

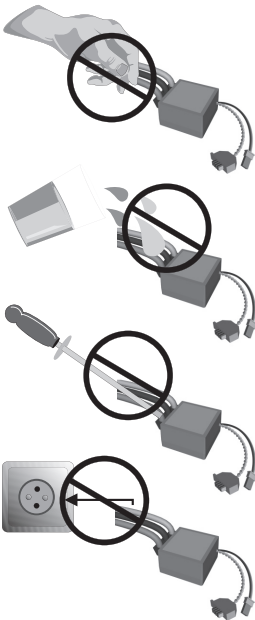
USER GUIDE



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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 solder a Schottky diode to the motor when you are using a SPHERE speed-control. A Schottky diode will destroy any brushless or forward/reverse speed-control.
 - 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.
 - 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).



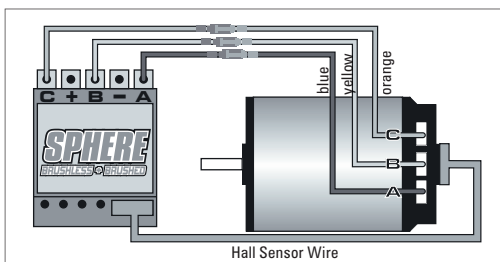
INSTALLATION

- Connect the speed-control to the receiver (position: channel 2)
- Be very careful with the correct wire sequence!

BRUSHLESS MOTOR:

The SPHERE comes pre-wired using common JST motor connectors. It's simply „plug & play“ when you intend using a designated LRP or Reedy brushless motor, see picture below! You can, of course, also use the supplied optional power wires for a „hardwired“ setup without connectors.

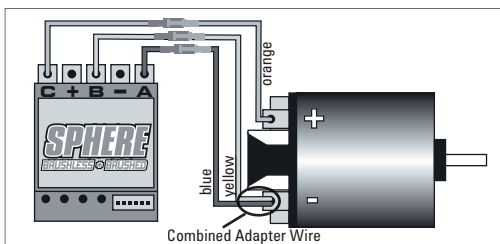
- MOT.A = blue wire
- MOT.B = yellow wire
- MOT.C = orange wire
- Connect the hall sensor cable to the speed-control and the motor.



BRUSHED MOTOR:

There are adapter wires supplied with the SPHERE, which allow simple and troublefree connection of a brushed motor, as shown in the picture below. You can, of course, also use the supplied optional power wires for a „hardwired“ setup without connectors.

- MOT.A (blue) and MOT.B (yellow) will be the combined „minus“ on the brushed motor.
- MOT.C (orange) wire will be „plus“ on the brushed motor.



- Double-check all connections before connecting the speed-control to a battery and ensure the switch is in „Off“ position.
- CAUTION:** If a connection is incorrect, it may damage the speed-control.
- The speed-control is now ready for setup.

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

- Brushless AND Brushed operation
- Small and lightweight
- Blue metalised case
- Multi-Protection System
- 4 adj. Modes (motor type selection, punch, initial-brake and automatic-brake)
- Fwd/Brk/Rvs and Fwd/Brk Racing Mode
- Sensored Brushless Technology
- External solder tabs
- Intuitive QC-style programming
- 100% Digital Technology

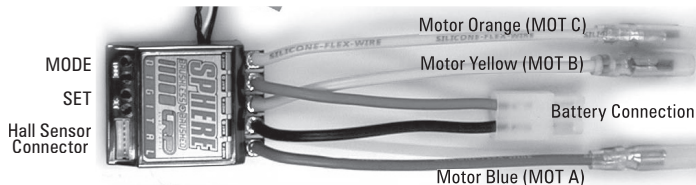
Please read and understand these instructions completely before you use this product!
With operating this product, you accept the LRP warranty terms.

SPECIFICATION

Brushless AND Brushed	yes	Typ.Volt.Drop (Brushed)* @20A	0.026V
Forward/Brake/Reverse	yes	Rec. Motor Limit (Brushed)**	>7 turns
Case Size	33.1x37.6x14.9	Rated Current (Brushed)*	200A
Weight (excl. wires)	24.5g	B.E.C.	5.5V
Voltage Input	4-7 cells (4.8-8.4V)	High Frequency	yes
Typ.Volt.Drop (Brushless)* @20A	0.035V / phase	Sensored Brushless System	yes
Rated Current (Brushless)*	200A / phase	Multi-Protection-System	yes
Rec. Motor Limit (Brushless)**	> 5.5 turns	Connectors	Std Tamiya
4 adj. Modes (Brushless/Brushed, Punch, Initial-brake, Auto-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 a 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 hall sensor wires available:

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

POWER WIRES:

The SPHERE comes pre-wired using common Tamiya/JST battery connector and JST motor connectors. It's simply „plug & play“ when you intend using a designated LRP or Reedy brushless motor! There are adapter wires included to connect the SPHERE to a brushed motor (see left chapter „Installation“ for details). There's also a complete set of power wires included, which allow you to use a „hardwired“ wire setup. The unique splitted solder-tabs allow easy and convenient replacement of the power wires. Nevertheless some soldering skills are required. Talk to your local hobbyshop if you are concerned about replacing the wires yourself. There is a replacement power wire set available: #82500

CAUTION: 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!

INSTALLATION TIPS

- Affix the speed-control, using the supplied doubled-sided adhesive tape.
- Make sure there are enough cooling slits in the body. This will increase the performance and life of all the electronic components.
- 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 plugs, connectors and buttons.
- Make sure there is enough clearance (about 3cm) between the speed-control, power-cable and antenna or 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 different 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.

IMPORTANT: We recommend using the supplied heatsink on the SPHERE brushless + brushed speed-control in order to achieve best performance even under extreme circumstances. Clean the heatsink and stickerplate before you attach the thermal tape to obtain best possible heat transfer.

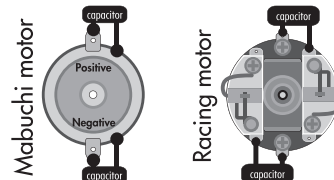
Because of the physical principles of brushless technology, the speed-controls do get a little hotter than brushed systems. Therefore it is required to let the speed-control cool down completely after every run. When running in extreme conditions (high ambient temperature, low-turn motors, high gear ratios, etc.), we recommend using LRP's brushless cooling set #82500, which includes an optional fan (perfectly sized 25x25mm, pre-wired) and a power-capacitor.



MOTOR 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).

CAUTION: Never use Schottky diodes in conjunction with a brushless or forward/reverse brushed speed-control, e.g. the LRP SPHERE brushless + brushed digital



SET-UP PROCEDURE

In setup mode, the SPHERE 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, EXPO	start with 0
Neutral trim	SUB Trim	centre
Throttle 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.
 - Press the SET button for at least 3sec, using the supplied plastic screwdriver.
- The SET LED flashes red and indicates that you entered setup mode (it continues flashing red until the setup is completed).
- Leave the throttle stick at neutral and press the SET button once.
-> neutral setting is now stored. The MODE LED flashes green and the motor beeps.
 - Hold the transmitter stick at full throttle and press the SET button once.
-> the full-throttle setting is now stored and the MODE LED flashes red.
 - Hold the transmitter stick at full brake and press the SET button once.
-> the brake setting is now stored. The MODE- and SET-LED glow red.
- This completes the setup procedure and your SPHERE 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 disconnect the drive battery and switch off the transmitter afterwards.
 - At the start of each run switch on the transmitter first, then connect the drive battery.

CHECKING THE FUNCTIONS:

If you run through the following functions with the throttle stick, you can check on the LED's that everything is setup correctly.

FUNCTION	STATUS	MODE LED	SET LED
Neutral and normal brake		off	red
Neutral and automatic brake		red	off
Forward	partial throttle	green	off
Forward	full throttle	green	red
Brake/Reverse	partial brake/reverse	red	off
Brake/Reverse	full brake/reverse	red	red

SPECIAL FEATURES

AVAILABLE MODES and PROGRAMMING THE MODES:

The SPHERE features 4 different modes, which enable you to adjust motor type and application, motor power/driving feel, initial-brake and automatic brake to match YOUR special requirements precisely.

- How to get into „PROGRAMMING THE MODES“: -> Press MODE button for at least 3sec.
- How to check the stored values: Count the number of flashes of the red SET LED (one flash equals value 1, two flashes 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/bold areas show „works default settings“).

MODE.1 (speed-control type selection): The SPHERE contains 4 speed-controls in 1 and „Mode.1“ allows you to select between the different „types“ of speed-controls, which are built into the SPHERE.

Motor Type	MODE LED	Value 1	Value 2	Value 3	Value 4
brushless	flashes green	FWD/RVS	Fwd/Brk	--	--
brushed	flashes green	--	--	Fwd/Rvs	Fwd/Brk

MODE 2 (drive-/punch-control): Allows you to adjust the SPHERE to your likes. Either you run on flwy or high-traction surfaces, the SPHERE has a profile for you! Contains „Sportsman“ profile with limited maximum RPM of 24'000 RPM, „Low Grip“ profile with great driveability and „Modified“ for unlimited power.

Motor Type	MODE LED	Value 1	Value 2	Value 3
brushless	flashes red	Sportsman	Low Grip	MODIFIED
brushed	flashes red	--	Low Grip	Modified

MODE.3 (initial brake): Allows you to set a certain level of „hand-brake effect“, i.e. you can vary the minimum brake effect when you apply the brake.

Motor Type	MODE LED	Value 0	Value 1	Value 2	Value 3
brushless	flashes green/red (alternate)	Linear	SMOOTH	Medium	Aggressive
brushed	not available	--	Fixed	--	--

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. Your car also has more front traction with this setting. **Tip:** With Value 1, a brushless motor will have the same „natural“ slowdown as a brushed motor without automatic brake.

Motor Type	MODE LED	Value 0	Value 1	Value 2	Value 3
brushless	flashes green/red (same time)	None	SOFT	Medium	Hard
brushed	not available	Fixed	--	--	--

INITIAL-/AUTOMATIC-BRAKE DEPENDENCY:

Only this unique feature will give you perfect brake-control. By not allowing lower initial-brake values than automatic-brake values, it ensures that the brake doesn't become less when you manually brake on the transmitter. This means, for example, if you have set automatic-brake on value 2 that you can not adjust value 0 or 1 on initial-brake (the set automatic-brake value becomes the minimum initial-brake value).

WORKS DEFAULT SETTINGS:

LRP speed-controls are supplied factory-adjusted. The defaults are the grey-shaded/bold areas in the Value columns above. If you loose track of the modes during the set-up procedure, you can reset the speed-control to the LRP works default settings. With the transmitter switched on, hold the SET button pressed while you switch on the speed-control. This 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. In this situation it is possible to adjust the MODE settings without the transmitter signal. All you have to do is disconnect the receiver lead from the receiver and connect the drive battery. You can now change the MODE settings as described in this chapter.

SENSORED BRUSHLESS TECHNOLOGY:

The SPHERE speed-control uses the sensed brushless technology to communicate with the brushless motor. This allows the SPHERE to obtain perfect knowledge of the brushless motor's magnet position. This means perfect motor control at high and low RPM's, as well as perfect brake control. The sensed brushless motor feels just as smooth to drive as the brushed motor!

TROUBLESHOOTING GUIDE

EXPLANATION: If there's no remark, the cause can be either with brushless and/or brushed motors. If „BM“ is indicated, the cause only occurs when brushed motors are used.

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
	Speed-control defective	Send in product for repair
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	
	Speed-control defective	Send in product for repair
Motor runs in reverse when accelerating forward on the transmitter.	Throttle stick polarity at transmitter changed while driving	Repeat set-up procedure
	BM - Motor connected incorrectly	Connect motor correctly
Insufficient performance. E.g. poor brake power, reverse power, topspeed or acceleration..	Motor pinion 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 defective.	Send in product for repair
Speed-control overheats or switches off frequently.	No heatsink installed	Install heatsink
	Motor stronger than motorlimit or input voltage higher too high	Use only motors within motorlimit and use batteries according to the specifications of the speed-control
	Motor pinion or gear ratio too big	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
	Extreme conditions	Use additional cooling fan
Motor never stops, runs at constant slow speed	Transmitter settings changed after set-up	Repeat set-up procedure
	Humidity/water in speed-control	Immediately unplug and dry speed-control
	Speed-control defective	Send in product for repair
Radio interference	BM - Motor suppressors not sufficient	Solder capacitors to motor
	Receiver or antenna too close to power wires, motor, battery or speed-control. Receiver aerial too short or coiled up	See „Installation Tips“ and „Installation“
	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 at regular intervals
	Transmitter antenna too short	Pull out antenna to full length

MULTI-PROTECTION SYSTEM, 4-way Protection

This unique monitoring software is the perfect protection for the SPHERE speed-control against short-circuits (motor), overload and overheating. If your speed-control is ever faced with overload, the motor function is switched off for protection and the SET LED will flash to indicate the overload, although the steering function is maintained. Wait a few minutes to allow the speed-control to cool down. Should you accidentally select one of the brushless motor modes while a brushed motor is connected to the speed-control, or vice versa, the SPHERE will warn you of this error by turning on the red SET LED and alternatively flashing red/green on the MODE LED. If the speed-control switches off frequently, either the motor used is too strong, the motor pinion is too big or you are using full brake too often. You can improve this by using the supplied heatsink or by obtaining the optional LRP fan (#82500).

POWER CAPACITORS:

We recommend the use of a power capacitor (as included in LRP's brushless cooling set #82500), when using the SPHERE speed-control. Power Capacitors improve punch and offer additional protection for the speed-control. Simply connect the power capacitors at BAT+ (Red) and BAT- (Black) on the SPHERE's soldering tabs.

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.

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.