

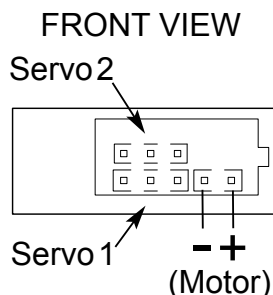
LRpro - pitch controller with sensitivity adjustment from your transmitter

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 **LRpro**'s sensitivity is not adjusted by a switch on the controller itself but via a proportional channel on your transmitter.

The two servo outputs on the **LRpro** allow bow and aft dive planes to be controlled via a single R/C channel. Both servo output channels on the **LRpro** can be inverted accordingly if necessary (refer to section Servo Reversal). Dive plane servo(s) are connected to 3-pole sockets marked as Servo 1 and/or Servo 2.

This kind of dual pitch control might prove beneficial in stabilizing the model or it may not. It mainly depends on type, size and also on velocity of the individual model and is left to your own discretion.



Connecting LRpro to receiver (Rx)

Both connection leads of the pitch controller are plugged into proportional channels of the receiver. The plug marked with a WHITE DOT is used for dive servo control. The second plug is for sensitivity adjustment, only. Once adjustment is completed this wire lead can be detached from Rx leaving this lead vacant afterwards.

Automatic pitch reverse

As soon as the propulsion motor (brushed!) draws more than 2V in reverse pitch control also reverts the servo signal, meaning that the **LRpro** will keep the model in its horizontal position even in backward motion. For detection of reverse propulsion the sockets on the **LRpro** marked - and + must be connected to the motor contact pins accordingly. BEC connector cable no. 9128 is ideal for this. Reverse mode is also indicated by a red LED (Reverse) at the upper right corner of the **LRpro**. Motor polarity indicated on the **LRpro** (Motor - and +) refers to ENGEL submarines with single propulsion motor. For other brands polarity might just be the opposite, and thus, must be determined individually.

Please note for BRUSHLESS MOTOR: If main drive motor is BRUSHLESS an additional module is required for Automatic Pitch Reverse.

This separate module is available in two versions:

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.



Installation & Click to Neutral

Make sure to align the **LRpro** 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 exactly horizontal. This will correspond to neutral position of the **LRpro**. By pressing the Neutral button on the **LRpro** the servos will travel to their neutral position. The servo horns or discs can now be fitted to the servos and the linkages connected which must correspond to the neutral position of the control surfaces.

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(s). This ensures that full manual control can be retrieved if required or desired in any situation without having to search for an "off button".

With less transmitter stick movement the **LRpro** increases its automatic control of the submarine until it has reached full control with the stick back in neutral.

Servo and linkage

Automatic pitch control puts quite some stress on the servo. Therefore, refrain from using cheap, low quality servos 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 Reversal

Direction of rotation of both servos can be reversed by the **LRpro**. This might become necessary due to predetermined servo fixture or linkage. To reverse servo 1 just keep the Neutral button pressed while powering-up the receiver. Repeating this procedure a second time will reverse both servos 1 and 2. Repeat this a third time and only servo 2 will be reversed. A fourth time will set both servos to their original direction of rotation. After having activated or deactivated servo reverse mode the servo's neutral position should be reset as described in *Click to Neutral*.

Servo-Throw-Adjustment

The **LRpro** allows reduction of servo movement (throw) down to 50%. Adjustment is made simply by pressing the *Neutral* button. The actual reduction is indicated by blinking frequencies in groups of three of the red LED.

Follow these steps for adjustment:

① Connect servos to pitch controller and connect pitch controller to receiver. Power-up transmitter and receiver.

② Press one of the corresponding control sticks on your transmitter to full throw in either direction.

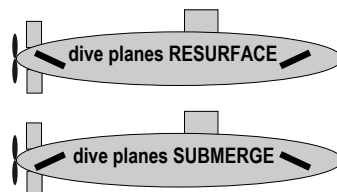
③ Press *Neutral* button and keep pressed. LED shows a single blink (1x).

④ Red LED blinks	1x = 100%	servo movement (default setting)
	2x = 90%	
	3x = 80%	
	4x = 70%	
	5x = 60%	
	6x = 50%	

⑤ As soon as the requested level of reduction is reached, release *Neutral* button and bring control stick back to neutral.

The red LED indicates each level of reduction by a blinking frequency in groups of three and then switches to the next level of reduction by 10%. For switching back to a higher level of movement (e.g. 100% instead of 70%) the reduction procedure must be maintained down to 50% which is then followed by the initial 100% setting (no reduction = full servo movement); the LED indicates this again by single blinking for three times.

NOTE: The dive planes must work against the pitch of the model. If not, the **LRpro** must be rotated by 180 degrees.



On models with dive planes at bow and aft both dive plane pairs must turn inversely to one another as illustrated.

Sensitivity

Sensitivity of the controller's sensor can be adjusted by connecting the second (unmarked) wire lead to a proportional channel of the receiver. The degree of sensitivity determines the amplification of servo throw relative to the model's slope. Default setting is just above 50%. For fast models this amplification must be reduced.

Adjustment

Default setting is at about neutral position of the proportional channel used for adjustment. This will result in full throw of dive planes at a slope of approx. 30 degrees. This complies with most model subs. More precise adjustment, if required, can only be achieved by individual testing. Higher amplification implies more precise adjustment of dive planes. On the other hand, this increases the probability 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 to swing. Exaggerated amplification will inevitably lead to intensification of oscillation with increasing velocity but, in turn, allow stable movement at lower speeds.

Technical Specifications

Operational voltage	3.5 - 8.5 V
Current consumption	6.1 mA (forward) to 8.4 mA (reverse) at 5 V receiver voltage
Propulsion motor voltage	max. 30 V
Dimensions (l x w x h)	approx. 41 x 25 x 9 mm
Weight (incl. casing/cables)	approx. 13 g

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 to your MiniPitchController send it post paid and insured to the address stated on the front page of this manual (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.

