Smart Scene Panel

Featuring LoRaWAN®

WS136 & WS156

User Guide

Safety Precautions

Milesight will not shoulder responsibility for any loss or damage resulting from not following the instructions of this operating guide.

- The device must not be modified in any way.
- In order to protect the security of the device, please change device the password when first configuration. The default password is 123456.
- Do not place the device close to objects with naked flames.
- Do not place the device where the temperature is below/above the operating range.
- When installing the battery, please install it accurately, and do not install the reverse or wrong model.
- Remove the battery if the device will not be used for a while. Otherwise, the battery will leak and damage the device.
- Make sure both batteries are newest when install, or battery life will be reduced.
- The device must never be subjected to shocks or impacts.

Declaration of Conformity

WS136 & WS156 is in conformity with the essential requirements and other relevant provisions of the CE, FCC, and RoHS.

BE	BG	CZ	DK	DE	EE	IE	EL
ES	FR	HR	IT	CY	LV	LT	LU
HU	MT	NL	AT	PL	PT	RO	SI
SK	FI	SE	NO	IS	LI	CH	TR

FCC Statement:

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or

more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator& your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

For assistance, please contact
Milesight technical support:
Email: iot.support@milesight.com
Tel: 86-592-5085280
Fax: 86-592-5023065
Address: Building C09, Software Park III, Xiamen 361024, China

Revision History

Date	Doc Version	Description
Oct. 19, 2021	V 1.0	Initial version
Aug. 1, 2022	V 1.1	1. Change insulating sheet place 2. Change RX2 setting place

Contents

1. Product Introduction

1.1 Overview

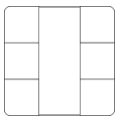
WS136 & WS156 is a LoRaWAN® based smart panel for wireless controls, triggers and alarms. Without any additional cable, WS136 & WS156 can be easily installed anywhere and control devices via LoRaWAN or Milesight LoRa D2D communication protocol. Besides, it's equipped a user-definable E-ink screen to suit different scenes. WS136 & WS156 can be widely used in smart home, smart office, hotel, school, etc.

1.2 Features

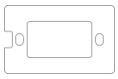
- Equipped with a programmable E-ink screen for flexible display
- Up to 6 scenes settable, each scene can consist of multiple devices
- Easy configuration via NFC
- Standard LoRaWAN® support
- Milesight IoT Cloud compliant
- LoRa D2D control without gateway
- Compact design, easy to install

2. Hardware Introduction

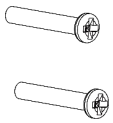
2.1 Packing List



1 ×
WS136 or WS156 Device



1 ×
3M Tape



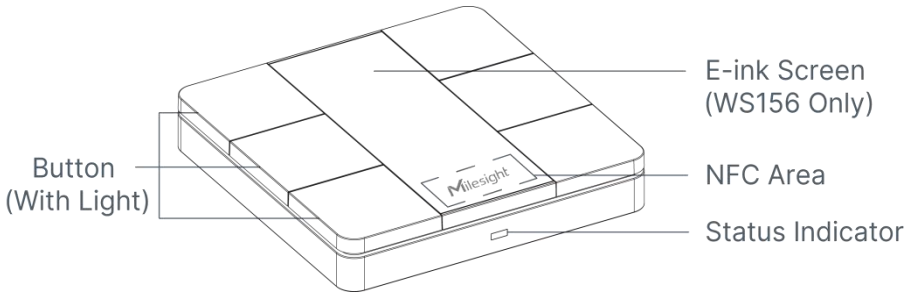
2 ×
Mounting Screws

1 ×
Warranty Card

1 ×
Quick Guide

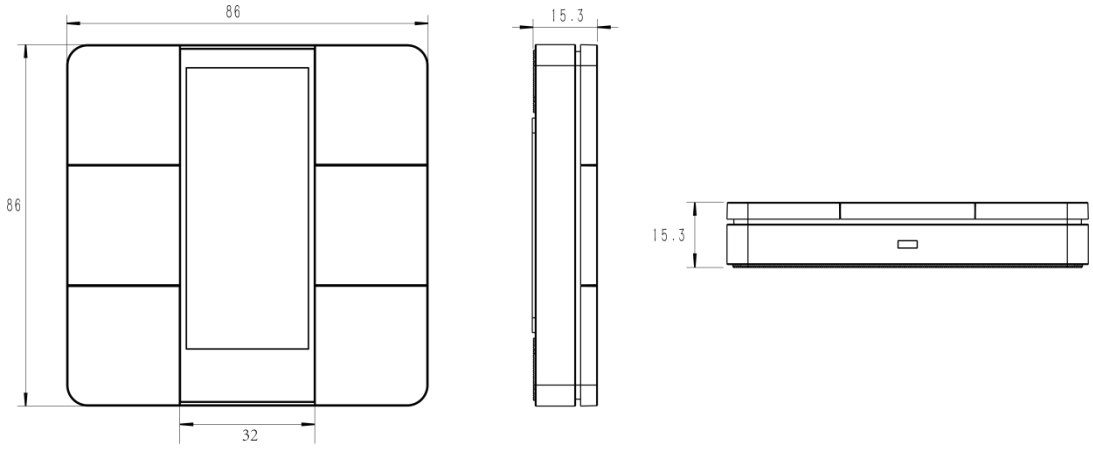
If any of the above items is missing or damaged, please contact your sales representative.

2.2 Hardware Overview



Note: For WS136, the E-ink screen is replaced by PVC sticker and the icons on the sticker supports customization.

2.3 Dimensions (mm)



2.4 LED Patterns

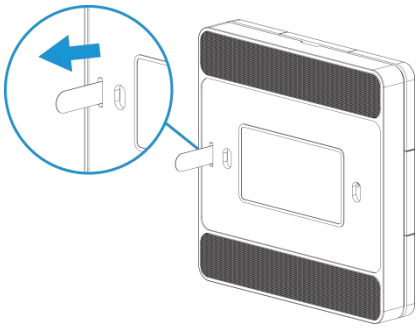
Indicator	Action	Indication
Button Light	Press the button	Always on until the button is being released
Status Indicator	Send join network requests	Blinks as requests
	Joined the network successfully	Blinks twice
	Receive ACK packages from NS	Blinks once

3. Operation Guide

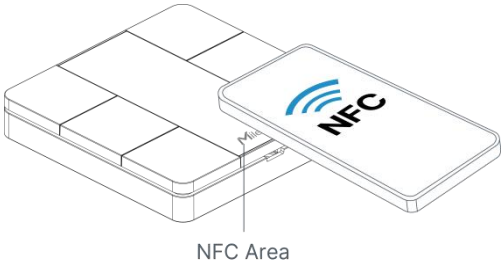
3.1 NFC Configuration

WS136 & WS156 can be configured via NFC-enabled smartphone.

1. Pull out the battery insulating sheet to power on the device.



2. Download and install “Milesight ToolBox” App from Google Play or App Store.
3. Enable NFC on the smartphone and open Milesight ToolBox.
4. Attach the smartphone with NFC area to the device to read device information.



5. Basic information and settings of the device will be shown on ToolBox if it’s recognized successfully. You can read and configure the device by tapping the Read/Write button on the App. In order to protect the security of devices, password validation is required when first configuration. The default password is **123456**.

Note:

1) Ensure the position of smartphone NFC area and it’s recommended to take off phone case.

2) If the smartphone fails to read/write configurations via NFC, move the phone away and back to try again.

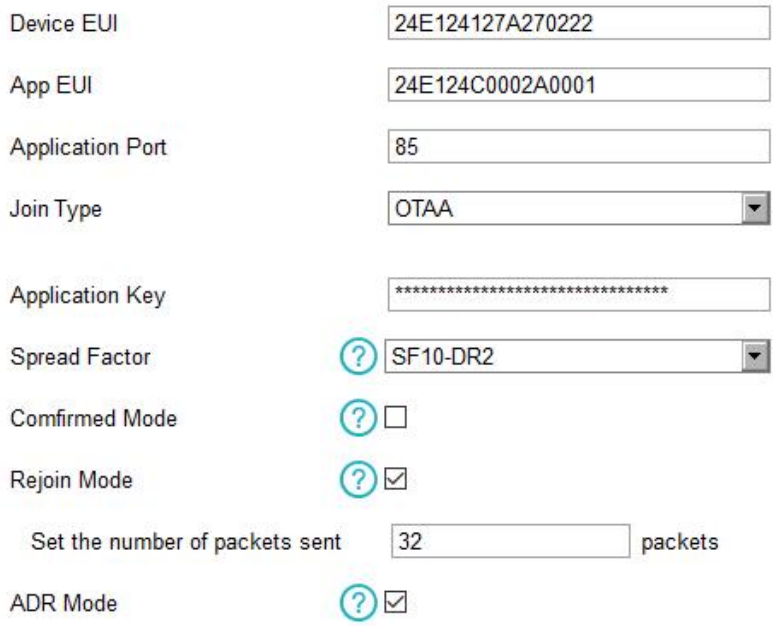
3) WS136 & WS156 can also be configured by ToolBox software via dedicated NFC reader provided by Milesight IoT.

3.2 LoRaWAN Settings

LoRaWAN settings are used for configuring the transmission parameters in LoRaWAN® network.

Basic LoRaWAN Settings:

Go to **Device -> Setting -> LoRaWAN Settings** of ToolBox App to configure join type, App EUI, App Key and other information. You can also keep all settings by default.



Parameters	Description
Device EUI	Unique ID of the device which can also be found on the label.
App EUI	Default App EUI is 24E124C0002A0001.
Application Port	The port is used for sending and receiving data, the default port is 85.
Join Type	OTAA and ABP modes are available.
Application Key	Appkey for OTAA mode, default is 5572404C696E6B4C6F52613230313823.
Device Address	DevAddr for ABP mode, default is the 5th to 12th digits of SN.
Network Session Key	Nwkskey for ABP mode, default is 5572404C696E6B4C6F52613230313823.
Application Session Key	Appskey for ABP mode, default is 5572404C696E6B4C6F52613230313823.
Spread Factor	If ADR is disabled, the device will send data via this spread factor.
Confirmed Mode	If the device does not receive ACK packet from network server, it will resend data once.
Rejoin Mode	The device will send a specific number of LinkCheckReq MAC packets to the network server every 30 mins to validate connectivity; If there is no response, the device will re-join the network.
Set the number of packets sent	When rejoin mode is enabled, set the number of LinkCheckReq packets sent.
ADR Mode	Allow network server to adjust datarate of the device.

RX2 Data Rate	RX2 data rate to receive downlinks or send LoRa D2D commands.
RX2 Frequency/MHz	RX2 frequency to receive downlinks or send LoRa D2D commands.

Note:

1) Please contact sales representative for device EUI list if there are many units.
2) Please contact sales representative if you need random App keys before purchase.
3) Select OTAA mode if you use Milesight IoT Cloud to manage devices.
4) Only OTAA mode supports rejoin mode.

3.3 General Settings

Go to **"Device->Setting->General Settings"** of ToolBox App to change the reporting interval, etc.

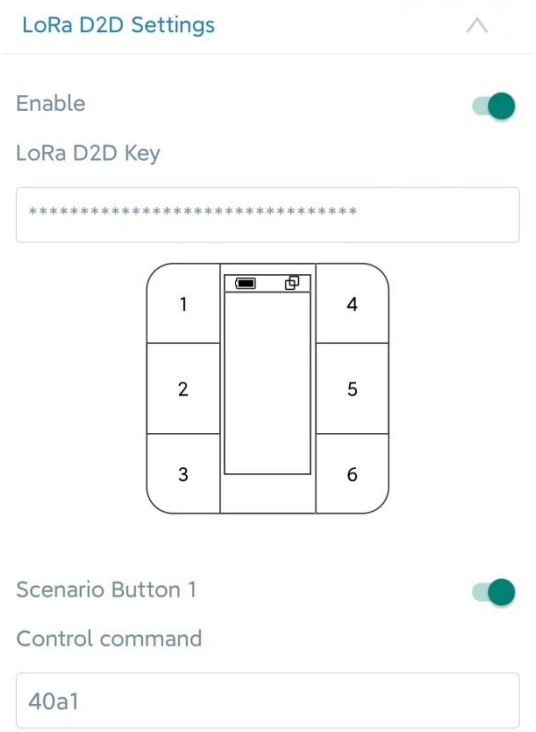
Parameters	Description
Reporting Interval	Reporting interval of battery level to network server. Default: 1080 min
Change Password	Change the password for ToolBox App to write this device.

3.4 LoRa D2D Settings

LoRa D2D protocol is developed by Milesight and used for setting up transmission among Milesight LoRaWAN® devices without gateway. When the LoRa D2D setting is enabled, WS136 & WS156 can work as a LoRa D2D controller for sending control commands to trigger LoRa D2D agent devices.

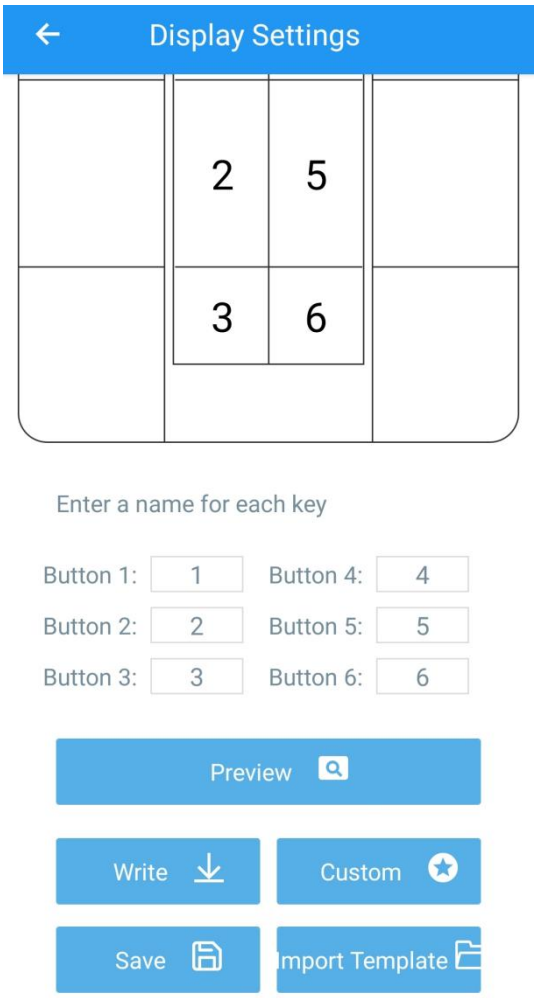
1. Ensure the RX2 datarate and RX2 frequency in LoRaWAN settings are the same as the LoRa D2D agent device.

2. Enable LoRa D2D feature, and define a unique LoRa D2D key that is the same as LoRa D2D agent devices. (Default LoRa D2D Key: 5572404C696E6B4C6F52613230313823)
3. Enable one of WS136 & WS156 button mode and configure a 2-byte hexadecimal command (This command is pre-defined in LoRa D2D agent device). When you press this button, WS136 & WS156 will send the control command to corresponding LoRa D2D agent devices.
Note: When this feature is enabled, the control command from this button will not send to LoRaWAN® gateway.



3.5 E-ink Screen Display Settings

WS156 supports e-ink screen display content programming according to user requirements.
1. Every button shows 1 to 6 numbers by default. Users can modify these numbers to any characters or click “Custom” to import pictures. When importing pictures, the recommended resolution is 128*270.
2. After modifying or importing, click “Preview” to check the display result on the upper picture.
3. Click “Write”, then attach the smartphone with NFC area to the device to complete the screen programming.
4. Click “Save” to save the current display as a template in ToolBox App. You can import this template to another device by clicking “Import Template”.



Note:

1) WS156 e-ink screen will show below fixed icons:

Icon	Description
	Battery level
	The device joins the network.
	The device fails to join the network.

2) WS156 do a full-screen refresh once a week in order to remove ghosting.

3.6 Maintenance

3.6.1 Upgrade

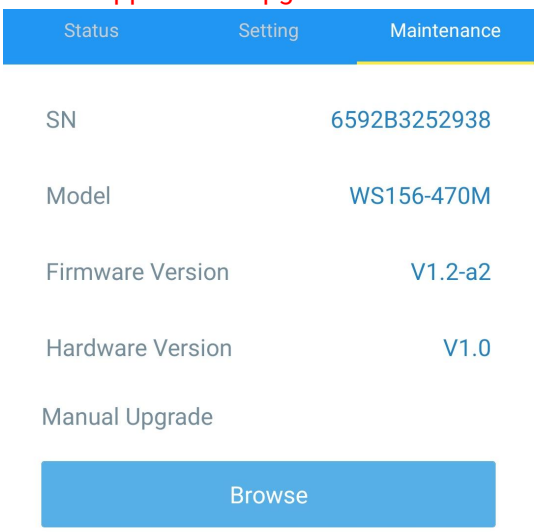
1. Download firmware from Milesight website to your smartphone.

2. Open ToolBox App and click “Browse” to import firmware and upgrade the device.

Note:

1) Operation on ToolBox is not supported during the upgrade.

2) Only Android version ToolBox supports the upgrade feature.

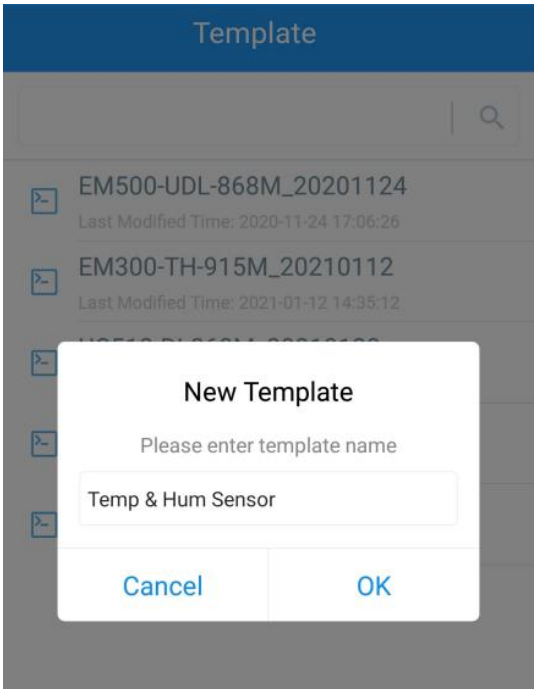


3.6.2 Backup

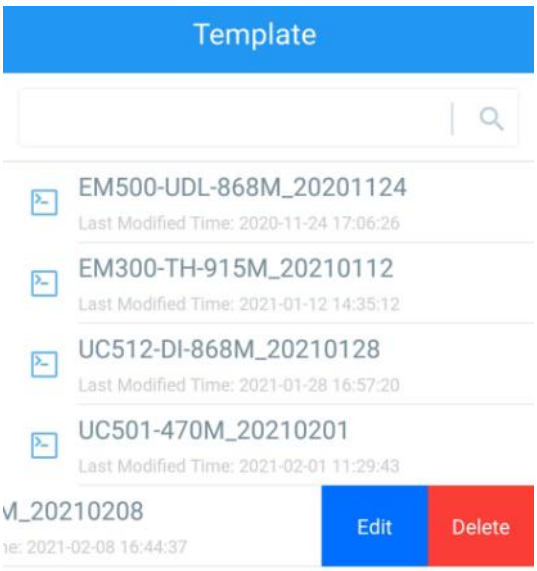
WS136 & WS156 supports configuration backup for easy and quick device configuration in bulk. Backup is allowed only for devices with the same model and LoRa frequency band.

1. Go to "Template" page on the App and save current settings as a template. You can also edit the template file.

2. Select one template file that saved in the smartphone and click "Write", then attach it to another device to write configuration.

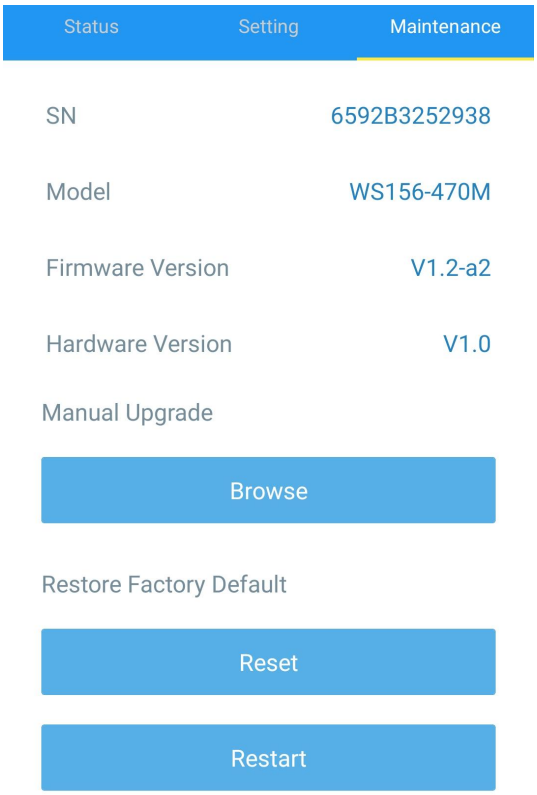


Note: Slide the template item to the left to edit or delete the template. Click the template to edit the configurations.



3.6.3 Reboot and Reset

Via Hardware: Hold on the button inside the device for 3s to reboot, 10s to reset.
Via ToolBox App: Go to "Device -> Maintenance" to tap "Restart" or "Reset", then attach smartphone with NFC area to the device to complete reboot or reset.

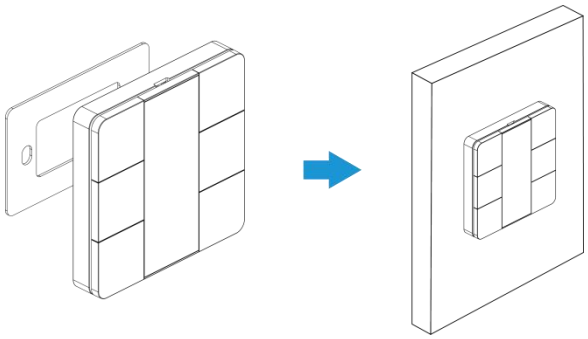


4. Installation

WS136 & WS156 can be placed on the desktop directly. If it needs to be fixed, please try below installation methods.

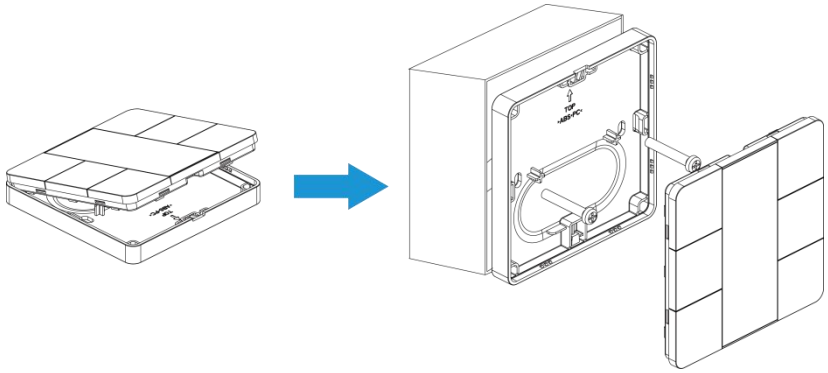
Fixed by 3M Tapes:

Paste 3M tape to the back of the panel, then tear the other side and place it on a flat surface. Please note the screen direction when installing.



Fixed by 86 Box:

Remove the back cover of the panel, screw the back cover to the 86 box with two M4 mounting screws, then install back the panel. Please note the screen direction when installing.



5. Device Payload

All data are based on the following format(HEX), the Data field should follow little -endian:

Channel1	Type1	Data1	Channel2	Type2	Data2	Channel 3	...
1 Byte	1 Byte	N Bytes	1 Byte	1 Byte	M Bytes	1 Byte	...

For decoder examples you can find them at https://github.com/Milesight-IoT/SensorDecoders.

5.1 Basic Information

WS136 & WS156 report basic information of panel whenever joining the network.

Channel	Type	Description
ff	01(Protocol Version)	01=> V1
	09 (Hardware Version)	01 40 => V1.4
	0a (Software Version)	01 14 => V1.14
	0b (Power On)	Device is on
	16 (Device SN)	16 digits

Example:

ff0bff ff0101 ff166592b32851010013 ff090100 ff0a0102					
Channel	**Type**	**Value**	**Channel**	**Type**	**Value**
ff	0b (Power On)	ff (Reserved)	ff	01 (Protocol Version)	01 (V1)
Channel	**Type**	**Value**	**Channel**	**Type**	**Value**
ff	16(Device SN)	6592b328510 10013	ff	09 (Hardware version)	0100 (V1.0)
Channel	**Type**	**Value**			
ff	0a (Software version)	0102 (V1.2)			

5.2 Button Message

WS136 & WS156 reports battery level according to reporting interval (1080 mins by default) and button message when button is pressed.

Channel	Type	Description
01	75(Battery Level)	UINT8, Unit: %
ff	34(Button Message)	Byte 1: Button Number Byte 2-3: Button LoRa D2D Command, the command is 01-06 by default.

Example:

01 75 64		
Channel	**Type**	**Value**
01	75 (Battery)	64 => 100%

ff 34 01 18 00		
Channel	**Type**	**Value**
ff	34(Button Message)	01 => Button 1 18 00=>This button LoRa D2D command is 0018

Note: if you press one button more than 6 times in a row, the 7th and follow-up messages will delay delivery.

5.3 Downlink Commands

WS136 & WS156 supports downlink commands to configure the device. Application port is 85 by default.

Note: Since the device type is class A, it only receives downlinks when the device upload battery level or button message to network server.

Channel	Type	Description
ff	03 (Set Reporting Interval)	2 Bytes, unit: s
	35 (Set LoRa D2D Key)	8 Bytes, other bytes are fixed as 0.
	36 (Set LoRa D2D Spreading Factor and Frequency)	Byte 1: Spreading factor Byte 2-3: Frequency, unit: Hz

Example:

1. Set reporting interval as 20 minutes.

ff03b004		
Channel	**Type**	**Value**
ff	03 (Set Reporting Interval)	b0 04=>04 b0=1200s =20 minutes

2. Set LoRa D2D key as 12345678123456780000000000000000.

ff351234567812345678		
Channel	**Type**	**Value**
ff	35 (Set LoRa D2D Key)	12 34 56 78 12 34 56 78

3. Set LoRa D2D spreading factor as DR5(SF7) and frequency as 505.7 MHz.

ff3605a05e241e		
Channel	**Type**	**Value**
ff	36 (Set LoRa D2D Spreading Factor and Frequency)	Byte 1: 05 (DR5) Byte 2: a0 5e 24 1e => 1e 24 5e a0=505700000 Hz (505.7 MHz)

-END-