Autoplugin RCP-B1

Version 7.1

Technical Description
User Manual

Rev. A

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Description

Autoplugin RCP-B1 is electronic module designed for remote control of fuel-fired heater (parking heater, fuel operated heater, pre-heater), factory installed on **BMW E/F series** (E65, E66, E70, E71, E90, E91, E92, E93, F01, F02, F06, F07, F10,F11, F18). The device controls the heater via CAN-bus.

Module Possibilities

- Embedded heater remote control by using car's remote control key
- Embedded ventilation remote control by using car's remote control key
- Set of inputs for outer heater remote control
- Set of outputs with programmable heater status signals
- Remote cancellation of heater startup, programmed with the iDrive
- Additional protection of car's battery from discharging by inspecting voltage level and time of autonomous operation of the heater

Package Content

1. Autoplugin RCP-B1 module (0104-1100)
2. Wiring for permanent connection
3. Installation set
4. Technical Description brochure
5. Installation Manual brochure

Basic Functions

1. To start the heater from car's remote control key:
   E-series: press "BMW" button for 3 times;
   F-series: press "Rhomb" button for 3 times.
   Time intervals between presses must not exceed 20 seconds. The excess of time interval restarts the counter of button presses. Car confirms commands reception with hazard signals flashing.

2. To start ventilation from car's remote control key:
   E-series: press "BMW" button for 3 times (settings 1.3.3. and 2.3.1 have to be adjusted);
   F-series: press "BMW" button for 2 times, then press "Rhomb" button (settings 1.3.2 have to be adjusted).
   Time intervals between presses must not exceed 20 seconds. The excess of time interval restarts the counter of button presses. Car confirms commands reception with hazard signals flashing.
   Also ventilation can be activated then windows release function is applied from the key. Adjust the setting 1.2 for the purpose.

3. To stop the heater/ventilation from car's remote control key:
   E-series: press "Unlock" button for 3 times and then press "BMW" button;
   F-series: press and hold "Rhomb" button for at least of 3 seconds*.
   Time intervals between presses must not exceed 20 seconds. The excess of time interval restarts the counter of button presses. Car confirms commands' reception with hazard signals flashing.
   **This combination can turn on the panic mode for some cars. Release the button to turn off the panic mode.*

Connection

See Installation Manual for details.
NB! RCP module needs that timers and direct start / stop function for heater control are present in the iDrive. Therefore it may be necessary to activate heater control using dealer's equipment before make a connection.

Additional Functions

By default RCP adjusted to execute basic functions, such as a start of the heater by car's key or by additional button, a stop of the heater by the button and a control of the boost heat mode by the button. To turn on additional functions enter the module into programming mode and activate the corresponding setting.

Programming button and the brake pedal are used to enter programming mode and to the settings change. You can use either additionally installed button, or front passenger's window close button on the driver's door control panel as a programming button.

It is necessary to stop the engine and the heater before. Turn the ignition on, press and hold the brakes pedal. Then 3 times press the programming button. The module's LED indicator goes on to confirm entering to the setup mode. Release the brakes pedal finally.

Each setup item in the settings table is a 3-digit code. To enter a digit of a code, shortly press the button so much times, as corresponds to a digit. The LED confirms each button pressing: the LED briefly goes off. To complete a digit entering, press and release brakes pedal. The module confirms it with one flash of LED. When all three digits entered, the module checks the code for validity and confirms it with the LED flashing. The LED flashes twice in case of valid code and flashes once in case of invalid code.

If entered digit is not correct, press and release brakes 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. The LED flashes three times, confirming command execution. Then the module exits Setup mode and restarts.

Settings Table (2)

1. Ventilation Control	**1.2** Ventilation on then windows release function is applied from the key	**1.2.1** *Function disabled **1.2.2** Function enabled
	1.3 Number of "BMW" button presses for ventilation startup	**1.3.1** Combination disabled **1.3.2** Two presses **1.3.3** **Three presses* **1.3.4** Four presses **1.3.5** Five presses
	1.4. Limitation of ventilation cycle operation time	**1.4.1** * Not adjusted (30 minutes by default) **1.4.2** 5 minutes **1.4.3** 10 minutes **1.4.4** 15 minutes **1.4.5** 20 minutes **1.4.6** 25 minutes
2. Heater control	**2.1.** Limitation of heater total operational time in	**2.1.1** *Not adjusted **2.1.2** 40 minutes **2.1.3** 50 minutes

	pre-heat mode	**2.1.4** 60 minutes **2.1.5** 70 minutes **2.1.6** 80 minutes **2.1.7** *90 minutes* **2.1.8** 100 minutes **2.1.9** 120 minutes
	2.2. Limitation of heater 1-cycle operational time in pre-heat mode	**2.2.1** 10 minutes **2.2.2** 15 minutes **2.2.3** 20 minutes **2.2.4** 25 minutes **2.2.5** 30 minutes **2.2.6** 40 minutes **2.2.7** 50 minutes **2.2.8** 60 minutes **2.2.9** *70 minutes
	2.3. Number of "Rhomb" (F series) or "BMW" (E series) button presses for heater startup	**2.3.1** Combination disabled **2.3.2** Two presses **2.3.3** **Three presses* **2.3.4** Four presses **2.3.5** Five presses
3. Battery Monitoring	**3.1.** Minimal battery voltage that lets the module start the heater in pre-heat mode	**3.1.1** * Not adjusted **3.1.2** 11.7V **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 battery voltage that lets the module keep operating the heater in 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 using car's	**6.2.** Indication of heater startup	**6.2.1** Off **6.2.2** *Seven flashes
	6.3. Indication of heater's operation, when starting	**6.3.1** *Off **6.3.2** On (periodic single flashes)

direction indicators in rearview mirrors [6]	source is a remote control	
	6.4. Indication of heater's operation, when starting source is the iDrive (direct or timer start)	**6.4.1** *Off **6.4.2** On (periodic single flashes)
	6.5. Indication of command reception from remote control	**6.5.1** *Off **6.5.2** On
	6.7. Flashing frequency for 6.3-6.5 Setup items	**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. Output signals adjustment	**7.3.** Notification signal feed to the output "Alert_1"	**7.3.1** *"Heater started"[4] **7.3.2** "Heater stopped"[4] **7.3.7** "Error occured" **7.3.8** Disable the output
	7.4. Notification signal feed to the output "Alert_2"	**7.4.1** "Heater started"[4] **7.4.2** *"Heater stopped"[4] **7.4.7** "Error occured" **7.4.8** Disable the output
	7.5. Signal feed to the output "Status Minus"	**7.5.1** Heater operates (potential) **7.5.2** *Heater operates autonomously (from battery, engine is off) (potential) **7.5.3** Flashers control signal(double impulses with the frequency adjusted by 6.7, applying settings 6.1-6.5)[5] **7.5.4** Engine runs (potential) **7.5.5** Engine runs (RPM impulses) **7.5.6.** Disable the output
8. Settings reset		**8.1.1** Apply factory settings

* Factory setting
Recommended settings is marked in italics

[2] –RCP turns off the heater if the battery voltage becomes lower than preset
[4] – Signals appear only during heater autonomous operation
[5] – Signal is used for indication by all the hazard flashers. It uses 1-wire connection to the hazard alarm button (see installation manual for details).
[6] – Additional connections required (see installation manual)

Signals

The module has two connectors: 9-pin connector X1 (table 3) for input signals and power connection, 10-pin connector X2 (table 4) for output signals, special signals and CAN-bus connection. The first pin on each connector is marked by the key.

Table 3

X1 pin number	Signal Name	Polarity	Wire colour
1	Ventilation+	+	White
2	Ventilation-	-	Grey
3	Heater+	+	Green
4	Heater-	-	Blue
5	Off	-	Brown
6	Ventilation_RC	+	Orange
7	Heater_RC	+	Yellow
8	*Ground*	-	*Black*
9	*Battery Power*	+	*Red*

The signals to be necessarily connected marked in the table in Italics

Table 4

X2 pin number	Signal Name	Polarity	Wire colour	Maximum Electric Load*, mA
1	RC_out	+	Blue-white	500
2	Status Minus	-	Yellow	500
3	Alert_1	-	Grey	500
4	Alert_2	-	Orange	500
5	-	-	Blue	500
6	Indication	+	Red-white	1000
7	-	-	Green-yellow	
8	Relay_control	-	Green	500
9	*CAN-L*		*Brown-white*	
10	*CAN-H*		*Brown*	

*The connection of outputs 2-5 directly to the Power, without a load, is not permitted. The connection of outputs 1 and 6 directly to the Ground, without a load, is not permitted

The signals to be necessarily connected marked in the table in Italics

X1.1 Ventilation+
The input can be used to switch ventilation on by the impulse of positive polarity (the input **Ventilation**- in that case has to be connected to the Ground). Ventilation is started by the leading edge of the impulse.

X1.2 Ventilation-
The input can be used to switch ventilation on by the impulse of negative polarity (the input **Ventilation**+ in that case has to be connected to the Power). Ventilation is started by the leading edge of the impulse.

X1.3 Heater+
The input can be used to switch the heater on by the impulse of positive polarity (the input **Heater**- in that case has to be connected to the Ground). The heater is started by the leading edge of the impulse.

X1.4 Heater-
The input can be used to switch the heater on by the impulse of negative polarity (the input **Heater**+ in that case has to be connected to the Power). The heater is started by the leading edge of the impulse. This input is suitable for the most alarm systems and GSM-modules connections in order to control the heater remotely.

X1.5 Off
The input is used to switch off the heater or ventilation by the impulse of negative polarity. The leading edge of the impulse stops the heater/ventilation.

X1.6 Ventilation_RC
The input can be used to switch ventilation on/off by the impulse of positive polarity. Ventilation is turned on by the leading edge of an impulse and is turned off by the trailing edge of the impulse. The specialized remotes such as Smart Start, Easy Start or Telestart can be connected to this input. GSM-modules with a potential signal on the control channel also may be connected to the input.

X1.7 Heater_RC
The input can be used to switch the heater on/off by the impulse of positive polarity. The heater is turned on by the leading edge of an impulse and is turned off by the trailing edge of the impulse. The specialized remotes such as Smart Start, Easy Start or Telestart can be connected to this input. GSM-modules with a potential signal on the control channel also may be connected to the input.

X1.8 Ground
Connects to a line permanently connected to the battery minus

X1.9 Power
Connects to a line permanently connected to the battery plus

X2.1 RC_out
Signal is used for Autoplugin DSS Kit version only
The input is used to inform the remote control unit that the heater has been switched off. When the heater is switched off, the impulse of positive polarity with 0.5 second duration appears on the output. When the engine is running, the output is permanently pulled up to the Power.

X2.2 Status Minus
The assignment of this output is defined by the setting 7.5. By default the signal "Heater operates autonomously" is given on the output.

X2.3 Alert_1
The signal is used to send a notification to the remote control device (if remote is compatible to alerts receiving). The assignment of this output is defined by the setting 7.3. When programmed event is occurred, the impulse of negative polarity with 1 second duration appears on the output. By default the signal "Heater started" is given on the output.

X2.4 Alert_2
The signal is used to send a notification to the remote control device (if remote is compatible to alerts receiving). The assignment of this output is defined by the setting 7.4. When programmed event is occurred, the impulse of negative polarity with 1 second duration appears on the output. By default the signal "Heater stopped" is given on the output.

X2.5 *Not used*

X2.6 Indication
The output can be used for connection of stand alone or built-in to a button indicator, which will inform user about heater run-time errors.

X2.7 *Not used*

X2.8 Relay_Control
The signal is used for outer relay control[1]

X2.9 CAN-L
Low-level line of Medium Speed CAN bus.

X2.10 CAN-H
High-level of Medium Speed CAN bus.

[1]- see Installation Manual for details

Troubleshooting

If a run-time error occurs during heater operation, RCP informs about error code with LED flashing. The number of flashes in series corresponds to the error code. See table 5 for the codes description and possible solutions.

Table 5

Error Code	Error Description	Possible Reasons of Error Appearance	Solutions
2	No answer from the heater followed the start command	No heater control in iDrive menu available	Change car configuration by the means of dealer equipment
		On-board electronics has detected that battery voltage is too low to start the heater	Charge battery with special charger (or start engine to charge)
		Fuel level in the tank is close to empty ("Fuel Low" warning indicator is lighting in CIP)	Refuel the car
		The heater is blocked	Try to start the heater from iDrive menu. If it not started to burn, check for fuel and coolant quality (especially at extreme cold temperatures) and possible heater's exhaust system clogging by snow. Then unblock the heater using special equipment
3	Battery low	The module has determined that the battery voltage at heater startup or during heater operation is below the specified settings 3.1 and 3.2	Charge battery with special charger (or start engine to charge) or cancel 3.1/3.2 settings
4	Time limits exceeded	Time limit for autonomous operation of the heater has achieved (with active setting 2.1.2 - 2.1.9)	Run the engine. It is recommended to have trips between heater operation cycles longer than heater operation cycles
5	Unsuccess-ful start	The heater switched off spontaneously at startup	Make diagnostics of the heater if the error appears again
6	Operation cycle too	The heater was switched off spontaneously with	Make diagnostics of the heater if the error appears again

	short	operating time of less than 20 minutes	
8	CAN-bus error	There is a problem with connection of the module to the CAN-bus	Check for the module's cables connection
9	Settings error	Settings have been incorrectly stored in RCP's 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 diagnostics of the heater

Glossary

CAN - Control Area Network (digital network for data transfer in vehicles)
RCP - Remote Control Plug-in (electronic module for the heater remote control)
CIP - Combined Instrument Panel
BHM or Boost Heat Mode – operational mode of the heater, when it operates together with the engine to help the engine and the interior warm up more quickly.