

## Operating and installation instructions for „3P“ speed controls

rev: A

**Caution:** Please read this instructions thoroughly before operating the speed control! It contains necessary information for operating the speed control!

### 1. Connection of the motor cables (valid for the Aveox motors)

Connect cable 1.5 mm<sup>2</sup> from speed control **red** to motor cable **red/orange**,  
 speed control **green** to motor cable **yellow**,  
 speed control **blue** to motor cable **blue**.

### 2. Connection of the sensor cables (valid for the Aveox motors)

Connect flat cable from speed control **blue** to sensor cable **blue**,  
 speed control **green** to sensor cable **green**,  
 speed control **yellow** to sensor cable **orange**,  
 speed control **orange** to sensor cable **black !!!!!!!!!**,  
 speed control **red** to sensor cable **red**.

### 3. Connection of the battery cables

Connect cable 2.5 mm<sup>2</sup> from speed control **red** to **battery plus (+)**.  
 speed control **black** to **battery minus (-)**.

**Use polarized connectors only !** Connecting the battery with reverse polarity will destroy the speed control immediately. In the speed control a polarity sensor is installed so incorrect polarity can easily be discovered. Any damage resulting from incorrect polarity is excluded from the warranty !

### 4. Specifications

#### **Speed controller 3P-B 30-6-12 :**

For 6 to 12 Ni-Cd-cells, 30A continuous current with little air cooling, 65A for 10s  
 With BEC up to 4 servos.

#### **Speed controller 3P-O 30-6-18 :**

For 6 to 18 Ni-Cd-cells, 30A continuous current with little air cooling, 65A for 10s  
 With opto coupler for separating the receiver from the motor current loop.

#### **Speed controller 3P-O 35-14-32 :**

For 14 to 32 Ni-Cd-cells, 35A continuous current with little air cooling, 75A for 10s  
 With opto coupler for separating the receiver from the motor current loop.

#### General specifications:

- Dimensions: 83 x 33 x 12 mm.
- Weight: approx. 45g excluding cables, approx. 65g including cables.
- Limited operation in partial load. In partial load more heat is produced. This heat must be carried of by additional cooling. Otherwise partial load can only be used for 20 to 30s.
- Temperature range: 0 - 70 degree Celsius.

## **5. Operation of the „3P“ speed controllers**

- The speed controller is operational after connection to a suitable drive battery when:
  - the throttle stick is in „motor off“ or „brake (off)“ position and
  - the arming switch (if connected and enabled by programming) is engaged.

The controller LED will flash twice to indicate that all is well and the motor can now be started.

- When connecting the battery to the speed control some sparking can occur as the capacitor inside the speed control is charged. This is harmless but results in a very good suppression of interference.
- To allow an easy inspection of the programmed throttle positions the LED is switched on at the positions „motor off“, „max. speed“ and „brake (off)“, but the LED is dimmed to conserve power. Between these throttle positions the LED stays dark.
- The KONTRONIK speed controllers have an integrated voltage cut-off which automatically switches the motor off if the battery voltage drops below 0.8V/cell. On every connection of a battery to the controller the specific cut-off voltage is computed to fit the battery's needs. This protects the battery from a deep discharge condition. The motor can be re-started by returning the throttle stick to the „motor off“ or „brake (off)“ position and advancing again. Now the throttle setting should be a little less as otherwise the battery voltage drops again and the speed control cuts off the motor again.
- The voltage cut-off function can be disabled as in chapter 6 described. Caution: With speed controls including BEC (3P-B ...) the voltage cut-off function must not be disabled for safety reasons !
- Should the speed control become overloaded during operation the motor will be switched off automatically. If the speed control receive only corrupted radio pulses or no pulses for about 1s the motor will also be switched off. For re-activating the system return the throttle stick to the „motor off“ or „brake (off)“ position and advance it again.
- It is recommended that the speed control is positioned to enable airflow above the flat surface (cooling plate) as this will provide cooling and so increase the load capacity. When using BEC all servo connections to the flying surfaces should be carefully checked for freedom of movement and minimum servo load. If any doubt exists in a particular case then it may be safer to disable the BEC by cutting and isolating the positive wire in the receiver connection of the controller and replacing it with a separate receiver battery.
- It is possible to use the BEC and a 4.8V receiver battery in parallel if a spare receiver connection is available. This will provide a redundant safeguard but care must be taken to ensure that the additional battery is fully charged since the BEC cannot provide any charge facility and a discharged battery in parallel would actually reduce the supply to the receiver and servos.

## 6. Programming the 3P speed controllers

\* = LED is flashing

1. Phase: sets „motor off position“, „max. speed position“, „brake (off) position“:

Preparation: switch on the radio, with speed controls with opto coupler connect also the receiver battery, plug the added jumper on the 2 golden pins at the speed control, now move the throttle stick (or the throttle switch) to the following positions:

**brake (off) pos. / connect battery to controller / \* / max. speed pos. / \* / motor off pos. / \* / brake speed / \* \***

Now disconnect the battery from the speed control, pull off the jumper and reconnect the battery. The speed control is now ready for operation.

- If the position „motor off“ is the same as the „max. position“ the brake is disabled.
  - The position „motor off“ and „brake (off)“ can be the same. Then the brake is switch on when the motor is switched off.
  - The brake speed is equivalent to the distance of the „brake speed position“ to the „brake (off) pos.“, i.e.
    - position „brake speed“ = „max. speed pos.“ -> max. brake speed, approx. 0.1s up to 100% brake
    - position „brake speed“ = „middle“ -> medium brake speed, approx. 0.5s to 100% brake
    - position „brake speed“ = „brake (off) pos.“ -> minimum brake speed, approx. 2s up to 100% brake
- Caution at high brake speeds! The arising torque can be very high so damage to the motor and the gearbox may result. Always start at lower brake speed and increase it until it's sufficient.
- If there is enough distance between the positions „motor off“ and „brake (off)“ and the position „brake speed“ is the same as „brake (off)“ then a proportional brake is used. The brake strength is no more time dependent but is determined by the throttle stick: At „motor off pos.“ the brake strength is 0% and at „brake (off) pos.“ the brake strength is 100%.

2. Phase: sets rotation direction cw/ccw, voltage cut-off yes/no, arming switch yes/no:

Preparation as in 1. phase described:

**max. speed pos. / connect battery to controller / \* / \* \* \* / brake (off) pos. or max. speed pos. / \* \* \* ( \* )**

Now disconnect the battery from the speed control, pull off the jumper and reconnect the battery. The speed control is now ready for operation.

- The throttle position after the first \* \* \* selects the rotation direction:
    - Throttle in „max. speed pos.“ results in rotation direction **cw**,
    - Throttle in „brake (off) pos.“ results in rotation direction **ccw**.
 (Stick forward -> rot. direction is forward, stick backward -> rot. direction is backward.)
  - At the end of the programming sequence the LED flashes 3 times when the rot. direction is cw, the LED flashes 4 times when the rot. direction is ccw.
  - At the end of the programming sequence (at the 3(4)-times flash) if the jumper is:
    - still plugged on, the voltage cut-off is enabled **(with jumper -> with cut-off)**
    - no more plugged on, the voltage cut-off is disabled **(without jumper -> without cut-off)**
- Caution:** If BEC is used the low voltage cut-off must not be disabled because otherwise the power supply of the receiver and the servos cannot be guaranteed when the battery voltage drops.
- Only if an arming switch shall be used: pull of the jumper and plug it on again within 5s after the end of the 2. phase progr. sequence. A 2-times flash occur and the arming switch function has been enabled.

The programming phases 1 and 2 operate separately and thus can be executed separately.

## **7. Fault diagnostics**

### During programming:

- The LED is never flashing:
  - The radio isn't switched on.
  - Only with speed controls with opto coupler: No receiver battery is connected to the receiver.
  - The speed control is not connected to the receiver or plugged in the wrong socket.
  - The jumper is not plugged on.
  
- The LED is **1** time flashing, then permanently switched on:
  - The position „brake (off)“ is not far enough away from the position „max. speed“.
  - The speed control is plugged in to the wrong socket at the receiver.
  - The throttle stick was not moved to the „max. speed pos.“ after the first flash of the LED.
  
- The LED is **2** times flashing, then permanently switched on:
  - The radio has transmitted to long servo pulses ( one of the first two throttle stick positions must have pulses shorter than 2ms). This fault can only occur when a computer controlled radio is used.  
Solution: Do not program any shifts of the throttle position in the radio transmitter.
  
- The LED is **3** times flashing, then permanently switched on:
  - The distance of the positions „brake (off)“ and „max. speed pos.“ is too large. This fault can only occur when a computer controlled radio is used.  
Solution: Do not program any spreads of the throttle positions in the radio transmitter.

### During operation:

- Unexpected motor cut-off:
  - The radio pulses are heavily disturbed. Solution: Install the receiver and the antenna with more distance from the motor, controller and battery.
  - Over-temperature (see chapter 5): Provide more airflow above the controller for more cooling.
  - Loose connection in the power supply: Use only high-quality connectors, for example KONTRONIK-connectors.
  
- Motor cannot be switched on:

The speed control starts operation after recognizing once the „motor off“ or „brake (off)“ position. If the speed control cannot find any of these positions the motor stays switched off and no twice flashing of the LED occurs.

Solution:

  - Not only the position of the throttle stick is important also the position of the trim must be moved to „motor off“ or „brake (off)“ position.
  - Programming the speed control to the actual throttle settings.
  - Some radios drift with the temperature. Here it is recommended to keep a little space from the limits of the throttle stick while programming the speed control. So there is some reserve left to securely reach the programmed positions.

## **8. The use of an arming switch**

Fitting and programming an arming switch provides an additional level of safety for the use of these speed controls. The arming switch isolates the motor from the rest of the system and all functions may be checked after connecting the battery but before arming the motor. In this condition there is no danger of motor start-up irrespective of the deliberate or accidental operation of any transmitter function including the throttle (particularly useful with helicopters).

But the arming switch is not necessary as the KONTRONIK speed controls don't start the motor until the throttle stick has been set to the „motor off“ or „brake (off)“ position. So a motor start-up is prevented when connecting the battery.

**Caution:** The safety features included in the KONTRONIK speed controls may be negated by damage to the unit. When a battery is connected to the speed control the motor must be considered to start unexpectedly.

Fitting an arming switch is done by connecting a pusher type switch to the 2 golden pins. Then the arming switch also takes over the function of the jumper. So press the arming switch while connecting the battery to the speed controller for programming.

## **9. Safety instructions**

- As soon as a battery and a motor is connected to the speed control the motor must be considered to start-up. That's why caution is required as soon as the battery is connected.
- An electric motor (especially with a propeller mounted) is able to cause severe injuries. Also parts flying away can cause severe injuries.
- The operation of this speed control is therefore only permissible in situations where any damage and injury is impossible.
- On no account a damaged speed control (by mechanic or electric influence) shall be used further. Otherwise a sudden failure may occur in later operation.
- The speed control is only designated to operate in an environment where no electrostatic discharge will occur as the speed control is not protected against electrostatic discharge.
- In no case it is allowed to connect the speed control in any way to the mains. The speed control is designed to be operated only by a battery. Also an operation with an electronic power supply is not permitted.

## **10. Warranty**

KONTRONIK guarantees these speed controllers to be free from factory defects in material and workmanship for a period of 6 months from date of purchase. This warranty does not cover: suitability for specific application, components worn by use, application of reverse or improper voltage, tampering, misuse or shipping. Our warranty liability shall be limited to repairing unit to our original specifications. Because we have no control over the installation or use of these products, in no case shall our liability exceed the original cost of the product.

By the act of using this speed control the user accepts all resulting liability.