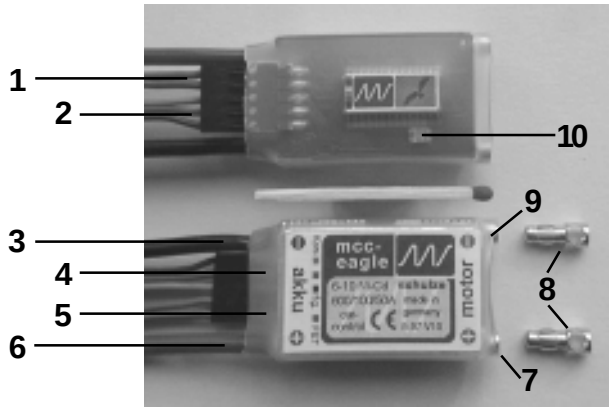


Key to illustrations:

1. Switch socket, bridged (2-pin)
2. Receiver cable (3-pin)
3. Battery connection, negative (-), black
4. Configuration socket (3-pin)
5. FET-Servo connector (ident. w. **akku +**)
6. Battery connection, positive (+), red
7. Motor connection, positive (+), (red)
8. pp35 plug (fitted as standard)
9. Motor connection, negative (-), (blue)
10. Duo-LED

1 Warning notes, cautions

Electric motors fitted with propellers are dangerous and require proper care for safe operation. Keep well clear of the rotating parts at all times when the battery pack is connected.

Technical defects of an electrical or mechanical nature may result in unintended motor runs; loose parts may cause serious personal injuriy and/or property damage.

The CE-certificate on the speed controller does not absolve you from taking proper care when handling the system!

Speed controllers are exclusively for use in RC models. Their use in man-carrying aircraft is prohibited.

Speed controllers and softswitches are not protected against reverse polarity (+ terminal and - terminal reversed). Connecting the **battery pack** to the **motor leads** of the controller or soft-switch will almost certainly cause irreparable damage.

Electronic equipment is sensitive to humidity. Speed controllers and soft-switches which have got wet may not function properly even after thorough drying. You should send them back to us for cleaning and testing.

Do not use speed controllers in conjunction with a power supply connected to the mains. Energy reversal can occur when the motor slows down and stops, and this may damage the power supply or cause an over-voltage condition which could damage the controller.

Never disconnect the flight pack while the motor is running, as this could cause damage on a speed controller or a soft-switch.

On no account connect a separate receiver battery or an electronic battery switch (two receiver batteries), as this may cause damage to the speed controller and could cause current to flow from the receiver battery to the motor. If you want to use a separate receiver battery cut through the + wire in the receiver cable, or pull it out of the connector if possible. However, for greater protection against motor-inducted interference it is always better to use a speed controller with an opto-coupler.

Protect the speed controller or soft-switch from mechanical loads, vibration, dirt and contamination.

Keep the cables to the battery and to the motor as short as possible.

Never leave the drive battery connected when ...
... the model is not in use and/or
... the battery pack is being charged.
(Although some speed controllers feature a separate On/Off switch, this does not isolate it completely from the battery.)

Protect the 3-pin configuration input and FET servo connector pin from short-circuit.

Note the limited capacity of the BEC system when used with high current load and/or a high number of cells in the flight pack (see Section 13).

Speed controllers and soft-switches can only function properly if they are in full working condition. The protective and monitoring circuits can also only work if the speed controller is in good operating condition.

In the case of motor failure (e.g.short circuits in the windings) the over-temperature sensor in the controllers may react too slowly to prevent damage. Switch the motor off immediately to prevent permanent damage to the speed controller.

If a transistor fails in the throttle stage, neither a "stop" signal from the transmitter nor the temperature monitor nor the current limiter will be able to throttle back or stop the motor.

Note: Please remember that the monitoring circuits are unable to detect every abnormal operating condition, such as a short between the motor cables. Note also that a stalled motor will only trip the current limiter if the motor's stall current is well above the controller's peak current. For example, if you are using an 80 A controller in conjunction with a 20 A motor, the current monitor will not detect an excessive current even when the motor is stalled.

2 Ensuring safe, trouble-free operation

Use only compatible connectors. A 2mm pin cannot provide reliable contact in a 2.5mm socket. The same applies with 2mm gold-contact pins and 2mm tin-plated sockets.

Please also remember that ...

... the wiring of your RC-components must be checked regularly for loose wires, oxidation, or damaged insulation, especially when using a BEC system.

... your motor is suppressed by at least two, better: three, ceramic capacitors of 10 to 100nF / 63 to 100V. Extra suppression can also be achieved using filters with coils.

... the CE certificate on the speed controller does not absolve you from the need to handle the system carefully.

... your receiver and the aerial must be at least 3 cm (>1") away from motor, speed controller and high-current cables. For example, the magnetic fields around the high-current cables can cause interference to the receiver (particularly when speeding up).

... Sie bei der Verwendung eines FET-Servos die dort beiliegende Drossel auch wirklich nach Vorschrift verwenden.

... all high-current cables must be as short as possible. Maximum length between flight pack and speed controller should not exceed 20 cm (7"), between speed controller and motor: 5 cm (2").

... all high-current cables longer than 5 cm (2") must be twisted together. This applies in particular to the motor power cables, which are very powerful sources of radiated interference.

... in model cars: the aerial must be deployed carefully - unless you are using a whip aerial. Fold up the aerial close to the receiver and slip the end into a plastic tube mounted vertically in the model.

... in model boats: half of the receiver aerial's length should be deployed inside the hull above the waterline, the other half should be threaded into a small tube mounted upright.

Every time you intend to use the power system - before you turn on the receiver - make sure that ...

... no one else is using the same frequency (identical channel number).

... your transmitter is switched on and the throttle stick is in the STOP position.

Carry out a range check before each drive. Collapse the transmitter aerial. Walk away from the model to the distance stated by the RC system manufacturer (this might be a distance of about 25-30 m = 100'). Make sure that you still have full control of the system at this range.
As a general rule: receiver interference is more likely to occur when using a controller with BEC system, as these units do not feature an opto-coupler with its optical link.

When Ni-Cd batteries approach the end of their charge, voltage falls drastically and quickly. The ***mcc-eagle*** detects this and reduces power to the motor automatically. This should leave sufficient energy to bring your model back home. However, if you use a small number of cells of high internal resistance and operate at high motor currents, the controller may reduce power before the pack is discharged. You can eliminate this problem by using low resistance straps to connect the cells, or use the direct cell-to-cell soldering technique (“sticks”) and short, heavy-gauge wire if you assemble your own batteries.

Your receiver also benefits from the stability of the voltage supplied from the battery. If the BEC voltage is stable, the receiver is less liable to suffer interference. For this reason, BEC voltage can be switched between two voltages (see Section 9.3.1).

Incidental note - definitions:

Our range includes both standard speed controllers and genuine speed regulators, which are capable of maintaining a constant motor speed even when the load varies. To differentiate between the two types our instructions always use the term “speed controller” for “standard” units which simply provide proportional control of motor speed, and reserve the term “regulator” for constant speed units.

3 Intended Applications

Since the mcc-eagle+ is of lightweight open construction, the preferred application is track-racing cars.

mcc-eagle3 makes use of high performance trench technology cool-MOSFETs for lowest losses and highest performance. For this reason mcc-eagle3 is a perfect fit for 3000 mAh cells.

Don't forget that weight and space are at a premium in model car racing, particularly if you specialise in 1:12 cars and the Pro-10 class.

Recommended motors, new minimum specification:
approx. 10/8 turns for 1:10 on-road,
approx. 10/8 turns for Monster 1:10 off-road,
approx. 11-13/9-11 turns for 4-WD off-road,
depending on how the car is set up.

Highlights:

In-line design and a "controller instead of cable" philosophy provide maximum pressure and a further substantial weight saving.

Ultra-small, ultra-light units due to absence of cooling fins.

A crucial point for all drivers who require maximum performance combined with minimum weight.

Fastest possible response to throttle commands (it's your transmitter that slows you down!).

Better than 400-step resolution over the whole throttle stick range for extremely fine speed control.

Controllers work reliably right down to the last scrap of energy in the battery pack.

DUO LED monitor system.

Brake light output.

"Auto-arm" function and "power-on reset".

"Quick plug-in" - qpi - system features integral high-current sockets and receiver cable sokket to allow motor or speed controller to be changed quickly and easily.

Plug-in push-button allows full configuration procedure; alternatively use the "carsoft" program from your PC or notebook. No pots!

During the configuration process the motor acts as a loudspeaker to give you audible confirmation of each process.

Configured data can be read-out by "carsoft", stored on a PC / notebook, fine-tuned on the computer, and then read back into the controller.

Configured data is retained in the unit even when the battery is disconnected.

Specification:

Function:	speed controller
Separation of receiver and load current circuit:	no; due to integral BEC system.
Low weight:	due to compact construction and super low-profile cool-FETs.
No. of cells, cell type:	6 to 8 Ni-Cd cells
Low voltage threshold:	at approx. 5V
Intended application:	maximum performance models

Special features:

- integral voltage converter produces an auxiliary voltage for the Power MOS FETs, resulting in ultra-low losses.
- Super high-capacity BEC circuit (peak current more than 3A)
- Switchable BEC voltage

Allows the use of receivers which are sensitive to fluctuations in BEC-generated operating voltage.

- High 2 kHz pulse frequency, keeping the motor and controller cool, shielding the receiver system from interference and providing optimum acceleration and braking characteristics.
- Turbo-start function
- Maximum resolution in throttle + brake range.
- Sophisticated triple current limiter system
- Minimum throttle function
- Automatic brake function
- Finely controllable proportional brake with high pulse rate, variable min. and max. parameters
- ABS
- It is usually possible to prevent the vehicle skidding during braking by implementing one of the 3 versions of ABS, or by reducing the maximum braking power; however, the effectiveness of these functions varies according to track surface quality, vehicle tyres and vehicle weight.

Super-light, super-small, super-low-profile, super-efficient:

All in all - a really **cool** speed controller!

4 Operating states and modes

"Awaiting command" status

This condition applies if you:

- connect the ***mcc-eagle*** to the battery when the transmitter throttle stick is in the "motor on" range

or

- press the command button when the motor is running slowly, if the ***mcc-eagle*** is already armed.

Display: both LEDs flash slowly and alternately

"Armed" status (ready to use):

In this condition the ***mcc-eagle*** can control the motor according to the default or configured characteristics.

The ***mcc-eagle*** is armed if the "auto-arm" function applies when you connect the battery and switch on the operating voltage, or when a re-configuration procedure is completed.

Display:

Throttle stick at neutral: both LEDs flash fast and alternately.

Throttle stick at brake position: green LED flashes fast.

"Disarmed" status:

This condition applies while you are configuring the controller. While in this state the ***mcc-eagle*** interprets all commands from the throttle stick as configuration values.

The ***mcc-eagle*** is disarmed by pressing the command button for less than one second when the "auto-arm" function is active and the throttle stick is in the "motor on" range (i.e. not at the idle or brake position).

The ***mcc-eagle*** remains disarmed if ...

... the drive battery is connected and the throttle stick is in a "motor on" position.

... the throttle stick is in a "motor on" position after you have completed the configuration of the unit.

"Configuration" mode:

Here we have to differentiate between standard configuration and property configuration.

The **standard configuration** process is used to ...

... reset all the properties of the unit to pre-set default values (general reset)

and / or

... define the brake, idle and full-throttle positions of the throttle stick.

The **property configuration** process is used to ...

... define and vary many characteristics of the controller (Chapter 9.3).

Note:

The "carsoft" software, available as an accessory for owners of PCs / notebooks, provides a simple and extremely accurate method of accessing all points of the configuration procedure.

This means, for example, that you have much finer control over current and acceleration values than when using the transmitter throttle stick to set these parameters.

At the same time all the configuration values are shown on the screen in a clearly comprehensible form.

These are professional configuration facilities, and if you are an ambitious driver you will not want to forego the software's advantages.

5 Monitor displays

Our ***mcc-eagle*** controllers feature two LEDs (= one Duo-LED) to help to understand the status of the unit at any time. The meaning of the coloured lights is as follows:

100% brake:	red,	full brightness, flashing
No-load:	g & r,	alternating flashing fast
10% forward:	green,	10% brightness
90% forward:	green,	90% brightness
100% forward:	g & r,	full brightness

Function:	**Note:**
No-load:	
red /green	alternating , flashing fast. ***mcc-eagle*** is "armed", throttle and brake off.
Waiting for arming:	
red/green	alternating, flashing slowly. ***mcc-eagle*** is "disarmed"
Excess temperature:	
red	flashing together. Wait until temperature falls. "Auto-arm" activates ***mcc-eagle***.
Standby:	
red	flashing at one second intervals. ***mcc-eagle*** is "disarmed"; On/Off switch is off, or no receiver signal is present.

6 Protective circuits

Note: the monitor circuits are effective, but they cannot detect every possible operating condition.

Temperature monitor:

The temperature monitor switches off the motor. You can reset the unit using the "auto-arm" function (throttle stick to stop for about 2 sec.)

If the motor windings are short-circuited the temperature monitor reacts too slowly to prevent damage. Switch the motor off immediately to avoid permanent damage to the speed controller.

Voltage monitor:

As soon as the voltage of the drive battery falls back to the 5V threshold the motor is throttled back. The speed controller - and your model car - remain fully controllable until the last drop of usable energy is exhausted.

Current monitor and -regulator:

The mcc-eagle includes a current monitor circuit which can be adjusted to suit different applications. This is carried out by running the property configuration process - see Chapters 7 and 9.

Receiver signal monitor:

If the receiver signal fails, or the signal is longer or shorter than the usual range of values, the ***mcc-eagle*** controller reverts to idle mode for about 0.5 seconds before switching to disarmed mode.

Reverse polarity protection:

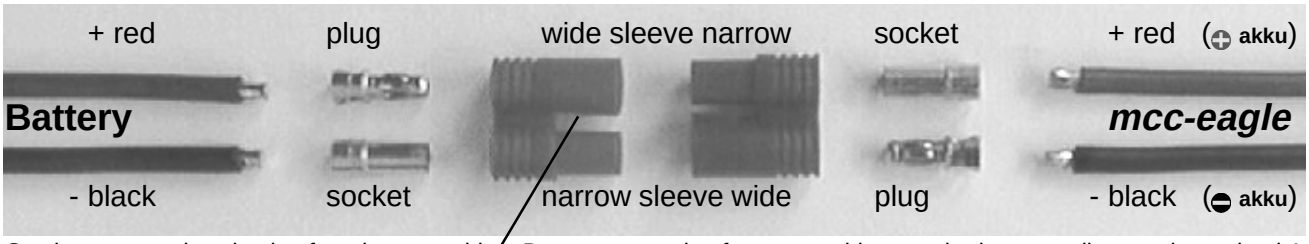
These speed controllers are not protected against reversed polarity!

Watchdog:

If this circuit is tripped the speed controller stops working briefly and then reverts to normal operation.

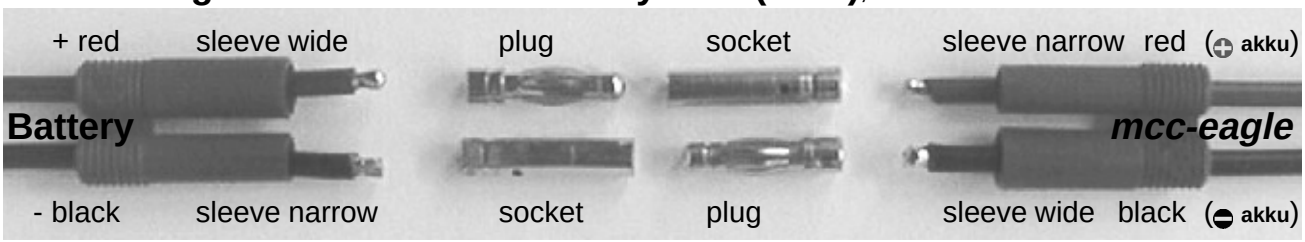
7 Connector systems and mounting instructions

7.1 3.5 mm gold-contact connector system (pp35); max. load > 80A



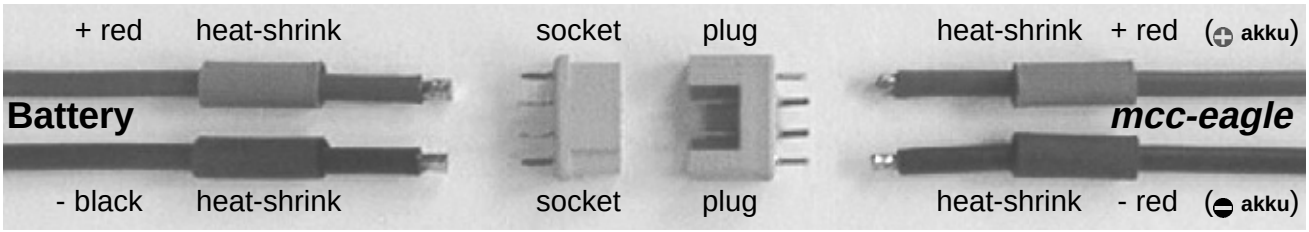
Caution: remove locating lug from battery cable. Do not remove lug from any cables attached to controllers or charge leads!
Fit the connectors in the order shown above; the contacts are pressed in as follows:
a. Place plastic sleeve vertically on table, grip end up. **b.** Push contact down into sleeve. **c.** Place 2.5mm wide screw-driver blade on top of cable solder joint inside sleeve. **d.** Tap screwdriver to press contact into sleeve until latch engages.

7.2 4 mm gold-contact connector system (CT 4); max. load > 80A



Fit the connectors in the order shown above; the contacts are pressed in as follows:
a. Rest plastic sleeve on vice jaws with cables hanging down. **b.** Close vice jaws until cables are just free to move.
c. Fit plug into socket and tap into sleeve until latch engages. **d.** Fit socket onto plug and tap into sleeve until latch engages.

7.3 MPX gold-contact connector system (green or red); max. load approx. 30A



Fit the connectors in the order shown above; the contacts are soldered as follows:
a. To center the contacts fit plug and socket together before soldering. **b.** Tin all 6 exposed contacts of plug or socket.
c. Fit cable end into triangle of contacts, solder to all three contacts. **d.** Position heat-shrink sleeve and shrink over joint.

Installing the controller in the chassis:
The ideal method of installing the unit is to attach it to the floor of the cradle or the rear of the chassis using Velcro (hook-and-loop) tape. Avoid any method which could produce a heat build-up in the eagle, and in particular never wrap it completely in foam rubber. Chapter 2 includes more information on locating the controller in the model.

Length of connecting cables:
The cables to the drive battery and - in particular - to the motor should be kept as short as possible. Long cables act as aerials and can radiate interference; they also add unnecessary weight. See also Chapter 2.

Motor connections:
Solder short cables to the motor terminals (red to the positive terminal, black to negative). Solder these cables to the schulze perfect plug 35 plug (pp35-st), either ”in-line” or at right-angles, as best suits your installation.
- insert the blue motor cable aligned with the blue mark (marker on the side of the black battery wire)
- insert the red motor cable aligned with the red mark (marker on the side of the red battery wire)
You may be able to arrange the cables so that they are not under tension, but if not, wrap fabric-based adhesive tape round the motor plug for safety’s sake.

Connecting the controller to the receiver:

Locate the receiver cable attached to the ***mcc-eagle*** and connect it to the throttle channel on the receiver, which is usually channel 2. The receiver's operating voltage is fed to it through this channel, and the receiver uses it in turn to send control signals to the ***mcc-eagle***. It is important to check regularly that the receiver and switch harness are securely connected to the eagle.

Note: the colour coding of Futaba/Novak/ Graupner (JR) receiver cables is correct, i.e. orange (signal) / red (+) / brown (-), but this may not apply to other receivers. Many mini-receivers for model car use have their own 5 V BEC system (you will see the letters BEC on the receiver label). If you connect this type of BEC receiver to the ***mcc-eagle*** you will often encounter problems, as the receiver cannot cope with the 5.7 V supply which it is fed - so to speak, backwards - via the servo cable. In this case you have two options:

- set the BEC voltage of the ***mcc-eagle*** to the lower value (4.5 V). Unfortunately this also means that a steering servo connected to the receiver works on the same voltage. Alternatively:

- cut through the positive wire in the 3-core receiver cable (centre wire, red), or remove the positive pin contact from the connector, and instead connect the 7.2 V FET servo current supply from the ***mcc-eagle*** to the **+ connection of the BEC receiver's battery socket**.

- In many cases wiring a 1000 uF/10 V capacitor in parallel with the receiver voltage helps the situation. Check the polarity of the capacitor, solder it to a short piece of servo cable and plug it into any vacant receiver channel.

- On no account connect a separate receiver battery to your receiver.

Caution: the 7.2 V FET servo connection is not affected by the On/Off switch. If you want to isolate a BEC receiver from the power supply completely, you must disconnect the battery.

FET servo:

Attach the socket supplied with the servo to the blue 7.2 V cable attached to the FET servo, and simply connect it to the single pin below the switch socket. Secure it so that it cannot shake itself loose. Please do not forget to solder the choke (supplied) in the cable.

On/Off switch:

If you want to install a switch you have to cut through the wire link adjacent to the three receiver cable sockets and solder the switch in that wire.

Alternatively we can supply an optional pre-wired switch which can be clipped to both terminals after carefully removing the wire link.

General note: the On/Off switch turns off the receiver and places the micro-processor in "stand-by" mode (red LED flashes at approx. 1 x per second). It does not switch off the FET servo output! If a BEC receiver is connected at that point, the only way to remove power from it is to disconnect the drive battery.

Connecting the command button:

You only need to connect the command button (or the "tast-vm" - combined button / voltmeter) if you intend making changes to the properties of the unit (see Chapter 9).

The push-button supplied (or the "tast-vm") should be connected to the 3-pin socket below the servo cable.

If you wish to use the functions of the "tast-vm" it is important to connect its cable according to the colour coding of the 3-pin connector (see label on controller). The colour coding is not the same as that of the receiver cable.

The configuration input is deliberately in a "concealed" position to avoid the risk of short-circuits. If you need to change the configuration regularly we suggest that you either mount the eagle on Velcro (hook-and-loop) tape so that it is easy to remove, or permanently connect a short servo extension lead to the configuration input.

Schottky diode:

It is not normally necessary to solder a Schottky diode across the motor terminals, as the ***mcc-eagle*** is fitted with internal diodes as standard.

Brake light:

See Chapter 11 for connections.

8 Variable properties, default settings

The ***mcc-eagle*** is a multi-purpose speed controller. It is possible to alter certain of its properties by a configuration process to optimize it for use as a normal speed controller, a reversing speed controller or a speed governor (regulator).

The ***mcc-eagle*** is configured at the factory in default mode; changing the operation mode is done by changing the unit's configuration. The table shows the features of the ***mcc-eagle*** which can be altered; note that the factory default values are underlined.

If you have configured the ***mcc-eagle*** to suit a certain model and want to change to a different model at a later date (and in the meantime you may have forgotten the exact configuration of the ***mcc-eagle***) than you can easily perform a "general reset" which returns the ***mcc-eagle*** to the factory default settings.

You can configure the ***mcc-eagle*** using -

- the transmitter throttle stick and the external command button supplied with the controller.
- the throttle stick and the external button/voltmeter combination ("tast-vm", optional)
- a PC, using the schulze-software "flysoft" and a suitable adapter cable "prog-adapt" (all optional).

The cable attached to the push-button or the cable of the button/voltmeter can be connected directly to the ***mcc-eagle*** (observe polarity = color codes). Alternatively, the PC adapter cable can be connected directly to the ***mcc-eagle*** (and to the receiver).

Parameters are configured in groups, and these are marked by thick outlines in the table.

Note:

Chapter 9 includes more details about changing the configuration of the ***mcc-eagle***.
If you accidentally store an incorrect value in the ***mcc-eagle***, you can abandon the entry by setting it to "full brake" (throttle stick at minimum) then pressing the button several times until the unit returns to the "awaiting command" state. This procedure takes care that all other values following the incorrect, are not changed. You can now try again.
Note: you can achieve the same result by disconnecting the ***mcc-eagle*** from the battery.

Parameter	Note	
Brake position (BP)	BP and NP can be identical. If BP between NP and FP: brake deactivated!	Standard config.
Neutral position (NP)		
Full throttle posit. (FP)		
Start current	0, <18A ...180A	Application configuration
Throttle acceleration, Soft start (s = seconds, ms = milliseconds ms = 1/1000 s)	adjustable: 1.5s 1.2s, 1s, 900, 800, 700, 600, 500, 400, 300, 200, 100, 50, 30, 10 ms 0=special funct.	
Continous current	0 ... 90*... 100A	
Turbo start / Wait time	off, 1-10sec=on	
ABS	off, on	
BEC-Voltage	4.5V, 5.7V	
Minimum throttle	0%...50% power	
min. braking effect	0%...100% brake	
max. braking effect	0%...100% brake	
Setup # 1		
Setup # 2		
Setup # 3		
Calibration of voltmeter test equipment		

[*] not set to 100% current value, because soft start would be disabled

9 Altering the properties (configuration process)

9.1 Symbols and terminology

Configuration:

Changing parameter settings to suit your application.

Stick:

The throttle stick on the transmitter.
Any brake position: stick pointing towards you;
0% = minimum value = usually neutral position of stick (stick released)
100% = maximum value, stick usually pointing away from you.

Brake position (abbreviation: BP):

Gashebelposition, die den Motor zum Stillstand bringt

Idle Position:
Neutral position of stick:
(abbreviation: NP)

Position where the motor just barely runs

Full-throttle position (abbrev.: FP):

100% voltage passed to the motor

Throttle position:

The stick position is defined as 1...100% throttle.

Symbol also used to select an application.

LED-indicators:

LED full on

LED full off

LED flashing at low rate

LED flashing at high rate

Using the push-button:

Hold button pressed in
(for specified duration)

Release button

Push button down and release immediately

Wait

Audible indicator:

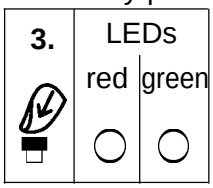
This indicator is only audible when a motor is attached, as the motor itself acts as the loudspeaker.

Single or multiple beep.
1 beep represents a 10 A current value or 10% throttle stick position.
Neutral = 0A = long beep;
At tables: 1x beep per table value

You can alter the settings of the ***mcc-eagle*** in two ways: please see chapters 9.2 (standard configuration) and 9.3 (application configuration):

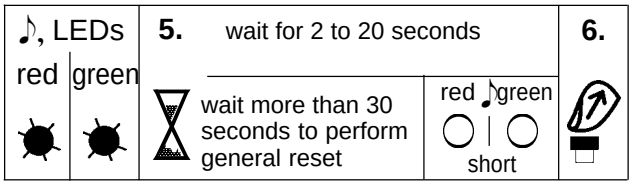
Standard configuration process and general reset:

1. Switch transmitter "On"
2. Switch at ***mcc-eagle*** must be "Off", battery pack disconnected.

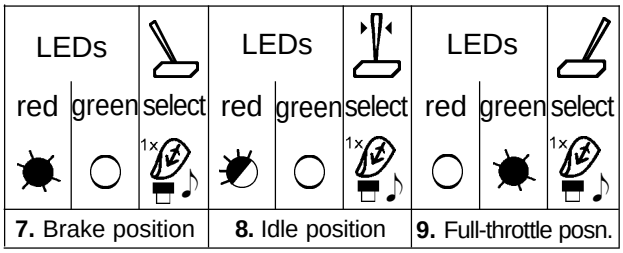


Note: hold push-button pressed in!

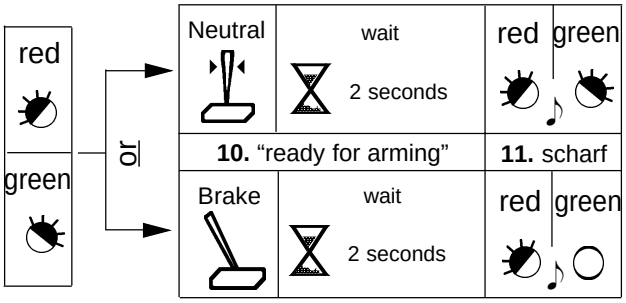
4. Fahrakku anstecken



Remarks:
Re. 5.: The general reset is confirmed by both LEDs by switching off for one moment.
Re.: 7. and 8.:
Brake and neutral positions can be identical (identical positions must also be programmed two times)
Brake position between idle position and full-throttle: Brake deactivated!



Configured stick positions valid



LEDs flash alternately at high rate
mcc-eagle is "armed", that means "ready for use"

9.2 Standard configuration:

a. Resets the ***mcc-eagle*** to factory defaults ("general reset"), which is useful if you become confused at some stage in the programming sequence. See the table in Chapter 6.

b. Program the stick positions for brake, idle and maximum rpm. Caution: If you only wish to perform a "general reset" you must disconnect power from the ***mcc-eagle*** when both lights switches off for a moment.

Note: A "general reset" causes the stick settings to Graupner mc-756 transmitter (brake, neutral and full-throttle positions) and all other settings (continous current, brake effekt, soft-start...) to revert to the factory defaults (see Section 7, underlined values).

9.3 Property configuration:

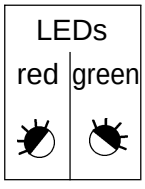
Once you have programmed stick positions in the standard configuration process, you can set the controller to e.g. a predefined setup for raceways with less grip: setup # 1 (see diagram on next page).

The following instructions show you how to start the sequence for selecting a desired application:

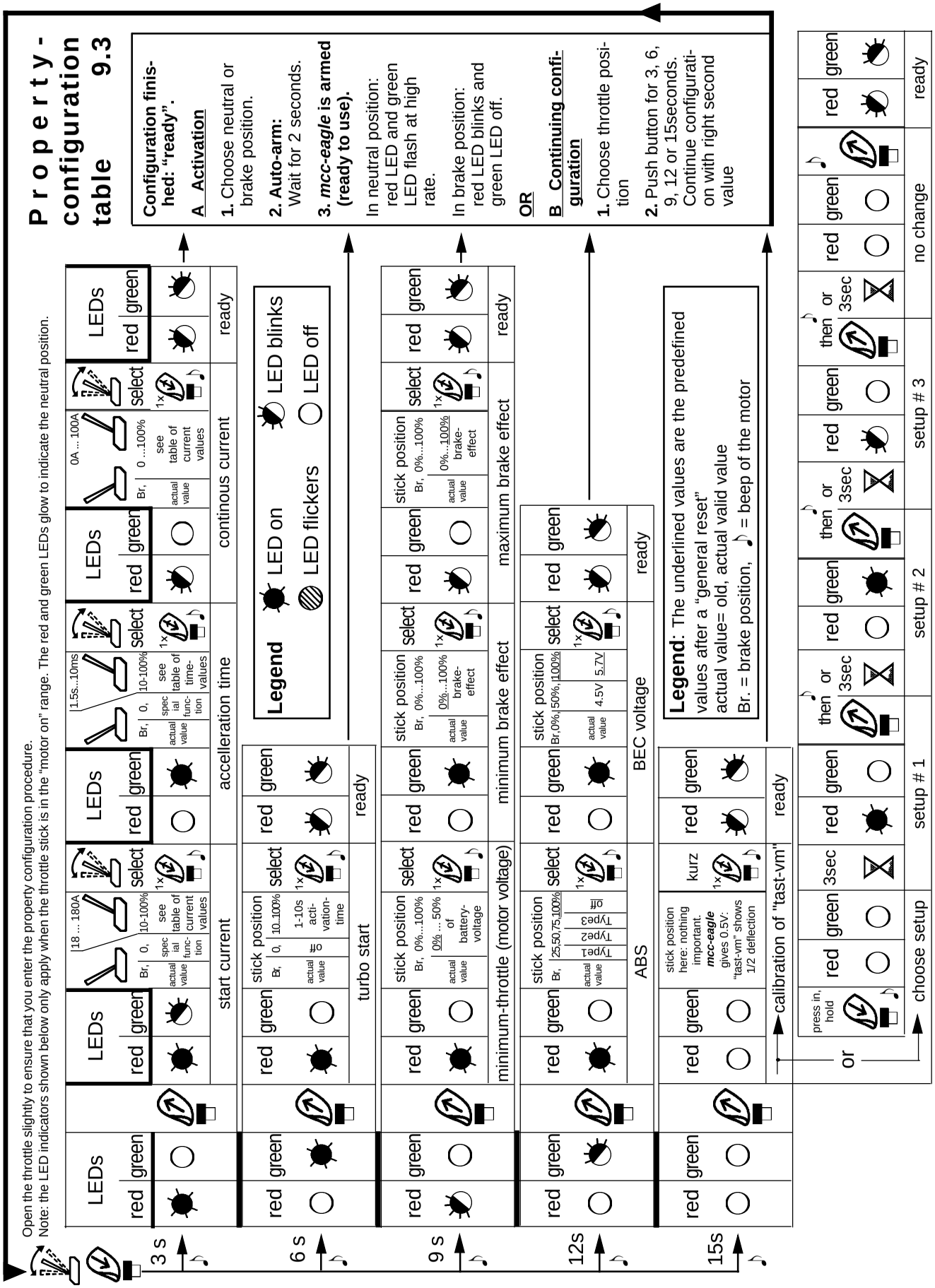
Property configuration process:

1. Switch transmitter "On"
2. Set throttle stick to "motor on" position, not to neutral or brake!

3. Switch at ***mcc-eagle*** must be "Off", battery pack disconnected.
4. Connect battery pack
5. Red and green LEDs flash alternately at low rate.



6. Hold push-button pressed in continously for 3-15 seconds to change desired characteristic:


Property-configuration table 9.3
Open the throttle slightly to ensure that you enter the property configuration procedure.
Note: the LED indicators shown below only apply when the throttle stick is in the "motor on" range. The red and green LEDs glow to indicate the neutral position.
Legend
LED on
LED blinks
LED flickers
LED off
Configuration finished: "ready".
A Activation
1. Choose neutral or brake position.
2. Auto-arm: Wait for 2 seconds.
3. mcc-eagle is armed (ready to use).
In neutral position: red LED and green LED flash at high rate.
In brake position: red LED blinks and green LED off.
OR
B Continuing configuration
1. Choose throttle position
2. Push button for 3, 6, 9, 12 or 15seconds. Continue configuration with right second value
Legend: The underlined values are the predefined values after a "general reset"
actual value= old, actual valid value
Br. = brake position, ♪ = beep of the motor
3 s
6 s
9 s
12s
15s
start current
acceleration time
continous current
turbo start
minimum-throttle (motor voltage)
minimum brake effect
maximum brake effect
ABS
BEC voltage
calibration of "tast-vm"
ready
choose setup
setup # 1
setup # 2
setup # 3
no change
or
press in, hold

9.3.1 Explanatory notes on adjusting the characteristics of the *mcc-eagle*

- When the red and green LEDs are flashing slowly and alternately, the controller's status is "awaiting command". In this mode you can select any of several parameters and alter them. This is done by holding the button pressed in (the command button or "tast-vm" must be connected).
- If the transmitter throttle stick is at the brake position, the "tast-vm" always shows the currently set value, and the controller then accepts this value if you simply press the button (especially if you decide not to alter a parameter value). You will also hear 1 ... 10 beeps from the motor in the brake position if the throttle stick was briefly in the "motor-on" range previously. While the unit is beeping the "tast-vm" or any other voltmeter connected to the system shows nothing.
- **You can set any of the following 16 current values for "start-up current" and "continuous current"** (1st / 3rd configuration values after holding the button pressed in for 3 sec.)

Throttle stick position	0	10	20	30	40	**50**	60	70	80	90	**100**%	throttle; 100% throttle switches off the soft start function!
Start-up current	0	20	40	60	80	100	120	140	160	180	200A;	Note: All current values of eagle3 1.5 times higher!
Continous current	0	10	20	30	40	50	60	70	80	90	100A	Note: All current values of eagle3 1.5 times higher!

- You can set any of the following 15 soft-start time values for "acceleration time" **(2nd configuration value after holding button pressed in for 3 seconds):**

0	5			25			**50**				75				**100%**	**throttle**
xx.	1.5 s	1.25 s	1 s	900	800	700	**600**	500	400	300	200	100	50	30	**10 ms**,	xx = no time value, special function

- **Turbo start** (button pressed in for 6 seconds):
  The ***mcc-eagle*** activates the turbo function if it is left in the brake position for the period of the "activation time". While the turbo-start function is active the control range from stop to full throttle is reduced to one third of the throttle stick travel, i.e. the full-throttle position is reached much earlier, but the proportional throttle function is still maintained (i.e. it is not a switched function). This means that it is still possible to drive your car slowly with the turbo function active. The turbo function is switched off automatically when the throttle stick is first moved back towards idle (neutral) by about 5% after the initial acceleration phase, i.e. the first time you reduce throttle again.
- **Minimum throttle** (1st configuration value, button pressed in for 9 seconds)
  In some situations it can be useful to set a particular throttle position below which the signal never falls. The result is that the motor immediately starts up at a raised throttle value when you advance the transmitter stick. The effect is that the control range between the idle and full-throttle positions operates at even higher resolution (note: the limiters are still active).
- **Minimum braking effect** (2nd configuration value, button pressed in for 9 seconds):
  In some cases it can be useful to set up a non-linear braking effect. For example, if you wish to implement gentle automatic braking before entering a turn, you should raise the minimum braking effect (e.g. to 15%) and then move the throttle trim on your transmitter to the "brake" area when driving. The car will then brake automatically at your selected rate (15% in this case) when you move the throttle stick to neutral.
- **Maximum braking effect** (3rd configuration value, button pressed in for 9 seconds):
  On tracks where grip (adhesion) is relatively poor, you can avoid the danger of skidding, even under full brake, by limiting the available braking power.
- **ABS** (1st configuration value, button pressed in for 12 seconds):
  The ***mcc-eagle*** includes a function which works in a similar way to ABS. Since the ***mcc-eagle*** cannot rely on information from wheel sensors, it releases the brake briefly when the motor stops turning. The released brake allow the wheels to continue to rotate, and the car will regain traction provided that track adhesion is sufficient to re-accelerate the locked wheel. There are three variations on this feature.
- **BEC voltage** (2nd configuration value, button pressed in for 12 seconds):
  If minimum soft-start is selected, the ***mcc-eagle*** immediately passes full battery voltage to the motor. In this situation the high start-up current can cause the operating voltage to collapse momentarily to less than 3.5 V. The stabilised BEC voltage of 5.7 V then collapses in turn. Many receivers respond to this event by emitting false control signals which produce unwanted steering movements and uneven throttling. At the 4.5 V position the receiver does not "see" voltage dips in the drive battery down to 4.5 V, and it does not produce the spurious signals. Drawback: a normal servo operates too slowly at this voltage. Solution: use an FET servo.
- **"tast-vm" calibration and set-up** (configuration values, button pressed in for 15 seconds)
  1. This function allows you to check the calibration of a "tast-vm" or a digital voltmeter, so that you can be reasonably confident of the indicated current values.
  2. The ***mcc-eagle*** contains three standard set-ups for tracks of different type and varying grip (adhesion). There is also a fourth set-up - the "hottest" one - which is obtained by carrying out a "general reset", but this procedure does alter the throttle stick settings. Of course, these set-ups can also be fine-tuned, i.e. used as the basis for further optimisation.

	Start-up current	Accelereation	Contin. current	Min. throttle	Min.brake	Max.brake	Note:
Set-up # 1	12A	500ms	27A	10%	10%	75%	All current values of eagle3 1.5 times higher!
Set-up # 2	17A	250ms	37A	20%	20%	85%	All current values of eagle3 1.5 times higher!
Set-up # 3	21A	100ms	50A	20%	20%	95%	All current values of eagle3 1.5 times higher!

schulze elektronik gmbh • prenzlauer weg 6 • D-64331 weiterstadt • tel: 06150/1306-5, fax: 1306-99
internet: http://www.schulze-elektronik.com e-mail: mail@schulze-elektronik.com

9.3.2 Explanatory notes on setting the torque limiters

It is possible to alter the acceleration characteristics of the *mcc-eagle*, e.g. for competition use. If you don't have the "golden thumbs" of the expert driver, you can set up the ***mcc-eagle*** to suit a particular track very accurately just by changing three parameters.

For example, you can use this facility to avoid the motor drawing such a high start-up current that the drive battery is discharged prematurely.

You can avoid the wheels spinning by limiting motor current.

You can achieve the same effect by altering the acceleration characteristics (soft-start) of the vehicle.

The difference between the two methods is that **reducing maximum permissible motor current** for the acceleration phase may also limit the maximum speed of the model, whereas **altering the soft-start characteristics** only causes motor voltage to be increased more or less quickly, and this has no effect on the model's absolute maximum speed.

Altering the soft-start characteristics has a useful side-benefit in that it results in a slightly exponential curve as current rises (good for acceleration out of a turn).

The ***mcc-eagle*** features three configurable limiters which influence the car's running characteristics:

start-up current value, acceleration value (soft-start) and **continuous current value**.

Adjusting and setting up all the possible variations can be a very complex procedure, and to make matters easier we have provided special configurations which are much easier to understand: **single current limiting** and **double current limiting**.

Single current limiting corresponds to the current limiting process possible with speed controllers which are not micro-processor controlled.

The three standard set-ups can also be used as the basis for your own adaptation, so that you can gradually feel your way towards the exact handling characteristics you prefer.

9.3.2.1 Single current limiting

(beginner's configuration)
Only one current value is to be selected.

Single current limiting is the process by which you configure the maximum possible current which the *mcc-eagle* passes to your motor under any circumstances. This current value is never exceeded, neither at the start of a race nor during normal driving.

The process represents the simplest form of motor torque limiting.

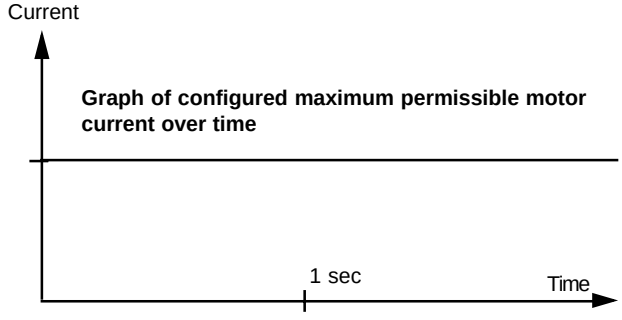
Single current limiting is set using the 3-second (3s) configuration process shown in the sequential chart on page 12. As you can see from the diagram, there are three configuration steps for the 3s configuration process, although in this case we only require one current value. This just means that the current limiting value is defined as the continuous current configuration (the 3rd configuration step), and steps 1 and 2 are skipped. This is done by defining them as 0%.

The procedure corresponds to defining "idle", "idle", and "desired current value".

Check that both LEDs on the ***mcc-eagle*** are glowing when you enter "idle", otherwise it will not adopt the single current limiting mode.

Note: if you define the limited current as 100%, you will obtain the fastest possible acceleration, and the soft-start feature will be disabled.

Caution: there is a "catch" to this set-up: if you have a powerful motor and battery voltage is falling off, when you abruptly apply full throttle the vehicle may only jerk. This is the result of battery voltage collapsing instantaneously below the minimum permissible value.



9.3.2.2 Double current limiting

(advanced configuration)
Two current values are to be selected: start-up current and continuous current.

The start-up current is not exceeded when the vehicle is in the acceleration phase.

The continuous current is not exceeded during normal driving, but the limit is only applied one second after the vehicle has completed any acceleration phase.

Double current limiting is set in the 3-second (3s) configuration process, as shown in the sequential chart on page 12. As you can see from the diagram, there are three configuration steps for the 3s configuration process, although in this case we only require two current values. This means that the current limiter values are defined as the start-up current and the continuous current, and step 2 is skipped. This is done by defining it as 0%.

This procedure corresponds to defining “start-up current”,“idle”, and “continuous current”.

Check that both LEDs on the ***mcc-eagle*** are glowing when you enter “idle”, otherwise it will not adopt the double current limiting mode.

Note also that the start-up current must not be defined as the idle position of the throttle stick, as this would activate single current limiting.

Definition of acceleration: the ***mcc-eagle*** considers that acceleration occurs only if the throttle stick is at least briefly in the neutral range before the throttle is opened.

Note also: the **start-up current value** defined in the first stage of configuration gradually (within one second) rises or falls to the value which you have defined in the third stage of configuration (continuous current value). The result is a current curve which is time-limited.

Note: if you define the start-up current or the continuous current as 100%, you will obtain the fastest possible acceleration, and the soft-start feature will be disabled. Caution: there is a ”catch” to this set-up: if you have a powerful motor and battery voltage is falling off, when you abruptly apply full throttle the vehicle may only jerk.

Effect of double current limiting:

Example 1: the **start-up current** is programmed to a lower value than the **continuous current**:

a) If the configured start-up current is lower than the start-up current required by the motor, the vehicle will accelerate gently.

You can therefore set different acceleration values by varying the start-up current: with 10% start-up current (= greater than zero) the throttle stick accelerates the vehicle gradually; whereas increasing the start-up current immediately starts the motor running when you open the throttle.

b1) If the configured continuous current is higher than the continuous current actually required by the motor, acceleration continues up to the maximum speed of the vehicle.

b2) If the configured continuous current is lower than the continuous current actually required by the motor, the vehicle only runs at “half power”.

Example 2: the **start-up current** is programmed to a higher value than the **continuous current**.

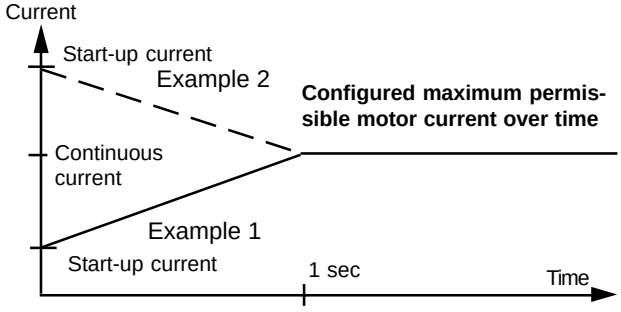
a) If the configured start-up current is greater than the actual start-up current of the motor, the vehicle accelerates with full power.

b1) If the configured continuous current is higher than the continuous current actually required by the motor, acceleration continues up to the vehicle’s maximum speed.

b2) If the configured continuous current is lower than the continuous current actually required by the motor, the vehicle only runs at “half power”.

Example 3: the **start-up current** is set to the same value as the **continuous current**.

Special case: works like single current limiting described in **Chapter 9.3.2.1.**



9.3.2.3 Triple current limiting

Two current values (start-up current and continuous current) are to be selected, plus one acceleration value.

What the three parameters mean, and how they work:

1st parameter: start-up current

- The start-up current value determines the point at which the soft-start limiter takes effect.
- If the defined start-up current is exceeded, the soft-start limiter is activated.
- If the start-up current value is not exceeded, the soft-start limiter is disabled.

Purpose: the start-up current is adjusted so that, from a ”motor stopped” situation, the voltage (i.e. torque) fed to the motor is not sufficient to allow the wheels of the vehicle to spin.

When set up perfectly, the rate of acceleration is dictated by the 2nd configuration value (acceleration) described below, as soon as the vehicle is moving. Note that the acceleration phase is purely time-related.

Note: if the motor draws less than the programmed start-up current during the acceleration phase, the voltage to the motor is raised gently from zero up to maximum operating voltage in 10 ms (i.e. in one hundredth of a second). This produces a highly efficient rising torque curve. At the same time the process protects the motor magnets from damage, as current cannot rise instantaneously. To obtain fastest possible acceleration you should define the start-up current as 100%, as this by-passes the brief soft-start.

2nd parameter: acceleration

- The acceleration value defines the period over which the ***mcc-eagle*** may increase motor voltage from 0% to 100% (0 V to 7.2 V with a six-celled battery).
- The higher the acceleration value, the faster the voltage to the motor rises.
- The lower the acceleration value, the longer the soft-start period.

Purpose: the aim is to set an acceleration value which ensures that the vehicle’s wheels do not spin, i.e. the motor’s torque should be maintained at a virtually constant level. The torque level must be adjusted to suit the prevailing track conditions.

- The acceleration value you set determines the torque and the subsequent increase in current of the motor (similar to a current rise function).

Graduation: the scale of acceleration values relative to the throttle stick position which is used to define the value is not linear (see table 9.3.1).

Special case 0%: not permissible when the professional configuration option is used.

Note: acceleration is purely time-related. If you wish to drive your car using a defined current limit for the acceleration phase, you must use double or single current limiting. Nevertheless, the acceleration phase is limited by a maximum current value, but this is not variable by the user; it is double the continuous current value, falling to the actual continuous current value within the first second.

The set soft-start time refers to the period over which the soft-start rises from 0 to 100% throttle.

If the acceleration value corresponds to a soft-start time of, say, 1 sec., and the motor sees 3.6 V (i.e. half battery voltage) at the time when the soft-start limiter trips (i.e. when the start-up current value is exceeded), then the time to reach full throttle is not a full second, but only 0.5 sec.

By configuring the **start-up current value** and/or the **acceleration current value** carefully it is possible virtually to switch off the soft-start phase altogether, either by defining the start-up current value as maximum start-up current, or the acceleration value to maximum acceleration (= minimum soft-start).

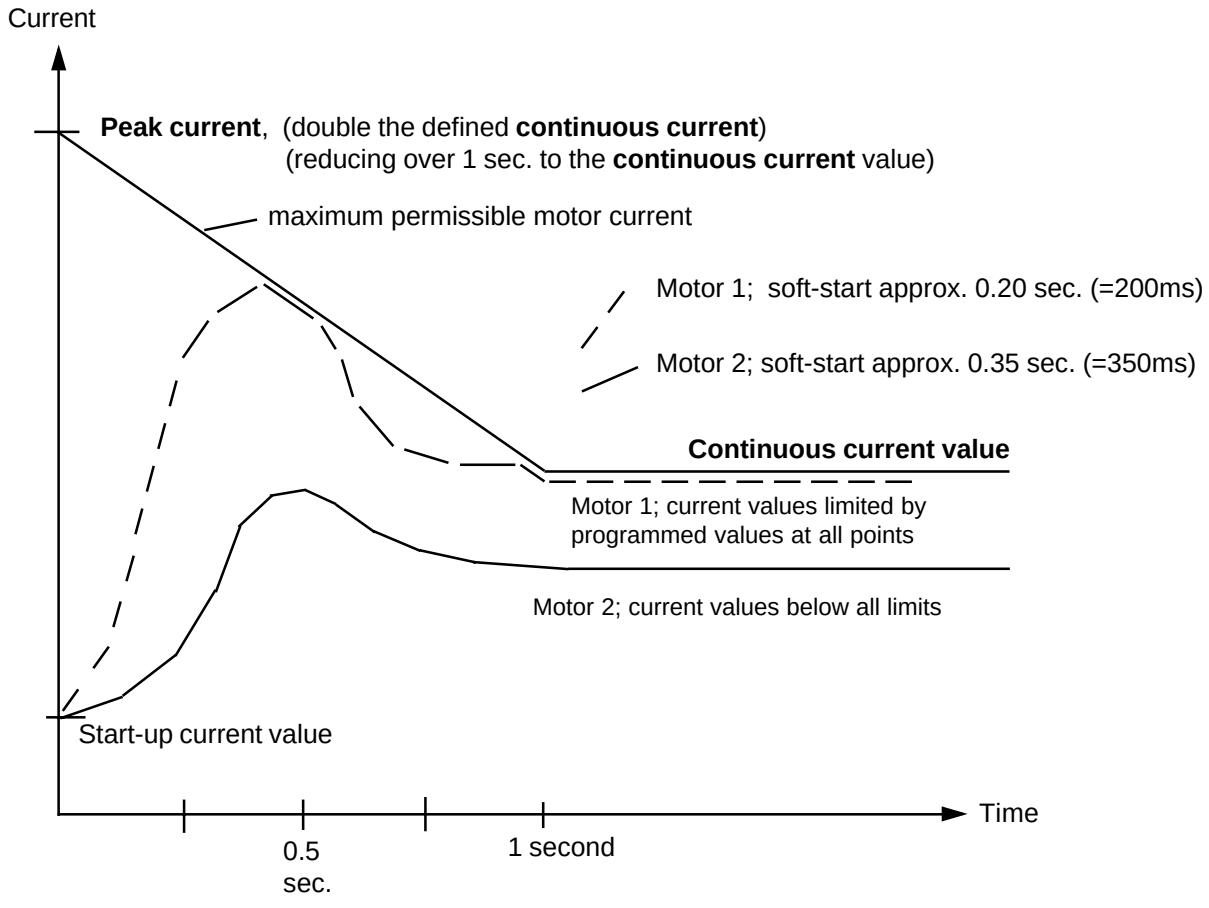
To re-iterate: by configuring the **start-up current value** to minimum start-up current the soft-start function takes effect virtually immediately. However, if you set the **acceleration value** close to maximum acceleration, the reduction in the **start-up current value** has no effect.

In numerical terms: if you configure the acceleration value as 100% (minimum soft-start), motor voltage rises to the maximum value of drive battery voltage within 10 ms. However, this also means that a low start-up current value has no effect if the acceleration value is set to 100%.

3rd parameter: continuous current value

- The **peak current** of the time-related current limiting function is **double the continuous current value**.
- The **peak current value** is reduced linearly to the **continuous current value** within a period of one second.
- The falling curve of maximum permissible motor current may also limit the acceleration function in terms of current, even though it is normally purely time-related.
- The longer the period of the soft-start, i.e. the gentler the acceleration, the less current is available for acceleration in terms of maximum permissible motor current - but at the same time gentler acceleration consumes less current.

The graph printed below is intended to clarify the inter-connected nature of the functions described above.



10 Sample configurations

Essential pre-condition:

The ***mcc-eagle*** must be aware of your transmitter's throttle stick travels, i.e. you must have carried out the standard configuration already.

1st aim:

To configure <u>single current limiting</u> to 20 A maximum current:

a. Switch on transmitter and receiver.

b. Set throttle stick to "motor on" position (i.e. not idle/brake; use trim as aid).

c. Connect command button or "tast-vm" to the ***mcc-eagle***;

d. If an On/Off switch is connected to the ***mcc-eagle***, set it to ON.

e. Connect the ***mcc-eagle*** to the drive battery;
- red and green LEDs flash slowly and alternately;
- the ***mcc-eagle*** is in the "awaiting command" state;
- it is not armed, as the throttle trim is not at neutral.

f. Hold the command button pressed in for 3 seconds:
- after 3 secs. the red LED glows, the green LED goes out.

g. Release button.
- the red LED glows, the green LED flashes.
- The *mcc-eagle* is in the correct mode for setting the start-up current.

h. For single current limiting the start-up current value must be defined as 0 A, so set the throttle stick to <u>neutral</u>. Check the neutral position of the two LEDs on the ***mcc-eagle***:
- both LEDs must be glowing.
If this is not the case, correct the neutral setting with the help of the throttle trim.

i. Press the button briefly.
- the red LED goes out, the green LED glows;
- the *mcc-eagle* is now in the correct mode for setting the acceleration value.

j. For single current limiting the acceleration value must also be defined as the idle setting, so set the throttle stick to neutral.

k. Press the button briefly.
- the red LED flashes, the green LED goes out.
- The *mcc-eagle* is now in the correct mode for setting the continuous current value.

l. Set the throttle stick to about 20% throttle, i.e. around 1/5 of full throttle. The table in Chapter 9.3.1 shows that this corresponds to a current value of 20A.

m. Press the button briefly.
- the red and green LED flash slowly and alternately;
- the *mcc-eagle* is again in the "awaiting command" mode.

<u>Configuration concluded.</u>

<u>Test:</u>

n. Set the throttle stick to idle and wait 2 sec.
- The ***mcc-eagle*** is armed, the red and green LEDs flash fast and alternately.
- If the throttle stick is at the brake position, the red LED flashes, the green LED goes out.

o. Hold the model with the wheels clear and open the throttle quickly.
- The motor should run up to speed <u>gradually</u> (soft-start), as the relatively low current limit value drastically restricts the start-up current, which would normally be very much higher.

p. Throttle stick back to brake position.
- The motor stops.

<u>Test concluded.</u>

2nd aim:

To configure <u>single current limiting</u> to 60 A maximum current.

The procedure is identical to that described under 1. as far as point l.

At point l. set the throttle stick to slightly more than half-throttle = 60% throttle = 60 A.

In the test described in point o. the motor should now pick up speed quickly.

3rd aim:

To configure <u>minimum throttle</u> (start-up throttle) to 25%:

a. Switch on the transmitter and receiver;
b. Set the throttle stick to a “motor on” position (not idle/brake; use trim as an aid).
c. Connect command button or “tast-vm” to the ***mcc-eagle***;
d. If an On/Off switch is connected to the ***mcc-eagle***, set it to ON.
e. Connect the ***mcc-eagle*** to the drive battery;
   - red and green LEDs flash slowly and alternately;
   - the ***mcc-eagle*** is in the “awaiting command” state;
   - it is not armed.
f. Hold the button pressed in for 9 seconds:
   - LEDs after 3 sec.: red on, green off;
   - LEDs after 6 sec.: red off, green on;
   - LEDs after 9 sec.: red flashes green off.
g. Release button.
   - The red LED is on, the green LED is off.
   - The *mcc-eagle* is in the correct mode for setting the minimum throttle value.
h. The effective stick travel is expanded to help you set the minimum throttle value accurately.
   In accordance with the configuration chart (see Chapter 9.3) only 50% of the battery voltage is passed to the motor when the throttle stick is at the 100% position (100% = full throttle). This means: to set 25% minimum throttle you must set the throttle stick to 50% throttle (half-throttle).
i. Press the button briefly.
   - the red LED is off, the green LED is on;
   - the *mcc-eagle* is now in the correct mode for setting minimum brake effect.
j. As we do not wish to make any changes here, move the throttle stick to a “brake” position in order to accept the old value. If the motor beeps, wait for the sound to stop before continuing with j.
k. Press the button briefly.
   - the red LED flashes, the green LED glows;
   - the *mcc-eagle* is in the correct mode for setting maximum brake effect.
l. Once again we do not wish to make any change here, so set the throttle stick to, say, full brake in order to accept the previous value. If the motor beeps (repeatedly), wait until the sound stops before continuing with l.
m. Press the button briefly.
   - the red and green LEDs flash slowly and alternately;
   - the *mcc-eagle* is again in the “awaiting command” state.

<u>Configuration concluded.</u>

<u>Test:</u>

n. Set throttle stick to idle, wait 2 sec.
   - The ***mcc-eagle*** is armed, the red and green LEDs flash fast and alternately.
   - If the throttle stick is at the brake position instead, the red LED flashes, the green LED is off.
o. Hold the model with the wheels clear and open the throttle very slightly.
   - The motor should not “soft-start”, because it is immediately fed 25% throttle. With a battery voltage of 8 V that is already 2 V! Since the limiters are still active, they may restrict this start-up process.
p. Throttle stick to brake position.
   - The motor stops.

<u>Test concluded.</u>

4th aim:

To set professional current limiting:
Start-up current (20 A, see text below), acceleration 300 ms, continuous current 50 A

a. Switch on transmitter and receiver.
b. Set throttle stick to “motor on” position (i.e. not idle/brake; use trim as aid).
c. Connect command button or “tast-vm” to the ***mcc-eagle***;
d. If an On/Off switch is connected to the ***mcc-eagle***, set it to ON.
e. Connect the ***mcc-eagle*** to the drive battery;
   - red and green LEDs flash slowly and alternately;
   - the ***mcc-eagle*** is in the “awaiting command” state;

- it is not armed.

f. Hold the button pressed in for 3 seconds:
- after 3 sec. the red LED is on, the green LED off.

g. Release the button.
- the red LED is on, the green LED flashes;
- the *mcc-eagle* is in the mode to set the start-up current.

h. On low-adhesion tracks it is important not to accelerate at full power. For this application we use a time-related acceleration configuration.

Note: with single current limiting the acceleration phase is purely current-limited; with double current limiting the same applies, although the current limiting value varies during the initial second.
To ensure that time-related acceleration limiting is activated, the vehicle's start-up current must always exceed the configured start-up current value, and for this reason we set it to 20 A.
Set throttle stick to 10% throttle = 20 A.

i. Press button briefly.
- the red LED is off, the green LED is on;
- the *mcc-eagle* is now in the correct mode for setting the acceleration value.

j. The acceleration value is defined according to the table in Chapter 9.3.1 using a throttle stick position of about 70%, i.e. just less than 3/4 of full throttle.

k. Press the button briefly.
- the red LED flashes, the green LED is off;
- the *mcc-eagle* is now in the correct mode for setting the continuous current value.

l. Set the throttle stick to 50% throttle, i.e. half-throttle. This corresponds to a current value of 50 A, as shown in the table in Chapter 9.3.1.

m. Press the button briefly.
- the red and green LEDs flash slowly and alternately;
- the *mcc-eagle* is again in the "awaiting command" mode.

Configuration concluded.

11 Connection accessories

Command button (included)
Push-button for adjusting the ***mcc-eagle***.
Also used as a manual arming button.

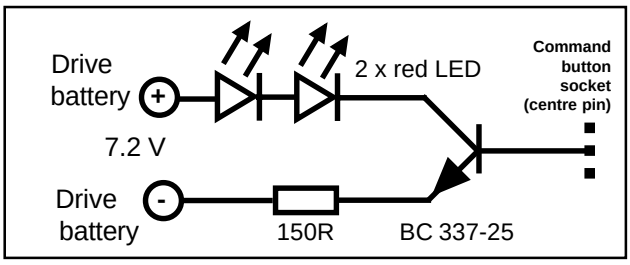
tast-vm (see left: voltmeter socket)
During the configuration process the voltage reading will vary in proportion to the position of the transmitter throttle stick.
You can also set the output to produce an accurate 0.5V voltage in order to calibrate the voltmeter (17 seconds time, Chapter 9.3)

carsoft
PC software; allows data to be read out, manipulated and re-configured with extreme accuracy.
A convenient and easily understood method of configuring the ***mcc-eagle***. Especially recommended for fine-tuning the control parameters when you wish to make very small adjustments.
Can only be used in conjunction with the prog-adapt cable.

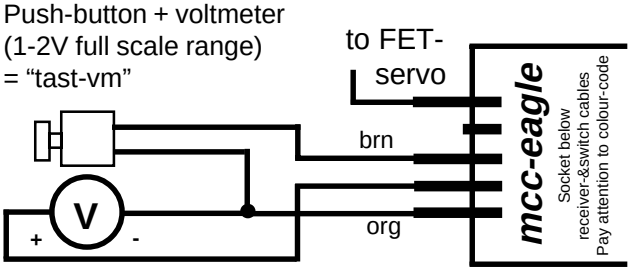
prog-adapt
An active buffered adaptor cable with three lead for connecting the PC to the mcc / mcd speed controllers and governors which we manufacture.
The cable is connected to the parallel port (LPTx) of the PC or notebook.

Brake light:
The brake light control signal is available at the centre pin of the command button socket. Wire up the LEDs as shown in the circuit diagram sketched below. Additional components required for brake light control circuit:

Additional components required for brake light control circuit:



External voltmeter socket:
Push-button + voltmeter
(1-2V full scale range)
= "tast-vm"



12 Legal matters

12.1 Warranty conditions

All **schulze** products are 100% dynamically tested by using a battery and a motor. We do not simulate tests.

If your unit develops a problem, please return it to **schulze** or to the importer. Include a description of the problem. Please be careful and precise, and list the battery voltage and capacity, motor type, conditions under which failure occured etc. A note saying “doesn't work” does not help us much, and it may lead to waisted time in trouble-shooting. Before returning the unit for repair, please test it “one more time” carefully. If we find that the controller is operating correctly, whether it is under warranty or not, we will make a charge for our lost time.

One final note:

Please don't try trouble-shoot a defective unit yourself. Very few hobby shops are equipped to analyze and repair surface-mount printed circuit boards. We reserve the right to refuse repair to units which have been modified or “improved” by unauthorized “experts”.

As we mentioned earlier, if you have a problem with one of our products, please send it back to us or our authorized representative (see catalogue). This ensures that the proper replacement parts will be used, and that you will gain maximum pleasure from using these products. You also have the comfort of a properly repaired unit with a renewed warranty. The guarantee period of repaired devices is applicable only to the repair. This period is shorter than the guarantee period of a new product (See our general conditions of business).

12.2 Liability / damages

We have invested a lot of effort in helping you to exploit this unit to maximum. However, since neither the manufacturer (**schulze**) nor the importer have control over how these products are used, we cannot accept liability for any direct or consequential damage, loss and/or injuries to the user, to third-parties or the environment from the use of this product. Taking into account our legal obligations, and regardeless of the legal basis for any action, our liability to compensate for damages shall be limited to the invoice amount of the portion of the merchandise directly involved in the event which incurred the damages. This does not apply in respect of our unlimited liability due to wrongful intend or gross negligence, as prescribed by law.

12.3 CE certification

The products described in this manual are manufactured in accordance with all specific and mandatory European CE guidelines:

EMI 89/336/EEC, 91/263/EEC and 92/31/EEC.

The products have been tested according to the following norms:

EMI-emissions: EN 50 081-1:1992
EMI-resistance: EN 50 082-1:1992 or
EN 50 082-2:1995

The design and construction of our products comply with the requirements for safe operation.

EMI emissions were tested under realistic conditions, i.e. using suitable motors close to the maximum allowed currents. The use of resistors instead of motors do not create maximum emission levels.

Further testing is carried out to ensure adequate EMI resistance against emissions from other apparatus. The RF signals used for these tests are similar to those produced by mobile telephones and RC transmitters.

We wish to point out again that our products are tested under realistic conditions for the most dangerous scenario: exposed to the field of a powerful transmitter, the motor must not start while you are working on the model.

Problems involving our products are most likely caused by unsuitable combinations of radio components or improper installations.

13 Technical data and characteristics

Type [Unit]	Current [A]	Ni-Cd [Cells]	Dimensions [mm]	Weight [g]	Cables [mm^2]	Throttle [mΩ]	Brake [mΩ]
mcc-eagle+	600/100/40	6-8	38+10*26*13	26-38	2.5	1.1	2.2
mcc-eagle3	600/150/50	6-8	38+10*26*13	26-38	2.5	0.55	1.1

Further information:

The max. temperature threshold is about 110 °C, max. pulse frequency 2 kHz.

Stated maximum current: peak current (theoretical) **/ 30 sec. current value / 5 minutes value:**

Its safe to operate the ***mcc-eagle*** fo 30 seconds with a current up to 100-150A (the 30 seconds current value) with full throttle, followed by a cooling-off period. Its safe to operate the ***mcc-eagle*** for 5 minutes with a current up to 40-50A (the 5 minutes current value) with full throttle.

NOTE: In ***mcc-eagle3*** all current values are 1,5 times higher then adjusted with ***carsoft***!

Dimensions: **Weight:**

PCB + capacitor without / with cables.

Throttle, brake:

Internal resistance of the FETs, calculated from the manufacturer's data sheet information.

BEC: 4.5V / 5.7V; peak current 3A with 6 Ni-Cd cells, 2.5A with 7 cells, 1.5A with 8 cells.

The peak current can only flow for less than 0.33 seconds, followed by a cooling-off period.
The maximum permissible continous current is much lower and is limited by the maximum power disspiation of the voltage regulator used.
The maximum power dissipation is about 1.6W, i.e. with a BEC voltage of 5.7V and a battery voltage of 7.3V (difference 1.6V) the maximum continous current is about 1A.

Connections

- All power cable connections are marked clearly by polarity signs and colour-code
- Colour-code of the servo and On/Off switch harness connections to avoid mistakes
- Colour-code of the “tast-vm” cable to ensure it is connected the right way round

The speed controller can scope with a very wide range of applications thanks to:

- three programmable stick positions (brake, idle, full-throttle)
- the configurable nature of many of its properties (Soft start, turbo-start, current limiting, ABS on/off, minimum throttle, minimum brake effect, maximum brake effect...) using the push-button, or with the “carsoft” PC software
- extremely fine speed control with more than 400-step resolution in whole stick travel range.
- automatic arming method (“auto-arm”)
- proportional brake and automatic proportional brake

Optional reliability and security thanks to:

- power-on pulse suppression; prevents motor starting when battery is connected
- stored configuration data; data is retained even after drive battery is disconnected
- watchdog- and voltage-supervisor ICs
- temperature stability, long term stability
- deep-discharge protection. No aprupt motor cut-off at low voltage. Your model car remain fully controllable until the last drop of usable energy is exhausted.
- over-temperature guard (can be reset)
- controller features no vulnerable potentiometers
- internal power cable solder joints, lightweight, high-flex, thin-wall silicone cables to connect battery
- integrated high current connectors for motor connection (3.5mm schulze perfect plug system)

High performance due to:

- 12 cool-FETs can tolerate high overload conditions for brief periods
- latest top-quality components and super-powerful brake circuit (6 cool-FETs)