

DF703 Waste Bin Sensor_LoRaWAN

User's Manual



V1.1

Date: 2021-7-21

Changed

V1.1 Modify DF703 device picture.

V1.0 DF703 initial version.

INDEX

1 Overview.....	4
2 DF703 Default Configuration.....	4
2.1 DF703 Default Configuration.....	4
2.2 LoRaWAN Band.....	5
3 DF703 Sensor Function Description.....	5
3.1 Reporting rules.....	5
3.2 Full /Empty state detection (height detection).....	5
3.3 Fire alarm function.....	6
3.4 Fall detection function.....	7
3.5 GPS function.....	7
4 DF703 Hardware interface.....	8
5 Connect to Power.....	9
6 Reboot Sensor by Magnet.....	10
7 Installation.....	10
7.1 DF703 Sensor housing installation.....	10
7.2 DF703 Sensor Installation.....	11

1 Overview

These documents are helpful to understand the DF703 Waste Bin Detector's following:

- DF703 sensor parameter setting by default
- DF703 sensor function description
- Hardware Interface
- Connect power
- Reboot DF703 sensor by magnet
- Installation
- Protocol and API

2 DF703 Default Configuration

2.1 DF703 Default Configuration

Parameters	Default Configuration	Description
Periodic upload time	24 hours	Sensor will report at the 24 hour interval, and report the reading of the moment.
Periodic detection time	10min	Sensor detects once every 10 minutes, but will only send right away if there's a change of status, if no change of status, it will report at the 24 hour interval.
Full alarm threshold	30cm	Used to determine if sensor is full. When the height is more than 30cm, the sensor is considered to be full;
Fire alarm threshold	75°C	Used to determine if sensor is fire. When the temperature is more than 75°C, the sensor is considered to be fire;
Fall alarm threshold	30°	Used to determine if sensor is fall. When the angle of the sensor tilted is more than 30°, the sensor is considered to be fall;
Battery alarm threshold	20%	Used to determine if the battery is lower. When the percentage of the battery is less than 20%, the battery is considered to be battery lower;
GPS function	Turned off by default	It is turned off by default; Note: standard version without GPS function;
Fall function	Turned off by default	It is turned off by default;

2.2 LoRaWAN Band

The main LoRaWAN band are used given below CN470, EU868, US915, AU915, AS923. The default frequency settings are as follows:

Band	The default uplink frequency	RXWIN1	RXWIN2
CN470 (470-510MHz)	470.3,470.5,470.7,470.9, 471.1,471.3,471.5,471.7	500.3,500.5,500.7,500.9 501.1,501.3,501.5,501.7	505.3
EU868 (863-870MHz)	868.1,868.3,868.5	868.1,868.3,868.5	869.525
US915 (902-928MHz)	902.3,902.5,902.7,902.9, 903.1,903.3,903.5,903.7	923.3,923.9,924.5,925.1 925.7,926.3,926.9,927.5	923.3
AU915 (915-928MHz)	915.2,915.4,915.6,915.8 916.0,916.2,916.4,916.6	923.3,923.9,924.5,925.1 925.7,926.3,926.9,927.5	923.3
AS923 (915-928MHz)	923.2,923.4	923.2,923.4	923.2

3 DF703 Sensor Function Description

3.1 Reporting rules

The DF703 device will report data in the following two cases,

- 1) Periodic upload time: report the reading of the moment at the periodic report interval.
- 2) Trigger reporting: The device will detect all states, such as full/empty, fire, fall, battery status, etc., During the periodic detection interval. If there is a status changed, it will report the data. If there is no status changed, it will only report it at the periodic upload interval. data. Status changed means the status change from full to empty or from empty to full and so on.

3.2 Full /Empty state detection (height detection)

This sensor can detect the air height from the probe (white part) of the device to the surface of the garbage/other object. According to this distance, it can be judged whether the trash bin is empty or full.

By default (the alarm threshold is 30cm), when the device measure that the height is less than 30cm, the garbage bin is considered to be full. When the distance is greater than 30cm, the trash can is considered empty.

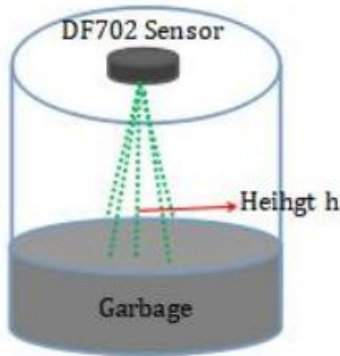


Figure 3.1 DF703 Height detection

Cardboard items can be used for simulation testing before actual installation.

Figure 3.2, test height with one cardboard or face ground;

Figure 3.3, test height with one cardboard or face ceiling without led;

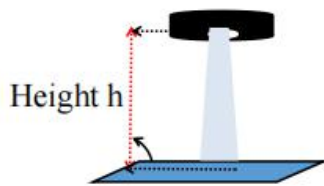


Figure 3.2 Height testing

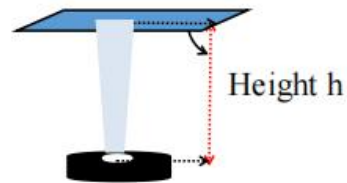


Figure 3.3 Height testing

Note: The test process ensures that the device is vertical to the object being measured, so that more accurate height data can be obtained.

3.3 Fire alarm function

The sensor can detect the temperature value to determine whether or not to catch fire. The default alarm threshold is 75 °C. When the temperature is detected to be greater than 75 °C, sensor will report this data.

If you need to verify this feature, it is recommended to change the alarm threshold. In order to avoid improper damage to the equipment. Suggested method:

1) Modify the alarm threshold to a temperature lower than room temperature, so the device device can be triggered to report alarm data. The method of modifying this parameter can be modified through the serial port or sent by the platform.

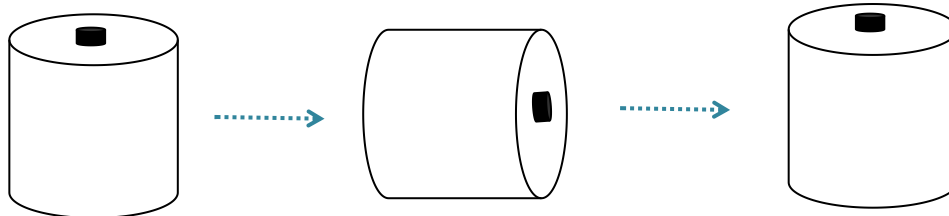
3.4 Fall detection function

Step 1: After fixing the device on the trash can, please restart the device. After the restart, the current position will be learned. The position is considered to be the standard position of the trash can, the angle is 0°, and it is not fall.

Step 2: When the trash bin is tilted and cut at an angle greater than 30°, the device will report the alarm data, indicating that the trash can has been inverted;

Step 3: Restoring the trash bin to the standard position. When the device is awakened to detect that the device has returned to the standard position, or the tilt and angle are less than 30°, the data will be reported, indicating that the trash can is not dumped;

.....



3.5 GPS function

The following content is only applicable to GPS-capable devices. The standard version does not have GPS. You can ignore this part.

Positioning interval: Positioning at upload interval.

Working environment: Open outdoor environment, no obstructions around the device, that is, the GPS antenna is facing up and is not blocked;

Installation: The sensor is installed outside the trash can, and the antenna is not covered by the trash can cover. In addition, if use the external GPS antenna, the device can be installed inside and the antenna is placed outside the trash bin.

Testing method:

1. Place the sensor in an outdoor open environment, restart the device with a magnet, and wait for about 5 minutes to view the data.

Note: The sensor will locate once every time it restarts.

2. Through the platform (our company's background management) location information.

上报时间	高度	坐标经度	坐标纬度	温度	设备状态	倾斜角度	漏磁	起火	倾斜	电量	信号强度	电池电压	RSRP	SNR	帧计数器
2019-11-26 15:01:01	0	116.509...	40.04027	11	0	0	1	0	0	0	0	3.58	-697	192	0

Figure 3.2 DF703 latitude and longitude information

Note:

(1) Why can't get the location information?

Keep the device completely open, restart the device with a magnet, check the data results multiple times, or view the positioning information directly through the serial port.

GPS positioning is easily affected by location and weather. If a location cannot be determined at a certain moment, please try multiple times; avoid testing in corners such as windows and corners.

(2) When the GPS function is not needed in actual applications, please turn off the GPS function to avoid unnecessary power consumption.

(3) If you test indoors for a long time, you can turn off the GPS function. Since GPS does not work indoors, turning on GPS will only consume power.

(4) GPS positioning time is up to 4 minutes.

4 DF703 Hardware interface

The detailed of power interface , device parameter configuration interface are given here, as shown in figure 4.1.

- Power socket: Connect to the battery,and capacitor.
- UART interface:This interface is used to configure device parameters.

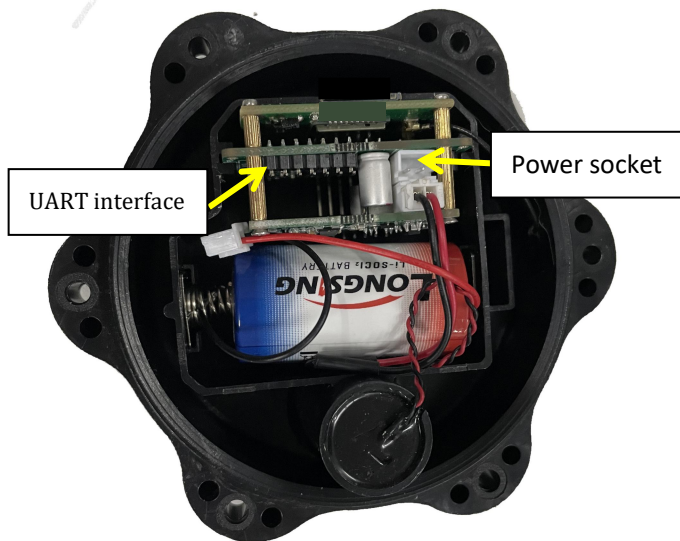


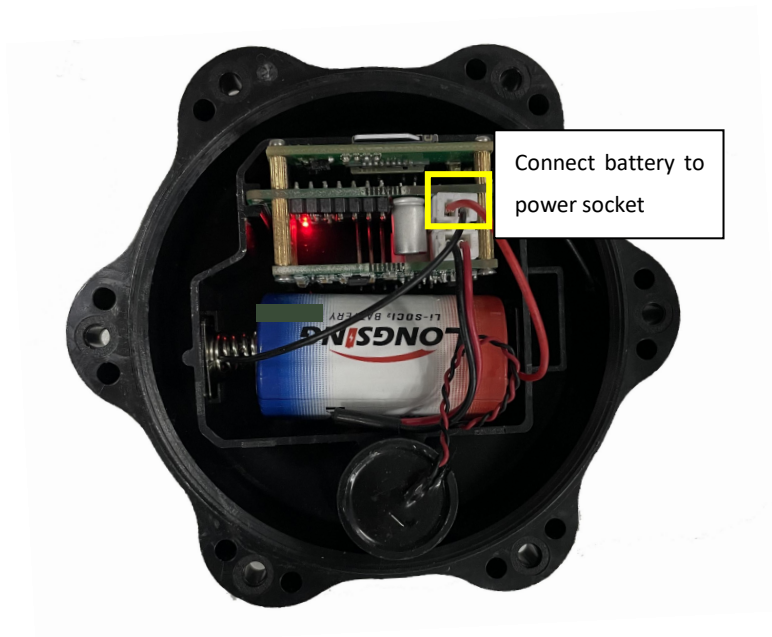
Figure4.1

5 Connect to Power

Please first connect the battery, as following picture:

Note:

- 1 If you connect the power, but not reporting, please try to restart sensor by magnet.
- 2 If you need to restart sensor, please use magnet. DONOT unplug/plug battery frequently.



6 Reboot Sensor by Magnet

Magnet:



Move the magnet around the probe side, then remove the magnet. If the device is successfully rebooted, the device will report a data.



7 Installation

7.1 DF703 Sensor housing installation

When installing the upper and lower shells of the device, please pay attention to the following:

1. Before installation, please check that the battery foam and gaskets are intact and placed correctly; make sure that there are no internal cables, such as power cords, stuck, otherwise it will easily cause gaps after installation, easy water leakage, and even failure to work properly.
2. Before fixing the screws, check whether the edge of the housing is squeezed by the antenna cable, power cord, etc., to avoid breaking the cable and causing the device to fail to work normally;
3. After installation, the gap between the upper and lower covers is less than **0.2mm**, which has achieved the purpose of waterproofing.

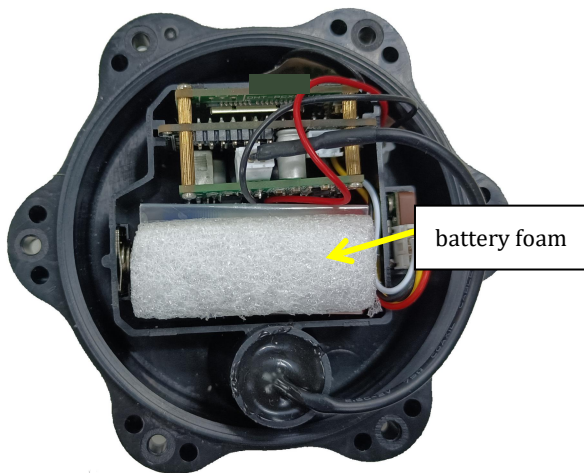


Figure 7.1

7.2 DF703 Sensor Installation

First install the DF703 device to the bracket, as shown in the figure below,



Drill holes on the top of the trash can according to the hole position of the mounting bracket, and fix the device on the top of the trash bin.

Note:

1. Place the DF703 device in the center of the top cover of the trash bin and make the device vertically downward. If the device is tilted or too close to the side of the trash bin, it will affect the accuracy of distance detection.

2. If the top cover of the trash bin is curved, spacers can be added to adjust the height, and finally the DF703 device will be perpendicular to the bottom of the trash bin.

3. After installation, you can restart the device again and check whether the data is normal on the platform.

4. If you use the fall detection function, after installation, you must use a magnet to restart the device to initialize its position.

