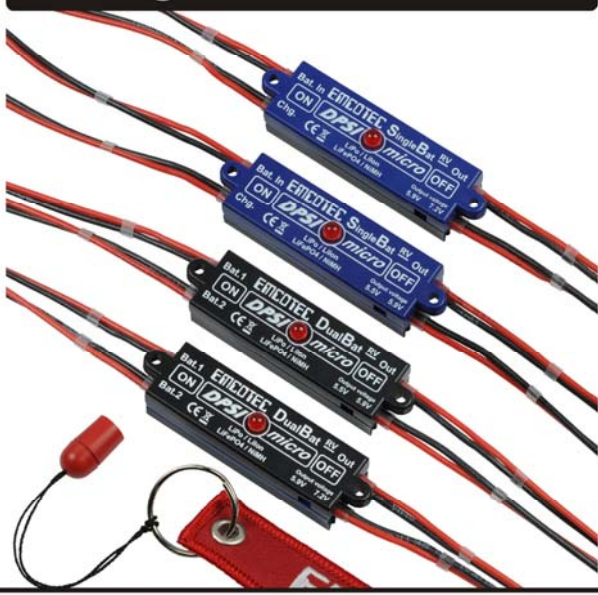
EMCOTEC®

embedded controller technologies

English

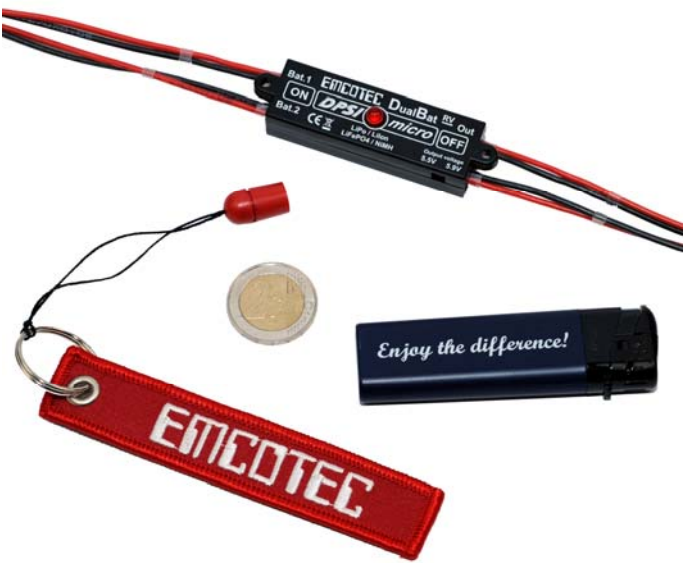
DPSI® micro

SingleBat / DualBat



Operating instructions

The smallest LiPo-powered Battery-Switch of the World*. Smaller than a lighter!



* As of March 2008

Contents

1. Preface

With this product of the EMCOTEC **DPSI Micro** family you purchased a high grade, modern and secure power supply system. We appreciate your trust and assure you that you made the right choice!

Long lasting experience for years in development and manufacturing of electronically systems as well as the knowledge of the world's best model airplane pilots has influenced the development of the **DPSI Micro** systems. All products are manufactured at EMCOTEC GmbH in Germany on our own production line. Extensive optically and electronically end tests for every system, which leaves our house, assure that you, our customer, acquire an absolute reliable product which considerably increases the reliability of your valuable RC-Model.

Of course, the products of the **DPSI Micro** family not only have been tested extensively in the laboratory, but also went through intensive flight-testing. Extensive series of tests with especially in house developed data loggers have been accomplished to measure the real current consumption in model airplanes. Like done in the automobile industry an FMEA (**F**ailure **M**ode and **E**ffect **A**nalysis) reduce the possibility of damage and malfunction on operating errors to a minimum.

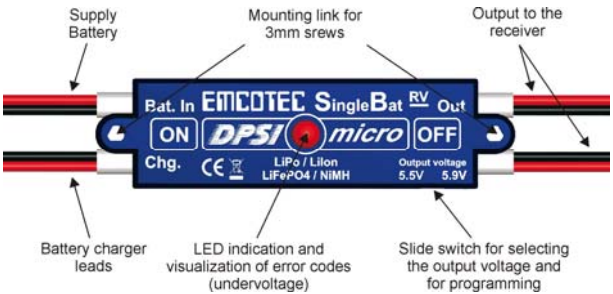
We kindly ask you to read these operating instructions carefully and to observe the installation hints. Thus, errors can be avoided in advance.

We are all ears for your wishes and questions. Challenge us!

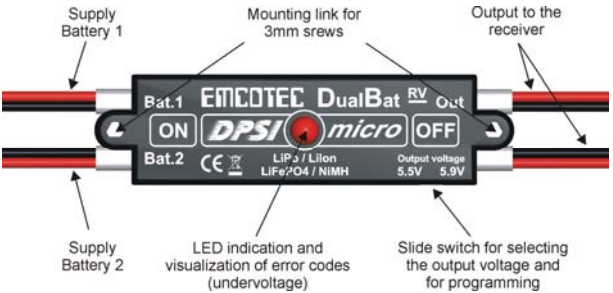
Bobingen, March 2009

The Staff of EMCOTEC GmbH

DPSI Micro – SingleBat:



DPSI Micro – DualBat:



Magnet-Holder (Switching Actuator):

2. Characteristics

This operating manual describes two products of the **DPSI Micro**-Family (in two implementations): the **SingleBat**-System (Connection for one battery) and the **DualBat**-System (Connection for two batteries = Dual Power Supply). Both versions generate a regulated output voltage for supplying the receiver set in a RC-Model independent of the applied battery.

Both systems are only different in their number of connected batteries: **SingleBat** (former name “DPSI Micro - MPS RV”) supports one battery, **DualBat** (former name “DPSI Micro - DPSI RV”) supports two batteries.

If especially low weight is in order or a second battery is not desired (e.g. increased effort for recharge) the **DPSI Micro – SingleBat** is first class.

The **DPSI Micro – DualBat** serves as redundant power supply in RC models. Redundancy is accomplished through two connected batteries. If one battery fails, safe operation is assured by the second battery. Usually both batteries are equally discharged. Furthermore, due to both batteries being “parallel”, current drawn from the batteries is cut in half; therefore, batteries with lower capacity can be utilized.

The actual On-/Off-process occurs through an external magnet for both versions, which is just hold against the corresponding On- or Off-Position of the **DPSI Micro.** Due to the contact-free electronically switching, the procedure is absolutely safe – no dirt, no humidity and no temperature changes can lead to erroneous turning off. There is no more safety!

Because of using an external magnet as contact free switch actuator, it is not necessary to cut large holes into the fuselage’s sidewall.

Three small holes for the LED und the mounting screws suffice. Therefore, the **DPSI Micro** is especially suitable for small glider fuselages.

The voltage of the connected batteries is of no importance for **DPSI Micro** systems: the output voltage stays fixed to a constant value (adjustable to 5.5/5.9 or 5.9/7.2 volts – depending of the version). Therefore, the reaction of the model is always the same, because the servos work the same speed due to the stabilized voltage.

As an additional safety feature, the internal electronics of the **DPSI Micro** systems eliminate high voltage peaks generated by powerful servos (headword: “dynamo effect”).

Through the usage of a linear regulator (not a switching regulator) the **DPSI Micro** does not produce any disturbances, which could influence receiving. A central ultra bright LED reliably indicates low voltage or other errors of the power supply through different blink codes. The errors are evaluated by a micro controller (**IVM** – **I**ntelligent **V**oltage **M**onitoring).

Using **DPSI Micro** systems a new dimension in safety for RC receiver equipment is reached. Here, a stabilized output voltage, a reliable switching process, a small form factor and effective and generously dimensioned heat sinks count for.

Voltage Regulation:
Until now, the receiver set was connected directly to the battery (e.g. 4-cell NiCad or NiMH batteries with 4.8 volts nominal voltage). Meanwhile, 2-cell Li++ batteries are utilized (LiIon, LiPo, LiFePO4), the nominal voltage being up to 7.4V. This means, the output voltage is higher as with 4-cell NiMH batteries. This high voltage is normally not acceptable for receiver sets und must be therefore reduced to lower values.

The electronics of the **DPSI Micro** systems now make sure, that voltage of the batteries is reduced to allowable values, independent of the higher input voltage of the batteries. With the help of a small sliding switch, the output voltage can be adjusted to either 5.5 or 5.9 volts. So, the power requirements can be made suitable to the pilots needs. In order to allow for servos and receiver sets which are designed for higher supply voltages (e.g. direct connection of 2S LiPo batteries), there are **DPSI Micro**-Versions available, whose output voltage can be switched between 5.9V and 7.2V.

Low voltage warnings:
In order to indicate the discharge state of the battery to the user, a micro controller is integrated, which monitors all voltages by using an intelligent algorism. Error messages (e.g. battery voltage too low) are unambiguously indicated at the central ultra bright LED.

Hint:
At delivery, the **DPSI Micro** systems are programmed to recognize low voltage of 2-cell LiPo batteries. In case of other battery types, the battery type must first be programmed!
Output voltage is always set to 5.9 volts at delivery.

3. The DPSI Micro - Family in Key Points

- Electronically, fail-proof On-/Off-Switch; contact free switchable with external magnet
- **CSHC** Circuitry (Controllerless Self Holding Circuitry): switching does not occur with a micro controller and is therefore more reliable
- Output voltage selectable in two steps (5.5V / 5.9V or 5.9V / 7.2V – depending on version)
- Compliant to all manufacturer specifications for RC receiver sets
- Continuously constant servo power through constant voltage supply
- 2-cell LiIon / LiPo / LiFePO4 -cells applicable
- 5 to 7-cell NiCad / NiMH batteries applicable
- Up to 8 watts thermal dissipation loss possible (4A continuous current*)
- Loadable with up to 25A pulse peak current
- Filtering of voltage peaks generated by servos to protect receiver ("dynamo effect")
- **IVM** – **I**ntelligent **V**oltage **M**onitoring with optical indication for different battery types (programmable)
- Special grounding concept and 4-fold multilayer PCB for flawless operation and highest safety
- High grade injection molding plastic housing
- Large area heat sink for high power dissipation
- Dual connection cables for the receiver with gold plated pins (FCI / Bergcon) and 0.5mm^2 silicone strand
- Each system 100% tested
- Delivery includes all accessories
- Total weight inclusive all connection cables approx. 28 grams only
- Developed and manufactured by market leader (Made in Germany)

* Using active cooling (air flow), higher power dissipation possible (higher maximum current)

4. Safety Features of DPSI Micro-Systems

Decoupling of both batteries in the **DPSI Micro - DualBat** and the electronically switches are completely separated (inclusively peripheral electronics) and therefore duplicated. No twin diodes (i.e. two diodes in one housing) are being used. Malfunction of one part does not lead to a total loss of the system. This circuitry has proven in many thousand systems already.

The electronically switches are <u>not</u> controlled by a micro controller. Therefore, a failing or defect micro controller can not cause the system to turn off. Herewith, DPSI power supplies are the only systems on the market which offer this **CSHC** feature!

Due to the circuitry design, voltage peaks, which are caused by powerful servos (“dynamo effect”), are totally eliminated. Such voltage peaks do not have any negative influence to receivers.

A **DPSI Micro** does not have to be disconnected from its batteries during long breaks (e.g. in winter time), because self discharge of the batteries is much higher than the quiescent current of a **DPSI Micro**, which practically is not measurable. Here too, **DPSI** systems are unique.

In order to provide Turn-On control, **DPSI Micro** systems are equipped with a build in ultra bright LED. The LED signals even at large distances that the system is turned on and indicates low voltage of the battery/batteries by blinking codes.

5. Packing Contents

Shipment of **DPSI Micro**:

- **DPSI Micro** Base Device
- Magnet holder (On-/Off-Switch actuator)
- 2 pieces single spare magnets as “reserve“
- Decals as orientation help and drilling template
- Self-adhesive Polyethylene-Mat for vibration protection
- 2 pieces countersunk screws M3x12 (Phillips)
- 2 pieces screwing collar
- Operating Instructions
- EMCOTEC 3D-Decal

Hint:
Delivered spare magnets should be readily positioned at a free spot of the fuselage and/or the transmitter housing to turn the **DPSI MICRO** on or off in case of loss of the original magnet-holders.

Each **DPSI Micro** system function is several times tested before delivery!

6. Mounting Instructions

6.1. Mounting the DPSI Micro

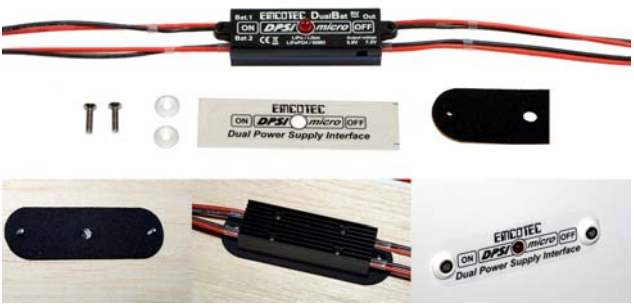
Hint:
Eventually reprogram the battery type and set correct output voltage before mounting, because the sliding switch is still easily accessible.

Because of **DPSI Micro** systems can be turned on and off in a contact free manner, direct access is not necessary. **DPSI Micro** systems therefore are mounted inside the fuselage. As a big advantage, no large holes have to be cut into the fuselage. A small hole of 5mm for the LED suffices. The **DPSI Micro** then can easily be glued to the fuselage's inner sidewall. This is the simplest method.

Even more elegant, you can screw down the **DPSI Micro**. There is a decal included in delivery, which not only indicates the switching positions, but also serves as drill template. Just mount it at the fuselage's outer sidewall where desired. The small holes indicate the marks for the drill holes. The hole in the center (for the LED) is 5mm/0.2"; both outer holes are the screwing positions in 3mm/0.12".

Now feed the screws through the screwing holes. The screws serve as positioning helps for the self-adhesive foam rubber, which serves as vibration protection. It is pushed over the screws from inside and glued to the fuselage's sidewall. This anti vibration mat is not mandatory, but advisable especially for combustion engines. Possibly small fuselage unevenness is eliminated, too.

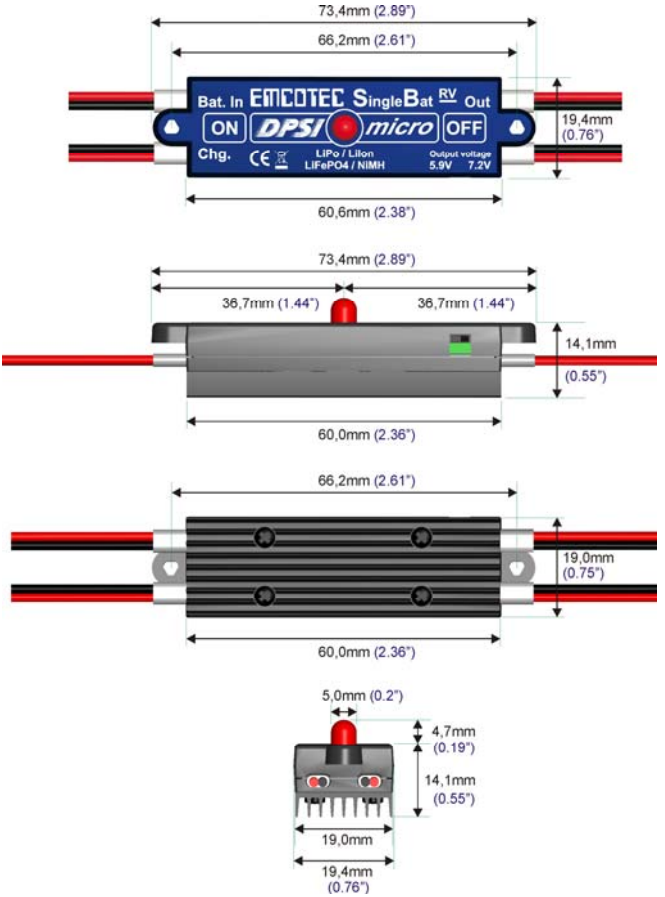
The **DPSI Micro** is now mounted with both M3 screws. The screwing collars enlarge the area of support and inhibit in this way damage to the fuselage. The screwing position of the **DPSI Micro** housing allows the screws to cut their way themselves. Don't tighten the screws too much, in order not to press the cellular rubber too extensively.



The connection cables (Graupner/JR Uni-Contact) can be secured against sliding out by connection protectors (Article-Number. A86015).

Side view of **DPSI Micro** mounted at fuselage's sidewall:

6.2. Dimensions of the DPSI Micro



7. Selecting the Batteries

As far as batteries are concerned, commercially available types are in use: NiCad, NiMH, Lithium-Ion (LiIon) and Lithium-Polymer (LiPo). Independent of the selected output voltage, these batteries are unlimited usable. Load capability should ranch from 3C up to 10C corresponding to the application.

Battery-Capacities

In general, load capability and capacity of the batteries must be observed. As far as the selection of capacities is concerned, also consider, if you want to recharge the batteries between flights or if you want to operate the model all day long without recharging.

A capacity of 1000mAh usually suffices for a F3A combat model. When using a **DualBat** system we recommend 2 batteries starting from approx. 600mAh.

Application	Recommended Capacity starting from
F3A-Models in Combat, small gliders with up to 5 servos	**2x 600mAh or 1x 1000mAh**
Helicopter with fast tail rotor servos	**2x 1000mAh or 1x 1500mAh**
aerobatic models and small jets with up to 7 servos	**2x 1500mAh or 1x 2400mAh**
Large gliders with up to 10 servos	**2x 2000mAh or 1x 3300mAh**

Because using Lithium-Polymer batteries saves a lot of weight anyway, the capacity should be chosen some what higher if in doubt.

If the batteries have to be positioned far away from the **DPSI Micro** due to reasons concerning the center of gravity (long connection cables), it is advisable to twist the longer battery cables (i.e. better suppression shielding).

Selection of the Output Voltage

The output voltage of the **DPSI Micro** products can be set to two values: 5.5 and 5.9 volts. “High voltage” versions allow for switching between 5.9V and 7.2V. All receivers available today allow for operation with up to 5.9V. Receivers and servos will be operated with LiPo batteries in the future. Then, operation with 7.2V will be possible.

Some servos are only approved for 4.8 volts according to their manufacturer’s specifications (e.g. fast tail rotor servos for helicopters). Here, an output voltage of 5.5 volts is simply allowable. The manufacturer’s values refer to 4-cell NiCad batteries. When fully charged, these batteries carry up to 5.5 volts, too. 4.8 volts are reached, when these batteries are almost discharged.

Hint:
The higher the difference between input and output voltage, the higher the power dissipation, which is converted to heat. In models with many servos it is advisable to select the higher output voltage at the **DPSI Micro** to limit the power dissipation.

Application	Recommended Output Voltage
Tail rotor servos, helicopters with quick gyros, servos for 4.8V according to manufacturer’s specification	**5.5V**
Gliders, small motorized models with up to approx. 5 servos	**5.5V or 5.9V**
Aerobatic models, jets, models with more than 5 servos	**5.9V**
Combat models (motorized aerobatic flights)	**5.9V**

Hint:
Due to drop out loss in the voltage regulation stages of the **DPSI Micro** systems, usage of 4-cell battery packs (NiCad / NiMH) is definitely NOT possible and is not permitted!

Hint:
DPSI Micro systems are not reverse polarity safe by design! Observe correct connection of the batteries, i.e. red wire to positive, black wire to negative. Better double check!

7.1. Charging the Batteries

The **DPSI Micro - DualBat (Battery Switch)** switches the battery positive pole, i.e. both batteries are connected at negative (ground) if connected. *Simultaneously* charging is not always possible, because many chargers with more than one charging output measure the current in the negative wire and connect the positive pole. **Separate charging of batteries is possible at any time, if connected to the DPSI**!

If charging of a battery should be possible even if connected to the **DPSI Micro – DualBat**, a second cable has to be soldered to the battery which serves as charging cable. This cable than is in parallel to the connection cable to the **DPSI Micro**. Btw, LiPo batteries can be charged directly via the balancer-plug (e.g. using the EMCOTEC Balancer-Charging-Cable and a suitable adapter).

Simultaneously charging of both batteries connected to a **DPSI Micro – DualBat** is possible in case of Lithium Polymer batteries. LiPo batteries are allowed to be charged in parallel, because they are discharged absolutely symmetrically by the **DPSI** and therefore have identical discharge states. This means: with the help of a Y-cable, both batteries are connected in parallel (positive to positive pole, negative to negative pole). This adds up to a “2S2P” battery. Cell number (voltage) is the same; the charging current can be doubled. Appropriate charging cables are available at EMCOTEC.

8. Programming the Batteries

Because **DPSI Micro** systems monitor the voltages using an intelligent algorism, the used battery type must be made known to them (e.g. 5, 6-cell NiCad/NiMH or LiPo batteries). The battery type must be programmed once – the programmed type is stored in the micro controller of the **DPSI Micro** until eventually newly reprogrammed.

Programming of the **DPSI Micro - DualBat** (battery switch) can be done in two ways, in case of the **DPSI Micro - SingleBat** only in one way.

Programming the **DPSI Micro - DualBat:**
Programming starts, if only one battery (regardless of type and which battery port) is connected to **DPSI** when turned on.

Programming both versions**:**
Programming starts, when the voltage selector switch is moved from one position to the other within 10 seconds of turning on.

Hint:
The voltage difference of the output voltage must be at least 0.5V when switching the voltage selector switch. An (almost) empty 5-cell battery provides only 5.5V, Therefore, the output voltage of the **DPSI MICRO** does not change when switched between 5.5 and 5.9V and the programming mode is not entered!

As soon as programming starts, the LED is turned on for 3 seconds. Then a 3 second dark phase follows. This indicates “programming mode”.

Now, blink codes are output: 1x flash, 3 seconds break, 2x flashes, 3 seconds break etc. The numbers of flashes indicate the battery type to be programmed.

As soon as the correct type is indicated, the programming mode must be left within 3 seconds (in advance of the next blink code).

Leaving programming mode of **DPSI Micro - DualBat**:
Programming mode is left by connecting the second battery to the **DPSI Micro**.

Leaving programming mode of both versions:
Programming mode is left by putting the sliding switch back to its previous position.

Programming at a glance:

DPSI Micro	Start of Programming	End of Programming
DualBat (Method 1)	Only connect one battery and turn on	Connect second battery
DualBat (Method 2)	Change position of voltage selection switch within 10 seconds after turning on	Operate voltage selection switch again
SingleBat	Change position of voltage selection switch within 10 seconds after turning on	Operate voltage selection switch again

Battery types are defined as follows:

Blink code	Battery Type/ Programming
1x Blink	5 NiCad/NiMH cells (6.0V nominal voltage)
2x Blink	6 NiCad/NiMH cells (7.2V nominal voltage)
3x Blink	2 LiIon cells (7.2V nominal voltage)
4x Blink	2 LiPo cells (7.4V nominal voltage)
5x Blink	2 LiFePO4 cells (6.6V nominal voltage)
6x Blink	7 NiCad/NiMH cells (8.4V nominal voltage)
7x Blink	Deactivate tests / no error indication

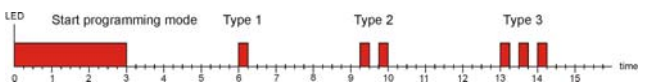
By default, battery type “4x blink” (2 cell LiPo battery) is programmed at delivery.

If “7x blink” is selected (all tests disabled) the **DPSI Micro** does not monitor voltages. No empty batteries or other errors are indicated!

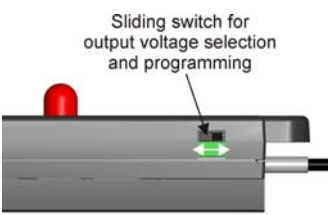
Hint:
For the **DPSI Micro - DualBat**, two identical batteries must be used, i.e. same type (NiCad/NiMH or LiPo) and same cell number. The capacity may vary – even if this does not make sense.

Hint:
Supply of a **DPSI Micro – DualBat** with one battery and a BEC-Supply as second battery instead is not possible!

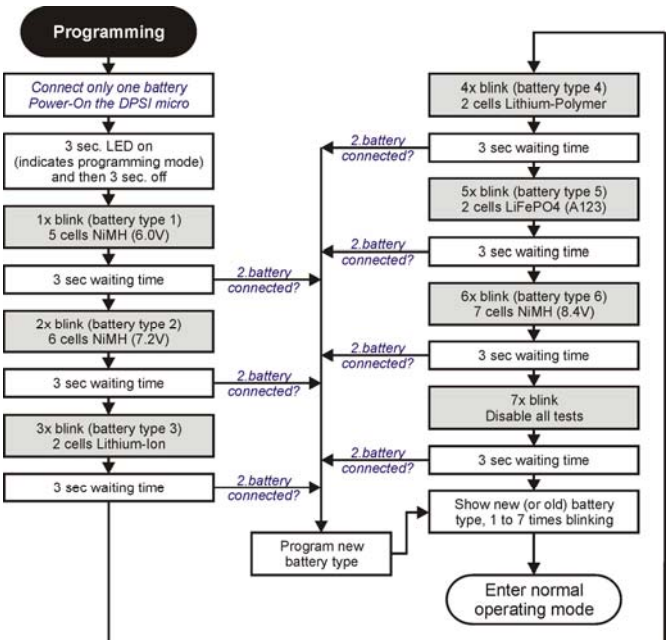
Timing of programming:



The new battery type is stored when programming is stopped during the dark phase of blink codes. If programming is already left in the 3 second break (in advance of “type 1”) NO change takes place. If the programming mode is not left by the user, no change takes place either.



Programming of the battery type at a glance (here DualBat):



Alternatively programming or programming of a **DualBat** via sliding switch as described! Because only one battery is used for the **SingleBat**, programming only works by using the voltage selection switch!

9. Operation

Hold the magnet holder for about 1 second in front of the On-Position for turning on the **DPSI Micro**. Distance can be up to approx. 8mm/0.3" (total distance of magnet actuator to upper surface of housing – "linear distance"). Half a second after being turned on, the ultra bright LED indicates the programmed battery type displayed by blink sequences. Afterwards, the algorism for error recognition is started.

In case one battery is not connected to the **DPSI Micro - DualBat** or one of both batteries is defective, the **DPSI** starts in programming mode. This mode is left automatically after approx. 30 seconds. Within these 30 seconds, a missing second battery must not be connected, if reprogramming is not desired.

Hint:
If the LED in the **DualBat system,** after turning on, is immediately lit for 3 seconds and then turned off, only one battery is connected and the DPSI starts in programming mode. If reprogramming is not desired, turn the **DPSI** either off or wait approx. 30 seconds before connecting the second battery.

Hint:
If a **DPSI Micro** starts indicating error codes shortly after turning the device on, even when the batteries (or the battery) are fully charged, a wrong battery type is probably programmed.
Possibly a battery is used, which internal resistance is too high and weakens under load. Therefore, only use batteries with high load capability!

In order to turn the **DPSI Micro** off, hold the magnet for approx. 2 seconds above the Off-Position. Here too, the distance may be 8mm/0.3". The LED extinguishes and the equipment is of no power.

If another position as opposed to on or off is used to switch the device, there is no safe prediction, whether the **DPSI Micro** is going to turn on or off. A **DPSI Micro** can not be damaged by using a wrong position of the magnet.

If the magnet holder is lost, a **DPSI Micro** can simply be turned off by disconnecting the batteries! Turning back on is not possible without magnet!

Hint:
Turning on a **DPSI Micro** device only works with the help of the magnet actuator. If it is lost, turning the equipment on is not possible! Therefore, 2 spare magnets are contained when delivered! Turning off on the other hand is possible by disconnecting the batteries.

Hint:
A **DPSI Micro** can NOT be turned on or off by external magnetic fields (i.e. electrical motors), because these are far too weak. There is no risk by external magnetic fields!

Hint:
Observe not to directly contact the magnetic stripes of credit cards. Stored data could be eventually corrupted.

10. Error Indication

There is an internal micro controller in the **DPSI Micro** which constantly monitors all voltages. An intelligent algorism not only detects low voltages of a connected battery which are caused by short movements of the servos. Therefore, the internal resistance of the different types of batteries has little influence. The algorism is especially designed for use in RC-Models (this is cyclic load of the battery), i.e. not for continuous load of the batteries. This way, safe recognition of low voltage is possible.

The central LED indicates error types through blinking codes.

1. Battery failure (DualBat only): — — — — — — — —
DualBat ONLY — error signal: LED endlessly 0.1s on / 0.1sec off

If a battery fails when used for a **DPSI Micro**, (e.g. cable broken or battery defective), the LED flashes continuously fast (5 Hz). This error type has highest priority. If the outage is removed during operation, the blinking still continues!

2. Low Voltage Battery 1: — — — ————————————
DualBat und SingleBat — error signal: LED blinks 3 x 0.05s on with 0.05s breaks each, then 1s on

If the voltage of battery 1 drops below a certain value, this blinking code is output. The capacity of the battery usually suffices for one more flight before recharging is necessary. Nevertheless, the battery should be recharged anyway if this error code is displayed, assuming the correct battery type is programmed. This error code is repeated in a sequence of 6 seconds. If the error is qualified once, it stays active until turning the **DPSI** off.

3. Low Voltage Battery 2:
DualBat ONLY

— — — ———— ————

error signal: LED blinks 3 x 0.05s on with 0.05s breaks each, then 2 x 0.8s on with 0.4s break

If the voltage of battery 2 drops below a certain value, this blinking code is output. The capacity of the battery usually suffices for one more flight before recharging is necessary. This error code is also repeated in a sequence of 6 seconds. If the error is qualified once, it stays active until turning the **DPSI** off.

If both batteries of the **DPSI Micro - DualBat** indicate low voltage, both error codes are output alternatively.

Low voltage errors have lower priority than battery malfunction errors. Error output for battery malfunctions therefore is interrupted.

Hint:
The limits for low voltage recognition of the algorism were especially designed for RC models. When used for other purposes, the **DPSI Micro** can emit wrong error codes. If this is the case (and if disturbing), the error output can be totally turned off (see also “programming the batteries”).

11. Safety Hints

- 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 Micro** must be protected from humidity and moisture.
- The **DPSI Micro** must be located at a sufficient distance from neighboring surfaces to enable good heat dissipation of the cooling element.
- Improper handling of the **DPSI Micro** 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.
- The **DPSI Micro** may not be taken apart or technically altered under any circumstances.
- Never use the **DPSI Micro** 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 Micro** 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 Micro** to any extremely hot or extremely cold temperatures, moisture or humidity. This would lead to danger of malfunction, damage or decreased efficiency.

12. Technical Data DPSI Micro – DualBat / SingleBat

Power Sources	5, 6 or 7-cell NiCad / NiMH cells, 2-cell Lithium-Ion, LiPo, LiFePO4 batteries
Operating Voltage Range	4.8V 12V
Nominal Input Voltage	6.0V 8.4V
Output Voltage	5.5V or 5.9V per sliding switch selectable or 5.9V or 7.2V per sliding switch selectable
Quiescent Current (turned off)	<1µA per battery
Quiescent Current (turned on))	Approx. 90mA in total (LED On)
Max. continuous current @ 5.9V (15 minutes for LiPo batteries)	4A
Max. peak current @ 5.9V (10 seconds for LiPo batteries)	10A
Max. peak current (20ms)	25A
Drop-Out- Losses @ 2A	0.5V (DualBat-Version) / 0.1V (SingleBat-Version)
Ripple 0,1A / 8A	Approx. 200mV
Max. Power Dissipation	8W
Number of Servos in System	Depending on application up to 10 servos. At high loads (and powerful digital servos) possibly only up to 7 servos usable
CE-Test	according to 2004/108/EC
Environmental Conditions	-10°C/14°F.... +50°C/122°F
Permissible Temperature Range	-25°C/77°F .... +85°C/185°F (Storage)
Protecting Dynamo Effect	Limiting of pulses to approx. 7.3V
Dimensions	73,4mm x 19,4mm x 14,1mm (2.9"x0.76"x0.55")
Screwing Diameter for Mounting	2 x 3mm/0.12" 66.2mm/2.6" spacing
Diameter LED	5mm/0.2"
Weight	Approx. 28g/0.9oz.
Warranty	24 month

Technical modifications and errors excepted!

13. Warranty

EMCOTEC GmbH shall issue a 24-month warranty on the "**DPSI Micro**". The guarantee period shall begin with delivery of the equipment by the retailer and shall be not extended by any guarantee repair or guarantee replacement.

During the period of guarantee, the warranty shall cover the repair or replacement of any proven manufacturing or material defects at no charge. There shall be no specific entitlement to repair work. In case of a guarantee claim, the manufacturer shall reserve the right to exchange the equipment for a product of equal value if repair of the item is not feasible for economic reasons. There shall be no assumption of liability for consequential damages that are brought about by a proven defect during operation of the "**DPSI Micro** ". There shall be no extended claims for damages.

- All transportation, packaging and travel expenses shall be borne by the purchaser.
- No liability shall be assumed for any damages during transport.
- If repair is needed, the equipment must be sent to the appropriate service center of the respective country or directly to EMCOTEC GmbH.
- The guarantee shall only be valid when the following conditions are met:

  The guarantee document (original invoice) must include the delivery date, the company stamp, the serial number and signature of the retailer.

  No intervention in the equipment may have been undertaken.

  It must have been operated in accordance with our operating instructions.

  Only the power sources and other accessory devices and components that were recommended by us may have been used.

- The guarantee document, the original invoice and other pertinent information regarding the malfunction (a short description of the defect) must be included with the transmittal.
- The equipment must still be the property of the initial purchaser.
- If equipment is sent in that later proves to be functional following an initial inspection, we shall impose a flat processing fee of € 15.
- In all other respects, the general business terms and conditions of EMCOTEC embedded controller technologies GmbH shall apply for any items not listed.

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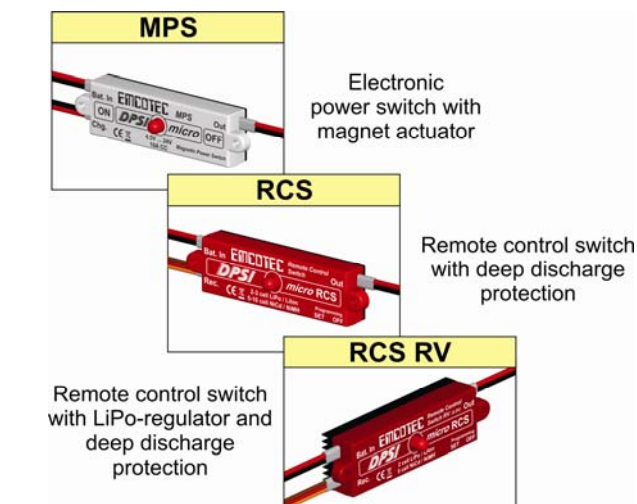

Legal Information:

Trademarks:
The following names are registered trademarks:

- EMCOTEC
- DPSI
- DPSI RV

Other product names mentioned in this manual may also be trademarks or registered trademarks of their respective owners.

Manual Note:
EMCOTEC GmbH reserves the right make changes to this manual and to equipment described herein without notice. Considerable effort has been made to ensure that this manual is free of errors and omissions. We shall not assume responsibility or liability for any errors that may be contained in this manual nor for any incidental, concrete or consequential damage that may arise from the provision of this manual, or the use of this manual in operating the equipment, or in connection with the performance of the equipment when so operated.

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