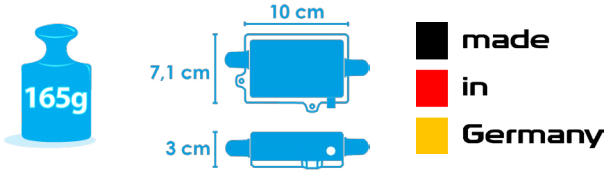
SmartSensor

HIGH PERFORMANCE WIRELESS ACCELEROMETER WITH INTEGRATED DATA LOGGER

//APPLICATIONS



- Dynamic measurement on embedded equipment
- Vibration analysis
- Inertial measurement
- Movement detection
- Structural health monitoring (SHM)

FEATURED VIDEO

BeanDevice® AX-3D Xrange main presentation video

BeanDevice® AX-3D Xrange-Wireless Sensor Network dedicated to health monitoring on bridge

USER MANUAL

BeanDevice® SmartSensor user manual

MECHANICAL DRAWING

BeanDevice® AX-3D Xrange drawing

//MAIN FEATURES

Wireless accelerometer
(measurement range ±2g or ±10g)
FFT and DIN4150-3 (Ground Vibration)
modules available

Time-Synchronized wireless sensor network

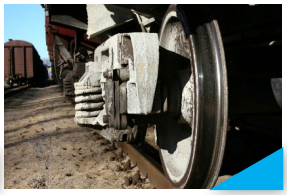
Embedded data logger : up to 8 millions data points (with events dating)

Waterproof IP67 casing | Nema 6

Fully autonomous system with an integrated Lithium-Ion battery charger

Excellent radio link relying on the radio antenna diversity developed by Beanair®





//TYPICAL CUSTOMER APPLICATIONS

Condition Monitoring on Wind Turbine

Vibration Analysis on Train Wheels

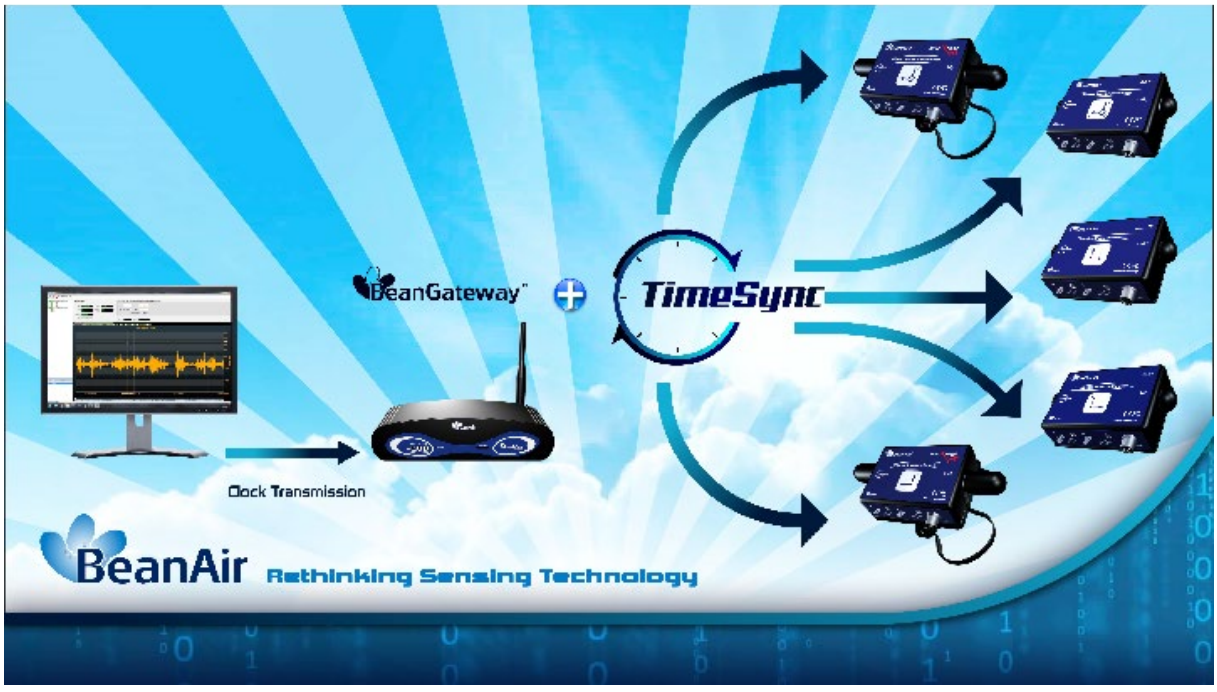
Ground and builidng vibration

Structural Health Monitoring

//TIME-SYNCHRONIZED WIRELESS SENSOR NETWORK

TimeSync

TimeSync function brings time-synchronization over the Wireless Sensor Network (±2.5ms of accuracy between each wireless sensor) and contributes to enhance user experience about correlation of remote sensing data and modal analysis.



//REMOTE CONFIGURATION & MONITORING

BeanScape® Basic

The BeanScape® application allows the user to view all the data transmitted by the BeanDevice® AX-3D XRange.

Thanks to the OTAC (Over-the-Air configuration) feature, the user can remotely configure the BeanDevice® AX-3D XRange.

SEVERAL DATA ACQUISITION MODES ARE AVAILABLE ON THE BEANDEVICE® AX-3D XRANGE :

- Low Duty Cycle Data Acquisition mode (LDCDA) : the data acquisition is immediately transmitted by radio. The transmission frequency can be configured from 1s to 24h.
- Streaming Packet Mode : all measured values are transmitted by packet within a continuous flow at 4000 samples per second maximum

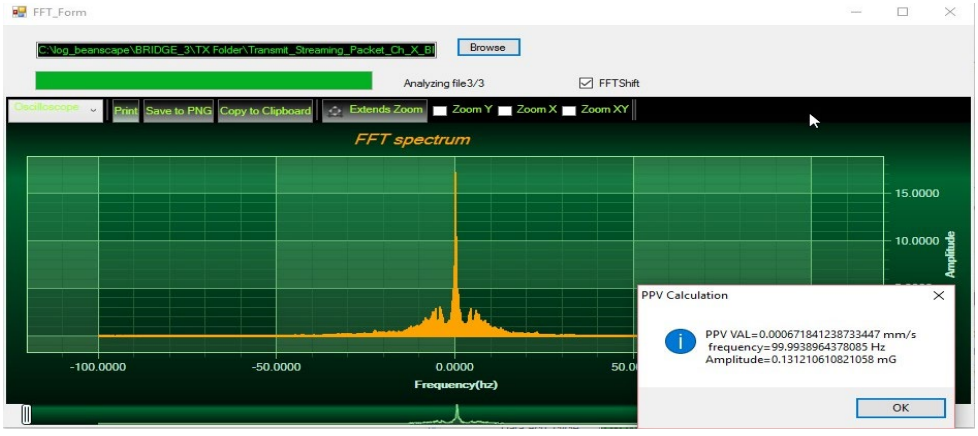
BeanScape® Premium+ Add-on

The BeanScape ® Premium+ integrates an OPC DA server (Data Access). OPC DA is particularly well suited for real time measurement and data sharing. Each data/measurement can be associated to a tag or its attributes and shared with one or many OPC clients.

For further information about the different data acquisition modes:
TN_RF_008 – "Data acquisition modes available on the BeanDevice®"

//VIBRATION ANALYSIS REPORT AT A GLANCE

The BeanScape® comes with advanced tools for user working on building and ground vibration:
- Vibration Analysis tools: FFT, PPV (Peak Particle Velocity), Velocity
- Automatic report meeting the DIN4150-3 standard (Excel, PDF and Word)



//ANTENNA DIVERSITY

While the vast majority of wireless sensors show their limits in harsh industrial environment, the BeanDevice® AX-3D XRange integrates an innovative antenna diversity design, boosting the radio link quality in environments subject to random and diverse disturbances. Antenna Diversity improves both the quality and reliability of a wireless link by 30%.

//EMBEDDED DATA LOGGER UP TO 8 MILLION DATA POINTS

The BeanDevice® AX-3D XRange integrates an embedded datalogger, which can be used to log data when a Wireless Sensor network can not be easily deployed on your site. All the data acquisition are stored on the embedded flash and then transmitted to the BeanGateway® when a Wireless Sensor Network is established.
The data logger function is compatible with all the data acquisition mode available on the BeanDevice® AX-3D XRange :

- Low Duty Cycle
- Streaming packet

EXAMPLE : VIBRATION ANALYSIS ON WINDMILLS BLADES

- In standalone operation, the BeanDevice® AX-3D XRange stores all the measurements on its embedded datalogger. Thus, a direct connection with the BeanGateway® is not needed.
- When the blades start rotating, all the acquired measurements are stored on datalogger.
- Data logs can be transmitted to the BeanGateway® on request. Once a successful transmission is done, the user can choose to erase automatically the logs from the datalogger memory, so new ones can be stored.

For further information about the Datalogger, please read the following technical note :
TN_RF_007 – "BeanDevice® DataLogger User Guide "

Product reference
MR – Measurement Range: ***2G*** : ±2g measurement range ***10G*** : ±10g measurement range
PS - Power Supply **RB :** Built-in rechargeable Lithium-Polymer battery 2Ah **XT :** External Power supply
MO - Mounting Option **SCM** - Screw Mounting Lid **MM** - Magnet Mounting Lid
Example n°1: ***BND-AX3D-10G-XR-RB-SCM***, High performance wireless accelerometer with 10g measurement range, built-in rechargeable battery, screw mounting **Example n°2: BND-AX3D-2G-XR-XT-MM,** High performance wireless accelerometer with 10g measurement range, external power supply , 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	±0.1% FS
Analog to Digital converter	16-bits, SAR architecture (Successive Approximation Register) with temperature compensation
Sensor frequency response (-3 dB)	DC to 800 Hz
Noise spectral density	±2g Version : 45 µg/√Hz ±10g version: 100 µg/√Hz
Zero-g Offset Variation from RT over Temp	±2g Version : ±0.2 mg/°C ±10g version: ±0.1 mg/ °C
Sensitivity Variation from RT over Temp	±2g Version : ±0.01 %/°C (XY) , ±0.02 %/°C (Z) ±10g version: ±0.01 %/° C
Offset Ratiometric Error	±2g Version : 4mg ±10g version: ±0.2% (XY) , ±0.1% (Z)
Sensitivity Ratiometric Error	±2g Version : ±1.25 % (X-Y) , ±0.2 % (Z) ±10g Version : ±1.6% (X-Y) , ±0.2 % (Z)
Cross Axis Sensitivity	2%
Anti-aliasing filter	Butterworth 5th order filter – cut-off frequency : 1 Hz to 2000 Hz remotely program-mable (BeanScape®)

	Over-the-air configuration (OTAC) parameters
Data Acquisition mode (**SPS** = sample per second)	Low Duty Cycle Data Acquisition (LDCDA) Mode: 1s to 24 hour Alarm & Survey mode: 1s to 24 hour Streaming & Streaming Packet Mode
Sampling Rate (in streaming packet 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)
Sampling Rate (in streaming packet mode with data logger only)	Minimum: 1 SPS Maximum: 4 kSPS maximum per axis (one or two axis enabled) 3,5 kSPS per axis (3-axis enabled)
Alarm Threshold	High and Low alarms threshold
Programmable Cut-off frequency (Anti-aliasing filter)	1– 2000 Hz
Power Mode	Sleep & Active

	RF Specifications
Wireless Protocol Stack	Ultra-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	650m (L.O.S)
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)

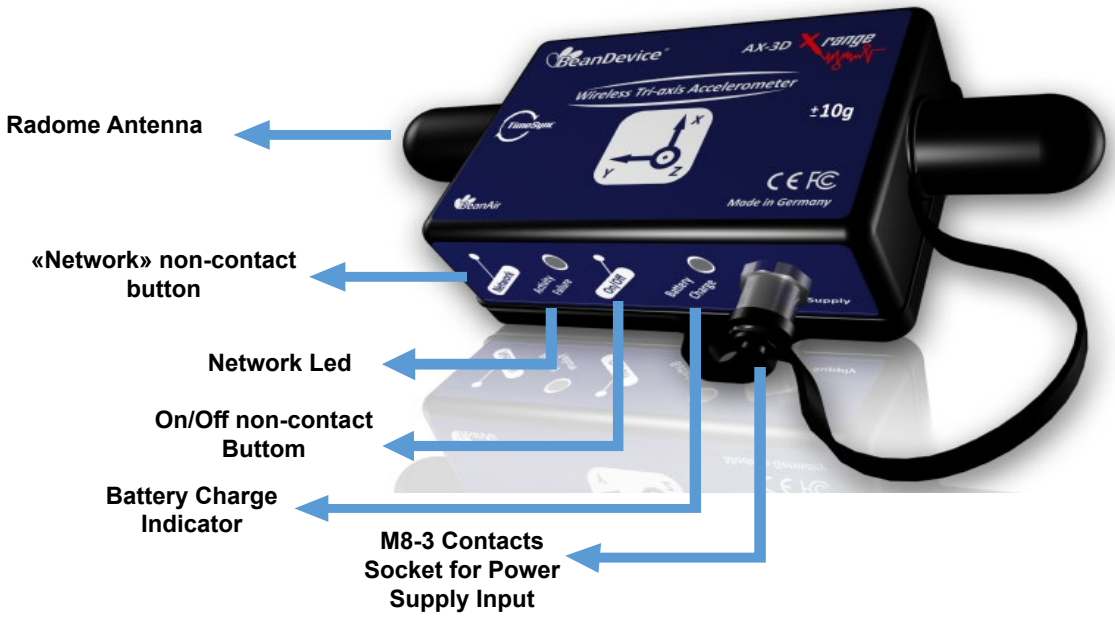
TimeSync function : Clock synchronization over the Wireless Sensor Networks (WSN)	
Clock synchronization accuracy	±2.5 ms (at 25°C)
Crystal specifications	Tolerance ±10ppm, stability ±10ppm

	Environmental and Mechanical
Casing	Aluminum & Waterpoof casing · Dimensions in mm (LxWxH): 100 x 60 x 31 (without antennas and mounting eyelet) · Weight (with internal battery) : 217g (screw mounting) and 245g (magnet 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 · Magnet Mounting Option: the device should be mounted on a steel surface.
Shock resistance	150g during 50 ms
Operating Temperature	-20 °C to +65 °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

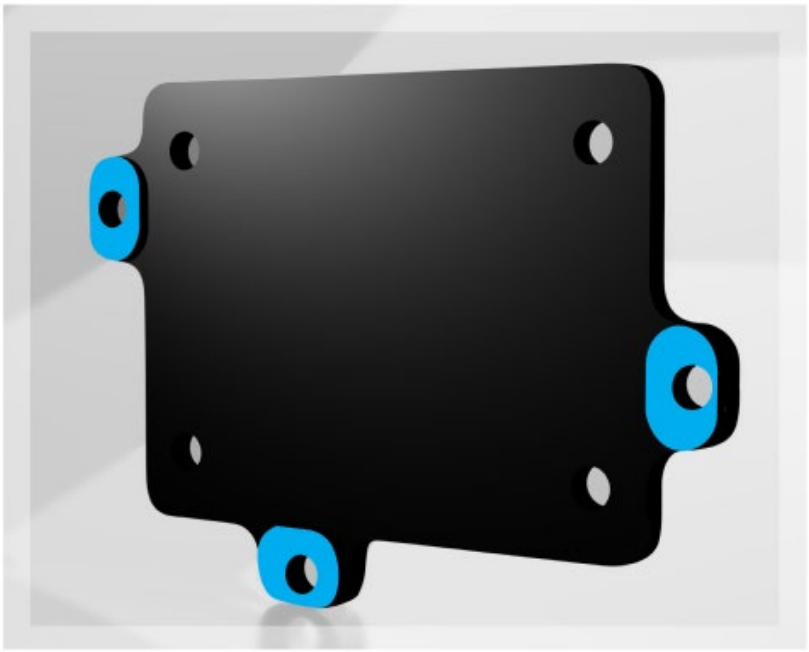
	Power supply
Integrated battery charger	Integrated Lithium-ion battery charger with high precision battery monitoring : · Overvoltage Protection, Overcurrent/Short-Circuit Protection, Undervoltage Protection · Battery Temperature monitoring
Current consumption @ 3,3V	· During data acquisition : 20 to 30 mA · During Radio transmission : 40 mA @ 0dBm , 80 mA @ 18 dBm · During sleeping : < 30 µA
External power supply	External power supply : +8v to +28v
Rechargeable Lithium-Polymer battery	Capacity 2Ah

	Options
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)	Solar panel- Polycrystalline solar cell technology with Solar charging controller and Lead-acid battery **Ref: X-SOL-5W-M8-2M**
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

//PRODUCT OVERVIEW



//RUGGED BASE PLATE WITH THREE-POINT-MOUNTING



For further information about the BeanDevice® battery life :
TN_RF_002 Current consumption in active & sleeping mode
TN_RF_012 Beandevice autonomy in Streaming and Streaming Packet Mode

Product specifications are subject to change without notice. Contact Beanair for latest specifications.

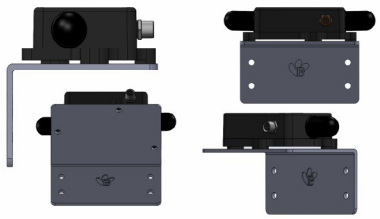
//ACCESSORIES

External power supply | Ref: M8-PWR-12V

. Wall plug-in power supply, Output: 12VDC, M8-3Pins plug
. AC Power plug: Europe/UK/North america/China/Australia
. Waterproof - IP67

Molded Cable with M8 plug | Ref: CBL-M8-2M (cable length: 2meters)
CBL-M8-5M (cable length : 5 meters)
CBL-M8-10M (cable length : 10 meters)

. 3pole - Male, PVC with shield protection
. Waterproof - IP67



90° Bracket | Ref: SMART-BRACK-MNT

. 90° bracket for screw mounting suitable for : BeanDevice AX-3DS , AX-3D Xrange, HI-INC Xrange

//CONTACT US

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