



SE



NO

Direktronik AB | Box 234 , 149 23 Nynäshamn | Besöksadress Konsul Johnsons väg 15 149 45 Nynäshamn
Telefon 08 52 400 700 | Fax | Epost info@direktronik.se | Org.nr 556281-9663 | Bankgiro 922-0179



Table of Contents:

- [1. Introduction](#)
 - [1.1 What is NB-IoT Analog Sensor](#)
 - [1.2 Features](#)
 - [1.3 Specification](#)
 - [1.4 Applications](#)
 - [1.5 Sleep mode and working mode](#)
 - [1.6 Button & LEDs](#)
 - [1.7 BLE connection](#)
 - [1.8 Pin Definitions , Switch & SIM Direction](#)
 - [1.8.1 Jumper JP2](#)
 - [1.8.2 BOOT MODE / SW1](#)
 - [1.8.3 Reset Button](#)
 - [1.8.4 SIM Card Direction](#)

- [2. Use PS-NB-NA to communicate with IoT Server](#)
 - [2.1 Send data to IoT server via NB-IoT network](#)
 - [2.2 Payload Types](#)
 - [2.2.1 General Json Format\(Type=5\)](#)
 - [2.2.2 HEX format Payload\(Type=0\)](#)
 - [2.2.3 ThingsBoard Payload\(Type=3\)](#)
 - [2.2.4 ThingSpeak Payload\(Type=1\)](#)
 - [2.3 Test Uplink and Change Update Interval](#)
 - [2.4 Multi-Samplings and One uplink\(It is replaced by AT+CLOCKLOG\)](#)
 - [2.5 Triggier an uplink by external interrupt](#)
 - [2.6 Set Power Output Duration](#)
 - [2.7 Set the Probe Model](#)
 - [2.8 Clock logging \(Since firmware version v1.0.5\)](#)
 - [Unix TimeStamp](#)
 - [Poll sensor value](#)
 - [Datalog Uplink payload](#)
 - [2.9 Example Query saved historical records](#)
 - [2.10 Uplink log query](#)
 - [2.11 Scheduled domain name resolution](#)
 - [2.12 Set the QoS level](#)
 - [2.13 Set the downlink debugging mode\(Since firmware v1.2.0\)](#)
 - [2.14 Domain name resolution settings\(Since firmware v1.2.0\)](#)
 - [2.15 Print last few data entries](#)
 - [2.16 Print data entries base on page](#)
 - [2.17 Clear Flash Record](#)
- [3. Configure PS-NB-NA](#)
 - [3.1 Configure Methods](#)
 - [3.2 Serial Access Password](#)
 - [3.3 AT Commands Set](#)
- [4. Battery & Power Consumption](#)
- [5. Firmware update](#)
- [6. FAQ](#)
 - [6.1 How can I access t BC660K-GL AT Commands?](#)
 - [6.2 How to configure the device through the MQTT subscription function? \(Since version v1.0.3\)](#)
- [7. Order Info](#)
- [8. Packing Info](#)
- [9. Support](#)

1. Introduction

1.1 What is NB-IoT Analog Sensor

The Dragino PS-NB-NA is a **NB-IoT Analog Sensor** for Internet of Things solution. PS-NB-NA has 5v and 12v output, 4~20mA, 0~30v input interface to power and get value from Analog Sensor. PS-NB-NA will convert the Analog Value to NB-IoT wireless data and send to IoT platform via NB-IoT network.

PS-NB-NA supports different uplink methods including **MQTT, MQTTs, UDP & TCP** for different application requirement, and support uplinks to various IoT Servers.

PS-NB-NA **supports BLE configure** and **OTA update** which make user easy to use.

PS-NB-NA is powered by **8500mAh Li-SOCI2 battery**, it is designed for long-term use up to several years.

PS-NB-NA has optional built-in SIM card and default IoT server connection version. Which makes it works with simple configuration.

1.2 Features

- NB-IoT Bands: B1/B2/B3/B4/B5/B8/B12/B13/B17/B18/B19/B20/B25/B28/B66/B70/B85 @H-FDD
- Ultra-low power consumption
- 1 x 0~20mA input , 1 x 0~30v input
- 5v and 12v output to power external sensor
- Multiply Sampling and one uplink
- Support Bluetooth v5.1 remote configure and update firmware
- Uplink on periodically
- Downlink to change configure
- 8500mAh Battery for long term use
- IP66 Waterproof Enclosure
- Uplink via MQTT, MQTTs, TCP, or UDP
- Nano SIM card slot for NB-IoT SIM

1.3 Specification

Common DC Characteristics:

- Supply Voltage: 2.5v ~ 3.6v
- Operating Temperature: -40 ~ 85°C

Current Input (DC) Measuring :

- Range: 0 ~ 20mA
- Accuracy: 0.02mA
- Resolution: 0.001mA

Voltage Input Measuring:

- Range: 0 ~ 30v
- Accuracy: 0.02v
- Resolution: 0.001v

NB-IoT Spec:

NB-IoT Module: BC660K-GL

Support Bands:

- B1 @H-FDD: 2100MHz
- B2 @H-FDD: 1900MHz
- B3 @H-FDD: 1800MHz
- B4 @H-FDD: 2100MHz
- B5 @H-FDD: 860MHz
- B8 @H-FDD: 900MHz
- B12 @H-FDD: 720MHz
- B13 @H-FDD: 740MHz
- B17 @H-FDD: 730MHz
- B18 @H-FDD: 870MHz
- B19 @H-FDD: 870MHz
- B20 @H-FDD: 790MHz
- B25 @H-FDD: 1900MHz
- B28 @H-FDD: 750MHz
- B66 @H-FDD: 2000MHz
- B70 @H-FDD: 2000MHz
- B85 @H-FDD: 700MHz

Battery:

- Li/SOCI2 un-chargeable battery
- Capacity: 8500mAh
- Self Discharge: <1% / Year @ 25°C
- Max continuously current: 130mA
- Max boost current: 2A, 1 second

Power Consumption

- STOP Mode: 10uA @ 3.3v
- Max transmit power: 350mA@3.3v

1.4 Applications

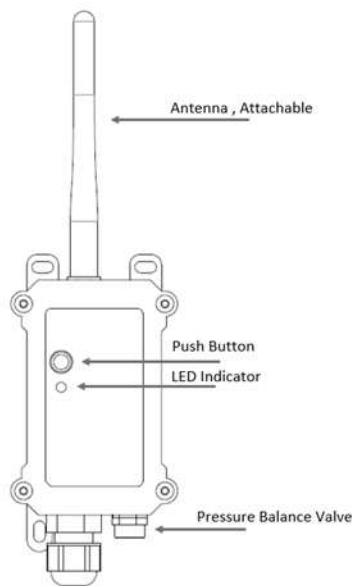
- Smart Buildings & Home Automation
- Logistics and Supply Chain Management
- Smart Metering
- Smart Agriculture
- Smart Cities
- Smart Factory

1.5 Sleep mode and working mode

Deep Sleep Mode: Sensor doesn't have any NB-IoT activate. This mode is used for storage and shipping to save battery life.

Working Mode: In this mode, Sensor will work as NB-IoT Sensor to Join NB-IoT network and send out sensor data to server. Between each sampling/tx/rx periodically, sensor will be in IDLE mode), in IDLE mode, sensor has the same power consumption as Deep Sleep mode.

1.6 Button & LEDs



Behavior on ACT	Function	Action
Pressing ACT between 1s < time < 3s	Send an uplink	If sensor has already attached to NB-IoT network, sensor will send an uplink packet, blue led will blink once. Meanwhile, BLE module will be active and user can connect via BLE to configure device.
Pressing ACT for more than 3s	Active Device	Green led will fast blink 5 times, device will enter OTA mode for 3 seconds. And then start to attach NB-IoT network. Green led will solidly turn on for 5 seconds after joined in network. Once sensor is active, BLE module will be active and user can connect via BLE to configure device, no matter if device attach NB-IoT network or not.

Fast press ACT 5 times.

Deactivate Device

Red led will solid on for 5 seconds. Means device is in Deep Sleep Mode.

Note: When the device is executing a program, the buttons may become invalid. It is best to press the buttons after the device has completed the program execution.

1.7 BLE connection

PS-NB-NA support BLE remote configure and firmware update.

BLE can be used to configure the parameter of sensor or see the console output from sensor. BLE will be only activate on below case:

- Press button to send an uplink
- Press button to active device.
- Device Power on or reset.

If there is no activity connection on BLE in 60 seconds, sensor will shut down BLE module to enter low power mode.

1.8 Pin Definitions , Switch & SIM Direction

PS-NB-NA use the mother board which as below.



1.8.1 Jumper JP2

Power on Device when put this jumper.

1.8.2 BOOT MODE / SW1

1) **ISP**: upgrade mode, device won't have any signal in this mode. but ready for upgrade firmware. LED won't work. Firmware won't run.

2) **Flash**: work mode, device starts to work and send out console output for further debug

1.8.3 Reset Button

Press to reboot the device.

1.8.4 SIM Card Direction

See this link. [How to insert SIM Card](#).

2. Use PS-NB-NA to communicate with IoT Server

2.1 Send data to IoT server via NB-IoT network

The PS-NB-NA is equipped with a NB-IoT module, the pre-loaded firmware in PS-NB-NA 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 PS-NB-NA.

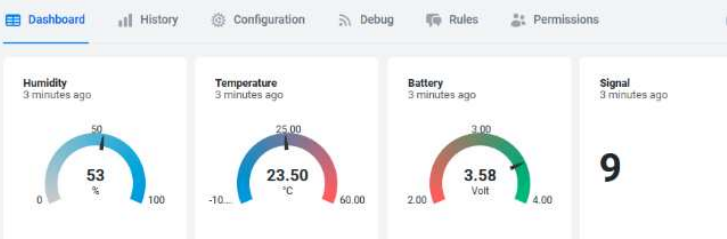
Below shows the network structure:

There are two version: **-GE** and **-1T** version of PS-NB-NA.

GE Version: This version doesn't include SIM card or point to any IoT server. User needs to use AT Commands to configure below two steps to set PS-NB-NA send data to IoT server.

- Install NB-IoT SIM card and configure APN. See instruction of [Attach Network](#).
- Set up sensor to point to IoT Server. See instruction of [Configure to Connect Different Servers](#).

Below shows result of different server as a glance.

Servers	Dash Board	Comments
Node-Red		
DataCake		

[Tigo.IO](#)

[General UDP](#)

[General MQTT](#)

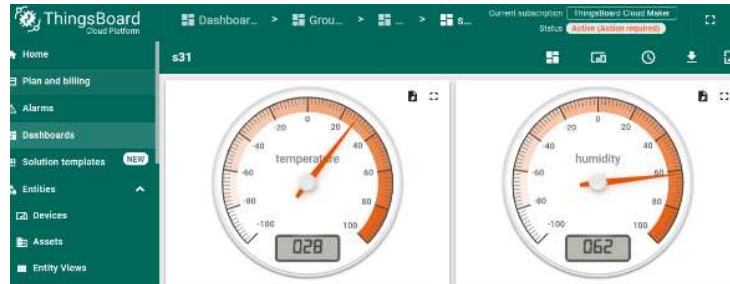
[ThingSpeak](#)

Raw Payload. Need Developer to design Dash Board

Raw Payload. Need Developer to design Dash Board



[ThingsBoard](#)



1T Version: This version has 1NCE SIM card pre-installed and configure to send value to ThingsEye. User Just need to select the sensor type in ThingsEyeand Activate PS-NB-NA and user will be able to see data in ThingsEye. See here for [ThingsEye Config Instruction](#).

2.2 Payload Types

To meet different server requirement, PS-NB-NA supports different payload type.

Includes:

- [General JSON format payload](#). (Type=5)
- [HEX format Payload](#). (Type=0)
- [ThingSpeak Format](#). (Type=1)
- [ThingsBoard Format](#). (Type=3)

User can specify the payload type when choose the connection protocol. Example:

AT+PRO=2,0 // Use UDP Connection & hex Payload
AT+PRO=2,5 // Use UDP Connection & Json Payload
AT+PRO=3,0 // Use MQTT Connection & hex Payload
AT+PRO=3,1 // Use MQTT Connection & ThingSpeak
AT+PRO=3,3 // Use MQTT Connection & ThingsBoard
AT+PRO=3,5 // Use MQTT Connection & Json Payload
AT+PRO=4,0 // Use TCP Connection & hex Payload
AT+PRO=4,5 // Use TCP Connection & Json Payload

2.2.1 General Json Format(Type=5)

This is the General Json Format. As below:

```
{"IMEI":"863663062798815","IMSI":"460083513507309","Model":"PS-NB","idc_input":0.000,"vdc_input":9.934,"battery":3.587,"signal":25,"time":"2024/12/20 02:51:05","1":[0.000,0.000,"2024/12/18 01:14:56"],"2":[0.000,0.000,"2024/12/18 00:59:56"],"3":[0.000,0.000,"2024/12/18 00:44:56"],"4":[0.000,0.000,"2024/12/18 00:29:56"],"5":[0.000,0.000,"2024/12/18 00:14:56"],"6":[0.000,0.000,"2024/12/17 23:59:56"],"7":[0.000,0.000,"2024/12/17 23:44:56"],"8":[0.000,0.000,"2024/12/17 23:29:56"]}]}
```

The screenshot shows the MQTT.fx 1.7.1 application window. The interface includes a menu bar (File, Extras, Help), a toolbar with a file icon, a dropdown menu showing 'normal/mqtt', and 'Connect' and 'Disconnect' buttons. Below the toolbar, there are tabs for 'Publish', 'Subscribe', 'Scripts', 'Broker Status', and 'Log'. The 'Subscribe' tab is active, showing a list of subscribed topics: '002_CB' (2 messages) and '004_NB' (3 messages). The '004_NB' topic is selected, and its message history is displayed in a list on the right. The most recent message is highlighted in blue and contains a JSON payload. The payload is decoded using the 'Plain Text Decoder'.

MQTT.fx - 1.7.1

File Extras Help

normal/mqtt Connect Disconnect

Publish Subscribe Scripts Broker Status Log

004_NB Subscribe QoS... QoS... QoS... Autoscroll

002_CB 2
Dump Messages Mute Unsubscribe

004_NB 3
Dump Messages Mute Unsubscribe

Topics Collector ... S... S...

002_CB 2
QoS 0

004_NB 3
QoS 0

004_NB 4
QoS 0

004_NB 5
QoS 0

004_NB 4
20-12-2024 10:51:07.39067077 QoS 0

```
{"IMEI":"863663062798815","IMSI":"460083513507309","Model":"PS-NB","idc_input":0.000,"vdc_input":9.934,"battery":3.587,"signal":25,"time":"2024/12/20 02:51:05","1":[0.000,0.000,"2024/12/18 01:14:56"],"2":[0.000,0.000,"2024/12/18 00:59:56"],"3":[0.000,0.000,"2024/12/18 00:44:56"],"4":[0.000,0.000,"2024/12/18 00:29:56"],"5":[0.000,0.000,"2024/12/18 00:14:56"],"6":[0.000,0.000,"2024/12/17 23:59:56"],"7":[0.000,0.000,"2024/12/17 23:44:56"],"8":[0.000,0.000,"2024/12/17 23:29:56"]}]}
```

Payload decoded by Plain Text Decoder

Notice, from above payload:

- Idc_input , Vdc_input , Battery, Signal & time are the value at uplink time.
- Json entry 1 ~ 8 are the last 1 ~ 8 sampling data as specify by **AT+CLOCKLOG=1,65535,15,8** Command.
Each entry includes (from left to right): Idc_input , Vdc_input, Sampling time.

2.2.2 HEX format Payload(Type=0)

This is the HEX Format. As below:

f863663062798815f46008351350730901790e03170000000000000026d06764dcab00000000676222100000000067621e8c0000000067621b08000000006762178400000000676214000000006762107c0000000067620cf80000000067620974

HEX Format for PS-NB(AT+CLOCKLOG=1,65535,15,8)																									
f863663062798815 f+IMEI 8 Bytes				f460083513507309 f+IMSI 8 Bytes				0179 Version		0e03 BAT	17 Singal	0000 PROBE MOD		00 IN1	00 IN2	00 GPIO_EXIT Level 19 Bytes		00 GPIO_EXIT Flag		0000 0~20mA		26d0 0~30V		6764dcab Timestamp	
0000 0~20mA		0000 0~30V		6762221 Timestamp		00000000067621e8c last 2nd data 8 Bytes				0000000067621b08 last 3rd data 8 Bytes								0000000067621784 last 4th data 8 Bytes							
00000000676214 last 5th data 8 Bytes				0000000006762107c last 6th data 8 Bytes				0000000067620cf8 last 7th data 8 Bytes								0000000067620974 last 8th data 8 Bytes									

The screenshot shows the MQTT.fx - 1.7.1 application window. The 'Subscribe' button is highlighted, and the topic '004_NB' is entered in the subscription field. The 'Publish' button is also visible. Below the subscription field, there are buttons for 'Dump Messages', 'Mute', and 'Unsubscribe'. The main message list shows a message received on the '004_NB' topic at '20-12-2024 10:55:58.39358181'. The message content is displayed in a black box with white text, showing the decoded payload: **f863663062798815f46008351350730901790e03170000000000000026d06764dcab00000000676222100000000067621e8c0000000067621b08000000006762178400000000676214000000006762107c0000000067620cf80000000067620974**. The 'Payload decoded by' dropdown is set to 'Plain Text Decoder'.

Device ID(f+IMEI): f863663062798815 =863663062798815

SIM Card ID(f+IMSI): f460083513507309 =460083513507309

Version:

These bytes include the hardware and software version.

Higher byte: Specify Sensor Model: 0x01 for PS-NB-NA

Lower byte: Specify the software version: 0x79=1.2.1, means firmware version 1.2.1

BAT (Battery Info):

Check the battery voltage for PS-NB-NA.

Ex1: 0x0dde = 3550mV

Ex2: 0x0B49 = 2889mV

Signal Strength:

NB-IoT Network signal Strength.

Ex1: 0x13 = 19

0 -113dBm or less

1 -111dBm

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

31 -51dBm or greater

99 Not known or not detectable

Probe Model:

PS-NB-NA might connect to different kind of probes, 4~20mA represent the full scale of the measuring range. So a 12mA output means different meaning for different probe.

For example.

Probe Type	4~20mA scale for this probe	Example: 12mA actually meaning for this probe
PH Combination Electrodes	0 ~ 14 pH	PH Value: 7
Water Pressure Sensor	0~5 meters	2.5 meters pure water
Pressure transmitter probe	0~1MPa	0.5MPa air / gas or water pressure

User can set different probe model for above probes. So IoT server is able to see identical how it should parse the 4~20mA or 0~30v sensor value and get the correct value.

IN1 & IN2:

IN1 and IN2 are used as Digital input pins.

Example:

01 (H): IN1 or IN2 pin is high level.

00 (L): IN1 or IN2 pin is low level.

GPIO_EXTI Level:

GPIO_EXTI is used as Interrupt Pin.

Example:

01 (H): GPIO_EXTI pin is high level.

00 (L): GPIO_EXTI pin is low level.

GPIO_EXTI Flag:

This data field shows if this packet is generated by **Interrupt Pin** or not.

Note: The Interrupt Pin is a separate pin in the screw terminal.

Example:

0x00: Normal uplink packet.

0x01: Interrupt Uplink Packet.

0~20mA:

Example:

$27AE(H) = 10158 (D)/1000 = 10.158mA$.

4~20mA Sensor Type	Connection to PS-NB-NA
2-wire Type	VCC(12v) <--> +12v_OUT
	OUT <--> IDC_IN
3-wire Type	VCC(12v) <--> +12v_OUT
	OUT <--> IDC_IN
	GND <--> GND

Connect to a 2 wire 4~20mA sensor.



0~30V:

Measure the voltage value. The range is 0 to 30V.

Example:

$138E(H) = 5006(D)/1000 = 5.006V$

TimeStamp:

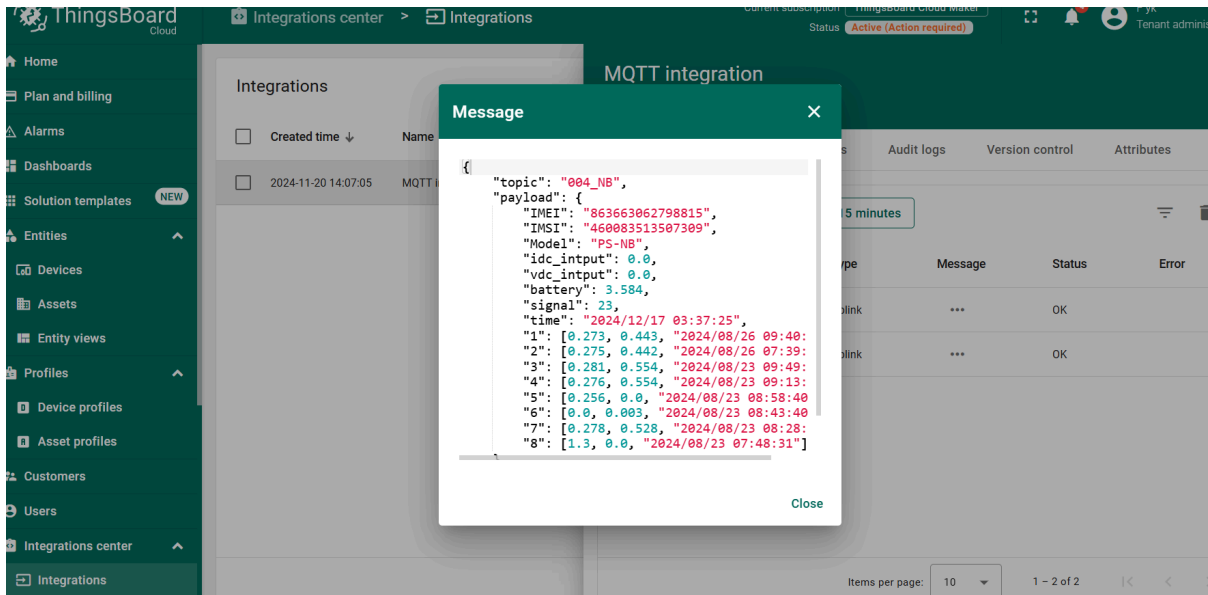
Unit TimeStamp Example: $64e2d74f(H) = 1692587855(D)$

Put the decimal value into this link(<https://www.epochconverter.com>) to get the time.

2.2.3 ThingsBoard Payload(Type=3)

Type3 payload special design for ThingsBoard, it will also configure other default server to ThingsBoard.

```
{
  "topic": "004_NB",
  "payload": {
    "IMEI": "863663062798815",
    "IMSI": "460083513507309",
    "Model": "PS-NB",
    "idc_intput": 0.0,
    "vdc_intput": 0.0,
    "battery": 3.584,
    "signal": 23,
    "time": "2024/12/17 03:37:25",
    "1": [0.273, 0.443, "2024/08/26 09:40:35"],
    "2": [0.275, 0.442, "2024/08/26 07:39:55"],
    "3": [0.281, 0.554, "2024/08/23 09:49:04"],
    "4": [0.276, 0.554, "2024/08/23 09:13:40"],
    "5": [0.256, 0.0, "2024/08/23 08:58:40"],
    "6": [0.0, 0.003, "2024/08/23 08:43:40"],
    "7": [0.278, 0.528, "2024/08/23 08:28:40"],
    "8": [1.3, 0.0, "2024/08/23 07:48:31"]
  }
}
```



2.2.4 ThingSpeak Payload(Type=1)

This payload meets ThingSpeak platform requirement. It includes only four fields. Form 1~4 are:

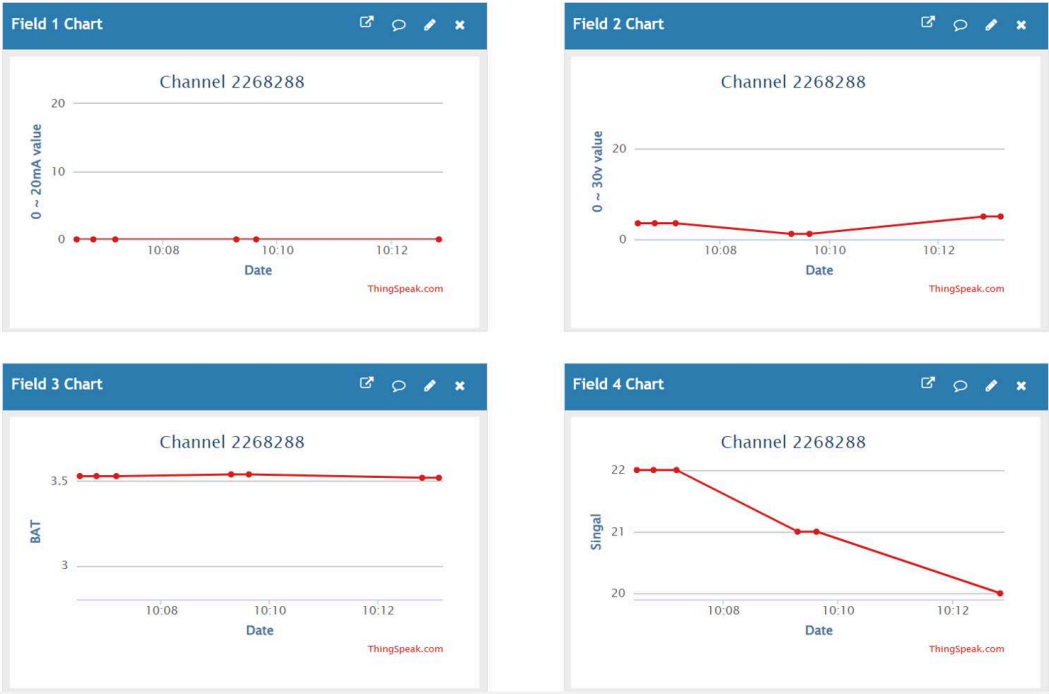
Idc_input , Vdc_input , Battery & Signal. This payload type only valid for ThingSpeak Platform

As below:

field1=idc_input value&field2=vdc_input value&field3=battery value&field4=signal value

Channel Stats

Created: 20 minutes ago
Entries: 6



2.3 Test Uplink and Change Update Interval

By default, Sensor will send uplinks every 2 hours
User can use below commands to change the uplink interval.

AT+TDC=7200 // Set Update Interval to 7200s

User can also push the button for more than 1 seconds to activate an uplink.

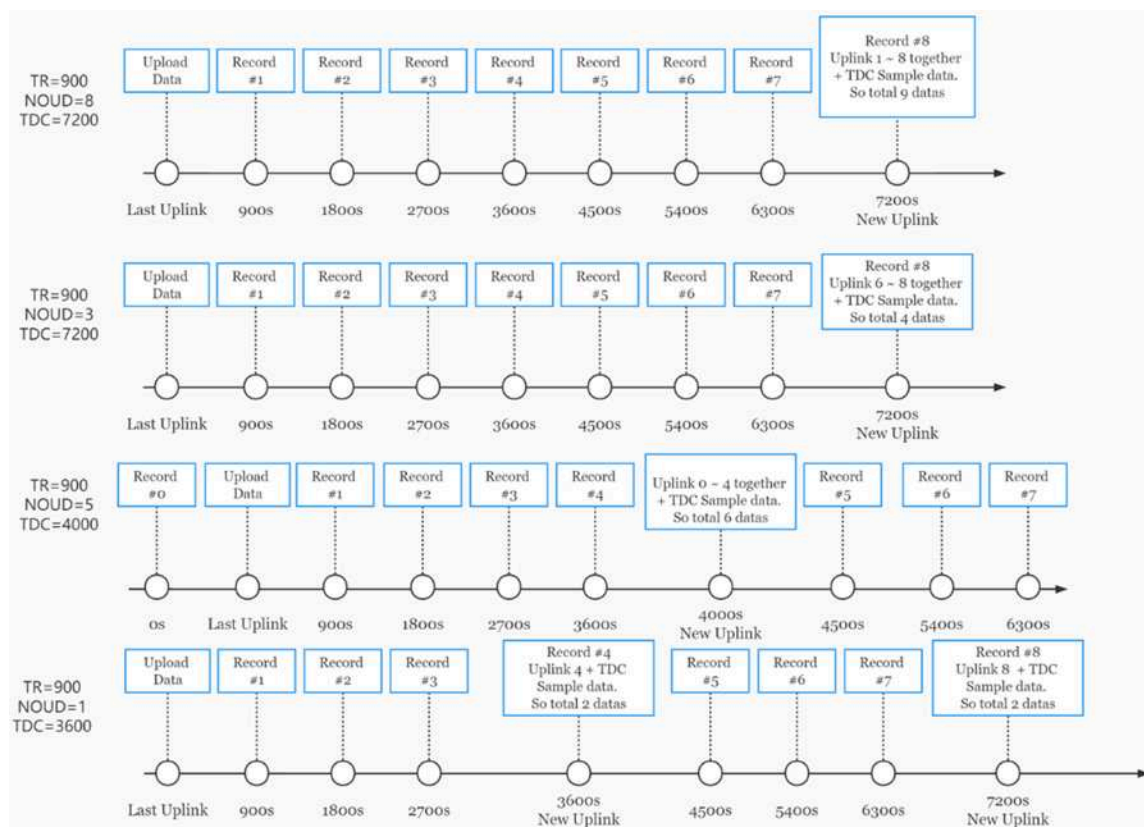
2.4 Multi-Samplings and One uplink(It is replaced by AT+CLOCKLOG)

Notice: The AT+NOUD feature is upgraded to Clock Logging, please refer [Clock Logging Feature](#).

To save battery life, PS-NB-NA will sample I_{dc_input} & V_{dc_input} data every 15 minutes and send one uplink every 2 hours. So each uplink it will include 8 stored data + 1 real-time data. They are defined by:

- **AT+TR=900** // The unit is seconds, and the default is to record data once every 900 seconds (15 minutes, 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:



2.5 Triggier an uplink by external interrupt

PS-NB-NA has an external trigger interrupt function. Users can use the GPIO_EXTI pin to trigger the upload of data packets.

AT command:

- **AT+INTMOD** // Set the trigger interrupt mode
- **AT+INTMOD=0** // Disable Interrupt, as a digital input pin
- **AT+INTMOD=1** // Trigger by rising and falling edge
- **AT+INTMOD=2** // Trigger by falling edge

- **AT+INTMOD=3** // Trigger by rising edge

2.6 Set Power Output Duration

Control the output duration 3V3 , 5V or 12V. Before each sampling, device will

1. first enable the power output to external sensor,
2. keep it on as per duration, read sensor value and construct uplink payload
3. final, close the power output.

- Set extend the time of 3V3 power:

AT Command: AT+3V3T

Command Example	Function	Response
AT+3V3T=?	Show 3V3 open time.	0 OK
AT+3V3T=0	Normally open 3V3 power supply.	OK default setting
AT+3V3T=1000	Close after a delay of 1000 milliseconds.	OK
AT+3V3T=65535	Normally closed 3V3 power supply.	OK

Downlink Command: 0x0701

Example 1: Downlink Payload: 070101F4 ---> AT+3V3T=500

Example 2: Downlink Payload: 0701FFFF ---> AT+3V3T=65535

- Set extend the time of 5V power:

AT Command: AT+5VT

Command Example	Function	Response
AT+5VT=?	Show 5V open time.	0 OK
AT+5VT=0	Normally closed 5V power supply.	OK default setting
AT+5VT=1000	Close after a delay of 1000 milliseconds.	OK
AT+5VT=65535	Normally open 5V power supply.	OK

Downlink Command: 0x0702

Example 3: Downlink Payload: 070203E8 ---> AT+5VT=1000

Example 4: Downlink Payload: 07020000 ---> AT+5VT=0

- Set extend the time of 12V power:

AT Command: AT+12VT

Command Example	Function	Response
AT+12VT=?	Show 12V open time.	0 OK
AT+12VT=0	Normally closed 12V power supply.	OK
AT+12VT=500	Close after a delay of 500 milliseconds.	OK

AT+12VT=65535	Normally open 5V power supply.	OK
---------------	--------------------------------	----

Downlink Command: 0x0703

Example 5: Downlink Payload: 070301F4 ---> AT+12VT=500

Example 6: Downlink Payload: 07030000 ---> AT+12VT=0

2.7 Set the Probe Model

Users need to configure this parameter according to the type of external probe. In this way, the server can decode according to this value, and convert the current value output by the sensor into water depth or pressure value.

AT Command: AT +PROBE

AT+PROBE=aabb

When aa=00, it is the water depth mode, and the current is converted into the water depth value; bb is the probe at a depth of several meters.

When aa=01, it is the pressure mode, which converts the current into a pressure value;

bb represents which type of pressure sensor it is.

Command Example	Function	Response
AT +PROBE = ?	Get or Set the probe model.	0 OK
AT +PROBE =0003	Set water depth sensor mode, 3m type.	OK
AT +PROBE =000A	Set water depth sensor mode, 10m type.	OK
AT +PROBE =0101	Set pressure transmitters mode, first type.	OK
AT +PROBE =0000	Initial state, no settings.	OK

- **Downlink command: 0x0A**

Format: Command Code (0x08) followed by 2 bytes.

- Example 1: Downlink Payload: 080003 ---> AT+PROBE=0003
- Example 2: Downlink Payload: 080101 ---> AT+PROBE=0101

Note: When entering the downlink payload, there must be no Spaces between bytes.

2.8 Clock logging (Since firmware version v1.0.5)

Sometimes when we deploy lots of end nodes in field. We want all sensors sample data at the same time, and upload these data together for analyze. In such case, we can use clock logging feature.

We can use this command to set the start time of data recording and the time interval to meet the requirements of the specific collection time of data.

- **AT Command: AT +CLOCKLOG=a,b,c,d**

a: 0: Disable Clock logging. **1:** Enable Clock Logging

b: Specify First sampling start second: range (0 ~ 3599, 65535) // **Note:** If parameter b is set to 65535, the log period starts after the node accesses the network and sends packets.

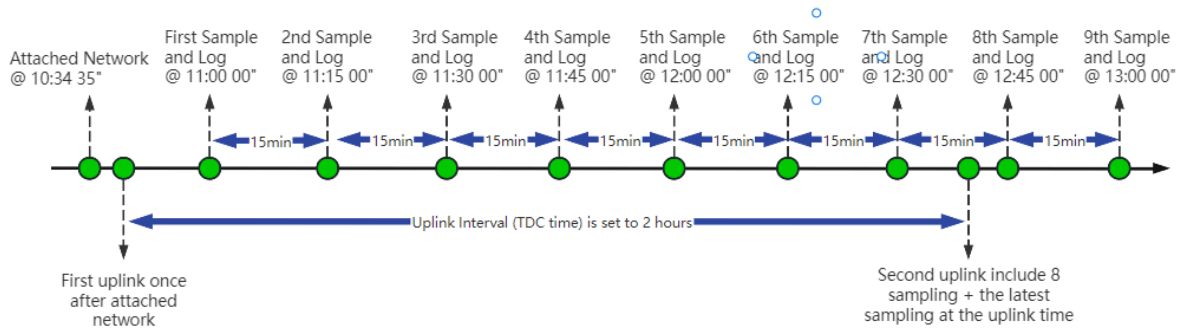
c: Specify the sampling interval: range (0 ~ 255 minutes)

d: How many entries should be uplink on every TDC (max 32)

Note: To disable clock recording, set the following parameters: AT+CLOCKLOG=1,65535,0,0

Example: AT+CLOCKLOG=1,0,15,8

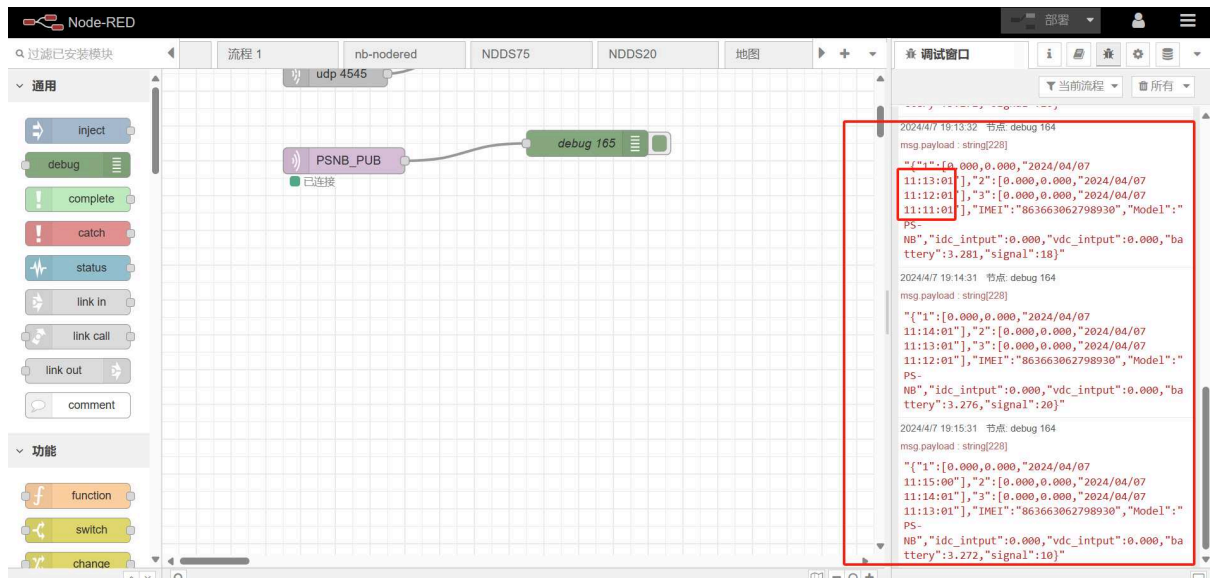
Device will log data to memory start from the 0th second (11:00 00" of first hour and then sampling and log every 15 minutes. Every TDC uplink, the uplink payload will consist: Battery info + last 8 memory record with timestamp + the latest sample at uplink time) . See below for the example.



Example:

AT+CLOCKLOG=1,65535,1,3

After the node sends the first packet, data is recorded to the memory at intervals of 1 minute. For each TDC uplink, the uplink load will include: battery information + the last 3 memory records (payload + timestamp).



Note: Users need to synchronize the server time before configuring this command. If the server time is not synchronized before this command is configured, the command takes effect only after the node is reset.

- **Downlink command: 0x0A**

Format: Command Code (0x0A) followed by 5 bytes.

- **Example 1:** Downlink Payload: **0A01FFFF0F08** // Set SHT record time: AT
+CLOCKLOG=1,65535,15,8
- **Example 1:** Downlink Payload: **0A0104B00F08** // Set SHT record time: AT
+CLOCKLOG=1,1200,15,8

Note: When entering the downlink payload, there must be no Spaces between bytes.

Unix TimeStamp

PS-NB uses Unix TimeStamp format based on

Size (bytes)	4	1
DeviceTimeAns Payload	32-bit unsigned integer : Seconds since epoch*	8bits unsigned integer: fractional-second in $\frac{1}{2}^8$ second steps

Figure 10 : DeviceTimeAns payload format

User can get this time from link: <https://www.epochconverter.com/> :

Below is the converter example



Epoch & Unix Timestamp Conversion Tools

The current Unix epoch time is 1735019603

Convert epoch to human-readable date and vice versa

1735007594 Timestamp to Human date [batch convert]

Supports Unix timestamps in seconds, milliseconds, microseconds and nanoseconds.

Yr Mon Day Hr Min Sec
2024 - 12 - 24 3 : 52 : 45 GMT Human date to Timestamp

Epoch timestamp 1735012365

Timestamp in milliseconds: 1735012365000

Date and time (GMT): 2024年12月24日TuesdayAM3点52分

Date and time (your time zone): 2024年12月24日星期二中午11点52分 GMT+08:00



So, 1735012365 means that the current time is Tuesday, December 24, 2024 at 11:52 AM.

Poll sensor value

User can poll sensor value based on timestamps from the server. Below is the downlink command.

1 byte	4 bytes	4 bytes
--------	---------	---------

31	Timestamp start	Timestamp end
----	-----------------	---------------

Timestamp start and Timestamp end use Unix TimeStamp format as mentioned above. Devices will reply with all data log during this time period.

For example, downlink command **31 676A 300D 676A 48A9**

Is to check 2024/12/24 03:52:45 to 2024/12/24 05:37:45's data

Datalog Uplink payload

The Datalog poll reply uplink will use below payload format.

Retrieval data payload:

Size(bytes)	2	2	4
value	0~20mA	0~30V	Timestamp

Function Description: This feature is only used when the clock logging feature is turned on. one uplink packet can send **64** groups of stored data totaling **512** bytes.

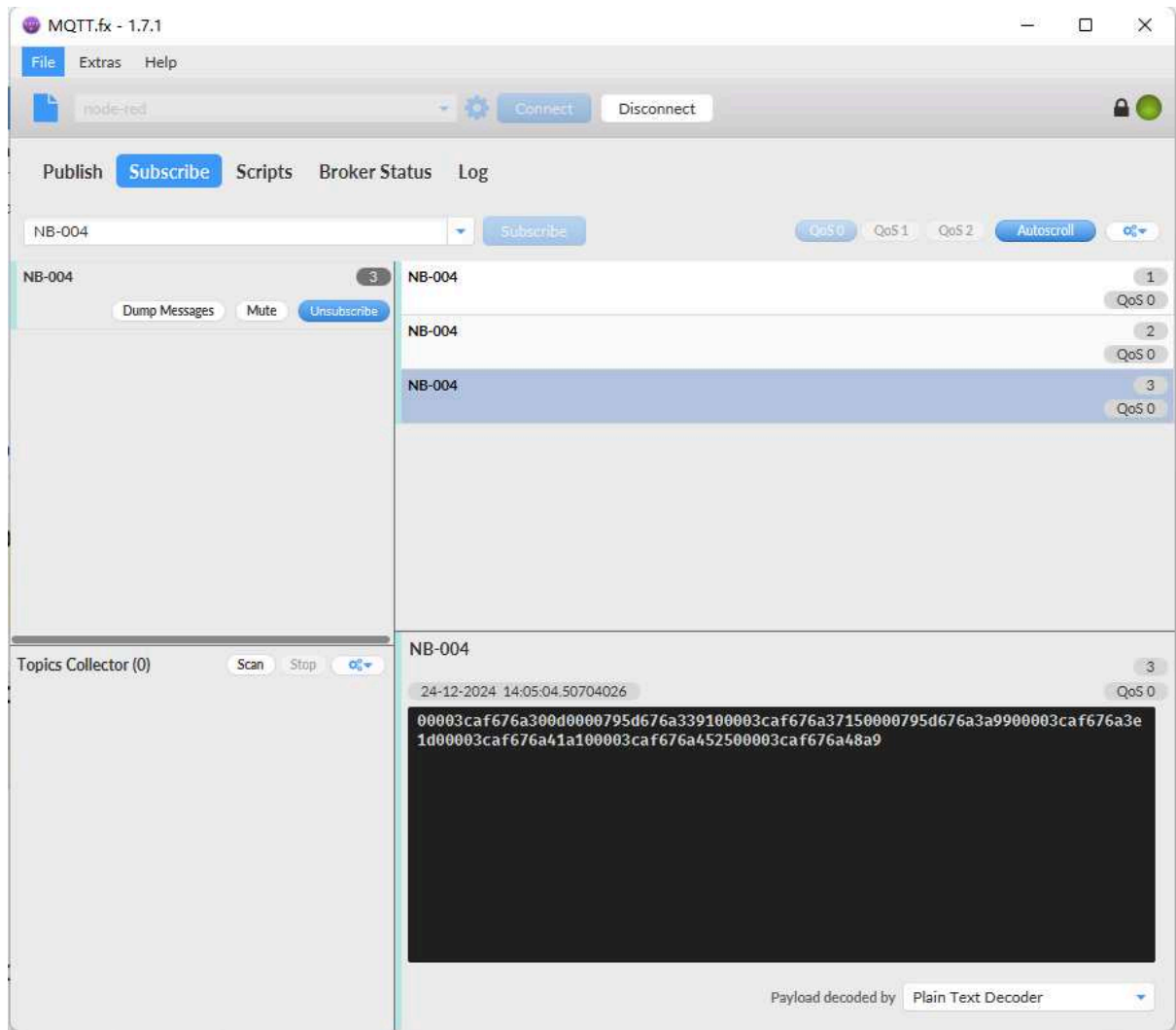
Example(For MQTT.fx):

If user sends below downlink command:

Where : Start time: 676A300D = time 24/12/24 03:52:45

Stop time: 676A48A9 = time 24/12/24 05:37:45

S31x-NB will uplink this payload.



0x00003caf676a300d 0000795d676a3391 00003caf676a3715 0000795d676a3a99 00003caf676a3e1d
00003caf676a41a1 00003caf676a4525 00003caf676a48a9

PS-NB(8 groups for example)					
0000	3caf	676a300d	0000795d676a3391	00003caf676a3715	0000795d676a3a99
0~20mA	0~30V	Timestamp	2nd data	3rd data	4th data
8 Bytes			8 Bytes	8 Bytes	8 Bytes
00003caf676a3e1d			00003caf676a41a1	00003caf676a4525	00003caf676a48a9
5th data			6th data	7th data	8th data
8 Bytes			8 Bytes	8 Bytes	8 Bytes

0~20mA = $0x0000/1000 = 0$ mA

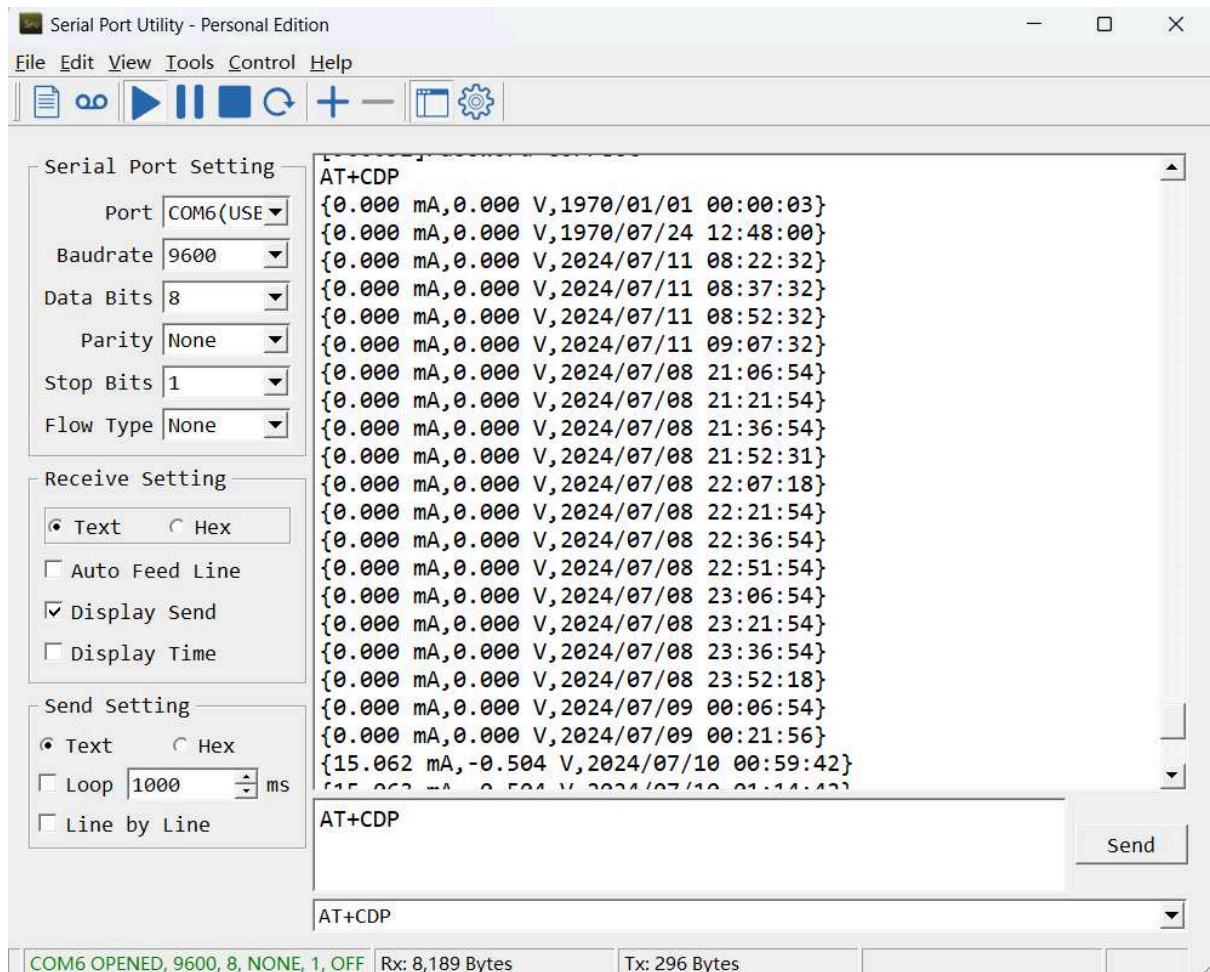
0~30V = $0x3caf/1000 = 15.535$ V

Unix time is $0x676A300D = 1735012365s = 24/12/24\ 03:52:45$

2.9 Example Query saved historical records

- **AT command:** **AT+CDP**

This command can be used to search the saved history, recording up to 32 groups of data, each group of historical data contains a maximum of 100 bytes.



2.10 Uplink log query

- **AT command:** **AT+GETLOG**

This command can be used to query upstream logs of data packets.

2.11 Scheduled domain name resolution

This command is used to set up scheduled domain name resolution.

AT command:

- **AT+DNSTIMER** // Unit: hour

After setting this command, domain name resolution will be performed regularly.

2.12 Set the QoS level

This command is used to set the QoS level of **MQTT**.

AT command:

- **AT+MQOS** // 0~2

Downlink command: 0x07

Format: Command Code (0x07) followed by 1 byte.

Ex1: Downlink payload: **0x0700** //AT+MQOS=0

Ex2: Downlink payload: **0x0701** //AT+MQOS=1

2.13 Set the downlink debugging mode(Since firmware v1.2.0)

Feature: Set the conversion between the standard version and 1T version downlinks.

AT command: AT+DOWNTE

Command Example	Function/Parameters	Response/Explanation
AT+DOWNTE=?	Get current Settings	0,0 (default) OK
AT+DOWNTE=a,b	a: Set the conversion between the downlink of the standard version and 1T version	0: Set the downlink of the standard version. 1: Set the downlink of the 1T version(ThingsEye platform)
	b: Enable/Disable downlink debugging	0: Disable downlink debugging mode. 1: Enable downlink debugging mode, users can see the original downlink reception.

Example:

- AT+DOWNTE=0,1 // Set to standard version downlink, and enable downlink debugging.
- AT+DOWNTE=1,1 // Set to 1T version downlink, and enable downlink debugging.

Downlink Command:

No downlink commands for feature

2.14 Domain name resolution settings(Since firmware v1.2.0)

Feature: Set dynamic domain name resolution IP.

AT command: AT+BKDNS

Command Example	Function/Parameters	Response/Explanation
AT+BKDNS=?	Get current Settings	0,0,NULL (default) OK
AT+BKDNS=a,b,c	a: Enable/Disable dynamic domain name resolution.	1: Disable dynamic domain name update. The ip address will be saved after the domain name is resolved, if the next domain name resolution fails, the last saved ip address will be used. 2: Enable dynamic domain name update. The ip address will be saved after domain name resolution, if the next domain name resolution fails, the last saved ip address will be used, and the domain name resolution will be updated regularly according to the time set by the customer.
	b: Set the time to update the domain name resolution at regular intervals.	Unit: hour
	c: Set the IP address manually.	The format is the same as AT+SERVADDR. If domain name resolution fails, this ip address will be used directly, if domain name resolution succeeds, parameter c will be updated to the successfully resolved IP address.

Example:

- AT+BKDNS=1,0 // Dynamic domain name resolution is disabled.
- AT+BKDNS=2,1 // The dynamic domain name resolution function is enabled and the automatic update time is set to 1 hour.

- AT+BKDNS=2,4,3.69.98.183,1883 // The dynamic domain name resolution function is enabled and the automatic update time is set to 4 hour, and manually set the ip address, if the domain name failed to resolve, it will directly use this ip to communicate. When the next domain name resolution is successful, it will be updated to the ip address of the successful resolution.

Downlink Command:

No downlink commands for feature

2.15 Print last few data entries

Feature: Print the last few data entries

AT command: AT+PLDTA

Command Example	4 bytes
AT+PLDTA=5 Print last 5 entries	Stop Tx events when read sensor data 1 24/12/24 04:37:45 idc_input=0.000 vdc_input=31.069 2 24/12/24 04:52:45 idc_input=0.000 vdc_input=15.535 3 24/12/24 05:07:45 idc_input=0.000 vdc_input=15.535 4 24/12/24 05:22:45 idc_input=0.000 vdc_input=15.535 5 24/12/24 05:37:45 idc_input=0.000 vdc_input=15.535 OK

Downlink Command:

No downlink commands for feature

2.16 Print data entries base on page

Feature: Print the sector data from start page to stop page.

AT command: AT+PDTA

Command Example	4 bytes
AT+PDTA=1,1 Print page 1 to 1	Stop Tx events when read sensor data 8028A00 24/11/13 07:01:06 idc_input=0.251 vdc_input=0.660 8028A08 24/11/13 07:27:11 idc_input=0.263 vdc_input=0.660 8028A10 24/11/13 07:30:03 idc_input=0.257 vdc_input=0.639 8028A18 24/11/13 07:31:03 idc_input=0.256 vdc_input=0.624 8028A20 24/11/13 07:32:03 idc_input=0.255 vdc_input=0.621 8028A28 24/11/13 07:33:03 idc_input=0.254 vdc_input=0.620 8028A30 24/11/13 07:34:03 idc_input=0.252 vdc_input=0.618 8028A38 24/11/13 07:35:03 idc_input=0.252 vdc_input=0.621 8028A40 24/11/13 07:36:03 idc_input=0.250 vdc_input=0.619 8028A48 24/11/13 07:37:03 idc_input=0.251 vdc_input=0.616 8028A50 24/11/13 07:38:03 idc_input=0.251 vdc_input=0.619 8028A58 24/11/13 07:39:03 idc_input=0.252 vdc_input=0.614

```
8028A60 24/11/13 07:40:03 idc_input=0.251 vdc_input=0.609
8028A68 24/11/13 07:41:03 idc_input=0.250 vdc_input=0.611
8028A70 24/11/13 07:42:03 idc_input=0.249 vdc_input=0.599
8028A78 24/11/13 07:43:03 idc_input=0.248 vdc_input=0.599

OK
```

Downlink Command:

No downlink commands for feature

2.17 Clear Flash Record

Feature: Clear flash storage for data log feature.

AT command: AT+CLRDTA

Command Example	Function	Response
AT+CLRDTA	Clear date record	Stop Tx events,Please wait for the erase to complete Clear all stored sensor data... Start Tx events OK

Downlink Command: 0x32

- Example: 0x32 00 // Same as AT+CLRDTA

3. Configure PS-NB-NA

3.1 Configure Methods

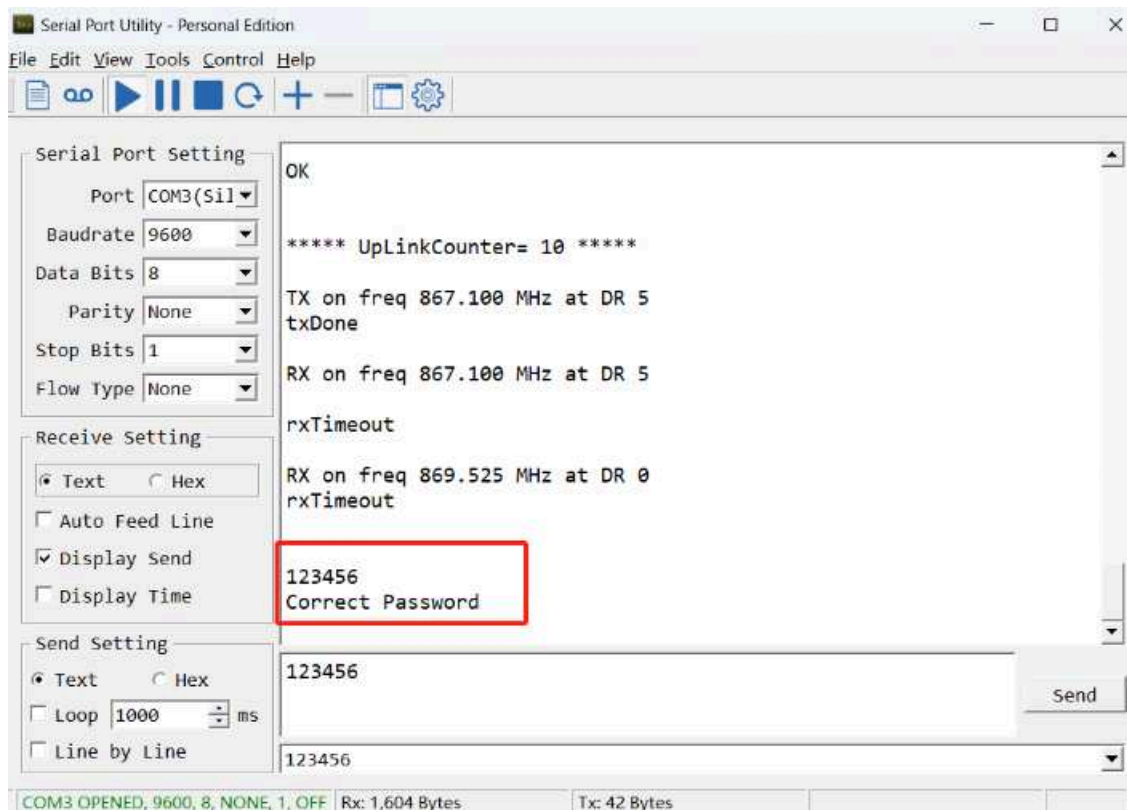
PS-NB-NA supports below configure method:

- AT Command via Bluetooth Connection (**Recommended**): [BLE Configure Instruction](#).
- AT Command via UART Connection : See [UART Connection](#).

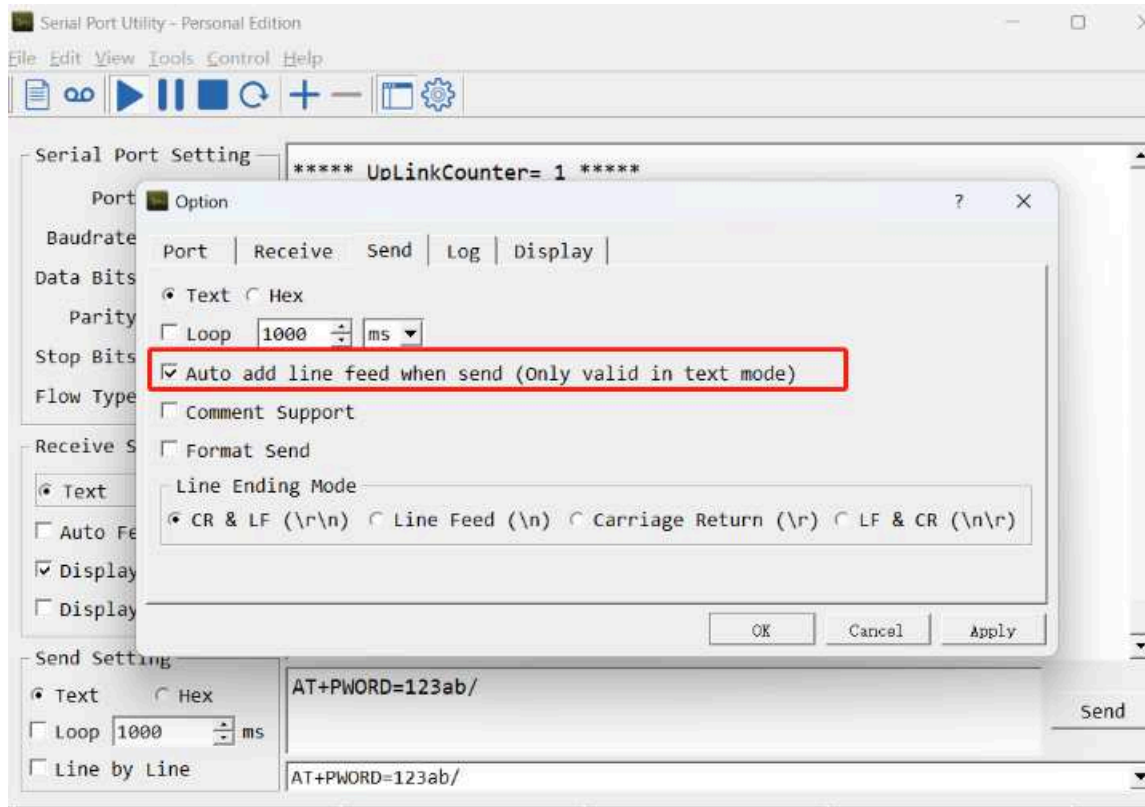
3.2 Serial Access Password

After the Bluetooth or UART connection is successful, use the Serial Access Password to enter the AT command window.

The label on the box of the node will print the initial password: AT+PIN=**xxxxxx**, and directly use the six-digit password to access the AT instruction window.



If you need to change the password, use **AT+PWORD=xxxxxx** (6 characters), NB nodes only support lowercase letters.



Note: After entering the command, you need to add a line break, and you can also set automatic line breaks in the Bluetooth tool or UART connection tool.

3.3 AT Commands Set

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+MODEL : Get module information

AT+SLEEP : Get or set the sleep status

AT+DEUI : Get or set the Device ID

AT+INTMOD : Set the trigger interrupt mode
AT+APN : Get or set the APN
AT+3V3T : Set extend the time of 3V3 power
AT+5VT : Set extend the time of 5V power
AT+12VT : Set extend the time of 12V power
AT+PROBE : Get or Set the probe model
AT+PRO : Choose agreement
AT+RXDL : Extend the sending and receiving time
AT+TR : Get or set data record time
AT+CDP : Read or Clear cached data
AT+NOUD : Get or Set the number of data to be uploaded
AT+DNSCFG : Get or Set DNS Server
AT+CSQTIME : Get or Set the time to join the network
AT+DNSTIMER : Get or Set the NDS timer
AT+TLSMOD : Get or Set the TLS mode
AT+GETSENSORVALUE : Returns the current sensor measurement
AT+SERVADDR : Server Address

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+PWORD : Serial Access Password
AT+LDATA : Get the last upload data
AT+CDP : Read or Clear cached data

4. Battery & Power Consumption

PS-NB-NA use ER26500 + SPC1520 battery pack. See below link for detail information about the battery info and how to replace.

[Battery Info & Power Consumption Analyze](#) .

5. Firmware update

User can change device firmware to::

- Update with new features.
- Fix bugs.

Firmware and changelog can be downloaded from : [Firmware download link](#)

Methods to Update Firmware:

- (Recommended way) OTA firmware update via BLE: [Instruction](#).
- Update through UART TTL interface : [Instruction](#).

6. FAQ

6.1 How can I access t BC660K-GL AT Commands?

User can access to BC660K-GL directly and send AT Commands.

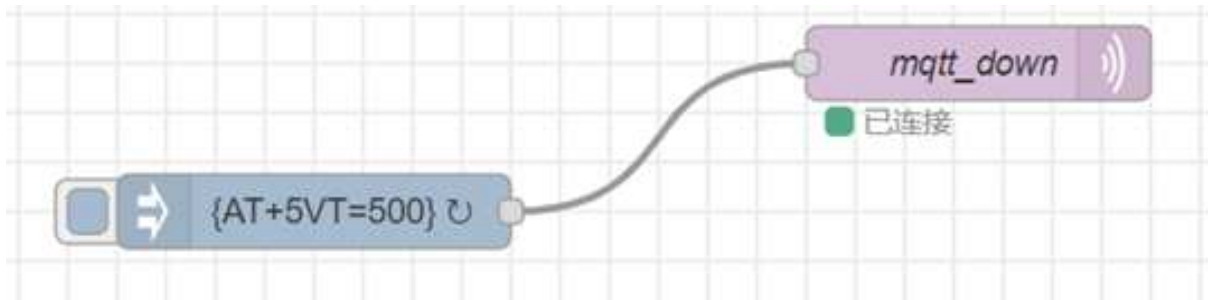
[See BC660K-GL AT Command set](#)

6.2 How to configure the device through the MQTT subscription function? (Since version v1.0.3)

Subscription content: {AT COMMAND}

Example:

Setting AT+5VT=500 through Node-RED requires MQTT to send the content {AT+5VT=500}.



The serial port displays:

```
[42203]BAT:3.584 V
[47629]Opened the MQTT client network successfully
[51187]Successfully connected to the server
AT+PWRM2
[54905]Upload data successfully
[58443]Received downlink data:AT+5VT=500
[59330]Subscribe to topic successfully
[62877]Close the port successfully
[63916]Send complete
[64940]*****End of upload*****
```

7. Order Info

Part Number: **PS-NB-NA-XX-YY**

XX:

- **GE:** General version (Exclude SIM card)
- **1T:** with 1NCE * 10 years 500MB SIM card and Pre-configure to ThingsEye server

YY: The grand connector hole size

- M12: M12 hole
- M16: M16 hole
- M20: M20 hole

8. Packing Info

Package Includes:

- PS-NB-NA NB-IoT Analog Sensor x 1
- External antenna x 1

Dimension and weight:

- Device Size: cm
- Device Weight: g
- Package Size / pcs : cm
- Weight / pcs : g

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.cc.



SE



NO

Direktronik AB | Box 234 , 149 23 Nynäshamn | Besöksadress Konsul Johnsons väg 15 149 45 Nynäshamn
Telefon 08 52 400 700 | Fax | Epost info@direktronik.se | Org.nr 556281-9663 | Bankgiro 922-0179