Agricultural Monitoring Starter Kit Quick Guide

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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.

Light Sensor RS485 LoRaWAN Sensor Node Soil Temperature & LoRa Cellular Moisture Sensor Ethernet Web Арр UG85 LoRaWAN Gateway Ursalink Cloud Soil NPK Sensor 1 Temperature & Humidity LoRaWAN Sensor

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 × 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

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'.

	Ursalink ToolBox V2.4	Θ	
	Serial information >		
	Serial Port Settings		
Status	Serial port COM4 💌		
	Login password		
	Baud rate 115200 -		
General	Parity bits None		
	Stop bits		
((•)) LoRaWAN	Save Cancel		

(2) Click 'Status' to check property of the device.

	Ursalink ToolBox V2.4				
	Status >				
Status	Model: Serial Number:	UC11N1 641192445061			
General	Partnumber: Firmware Version: Hardware Version: RSSI/SNR:	CN470-0080 01.01 V1.1 0/0			

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

	Ursalink ToolBox	\ominus	ር			
	General >					
Status	Basic	Serial	GPIO	AI		
「三」		Device ID	641192445061			
General		Description Reporting Interval	31	s		
		Interface 1 (Pin2) 3V3 Output				
		Interface 2 (Pin2) 3V3 Output				
((0))		Change Password				
LoRaWAN		Save				
\sim						
Upgrade						
		Firmware Ver	sion: 01.01 Hardware Vers	ion V1.1		

(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).

	General >				
Status	Basic	Serial	GPIO	AI	
		Enable	\checkmark		4
		Interface Type	RS485 (Modbus M	laster)	
		Interface 1 (Pin1) 5/9/12V Output	\checkmark		
General		Power Output Time Before Collect	5000	ms	
		Baud Rate	9600	<u>-</u>	
		Data Bit	8 bits	<u>•</u>	_
((0))		Stop Bit	1 bits	<u>·</u>	
LoRaWAN		Parity	None	<u>-</u>	
		Data Polling Interval	10	s	
		Execution Interval	10	ms	
<u>수</u>		Max Resp Time	500	ms	
 Upgrade	Channel Settings	Max Retry Times	3		-
		F 1 1 1 1 1			
		Firmware Version: 01.01	Hardware Versi	on V1.1	

the following figure.

(5) You could click 💛 to add a channel or click 🎽 to delete a channel. Fill in the corresponding item as

	ToolBox V5.5.0	Θ \otimes
	General >	
Status	Basic Serial GPIO Al	-
B	Channel Settings Channel ID Name Stave ID Address Quantity Type Sign Value	
General	1 N 1 30 1 Holding Register(NT16)	8
((°))	3 K 1 32 1 Holding Register(INT16) C Control	8
Lunamour	4 Light 2 1 Holding Register(NT16)	\otimes
	6 Soil Temp 3 0 1 Holding Register(H122 w 2 2 1000)	⊗⊕ -
	Up to 8	channels 🗾

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	Addres	Quantity	Туре	Sign
			S			
1	Ν	1	30	1	Holding Register (INT16)	
2	Р	1	31	1	Holding Register (INT16)	
3	К	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

♥ URSALINK × +		- • ×
← → ♡ 192.168.1.1/login.html		
192.168.1.1		⊕ English
	Lusername	
	Password	
	Locin	

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.

Change Password						
Old Password						
New Password						
Confirm New Password						
Save	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 Informa	tion							
		Model		UG85						
Network	•	Partnumber		L00E-S101	L00E-S1011-EU868					
Puetom		Serial Number		621791810	621791810162					
system		Firmware Version		80.0.0.6	80.0.0.6					
Industrial	•	Hardware Version	I.	V1.0						
		Local Time		2019-06-11	11:30:26					
Maintenance	•	Uptime		00:15:40						
		CPU Load		28%						
		RAM (Capacity/A	vailable)	512MB/257	MB(50.2%)					
		eMMC (Capacity/	Available)	6.6G/6.0G(91.63%)					

Network Access

Connecting via cellular

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

- A. Click "Network" \rightarrow "Interface" \rightarrow "Cellular" \rightarrow "Cellular Setting" to configure the cellular info.
- B. Enable SIM1.
- C. Choose network type as "Auto", and then set the right APN.
- D. Click "Save" and "Apply" for configuration to take effect.

Status	^	Port	WAN	LAN	VLAN Trunk	Cellular	Loopback	
LoRaWAN	•	Cellular Se	tting				_	
				SIM1		SIM2		
Network	Ť	Enable				\checkmark		
Interface		Network Typ)e	Auto	~	Auto	\checkmark	
Firewall		APN						
		Username						
QoS	_	Password						
DHCP		Access Num	iber					
DDNS		PIN Code						
Link Failover		Authenticatio	on Type	Auto	~	Auto	\vee	
Link Fallover		Roaming						
VPN		SMS Center						
System	•	Connection	Setting					
	_	Dual SIM St	trategy	\checkmark				
Industrial	•	Primary SIM	Card	SIM2	~	/		
		Switch to ba	ckup SIM card w	hen ICMP				
Maintenance		Quetion to be	okun CIM oart :	then the				
		Swtich to ba	CKUP SIM Card W	men the				
				12				

E. Click "Status" \rightarrow "Cellular" to view the status of the cellular connection. If it shows "Connected", it means SIM1 has dialed up successfully.

	NK				
Status	Overview	LoRa	Cellular	Network	VPN
LoRaWAN	Modem				
Network	Status		Ready FC25		
System	Current SIM		SIM1		
	Signal Level		31asu (-51d	3m)	
Industrial	Register Status		Registered (Home network)	
	IMEI		8611070323	21490	
Maintenance	IMSI		4601102694	96240	
APP	ICCID		8986031724	5923922835	
	ISP		CHN-CT		
	Network Type		LTE		
	PLMN ID		46011		
	LAC		5f02		
	Cell ID		5fb0d34		
	Network				
	Status		Connected		ted
	IP Address		172.21.143.1	187	
	Netmask		255.255.255	.248	
	Gateway		172.21.143.1	188	
	DNS		218.85.152.9	99	
	Connection Duratio	n	0 days, 00:0	1:39	

Connecting via WAN

A. Click "Network" \rightarrow "Interface" \rightarrow "Port" to configure Property as WAN, and then click save and apply.

Status	Por	t WAN	LAN	VLAN Trunk	Cellular	Loopback	
LoRaWAN	Port	Setting					
		Port	Status	Property	Speed	Duplex	
Network		GE 0	up 🗸	wan 🗸	auto 🗸	auto 🗸	
Interface		Save					
Firewall							

B. Click "WAN" to configure corresponding items and save

Status	Port	WAN	LAN	VLAN Trunk	Cellular	Loopback	
LoRaWAN 🕨	— WAI	۱_1					
Network 🗸	Ena	ble					
Interface	Port			GE 0			
Firewall	Con	nection Type		Static IP	\sim		
	IP A	ddress		192.168.24.155			
QoS	Netr	nask		255.255.255.0			
DHCP	Gate	eway		192.168.24.1	192.168.24.1		
DDNS	MTU	J		1500			
	Prim	ary DNS Server		114.114.114.114			
Link Failover	Sec	ondary DNS Serve	r				
VPN	Ena	ble NAT					

C. Click "Status" \rightarrow "Network" to view the status of the WAN connection.

Status		Overview	LoRa	Cellular	Network	VPN	Host List		
LoRaWAN		WAN							
		Port	Status	Туре	IP Address	N	etmask	Gateway	DNS
Network	·	GE 0	up	Static	192.168.24.155	<u>255.</u>	255.255.0	192.168.24.1	114.114.114.114
System	- 11	LAN							
Industrial			Nam	e	VLAN ID		IP Address	Netmask	МТО

Network Server Configuration

A. Click "LoRaWAN" \rightarrow "Network Server" \rightarrow "General" to configure the general setting. Configure the mode as Ursalink Cloud

URSALIN	1K		For your days		the defend encount		admin	-
	Canada	Applications	Por your down	Device	Packete		Help	_
Status	General	Applications	Promos	Device	Packets		General Setting	1
LoRaWAN	General Se	tting					Enable Click to enable Network S- mode.	lerver
Packet Forwarder	Enable	×		-			Mode	
	Mode	Orsalink Ci	oud •	<u>י</u>			Show the working mode of LoRaWAN.	4
	NetID	010203					NetiD	
Network	Join Delay RX1 Delay	5		sec			Enter the network identifie default is 01023. Range: 6-digit hexadecim	r.The
System	Lease Time	744-0-0		hh-mm-ss			string	-
Industrial	Log Level	info	•	•			Enter the interval time bet the end-device sends a	ween
Maintenance	Channel P	lan Setting					Join_request_message to network server and the en device prepares to open R	id- RX1
	Channel Pla	an CN470	,	•			to receive the Join_accept_message ser	nt
	Channel Ma	isk]			from network server. The default is 5 sec.	
		_					RX1 Delay	
	Save & A	poly					Enter the interval time beth the end-device sends uplit packets and the end-devic prepares to open RX1 to receive the downlink packet.The default is 1 set	ween .nk De
							Lease Time	
							Enter the amount of time u a successful join expires." format is hours-minutes-	Intil The

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".

	Cloud						demo@ursalink.com	20 in (+
Device	Add Delete							с ш.
My Devices								
Gateway	Status 🛊	Name 🕴	Model 0	Partnumber 🖕	Serial Number 🖕	version 🕴	Update Time 💧	Operation
Device Groups				No matching record	Is found			
Event Center								
Account +								
				Add Device	×			
			SN					
			(i) Please enab	ole Ursalink Cloud mode on gate	way first.			
				Add Cancel				

Device	•	Add	Delete						Search	0 Ⅲ-
My Devices										
Gateway		•	Status 🔶	Name	Model 👌	Partnumber	Serial Number	version 🕚	Update Time 👌	Operation
Device Groups				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	0
Event Center Account	•			My Gateway	UG85-L00E-G-US915	L00E-G-US915	621791878976	Firmware:80.0.0.24 Hardware:V1.0	2019-08-05 19:37	۵
				My Gateway	UG85-L00E-G-EU868	L00E-G-EU868	621791898699	Firmware:80.0.0.20 Hardware:V1.0	2019-07-24 10:23	۵

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

Device *	Add	Delete			Search	C #.
My Devices		Status A	Name A			Opuration
Gateway	<u> </u>	Juius	iname v		opuare nine	operation
Device Groups			My Device			
Event Center			Model: UC3422	Al_2mA		
Account >				Add Device X		
			My Device SN: 611590796270 Model: UC3422	SN 641152445061	2019-06-17 16:15	
			My Device SN: 61250002000 Model: UC3462	Associated Gateway My Gateway (621682473006) • Device EUI 24e19641192445081 • Application Key 5572404cd96e6b4c96526132303136 •	2019-08-06 20 28	
			My Device SN: 641192416310 Model: UC11-N1	Add Cancel	2019-08-05 19:35	

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'.

AVO

Formula: Soil Moisture: x/10

Soil Temp: x/100-20

							5	
Channel ID	Channel Name	Туре	Sign	Raw Data 🕕	Formula 🕕	Value	Unit	Operation
1 🔻	Ν	REG_HOLD_INT16		HEX:0500 DEC:5		5	mg/k	甸
2 🔻	P	REG_HOLD_INT16		HEX:0200 DEC:2		2	mg/k	Ŵ
3 🔻	К	REG_HOLD_INT16		HEX:0c00 DEC:12		12	mg/k	圃
4 🔻	Light	REG_HOLD_INT16		HEX:a707 DEC:1959		1959	µ•mo	Ŵ
5 🔻	Soil Moistu	REG_HOLD_INT16		HEX:3300 DEC:51	x/10 🔻	5.1	%RH	创
6 🔻	Soil Temp	REG_HOLD_INT16		HEX:fe0f DEC:4094	x/100-20	20.94	°C	ŵ (+)

Check "Data" that connects with UC11-N1.

• •	My Device SN: 641192445091 Model: UC11-N1	0PIO_1: 0 0PIO_2: 0		2019-07-30 09:08	⊌ ⊡
838: 4560x Bategy: 50% Group Name: Associate DR: 24x15011046001 Device DR: 24x15011046001 Pinnare: v13 Herbane: v13	400- 200- 100- 100- 100- 100- 100- 100- 1	->-A() ->-A()	0 0001 -0 0002 -0 0001 -0 0000 0000		
• •	My Device SN: 641192806420 Model: UC11-N1	0P0_1: 0 0P0_2: 0		2018-08-05 19 37	⊚ >
• •	My Device SN: 641192872241 Model: UC11-N1	6910_1: () 0910_2: ()		2019-08-05 19:37	⊗ >

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 mhA 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