BeanAir
WIRELESS IIOT SENSORS

2.4 GHz

BeanDevice® 2.4GHz INC

Wireless inclinometer sensor | tilt / inclination / slope monitoring | Low-cost version

FEATURED VIDEO

USER GUIDE

QUICK START

MECHANICAL DRAWING

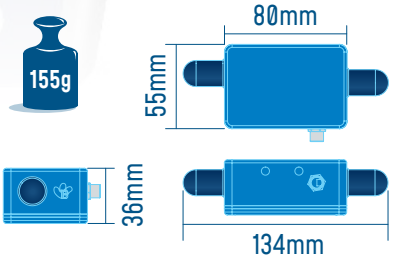
STEP FILE

SmartSensor

2year Warranty

MADE IN GERMANY

CE FC R 001A-08148



MAIN FEATURES

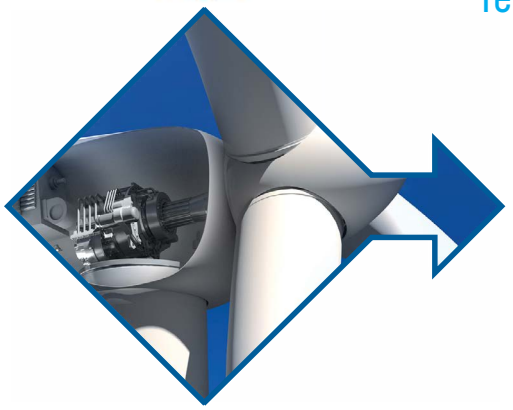
- High precision bi-axis inclinometer with great measurement repeatability (±0.005° for bi-axis ±15° version, and ±0.006° for bi-axis ±15° version)
- Time-synchronized wireless sensor networks (±2.5ms of accuracy)
- Embedded data logger : up to 1 million data points (with events dating)
- Excellent radio link relying on the radio antenna diversity developed by Beanair®
- Waterproof IP67 casing (Nema 6)
- Integrated Lithium-Ion battery charger

BeanDevice® 2.4GHz INC

APPLICATIONS

Structural Health Monitoring

Test and Measurement



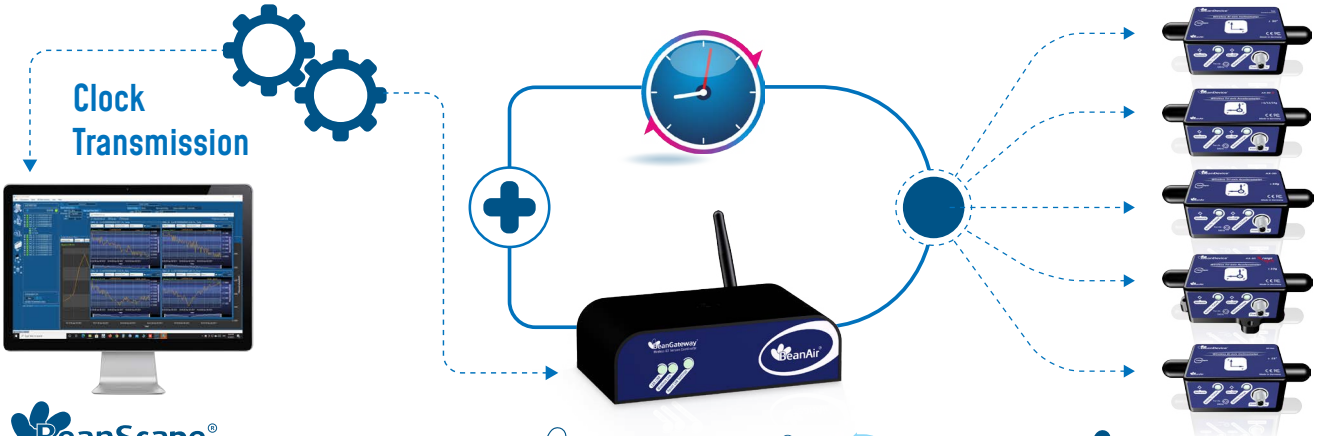
Condition Monitoring

Land Surveying

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

TIME-SYNCHRONIZED WIRELESS IIOT SENSORS

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



BeanScape® 2.4GHz VERSION
Wireless IOT Sensors
Supervision Software

BeanGateway® 2.4GHz
Wireless IOT Sensors coordinator
Indoor Version

BeanDevice® 2.4GHz

BeanDevice® 2.4GHz INC

REMOTE CONFIGURATION & MONITORING

BeanScape®2.4GHz Basic

The BeanScape® 2.4GHz application allows the user to view all the data transmitted by the BeanDevice® 2.4GHz INC
Thanks to the OTAC (Over-the-Air configuration) feature, the user can remotely configure the BeanDevice® 2.4GHz INC

SEVERAL DATA ACQUISITION MODES ARE AVAILABLE ON THE BEANDEVICE® 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 3 ksps/s maximum

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® 2.4GHz 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%.

BeanDevice® 2.4GHz INC

EMBEDDED DATA LOGGER UP TO 1 MILLION DATA POINTS

The BeanDevice® 2.4GHz INC integrates an embedded datalogger, which can be used to log data when a Wireless IIOT Sensors can not be easily deployed on your site.
All the data acquisition are stored on the embedded flash and then transmitted to the BeanGateway® 2.4GHz when a Wireless IIOT Sensors is established.
The data logger function is compatible with all the data acquisition mode available on the BeanDevice® 2.4GHz INC :

- LowDutyCycle Data Acquisition
- Survey
- Streaming packet

EXAMPLE : TILT MONITORING ON A BRIDGE

• In standalone operation, the BeanDevice® 2.4GHz INC stores all the measurements on its onboard datalogger. Thus, a direct connection with the BeanGateway® 2.4GHz is not needed.
• During the measurement campaign, all the acquired measurements are stored on datalogger.
• Data logs can be transmitted to the BeanGateway® 2.4GHz 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-2.4GHZ-INC-MR-PS

MR – Measurement Range	PS - Power Supply
30B : bi-axial ±30°	RB : Internal rechargeable battery
90B : bi-axial ±90°	XT : External Power supply

Example n°1: BND-2.4GHZ-INC-30B-RB, wireless bi-axial inclinometer with ±30°measurement range,internal rechargeable battery
Example n°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 5th 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 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)

TECHNICAL SPECIFICATIONS

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 millions 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): 80x55x36 mm Weight (battery included) : 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

TECHNICAL SPECIFICATIONS

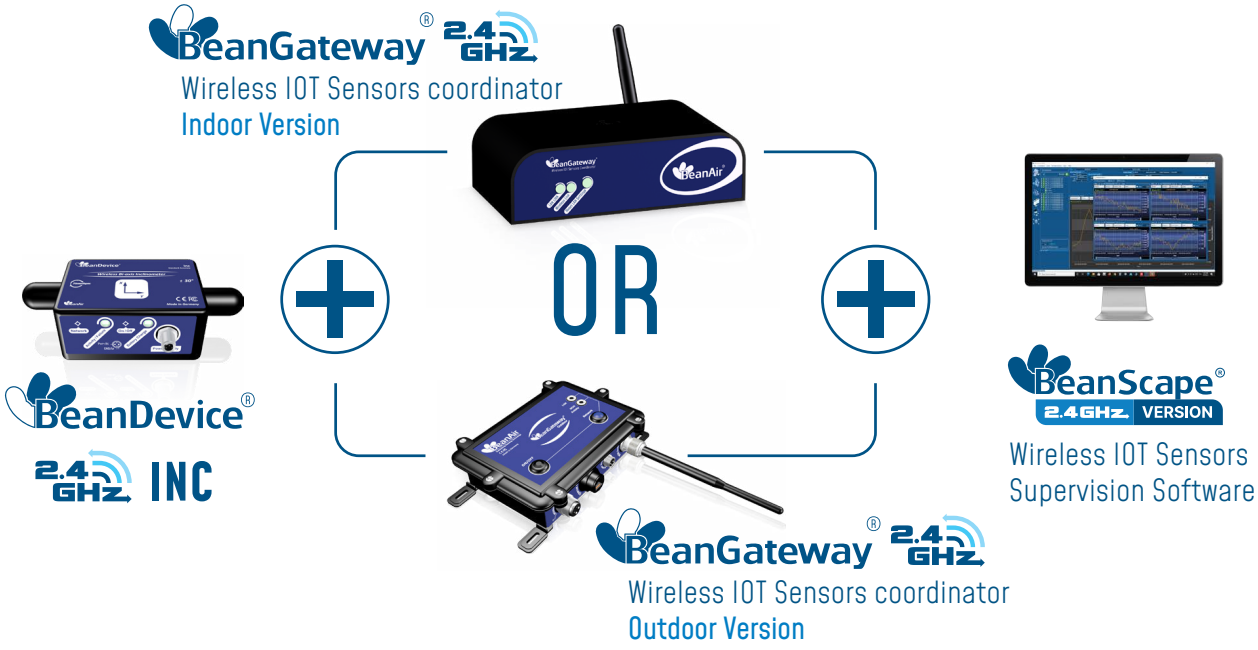
POWER SUPPLY	
Integrated battery charger	Integrated Lithium-ion battery charger with high precision battery monitoring : • Overvoltage/Overcurrent/Short-Circuit/ Undervoltage protection • Battery Temperature monitoring
Current consumption @3,3V	• During data acquisition : 30 to 40 mA • During Radio transmission : 80 mA @ 18 dBm • During Battery Saver Mode : < 38 µA
External power supply	8-28VDC with reverse polarity protection
Rechargeable Lithium-Polymer 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 effeciency solar panel 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

BeanDevice® 2.4GHz INC

GETTING STARTED WITH A WIRELESS IIOT SENSORS



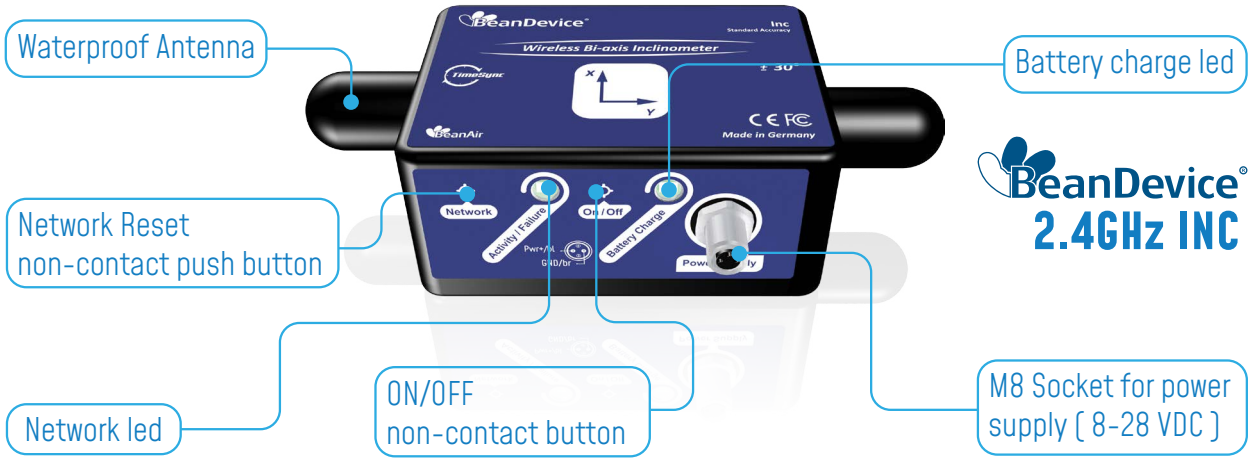
BeanAir® Rethinking Sensing Technology

2year Warranty

The BeanDevice® 2.4GHz INC operates only on our Wireless IIOT Sensors, you will need the BeanGateway® 2.4GHz and the BeanScape® 2.4GHz for starting a wireless IIOT sensors.

For further information about BeanDevice® battery life :
TN-RF-002 Current consumption in active & sleeping mode
TN-RF-012 Beandevice autonomy in Streaming and Streaming Packet Mode

BEANDEVICE® 2.4GHZ INC FRONT VIEW

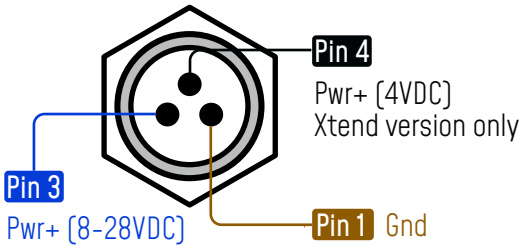


Product specifications are subject to change without notice.
Contact Beanair for latest specifications.

BeanDevice® 2.4GHz INC

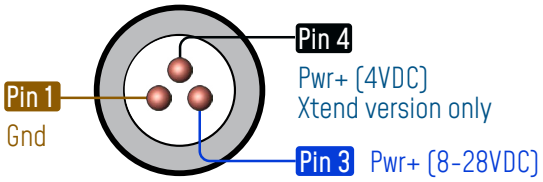
EXTERNAL POWER SUPPLY WIRING CODE

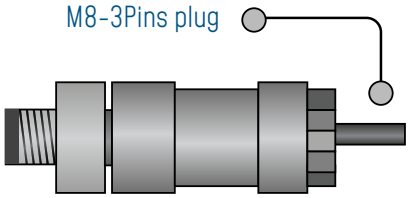
M8 Socket (A-Coding) - Pin Assignation



Interface Name	M8 Pin assignation	Wire Color (A-coding)
Power Supply 8-28VDC	PIN 3	Blue
Power Supply 4VDC (available on Xtend version only)	PIN 4	Black
Ground	PIN 1	Brown

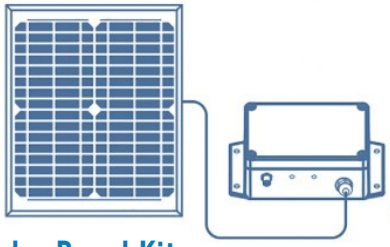
M8 Plug (A –Coding) - Pin Assignation





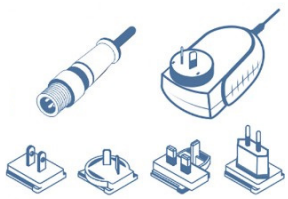
Do not power PIN4 and PIN3 at the same time, you will damage your Beandevice

OPTIONS AND ACCESSORIES



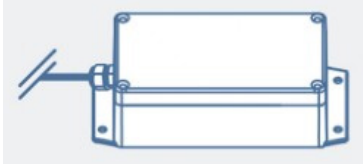
Solar Panel Kit

High efficiency solar panel with solar charging controller and Lead-acid battery
Ref: X-SOL-SLP-VOUT-CL



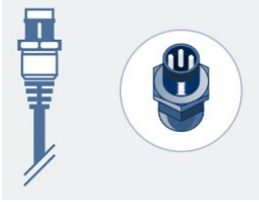
External Power-Supply

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



External Battery Pack

Waterproof IP67 battery box for long-term monitoring applications
Ref: PRIM-XTEND



M8 extension cable for external power supply

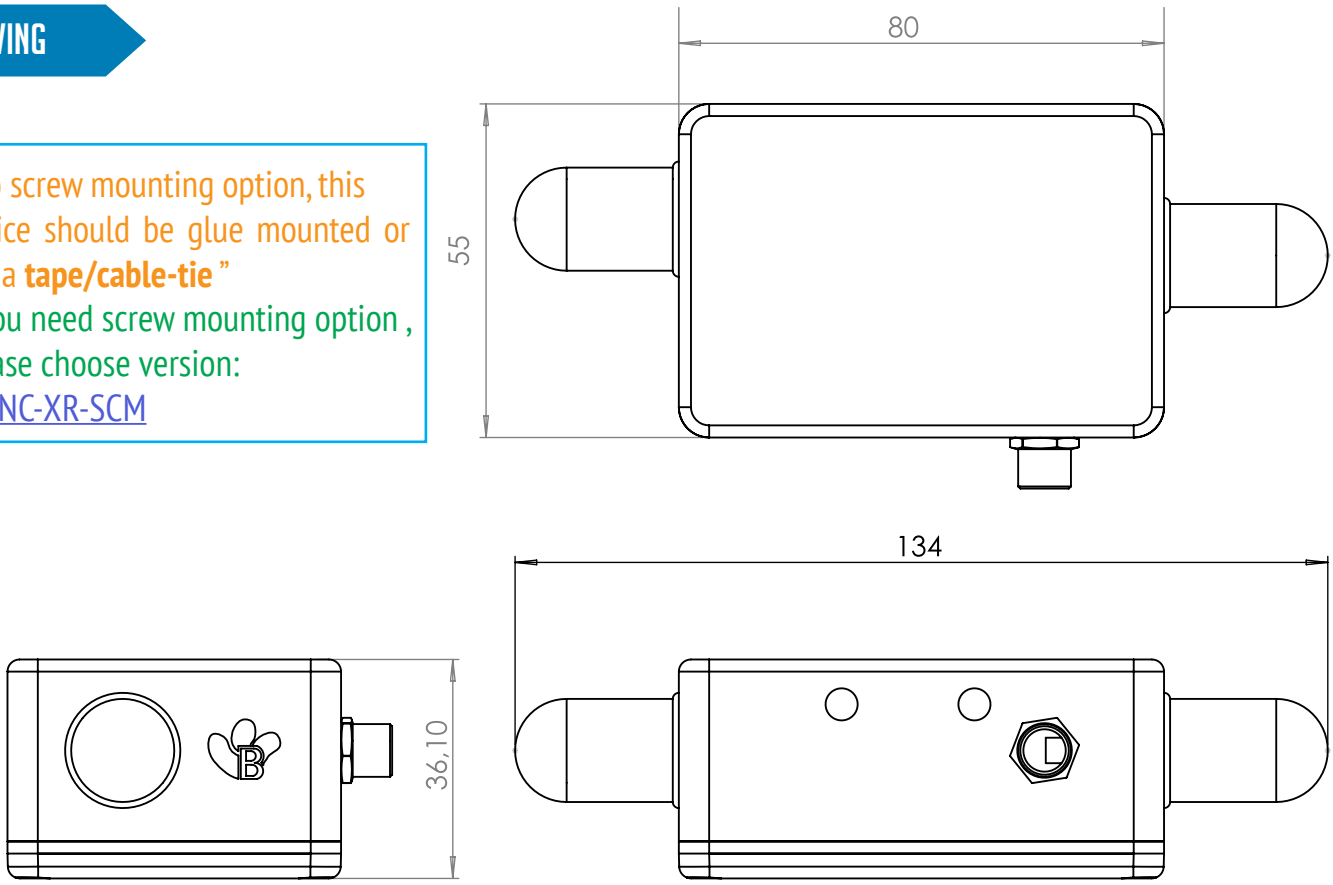
Molded cable with M8-3pins male plug
Material: PVC with shield protection
IP Rating : IP67 | Nema 6

Cable length: 2 meters , Ref: CBL-M8-2M
Cable length : 5 meters, Ref: CBL-M8-5M
Cable length: 10 meters, Ref: CBL-M8-10M

BeanDevice® 2.4GHz INC

DRAWING

" No screw mounting option, this device should be glue mounted or use a **tape/cable-tie** "
If you need screw mounting option , please choose version:
HI-INC-XR-SCM



CONTACT US

Headquarter:
Buchholzer Straße 65, 13156
Berlin, Germany

Email:
info@beanair.com

Phone number:
+493066405051

www.facebook.com/BeanAir

www.beanair.com

www.youtube.com/user/BeanairSensors

www.twitter.com/beanair