

USER GUIDE



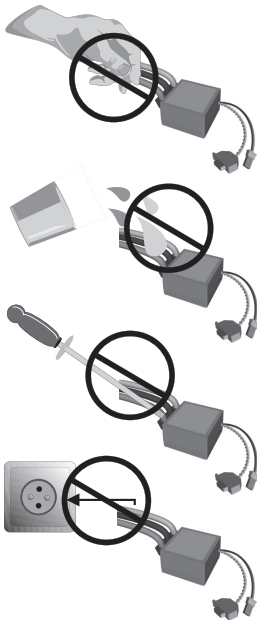
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WARNING NOTES

- IMPORTANT:** Never leave your RC model unsupervised when the battery is plugged in. If a defect occurs, it could set fire to the model or the surroundings.
- Never wrap your speed-control in plastic film or metal foil. In fact, make sure it gets enough fresh air.
- Avoid soldering longer than 5sec per soldering joint when replacing the power wires to prevent possible damage to the speed-control due to overheating of the components!

IMPORTANT: Pay close attention to the following points, as they will destroy the speed-control and void your warranty:

- Never allow the speed-control or other electronic components to come in contact with water. Do not operate the speed-control in the rain. If you ever have to operate in the rain, protect your speed-control properly to avoid that water reaches the speed-control.
- If the speed-control is connected to the motor, never run the motor directly with a separate battery or run-in device.
- Never connect the speed-control incorrectly or with reversed polarity.
- All wires and connections have to be well insulated. Short-circuits will destroy the speed-control. Pay special attention to the receiver- and switch wires.
- Never change the polarity of the receiver connector.
- Never open the speed control and never solder on the PCB (except on external solder-tabs).



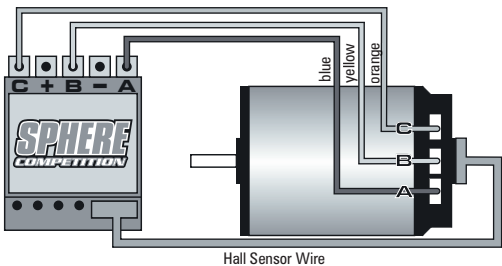
CONNECTION

The SPHERE COMPETITION is supplied with 13AWG power-wires without connectors. Be very careful with the correct wire sequence/colors since an incorrect connections may damage the speed-control! Avoid creating solder bridges on the solder-tabs and isolate all connections carefully.
Caution: Avoid soldering longer than 5sec per soldering joint when replacing the power wires on speed-control and motor to prevent possible damage due to overheating of the components!

- Connect the speed-control to the receiver (position: channel 2)

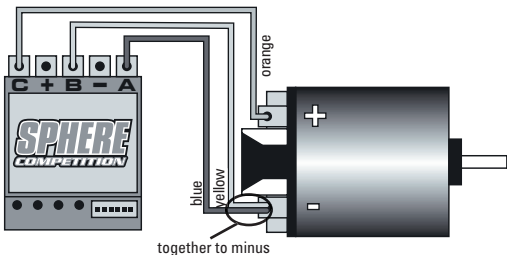
BRUSHLESS MOTOR:

- Blue power-wire → Speedo MOT.A to motor „A“
- Yellow power-wire → Speedo MOT.B to motor „B“
- Orange power-wire → Speedo MOT.C to motor „C“
- Connect the hall sensor cable to the speed-control and the motor.



BRUSHED MOTOR:

- Blue/Yellow power-wire → Speedo MOT.A/MOT.B to „Minus“ on the motor.
- Orange power-wire → Speedo MOT.C to „Plus“ on the motor.



- Doublecheck all connections before connecting the speed-control to a battery.
- CAUTION:** If battery is connected with reversed polarity it will destroy your speed-control!
- Red power-wire → Speedo BAT+ to battery „Plus“
- Black power-wire → Speedo BAT- to battery „Minus“
- The speed-control is now ready to be set-up (see back side).

Dear Customer,

Thank you for your trust in this LRP product. By purchasing a SPHERE COMPETITION speed-control, you have chosen one of the most advanced speed-controls of today, which is full of new design features such as:

- Automatic Brushless / Brushed Adaptation
- IceDrive Design
- Super-Low Motorlimit
- Blue metalised case and blue LED
- Multi-Protection System
- Advanced Digital with 4 adj. Modes (AutoCell System, ADPC™, Initial-Brake, Automatic-Brake)
- Forward/Brake Racing Speed-Control
- AutoCell System - NiMH/LiPo Adaptation
- Sensored Brushless Technology
- 13AWG power-wires + external solder tabs
- Intuitive QC-style programming

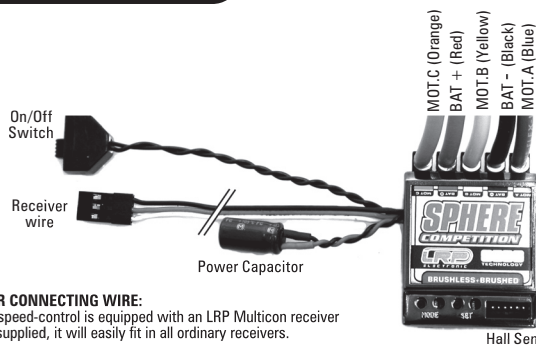
Please read and understand these instructions completely before you use this product!
With operating this product, you accept the LRP warranty terms.

SPECIFICATIONS

Brushless AND Brushed	yes (automatic adaptation)	Typ.Volt.Drop (Brushed)* @20A	0.013V
Forward/Brake	yes (racing style)	Rec. Motor Limit (Brushed)**	>5 turns
Case Size	33.1x37.6x14.9	Rated Current (Brushed)*	400A
Weight (excl. wires)	24.5g	B.E.C.	5.5V / 3.0A
Voltage Input	4-7 cells (4.8-8.4V)	High Frequency	yes
Typ.Volt.Drop (Brushless)* @20A	0.018V / phase	Sensored Brushless System	yes
Rated Current (Brushless)*	400A / phase	Multi-Protection-System	yes
Rec. Motor Limit (Brushless)**	>3.5 turns	Power Wires	13awg
4 adj. Modes (NiMH/LiPo, ADPC™ Power Profiles, Initial Brake, Automatic Brake)			yes

* Transistors rating at 25°C junction temperature. Specifications subject to change without notice.
** @6cells (7.2V)

CONNECTIONS



RECEIVER CONNECTING WIRE:

This LRP speed-control is equipped with an LRP Multicon receiver wire. As supplied, it will easily fit in all ordinary receivers.

HALL SENSOR WIRE:

This bi-directional multipole wire (which comes with the motor and NOT the speed-control!) connects the speed-control and the motor. Do not alter or modify this cable! There are replaceable/optional hall sensor wires available:

- #81910 (20cm)
- #81920 (10cm)

POWER WIRES:

For maximum performance, 13AWG power wires without any connectors are used. The unique splitted solder-tabs allow easy and convenient replacement of the power wires. Nevertheless some soldering skills are required. Avoid soldering longer than 5sec per soldering joint to prevent possible damage to the speed-control due to overheating of the components! There is a full 13awg replacement power wire set available: #82505

INSTALLATION TIPS

- Mount the speedo using the supplied thick/black doubled-sided tape. **Do not use the clear Scotch 468MP tape!**
- Position the speed-control where it is protected in the event of a crash.
- Install the speed-control so that you have easy access to the connector and buttons.
- Make sure there is enough clearance (about 3cm) between the speed-control, power-wires, antenna and receiver. Avoid any direct contact between power components, the receiver or the antenna. This can cause interference. If interference occurs, position the components at a difference place in the model.
- The aerial should be run vertically up and away from the receiver. Avoid contact with any parts made of carbon fibre or metal. If the aerial is too long, don't coil up the excess length. It is better to cut it down to a length of about 35 cm. See also the instructions supplied with your radio control system.
- Make sure there are enough cooling slits in the body. This will increase the performance and life of all the electronic components.

HEATSINK: We recommend using the supplied heatsink in order to achieve best performance even under extreme circumstances. Clean the heatsink and stickerplate before you attach the clear/thin Scotch 468MP thermal tape to guarantee perfect heat dissipation.

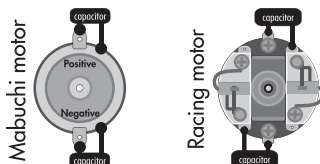
Caution: Use ONLY the supplied clear/thin Scotch 468MP thermal tape to attach the heatsink! Do not use standard double sided tape!

Because of the physical principles of brushless technology, the speed-controls do get a little hotter than brushed systems. Therefore it is required to let the speed-control cool down completely after every run. When running in extreme conditions (high ambient temperature, low-tum motors, high gear ratios, etc.) we recommend using LRP's brushless cooling set #82500, which includes a pre-wired and perfectly sized fan and a spare power-capacitor.



SUPPRESSION

ONLY FOR BRUSHED MOTORS! Motors with no capacitors or not enough capacitors may interfere with the speed-control. To avoid this, solder the supplied capacitors to your motor (see picture).



Mount the power-capacitor in a position where it is protected in the event of a crash. The best place is right below the solder tabs and secure it with double-sided tape.

RADIO / SPEED-CONTROL SET-UP

In setup mode the SPHERE COMPETITION stores every step when you press the SET button. All the settings will be stored in the speed-controls memory even if the speed-control will be disconnected from the battery.

TRANSMITTER SETTINGS

Setup the following basic functions on your transmitter (if available):

Throttle travel	High ATV, EPA	maximum
Brake travel	Low ATV, EPA, ATL	maximum
Throttle exponential	EXP, EXP0	start with 0
Neutral trim	SUB Trim	centre
Serve reverse	Throttle reverse	any setting, don't change after set-up procedure!

If your transmitter doesn't offer any of above functions, it's already in „basic setup“ mode.

- Ensure that the speed-control is not connected to the drive battery, and is switched off.
- Remove motor pinion, or ensure that the wheels of the model are free to rotate.
- Switch the transmitter on and set the transmitter throttle stick to neutral..

- Connect the speed-control to the battery, and switch the unit on.
- Hold the SET button pressed for at least 3sec using the supplied plastic screwdriver.
→ you entered setup mode and SET LED flashes blue (it will flash until the setup is completed).

- Leave radio in neutral and press the SET button once.
→ neutral setting is stored, MODE LED flashes yellow and the motor beeps.
- Hold full throttle on radio and press the SET button once.
→ full-throttle setting is stored, MODE LED flashes red.
- Hold full brake on radio and press the SET button once.
→ brake setting is stored, LED's glow red (MODE) and blue (SET).

- This completes the setup procedure and your SPHERE COMPETITION is ready to use.
- If you make a mistake during the setup procedure, don't worry: disconnect the battery for about 10sec and start again from the first step.
- At the end of each run switch of the car, and only then switch off the transmitter.
- At the start of each run switch on the transmitter first, then switch on the car.
- For storage of the car, disconnect the drive battery at any time!

CHECKING THE FUNCTIONS:

Check the LED's when moving your throttle stick and you will see if everything is setup correctly.

FUNCTION	STATUS	MODE LED	SET LED
Neutral (automatic brake inactive)	--	off	blue
Neutral (automatic brake active)	--	red	off
Forward	partial throttle	yellow	off
Forward	full throttle	yellow	blue
Brake	partial brake	red	off
Brake	full brake	red	blue

TROUBLESHOOTING GUIDE

Explanation: If no remark, cause can be either with brushless or brushed motor. If „BM“ is indicated, cause only relating to brushed motor.

SYMPTOM	CAUSE	REMEDY
Servo is working, no motor function.	Speed-control plugged in incorrectly	Plug speed-control in Ch 2
	Overload protection activated	Allow speed-control to cool down
	Wiring problem	Check wires and plugs
	Motor defective	Replace motor
	BM - Motor brushes stuck	Check that brushes are moving freely
No servo and no motor function.	Speed-control plugged in incorrectly	Plug speed-control in with correct polarity
	Crystal defective	Replace components one by one.
	Receiver defective	
	Transmitter defective	
Motor runs in reverse when accelerating forward on the transmitter.	Speed-control defective	Send in product for repair
	BM - Motor connected incorrectly	Connect motor correctly
Insufficient performance. E.g. poor brake power, topspeed or acceleration..	Motor pinion too big or gear ratio too long.	Use smaller motor pinion/shorter gear ratio
	Transmitter settings changed after set-up	Repeat set-up procedure
	BM - Motor worn out	Maintain motor
	Motor defective	Replace motor
Speed-control overheats or switches off frequently.	Speed-control defective.	Send in product for repair
	No heatsink installed	Install heatsink
	Motor stronger than motorlimit or input voltage too high	Use only motors and batteries which are within the specifications of the speed-control
	Motor pinion too big or gear ratio too long.	Use smaller motor pinion/shorter gear ratio
	Drive train or bearing problems.	Check or replace components.
	Model used too often without cool-down periods	Let speed-control cool down after every run
Motor never stops, runs at constant slow speed	Extreme conditions	Use additional cooling fan
	Transmitter settings changed after set-up	Repeat set-up procedure
	Humidity/water in speed-control	Immediately unplug and dry speed-control
Radio interference	Speed-control defective	Send in product for repair
	BM - Motor suppressors not sufficient	Solder capacitors to motor
	Receiver or antenna too close to power wires, motor, battery or speed-control.	See „Installation Tips“ and „Installation“
	Receiver aerial too short or coiled up	
	Receiver defective, too sensitive; Transmitter defective, transmitter output power too low, servo problem	Replace components one by one Only use original manufacturers crystals
	Poor battery connection	Check plugs and connecting wires
Transmitter batteries empty	Replace / recharge transmitter batteries	
Transmitter antenna too short	Pull out antenna to full length	

REPAIR PROCEDURES / LIMITED WARRANTY

All products from LRP electronic (hereinafter called „LRP“) are manufactured according to the highest quality standards. LRP guarantees this product to be free from defects in materials or workmanship for 90 days from the original date of purchase verified by sales receipt. This limited warranty doesn't cover defects, which are a result of normal wear, misuse or improper maintenance. This applies among other things on:

- Cut off original power plug or not using reverse polarity protected plugs
- Receiver wire and/or switch wire damaged
- Mechanical damage of the case
- Humidity/Water inside the speed control
- Mechanical damage of electronic components/PCB
- Soldered on the PCB (except on external solder-tabs)
- Connected speed-control with reversed polarity

With Limited Lifetime Warranty products, the warranty terms on the Limited Lifetime Warranty card do also apply. To eliminate all other possibilities or improper handling, first check all other components and the trouble shooting guide before you send in this product for repair or warranty. Products sent in for repair, that operate perfect have to be charged with a service fee.

MODE PROGRAMMING

All modes are available for brushless and brushed motors (speedo adapts automatically). The SPHERE COMPETITION features 4 modes which enable you to adjust it to YOUR special requirements.

- How to get into „programming the modes“ → Press MODE button for 3+ sec.
- How to check the stored values → Count the number of flashes of the blue SET-LED (1x = value 1, 2x = value 2, etc.).
- How to change the value → Press SET button to increase value by one step.
- How to get to the next Mode → Press MODE button once.
- Table of settings, values and modes: see below (grey-shaded values show „works default settings“).

MODE.1 (AutoCell System): see below for explanations.

MODE LED	Value 1	Value 2
Yellow	LiPo/NiMH Automatic	4-7cell NiMH Racing Mode

MODE 2 (ADPC™ + DEMS drive-/punch-control): see below for explanations.

MODE LED	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6
Red	Smooth, low traction	Very Linear	Linear, increased punch	Aggressive map	Very aggressive map	Super aggressive map

MODE.3 (Initial Brake): allows you to set a certain level of “hand-brake effect“, i.e. you can vary the minnum brake effect when you apply the brake.

MODE LED	Value 0	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6
Yellow/Red (alternate)	No Initial Brake						
		Going from lowest to highest initial brake setting (value 1 = minimum / value 6 = maximum)					

MODE.4 (Automatic Brake): allows you to set a slight braking action which is applied in the neutral range. This enables you to simulate the feel of a brushed motor and also hold the throttle on longer when entering a turn. **Tip:** Value 2 with brushless has identical natural slowdown as brushed without automatic brake.

MODE LED	Value 0	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6
Yellow/Red (same time)	No Automatic Brake						
		Going from lowest to highest automatic brake setting (value 1 = minimum / value 6 = maximum)					

MODE FEATURES & EXPLANATIONS

WORKS DEFAULT SETTINGS: All LRP speed-controls come factory-adjusted (defaults are grey-shaded above). If you lose track of the modes, you can restore the works default settings. With the transmitter switched on, hold the SET button pressed while you switch on the speed-control. This simple action returns the unit to the LRP works default settings.

CHANGING MODE SETTINGS WITHOUT THE TRANSMITTER: At race events you usually do not have access to your transmitter, but never mind since you can simply disconnect the receiver lead from the receiver and change the MODE settings as described in this chapter.

AUTOMATIC BRUSHLESS / BRUSHED ADAPTATION: The LRP exclusive Automatic Brushless/Brushed Adaptation detects the connected motor type during turn-on/initialisation and adjusts the correct brushless or brushed operation automatically. No adjustments required by yourself, apart from the correct connection of each motor type (don't forget the hall-sensor-wire for brushless!).

Caution: Keep in mind, when swapping between brushless and brushed motors, that the chosen mode values will be identical!

FORWARD / BRAKE: Uncompromising and outstanding performance for top level competition was the target! Therefore the LRP engineering team developed a pure forward/brake competition speed-control without reverse function.

POWER CAPACITOR: Never disconnect the power-capacitor! It offers increased punch and additional protection.

IceDrive DESIGN: LRP's secret IceDrive Design results in lower speedo temperature under all racing conditions and for both brushless + brushed. Sorry, no further details to be disclosed. Simply a step ahead of the competition!

AutoCell SYSTEM: Ready for the next battery technology – LiPo batteries! LRP's exclusive and smart AutoCell System ensures that LiPo batteries can be used safely without accidentally deep-discharging of the cells. The motor function will be shut-off and the SET LED will flash if the system recognises very low battery voltage. **Tip:** We recommend using value 2 for 4-7 cells NiMH racing purposes, which disengages the LiPo protection.

SENSORED BRUSHLESS TECHNOLOGY: Advanced Digital allows the perfect knowledge of the brushless motor's magnet position. This results in perfect motor control at high and low RPM's, as well as perfect brake control.

ADPC™ BRUSHLESS - DRIVE-/PUNCH-CONTROL: an all new brushless technology which results in more power and better driveability. Depending on the status of the car (start, acceleration and full speed) the software calculates the perfect motor management. Higher value means more overall power and aggressive response.

Caution: Do not advance mechanical timing on the motor when you use ADPC values 3 to 6. Leave the motor timing on minimum timing, which equals to 2mm on sticker. We recommend the following settings for each class.

- 1/12: 2 - 3
- Off-Road: 1 - 4
- Touring Car: 3 - 5
- Stock BL: 6

D.E.M.S. BRUSHED - DRIVE-/PUNCH-CONTROL: the known and world's winning D.E.M.S. Brushed Quantum style power programs have been implemented. Higher value means more overall power and aggressive response, we recommend the following settings for each class:

- 1/12: 2 - 3
- Off-Road: 1 - 4
- Touring Car: 3 - 5
- 19/27t motors: 6

MULTI-PROTECTION SYSTEM, 3-way Protection: the perfect protection against short-circuits (motor), overload and overheating. If your speed-control faces overload, the motor function will be shut-off for protection and the SET LED will flash, although the steering function is maintained. Let the speed-control cool down for a few minutes. If you experience frequent shutdowns, check for the following:

- Correct gear ratio (refer to motor manual for gearing recommendations)
- ADPC setting too high (higher value will heat up motor and speed-control excessively)
- Motor is too strong or motor is damaged.

Tip: Always use the supplied heatsink, if you still experience shutdown issues you should consider obtaining the optional LRP brushless cooling set (#82500).

By sending in this product, you assign LRP to repair the product, if it is no warranty or Limited Lifetime Warranty case. The original sales receipt including date of purchase needs to be included. Otherwise, no warranty can be granted. For quick repair- and return service, add your address and detailed description of the malfunction.

Our limited warranty liability shall be limited to repairing the unit to our original specifications. In no case shall our liability exceed the original cost of this unit. Because we don't have control over the installation or use of this product, we can't accept any liability for any damages resulting from using this product. By installing or operating this product, the user accepts all resulting liability.

The specifications like weight, size and others should be seen as guide values. Due to ongoing technical improvements, which are done in the interest of the product, LRP does not take any responsibility for the accuracy of these specs.

LRP-DISTRIBUTOR-SERVICE:

- Package your product carefully and include sales receipt and detailed description of malfunction.
- Send parcel to your national LRP distributor.
- Distributor repairs or exchanges the product.
- Shipment back to you usually by COD (cash on delivery), but this is subject to your national LRP distributor's general policy.

IMPORTANT - „2007 EDITION“ - SUPPLEMENTARY MANUAL - IMPORTANT

Dear Customer,

RVZ0038



Thank you for your trust in this LRP product. By purchasing a Sphere Competition „2007 Edition“, you have chosen one of the most advanced speed-controls of today. All the latest features and developments have been incorporated into this speed-control. All our products get improved continually in order to give you the best possible performance and reliability. This supplementary manual explains you the improvements which the „2007 Edition“ offer you and how it differs from the regular Sphere Competition.

Pay attention, this is not a complete new manual but just a supplement to the enclosed full manual!

Please read and understand instructions completely before you use this product! With operating this product, you accept the LRP warranty terms.

„2007 EDITION“ IMPROVEMENTS

HARDWARE IMPROVEMENTS

1) larger external power capacitor

- more power.
- troublefree operation, easily handles latest generation of cells and very powerful motors.

2) revised internal components

- further improved 4-cell operation.
- troublefree operation, easily handles latest generation of cells and very powerful motors.

SOFTWARE IMPROVEMENTS / CHANGES

1) improved ADPC

- 8 maps instead of 6 for finer adjustments.
- latest team maps are incorporated for all classes.
- revised maps for new Vector X11 4.5t motor with sintered magnet.
- improved and more precise throttle control for all motors.

2) improved „Push“ Brake

- new/more efficient brake software, more control and lower motor-/speedo-temperature.

3) improved Automatic Brake

- more precisely adjustable in smaller increments.
- revised brake maps for perfect operation with sintered- and bonded-magnets.

4) Internal-Temp-Check System

- allows you to read-out the max. internal temperature the speedo reached!
- you can accurately check if all is running well or if you're close to shutdown already.

5) Launch Control

- The known and famous „automatic start“ is back! First time for brushless.
- More power off the line (only recommended for TC!).



The crossed-out wheeled bin means that within the European Union the product must be taken to separate collection at the product end-of-life. Do not dispose of these products as unsorted municipal waste.

MODE'S

Changes from „2007 Edition“ over normal Sphere Competition (factory defaults: grey shaded):

- Mode.2 (ADPC): contains 8 instead of 6 values
- Mode.4 (Automatic Brake): more precisely adjustable in smaller increments. revised maps for perfect operation with sintered- and bonded-magnets.

MODE.1 (AutoCell System):

MODE LED	Value 1	Value 2
Yellow	LiPo/NiMH Automatic	4-Cell NiMH Racing Mode

MODE.2 (ADPC): Higher value means more overall power and aggressive throttle response

MODE LED	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6	Value 7	Value 8
Red	Smooth Power: 1X	Smooth Power: 2X	Smooth Power: 3X	Smooth Power: 4X	Linear Power: 4X	Linear Power: 5X	Progressive Power: 5X	Aggressive Power: 6X

Team tips: following settings are the preferences from our teamdrivers:

- Touring Car: Bonded: 4-7 Sintered: 3-5
- Off-Road 2wd + Truck: Bonded: 1-2 Sintered: 1
- Off-Road 4wd: Bonded: 1-4 Sintered: 1-3
- 1/12: Bonded: 3-5 Sintered: 2-4

MODE.3 (Initial Brake): allows you to set a certain level of „hand-brake-effect“

MODE LED	Value 0	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6
Yellow/Red (alternate)	No Initial Brake	Going from lowest to highest initial brake setting (value 1 = minimum / value 6 = maximum)					

Team tips: good starting point for the brake is 80% (bonded) and 70% (sintered) on the radio, for all classes. But make sure you do the radio-setup with all settings on the radio on 100%.

MODE.4 (Automatic Brake): allows you to set a slight braking action in neutral range

MODE LED	Value 0	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6
Yellow/Red (same time)	No Automatic Brake	Going from lowest to highest automatic brake setting (value 1 = minimum / value 6 = maximum)					

Team Tips: You achieve the same natural slowdown as a brushed motor with no autobrake when you set value 2/3 (for bonded magnet) or 0/1 (for sintered magnet).

Internal-Temp-Check System: as a world-exclusive the „2007 Edition“ allows you to read-out the maximum internal temperature that the speedo reached. To save it to the memory you have to briefly apply brakes after the run before you turn the switch off. You can conveniently read-out the temperature back in the pits since it remains stored until you turn it on the next time regularly (which will reset the memory). This new feature allows you to accurately check if all is running well or if you're close to shutdown already!

How to read-out the temperature:

- Switch at „OFF“ position.
- Keep MODE button pressed while you turn switch to „ON“ (then release button)
- SET LED will start to flash blue (MODE LED is off), now count the number of flashes.
 - thermal shutdown of the speedo would occur at 5 flashes.
 - the higher the number of flashes, the cooler the speedo ran (e.g. the better it is!).
 - every flash over 5 equals to ~8°C lower internal temp. (e.g. 10 flashes is 40°C below shutdown)

Launch Control: Well known and famous from our brushed speedos! Now also available for brushless, the launch control allows „rocket like“ starts. After activation it gives you more power one time for the start (this feature is only recommended to be used with touring cars on high traction surfaces!).

How to activate launch control:

- Hold trigger of transmitter at full brake for 5sec before start. Ready and active!!!