

# Instructions for the ALZRC 3-axis gyro

## 1. Introduction

ALZRC 3GYS is a small, light weight, high-performance 3-axis gyro, for various levels of electric and gas helicopters. It uses a High-performance processor, which can do very fast operations. Its main use is for the control of RC model helicopters, and can be used as a stand alone tail rotor control gyro.

## 2. Specification

Size: 38.2mm \* 26.2mm \* 13mm

Weight: 26g (full metal shell, including cable and plugs)

Operating Voltage: DC 3.5V-9V

Operating Current: 60mA

Operating temperature: -10° to +50°

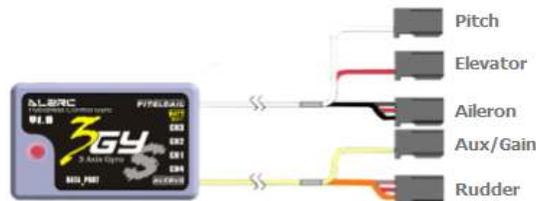
Maximum angular rate: 800 degrees / sec

Support for the rudder servo: 1.52ms analog servo, 1.52ms digital servo, 760us digital servo, 960us digital servo

Support for swashplate servos: 1.52ms analog servos, 1.52ms digital servos

Supported remote control devices: PPM, PCM, 2.4G

## 3. Functions and interfaces



Connections to the receiver

Servo connections: rudder connected CH4, depending on the swashplate type, the swashplate servos are connected to CH1, CH2 & CH3.

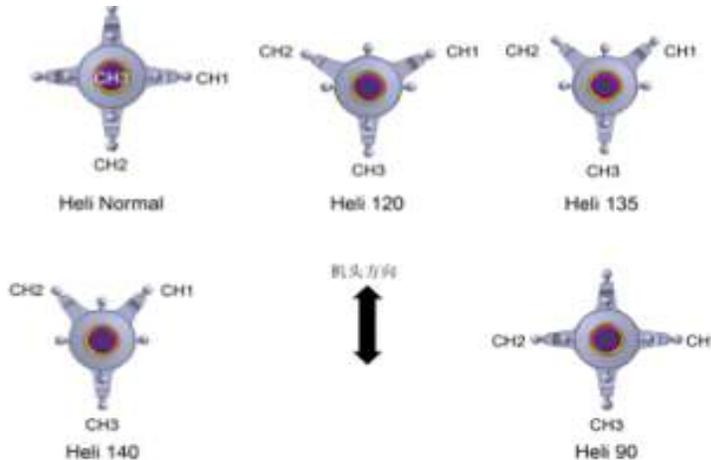
For CCPM 120° (Heli 120) a good place to start is:

CH1: Aileron

CH2: Pitch

CH3: Elevator

Note: Aileron and pitch may need to be swapped around.



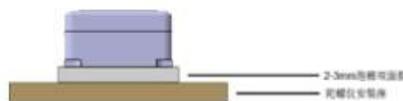
Supported swashplate types

#### 4. LED indications

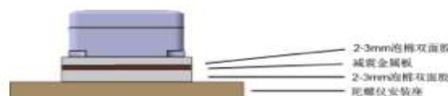
Red light	Working in tail lock gyro mode
Blue light	Working in the non tail lock gyro mode
Red and blue light	Gyro has not received any signal
Red and blue lights flashing	Initialization failed, please keep the gyro still and the rudder stick at center
Red light keeps flashing	Gyro in firmware upgrade mode

#### 5. Gyro installation

- ◆ the gyro should be installed in a vertical or horizontal alignment on a stable platform, as far as possible away from the engine and other electronic devices.
- ◆ the gyro should be installed using double-sided foam adhesive between the gyro bottom and gyro mount. To prevent transferring fuselage vibration to the gyro, make sure the cables are not pulled too tight and that the case does not touch any other helicopter component.
- ◆ when installed in small electric helicopters, use a 2mm or 3mm foam double-sided adhesive pad.

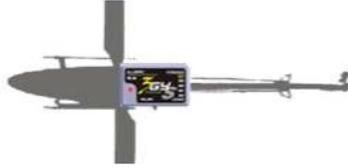


- ◆ when installed in a large helicopter or when there is helicopter vibration, it is recommended to use a metal plate between two foam double-sided adhesive pads.



◆The gyro has three installation directions that can be chosen: 1, 2 & 3

Direction 1:



Direction 2:



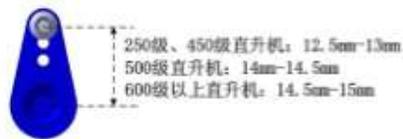
Direction 3:



## 6. Servo arm and connecting rod installation

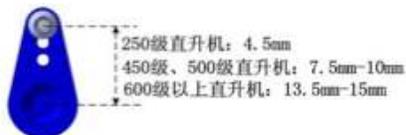
### 6.1 Swashplate servo

- ◆ Firstly, confirm that the rotor head and swashplate mechanical parts are installed correctly, and move smoothly, before being connected to the servos.
- ◆ The proposed position of the ball on the swashplate servo arm is: 250/450 helicopters to 12.5mm-13mm, 500 helicopters to 14mm-14.5mm, 600 level and above to 14.5mm-15mm helicopter



### 6.2 Rudder servo

- ◆ Firstly, verify that tail rotor mechanical parts are installed correctly, and move smoothly, by moving the tail control pushrod by hand.
- ◆ The proposed position of the ball on the tail servo arm is: 250 helicopter to 4.5mm, 450/500 helicopters to 7.5mm-10mm, 600 and above helicopters to 13.5mm-15mm.



- ◆ Temporarily install the tail control rod on the rudder servo arm ball. With the servo arm square to the control rod, adjust the length of the tail control rod for a tail pitch of 8 degrees.

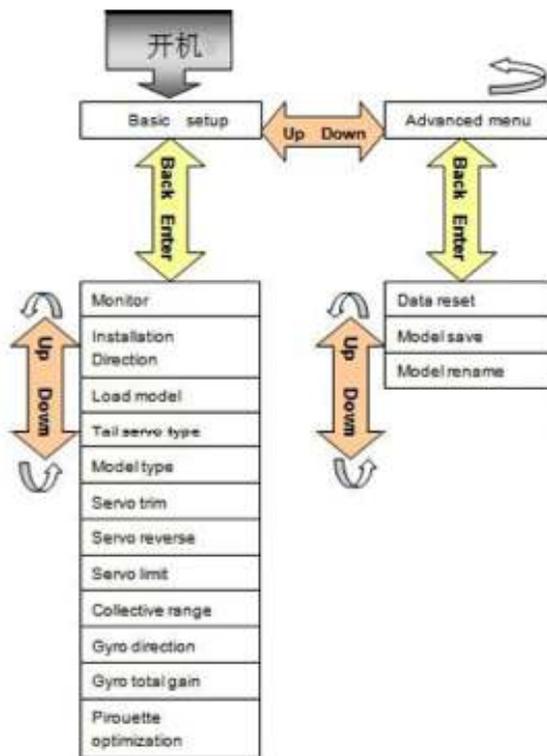


Note: After completion of the above rudder setup, do not connect the rudder servo to the gyro.

## 7. Remote Device Settings

In the transmitter, create a new helicopter model without any mixing functions. Select 1 servo (90 degree) mode (Futaba: H1; JR: 1 servo NORM; Hitec Aurora 9: 1 servo (90°)). For all channels, set the fine-tuning value (Trim) and the internal fine-tuning value (Sub-trim), to zero. Ensure that all swashplate and tail rotor mixing functions are turned off. Initially adjust the pitch curve to be a straight line, from minimum to maximum pitch.

## 8. Programmer menu structure



## 9. Parameter settings

### 9.1 Connection and boot up

Note: Because the servo type has not been selected yet, don't connect any servos at this stage, otherwise they may be damaged.

Turn on the transmitter and receiver.

After power up is complete, connect the programmer to the gyro data port using the data cable.



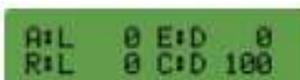
Note the correct orientation of the data cable plug

The programmer will boot and display "ALZRC 3GYS Loading data!". After a successful connection the display will show "Load succeed!", and then displays the first menu "Basic setup".

## 9.2 Monitor

Use the "Monitor" menu to check the transmitter settings are correct.

When the screen shows "Basic setup", press the ENTER key to display "Monitor", and then press ENTER to select it.



The first page shows the 4 signal channels from the receiver

A: Aileron channel, E: Elevator channel, R: Rudder channel, C: Collective channel

To check that the transmitter has all the mixing functions turned off, move each stick separately and check that only the corresponding channel changes and the remaining channels remain unchanged.

Adjust all the transmitter channel directions, so for example, the rudder stick "R", shows "L" when the stick is moved to the left and "R" when moved to the right. Note that "U" (up) is stick up and not up elevator.

Position the throttle at mid stick and adjust all four channels on the monitor display so the value shows 0. This is done by using the transmitters internal fine-tuning (commonly known as Sub-trim). Look for the direction letter changing for absolute center.

When each of the sticks are moved to the limit (up, down, left and right), ensure that the value displayed shows 100. If not, adjust the corresponding channels end point adjustment (EPA) until it does read a value of 100. Control sensitivity can be changed later with dual rates and expo.



Examples of stick travel where the value should read 100. Also note the "L", "R", "U" & "D". Press the DOWN/DATA- key to select the second page, showing the transmitter channel gain signal and the gyro parameter set currently in use:



"G" indicates the transmitter gain channel value is displayed; "A" indicates tail lock gyro mode (heading hold); "N" indicated non locked gyro mode (rate); "Condition:" current gyro parameter set. For each gyro there are two sets of parameters to choose from. Here the value is just shown, and cannot be changed.

A gyro mode switch should be setup in the transmitter to change between locked tail and non lock tail mode. The following table is a list of major transmitter brands showing the suggested values that should be uses.

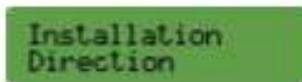
	非锁尾模式		锁尾模式		
陀螺仪实际感度 (在编程器的 monitor 菜单显示)	100	93	0	96	100
Futaba 陀螺仪菜单	85%		0%		85%
Futaba Endpoint	100%		0%		100%
JR/Spektrum 陀螺仪菜单		0%	51%	100%	
JR/Spektrum Endpoint	104%		1%		108%

After transmitter setup, set the switch to the tail locked mode position. After the "G:" an "A" should be displayed. Toggle the switch to the non-locked mode position, it should show "N", if setup correctly. It is recommended to initially set the transmitter so that the display shows a gain value close to 36. This can be adjusted later after the tail behavior has been monitored during flight.

When finished, press the BACK key to return to "Monitor".

## 9.2 Gyro installation position selection

When the screen shows "Monitor", press the DOWN/DATA- key to display "Installation Direction", and then press ENTER to select it.

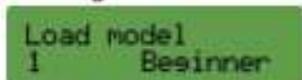


Installation  
Direction

Select one of the three orientation modes for the gyro (shown earlier in the manual), to match the actual installation in the helicopter. When finished, press the BACK key to return to "Installation Direction".

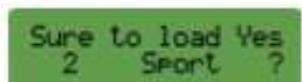
## 9.3 Download model data stored in the programmer to the gyro

When the screen shows "Installation Direction", press the DOWN/DATA- key to display "Load model". Press ENTER, then press UP/DATA+ or DOWN/DATA- keys to select one of the ten models, in which 1-5 are a factory pre-existing set of model parameters, and 6-10 are reserved for 5 sets of user's own parameters (see instructions on using the programmer's Model save and Model rename, in the Advanced menu). It is recommended to starting with model parameters 1-5. Select the desired feel you require, for example "Beginner", "F-3C", "Soft 3D" etc.



Load model  
1 Beginner

When you have selected the model data to download, press ENTER. The following menu will appear on the display.

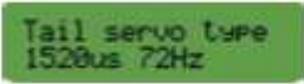


Sure to load Yes  
2 Sport ?

When the "Yes" is flashing, press the UP/DATA+ key next to the "Yes". The selected model data will be read from the programmer and sent out to the gyro. When the download is complete, press the BACK key twice to return to "Load model".

## 9.4 Rudder servo type selection

When the screen shows "Load model", press the DOWN/DATA- key to display "Tail servo type", and then press enter to select it.



Tail servo type  
1520us 72Hz

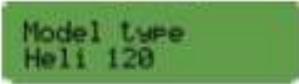
There are five types of servos to choose from:

- ◆ "1520us 72Hz" all the servos are analog servos
- ◆ "1520us 250Hz" broadband digital rudder servo is a servo (Futaba S9253, S9254, S9257, etc. and some of the common digital servos). Main rotor servos are analog servos
- ◆ "1520us 333Hz" broadband digital rudder servo is a servo (Futaba S9253, S9254, S9257, etc.). Main rotor servos are broadband digital servos
- ◆ "760us 400Hz" rudder servo is a narrowband digital servos (Futaba S9251, S9256, BLS251, MKS DS8910, BLS980). Main rotor servos are broadband digital servos
- ◆ "960us 333Hz" rudder servo is a digital servo (LogicTech6100G, 3100G, Hitec5083MG). Main rotor servos are broadband servos

Use the UP/DATA+ or DOWN/DATA- keys to select the required servo type. When finished, press the BACK key to return to "Tail servo type".

## 9.5 Model type selection (helicopter swashplate type selection)

When the screen shows "Tail servo type", press DOWN/DATA- key to display "Model type", and then press ENTER to select it.



Model type  
Heli 120

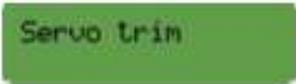
There are five swashplate types to choose from: "Heli 120", "Heli 135", "Heli 140", "Heli 90" & "Heli Normal". These are shown earlier in the manual. For example, for helicopters with 120 degree CCPM, select "Heli 120".

Use the UP/DATA+ or DOWN/DATA- keys to select the required swashplate type. When finished, press the BACK key to return to "Model type".

You can now connect the servos to the gyro, but do not install the servo arms.

## 9.6 Servo tuning

When the screen shows "Model type" press DOWN/DATA- key to display "Servo trim", and then press ENTER to select it.



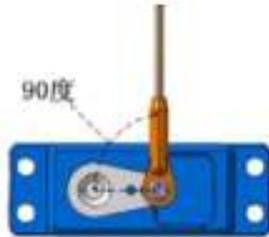
Servo trim



Servo 1:  
-10 <<<

Switch the gyro mode switch, setup earlier, several times quickly, to re-initialize the gyro, and then leave the switch is the non locked tail mode (rate). Set all transmitter sticks to the center position. Now fit the servo arms.

Adjust the swashplate servos "Servo 1", "Servo 2", "Servo 3" value, so that all the swashplate servo arms are level and the rods are vertical. Then adjust the servo arm to the swashplate pushrods, so that the swashplate is level. Now adjust the blade arm pushrods for zero degrees pitch.



Adjust the rudder servo "Servo 4" value, so that the rudder servo arm and tail rotor control rod are at right angles to each other.



Adjust the length of the tail rotor control arm for approximately 8 degrees of pitch.

When finished, press the BACK key to return to "Servo trim".

## 9.7 Servo reversing

When the screen shows "Servo trim", press the DOWN/DATA- key to display "Servo reverse", and then press ENTER to select it.



Move the throttle stick up and down and check that all of the servos move in the same direction and that the ailerons and elevator also operate correctly. If not, adjust the "Servo 1", "Servo 2", "Servo 3" symbol. It may sometimes be necessary to swap the aileron and pitch servo plugs. Don't worry about the collective direction, at this stage.

Move the rudder stick and check that the tail moves in the correct direction (stick to the left, the tail pitch changes to move the nose of the helicopter to the left; stick to the right, the tail pitch changed to move the nose of the helicopter to the right). If not, change the "Servo 4" symbol to reverse the direction.

Note:

- ◆ See the "Main rotor collective pitch direction and range" menu for reversing the collective.
- ◆ Be careful when moving the rudder stick as the tail limits have not yet been set and the servo may try to drive the tail past it's limits.

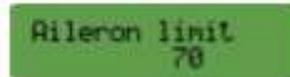
When finished, press the BACK key to return to "Servo reverse".

## 9.8 Servo position adjustment limit

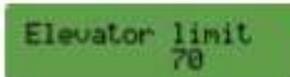
When the screen shows "Servo reverse" press the DOWN/DATA- key to display "Servo limit", and then press ENTER to select it.



Move the rudder stick to the full left and right position, and adjust the "Tail limit A" and "Tail limit B" so that the maximum travel is used without any binding at the limit. Press ENTER to change the limit and BACK when finished.



Move the Aileron stick full left and right, and adjust the "Aileron limit" to ensure the swashplate is at no point jammed and stalling the servos.

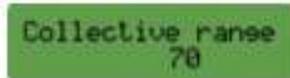


Move the Elevator stick full up and down, and adjust the "Elevator limit" to ensure the swashplate is at no point jammed and stalling the servos.

When finished, press the BACK key to return to "Servo limit".

## 9.9 Main rotor collective pitch direction and range

When the screen shows "Servo limit", press the DOWN/DATA- key to display "Collective range", and then press ENTER to select it.

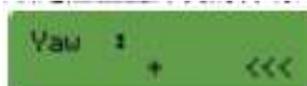


Move the throttle stick to the top and check the collective moves in the correct direction. If not, change the Collective range to a negative number of the same value. Check the collective for the required pitch with the use of a pitch gauge, and adjust the range (-125 to 125) until this is achieved. This is usually between 10 and 12 degrees. Check for equal pitch in both directions. If they are not the same, then recheck the servo trim, transmitter end points and that the Tx pitch curve is straight, from minimum to maximum pitch.

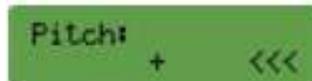
When finished, press the BACK key to return to "Collective range".

## 9.10 Gyro direction

When the screen shows "Collective range", press the DOWN/DATA- key to display "Gyro direction", and then press ENTER to select it.



Switch the tail to locked tail mode. Rotate the helicopter and check the movement of the tail pitch. The tail pitch should change in the opposite direction, as if to stop the rotation. If it does not, then change the "Yaw:" symbol.



Pick up the helicopter and pitch the helicopter forwards and backwards. The swashplate should try to remain level (pitch forward, swashplate moves backwards; pitch backwards, swashplate moves forwards). If the reverse happens, change the "Pitch:" symbol.

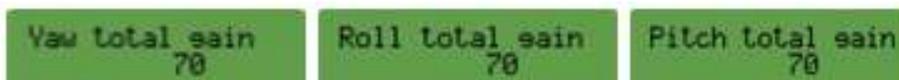


Pick up the helicopter and roll the helicopter to the left and right. The swashplate should try to remain level (roll left, swashplate moves to the right; roll right, swashplate moves to the left). If the reverse happens, change the "Roll:" symbol.

When finished, press the BACK key to return to "Gyro direction".

### 9.11 Total gyro gain adjustment

When the screen displays "Gyro direction", press the DOWN/DATA- key to display the "Gyro total gain", and then press ENTER to select it.



"Yaw total gain:" tail rotor total gain, "Roll total gain:" aileron total gain, "Pitch total gain:" elevator total gain. For the first flight, these values should be left as the default. If the helicopter drifts in the hover, increase the roll and pitch gain. If the helicopter oscillates in the hover reduce the roll and pitch gain. Usually the yaw total gain is left at the default (100) and adjustments are made in the transmitter.

Note: The default values are 100 for yaw and 40 for roll and pitch.

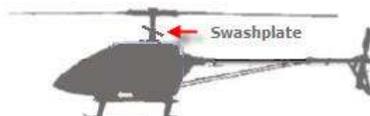
After setting, press the BACK key to return to "Gyro total gain".

### 9.12 Rotation direction setting optimization

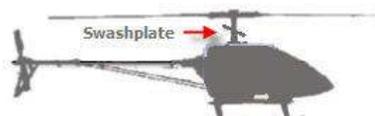
When the screen shows "Gyro total gain" press the DOWN/DATA- key to display "Pirouette optimization", and press ENTER to select it.



The swashplate will tilt at an angle. Note the direction of the swashplate. Rotate the tail of the helicopter, making sure the programmer does not become disconnected. During the rotation the swashplate should continue to point in the same direction, as the needle of a compass would do if you rotated the compass body. If the swashplate does not maintain in the same direction, change the direction symbol and try again.



Rotate the tail. The swashplate should still be tilted in the same direction.



When finished, press the BACK key to return to "Pirouette optimization". The swashplate will return to neutral. The 3-axis gyro adjustments are now complete. In the transmitter, you can now set the throttle and pitch curves, dual rates and expo, to your preferred flight settings.

It's now time for the test flight...

## 10. Flight Notes

- ◆ Always do regular inspections of the mechanical structure of the helicopter, checking for loose screws and mechanical parts that are badly worn.
- ◆ Always check before each flight that the helicopter's mechanical movement is smooth.
- ◆ If during the initialization, the body is not kept still or the rudder stick is moved, then gyro drift may occur. While keeping the body stationary and the rudder stick still, quickly switch the gyro tail mode switch, a few times, from locked to non locked mode. This will re-initialize the gyro and eliminating the drift. If after initialization the red and blue lights are flashing, move the rudder stick to the left, to restart the initialization.