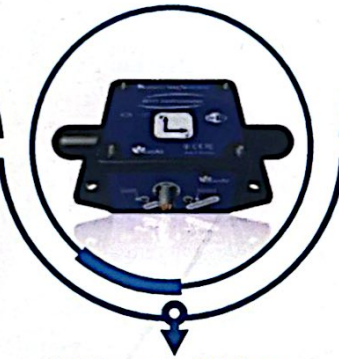




Wilow® AX-3D
WIFI VIBRATION SENSOR
±2G & ±10G



Wilow® Hi-Inc
WIFI INCLINOMETER
±15° OR ±30°



Wilow® AX-3DS
WIFI SHOCK SENSOR
±2/4/8/16G



Wilow® X-Inc
WIFI COMBO SENSORS
VIBRATION, INCLINATION
AND SHOCK MONITORING
±15°/30° . ±2G/10G

Wilow



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1. TECHNICAL SUPPORT

For general contact, technical support, to report documentation errors and to order manuals, contact BeanAir Technical Support Center (BTSC) at:
tech-support@beanair.com

For detailed information about where you can buy the BeanAir equipment/software or for recommendations on accessories and components visit:
www.beanair.com

To register for product news and announcements or for product questions contact BeanAir's Technical Support Center (BTSC).

Our aim is to make this user manual as helpful as possible. Please keep us informed of your comments and suggestions for improvements. BeanAir appreciates feedback from the users.

2. VISUAL SYMBOLS DEFINITION

Symbols	Definition
	Caution or Warning – Alerts the user with important information about BeanAir wireless IIOT sensors, if this information is not followed, the equipment /software may fail or malfunction
	Danger – This information MUST be followed if not you may damage the equipment permanently or bodily injury may occur.
	Tip or Information – Provides advice and suggestions that may be useful when installing BeanAir Wireless IIOT Sensors.

3. ACRONYMS AND ABBREVIATIONS

AES	Advanced Encryption Standard
CCA	Clear Channel Assessment
CSMA/CA	Carrier Sense Multiple Access/Collision Avoidance
GTS	Guaranteed Time-Slot
kSps	Kilo samples per second
LDCDA	Low duty cycle data acquisition
LLC	Logical Link Control
LQI	Link quality indicator
MAC	Media Access Control
PER	Packet error rate
POE	Power Over Ethernet
RF	Radio Frequency
SD	Secure Digital
UPS	Uninterruptible power supply
USB OTG	USB On The Go
WDAQ	Wireless DAQ
WSN	Wireless Sensor Networks

4. QUICK PRODUCT DESCRIPTION

4.1 UNBOXING YOUR BEANDEVICE® WILLOW®

Open the BeanDevice® Willow® Box



Figure 1 : BeanDevice® Box

The BeanDevice® Willow® is provided with a USB cable, a magnet, M8 Cap and four screws with locknuts



Figure 2 : BeanDevice® Pack

4.2 ACCESSORIES DESCRIPTION

The BeanDevice® Wilow® comes with additional accessories, useful for the proper functioning of the device :

- M8 to USB 2.0 Cable
- Magnet to Power ON/OFF your device
- Four screws+Locknut
- M8 Plastic Cap

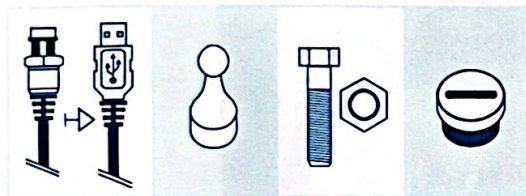


Figure 3 : BeanDevice® Wilow® AX-3D

4.3 M8 TO USB 2.0 CABLE

The USB cable is used to power supply the BeanDevice® Wilow® and to setup the Network configuration. It is an M8-6 Pins plug / USB 2.0 cable, used to connect the BeanDevice® Wilow® to the computer.

It is important to notice, that the M8-6 Pins side of the cable should be plugged correctly on the device socket, respecting the notch.

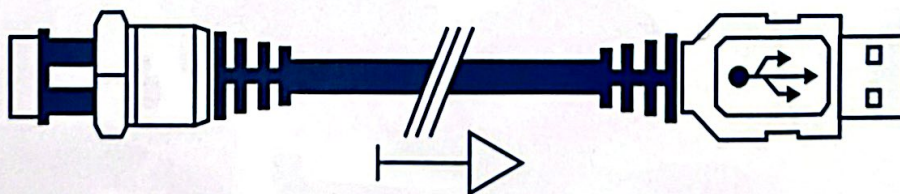


Figure 4 : USB to M8 cable

4.4 MAGNET

To avoid any accidental misconfiguration while installing and using the BeanDevice® Willow®, a magnet is used to command the BeanDevice® instead of mechanical push button. To Power ON/Power OFF the BeanDevice® or to make a Network Reset, all you have to do is to point the magnet toward one of the two white circles as shown on the next picture.

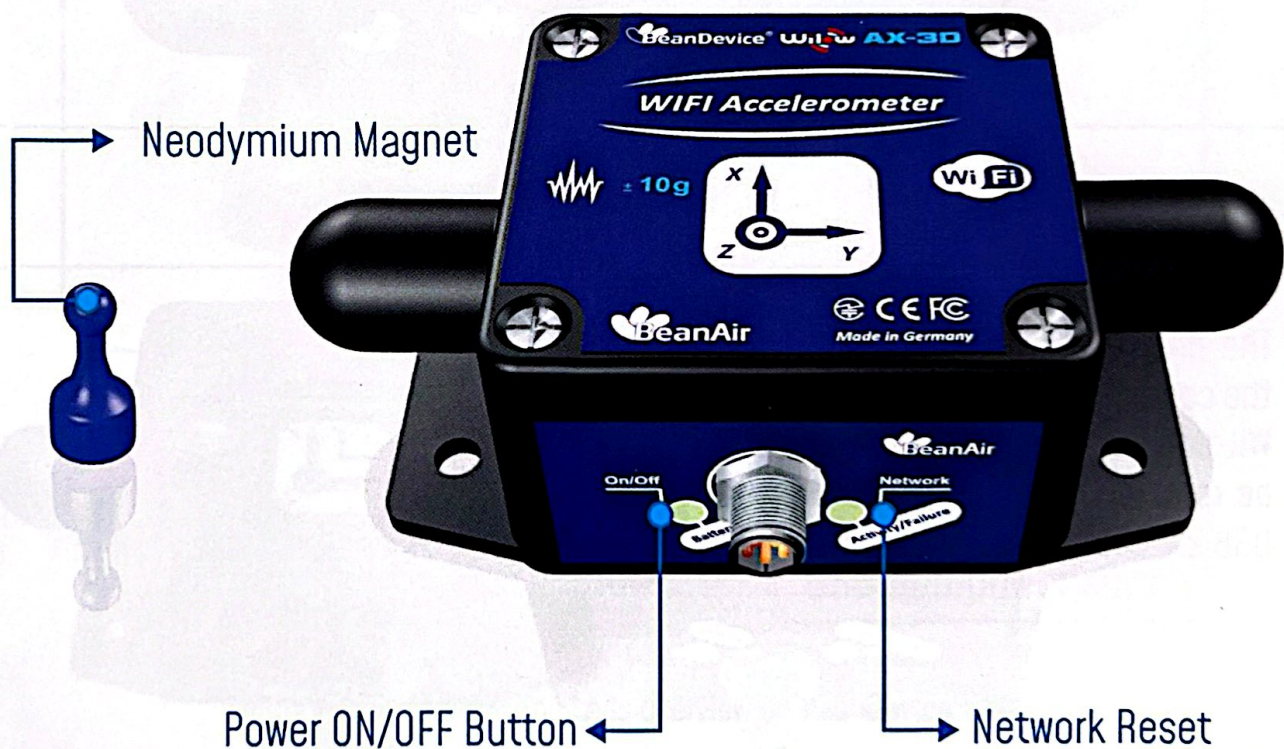


Figure 5 : Power on/off and Network Reset

4.5 LOCKNUTS AND SCREWS

Inside the packet, you will find four screws and four locknuts that will be used to mount the BeanDevice® Wilow® on the four sides. A correct mounting is essential to the success of your monitoring system.

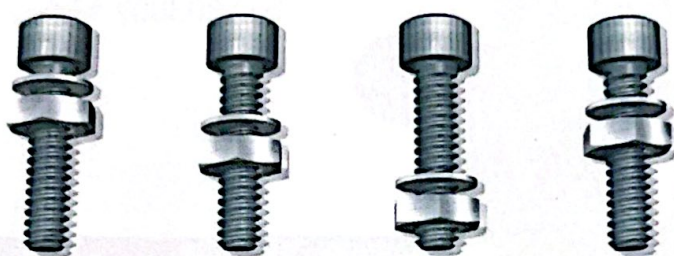


Figure 6 : Screws and Locknuts

4.6 M8 PROTECTION CAP

The plastic cap is used to cover the connector of the BeanDevice® Wilow® as a protection. It should be removed when connecting the USB 2.0 cable.



Figure 7 : Protection Cap



Do not forget to tighten correctly the M8 cap otherwise you will loose the waterproofness

4.7 CONNECTORS AND LEDS

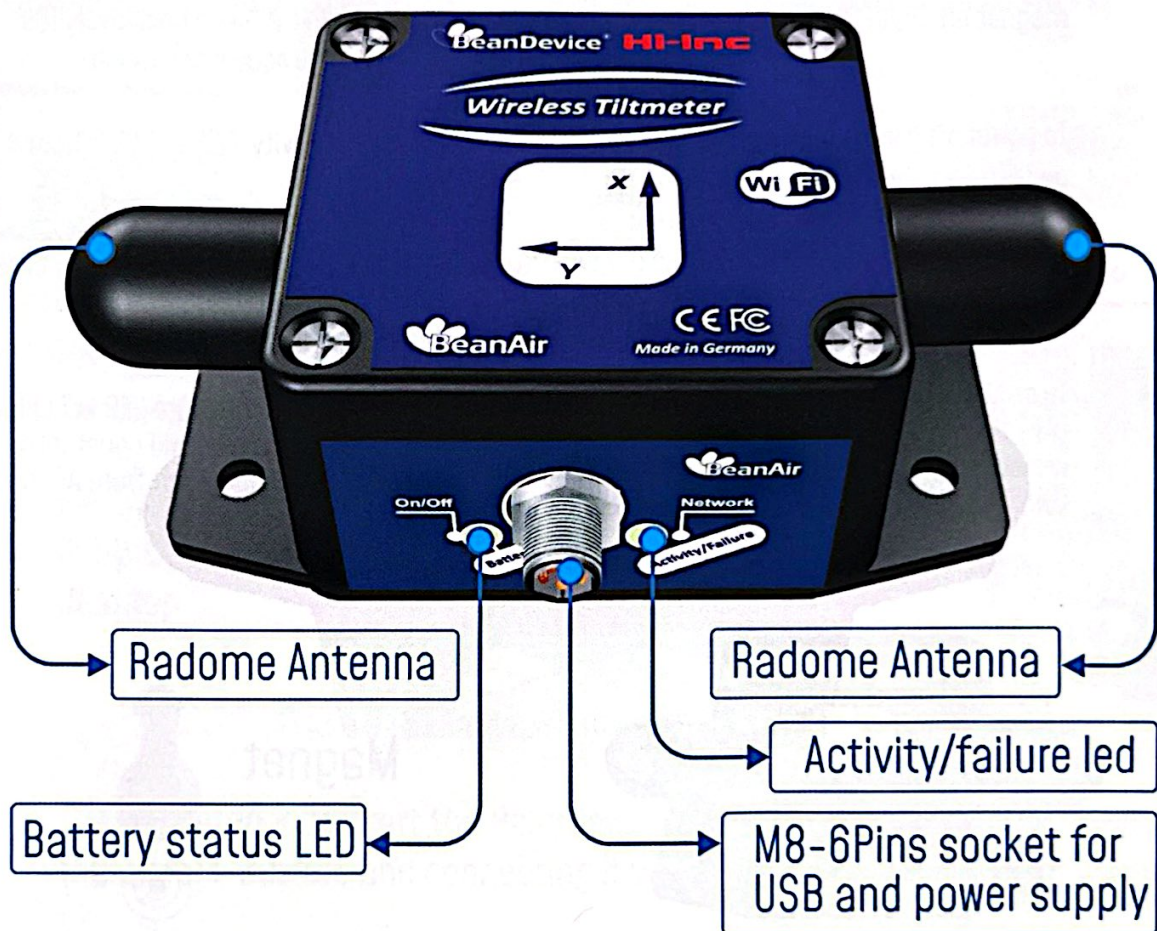


Figure 8 : Connectors and Leds overview on BeanDevice® Willow®



Do not turn the Radome Antenna , you will unscrew it from its base and the device will not work properly

4.7.1 Operations on non-contact buttons and Network LED

Operation ID	Operations on Non-contact buttons	Network LED
1	To power ON the BeanDevice® Wilow® hold the magnet on ON/OFF Label	Activity/Failure LED blinks in Green twice, then will blink in Green Color every 10s (default Data Acquisition mode).
2	To power off the BeanDevice® hold the magnet on ON/OFF Label for 5s	After 5s, Activity/Failure LED will blink one time in Red .
3	To restore factory settings hold the magnet on Network Label for 10s (Battery saver mode disabled) or 15s (battery saver mode enabled)	After 10s/15s, Activity/Failure LED blinks in Red during 2s then twice in Green
4	To configure the BeanDevice® on Access Point (AP) Mode, make sure that you device was previously powered off , then hold the magnet on ON/OFF Label for 10s	After 10s, Activity/Failure LED will blink one time in Red, then will constantly blink in Red. To come out from AP mode refer to Operation n° 3



Magnet



4.7.2 Battery Charge LED description

Action	Battery Charge LED
External Power supply is not connected	LED OFF.
External Power supply is connected	Green LED ON: Battery charged Red LED ON: Battery not charged

5. HOW TO CONNECT MY BEANDEVICE® WILOW® TO MY WIFI NETWORK

Before to start to configure your Beandevice® wilow®, make sure that your PC is connected to a WIFI AP. You need to connect your Beandevice® wilow® to the same WIFI AP.



To connect the BeanDevice® Wilow®, for the first time or after a network reset, to your WIFI Network, it is recommended to follow the next steps of configuration:

1. Firstly, install BeanScape® Wilow® software, then run it by double clicking on the BeanScape® icon on the desktop.

Figure 9 : BeanScape® Wilow® RA icon



2. The next step is to start the BeanDevice® Wilow® by pointing the magnet toward the ON/OFF Button, and connecting it via the M8/USB cable to your computer.

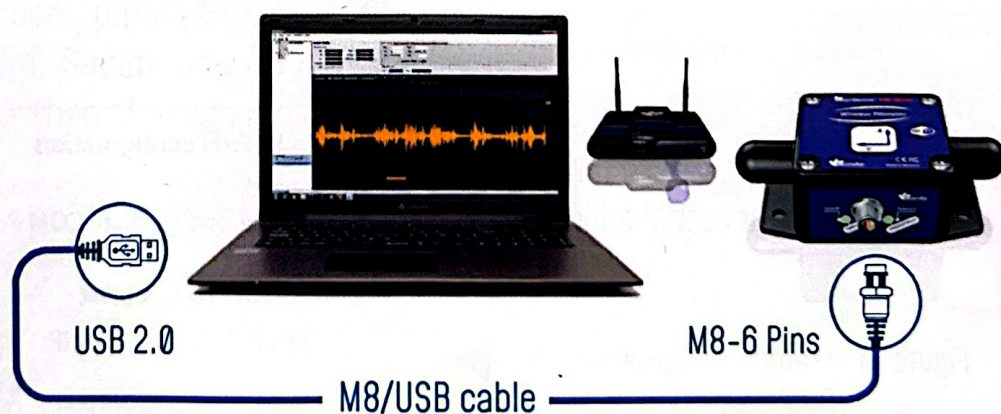
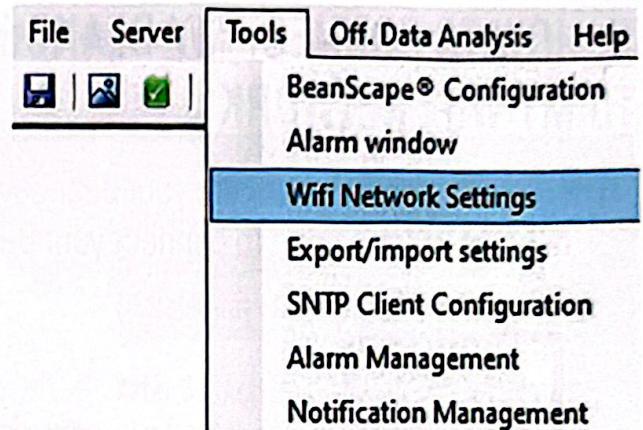


Figure 10 : Connecting BeanDevice® Wilow® to a PC through the M8/USB Cable Adapter

- On BeanScape® software Menu bar, select Tools and choose the option WIFI Network settings

Figure 11 : WLAN Configuration on BeanScape® menu

BeanScape



- The following configuration window will appear

Figure 12 : Wilow® WIFI Configuration

- On configuration via COM port frame, select your Computer IP address

Figure 13 : Frame Configuration via COM port

Wilow Wi-Fi configuration

6. Select the right serial port assigned to your BeanDevice® Wilow®.
If there is more than one BeanDevice® connected to your computer, or another kind of devices using COM serial port, you have to select the suitable port assigned to your BeanDevice® Wilow®.

Wilow Wi-Fi configuration

Wilow Sensor configuration: COM Port, UDP or WIFI

☒ COM port

Configuration via COM Port

Select PC WLAN/LAN IP: 192.168.1.75

COM port :

 COM3
 COM22

Figure 14 : COM port configuration

7. Enable DHCP on the TCP/IP configuration frame to let the Access Point allocate a dynamic IP address to the BeanDevice® Wilow®

Figure 15 : Enabling DHCP

Configuration

BeanScape Tcp/IP configuration

☒ DHCP Enabled

Wilow Tcp/IP

IP address : 192.168.1.____

Sub network mask : 255.255.255.0__

Default gateway IP : 192.168.1.___1__

8. Enable the Wi-Fi configuration and enter the WIFI Access Point connection parameters (SSID, Password, Security type and RF Region), then click on validate

Figure 16 : WIFI configuration

WI-FI connection settings

☒ Enabled

SSID :

Password :

Security type :

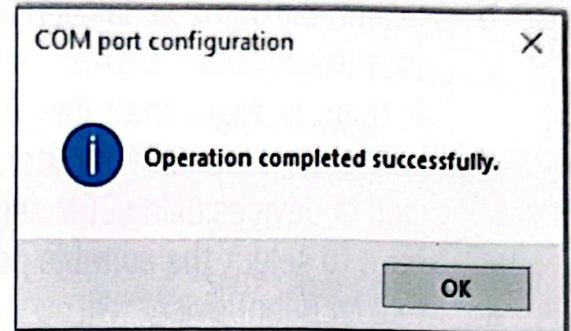
RF Region:
 REGION_EU
 REGION_EU
 REGION_US
 REGION_JP



To avoid network disconnections, select correctly your WIFI Region

9. If all parameters were filled correctly, a validation window will pop up and let you know that the configuration operation has been completed successfully.

Figure 17 : Configuration Success



10. Add BeanScape® to firewall, from tools click on Advanced Settings then Add to Firewall.

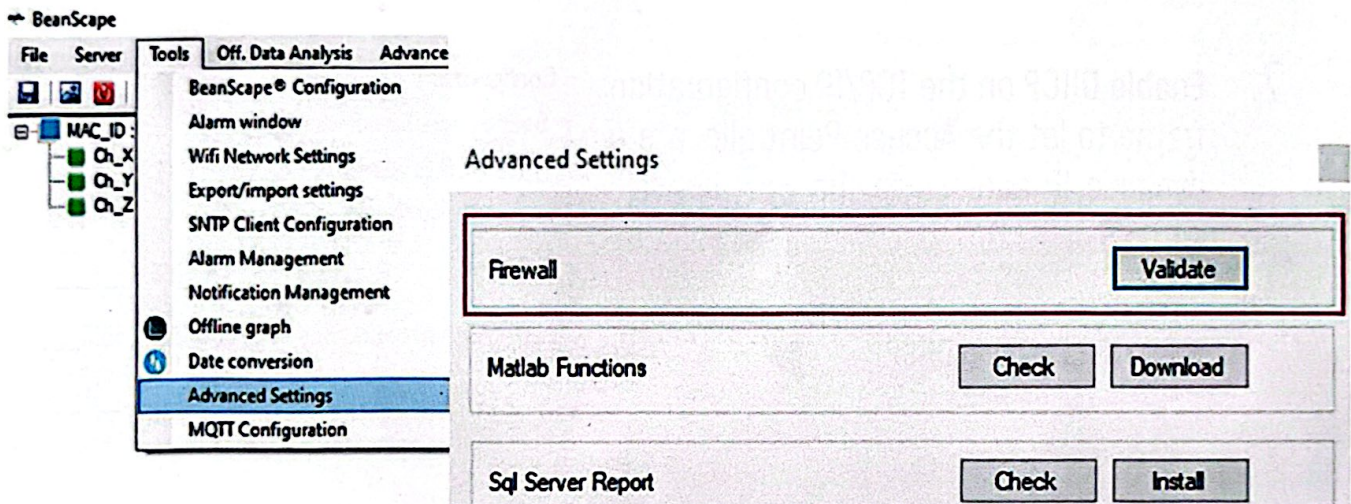


Figure 18 : Add to Firewall

11. Now start the BeanScape® Server by clicking directly on the Green button or by selecting Start the server from the Server option on the Menu bar

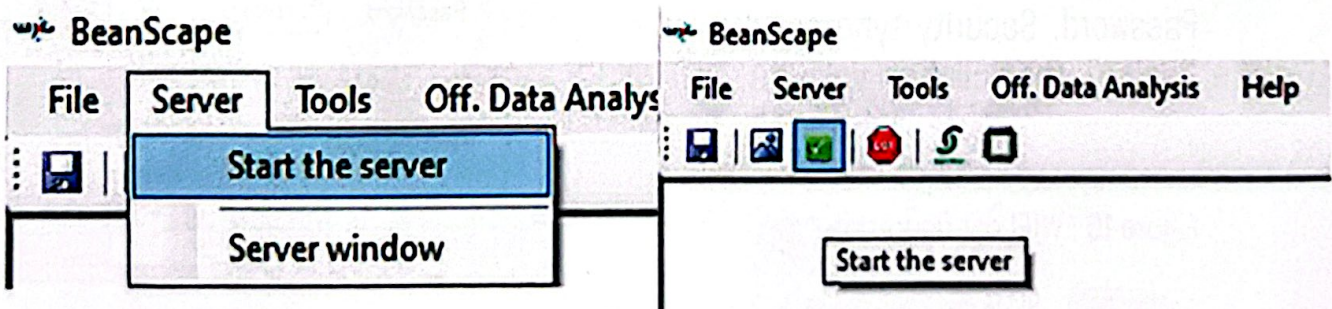


Figure 19 : Start Server

The BeanDevice® profile will be displayed on your screen

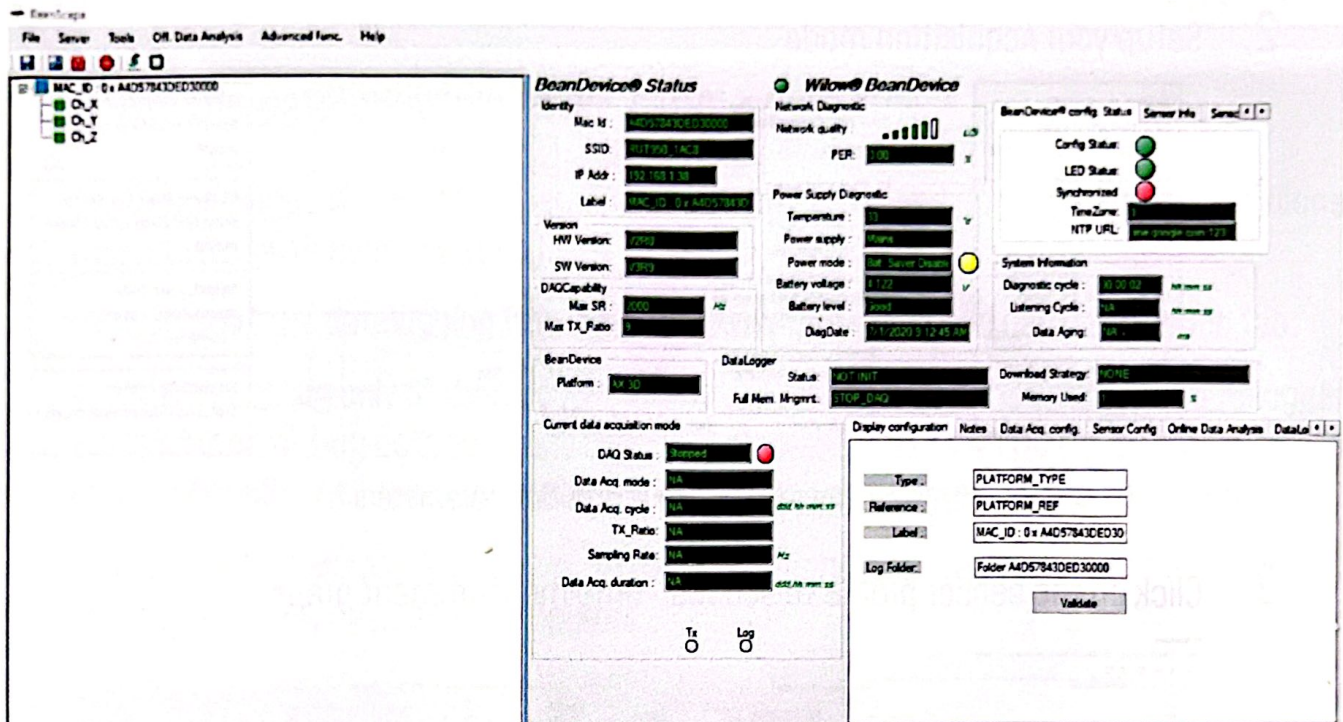


Figure 20 : BeanDevice® Dashboard

6. A QUICK OVERVIEW ABOUT DEVICE SETTINGS

6.1 How to setup a data acquisition

1. From the Beandevicé® Willow® main dashboard, go to the configuration frame and select Data Acq. Config tab

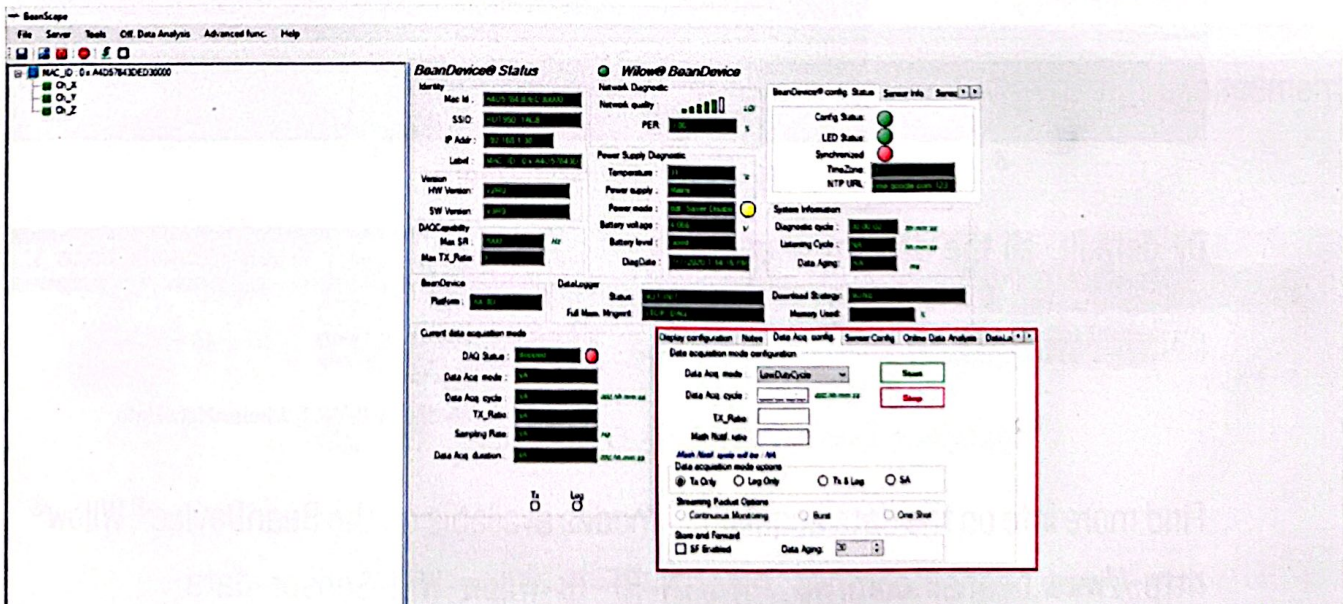


Figure 21 : Data Acq Config frame

2. Setup your Acquisition mode

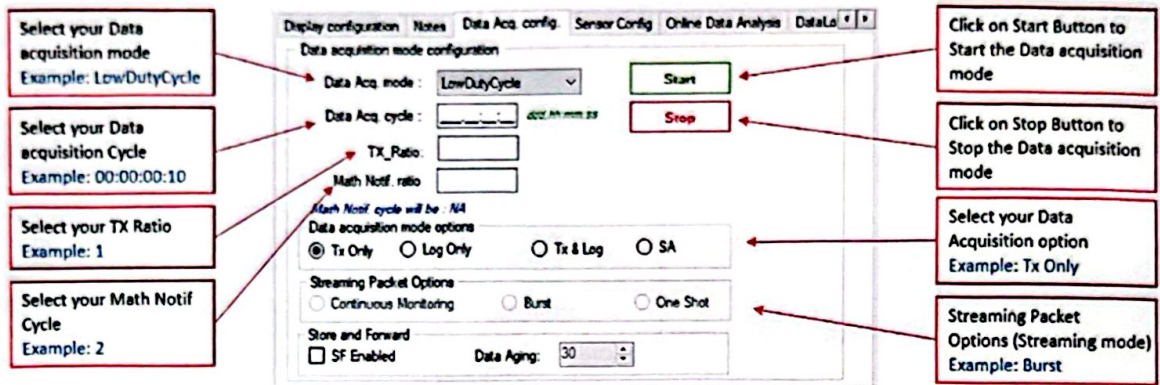


Figure 22 : Data acquisition parameters

3. Click on the sensor profile to see real-time measurement graph

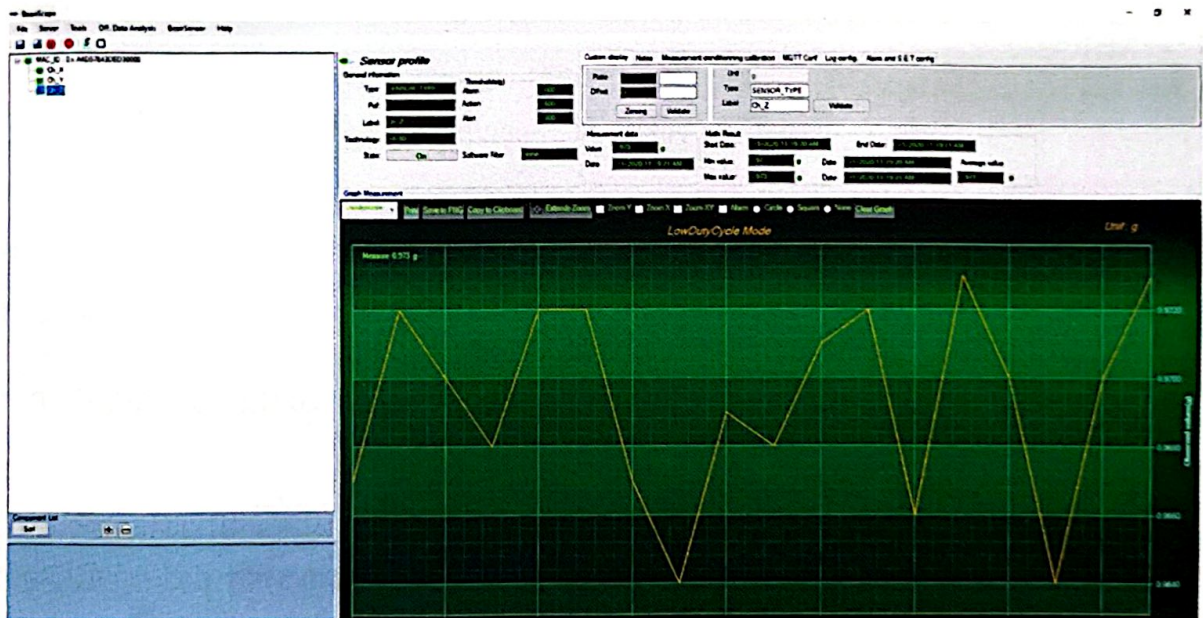
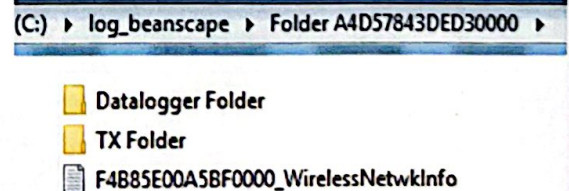


Figure 23 : Real-time graph

By default, all the data measurement will be located on the folder
C:\log_beanscape



Find more info on the data acquisition modes available on the BeanDevice® Willow® :
http://www.beanair.com/wa_files/TN-RF-18-Wilow-Wifi-Sensor-data-acquisition-modes.pdf

6.2 Using the datalogger

The **BeanDevice® Wilow®** comes equipped with an embedded datalogger up to 5 millions data points (with events dating).

You can start the datalogging from the previously demonstrated data acquisition tab.

you can select Log only as data acquisition option for only using the embedded datalogger without transmitting data to **BeanScape®** or you can select TX & LOG for jointly save data on your **BeanScape®** Host computer and also in the datalogger at the same time.

You can set the **BeanDevice® Wilow®** to SA (Stand Alone) in order to perform measurement on its own not relying at any WiFi network .

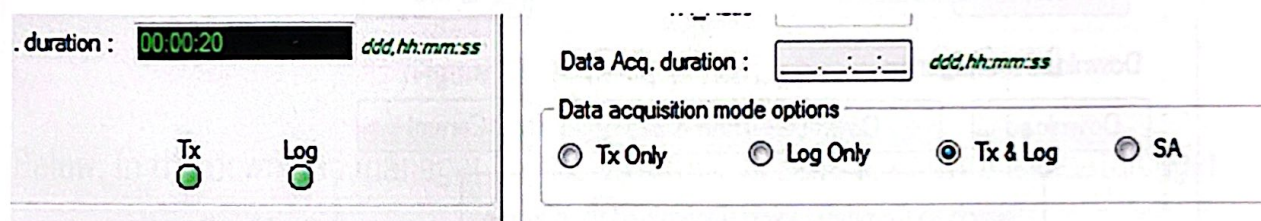


Figure 24 : Data acquisition mode options

You can monitor the Datalogger status , actual strategy of the datalogger after getting full,download strategy and memory Rate used from **BeanScape®** .

From this window, you can monitor the datalogger status, Full memory management and the memory rate used.

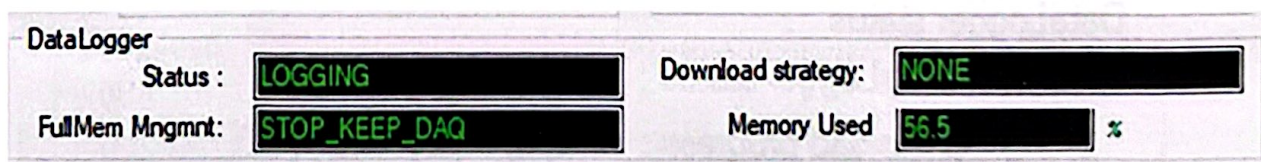


Figure 25 : DataLogger information on **BeanScape®**

These settings can be changed from the DataLogger tab at configuration panel

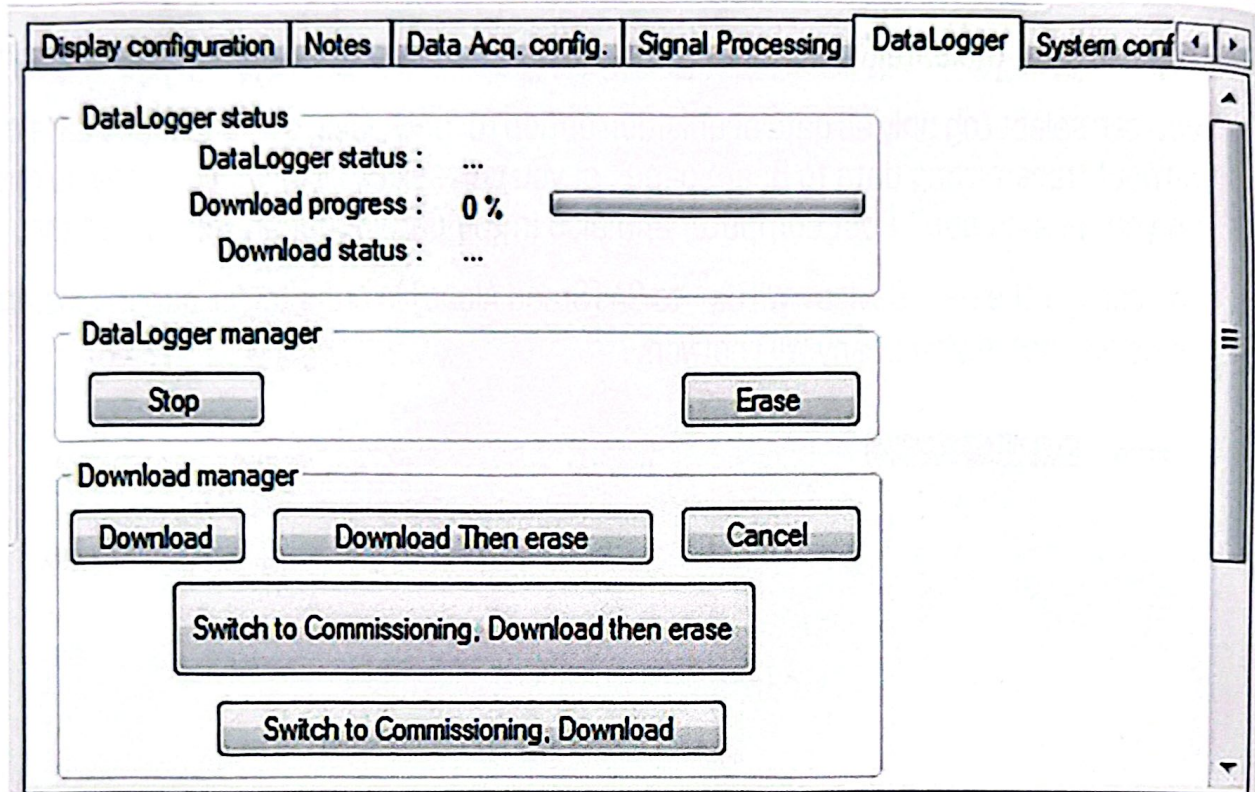


Figure 26 : DataLogger tab

Brief information about datalogger status and progress download can be seen from this tab

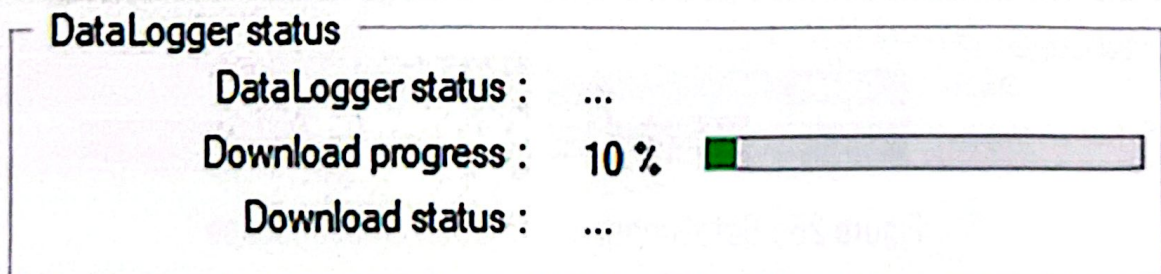


Figure 27 : DataLogger status

Several status levels are available :

- o **Ready:** the Datalogger is ready to register data
- o **NotInit:** the Datalogger is not initialized
- o **Active logs only:** Data acquisition is logged only
- o **Active TX and Log:** Data acquisition is logged & transmitted by Radio
- o **Stopped:** Datalogger is stopped

Two buttons ,one to stop the logging and the other is to erase stored data and initialize the Datalogger

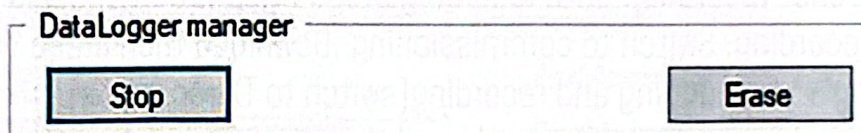


Figure 28 : DataLogger manager

Below, in the download manager frame, different options to control the datalogger

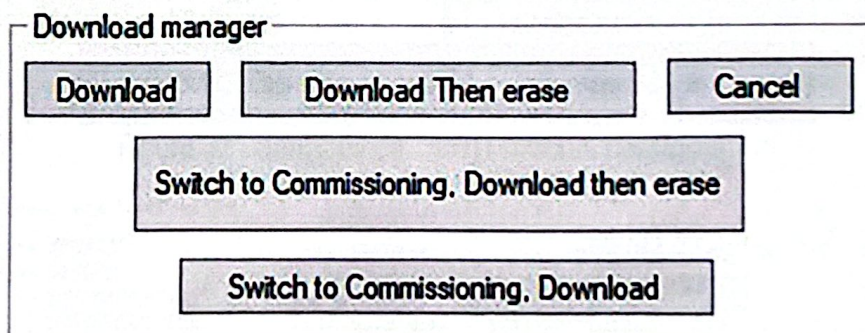


Figure 29: DataLogger download manager

Download: Starts to download all the logs on the BeanDevice® flash memory to your computer

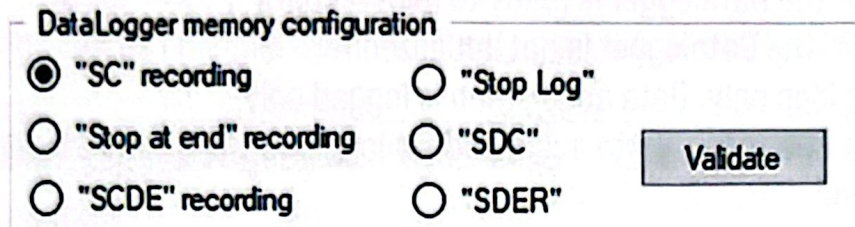
Download then erase: downloads all the logs and then erase them.

Cancel: Stops the download process

Switch to commissioning, download then erase: switch to commissioning mode download the data logged then erase it

Switch to commissioning,Download:switch to commissioning then download [without erasing the logged data]

Below, we can configure the datalogger when it's full . Several choices are available:



DataLogger memory configuration

☒ "SC" recording ☐ "Stop Log"
☐ "Stop at end" recording ☐ "SDC"
☐ "SCDE" recording ☐ "SDER"

Validate

Figure 30 : DataLogger memory configuration

"SC" recording : Switch to commissioning mode when the memory is full

"stop at end" recording: Data recording stops when the memory is full

"SCDE"recording: Switch to commissioning ,Download then erase the recording

"Stop Log": Stop logging and recording(switch to TX recording)

"SDC":Switch commissioning mode and then download recording

"SDER":Download the recording then erase the data logged then restart recording again

After download completion , data logs can be found on the folder C:\log_beanscape

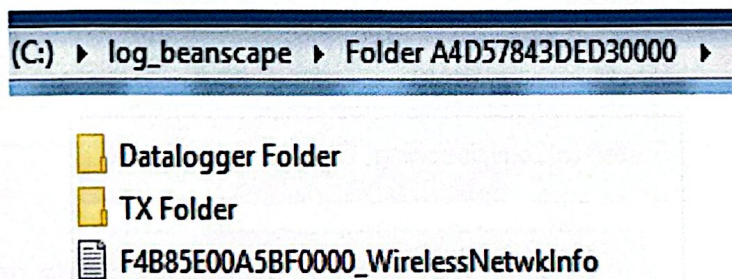


Figure 31 : Datalogger Folder on PC

7. FIRMWARE UPDATE

Wilow® sensors firmware is available on our FTP server. Click on the following web-link:

<https://www.beanair.com/firmware-for-wilow-iot-sensors-download-area.html>

Use this password (it's case sensitive, copy it without space):

BeanDeviceWilow678076!

Watch the following video on how to upload the firmware:

https://www.youtube.com/watch?v=HblZnW_r38

8. MQTT MODULE

The BeanDevice® Willow® comes with an embedded MQTT module for lightweight data exchange with a third-party IOT software , and can remotely communicate with BeanScape® Willow RA. To configure MQTT Module related to each BeanDevice® Willow®, select your device the left panel then go to Advanced funct. on the Menu bar and select MQTT.

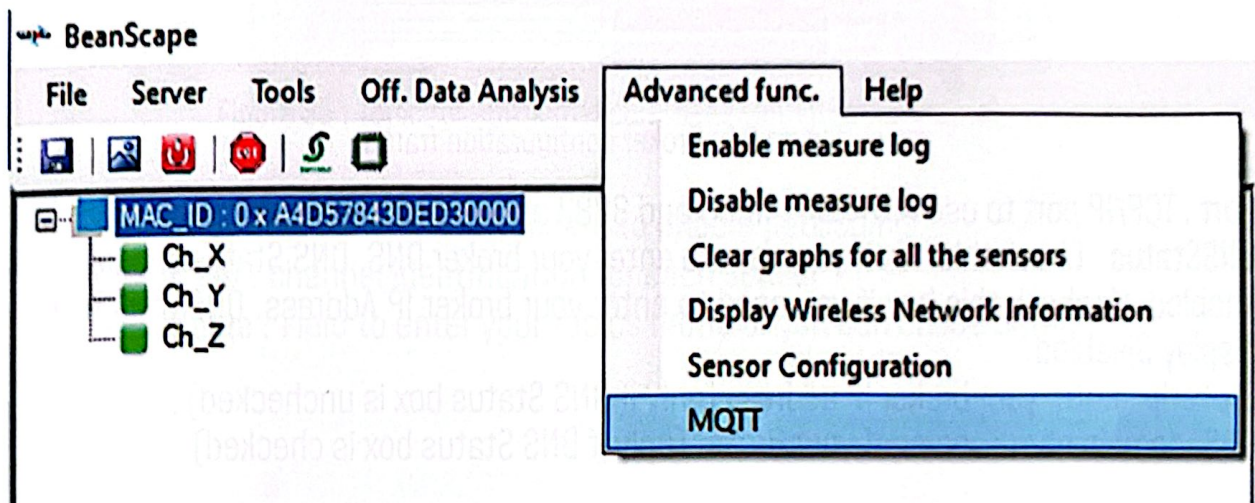


Figure 32 : BeanDevice® MQTT module configuration

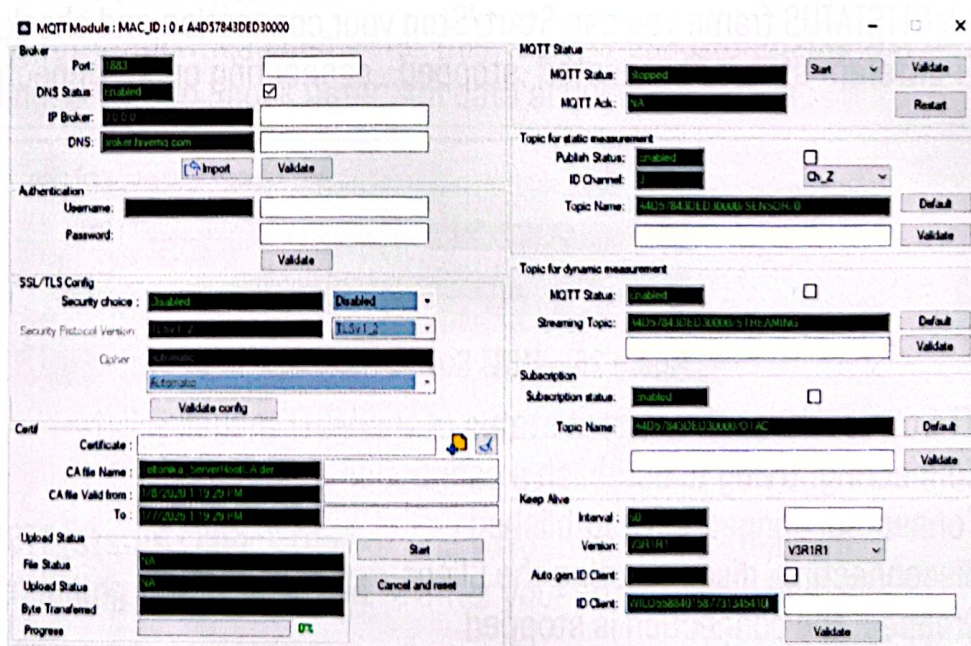


Figure 33 : MQTT configuration window

8.1 MQTT broker

The Broker is in charge of distributing messages to related client based on the topic of a message.

There are two categories of brokers, one that is hosted on the Internet, the other is running on internal network.

Broker configuration frame showing fields for Port (1883), DNS Status (Enabled), IP Broker, and DNS (broker.hivemq.com). Buttons for Import and Validate are present.

Figure 34 : Broker configuration frame

Port : TCP/IP port to use with MQTT .1883 and 8883 are the reserved ports for use with MQTT

DNSStatus : Check this box if you want to enter your broker DNS. DNS Status should display Enabled. Uncheck this box if you need to enter your broker IP Address. DNS Status should display Disabled.

BrokerIp : enter your broker IP address (only if DNS Status box is unchecked) .

DNS :domain name server of your Broker (only if DNS Status box is checked) .

8.2 MQTT status

From the MQTTSTATUS frame you can **Start/Stop** your connection and check your MQTT different status (connected ,stopped , connecting or disconnecting).

MQTTSTATUS frame showing MQTT Status (Connecting) and MQTT Ack (NA). Buttons for Start, Validate, and Restart are present.

Figure 35 : MQTT Status frame

MQTT Status: shows the current status of the MQTT module:

- Connecting: trying to establish a connection
- Connected: connection established
- Disconnecting: disconnecting the Client
- Stopped: the connection is stopped

Start/Stop: select and **Validate** to start or stop your MQTT Client connection

Restart: restart your connection

8.3 topic for static measurement

This topic is used to allow user in the other end connecting on the same MQTT broker to monitor and receive all the data measurement on LowDutyCycle and Alarm acquisition modes (static measurement) .

Figure 36 : Topic for static measurement configuration frame

Publish_status : check and validate to enable publishing

Channel ID : channel identification for each sensor

Topic Name : Field to enter your topics name or you can chose default

8.4 topic for Dynamic measurement

Same as for static measurements, this topic is used to enable the reception of Streaming, S.E.T and Shock Detection data acquisition modes .

Figure 37 : Topic for dynamic measurement configuration frame

MQTT_status : check the box and validate to enable publishing

Streaming Topic : Text field to enter your streaming topics name

8.5 Subscribe

Subscribe will be used to connect to this BeanDevice® Willow® and send OTACs from third party software or from BeanScape® Willow RA .

The screenshot shows a 'Subscription' window. It has a 'Subscription status:' label with a dropdown menu showing 'Enabled' and an unchecked checkbox. Below this is a 'Topic Name:' label with a text input field containing 'A4D57843DED30000/OTAC'. To the right of the input field are two buttons: 'Default' and 'Validate'.

Figure 38 : Subscribe frame

Subscribe_status : check the box to enable subscribing

Topic Name : Subscribe by entering your topics name.

Otherwise choose the default option.

8.6 Keep alive

Keep Alive option is used to maintain the open communication pathway or to regularly check the status of the connection to the remote device.

The screenshot shows a 'Keep Alive' window. It has four rows of controls: 'Interval:' with a text input field containing '60'; 'Version:' with a dropdown menu showing 'V3R1R1'; 'Auto.gen.ID Client:' with a checked checkbox; and 'ID Client:' with a text input field. To the right of the 'ID Client' field is a 'Validate' button.

Figure 39 : Keep Alive option

Interval : Enter the keepalive interval

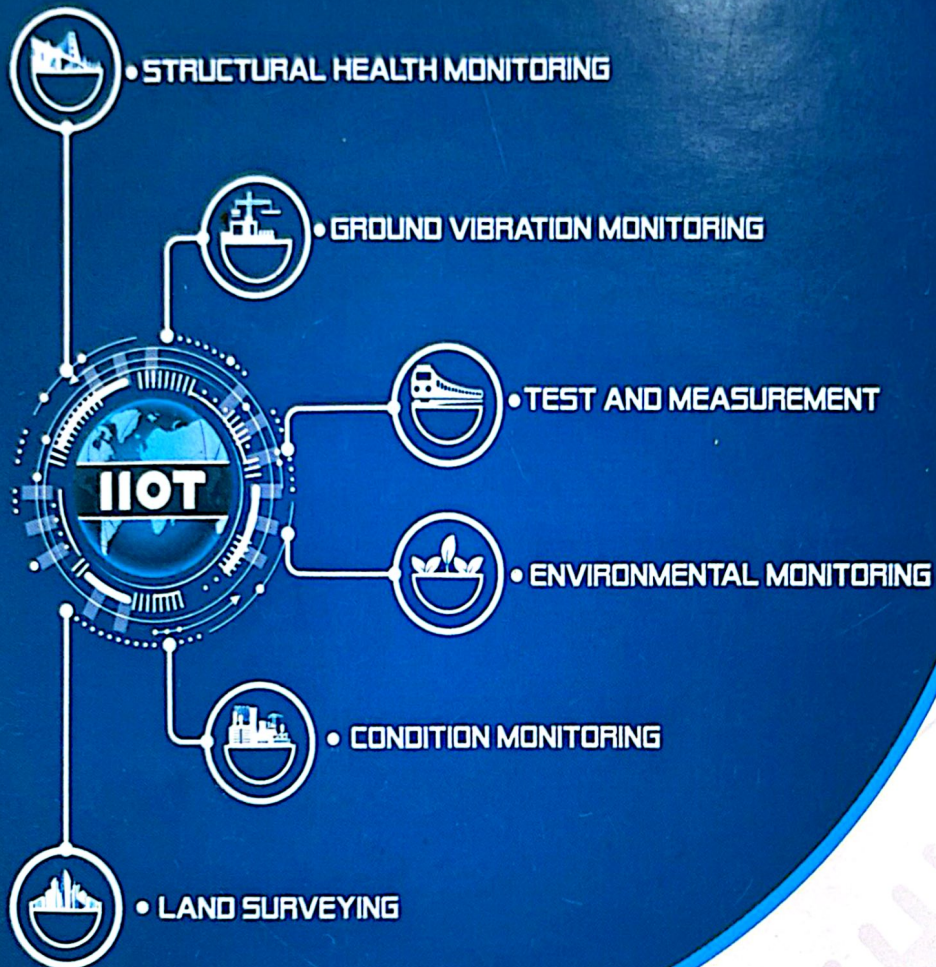
Version : select the latest version from the scrolling menu

Auto gen ID Client : check the box and click on validate to automatically generate an ID client

ID Client : Displays the client ID

9. WHERE TO FIND MORE TECHNICAL INFORMATION ?

- For more technical literature, please visit our White Paper Page:
<http://beanair.com/wireless-iot-sensors-white-paper.html>
- Please refer to the BeanDevice® Willow® user manual section for more information about MQTT,
<http://www.wireless-iot.beanair.com/files/UM-RF-07-ENG-Wilow-Wifi-Sensor.pdf>
- For detailed information on the MQTT exchanged frames ,please refer to our technical note on the MQTT communication protocol
<http://www.wireless-iot.beanair.com/files/TN-RF-004-MQTT-Communication-Protocol.pdf>
- Several information on using MQTT in IoT connected world with examples can be found in our technical note : BeanDevice® Willow® IoT starter Guidelines using MQTT protocol.
<http://www.wireless-iot.beanair.com/files/TN-RF-19-BeanDevice-Wilow-using-MQTT-with-NodeRed.pdf>



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