

Agricultural Monitoring Starter Kit

Quick Guide

CONTENTS

Welcome.....	1
System Topology.....	1
Product List.....	1
Hardware Installation	3
UG85 Installation	3
SIM Card Installation	3
Antenna Installation	3
Ethernet Connection	3
UC11-N1 & UC11-T1 Installation.....	4
UC11-N1 Wiring.....	4
T1 Mounting.....	4
N1 Mounting	4
Turn ON/OFF N1&T1	5
Sensor Installation	5
Soil Temp & Moisture Sensor.....	5
Soil NPK Sensor	6
Light Sensor	6
Device Configuration.....	7

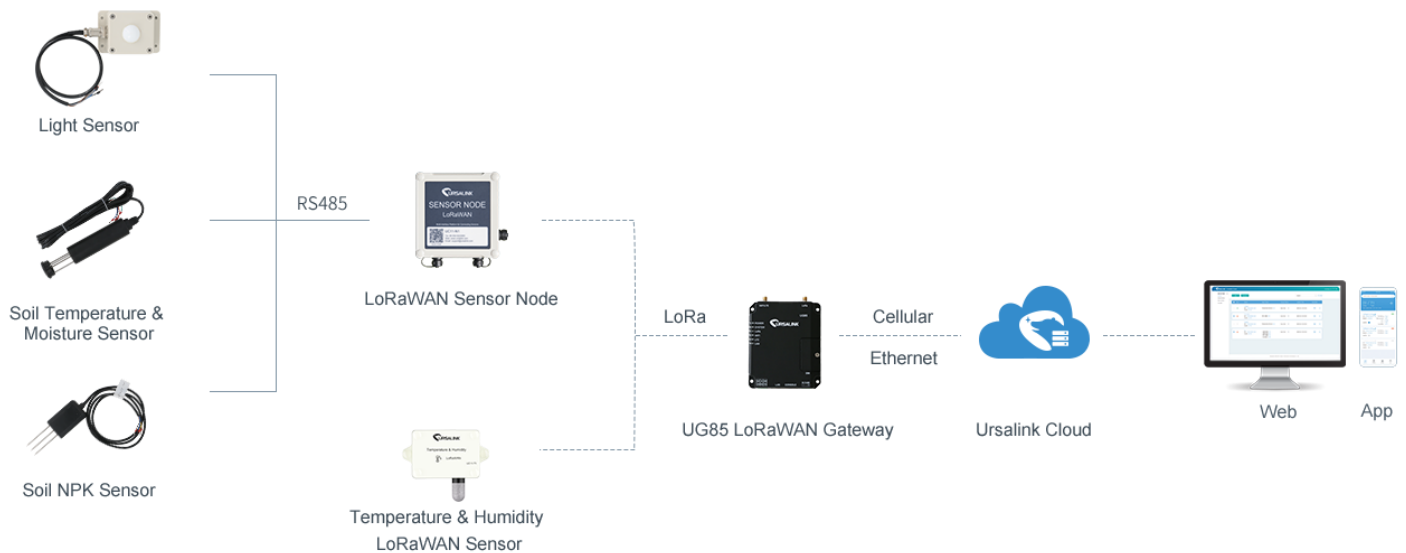
UC11-N1 Configuration.....	7
UC11-N1 Default Setting.....	10
Gateway Configuration	10
Connect to Laptop	10
Network Access	12
Network Server Configuration.....	14
Ursalink Cloud Configuration	15
Appendix.....	18
Environmental Requirements.....	18
Related Information	20

Welcome

Thank you for choosing Ursalink LoRaWAN Agricultural Monitoring Node-to-App Starter Kit. This user guide will show you all the functions and features of the product. The kit is designed for agricultural applications. The product should be used under the guidance of this user guide, referring to parameters and technical specifications. This kit can offer LoRaWAN connectivity for remote access and easy management of sensors.

We bear no liability for property loss or physical injury arising from abnormal or incorrect usage of this product.

System Topology



Product List

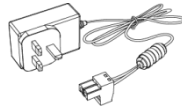
The kit, capable of data collection in the agricultural industry, contains a variety of sensors to measure light, NPK (nitrogen, phosphorus, and potassium), temperature & moisture in soil, and ambient temperature & humidity. Working together with LoRaWAN gateway, it can help users to collect data and monitor real-time environment change remotely as well as check visualized data on Ursalink Cloud anywhere and anytime. Please note: third-party LoRaWAN sensors can be added based on the interface.



1 × UG85



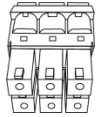
1 × Ethernet Cable



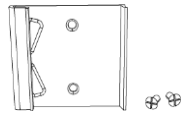
1 × Power Adapter



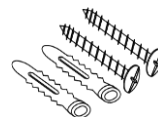
1 × Stubby LoRa Antenna



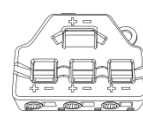
1 × 6-Pin Pluggable
Terminal



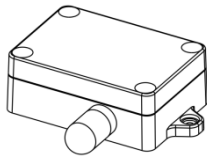
1 × DIN Rail Kit



4 × Setscrews



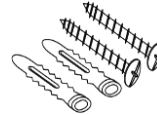
2 x Wire Connector



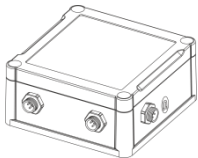
1 × UC11-T1



1 × Magnet



4 x Screw Set



1 × UC11-N1



2 × Data Cable



1 × USB Cable



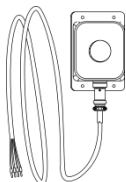
1 × Magnet



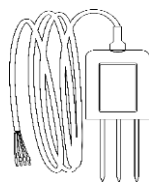
4 x Screw Set

(for connection)

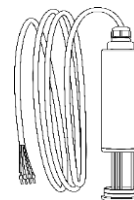
(for configuration)



1 × Light Sensor



1 x Soil NPK Sensor



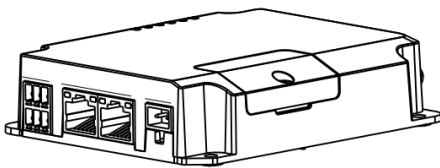
1 x Soil Temp & Moisture Sensor

Hardware Installation

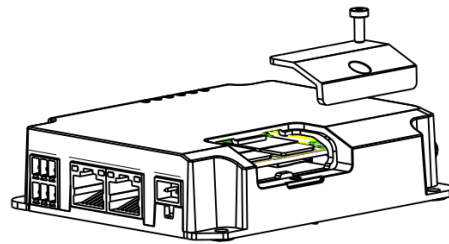
UG85 Installation

SIM Card Installation

A. Unscrew the cover of the SIM card and take it off.



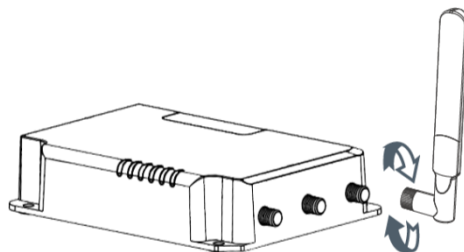
B. Put the SIM card into the slot and screw it up.



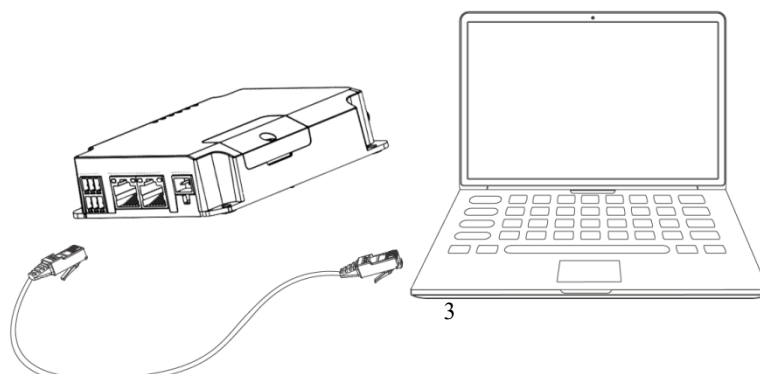
Antenna Installation

Rotate the antenna into the antenna connector accordingly.

Note: The external antenna should be installed vertically always on a site with a good cellular signal.



Ethernet Connection



UC11-N1 & UC11-T1 Installation

UC11-N1 Wiring

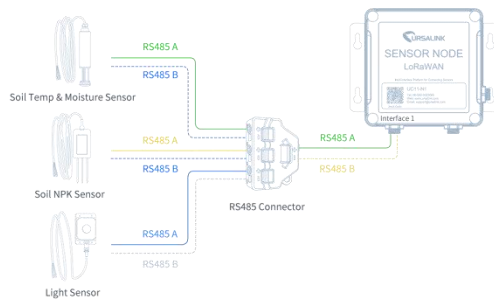


Figure 1 RS485 Wiring

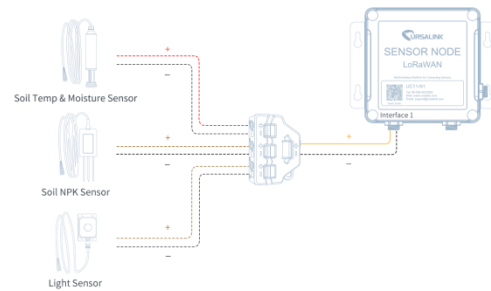
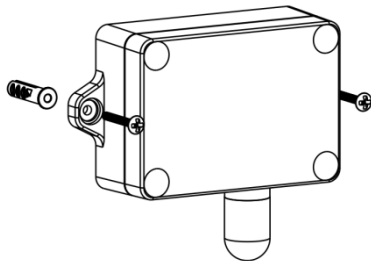


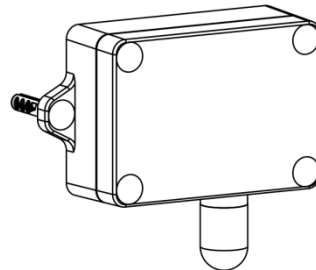
Figure 2 Power Wiring

UC11-T1 Mounting

- A. Use 2 flat head Phillips screws to fix the UC11-T1 onto the wall mounting.

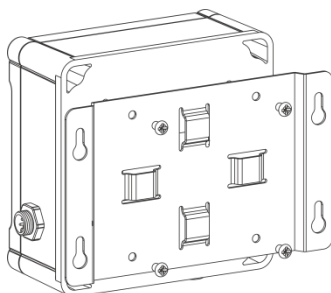


- B. Cover the screws with two screw caps.

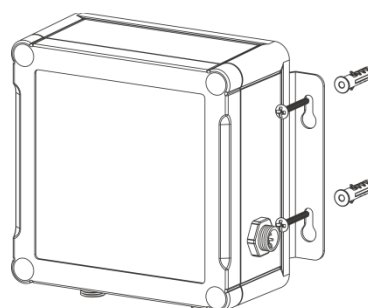


UC11-N1 Mounting

- A. Mount the enclosure to the mounting bracket with screws.



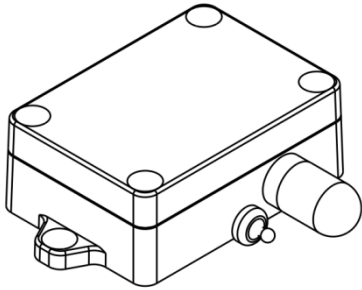
- B. Mount the mounting bracket horizontally to the wall by fixing the screws into the wall plugs.



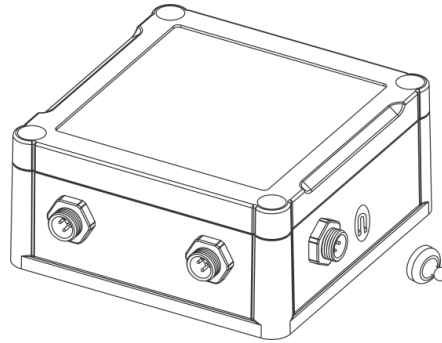
Turn ON/OFF UC11-N1 & UC11-T1

Place the magnet on the sign 'U' to turn on/off UC11-N1.

Power ON: Beep for 2 seconds



Power OFF: Beep for 6 seconds



Sensor Installation

Soil Temp & Moisture Sensor

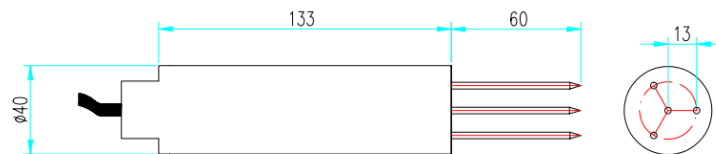


Figure 3

Remove the round top cover. In order to avoid damaging the probe, insert the probe into the soil where the density is even.

Example:



Quick Test: Choose a suitable measurement place, and avoid rocks or other hard objects. Insert the sensor vertically into the soil. Do not rock the probe while inserting it. This method can only make a small range of measurements and needs multiple measurements to get the average value as calibration value.

Underground Test: Dig a pit of a certain depth vertically, and insert the sensor horizontally into the measured position, after that fill the pit. This method can measure and record value for a long time.

Soil NPK Sensor



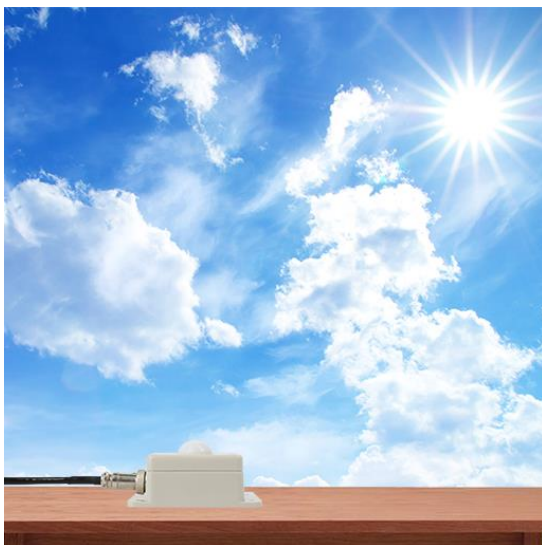
Quick Test: Choose a suitable measurement place, and avoid rocks or other hard objects. Insert the sensor vertically into the soil. Do not rock the probe while inserting it. This method can only make a small range of measurements and needs multiple measurements to get the average value as calibration value.

Underground Test: Dig a pit of a certain depth vertically, and insert the sensor horizontally into the measured position, after that fill the pit. This method can measure and record value for a long time.

! NOTE: Keep the Soil Temp & Moisture Sensor and Soil NPK Sensor at a distance of about 80cm while in working mode. Make sure no metal is around the sensor.

Light Sensor

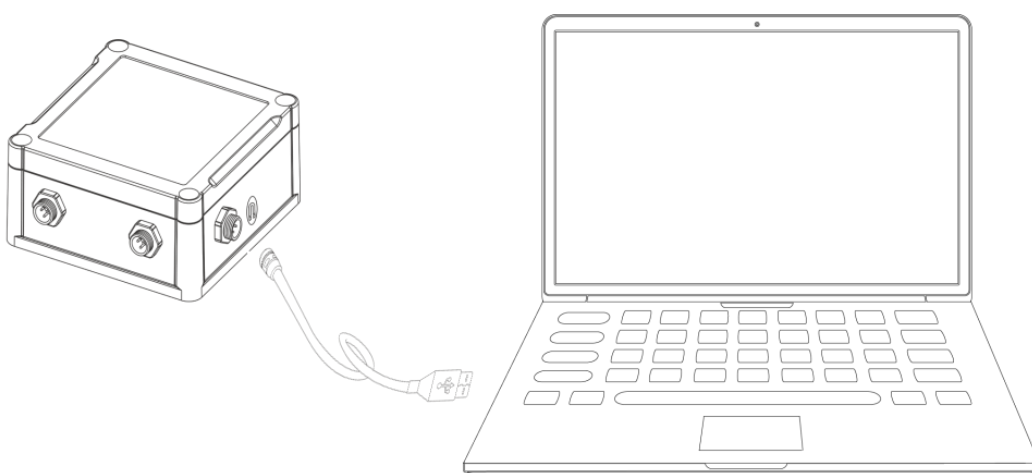
Be sure to place the round sensor always on top and always towards the sun while using it.



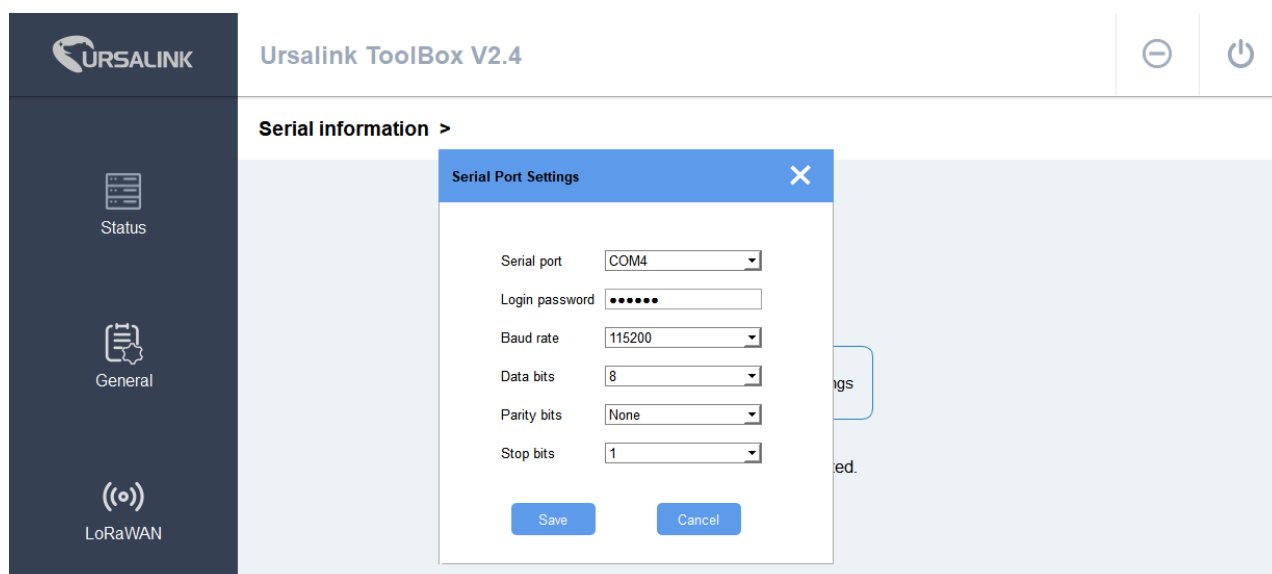
Device Configuration

UC11-N1 Configuration

Please connect PC and UC11-N1 directly via USB ports and open the Toolbox.



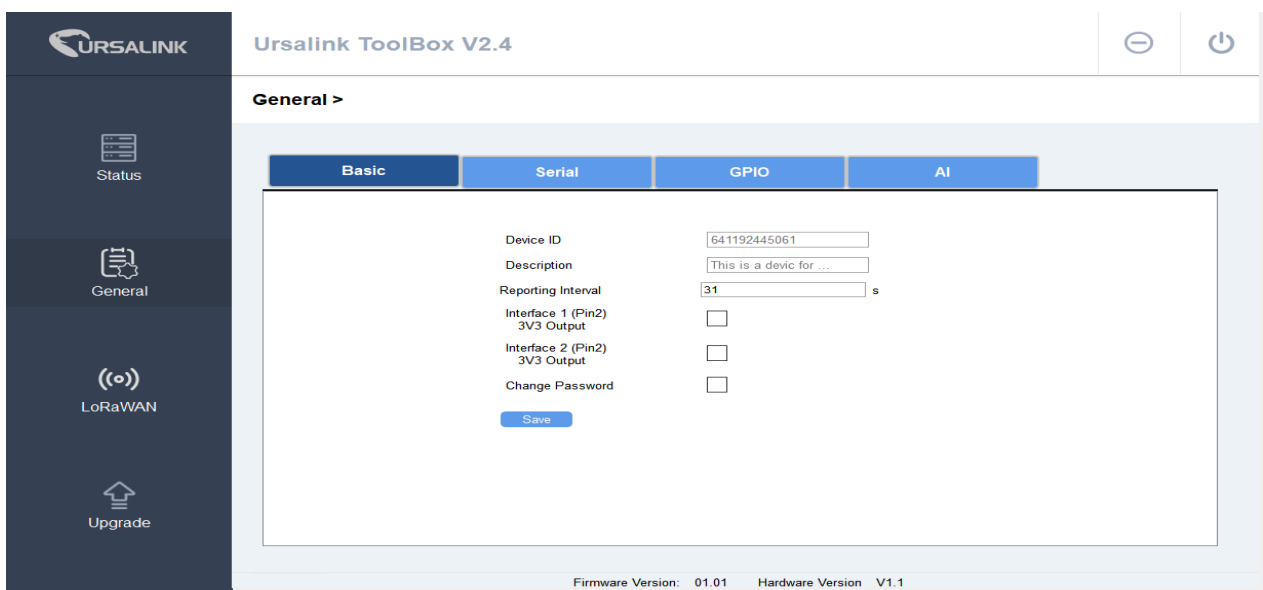
- ① Select serial port and fill in the default login password: '123456', and then click 'Save'.



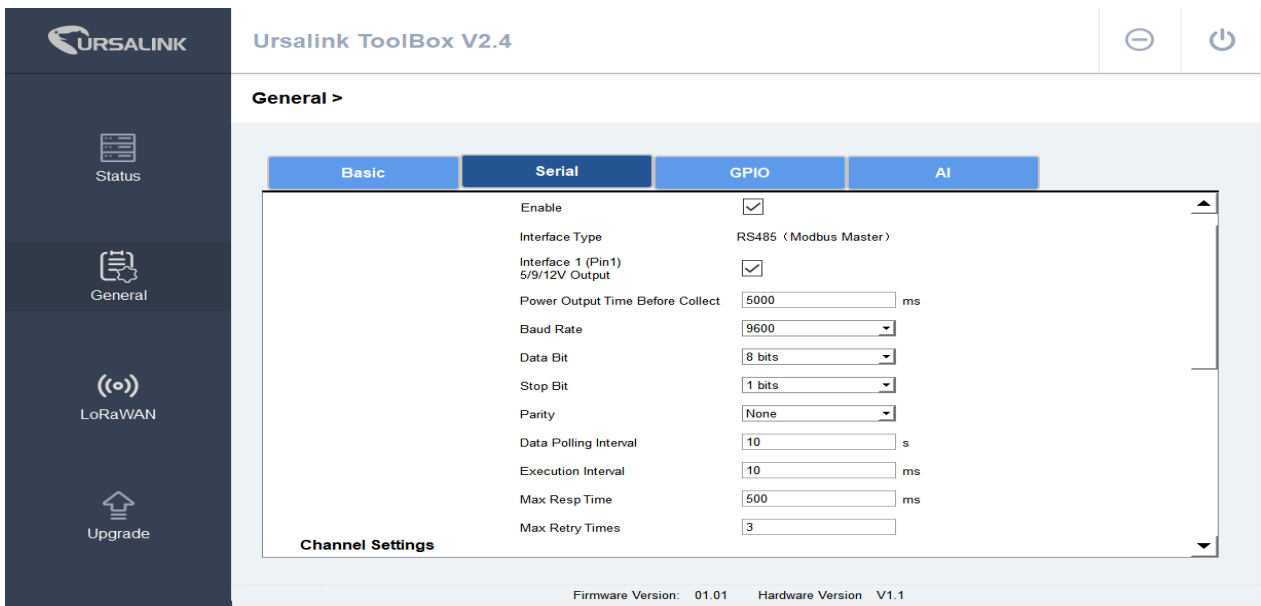
- ② Click 'Status' to check property of the device.





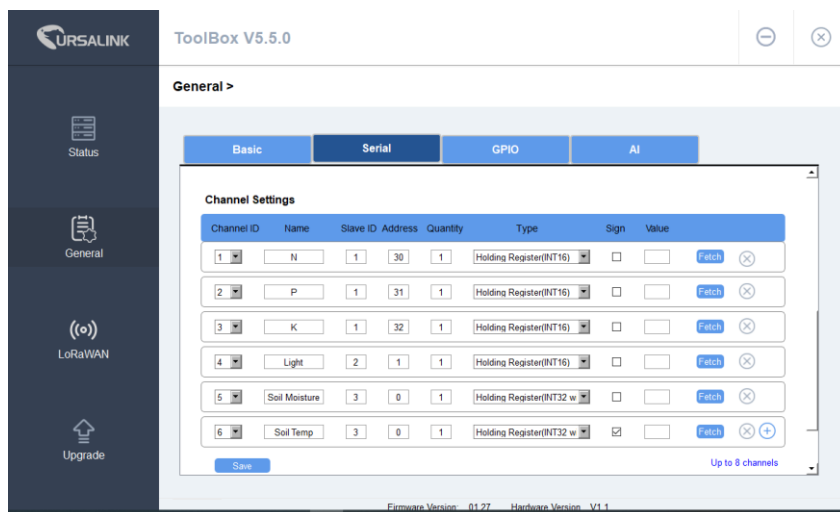
③ Click 'General/Basic' to configure the 'Reporting Interval'.



④ Click 'General/Serial' to configure RS485 property and channel. If you want to make N1 as a power supply source, please make sure that the Interface Output is enabled. (The suggested 'Power Output Time Before Collect' is 5000ms) .



⑤ You could click  to add a channel or click  to delete a channel. Fill in the corresponding item as the following figure.



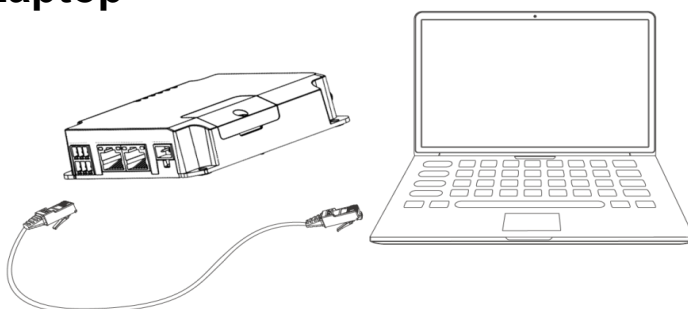
If the value is obtained after clicking the button 'fetch', it means that N1 can fetch data from the sensor normally.

UC11-N1 Default Setting

Channel ID	Name	Slave ID	Addresses	Quantity	Type	Sign
1	N	1	30	1	Holding Register (INT16)	
2	P	1	31	1	Holding Register (INT16)	
3	K	1	32	1	Holding Register (INT16)	
4	Light	2	1	1	Holding Register (INT16)	
5	Soil Moisture	3	0	1	Holding Register (INT32 with upper 16bits)	
6	Soil Temp	3	0	1	Holding Register (INT32 with lower 16bits)	

Gateway Configuration

Connect to Laptop



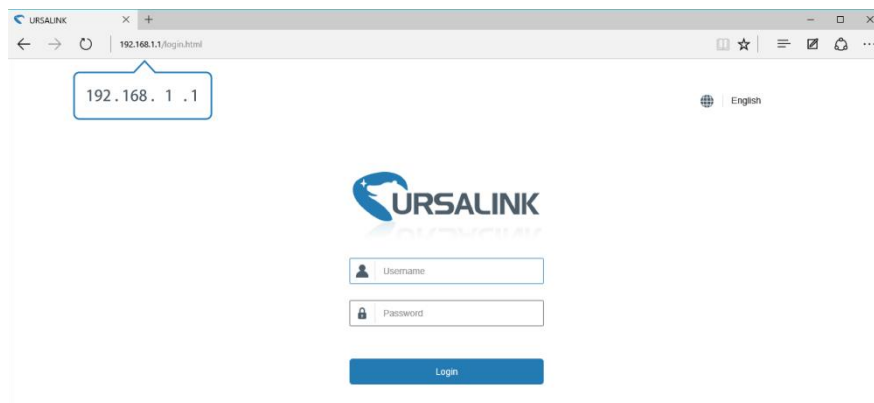
A. Open a web browser on your PC (Chrome and IE are recommended), type in the IP address, and press Enter on your keyboard.

B. Enter the username and password, click “Login”.

IP Address: 192.168.1.1

Username: admin

Password: password



! If you enter the username or password incorrectly more than 5 times, the login page will be locked for 10 minutes.

B. When you log in with the default username and password, you will be asked to modify the password. It's suggested that you change the password for the sake of security. Click the 'Cancel' button if you want to modify it later.

A 'Change Password' dialog box with a close button (X) in the top right corner. It contains three input fields: 'Old Password', 'New Password', and 'Confirm New Password'. At the bottom, there are two buttons: 'Save' and 'Cancel'.

D. After you log into the Web GUI, you can view system information and adjust the configuration of the gateway.

For your device security, please change the default password

Status	Overview	LoRa	Cellular	Network	VPN	Host List
LoRaWAN	System Information Model: UG85 Partnumber: L00E-S1011-EU868 Serial Number: 621791810162 Firmware Version: 80.0.0.6 Hardware Version: V1.0 Local Time: 2019-06-11 11:30:26 Uptime: 00:15:40 CPU Load: 28% RAM (Capacity/Available): 512MB/257MB(50.2%) eMMC (Capacity/Available): 6.6G/6.0G(91.63%)					
Network						
System						
Industrial						
Maintenance						
APP						
	Manual Refresh Refresh					

Network Access

Connecting via cellular

Take inserting SIM card into SIM1 slot as an example; please refer to the following detailed operations.

- Click “Network” → “Interface” → “Cellular” → “Cellular Setting” to configure the cellular info.
- Enable SIM1.
- Choose network type as “Auto”, and then set the right APN.
- Click “Save” and “Apply” for configuration to take effect.

Status	Port	WAN	LAN	VLAN Trunk	Cellular	Loopback
LoRaWAN	Cellular Setting <div> <div>SIM1</div> <div>SIM2</div> </div> <div> <div>Enable</div> <div>Network Type</div> <div>APN</div> <div>Username</div> <div>Password</div> <div>Access Number</div> <div>PIN Code</div> <div>Authentication Type</div> <div>Roaming</div> <div>SMS Center</div> </div> <div> <div>Connection Setting</div> <div>Dual SIM Strategy</div> <div>Primary SIM Card</div> <div>Switch to backup SIM card when ICMP detection fails</div> <div>Switch to backup SIM card when the</div> </div>					
Network						
Interface						
Firewall						
QoS						
DHCP						
DDNS						
Link Failover						
VPN						
System						
Industrial						
Maintenance						

E. Click “Status” → “Cellular” to view the status of the cellular connection. If it shows “Connected”, it means SIM1 has dialed up successfully.

URSALINK

Status	Overview	LoRa	Cellular	Network	VPN
LoRaWAN	Modem Status: Ready Model: EC25 Current SIM: SIM1 Signal Level: 31asu (-51dBm) Register Status: Registered (Home network) IMEI: 861107032321490 IMSI: 460110269496240 ICCID: 89860317245923922835 ISP: CHN-CT Network Type: LTE PLMN ID: 46011 LAC: 5f02 Cell ID: 5fb0d34				
Network	Network Status: Connected IP Address: 172.21.143.187 Netmask: 255.255.255.248 Gateway: 172.21.143.188 DNS: 218.85.152.99 Connection Duration: 0 days, 00:01:39				
System					
Industrial					
Maintenance					
APP					

Connecting via WAN

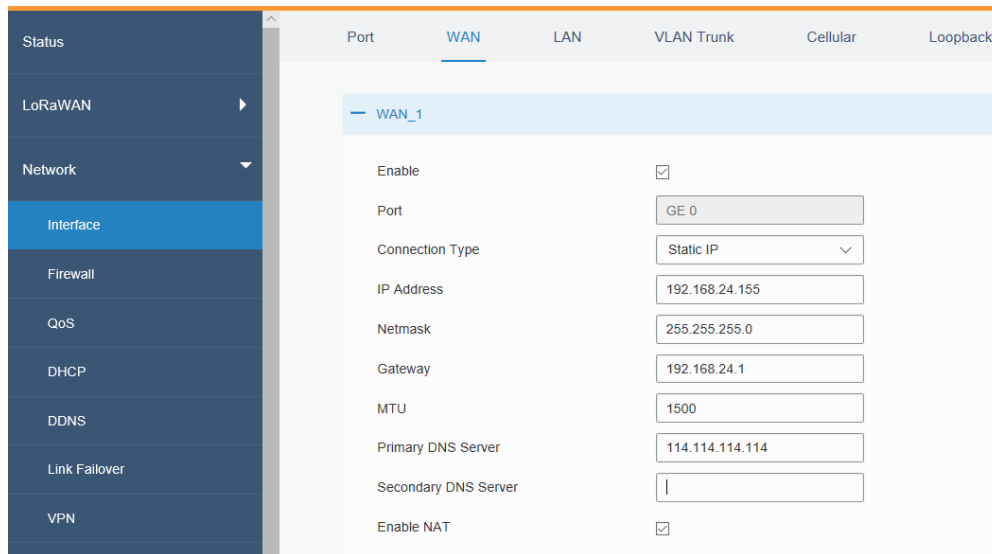
A. Click “Network” → “Interface” → “Port” to configure Property as WAN, and then click save and apply.

Port Setting

Port	Status	Property	Speed	Duplex
GE 0	up	wan	auto	auto

Save

B. Click “WAN” to configure corresponding items and save



Port	WAN	LAN	VLAN Trunk	Cellular	Loopback
WAN_1					
Enable	<input checked="" type="checkbox"/>				
Port	GE 0				
Connection Type	Static IP				
IP Address	192.168.24.155				
Netmask	255.255.255.0				
Gateway	192.168.24.1				
MTU	1500				
Primary DNS Server	114.114.114.114				
Secondary DNS Server					
Enable NAT	<input checked="" type="checkbox"/>				

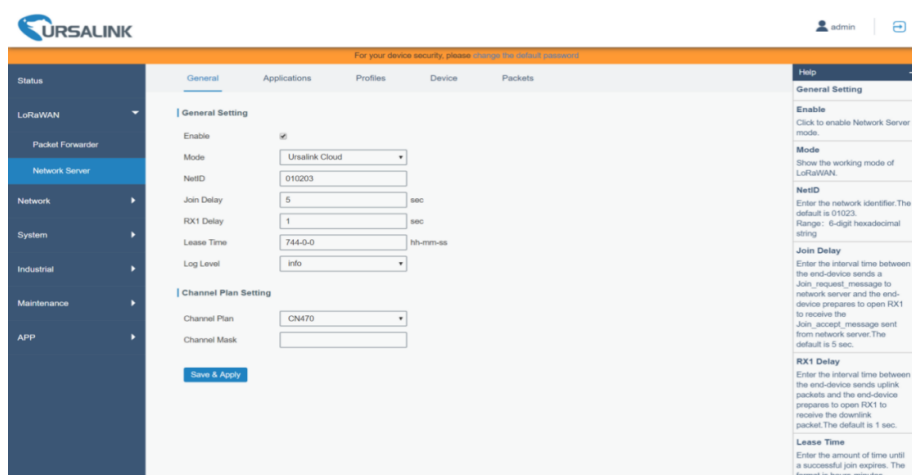
C. Click “Status” → “Network” to view the status of the WAN connection.



Port	Status	Type	IP Address	Netmask	Gateway	DNS
GE 0	up	Static	192.168.24.155	255.255.255.0	192.168.24.1	114.114.114.114

Network Server Configuration

A. Click “LoRaWAN” → “Network Server” → “General” to configure the general setting. Configure the mode as Ursalink Cloud

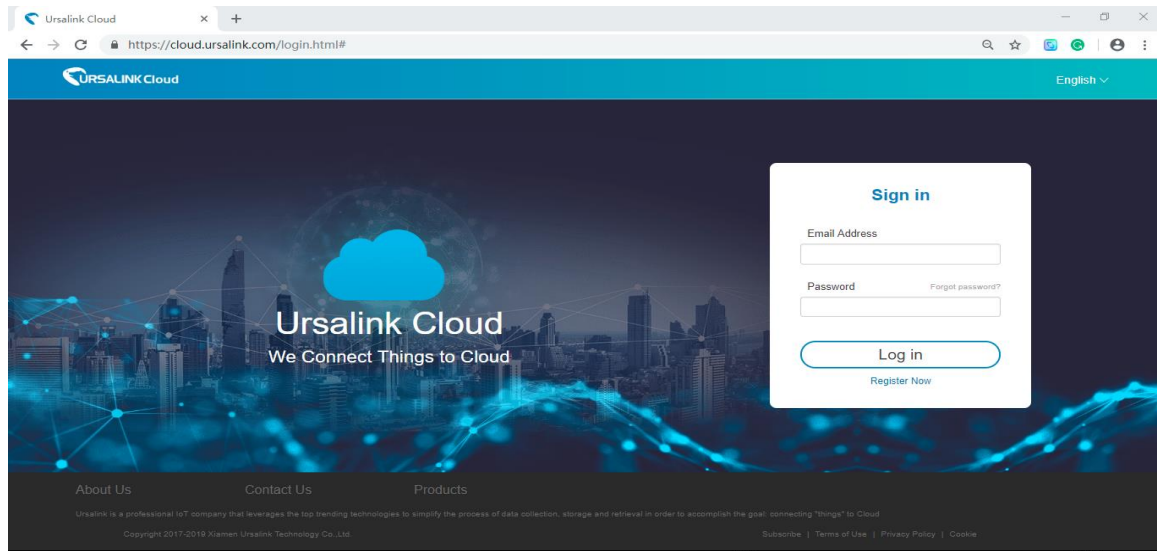


General Setting	Applications	Profiles	Device	Packets
<p>Enable <input checked="" type="checkbox"/></p> <p>Mode Ursalink Cloud</p> <p>NetID 010203</p> <p>Join Delay 5 sec</p> <p>RX1 Delay 1 sec</p> <p>Lease Time 744-0-0 h:m:s</p> <p>Log Level info</p> <p>Channel Plan CN470</p> <p>Channel Mask </p> <p>Save & Apply</p>				

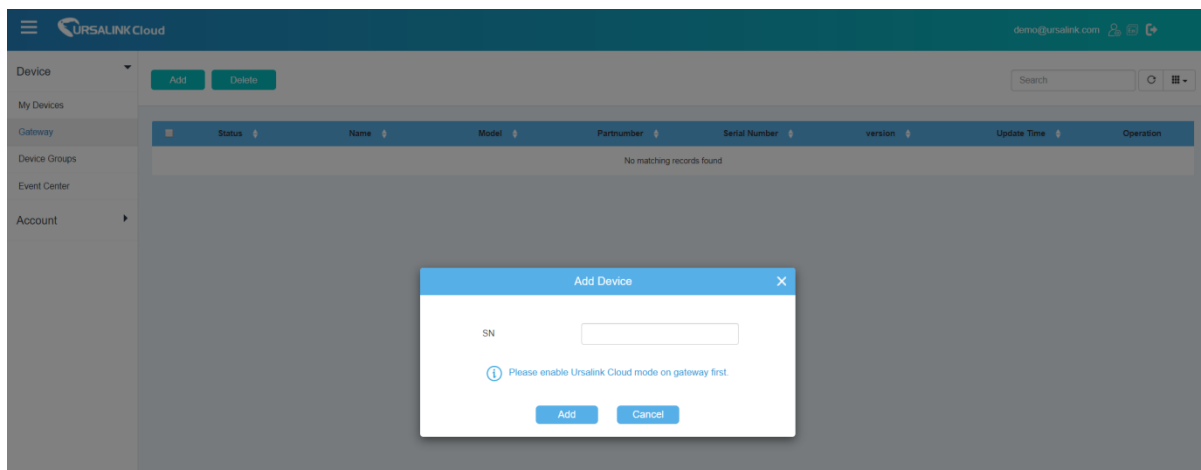
Ursalink Cloud Configuration

Register an Ursalink Cloud account.

Ursalink Cloud Address: <https://cloud.ursalink.com/login/register.html>



Log in Ursalink Cloud and go to “Gateway/Add” to fill in the gateway SN and click “add”.



Device

My Devices

Gateway

Device Groups

Event Center

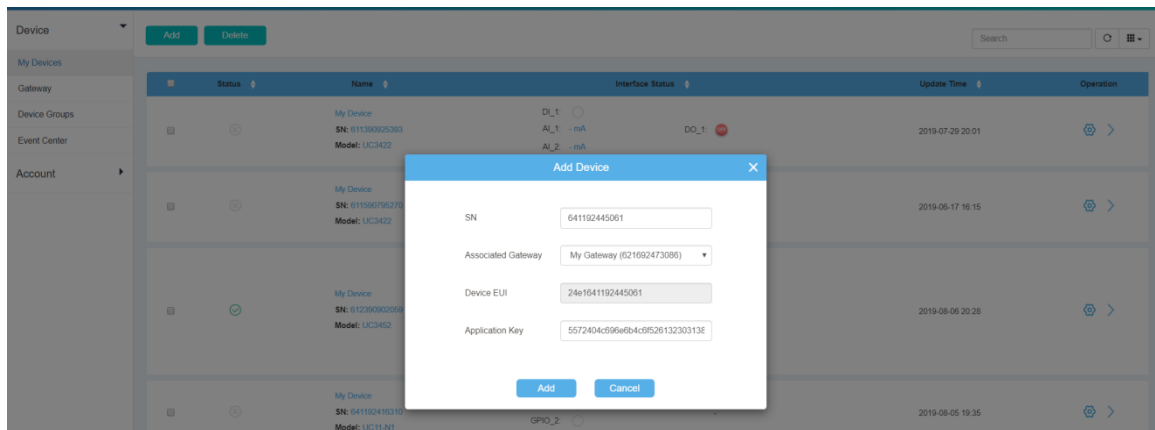
Account

AddDelete

Search

	Status	Name	Model	Partnumber	Serial Number	version	Update Time	Operation
<div><div></div><div></div></div>	<div></div>	My Gateway	UG87-L00E-W-G-EU868	L00E-W-G-EU868	621692473086	Firmware:80.0.0.24 Hardware:V2.0	2019-08-05 19:37	<div></div>
<div><div></div><div></div></div>	<div></div>	My Gateway	UG85-L00E-G-US915	L00E-G-US915	621791878976	Firmware:80.0.0.24 Hardware:V1.0	2019-08-05 19:37	<div></div>
<div><div></div><div></div></div>	<div></div>	My Gateway	UG85-L00E-G-EU868	L00E-G-EU868	621791898999	Firmware:80.0.0.20 Hardware:V1.0	2019-07-24 10:23	<div></div>

Go to “My Devices” and click “add”. Fill in the SN of the UC11-N1 and select corresponding gateway.



Click to configure the UC11-N1 from Ursalink Cloud and add channels to obtain data.

Note: Channel ID and its name should be as same as the one set in UC11-N1. You can configure as the following picture, fill the ‘formula’ and ‘unit’.

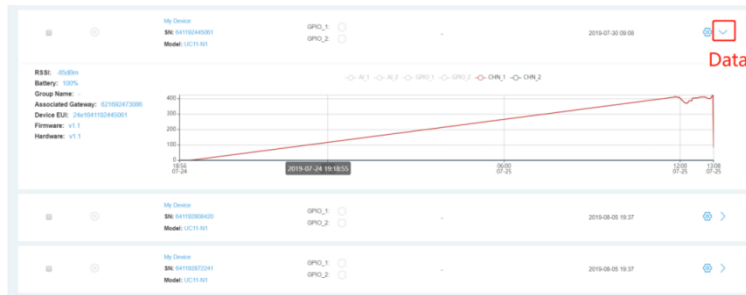
Formula: Soil Moisture: $x/10$

Soil Temp: $x/100-20$

AVG:

Channel ID	Channel Name	Type	Sign	Raw Data	Formula	Value	Unit	Operation
1	N	REG_HOLD_INT16	<input type="checkbox"/>	HEX:0500 DEC:5		5	mg/k	
2	P	REG_HOLD_INT16	<input type="checkbox"/>	HEX:0200 DEC:2		2	mg/k	
3	K	REG_HOLD_INT16	<input type="checkbox"/>	HEX:0c00 DEC:12		12	mg/k	
4	Light	REG_HOLD_INT16	<input type="checkbox"/>	HEX:a707 DEC:1959		1959	μ m	
5	Soil Moistu	REG_HOLD_INT16	<input type="checkbox"/>	HEX:3300 DEC:51	$x/10$	5.1	%RH	
6	Soil Temp	REG_HOLD_INT16	<input type="checkbox"/>	HEX:fe0f DEC:4094	$x/100-20$	20.94	°C	

Check "Data" that connects with UC11-N1.



Appendix

Environmental Requirements

Gateway UG85

- Power Input: 9-48 VDC
- Power Consumption: Typical 3.3W (Max 6.4 W)
- Operating Temperature: -40°C to 70°C (-40°F -158°F)
- Relative Humidity: 0% to 95% (non-condensing) at 25°C/77°F

UC11-T1

- Power Input: 8000 mAh replaceable Li-SOCL2 battery
- Operating Temperature: -40°C to +70°C
- Relative Humidity: 0% to 100% (non-condensing)

UC11-N1

- Power Input:
 1. 5-24 VDC with 4900 mAh battery backup
 2. Solar-powered with 4900 mAh Battery
- Operating Temperature: -20°C to +70°C

Light Sensor

- Power Input: 7 to 24 VDC
- Operating Temperature: -40°C to +65°C

Soil NPK Sensor

- Power Input: 12 to 24 VDC
- Power Consumption: Max 0.2W
- Operating Temperature: 5°C to +45°C

Soil Temp & Moisture Sensor

- Power Input: 12 to 24 VDC
- Power Consumption: Max 0.6W
- Operating Temperature: -20°C to 80°C

Related Information

UG85 LoRaWAN Gateway:

<https://www.ursalink.com/en/ug85-lorawan-gateway/>

UC11-N1 LoRaWAN Sensor Node:

<https://www.ursalink.com/en/n1-lorawan-sensor-node/>

UC11-T1 Temperature and Humidity Sensor:

<https://www.ursalink.com/en/t1-temperature-humidity-lorawan-sensor/>

Related Document Download:

<https://www.ursalink.com/en/documents-download/>

UC11-N1 Payload Structure Download:

https://www.ursalink.com/en/download/n1_payload_structure.pdf

UC11-T1Payload Structure Download:

https://www.ursalink.com/en/download/t1_payload_structure.pdf

Sensor Payload Structure Download:

[http://image.ursalink.com/Ursalink/Sensors%20Payload/Other%20Sensors%20Payload%20\(Light\).pdf](http://image.ursalink.com/Ursalink/Sensors%20Payload/Other%20Sensors%20Payload%20(Light).pdf)