

## Pitch Controller SPC<sup>2</sup>

A pitch controller in a model submarine stabilizes the submerged model in its horizontal attitude. The integrated sensor (or so-called inclinometer) acts as electronic spirit level by automatically adjusting the dive planes accordingly.

The **SPC<sup>2</sup>** can easily handle fast model submarines as well as digital servos.

### Installation & Click to Neutral

Make sure to align the **SPC<sup>2</sup>** somewhat horizontally, but accurately parallel to the keel line of your submarine. The controller can be mounted horizontal or on its side but NOT end-on. The controller can either be fixed with the M3 screw and nut supplied or with double-sided adhesive tape. Place model on even keel, meaning exact horizontally. This will correspond to neutral position of the **SPC<sup>2</sup>**. By pressing the *Neutral* button on the **SPC<sup>2</sup>** the servo will travel to its neutral position. The servo horn or disc can now be fitted to the servo and the linkage connected which must correspond to the neutral position of the control surfaces.

### Servo and Linkage

Automatic pitch control puts quite some stress on the servo. Therefore, refrain from using a cheap, low quality servo with a pitch controller. Instead, servos should be equipped with metal gears for improved rigidity as well as ball bearings for reduced friction. Linkages should be free from float. Any unnecessary clearance or inaccuracy will reduce effectiveness of pitch control and must therefore be avoided.

### Servo-Throw-Adjustment

The **SPC<sup>2</sup>** allows reduction of servo movement (throw) from 100% to 60%. Adjustment is made simply by pressing the *Neutral* button. Follow these steps for adjustment:

- 1 Connect servo to **SPC<sup>2</sup>** and connect **SPC<sup>2</sup>** to receiver.
- 2 Switch transmitter (Tx) on.
- 3 Press the corresponding control stick on your transmitter to full throw in either direction.
- 4 Press *Neutral* button and keep pressed.
- 5 Power-up receiver and release *Neutral* button as well as control stick.

Servo throw is now reduced to 60%. Repeating this procedure will bring servo throw back to 100%. Press *Neutral* button again in order to ensure that SPC is again set back to neutral servo position.

### Pitch Reverse

Direction of pitch control can be reversed simply by pushing a jumper (supplied) on to the two pins marked ARF on the **SPC<sup>2</sup>** as shown. This might become necessary due to predetermined servo fixture or linkage. After having activated or deactivated manual pitch reverse the **SPC<sup>2</sup>**'s neutral position should be reset as described in *Click to Neutral*.

**Please note:** Pitch reversal does NOT reverse receiver servo signal but direction of pitch control, only. Servo receiver signal must be reversed by the transmitter (Tx) if necessary.

### Automatic Pitch Reverse ARF (optional no. 8454 or 8455)

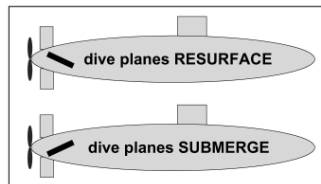
The **SPC<sup>2</sup>** can be fitted with an Automatic Reverse Drive Detection (ARF) which will invert the pitch of the dive planes automatically when the main drive motor runs in reverse. This will work in combination with a brushed as well as a brushless main drive motor.

**No. 8454 Reverse Drive Detection without BEC is used for models using a receiver battery.**

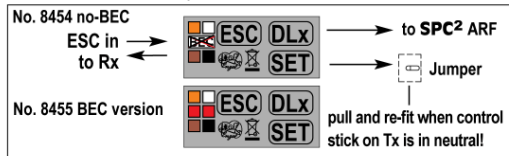
**No. 8455 Reverse Drive Detection with BEC is used for models using NO receiver battery but BEC (Battery Eliminating Circuit) instead by which receiver power is supplied by the speed controller of the main drive motor.**

As soon as the main drive motor draws more than 2V in reverse, the pitch controller will also revert the servo signal, meaning that the **SPC<sup>2</sup>** will keep the model in its horizontal position even in backward motion. For detection of reverse propulsion the two sockets on the **SPC<sup>2</sup>** marked ARF must be connected to the ARF accordingly. Correct polarity on the **SPC<sup>2</sup>** (ARF +/-) must be determined individually.

**NOTE:** Should ARF be active in forward motion (meaning that planes react in inverse manner than illustrated) just reverse polarity simply by reversing the (red) plug of Automatic Pitch Reverse by 180 degrees.



After all connections between **SPC<sup>2</sup>**, ARF, servo, receiver (Rx) and speed controller (ESC) have been made, ensure that control stick of your transmitter is in neutral. Power-up the R/C system and pull jumper on the ARF and re-fit again on to the pins marked SET on the ARF. Now neutral setting of the control stick is memorized by the ARF.



### Dynamic passivation

The more the transmitter stick is moved in either direction, the higher the level of manual control. At about 70% stick movement (depending on transmitter) pitch control is almost inactive. Transmitter signal is then passed on directly to the servo. This ensures that full manual control can be retrieved if required or desired in any situation.

With less transmitter stick movement the **SPC<sup>2</sup>** increases its automatic control of the submarine until it has reached full control with the stick back in neutral.

### Adjustment

The **SPC<sup>2</sup>** is equipped with a potentiometer (*Sensor*) with which the sensitivity can be adjusted. Smaller and faster models require a lower sensitivity. Larger and slower models require a higher sensitivity.

If the poti is turned all the way to the left (anti-clockwise) the sensitivity is "0" meaning that the pitch controller is in its "off position" and therefore not activated.

The pitch controller is preadjusted to a standard sensitivity which works well with most models. A perfect set-up can only be reached by individual readjustment of the poti.

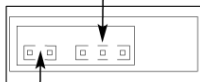
The higher the sensitivity (i.e. the more the poti is turned to the right) the more exact the adjustment. However, this does also increase the possibility of "dolphin-like" behaviour with the model swinging up and down. The optimal sensitivity adjustment lies therefore just below the point at which the model starts swinging.

### Technical Specifications

- Operational voltage: 3.5 - 8.5 V
- Current consumption: 6.1 mA at 5 V receiver battery voltage.
- Maximum voltage for drive motor: 30 V
- Dimensions (length x width x height): 37 x 24 x 7 mm
- Weight approx. 9 g

### FRONT VIEW SPC<sup>2</sup>

Dive Plane Servo



Pitch Reverse



(Jumper)

OR

Reverse Drive Detection (optional)

**WARNING!** This item is not a toy and therefore not suitable for persons under 16 years of age. Please adhere to your country's safety guidelines during construction and operation of this item. We are not liable for any personal injury or damage of any kind resulting with the assembly and/or use of our products as we are neither able to delegate nor verify the assembly and/or use of these items.

24 Month Limited Warranty: The manufacturer of this unit warrants this product to be free from defects in material and workmanship for a period of 24 (twenty-four) months from date of purchase. During that period, we will repair or replace, at our option, any unit supplied through us that does not meet these standards. You will be required to provide proof of purchase (receipt or invoice). Defects

caused by abuse, misuse, or accident, etc. are not covered under this warranty. Under no circumstances will the purchaser be entitled to consequential or incidental damages. If you attempt to disassemble, modify, or repair this unit in any way yourself it may void the warranty. For service or repair please send item post paid and insured to the address stated below. Please ensure adequate and safe packaging.



This symbol indicates that after the service life of this electrical device has ended it must be disposed separately from domestic refuse at your communal waste collection.

