Autoplugin Therminal-V1R

Version 10.3

Technical Description
Installation Manual

Rev. A

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Description

The **Autoplugin Therminal-V1R** is a kit intended for remote control of the fuel-fired heater (parking heater, fuel operated heater, pre-heater), factory installed on **Volvo S60** (2005-2010), **V70** (2005-2007), **XC70** (2005-2007) or **XC90** (2005-2014). The kit includes two modules: climatic GSM-module **Therminal-XC/XF** and interface module **RCP Light-V1R**. GSM-module receives commands from user's phone or smartphone and translates them to the RCP module, which controls the heater via CAN-bus.

Possibilities

- Heater remote control using SMS, via specialized application Therminal for Android (4.1 and higher) and iOS-based smartphones or by voice call
- Feedback about heater startup, stop and errors by SMS/ in Therminal
- Embedded remote control of the heater with the car's remote control key
- Main battery protection from discharging inspecting voltage level and time of autonomous operation of the heater
- Notification of alarm system triggering
- Plug-n-play or permanent connection

Package Content

1. GSM-module Autoplugin Therminal-XC (0502-1100) or Autoplugin Therminal-XF (0502-1103)
2. Autoplugin RCP Light-V2 module (0702-1110)
3. Interconnection cable

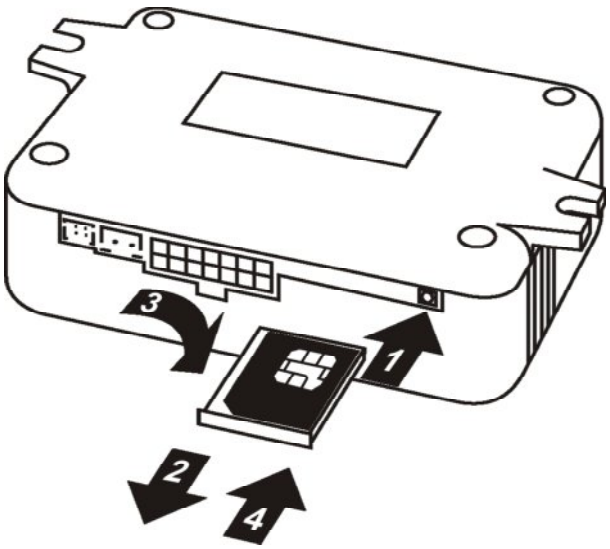
4. Permanent connection cable
5. Plug-n-play cable
6. Thermo sensor with cable
7. LED-button with cable
8. Technical Description and Installation Manual brochure
9. User Manual brochure

Basic Functions

1. Refer to the **User Manual** to control the heater from a mobile phone or a smartphone.
2. A special combination of buttons presses is used to start the heater with the remote control key. Firstly press yellow button on the key to switch on the car's perimeter lighting. Then press "Lock" button twice within 30 seconds, while lighting is on. Every "Lock" button's pressing is confirmed with direction indicators flashing.
3. To stop the heater with the remote control key, switch on and then switch off car's perimeter lighting twice. Intervals between yellow button presses should not exceed 20 seconds.

Connection

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



Picture 1

GSM-module is supplied without SIM card inside. The customer should buy a SIM card with subscription to local GSM provider services (SMS and GPRS are required).
Possibly you should make some preparatory operations with SIM before installation to the GSM-module:

1. Insert SIM to a phone or smartphone and disable PIN code acquire
2. Switch off 3G/4G services and send test SMS to another phone or smartphone and check that it successfully received

Choose tariff plans with non-expensive/pre-paid SMS traffic for SMS control 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 only the mobile data.

Install SIM card into the GSM-module, as shown at the picture 1. 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).
We recommend firstly use Plug-n-Play connection to set up the Therminal.

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 with attached RCP Light module and connect it to the GSM-module by two connectors (14-pin black and 2-pin white). Take outer button and attach it to the GSM-module. Take Plug-n-Play cable and temporary connect it with interconnection cable. Turn ignition on, insert OBD jack into car's service socket, wait 10 seconds and then turn ignition off. Wait for GSM-module boot during 30 seconds and then check that the GSM-module ready to receive commands (button's LED flashes 5 times in series).
- Launch the Quickstart procedure (see **Brief User Manual** for details). When the procedure will be completed make a voice call on GSM-module number and make sure the heater is started. You can detach outer button if you don't want to install it.
- Find space inside the dashboard for kit placement. Secure packet of modules inside the dashboard with straps. GSM module can be fixed with adhesive tape or can be fixed by straps. For Therminal-XC version pay attention that internal antenna of GSM-module (placed at the housing's side, opposite to

SIM-holder) doesn't stay close to metal parts of the dashboard.
For Therminal-XF version connect both outer antennas' connectors to the GSM-module, according to connectors' colors. Combined GSM/GPS/GLONASS antenna has a magnetic base which can be attached to metal parts. Or can be fixed with adhesive tape. It is important to point the antenna toward the sky and don't cover it by metal parts from the sky side.
GSM-module can indicate GSM signal level by LED inside the button. This mode can be useful to find an appropriate location of the GSM-module (Therminal-XC) or outer antenna (Therminal-XF). To activate the mode press and hold the button until the embedded LED flashes from 15 to 20 times, then release the button. The LED starts indicate GSM signal level by frequent flashes (1-5) in series. Signal status will be refreshed every 10 seconds.

- Before final fixation of the kit connect Plug-n-Play cable to the interconnection cable one more time to be sure that cables' length is enough to make connection into OBD socket. Shorten excess length of the Plug-n-Play cable by straps and fix all the cables of kit inside the dashboard. Finally connect Plug-n-Play cable to the OBD-II service connector.

Permanent connection

It is recommended to install Autoplugin Therminal permanently under the dashboard.

Table 1. Permanent connection cable description

ermanent cable pin number	**Wire colour**	**Signal**	**Connection point**
6	Black	Ground	Connects to a terminal where permanent negative potential of the battery is present (ex. to the black-white wire of service connector, pin 4).
3	Red-white	Battery +	Connects to a terminal where permanent positive potential of the battery is present (ex. to the orange wire of service connector, pin 16)
4	Green-yellow	CAN-L	Connects to the green wire of LOSPEED CAN-bus (ex. to the service connector's pin 11),
1	Green	CAN-H	Connects to the white wire of LOSPEED LOSPEED CAN-bus (ex. to the service connector's pin 3).

Make all the steps listed in chapter above. Then take permanent connection cable and cconnect free ends of permanent connection cable to the car's wiring in accordance with Table 1. Use quick splice connectors for wires connection.
Connect outer thermo sensor to the GSM module (instead of connector with single orange wire of interconnection cable) and fix it with adhesive pad at the place where temperature will be registered.
Shorten wires of permanent connection cable by place, as required. Plug permanent connection cable to the interconnection cable. Fix cables with car's harnesses by straps.

RCP Light-V1R Additional Functions

Some functions, such as start and stop of the heater by using remote control key and indication by direction indicators, are implemented in RCP Light module. To control these functions, enter the module into Setup mode and activate corresponding setup item (see Settings table 2).

The buttons of the left-hand stalk switch and the brakes pedal are used to enter Setup 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 brakes pedal. Rotate the thumbwheel to turn off the display in the CIP. Then press and hold for at least 5 seconds "OK" button, while module's LED flashes once a second. Both direction indicators in the CIP confirm entering to the setup mode with 2 flashes. Release the brakes pedal and "OK" button finally.

Each setup item in the settings table is a 3-digit code. To enter a digit of a code, shortly press "RESET" button so many times, as corresponds to a digit. The LED and the direction indicators symbols in the CIP confirm each button press: the LED briefly goes off, the left direction indicator flashes one time when the first or the third digit of code is entered, the right direction indicator - when the second digit of code is entered. To complete a digit entering, press and release "OK" button. The CIP confirms it with one flash of both direction indicators simultaneously. When all three digits entered, the module checks the code for validity and confirms it with the direction indicators flashing. The both direction indicators flash twice simultaneously in case of valid code and flash twice alternately in case of invalid code.
If entered digit is not correct, press and release "OK" button until the module indicates an error. Enter the code once more in that case. Several codes can be entered without exit of setup mode.
Turn the ignition off to exit setup mode. New settings are saved in the nonvolatile memory of the module and stored there regardless of whether the module is connected or not. **Attention:** If you start the engine without exit Setup mode, new settings will not be saved in memory.
To reset the module to the factory settings, enter the code 8.1.1. Both direction indicators in the CIP should flash three times, confirming command execution. Then the module exits Setup mode and restarts.

Settings Table (2)

Settings Group	**Setting**	**Possible Values**
2. Heater control with remote control key	**2.1.** "Lock" and "Yellow" button functions for the heater control	**2.1.1** *"Lock" button to the heater startup, yellow button to the heater stop **2.1.2** Yellow 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 "Yellow" button for heater control	**2.2.1** Heater control by "Yellow" 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*
6. Indication of heater status by using car's lighting	**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 heater stop	**6.2.1** *Off (only switching off the lighting) **6.2.2** Switch the lighting on for 1 sec **6.2.3** Switch the lighting on for 2 sec **6.2.4** Switch the lighting on for 3 sec **6.2.5** Switch the lighting on for 5 sec **6.2.6** Switch the lighting on for 7 sec **6.2.7** Switch the lighting on for 10 sec
8. Service menu	**8.1.** Default Settings	**8.1.1** Apply default settings to RCP Light module

* Factory setting
Recommended settings marked in italics

Troubleshooting

If you have problems with heater startup try sequentially start the heater from the key, then from the button and finally – from phone. When the heater doesn't start at all, make diagnostics beginning with the RCP Light. If the heater starts from the key, make diagnostics of the GSM-module.

- RCP Light diagnostics

RCP-module in the kit is responsible for command translation to and from the CAN-bus. It has the LED indicator on the side, opposite to the connector.
If a run-time error occurs during heater operation, RCP module informs about the error code with LED flashing. The number of flashes in series corresponds to the error code. See table 3 for the codes description and possible solutions.

Table 3

Error Code	Error Description	Possible Reasons of Error Appearance	Solutions
2	No answer from the heater followed the start command	The heater is not activated in CIP	Configure the heater by Volvo dealer's equipment
		Fuel level in the tank is close to empty ("Fuel Low" warning indicator is lighting in CIP)	Refuel the car
		The heater is blocked after 3 unsuccessful starts	Try to start the heater from CIP menu. If it not started to burn, make diagnostics of the heater.
5	Unsuccessful start	The heater was switched off spontaneously at heater startup	Make diagnostics of the heater if the error appears again
6	Operation cycle too short	The heater was switched off spontaneously	Make diagnostics of the heater if the error appears again
8	CAN-bus error	There is a problem with connection of the module to the CAN-bus	Check for the module connection
9	Settings error	Settings have been stored incorrectly in RCP's memory	Reset the settings (8.1.1), readjust RCP

- GSM-module diagnostics

If the heater doesn't start from the button, check all the kit connections. 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 restart. See table 4 for details.

Table 4. 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 temporary not available. 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 or 6	Ready for command reception	No user action required

[1]*Switch off GSM-module's power supply before the operation*
[2]*Heater start will be performed. Make the second voice call to stop the heater*

Glossary

CAN - Control Area Network (digital network for data transfer in vehicles)
CIP - Combined Instrument Panel
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 heater remote control)
SIM – Subscriber Identification Module
SMS – Short Message Service

