CAN-bus interface

CANTEC-F2

CAN-bus interface with USB-support for analogue car-alarms, PDC & more

18.12.2019

Contents

Product features

CANTEC-F2 is a universal CAN-bus interface, hereafter referred to as unit, designed for connecting after-market car-alarm security, park-distance control, multimedia and service systems to vehicles with CAN-bus. The Unit has a build in micro USB port for easy programming with TECprog Software.

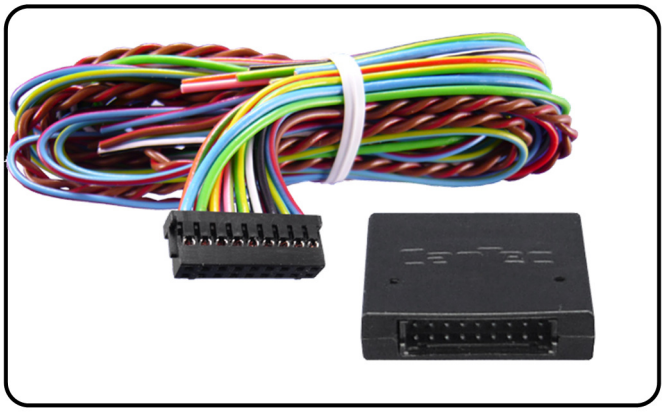
The unit has ten programmable outputs, two of which have changeable polarity. 24 different output functions are available (see chapter 4.2.1., available programmable outputs functions – table 4). Four programmable inputs are designed for controlling vehicle devices. 9 different input functions are available (see chapter 4.2.2., available programmable inputs functions – table 6).

Vehicle recognition (model selection) is carried out automatically - for the majority of vehicles after connecton, turning ignition on and off + vehicle locking/unlocking by original remote control key.

1. Prior to installation

Read the manual prior to installation.
Technical knowledge is necessary for installation. The place of installation must be free of moisture and away from heat sources.

1.1. Delivery contents



1.2. Checking the compatibility of vehicle and function limitations

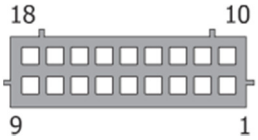
Requirements	
Vehicle	See CANTEC-F2 compatibility list at
Limitations	
Vehicle-specific functions	See CANTEC-F2 vehicle-specific installation files and compatibility list
TECprog software look at:	http://tecel.ru/en/tecprog/
Look for product info at	www.navlinkz.de or www.canbus-alarm.com

1.3. Planing programmable inputs and outputs

It is strongly recommended to read the complete manual and to plan in advance, which of the available programmable input and output functions are needed for the specific installation (see chapter 4.2.). Maximum currents of the unit's programmable inputs and outputs must match connected devices' power consumption.

It is possible to do most of the programming works with the TECprog software.
Please connect the Cantec Module with the Micro USB plug after you have installed the Software from TEC website. It is not possible to setup the vehicle type of vehicles what are newer than year 2017. This cars are almost not more listed in TECprog.
Please choose the automatic vehicle recognition (see **3.2.1**) procedure for all cars – not TECprog for this setup! Otherwise wrong CAN connections will be not or bad detected.
Nearly all other setup works for inputs outputs and user or hardware options are possible to realize with TEC-prog. (For all compatible cars what are listed in integrator.)

2. Pin definition and factory defaults of programmable outputs/inputs

Male pins of black-box 18pin port 

Programmable outputs/inputs configuration can be done out via programming (see chapter 4.) or via TEC-PROG tool and software with Windows PC. Factory defaults are predefined according to table 1. These settings can be restored by resetting the unit (see chapter 5.)

Pin definition and factory defaults of programmable outputs/inputs – table 1				
Pin no.	**Harness wire color**	**Functionality**	**Factory default settings**	**Maximum current**
1	Blue/red	Programmable output (+ / -) with changeable polarity*	Front parking sensors polarity +	200 mA
2	Blue/yellow	Programmable output (+ / -) with changeable polarity*	Back parking sensors polarity +	200 mA
3	Black	Ground of power supply	-	-**
4	White/black	Programmable output (+)	ACC	50 mA
5	Green/yellow	Programmable output (-)	Brake	50 mA
6	Pink/green	Programmable output (+)	Ignition	50 mA
7	Yellow/red	Programmable output (+)	PDC LED	50 mA
8	Green	Programmable input (-)	PDC control button	1.5 mA
9	Blue	Programmable input (-)	Unlock central door locking	1.5 mA
10	Brown/red	CAN-high of vehicle data bus	-	-
11	Brown	CAN-low of vehicle data bus	-	-
12	Red	+12V of power supply	-	750 (4) mA ***
13	Gray/black	Programmable output (-)	Original buttons	50 mA
14	Gray/blue	Programmable output (-)	Car is moving	50 mA
15	Gray/green	Programmable output (-)	Parking brake	50 mA
16	Gray/yellow	Programmable output (-)	Speed	50 mA
17	Orange/white	Programmable input (+)	Hazard light control	1.5 mA
18	Orange/green	Programmable input (-)	Trunk opening	1.5 mA

* Outputs with changeable polarity. Outputs' operation with load higher than the indicated is not guaranteed and may damage the unit.
** Consumed current of output pin 3 depends on the load connected to all negative outputs.
*** Typical current rate is indicated for operation and standby modes. It may change depending on positive outputs' load.

Avoid making contact between ground and outputs pins 4, 6, 7 or +12V and outputs pins 5, 13-16. Otherwise the unit is damaged.

3. Installation

3.1. Power and CAN connections

Disconnect the vehicle's battery during installation or changes on the wiring!
Connect +12V, Ground, CAN-high and CAN-low wires of the unit's harness to the corresponding wires of the vehicle (see vehicle-specific installation file).
Connect the unit's black-box to its harness and make sure that all other open end wires of the harness do not short-circuit.

3.2. Vehicle recognition

For proper operation, the unit must recognize the vehicle and its specific CAN-bus, thus vehicle group and sub-group. There are two ways:

3.2.1. Automatic vehicle recognition

After installing the unit to power and CAN-bus, by carrying out a set of simple actions (see vehicle-specific installation file for procedure) the vehicle-specific group and sub-group are defined automatically. To check correctness of group and sub-group the LED issues a number of light signals (group number – pause, sub-group – pause).

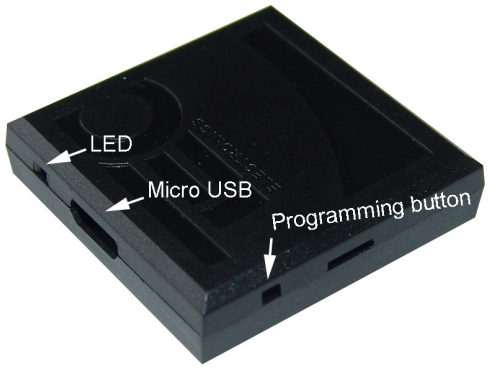
If the unit identifies both vehicle group and sub-group, it emits triple series of light signals, where the number of long signals corresponds with the group number, while the number of short signals corresponds with the sub-group number.

If the unit identifies only the vehicle group, it stops emitting short light signals and periodically emits series of lights signals, where the number of signals corresponds with vehicle group.

3.2.2. Forced vehicle recognition

Forced vehicle recognition is only to be executed in exceptional cases, when automatic vehicle recognition has failed.

Programming is carried out via programming button and LED indicator, which are located in the unit's body. Prior to forced vehicle recognition, the vehicle group previously **must not** have been identified (if the vehicle group has previously already been identified, a factory reset is necessary) and the CAN-bus **must not** be connected. Programming stops if the programming button is not pressed within 60 seconds.



Programming sequence of forced vehicle recognition:

1. Connect the unit to power only and wait for permanent short fast light signals.
2. Press and release the programming button 10 times (begin this action not later than 10 seconds upon connecting the power source to the unit). If all the actions are carried out correctly, the unit confirms with three light signals.
3. Enter option No. 1 – forced vehicle recognition (see table 2, chapter 4.1.) – by pressing the programming button 1 time. The unit confirms the selection with repeated single light signals.
4. Enter vehicle group number by pressing the programming button for the corresponding number of times (see vehicle-specific installation file for group number). The unit periodically emits series of light signals, where the number of signals corresponds with the entered group number.
5. Wait at least 2 seconds.
6. Enter the vehicle sub-group number by pressing the programming button for the corresponding number of times (see vehicle-specific installation file for sub-group number). Check if the vehicle model has been chosen correctly. The unit emits light signals (group number – pause, sub-group number – pause):
    - If the vehicle model is chosen correctly, press the programming button once. Light signals stop and the vehicle model is saved.
    - If the vehicle model has been chosen incorrectly, press the programming button twice. Repeat the programming beginning from point 4.
7. Reconnect unit to CAN-bus.

3.3. Connections of programmable outputs/inputs

After successful vehicle recognition disconnect the unit's black-box from its harness. Connect all the input and output wires to the corresponding places. Make sure that unneeded output/input wires are isolated.

4. Programming

All programming is done by the unit's programming button, LED and the vehicle's brake pedal. The unit's settings and input/output functions can be changed or checked in two menus after entering their programming modes. In MENU 1 it is possible to change settings – activate/deactivate functions, or change values or algorithms of functions (see chapter 4.1.). In MENU 2, the functions which shall be used on the unit's programmable outputs (see chapter 4.2.1.) and on the programmable inputs (see chapter 4.2.2.) can be defined.

4.1. Settings programming (MENU 1)

Follow the below *programming sequence* to change or check settings of MENU 1:

1. Turn on ignition.
2. To enter MENU 1, press the programming button 10 times. The unit confirms with three light signals.
3. After selecting the option desired from table 2, to change or check its status, press the programming button for the number of times corresponding with the option number (no.). The unit confirms with the same number of light signals.
4. To enter the programming mode, press and hold the brake pedal*****. The unit informs about the status of the chosen option by the corresponding number of LED light signals. There is no countdown until programming mode is deactivated.
5. Change the option's setting value (exception: option no. 9 – PDC control button - see table 2 instead******) by pressing the programming button for the number of times required to move from current setting to the required setting value while the last setting value is followed by the first one. (e.g., in order to change option no. 5 (comfort timer channel) from setting value 3 to 1, press the programming button 4 times). The unit confirms new the setting value with the corresponding amount of light signals.
6. Release the brake pedal. The unit's light indication changes from option setting back to option number. It is possible to proceed with programming the next option or to leave the programming mode.
7. Move to next option's programming by pressing the programming button for the number of times required to navigate from current option's number to the required option's number while the last option's number is followed by the first one.
8. The unit leaves the programming mode and saves all settings in permanent memory, 60 seconds after last action if brake is not pressed or when ignition is switched off.

***Note –** If the vehicle's brake pedal is not visible on CAN-bus (see vehicle-specific installation file), the unit's trunk opening input is used (GND impulse instead of brake pedal press).

Settings (MENU 1) – table2			
no.	**Option description**	**Setting range/ default**	**LED signals, notes**
1	Forced vehicle recognition	- / -	See chapter 3.2.2. Forced vehicle recognition
	Forced vehicle group and sub-group assignment, when automatic has not worked.		
2	Original car alarm control	-/disabled	LED is on – factory car alarm control is on LED is off – factory car alarm control is off
	If ON, the unit locks and unlocks the vehicle with the same commands that activate (deactivate) the original alarm system (via original remote control, door lock etc.). If OFF, the unit locks (unlocks) the vehicle with commands that don't activate (deactivate) the original alarm system. (E.g. central lock locking/unlocking via vehicle interior button).		
3	Sequential door opening	-/disabled	LED is on – the function is on LED is off – the function is off
	Activating or deactivating the sequential door opening. If activated upon one unlocking command only driver's door is unlocked, after two commands all doors.		
4	Automatic windows closing (comfort feature)	-/disabled	LED is on – the function is on LED is off – the function is off
	Activating or deactivating automatic windows closing comfort feature when using the central lock. If ON, 2 seconds after central locking the unit will close the windows.		
5	Comfort timer channel function operation length – output function no. 24	1-6 / 3	One LED signal per 10 seconds
	Time during which timer channel (comfort) function stays active. Set in 10-second intervals.		
6	Central locking alternative control algorithm of output pin 2	1-3/-	1 – impulse negative control 2 – impulse positive control 3 – impulse negative control (when central locking status is not available)

<table>
<tr><td></td><td colspan="3">In most cases the algorithm and polarity are set automatically when recognizing the vehicle.</td></tr>
<tr><td rowspan="2">7</td><td>Hazard lights alternative control algorithm of output pin 1</td><td>1-5 / -</td><td>1 – impulse negative control
2 – status negative control
3 – impulse positive control
4 – status positive control
5 – lamps control (negative)</td></tr>
<tr><td colspan="3">In the majority of cases the algorithm is set automatically when recognizing the vehicle.</td></tr>
<tr><td rowspan="2">8</td><td>Parking distance control (PDC) system algorithm – output functions no. 17-19</td><td>1-3/1</td><td>1 – “Activation on rear gear”
2 – “Activation on speed”
3 – “Activation on rear gear with priority of switching off”</td></tr>
<tr><td colspan="3">“Activation on rear gear” - Front and rear parking sensors are activated when reverse gear is engaged or by PDC control button (see option no. 9). Deactivation upon speed reaches 15km/h or by PDC control button.

“Activation on speed” - Front parking sensors are active as long as the vehicle’s speed is less than 15km/h. Rear parking sensors are active if the vehicle moves back and its speed is less than 15km/h. Activation (when speed < 15km/h) and deactivation possible by PDC control button. Automatic (re-)activation on ignition on.

“Activation on rear gear with priority of switching off”. Same algorithm as “Activation on rear gear”, but if parking sensors have been deactivated by PDC control button no automatic activation on engaged reverse gear until next ignition on or activation by PDC control button.</td></tr>
<tr><td rowspan="2">9</td><td>PDC control button – output functions no. 17-19</td><td>-/-</td><td>Any OEM (factory) vehicle’s button which is “visible” in CAN-bus can be used. Also any (negative/positive) button connected to the corresponding output of the unit. Also the length of control press can be determined.</td></tr>
<tr><td colspan="3">PDC control button assigning algorithm. Press and hold the button that you have chosen as PDC button for the particular time:
• Control with short press – keep button pressed less than 2 seconds
• Control with long press (2.5 sec) – keep button pressed 3-5 seconds
• Control by status (on/off) – keep the button pressed longer than 5 seconds
The LED light is off while the button press is detected. Release the button. The unit emits one light signal and turns off. → 6. of programming sequence (chapter 4.1.)</td></tr>
</table>

4.2. Programmable outputs/inputs configuration (MENU 2)

In MENU 2, the programmable outputs and inputs can be set to other functions than the predefined factory defaults (see chapter 2.).

Follow the below *programming sequence* to change or check programmable output/input functions of MENU 2:

1. Turn on ignition.
2. To enter MENU 2, press the programming button 12 times. The unit confirms with four light signals.
3. After selecting the programmable output's/input's option no. desired to change/check (see chapters 4.2.1. or 4.2.2., tables 3 or 5), press the programming button for the number of times corresponding with the option number (no.). The unit confirms with the same amount of light signals.
4. To enter the programming mode, press and hold the brake pedal*****. The unit informs about the status of the chosen option by the corresponding number of LED light signals. There is no countdown until programming mode is deactivated.
5. Change the option's function no. by pressing the programming button for the number of times required to move from current setting to the required setting value while the last setting value is followed by the first one. (e.g., in order to change option no. 5 (positive output – pin 4) from factory default function no. 13 - engine on to function no. 21 - brake, press the programming button 8 times). The unit confirms new the setting value with the corresponding number of light signals.
6. *Exceptions: programmable output functions no. 8, 10 and 15 require additional programming sub-sequence, see corresponding function no. in table 4.*
7. Release the brake pedal. The unit's light indication changes from option setting value back to option number. It is possible to proceed with programming the next option or to leave the programming mode.
8. Move to next option's programming by pressing the programming button for the number of times required to navigate from current option's number to the required option's number while the last option's number is followed by the first one.
9. The unit leaves the programming mode, and saves all settings in permanent memory, 60 seconds after last action if brake is not pressed or when ignition is switched off.

***Note –** If the vehicle's brake pedal is not visible on CAN-bus (see vehicle-specific installation file), the unit's trunk opening input is used (GND impulse instead of brake pedal press).

4.2.1. Programmable outputs (MENU 2 – options no. 1-12)

Pin 1 and 2 are, if necessary for this vehicle, preset to alternate hazard lights control and alternate central locking control, including the required polarity (see vehicle-specific installation file). If alternate hazard lights control and alternate central locking control are not necessary, both pins are programmable (max. 200mA) with changeable polarity. When

assigning any of the available output functions to these two programmable outputs, it is necessary to set the required polarity.
All other outputs are generally programmable and can be changed from their factory defaults (see chapter 2. - table 1) to any other available output function (see chapter 4.2.1., table 4) with max. 50mA. It is possible to use the same function for more than one output.
It is possible to enter the from table 4 chosen output function for each programmable output into below table 3.

Programmable outputs configuration (MENU 2) – table 3			
no.	**Option description**	**Setting range / default**	**Notes (enter programmed/planned output functions from table 4)**
1	Output (+/-) pin 1	(1-24) / 17	Front parking sensors turning on
2	Output pin 1 polarity	+ / positive polarity	LED is on – positive LED is off – negative
3	Output (+/-) pin 2	(1-24) / 18	Rear parking sensors turning on
4	Output pin 2 polarity	+/ Positive polarity	LED is on – positive LED is off – negative
5	Output (+) pin 4	1-24/12	ACC
6	Output (-) pin 5	1-24/21	Brake
7	Output (+) pin 6	1-24/11	Ignition
8	Output (+) pin 7	1-24/19	PDC LED
9	Output (-) pin 13	1-24/10	Original buttons
10	Output (-) pin 14	1-24/16	Car is moving
11	Output (-) pin 15	1-24/22	Parking brake
12	Output (-) pin 16	1-24/20	Speed

The setting range 1-24 in table 3, equals the available programmable output functions from table 4.

Output functions no. 8, 10 and 15 have sub-settings for which the sub-sequences to chapter 4.2. are also described in table 4.

Available programmable output functions – table 4		
no.	**Function**	**Function description**
1	Security	Constant level signal while the unit is in Secure mode.
2	Arming impulse	0.8 sec long impulse when the unit is armed.
3	Disarming impulse	0.8 sec long impulse when the unit is disarmed.
4	Trunk opening via original remote control impulse	0.8 sec long impulse on trunk opening command of original remote control.
5	Original alarm system panic	Constant level signal while original alarm system (if one is installed) is in alert mode.
6	Siren panic	30 sec long constant level signal when one of the zones is triggered in security mode: trunk, doors, hood opening. This function can be used in vehicles that are not equipped with an original alarm system. The signal stops when the vehicle leaves security mode.
7	Panic on horn from external input	Impulse signal while there is an input signal on a programmable input which is defined as horn control.
8	Doors, hood and trunk	Constant level signal when any of the preprogrammed doors, hood or trunk is open.
	Programming sub-sequence: Any combination of doors, hood and trunk opening can be chosen to trigger this programmable output. For purpose of description, the doors, hood and trunk is below referred to as doors. Release brake. Open only doors that are supposed to be indicated by this output, keep the rest closed (doors can be open in advance). Press the brake again. The unit confirms with series of 8 light signals and the open doors are be assigned as trigger(s) to this output. If the brake is not pressed, the previous assignment stays saved. After releasing the brake, the unit starts indicating the option's no. → 8. of programming sequence (chapter 4.2.).	
9	Sensors ignoring	Constant level signal while in security mode with the trunk open if it is opened with original remote control. Also the signal is formed for the time while comfort feature is active. This function is designed for organizing sensors' deactivation in order to evade false alarms.

10	Original buttons	Constant level signal when a preprogrammed vehicle button is pressed.
	Programming sub-sequence: Without releasing the brake, press desired button (see vehicle specific installation file for visible buttons). Upon button identification, the unit stops emitting short light signals and emits series of 10 light signals. If brake is released prior to identification, the previous assignment stays saved. After releasing brake, the unit starts indicating the option's no. → 8. of programming sequence (chapter 4.2.).	
11	Ignition	Constant level signal while ignition is on (including engine start).
12	ACC	Constant level signal while vehicle ACC is on (first key position, may be congruent with ignition in some vehicles). Deactivation when the key is removed from the ignition lock. Can be used as accessory power supply for multimedia systems.
13	Engine on	Constant level signal while engine is on.
14	Engine rpm	Impulse signal with impulse sequence frequency proportionate to vehicle crank rotation frequency. 1 impulse/sec corresponds with crank rotation frequency of 20rpm. Signal is designed for determining estimated, but not the exact rpm.
15	Transmission condition	Constant level signal when the transmission is set to preprogrammed gear (P, R, N, D). For robotized transmissions the following gears can be programmed: R, N, D). For manual transmissions only R gear is available.
	Programming sub-sequence: Without releasing the brake, set the transmission to required gear: P, N, D or R. Release and press the brake again. The unit stops emitting short light signals and indicates option setting number with series of 15 light signals. If the brake is not pressed, the previous assignment stays saved. After releasing the brake, the unit starts indicating the option's no. → 8. of programming sequence (chapter 4.2.).	
16	Vehicle moving	Constant level signal while the vehicle speed has exceeded a certain threshold rate (varies from vehicle to vehicle but within 5-10km/h).
17	Front parking sensors activation	Constant level signal for front-parking sensors activation according to algorithm chosen in MENU1 (table 2), no. 8

18	Rear parking sensors activation	Constant level signal for rear-parking sensors activation according to algorithm chosen in MENU1 (table 2), no. 8
19	Parking distance control LED indicator	Indicator the PDC system condition. • If parking sensors work according to “Activation on rear gear” or “Activation on rear gear with priority of switching off “ algorithm, LED indicator is ON when the sensors are active • If parking sensors works according to “Activation on speed” or “Activation on rear gear with priority of switching off “ algorithm, LED indicator is OFF when the sensors are not active
20	Speed	Impulse signal with impulse sequence frequency proportionate with vehicle movement speed. 1 imp/sec corresponds with 1km/h speed. This signal is designed for determining estimated but not the exact speed.
21	Brake	Constant level signal when the brake pedal is pressed.
22	Parking brake	Constant level signal when parking brake is activated.
23	Parking lights	Constant level signal when the external lights are activated.
24	Comfort timer channel	Constant level signal during a certain time period (from 10 to 60 seconds) after arming the vehicle. The time is set in units of 10sec.

4.2.2. Programmable inputs (MENU 2 – options no. 13-16)

All other inputs are generally programmable and can be changed from factory defaults (see chapter 2., table 1) to available input functions (see chapter 4.2.2., table 5) with max. 50mA. It is possible to enter the from table 6 chosen input function for each programmable input into below table 5.

Programmable inputs configuration (MENU 2) – table 5			
no.	**Option description**	**Setting range / default**	**Notes (enter programmed/planned output functions from table 6)**
13	Input (-) pin 8	1-9/9	PDC control button
14	Input (-) pin 9	1-9/2	Unlock central door locking

15	Input (+) pin 17	1-9/4	Hazard lights control
16	Input (-) pin 18	1-9/3	Unlock trunk

The setting range 1-9 in table 5, equals the available programmable input functions from table 6.

Available programmable inputs functions – table 6		
no.	**Function**	**Function description**
1	Central locking + Comfort	Trigger input (impulse) for central locking. When input signal is >2 seconds, windows comfort closing is started. Windows' closing stops when the signal stops. CAN-bus or alternate.
2	Central unlocking	Trigger input (impulse) for central unlocking. CAN-bus or alternate.
3	Trunk opening	Trigger input (impulse) for s opening the trunk lid via CAN-bus.
4	Hazard lights activation	Trigger input (impulse) for hazard lights, one flash per impulse. On some vehicles, uneven lamp blinking may be observed while the impulses are fed evenly. CAN-bus or alternate.
5	Horn control	Trigger input (constant) activates the programmable output function no. 7 – "panic on horn from external input". Sound output in intervals. Stopping the input feed stops this function.
6	Engine start	Engine starts via CAN-bus (only some Cadillac, Chevrolet, Hummer).
7	Central lock is locked (status)	Trigger input (constant) to provide "locked" status in vehicles where it is not available on CAN-bus (see vehicle-specific installation file).
8	Central lock is unlocked (status)	Trigger input (constant) to provide "unlocked" status in vehicles where it is not available on CAN-bus (see vehicle-specific installation file).
9	PDC control button	Used for providing control of PDC (parking distance control) with optional external button (required when no "visible" CAN-bus buttons available).

5. Reset to factory defaults

By hardware reset, all programmable settings and functions of the unit are restored to factory default and the vehicle recognition (group and sub-group) is erased. To restore factory defaults:

- Detach the unit from power source and CAN-bus.
- Press and hold the programming button.
- With the programming button pressed, supply power to the unit (CAN-bus must remain disconnected). The unit emits permanently short fast light signals.
- Detach the power source and release the programming button.

6. Specifications

BATT/ACC range	9V ~ 15V
Stand-by power drain	<4mA
Power consumption	9W
Temperature range	-40°C to +85°C
Weight (box with harness)	45g
Dimensions (box only) B x H x T	30 x 30 x 7 mm

CE ⎓ 12V DC

7. Technical Support

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8. Customer-specific programmable output/input configuration (complete)

For reason of better comprehension, in chapter 4.2., programmable outputs and inputs are separated. Full configuration can be noted in the below table. For support reasons, we also suggest to apply the extra serial number sticker in CANTEC-F2 box here:

_____

Pin definition and customer-specific outputs/inputs configuration				
Pin no.	**Harness wire color**	**Functionality**	**Factory default settings**	**Maximum current**
1	Blue/red	Programmable output (+ / -) with changeable polarity*		200 mA
2	Blue/yellow	Programmable output (+ / -) with changeable polarity*		200 mA
3	Black	Ground of power supply	reserved	
4	White/black	Programmable output (+)		50 mA
5	Green/yellow	Programmable output (-)		50 mA
6	Pink/green	Programmable output (+)		50 mA
7	Yellow/red	Programmable output (+)		50 mA
8	Green	Programmable input (-)		1.5 mA
9	Blue	Programmable input (-)		1.5 mA
10	Brown/red	CAN-high of vehicle data bus	reserved	
11	Brown	CAN-low of vehicle data bus	reserved	
12	Red	+12V of power supply	reserved	
13	Gray/black	Programmable output (-)		50 mA
14	Gray/blue	Programmable output (-)		50 mA
15	Gray/green	Programmable output (-)		50 mA
16	Gray/yellow	Programmable output (-)		50 mA
17	Orange/white	Programmable input (+)		1.5 mA
18	Orange/green	Programmable input (-)		1.5 mA