USER GUIDE FOR WIRELESS SENSOR DIGITAL INPUTS WS433-DI

WS433-DI-MN-EN-01	FEB-2020

This document is applied for the following products

SKU	WS433-DI	**HW Ver.**	2.5	**FW Ver.**	5.0
Item Code	WS433-DI-12	Wireless Sensor with 2 channel Digital inputs with dry-contact of voltage input max 3.3VDC, Logic detecting or Pulse counting IP67, battery AA 1.5VDC, shielded cable 0.5m length with PG9 cable gland			

1. Functions Change Log

HW Ver.	FW Ver.	Release Date	Functions Change
2.5	5.0	DEC-2019	• Change function status or counter by switch • Change RF data rate by button

2. Introduction

Wireless sensor with 2 channel digital inputs to detect logic status 0/1 OR counting pulses from proximity sensor, limit switch, machine output, pressure switch…It is configured the operation parameters like data sending interval, health check cycle...remotely from Globiots platform or via ModbusRTU software. The wireless module can last up to 10 years with a single AA battery.

DIGITAL INPUT - STATUS DETECTOR
WIRELESS SENSOR WS433-DI



WS433-DI-H1.PNG

3. Specification

Input	2 channel Digital inputs with dry-contact or voltage input (max 3.3VDC)
Functions	Logic Detecting or Pulse Counting
Logic Detecting	Max frequency 2Hz, default Filter time 300mS, adjustable 1 .. 65535 mS
Pulse Counting	Max frequency 2Hz, default Filter time 100mS, adjustable 1 .. 65535 mS
Electrical connection	shielded cable 0.5m length with PG9 cable gland
Optional accessories	304SS Adapter PG9/male 1/2"NPT or PG13.5 or M20 to allow direct mounting on Process instruments or electrical panel
Data speed	Up to 50kbps
Tranmission distance, LOS	500m
Antenna	Internal Antenna, 3 dbi
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
Receiving Sensitivity	-110dBm at 50kbps
International Compliance	ETSI EN 300 220, EN 303 204 (Europe) FCC CFR47 Part15 (US), ARIB STD-T108 (Japan)
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	125x30x30mm
Net weight (without battery)	< 100g
Box dimension	190x50x50mm
Gross weight	140g

4. Product Pictures



WS433-DI-H1.PNG



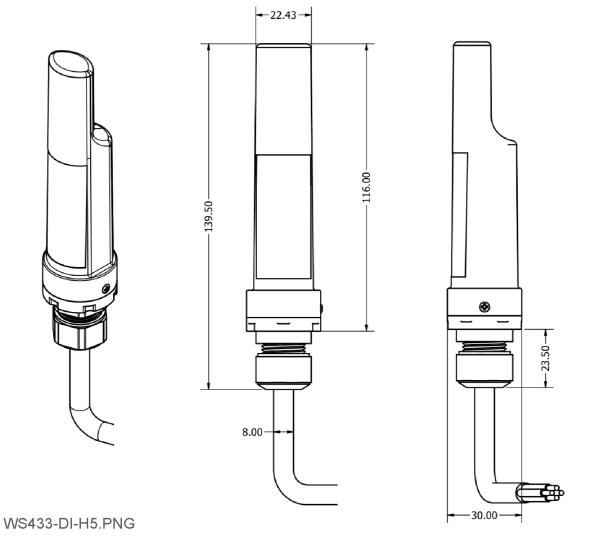
WS433-DI-H2.PNG

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WS433-DI-H4.PNG



WS433-DI-H5.PNG



WS433-M12F-H6.PNG



WS433-M12F-ATH-H8.PNG



WS433-M12F-H8.PNG

5. Operation Principle

WS433-DI-12 has 02 digital inputs, there are 02 operation modes:

- Digital status detector Mode;
- Counter Mode.

5.1 Digital Status Detector

- To use Digital Status Detector mode, please turn the switch in the wireless node to the Status Detecting Mode.
- Max frequency **2Hz**, default Filter time 300mS, adjustable 1 .. 65535 mS
- Whenever the status changes from 0 to 1 or from 1 to 0, the wireless node will send data package, includes the status of Digital input DI1 and DI2, the value can be 0 or 1.
- Please retrieve the status values of DI1 and DI2 at the following addresses.
- To retrieve the Toggle value, please read at the following addresses.

https://filerun.daviteq.com/wl/?id=BKEaUzdArkoc0Hc7nfpRShdPVToVrqQZ

- Beside that, there are also other addresses hold the analytic data of DI1 and DI2:
  - Counter value:..
  - Hour counter value:...

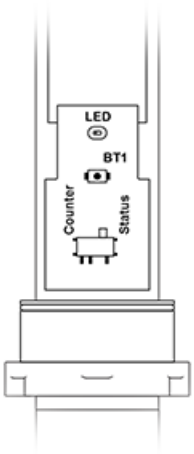
5.2 Counter Mode

- DI1 and DI2 can work as a counter to count the Digital Pulse applied on them;
- Max frequency **2Hz**, default Filter time 100mS, adjustable 1 .. 65535 mS. The higher frequency, the higher energy consumption, the lower battery life;

5.3 Applications

- Connect to a switch (status detector).
- Connect to a button (status detector with toggle registers).
- Connect to a Reed switch to detect Door opened/closed.
- Connect to limit switch of equipment or Valve to detect status Run/Stop or Open/Close
- Connect to auxiliary of relay or contactor to detect status of counting the status of machine, equipment
- Connect to Smoke detector
- Connect to Isolated AC/DC voltage detector to detect the running status of Machine, Fan, Pump...

5.4 LED Function



LED status indicator when using the button for 30 seconds after installing the battery => if not using the button, the LED will not work.

After that, the LED will blink when sending data packet to Co-ordinator.

5.5 Button Function

Use the push button to set the data transfer speed for the first 30 seconds when the battery is first installed, after 30 seconds the push button function does not work.

- Press and hold the button for 2 seconds => LED blinks once => Release the button to set Data rate RF 50kbps
- Press and hold the button for 5 seconds => LED blinks twice => Release the button to set Data rate RF 625bps
- Press and hold the button for 10 seconds => LED blinks 3 times => Release the button to reset RF parameters (frequency, RF output power, data rate), if held for more than 30 seconds then the button function does not work.

Reset default WS433:

Frequency: 433.92 MHz
RF transmit power: 15 dBm
RF data rate: 50 kbps

5.6 Switch Function

Used to select the wireless sensor input is 2 channel Counter or 2 channel Status.

Configuration steps:

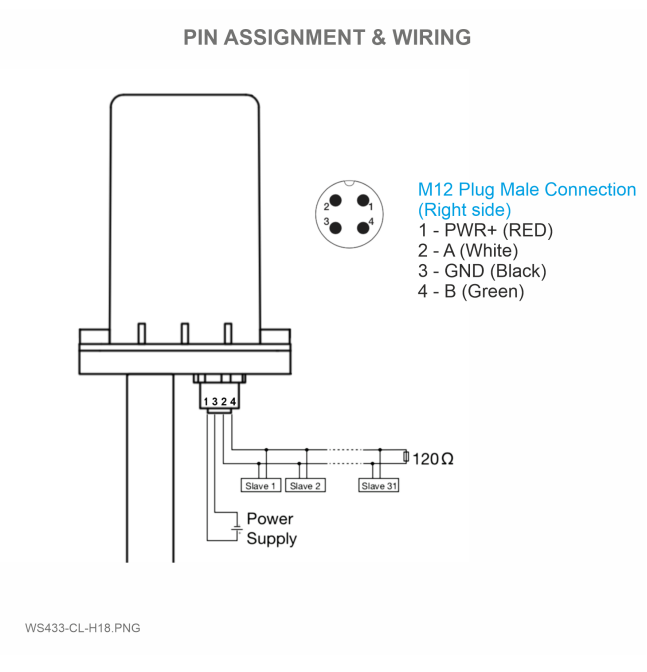
- Step 1: Set the switch according to the label on the board as "Counter" or "Status".

- Step 2: Remove the battery.
- Step 3: Wait for about 10 seconds and then insert the battery.
- Step 4: Read Sensor status information in the packet sent to know whether the sensor is operating in Counter mode or Status => see file "Modbus Memmap of WR433 for WS433-FW_V5.xx.xlsx" as the following link for more information.

https://filerun.daviteq.com/wl/?id=BKEaUzdArkoc0Hc7nfpRShdPVToVrqQZ

5.7 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.

Node id added in this way will be written to the **smallest node_id_n** address which is = **0.**

Set **Rssi_threshold** (see **RF MODE CONFIG** (in the **Modbus Memmap of WS433-CL**), default **-25**): The case if Co-ordinator is on high position and need to add node sensor. We set the sensor as close as possible and set the **Rssi_threshold** to **-80**, **-90** or **-100** to increase the sensitivity to allow WS433-CL-04 can add sensors at a longer distance. After that, perform 2 steps of adding sensors and then reset Rssi_threshold = -25.

Enb_auto_add_sensors configuration (see **RF MODE CONFIG** (in the **Modbus Memmap of WS433-CL**)): In case you do not want to turn off the power WS433-CL, you can set **Enb_auto_add_sensors = 1**, this way we have 5 minutes to add nodes (add up to 40 nodes) . After 5 minutes **Enb_auto_add_sensors** will automatically **= 0.**

> **Memmap resgisters**
>
> You can download Modbus Memmap of WS433-CL with the following link:
>
> **https://filerun.daviteq.com/wl/?id=WBbGm89AToHWyvIyMOc780N1KmjfUr3Y**

5.8 Wireless sensor configuration with co-ordinator

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

6. Installation

6.1 Mounting bracket installation

Wireless Sensor Digital Inputs WS433-DI has been mounted mounting bracket.

6.2 Installation location

Wireless sensor utilize the ultra-low power 433Mhz RF signal to transmit/receive data with Wireless co-ordinator.

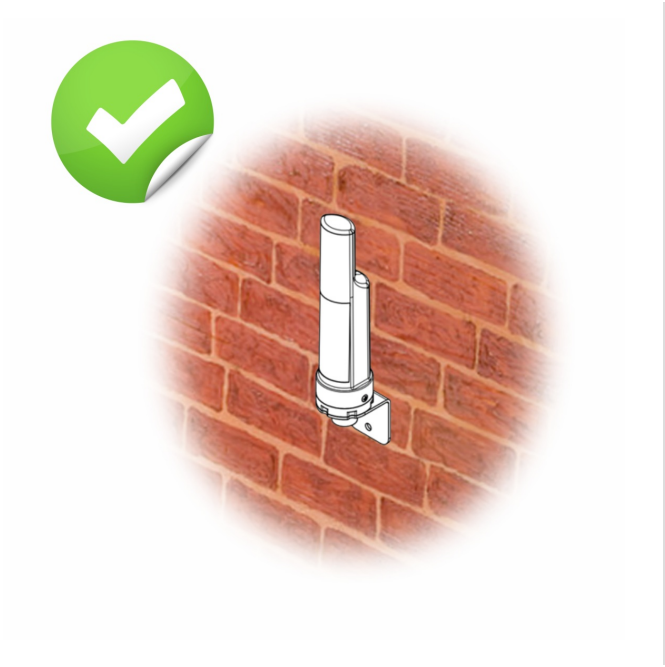
To maximize the distance of transmission, the ideal condition is Line-of-sight (LOS) between the Wireless sensor and Gateway. In real life, there may be no LOS condition. However, the two modules still communicate each other, but the distance will be reduced significantly.

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.

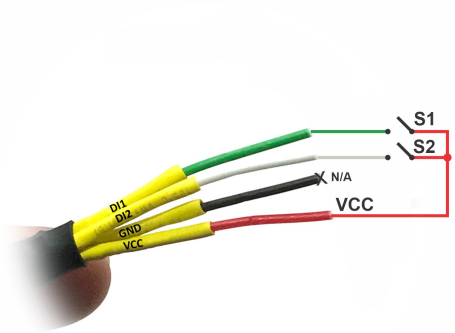




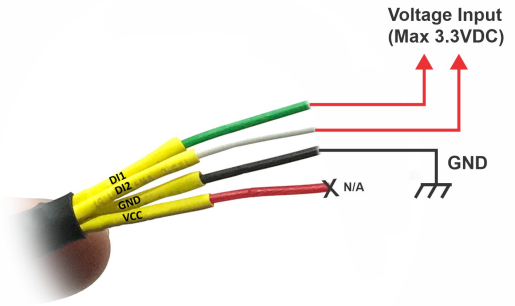
6.3 IO Wiring & Sensor installation

Connect **DI1** and **DI2** of the wireless sensor digital inputs to any dry contact (**S1**, **S2**) like relay, button, switch, ... to **VCC** or voltage input (max **3.3VDC**) to **DI1**, **DI2.**

The wireless sensor digital inputs will detect status of the**DI1** and **DI2**.



WS433-DI-H11.PNG



WS433-DI-H12.PNG

NOTE:

* Please **DO NOT** connect **VCC** to any external power source more than **3.3VDC**.

** To change the Digital Input function to **Counter**, uncover the housing, find the **Status** switch and turn it to **Counter**, take the battery out, wait **5 seconds** then put it back to the sensor.

*** If the extension cord of WS433-DI is required, use the wire type Control Cable Cu/PVC/OS/PVC 4x0.25mm2, Length=5m, Rohs, Shield 80% and shielding should be soldered to GND if possible.

6.4 Power Supply & Battery installation

Steps for battery installation:

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



WS433-DI-H13.PNG

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



WS433-DI-H14.PNG

> **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

> **REVERSED POLARITY OF BATTERIES IN 10 SECONDS CAN DAMAGE THE SENSOR CIRCUIT !**



WS433-DI-H15.PNG

- Insert the top plastic housing and locking by M2 screw



WS433-DI-H16.PNG

7. 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 uses the wrong counter or status function	• Configuration of switch function is not correct	• Check that the switch is set up correctly
3	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

8. Support contacts

Manufacturer

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