

Specifications:	Markus Revo20	Markus Revo30
Continuous current	20 A	30 A
Maximal peak current	25 A	35 A
Resistance:	0,011ohms	0,0049 ohms
Cells elements of battery:		
NiCd/NiMh	5-12	5-12
LiPo	2-4	2-4
Switching Frequency:	8 KHz	8 KHz
Cable cross-section:	1,0 mm <sup>2</sup>	1,5 mm <sup>2</sup>
BEC:		
Voltage:	5 V	5 V
Continuous current:	2 A	2 A
Short current:	4 A	4 A
Weight (include cables):	18 g	23 g

**Features:**

- battery type - "Auto Li-xx" (2-4 cells) or "Auto Ni-xx" (5-12 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
- small dimensions and weight
- power switch
- simple setup

**Programming Features:**
**Cut-off voltage – 7 settings:**

- "off"
- 4.0 V
- 6.0 V
- 9.0 V
- 12.0 V
- "Auto Li-xx"                    automatic determination of a battery voltage (from 2 till 4 cells LiPo packs)
- "Auto Ni-xx"                    automatic determination of a battery voltage (from 5 till 12 cells NiCd/NiMh packs)

**Brake/Reverse type – 3 settings:**

- FF – N – Brake                    Forward – Neutral – Proportional Brake
- FF – N – Brake/Reverse            Forward – Neutral – Proportional Brake – Pause – Reverse
- FF – N – Reverse                    Forward – Neutral – Pause – Reverse

**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:**

- hard
- fast
- normal
- soft

**Acceleration - 3 settings:**

- fast
- normal
- slow

**Duration of pause before change of rotation direction – 2 settings:**

- 0,5 sec.
- 1,0 sec.

**Reverse Throttle amount/Brake Strength – 2 settings:**

- 50%
- 100%

**Change of rotation direction – 2 settings:**

- Forward
- Reverse

**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

**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	5-6 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
Micro servos	6	5	4	2
Standard servos	5	4	3	1
High Torque servos	4	3	2	-

## 2. 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".
5. Move the throttle arm to the **middle (Neutral)** position on your transmitter, you will hear "tee-lee-lee".
6. Move the throttle arm to the **lowest** position on your transmitter, you will hear "tee-lee-lee".
7. Move the throttle arm to the **middle (Neutral)** position on your transmitter, you will hear "tee-lee-lee".

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

**Attention! Always perform a range check before flying with any new speed controller! Perform your range check at full throttle, half throttle and no throttle.**

## 3. THE SOUND INDICATION

The sound signal is heard only at the included motor.

Switch on your transmitter. Move the throttle arm to the **middle (Neutral)** 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 long "beep" of low tone	"off"		
or a short "beep" of high tone	4,0 V		
or two short "beeps" of high tone	6,0 V	2 cells LiPo	5-7 cells NiCd/NiMh
or three short "beeps" of high tone	9,0 V	3 cells LiPo	8-9 cells NiCd/NiMh
or four short "beeps" of high tone	12,0 V	4 cells LiPo	10-12 cells NiCd/NiMh

### "Auto Li-xx" settings

"tee-lee-lee" and two short "beeps" of high tone	6,0 V	"Auto Li-xx" 2 cells LiPo
or "tee-lee-lee" and three short "beeps" of high tone	9,0 V	"Auto Li-xx" 3 cells LiPo
or "tee-lee-lee" and four short "beeps" of high tone	12,0 V	"Auto Li-xx" 4 cells LiPo

### "Auto Ni-xx" settings

a long "beep" of low tone a long "beep" of high tone	"Auto Ni-xx" 5-12 cells NiCd/NiMh (0,8 V/cell)
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Controller ready to use!

**Attention! In a mode "Auto Li-xx" should be used only fresh charged LiPo batteries! Correct number setting is possible only for full or partial charge battery. 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.**

## 4. VIEWING AND PROGRAMMING OF SETTINGS

### Entering Programming Mode:

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, disconnect the battery pack. This will return the controller in the normal mode.**

5. Move the throttle arm to the **middle (Neutral)** 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** "beep" of high tone:

### parameter A – Cut-off voltage

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

- one "beep"	4,0 V***	5-7 cells NiCd/NiMh	
- two "beeps"	6,0 V	7-9 cells NiCd/NiMh	2 cells Lipo
- three "beeps"	9,0 V	10-12 cells NiCd/NiMh	3 cells Lipo
- four "beeps"	12,0 V	13-14 cells NiCd/NiMh	4 cells Lipo
- five "beeps"	"Auto Li-xx"	(2-4 cells Lipo) 3,0 V/cell	
- six "beeps"	"Auto Ni-xx"	(5-12 cells NiCd/NiMh) 0,8 V/cell	
- one long "beep"	"off"		

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

Then move the throttle arm to the **middle (Neutral)** 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** "beeps" of high tone:

### parameter B – Brake/Reverse type

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

- one "beep"	FF – N – Brake	Forward – Neutral – Proportional Brake
- two "beeps"	FF – N – Brake/Reverse***	Forward – Neutral – Proportional Brake – Pause – Reverse
- three "beeps"	FF – N – Reverse	Forward – Neutral – Pause – Reverse

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

Move the throttle arm to the **middle (Neutral)** 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** "beeps" of high tone:

### parameter C – Timing

Move the throttle arm to the **middle (Neutral)** 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, move the throttle arm to the **lowest** position on your transmitter, you will hear one long "beep".  
Move the throttle arm to the **middle (Neutral)** 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** "beeps" of high tone:  
**parameter D – Start**

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

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

For change of default settings, move the throttle arm to the **lowest** position on your transmitter, you will hear one long "beep".  
Move the throttle arm to the **middle (Neutral)** 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** "beeps" of high tone:  
**parameter E – Acceleration**

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

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

For change of default settings, move the throttle arm to the **lowest** position on your transmitter, you will hear one long "beep".  
Move the throttle arm to the **middle (Neutral)** 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 have returned to the **parameter A – Cut-off voltage**.  
If you want to **escape from the Programming Mode**, move the throttle arm to the **middle (Neutral)** position on your transmitter and disconnect the battery pack.

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

**5. THE CHOICE OF DURATION OF PAUSE BEFORE CHANGE OF ROTATION DIRECTION**

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

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

- one "beep" of low tone	duration of pause 0,5 sec. or
- two "beeps" of low tone	duration of pause 1,0 sec.

**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, move the throttle arm to the **middle (Neutral)** position on your transmitter, you will hear

- one "beep" of low tone	duration of pause 0,5 sec. or
- two "beeps" of low tone	duration of pause 1,0 sec.

The audible signal is monitored a new setting. **Move the throttle arm to the highest position. This will return the controller in the parameter A – Cut-off voltage.**

If you want to **escape from the Programming Mode**, move the throttle arm to the **middle (Neutral)** 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".
5. Move the throttle arm to the **middle (Neutral)** 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** "beep" of high tone - **parameter A – Cut-off voltage**
7. Move the throttle arm to the **lowest** position on your transmitter, you will hear
 

- one "beep" of low tone	duration of pause 0,5 sec. or
- two "beeps" of low tone	duration of pause 1,0 sec.

**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.**

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

- one "beep" of low tone	duration of pause 0,5 sec. or
- two "beeps" of low tone	duration of pause 1,0 sec.

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 from the Programming Mode**, move the throttle arm to the **middle (Neutral)** position on your transmitter and disconnect the battery pack.

**6. REVERSE THROTTLE AMOUNT/BRAKE STRENGTH**

For it you must enter into the **parameter B – Brake type**

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

- one "beep"	50 %
- two "beeps"	100 %

If you don't need to 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, move the throttle arm to the **middle (Neutral)** position on your transmitter, you will hear

- one "beep"	50 %
- two "beeps"	100 %

The audible signal is monitored a new setting. **Move the throttle arm to the highest position. This will return the controller in the parameter B – Brake type.**  
If you want to **escape from the Programming Mode**, move the throttle arm to the **middle (Neutral)** position on your transmitter and disconnect the battery pack.

**7. CHANGE OF ROTATION DIRECTION OF THE MOTOR**

For it you must enter into the **parameter D – Start**

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

- one "beep" or
- two "beeps"

If you don't need to change the rotation direction of your motor, move the throttle arm to the **highest** position. **This will return the controller into the parameter D – Start.**

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

- one long "beep" or
- two "beeps"

The audible signal is monitored a new setting. **Move the throttle arm to the highest position. This will return the controller in the parameter D – Start.**

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

## 8. THROTTLE CURVE

For it you must enter into the **parameter E – Acceleration**

For viewing of default settings, 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 to 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, move the throttle arm to the **middle (Neutral)** position on your transmitter, you will hear

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

The audible signal is monitored a new setting. **Move the throttle arm to the highest position. This will return the controller in the parameter E – Acceleration.**

If you want to **escape from the Programming Mode**, move the throttle arm to the **middle (Neutral)** 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>	4,0 V	5-7 cells NiCd/NiMh
<b>Brake type</b>	FF – N – Brake/Reverse	Forward – Neutral – Proportional Brake – Pause – Reverse
<b>Timing</b>	7°	for 2 pole motors
<b>Start</b>	normal	
<b>Acceleration</b>	normal	
<b>Throttle curve</b>	"exponential"	
<b>Reverse Throttle amount/Brake Strength</b>	50 %"	maximum brake strength, and reverse speed equal to 50% of full power
<b>Duration of pause before change of rotation direction</b>	0,5 sec.	

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".
5. Move the throttle arm to the **middle (Neutral)** 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** "beep" of high tone - **parameter A – Cut-off voltage**
7. Move the throttle arm to the **middle (Neutral)** position on your transmitter, you will hear from one "beep" till six "beeps" or one long "beep". 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** "beeps" of high tone - **parameter B – Brake/Reverse type**
9. Move the throttle arm to the **middle (Neutral)** position on your transmitter, you will hear from one "beep" till three "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, it is 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, move the throttle arm to the **middle (Neutral)** position on your transmitter, you will hear a "tee-lee-lee". **The settings of your controller have been returned to factory default settings.**

**Move the throttle arm to the highest position. This will return the controller in the parameter C – Timing**

**For the escape from the Programming Mode**, move the throttle arm to the **middle (Neutral)** position on your transmitter and disconnect the battery pack.

## 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.**