

Before installation always read carefully all these instructions.

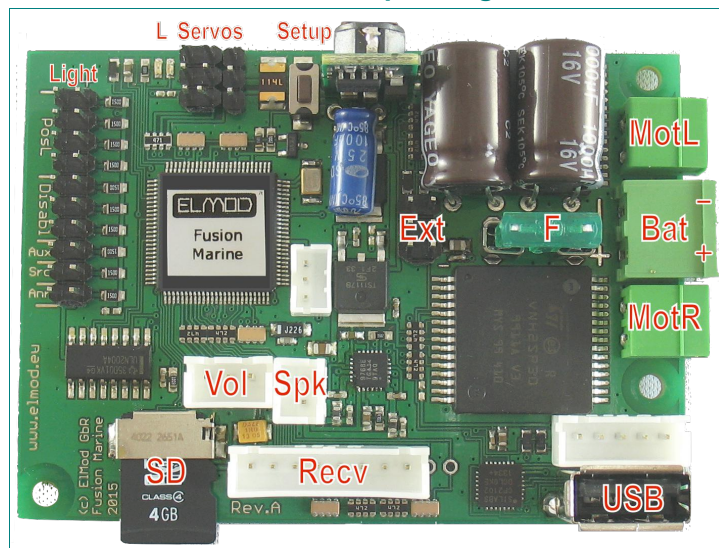
We congratulate on your purchase of the *EIMod Fusion Marine*, the innovative and universal full-option-solution for small and middle size vessels. The *EIMod Fusion Marine* enhances your model by true to scale movement, extensive lighting- and other functions combined with simple installation. All functions right down to the last detail may be easily adjusted on your computer by numerous parameters which are reasonable grouped and explained in detail. By ongoing improvements and software updates, which may be easily applied at home within few minutes, you bought a future-proof product.

Scope of delivery

Before starting the installation, check the scope of delivery for completeness.

- *EIMod Fusion Marine* PCB
- plug with cable for connecting to the battery
- plug for connecting up to two drive motors
- volume control rotary knob with cable
- cable for the RC receiver
- shrink tube for the protection of the connection between power cable and battery connector
- cable for connecting to the loudspeaker
- microSD card (already plugged-in on the PCB)
- USB cable for connecting to the computer
- contacts and housing for up to 10 light sources

Connectors and operating elements



Bat	battery connector (red/black for positive and negative poles)	SD	microSD card
MotR	connector for the right motor	Vol	connector for the volume control rotary knob
MotL	connector for the left motor	Spk	connector for the loudspeaker
F	main fuse	Recv	connector for the RC receiver
Setup	pushbutton for the motor setup, firmware update and reset	US	USB port for computer
Servos	servo connectors	Ext	connectors for external motor drivers
L	status LEDs		
Light	light outputs		
PosL	position light (up to four LEDs)		
Disabl	disabled and adrift light (up to three LEDs)		
Aux	auxiliary light / flash (one LED)		
Src	search light (one LED)		
Anr	anchor light (one LED)		

Hint: all connectors are marked and described on the bottom side of the PCB.

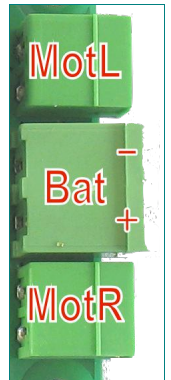
In this paragraph the installation is described step by step. It is essential that each step is accomplished correctly and completely. Wrong or improper connection may cause malfunction or damage and/or destruction of the electronics, the installed components or the model. Please contact the support of your dealer if you have further questions regarding the installation.

Connection of the power supply

- solder the loose ends of the power cable to a suitable battery plug
- to prevent short-circuits use the provided shrink tube for insulation
- attach the other sides of the cables to the power connector
- connect the red cable with the + terminal and the black cable with the – terminal of the battery plug. Incorrect connection causes the destruction of the electronics!
- keep the cable length as short as possible in order to prevent interferences!

The following battery types can be used:

battery type	cells	voltage	low voltage shut off
NiMh/NiCd	6	7,2 V	6 V
NiMh/NiCd	7	8,4 V	7 V
NiMh/NiCd	8	9,6 V	8 V
NiMh/NiCd	9	10,8 V	9 V
NiMh/NiCd	10	12 V	10 V
LiPo	2S	7,4 V	6,4 V
LiPo	3S	11,1 V	9,6 V
Pb	-	6 V	5,5 V
Pb	-	12 V	10V



If the battery voltage drops below a certain threshold, the protective undervoltage shut down will be activated. The voltage value depends on the used battery type as listed in the table.

If the battery voltage exceeds a maximum value, the protective overvoltage shut down will be activated.

The protective shut down (undervoltage and overvoltage) deactivates most functions of the *EIMod Fusion Marine*. The motors run only with half the nominal power. The announcement "Low Battery" or "Voltage too high" follows via loudspeaker every 5 seconds and the red status LED shows an error state (see chapter "Status LEDs").

The factory setting is NiMh/NiCd-battery 7,2V (6 cells). If another battery type is used, it has to be set in the configuration software, otherwise the undervoltage protection shut down won't work correctly.

If any other battery type as listed is used, a proper function cannot be guaranteed. The warranty is void if higher voltage than allowed is used!

Connection of the propeller motors (integrated drivers)

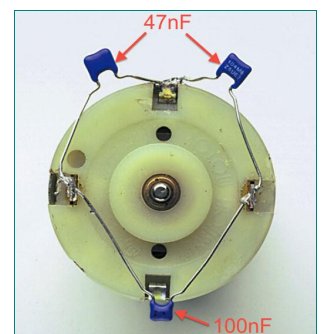
The *EIMod Fusion Marine* supports one or two DC motors for the main drive. Brushless motors and motors with an extra high current consumption may be used optionally by commercially available external drivers (see next chapter). It is not possible to operate integrated and external drivers simultaneously.

The maximum current consumption of the drive motors is internally limited to 30 A peak. The allowed permanent load is 10 A. The motor drivers need no further cooling. They are protected against short circuit and overload.

- attach the motor wires for the right propeller to the connector *MotR*
- attach the motor wires for the left propeller to the connector *MotL*
- for vehicles with only one propeller use one of the two connectors
- it is indifferent which cable (+/- of the motor) is connected to which screw terminal of the plug
- keep the cable length as short as possible in order to prevent interferences! For additional interference protection the motor cables can be twisted.
- IMPORTANT! The motors must be interference-suppressed. This is accomplished with the use of three capacitors as shown in the figure. Many motors are interference-suppressed already. Please check this by asking the producer or distributor of your motors. Genuine *EIMod* motors are fully suppressed.

For checking the correct wiring of the motors proceed as follows:

- make sure that the propeller can move freely and the vessel is secured
- connect a fully charged battery to the electronics and connect the power supply in accordance with section "connection of the power supply"
- please wait for 3-4 sec. until the blue LED starts blinking constantly
- press and hold the setup pushbutton
- the motors start rotating. The motors are connected correctly if the left one is rotating slightly slower as the right
- every few seconds the motors change their rotation. Release when the propellers rotate ahead. Now the motors are set up correctly
- by use of just one motor proceed respectively. Release the button when the propeller rotates in the forward direction



Connection of the drive motors (external drivers)

Commercially available external drivers may be connected directly to the *EIMod Fusion Marine*. The operating type (internal/external drivers) must be set by the configuration software (tab "drive", parameter "motor drivers"). It is not possible to operate integrated and external drivers simultaneously. The external drivers are connected with the *connectors Ext*. The black ground wire of the drivers points to the lower edge of the PCB.

Light functions

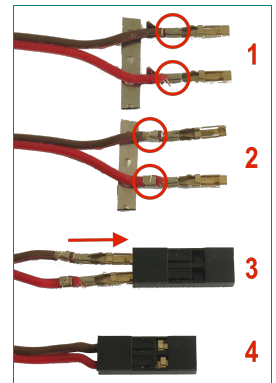
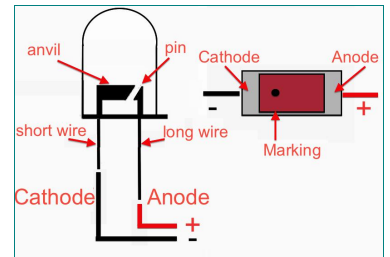
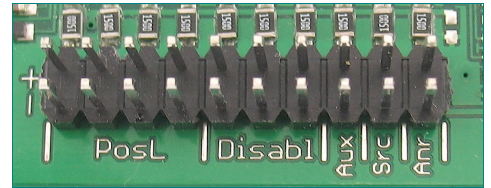
The *EIMod Fusion Marine* is able to control several light channels:

- position light ("Pos"), may drive up to four LEDs
- light for "disabled and adrift" ("Disabl") condition which consists of up to three LEDs
- auxiliary light ("Aux") which may be configured for single or double flash light with adjustable blinking frequency. One LED
- search light ("Src"). One LED
- anchor light ("Anr"), also one LED

Each light output may drive LEDs in any color and type. The light connections are short circuit protected and current limited to 30-40 mA.

All light channels are individually dimmable and may be switched on and off with the radio.

The LEDs are polarity sensitive. If the LED is wrong connected it won't light up. Nevertheless due to the circuit protection, the LEDs cannot be damaged. To light up the LED, the so-called anode must be connected with the red wire and the cathode with the black wire (see image). If you use wired LEDs the polarity may be distinguished as follows: the shorter wire is usually the cathode. Also the larger electrode or the flattening of the body marks the cathode. If you use SMD-LEDs you can recognize the cathode by a little dot inside the LED or a marking on the body.



A sufficient amount of housings and contacts are provided with the *EIMod Fusion Marine*. The cables for each LED have to be connected with two contacts:

1. use a suitable kind of braid wire (about 0,14 qmm, AWG 26 or thinner). Remove the insulation on the last 3 mm of the wires. Use precision pliers to fix the blank ends by bending of the small fishplates in the middle of the contacts.
2. fasten the wires by bending of the large fishplates circularly around the insulation
3. now push the contact into the housing
4. the contacts lay correctly when they snapped with the notches of the housing

Sound: installation and connection

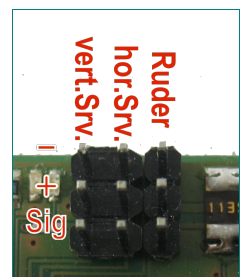
- plug the provided volume rotary knob to the volume connector
- the *EIMod Fusion Marine* also provides the option to control the main volume by the radio. To activate this feature the appropriate parameter has to be set in the configuration software (tab "sound volume", parameter "main volume control"). In this case the volume control knob on the volume connector will be deactivated.
- connect the loudspeaker's cable with the speaker output of a suitable 8 Ohm loudspeaker. The loudspeaker's polarity (+/-) makes no difference at this. We recommend the Visaton® FRS7-8 (loud, high pitch) or Visaton® FRS8-8 (quieter, lower/deeper pitch)
- install the loudspeaker in an insulated airtight chassis with as large volume as possible.
- check the correct fitting of the micro SD card. If the card is not well fitted or its contents is faulty, the sounds cannot be played.
- connect a fully charged battery to the *EIMod Fusion* and wait 3-4 sec. until the blue LED starts blinking constantly
- now push the setup button. The call "setup" is played.
- if this doesn't happen, please check if the volume is set too low



Servos

The *EIMod Fusion Marine* drives up to three servos. The servos are power supplied by the board. The maximum current is 1,5 A for all attached servos together. The servos are connected so that the ground line points to the upper edge of the PCB (see image).

Each servo is assigned to a fixed function. For each function the servo lock angle may be reversed be limited (separately for right and left side). This is useful if the attached mechanic has a smaller movement clearance as the servo's side arm). By one additional parameter each function may be further adjusted (see table).



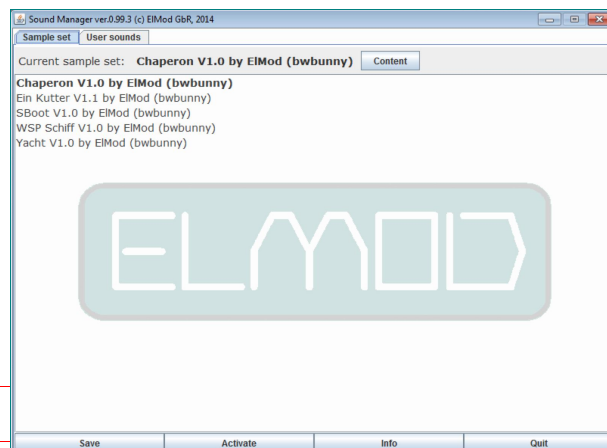
servo	function	effect	parameter (0-100%)
1	ruder	ruder position	speed dependent ruder deflection (0% - off, 100% - no ruder deflection on max. speed)
2	elevation	horizontal positioning of the search light	max. speed of the servo
3	traversal	vertical positioning of the search light	max.speed of the servo

Setup of the sample set

The provided micro SD card contains a number of sample sets for different vessels. At delivery the sample set for a motor boat is activated. If you want to activate a different set insert the microSD in your computer (use a suitable card reader or card adapter) and start the file "SoundManager.exe" (for Windows®) or "SoundManager.app" (for Mac® OSX®) located in the root folder of the card. Follow the screen instructions.

By the click of "confirm" the selected sample set will be activated. After quitting the program please ensure that the card was signed out correctly. Don't remove the card until it was signed out correctly from the system.

The SD card must not be removed or inserted in the EIMod Fusion board during operation!



RC receiver

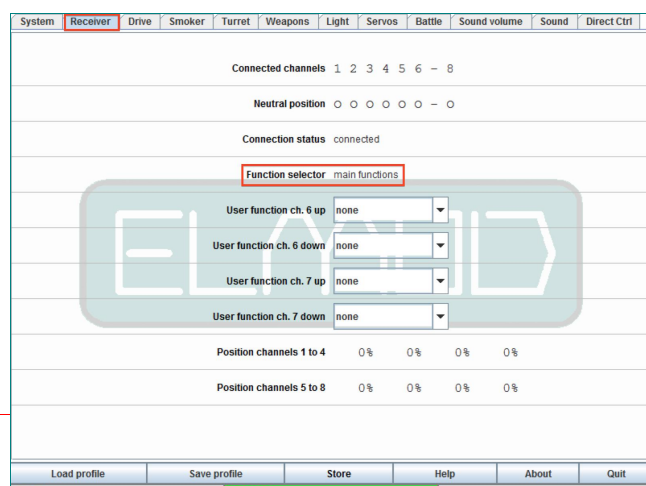
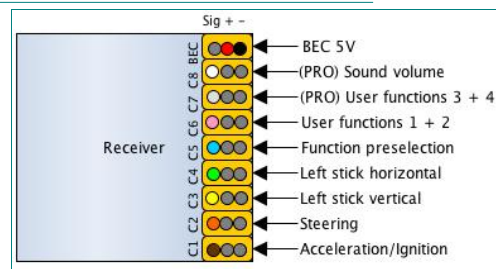
The *EIMod Fusion Marine* operates with a common radio gear. The number of required channels depends on the demands and is summarized in the table below. The power supply of the receiver is provided by the *EIMod Fusion Marine* (5V BEC, servo plug with red/black wire). An additional battery for the receiver is not necessary.

channel	function	wire color	control
1	propulsion	brown	stick
2	ruder	orange	
3	light functions, servos, ignition	yellow	stick
4		green	
5	selection of the function group	blue	3-way switch (up/off/down) or slider/knob (reduced function when using an on/off switch)
6	optional volume control	violet	slider/knob

The number of connected channels is determined automatically. For the correct identification and the correct function all mixers must be deactivated, the servo angle lock must be set to 100% and the trimming must be centered. Please contact the support of your dealer if you have problems with the identification and the operation of your radio with the *EIMod Fusion Marine*. In the majority of cases the cause is detected and fixed easily by the configuration software.

The control of channel 5 should be either a three way switch (top - center - bottom) or a slider/knob. The switch's position determines which function group is active on the left stick (main functions, servo functions or user sounds). In case the 5th. channel is not present, only the main functions are available. If an on/off switch is installed, two of three function groups are accessible. Use the configuration software to figure out which function groups are available (tab "receiver" parameter "Function selector". see figure).

The wires carrying the receiver's signals must be plugged in on the receiver so that the cable on the plug is connected with the signal bearing receiver's pin (usually the upper or inner pin on the receiver, see image). The black wire of the red/black power supply plug must be connected with the ground pin (usually the lowest or furthest pin at the power supply connection of the receiver). If your receiver doesn't provide polarity protected terminals, read the manual of the receiver to find out the correct pin assignment. Wrong connected plugs won't damage the components in most cases but the receiver won't work.



Depending on the used RC it may be necessary to change the order of the channels or to inverse the servo travel. Please read the manual of your RC gear for details. The signal of channels, that remains unused must not be connected.

Motor control (channels 1 & 2)

To start the engine the left stick must be moved to the upper most position for about 0,5 sec . The ignition sequence starts (see image below). Wait until the ignition sequence is finished and the idle sound is played. Now the vessel is operational.

- for moving the vessel forward, the throttle control must be moved to the top. The vehicle starts moving gently.
- is the throttle control released or moved back to the center, the motors stop running
- is the throttle control moved in the opposite to current direction, the motors start running in the opposite direction
- the rudder is controlled by the horizontal deflection of the right throttle stick (depending on the configuration by ruder servo only supported by the propellers)
- if the vessel stands still and the right throttle stick is moved horizontal, the vessel turns on a spot (prop reverse) Depending on the model type this behavior may not be desired and can be deactivated.
- all drive relating parameters may be configured by the configuration software.

To switch the motor off, proceed as follows: stop the vehicle for at least three seconds. After that the throttle stick must be put to the bottom and released back to the center position quickly. This procedure may not last longer than one second.

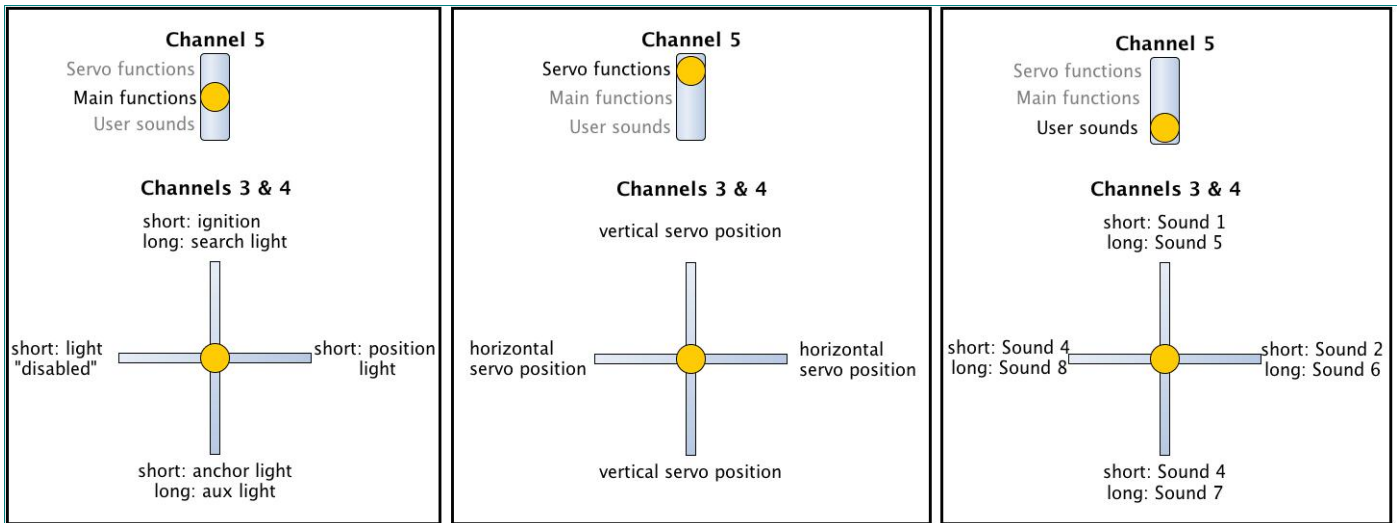
Is the motor restarted after just a short time, a shorter start up sequence (warm start) is played. The time of cooling down the engine may also be configured by the software.

Function control (channels 3 to 5)

The functions of the lights, search light servos and the ignition are implemented by the channels 3 to 5. Channel 5 chooses the function group that is available on the left stick:

- main functions (ignition, light channels on/off)
- servo function of the servos 2 and 3 (horizontal/vertical position of the search light)
- up to eight user defined sounds (such as horn or casting the anchor). Depending on the sample set there are different numbers and contents of user sounds. If a particular user sound is not defined, the call "User 1" to "User 8" is played. Custom user sounds may be easily added with the Sound Manager.

The function layout is shown below. Short operation means holding for less than 1 sec. Long operation means holding for at least 2 secs.



Status LEDs

The blue and red status LEDs on the PCB show the current operating status of the *EIMod Fusion Marine*.

- | | | | | |
|-----|---|---|----------|---|
| off | ■ | ■ | on | ready to operate. blue LED blinks once after stick movement |
| off | ■ | ■ | blinking | no receiver signal identified |
| on | ■ | ■ | off | under- or over voltage protection active |
| on | ■ | ■ | on | no SD card inserted, card empty or its contents faulty (operation only with default settings and without sound) |
- blinking red LED means that the currently played sound is clipped. That happens when the volume of several sound types was raised in the configuration software. To fix the problem, lower these settings. Otherwise the sound may be distorted.

First start up

- ensure that all wires are connected correctly
- switch on the RC
- attach a fully charged battery to the electronics and turn on the vessel
- the blue status LED blinks shortly after turning on and goes out again
- after 2-3 sec. the blue LED starts blinking periodically (search for receiver signal)
- the blue LED lights permanently as soon as valid receiver signals have been detected
- start the engine and have fun!

Installation

By choosing the fitting position please consider the following points:

- make sure that short circuits are excluded. The board must not touch any voltage carrying parts. Insulate all open wire connections with a shrinking tube.
- keep the cable length (especially the cables for the motors and the battery) as short as possible in order to prevent interferences!
- ensure that the antenna of the receiver is not located near metal parts (e.g. within a metal hull of a tank model) or between strong power consumer (motors). This can lead to a strong interferences of the radio signal and cause the loss of control of the model. The *EIMod Fusion Marine* provides fail-safe-mechanisms that help to detect the malfunction of the radio signal. For proper function the fail safe of the receiver should be deactivated.

Firmware update and configuration

The freely available software for Microsoft® Windows® and Mac® OSX® provides numerous parameters which may be tuned to get the most out of your vessel. Furthermore firmware updates of the *EIMod Fusion Marine* may be transferred to the board. Please notice, that the software needs direct access to the USB hardware and thus it must be run with administrator rights on Windows® computers. Also ensure that you malware protection software doesn't block the USB hardware access.

Configuration and tuning

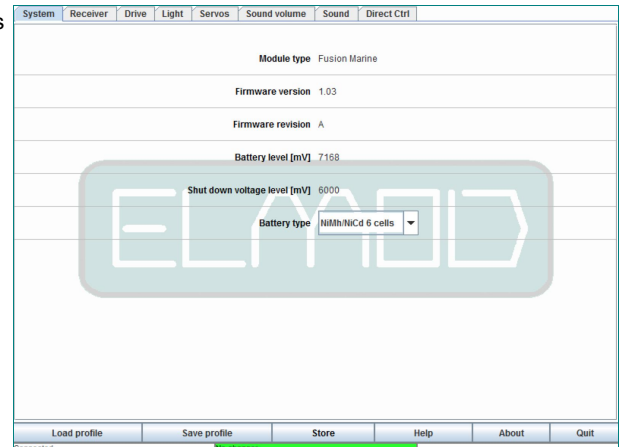
The factory settings of the *EIMod Fusion Marine* matches a vessel with two propellers and propeller ruder support. The settings for other drive configurations are provided with the configuration software. Press the button "load profile" to choose one of them. You can also save your own profiles by pressing the "save profile" button.

To change settings with the configuration software a connection to the EIMod Fusion must be established. Proceed as follows:

- power on the *EIMod Fusion Marine* and connect it to the computer
- start the configuration software
- after 2-5 sec. the *EIMod Fusion Marine* will be detected and the current settings are shown on the screen.

With the configuration software various settings can be made and different informations are displayed. The main screen is divided in four areas:

- on the upper edge there is a tab to choose the parameter's group
- in the center area the parameters in the chosen category are listed. For each parameter a detailed description is given. It is shown whenever you hover the mouse pointer over the parameter's name wait moment.
- there are several buttons below:
 - "Load profile" loads a previously saved or provided setting profile from your hard disk
 - "Save profile" saves all current settings on your hard disk
 - "Store" saves current settings on the *EIMod Fusion Marine* . If this button is not pressed after parameters have been changed, all changes will be lost after switching off the battery
 - "Help" shows a brief manual for the configuration software
 - "About" shows the version number of the program/software and legal notes
 - "Quit" closes the configuration software
- on the bottom edge the left area shows the current connection status. The colored center area has the following meaning:
 - green: no parameter has been changed
 - yellow: settings have been changed but not saved yet on the *EIMod Fusion Marine* by pressing the "Store" button. All changes will be lost after switching off the battery.
 - red: the firmware update mode of the *EIMod Fusion Marine* is active and the module is ready to receive new firmware.



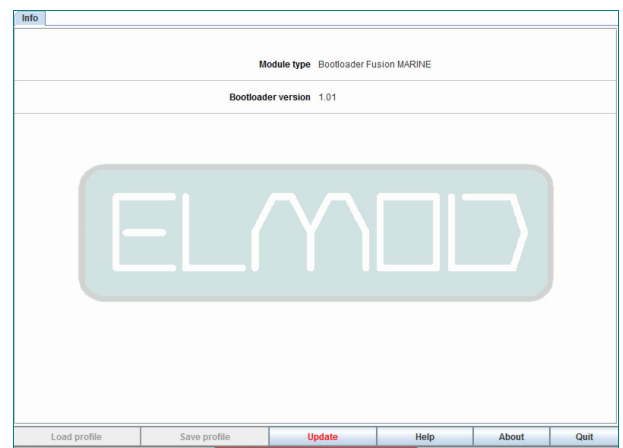
Reset to factory defaults

To reset all settings to factory values proceed as follows:

- switch off the voltage and wait for 3 sec. Preventively disconnect the motors from the electronics or jack up the vehicle so that it cannot move
- switch on the voltage again
- as soon as the blue LED lights up (about 0.5 sec. after power on) press and hold immediately the setup pushbutton
- the blue LED goes out. After about 4 secs both LEDs light up together
- release the setup button. All parameters are set to delivery condition.

Firmware update

For updating the firmware the *EIMod Fusion Marine* must be connected to the computer. To set the board in update mode, switch off the voltage and press and hold



the setup pushbutton on the *EIMod Fusion Marine*. Switch the voltage on again. The blue status LED blinks three times. Now start the configuration software and press the red "Update" button. Follow the instructions. on the screen.

The newest firmware versions are always included in the current installation package of the configuration software. A new version of the configuration software may be installed anytime. It's not necessary to deinstall the existing version before.

In-Depth informations

You can find several (english) documents describing various aspects of the *EIMod Fusion* Modules in our forum. Just enter the URL

<http://www.rceifel.de/forum/showthread.php?t=8155> in your browser or go to <http://www.rceifel.de> → Forum → Tipps und Tricks rund um EIMod → EIMod allgemein, posting "important informations about EIMod".

Nicht geeignet für Kinder unter 14 Jahren.
Ne convient pas pour des enfants de moins de 14 ans.

Not suitable for Children under 14 years.
Niet geschikt voor kinderen onder de 14 jaar.

EIMod Thomas Kusch
Banater Str. 19
D-78054 Villingen-Schwenningen, Germany



info@elmod.eu



EIMod Thomas Kusch
<http://www.elmod.eu>