



airflo M duo

4th Axis Stabilizer

User Guide

Getting Started with your 4th Axis Stabilizer	3
Initial Warnings	3
Proper storage when not being regularly used	3
Pinching Hazards	3
Let's get your new Stabilizer out!	4
Now for a quick once over	5
Variable Bounce Damping Controllers	5
Suspension System	6
Support Arms	6
Payload Spring Adjusters	6
Handles	7
Initial Setup	8
Handle Position	8
Attaching the gimbal mount to your gimbal	9
Balancing Your Payload	9
Turn off bounce dampening	9
2. Initial Payload Adjustment	9
3. Support Arm Angle	10
4. Even Out the Payload	10
Holding your stabilizer with a soft touch	10
Bounce Practice	12
Testing	14
Payload -> Shoot, Analyse, Adjust, Repeat	14
Variable Damping System	16
Damping Settings:	17
Damping -> Shoot, Analyse, Adjust, Repeat	18
Common Rig Configurations	20
Upright Mode	20

High Mode	20
Mid Mode	21
Low Mode	21
Rigid Mode	22
Changing Springs	23
Remove Spring	23
Add New Spring	24
Advanced Usage	25
Semi-Rigid Mode	25
General Care	26
Proper storing when not being regularly used	26
Temperature range	26
Rain, Dust and moisture	26
Cleaning, Maintenance, Care and Precautions	27
OK, that's it! Congratulations! :)	27

Getting Started with your 4th Axis Stabilizer

Handheld gimbals are the biggest game-changer in the past few years for independent filmmakers! - You turn it on and out comes the magic footage! But they do have their (bumpy) limitations which is why you're here.

Our 4th Axis Stabilizers are designed to reduce that bounce that you typically see when someone is walking with a gimbal. That vertical bounce from your steps transferred to your hands can be mostly absorbed before it gets to the camera. But it doesn't stop at walking, you can go from softer motion all the way to jumping around like crazy.

Initial Warnings



Proper storage when not being regularly used

For the best working life of the stabilizer make sure that during periods of no use, that you take the tension off the suspension modules. This is achieved by turning the Spring Adjuster Knobs anti-clockwise toward higher tension until there is no tension on the spring and the stabilizer arms move freely for a short distance.

Pinching Hazards



As there are moving parts in the stabilizer there are a number of pinching hazards that you will need to take care of so as not to injure yourself.





The best Steadicam support arm operators usually take years before they truly master their trade, but with our 4th Axis Stabilizers and a handheld gimbal, the learning curve is vastly quicker to get smooth results. You might be a natural right out of the box but most of us will need to dedicate time to getting your technique and settings right for each shooting scenario. Follow this guide to get up to speed as quickly as possible and you'll soon understand the finer points about how to get lovely smooth footage!

Let's get your new Stabilizer out!

Your 4th axis stabilizer (also called a Z-axis stabilizer) comes to you almost fully assembled with little more than adding the handles and mounting your gimbal.

You'll also find this printed guide, a small lithium grease tube and a M2.5 Allen key for spring changes, additional Light (black) and Heavy (red) springs - (Medium Springs are pre-installed).



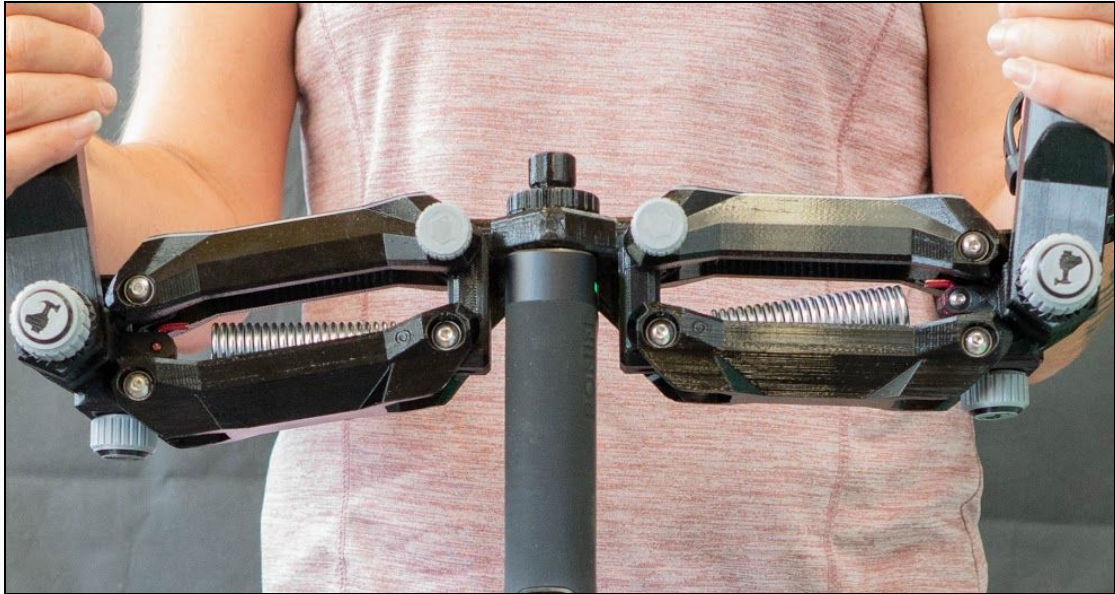
The handles, payload adjusters, fluid damping adjusters are all tool-less too! Although your stabilizer is 'tough as old boots' extremely high temperatures can cause permanent damage so please remember:-



Note: *The stabilizer modules are always permanently under tension. Just as you wouldn't leave your expensive cameras in a car on a very hot day, don't do likewise with your AirFlo M Duo as the combination of heat and the tension in the module means that temperatures exceeding 65°C (150°F) can cause permanent deformation!*

Now for a quick once over

Variable Bounce Damping Controllers



On each side of the gimbal base are the two smaller adjuster knobs for the variable bounce damping adjusters. The suspension springs, by their nature, when stretched and released will bounce back and forth until the springs initial energy or bounce is lost in the system via friction.

That bounce can be reduced and absorbed in the bounce damping system by setting the damping knob; turn it anti-clockwise to increase the strength of the damping and clockwise to lighten the damping. There is a bit more to it than that and it's a concept that's easy to misunderstand.



Suspension System

Support Arms

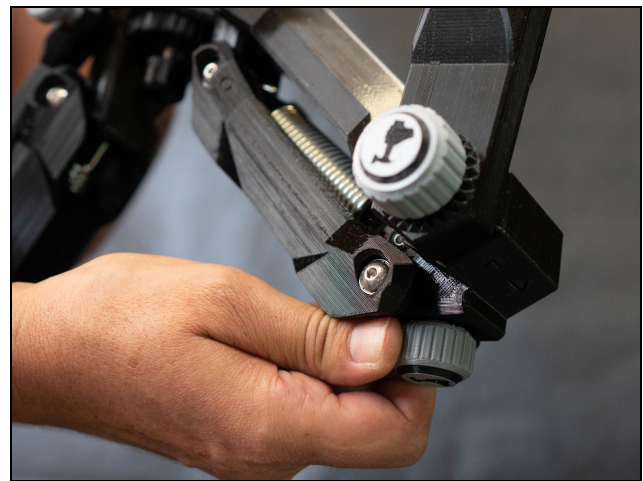
The two sets of support arms connect the spring adjusters to gimbal mount and hold the sprung system in tension in a 'McPherson Strut' arrangement.



This geometry is what gives you the range of support for different weight rigs. It's also mostly responsible for the very soft up to the more firm elastic suspension.

Payload Spring Adjusters

The payload spring adjuster assembly to the support arms and the other side attaches to the handles via the rosette mount.



The main purpose though is to adjust the spring tension so that you can balance your rig(payload) properly.

The spring adjustment knob turns anti-clockwise to increase the spring tension and the bolt runner moves closer to the top. This will support an increased payload weight while at the same time decreasing the iso-elasticity.

Turn it clockwise and the bolt runner moves closer to the bottom. This will decrease the spring tension (also increasing the iso-elasticity). In most cases, you want to be using the most 'Iso-Elastic' setting for your rig but please read the 'Balancing' section to find out more about this as there's reasons to break these rules too!



It's all about control and how much you can do without!

In other words when the payload is adjusted towards;

- ***the firmest end*** allows enough control to frame the shot easier at the expense of more vertical movement in the footage and;
- ***the softest end*** has the potential to give you a shot that looks 'like it's on rails' but until you master it you likely find it too hard to control and you'll lose your framing easily - It usually takes some practice with the rig to master it - but if a guy like me with a bung knee can do it then you can too!

Think of it in the same way that car suspension smooths out a bumpy road. So too our suspension system does the same to your bumps.

Now consider the difference between the super-soft suspension of a luxury limo and the very rigid suspension of an off-roader.

In a luxury limo, you barely feel any bumps and this is 'Iso-Elastic' suspension. With the stiff suspension of the off-roader, you feel the bumps a lot more and this is more 'Elastic' or 'springy' suspension.

Handles

The handles are offset slightly towards the rear so as to give a slight forward pre-load to aid in reducing 'forward / aft' wobbles.

Secondly, there's a slight lip at the top of the handles that aids in positioning your hands.

Lastly, they attach via a 'Rosette Knob' that gives a full 360 degree range of possible positioning.



Initial Setup

Handle Position

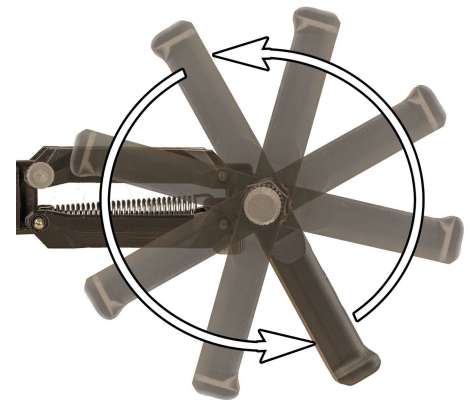
Just for reference, we call the side of your stabilizer with the bounce damping adjusters and rosette knobs the ‘back’ and this side should always face you when filming. This way you can make adjustments on the fly.

Now you’ll start with the modules in ‘Upright’ mode. Even if you’re planning on using your stabilizer predominantly with the modules inverted you’ll find it easier to set up and balance in ‘Upright’ mode first before moving to ‘Inverted’ mode.



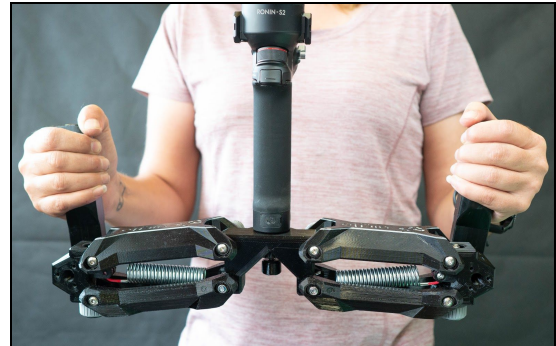
Loosen the Rosette Knobs until the handles can be rotated.

I prefer my handles pointing out at around a 10-degree angle but this is just my preference so whatever angle you’re comfortable with. Some people like the handles rotated in slightly as it narrows the width for a narrower grip and more compact form. Once both sides are at the same angle just tighten up the Rosette knobs making sure that the rosette teeth are meshed together and locked in place. You don’t need to overtighten these knobs, just tighten until you meet firm resistance. You may find if you’re shooting for instance while ‘crabbing’ to the side that adjusting the handles independently to different angles may be more ergonomic for you.



Attaching the gimbal mount to your gimbal

Before you add your gimbal to the stabilizer you first need to balance your camera on your gimbal as you normally do.



1. Then mount your stabilizer in the upright position.
2. Turn on the gimbal and screw the stabilizer firmly onto the base mount with the camera facing forward, away from you.
3. Check that the stabilizer is firmly attached and then balance your payload.

Balancing Your Payload

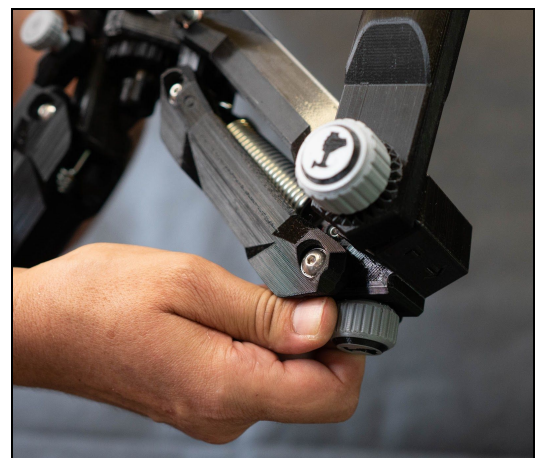
1. Turn off bounce dampening

Now you'll adjust both of the Bounce Damping Knobs anti-clockwise up to 5 revolutions or until the small compression spring becomes almost loose. This is so that the damping doesn't affect your balancing process.



2. Initial Payload Adjustment

We start by getting to a baseline loading where the support arms are roughly horizontal. We adjust the Payload Adjuster knobs roughly equal amounts to get the support arms close to that position. This payload setting will be fine-tuned later.



3. Support Arm Angle

When you hold the stabilizer with the rig loaded you'll notice that the support arms either point up towards the centre or down. The most common use is for typical walking shots and the angle of the support arms is not as important as the setting for the most optimal smoothing as the vertical movement tends to be small. As long as your stabilizer doesn't 'bottom out' during your shot then you can go as low as you like with the support arms pointing down in the middle. The lower you go the more iso-elastic the stabilizer will behave.

4. Even Out the Payload

One of the biggest sources of inconsistent smoothing occurs when one support arm has the payload set differently to the other. To test this you'll need to do a bounce test but before that we'll need to work on your form (next).

Before you start shooting, there's one aspect of using the 4th axis for first timers to be aware of as it can be off-putting. When first walking with the 4th axis, it will seem to be bouncing a lot, but what is mostly happening is that it's actually you that is bouncing and it's tending to stay level. Don't see this bounce and try and do something to stop it! Relax, and go with it!

Holding your stabilizer with a soft touch

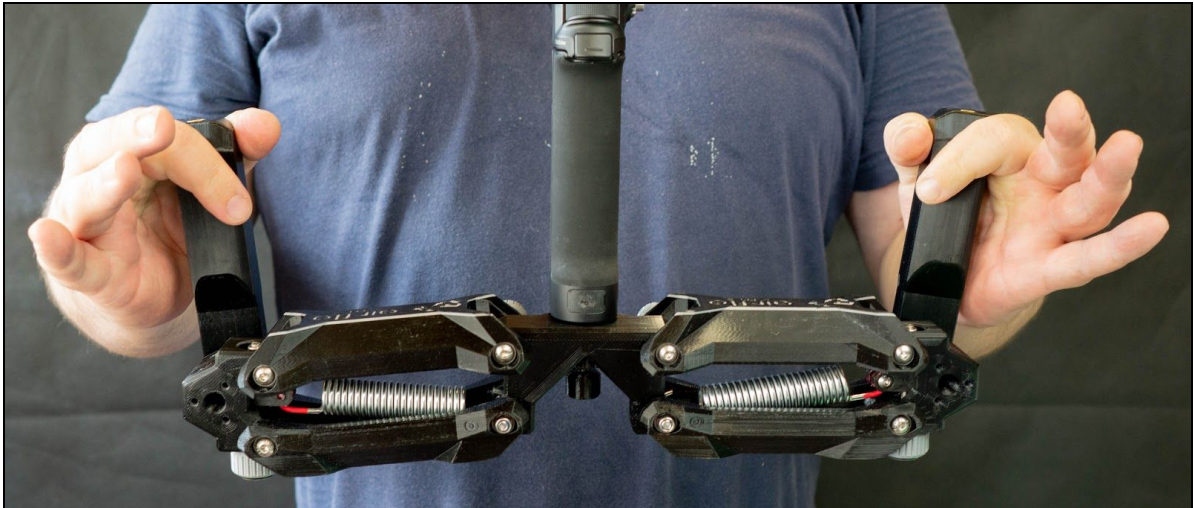
Before you start testing you first need to perfect your grip technique.

Many of us that come from using rigid dual handles are used to operating with the dual handle 'power grip of death' ;-)

The biggest key to transitioning to the AirFlo Duo 4th axis is to relax that strong grip and start using '**soft hands**' instead. There's an art to 'soft hands' so please read on?

The reason this is so important is that your Duo is a truly dynamic system and what you want to do is eliminate any inward or outward pressure on this dynamic system. It may be hard to 'un-learn' the techniques you've learnt but the silky smooth footage you get will be worth it!

1. The first step is to hold your Duo and place your hands so that the slight lip at the top of the handles sits on your hand.



2. Now feel the rig in your hands. You should feel the rig leaning slightly forward. This forward pre-load is by design and assists in preventing unwanted forward to aft wobbles that can affect overall stability.
3. Now try pushing inwards and outwards to see what effect it has on the vertical position of the gimbal. This will vary by whether the arms are pointing up or down. This is the motion you're attempting to avoid.



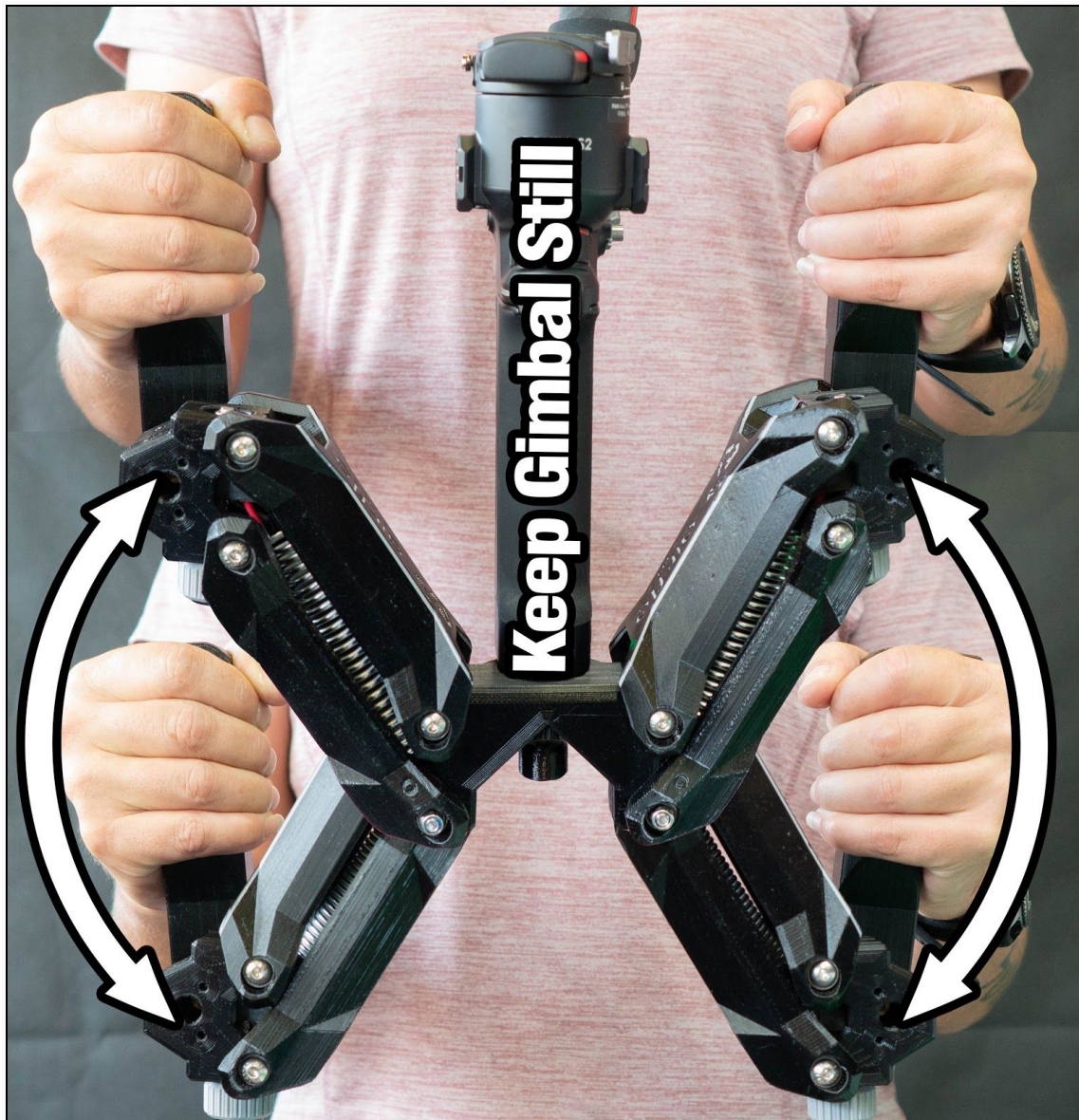
4. Finally drop your hands to make the gimbal bounce without any inwards or outwards pressure.



Bounce Practice

When you look at the AirFlo Duo in motion you'll see that both suspension modules sweep in an arc. You're trying to reduce any sideways force from your hands affecting this smooth arc. It takes time but there's one very easy way to practice this technique so you can get a feel for it fairly quickly. It might remind

you of that weird ‘jerking exercise gadget’ on tv but bouncing the arms up and down repetitively will quickly teach you whether you are doing it right or not. The aim is to bounce the hands while keeping the gimbal as steady as possible. At first you’ll find it may be hard to keep it steady but not before too you’ll get the hang of it!



Testing

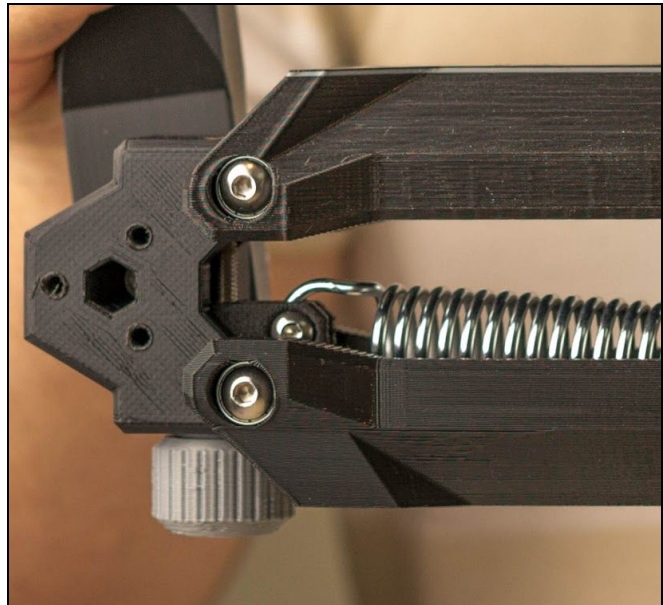
Payload -> Shoot, Analyse, Adjust, Repeat

You'll start your testing by finding the best settings for your payload and your current level of ability.

The easiest way to do this is to practise the same short filming movement and analyse it to find the best settings for you.

What works best is if you repeat a short 15 to 30 second shot that involves walking on hard and soft surfaces, with some changes in direction and if possible also on an uneven surface such as that found on a lawn.

1. Start with both Payload Spring Adjusters set all the way to the bottom - make sure you stop when you feel the resistance at the bottom.
2. Set both damping adjustment knobs so that they're turned off (Fully tighten the knobs at first and then loosen them 5 revolutions to turn off the damping). This may give you some uncontrolled bouncing during the test but that will be fixed in the next section when we adjust the variable damping.
3. Rotate in full revolutions both Payload Spring Adjusters the same number of revolutions until they're high enough not to bottom out on your practise shoot. (This is now the minimum setting for the weight of your rig)



4. Next is the 'Bounce Test' to make sure the spring tension is even. It's critical to focus on using soft hands or the test might fail. Once you have the arms roughly in the right position then you evenly bounce your hands down and



let it bounce back up to see if the gimbal favours one side or the other. If your gimbal bounces say to the right then the right Payload Spring is weaker than the left and you need to increase the payload adjuster tension on the right side to even it up with the left. When your gimbal bounces straight up you're all set to start your test shot!

5. Let's be optimistic and start at this low setting! Film the movement with this setting and if possible look at the results on a monitor to see 1) how well bounce was controlled and 2) if you lost your framing or not. If you're not there yet then increase both Payload Spring Adjustment Knobs exactly the same quantity of revolutions, check with a 'Bounce Test' and then shoot again and repeat until you find the optimal balance (*pun intended!*) for your own style of filming.

Variable Damping System

Your stabilizer has two independently adjustable damping systems using PTFE (AKA Teflon) to give 'fluid like' bounce damping. These can be adjusted to smooth out a large range of spring bounce in your stabilizer.

The range of damping goes from zero to 100%. At 100% the small compression spring is fully compressed and can't be screwed in further. Loosening the damping knob 5 full rotations will give you zero damping. Each clockwise rotation increases the damping by 20%. There is a black line on the top and a red line on the bottom of each damping knob so that you can count every 20% increase using the black line and use the red line to count the odd settings i.e. 10%, 30%, 50%, 70%, 90%.



To zero the damping first tighten the damping knobs to 100% each and then loosen them 5 full rotations to get to 0% damping. This is always a good starting point rather than using guesswork.



We each move and shoot differently for our various filming movements. This guide is a good starting point but you each need to find the range of damping to suit your own shooting styles.



Understanding how to set the damping

When you set the damping to a certain level you are actually setting the dampening range i.e. Setting the damping to 100% will not dampen out all vertical motion. Max damping will only dampen the most extreme vertical motion and light to medium motion will not be damped out.

You need to think of this setting more as a range - For instance, if I set the damping to around 20% I find that motion from slow walking thru to walking downstairs will be smoothed out but any harder or softer motion won't be smoothed out.

Damping Settings:

To give you an idea of where to set the damping here's a range of filming movements with the level of fluid damping that I use for each. This uses the single black line in the white gauge:-

- The most gentle camera movement - for this I tend to use from 0% damping up to 20% damping. (e.g. slow walking, all the faux slider shots, dolly/pans, faux crane shots, Push-In and Pull-Out)
- For walking or vertical or rotational motion (tilts, orbits or rotates) and stairs, I'll have it set roughly between 15% and 30%.
- For brisk walking or sudden changes in camera direction - (20%-40%).
- For walking backwards or light jogging (follow /Lead) - (30%-45%).
- For medium-pace jogging - (30%-60%).

- For running pace to hard running - (40%-70%).
- For jumping about or with very hard action on uneven surfaces - (60%-100%).



Note: As with the spring adjusters you should do a similar style of **Bounce Test** to make sure both damping cartridges are set the same. First set the Payload Spring Adjusters to the exact level and then bounce the loaded stabilizer. If say the gimbal bounce leans towards the right side then the right has more damping than the left and you need to increase the left side damping adjustment or decrease the right side adjuster.



Once set, do the bounce test to confirm

As with the spring adjusters, you should do the same **Bounce Test** to make sure both damping adjusters are set the same. As the payload springs are already adjusted you just do the bounce test with the loaded stabilizer. If the gimbal bounce leans towards the right side then the right has more damping than the left and you need to increase the left side damping adjustment or decrease the right side adjuster.

Damping -> Shoot, Analyse, Adjust, Repeat

This process is useful to do in advance so that you don't need to go through the full process when on a shoot. You'll work out the damping settings for different filming movements from very soft motion to very hard action.

Since you have already found the 'ideal' Payload Spring Setting for your rig you can start with that setting to next find the best damping adjustments for your own personal filming styles.

What I find works best is if you find a short 10-second circuit where you can vary your intensity from soft motion all the way to hard motion (or as hard as you can physically go).

1. Start with both Payload Spring Adjusters set to the ideal level that you already worked out before.
2. Set the fluid damping adjustment to 0%.
3. Do the 'Bounce Test' to make sure the damping is even and adjust if necessary.
4. Do your 'soft' motion shot and examine the footage.
5. Next turn both Fluid Damping Knobs half a full rotation to 10% Damping and do the 'bounce test' again (adjust if necessary).
6. Do your 'soft' motion shot again and examine the footage and compare it to the first footage.
 - a. If the first shot was best then keep a note of the first setting.
 - b. If the new shot was better then increase the damping again and keep testing until you find the footage smoothing declines.
7. Once you have your 'soft motion' settings nailed down then keep the damping at the last 'ideal' setting and start the process again but this time up the intensity to the next movement with gentle walking.
8. Next, try normal walking
9. Then brisk walking
10. Then jogging
11. Then running
12. Finally hard motion such as on some uneven ground or jumping about.
Don't be too hard on yourself if this last one doesn't work out at first!

Once you apply these new 4th axis stabilizer techniques to your shoots you'll find you can get even better traditional gimbal moves such as push in, pull out, follow, lead, orbits etc.

Common Rig Configurations

Upright Mode

The most common is the Upright Mode which gives the viewer the 'person's eye view' that they're already very familiar with. I tend to use it 80% of the time (e.g. walking headshots or head to waist shots, over the shoulder, high to low shots and all the common moves such as push-ins out outs)



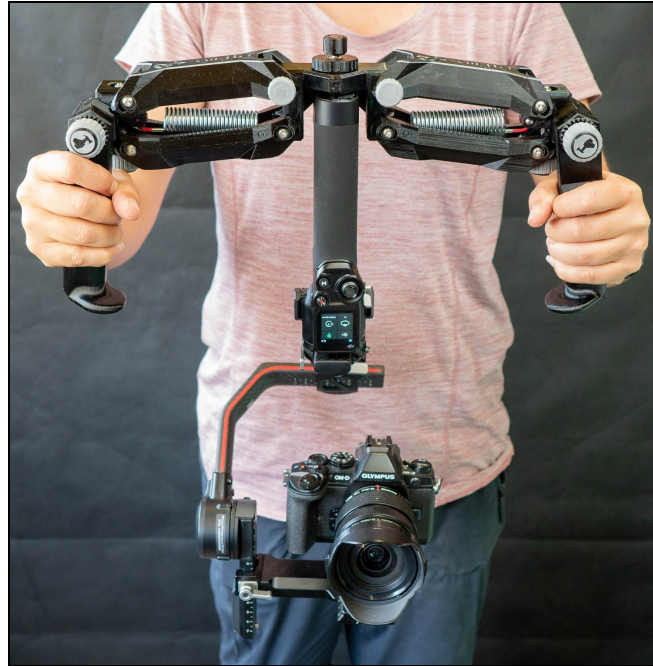
High Mode

From Upright Mode if you invert the handles you get the High Mode. This is useful for a range of high shots and can give some interesting faux crane shots. Its higher centre of gravity makes it harder to control than the other modes.



Mid Mode

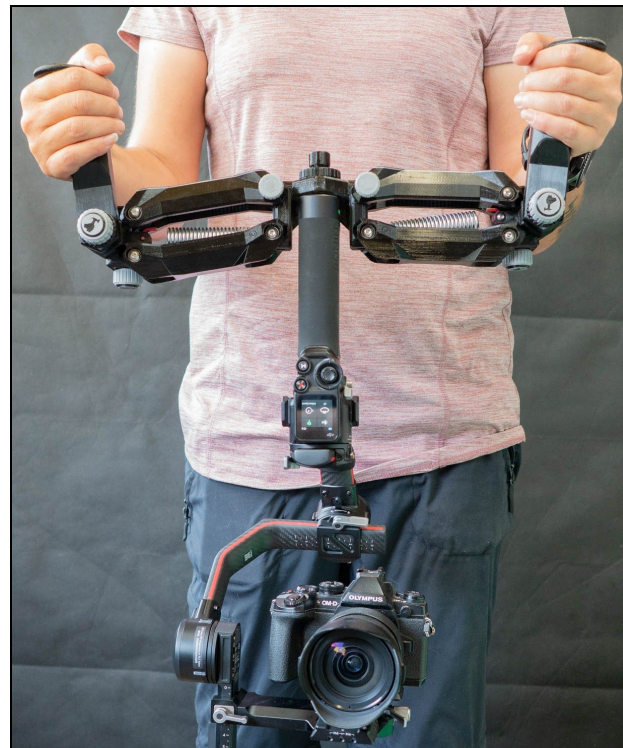
Now you re-attach both modules while swapping sides to keep the handles in the correct orientation. This takes you to the inverted gimbal Mid Mode. If you're not yet silky smooth with Upright Mode then this will be an easier mode to get smooth shots as the height isn't too far away from Upright Mode. You can get some interesting creative angles such as tilted up



'Child's eye view' or moving along lower objects such as cars, railings, plants that's great for B-roll. It's also a good height for capturing smaller children.

Low Mode

Now with the gimbal in the Mid Mode you turn the handles upright to get to Low Mode (also called Briefcase Mode). It's great for those 'dog's eye view' of the world shots and the toe to head shot tilting up or a following behind legs or feet shots. Of all the stabilizer positions this is the easiest mode to operate as the lower centre of gravity keeps the gimbal nice and smooth with minimal effort.



Rigid Mode

You might find that there are times when you want to do a controlled motion such as a whip pan or a tilt without having to attach rigid handles. This is how you turn your Duo into rigid handles in just a second!



First, make sure your handles are straight up or angled outwards as the next step can pinch your hand if they're angled inwards. It's actually very easy, and all you do is bounce down on the gimbal and on the up-stroke push inwards on the handles and 'Hey Presto!' you're in Rigid Mode. You can also go to Rigid Mode from all other Modes as well!

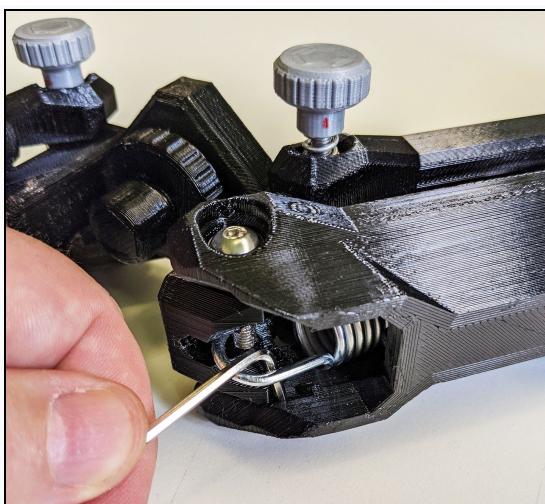


Changing Springs

Changing the spring is a simple and straightforward process that can take just a few minutes. You may find it easier to follow the **AirFlo M Spring Change** video on our Scotty Makes Stuff YouTube channel:-
<https://www.youtube.com/c/ScottyMakesStuff>

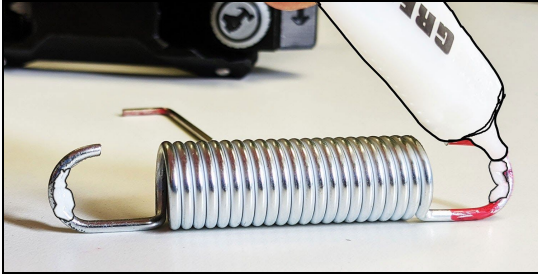
Remove Spring

1. Turn your spring adjuster knob anti-clockwise until the spring is no longer under tension.
2. Take the Allen Key and unscrew the bolt runner screw until the spring comes out. If you place a bit of tension on the spring while unscrewing, it will pop out. Unscrew one more turn and stop.
3. Take the Allen key and hook onto the spring at the gimbal end and pull out the spring.

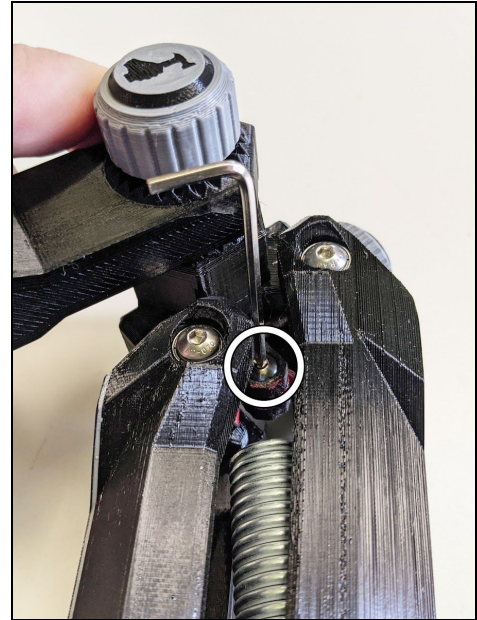


Add New Spring

1. Take your lithium grease tube and snip the tip open before placing grease on the inside of the hooks.



2. Push the suspension arm up and then insert the new spring in the same way you removed the previous spring and make sure the hook goes onto the large bolt.
3. Place your finger on the end of the spring and then take the suspension arm from pointing up and slowly pull down until the spring hook lines up with the bolt runner and then push the spring hook into the bolt runner.
4. While still pushing from the other end, take the Allen key and screw down the small bolt until the bolt head just sits flush with the surface. Do not tighten this bolt further.



Advanced Usage

As you get more and more familiar with the 4th Axis Stabilizer you'll uncover your own little tips and tricks to make your stabilizer do more. Here's one that I use on occasion;

Semi-Rigid Mode

Ok, I know some of you are having a chuckle at the name but I'm serious!

This is a bit of a dark art to get right so don't worry if you can't get it easily. You can't use Rigid Mode as part of a shot that goes from soft suspension to Rigid Mode as the locking motion will give an obvious jolt in the footage. You might find that there are times when you want this transition so what you can do is rather than fully locking the arms just apply enough inward pressure on the handles to lift or lower the gimbal so that the majority of the suspension is mostly locked and you can do your controlled rapid movement. This takes a bit of practice but if you do these transitions like whip pans regularly then it's well worth the practice to get it right.



General Care

Here are a few pointers that you should be aware of if you want to take the best care of your stabilizer.



Note: *Your stabilizer is fully tuned out of the box so don't be tempted to go and tighten any bolts - The only changes you'll be making is adjusting the load and dampenings knobs, and also when changing to the different weighted springs.*

Proper storing when not being regularly used

For the best working life of the stabilizer make sure that during periods of no use, that you take the tension off the suspension modules. This is achieved by turning the Spring Adjuster Knobs anti-clockwise until there is no tension on the spring and the stabilizer arms move freely for a short distance.

Temperature range

You should keep your stabilizer under 65°C (150°F) as some of the polymers will begin to soften after this point and since the stabilizer is under tension, it can potentially warp out of shape. **Don't leave it in a car on an extremely hot day!** Think of it like any camera gear as you wouldn't leave your expensive camera gear in a hot car.

Rain, Dust and moisture

You should avoid situations where the sealed bearings are subjected to water or dust ingress. Your stabilizer can withstand light rain but heavy driving rain could force water or dust particles into the bearings. **Do not immerse your stabilizer in water or spray pressurised water at it!**

Cleaning, Maintenance, Care and Precautions

After any use where your stabilizer is subjected to dust or moisture, you should wipe with a dry or slightly moist cloth.

When you store your stabilizer for extended periods to minimise the stress on the stabilizer you should adjust both of the spring adjusters to the minimum position. The lubricated bearings are sealed so no lubrication is required to the bearings or any other part of the stabilizer.



Note: *We build our stabilizers extremely tough but occasionally under certain movements there can be exceptional forces inadvertently applied to the stabilizer. Although unlikely this can possibly lead to breaking forces being applied to components of the stabilizer possibly causing catastrophic failure. This is especially important during autonomous use where the stabilizer is mounted to an object such as a car. In these types of scenarios, it's important to protect your rig with a safety line in the event of a catastrophic failure.*

OK, that's it! Congratulations! :)

Now you have all the knowledge you need to get started. Just remember that at first you will need to practise those techniques before you use it on a shoot. You might be a complete natural but I generally suggest you dedicate at least a few hours shooting and reviewing footage to find the right settings for you. Then you can go out with confidence and make all your very own silky smooth footage!

And one last thing, if you post some footage online then we'd love to see it so please shoot me off a link?

Thanks again!

Scotty McPherson