Empowering Confidence in Motorsport

Thank you for signing up with Motoklik! We're super pumped to bring you automated suspension set-up and the confidence you need to win!

Before we get there however, we've put together this cheat-sheet full of bike set-up tips that you can use now, to get the most out of your bike. We've also included a check list that you can use at the end.

Why do we need suspension?

First let's discuss what your suspension is actually supposed to do. The job of suspension is to try and control how the bike reacts to obstacles that you meet when out riding. If there was no suspension and the wheels were bolted directly to the frame, it would make for a pretty uncomfortable ride! The first step in controlling how the bike behaves when it hits bumps on the track, is to fit the bike with springs. This will let the wheels move relative to the bike when you hit a bump, so that not all of the bump force is put through the seat, handlebars and foot-pegs and into your body! If you just have springs alone, it's difficult to control the suspensions movement when bigger forces need to be controlled like when you land from a jump, or hit some serious braking bumps. To control this movement and try and make sure the bike doesn't bottom out or rebound uncontrollably, the springs are joined in parallel with a damper system. The damper assists the springs as the bike moves across the ground to try and keep the suspension system moving in a predictable way.

Why does suspension need damping?

Damping in motorcycle suspension for the most part works by passing oil through a passage way. The size of the opening in this passage way, as well as how warm the oil is, determines how quickly the oil can pass through the passage way. If the opening is small, the oil won't be able to pass through as quickly and vice versa. When you turn your clickers "in" and "out", you are making the opening in the passage way smaller and bigger respectively. If the opening is small, it's more difficult for the oil to pass through, and this will make your suspension stiffer. There is a passage way for both the compression and the rebound movement of your suspension. In modern dirt bikes, the passage ways work in parallel with "valving". When the suspension reaches a certain speed, this valving can open and let the oil through. You can think of the valving like a variable throttle, the faster the suspension moves, the more the valving opens. It's a very complex task to get the response of the valving right, and this is where a lot of the magic happens for getting the best feeling from the bike depending on if you are doing motocross, supercross, enduro, Supermoto etc. The compression stroke is when the wheels are moving towards the bike, and the rebound stroke is when the wheels are moving away from the bike, and as mentioned, you can control the passage ways for both the compression and rebound stroke to fine tune the feeling you get from the bike. This is where it gets

tricky, how should you know what's a good setting and what isn't, what clicker needs to be adjusted when, and which way?

Pre-ride bike checks.

Before ever going near a clicker, there's some ground work that needs to be done. Properly performing suspension needs to be *proper*. By proper, we mean that the components are in good condition. A few checks that you can do in the comfort of your own shed or workshop is to check the condition of the pivot bearings in the swingarm axle, linkage, top shock mount, wheels and steering stem, as well as spoke tightness (When tightening spokes, start from the bead lock or tube valve, and tighten every third spoke i.e. tighten a spoke, count 1,2,3 and then tighten that spoke, it should be on the opposite side of the wheel to the one you just tightened. It will take three revolutions of the wheel to tighten all the spokes, and using this method will keep the rim centred to the hub), tyre pressures (Tyre pressures are usually in the ball park of 8psi to 14psi where softer pressures are used for softer wet conditions and vice versa), and chain tension (The chain tension can be adjusted by tightening and loosening the bolts in the swingarm that sit against the rear axle. A rule of thumb is to be able to fit two fingers vertically between the chain and swingarm at the end of the chain guide on the top surface. Some models will have a mm range that this measurement must be.) The bearings should move freely without any notchiness. The steering stem bearings however should not be so free that the handlebars can flop from side to side on their own, they should require a small push from your fingers before they move (The "stiffness" of the steering can be adjusted by tightening or loosening the steering stem nut underneath the handlebars). Depending on the conditions you ride in, it's a good idea to dismantle, inspect and re-grease your linkage bearings every 5 hours or so. The grease we find that works best, is grease that is "water resistant". It has an almost waxy feel, and withstands power washing and wet conditions well. Be sure to also check the condition of the forks. Look for any oil weeping from the seals. You can also pull down the dust seal (The seal that you see when you look at the fork) and clean out any dirt that has gathered behind it. Again, depending on the conditions you ride in, you can clean out the dust seals every 5 hours or so also. There is also more in-depth service work that needs to be carried out i.e. replacing fork bushes, seals and damping oil. This work requires the complete dismantling of the forks and shock using special tools. Unless you really know what you're doing, it's best to get this work done by a professional. A rule of thumb is to have the suspension serviced every 20 hours.

Pre-ride bike set-up.

Before hitting the track, there's a couple of things you want to check, namely fork position and sag height. You can start with fork position; this is a measurement of where the fork legs are relative to the triple clamps. The easiest way to measure this is from the top surface of the top triple clamp to either the end of the outer fork leg (where it meets the fork cap on top) or to the top edge of the fork cap. There will be a manufacturers recommendation as to where to set the forks to begin with. WP forks actually have circumferential lines machined out of the outer fork tube that

can be used as markers. To adjust the forks up or down in the triple clamps, you must loosen the 8 bolts on either side of the clamps. When tightening the bolts, be sure to tighten them to the recommended torque spec. The reason for this is that the bush inside the suspension actually passes by the bottom clamp and if it's too tight, the bush can get caught up at this part of the stroke, and you don't want that! It's a little bit tricky to adjust the position of the forks, so take your time.

The more common adjustment that's spoken about is sag. There are two sag measurements, static sag, and race sag. Static sag is how much the bikes ride height drops under its own weight, and race sag is how much the bikes ride height drops with you, the rider, on board. To measure sag, put on all your gear that you wear when riding, and sit in a central position on the bike that is "normal" for your riding style. You can try and support yourself by holding the bike at the upright balance point and keeping one hand on a wall or support beside you, or you can ask a friend to hold you at the balance point with-out pushing on or lifting the bike. Sag can be measured for both front and rear suspension. An adult size dirt bike ballpark race sag figure for front suspension is 60mm - 75mm. To measure front sag, you can put the end of a tape measure on the top surface of the axle lug next to the inner fork tube, be careful not to scratch the fork tube. Measure from the axle lug to the bottom of the outer fork tube. Sit on the bike, and repeat the measurement. By subtracting the compressed value from the full extension value, you will see what your race sag is. When measuring front race sag, if you are getting values greater than 75mm you may need a stiffer spring, and if you are getting less than 60mm, you may need a softer spring.

Adjusting rear race and static sag is a little trickier as you must take into account the amount of pre-load in the shock spring. Pre-load can also be adjusted for the front spring, but it is less common. An adult size dirt bike ballpark static sag figure for rear suspension is ≈40mm, and for race sag is ≈100mm. To adjust the static and race sag, there are two threaded rings that sit against the top of the spring on the rear shock. The top ring is a locking ring, and the bottom ring is an adjustment ring. If you tighten the adjustment ring, it will rise the rear of the bike, and if you loosen the adjustment ring, the rear of the bike will drop. To measure the sag values, put the bike on the stand so that the rear shock is fully extended. Put the end of the tape measure centrally in the rear axle, and find a point on the rear mudguard to take the measurements from.

On KTM and Husqvarna models, there will be a sag point marked on the rear mudguard, to take the measurements from. There is some debate as to where to pick a point to measure sag from, some will say to go straight up from the axle, and some will say to follow the arc of the ring swingarm to pick a point. We have found it is not always practical to follow the arc exactly, so if a sag point is not indicated on the body work, bring the tape measure straight up from the axle, and keep moving the spooled end of the tape measure towards the front of the bike until you find a point where you can easily take repeat measurements from. This can sometimes be an intersection of the side plate and rear mudguard, or a change in form of the rear mudguard.

When you have found the point you want to take measurements from, measure the distance with the rear shock at full extension and right that mm value down (We'll call it L1). Let the bike down off the stand. A quick and inaccurate way to take a static sag measurement is to bounce the bike by the saddle a few times, and measure the distance from the axle to the sag point (We'll call it L2). Subtract L2 from L1 and you have a static sag value. However, repeat this method again, and it's most likely you won't get the same value. Hmmm, why is that? It's because there is always going to be a certain amount of friction in the system, no matter how well your bearings are greased or you shaft is coated. A more consistent method to measure sag is to drop the bike from the stand, then press down on the rear of the saddle slightly (about 20mm-30mm) and let the bike rise, measure the distance from the axle to the sag point to give you a new L2. Then lift the rear of the bike by the mudguard by the same distance and let it drop slowly. Measure the distance from the axle to the sag point again to give you another value L3. The difference between L2 and L3 is the amount of stiction in the rear suspension because of friction. To calculate your sag value, use the formula: L1-((L2+L3)/2). This will give you a very repeatable sag value. The same method is used to measure race sag, just with the rider on the bike. You can also use this method when measuring front suspension.

If you've done all this, and find that for example you are getting a static sag of 54mm and a race sag of 112mm, you can tighten the adjusting ring to raise the back of the bike, and get to those 40mm/100mm values (or what is spec'd by your manufacturer). The opposite can be done If you are getting 30mm/90mm values. If, however, you are getting a 100mm race sag value and a 20mm static sag value, this means that your spring is too soft. You are having to put way too much pre-load tension in the spring to keep your weight off the ground. In this case you will need a stiffer spring (be careful to match the rear and front springs if new springs are needed). The same is true if you have a race sag of 100mm and a static sag of 60mm, the spring is way too stiff because the spring is so strong you don't need to put any pre-load into it to keep you at the right ride height. In this case you will need a softer spring.

Bike set-up at the track.

OK, well done! You have made sure your suspension is all working properly, your tires are inflated to the correct pressure, your chain is adjusted and your sag values are where you want them. Now, welcome to opposite land where softer ground needs stiffer suspension, and sometimes suspension that feels stiff is actually set too soft. Suspension set-up is a tricky business, but you can use some basics to get started. Be aware of the amount of adjustment in your suspension i.e. the number of clicks from fully in to fully out on the compression and rebound. There is also usually a high-speed compression adjuster on the rear shock which can be adjusted via a nut around the clicker, or a separate clicker depending on how the shock is made. Before hitting the track, you can either set all the clickers and adjusters to the mid-point, or use the manufacturers recommended settings from the manual. Go out on track with these settings but be sure to TAKE YOUR TIME especially if you have

changed the clickers a lot from what you had been using, it can take a good few laps to start to feel comfortable.

Remember, turning your clickers in (clockwise) makes the compression stiffer and the rebound slower. When starting to adjust the settings, it's probably easier to feel the difference from the compression clickers than the rebound clickers.

When adjusting the front forks, try to keep in mind that you are tuning the forks for "on ground" obstacles such as breaking bumps, accelerating bumps, roller sections and so on. If you get the front forks feeling comfortable on the ground, but feel like they are bottoming when taking off and landing from a jump, you can try adding more oil to the forks in 10ml increments to accommodate more bottoming resistance. Again, a recommended oil volume will be given in the owner's manual. This will be an iterative process and try to adjust your clickers by 1 or 2 clicks each time you go out until you feel comfortable. The rebound should be a slightly underdamped response, meaning that if you compress the suspension, the fork should rebound at enough speed to move the forks back up past the race sag position but settle very quickly after this point. It can be really tricky to know that rebound is set correctly, but try and pay attention to the movement of the suspension when turning on flat rough ground. We have found that this is where rebound adjustment can be felt the most if you are happy with your compression setting. If the front feels like it's very loose and dancing around, turn the rebound in to slow down the rebound, if it feels dead and harsh, like it's being held deep in the stroke, open the clicker to allow the rebound stroke to move faster.

When adjusting the rear suspension, start with the low-speed adjuster. Low-speed doesn't mean you are riding slowly; it means that the shock shaft is travelling through the shock body slowly. Examples of low speed movements, are when you are travelling on the ground over rises and falls without getting much or any air time. It's also when the bike moves into a squatting position when going from the brakes to accelerating. Try and find parts of the track or terrain without jumps or square edge holes to fine tune your low speed adjustment. When you are comfortable with the low-speed setting, move on to the high-speed adjuster. High-speed movements are where the shock shaft is forced very quickly through the stroke over a short distance. Examples of this are nasty square edge holes, and steep jump take off and landings. Find a part of the track with severe accelerating bumps and jumps to make adjustments to the high speed-adjuster. Remember though, there is going to be a compromise here, the stiffer you make the high-speed for jumps, the less comfort you will have over accelerating bumps. You are going to have to decide what you want to compromise on and this is why line choice is so important when racing. If you can find a smooth line, you can continue to hammer the jumps while not giving up rear wheel traction out of the corners. Adjusting rear rebound is similar to adjusting it for your forks, but pay attention to jump take offs as well, if the back end feels a bit wild just as you leave the peak of the jump.

Each time you are on track, try and give some time to think about what your bike is doing, and what changes you could make based on your experience to make it better.

Suspension set-up and feeling what the bike is doing is not easy, which is why there are riders such as Travis Preston and Kris Keefer whose whole job is to test bikes and new parts because they have really concentrated on feeling what the bike is doing throughout their decades of riding, and their experience. So, don't feel put off if it takes a while, or even a few years to get used to adjusting your settings.

This is why we are developing Motoklik, so you don't even have to think about your suspension set-up, and give you full confidence when you're on track!

We're really looking forward to getting Motoklik out to you, so please keep an eye on our website for the latest news, or you can contact us through the form on our website.

Happy riding, braap!

Jens Köpke, CEO, Motoklik

Suspension Set-Up Check Sheet

Pre-ride bike checks.

Item	Frequency	Complete
Spoke Tightness	Every Ride	
Tyre Pressure	Every Ride	
Chain Tension	Every Ride	
Oil Weeping from Fork	Every Ride	
Swingarm Axle Bearings	≈5Hrs	
Linkage Bearings	≈5Hrs	
Top Shock Mount Bearing	≈5Hrs	
Front Wheel Bearings	≈5Hrs	
Rear Wheel Bearings	≈5Hrs	
Steering Stem Bearing	≈5Hrs	
Dust Seal Clean	≈5Hrs	
Full Suspension Service	≈20Hrs	

Pre-ride bike set-up

Item	Value
Fork Height Position in Clamps	
Fork Full Extension mm (L1)	
Fork Race Position mm (L2)	
Fork Race Sag mm (L1-L2)	
Fork Oil Volume ml	
Shock Full Extension mm (L1)	
Shock Static Position Low mm (L2)	
Shock Static Position High mm (L3)	
Shock Static Sag mm (L1-((L2+L3)/2))	
Shock Race Position Low mm (L4)	
Shock Race Position High mm (L5)	
Shock Race Sag mm (L1-((L4+L5)/2))	

Bike set-up at the track.

Item	Value
Total Front Compression Clicks	
Total Front Rebound Clicks	
Total Rear Low-Speed Compression Clicks	
Total Rear High-Speed Compression Turns / Clicks	
Total Rear Rebound Clicks	