

INNOVATION & TECHNOLOGY

Граупнер

mz-12 & GR-18 Setup Tutorial

INTRODUCTION

Thank you for purchasing the mz-12 COPTER radio. This radio is the first of its kind that lets you fly your multirotor without the need of complex setups, computer software or internet downloads. The mz-12 is a 2.4 GHz radio that has a 20 model memory allowing you to expand your flying fleet, adding your airplane and helicopter models. Both the mz-12 and GR-18 receiver controller can support all of those types of airframes using a single integrated receiver controller.

The mz-12 radio is preconfigured with a multirotor model named Alpha 250 which is a suitable setup for a 250 size multirotor X copter. The GR-18 receiver controller has also been preconfigured for a multirotor X copter. All you will need to do to start flying is install the GR-18 in your multirotor, attach the ESCs, setup the ESC throttle range, check motor rotation direction, and go fly. No need for complex setups!

The mz-12 and GR-18 have built in telemetry to monitor receiver battery voltage, temperature, and receiver strength. You can access this information using the mz-12 radio display or by using an earpiece where all the telemetry information is provided via voice alerts. You can expand the telemetry information with optional sensors that provide altitude, speed, remaining battery capacity, and much more.

Graupner provides occasional software updates to enhance its products. Please check our website frequently at www.graupnerusa.com.



GETTING STARTED

Before you get started you will need to have an already assembled multirotor copter. There are many multirotor copters out there like the Graupner Alpha 250Q that are sold in kit or ARF format. Some will need assembly of the frame, ESCs, and motors while others come almost ready to fly, needing only a receiver or controller. Some multirotors already have a controller built in—such as a NAZE32 or CC3D—which are not needed and therefore can be safely removed from the multirotor. The GR-18 will function both as receiver and flight controller, simplifying the setup and leaving you with more space for a larger battery, FPV gear, and HD video cameras.

mz-12 Radio Setup

In some cases, the mz-12 radio may already have an appropriate model setup that can be used with the GR-18 flight controller. All of Graupners GR-18 enabled copter products such as the Alpha 110, Alpha 250Q, Alpha 300Q and Hornet 250 can share the same model since all the controls and settings are identical.

Model Setup

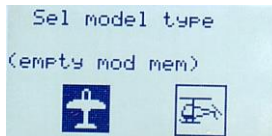
Press the ENT key on the right keypad and select “model mem.” and press the ENT twice.



Select a free model memory by pressing ENT.



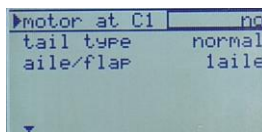
Select model type airplane and press ENT. You can go back to the same menu and set a name for your model.



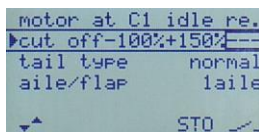
At this point the radio will ask you to perform a bind which we will skip for now. You are now back at the main menu. Press ENT and move the cursor with the left arrow keys to the “m.type + quick” icon and press ENT twice



Move the cursor to the field “motor at C1” which is set to default “no” indicating that the model has no throttle.



Press ENT and with the left keypad move the cursor keys until the field shows “idle re.” which tells the radio that the throttle at C1 is setup to idle/off when the stick is all the way back.



Press ENT and move to cursor to the second line all the way to the right where the three dashes are show. This field allows us to set a switch for throttle cutoff/hold. The standard switch used for this function is switch S1. Before you assign the switch make sure that S1 is pointing away from you and then press ENT.

```
motor at C1 idle re.
push desired switch
into position ON
ail/flap      1aile
STO
```

A dialog will show asking you to toggle the desired switch. Move switch S1 towards you which will automatically record switch S1 for the throttle cutoff/hold function.

```
motor at C1 idle re.
cut off-100%+150%
tail type     normal
ail/flap      1aile
STO
```

When S1 is in the down position then the switch should show as in the image above. If you made a mistake just repeat the above, one more time.

Press the ESC key twice and move the cursor to then “servo sett.” menu icon and press ENT

```
model  m.type  servo  cont.
mem.   quick  sett.  sett.
D/R    RF      wing   free
expo.  sett.    mix    mix
```

Make sure that the throttle stick is all the way down and that the cursor is at the first field S1. Move the cursor to the 100% field and press ENT

```
S1 => 0% 100% 100%
S2 => 0% 100% 100%
S3 => 0% 100% 100%
S4 => 0% 100% 100%
S5 => 0% 100% 100%
rev cent -trv +
```

With the left cursor keys change the value to read 94%. This will have the motors start spinning at very low RPM when the S1 switch is armed. This will avoid abrupt motor cutoff during flight leaving a bit power for the motors and flight controller to do their job during flight maneuvers

▶S1 =>	0%	94%	100%
S2 =>	0%	100%	100%
S3 =>	0%	100%	100%
S4 =>	0%	100%	100%
S5 =>	0%	100%	100%
▼ rev cent	-trv	+	

Press the ENT key to record the value. Now move the motor stick all the way forward so that the cursor is moving to the right S1 and over the 100% block and press ENT.

▶S1 =>	0%	94%	100%
S2 =>	0%	100%	100%
S3 =>	0%	100%	100%
S4 =>	0%	100%	100%
S5 =>	0%	100%	100%
▼ rev cent	-trv	+	

With the left cursor keys change the value from 100% to 90%. What this does is reducing the maximum throttle input to 90% so that the GR-18 flight controller can regulate the upper throttle input. In case you notice that your copter is a bit shaking at full throttle go back to this menu and check the presence of this setting

▶S1 =>	0%	94%	90%
S2 =>	0%	100%	100%
S3 =>	0%	100%	100%
S4 =>	0%	100%	100%
S5 =>	0%	100%	100%
▼ rev cent	-trv	+	

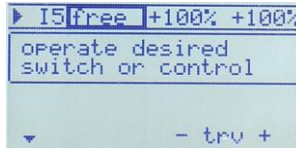
Press the ENT key to store this setting and press ESC.

model mem.	mtype quick	servo sett.	cont. sett.
D/R expo.	RF sett.	wing mix	free mix

Move the cursor to the “cont. sett.” menu and press ENT.

▶ I5 free	+100%	+100%
I6 free	+100%	+100%
▼	-	trv +

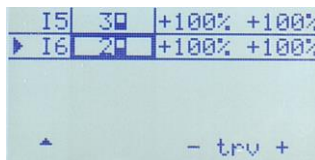
In this menu we will setup the switches that enable attitude or rate mode as well as the auto flip function. For the attitude/rate mode we will select switch S3 for this function. Make sure that switch S3 is in the down position and press enter on the I5 “free” field



Toggle switch S3 from the down to the up position to record this key function. S3 is now controlling the flight mode you are in. When S3 is in the down position you are in attitude mode which is the preferred beginner’s mode. Always take off and land in attitude mode until you are familiar with flying your copter.

The next switch we can program is the flip mode switch. What flip mode does is when enabled it performs for you a flip into the direction your right stick is moving. For example, when flip mode is active and you move the right aileron stick the copter will automatically flip into that direction and level off. Please note that flip mode only works in attitude mode and is only active for a period of 5 seconds after the flip mode switch has been activated.

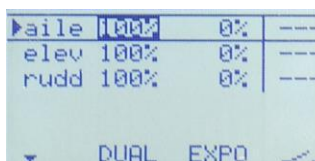
To program the flip mode switch, move the cursor to the I6 “free” field and select switch S2 as the activation switch. S2 is a momentary switch.



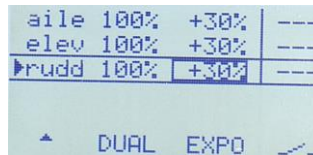
Check that both switch setting corresponds to the above image and press ESC to move to the “D/R expo.” menu icon and press ENT



In this menu we will add some expo to the controls which will soften a bit control input for a smoother flight. The settings here are merely a suggestion and depend on personal preferences. Some pilots like more or no expo at all and is mostly a trial and error effort.



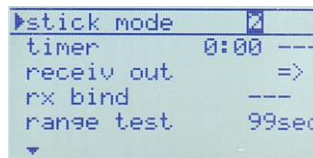
A good starting value for expo is about 30%. Move the cursor to the expo column and press ENT to change the value to +30%. Repeat this for the other fields as well.



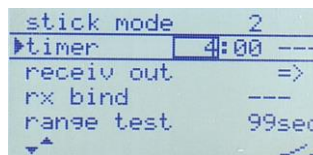
Check and compare the image above and press ESC to move to the “RF sett.” menu icon and press ENT



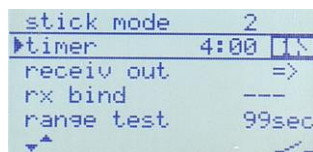
Always check when setting up a new model that the stick mode value is set to 2 which corresponds to mode 2 which is the mode common in the USA. This will ensure that the throttle stick is on the right hand side.



Move to the timer field and enter a value for the flight time. This will enable a timer that when activated will warn you when the set time has passed so that you can land and avoid depleting your batteries during flight. A good starting value is 4 minutes. You can change that after you have had some experience with your batteries and flying style.

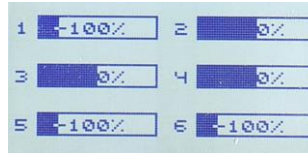


We need to assign also a switch that activates the timer and for this we will use the same switch as the throttle cutoff/hold S1. This will automatically start the timer when we toggle S1 to start the motors.

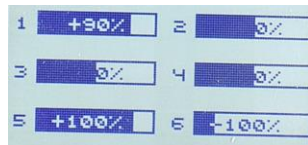


Compare the image above repeat the steps in case you made a mistake you can repeat above steps.

Before you continue its good practice to check if each channel on your radio is functioning properly by using the servo monitor. Press the “view” key on the right hand keypad to bring up the servo monitor window.



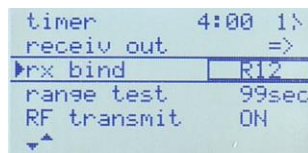
With both switches S1 and S3 in the down position the servo monitor should match the image above.



Move both switches S1 and S3 to the up position and the throttle all the way up and verify that the servo monitor matches the image above. You can now test the function of S2 by pulling the momentary switch S2 and check channel 6 moving from -100% to +100%. If all checks out fine the mz-12 is now ready for flight.

Now would be a good time to bind your GR-18 flight controller to the mz-12 radio. Before doing this, remove all the propellers from your copter for safety reasons. This will allow us to test all the settings in a safe manner.

Binding is easy. Power your GR-18 flight controller and position the cursor on the “rx bind” field where the three dashes are. Check that the power is switched to on your receiver and press the set button on the GR-18 following with pressing the ENT key on the mz-12.



You will see a “binding” message on the mz-12 and soon thereafter a number such as R09, R12 depending on the GR-18 model used.

Your GR-18 flight controller is now bound to the mz-12 and operational for flight.

One last thing to do is to setup the failsafe for your mz-12 radio. In the event of signal loss, we want program the GR-18 to cut the throttle level off and neutralize all controls to avoid uncontrolled flight which can be dangerous.

Move your cursor to the “fail save” menu icon and press ENT.



We need to toggle channel 1 to 5 from “Hold” to “Pos”. This is done by pressing the ENT key and moving to the next field with the left arrow keys.



When all channels are properly set we need to store the information in our GR-18 flight controller. Move the cursor with the left arrow key to the STO field and press ENT.



That’s it! Your copter is now ready and safe to fly.

If you need to setup your copter, please follow the instructions in the following pages.

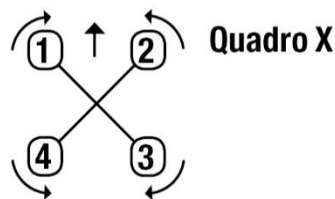
Step One: Installation



- Make sure all propellers are removed from your multirotor. Graupner is not responsible for any injuries sustained during the installation and setup of the mz-12 and GR-18 due to improper use or inattention to safety procedures.
- The first task is to find a proper location to mount the GR-18 receiver/controller. A good location is towards the front of the multirotor right behind the FPV camera if you have one. Make sure that your ESCs and motors are properly connected and that the four ESC wires are routed safely to a single spot where the GR-18 location is going to be. The GR-18 antennas will need to be pointing towards the front of the multirotor.
- Mount the GR-18 with the supplied 3M VHB double sided tape with the antenna's facing the front of the multirotor and the connector socket towards the back close to the ESC wires. Wipe the surface of the multirotor with alcohol to assure proper bonding before attaching the GR-18. This step is critical to ensure that little to no vibration will affect the flight performance of the GR-18 receiver/controller.
- Now is a good time to number your ESC connections to assist you later with the setup. You also need to check if your motor exhibits any markings indicating if it rotates clockwise (CW) or counter clockwise (CCW). Number your ESCs with the back of the multirotor facing you (front points forward) as follows;

1. Front Left Motor (CW) 1 = Ch1
2. Front Right Motor (CCW) 2 = Ch2
3. Back Right Motor (CW) 3 = Ch3
4. Back Left Motor (CCW) 4 = Ch4

Now plug in the ESCs in order as determined in the previous step. Motor 1 goes to Ch1 etc.



Step Two: ESC Setup

Your multirotor should provide power to the GR-18 using the BEC (Battery Elimination Circuit) of the ESC. If not, you will have to

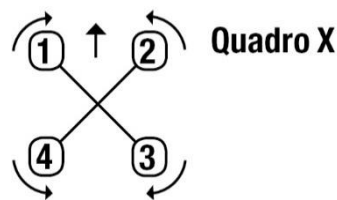
provide another source of power not exceeding 8 volts. Make sure that switch S1 (throttle hold) on the mz-12 is in the safe (down) position. With the throttle stick all the way down (towards you) and the multicopter in a level, stationary position, turn on the mz-12 and attach a power source to your multicopter. After a few seconds the mz-12 and GR-18 will connect and, depending on the motors, a string of beeps will sound. This indicates that the mz-12 and GR-18 are properly communicating. You can verify the connection on top of the GR-18 where a green LED light should be visible. If a red light is showing, you will need to bind the GR-18 to the mz-12. Please follow the binding instructions on page 8 of the mz-12 manual.

- To test the motors (ensure no propellers are attached) flip switch S1 to the arm (up) position and slowly start moving the throttle forward. The four motors should start turning. If not, check the wiring and power source.
- You will now need to teach the mz-12 the minimum and maximum throttle range endpoints of your ESCs to ensure continuous, smooth throttle operation. The mz-12 radio provides a wireless interface to make the needed setting adjustments to the GR-18 receiver. The GR-18 manual provides additional information for the advanced user who wishes to make changes to flight controller settings but for now this manual will only focus on ESCs setup.
- To access the wireless interface:
 1. On the mz-12 radio press the TLM button on the right keypad and select SETTING & DATA VIEW by pressing the ENT button.
 2. On the left keypad press the right arrow key three times until reaching the multicopter base menu. Press the down key to move the cursor to the MODE field and press ENT.
 3. The NORMAL value is now highlighted. Press the down arrow to change the field from NORMAL to ESC SET and press ENT. This puts the GR-18 in learning mode. Never fly your multicopter in this mode! Press ESC on the right keypad twice to return to the mz-12 main menu and turn off the power to your multicopter. The mz-12 will sound low short beeps which is normal indicating there is no receiver communicating with the mz-12.
- Move the mz-12 throttle stick all the way forward (make sure no propellers are connected) and turn the power back on your multicopter. The mz-12 will now rebind with the GR-18 and the short beeps should stop. Wait till you hear a range of beeps indicating that the maximum throttle level has been

```
MULTICOPTER BASE < >
>TYPE          QUADRO X
MODE           NORMAL
MINPOWER %     10
LOGGING        1
CALIBR. POSITION NO
```

programmed (consult your ESC manual as to which beep sequence you should hear during ESC calibration). Then pull the throttle to the minimum position, upon which another range of tones can be heard indicating that the lower throttle level has been programmed. Turn the power off and on your multicopter and check smooth operation of the motors when moving the throttle control on the mz-12. The motors should start spinning almost immediately when moving the throttle stick. If you notice that a lot of stick movement is needed before the motors start spinning you should repeat the ESC calibration process.

- Now is a good time to check that the motors are spinning in the right direction by comparing it with the diagram. In case you need to change motor direction, you should flip two of the three motor wires and re-check the motor rotation.



- We now need to change the GR-18 ESC SET mode back to NORMAL. Follow the same steps from above and change the MODE parameter from ESC SET back to NORMAL, return to the mz-12 main menu, and turn the power off and on the multicopter.
- Now you can test the motor responses on the multicopter by moving the throttle hold switch to ARM (up) and move the controls such as aileron and elevator which should produce variations in motor RPM.
- If all operate as expected, your multicopter is now ready for flight. Turn the power off and attach the propellers. Note that the propellers are marked CW/CCW and should be attached to the corresponding motors.

This concludes the setup of the mz-12 and GR-18 receiver/controller on your multicopter. The GR-18 user manual provides additional information as to how to program advanced features of the controller such as PID settings and telemetry alarms. The GR-18 controller has been optimized for a 250 size FPV multicopter racer. If you would like to make changes, please consult the GR-18 user manual.



BEFORE FLIGHT SAFETY CHECKLIST

- Choose a wide open space such as a soccer or baseball field. Don't fly in the vicinity of people, houses, your backyard or obstacles such as trees and electrical poles.
- Before attaching the battery, always make sure that the throttle hold is in the SAFE position and that your throttle stick is always at the bottom of the throw (towards you).
- Always conduct a radio range check (consult your radio manual on how to perform a range check)
- Makes sure the flight mode switch is in attitude mode, which is the recommended beginner's flight mode.

Your First Flight

Flying with the GR-18 controller is very easy but you should be aware that your multirotor can accelerate very quickly; be ready to provide the proper stick inputs to level it and slow it down. If you have no flying experience, you should consider having an experienced RC pilot with you, especially during initial flights.

Move your throttle hold switch to the ARM position (forward) and advance the throttle slightly. The propellers will start spinning.

Take note of the copter behaviour! If you notice it starts rotating already while close to the ground in an unanticipated manner, check if your propellers are attached correctly.

After your multirotor has lifted from the ground, bring it to a hover at or below eye level and verify it is hovering straight and level with minimal inputs. In case the multirotor is not hovering at a level flight attitude you should check the neutral position of the trims or perform a new level calibration (this is explained in the GR-18 user manual).

Build up some experience flying your multirotor before switching from Attitude mode to Rate mode. In rate mode the multirotor becomes very responsive and you can perform aerobatic maneuvers such as rolls and loops.

Telemetry

Your mz-12 and GR-18 flight controller provide real-time flight information which is helpful during flight and also increases overall safety. On the mz-12 radio the trainer switch has been pre-programmed to provide a range of telemetry information that can be called at any time during flight. In order to hear telemetry voice announcements a headset or ear piece needs to be plugged into the back of the mz-12 DSC port.

Telemetry announcements are triggered and cycled by using the trainer switch.

You can expand telemetry information by adding additional modules. For more information, check our website at www.graupnerusa.com.

Fail Safe

In the event that radio communication between the transmitters is failing the GR-18 will automatically revert to a pre-set setting that throttles back the power to avoid uncontrolled and potential dangerous flight.

To change and modify fail safe settings you should consult your radio manual.