BeanDevice® Hi-Inc X-Range

High performance wireless inclinometer with built-in data logger

(high accuracy version)

2.4 GHz

DATASHEET

SmartSensor

www.beanair.com

Wireless Inclinometer

BeanDevice® Hi-Inc X-range

MADE IN GERMANY

Video

Product Video

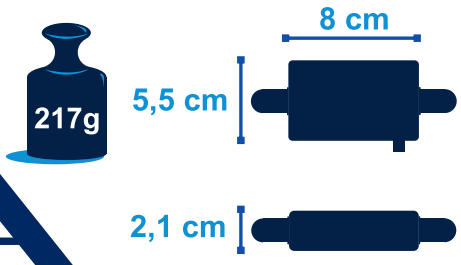
Application Video

User Guide

Quick Start

Mechanical Drawing

STEP File



OVERVIEW

- Wireless inclinometer (measurement range ±15°, ±30°)
- Time-synchronized wireless sensor networks (±2.5ms of accuracy)
- Embedded data logger : up to 1 million data points (with events dating)
- Waterproof IP67 casing (Nema 6)
- Integrated Lithium-Ion battery charger
- Excellent radio link relying on the radio antenna diversity developed by Beanair®

BeanDevice® Hi-Inc X-range

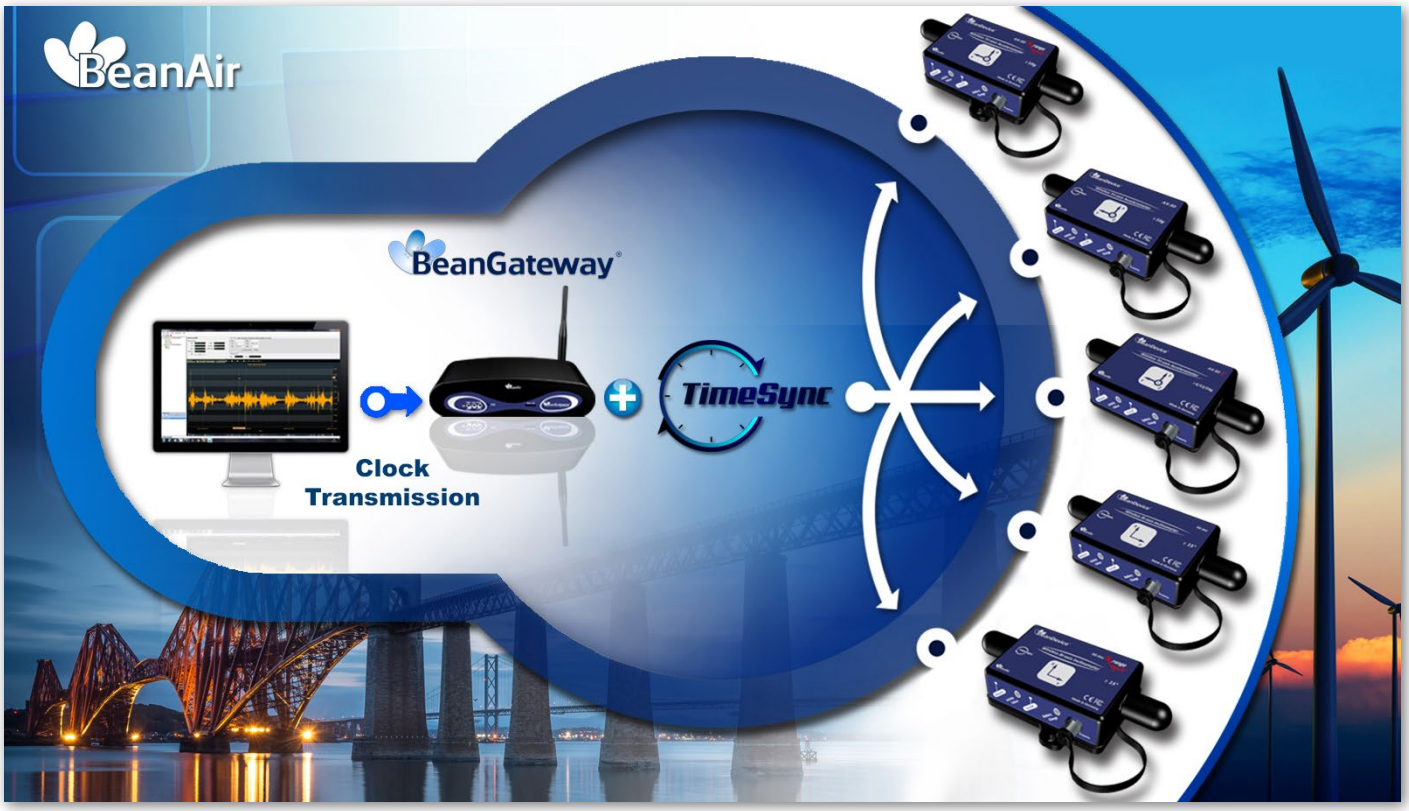
APPLICATIONS

- Land surveying (use the weblink)
- Structural Health Monitoring (SHM)
- Built-in test equipment
- Rail sleepers monitoring (use the weblink)

For further information about bridge monitoring, please read the following applications note :
AN_RF_002 – "Bridge monitoring with BeanAir® products"

Time-Synchronized Wireless Sensor Networks

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

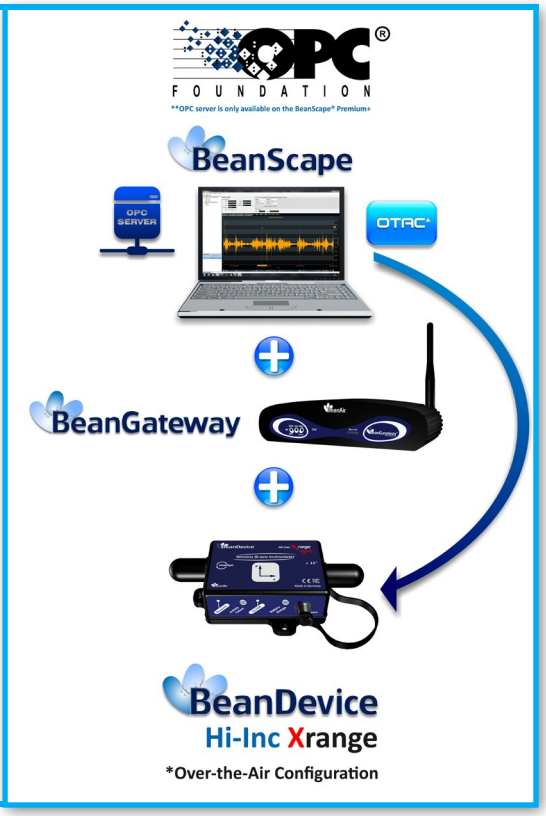
A powerful and versatile supervision software for managing your wireless sensors

The BeanScape® allows the user to view and manage all the data transmitted by the BeanDevice® HI-INC XRange. Thanks to the OTAC (Over-the-Air configuration) function, users can remotely configure the BeanDevice® HI-INC XRange.

A versatile wireless inclinometer with different data acquisitions mode:
- **Low Duty Cycle Data Acquisition mode (LDCDA) :** Data acquisition is immediately transmitted by radio. Transmission frequency can be configured from the BeanScape® software from 1s to 24h.
- **Survey Mode:** An alarm notification is transmitted when a threshold is reached. A powerful alarm management tool available on the BeanScape® software allows the user to configure alarm threshold and to generate automatic alarm notification by email. A "heartbeat" notification is frequently transmitted, and keeps the user informed about its current status.
- **Streaming Mode :** All measured data are transmitted by packet within a continuous flow at 60 samples per second maximum

A seamless integration into a third-party supervision software

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®"

Antenna diversity

While the vast majority of wireless sensors show their limits in harsh industrial environment, the BeanDevice® HI-INC 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 1 million data points

The BeanDevice® HI-INC 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® HI-INC XRange :

- LowDutyCycle Data Acquisition
- Survey
- Streaming packet

EXAMPLE : TILT MEASUREMENT ON A BRIDGE

- In standalone operation, the BeanDevice® HI-INC XRange 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 data logger, please read the following technical note :
TN-RF-007 – "BeanDevice® DataLogger User Guide "

Technical Specifications

Product reference	
BND-HI-INC-MR-XR-PS-MO	
MR – Measurement Range	**PS -** Power Supply
15B : bi-axial ±15°	**RB :** Internal rechargeable battery
30B : bi-axial ±30°	**XT :** External Power supply
MO - Mounting Option **SCM -** Screw Mounting Lid **MM -** Magnetic Mounting Lid	
Example 1: BND-HI-INC-15B-XR-RB-SCM, High performance wireless bi-axis inclinometer with ±15° measurement range, internal rechargeable battery, Screw mounting **Example 2: BND-HI-INC-30M-XR-XT-MM,** High performance wireless mono-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
Accuracy (full scale, @ 25°C)	±0.05° (±0.02° on customer request)
Offset temperature dependency	±0.002 °/°C
Sensitivity temperature dependency	±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 filter	Butterworth 5th 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 Streaming Mode (not available on XT version, External power supply) Survey Mode: 1s to 24h
Sampling Rate (in streaming packet mode)	Minimum: 1 SPS Maximum: 60 SPS on each axis
Alarm Threshold	2 High level and 2 Low level
Programmable cut-off frequency (Anti-aliasing filter)	1– 100 Hz
Power Mode	Sleep Active (not available on XT version, External power supply)

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 (Line of Sight) , 30-100m (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)

Technical Specifications

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 (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 -20 °C to +65 °C during battery discharge 0 to 45°C during battery charge 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

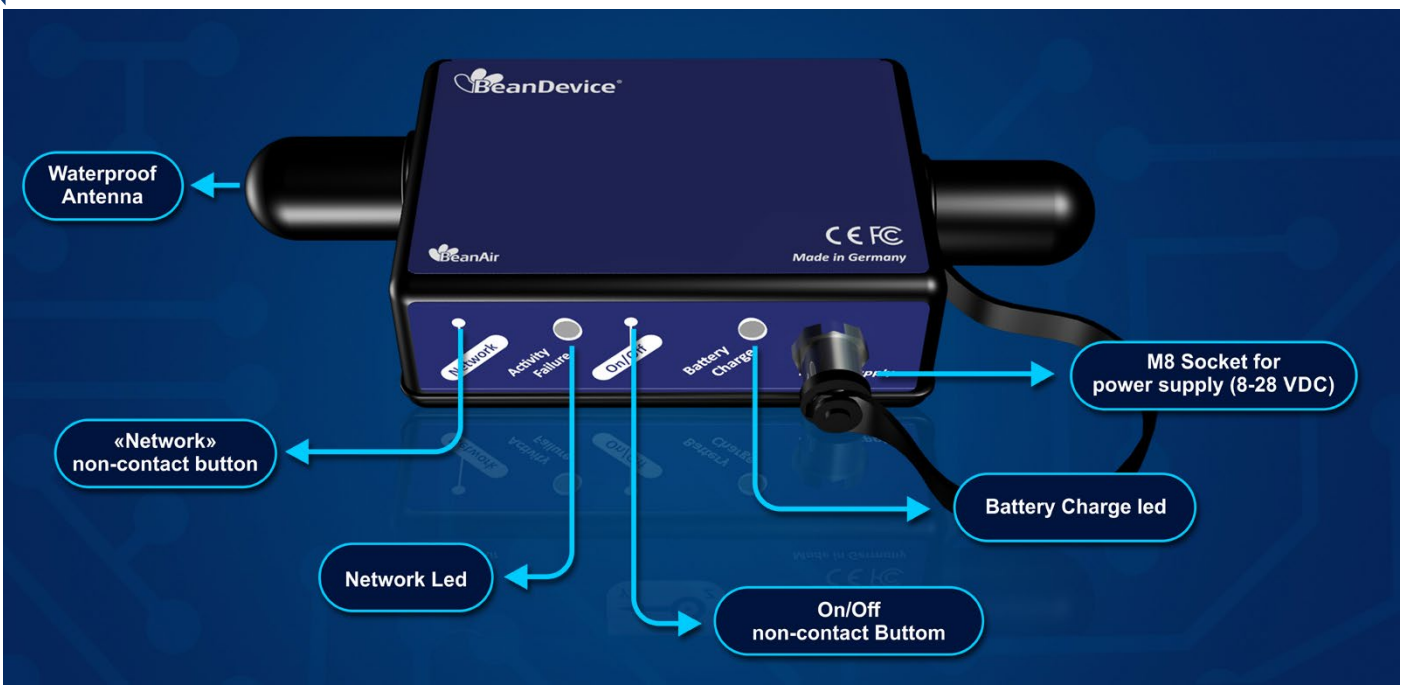
Power supply	
Integrated battery charger	Integrated Lithium-ion battery charger with high precision battery monitoring : · Overvoltage Protection, Overcurrent/Short-Circuit Protection, Undervoltage Protection · Battery Temperature monitoring
Current consumption @3,3V	· During data acquisition : 30 to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

Option(s)	
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 effeciency 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	Exernal Primary cell mounted in a IP67 aluminum Alloy casing: IP67 Battery Holder Lithium-thionyl chloride primary cell (Li-SOCl2) 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

Wireless Inclinometer

BeanDevice® Hi-Inc X-range

Beandevice® Hi-Inc X-range Front View



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

Options and Accessories

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)

X-SOLAR (Solar Charging Controller)

High efficiency Solar Panel with Solar Charging Controller and Lead-acid battery

AC/DC Power supply with M8 Plug

Ref: M8-PWR-12V

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

Mounting Option

- Braket
- Screws Mounting
- Magnetic Mounting

CONTACT US

Headquarter:

BeanAir GmbH
Wolfener Straße 32 - 34
12681 Berlin

Email:

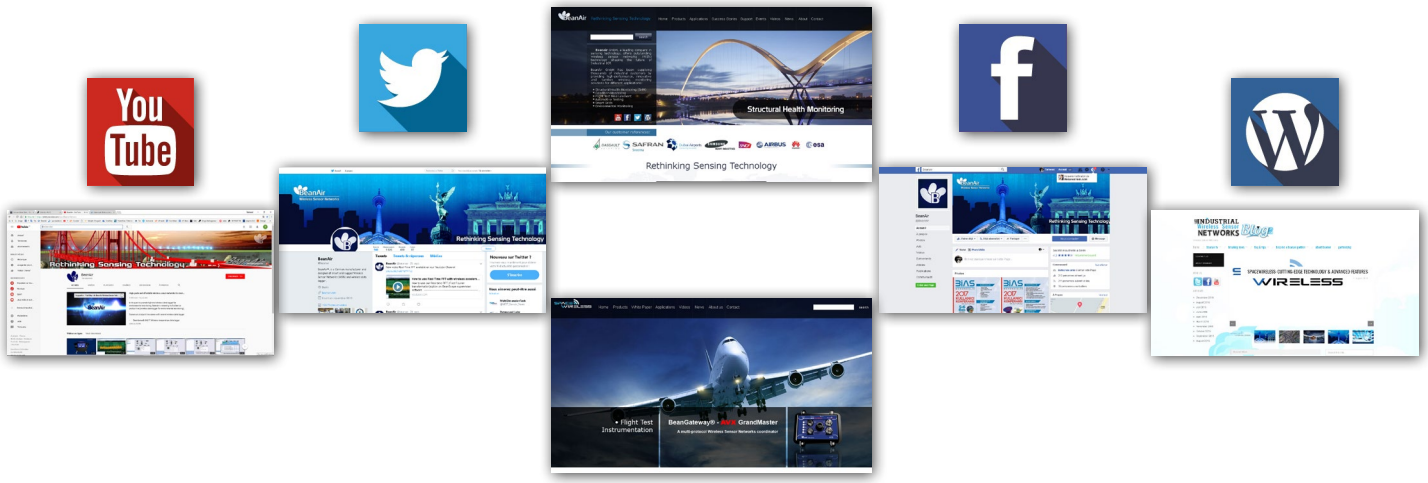
info@beanair.com

Phone number:

+49 30 98366680

Visit our Websites

www.beanair.com



www.space-wireless.com