



Ampere

Battery Backer 2x 30A

3.6 up to 13.2 Volt



English

Operating manual

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1. Preface

With the EMCOTEC **DPSI Ampere** you purchased a high grade, modern and secure product. We appreciate your trust and assure you that you made the right choice!

More than 25 years of experience 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** 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-Family** not only have been tested extensively in the laboratory, but also went through intensive flight-testing. 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!

Wehringen, August 2012

The Staff of EMCOTEC GmbH

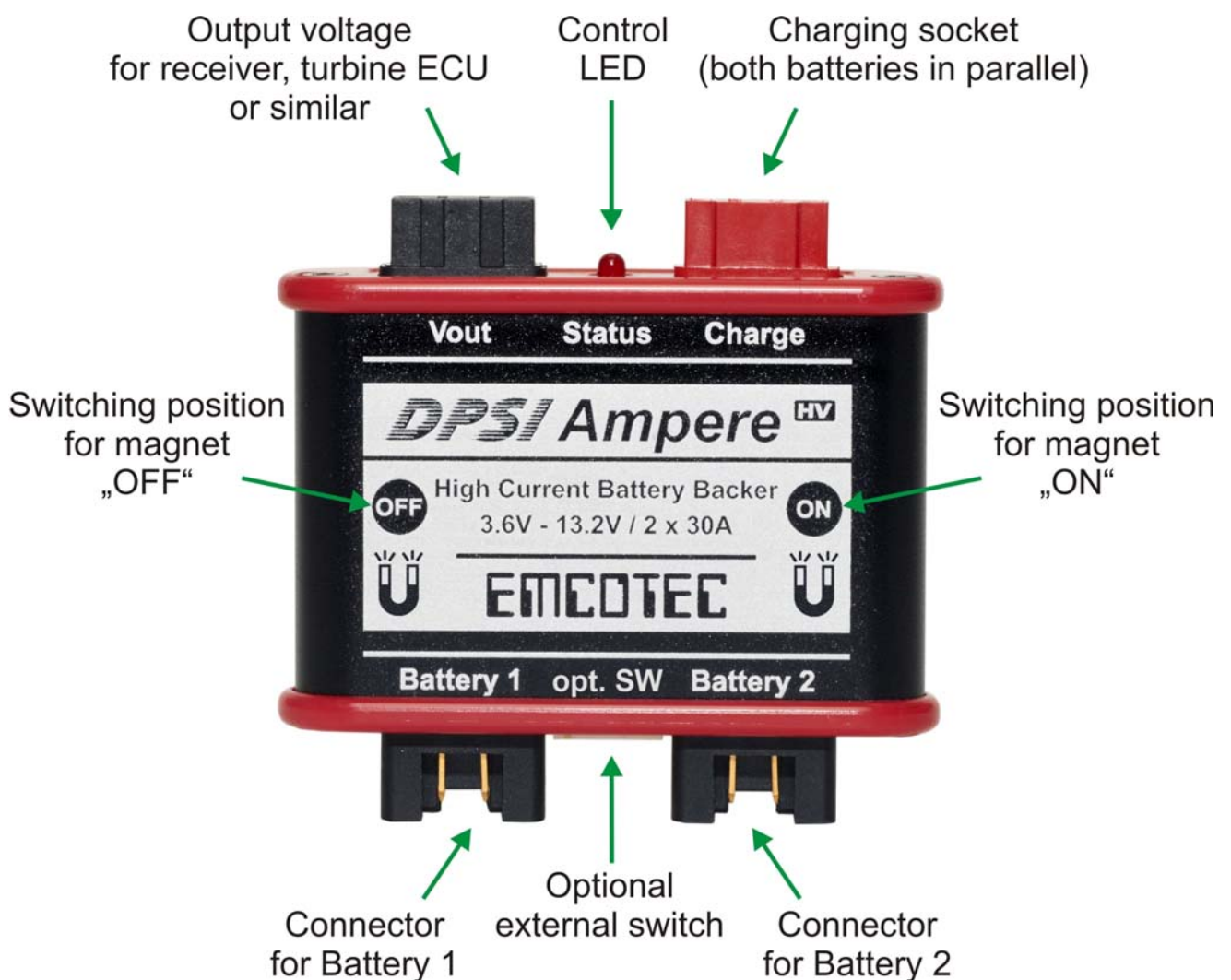


2. Safety Instructions

- 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 mufflers).
- High current carrying cables of electrically drives must keep a distance of at least 3cm (1.2") to the **DPSI Ampere**.
- The **DPSI** must be protected from humidity and moisture.
- The **DPSI** must be located at a sufficient distance from neighboring surfaces to enable good heat dissipation of the cooling element.
- Improper handling of the **DPSI** 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** may not be taken apart or technically altered under any circumstances.
- Never use the **DPSI** 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** 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** to any extremely hot or extremely cold temperatures, moisture or humidity. This would lead to danger of malfunction, damage or decreased efficiency.
- Only use accessories approved by EMCOTEC with the **DPSI** (e.g. Switch Actuators, external voltage indicators and so on).

3. Connection Scheme of DPSI Ampere



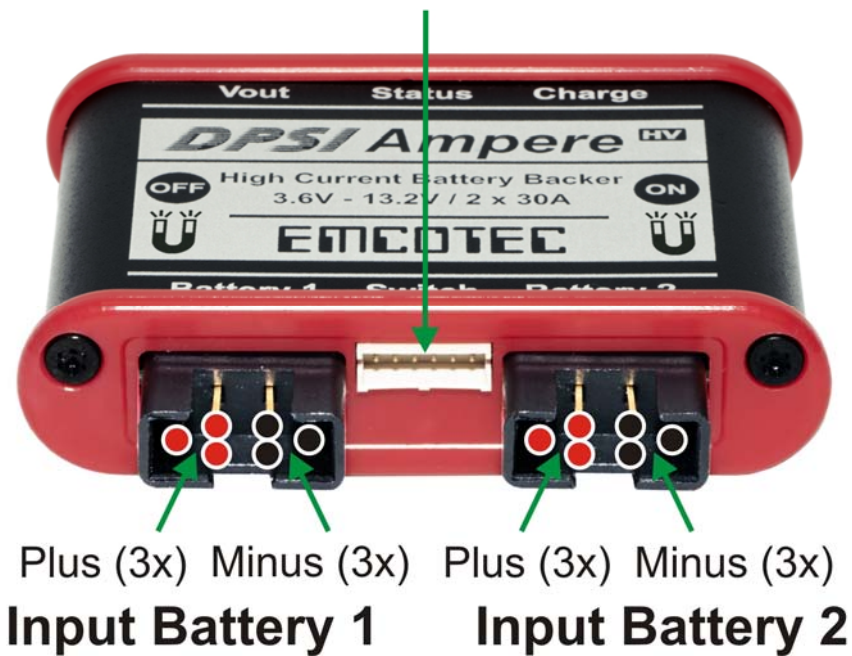
Switching Magnet:

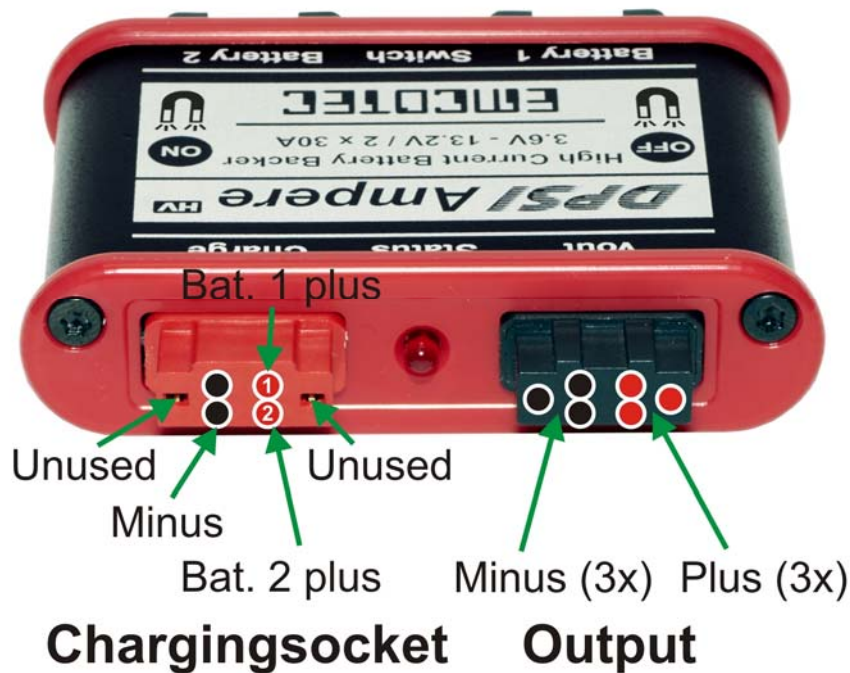


Hint:

The magnet is quite strong and therefore should not come in close distance to magnetic data storage medium in order to avoid data loss.

Optional external switch





4. Characteristics

The **DPSI Ampere** is the most powerful dual current supply (battery backer) for RC modeling worldwide. It can be utilized as dual current supply for receiver sets, turbines or other consumers in RC models.

The **DPSI Ampere** contains integrated power switches and can switch very high currents (up to 60 amps) and voltages (up to 3S LiPo) because NO diodes are used for decoupling of the connected batteries. System stability of the total system is ensured by connecting two batteries. If one battery fails, safe operation is guaranteed by the second battery. Normally, both batteries are discharged symmetrically and simultaneously (at the same time). Due to the parallel connected batteries the current is split in half for each battery.

Hint:

Both connected batteries of the **DPSI Ampere** discharge symmetrically (maintaining identical voltages).

Powering on or off of the supply voltage is completely done electronically by an external magnet, which is to be placed momentarily onto the corresponding switching position on the devices housing.

Electrically switches are built in for each battery separately, i.e. the electronics are doubled. The switches are fail proof and are controlled by a self-locking circuitry (NOT by a microcontroller). This means, a **DPSI Ampere** stays turned on, even if the microcontroller fails. The logic for turning off is also doubled. Here too, a malfunctioning part can not cause the current supply to turn off.

With the help of a **DPSI Ampere** a new dimension of safety is reached for current supplies of RC models!

The **DPSI Ampere** in buzzwords:

- Most powerful dual current supply worldwide with a peak load up to 60 amps
- Operates with up to 3S LiPo batteries or up to 13.2 volts input voltage
- Lossless switching function WITHOUT diodes
- Separately built in integrated electronically fail-proof switches for each battery without using the microcontroller (**CSHC**)
- Dual safeguarded power off logic – even a failing part does not lead to turn the output voltage off
- An external switch actuator can be optionally connected (pin switch actuator, tank cap switch actuator, magnetically switch actuator)
- Battery switching function, i.e. a failing battery does not lead to a failing output voltage
- **IVM** (Intelligent Voltage Monitoring) battery voltage monitoring with acoustically warning indications for different battery types (NiMH, Lilon, LiPo, LiFePO4)
- Booster for safe control of the power switches even at extremely low voltages or short interruptions of the battery voltage (**MBOOST**)
- Integrated charging connector for simultaneously charging of both batteries using just one charging device

- Special grounding concept for interference free operation and highest safety
 - High grade aluminum housing, which serves as heat sink at the same time
 - Developed and produced by the market leader (Made in Germany)
-

4.1. CSHC Circuitry

CSHC Circuitry (**C**ontrollerless **S**elf **H**olding **C**ircuitry): turning on or off is not done via microcontroller and therefore is even more safe. A failing microcontroller does not cause the output voltage to fail.

Thanks to the elaborate **CSHC** switches the batteries need not to be disconnected from the **DPSI Ampere** during long breaks (e.g. in winter time). Self discharging of the batteries is much higher than the quiescent current of the **DPSI Ampere** which actually is not measurable.

4.2. IVM (Intelligent Voltage Monitoring)

An internal microcontroller monitors all voltages using an intelligent algorithm and indicates various errors using a buzzer (low voltage, interrupts and voltage errors).

Furthermore, these errors are displayed by an indicator LED using blink codes. In order to utilize different battery types, the **DPSI Ampere** can be set up to the desired battery. By simple programming, one can select between different battery types.

Hint:

At delivery, the **DPSI Ampere** is programmed to recognize 2-cell LiPo batteries. If other battery types are desired, the corresponding battery type must be programmed (see chapter 9)!

4.3. MBOOST

A special circuitry (Booster) makes sure that the internal semi-conductors are always supplied with the optimal voltage in order to assure perfect switching. Therefore, the **DPSI Ampere** functions even with very low voltages or voltage drops reliably and safely.

Here too, all parts of the circuitry are completely doubled and substitute each other if one part fails.

Decoupling of both batteries and even the electronically switches is completely (inclusive peripheral electronics) separately designed. There are NO diodes used for decoupling of the batteries. Only this makes these extremely high currents possible.

5. Packing Contents

Contents of Delivery of DPSI Ampere:

- **DPSI Ampere** base device
- Magnet (On/Off-switch actuator) with key ring
- 2 pieces spare magnets "just in case..."
- Operating instructions
- EMCOTEC 3D sticker

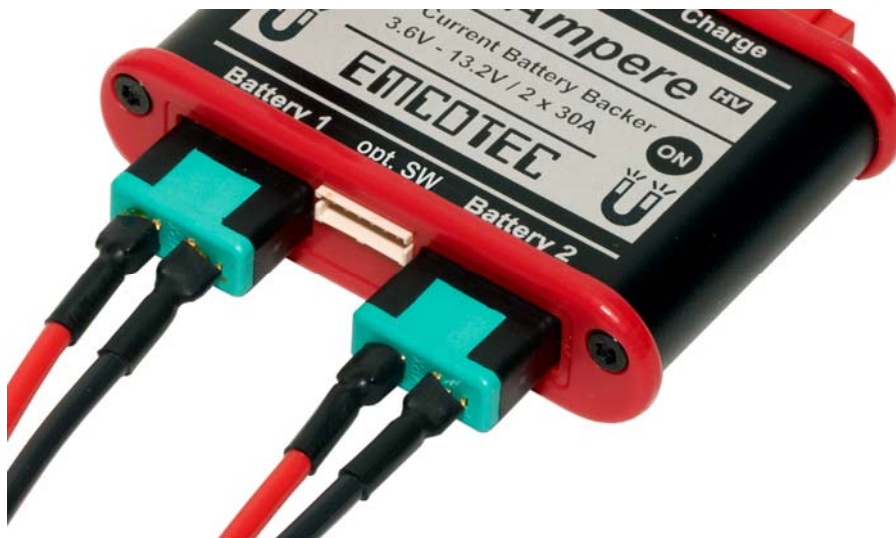
Hint:

The delivered spare magnets should be readily available at a free spot in the model (fuselage) and at / in the transmitter housing to be able to turn the DPSI Ampere on or off in case of loss of the original magnet!

Each **DPSI Ampere** is tested for its functions several times prior to delivery!

6. Connecting the Batteries

The **DPSI Ampere** is equipped with MPX compatible high current connectors. Therefore, each battery with a MPX high current socket fits. Of course, the EMCOTEC EMC connector system (100% MPX compatible) is suitable, too. Observe correct polarity because the **DPSI Ampere** is not protected against reverse polarity by design.



7. Selecting the Batteries

All battery types in the market (NiCd and NiMH) are suitable as well as Lithium-Ion (Lilon), Lithium-Polymer (LiPo) or Lithium-Ferrum-Phosphate (LiFePO₄). Maximum input voltage must not exceed 13.2 volts. This means, the **DPSI Ampere** is suitable for 4-cell NiMH (approx. 4.8 volts) as well as for a 3S LiPo battery (12.6 volts maximum voltage).

Depending on the demanded current when selecting the batteries make sure that the connecting cables are thick enough. For receiver current supplies 0.5mm² up to 1.0 mm² suffice, for a turbine ECU 1.5mm² up to 3.0mm² wire cross section are in order because the current can be up to 30 amps.

We recommend using EMCOTEC *EMC Lithium Polymer batteries*. These are delivered readily wired and can be connected to the **DPSI Ampere** right away.

Hint:

Always use two identical battery types (e.g. 2S LiPo with 2.2Ah capacity). Only this guarantees for problem free charging via the built in charging connector of the DPSI Ampere.

8. Charging the Batteries

The **DPSI Ampere** has its own charging connector (red color). When connecting the charging cable (e.g. EMCOTEC part number A63025) both batteries are connected in parallel automatically. This allows for charging both batteries simultaneously using just one charging device. When using Li++ batteries a balancer is to be connected to each battery. Alternatively, an EMCOTEC LiProtector (part number A52070) can be connected directly to the balancing connector of the battery (and remain there). In this case no additional balancer is necessary.

Hint:

During recharging, the batteries are connected in parallel by the charging connector. TWO LiPo batteries 2S1P become now ONE LiPo battery 2S2P. Therefore, the charging current can be doubled – number of cells stays the same (charging end voltage).

Hint:

Maximum charging current should not exceed 5A, even if the batteries allow for higher charging currents!

Hint:

The batteries must be disconnected and charged separately if not to be charged together via the charging connector of the DPSI Ampere.

9. Programming the Battery Types

Because the **DPSI Ampere** works with intelligent battery voltage monitoring, the connected battery type must be known to it (e.g. whether 5 or 6 cell batteries or LiPo batteries are used). The battery type must be programmed once – the programmed state remains in the microcontroller of the **DPSI Ampere** until reprogramming takes place.

Programming starts by connecting just one battery (no matter what type and which battery connector) to the **DPSI Ampere** and turning it on.

After power on, the internal buzzer (signal actuator) of the **DPSI Ampere** turns on for 3 seconds and then pauses for another 3 seconds. This indicates operating mode "Programming".

Now, **one** beep sounds, indicating "battery type 1". When connecting the second battery to the **DPSI Ampere** within 3 seconds, "battery type 1" is selected and programmed.

If the second battery is not connected within 3 seconds, two beeps sound for "battery type 2". Here again, the user has 3 seconds to connect the second battery in order to select (program) this battery type.

This principle repeats until the buzzer beeps nine times (battery type 9). If no second battery is connected within 3 seconds, no programming takes place and the systems returns to normal operation.

Battery types are defined as follows:

Buzzer Code	Battery Type / Programming
1x beep	5 cell Battery (NiCd / NiMH)
2x beeps	6 cell Battery (NiCd / NiMH)
3x beeps	2 cell Lilon Battery
4x beeps	2 cell LiPo Battery
5x beeps	2 cell LiFePO4 Battery (A123)
6x beeps	7 cell Battery (NiCd / NiMH)
7x beeps	Deactivate all tests
8x beeps	3 cell LiPo Battery
9x beeps	3 cell LiFePO4 Battery (A123)

At delivery "battery type 4" (2 cell LiPo battery) is programmed by default. When selecting "7 times beep" (all tests deactivated) the **DPSI Ampere** now executes no voltage tests from now on. No empty batteries or other errors are indicated anymore!

Hint:

Always use two identical batteries, i.e. same battery type (NiCd, NiMH or LiPo) and same number of cells.

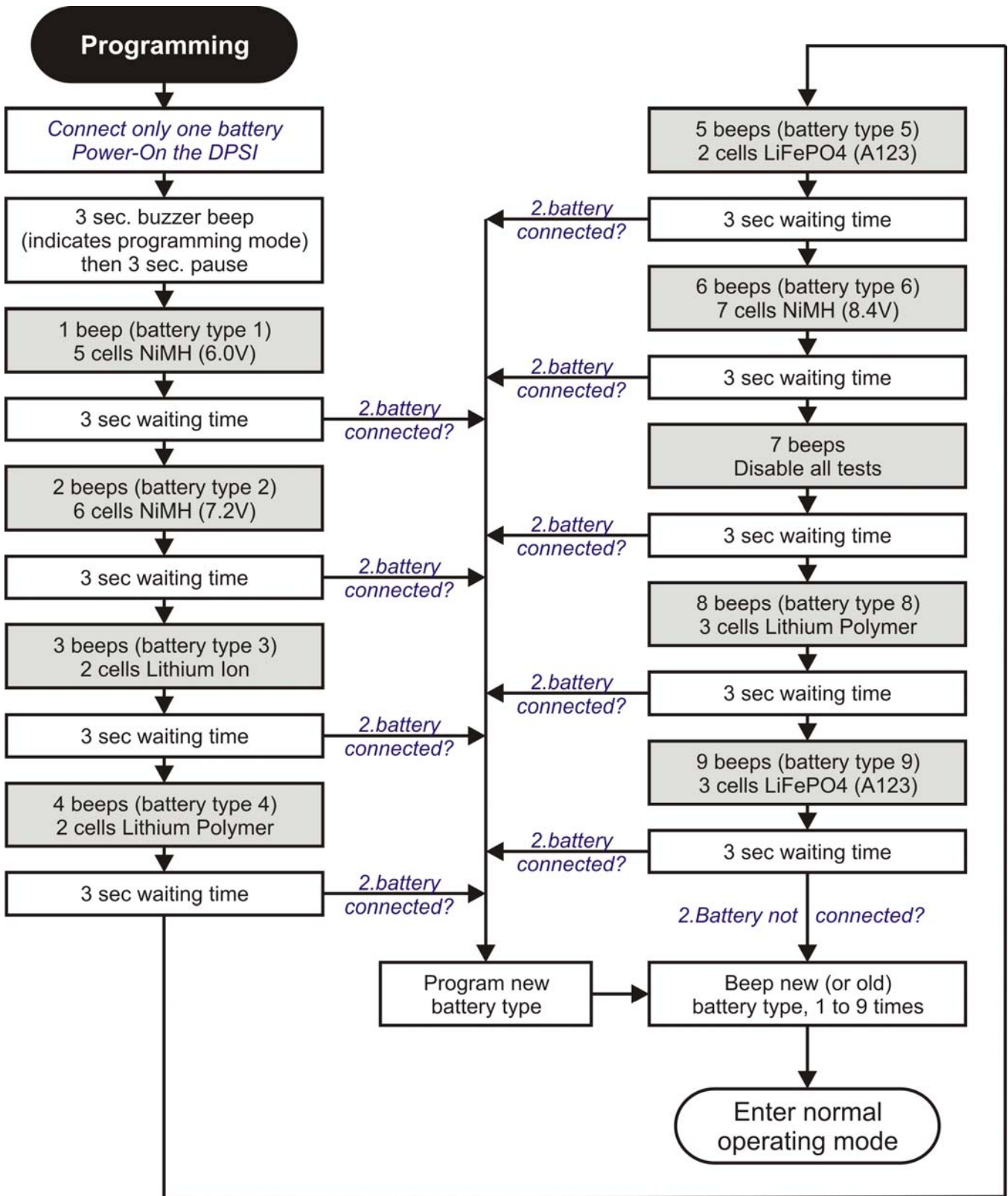
Hint:

Don't rely to low voltage detection to 100% for LiFePO4 batteries, because the voltage of these batteries drops rapidly at the end of their capacity. A reliable recognition of the remaining capacity is not realizable based on the current voltage. Here, the responsibility of the pilot is in order to assess correctly the batteries capacity (and therefore the duration of flight).

Hint:

Low voltage detection for batteries other than the types mentioned (e.g. 4 cell or 8 cell NiMH) is not planned or implemented.

Programming of battery types at a glance:

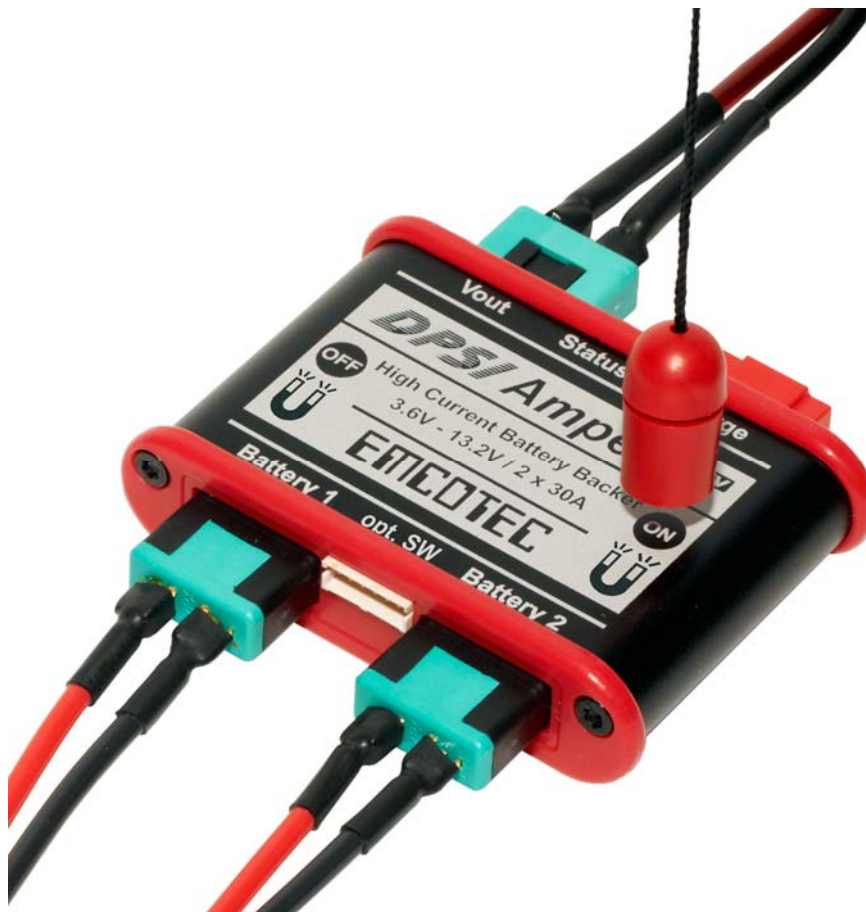


10. Operating

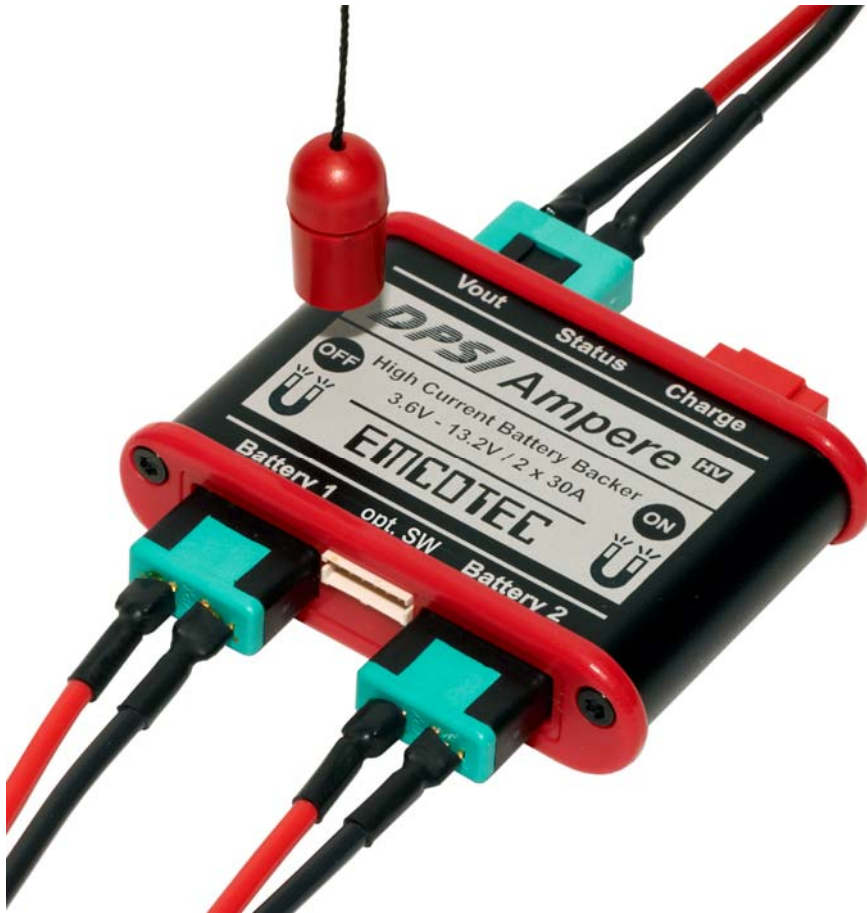
The actual power on or off process of the **DPSI Ampere** is accomplished by using an external magnet which is just hold to the on or off position (**ON** or **OFF** symbol on housing) momentarily. Due to this contact free, electronically switching process no erroneous power off can happen. There is no more safety!

Hint:

The distance of the magnet to the surface of the housing of the DPSI Ampere must not exceed 6mm in order to guaranty reliable switching.

**Hint:**

Power on takes about 0.2 seconds, turning off lasts about 0.8 seconds.

**Hint:**

If the DPSI Ampere buzzes for 3 seconds after power on, only one battery is connected and the DPSI Ampere starts programming mode. If no reprogramming is desired, turn the DPSI off or wait for approx. 40 seconds, then connect the second battery.

Hint:

If the DPSI Ampere starts indicating error codes after a short time, although the batteries are fully charged, possibly a wrong battery type is programmed.

Perhaps a battery is in usage which has a too high internal resistance and which breaks down under high loads (e.g. NiMH batteries of "AA" size). Therefore only use batteries suitable for high current load!

11. Error Indications

The **DPSI Ampere** contains an internal microcontroller which constantly monitors all voltages. An intelligent algorithm makes sure that low voltage of connected batteries is not only detected due to momentarily dropping voltages (e.g. movement of all servos). The algorithm is especially designed for operating RC models (i.e. cyclic loads of batteries). Herewith, relatively safe recognition of low voltage is possible.

Different error types are indicated by the internal piezo-buzzer and the indicator LED.

1. System error:

error signal: constant beep

If a hardware error is detected in the **DPSI Ampere** or the input voltage exceeds 13.2 volts, this error is indicated. In case of a hardware malfunction send the device in for repair.

2. Error low supply:

error signal: constantly 0.5 seconds beeps, then 0.5 seconds pause

If the output voltage of the **DPSI Ampere** drops below 3.6 volts this error code is output. For this low voltage the error recognition of the **DPSI Ampere** is not designed – therefore, this error is output until power off.

3. Error excessive supply:

error signal: constantly 0.5s beeps, then 0.1s pause, again 0.1s beep and 0.2s pause

If the output voltage exceeds 13.0 volts this buzzer code is output. For this high voltage, the **DPSI Ampere** is not designed – therefore this error is output (until power off).

4. Battery interruptions:

— — — — —
 error signal: constantly 0.1s beeps / 0.1s pause

In case a battery encounters an interruption (e.g. loose contact) this error is indicated. This error type is active until powering the **DPSI Ampere** down.

5. Low voltage battery 1:

— — — — —
 error signal: 3 x 0.1s beeps with 0.1s pause each,
 then 1s beep

When battery's 1 voltage drops below a certain value (corresponding to approx. 60% discharge) this error is indicated. The capacity of the battery suffices normally for one more flight prior to recharge. Nevertheless, it is better to recharge right away when hearing this error code. It is mandatory that the correct battery type is programmed. This error code is output every 7 seconds until the **DPSI Ampere** is powered off.

6. Low voltage battery 2:

— — — — —
 error signal: 3 x 0.1s beeps with 0.1s pause each,
 then 2 x 0.65s beeps with 0.1s pause

Analogous to battery 1: When battery's 2 voltage drops below a certain value (corresponding to approx. 60% discharge) this error is indicated.

If battery 1 as well as battery 2 encounter low voltage both error codes are output alternatively. These error types have lower priority than earlier mentioned errors and therefore can be interrupted.

Hint:

The algorithm limits for recognizing low voltage are especially designed for operating RC models. If the DPSI Ampere is used otherwise, wrong information can be output. If this is the case, the error indication (if disturbing) can be totally turned off (see "Programming the Batteries").

12. Connecting an external Switch Actuator

Mechanical switches risk failing. Vibrations on a fuselage of a RC model walls are relatively strong. In order to avoid any mechanically influence the **DPSI Ampere** contains internal electronically switches with self locking circuitry. These internal switches can be activated by an externally positioned magnet or even with the help of an external switch actuator which is mounted in the model elsewhere.

Different switch actuators are available:

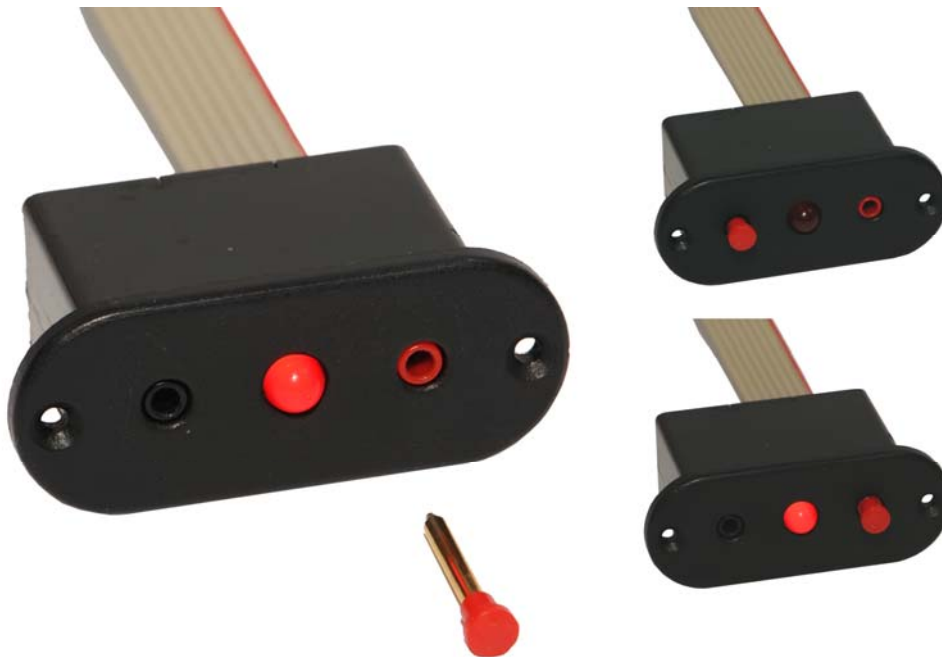
Pin switch actuator	Part number A15030
Tank cap switch actuator	Part number A15032
Magnetically switch actuator	Part number A15034

The switch actuators simply generate a pulse which triggers the internal switches of the **DPSI Ampere**.

Connecting an external switch actuator:



12.1. Switch Actuator by Pin



In order to turn on the **DPSI Ampere** pull the 2mm pin out of the power off socket (black) and put into the power on socket (red). Even if the pin gets lost a powered **DPSI Ampere** remains powered. The red LED in the switch actuator and the LED in the **DPSI Ampere** are lit. This indicates operation. Immediately after power on the buzzer indicates the battery type programmed in the **DPSI Ampere** by outputting the corresponding beep codes. Afterwards, the algorithm for error recognition (voltage monitoring) starts.

Putting the pin into the power off socket (black) turns the **DPSI Ampere** off.

The rear of the switch actuator housing accommodates two battery controllers with JR Uni-connectors readily available on the market (e.g. EMCOTEC Universaltester with part number A71055). Inscription "B1" stands for battery 1, "B2" for battery 2. Herewith, additional optically voltage monitoring of the batteries is possible. When using such battery controllers observe correctly selected cell numbers and battery type.

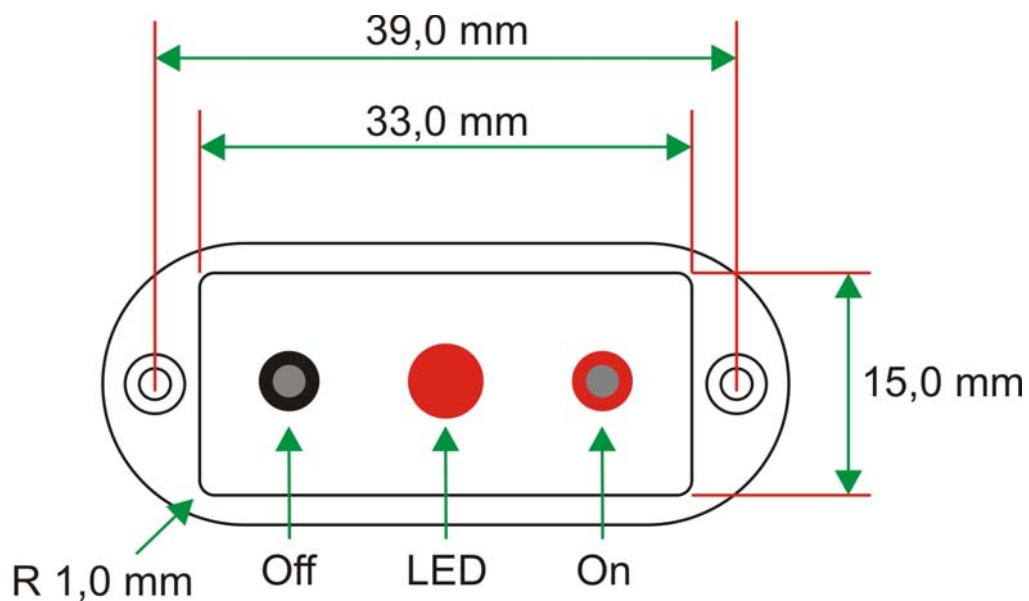


Backside of the switch actuator with connected battery monitors

Hint:

If the DPSI Ampere is turned off optionally connected battery monitors are turned off as well.

Switch dimensions:



Hint:

Should the pin get lost, a 2mm wire or 2mm screw suffices by putting it into the corresponding socket.

12.2. Tank Cap Switch Actuator

Alternatively a tank cap switch actuator is available. The design mimics as the name implies a tank cap. Here too, switching occurs by a magnet. Pulling the magnet turns the **DPSI Ampere** on, putting it back turns it off. The quiescent current of the **DPSI Ampere** increases a little up to approx. 30 μ A with a tank cap switch actuator. When storing the models (some month or even years) the batteries are better disconnected from the **DPSI Ampere**.



When turned on, the transparent ring of the tank cap switch actuator is illuminated in red. If errors are encountered (e.g. low voltage) the ring "blinks" synchronously with the buzzer if tests are activated.

12.3. Magnetically Switch Actuator

An especially light weight and space saving variation the magnetically switch actuator is available.



The magnetically switch actuator is designed for applications where large cutouts in a fuselage's side wall is not desired or where the fuselage is especially small (e.g. gliders). The actual switching occurs by an external magnet which is hold to the ON or OFF position momentarily.

The magnetically switch actuator needs extremely little space and can be mounted unobtrusive. Prior to mounting drill a 3mm hole for the LED. Then glue the PCB onto the inner side of the fuselage using silicone glue. This connection is flexible and therefore vibration damping.

The delivered magnet (in its red plastic cone) serves as switching element. It turns on the **DPSI Ampere** when hold left to the LED. The LED serves for orientation.

In order to turn off, hold the magnet close to the off position for approx. 2 seconds. There is no switching in the undefined area above the LED.

There is a maximum distance of 6mm allowable between the magnet and the switch actuator. The central LED in the switch actuator is always lit, when the **DPSI Ampere** is turned on. In case of errors (e.g. low voltage) this LED blinks synchronously with the buzzer if tests are activated.

13. Technical Data of DPSI Ampere

Current Sources	4 up to 8-cells of NiCd / NiMH-Batteries, 2 up to 3-cells of Lithium++-Batteries (LiPo, LiFePO4, Lilon)
Operating Voltage Range	2.6V (*) 13.2V
Nominal Input Voltage	3.6V 13.0V
Output Voltage	Same as input voltage (no dropout losses)
Quiescent Current (turned off)	< 4µA per battery
Quiescent Current (turned on)	Approx. 30mA total
Max. continuous current	50A (30A pro channel)
Max. peak current (10 sec.)	60A (30A pro channel)
Internal Resistance	Approx. 3mR
CE-Test	According to 2004/108/EG
Environmental Conditions	-10°C +50°C
Permissible Temperature Range	-25°C +70°C
Dimensions	64mm x 60mm x 16mm (W x L x H)
Weight	45 grams
Warranty	24 month

* For voltages < 3.6V no voltage monitoring, i.e. monitoring must be deactivated

Technical modifications and errors excepted!

14. Warranty

EMCOTEC GmbH shall issue a 24-month warranty on the **DPSI**. 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**. 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.



Made in Germany

15. Conformity Declaration

EMCOTEC GmbH hereby declares that this product satisfies the fundamental requirements and other relevant regulations contained in the appropriate EU directives. The original Conformity Declaration can be viewed on the Internet under <http://shop.rc-electronic.com> which is included in each device description.

16. Disposal of Devices

It is illegal to dispose of electronic equipment in the ordinary household waste: that is the meaning of the symbol printed alongside. It simply means that you must dispose of electrical and electronic equipment separately from the general household waste when it reaches the end of its useful life. Take your **PSS2018** to your local specialist waste collection point or recycling centre. This applies to all countries of the European Union, and to other European countries with a separate waste collection system.

17. Legal information

Trademarks:

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

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