EziTrak®
security & tracking systems

300ET User Manual
V1

Contents

1 INTRODUCTION

1.1 Attention

Do not disassemble the device. If the device is damaged, the power supply cables are not isolated or the isolation is damaged, before unplugging the power supply, do not touch the device.

All wireless data transferring devices produce interference that may affect other devices which are placed nearby.

The device must be connected only by qualified personnel.

The device must be firmly fastened in the predefined location.

The programming must be performed using a second class PC (with autonomic power supply).

The device is susceptible to water and humidity.

Any installation and/or handling during a lightning storm are prohibited.

300ET has USB interface;
Please use cables provided with 300ET device. EziTRAK is not responsible for any harm caused by using wrong cables for PC <-> 300ET connection.

1.2 Instructions of Safety

This chapter contains information on how to operate 300ET safely. By following these requirements and recommendations, you will avoid dangerous situations. You must read these instructions carefully and follow them strictly before operating the device!

The device uses a 10 V…30 V DC power supply. The nominal voltage is 12 V DC. The allowed range of voltage is 10 V...30 V DC.

To avoid mechanical damage, it is advised to transport the 300ET device in an impact-proof package. Before usage, the device should be placed so that its LED indicators are visible, which show the status of operation the device is in.

When connecting the wiring loom to the vehicle, the appropriate jumpers of the power supply of the vehicle should be disconnected.

Before dismounting the device from the vehicle, the wiring loom must be disconnected. The device is designed to be mounted in a zone of limited access, which is inaccessible for the operator. All related devices must meet the requirements of standard EN 60950-1.

The device 300ET is not designed as a navigational device for boats.

1.3 Legal Notice

Other products and company names mentioned here may be trademarks or trade names of their respective owners.

The manufacturer reserves the right to make changes and/or improvements at any time in design, functionality, parameters and electrical characteristics without any prior notice and without incurring obligations.

1.4 About Document

This document contains information about the architecture, possibilities, mechanical characteristics, and configuration of the 300ET device.

Acronyms and terms used in document

PC – Personal Computer.

GPRS – General Packet Radio Service

GPS – Global Positioning System

GSM – Global System for Mobile Communications

SMS – Short Message Service

AC/DC – Alternating Current/Direct Current

I/O – Input/Output

Record – AVL data stored in 300ET memory. AVL data contains GPS and I/O information

AVL packet - data packet that is being sent to server during data transmission. AVL packet contains from 1 to 50 records.

2 BASIC DESCRIPTION

300ET is a terminal with GPS and GSM connectivity, which is able to determine the object's coordinates and transfer them via the GSM network. This device is perfectly suitable for applications, which need location acquirement of remote objects. It is important to mention that 300ET has additional inputs and outputs, which let you control and monitor other devices on remote objects. 300ET also has a USB port for device status log output and entering configurations.

2.1 Package contents[1]

The 300ET device is supplied to the customer in a cardboard box containing all the equipment that is necessary for operation. The package contains:

- 300ET device
- Wiring loom harness with a 1x6 connection pins
- GNSS antenna
- GSM/3G antenna
- 10A Fuse and Holder

2.2 Basic characteristics

2.2.1 GSM / GPRS / 3G features:

- UMTS/HSPA+, GSM/GPRS/EDGE module
- UMTS/HSPA+ bands 800/850, 900, 2100
- HSUPA rate up to 5.76 Mbps, HSDPA rates up to 7.2 Mbps
- UMTS Uplink/Downlink up to 384 kbps
- EDGE uplink up to 236.8 kbps, downlink up to 296 kbps
- Quad band GPRS and EDGE class 33
- SMS (text, data)

2.2.2 300ET Interface features:

- Power supply: 10 ÷ 30V
- USB port
- 2 digital inputs*
- 1 Analogue input*
- 1 open collector digital outputs*
- 1Wire® temperature sensor**
- 1Wire® iButton*
- LEDs indicating device status

2.2.3 Hardware features:

- Cortex®-M3 processor
- 1 MB internal Flash memory
- Built-in accelerometer sensor

2.2.4 GNSS Features

- G33 Multi-GNSS engine for GNSS, GLONASS, Galileo and QZSS
- 32 independent tracking/search channels
- Protocol NMEA-0183: GGA, GGL, GSA, GSV, RMC, VTG
- -162 dBm Tracking Sensitivity

* Analogue IN and DIN2 on shared input and only one can be used. ** Optional accessories not supplied with the standard kit.

2.2.5 Special features:

- Any element event triggers (external sensor, input, speed, temperature, etc.)
- Highly configurable data acquisition and sending
- Multiple Geo-fence areas
- Sleep mode
- Deep sleep mode
- Configurable scenarios available
- Real-time process monitoring
- Authorized number list for remote access
- Firmware update over USB port
- TCP/IP or UDP/IP protocol support
- Up to 100350 records storing

2.2.6 Optional hardware accessories:

- 1-Wire® Digital Thermometer (P/N: A-TEMPSENSOR)
- iButton Driver ID button can reader (P/N: A-IBREADER)
- iButton Driver ID button key ring clip (P/N: A-IBHOLDER)
- iButton Driver ID button can (P/N: A-IBUTTON)

2.3 Technical Features:

Part Name	Physical Specification
Modem LED	LED
System LED	LED
Navigation LED	LED
GNSS	GNSS antenna connector MCX
GSM / 3G	GSM / 3G antenna connector SMA female outer shell, female inner pin
Socket 1x6	Tyco Micro MATE-N-LOK™ 4-794628-0 or similar
USB	Mini USB socket

Technical Details
Power supply 10...30 V DC 2W Max Energy consumption: GPRS 150mA r.m.s Max., Nominal: average 65 mA r.m.s, GNSS Sleep: average 28 mA Deep Sleep: average less than 2 mA Operation temperature: -25°C ... +55°C Storage temperature: -40°C ... +70°C Storage relative humidity 5 ... 95 % (no condensation)

Table 1 300ET Specifications

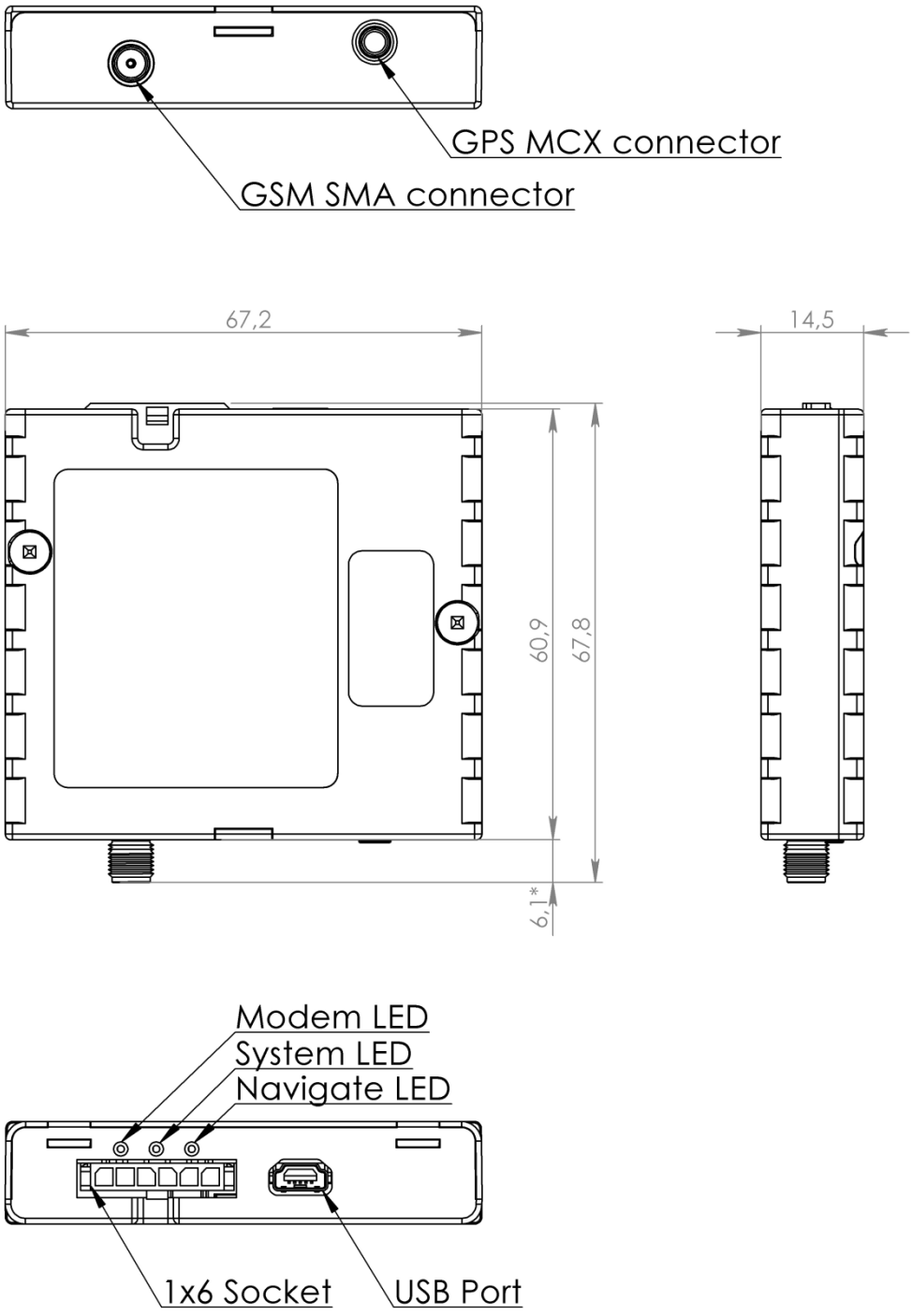


Figure 1 300ET View & Dimensions (Tolerance ±2mm)

2.4 Electrical Characteristics

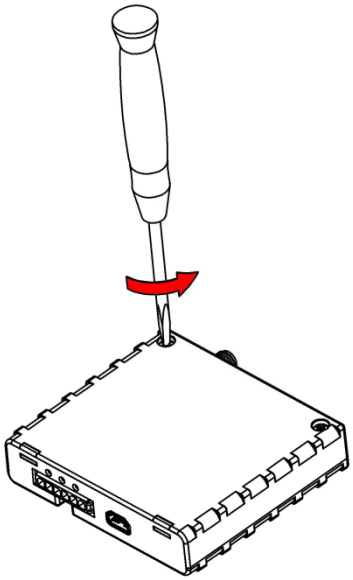
CHARACTERISTIC DESCRIPTION / VALUE	Min.	Typ.	Max.	Unit
Supply Voltage:				
Supply Voltage (Recommended Operating Conditions)	10		30	V
Digital Output (Open Drain grade):				
Drain current (Digital Output OFF)			120	uA
Drain current (Digital Output ON, Recommended Operating Conditions)			300	mA
Static Drain-Source resistance (Digital Output ON)			300	mOhm
Digital Input:				
Input resistance (DIN1, DIN2)	15			kOhm
Input Voltage (Recommended Operating Conditions)	0		Supply voltage	V
Input Voltage threshold (DIN1)		7.5		V
Input Voltage threshold (DIN2)		2.5		V
Analog Input:				
Input Voltage (Recommended Operating Conditions), Range 1	0		10	V
Input resistance, Range 1		120		kOhm
Input Voltage (Recommended Operating Conditions) Range 2	0		30	V
Input resistance, Range 2		146.7		kOhm

2.5 Absolute Maximum Ratings

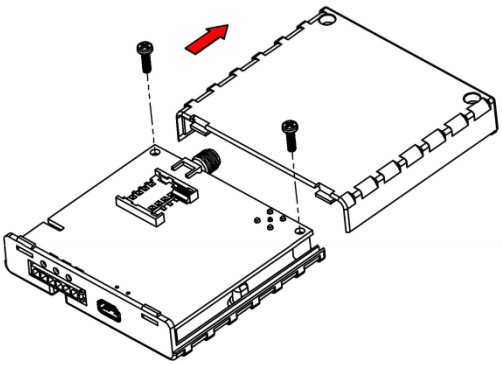
CHARACTERISTIC DESCRIPTION / VALUE	Min.	Typ.	Max.	Unit
Supply Voltage (Absolute Maximum Ratings)	-32		32	V
Drain-Source clamp threshold voltage (Absolute Maximum Ratings), (I_{drain} = 2mA)			36	V
Digital Input Voltage (Absolute Maximum Ratings)	-32		32	V
Analog Input Voltage (Absolute Maximum Ratings)	-32		32	V

3 CONNECTION, PINOUT, ACCESSORIES

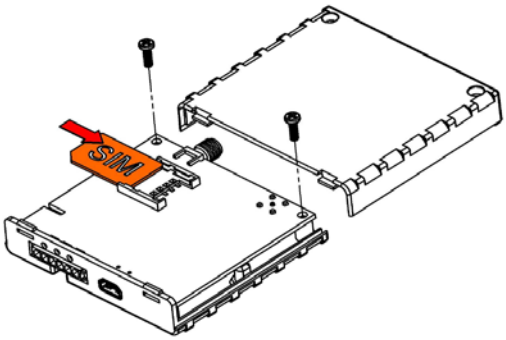
3.1 How to insert SIM card into 300ET device



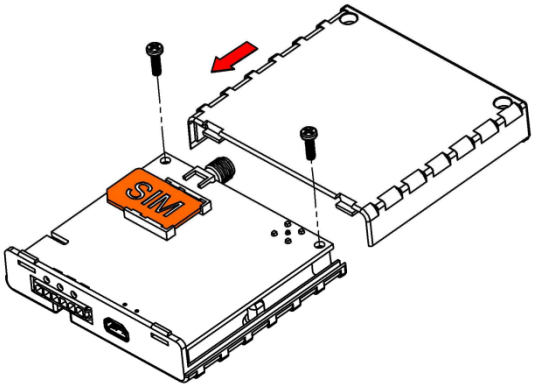
- Gently open 300ET case using screwdrivers



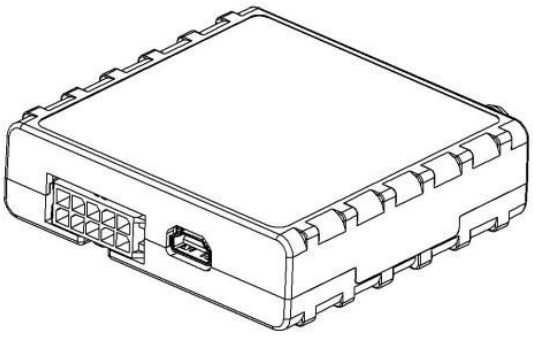
- Remove 300ET case



- Insert SIM card as shown



- Attach top housing cover



Device is ready

3.2 Navigate LED

Behaviour	Meaning
Permanently switched on	GNSS signal is not received
Blinking every second	Normal mode, GNSS is working
Off	GNSS is turned off because: • Sleep mode • Deep sleep mode Or

3.3 Status LED

Behaviour	Meaning
Blinking every second	Normal mode
Blinking every 2 seconds	Deep sleep mode
Blinking fast for a short time	Modem activity
Blinking fast constantly	Boot mode
Off	Device is not working OR Device firmware being flashed

3.4 300ET Socket 1x6 Pin Out

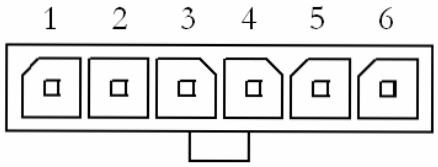


Figure 2 1x6 socket pinout

Pin No.	Pin Name	Description
1	VCC (10÷30)V DC (+)	Power supply for module. Power supply range (10÷30) V DC. Energy consumption: GPRS: 200 mA r.m.s Max.
2	GND (-)	Ground Pin
3	DIN 1	Digital input, channel 1.
4	OUT 1	Digital output, channel 1. Open collector output. Max. 150mA.
5	DIN 2 / AIN	Digital input, channel 2* / Analog input 0-30V range.
6	1-Wire® Data	Data channel for Dallas 1-Wire® devices

Table 2 Socket 1x6 pinout description
**- digital input status 0 -2 V – FALSE; 2,5 V-30; V– TRUE*

EziTRAK recommended connections

Pin1. VCC (10÷30)V DC (+) – Connect to directly to vehicles positive battery terminal or main power source.

Pin2. GND (-) – Connect directly to the vehicles negative battery terminal or main power source.

Pin3. DIN 1 – Connect to vehicles Ignition.

Pin4. OUT1 – Connect to kill relay for engine immobilization when using iButton

Pin5. DIN 2 / AIN* - DIN2 connect to the vehicles door light. AIN connect to the vehicles fuel gauge.

Pin6. 1-Wire® Data – Connect to optional iButton reader and/or digital thermometer..

**By default the unit is set to DIN 2 as the default 2nd input. SMS command will need to be sent to change the input configuration to AIN for fuel sense.*

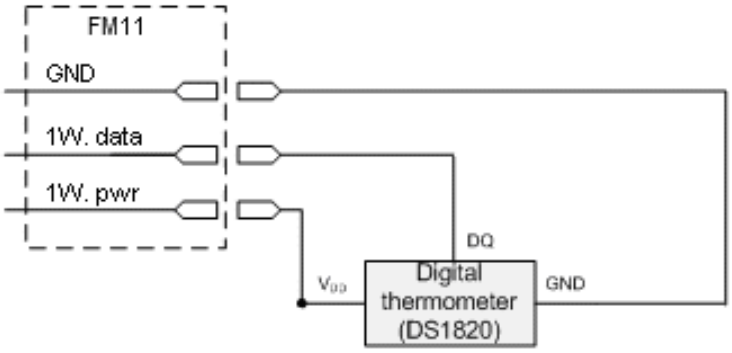
3.5 Accessories

Note

EziTRAK can provide additional equipment like panic buttons, door sensors or others.

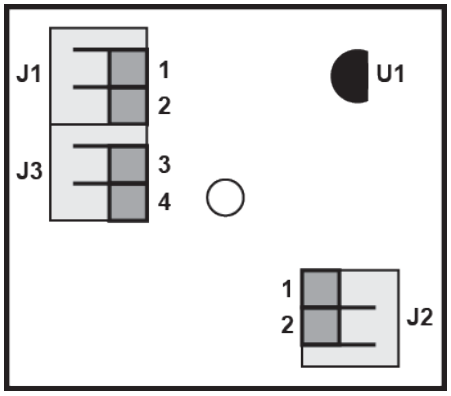
3.5.1 1-Wire® Devices

One of the features of 300ET is 1-Wire® data protocol, which enables connection of thermometer (DS1820, DS18S20 and DS18B20) and I-Button type: DS1990A (Figures 8 and 9 show 300ET and 1-wire® device connection schemes).



Left Row of Pins

1W. Data (300ET – pin6)	2
GND (300ET – pin2)	3
Digital Input	4



Right Row of Pins

1	Vpp (+5 Volts DC) – power source for external digital sensor
2	Output from external digital sensor

Figure 3 Digital Thermometer DS1820 and TTJ100 connection scheme

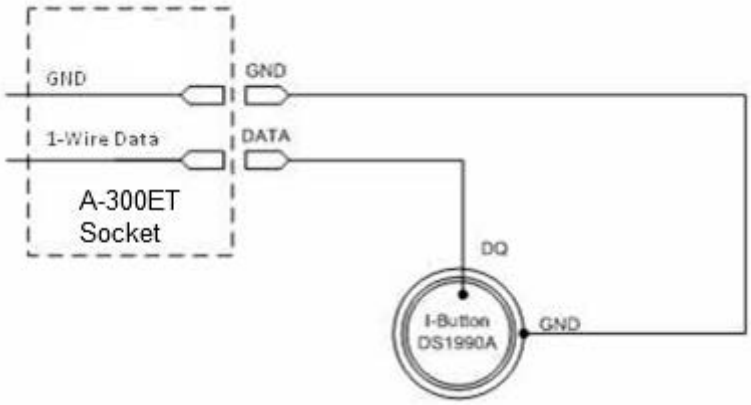


Figure 4 I-Button DS1990A connection scheme

3.5.2 Fuel Tank Sensors

A fuel tank level sensor exists in most cars, which shows the approximate fuel level in the driver's indicator panel. It is possible to connect 300ET Analog input to it (if sensor returns analogue signal proportional to fuel level). Figure shows the connection scheme to the 300ET and fuel tank sensor. After the connection to the tank fuel level sensor, calibration is needed. This is because most fuel tank sensors are not linear. Calibration is performed by measuring voltage dependence on volume of fuel in tank.

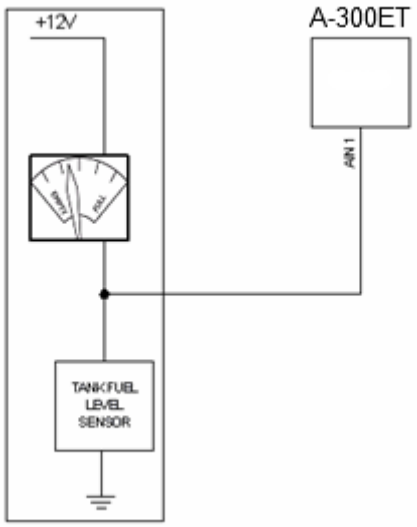


Figure 5 Fuel Tank sensor connection

3.5.3 Alarm Buttons, Door Sensors, etc.

Alarm buttons, door sensors, ignition, etc. return two states: high or low voltage. Digital inputs are used to read this information. Figure below shows how to connect alarm button, door sensor, etc.

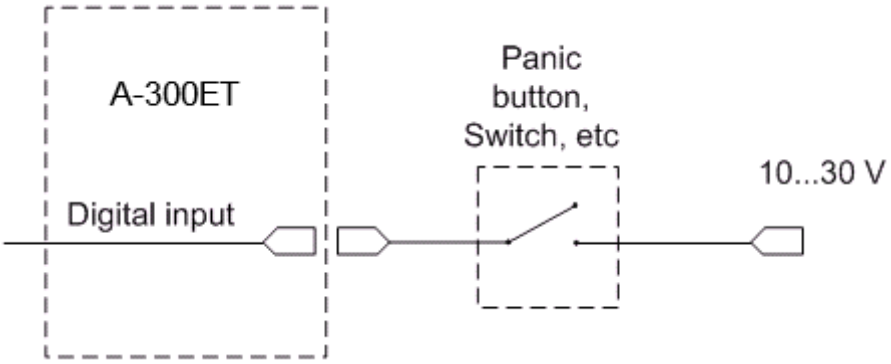


Figure 6 Panic button connection

In cases when sensor output signal is negative, an additional relay has to be installed to convert negative signal to positive.

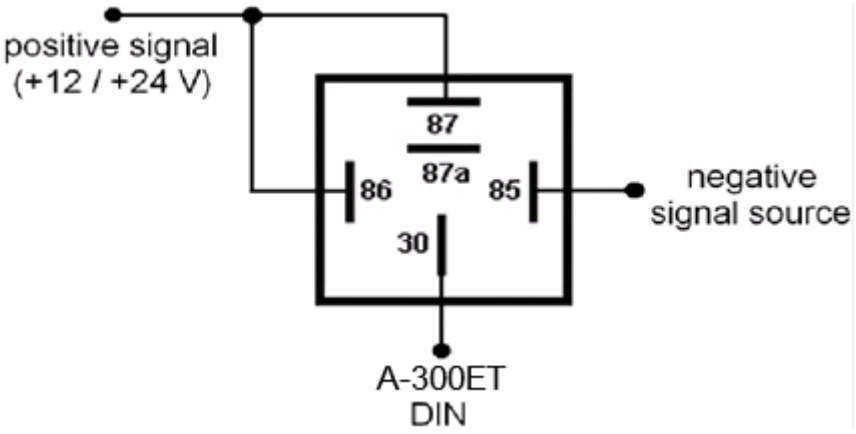


Figure 7 Inverting relay connection

3.5.4 Immobiliser Relay

When connected as shown below, 300ET disables engine starter when output is OFF. More details about relays can be found below.

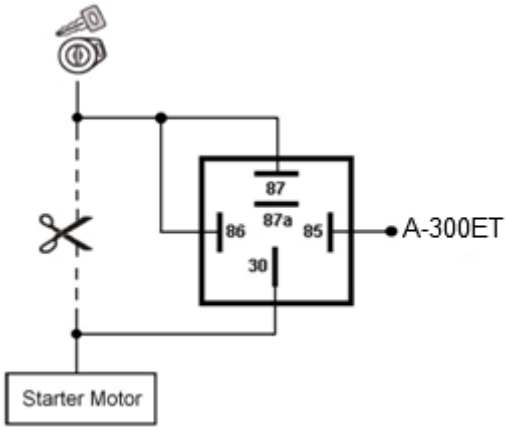


Figure 8 Immobiliser relay connection

3.5.5 Relays

An ordinary automotive relay is used to invert input signal or to immobilize engine starter. Note, that they are available as 12 V or 24 V.

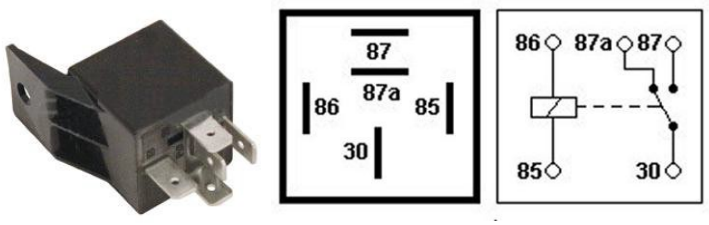


Figure 9 Automotive relay pinout

4 OPERATIONAL BASICS

4.1 Operational principles

300ET module is designed to acquire records and send them to server. Records contain GNSS data and I/O information. Module uses GNSS receiver to acquire GNSS data and is powered with three data acquire methods: time-based, distance-based and angle-based method. Note, that if 300ET loses connection to GNSS satellites, it continues to make records, however coordinate in these records remains the same (last known coordinate).

All data is stored in flash memory and later can be sent via 3G, GPRS or SMS. 3G mode is the most preferred data sending mode. If 3G coverage is not available the device sends data through GPRS network.

300ET can also be configured to send data over GPRS and SMS only. This mode can be used to save bills or in the areas where 3G is not available. The least preferred data sending mode is SMS, which is mostly used in areas without GPRS coverage or GPRS usage is too expensive.

3G, GPRS and SMS settings are described in further sections. 300ET communicates with server using special data protocol.

300ET can be managed by SMS commands. SMS Command list is described in SMS COMMAND LIST. Module configuration can be performed over TCP or via SMS.

4.2 Sleep mode

The 300ET has the ability to turn off the GPS receiver and the phone module to conserve power and go to sleep mode after configured interval of time (only event records is being recorded with last known coordinate and sent to AVL server). As a result power usage decreases allowing saving vehicle battery.

4.2.1 GPS Sleep mode

While in GPS sleep mode the 300ET sets GPS receiver off and it isn't recording the vehicle position. 300ET can enter sleep mode if ALL of these conditions are met:

- 300ET has to be configured to work in Sleep mode and Sleep timeout set;
- Device must be synchronised time with GNSS satellites;
- No movement by motion sensor is detected;
- Ignition (DIN1) is off;

300ET exits sleep mode when if ONE of following conditions are true:

- Movement by motion sensor is detected;
- Ignition (DIN1) is turned on;

4.2.2 Deep Sleep mode

While in deep sleep mode, 300ET sets GPS receiver to sleep mode and turns off GSM/GPRS module (it is not possible to wake up device via SMS), therefore records with last good coordinates are being saved and send to AVL server if configured (GSM/GPRS module is turned on to send data and after that it is turned off again). Depending on two configurable parameters, send period and min period, in Deep Sleep mode power usage can be decreased to save vehicle's battery.

300ET can enter deep sleep mode (standby mode) if ALL of these conditions are met:

- 300ET has to be configured to work in Deep Sleep mode;
- Startup timeout has elapsed (5 minutes after every restart of the device); No movement by movement sensor is detected;
- Ignition (DIN1) is off (driven logic low);

- Send period in stop mode is more than 60 seconds (Data Acquisition Mode settings);
- USB cable is not connected.

300ET exits deep sleep mode when if ONE of following conditions are true:

- Movement by movement sensor is detected;
- Ignition (DIN1) is turned on (driven logic high);
- USB cable is connected;

Note

In order to save GPRS traffic records saved in deep sleep mode do not contain below listed I/O elements information:

PDOP, HDOP, Odometer, Speedometer, iButton ID, Cell ID, Area Code, Temperature and GPS power

4.3 Virtual odometer

Virtual odometer is used to calculate traveled distance in 300ET as a separate I/O element. When 300ET detects movement, it starts counting distance using GNSS signal: every second it checks current location and calculates distance between current and previous point. It keeps adding these intervals until it is time to make a record, then 300ET records its location and adds odometer value, which is equal to the sum of all distances, measured every second. When record is made, odometer resets to zero and distance calculation starts all over again.

Virtual odometer as an I/O element can be also used with Trip feature.

4.4 Features

Using available features can greatly increase 300ET usability options.

4.4.1 Scenarios

Green Driving Scenario. Helps to prevent and inspect driver about harsh driving. Scenario continuously monitors: accelerating force, braking force and cornering angles. Warns driver if needed. DOUT1 is controlled by scenario for user needs, for example buzzer or LED.

To save GPRS traffic Green Driving event will be generated (included into sent records) only when 300ET measured values are higher than those set in configuration, without additional I/O settings.

To prevent generating false events, harsh acceleration and harsh braking is monitored only when following conditions are fulfilled:

- Ignition is ON (DIN1 = 1)
- Vehicle speed is equal or higher than 10km/h

Harsh cornering is monitored only when following conditions are fulfilled:

- Ignition is ON (DIN1 = 1)
- Vehicle speed is equal or higher than 30km/h

Note:

Green Driving Scenario is a factor on various cars and various drivers testing phase and can be subject to changes. EziTRAK is constantly working on improvement of the functionality of the devices, and strongly recommends using the latest version of the firmware.

Over Speeding Scenario. Helps to prevent from exceeding fixed speed and inspects driver if needed.

Authorised Driving Scenario. Gives ability to use vehicle only for 50 specific iButton owners (specified in iButton list). DOUT2 is controlled by scenario for user needs, to manage buzzer, LED, etc.

Note:

In order for Authorised driving to work properly, at least 1 iButton ID must be written to the iButton list.

Immobiliser Scenario. Vehicle can be used only if iButton is connected. In this scenario iButton list is not used; connect any iButton to pass Immobiliser security. DOUT2 is controlled by scenario for user needs, to manage buzzer, LED, etc.

300ET scenario usage: It can be used for Green Driving/Over Speeding or Authorised Driving/Immobiliser scenarios. In this case, only one scenario of chosen pair can control Digital Output No.1, other scenario is also active and functional, but it cannot control Digital Output No.1. The scenario of the chosen pair is used to control Digital Output No.1 depends on configuration.

Geofencing and Autogeofencing features can be used in this hardware version as described further in this section

4.4.2 Trip

Trip customisable feature enables user extended monitoring of performed trips (from engine start at present location to engine stop at arrived location), log their start and stop points, view driven total distance[2]. Event will be generated (included into send records) only when trip starts and finishes.

Note:

Scenarios and Trip features are activated (DOUTs are activated) only if DIN1=1 (ignition is on).

4.4.3 Geofencing

Geofencing is another feature which is highly customisable and can detect wherever car enters or leaves customised areas. More about Geofencing can be read in chapter 7.6.11.

Auto Geofencing feature if enabled is activated automatically by turning off car ignition. Next time before driving user has to disable Auto Geofencing with iButton or by turning on car ignition. In case of theft car leaves Auto Geofencing zone without authorisation 300ET device automatically sends high priority record to AVL application.

4.4.4 iButton list

iButton list is used to enter Authorised iButton ID codes, which are used to authenticate driver in Authorised driving and Auto Geofencing options.

4.5 Configuration

The 300ET can only be configured by sending SMS to the unit.

4.6 System settings

System settings have 4 configurable parameters:

- Deep sleep settings, where user can turn deep sleep on or off
- Analog Input Settings, where user can choose analog input range 10 V or 30 V, depending on needed accuracy (lower range gives higher accuracy of measurements), and input voltage
- Object Motion Detection Settings, where user can configure 3 ways how 300ET will detect stopped movement, and change its working mode (for working modes, read section 5.12)
- Static navigation settings, where user can turn static navigation on or off

[2] Continuous odometer – total driven distance, works only in TRIP mode. Continues distance is counted only for ONE trip. If trip is finished (stop point is detected), odometer resets to 0 (zero). Next trip will start counting from the beginning.

Stop Detection Source	Vehicle on Stop mode	Vehicle Moving mode
Ignition (recommended)	If ignition (DIN1) is logic low	If ignition (DIN1) is logic high
Msensor (movement sensor)	Internal movement sensor does not detect movement	Internal movement sensor detects movement
GPS	GPS fix is available and vehicle speed is lower than 5 km/h	GPS fix is available and vehicle speed is higher than 5 km/h
	While GPS fix is unavailable, Object Motion Detection Settings are working like in Msensor mode	

Static Navigation Mode is a filter, which filters out track jumps when the object is stationary. If Static navigation filter is disabled, it will apply no changes on GPS data. If Static navigation filter is enabled, it will filter changes in GPS position if no movement is detected (depends on Object Motion Detection Settings). It allows filtering GPS jumps when object is parked (is not moving) and GPS position is still traced.

4.7 Records settings

Here user can modify if 300ET device will send newest records first, meaning, that the most important thing is to know recent position of car, older records are being sent right after newest records arrive to AVL application.

Activate Data Link Timeout is used to set timeout of link between 300ET and AVL application termination. If 300ET has already sent all records it waits for new records before closing link. If new records are generated in the period of this timeout, and minimum count to send is reached, they are sent to AVL application. This option is useful when GSM operator charge for link activation.

4.8 GSM settings, GPRS part

'GPRS' defines main parameters for 300ET: GSM operator APN and GPRS username and password (optional – depending on operator), destination server IP and port, and allows to set protocol used for data transfers – TCP or UDP.

Some operators use specific authentication for GPRS session – CHAP or PAP. If any of these is used, APN should be entered as '`chap:<APN>`' or '`pap:<APN>`'. I.e. if operator is using APN 'internet' with CHAP authentication, it should be entered as '`chap:internet`'. Information about APN and authentication type should be provided by your GSM operator.

4.9 GSM settings, SMS configuration

Essential fields in 'SMS' part are 'Login' and 'Password'. The login and password are used with every SMS sent to 300ET. By default the login and password are not set, in every SMS sent to 300ET device two spaces before command have to be used (<space><space><command>).

Command structure with set login and password:

`<login><space><password><space><command>`, example: "asd 123 getgps"

Phone numbers have to be written in international standard, without using "+" or "00" signs in prefix. If no numbers are entered, configuration and sending commands over SMS are allowed from all GSM numbers.

SMS data sending settings – enable or disable periodic data and event SMS usage. This setting does not affect replies to SMS request messages – answers are always sent back to sender telephone number

SMS login and password and Authorised number list are used to protect 300ET module from un Authorised access. Module accepts messages only from a list of Authorised numbers and with proper module login and password. Numbers must be without “+” or “00” prefix. If no Authorised numbers are entered, module accepts messages from all numbers.

4.10 GSM settings, Operator list

Operators list – 300ET can work in different modes (use different settings) according to the operator list defined. Operator list is used for Data Acquisition Mode switching (see chapter 6.5 Data Acquisition Mode settings for more details). Modes are changed based on GSM operator 300ET is connected to.

If operator list is left empty, it will allow using GPRS to any GSM operator. Please note that 300ET will work in Unknown mode only (make sure it is configured to allow data sending – GPRS context is enabled).

Current operator codes:

Telstra: 50501

Vodafone: 50503

Optus: 50590

Contact EziTRAK staff or search for your current operator code if your carrier is not listed above.

Device checks if the time between last saved record and current time is equal or higher than Time based acquire interval. If so, 300ET saves record to memory. If not, 300ET checks if the distance from last record to current record is equal or higher than Distance based acquire interval. If so, saves the record to memory. If not and speed is higher than 10km/h, then 300ET checks if angle difference between last record and current record is equal or higher than Angle based acquire value. If so, saves the record to memory. These checks are performed every second.

Note:

Keep in mind that 300ET operates in GMT:0 time zone, without daylight saving. Time Displayed on the tracking site will be you current local time once your units UTC offset has been set on the web site.

4.10.1 Scenarios settings

In Scenarios window four different scenarios are available, two per each Digital Output (DOUT). Only one per digital output can be active at a same time, e.g. DOUT1 can have either Green driving or Over Speeding enabled, DOUT2 can have either Authorised Driving or Immobiliser enabled.

Digital Output (open drain grade) usage in scenarios:

Green Driving

DOUT1 is ON for:

- 3sec. if detected value is over (0; 30) % from preconfigured allowed value
- 5sec. if detected value is over (30; 50) % from preconfigured allowed value
- 7sec. if detected value is over (50; -) % from preconfigured allowed value

After period of time DOUT1 is turned OFF.

Over Speeding

DOUT1 is ON, while vehicle speed exceeds parameter value. DOUT1 is activated until current speed decreases below parameter value.

Authorised driving

DOUT2 is continuously OFF. Dout2 turns ON if Ignition turns ON (Din1=1). After authorizing iButton (iButton ID is read and it matches the ID from the iButton list), DOUT2 turns OFF. After successful authorisation DIN1 (ignition) can be turned OFF (Din1=0) for no longer than 30 seconds, otherwise authorisation must be repeated.

Immobiliser

DOUT2 is continuously OFF. Dout2 turns ON if Ignition turns ON (Din1=1). After iButton ID is read (any iButton is attached), DOUT2 turns OFF. After iButton identification DIN1 (ignition) can be turned OFF (Din1=0) for no longer than 30 seconds, otherwise Immobiliser must be repeated.

4.10.2 Trip settings

Trip window offers user to configure Trip feature. If Trip is enabled configuration of parameters are enabled.

Start Speed – GPS speed has to be greater than the specified Start Speed in order to detect Trip Start.

Ignition Off Timeout – timeout to wait if ignition was off, to detect Trip stop.

Continuous distance counting – Not or Continuous can be chosen. For this feature I/O Odometer must be enabled (see Figure 26).

If I/O Odometer is enabled and Continuous distance counting variable is set to Continuous, Trip distance is going to be counted continuously (from Trip start to Trip stop). This value is written to I/O Odometer value field. When Trip is over and next Trip begins, Odometer value is reset to zero. When the next trip starts counting continuously starts from the beginning again.

If I/O Odometer is enabled and Continuous Distance Counting variable is set “Not”, then the distance is going to be counted only between every record made. This value is written to I/O Odometer value field and reset to zero every new record until Trip stops. If later all Odometer values are summed up manually, the user gets the distance driven during the whole period of the Trip.

4.10.3 Geofencing settings

300ET has 5 configurable Geofence zones and it can generate an event when defined Geofence zone border is crossed.

Frame border – frame border is an additional border around Geofence zone. It is additional area around defined zone used to prevent false event recording when object stops on the border of the area and because of GPS errors some records are made inside area and some outside. Event is generated only when both borders are crossed. See figure 9 for details: Track 1 is considered to have entered the area while track 2 is not.

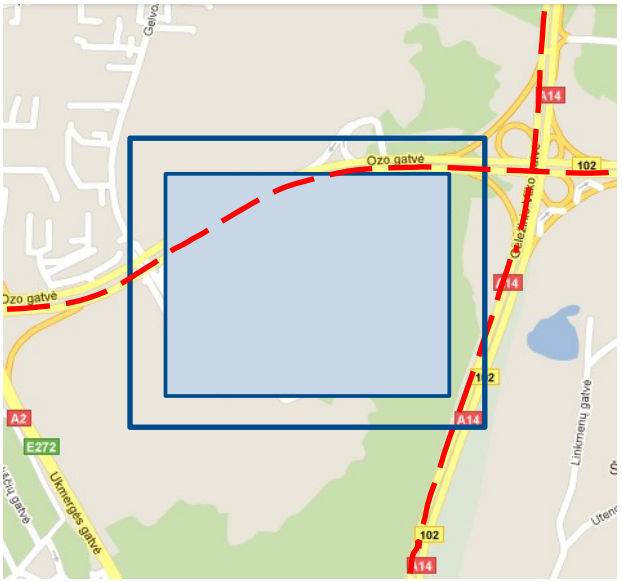


Figure 10. Geofence border

- **Shape –** can be rectangle or circle
- **Priority –** priority of Geofence event: low, high or panic. These levels define priority of event information sending to server. See I/O element description for more details about priorities.
- Generate event (On entrance, On exit, On Both) – choose when record will be generated;
- **X1 –** geofence zone left bottom corner X coordinate (longitude);
- **Y1 –** geofence zone left bottom corner Y coordinate (latitude);
- **X2 or R –** geofence zone upper right corner X coordinate (longitude) or radius of circle when Circular zone is used (radius in metres);
- **Y2 –** geofence zone upper right corner Y coordinate (latitude);

4.10.4 AutoGeofencing settings

AutoGeofence – the last known position after movement = off. If your car's being taken away – you can be notified. The shape and size of the geofence zones are parameters. It is possibility to state whether entering in or out of the geofence triggers an asynchronous message.

- Activate – Enable or Disable AutoGeofence functionality.
- **Activation TMO –** Time period before Geofence is activated after vehicle stops.
- Deactivate By:
  - **Ignition –** If ignition becomes high it will disable AutoGeofenze Zone.
  - **iButton –** if iButton is attached it will disable AutoGeofence Zone.
- **Edit iButton List –** if list is not empty, attached iButton is tested against an iButton list, if match is found AutoGeofence zone is disabled.
- **Priority –** Priority of generated event, which will be applied to saved record. Enter Event – Event generation on Geofence entrance.
- **Exit Event –** Event generation on Geofence exit.
- **On Both –** Event generation on Geofence entrance or exit.

Note that AutoGeofencing does not require entering coordinates, instead it requires GPS visibility. If vehicle stopped and activation timeout has passed, an AutoGeofence will be created around vehicle's last position with set Radius value. AutoGeofence event generation works the same as Geofencing mentioned above.

Note:

300ET operates GMT:0 time without daylight saving.

4.10.5 SMS events

SMS events functionality allows 300ET to send a configured SMS when an event is triggered. This event can be triggered by:

- Green Driving
- OverSpeeding
- Authorised
- Driving
- Immobiliser
- Trip start/stop
- Geofence
- AutoGeofence
- I/O event

When any of the above events is triggered, 300ET sends a configured SMS message to a defined phone number. If SMS events is activated, but there are no numbers defined in SMS events PreDefined Numbers list, then the device will not send any messages.

The sent SMS messages format is according to:

"Date Time EventText"

For example, if 300ET is configured to send an SMS, when Digital Input 1 reaches High level, with priority High and configured to generate event on both range enter and exit, then the sent SMS is:

"2012/6/7 12:00:00 Digital Input 1"

The SMS Text field can be altered and any text can be entered. Maximum message length is 90 symbols (numbers, letters and symbols in ASCII, except for comma ",").

Attention!

If 300ET is in Deep Sleep mode and SMS event occurs with LOW priority (which does not wake up 300ET), then the device does not send the message. It is saved in device memory until it wakes up from Deep Sleep mode and GSM modem starts working normally. After it wakes up, all the messages that are saved in memory will be sent, but keep in mind that only 10 messages can be saved in memory – all other messages will not be saved, until there is room in device memory.

4.10.6 SMS events configuration

Scenarios

To configure SMS events for scenarios you will need to configure the setting through SMS. Enabled scenarios will automatically appear near the SMS event window. Note that Green Driving can't work together with Over Speeding, and Authorised Driving can't work together with Immobiliser scenario – only one of them can be enabled. After enabling SMS events, different message texts can be written for different scenarios.

When any of the scenarios events occurs, a text message will be sent to the predefined number.

Trip

In order to configure Trip SMS you will need to configure the setting through SMS. After enabling SMS Events, trip event will be triggered and message sent, when Trip starts (GPS speed exceeds the speed in Start Speed (eg. 5 km/h) and when Trip stops, that is ignition is turned off longer then the time written in Ignition Off Timeout (eg. 60 seconds).

Geofence

Geofence SMS event is triggered and message sent when the device exits and/or enters a configured Geofence zone. The Geofence zone must be configured to generate an event On Exit, On Enter or On Both. If No Event is selected, then it is not possible to turn on SMS events. If several zones are

created then SMS events can be turned on separately for each zone entering different text message.

AutoGeofence

SMS events for AutoGeofence are configured the same as in Geofence. AutoGeofence and its SMS event configuration is next to Geofence configuration. This feature is on by default.

I/O events

300ET sends SMS event message when a configured I/O property enters and/or exits its configured High/Low boundaries or Hysteresis event generation is chosen (Monitoring does not generate event, so SMS event could not be configured). Every IO element SMS event can be configured to send individual message to different numbers.

4.11 I/O settings

When no I/O element is enabled, AVL packet comes with GPS information only. After enabling I/O element(s) AVL packet along with GPS information contains current value(s) of enabled I/O element.

Enabled or disabled field – allows enabling I/O element so it is added to the data packet and is sent to the server. By default all I/O element are disabled and 300ET records only GPS coordinates.

Priority (AVL packet priority) can be low, high or panic. Regular packets are sent as Low priority records. When low priority event is triggered, 300ET makes additional record with indication that the reason for that was I/O element change. When High priority is selected, module makes additional record with high priority flag and sends event packet immediately to the server by GPRS. Panic priority triggers same actions as high priority, but if GPRS fails, it sends AVL packet using SMS mode if SMS is enabled in SMS settings.

High and Low levels – define I/O value range. If I/O value enters or exits this range, 300ET generates event. “Generate event” parameter defines when to generate event – when value enters defined range, exits it or both.

Averaging constant – it is an I/O event delay parameter. In some applications there is no need to generate events on every I/O range enter/exit immediately. Sometimes it is necessary to wait some time interval before event generating. Averaging constant allows setting I/O event delay (averaging). If I/O value is entering or leaving predefined range, it must have same value for Averaging constant time. 1 Averaging constant value equals about 30 milliseconds. In Deep Sleep mode there is no Averaging.

Note:

I/O element’s “Movement sensor” Averaging constant is interpreted as Start Move Timeout in seconds (from 1 to 59).

Start Move Timeout is a time interval required for movement sensor to be in the moving state, to consider vehicle as moving.

4.11.1 Monitoring

I/O monitoring starts after enabling I/O element and setting up I/O parameters as it is shown below:

4.11.2 Event Generating

Events happen when the value of enabled I/O intersects thresholds (enter, exit or on both) predefined by High and Low level thresholds. Table below defines all available values of I/O settings.

Setting	Value
Priority	low, high
High level	maximum threshold
Low level	minimum threshold
Generate event	on interval enter, on interval exit, on both enter and exit
Average constant	1 – 232 (4 Bytes)

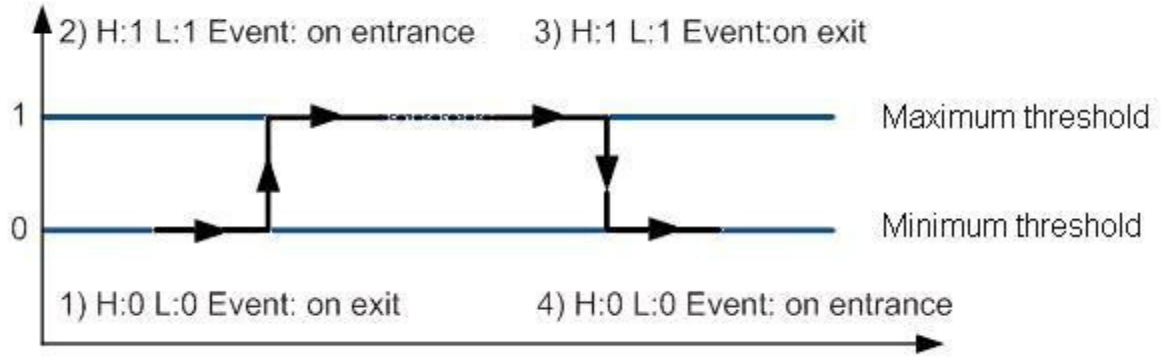


Figure 11. Digital Input event generation example

4.11.3 Hysteresis

I/O elements can generate events according to hysteresis algorithm. If I/O event operand “Hysteresis” is selected, events will be generated as it is shown in the illustration below (I/O speed is taken as I/O value example):

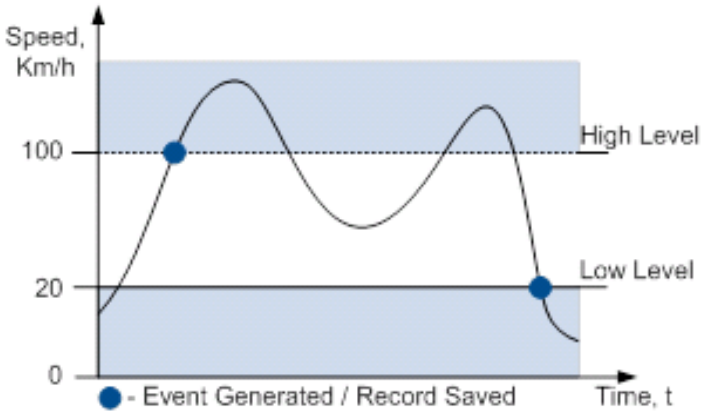


Figure 12. Event generation according hysteresis algorithm

5 SMS COMMAND LIST

Read chapter 4.9 to know how to construct a proper SMS message and send it to the 300ET device. All commands are case sensitive. While 300ET operates in Deep Sleep mode and user tries to send SMS message it cannot arrive to 300ET device, because GSM/GPRS module is disabled most of the time (wake up depends on Send Period parameter). 300ET will receive the SMS when it wakes up (exits deep sleep mode).

5.1 SMS command list

Command	Description	Response
getstatus	Modem Status information	Yes
getweektime	Current device time, Day of Week and amount of minutes passed since start of week	Yes
getops	List of currently available GSM operator	Yes
getcfgtime	Date and Time of last successful configuration	Yes
getgps	Current GPS data and time	Yes
cpureset	Reset CPU	No
resetprof	Reset all FLASH1 profile to default profile	No
getver	Device / Modem / Code version information	Yes
getinfo	Device runtime system information	Yes
deleterecords	Delete all records saved on FLASH	No
getio	Readout digital inputs and outputs	Yes
readio #	Readout input value according entered ID, # - ID value	Yes
setdigout ## Y1 Y2	set digital outputs 0 – OFF, 1 – ON Y1 – timeout for O1 Y2 – timeout for DO2	Yes
getparam #	Readout parameter value according entered ID. # - ID value.	Yes
setparam # #	Set parameter value according entered ID and Value. 1.# - ID value. 2.# - New Parameter Value	Yes
flush #,#,#,#,#,#,#	Initiates all data sending to specified target server 1.# - IMEI 2.# - APN 3.# - LOGIN 4.# - PASS 5.# - IP 6.# - PORT 7.# - MODE (0-TCP/1-UDP)	No
readops #	1 – send first 20 operator codes, 2 – send from 21st to 40th operator codes, 3 – send all other operator codes	
sn #	Static navigation, 1 – enable, 0 – disable	Yes
banlist	Banned operators information	Yes
crashlog	Device last information before unexpected reset	Yes
delete_all_sms	Deletes all SMS	No

5.1.1 getstatus

Response details	Description
Data Link	Indicate module connection to server at the moment: 0 – Not connected, 1 – connected
GPRS	Indicate if GPRS is available at the moment
Phone	Voice Call status: 0 – ready, 1 – unavailable, 2 – unknown, 3 – ringing, 4 – call in progress, 5 – asleep
SIM	SIM Status: 0-ready, 1-pin, 2-puk, 3-pin2, 4-puk2
OP	Connected to GSM Operator: numerical id of operator
Signal	GSM Signal Quality [0-5]
NewSMS	Indicate if new message received
Roaming	0 – Home Network, 1 – roaming
SMSFull	SMS storage is full? 0 – ok, 1 – SMS storage full
LAC	GSM Tower Location Area Code
Cell ID	GSM Tower Cell ID Code

Example: Data Link: 0 GPRS: 1 Phone: 0 SIM: 0 OP: 24602 Signal: 5 NewSMS: 0 Roaming: 0 SMSFull: 0 LAC: 1 Cell ID: 864

5.1.2 getweektime

Response details	Description
Clock Sync	Indicates system clock synchronisation status. 0 – System is not synchronised, 1 – System synchronised
DOW	Day Of Week – indicates current day of week starting from 0 – Monday, 1 – Tuesday, etc.
Time	Indicates current GMT time
WeekTime	Indicates time in minutes starting from Monday 00:00 GMT

Example: Clock Sync: 1 DOW: 4 Time 12:58 Weektime: 6538

5.1.3 getops

Response details	Description
LIST	Returns list of current available allowed operators.

Example: GSM OP LIST: 0. 24602

5.1.4 getcfgtime

Response details	Description
Date/Time	Returns last performed configuration date and time.

Example: Last Configuration was performed on: 2010.4.15 5:45:19

5.1.5 getgps

Response details	Description
GPS	Indicates valid (1) or invalid (0) GPS data
Sat	Count of currently available satellites
Lat	Latitude (Last good Latitude)
Long	Longitude (Last good Longitude)
Alt	Altitude
Speed	Ground speed, km/h
Dir	Ground direction, degrees
Date	Current date
Time	Current GMT time

Example: GPS:1 Sat:7 Lat:54.71473 Long:25.30304 Alt:147 Speed:0 Dir:77 Date: 2007/8/24 Time: 13:4:36

5.1.6 getver

Response details	Description
Code Ver	Firmware version
Device IMEI	IMEI
Device ID	Device ID is used to detect by server which type of configuration to load
Bootloader Ver	Bootloader Version
Modem App Ver	Version of modem application (veiks: nuo 00.05.14)

Example: Code Ver:0.48.17 Device IMEI:353976010139156 Device ID:000001 Bootloader Ver: 01.06 Modem APP Ver:01.00.02

5.1.7 getinfo

Response details	Description
INI	Device Initialisation Time
RTC	RTC Time
RST	Restart Counter
ERR	Error Counter
SR	Number of Sent Records
BR	Number of broken records
CF	Profile CRC Fail counter
FG	Failed GPRS counter
FL	Failed link counter
UT	UPD Timeout counter
SMS	Sent SMS Counter
NOGPS	No GPS Timer
GPS	GPS receiver state. 0 – OFF, 1 – restarting, 2 – ON but no fix, 3 – ON and operational, 4 – sleep mode
SAT	Average satellites
RS	Reset Source Identification 1 – Low Power, 2 – W Watchdog, 3 – I Watchdog, 5 – Power On, 6 - Pin Reset
MD	Data Mode state. 0 – Home and Stop, 1 – Home and Moving, 2 – Roaming and Stop, 3 – Roaming and Moving, 4 – Unknown and Stop, 5 – Unknown and Moving

Example: INI:2007/8/24 10:15 RTC:2007/8/24 12:43 RST:2 ERR:11 SR:182 BR:0 CF:0 FG:0 FL:0 UT:0 SMS:2 NOGPS:0:0 GPS:3 SAT:7 RS:5 MD:0

5.1.8 getio

Response details	Description
DI#	Digital Input state
DO#	Digital Output state

Example: DI1:0 DI2:0 DO1:0 DO2:0

5.1.9 readio

Response details	Description
ID	I/O element ID
Value	I/O Element value

Example: I/O ID:3 Value:0

5.1.10 setdigout ## Y1 Y2

Sets digital outputs to ON or OFF state (for some time if needed). Value is written as a row for OUT1 and OUT2 values.

Example: 'setdigout 01 0 5' will set OUT2 to high level for 5 seconds, while OUT1 to low level.

5.1.11 getparam

Read parameter value. ID consists of 4 digits – first digit must be 1[3], second, third and fourth identifies parameter ID as described in Parameter List chapter.

Response details	Description
ID	Profile number and parameter ID
Value	Parameter value

Example: 'getparam 1245' command will request server IP address in profile1.

5.1.12 setparam ####

Sets new value for parameter. ID consists of 4 digits – first digit identifies profile, second, third and fourth identifies parameter ID as described in Parameter List chapter. In value field a new parameter value is entered.

Example: 'setparam 1245 127.0.0.1' will change configured IP address in profile1 with new value

5.1.13 readops

Send from device Operator List.

1 – send first 20 operator codes, 2 – send from 21st to 40th operator codes, 3 – send all other operator codes.

[3] 300ET has only one profile

5.1.14 flush #,#,#,#,#,#,#

Initiates all data sending by GPRS to specified target server. Comma separated parameters go as numbered:

1.# - IMEI

2.# - APN

3.# - GPRS LOGIN

4.# - GPRS PASSWORD

5.# - IP

6.# - PORT

7.# - MODE (0-TCP/1-UDP)

Parameters are separated by comma (no spaces needed). In case you don't need to enter parameter (Login/Pass) – do not put space, simply put comma and write next parameter.

Example: opa opa flush 353976012555151,banga,,,212.47.99.62,12050,0

Response details	Description
FLUSH SMS Accepted	FLUSH SMS Accepted
# records found on FLASH	Number of records found on FLASH
Minimum Records to Send: #	Number of minimum saved records to send
GPRS Enabled: #	State of the GPRS connection, 0 – disabled; 1 – enabled
Time Sync: #	Indicates time synchronisation on the device, 0 – not synchronised; 1 – synchronised

Example: FLUSH SMS Accepted. 11 records found on FLASH. Minimum Records to Send: 1. GPRS Enabled: 1. Time Sync: 1.

5.1.15 sn

Enables or disables Static navigation. 1 – enable, 0 – disable.

5.1.16 banlist

Gives a list of all banned operators.

Example when no operators are banned: 0000.00s.0.000

5.1.17 crashlog

Gives the last information before the device has crashed for unexpected reasons. It is useful when the device acts unexpectedly or restarts for unexplained reasons.

Example if no unexpected reset: "Crash: "

Example if unexpected reset was detected: "Crash: 3051,3052,3053".

6 PARAMETER LIST

6.1 Parameters value types

- S8 – Signed Char
- S8[n] – String of n Char
- U8 – Unsigned Char
- U16 – Unsigned Short
- S32 – Signed Integer
- U32 – Unsigned Integer
- U64 – Unsigned Long Long Integer

6.2 System parameters

6.2.1 Deep Sleep Mode (ID=1000)

Device can operate in three modes: active, GPS Sleep or deep sleep. In active mode (value 0) module is able to operate all tasks, while in GPS Sleep mode (value 1) only the GPS is turned off to conserve power but the phone module is still active, while in deep sleep mode (value 2) the GPS and phone module are turned off reducing the level of power usage.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2	-		U8

6.2.2 Analog Input value range (ID=1001)

Analog input measuring resolution and range can be defined as 0…10V (value 0) or 1…30V (value 1).

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1	-		U8

6.2.3 Stop Detection Source (ID=1002)

Device can operate and change its working mode according to motion detection source: ignition (value 0), movement sensor (value 1), GPS (value 2).

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2		8.5 Data Acquisition Modes parameters	U8

6.2.4 Static Navigation (ID=1003)

When static navigation is enabled, 300ET filters out GPS jumps, when it is not moving. When it is disabled, it does not make any changes to collected GPS data.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1	1		U8

6.3 Records parameters

6.3.1 Sorting (ID=1010)

Record sorting parameter is responsible for record sorting order. Value of 0 arranging data starting from newest, while value of 1 arranging data starting from oldest.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1	-	Data Acquisition Modes parameters (Send Period)	U8

6.3.2 Active Data Link Timeout (ID=1011)

Defines for how many seconds device will keep connection to the server after successful data transfer while waiting for a new record.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	259200	-	Data Acquisition Modes parameters (Send Period)	U32

ATTENTION!

Some GSM operators may disconnect the device from an active data link if the device doesn't send any data for a very long time, even if active data link timeout is set to maximum value. The amount of time that an operator keeps the link open depends solely on the operator. For example, if active data link timeout is set to maximum, 259200 seconds (72 hours), and the device sends data to server every 86400 seconds (24 hours), the operator might disconnect the link earlier and the device will have to connect to the server anew. This may cost extra, depending on the operator GPRS data charge. It is strongly recommended, when using active data link timeout, that data sending to the server should not be very rare (24 hours or more). If data sending is more frequent, then the operator will not disconnect the device form the server.

6.4 GSM parameters

6.4.1 GPRS content activation (ID=1240)

Parameter allows or does not allow GPRS usage. If GPRS is not allowed value is 0, if GPRS is allowed value is 1.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1	-	APN Name (ID=1242) APN username (ID=1243) APN Password (ID=1244)	S8

6.4.2 APN Name (ID=1242)

Parameter defines GPRS Access Point Name.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
Empty	32 char string	-	GPRS content activation (ID=1240) APN username (ID=1243) APN Password (ID=1244)	S8[32]

6.4.3 APN username (ID=1243)

Parameter defines APN username. In case operator does not use username for login, value should be empty.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
Empty	30 char string	-	GPRS content activation (ID=1240) APN Name (ID=1242) APN Password (ID=1244)	S8[30]

6.4.4 APN Password (ID=1244)

Parameter defines APN password. In case operator does not use password for login, value should be empty.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
Empty	30 char string	-	GPRS content activation (ID=1240) APN Name (ID=1242) APN username (ID=1243)	S8[30]

6.4.5 Domain (ID=1245)

Parameter defines AVL data destination server IP address. Example: 212.47.99.62

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	50 char string	-	GPRS content activation (ID=1240)Domain (ID=1245)	S8[16]

6.4.6 Target Server Port (ID=1246)

Parameter defines AVL data destination server port number. Example: 12050

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
Empty	65535	-	GPRS content activation (ID=1240) Target Server Port (ID=1246)	U16

6.4.7 Protocol (ID=1247)

Parameter defines GPRS data transport protocol. Module can use TCP or UDP transport protocol to send data to server. For TCP protocol value is 0, for UDP protocol value is 1.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1	-	GPRS content activation (ID=1240)	U8

6.4.8 SMS Login (ID=1252)

User login is used to ensure module security. Used in every SMS that is sent to device. Example: ba321

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
Empty	5 char	-	SMS Password (ID=1253) Server Number (8.4.12)	S8[5]

6.4.9 SMS Password (ID=1253)

User password is used to ensure module security. Used in every SMS that is sent to device. Example: ab123

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
Empty	5 char	-	SMS Login (ID=1252) Server GSM Number (8.4.12)	S8[5]

6.4.10 SMS data sending settings (ID=1250)

Parameter allows or does not allow sending AVL data using binary SMS. If SMS use is not allowed value is 0 and 1 if SMS use is allowed.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1	-	SMS Data send week time schedule (ID=1273)	S8

6.4.11 SMS Data send week time schedule (ID=1273)

Parameter defines SMS data sending according to week time schedule. This parameter is used to set data sending on selected week days and hours. Minimum time step is 10 minutes.

Example value: 7F,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF

For more information read 8.5.1.4 “Schedule parameter format”.

6.4.12 Authorised phone numbers (ID=1260-1269)

If at least one number is entered then only those number can send messages to device.

Number must be entered without “+” or “00”.

Example: 37060012346

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
Empty	-	-		S8[17]

If SMS data sending is enabled (ID=1250) first value in a list is server GSM number. The SMS with 24 coordinates is sent to this number.

6.4.13 Operator List (ID=1271)

Parameter defines operator list. According to this list module selects operating profile. GSM operator codes are comma separated. First in a list is Home Operator Code, then Preferred Roaming Operator Codes are written. Example: 24601, 24602, 24705…24503.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
Empty	7 digits	-		U32

6.5 Data Acquisition Modes parameters

6.5.1 Home Network GSM operator code "Vehicle on STOP" parameters

6.5.1.1 Min Period (ID=1540)

This parameter indicates time interval in seconds in order to acquire new record. If value is 0 it means no records by min period will be saved.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2592000	-		U32

6.5.1.2 Min Saved Records (ID=1543)

This parameter defines minimum number of records in one data packet that can be sent to server. It has higher priority than Data Send Period (ID=1544).

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
1	255	1	GPRS Week Time (ID=1545)	U8

6.5.1.3 Send Period (ID=1544)

This parameter indicates frequency (time interval in seconds) of sending data to server.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2592000	-	Min Saved Records (ID=1543) GPRS Week Time (ID=1545)	U32

6.5.1.4 GPRS Week Time (ID=1545)

This parameter manages when it is allowed to open GPRS context. When module starts it is prohibited to open the context. When modem's GPRS context is closing (for example changing network) it is allowed to open it only at a defined time. It is possible to allow connections every 10 minutes up to once per day.

Example value: 7F,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF

Schedule parameter format:

Time is defined as 19 byte array. First byte of array defines week days; the rest 18 bytes define timestamps with 10 minute interval. In first byte, first bit (LSB) defines if module should connect to GPRS (send SMS) on Monday, second bit – on Tuesday and so on up to seventh bit – which means Sunday. Eighth bit (MSB) is not used.

If bits value is 0 then device is not allowed to open GPRS context, but if it is already open – does not close it. If value is 1 it will work as day minutes are defined in rest of the bytes. Day's minutes are defined by 18 bytes (144 bits). Every nth bit (beginning from the first bit (LSB) and ending 18 bytes 8th bit (MSB)) indicates every 10th minute of the day (day has 1440 minutes).

Sample: GPRS will be allowed on Monday to Friday at 8:00 and 16:00 GMT. The following value should be configured:

00011111 00000000 00000000 00000000 000000000 00000000 00000000 00000001 00000000 00000000

00000000 00000000 00000000 000000001 00000000 00000000 00000000 00000000 00000000

Red bits indicate that GPRS will be allowed every day except Saturdays and Sundays. Blue bits indicate 480 and 720 minutes (480min = 8h and 720min = 16h). So the parameter value should be: 1F,00,00,00,00,00,00,01,00,00,00,00,00,01,00,00,00,00,00

It should be sent as UTF8 encoded string.

6.5.2 Home Network GSM operator code "Vehicle MOVING" parameters

6.5.2.1 Min Period (ID=1550)

This parameter indicates time interval in seconds in order to acquire new record. If value is 0 it means no records by min period will be saved.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2592000	-	Min Distance (ID=1551) Min Angle (ID=1552) GPRS Week Time (ID=1555)	U32

6.5.2.2 Min Distance (ID=1551)

This parameter indicates distance in metres in order to acquire new record. Record is stored when the distance between previous records is greater than parameters value. If value is 0 it means no records by min distance will be saved.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	65535	-	Min Period (ID=1550) Min Angle (ID=1552) GPRS Week Time (ID=1555)	U32

6.5.2.3 Min Angle (ID=1552)

This parameter indicates angle in degrees in order to acquire new record. If angle difference between last recorded coordinate and current position is greater than defined value, new record is stored. This parameter is operational, when speed is higher than 10km/h. If value is 0 it means no records by min angle will be saved.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	180	-	Min Period (ID=1550) Min Distance (ID=1551) GPRS Week Time (ID=1555)	U16

6.5.2.4 Min Saved Records (ID=1553)

This parameter defines minimum number of records in one data packet that can be sent to server. It has higher priority than Data Send Period (ID=1554).

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	180	-	Min Period (ID=1550) Min Distance (ID=1551) Min Angle (ID=1552) GPRS Week Time (ID=1555)	U8

6.5.2.5 Send Period (ID=1554)

This parameter indicates frequency (time interval in seconds) of sending data to server.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2592000	-	GPRS Week Time (ID=1545)	U32

6.5.2.6 GPRS Week Time (ID=1555)

Read 6.5.1.4.

6.5.3 Roaming Network GSM operator code “Vehicle on STOP” parameters

6.5.3.1 Min Period (ID=1560)

This parameter indicates time interval in seconds in order to acquire new record. If value is 0 it means no records by min period will be saved.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2592000	-		U32

6.5.3.2 Min Saved Records (ID=1563)

This parameter defines minimum number of records in one data packet that can be sent to server. It has higher priority than Data Send Period (ID=1564).

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
1	255	1	GPRS Week Time (ID=1565)	U8

6.5.3.3 Send Period (ID=1564)

This parameter indicates frequency (time interval in seconds) of sending data to server.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2592000	-	Min Saved Records (ID=1563) GPRS Week Time (ID=1565)	U32

6.5.3.4 GPRS Week Time (ID=1565)

Read chapter 6.5.1.4.

6.5.4 Roaming Network GSM operator code "Vehicle MOVING" parameters

6.5.4.1 Min Period (ID=1570)

This parameter indicates time interval in seconds in order to acquire new record. If value is 0 it means no records by min period will be saved.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2592000	-	Min Distance (ID=1571) Min Angle (ID=1572) GPRS Week Time (ID=1575)	U32

6.5.4.2 Min Distance (ID=1571)

This parameter indicates distance in metres in order to acquire new record. Record is stored when the distance between previous records is greater than parameter's value. If value is 0 it means no records by min distance will be saved.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	65535	-	Min Period (ID=1570) Min Angle (ID=1572) GPRS Week Time (ID=1575)	U32

6.5.4.3 Min Angle (ID=1572)

This parameter indicates angle in degrees in order to acquire new record. If angle difference between last recorded coordinate and current position is greater than defined value, new record is stored. This parameter is operational, when speed is higher than 10km/h. If value is 0 it means no records by min angle will be saved.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	180	-	Min Period (ID=1570) Min Angle (ID=1572) GPRS Week Time (ID=1575)	U16

6.5.4.4 Min Saved Records (ID=1573)

This parameter defines minimum number of records in one data packet that can be sent to server. It has higher priority than Data Send Period (ID=1574).

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
1	255	-	Min Period (ID=1570) Min Distance (ID=1571) Min Angle (ID=1572) GPRS Week Time (ID=1575)	U8

6.5.4.5 Send Period (ID=1574)

This parameter indicates frequency (time interval in seconds) of sending data to server.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2592000	-	Min Saved Records (ID=1573) GPRS Week Time (ID=1575)	U32

6.5.4.6 GPRS Week Time (ID=1575)

Read chapter 6.5.1.4.

6.5.5 Unknown Network GSM operator code “Vehicle on STOP” parameters

6.5.5.1 Min Period (ID=1580)

This parameter indicates time interval in seconds in order to acquire new record. If value is 0 it means no records by min period will be saved.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2592000	-		U32

6.5.5.2 Min Saved Records (ID=1583)

This parameter defines minimum number of records in one data packet that can be sent to server. It has higher priority than Data Send Period (ID=1584).

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
1	255	1	GPRS Week Time (ID=1585)	U8

6.5.5.3 Send Period (ID=1584)

This parameter indicates frequency (time interval in seconds) of sending data to server.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2592000	-	Min Saved Records (ID=1583) GPRS Week Time (ID=1585)	U32

6.5.5.4 GPRS Week Time (ID=1585)

Read chapter 8.5.1.4.

6.5.6 Unknown Network GSM operator code “Vehicle MOVING” parameters

6.5.6.1 Min Period (ID=1590)

This parameter indicates time interval in seconds in order to acquire new record. If value is 0 it means no records by min period will be saved.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2592000	-	Min Distance (ID=1571) Min Angle (ID=1572) GPRS Week Time (ID=1575)	U32

6.5.6.2 Min Distance (ID=1591)

This parameter indicates distance in metres in order to acquire new record. Record is stored when the distance between previous records is greater than parameter's value. If value is 0 it means no records by min distance will be saved.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	65535	-	Min Period (ID=1570) Min Angle (ID=1572) GPRS Week Time (ID=1575)	U32

6.5.6.3 Min Angle (ID=1592)

This parameter indicates angle in degrees in order to acquire new record. If angle difference between last recorded coordinate and current position is greater than defined value, new record is stored. This parameter is operational, when speed is higher than 10km/h. If value is 0 it means no records by min angle will be saved.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	180	-	Min Period (ID=1570) Min Angle (ID=1572) GPRS Week Time (ID=1575)	U16

6.5.6.4 Min Saved Records (ID=1593)

This parameter defines minimum number of records in one data packet that can be sent to server. It has higher priority than Data Send Period (ID=1594).

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
1	255	1	Min Period (ID=1590) Min Distance (ID=1591) Min Angle (ID=1592) GPRS Week Time (ID=1595)	U8

6.5.6.5 Send Period (ID=1594)

This parameter indicates frequency (time interval in seconds) of sending data to server. In order to send data to server GPRS parameters must be enabled.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2592000	-	Min Saved Records (ID=1593) GPRS Week Time (ID=1595)	U32

6.5.6.6 GPRS Week Time (ID=1595)

Read chapter 8.5.1.4.

6.6 Features Parameters

6.6.1 Digital Output No.1 usage scenarios (ID=1600)

Device can operate in its scenario according to selected value: No Scenario for Digital No.1 selected (value 0); Green Driving selected (value 1), Overspeeding selected (value 2).

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2	-		U8

6.6.2 Max Acceleration Force (ID=1602)

It is max allowed acceleration force which can be reached while accelerating without triggering harsh acceleration event.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0.25	0.85	0.25	Digital Output No.1 usage scenarios (ID=1600)	Float

6.6.3 Max Braking Force (ID=1603)

It is max allowed braking force which can be reached while braking without triggering harsh braking event.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0.25	0.85	0.35	Digital Output No.1 usage scenarios (ID=1600)	Float

6.6.4 Max Angular Velocity (ID=1604)

It is max allowed cornering angle which can be reached while cornering without triggering harsh cornering event.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0.1	1.0	-	Digital Output No.1 usage scenarios (ID=1600)	U16

6.6.5 Max allowed Speed (ID=1605)

It is max allowed speed which can be reached. If this value exceeded Over speeding event will occur.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	260	-	Digital Output No.1 usage scenarios (ID=1600)	U16

6.6.6 Digital Output No.2 usage scenarios (ID=1601)

Device can operate in its scenario according to selected value: No Scenario for Digital No.2 selected (value 0); Authorised Driving (value 1), Immobiliser (value 2).

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2	-	iButton List (ID=1610-1659)	U8

6.6.7 Trip (ID=1280)

This parameter enables ability to detect START and STOP of the trip.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1	-		U8

6.6.8 Start Speed (ID=1281)

This parameter represents speed, which is detected as minimum speed to indicate TRIP START and generate event.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	255	-	Trip (ID=1280)	U8

6.6.9 Ignition Off Timeout (ID=1282)

This parameter represents timeout to wait if ignition is off in order to detect TRIP STOP and generate event.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	65535	-	Trip (ID=1280)	U16

6.6.10 Trip Continuous distance counting (ID=1283)

For this feature I/O#11 ODOMETER must be enabled. If I/O ODOMETER is enabled, and Continuous distance counting variable is set to Continuous (value 1), TRIP distance is going to be counted continuously (from TRIP start to TRIP stop) and shown as I/O ODOMETER value.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1	-	Trip (ID=1280) I/O#11 – Odometer (ID=1410-1415)	U8

6.6.11 Geofencing

In this chapter it is explained how to get all parameters for the first Geofence zone (all ID numbers are for the 1st zone). Part 6.6.11.8 presents a table with the IDs of all the rest of the Geofence zones.

6.6.11.1 Frame border (ID=1020)

Geofence border thickness, measured in metres.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1000000	1000	All Geofencing parameters	U32

6.6.11.2 Geofence Zone #1 Shape (ID=1030)

Geofence shape parameter can be: circle – value 0; rectangle – value 1.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1	-	All Geofencing parameters	U8

6.6.11.3 Geofence Zone #1 Priority (ID=1031)

Parameter defines Geofence priority: 0 is low, 1 – high, 2 – panic;

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2	-	All Geofencing parameters	U8

6.6.11.4 Geofence Zone #1 Generate Event (ID=1032) Generate event on:

a) No event – value 0

b) On entering zone – value 1;

c) On exiting zone – value 2;

d) On both – value 3;

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	3	-	All Geofencing parameters	U8

6.6.11.5 Geofence Zone #1 Longitude (X1) (ID=1033)

Parameter has two meanings dependent on zone shape. If shape is a rectangle, then ID=10333 is left down corner X coordinate. If shape is a circle, then ID=1033 is centre of that circle X coordinate.

Sample value: 25.30528

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
-180	180	-	All Geofencing parameters	Float

6.6.11.6 Geofence Zone #1 Latitude (Y1) (ID=1034)

Parameter has two meanings dependent on zone shape. If shape is a rectangle, then ID=1034 is left down corner Y coordinate. If shape is a circle, then ID=1034 is centre of that circle Y coordinate.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
-90	90	-	All Geofencing parameters	Float

6.6.11.7 Geofence Zone #1 Longitude (X2) (ID=1035)

Parameter has two meanings depending on zone shape. If shape is a rectangle, then ID=1035 is right upper corner X coordinate. If shape is a circle, then ID=1035 is radius of circle with centre of ID=1033 and ID=1034.

For rectangle:

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
-180	180	-	All Geofencing parameters	Float

For circle:

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1000000	1000	All Geofencing parameters	Float

6.6.11.8 Geofence Zone #1 Latitude (Y2) (ID=1036)

If shape is rectangular, then ID=1036 is right upper corner Y coordinate. If shape circle, ID=1036 is not used.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
-90	90	-	All Geofencing parameters	Float

Other 4 GeoFence zone's parameters have the same logic as shown in GeoFence Zone #1.

GeoFence Zone Number	Geofence Zone's parameters
1	1030-1036
2	1040-1046
3	1050-1056
4	1060-1066
5	1070-1076

6.6.12 AutoGeofencing

6.6.12.1 Enable/Disable (ID=1101)

Enable – value 1; disable – value 0;

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1	1		U8

6.6.12.2 Activation Timeout (ID=1102)

Parameter represents AutoGeofencing activation timeout in seconds.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	65535	60	Enable/Disable (ID=1101)	U16

6.6.12.3 Deactivate by (ID=1100)

Parameter defines Autogeofence deactivation source. Value 1 is dedicated for attached iButton, value 0 – for Ignition.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1	-	Enable/Disable (ID=1101) iButton List (ID=1610-1659)	U8

6.6.12.4 AutoGeofence event Priority (ID=1103)

Parameter defines AutoGeofence event priority: 0 is low, 1 – high;

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1	1	Enable/Disable (ID=1101) Autogeofence event generating (ID=1104)	U8

6.6.12.5 AutoGeofence event generating (ID=1104)

Generate event: 0 – no event, 1 - on entering zone; 2 – on exiting zone; 3 – on both;

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	3	2	Enable/Disable (ID=1101) Autogeofence event generating (ID=1103)	U8

6.6.12.6 Radius (ID=1105)

Parameter represents radius of circle with centre device coordinates after activating AutoGeofence feature.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1000000	100	Enable/Disable (ID=1101) Deactivate by (ID=1100)	U32

6.6.13 iButton List (ID=1610-1659)

iButton list is used to enter Authorised iButton ID codes, which are used to authenticate driver in Authorised driving and Auto Geofencing options.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	FFFFFFFF FFFFFFFF	2	Digital Output No.2 usage scenarios (ID=1601) Deactivate by (ID=1100)	U64

6.7 I/O parameters

I/O properties are additional data sources which are recorded along with usual GPS data.

6.7.1 I/O#1 property parameter (ID=1300)

Parameter defines I/O property value. Possible values: enabled (1), disabled (0).

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	1	-	I/O#1 priority (ID=1301) I/O#1 High level (ID=1302)	S8
			I/O#1 Low level (ID=1303) I/O#1 logic operand (ID=1304) I/O#1 averaging length (ID=1305)	

6.7.2 I/O#1 priority (ID=1301)

Parameter defines I/O property type of priority: 0 is low, 1 – high, 2 – panic.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2	0	I/O#1 property parameter (ID=1300) I/O#1 High level (ID=1302) I/O#1 Low level (ID=1303) I/O#1 logic operand (ID=1304) I/O#1 averaging length (ID=1305)	S8

6.7.3 I/O#1 High level (ID=1302)

Parameter defines high value of triggered I/O property. This parameter is used to set thresholds for I/O properties to generate events.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
-2147483648	2147483647	1	I/O#1 property parameter (ID=1300) I/O#1 High level (ID=1302) I/O#1 Low level (ID=1303) I/O#1 logic operand (ID=1304) I/O#1 averaging length (ID=1305)	S32

6.7.4 I/O#1 Low level (ID=1303)

Parameter defines low value of triggered I/O property. This parameter is used to set thresholds for I/O properties to generate events.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
-2147483648	2147483647	0	I/O#1 property parameter (ID=1300) I/O#1 priority (ID=1301) I/O#1 High level (ID=1302) I/O#1 logic operand (ID=1304) I/O#1 averaging length (ID=1305)	S32

6.7.5 I/O#1 logic operand (ID=1304)

Parameter defines when event is sent: 0 – on range exit, 1 – on range entrance, 2 – both, 3 – monitoring, 4 – hysteresis.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	4	3	I/O#1 property parameter (ID=1300) I/O#1 priority (ID=1301) I/O#1 High level (ID=1302) I/O#1 Low level (ID=1303) I/O#1 averaging length (ID=1305)	S8

6.7.6 I/O#1 averaging length (ID=1305)

Parameter defines I/O property sample length to average. If no averaging needed default value is 1.

Minimum value	Maximum value	Recommended value	Goes with (depends on) parameters	Value type
0	2592000	1	I/O#1 property parameter (ID=1300) I/O#1 priority (ID=1301) I/O#1 High level (ID=1302) I/O#1 Low level (ID=1303) I/O#1 logic operand (ID=1304)	S32

Other I/O property elements can be configured in same logic. All I/O element parameters are listed in the next table.

I/O Element Number	I/O element parameters
I/O#0 – Digital input 1	1300 – 1305
I/O#1 – Digital input 2	1310 – 1315
I/O#2 – Digital input 3	1320 – 1325
I/O#3 – Analog input	1330 – 1335
I/O#4 – Digital output 1	1340 – 1345
I/O#5 – Digital output 2	1350 – 1355
I/O#6 – PDOP	1360 – 1365
I/O#7 – HDOP	1370 – 1375
I/O#8 – Power voltage	1380 – 1385
I/O#9 – GPS power	1390 – 1395
I/O#10 – Movement sensor	1400 – 1405
I/O#11 – Odometer	1410 – 1415
I/O#12 – Actual operator Code	1420 – 1425
I/O#13 – Speedometer	1430 – 1435
I/O#14 – iButton ID	1440 – 1445
I/O#15 – Operating Mode	1450 – 1455
I/O#16 – GSM Signal	1460 – 1465
I/O#17 – Deep Sleep	1470 – 1475
I/O#18 – Cell ID	1480 – 1485
I/O#19 – Area Code	1490 – 1495
I/O#20 – Temperature	1500 – 1505

6.8 SMS event configuration

6.8.1 I/O#1 element SMS event configuration (ID=100)

Command sets SMS warning on I/O#1 element.

SMS Format: setparam X,Y,W,Z X – ID
Y – Enable/Disable (0/1)
W – Telephone number INDEX (See 8.4.13 SMS Event Predefined Numbers paragraph, ID 150 – INDEX 1; ID151 – INDEX 2, …)
Z – SMS Text

Example: *“setparam 100 1,5,Digital Input 1 Event!”*

Other I/O element SMS events can be configured in same logic. All I/O element SMS event IDs are listed in the next table.

Element name (default SMS Event Text)	ID
Digital Input 1	100
Digital Input 2	101
Analog Input	103
Digital Output 1	104
Digital Output 2	105
GNSS PDOP	106
GNSS HDOP	107
External Voltage	108
GNSS Power	109
Movement Sensor	110
Odometer Value	111
GSM Operator	112
Speed	113
iButton ID	114
Data Mode	115
GSM Signal	116
Deep Sleep	117
Cell ID	118
Area Code	119
Dallas Temperature	120
Reserved	121
Reserved	122
Reserved	123
Reserved	124
Green Driving	125
OverSpeeding	126
Authorised Driving	127
Immobiliser	128
Trip	129
Geo Zone 1	130
Geo Zone 2	131
Geo Zone 3	132
Geo Zone 4	133
Geo Zone 5	134
Auto Geofence	135
Reserved	136
Reserved	137
Reserved	138
Reserved	139

7 MOUNTING RECOMMENDATIONS

7.1 Connecting Wires

Wires should be connected while module is not plugged in. Wires should be fastened to the other wires or non-moving parts. Try to avoid heat emitting and moving objects near the wires.

The connections should not be seen very clearly. If factory isolation was removed while connecting wires, it should be applied again. If the wires are placed in the exterior or in places where they can be damaged or exposed to heat, humidity, dirt, etc., additional isolation should be applied.

Wires cannot be connected to the board computers or control units.

7.2 Connecting Power Source

Be sure that after the car computer falls asleep, power is still available on chosen wire. Depending on car, this may happen in 5 to 30 minutes period.

When module is connected, be sure to measure voltage again if it did not decrease. It is recommended to connect to the main power cable in the fuse box.

7.3 Connecting Ignition Wire

Be sure to check if it is a real ignition wire – power does not disappear while starting the engine. Check if this is not an ACC wire (when key is in the first position, most electronics of the vehicle are available). Check if power is still available when you turn off any of vehicles devices.

Ignition is connected to the ignition relay output. As alternative, any other relay, which has power output, when ignition is on, may be chosen.

7.4 Connecting Ground Wire

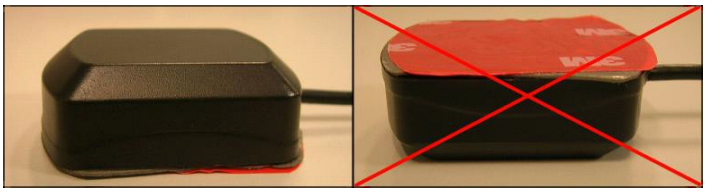
Ground wire is connected to the vehicle frame or metal parts that are fixed to the frame. If the wire is fixed with the bolt, the loop must be connected to the end of the wire. For better contact scrub paint from the place where loop is connected.

Pay Attention!

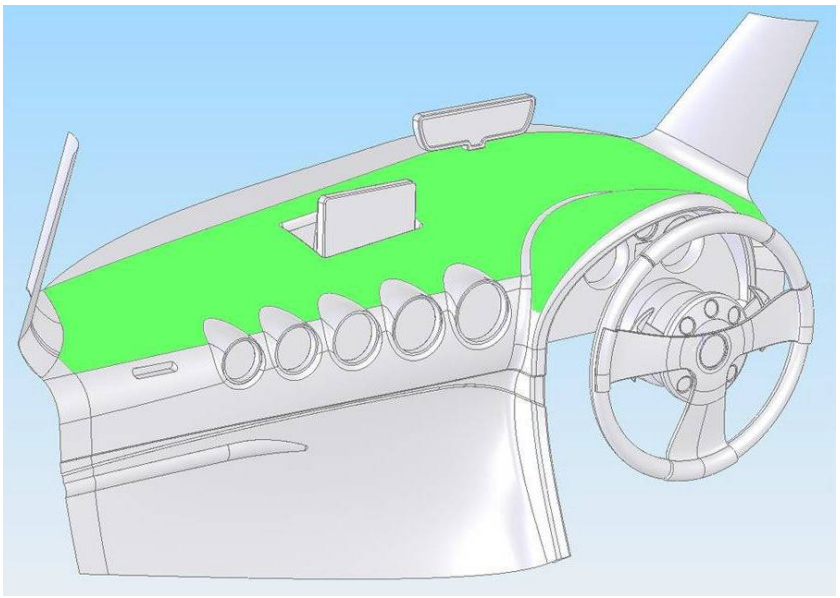
Connecting the power supply must be carried out in a very low impedance point on-board vehicle network. These points in the car are the battery terminals. Therefore, we recommend connecting the power of 300ET (wire GND and POWER) directly to the battery terminals. Another valid option is to connect the wires to the main POWER cable inside the fuse box (if there is none, then to the power supply where the fuses of vehicle's computer are), wire GND must be connected in a special point, designed to connect GND vehicle computer. Connecting the GND at an arbitrary point to the mass of the car is unacceptable, as static and dynamic potentials on the line GND will be unpredictable, which can lead to unstable 300ET and even its failure.

7.6 Connecting Antennas

- When placing antennas avoid easily reached places.
- Avoid GPS antenna placement under metal surfaces.
- Avoid placing 300ET device near car radio, speakers or alarm systems.
- GPS antenna must be placed so its state is as horizontal as possible (if antenna is leant more than 30 degrees, it is considered incorrect mounting).
- GPS antenna cable cannot be bent more than 80 degrees.
- GPS antenna must be placed sticker facing down.



It is recommended to place GPS antenna behind dashboard as close to the window as possible. A good example of GPS antenna placement is displayed in a picture below (area colored green).



7.7 Module Installation

- Module should not be seen or easily reached.
- Module should be firmly fixed to the surface or cables.
- Module cannot be fixed to heat emitting or moving parts.
- SIM card should be inserted in the module while the connector is plugged off (while module has no power).