Manuals+ — User Manuals Simplified.

Milesight WS558 Smart Light Controller User Guide

Contents

Milesight WS558 Smart Light Controller

Safety Precautions

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

- The device must not be modified in any way.
- To protect the security of the device, please change device the password when first configuration. The default password is 123456.
- The installation and maintenance must be conducted by a qualified service person and should strictly comply with the electrical safety regulations of the local region.
- Ensure power is off during the installation.
- For the LN model, do not reverse the Live Wire (L) and Neutral (N) wire.
- To get the best data transmission, ensure the device is within the signal range of the LoRaWAN® gateway and keep it away from metal objects and obstacles.
- Do not overload the maximum capacity to avoid damage to the device.
- The device is intended only for indoor use. Do not place the device where the temperature is below/above the operating range.
- Do not place the device close to objects with naked flames, heat source (oven or sunlight), cold source, liquid and extreme temperature changes.
- Keep the device away from water to prevent electric shock.
- Use the device only in a clean environment. Dusty or dirty environments may prevent the proper operation of this device.
- Do not drop the device or subject it to physical shocks and strong vibration.

Product Introduction

Overview
WS558 is a LoRaWAN® Smart Light Controller for the monitoring and control of lights. With 2 circuit types and 8 switches, WS558 can fit in different rooms without the need for re-wirings and reduce the renovation costs. Besides LoRaWAN®, WS558 can be controlled whithout a gateway via Milesight D2D communication protocol, which sets up a connection quickly. WS558 can be widely used for wireless control of indoor lights, fans, heaters, machines, etc. Power data and switch status are transmitted via LoRaWAN® protocol, and LoRaWAN® technology enables encrypted radio transmissions over long distances while consuming very little power. Also, users can check visualized data through Milesight IoT Cloud or the user's own Application Server.

Features

- LN type or switch type optional, controls up to 8 circuits of lights, adopts different indoor wiring
- Support local switch button control, able to test the lamp status without networking
- Collect data on current, voltage, electrical consumption
- Up to 15 km communication range
- Easy configuration via NFC
- Standard LoRaWAN® technology
- Compatible with Milesight IoT Cloud and Milesight ToolBox
- Support Milesight D2D protocol to enable ultra-low latency control without gateway
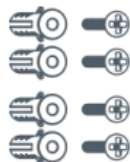- Support multicast for control in bulk

Hardware Introduction

Packing List

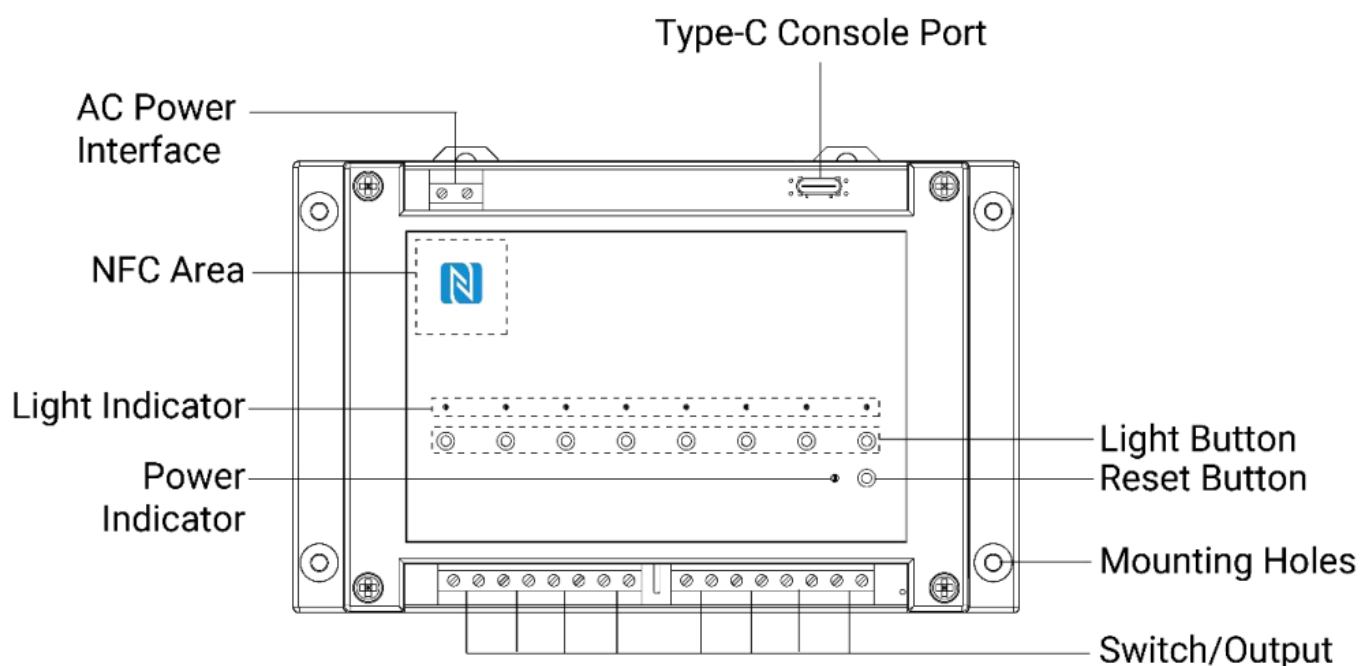|			
1 ×	4 ×	1 ×	1 ×
WS558 Controller	Wall Mounting Kits	Quick Guide	Warranty Card

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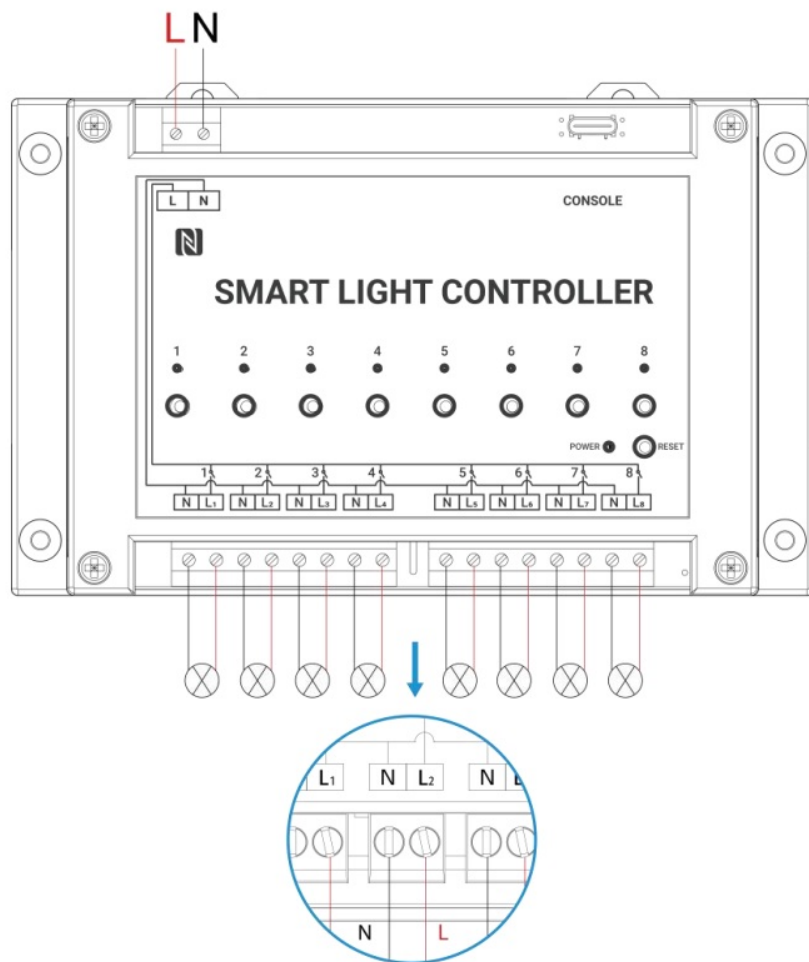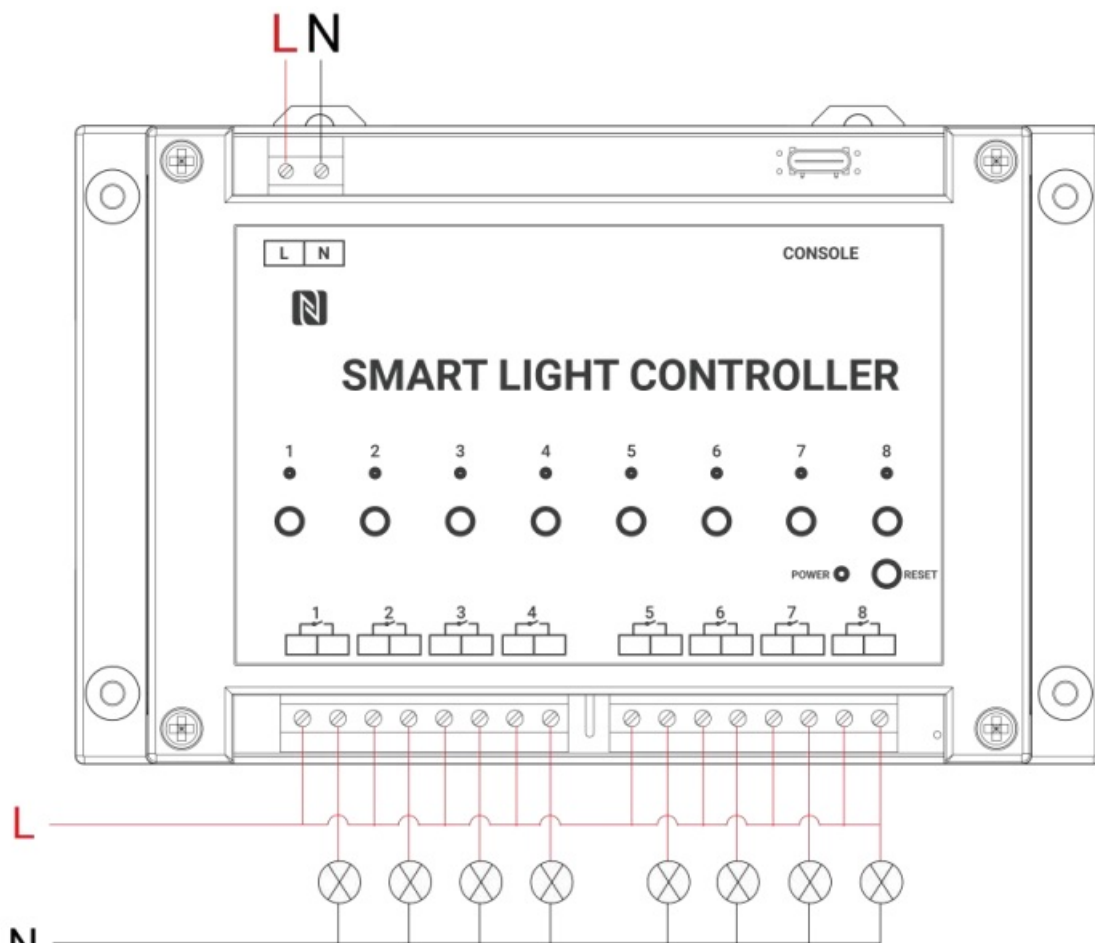
Hardware Overview

All circuits/switches are open with their LED indicator off by default. You can press the button beneath their LED indicator to close a circuit/switch, and the LED indicator will be lit on as the lamp connected to this circuit/switch.
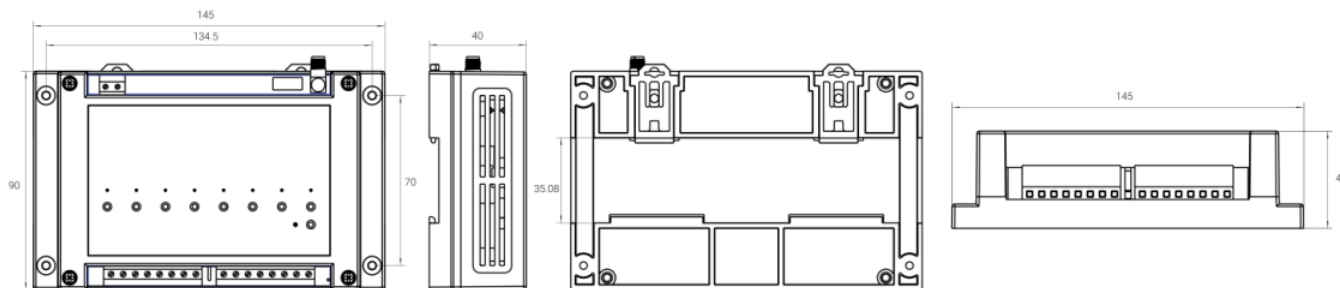
Wiring Diagram

LN Model:

**Switch Model:**

Dimensions (mm)

Operation Guide

ToolBox Login
WS558 can be configured via NFC or Type-C port. Please select one of them to complete the configuration.

NFC Configuration

1. Download and install "Milesight ToolBox" App from Google Play or Apple App Store.
2. Enable NFC on the smartphone and launch Milesight ToolBox.
3. Attach the smartphone with the NFC area to the device to read device information. Basic information and settings of the device will be shown on ToolBox App if it's recognized successfully. You can read and configure the device by tapping the Read/Write device on the App. To protect the security of the device, password validation is required when first configuration. The default password is **123456.**
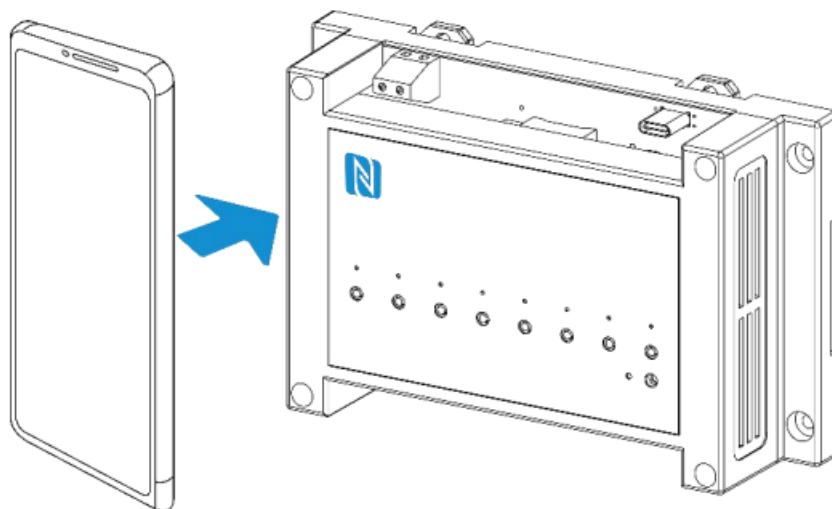
Note:

1. Check the NFC area of your smartphone and it's recommended to remove the phone case.
2. If the smartphone fails to read/write configurations via NFC, move the phone away and back to try again.
3. WS558 can also be configured on ToolBox via a dedicated NFC reader provided by Milesight IoT.

USB Configuration

1. Download ToolBox software from www.milesight-iot.com.
2. Connect the device to a computer via the Type-C port. Please note that do not touch the power interface, switches and other wirings to avoid electric shock.
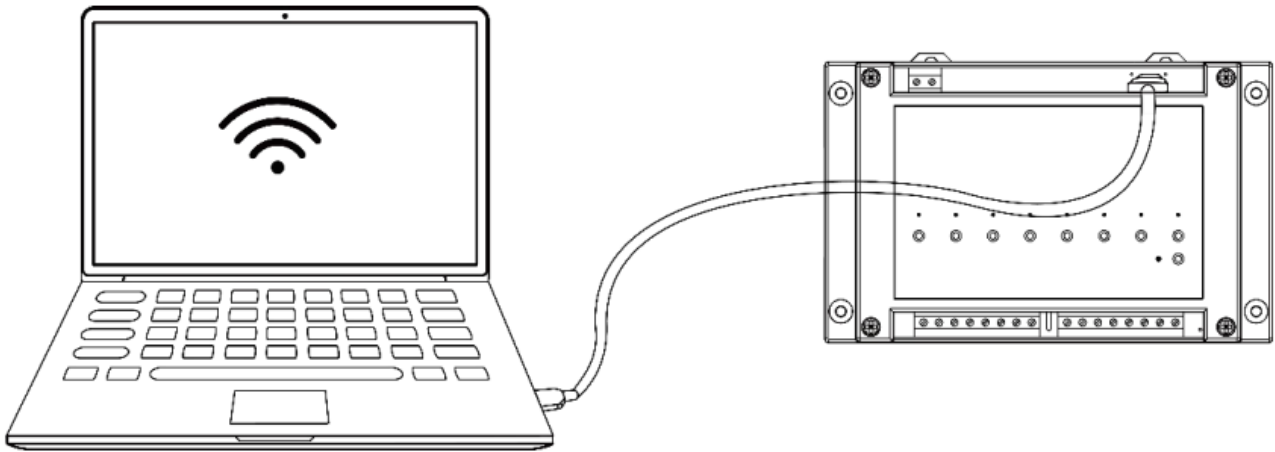
3. Open the ToolBox and select type as "General", then click password to log into the **ToolBox**.(Default password: **123456**)

4. After logging into the ToolBox, you can check device status and change device

Model:	WS558-915M
Serial Number:	6756C22186300001
PN:	LN
Device EUI:	24e124756c221863
Firmware Version:	01.01-a3
Hardware Version:	2.0
Device Status:	On
Join Status:	De-Activate
RSSI/SNR:	0/0
Voltage:	222V
Total Current:	5mA
Power Consumption:	0kWh
Channel Mask:	0000000000000000ff00
Uplink Frame-counter:	0
Downlink Frame-counter:	0

[Reset]

LoRaWAN Settings
LoRaWAN settings are used to configure the data transmission parameters in the LoRaWAN® network.

Basic Settings
WS558 supports basic configurations like join type, App EUI, App Key and other information. You can also keep all settings by default.

Device EUI	24E124756C221863
App EUI	24E124C0002A0001
Application Port	85
Join Type	OTAA
Application Key	********************************
RX2 Date Rate	DR8 (SF12, 500k)
RX2 Frequency	923300000
Spread Factor	(?) SF8-DR2
Confirmed Mode	(?) ☐
Rejoin Mode	(?) ☑
Set the number of packets sent	32 packets
ADR Mode	(?) ☑
TXPower	TXPower0-22 dBm

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 used for sending and receiving data, 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.
RX2 Data Rate	RX2 data rate to receive downlinks or Milesight D2D commands.
RX2 Frequency/MHz	RX2 frequency to receive downlinks or Milesight D2D commands.
Spread Factor	If ADR is disabled, the device will send data via this spread factor.

Confirmed Mode	If the device does not receive the ACK packet from network server, it will resend data once.
Rejoin Mode	Reporting interval ≤ 30 mins: 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. Reporting interval > 30 mins: the device will send a specific number of LinkCheckReq MAC packets to the network server every reporting interval to validate connectivity; If there is no response, the device will re-join the network.
ADR Mode	Allow the network server to adjust the data rate of the device.
Tx Power	Transmit power of the device.

Note:

1. Please contact your sales representative for device EUI list if there are many units.
2. Please contact your 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.

Frequency Settings
Select supported frequency and channels to send uplinks. Make sure the channels match the LoRaWAN® gateway.

If the device frequency is one of CN470/AU915/US915, you can enter the index of the channel that you want to enable in the input box, making them separated by commas.

Examples:

- 1, 40: Enabling Channel 1 and Channel 40
- 1-40: Enabling Channel 1 to Channel 40
- 1-40, 60: Enabling Channel 1 to Channel 40 and Channel 60
- **All**: Enabling all channels
- **Null**: Indicates that all channels are disabled

Channel Index	Frequency/MHz	Channel Spacing/MHz	BW/kHz
0 - 15	915.2 - 918.2	0.2	125
16 - 31	918.4 - 921.4	0.2	125
32 - 47	921.6 - 924.6	0.2	125
48 - 63	924.8 - 927.8	0.2	125
64 - 71	915.9 - 927.1	1.6	500

Note

- For -868M model, the default frequency is EU868;
- For -915M model, the default frequency is AU915.

Multicast Settings
WS558 supports setting up several multicast groups to receive multicast commands from network servers and

users can use this feature to control devices in bulks.

1. Enable Multicast Group on WS558, set a unique multicast address and keys to distinguish other groups. You can also keep these settings by default.

Multicast Group 1 ☑

    Multicast Aaddress (?) `11111111`

    Multicast McAppSKey `********************************`

    Multicast McNetSKey `********************************`

Multicast Group 2 ☐

Multicast Group 3 ☐

Multicast Group 4 ☐

Parameters	Description
Multicast Address	Unique 8-digit address to distinguish different multicast groups.
	32-digit key. Default values:
Multicast McAppSkey	Multicast Group 1: 5572404C696E6B4C6F52613230313823 Multicast Group 2: 5572404C696E6B4C6F52613230313824 Multicast Group 3: 5572404C696E6B4C6F52613230313825
	Multicast Group 4: 5572404C696E6B4C6F52613230313826
	32-digit key. Default values:
Multicast McNetSkey	Multicast Group 1: 5572404C696E6B4C6F52613230313823 Multicast Group 2: 5572404C696E6B4C6F52613230313824 Multicast Group 3: 5572404C696E6B4C6F52613230313825
	Multicast Group 4: 5572404C696E6B4C6F52613230313826

2. Add a multicast group on the network server. Take Milesight UG6x gateway as example, go to **"Network Server -> Multicast Groups"**, click **"Add"** to add a multicast group.

Status	General	Applications	Profiles	Device	Multicast Groups	Gateway Fleet	Packets
Packet Forwarder		Multicast Groups					
Network Server	Add					Search 🔍	
Network ▶		Multicast Address	Group Name	Number of Devices		Operation	
			No matching records found				

Fill in the multicast group information the same as **WS558** settings, and select the devices which you need to control, then click **"Save".**

Group Name	WS558 Control
Multicast Address	11111111
Multicast Network Session Key	5572404C696E6B4C6F526132
Multicast Application Session Key	5572404C696E6B4C6F526132
Class Type	Class C
Datarate	DR0 (SF12, 125 kHz)
Frequency	505300000 Hz
Frame-counter	0

Selected Devices

WS558 x

General	Applications	Profiles	Device	Multicast Groups	Gateway Fleet	Packets

| Multicast Groups

Add   Search

Multicast Address	Group Name	Number of Devices	Operation
11111111	WS558 Control	2	✎ ✕

3. Go to **"Network Server -> Packets"**, select the multicast group and fill in the downlink command, click **"Send"**. The network server will broadcast the command to devices which belong to this multicast group.

Note: ensure all devices' application ports are the same.

Status	General	Applications	Profiles	Device	Multicast Groups	Gateway Fleet	Packets

| Send Data To Device

Device EUI	Type	Payload	Port	Confirmed	
0000000000000000	ASCII		85	☐	Send

| Send Data to Multicast Group

Multicast Group	Type	Payload	Port	
WS558 Control	hex	ff31ffff	85	Send

send success

Packet Forwarder · Network Server · Network ▸ · System ▸ · Maintenance ▸ · APP ▸

General Settings

Parameters	Description									
Reporting Interval	The interval of reporting switch status and electrical parameters. Default: 20 mins, Range: 1 – 1080 mins									
The device returns to the power supply state	If the device loses power and returns to power supply, all switches or outputs status will change according to this parameter.									
Change Password	Change the configuration.	password	of	the	device	for	ToolBox	App	or	software

Milesight D2D Settings

Milesight D2D protocol is developed by Milesight and used for setting up transmission among Milesight devices without a gateway. When the Milesight D2D setting is enabled, WS558 can work as Milesight D2D agent device to receive commands from Milesight D2D controller devices.

1. Ensure the RX2 datarate and RX2 frequency in LoRaWAN settings are the same as the Milesight D2D controller device.
2. Enable the Milesight D2D feature, and define a unique Milesight D2D key to be the same as the setting in Milesight D2D controller device. (Default Milesight D2D Key: 5572404C696E 6B4C6F52613230313823)
3. Define a 2-byte hexadecimal control command (0x0000 to 0xffff) and command action. For example, you can configure a control command 0001 to inverse Output channel 2 as below. WS558 supports at most 16 control commands.

4. These control commands can be configured in Milesight D2D controller device. When Milesight D2D controller device is triggered, it will send the pre-defined control command to control the circuits/switches of **WS558** to on, off or inverse status.

Maintenance

Upgrade

ToolBox Software:

1. Download firmware from www.milesight-iot.com to your PC.
2. Go to **"Maintenance -> Upgrade"** of ToolBox software, click "**Browse**" to import firmware and upgrade the device. You can also click "**Up to Date**" to search for the latest firmware of the device and upgrade.

ToolBox App:

1. Download firmware from **www.milesight-iot.com** 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 the Android version ToolBox supports the upgrade feature.

Backup
WS558 supports configuration backup for easy and quick device configuration in bulk. Backup is allowed only for devices with the same model and LoRaWAN® frequency band.

ToolBox Software:

1. Go to "**Maintenance -> Backup and Reset"** of ToolBox software, click **"Export"** to backup the device configuration.
2. Click "**Browse"** to import the backup file, then click "Import" to load the configuration.
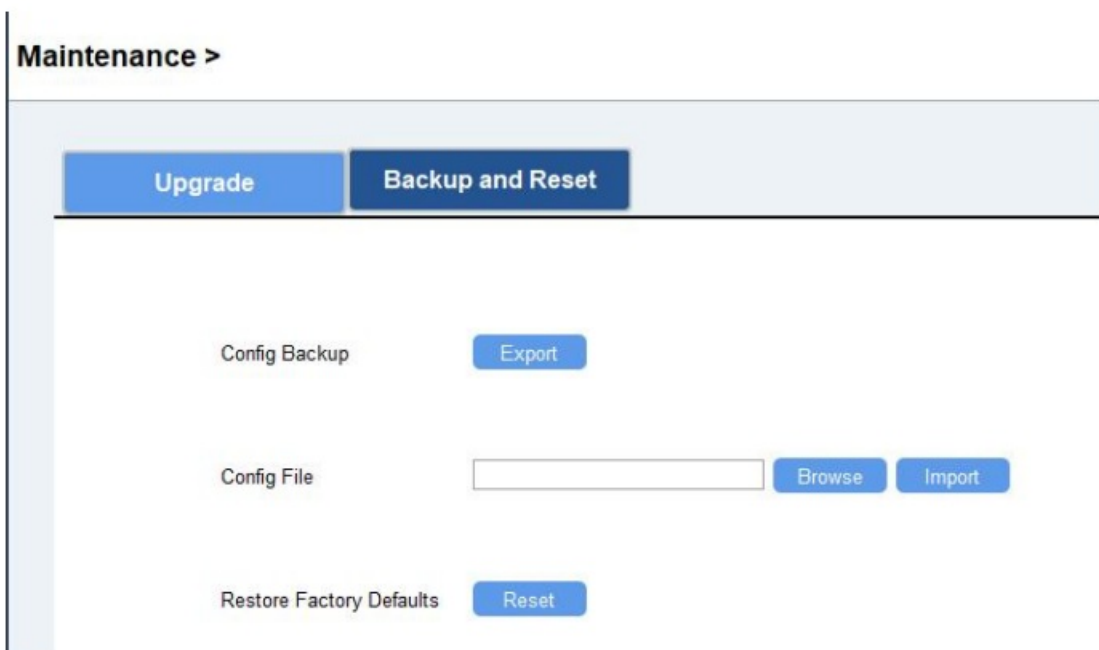
ToolBox App:

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 saved in the smartphone and click "**Write**", then attach it to another device to write configuration.
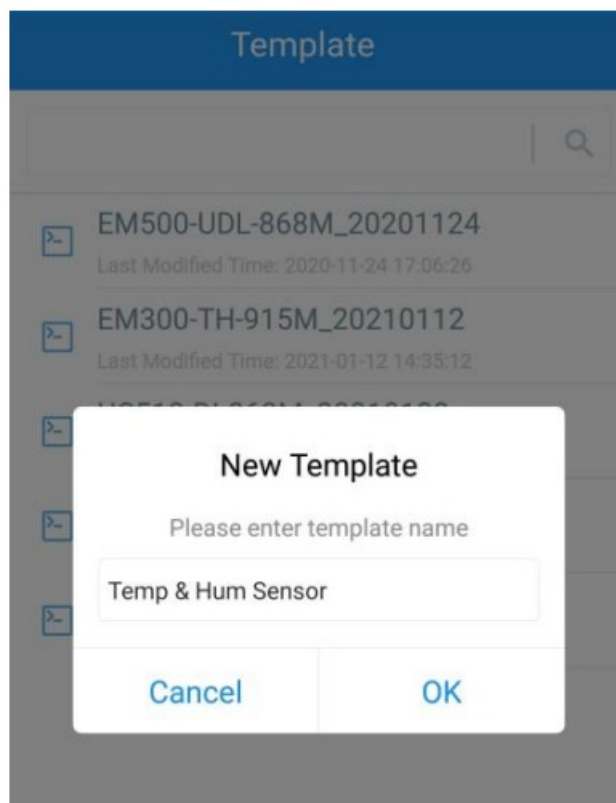
Note: Slide the template item to the left to edit or delete it. Click the template to edit the configurations.

Reset to Factory Default

Please select one of the following methods to reset the device:

Via ToolBox Software: Go to "Maintenance -> Backup and Reset" of ToolBox software, click "Reset" to complete.

Via ToolBox App: Go to "Device -> Maintenance" to tap "Reset", then attach smartphone with NFC area to the device to complete.

Installation

Wall Mounting

Fix the wall plugs into the wall, then fix the device to the wall plugs with screws.
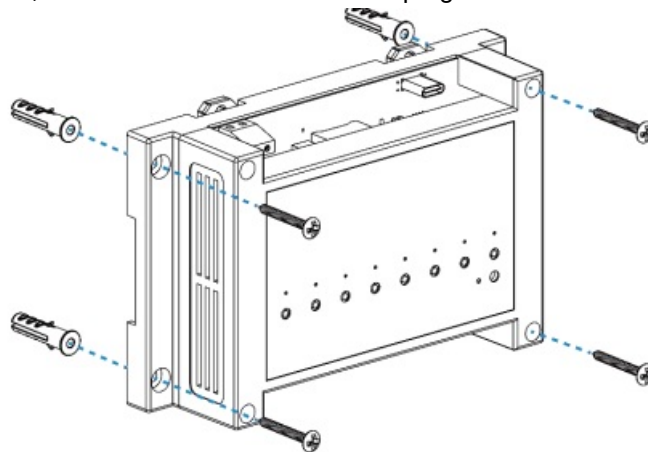
DIN Rail Mounting

Fix the device to DIN rail via the groove on the back of the device.
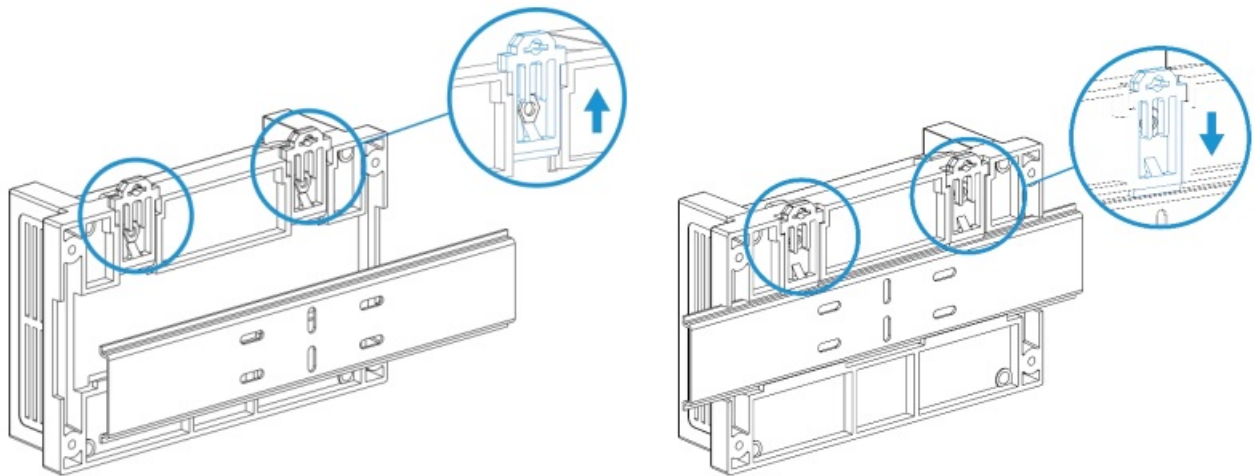
Device Payload

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 at **https://github.com/Milesight-IoT/SensorDecoders.**

Basic Information
WS558 reports basic information of the device whenever it joins 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
	0f (Device Type)	00: Class A, 01: Class B, 02: Class C
	16 (Device SN)	16 digits
	26 (Power Consumption)	00-disabled, 01-enabled

Example:

ff0bff ff0101 ff166756c22186300001 ff090200 ff0a0101 ff0f02 ff2601

Channel	Type	Value	Channel	Type	Value
ff	0b (Power On)	ff (Reserved)	ff	01 (Protocol Version)	01(V1.0)

Channel	Type	Value	Channel	Type	Value
ff	16(Device SN)	6756c22186 300001	ff	09 (Hardware Version)	0200 (V2.0)

Channel	Type	Value	Channel	Type	Value
ff	0a (Software Version)	0101 (V1.1)	ff	0f (Device Type)	02=>Clas s C
ff	26 (Power Consumption)	01=>Enabled			

Sensor Data

WS558 reports switch status and electrical data according to reporting interval (20 mins by default). For Switch model, it only uploads switch status.

Channel	Type	Description
03	74 (Voltage)	UINT16, Unit: V Resolution: 0.1V
04	80 (Active Power)	UINT32, Unit: W
05	81 (Power Factor)	UINT8, Unit: %
06	83 (Power Consumption)	UINT32, Unit: Wh
07	c9 (Total Current)	UINT16, Unit: mA
08	31 (Switch Status)	**Byte 1:** 00 **Byte 2:** indicate every switch status per bit, 0=close, 1=open

Example:

1. Periodic package:

08310001 058164 07c90200 0374b208 068301000000 048001000000					
Channel	**Type**	**Value**	**Channel**	**Type**	**Value**
08	31 (Switch Status)	Byte 1: 00 Byte 2: 01= 00000001 => L1 open and others close	05	81 (Power Factor)	64=> 100%
Channel	**Type**	**Value**	**Channel**	**Type**	**Value**
07	c9 (Current)	02 00=>00 02=2mA	03	74(Voltage)	b2 08=>08 b2=2226 Voltage=2226 *0.1=222.6V
Channel	**Type**	**Value**	**Channel**	**Type**	**Value**
06	83(Power Consumption)	01 00 00 00=>00 00 00 01=1 Wh=0.001 kWh	04	80 (Active Power)	01 00 00 00=>00 00 00 01=1 W

2. When any switch changes status:

08310060		
Channel	**Type**	**Value**
08	31 (Switch Status)	Byte 1: 00 Byte 2: 60= 0110 0000 => L6, L7 open and others close

3. When LN model device detects the current over 13A for more than 30s, all switches will close and upload alarm package:

07c9413f 08310000					
Channel	**Type**	**Value**	**Channel**	**Type**	**Value**
07	c9 (Current)	41 3f=>3f 41=16193 mA=16.193 A	08	31 (Switch Status)	Byte 1: 00 Byte 2: 00 =>All close

Downlink Commands
WS558 supports downlink commands to configure the device. The application port is **85** by default.

Channel	Type	Description
08	–	**Byte 1:** every switch control status per bit, 0=not allow control, 1=allow control **Byte 2:** every switch status per bit, 0=close, 1=open
ff	03 (Set Reporting Interval)	2 Bytes, unit: s
	10 (Reboot Device)	ff
	32 (Add Delay Task)	**Byte 1:** 00 **Byte 2-3:** delay time, unit: s **Byte 4:** every switch control status per bit, 0=not allow control, 1=allow control **Byte 5:** every switch status per bit, 0=close, 1=open Note: WS558 supports adding only one task. Later command will cover previous command.
	23 (Delete Delay Task)	00 ff
	26 (Power Consumption)	00-disable, 01-enable

	27 (Reset Power Consumption)	ff
	28 (Enquire Electrical Status)	ff

Example:

1. Close L1 and open **L6.**

082120		
Channel	**Type**	**Command**
08	–	Byte 1: 21=0010 0001 =>L1 and L6 allow control Byte 2: 20 = 0010 0000 => L1 close, L6 open

2. Close all switches.

08ff00		
Channel	**Type**	**Command**
08	–	Byte 1: ff=1111 1111 =>All switches allow control Byte 2: 00 = 0000 0000 =>All switches close

3. Set reporting interval as 20 minutes.

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

4. Add a delay task: close L6 after 1minute

ff32003c002000		
Channel	**Type**	**Value**
ff	32 (Add Delay Task)	Byte 1:00 Byte 2-3: 3c 00=>00 3c=60s=1min Byte 4: 20=>Bit6=1=>Control L6 Byte 5: 00=>Bit6=0=>L6 close

5. Delete the delay task

ff2300ff		
Channel	**Type**	**Value**
ff	23(Delete Delay Task)	00ff

6. Disable the collection and upload of power consumption.

Channel	Type	Value
ff	26 (Power Consumption)	00 = disable

7. Reset power consumption

ff27ff		
Channel	**Type**	**Value**
ff	27(Reset Power Consumption)	ff (Reserved)

Declaration of Conformity

WS558 is in conformity with the essential requirements and other relevant provisions of the CE, FCC, and RoHS.

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
July 20, 2022	V 2.0	Initial version

Documents / Resources

Smart Light Controller Featuring LoRaWAN® WS558 User Guide	**Milesight WS558 Smart Light Controller** [pdf] User Guide WS558, Smart Light Controller, WS558 Smart Light Controller
QUICK START GUIDE	**Milesight WS558 Smart Light Controller** [pdf] User Guide 2AYHY-WS558, 2AYHYWS558, WS558, Smart Light Controller, WS558 Smart Light Controller, Light Controller, Controller

References

- M **Milesight IoT - LoRaWAN, 5G & AIoT**
- O **GitHub - Milesight-IoT/SensorDecoders**
- M **Download Center | Milesight - AIoT Solution Provider**