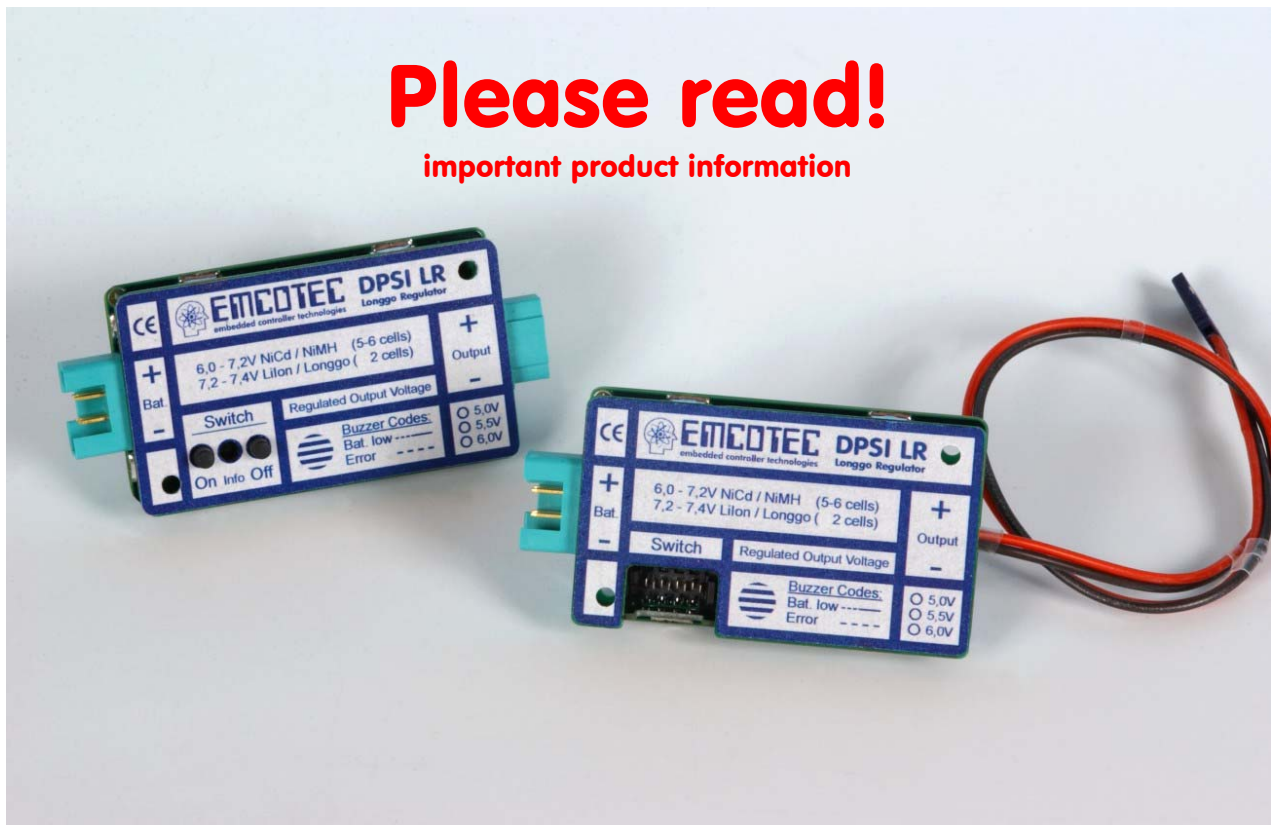# EMCOTEC®
embedded controller technologies

DPSI-LR (S)
(LONGGO Regulator)

Electronic switch with integrated voltage regulator for RC models

Please read!
important product information

General:

The **DPSI LR** (Longgo-Regulator) is suitable for smaller models, for which a DPSI RV System would be too large (i.e. small gliders, E-models, F3A-engine models, F3C-helicopters). It is an electronic (and therefore breakdown proof) On/Off switch modelled after the approved DPSI principle and a low dropout voltage regulator in line, which generates a regulated voltage from a variable input voltage of 6.0 Volts up to 8.4 Volts. The voltage of the battery is monitored by a microcontroller and when it drops under an acceptable range (battery discharged approx. 60% - 70%), it is reported by a buzzer acoustically and a LED optically. With a size of even 1.5" x 2.56" x 0.6" and a weight of just 35g you can now use LONGGO batteries (Lithium-Polymer) for your receiver set.

The LONGGO regulator is also suitable as control unit for ignition sets. Some ignition sets for gas engines do not withstand the high voltages of Lithium-Polymer batteries. Through the regulated output voltage the ignition set is supplied with a constant voltage. Due to the electronic switch, the supply of the ignition set is now absolutely reliable and failsafe.

You can utilize the **DPSI LR** without any problems with 5 cell batteries, because the dropout losses (minimal difference input to output voltage) are only 0.05 Volts. Therefore you get a constant output voltage of e.g. 5.5 Volts or 6.0 Volts with 5 cell batteries too.

An effective heat dissipation allows high output currents without any damage of the electronic. This type of cooling is being used in the **DPSI LR** to allow for minimum weight. To save another 15 g weight, you can get a version with On/Off buttons (**DPSI LR S**). Here the switching does not take place with the regular DPSI ON/OFF switch, but rather with one ON and one OFF push button on the printed circuit board. Here too, maximum safety is guaranteed. To turn off the device, you must press the OFF button at least for 2 seconds.

The circuitry of the **DPSI LR** too, guarantees a quiescent current dissipation in the turned off state, which does not discharge the battery. This quiescent current is less than 1µA! Therefore it is ensured, that no damage can happen to the battery, even when connected to the **DPSI LR** for a long time (e.g. winter season).

Handling:

Mechanical switches contain the risk of failure. In order to rule out any possible mechanical influence, the **DPSI LR (S)** uses a self-holding electronic switch, which is activated just by an electrical pulse. For the **DPSI LR** you use a gold-plated 2 mm plug pin to generate this pulse. Putting it into the ON socket (red) turns the **DPSI LR** on; putting it into the OFF socket (black) turns it off. Many tests provided that the pin could not be lost due to vibrations. Even if the pin should get lost, the **DPSI LR** remains switched on (in switched on mode). If the ribbon cable gets damaged or is being removed, the **DPSI LR** stays on in switched on mode, as well!

The **DPSI LR** can only be switched off if the pin plug is plugged into the off socket. The contact pin should always remain plugged in the corresponding socket (ON or OFF)! If the pin should get lost, a 2 mm wire or a 2 mm screw can be used; simply plug it into the respective socket.

The ON/OFF switch can be placed wherever desired (e.g. on a fuselage side wall). The connection cable with plug is plugged into the respective multiple plug of the **DPSI LR** until it locks into place on impact. In the event that replacement or removal is necessary, the plug can be disengaged from the multiple plugs by carefully pulling it out parallel (take hold of the cable directly at the plug).

In the **DPSI LR S,** the pulse to turn on the device is being generated by the built-in ON push button. If you press this button momentarily, the **DPSI LR S** is turned on. The LED between both push buttons is steady on (respectively in "parallel" to the buzzer). You turn off the **DPSI LR S** by pressing the OFF button for <u>at least 2 seconds</u>. Due to the built-in time delay it is impossible to turn off the **DPSI LR S** by short loose contacts. Here too, maximum safety is guaranteed.

The central, ultra-bright light-emitting diode (LED) in the switch (respectively on the printed circuit board of the **DPSI LR S**) always illuminates when the **DPSI LR S** is switched on (pin plug in the red ON socket). In case of low voltage, the LED blinks in sync with the buzzer.

A commercial battery controller (monitor) can be plugged directly to the backside of the switch (at "B1" or "B2"). This enables additional optical voltage monitoring of the battery. When using this type of battery controller, you must ensure that the required number of cells is correctly set.

If the pin plug is plugged into the black (OFF) socket, the entire receiver station is switched off (any battery controllers that may be connected as well). In switched-off position, the batteries will not discharge. The minimum "no-signal current" of the **DPSI LR (S)** is far below the self-discharge of the connected batteries. Theoretically, it would take 274 years for the "no-signal current" to discharge a battery with 2.4 Ah.

When turning the DPSI LR (S) on, you hear a buzzing signal (1 to 5 beeps, dependent on the programmed battery type). After shipping, the DPSI LR (S) is programmed for LONGGO batteries (LiPo). Therefore, the buzzer sounds 4 times! Programming is possible to adjust the thresholds for the low voltage detection of different battery types.
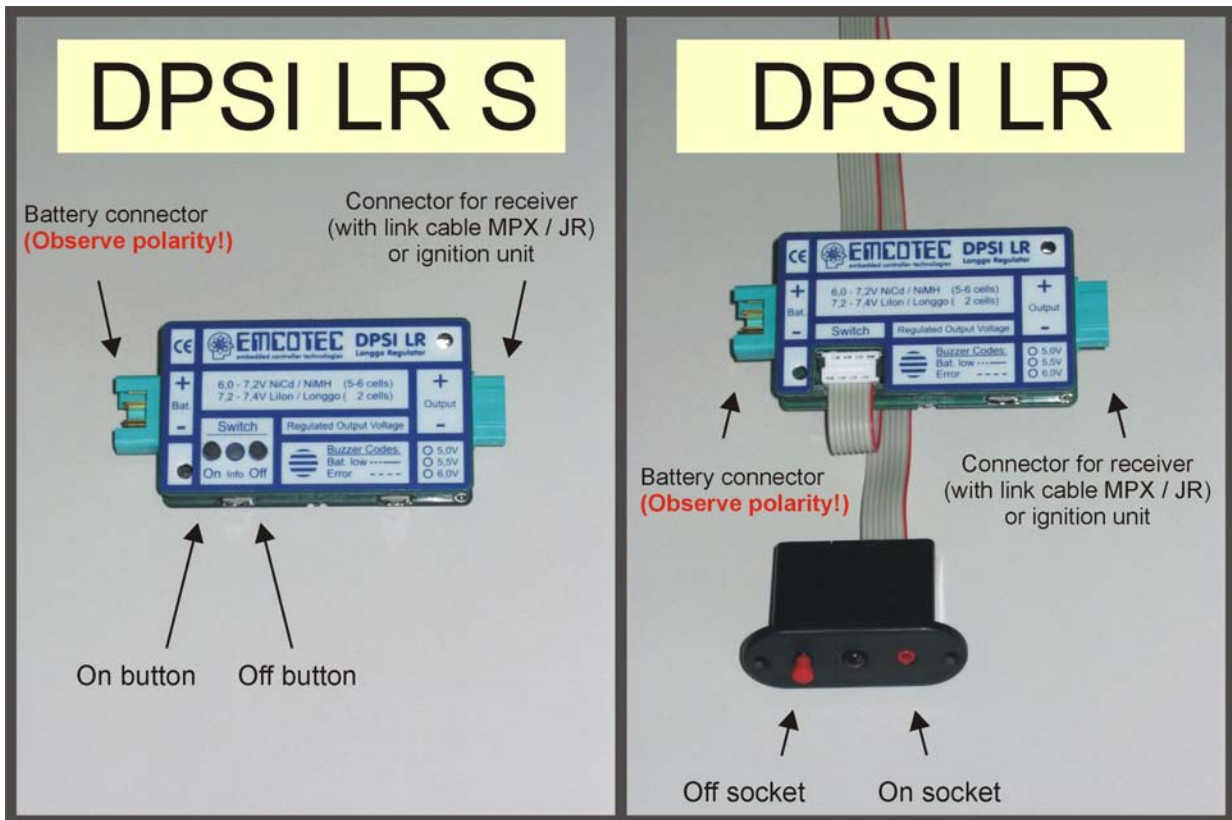
Low voltage detection:

The **DPSI LR** is equipped with an 8-bit microcontroller, which constantly monitors the battery voltage. An intelligent algorithm (IVM, **I**ntelligent **V**oltage **M**onitoring) makes sure, that, when all servos are moved, a short low voltage event of the connected battery is not detected. Therefore, the internal resistance of the battery cells, which is different for different battery types, has very low impact. The algorithm is especially laid out for RC model airplanes (cyclic load of the batteries), i.e. not permanent load of the batteries. So, proof low voltage detection is possible. An internal buzzer indicates low voltage.

Low voltage: — — — ———————

error signal: 3 x 0.1 seconds beep with 0.1 seconds pause each, then 1 second beep

This buzzer signal is output, when the battery is discharged approx. 60% to 70%. The capacity of the battery is sufficient for another flight, before you must recharge. Nevertheless, you should recharge the battery when you hear that error code. Prerequisite is, that you programmed the correct battery type (5, 6, 7 cells or **Longgo**). The error code repeats in a 7 second interval. Whenever the error is qualified, it keeps active until you turn off the **DPSI LR (S).**

Battery empty: — — — — — — — — —

error signal: endlessly 0.2 seconds beep / 0.2 seconds pause

If the output voltage of the **DPSI LR (S)** falls under a value of approx. 4.2 Volts, this error is output. In this case, the battery (no matter which battery type is being used) is totally discharged and a secure operation is not possible anymore. This error is extremely critical, because the whole RC system can totally malfunction (due to the empty battery).

This error type has highest priority, i.e. a low voltage error is not indicated anymore. It also cannot be disqualified, i.e. you need to turn off the **DPSI LR (S).**

Optical display by LED:
An eventual error not only is indicated acoustically, but optically too. The LED in the switch (or on the printed circuit board of the **DPSI LR S**) turns off for the duration of the buzzer activation. As soon the buzzer is turned off, the LED is again steadily lit. Therefore the LED displays a blinking code, which corresponds exactly to the buzzer activation. A blinking LED means that there is an error.

Programming the battery:

Since you can use different battery types with the **DPSI LR (S)** you must tell it the intended battery type (e.g. 5, 6, 7 cell or Longgo batteries). This must be done once - the settings stay resident until you eventually reprogram. After shipping, the **DPSI LR (S)** is always programmed for the usage of Longgo (Lithium-Polymer) batteries.

In order to program you need an external power supply, which allows for variable output voltage. As an alternative, you also can use a 10 cells NiCd or NiMH battery (respectively a battery with 12 Volts nominal voltage => car battery). You connect the **DPSI LR** to that power supply using an appropriate cable. As soon as the input voltage is more than 10 Volts, the device enters programming mode. For programming, the voltage at the power supply has to be set to approx. 12 Volts.

After turning the **DPSI LR** on, you hear the internal buzzer of the **DPSI LR** for 3 seconds, which is followed by a 3 second pause. This indicates operating mode "programming".

Now follows a **single** beep, which stands for "battery type 1". When you disconnect the supplied voltage within 3 seconds (just remove the connector from "Bat"), "battery type 1" is selected and programmed.

When the supply voltage is not removed within this 3 seconds, you hear a double beep for "battery type 2". Here too, you have 3 seconds time to remove the supply voltage, if you want to select (program) this type.

As an alternative to removing the supply voltage, you can reduce the voltage at the power supply below 10 Volts. This has the same effect!

This principle repeats, until the buzzer beeps 5 times (deactivate all checks). If you do not remove the voltage within 3 seconds, there is no change in programming and the system enters normal operating mode.

The battery types are defined as follows:

Buzzer code	Battery type	Programming
1 x beep	1	5 cell battery (NiCd / NiMH)
2 x beeps	2	6 cell battery (NiCd / NiMH)
3 x beeps	3	7 cell battery (NiCd / NiMH)
4 x beeps	4	Longgo battery (LiPo)
5 x beeps	5	Deactivate all checks

After shipping, "battery type 4" (**Longgo** battery) is programmed. If you select "5 times beep" (deactivate all tests), there is no voltage monitoring anymore. So, you don't get indications for an empty battery or any other errors.

Programming of the battery type in summery:
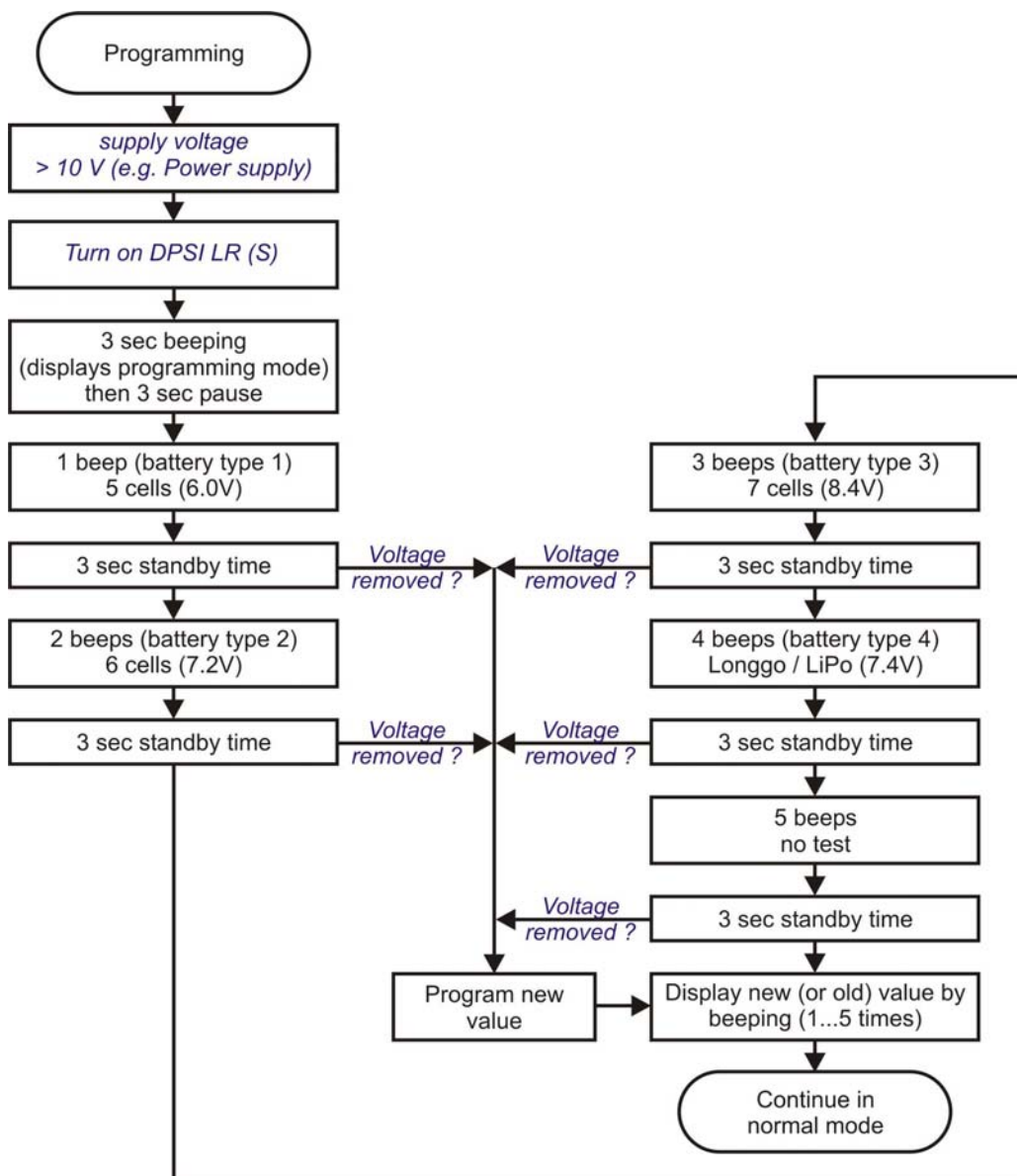
"Voltage removed?" means, that the supply voltage is just disconnected from the DPSI LR (S). The internal buffered energy within the DPSI LR (S) is sufficient to program successfully. As an alternative you can reduce the supply voltage under 10V in case of using a regulated power supply. After programming the DPSI LR (S) enters normal mode.

Safety Instructions:

○ In general, all connecting lines should be run so that they do not come into contact with moving or hot parts of the model (such as servos, gears or sound absorbers).

○ The **DPSI LR** must be protected from humidity and moisture.

○ Improper handling of the **DPSI LR** can result in serious damage/injury to property or persons!

○ Carry out a general inspection of all connections in your model before each use! All plugs must be correctly polarized and have clean contacts (i.e. fit tightly). Loose cables present a potential hazard!

○ Under no circumstances may power sources that do not meet the specified voltages be used.

○ The current-conducting contacts of the connector plugs may not be short-circuited. If you fail to observe this warning, the short-circuited cables may overheat and even melt.

○ Never use the **DPSI LR** for purposes other than for RC model making as a hobby. Above all, their use in passenger-carrying equipment is strictly prohibited.

○ Operate the **DPSI LR** only with the remote control components provided for model making.

○ Always ensure that you have fully charged batteries when operating your model. Empty batteries inevitably lead to failure of the RC components, which cause the model to crash.

○ Do not expose the **DPSI LR** to any extremely hot or extremely cold temperatures, moisture or humidity. This would lead to danger of malfunction, damage or decreased efficiency.

○ Use only additional components that have been approved by us in conjunction with the **DPSI LR** (On/Off switch, external voltage indicators (battery controllers)).

Technical Data:

Power sources	5, 6, 7-cell NiCd / NiMH cells, Lithium Ion batteries, Plastic Lithium Polymer batteries (Longgo, LiPo)
Operating voltage range	5.0V 12V
Rated input voltage	6.0V 8.4V
Output voltage	5.5V (other values on request)
Quiescent current (when off)	< 1µA
Quiescent current (when on)	approx. 25mA total
Max. continuous current @ 5.5 V (15 minutes using Longgo batteries)	3A
Max. peak current @5.5 V (5 seconds using Longgo batteries)	30A
Drop-out losses @ 1 A	approx. 0,05V
CE Test	in accordance with 89/336/EWG
Environmental conditions	-10°C .... +50°C
Permissible temperature range	-25°C .... +85°C
Dimensions	65mm x 38mm x 15mm (2.56inch x 1.50inch x 0.59inch)
Screw diameter for fastening	2 x 3,1mm (39mil)
Hole spacing for fastening	54mm x 28mm (2.12inch x 1.10inch)
Weight	ca. 35g DPSI LR + 15g ON/OFF switch ca. 35g DPSI LR S
Warranty	24 month

Technical modifications and errors expected!

You find additional information (among other things FAQ = frequently asked questions) in the internet on our homepage www.rc-electronic.com. This information is constantly updated. Please inform yourself about our other products around RC modeling.

Legal information:

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