Strain gage +/- 2 mv/V, LVDT,....)
- ✓ Unit: customer sensor unit (bar, °C, I/h....)
- ✓ Ratio : Sensor Ratio coefficient (RAT);
- ✓ Offset : Sensor Offset coefficient (OFF);
- ✓ *Label*: Give a name to your sensor. (*ex* : Sensor on Stator Machine 1, sensor in Room 2 Floor 3)

<u>Zeroing</u>
BeanDevice® Wilow® User Manual
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 Milow® wireless sensors
 In order to secure accurate and precise Velocity and FFT measurements on axis that's mounted to ward the earth gravity you should Apply zeroing to cancel earth gravity.

 Zeroing sensor channel
 Apply

 7.4.2.2
 Tab : Notes

Figure 94: Sensor channel Notes tab

This field contains notes relating to the BeanDevice[®] sensor. To change this field, enter a value or free text and click the "Validate" button.

A new window opens; accept your modifications by clicking on "OK".



To back up your text click on the icon "Backup your Database" 📓

7.4.2.3 Measurement Conditioning calibration

WARNING: These calibration coefficients should be accessible to an advanced user. A wrong calibration will result in false measurements.

Validate

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These coefficients are used to calibrate the *internal accelerometer/inclinometer* sensors:

Custom display Notes	Measurement cor	nditionning calibration	MQTT	Conf	Log config.	Alarm and S.E.T confi
Basic calibration		Advanced calibration				
Ratio : 1		O0: 0	R01:	0		
Offset : 0		R00: 1	R02:	0		
	Validate	E	xport	R	eset	

Figure 95: Sensor calibration tab

The BeanScape[®] provides a Basic calibration and Advanced calibration interface for each measurement channel:

Basic Calibration:

- **Ratio**: multiplier coefficient
- **Offset**: adder/subtracted coefficient. its unit is the sensor unit

Calibrated_value = (Ratio x Non_Calibrated_Value) + Offset

Enter the calibration coefficients and then click on validate.



The calibrations coefficients are backed up on the BeanDevice[®] flash memory, and cannot be lost if the BeanDevice[®] is switched off

Advanced Calibration:

These values are obtained through an advanced calibration process.



For further details have a look to section 13.

7.4.3 MQTT Conf

Here you can see your current MQTT topic's Name and Status, whether it is publishing or not and whether retains flag is enabled or disabled

Bear	Device [®] Wilov	v® User	Manual		١	Wilow [®] wireless sensors
	Custom display	Notes	Measurement conditionning calibration	MQTT Conf	Log config.	Alarm and S.E.T config
	Topic LDC /	LDCA				
	Topic Name:	F4B85	E00A14B0000/SENSOR/1			
	Retain Flag:	disable	ed and a second s			
	Publishing:	Enable	ad			
			Figure 96: Sensor MQTT	<u>configurat</u>	ion tab	
1	Topic Name channel to v information information.	: The which chann	MQTT specification defines t payload data is published. Su els (E.g. : measurements on Z	opic as th ubscribers (Axis) on	e key tha will then which the	t identifies the information use the key to identify the y want to receive published
1	<i>Retain Flag:</i> subscribes, v	The b	roker will store the last retai eive that message immediate	ned messa y after sub	ge for tha scribing.	t topic and each client that
	Publishina:	That sh	ows if the Topic publishing is	enabled or	disabled.	
	5					
7.4.4	Log file config	guratio	n tab			
	This tab sh	nould n	ot be confused with the Data	logger fea	ture avail	able on the Beandevice®:
	Custom displa	ay Note	s Measurement conditionning calibration	on MQTT Co	nf Log confi	9. Alarm and S.E.T config
	Log file	name mo	Transmit LowDutyCycle Ch. X. MA			
	- Loa confic	ouration				
	Log en	abled				
	Log file	name aut	0			
			Validate			
			Figure 97: Log confi	guration to	<u>ab</u>	
Ву	default, Log f	ile nan	ne is built with the measurem	ent channe	el & BeanD	evice [®] MAC Address:
< 5	Sensor Channe	el Num	ber > < MAC ID >			
	√ log engl	hlod If	checked log is enabled on th	e ReanSca	ne [®]	
	Log end		checked, Log is chabled off th		μe	

✓ Log filename auto.: If checked, Log file name is named automatically

Click on *validate* in order to validate all your modifications.

For users who want to rename the log file, two solutions are provided:

✓ Add automatically the channel "Label" in your log file name:

<Label><Sensor channel Number> <MAC_ID>

✓ The log file name can be fully customized: Uncheck the case « Log filename auto" and add your own label

7.4.5 Alarm and S.E.T conf tab

In this tab, you can configure threshold high values (High Level Alarm & High-Level Alert) and low values (Low Level Alert a Low-Level Alarm).

Custom display	Notes	Measurement conditionning calibration	MQTT Conf	Log config.	Alarm and S.E.T config
High Lev	vel Alarm				
High Lev	vel Alert				
Low Lev	vel Alert				
Low Lev	vel Alarm	Va	lidate		
High level Al	arm >=	Hinh Level Alert > Low Level Alert	>= I ow leve	Alarm	

Figure 98: Alarm and S.E.T config tab

In Alarm or S.E.T mode, when a high/low level threshold value is reached, an alarm notification is transmitted to the supervision system:

• If the measurement value is higher than High level alarm/High level alert, an alarm notification is transmitted to the supervision system

• If the measurement value is lower than Low level alarm/Low level alert, an alarm notification is transmitted to the supervision system

Threshold values must be organized in this manner:

High level alarm >=High level alert > Low level alert>= Low level alarm

Starting from firmware 3.7, the alarm thresholds topology has been changed and become based on triple A topology.

Alarm > Action > Alert

Custom display	Notes	Measurement	conditionr	ning calibration	MQTT Conf	Log config.	Alarm and S.E.T config
Alarm	[g	Alarm > Act	ion > Alert		
Action	[g				
Alert	[g				
		Validate	Re	set			

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7.4.6 Graphical display



Figure 99: Overview: Channel acquisition graph visualization

To have a wide display view of the graph, it is recommended to click on the Green button on the top of the sensor's channel configuration area to hide it.





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The BeanDevice[®] WILO[®] data acquisition mode and the last data acquisition can be visualized directly from the graph.



Figure 102: Example: Graph visualization

7.4.6.1 Frame: Display



Figure 103: Graph measure mode: Frame Display

7.4.6.2 Frame: Marks

From this frame you can select the display mode of action of the chart. Three types of symbols are available:



Circle: Brings up a point on each bar graph

Square: brings up a square on each measure of the graph

None: No logs is displayed on the graph



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7.4.6.3 Frame: Scale

From this frame, the scaling of the graphics can be customized to suit your needs.

🔲 Zoom Y 📄 Zoom X 📄 Zoom XY

Checkbox "Zoom X and Y Zoom"

These boxes are useful for performing a graph zoom from the mouse wheel, there are four cases:

- ✓ <u>Case 1</u>: Case "Zoom X" ticked. The graph zoom will only affect the X axis.
- ✓ <u>Case 2</u>: Case "Zoom Y" ticked. The graph zoom will only affect the Y axis.
- Case 3: Case "Zoom XY" ticked." Zoom will affect both X and Y axes
- Case 4: Case "Zoom X ", "Zoom XY "and "Zoom Y " not ticked. The zoom function from the mouse wheel is disabled.

7.5 DATALOGGER CONFIGURATION

All the BeanDevice[®] integrates an onboard DataDatalogger based on a flash memory. It integrates a wide spectrum of advanced features:

- ✓ Very fast download (< 5 minutes for 1 million data acquisition, <25 minutes for 8 millions data acquisition)</p>
- ✓ A great flexibility for the user who can choose three configurations: Datalogging only or Datalogging + Data transmission or Data transmission
- ✓ The BeanDevice[®] can operate in standalone mode, without the necessity to be always connected to a Wireless Sensor Networks
- ✓ Datalogging is compatible with a maximum sampling rate of 2 Ksamples/s per channel

7.5.1 Datalogger capacity

The following table shows the Datalogger capacity regarding the version of the BeanDevice®:

BeanDevice®	Datalogger capacity
AX-3D	5 million data points
AX-3DS	5 million data points
Hi-Inc	5 million data points

7.5.2 Data acquisition configuration tab

D			1		-
Data Acq. config.	Shock Sensor Config	Online Data Analysi	DataLogger	System config.	F
Data acquisition	I mode conliguration				
Data Acq. n	node : LowDutyCycle	e 🗸 🖌	Start		
Data Acq.	cycle:::	ddd, hh:mm:ss	Stop		
тх	Ratio:	י נ			
		1			
Data Acq du	uration:::	ddd,hh:mm:ss			
Data acquisitio	on mode options			1	
O Tx Only	O Log Only	Tx & Log	⊖ sa		
0	0	0			
Streaming Pag	cket Options			1	
Continuou	s Monotoring	Burst	One Shot		
Store and Forv	vard	D	atalogge <u>r or</u>	otions	

Figure 105: Tab: Data acquisition configuration

- **TX only**: The BeanDevice[®] transmits the data acquisition without Data logging
- Log only: The BeanDevice[®] logs the data acquisition without wireless transmission
- TX & Log: The BeanDevice[®] transmits and logs the data acquisition;
- **SA** (*Standalone*): The BeanDevice[®] logs the data acquisition without wireless transmission. The BeanDevice stores all the measurements on its embedded Datalogger.

7.5.3 Configure a data acquisition mode with Datalogger



Figure 106: Overview: Data acquisition configuration scenario

7.5.3.1 LDCDA mode with Log only data logging option

With LDCDA mode, when the BeanDevice[®] is restarted, the Datalogger should continue storing data.

Current data acquisition mode		Data Acq. config.	Shock Sensor Config	Online Data Analysis	DataLogger	Sys
DAQ Status : Started		Data acquisition	mode configuration	·		
Data Acq. mode : LowDutyCy	rcle	Data Acq. n	mode : LowDutyCycle	e ~	Start	
Data Acq. cycle : 00:01:00	ddd, hh:mm:ss	Data Acq.	. cycle::01:	ddd,hh:mm:ss	Stop	
TX Ratio : 1		TX_	_Ratio: 1]		
Sampling rate : NA	Hz	Data Acq du	uration:::	ddd,hh:mm:ss		
Data Acq. duration : NA	ddd,hh:mm:ss	Data acquisitio	on mode options			
		O Tx Only	Log Only	○ Tx & Log (⊃ sa	
Tx O		Streaming Pac	cket Options			
		Continuou	Manatarina 🔿	Drawst	One Shat	

Figure 107: BeanDevice Configured with LDCDA mode with LOG only

7.5.3.2 Streaming mode with Log only data logging option

The same steps are to be followed as for LDCDA mode. After powering off and then on the BeanDevice[®], the Datalogger restarts logging

- Current data acquisition m	node		Data Acq. config. Shock Sensor Config	Online Data Analys	is DataLogger Sy
DAQ Status :	Started		Data acquisition mode configuration	r	
Data Acq. mode :	Streaming		Data Acq. mode : Streaming	\sim	Start
Data Acq. cycle :	NA	ddd, hh:mm:ss	Data Acq. cycle::::	ddd,hh:mm:ss	Stop
TX Ratio :	NA		Sampling Rate: 1000	Hz	
Sampling rate :	1000	Hz	Data Acq duration::::	ddd,hh:mm:ss	
Data Acq. duration :	Continue	ddd.hh:mm:ss	Data acquisition mode options		
			◯ Tx Only	🔿 Tx & Log	⊖ sa
	Tx O		Streaming Packet Options		
Fig	ure 108:	BeanDevice Config	ured with streaming mode v	vith LOG only	

7.5.4 Configure a Data Acquisition mode with Standalone option

Standalone option is similar to Log only option with the difference that the BeanDevice continues to log the data even if it is no more connected to the network.

Check **SA** to configure your BeanDevice to function on standalone, validate and turn it off. now when you turn it on, your BeanDevice will start to log data independently from the Wireless network.

After finishing logging and when you want to extract your logged data from the BeanDevice, turn it off and turn it on in the periphery of your Wi-Fi network, it will connect to your BeanScape supervision software and it is from there you will download your logged data

For further information about downloading logged data Please read the following section: "<u>click here</u>"





Figure 109: BeanDevice Configured with LDCDA mode with Stand Alone

7.5.5 Configure a Data Acquisition mode with TX & Log option

If the user chooses to configure the Data Acquisition mode with TX & Log option activated:



8. LOG FILE & FOLDER ORGANIZATION

8.1.1 Log file directory

By default, the Log file directory is: C:\log_beanscape

To change it and have access to the BeanScape[®] advanced settings, select **Tools** from the Top menu bar, then BeanScape[®]



Figure 110: BeanScape® configuration menu

This window lets you configure the logs, and the data cache.

BeanScape Configuration		
LOG Configuration		1
Log directory :	C:\log_beanscape	
Stop loggin when disc space is	2048 🗢 MB	
Main Log filename :	LOG	
Main log max. size :	200	
Sensor Log enabled :		
Sensor log max. size (KB) :	1024	
Network log info. enabled :		
Network info log max. size (KB) :	1024	
Streaming log max. size (KB) :	2048	
BGw Module Log enabled :		
BGw Module log max. size (KB) :	1024	
Syst. Maint. Status Log enabled :	\checkmark	
Syst. Maint. Status log max size	1024	
		~
Reload Apply	Save Reset Close	

Figure 111: BeanScape® configuration window

- ✓ *LOG directory*: Enter here the path/folder where you would want to save the LOG files.
- ✓ *Main log filename*: Here you may enter the desired name in order to save the LOG file.
- ✓ Main log max. size (KB): Maximum file size in Kilobytes (KB) for your principal LOG file
- ✓ Sensor Log Enabled: Check this box if you want to enable the sensor(s) data acquisition in your LOG file
- ✓ Sensor log max. size (KB) : Maximum size in Kilobytes (KB) of sensor log files (<u>except</u> for streaming & streaming data acquisition mode)
- Network log info. enabled : Check this box if you want to enable network information in your LOG file
- ✓ *Network info log max. size (KB)* : Maximum size in Kilobytes for your network information LOG file
- ✓ Streaming log max. size : Maximum size in Kilobytes (KB) of sensor log files (only for streaming & streaming data acquisition mode)



reverts to the original configuration.

8.1.2 Log folder

By Default, log files linked to the *BeanDevice® WiLow®* are stored in the log folder (located in C:/log_beanscape directory):

"Folder MAC_ID"

Only the last 4 Char of BeanDevice[®] MAC ID are displayed.

User can change log folder name by clicking on "Custom display" tab located on the **BeanDevice**[®] *WiLow*[®] profile:

Display configuration	Notes	Data Acq. config.	Shock Sensor Config	Online Data Analysis	4
Type :	PLA	TFORM_TYPE			
Reference :	PLA	TFORM_REF			
Label :	MAG	C_ID : 0 x F4B85E00	DA14B00		
Log Folder:	Fold	ler F4B85E00A14B0	0000		
		Valida	ate		

Figure 112: BeanDevice®Custom Display tab

Enter your own log folder name, then click on validate.

The following example shows the log folder changed to "Factory2":

Display configuration	Notes	otes Data Acq. config. She	
Type :	PLA	TFORM_TYPE	
Reference :	PLA	TFORM_REF	
Label :	MA	C_ID : 0 x F4B85E00)A14B00
Log Folder:	Fac	tory2	
		Valida	ite

8.1.3 Log file size configuration

BeanScape Configuration	100	2
Log directory :	C:Vog_beanscape	
Stop loggin when disc space is	2048 🚔 MB	
Main Log filename :	LOG	E
Main log max. size :	200	
Sensor Log enabled :		
Sensor log max. size (KB) :	1024	
Network log info. enabled :		
Network info log max. size (KB) :	1024	
Streaming log max. size (KB) :	2048	
	All sensor chanels in one file	
Log file Generation	Separated	
Configuration via Udp		
Udp port :	53130	-
Reload Apply	Save Reset	Close

- ✓ *LOG directory*: Enter here the path/folder where you would want to save the LOG files.
- ✓ *Main log filename*: Here you may enter the desired name in order to save the LOG file.
- ✓ Main log max. size (KB): Maximum file size in Kilobytes (KB) for your principal LOG file
- Sensor Log Enabled: Check this box if you want to enable the sensor(s) data acquisition in your LOG file
- Sensor log max. size (KB): Maximum size in Kilobytes (KB) of sensor log files (except for streaming & streaming packet data acquisition mode)
- Network log info. enabled: Check this box if you want to enable network information in your LOG file
- ✓ *Network info log max. size (KB)*: Maximum size in Kilobytes for your network information LOG file
- ✓ Streaming log max. size: Maximum size in Kilobytes (KB) of sensor log files (only for streaming & streaming packet data acquisition mode)

8.1.4 Log file generation

By default, 1 log file is linked to 1 sensor channel. The user can select a log file linked to all the sensor channels present on the BeanDevice[®].

	\bigcirc All sensor chanels in one file
Log file Generation	 Separated
Figure 113: Loo	a file generation option

Once "All sensor channels in one file" option is selected, user can see all the channel in one single file under the C:\log_beanscape directory.

File Edit Format View Help	
Reansensor ax-30	-
Mac Id : 00158000000004A8 Network Id : 0002 Pan Id : 0020 Date : 04/07/2016 13:28:41	
Data acquisition cycle : 1 Data acquisition duration : NA Sampling rate : 10 Cut off frequency : 1000	
Measure Index; Measure Value	
1270 0.3685 0.0655 0.6859 0.8315 1271 0.3438 0.0752 0.8415 0.4842 1273 0.371 0.0371 0.6871 1.86637 12774 0.341 0.0661 0.8817 0.8414 12775 0.3444 0.0663 0.8336 0.8336 12775 0.3444 0.0664 0.8336 0.8336 0.3728 0.3998 0.061 0.8376 0.8387 12727 0.3414 0.0664 0.8336 0.8336 0.3009 0.0674 0.8817 0.8817 12728 0.3292 0.6851 0.8359 12728 0.3272 0.8817 0.8817 1283 0.3664 0.8829 0.8613 1284 0.3664 0.8829 0.8635 1284 0.3664 0.8829 0.8635 1294 0.3756 0.8843 0.8635 1294 0.3757 0.8843 0.8635 1294 0.3756 0.8843 0.8635 12940 0.3836 0.8	
	P

Figure 114: Example of Log file

8.1.5 Cache Data configuration (for Graph)

Data Cache Configuration	
Max. points :	40000
Max. packets :	6
Max. diagnostics :	1000
Max. alarms :	25
Max. streaming points :	10000

Figure 115: Data cache configuration options

- ✓ Maximum number of points: Set here the maximum number of points displayed on the BeanScape[®] graph
- ✓ Maximum number of packets: Set here the maximum number of packets displayed on the BeanScape[®] graph
- ✓ Max number of diagnostics: Set here the maximum number of diagnostics displayed on the BeanScape[®] graph
- Max number of alarms: Set here the maximum number of alarms displayed on the BeanScape[®] graph
- ✓ Maximum streaming points: Set here the maximum number of points displayed in Streaming/Streaming Packet on the BeanScape[®] graph



Please note that the values backed up by the BeanScape[®] may affect the memory capacity of your computer depending upon the size of every file.

8.1.6 Log file related to data acquisition (TX Folder)

8.1.6.1 Log filename root

For each sensor channel a log file is automatically created by the BeanScape[®].

The user can easily change the log file root:



By default, Log file name is built with the measurement channel & *BeanDevice®* MAC Address: < Sensor Channel Number > <MAC ID>

- ✓ Log enabled: If checked, Log is enabled on the BeanScape[®]
- ✓ Log filename auto.: If checked, Log file name is named automatically

Click on *validate* in order to validate all your modifications.

For users who want to rename the log file, two solutions are provided:

Solution 1	Add automatically the channel "Label" in your log file name: <label><sensor channel="" number=""> <mac_id></mac_id></sensor></label>
Solution 2	The log file name can be fully customized: Uncheck the case « Log filename auto" and add your own label

8.1.6.2 Specific case: log filename creation in "Streaming"/"Streaming" mode

In streaming or Streaming mode, log filename is built as follow:

Transmit_Streaming_Sensor_channel_MAC_ID_DATE_partXXX

- ✓ Sensor channel = Sensor channel
- ✓ MAC_ID: BeanDevice[®] MAC ID
- ✓ DATE: date when the streaming mode starts
- ✓ partXXX : Log file sequence number, part000 corresponds to the first log file

Example:

Transmit_Streaming_INC_Y_MAC_ID___0_x_A4D57843DE580000_2017-06-15_11-00-05_part000 Transmit_Streaming_INC_Y_MAC_ID___0_x_A4D57843DE580000_2017-06-15_11-00-05_part001

8.1.6.3 Log file analysis

Transmit_Streaming_INC_X_MAC_ID__0_x_A4D57843DE580000_2017-06-15_11-00-File Edit Format View Help BeanSensor Inclinometer Mac Id : A4D57843DE580000 Network Id : 0116 Pan Id : FFFE Sensor Id : 3 Sensor Label : INC_X Ratio : 1 Offset : 0 Unit : Deg Date : 15/06/2017 11:00:05 Data acquisition cycle : 0 Data acquisition duration : NA Sampling rate : 1000 Cut off frequency : 0 -------Measure Index;Measure Value 0;1.66 1;1.69 2;1.69 3;1.68 4;1.67 5;1.67 6;1.67 7;1.68 8;1.69 9;1.69 10;1.68 11;1.68 12;1.68 13;1.68 14;1.68 15;1.69 16;1.7 17;1.71 18;1.7 19;1.69 20;1.69 21;1.68

Figure 118: Log file example

The date which is displayed in the log file corresponds to the date when the streaming mode starts.

Measure index allows the user to use a timestamp, the time value between the Index N and N+1 corresponds to the period rate.

Example: Data acquisition starts at 17h55min05s

A data acquisition with a measurement index of 30 (value -0,0035) corresponds to a time 17h55min05s30ms.

8.1.7 Log file related to Datalogger (Datalogger Folder)

8.1.7.1 Log filename organization

Datalogger filename is built as follow:

MAC_ID_Streaming_DATE

- ✓ MAC_ID: BeanDevice[®] MAC ID
- ✓ DATE: date when the streaming mode starts

8.1.7.2 Log file analysis

File	Edit	Format	View	Help
Bear	nSens	or Inc	linom	eter
Date	e : 1	.5/06/2	017 1:	1:00:05
PAN.	_ID :	FFFE		
MAC.	_ID :	A4D57	84 3DE	580000
Meas	sureM	lode: S	cream	ing
Duty	y cyc	:1e= 0		
sam	pling	Rate=	1000	
Date		XTNC	v	
Duci	-, -, -, -, -, -, -, -, -, -, -, -, -, -		ಕಡಿ	
0;1	L.66;	0.35		
1;1	L.69;	0.34		
2;:	1.69;	0.35		
3 ;]	1.68;	0.35		
4 ; ;	1.6/;	0.35		
5 ; -	1.6/;	0.35		
0;	1.6/;	0.35		
1 :-	L. 68;	0.35		
8 ; .	1. 69;	0.35		
10	1.09;	0.35		
11	1.00	0.34		
12	1.00	0.34		
12	1.00	,0.33		

Figure 119: Log file example

Once downloaded, the user will get the same files as the Log files related to TX folder, a start time reference is noted, and an indexed measurement recorded.

8.1.8 Log file related to Wireless Network diagnostic

8.1.8.1 Log filename organization

Wireless Diagnostic log filename is built as follow:

MAC_ID_WirelessNetwkInfo

✓ MAC_ID: BeanDevice[®] MAC ID

8.1.8.2 Log file analysis

Log file related to wireless network diagnostic provides the following information:

- Date : diagnostic date
- LQI: BeanDevice[®] Link quality indicator
- **PER** : Packet Error Rate
- Internal temperature: internal battery voltage
- LoggerUsedSizeRatio: datalogger available memory size
- Energie Harvester: energie harvester status

Battery voltage: battery voltage

Figure 120: Wireless Network Info log file

BeanDevice[®] Wilow[®] User Manual

If the BeanDevice[®] is configured with the streaming data acquisition mode, the following diagnostic information are not refreshed:

- Battery voltage
- Battery level
- Internal temperature

A4D57843DE580000_WirelessNetwkInfo - Notepad
File Edit Format View Help
BearComponent Wireless Network Information Date : 15/06/2017 14:54:28 PAN_ID : FFFE MAC_ID : A4D57843DE580000
Date ; LQI ; PER ; Internal Temperature ; Store and Forward ;LoggerUsedSizeRatio; Energie Harvester ; Battery Voltag
15/06/2017 14:54:27;71; 0.00; 15/06/2017 14:54:27;58; 0.00; 15/06/2017 14:54:27;58; 0.00; 15/06/2017 14:54:28;63; 0.00; 15/06/2017 14:54:28;67; 0.00; 15/06/2017 14:54:28;67; 0.00; 15/06/2017 14:54:28;67; 0.00; 15/06/2017 14:54:28;67; 0.00; 15/06/2017 14:54:28;71; 0.00; 15/06/2017 14:54:29;71; 0.00; 15/06/2017 14:54:29;71; 0.00; 15/06/2017 14:54:29;71; 0.00; 15/06/2017 14:54:29;71; 0.00; 15/06/2017 14:54:29;71; 0.00; 15/06/2017 14:54:29;76; 0.00; 15/06/2017 14:54:29;76; 0.00; 15/06/2017 14:54:29;76; 0.00;

Figure 121: Wireless Network Info log file

8.1.8.3 How to open a measurement file with excel

Step 1 : Open Excel

🗶 i 🔓	10 - 1	(≈ - ∓						Book1 - Microsoft Excel											- e X				
File	Ho	me	Insert Pa	age Layout	Formulas	Data	Review	leview View Nuance PDF												۵ 🕜	- # %		
From	From	From	From Other	Existing	Refresh	Connectio Properties		The Filter	Reapply	Text to	Remove	Data	Consolidat	e What-If	Group	Ungroup Sub	e total	Show Detail Hide Detail					
Acces	s web	Get Ext	ternal Data	connections	Con	nections	Sort & Filter						ls	Analysis *		Outlin	ne	G.					
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1		1																					
2																							
3																							
4																							

<u>Step 2: Go on « Data » Tab, then select "From Text"</u>

X	- 19 -	(Ci - 1								Book1 -	Microsoft E	Excel									- 🗗 🖂	
Fil	e H	lome	Insert P	age Layout	Formulas	Data	Review	View Nuance PDF											a 🕜 🗖 🗗			
From	n From	From	From Other Sources *	Existing	Refresh All *	Connection Properties Bedit Links	ns ≵↓ Z Z↓ s	ort Filter	Clear	Text to	Remove	Data Validation	Consolidat	e What-If	Group L	Jngroup Sub	elle elle elle elle elle elle elle ell	ihow Detail Hide Detail				
		Get E	ternal Data		c	onnections Sort & Filter Data Tools Outline 💀																
	A1	Get E	ternal Data Fi	rom Text																	*	
	А	Import data from a text file.				F	G	н	1	J	K	L	М	N	0	Р	Q	R	S	23	U 🛣	
1		Press F1 for more help.																				
2																						

Step 3 : Choose your log file

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File	Hor	me Ir	nsert P	Page Layout	Formulas Data	Review	View N	luance PDF								
From Access	From Web	From F Text Get Exter	rom Other Sources * rnal Data	Existing Connections	Refresh	ions 🛃 🧸	The Filte	Reapply	Text to	Remove	Data	Consolidate	E? What-If	Group	Ungroup	Subtotal
	A1		+ (0	f_{x}	Look in:	🛅 log_bear	@ • 📬	X								
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20					Tools •	s T Import C										
21																

<u>Step 4</u> : Text import wizard will open, select « Delimited » for Characters such as commas or tabs separate each field.

On "Start import at row" field: Select the number of lines that you want to suppress from the header:



Select semicolon

ext Import Wizard - Step 2 of 3
This screen lets you set the delimiters your data contains. You can see how your text is affected in the preview elow.
Delimiters [[f_ab] Segicolon Comma Space Other:
BeanSensor SUN Date : 12/01/2012 15:48:22 PAN_ID : 2806 MAC_ID : 00158D0000AA9E7
Cancel <back next=""> Einish</back>

Select Text

BeanDevice® Wilow® User Manual Wilow[®] wireless sensors Text Import Wizard - Step 3 of 3 ? \times This screen lets you select each column and set the Data Format. Column data format O <u>G</u>eneral $^{\circ}\mbox{General}^{\circ}$ converts numeric values to numbers, date values to dates, and all remaining values to text. • Text \sim O Date: MDY Advanced... ○ Do not import column (skip) Data <u>p</u>review 2 Text _____ ^ BeanSensor Inclinometer Date : 2/8/2016 6:48:58 PM PAN_ID : 2401 MAC_ID : 00158D000004A9D1 > e Cancel < <u>B</u>ack <u>F</u>inish

Click on OK

Import Data	?	×
Select how you want to view this data in	your wo	rkbook.
📝 🔿 PivotTable Report		
PivotChart		
Only Create Connection		
 Where do you want to put the data? Existing worksheet: 		
=SAS1	•	
○ <u>N</u> ew worksheet		
Add this data to the Data Model		
Properties OK	Ca	ncel

Click on format cells:

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	ile Home I	nsert Page	e Layo	ut Formulas	Data Re	view	View	Nuance PD	F										۵ 🕜	- 6	23
Fre	Text B1	From Other Sources *	Exist Calib B	$\begin{array}{c c} & & \\ \hline \\ \hline$	Connections Properties	2↓ <u> </u> <u> </u>	Sort Filt	ter Adv	ar apply vanced C	rext to Rem olumns Dupli	ove Data cates Validati Data	Consol on T Tools	idate What- Analysis	f Group	Ungroup S	Subtotal	Show Detail Hide Detail Fa				*
	Δ		-		C	D	F	F	G	н	1	1	к	1	M	N	0	P	2	R	
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2	TimeStamp	Date		Copy	asure																=
3				Paste Options:																	
4	1,29709E+17	1			38																
5	1,29709E+17	1		Paste <u>S</u> pecial	45																
6	1,29709E+17	1		Insert	126																
7	1,29709E+17	1		Delete	129																
8	1,29709E+17	1			5																
9	1,29709E+17	1		Format Calls																	
10	1,29709E+17	1	.	Column Milath	109																
11	1,29709E+17	1		Column Width	103																
12	1,29709E+17	1		Hide	103																
14	1,25705E+17	1	2017	Unhide	104																
15	1,29709E+17	12	2/01/	2012 15:50:00	102																
16	1.29709E+17	1	2/01/	2012 15:50:20	102																
17	1,29709E+17	1	2/01/	2012 15:50:30	101																
18	1,29709E+17	1	2/01/	2012 15:50:40	101																
19	1,29709E+17	12	2/01/	2012 15:50:50	100																
20	1,29709E+17	12	2/01/	2012 15:51:00	102																
21	1,29709E+17	12	2/01/	2012 15:51:10	101																
22	1,29709E+17	12	2/01/	2012 15:51:20	101																
23	1,29709E+17	12	2/01/	2012 15:51:30	101																
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See "Exporting a log file to Excel" YouTube video

9. MQTT CONFIGURATION

An MQTT Module window will pop up.

In order to configure MQTT Select your BeanDevice[®] and go to BeanDevice[®] menu and scroll down to MQTT

👾 BeanScape	
File Server Tools Off. Data Analysis	BeanDevice Help
: 🛃 🔤 😳 🧕	Enable measure log
	Disable measure log
Ch_X	Reset measure memory cache for all the sensors
Ch_Y	Display Wireless Network Information
	Sensor Conf
	MQTT

Figure 122: BeanDevice® menu

MQTT Module : MAC_ID : 0 x 5C313E07049A0000	– 🗆 X
Broker Port: 1883 DNS Status: Enabled IP Broker: 0.0.0.0	MQTT Status MQTT Status: Stopped Start Validate MQTT Ack: NA Restart
DNS: Contraction	Topic for static measurement Publish Status: Disabled ID Channel: 3
Usemame: Password:	Topic Name: Default Default Validate
SSL/TLS Config Security choice : Disabled	Topic for dynamic measurement MQTT Status: Disabled
Security Protocol Version: SSLv3_0 SSLv3_0 Cinher · Automatic	Streaming Topic: Default Default Validate
Validate config	Subscription Subscription status: Disabled
Certif Certificate : A CA file Name : NA	Topic Name: Default Validate
CA file Valid from : NA To : NA	Keep Alive Interval : 60
Upload Status Start File Status NA Upload Status NA Upload Status Cancel and reset Byte Transferred 0%	Version: V3R1R1 V3R1R1 ✓ Auto.gen.ID Client: ID Client: V3R1R1 / V3R1R1 / Validate

Figure 123: MQTT Module window

9.1 BROKER

The broker is responsible for distributing messages to interested clients based on the topic of a message and there are two categories of brokers, one that is hosted on the Internet, the other is running on internal network.

Broker Port:	1883	1883
DNSStatus:	1	
Brokerlp:	0.0.0.0	
DNS:		iot.eclipse.org
	import	Validate

Figure 124: Broker frame

- Port: TCP/IP port to use with MQTT. 1883 and 8883 are the reserved ports for use with MQTT.
- **DNSStatus**: check if you want to enter your broker DNS. DNSStaus is 1
- Brokerlp: enter your broker IP address after unchecking DNSStatus. DNSStatus is 0
- **DNS**: domain name server of your Broker

9.2 KEEP ALIVE

The keep alive functionality assures that the connection is still open and both broker and client are connected to one another

KeepAlive		
Interval:	60	60
Version:	V3R1R1	V3R1R1 ~
Auto_gen_client_id_	1	\checkmark
Client ID:	WILO8425901549372612666	
		Validate

Figure 125: Keep alive frame

- **Interval**: The interval is the longest possible period of time, which broker and client can endure without sending a message.
- Version: MQTT protocol version
- Auto_gen_client_ID: check for auto generate a Client ID
- *Client ID*: Enter your client ID

9.3 AUTHENTIFICATION

MQTT broker can be configured to require client authentication using a valid username and password before a connection is permitted.

	Authentification				
	User Name:				
	Password:				
			Maltidate		
			Validate		
		Figure 126: Authentica	tion frame		
User N	Name: specify your us	ser name			
Passw	ord: enter your pass	word			
Passw	ord: enter your pass	word			
9.4	SSL/TLS	word			
9.4	SSL/TLS	word			
9.4	SSL/TLS				
9.4	SSL/TLS SSL/TLS Config Security choice :	Disabled	Enabled	•	
9.4	SSL/TLS SSL/TLS Config Security choice : Security Protocol Version:	Disabled SSLv3_0	Enabled Automatic	•	
<u>9.4</u>	SSL/TLS SSL/TLS Config Security choice : Security Protocol Version: Cipher :	Disabled SSLv3_0 Automatic	Enabled Automatic	•	
<u>9.4</u>	SSL/TLS SSL/TLS Config Security choice : Security Protocol Version: Cipher :	Disabled SSLv3_0 Automatic Automatic	Enabled Automatic	•	
9.4	SSL/TLS SSL/TLS Config Security choice : Security Protocol Version: Cipher :	Disabled SSLv3_0 Automatic Validate config	Enabled Automatic		

- Security choice: Enable or disable the security.
- Security Protocol Version: Choose the security protocol (Automatic choice is recommended).
- *Cipher:* Choose the cipher suit (Automatic choice is recommended).

9.5 CERTIF

Certif Certificate	:	🔎 🎝
CA file Name	: NA	
CA file Valid from	: NA	
То	: [NA	
Upload Status		Start
File Status	NA	otait
Upload Status	NA	Cancel and reset
Byte Transferred		
Progress	0%	

Figure 128 Certification

- *Certificate:* choose the certificate from local machine.
- **CA file Name:** enter the name of the file.
- **CA file Valid from:** choose the sender.
- **To:** choose the receiver (we can check the validity of the file on the Beanscape[®] side before send it to avoid problems).
- **Start:** starting the process of the sending.
- **Cancel and reset:** cancelling the sending of the file and reset the information.

TFor further information about the SSL/TLS please refer to the SSL/TLS Technical note

9.6 MQTT STATUS

Here you can check your MQTT different status, connected, stopped, connecting or disconnecting and can start your connection from here.

	MQTTSTATUS MQTT Status: MQTT Ack:	Connected ClientAccepted	Start	~	Validate Restart	
		Figure 129: MQTT Statu	<u>s frame</u>			
ΜQTT	<i>Status:</i> shows the o	current status of the MQTT	module:			

- Connecting: trying to establish a connection
- Connected: connection established
- Disconnecting: disconnecting the Client
- Stopped: the connection is stopped
- **Start/Stop:** select and **Validate** to start or stop your MQTT Client connection
- Restart: restart your connection

9.7 TOPIC FOR STATIC MEASUREMENT

A topic is a string used by the broker to filter messages for each connected client. Using this Topic for static measurement you will receive LowDutyCycle & alarm acquisition modes that are publishing to the MQTT broker,

Topic for Static measure	ement		
Publish_status:	Enabled		
Channel ID:	0	Ch_Z ∨	
Topic Name:	F4B85E00A14B0000/SENSOR/0		Default
	F4B85E00A14B0000/SENSOR/0		Validate

Figure 130: Topic for static measurement frame

- Publish_status: Check the check-button and validate to enable publishing
- **Channel ID:** channel identification
- **Topic Name:** Field to enter your topic's name

9.8 TOPIC FOR DYNAMIC MEASUREMENT

Using this Topic for Dynamic measurement you will receive Streaming, S.E.T & Shock detection acquisition modes that are publishing to the MQTT broker,



Figure 131: Topic for dynamic measurement frame

- **Publish_status:** check the check-button and **validate** to enable publishing
- **Streaming Topic:** Text field to enter your streaming topic's name

9.9 SUBSCRIBE

ubscribe subscribe_status:	Enabled	
Topic Name:	F4B85E00A14B0000/OTAC	Default
	F4B85E00A14B0000/OTAC	Validate

Figure 132: Subscribe

- **Subscribe_status:** check the check-button and **validate** to enable subscribing
- **Topic Name:** Field to enter your topic's name to subscribe to

10. OFFLINE DATA ANALYSIS TOOL

10.1 FFT (FAST FOURIER TRANSFORM) WAVEFORM ANALYSIS MODULE (AVAILABLE ONLY ON BEANDEVICE® WILOW® AX-3D)

The Fast Fourier Transform (FFT) resolves a time waveform into its sinusoidal components. The FFT takes a block of time-domain data and returns the frequency spectrum of the data. The FFT is a digital implementation of the Fourier transform. Thus, the FFT does not yield a continuous spectrum. Instead, the FFT returns a discrete spectrum, in which the frequency content of the waveform is resolved into a finite number of frequency lines, or bins.



FFT (Fast Fourier transform) module is only compatible with "Streaming" and "S.E.T" measurement modes.

The BeanScape[®] Software includes an FFT module used for spectrum analysis. Under the menu Off.Data Analysis displayed on the BeanScape[®] top menu, select FFT to have access to FFT spectrum analysis module.



For further information about the Offline FFT Data Analysis Tool please refer to this technical note TN RF 18 – "Data acquisition modes available on the BeanDevice®"

10.2 PARTICLE VELOCITY (AVAILABLE ONLY ON BEANDEVICE® WILOW® AX-3D ±2G VERSION)

According to the DIN4150-3, the BeanScape[®] software Particle Velocity option acts as follow:

1-Display Particle velocity which is calculated from the acceleration.

2-Implement an analysis report.



Figure 134: Particle Velocity menu

<u>For further information about the Offline Particle Velocity Data Analysis Tool please refer to</u> this technical note TN_RF_18 – "Data acquisition modes available on the BeanDevice®"
11. ONLINE DATA ANALYSIS TOOL

Click on the online data analysis tab to explore the available features.

Display configuration Notes Data Acq. config.	Sensor Config Online Data Analysis Data Lo
Online FFT Configuration Enable Online FFT	Online Velocity configuration Enable Online Velocity
Automatic FFT Report(S.E.T) Enable FFT Log file	Automatic DIN Report(S.E.T) Enable Velocity Log file Enable PPV Log file
Number of points(Streaming)	Software Filters
Manual SR/0.1 XX The number of the current point SR/0.1	Acc Filter : Enabled
Unit of acceleration g g v	Validate

Figure 135: Online Data Analysis tool

For further information about the Offline Data Analysis Tool please refer to this technical note TN RF 18 – "Data acquisition modes available on the BeanDevice®"

12. TOOLS TAB

From this tab, user have the possibility to access to many features and configurations related to BeanScape[®]/BeanDevice[®] management.

By simply clicking on Tools tab several topics will be displayed as follow



Figure 136: Tools Tab Main Menu

12.1 BEANSCAPE CONFIGURATION

BeanScape[®] menu window contains several configuration options related to the system configuration, Log file management and many other options.

12.1.1 Log File Organization

In Log Configuration frame, all the options are related to the Log file generation, seize and WIFI connection management.

LOG Configuration Log directory : C:\log_beanscape Stop logging when h.disc 2048 Main Log filename : LOG Main log max. size : 200 Sensor Log enabled : Sensor Log max. size (KB) : 1024 Network log info. enabled : Network info log max. size (KB) : 1024
Log directory : C:\log_beanscape Stop logging when h.disc 2048
Log directory : C:\log_beanscape Stop logging when h.disc 2048
Stop logging when h.disc 2048 MB Main Log filename : LOG Main log max. size : 200 Sensor Log enabled : Sensor log max. size (KB) : 1024 Network log info. enabled : Network info log max. size (KB) : 1024
Main Log filename : LOG Main log max. size : 200 Sensor Log enabled : Sensor log max. size (KB) : 1024 Network log info. enabled : Network info log max. size (KB) : 1024 Network info log max. size (KB) : 1024
Main log max. size : 200 Sensor Log enabled : Sensor log max. size (KB) : 1024 Network log info. enabled : Network info log max. size (KB) : 1024
Sensor Log enabled : Sensor log max. size (KB) : 1024 Network log info. enabled : Network info log max. size (KB) : 1024 Streamin log max. size (KB) : 1024
Network info log max. size (KB) : 1024
Characterized and a second sec
Streaming log max. size (NB) : 2048
 All sensor chanels in one file Log file Generation Separated
(a) occurated

Figure 137: Log file Configuration

BeanDevice [®] Wilow [®] User Manual Wilow [®] wireless sensors
For further details please have a look to section 8 in this document.
12.1.2 Configuration via UDP
User can configure the UDP port from this section, by default the port number is 53130.
Configuration via Udp
Udp port : 53130
Figure 138: UDP Port Configuration
12.1.3 Keep Alive App
Keep Alive App
KeepAliveApp enabled :
KAA timeout : 15000
KAA interval : 4000
Max. retry : 7
Figure 139: Keep alive tab
Three parameters related to keepalive are available:
 Keep alive timeout is the duration between two keep alive transmissions in idle condition. TC keepalive period is required to be configurable and by default is set to no less than 2 hours. Keep alive interval is the duration between two successive keep alive retransmissions, i acknowledgement to the previous keep alive transmission is not received. Max retry is the number of retransmissions to be carried out before declaring that remote end i not available.
Keepalive packet contains null data. In a TCP/IP over Ethernet network, a keepalive frame is of 60 bytes, whil acknowledge to this also null data frame and is of 54 bytes.
12.1.4 Language Configuration
Language Configuration Auto English French Japanese Chinese
Figure 140: Language configuration
✓ Auto: The BeanScape [®] will use the OS language by default
✓ English: select English language
 ✓ French: select French language
Beanair GmbH "Rethinking sensing technology" 147

BeanDevic	e [®] Wilow [®] User Manual	Wilow [®] wireless sensors
✓ Japa✓ Chin	nese: Select Japanese language ese: Select Chinese language	
This configu	ration will be updated when th	e BeanScape [®] is restarted.
12.1.5 Svst	em Configuration	
	System Configuration Alarm automatic Alarm => sound o	display :
	Figure	141: System Configuration
 ✓ Alar where 	<i>m automatic display:</i> Check thi a window alarm threshold is exce	s box if you want to see an alarm window displayed automatically eeded.
✓ Alar	m → Sound Effect: Check this bo	x if you want to hear a sound effect when a threshold is exceeded.
		,
12.1.6 Rem	ote Access	
	Remote Access	
	Fig	ure 142: Remote Access
Check Enable	MQTT Protocol for remote Acces	S.
12.1.7 Date	and Time Format	
	Date and Time format	
	Date :	M/d/yyyy h:mm:ss tt ~
	Example	4/6/2020 12:00:31 PM
	Figure 143	: Date and Time Configuration
Scroll down t	he Date Menu and select your sui	table format from the list.

BeanDevice [®] Wilow [®]	⁹ User Manual	Wilow [®] wireless sensors
12.1.8 BeanScape [®] M	ultiSite Configuration	
	-	
	BeanScape MultiSite Configuration	
	Enable MultiSite	
	Figure 144: BeanScape Mult	<u>iSite Configuration</u>
In order to open more	than one BeanScape [®] software session	, check enable MultiSite options.
12.1.9 G-Value		
Pacausa thara ara clig	at variations in the C value about ear	th's surface within the value of C dependent upon
location user have the	no variations in the G value about ear	alue from BeanScape Configuration option
location, user have the	possibility to set the corresponding d	and from beanscape configuration option.
	Gravity Config	
	g value: 9806.5 mm/s	
	Figure 145: G-Value C	onfiguration
12.2 WIFI NFTW	ORK SETTINGS	
	we BeanScape	
	File Server Tools Off. Data Analy	is Advanced func. Help
	BeanScape® Confi	guration
	Alarm window	
	Ch_X Wifi Network Settin	gs
	Ch_Y Export/import setti	ngs
	SNTP Client Config	uration
	Alarm Managemer	t .
	Offline graph	ement
	Date conversion	
	Advanced Settings	
	MQTT Configuratio	n
		and Cotting
	Figure 146: WIFI Netv	<u>fork Settings</u>
By clicking on WIFI Net	work Settings, new windows will pop u	p

BeanDevice [®] Wilow [®] User Manu	al	Wilow [®] wireless sensors
Wilow Wi-Fi configuration Wilow Sensor configuration: COM Port, UDP or WIFI O COM port Configuration via COM Port Select PC WLAN/LAN IP: COM port : COM port : COM port : 	O UDP Configuration via UDP (Network reconnection) Select PC WLAN/LAN IP: < Select > < Empty >	Configuration via Wi-Fi Select PC WLAN/LAN IP:
Configuration BeanScape Tcp/IP configuration DHCP Enabled Wilow Tcp/IP IP address : Sub network mask : Default gateway IP :	BeanScape Port: 5313 IP Address: Domain name :	WI-FI connection settings Enabled SSID: Password: Security type: None RF Region: REGION_EU Validate Close

Figure 147: WIFI Configuration

From this window user can configure his BeanDevice[®] and enter Router settings in order to connect the BeanDevice[®] on BeanScape Software.

For further details refer to BeanDevice[®] Configuration section.

12.3 EXPORT/IMPORT USER SETTINGS (ONLY FOR ADVANCED USER)

12.3.1 Custom User Configuration: Export Function

Click on the tab Tools then "Export/Import user settings"



Figure 148: Export/Import feature

A new window will appear, which contains the Custom User Configuration and the BeanScape Configuration,

- Custom User Configuration refers to the BeanDevice[®] Configuration settings.
- **BeanScape Configuration** is related to BeanScape[®] settings.

Wilow[®] wireless sensors

Under Custom User Configuration click on *Export*:

Export/import settings	x
Custom User Configuration	
Replace Merge Export Clear	
BeanScape Configuration	
Import Export Reset	
Figure 149: Custom user configuration window	

User configuration is exported in XML format:

💞 Save As						×
← → • ↑ 🖺	> This	PC → Documents	ٽ ~	Search Document	5	Q
Organize 🔻 New	w folder					?
henrik	^	Name	Date modified	Туре	Size	
JANV	t	Custom Office Templates	1/2/2019 10:03	File folder		
i OneDrive						
💻 This PC						
3D Objects						
📃 Desktop						
🔮 Documents						
🖊 Downloads						
👌 Music	~					
File name:	BeanUs	erCustomDB.xml				~
Save as type:						~
 Hide Folders 				Save	Cancel	

Figure 150: User export

C:\Users\GraphicDesigner\Desktop\BeanUserCustomDB11..xml - Sublime Text (UNREGISTERED)

File Edit	Selection Find View Goto 1001s Project Preferences Help
••	BeanUserCustomDB11xml ×
	<pre>k?xml version="1.0" standalone="yes"?></pre>
	<beanusercustomdb xmlns="BeanUserCustomDB"></beanusercustomdb>
	<site></site>
	<pan_id>FFFE</pan_id>
	<mac_id>5C313E07049A0000</mac_id>
	<site_lbl>PAN_ID : 0 x FFFE</site_lbl>
	<site_ref>SITE_REF</site_ref>
	<site_type>SITE_TYPE</site_type>
	<pre><site_comments></site_comments></pre>
11	<platform></platform>
12	<pan_id>FFFE</pan_id>
13	<mac id="">5C313E07049A0000</mac>
14	<platform lbl="">MAC ID : 0 x 5C313E07049A0000</platform>
15	<platform ref="">PLATFORM REF</platform>
	<platform type="">PLATFORM TYPE</platform>
17	<pre><platform folder="" name="">Folder 5C313E07049A0000</platform></pre>
18	<pre><fft realtime="">false</fft></pre>
19	<pre><fft_shift>false</fft_shift></pre>
20	<fft_autoreport>false</fft_autoreport>
21	<pre><fft_logfile>false</fft_logfile></pre>
22	<fft_vector>0</fft_vector>
23	<pre><fft_vector_manual>false</fft_vector_manual></pre>
	<pre><fft_window_type>0</fft_window_type></pre>
25	<fft_algorithm>0</fft_algorithm>
	<iirfilter>false</iirfilter>
27	<zero_padding>true</zero_padding>
	<manual_fft>false</manual_fft>
29	<velocity_realtime>false</velocity_realtime>
	<velocity_din_report>false</velocity_din_report>
	<velocity_logfile>false</velocity_logfile>
32	<ppv_logfile>false</ppv_logfile>
	<velocityfft_manual>false</velocityfft_manual>
	<pre><velocityzer0_padding>false</velocityzer0_padding></pre>
	<velocityfft_window_type>0</velocityfft_window_type>
	<velocityfft_algorithm>0</velocityfft_algorithm>
37	<pre><velocity_streaming_response_type>false</velocity_streaming_response_type></pre>
38	<pre><velocity_streaming_calculation_mode>3</velocity_streaming_calculation_mode></pre>
39	<pre><velocity_streaming_sampling_rate>0</velocity_streaming_sampling_rate></pre>
40	<pre><velocity_streaming_design_method>0</velocity_streaming_design_method></pre>
41	<velocity_streaming_filter_order>0</velocity_streaming_filter_order>
42	<pre><velocity_setmode_response_type>false</velocity_setmode_response_type></pre>
43	<pre><velocity_setmode_calculation_mode>3</velocity_setmode_calculation_mode></pre>
44	<pre><velocity_setmode_sampling_rate>0</velocity_setmode_sampling_rate></pre>
45	<pre><velocity_setmode_design_method>0</velocity_setmode_design_method></pre>
	<pre><velocity_setmode_filter_order>0</velocity_setmode_filter_order></pre>
47	<ppv_standard>0</ppv_standard>
	<_IS_Virtual_XINC_>false _IS_Virtual_XINC_
	<_REALPROFILETYPE_>3 _REALPROFILETYPE_
50	<_TILT_FILTER_MODE_>-1 _TILT_FILTER_MODE_
51	

Figure 151: Custom DB example

12.3.2 Custom User Configuration: Import Function

12.3.1 Import Function

Click on *Replace* to import user configuration, by choosing replace function the old Custom_DB will be replaced with the new one.

BeanDevice [®] Wilow [®] User Manual Wilow [®] wire	eless sensors						
Export/import settings							
Custom User Configuration							
Replace Merge Export Clear							
BeanScape Configuration							
Import Export Reset							
Figure 152: Custom user configuration window							
By choosing <i>Merge</i> function the old Custom_DB will be merged with the new one.							
Export/import settings ×							
Custom User Configuration							
Replace Merce Export Clear							
BeanScape Configuration							
Import Export Reset							
Figure 153: Custom user configuration (merge)							
Click on Clear to clear the Custom_DB.							
Don't try to change manually the XML file, there is a high risk to corrupt it.							
12.3.2 ReanScane [®] configuration							
12.3.2.1 Export Function							
Click on " <i>Export</i> " to export BeanScape configuration							
Export/import settings ×							
Custom User Configuration							
Replace Merge Export Clear							
BeanScape Configuration							
Import Export Reset							
Figure 154: Export BeanScape configuration settings							

ave As							
→ · ↑ 💶 ›	This PC > Desktop				~ Ū	Search Desktop	4
janize 🔻 New fo	lder						
seif (• Name	Date modified	Туре	✓ Size			
OneDrive	image_2020_02_24T15_45_14_565Z	2/24/2020 4:48 PM	PNG File	120 KB			
	BeanScape_Configuration	2/24/2020 4:48 PM	XML Document	8 KB			
This PC	🙈 App & Layout	2/24/2020 4:39 PM	Adobe Acrobat D	976 KB			
🔰 3D Objects	BeanUserCustomDB.	2/24/2020 12:13 PM	XML Document	9 KB			
🔜 Desktop	🚰 BeanScape 2.4Ghz	2/24/2020 10:17 AM	Shortcut	2 KB			
Documents	💴 Weekly-Report	2/21/2020 2:35 AM	Microsoft Word D	. 143 KB			
	Weekly-Report	2/21/2020 2:34 AM	Adobe Acrobat D	82 KB			
Music	🔟 UM-RF-01-ENG-SmartSensor-wireless-ac	2/21/2020 2:22 AM	Microsoft Word D	. 34,797 KB			
Distance	UM-RF-01-ENG-SmartSensor-wireless-ac	2/21/2020 2:22 AM	Adobe Acrobat D	13,855 KB			
Pictures	🔟 UM-RF-07-ENG-Wilow-Wifi-Sensor V2.6	2/21/2020 2:14 AM	Microsoft Word D	. 47,860 KB			
Videos	UM-RF-07-ENG-Wilow-Wifi-Sensor	2/21/2020 2:13 AM	Adobe Acrobat D	14,378 KB			
Windows (C:)	Modbus Report	2/21/2020 1:27 AM	Microsoft Word D	. 1,797 KB			
File name: Be	anScape_Configuration.xml						



12.3.2.2 Import Function

Click on *Import* to import BeanScape configuration

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Export/import settings			×
Custom User Configuration			
Replace	Merge	Export	Clear
BeanScape Configuration			
Import	Export	Reset	

Figure 156: Import BeanScape® config settings

Click on **Reset** to reset the BeanScape configuration.

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12.4 SNTP CLIENT



Figure 157: SNTP Client Configuration

SNTP refers to Simple Network Time Protocol. This function could be used to query a Network Time Protocol (NTP) server and give the time drift of the computer clock relative to the server clock.

Set "UpdateLocalDate Time" to True to synchronize the Time with The Computer hosting the BeanScape[®]

🖳 SNTPClient			23
SNTP Client Settings	Action / Property	Result / Data	•
Actions UpdateLocalDateTime True Connection True RemoteSNTPServer False Timeout	Query Suceeded: IP endpoint: Leap indicator: Version number: Mode:	time nist.gov:123 216.229.0.179:123 No warning Version 3 (IPv4 only) Server	
UpdateLocalDateTime Whether to update the local date and time to the date and time calculated by querying the server.	Stratum: Poll interval (seconds): Precision (seconds): Root delay (seconds): Root dispersion (seconds):	1, Primary reference (e.g. radio clock) 1 1,86264514923096E-09 0 0	II
Query Server	Reference date & time: Originate date & time:	23/09/2016 16:37:20.296 23/09/2016 06:38:03.227	
Display Now	Receive date & time: Transmit date & time: Destination date & time:	23/09/2016 16:38:04.700 23/09/2016 16:38:04.700 23/09/2016 16:38:04.700	
Current UTC Offset: 01:00:00		0.0010303	-

Figure 158: SNTP Client configuration

Press Query Server to update the clock of your computer based on network clock

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SNTPClient				x
SNTP Client Settings		Action / Property	Result / Data	*
Actions UpdateLocalDateTime T	īrue	Query Suceeded:	time.nist.gov:123 128 138 141 172-123	
RemoteSNTPServer ti Timeout 5	ime.nist.gov:123	Leap indicator: Version number:	No warning Version 3 (IPv4 only)	
VersionNumber V	/ersion3	Mode: Stratum: Poll interval (seconds):	Server 1, Primary reference (e.g. radio clock) 8192	E
UpdateLocalDateTime Whether to update the local d time calculated by querying the	ate and time to the date and e server.	Precision (seconds): Root delay (seconds): Root dispersion (seconds):	1,86264514923096E-09 0,0002441 0,0004882	
Query Server		Reference identifier: Reference date & time: Originate date & time:	NIST 23/09/2016 16:38:26.0 23/09/2016 16:39:59.300	
Display Now		Receive date & time: Transmit date & time:	23/09/2016 16:39:59.505 23/09/2016 16:39:59.505	
Current UTC Offset: 01:00:00		Destination date & time:	23/09/2016 16:39:59.505	-

Figure 159: SNTP Client configuration

• You can display also the current server time by clicking on Display Now

<u></u> S	SNTPClient			10.0			23
SI	NTP Client Settings		Action	n / Property	Result / Data		
	Actions UpdateLocalDateTime Connection RemoteSNTPServer Timeout VersionNumber	True time.nist.gov:123 5000 Version3	Query IP en Leap Versio Mode	/ Suceeded: dpoint: indicator: on number: e:	time.nist.gov:123 128.138.141.172:123 No waming Version 3 (IPv4 only) Server		
L V tir	UpdateLocalDateTime Whether to update the loca me calculated by querying Query Server	al date and time to the date and the server.	Stratu	rent Date & Time The real local 23/09/2016 17	1, Primary reference (e.g.	g. radio clock)	E
Di Ci	i <mark>splay Now</mark> urrent UTC Offset: 01:00:0	10			ОК	05 05 05	•

Figure 160: SNTP Client configuration

• As an example, we are using the following settings for the SNTP server:

4	Actions	
	UpdateLocalDateTime	True
4	Connection	
4	RemoteSNTPServer	time.nist.gov:123
	HostNameOrAddre:	time.nist.gov
	Port	123
	Timeout	5000
	VersionNumber	Version3

Figure 161: Example of SNTP server configuration



See "Configuring SNTP client" YouTube video

12.5 ALARM MANAGEMENT

User can receive alarms notification by email. This function is only available with "Alarm" data acquisition mode, "S.E.T" mode or "SSD".

From your BeanScape[®] software click on "Tools" tab then "Alarm Management"

The alarm management window is essentially made up of three tabs, one for configuring the DAQ Alarm, System Alarm and Structure Configuration



Figure 162: Alarm Management menu

A new window will pop up with **DAQ alarm SMTP configuration** and reports management, also other system related to alarm notification (Internal temperature, Battery level, Packet Error Rate, Link Quality Indicator) are configured from this window

Check on Enable Notification by email: Check on Enable Notification by email and fill out the parameters described below:

Field	Description
From	Enter the email address sending the alarm notification
То	Enter the receiver(s) address(es) for alarm notification (max. 3)
SMTP server	Enter your Outgoing SMTP server
Port	Enter your port Number for your outgoing SMTP server
User name	Enter your full email address
Password	Enter the password (case sensitive) of your email account
Max Email per minute	Maximum number of emails allowed to be sent in one minute

Table 13: Alarm Management content

Alarm Management					×				
Email Config. DAQ Alarn	n System Alarm	Structure Config.							
Enable Notification by ema	il			Alarm Managem	ient				
Note: Required Fields are mar	ked with *			Email Config.	DAQ Alarm	System Alarm	Structure	e Config.	
From :	host@host.com			Freed Alert 6				Devel Develo	
To Contact 1 :	host@host.com			Email Alert to	r S.E. Fand Soft SEF IT			Sound Config	
To Contact 2 :				🖌 Send FFT	Report by email			Enable	None v
To Contact 3 :				🗹 Send DIN	Report by email				
Smtp Server	SMTPServer	Port: 25	\$	Send FFT	Log file by email			Email for alarn	n mode
User Name	User Name			Send velocities	city Log file by email			Enable	
Password:	•••••			Send PP	Report by e-mail				
SMTP Test									Validate
		Validate							

Figure 163: Alarm Management window

Users who use the Gmail or Hotmail emails, it's recommended to use the port number 25 while setting the SMTP configuration. Otherwise, users will face issues concerning receiving the Alarm emails.

Do not use the port number 488 instead of 25 while configuring the SMTP server in order to cancel all the issues that might affect the process of receiving the Alarm Emails.

Concerning the number port of the Gmail and Hotmail SMTP, it's highly recommended to use the port number 25 for both servers. DO NOT use any other port number





cancel all th

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12.6 DAQ ALARM

In DAQ alarm, user configure the SMTP account for the measurement alarm notifications.

First, by checking *Enable Notification by email* and entering account credentials properly:

Alarm Manag	ement							
Email Config.	DAQ Alarm	1	System Alarm	Structure Co	nfig.			
🗸 Enable Not	ification by emai	I						
Note: Require	d Fields are mark	ced with *]	
	From : (host@h	ost.com					
	To Contact 1 : (host@h	ost.com					
	To Contact 2 : (
	To Contact 3 : (
	Smtp Server (SMTPSe	rver	F	ort:	25 ᅌ		
	User Name (User Na	me					
	Password:	••••	•••					
SMTP Test)						J	
					Valida	ate		

Figure 164: Alarm management: email setting

Chose the maximum number of emails allowed to be sent to your email address per minute (it goes from 1 to 6).

Field	Description
From	Enter the email address sending the alarm notification
То	Enter the receiver address for alarm notification
SMTP server	Enter your Outgoing SMTP server
Port	Enter your port Number for your outgoing SMTP server
User name	Enter your full email address
Password	Enter the password of your email account

In order to check if your account is well configured, validate then send a test email by clicking on **SMTP Test**, a test email will be received at your email inbox.

This email is sent by the Beanscape® Software To test your SMTP Config

Several **Email Alarm** options are available for S.E.T mode, user can select the Specific Report/File related to his measurement.



<u>More details about FFT Report/ Log files can be found on the Data acquisition modes available on the</u> <u>BeanDevice® Technical note</u>



See S.E.T mode Alarm Notification

You can also enable pop-up window by checking Enable pop-up window and select your window sound here:



To enable email notification for Alarm/Survey mode, check Enable email then click on validate.



Figure 167: Email Alarm for Alarm mode

12.7 SYSTEM ALARM

Same as the DAQ Alarm tab, the **System Alarm tab** contains SMTP configuration in order to receive notification on system status, as the status of the system internal temperature.

Alarm Management					
Email Config.	DAQ Alarm	System Alarm	Structure Config.		
Figure 168: System Alarm tab					

In System alarm, we setup the SMTP account for alarm in case the internal temperature of the BeanDevice[®] exceeded the predefined working temperature.

Alarm config. for internal Temperature				
🔽 Enable email alert f	or internal temperature			
Internal Max temp	60 °C			
Internal Min temp	-20 °C			

Figure 169: system alarm settings

Send System Log file

You can also choose to receive the system log file in case of a system alarm, by checking this checkbox.



See « Alarm by email » Youtube video

12.8 STRUCTURE CONFIGURATION

Structure Configuration tab is used to select the Building type and the pipe material that should be displayed on the DIN Report and the Velocity Log file.



----- Velocity Report --

```
Building type = Commercial
Pipeline Material = Steel
Velocity Average = 4.49583548167709E-12 (mm/s)
```

Figure 174: Building type & Pipeline Material on the Velocity Log file

12.9 NOTIFICATION MANAGEMENT

Several notification options are available, linked to the BeanDevice[®] status information and BeanScape[®] software. Click on Tools Tab and navigate to Notification Management option, new window will pop up.

Notification Management			x
Enable notification for :	Display Notif: All	Log File: All	
Alarm DAQ on the S.E.T Mode:			
Alarm of system			
Damaged BeanDevice:			
Out of range BeanDevice:			
LQI level:			
PER level:			
Hard Disc space:			
Accepted configuration:			
Listening cycle change:			
Diagnostic cycle change:			
Language change:			
MultiSite change:			
Save	Reset	Close)

Figure 175: Notification Management Window

By enabling the notification option, user have the possibility to choose a displayed notification message on the screen of his PC and a received Log file containing the notification details.

Notification for	Description
Alarm DAQ on S.E.T mode	A notification message will pop up whenever an alarm threshold occurred and after reaching the DAQ duration
Alarm of system	Whenever the BeanDevice® internal temperature goes over the thresholds a notification message will pop up on the screen
Damaged BeanDevice®	Whenever the BeanDevice® does not connect properly a notification message will pop up

BeanDevice [®] Wilow [®] User Manual	Wilow [®] wireless sensors
BeanDevice [®] out of range	BeanScape [®] will notify you if the BeanDevice [®] is out of range and the network link is so poor
LQI Level	Notification message will pop up displaying the LQI Level if the LQI was poor
PER Level	Notification message will pop up displaying the PER Level if the PER was high
Hard Disc Space	Notification message will pop up displaying the hard disc current available space
Accepted configuration	Notification message will pop up whenever you start new DAQ mode
Listening Cycle change	Whenever user change the listening cycle duration BeanScape® notify you with this change
Diagnostic Cycle change	Whenever user change the diagnostic cycle duration BeanScape® notify you with this change
Language change	By changing BeanScape [®] language a notification message will be displayed
Multisite change	By enabling/Disabling the Multisite option a message notification will pop up displaying the new modification

Table 14: Notification management options

Notification example for SET mode DAQ

Check **display notif** and **log file** boxes for Alarm DAQ on the SET mode, whenever a measurement reaches the threshold a notification message will pop up on the screen.



Figure 176: Notification message for SET mode

BeanDevice [®] Wilow [®] User Manual		Wil	ow [®] wirele	ess sensor	S
By checking enabling Log File for SET mode notification folder, inside the BeanDevice [®] folder that contains the	n, a Notifica notificatio	ntion folder will be cr n file.	eated und	er log_bea	anscape
_ 	Notifications Folder				
File Home $\leftarrow \rightarrow \lor \uparrow$	Share View	s (C:) > log_beanscape > Folder 5C313E07049A0	0000 > Notifications Fol	der	
Notifications/Messages_MAC_ID_MAC_ID0_x_5C313E07049A0000_4_2_2020 - Notepad	- 0 ×	Name	Date modified	Туре	Size
File Edit Format View Help		NotificationsMessages_MAC_ID_5C313E0	4/2/2020 4:59 PM	Text Document	8 KB
<pre>PANL_D : FFFE MAL_D : SC313E97043A0000 Network Id : 0100 DatE_FOMUMAT : No(Aryyry h:mm:ss tt Date: Tw/272020 4:57:33 PM Date;Type;Title;Message 4/2/2020 4:57:33 PM;Information;DAQ Alarm;No acceleration event occurred - Monitoring OK MAC_ID : 0 x SC313E07049A0000 4/2/2020 4:57:44 PM;Information;DAQ Alarm;New Streaming alarm Occurred in device: MAC_ID : 0 x SC313E07049A0000</pre>	4948900				110
Notification example for PER & LQI					
If the network link quality was so poor, a new message is low please check your network quality.	e will pop u	p on the screen sayir	ng that you	ır BeanDe	vice LQI
					- a ×
Image: Constraint of the state of	BeanDevice® co	nfig. Status Sensor info			

2

×

Stop

One Shot

⊖ Tx & Log

Data Aging: 30 0

O Burst

BeanScape : Wireless link

network configuration

oq. cycle : Ma TX Ratio: Ma

> Tx Log O O

Data Acq. duration :

In the same Notification log file, you will find the LQI notification message.

Wireless link is very weak on the BeaDevice MAC_ID : 0 x 5C313E07049A0000 (LQI = 54), please check your

Data Acq. cycle

TX_Ratio: Math Notf, ratio Math Notf, ratio Math Notf, cycle will be : N4 Data acquisition mode options © Tx Only O Log Only

Streaming Packet Options Continuous Monitoring

Figure 177: LQI notification message

Store and Forward

SW Version

Figure 178: LQI notification file

4/2/2020 4:57:33 PM;Information;DAQ Alarm;No acceleration event occurred - Monitoring OK MAC_ID : 0 x 5C313E07049A0000 4/2/2020 4:57:44 PM;Information;DAQ Alarm;New Streaming alarm Occurred in device: MAC_ID : 0 x 5C313E07049A0000 4/2/2020 5:07:13 PM;Warning;Wireless link;Wireless link is very weak on the BeaDevice MAC_ID : 0 x 5C313E07049A0000 (LQI = 54), please check your network configuration 4/2/2020 5:07:15 PM;Warning;Wireless link;Wireless link is very weak on the BeaDevice MAC_ID : 0 x 5C313E07049A0000 (LQI = 54), please check your network configuration 4/2/2020 5:07:17 PM;Warning;Wireless link;Wireless link is very weak on the BeaDevice MAC_ID : 0 x 5C313E07049A0000 (LQI = 54), please check your network configuration 4/2/2020 5:07:17 PM;Warning;Wireless link;Wireless link is very weak on the BeaDevice MAC_ID : 0 x 5C313E07049A0000 (LQI = 54), please check your network configuration

- Ch_X - Ch_Y - Ch_Z

Component List Sort

± =

Date;Type;Title;Message

MotificationsMessages_MAC_ID_MAC_ID__0_x_5C313E07049A0000_4_2_2020 - Notepad

Bean Scape : Wireless link Wireless link is very weak on the BeaDevice MAC_ID : 0 x 5C313E07049A0000 (LQI = 54), please check your

12.10 DATE CONVERSION

Data downloaded from the data logger are organized in a system well optimized to minimize non-important data and leave maximum storage space for measurement values, hence using indexation to refer to measurement timing.

To make these files more readable we use this data conversion tool.

Transmit_Streaming_Ch_Z_MAC_ID0_x_00158D00000CE454_20	DataConversion_MAC_ID0_x_00158D00000CE454_CH_22
File Edit Format View Help	File Edit Format View Help
BeanSensor AX-3D	BeanSensor AX-3D
Mac Id : 00158D00000CE454 Network Id : 0003 Pan Id : 3905 Sensor Id : 2 Sensor Label : Ch_Z Ratio : 1	Mac Id : 00158D00000CE454 Network Id : 0003 Pan Id : 3905 Sensor Id : 2 Sensor Label : Ch_Z Ratio : 1 Offset : 0
Offset : 0 Unit : g	Unit : g Date : 10/07/2017 10:32:47
Date : 10/07/2017 10:32:47	Data acquisition duration : NA Sampling_rate : 100
Data acquisition cycle : 10 Data acquisition duration : NA Sampling rate : 100 Cut off frequency : 1000	Cut off frequency : 1000 Date: Measure 10/07/2017 10:32:47.000 ; -0.03017 10/07/2017 10:32:47.010 ; -0.03081
Measure Index: Measure Value 0; -0.03017 1; -0.02981 2; -0.02855 3; -0.03047 4; -0.03084 5; -0.02892 6; -0.0301 7; -0.02892 6; -0.0301 9; -0.02944 10; -0.02892 11; -0.02885 12; -0.03885 12; -0.0385 12; -0.0385 1	10/07/2017 10:32:47.020 ; -0.02855 10/07/2017 10:32:47.030 ; -0.03047 10/07/2017 10:32:47.040 ; -0.03084 Converted 10/07/2017 10:32:47.050 ; -0.02892 10/07/2017 10:32:47.070 ; -0.02936 10/07/2017 10:32:47.080 ; -0.03003 10/07/2017 10:32:47.090 ; -0.02944 10/07/2017 10:32:47.100 ; -0.02892 10/07/2017 10:32:47.110 ; -0.02892 10/07/2017 10:32:47.120 ; -0.02892 10/07/2017 10:32:47.130 ; -0.02892 10/07/2017 10:32:47.130 ; -0.02944 10/07/2017 10:32:47.130 ; -0.02944 10/07/2017 10:32:47.150 ; -0.02944
13; -0. 02944 14; -0. 0301 15; -0. 02907 16; -0. 03032 17; -0. 02981 18; -0. 02988 19; -0. 0304 20; -0. 02973 21; -0. 02855	10/07/2017 10:32:47.160; -0.03032 10/07/2017 10:32:47.170; -0.02981 10/07/2017 10:32:47.180; -0.02988 10/07/2017 10:32:47.190; -0.0304 10/07/2017 10:32:47.200; -0.02973 10/07/2017 10:32:47.210; -0.02855 10/07/2017 10:32:47.220; -0.03054 10/07/2017 10:32:47.230; -0.0287 10/07/2017 10:32:47.240; -0.02899 10/07/2017 10:32:47.250; -0.02833

Figure 179: Date Conversion

To use the Date Conversion, go to Tools and select Date Conversion



Figure 180: Date conversion option on BeanScape®



Figure 181: Date conversion window

Click on browse and import streaming file containing the logged measurement.

Browse	Convert					
The generate	d files will be saved in C:Vog	beanscape\Converted File Folder\				
	← → * ↑	beanscape > Folder F4B85E00A4D00000 > TX F	older 🗸 🗸	Search TX Fold	der	,c
° Parts File	Organize 👻 New folder					(
	^	Name	Date modified	Туре	Size	
-	🖈 Quick access	Transmit S.E.T Ch X MAC ID 0 x F4B8	12-Feb-19 9:49	Text Document	7 K	в
	🛄 Desktop 🛛 🖈	Transmit S.E.T Ch X MAC ID 0 x F4B8	12-Feb-19 9:49	Text Document	7 KE	8
	👆 Downloads 🖈	Transmit_S.E.T_Ch_X_MAC_ID0 x_F4B8	12-Feb-19 9:49	Text Document	7 KI	8
-	💻 BEANAIR_TUI 🖈	Transmit_S.E.T_Ch_X_MAC_ID0_x_F4B8	12-Feb-19 9:50	Text Document	7 KI	8
-	📙 log_beanscar 🖈	Transmit_S.E.T_Ch_X_MAC_ID0_x_F4B8	12-Feb-19 9:50	Text Document	7 KI	в
	All	Transmit_S.E.T_Ch_X_MAC_ID0_x_F4B8	12-Feb-19 9:50	Text Document	7 KI	в
	FEB	Transmit_S.E.T_Ch_X_MAC_ID0_x_F4B8	12-Feb-19 9:50	Text Document	7 KI	В
-		Transmit_S.E.T_Ch_X_MAC_ID0_x_F4B8	12-Feb-19 9:50	Text Document	7 KI	В
	TV Folder	Transmit_S.E.T_Ch_X_MAC_ID0_x_F4B8	12-Feb-19 9:50	Text Document	7 KI	В
		Transmit_S.E.T_Ch_X_MAC_ID0_x_F4B8	12-Feb-19 9:50	Text Document	7 KI	В
	ineDrive 🍊 🗠	Transmit_S.E.T_Ch_X_MAC_ID0_x_F4B8	12-Feb-19 9:50	Text Document	7 KE	В
	This PC	Transmit_S.E.T_Ch_X_MAC_ID0_x_F4B8	12-Feb-19 9:50	Text Document	7 KI	в
	- msrc v	Transmit S.E.T Ch X MAC ID 0 x F4B8	12-Feb-19 9:50	Text Document	7 KI	В

Figure 182: Importing files into data conversion window

В	eanDe	vice [®] Wilow [®] User Manual	Wilow [®] wireless sensors	
	• 0\	verview of the selected files		
0	Date conv	ersion	— □	×
Sele	ct Log File: -> 1 Fil Brow The gene	es Selected se Convert Reset ated files will be saved in C:Vog_beanscape\Converted File Folder\ Browse files to process		
N° 1	Parts 1	File Name Transmit_S.E.T_Ch_X_MAC_ID0_x_F4B85E00A4D00000_12_Feb_19_09_49_39		

Figure 183: Overview of a selected file on Data conversion window

• Select the converted file to view or go to your log directory and you will find all the converted files in a new generated folder named **Converted File Folder**



12.11 OFFLINE GRAPH

Offline graph permit user to read previously recorded measurement. To use this option, go to Tools and select Offline Graph.



Figure 185: Offline graph option on BeanScape®

BeanDevice[®] Wilow[®] User Manual Wilow[®] wireless sensors Offline graph × ect Log Files N° Parts Unit File Name Grid Overlaid (Time) Overlaid (Frequency) Grid om 📃 Zoom Y 📃 Zoom X 🔲 Zoom XY Print Save to PNG Copy to Clipboard 10.0000 9.0000 8.0000 6.0000 4.0000 3.0000 1.0000 0.0000 00:00 Feb 13 0 Feb 11 00:00 Feb 12 Figure 186: Offline graph window **Graph Options** Offline graph Select Log Files Start converting Show selected graph Graph 4 Browse Grid View All Charts Browse files from Log folder -Overlaid (Time) Overlaid (Frequency) er graph Reset all the interface





Figure 188: Offline displayed graph

Browse file or different files and then click view or select one file to show the graph, or you can choose to view all charts.



Figure 189: Gird display of graphs

13. BEANDEVICE® ADVANCED CALIBRATION

The advanced calibration configuration is only available for the accelerometer such the **AX-3D**, **AX3DS** and the **X-Inc**.

Click on the Calibration Icon on the top left side in order to have access to the calibration menu.



Two different options are available, either to do a new configuration or to import an existing configuration from a file.

💦 Advanced calibration	– 🗆 🗙
New Config. Info	Import Config from file
Platform : AX 3D	AX 3D 🗸 🗸
Platform ref : AX 3D	AX 3D 🗸 🗸
Acc Range : -2g / +2g	+-2g ~
Inc Range NA	-/+ 15 🜩
Measure Mode : Streaming	Streaming 🗸
SR/Cycle 100	100 ∨ Sec
Calibration Method : Auto	Auto 🗸
Number of sensors: 3	3 🗸
Sensor Ids: 0 1 2	0 1 2
Channel Names Ch_Z Ch_X C	ĥ_Y
PositionNumber: 9	9 😫 🚺
Position Size : 1	1 ≑
Error Epsilon : 1E-06	0.0000010000
Nb Iteration : 200	200 🚖
Calibration type : Static	Static 🗸
Reset to	Deault Validate
	Next>>

Figure 191: Advanced Calibration settings

13.1 NEW CONFIGURATION

13.1.1 New Configuration settings

13.1.1.1 Configure the calibration settings

For the calibration process you should use 2 different BeanDevices[®], one as a reference and the other for calibration.

First of all, select the Device platform that you want to calibrate and the reference BeanDevice platform.

New Config. Info	Import Config from file
Platform : AX 3D	AX 3D 🗸 🗸
Platform ref: AX 3D	AX 3D 🗸 🗸

Then select the BeanDevice[®] acceleration or/and inclination measurement range based on your selected device platform.

Acc Range :	-2g / +2g	+-2 g		~	
Inc Range	NA	-/+	15	÷	

Select the suitable measurement range, either dynamic (Streaming) with the suitable sampling rate or static (Low duty cycle) with the DAQ cycle.

Measure Mode :	Streaming	Streaming	\sim	Measure Mode :	Streaming	LowD	utyCycle	~
Sampling Rate:	100	10 ~	Hz	Data Acq. cycle :	100	1	÷	Sec

Select the calibration method to use, there are several different available methods.

It's recommended to use the Auto option which is the default selected option, however if you will use high number of positions with high sampling rate use one of the Average methods.

Calibration Method : Auto	Auto 🗸
Number of sensors: 3	Auto Levenberg Marquardt
Sensor Ids: 0 1 2	Trust region dogleg Trust region reflective
Channel Names Ch_Z Ch_X Ch_`	Auto by Average Levenberg Marquardt by average
PositionNumber: 9	Trust region dogleg by average Trust region reflective by average

For more information about the MATLAB methods please visit the following webpage:

https://www.mathworks.com/help/optim/ug/fsolve.html?searchHighlight=fsolve&s_tid=srchtitle

Choose the number of sensors to calibrate.

Number of sensors:	3	3	\sim
Sensor Ids:	0 1 2	0 1 2	
Channel Names	Ch_Z Ch_X Ch_	Y	

Choose carefully the number of positions on which the calibration process will be based on.

You should not have same values in the log file using different positions, each position should have its own values which are different from other position values.

Device	Calibration Mode	Active Sensor	Minimum number of positio
		1	2
	Dynamic	2	
AX3D	Dynamic		12
XINC		1	2
	Static	2	5
			9

You should choose a number of positions higher than the minimum values displayed as following.

Then select the position size, position size stands for the amount of data for each position.

The position size should be less or equal to the maximum data number in each file.

For example, if the log file contains 1000 Data, you should choose 1000 points or less.

Position Size :	1	þ	+	
			-	4

Configure the error tolerance.

	Error Epsilon :	1E-06	0.0000010000	+
--	-----------------	-------	--------------	----------

Choose the number of iterations, you need to choose carefully the number of iterations on which will depend the calibration values

Nb Iteration :	200	200	+

Finally, choose the calibration methodology either static or dynamic. It depends on your application.

Calibration type : Static	Static 🗸 🗸
	Static
	Dynamic

After configuring all the settings don't forget to click on Validate button.

13.1.1.2 Perform a DAQ to generate the files

After configuring the calibration settings, and based on that you should perform a DAQ to generate the files.

For static calibration method you can use a granite desk however for a dynamic calibration method you can use a vibratory machine.

The same previous calibration method should be performed either it's static or dynamic.

Then start the same DAQ mode with the same sampling rate configured before in the calibration settings.

Redo the same measurements with different device positions.

The number of positions is already configured in the calibration configuration before.

Validate

The minimum number of positions using static calibration method is 9 positions, however using Dynamic calibration method the number of positions is 12.

Always make sure to use a number of positions higher than the minimum number for both calibration methods.

13.1.2 Loading files



The target sensor file will be displayed on the left panel side and the reference senor files will be displayed on the right one.



Wilow[®] wireless sensors

on info			- File Upload						
Target Platform : AX 3D	Calibration Method :	Auto	Add	N°	P I	File Name			
Ref platform : X-INC	Position Number:	9							
Tarriet Sensor: 3 Id: 01112	Position Size :	500	Clear All						
	Nb Iteration :	200	Load All						
Ref. Sensor: 3 Id: UIII2		15.00	Load Selected						
Sampling Rate: 100 Hz	Error Epsilon :	IE-06	C Townst						
Acc Range : -10g / +10g	Measure Mode :	Streaming							
Inc Range : [-15deg / +15deg	Calibration type :	Static		<					
Sensor:		∧ ∨ 🔽	Clear All	-Ref Senso	irs —				🛛 🜄 Clear A
ld Label - Ele News		<u> </u>		Nº II	Label	File News			
1 Ch X Transmit Streaming Ch	X MAC ID 0 x A4D578	43DED30000 8 9 20	121 12 17		Label	File Name			
1 Ch_X Transmit_Streaming_Ch_	X_MAC_ID0_x_A4D578	43DED30000_8_9_20	021_12_18_						
1 Ch_X Transmit_Streaming_Ch_	X_MAC_ID0_x_A4D578	43DED30000_8_9_20	021_12_20_						
Ch_X Transmit_Streaming_Ch_ Ch_X Transmit_Streaming_Ch_	X_MAC_ID0_X_A4D578 X_MAC_ID0_X_A4D578	43DED30000_8_9_20	$121_12_21_$						
1 Ch_X Transmit_Streaming_Ch_	X_MAC_ID0_x_A4D578	43DED30000_8_9_20	021_12_23_						
1 Ch_X Transmit_Streaming_Ch_	X_MAC_ID0_x_A4D578	43DED30000_8_9_20	021_12_24_						
1 Ch X Transmit_Streaming_Ch_ 1 Ch X Transmit Streaming Ch	X_MAC_ID0_X_A4D578	43DED30000_8_9_20	021_12_26_						
2 Ch_Y Transmit_Streaming_Ch_	Y_MAC_ID0_x_A4D578	43DED30000_8_9_20)21_12_17_						
2 Ch_Y Transmit_Streaming_Ch_	Y_MAC_ID0_x_A4D578	43DED30000_8_9_20	021_12_18_ ~						
n Number: SENS_0:9 SENS_1:9	SENS_2:9			Position N	lumber:	NA NA	NA		
<u>View log info/error details</u>									
<u>View log info/error details</u> vious									Nex
View log info/error details									Nex
vious	load the refe	rence devic	ce files.						Nex
vious	load the refe	rence devic	ce files.				- 0	×	Nex
vious o the same steps to	load the refe	rence devic	ce files.				- 0	×	Nex
vious o the same steps to Padou rio Taget	cad the reference of the reference of the second the reference of the second se	rence devic	ce files.	N° P 1 1	File Name Transmt_	s Streaming_Ch, X, MAC_ID0, x, F6851		×	Nex
vious o the same steps to Pator ro Pator ro Pator ro Taget Taget	calbration Ratom: X3D C tame: KNC t Sensor: 21 dt 01112	rence devic albrator Method : Auto Poston Number : 3 Poston Size : 500	ce files.	N* P 1 1 2 1 3 1	File Name Transmt_ Transmt_ Transmt	s Sreaming_Ch_X_MAC_D0_x_F085 Sreaming_Ch_X_MAC_D0_x_F085	 D1A452E90000_8_9_2021_11_16_48, D1A452E90000_8_9_2021_11_9_50 M4542E90000_8_9_2021_11_9_50	×	Nex
vious the same steps to Radounce Particle Radounce	Coad the reference of the second the reference of the second terms of te	rence devic albraton Method : Ado Poston Number: 9 Poston Size : 500 No treaton : 200 Ever Seriet : 156A	ce files.	N° P 1 1 2 1 3 1 4 1 5 1	File Name Transmt_ Transmt Transmt_ Transmt_	; StreamingDr.,X_MAC_D0F085 StreamingDr.X_MAC_D0F085 StreamingDr.X_MAC_D0F085 StreamingDr.X_MAC_D0F085		× A A A A A A A A A	Nex
View log info/error details vious the same steps to Radvance Postor rfo Taget Tage Red Sarro Acc	Icoad the refei d calibration tations: KHC t Sensor: Sensor: <tr< td=""><td>rence device albraton Method : Ado Poston Number: 9 Poston Size : 200 No treation : 200 Emr Episton : 16:06 Measure Mode : Greening</td><td>Ce files.</td><td>N" P 1 1 2 1 3 1 4 1 5 1 5 1 6 1</td><td>Fie Name Transmt_ Transmt_ Transmt_ Transmt_ Transmt_ Transmt_</td><td>5 StreamingDr.,X,MAC_DD,y_F085 StreamingDr.,X,MAC_D_D_y_F085 StreamingDr.,X,MAC_D_D_y_F085 StreamingDr.X,MAC_D_D_y_F085 StreamingDr.X,MAC_D_D_y_F085 StreamingDr.X,MAC_D_D_J_yF085</td><td></td><td>× A A A A A A A A A A</td><td>Nex</td></tr<>	rence device albraton Method : Ado Poston Number: 9 Poston Size : 200 No treation : 200 Emr Episton : 16:06 Measure Mode : Greening	Ce files.	N" P 1 1 2 1 3 1 4 1 5 1 5 1 6 1	Fie Name Transmt_ Transmt_ Transmt_ Transmt_ Transmt_ Transmt_	5 StreamingDr.,X,MAC_DD,y_F085 StreamingDr.,X,MAC_D_D_y_F085 StreamingDr.,X,MAC_D_D_y_F085 StreamingDr.X,MAC_D_D_y_F085 StreamingDr.X,MAC_D_D_y_F085 StreamingDr.X,MAC_D_D_J_yF085		× A A A A A A A A A A	Nex
vious to the same steps to Readown to Postown to Taget Taget Samo Samo Advance Postown to Taget Taget Taget Samo Samo Advance Postown to Samo Advance Postown to Samo Advance Postown to Samo Advance Postown to Samo New Samo Postown to Samo New Samo Postown to Samo New Samo Postown to Samo Postown to Postown to Postown Po	Ioad the refei d calibration Mation: EX:30 Keforn: EX:NC Sensor: El & 0:112 Sensor: El & 0:112 Renge: 100, -100 Range: 105/-105	rence device albraton Method : Auto Paston Number: 9 Paston Size : 200 No teration : 200 Emer Epsilon : 1206 Meaure Mode : Sevening Calibration type : 9 Jac	Ce files.	N* P 1 1 2 1 3 1 4 5 5 1 6 1 7 1 4 1	File Name Transmt Transmt Transmt Transmt Transmt Transmt Transmt	9 Streaming_Oh_X_MAC_D_0_X_F085 Streaming_Oh_X_MAC_D_0_X_F085 Streaming_Oh_X_MAC_D_0_X_F085 Streaming_Oh_X_MAC_D_0_X_F085 Streaming_Oh_X_MAC_D_0_X_F085 Streaming_Oh_X_MAC_D_0_X_F085 Streaming_Oh_X_MAC_D_0_X_F085 Streaming_Oh_X_MAC_D_0_X_F085 Streaming_Oh_X_MAC_D_0_X_F085 Streaming_Oh_X_MAC_D_0_X_F085		× A A A A A A A A A A A A A A A A A A A	- Target sensor
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vious the same steps to the same steps to read rea	Ioad the refet d calibration Mattern : MX 30 Kattorn : XHVC Sensor : B 46 01112 Sensor : B 46 01112 Range : 100 / 110 Range : 100 / 100 Range : 100 / 100 Mattern : MX 400 Mattern : MX 400	Albration Method : Are Postion Number 9 Postion Number 9 Postion Size : 200 No Internon : 200 Ener Epision : 1666 Measure Mode : @reoming Calibration type : @adic	Ce files.	N* P 1 1 2 1 3 1 4 5 5 1 6 1 7 1 8 1 9 1 7 1 6 1 7 1 6 1 7 1 6 1 7 1 6 1 8 1 8 1 9 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 11 1 12 1 13 1 14 1 15 1 16 1 17	File Name Transmt_ Transmt T	9 Streaming_Oh_X_MAC_D_DX_F085 Streaming_Oh_X_MAC_D_DV_F085 Streaming_Oh_X_MAC_D_DV_F085 Streaming_Oh_X_MAC_D_DV_F085 Streaming_Oh_X_MAC_D_D_A_V_F085 Streaming_Str		× A A A A A A A A A A A A A A A A A A A	Nex - Target sensor
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vious to the same steps to the same steps to c the same steps to c the same steps to c the same steps to c to c the same steps to c to c the same steps to c to	Load the refer d calibration d calibration Matom: 24/NC Sensor: 14 d 01112 Sensor: 14 d 01112 Sensor: 14 d 01112 Range: 100 b t Range: 100 b t Sensor: 15deg/+15deg	attenton Method : Arto Poston Number: 9 Poston Number: 9 Poston Number: 90 Na transmi 200 Ener Epsiders 1606 Measure Mode : 970 Calibration type : 2ato C 0	Ce files.	N* P 1 1 2 1 3 1 4 1 6 1 7 1 8 Sector N* 6 1 1 2 1 3 1 5 1 5 1	File Name Transmit, Transm	Stearing_Oh_X_MAC_D_O_X_F085 Mark md_Stearing_Oh_X_MAC_O_0_X_F085 Mark Mark md_Stearing_Oh_X_MAC_O_0_X_F085 Mark			- Target sensor
View log info/error details vious the same steps to the same steps to Pattor ifo reget sensor files N' 6/ 1 1 0 3 1 0 5 1 0	Load the refer d calibration d calibration Matom: 2010 Sensor 1 kd 01112 Sensor 1 kd 01112 Sensor 1 kd 01112 Range 1 00 k k Range 1 10 kg + 15deg Range 1 10 kg + 15deg d file Name h_X Tarama, Sensoring - D, X, MA h_X Tarama, Sensoring - D, X, MA	attenton Method : Aufo Poston Number: 9 Poston Number: 9 Poston Size : 90 Ener Epsilon : 1606 Messure Mode : 9 Calibration type : 3stc Color	Ce files.	N* P 1 1 3 1 4 1 5 1 7 1 8 Construction N* Id L 1 2 1 3 1 3 1 5 1 7 1 5 1 7 1 6 1 7 1 8 1	File Name Transmit, Transmit, Transmit, Transmit, Transmit, Transmit, X. Trans X. Trans X. Trans X. Trans X. Tr	Stearing_0h_X_MAC_[D_0_X_F065 Stearing_0h_X_MAC_[D_0X_F065 Stearing_0h_X_MAC			_ Target sensor
tious the same steps to the same steps to Pattor to repair of the t sensor files N' bl 1 1 0 3 1 0 5 1 0	A Tarend, Seearra, D. X, MA N.X. Tarend, Seearra, D. X, MA	attenton Method : Auto Poston Number: 9 Poston Number: 9 Poston Size: 200 Emer Epsilon: 1606 Messure Mode: 9 Calibration type: 3xic Color: 0.0 Messadabletabletabletabletabletabletabletablet	Ce files.	N* P 1 1 3 1 4 1 5 1 7 1 8 0 1 1 2 1 3 1 1 1 2 1 3 1 5 1 5 1 7 1 8 1 9 1 1 0 1 1	File Name Transmit, Transm	Stearing_0h_X_MAC_D0_0_X_F065 Stearing_0h_X_MAC_D0_0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F065 Stearing_0h_X_MAC_D0_X_F65 Stearing_0h_X_MAC_X_F65 Stearin			- Target sensor
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View loa info/error details vious to the same steps to Pation ifo et sensor files N' bi 1 1 0 3 1 0 5 1 0 5 1 0 5 1 0 5 1 0 5 1 0 5 1 0 7 1 0 8 1 0 7 1 0 0 7 1 0 0 7 1 0 7 10 10 7 10 7	Icoad the refer d clibration dtdom: X 30 dtdom: X 10 sensor: 14 p Rase: 1500 / 112 sensor: 14 p Rase: 1500 / 112 sensor: 1500 / 1130 sensor: 1500 / 1100 sensor:	ateaton Method: Ado Poston Number: 9 Poston Number: 9 Poston Size: 90 Ener Epsilon: 100 Ener Epsilon: 100 Calibration Type: 9	Ce files.	N* P 1 1 3 1 4 1 5 1 7 1 8 0 1 1 2 1 4 1 3 1 4 1 5 1 4 1 5 1 7 1 8 1 9 1 10 2 11 2 7 1 9 1 10 2 11 2 7 -	File Name Transmit, Transm	Stearing_0h_X_MAC_D_0_x_F065 Stearing_0h_X_MAC_0_x_F065 Stearing_0			- Target sensor
vious the same steps to the same steps to reat sensor files red sensor files	Icoad the refer d calibration default default d calibration default d calibration	albration Method: Mo Reation Method: Mo Reation Network De Peation Size: 200 No Instance: 200 Exer Egistent: 1500 Calibration type : 2mming Colon: AdSTRADED2000	Ce files.	N* P 1 1 3 1 4 1 5 1 7 1 8 0 1 1 2 1 3 1 4 1 5 1 3 1 4 1 5 1 7 1 8 1 9 1 10 2 11 2 6 1 7 1 9 1 10 2 11 2 6 1 7 1	File Name Travanst, Travan	Stearing_On_X_MAC_D_O			- Target sensor
vious the same steps to the same steps to Peton for red sensor files red sensor files	Image: Section 2010 Section 2010 Action: Section 2010 Section 2010 Action: Section 2010 Section 2010 Section: Section 2010 Section 2010 <	atbratom Method: Mod Reation Method: Mod Reation Matches: Di Reation Stat: 200 No brandon: 200 Exercision: 200 Exercision: 200 Calibration type: 1564 Measure Mode: Description: Calibration type: 2.00 C.D A.0574840ED2000 C.D A.40574840ED2000	Ce files.	N* P 1 1 2 1 3 1 4 1 6 1 7 1 8 0 1 1 2 1 3 1 4 1 5 1 7 1 8 0 9 1 10 2 11 2 7 1 8 0 9 1 10 2 11 2 12 1 13 1 14 1 15 1 10 2 11 2 12 2 13 1 10 2 10 2 10 2 10 2 10	File Name Transmt, Tr	Stearing_Ch, X, MAC, D.L. 0, X, F085 Market Mill Stearing_Ch, X, MAC, D.L. 0, X, F085 Market Mill Stearing_Ch, X, MAC, D.L. 0, X, F085 Mill Stearing_Ch, X, MAC, D.L. 0, X, F145 Mill Stearing_Ch, Y, MAC, D.L. 0, X, F145<			- Target sensor
View log info/error details vious to the same steps to the same steps to Petaon Ho et sensor files	Icoad the refer d calibration Atdom: X 30 Atdom: X 30 Atdom: X 30 Atdom: X 30 Sensor: J 40 J 1112 Sensor: Sensor: J 40 Taramad, Sensoria, D. J., MA Att Taramad, Sen	atbratem Method: Mon Reatem Method: Mon Reatem Naturber: D Protection State: DO Naturber: DO Naturber: DO Naturber: DO Derstein State: DO Montering DO Aubration Hysis: Edit Calibration Hysis: Edit Calibration Hysis: Edit Calibration Hysis: Edit CD: AutoFranceEnous	Ce files.	N* P 1 1 2 1 3 1 4 1 5 1 7 1 8 0 5 1 3 1 4 1 5 1 7 1 8 0 9 1 10 2 9 1 10 2 9 1 10 2 9 1 11 2 12 1 13 1 14 1 10 2 10 2 11 2 12 2 13 1 10 2 10 2 10 2 10 2 10 2 10	File Name Transmt, Tr	Stearing_Or, X, MAC_D_O_Y, F085 Stearing_Or, X, MAC, D_O_Y, F085 Stearing_Or, X, MAC, D_Y, D_Y, F005 Stearing_Or, X, MAC, D_Y, JAC0, D_Y, F1405 Stearing_Or, Y, MAC, D_Y, JAC0, D_Y, F1405 Stearing_Or, Y, MAC, D_Y, JAC0, D_Y, F1405 Stearing_Or, Y, MAC0, D_Y, F1405			- Target sensor
View log info/error details vious to the same steps to the same steps to reader if reader if the sensor files reader if reader if	Load the refer d calibration Reform: K 30 Reform: K 30 Reform: K 40 K 10 Reform: K 40 K 10 K 1	atbraten Method: Mod Reaten Method: Mod Reaten Mathod: D Reaten Sar: D Mathod: SO De tradion 200 De tradion 200 De tradion 200 Calibration type: 150 Mathod: Sort Calibration type: 2 ato CD A ADSTRADEDDOOR	Ce files.	N* P 1 1 2 1 3 1 4 1 7 1 8 1 7 1 8 1 9 1 9 1 9 1 9 1 10 2 9 1 10 2 4 1 9 1 10 2 6 1 9 1 10 2 4 1 10 2 10 2 4 1 10 2 10 2 10 2 10 2 10 2 10 2 10 2 10 2 10 2 10	File Name Transmt, Tr	Stearing_Or, X, MAC_D_O_Y, F085 Stearing_Or, X, MAC, D_O_Y, F085 Stearing_Or, X, MAC, D_Y, JAC, D_Y, S Stearing_Or, Y, MAC, D_Y, JAC, D_Y, S Stearing_Or, Y, MAC, D_Y, JAC, D_Y, S Stearing_Or, Y, MAC, D_Y, S			- Target sensor
vious trous the same steps to the same steps to reaction if is et sensor files reaction if i the same reaction if	Load the refer d calibration Reform: K 30 Reform: K 30 Reform: K 40 K 30 K 30	atbraten Method: Mod Reaten Method: Mod Reaten Mathod: D Pasteon Mathod: D Description: 200 Description: 200 Description: 200 Description: 200 Calibration bysi: 1566 Measure Mode: Description: CD: A. ADSTRADED2000	Ce files.	N* P 1 1 2 1 3 1 4 1 7 1 8 1 7 1 7 1 8 1 9 1 9 1 9 1 9 1 10 2 9 1 10 2 4 1 9 1 10 2 9 1 10 2 4 1 9 1 10 2 4 1 10 2 10 2 10 2 10 2 4 1 10 2 10 2 4 1 10 2 2 <	File Name Trainst, Tr	Stearing_On_X_MAC_D_D0_X_F085 Stearing_On_X_MAC_D_D_X_F085 Stearing_On_X_MAC_D_D_X_F085 Stearing_On_X_MAC_D_D_X_F085 Stearing_On_X_MAC_D_D_X_F085 Stearing_On_X_MAC_D_D_X_F085 Stearing_On_X_MAC_D_D_X_F085 Stearing_On_X_MAC_D_D_X_F085 Stearing_On_X_MAC_D_D_X_F085 Stearing_On_X_MAC_D_D_X_F085 Mare Intil Stearing_ON_X_MAC_D_0_X_F685 Mare Mare Intil Stearing_ON_X_MAC_D_0_X_F685 Mare Mare <t< td=""><td></td><td></td><td>_ Target sensor</td></t<>			_ Target sensor

Status : 0 valid , 8 invalid sensor(s) profile(s) Mew log info/error details			
🔀 Logging Details	_		×
2021/08/10 11:04:23 : ERROR : UPLOADED_FILES_NOT_CONTAIN_SENS_ID_CONFIGURED_BY_THE_USER, FileName :Transmit_StreamingINC_Y_MAC_ID0_x_F0B5D1A492E90000_8_9_2021_11_18_29_AM 2021/08/10 11:04:23 : ERROR : UPLOADED_FILES_NOT_CONTAIN_SENS_ID_CONFIGURED_BY_THE_USER, FileName :Transmit_StreamingINC_Y_MAC_ID0_x_F0B5D1A492E90000_8_9_2021_11_19_55_AM 2021/08/10 11:04:23 : ERROR : UPLOADED_FILES_NOT_CONTAIN_SENS_ID_CONFIGURED_BY_THE_USER, FileName :Transmit_StreamingINC_Y_MAC_ID0_x_F0B5D1A492E90000_8_9_2021_11_21_23_AM			
Then Click on Next button Next>> to move to the next step			
Beanair GmbH "Rethinking sensing teo	hnolog	gy"	175

In case of a detection of a similar position shared between different files a notification message will pop up on the screen, and the files which contain the same position will be selected and displayed in red.

💦 Advanced cali	bration				- 🗆 X	<
Position info		File Upload		_		٦
Target Platfo Ref platfo	Similar p	position detected	×	Р 1 1	File Name ^ Transmit_StreamingINC_Y_MAC_ID0_x_F0B5D1A492E90000_8_9_2021_11_19_55_	
Target Ser Ref. Ser Sampling F Acc Ran		The following file contain a position value similar to ea others Do you want to continue ?	ch	1 1 1 1	Transmit_StreamingINC_Y_MAC_ID0_x_F085D1A492E90000_8_9_2021_11_22_21_/ Transmit_StreamingINC_Y_MAC_ID0_x_F085D1A492E90000_8_9_2021_11_23_39_/ Transmit_Streaming_INC_Y_MAC_ID0_x_F085D1A492E90000_8_9_2021_11_26_36_/ Transmit_Streaming_INC_Y_MAC_ID0_x_F085D1A492E90000_8_9_2021_11_26_36_/ Transmit_Streaming_INC_Y_MAC_ID0_x_F085D1A492E90000_8_9_2021_11_26_36_/	
Inc Ran		Yes No		s —	>	
					in 🗠 🔍 🔀 Clear All	
N° ld Label	File Name	^	N° Id	Labe	el File Name ^	
1 1 Ch_X 2 1 Ch_X 3 1 Ch_X 4 1 Ch_X 5 1 Ch_X 6 1 Ch_X 7 1 Ch_X 8 1 Ch_X 9 1 Ch_Y 10 2 Ch_Y 11 2 Ch_Y Postlon Number:	Transmit_5 Transmit_5 Transmit_5 Transmit_5 Transmit_5 Transmit_5 Transmit_5 Transmit_5 Transmit_5 SENS_0.9	Similar position detected The following file contain a position value similar to each others Do you want to continue ? Ves No Streaming_Ch_Y_MAC_ID_0_x_A4D57843DED30000_8_9_2021_12_17_ Streaming_Ch_Y_MAC_ID_0_x_A4D57843DED30000_8_9_2021_12_18_ SENS_1-9 SENS_2-9	17 2 18 2 19 0 20 0 21 0 22 0 23 0 24 0 25 0 26 0 27 0 27 0 28 0	Ch_i Ch_i Ch_i Ch_i Ch_i Ch_i Ch_i Ch_i	Y Transmit_Streaming_Ch_Y_MAC_ID_0_x_F085D1A492E90000_8_9_2021_11_26_2 Y Transmit_Streaming_Ch_Y_MAC_ID_0_x_F085D1A492E90000_8_9_2021_11_31_1 Z Transmit_Streaming_Ch_Z_MAC_ID_0_x_F085D1A492E90000_8_9_2021_11_16_4 Z Transmit_Streaming_Ch_Z_MAC_ID_0_x_F085D1A492E90000_8_9_2021_11_18_1 Z Transmit_Streaming_Ch_Z_MAC_ID_0_x_F085D1A492E90000_8_9_2021_11_18_1 Z Transmit_Streaming_Ch_Z_MAC_ID_0_x_F085D1A492E90000_8_9_2021_11_21_19_1 Z Transmit_Streaming_Ch_Z_MAC_ID_0_x_F085D1A492E90000_8_9_2021_11_22_2 Z Transmit_Streaming_Ch_Z_MAC_ID_0_x_F085D1A492E90000_8_9_2021_11_22_3 Z Transmit_Streaming_Ch_Z_MAC_ID_0_x_F085D1A492E90000_8_9_2021_11_24_3 Z Transmit_Streaming_Ch_Z_MAC_ID_0_x_F085D1A492E90000_8_9_2021_11_31_3 × × x x	
Status :	Invalide files d	letected , see details error				
	<u>View log info</u>	/error details				
< <previous< th=""><th></th><th></th><th></th><th></th><th>Next>></th><th></th></previous<>					Next>>	

In this case you need to need to generate new log files without having the same position.

13.1.3 Loading Calibration Values

After the validation process of the target and reference sensors log files, the next step is generating the calibration values for each sensor.

Once you click next the following window will be displayed

BeanDevices list	BeanDevice	es platform
X Advanced calib	ration — 🔽	×
BeanDevice list :	5C313E0708AE0000	•
Selected Devices : Current Inc. range : Config Inc. range :	NA NA -15 / +15	
Status :	NA View log info/error details	
Start calcul	Update device Show Detail	is >>>
Start calibration values calculation	Update the device calibration values	Show result details

1- First of all select the BeanDevice[®] from the BeanDevices[®] list, then click on Select Dev button to validate your choice. The BeanDevice.





BeanDevice [®] Wilow [®]	User Manual	Wil	ow [®] wireless sensors
	BeanDevice Status BeanDevic Selected D value calculate	ed successfully	
🔀 Advanced calil	pration		- 0 ×
BeanDevice list :	5C313E0708AE0000 • •	Export	Result Export
Selected Devices :	5C313E0708AE0000	Rzz : 1	
Status :	values calculated successfully	Oz : 0 Rzx : 0 Rzy : 0	
	<u>View log info/error details</u>	Rox: 1	
Start calcul	Update device <<< Hide Details	Ox: 0 Rxy: 0	
		Rxz : 0	
		Ryy: 1	
		Ryx: 0	
		Ryz : 0	
< <previous< td=""><td></td><td></td><td></td></previous<>			

3- Now you can easily load the new calibration settings to the device by clicking on update device button.

Status :	value calculated successfully				
	<u>Mew log info/error details</u>				
	Start calcul	Update Device			

When you try to update the device with the new calibration values, a warning message will pop up to make sure that you confirm the process, hit yes.

BeanDevice	[®] Wilow [®] User Manual	Wilow [®] wireless sensors
🔀 Advanced calib	ration	- 🗆 X
BeanDevice list :	5C313E0708AE0000 • 👀	Virtual Inc. X Virtual Inc. Y
	Select Dev	Measurement calibration X
Selected Devices :	5C313E0708AE0000	
Current Inc. range :	NA	Warning, the modification of these parameters can lead to a
Config Inc. range :	-15 / +15	Are you sure you want to change the calibration parameters?
Status :	Sending to Device	0.047617
	View log into/error details	Yes No -0.206772
Start calcul	Update device < Hide Details	Rvx : 0.987722 -0.189337 Rvx : 0.291825 0.067909

With that the calibration fields will be updated with the new values.

			💶 Se	ensor profile		_	Custom display Notes Measurement conditionning calibration MQTT Conf Log config. Nam and S.E.T. config. Soft Set Alam Parts a situation
	🔾 Advanced calib	ration		Current	– 🗆 X	1.500	Ratio
Ch_Y Ch_Z	BeanDevice list :	5C313E0708AE0000 Select Dev	• 😯	Export	Export	0.500	Valdate Export Reset
	Selected Devices :	5C313E0708AE0000		Rzz : 1 Oz : 0			Valuer Total Man Heautring Carl And San Heaut
	Status :	values calculated successfully		Rzx: 0 Rzy: 0	0 0		Max value: MA g Date MA
	Start calcul	Update device <pre></pre>	Details	Rox: 1 Ox: 0	1	_	Data Acquisition Stopped
				Rxy: 0 Rxz: 0	0		
				Ryy: 1			
				Ryz: 0			

13.2 IMPORTE CONFIGURATION FROM A FILE

If you have already a file from a reference sensor which is already calibrated, you don't need to go through the calibration instructions mentioned above. You can just use that file to calibrate your device using the Import configuration.

	🔀 Advanced calibration				
	• New Config.	Info	• Import Config from file		
	BeanDevices list :	Select Beandevices		- 😥	
	Config type :	• Acc	Virtual Inc. X	Virtual Inc. Y	
First of all, select the device which you want to calibrate.					
	BeanDevi	ces list :	5C313E0708AE0000	-	
A notification message will be displayed in the status frame saying that the BeanDevice [®] has been selected successfully otherwise check the info/error details option					
	Status :	BeanDevice <u>View log in</u> t	e selected successfully fo/error details		
Then select the configuration type

- Acceleration if you will calibrate an accelerometer
- Virtual INC-X or Virtual INC-Y if you will calibrate your virtual tilt axis.

Don't forget to click on Validate button to confirm your choice.

BeanDevices list :	5C313E0708AE0000	- 📀
Config type :	Acc Virtual Inc. X	Virtual Inc. Y
	Validate	
Selected Devices :	5C313E0708AE0000	

Once you validate the configuration, the current calibration settings which are backed up on the device will be displayed.

Current Values					
B77 1	Pay 0	Rzy	0	07	
Rxz 0	Rxx 1	 Rxy	0	Ox	0
Ryz 0	Ryx 0	Ryy	1	Oy	0
			Reset		Export

Now, navigate to the Upload configuration from file section and click on the file icon to select the file.

Upload configuration from file				
Selected Devices :	NA			
	Update device			

Then select the reference file and the new calibration values will be automatically loaded.

	Upload configuration from file					
	Selected Devices :	C:\log_beanscape\Fold	der 5C313E0708AE000	0\Currentcalibratio 👃		
		Update device				
	Rzz 1	Rzx 0	Rzy 0	Oz 0		
	Rxz 0	Rxx 1	Rxy 0	Ox 0		
	Ryz 0	Ryx 0	Ryy 1	Oy 0		
Click on Update de	vice to back up the	e new calibration se	ttings on the devic	e. Update device		

Validate

14. VIRTUAL TILT

The virtual tilt is a new feature available on the accelerometer devices only (**AX-3D** & **AX-3DS**) compatible with the **firmware version 4.4** and above.

The virtual tilt obtained based on the acceleration results passing through different calculation process.

You can enable or disable the virtual tilt sensor based on your application needs.

Before enabling the virtual tilt option, you should go through a virtual tilt calibration procedure.

To calibrate a virtual tilt, you can use a sinus table or a reference device (inclinometer).

14.1 VIRTUAL TILT CALIBRATION

The calibration can be done using a reference device or using a Sinus table.

The target platform can be either AX-3D V-INC or AX-3DS V-INC and the reference device can be Hi-INC or X-INC.

💦 Advanced calibration	– 🗆 ×
New Config. Info	Import Config from file
Target Platform : AX 3D	AX3D V-INC V
Ref platform : AX 3D	AX 3D AX 3DS
Acc Range : -2g / +2g	AX3D V-INC
Inc. Bange : NA	AX3DS V-INC

BeanDevice Platform to calibrate

🔀 Advanced calibration	- 🗆 X
New Config. Info	Import Config from file
Target Platform : AX 3D	AX3D V-INC V
Ref platform : AX 3D	Inc 🗸
Acc Range : -2g / +2g	X-INC

BeanDevice Platform Reference

Select your BeanDevice[®] target acceleration measurement range, you can find this info from the BeanDevice[®] dashboard under sensor info tab.

BeanDevice® config. Status	Sensor Info	SSD Status				_
_			Acc Range :	-2g / +2g	+-2g	~
Sensor calib date:	8/19/2021 2:	02:21 PM			+-2 g	
Meas, Range Acc: a	-10/+10		inc Range :	NA	+-10 g	

Choose the virtual inclinometer measurement range which goes from ±1deg up to ±90deg.



The number of positions will determine the calibration resolution and the calibration step value to cover the virtual tilt measurement range.

The resolution =
$$\frac{Virtual Tilt measurement range}{Number of positions}$$
 = Error rate = Calibration step

In our example:

The number of positions is 27 and the virtual tilt measurement range is ±4 deg

Nb Iteration : 200

Resolution = error rate = calibration step = $\frac{2*4}{27}$ = 0.3

The position size is the data amount which will be used in the calibration calculation, it should not be higher than the number of data in the log file.

	Position Size :	6000	6000	-
r .				

200

÷.

After that click on **Validate** then **Next**.

Choose the iteration numbe

Now just put the files for the target device and reference device, and make sure that the number of files is exactly equal to the number of positions configured earlier.

🔀 Advanced calibration		- 🗆 X
Position info	File Upload	
Target Platform : AX3D V-INC Calibration Method : Auto	Add	N° P File Name
Ref platform : Inc Position Number: 27	Clear Al	1 1 Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_19_00 2 1 Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_23_26
Target Sensor: 3 Id: 0 1 2 Position Size : 6000	Load Al	3 1 Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_26_14
Ref. Sensor: 2 Id: 314 No Iteration : 200	Load Selected	4 1 Transmit_Streaming_MacId_A4U5/843UEA90000_24_08_2021_09_28_34 5 1 Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_31_01
Sampling Rate: 800 Hz Error Epsilon : 12-00	Target	6 1 Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_34_50 7 1 Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_37_40
Inc Range : 4deg / +4deg	 Ref 	8 1 Transmit Grazining Marld Δ/D578/3DEΔ90000 2/ 08 2021 09 39 12
	r F	Ref Sensors
∧ ∨ <mark>⊠</mark>	Clear All	A V 🔀 Clear Al
N° Id Label File Name	^	N° Id Label File Name
1 0 Ch_Z Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_19_00_3	SENSID_0	1 3 INC_X Transmit_Streaming_MacId_A4D57843DEDD0000_24_08_2021_09_19_14_SENSID_3
2 1 Ch_X Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_19_00_3	SENSID_1	2 4 INC_Y Transmit_Streaming_MacId_A4D57843DEDD0000_24_08_2021_09_19_14_SENSID_4
3 2 Ch_Y Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_19_00_3	SENSID_2	3 3 INC_X Transmit_Streaming_MacId_A4D57843DEDD0000_24_08_2021_09_23_36_SENSID_3
4 0 Ch_Z Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_23_26_	SENSID_0	4 4 INC_Y Transmit_Streaming_MacId_A4D57843DEDD0000_24_08_2021_09_23_36_SENSID_4
5 1 Ch_X Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_23_26_	SENSID_1	5 3 INC_X Transmit_Streaming_MacId_A4D57843DEDD0000_24_08_2021_09_26_02_SENSID_3
6 2 Ch_Y Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_23_26_	SENSID_2	6 4 INC_Y Transmit_Streaming_MacId_A4D57843DEDD0000_24_08_2021_09_26_02_SENSID_4
7 0 Ch_Z Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_26_14_	SENSID_0	7 3 INC_X Transmit_Streaming_MacId_A4D57843DEDD0000_24_08_2021_09_28_17_SENSID_3
8 1 Ch_X Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_26_14_	SENSID_1	8 4 INC_Y Transmit_Streaming_MacId_A4D57843DEDD0000_24_08_2021_09_28_17_SENSID_4
9 2 Ch_Y Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_26_14_	SENSID_2	9 3 INC_X Transmit_Streaming_MacId_A4D57843DEDD0000_24_08_2021_09_30_47_SENSID_3
10 0 Ch_Z Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_28_34_	SENSID_0	10 4 INC_Y Transmit_Streaming_MacId_A4D57843DEDD0000_24_08_2021_09_30_47_SENSID_4
11 1 Ch_X Transmit_Streaming_MacId_A4D57843DEA90000_24_08_2021_09_28_34_ <	SENSID_1 V	11 3 INC_X Transmit_Streaming_MacId_A4D57843DEDD0000_24_08_2021_09_34_34_SENSID_3 ~ <
Position Number: SENS_0.27 SENS_1.27 SENS_2.27		Position Number: SENS_3:27 SENS_4:27
Status : 81 sensor(s) profile(s) loaded successfully		
<u>View log info/error details</u>		
< <previous< th=""><th></th><th>Next>></th></previous<>		Next>>

Select the BeanDevice[®] from the list then confirm your choice by clicking on Select Dev button.

BeanDevice list :	A4D57843DED30000	- 📀
	Select Dev	
Selected Devices :	A4D57843DED30000	
Current Inc. range :	-4 / +4	
Config Inc. range :	-4 / +4	

Now, just start the calculation process.

Status :	Calcul in process		
	View log info/error details		
Start calcul	Update device calibration values		

The results will be displayed in the following window.

Virtual Inc. X		Virtual Inc. Y	
Current	Result	Current	Result
Export	Export	Export	Export
Rzz : 0.34073	0.929073	Rzz : 0.744074	1.764387
Oz : -0.230779	-0.103693	Oz : -0.206655	-0.082066
Rzx : 0.074796	-0.006476	Rzx : 0.376538	0.047617
Rzy : -0.179475	-0.141905	Rzy : -0.298313	-0.206772
Rxx: 0.987722	-0.189337	Rxx: 0.291825	0.067909
Ox : -0.059114	0.12211	Ox : -0.036512	-0.086062
Rxy: 0.130107	-0.214916	Rxy : 0.36299	-0.006723
Rxz : -0.129674	-0.057902	Rxz : -0.713531	-0.009719
Ryy : 0.764621	1.966055	Ryy : 0.667691	0.039124
Oy: 0.297703	-0.022613	Oy: 0.225587	0.116857
Ryx : 0.241182	0.511068	Ryx : -0.12776	0.003791
Ryz : -1.392144	0.158493	Ryz : -1.444 <u>623</u>	-0.04714
Otx : -0.016687	-0.27022	Otx : -0.020828	-0.006779
Oty : 0.001639	-0.00069	Oty : 0.001759	0.29844
Txx : 0.303021	-2.08408	Tw: -0.00112	0.432237
Txy: -0.019616	-0.077445	Tyx: 0.105991	-0.002209
		174. 0.100001	

Now just load the new calibration settings on your BeanDevice by clicking on **Update device calibration values** button.

14.2 ENABLE VIRTUAL TILT SENSORS

Once the calibration process is finished and the BeanDevice is updated with the new calibration values, now is the time to enable the virtual tilt sensors.

BeanDevice	e [®] Wilow [®] User Manual	Wilow [®] wireless sensors
So, Virtual Inc	linometer tab then Enable the Virtual Inclinometer senso	ors.
	System config. Remote Configuration Power mode Configuration	Virtual Inclinometer
	Virtual Inclinometer Config State: Disabled	Enable
To Enable the up.	virtual tilt, you should reboot the BeanDevice® so click or	Yes when the notification message will pop
	Virtual Inclinometer State	×
	The BeanDevice need to be rebooted to Do you want to continue ?	o take effect ,
	Yes	No
After that you	u will see the Accelerometer has now 5 sensors with the V	/irtual Tilt option.

MAC_ID : 0 x A4D57843DED30000 Ch_X Ch_Y Ch_Z	MAC_ID : 0 x A4D57843DED30000
BeanDevice	BeanDevice
Platform : AX 3D	Platform : AX3D V-INC

You can verify the calibration setting by clicking on the virtual tilt sensor profile then go to measurement conditioning calibration.

	Custom display Notes Measurement conditionning calibration Log config.	
MAC_ID: 0 x A4D5/843DED30000		
Ch_Y	R10 0.032789 R11 0.650475 R12 0.293098 01 0.430837	T00 -1.592097 T01 0.029342
	R20 0.081547 R21 1.390657 R22 1.371272 02 0.127348	
	Calib. status On Filter status Off Filter.Coef 159 1E-06	40 Reset Export

Another option is available by enabling the virtual tilt option, is the virtual inclinometer filter.

System config.	Remote Configuration	Power mode Configuration	Virtual Inclinometer	4 >
Virtual Inclinor State:	meter Config		Disable	
Virtual Inc. filte	er : Disabled		Enable	

You can enable the virtual tilt filter by clicking on Enable button.



The Virtual tilt will be enabled only if the calibration settings are correct otherwise it will be always OFF even when you enable the filter option.

You can always check the virtual tilt filter status from the measurement conditioning calibration tab

BeanDevice [®] Wil	ow [®] User Manual	Wilow [®] wireless sensors
Custom display Notes	Measurement conditionning calibration Log config.	
Accelerometer		Inclinometer
R00 0.450058	R01 -0.023002 R02 -0.063388 00 -0.087494	OT0 -0.073224 OT1 -0.002089
R10 -0.032789	R11 0.650475 R12 -0.293098 01 0.430837	T00 -1.592097 T01 0.029342
R20 0.081547	R21 1.390657 R22 1.371272 O2 0.127348	
Calib. status	Filter status On Filter.Coef 159 1E-06	40 Reset Export

15. MAINTENANCE & SUPERVISION (FOR EXPERIENCED USER)

This section allows to an experienced user to configure correctly the Wireless Sensor Networks.

15.1 RESTORING FACTORY SETTINGS

If desired, the user can perform a Network context deletion. It allows to restore default parameters on the BeanDevice[®]:

	BeanDevice [®] WiLow [®] version		
Parameter	AX-3D	AX-3DS	HI-INC
Power Mode	Active		
Data Acquisition duty cycle	10s		
Acquisition duration time	ОК		
Sampling rate	ОК		
Data Acquisition mode	LowDutyCycle		
C s Threshold	H1 :2, 10, 13	H1 :20	H1 :20
	H2 :2, 10, 13	H2 :20	H2 :20
	S2: -2, -10, -13	S2 :0	S2 :0
	S1: -2, -10, -13	S1 :0	S1 :0
Anti-aliasing Filter cut-off frequency	100 Hz	/	100 Hz

To restore these defaults parameters, you must perform a *Network context deletion*. The "Network" noncontact button is outside the product. Hold the magnet on the button network ("Network") for more than 2 seconds.



15.2 EXTENDING BATTERY LIFE

The battery autonomy depends on several parameters:

- ✓ The environment where the BeanDevice[®] WiLow[®] is deployed
- ✓ Data acquisition mode which is configured

The table below presents the BeanDevice[®] WiLow[®] current consumption during radio TX or during sleep phase:

<i>Current consumption during radio TX at 25°C, powered by a battery of 3.6V</i>	Current consumption in sleep phase at 25°C, powered by a battery of 3.6V
250-280 mA	< 100 uA

The following table gives you a list of recommendations in order to extend the battery autonomy of your BeanDevice[®] Wilow[®]:

Influence factors on battery lifetime	Observations	Recommendations
Sleep power mode on your BeanDevice® Wilow®	Sleep power mode can be configured on the BeanDevice [®] from the BeanScape [®]	By activating this power mode on your BeanDevice [®] , you will increase the BeanDevice [®] battery life.
Sampling rate in streaming mode	Power consumption will grow with the sampling rate.	Choose the right sampling rate on your BeanScape [®] interface.
Packet Error Rate (PER)	A high packet error rate can cause a higher retransmission data and this increase the current consumption.	Try to replace your BeanDevice® in an area where the radio link is much better (see Link Quality Indicator value).

15.3 OVER-THE-AIR CONFIGURATION (OTAC) PARAMETERS BACKED UP ON FLASH

The BeanDevice[®] WiLow[®] integrates an internal flash memory used for backing up OTAC (Over-the-air configuration) parameters.

This memory is organized into several levels:



15.3.1 Level 1: End-user OTAC parameters

The following table presents all the defaults configuration parameters:

	BeanDevice® WiLow® version		
Parameter	AX3D	HI-INC	AX-3DS
Power Mode	Active	Active	Active
Data Acquisition duty cycle	10s	10s	10s
Acquisition duration time	N.A.	N.A.	N.A.
Sampling rate	N.A.	N.A.	N.A.
Data Acquisition mode	LowDutyCycle	LowDutyCycle	LowDutyCycle
Alarms Threshold	High level: 2g or 10g	High level: 15° or 30°	High level: 2g
	Low level :-2g or -10g	Low level: -15° or - 30°	Low level :-2g

Table 15: End-user OTAC parameters

To restore these defaults parameters, you must perform a *Network context deletion*.

The "Network" non-contact button is outside the product. Hold the magnet on the button network ("Network") for more than 2 seconds.



Figure 192: Network Reed button position

Level 2, 3 & 4 of Configuration parameters are not affected by network context deletion (by hardware or software)

15.3.2 Level 2: Sensor calibration parameters

The table below presents the sensor calibration parameters depending on BeanDevice® version:

	BeanDevice [®] WiLow [®] Version			
Parameter	AX3D	HI-INC	AX-3DS	
Sensor gain	ОК	ОК	ОК	
Sensor offset	ОК	ОК	ОК	

15.4 NETWORK DIAGNOSTIC FROM YOUR BEANSCAPE® WILOW® SOFTWARE

The BeanScape[®] provides network diagnostic information which is described in this chapter.

15.4.1 Displaying Network information

- 1. Launch your BeanScape® WiLow® application
- Select your BeanDevice[®] WiLow[®] profile, a new tab "BeanDevice[®]" will appear in your BeanScape[®] toolbar;
- 3. Click on this tab, and then click on "View History Network".



15.4.1.1 Packet Error Rate

Packet error rate (PER) is the number packet errors divided by the total number of transferred packet during a studied time interval. PER is a unit less performance measure, often expressed as a percentage number.

15.4.1.2 LQI (Link Quality Indicator)

LQI (Link Quality Indicator) represents the radio signal quality in your Environment. It is possible that LQI is low due to EMC interference or metal presence in the environment.

If you encounter such problems, several solutions are proposed to increase your LQI:

- ✓ Try to configure your receiver antenna and your transmitter antenna on the same antenna pattern (cf. the Beam with of your antenna)
- ✓ Use a high gain antenna (in outdoor use only) for a better RF Link Budget
- ✓ Mount your BeanDevice[®] Wilow[®] or WIFI AP/Repeater on a top of a mast or a building.



For further information, read the application note on "How to extend your wireless range?"

15.4.1.3 Internal temperature monitoring

An internal temperature sensor is used for onboard & battery temperature monitoring

15.4.1.4 Battery charge monitoring

Battery charge is based on current accumulation. The **BeanDevice® Wilow®** integrates a current accumulator circuit which facilitates remaining capacity estimation by tracking the net current flow into and out of the battery. Current flow into the battery increments the current accumulator while current flow out of the battery decrements it.

Voltage measurement corresponds to battery voltage.

15.4.2 Scrolling menu « BeanDevice[®] »

The BeanDevice[®] scrolling menu provides access to additional features: like the multi-graph mode (display of multiple windows on a graph measuring the same screen), deleting graphs displayed and the activation / deactivation of logging measurements.

To access to this scrolling menu, click on the sensor attached to your BeanDevice[®]. You will then see the BeanDevice[®] scrolling menu appearing.



By clicking on the scrolling menu « BeanSensor », you can access to the following features:

15.4.2.1 Disable/Enable log

All the data received on the BeanScape® are stored in a log file in CSV format.

This feature allows you to enable / disable data logging on your log file.





For further information about CSV log file, please read the BeanScape® user manual.

15.4.2.2 Buffer reset

This function clears the graphical display concerning recorded measurements of your sensor. The data stored in a log are not affected by this function.

By clicking on « Buffer reset », a second window appears asking you to confirm your choice:

Yes, you accept to delete the whole measure data of this BeanSensor

No, don't delete the whole measure data of this BeanSensor





15.4.2.3 Open the graph in a new window

By clicking on "Open the graph in a new window", you can open a graph corresponding to your sensor.



You can easily open several graphs in a window.

The multi-graph mode requires a lot of resources on your computer, it is recommended to install the BeanScape[®] software on a powerful computer.

16. TROUBLESHOOTING

✓ Why the BeanDevice[®] WiLow[®] LEDS are not activated?

If there is no wireless network activity, the led will be inactive. Make sure you have powered your BeanDevice[®] with a charged battery.

✓ What should I do if interference is present on the radio channel?

Choose an appropriate WiFi radio channel.

- ✓ Why the BeanDevice[®] WiLow[®] does not provide the right measurement value?
 - Check if your sensor channel is activated on your BeanScape[®] interface (ON Position)?;
 - Check if your BeanDevice[®] is powered up;
 - Check your LQI quality, if your LQI is under 50-60. You must change your antenna position, or your product position;
 - Check your data acquisition mode, maybe you have specified a data acquisition which is too long;

Why the BeanDevice[®] WiLow[®] doesn't respond when I try to configure it (Over-the-airconfiguration)?

- ✓ If your BeanDevice[®] WILO[®] operates with sleep power mode, the RF Hardware operates also with a sleep power mode. Therefore your BeanDevice[®] WILO will not receive in real-time the OTAC configuration;
- Check the LQI (Link Quality Indicator) value, if this value is under 80, the over-the-air configuration will not be easy. Try to decrease the wireless range between the BeanDevice[®] WILO[®] and the WIFI Access Point or WIFI Repeater .

Why do I have too much noise on my sensor signal ?

✓ Check your external power supply quality

Why I see 1g on the axis pointing to the ground ?

Accelerometers are devices that measure acceleration, which is the rate of change of the velocity of an object. They measure in meters per second squared (m/s2) or in G-forces (g). A single G-force for us here on planet Earth is equivalent to 9.8 m/s2 = 1g.

✓ The gravitational force has three vector components, in X, Y & Z directions, the accelerometer should read 1g on the Z axis (Z axis is pointed to the ground), it's usual to view 1g on this axis as it's the gravity. Our sensors are MEMS based and are working between DC to 800Hz. It's a normal behavior.

17. APPENDICES

17.1 FFT WINDOW GRAPH ON MATLAB

The following graphs represent the graphical display of each window function on MatLab:



Figure 193: Rectangular Window Graph on MatLab







Figure 195: Hann Window Graph on MatLab



Figure 196: Blackman Window Graph on MatLab



Figure 197: Blackman-Harris Window Graph on MatLab







Figure 199: Kaiser Window Graph on MatLab



Figure 200: Taylor Window Graph on MatLab

Wilow[®] wireless sensors



Figure 201: Triangular Window Graph on MatLab



Figure 202: Flat Top Window Graph on MatLab



Figure 203: Bartlett Window Graph on MatLab



