USER GUIDE FOR WIRELESS INTEGRATED HUMIDITY SENSOR WS433-ATH

WS433-ATH-MN-EN-01	FEB-2020

This document is applied for the following products

SKU	WS433-ATH	**HW Ver.**	2.5	**FW Ver.**	5.04
Item Code	WS433-ATH-11	Wireless Sensor Transmitter 433Mhz, Integrated ambient humidity and temperature sensor, AA 1.5 - 3.6VDC battery, IP67			

1. Functions Change Log

HW Ver.	FW Ver.	Release Date	Functions Change
2.5	5.04	NOV-2019	• Change RF data rate by button

2. Introduction

WS433-ATH is the Wireless Integrated Ambient Humidity & Temperature Sensor, it utilises Digital capacitance humidity sensor to deliver high accuracy and stable measurement. The wireless portion is Sub-GHz technology from Texas Instruments allows long range transmission at ultra-low power consumption. It will connect 2-way wirelessly to the wireless co-ordinator WS433-CL to send data and receiving the configuration. It can be configured the operation parameters like data sending interval, health check cycle...remotely from Globiots platform or via ModbusRTU software (thru the WS433-CL). Its default data rate is 50 kbps, can be switched to 625 bps to increase the communication range. It can last up to 10 years with a single AA battery. There are a lot of applications as environment monitoring for office, warehouse, data center, hospital, agriculture...



WS433-ATH-H1.PNG

3. Specification

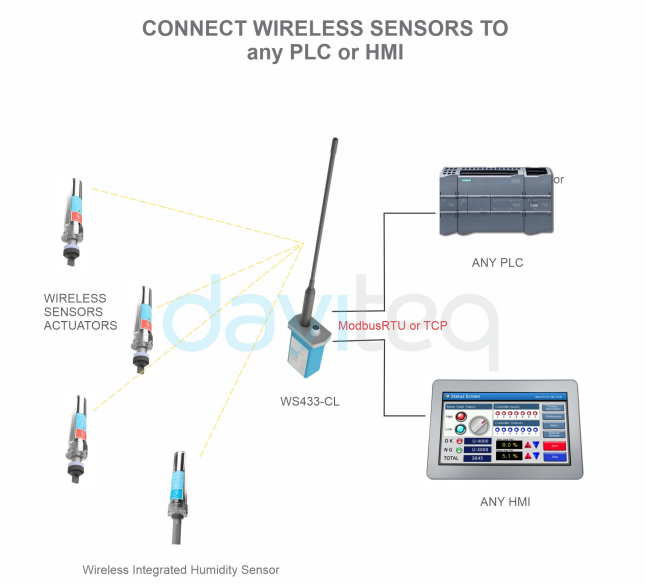
SENSOR SPECIFICATION :	
Sensor	Digital type, factory calibrated, output both Humidity & Temperature values
Humidity measuring range & accuracy	0 .. 100 %RH, +/- 2.0%
Humidity resolution	0.1%
Humidity drift	
Temperature measuring range & accuracy	-40 .. + 85 oC, +/- 0.2 oC
Temperature resolution	0.1 oC
Sensor Filter	20um Alloy sintered filter
WIRELESS TRANSMITTER SPECIFICATION :	
Data speed	Up to 50kbps
Tranmission distance, LOS	1000m
Antenna	Internal Antenna
Battery	01 x AA 1.5-3.6VDC, up to 10-year operation, depends on configuration
Frequency Band	ISM 433Mhz, Sub-GHz technology from Texas Instrument, USA
International Compliance	ETSI EN 300 220, EN 303 204 (Europe) FCC CFR47 Part15 (US), ARIB STD-T108 (Japan)
Vietnam Type Approval Certification	QCVN 73:2013/BTTTT, QCVN 96:2015/BTTTT (DAVITEQ B00122019)

Security Standard	AES-128
Operating temperature of PCB	-40oC..+60oC (with AA L91 Energizer)
Housing	Poly-carbonate, IP67
Installation method	L-type bracket SUS304 , by M4 screws or double-sided 3M tape (included)
Product dimensions & weight	160x30x30mm, < 50g (without battery)
Box dimension & gross weight	190x50x50mm, < 90g

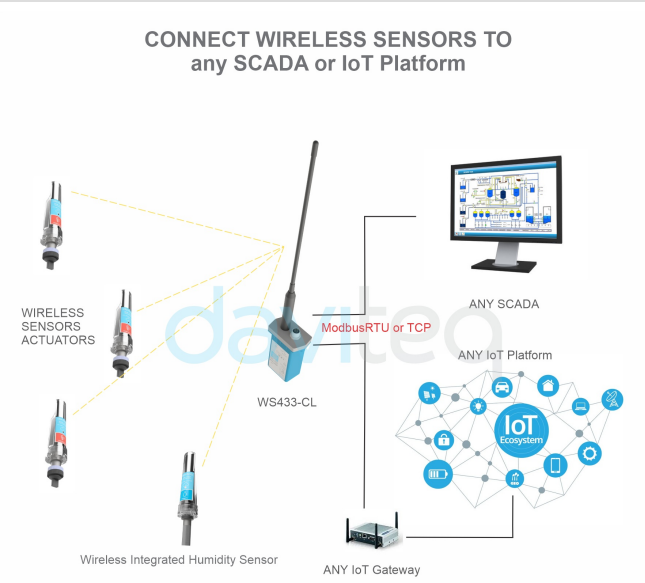
4. Product Pictures



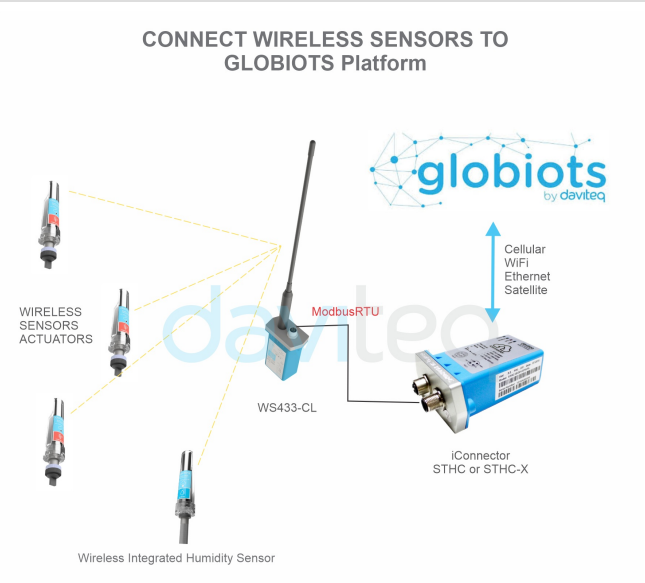
WS433-ATH-H1.PNG



WS433-ATH-H2.PNG



WS433-ATH-H3.PNG



WS433-ATH-H4.PNG

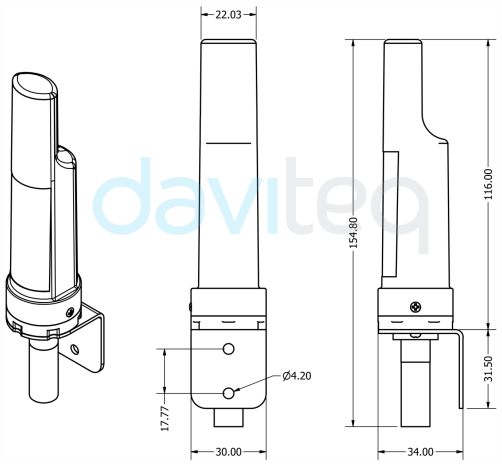
CARTON BOX OF WIRELESS SENSOR



SIZE: 50x50X190MM

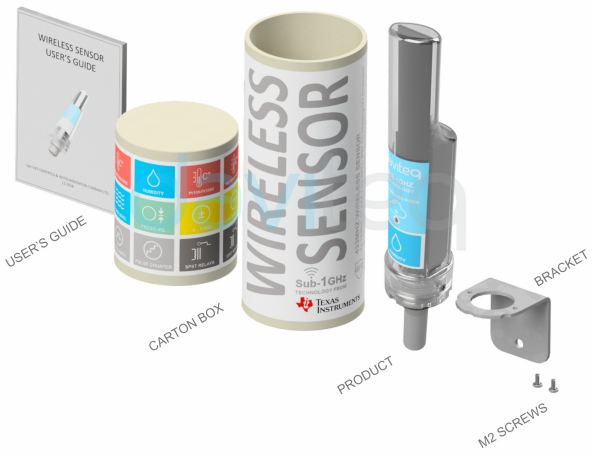
WS433-ATH-H5.PNG

DIMENSION DRAWING OF
WIRELESS INTEGRATED HUMIDITY SENSOR



WS433-ATH-H6.PNG

PRODUCT PACKAGE INCLUDES



WS433-ATH-H7.PNG

RECOMMENDED BATTERIES

E91 AA Alkaline battery



-18 .. + 60 oC working temperature

10-year shelf life

3000 mAH Capacity

Price: 1X

L91 AA Lithium battery



-40 .. + 60 oC working temperature

20-year shelf life

3500 mAH Capacity

Price: 3.5X

WS433-ATH-H8.PNG

5. Operation principle

5.1 Process of measurement

When the sensor sampling time interval is reached, for example 2 minutes, the node will wake up and switch ON the power supply to supply the energy to external sensor to start the measurement. Depends on the type and characteristic of external sensor, the sensor will take a certain time to finish the measurement.

For example, the measurement time is 200mS, after this time, the node will read the value of sensor using I2C, node will switch OFF power supply to external sensor to save energy.

Once reading the sensor value, the raw data is X, it can be scaled to any engineering value by the following formula:

Y = aX + b

Where

X: the raw value from sensor

Y: the calculated value for parameter 1's value or parameter 2's value

a: constant (default value is 1)

b: constant (default value is 0)

So, if there is no user setting for**a** and **b** ==> **Y** = **X**

The **Y** value will be compared with Lo and Hi threshold.

Status bytes of sensor Node

- Hi-Byte is error code

Error code	Description
0	No error
1	Just exchange the sensor module but node has not been reset ==> please take out the battery for 20s then install it again to reset node to recognize the new sensor module
2	Error, sensor port M12F shorted to GND
3	Error, sensor port M12F shorted to Vcc
4	Error, sensor port M12F shorted each other

- Lo-Byte is sensor type

Error code	Description
0	No error
1	Just exchange the sensor module but node has not been reset ==> please take out the battery for 20s then install it again to reset node to recognize the new sensor module
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4	Error, sensor port M12F shorted each other

Logic status of parameters

- Hi-Byte is Logic status of parameter 1
  - If parameter 1's value > high threshold 1 => Hi-Byte of Logic status = 1
  - If parameter 1's value < low threshold 1 => Hi-Byte of Logic status = 0
  - If parameter 1 is digital => Hi-Byte of Logic status = parameter 1's value
  - Timer up 1 = (Total time when Hi-Byte of Logic status = 1)
  - Timer down 1 = (Total time when Hi-Byte of Logic status = 0)
  - RisingEdge counter 1 = (Counter value when Hi-Byte of Logic status changes from 0 to 1)
  - FallingEdge counter 1 = (Counter value when Hi-Byte of Logic status changes from 1 to 0)

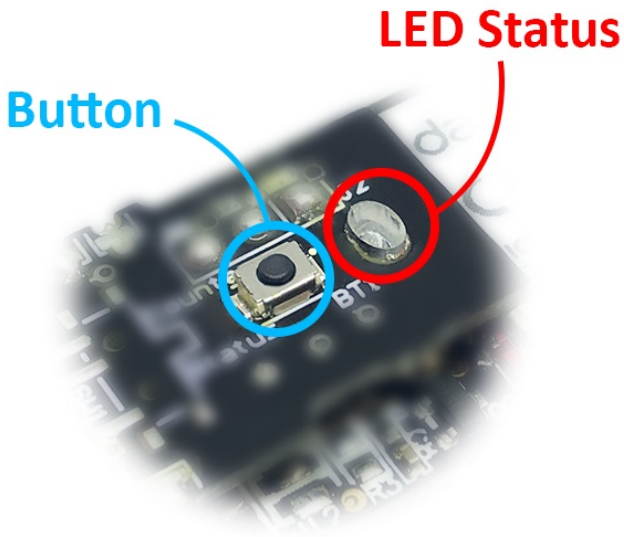
- Lo-Byte is Logic status of parameter 2
  - If parameter 2's value > high threshold 2 => Lo-Byte of Logic status = 1
  - If parameter 2's value < low threshold 2 => Lo-Byte of Logic status = 0
  - If parameter 2 is digital => Lo-Byte of Logic status = parameter 2's value
  - Timer up 2 = (Total time when Lo-Byte of Logic status = 1)
  - Timer down 2 = (Total time when Lo-Byte of Logic status = 0)
  - RisingEdge counter 2 = (Counter value when Lo-Byte of Logic status changes from 0 to 1)
  - FallingEdge counter 2 = (Counter value when Lo-Byte of Logic status changes from 1 to 0)

Ambient Temperature Sensor Module (ATH)

- Feature of measuring humidity in environment:
  - Humidity measuring range & accuracy: 0 .. 100 %RH, +/- 2.0%
  - Resolution ±0.1%
  - Long-term Drift ±0.25%RH/year
- Feature measuring ambient temperature:
  - Temperature Range -40oC to +125oC
  - Accuracy ±0.4oC
  - Resolution ±0.1oC

5.2 Button Function

The Wireless Sensor had been pre-configured, only use this feature if you really want to change the data rate RF.



5.2.1 Reset Sensor Node

- **Step 1:** Using Philips screw driver to unscrew M2 screw at the side of housing and carefully pull out the top plastic housing in the vertical direction.
- **Step 2:** Press the button until you see LED flashes 3 times to reset

Reset default WS433:

- **Frequency:** 433.92 MHz
- **RF transmit power:** -10 dBm
- **RF data rate:** 50 kbps

5.2.2 Data rate configuration 625 kps

- Take off the sensor cover like**Step 1** and press the button until you see LED flashes 2 times for 625 kps option

5.3 Add Sensor Node ID automatically

Step 1: After supplying power the Co-ordinator via M12 connector, the Node ID must be registered within the first 5 minutes, up to 40 WS.

Step 2: Bring the wireless sensor closer to the Co-ordinator's antenna then take off the wireless sensor battery, wait for 5s then insert the battery again. If:

- Buzzer plays 1 peep sound, LED blink 1 time, that means registering Node ID on Co-ordinator successfully.
- Buzzer plays 2 peep sounds, LED blink 2 times, that this Node ID is already registered.

If you do not hear the "Peep" sound, please disconnect the power the co-ordinator, wait a few minute and try again.

5.4 Wireless sensor configuration with co-ordinator

You can configure the wireless sensor with the co-ordinator by following the steps in the link below:

http://www.daviteq.com/en/manuals/books/long-range-wireless-co-ordinator-ws433-cl/page/user-guide-for-long-range-wireless-co-ordinator-ws433-cl

7. Installation

7.1 Mounting bracket installation

Locate the place where the wireless sensor is mounted, from that locate the position to mount the bracket;

Placing the wireless module on bracket and secure it by 02 x M2 screws (supplied in accessory bag)

> **Note: The bracket can be mounted on the wireless module in both direction, upward or downward**

The mounting bracket is made from hard metallic material. The following steps are for mounting this bracket;



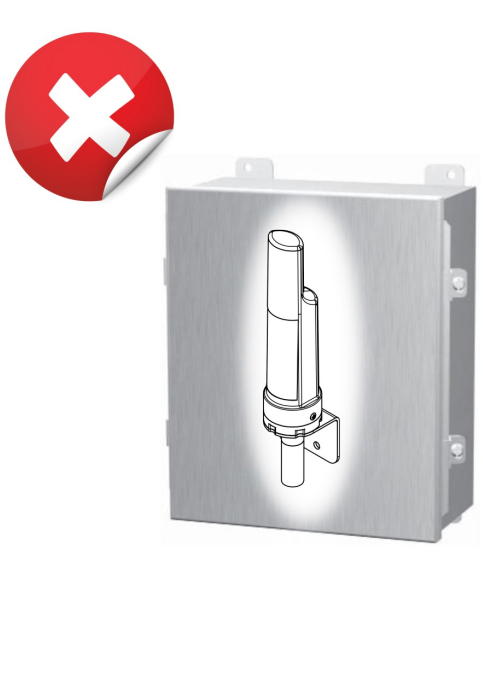
7.2 Installation location

The bracket will be fixed on the wall or material with a flat surface with double-sided 3M tape (included in the accessory bag in a carton box) or 2 x M4 screws (supplied by the customer);

> When using 3M double sided tape, please install the sensor at a height of 2 meters or less.

> **ATTENTION:**
>
> **DO NOT** install the Wireless sensor or its antenna inside a completed**metallic** box or housing, because the RF signal can not pass through the metallic wall. The housing is made from Non-metallic materials like plastic, glass, wood, leather, concrete, cement…is acceptable.





7.3 Battery installation

Steps for battery installation:

- Using Philips screw driver to unscrew M2 screw at the side of housing



- Carefully pull out the top plastic housing in the vertical direction



> ⚠ **NOTE:** Because of O-ring, it requires to have much pulling force at the beginning, therefore please do it carefully to avoid the damage of circuit board which is very thin (1.00mm);

- Insert the AA battery, please take note the poles of battery

> ❗ **ATTENTION: REVERSED POLARITY OF BATTERY IN 10 SECONDS CAN DAMAGE THE SENSOR CIRCUIT**



- Insert the top plastic housing and locking by M2 screw



8. Troubleshooting

No.	Phenomena	Reason	Solutions
1	The status LED of wireless sensor doesn't light up	• No power supply. • Configuration function of the LED is not correct.	• Check that the battery is empty or not installed correctly. • Reconfigure the led light function exactly as instructed.
2	Wireless sensor not connected to co-ordinator	• No power supply. • The configuration function of the RF data rate is incorrect.	• Check that the battery is empty or not installed correctly. • Reconfigure the RF data rate with the button according to the instructions.

9. Support Contacts

Manufacturer

Daviteq Technologies Inc
No.11 Street 2G, Nam Hung Vuong Res., An Lac Ward, Binh Tan Dist., Ho Chi Minh City, Vietnam.
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