



DSF10

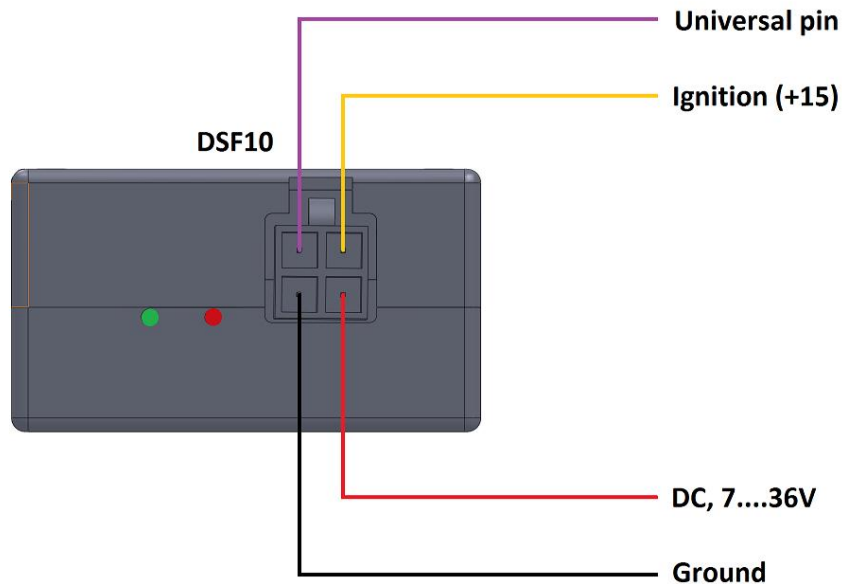
INSTALLATION AND SETUP GUIDE

5/30/2016

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Wiring diagram.

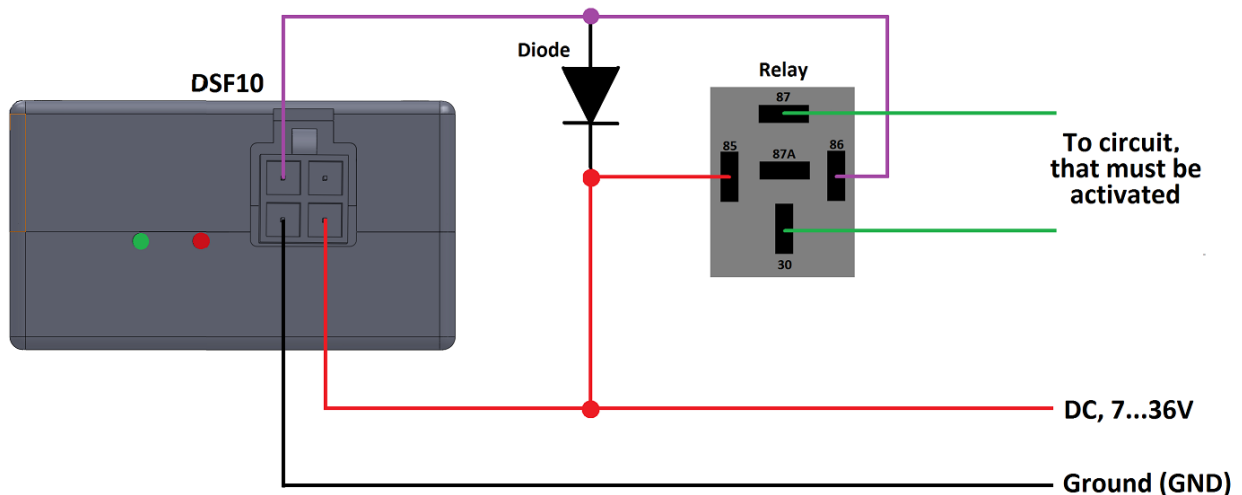


Description of wires.

Purpose of wire	Colour of the wire	Description
Power supply	Red	This wire used to power a GPS/GSM monitoring terminal, must be connected to positive terminal of vehicle's battery. Power supply must be within range 7...36 Volts.
Ground	Black	This wire must be connected to negative terminal of vehicle's battery or to vehicle's chassis.
Ignition input	Yellow	This wire used to monitor a status of vehicle's ignition, and switch monitoring terminal from idle to tracking mode. Must be connected to ignition switch, voltage range for this input must be within 7...36 Volts (ignition ON state).
Universal pin	Violet	This is universal pin, by default it's configured as analog input, can be used to measure voltage 0-30V Can be configured as digital input to monitor status of vehicle doors, lights or other equipment. Also can be configured as digital Open-collector output, max load 500mA. Can be used for remote activation some of vehicle systems, such as lights, heater, etc.

Remote load activation.

Using DSF10 terminal, it is possible remotely activate different kind of vehicle's equipment, such as lights, siren, electric motors, pumps or other electric loads. In this case, external relay must be used to provide power switching for load. Picture below shows correct connection:



We recommend to connect also diode (for example 1N4001), it will protect circuits from voltage spikes caused by relay coil.

Note!

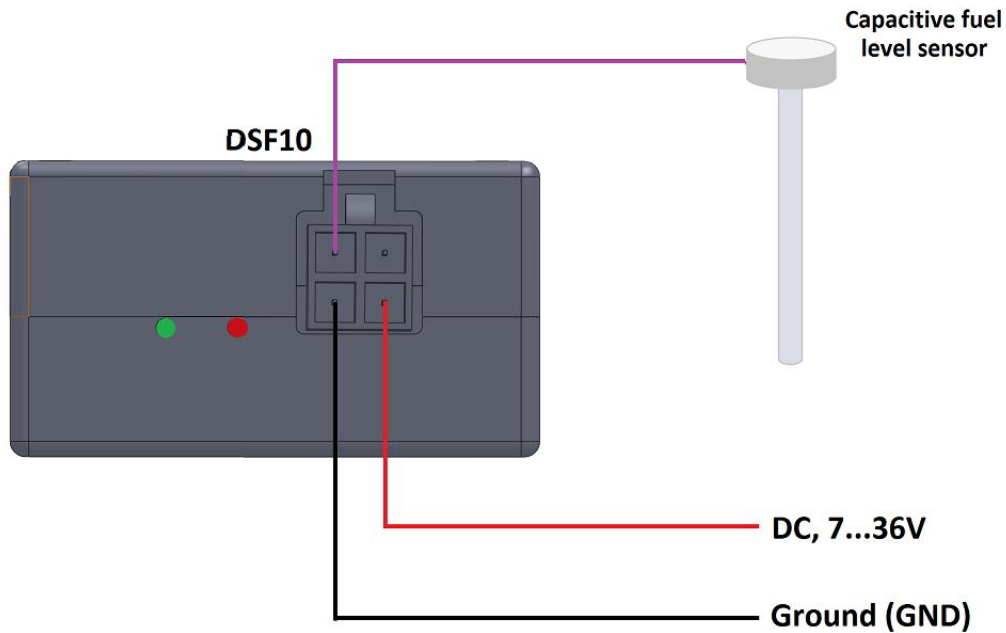
To use monitoring terminal for remote activation of equipment, user must configure universal pin as digital output. It can be done by setting parameter P35.

Settings related to remote load activation.

Parameter	Required value	Comments
P30	1 or 0	Active or deactivate load (external relay)
P35	2	Configure universal pin as digital output

Measure fuel level.

It is possible to monitor fuel level and get very accurate data of consumed fuel. For this purpose, we recommend to use additionally installed capacitive fuel sensor with analog output. This method of fuel measuring known as best and provides accuracy 0.2-1% of total amount of fuel tank.



Note!

There are limited possibilities to install capacitive fuel sensors. In most cases, it is possible to install capacitive fuel sensors only on trucks, tractors or construction machinery. If you need to get fuel information from passenger cars or commercial vans, please visit www.digitalsystems.lv/en/dsf22

Settings related to capacitive fuel sensor usage.

Parameter	Required value	Comments
P35	0	Configure universal pin as analog input
P50	1 or 0	Enable/Disable fuel data averaging
P51	1-250	Fuel data averaging period
P52	0-2	Fuel data measuring conditions

Status indication LED.

There are two indication LEDs, which provides visual information about current operating mode of monitoring terminal. Following tables explains the meaning of blinks.

GPS module status (Red LED).

Condition of LED	Description of operating mode
Constantly OFF	GPS module switched OFF.
Constantly ON	GPS module is not ready, module setup proceeding.
Fast blinking	GPS module ready, no GPS position detected.
Long blinks	GPS module ready, approximate position available.
Short blinks	GPS module ready, accurate position available.

GSM module status (Green LED).

Condition of LED	Description of operating mode
Constantly OFF	GSM module switched OFF
Constantly ON	GSM module is not ready, module setup proceeding.
Fast blinking	GSM module ready, SIM card detecting/checking mode
Long blinks	GSM module ready, not registered, searching for available network.
Short blinks	GSM module ready, registered in network.
Double short blinks	Connected to GPRS/data transmission to server

GPRS connection limiter

In case if GSM operator (in home or roaming networks) have fee for each GPRS session (connection), it is possible to limit number of GPRS sessions made by terminal for each trip (from Ignition ON till Ignition OFF). Normally terminal makes only one GPRS session and keeps it open while ignition is switched on, however by different reasons GPRS session can be terminated from operator side or bad network coverage. In case if GPRS connection limiter is enabled and defined GPRS session limit is reached, terminal will stop attempts to connect server and stay this condition until next time ignition switched on.

Settings related to GPRS connection limiter.

Parameter	Required value	Comments
P18	0-250	Number of allowed GPRS connections per trip

Vehicle engine status report.

If enabled, terminal will measure vehicle's on-board voltage, in case if defined level has been reached, terminal will set special flag bit, that will be sent to server. Using this feature, it is possible to determinate is vehicle engine working or just only ignition switched on but engine not working. As this features works by on-board voltage level, installer must measure actual charge level during time when engine is working, and set it as threshold in terminal.

Settings related to vehicle engine status report.

Parameter	Required value	Comments
P61	10-300	Charge threshold voltage level.

Ignition simulation.

In case if vehicle (tractor, construction machinery, etc) don't have ignition switch, it is possible to determinate usage of actual vehicle by on-board voltage level. If vehicle engine is working, on-board voltage level will raise up to provide charge for battery, and it is good indicator about working engine, can be used also for motor hour calculation in server.

Settings related to ignition simulation.

Parameter	Required value	Comments
P61	10-300	Charge threshold voltage level.
P63	1	Enable ignition simulation by on-board voltage

SMS commands.

Each terminal parameter can be accessed (read and modified) by SMS commands. There are two types of SMS commands – reading and writing commands. Reading commands returns current parameter value from device memory, writing commands overwrites previous parameter value with new and returns a new parameter value.

Syntax of SMS commands.

All SMS commands must be written with capital letters, in case if wrong SMS command has been sent, device will ignore it.

Read commands

Read commands always starts with **GET**, followed by space and then parameter number at the end.

Example of reading parameter P11 (server IP address):

GET P11

Response from device:

P11: 80.81.57.66

Write commands

Write commands always starts with **SET**, followed by space, then parameter number, space again and then new parameter value at the end.

Example of setting parameter P11 (server IP address):

SET P11 195.126.118.111

Response from device:

P11: 195.126.118.111

List of all parameters.

Parameter	Description	Options	Response	Default value
P10	APN name	Read and Set	Yes	<i>internet</i>
P11	Server IP address	Read and Set	Yes	<i>92.63.86.53</i>
P12	Server PORT	Read and Set	Yes	<i>3432</i>
P13	Communication protocol	Read and Set	Yes	<i>0</i>
P14	GPRS Login	Read and Set	Yes	<i>(empty)</i>
P15	GPRS Password	Read and Set	Yes	<i>(empty)</i>
P16	GPRS	Read and Set	Yes	<i>1</i>
P17	Roaming	Read and Set	Yes	<i>0</i>
P18	GPRS connection limiter	Read and Set	Yes	<i>15</i>
P19	Server response wait time	Read and Set	Yes	<i>20</i>
P20	GPS angle threshold	Read and Set	Yes	<i>4</i>
P21	GPS start speed threshold	Read and Set	Yes	<i>2</i>
P22	GPS time threshold	Read and Set	Yes	<i>180</i>
P23	PING interval in home network	Read and Set	Yes	<i>60</i>
P24	New event wait time	Read and Set	Yes	<i>5</i>
P25	PING interval in roaming network	Read and Set	Yes	<i>60</i>
P26	Static STOP coordinates	Read and Set	Yes	<i>1</i>
P27	Anti-sabotage function	Read and Set	Yes	<i>1</i>
P30	Digital output 1	Read and Set	Yes	<i>0</i>
P35	Universal digital pin working mode	Read and Set	Yes	<i>0</i>
P50	Fuel data averaging	Read and Set	Yes	<i>1</i>
P51	Fuel data averaging time period	Read and Set	Yes	<i>10</i>
P52	Fuel measurement conditions	Read and Set	Yes	<i>0</i>
P61	Vehicle engine status report	Read and Set	Yes	<i>0</i>
P63	Ignition signal source	Read and Set	Yes	<i>0</i>
GPS	Request actual GPS data	Read	Yes	<i>-</i>
GSM	Request actual GSM network data	Read	Yes	<i>-</i>
ID	Request device ID and FW version	Read	Yes	<i>-</i>
STATUS	Request actual device status	Read	Yes	<i>-</i>
ERASE	Erase data memory	Set	Yes	<i>-</i>
CELLPOS	Request position based on GSM cells	Read	Yes	<i>-</i>
RSTGSM	Reset GSM module	Set	No	<i>-</i>
RSTGPS	Reset GPS module	Set	Yes	<i>-</i>
RESET	Reset device	Set	No	<i>-</i>
FUEL	Request actual analog input measurement	Read	Yes	<i>-</i>

Description of parameters.

This section describes all parameters used in terminal. Each parameter can be accessed by SMS commands, in case of need, parameter can be modified. Almost all parameters are stored in the non-volatile memory, in case if power loss parameter value will not be changed.

P10 APN name

Description	APN (Access Point Name), used to established GPRS communication. APN is provided by GSM operator.
Options	Parameter can be read and modified.
Used values	Any ASCII characters, maximal length 32 bytes
Default value	<i>internet</i>
Example	To read parameter: GET P10 To set parameter: SET P10 internet Response from device: P10: internet

P11 IP address

Description	Server IP address to send all data.
Options	Parameter can be read and modified.
Used values	String of digits, separated by dots.
Default value	<i>92.63.86.53</i>
Example	To read parameter: GET P11 To set parameter: SET P11 192.168.100.101 Response from device: P11: 192.168.100.101

P12 PORT

Description	Server PORT number.
Options	Parameter can be read and modified.
Used values	String of digits, max length 5 bytes.
Default value	3432
Example	To read parameter: GET P12 To set parameter: SET P12 12345 Response from device: P12: 12345

P13 Communication protocol (TCP/UDP)

Description	Defines communication protocol between terminal and server.
Options	Parameter can be read and modified.
Used values	0 - TCP 1 - UDP
Default value	0
Example	To read parameter: GET P13 To set parameter: SET P13 1 Response from device: P13: 1

P14 GPRS Login

Description	Defines GPRS Login to establish communication. Ask your GSM operator to get correct Login.
Options	Parameter can be read and modified.
Used values	Any ASCII characters, maximal length 16 bytes
Default value	<i>(empty)</i>
Example	To read parameter: GET P14 To set parameter: SET P14 wap Response from device: P14: wap

P15 GPRS Password

Description	Defines GPRS password to establish communication. Ask your GSM operator to get correct password.
Options	Parameter can be read and modified.
Used values	Any ASCII characters, maximal length 16 bytes
Default value	<i>(empty)</i>
Example	To read parameter: GET P15 To set parameter: SET P15 wap Response from device: P15: wap

P16 GPRS connectivity.

Description	Enable or Disable GPRS connectivity.
Options	Parameter can be read and modified.
Used values	0 - GPRS Disabled 1 - GPRS Enabled
Default value	<i>1</i>
Example	To read parameter: GET P16 To set parameter: SET P16 0 Response from device: P16: 0

P17 Roaming

Description	Enable or Disable GPRS connectivity in roaming networks.
Options	Parameter can be read and modified.
Used values	0 - Disabled 1 - Enabled
Default value	<i>0</i>
Example	To read parameter: GET P17 To set parameter: SET P17 1 Response from device: P17: 1

P18 GPRS connection limiter

Description	In case if there are problems with GPRS connectivity, it is possible to define maximal number of GPRS sessions per one trip. This option helps to prevent users from expenses caused by unlimited attempts to establish communication with server.
Options	Parameter can be read and modified.
Used values	0 – GPRS connection limiter disabled. 1-250 - Number of allowed GPRS sessions per one trip. Maximal value allowed - 250
Default value	<i>15</i>
Comments	
Example	To read parameter: GET P18 To set parameter: SET P18 50 Response from device: P18: 50

P19 Server response wait time

Description	Each data packet sent from terminal to the server must be confirmed from server. This parameter defines time (seconds) to wait response from server. In case if defined time is reached and no response received, current data sending considered as unsuccessful – GPRS session will be re-established to try again.
Options	Parameter can be read and modified.
Used values	1-250 - Number of seconds to wait response from server. Maximal value allowed - 250
Default value	<i>20</i>
Comments	Not recommend to use value below 5
Example	To read parameter: GET P19 To set parameter: SET P19 30 Response from device: P19: 30

P20 GPS angle threshold

Description	Defines GPS angle changes to trigger new event in tracking mode (when ignition is switched on). In case ignition is switched off, this parameter is not used.
Options	Parameter can be read and modified.
Used values	<p>0 – GPS angle change trigger disabled.</p> <p>1-250 – GPS angle change trigger enabled, value equals to decimal degrees of driving angle change to trigger new event.</p> <p>Maximal value allowed - 250</p>
Default value	4
Comments	
Example	<p>To read parameter: GET P20</p> <p>To set parameter: SET P20 5</p> <p>Response from device: P20: 5</p>

P21 GPS start speed threshold

Description	Defines GPS start speed (km/h). In case if vehicle speed is less than GPS start speed threshold parameter, terminal will not trigger GPS angle events. This parameter is used only in tracking mode and not used when ignition switched off.
Options	Parameter can be read and modified.
Used values	<p>0 – GPS start speed disabled.</p> <p>1-250 – GPS start speed enabled, value equals to vehicle speed (km/h) to start monitor driving angle</p> <p>Maximal value allowed - 250</p>
Default value	2
Comments	
Example	<p>To read parameter: GET P21</p> <p>To set parameter: SET P21 5</p> <p>Response from device: P21: 5</p>

P22 GPS time threshold

Description	Defines GPS time (seconds) to trigger new event. This parameter used only when ignition is switched ON and no other event has been triggered during defined time.
Options	Parameter can be read and modified.
Used values	0 – GPS time trigger disabled. 1-250 – GPS time trigger enabled, value equals to vehicle seconds Maximal value allowed - 250
Default value	<i>180</i>
Comments	
Example	To read parameter: GET P22 To set parameter: SET P22 100 Response from device: P22: 100

P23 PING time

Description	Defines PING interval (minutes) in home networks (also called as <i>heartbeat</i>). This parameter used only when ignition is switched OFF. In case if ignition switched OFF and defined time is reached, terminal will trigger event.
Options	Parameter can be read and modified.
Used values	0 – PING disabled 1 – 250 - PING enabled, value equals to minutes between each PING Maximal value allowed - 250
Default value	<i>60</i>
Comments	
Example	To read parameter: GET P23 To set parameter: SET P23 30 Response from device: P23: 30

P24 New event wait time

Description	Defines time (seconds) for collecting data for next data block to be sent. During this time terminal keeps all unsent events and waits for new event to include it the data block. In case if defined time is reached (no new events has been triggered), terminal sends all unsent events to server. If parameter set to 0, terminal will send event right after event has been triggered.
Options	Parameter can be read and modified.
Used values	0 – Event wait time disabled. 1-250 – Event wait time enabled, value equals to seconds for new event waiting. Maximal value allowed - 250
Default value	5
Comments	
Example	To read parameter: GET P24 To set parameter: SET P24 10 Response from device: P24: 10

P25 PING interval in roaming networks

Description	Defines PING interval (minutes) in roaming networks (also called as <i>heartbeat</i>). This parameter used only when ignition is switched OFF. In case if ignition switched OFF and defined time is reached, terminal will trigger event.
Options	Parameter can be read and modified.
Used values	0 – PING disabled 1 – 250 - PING enabled, value equals to minutes between each PING Maximal value allowed - 250
Default value	60
Comments	
Example	To read parameter: GET P25 To set parameter: SET P25 120 Response from device: P25: 120

P26 Static STOP coordinates

Description	This parameter enables/disables static GPS coordinates for parking time. If static coordinates are enabled, terminal will send same coordinates with each PING (during parking time). If static coordinates are disabled, terminal will send new (actual) coordinates with each PING
Options	Parameter can be read and modified.
Used values	0 – Static coordinates disabled 1 – Static coordinates enabled
Default value	<i>1</i>
Comments	
Example	To read parameter: GET P26 To set parameter: SET P26 0 Response from device: P26: 0

P27 Anti-sabotage function

Description	This function allows detecting situations, when vehicle driver are trying to interrupt GPS signal, by disconnecting GPS antenna or by jamming GPS signal. In case if this function is enabled and terminal lost a GPS signal during driving, terminal becomes in Anti-sabotage mode. In this mode terminal sends last valid position (before loss of GPS signal) and all actual data (time, fuel data, inputs and outputs). Also special flag bit is set, that allows detecting this mode in server. In case if this function is disabled and terminal lost GPS signal, no new events will be triggered until GPS signal will be restored.
Options	Parameter can be read and modified.
Used values	0 – Anti-sabotage disabled 1 – Anti-sabotage enabled
Default value	<i>1</i>
Comments	
Example	To read parameter: GET P27 To set parameter: SET P27 0 Response from device: P27: 0

P30 Digital output

Description	This parameter defines condition of digital output. It is useful in cases when some of vehicle's equipment (autonomous heating system, lights, etc.) must be activated remotely.
Options	Parameter can be read and modified.
Used values	0 – Digital output deactivated 1 – Digital output activated
Default value	0
Comments	In case of terminal power loss or restart, this parameter will be set to 0
Example	To read parameter: GET P30 To set parameter: SET P30 1 Response from device: P30: 1

P35 Universal digital pin working mode

Description	This parameter defines universal digital pin (violet wire) working mode – it can work as digital input/output or analog input.
Options	Parameter can be read and modified.
Used values	0 – Universal digital pin is configured as analog input 1 – Universal digital pin is configured as digital input 2 - Universal digital pin is configured as digital output
Default value	0
Comments	
Example	To read parameter: GET P35 To set parameter: SET P35 1 Response from device: P35: 1

P50 Fuel data averaging

Description	This parameter enables/disables fuel data averaging. If enabled, terminal will collect fuel data measurements and calculate average value to send to server.
Options	Parameter can be read and modified.
Used values	0 – Fuel data averaging disabled 1 – Fuel data averaging enabled
Default value	<i>1</i>
Comments	
Example	To read parameter: GET P50 To set parameter: SET P50 0 Response from device: P50: 0

P51 Fuel data averaging time period

Description	This parameter defines period for data averaging. Each unit equals 2 seconds. For example – if parameter is set to 10, fuel data averaging period will be 20 seconds.
Options	Parameter can be read and modified.
Used values	1-250
Default value	<i>10</i>
Comments	
Example	To read parameter: GET P51 To set parameter: SET P51 30 Response from device: P51: 30

P52 Fuel measurement conditions.

Description	This parameter defines conditions under which allowed measurement of the fuel level.
Options	Parameter can be read and modified.
Used values	0 – Fuel level measurement always allowed. 1 – Fuel level measurement allowed only when ignition is ON 2 – Fuel level measurement allowed only when ignition is OFF
Default value	0
Comments	
Example	To read parameter: GET P52 To set parameter: SET P52 2 Response from device: P52: 2

P61 Vehicle engine status report

Description	This parameter enables and defines voltage level of vehicle engine status report. In case if vehicle on-board voltage reaches defined value in current parameter, terminal will set special flag bit in status register, that will be sent to server as indication about working engine. If on-board voltage drops below defined voltage, flag bit will be cleared.
Options	Parameter can be read and modified.
Used values	0-99 – Vehicle engine status report disabled 100-300 – Vehicle engine status report enabled <i>Examples:</i> Value 100 equals to 10.0 Volts Value 128 equals to 12,8 Volts Value 285 equals to 28,5 Volts
Default value	0
Comments	
Example	To read parameter: GET P61 To set parameter: SET P61 138 Response from device: P61: 138

P63 Ignition signal source

Description	This parameter defines ignition signal source for terminal
Options	Parameter can be read and modified.
Used values	0 – Ignition signal provided in ignition input (yellow wire) 1 – Ignition signal imitation by on-board voltage
Default value	0
Comments	To imitate ignition signal by on-board voltage, installer must define voltage level (threshold) in parameter P61 (engine status report)
Example	To read parameter: GET P63 To set parameter: SET P63 1 Response from device: P63: 1

GPS Actual GPS data

Description	This command requests actual GPS data from GPS receiver.
Options	Parameter is read only.
Used values	LAT – Actual Latitude in decimal degrees LONG – Actual Longitude in decimal degrees SPEED - Actual speed FIX – Actual GPS quality (0 and 1 – no position available, 2 – weak position, 3-good position) SAT – Number of satellites used for navigation
Default value	
Comments	
Example	To read parameter: GET GPS Response from device: LAT: 54.2345678 LONG: 24.1234567 SPEED: 0 KM/H FIX: 3 SAT: 9

GSM Actual data of GSM network

Description	This command requests actual GSM network data.
Options	Parameter is read only.
Used values	GSM signal – Actual strength of GSM signal NETW – Network type (home or roaming) CODE – Current operator PLMN code
Default value	
Comments	
Example	To read parameter: GET GSM Response from device: GSM signal: 30 NETW: home CODE: 24705

ID Identification data

Description	This command requests Identification data of terminal.
Options	Parameter is read only.
Used values	ID – Terminal model s/n – Terminal serial number vx.xx – Firmware version
Default value	
Comments	
Example	To read parameter: GET ID Response from device: ID: DSF10, s/n: 08647, v1.01

ERASE Erase internal memory

Description	This command performs full erase of internal data memory; all unsent data will be erased.
Options	Parameter is write only.
Used values	
Default value	
Comments	
Example	To perform command: SET ERASE Response from device: DONE

CELLPOS Position based on GSM cells

Description	This command requests position that is based on GSM cells.
Options	Parameter is read only.
Used values	
Default value	
Comments	
Example	To read parameter: GET CELLPOS Response from device: 24.506144,56.851971,2015/02/22,14:20:48

STATUS Terminal control register

Description	This command requests contents of terminal control register
Options	Parameter is read only.
Used values	UNS – Number of unsent events in terminal’s memory GPRS – Number of unsuccessful GPRS connections RES - Number of terminal power resets MEM – Number of data memory faults GPS – Number of GPS module restarts POW – Vehicle’s on-board voltage AIN – External Analog input voltage IGN – Status of Ignition (0-off, 1-on) IN1 – Status of digital input (0-off, 1-on) FIX – GPS signal quality SAT – number of visible satellites
Default value	
Example	To read parameter: GET STATUS Response from device: UNS:00004, GPRS:000, RES:002, MEM:000, GPS:002, POW:12,8V, AIN:00000mV, IGN:0, IN1:0, FIX: 3, SAT:11

RESET Restarts terminal

Description	This command performs full restart (reboot) of terminal.
Options	Parameter is write only.
Used values	
Default value	
Example	To perform command: SET RESET Response from device: <i>(no response from device)</i>

RSTGSM Restarts GSM module

Description	This command performs full restart of GSM module.
Options	Parameter is write only.
Used values	
Default value	
Example	To perform command: SET RSTGSM Response from device: <i>(no response from device)</i>

RSTGPS Restarts GPS module

Description	This command performs full restart of GPS module.
Options	Parameter is write only.
Used values	
Default value	
Comments	
Example	To perform command: SET RSTGPS Response from device: DONE

FUEL Measured fuel value

Description	This command requests actual measurement of fuel level. This value is result of measurement from ADC (Analog to Digital Converter) module.
Options	Parameter is read only.
Used values	
Default value	
Comments	
Example	To read parameter: GET FUEL Response from device: ANALOG: 1735 mV

Technical parameters.

	Parameter name	Value
ELECTRICAL	Operating voltage, DC Volts	7...36
	Average current consumption (@ 12V), mA	
	Idle mode (Ignition Off)	34
	Tracking mode (Ignition On)	100
	Digital inputs (IGN, DIN) voltage	7...36
	Analog input measurement range, V	0...30
	Digital output load, mA (max)	500
GPS	Number of GPS channels	50
	Tracking sensitivity, dBm	-162
	GPS accuracy ,meters	2
	GPS Cold start, seconds	32
	Hot start, seconds	<1
GSM	GSM bands	4
	Operating frequency, MHz	850/900/1800/1900
	GPRS uplink speed, kbps	85,6
	Transmit power, W	
	EGSM 850/900	2
DCS 1800/1900	1	
MECHANICAL	Length of GPS antenna cable, m	3
	Length of installation cables, m	0,5
	Dimensions of terminal, mm	49x34x19
	Operating temperature, C ⁰	-30...65
	Humidity, % (non-condensing)	5...90

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