

Stabilizer H4

1. FOREWORD

The **Stabilizer H4** is a completely innovative electronic device, so please read the [whole](#) manual before installing and using it.

Thank you for purchasing the **Stabilizer H4**! The **Stabilizer H4** is warranted to be free of manufacturing defects for 2 years from the date of purchase. Also anyone who is dissatisfied with it or is unable to make it work and has bought the unit directly from **GENERAL LASER** will be cheerfully refunded the purchase price, if the **Stabilizer H4** is returned to us within 30 days of the purchase date.

Stabilizer H4 is a patented, compact, lightweight, easy to install 2-axis flight stabilization system (Roll-cyclic and Pitch-cyclic-function) developed for model helicopters and is based on the analysis of infrared datas in a spectral area, where the composition of the ground (grass, water, asphalt, snow etc.) and the solar radiation are almost not relevant. **Stabilizer H4** gets connected between the rc-receiver and the Pitch-cyclic- and Roll-cyclic-servos.

The **Stabilizer H4** functions only outdoor properly, an indoor-use is impossible.

Stabilizer H4 works in almost all weathers, on day and night. Light or direct solar radiation into the sensors have no influence. The system does not perform well (or even at all!!!) in low stratus, heavy fog, smog, when it is raining or in snow shower. The infrared horizon has to be straight / near to straight or simmetrical. In even or in a slightly hilly site, also in a valley between two mountains it will perform well. Among building or in a forest between the trees the **Stabilizer H4** will work after the helicopter is above the houses / trees (usable infrared horizon). If the helicopter is above inclined plane, or in a flat country site, but close to high hill/ big building, the infrared horizon is not symmetrical and the helicopter will drift from the hill/building away. The wind direction has no influence on the stabilization, but the helicopter will drift with the wind, if the pilot does not control against the wind.

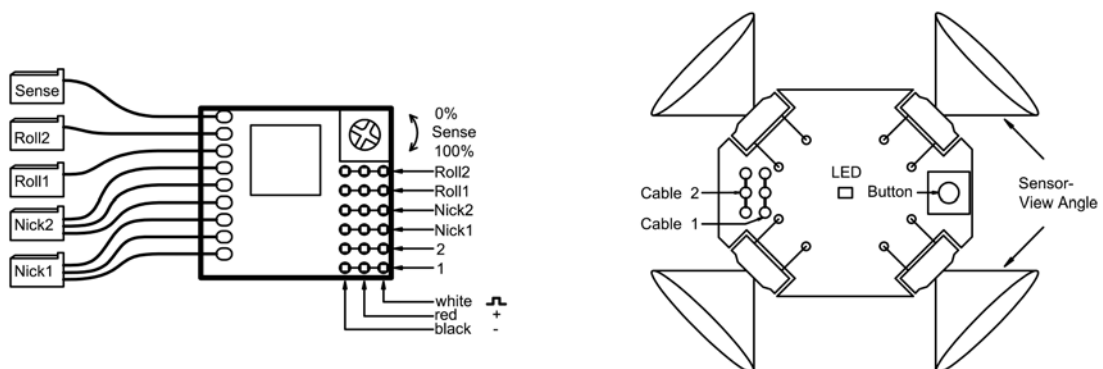
2. FEATURES

- Stabilizes normal flight. (For normal- and inverted-flight stabilisation look at the **Stabilizer 3D-H4**)
- For helicopters with and without flybar, also for multi-bladed systems, for aerial photography helicopters, as learning aid for beginners, as assistance for advanced and as „emergency switch“ for specialist.
- Compatible with all **Futaba PPM**-receivers, all **Futaba PCM 1024** and **Futaba PCM 2048 G3**-receivers, with all **JR/Graupner PPM**-receivers and all **JR/Graupner SPCM**-receivers.
- Compatible with analog and digital servos.
- Sensibility can be set from the transmitter or from the control-unit trimmer.
- For **4-Servos-90° H4** CCPM swashplates. Not compatible with 2-Servos-90° and 3-Servos-120° swashplates. Swashplates with 2 or 3 servos **are not supported**, trying to control such systems will cause mechanical or electronic damages!!! (For H1-90° and HR3-120° swashplates with 2 or 3 servos there is another **Stabilizer 3D** -version available since 2005).
- Only for outdoor use.
- Compact and lightweight.
 - Control unit 22 x 25 x 8mm, 11g
 - Sensor unit 28 x 34 x 9mm, 16g
- Current draw max. 20 mA, operating voltage 4V to 10V.

3. SCOPE OF DELIVERY

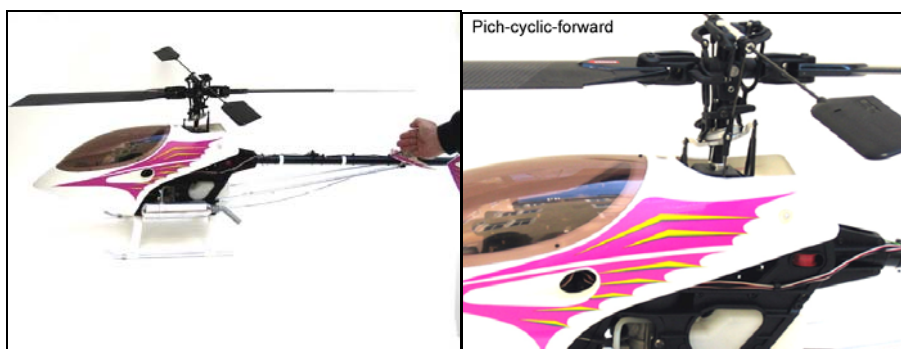
- Control unit with ca. 10cm long servo cables.
- Sensor unit with ca. 25cm. long servo cables, pushbutton, LED and 4 sensors.

4. INSTALLATION



Note: „Nick-“ stays for „Elevator-“ or „Pitch-cyclic-“; „Roll-“ stays for „Aileron-“ or „Roll-cyclic-“; „Sense“ stays for the sensitivity.

1. The model helicopter must be mechanically and electronically rightly set, before you install the **Stabilizer H4**.
2. Disconnect the two pitch-cyclic servos and the 2 roll-cyclic servos from the receiver.



Pic.3

The servo-reverse is made in the setup-mode by pitch-cyclic- and roll-cyclic-commands from your transmitter.

1. Your transmitter must be programmed for unturned swashplates (0°) or for swashplates turned under -45° or +45°. In case your swashplate is turned under another angle, than -45°, 0° or +45°, you have to program nevertheless the transmitter for -45°, 0° or +45° for the time you make the servo-reverse. After the setting is done, you must reprogram the transmitter again for the actual angle your swashplate is turned on. If your swashplate is turned under -45° to -23°, than program the transmitter for -45°. If your swashplate is turned under -22° to +22°, than program the transmitter for 0°. If your swashplate is turned under +23° to +45°, than program the transmitter for +45°.
2. Switch the transmitter on.
3. Set the Pitch-collective joystick in middle position, Pitch-cyclic and Roll-cyclic should be from alone in their middle position.
4. Push the button on the sensor unit and hold it pushed down.
5. Switch on the receiver, hold for min. 5sec the button pushed and than release it. The LED will flash twice 3-times (two triplets) with pauses and then will light up permanently. You are now in the setup mode for the servo reverse.
6. Give a full "pitch-cyclic-forward" command and let the joystick return to the neutral position.
7. The LED will flash 2-times and will light up permanently.
8. Give a full "roll-cyclic-right" command and let the joystick return to the neutral position.
9. The LED will flash 2-times and will no more light .
10. Switch off the receiver, the settings will be permanently saved.
11. Reprogram the right swashplate angle values in the transmitter, in case your swashplate is turned under another angle, than -45°, 0° or +45°.
12. Switch the transmitter on, switch the receiver on, set the Sense to +100% from the transmitter or from the on board trimmer, activate the **Stabilizer H4** by giving a short Pitch-cyclic- or Roll-cyclic- command and test, if the Servo-Reactions are right . If so – you may now mechanically connect the disconnected servo to the washplate.

The servos must react, as in the first paragraph of 5.1. described.

5.2. Sense

1. If there is a free channel on transmitter and receiver, you can connect the Sense cable to this channel and change the Sense of the **Stabilizer H4** during the time you are flying (0% - channel middle, no stabilisation; +100% - max. stabilisation.) The area from -100% to 0% is used for horizon calibration in the air and have to be used only if explicitly desired, no corrections from the **Stabilizer H4** are mixed to the commands of the pilot in that Sense range. This is a good way to set the proportion of the influence of **Stabilizer H4** during the flight.
2. For 3D flight the Sense of the **Stabilizer H4** must be reduced from the set value (for example +65%) with increasing Roll- and/or Pitch-cyclic- commands. Otherwise the electronics will always try to keep the helicopter in horizontal position. This is achieved by programming of two mixers in the transmitter, so with greater Roll- and Pitch-cyclic- commands the Sense gets reduced to 0% (!!!Attention, not negative values allowed! At under -75% you get a new horizon calibration!). This two mixers are not obligate, but recommended.
3. If the Sense cable is not connected, the Sense will be read from the on board trimmer.
4. Like well known from the Gyros, if the Sense is set too high you can get an over-reaction of the stabilisation. In that case just reduce slightly the Sense. Especially models without flybar have a direct control and need in the most cases much lower corrections than helicopters with flybar (with Bell-Hiller-Mixer). In these cases the Sense shouldn't vary up to 100% (for example only from 0% to 50%). It is recommended to start with Sense 10% and step by step set it higher, till you achieve the wished stabilisation.

The +/- directions of different transmitters may be different, in some cases you may have the full Sense at -100% and the horizon calibration at +100%. In that case you can make a servo-reverse to set the desired + direction correctly.

6. CALIBRATION AND FLYING

A horizon is necessary before the first flight, after mounting the **Stabilizer H4** on your helicopter. Once the horizon is rightly calibrated, you don't need to calibrate again.

6.1. Pre-Flight Check

1. Test before every flight with Sense set to 0%, if your commands to the swashplate are right.
2. Set the sense to the position you want to fly with (min 25%) and check with your hand, if the corrections of the **Stabilizer H4** are right.

If the servo directions are correct, the swashplate will tilt only to the "pitch-cyclic-forward" of the helicopter, when you hold your warm hand behind sensor unit (Pic.2.). If you hold your hand or something hot in front of the sensor unit, the swashplate must tilt only to the "pitch-cyclic-backward". Holding your warm hand in front of the left side of the sensor unit will cause a tilt of the swashplate only to the "roll-cyclic-right" (Pic.3.). If you cover the right side of the sensor unit, the swashplate will tilt only to the "roll-cyclic-left". For all swashplates **only pitch-cyclic- and roll-cyclic-corrections** will occur, if the **Stabilizer H4** is correctly set, **never occur pitch-collective-corrections**. Only in case that works this way you may fly!!!

6.2. Horizon calibration on the ground, especially for beginners

1. The helicopter must be horizontally on the ground, houses, trees and cars must be at least 10m away from the helicopter.
2. Switch the transmitter on.
3. Switch the receiver on.
4. The red LED must flash in single pulsed mode.
5. Push shortly the button on the sensor unit and release it.
6. The red LED will flash 10 sec. In this time you have to go away from the helicopter to min. 5m and stay exactly behind it or exactly in front of it. In this way you are staying between the sight fields of the sensors and allow a precise calibration.
7. Right after the last LED flashing the system calibrates. The values get permanently saved in the memory and the LED lights up permanently.
8. The **Stabilizer H4** is ready for use, you can make the Pre-Flight-Check and can fly.

Another possibility to calibrate is, instead of doing the points 5,6 and 7, just to go away from the helicopter and set the Sense channel to -100% shortly – that's it. The horizon calibration happens only once in the moment when the Sense has reached -100%. To make a new horizon calibration you need to set the sense to 0% back and than again to -100%.

If on your landing field you have an asphalt – beton – grass – snow ground, it is better to calibrate over the coldest surface (above is the gradation from warm to cold).

Tip: In normal hover position the helicopter is (mostly) slightly inclined, because the rear rotor of the most helicopter models is not in the plane of the main rotor. To calibrate on the ground under the same angle you hover, you can do the following:

1. Incline slightly the helicopter on the ground (~2°) on the side it is inclined when hovering, try to reach the same angle as in flight and make the calibration.
2. You can also let the helicopter horizontally on the ground, but trim the Roll to the opposite side as hovering. After you calibrate, set the trimmer in neutral position again.
3. If you do not follow these tips, the helicopter will drift slightly in flight and you must trim against that. A rightly set helicopter must hover with and without stabilisation without retrimming.

6.3. Horizon calibration in the air, during the flight

1. Control the helicopter in stabile hover position, not away from you and in height 2-4m, so you can see the aircraft is not drifting and also see the ground as reference.
2. Move the sense channel to -100% shortly.
3. In the moment you have reached Sense -100%, the horizon position is saved.
4. Put the sense to the position you want to fly with.

You can repeat the points 2. to 4. as long as you want. To calibrate the horizon again you just need to set the Sense back to 0% and again to -100%.

6.4. Flying without calibration

1. Switch the transmitter on.
2. Switch the receiver on.
3. The red LED must flash in single pulsed mode.
4. Wait for 5 sec. (systemcheck) and than give a Roll- or a Pitch-cyclic- command. The last saved calibration values get adopted.
5. The red LED starts lighting up continuously.
6. The system is ready, after the Pre-Flight-Check you can fly.

7. GENERAL INFORMATION

1. On **Futaba PPM** and **Futaba PCM 1024** the **Sense** must be on channel 7. When using **Futaba PCM 2048 (G3)** the Roll2 channel (originally 5) must be copied on channel 7 or 8. That means the Roll2 cable from the control unit must be connected with channel 7 or 8 on the receiver, the **Sense** must be connected with channel 8 or 9. On **JR/Graupner PPM and SPCM-receivers**, the **Sense** must be on channel 7 or 8.
2. For 3D flying you can program in the transmitter two mixers for the Sense, look above.
3. In critical situations you can just let Roll and Pitch-cyclic- on neutral, just control Pitch-collective, the rest makes the **Stabilizer H4**, the Sense should be on 40% or more.
4. Some advanced pilots can use the **Stabilizer H4** just as an emergency exit in case of gyro failure, motor failure, lost sight to the model and so on.
5. The Sense can be set also on a three position switch (instead of trimmer). For example:
 - 1- position – calibration in the air, -100% Sense
 - 2- position – 0% Sense, the pilot commands are just conducted to the servos
 - 3- position – stabilisation needed for flying, from 0% to +100%
6. Some pilots use also two-position switch for the Sense:
 - 1- position – calibration in the air, -100% sense.
 - 2- position – 0% Sense, the pilot commands are just conducted to the servo.The pilot takes off with 0% Sense, when the helicopter is hovering horizontally, the pilot switches shortly to Sense -100% and back to 0% and than lands. Than the pilot programs the two-position-switch in the transmitter again:
 - 1- position – 0% Sense
 - 2- position – the % Sense you want to fly with, from 0% to +100%.
7. Cleaning of the sensors: with cotton-sticks or cotton tissue and alcohol.
8. It is recommended to make the first few flights with Sense ca. 50% for helicopters with flybar to get familiar with the **Stabilizer H4**. For helicopters without flybar are 20% for the beginning recommended.
9. On our homepage www.general-laser.at you can find under FAQ and Newsletter tips, updates and additional information about our products.

RC Type	Receiver Output Channels											
	Swashplate Type											
	<i>Stabilizer and Stabilizer 3D</i>						<i>Stabilizer H4 and Stabilizer 3D-H4</i>					
	H1 - 90°			HR3 - 120°			H4 - 90°					
	Nick	Roll	Sense	Nick	Roll1	Roll2	Sense	Nick1	Nick2	Roll1	Roll2	Sense
JR/Graupner PPM	3	2	7,8	3	2	1	7,8	3	5	2	1	7,8
JR/Graupner SPCM	3	2	7,8	3	2	1	7,8	3	5	2	1	7,8
Futaba PPM	2	1	7,8	2	1	6	7,8	2	8	1	6	7
Futaba PCM1024	2	1	7,8	2	1	6	7,8	2	8	1	6	7
Futaba PCM2048	5	4	7,8	5	4	7	8	4	6	3	7,8,	8,9
Multiplex Royal Evo 7,9 und 12	Leave 1 channel or more unused between Nick, Roll1, Roll2 and Sense, for example, use only even channels. For example right is: 1,4,6,9. Example for wrong: 1,3,6,7.							Not supported.				
Another PPM	Each combination is possible.							Not supported.				

8. FAILSAFE

1. Trim the helicopter in stable hover position.
2. Calibrate the horizon.
3. The helicopter should hover without your aid.
4. Trim the motor so, that the helicopter is slowly sinking and landing.
5. Chose from the transmitter the function Failsafe and save all the datas for Nick, Roll, Tail, Pitch, Motor, Gyro and **Stabilizer H4** Sense.
6. On the most transmitters you just have to push SET.
7. In case of Failsafe, your helicopter will sink slightly and land.

9. WARNING

A model helicopter is not a toy, it can cause serious injuries and property damages. Mistakes in building and piloting of the helicopter can lead to extremely dangerous situations.

We can not control our customers for the proper use of the **Stabilizer H4** and do not carry any responsibility for any damages of property and material, and also for any injuries of persons and animals.

Stabilizer H4 is a product of



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