RC Electronic by EMCOTEC embedded controller technologies

# DPSI® V-Match

**Digitally Programmable Servo Interface**

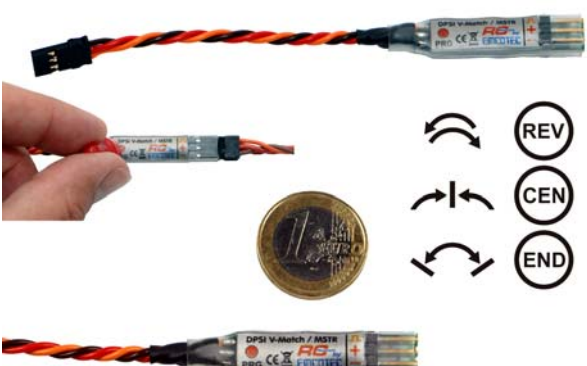
## V-cable with servo matching

English

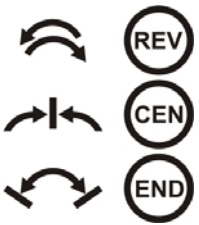

## Operating Instructions

# Contents





## *1. Functionality*




**DPSI V-Match** constitutes a servo V-cable that accommodates two commercially available servos.

As a special feature, one servo (SLAVE) is programmable for direction, as well as center position and end-limits. Therefore, this servo adapts ("matches") to the main servo (MSTR).

This is especially handy if two servos actuate on one rudder (e.g. two servos on one aileron) and synchronism cannot be established by mechanically means. Often, it suffices if one servo's direction can be changed (e.g. counter rotating mounted servos for the airplane's elevator). This too, is simply accomplished with **DPSI V-Match**.

**Failsafe-Function:**
A failsafe-function is added to its features. Both servos (MSTR and SLAVE) remain at their current position (HOLD) when encountering an erroneous or missing receiver signal until a valid signal is again delivered by the receiver. A flashing red LED (at the PCB's side) indicates this state and stays active (i.e. flashes) until power is turned off.

**Powerful Servos:**
The electronically design of the **DPSI V-Match** allows for usage of powerful digital servos; supply voltage ranging up to 8.4 volts. Due to the PCB (4-layer) and the thick (0.34 $mm^2$) connection cable, current load is especially high.


**Pulse Amplifier & HF-Suppression:**
Besides pulse amplifiers, which recognize and amplify even weak servo signals, high effective noise filters are built into the **DPSI V-Match**. Therefore, ferrite cores or other noise suppression measures can be omitted.

**High Precision:**
Because of the intelligent software design and a highly accurate crystal oscillator, a resolution of more than 3000 steps is obtained. Therefore, the **DPSI V-Match** is also suitable for modern remote control systems with high servo positioning precision (number of steps).

## *2. Programming*

There is no external programming device necessary, e.g. a PC or a programming box for programming of the **DPSI V-Match**. Only a delivered magnet serves for activation of the corresponding programming functions. Everything else is conducted with the transmitter and remote control equipment.

During programming, settings of the original servo (master = MSTR) remain unchanged! Programming always refers to the slave servo (SLAVE).

***Hint:***
Adjustment / programming of the slave servo is only possible within the first 10 seconds after power on. Afterwards, programming is inhibited for safety reasons!

***Hint:***
**Before starting EACH programming, the corresponding transmitter stick (or switch actuator) must be positioned in center position!**

***Hints:***
**If both servos MSTR and SLAVE actuate a common rudder, at least one servo linkage must be released in order to avoid mechanical touch.**

***Hint:***
Whenever a change e.g. of the servo center position takes place, the end-limits should be reprogrammed as well!

***Hint:***
Basic adjustments in DPSI V-Match correspond to Graupner/JR equipment. Center position is 1.50ms; end-limits are set to 100% each. Of course, all remote control sets can be used with no limitation.

***Hint:***
Whenever programming takes place, the integrated red LED blinks for controlling purposes at a rate of 0.5Hz (1s on, 1s off) at the DPSI V-Match's side.


## *2.1. Changing Servo Direction*

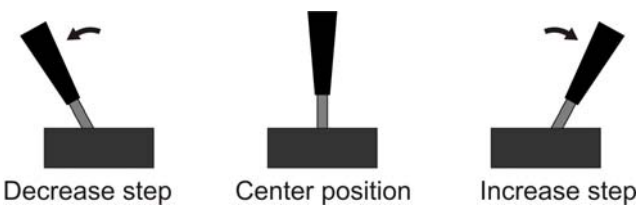

When changing the direction of the servo, all other settings remain! For reversing direction of the servo, hold the magnet close to position "PRG" (red dot on sticker) within the first 10 seconds after power on. Distance of the magnet can be up to 8mm. The magnet also operates through thin fuselage sidewalls, if the **DPSI V-Match** is attached to the fuselage's inner sidewall using e.g. dual adhesive tape.

2.5 seconds after positioning the magnet, the servo makes a short move (10% stroke). If the magnet is removed within the next 5 seconds, the servo direction is reversed and permanently stored. The **DPSI V-Match** now executes a restart.

### *2.2. Calibrating Servo Center*


Programming also starts by positioning the magnet close to the red dot ("PRG"). The slave servo makes a short move after 2.5 seconds (just like for servo reverse). The magnet now is not removed, but rather remains at the "PRG" position. The stick or switch actuator must not be moved now, i.e. it must remain in center position. After 5 seconds, the servo makes a short move again. Now, programming of servo center is active.

The master servo now remains centered and does not move anymore, even if the stick is moved. With each movement of the transmitter stick out of center, the servo position (servo center) is incremented or decremented by one step.




If the stick remains in one end-position, steps automatically increment or decrement after 2.5 seconds. This serves for quicker settings of the values.

***Hint:***
Due to the high resolution of the DPSI V-Match, changes of the servo position are possibly recognizable only after several steps.

Remove the magnet from its red dot position ("PRG") as soon as the slave servo reaches the desired center position. The **DPSI V-Match** now starts with the newly programmed center position of the slave servo.

***Hint:***
Reprogram the end-limits in order to obtain linear curves after programming the servo center.


## *2.3. Calibrating End-Limits*


Start programming of end-limits just like programming servo center. Here, the transmitter stick (or switch actuator) is set to maximum position (servo end-limit) within 5 seconds after the servo makes its first short move. After these 5 seconds the servo moves again shortly and both servos remain in their actual (maximum)-position. Reposition the stick to its center position – servo positions do not alter!

Here too, the stroke of the slave servo changes by increasing or decreasing steps when moving the stick out of its center position.

Remove the magnet when the desired end position is reached.

***Hint:***
Whenever changing servo settings, all values should be reprogrammed, i.e. center and end-limits! Sequence of programming (center, end-limits) does not really matter.

***Attention:***
Programmable values for end-limits could possibly be higher than the mechanical resolution of the servo. The servo therefore could be damaged or function incorrectly (e.g. wheel spinning) when utilizing the full range. Therefore, approximate the limiting values carefully. An additionally connected servo tester (e.g. using the EMCOTEC Mini Servo Tester – part number A71050) can help if in doubt, indicating the corresponding servo position digitally.

## *2.4. Deleting all Programming*


Total reset of all programmed settings is possible too. Position the magnet after power on close to the "PRG" position and hold it there for approx. 40 seconds. After 2.5 seconds and after additional 5 seconds the servo makes its short move (just like when programming center/end-limits). The transmitter stick must not be moved at that time and the magnet must remain at the "PRG" position. After 40 seconds have elapsed, all settings are deleted and a restart of the **DPSI V-Match** takes place. Now, the magnet can be removed.

***Hint:***
Whenever programming takes place, the integrated red LED blinks for controlling purposes at a rate of 0.5Hz (1s on, 1s off) at the DPSI V-Match's side.

## *3. Additional Hints*

These additional hints are valuable for the ambitious user who likes to know more about the functions of the **DPSI V-Match** by explaining its behavior under certain circumstances.

### *3.1. Adapting several Servos*

If more than two servos need to be synchronized (e.g. three aileron servos) two **DPSI V-Match** can be chained one after another. This means: the input of the second **DPSI V-Match** connects to the MSTR output of the first **DPSI V-Match**.

Now, a SLAVE output is available at the first **DPSI V-Match**, a MSTR and a SLAVE output at the second one. Both SLAVE servos can now be independently set up.

### *3.2. Changing the Model*

If a programmed **DPSI V-Match** is to be used in an other application (e.g. changing a model), generally all settings should be deleted (see also "Deleting all Programming"). This is also true if a servo with a different rotating direction is to be built in.

### *3.3. Sequence of Programming*

When programming the slave servo, the rotating direction (if necessary) should always be programmed first. Then center position and end-limits follow, sequence is unimportant.

***Hint:***
Whenever there is a change, e.g. serve center position, the end-limits should be programmed, too!

### *3.3. Limiting Tuning Range*

The **DPSI V-Match** only allows for certain values when programming or adjusting the slave servo. Because the slave servo is to be adapted to the master servo, both servos should have similar base adjustments in the first place, e.g. comparable center positions.

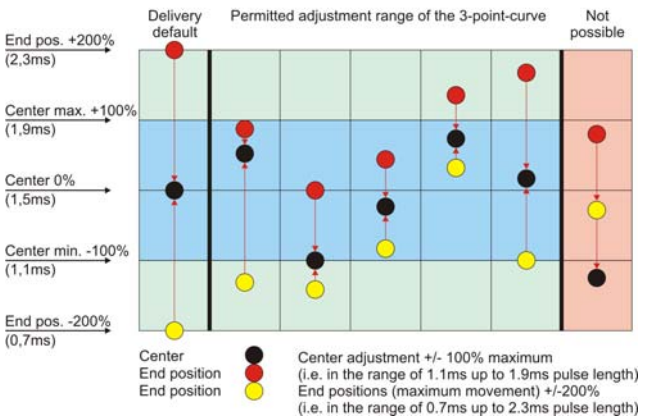
If the center of the master servo already is over 100% of the possible servo stroke it does not make much sense to adjust the slave servo even further. Therefore, only a maximum of +/-100% (referring to JR values) of the servo center position is possible.

Adjustment of the slave servo is carried out by a so-called 3-point curve (i.e. center, maximum value left/top, maximum value right/bottom).

The "distance" of the maximum position of a servo in respect to its center must be at least 20%, otherwise the value is not programmable.

Range checking accompanies each programming. It is therefore not possible to position the servo center position off limits. Malfunctions are avoided this way (e.g. V-curve of the servo).

**Example for the different adjustment possibilities of the DPSI V-Match**



## *4. Technical Data*

| | |
|---|---|
| ***Operating Voltage Range*** | 4V .... 8.4V |
| ***Current Consumption*** | Approx. 4.7mA |
| ***Servo Signal Level Input:*** | |
| ***Low-Level*** | 0V ... 0.8V |
| ***High-Level*** | 2.0V ... 8.4V |
| ***Servo Signal Level Output:*** | |
| ***Supplying > 5.1V*** | Approx. 5.0V |
| ***Supplying < 5.1V*** | Supply voltage -0,1V |
| ***Maximum Allowable Current*** | 8A continuous, 20A peak |
| ***Allowable Center Position*** | +/-100% (1.10ms .... 1.90ms) |
| ***Allowable End-Limits**** | +/-200% (0.70ms .... 2.30ms) |
| ***Allowable Signal Cycle Time*** | Min. 6.9ms, max. 34.868ms |
| ***Resolution (Steps)*** | 3200 |
| ***CE-Test*** | According to 2004/108/EC |
| ***Temperature Range*** | -20°C .... +85°C |
| ***HF-Noise Suppression*** | -30dB attenuation @ 35MHz |
| ***Dimensions*** | approx. 50mm x 8.4mm x 7.2mm |
| ***Weight*** | Approx. 4.5g |
| ***Warranty*** | 24 month |

**** Attention:***
Programmable values for end-limits could possibly be higher than the mechanical resolution of the servo. The servo therefore could be damaged or function incorrectly (e.g. wheel spinning) when utilizing the full range. Therefore, approximate the limiting values carefully. An additionally connected servo tester (e.g. using the EMCOTEC Mini Servo Tester – part number A71050) can help if in doubt, indicating the corresponding servo position digitally.

Technical modifications and errors excepted!

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## *5. Warranty*

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

## 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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