

# **Autoplugin Therterminal – X**

**Version 10.6**

**Description  
Installation Manual**

**Rev. A**

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### 1. 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.

### 2. Functionality

- Heater start and stop via SMS, from Therminal application for Android

- (4.1 and higher) or iOS (9 and higher) based smartphone, by voicecall
- Information about heater start and stop, heater runtime errors, interior temperature, battery voltage and vehicle location inside the Android/iOS application or by SMS.
  - Touch button for quick start and stop of the heater
  - Separated heater and ventilation control
  - Cooling and ventilation control modes
  - Multiuser mode
  - Car battery protection from discharge during the heater operation
  - Errors reading and resetting for Webasto heaters via w-bus

### **3. Package content**

1. GSM-module Autoplugin Therminal-XC (0500-0000), Therminal-XE (0500-0002) or Therminal-XF (0500-0003)
2. Permanent connection cable
3. Outer temperature sensor with cable
4. LED-button with cable
5. Description and installation manual
6. Brief user manual brochure

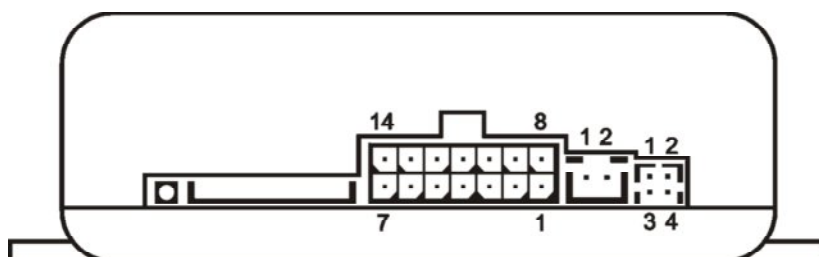
### **4. Therminal Main Functions Review**

1. Refer to the **Brief User Manual** to control the heater from a mobile phone or a smartphone
2. To start the heater from the button shortly push and then release the button. The LED, embedded to the button, will light in red, confirming the heating start and stays lit during the heater operation.
3. Pushing the button during the heater operation stops the heating, the LED goes off.

### **5. Inputs and Outputs. Signals 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:



Therminal-XE/XF versions also have magenta colored FAKRA-D type connector for external GSM-antenna connection, версия Therminal-XF version additionally - blue colored FAKRA-C connector for external GPS/GLONASS-antenna connection.

Table 1. 14-contact socket signals description

Contact №	Signal name	Polarity	Wire colour in harness*	Description
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 conjugated with Therminal modules
14	Ground	-	Black	Permanent battery "-"(0 Volts) for powering of conjugated with Therminal modules

## 6. Connection Schemes

In order to warm up the engine and the interior Therminal can control fuel and electric heaters, engine start and climatic modules; to ventilate the interior - climatic module; to cool the interior – engine start module.

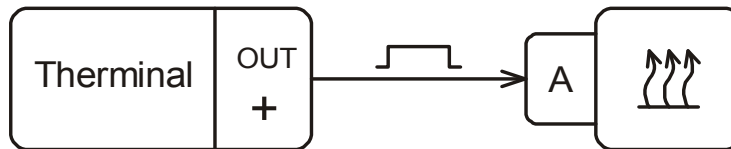
- Power connection

Signal BATTERY+ connects to the “+” vehicle’s battery terminal through 3A fuse, signal BATTERY- connects to the “-” vehicle’s battery terminal or vehicle’s body.

## 6.1. Heater Control by Continuous ‘+’ Signal

Therminal has got the line OUT+ in order to control a heater by continuous ‘+’ signal. It can be used for control of fuel fired heaters like Eberspacher Hydronic, Webasto Thermo Top and also for electrical heaters like DEFA WarmUp.

- Connection of fuel fired heater or electrical heater of the engine/interior (cabin)



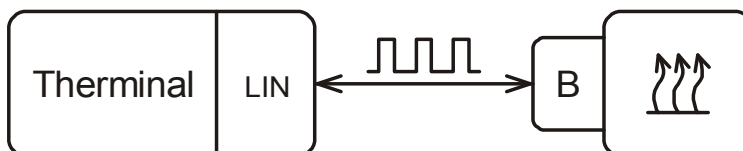
Heater type	Wire colour	Terminal A
Webasto Thermo Top C / E <sup>1</sup>	Black	Connector X1, pin 1
Eberspacher Hydronic <sup>1</sup>	Yellow	Connector B1, pin 7
DEFA WarmUp <sup>2</sup>	Yellow	⊙ (Multicharger 1203) + (Plugin Relay)

<sup>1</sup>Adjustments applied for fuel heater: **set hardware=151,164** (default settings)

<sup>2</sup>Adjustments applied for electrical heater: **set hardware=156,164**

## 6.2. Heater Control via Digital Bus (W-Bus)

Therminal can control Webasto heaters by digital line W-bus. When Therminal is connected to Webasto TT-V, Evo, Vevo or Z via w-bus, the heater operation can be determined automatically, without need of additional connections. By default Therminal determines heater operation by blowing fan status (setting 4.D.3), applies automatic selection of heater start mode (setting 4.C.F), and uses the commands of diagnostic software tool Webasto Thermo Test (setting 4.B.F).



Adjustments applied: **set hardware=251** (default settings)

Heater type	Wire colour	Terminal B
Webasto Thermo Top C / E / Evo / V / Vevo / Z (aftermarket)	Yellow	6-pins connector X1, pin 2
Webasto Thermo Top Evo / V (factory installed on Ford cars)		6-pins connector X1, pin 2
Webasto Thermo Top C (factory installed on VW, Audi, Skoda, BMW cars)		6-pins connector X1, pin 1
Webasto Thermo Top V (factory installed on Land Rover cars)		8-pins connector X1, pin 2

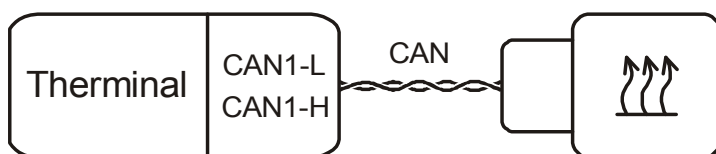
For factory installed Webasto heaters it may be necessary to set up the type of control command (4.B.\* settings).

When the auxiliary heater is upgraded to the parking heater with remote control, it may be needed to install the water pump for coolant circulation during the engine is not running. The control of the pump is proceeded by the means of relay connected to free Therminal output: OUT+,OUT1- or OUT2-, programmed for the heater control by continuous signal.

When Webasto heater is connected via w-bus, the functions of heater errors reading and resetting are available from configuration web-console (**config.autoplugin.m2mgate.net**, *under construction yet*). The login and password for panel accessing can be requested by the SMS sent from administrator's phone: 1234 get webaccess.

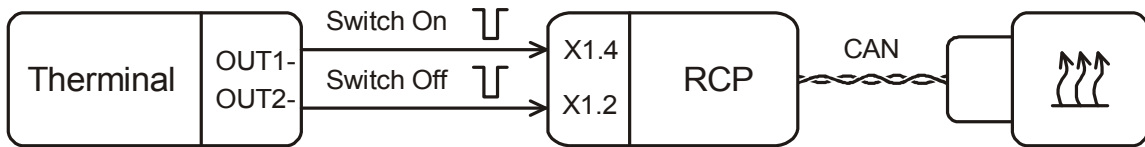
### 6.3. Factory Heater Control via CAN Bus

For some car models Therminal can control factory installed heater directly via CAN bus. CAN type adjustment may be additionally required.



### 6.4. Specific Variants of Heater Control

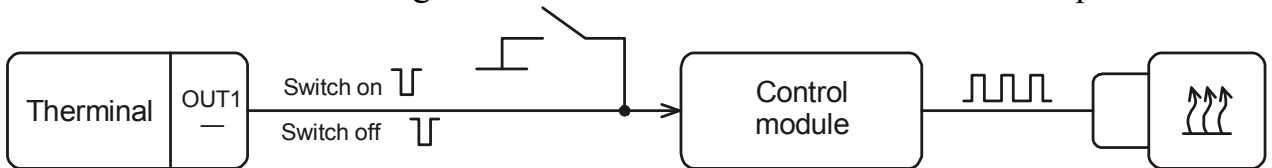
- Control by the means of interface CAN-module Autoplugin RCP



Adjustments applied: **set hardware=171,181,191,1A2**

For RCP the schemes 1,3 and 5 from installation instructions should be used

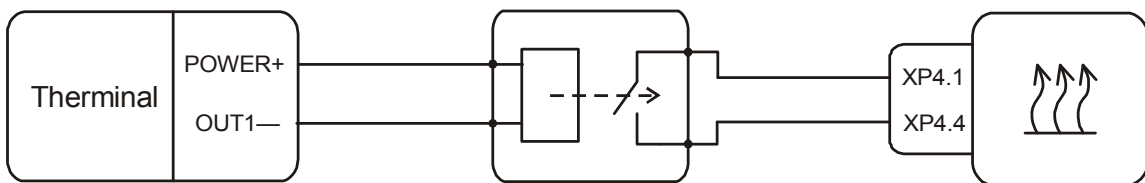
- Connection to the original control button or to the mini-timer's input



Adjustments applied: **set hardware=171,183**

- Binar-5B/D-Compact, Binar-5S heaters

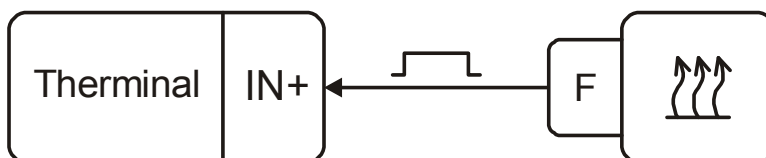
The additional relay needs to be installed for connection:



Adjustments applied: **set hardware=171,184**

## 6.5. Fuel Heater Feedback Connection

By using the scheme below Therminal will notify with actual information about heater startup, stop and runtime errors.



Heater type	Wire colour	Terminal F
Webasto Thermo Top C / E / Evo <sup>1</sup> / V <sup>1</sup> / Vevo <sup>1</sup> / Z	Blue	Connector X1, pin 6 (fuel pump)
Webasto Thermo Top Evo <sup>1</sup> / V <sup>1</sup> / Vevo <sup>1</sup>	Black	Connector X4, pin 2 (water pump)
Eberspacher Hydronic	Green	Connector B1, pin 4 (fuel pump)
Eberspacher Hydronic WS	Black	Connector S7, pin B (external fuel pump)
Eberspacher Hydronic II S	Violet	Connector B1, pin 8 (external fuel pump)
Binar-5B/D-Compact, Binar-5S	Yellow	XP2.3 Water Pump Control
	Red/Black	XS1.1 Fuel Pump Control

<sup>1</sup> Apply only when feedback via w-bus is switched off (setting 4.D.F adjusted)

Adjustments applied: **set hardware=119,124** (factory setting)

*Note: It is not allowed to combine together several signals and connect them to the input IN+ without использования элементов для развязки*

## 6.6. Separated Interior (Cabin) Warm Up Control

Therminal allows to setup separated heating of the engine and the interior for fuel fired and electrical heaters.

Being started from the button Therminal always switches on the interior warm up at the same time as the heater startup. When the startup source is SMS, voice call or application, the interior warm up will be switched on, if all of conditions listed below are satisfied:

- Ventilation button in the app is active, or SMS start command includes +FAN parameter, or the heater start source is a voice call
- Active signal is present on the Therminal's input, adjusted for ventilation control. Or adjusted and satisfied one of table settings 4.4 or 4.5
- The battery is not discharged (table setting 5.9 is satisfied)

In order to control the interior warm up from Therminal it is necessary to set up in the hardware settings one of the outputs OUT+, OUT1- или OUT2- : select the output's function – interior warm up control, and the type of control signal (impulse, potential or trigger). And connect it in accordance with one of typical connection schemes below.



## 6.7. Engine Start Control

In order to boost the heating process, to restore battery capacity or to cool the interior/cabin the Thermanal can control the outer engine start module (ex. Fortin or iDataLink). The engine startup is detected by the battery voltage rising due to the generator operation.

Independently of the heater start method the Thermanal activate the engine start in case if battery voltage level lowers to adjusted by setting 4.6 threshold. When the heater startup source is SMS, voice call or application, the engine start will be switched on, if all of conditions listed below are satisfied:

- Engine button in the app is active, or SMS start command includes +ENGINE parameter, or the heater start source is a voice call
- Adjusted and satisfied one of table settings 4.8 or 4.9

Except of heating boost mode the engine start is applied in the following cases:

- Cooling mode is selected and used in the app
- Heating mode is selected and used in the app, but the heater control is switched off by settings of Thermanal. In that case the app uses the engine start in order to warm up the engine and the interior/cabin
- SMS-command ENGINE ON was received

In order to control the engine start up from Thermanal it is necessary to set up in the hardware settings one of the outputs OUT+, OUT1- или OUT2- : select the output's function – engine start up control, and the type of control signal (impulse, potential or trigger). And connect it to the engine start module in accordance with engine start module documentation.

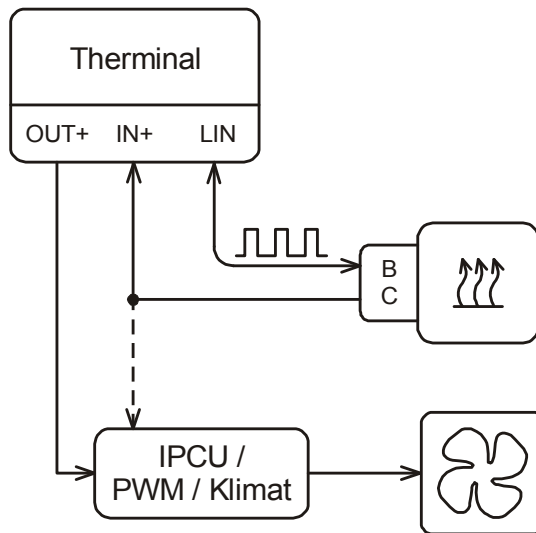
## 6.8. Interior (Cabin) Ventilation Control

Thermanal differentiates interior ventilation and interior warm up modes, allowing to set up different outputs for the modes control. If one ventilation control device is used for both modes (ex. IPCU or Autoplugin Klimat), the outputs can be combined for connection.

When Thermanal connects to the factory heater via w-bus, ventilation mode will be available, if it is supported by car configuration.

## 6.9. Typical Connection Schemes

- Webasto Thermo Top connection with possibility of separated interior warm up control from the application or via SMS

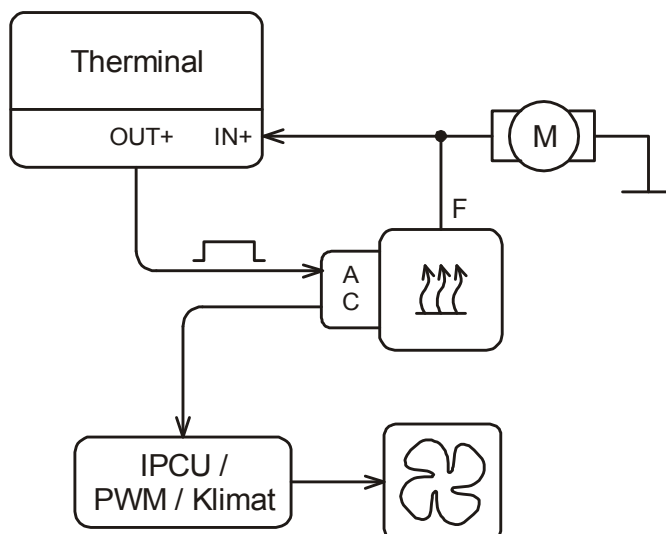


*\*Typical ventilation control directly from the heater's output is marked by dashes*

Heater type	Wire Colour	Terminal C
Webasto Thermo Top C / E / Z	Green/White	Connector X1, pin 4
Webasto Thermo Top Evo / V / Vevo	Green /White	Connector X1, pin 5
Eberspacher Hydronic	Black/Red	Connector B1, pin 3
Binar-5B/D-Compact, Binar-5S	Brown	Connector XS9, terminal 85 of fan control relay (signal Relay Control)
	Black	Connector XS9, terminal 30 of fan control relay

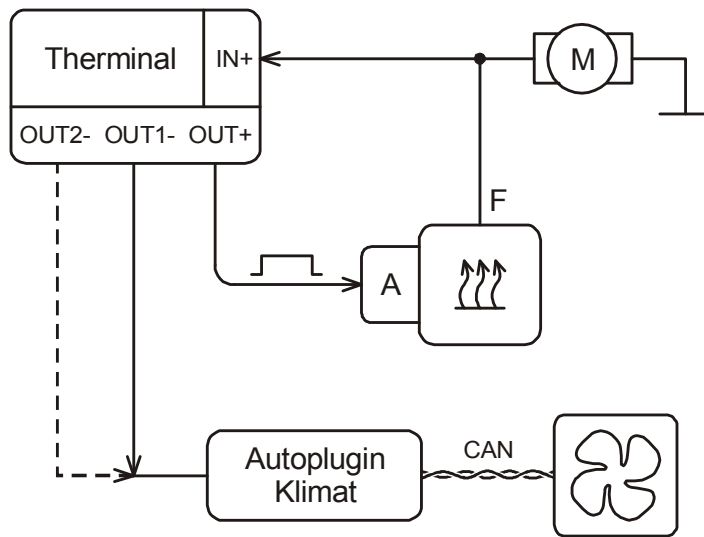
Adjustments applied: **set hardware=112,124,152,164**

- Eberspacher Hydronic connection, with feedback and interior warm up control from the heater's output



Adjustments applied: **set hardware=119,124, 151,164** (factory setting)

- Eberspacher Hydronic connection, with feedback and interior warm up/ ventilation control from Thermanal

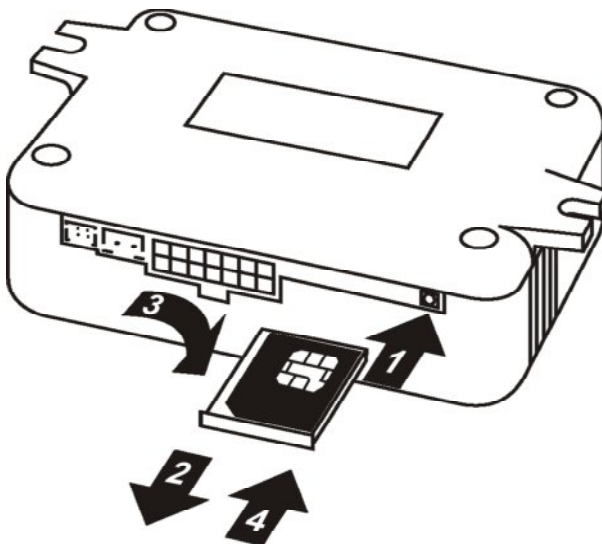


Adjustments applied: **set hardware=119,124, 151,164,172,184** (factory setting)

*\*Interior ventilation control line is marked by dashes (additional adjustments: set hardware=193,1A4)*

## 7. 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 Thermanal.*



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.

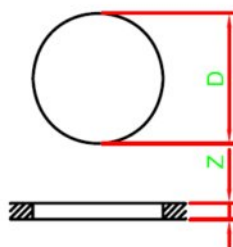
Choose tariff plans with non-expensive/pre-paid SMS traffic for control by SMS or with pre-paid mobile data traffic for control via Internet (50-100 Mb per month is enough). Combine phone account with GSM module account if possible.

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

Install SIM card into the GSM-module, as shown at the figure. The operation should be performed with unplugged power from the GSM-module. Press with a thin blunt object (phillips 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).

## 8. Button Installation

The device is completed by the pushbutton with LED, which can be mounted on the dashboard for one-touch heater start and stop. It is recommended to install the button to a stub of absent dashboard's original button. Drill the hole with diameter  $D$  depending on thickness of material  $Z$  (see figure below), then pull the button's cable through the hole, and finally push and fix the button in the hole. Sizes in the table are in millimeters.



Z	D
1.0 ~ 2.0	8.0 ~ 8.2
2.0 ~ 2.5	8.2 ~ 8.4
2.5 ~ 3.0	8.4 ~ 8.6

## 9. Temperature Sensor Installation

The device is completed by the sensor for temperature monitoring inside the interior (cabin). The sensor may be mounted near a ventilation canal or on the roof console. Choose an appropriate location for the sensor and fix it with a mounting pad.

## 10. Antenna Installation

Therminal-XC is equipped with embedded antenna. For the best signal receiving it is necessary to mount the GSM-module as close as possible to the windows line of the vehicle's body (cabin). It is not recommended to install the module inside closed body's niches, because it can lead to unstable GSM-module connection with a network.

Therminal-XE is completed by external pin type GSM-antenna, which may be mounted on the windshield or on a motionless side window. The antenna's cable length is 1.8 meters. The antenna and its cable also may be mounted under the window's molding or window's pillar trim. But it is important to place the antenna not closer than 3 centimeters from body's metal parts.

Therminal-XF is completed with 2 external antennas: GPS/GLONASS navigation antenna and pin type GSM-antenna (with cables 1.8 long). It is recommended to place navigation antenna on the top of the dashboard, under the windshield. Be sure the navigation antenna is not covered up by metal parts from the sky.

## 11. Therminal Adjustment

It is necessary to launch the procedure called Quickstart before you get started with Therminal. *Refer to the **Brief User Manual** for details.*

Therminal adjustment may be performed from web-console or by SMS from a phone or smartphone. *Refer to the **Full User Manual** for details.*

## 12. Troubleshooting

If a problem exists with the heater startup, try sequentially start the heater from the key, then from the button and finally – from a phone.

If the heater doesn't start from the button, check the connection correctness, the function and signal type of the output control line. Startup from the button operates independently from GSM network status. 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 re-start. See table below for details.

Number of flashes in series	GSM-module status	User action required
2	Not available for GSM control	<ol style="list-style-type: none"> <li>1. Check for presence of SIM in GSM module</li> <li>2. Check that SIM installed correctly</li> <li>3. Install SIM into a phone and disable PIN request</li> <li>4. Check that GSM-module number is active: make a voice call and wait for «busy» tone<sup>2</sup></li> <li>5. Make sure that the GSM-module hasn't went to Shutdown mode by reason of battery discharge</li> </ol>
3	Waiting for GSM ready	GSM-module is temporary unavailable. No user action required.
4	Waiting for GSM registration complete	GSM-module is temporary unavailable. 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 or 6	Ready for command reception	No user action required

<sup>1</sup>Disconnect GSM-module from power supply before the operation

<sup>2</sup>Heater start will be performed. Make the second voice call to stop the heater

### 13. Technical Characteristics

Protection: IP44

Operating voltage: 7..30V

Operating temperature (excluding SIM): -40..+85°C

Power consumption in GPRS data transfer mode: up to 1.5W (for a short time)

Power consumption in GSM operation mode: 0.14W

Power consumption in GSM searching mode: 0.4W

Power consumption in Standby mode: 70mW

Power consumption in Powerdown mode: 10mW

## **14. Glossary**

CAN - Control Area Network (digital bus for data transfer in vehicles)

GSM - Global System for Mobile (cellular network standard)

GPRS – General Packet Radio System (packet data transfer standard)

LED - Light Emission Diode

SIM - Subscriber Identification Module

SMS - Short Message Service

