



GPS TRACKER
DOT A SERIES
USER MANUAL

Table of contents

GENERAL INFORMATION.....	3
Specifications.....	4
Main connector pinout and device appearance.....	5
Connection recommendations.....	6
Status indicators.....	7
Digital input and output operating modes.....	8
SMS AND TCP COMMANDS.....	9
RS485/RS232 interface operating modes (A2, A3, A4 models).....	11
Bluetooth (BLE) sensors – server integration.....	12
SMS AND TCP COMMANDS.....	13
WIALON INTEGRATION.....	15
WARRANTY TERMS.....	18
PACKAGE CONTENTS.....	19

GENERAL INFORMATION

The A series GPS tracker (hereinafter referred to as the “tracker”) is a compact, versatile device designed for remote monitoring of mobile and stationary assets and for collecting data from equipment installed on them.

Data is transmitted to the server over a 2G GSM connection (A1, A2, A3 models) or a 2G/4G GSM connection (A4 model).

The tracker can transmit data to 2 servers simultaneously. Supported server communication protocols:

- INTERNAL – a proprietary open protocol available for integration.
The device is identified on the server by the modem IMEI.
Supported in monitoring systems Wialon, Locavist and others.
- USER_AG – a specialized protocol.
Identification uses the ID(SN) and password.
- EGTS_ID.
The device is identified on the server by the modem ID(SN).
- EGTS_IMEI.
The device is identified on the server by the modem IMEI.

Tracker functions and key features:

- Built-in cellular, navigation and Bluetooth antennas
 - 2 nano-SIM cards (A4 model); 1 nano-SIM card (A1, A2, A3 models)
 - RS485 (RS232 optional) digital interface for connecting fuel level sensors (A2, A3, A4 models)
 - Bluetooth 4.0 LE for connecting wireless sensors
 - Motion (acceleration) sensor – accelerometer
 - 1 positive-trigger digital input for ignition monitoring or another sensor
 - 2 negative-trigger digital inputs for a frequency-output fuel level sensor, pushbutton, etc.
 - 1 digital output with inductive transient protection (immobilizer relay, etc.).
- Maximum switched current: up to **500 mA**
- External GPS | GLONASS navigation antenna (A3 model)
 - Backup rechargeable battery (capacity from **300 mA**) with charge monitoring

Specifications

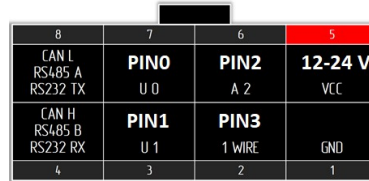
The main technical characteristics of the tracker are presented in Table 1.

Table 1

Parameter	Value	Note
Device dimensions, mm	70 x 52-62 x 22	Excluding antennas and mounting hardware
Weight, g	50	Excluding wires and battery
Supply voltage, V	8 — 50	Excluding voltage transients
Reverse polarity protection	Yes	
Operating temperature range, °C	-40 ... +80	Excluding battery
Positive-trigger digital inputs, qty.	1	Logic “1” level: less than 7 V at the input
Negative-trigger digital inputs, qty.	2	Logic “1” level: less than 1 V at the input
Digital outputs, qty.	1	Open collector (up to 500 mA)
Motion/tilt sensor	+	Built-in
USB interface	Yes	Diagnostics, updates
RS485 interface	Yes	
RS232 interface	Yes*	Optional
Bluetooth 4.0	Yes	Wireless sensors
Non-volatile memory	Yes	At least 12000 events
2G GSM module (A1, A2, A3 models)		GSM/GPRS/EDGE: 850 / 900 / 1800 / 1900 MHz
2G/4G GSM module (A4 model)		FDD-LTE (Cat.1): B1/B3/B5/B7/B8/B20 MHz
Navigation module		GSM/GPRS/EDGE: 900/1800 MHz GPS GLONASS
GSM antenna		Internal
Navigation antenna		Internal (A1, A2, A4 models) External (A3 model)
Bluetooth antenna		Internal
Number of SIM card slots	1	Can be replaced with a SIM chip
Number of SIM chip slots	1	(A4 model)
Backup battery, mA	300-1200	Li-Pol
Built-in battery protection	+	Overcharge and deep-discharge protection; battery temperature monitoring
Enclosure protection rating		IP54

Main connector pinout and device appearance

Figure 1 and Table 2 provide information on the pinout of the main connector. The appearance of the device is shown in Figure 2.



8	7	6	5
CAN L RS485 A RS232 TX	PIN0 U 0	PIN2 A 2	12-24 V VCC
CAN H RS485 B RS232 RX	PIN1 U 1	PIN3 1 WIRE	GND
4	3	2	1

Figure 1

Table 2

No	Designation	Description
1	GND	Power supply negative
2	PIN3	Negative-trigger digital input
3	PIN1	Digital output
4	L / A / TX	Digital interface input (A2, A3, A4 models)
5	12-24V	External power supply input
6	PIN2	Positive-trigger digital input
7	PIN0	Negative-trigger digital input
8	H / B / RX	Digital interface input (A2, A3, A4 models)

Connection recommendations

Recommended device connection procedure:

1. Install the SIM card
2. Connect the device's internal rechargeable battery
3. Close the enclosure
4. Connect the device power supply (red and black wires of the main harness)

Warning: *Connect the permanent positive supply wire last, through a 1–2 A fuse installed as close as possible to the connection point on the vehicle electrical system.*

The remaining wires of the harness are connected according to the required functionality.

For the best satellite reception, position the tracker with the logo on the enclosure facing upwards. Installation at other angles is also permitted. Do not cover the logo side of the tracker with metal objects or metal coatings.

If driving behavior monitoring is required, install the tracker with the main connector side facing in the vehicle's direction of travel.

WARNING! *Do not install the tracker near vehicle components that become very hot. Ambient temperatures above +80°C may affect device stability.*

There are **4** ways to configure the tracker:

- WEB Configurator – remote configuration and firmware updates
- PC software – USB connection. Diagnostics of the device and connected equipment; configuration changes
 - Mobile application (Android OS) – Bluetooth or USB connection. Diagnostics of the device and connected equipment; configuration changes
 - SMS commands

Status indicators

POWER

Combined power indicator.

- Green – external power is connected.
- Green and red at the same time (looks like yellow) – external power is connected, the internal battery is charging.



GSM/GPS modem status indicator. The indication is a series of short and long LED flashes.

Long flashes – GSM modem operating mode:

- There are no long flashes – the GSM modem is disabled.
- 1 long flash – search and registration in the cellular network.
- 2 long flashes – the device is registered on the network, connecting to the server.
- 3 long flashes – connection to the server is established.

Short flashes – navigation modem operating mode:

- There are no short flashes – the navigation modem is disabled.
- 1 short flash – the modem is turned on, searching for satellites.
- 2 short flashes – satellites have been found, the signal level is acceptable (from 5 to 8 satellites in the visibility zone).
- 3 short flashes – satellites found, excellent signal level (more than 8 satellites in visibility range).

Some time after power is applied (1–3 min), the GSM | NAV LED should begin repeating a sequence of 3 long flashes and 3 short flashes. This indicates normal device operation.

If this does not occur, check the installation and configuration, or contact technical support.

Digital input and output operating modes

Negative-trigger digital input PIN0

“**Digital**” mode detects a connection to the negative supply: when connected to negative, the input is active (logic 1); otherwise, it is inactive (logic 0). Used for pushbuttons and limit switches.

“**Cumulative pulse**” mode supports pulse-output sensors (fuel flow sensors and various counters). The maximum count is 65535, after which counting restarts.

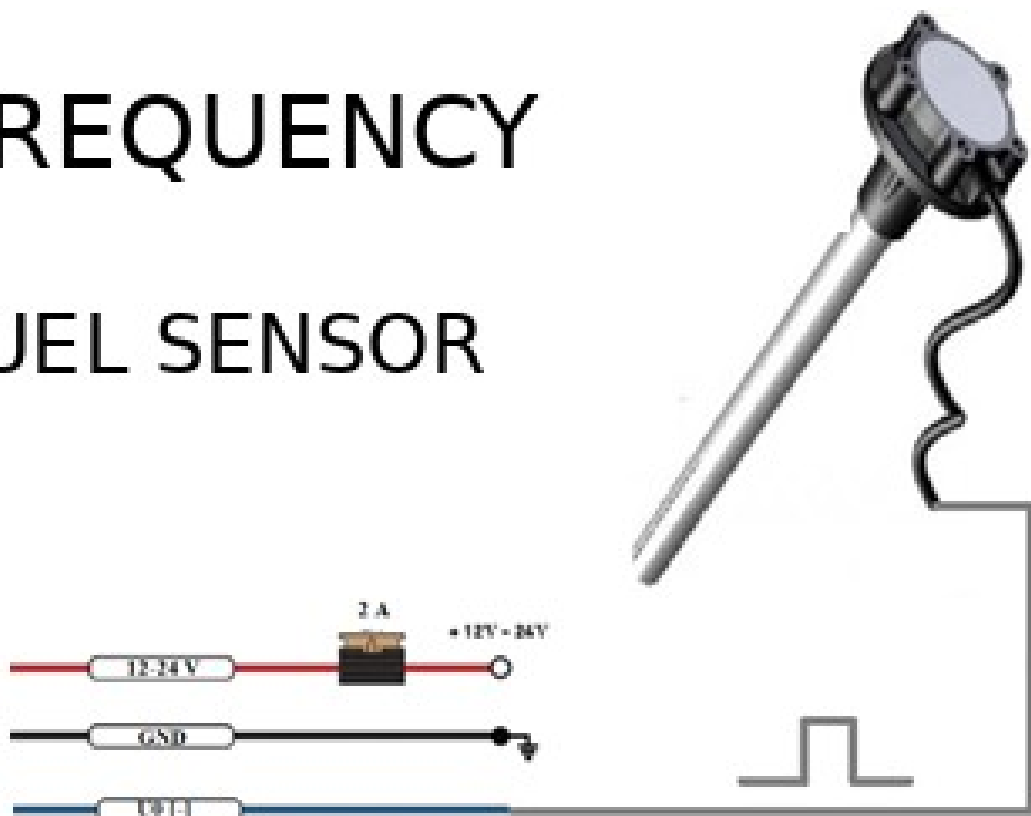
“**Resetting pulse**” mode counts pulses since the previous packet was generated. If no pulses are detected between packets, the zero value is not transmitted to the server, reducing data traffic.

“**Frequency**” mode supports a frequency-output fuel level sensor. Set the following parameters in the fuel level sensor configuration:

- Output signal type: frequency
- Frequency range: 30–2000 Hz (up to a maximum of 10000 Hz)

When connecting frequency-output fuel level sensors from other manufacturers, a pull-up resistor to the supply may be required. Select its resistance according to the vehicle supply voltage and the sensor output characteristics.

FREQUENCY FUEL SENSOR



Digital output PIN1

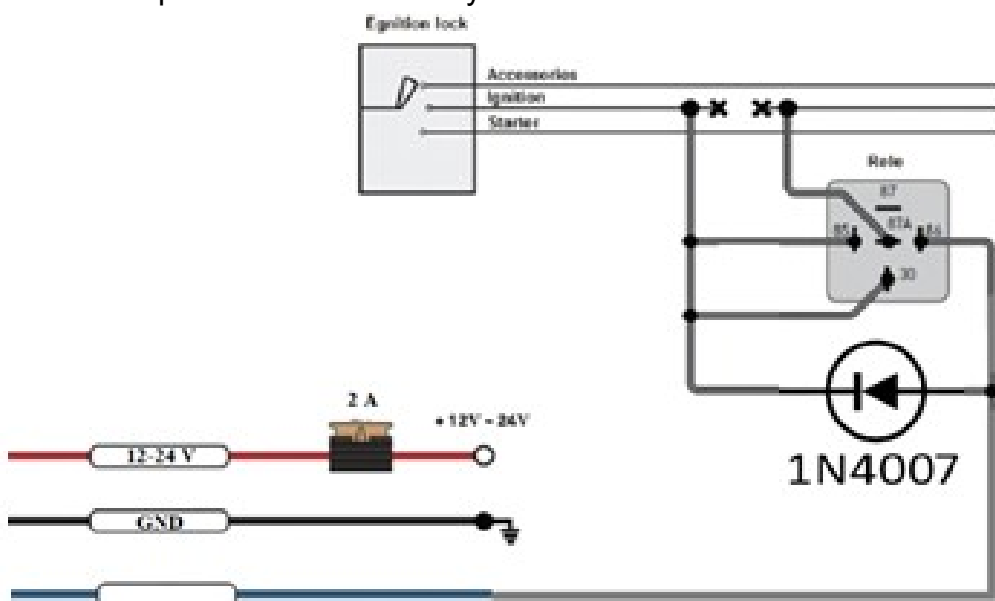
“**Output mode 1**” activates and deactivates the output in response to server or SMS commands. The output state is stored in non-volatile memory and restored after the device restarts.

“**Safe immobilization**” output mode is similar to “Mode 1”, but the output is activated only after the vehicle has come to a complete stop.

The output is an open-collector output. When active, it is connected to ground. The output supports loads up to 500 mA.

Use external relays to switch higher-power devices.

An example of an external relay connection is shown below:



Use the SERV*8 and SERV*24 commands to control the outputs.

SMS AND TCP COMMANDS

Positive-trigger digital input PIN2

“Digital” mode detects a positive input voltage: when a positive voltage above 7 V is applied, the input is active (logic 1); otherwise, it is inactive (logic 0).

“Ignition” mode operates in the same way as digital mode, but the input state also determines the tracker’s virtual ignition state.

The ignition state is used for:

- freezing coordinates
- battery charging control

Ignition can also be monitored by measuring the supply input voltage. Set the virtual ignition threshold correctly in “System settings”. **The *digital*** input state in “Ignition” mode takes priority over ignition detection based on supply voltage.

Negative-trigger digital input PIN3

“**Digital**” mode detects a connection to the negative supply: when connected to negative, the input is active (logic 1); otherwise, it is inactive (logic 0). Used for pushbuttons and limit switches.

RS485/RS232 interface operating modes (A2, A3)

The Omnicomm LLS protocol is supported.

Sensors at addresses 1 and 2 are **polled** every 5 seconds.

For correct operation, set the fuel level sensor network address to 1 or 2.

On the Wialon server, the fuel level sensor can be monitored using the following parameters:

- `lssX_val` – relative level value
- `lssX_temp` – sensor temperature

Where X is the sensor number (network address)

Example: fuel level sensor at address 1

LSS1_VAL=1500 – relative fuel level

LLS1_TEMP=19 – temperature with a resolution of one degree (C)

Bluetooth (BLE) sensors – server integration

To connect a wireless sensor, enter its MAC address in the tracker settings under “Bluetooth (BLE) sensors”.

The tracker supports:

- fuel level sensors (DOT, Escort and others)
- temperature sensors with reed switch or pushbutton state monitoring (DOT, Escort and others)
- wireless relays (DOT)

On the Wialon server, temperature sensors and fuel level sensors can be monitored using the following parameters:

- temp_1wire_X – temperature with a resolution of 0.1 °C.

This parameter is transmitted only for temperature sensors when “Transmit *temperature with 0.1 °C resolution*” is ^{enabled} in the “System” section.

• lssX_val – relative fuel level for fuel level sensors, or circuit monitoring state for temperature sensors

- llsX_temp – sensor temperature
- llsX_bat – battery voltage

Where X is the sensor number (cell number)

Example: a **temperature** sensor is configured in slot 1 (MAC address 3).

TEMP_1WIRE_3=22.1 – temperature with a resolution of one tenth of a degree Celsius.

LSS3_VAL=0 – circuit monitoring sensor state

(1 – circuit open, 0 – circuit closed)

LLS3_TEMP=22 – temperature with a resolution of one degree Celsius

LLS3_BAT=3.6 – battery voltage (V)

Example: a fuel level sensor is configured in slot 1 (MAC address 4).

LSS4_VAL=1500 – relative fuel level

LLS4_TEMP=19 – temperature with a resolution of one degree (C)

LLS4_BAT=3.6 – battery voltage (V)

SMS AND TCP COMMANDS

Table 5 – SMS and text TCP commands:

Binary TCP commands ("custom_msg" in Wialon)	SMS format or text TCP command ("driver_msg" in Wialon)	Action
0101	<access_password>*SERV*1.1	send the packet to the monitoring server
0102	<access_password>*SERV*1.2	Send an information SMS (ID, IMEI, etc.)
0103	<access_password>*SERV*1.3	Send an SMS with a map link
0104	<access_password>*SERV*1.4	Force a firmware update
0105	<access_password>*SERV*1.5	Update firmware via WEB Configurator
0106	<access_password>*SERV*1.6	Clear device memory
0107	<access_password>*SERV*1.7	Restart the device
0108	<access_password>*SERV*1.8	Update settings via WEB Configurator
0109	<access_password>*SERV*1.9	Upload settings to WEB Configurator (synchronize)
08000X	<access_password>*SERV*8.0.X	Set the output to state X 1 – turn on 0 – turn off
1800XXYY	<access_password>*SERV*24.0.XX.YY	Activate the output for XX minutes and YY seconds

All commands above can be sent either by SMS or as text TCP commands (the "driver message" function in Wialon).

Examples of binary commands in Wialon (custom_msg):

Unit properties - _L1_ ×

General

Access

Icon

Advanced

Sensors

Custom fields

Groups

Commands

Driving behavior

Properties

Trip detector

Fuel consumption

Maintenance

+ Create

Command name	Phone number	Channel	Parameters	Queue	
Restart device	-	TCP	0107	-	
Send custom message (custom_msg)					
Update firmware via WEB	-	TCP	0105	-	
Send custom message (custom_msg)					
Update settings via WEB	-	TCP	0108	-	
Send custom message (custom_msg)					
Deactivate output U0	-	TCP	080000	-	
Send custom message (custom_msg)					
Activate output U0	-	TCP	080001	-	
Send custom message (custom_msg)					
Clear memory	-	TCP	0106	-	
Send custom message (custom_msg)					

Restore properties

Export to file

Cancel

OK

Examples of text commands in the Wialon system (driver_msg):

Unit properties - _L1_ ×

General

Access

Icon

Advanced

Sensors

Custom fields

Groups

Commands

Driving behavior

Properties

Trip detector

Fuel consumption

Maintenance

+ Create

Command name	Phone number	Channel	Parameters	Queue	
Update firmware via WEB Configurator	-	TCP	123456*SERV*1.5	-	
Send driver message (driver_msg)					
Update settings via WEB Configurator	-	TCP	123456*SERV*1.8	-	
Send driver message (driver_msg)					
Restart device	-	TCP	123456*SERV*1.7	-	
Send driver message (driver_msg)					

Restore properties

Export to file

Cancel

OK

WIALON INTEGRATION

To add the device to the Wialon (Gurtam) monitoring system, complete these two steps:

- Select Device type – Arnavi
- Enter the Unique ID – use the GSM modem IMEI

New unit

×

General

Access

Icon

Advanced

Sensors

Custom fields

Unit groups

Commands

Driving behavior

Properties

Trip detector

Maintenance

Name: *

DOT_A_series

Unit type:

Device type: *

Arnavi

Arnavi

Server address:

ru.gpsgsm.org:20623

IP

Unique ID:

876541234509876

Phone number:

Password:

Creator:

Account:

Mileage counter:

GPS

Current value:

0

km

☐

Auto

Engine hours counter:

Current value:

0

h

☐

Auto

GPRS traffic counter:

Reset

Current value:

0

KB

☐

Auto

Restore properties

Export to file

!

Cancel

OK

Additionally, to simplify adding a unit to Wialon, create a unit from WLP.

wialon

Dashboard

Monitoring

Tracks

Units

Groups

Create

Create from WLP

Search

The Arnavi_A_series.wlp file contains the main sensors and commands for the device.

 DOT_A_series 2 min. 0 sec. ago
(2022-01-13 17:34:53)

Moscow Region, Russia

0 km/h	200 m	 14	55.636253 37.208683
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Sensor values:

PIN0: Off	PIN1: On
PIN2: Off	PIN3: Off
External voltage: 15.54 V	Backup battery voltage: 0.00 V
Frequency FLS (PIN0): 0.00 I	GSM signal strength: 24.00
INFO_MES: 306.00	Motion sensor: Stationary
Temp. sensor 3 (BLE) battery: N/A	FLS 4 (BLE) battery: N/A
Temp. sensor 3 (BLE): N/A	FLS 1 (RS485) level: 0.00 I
Temp. sensor 3 (BLE) circuit state:	FLS 4 (BLE) temperature: N/A
FLS 1 (RS485) temperature: 0.00 °C	FLS 2 (RS485) level: N/A
FLS 2 (RS485) temperature: 0.00 °C	

Connection settings:

Device type: Amavi

Unique ID: 866854053863943

Table 6 lists the Wialon parameters.

Table 6

Wialon parameter	Description	Comments
pwr_ext	External supply voltage, V	
pwr_int	Internal battery voltage, V	
cell_id1	GSM base station code	
lac1	GSM location area code	
mnc1	GSM mobile network code	
mcc1	GSM mobile network code	
gsm	GSM signal strength	Range 1 to 31 (99 – no GSM network)
gsm_st	Operating status of the GSM modem	0 - disabled 1 - enabled 2 - AT Ok 3 - GPRS activation 4 - GPRS Ok
nav_st	Operating status of the GPS GLONASS module	0 - disabled 1 - enabled 2 - on, NMEA OK, satellite search 3 - 3D fix (excellent reception quality)
hdop	Horizontal dilution of precision	
sim1_st	SIM card status	0 - no SIM card 1 - registration in the home network 2 - network search 3 - registration rejected 4 - reserve 5 - roaming registration 6 - PIN error

s0_st	Service server connection status (WEB Configurator)	7 - reserve 0 - not used 1 - connection establishment 2 - connection established 3 - reserve
s1_st	Monitoring server connection status	0 - not used 1 - connection establishment 2 - connection established 3 - reserve
mw	Motion sensor status (accelerometer)	0 - stationary 1 - movement 2 - error 3 - self-test error
bt	Bluetooth module operating status	0 - disabled 1 - enabled 2 - error
lls1_val or lls4_val lls1_temp or lls4_temp lls1_bat or lls4_bat freq_0	Fuel level sensor reading or Temperature sensor circuit monitoring state Fuel level sensor temperature or Temperature sensors Fuel level sensor battery voltage or Temperature sensors Frequency value from PIN0	Wireless and wired sensors Wireless and wired sensors Transmitted in degrees Wireless sensors Transmitted in volts Frequency-output fuel level sensor on PIN0 (frequency input)
info_messages	Service value	Packet formation code (see protocol for description)
v_in	Ignition state (PIN2 input) / virtual ignition state (voltage threshold)	
pin	Device digital input/output bitmask	PIN0 - bit 0 PIN1 – bit 1 PIN2 - bit 2 PIN3 – bit 3
I/O	Bitwise parameter (inX/outX)	

WARRANTY TERMS

To ensure the specified characteristics of the tracker, it is recommended to replace the battery every 2 years.

WARRANTY REPAIR OR REPLACEMENT DOES NOT APPLY IN THE FOLLOWING CASES:

- Failure to follow the product operating instructions;
- Mechanical damage (external or internal);
- Faults caused by foreign objects, insects or liquids entering the device;
- Chemical, electrochemical, electrostatic or extreme thermal damage;
- Repairs or maintenance during the warranty period performed by persons not authorized by the manufacturer;
 - Equipment faults resulting from external influences on the device or the electrical circuit to which it is connected;
 - Faults caused by third parties or other unforeseen circumstances outside the equipment manufacturer's obligations.

PACKAGE CONTENTS

The tracker is supplied with the items listed in Table 9.

Table 9 – Package contents

N o.	Item	Qty	Note
1	Navigation controller	1	monitoring device
2	Main harness	1	
3	Rechargeable battery	*	Optional
4	Product data sheet	*	On request

The latest technical information and software are always available on the relevant page of the manufacturer's website.

Note: *The manufacturer reserves the right to change the supplied items without reducing the device's performance or functionality.*
