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Specifications

GSM	
GSM Module:	uBlox SARA U201
GSM Frequency:	3G: 800/ 850/ 900/ 1900/ 2100MHz GSM: 850 / 900/ 1800/ 1900MHz
3G Transmission:	Power class 3 (24 dBm) for WCDMA/HSDPA/HSUPA mode
GPS	
GPS Module:	u-blox G8030 support NMEA0183
Sensitivity:	-164 dBm
Channels/ Frequency:	72 Channels/ GPS/QZSS/GLONASS
TTFT(Hot/Warm/Cold):	Cold/Warm <26 seconds Hot <1 second
Position Accuracy:	2.5 meter (CEP, 50%, 24 hours static, -130dBm, SEP: <3.5m)
RF	
RF Module:	RIFO TI CC1101/ Modulation: FSK
Frequency:	436.8MHz
Sensitivity:	-116dBm/0.6kbaud
System	
Control system	Alarm/ RF/ GSM
Antenna type:	Embedded GPS/ GSM/ RF antenna
Power	
External Power Output:	DC 9V/ 2A/ 18W (Standard)
Battery Power:	3.7V DC Li-Ion Battery, 2300mAh
Battery life:	Charge 3 hours battery to support the device to operate more than 30 hours (based on 1 report/1 minutes, No alarm)
Environment Condition	
Charging temperature:	0°C ~ +40°C
Working/Storage temperature:	-10°C ~ +55°C
Relative Humidity:	5% ~ 95%, non-condensing
Mechanics Data	
Size:	80mm (L) x 68mm (W) x 42mm (H)
Strap Size:	375mm (L) x 30mm (W) x 4.5mm (T)
Weight:	200g (Including strap and batteries)

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Waterproof:	IP68

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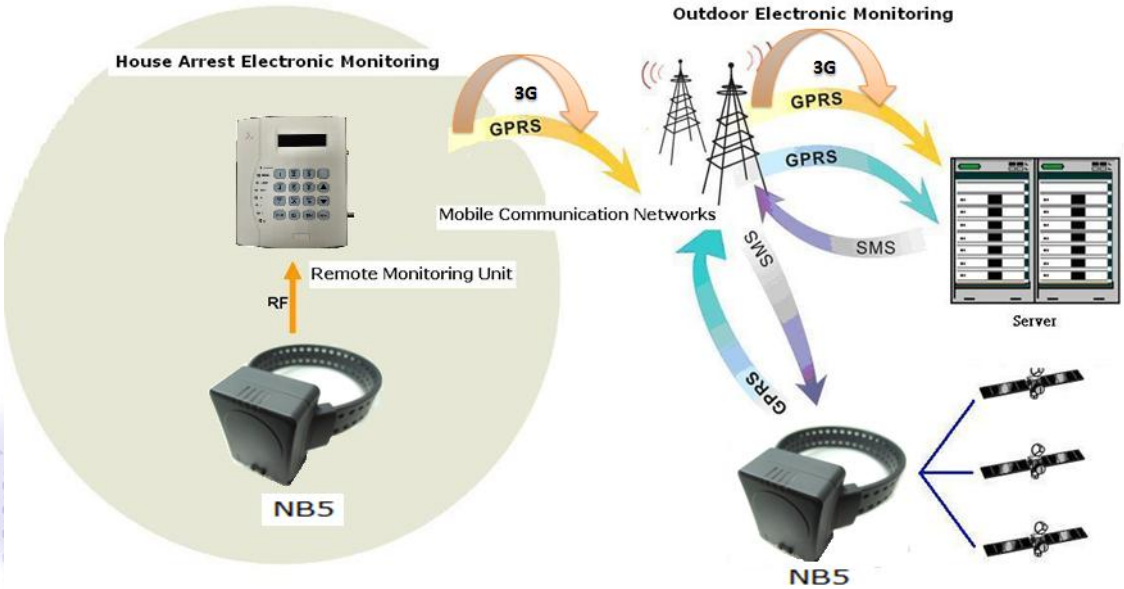
NB5 Function Overview

1. Basic Function Introduction

NB5 is multi-functional electronic monitoring ankle bracelet with GPS/3G/RF monitoring technology. With electronic monitoring technology, you have ability to reliability track user's location. NB5 utilizes GPS and 3G services to upload the RMC sentences containing latitude, longitude, date and time to assigned monitoring center. It is specially designed for the intensive tracking applications, such as offender tracking or life security.

Note: In the house, please install remote monitoring unit and signal amplifier to enhance signal strength if necessary. Remote monitoring unit monitors user's movement and an alarm is automatically sent to assigned monitoring center if the user violates the regulations.



2. Main features

- Built-in buzz and vibration alarm
- Support low battery / strap cut / equipment case opened
- Reusable and adjustable fiber optical strap
- Entering/leaving restriction zoom alarm
- IP68 waterproof
- Weak signal alarm
- 100% charge/charging/ low-charge LED indication ; Power status of NB5 reports to remote monitoring unit

- Charge 3 hours to provide above 30-hour operation (each report/1 minutes, no general alarm)

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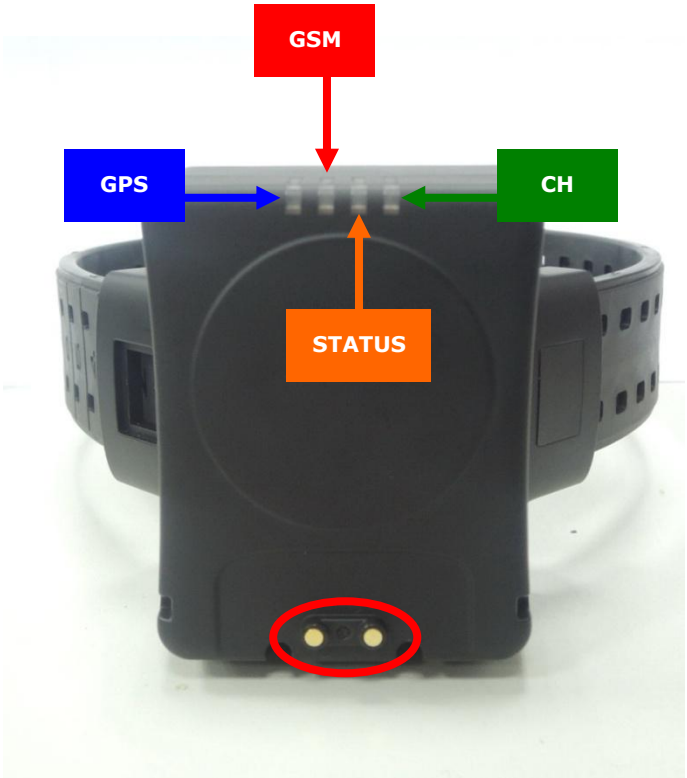
3. Front View



LED (from left to right):

1. GPS Positioning LED (Blue):

   While the device gets GPS fixed, the GPS light will stay on.

2. GSM LED (Red):

   While the device gets GSM fixed or in normal operation, the GSM light will flash every 3 seconds.

   In case of weak GPS signal, the GSM LED will flash every second.

   When GSM enter the power-saving mode, the GSM light will stay off.

3. Status LED (Orange):

   While the device is sending the reports or SMS message, the Status LED will flash one time. In case the device is at low battery, the LED will flash every second. If an alarm has occurred, the Status LED will be quick flash.

4. CH charge LED (Green):

   While the device connects to the charger, the CH LED will flash every second. Once the device is fully

charged, the CH LED will stay on. Unplug the charger when the device is fully charged. In this situation, CH charger LED will be off.

5. Charge Socket (Red circle):

   Please make sure to use San Jose original charger and charging pack to protect your equipment.

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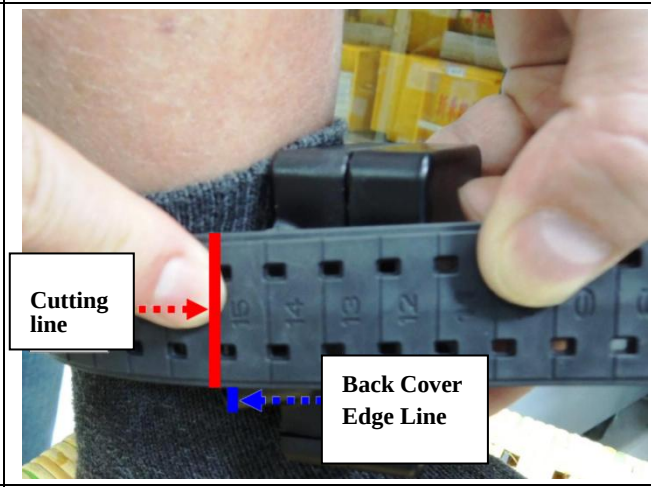
4. Back Cover

5. Wall Charger

NB5 Tracker Installation

Note: The device must be fully charged prior to installation. Remember to wear a pair of socks for comfortable attaching.

1. Circle the user's leg with strap and installation height of NB5 will be 8-10cm from an outer ankle.	
2. Circle the user's leg with strap and determine the length of the strap that leaves approximately 20-30 mm (2-3 scales) of space between the use's leg and the strap for comfortable to wear. 3. For example, Back Cover Edge Line is at the block 14; you should cut the block 16 which is spare space for the strap clip.	
4. Use the specific cutting tool to cut the strap not the scissors. Please refer to the document of cutting tool below. Use the dedicated strap cutter to cut the strap to corresponded length as measured at step 2. Note: The cut edge of strap should be flat to have good contact of fiber optical detection.	

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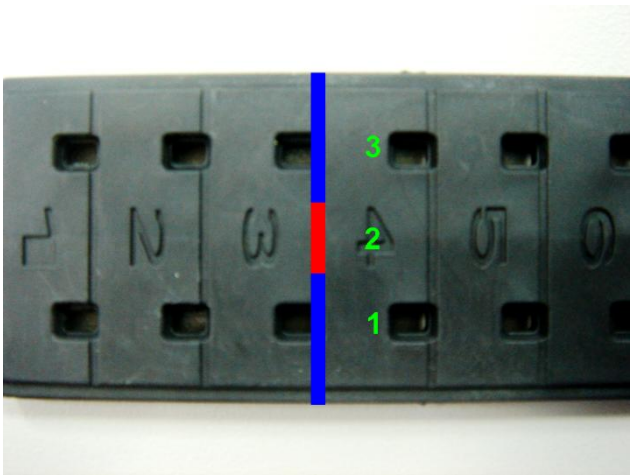
5. Please note that the cutting line should be on the groove between two scales for easy cutting and wearing purpose.	
6. While cutting the strap by using the dedicated strap, it should proceed with 3 stages cutting procedures. Keep cutter and strap at 90-degree angle to make sure that the cutting edge should be flat. (1) 1ST stage: Cut slowly from strap edge to 2/5 of strap width (as marked "1" of right picture). (2) 2nd Stage: Continue to cut 1/5 of strap width, where is the fiber optical wire, by one-time cut to avoid from bumpy cutting edge (as marked "2" of right picture). (3) 3rd Stage: Continue to cut 2/5 of strap width (as marked "3" of right picture).	

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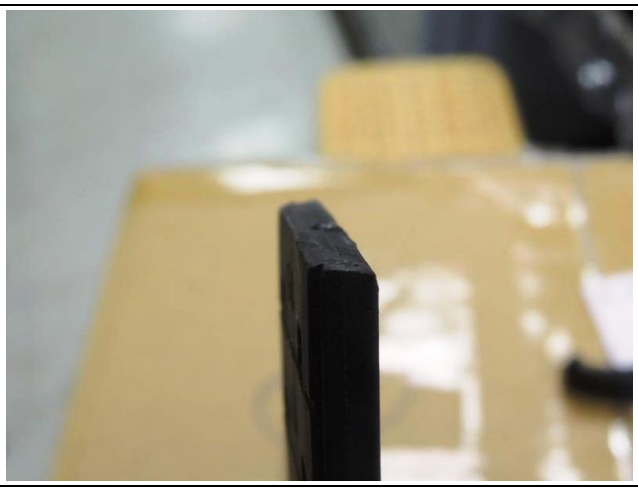
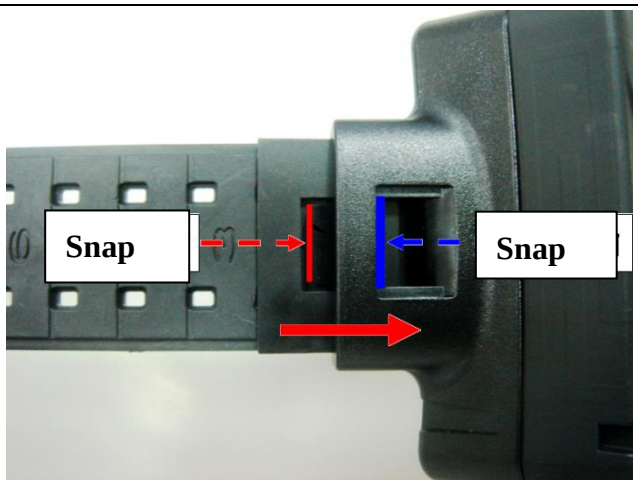
7. Cut procedures are completed.	
8. Put up the Jelly cover at the end of strap. Please refer to NB5 Jelly cover assembly SOP. 9. Fix the strap clip at the end of strap.	
10. Insert the strap with strap clip into the socket chamber at rear cover right side. Press the strap deeply into the chamber. Make sure the strap can not be pull-off from the strap chamber.	

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11. Activated. Start tracking.	
12. While using wall charger, aim the charger connector (female) to NB5 charge socket (male), push till the end to lock the device. Unplug the wall charger in correct direction to avoid from charge socket or charger malfunction.	
13. Connected and charged.	

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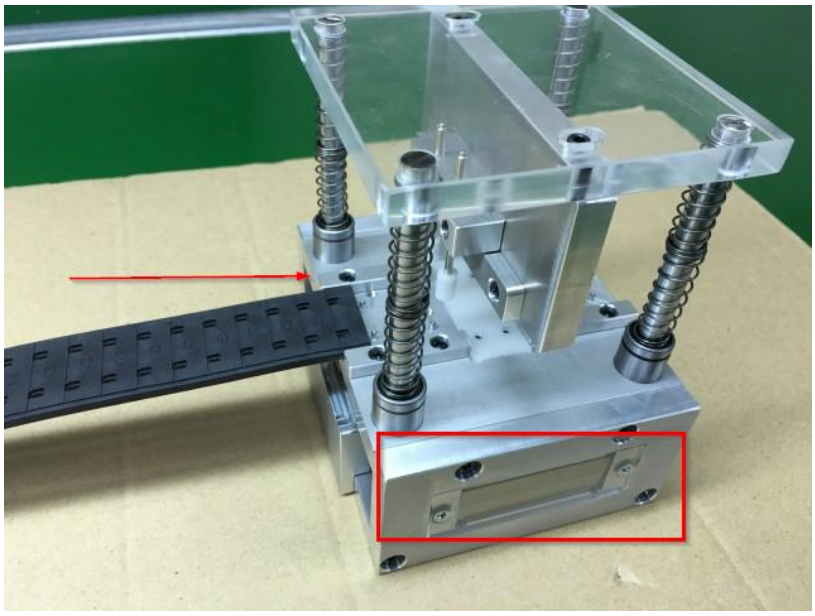
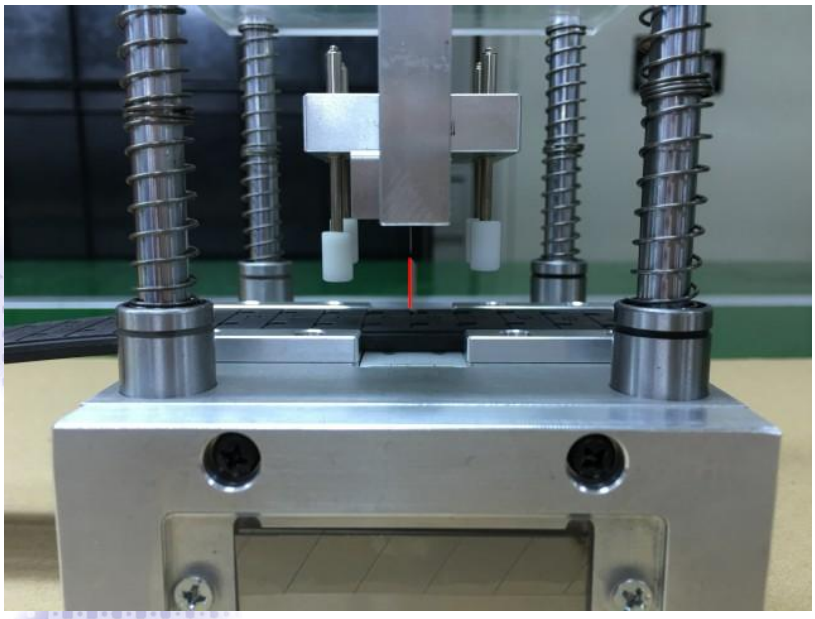
Cutting Tools

1. Make sure that the front side of the cutting tool faces to you and that the strap's entrance direction.

   The spare blades are restored in the red rectangle.



2. Check that the blade is right on the block that should be cut.



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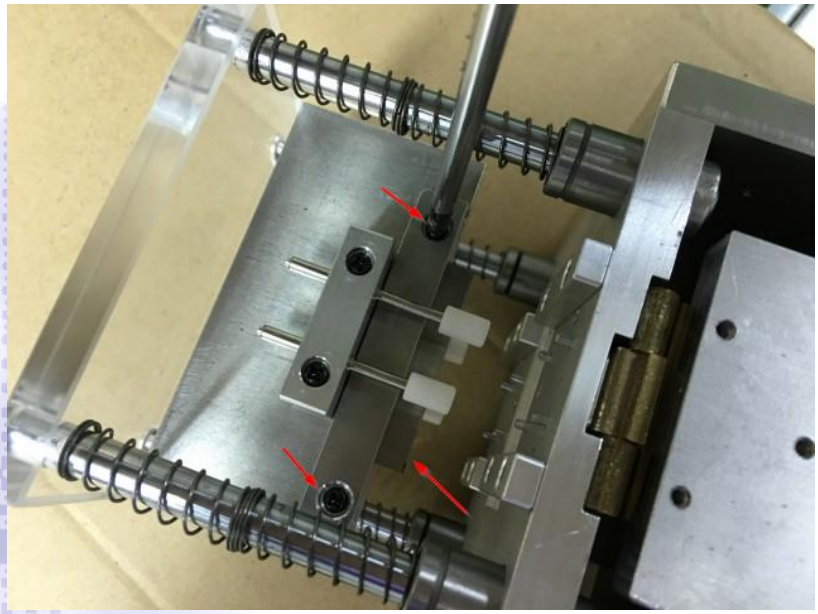
3. After making sure the location is right, push the top of cutting tool to cut the strap

4. Exchange the blade if needed.

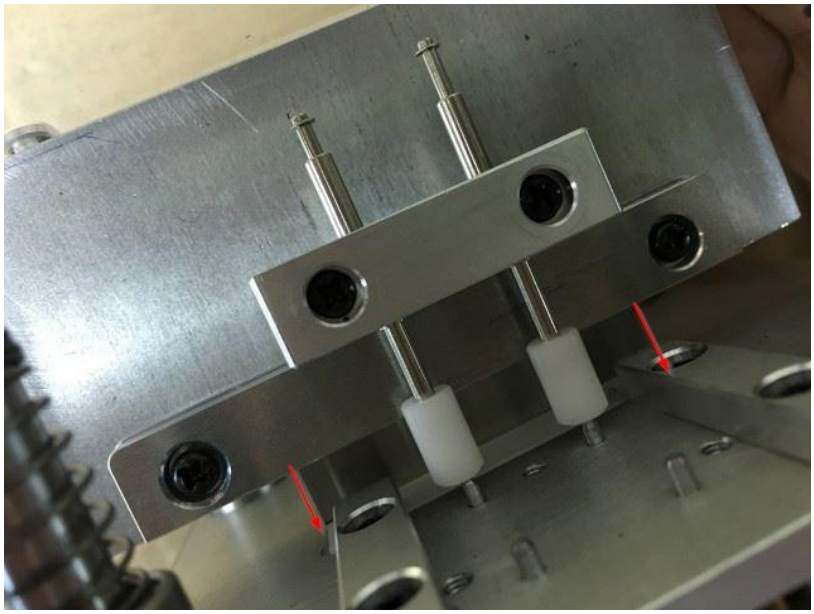
   Release the screw ant then remove the blade. Note that releasing completely the screw is not necessary.

   Notice the direction of the blade since we need to install the spare blade on the same direction later.



5. Install the blade. Please make sure the edge of the blade is inside the white area on the cutting tool.

   Push the top of cutting tools to the bottom so that the blade is back to the right place and screw it up.



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NB5 SMS Command Quick Setting

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SMS Command setting

1. Any setup command must be started with a "#" sign and ended up with a "*" sign. Please note that all the characters which include "#", "*" and comma (,) should be HALFWIDTH form.
2. Please be aware of the upper (capital)/lower cases when entering the SMS command.
3. While entering any SMS command, note that NO SPACE is allowed between the characters, comma and signs in the SMS.
4. The comma (,) can be abbreviated if no further setup required for the command besides Set up APN for 3G Service. Please refer to the examples of Set up Auto Report.
5. The device will update setting only when the password, username and setup command are all correct.
   If the command is not valid, a failure report is going to be sent to the user's cell phone.
6. If the device set up the authorized number, SMS commands should be sent via authorized number.
7. If the command is valid, a success report is going to be sent to the user's cell phone.
8. Please make sure that the Call-Forward function of SIM card is turned off and Call-Display function of SIM card is turned on.
9. Please make sure that the PIN-Code of SIM card if off. If the PIN-Code is necessary, use 0000 as PIN-Code.

SETP 0: Send the Alarm-OFF Command

STEP 1: Set up Username/Password (Optional)

STEP 2: Set up Phone Book and Security Phone Number (Optional)

STEP 3: Set up HA ID

SETP 4: Set up RF Detection Range Test (Optional)

SETP 5: Set up RF Power

STEP 6: Set up APN for 3G Service

STEP 7: Set up Route for Data Transmission

STEP 8: Set up URL and TCP/UDP IP Address

STEP 9: Set up Auto Report (Optional; default setting 60 seconds/each report)

STEP 10: Request IMEI Number

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SETP 0: Send the Alarm-Off Command

Once the events such as strap violation and device tamper are triggered, NB5 will send the reports with the alarm message followed by the beep sound and vibration.

This command is used to deactivate the alarm status, and then the device will be detecting the events.

Setup Format：#<User Name>, <Password>, <Function Mode>*

Example：#username,0000,alarmoff*

(1) Turn on 'buzz sound when alarming' function (Function Code 19).

Example: #username,0000,19,1,1 (0 means to disable it)*

The 1st parameter is for toggling the buzz alarm function. The 2nd is for toggling the vibration alarm function

(2) Once the events are triggered, deactivate all alarm by sending Alarm-Off commands if it's necessary.

Example: #username,0000,alarmoff*

Note: If triggered events occurred, vibration and buzz alarm can be stop temporarily by sending Alarm-Off commands. However, afterward, vibration and buzz alarm will be generated again if triggered events continuously occurred.

SMS Text	Description
#	Start sign.
username	• Default ID of BRACELET. • If you have changed the Username, please use the updated one.
0000	• Default password. • If you have changed the password, please use the updated one.
alarmoff	Function to turn off all alarms
*	End sign.

Table: Alarm-off Setup Format Description

Situation	Message Reply
Setup Succeeds	[username] +, Alarm is set off.

Table: Alarm-off Setup Response Description

STEP 1: Set up Username/Password (Optional)

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Set up Username

Generally, SMS command execution needs correct user name (I.D) with password, or it will remain the same setting.

The SMS command default user name is "username". It can be changed by following the command format.

For example, entering the SMS command as the following allows user to change the user name from "username" to a new user name "abc".

Only enter new command with new user name after it has been changed.

Setup format：#<username>, <Password>, <Function Code>, <New username>*

Example：#username,0000,1, abc *

SMS Text	Description
#	Start sign.
username	Default ID of Bracelet. If you have changed the username, please use the updated one.
0000	Default password of Bracelet. If you have changed the password, please use the updated one.
1	Mode 1 defines user name setup mode.
abc	New defined user name. At the maximum of 16 letters which can only be a~z,A~Z,0~9, @ - _ /
*	End sign.

Table: Username Setup Format Description

Situation	Message Reply
Setup Succeeds	[username] + Device username is updated.
Setup Fail	[username] + Device username setup fail!
Incorrect username or command format	[username] + command error

Table: Username Setup Response Description

Set up Password

Generally, SMS command execution needs correct user name with password, or it will remain the same setting. The SMS command default password is "0000". It can be changed by following the command format.

For example, entering the SMS command as the following allows user to change the password from "0000" to a new password "1111". Only enter command with new password will be valid for setting change after it has been changed.

Setup format：#<username>, <Password>, <Function Code>, <new Password>, <new Password>*

Example：#username,0000,2,1111,1111*

SMS/ COTA Command	Description
#	Start sign.
username	✧ Default ID of the device. ✧ If you have changed the username, please use the updated one.
0000	✧ Default password. ✧ If you have changed the password, please use the updated one.
2	Mode 2 defines the password setup mode.
1111	New password (Please note at the maximum of 4 number)
1111	Reconfirm the password
*	End sign.

Table: Password Change Format Description

Situation	Message Reply
Setup Succeeds	[username] + Device Password is updated.
Setup Fail	[username] + Password setup Fail!

Table: Password Change Response Description

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STEP 2: Set up Phone Book and Security Phone Number (Optional)

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Security Phone Number allows limited administrators to manage and change the settings of the bracelet.

When the Security Phone Number is set, even the User Name and Password are correct, if the setup phone number is not matched, the setup or any change will be invalid. Please be careful when setting up Security Phone Number.

Security Phone Number also is the number that is used when the router is set as HTTP/SMS, TCP/SMS or SMS mode.

If the router of the device is set as those above, the device will send the reports via SMS to the Security Phone Number as the backup router in the occasion in which the device cannot send out the reports due to the poor GSM signal or something.

The maximum set of Security Phone Number is 3. We can simply set up one number or two numbers as well.

Setup format: #<User Name>, <Password>, <Function Mode>, <Security Number1>, <Security Number2>, <Security Number3>*

Example：#username,0000,5,+886123456789*

Example：#username,0000,5,+886123456789,+886123456789*

Example：#username,0000,5,+886123456789,+886123456789,+886123456789*

Using this command to empty the phone book:

Example：#username,0000,5,0,0,0*

Note that both adding and not adding the '+' sign in front of the cellular phone number(s) are both acceptable, while the '+' sign should precede the national code.

SMS/ COTA Command	Description
#	Start sign.
username	Default ID of the device. If you have changed the user name, please use the updated one.
0000	Default password. If you have changed the password, please use the updated one.
5	Mode "5" defines the Phone Book and the Security Number setup mode.
+886123456789	The Security Phone number 1 and Phone number 1 you would like to assign to the device.
+886123456789	The Security Phone number 1 and Phone number 1 you would like to assign to the device.
+886123456789	The Security Phone number 1 and Phone number 1 you would like to assign to the device.

*	End sign.

Table: Security Phone Number Setup Format Description

Situation	Message Reply
Setup Succeeds	[username] + Device phone book is updated.

Table: Security Phone Number Setup Response Description

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STEP 3: Set up HA ID

The bracelet (HA) ID is set for identification. The ID number ranges from 1 to 9999.

The ID will be shown in the reports.

E.g.

imei=356496041252545&rmc=$GNRMC,020733.00,A,2457.80794,N,12125.53854,E,0.012,,170720,,,A*67,AUTO,I0200,,,,9999,M14,4182mV,33,1.48,466,1,24A5,13E16E9,30,FFFF,29,10613,26,19,FFFF,195,10613,26,19

NB5's HA ID is for the purpose that user can quickly recognize which bracelet (NB5) is and manage it more easily.

Setup Format：#<username>, <Password>, <Function Mode>, <HA ID Number>*

Example：#username,0000,haid,200*

SMS Text	Description
#	Start sign.
username	Default ID of Bracelet. If you have changed the Username, please use the updated one.
0000	Default password of Bracelet. If you have changed the password, please use the updated one.
haid	Mode "haid" defines HA ID setup mode.
200	HA ID number. Ranges from 1 to 9999.
*	End sign.

Table: HA ID Setup Format Description

Situation	Message Reply
Setup Succeeds	[username] + setup OK. Device ID setting is updated.

Table: HA ID Setup Response Description

SETP 4: Set up RF Detection (Optional)

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This command is for the bracelet with RF capability. Once the RF Detect function is turned on, the device can communicate with the Home Unit. This command can be used for site survey when installing Home Unit.

When RF test mode (the 2nd parameter) is turned on, the bracelet will beep when it receives the RF signal from Home Unit. Sometimes we have to know the boundary of RF433 detection; therefore it's an easier way to test the communication between the two devices via the beep sound without observing the report in the server especially at the first time of installation of the two units. After having tested it, we can turn the beep sound off. There are two types of command, the short one is for toggling the function quickly and the long one is for setting up all the parameter

Setup Format of short type：#<User Name>, <Password>, <Function Mode rf433>, <0/1 (Detection On/OFF)>*

Example：#username,0000,rf433,1*

Setup Format of long type：#<User Name>, <Password>, <Function Mode rf433>, <0/1 (Detection On/OFF)>, < Sound Enable/Disable>*

Example：#username,0000,rf433,1,0*

SMS Text	Description
#	Start sign.
username	Default ID of Bracelet. If you have changed the Username, please use the updated one.
0000	Default password of Bracelet. If you have changed the password, please use the updated one.
rf433	Function Mode of RF Detection
0/1	0: Disable RF detection in Bracelet 1: Enable RF detection in Bracelet. Bracelet will transmit information to the Home Unit nearby which Bracelet is paired to. (default)
0/1	0: Turn off buzzer when receiving RF signals from Home Unit (default) 1: Turn on buzzer when receiving RF signals from Home Unit for RF range test
*	End sign.

Table: RF Detection Setup Format Description

Situation	Message Reply
Setup Succeeds	[username] + setup OK. Device RF433 setting is updated.

Table: RF Detection Setup Response Description

SETP 5: Set up RF Power

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The ankle bracelet RF transmit power can be set for Home Unit curfew range adjustment.

There are totally 8 levels of RF transmit power that can be set. The stronger the RF transmit power is, the wider the curfew range would be. We always adjust the level of RF transmit power for both the bracelet and Home Unit.

RF channel defines that all the equipments including NB5 (bracelet), HU3 (Home Unit) should use the same channel to communicate each other. In some case there are a number of set of equipments in the same place (such as more than 10 sets), we can set them in groups and configure each set to different channel, and it will reduce the possibility of disturbing each other. Generally we don't have to change the default channel.

Setup Format：#<username>, <Password>, <Function Mode>, <RF Power Level>, <RF Channel>, <RF Distance Mode>*

Example：#username,0000,rfpw,5,10*

SMS Text	Description
#	Start sign.
username	Default ID of Bracelet. If you have changed the Username, please use the updated one.
0000	Default password of Bracelet. If you have changed the password, please use the updated one.
rfpw	Mode "rfpw" defines RF power level setup mode.
5	RF power level. Ranges from 1(min) to 8(max). (The default is 5)
10	RF channel. Ranges from 1 to 150. (The default is 10)
*	End sign.

Table: RF Power Setup Format Description

Situation	Message Reply
Setup Succeeds	[username] + setup OK. Device RF power level is updated.

Table: RF Power Setup Response Description

STEP 6: Set up APN for 3G Service

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Access Point Name (APN) is a protocol that typically allows a user's device to access the internet using the mobile phone network. It is a network identifier used by a mobile device when connecting to a GSM carrier. The carrier will then examine this identifier to determine what type of network connection should be created.

For uploading the data to a server in the internet, a set of GPRS APN depending on your GSM network is required. Various GSM network provides different GPRS APN settings. Please ask your GMS carrier about the APN settings. If the user name, password and DNS of APN are not required, just leave the parameters empty (no space). User can follow the Setup Format below to setup the APN that is provided by your GSM carrier.

Setup Format: #<username>, <Password>, <Function Mode>, <APN name>, <APN username>, <APN password>, <APN DNS>*

Example1:#username,0000,3,internet,guest,guest,172.20.2.10*

Leave the parameters empty (no space) if other parameters are not required.

Example2:#username,0000,3,internet,,,*

Note1: The total length of APN name, APN username, APN Password, and APN DNS should be less than 70 characteristics.

Note2: Some PREPAID PHONE CARD SIM modules do not enable or even not support GPRS service. Please consult with GSM carrier for further information.

SMS/ COTA Command	Description
#	Start sign.
username	✧ Default ID of the device. ✧ If you have changed the user name, please use the updated one.
0000	✧ Default password. ✧ If you have changed the password, please use the updated one.
3	Mode 3 defines the APN setup mode.
internet	APN Name
guest	APN User name (optional)
guest	APN Password (optional)
172.20.2.10	APN DNS (optional)
*	End sign.

Table: APN Setup Format Description

Situation	Message Reply
Setup Succeeds	[username] +, Device GPRS APN is updated.

Table: APN Setup Response Description

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STEP 7: Set up URL and TCP/UDP IP Address

Set up URL

This SMS command is for setting up a specified URL (Uniform Resource Locator) or IP address of HTTP protocol server where the bracelet will transmit GPS (GPRMC) positioning data to for real time GPS tracking as route of the device is set as HTTP mode.

E.g. Use function code 4 to setup the URL as the following command to configure URL for HTTP.

Setup Format：#<User Name>, <Password>, <Function Mode 4>, <URL>*

Example：#username,0000,4, http://www.sanavtw.com/uploadM1.php *

SMS Text	Description
#	Start sign.
username	Default ID of Bracelet. If you have changed the Username, please use the updated one.
0000	Default password of Bracelet. If you have changed the password, please use the updated one.
4	Mode 4 defines URL setup mode.
http://www.sanavtw.com /uploadM1.php	Default domain name and the sign "?" is not allowed to write in the area.
*	End sign.

Table: URL Address Setup Format Description

Situation	Message Reply
Setup Succeeds	[username] + Device IP/Domain is updated.
Setup Fail	[username] + IP/Domain setup Fail!
Incorrect password	[username] + Password setup Fail!
Incorrect username or command format	[username] + command error

Table: URL Address Setup Response Description

Set up TCP/UDP IP Address

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This SMS command is for setting up a specified TCP or UDP protocol based server where the bracelet will transmit GPS (GPRMC) positioning data for real time GPS tracking as route of the device is set as TCP or UDP mode.

E.g. Use function code 18 to setup the URL as the following command to configure URL for TCP or UDP.

Setup Format：#<User Name>,<Password>,<Function Mode>,<TCP/IP Address>：<Port>*

Example：#username,0000,18,202.39.31.127:13337*

SMS Text	Description
#	Start sign.
username	Default ID of Bracelet. If you have changed the Username, please use the updated one.
0000	Default password of Bracelet. If you have changed the password, please use the updated one.
18	Mode 18 defines IP address setup mode for TCP or UDP.
202.39.31.127:1337	The specified TCP/UDP IP address and port.
*	End sign.

Table: TCP/UDP IP Address Setup Format Description

Situation	Message Reply
Setup Succeeds	[username] +", setup ok. Device TCP/IP is updated."
Setup Fail	[username] +", TCP/IP setup fail!"
Incorrect username or password	[username] + Username or Password error
Incorrect function mode	[username] + command error

Table: TCP/UDP IP Address Setup Response Description

STEP 8: Set up Route for Data Transmission

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This SMS command set up the route that determine in which protocol the device ends up transmitting GPS (GPRMC) positioning data. Please confirm the back-end server protocol type and corresponded URL or IP address with port number before setup.

There are 3 main protocols available:

1. HTTP: Hypertext Transfer Protocol. An internet browser based server protocol that usually has a specified URL (Uniform Resource Locator).
2. TCP/IP: TCP/IP provides end-to-end connectivity specifying how data should be packetized, addressed, transmitted, routed and received at the destination.
3. SMS: The device will send GPS data by SMS message format to Cellular phone that has been set in Phone Book.

User can choose the route to transmit the data by HTTP/TCP/SMS protocol individually or with SMS message as a backup route. Please refer to the following table for the route setup.

Setup Format: #<username>, <Password>, <Function Mode>, <0/2/4/6/7>*

Command: #username,0000,14,2* (HTTP Only)

#username,0000,14,7* (TCP Only)

SMS/ COTA Command	Description	
#	Start sign.	
Username	Default ID of the device. If you have changed the user name, please use the updated one.	
0000	Default password. If you have changed the password, please use the updated one.	
14	Mode 14 defines Transmission Route mode.	
6	0	HTTP/SMS. Send data to HTTP server. If the route is not available, send data by SMS message instead.
	2	HTTP only. Send data to HTTP server. No SMS backup route.
	4	SMS only. Send data by SMS message to cell phone. No backup route.
	6	TCP/SMS. Send data to TCP server. If the route is not available, send data by SMS message instead.
	7	TCP Only. Send data to TCP server. No SMS backup route.
*	End sign.	

Table: Data Transmission Route Setup Format Description

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Situation	Message Reply
Setup Succeeds	[username] +, Device is switching to HTTP mode.
	[username] +, Device TCP is updated.
	[username] +, Device is switching to SMS mode.

Table: Data Transmission Route Setup Response Description

STEP 9: Set up Auto Report (Optional)

Auto Report setup can enable the bracelet report GPS data automatically during a period of time.

Use this command to set up the frequency of Auto Report. The bracelet can report according to interval. If you send the SMS command as the following example, it will send a report every 1 minute (60 seconds) and the total number of reports is 10.

Setup Format：#<User Name>, <Password>, <Function Mode>, <intervals (sec)>, <Number of Reports>*

Example：#username 0000,6,60,9999*

Note1: Users may limit the number of the Auto reports by entering the digits from 1 to 9998 in the <Number of Reports>field. When you input 9999, the Auto Report Message will not stop unless you define a new Auto Report Setting.

SMS Text	Description
#	Start sign.
username	Default ID of Bracelet. If you have changed the Username, please use the updated one.
0000	Default password of Bracelet. If you have changed the password, please use the updated one.
6	Mode 6 defines AUTO report setup mode.
60	A constant interval of sending data (15~65000), default is 60. Unit : Second
10	The number of reports will be sent automatically (0~9999), default is 9999 which means infinite.
*	End sign.

Table: Auto Report Setup Format Description

Situation	Message Reply
Setup Succeeds	[username] + Setup OK. Device Auto Report setting is updated.
Setup Fail	[username] + Auto Report setting Setup Fail!
Incorrect password	[username] + Password setup Fail!
Incorrect username or command format	[username] + command error

Table: Auto Report Setup Response Description

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Step 10: Request IMEI Number

IMEI stands for International Mobile Equipment Identification, a unique number for identifying mobile devices validity in GSM network.

As above stated, each device has a unique IMEI number. Entering the SMS command as the following allows user to check the IMEI number of the device for network registration and tracking.

Setup format: #<User Name>, <Password>, <Function Code>*

Command: #username,0000,imei*

SMS Text	Description
#	Start sign.
username	✧ Default user name of the device. ✧ If you have changed the username, please use the updated one.
0000	✧ Default password. ✧ If you have changed the password, please use the updated one.
imei	Mode 'imei' defines IMEI inquiry mode.
*	End sign.

Table: IMEI Inquiry Format Description

Situation	Response
Setup Succeeds	[username] + ',[imei]'
Incorrect password	[username] + Password setup Fail!
Incorrect username or command format	[username] + command error

Table: IMEI Inquiry Response Description

Appendix 1: Report Data Format

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1	2
357520074257524,	$GNRMC,081219.00,A,2457.80821,N,12125.53897,E,0.054,,160720,,,A*6C,

3	4	5	6	7	8	9	10	11	12
AUTO,	I0200,	,	,	,	9970,	M16,	3782mV,	45,	2.40,

13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
466,	1,	24A5,	13E16E9,	36,	FFFF,	45,	10613,	27,	14,	FFFF,	29,	10613,	25,	10

Item	Name	Description
1	IMEI number	IMEI stands for International Mobile Equipment Identification, a unique number for identifying mobile devices validity in GSM network.
2	Main GPRMC Sentence	1. 081219.00: time of fix (UTC) 2. A: GPS fix status, A = GPS fix, V = GPS no fix 3. 2457.80821,N,12125.53897,E,: Latitude/Longitude Coordinates 4. 0.054: Speed over ground, Knots 5.: Course over ground 6. 160720: Date of fix 16th,July, 2020 7. *6C: Mandatory checksum
3	Event	Triggered event or warning message.
4	HA ID	The ankle bracelet's(HA) ID.
5	Reserved	
6	Reserved	
7	Reserved	
8	AUTO Report	The accumulated number of AUTO report
9	GSM Sensitivity	GSM sensitivity from M0 to M31. (M0~M31,the greater value is better. M99 means not measurable)
10	Battery Voltage	Battery voltage indication
11	GPS Sensitivity	GPS signal strength.
12	GPS HDOP Value	The smaller value is the higher accuracy.
13	GSM Cell ID MCC	Mobile Country Code. The range is 0-999(1 to 3digits).

14	GSM Cell ID MNC	Mobile Network Code. The range is 0-999 (1 to 3digits).
15	GSM Cell ID LAC	Location Area Code, The range is 0x0-0xFFFF (2 octets)
16	GSM Cell ID	Cell identity. The range is: o 2G cell: range 0x0-0xFFFF (2 octets) o 3G cell: range 0x0-0xFFFFFFF (28 bits)
16	GSM Cell ID	Cell identity. The range is: o 2G cell: range 0x0-0xFFFF (2 octets) o 3G cell: range 0x0-0xFFFFFFF (28 bits)
17	RSCP Level	Received Signal Code Power expressed in dBm levels: • 0: less than -115 dBm • 1..90: from -115 dBm to -26 dBm with 1 dBm steps • 91: -25 dBm
18	Reserved	FFFF
19	scrambling_code	Scrambling code. The range is 0-511, 0 if not known or not detectable
20	dl_frequency	Downlink frequency. The range is 0-16383.
21	rscp_lev	Received Signal Code Power expressed in dBm levels: • 0: less than -115 dBm • 1..90: from -115 dBm to -26 dBm with 1 dBm steps • 91: -25 dBm
22	ecn0_lev	Energy per Chip/Noise ratio expressed in dB levels: • 0: less than -24 dB • 1..48: from -24 dB to 0.5 dB with 0.5 dB steps • 49: 0 dB
23	Reserved	FFFF
24	scrambling_code	Scrambling code. The range is 0-511, 0 if not known or not detectable
25	dl_frequency	Downlink frequency. The range is 0-16383.
26	rscp_lev	Received Signal Code Power expressed in dBm levels: • 0: less than -115 dBm

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		• 1..90: from -115 dBm to -26 dBm with 1 dBm steps • 91: -25 dBm
27	ecn0_lev	Energy per Chip/Noise ratio expressed in dB levels: • 0: less than -24 dB • 1..48: from -24 dB to 0.5 dB with 0.5 dB steps • 49: 0 dB

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Appendix 2: Tracker Event List

This table shows the different events/ messages sent from the device.

Basically, there are more than 10 different situations that trigger the device to respond its position and tracker status messages as the following.

Event	Description
AUTO	When the device is set to report to assigned route in a given period of time, it will send a report automatically with an AUTO message. When any other event such DT and ST message is triggered and the priority is greater than AUTO, the AUTO report will suspend. The AUTO report recovers until the Alarm-OFF command has been sent and the Alarm status ends.
POLL	When the device has received the POLL command, the POLL message will be sent immediately.
ST	When the equipment fiber optic loop is opened (strap cut or broken), it triggers the "ST" event.
DT	When the equipment reed switch is opened (the equipment case), it triggers the "DT" event.
PLUG	When the equipment is plugged in charger for more than 4 seconds, it triggers the "PLUG" event.
UNPLUG	When the equipment is unplugged from charger, it triggers the "UNPLUG" event.
CHOK	When the equipment is fully charged, the CHOK message will be sent once. When the equipment is unplugged from charger, the device will detect whether it is fully charged. If so, the CHOK message will be sent once as well.
CHFL	When the equipment is unplugged from charger, the device will detect whether it is fully charged. If not, the CHFL message will be sent.
LP	When the equipment is in low power, it triggers the "LP" event.
LP2	When the equipment is in the lowest power, it triggers the "LP2" event and then shut down.

Note:

(1) Any event marks with letter "**B**" (Bauto…..) represents data which was not able to send to assigned route immediately due to priority or mobile network service is not available. The data will be sent after the issues are cleared.

(2) The event marks with letter "**L**" (LAUTO) represents power saving mode for data transmission. "LAUTO" represents a specific number of AUTO reports. The equipment will send reports at once as a group when it has logged a fixed number of reports in the memory.

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SMS Command Introduction

SMS Command setting

10. Any setup command must be started with a "#" sign and ended up with a "*" sign. Please note that all the characters which include "#", "*" and comma (,) should be HALFWIDTH form.
11. Please be aware of the upper (capital)/lower cases when entering the SMS command.
12. While entering any SMS command, note that NO SPACE is allowed between the characters, comma and signs in the SMS.
13. The comma (,) can be abbreviated if no further setup required for the command besides Set up APN for GPRS Service. Please refer to the examples of Set up Auto Report.
14. The device will update setting only when the password, username and setup command are all correct. If the command is not valid, a failure report is going to be sent to the user's cell phone.
15. If the device set up the authorized number, SMS commands should be sent via authorized number.
16. If the command is valid, a success report is going to be sent to the user's cell phone.
17. Please make sure that the Call-Forward function of SIM card is turned off and Call-Display function of SIM card is turned on.
18. Please make sure that the PIN-Code of SIM card if off. If the PIN-Code is necessary, use 0000 as PIN-Code.

How to Use ER Command for erase the flash

This command is to erase the reports restored in the flash memory before.

Once the GSM signal is weak or other reasons that cause that the device is not able to send reports to the server, the reports will be restored in the flash memory and re-sent later. In some case, you might want to erase those reports immediately, and then you can use this command. Please make sure that those reports in flash won't be needed anymore before you use it.

Setup Format：#<User Name>, <Password>, <Function Mode er>*

Example：#username,0000,er*

Note: Erasing the flash memory takes about 90 seconds, so the reply will be a bit later than that of other SMS commands. In generally, the reply will be received in 2-3 minutes.

SMS Text	Description
#	Start sign.
username	Default ID of BRACELET. If you have changed the Username, please use the updated one.
0000	Default password. If you have changed the password, please use the updated one.
er	Function code for erasing data in flash
*	End sign.

Table: ER Setup Format Description

Situation	Message Reply
Setup Succeeds	[username] +, setup OK. Device logged data is erased.

Table: ER Setup Response Description

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How to Restart The Device

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Use this SMS command to restart the device remotely. This command allow user to restart the device immediately or in schedule.

Setup format: #<User Name>, <Password>, <Function Code>, <interval of restart>*

Command: #username,0000,rst,9*

Command: #username,0000,rst,now*

SMS Text	Description
#	Start sign.
username	✧ Default user name of the device. ✧ If you have changed the username, please use the updated one.
0000	✧ Default password. ✧ If you have changed the password, please use the updated one.
rst	Mode 'rst' defines Restart the device.
now or 1~9	Now means restarting the device immediately 1~9: Unit is 0.5 hour. 1 means 0.5 hour 9 means 4.5 hours (0.5 times 9 equals 4.5)
*	End sign.

Table: Restart Format Description

Situation	Response
Setup Succeeds	[username] + Setup OK. Device has been reset.
Setup Fail	[username] + Reset Fail!
Incorrect password	[username] + Password setup Fail!
Incorrect username or command format	[username] + command error

Table: Restart Response Description

Setting of Restart The Device

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This setting defines the behavior when the device restarts. We can choose which opponent will be restarted such as MCU, GSM and GPS.

Setup format: #<User Name>, <Password>, <Function Code>, <Function Code>, <interval of restart>*

Command: #username,0000,rst,cfg,7*

Command: #username,0000,rst,cfg,6*

SMS Text	Description
#	Start sign.
username	✧ Default user name of the device. ✧ If you have changed the username, please use the updated one.
0000	✧ Default password. ✧ If you have changed the password, please use the updated one.
rst	Mode 'rst' defines Restart the device.
cfg	Mode 'cfg' defines Restart the device.
6	1: restart with MCU
	2: restart with GSM
	4: restart with GPS
	6: restart with MCU and GSM
	7: restart with MCU, GSM and GPS
*	End sign.

Table: Restart Setting Format Description

Situation	Response
Setup Succeeds	[username] + Setup OK. Auto Reset is defined.
Setup Fail	[username] + Reset Fail!
Incorrect password	[username] + Password setup Fail!
Incorrect username or command format	[username] + command error

Table: Setting Restart Response Description

Use POll Command for acquiring the position

This feature is for acquire the device' position immediately.

Once the device has received the POLL command, the POLL message will be sent to the server depending on the route you've set.

The POLL message will be shown in the "Event" field of the report.

Setup Format：#<User Name>, <Password>, <Function Mode 10>*

Example：#username,0000,10*

SMS Text	Description
#	Start sign.
username	Default ID of BRACELET. If you have changed the Username, please use the updated one.
0000	Default password. If you have changed the password, please use the updated one.
10	Function code for polling
*	End sign.

Table: POLL Setup Format Description

Situation	Message Reply
Setup Succeeds	None

Table: POLL Setup Response Description

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Set up FBR Command for Fiber Strap

FRB feature is for detecting the strap violation. The default setting of "FBR Tamper" detected time is 10 seconds due to fiber characteristic.

When the feature is turned on, if the strap is cut, the alarm will be triggered and the device will send the ST reports to indicate the strap violation. The ST state will be shown in the state field of report. The interval of ST report depends on the setting. There may be a buzzing sound or vibration if the buzzer and vibrator are turned on.

Once the alarm is triggered, it will not stop only if the "alarm off" command is being sent.

Regarding the "alarm off" command, please refer to the step 0 in the quick setting of SMS command.

There are two types of command, the short one is for toggling the function quickly and the long one is for setting up all the parameter

Setup Format of short type：#<User Name>, <Password>, <Function Mode fbr>, <0/1 (On/OFF)>*

Example：#username,0000,fbr,0*

Setup Format of long type：#<User Name>, <Password>, <Function Mode fbr>, <0/1 (On/OFF)>, <Interval 15~65000>*

Example：#username,0000,fbr,1,60*

SMS Text	Description
#	Start sign.
username	Default ID of BRACELET. If you have changed the Username, please use the updated one.
0000	Default password. If you have changed the password, please use the updated one.
fbr	Function code for fbr
0/1	Toggle the function: 0 means the device will not detect the strap violation 1 means the feature is enabled. (default)
60	This parameter is for setting up the interval of ST report. The value range is from 15 to 65000. "60" means 60 seconds. (default) E.g. Once the fbr alarm is triggered , the device will send reports every 60 seconds until the "alarm off" command has been received.
*	End sign.

Table: FBR Setup Format Description

Situation	Message Reply
Setup Succeeds	[username] +, setup OK. Device Fiber detection is switched on/off.

Table: FBR Setup Response Description

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Use REED Command for Cover Tamper

FRB feature is for detecting the Tamper violation. When the feature is turned on, if the cover of the bracelet is opened, the alarm will be triggered immediately and the device will send the DT reports to indicate the strap violation. The DT state will be shown in the state field of report. The interval of DT report depends on the setting. There may be a buzzing sound or vibration if the buzzer and vibrator are turned on.

Once the alarm is triggered, it will not stop only if the "alarm off" command is being sent.

Regarding the "alarm off" command, please refer to the step 0 in the quick setting of SMS command.

There are two types of command, the short one is for toggling the function quickly and the long one is for setting up all the parameter

Setup Format of short type：#<User Name>, <Password>, <Function Mode reed>, <0/1 (On/OFF)>*

Example：#username,0000,reed,0*

Setup Format of long type：#<User Name>, <Password>, <Function Mode reed>, <0/1 (On/OFF)>, <Interval 15~65000>*

Example：#username,0000,reed,1,60*

SMS Text	Description
#	Start sign.
username	Default ID of BRACELET. If you have changed the Username, please use the updated one.
0000	Default password. If you have changed the password, please use the updated one.
reed	Function code for reed
0/1	Toggle the function: 0 means the device will not detect the strap violation 1 means the feature is enabled. (default)
60	This parameter is for setting up the interval of DT report. The value range is from 15 to 65000. "60" means 60 seconds. (default) E.g. Once the reed alarm is triggered , the device will send reports every 60 seconds until the "alarm off" command has been received.
*	End sign.

Table: REED Setup Format Description

Situation	Message Reply
Setup Succeeds	[username] +, setup OK. Device reed detection is switched on/off.

Table: REED Setup Response Description

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Command for Toggling the Buzzer and vibrator

When the Alarm events (such as ST, DT, Geo-fence event) are triggered, the device will beep and vibrate for notice as well as send the reports.

This command is to toggling the beep sound and vibration respectively and configuring the interval of notice.

This command only affects the beep sound and vibration when the Alarm events are triggered.

There are two types of command, the short one is for toggling the function quickly and the long one is for setting up all the parameter

Setup Format of short type：#<User Name>, <Password>, <Function Mode 19>, <0/1 (Buzzer On/OFF)> , <0/1 (Vibration On/OFF)>*

Example：#username,0000,19,0,0*

Setup Format of long type：#<User Name>, <Password>, <Function Mode 19>, <0/1 (Buzzer On/OFF)> , <0/1 (Vibration On/OFF)>, <1 (Interval of beep sound)> , <180 (Interval of vibration)>*

Example：#username,0000,19,1,1,1,180*

SMS Text	Description
#	Start sign.
username	Default ID of BRACELET. If you have changed the Username, please use the updated one.
0000	Default password. If you have changed the password, please use the updated one.
19	Function code for toggling the beep sound and vibration
0/1	Toggle the beep sound: 0: turn off the beep sound during the Alarm event. 1: turn on the beep sound during the Alarm event. (default)
0/1	Toggle the vibration: 0: turn off the vibration during the Alarm event. 1: turn on the vibration during the Alarm event. (default)
1	This parameter is for setting up the interval of beep sound. The value range is from 0.2 to 65000. "1" means 1 second. (default) E.g. Once the alarm event is triggered, the device will beep every 1 second until the "alarm off" command has been received.
180	This parameter is for setting up the interval of vibration. The value range is from 1 to 65000. "1" means 1 second. (The default setting is 180) E.g. Once the alarm event is triggered, the device will vibrate every 180 seconds until the "alarm off" command has been received.
*	End sign.

Table: Toggle Beep & Vibration Setup Format Description

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Situation	Message Reply
Buzzer setup succeed	[username] +, setup OK. Device buzzer is turned off. / on.
Vibrator setup succeed	[username] +, vibration motor is disabled. / enabled.
Buzzer and Vibrator setup scceed	[username] +, setup OK. Buzzer & vibrator setting are updated.
Buzzer or Vibrator setup fail	[username] +, buzzer or vibrator switch setup fail!
Parameter setup fail	[username] +, setup fail! buzzer or vibrator parameter error!

Table: Toggle Beep & Vibration Setup Response Description

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Power Saving Mode Setup

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This mode has two part of feature.

In Power Saving Mode 0, the battery life can be saved by stopping GPS output temporarily while the device isn't reporting. This is the default setting.

Set <Power Saving Mode> to 0 to enable it such like this command: #username,0000,combo,0*.

In Power Saving Mode 1, power save mode will be disabled and the GPS is always on. If the GPS signals are often poor in your environment, to use this mode is recommended.

Set <Power Saving Mode> to 1 to disable it such like this command: #username,0000,combo,1*.

Setup Format: #<User Name>, <Password>, <Function Mode>, <Power Saving Mode>*

Command: #username,0000,combo,3*

SMS Text	Description	
#	Start sign.	
username	✧ Default user name of the device. ✧ If you have changed the username, please use the updated one.	
0000	✧ Default password. ✧ If you have changed the password, please use the updated one.	
combo	Mode 'combo' defines Power Save mode	
1	0	Power Saving mode 0. The basic power save interval is 30 seconds. The device will try to get valid position data every 30 seconds and the interval will be accumulated (30, 60, 90, 120…etc) if successful (well positioned), or start from 30 sec. interval.
	1	To disable the Power Saving mode. GPS will always on.
*	End sign.	

Table: Power Save Mode Setup Format Description

Situation	Description
Success	[username] +, Device Combo mode has been deactivated.

Table: Power Save Mode Setup Response Description

AES128 encryption function setting

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Set <Encryption Mode> to 1 to enable it such like this command: #username,0000,aes,1*.

Setup Format: #<User Name>, <Password>, <Function Code>, <Encryption Mode>*

Command: #username,0000,aes,1*

SMS Text	Description	
#	Start sign.	
username	✧ Default user name of the device. ✧ If you have changed the username, please use the updated one.	
0000	✧ Default password. ✧ If you have changed the password, please use the updated one.	
AES	Code 'AES' defines encryption function.	
Encryption Mode	0	Disable returned data encryption by AES128 function.
	1	Enable returned data encryption by AES128 function.
*	End sign.	

Table: AES128 encryption Setup Format Description

Situation	Description
Success	[username] + setup OK. Device data for aes128 protection is switched off. / on.
fail	[username] + , command error.

Table: AES128 encryption Setup Response Description

TCP acknowledge function setting

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Set <Function Mode> to 1 to enable it such like this command: #username,0000,tcpack,1*.

Setup Format: #<User Name>, <Password>, <Function Code>, <Function Mode>*

Command: #username,0000,tcpack,1*

SMS Text	Description	
#	Start sign.	
username	✧ Default user name of the device. ✧ If you have changed the username, please use the updated one.	
0000	✧ Default password. ✧ If you have changed the password, please use the updated one.	
TCPACK	Code 'TCPACK' defines acknowledge function.	
Function Mode	0	Disable returned data acknowledge function.
	1	Enable returned data acknowledge function.
*	End sign.	

Table: TCP acknowledge Setup Format Description

Situation	Description
Success	[username] + setup OK. Device tcp ack mode is updated.
fail	[username] + , command error.

Table: TCP acknowledge Setup Response Description

Set up Low Power reminder

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The user can set the SMS/COTA command to alert user if the battery voltage is low or automatically shut down system when the battery voltage reaches a certain threshold.

Setup Format: #<User Name>, <Password>,<Function Code>, <Voltage Value 1>,< Voltage Value 2>*

Command: #UserName,0000,LP,3650,50*

SMS/ COTA Command	Description
#	Start sign.
UserName	✧ Default ID of the device. ✧ If you have changed the user name, please use the updated one.
0000	✧ Default password. ✧ If you have changed the password, please use the updated one.
Function Code	Code "LP" defines the Low Power alarm setting.
Voltage Value 1 (V1)	The range is 3500~3800, when the voltage reaches this value, the "LP" event will be sent out
Voltage Value 2 (V2)	The range is 1~99, when the voltage is lower than V1 - V2, "LP2" event will be sent out and shut down
*	End sign.

Table: Low Power Setup Description

Situation	Message Reply
Setup Succeed	[username] + setup OK. Device low power value setting is updated.
Setup fail	[username] + Setup fail. Device low power value setting is not change.

Table: Low Power Setup Response Description

GSM Cell Information Setting

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Use this command to switch the display GSM Cell Information in the data of report.

Setup Format: #<User Name>, <Password>,<Function Code>, <Mode>*

Command: # UserName,0000,cellid,1*

SMS/ COTA Command	Description
#	Start sign.
UserName	Default ID of the device. If you have changed the user name, please use the updated one.
0000	Default password. If you have changed the password, please use the updated one.
Function Code	Mode "cellid" defines the Cell ID information Setting setup mode.
Mode	0: Disable cell information report function.
	1: Enable 3 groups of cellid and all parameters.
*	End sign.

Table: Cell ID Setting Setup Format Description

Situation	Message Reply
Setup Succeed	[username] + , setup OK. GSM Cell ID Function is turned off.
Setup fail	[username] + , command error.

Table: Cell ID Setting Setup Response Description

Firmware upgrade Over The Air (FOTA) function

Use this command to upgrade firmware from a file on http server.

Setup Format: #<User Name>, <Password>,<Function Code>, <URL of firmware>*

Command: #

UserName,0000,fota,Http://220.128.123.1:8000/NB5-F5359-0609201617-VA1.0.3-OTA(00383390).txt*

SMS/ COTA Command	Description
#	Start sign.
UserName	Default ID of the device. If you have changed the user name, please use the updated one.
0000	Default password. If you have changed the password, please use the updated one.
Function Code	Code "fota" defines the firmware upgrade function.
URL of firmware	URL of firmware file on http server, file name could be any, but need add a –OTA(filesize) at file name tail, filesize must be 8 digit with 0 prefix.
*	End sign.

Table: FOTA command Format Description

Situation	Message Reply
command Succeed	[username] + , Device OTA Process Start.
Upgrade completed	[username] + , Download success. Device will start update and reboot.
Upgrade fail	[username] + , Server Return File Not Found, or file size not matching. Or [username] + , Download fail. Receive data not complete. Or [username] +, erase flash fail. OTA is canceled.
command fail	[username] + , command error.

Table: FOTA command Response Description

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FCC Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

Specific Absorption Rate (SAR) information:

This NB5 meets the government's requirements for exposure to radio waves. The guidelines are based on standards that were developed by independent scientific organizations through periodic and thorough evaluation of scientific studies. The standards include a substantial safety margin designed to assure the safety of all persons regardless of age or health. FCC RF Exposure Information and Statement the SAR limit of USA (FCC) is 1.6 W/kg averaged over one gram of tissue. Device types: Tablet has also been tested against this SAR limit. This device was tested for typical body-worn operations with the back of the phone kept 10mm from the body. To maintain compliance with FCC RF exposure requirements, use accessories that maintain an 10mm separation distance between the user's body and the back of the phone. The use of belt clips, holsters and similar accessories should not contain metallic components in its assembly. The use of accessories that do not satisfy these requirements may not comply with FCC RF exposure requirements, and should be avoided.