

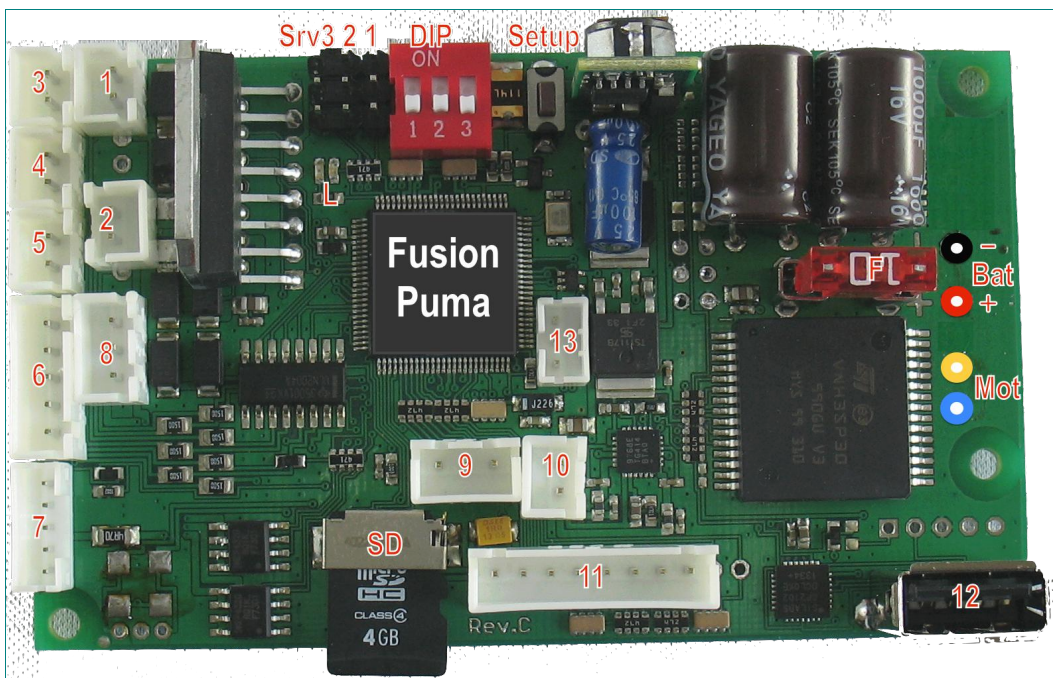
Before installation always read carefully all these instructions.

We congratulate on your purchase of the *EIMod Fusion Puma*, the innovative and universal full-option-solution for the SdKfz 234. The *EIMod Fusion Puma* enhances your model by true to scale movement, weapon-, 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 Puma* PCB
- volume control rotary knob with cable
- cable for the RC receiver
- cable for connecting to the loudspeaker
- microSD card (already plugged-in on the PCB)
- USB cable for connecting to the computer
- wires for four light functions and turret rotation motor



### Connectors and operating elements

Bat	battery wires (red/black for positive and negative poles)
Mot	motor wires
F	main fuse
DIP	DIP-switch for the configuration of the IR battle function
Setup	pushbutton for the drive setup, firmware update and reset
Srv1..3	servo connectors
L	status LEDs
SD	microSD card
1	turret rotation motor
2	front light
3	muzzle flash of the MG
4	brake/rear lights
5	notek camo light
6	main gun muzzle flash
7	IR battle connector
8	smoke unit connector
9	connector for volume control
10	connector for the loudspeaker
11	connector for the RC receiver
12	USB port
13	connector for a Multiplex® M-Link® receiver

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
- connect the red cable with the + wire of the battery and the black cable with the – wire of the battery. 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	undervoltage shut down
NiMh/NiCd	6	7,2 V	6 V
NiMh/NiCd	7	8,4 V	7 V
NiMh/NiCd	8	9,6 V	8 V
LiPo	2S	7,4 V	6,4 V

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 all functions of the *EIMod Fusion Puma*. The engine turns off and the vehicle cannot be operated any more. 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 drive motor (integrated driver)

The *EIMod Fusion Puma* supports one 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 the integrated and the external driver simultaneously. The maximum current consumption of the drive motor is internally limited to 30 A peak. The allowed permanent load is 10 A. The motor driver need no further cooling. It is protected against short circuit and overload.

- solder the blue and yellow motor wires to the motor
- 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 motor 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 motor.

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

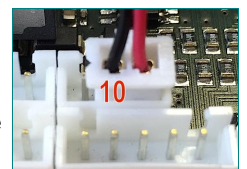
- make sure that the driving shaft is free to rotate and the model cannot move uncontrollably
- connect a fully charged battery to the electronics and connect the power supply in accordance with section "connection of the power supply"
- please wait for 3-4 sec. until the blue LED starts blinking constantly
- press and hold the setup pushbutton
- the motor start rotating
- every few seconds the motor change its rotation. Release when the wheels rotate forward. Now the motor is set up correctly.

## Connection of the drive motors (external drivers)

A commercially available external driver may be connected directly to the *EIMod Fusion Puma*. The operating type (internal/external drivers) must be set by the configuration software (tab "drive", parameter "motor driver"). It is not possible to operate the integrated and the external driver simultaneously. The external driver has to be connected to the 3-pin connector left of the main fuse. The black ground wire of the driver points to the lower edge of the PCB.

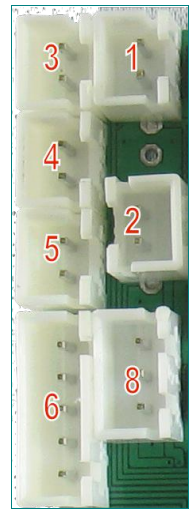
## Smoke generator

The smoke generator is connected to the connector for the smoke- and extension module (*connector 8*). The two wires plug of the Taigen® smoke unit is plugged as shown on the image. Therefore the plastic sprue of the smoke unit's plug must be removed with a sharp knife. The smoke volume depends on the driving situation. The amount of the generated smoke may be widely set up by the configuration software. The smoke function may be switched on and off by the radio freely. When using the Taigen® smoke unit, the red and black wires may be swapped. It has no affect on the function.



## Turret and weapon functions

- turret rotation motor: attach the motor to the *connector 1*
- for barrel elevation a servo may be used. Attach it to the connector *Servo 2*. See chapter "Servos" for further details.
- main gun recoil may also be implemented by a servo. The proper connector is *Servo 3*.
- main gun muzzle flash: the Taigen® XenonFlash and the HengLong® muzzle flash LED are equipped with a 5 pin plug and may be connected to *connector 6*. The Tamiya® xenon flash is not supported.
- MG muzzle flash. A super bright red or white LED may be attached directly to connector 3.



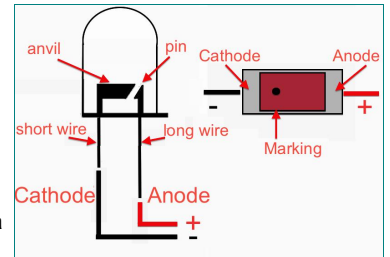
## Light functions

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

- front light (*connector 2*)
- combined rear light and brake light (*connector 4*). This light may be switched on and off simultaneously with the main light. The brake light is also active when the main light is off.
- camo light (*connector 5*)

Each light channel handles up to four LEDs in any color and type. The light outputs are short circuit protected, the current is limited to 30-40 mA.

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.

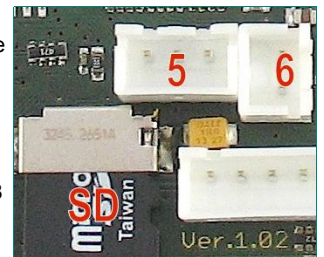


If several LEDs are connected to one light channel, the following must be observed:

- if the LEDs are unicolored and the same type, they have to be parallel-connected (see image)
- if the LEDs are mixed (color and type), the LEDs of the same type are parallel-connected. These groups are series-connected then.

## Sound: installation and connection

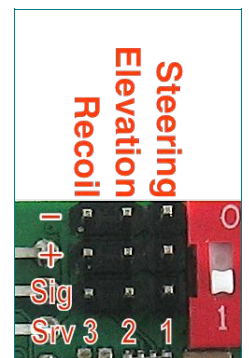
- plug the provided volume rotary knob to *connector 5*
- the *EIMod Fusion Puma* also provides the option to control the main volume by the radio. To activate this feature the appropriate parameter has to be set in the configuration software (tab "sound volume", parameter "main volume control"). In this case the volume control knob on *connector 8* will be deactivated.
- connect the loudspeaker's cable with the output of a suitable 8 Ohm loudspeaker (*connector 9*). 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 Puma* 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

Up to three servos may be driven by the *EIMod Fusion Puma*. The servos are power supplied by the board. The maximum current is 1,5 A. 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 servo the servo lock angle may be reversed or limited (right and left side separate). This is useful if the attached mechanic has a smaller movement clearance as the servo's side arm). By two other parameters each function may be further adjusted (see table).



servo	function	effect	param 1 (0-100%)	param 2 (0-100%)
1	steering	steering axle	speed dependent steering lock angle (0% - off, 100% - no steering on max. speed)	
2	elevation	vertical movement of the main gun. The larger the stick deflection the faster the movement	max. speed	
3	barrel recoil	barrel recoil after firing the main gun	retraction speed	extraction speed

## IR battle functions

The *EIMod Fusion Puma* provides a Tamiya® Battle Unit compatible battle function. The configuration takes place by three DIP switches. Thus it is independent of the availability of a computer and provides full flexibility on outdoor use. The DIP switches are assigned as shown below. After the change of the switch's position the vehicle must be powered off and on again.



Battle function deactivated. This setting should be selected, when you do not use the battle function.



Test mode activated. To check the function of the receiver you may trigger a hit by any infrared remote control.



Battle function with light vehicle active. Short reload time, but light armor.



Battle function with medium vehicle active. Moderate reload time with medium armor.



Battle function with heavy vehicle active. Long reload time, but strongest armor.



Default battle. The vehicle returns to operational state after a short time after being destroyed.



Hard core. Vehicle stays destroyed until it's switched off and on again.

The selection of the vehicle's type affects its behavior during the battle. These features are listed in the following table:

setting	Hit count			Time in seconds			Mushroom blinks after power up
	slight slow down*	strong slow down*	destruction	reload time	invulnerability after a hit	delay until resurrection	
test mode	1	3	6	3	2	5	4x
light	1	2	3	3	15	15	1x
middle	1	4	6	5	12	15	2x
heavy	1	5	9	9	10	15	3x

\* reduction of the maximum velocity of the vehicle

The *EIMod Fusion Puma* indicates specific events with four sounds:

- a fanfare after switching on with activated battle function and after each resurrection. The vehicle stays invulnerable for several seconds (see table: reload time).
- reloading sound. Until this sound is heard you cannot fire again.
- metal impact after a hit. The vehicle stops and cannot be operated for two sec.
- an explosion during vehicle's destruction. The vehicle cannot be operated for the interval shown in the table (delay until resurrection).

For the IR battle function an additional gear is required:

- an IR sensor for the detection of a hit and signaling LEDs (sensor mushroom)
- an IR transmitter that is preferably installed in the main gun barrel.

These components are supported in the following version:

- the *EIMod Fusion BU set* is connected directly to *connector 7*
- Tamiya® sensor mushroom and transmitter are connected to *connector 7* by using an optional adapter
- HengLong®/Taigen® sensor mushroom and transmitter are connected to *connector 7* by using an optional adapter

### Setup of the sample set

The provided micro SD card contains several sample sets for different vehicle types (half-tracks and trucks). At delivery the sample set for the SdKfz 234 Puma 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® OS X®) located in the root folder of the card. Follow the screen instructions.

There are two different types of sample sets available:

- *NextGen* (green). These are advanced sample sets, that reproduce the different driving conditions prototypically. These sample sets should always be preferred.
- Legacy (grey) are sample sets that are compatible to older EIMod sound generators. This sample sets won't exhaust the abilities of the *EIMod Fusion Puma*

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.

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



## RC receiver

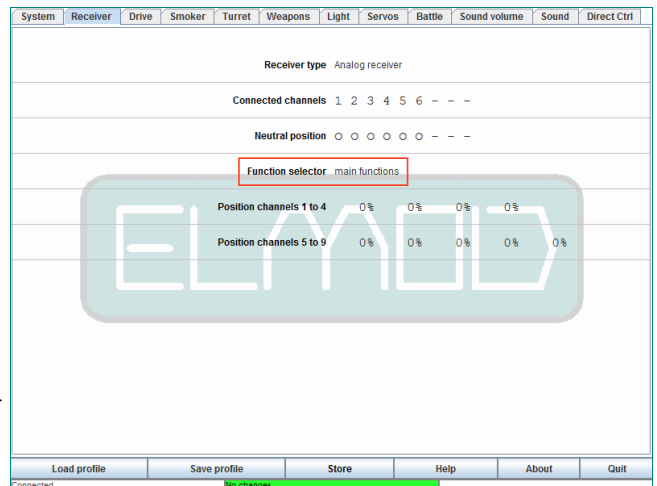
The *EIMod Fusion Puma* operates with a common radio gear. The number of required channels depend on the demands and is summarized in the table below. The power supply of the receiver is provided by the *EIMod Fusion Puma* (5V BEC, servo plug with red/black wire). An additional battery for the receiver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

channel	function	wire color	control
1	acceleration and ignition	brown	stick
2	steering	orange	
3	turret, weapons, light and auxiliary functions	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	volume control	white	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 Puma*. 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, auxiliary functions or user sounds). In case the 5<sup>th</sup> 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). 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.

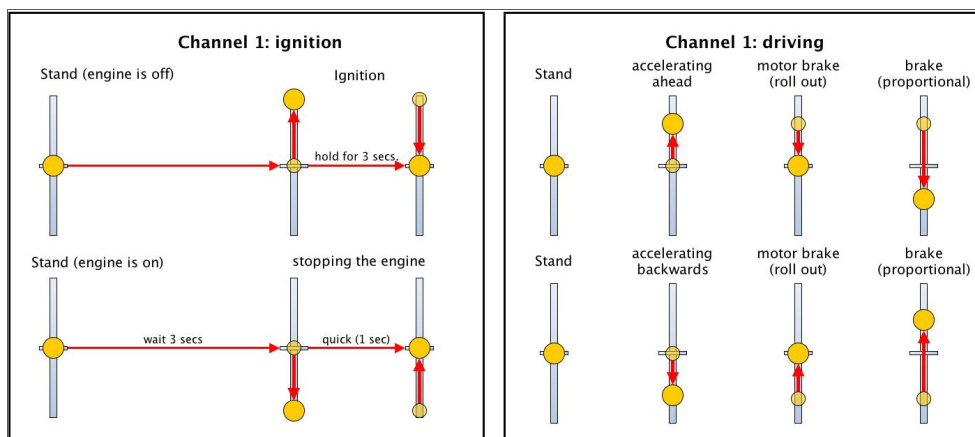


Depending on the used RC it may be necessary to change the order of the channels or to invert the servo travel. Please read the manual of your RC gear for details. The signal of channels, that remains unused must not be connected.

## Motor control (channels 1 & 2)

The ignition and acceleration/brake control is made by channel 1 (brown wire). After power up the engine doesn't run and the vehicle cannot be moved. To start the engine the throttle control must be moved to the upper most position and hold until the ignition sequence starts (see image below). Wait until the ignition sequence is finished and the idle sound is played. Now the vehicle is operational.

- for moving the vehicle forward, the throttle control must be moved to the top. After engaging a gear the vehicle starts moving gently.
- is the throttle control released or moved back to the center, the vehicle slows down (engine brake)
- is the throttle control moved in the opposite to current direction, the vehicle brakes (actively braking)
- the brakes are full proportional. That means, the higher the deflection in the opposite direction the stronger the brake force.
- if the vehicle comes to a stop and the throttle control is not put back to the center, the vehicle will stand still for a moment and start moving in the opposite direction.
- the vehicle direction is controlled by the horizontal deflection of the right throttle stick (depending on the configuration by chains and/or steering axles)



- all drive related parameters, such as maximum speed ahead and back, acceleration and deceleration power, hold time during directional change and many more may be configured by the configuration software.

To switch off the motor, 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 quickly to the center position. 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.

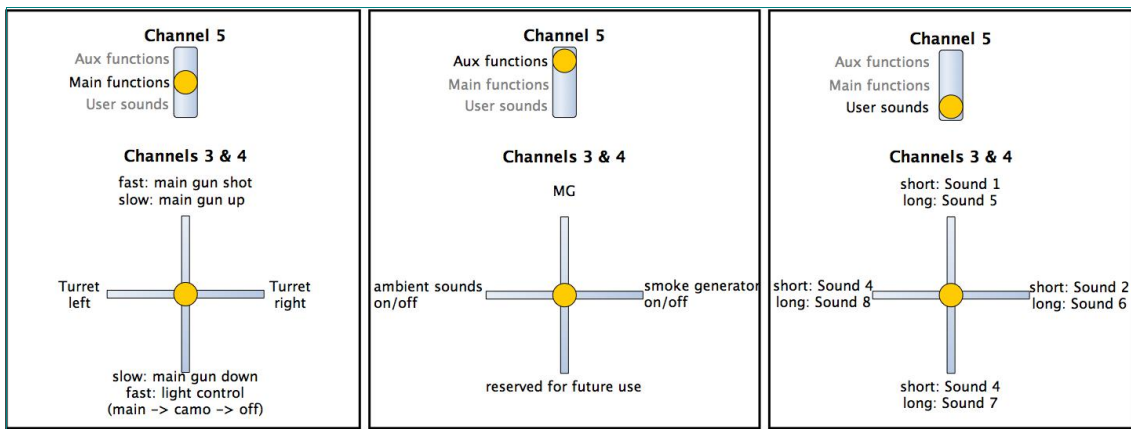
## Function control (channels 3 to 5)

The control of the functions of the turret, weapons, lights and the servos is done by the left throttle stick and the switch or slider/knob on channel 5. Depending on the position of the switch on channel 5, the right stick controls

- main functions (turret rotation, elevation of the main gun, fire the main gun and light control),
- auxiliary functions (MG shot, activation/deactivation of the optional smoke generator and the ambient sounds)
- or the playing of user sounds (e.g. horn).

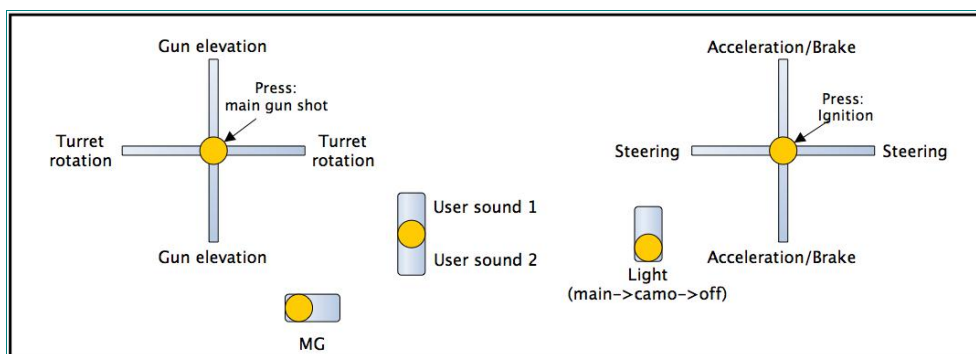
Depending on the sample set there are different numbers and contents of user sounds. If a particular user sound is not defined, the call "User 1" to "User 8" is played. Custom user sounds may be easily added with the Sound Manager.

The function layout is shown below. Short operation means holding for about 1 sec. Long operation means holding for 2 sec or longer.



## Connection of a Multiplex® M-Link® receiver

A Multiplex® Smart SX 9 Flexx receiver may be attached with an optional available cable to the *connector* 13. The functions are described on the image below. The radio must be set to universal mode for proper operation.



## Status LEDs

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

- |     |   |   |          |   |
|-----|---|---|----------|---|
| off | ■ | ■ | on       | ready to operate. blue LED blinks once after stick movement   |
| off | ■ | ■ | blinking | no receiver signal identified   |
| on  | ■ | ■ | off      | under- or overvoltage protection active   |
| on  | ■ | ■ | on       | no SD card inserted, card empty or its contents faulty (operation with default settings and without sound only) |
- 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.

## 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, ludspeaker). This can lead to a radical disturbance of the radio signal, the malfunction of the radio signal and cause the loss of control of the model. The *EIMod Fusion Puma* 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.

## 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 vehicle
- 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!

## Firmware update and configuration

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

## Configuration and tuning

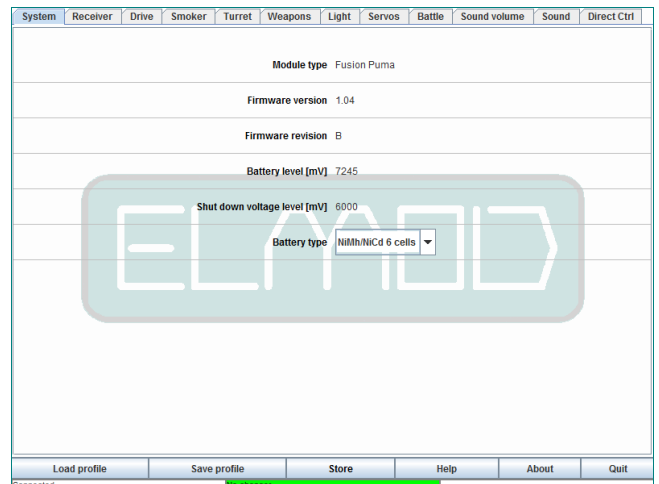
The factory settings of the *EIMod Fusion Puma* matches the Xion® SdKfz 234. If you wish to alter the settings, use the free EIMod Configurator Tool.

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

- power on the *EIMod Fusion Puma* and connect it to the computer
- start the configuration software with administrator rights
- after 2-5 sec. the *EIMod Fusion Puma* 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 of the current category are listed. Each parameter has a detailed description. It is shown whenever you hoover the mouse pointer over the parameter's name.
- below are several buttons:
  - "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 Puma*. 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 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 Puma* by pressing the "Store" button. All changes will be lost after switching off the battery.
  - red: the firmware update mode of the *EIMod Fusion Puma* is active and the module is ready to receive new firmware.



## Reset to factory defaults

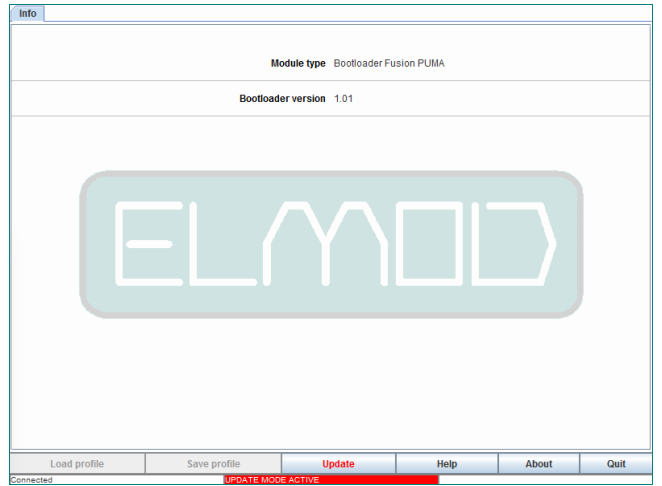
To reset all settings to factory values proceed as follows:

- 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 off. After about 4 sec the blue LED and the red LED light up together
- release the setup button. All parameters are set to delivery condition.

### Firmware update

For updating the firmware the *EIMod Fusion Puma* must be connected to a computer. To set the PCB in update mode, switch off the voltage and press and hold the setup pushbutton on the *EIMod Fusion Puma*. 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 instruction. 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.



**Nicht geeignet für Kinder unter 14 Jahren.**

**Ne convient pas pour des enfants de moins de 14 ans.**

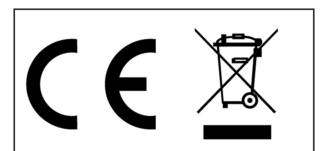
**Not suitable for Children under 14 years.**

**Niet geschikt voor kinderen onder de 14 jaar.**

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