

RCP Can FTC
Version 7.2

Technical description
User manual

Rev. A

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Description

The **RCP Can-FM** module is intended for remote control connection to the fuel-fired heater (parking heater, fuel operated heater, pre-heater), which was factory equipped on **Ford Transit Custom** (2013-) and **Ford Tourneo Custom** (2013-), including the original Ford vehicle key. The device controls the heater via CAN-bus.

Module Possibilities

- The heater start and stop by various impulses
- Heater status signals
- Embedded remote control of the heater by the original 3-button Ford vehicle key
- Remote cancellation of the heater start, programmed by the driver information system
- Extended boost heat mode control
- Main battery protection from discharging by inspection of the voltage level and time of autonomous work of the heater
- Heater errors clearing (unblocking)

Package Content

1. RCP Can-FM module
2. Wiring for permanent connection
3. Plug-n-play cable
4. Manuals

Signals

The module has two connectors: 9-pin connector X1 (table 1) for input signals and power connection, 10-pin connector X2 (table 2) for output signals, special signals and CAN-bus connection. The first pin on each connector is marked by the key.

Table 1

X1 pin number	Signal Name	Polarity	Wire colour
1	Heater_off+	+	White
2	Heater_off-	-	Grey
3	Heater_on+	+	Green
4	Heater_on-	-	Blue
5	Button	-	Brown
6	Timer_in	+	Orange
7	RC_in	+	Yellow
8	<i>Ground</i>		<i>Black</i>
9	<i>Battery Power</i>		<i>Red</i>

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

Table 2

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

*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 by Italics

X1.1 Heater_off+

The input can be used to switch off the heater, operated in pre-heat mode, by the impulse of positive polarity (the input **Heater_off-** in that case has to be connected to the Ground). The heater is stopped by the leading edge of the impulse. If the heater is idle, positive impulse on this input cancels the program start of the heater, programmed by DIS.

X1.2 Heater_off-

The input can be used to switch off the heater, operated in pre-heat mode, by the impulse of negative polarity (the input **Heater_off+** in that case has to be connected to the Power). The heater is stopped by the leading edge of the impulse. If the heater is idle, negative impulse on this input cancels the program start of the heater, programmed by DIS. This input is suitable for the most alarm systems and GSM-modules connections in order to control the heater remotely.

X1.3 Heater_on+

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

X1.4 Heater_on-

The input can be used to switch the heater on by the impulse of negative polarity (the input **Heater_on+** 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 Button

The input for outer multi-functional button connection. The current function of the button depends on the heater status, the ignition status and the engine status (see Table 4 for more details)

X1.6 Timer_in

Not used in current version

X1.7 RC_in

The input can be used to switch the heater on/off by an 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 and 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**X1.9 Power +12V**

X2.1 RC_out

Signal is used for RCP 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

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 receive a notification to remote control (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 receive a notification to remote control (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 Engine_RS

Not used

X2.6 Indication

The output can be used for connection of stand alone or button built-in indicator, which will inform you about heater run-time errors.

X2.7 Sensor_In

Not used

X2.8 Sensor_Out

Not used

X2.9 CAN-L

Low-level line of Medium Speed CAN bus.

X2.10 CAN-H

High-level of Medium Speed CAN bus.

Connection

RCP Can has two variants of connection. Plug-n-play connection is easy type of connection which not requires special skills. Permanent connection is recommended for professional installation. It needs at least some experience in car electronics installation. Read installation manual for detailed connection schemes.

Basic Functions

1. To start/stop the heater by additional remote control, see documentation for the remote control. The functions of the remote control depend on its possibilities, connection schemes and module's settings.
2. To start the heater by the original Ford key press "Unlock" button 3 times and then press "Lock" button. Time intervals between presses must not exceed 20 seconds. The excess of time interval will restart the counter of "Unlock" button presses. Watch to the turn signals to be sure that RCP has received a command from the key: every "Unlock" button press on the key will be confirmed with long single flash of hazard flashers, "Lock" button press on the key will be confirmed with short double flashes of hazard flashers.
3. The RCP Can is adjusted by default only to switch the heater on by Ford key. If you also plan to switch off the heater too, change the setting 3.1. As both the commands use the same combination of "Unlock" presses, you should know a condition of the heater before a command send. The possibility to stop the heater remotely may be useful in the case of cancelation of the trip, including ones programmed by DIS.
4. You can remotely cancel the start of the heater by a DIS program, if your additional remote control can send stop command when the heater is idle (not possible by Ford key). After stop command sending, DIS programs will be temporary disabled. Starting the heater by any way or turning the ignition on will enable DIS programs again.
5. Additionally installed button has several functions. Current function is defined by the heater condition, the ignition condition and the engine condition (see table. 3)

When the ignition is turned off, 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.

When the ignition is turned on, button press keeps the current condition of the heater after the engine start. So, if the heater has operated before the engine start, it may continue to operate after the engine start (in boost heat mode). If the heater has been idle before the engine start, button press will inform RCP don't let the heater to start in boost heat mode after the engine

start. These functions are called quick enabling and disabling of boost heat mode respectively. Being activated these functions act for the current ignition cycle. Turning the ignition off cancels function activity.

When the engine runs, the button press is used to quick enable of the boost heat mode (if boost heat mode was disabled).

Warning! The parking heater must not be operated at filling stations, near sources of combustible vapours or dust or in enclosed spaces

Table 3

Button function	Ignition status	Engine status	Heater status	Description (how to use)
Heater immediate start	Off	Not running	Off	One-touch heater start
Heater immediate stop	Off	Not running	On	One-touch heater stop
One-time boost disable	On	Not running	Off	Quick disabling of boost heat mode for short trips
One-time boost enable	On	Not running	On	Quick enabling of boost heat mode in the case of boost heat mode disabling by RCP settings or in the case of one-time disabling previously
	On	Running	Off	

The fuel fired heater needs about 3 minutes to go to the normal operation after the startup. If your trip is planned to be shorter, it is highly recommended to use a button function called “one-time boost disable”. This preserves the heater from premature clogging. Turn on the ignition, press the button, then start the engine. Now the heater will not operate with the engine while don’t you enable boost heat mode again.

Additional Functions

By default RCP Can is adjusted to execute basic functions, such as a start of the heater by the Ford 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 (a possibility to stop the heater by Ford key, battery monitoring, indication by the turn signals in the rear-view mirrors, extended control of boost heat mode, etc.) you may 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. Plug-n-play cable is equipped with preinstalled

programming button. Use additionally installed button as programming button in the case of permanent connection of the module.

It is necessary to stop the engine and the heater before. Turn the ignition on, press and hold the brake pedal. Then press and release 3 times programming button (hold additional button every time until LED is not goes off, about 1.5 seconds). Both turn signal repeaters in DIS will flash twice (LED goes on) as a confirmation of entering programming mode. Release the brake pedal now.

Each setting in the table 1 corresponds to the 3-digit code. You need to enter appropriate code to activate a setting. To enter a digit of a code, press the button so much times, as corresponds to a digit. Each button press is confirmed 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) and by a LED blink. To confirm enter of a digit press and release the brake pedal (DIS flashes one time by the both repeaters simultaneously). When the third digit is entered, module 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) and by a LED (goes off once a second twice in the case of valid code, goes off for 2 seconds 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 the brake pedal until the module indicate an error by repeaters. Enter the code again in that case. Also you may enter other codes without exit of programming mode.

Release a brake pedal and 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.

To clear all the errors in the heater's memory and thus unblock the heater, enter the code 9.1.1. Both repeaters will flash five times to confirm command execution. If unblocking of the heater is impossible, the repeaters will flash five times alternatively. **Pay attention:** when you apply unblocking function for the first time, RCP Can remember VIN code of the car. In the future unblock function will work only for this car.

Settings Table (4)

2. Heater Timing	2.1. Limitation of heater's total operation time in pre-heat mode	2.1.1 *Not applied 2.1.2 40 minutes 2.1.3 50 minutes 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
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		2.1.9 120 minutes
	2.2. Limitation of heater's cycle operation 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
3. Heater remote control by Ford Key	3.1. "Unlock" button function for the heater control	3.1.1 *Heater start only 3.1.2 Start of idle heater, stop of operated heater
	3.2. "Unlock" button presses count to start the heater	3.2.1 Heater control by Ford key is disabled 3.2.2 Two presses 3.2.3 <i>Three presses</i> 3.2.4 *Four presses 3.2.5 Five presses 3.2.6 Six presses
4. Battery Monitoring	4.1. Minimal voltage to let the heater start in pre-heat mode	4.1.1 * Not adjusted 4.1.2 11.4V 4.1.3 11.6V 4.1.4 11.8V 4.1.5 <i>12.0V</i> 4.1.6 12.1V 4.1.7 12.2V 4.1.8 12.3V 4.1.9 12.4V
	4.2. Minimal voltage to keep operating the heater for pre-heat mode ²	4.2.1 * Not adjusted 4.2.2 10.6V 4.2.3 10.8V 4.2.4 11.0V 4.2.5 11.2V 4.2.6 <i>11.4V</i> 4.2.7 11.5V 4.2.8 11.6V 4.2.9 11.7 V
6. Heater startup and operation mode indication by the turn signals ⁶	6.1. Indication of command reception from remote control ⁷	6.1.1 Off 6.1.2 *Three flashes
	6.2. Indication of successful startup of the heater via remote control	6.2.1 Off 6.2.2 *Seven flashes
	6.3. Indication of the operated heater, started by remote	6.3.1 *Off 6.3.2 On

	control	
	6.4. Indication of the operated heater, started by DIS (direct or program start)	6.4.1 *Off 6.4.2 On
	6.5. Indication of the operated heater, started by additional button	6.5.1 *Off 6.5.2 On
	6.7. Flashing frequency for indication of heater autonomous operation	6.7.1 One flash within 3 sec 6.7.2 One flash within 5 sec 6.7.3 * <i>One flash within 10 sec</i> 6.7.4 One flash within 15 sec
7. Output signals adjustment	7.3. Notification signals on the output “Alert_1”	7.3.1 *"Heater started" ⁴ 7.3.2 "Heater stopped" ⁴ 7.3.5 "Heater started to burn" ⁴ 7.3.6 “Heating finished 7.3.7 "Error occurred" 7.3.8 Disable the output
	7.4. Notification signals on the output “Alert_2”	7.4.1 "Heater started" ⁴ 7.4.2 *"Heater stopped" ⁴ 7.4.5 "Heater started to burn" ⁴ 7.4.6 “Heating finished 7.4.7 "Error occurred" 7.4.8 Disable the output
	7.5. Signals on the output “Status”	7.5.1 Heater operates (potential) 7.5.2 *Heater operates autonomously (from battery, engine is off) (potential) 7.5.3 Hazard flashers control (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. Ventilation is on during the heater operation (potential) 7.5.7. Ventilation is off during the heater operation (potential) 7.5.10. Disable the output
	7.6. Signal feed to the output “Status_Plus”	7.6.1 Heater operates (potential) 7.6.2 *Heater operates autonomously (from battery, engine is off) (potential) 7.6.3 Feedback for Defa Vehicle Unit

		7.6.4 Engine runs (potential) 7.6.5 Ventilation is on during the heater operation (potential) 7.6.6. Disable the output
8. Settings reset		8.1.1 Apply factory settings
9. Heater errors reset		9.1.1 Clear all errors in heater's memory, resulting heater unblocking

* Factory setting

Recommended settings is marked in italics

² –RCP will turn off the heater if the battery voltage becomes lower than presetted

³ – Setting is not tested yet

⁴ – Signals appear only at the heater autonomous operation

⁵ – Signal is used for indication by 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), not via plug-n-play cable

⁷ – Ford key only

Troubleshooting

If a run-time error occurs at the start of the heater, RCP Can will inform you by the built-in and additional LEDs blinking about the error code. The number of flashes 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
1	Start error	Fuel level in the tank is close to empty	Refuel the vehicle
2	No answer from the heater followed the start command	Outer temperature is upper than +15 Celsius degrees	The heater works only with temperatures below +15°C. It is the heater manufacturer's restriction
		The engine is hot (no need to pre-heat)	Let the engine cool down below +75 degrees

		The heater hasn't finished previous cycle of operation yet (you can hear the noise from the air blower fan)	The heater will startup after previous cycle of operation will be fully completed
		The heater is blocked after 5 unsuccessful starts	Try to start the heater from DIS 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 by RCP command 9.1.1.
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 4.1 и 4.2	Charge vehicle's battery with special charger (or start engine to charge) or cancel 4.1/4.2 module's settings
4	Time limits exceeded	Time limit for autonomous operation of the heater is 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	Unsuccessful start	The heater switched off spontaneously at startup	Make a diagnostics of the heater if the error is repeated
6	Operation cycle too short	The heater was switched off spontaneously with operating time of less than 20 minutes	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 the module 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