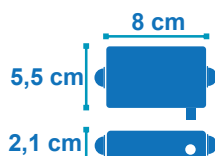


WIRELESS INCLINOMETER WITH INTEGRATED DATA LOGGER

2year
Warranty



made
in
Germany

//MAIN FEATURES



Wireless inclinometer (measurement range $\pm 15^\circ$, $\pm 30^\circ$)



Embedded data logger : up to 1 million data points (with events dating)



Fully autonomous system with an integrated Lithium-Ion battery charger



Time-Synchronized wireless sensor network



Waterproof IP67 casing | Nema 6



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

//APPLICATIONS

- Dynamic measurement on embedded equipment
- Vibration analysis
- Inertial measurement
- Movement detection

FEATURED VIDEO



BeanDevice® HI-INC main presentation video



BeanDevice® HI-INC - Wireless Sensor Network dedicated to health monitoring on bridge

USER MANUAL

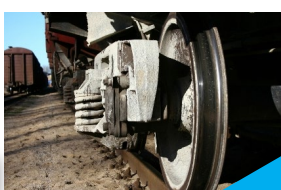


BeanDevice® SmartSensor user manual

MECHANICAL DRAWING



BeanDevice® HI-INC drawing



//TYPICAL CUSTOMER APPLICATIONS
ANTENNA POSITIONNING

BENCHMARK ON CAR FRAME STABILITY

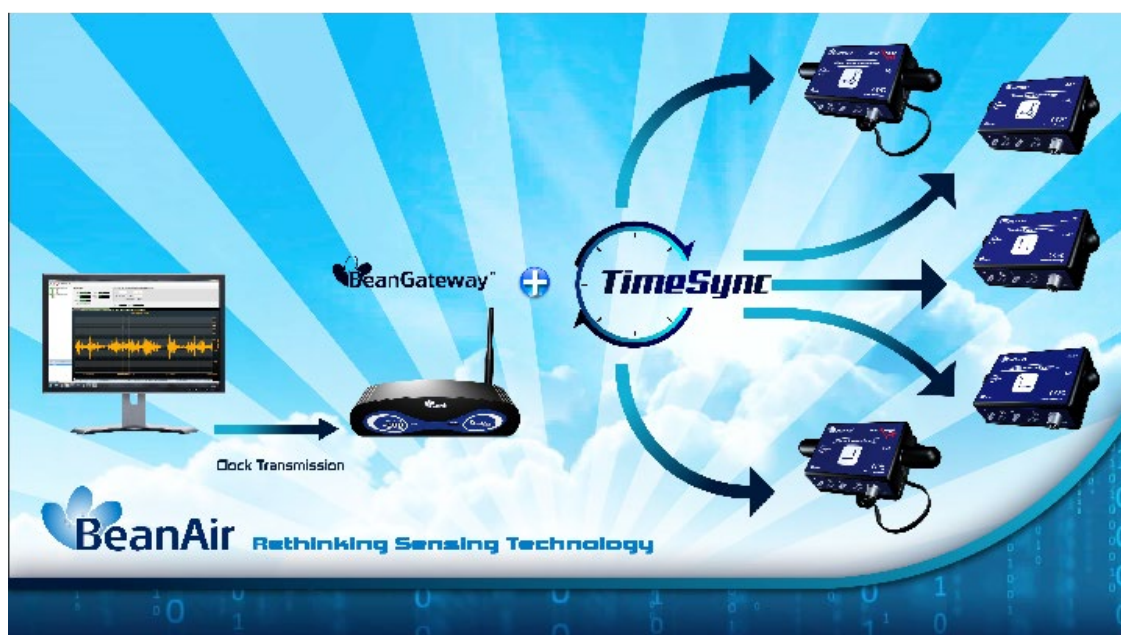
FLIGHT TEST MEASUREMENT

STRUCTURAL HEALTH MONITORING


For further information about bridge monitoring, please read the following applications note :
[AN_RF_002 – “Bridge monitoring with BeanAir® products”](#)

//TIME-SYNCHRONIZED WIRELESS SENSOR NETWORK
TimeSync

TimeSync function brings time-synchronization over the Wireless Sensor Network ($\pm 2.5\text{ms}$ 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® HI-INC**.

Thanks to the OTAC (Over-the-Air configuration) feature, the user can remotely configure the **BeanDevice® HI-INC**.

SEVERAL DATA ACQUISITION MODES ARE AVAILABLE ON THE BEANDEVICE® HI-INC :

- **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.
- **Survey Mode**: the measured value is transmitted by radio whenever an alarm threshold (fixed by the user) is detected (4 alarms threshold levels High/Low). Meanwhile, the device sends frequently a beacon frame informing its current status.
- **Streaming Packet Mode** : all measured values are transmitted by packet within a continuous flow at 60 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.



*Over-the-Air Configuration



For further information about the different data acquisition modes:

[TN_RF_008 – “Data acquisition modes available on the BeanDevice®”](#)

//ANTENNA DIVERSITY



While the vast majority of wireless sensors show their limits in harsh industrial environment, the **BeanDevice® HI-INC** 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 1 MILLION DATA POINTS

The **BeanDevice® HI-INC** 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® HI-INC** :

- LowDutyCycle Data Acquisition
- Survey
- Streaming packet

EXAMPLE : TILT MEASUREMENT ON A BRIDGE

- In standalone operation, the **BeanDevice® HI-INC** stores all the measurements on its embedded datalogger. Thus, a direct connection with the **BeanGateway®** is not needed.
- During the measurement campaign, 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.



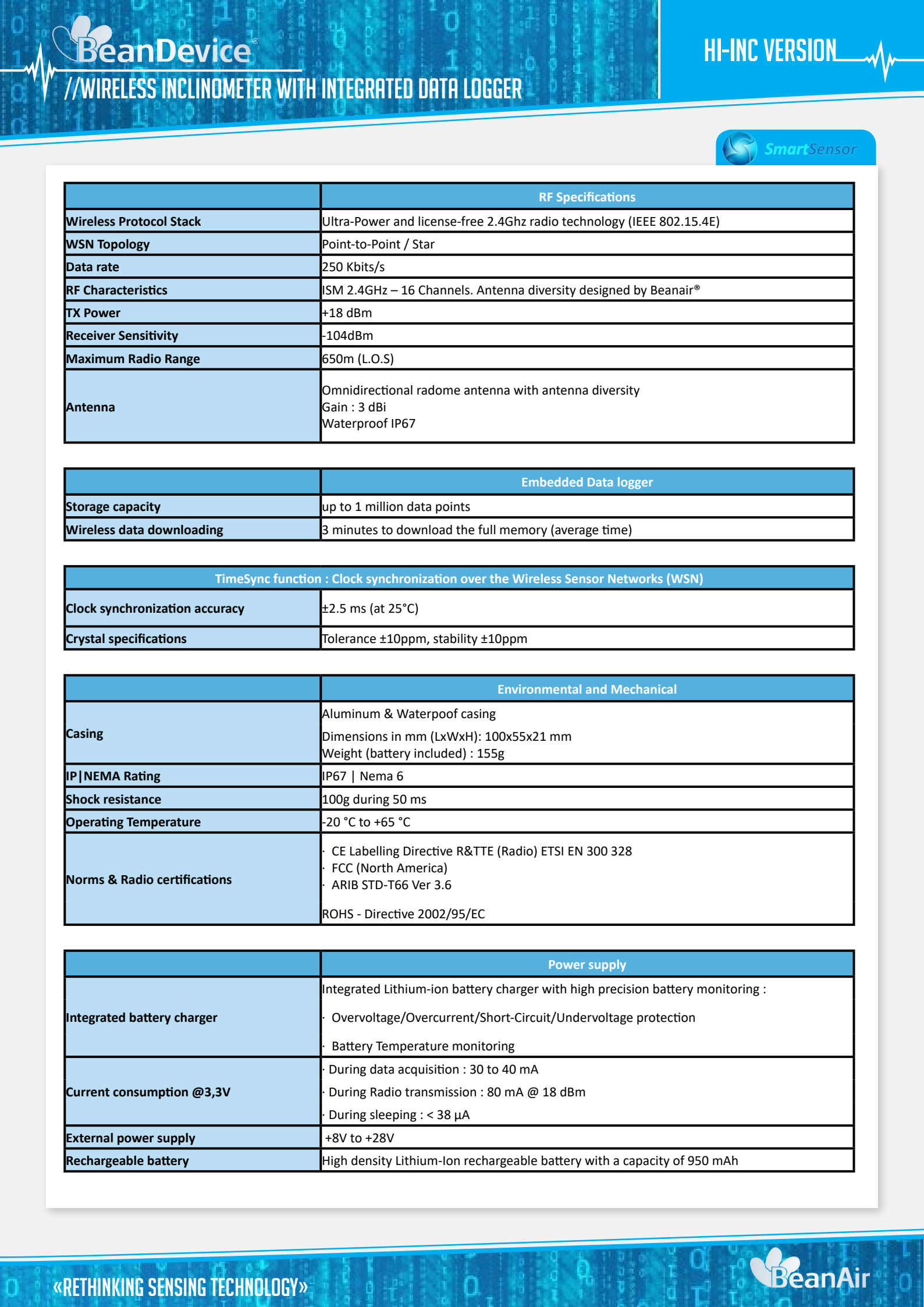


For further information about the Datalogger, please read the following technical note :
[TN_RF_007 – “BeanDevice® DataLogger User Guide”](#)

Product reference	
BND-HI-INC- MR-PS	
MR– Measurement Range: 15M : mono-axis $\pm 15^\circ$ 15B : bi-axis $\pm 15^\circ$ 30M : mono-axis $\pm 30^\circ$ 30B : bi-axis $\pm 30^\circ$	PS - Power supply : RB : Internal rechargeable battery XT : External Primary cell
Example 1: BND-HI-INC-15B-RB-wireless bi-axial inclinometer with $\pm 15^\circ$ measurement range, internal rechargeable battery Example 2: BND-HI-INC-30M-XT-wireless mono-axial inclinometer with $\pm 30^\circ$ 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 °/VHz
Accuracy (Full scale)	$\pm 0.05^\circ$
Offset temperature dependency	$\pm 0.002^\circ / ^\circ\text{C}$
Sensitivity temperature dependency	$\pm 0.005\% / ^\circ\text{C}$
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 °/ VHz
Anti-aliasing filter	Butterworth 5 th order filter – cut-off frequency : 1 Hz to 100 Hz remotely programmable (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 Packet Mode
Sampling Rate (in streaming packet mode)	Minimum: 1 SPS
	Maximum: 60 SPS on each axis
Alarm Threshold	High and Low alarms threshold
Programmable cut-off frequency (Anti-aliasing filter)	1– 100 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 1 million data points
Wireless data downloading	3 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 & Waterproof casing Dimensions in mm (LxWxH): 100x55x21 mm Weight (battery included) : 155g
IP NEMA Rating	IP67 Nema 6
Shock resistance	100g 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/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 sleeping : < 38 µA
External power supply	+8V to +28V
Rechargeable battery	High density Lithium-Ion rechargeable battery with a capacity of 950 mAh

	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)	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	External Primary cell mounted in a IP67 aluminum Alloy casing: IP67 Battery Holder Lithium-thionyl chloride primary cell (Li-SOCl ₂) 6,5 Ah 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



For further information about aggregation capacity of wireless sensor networks :
[TN_RF_003 Aggregation capacity of wireless sensor networks](#)

//GETTING STARTING WITH A WIRELESS SENSOR NETWORK

The **BeanDevice® HI-INC** operates only on our Wireless Sensor Networks, you will need the **BeanGateway®** and the **BeanScope®** for starting a wireless sensor Network.



BeanDevice
Hi-Inc



OR



BeanScope

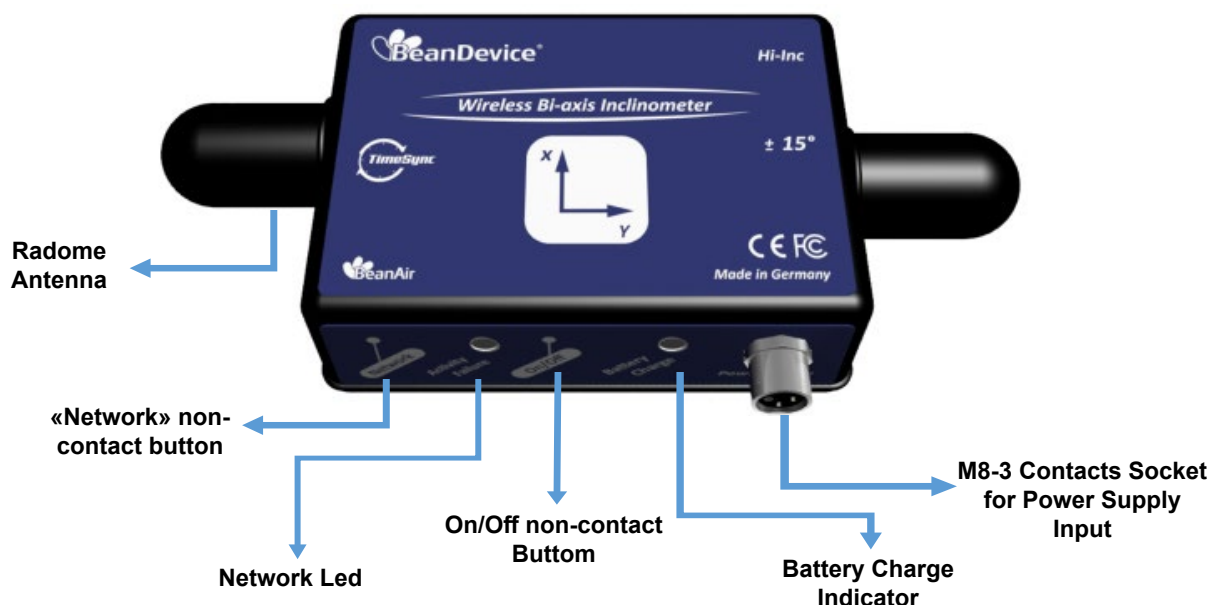


2year
Warranty



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 OVERVIEW



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

//CONTACT US

FOR MORE INFORMATION :

sales@beanair.com

Visit our website : www.beanair.com

Visit our blog : www.industrial-wsn.com

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