Autoplugin **Therminal**

Full User Manual

Rev A

Table of Content

Description

Autoplugin Therminal-XC/XE/XF is automotive climatic GSM-module intended for heater and ventilation remote control from mobile phones and smartphones. Voice call, SMS or Android/iOS application may be used to access Therminal. The applications use data transfer via proprietary secure internet server. In order to warm up the engine and the interior Therminal can control fuel and electric heaters, to ventilate the interior - climatic module, to cool the interior – engine start module.

GSM-Module Possibilities

- Remote control via Android/ iOs application via server and/or SMS. State of the art data transfer protection methods for server connection.
- Remote control via SMS with easy to remember commands
- Simple remote control by using a voice call (incoming call acceptation, hanging up, replying with SMS or data message, launching the preprogrammed function)
- Parking heater remote control with feedback – informing about heating completion and heating errors.
- Possibility to control engine heating and interior heating separately
- Possibility to use engine remote start to increase heating efficiency
- Weekly and shift work schedules in the apps
- Outer thermo sensor for interior temperature registering
- Outer LED-button for one-touch control with programmable function: from the heater control to emergency button
- Approximate geoposition by GSM signals (all versions), accurate geoposition by GPS/GLONASS signals (XF version only).
- Software tracking mode (by the apps)*
- QiuckStart procedure for installation simplifying (installation «from the box»). It is enough to send 1 SMS or make a voice call on modem number after SIM installation.

- Fully functional multi-user mode for 3 registered users. The principle “only the driver controls the vehicle”. Notifications are sent to the user, who is the Driver at the moment, and don’t disturb other users of the system.
- Separation of user access to confidential information (i.e. to the vehicle location).
- Accurate information of the heater operation including the source of the heater startup or stop event.
- Automatic application adjustment (auto configuration). After applying only functions supported by the hardware remain available in the app.
- Flexible adjustment of the device for different needs. Fully programmable inputs and outputs.
- Device setup via administrator web console*
- Heater errors reading and resetting via web console for w-bus type connection for Webasto heaters*
- Power save modes allow the user don’t remember how long the vehicle stay inactive during the parking with Therminal connected. After the first inactivity period Therminal goes to the periodical operation mode, but after the second period finishing switches off all radio modules, thus minimizing power consumption.
- Algorithms of remote control for fuel fired parking heater, ventilation, engine start, electrical parking heater of engine/interior.
- GSM pager mode for the factory alarm system (alarm triggering notification)
- The function of automatic heater operation time calculation based on weather forecast for the region of the smartphone/vehicle location.

*the function readiness is a subject to refinement at the moment of publication

Passwords

In order to prevent unauthorized access to the vehicle via Therminal, users have to use passwords. Therminal provides different access levels for the user who knows User password and for the user who knows Administrator password.

User password (marked as <password> in examples of commands below) allows to request non-confidential information and control the heater (or other controlled device). Therminal can store 1 common user password for unregistered users to get access via SMS and 3 personal user passwords for registered users to get access via SMS/internet.

Administrator password (<admin_password> in examples of commands below) allows to request any information and to change Therminal settings, including User passwords.

Initially all User passwords are the same and equal to factory value 1234. We recommend change factory password for each user in purpose of security enhancement. The user password can include digits 0-9, Latin lowercase (a –z) and upcase (A-Z) letters and also some special symbols: !"#$%&*()-+'/,.

User password length should be at least 4 symbols and no longer than 16 symbols.

Figure 1

Administrator password is a 7 digits code, which equal to last 8 – 1 symbols of ICCID code, printed on SIM (fig. 1). For SIM at figure 1 the administrator password is 1234567. You can use as administrator password any part of ICCID code, which includes correct sequence of digits, i.e.: 1234567**8**, 012**1234567**, 78901**1234567**8.

The administrator password can be changed by the means of SIM replacement only.

Users and Administrators

Everyone who knows common user password <**password**> can access Therminal via SMS in order to control the heater, ventilation and the engine.

Everyone who knows administrator password <**admin_password**> can access Therminal via SMS and web in order to control the heater, ventilation and the engine and also to change settings.

- **Administrator**

User must have administrator permissions to be able to make adjustments and request confidential information.

A special command there exists to set a user as the administrator:

<admin_password> Admin

Therminal will answer with a confirmation: **ADMIN: accepted, <status>**

If Therminal receives SMS, beginning with **admin_password**, it will also store user's GSM-number as the number of administrator.

Administrator can request service information by using both user **password** and **admin_password**, but change settings - only with **admin_password.**

- **Active User or Driver**

At any moment the only one user can drive the vehicle, and similarly the only one user can have permissions to control the vehicle by using Therminal. This user is called the Driver in this manual. The Driver receives all alarms and notifications, sent by Therminal. The user can take Driver permissions only if other user (the current Driver) doesn't control the vehicle via Therminal or directly, inside the vehicle. In other case current Driver has to finish the control at first. No approval from current Driver is needed to take permissions. The User only needs to know the <**password**> to become the Driver.

Variants for the Driver change:

1. By the command **Driver ON**, which the User sends to take Driver permissions:

<password> Driver ON

Therminal confirms the command with **DRIVER ON: accepted, < status >**. If other User controls the vehicle at the moment, Therminal doesn't allow the Driver change with **DRIVER ON: busy, < status >**

If the command is sent with **<admin_password> ,** the module will deny the operation with **DRIVER ON: denied, < status >**

2. By the command of temporary refusal from Driver permissions **Driver OFF**

<password> Driver OFF

The Driver permissions temporary will be given from the User to the Web-user (means that all notifications will be redirected to the server). Refusal is active up to the module restart, whereupon the User becomes the Driver again. Accordingly the command doesn't change the Driver number stored in Therminal memory.

The command is confirmed with **DRIVER OFF: accepted, < status >**. If the command was sent with **<admin_password> ,** the module will deny the operation with **DRIVER OFF: denied, < status >**

If the command is sent by the User, who is not the Driver, he only receives a confirmation **DRIVER OFF: accepted, < status >**, but the Driver remains the same. The refusal is possible only if the Driver doesn't control the vehicle via Therminal. Otherwise he receives **DRIVER OFF: busy, < status >**.

The command is primarily used to disable the notification from the module.

3. By the command **Set Driver**, which is used by the Administrator to transfer the Driver permissions to the particular User.

<admin_password> Set Driver=<number>

Where <**number**> can take values **USER1, USER2, USER3, SELF, EMPTY, BACK,** or can be a GSM-number

The command is confirmed by **Set Driver: accepted, <status>**. It transfers the permissions forcibly and independently to the fact, whether the Driver controls the vehicle via Therminal or not. The SMS-user, which receives Driver permissions, has to know the **<password>** to be able control the Therminal. Otherwise he can only receive notifications from Therminal.

If permissions transfer was successful, Therminal sends to the previous Driver the notification **DRIVER OFF: forced, <status>**, to the current Driver - **DRIVER ON: forced, <status>**

4. By receiving and launching any control command (except Get and Set), beginning with <**password**>, Therminal will save user's GSM-number as the Driver number. The previous Driver will get the notification **DRIVER OFF: forced, <status>.** New Driver can check his Driver status by the field **Status:** inside the notification.

The launching of control commands with <**admin_password**> doesn't lead to the Driver change. Therefore it is necessary to take the Driver permissions forcibly (by **Set Driver=Self** or **Empty**) before sending test commands from web-panel. And return them at the end of tests (by **Set Driver=Back** or **Restart**). Otherwise confirmations of commands, sent by Therminal, will be delivered to the Driver instead of web-panel.

The possibility to receive the SMS-notifications about Driver change can be adjusted in the table settings individually for every registered user and separately for all unregistered users.

Multi-User Mode

- **User registration**

The device can store up to 3 phone numbers of regular users (register them). The registration procedure is necessary in some cases:

1. User wants to control Therminal via voce call

2. User needs personal permissions to request vehicle location

3. User wants to control Therminal from applications via Internet

Registration of users is managed by the Administrator. The first user can be registered automatically during Quickstart procedure launching. Other users need to be registered by the administrator, via SMS command or from web-panel.

The commands intended for user list managing:

1. The administrator's request which adds user's GSM-number **<number>** to the list of registered users:

<admin_password> Set users=<position>.**<phone_number> [,**
<position>.**<phone_number>[,** <position>.**<phone_number>,]]**

The command creates a new user with the name **User**<**position**> for access to Therminal. Parameter <**position**> point to the position in the registered users list, 1-3. The position affects on user's permissions to request car location (than farther from 1 – than lower priority).

Therminal confirms the command with **SET USERS: accepted, <status>**

If at least one of the numbers in the parameters list is registered yet in another position, Therminal will refuse the registration with **SET USERS: denied, <status>.** It is necessary to delete this number from registered users list at first by the command **<admin_password> Set users=**<position>.**EMPTY** or save to this position the number of another user.

For every registered user Therminal creates a personal password, initially the same as the common user password **<password>** at the moment of user registration. It can be changed later by the administrator (usually with the purpose to achieve more confidentiality inside the group of IP-users). If the personal password has not been individually changed, the change of the common password will also change the personal password.

The registered users list is stored in SIM memory. It is necessary to reregister the users after SIM replacement.

2. <admin_password> Set Users=Default - resets the registered users list.

Data Transfer Methods

Therminal uses two methods of data transfer: SMS and mobile data transferring via high secure internet connection. By using internet connection the device can be configured via administrator's web panel with http(s) access.

Therminal uses the same data transfer method as the user applies: if Therminal receives SMS-command, it switches to SMS-mode for the user; if receives a command from the server – switches to internet mode for the user. Therminal stores data transfer mode type for each registered user.

When Therminal receives incoming voicecall from the registered user, it launch assigned with voicecall function (fuel heater start by default), then hangs up the call with busy tone and sends the response message (HEATER ON: accepted) to the user by its last applied data transfer method.

Answers from Therminal

Answer – is a reaction of Therminal for user's command. It will be sent only in case of valid <password> or <admin_password> at the beginning of the command is present (for all the users including the registered ones). Otherwise the command will be ignored for security reasons.

If the password is valid, but:

1. The command is not supported (did not recognized by Therminal), it will be answered by notification Command error, <status>

2. There is an error in the command format (invalid separators, invalid directives, invalid parameters). In this case Therminal answers with error message, including the initial command and error directive, e.g:

SET TIME: error, <status>

If Therminal receives a valid message, it answers with confirmation message, including the initial command completely or partially, e.g:

HEATER ON: accepted, <status>

If Therminal at the moment is used by another user, it answers with busy notification:

HEATER ON: busy, <status>

If the user has no permissions for command launching (e.g. administrator password is required instead of user password), Therminal answers with restriction message, including the initial command and **denied** directive:

SET PASSWORDS: denied, <status>

Therminal Registration. QuickStart Procedure

The Android app can control the Therminal by SMS or via Internet. The iOS app controls the Therminal via Internet. High secure internet connection server is used for data transfer. In order to the server be able send and receive data between the app and Therminal, the special registration procedure should be performed on the server.

The device uses GPRS technology in a 2G GSM network. It is important to make sure the GPRS is available on GSM-operator's side before the registration.

Therminal stores GPRS settings (APN, login and password) for Russian and Scandinavian GSM operators. GPRS settings are selected automatically for these operators. User also can adjust the GPRS settings manually by the command **Set GPRS**, in case if settings for the operator don't present in the device.

The command <**admin_password**> **Register** starts server registration process for the Therminal. The registration may be performed independently of **INTERNET** setting value. User can check the registration status by the command <**admin_password**> **Get IPSTATUS** or <**password**> **Get IPACCESS** (for a registered user only).

There exists a special procedure **Quickstart**, which includes simplified the first (main) user registration, server registration and also requests the access to administrative web-console. The procedure may be started in two ways:

1. Press and hold the LED button for at least 10, but not more than 15 seconds, then release the button. The LED will flash with 10 flashes in series. During 3 minutes make a voicecall on Therminal's number. The device will reject the call with busy tone, store the caller's number as USER1, ADMIN и DRIVER, allow server access (**Set INTERNET=ON**) and start server registration procedure (**Register**). At the end of registration the LED stops flashing, Therminal sends SMS with registration results. Then the device will make web-console access request (**Get WEBACCESS**) and then will send SMS with request results.

The procedure can be started in such a manner only once, and only until the device doesn't store driver's number. The repeated start will be possible only after full reset of Therminal to the factory settings (**Set DEVICE=FACTORY**) is done.

2. Send on Therminal's number SMS <**password**>**Quickstart**. The device will store the sender's number as USER1, ADMIN и DRIVER, allow server access (**Set INTERNET=ON**) and start server registration procedure (**Register**). At the end of registration the LED stops flashing, Therminal sends SMS with registration results. Then the device will make web-console access request (**Get WEBACCESS**) and then will send SMS with request results.

The procedure can be started with user password (factory value – 1234) only once, and only until the device doesn't store driver's number. The repeated start will be possible only after full reset of Therminal to the factory settings (**Set DEVICE=FACTORY**) is done. Anytime **Quickstart** can be repeatedly started with the administrator password.

If during **Quickstart** execution the automatic registration was failed, the administrator can make changes in server access settings and repeat the registration manually by the command **Register**.

Control Commands

User controls the heating, ventilation and engine remote start by typing SMS manually or via application interface of its smartphone. In this case commands will be generated automatically.

Commands should be typed in Latin letters only, in lower or upper case (except passwords - case sensitive).

- Command format in common:
  [<password> space] <command>[space or =][<command parameter>][space < command parameter >][space < command parameter >]

- Device control commands

Therminal is able to control the devices:

Fuel fired heater, engine remote start module, climate control module, AC electrical heater for engine and interior compartment. Commands intended for the direct control:

Heater on	Turn on the fuel fired heater
Heater off	Turn off the fuel fired heater
Climate on	Turn on the climate control module
Climate off	Turn off the climate control module
Engine on	Start the engine
Engine off	Stop the engine
Eheater on	Turn on the electrical heater
Eheater off	Turn off the electrical heater

- Parameters

<numerical value 1..255> - operational time of the process in minutes, e.g:

Heater on 30 turns the fuel heater on and limit its operational time by 30 minutes

It can be set in parameters for the fuel and electrical heater how to use ventilation and engine start during the heating process:

Heater on +fan will apply table settings (4.4) to activate interior warm up

Heater on +engine will apply table settings (4.6, 4.8) to activate engine start

Heater on 15 +engine +fan will turn on the fuel heater for 15 minutes applying settings of ventilation and engine start activation

- Administrative commands

1. < admin_password > USSD <command>
   Transfer USSD code to the module in order to launch it in GSM serving network. Command is intended to control the provider's services. Reception of the command is not confirmed by the GSM-module.

   Network response for USSD code will be sent to the user as a message with USSD: prefix. Dialog USSDs are not supported.

   If the user has no permissions to apply the command, the module will answer with USSD: denied, <status>

2. <admin_password> Restart performs the reload of Therminal. The reload may be needed after settings change, e.g. Command is not confirmed. It can be used with user password also, if sent from the administrator's number.

3. <admin_password> Powerdown – command forcedly goes Therminal to the Powerdown mode. In this mode GSM and GPS modules are switched off to minimize power consumption. The mode allows to leave the vehicle (with Therminal connected and powered) unused for a long period of time without need to disconnect Therminal from power. Supply current in Powerdown mode is less than 1mA (for 12 Volt power). Possible inactivity time in the mode is

defined by self-discharge characteristics of vehicle's battery in fact (about a half of the year).
In order to go Therminal back to the Normal mode, user can press the LED button or disconnect and then repeatedly connect the module (suitable for Plug-n-Play connection). The command is confirmed by **Powerdown: accepted,<status>**; the Driver receives the notification **NOTICE: Powerdown mode, < status >**

If power save modes are adjusted in settings, Therminal automatically goes to Powerdown mode, if the vehicle stays unused (no engine starts) for longer than 60 days period.

4. <admin_password> Standby – command forcedly goes Therminal to the Standby mode. In this mode GSM and GPS modules are switched off to minimize power consumption. The mode allows to leave the vehicle (with Therminal connected and powered) unused for a long period of time without need to disconnect Therminal from power. Supply current in Powerdown mode is less than 5.5 mA (for 12 Volt power). Possible inactivity time in the mode is about 2 months.
In order to go Therminal back to the Normal mode, user can press the LED button. Also Therminal automatically goes to the Normal mode when the engine starts (battery voltage achieves 13.5 Volts) and alarm is triggered.
Command's action is equal to automatic going to power save mode after 14 days inactivity (with the setting 1.9.4 applied).

The command is confirmed by **STANDBY: accepted,<status>**; the Driver receives the notification **NOTICE: Standby mode, <status >**

5. <password> Normal – command forcedly goes Therminal to the Normal mode from one of power save modes, when it possible (depends from 1.9 settings and power save mode stage). The command is confirmed by **NORMAL: accepted,< status>**

When the command is launched in Normal mode, it resets inactivity timers (imitates driver activity).

Get Command for Parameters Requesting

The command is intended to request settings, parameters, access codes, etc. from Therminal. The common format is:

<password> Get <parameter>

Common format for answers:

<parameter1>:<values>, parameter2>:<values>,…,<parameterN>:<values>

Table 1

Parameter Name	Parameter Description	Parameter Requesting Details and Answers from Therminal
passwords	Users' passwords requesting (common and personal)	<admin_password> Get passwords Answer (factory settings): COMMON:1234, PERSONAL1:1234, PERSONAL 2:1234, PERSONAL 3:1234
status	Requesting of vehicle's components statuses.	Answer example on Get status request: STATUS:e.h.c.o.U,VOLT:12.3, TEMP:+12, BALANCE:74.2, LONG:n/a, LAT:n/a, CELL:1.250.99.A482.8B16, NET:2/5R STATUS field description: a – alarm system is disarmed, A – alarm system is armed; e – engine is stopped, E – engine is running; h – fuel heater is off, H – fuel heater is on; c – ventilation (climate control module) is off, C – ventilation (climate control module) is on; o – electrical heater is off, O- electrical heater is on (virtual status);

		u – user is not the Driver, U – user is the Driver *If some device has no actual status (status is unknown), its status will be missed in the list.* **VOLT**: < battery voltage, 0…30.0 Volts>-, **TEMP**: <thermo sensor value, -50…+90˚C>, **BALANCE**: <digital value extracted from response for the balance request>, **LAT**:<latitude coordinate of GSP position (last known) or n/a> **LONG**:<longitude coordinate of GPS position, (last known) or n/a>, **CELL**:<TA,MNC,MCC,LAC,CID или n/a – CELL monitoring parameters for GSM network>, **NET**: <GSM signal strength level 1..5/5><R-roaming mode>
location	Vehicle's location by GPS/GSM signals as a http link to map	LOCATION at <time>, <date>: <URL-link to map> The used should have permissions for location requesting; *If (GMT) follows* <time>, <date>*, the timestamp is fixed by Greenwich time.*
ipstatus	Server connection status and the current GPRS and server settings	**GROUP**:<users group identificator[1]>, **IPSTATUS**: <connection status: online/offline>, **SERVER**:<servicing internet connection server>, **PORT**:<port number>, **PERIOD**: <server connection interval[2]>, **GPRS**: <attached/detached>, **APN**:<GPRS access point name>, **APLOG**:< GPRS access point login>, **APPAS**:< GPRS access point password> [1]**n/a**, if GSM-module registration is not performed (see **Register**, **Quickstart** commands) [2]**OFF**, if access to the server is switched off by

		the command **Set internet=off**
gpsdata	Last actual (most recent) data of GPS receiver	**LAT**:<latitude coordinate of GPS position>, **LONG**:<longitude coordinate of GPS position>, **SPEED**: <speed in km/h>, **COURSE**:<course in degrees >, **TFIX**:<coordinates fix time, local >, **DFIX**:<coordinates fix date, local>, [**GTFIX**:< coordinates fix time, by Greenwich>, **GDFIX**:< coordinates fix date, by Greenwich>] **CELL**:<TA,MNC,MCC,LAC,CID> – CELL monitoring parameters for GSM network The used should have permissions for location requesting, otherwise the response will be*:* **GPSDATA**:n/a, **CELL**:n/a
info	Device identification data	**DEVICE**: <device name>, **VERSION**:<device firmware version>, **HWID**: <hardware identificator>, **IMEI**: <GSM-modem identificator>, **PROVIDER**: <MCC/MNC of GSM provider>, **OPERATOR**: <MCC/MNC of current GSM operator>, **TIME**:< device local time>, **DATE**:< device local date>
ipaccess	Data for access from applications via internet	**USERID**: <driver identificator>, **PASSWORD:**<user password> **IPACCESS:n/a**, if GSM-module is not registered on server (see **Register**, **Quickstart** commands) **GET IPACCESS**: **denied**, if user's GSM-number is not registered in the device (see **Set users** command)

users	Registered users numbers list, administrator and driver numbers	<admin_password> Get users Response: ADMIN:<administrator's GSM-number>, DRIVER:<driver's GSM-number>, USER1:<GSM-number of user 1>, USER2:<GSM-number of user 2>, USER3:<GSM-number of user 3> *The request can be used with user password, but only if sent from the administrator's number*
table	Software table settings	<admin_password> Get table Response: TABLE: 1.353B11111111111, 2.23411111111111A,… 9.151111111111111 *The request can be used with user password, but only if sent from the administrator's number*
hardware	Hardware table settings	<admin_password> Get hardware Response: HARDWARE:1.F11111111111111,2.11111111111111 *The request can be used with user password, but only if sent from the administrator's number. Letters A,B,C,D,E,F mean values 10,11,12,13,14,15 respectively*
errors	Last fixed errors	CMEC:<CME error code>, CMSC:<CMS error code>, TCPEC: <TCP error code>, ALEC:<AES Link error code>, RTEC :<runtime error code, BCD format>, EEC:<EEPROM error code, BCD format>, HREC: <heating error code>
statistics	GSM-modem operation statistics	SYNCPOINT:<the time of clock synchronization>, LDA:<last driver activity (*activity by network is*

		not took into account)>, REBNUM:<the modem restarts number>, LRREAS:<the modem last restart reason>, LSREAS:<the modem last shutdown reason>, ERRATE:<the number of unsuccessful/successful connections with the server> STO: <server timeout value (characterizes the connection quality), seconds> SMS:<the number of authorized incoming SMS / all incoming SMS/outgoing SMS> CALL:<the number of authorized incoming calls / unauthorized incoming calls >
balance	Balance response	Response: USSD: <operator's response text >
webaccess	Access to the administrative web-console	Response:| WEBACCESS:<web-console access status: on/off*>, URL: <http(s) link to the web-console sign in page >, LOGIN: <user's login>, PASSWD: <user's password> *In order to control the GSM-module via web-console it is necessary to allow web access by the command Set webaccess=on (factory setting is on) In case of unsuccessful request to the server for web-console access (no connection, GPRS is not adjusted, server registration is not performed) the modem will response with the answer: WEBACCESS:n/a, <ipstatus>

Set Command for Parameters Change

The Set command is intended for GSM-module parameters change. Common command format:

<admin_password> Set <parameter**>=**value1, …,valueN

Only the administrator may execute the command and get answer. The detailed description of command parameters is presented in table 2.

Table 2

Parameter Name	Parameter Description	Parameter Requesting Details and Answers from Therminal
passwords	Users passwords control	**Set passwords**=0.<common password>[,1.<USER1 password>][,2.<USER2 password>][,3.<USER3 password>] **Set passwords=default** – resets common password to default value 1234, deletes users' personal passwords The module answers with command accept confirmation + the answer on **Get passwords** request Example: Set Passwords=3.myford,0.3456,2.,1. – change personal password for the USER3 to myford, common password - to 3456, delete personal password for the USER2 (reset to common value), delete personal password for the USER1
device	Full device reset to the factory settings*	**Set device=factory** **Do not erase users' GSM numbers (stored in*

		the SIM) *Command is not confirmable*
users	Users list control – registration and deletion	**Set users**=1.<value1>][,2.<value2>][,3.<value3>] **Set users=default** – resets users list <value>=**empty** – position reset <value>=<empty> - position reset <value>=**self** – registers the own number (administrator's number) Example: **Set users**=1.+79111111111,3.**empty**,2. The module answers with command accept confirmation + the answer on **Get users** request
time	Local time adjustment (also sets automatically from incoming SMS)	**Set time**=<hh:mm>- sets local time in the device The module answers with command accept confirmation + the answer on **Get info** request
date	Local date adjustment (also sets automatically from incoming SMS)	**Set date**=<dd-mm-yyyy>- sets local time in the device The module answers with command accept confirmation + the answer on **Get info** request
GPRS	GPRS-connection parameters for GSM-module's SIM provider (GPRS profile)	**Set GPRS**=<profile>[,[<access point>],[<login>],[<password>]] <profile>=**custom**– user defined settings. The missed parameter is not changed, * deletes (sets to empty value) the parameter, i.e:

		set gprs=custom – apply custom user settings **set gprs=custom,,guest,*** - modify and apply custom settings: leave APN, change login to *guest*, delete password <profile>=**auto** – select GPRS settings automatically (*factory settings*) <profile>=**default** (or **0**)– select default GPRS profile (mostly often used settings: **internet,,**) The module answers with command accept confirmation + the answer on **Get ipstatus**
internet	Internet access control	**Set internet**=<**on/off**> Factory value – **off** The module answers with command accept confirmation + the answer on **Get ipstatus** *The request can be used with user password, but only if sent from the administrator's number*
webaccess	Web-console access control	**Set webaccess**=<**on/off**> Factory value - **on** If access to the web-console is switched off, all the commands received from the web-console will be answered by the module with the notification **WEBACCESS:denied**
balance	Adjusting of USSD-code for GSM account's balance requesting. *May be usable for*	**Set balance**=<code> **Set balance=default** – reset code to default value (#100#) **Set balance=auto** – select code automatically by

	prepaid accounts only. Contact GSM provider for details	provider's profile (factory settings)
driver	Set the Driver	**Set driver=<**value**>,** where <value> is: **USER1**, **USER2**, **USER3** – assign one of the registered users, **SELF** – assign yourself, **EMPTY** – temporary assign the web-console user (administrator), **BACK** – restore the Driver after temporary assigning the administrator as the Driver, or **phone number** in format, permitted by table setting 9.7. The module answers with command accept confirmation + the answer on **Get users**
table	Software table settings adjustment (see table 5 for codes)	**Set table**=<code 1>[,<code 2>]…[,<code N>] **Set table=default** - reset software table setting to the default values and restart the module *Some settings take effect only after restart will be performed (see **Restart** command)* Example: **Set table=**111,121,7F2
hardware	Hardware table settings adjustment (see table 6 for codes)	**Set hardware**=<code 1>[,<code 2>]…[,<code N>] **Set hardware=default** – reset hardware table setting to the default values and restart the module *Any setting takes effect only after restart will be performed (see **Restart** command)*

Notifications

When the status of the controlled by Therminal device changes, it sends a notification message for the Driver. The type of notification – SMS or data packet – is defined by the type of last command, received from the Driver.

Notification format:

NOTICE: <notification text>, <status>

Possible notifications:

NOTICE: Heater started w/command, <status> -when the heater starts by the command, sent from user's phone
NOTICE: Heater started w/voicecall, <status> - when the heater starts by voicecall
NOTICE: Heater started w/input, <status> - when the heater starts by signal change on a module's input
NOTICE: Heater started w/button, <status> - when the heater starts from the LED button

NOTICE: Heater stopped w/…, <status> -when the heater stops with no error, includes a source of stopping (command, voicecall, input, button, timer)
NOTICE: Heater start error (<error description >), <status> -when the heater start error happens
NOTICE: Heater stopped w/error (<failure description>), <status> -when the heater stops abnormally

NOTICE: Engine started w/…, <status> - when the engine starts remotely
NOTICE: Engine start error, <status> - when the engine remote start error happens
NOTICE: Engine stopped, <status> - when the engine stops remotely

NOTICE: Climate started w/…, <status> - when ventilation starts
NOTICE: Climate stopped w/, <status> - when ventilation stops

NOTICE: Normal mode, <status> -when the device goes to the Normal mode from any another mode
NOTICE: Standby mode, <status> -when the device goes to Standby mode
NOTICE: Powerdown mode, <status> - when the device goes to Powerdown mode
NOTICE: Shutdown mode. Battery discharged, <status> - when the device goes to Shutdown mode (forced disconnection of GSM and GPS power) because of battery discharging

NOTICE: Powersave mode/ internet off, <status> - when the device goes to power save mode after fulfilling of conditions, adjusted by the setting 1.9.2.

NOTICE: Powersave mode/ sleep stage 5 h 45 min, <status> - when the device goes to power save mode (sleep stage) after fulfilling of conditions, adjusted by the setting 1.9.3 or 1.9.4
NOTICE: Powersave mode/ active stage 15 min, <status> - when the device goes from sleep stage to active stage in power save mode
NOTICE: Powersave mode/ deep sleep stage, <status> - when the device goes to power save mode (deep sleep stage) after fulfilling of conditions, adjusted by the setting 1.9.4

NOTICE: Registration successful, <ipaccess> - after successful registration of the device on server
NOTICE: Registration failed, <ipstatus> - after unsuccessful registration of the device on server

When alarm system triggers, Therminal sends notification beginning with ALARM prefix:
ALARM: siren triggered at <HH:MM>, <DD.MM.YY>, <status> - when factory alarm system triggers (alarm signal is presented on Therminal's input). If <HH:MM> followed by (GMT), timestamp in the notification is indicated by Greenwich.

Multi-Control Messages

Up to 7 commands can be transferred inside one message. To separate commands the semicolon (';' without spaces before or after the separator) is used, i.e:

<admin_password> Set table=123;Restart

The commands Register, Quickstart, Get Webaccess, Get Balance, USSD (all commands, which need dialog data transfer with the network or the server), Set Driver, Restart, Set Device=Factory have to be placed at the end of the list, because all commands placed after these will be ignored.

The module can answer for multi-control message with no more than 7 messages. Wherefore if there is a command inside multi-control message which leads to the Driver change (+2 messages to the answer), the commands number should be accordingly decreased.
The answers for commands will be sent in the same sequence as commands are listed in multi-command.

Button and Indication

The GSM-module is equipped with outer button with integrated LED. During 2 minutes after powering up or restarting the LED indicates device status by flashes in series. The indication also stops after starting the engine in order to don't divert the driver.

Outer button's main function is defined by table setting 2.7 (fuel heater one touch control by default). If the button is pressed at the moment when periodic indication mode (status indication, Quickstart indication, signal strength indication) is active, the first pressing will cancel periodic indication mode. And only next pressings will control the button's main function.

Table 3

Number of flashes in series	Status description	The possible reasons and actions required
2	GSM inactive	The device is not available for control via cellular network, GSM-modem is switched off. If the device went to this mode after powering up, it can be caused by one of problems: PIN-code accepting is on, SIM is out of order, the registration in the network is prohibited by the operator (i.e. SIM-card is out of service, SIM is blocked). The problem should be solved.
3	Waiting for GSM ready	The device is starting and temporary unavailable for control via cellular network. No action required from the user.
4	Waiting for GSM registration	The device is temporary unavailable for control via cellular network. Possible reasons: no available network (no signal, roaming mode is prohibited), registration is blocked by operator (i.e. because of long inactivity time). The network signal strength can be checked by applying special LED indication mode from the button.
5	Ready for the command accepting	The device is ready for control via cellular network. If the device doesn't answer for SMS, and the app informs "Vehicle is offline", check at first GSM account condition by using the provider's service.
6	Ready for the command accepting, roaming mode	The device is ready for control via cellular network with some limitations (see table setting 1.3)
10	QuickStart mode	QuickStart mode is active. The device is waiting for incoming call, if the mode was activated from the button.

If the button's main function is emergency button, all registered users (except of the Driver) will receive emergency message as SMS and a data packet (via server) when the button is pressed. The message format is:

SOS! ATTENTION! THE DRIVER < GSM subscriber's number> NEEDS HELP! VEHICLE LOCATION at hh.mm dd.mm.yyyy: <link on a map>

In order to execute additional button's functions press and hold the button for a period of time, specified by table 4. The LED will go on and start flashing with 1 second period. Release the button in several seconds after pressing in order to execute specific function:

Table 4

Hold time	Function
1-5 seconds	Exits from Standby and Powersave modes
5-10 seconds	Switches on status indication mode. Shortly press the button to exit the mode.
10-15 seconds	Activates Quickstart. The device will wait for incoming call during 3 minutes after the activation.
15-20 seconds	Switches on the GSM signal strength indication mode. Very short flashes in series are used to indicate signal strength. One flash corresponds to the lowest level of signal, five flashes correspond to the highest level of signal. There are no flashes If the signal is absent at all. Information is updated every 10 seconds. The function can be used in order to find place for the antenna/module inside the vehicle during installation procedure. Shortly press the button to exit the mode.
20-25 seconds	Restarts the device.
25-30 seconds	Partial device reset to the factory settings. Registered users' numbers (placed on SIM), the Driver's number, the administrator's number will not be cleared.

Software Table Settings

All other settings are not presented in the chapter 11 (except hardware settings) can be found in the table 5. In order to apply the setting send command **Set table** with setting code as a parameter.

Table 5

1. GSM user settings	1.1 Reaction for incoming call from registered number	1. Hang up with busy tone 2. Hang up with busy tone, send status message 3. Hang up with busy tone, send confirmation for the command of switching on, switch on the controlling device (see 1.2 setting) *4. Hang up with busy tone, send confirmation for the command of device status changing, put the controlling device (see 1.2 setting) in the opposite state 7. Hang up with busy tone, initiate data request from the server
	1.2. Incoming call controlling device	1. Fuel fired heater 2. Engine remote starter 3. Climate module (in ventilation mode) A. Electrical heater of engine (interior)
	1.3. Roaming mode behavior	1. Like at home network 2. Switch off GPRS for any type of roaming 3. Switch off GPRS, don't send SMS for any type of roaming 4. Switch off GPRS, don't send SMS for any type of roaming, except of answers and alarm notifications 5. Switch off GPRS for international roaming 6. Switch off GPRS, don't send SMS for international roaming *7. Switch off GPRS, don't send SMS for international roaming, except of answers and

		alarm notifications
	1.4. Users group having permissions to request of vehicle location	1. All the users knowing the password 2. All registered users 1,2,3 3. Registered users 1 and 2 4. *Registered user 1 5. Only the administrator (also with user password)
	1.8. Balance value position inside the answer on balance USSD-request	1. *First digital value 2. Second digital value … F. Fifteen digital value
	1.9. Power save modes *It is recommended to send the command* ***Normal*** *before changing this setting: it prevents unpredictable switching to the active phase of power save mode*	1. Mode 1: Going to Shutdown mode - (disconnecting GSM-modem and GPS receiver) when battery voltage lowers to 11 Volts (instead of threshold set by 9.9 setting), with notifying the driver that battery is discharged. Returning to Normal mode - when battery voltage becomes higher than 13.5 instead of threshold set by 9.8 setting). If the vehicle is not used during 60 days, the device will go to Powerdown mode. 2. Mode 2: Mode 1 + GPRS (and data transfer via server) will be disconnected in 8 days of driver inactivity (no ordinary vehicle usage). SMS and calls remain available. 3. Mode 3: Mode 1 + in 8 days of driver inactivity GSM-modem will be powered by schedule: 4 times a day for 15 minutes in order to receive a

		power control command (Normal, Powerdown, Standby). 4. *Mode 4: Mode 3 + in 14 days of driver inactivity GSM-modem will be disconnected at all until alarm triggers or driver activity will be detected. F. *Power save modes off, Normal mode of operation (GSM-modem is always online)
2. Control settings	2.7. Button main function	1. *Fuel fired heater control 2. Ventilation control 5. Electrical heater control 9. Emergency button F. Not adjusted
3. Security settings	3.10. Max value of alarm triggering counter for notifying via SMS (resets by engine starting)	1. 1 alarm 2. 2 alarms 3. 3 alarms 4. 4 alarms 5. *5 alarms … F. 15 alarms
4. Heating settings (fuel and electrical heaters)	4.1. Limitation of one cycle time for fuel fired heater (if not specified inside a command) when it starts remotely. Resets by engine starting	1. Not applied 2. 10 minutes 3. 15 minutes 4. 20 minutes 5. 25 minutes 6. 30 minutes 7. 35 minutes 8. 40 minutes 9. 45 minutes A. 50 minutes B. 55 minutes C. *60 minutes D. 65 minutes E. 70 minutes

		F. 75 minutes
	4.2. Limitation of total operation time (calculates as a sum of operation times in several cycles) for fuel fired heater. Resets by engine starting	1. Not applied 2. 20 minutes 3. 40 minutes 4. 60 minutes 5. 80 minutes 6. 100 minutes 7. *120 minutes 8. 140 minutes 9. 160 minutes A. 180 minutes B. 200 minutes C. 220 minutes D. 240 minutes
	4.3. Battery voltage threshold for heating cut-off. *For 24-voltage power the values should be multiplied by 2*	1. 11.2 V 2. 11.3 V 3. 11.4 V 4. 11.5 V 5. 11.6 V 6. **11.7 V* 7. 11.8 V 8. 11.9 V 9. 12.0 V A. 12.1 V B. 12.2 V C. 12.3 V

		D. 12.4 V **F.** Not applied
	4.4. Conditions for interior heating enabling, by time of fuel heater operation (applied when +FAN parameter is presented in the command HEATER ON, when the heater was started from the button, by external input or by voicecall)	**1.** *Not applied (for aftermarket heater)/ factory algorithm (factory installed heater) **2.** Switch on together with the heater (in fact - in 3 minutes after the heater startup) **3.** Switch on in 5 minutes after the heater startup **4.** Switch on in 7 minutes after the heater startup **5.** *Switch on in 10 minutes after the heater startup* **6.** Switch on in 15 minutes after the heater startup **7.** Switch on in 20 minutes after the heater startup **8.** Switch on in 25 minutes after the heater startup **9.** Switch on in 30 minutes after the heater startup
	4.5. Conditions for interior heating activation, by time of electrical heater operation (applied when +FAN parameter is presented in the command EHEATER ON, when the heater was started from the button, by	**1.** Not applied **2.** 20 minutes before heating completion **3.** 30 minutes before heating completion **4.** 40 minutes before heating completion **5.** 50 minutes before heating completion **6.** ** 60 minutes before heating completion* **7.** 70 minutes before heating completion **8.** 80 minutes before heating completion **9.** 90 minutes before heating completion **A.** 100 minutes before heating completion **B.** 110 minutes before heating completion **C.** 120 minutes before heating completion **D.** 130 minutes before heating completion **E.** 140 minutes before heating completion

	external input or by voicecall). *If no operation time parameter is presented in the command Eheater On, then maximum heating time for electrical heater - 180 minutes - is used for interior heating start point calculation*	**F.** 150 minutes before heating completion
	4.6. Battery voltage threshold for engine start activation during the fuel heater operation (applied when +ENGINE parameter is presented in the command HEATER ON, when the heater was started from the button, by external input or by voicecall). *For 24-voltage power the values should be*	**1.** 11.3 V **2.** 11.4 V **3.** 11.5 V **4.** 11.6 V **5.** 11.7 V **6.** *11.8 V* **7.** 11.9 V **8.** 12.0 V **9.** 12.1 V **A.** 12.2 V **B.** 12.3 V **C.** 12.4 V **D.** 12.5 V **F.*** Not applied

	multiplied by 2	
	4.8. Conditions for engine start activation, by time of fuel heater operation (applied when +ENGINE parameter is presented in the command HEATER ON, when the heater was started by external input or by voicecall). *Not applied for startup from the button*	**1.** *Not applied **2.** 3 minutes after the heater startup **3.** 5 minutes after the heater startup **4.** 7 minutes after the heater startup **5.** 10 minutes after the heater startup **6.** 15 minutes after the heater startup **7.** 20 minutes after the heater startup **8.** 25 minutes after the heater startup **9.** 30 minutes after the heater startup **A.** 35 minutes after the heater startup **B.** 40 minutes after the heater startup **C.** 45 minutes after the heater startup **D.** 50 minutes after the heater startup **E.** 55 minutes after the heater startup **F.** For a time, selected in 5.3, before heating completion
	4.9. Conditions for engine start activation, by time of electrical heater operation (applied when +ENGINE parameter is presented in the command EHEATER ON, when the heater was started by external input or by voicecall).	**1.** *Not applied **2.** 20 minutes after the heater startup **3.** 30 minutes after the heater startup **4.** 40 minutes after the heater startup **5.** 50 minutes after the heater startup **6.** 60 minutes after the heater startup **7.** 70 minutes after the heater startup **8.** 80 minutes after the heater startup **9.** 90 minutes after the heater startup **A.** 100 minutes after the heater startup **B.** 110 minutes after the heater startup **C.** 120 minutes after the heater startup **D.** 130 minutes after the heater startup **E.** 140 minutes after the heater startup **F.** For a time, selected in 5.3, before heating

	Not applied for startup from the button	completion
	4.B. W-bus device imitation	**1.** Instrument cluster **2.** Telestart **3.** Timer 1533 **F.** *Webasto Thermo Test
	4.C. Heater control mode in LIN bus	**1.** W-bus/LIN, Simple On/Off mode **2.** W-bus/LIN, Parking heater mode **3.** W-bus/LIN, Auxiliary heater mode **4.** W-bus/LIN, Boost mode **5.** * W-bus/LIN, automatically selected by the heater answer for the request of supported modes
	4.D. Heater operation feedback via LIN bus	**1.** W-bus/LIN, By control signal frequency on the fuel pump **2.** W-bus/LIN, by RPM of the water pump **3.** * W-bus/LIN, by RPM of the blower fan **6.** W-bus/LIN, by condition of the flame sensor **7.** W-bus/LIN, by power stage of heating **F.** Switched off
5. Additional settings, Comfort group (ventilation and engine start control)	**5.1.** Engine start cancellation, if there is no engine operation signal during a time after activation of engine start (if engine operation feedback is swithed on)	**5.1.1** 60 seconds **5.1.2** 90 seconds **5.1.3** 120 seconds **5.1.4** 150 seconds **5.1.5** *180 seconds **5.1.6** 210 seconds **5.1.7** 240 seconds **5.1.8** 270 seconds **5.1.9** 300 seconds **5.1.A** 330 seconds **5.1.B** 360 seconds **5.1.C** 390 seconds **5.1.D** 420 seconds

		5.1.E 450 seconds **5.1.F** 480 seconds
	5.3. Engine start operation time (when not specified in the command)	**5.3.1** 5 minutes **5.3.2** 10 minutes **5.3.3** **15 minutes* **5.3.4** 20 minutes **5.3.5** 25 minutes **5.3.6** 30 minutes
	5.4. Coolant temperature threshold to finish engine start process (where available)	**5.4.1** *Not applied **5.4.2** 75˚C **5.4.3** 80˚C **5.4.4** 85˚C **5.4.5** 90˚C
	5.5. Finish engine start at heating completion	**5.5.1** *Off **5.5.2** On
	5.7. Limitation of one cycle time for ventilation (if not specified inside a command) when it starts remotely, including starts by external input or by voicecall	**1.** Not applied **2.** 10 minutes **3.** 15 minutes **4.** 20 minutes **5.** 25 minutes **6.** **30* minutes **7.** 35 minutes **8.** 40 minutes **9.** 45 minutes **A.** 50 minutes **B.** 55 minutes

		C. 60 minutes D. 65 minutes E. 70 minutes F. 75 minutes
	5.8. Limitation of total operation time (calculates as a sum of operation times in several cycles) for ventilation. Resets by engine starting	1. Not applied 2. 20 minutes 3. 30 minutes 4. 40 minutes 5. 50 minutes 6. **60* minutes 7. 70 minutes 8. 80 minutes 9. 90 minutes A. 100 minutes B. 110 minutes C. 120 minutes D. 130 minutes E. 140 minutes F. 150 minutes
	5.9. Battery voltage threshold for ventilation cut-off. *For 24-voltage power the values should be multiplied by 2*	1. 11.3 V 2. 11.4 V … 6. **11.8 V* … D. 12.5 V F. Not applied
	5.A. Battery voltage threshold meaning the engine is running. *For 24-voltage power the values*	1. 13.1 V 2. 13.2 V … 7. * 13.7 V … E. 14.4 V F. Not applied

	should be multiplied by 2	
7. Notifications, confirmations and answers adjustment	**7.1.** The confirmation of command acceptance for processing (for user 1/ unregistered user)	**1.** *Answer with SMS for SMS-request, answer via internet for internet request. Answer the voicecall (for registered users only) with SMS if the user uses SMS, answer via internet if the user uses internet for control. **2.** Do not answer for SMS-request, answer via internet for internet request. Answer the voicecall (for registered users only) via internet if the user uses internet for control
	7.2. ALARM type notifications (for user 1/ unregistered user)	**1.** *Always duplicate alarm notifications via SMS **2.** Send alarm notifications via SMS if the Driver uses SMS for control **3.** Send alarm notifications via SMS only if the control via internet is not available (i.e. internet control is switched off, the Driver is not a registered user) **4.** Do not send alarm notifications via SMS
	7.3. NOTICE type notifications (for user 1/ unregistered user)	**1.** *Always duplicate notifications via SMS **2.** Send notifications via SMS if the Driver uses SMS for control **3.** *If the Driver uses SMS for control, send via SMS those notifications, which are the results of GSM-commands launching. **4.** Send notifications via SMS only if the control via internet is not available (i.e. internet control is switched off, the Driver is not a registered user) **5.** Do not send notifications via SMS
	7.4. The Driver change notifications (for user 1/	**1.** Always duplicate notifications via SMS **2.** *Send notifications via SMS if the Driver uses SMS for control **3.** Send notifications via SMS only if the control

	unregistered user)	via internet is not available (i.e. internet control is switched off, the Driver is not a registered user) 4. Do not send notifications via SMS
	7.5. The confirmation of command acceptance for processing (for user 2)	1. *Answer with SMS for SMS-request, answer via internet for internet request. Answer the voicecall (for registered users only) with SMS if the user uses SMS, answer via internet if the user uses internet for control. 2. Do not answer for SMS-request, answer via internet for internet request. Answer the voicecall (for registered users only) via internet if the user uses internet for control
	7.6. ALARM type notifications (for user 2)	1. *Always duplicate alarm notifications via SMS 2. Send alarm notifications via SMS if the Driver uses SMS for control 3. Send alarm notifications via SMS only if the control via internet is not available (i.e. internet control is switched off, the Driver is not a registered user) 4. Do not send alarm notifications via SMS
	7.7. NOTICE type notifications (for user 2)	1. *Always duplicate notifications via SMS 2. Send notifications via SMS if the Driver uses SMS for control 3. *If the Driver uses SMS for control, send via SMS those notifications, which are the results of GSM-commands launching. 4. Send notifications via SMS only if the control via internet is not available (i.e. internet control is switched off, the Driver is not a registered user) 5. Do not send notifications via SMS
	7.8. The Driver change	1. Always duplicate notifications via SMS 2. *Send notifications via SMS if the Driver uses

	notifications (for user 2)	SMS for control 3. Send notifications via SMS only if the control via internet is not available (i.e. internet control is switched off, the Driver is not a registered user) 4. Do not send notifications via SMS
	7.9. The confirmation of command acceptance for processing (for user 3)	1. *Answer with SMS for SMS-request, answer via internet for internet request. Answer the voicecall (for registered users only) with SMS if the user uses SMS, answer via internet if the user uses internet for control. 2. Do not answer for SMS-request, answer via internet for internet request. Answer the voicecall (for registered users only) via internet if the user uses internet for control
	7.A. ALARM type notifications (for user 3)	1. *Always duplicate alarm notifications via SMS 2. Send alarm notifications via SMS if the Driver uses SMS for control 3. Send alarm notifications via SMS only if the control via internet is not available (i.e. internet control is switched off, the Driver is not a registered user) 4. Do not send alarm notifications via SMS
	7.B. NOTICE type notifications (for user 3)	1. *Always duplicate notifications via SMS 2. Send notifications via SMS if the Driver uses SMS for control 3. *If the Driver uses SMS for control, send via SMS those notifications, which are the results of GSM-commands launching. 4. Send notifications via SMS only if the control via internet is not available (i.e. internet control is switched off, the Driver is not a registered user) 5. Do not send notifications via SMS

	7.C. The Driver change notifications (for user 3)	1. Always duplicate notifications via SMS 2. *Send notifications via SMS if the Driver uses SMS for control 3. Send notifications via SMS only if the control via internet is not available (i.e. internet control is switched off, the Driver is not a registered user) 4. Do not send notifications via SMS
	7.E. Notifications/confirmations structure	1. Only notification/confirmation text 2. *Text + devices statuses + voltage + temperature + location (is used by applications)
	7.F. The answer for *Get Location* request	1. *Link on Autoplugin service 2. Link on Google Maps service 3. Link on Yandex Maps service
8. Service settings, Group 1	8.1. Local time synchronization	1. *By using the timestamp from received SMS or manually by Set Time command 2,3. Only manually by Set Time command
	8.2. Local date synchronization	1. *By using the timestamp from received SMS or manually by Set Date command 2,3. Only manually by Set Date command
9. Service settings, Group 2	9.2. Module behavior in conditions of no GSM network signal	1. Continuous network searching (may lead to accelerated battery discharging and to the switching the module to the Shutdown mode according with 9.9 or 1.9 settings) 2. Going to Powersave mode (see 1.1.3 settings description) in 1 hour 3. Going to Powersave mode (see 1.1.3 settings description) in 2 hours 4. Going to Powersave mode (see 1.1.3 settings description) in 4 hours 5. Going to Powersave mode (see 1.1.3 settings description) in 8 hours

		6. Going to Powersave mode (see 1.1.3 settings description) in 12 hours 7.* *Going to Powersave mode (see 1.1.3 settings description) in 24* hours *(1 day)* 8. Going to Powersave mode (see 1.1.3 settings description) in 48 hours (2 days) 9. Going to Powersave mode (see 1.1.3 settings description) in 72 hours (3 days)
	9.5. Checking periodicity of GSM services availability	1. *Not applied 2. Every 10 minutes 3. Every 20 minutes 4. Every 30 minutes 5. Every 40 minutes 6. Every 60 minutes 7. Every 120 minutes 8. Every 180 minutes
	9.6. Balance request frequency	1. After SMS sending 2. *After SMS sending + periodically one time a day 3. With periodicity adjusted in 9.5 setting 4. Only manually, by processing Get Balance command from a user
	9.8. Minimal battery voltage level required for module starting up and exiting Shutdown mode	1. Not applied 2. 9.5 Volts 3. *10.0 Volts 4. 10.5 Volts 5. 11.0 Volts 6. 11.5 Volts
	9.9. Maximum battery voltage threshold leading to entering Shutdown mode	1. Not applied 2. 7.5 Volts 3. *8.0 Volts 4. 8.5 Volts 5. 9.0 Volts

Hardware Table Settings

The settings for hardware interface adjustment are presented in the table 6: functions and parameters of inputs/outputs, on-board components control. Settings change can be performed by **Set hardware** command.

Table 6

1. Inputs/Outputs settings	1.1. «Input+» function	1. Fuel heater outer control 2. *Interior warm up outer control 3. Interior ventilation outer control 4. Alarm mode (arm/disarm) outer control 9. **Fuel heater activity (fuel/water pump control signal, RCP's signal "Heater operates") B. Alarm signal (signal from car's siren) F. Signal "Heating terminated" from RCP module
	1.2. «Input+» operational mode	1. On mode: status activation / device switching on by the leading edge of signal impulse 2. Off mode: status deactivation / device switching off by the leading edge of signal impulse 3. Switching mode: status activation / device switching on by the leading edge of odd signal, status deactivation / device switching off by the leading edge of even signal impulse 4.*,**Status mode: status activation / device switching on by the leading edge of signal impulse, status deactivation / device switching off by the trailing edge of signal impulse
	1.3. «Input-» function	1. *Outer fuel heater control 2. Outer interior warm up control 3. Outer interior ventilation control 4. Alarm mode (arm/disarm) outer control 9. Fuel heater activity (fuel/water pump control signal, RCP's signal "Heater operates") B. Alarm signal (signal from car's siren) F. **Signal "Heating terminated" from RCP module

	1.4. «Input-» operational mode	1. **On mode: status activation / device switching on by the leading edge of signal impulse 2. Off mode: status deactivation / device switching off by the leading edge of signal impulse 3. *Switching mode: status activation / device switching on by the leading edge of odd signal, status deactivation / device switching off by the leading edge of even signal impulse 4. Status mode: status activation / device switching on by the leading edge of signal impulse, status deactivation / device switching off by the trailing edge of signal impulse
	1.5. «Output+» function	1. *Fuel heater control 2. Interior warm up control 3. Interior ventilation control 4. Engine remote start control 6. Electrical engine heater control 7. Electrical interior heater control 8. Siren out 9. Video recorder control D. Embedded alarm system status F. **Output is switched off
	1.6. «Output+» operational mode	1. One-second impulse at device switching on 2. One-second impulse at device switching off 3. One-second impulse at device switching on, one-second impulse at device switching off 4. *Permanent signal for the time of device control
	1.7. «Output-» function	1. **Fuel heater control 2. *Interior warm up control 3. Interior ventilation control 4. Engine remote start control 6. Electrical engine heater control 7. Electrical interior heater control 8. Siren out

		9. Video recorder control D. Embedded alarm system status F. Output is switched off
	1.8. «Output-» operational mode	1. **One-second impulse at device switching on 2. One-second impulse at device switching off 3. One-second impulse at device switching on, one-second impulse at device switching off 4. *Permanent signal for the time of device control
	1.9. «Output2-» function	1. **Fuel heater control 2. Interior warm up control 3. Interior ventilation control 4. *Engine remote start control 6. Electrical engine heater control 7. Electrical interior heater control 8. Siren out 9. Video recorder control D. Embedded alarm system status F. Output is switched off
	1.10. «Output2-» operational mode	1. One-second impulse at device switching on 2. **One-second impulse at device switching off 3. One-second impulse at device switching on, one-second impulse at device switching off 4. *Permanent signal for the time of device control
2. On-board components control	2.1. Navigation module	2.1.1. NAVIA KL3333, switched on in normal mode 2.1.2.* NAVIA KL3333, switched on in power save mode 2.1.F. Switched off (absent)
	2.5. LIN/K-Line interface and its operational mode	2.5.1. *Webasto w-bus 2.5.F. Switched off (absent)

	2.8. Button's LED brightness	2.8.1. 30% 2.8.2. 40% 2.8.3. 50% 2.8.4. 60% 2.8.5. 70% 2.8.6. 80% 2.8.7. 90% 2.8.8. 100% 2.8.9. 40%, with backlit 2.8.A. 50%, with backlit 2.8.B. 60%, with backlit 2.8.C. *70%, with backlit 2.8.D. 80%, with backlit 2.8.E. 90%, with backlit 2.8.F. 100%, with backlit

* - factory setting value for stand-alone Therminal-X module
** - factory setting value for Therminal-X kit with RCP Light module, if it differ from stand-alone Therminal-X module

Control Features for Peripherals Connected to Therminal

- Fuel heater start and stop features

When the heater is started from the button, and also in case when Therminal couldn't determine the heater start source, heater operation time during a cycle is not limited. When the heater is started by the potential signal presented on Input+ or Input-, heater operation time is defined by the signal duration. In other cases, and also when operation time is not specified in start command as a parameter, the setting 4.1 is applied to limit the heater operation cycle time.

Therminal always uses full command Heater On +Fan +Engine when the start source is differ from SMS or app-composed packet.

If ventilation was activated during heater operation as a result of applying of 4.4 setting, it will be operate up to the heating completion. If ventilation was activated during heater operation by status signal on the control input, ventilation operation time will be equal either to the duration of control signal, or to the heater operation cycle time (the lowest value). If ventilation was activated during heater operation by short impulse signal on the control input, ventilation will be activated for a time adjusted in setting 5.7 (limits ventilation operation cycle time).

When the heater is started from the button, ventilation starts just after the heater has started (in one minute in fact) independently of ventilation activation settings 4.4 (don't starts for 4.4.1), engine remote start is applied only when battery level lowers to adjusted by 4.6 settings threshold. The heater start mode from the button is optimized for continuous interior heating, when the driver is seating inside the cabin.

- Electrical heater start and stop features

If the heater operation time is not set in the start command as a parameter, cycle time will not be limited.

Therminal always uses full command Eheater On +Fan +Engine when the start source is differ from SMS or app-composed packet.

If interior warm up (by using of the electrical heater) was activated as a result of applying of 4.5 setting, it will be operate up to the heating completion.

When the electrical heater of the engine is started from the button, the interior warm up (by electrical heater of the interior) starts just after the heater has started (in one minute in fact) independently of ventilation activation settings 4.5 (don't starts for 4.5.1).

Security Functions

- Alarm triggers

The inputs IN+ IN- can be adjusted to process the alarm signal fed from the car's alarm system siren. Then the alarm input triggers, the alarm type message ALARM: siren triggered, <status> will be sent to the Driver, and the input stops fixing signal change for 30 seconds. The alarm event will be sent to the Driver by all available methods: by SMS and by data packet via server. It is set a limit for SMS informing – 5 messages for alarm events (can be changed by 3.A setting). After the limit has reached all the alarm events will be sent only as data packets until the module fix the driver activity in the vehicle.

- Emergency button

The LED button can be adjusted as emergency button (2.7.9 setting). When the emergency button is pressed, the LED goes on and the following message will be sent for all registered users (excluding the Driver): SOS! ATTENTION! THE DRIVER <Driver number> NEEDS HELP! Location at HH.MM, DD-MM-YY: <map link >. The message is sent by SMS and duplicated by data packet via server. ***Please note****: link to a map with vehicle location will be sent for all registered users independently of their permissions!*

Feedback from Peripherals Connected to Therminal

The module can notify the user about statuses changing for all the devices it controls. Initially Therminal is adjusted to notify about all status change events via internet control only. When the Driver uses SMS for control, some notifications is switched off in order to save SMS traffic. Full feedback for SMS control can be enabled in the settings separately for different events (see table settings 7.3.2, 7.7.2, 7.B.2), as well as can be fully disabled for more SMS traffic economy (see table settings 7.3.5, 7.7.5, 7.B.5)

- Fuel heater operation feedback

Heater feedback signal presented in one of the inputs IN+ or IN- has the higher priority in processing. If the input is adjusted on fuel heater feedback signal (fuel pump

impulses, water pump signal, RCP module signal “Heater operates”), the heater operation is defined by signal change on the input.

If the inputs are adjusted on other functions (default setting), the module can request the heater status from the LIN bus. In order to use this feature LIN bus feedback should be turned on (4.D.1 – 4.D.E settings) and the heater has to be connected via LIN bus (w-bus for Webasto heaters).

In summary, feedback will be automatically enabled for connection of the heater to the LIN bus (digital type connection). When the heater is controlled by discrete signal presented on one of the outputs OUT+, OUT1- or OUT2-, feedback has to be enabled manually in the settings by selecting one of the inputs for heater operation signal reception.

In case when feedback is disabled or not functional (no heater activity detected in the LIN bus), Therminal uses program (or virtual) status, which is set by control commands.

- Engine operation feedback

In order to get engine operation feedback it is necessary to apply a setting 5.A.1-5.A.E. Engine operation is determined by voltage change of battery charging current. Until Therminal measures voltage surge, It wouldn’t inform about engine status with e/E in STATUS field. Therefore after Therminal restart or power disconnection the engine should be started once in order to get information about engine operation status.

- Climatic module operation feedback

Therminal informs about program status (set by ventilation control commands) of climatic module, if at least one of the outputs OUT+, OUT1- or OUT2- is adjusted for interior ventilation control or interior warm up control by climatic module.

- Electrical heater operation feedback

Therminal informs about program status (set by electrical heater control commands) of electrical heater, if one of the outputs OUT+, OUT1- or OUT2- is adjusted to control the engine electrical heater.

Hardware Interface. SIM Installation

- GSM-module peripherals description

At the front side of Therminal enclosure there are placed from the right to the left: 4-contacts socket for outer LED button connection, 2-contacts socket for outer thermo sensor connection, 14-contacts socket for car wiring and peripherals connection, and finally the tray for SIM-card holder loading (fig. 2). Therminal-XE/XF versions also have magenta colored FAKRA-D type connector for outer GSM-antenna connection, версия Therminal-XF version additionally - blue colored FAKRA-C connector for outer GPS/GLONASS-antenna connection.

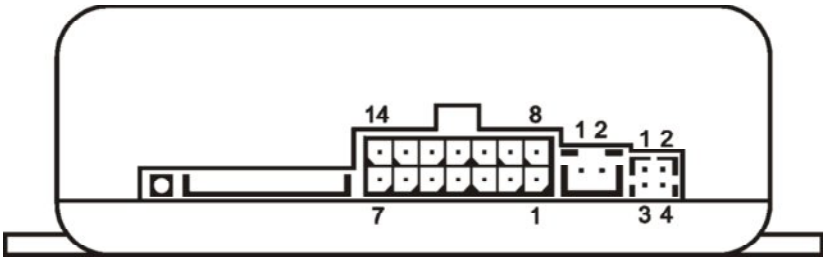

Figure 2

Table 7. 4-contacts outer button socket signals description

Contact №	Signal name	Potential in active state
1	Ground	0V
2	Indicator-H	Power
3	Contact	0V
4	Indicator-L	+3.3 V

Table 8. 2-contacts thermo-sensor socket signals description

Contact №	Signal name	Polarity
1	Ground	-
2	Sensor	+

Table 9. 14-contacts socket signals description

Contact №	Signal name	Polarity	Wire colour in harness*	Описание
1	CAN1-H	+	Brown	Digital bus CAN 1, line High
2	CAN2-H	+	Green	Digital bus CAN 2, line High
3	IN-	-	Grey	Programmable discrete input, negative
4	OUT+	+	White	Programmable discrete output, positive
5	OUT2-	-	Blue	Programmable discrete output, negative
6	Power	+	Red	Permanent battery “+”(12/24 Volts)
7	Ground	-	Black	Permanent battery “–“ (0 Volts)
8	CAN1-L	+	Brown-White	Digital bus CAN 1, line Low
9	CAN2-L	+	Green-Yellow	Digital bus CAN 2, line Low
10	IN +	+	Orange	Programmable discrete input, positive
11	LIN	-	Yellow	Digital bus LIN (w-bus)
12	OUT1-	-	White-Blue	Programmable discrete output, negative
13	Power	+	Red	Permanent battery “+”(12/24 Volts) for powering of conjugate with Therminal modules
14	Ground	-	Black	Permanent battery “-”(0 Volts) for powering of conjugate with Therminal modules

*for universal cable with cut ends

- **SIM installation**

SIM-card in Mini-SIM format is required for GSM-module operation and should be purchased separately from local GSM operator (2G network with GPRS technology

support is demanded). *If the operator supports 3G/4G phones only, a SIM-card from the operator can't be used in Therminal.*

Some SIM cards (usually ones produced in 2000s) require some preparing operations to be done:

1. Put the SIM-card to a mobile phone and disable PIN-code request on phone reboot (brand new cards are usually supplied with disabled PIN request).
2. Check for SMS-center number is written in SIM-card memory. All up-to-date SIMs are supplied with SMS-center written. The number may absent for old SIM-cards. Put the SIM-card to a mobile phone, then send SMS to another mobile phone, check for SMS delivery.

Choose tariff plans with non-expensive/pre-paid SMS traffic for control by SMS or with pre-paid mobile data traffic for control via Internet (50-100 Mb per month is enough). Combine phone account with GSM module account if possible.

Android application allows use both the mobile data and SMS, iOS application allows use the mobile data only.

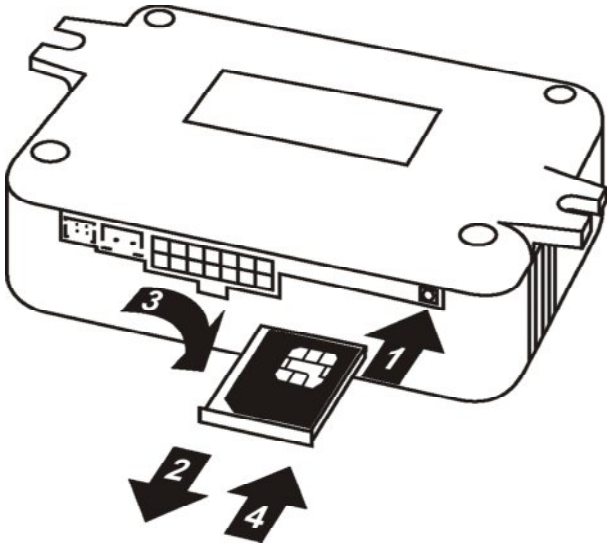

Figure 3

Install SIM card into the GSM-module, as shown at the figure 3. The operation should be performed with unplugged power from the GSM-module. Press with a thin blunt object (philips screwdriver, pen, etc.) on the SIM-holder ejector pushbutton (1), pull for the SIM-holder and pull the holder out of the housing (2) . Then put the SIM into the holder to commit (3) and insert the holder back to the housing up to the stop (4).

Troubleshooting

Heater start from the button works independently from GSM-module network status. Use it to check for the heater is in order.

If the heater doesn't start from the button: check all connections, make diagnostics of the heater. In case when the heater starts from the button, but doesn't start via GSM (SMS, voice call or app) use GSM-module indication for diagnostics: press and hold the button until the embedded LED flashes from 5 to 10 times, then release the button. GSM-module goes to status indication mode. Status indication mode also becomes active for 2 minutes after boot or restart. See table 10 for details.

Table 10. GSM-module indication

Number of flashes in series	GSM-module status	User action required
2	Not available for GSM control	1. Check for presence of SIM in GSM module 2. Check that SIM installed correctly 3. Install SIM into a phone and disable PIN request 4. Check that GSM-module number is active: make a voice call and wait for «busy» tone[2] 5. Make sure that the GSM-module hasn't went to Shutdown mode by reason of battery discharge

3	Waiting for GSM ready	GSM-module is loading and temporary not available for GSM control. No user action required.
4	Waiting for GSM registration complete	GSM-module is temporary not available. Possible reasons: no available networks (no signal, roaming prohibited), SIM locked by the provider. Change button indication mode to check GSM signal strength level
5	Ready for command reception	No user action required. If the module stopped to send SMS or connect to the server (the app notifies that the vehicle is offline), check balance of GSM account by using operator service (i.e. web account). Balance request by using module embedded function is not available if balance is inadequate
6	Ready for command reception, roaming mode	No user action required

[1]*Switch off GSM-module's power supply before the operation*

[2]*Heater start may be performed. Make the second voice call to stop the heater*