Autoplugin Therminal V2
Version 7.5

Technical Description
Installation Manual

Rev. A

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Kit Description

The **Autoplugin GSM Kit-V2** is intended for remote control of the fuel-fired heater (parking heater, fuel operated heater, pre-heater), which was factory installed on **Volvo S60** (2011-), **V70** (2007-), **XC70** (2007-) or **XC60** (2010-). The kit consist of **GSM** module and **RCP Can-V2** module. GSM module receives commands from user's phone or smartphone and sends them to the RCP module, which controls the heater via CAN-bus.

Possibilities

- Start and stop of the heater by SMS or via specialized application Therminal from Android (4.1 and higher) based smartphone
- Feedback about heater's startup, stop and errors by SMS/ in Therminal
- Embedded remote control of the heater by the original Volvo vehicle key
- Main battery protection from discharging by inspection of the voltage level and time of autonomous work of the heater
- Plug-n-play or permanent connection

Package Content

1. GSM module
2. RCP Can-V2 module, special version (0106-1115)
3. Interconnection cable
4. Permanent connection cable
5. Plug-n-play cable

6. Technical Description and Installation Manual brochure
7. User Manual brochure

Basic Functions

1. Refer to the **User Manual** control the heater from mobile phone or smartphone.
2. RCP Can give a possibility of the remote control of the heater by the original Volvo key. To start the heater, press "Lamp" button on the key to turn the perimeter lighting on. Then press "Lock" button twice within 30 seconds, while lighting is on. Every "Lock" button press on the key will be confirmed by the turn signals. Also it is possible to adjust the module so, that it will flash 3 times by the turn signals in the rear-view mirrors, when keypress combination is received (6.2 setting).
3. To stop the heater by the original Volvo key, twice turn on and then off the perimeter lighting by the "Lamp" button, when the heater operates. The intervals between "Lamp" button presses should not exceed 20 seconds.
4. You can remotely cancel the start of the heater by a DIS timer: send the stop command by remote control for the idle heater. DIS timers will be temporary disabled. Start the heater by any way or turn the ignition on will enable DIS timers again.
5. An additional button may be connected to the module. The button is used for immediate start or stop of the heater. Button press changes a heater condition to another one: switches off the operated heater or switches on the idle heater.
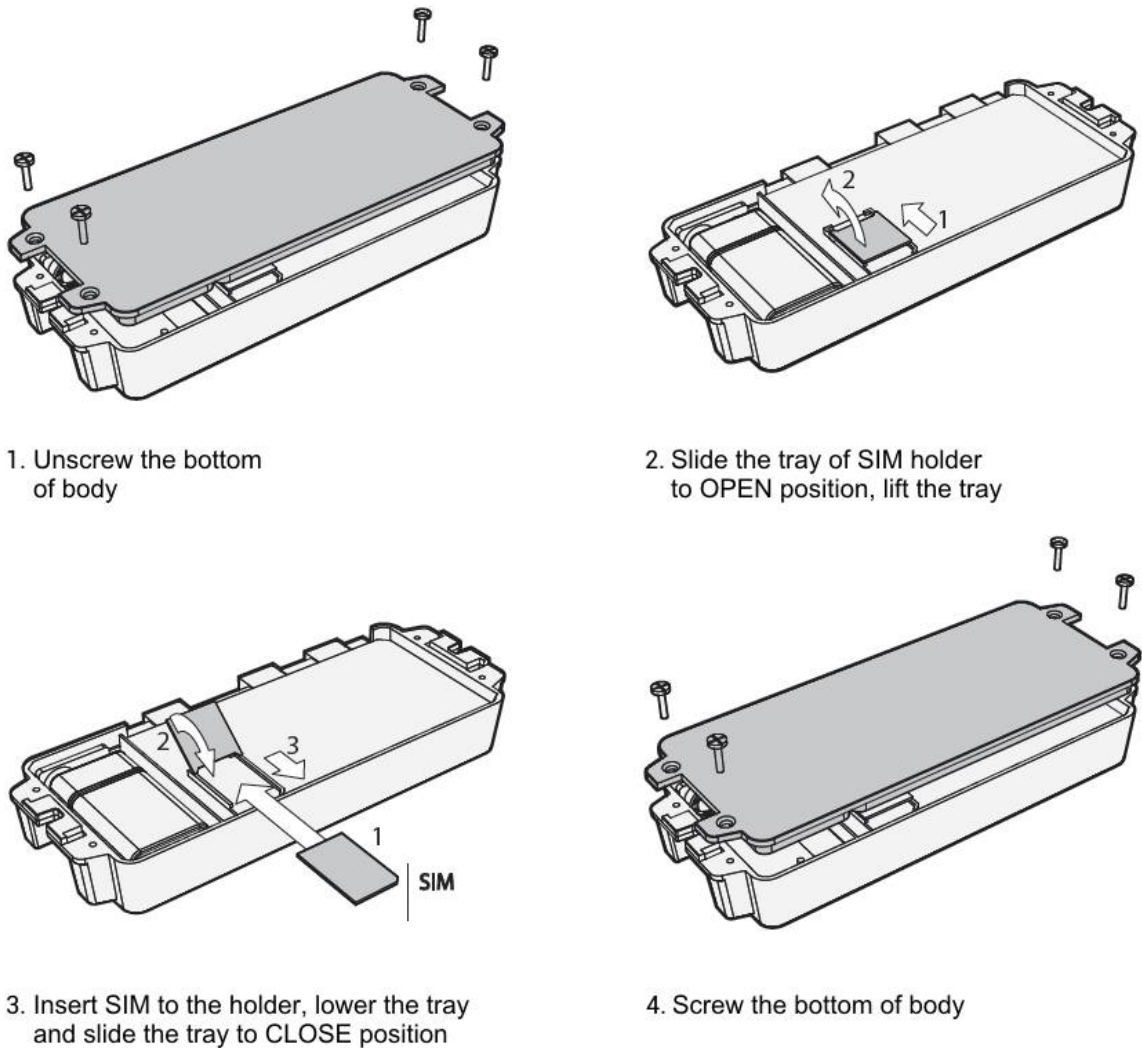
Connection

RCP module needs that 2 timers and direct start / stop function for the heater control are present in DIS. Therefore it may be necessary to load software to DIS by Volvo dealer equipment before make connection of kit.

GSM module is supplied without SIM card inside. The customer should buy a SIM card with subscription to services of local GSM provider. Make some operations with SIM before installation to the GSM module:

1. Insert SIM to a phone or smartphone and disable PIN code acquire
2. Send test SMS to another phone or smartphone and check that it successfully received

It is recommended to select tariffs with non-expensive SMS traffic. Combine phone account with GSM module account if possible.

Open the case of GSM-module to install SIM card, as shown at the picture 1. Use screwdriver from package to remove screws.

1. Unscrew the bottom of body

2. Slide the tray of SIM holder to OPEN position, lift the tray

3. Insert SIM to the holder, lower the tray and slide the tray to CLOSE position

4. Screw the bottom of body

Figure 1

Plug-n-Play Connection

This type of connection uses OBD-II service connector. It placed at the left lowest point of the dashboard. Open the case of service connector (if applicable). Take interconnection cable and connect RCP and GSM modules together. Only highlighted at the figure 2 connectors are used. Take Plug-n-Play cable and connect it to interconnection cable. Find a place inside the dashboard for modules. RCP and GSM modules can be joined to the packet using double-sided adhesive tape (see fig. 2). Secure packet of modules inside the dashboard with straps. If modules are placed separately, RCP module can be fixed with adhesive tape, and GSM module can be fixed with straps. Pay attention that internal antenna of GSM module (marked by dashes at figire 2) doesn't stay close to metal parts of the

dashboard. Shorten Plug-n-Play cable by straps and fix all the cables of kit to the dashboard. Finally connect Plug-n-Play cable to the OBD-II service connector.
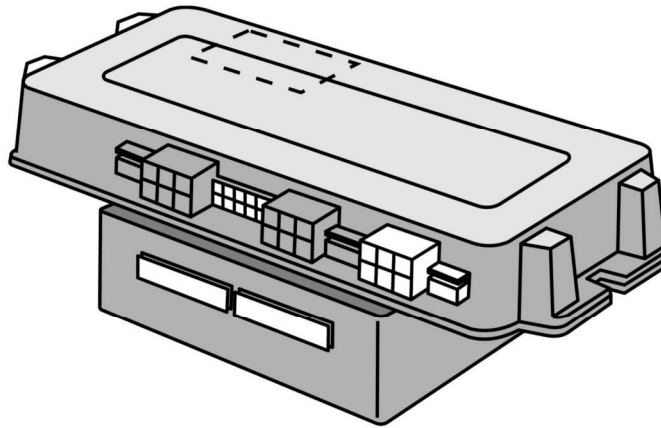
Figure 2

Permanent connection

Autoplugin GSM kit is recommended to be installed permanently in the cargo area. Detach the upholstery on left-hand side of cargo area, where fuse box is located. Take interconnection cable and connect RCP and GSM modules together. Only highlighted at the figure 2 connectors are used. Take permanent connection cable and connect it to interconnection cable.
Find a place for modules behind the upholstery. RCP and GSM modules can be joined to the packet using double-sided adhesive tape (see fig. 2). Secure packet of modules inside the dashboard with straps. If modules are placed separately, RCP module can be fixed with adhesive tape, and GSM module can be fixed with straps. Pay attention that internal antenna of GSM module (marked by dashes at figire 2) doesn't stay close to metal parts of the dashboard. Connect LED to the GSM module (instead of connector with single blue wire of permanent connection cable) and fix it at the place where it will be visible this detached upholstery.
Shorten wires of permanent connection cable by place, as required. Temporary unplug permanent connection cable from interconnection cable. Connect free ends of permanent connection cable to the car's wiring in accordance with table 1 and figure 3. Use quick splice connectors for wires connection.
Plug-in permanent connection cable to interconnection cable again. Fix cables to the car's wiring by the straps.
Attach the upholstery back to its place.

Additional Functions of RCP Can-V2

By default RCP Can is adjusted to execute basic functions, such as start and stop of the heater by the Volvo key or by additional button. To turn on additional functions (ex. battery monitoring) you may enter the module into programming mode and activate the corresponding setting.

The left-side steering wheel lever and the brake pedal are used to enter programming mode and to the settings change. It is necessary to stop the engine and the heater before. Turn the ignition on, press and hold the brake pedal. Twist the lever's ring some steps to turn off the left display in DIS. Then press and hold "Read" button at least for 5 seconds, while built-in LED is flashing once a second. Both turn signal repeaters in DIS will flash twice as a confirmation of entering programming mode. Release the brake pedal and "Read" button now.

Each setting in the table 3 corresponds to the 3-digit code. You need to enter appropriate code to activate a setting. To enter a digit of a code, shortly press "Reset" button on the lever so much times, as corresponds to a digit. Each button press will be confirmed by the LED flashing and by a turn signal repeater of DIS: the left turn to the first and the third digits of code, the right turn to the second digit of code. To confirm a digit entering, press and release "Read" button (DIS will flash one time by the both repeaters simultaneously). After the third digit will be entered, module will check the code for validity and confirm it by repeaters: flash twice by the both repeaters simultaneously in the case of valid code, flash twice by the both repeaters alternately in the case of invalid code.

If you made a mistake with the number of button presses when you enter the code, press and release "Read" button until the module will indicate an error by repeaters. Enter the code again in that case. Also you may enter other codes without exit of programming mode.

Turn the ignition off to exit programming mode. New settings will be saved in the module's memory and will be stored there regardless of whether the module is connected or not. **Attention:** If you start the engine without exit of programming mode, new settings will not be saved in memory.

To reset the module to factory settings, enter the code 8.1.1. Both repeaters will flash three times to confirm command execution, and then the module will exit of programming mode and will restart.

Settings Table (3)

Settings Group	Setting	Possible Values
1. Heater Timing	1.1. Limitation of heater's total operational time, in pre-heat mode	1.1.1 Not adjusted 1.1.2 40 minutes 1.1.3 50 minutes 1.1.4 60 minutes 1.1.5 *70 minutes* 1.1.6 80 minutes 1.1.7 90 minutes

		1.1.8 100 minutes
		1.1.9 120 minutes
	1.2. Limitation of the heater's cycle operational time, in pre-heat mode	**1.2.1** 10 minutes
		1.2.2 15 minutes
		1.2.3 20 minutes
		1.2.4 25 minutes
		1.2.5 30 minutes
		1.2.6 40 minutes
		1.2.7 50 minutes
		1.2.8 60 minutes
		1.2.9 *70 minutes*
2. Heater Control by Volvo Key	**2.1.** "Lock" and "Lamp" button's functions for the heater control	**2.1.1** *"Lock" button to the heater startup, yellow button to the heater stop
		2.1.2 "Lamp" button to the heater startup, "Lock" button to the heater stop
	2.2. Number of sequential turning on and then turning off the perimeter lighting by "Lamp" button for the heater control	**2.2.1** Heater control by "Lamp" button disabled
		2.2.2 *Two times*
		2.2.3 Three times
		2.2.4 Four times
	2.3. Number of sequential "Lock" button presses for the heater control (with the perimeter lighting turned on)	**2.3.1** Heater control by "Lock" button disabled
		2.3.2 *Two presses*
		2.3.3 Three presses
		2.3.4 Four presses
3. Battery Monitoring	**3.1.** Minimal voltage to let the heater start in pre-heat mode	**3.1.1** * Not adjusted
		3.1.2 11.8V
		3.1.3 11.8V
		3.1.4 11.9V
		3.1.5 *12.0V*
		3.1.6 12.1V
		3.1.7 12.2V
		3.1.8 12.3V
		3.1.9 12.4V
	3.2. Minimal voltage to keep operating the heater for pre-heat mode [2]	**3.2.1** * Not adjusted
		3.2.2 11.4V
		3.2.3 11.5V
		3.2.4 11.6V
		3.2.5 *11.7V*
		3.2.6 11.8V
		3.2.7 11.9V
		3.2.8 12.0V

6. Indication of the heater status by the perimeter lighting and by the turn signals in the rear-view mirrors	6.1. Indication of heater startup	6.1.1 *Off (only switching off the lighting) 6.1.2 Switch the lighting on for 1 sec 6.1.3 Switch the lighting on for 2 sec 6.1.4 Switch the lighting on for 3 sec 6.1.5 Switch the lighting on for 5 sec 6.1.6 Switch the lighting on for 7 sec 6.1.7 Switch the lighting on for 10 sec
	6.2. Indication of command reception from remote control	6.2.1 Off 6.2.2 *Three flashes
	6.3. Indication of operated heater, started by remote control	6.3.1 *Off 6.3.2 On
	6.4. Indication of operated heater, started by DIS (direct or program start)	6.4.1 *Off 6.4.2 On
	6.5. Indication of operated heater, started by additional button	6.5.1 *Off 6.5.2 On
	6.7. Flashing frequency for the indication of heater autonomous operation	6.7.1 One flash within 3 sec 6.7.2 One flash within 5 sec 6.7.3 * *One flash within 10 sec* 6.7.4 One flash within 15 sec
7. Notifications	7.3. Send SMS «ALARM Trunk or Hood»	7.3.7 *In the case when the heater has not started or shut down during operation (i.e. error occurred with the heater) 7.3.8 Do not send
	7.4. Send SMS «ALARM Doors»	7.4.2 *In the case when the heater has finished operation with no errors or when the engine has been run during the heater operation 7.4.8 Do not send
8. Service menu	8.1. Default Settings	8.1.1 Apply factory settings

* Factory setting
Recommended settings is marked in italics

[1] –RCP will turn off the heater if the battery voltage becomes lower than preset

[2]- Notifications are needed for the operation of Therminal application. If user sends SMS manually, notifications can be turned off by the means of RCP settings 7.3.8 and 7.4.8, or via settings of GSM modem (see User Manual for details).

Troubleshooting

If a run-time error occurs with the heater, RCP Can will inform you by the built-in and additional LEDs blinking about the error code. When Plug-n-Play cable is used for connection, additional red LED is placed inside the housing of OBD-II connector of Plug-n-Play cable and stays visible from the driver's side.
The number of LED's flashes corresponds to the error code. See table 4 for the codes description and possible solutions.

Table 4

Error Code	Error Description	Possible Reasons of Error Appearance	Solutions
1	Wrong heater configuration	The heater is not activated in DIS	Configure the heater by Volvo car dealer equipment
		Outer temperature is upper than +15 Celsius degrees	The heater works only with temperatures below +15°C. It is the heater manufacturer's restriction
		Fuel level in the tank is close to empty ("Fuel Low" warning indicator is lighting in DIS)	Refuel your vehicle
		The heater is blocked after 3 unsuccessful starts	Try to start the heater from DIS menu. If it not started to burn, make a diagnostics of the heater.
3	Battery level is low	The module has determined that the battery voltage at the heater startup or during the heater operation is below the specified settings 3.1 и 3.2	Charge vehicle's battery with special charger (or start engine to charge) or cancel 3.1/3.2 module's settings
4	Time limits exceeded	Time limit for autonomous operation of the heater is achieved (with active setting 1.1)	Run the engine or cancel 1.1 module's setting

5	Unsuccessful start	The heater was switched off spontaneously at a startup	Make a diagnostics of the heater if the error is repeated
6	Operation cycle too short	The heater was switched off spontaneously	Make a diagnostics of the heater if the error is repeated
8	CAN-bus error	There is a problem with connection of the module to the CAN-bus	Check for the module's connection
9	Settings error	Settings have been incorrectly stored in RCP memory	Reset the settings (8.1.1), readjust RCP
11	Heater no connection	The heater is unplugged from CAN-bus or is out of order	Make a diagnostics of the heater

The outer bi-color (red/green) LED can be connected to the GSM-module to control its status in the case of permanent connection. If Plug-n-Play cable is used for connection, green status LED of GSM module is placed inside the housing of OBD-II connector of Plug-n-Play cable and stays visible from the driver's side. Indication of GSM-module presented in the table 4.

Table 4. Indication of GSM module

Number of flashes in series	GSM module condition	User actions required
1	No SIM access	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
2	No service	1. Check balance of GSM module 2. Check that GSM module is available in GSM network: make a call to the number of GSM module and wait for "busy" signal
3	GSM module is not initialized	Refer to the User Manual
4	Ready	Not required

Glossary

CAN -   Control Area Network (digital network for data transfer in vehicles)
DIS -   Driver Information System of the instrument cluster
GSM – Global System for Mobile
GPRS – General packet radio service, packet oriented mobile data service
LED - Light Emission Diode
RCP - Remote Control Plug-in (electronic module for the heater remote control)
SIM – Subscriber Identification Module
SMS – Short Message Service