

Beanair GmbH

SmartSensor User Manual

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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 ABREVIATIONS

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. RELATED DOCUMENTS & VIDEOS

4.1 WHITE PAPER WEBPAGE

Application notes, technical notes and user guides are available on our White Paper webpage:

Click here

Home Pr	oducts Applications Succ	ess Stories Support News & Eve	nts Vīdeos About Contact
Reference Number	Document Name	Related product	Description
AN_RF_002	Structural Health Monitoring on bridges	All BeanAir products	The aim of this document is to overview BeanAir® products suited for bridge monitoring, their deployment, as well as their capacity and limits by overviewing various data acquisition modes available on each BeanDevice®
AN_RF_003	IEEE 802.15.4 2.4 GHz Vs 868 MHz	All BeanAir products	Comparison between 868 MHz frequency band and a 2.4 GHz frequency band
AN_RF_005	BeanGateway & Data Terminal Equipment Interface	BeanGateway®	DTE interface Architecture on the BeanGateway®
AN_RF_006	How to extend your wireless range	All BeanAir products	A guideline very useful for extending your wireless range
AN_RF_007	BeanAir WSN Deployment	All BeanAir products	Wireless sensor networks deployment guidelines

Technical Notes			
Reference Number	Document Name	Related product	Description
TN-RF-001	Wireless range benchmarking	BeanDevice® 2.4GHz Sensor series	Wireless range tests results of BeanDevice® 2.4GHz inside (N.L.O.S.) and outside a Building (L.O.S.)
TN-RF-002	Current consumption in active & sleeping mode	BeanDevice® 2.4GHz Sensor series	Current consumption estimation in active and sleeping mode.
TN-RF-003	Aggregation capacity of Wireless Network	BeanDevice® 2.4GHz Sensor series	Overview of aggregation capacity of wireless sensor networks in streaming mode
TN-RF-004	MQTT Communication Protocol	BeanDevice® Wilow® sensor series	MQTT Communication Protocol for a seamless integration into a third-party IOT software

Figure 1 : White Paper webpage

4.2 FEATURED VIDEOS



All the videos are available on our YouTube channel

Beanair video link (YouTube)	Related products
First step into Beanair Wireless Sensor Networks	All
Wireless Sensor Networks	All
Wireless Sensor Networks dedicated to Structural Health Monitoring	All
BeanGateway [®] - Ethernet Outdoor version introduction	BeanGateway® - Ethernet Outdoor version introduction
<u>BeanGateway[®] – Ethernet Indoor version</u> presentation	BeanGateway® Ethernet Indoor version
BeanDevice [®] AN-XX wireless range demonstration	BeanDevice® AN-V/AN-420/AN-mV Standard and Extender
BeanDevice [®] AN-XX presentation	
Self-powered data logger	BeanDevice® AN-V/AN-420/AN-mV Xtender
BeanDevice [®] AX-3D presentation	BeanDevice® AX-3D
BeanDevice [®] HI-INC presentation	BeanDevice® HI-INC
Wireless inclinometer with integrated datalogger	
BeanDevice® AX-3DS presentation	BeanDevice® AX-3DS
Wireless Accelerometer dedicated to shock detection	
High performance wireless accelerometer	BeanDevice® AX-3D Xrange
Wireless temperature and humidity sensor with integrated data logger	BeanDevice® ONE-TH
High performance wireless inclinometer	BeanDevice® HI-INC Xrange
High Grade and affordable wireless sensor networks for environmental monitoring	Ecosensor products

4.3 TECHNICAL VIDEOS



All the videos are available on our YouTube channel

Beanair video link (Youtube)	Related products
How to launch the BeanScape [®] software	BeanScape [®]
BeanGateway [®] Ethernet/LAN Configuration, directly connected to the Laptop/PC	BeanGateway [®]
How to remove a BeanDevice [®] from your Network	BeanDevice [®]
Energy Scan	BeanGateway®
Synchronous Multicasting process	BeanGateway®
Manual channel selection	BeanGateway®
Automatic Channel selection	BeanGateway®
Authorized Channels	BeanGateway®
Fast Fourier Transform waveform analysis module	BeanScape®

5. ACRONYMS AND ABBREVIATIONS

BeanDevice [®] product overview	• Details the BeanDevice [®] product presentation
Data acquisition mode description	 Details the data acquisition mode available on the BeanDevice[®] <i>Related Technical Note:</i> TN_RF_008 - "Data acquisition mode available on the BeanDevice[®]"
BeanDevice [®] installation guidelines	 Details the installation guidelines of the BeanDevice[®] <i>Related Technical Note:</i> TN_RF_010 - "Beandevice[®] Power Management " <i>Related Technical Note:</i> TN_RF_007- "Beandevice[®] DataLogger user Guide" <i>Related Technical Note:</i> TN_RF_006- "Beandevice[®] wireless network association"
BeanDevice [®] supervision from the Beanscape [®]	• Details the BeanDevice [®] supervision from the BeanScape [®]
BeanDevice [®] maintenance & supervision (for experienced user)	•Details the BeanDevice [®] maintenance (for experienced user)
Troubleshooting	•Frequently asked questions
Installation procedures	•Details the installation procedures

6. PRODUCT DESCRIPTION



- It is highly recommended to read all the user manual related to Beanair software & equipment (BeanScape® 2.4GHz, BeanGateway® 2.4GHz, BeanDevice® 2.4GHz) before getting start your BeanDevice® 2.4GHz.
- ✓ Use only accessories supplied by Beanair (batteries, power supply unit, and antenna). Use of other materials may damage the BeanDevice[®] 2.4GHz;
- ✓ Only Beanair is qualified to make changes on the BeanDevice[®] 2.4GHz;
- ✓ Don't try to remove the adhesive label on the product; it contains important information such as the MAC address or sensor measurement range

6.1 ABOUT SMARTSENSOR PRODUCT LINE

Smart Sensor product line was initially designed for Structural Health monitoring (SHM), Condition Maintenance Monitoring (CMS) and Testbed applications.

It comes with different types of sensors for dynamic measurements:

- Wireless accelerometer for vibration measurement
- Wireless inclinometer for tilt/slope measurement
- Wireless shock sensor for shock monitoring

6.2 BEANDEVICE® 2.4GHZ AX-3D

6.2.1 Featured video



6.2.2 Main features

Main Features

- Wireless Tri-axis accelerometer based on MEMS Technology
- Measurement range: ±2g, ±10g
- Very Low noise Density:
- 45 μg/VHz (±2g version), 100 μg/VHz (±10g version),
- Excellent radio link thanks to the radio antenna diversity developed by Beanair®
- Maximum sampling rate: 3 KSPS
- TimeSync function: Time Synchronization through wireless sensor network
- Maximum Radio Range: 500 m (L.O.S)
- Ultra-Power Radio Technology IEEE 802.15.4
- Current consumption in idle mode: < 30 uA
- Embedded logger: up to 1 million data points (with events dating)
- Entirely autonomous system with an integrated Lithium-Ion battery charger
- Anti-aliasing Butterworth filter (5th order) with a cut-off frequency of 1 Hz to 2 KHz (remotely programmable from the BeanScape[®])
- Watertight Aluminum AL6061 & Waterpoof casing IP67 (dimensions Lxlxh : 100x55x36 mm - weight 155g rechargeable battery included) suitable for Harsh Industrial Environment

6.2.3 Applications

This BeanDevice® AX-3D is suitable for the following applications:

- Ground vibration Monitoring on construction site
- Dynamic measurement on rolling stock
- Condition monitoring
- Structural Health Monitoring (SHM)
- Vibration analysis

6.3 BEANDEVICE® 2.4GHZ AX-3D-SR

6.3.1 Featured video

Wireless and low noise IOT vibration sensor

6.3.2 Main features

Main Features

- Wireless Tri-axis accelerometer based on MEMS Technology
- Measurement range: ±1.2g/±2.4g
- Very Low noise Density:
- 20 μg/VHz (±1.2g measurement range), 32 μg/VHz (±2.4g measurement range),
- Excellent radio link thanks to the radio antenna diversity developed by Beanair[®]
- Maximum sampling rate: 800 SPS for ±2.4g (static range)

400 SPS for ±1.2g (static and auto range), for

±2.4g (Auto range).

- TimeSync function: Time Synchronization through wireless sensor network
- Maximum Radio Range: 500 m (L.O.S)
- Ultra-Power Radio Technology IEEE 802.15.4
- Current consumption in idle mode: **< 30 uA**
- Embedded logger: up to **1 million** data points (with events dating)
- Entirely autonomous system with an integrated Lithium-Ion battery charger
- Anti-aliasing Butterworth filter (5th order) with a cut-off frequency of 1 Hz to 2 KHz (remotely programmable from the BeanScape[®])
- Watertight Aluminum AL6061 & Waterpoof casing IP67 (dimensions Lxlxh : 100x55x36 mm - weight 155g rechargeable battery included) suitable for Harsh Industrial Environment

6.3.3 Applications

This **BeanDevice® AX-3D** is suitable for the following applications:

- Ground vibration Monitoring on construction site
- Dynamic measurement on rolling stock

Beanair GmbH

- Condition monitoring
- Structural Health Monitoring (SHM)
- Vibration analysi

6.4 BEANDEVICE[®] 2.4GHZ HI-INC - 2.4GHZ SERIES (WIRELESS INCLINOMETER)

6.4.1 Main features



6.4.2 Applications

- ✓ Platform Leveling and stabilization
- ✓ Laser level rotation
- ✓ Slope measurement (Building, infrastructure & construction)

- ✓ Oïl drilling
- Axial rotor measurement

6.5 BEANDEVICE® 2.4GHZ AX-3DS - 2.4GHZ SERIES (WIRELESS SHOCK SENSOR)

6.5.1 Main features

Main Features

- Wireless tri-axis accelerometer
- Scalable measurement range (two versions) : ±6g/±12g/±24g or ±2g/±4g/±8g
- Excellent radio link thanks to the antenna diversity developed by Beanair[®]
- Advanced and smart shock detection
- Non-contact actuation for faster installation
- Maximum sampling rate: 3 KSPS (maximum)
- Maximum radio range: 500 m (L.O.S)
- Ultra-Low Power Radio Technology IEEE 802.15.4
- Current consumption during deep sleeping mode: < 28 uA
- Embedded Data Logger: up to 1 million data points
- Entirely autonomous system with an integrated Lithium-Ion battery charger
- Watertight aluminum enclosure IP67 (dimensions LxWxH: 100x55x36mm)—weight 155g (rechargeable battery included) -suitable for Harsh Industrial Environment



6.5.2 Applications

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

6.6 BEANDEVICE[®] 2.4GHZ AX-3D XRANGE – 2.4GHZ SERIES (HIGH PERFORMANCE WIRELESS ACCELEROMETER)

6.6.1 Main features

	Main Features
•	Wireless Tri-axis accelerometer based on MEMS Technology
•	Measurement range (2 versions): $\pm 2g \& \pm 10g$
•	Very Low noise Density:
	 45 μg/VHz (± 2g version)
	\circ 100 µg/VHz (± 10g version)
-	TimeSync function: Time Synchronization through wireless sensor
	network
•	Watertight IP67 aluminum enclosure coming with a rugged base plate and three-point-mounting
•	Excellent radio link relying on the radio antenna diversity developed by Beanair®
• .	Non-contact actuation for quick mounting
•	Maximum sampling rate: 3 KSPS
-	Maximum Radio Range: 500 m (L.O.S)
•	Ultra-Power radio technology IEEE 802.15.4
•	Current consumption in sleeping mode: $< 30 \ \mu A$
•	Embedded data logger: up to 8 million data points
•	OPC server allowing real time access from your IT system to the
	BeanScape [®] (available on <u>BeanScape[®] Premium+</u>)
•	Entirely autonomous system with an integrated Lithium-Ion battery charger
•	Anti-aliasing Butterworth filter (5 th order) with a cut-off frequency of 1 Hz to 2 KHz (remotely programmable from the BeanScape [®])
•	Fully calibrated sensor

6.6.2 Applications

This BeanDevice® AX-3D Xrange is suitable for the following applications:

- Ground vibration Monitoring on construction site
- Dynamic measurement on rolling stock
- Condition monitoring
- Structural Health Monitoring (SHM)
- Vibration analysis

6.7 BEANDEVICE® HI-INC XRANGE (HIGH PERFORMANCE WIRELESS INCLINOMETER)

6.7.1 Main features

Main Features	
 Wireless Inclinometer based on MEMS Technology 	
 Measurement range: ±30° (bi-axis) 	
 Excellent resolution (0.001°) & accuracy (±0.05°) 	
 Temperature compensated sensor 	
 Excellent radio link thanks to the antenna diversity developed by Beanair[®] 	
 Non-contact actuation for quick mounting 	
 Maximum sampling rate: 200 SPS 	Wireless Bi-axis inclinometer taninger * 15*
 Maximum radio range: 500 m (L.O.S) 	€€F© Made In Germany
 Ultra-Power Radio Technology IEEE 802.15.4 	
 Current consumption in sleeping mode: < 30 μA 	Contraction of the second seco
Embedded data Logger: up to 8 million data points	
• OPC server allowing real time access from your IT system to the	
BeanScape [®] (available on <u>BeanScape[®] Premium+</u>)	
 Entirely autonomous system with an integrated Lithium-Ion 	
battery charger	
 Watertight IP67 aluminum enclosure coming with a rugged 	
base plate and three-point-mounting	
 Anti-aliasing Butterworth filter (5th order) with a cut-off 	
frequency of 1 Hz to 100Hz (remotely programmable from the	
BeanScape [®])	
 Fully calibrated sensor 	

6.8 BEANDEVICE® 2.4GHZ HI-INC-SR - 2.4GHZ SERIES (TRI-AXIS WIRELESS INCLINOMETER)

6.8.1 Main features

	Main Features
•	Wireless Tri Axis Inclinometer based on MEMS Technology
•	Measurement range:
	 10T: Tri-axis ±10° / ±90°
•	Excellent resolution:
	o 0,0055°
•	TimeSync function: Time Synchronization through wireless
	sensor network
•	Excellent radio link thanks to the antenna diversity developed
	by Beanair®
•	Streaming mode:
	 20 SPS on each channel, for ±10° measurement range
	 80 SPS on each channel, for ±90° measurement range
•	Maximum Radio Range: 500 m (L.O.S)
•	Ultra-Power Radio Technology IEEE 802.15.4
•	Current consumption in idle mode: < 30 uA
•	Embedded logger: up to 8 million data acquisition records
	(with events dating)
•	Entirely autonomous system with an integrated Lithium-Ion
	battery charger
•	Anti-aliasing Butterworth filter (5 th order) with a cut-off
	frequency of 1 Hz to 100 Hz (remotely programmable from
	the BeanScape [®])
•	Aluminum AL6061 enclosure IP67 Nema 6
•	Dimensions LxWxH : 80x55x36 mm—weight 155g
	(rechargeable battery included) -suitable for Harsh Industrial
	Environment

6.8.2 Applications

- ✓ Land Survey
- ✓ Structural Health Monitoring (SHM)
- ✓ Test & Measurement
- ✓ Railway sleepers monitoring

6.9 TECHNICAL SPECIFICATIONS

6.9.1 BeanDevice[®] 2.4GHz AX-3D

Product reference

BND-2.4GHZ-AX3D-MRG-RB

MR – Measurement Range (1g = 9806.65 mm/s^2)

2: ±2g measurement range

10: ±10gmeasurement range

Example: BND-2.4GHZ-AX3D-10G-RB, Wireless Accelerometer with 10g measurement range

	Accelerometer Specifications
Accelerometer technology	Accurate and low power MEMS technology
Sensitivity	±2g Version: 61 μg/digit ±10g version: 305 μg/digit
Typical non-linearity (Full scale, @ 25°C)	±0.1%
Analog to Digital converter	16-bit, SAR architecture (Successive Approximation Register) with temperature compensation
Sensor frequency response (-3 dB)	DC to 800 Hz
Noise spectral density	±2g Version: 45 μg/VHz ±10g version: 100 μg/VHz
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	2%
Anti-aliasing Hardware filter	Butterworth 5 th order filter – cut-off frequency: 1 Hz to 2000 Hz remotely programmable (BeanScape [®])

	Configurable settings from the BeanScape [®] 2.4GHz software
Data Acquisition mode (SPS = sample per second)	Static Data Acquisition: Low Duty Cycle Data Acquisition (LDCDA) Mode Measurement heartbeat 1s to 24 hour Dynamic data acquisition: Streaming and S.E.T. (Streaming with Event Trigger)
Sampling Rate (in streaming and S.E.T. mode)	Minimum: 10 SPS Maximum: 3 kSPS per axis (one axis enabled) 1.5 kSPS per axis (2-axis enabled) 1 kSPS per axis (3-axis enabled)
Programmable Cut-off frequency (Anti-aliasing filter)	1– 2000 Hz
Power Mode	Battery saver mode & Active power mode

	RF Specifications
Wireless Technology	Ultra-Low-Power and license-free 2.4Ghz radio technology (IEEE 802.15.4E)
WSN Topology	Point-to-Point / Star
Data rate	250 Kbits/s
RF Characteristics	ISM 2.4GHz – 16 Channels. Antenna diversity designed by Beanair®
TX Power	+18 dBm
Receiver Sensitivity	-104dBm
Maximum Radio Range	500 m in Line-Of-Sight 30-100 m in Non-Line-of-Sight
Antenna	Omnidirectional radome antenna with antenna diversity Gain : 3 dBi Waterproof IP67

	Embedded Data logger
Storage capacity	up to 1 million data points
Wireless data downloading	3 minutes to download the full memory (average time)

TimeSync function : Clock synchronization over the Wireless IOT Sensor		
Clock synchronization accuracy	±2.5 ms (at 25°C)	
Crystal specifications	Tolerance ±10ppm, stability ±10ppm	

	Environmental and Mechanical
	Aluminum AL6061 & Waterpoof casing
Casing	Dimensions in mm (LxWxH): 100x55x36 mm Weight : 155g

IP NEMA Rating	IP67 Nema 6
Shock resistance	100g during 50 ms
Operating Temperature	-40 °C to +60 °C
Norms & Radio certifications	 CE Labelling Directive R&TTE (Radio) ETSI EN 300 328 FCC (North America) ARIB STD-T66 Ver 3.6 ROHS - Directive 2002/95/EC

	Power supply
Integrated battery charger	 Integrated Lithium-ion battery charger with high precision battery monitoring : Overvoltage/Overcurrent/Short-Circuit/Undervoltage protection Battery Temperature monitoring
Current consumption @ 3,3V	 During data acquisition : 20 to 30 mA During Radio transmission : 70 mA @ 18 dBm During Battery Saver Mode : < 30 μA
External power supply	8-28VDC with reverse polarity protection
Rechargeable Lithium-Polymer battery	Capacity 1.25 Ah

Included accessories
1x Magnet to Power ON/Power OFF the device 1x M8 Cap for Power Supply

	Optional Accessories and Services
External Power Supply	Wall plug-in, Switchmode power Supply 12V @ 1,25A with sealed M8 Plug (IP67/Nema 6) Ref: M8-PWR-12V
M8 extension cable for external power supply	Molded cable with M8-3pins male plug Material: PVC with shield protection IP Rating : IP67 Nema 6 Cable length: 2 meters , Ref: CBL-M8-2M Cable length : 5 meters, Ref: CBL-M8-5M Cable length: 10 meters, Ref: CBL-M8-10M
Calibration certificate	Calibration certificate provided by Beanair GmbH A static calibration method is used on a granite surface plate DIN876 Ref: CERT-CAL-SMART

6.9.2 BeanDevice[®] AX-3D-SR

Product reference

BND-2.4GHZ-AX-3D-SR-MR-PS-MO

MR– Measurement Range:

1.2T: tri-axis Low noise vibration sensor ±1.2g/±2.4g

PS - Power supply:

RB: Internal rechargeable battery

MO - Mounting Option

SCM - Screw Mounting Lid MM - Magnetic Mounting Lid

Example 1: BND-2.4GHZ-AX-3D-SR-1.2T-RB-SCM, Low Noise wireless Vibration sensor with ±1.2G/±2.4G measurement range, internal rechargeable battery, Screw mounting **Example 2:** BND-2.4GHZ-AX-3D-SR-1.2T-RB-MM, Low Noise wireless Vibration sensor with ±1.2G/±2.4G measurement range, internal rechargeable battery, Magnetic Mounting

	Accelerometer sensor
Inclinometer Technology	Accurate and low power MEMS technology
Scalable Measuring Range	user-seletctable range ± 1.2 g or ± 2.4 g, with automatic range adjustment depending on the application
Sensor resolution	0.17mg
Noise density	20 μg/VHz for ±1.2G measurement range 32 μg/VHz for ±2.4G measurement range
Sensor precision (full scale, @ 25°C @1HZ sampling rate)	±1mg for ±1.2G measurement range ±2mg for ±2.4G measurement range
Sensitivity temperature dependency (temperature range –25°C to +85°C)	±0.3 %
Offset LifeTime Drift (@25°C)	±4mg
Sensor frequency Response (-3 dB)	DC to 40 Hz for ±1.2g measurement range DC to 70 Hz for ±1.2g measurement range

	Integrated Temperature sensor
Temperature Range	-40°C to +75°C
Measurement resolution	±0.06°C
Sensor Precision	±1°C

	Configurable settings from the BeanScape [®] 2.4GHz software
Data Acquisition mode (SPS = sample per second)	Static Data Acquisition: Low Duty Cycle Data Acquisition (LDCDA) and Alarm Mode (based on alarm thresholds). Measurement heartbeat 1s to 24 hour
	Dynamic data acquisition (not available on devices with ref. extension XT): Streaming and S.E.T. (Streaming with Event Trigger) Mode
Sampling Rate (in streaming and S.E.T. mode)	Minimum: 10 SPS
	Maximum: 20 SPS on each axis, for ±1.2g measurement range (Static and Auto Range), for ±2.4g measurement range (Auto Range), Maximum: 800 SPS on each axis, for ±2.4g measurement range (Static Range)
Alarm Threshold	Three-level alarms: Alert < Action < Alarm
Scalable Mesurement Range	±1.2g, ±2.4g and automatic ±1.2g/±2.4g
Power Mode	Battery saver mode & Active power mode (Active Power Mode is not available on -XT version)

	RF Specifications
Wireless Protocol Stack	Ultra-Low-Power and license-free 2.4Ghz radio technology (IEEE 802.15.4E)
WSN Topology	Point-to-Point / Star
Data rate	250 Kbits/s
RF Characteristics	ISM 2.4GHz – 16 Channels. Antenna diversity designed by Beanair®
TX Power	+18 dBm
Receiver Sensitivity	-104dBm
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Maximum Radio Range	500 m in Line-Of-Sight 30-100 m in Non-Line-of-Sight
Antenna	Omnidirectional random antenna with antenna diversity Gain: 3 dBi Waterproof IP67

	Embedded data logger
Storage capacity	up to 8 million data points
Wireless data downloading	20 minutes to download the full memory (average time)

TimeSync function : Clock synchronization over the Wireless IOT Sensor	
Clock synchronization accuracy	±2.5 ms (at 25°C)
Crystal specifications	Tolerance ±10ppm, stability ±10ppm

	Environmental and Mechanical
	Aluminum AL6061 & Waterpoof casing
Casing	 Dimensions in mm (LxWxH): 100 x 71 x 38 (without Radome antennas, with mounting eyelet) Weight (with internal battery) : 225g (screw mounting) 252g (magnetic mounting)
IP NEMA Rating	IP67 Nema 6
Base plate	 Aluminum black anodized AL 7075 with rugged three-point-mounting Screw Mounting Option: the device should be mounted on a flat and smooth surface with 3 screws, dimension M5. Mounting torque 5 ±1Nm Magnetic Mounting Option: the device should be mounted on a steel surface.
Shock resistance	150g during 50 ms

Operating Temperature	RB : Internal rechargeable battery -40°C to +60°C XT : External Power Supply -40°C to +75°C during battery discharge
Norms & Radio certifications	 CE Labelling Directive R&TTE (Radio) ETSI EN 300 328 FCC (North America) ARIB STD-T66 Ver 3.6
	ROHS - Directive 2002/95/EC

	Power supply
Integrated battery charger	Integrated Lithium-ion battery charger with high precision battery monitoring:
	· Overvoltage/Overcurrent/Short-Circuit/Undervoltage protection
	· Battery Temperature monitoring
Current consumption @3,3V	· During data acquisition: 30 to 40 mA
	· During Radio transmission: 55 mA @ 18 dBm
	· During Battery Saver Mode: < 30 μA
External power supply	8-28VDC with reverse polarity protection IEC-61000-4-2: ESD 30kV (Air), 30kV (Contact) Surge protection > 28VDC (600W during 10us max)
Rechargeable battery	2 Ah, Lithium-Polymer battery

Included accessories
1x Magnet to Power ON/Power OFF the device 1x M8 Cap for Power Supply

	Optional Accessories and Services
External Power Supply	Wall plug-in, Switchmode power Supply 12V @ 1,25A with sealed M8 Plug (IP67/Nema 6) Ref: M8-PWR-12V

Standalone Solar System	High efficiency solar panel with <u>with Solar charging controller and Lead-acid battery</u> Ref.: X-SOL-7AH-20W-4V-5M for XT version Ref: X-SOL-7AH-20W-12V-5M for RB version Ref: X-SOL-14AH-20W-4CH-4V-5M for XT version Ref: X-SOL-14AH-20W-4CH-12V-5M for RB version Ref: X-SOL-14AH-80W-4CH-4V-5M for XT version Ref: X-SOL-14AH-80W-4CH-12V-5M for RB version More options and references are available on X-SOLAR datasheet
Bracket Mounting	90° Bracket for BeanDevice (Xrange smartsensor) with 4 x M5 screws + Locknut Ref: SMART-BRACK-MNT
M8 extension cable for external power supply	Molded cable with M8-3pins male plug Material: PVC with shield protection IP Rating : IP67 Nema 6 Cable length: 2 meters , Ref: CBL-M8-2M Cable length : 5 meters, Ref: CBL-M8-5M Cable length: 10 meters, Ref: CBL-M8-10M
Calibration certificate	Calibration certificate provided by Beanair GmbH A static calibration method is used on a granite surface plate DIN876 Ref: CERT-CAL-SMART

6.9.3 BeanDevice[®] AX-3DS

Product reference BND-2.4GHZ-AX3DS -MR-RB-MO

MR – Measurement Range (1g = 9806.65 mm/s^2) 24G: ±6/12/24g measurement range

8G: ±2/4/8g measurement range

PS - Power supply :

RB : Rechargeable battery

MO - Mounting Option SCM - Screw Mounting Lid MM - Magnet Mounting Lid Leave it empty if there is no mounting option

Example 1: BND-2.4GHZ-AX3DS-24G-RB—Wireless Accelerometer with ±6/12/24g measurement range, rechargeable battery **Example 2**: BND-2.4GHZ-AX3DS-8G-RB-SCM—Wireless Accelerometer with ±2/4/8g measurement range, rechargeable battery, screw mounting option

	Sensor specifications
Accelerometer Technology	Low power MEMS technology
Scalable measurement range	24G Version :±6g / ±12g/ ±24g 8G Version :±2g / ±4g/ ±8g
Measurement resolution	24G Version: 3 mg/digit @±6g , 6 mg/digit @±12g , 12 mg/digit @±24g 8G Version: 1 mg/digit @±2g , 2 mg/digit @±4g , 3.9 mg/digit @±8g
Typical non-linearity (Full scale, @ 25°C)	±0,15% for the version BND-2.4GHZ-AX3DS-8G-RB ±0,19% for the version BND-2.4GHZ-AX3DS-24G-RB
Sensitivity change Vs temperature	±0,01% /°C
Zero-g level change vs temperature (max delta from	24G Version:±0,4 mg/°C
25°C)	8G Version: ±0,1 mg/°C
Turing and a lovel offert any many	24G Version: ±70 mg
l ypical zero-g level offset accuracy	8G Version: ±20 mg
Analog to Digital converter	12-bit with temperature compensation
Noise spectral density @ BW 10Hz	24G Version: 650 μg/VHz
Noise spectral density @ BW 10H2	8G Version: 218 μg/ VHz
Anti-aliasing filter	Butterworth 2th order filter

	Configurable settings from the BeanScape [®] 2.4GHz software
Data Acquisition mode (SPS = sample per second)	Dynamic data acquisition: Streaming and SSD (Smart Shock Detection)
Shock detection function	 Shock threshold in mg Data acquisition sample rate in sleeping mode Data acquisition sample rate after the shock detection Shock detection hysteresis
Sampling Rate (in streaming mode)	Minimum: 1 SPS Maximum: 3 kSPS per axis (one axis enabled) 1.5 kSPS per axis (2-axis enabled) 1 kSPS per axis (3-axis enabled)
Power Mode	Battery saver mode & Active power mode

	RF Specifications
Wireless Technology	Ultra-Low-Power and license-free 2.4Ghz radio technology (IEEE 802.15.4E)
WSN Topology	Point-to-Point / Star
Data rate	250 Kbits/s
RF Characteristics	ISM 2.4GHz – 16 Channels. Antenna diversity designed by Beanair®
TX Power	+18 dBm
Receiver Sensitivity	-104dBm
Maximum Radio Range	500 m in Line-Of-Sight 30-100 m in Non-Line-of-Sight
Antenna	Omnidirectional radome antenna with antenna diversity Gain : 3 dBi Waterproof IP67

	Embedded Data logger
Storage capacity	up to 1 million data points
Wireless data downloading	3 minutes to download the full memory (average time)

	Environmental and Mechanical
	Aluminum AL6061 & Waterpoof casing
Casing	Dimensions in mm (LxWxH): 100x55x36 mm Weight : 155g
IP NEMA Rating	IP67 Nema 6
Shock resistance	100g during 50 ms

Operating Temperature	-40 °C to +60 °C
Norms	 CE Labelling Directive R&TTE (Radio) ETSI EN 300 328 FCC (North America) ARIB STD-T66 Ver 3.6

	Power Supply
Integrated battery charger	Integrated Lithium-ion battery charger with high precision battery monitoring :
	 Overvoltage/Overcurrent/Short-Circuit/Undervoltage protection
	Battery Temperature monitoring
Current consumption @3,3V	· During data acquisition : 20 to 30 mA
	· During Radio transmission : 60 mA @ 18 dBm
	· During sleeping mode: 68uA
	· During Battery Saver mode: 28 uA
External power supply	8-28VDC with reverse polarity protection
Rechargeable battery	Capacity 1.25 Ah

Included accessories
1x Magnet to Power ON/Power OFF the device 1x M8 Cap for Power Supply

	Optional Accessories and Services
External Power Supply	Wall plug-in, Switchmode power Supply 12V @ 1,25A with sealed M8 Plug (IP67/Nema 6) Ref: M8-PWR-12V
M8 extension cable for external power supply	Molded cable with M8-3pins male plug Material: PVC with shield protection IP Rating : IP67 Nema 6 Cable length: 2 meters , Ref: CBL-M8-2M Cable length : 5 meters, Ref: CBL-M8-5M Cable length: 10 meters, Ref: CBL-M8-10M
Calibration certificate	Calibration certificate provided by Beanair GmbH A static calibration method is used on a granite surface plate DIN876 Ref: CERT-CAL-SMART

6.9.4 BeanDevice® INC

Product reference

BND-2.4GHZ-INC-MR-PS

MR– Measurement Range:

30B : bi-axial ±30°

90B : bi-axial ±90°

PS - Power supply:

RB : Internal rechargeable battery

XT : External Power Supply

<u>Example 1</u>: BND-2.4GHZ-INC-30B-RB-wireless bi-axial inclinometer with ±30° measurement range, internal rechargeable battery

Example 2: BND-2.4GHZ-INC-90B-XT-wireless bi-axial inclinometer with ±90° measurement range, external primary cell

	Sensor specifications
Inclinometer Technology	Accurate and low power MEMS technology
Measurement resolution (Bandwidth 10 Hz)	0.0025°
Noise density	0.0008 °/√Hz
Measurement Repeatability (full scale, @ 25°C, Static Measurement Mode every 2s)	±0.04° for bi-axis ±30° version ±0.08° for bi-axis ±90° version
Offset temperature dependency	±0.008 °/°C
Sensitivity temperature dependency	±0.008 %/°C
Long term stability (@23°C)	< 0.014 °
Analog to Digital converter	16-bits, SAR architecture (Successive Approximation Register) with temperature compensation
Sensor frequency Response (-3 dB)	DC to 28 Hz
Noise spectral density DC to 100 Hz	0.0008 °/ √Hz
Anti-aliasing Hardware filter	Butterworth 5 th order filter – cut-off frequency : 1 Hz to 100 Hz remotely programmable (BeanScape [®])

	Configurable settings from the BeanScape [®] 2.4GHz software
Data Acquisition mode (SPS = sample per second)	Static Data Acquisition: Low Duty Cycle Data Acquisition (LDCDA) and Alarm Mode (based on alarm thresholds). Measurement heartbeat 1s to 24 hours Dynamic data acquisition (not available on devices with ref. extension XT): Streaming and S.E.T. (Streaming with Event Trigger) Mode
Sampling Rate (in streaming and S.E.T. mode)	Minimum: 1 SPS Maximum: 100 SPS on each axis
Alarm Threshold	Three-level alarms: Alert < Action < Alarm
Programmable cut-off frequency (Anti-aliasing filter)	1– 100 Hz
Power Mode	Battery saver mode & Active power mode (not available on XT version, External power supply)

	RF Specifications
Wireless Protocol Stack	Ultra-Low-Power and license-free 2.4Ghz radio technology (IEEE 802.15.4E)
WSN Topology	Point-to-Point / Star
Data rate	250 Kbits/s
RF Characteristics	ISM 2.4GHz – 16 Channels. Antenna diversity designed by Beanair®
TX Power	+18 dBm
Receiver Sensitivity	-104dBm
Maximum Radio Range	500 m in Line-Of-Sight 30-100 m in Non-Line-of-Sight
Antenna	Omnidirectional random antenna with antenna diversity Gain : 3 dBi Waterproof IP67

	Embedded Data logger
Storage capacity	up to 1 million data points
Wireless data downloading	3 minutes to download the full memory (average time)

TimeSync function : Clock synchronization over the Wireless IOT Sensor	
Clock synchronization accuracy	±2.5 ms (at 25°C)
Crystal specifications	Tolerance ±10ppm, stability ±10ppm

	Environmental and Mechanical
Casing	Aluminum AL6061 & Waterpoof casing Dimensions in mm (LxWxH): 100x55x36 mm Weight : 155g
IP NEMA Rating	IP67 Nema 6
Shock resistance	100g during 50 ms
Operating Temperature	RB : Internal rechargeable battery -40 °C to +60 °C XT : External Power Supply -40 °C to +75 °C during battery discharge
Norms & Radio certifications	 CE Labelling Directive R&TTE (Radio) ETSI EN 300 328 FCC (North America) ARIB STD-T66 Ver 3.6 ROHS - Directive 2002/95/EC

	Power supply
Integrated battery charger	Integrated Lithium-ion battery charger with high precision battery monitoring :
	· Overvoltage/Overcurrent/Short-Circuit/Undervoltage protection
	Battery Temperature monitoring
Current consumption @3,3V	· During data acquisition : 30 to 40 mA
	· During Radio transmission : 80 mA @ 18 dBm
	· During Battery Saver Mode : < 38 μA
External power supply	8-28VDC with reverse polarity protection
Rechargeable battery	High density Lithium-Ion rechargeable battery with a capacity of 950 mAh

Included accessories
1x Magnet to Power ON/Power OFF the device 1x M8 Cap for Power Supply

	Optional Accessories and Services
External Power Supply	Wall plug-in, Switchmode power Supply 12V @ 1,25A with sealed M8 Plug (IP67/Nema 6) Ref: M8-PWR-12V

Solar Panel Kit (compatible with External Power Supply version only)	High efficiency solar panel with with Solar charging controller and Lead-acid battery Ref: X-SOL-5W-M8-2M
External Primary Cell in a Waterproof IP67 Casing	Waterproof IP67 battery box for long-term monitoring applications IP67 Battery Holder Battery Pack with 3 x C size primary cell, Li-SOCL2 Lithium Primary cell 3.6VDC Type Ref: PRIM-XTENDER
M8 extension cable for external power supply	Molded cable with M8-3pins male plug Material: PVC with shield protection IP Rating : IP67 Nema 6 Cable length: 2 meters , Ref: CBL-M8-2M Cable length : 5 meters, Ref: CBL-M8-5M Cable length: 10 meters, Ref: CBL-M8-10M
Calibration certificate	Calibration certificate provided by Beanair GmbH A static calibration method is used on a granite surface plate DIN876 Ref: CERT-CAL-SMART

6.9.5 BeanDevice[®] HI-INC

Product reference	
BND-2.4GHZ-HI-INC- <i>MR-PS</i>	
MR– Measurement Range: 30B : bi-axis ±30°	PS - Power supply : RB : Internal rechargeable battery XT : External power supply

<u>Example 1</u>: BND-2.4GHZ-HI-INC-30B-RB-wireless bi-axial inclinometer with ±30° measurement range, internal rechargeable battery

Example 2: BND-2.4GHZ-HI-INC-30B-XT-wireless bi-axial inclinometer with ±30° measurement range, external primary cell

	Sensor specifications
Inclinometer Technology	Accurate and low power MEMS technology
Measurement resolution (Bandwidth 10 Hz)	0.001°
Noise density	0.0004 °/√Hz
Measurement Repeatability (full scale, @ 25°C, Static Measurement Mode every 2s)	±0.006°
Offset temperature dependency	±0.002 °/°C
Sensitivity temperature dependency	±0.005 %/°C
Long term stability (@23°C)	< 0.004 °
Analog to Digital converter	16-bits, SAR architecture (Successive Approximation Register) with temperature compensation
Sensor frequency Response (-3 dB)	DC to 28 Hz
Noise spectral density DC to 100 Hz	0.0004 °/ √Hz
Anti-aliasing Hardware filter	Butterworth 5 th order filter – cut-off frequency : 1 Hz to 100 Hz remotely programmable (BeanScape [®])

	Configurable settings from the BeanScape [®] 2.4GHz software
Data Acquisition mode (SPS = sample per second)	Static Data Acquisition: Low Duty Cycle Data Acquisition (LDCDA) and Alarm Mode (based on alarm thresholds) . Measurement heartbeat 1s to 24 hour
	Dynamic data acquisition(not available on devices with ref. extension XT): Streaming and S.E.T. (Streaming with Event Trigger) Mode
Sampling Rate (in streaming and	Minimum: 1 SPS
S.E.T. mode)	Maximum: 100 SPS on each axis
Alarm Threshold	Three-level alarms : Alert < Action < Alarm
Programmable cut-off frequency (Anti-aliasing filter)	1– 100 Hz
Power Mode	Battery saver mode & Active power mode (not available on XT version, External power supply)

	RF Specifications
Wireless Protocol Stack	Ultra-Low-Power and license-free 2.4Ghz radio technology (IEEE 802.15.4E)
WSN Topology	Point-to-Point / Star
Data rate	250 Kbits/s
RF Characteristics	ISM 2.4GHz – 16 Channels. Antenna diversity designed by Beanair®
TX Power	+18 dBm
Receiver Sensitivity	-104dBm
Maximum Radio Range	500 m in Line-Of-Sight 30-100 m in Non-Line-of-Sight
Antenna	Omnidirectional radome antenna with antenna diversity Gain : 3 dBi Waterproof IP67

	Embedded Data logger
Storage capacity	up to 1 million data points
Wireless data downloading	3 minutes to download the full memory (average time)

TimeSync function : Clock synchronization over the Wireless IOT Sensor	
Clock synchronization accuracy	±2.5 ms (at 25°C)
Crystal specifications	Tolerance ±10ppm, stability ±10ppm

	Environmental and Mechanical
	Aluminum AL6061 & Waterpoof casing
Casing	Dimensions in mm (LxWxH): 100x55x36 mm Weight : 155g
IP NEMA Rating	IP67 Nema 6
Shock resistance	100g during 50 ms
Operating Temperature	RB : Internal rechargeable battery -40 °C to +60 °C XT : External Power Supply -40 °C to +75 °C during battery discharge
Norms & Radio certifications	 CE Labelling Directive R&TTE (Radio) ETSI EN 300 328 FCC (North America) ARIB STD-T66 Ver 3.6 ROHS - Directive 2002/95/EC

	Power supply
Integrated battery charger	Integrated Lithium-ion battery charger with high precision battery monitoring :
	· Overvoltage/Overcurrent/Short-Circuit/Undervoltage protection
	Battery Temperature monitoring
Current consumption @3,3V	• During data acquisition : 30 to 40 mA
	· During Radio transmission : 80 mA @ 18 dBm
	· During Battery Saver Mode : < 38 μA
External power supply	8-28VDC with reverse polarity protection
Rechargeable battery	High density Lithium-Ion rechargeable battery with a capacity of 950 mAh

Included accessories
1x Magnet to Power ON/Power OFF the device 1x M8 Cap for Power Supply

	Optional Accessories and Services
External Power Supply	Wall plug-in, Switchmode power Supply 12V @ 1,25A with sealed M8 Plug (IP67/Nema 6) Ref: M8-PWR-12V

Solar Panel Kit (compatible with External Power Supply version only)	High efficiency solar panel with with Solar charging controller and Lead-acid battery Ref: X-SOL-5W-M8-2M
External Primary Cell in a Waterproof IP67 Casing	Waterproof IP67 battery box for long-term monitoring applications IP67 Battery Holder Battery Pack with 3 x C size primary cell, Li-SOCL2 Lithium Primary cell 3.6VDC Type Ref: PRIM-XTENDER
M8 extension cable for external power supply	Molded cable with M8-3pins male plug Material: PVC with shield protection IP Rating : IP67 Nema 6 Cable length: 2 meters , Ref: CBL-M8-2M Cable length : 5 meters, Ref: CBL-M8-5M Cable length: 10 meters, Ref: CBL-M8-10M
Calibration certificate	Calibration certificate provided by Beanair GmbH A static calibration method is used on a granite surface plate DIN876 Ref: CERT-CAL-SMART

6.9.6 BeanDevice® HI-INC-SR

Product reference

BND-2.4GHZ-HI-INC-SR-MR-PS-MO

MR- Measurement Range: 10T :tri-axis ±10°/±90°

PS - Power supply :

RB : Internal rechargeable battery

XT : External power supply 4VDC (Compatible with X-SOLAR-4VDC and External Primary Cell)

MO - Mounting Option

SCM - Screw Mounting Lid

MM - Magnetic Mounting Lid

Example 1: BND-2.4GHZ-HI-INC-SR-10T-SCM, High performance wireless Tri-axis inclinometer with ±10°/±90° measurement range, internal rechargeable battery, Screw mounting **Example 2:** BND-2.4GHZ-HI-INC-SR-10T-XT-MM, High performance wireless Tri-axis inclinometer with ±10°/±90° measurement range, external power supply, Magnetic Mounting

	Inclinometer sensor
Inclinometer Technology	Accurate and low power MEMS technology
Scalable Measuring Range	±10° or ±90°, with automatic range adjustment depending on the application
Sensor resolution	0.0055°
Noise density	for ±10° range: 0.0009 °/VHz on Y Axis, 0.0012 °/VHz on X, Z Axis for ±90° range: 0.0018 °/VHz on all axis
Sensor precision (full scale, @ 25°C, Static Measurement Mode every 2s)	±0.01° for ±10° measurement range ±0.02° for ±90° measurement range
Offset temperature dependency (temperature range −25°C to +85°C)	±0.002 °/°C
Sensitivity temperature dependency (temperature range –25°C to +85°C)	±0.3 %
Offset LifeTime Drift (@25°C)	±0.23 °
Sensor frequency Response (-3 dB)	DC to 10 Hz for ±10° measurement range DC to 40 Hz for ±90° measurement range (Automatic Range) DC to 70 Hz for ±90° measurement range

	Integrated Temperature sensor
Temperature Range	-40°C to +75°C
Measurement resolution	±0.06°C
Sensor Precision	±1°C

	Configurable settings from the BeanScape [®] 2.4GHz software
Data Acquisition mode (SPS = sample per second)	Static Data Acquisition: Low Duty Cycle Data Acquisition (LDCDA) and Alarm Mode (based on alarm thresholds) . Measurement heartbeat 1s to 24 hour
	Dynamic data acquisition(not available on devices with ref. extension XT): Streaming and S.E.T. (Streaming with Event Trigger) Mode
Sampling Rate (in streaming and S.E.T. mode)	Minimum: 1 SPS
	Maximum: 20 SPS on each axis , for $\pm 10^\circ$ measurement range Maximum: 80 SPS on each axis , for $\pm 90^\circ$ measurement range
Alarm Threshold	Three-level alarms : Alert < Action < Alarm
Scalable Mesurement Range	±10°, ±90° and automatic ±10°/±90°
Power Mode	Battery saver mode & Active power mode (Active Power Mode is not available on -XT version)

	RF Specifications
Wireless Protocol Stack	Ultra-Low-Power and license-free 2.4Ghz radio technology (IEEE 802.15.4E)
WSN Topology	Point-to-Point / Star
Data rate	250 Kbits/s
RF Characteristics	ISM 2.4GHz – 16 Channels. Antenna diversity designed by Beanair®
TX Power	+18 dBm
Receiver Sensitivity	-104dBm
Maximum Radio Range	500 m in Line-Of-Sight 30-100 m in Non-Line-of-Sight
Antenna	Omnidirectional radome antenna with antenna diversity Gain : 3 dBi Waterproof IP67

2.4GHz wireless sensors

	Embedded data logger
Storage capacity	up to 8 millions data points
Wireless data downloading	20 minutes to download the full memory (average time)

TimeSync function : Clock synchronization over the Wireless IOT Sensor	
Clock synchronization accuracy	±2.5 ms (at 25°C)
Crystal specifications	Tolerance ±10ppm, stability ±10ppm

	Environmental and Mechanical
	Aluminum AL6061 & Waterpoof casing
Casing	 Differsions in min (LXWXR): 100 x 71 x 38 (without Radome antennas, with mounting eyelet) Weight (with internal battery) : 225g (screw mounting) 252g (magnetic mounting)
IP NEMA Rating	IP67 Nema 6
Base plate	 Aluminum black anodized AL 7075 with rugged three-point-mounting Screw Mounting Option: the device should be mounted on a flat and smooth surface with 3 screws, dimension M5. Mounting torque 5 ±1Nm Magnetic Mounting Option: the device should be mounted on a steel surface.
Shock resistance	150g during 50 ms
Operating Temperature	RB : Internal rechargeable battery -40°C to +60°C XT : External Power Supply -40°C to +75°C during battery discharge
Norms & Radio certifications	 CE Labelling Directive R&TTE (Radio) ETSI EN 300 328 FCC (North America) ARIB STD-T66 Ver 3.6
	ROHS - Directive 2002/95/EC

	Power supply
Integrated battery charger	Integrated Lithium-ion battery charger with high precision battery monitoring:
	 Overvoltage/Overcurrent/Short-Circuit/Undervoltage protection
	· Battery Temperature monitoring
Current consumption @3,3V	 During data acquisition : 30 to 40 mA During Radio transmission : 55 mA @ 18 dBm
	· During Battery Saver Mode : < 30 μA
External power supply	8-28VDC with reverse polarity protection IEC-61000-4-2: ESD 30kV(Air), 30kV (Contact) Surge protection > 28VDC (600W during 10us max)
Rechargeable battery	2.2 Ah, Lithium-Polymer battery

Included accessories
1x Magnet to Power ON/Power OFF the device 1x M8 Cap for Power Supply

	Optional Accessories and Services
External Power Supply	Wall plug-in, Switchmode power Supply 12V @ 1,25A with sealed M8 Plug (IP67/Nema 6) Ref: M8-PWR-12V
Solar Panel Kit	High efficiency solar panel with <u>Solar charging controller and Lead-acid battery</u> Ref.: X-SOL-7AH-20W-1CH-4V-5M for XT version Ref: X-SOL-7AH-20W-1CH-12V-5M for RB version Ref: X-SOL-14AH-20W-4CH-4V-5M for XT version Ref: X-SOL-14AH-20W-4CH-12V-5M for RB version Ref: X-SOL-14AH-80W-4CH-4V-5M for XT version Ref: X-SOL-14AH-80W-4CH-12V-5M for RB version
Bracket Mounting	90° Bracket for BeanDevice (Xrange smartsensor) with 4 x M5 screws + Locknut Ref: SMART-BRACK-MNT

External Primary Cell in a Waterproof IP67 Casing	Waterproof IP67 battery box for long-term monitoring applications IP67 Battery Holder + Battery Pack with 3 x 6500mAh Li-SOCL2 Lithium Primary cell (Capacity 3x 6.5Ah) Ref: PRIM-XTENDER Compatible with : BND-2.4GHZ-HI-INC-SR-10T- XT -MM & BND-2.4GHZ-HI-INC-SR-10T- XT -SCM
M8 extension cable for external power supply	Molded cable with M8-3pins male plug Material: PVC with shield protection IP Rating: IP67 Nema 6 Cable length: 2 meters, Ref: CBL-M8-2M Cable length: 5 meters, Ref: CBL-M8-5M Cable length: 10 meters, Ref: CBL-M8-10M
Calibration certificate	Calibration certificate provided by Beanair GmbH A static calibration method is used on a granite surface plate DIN876 Ref: CERT-CAL-SMART

6.9.7 BeanDevice[®] AX-3D XRange

Product reference

BND-2.4GHZ-AX-3D-MR-XR-PS-MO

MR – Measurement Range (1g = 9806.65 mm/s^2)

2:±2g measurement range

10 :±10gmeasurement range

PS - Power Supply

RB: Built-in rechargeable Lithium-Polymer battery 2Ah

MO - Mounting Option

SCM - Screw Mounting Lid **MM** - Magnetic Mounting Lid

Example n°1: *BND-2.4GHZ-AX-3D-10G-XR-RB-SCM*, High performance wireless accelerometer with 10g measurement range, built-in rechargeable battery, screw mounting *Example n°2*: *BND-2.4GHZ-AX-3D-2G-XR-RB-MM*, High performance wireless accelerometer with 2g measurement range, built-in rechargeable battery, Magnet Mounting

	Accelerometer Specifications
Accelerometer technology	Accurate and low power MEMS technology
Sensitivity	±2g Version : 61 μg/digit ±10g version: 305 μg/digit
Typical non-linearity (Full scale, @ 25°C)	±0.1%
Analog to Digital converter	16-bit, SAR architecture (Successive Approximation Register) with temperature compensation
Sensor frequency response (-3 dB)	DC to 800 Hz
Noise spectral density	±2g Version : 45 μg/VHz ±10g version: 100 μg/VHz
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
Anti-aliasing Hardware filter	Butterworth 5th order filter – cut-off frequency : 1 Hz to 2000 Hz remotely programmable (BeanScape®)

	Configurable settings from the BeanScape [®] software
Data Acquisition mode (SPS = sample per second)	Static Data Acquisition: Low Duty Cycle Data Acquisition (LDCDA) Mode Measurement heartbeat 1s to 24 hour
	Dynamic data acquisition: Streaming and S.E.T. (Streaming with Event Trigger)
Sampling Rate (in streaming and S.E.T. mode)	Minimum: 10 SPS
	Maximum: 3 kSPS per axis (one axis enabled) 1,5 kSPS per axis (2-axis enabled) 1 kSPS per axis (3-axis enabled)
Sampling Rate	Minimum: 1 SPS
(in streaming mode with data logger only)	Maximum: 4 kSPS maximum per axis (one or two axis enabled) 3,5 kSPS per axis (3-axis enabled)
Programmable Cut-off frequency (Anti-aliasing filter)	1– 2000 Hz
Power Mode	Battery saver mode & Active power mode

	RF Specifications
Wireless Protocol Stack	Ultra-Low-Power and license-free 2.4Ghz radio technology (IEEE 802.15.4E)
WSN Topology	Point-to-Point / Star
Data rate	250 Kbits/s
RF Characteristics	ISM 2.4GHz – 16 Channels. Antenna diversity designed by Beanair®
TX Power	+18 dBm
Receiver Sensitivity	-104dBm
Maximum Radio Range	500 m in Line-Of-Sight 30-100 m in Non-Line-of-Sight
Antenna	Omnidirectional radome antenna with antenna diversity Gain : 3 dBi Waterproof IP67

2.4GHz wireless sensors

	Embedded data logger
Storage capacity	up to 8 millions data points
Wireless data downloading	20 minutes to download the full memory (average time)

TimeSync function : Clock synchronization over the Wireless IOT Sensor

Clock synchronization accuracy	±2.5 ms (at 25°C)
Crystal specifications	Tolerance ±10ppm, stability ±10ppm

	Environmental and Mechanical
Casing	 Aluminum AL6061 & Waterpoof casing Dimensions in mm (LxWxH): 100 x 71 x 38 (without Radome antennas, with mounting eyelet) Weight (with internal battery) : 225g (screw mounting) 252g (magnetic mounting)
IP NEMA Rating	IP67 Nema 6
Base plate	 Aluminum black anodized AL 7075 with rugged three-point-mounting Screw Mounting Option: the device should be mounted on a flat and smooth surface with 3 screws, dimension M5. Mounting torque 5 ±1Nm Magnetic Mounting Option: the device should be mounted on a steel surface.
Shock resistance	150g during 50 ms
Operating Temperature	-40 °C to +60 °C
Norms & Radio certifications	 CE Labelling Directive R&TTE (Radio) ETSI EN 300 328 FCC (North America) ARIB STD-T66 Ver 3.6
	ROHS - Directive 2002/95/EC

	Power supply
	Integrated Lithium-ion battery charger with high precision battery monitoring :
Integrated battery charger	 Overvoltage Protection, Overcurrent/Short-Circuit Protection, Undervoltage Protection
	Battery Temperature monitoring
	• During data acquisition : 20 to 30 mA
Current consumption @ 3,3V	· During Radio transmission : 40 mA @ 0dBm , 80 mA @ 18 dBm
	\cdot During Battery Saver Mode : < 30 μ A
External power supply	8-28VDC with reverse polarity protection
Rechargeable battery	High density Lithium-Ion rechargeable battery with a capacity of 2.2Ah with polyswitch protection

Included accessories
1x Magnet to Power ON/Power OFF the device 1x M8 Cap for Power Supply

	Optional Accessories and Services
External Power Supply	Wall plug-in, Switchmode power Supply 12V @ 1,25A with sealed M8 Plug (IP67/Nema 6) Ref: M8-PWR-12V
Bracket Mounting	90° Bracket for BeanDevice (Xrange smartsensor) with 4 x M5 screws + Locknut Ref: SMART-BRACK-MNT
M8 extension cable for external power supply	Molded cable with M8-3pins male plug Material: PVC with shield protection IP Rating : IP67 Nema 6 Cable length: 2 meters , Ref: CBL-M8-2M Cable length : 5 meters, Ref: CBL-M8-5M Cable length: 10 meters, Ref: CBL-M8-10M
Calibration certificate	Calibration certificate provided by Beanair GmbH A static calibration method is used on a granite surface plate DIN876 Ref: CERT-CAL-SMART

6.9.8 BeanDevice[®] HI-INC Xrange

Product reference

BND-2.4GHZ-HI-INC-MR-XR-PS-MO

MR- Measurement Range: 15B : bi-axis ±15° 30B : bi-axis ±30°

PS - Power supply : RB : Internal rechargeable battery

XT : External power supply

MO - Mounting Option SCM - Screw Mounting Lid MM - Magnetic Mounting Lid

Example 1: BND-2.4GHZ-HI-INC-15B-XR-RB-SCM, High performance wireless Bi-axis inclinometer with ±15° measurement range, internal rechargeable battery, Screw mounting **Example 2:** BND-2.4GHZ-HI-INC-30B-XR-XT-MM, High performance wireless Bi-axis inclinometer with ±30° measurement range, external power supply, Magnet Mounting

	Sensor specifications	
Inclinometer Technology	Accurate and low power MEMS technology	
Measurement resolution (Bandwidth 10 Hz)	0.001°	
Noise density	0.0004 °/√Hz	
Measurement Repeatability (full scale, @ 25°C, Static Measurement Mode every 2s)	±0.005° for bi-axis ±15° version ±0.006° for bi-axis ±15° version	
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	16-bits, SAR architecture (Successive Approximation Register) with temperature compensation	
Sensor frequency Response (-3 dB)	DC to 28 Hz	
Noise spectral density DC to 100 Hz	0.0004 °/ √Hz	

Anti-aliasing Hardware filter	Butterworth 5 th order filter – cut-off frequency : 1 Hz to 100 Hz remotely programmable (BeanScape®)	
-		
	Configurable settings from the BeanScape [®] 2.4GHz software	
Data Acquisition mode (SPS = sample per second)	Static Data Acquisition: Low Duty Cycle Data Acquisition (LDCDA) and Alarm Mode (based on alarm thresholds) . Measurement heartbeat 1s to 24 hour	
	Dynamic data acquisition(not available on devices with ref. extension XT): Streaming and S.E.T. (Streaming with Event Trigger) Mode	
Sampling Rate (in streaming and	Minimum: 1 SPS	
S.E.T. mode)	Maximum: 100 SPS on each axis	
Alarm Threshold	Three-level alarms : Alert < Action < Alarm	
Programmable cut-off frequency (Anti-aliasing filter)	1– 100 Hz	
Power Mode	Battery saver mode & Active power mode (Active Power Mode is not available on -XT version)	

	RF Specifications	
Wireless Protocol Stack	Ultra-Low-Power and license-free 2.4Ghz radio technology (IEEE 802.15.4E)	
WSN Topology	Point-to-Point / Star	
Data rate	250 Kbits/s	
RF Characteristics	ISM 2.4GHz – 16 Channels. Antenna diversity designed by Beanair®	
TX Power	+18 dBm	
Receiver Sensitivity	-104dBm	
Maximum Radio Range	500 m in Line-Of-Sight 30-100 m in Non-Line-of-Sight	
Antenna	Omnidirectional radome antenna with antenna diversity Gain : 3 dBi Waterproof IP67	

	Embedded data logger	
Storage capacity	up to 8 millions data points	
Wireless data downloading	20 minutes to download the full memory (average time)	

TimeSync function : Clock synchronization over the Wireless IOT Sensor		
Clock synchronization accuracy	±2.5 ms (at 25°C)	
Crystal specifications	Tolerance ±10ppm, stability ±10ppm	

	Environmental and Mechanical	
Casing	 Aluminum AL6061 & Waterpoof casing Dimensions in mm (LxWxH): 100 x 71 x 38 (without Radome antennas, with mounting eyelet) Weight (with internal battery) : 225g (screw mounting) 252g (magnetic mounting) 	
IP NEMA Rating	IP67 Nema 6	
Base plate	 Aluminum black anodized AL 7075 with rugged three-point-mounting Screw Mounting Option: the device should be mounted on a flat and smooth surface with 3 screws, dimension M5. Mounting torque 5 ±1Nm Magnetic Mounting Option: the device should be mounted on a steel surface. 	
Shock resistance	150g during 50 ms	
Operating Temperature	RB : Internal rechargeable battery -40°C to +60°C XT : External Power Supply -40°C to +75°C during battery discharge	
Norms & Radio certifications	 CE Labelling Directive R&TTE (Radio) ETSI EN 300 328 FCC (North America) ARIB STD-T66 Ver 3.6 	
	ROHS - Directive 2002/95/EC	

	Power supply	
	Integrated Lithium-ion battery charger with high precision battery monitoring :	
Integrated battery charger	· Overvoltage/Overcurrent/Short-Circuit/Undervoltage protection	
	Battery Temperature monitoring	
	· During data acquisition : 30 to 40 mA	
Current consumption @3,3V	· During Radio transmission : 80 mA @ 18 dBm	
	\cdot During Battery Saver Mode : < 30 μ A	
External power supply	8-28VDC with reverse polarity protection	
Rechargeable battery	High density Lithium-Ion rechargeable battery with a capacity of 2.2Ah with polyswitch protection	

Included	accessories

2.4GHz wireless sensors

1x Magnet to Power ON/Power OFF the device 1x M8 Cap for Power Supply

	Optional Accessories and Services		
External Power Supply	Wall plug-in, Switchmode power Supply 12V @ 1,25A with sealed M8 Plug (IP67/Nema 6) Ref: M8-PWR-12V		
Solar Panel Kit (compatible with External Power Supply version only)	High efficiency solar panel with with Solar charging controller and Lead-acid battery Ref: X-SOL-5W-M8-2M		
Bracket Mounting	90° Bracket for BeanDevice (Xrange smartsensor) with 4 x M5 screws + Locknut Ref: SMART-BRACK-MNT		
External Primary Cell in a Waterproof IP67 Casing	Waterproof IP67 battery box for long-term monitoring applications IP67 Battery Holder Battery Pack with 3 x C size primary cell, Li-SOCL2 Lithium Primary cell 3.6VDC Type Ref: PRIM-XTENDER		
M8 extension cable for external power supply	Molded cable with M8-3pins male plug Material: PVC with shield protection IP Rating : IP67 Nema 6 Cable length: 2 meters , Ref: CBL-M8-2M Cable length : 5 meters, Ref: CBL-M8-5M Cable length: 10 meters, Ref: CBL-M8-10M		
Calibration certificate	Calibration certificate provided by Beanair GmbH A static calibration method is used on a granite surface plate DIN876 Ref: CERT-CAL-SMART		

2.4GHz wireless sensors

6.10 PRODUCT FOCUS

6.10.1 Casing description





Power On



Network Reset
<u>Figure 2: Casing description</u>



Power Off

Number	Function	Description	
1	M8-3 Contacts Socket for power supply input	<i>DC 8-28 volts</i> power supply. The socket sealing is assured with a screw cap. <i>If you don't use the external power supply, don't forget to protect the M8-3 pins socket with a M8 protection cap.</i>	
2	Random antenna	Waterproof IP67 Radom antenna	
3	MAC ID Label	Unique identifier assigned to the BeanDevice® (64-bytes) Every wireless network product which is based on the IEEE 802.15.4 standard must have a 64-bit MAC address that allows unique identification of the device within a global network.	
4	BeanDevice [®] product version label	 Three label version are available: ✓ BeanDevice® AX-3D: measurement range and the three axis are indicated on the Label ✓ BeanDevice® HI-INC: measurement range and the three axis are indicated on the Label ✓ BeanDevice® AX-3DS: measurement range and the three axis are indicated on the Label ✓ BeanDevice® AX-3DS: measurement range and the three axis are indicated on the Label 	
5	Acceleration/inclination axis	Indicates acceleration/inclination on X/Y/Z axis	
6	" <i>Network</i> "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. Hold the magnet for approximately 2s Please read the following section for more information "click here" 	
7	"Network 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 (refer fig. 3) (V1R2 only).Hold the magnet for approximately 2s	

9

Battery charge indicator LEDThis bi-color GREEN / RED Led indicates battery charge status: Cf. table below for led description	arge status:
--	--------------

6.10.2 LEDs Description

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

6.10.3 Mechanical drawing for standard version

The BeanDevice® AX-3DS/AX-3D/HI-INC/INC products use the same sensor housing.

Enclosure Features

Material	Aluminum	
Protection	Protection IP67	
Dimensions	(L/l/h: 80x55x36 mm)	
Weight	155g battery included	

2.4GHz wireless sensors



Figure 3: Mechanical drawing - BeanDevice® AX-3D/HI-INC/INC

6.10.4 Mechanical drawing for Xrange version

The BeanDevice® AX-3D/HI-INC Xrange products use the same sensor housing.

Enclosure Features

Material	Aluminum	
Protection	IP67	
Dimensions	(L/l/h: 100x71x38 mm)	
Weight	225g battery included	

Table 1 : BeanDevice AX-3D/HI-INC/INC enclosure feature

6.10.5 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.



The diagram below provides information on the radome antenna performance:

Figure 4 : Radome antenna performances

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

6.10.6 Radome antenna

Electrical specifications	
Picture	
Center Frequency	2,45 GHz
Gain	3 dBi
Wavelength	¼ -wave
VSWR	<1.9 typ. at center
Impedance	50 Ω
Size	Diameter: 27mm
	Height: 11 mm

2.4GHz wireless sensors



Figure 5: Antenna position on the BeanDevice AX-3D



Never try to change the antenna integrated on the BeanDevice[®]. This action may void the product anty.

6.11 MOUNTING INSTRUCTIONS

6.11.1 Adhesive mounting instructions (BeanDevice[®] INC, HI-INC, AX-3D, AX-3DS)

Characteristics	SmartSensor	
Mounting techniques	Adhesive mounting	
Flatness	0,1 mm	
Surface Roughness	0,1 mm	
Surface treatment	Satin black textured polyester powder paint	
Material	AL 6061	

6.11.1.1 Components needed for a non-permanent mounting

Aluminum Foil Tape	Use an aluminum foil offering a good breaking load & water resistant for outdoor use. <i>Example</i> : Advance Tapes – Ref: 196074 - Thickness 0,09mm - Breaking load: 35 N/cm - Adhesion: 4 N/cm - Water resistant	
High strength Epoxy Glue	High Strength Epoxy Adhesive – Resin <i>Example</i> : Radio spares 159-3957	

6.11.1.2 Reference edge

The BeanDevice[®] has a mounting reference angle (red line) for an optimal mounting of the product, which is parallel to the Y-axis. This reference edge must be placed exactly parallel to the object to be measured to prevent or minimize any mechanical offset/cross sensitivity.



6.11.1.3 Mounting instructions for non-permanent mounting

For a non-permanent mounting we recommend to use the following process:

Step 1: Fix the aluminum foil tape on the back side of your BeanDevice[®] casing. Surface should be clean, dry and free from Grease.



Step 2: Mount the aluminum foil tape on the equipment where you wanted to mount the BeanDevice[®]. Surface should be clean, dry and free from Grease.



Step 3: Mix equal amount s of resin and hardener for 1 minute. Mixture should be used within 15-20 minutes. Apply the mixture on your BeanDevice[®]


Step 4: Clamp the two surface together until adhesive has cured (depending of the type of epoxy glue that you use, it can take 1 hour to 1 day). Your BeanDevice[®] is ready to be used for indoor and outdoor application.



Step 5: You can unmount the BeanDevice[®] very easily. Use a knife or a sharp object to unmount the BeanDevice[®]. Your BeanDevice[®] is clean and ready to be used on another application.



6.11.2 Screw Mounting (BeanDevice® AX-3D Xrange & BeanDevice® HI-INC Xrange)

Characteristics	SmartSensor Xrange
Mounting techniques	Screw mounting Three M5 drilled flanges
Flatness	38,1 μm
Surface Roughness	RA 1.6 (μm)
Surface treatment	Black anodized (Corrosion-proof)
Material	AL 7075 (twice harder than AL6061)



Figure 7: Xrange base plate overview

- ✓ 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 is secure 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.

6.11.3 Wireless inclinometer special instructions (BeanDevice® HI-INC, INC & HI-INC Xrange)

The BeanDevice[®] 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.

6.12 BEANDEVICE® 2.4GHZ POWER SUPPLY

6.12.1 Integrated Lithium-ion Rechargeable battery (Xtend version excluded)

The BeanDevice[®] 2.4GHz from SmartSensor product lines integrates a Lithium-Ion rechargeable battery (except XTend version):

BeanDevice® version	Battery Capacity @25°C	Nominal Voltage @25°C	Charge/Discharge cycle @25°C
BeanDevice [®] 2.4GHz AX-3D			
BeanDevice [®] 2.4GHz AX-3DS	2200 mAh		
BeanDevice [®] 2.4GHz HI-INC		4,2V	370
BeanDevice [®] 2.4GHz HI-INC-SR	2200 mAh		

The rechargeable battery can be used as an UPS (uninterruptible power supply) battery on your BeanDevice[®]. 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.

6.12.2 External Primary cell (Xtend version only)

The battery life can be increased by using an external primary cell with a capacity of 6500 mAh. The primary cell is integrated in a watertight (IP65) enclosure.



Figure 8: External Primary cell



6.12.2.1 Primary cell specifications

The Primary lithium-thionyl chloride cell (*Li-SoCl2*) provides the following features:

Primary Cell Capacity	Size	Nominal Voltage	Operating temperature range	Maximum recommended continuous current	Pulse Capability
6500 mAh	C-size spiral cell	3,6 V	- 55°C/+ 80°C	1.5A	2.5 A during 0.1s



A Primary Cell is not a rechargeable battery; do not try to recharge it. You will damage your primary cell and your BeanDevice®

We recommend you the following primary cell provider:

Provider	Model
SAFT	LSH14
Europa Batteries	
EVE	ER26500M
Able Battery	

6.12.2.2 Main advantages of primary cell

These are the main advantages of using a primary cell:

- ✓ The operating temperature of your BeanDevice[®] is extended: -55°C to +80°C instead of -20°C to +75°C;
- ✓ The self-discharge of a primary cell is **2%/year** instead of 12%/year for a rechargeable battery;
- ✓ The capacity of a primary cell is 6000 mAh instead of 1250 mAh,



Please read the following section for more information about the primary cell replacement and calibration: "<u>click here</u>"

6.12.3 How to change the Primary cell on the BeanDevice[®] (Xtend version only)

This section concerns the BeanDevice® provided with an external primary cell power supply.

All the BeanDevice[®] HI-INC/AX-3D/AX-3DS provided with an internal rechargeable battery are not concerned by this section.





Figure 9: Changing the External Primary cell

Step 2 : Change the primary Cell Change the primary cellCheck the battery polarity: pole + is on the screw cap side;



Figure 10: Changing the External Primary cell

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SmartSensor User Manual

•Close properly the screw cap

•Don't forget the Gasket, it's very important to maintain a watertight seal on your device

Do not invert the battery polarity, your BeanDevice® will not work.

Step 3 : Close the screw cap

 \bigcap



The primary cell is inverted

Figure 11: Changing the External Primary cell (wrong practice)

2.4GHz wireless sensors

Step 4: Connect your primary cell enclosure to your BeanDevice®



•Screw the M8 Plug on the M8 socket of your BeanDevice®

• Make sure that your M8 plug is correctly connected to your M8 socket, otherwise the sealing between the enclosures is not maintained;

Figure 12: Changing the External Primary cell (connecting the BeanDevice®)



<u>Example:</u> If your BeanDevice[®] is operating in "Sleeping" power mode. You should Power off then power on your BeanDevice[®], the new configuration parameter is loaded during the cold start of your BeanDevice[®].

For further information about Power mode management, please read the technical note <u>TN_RF_010 –</u> <u>« BeanDevice® Power Management »</u>



Beanair GmbH

6.12.4 AC-To-DC power adapter (option)

The BeanDevice[®] can also be powered by an AC-to-DC adapter *8-28Volts*. The power adapter can be used for recharging Lithium-Ion battery or to power supply continuously the BeanDevice[®].

A M8-3Pins standard plug is used for connecting the power adapter to the BeanDevice[®].

If battery charge is very low, connect the power adapter in order to recharge your internal battery.



Only the M8 plug is fully sealed, the power adapter is not sealed.

6.12.5 Power supply wiring code



Figure 15: M8 socket Power supply Wiring code

M8 Plug (A –Coding) - Pin Assignation





Interface Name	M8 Pin assignation	Wire Color (A-coding)
Power Supply 8-28VDC	PIN3	Blue
Power Supply 4VDC (available on Xtend version only)	PIN2	Black
Ground	PIN1	Brown

Figure 16: M8 Plug Power supply Wiring code

If a M8 plug with a molded cable is used, the wiring code comes as follow:

Pin Number	Description	Color code
PIN3	Pwr+ : Power supply 8-28VDC	Blue
PIN1	Ground	Brown
Table 2 : M8-3P Plug Wiring code		

If a M8 plug with a molded cable is used, the wiring code comes as follow:

Pin Number	Description	Color code
PIN3	Pwr+ : Power supply 8-28VDC	Blue
PIN2	PM_Primary cell power supply (4V Maximum)	Black
PIN1	Ground	Brown

Table 3 : M8-3P Plug Wiring code (Xtend version)

6.13 RESTORING FACTORY SETTINGS

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

		BeanDevice [®] version	
Parameter	AX-3D – standard and Xrange version	AX-3DS	HI-INC – Standard, Xrange & SR versions
Power Mode		Active	
Data Acquisition duty cycle	10s		
Acquisition duration time	ОК		
Sampling rate	ОК		
Data Acquisition mode	LowDutyCycle		
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.



7. BEANDEVICE® SUPERVISION FROM THE BEANSCAPE®

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

MaltLab MCR 64 bits download link

http://ssd.mathworks.com/supportfiles/downloads/R2015a/deployment_files/R2015a/installers/win64 /MCR_R2015a_win64_installer.exe

MaltLab MCR 32 bits download link

http://ssd.mathworks.com/supportfiles/downloads/R2015a/deployment_files/R2015a/installers/win32 /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. Click on the button « start »
- 3. All the BeanDevice® connected to the WSN will appear on your left window
- 4. Select the BeanDevice[®] you want to configure. You can configure your BeanDevice[®] and its attached sensors.

SmartSensor User Manual

Beanscape 2	4GHz		- a ×
File BeanSo	spe® App 10015 Advanced func. Off.Data Analysis Vie	integ integ integ integ	
	Started O	Identity Network Diagnostic System	
	MAC_ID: 0 × 00158D00000E0588 Gn_X Gn_Y	Mac Id: RMS000000000000000000000000000000000000	
	AC_ID : 0 × 00158D00000E0986	Pan Idi 301A Prover Supply Diagnostic Sensor Info	
		Nation Dag. Date: 12///CR2 0 53/43 MJ Mass. Range: 2/-2 9 Padform: A130 Internal Temp: 12//05 10//01 0.01 cfl finguency: 0.00 cfl fingu	
	- 01.V.2 - 01.V.3	Power supply: Wans Hund une 1022 Power mode: Bet Save Disabled	
	MAC_ID: 0 x 00158D00000E0C37 Ch_X	Soft was, VIRS Buttery Voltage: 4226 V	
2.5	G, Z MAC_ID : 0 x 00158D00000E1049 	Battery level: Cool	
		I I MAC_ID : 0 x 00158D00000E1049 ← BeanDevice Profile	
2		Ch_X Ch_Y Ch_Y Ch_Y Ch_Z Ch_Y Ch_Y	
		Bata Acq. mode: ML Label: MLC_10: 8 x 00550000000000400440	
		Data Aco, opcie: NA ddd.)th:mm:ss Log faider: Folder 1849	
.	Component List	Sampling nata : [VA.] (Hz) Data keg, duration : [VA.] ddd Jhhmm.st Valdate Valdate	
	Sort - Access to different sites		
	Ste : 0 x 391A		

Figure 18: BeanDevice® display on BeanScape®

The user interface is organized as follow:

White on blue background is displaying information

Mac Id: 00158D00000E06BB

Black on white background and white on blue background are customizable field;



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

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

Beanscape 2	IGHz	w Malo
Plie Beansca	Server	BeanDevice system profile
	Started O	Identity Network Diagnostic System
	AC_ID : 0 x 00158D00000E068B	Mac Id: 00155000000E1049 Network quality:0[[]] (0) Diagnostic cycle: 00-01-00 Nh:mm:ss
		Site ID: MAC_ID: @ x @01550000000E0 PER: 3.92 % Listening cycle: @0-00-01 hh.mm:ss
	AC_ID : 0 x 00158D00000E0986	Pan Id: 391A Power Supply Diagnostic Sensor Info
^		Net 18: 0001 Dag. Date: 12/9/28/28 18:27:83 AM Meas.Range: -2/-2 g
	Ch_V_0	Internal Temp.: 23.500 (C) Dut off frequency: 1000 (kz
		Power supply: Mains
Ť	AC_ID : 0 x 00158D00000E0C37	Hard, vers. VIR3 Power mode: Batts wer Usabled
		Soft vers. V/HD Battery level: Good
ð 5	MAC_ID: 0x 00158D00000E1049 Ch_X Ch_X	Datalogger
Ċ.	GZ	Status Ready Memory action: "State RM" recording Memory used: (%)
		Listening Wood status Watting Sent Deleted Ratalogaer System config Priver mode manaet Online Rata Analysis
		Config. frame is: Custum display Notes Data Acq. config. Sensor Config
		Durrent data acquisition mode configuration
		DAQ Startus : Stopped Bata Acq, mode: LosDutyCycle Start
Ŭ		Usta Acq. cycle : NA ddd, hh-mm-ss ddd, hh-mm-sdd, hh-mm-ss ddd, hh-mm-ss ddd, hh-mm-ss ddd, hh-mm-s
		Sampling rate : NA Hz Dire Role Of Lea Role Of Rol
.8.	Component List	Data Acq. duration: NA ddd.hh:mm.ss
- 🍝	Sort	Tr Inn
*&	Access to different sites	BeanDevice Configuration
	Ste : 0 x 391A	
⊗		

Figure 19: Overview: BeanDevice® System Profile on BeanScape®

7.2 DISPLAYING THE BEANDEVICE® INFORMATION

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

7.2.1 Frame: Identity



How the PAN ID is assigned ?

The BeanGateway[®] starts the WSN, assigning a PAN ID (Personal Area Network identifier) to the network. The PAN ID is pre-determined and cannot be modified. If you use several WSN, before deploying your BeanDevice[®] check to which WSN is assigned your BeanDevice[®].

7.2.2 Frame : Wireless Network Diagnostic



PER = Number of lost packet/Total of packet transmitted

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

7.2.3 Frame: Power supply diagnostic



Figure 22: BeanDevice® Power Supply information

The BeanDevice® incorporates an internal temperature sensor:

- Battery temperature monitoring during charging ;
- Temperature compensation of the analog conditioning chain ;
- ✓ An alarm notification is send to the BeanGaeway® if the internal temperature is anormally high ;

When you plug the BeanDevice[®] on an external power supply, the power supply status is automatically detected.

If your primary cell charge level is low, it is highly recommended to recharge your battery. Your BeanDevice[®] from SmartSensor product lines integrates a battery charger.



For further information about Power mode management, please read the technical note <u>TN_RF_010 -</u> <u>« BeanDevice® Power Management »</u>



When using the Streaming mode or the S.E.T mode, BeanScape[®] stops to display the full Battery health status information on the Power Supply Diagnostic frame until stopping the acquisition.



Figure 23:BeanDevice® Power modes



Figure 24: BeanDevice® Diagnostic cycle information

* The diagnostic cycle is a regular period during which the system collects information about the BeanDevice[®] (battery charge status, internal temperature, LQI, PER ..).

How to convert dBm to mW

Zero dBm equals one milliwatt. A 3dB increase represents roughly doubling the power, which means that 3 dBm equals roughly 2 mW. For a 3 dB decrease, the power is reduced by about one half, making –3 dBm equal to about 0.5 milliwatt. To express an arbitrary power P as x dBm, or go in the other direction, the following equations may be used:

$$x = 10 \log_{10}(1000P)_{Or}, x = 10 \log_{10} P + 30$$

And

$$P = 10^{(x/10)}/1000$$
 or, $P = 10^{(x-30)/10}$

Where P is the power in W and x is the power ratio in dBm.

7.2.5 Frame : BeanDevice®

According to the BeanDevice[®] version, the information displayed in the frame will not be the same. For example, for the BeanDevice[®] AX-3D Xrange:



7.2.6 Frame: Product Version



Figure 26: BeanDevice® Product version frame

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 encountered a material or software dysfunction.

7.2.7 Frame: Current Data Acquisition mode

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



Figure 27: Current data acquisition mode

7.2.8 Frame: Sensor Info

All the information related to the sensor itself will be displayed in this frame.

For the AX3D and AX3D Xrange

Sensor Info	
Meas.Range: -2/+2	BeanDevice measurement range
Cut off frequency: 1000	Cut-off frequency

For the AX3DS

Sensor Info	
Meas.Range: (-2/+2	9

For the AX-3D-SR

There are 3 tabs information available inside the sensor info frame of the BeanDevice Hi-Inc-SR

Sensor Ir	nfo	
Acc	Hyst. Acc Temp.	
Rar	19e: ±2,4	
	Max SR : 🛛 🛛 🛛	10 Hz

• Acceleration Tab:

- Measurement range: 4 different measurement range available on the AX-3D-SR, ±1.2g / ±2.4g / Auto ±1.2g / Auto ±2.4g
- ✓ Max SR: Maximum sampling rate depending on the BeanDevice Measurement range (if it's Auto ±1.2g the maximum sampling rate in dynamic DAQ modes is 400 Hz, if it's Auto ±2.4g the maximum sampling rate is 800 Hz).

• Hyst. Tilt

Displays the threshold levels to auto scale the BeanDevice measurement range.

Sensor Info					
Acc	Hyst. Acc	Temp.			
Hy	steresis value	es for autom	atic Acc range		
Dy	Dynamic DAQ : 2000 samples				
	Static DAQ :	20	samples		

- Dynamic DAQ: threshold level related to dynamic measurement DAQ modes (streaming + SET), if 2000 successive values are lower/higher than the BeanDevice measurement range, the device change automatically its measurement range.
- ✓ Static DAQ: threshold level related to static measurement DAQ modes (Low Duty Cycle + Alarm).
 - Temp.

This information is related to the temperature sensor

Sensor Info			
Acc	Hyst. Acc	Temp.	
	Min Temp	-40	1
	Max Temp	60	\odot

- ✓ Min Temp: Minimum temperature that can be measured by the temperature sensor
- ✓ Max Temp: Maximum temperature that can be measured by the temperature sensor

For the Hi-Inc & Hi-Inc Xrange

Sensor Info	_	
Meas.Range: 主 15 🗸 👘 😽		BeanDevice Measurement range
Sensitivity: 0.0010 deg		BeanDevice sensitivity
Cut off frequency: 1000 Hz	[Cut-off frequency

For the Hi-Inc-SR

Tilt Tab:

•

There are 3 tabs information available inside the sensor info frame of the BeanDevice Hi-Inc-SR

Sensor In	nfo	
Tilt	Hyst. Tilt	Тетр.
	Meas.Rang	ge: 主 10 deg
	Sensitivi	ity: 0.0025 deg
	Max SF	R: 20 Hz

- ✓ Measurement range: 4 different measurement range available on the Hi-Inc-SR, ±10° / ±90° / Auto ±10° / Auto ±90°
- ✓ Sensitivity: BeanDevice sensitivity
- Max SR: Maximum sampling rate depending on the BeanDevice Measurement range (if it's Auto ±10° the maximum sampling rate in dynamic DAQ modes is 20 Hz, if it's Auto ±90° the maximum sampling rate is 80 Hz).
 - Hyst. Tilt

Displays the threshold levels to auto scale the BeanDevice measurement range.

Sensor Inf	ö				
Tilt	Hyst. Tilt	Temp.			
H	ysteresis valu	es for autom	atic tilt range		
D	Dynamic DAQ : 2000 samples				
	Static DAQ : (20	samples		

- Dynamic DAQ: threshold level related to dynamic measurement DAQ modes (streaming + SET), if 2000 successive values are lower/higher than the BeanDevice measurement range, the device change automatically its measurement range.
- ✓ Static DAQ: threshold level related to static measurement DAQ modes (Low Duty Cycle + Alarm).

• Temp.

This information is related to the temperature sensor



- ✓ Min Temp: Minimum temperature that can be measured by the temperature sensor
- ✓ Max Temp: Maximum temperature that can be measured by the temperature sensor

7.3 BEANDEVICE® CONFIGURATION

Beanscape 2.4	4GHz	Hala					-	σ
	Server	BeanDevice system profile	Network Diagnostic	System				
Č.	Started S	Mac Id: 0015900000001049 Site ID: MAC_ID: 0 x 0015800000001 Pan Id: 391A	Network quality:	Diagnostic c S	rcle: 00:01:00 hh:mm:ss rcle: 00:00:01 hh:mm:ss			
60 0	O.X O.Y O	Net Id: 8001 Platform: AX 30 Version Hard, vers. VIR3	Diag. Date: 12/9/2020 12: Internal Temp.: 25.375 Power supply: Mains Power mode: Bat Saver Dis	13:24 PM Meas.R: To the first of the first	nge: -2/+2 0 kncy: 1000 Hz			
		Soft. vers. V7R5	Battery Voltage: 4.228 Battery level: Good Mernory option: *Stop DAO* re	cording Memory s	sed: 0 (S)			
	Select the BeanDevice	Listening Mode Status Wating Sent Deleter onfig. frame is:	Datalogger Custum display	System config. Power Notes Dat	mode managt Online Data Analysis Acq. config. Sensor Config			
5-	be configured	DAD Status : Stopped Data Acq. mode: NA Data Acq. cycle : NA ddd.h Sampling rate : NA ()	Location : Label: h:mm.ss Log folder: Hz	Device Location MAC_ID : 0 x 0015800000001049 Folder 1049				
	Component List Sort To Constant Access to different sites	Data Acq. duration : NA (ddd.h	Datalogger	Validate	Power mede manaat	Dolino Data Analysia		
	Ste : 0 x 391A		Custum display	Notes	Data Acq. config.	Sensor Config		

Figure 28: BeanDevice® configuration frame

Tab	Description
Custom Display	Customize the BeanDevice [®] label
Notes	This area contains the notes related to the BeanDevice [®] .
Data Acquisition configuration	Configure the Data acquisition mode on your BeanDevice [®] , set the acquisition cycle or the sampling rate, enable/disable the datalogger function.
Datalogger	Manage the Datalogger function on the BeanDevice®
System configuration	Configure the diagnostic cycle and the TX Power
Power Mode Management	Configure the Power mode on your BeanDevice [®] (Active mode, Sleep power mode)
Sensor Config	Enable the available filters
Online Data Analysis	Enable FFT/PPV and available filter depending on the BeanDevice platform

This frame is composed of several Tabs and includes BeanDevice® OTAC (Over the Air Configuration) Parameters:

7.3.1 Tab: Custom Display

Datalogger	System config.	Power mode managt	Online Data Analysis			
Custum display	Notes	Data Acq. config.	Sensor Config			
Location :	Device Location					
Label: (MAC_ID : 0 x 00158D0000	0E1049				
Log folder:	Folder 1049					
Validate						

Figure 29: BeanDevice® custom display tab

Parameter	Description
Location	You can enter here your BeanDevice [®] location
Label	You can assign any sort of Label to your BeanDevice [®] . Therefore, the user can easily associate the BeanDevice [®] with its equipment (example: Room_N521_Second_Floor)
Log Folder	You can customize a name for your log folder where the measurement data will be saved in

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

7.3.2 Tab: Notes

Datalogger	System config.	Power mode managt	Online Data Analysis
Custum display	Notes	Data Acq. config.	Sensor Config
V	alidate	Clear	

Figure 30: 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 Tab : Data Acquisition configuration



Figure 31: Tab: Data acquisition configuration

Parameter		Description	
	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.	
ode	Alarm	Survey mode is a mix between the LDCDA mode and Alarm mode. A data acquisition is transmitted	
Data Acquisition mo		 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 	
	Streaming	Streaming is more suitable for users requiring a high data sampling rate (maximum 1 KHz).	
	Shock Detection	When the Shock detection ode is activated (only available for the BeanDevice AX-3DS) the BeanDevice will wake up if a shock is detected. During the sleeping mode of the BeanDevice [®] , the sensor will continue to track a shock event.	
	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 1Ksps)	

Data acquisition Cycle	Select the Data acquisition cycle between 1s and 24hours. The format is: Day: Hour: Minute: Second
Sampling rate	 Select the sampling rate of your BeanDevice[®] between 1 sample per second and 3000 Samples per second maximum. The resolution is 1 sample per second. If Datalogger is selected, the maximum sampling rate is 3000 samples per second. This field is available in streaming: Choose carefully the Sampling rate value: ✓ The PER (Packet Error Rate) can increase if the Sampling rate is high on your BeanDevice[®]. For further information read the technical note <u>TN_RF_003 - "Wireless Network capacity"</u> ✓ Power consumption increases with the sampling rate of your BeanDevice[®]
Data acquisition duration	Data acquisition duration in streaming mode. The format is Day: Hour: Minute: Second The Data acquisition duration value can be higher than Data acquisition cycle.
Options	 TX only: The BeanDevice® transmits the data acquisition without Datalogging Log only: The BeanDevice® logs the data acquisition without wireless transmission Tx & Log: The BeanDevice® transmits and logs the data acquisition; For further information about the Datalogger feature, read the technical note TN_RF_007 – "BeanDevice® Datalogger User Guide"

For further information about the Datalogger, please read the technical note <u>TN RF 007 –</u> <u>"BeanDevice® Datalogger User Guide"</u>

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

Beanscape 2.4GHz



Figure 32: Current data acquisition mode display

For further information, please read the technical note <u>TN_RF_008 – "Data acquisition modes available</u> on the BeanDevice®"

7.3.4 Tab: Sensor Config

Sensor Config tab offers different functionalities according the nature of the BeanDevice[®].

7.3.4.1 BeanDevice® AX-3D and AX-3D X-range Sensor config Tab

Datalogger	System config.	Power mode managt	Online Data Analysis	
Custum display	Notes	Data Acq. config.	Sensor Config	
AAF- Cutoff frequency(Hz) Validate				
Figure 33:BeanDevice® AX 3D and AX 3D X-range Sensor Config tab				

When using the BeanDevice[®] Ax-3D or AX-3D Xrange, the Sensor Config Tab will be used to set the Sensor AAF-Cut frequency.

7.3.4.2 BeanDevice® AX-3D-SR Sensor Config Tab

Datalogger	System config.	Power Mode config.	Online Data Analysis		
Custom display	Notes	Data Acq. config.	Sensor Config		
Temperature unit : C Degree celsius(°C) v Validate					
Hyst. Acc Configuration					
Acc R	lange: ±2.4	Y g)		
Hysteresis values for Automatic Acc Range					
Dynamic	DAQ : 20	100 ᅌ 🛛 samples			
Static	DAQ :	20 ᅌ 🛛 samples			
	Validate				

Figure 34: BeanDevice® AX-3D-SR Sensor Config Tab

- Temperature Unit: Change the temperature unit for the temperature sensor which is used to detect Object temperature and it's not designed to measure the ambient temperature, you can choose between (Degree Celsius (C°), Fahrenheit (F°), Kelvin (K°)).
- **Tilt range:** gives you the possibility to change the BeanDevice measurement range, you can choose a static measurement range ±1.2g or ±2.4g or a dynamic measurement range Auto ±1.2g, Auto ±2.4g.

Hyst. Acc Configuration				
Acc Range:	±1.2 ~	g		
Hysteresis values for Automatic	±1.2			
Dynamic DAQ :	±2.4 Auto ±1.2	samples		
Static DAQ :	Auto ±2.4	samples		

- Hysteresis acceleration configuration: from this spot you can specify the threshold level from which the BeanDevice will automatically change its measurement range scale.
 - ✓ Dynamic DAQ: threshold level related to dynamic measurement DAQ modes (streaming + SET), if 2000 successive values are lower/higher than the BeanDevice measurement range, the device change automatically its measurement range.
 - ✓ Static DAQ: threshold level related to static measurement DAQ modes (Low Duty Cycle + Alarm).

7.3.4.3 BeanDevice[®] Hi-Inc Sensor and Hi-Inc X-range Config Tab

Datalogger	System config.	Power mode managt	Online Data Analysis	
Custum display	Notes	Data Acq. config.	Sensor Config	
AAF- Cutoff frequency(Hz)				
Tare Inclinometer		(Validate	
DAQ Alarm configuration				
Enable IIR Filter		Validate		

Figure 35: BeanDevice® Hi-Inc and Hi-Inc X-range & Hi-Inc-SR Sensor Config tab

When using the BeanDevice® Hi-Inc or Hi-Inc X-range, user can have access to these functionalities:

- AAF-Cutoff Frequency: Used to set the Cutoff frequency
- **Tare Inclinometer:** Used to bring zero offset values on the sensor axis at the beginning of a monitoring application.

7.3.4.4 BeanDevice[®] Hi-Inc-SR Sensor Config Tab



Figure 36: BeanDevice® Hi-Inc-SR Sensor Config Tab

- Temperature Unit: Change the temperature unit for the temperature sensor, you can choose between (Degree Celsius (C°), Fahrenheit (F°), Kelvin (K°)).
- **Tare Inclinometer:** Used to bring zero offset values on the sensor axis at the beginning of a monitoring application
- Tilt range: gives you the possibility to change the BeanDevice measurement range, you can choose a fixed measurement range ±10° or ±90° or a dynamic measurement range Auto ±10° or Auto ±90°.
- Hysteresis tilt configuration: from this spot you can specify the threshold level from which the BeanDevice will automatically change its measurement range scale.
 - ✓ Dynamic DAQ: threshold level related to dynamic measurement DAQ modes (streaming + SET), if 2000 successive values are lower/higher than the BeanDevice measurement range, the device change automatically its measurement range.
 - ✓ Static DAQ: threshold level related to static measurement DAQ modes (Low Duty Cycle + Alarm).



When using the BeanDevice[®] AX-3DS, user can have access to these functionalities:

- IIR Filter: Enable/Disable IIR Filter
- Meas. Range: Used to set Measurement Range according to the Sensor measurement unit.
- Sensor measurement Unit: Used can select between g or mm/s²

7.3.5 Tab: Online Data Analysis



Online data analysis is only available on the following hardware platforms:

- BeanDevice® AX-3D
- BeanDevice[®] AX-3D Xrange.

Custum display	Notes	Data Acq. config.	Sensor Config	
Datalogger	System config.	Power mode managt	Online Data Analysis	
Online FFT Configuration		Online Velocity configuration		
 Enable Online FFT Automatic FFT Repo Enable FFT Log file Number of Points (Streat Manual SR/0.1) Current Points Number 	rt(S.E.T) ming) : SR/0.1	Enable Online Velocity		
Online waveform configu	uration	Unit of acceleration	j v	
Automatic waveform Enable waveforms L	ns Report(S.E.T) og file(S.E.T)	S.E.T threshold	Acceleration ~	
Software Filters Enable IIR Filter		Validate		

Figure 38: Signal processing tab

Signal processing tab is composed of six different fields:

- Online FFT Configuration
- **Online Velocity configuration**
- Online waveform config
- **Software filters**
- Unit of acceleration
- **S.E.T threshold**

7.3.5.1 Online FFT Configuration



1: Check Enable Online FFT to view the display of FFT graph in the sensor profile



Figure 39: FFT Spectrum

2: Check Enable FFT Log file to generate log files in the log_beanscape directory.



Figure 40: Online FFT Configuration frame
The log files will be generated in a folder called "FFT" under the BeanDevice® repertory.

GeneratedDisplay Report Folder TX Folder	26/10/2018 08:49		
Report Folder			
TX Folder	26/10/2018 08:49		
	26/10/2018 08:51		
00158D00000E06A8_WirelessNetwkInfo.txt	26/10/2018 08:53	435 Ko	
FFT_RealTime_MAC_ID0_x_00158D00000E	06A8_2018-10-26_08-51-44.txt	26/10/2018 08:54	4 619 K
FFT_RealTime_MAC_ID0_x_00158D00000E	06A8_2018-10-26_08-51-44.txt 0-26_08-25-58.txt	26/10/2018 08:54 26/10/2018 08:26	4 619 K
FFT_RealTime_MAC_ID0_x_00158D00000E FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1	06A8_2018-10-26_08-51-44.txt 0-26_08-25-58.txt 0-26_08-26-20.txt	26/10/2018 08:54 26/10/2018 08:20 26/10/2018 08:20	4 619 K 6 10 K 6 10 K
FFT_RealTime_MAC_JD_0_x_00158D00000E FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1	06A8_2018-10-26_08-51-44.bd 0-26_08-25-58.bd 0-26_08-26-20.bd 0-26_08-26-20.bd	26/10/2018 08:54 26/10/2018 08:20 26/10/2018 08:20 26/10/2018 08:20	4 619 K 5 10 K 5 10 K 7 11 K
FFT_RealTime_MAC_JD0_x_00158D00000E FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D0000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1	06A8_2018-10-26_08-51-44.txt 0-26_08-25-58.txt 0-26_08-26-20.txt 0-26_08-26-20.txt 0-26_08-27-23.txt 0-26_08-28-24.txt	26/10/2018 08:5/ 26/10/2018 08:2/ 26/10/2018 08:2/ 26/10/2018 08:2/ 26/10/2018 08:2/ 26/10/2018 08:2/	4 619 K 5 10 K 6 10 K 7 11 K 8 11 K
FFT_RealTime_MAC_ID0_x_00158D00000E FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D0000E06A8_2018-1	06A8_2018-10-26_08-51-44.bt 0-26_08-25-58.bt 0-26_08-26-20.bt 0-26_08-27-23.bt 0-26_08-28-24.bt 0-26_08-28-24.bt	26/10/2018 08:54 26/10/2018 08:24 26/10/2018 08:24 26/10/2018 08:27 26/10/2018 08:24 26/10/2018 08:24	4 619 К 5 10 К 5 10 К 7 11 К 8 11 К 9 11 К
FFT_RealTime_MAC_ID0_x_00158D00000E FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1	06A8_2018-10-26_08-51-44.bxt 0-26_08-25-58.bxt 0-26_08-26-20.bxt 0-26_08-27-23.bxt 0-26_08-28-24.bxt 0-26_08-28-25.bxt 0-26_08-29-25.bxt 0-26_08-30-26.bxt	26/10/2018 08:54 26/10/2018 08:24 26/10/2018 08:24 26/10/2018 08:22 26/10/2018 08:24 26/10/2018 08:24 26/10/2018 08:33	4 619 K 5 10 K 5 10 K 7 11 K 8 11 K 9 11 K 0 11 K
FFT_RealTime_MAC_ID0_x_00158D00000E FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1	06A8_2018-10-26_08-51-44.bxt 0-26_08-25-58.bxt 0-26_08-25-20.bxt 0-26_08-27-23.bxt 0-26_08-27-23.bxt 0-26_08-28-24.bxt 0-26_08-29-25.bxt 0-26_08-30-26.bxt 0-26_08-31-27.bxt	26/10/2018 08:54 26/10/2018 08:24 26/10/2018 08:24 26/10/2018 08:24 26/10/2018 08:23 26/10/2018 08:23 26/10/2018 08:33 26/10/2018 08:33	4 619 K 5 10 K 5 10 K 7 11 K 8 11 K 9 11 K 1 11 K
FFT_RealTime_MAC_JD_0_v_00158D00000E FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1	06A8_2018-10-26_08-51-44.bxt 0-26_08-25-58.bxt 0-26_08-26-20.bxt 0-26_08-26-20.bxt 0-26_08-27-23.bxt 0-26_08-28-24.bxt 0-26_08-29-25.bxt 0-26_08-39-26.bxt 0-26_08-31-27.bxt 0-26_08-31-27.bxt 0-26_08-32-29.bxt	26/10/2018 08:54 26/10/2018 08:24 26/10/2018 08:24 26/10/2018 08:24 26/10/2018 08:23 26/10/2018 08:23 26/10/2018 08:33 26/10/2018 08:33 26/10/2018 08:33	4 619 K 5 10 K 5 11 K 8 11 K 9 11 K 1 11 K 2 11 K
FFT_RealTime_MAC_ID_0_x_00158D00000E FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1 FFT_SET_MACID_00158D00000E06A8_2018-1	06A8_2018-10-26_08-51-44.txt 0-26_08-25-58.txt 0-26_08-26-20.txt 0-26_08-27-23.txt 0-26_08-28-24.txt 0-26_08-29-25.txt 0-26_08-30-26.txt 0-26_08-31-27.txt 0-26_08-31-27.txt 0-26_08-33-20.txt 0-26_08-33-30.txt	26/10/2018 08:5/ 26/10/2018 08:2/ 26/10/2018 08:2/ 26/10/2018 08:2/ 26/10/2018 08:2/ 26/10/2018 08:3/ 26/10/2018 08:3/ 26/10/2018 08:3/ 26/10/2018 08:3/	4 619 K 5 10 K 5 10 K 8 11 K 9 11 K 0 11 K 1 11 K 2 11 K 3 11 K

Figure 41: FFT log files folder

3: Enabling Automatic Report: This functionality is available only in S.E.T mode. To activate automatic reports generation, check the option on Online FFT configuration frame



Figure 42:Enabling Automatic FFT Report

The Reports will be generated in your log_beanscape directory, under "Report Folder" repertory.

) ▶ log_beanscape ▶ Folder 06A8 ▶		
and the second sec		
📙 FFT	26/10/2018 09:00	
Generated Display	26/10/2018 08:49	
in ocherateabispiay	20/10/2010 00.45	
📙 Report Folder	26/10/2018 08:49	
TX Folder	26/10/2018 09:02	
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
00158D00000E06A8_WirelessNetwkInfo.txt	26/10/2018 09:03	592 K

#### I (C:) ► log_beanscape ► Folder 06A8 ► Report Folder

FFT_StateReport_2018-10-26_08-25-58.docx	26/10/2018 08:26	613 Ko
FFT_StateReport_2018-10-26_08-26-20.docx	26/10/2018 08:26	612 Ko
FFT_StateReport_2018-10-26_08-27-23.docx	26/10/2018 08:27	567 Ko

Figure 43: Report Folder

For further information about the configuration of Online FFT please refer to section <u>7.3.4</u> of this user manual

After enabling Real time FFT and setting SMTP configuration (<u>more information on section 8</u>), this is an example of an FFT report emailed to concerned recipients.



Figure 44: FFT Report (S.E.T mode)

1	Logo of your company, you can upload it from the alarm management configuration window. Tools→Alarm management
2	General information about the Measurement, Date, duration sampling rate ,pre-trigger duration, IIR filter status and triggered axis
3	Information related to monitoring site: user, location and monitoring sites (can be configured from the Alarm tool window. This field can be configured be from the alarm management configuration window Tools→Alarm management
4	BeanDevice [®] Information: Type, MAC ID and label, measurement range, and Alarm Type : Acceleration or Velocity
5	Alarm thresholds value on each Axis, the three levels of alarms are displayed Action-Alert-Alarm
6	FFT Report with Max Frequency for each Axis, VPPV (Vector Peak Particle Velocity) value and Max amplitude
7	Graph Area – 3 Axis are displayed on the same graph

For further information about managing your notification and reports email please refer to section <u>8:</u> Alarm management.

# • FFT Advanced Configuration

The FFT configuration allows the user to activate the FFT Shift and to go for manual settings related to FFT.

📾 FFT Configurat	tion		—	$\times$
🔘 Auto	FFT Shift			
Window Type :	Rectangular v	Current FFT Configuratio	n	
Algorithm :	Estimate ~	Mode : (	By FFT_Auto	
Zero Padding :	<b>V</b>	FFT Shift : (	Disabled	
Number of Points	SR/0.1	Window type : (	Rectangular	
(Streaming mode)		Algorithm : (	Estimate	
	Validate	Zero padding : (	Enabled	
		·		

- Auto/Manual

🔵 Manual		FFT Shift
Window Type :	Rectangular	v
Algorithm :	Estimate	v
Zero Padding :	✓	

Window type:

Rectangular
Hamming
Hann
Blackman
Blackman Harris
Gaussian
Kaiser
Taylor
Triangular
Flattop
Bartlett
Bartlett-Hann

When the number of periods in the acquisition is not an integer, the endpoints are discontinuous. These artificial discontinuities show up in the FFT as high-frequency components as not present in the original signal. These frequencies can be much higher than the Nyquist frequency and are aliased between 0 and half of your sampling rate. This phenomenon is known as spectral leakage.

You can minimize these effects by using a technique called windowing.

Windowing reduces the amplitude of the discontinuities at the boundaries of each finite sequence acquired by the digitizer. Windowing consists of multiplying the time record by a finite-length window with an amplitude that varies smoothly and gradually toward zero at the edges. This makes the endpoints of the waveform meet and, therefore, results in a continuous waveform without sharp transitions. This technique is also referred to as applying a window.

There are several different types of window functions that you can apply depending on the signal. To understand how a given window affects the frequency spectrum, you need to understand more about the frequency characteristics of windows.

Selecting a window function is not a simple task. Each window function has its own characteristics and suitability for different applications. To choose a window function, you must estimate the frequency content of the signal.

• If the signal contains strong interfering frequency components distant from the frequency of interest, choose a smoothing window with a high side lobe roll-off rate.

• If the signal contains strong interfering signals near the frequency of interest, choose a window function with a low maximum side lobe level.

• If the frequency of interest contains two or more signals very near to each other, spectral resolution is important. In this case, it is best to choose a smoothing window with a very narrow main lobe.

• If the amplitude accuracy of a single frequency component is more important than the exact location of the component in a given frequency bin, choose a window with a wide main lobe.

• If the signal spectrum is rather flat or broadband in frequency content, use the uniform window, or no window.

In general, the Hanning (Hann) window is satisfactory in 95 percent of cases. It has good frequency resolution and reduced spectral leakage. If you do not know the nature of the signal but you want to apply a smoothing window, start with the Hann window.

- Algorithm

Estimate	Determine a best-guess transform algorithm based on the size of problem.
Measure	Find a better algorithm by computing multiple transforms and measuring the run times.
Patient	Run a wider range of testing compared to 'measure', resulting in a better transform algorithm, but at the expense of higher computational cost to determine the parameters.
Hybrid	Use a combination of 'measure' for transforms with dimension length (number of points) 8192 or smaller and 'estimate' for transforms with dimension length (number of points) larger than 8192.

- Zero Padding: The use of zero padding enables you to estimate the amplitudes of frequencies correctly.
- FFT Shift: Check to enable real time FFT Shift processing for BeanDevice AX-3D on streaming mode and the FFT spectrum will appear shifted below the Streaming graph in the sensor profile.

		🛸 FF	T Configuration			
			Auto	✓ FFT Shift		
FFT realtime graph			1			
Oscilloscope 🖕	Print Save to PNG Copy to Clipbo	ard Extends Zoom Zo	om Y Zoom X Zoom XY	Circle 🕥 Square 🕥 None		
			FFT Spectrum			
						0.0120
						0.0080
						0.0040
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	$\sim$		$\sim$		0.0000
.000	-40.000	-20.000	0.000	20.000	40.000	60.000
			Frequency(Hz)			
0			~A	~	~ ~ ~	0

Figure 45: FFT Shift Spectrum

7.3.5.2 Online Velocity configuration

In order to use Real time PPV, you should use high sampling rate to provide good PPV values.



You need to sample at 200Hz at least to provide good PPV values.

By using SET mode, you need to choose the highest sampling rate which is 200Hz and don't forget to enter a DAQ duration higher than 10s.



For Streaming mode, choose at least 500Hz and above with a minimum DAQ duration of 10s, to provide good PPV measurement.



Real time observation of velocity available for BeanDevice AX-3D only with Streaming and S.E.T acquisition modes and is enabled from the signal processing tab in the Configuration panel.

Custum display	Notes	Data Acq. config.	Sensor Config
Datalogger	System config.	Power mode managt	Online Data Analysis
Online FFT Configuration Enable Online FFT Automatic FFT Repo Enable FFT Log file	rt(S.E.T)	Online Velocity configu Control Enable Online Velocity Automatic DIN Rep Enable Velocity Log Enable PPV Log file	city Cont(S.E.T) g file
Manual SR/0.1 Current Points Number:	SR/0.1		
Online waveform configu	ration	Unit of acceleration	g Y
Automatic waveform Enable waveforms Lo	s Report(S.E.T) ng file(S.E.T)	S.E.T threshold	Acceleration Y
Software Filters Enable IIR Filter		Validate	

Figure 46: Online Velocity configuration tab

Enable online Velocity: check to enable real time Velocity processing, PPV and PVS, the velocity graph will be displayed.

On the Graph side a real time DIN 4150 graph will be displayed on the right side of the screen.

Under the DIN 4150 Graph, the PPV and the PVS values will be displayed in real time.

On the PPV frame, BeanScape will display PPV in mm/s, ZC Frequency in Hz, Peak Acceleration in g and Peak Displacement in mm.



It is important to notice that the PVS calculation required 3 active channels to be generated.

<u>PPV:</u> is a measurement of maximum ground particle movement speed, it is in millimeters per second (mm/sec), PPV is a "vector" quantity (i.e. it has both a value and an associated direction).

Peak Vector Sum (PVS): is simply the square root of the sum of the squares of the individual PPV values. PVS is a "scalar" quantity, i.e. one with only a value, which is always larger than the individual PPV vector values.

Scientific studies have shown that the PPV correlates best with damage potential of all the tested characterizations of ground movement (e.g. acceleration, displacement, or strain). Most, though not all, ground vibration standards are quoted in PPV values, although the "acceptable" values of PPV differ with the standard applied and with the frequency of the vibration components.



Figure 47: Velocity Graph

SmartSensor User Manual



Figure 48: Velocity and FFT Graph, PPV and PVS



Figure 49: DIN 4150 Real Time Graph, PPV & PVS

Automatic DIN Report (S.E.T): check to enable DIN4150-3 report automatic generation when threshold is reached, or an acquisition cycle is reached on the S.E.T acquisition mode.

An automatic Report will be sent to the email addresses configured on Alarm Management Option.

BeanAir	06-Feb-19 12:07:37
BeanDevice MAC_ID : F4B85E00A14B0000	Sensor Label : Ch_Z

Building Type	Commercial
Pipeline Material	Steel
Velocity Average(mm/s)	0.0177327272727272
Sampling Rate(hz)	100
Analyze Duration(hh:mm:ss)	00:00:01.1000000
LTVEE	ОК
LTEBP	ок
Velocity Frequency(hz)	0
PCPV(mm/s)	2.4892
STEBP	ОК
STVEE	NOK

DIN 4150-3 REPORT

KeyWord	Meaning			
LTVEE	Long Term Vibration Evaluation Effect			
LTEBP	Long Term Effect on Buired Pipework			
STEBP	Short Term Effect on Buired Pipework			
STVEE	Short Term Effect Evaluation			
PCPV	Peak Component Particle Velocity			

Figure 50: DIN 4150-3 Report email

INFORMATION	DETAILS			
Building type	User configurable			
Pipeline Material	User Configurable			
Velocity Average	Get the average of the signal after transforming the acceleration signal into velocity signal			
Sampling Rate	In Hz			
Analyse duration	BeanScape property			
Long term vibration evaluation	1-Find the maximum velocity values over the Time			
effect	2- Compare the maximum velocity to the guideline value described on the Norm DIN 4150.			
	3-Display if the result is OK or not (guideline respected or not)			
Long term Effect on buried pipework	 1-Find the maximum velocity values over the Time 2- Compare the maximum velocity to the guideline value described on the Norm DIN 4150. 3-Display if the result is OK or not (guideline respected or not) 			
Velocity Frequency	Get the signal frequency (FFT + windowing)			
Maximum velocity (mm/s)	BeanScape Property			
Short term Effect on buried	1-Find the maximum velocity values over the Time			
pipework	2- Compare the maximum velocity to the guideline value described on the Norm DIN 4150.			
	3-Display if the result is OK or not (guideline respected or not)			
Short term vibration effect	1-find the maximum velocity value over the time.			
	2-Determine the significant frequency (use the FFT + windowing).			
	3-compare the maximum velocity to the guideline value described on the Norm DIN 4150			
	5-Display if the result is OK or not (guideline respected or not)			

Enable Velocity Log file: check to enable Velocity data to be stored in the log folder.

	Name	Date modified	Туре	Size
	FFT	13-Feb-19 14:43	File folder	
7	📕 TX Folder	13-Feb-19 14:58	File folder	
*		13-Feb-19 14:58	File folder	
*	5C313E06A9A70000 WirelessNetwkInfo	13-Feb-19 14:58	Text Document	

Velocity_RealTime_Ch_Y_MAC_ID___0_x_F4B85E00A14B0000_6_12_2019_10_48_00_AM

Velocity_RealTime_Ch_Z_MAC_ID___0_x_F4B85E00A14B0000_6_12_2019_10_48_00_AM

Figure 51: Velocity Log Folder/Files

Enable PPV Log file

poouru		Organize	140.00		pen
<mark>}</mark> ≯ Thi	s PC → Local Disk (C:) →	log_beanscape > Fo	older 5C313E06A9A70000)	
	Name	`	Date modified	Туре	Size
	FFT		13-Feb-19 14:43	File folder	
Я	TX Folder		13-Feb-19 14:58	File folder	
A	Velocity		13-Feb-19 14:58	File folder	
INIS 🖈	5C313F06A9A70000	WirelessNetwkInfo	13-Feb-19 14:58	Text Document	
PPV_	RealTime_Ch_X_M	AC_ID0_x_F4E	385E00A14B0000_	6_12_2019_10_4	8_00_AN
PPV_	RealTime_Ch_Y_M	AC_ID0_x_F4E	85E00A14B0000_	6_12_2019_10_4	8_00_AM
PPV_	RealTime_Ch_Z_M	AC_ID0_x_F4E	85E00A14B0000_	6_12_2019_10_4	8_00_AM

Figure 52: PPV Log Folder/Files



By default, the Velocity is configured "By Zero Crossing", to edit the Velocity settings user must select "By FFT" or "By Filter".

📾 Velocity Configuration		×
⊖ By FFT	○ By Filter	
- By FFT: By select	ing this option, the user will setup the Ve	elocity basing on customized FFT settings.

o Auto: If Auto is selected, The Velocity calculation will activate FFT Auto mode Settings

L

📾 Velocity Configuration

⊙ By FFT					
FFT					
🔘 Auto					
Window Type :	Rectangular	÷	(Î	Import	
Algorithm :	Estimate	v			
Zero Padding :	<u>~</u>				J

 Manual: Once switched to Manual, the user must configure the FFT settings manually (Window Type, Algorithm & Zero Padding).

By clicking on Import the Configuration will import the FFT current settings, already configured on the FFT frame.

📸 Velocity Configuration								
∍ By FFT								
FFT								
🔘 Manual								
Window Type :	Rectangular	¥		Import				
Algorithm :	Estimate	v						
Zero Padding :								

<u>To save all settings Press Validate. The new settings should be displayed on the Left side of the Window.</u>

SmartSensor User Manual		2.4GHz wireless sensors
SmartSensor User Manual	Streaming Mode SET Mode Streaming Mode SET Mode Image: Set Mode Filters Profile Image: Set Mode Filters Profile Image: Mode </th <th>2.4GHz wireless sensors</th>	2.4GHz wireless sensors
	Velocity Configuration saved Succe	ssfully <u>ok</u>

- **By Filter:** By selecting this option, the user will setup the Velocity basing on the Software Filter.





 \circ $\;$ Auto: If Auto is selected, Velocity Automatic filter will be configured

Close

Validate

By Filter		
Streaming Mode SET Mo	ide	
🔘 Auto	Filters Profile :	1 🖞 🏒 🕁 🕥
Response Type	Frequency Specification	Magnitude Specification
HighpassBandpass	Units: Hz	Units: (B)
Design Method	Fs: 2000 V Fstop1: 0.1	Astop1: 60 Wpass: 0.1
IIR Chebyshev_type FIR Equiripple	Fpass1 : 2.5 Fpass 2 800	Wstop2 : 60
Filter Order	Fstop 2 : 999	
Minimum Order Specify Order		Filer name :
Filer Specification		
[♠] Mag. (dB)		
0 Astop1 0 Fstop1	Fpass1 Fpass2 Fstop2 Fs/2	−► _{f (Hz)}
		Close Validate

- Manual: Once switched to Manual, the user must configure manually the Filter settings.
 - Response Type: User should specify if the Response is Highpass or Bandpass

Response Type						
Highpass						
○ Bandpass						

 Design Method: User should Select the nature of the Filter between IIR or FIR From the List of every filter, user have to specify the method of the Filter: IIR: Chebyshev_type_I, Chebyshev_type_II or Butterworth FIR: Equiripple, Generalized_Equiripple or Kaiser_Window

<u>The Frequency Specification and The Magnitude Specification</u> will be modified according the selected Design Method Filter Order: If the user is using IIR Design Method, Minimum Order will be selected automatically.

If the FIR Design Method is selected, user must Specify Order.

- Frequency Specification: Is a customizable frame according to the Design Method.
- Magnitude Specification: Is a customizable frame according to the Design Method.
- ✤ <u>Filter Profile:</u> User can save a specific Configuration and re-use it later.



 Filter Specification: Is a Graphical Display of the Filter Specification depends on the user settings.



Window.

📽 Velocity Confi	guration								- 0	\times
⊖ By FFT					• By Filter		⊖ By Z	ero Crossing		
FFT					Streaming Mode	SET Mode				
🔘 Manual						Filtere Desfile				
Window Type :	Rectangular		😙 Import					Magaituda Caa		
Algorithm :	Estimate	·				The second se	quency specification	Magnitude spe		
Zero Padding :					Highpass Randnass		Units: Hz	Units:	dB	
Current Velocity Co	nfiguration				O bandpass		Fs: 100 ×	Astop : (1	
		/-			Design Method		Fstop : 20	Apass : (1	
Points Used					O IIR Chebysh	ev_tγpe_l Υ	Fpass : 40			
Number of point	sf:	S	R/0.1		O FIR Equiripp	le v				
(Streaming mode	י דע				Filter Order					
S	treaming			S.E.T	O Minimum Orde			Eilor pama	Filter Name	
Mode :	By Filter		Mode :	By Filter_Auto	 Specify Order 	Velocity Configuration				
Sampling Rate :	100	Hz	Sampling Rate :	1000 Hz	Filer Specification					
Response Type:	Highpass		Response Type:	Highpass		Velocity Con	figuration saved Successfully			
Design Method:	Cheb_type_II		Design Method:	Cheb_type_l	Mag. (dB)					
Filter Order:	Min order	\sim	Filter Order:	Min order			OK			
Fstop :	_20	(Hz)	Fstop :	0.1 (Hz	0-	Apass L				
Fpass :	40	(Hz)	Fpass :	2.5 Hz						
Fpass2 :		Hz	Fpass2 :							
Fstop2 :			Fstopi :					_		
Ascup :			Astop : Anaee :			Fpass		Fs/2 f (Hz)		
Wston2 :		a a a a a a a a a a a a a a a a a a a	Aston2 :							
					J					
									Close Valio	late

7.3.5.3 Online waveform configuration

- Online waveform configuration

 Image: Automatic waveforms Report(S.E.T)

 Image: Automatic waveforms Log file(S.E.T)
- Automatic Wave Report (S.E.T): Check to enable waveform reports, this is only available for S.E.T mode
- *Enable Wave Log file:* check to enable logging wave form for real-time data (only S.E.T mode)

7.3.5.4 Software filters

Enable IIR Filter: Check to enable IIR filter

7.3.5.5 Unit of acceleration

Select which unit to be used for acceleration measurement.

Unit of acceleration	g ×
	g
S.E.T threshold	mm/s ²

7.3.5.6 S.E.T threshold

In so many cases the threshold is needed to be set in mm/s and not in g or mm/s², you need to configure your S.E.T threshold parameters before starting.

To configure the threshold to be set in mm/s, you need to go to Online Data Analysis and change S.E.T threshold from acceleration to Velocity.

S.E.T threshold	Acceleration 👻
(Acceleration
	Velocity

7.3.6 Tab: Datalogger



For further information about the Datalogger, please read the technical note <u>TN_RF_007 –</u> <u>"BeanDevice® Datalogger User Guide "</u>

Custum display	Notes	Data Acq. config.	Sensor Config					
Datalogger	System config.	Power mode managt	Online Data Analysis					
DataLogger status								
DataLogger status: Ready								
Download progress: NA								
Downlo	ad status: NA							
DataLogger manager								
	Stop	Erase						
Download manager								
Download	Download t	then erase	Cancel					
Stop DAQ, download then erase								
DataLogger memory configuration								
O "Stop DAQ" record	O "Stop DAQ" recording O "Stop at end" recording							
O "Stop DAQ DE" red	O "Stop DAQ DE" recording							

Figure 54: Datalogger Tab

Data logger tab is composed of five different fields:

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

7.3.6.1 Datalogger status

Datalogger	System c	onfig.	Power mode managt	Online Data Analysis
DataLogger status				
DataLogg	er status:	Ready		
Download	progress:		NA	
Downloa	id status:	NA		

- **Datalogger status**: Displays logger status, four status are available:
 - o *Ready*: the Datalogger is ready to register data
 - NotInit: the Datalogger is not initialized;
 - Active logs only: Data acquisition is logged only;
 - o Active TX and Log: Data acquisition is logged & transmitted by Radio;
 - Stopped: Datalogger is stopped;
- Download process: Displays the download process 0 to 100%. If 100%, all the data logs are successfully downloaded on your PC.
- **Download status**: Displays the download status, two types of status are available:
 - Processing: Data logs download is under process;
 - Completed: Data Logs are completely downloaded on your PC;

7.3.6.2 Datalogger manager



- **Stop**: Stops Data Logging process
- *Erase*: Stops & Erases all the logs on flash memory

7.3.6.3 Download manager

Download manager		
Download	Download then erase	Cancel
	Stop DAQ, download then erase	

- **Download**: Starts to download all the logs on the flash memory
- **Download then erase**: downloads all the logs and the erase them.
- Cancel: Stops the download process
- Stop DAQ, download then erase.

7.3.7 Tab: System config.

Custum display	Notes	Data Acq. config.	Sensor Config				
Datalogger	System config.	Power mode managt	Online Data Analysis				
Diagnostic Cycle							
Ratio:	1 🗢 00 h 00 mm (01 s	Validate				
Restart device							
	Restart						

Figure 55: System Configuration Tab

Parameter	Description
Diagnostic cycle	You can set the BeanDevice [®] diagnostic cycle (Battery status, LQI, PER). The Diagnostic cycle is a ratio of the data acquisition 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 ;
Restart Device	You can restart your BeanDevice [®] from BeanScape [®] .

7.3.8 Tab : Power mode management

For further information about Power mode management, please read the technical note <u>TN_RF_010</u> – <u>« BeanDevice® Power Management »</u>

This Tab is composed of three options:

- Battery Saver Power mode configuration: Configure the Power mode on your BeanDevice[®] (active / Battery saver mode)
- ✓ *BeanDevice Listening Ratio:* Configuration settings for Battery Saver power mode with network listening
- ✓ **Delete Pending OTAC frame:** Delete the last performed OTAC



Figure 56: Power Mode Management Tab

Parameter	Description
Battery Saver configuration	<i>Enable:</i> Battery Saver power mode is enabled. The BeanDevice [®] operates on Saver battery power mode to decrease the power consumption.
	<i>Disable:</i> Battery Saver power mode is disabled, the BeanDevice [®] works in active power mode.
	<i>Ratio</i> : Fix the Ratio of the listening cycle. This ratio depends on the data acquisition low duty cycle.
	Example: If the data acquisition is 30 seconds and the ratio is set to 5, the Listening cycle will be 150 seconds (5*30).
Delete pending OTAC frame	By clicking on "validate", the pending OTAC frame is deleted



7.3.9 Right Click functionalities

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

- Change the Device Label
- Restart the Device
- Remove the Device



Figure 58: Overview: Sensor channel profile

7.4.1 Sensor channel status

7.4.1.1 Frame: General information



Figure 59: Sensor Channel General information frame

7.4.1.2 Frame: Measurement data



Figure 60: Measurement data frame

By default, sensor unit format is

- G or mm/s² for the BeanDevice AX-3D & AX-3DS
- o deg for the BeanDevice HI-INC

7.4.2 Sensor channel configuration

This frame contains a set of 5 tabs:

Custom Display	 Allows the end user to customzie the sensor
Notes	 Contains notes relating to the BeanDevice[®] sensor
Alarm Config	 Sensor configuration interface. The user can configure the alarm thresholds related to the sensor Depending on the BeanDevice[®] version which is used, other configuration parameters are available
Sensor calibration	Sensor channel calibration
Log config	 Logs configuration on the BeanScape[®]

7.4.2.1 Tab: Custom display on the BeanDevice® AX-3D/AX-3D-SR

These parameters allow the user to customize his sensor:

Se	nsor Config					
Custom display	Notes	Alarm level Config	Sensor calibration	Log config.		
Label: (Ch_Z	Validate	Unit: (g Ratio: (1 Offset: ()		Zeroing se	ensor channel:	Apply

Figure 61: Sensor channel custom display tab

- ✓ Label: Give a name to your sensor. (<u>ex</u>: Sensor on Stator Machine 1, sensor in Room 2 Floor 3)
- ✓ *Zeroing sensor channel*: Center the signal graph in the 0 value (cancel the gravity value)

<u>Zeroing</u>

In order to secure accurate and precise Velocity and FFT measurements on axis that's mounted toward the earth gravity you should Apply zeroing to cancel earth gravity.

Ward the earth gravity you should Apply zeroing to cancel earth gravity.

 Zeroing sensor channel:
 Apply

7.4.2.2 Tab: Custom display on the BeanDevice® Hi-Inc & Hi-Inc-SR

Se	ensor Config				
Custum display	Notes	Alarr	n level Config	Sensor calibration	Log config.
Label: Ch_Y	Validate	Unit: Ratio: Offset:	(deg (1) (0)		
			Conversion		

Figure 62: Hi-Inc 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);

Measurement conversion formula:

Converted Measurement = Measurement x RAT + OFF

Example with a temperature sensor: By default, the temperature unit is in degree Celsius. The user wants to convert the unit in degree Fahrenheit.

Converted Measurement [°F] = Measurement[°C] x RAT + OFF

With RAT = 1.8 and OFF = 32

Conversion assistant

To avoid conversion error, a conversion assistant is available to help you to setup quickly your measurement channel of your BeanDevice[®].

Click on conversion assistant from the tab "*Custom display*", a window will open allowing you to do a linear conversion.

SmartSensor User Manual		2.40	Hz wireless sensors
Sensor Config			
Custum display Notes	Alarm level Config	Sensor calibration	Log config.
Label: (Ch_Y	Unit: (deg		
	Ratio: (1		
Validate	Offset: (0		
	Conversion		

On the left column, the user can enter the non-converted measurement data. On the right column, the user can enter the converted measurement values with the desired unit.

The ratio and offset values are calculated automatically by the conversion assistant.



Figure 63: Unit Conversion Assistant

7.4.2.3 <u>Tab : Notes</u>

Si	ensor Config				
Sensor labelling	Notes	Alarm level Config	Sensor calibration	Log config.	
		(Vali	date		

Figure 64: 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".



			203 00
Alarm			
	/alidate		
	Alarm	Alarm Validate	Alarm Validate

Parameter	Description
Alarm threshold configuration for S.E.T mode	The S.E.T mode (Streaming with event triggering) the threshold is based on AAA(Alert/Action/Alarm) with: Alert values < Action value < Alarm value. Measurement exceeding each threshold will results in notification sent with the appropriate reports and info via email and audio notification on the computer will take place.

For further information about the alarm thresholds configuration, please read the technical note ponseTN RF 008 – "Data acquisition modes available on the BeanDevice®"

7.4.2.5 Tab: Alarms Config Configuration - BeanDevice® AX-3DS

For further information about the SSD (Smart Shock Detection) measurement mode, read the technical note <u>TN RF 008 – "Data acquisition modes available on the BeanDevice®"</u>

Configuration du capteur de Temp. du corps							
Sensor labelling	Notes	Alarm level Config	Sensor calibrat	tion	Log config.		
Alarm Level Config High level Alarm >= High Level Alert > Low Level Alert >= Low level Alarm Low Level Alarm			m	Shock	detection configuration Modify		
		Validate					

Figure 66: Alarm configuration tab (BeanDevice® AX-3DS)

Parameter	Description				
Alarm threshold	You can configure threshold high values (High level alarm, High level alert) and low values (Low level alarm, Low level alert). In alarm mode, when a higher low threshold value is reached, an alarm notification is transmitted to the BeanGateway ;				
	If the sensor value is higher than High level alarm/High level alert, notification is send to the BeanGateway/BeanScape;				
	If the sensor value is lower than Low level alarm/Low level alert, notification is send to the BeanGateway/BeanScape.				
	Threshold values must be organized in this manner:				
	High level alarm >=High level alert > Low level alarm >= Low level alert				
	Alarm thresholds are not available for SSD (Smart shock detection mode)				
Accelerometer	\checkmark The user can change the measurement range of the accelerometer:				
range configuration	• BeanDevice® AX-3DS 24G : ±6g or ±12g or ±24g				
	• BeanDevice® AX-3DS 8G : ±2g or ±4g or ±8g				
Shock detection configuration	Click on modify, a new window will open.				



Beanair GmbH

1	Changes the accelerometer bandwidth du	ring the sleep period of the BeanDevice [®] : accelerometer during the sleep period, the ry:					
	Accelerometer sampling rate during sleep period	BeanDevice [®] Current consumption					
	0,5 Hz	21 μΑ					
	1 Hz	31 μΑ					
	2 Hz	50 μΑ					
	5 Hz	78 μΑ					
	10 Hz	130 μA					
	50 Hz	302 μA					
	100 Hz	308 μA					
	400 Hz	343µA					
	1000 Hz	413 μΑ					
2	The user can select two events profile <i>Eve</i>	nt 1 and Event 2.					
З	<i>Event combination</i> The user can use two logical combinations: <i>AND</i> and <i>OR</i> combination on the axis event selection.						
4	Set the shock detection thresholdUnit value: gThe threshold resolution depends highly on the acceleration range.On the axis event selection frame, if the high axis is selected, the threshold value will bepositive.If the Low axis is selected, the threshold value will be negative. <u>Example</u> : For a threshold value settled at 2g, if X High Axis <u>OR</u> X Low Axis is selected.For all the values upper than 2g on the X Axis, a shock event is detected						



	+ Range_MAX					
	+TH_VAL					
	Measurement is OK					
	- TH_VAL					
	Shock Detection Area					
	- Range_MIN					
	 The user selects a high event on the axis (+TH_VALUE), a shock is detected if the threshold value +TH_VALUE is reached: 					
	Hysteresis					
6	The user can fix an hysteresis on threshold value					
	The resolution depends on the accelerometer bandwidth during sleep or deep sleep.					
	VALIDATE					
7	Click here to validate your new configuration					
	RESET					
8	Click to restore a default configuration					
9	CANCEL Click here to cancel your configuration					

Depending on your sensor resolution, the displayed threshold value can differ from the reference value.

7.4.2.6 Tab : Sensor calibration

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

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

<u>AX-3D sensor calibration tab description</u>

Ser	nsor Config					
Custom display	Notes	Alarm level Config	Se	nsor calibration	Log config.	
Current Ratio: Current Offset:	1			Ratio: Offset:		
					Va	lidate

Figure 68: AX-3D Sensor calibration tab

• AX-3D-SR sensor calibration tab description

Ser	nsor Config					
Custom display	Notes	Alarm level Config	Calib. ±12g		Calib. ±2.4g	Log config.
Current Ratio: Current Offset:	1,0016 0,0036			Ratio: Offset:	Validate	

Figure 69: AX-3D-SR sensor calibration 1.2g measurement range

Smart	Sensor User Manua	al			2.4GHz w	vireless sensors	
	(Ser	nsor Config					
	Custom display	Notes	Alarm level Config	Calib. ±1.2g	Calib. ±2.4g	Log config.	
	Current Ratio:	0,9986		Ratio			
	Current Offset:	(0,0036)	Uffset	: [
					Validate		
	<u>Fi</u> g	gure 70: /	4X-3D-SR sensor co	alibration 2.4g me	asurement range		
The Bea	anScape [®] provide	s a calib	ration interface f	or each measure	ment channel:		
	Ratio: multiplier	coefficie	nt				
	Offset : adder/sub	otracted	coefficient. its ur	nit is the sensor u	nit		
	Ca	libratea	l value = (Ratio x	Non_Calibrated	_Value) + Offset		
Ent	er the calibration	coefficie	ents and then clic	k on validate.			
lost if t	The calibration he BeanDevice® i	ns coeffi s switch	cients are backed ed off	d up on the Bean	Device® flash mer	mory, and cannot be	
7.4.2.7	Tab: Log configi	uration					
	This tab should i	not be co	nfused with the Do	atalogger feature	available on the Be	anDevice®:	
(Sensor Config]					
Custum	n display Notes		Alarm level Config	Sensor calibration	Log config.		
L	.og filename root: NA						
Log o	configuration						
	Log enabled				The file name will be cha	anged only if the	
	Log filename auto.				separated files generati	ion is enabled.	
			\ Va	alidate			
			Figure 71: Lo	g configuration ta	<u>b</u>		
By default, Log file name is built with the measurement channel & BeanDevice® MAC Address:							
< Se	ensor Channel Num	ber > < N	/IAC_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



The file name will be changed only if the separated files generation option was selected.

7.4.2.8 Right Click functionalities

Graphic BeanScape[®] offers access to quick functionalities in relation to Sensor channels. By using the mouse, Right Click on the channel under the BeanDevice[®] profile then you can quickly:

- Change State to: off
- Change Sensor Label
- Disable Log



Figure 72: Right Click on the Sensor's Channel

7.4.3 Graphical display



By selecting the suitable sensor's channel, user will get this view on his BeanScape® software.

Figure 73: Overview: Channel acquisition graph visualization of the AX-3D



Figure 74: Real-time graph of the temperature channel on the AX-3D-SR

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

📾 Beanscape 2.4GHz



Figure 75: Sensor profile ON/OFF display button



Figure 76: Wide view of the graph

The chart is composed of two parts:

- **Part 1**: This is a preview window, allowing you to observe sensors acquisitions.
- **Part 2**: A strip on the side composed of different frames allows customizing the graph.



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



Figure 77: Example: Graph visualization

7.4.3.1 Frame: Display

Electric	v
BlackSteel	
BrightSpark	
Chrome	
Electric	
ExpressionDark	
ExpressionLight	
Oscilloscope	

Figure 78: Graph measure mode: Frame Display

7.4.3.2 Frame: Marks

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

Circle	Ś
None	
Square	
Circle	

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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7.4.3.3 Frame : Scale

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

Extents Zoom	Ŷ
Extents Zoom	
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:

- **Case 1**: Case "Zoom X" ticked. The graph zoom will only affect the X axis.
- **Case 2**: 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

Custum display	Notes	Data Acq. config.	Sensor Config
Datalogger	System config.	Power mode managt	Online Data Analysis
DataLogger status			
DataLogg	er status: Ready		
Download	progress:	NA	
Downloa	ad status: NA		
DataLogger manager			
	Stop	Erase	
Download manager			
Download	Download	d then erase	Cancel
	Stop DAQ, downl	oad then erase	
DataLogger memory co	nfiguration		
O "Stop DAQ" record	ing 🔿 "Stop at e	nd" recording	
○ "Stop DAQ DE" rec	cording		Validate

Figure 80: BeanDevice® Datalogger tab

Please read the technical note TN_RF_007 – "BeanDevice® datalogger User Guide "

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SmartSensor User Manual

7.6 OPTIONS FOR LOG FILE GENERATION & FOLDER ORGANIZATION

7.6.1 Log file system overview



7.6.2 Log file directory

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

Click on the tab Tools then Options to configure advanced settings in *BeanScape®*:



Figure 81: BeanScape® configuration menu

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

✓ A second window is displayed:

BeanScape Configuration		x
Log		
Keep Alive App	Log directory : C:\log_beanscape	
TCP/UDP	Stop loggin when disc space is 2048 😽 MB	_
Sustam	Main Log filename : LOG	
System	Main log max. size : 200 🗢	
Data cache	Sensor Log enabled : 🗹	
Data Logger	Sensor log max. size (KB) : 📃 1024 🔶	
Gravity	Network log info. enabled : 🗹	
StartUp	Network info log max. size (KB) : 📃 1024 😂	
Data and Time Format	BGw Module Log enabled : 🔽	
Date and time ronnat	BGw Module log max. size (KB) : 📃 1024 🚭	
Language	Syst. Maint. Status Log enabled : 🛛 🗹	
Precision	Syst. Maint. Status log max size (KB) : 📃 1024 🗲	
	Log file generation igodot All sensor channels in one file	
	O Separated	
	Streaming log max. size (KB) : 📃 2048 🗲	
	Reload Apply Save Rese	t

Figure 82: BeanScape® configuration window

✓ Clicking the button

Reset

reverts back to its original configuration.

7.6.3 Log folder

By Default, log files linked to the *BeanDevice*[®] 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**[®] profile:

Datalogger	System config.	Power mode managt	Online Data Analysis
Custum display	Notes	Data Acq. config.	Sensor Config
Location :	Device Location		
Label: (MAC_ID : 0 x 00158D0000	10E1049	
Log folder:	Folder 1049		
	Valid	late	

Figure 83: BeanDevice® Custom Display tab

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

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

Location :	Device Location
Label:	MAC_ID : 0 x 00158D00000E1049
Log folder:	Factory2



7.6.4 Log file size configuration



Figure 85: Logfile settings

- ✓ *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 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)
- Precision: change the device precision for measurements and calibration process.

7.6.5 All sensor channels in one log file

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[®].

BeanScape Configuration	×
Log	
Keep Alive App	Log directory : C:\log_beanscape
TCP/UDP	Stop loggin when disc space is 2048 MB
System	Main Log Tilename : Luo
Data cache	
Data Lagger	
Data Logger	
Gravity	
StartUp	BGw Module I og enabled : 🔽
Date and Time Format	BGw Module log max. size (KB) : 1024 🚭
Language	Syst. Maint. Status Log enabled : 🗹
Precision	Syst. Maint. Status log max size (KB) : 1024 🚭
	Log file generation igodot All sensor channels in one file
	O Separated
	Streaming log max. size (KB) : 2048 🗲
	Reload Apply Save Reset

Figure 86: Log file generation options

You should have all channels data recorded in one single file located in your C:\log_beanscape directory



Figure 87: Example of Log file

7.6.6 Cache Data configuration (for Graph)

BeanScape Configuration				×
Log Keep Alive App TCP/UDP System	Max. BGw	Max. points : Max. packets : Max. diagnostics : Module status nbr. :	3000 ♀ 6 ♀ 1000 ♀ 100 ♀	
Data cache	Syst. Mai	nt. Status max nbr :	500 ᅌ	
Data Logger		Max. alarms :	25 ≎	
Gravity	Мах	x. streaming points :	5000 ᅌ	
StartUp				
Date and Time Format				
Language				
Precision				
	Reload	Apply	Save	Reset

Figure 88: 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 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.

7.6.7 Data acquisition Log file

7.6.7.1 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:

Beanscape 2. File BeanSc	4GHz ape® App Tools Off.Data Analysis View Hel	
	Server Image: Start Image: Start	Bashboard Sensor Corrig Sensor Channel Status Sensor Corrig Label: (D.2.) Nami level Status [g] Ichronicgy: (W-30) Nam: (1852) Alarm: (1852) Alert: (1.441) Istate: 0 In physical status 0 Istate: 0
Clic	k on sensor channel profile	Click on Log Config tab on BeanScape®



Si	ensor Config				
ensor labelling	Notes	Alarm level Config	Sensor calibration	Log config.	
Log filename	root: (Transmit_	LowDutyCycle_Ch_Z_MAC_ID) : 0 x 00158D00000E10	49	
Log configuration					
🖌 Log enable	d		🕛 Th	e file name will be cha	nged only if the
🗸 Log filenar	ne auto.		SE	parated files generation	on is enabled.
		Vali	idate		



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 This option is working only with separated files option

7.6.7.2 Specific case: log filename creation in "Streaming" mode

In streaming mode, log filename is built as follow (separated channels):

Transmit_Streaming_Sensor_channel_MAC_ID_DATE

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

Example:

Transmit_Streaming_Ch_X_MAC_ID0_x_00158D00000E06A8_2018-10-24_11-42-31.txt 24/10/2018	8 11:45 1 Ko
Transmit_Streaming_Ch_Y_MAC_ID0_x_00158D00000E06A8_2018-10-24_11-42-31.txt 24/10/2018	8 11:45 1 Ko
Transmit_Streaming_Ch_Z_MAC_ID0_x_00158D00000E06A8_2018-10-24_11-42-31.txt 24/10/2018	8 11:45 1 Ko
Transmit_Streaming_Ch_X_MAC_ID0_x_00158D00000E06A8_2018-10-24_11-45-14.txt 24/10/2018	8 11:47 192 Ko
Transmit_Streaming_Ch_Y_MAC_ID0_x_00158D00000E06A8_2018-10-24_11-45-14.txt 24/10/2018	8 11:47 185 Ko
Transmit_Streaming_Ch_Z_MAC_ID0_x_00158D00000E06A8_2018-10-24_11-45-14.txt 24/10/2018	8 11:47 181 Ko

In streaming mode, log filename is built as follow (all channels in one file):

Transmit_Streaming_Sensor_channel_MAC_ID_DATE_PART

- ✓ 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_MacId_00158D00000E06A8_24_10_2018_11_42_31_part1.txt	24/10/2018 11:44	2,064 Ko
Transmit_Streaming_MacId_00158D00000E06A8_24_10_2018_11_42_31_part2.txt	24/10/2018 11:44	174 Ko

7.6.7.3 Log file analysis

```
Transmit_Streaming_Ch_Z_MAC_ID__0_x_5C313E06A9A70000_12_11_2020_4_25_01_PM.txt - Notepad
File Edit Format View Help
BeanDevice : AX 3D
Range for accelerometer: -2g / +2g
Mac Id : 5C313E06A9A70000
Network Id : 0121
Pan Id : FFFE
Measure mode : Streaming
Streaming Options : Continuous Monitoring
Sensor Id : 0
Sensor Label : Ch_Z
Ratio : 1
Offset : 0
Unit for accelerometer : g
DATE_FORMAT : M/d/yyyy h:mm:ss tt.fff
Date : 12/11/2020 4:25:01 PM.110
Sampling rate : 10
TimeStamp;Measure
0;0.783
1;0.782
2;0.781
3;0.782
4;0.784
5;0.783
6;0.783
7:0.784
```

Figure 91: Log file example (Streaming mode)

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.

7.6.8 Log file related to Wireless Network diagnostic

7.6.8.1 Log filename organization

Wireless Diagnostic log filename is built as follow:

MAC_ID_WirelessNetwkInfo

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

```
7.6.8.2 Log file analysis
```

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

- Date : diagnostic date
- LQI TX: Link quality indicator on the BeanDevice[®] side
- LQI RX: Link quality indicator on the BeanGateway[®] side
- Local PER TX: Local Packet Error Rate on the BeanDevice[®] side
- Local PER Rx: Local Packet Error Rate on the BeanGateway[®] side
- Global PER: N.A.
- Battery voltage: internal battery voltage
- Battery level: battery level of charge
- Internal temperature: Local temperature of the BeanDevice[®]

III 00158D00000E1049_WirelessNetwkInfo.txt - Notepad	—	\times
File Edit Format View Help		
BeanComponent Wireless Network Information		
DATE_FORMAT : M/d/yyyy h:mm:ss tt		
Date : 12/14/2020 9:06:01 AM		
PAN_ID : 391A		
MAC ID : 00158D00000E1049		

Date ; LQI Tx ; LQI Rx ; Local PER Tx ; Local PER Rx ; Battery Voltage ; Battery Level ; Internal Temperature ; DisableDischarge ;

12/14/2020 9:05:58 AM;132;0;3.57;0;4.226;97.91;17.000;N;N;N;N;N;N;N;0.00 12/14/2020 9:06:48 AM;180;0;1.86;0;4.226;97.91;17.500;N;N;N;N;N;N;N;0.00 12/14/2020 9:07:38 AM;90;0;1.26;0;4.226;97.91;18.000;N;N;N;N;N;N;N;0.00 12/14/2020 9:08:28 AM;96;0;1.91;0;4.226;97.91;18.125;N;N;N;N;N;N;N;0.00 12/14/2020 9:09:18 AM;174;0;2.3;0;4.226;97.91;18.500;N;N;N;N;N;N;N;0.00

Figure 92: Wireless Network Info log file

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

- Battery voltage
- Battery level
- Internal temperature

00158D00000E1049_WirelessNetwkInfo.txt - Notepad	-		\times
File Edit Format View Help			
BeanComponent Wireless Network Information DATE_FORMAT : M/d/yyyy h:mm:ss tt Date : 12/14/2020 9:06:01 AM PAN_ID : 391A MAC_ID : 00158D00000E1049			
Date ; LQI Tx ; LQI Rx ; Local PER Tx ; Local PER Rx ; Battery Voltage ; Battery Level ; Internal Temperature ; Disat	leDis	charge	2;
12/14/2020 9:05:58 AM;132;0;3.57;0;4.226;97.91;17.000;N;N;N;N;N;N;0.00			

12/14/2020 9:06:38 AM;182;0;1.57;0;4:226;97.91;17.500;N;N;N;N;N;N;N;0:00 12/14/2020 9:06:48 AM;180;0;1.86;0;4.226;97.91;17.500;N;N;N;N;N;N;N;0:00 12/14/2020 9:07:38 AM;90;0;1.26;0;4.226;97.91;18.000;N;N;N;N;N;N;N;0:00 12/14/2020 9:08:28 AM;96;0;1.91;0;4.226;97.91;18.125;N;N;N;N;N;N;N;0:00 12/14/2020 9:09:18 AM;174;0;2.3;0;4.226;97.91;18.500;N;N;N;N;N;N;N;0:00

7.6.8.3 How to open a measurement file with excel

Step 1 : Open Excel

SmartSensor User Manual

X	- 19 - 1	(1 - 17								Book1 -	Microsoft I	Excel								_	- @ XX
Fil	e Ho	me I	nsert Pa	age Layout	Formulas	Data R	eview	View Ni	uance PDF											۵ 🕜	- 8 23
Fror	n From	From F Text	From Other Sources *	Existing Connections	Refresh All •	Connections Properties Edit Links	Z↓ A Z↓ So	rt Filter	K Clear Reapply	Text to Column	Remove	Data Validation	Consolidate	What-If	Group	Ungroup Su	btotal	♥∃ Show Detail ■∃ Hide Detail			
		Get Exte	rnal Data		Conr	nections		Sort & F	ilter			Data Too	ls			Outl	ine	Fai			
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2																					
3																					
4																					

Step 2: Go on « Data » Tab, then select "From Text"

X [19 - 1	(21 - ∓							Book1 -	Microsoft E	xcel									23 🖷 🗆
File	Ho	ome Insert P	age Layout	Formulas	Data Re	eview \	/iew Nu	ance PDF											۵ 🕜	- 7 23
From	From s Web	From Text	Existing Connections	Refresh All *	Connections Properties Edit Links	Ž↓ <u>Z</u> Z↓ Sor	t Filter	Clear Reapply Advance	d Text to Column	Remove ns Duplicates	Data Validation	Consolidat	What-If Analysis *	Group U	Ingroup Sub	●∃ Sh ■∃ Hit total	ow Detail le Detail			
		Get External Data		Con	nections		Sort & Fi	Iter			Data Too	ls			Outlin	ne	Gi .			
	A1	Get External Data F	rom Text																	~
	А	Import data from a	a text file.	E	F	G	н	1	J	K	L	М	N	0	Р	Q	R	S	-5	U 🚡
1		Press F1 for mo	ve heln																	
2		••••••																		
3																				

Step 3 : Choose your log file

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File Home Insert	Page Layout Fo	ormulas Data Review View Nuance PDF	
From From From Text Sour Get External D	Other Existing F Connections	Connections 21 22 Transformed Text Properties 21 Sort Filter Clear Text Import Text File	Remove Data Consolidate What If Group Ungroup Subtotal
A1 - (fx	Look in: 🔄 log_beanscape	Q·2 × 1 = ·
A B 1	C D	Mess € Disclup € D	(0 × 2,0 × 0015800000AD55E (0 × 2,0 × 0015800000AD55E (0 × 2,0 × 0015800000AA23 (0 × 2,0 × 0015800000AA23 (0 × 0,0 × 00158000000AA23 (0 × 0,0 × 00158000000A35 (0 × 0,0 × 0,0 × 00158000000A35 (0 × 0,0 × 0,0 × 001580000000000000000000000000000000000

2.4GHz wireless sensors

<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:

🗶 i 🛃 =9 - (*	* 🖛 Booki -	Microsoft	Excel								-	. F 13
File Hom	to local Data Lauret Econolise Data Barlaw Man Masara DDE										ه 🕜 ه	- # X
A) A) A	Text Import Wizard - Step 1 of 3	3			100	• 58	9 <u>0</u> 3 .51	9] she	w Detail			
_ <u>A</u>	The Text Wilzard has determined that your data is Delmited.		-0		 5	20	1 B	Ш - на	e Detail			
From From I	If this is correct, choose Next, or choose the data type that best describes your data.	Remov	e Data	Consolida	ste What-If	Group U	ngroup Sub	total				
HOUSE THEN	Criginal data type	Copincar	Data Top	ols	Period to 1		Outlin	e	5			
A1	Choose the file type that best describes your data:										_	~
	Qelimited Characters such as commas or tabs separate each field.					-	-	-	-		2	
A	O Fixed width - Fields are aligned in columns with spaces between each field.	K	L	M	N	0	P	Q	ĸ	5	52	U 🔺
-												
2	Start import at gow: 1 🔅 File grigin: MS-DOS (PC-8)											
3												
5												
5	Preview of file C: ljog_beanscape\0 x 0_0 x 00158D00000AA9E7.txt.											
7												
8	2 BeanSensor SUN											
9	3 Date : 12/01/2012 15:48:22											
10	4 PAN_ID : 2506 S NAC ID : 00150D00000A8E7											
11	c 3											
12												
13	Cancel < Back Next > Enish											
14												
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26	et1 Sheet2 Sheet3 1			14								- ¥
Ready	ALL ALLER T BUILDED T BUILDED									1 100% (

Select semicolon

ext Import Wizard - Step 2 of 3	×
his screen lets you set the delimiters your data contains. You can see how your text is affected in the preview elow.	
Delimiters [Tab] Semicolon Comma Space Other:	
Data greview	
Date : 12/01/2012 15:48:22 PAN_ID : 2806 MAC_ID : 00158D00000AA9E7	
Cancel < Back Next > Einish	

Select Text

Column data format O <u>G</u> eneral O Tayt	'General' converts numeric values to numbers, date val	ues to date
O Date: MDY ✓	all remaining values to text. <u>A</u> dvanced	
() Do not import column (skip)		
O Do not import column (skip)		
O Do not import column (skip)		
O Do not import column (skip) Data preview		
O Do not import column (skip) Data greview		

SmartSensor User Manual			2.4GHz wireless sensors	
Click on OK				
	Import Data	?	×	
	Select how you want to view this data in Table PivotTable Report PivotChart Only Create Connection Where do you want to put the data? Existing worksheet: =SAS1 New worksheet Add this data to the Data Model Properties	n your wo	ncel	
Click on format cells:				

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File	Home I	insert Pag	e Layout Formula	s Data Review	View	Nuance PD	F										۵ (3 - 🗗 X
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	A) []	C D	E	F	G	Н	1	J	К	L	м	N	0	Р	62	R -
1 2 Ti	meStamp	Date	Cu <u>t</u> <u>Copy</u> Paste Options:	asure	-		5				K	-						
4	1.29709E+17	1		38														
5	1,29709E+17	1	Paste Special	45														
6	1,29709E+17	1	Incert	126														
7	1,29709E+17	1	Delete	129														
8	1,29709E+17	1	Class Contents	5														
9	1,29709E+17	7 1	clear co <u>n</u> tents															
10	1,29709E+17	1	Format Cells	109														
11	1,29709E+17	1	<u>C</u> olumn Width	103														
12	1,29709E+17	1	Hide	103														
13	1,29709E+17	1	<u>U</u> nhide	104														
14	1,29709E+17		2/01/2012 15:50:00	102														
15	1,29709E+17		2/01/2012 15:50:10	105														
10	1,29709E+17		2/01/2012 15:50:20	102														
10	1,29709E+17	1	2/01/2012 15:50:50	101														
10	1,29709E+17	1	2/01/2012 15:50:40	101														
20	1,29709E+17	1	2/01/2012 15:51:00	102														
21	1.29709E+17	1	2/01/2012 15:51:10	101														
22	1,29709E+17	1	2/01/2012 15:51:20	101														
23	1,29709E+17	1	2/01/2012 15:51:30	101														
24	1,29709E+17	1	2/01/2012 15:51:40	102														
25	1,29709E+17	1	2/01/2012 15:51:50	104														
26	1 29709E+17		2/01/2012 15:52:00	100														▼
Rendu	sneet1	Sneet2 / Sh									A1	verage 12/01	1/2012 22:21.	25 Count	256 100 00	100%	0	

See "Exporting a log file to Excel" YouTube video

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7.6.8.4 Calibration Settings log file

Once you connect the BeanDevice[®] to the BeanGateway[®] for the first time, all the calibration values will be backed up in the Calibration settings log file inside the BeanDevice folder.



Figure 93: Calibration log file

If you change the your BeanDevice[®] calibration values, you can easily retrieve them from the calibration settings log file.

8. ALARM MANAGEMENT

8.1 EMAIL CONFIG

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

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



Figure 94: Alarm management menu

A new window will pop up with **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					

Alarm Manage	ement								×
Email Config.	DAQ Alarm		Health Status	SSD DAQ Mode	Alarm DAQ Mode	File Format	DIN 4150-3 Config	Crash report	
🖌 Enable Noti	ification by emai	I							
Note: Require	d Fields are mark	ed with *							
	From*: (host@h	ost.com						
	To Contact 1 : (host@h	ost.com						
	To Contact 2 : (host@h	ost.com						
	To Contact 3 : (host@h	ost.com						
	Smtp Server*: (smtpse	ver	Port*:	25 🔶				
	User Name*: (userNar	ne						
	Password*:	•••••	•••						
SMTP Test									
				(Validate				

Figure 95: Alarm management window





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

8.2 DAQ ALARM

The **DAQ alarm** is related to the **S.E.T mode**, you can select Report format (word, PDF, png) and the specific Report/File related to the S.E.T mode to be sent via email.

Alarm Managemer	nt		
Email Config.	DAQ Alarm	Health Status	SSD DAQ Mod
Email alarm for S.E	.T. mode		
Send Waveforr	m Log file		
Send Waveforr	n Report		
Send FFT Repo	ort		
Send DIN Repo	ort		
Send FFT Log f	file		
Send velocity	Log file		
Send PPV Log	file		

Figure 96: Frame: Email alarm for S.E.T mode



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



See «S.E.T mode for 2.4GHz» Youtube video

If a threshold is reached, it is possible to have audio alarm on your PC, it is also possible to import your own MP3 sound.





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8.3 SSD DAQ MODE

To enable email notification for Smart Shock Detection, navigate to SSD DAQ Mode tab check Enable email, for Audio notification on PC check Enable Notif/Sound

Alarm Managemer	nt				
Email Config. Alert for SSD	DAQ Alarm	Health Status Vo	SSD DAQ Mode ice / Sound Configurati	Alarm DAQ Mode	File Format
 ✓ Enable email ✓ Enable Notif/S 	Sound		Bip Bip Voice MP3		

To Test your Configuration, you can send a test email by clicking on SMTP Test, if everything is ok, you will receive a validation email then Validate and close the window.

SMTP Test	
	Validate
Figure 99: Alarm Mailing SMTP Test	

8.4 ALARM DAQ MODE

To enable email notification for Alarm mode, navigate to Alarm DAQ Mode tab check Enable email, for Audio notification on PC check Enable Notif/Sound

Email Config.	DAQ Alarm	Health Status	SSD DAQ Mode	Alarm DAQ Mode	File Format
Email alarm for Al	larm mode	,	Voice / Sound Configura	ation	
Enable emai	l /Sound		Bip Bip Voice MP3	~	
		Figure 100: Emai	l alarm for Alarm r	node	

Figure 98: Email alarm for Shock detection

SmartSensor User Manual	2.4GHz wireless sensors							
To Test your Configuration, you can send a test email by clicking of	on SMTP Test, if everything is ok, you							
will receive a validation email then Validate and close the window	1.							
SMTP Test								
	Validate							
Figure 101: Alarm Mailing SMTP	Test							
8.5 SYSTEM ALARM								

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

Alarm Managemer	nt							×
Email Config.	DAQ Alarm	Health Status	SSD DAQ Mode	Alarm DAQ Mode	File Format	DIN 4150-3 Config	Crash report	
Health Status						Voice / Sound Con	figuratior	
Enable email								
Send System L	og file					Enable Notif	f/Sound for Health Stat	us
Alarm configuratio	n for internal Temperat	ure	Alarm configuratio	n for PER (Packet Error	Rate)	Enable Noti	f/Sound for Datalogger	
Min 20	°C Max	60 °C	Min 0	% Max	%	Bip	~	
Alarm configuratio	in for Battery Level		Alarm configuratio	n for LQI (Link Quality I	ndicator)			
Min 3	VDC Max	4 VOC	Min (125	pts Max	255 pts			
Alert for Datalogger						L		
Enable email								
Validate								

Figure 102: BeanDevice® Health Status management

- Internal temperature: email notification if the internal temperature reached the pre-defined levels.
- **Battery level**: email notification if the battery level reached the pre-defined minimum and maximum voltages.
- Packer error rate (PER): email notification if the PER reaches the pre-defined levels
- Link quality indicator (LQI): email notification when the LQI reaches the pre-defined levels

Check Send System Log file to receive all the related information within a log file.

✓ Enable email	
Send System Log file	
Alarm configuration for internal Temperature Min 20 °C Max 60 °C	Alarm configuration for PER (Packet Error Rate) Min 0 % Max 10 %
Alarm configuration for Battery Level Min 3 VDC Max 4 VDC	Alarm configuration for LQI (Link Quality Indicator) Min 125 pts Max 255 pts Max 255

Figure 103: System Alarm Settings

From System Alarm, user can receive Alert for Datalogger by enabling Notification or Emails, also receiving Alert for Diagnostic.

ert for Datalogger		
Enable email		
	Voice / Sound Configuration	
	Enable Notif/Sound for Health Status	
	Enable Notif/Sound for Datalogger	
	Bip 🗸	
	Bip	
	МРЗ	
Figure 104	I: Enable/Disable Notif/mail for Diagnostic and Datalog	<u>ler</u>

8.6 FILE FORMAT

In this area, user can choose the report format and apply a custom document header setting as uploading a logo and other textual information related to monitoring site:

Alarm Manager	nent						
Email Config.	DAQ Alarm	Health Status	SSD DAQ Mode	Alarm DAQ Mode	File Format	DIN 4150-3 Config	Crash report
Report and Alarm	ns File Format						
Report Format:		PDF	×				
Document Heade		WORD					
		PDF					
		<u>F</u>	igure 105: File	Format sett	tings		
nair GmbH					"Rethi	nking sensing t	echnology"

- Logo: Choose a picture to define it as a logo
- **User Name:** Use a specific User name
- Monitoring Site: Name you Monitoring Site
- Location: Your Monitoring Site location

Document Header	
Logo:	Browse
User Name:	
Monitoring Site:	
Location:	

Figure 106: Alarm Note settings

8.7 DIN 4150-30 CONFIGURATION

Din 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.

You can select 3 Building types from the list: Commercial, Dwellings and Non_Classified.

For the Pipe material, the list contains: Steel, Clay Concrete and Masonry Plastic.

Ala	rm Managemer	nt						x
Ema	il Config.	DAQ Alarm	Health Status	SSD DAQ Mode	Alarm DAQ Mode	File Format	DIN 4150-3 Config Crash report	
	DIN Config Building Pipe mat	type: Commercial erial: Steel		* *		Building type: Pipe material:	Commercial Commercial Dwellings Non_Classified	
	Apply	Sa	ve	Reset		Pipe material:	Steel Steel Clay,Concrete Masonry,Plastic	
				Figure 107	<u>: DIN 4150-3</u>	Configurat	ion	

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	Ch_X	Ch_Y	Ch_Z
Building Type	Commercial	Commercial	Commercial
Pipeline Material	Steel	Steel	Steel
Velocity Average(mm/s)	0.0031145223880597	0.00540280099502487	-0 0036633432835820

=====> NO acceleration event occurred - monit ------ DIN Report ----Building type = Dwellings Pipeline Material = Masonry,Plastic Velocity Average (mm/s) = -0.0007515524999999

Figure 109: Building type & Pipeline Material on the Velocity Log file

8.8 CRASH REPORT

If the software crashes down, the user can send us a detailed report within all the information related to this crash.

Alarm Management

Email Config.	DAQ Alarm	Health Status	SSD DAQ Mode	Alarm DAQ Mode	File Format	DIN 4150-3 Config	Crash report		
✓ Send crash report to BeanScape Tech Team									
Note: Required Field	ds are marked with *								
Company Name*:	CompanyName								
User Name:	CompanyUserNam	IE							
To (for test purpos	To (for test purpos host@host.com								
	Validate								

Figure 110: Crash Report settings

9. TOOLS TAB

Many features are available in the tools tab, so user has access to several options and configurations related to BeanScape[®] & BeanDevice[®] management.



Figure 111: Tools tab main menu

9.1 BEANSCAPE® CONFIGURATION

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

9.1.1 Log file configuration

Here the user can manage the log file size, log file name, log file generation option and so on.



Figure 112: Log file configuration

9.1.2 Keep Alive App

BeanScape Configuration	x
Log	V 10 1 1 -
Keep Alive App	Keep Alive App enabled : 🗹
TCP/UDP	KAA interval (ms) : 4000 🗣
System	Max. retry nbr : 7 🚭

Figure 113: Keep Alive app

Three parameters related to keepalive are available:

- Keep alive timeout is the duration between two keep alive transmissions in idle condition. TCP 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, if 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 is not available.

Keepalive packet contains null data. In a TCP/IP over Ethernet network, a keepalive frame is of 60 bytes, while acknowledge to this also null data frame and is of 54 bytes.

9.1.3 BeanGateway[®] Configuration via TCP/UDP

User can change the TCP/UDP ports and UDP server. By default, the TCP port is set to 5313, UDP port 53130 and the UDP server is 127.0.0.1

BeanScape Configuration	×
Log Keep Alive App	BeanGateway configuration via Udp :
TCP/UDP	Udp port : 53130 🚭
System Data cache	
Data Logger	UDP Server Config
StartUp	UDP Server : 127.0.0.1



9.1.4 System Configuration

BeanScape Configuration		x
Log Keep Alive App TCP/UDP System	System clock transmission enabled ✓ Clock transmission interval (sec) : 3600 🐳 Alarm automatic display : ✓ Alarm => sound effect : ✓	

Figure 115: System Config

- ✓ *System clock transmission enabled:* Check this box to enable the system clock transmission.
- ✓ *Clock transmission interval:* Choose the clock transmission interval in seconds.
- Alarm automatic display: Check this box if you want to see an alarm window displayed automatically when a window alarm threshold is exceeded.
- ✓ *Alarm* → *Sound Effect:* Check this box if you want to hear a sound effect when a threshold is exceeded.

9.1.5 Data cache configuration

BeanScape Configuration	x
Log	и Голо А
Keep Alive App	Max. points : 5000 🔽
TCP/UDP	Max. diagnostics : 1000 🚭
System	Max. BGw Module status nbr. :
Data cache	Syst. Maint. Status max nbr : 🚺 500 🖨
Data Logger	Max. alarms : 25 🜩
StartUp	Max. streaming points : 5000 🗲

Figure 116: Data Cache configuration

- 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 BGw Module status number: Set here the maximum number of modules displayed on the BeanGateway[®] Status graph on BeanScape[®] graph

- System Maint Status max number: Set here the maximum number of points displayed on the BeanGateway[®] Status graph on BeanScape[®] graph
- Max. alarms: Set here the maximum alarms number
- Max. Streaming points: Set here the maximum streaming points number.

9.1.6 Data Logger configuration

BeanScape Configuration	x
Log	
Keep Alive App	DataLogger Auto Download 🔽
TCP/UDP	
System	
Data cache	
Data Logger	



Check the data logger downloader check box to enable the automatic downloading process once, you start the connection.

9.1.7 Startup

BeanScape Configuration	x
Log	
Keep Alive App	Enable Autostart Beanscape :
TCP/UDP	
System	
Data cache	
Data Logger	
StartUp	

Figure 118: BeanScape® startup

Check the AutoStart check box to enable auto launch BeanScape® software once you start your PC.

9.1.8 Date & Time format

BeanScape Configuration	
Log	
Keep Alive App	Format M/d/yyyy h:mm:ss tt 🗸 🗸
	M/d/yyyy h:mm:ss tt
	Example: dd/MM/yyyy HH:mm:ss
System	MM/dd/yyyy HH:mm:ss
	yyyy/MM/dd HH:mm:ss
Data cache	yyyy/dd/MM HH:mm:ss
Data Logger	dd/MM/yy HH:mm:ss
Data 20390	MM/dd/yy HH:mm:ss
StartUp	
Date and Time Format	

Figure 119: Date & time settings

Select the suitable date and time format from the scroll down menu then validate.

9.1.9 Language

BeanScape Configuration		x
Log	Current Language : Automatic(System Language)	
Keep Alive App		
TCP/UDP	Language : Automatic(System Language) 🗸 🤟	
System	Automatic(System Language)	
System	English	
Data cache	French	
Data Logger	Japanese	
Startlin	Chinese	
Startop	Polish	
Date and Time Format		
Language		

Figure 120: BeanScape® language

BeanScape® software support several languages, select your suitable one from the scroll down list.

9.1.10 Precision

BeanScape Configuration		x					
Log	Precision for measurement and calibration						
Keep Alive App	Anxx : 4 4						
TCP/UDP							
System							
Data cache	Inc : 4 4 🗲						
Data Logger	OneTxx : 2 2 🗲						
Gravity	Precision for data analysys						
StartUp	Velocity/PPV/RMS/Displacement : 5						
Date and Time Format							
Language							
Precision							

You can change the precision based on your BeanDevice platform. The maximum number of digits is 6.

📾 Beanscape 2.4GHz								
File	BeanScape® App		Тоо	Off.Data Analy	sis View	Help		
				BeanScape® configuration				
		Serve		Alarm Window				
				BeanGateway Ethernet/LAN Config.				
			Import/Export user settings					
		MA		Alarm Management				
			Notification Management					
		MA		Offline graph				
		0	Date conversion					
			Advanced Settings					
			BeanScape Client Management					
			FTP Configuration					
				PC Management	:			

9.2 ALARM WINDOW

Figure 121: Alarm Window

All the Alarm events will be displayed on the alarm window with the corresponding date and time and on which sensor the alarm was occurred.

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Figure 122: Alarm window display

9.3 IMPORT/EXPORT USER SETTINGS

9.3.1 Custom User Configuration

9.3.1.1 Export Function

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



Figure 123: Import/Export feature

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

- Custom User Configuration represent the settings that have relationship with the BeanGateway and the BeanDevices[®].
- BeanScape Configuration is related to BeanScape settings.

Under Custom User Configuration click on *Export*:

Manual	2.4GHz wireless sensors		
Import/Export	x		
Custom User Configuration			
Replace Merge Export	Clear		
DeepCoope Configuration			

Reset

Figure 124: Custom user configuration section

Export

User configuration is exported in XML format:

Import

SmartSensor User

💞 Save As							×
← → • ↑ 🖺	> This	PC > Documents		√ Ö	Search Documents		Q
Organize 🔻 Nev	v folder						?
henrik	^	Name	Da	ate modified	Туре	Size	
JANV		Custom Office Templates	1/2	2/2019 10:03	File folder		
a OneDrive							
💻 This PC							
🗊 3D Objects							
E. Desktop							
Documents							
👆 Downloads							
b Music	~						
File name:	BeanUs	erCustomDB.xml					~
Save as type:							~
 Hide Folders 					Save	Cancel	

Figure 125: user export settings


Figure 126: Custom_DB example

Import Function 9.3.1.2

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

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

Figure 127: Custom user configuration window

By choosing *Merge* function the old Custom_DB will be merged with the new one.

SmartSensor User Manual	2.4GHz wireless sensors
Import/Export	x
Custom User Configuration	
Replace Merge Export	Clear
BeanScape Configuration	
Import Export Reset	
Figure 128: Custom user configuration (merge	2
Click on Clear to clear the Custom_DB.	
Don't try to change manually the XML file, there is a high risk to cor	rupt it.

9.3.2 BeanScape[®] Configuration

9.3.2.1 Export Function

Click on *Export* to export BeanScape configuration

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

Figure 129: Export window for BeanScape Config

BeanScape configuration is exported in XML format:

SmartSensor Us	ser Manual				2.4GHz v	vireless sen	sors	
🖤 Save As								×
← → ` ↑	iis PC > Desktop				~ Ū	Search Desktop		Ą
Organize 👻 New fold	er							?
seif ^	Name	Date modified	Туре 🗸	Size				^
OneDrive	image_2020_02_24T15_45_14_565Z	2/24/2020 4:48 PM	PNG File	120 KB				
T 1: DC	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				
Downloads	Weekly-Report	2/21/2020 2:34 AM	Adobe Acrobat D	82 KB				
Music	LIM-RE-01-ENG-SmartSensor-wireless-ac	2/21/2020 2:22 AM	Adobe Acrobat D	13,855 KB				
Pictures	WILLING UNITED UNITED IN THE AND A STREET WILLING WILL	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: Bean Save as type:	Scape_Configuration.xml					Save	Cance	~ ~ I
9.3.2.2 <u>Import</u> Click on <i>Import</i> to	<u>Figure 130</u> <u>Function</u> o import BeanScape configura): BeanScape	<u>Config expor</u>	<u>tation</u>				
	Import/Export				x			
	Custom User Configuration Replace BeanScape Configuration Import Figure 131: Import	Merge (Export	Export Reset	Clea pe Config	ar			
Click on Reset to	reset the BeanScape configu	ration.						

9.4 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.

MainWindow			x
Enable notification for :	Display Notif:	Log File:	
	II 🔽	🗸 All	
Alarm DAQ on the S.E.T Mode	✓		^
Damaged BeanDevice	✓		
Out of range BeanDevice	✓		
LQI level	✓		
PER level	✓		
Hard Disc space	✓		
Accepted configuration	✓		
Listening cycle change	✓		
Diagnostic cycle change	✓		
Language change:	✓		
Shock detection:	✓		
Alarm detection:	✓		
Connection with BeanGateway closed:	✓		
Full Datalogger memory:	✓	✓	
DataLogger downloader :	✓	✓	
Internal temperature of BeanDevice:	✓	✓	\sim
Save	Reset	Close	

Figure 132: 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.

9.5 OFFLINE GRAPH

Offline Graph gives the ability to read previous measurements files, proceeding by browsing the files and then clicking on view.

Under the Tool menu on the BeanScape[®] software, select Offline Graph option, a new window will pop up, and will be ready to be used to display graphs from the saved measurements.



Figure 133: Offline graph menu on BeanScape®

SmartSensor User Manual		2.4GHz wireless sensors
📲 Offline graph		- 🗆 X
Select Log Files	Show selected graph N* Parts Unit File Name View All Charts Number graph :	
		- 10 0000

Figure 134: Offline graph window

- Chose Grid if you want to see the graphs displayed on a grid
- Chose overlaid if you want to see the graphs displayed overlaid (pick Time for temporal x axis or frequency for frequential x axis)



Figure 135: Grid display of graphs



Figure 136: Overlaid (frequency)display of FFT graphs

9.6 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 the Data Conversion tool.

File Edit Format View HelpI
L
BeanSensor AX-3DBeanSensor AX-3DMac Id : 00158D00000CE454Mac Id : 00158D00000CE454Network Id : 0003Pan Id : 3905Sensor Id : 2Sensor Id : 2Sensor Label : Ch_ZSensor Label : Ch_ZRatio : 1Offset : 0Unit : gUnit : gDate : 10/07/2017 10:32:47Data acquisition cycle : 10Data acquisition cycle : 10Offset : 100Cut off frequency : 1000Cut off frequency : 1000
Mac Id : 00158D00000CE454Mac Id : 00158D00000CE454Network Id : 0003Pan Id : 3905Sensor Id : 2Sensor Id : 2Sensor Label : Ch_ZSensor Label : Ch_ZRatio : 1Offset : 0Unit : gDate : 10/07/2017 10:32:47Data acquisition cycle : 10Data acquisition cycle : 10Data acquisition cycle : 10Cut off frequency : 1000Cut off frequency : 1000Cut off frequency : 1000
Network Id : 0003Network Id : 0003Pan Id : 3905Pan Id : 3905Sensor Id : 2Sensor Id : 2Sensor Label : Ch_ZSensor Label : Ch_ZRatio : 1Offset : 0Unit : gUnit : gDate : 10/07/2017 10:32:47Data acquisition cycle : 10Data acquisition cycle : 10Data acquisition cycle : 10Data acquisition cycle : 10Cut off frequency : 1000
Pan Id : 3905 Sensor Id : 2Pan Id : 3905 Sensor Id : 2Sensor Id : 2 Sensor Label : Ch_ZSensor Id : 2 Sensor Label : Ch_Z Ratio : 1 Offset : 0 Unit : gDate : 10/07/2017 10:32:47Data acquisition cycle : 10 Data acquisition cycle : 10Data acquisition cycle : 10 Data acquisition cycle : 10Cut off frequency : 1000 Cut off frequency : 1000
Sensor Id : 2 Sensor Label : Ch_ZSensor Id : 2 Sensor Label : Ch_Z Ratio : 1 Offset : 0 Unit : gSensor Id : 2 Sensor Label : Ch_Z Ratio : 1 Offset : 0 Unit : g Date : 10/07/2017 10:32:47 Data acquisition cycle : 10 Data acquisition cycle : 10 Data acquisition cycle : 10 Data acquisition cycle : 10 Cut off frequency : 1000
Sensor Label : Ch_ZSensor Label : Ch_ZRatio : 1Offset : 0Offset : 0Unit : gUnit : gDate : 10/07/2017 10:32:47Date : 10/07/2017 10:32:47Data acquisition cycle : 10Data acquisition cycle : 10Cut off frequency : 1000Data acquisition duration : NASampling rate : 100
Ratio : 1Ratio : 1Offset : 0Unit : gDate : 10/07/2017 10:32:47Date : 10/07/2017 10:32:47Data acquisition cycle : 10Data acquisiticy cycle : 10 </td
Ratio : 1offset : 0Offset : 0Unit : gUnit : gDate : 10/07/2017 10:32:47Date : 10/07/2017 10:32:47Data acquisition cycle : 10Data acquisition cycle : 10Data acquisition duration : NASampling rate : 100Cut off frequency : 1000
Offset : 0 Unit : gUnit : g Date : 10/07/2017 10:32:47Date : 10/07/2017 10:32:47Data acquisition cycle : 10 Data acquisition duration : NA Sampling rate : 100 Cut off frequency : 1000
Unit : g Date : 10/07/2017 10:32:47 Data acquisition cycle : 10 Data acquisition duration : NA Sampling rate : 100 Cut off frequency : 1000
Data acquisition cycle : 10 Data acquisition duration : NA Data acquisition cycle : 10 Data acquisition duration : NA Sampling rate : 1000 Cut off frequency : 1000
Date : 10/07/2017 10:32:47 Data acquisition duration : NA Sampling rate : 100 Cut off frequency : 1000 Data acquisition duration : NA
Data acquisition cycle : 10 Data acquisition duration : NA
Data acquisition cycle : 10 Cut off frequency : 1000
Data acquisition duration : NA
Sampling rate : 100 Date: Measure
Cut off frequency : 1000 10/07/2017 10:32:47.000 ; -0.03017
<u>10/07/2017 10:32:47.010 ; -0.02981</u>
Measure Index; Measure Value 10/07/2017 10:32:47.020 ; -0.02855
10/07/2017 10:32:47.030 ; -0.03047
0;-0.03017 10:32:47.040; -0.03084 Converted
1;-0.02981 10/07/2017 10:32:47.050; -0.02892
2;-0.02855 10/07/2017 10:32:47.060 ; -0.0301 file
3;-0.03047 10/07/2017 10:32:47.070 ; -0.02936
4; -0.03084 10/07/2017 10:32:47.080 ; -0.03003
5; -0.02892 Original file 10/07/2017 10:32:47.090 ; -0.02944
6; -0.0301 10/07/2017 10:32:47.100 ; -0.02892
7; -0.02936 10/07/2017 10:32:47.110 ; -0.02885
10/07/2017 10:32:47.120 ; -0.02892
10/07/2017 10:32:47.130 ; -0.02944
10/07/2017 10:32:47.140 ; -0.0301
10/07/2017 10:32:47.150 ; -0.02907
12: -0.02892 10/07/2017 10:32:47.160 ; -0.03032
10/07/2017 10:32:47.170 ; -0.02981
14; -0.0301 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 137: Data conversion example

Under the Tool menu on the BeanScape[®] software, select Data Conversion, a new window will pop up, where downloaded data can be converted.



Figure 138: Data Conversion menu on BeanScape®

A new window will open:

A Date conversion	- 🗆 ×
Select Log Files	
Browse Convert Reset	
The generated files will be saved in C:\logbeanscape\Converted File Folder\	
Browse files to process	
N° Parts File Name	
Eigure 120:Data Conversion window	
rigure 159.Duta conversion window	
🙀 Date conversion	
Select Log Files	Start
Select Log Files	Start
Select Log Files	Start converting
Select Log Files	Start converting
Select Log Files Browse Convert	Start converting
Select Log Files Browse Convert	Start converting
Select Log Files Browse Convert Reset The generated files will be saved in C:\logbeanscape\Converted File Folder\	Start converting
Select Log Files Browse Convert Reset The generated files will be saved in C:\logbeanscape\Converted File Folder\ Browse to the Drowse files to pressed	Start converting Reset all the
Select Log Files Browse Convert Reset The generated files will be saved in C:\logbeanscape\Converted File Folder\ Browse to the Browse files to process	Start converting Reset all the graphs
Select Log Files Browse Convert Reset The generated files will be saved in C:\logbeanscape\Converted File Folder\ Browse to the Rrowse files to process Tx File	Start converting Reset all the graphs
Select Log Files Browse Convert Reset The generated files will be saved in C:\logbeanscape\Converted File Folder\ Browse to the Prowse files to process Tx File N° Parts File Name	Start converting Reset all the graphs
Select Log Files Browse Convert Browse Convert Reset The generated files will be saved in C:\logbeanscape\Converted File Folder\ Browse to the Browse files to process Tx File N° Parts File Name	Start converting Reset all the graphs

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

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Figure 141: Importing files into Data Conversion tool

• Overview of the selected files

📾 Date conversion

\square	Sele	ct Log Files		
>1	>1 Files Selected			
	Browse	Convert	Reset	
The gen	erated files w	ill be saved in C:\logbeanscape\Conv	erted File Folder\	
		Browse fil	es to process	
N°	Parts	File Name		
1	1	Transmit_Streaming_MacId_00158D00	000E0986_12_15_2020_12_3	

Figure 142: Overview of the selected files 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**

SmartSensor User Manual		2.4	4GHz wireless	sensors
				-
🕒 🗢 📕 🕨 Computer 🕨 OS (C:	▶ log_beanscape ➤ Converted File Folder ➤			
Organize Include in library	Share with ▼ Burn New folder			
	Name	Date modified	Type	Size
💢 Favorites	Name	Datemounieu	Type	SIZE
🗼 Downloads	MAC_ID_00158D00000CE454	10/07/2017 15:23	File folder	
ineDrive 🍊 🗠	MAC_ID_ 00158D00000E04A8	06/07/2017 15:45	File folder	
📳 Recent Places				
customers				
log_beanscape				
Google Drive				
Desktop				
·				
	Figure 143: Overview: Converted	l File Folder		

9.7 ADVANCED SETTINGS

Navigate to **Tools** and click on Advanced settings.



Figure 144: Advanced settings

A new window will pop up in which user can find several settings

Advanced Settings	×
Firewall	
Add	
Sql Server Report	
Check	Install
Matlab Functions	
Check	Download
Figure 145: Adv	anced settings

9.7.1 Firewall

Click on **Add** button in order to add BeanScape on firewall, with that user will be sure that the firewall will not interrupt the connection between BeanScape software and the BeanGateway.

Add	
	Add

Figure 146: Add BeanScape to Firewall

Right after clicking on Add a notification message will be displayed on the screen saying that BeanScape was added to firewall successfully.

Add BeanScape To Firewall X
BeanScape added To Firewall
ОК
Figure 147: Notification message

9.7.2 SQL Server Report

Click on Check to check if the SQL Server was installed on your PC.

Sql Server Report	
Check	Install

Figure 148: SQL Server installation

If the SQL Server is installed a pop-up notification will be displayed on the PC screen saying that the SQL Server is already installed.



SmartSensor User Manual		2.4GHz wireless sensors
If it is not the case just click on Install b	outton to install it.	
Sa	I Server Report	
	Check Install	
<u>Fic</u>	gure 150: SQL Server Report Installation	
9.7.3 MATLAB Function		
Click on Check to check if the SQL Serv	er was installed on your PC.	
	atlah Functions	
	Check Download	
	Figure 151: Check MATLAB extension	
If the MATLAB extension was already i	nstalled a pop-up notification will be disp	layed on the PC screen saying that
is installed.	1	
C	Date ×	
	Matlab is Installed on your pc.	
	ОК	
	Figure 152: Notification message	
Otherwise Click on Download button t	o download the extension then install it a	n vour PC
M	atlab Functions	
	Check Download	
	nue 152 Doumland MATLAD outomaion	
<u>FI</u>	gure 153: Download MATLAB extension	
Poppair Cmbl	"p	nking concing technology 401
		incing sensing technology 191

9.8 BEANSCAPE® CLIENT MANAGEMENT

This option is available only on BeanScape® Multiview version



Figure 154: Client management

Based on Client/Server paradigm, this option allows user to switch between client and server mode by entering a right serial key, and it gives the possibility also to give the client the rights to manage the system.

📾 BeanScape Client Managem	ent X
O Server mode	○ Client mode
Allow BeanScape Client	to
Send configuration to Bea	nDevice
Change Online Data analys	sis configuration
🔲 Use Offline Data analysis	
Server Authentication	
Serial key 🖉 🛛 🗸 Val	idate
Save Re	eset Close

Figure 155: Client/Server Management

9.9 FTP CONFIGURATION

The user has the ability to send all his measurement data log files to the FTP Server through the FTP feature.



Figure 156: FTP Configuration

Check FTP enable check box then enter the right FTP Server setting using the following window



Figure 157: FTP configuration window

You should connect to your FTP server before setting up the FTP configuration on the BeanScape software.

	FTP Settings	
	Use IP address	
FTP Server*:	server	
	000	
Port* :	21	
User Name*:	UserName	
Password*:	•••••	
	Check Current config.	Check New config.
State:		Validate
	Show details	
	Figure 158: FTP Server	settings

- FTP Server: Enter your FTP Server DNS or IP address by checking use IP address checkbox
- User Name: Enter your FTP user name
- **Password:** Enter your right FTP password
- Port: By default, the FTP port is 21, you can change it also
- Check New Configuration: click on check new configuration to make sure the settings are correct.
- Validate: click on validate to save the setting and proceed
- State: display if the connection status successfully established or failed.

If the connection was failed please click the Show details link to see the cause of the issue.

😳 FTP Configuration

	FTP Settings	
	Use IP address	
FTP Server*:	server	beanair.exavault.com
	0,0,0	'
Port* :	21	21
User Name*:	UserName	beanair
Password*:	•••••	•••••
	Check Current config.	Check New config.
State:	Failure !	Validate
	Show details	
🛃 Form_ErrorDetails		- 0
2021/03/08 14:44:51 :	The remote server returned an e	error: (451) Local error in processing

Figure 159: Failure details

Then check the type of files which you want to send to you FTP server, and click on Validate



Figure 160: the available type of files

The files will be stored on your FTP server every 1 min.

$\leftarrow \ \rightarrow$	C B beanair.sxevault.com/files/		x * 🖯 :
B	eanAir		Home
Ð		1	UPLOAD 📄 NEW FOLDER
Ð	De Home	C VIEW -	Search Q
© -∿	log_beanscape label(F0B5D1A48F4E0000) from hivF4E0000)		
	show 107page w		Displaying 1 - 4 of 4 total

Figure 161: Files stored on the FTP server

10. VIEW TAB

BeanScape[®] 2.4GHz software comes with two view options, a Standard view and an Expert view.

0		🗸 s	tandard view
Serve	ſ	E	xpert view
<u>Figure</u>	162: Vi	ew tab	

10.1 STANDARD VIEW

Once you open BeanScape® software and start the server, the standard view is selected as default view.

The standard view is just a simplified dashboard displaying the needed information that makes the system easy to use.

Beanscape 2.4GHz iile BeanScape® App Tools Advanced func. Off.Data Analysis	View Help
Server	BeanDevice system profile
Started Started	
MAC_ID : 0 x 00158D00000E06BB	Site ID: MAC_ID : 0 x 00156D00000EIQ PER: 0.20 (%) Listening cycle: 00:00:01 hh:mm:ss
	Platform: AX 30 Power Supply Diagnostic Sensor Info
Ch_Y Ch_Z Ch_Z	Diag. Date: 12/17/2020 3:35:56 PM Meas. Range: (-2/+2 g
	Internal Temp.: 25.375 CL Cut off frequency: 1000 (Hz)
	Version Power supply: Mains
	Hard, vers. VIR3 Power mode: Bat Saver Disabled
MAC_ID: 0 x 00158D00000E0F90 Ch_X	Soft. vers. V/Hb Battery voltage: 4.220 Battery level: Good
Ch_Y = MAC_ID:0x00158D00000E1049	Datalogger
Gn_Y Gn_Z	Status: Ready Memory option: "Stop DAQ" recording Memory used: 0 (%)
	Custum display Motes
****	Data Acq. mode: NA
	Data Acq. cycle : NA ddd.hh:mm:ss
	Sampling rate : NA (tz)
	Data Acq. duration : NA ddd,hh:mm:ss
Component List	
Component List	

Figure 163: Standard View dashboard



By connecting the BeanGateway[®] directly to the PC, the Expert view should be the selected view.

10.1.1 Dashboard Management

10.1.1.1 BeanGateway® Dashboard

The BeanGateway[®] is identified by its PAN ID and is located on the lower left window.

The Con	and a factor from the	
	Inscis View Help Connection Started Image: Started s	
C	Component list Sort I III Access to different sites Rec 8x 072	Label Ster 14 4770

Figure 164: BeanGateway® PAN ID

✓ You will see the following window:

Started Started	BeanGateway profile Status recorded on the BeanScape
Component list Sort ① ① Kocess to different sites Re: (1x 0770	Enclosed were Were Were Were Were Image: Non-Image: No Image: Non-Image: Non-Imag
	Figure 165: BeanGateway® profile

• Identity Frame

Identity	
Mac Id: 00158D00000E077D	BeanDevice MAC Address: is a unique identifier can be used as a network address for most network technologies including Ethernet & WIFI
Site ID: Site : 0 x 077D	BeanDevice Site ID: By default the MAC address is assigned as a device Label. This Label is editable by the user

• Version Frame

Version	
Hard. vers. V3R4	Hardware version: BeanDevice hardware version
Soft. vers. V6R1	Software version: BeanDevice embedded software version

• Labelling

Site Labelling	Notes	Multicasting	Modbus	
Label	Site : 0 x 077D			
	Validate			

• Notes

Site Labelling	Notes	Multicasting
Validate		

• Multicasting

Site Labelling	Notes	Multicasting	
Multicast Group M	gnt		Configuration manager
Multicast Group v	view 🖪	A	Data Acq. mode: Start
	T		Data Acq. cycle:i ddd,hh:mm:ss Stop
			Sampling Rate:
			Data Acq. duration::: ddd,hh:mm:ss
			Start data acq.: ddd,hh:mm:ss
			Pre-Trigger duration: ddd,hh:mm:ss
			Data acquisition mode options
Add BeanDevice			● Tx Only O Log Only O Tx & Log
< Select >		Add BeanDevice Add all Remove	Streaming Packet options

• Modbus (if the BeanGateway[®] comes with a Modbus module)

Site Labelling	Notes	Multicasting	Modbus	
General			Serial	
	Modbus status: (Disabled	Slave Id : 2	24 (Øx18)
	Interface:	TCP	Serial Mode:	IS 485
Device a	ddressing mode: (NetworkId	Serial data format:	RTU)
ſ)ate field option: (No date field	Serial baudrate: 🚺	1800 bauds
Supp	orted interfaces: (RS485 RS232 TCP	Serial parity: 🚺	lone
ТСР			RS 485	
	Port: (Rx timeout: (500 5000 ms	Terminal resistor:	inabled
Configuration				
Start		Co	nfig Assistant (MacId Table

10.1.1.2 BeanDevice® Dashboard

• <u>Identity</u>

Identity	BeanDevice MAC Address: is a unique address for most network techno	e identifier can be used as a network logies including Ethernet & WIFI
Mac Id: 00158D00000E1049 Site ID: MAC_ID : 0 x 00158D00000E1	BeanDevice Site ID: By default the M Label. This Label is ed	AC address is assigned as a device litable by the user
Platform: AX 3D	Platform: BeanDevice	platform model

Version



<u>Network Diagnostic</u>

Network Diagnostic	
	BeanDevice Connectivity quality indicator
PER: 1.06 %	Packet Error Rate (PER): Displays the rate of lost packets on wireless network

• <u>Power supply diagnostic</u>

Power Supply Diagnostic	Latest diagnostic information date
Diag. Date: 11/6/2020 2:52:21 PM	BeanDevice Internal temperature
Internal Temp.: 31.750 (°C)	BeanDevice Internal temperature
Power supply: Bat	Color LED indicator: indicates the BeanDevice power mode status
Battery Voltage: 4.226	Battery voltage: indicates the battery voltage value
Battery level: Good	Battery level: indicates the Battery voltage level

<u>System</u>

System	Diagnostic cycle display
Diagnostic cycle: 00:01:00 hh:mm:ss	
Listening cycle: 00:00:05	Listening ratio display for battery saver mode with network listening

- <u>Sensor info</u>
- For the AX3D and AX3D Xrange



For the AX3DS

Sensor Info			
Meas.Range:	-2/+2	9	

For the Hi-Inc & Hi-Inc Xrange

Sensor Info	
Meas.Range: ±15 📥 deg	BeanDevice Measurement range
Sensitivity: 0.0010 deg	BeanDevice sensitivity
Cut off frequency: 1000 Hz	Cut-off frequency

SmartSensor User Manual	2.4GHz wireless sensors
For the Hi-Inc-SR Sensor Info Tilt Hyst. Tilt Temp.	
Meas.Range: ±10 Sensitivity: 0.0025 Max SR : 20	deg deg
<u>Custom display</u> <u>Custom display</u> Notes	
Location : Device Location Label: MAC_ID : 0 x 00158D00000E1049 Log folder: Folder 1049 Validate	
Note Notes	
Validate	
10.1.1.3 Sensor Profile	
Custom display	
Sensor Config	
Sensor labelling Notes Log config.	
Label: (Ch_X	

Beanair GmbH

Validate

Apply

Zeroing sensor channel:

• Notes

	_					
Sensor labelling	Notes	Log config.				
		_				
			Validate			
Log conf	ig					
Sensor labelling	Notes	Log config.				
Log filename	root: NA					
Log configuratio	n					
🔽 Log enable	ed			① The file r	name will be changed only if the	
🔽 Log filenar	me auto.			separate	ed files generation is enabled.	
			Validate			
10 2 EVDE						
10.2 LAPLI						
The expert view	contains more teo	chnical features	for expert	using.		
To change the vi	ew simply go to V	iew tab then se	lect Expert	view.		
sea Bea	inscape 2.4GHz		·			
File	BeanScape® App	Tools Adva	nced func.	Off.Data Analysis	View Help	
					Standard view	
	Serv	er			 Expert view 	
		<u>Figu</u>	<u>re 166: Exp</u>	ert View		
You need to ente	er the right serial l	key in order to h	nave access	to the expert view	N	
	E	xpert View Config	I		x	
		Exp	ert User Auth	entication		
		Serial key			J	
		(Switch	to expert view)	
		Fiqu	ure 167: Se	rial Key		
				// D ·//		202

Once you choose the Expert view you notice that the dashboard display looks quite different and that there are more information and features were added to the chart.



Figure 168: Expert view dashboard

The PAN ID, Net ID, PER level, the system information and much more options are accessible from only the expert view.

10.2.1 BeanGateway[®] profile

• Identity

,	
	Pan Id: 0770
	Net Id: 0000
Radio config	
	Radio Configuration
	Radio Channel : 26
	Used RF channels : 11-26
• Power supply diagnostic	

	Power Supply Diagnostic
	Diag. Date: 7/16/2021 12:54:10 PM
	Internal Temp.: 43.125
	Power supply: Mains
	Battery Voltage: 4.196
	Battery level: Good
Auto reboot status	
	Auto-Reboot Status
	Disabled Reboot Cycle NA dd:hh
	Auto Reboot Remaining time NA minutes
System	
	System
	Diagnostic cycle : NA d.hh:mm:ss
	Beep sound funct.: Disabled
	Network Status : Enabled
Additional module	
	Additional Module
	Module : Ethernet Modbus
	Soft. Vers : V5R1

• Radio Config

•

.

SmartSensor User Manual

Site Labelling	Notes	Radio Config	System Config	Multicasting	Modbus	Upload device profile
Panld Configuratio	n			Authorized RF Chanr	els config.	
New Pan Id (H	ex.) :	0x077D 🔶 🤇	Validate	11 12 13 14 15	16 17 18 19 20	21 22 23 24 25 26
Radio channel co	nfiguration					Validate
Char	nnel List	Ŷ		Network Configuration	n	
Scan	duration <s< td=""><td>election > Y</td><td>Validate</td><td></td><td>Max. nodes :</td><td></td></s<>	election > Y	Validate		Max. nodes :	
Wireless Sensor Net	work diag.tool				Max. routes :	•
Ener	rgy Scan < s	election > Y	Request	Max.	network depth :	Validate

• System Config

Site Labelling	Notes	Radio Config	System Config	Multica	sting	Modbus	Upload device profile		
Diagnostic cycle o	configuration				Delete Dev	ice			
Enable ×	Diagnostic cy	/cle : 🚺 🔶 🤇	min Validate			Device List :		ř (Validate
Profile Erasement/D	lefault config.				Auto-Ret	poot			
Network profile	deletion :	• De	lete Disable ne	twork	Enable	v	Auto-Reboot :	ᅌ hours 🤇	Validate
Beep sound config.									
Beep	o sound		 Validate 						

• Upload device profile

Site Labelling	Notes	Radio Config	System Config	Multicasting	Modbus	Upload device profile
BeanDevice		Browse	Validate	Clear In	valid files	
Network Id						
Macld:						
	Validate					

10.2.2 Data Acquisition configuration

• Data Acq Config tab

Custum display	Notes	Data Acq. config	, Sensor Config				
Data acquisition mode configuration							
Data Acq. mode:	LowDutyCycle	~	Start				
Data Acq. cycle :	;;;	ddd,hh:mm:ss	Stop				
Data acquisition mode	options						
⊙ Tx Only () Log Only () Tx & Log					

<u>Sensor Config tab</u>

For the AX3D & AX3D Xrange

Custum display	Notes	Data Acq. config.	Sensor Config
AAF- Cutoff freq	uency(Hz)		Validate

• Datalogger tab

Datalogger	System o	config.	Power mode managt	Online Data Analysis
DataLogger status				
DataLogg	er status:	Ready		
Download	progress:		NA	
Downloa	ad status:	NA		
DataLogger manager				
	Stop		Erase	

• System config tab

Datalogger	System config.	Power mode managt	Online Data Analysis
Diagnostic Cycle			
Ratio:	1 🗢 00 h 00 mm 0	ll s	Validate
Restart device			
	Restart		

• Power management tab



• Online Data Analysis

Datalogger	System config.	Power mode managt	Online Data Analysis
Online FFT Configuration		Online Velocity configura	ition
Enable Online FFT Automatic FFT Repo Enable FFT Log file	rt(S.E.T)	Enable Online Velocit Automatic DIN Repo Enable Velocity Log file Enable PPV Log file	ty 🔯 rt(S.E.T) file
Number of Points (Strea	ming)		
Current Points Number	SR/0.1		
Online waveform configu	Iration	Unit of acceleration 🔓	~

10.2.3 Sensor Profile

• Alarm levels config

Se	nsor Config				
Sensor labelling	Notes	Alarm level Config	Sensor calibration	Log config.	
Alarm DAQ mode (g)					
Alert < Action < .	Alarm				
Alarm:					
Action:					
Alert:	Validat	•			

• Sensor calibration

C Se	nsor Config			
Sensor labelling	Notes	Alarm level Config	Sensor calibration	Log config.
Current Ratio: Current Offset:	0		Ratio: Offset: V	/alidate

10.2.4 Tools tab

More options are available on the expert view

📾 Beans	cape 2.4	GHz				
File	BeanSca	pe® App	Tools	Advanced func.	Off.Data Analysis	
		<u> </u>	В	eanScape® configu	ration	
		Serve	A	larm Window		
 16			В	BeanGateway Ethernet/LAN Config.		
- (-)-			Ir	nport/Export user se	ttings	
		💻 MA	A	larm Management		
		N	Notification Management			
		m MA	٥ 🕑	ffline graph		
			A	dvanced Settings		
			В	eanScape Client Mai	nagement	
(1)		E MA	F	TP Configuration		
	2		0	PC Management		

Figure 169: Tools options list on the expert view

• BeanScape[®] configuration

BeanScape Configuration	x
Log	
Keep Alive App	Log directory : C:\log_beanscape
TCP/UDP	Stop loggin when disc space is 2048 😴 MB
Sustam	Main Log filename : LOG
System	Main log max. size : 📃 200 😴
Data cache	Sensor Log enabled : 🗹
Data Logger	Sensor log max. size (KB) : 1024 🚭
StartUp	Network log info. enabled : 🗹
Date and Time Format	Network info log max. size (KB) : 1024 🗢
Language	BGw Module Log enabled : 🗹
Language	BGw Module log max. size (KB) : 📃 1024 😂
	Syst. Maint. Status Log enabled : 🗹
	Syst. Maint. Status log max size (KB) : 📃 1024 🚭
	Log file generation • All sensor channels in one file
	Separated
	Streaming log max. size (KB) : 2048 🗢
	Reload Apply Save Reset

• Import/Export user settings

Import/Export	x
Custom User Configuration	
Replace Merge	Export Clear
BeanScape Configuration	
Import Export	Reset

• Alarm Management Toolbox

Alarm Managem	ient							
Email Config.	DAQ Alarm	Health Status	SSD DAQ Mode	Alarm DAQ Mode	File Format	DIN 4150-3 Config	Crash report	
Enable Notific	ation by email							
Note: Required F								
		sender						
		receiver						
		Server	Port*:	25 🚓				
	User Name*: (userName						
		•••••						
SMTP Test								
			(Validate				

• Notification Management

MainWindow			×
Enable notification for :	Display Notif:	Log File:	
	All	All	
Alarm DAQ on the S.E.T Mode			^
Damaged BeanDevice			
Out of range BeanDevice			
LQI level			
PER level			
Hard Disc space			
Accepted configuration			
Listening cycle change			
Diagnostic cycle change			
Language change:			
Shock detection:			
Alarm detection:			
Connection with BeanGateway closed:			
Full Datalogger memory:			
DataLogger downloader :			
Internal temperature of BeanDevice:			\sim
Save	Reset	Close	

• Offline Graph

📽 Offline graph	-		×
Select Log Files			
Show selected graph N* Parts Unit File Name			
Browse Braph New Ul Chada			
View O Grid			
Reset O Overlaid (Frequency)			
Electric Actions Extents Zoom			
		_]	0.0000

• Advanced Settings

Advanced Settings	×
Firewall	
Add	
Sql Server Report	
Check	Install
Matlab Functions	
Check	Download

BeanScape Client Management

📽 BeanScape Client Management					
O Server mode	🔿 Client mode				
Allow BeanScape Client	to				
Send configuration to BeanDevice					
Change Online Data analysis configuration					
Use Offline Data analysis					
Server Authentication					
Serial key 🖉 Va	lidate				
Save R	eset Close				

• OPC Management

Set.								×
OPC Configuration								
General Configuration								
Current Server ID: (EA1370BF-AC53-41f2-940	Server ID:			Streaming Configurat	tion		
Current Prog ID: (Beanair.BeanOpc	Prog ID:			① Current values		Buffer Autosize	
Current Answer: (XML	Answer Format:	XML	~	Buffer Size: (1	Buffer Size:	
Current Server Type: (OPC_DA_XTEND	Server Type:	OPC_DA_XTEND	v	Tag Value Type: (Vector_String_CSV	Tag Value Type: Vector_Strin	.g_CSV v
General Configuration					Streaming Option: (Streaming	Streaming Option: Streaming	· ·
Name: B	leanOpc_DA						5	
Version: 1.	0			Valida	ate	Restore		
Tags: 5	00							
OPC server status								
Start	Stopped					Close		

• FTP Configuration

😳 FTP Configuration	×
FTP Enable	
FTP Server*:	ftp://serverIP Port* 21
User Name*:	UserName
Password*:	•••••
Validate	Test FTP

10.2.5 Advanced Functions

This option is related to the BeanDevice[®]

📾 Bean	scape 2.4	GHz							
File	File BeanScape® App Tools		Advanced func.		Off.Data Analysis	View	Help		
					Enable logging on PC				
Server			Disable logging on PC						
					Reset measure memory cache for all the sensors				
					Beandevice® health status (history)				
- Leve		📁 📃 MAC_ID : 0>			Multigraph o	display			

- Enable logging on PC: to generate a log file which contains all the data and will be backed up on your PC
- Disable logging on PC: there is no log file containing the data stored on your PC
- Reset measure memory cache for all sensors: to Reset the cache
- BeanDevice[®] health status

BeanDevice MAC:00158D00000E1049	-	D X
Network Information -		
Network Diagnostic LQI	Network Diagnostic PER	
		0.2100 0.2050 0.2000 0.1950 0.1900
15:40:00 Dec 17 2020 16:00:00 Dec 17 2020 16:20:00 Dec 17 2020 16:40:00 Dec 17 2020	16:00:00 Dec 17 2020 16:40:00 Dec 17 2	020
Time	Time	
Internal Temperature Information		
Internal Temper	ature	
$ \qquad \qquad$		25.5000
		25.4000
		25.3000
15:30:00 Dec 17 2020 15:40:00 Dec 17 2020 15:50:00 Dec 17 2020 16:00:00 Dec 17 2020 16:10:00	Dec 17 2020 16:20:00 Dec 17 2020 16:30:00 Dec 17 2020 16:40:00 Dec 17 2020	
Power Information		
Battery Status I	aformation	
98.2500		4.2300
	╺──┤┤∖──╷╢─┤─╎╴╢╎╎╴╴╢╶╢╶╢╢╎╴╴┤╎╴╴╢╶╢╴╢	4.2295
		4.2290
		4.2285 8
		4.2280 🛔
98.0500 -		4.2275 🎐
	<u>┥╾╼╢╾┞╾┟┥┽╒╿╾┥┽╢┍╺</u> ┧╴╱┥┧╢┧╶┍╢╼╢═╢═╢╼╢╴┥╸╢┥┥╱	4.2270
97.9500		4.2265
	<u>↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ </u>	4.2260
15:30:00 Dec 17 2020 15:40:00 Dec 17 2020 15:50:00 Dec 17 2020 16:00:00 Dec 17 2020 10 Time	:10:00 Dec 17 2020 16:20:00 Dec 17 2020 16:30:00 Dec 17 2020 16:40:00 Dec 17 2020	

• Multigraph display



11. ONLINE AND OFFLINE DATA ANALYSIS TOOL

Online and offline analysis tool is only available on BeanDevice® AX-3D and BeanDevice® AX-3D Xrange

11.1 OFFLINE DATA ANALYSIS TOOL

11.1.1 FFT (Fast Fourier Transform) waveform analysis module

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.

11.1.1.1 FFT generation

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.

📾 Bea	nscape 2.4GH	lz					
File	BeanScape	® Арр	Tools	Advanced func.	Off.	Data Analysis	View
	C				Sec.	FFT	
Server			6	Particle Veloci	ty		
Figure 170: FFT offline data analysis on BeanScape® top menu							

A new pop-up window will appear, where the user is invited to browse Tx files to be treated and graphically displayed.

water FFT				- 🗆 X
It time Start End Browse files to process	Browse View Reset	Show selected graph Number graph :	FFI Configuration ● Auto Window Type : Algorithm : Estimate Zero Padding : ✓ FFI Points ● Use All Measurement data ● Adjust number of FFI points SRV/0.1	Current FFT Configuration Mode: FFT Auto FFT Shift: Disabled Window type: Rectangular Algorithm: Estimate Zero padding: Enabled Points used: All measurement
N° Parts File Name	<u>Figure 1</u>	Start End 71: FFT tool wind	The following file are invalid	

SmartSensor User M	anual			2.4GHz v	vireless sensors
Check all time option to work with all data at any time	Time range Select the T settings display files	X Generate and show the FFT graphs	Reset all settings	Change FFT settings from Auto to Manual	Enable FFT shift
					×
All time Start End	Browse View	Reset	FFT Configuration Auto Vin Zerc FFT Points	dow Type : Rectangular	Current FFI Configuration Mode: FFI Auto FFI Shift: Disabled Window type: Rectangular Algorithm: Estimate
Browse files to process	Enable FFT shift	Pagination Panel	 Use All Measuren Adjust number of 	nent data (Validate f FFT points SR/0,1	Zero padding: Enabled Points used: All measurement
N° Parts File Name		Start End	The following file are	Invalid	
↑					ţ
Selected Tx files list		FFT Point	s settings	/anual Mode settings frame	Invalid Tx files list

Figure 172:FFT tool options

To import the files containing the logged measurement, the user should click on Browse, then import the files from log_beanscape folder, where Tx files are saved.

The FFT tool will generate as a result:

o Power spectral density and a new window displays

Start Browse	View Reset Number graph : Win	dow Type : Rectangular	Current FFT Config Mode: (FFT Shift: (uration FFT Auto Disabled
Genera	2 Log files Zero	p Padding : 🔽	Algorithm: (Rectangular Estimate
Browse files to process	📾 Open ← → ← ↑ 🔽 > This PC > Windows (C:) > log_beanscape > Folder 1049 > TX Folder	er v õ	Search TX Folder	ر × م
1° Parts File Name	Organize New folder		8==	· • •
Click on Browse to select Tx Files	Name Transmit, Allsensor, LowDutyCycle, MAC, JD., 0, x, 00158000000E1049, 11, 23, 202 Transmit, Allsensor, LowDutyCycle, MAC, JD., 0, x, 00158000000E1049, 12, 8, 2020 Transmit, Allsensor, LowDutyCycle, MAC, JD., 0, x, 00158000000E1049, 12, 8, 2020 Transmit, Allsensor, LowDutyCycle, MAC, JD., 0, x, 00158000000E1049, 12, 8, 2020 Transmit, Allsensor, LowDutyCycle, MAC, JD., 0, x, 00158000000E1049, 12, 9, 2020 Transmit, Allsensor, LowDutyCycle, MAC, JD., 0, x, 00158000000E1049, 12, 9, 2020 Transmit, Allsensor, LowDutyCycle, MAC, JD., 0, x, 00158000000E1049, 12, 9, 2020 Transmit, Allsensor, LowDutyCycle, MAC, JD., 0, x, 00158000000E1049, 12, 9, 2020 Transmit, Streaming, MacId, 00158000000E1049, 12, 8, 2020, 3, 20, 08, PM.txt Transmit, Streaming, MacId, 00158000000E1049, 12, 8, 2020, 3, 20, 2, PM.txt Transmit, Streaming, MacId, 00158000000E1049, 12, 8, 2020, 3, 2, 14, PM.txt Transmit, Streaming, MacId, 00158000000E1049, 12, 8, 2020, 3, 2, 14, PM.txt Transmit, Streaming, MacId, 00158000000E1049, 12, 8, 2020, 3, 2, 14, PM.txt Transmit, Streaming, MacId, 00158000000E1049, 12, 8, 2020, 3, 2, 14, PM.txt Transmit, Streaming, MacId, 00158000000E1049, 12, 8, 2020, 3, 3, 114, PM.txt	Date modified Type 11/23/2020 4:57 PM Text Docu 12/8/2020 2:45 PM Text Docu 12/8/2020 2:35 PM Text Docu 12/8/2020 2:35 PM Text Docu 12/9/2020 2:35 PM Text Docu 12/9/2020 2:36 PM Text Docu 12/9/2020 2:36 PM Text Docu 12/9/2020 2:36 PM Text Docu 12/9/2020 3:20 PM Text Docu 12/8/2020 3:30 PM Text Docu 12/8/2020 3:31 PM Text Docu	Size ment 2 Kiz ment 1 Ki ment 20 Ki ment 76 Ki ment 2 Ki ment 2 Ki ment 1 Ki ment 30 Ki ment 40 Ki ment 49 Ki ment 49 Ki ment 48 Ki ment 48 Ki ment 48 Ki ment 49 Ki ment 48 Ki ment 49 Ki ment 49 Ki ment 48 Ki ment 49 Ki ment 40 Ki	
Select files then	File name:		✓ Log files (*.txt)	~
click on open			Open 2	Cancel

1: Click on Browse to choose files

Figure 173: Browsing TX files on FFT tool
2: Overview of the selected files

🛸 FFT											-	×
Star Eni	time rt Tuesday d Tuesday e files to pro	r, December r, December ocess	r 8, 2020 3:20:08 PV ↔ 8, 2020 3:31:33 PV ↔ Check to generate the corresponding FFT file	e es Click on View to st	Reset	Show select	ad graph	FFT Configuration C Auto Window Type : Algorithm : Zero Padding : FFT Points Use All Measurement data Adjust number of FFT points	FFT Shift Rectangular v Estimate v SR/0.1	Current FFT Confij Mode: FFT Shift: Window type: Algorithm: Zero padding: Points used:	guration FFT Auto Disabled Rectangular Estimate Enabled All measurem	
N°	Parts	File Name				Start	End	The following file are Invalid				
1	1	Transmit_St	reaming_MacId_00158D00000E1049_1	2_8_2020_3_20_08_PM		12/8/2020 3:20:08 PM	12/8/2020 3:20:27 PM					
2	1	Transmit_St	reaming_MacId_00158D00000E1049_1	2_8_2020_3_20_32_PM		12/8/2020 3:20:32 PM	12/8/2020 3:20:51 PM					
3	1	Transmit_St	reaming_MacId_00158D00000E1049_1	2_8_2020_3_27_14_PM		12/8/2020 3:27:14 PM	12/8/2020 3:27:33 PM					
4	1	Transmit_St	reaming_MacId_00158D00000E1049_1	2_8_2020_3_28_14_PM		12/8/2020 3:28:14 PM	12/8/2020 3:28:33 PM					
5	1	Transmit_St	reaming_MacId_00158D00000E1049_1	2_8_2020_3_29_14_PM		12/8/2020 3:29:14 PM	12/8/2020 3:29:33 PM					
6	1	Transmit_St	reaming_MacId_00158D00000E1049_1	2_8_2020_3_30_14_PM		12/8/2020 3:30:14 PM	12/8/2020 3:30:33 PM					
7	1	Transmit_St	reaming_MacId_00158D00000E1049_1	2_8_2020_3_31_14_PM		12/8/2020 3:31:14 PM	12/8/2020 3:31:33 PM					

Figure 174: Overview: FFT window

3:Loading

1422 FF1							- U X
✓ All time Start Tuesday, December 8, 2020 9:27:06 Ah ↔ ♥ End Wednesday, December 9, 2020 9:27:06 ↔ ♥		y, December 8, 2020 9:27:06 Ah 🚖 Υ day, December 9, 2020 9:27:06 😓 Υ	> 10 Files Selected Reset Generate Log files	Show selected graph Number graph :		FFT Configuration Auto Kindow Type : FFT Shift Algorithm : Estimate Zero Padding : FFT Points Validate Validate	Current FFT Configuration Mode: FFT Auto FFT Shift: Disabled Window type: Rectangular Algorithm: Estimate Zero padding: Enabled
Proce	ssing 7/10					O use All Measurement data	Points used: All measurement
N°	Parts	File Name		Start End		The following file are Invalid	
1	1	Transmit_Streaming_MacId_00158D00000E1049_12	2_8_2020_3_20_08_PM	12/8/2020 3:20:08 12/8/2020 PM PM	3:20:27		
2	1	Transmit_Streaming_MacId_00158D00000E1049_12	2_8_2020_3_20_32_PM	12/8/2020 3:20:32 12/8/2020 PM	3:20:51		

Figure 175: FFT generation

4: FFT report generated with the following results:

- a. Frequency
- b. Amplitude

🐋 FFT Current FFT Configuration 🗸 All time FFT Configuration -> 10 Files Selected Show selected graph 🔘 Auto FFT Shift Mode: FFT Auto :day, December 8, 2020 9:27:06 AN 🐳 👻 Start Reset Number graph : 10 Window Type : Rectangular FFT Shift: Disabled esday, December 9, 2020 9:27:06 🚔 🗸 Fnd Estimate Generate Log files 🌌 Off.Data Analysis FFT \times _ Ch_X(g)_Transmit_Streaming_MacId_00158D00000E1049_12_8_2020_3_20_08_PM Part 1/1 , 1621 Samples Processing 10/10 File Name Parts 0.0500 Transmit_Streaming_MacId_00158D00000E1049_12_8_2020_3_20_08_PM - 0.0400 ransmit_Streaming_MacId_00158D00000E1049_12_8_2020_3_27_14_PM - 0.0200 fransmit_Streaming_MacId_00158D00000E1049_12_8_2020_3_28_14_PM ransmit_Streaming_MacId_00158D00000E1049_12_8_2020_3_29_14_PM 0.0000 Transmit_Streaming_MacId_00158D00000E1049_12_8_2020_3_30_14_PM 0.000 10.000 20.000 30.000 40.000 50.000 Frequency(Hz) Transmit_Streaming_MacId_00158D00000E1049_12_8_2020_3_31_14_PM ransmit_Streaming_MacId_00158D00000E1049_12_8_2020_3_32_14_PM



5: FFT LOG files generated

FFT LOG files will be generated in a folder located in log_beanscape repertory called FFT FOLDER. In this folder, BeanScape[®] will create separate folders for each BeanDevice[®].

MAC_ID_00158D0000E02A9	25/10/2018 12:36	Dossier de fichie
MAC_ID_00158D00000E06A8	25/10/2018 12:36	Dossier de fichie
	25/10/2019 12:26	Dossier de fichie
MAC_ID_ 00158D00000E0277	23/10/2010 12:50	bosser de riente
MAC_ID_ 00158D00000E0277	58D00000E06A8	
MAC_ID_ 00158D00000E0277 I (C:) ▶ log_beanscape ▶ FFT FOLDER ▶ MAC_ID_001 EFT_page 00158D00000E06A8_2018_10_25 12_26_19_bt	25/10/2016 12:50 58D00000E06A8	

6: The graphs will be displayed automatically when VPPV Report is generated via a pop-up window, that can be formatted to select the number of graphs to display simultaneously in this window. An easy navigation bar on the top of the window, allow to the user to navigate between the graphs and select the page size.



Figure 178: Graph display (Offline Data Analysis)

7: Users can manually select and launch graph by double click or selecting file and click on "Show selected graph" button.

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📽 FF	a FFT – D X								
It time Start Tuesday, December 8, 2020 9:27:06 Ah 🐨 Y End Wednesday, December 9, 2020 9:27:06 T Wednesday, December 9, 2020 9:27:06 T T End Generate Log files			> 10 Files Selected Reset Generate Log files	Show selected graph Number graph : 10 Click on show	FFT Configuration	Current FFI Configuration Mode: FFT Auto FFT Shift: Disabled Window type: Rectangular Algorithm: Estimate Zero padding: Enabled			
	saling to/ to			selected graph	Adjust number of FFT points SR/0.1	Points used: All measurement			
N°	Parts	File Name		Start End	The following file are Invalid				
1 1 Transmit_Streaming_MacId_00158D00000E1049_12_8_2020_3_20_08_PM			2_8_2020_3_20_08_PM	12/8/2020 3:20:08 12/8/2020 3:20:27 PM PM	Colort the remut				
2 1 Transmit_Streaming_MacId_00158D00000E1049_12_8_2020_3_20_32_PM			2_8_2020_3_20_32_PM	12/8/2020 3:20:32 12/8/2020 3:20:51	Select the requir	rea			
3	1	Transmit_Streaming_MacId_00158D00000E1049_1	2_8_2020_3_27_14_PM	12/8/2020 3:27:14 12/8/2020 3:27:33	File				
4	1	Transmit_Streaming_MacId_00158D00000E1049_1	2_8_2020_3_28_14_PM	12/8/2020 3:28:14 PM PM					



8: The selected graph is displayed



Figure 180: Selected graph display

10: Make sure that the time range is within your measurements, otherwise the files will be considered as invalid.



11.1.1.2 FFT shift

FFT shift allows sorting the FFT output by moving the zero-frequency component to the center of the array. It is useful for visualizing a Fourier transform with the zero-frequency component in the middle of the spectrum.

FFT shift option is activated when the checkbox "FFT shift" is checked.

Click on browse and import file containing the logged measurement, the result will be:

• Power spectral density and a new window displays (with zero-frequency at the center)

1: To use FFT Shift: check FFT Shift, select files and click the "View" button:



Figure 182: FFT Shift activation

2: FFT Spectrum with FFT Shift option enabled



Figure 183: Gird of FFT Shift spectra



11.1.2 Particle Velocity

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.

The first step: Under Off.Data Analysis menu on the Beanscape® top menu, select Particle Velocity

 Seanscape 2.4GHz

 File
 BeanScape® App

 Tools
 Advanced func.

 Off.Data Analysis
 View

 Help
 Image: Server

 Server
 Image: Particle Velocity

Figure 184: DIN on BeanScape® top menu



Figure 185: Particle Velocity window

The second step is to browse and import the file containing the logged measurement. The result will be:

- Velocity display window
- DIN report generated
- Velocity files created

3: Velocity Advanced Configuration.

O By FFT	O By Filter	⊙ By Zero Crossing	
FFT Configuration Auto Window Type : Rectangu Algorithm : Estimate Zero Padding :	Jar	rent FFT Configuration Use All Measurement data Adjust number of FFT points (Streaming mode)	Current Velocity Configuration Mode : Zero Crossing
Filter Configuration Auto Filter Response Type Highpass Bandpass Design Method IIR Chebyshev_type_1 FIR Equiripple Filter Order Minimum Order Specify Order	rs Profile : Frequency Specificat Units : Hz Fs : Fstop : Fpass : Fpass :	tion Magnitude Specification Units : @ Astop : Apass : Filter Name :	
Mag. (dB)	pass	Fs/2 f (Hz)	Validate

By default, the Velocity is configured "By Zero Crossing", to edit the Velocity settings user must select "By FFT" or "By Filter".



⊙ By FFT	⊖ By Filter	O By Zero Crossing		
FFT Configuration		Current FFT Configuration		
Window Type :	Rectangular v	💿 Use All Measurement data 🔹 🕕		
Algorithm :	Estimate ~	O Adjust number of FFT points		
Zero Padding :	✓	(Streaming mode)		

 Manual: Once switched to Manual, the user must configure the FFT settings manually (Window Type, Algorithm & Zero Padding).

⊙ By FFT	○ By Filter	○ By Zero Crossin	g
FFT Configuration Manual		Current FFT Configuration	
Window Type :	Rectangular ~	O Use All Measurement data	()
Algorithm :	Estimate ~	O Adjust number of FFT points	8 🗸 🖍
Zero Padding :		(Streaming mode)	
o FF	T Points:		
	Current FFI Configuration		
	 O Use All Measurement da ○ Adjust number of FFT po 	ata () aints 128 v x	

By default, the Number of Points is configured to be set automatically as Sampling Rate / 0.1 (SR/0.1). By moving to the Manual settings, user must choose a value between 128 and 32768.

(Streaming mode)



It is important to notice that larger Number of Points provide higher spectral resolution but take longer to compute.

The frequency resolution of each spectral line is equal to the Sampling Rate divided by the Number of Points. For instance, for example, if the Number of Points is 4096 and the Sampling Rate is 2000, the resolution of each spectral line will be:

2000/4096 = 0.48828125



The Number of Points should be equal or higher than the Samplig Rate (Acquisition time at least = 1 second)



It is important to notice that larger Number of Points provide higher spectral resolution but take longer to compute.

By Filter: By selecting this option, the user will setup the Velocity basing on the Software Filter.



o Auto: If Auto is selected, Velocity Automatic filter will be configured

- Manual: Once switched to Manual, the user must configure manually the Filter settings.
 - * <u>Response Type:</u> User should specify if the Response is **Highpass** or **Bandpass**



 Design Method: User should Select the nature of the Filter between IIR or FIR From the List of every filter, user have to specify the method of the Filter: IIR: Chebyshev_type_I, Chebyshev_type_II or Butterworth FIR: Equiripple, Generalized_Equiripple or Kaiser_Window

<u>The Frequency Specification and The Magnitude Specification</u> will be modified according the selected Design Method

 Filter Order: If the user is using IIR Design Method, Minimum Order will be selected automatically.

If the FIR Design Method is selected, user must Specify Order.

- Frequency Specification: Is a customizable frame according to the Design Method.
- Magnitude Specification: Is a customizable frame according to the Design Method.



✤ <u>Filter Profile:</u> User can save a specific Configuration and re-use it later.

 Filter Specification: Is a Graphical Display of the Filter Specification depends on the user settings.

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4: Click on browse button to choose TX Files.

Particle Velocity						_	\Box \times
Select Log Files Browse View Reset VPV Report DIN 4/50-3 Report Browse files to process	O By FFT FFT Configuration FFT Configuration Window Type : Algorithm : Zero Padding :	By Filter	O By Concert Child Conference of Use Al Measurement data • Adjust number of FFT poin (Streaming mode)	Zero Crossing ts 128	• ×	Current Velocity Conf Mode : Zero Cros	iguration
	Filter Configurat	on					
N° Parts File Name	Open						×
	> × 🛧 📙 > This PC > Win	dows (C:) > log_beanscape >	Folder 1049 > TX Folder		× ق	Search TX Folder	Q,
	Organize 🔻 New folder					== -	
Click on Browse to select Tx Files	Name Transmit_Allsensor_LowC	^ nutyCycle_MAC_ID0_x_00138 hutyCycle_MAC_ID0_x_00158 hutyCycle_MAC_ID0_x_00158	D00000E1049_12_10_202 D00000E1049_12_10_202 D00000E1049_12_10_202	Date modified 12/10/2020 11:01 12/10/2020 11:18 12/10/2020 11:31	Type Text Document Text Document Text Document	Size 1 KB 4 KB	^
		httyCycle_MAC_ID0_x_00158 httyCycle_MAC_ID0_x_00158 httyCycle_MAC_ID0_x_00158	D00000E1049_12_10_202 D00000E1049_12_10_202 D00000E1049_12_11_202	12/10/2020 12:25 12/10/2020 4:43 PM 12/11/2020 9:56 AM	Text Document Text Document	2 KB 58 KB 8 KB	
	Transmit_Streaming_Mac	Id_00158D00000E1049_12_8_202 Id_00158D00000E1049_12_8_202	0_3_20_08_PM.txt 0_3_20_32_PM.txt	12/8/2020 3:20 PM 12/8/2020 3:20 PM	Text Document Text Document	40 KB 41 KB	
	Transmit_Streaming_Mac	Id_00158D00000E1049_12_8_202 Id_00158D00000E1049_12_8_202	0_3_27_14_PM.txt 0_3_28_14_PM.txt	12/8/2020 3:27 PM 12/8/2020 3:28 PM	Text Document Text Document	49 KB 49 KB	
	Transmit_Streaming_Mac	Id_00158D00000E1049_12_8_202 Id_00158D00000E1049_12_8_202	0_3_29_14_PM.txt 0_3_30_14_PM.txt	12/8/2020 3:29 PM 12/8/2020 3:30 PM	Text Document	48 KB 48 KB	
	Transmit_Streaming_Mac	Id_00158D00000E1049_12_8_202 Id_00158D00000E1049_12_8_202 Id_00158D00000E1049_12_8_202	0_3_31_14_PM.txt 0_3_32_14_PM.txt 0_3_33_14_PM.txt	12/8/2020 3:31 PM 12/8/2020 3:32 PM 12/8/2020 3:33 PM	Text Document	49 KB 49 KB 49 KB	
The following file are Invalid	Transmit_Streaming_Mac	ld_00158D00000E1049_12_9_202	0_2_37_08_PM.txt	12/9/2020 2:37 PM	Text Document	199 KB	~
Select files then	File name: Transm	it_Streaming_MacId_00158D000	00E1049_12_8_2020_3_29_14	_PM.txt	~	Log files (*.txt)	~ Cancel
click on open				J			

Figure 186: Browsing TX files into Particle Velocity tool

5: Loading.



Figure 187: Particle Velocity result generation

- 6: The Particle Velocity Window will be displayed and will display:
 - Velocity Graph
 - Particle Velocity Graph
 - PPV Values
 - Zero Crossing frequency values
 - Peak Acceleration and Displacement values



Figure 188: Particle Velocity Display Window

6: The VPPV and DIN Report:

VPPV & DIN Report will be generated by clicking on the VPPV View and DIN-4150-3 Report buttons

> 10 Files Selected		Show selected graph
	Reset	VPPV Report
✔ Generate Log files		DIN 4150-3 Report
Successful operation Velocity log files are located a	at C:\logbeanscape\DIN FO	LDER



PPV					- U X
{ ◀ 1 of 1 ▶ ▶ ♦ ⊗ ۞ ♣ 🗐 🕮 💐 100%	-	Find Next			
BeanAir	VPP	V REPORT			6/27/2019 11:11:15
File Name	VPPV (mm/s)	Time PPV	ZC Freq(hz)	Peak Acc	Peak Disp(mm)
Transmit_S.E.T_Ch_X_MAC_ID0_x_F4B85E00A14B0000_6_26_2019_3_ 00_48_PM	0.5144	6/26/2019 3:00:51 PM	7.52	0.3531	2.0762
Transmit_S.E.T_Ch_X_MAC_ID0_x_F4885E00A1480000_6_26_2019_3_ 00_53_PM	0.0041	6/26/2019 3:00:53 PM	5.01	0.0024	0.0227

Figure 190: VPPV Report



INFORMATION	DETAILS
Building type	User configurable
Pipeline Material	User Configurable
Velocity Average	Get the average of the signal after transforming the acceleration signal into velocity signal
Sampling Rate	In Hz
Analyse duration	BeanScape property
Long term vibration evaluation	1-Find the maximum velocity values over the Time
effect	2- Compare the maximum velocity to the guideline value described on the Norm DIN 4150.
	3-Display if the result is OK or not (guideline respected or not)
Long term Effect on buried	1-Find the maximum velocity values over the Time
pipework	2- Compare the maximum velocity to the guideline value described on the Norm DIN 4150.
	3-Display if the result is OK or not (guideline respected or not)
Real Frequency	Get the signal frequency (FFT + windowing)
Maximum velocity (mm/s)	BeanScape Property
Short term Effect on buried	1-Find the maximum velocity values over the Time
pipework	2- Compare the maximum velocity to the guideline value described on the Norm DIN 4150.
	3-Display if the result is OK or not (guideline respected or not)
Short term vibration effect	1-find the maximum velocity value over the time.
evaluation	2-Determine the significant frequency (use the FFT + windowing).
	3-compare the maximum velocity to the guideline value described on the Norm DIN 4150
	5-Display if the result is OK or not (guideline respected or not)



Signal windowing is used in this analysis. Windowing is a technique used to cut out a section of your data to measure, in order to minimize distortions that cause spectral leakage of the FFT.

DIN 4150-3 Interpretation video

11.2 ONLINE DATA ANALYSIS TOOL

11.2.1 Online FFT

The FFT (Fast Fourier transform) operates by decomposing an N point time domain signal into N time domain signals each composed of a single point.

The second step is to calculate the N frequency spectra corresponding to these N time domain signals.

Lastly, the N spectra are synthesized into a single frequency spectrum.

When using FFT in SET mode, for best performance FFT points are automatically calculated on the number of data acquisition (sampling rate xdata acquisition duration).



Real time observation of FFT available for BeanDevice AX-3D only with Streaming and S.E.T acquisition modes and is enabled from the Online Data Analysis tab in the Configuration panel.

Custum display	Notes	Data Acq. config.	Sensor Config
Datalogger	System config.	Power mode managt	Online Data Analysis
Online FFT Configuration		Online Velocity configurat	tion
 Enable Online FFT Automatic FFT Repo Enable FFT Log file 	rt(S.E.T)	Enable Online Velocit Automatic DIN Repor Enable Velocity Log f Enable PPV Log file	v 😰 t(S.E.T) ile
Number of Points (Strea	ming)		
Manual SR/0.1 Current Points Number	>\$ SR/0.1		

Figure 192: Online FFT Configuration frame

1: Check Enable Online FFT to view the display of FFT graph in the sensor profile



Figure 193: FFT Spectrum

2: Check Enable FFT Log file to generate log files in the log_beanscape directory.

Enable Online FFT Automatic FFT Report(S.E.T) Enable EFT Les file	Online FFT Configuration	
Automatic FFT Report(S.E.T)	✓ Enable Online FFT	
Cooble EET Leg file	Automatic FFT Report(S.E.T)	
	Enable FFT Log file	

Figure 194: Online FFT Configuration frame

The log files will be generated in a folder called "FFT" under the BeanDevice® repertory.

C:) > log_beanscape > Folder 06A8 >		
🎍 FFT	26/10/2018 08:51	
📙 GeneratedDisplay	26/10/2018 08:49	
📙 Report Folder	26/10/2018 08:49	
TX Folder	26/10/2018 08:51	
00158D00000E06A8_WirelessNetwkInfo.txt	26/10/2018 08:53	435 Ko

I (C:) I log_beanscape I Folder 06A8 I FFT

FFT_RealTime_MAC_ID0_x_00158D00000E06A8_2018-10-26_08-51-44.txt	26/10/2018 08:54	619 Ko
FFT_SET_MACID_00158D00000E06A8_2018-10-26_08-25-58.txt	26/10/2018 08:26	10 Ko
FFT_SET_MACID_00158D00000E06A8_2018-10-26_08-26-20.txt	26/10/2018 08:26	10 Ko
FFT_SET_MACID_00158D00000E06A8_2018-10-26_08-27-23.bt	26/10/2018 08:27	11 Ko
FFT_SET_MACID_00158D00000E06A8_2018-10-26_08-28-24.txt	26/10/2018 08:28	11 Ko
FFT_SET_MACID_00158D00000E06A8_2018-10-26_08-29-25.txt	26/10/2018 08:29	11 Ko
FFT_SET_MACID_00158D00000E06A8_2018-10-26_08-30-26.txt	26/10/2018 08:30	11 Ko
FFT_SET_MACID_00158D00000E06A8_2018-10-26_08-31-27.txt	26/10/2018 08:31	11 Ko
FFT_SET_MACID_00158D00000E06A8_2018-10-26_08-32-29.bt	26/10/2018 08:32	11 Ko
FFT_SET_MACID_00158D00000E06A8_2018-10-26_08-33-30.txt	26/10/2018 08:33	11 Ko
FFT SET MACID 00158D00000E06A8 2018-10-26 08-34-31.bt	26/10/2018 08:34	11 Ko

Figure 195: FFT log files folder



After enabling Real time FFT and setting SMTP configuration (more information on section 8), this is an example of an FFT report emailed to concerned recipients.



Figure 198: FFT Report (S.E.T mode)

1	Logo of your company, you can upload it from the alarm management configuration window. Tools→Alarm management
2	General information about the Measurement, Date, duration sampling rate ,pre-trigger duration, IIR filter status and triggered axis
3	Information related to monitoring site: user, location and monitoring sites (can be configured from the Alarm tool window.
	This field can be configured be from the alarm management configuration window Tools \rightarrow Alarm management
4	BeanDevice [®] Information: Type, MAC ID and label, measurement range, and Alarm Type : Acceleration or Velocity
5	Alarm thresholds value on each Axis, the three levels of alarms are displayed Action-Alert-Alarm
6	FFT Report with Max Frequency for each Axis, VPPV (Vector Peak Particle Velocity) value and Max amplitude
7	Graph Area – 3 Axis are displayed on the same graph

For further information about managing your notification and reports email please refer to section <u>8:</u> <u>Alarm management.</u>

• FFT Advanced Configuration

The FFT configuration allows the user to activate the FFT Shift and to go for manual settings related to FFT.

🐝 FFT Configurat	tion	- 🗆 X
O Auto	FFT Shift	
Window Type :	Rectangular ~	Current FFT Configuration
Algorithm :	Estimate ~	Mode : By FFT_Auto
Zero Padding :	∠	FFT Shift : Disabled
Number of Points	SR/0.1	Window type : Rectangular
(Streaming mode)		Algorithm : Estimate
	Validate	Zero padding : Enabled

- Auto/Manual

🔵 Manual		FFT Shift
Window Type :	Rectangular	~
Algorithm :	Estimate	U I
Zero Padding :	✓	

Window type:

Rectangular
Hamming
Hann
Blackman
Blackman Harris
Gaussian
Kaiser
Taylor
Triangular
Flattop
Bartlett
Bartlett-Hann

When the number of periods in the acquisition is not an integer, the endpoints are discontinuous. These artificial discontinuities show up in the FFT as high-frequency components as not present in the original signal. These frequencies can be much higher than the Nyquist frequency and are aliased between 0 and half of your sampling rate. This phenomenon is known as spectral leakage.

You can minimize these effects by using a technique called windowing.

Windowing reduces the amplitude of the discontinuities at the boundaries of each finite sequence acquired by the digitizer. Windowing consists of multiplying the time record by a finite-length window with an amplitude that varies smoothly and gradually toward zero at the edges. This makes the endpoints of the waveform meet and, therefore, results in a continuous waveform without sharp transitions. This technique is also referred to as applying a window.

There are several different types of window functions that you can apply depending on the signal. To understand how a given window affects the frequency spectrum, you need to understand more about the frequency characteristics of windows.

Selecting a window function is not a simple task. Each window function has its own characteristics and suitability for different applications. To choose a window function, you must estimate the frequency content of the signal.

• If the signal contains strong interfering frequency components distant from the frequency of interest, choose a smoothing window with a high side lobe roll-off rate.

• If the signal contains strong interfering signals near the frequency of interest, choose a window function with a low maximum side lobe level.

• If the frequency of interest contains two or more signals very near to each other, spectral resolution is important. In this case, it is best to choose a smoothing window with a very narrow main lobe.

• If the amplitude accuracy of a single frequency component is more important than the exact location of the component in a given frequency bin, choose a window with a wide main lobe.

• If the signal spectrum is rather flat or broadband in frequency content, use the uniform window, or no window.

In general, the Hanning (Hann) window is satisfactory in 95 percent of cases. It has good frequency resolution and reduced spectral leakage. If you do not know the nature of the signal but you want to apply a smoothing window, start with the Hann window.

- Algorithm

Estimate	Determine a best-guess transform algorithm based on the size of problem.
Measure	Find a better algorithm by computing multiple transforms and measuring the run times.
Patient	Run a wider range of testing compared to 'measure', resulting in a better transform algorithm, but at the expense of higher computational cost to determine the parameters.
Hybrid	Use a combination of 'measure' for transforms with dimension length (number of points) 8192 or smaller and 'estimate' for transforms with dimension length (number of points) larger than 8192.

- Zero Padding: The use of zero padding enables you to estimate the amplitudes of frequencies correctly.
- FFT Shift: Check to enable real time FFT Shift processing for BeanDevice AX-3D on streaming mode and the FFT spectrum will appear shifted below the Streaming graph in the sensor profile.



FFT Spectrum	v Actions v Extents Zoom v None v					
			FFT Spectrum			
						1,8000 1,6000 1,4000 1,2000 0,8000 0,8000 0,6000 0,2000 0,2000 0,2000
	-40.000	-20.000	0.000 Frequency(Hz)	20.000	40.000	

Figure 199: FFT Shift Spectrum

11.2.2 Online Velocity

In order to use Real time PPV, you should use high sampling rate to provide good PPV values.



You need to sample at 200Hz at least to provide good PPV values.

By using SET mode, you need to choose the highest sampling rate which is 200Hz and don't forget to enter a DAQ duration higher than 10s.



For Streaming mode, choose at least 500Hz and above with a minimum DAQ duration of 10s, to provide good PPV measurement.



Real time observation of velocity available for BeanDevice AX-3D only with Streaming and S.E.T acquisition modes and is enabled from the signal processing tab in the Configuration panel.

Custum display	Notes	Data Acq. config.	Sensor Config
Datalogger	System config.	Power mode managt	Online Data Analysis
Online FFT Configuration Enable Online FFT Automatic FFT Repo Enable FFT Log file Number of Points (Streat Manual SR/0.1) Current Points Number	rt(S.E.T) ming)	Online Velocity config Control Enable Online Velocity Automatic DIN Re Enable Velocity Log Enable PPV Log fil	uration poity port(S.E.T) ng file e
Online waveform configu Automatic waveform Enable waveforms Lo	ration s Report(S.E.T) ig file(S.E.T)	Unit of acceleration S.E.T threshold	g × Acceleration ×
Software Filters Enable IIR Filter		Validate	

Figure 200: Online Velocity configuration tab

Enable online Velocity: check to enable real time Velocity processing, PPV and PVS, the velocity graph will be displayed.

On the Graph side a real time DIN 4150 graph will be displayed on the right side of the screen.

Under the DIN 4150 Graph, the PPV and the PVS values will be displayed in real time.

On the PPV frame, BeanScape will display PPV in mm/s, ZC Frequency in Hz, Peak Acceleration in g and Peak Displacement in mm.



It is important to notice that the PVS calculation required 3 active channels to be generated.

PPV: is a measurement of maximum ground particle movement speed, it is in millimeters per second (mm/sec), PPV is a "vector" quantity (i.e. it has both a value and an associated direction).

Peak Vector Sum (PVS): is simply the square root of the sum of the squares of the individual PPV values. PVS is a "scalar" quantity, i.e. one with only a value, which is always larger than the individual PPV vector values.

Scientific studies have shown that the PPV correlates best with damage potential of all the tested characterizations of ground movement (e.g. acceleration, displacement, or strain). Most, though not all, ground vibration standards are quoted in PPV values, although the "acceptable" values of PPV differ with the standard applied and with the frequency of the vibration components.



Figure 201: Velocity Graph

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Figure 202: Velocity and FFT Graph, PPV and PVS



Figure 203: DIN 4150 Real Time Graph, PPV & PVS

Beanair GmbH

Automatic DIN Report (S.E.T): check to enable DIN4150-3 report automatic generation when threshold is reached, or an acquisition cycle is reached on the S.E.T acquisition mode.

An automatic Report will be sent to the email addresses configured on Alarm Management Option.

BeanAir	06-Feb-19 12:07:37
BeanDevice MAC_ID : F4B85E00A14B0000	Sensor Label : Ch_Z

Building Type	Commercial
Pipeline Material	Steel
Velocity Average(mm/s)	0.0177327272727272
Sampling Rate(hz)	100
Analyze Duration(hh:mm:ss)	00:00:01.1000000
LTVEE	ОК
LTEBP	ок
Velocity Frequency(hz)	0
PCPV(mm/s)	2.4892
STEBP	ОК
STVEE	NOK

DIN 4150-3 REPORT

KeyWord	Meaning	
LTVEE	Long Term Vibration Evaluation Effect	
LTEBP	Long Term Effect on Buired Pipework	
STEBP	Short Term Effect on Buired Pipework	
STVEE	Short Term Effect Evaluation	
PCPV	Peak Component Particle Velocity	

Figure 204: DIN 4150-3 Report email

INFORMATION	DETAILS
Building type	User configurable
Pipeline Material	User Configurable
Velocity Average	Get the average of the signal after transforming the acceleration signal into velocity signal
Sampling Rate	In Hz
Analyse duration	BeanScape property
Long term vibration evaluation	1-Find the maximum velocity values over the Time
effect	2- Compare the maximum velocity to the guideline value described on the Norm DIN 4150.
	3-Display if the result is OK or not (guideline respected or not)
Long term Effect on buried	1-Find the maximum velocity values over the Time
pipework	2- Compare the maximum velocity to the guideline value described on the Norm DIN 4150.
	3-Display if the result is OK or not (guideline respected or not)
Velocity Frequency	Get the signal frequency (FFT + windowing)
Maximum velocity (mm/s)	BeanScape Property
Short term Effect on buried	1-Find the maximum velocity values over the Time
ріремогк	2- Compare the maximum velocity to the guideline value described on the Norm DIN 4150.
	3-Display if the result is OK or not (guideline respected or not)
Short term vibration effect	1-find the maximum velocity value over the time.
evaluation	2-Determine the significant frequency (use the FFT + windowing).
	3-compare the maximum velocity to the guideline value described on the Norm DIN 4150
	5-Display if the result is OK or not (guideline respected or not)

Enable Velocity Log file: check to enable Velocity data to be stored in the log folder.

	organize	TACAA	00	
> This	s PC > Local Disk (C:) > log_beanscape > Fo	lder 5C313E06A9A7000	00	
	Name	Date modified	Туре	Size
	FFT	13-Feb-19 14:43	File folder	
7	TX Folder	13-Feb-19 14:58	File folder	
R		13-Feb-19 14:58	File folder	
S 🖈 🛛	5C313E06A9A70000 WirelessNetwkInfo	13-Eeb-19 14:58	Text Document	

Uelocity_RealTime_Ch_Y_MAC_ID___0_x_F4B85E00A14B0000_6_12_2019_10_48_00_AM

Velocity_RealTime_Ch_Z_MAC_ID___0_x_F4B85E00A14B0000_6_12_2019_10_48_00_AM

Figure 205: Velocity Log Folder/Files

Enable PPV Log file

poond		Organize	140.00		open
) > Th	is PC → Local Disk (C:) ⇒	log_beanscape > F	older 5C313E06A9A7000	0	
	Name	^	Date modified	Туре	Size
	FFT		13-Feb-19 14:43	File folder	
7	TX Folder		13-Feb-19 14:58	File folder	
*	Velocity		13-Feb-19 14:58	File folder	
INIS 🖈	5C313E06A9A7000) WirelessNetwkInfo	13-Feb-19 14:58	Text Document	
PPV_	RealTime_Ch_X_N	1AC_ID0_x_F4	B85E00A14B0000_	6_12_2019_10_4	48_00_AN
PPV_	RealTime_Ch_Y_N	IAC_ID0_x_F4	B85E00A14B0000_	6_12_2019_10_4	48_00_AN
PPV_	RealTime_Ch_Z_N	1AC_ID0_x_F4	B85E00A14B0000_	6_12_2019_10_4	48_00_AN

Figure 206: PPV Log Folder/Files



By default, the Velocity is configured "By Zero Crossing", to edit the Velocity settings user must select "By FFT" or "By Filter".

🐭 Velocity Configuration								- 0	×
⊖ By FFT			$^{ m O}$ By Filte	r		⊙ By Zero Cros	sing		
- B'	y FFT: By se	electing this op	tion, the user w	ill setup the	e Velocity b	asing on custo	mized FF	T setti	ngs.
	0	Auto: If Auto	is selected, The	Velocity ca	lculation wi	Il activate FFT	Auto mo	de Set	ttings

L

📾 Velocity Configuration

⊙ By FFT					
FFT					
🔘 Auto					
Window Type :	Rectangular	~	Ś	Import	
Algorithm :	Estimate	v			
Zero Padding :	V				

 Manual: Once switched to Manual, the user must configure the FFT settings manually (Window Type, Algorithm & Zero Padding).

By clicking on Import the Configuration will import the FFT current settings, already configured on the FFT frame.

📾 Velocity Configu	iration				
∍ By FFT					
FFT					
🔘 Manual					
Window Type :	Rectangular	×	Import		
Algorithm :	Estimate	v			
Zero Padding :					

<u>To save all settings Press Validate. The new settings should be displayed on the Left side of the Window.</u>

SmartSensor User Manual		2.4GHz wireless sensors
SmartSensor User Manual	By Filter Streaming Mode SEI Mode Auto Filters Profile : Rendpass Bandpass Bendpass Chebyshev_type_1 FIR Equiripple FIR Equiripple Minimum Order Specify Order Microanneeton Velocity Configuration saved Su	2.4GHz wireless sensors

- **By Filter:** By selecting this option, the user will setup the Velocity basing on the Software Filter.





 \circ $\;$ Auto: If Auto is selected, Velocity Automatic filter will be configured

Close

Validate

© By Filter		
Streaming Mode SET Mode		
O Auto Filters Profil	e: 🗸 🗸	
Response Type	Frequency Specification	Magnitude Specification
HighpassBandpass	Units: Hz Fs : 2000	Units: dB Astaal: 60
Design Method	Estoni : 0.1	Wnass: 1
IIR Chebyshev_type_l ×	Fpass1: 2.5	Wston2: 60
O FIR Equiripple	Fpass 2 800	
Filter Order	Fstop 2: 999	
Minimum Order Specify Order		Filer name :
Filer Specification		
Mag. (dB)	F _{pass2} F _{stop2} F _{s/2} f (H	iz)
		Close Validate

- Manual: Once switched to Manual, the user must configure manually the Filter settings.
 - Response Type: User should specify if the Response is Highpass or Bandpass



 Design Method: User should Select the nature of the Filter between IIR or FIR From the List of every filter, user have to specify the method of the Filter: IIR: Chebyshev_type_I, Chebyshev_type_II or Butterworth FIR: Equiripple, Generalized_Equiripple or Kaiser_Window

<u>The Frequency Specification and The Magnitude Specification</u> will be modified according the selected Design Method Filter Order: If the user is using IIR Design Method, Minimum Order will be selected automatically.

If the FIR Design Method is selected, user must Specify Order.

- Frequency Specification: Is a customizable frame according to the Design Method.
- Magnitude Specification: Is a customizable frame according to the Design Method.
- Filter Profile: User can save a specific Configuration and re-use it later.



 Filter Specification: Is a Graphical Display of the Filter Specification depends on the user settings.



<u>To save all settings Press Validate. The new settings should be displayed on the Left side of the Window.</u>

Nelocity Configuration		- D X
○ By FFT	⊙ By Filter	○ By Zero Crossing
FFI	Streaming Mode SET Mode	
Manual	Manual Filte	rs Profile : 💦 🗸 🖌 🕥
Window Type : Hectangular V Import	Response Type	Frequency Specification Magnitude Specification
Algorithm : Estimate	• Highpass	linite: (H7)
	O Bandpass	
Current Velocity Configuration	Design Method	Fetn: 28
Points Used	◯ IIR Chebyshev_type_l ヾ	Fpass: 40
Number of points(: SR/0.1	O FIR Equiripple	
(Streaming mode)	Filter Order	
Streaming S.E.T	Minimum Order Velecity Co	Filer name Filter_Name
Mode: By Filter Mode: By Filter_Auto	Specify Order	
Sampling Rate : 100 (Hz) Sampling Rate : 1000 (Hz)	Filer Specification	/elocity Configuration saved Successfully
Response type: migripass Response type: migripass	Mag. (dB)	
Filter Order: Min order		ОК
Fstop : 20 (Hz) Fstop : 0.1 (Hz)		Apass
Fpass : 40 Hz Fpass : 2.5 Hz	1	
Fpass2: NA (Hz) Fpass2: NA (Hz)		
Fstop2: NA Hz Fstop1: NA Hz		
Anass: 1 dB Anass: 0.1 dB		F Fs/2 f (Hz)
Wstop2: NA dB Astop2: NA dB		
11.2.3 IIR Software Filter		
Enable IIR Filter: Check to enable IIR f	filter	
Software P	Filters	
	n IID Filtor	
	e lin fillei	
11.2.4 Number of Points (Streaming)		
Number of Poi	ints (Streaming)	
🗖 Manual (SR/0.1)	24
Current Point		1
Du defeult the Number of Deinte is sufficient	ad to be set :	tomotically as formalian Data / 0.4 /SD/0.4)
By default, the Number of Points is configur	ed to be set au	tomatically as Sampling Rate / 0.1 (SR/0.1).
By moving to the Manual settings, user must cho	ose a value betwe	en 128 and 32768.



The frequency resolution of each spectral line is equal to the Sampling Rate divided by the Number of Points. For instance, for example, if the Number of Points is 4096 and the Sampling Rate is 2000, the resolution of each spectral line will be:

2000/4096 = 0.48828125



It is important to notice that larger Number of Points provide higher spectral resolution but take longer to compute.

11.2.5 Online Waveform Configuration

On	Online waveform configuration						
~	Automatic waveforms Report(S.E.T)						
~	Enable waveforms Log file(S.E.T)						

- Automatic Wave Report (S.E.T): Check to enable waveform reports, this is only available for S.E.T mode
- **Enable Wave Log file:** check to enable logging wave form for real-time data (only S.E.T mode)

11.2.6 Unit of acceleration

Select which unit to be used for acceleration measurement.

- G
- mm/s²

Unit of acceleration	g 👻
	g
S.E.T threshold	mm/s ²

11.2.7 S.E.T threshold

In many cases the threshold is needed to be set in mm/s and not in g or mm/s², you need to configure your S.E.T threshold parameters before starting. To configure the threshold to be set in mm/s, you need to go to Online Data Analysis and change S.E.T threshold from acceleration to Velocity.

Unit of acceleration	g v	
S.E.T threshold	Acceleration 👻	2
L	Acceleration	ľ
	Velocity	
12. APPENDICES

12.1 APPENDICE 1: INSTALLATION PROCEDURES

12.1.1 Sealing

The product BeanDevice[®] comes with an *IP67* rating. So, do not install the BeanDevice[®] in a marine environment with high turbulence.

Do not install the BeanDevice[®] up front to prevent the accumulation and infiltration of water from the front of the case.

If the BeanDevice[®] is used in a cold environment, it will be better to integrate it inside a plastic casing.

12.1.2 Coexistence With other Frequencies at 2.4 GHz

The BeanDevice[®] is sensitive to noise 2.4GHz (Wi-Fi as a source for example), but many protections are already in place, particularly in the IEEE 802.15.4[®].

It should however be careful when installing the product, check all the possibilities of radio channels on the frequency range 2.4-2.5GHz. The operation of the product will be improved.

For further information, read the application note: <u>AN_RF_004 – "Coexistence of Beanair WSN at</u> <u>2.4GHz"</u>

12.1.3 Temperature & Humidity

The BeanDevice® SmartSensor series comes with an operating temperature of -20°C to +65°C.

BeanDevice[®] products can operate in an area with 90% humidity.

However, the wireless range can be reduced in the presence of water. Avoid mounting the BeanDevice[®] in an enclosure surrounded by water, or near bushy plants (plants are composed of 90% water), ...

12.1.4 Reflections, Obstructions and Multipath

For further information, read the application note: <u>AN_RF_007 :" Beanair_WSN_Deployment"</u>

12.1.5 shock & Vibration resistance

Shock resistance on BeanDevice® products are:

Shock resistance

Do not force connections.

12.1.6 Antenna

Check the LQI (Link Quality Indicator) of your BeanDevice® for being sure that your antenna is right oriented.

For further information, read the application note: <u>AN_RF_007 :" Beanair_WSN_Deployment"</u>

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12.2 APPENDICE 2: SENSOR CHARACTERISTICS

12.2.1 BeanDevice® AX-3D & AX-3D Xrange

12.2.1.1 Sensor architecture

BEANDEVICE® AX-3D



Figure 208: Sensor design

12.2.1.2 MEMS Accelerometer

The BeanDevice[®] 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 acceleration-induced 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 wafer level by bonding a second silicon lid wafer to the device using a glass frit.

12.2.1.3 5th order Anti-aliasing filter

BeanDevice[®] AX-3D & HI-INC products integrates a high-performance 5th order Butterworth filter.

12.2.1.4 Why using an anti-aliasing filter?

When selecting an analog filter, the goal is to provide a cutoff frequency that removes unwanted signals from the ADC input or at least attenuates them to the point that they will not adversely affect the circuit. An anti-aliasing filter is a low-pass filter that accomplishes this. How does one select the right filter? The key parameters that need observation are the amount of attenuation (or ripple) in the passband, the desired filter rolloff in the stopband, the steepness in the transition region and the phase relationship of the different frequencies as they pass through the filter.



Once the signal frequencies of interest are known, use a simple filter program to determine the filter topology needed to meet the passband, stopband, and transition region requirements. Of the four basic filter types, each has its own advantages



The Butterworth filter used on the BeanDevice[®] SmartSensor product lines, has the flattest passband region, meaning it has the least attenuation over the desired frequency range. The Bessel filter has a more gradual roll-off but its key advantage is that it has a linear phase response, meaning each frequency component is delayed by an equal amount of time as it passes through the filter. A linear phase response is often specified as a constant group delay, since group delay is defined as the derivative of the phase response with respect to frequency. The Chebyshev filter has a steeper rolloff but more ripple in the passband. The Elliptic filter has the steepest rolloff. For a simple anti-aliasing filter, often times a simple single-pole passive RC filter is acceptable. In other cases an active filter works well. One advantage of an active filter is that for multi-order filters, the operation of the filter is less sensitive to the values of the external components, in particular, the 'Q' value of the filter.

12.2.1.5 Anti-aliasing filter features

specifications	Typical
Type of Lowpass filter	5-th Butterworth response
Total harmonic distortion plus Noise (THD + N)	-81 dB
Typical Harmonic Distortion	-86,4 dB
Cutoff frequency (or corner frequency)	Configurable from the BeanScape® :
	AX-3D : 0 à 2 KHz
	AX-HD : 0 à 2 KHz
	HI-INC : 0 à 60 Hz

Table 4: Frequency & Phase response curve cutoff frequency 1 KHz



Total Harmonic Distortion plus Noise vs Input signal amplitude





5th-order Ladder Filter network

12.2.1.6 Analog Digital Converter

The Analog-to-Digital (16-bits) converter is based on a true SAR (Successive Approximation Register) architecture with no missing codes.

The ADC integrates an internal temperature sensor, which is useful for performing a system calibration. The internal reference is temperature-compensated to within 10 mV. The reference is trimmed to provide a typical drift of ± 10 ppm/°C.

12.2.2 BeanDevice[®] HI-INC & HI-INC Xrange

12.2.2.1 Sensor architecture



Figure 209: Inclinometer Block Diagram (BeanDevice® HI-INC ±30° and ±15° versions)



12.2.3 Inclinometer Block Diagram (BeanDevice® version)



12.2.4 MEMS Inclinometer & differential output

The BeanDevice[®] 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[®] HI-INC an ideal choice for high accuracy leveling instruments.

The inclinometer used on the BeanDevice[®] HI-INC $\pm 15^{\circ}$ and $\pm 30^{\circ}$ 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.

12.2.5 5th order Anti-aliasing filter

Same specifications as BeanDevice® AX-3D

12.2.6 Analog to digital converter

Same specifications as BeanDevice[®] AX-3D

12.2.7 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 ±0.057° (6 δ limit) and the temperature dependence is typically ±0.002°/°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 ±2.9°, corresponding to ±50mg. This error is of importance when using large inclination angle amplitudes and is seen as an addendum to the non-linearity (Typically ±5mg in ±0.5g and ±10mg in ±1g).

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 cutoff freq. $f_{-3dB} = 0 \dots 10Hz$). In an extreme case, high amplitude vibrations (>5g) may cause a measurable zero point shift.

12.2.8 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 polynome 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 ±15° and ±30° versions
- ✓ 0.014%/°C down to 0.008%/°C for the BeanDevice[®] HI-INC ±90°

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 represents 99.73% of the inclinometer sensor population.



Temperature dependency of the inclinometer sensor offset (differential output)





12.2.9 BeanDevice® AX-3DS

12.2.9.1 Mems Sensor architecture





Figure 211: BeanDevice® AX-3DS mems Sensor architecture

12.2.9.2 Shock detection trigger

The shock detection trigger allows the BeanDevice[®] AX-3DS to wake up when a threshold is reached. The threshold value can be modified from the BeanScape[®].

This feature is used for "Smart shock detection" data acquisition mode.

12.2.9.3 <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 of the BeanDevice[®], the sensor will continue to track a shock event.

Depending on the sampling rate of the accelerometer during sleeping, the BeanDevice[®] current consumption can change:

Accelerometer sampling rate during sleeping	BeanDevice [®] AX3DS Current consumption
0,5 Hz	21 μΑ
1 Hz	31 μΑ
2 Hz	50 μA

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2.4GHz wireless sensors

5 Hz	78 μA
10 Hz	130 μΑ
50 Hz	302 μΑ
100 Hz	308 μΑ
400 Hz	343µA
1000 Hz	413 μΑ

Table 5 : BeanDevice[®] AX-3DS power consumption for a given sampling rate

For further information about the SSD (Smart Shock Detection) measurement mode, read the technical note TN RF 008 – "Data acquisition modes available on the BeanDevice®"

12.2.10 Sensor position inside the casing

12.2.10.1 BeanDevice® AX-3D



Position of the MEMS Accelerometer



Figure 212: Overview: MEMS Accelerometer in BeanDevice® AX-3D

12.3 APPENDICE 3: MAINTENANCE & SUPERVISION (FOR EXPERIENCED USER)

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

12.3.1 Extending battery life

The battery autonomy depends on several parameters:

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

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

BeanDevice [®] version	<i>Current consumption during radio TX at 25°C, powered by a battery of 3.6V</i>	<i>Current consumption in sleep phase at 25°C, powered by a battery of 3.6V</i>
BeanDevice® AX-3D & BeanDevice® AX-3D XRange	60-61 mA	< 30 uA

BeanDevice® HI-INC	70-73 mA	<30uA
BeanDevice® HI-INC XRange		
BeanDevice® INC		
BeanDevice® AX-3DS	50-55 mA	<30uA
BeanDevice® AX-3DS XRange		

For further information, please read the technical note <u>"TN_RF_002 V1.0 - Current consumption in</u> active & sleeping mode"

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

Influence factors on battery lifetime	Observations	Recommendations
Sleeping power mode on your BeanDevice®	Sleeping power mode can be configured on the BeanDevice® from the BeanScape®	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 micro-amperes. For further information, please read the technical note <u>TN_RF_010 –</u> <u>« BeanDevice[®] Power Management »</u>
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).

12.3.2 Over-the-air Configuration (OTAC) parameters backed up on Flash

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

This memory is organized into several levels:



12.3.2.1 Level 1: End-user OTAC parameters

The following table presents all the defaults configuration parameters:

		BeanDevice [®] version	
Parameter	AX3D & AX-3D Xrange	HI-INC & HI-INC XRange	AX-3DS & AX-3DS XRange
Power Mode	Active	Active	Active
Data Acquisition duty cycle	10s	10s	10s
Acquisition duration time	ΟΚ	ОК	ОК
Sampling rate	ОК	ОК	ОК
Data Acquisition mode	LowDutyCycle	LowDutyCycle	LowDutyCycle
Alarms Threshold	H1 :2 ou10	H1 :20	H1 :20
	H2 :2 ou 10	H2 :20	H2 :20
	S2 :-2 ou -10	S2 :0	S2 :0
	S1 :-2 ou -10	S1 :0	S1 :0
Anti-aliasing Filter cut-off frequency	100 Hz	10 Hz	10 Hz

Table 6: 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.



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

12.3.2.2 Level 2: Sensor calibration parameters

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

		BeanDevice [®] Version	
Parameter	AX3D & AX-3D Xrange	HI-INC & HI-INC XRange	AX-3DS & AX-3DS XRange
Sensor gain	ОК	ОК	ОК
Sensor offset	ОК	ОК	ОК

Network diagnostic from your BeanScape® software

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

12.3.2.3 Displaying Network information

- 1. Launch your BeanScape[®] application
- Select your BeanDevice[®] profile, a new tab "Advanced func." will appear in your BeanScape[®] toolbar;
- 3. Click on this tab, and then click on "BeanDevice[®] health status (history)".



A new window occurs:



Figure 215: BeanDevice® health status window

12.3.2.4 Packet Error Rate

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

PER is only available with IEEE 802.15.4 Network; it represents the ratio of "lost data/data send" between the BeanDevice[®] and the BeanGateway[®].

12.3.2.5 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
- ✓ Fix your BeanDevice & BeanGateway on a top of a mast or a building.



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

range?"

12.3.2.6 Internal temperature monitoring

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

12.3.2.7 Battery charge monitoring

Battery charge is based on current accumulation. The BeanDevice[®] 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.

12.3.3 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.



Figure 216: BeanDevice® Scrolling menu

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

12.3.3.1 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.

🛸 Bear	nscape 2.4	GHz							
File	BeanSca	pe® App	Tools	Adv	anced func.	Off.Data Analysis	View	Help	
					Enable loggi	ng on PC			
	File BeanScape® App Tools Server Image: Server		Disable logg	ing on PC					
	<u>.</u>				Reset measu	re memory cache for	r all the s	ensors	
J.					Beandevice@	lealth status (histo	ry)		
		💻 🗾 MA	C_ID : 0>		Multigraph o	display			
📾 Bear	nscape 2.4	GHz							
File	BeanSca	pe® App	Tools	Adv	anced func.	Off.Data Analysis	View	Help	
		<u> </u>			Enable loggi	ng on PC			
Server		r		Disable logg	ing on PC				
			Reset measu	re memory cache for	r all the s	ensors			
J.			App Tools Advanced func. Off.Data An Enable logging on PC Enable logging on PC CIVEI Disable logging on PC Reset measure memory ca Beandevice® health statu MAC_ID : 0 Advanced func. Off.Data An MAC_ID : 0 Advanced func. Off.Data An Enable logging on PC Enable logging on PC Beandevice® health statu Multigraph display	lealth status (histo	ry)				
	Con 1	m MA			Multigraph o	display			

Figure 217: BeanSensor: Enable/Disable Log

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

12.3.3.2 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;



12.3.3.3 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.

Server	Dashboard	Sensor Config
MAC_DD: 0 x 00158D00000E0688 Gn_X MAC_DD: 0 x 00158D00000E0986 Gn_Y Gn_X Gn_X	Sensor Channel Status Label: Ch.Y Rechnology: (Inclinometer Ref: State:Alarm: 13Alert: 5 Action: 10	Distum display Notes Alarm level Config Sensor calibration Log config. Label: (b, Y) Unit: (dog) Ratio: (1) Validate Offset: (I) (I) (I) (I) Conversion Conversion (I) (I) (I) (I) (I)
Gn_X Gn_Y Gn_Z ■ MAC_ID:0x00158D00000E0C4D	Graph Measure Mode Electric v Actions v Extents Zoom v None v V Alarm	Clear Graph Open in new window

Figure 220: BeanSensor: Open the graph in a new window

You can easily open several graphs in a window.



Figure 221: Graphs opened in separated windows

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

12.4 APPENDICE 4: TROUBESHOOTING

✓ Why the Red LED is flashing?

Each time a packet is lost by the BeanDevice[®], Nwk/Activity led will blink in red. Try to decrease the wireless range between the BeanGateway[®] and the BeanDevice[®].

✓ Why the BeanDevice[®] 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?

Please turn off your BeanDevice [®], and then choose an appropriate channel. The channel selection is done from the BeanGateway [®].

For further information, please Read BeanGateway User's Manual BeanGateway [®].

Why the BeanDevice[®] 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;
- If you use a BeanDevice[®] AN-XX :
 - Check your sensor power supply, maybe you need to increase/decrease your power supply;
 - Check your sensor preprocess time. Maybe your sensor preprocess time is too short?
 - Check the wiring code of your sensor plug;

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

- ✓ If your BeanDevice[®] operates with sleep phase, the RF Hardware operates also with a sleep phase. Therefore an Over-the-air-configuration will not be possible.
- 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[®] and the BeanGateway[®].
- ✓ If your BeanDevice[®] works in streaming mode, in order to keep a full synchronization of the data acquisition, any over-the-air-configuration is authorized.
- Why do I have too much noise on my sensor signal?
 - ✓ If you use a BeanDevice[®] AX3D/HI-INC/AX-3DS: don't forget to configure the cutoff frequency of your anti-aliasing filter
 - ✓ If you use a BeanDevice[®] AN-mV: use a shielded cable.

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.

12.5 APPENDIX 5: SENSOR CALIBRATION

12.5.1 Factory Calibration procedure

12.5.1.1 BeanDevice[®] HI-INC/INC & HI-INC Xrange (Wireless Inclinometer)

The calibration procedure is based on a side-by-side comparison with a reference tiltmeter (Level development, Ref: SOLAR-2-05-1-RS232, accuracy $\pm 0.01^{\circ}$ on the FS). For a better measurement stability, the two tiltmeters are mounted on a sinus table (Mecamag, ref: 1005/02/175100S, accuracy ± 5 seconds, planity $\pm 0.005/100$ mm).

12.5.1.2 BeanDevice[®] AX-3D/AX-3DS & AX-3D Xrange (Wireless Accelerometer)

A static calibration method is used to calibrate the sensor.

12.5.2 Re-calibration

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

BeanDevice [®] version	Operating temperature < 40°C	Operating temperature > 40°C
BeanDevice [®] AX-3D & BeanDevice [®] AX-3D Xrange	6 years	3 years
BeanDevice [®] AX-3DS	3 years	2 years
BeanDevice HI-INC, BeanDevice [®] HI-INC Xrange and BeanDevice [®] INC	6 years	3 years

UClick here for more information about calibration settings

12.6 FIREWALL EXCEPTION FOR BEANSCAPE®

By default, firewall blocks all unknown network traffic coming in to the network. To permit traffic through the firewall we create exceptions (or rules) that allow certain traffic on the network. In our case the rules are defined by the software which is BeanScape.

Usually when launching BeanScape for the first time your Windows OS will ask you to add an exception and to allow the software to use your network resources, however in case this doesn't occur or rejected, manually adding BeanScape to exceptions list is possible through these following steps:

1. Use your Search bar at the windows launcher and look for "Allow an app through Windows Firewall"



Figure 222 : Windows search for firewall screenshot

2. Look for BeanScape in the list and check its box, check Private if you are only willing to use BeanScape in your LAN or Public for allowing remote access from outside the LAN.Validate and your BeanScape will be allowed in your network.

nartSensor User Manual			2.4GHz wireless ser			
Allowed apps						_
← → · · ↑ 👉 > Control Panel >	System and Security \rightarrow Windows Defender Firewall \rightarrow Allowed apps		~ Ū	Search Control Panel		
	Allow apps to communicate through Windows Defend	der Firewall				
	To add, change, or remove allowed apps and ports, click Change settin	igs.				
	What are the risks of allowing an app to communicate?	😯 Change sett	ings			
	Allowed apps and features:					
	Name	Private Public	^			
	BeanScape					
	✓ Bubble Witch 3 Saga	VV				
	☑ Candy Crush Soda Saga	\checkmark				
	Captive Portal Flow					
	Cast to Device functionality					
	Connect	V				
	Connected Devices Platform	V				
	Core Networking	VV				
	✓ Cortana	V				
	Delivery Optimization	Y Y				
	✓ DiagTrack					
	DIAL protocol server		~			
		Details Remov	e			
		Allow another app	o			
		OK Cano	:el			

Figure 223: allowed apps window

If you are not familiar to configure a firewall exception, you can directly from BeanScape[®] add this rule automatically.

On the BeanScape[®] menu select Tools, then Advanced Settings then click on validate to add BeanScape[®] to the Firewall.

🐝 Beanscape 2.4GHz	
File BeanScape® App	Tools Off.Data Analysis View Help
Serve	BeanScape® configuration Alarm Window BeanGateway Ethernet/LAN Config. Import/Export user settings Alarm Management Notification Management Offline graph Advanced Settings BeanScape Client Management
	FTP Configuration Advanced Settings × OPC Management
	Firewall Add Figure 224: Firewall auto exception