
NSE01 - NB-IoT Soil Moisture & EC Sensor User Manual

last modified by Xiaoling

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1. Introduction

1.1 What is NSE01 Soil Moisture & EC Sensor

The Dragino NSE01 is a **NB-IOT soil moisture & EC sensor** designed for IoT of Agriculture. It detects Soil Moisture, Soil Temperature and Soil Conductivity, and upload the value via wireless to IoT Server via NB-IoT Network.

NarrowBand-Internet of Things (NB-IoT) is a standards-based low power wide area (LPWA) technology developed to enable a wide range of new IoT devices and services. NB-IoT significantly improves the power consumption of user devices, system capacity and spectrum efficiency, especially in deep coverage.

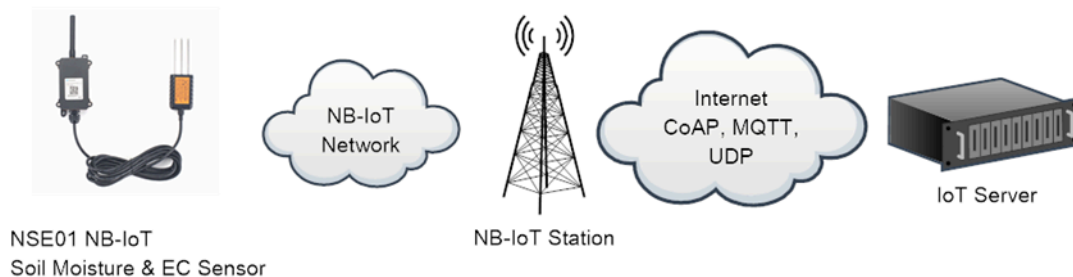
NSE01 supports different uplink methods include **TCP, MQTT, UDP and CoAP** for different application requirement.

NSE01 is powered by **8500mAh Li-SOCI2 battery**, It is designed for long term use up to 5 years. (Actually Battery life depends on the use environment, update period & uplink method)

To use NSE01, user needs to check if there is NB-IoT coverage in local area and with the bands NSE01 supports. If the local operate support it, user needs to get a **NB-IoT SIM card** from local operator and install NSE01 to get NB-IoT network connection.



NSE01 in a NB-IoT Network



1.2 Features

- NB-IoT Bands: B1/B3/B8/B5/B20/B28 @H-FDD
- Monitor Soil Moisture

- Monitor Soil Temperature
- Monitor Soil Conductivity
- AT Commands to change parameters
- Uplink on periodically
- Downlink to change configure
- IP66 Waterproof Enclosure
- Ultra-Low Power consumption
- Micro SIM card slot for NB-IoT SIM
- 8500mAh Battery for long term use

1.3 Specification

Common DC Characteristics:

- Supply Voltage: 2.1v ~ 3.6v
- Operating Temperature: -40 ~ 85°C

NB-IoT Spec:

- - B1 @H-FDD: 2100MHz
- - B3 @H-FDD: 1800MHz
- - B8 @H-FDD: 900MHz
- - B5 @H-FDD: 850MHz
- - B20 @H-FDD: 800MHz
- - B28 @H-FDD: 700MHz

Probe Specification:

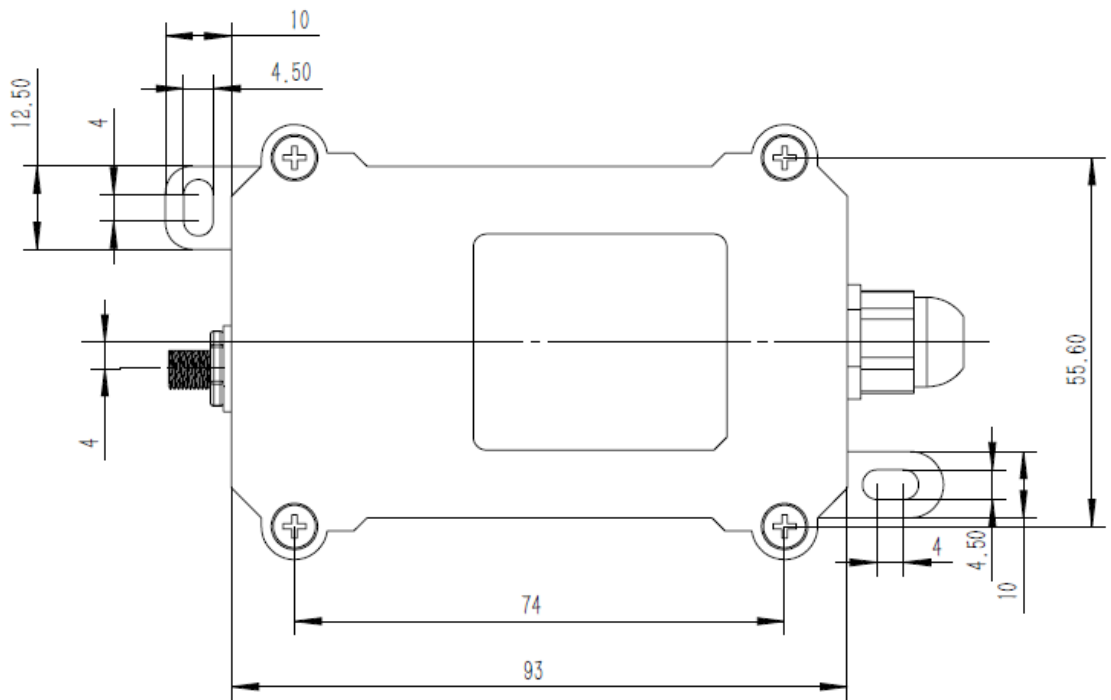
Measure Volume: Base on the centra pin of the probe, a cylinder with 7cm diameter and 10cm height.

Parameter	Soil Moisture	Soil Conductivity	Soil Temperature
Range	0-100.00%	0-20000uS/cm (25°C)(0-20.0EC)	-40.00°C ~ 85.00°C
Unit	V/V %,	uS/cm,	°C
Resolution	0.01%	1 uS/cm	0.01°C
Accuracy	±3% (0-53%) ±5% (>53%)	2%FS,	-10°C ~ 50°C: <0.3°C All other: <0.6°C
Measure Method	FDR , with temperature & EC compensate	Conductivity , with temperature compensate	RTD, and calibrate

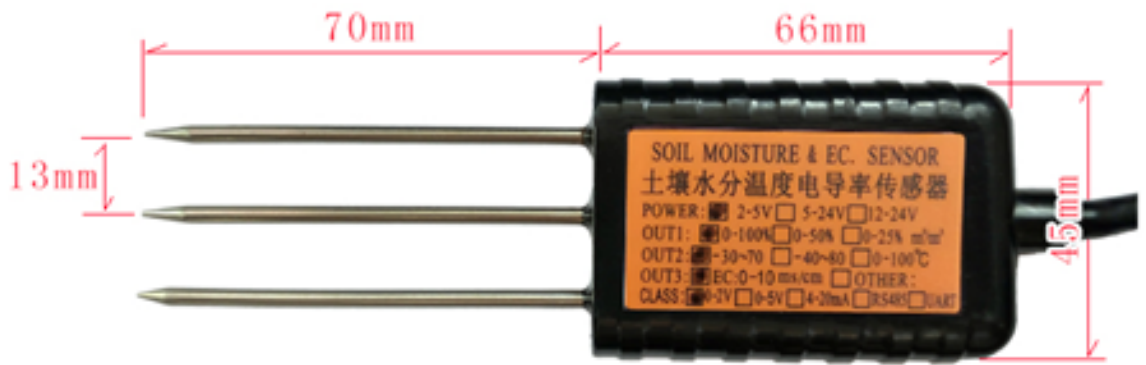
1.4 Dimension

Main Device Dimension:

See LSN50v2 from: https://www.dragino.com/downloads/index.php?dir=LSN50-LoRaST/Mechanical_Drawing/



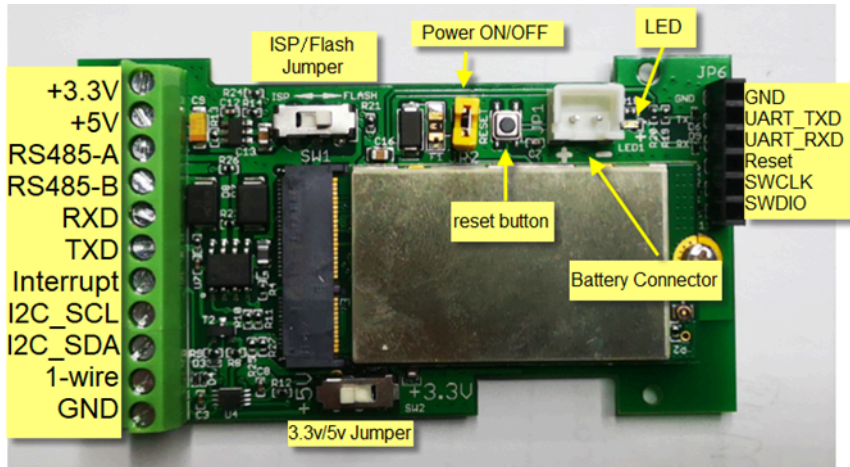
Probe Dimension



1.5 Applications

- Smart Agriculture

1.6 Pin Definitions

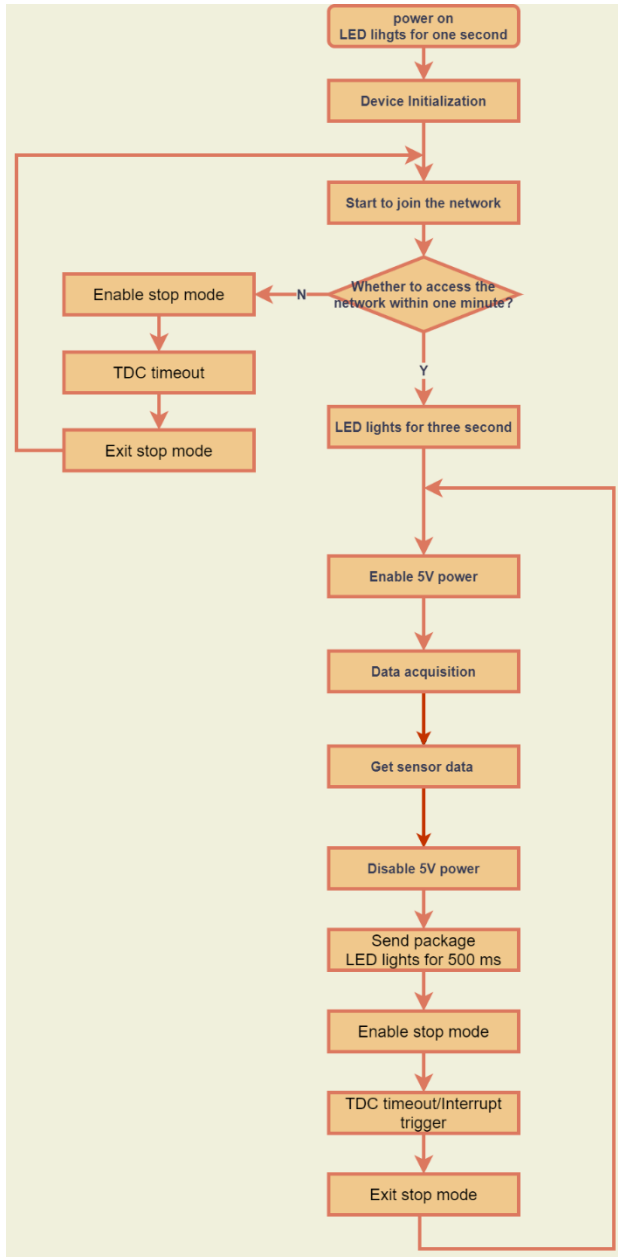


2. Use NSE01 to communicate with IoT Server

2.1 How it works

The NSE01 is equipped with a NB-IoT module, the pre-loaded firmware in NSE01 will get environment data from sensors and send the value to local NB-IoT network via the NB-IoT module. The NB-IoT network will forward this value to IoT server via the protocol defined by NSE01.

The diagram below shows the working flow in default firmware of NSE01:



2.2 Configure the NSE01

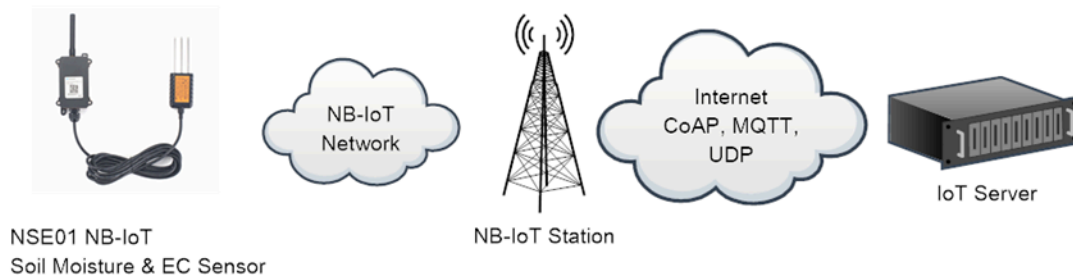
2.2.1 Test Requirement

To use NSE01 in your city, make sure meet below requirements:

- Your local operator has already distributed a NB-IoT Network there.
- The local NB-IoT network used the band that NSE01 supports.
- Your operator is able to distribute the data received in their NB-IoT network to your IoT server.

Below figure shows our testing structure. Here we have NB-IoT network coverage by China Mobile, the band they use is B8. The NSE01 will use CoAP(120.24.4.116:5683) or raw UDP(120.24.4.116:5601) or MQTT(120.24.4.116:1883) or TCP(120.24.4.116:5600) protocol to send data to the test server

NSE01 in a NB-IoT Network



2.2.2 Insert SIM card

Insert the NB-IoT Card get from your provider.

User need to take out the NB-IoT module and insert the SIM card like below:



2.2.3 Connect USB – TTL to NSE01 to configure it

User need to configure NSE01 via serial port to set the **Server Address / Uplink Topic** to define where and how-to uplink packets. NSE01 support AT Commands, user can use a USB to TTL adapter to connect to NSE01 and use AT Commands to configure it, as below.

Connection:

USB TTL GND <----> GND

USB TTL TXD <----> UART_RXD

USB TTL RXD <----> UART_TXD

In the PC, use below serial tool settings:

- Baud: **9600**
- Data bits: **8**
- Stop bits: **1**
- Parity: **None**
- Flow Control: **None**

Make sure the switch is in FLASH position, then power on device by connecting the jumper on NSE01. NSE01 will output system info once power on as below, we can enter the **password: 12345678** to access AT Command input.



Note: the valid AT Commands can be found at: https://www.dropbox.com/sh/351dwor6joz8nwh/AADn1BQaAAxLF_QMyU8NkW47a?dl=0

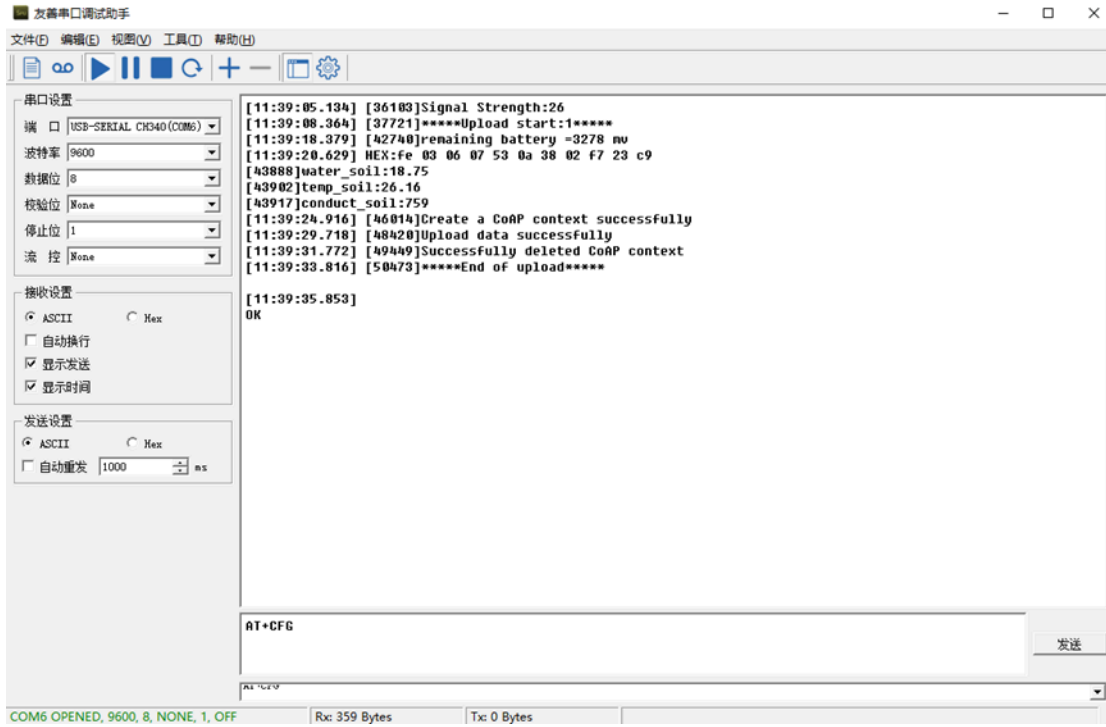
2.2.4 Use CoAP protocol to uplink data

Note: if you don't have CoAP server, you can refer this link to set up one: <http://wiki.dragino.com/xwiki/bin/view/Main/Set%20up%20CoAP%20Server/>

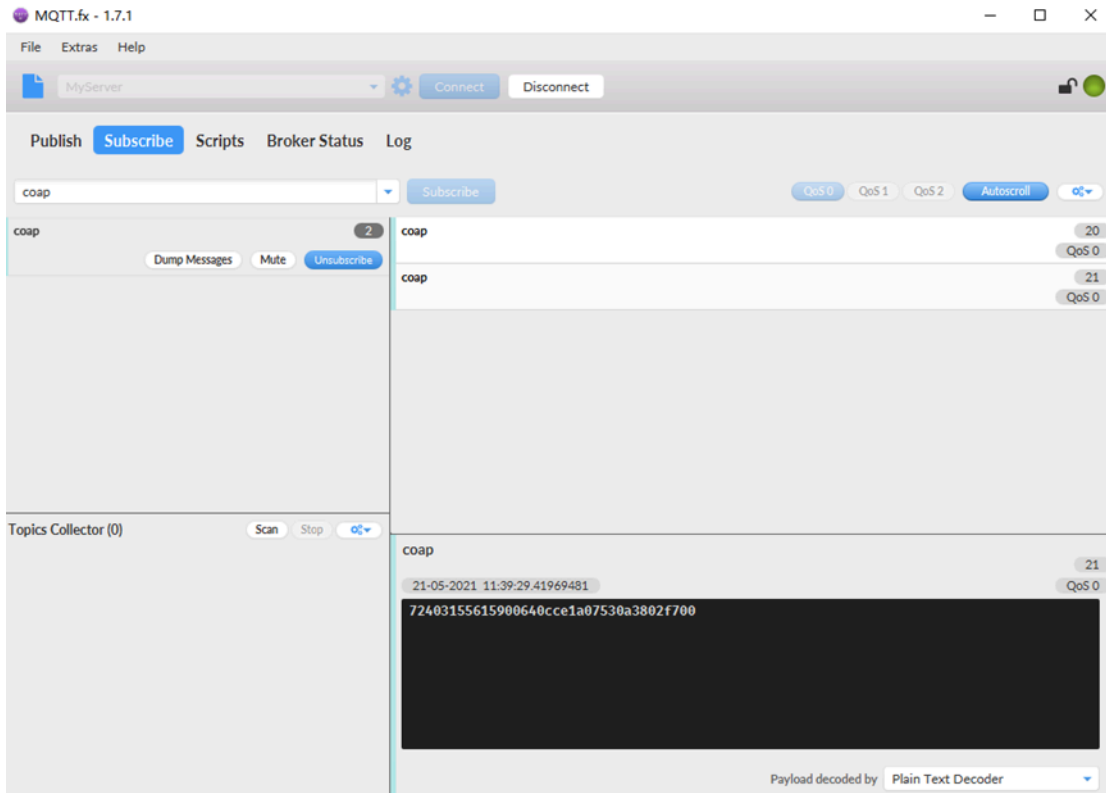
Use below commands:

- **AT+PRO=1** // Set to use CoAP protocol to uplink
- **AT+SERVADDR=120.24.4.116,5683** // to set CoAP server address and port
- **AT+URI=5,11,"mqt",11,"coap",12,"0",15,"c=text1",23,"0"** //Set COAP resource path

For parameter description, please refer to AT command set



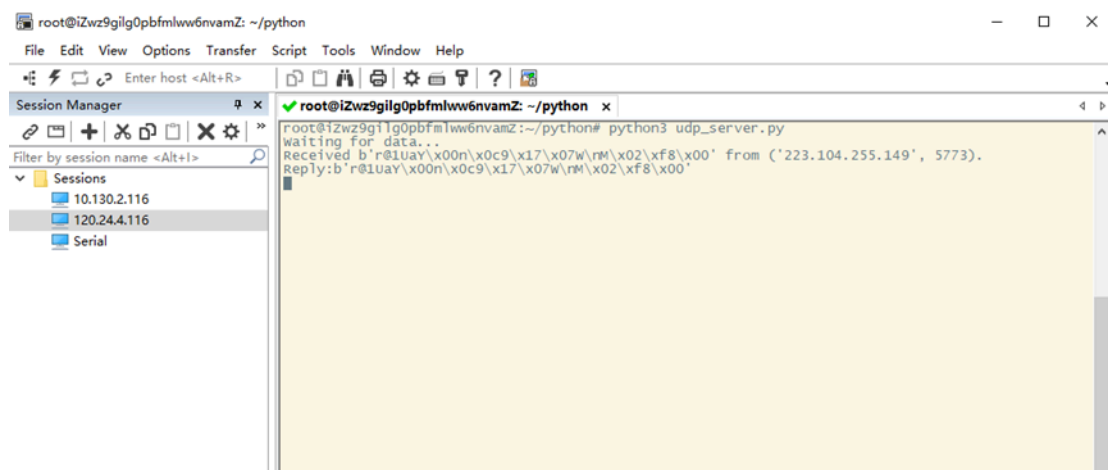
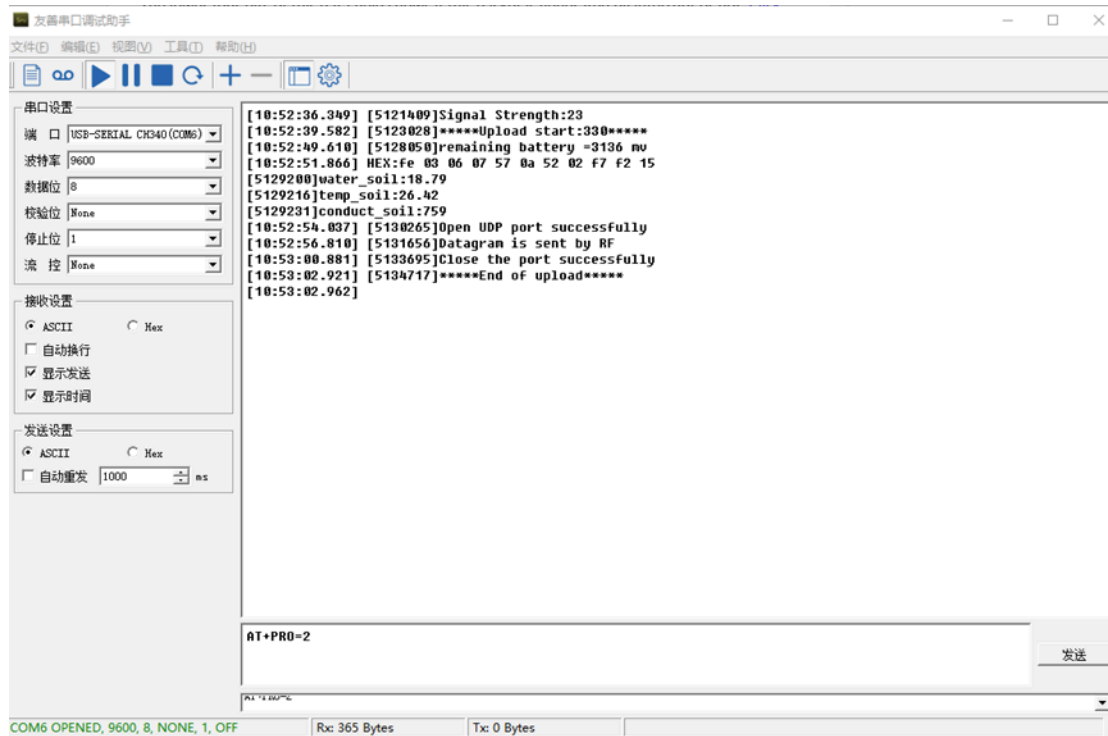
After configure the server address and **reset the device** (via AT+ATZ), NSE01 will start to uplink sensor values to CoAP server.



2.2.5 Use UDP protocol to uplink data(Default protocol)

This feature is supported since firmware version v1.0.1

- **AT+PRO=2** // Set to use UDP protocol to uplink
- **AT+SERVADDR=120.24.4.116,5601** // to set UDP server address and port
- **AT+CFM=1** //If the server does not respond, this command is unnecessary

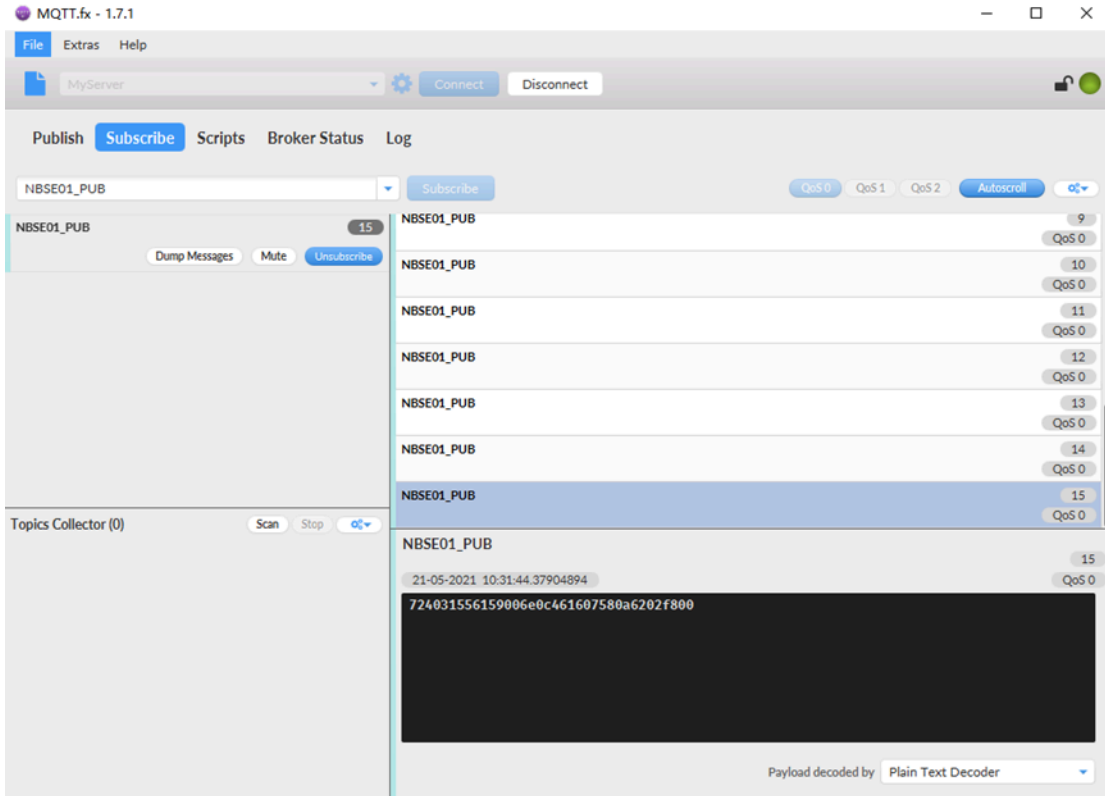
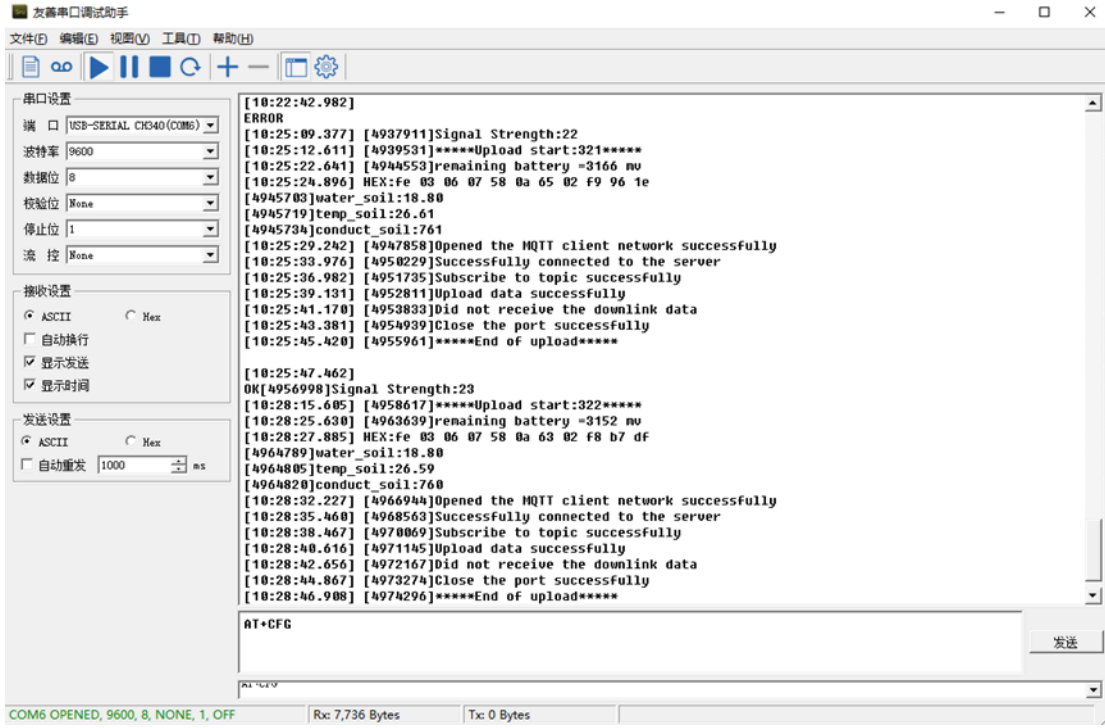


2.2.6 Use MQTT protocol to uplink data

This feature is supported since firmware version v110

- **AT+PRO=3** //Set to use MQTT protocol to uplink
- **AT+SERVADDR=120.24.4.116,1883** //Set MQTT server address and port
- **AT+CLIENT=CLIENT** //Set up the CLIENT of MQTT

- **AT+UNAME=UNAME** //Set the username of MQTT
- **AT+PWD=PWD** //Set the password of MQTT
- **AT+PUBTOPIC=NSE01_PUB** //Set the sending topic of MQTT
- **AT+SUBTOPIC=NSE01_SUB** //Set the subscription topic of MQTT

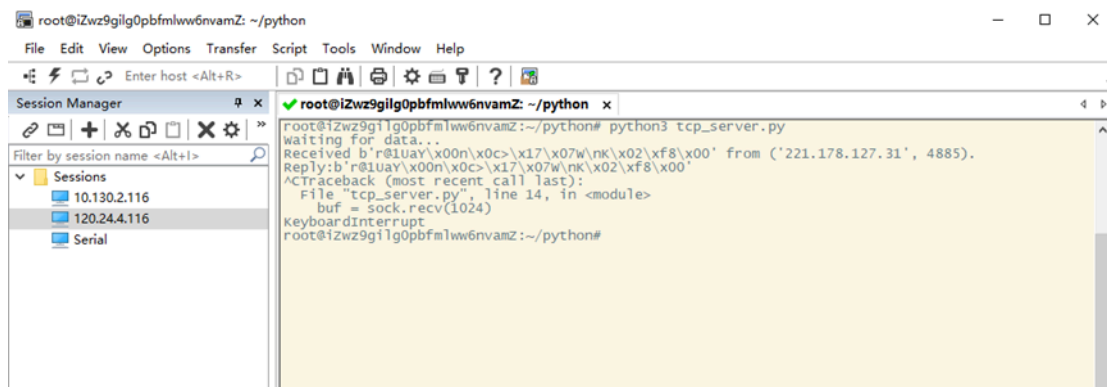
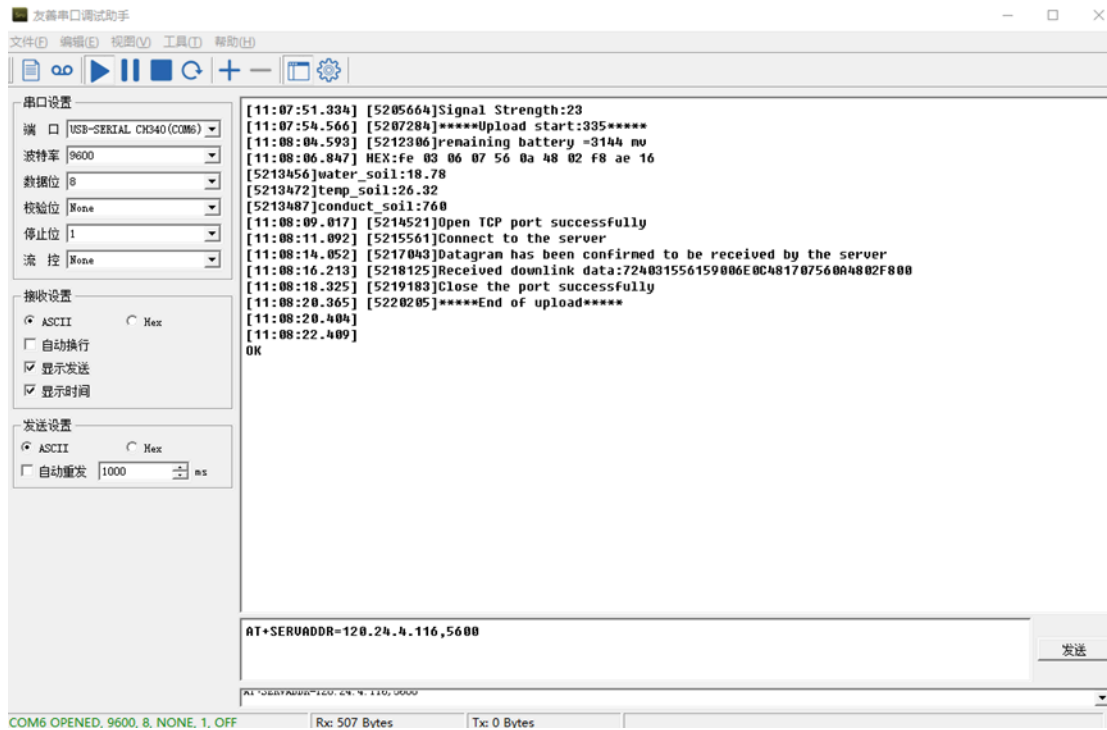


MQTT protocol has a much higher power consumption compare vs UDP / CoAP protocol. Please check the power analyze document and adjust the uplink period to a suitable interval.

2.2.7 Use TCP protocol to uplink data

This feature is supported since firmware version v110

- **AT+PRO=4** // Set to use TCP protocol to uplink
- **AT+SERVADDR=120.24.4.116,5600** // to set TCP server address and port



2.2.8 Change Update Interval

User can use below command to change the **uplink interval**.

- **AT+TDC=600** // Set Update Interval to 600s

NOTE :

1. By default, the device will send an uplink message every 1 hour.
2. When the firmware version is v1.3.2 and later firmware:

By default, the device will send an uplink message every 2 hours. Each Uplink Include 8 set of records in this 2 hour (15 minute interval / record).

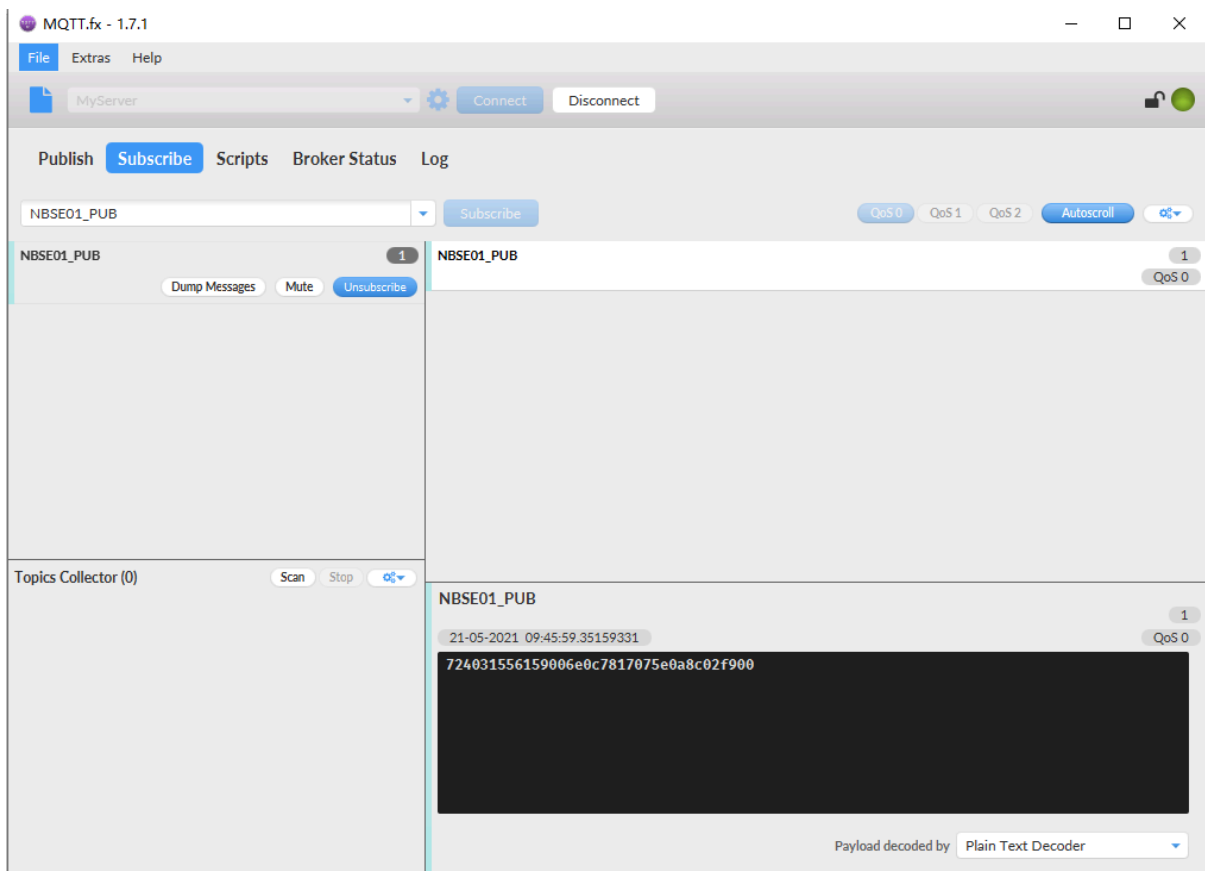
2.3 Uplink Payload

2.3.1 Before Firmware version v1.3.2

In this mode, uplink payload includes in total 18 bytes

Size(bytes)	6	2	2	1	2	2	2	1
Value	Device ID	Ver	BAT	Signal Strength	Soil Moisture	Soil Temperature	Soil Conductivity(EC)	Interrupt

If we use the MQTT client to subscribe to this MQTT topic, we can see the following information when the NSE01 uplink data.



The payload is **ASCII** string, representative same HEX:

0x72403155615900640c7817075e0a8c02f900 where:

- **Device ID:** 0x 724031556159 = 724031556159

- **Version:** 0x0064=100=1.0.0
- **BAT:** 0x0c78 = 3192 mV = 3.192V
- **Singal:** 0x17 = 23
- **Soil Moisture:** 0x075e= 1886 = 18.86 %
- **Soil Temperature:** 0x0a8c =2700=27 °C
- **Soil Conductivity(EC):** 0x02f9 =761 uS /cm
- **Interrupt:** 0x00 = 0

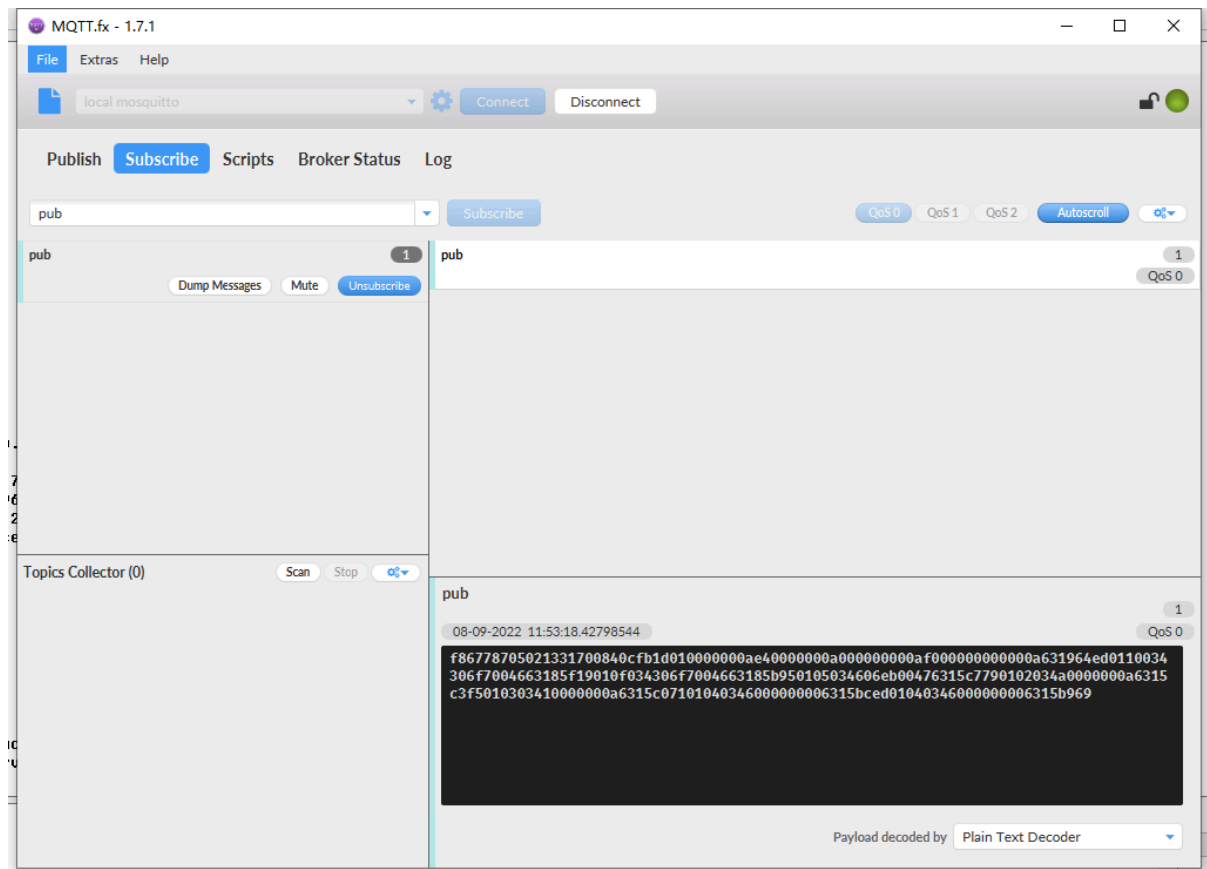
2.3.2 Since Firmware version v1.3.2

In this mode, uplink payload includes 123 bytes in total by default.

Each time the device uploads a data package, 8 sets of recorded data will be attached. Up to 32 sets of recorded data can be uploaded.

Size(bytes)	8	2	2	1	1	1	2	2	2
Value	Device ID	Ver	BAT	Signal Strength	MOD	Interrupt	Soil Moisture	Soil Temperature	Soil Conductivity(EC)
2	4	2	2	2	2	2	2	2	4
	Soil dielectric constant	Time stamp	Soil Temperature	Soil Moisture	Soil Conductivity(EC)	Soil dielectric constant	Time stamp		

If we use the MQTT client to subscribe to this MQTT topic, we can see the following information when the NSE01 uplink data.



The payload is ASCII string, representative same HEX:

0x f867787050213317 0084 0cfd 1b 01 00 0000 0ae8 0000 000a
6315537b 0110034306f7004663185f19 010f034306f7004663185b95
0105034606eb00476315c779 0102034a0000000a6315c3f5
010303410000000a6315c071 01040346000000006315bced
01040346000000006315b969 01040341000000006315b5e5

where:

- **Device ID:** f867787050213317 = f867787050213317
- **Version:** 0x0084=132=1.3.2
- **BAT:** 0x0c78 = 3325 mV = 3.325V
- **Singal:** 0x1b = 27
- **Mod:** 0x01 = 1
- **Interrupt:** 0x00= 0
- **Soil Moisture:** 0x0000= 0 = 0
- **Soil Temperature:** 0x0ae8 =2795=27.95 °C
- **Soil Conductivity(EC):** 0000=0
- **Soil dielectric constant:** 000a=1
- **Time stamp :** 0x6315537b =1662342011 ([Unix Epoch Time](#))
- **Soil Temperature,Soil Moisture,Soil Conductivity(EC),Soil dielectric constant,Time stamp :** 0110034306f7004663185f19
- **8 sets of recorded data:** Soil Temperature,Soil Moisture,Soil Conductivity(EC),Soil dielectric constant,Time stamp : **010f034306f7004663185b95**,.....

2.4 Payload Explanation and Sensor Interface

2.4.1 Device ID

By default, the Device ID equal to the last 6 bytes of IMEI.

User can use **AT+DEUI** to set Device ID

Example:

AT+DEUI= A84041F15612

The Device ID is stored in a none-erase area, Upgrade the firmware or run **AT+FDR** won't erase Device ID.

NOTE: When the firmware version is v1.3.2 and later firmware:

By default, the Device ID equal to the last 15 bits of IMEI.

User can use **AT+DEUI** to set Device ID

Example:

AT+DEUI= 868411056754138

2.4.2 Version Info

Specify the software version: 0x64=100, means firmware version 1.00.

For example: 0x00 64 : this device is NSE01 with firmware version 1.0.0.

2.4.3 Battery Info

Check the battery voltage for LSE01.

Ex1: 0x0B45 = 2885mV

Ex2: 0x0B49 = 2889mV

2.4.4 Signal Strength

NB-IoT Network signal Strength.

Ex1: 0x1d = 29

0 -113dBm or less

1 -111dBm

2...30 -109dBm... -53dBm

31 -51dBm or greater

99 Not known or not detectable

2.4.5 Soil Moisture

Get the moisture content of the soil. The value range of the register is 0-10000(Decimal), divide this value by 100 to get the percentage of moisture in the soil.

For example, if the data you get from the register is **0x05 0xDC**, the moisture content in the soil is

05DC(H) = 1500(D) /100 = 15%.

2.4.6 Soil Temperature

Get the temperature in the soil. The value range of the register is -4000 - +800(Decimal), divide this value by 100 to get the temperature in the soil. For example, if the data you get from the register is **0x09 0xEC**, the temperature content in the soil is

Example:

If payload is 0105H: ((0x0105 & 0x8000)>>15 === 0),temp = 0105(H)/100 = 2.61 °C

If payload is FF7EH: ((FF7E & 0x8000)>>15 ===1),temp = (FF7E(H)-FFFF(H))/100 = -1.29 °C

2.4.7 Soil Conductivity (EC)

Obtain [soluble salt concentration](#) in soil or [soluble ion concentration in liquid fertilizer](#) or [planting medium](#). The value range of the register is 0 - 20000(Decimal)(Can be greater than 20000).

For example, if the data you get from the register is **0x00 0xC8**, the soil conductivity is 00C8(H) = 200(D) = 200 uS/cm.

Generally, the EC value of irrigation water is less than 800uS / cm.

2.4.8 Soil dielectric constant

Get the soil dielectric constant in the soil. The value range of the register is 10 - 800(Decimal)

For example, if the data you get from the register is **0x00 0xD2**, the soil conductivity is 00D2(H) = 210(D) = 21.
Generally, the EC value of irrigation water is less than 21.

2.4.9 Digital Interrupt

Digital Interrupt refers to pin **GPIO_EXTI**, and there are different trigger methods. When there is a trigger, the NSE01 will send a packet to the server.

The command is:

AT+INTMOD=3 //(more info about INMOD please refer [AT Command Manual](#)).

The lower four bits of this data field shows if this packet is generated by interrupt or not. Click here for the hardware and software set up.

Example:

0x(00): Normal uplink packet.

0x(01): Interrupt Uplink Packet.

2.4.10 +5V Output

NSE01 will enable +5V output before all sampling and disable the +5v after all sampling.

The 5V output time can be controlled by AT Command.

AT+5VT=1000

Means set 5V valid time to have 1000ms. So the real 5V output will actually have 1000ms + sampling time for other sensors.

2.5 Downlink Payload

By default, NSE01 prints the downlink payload to console port.

Downlink Control Type	FPort	Type Code	Downlink payload size(bytes)
TDC (Transmit Time Interval)	Any	01	4
RESET	Any	04	2
INTMOD	Any	06	4

Examples:

- **Set TDC**

If the payload=0100003C, it means set the END Node's TDC to 0x00003C=60(S), while type code is 01.

Payload: 01 00 00 1E TDC=30S

Payload: 01 00 00 3C TDC=60S

- **Reset**

If payload = 0x04FF, it will reset the NSE01

- **INTMOD**

Downlink Payload: 06000003, Set AT+INTMOD=3

2.6 LED Indicator

The NSE01 has an internal LED which is to show the status of different state.

- When power on, NSE01 will detect if sensor probe is connected, if probe detected, LED will blink four times. (no blinks in this step is no probe)
- Then the LED will be on for 1 second means device is boot normally.
- After NSE01 join NB-IoT network. The LED will be ON for 3 seconds.
- For each uplink probe, LED will be on for 500ms.

2.7 Installation in Soil

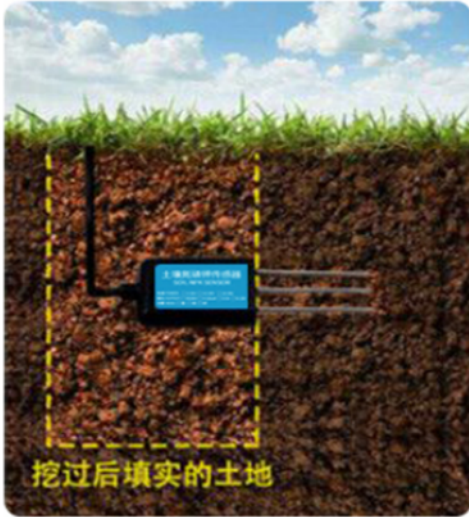
Measurement the soil surface

Choose the proper measuring position. Avoid the probe to touch rocks or hard things. Split the surface soil according to the measured deep. Keep the measured as original density. Vertical insert the probe into the soil to be measured. Make sure not shake when inserting. https://img.alicdn.com/imgextra/i3/2005165265/O1CN010rj9Oh1olPsQxrdUK_!!2005165265.jpg



Dig a hole with diameter > 20CM.

Horizontal insert the probe to the soil and fill the hole for long term measurement.



2.8 Moisture and Temperature alarm function (Since Firmware 1.3.2)

AT Command:

AT+ HUMALARM=min,max

- ² When min=0, and max≠0, Alarm higher than max
- ² When min≠0, and max=0, Alarm lower than min
- ² When min≠0 and max≠0, Alarm higher than max or lower than min

Example:

AT+ HUMALARM =50,80 // Alarm when moisture lower than 50.

AT+ TEMPALARM=min,max

- ² When min=0, and max≠0, Alarm higher than max
- ² When min≠0, and max=0, Alarm lower than min
- ² When min≠0 and max≠0, Alarm higher than max or lower than min

Example:

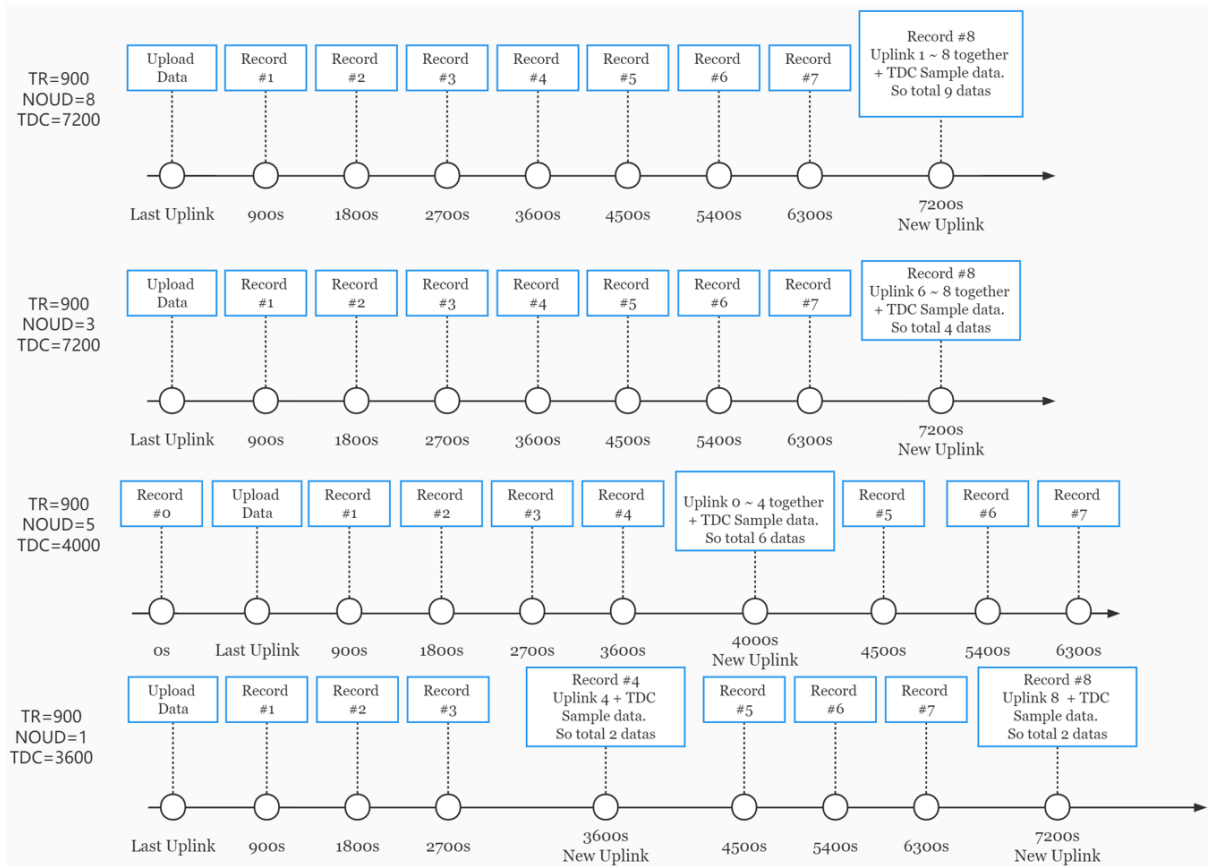
AT+ TEMPALARM=20,30 // Alarm when temperature lower than 20.

2.9 Set the number of data to be uploaded and the recording time

AT Command:

- **AT+TR=900** // The unit is seconds, and the default is to record data once every 900 seconds.(The minimum can be set to 180 seconds)
- **AT+NOUD=8** // The device uploads 8 sets of recorded data by default. Up to 32 sets of record data can be uploaded.

The diagram below explains the relationship between TR, NOUD, and TDC more clearly:



2.10 Read or Clear cached data

AT Command:

- **AT+CDP** // Read cached data
- **AT+CDP=0** // Clear cached data

The screenshot shows a serial terminal interface. On the left, there are configuration settings for a serial port:

- 波特率 (Baud Rate): 9600
- 数据位 (Data Bits): 8
- 校验位 (Parity): None
- 停止位 (Stop Bits): 1
- 流控 (Flow Control): None
- 接收设置 (Receive Settings):
 - ASCII Hex
 - 自动换行 (Auto Line Feed)
 - 显示发送 (Show Send)
 - 显示时间 (Show Time)
- 发送设置 (Send Settings):
 - ASCII Hex
 - 重复发送 (Repeat Send) with a dropdown set to 1000 ms

The main area on the right displays a log of data received, with each line representing a timestamped data packet. The data is formatted as: `Value1 Value2 Value3 Value4 Day Mon Sep Time Year`. For example, the first line is `25.81 0.00 0.0 1.00 Fri Sep 2 09:55:08 2022`. The log ends with `OK`.

2.11 Firmware Change Log

Download URL & Firmware Change log: <https://www.dropbox.com/sh/1zmcakvbkf24f8x/AACmq2dZ3iRB9F1nVWeEB9Moa?dl=0>

Upgrade Instruction: [Upgrade Firmware](#)

2.12 Battery Analysis

2.12.1 Battery Type

The NSE01 battery is a combination of an 8500mAh Li/SOCI2 Battery and a Super Capacitor. The battery is non-rechargeable battery type with a low discharge rate (<2% per year). This type of battery is commonly used in IoT devices such as water meter.

The battery is designed to last for several years depends on the actually use environment and update interval.

The battery related documents as below:

- [Battery Dimension](#)
- [Lithium-Thionyl Chloride Battery datasheet](#)
- [Lithium-ion Battery-Capacitor datasheet](#)



2.12.2 Power consumption Analyze

Dragino battery powered product are all runs in Low Power mode. We have an update battery calculator which base on the measurement of the real device. User can use this calculator to check the battery life and calculate the battery life if want to use different transmit interval.

Instruction to use as below:

Step 1: Downlink the up-to-date DRAGINO_Battery_Life_Prediction_Table.xlsx from: https://www.dragino.com/downloads/index.php?dir=LoRa_End_Node/Battery_Analyze/

Step 2: Open it and choose

- Product Model
- Uplink Interval
- Working Mode

And the Life expectation in difference case will be shown on the right.

DRAGINO How to use:
 1. Please do not modify the formula in the table
 2. After selecting the product number and model, then select the TDC unit, and finally enter the TDC, you can get the predicted battery life
 3. Explanation of abbreviations: WD-->Watchdog TX-->Transmit RX-->Receive

Battery Life Calculator

Product	battery capacity(mah)											
LHTS2_LoRaWAN_Temperature_Humidity_Sensor	1000											
UNIT	TDC (Uplink Interval)	Work Mode										
min	20	EXT-1										

	Sleep power (mA*ms)	Sampling power (mA*ms)	TX power (mA*ms)	RX1 power (mA*ms)	RX2 power (mA*ms)	Watchdog power (mA*ms)	Average power (mA)	Detect power (mA*ms)	Life expectancy (yr)
EU868	8400	787.31488	7367.8544	880.58488	4097.083	757.1706667	0.018567657	0	5.5
DR5_SF7_125K_14dB	8400	787.31488	13210.2528	950.0943	4097.083	757.1706667	0.0234891202	0	4.4
DR4_SF8_125K_14dB	8400	787.31488	23652.608	1068.0316	4097.083	757.1706667	0.032284892	0	3.3
DR2_SF10_125K_14dB	8400	787.31488	42244.125	1461.4876	4097.083	757.1706667	0.048089509	0	2.3
DR1_SF11_125K_14dB	8400	787.31488	94013.4	2230.4828	4097.083	757.1706667	0.091803712	0	1.2
DR0_SF12_125K_14dB	8400	787.31488	168081	4097.083	4097.083	757.1706667	0.1549102	0	0.7
US915	8400	787.31488	8441.476	681.61989	1587.135	757.1706667	0.01270746	0	5.9
DR2_SF8_125K_20dB	8400	787.31488	15170.785	913.6491	1587.135	757.1706667	0.02300594	0	4.5
DR1_SF9_125K_20dB	8400	787.31488	27254.383	941.388	1587.135	757.1706667	0.033092867	0	3.2
DR0_SF10_125K_20dB	8400	787.31488	48745.32	995.2241	1587.135	757.1706667	0.051032482	0	2.1

2.12.3 Battery Note

The Li-SiCO battery is designed for small current / long period application. It is not good to use a high current, short period transmit method. The recommended minimum period for use of this battery is 5 minutes. If you use a shorter period time to transmit LoRa, then the battery life may be decreased.

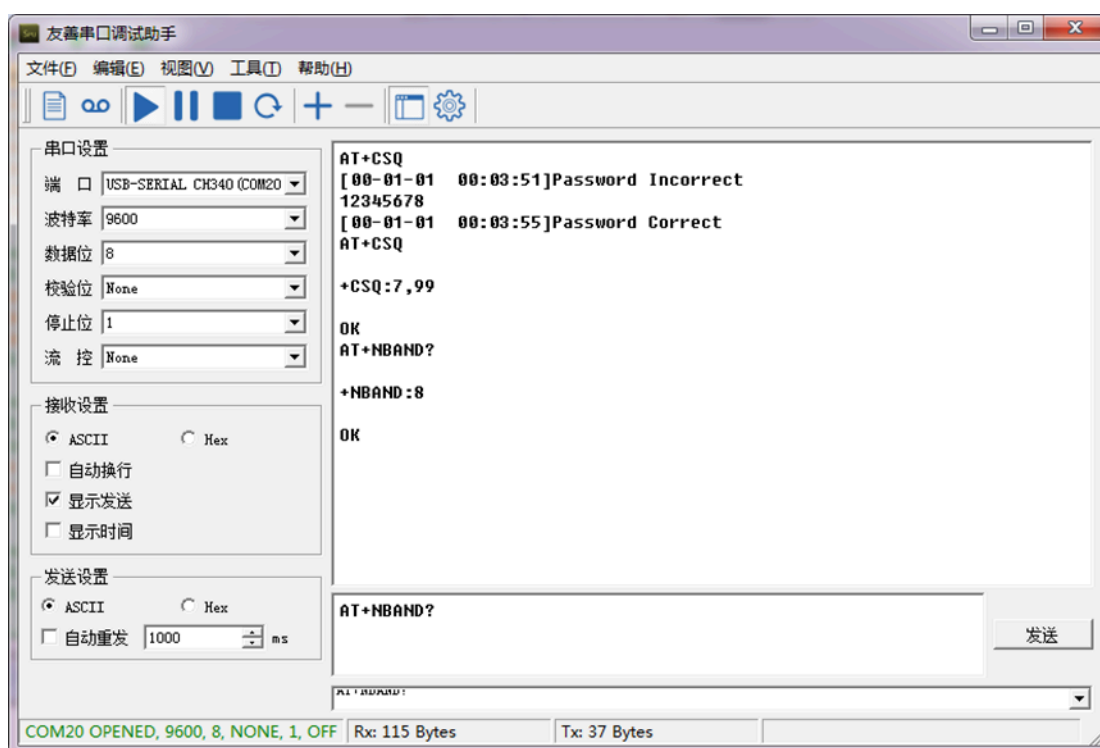
2.12.4 Replace the battery

The default battery pack of NSE01 includes a ER26500 plus super capacitor. If user can't find this pack locally, they can find ER26500 or equivalence without the SPC1520 capacitor, which will also work in most case. The SPC can enlarge the battery life for high frequency use (update period below 5 minutes).

3. Access NB-IoT Module

Users can directly access the AT command set of the NB-IoT module.

The AT Command set can refer the BC35-G NB-IoT Module AT Command: https://www.dragino.com/downloads/index.php?dir=datasheet/other_vendors/BC35-G/



4. Using the AT Commands

4.1 Access AT Commands

See this link for detail: https://www.dropbox.com/sh/351dwor6jz8nwh/AADn1BQaAAxLF_QMyU8NkKW47a?dl=0

AT+<CMD>? : Help on <CMD>

AT+<CMD> : Run <CMD>
AT+<CMD>=<value> : Set the value
AT+<CMD>=? : Get the value

General Commands

AT : Attention
AT? : Short Help
ATZ : MCU Reset
AT+TDC : Application Data Transmission Interval
AT+CFG : Print all configurations
AT+CFGMOD : Working mode selection
AT+INTMOD : Set the trigger interrupt mode
AT+5VT : Set extend the time of 5V power
AT+PRO : Choose agreement
AT+RXDL : Extend the sending and receiving time
AT+SERVADDR : Server Address
AT+TR : Get or Set record time"
AT+APN : Get or set the APN
AT+FBAND : Get or Set whether to automatically modify the frequency band
AT+DNSCFG : Get or Set DNS Server
AT+GETSENSORVALUE : Returns the current sensor measurement
AT+NOUD : Get or Set the number of data to be uploaded
AT+CDP : Read or Clear cached data
AT+TEMPALARM : Get or Set alarm of temp
AT+HUMALARM : Get or Set alarm of moisture

COAP Management

AT+URI : Resource parameters

UDP Management

AT+CFM : Upload confirmation mode (only valid for UDP)

MQTT Management

AT+CLIENT : Get or Set MQTT client
AT+UNAME : Get or Set MQTT Username
AT+PWD : Get or Set MQTT password
AT+PUBTOPIC : Get or Set MQTT publish topic
AT+SUBTOPIC : Get or Set MQTT subscription topic

Information

AT+FDR : Factory Data Reset

AT+PASSWORD : Serial Access Password

5. FAQ

5.1 How to Upgrade Firmware

User can upgrade the firmware for 1) bug fix, 2) new feature release.

Please see this link for how to upgrade: <http://wiki.dragino.com/xwiki/bin/view/Main/Firmware%20Upgrade%20Instruction%20for%20STM32%20base%20products/#H2.HardwareUpgradeMethodSupportList>

Notice, NSE01 and LSE01 share the same mother board. They use the same connection and method to update.

5.2 Can I calibrate NSE01 to different soil types?

NSE01 is calibrated for saline-alkali soil and loamy soil. If users want to use it for other soil, they can calibrate the value in the IoT platform base on the value measured by saline-alkali soil and loamy soil. The formula can be found at [this link](#).

6. Trouble Shooting

6.1 Connection problem when uploading firmware

Please see: <http://wiki.dragino.com/xwiki/bin/view/Main/Firmware%20Upgrade%20Instruction%20for%20STM32%20base%20products/#H3.3Troubleshooting>

6.2 AT Command input doesn't work

In the case if user can see the console output but can't type input to the device. Please check if you already include the **ENTER** while sending out the command. Some serial tool doesn't send **ENTER** while press the send key, user need to add ENTER in their string.

7. Order Info

Part Number: **NSE01**

8. Packing Info

Package Includes:

- NSE01 NB-IoT Soil Moisture & EC Sensor x 1
- External antenna x 1

Dimension and weight:

- Size: 195 x 125 x 55 mm
- Weight: 420g

9. Support

- Support is provided Monday to Friday, from 09:00 to 18:00 GMT+8. Due to different timezones we cannot offer live support. However, your questions will be answered as soon as possible in the before-mentioned schedule.
- Provide as much information as possible regarding your enquiry (product models, accurately describe your problem and steps to replicate it etc) and send a mail to support@dragino.com