

# BeanDevice® 2.4GHz AX-3DS

Wireless IIOT accelerometer sensor| Shock and impact monitoring

PRODUCT VIDEO



FEATURED VIDEO



USER GUIDE



QUICK START



MECHANICAL DRAWING



STEP FILE



SmartSensor



155g

55mm

80mm

36mm



BEANDEVICE® 2.4GHz  
AX-3DS CANNOT WORK  
WITHOUT BEANGATEWAY®  
(WIRELESS RECEIVER)



2year  
Warranty

MADE IN GERMANY



001A-08148



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



• Wireless accelerometer dedicated to shock  
Scalable measurement range :  
±6g/±12g/±24g or ±2g/±4g/±8g



• Waterproof IP67 casing (Nema 6)



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

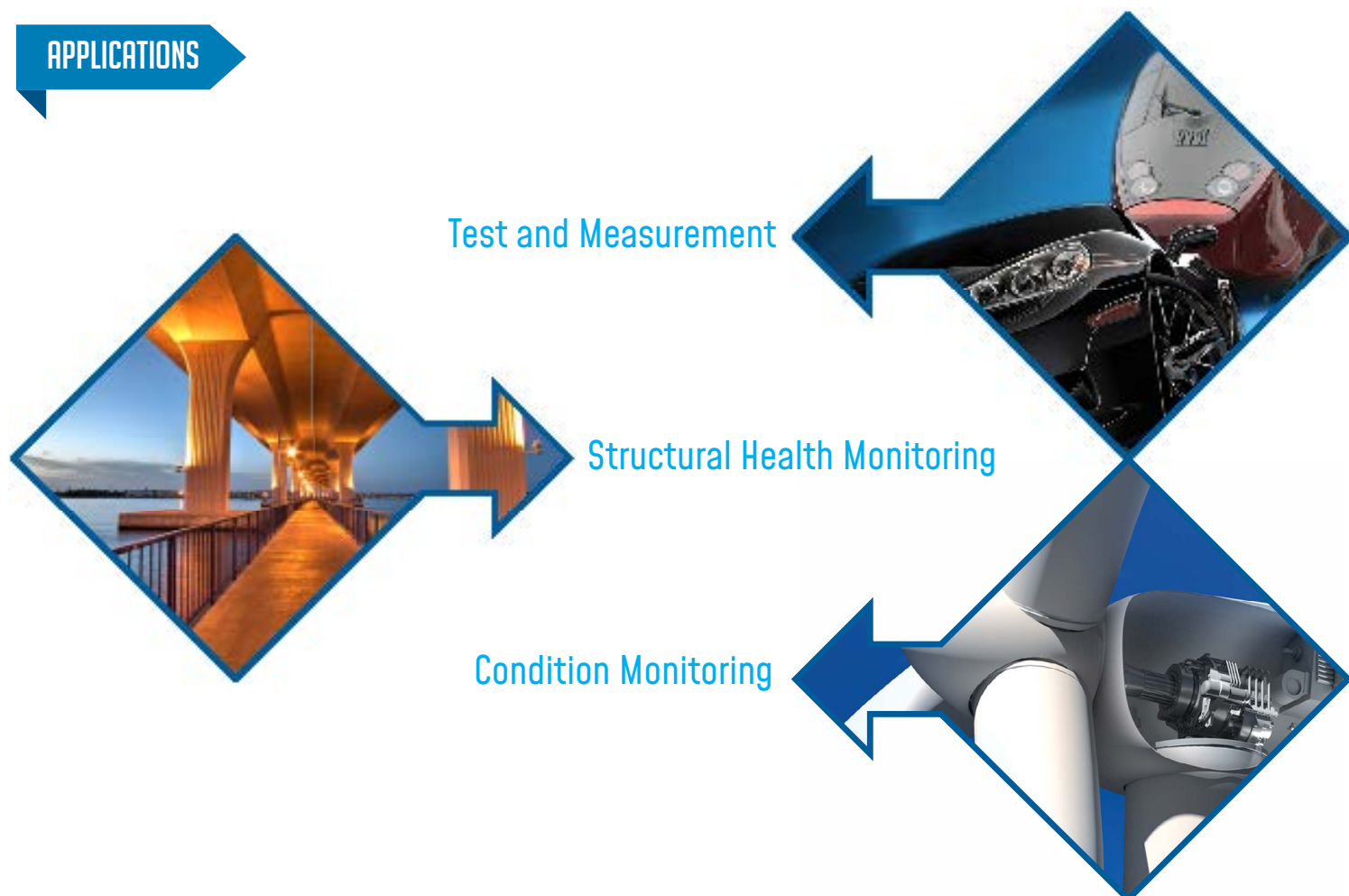


• SSD (Smart Shock Detection), wireless sensor can wakeup on shock detection (software configurable)



• Integrated Lithium-Ion battery charger

## APPLICATIONS

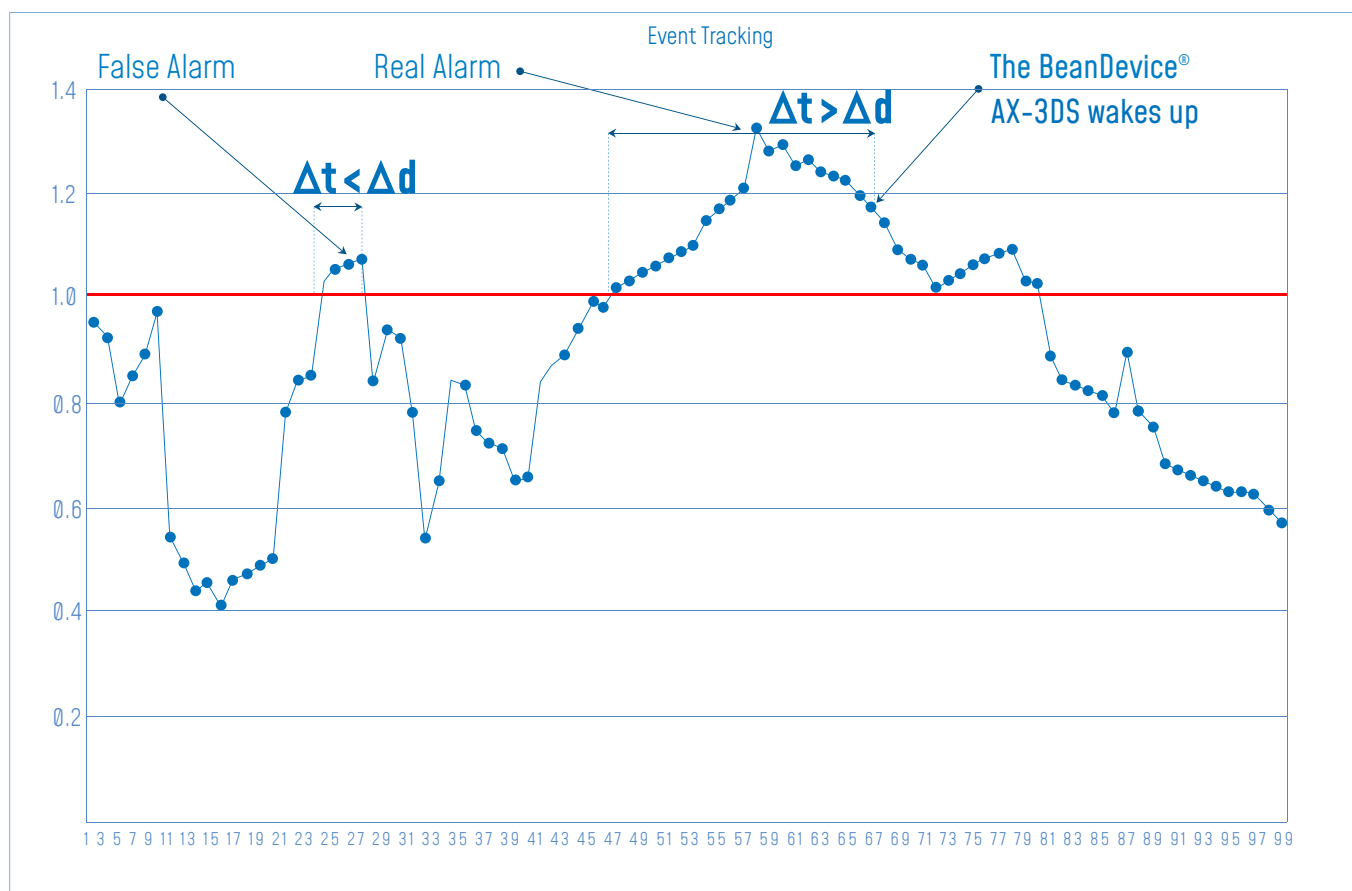


## SMART SHOCK DETECTION TECHNOLOGY



The [BeanDevice® 2.4GHz AX-3DS](#) integrates a smart shock detection technology which permits to detect & recognize a shock event during the sleeping or deep sleeping mode of the [BeanDevice® 2.4GHz AX-3DS](#). When the [BeanDevice® 2.4GHz AX-3DS](#) is in sleeping mode, the accelerometer continues to track a shock event with a power consumption of 68 uA in sleeping mode and 28uA in deep sleeping mode. A hysteresis on the shock event, fully configurable through the [BeanScape® 2.4GHz](#), allows to avoid false alarm.

**EXAMPLE :** THIS CURVE SHOWS TWO SHOCK EVENTS, ONE CONSIDERED AS SIGNIFICANT (REAL ALARM) AND ANOTHER CONSIDERED AS NOT SIGNIFICANT (FALSE ALARM).



$\Delta d$  : shock detection hysteresis.

$\Delta t$  : Observed duration

If  $\Delta t = \Delta d$ , the shock event is detected and recognized, the BeanDevice® wakes up and start data sampling in "streaming mode".

The following tables show the accelerometer sampling rate and the hysteresis time value in deep sleeping mode and sleeping mode of the **BeanDevice® 2.4GHz AX-3DS**.

Accelerometer sampling rate during deep sleeping mode (in HZ)	$\Delta d$ max value(s)	Resolution
0.5	128 s	2 s
1	64 s	1 s
2	32 s	500 ms
5	12.8 s	200 ms
10	6.4 s	100 ms

Accelerometer sampling rate during deep sleeping mode (in HZ)	$\Delta d$ max value(s)	Resolution
50	1.28 s	20 ms
100	640 ms	10 ms
400	160 ms	2.5 ms
1000	64 ms	1 ms

**BeanDevice® 2.4GHz AX-3DS**

**SHOCK MEASUREMENT ON PANTOGRAPH**



Wireless IOT Sensors  
Supervision Software



Ethernet LAN Interface



**BeanGateway® 2.4GHz**

Wireless IOT Sensors coordinator  
Outdoor Version



**REMOTE CONFIGURATION & MONITORING**

**BeanScape® 2.4GHz Basic**

The **BeanScape® 2.4GHz application** allows the user to view all the data transmitted by the **BeanDevice® 2.4 GHz AX-3DS** With the OTAC (Over-the-Air configuration) feature.

SEVERAL DATA ACQUISITION MODES ARE AVAILABLE ON THE BEANDEVICE® 2.4 GHz AX-3DS :

- **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 kbps/s maximum

## REMOTE CONFIGURATION & MONITORING



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 IIOT sensors show their limits in harsh industrial environment, the **BeanDevice® 2.4GHz AX-3DS** 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® 2.4GHz AX-3DS** integrates an embedded data logger, 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® 2.4 GHz** when a wireless IIOT sensors is established.

The data logger function is compatible with all the data acquisition mode available on your **BeanDevice® 2.4 GHz AX-3DS** :

- LowDutyCycle Data Acquisition
- Survey
- Shock detection
- Streaming packet



## EXAMPLE : SHOCK DETECTION ON A TRAIN



- In standalone operation, the **BeanDevice® 2.4GHz AX-3DS** stores all the measurements on its embedded datalogger. Thus, a direct connection with the **BeanGateway® 2.4GHz** is not needed.
- When the train is moving, 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 the Datalogger, please read the following technical note :  
**TN-RF-007 – “BeanDevice® DataLogger User Guide ”**

## TECHNICAL SPECIFICATIONS

### PRODUCT REFERENCE

#### **BND-2.4GHZ-AX3DS -MR-RB-MO-HG**

**MR** – Measurement Range  
(1g = 9806.65 mm/s<sup>2</sup>)  
**24G** : ±6/12/24g measurement range  
**8G** : ±2/4/8g measurement range

**PS** - Power Supply  
**RB** : Rechargeable battery

**HG**: High Gain External Antenna 5dBi

If this field is left blank, Integrated Radome Antenna will be provided

**MO** - Mounting Option

**SCM** - Screw Mounting base

**MM** - Magnetic Mounting base

Leave it empty if there is no screw or magnetic mounting option (the sensor should be glue mounted)

**Example 1: BND-2.4GHZ-AX3DS-24G-RB** – Wireless Accelerometer with ±6/12/24g measurement range , rechargeable battery, the sensor should be glue mounted

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

**Example 3: BND-2.4GHZ-AX3DS-8G-RB-SCM-HG** – Wireless Accelerometer with ±2/4/8g measurement range , rechargeable battery, screw mounting option, with High Gain Antenna

## TECHNICAL SPECIFICATIONS

### SENSOR SPECIFICATIONS

Accelerometer Technology	Low power MEMS technology
Scalable measurement range	24G Version : $\pm 6g / \pm 12g / \pm 24g$ 8G Version : $\pm 2g / \pm 4g / \pm 8g$
Measurement resolution	24G Version : 3 mg/digit @ $\pm 6g$ , 6 mg/digit @ $\pm 12g$ , 12 mg/digit @ $\pm 24g$ 8G Version : 1mg/digit @ $\pm 2g$ , 2 mg/digit @ $\pm 4g$ , 3.9 mg/digit @ $\pm 8g$
Typical non-linearity (Full scale, @ 25°C)	$\pm 0.09\%$ for the version <b>BND-2.4GHZ-AX3DS-8G-RB</b> $\pm 0.11\%$ for the version <b>BND-2.4GHZ-AX3DS-24G-RB</b>
Sensitivity change Vs temperature	$\pm 0.01\% / ^\circ C$
Zero-g level change vs temperature (max delta from 25°C)	24G Version : $\pm 0.4 \text{ mg}/^\circ C$ 8G Version : $\pm 0.1 \text{ mg}/^\circ C$
Typical zero-g level offset accuracy	24G Version : $\pm 70 \text{ mg}$ 8G Version : $\pm 20 \text{ mg}$
Analog to Digital converter	12-bit with temperature compensation
Noise spectral density @ BW 10Hz	24G Version : $250 \mu g/\sqrt{Hz}$ 8G Version : $118 \mu g/\sqrt{Hz}$
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	<ul style="list-style-type: none"> <li>Shock threshold in mg</li> <li>Data acquisition sample rate in sleeping mode</li> <li>Data acquisition sample rate after the shock detection</li> <li>Shock detection hysteresis</li> </ul>
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

### EMBEDDED DATA LOGGER

Storage capacity	up to 1 millions data points
Wireless data downloading	3 minutes to download the full memory (average time)

### INCLUDED ACCESSORIES

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

### 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 (In Transmission Mode)	High Gain Antenna : 400-500m (L.O.S), 60-120m (N.L.O.S.) Integrated Radome Antenna : 200-300m (L.O.S), 30-60m (N.L.O.S.)
Antenna	Antenna diversity : High Gain Antenna : 2 x N-Type Antenna 5dBi , IP67 Radome Antenna : 2 x Antenna 1.9 dBi , IP67

### ENVIRONMENTAL AND MECHANICAL

Casing	Aluminum AL6061 & Waterproof casing Dimensions in mm (LxWxH) without Antenna: 100x55x36 mm Weight : 200g with Integrated Radome Antenna 400g with HG Antenna (antenna included)
IP   NEMA Rating	IP67   Nema 6
Shock resistance	100g during 50 ms
Operating Temperature	-40 °C to +60 °C , a sunshield must be used if the sensor is exposed to direct sun radiation
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
Maximum Humidity	90 %RH

### 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 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 Lithium-Polymer battery	2 Ah, Lithium-Polymer battery



## TECHNICAL SPECIFICATIONS

### 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](#)

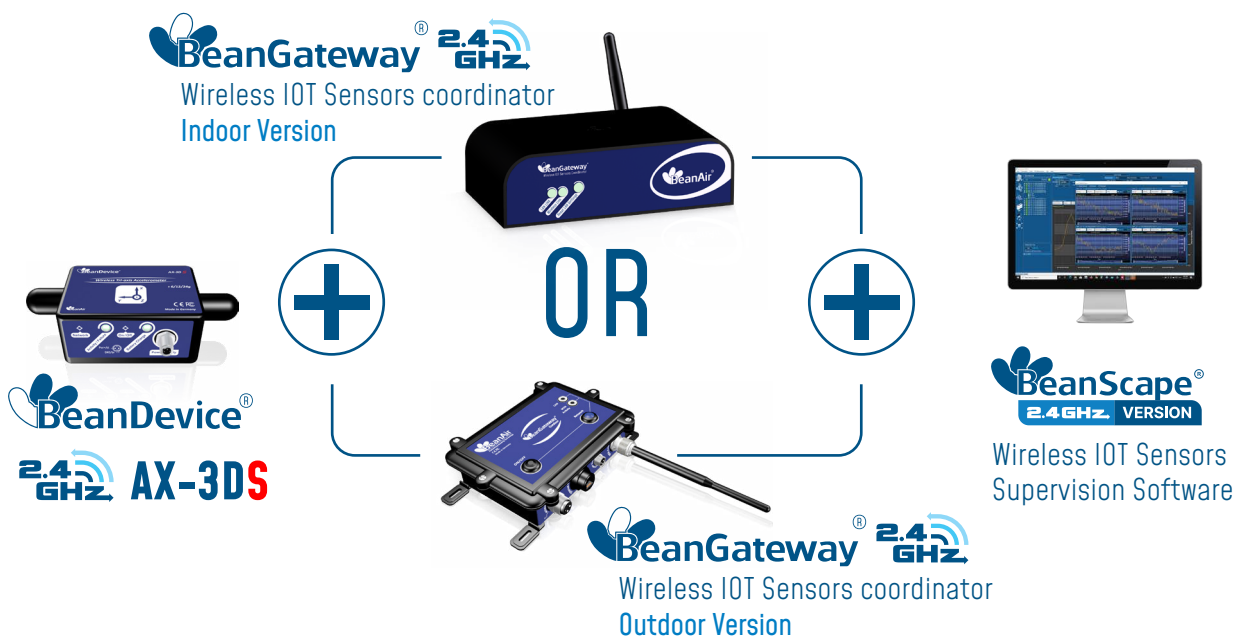
Calibration certificate

Calibration certificate provided by Beanair GmbH  
A static calibration method is used on a granite surface plate DIN876 [Ref: CERT-CAL-SMART](#)

500m L.O.S conditions is reached:

- Beangateway is positioned in Line Of Sight toward sensor (no obstacles, no radio interferences) with High Gain Antenna, with a Height of 3 meters minimum. 26dBm High Gain Directional Antenna is used on gateway side.
- On sensor side : Radome Antenna should point to Vertical Direction for better Coverity

## GETTING STARTED WITH A WIRELESS IIOT SENSORS



The **BeanDevice® 2.4 GHz AX-3DS** 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 Beandevide autonomy in Streaming and Streaming Packet Mode**

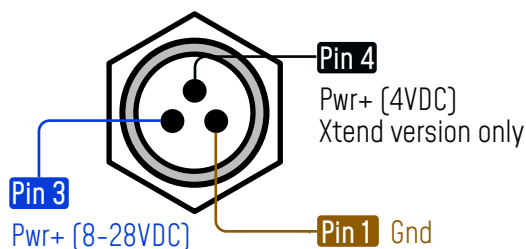
## BEANDEVICE® 2.4GHz AX-3DS FRONT VIEW



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

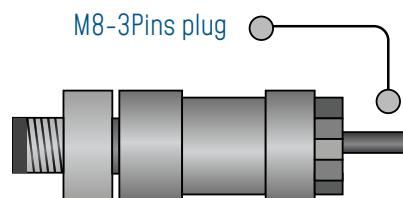
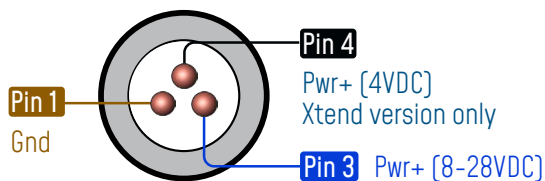
## EXTERNAL POWER SUPPLY WIRING CODE

### M8 Socket (A-Coding) - Pin Assignment



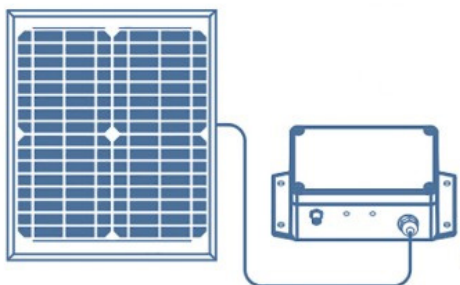
Interface Name	M8 Pin assignment	Wire Color [A-coding]
Power Supply 8-28VDC	PIN 3	Blue
Power Supply 4VDC (available on Xtend version only)	PIN 4	Black
Ground	PIN 1	Brown

### M8 Plug (A -Coding) - Pin Assignment



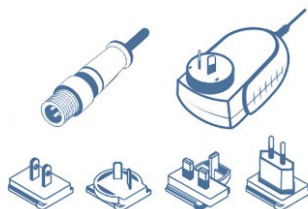
Do not power PIN4 and PIN3 at the same time, you will damage your Beandevic

## OPTIONS AND ACCESSORIES



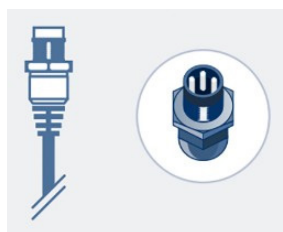
### Solar Panel Kit

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



### M8 extension cable for external power supply

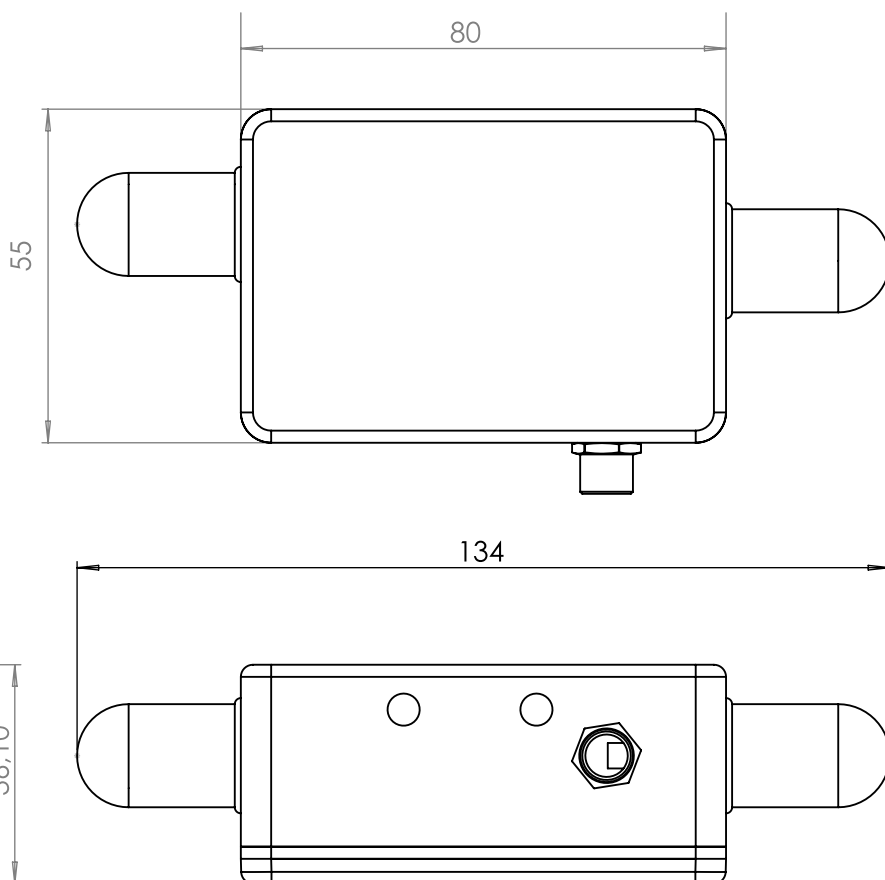
Molded cable with M8-3pins male plug  
Material: PVC with shield protection  
IP Rating : IP67 | Nema 6  
Cable length: 2 meters , Ref: CBL-M8-2M  
Cable length : 5 meters, Ref: CBL-M8-5M  
Cable length: 10 meters, Ref: CBL-M8-10M

**BeanDevice® 2.4GHz AX-3DS**

**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: **AX-3DS-SCM**



**CONTACT US**

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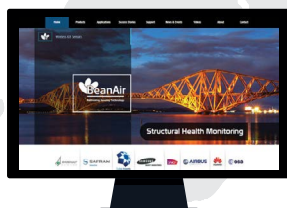
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Above given technical data are only for information purpose.

BeanAir® Sensors has right to change product specifications without notice.