



N105-US-6000 6000mAh GPS/GPRS Tracker
with Ultrasonic distance Sensor

USER GUIDE



1 INTRODUCTION

The lithium battery operated N105 tracker has been designed to provide bin/container level and tracking information through a GSM/GPRS network.

After a pre-programmed standby delay, or in case of a movement, or in case of container door opening alarm, the N105 sends its GPS position to the GSM/GPRS network, as well as the container level (obtained from the **ultrasonic distance sensor**).

It integrates an **accelerometer** and a **real time clock**, to wake up system periodically or in case of a movement.

A **proximity sensor** placed on the container door generates an alarm if this door is opened.

N105-US can operate in 3 different modes : SMS mode to communicate easily with a mobile phone, UDP mode when using FTS server (or 3rd party application), or E-mail messaging.

The high performance **GPS** chipset delivers accurate position information even in poor signal level environments (tree foliage, urban canyons, inside clothes).

2 STARTING

2.1 *Insert SIM card*

The N105 tracker operates a GSM/GPRS modem, so a SIM card is necessary to enable wireless communications.

First of all the PIN code has to be disabled before insertion (you can use a mobile phone to disable it).

After this, you have to :

- open the cover (remove the 4 screws),
- insert the nano-SIM card as shown on the pictures.
- replace cover and screws.



SIM card insertion

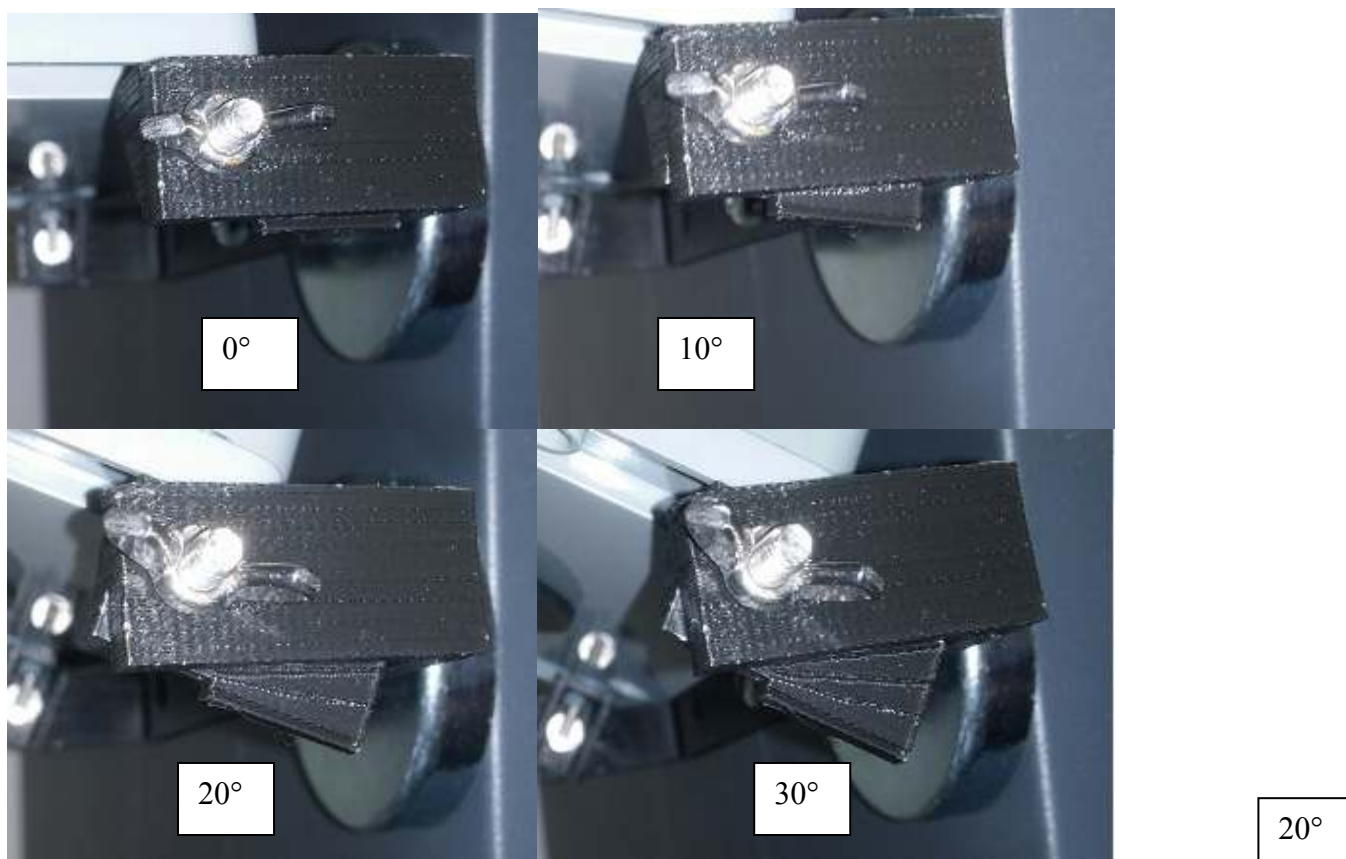


SIM card installed

2.2 Mounting in the container

Mount the tracker with its magnet or M5/M6 screws on the container wall. The 100% level is set by default to 30 centimeters from the ultrasonic sensor surface. This 100% level distance can be modified through the UZ command.

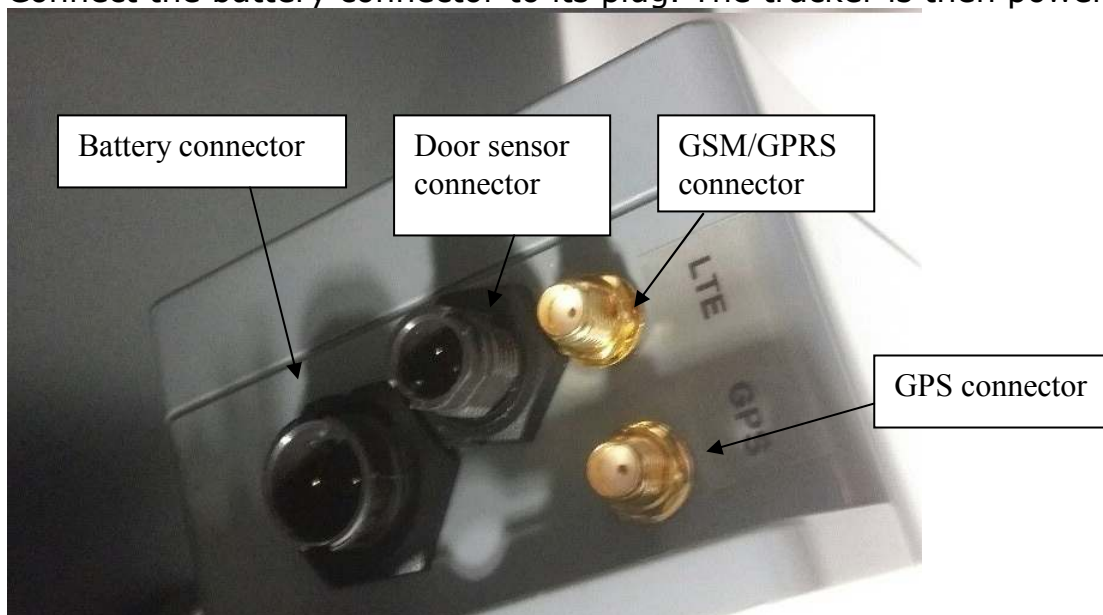
Adjust the angle of the bracket using the butterfly nuts. 0°, 10°, 20°, 30° angles are indicated on the bracket support.



The antenna must be mounted outside the container, face up to the sky, with a clear view area. Connect the LTE and GPS connectors to their respective plugs.

Connect the door sensor to its plug, and mount the door sensor with its magnet on the container door.

Connect the battery connector to its plug. The tracker is then powered ON.

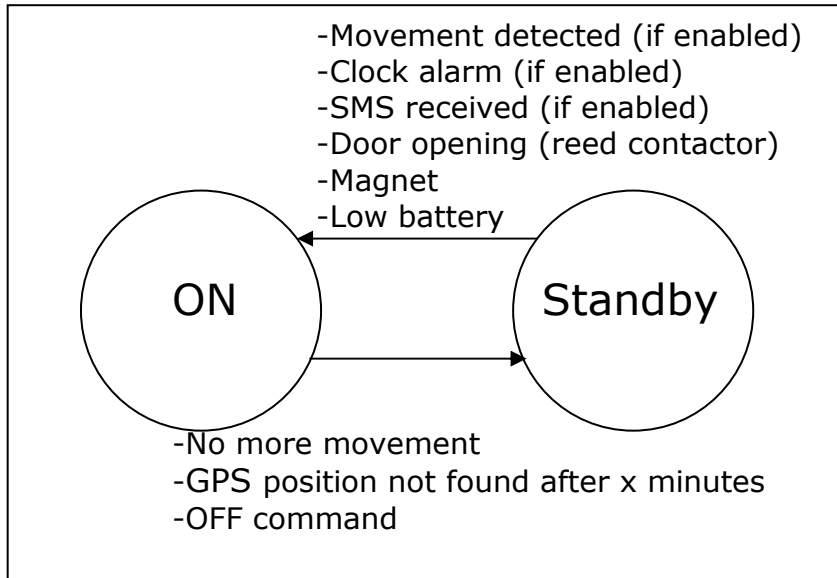


2.3 Tracker operation

The N105 operates within the 2 following states:

- ON state,
- Standby state.

This schematic shows the different states interaction:



The N105 enters ON state if:

- A movement stronger than the defined threshold (10 by default) is detected, if this function is enabled (see AC command).
- The Alarm clock (programmed standby time) occurs, if this function is enabled (see RTC command).
- Low battery threshold has been reached.
- Door is opened.
- Magnet is activated (magnet sensor is located near the SIM card).
- SMS is received (if this function is enabled, see WU command).

ON mode is confirmed by the green LED fading ON. After that the green LED blinks (small flashes) every 5 seconds. The number of green flashes indicates the GPS status :

GPS position found	2 green flash
GPS position not found	1 green flash

Also, the red LED indicates the network connection status, as well as the ultrasonic sensor status :

Connected to GPRS network	1 red flash
Not connected to GPRS network	No red flash
Container level sensor in default (too many ultrasonic signal reflections). Bracket angle must be modified.	Red LED ON

When entering ON Mode, the N105 sends its previous position at power ON, and then periodically (60 seconds by default), if the position is valid.

The N105 enters Standby mode if:

- The tracker stops moving (less than 20 meters by minute, default value).
- The GPS position is still not valid after 3 minutes (default value, configurable).
- OFF SMS command is received.

Standby mode is confirmed by the green LED fading OFF.

2.4 Communication mode

There are 4 different communication modes :

- SMS mode : data frame (described in chapter 2.5) is sent only by SMS
- UDP mode. : data frame (described in chapter 2.5) is sent only in UDP
- E-mail mode : : data frame (described in chapter 2.5) is sent only by E-mail
- MIX mode (one SMS is sent at each startup, and then UDP frames)

New frame is sent when the tracker is already ON, if the door is being opened, or being closed. This frame is sent by SMS in SMS, E-mail or MIX mode, and by UDP in UDP mode.

2.5 Data sent

- SMS mode

The data automatically sent by SMS is the following: (fields are separated by comas)

- Tracker part number (GTLD01)
- Tracker Serial number
- Door alarm status (DOOR ALARM or DOOR CLOSED)
- Accelerometer alarm status (if tracker has been wake up by accelerometer : ACC ALARM or blank)
- Container level (0% to 100%)
- Battery level (0% to 100%)

- Internal temperature (°C)
- Number of GPS satellites tracked
- GPS position valid or not (Fix OK/ NOK)
- Latitude and Longitude of last position known (google maps link)

- E-mail mode

The data automatically sent by E-mail is the following: (fields are separated by comas)

- Tracker ID (part number)
- Door alarm status (DOOR ALARM or DOOR CLOSED)
- Accelerometer alarm status (if tracker has been wake up by accelerometer : ACC ALARM or blank)
- Container level (0% to 100%)
- Battery level (0% to 100%)
- Internal temperature (°C)
- Number of GPS satellites tracked
- GPS position valid or not (Fix OK/ NOK)
- Latitude and Longitude of last position known (google maps link)

'From' address is GTLD01@heoldesign.com

'From' name is the serial number of the tracker

You can see green LED also blinking when SMS or E-mail is sent. If a failure occurs when sending the E-mail, the error status will be sent by SMS to the user.

To visualize quickly the tracker GPS position on a smart phone or computer, you can click the GPS coordinates, and it will show the position on the map application.

- UDP mode

The data sent by UDP is the following: (fields are separated by comas)

IMEI,SN,yyyy/dd/mm,hh:mm:ss,IIII.IIIII,nnnnn.nnnnn,Door,Accelerometer ,LVLxxx%,BATbbb%,cccC,GPS_Fix,GPS_sat

Name	Description
IMEI	IMEI number, 15 digits
SN	Serial number, 7 digits
yyyy/dd/mm	Current date
hh:mm:ss	Current time
IIII.IIIII	GPS Latitude (WGS84 format)
nnnnn.nnnnn	GPS Longitude (WGS84 format)
Door	Door alarm status ('DOOR ALARM' or 'DOOR CLOSED')

Accelerometer	Accelerometer alarm status (if tracker has been wake up by accelerometer : 'ACC ALARM' or blank)
xxx	Container level (0% to 100%)
bbb	Battery level (0% to 100%)
ccc	Internal temperature (°C)
GPS_Fix	GPS position valid or not ('Fix OK' or 'Fix NOK')
GPS_sat	Number of GPS satellites tracked

3 CONFIGURATION COMMANDS

The configuration commands sent by SMS can be sent in any mode, at any time (SMS are managed by read/acknowledge process). The N105 has to be in ON mode to receive the SMS (or GSM/GPRS modem can be in low power mode during standby, see command WU); it will answer with acknowledge for each command. Also sending SMS when the tracker is in UDP is possible.

The configuration commands sent by UDP must be sent only in UDP mode, immediately after having received a UDP frame from the tracker (ensuring the tracker is ON, and knowing the tracker IP address and UDP port provided by network operator (these are dynamic values). All the acknowledges of these UDP commands include the IMEI number in first field.

3.1 *User phone number modification*

The **PH** command sent by SMS to the N105 allows modifying the addressee number; the N105 will memorize the phone number which sent this SMS.

The **PH,<phone number>**, command sent by UDP allows to modify the phone number which to send SMS messages

Example : Send PH,06451548, command by UDP to send this phone number to the N105 tracker.

3.2 *Standby and tracking parameters*

The **TS,a,b,c,d**, command allows modifying the following parameters :

a : delay in seconds to enter standby mode, if the GPS position is still not valid. Default value 180 seconds.

b : tracking interval in seconds (for SMS, UDP, E-mail modes). Default value 30 seconds.

c : distance in meters to detect immobility (N105 enters standby if the distance between current GPS position and position calculated 1 minute ago is less than c meters). Default value 10 meters.

d : tracking record interval (in seconds) when the network is not available. Default value 30 seconds. *Not implemented in current firmware.*

For example, to set tracking interval to 20 seconds, you must send the command `TS,300,20,10,30`, by SMS (don't forget the comma at the end of this command). Also be careful not to add commas between characters.

3.3 Accelerometer threshold

The command `AC,a,b`, allows modifying the accelerometer threshold 'a' to wake up the N105 from standby. Default value is 10. The parameter 'b' enables (1) or disables (0) the accelerometer function (don't forget the comma at the end of this command).

To detect a smaller movement, you can for example send the command `AC,5`. Min and max values are 3 / 80.

3.4 Clock alarm

The command `RTC,a,day,month,b,c`, allows modifying the interval 'a' (in minutes) to wake up the N105 from standby. Default value is 10 minutes. After day/month date, the standby time switches to interval 'b'. The parameter 'c' enables (1) or disables (0) the clock alarm function (don't forget the comma at the end of this command).

Example: `RTC,240,15,11,120,1` : Before November 15, standby time is 4 hours. After November 15, standby time is 2 hours.

3.5 OFF mode

The `OFF` command sent to the N105 forces to enter OFF mode immediately (wake up by accelerometer, internal clock and SMS are disabled). Only the magnet or removing the battery can then switch ON the tracker.

3.6 Current GPS position

The `PO` command allows knowing the current GPS position. Data sent by reception of this command are the same as the one in paragraph 2.5.

3.7 APN

The `APN,name`, command allows modifying the APN name (provider name for UDP data session). Don't forget the comma at the end of the command.

Example : `APN,orange.fr`, .

3.8 IP destination address

The **IP,address**, command allows modifying the IP destination address (UDP data session). Don't forget the comma at the end of the command.

Example : IP,heoldesign.ddns.net,

3.9 IP destination port (SMS only)

The **PT,portnumber**, command sent by SMS allows modifying the port number (range 1 – 65000) for UDP data session. Don't forget the comma at the end of the command.

Example : PT,1730,

3.10 GSM/GPRS mode

The **GM,x** command allows modifying the GSM mode : SMS, UDP, or E-mail :

- GM,S : enter SMS mode.
- GM,U : enter UDP mode.
- GM,E : enter E-mail mode
- GM,M : enter MIX mode (one SMS is sent at startup, and then UDP frames)

3.11 PM (SMS only)

The **PM** command sent by SMS returns the current parameters of the N105 tracker (in 2 successive SMS).

3.12 UZ

The **UZ**, command initializes the 0% container level parameter of the Ultrasonic sensor. The container must be empty when sending this command.

The **UZ,x**, command initializes the 0% container level parameter of the Ultrasonic sensor, as well as the 100% level distance from the sensor (value x in centimeters) The container must be empty when sending this command.

X min = 20 cm; x max = 100 cm

3.13 ES

ES,<smtp server address>, sets the SMTP server name for E-mail functionality.

Example : ES,contact@heoldesign.com,

3.14 EA

EA,<smtp_authentication>, sets the SMTP authentication level (smtp_authentication = 0 : SMTP server does not request authentication; smtp_authentication = 1 : SMTP server needs authentication)

3.15 EL

EL,<login>, sets the SMTP login (user name), when authentication is needed.

3.16 EP

EP,<password>, sets the SMTP password, when authentication is needed.

3.17 ET

ET,<E-mail destination address>, sets the E-mail recipient ('to') address

3.18 ID (SMS only)

The **ID,<myid>**, command sent by SMS allows modifying the user ID. The ID is sent in the PM command. ID max length is 7 characters (numeric and alphanumeric characters. Don't forget the comma at the end of the command.
Example : ID,abcd05,

3.19 Wake up by SMS

The **WU** command enables wake-up tracker from standby by receiving SMS. It is not recommended to activated this function with the N105-US.

- WU,1 : GSM/GPRS modem is in low power mode when the tracker is in standby (enabling wake up by SMS).
- WU,0 : GSM/GPRS modem is switched OFF when the tracker is in standby. Recommended for very low power operation.

4 CHARGING THE BATTERY

Below 3.6V (15%), the Lithium battery has to be recharged. The N105 wakes up automatically form OFF mode and sends a SMS when voltage drops below this threshold. In UDP mode, the battery voltage is displayed in the data window.

The battery is charged with the Lithium charger. Orange LED of the charger is ON when charge is in progress.

A full charge will take about 3-4 hours.

Depending on temperature conditions, the battery autonomy is several months in Standby mode, with 1 or 2 daily wake-up.