en/FailSafe

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1 Prolog

The **FailSafe**-Function is an additional safety feature for the MikroKopter.
If there is a loss of the receiving signal the Kopter will not crash with the correct set up functions,
but flies back automatically into the direction of the Homeposition (Start position) and also into the range of receiving.

Important:

So that you can use this function the used receiver must display the loss of the received signal.

Wether the used receiver is indicating that you can determine easily as follows:

- Receiver is connected to the FlightCtrl.
- Transmitter and copter are switched ON (supplied with voltage).

If the transmitter will be switched OFF now:

1. the red LED on the FlightCtrl must light and
2. the buzzer must give a warning signal as you can hear here: Link.

After you switch the transmitter ON again the warning signal disappears and the red LED is OFF.

If this case you can use the FailSafe after some settings that are described below.

IMPORTANT

Before using the FailSafe-Function it is necessary that the user clarifies wether such a mode of operation is permitted in the country / to the respective site or by legal, insurance or other terms.

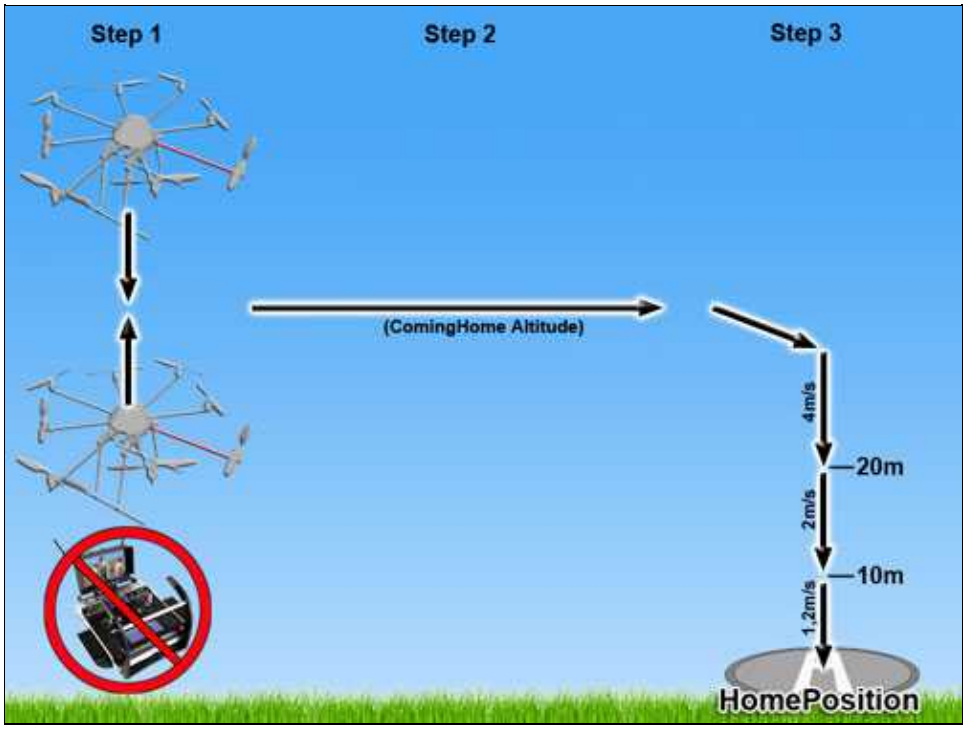
The **FailSafe**-Function can be used only if a GPS-System is available on the Kopter and a Sat-Fix is present!

2 The function

A loss of a signal can have different sources. You fly out of the range of the transmitter/receiver or the battery has a low voltage and fails, etc.

If the MikroKopter detects a loosing signal the FailSafe-Function will be active for the time you set under "Failsafe CH time" (Link). In this time the following functions will run:

- First at all the function "PositionHold" will be activated for 5 seconds and the Kopter climbs/falls to the preset "ComingHome Altitude". (note: only if the distance from the starting point is >25m)
- After the 5 seconds the function "ComingHome" will be automatically activated and the Kopter flies back into the direction of the Homeposition (Start Point).
  (If the set altitude shouldn't have been reached within the first 5 seconds increases or decreases the Kopter its altitude during the flight back.)
- If the signal restores again a normal control is possible.
- If the signal is not restoring at that time the Kopter will fly back to the Homeposition, goes down and tries to land (see below 'landing speeds').
- For the way back and the descent / landing to the Homeposition the left set time are available.



If the 60sec. are used up because of a to great distance or altitude to the homepoint, the pre-defined "EMERGENCY-Gas/Throttle" will be switched on automatically.
The Kopter will go into a descent with the set up values for "EMERGENCY-Gas/Throttle Time" and "EMERGENCY-Gas/Throttle".

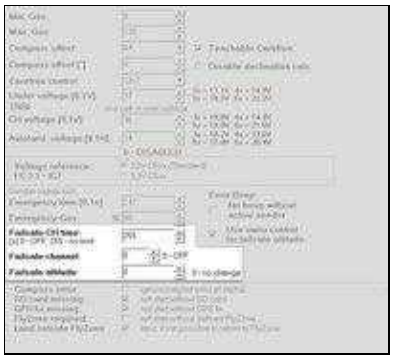
IMPORTANT

If **no** "Failsafe CH time" has been entered in the settings, the Kopter will directly go down with the emergency-gas and emergency-time settings

3 Security

Failsafe with reception failure at the start point will be suppressed if the throttle stick has been on ZERO for about 1,5 seconds before (40m radius and 15m altitude). It will be switched now to Min-throttle instead. That should cover the following scenario: The MK will be landed close to the start place and the pilot switches off the transmitter accidentally (the motors are still running). In older versions the MK started again under circumstances.

4 The settings



INFO: The settings can be found in KopterTool under the tab **Misc**.

If the tab is not visible you have to activate the **Expert view**.

To use the "FailSafe"-Function you need to set this 3 Step's:

4.1 Step 1

Setup of the **FaliSafe Altitude**.

The altitude can be entered in the settings under "Misc" -> "FailSafe Altitude":
(INFO: if you use an older software the "ComingHome altitude" (set under "EasySetup") this altitude is also the FailSafe altitude)

Here you can enter the altitude in which the Kopter, in case of a lost signal, flies back.
This altitude will be used not to fly into i.e. houses, trees, bushed etc. during an automatical back flight.

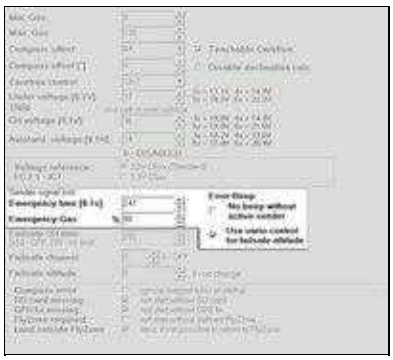
4.2 Step 2

Setup of the **Failsafe CH time**.

This "FailSafe"-Time will be entered under "Failsafe CH time" (adjustable to observe legal regulations).

In this setting you enter the time for the Kopter which is maximal available for the function "FailSafe".
User without license can enter here "60" for max. 60 Seconds.
With license you can enter here up to 254 (seconds) or disable the limit with 255.
During this time the copter flies back to the home position.

4.3 Step 3



Setup of **EMERGENCY-Gas/Throttle Time** and **EMERGENCY-Gas/Throttle**.
(is active after the FailSafe time is over)

For information: The whole Emergency-Gas/Throttle-regulation will be only active if a gas/throttle value of >40 and for at least 4 seconds has been exceeded, that means the Kopter probably flies!

If the "FailSafe"-Time has been elapsed and the Kopter is still in the air the **EMERGENCY-Gas/Throttle Time** and the **EMERGENCY-Gas/Throttle** will be active.
This setting works also immediatly if no "ComingHome Altitude/height" has been entered.

Point 1: EMERGENCY-Gas/Throttle Time
The "EMERGENCY-Gas/Throttle Time" determines the term of the EMERGENCY-Gas/Throttle function. After that time the engines turn off automatically.
Here you can enter maximal "247" = 24,7 Seconds.

Point 2: EMERGENCY-Gas/Throttle
Here you can set the speed for the descent flight of the Kopter.
(Only valid for the "EMERGENCY-Gas/Throttle"-function, not for the function "FailSafe". Here the speed for the descent flight will be determined automatically.)

You can enter here either way a fixed value which depends on the weight of the Kopter. That must be determined before.
Or you use the "Automatic" and activate the entry "Use vario control for failsafe altitude".
ATTENTION: If you activate this entry a percent-sign (%) appears before the entry "EMERGENCY-Gas/Throttle".

Now you can enter here a percent value of the needed hovering-gas/throttle. If you enter here a "100" for 100% the Kopter would hover instead of turning into a descent flight.
A little bit smaller value should be entered here.
ATTENTION: The smaller the value the faster descent the Kopter. With a value i.e. of 80% the Kopter comes down pretty quick.

4.4 Landing speed in failsafe case

Since firmware-Version FC 0.91 you can set under **Altitude** a landing speed for auto-landing. This landing speed is also used for emergency landing in failsafe-case (RC-Lost).

example setting



Procedure in the case of failsafe is:

- go to CH-Altitude (defined in the sample to 30m) and stay for 5 seconds on that position (PH)
- fly home (usually the speed is 7-8m/sec)
- at home point go down:
    - ♦ descend 4m/sek until altitude of 20m
    - ♦ descend 2m/sek until altitude of 10m
    - ♦ use the 'landing-speed-Setting' for the last 10m for descending

This procedure above may take 60 second (what you set as failsafe-time). After this time the MK uses the "emergency-gas" for the set time:

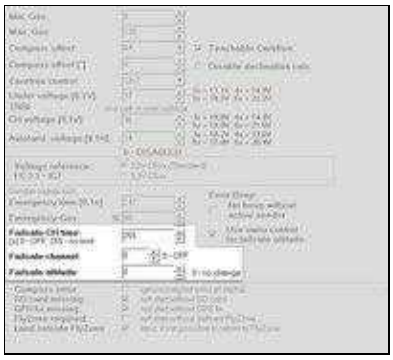
- motor to emergency-gas for the selected time (in my example 85% hoovergas for 9 seconds)

If the RC-Signal comes back within the procedure, the failsafe is cancelled an the MK is back under RC-control.

5 Video of the FailSafe

⚠ **ATTENTION**: PLEASE DO NOT IMITATE! If you switch OFF the transmitter the Kopter is inevitably NOT UNDER CONTROL and can crash! To switch ON the transmitter can take a few seconds.

6 FailSafe Channel



The function **Failsafe channel** can be used for two Applications.

6.1 Application 1: FailSafe testing - simulating a reception failure

The FailSafe function will normally only work when the signal between transmitter and receiver is lost.

This can e.g. happen when:

- you fly out of range
- the battery of the transmitter is empty or
- you drop your transmitter under water

To test the FailSafe function you must have an reception failure.
But for this you please **NEVER** switch off your transmitter !!!

Quick and easy you can test it with the "Failsafe channel".
So you can terminate very fast the reception failure and get back the control over your copter.

To use this you need:

- a free channel on your transmitter
- a free 2-way switch on your transmitter

On your transmitter you will now program this free channel to the free 2-way switch.
Set this channel then under "Failsafe channel".

The function is now:

- Channel OFF => Receiving is OK - You can control your copter as before
- Channel ON => interrupted reception - FailSafe is activated

Test on the ground:

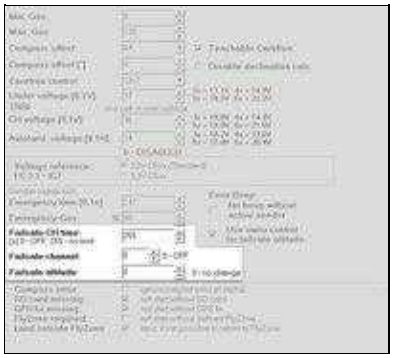
- Transmitter is ON
- Copter is connected with the battery

- Motors are OFF
- Switch OFF - You can completly control your copter (calibrate etc.)
- Switch ON - The copter is "beeping" directly and continuously + the red LED on the FlightCtrl is ON. You can not control your copter now.

  INFO: If you use a Graupner HoTT or Jeti transmitter, you can still see the telemetry of your copter include the information "Signal lost".

So you can now quickly and easily interrupt the reception and start the function FailSafe.
The copter will then do as described under "The function".
Should then happen something unexpected (e.g. in the flight path is suddenly a tree)
you can switch off the function and get beck immediately the control.

6.2 Application 2: unsuitable receiver



You need this function only if you use a receiver who will **not** display the loss of the received signal (see above).

So if you switch "OFF" the transmitter and you do **not** hear a warning signal from the copter and there is **no** red LED on the FlightCtrl, the receiver will not send a "warning signal".

In this case you please do this:

- You need a free channel on your transmitter
- The receiver / transmitter have an own "Failsafe" (see manual of the receiver/transmitter).

  (Importand: It has nothing to do with the "FailSafe" of the MikroKopter)

Set this free channel under **Failsafe channel**.

Here the selected channel must then be set so that:

- the used channel is **off** during the normal use

- and that this channel is **on** during an reception failure

(The exact settings are described in the instruction manual of the appropriate receiver/transmitter or information will be given by the manufacturer.)

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see also: Firmware-0.86
