

Specifications:	Markus SL100	Markus SL150	Markus SL200	Markus SL250	Markus SL300
Continuous current ( <b>forF5B/F5D</b> )	100 A	150 A	200 A	250 A	300 A
Maximal peak current	140 A	200 A	270 A	340 A	400 A
Resistance:	0,001 ohms	0,00075 ohms	0,0006 ohms	0,00043 ohms	0,00036 ohms
Cells elements of battery:					
NiCd/NiMh	5-18	5-18	5-18	5-18	5-18
LiPo	2-6	2-6	2-6	2-6	2-6
Switching Frequency:	8/16 KHz	8/16 KHz	8/16 KHz	8/16 KHz	8/16 KHz
Cable cross-section:	3,4 mm <sup>2</sup>	3,4 mm <sup>2</sup>	6,7 mm <sup>2</sup>	6,7 mm <sup>2</sup>	6,7 mm <sup>2</sup>
BEC: Voltage:	5 V	5 V	5 V	5 V	5 V
Continuous current:	2 A	2 A	2 A	2 A	2 A
Short current:	4 A	4 A	4 A	4 A	4 A
Weight (include cables):	51 g	54 g	81 g	91 g	103 g

#### Features:

- battery type - "Auto Ni-xx" (5-18 cells)
- auto-shutoff when signal is lost or interference is severe
- smooth motor cut-off when the battery voltage hits LVC
- calibrating throttle endpoints
- return to default settings
- audible and LED signal
- simple setup
- USB interface to PC

#### Programming Features:

##### Cut-off voltage – 7 settings:

5.0 V  
6.0 V  
9.0 V  
12.0 V  
15.0 V  
18.0 V  
"Auto Ni-xx" automatically determination of a battery voltage (from 5 until 18 cells NiCd/NiMh packs)  
"Off"  
"Custom" (PC connect)

##### Brake type – 4 settings:

"off"  
soft delayed brake  
soft brake  
hard brake

##### Timing – 6 settings:

3° for 2 pole motors  
7° for 2 pole motors  
12° for 2-4 pole motors  
17° for 4-10 pole motors  
22° for 6-14 pole motors  
27° for 10-14 pole motors

##### Start – 4 settings:

soft  
normal  
fast  
hard

##### Acceleration - 3 settings:

slow  
normal  
fast

##### Throttle curve – 2 settings:

"exponential" an exponential course of rpm with the throttle stick displacement.  
"linear" a linear course of rpm with the throttle stick displacement

##### Cutoff type – 2 settings:

"acro"  
"heli"

##### Change rotation of the motor – 2 settings:

forward  
reverse

##### The sound and LED indication of the lost signals (when signal is lost or interference is severe) – 2 settings:

audible and LED signal  
only LED signal (audible signal "off")

##### PWM Switching Rate – 2 settings:

8 KHz  
16 KHz

## 1. INSTALLING AND CONNECTING THE CONTROLLER

The motor is connected to the side of the controller that has three power wires. The three speed controller wires should be soldered directly to the three motor wires. The connection is also possible by using the connectors, ensuring a reliable contact and designed for the appropriate current.

**The places of connection wires should necessarily be isolated!**

To change the rotation direction of the motor, swap any two motor wire connections or change the setting of your controller.

Connect the speed controller receiver connector (the three color wires with a connector) to the proper channel on your receiver (usually channel 3).

The battery pack is attached to the side of the controller that has only two power wires (red and black) and also has the radio connector. Attach the wires of battery pack to the wires of controller (the red controller wire to the red battery wire, the black controller wire to the black battery wire).

**IMPORTANT NOTE: You must be sure that the polarity is correct when connecting the speed controller. Incorrect polarity could permanently damage the controller! We recommend using connectors, ensuring that the polarity is correct!**

Install the speed controller in the model so that it is isolated from vibration and shock, using double sided foam tape. Allow space around the speed controller for cooling. Make sure that there is sufficient cooling of the motor and speed controller by the directing adequate cooling air from the outside airflow. The BEC can hold peak currents up to 4A. Be careful when determining the range of the set, especially when using more batteries – in case of signal loss servos might turn to their maximum which would cause significant rise in drawn current. This might lead to a power overload of BEC with all its consequences. At connection servo type it is recommended to be guided by the following table:

Servo type	6 cells NiCd/NiMh	7-8 cells NiCd/NiMh or 2 cells LiPo	9-10 cells NiCd/NiMh or 3 cells LiPo	11-12 cells NiCd/NiMh or 4 cells LiPo	13-14 cells NiCd/NiMh or 5 cells LiPo
Micro servos	6	5	4	2	-
Standard servos	5	4	3	1	-
High Torque servos	4	3	2	-	-

**Attention!** BEC voltage is possible use up to 17V (4 Lipol or 12 Nixx cells). If you want to use 5 LiPo or 13-14 NiCd/NiMn battery packs, so you must remove central tap (red wire) from servoconnector. And also you need to isolate this tap properly. For higher voltages you can use an external battery or an external BEC for receiver and servos supply.

## 2. THE SOUND INDICATION

The sound signal is heard only at the included motor.

Switch on your transmitter. Move the throttle arm to the **lowest** position on your transmitter.

Connect the battery pack to the speed controller. After 2 seconds you will hear signal (this signal is indication of cut-off voltage):

a short "beep" of high tone	5,0 V	5-7 cells NiCd/NiMh
"tee-lee-lee" and two short "beeps" of high tone	6,0 V	8-9 cells NiCd/NiMh
"tee-lee-lee" and three short "beeps" of high tone	9,0 V	10-12 cells NiCd/NiMh
"tee-lee-lee" and four short "beeps" of high tone	12,0 V	13-16 cells NiCd/NiMh
"tee-lee-lee" and five short "beeps" of high tone	15,0 V	17-18 cells NiCd/NiMh
"tee-lee-lee" and six short "beeps" of high tone	18,0 V	
a long "beep" of high tone	"off"	
"tee-lee-lee"	Custom	
a long "beep" of low tone a long "beep" of high tone	"Auto Ni-xx" (5-18 cells)	

**Controller ready to fly!**

**Attention! Always connect the motor battery pack just before flight and disconnect it immediately after landing the model.**

**If you do not use model, always disconnect the battery, because the small current of controller can unload batteries below allowed voltage.**

**If you hear short "beeps" in low tones every two seconds, it is because of loss of transmitter signal or excessive radio noise cutoff.**

## 3. CALIBRATING THE CONTROLLER FOR YOUR TRANSMITTER:

1. Move the trimmer on the throttle channel to the middle position.
2. Connect the speed controller receiver connector to the proper channel on your receiver (usually channel 3).
3. Switch on your transmitter. Move the throttle arm to the highest position on your transmitter.
4. Connect the battery pack to the speed controller. After 5 seconds you will hear "tee-lee-lee".

**If you input into the calibration mode by mistake, move the throttle arm to the lowest position on your transmitter. This will return the controller in the normal mode.**

5. Move the throttle arm to the middle position on your transmitter. After 5 seconds you will hear "tee-lee-lee".

6. Move the throttle arm to the lowest position on your transmitter. After 5 seconds you will hear "tee-lee-lee".

**The calibrating of throttle endpoints is finished. Your controller is ready to use.**

## 4. VIEWING AND PROGRAMMING OF SETTINGS

1. Connect the speed controller receiver connector to the proper channel on your receiver (usually channel 3).
2. Switch on the transmitter and move to the throttle arm to the **highest** position.
3. Connect the battery pack to the speed controller.
4. After 5 seconds, you will hear a "tee-lee-lee".

**If you input into the programming mode by mistake, move the throttle arm to the lowest position on your transmitter. This will return the controller in the normal mode.**

5. Move the throttle arm to the **middle** position on your transmitter; you will hear "tee-lee-lee".

Move the throttle arm to the **highest** position on your transmitter. You will hear **one** high "beep" of low tone:

**parameter A – Cut-off voltage**

Move the throttle arm to the **middle** position on your transmitter. You will hear:

- one "beep"	5,0 V	5-7 cells NiCd/NiMh	2 cells Lipo
- two "beeps"	6,0 V	7-9 cells NiCd/NiMh	3 cells Lipo
- three "beeps"	9,0 V	10-12 cells NiCd/NiMh	4 cells Lipo
- four "beeps"	12,0 V	13-16 cells NiCd/NiMh	5 cells Lipo
- five "beeps"	15,0 V	17-18 cells NiCd/NiMh	6 cells Lipo
- six "beeps"	18,0 V		
- seven "beeps"	"Auto Ni-xx"	(5-18 cells NiCd/NiMh)	
- eight "beeps"	"Off" ***		
- nine "beeps"	"Custom"	(PC connect)	

For change of defaults settings you move the throttle arm to the **lowest** position on your transmitter, you will hear one long "beep".

Move the throttle arm to the **middle** position on your transmitter. The audible signal is monitored a new setting in this parameter.

Move the throttle arm to the **highest** position on your transmitter. You will hear **two** highs "beeps" of low tone:

**parameter B – Brake type**

Move the throttle arm to the **middle** position on your transmitter you will hear:

- one "beep"	brake off
- two "beeps"	soft delayed brake
- three "beeps"	soft brake
- four "beeps"	hard brake ***

For change of default settings you move the throttle arm to the **lowest** position on your transmitter, you will hear one long "beep".

Move the throttle arm to the **middle** position on your transmitter. The audible signal is monitored a new setting in this parameter.

Move the throttle arm to the **highest** position on your transmitter. You will hear **three** highs "beeps" of low tone:

**parameter C – Timing**

Move the throttle arm to the **middle** position on your transmitter you will hear:

- one "beep"	3°	for 2 pole motors
- two "beeps"	7°	for 2 pole motors
- three "beeps"	12° ***	for 4-10 pole motors
- four "beeps"	17°	for 6-14 pole motors
- five "beeps"	22°	for 6-14 pole motors
- six "beeps"	27°	for 10-14 pole motors

For change of default settings you move the throttle arm to the **lowest** position on your transmitter, you will hear one long "beep". Move the throttle arm to the **middle** position on your transmitter. The audible signal is monitored a new setting in this parameter.

Move the throttle arm to the **highest** position on your transmitter. You will hear **four** highs "beeps" of low tone:  
**parameter D – Start**

Move the throttle arm to the **middle** position on your transmitter. You will hear:

- one "beep"	hard
- two "beeps"	fast
- three "beeps"	normal ***
- four "beeps"	soft

For change of default settings you move the throttle arm to the **lowest** position on your transmitter, you will hear one long "beep". Move the throttle arm to the **middle** position on your transmitter. The audible signal is monitored a new setting in this parameter.

Move the throttle arm to the **highest** position on your transmitter. You will hear **five** highs "beeps" of low tone:  
**parameter E – Acceleration**

Move the throttle arm to the **middle** position on your transmitter. You will hear:

- one "beep"	fast
- two "beeps"	normal ***
- three "beeps"	slow

For change of default settings you move the throttle arm to the **lowest** position on your transmitter, you will hear one long "beep". Move the throttle arm to the **middle** position on your transmitter. The audible signal is monitored a new setting in this parameter.

Move the throttle arm to the **highest** position on your transmitter. You will hear **six** highs "beeps" of low tone:  
**parameter F – PWM Switching Rate**

Move the throttle arm to the **middle** position on your transmitter. You will hear:

- one "beep"	8 KHz***
- two "beeps"	16 KHz

For change of default settings you move the throttle arm to the **lowest** position on your transmitter, you will hear one long "beep". Move the throttle arm to the **middle** position on your transmitter. The audible signal is monitored a new setting in this parameter.

Move the throttle arm to the **highest** position on your transmitter. You will hear **one** high "beep". You return to the **parameter A – Cut-off voltage**. If you want to **escape from Programming Mode**, move the throttle arm to the **middle** or **highest** position on your transmitter and disconnect the battery pack.

## 5. SWITCH ON/OFF SOUND INDICATION OF THE LOST SIGNALS

For it you need to enter into the **parameter A – Cut-off voltage**

For viewing of default settings you move the throttle arm to the **lowest** position on your transmitter, you will hear

- one "beep" of low tone	sound "on"
- two "beeps" of low tone	sound "off" ***

(If you do not need change settings, move the throttle arm to the **highest** position. **This will return the controller in the parameter A – Cut-off voltage**)

For changing of default settings you move the throttle arm to the **middle** position on your transmitter, you will hear

- one "beep" of low tone	sound "on"
- two "beeps" of low tone	sound "off"

The audible signal is monitored a new setting.

If you want to **Escape Programming Mode**, move the throttle arm to the **highest** position on your transmitter and disconnect the battery pack.

### Example:

1. Connect the speed controller receiver connector to the proper channel on your receiver (usually channel 3).
2. Switch on the transmitter and move to the throttle arm to the **highest** position.
3. Connect the battery pack to the speed controller.
4. After 5 seconds, you will hear a "tee-lee-lee".

**If you input into the programming mode by mistake, move the throttle arm to the lowest position on your transmitter. This will return the controller in the normal mode.**

5. Move the throttle arm to the **middle** position on your transmitter; you will hear "tee-lee-lee".

Move the throttle arm to the **highest** position on your transmitter. You will hear **one** high "beep" of low tone - **parameter A – Cut-off voltage**

6. Move the throttle arm to the **lowest** position on your transmitter, you will hear

- one long "beep" of low tone	sound "on"
- two "beeps" of low tone	sound "off"

**If you don't need change settings, move the throttle arm to the highest position. This will return the controller in the parameter A – Cut-off voltage.**

If you want to change of default settings you move the throttle arm to the **middle** position on your transmitter, you will hear

- one long "beep" of low tone	sound "on" or
- two "beeps" of low tone	sound "off"

The audible signal is monitored a new setting.

7. Move the throttle arm to the **highest** position. **This will return the controller in the parameter A – Cut-off voltage.**

8. If you want to **Escape Programming Mode**, move the throttle arm to the **middle** position on your transmitter and disconnect the battery pack.

## 6. CUTOFF TYPE

For viewing and changing settings of **cutoff type** you need to enter into the **parameter B – Brake type**

For viewing of default settings you move the throttle arm to the **lowest** position on your transmitter, you will hear

- one "beep"	"acro" ***
- two "beeps"	"heli"

(If you don't need change settings, move the throttle arm to the **highest** position. **This will return the controller into the parameter B – Brake type**)

For changing of default settings you move the throttle arm to the **middle** position on your transmitter, you will hear

- one "beep"	"acro"
- two "beeps"	"heli"

The audible signal is monitored a new setting.

If you want to **Escape Programming Mode**, move the throttle arm to the **highest** position on your transmitter and disconnect the battery pack.

## 7. CHANGE ROTATION OF THE MOTOR

For it you need to enter into the **parameter D – Start**

For viewing of default settings you move the throttle arm to the **lowest** position on your transmitter, you will hear

- one "beep"
- two "beeps"

(If you don't need change settings, move the throttle arm to the **highest** position. **This will return the controller into the parameter D – Start**)

For changing a rotation direction of the motor you move the throttle arm to the **middle** position on your transmitter, you will hear

- one long "beep"
- two "beeps"

The audible signal is monitored a new setting.

If you want to **Escape Programming Mode**, move the throttle arm to the **highest** position on your transmitter and disconnect the battery pack.

## 8. THROTTLE CURVE

For viewing and changing settings of **throttle curve** you need to enter into the **parameter E – Acceleration**

For viewing of default settings you move the throttle arm to the **lowest** position on your transmitter, you will hear

- one "beep" " exponential " \*\*\*
- two "beeps" " linear "

If you don't need change settings, move the throttle arm to the **highest** position. **This will return the controller into the parameter E – Acceleration.**

For changing of default settings you move the throttle arm to the **middle** position on your transmitter, you will hear

- one "beep" " exponential "
- two "beeps" " linear "

The audible signal is monitored a new setting.

If you want to **escape from Programming Mode**, move the throttle arm to the **highest** position on your transmitter and disconnect the battery pack.

## 9. RETURN TO FACTORY DEFAULT SETTINGS

**Factory default settings of controller include:**

<b>Cut-off voltage</b>	"off"
<b>Brake type</b>	hard brake
<b>Timing</b>	12°
<b>Start</b>	normal
<b>Acceleration</b>	normal
<b>Throttle curve</b>	"exponential"
<b>Cutoff type</b>	"acro"
<b>Audible signal</b>	"off"
<b>PWM Switching Rate</b>	8 KHz

If you want to return to **factory default settings** so you must enter into the **parameter C – Timing**

**For it:**

1. Connect the speed controller receiver connector to the proper channel on your receiver (usually channel 3).
2. Switch on the transmitter and move to the throttle arm to the **highest** position.
3. Connect the battery pack to the speed controller.
4. After 5 seconds, you will hear a "tee-lee-lee".

**If you input into the programming mode by mistake, move the throttle arm to the lowest position on your transmitter. This will return the controller in the normal mode.**

5. Move the throttle arm to the **middle** position on your transmitter, you will hear "tee-lee-lee".
6. Move the throttle arm to the **highest** position on your transmitter. You will hear **one** high "beep" of low tone - **parameter A – Cut-off voltage**
7. Move the throttle arm to the **middle** position on your transmitter, you will hear from one "beep" till six "beeps" or "tee-lee-lee". The audible signal is monitored the settings in this parameter.
8. Move the throttle arm to the **highest** position on your transmitter. You will hear **two** high "beeps" of low tone - **parameter B – Brake type**
9. Move the throttle arm to the **middle** position on your transmitter, you will hear from one "beep" till four "beeps". The audible signal is monitored the settings in this parameter.
10. Move the throttle arm to the **highest** position on your transmitter. You will hear **three** high "beeps" of low tone - **parameter C – Timing**
11. Move the throttle arm to the **lowest** position on your transmitter, you will hear:

- three long "beeps" of high tone, this signal of a readiness to **returning to factory default settings**.

(If you do not need to change your settings, move the throttle arm to the **highest** position on your transmitter. This will return the controller into the parameter **C – Timing**).

For a returning to factory default settings you move the throttle arm to the **middle** position on your transmitter, you will hear a "tee-lee-lee".

**The settings of your controller have been returned to factory default settings.**

If you want to **escape from Programming Mode**, move the throttle arm to the **highest** position on your transmitter and disconnect the battery pack.

**NOTE: factory defaults are indicated by asterisks (\*\*\*)**

## 11. WARRANTY

All Markus products are accompanied by an **one-year** manufacturer warranty against defects in materials and workmanship. This warranty does not cover damage due to misuse, abuse, neglect, or incorrect wiring.

**Controllers must has original packing and label!**

**WARNING: Controllers WILL NOT be covered under the warranty for:**

- connecting more battery cells to the controller than the max. number specified in the technical data
- reversing connections to the accumulator
- overloading
- overloading of the BEC with bigger currents or bigger power loss than is specified in technical data
- water in the controller
- mechanical damages

**Do not connect the speed controller to just "any" kind of power source. Take care to ensure the right polarity of NiCd/NiMH or LiPo power packs only. Do not connect the motor battery to the wrong polarity, the speed controller will be severely damaged.**