Shock Absorber for MC Road & Track

TTX GP

Owner’s Manual
Öhlins Racing AB - The Story

It was the 1970’s, a young man named Kenth Öhlin spent most of his spare time pursuing his favourite sport: motocross.

Being a careful observer, Kenth’s attention was continuously drawn to one specific detail - motocross bikes had more engine power than their suspension could handle. It was not long before Kenth realised that better performance could be achieved by improved wheel suspension.

Öhlins Racing was established in 1976, and just two years later the company won its first World Championship title. Despite being in the business for more than 40 years, the search for perfection and new functions is still the main focus of the company.

Congratulations! You are now the owner of an Öhlins product. More than two hundred World Championships and other major world titles are definitive proof that Öhlins products offer outstanding performance and reliability.

Every product has gone through rigorous testing and engineers have spent thousands of hours, doing their very best to use every possible experience from our 40 years within the racing sport.

The product that you now have in your possession is pure racing breed that is built to withstand.

By installing this product on your vehicle you have made a clear statement… you are a serious rider or driver with a focus on getting the maximal handling ability and outstanding feedback from your vehicle. Along comes the fact that your Öhlins product will be a long lasting friend, delivering the very best of comfort and performance every time you go for a ride. Go explore!
General Warnings

⚠ Note!
The shock absorber/front fork/steering damper is an important part of the vehicle and will affect the stability.

⚠ Note!
Read and ensure you understand the information in this manual and other technical documents provided by Öhlins, before using the product.

⚠ Note!
Öhlins Racing AB can not be held responsible for any damage to the shock absorber/front fork/steering damper, vehicle, other property or injury to persons, if the instructions for mounting, usage and maintenance are not followed exactly.

⚠ Warning!
After installing the Öhlins product, take a test ride at low speed to ensure your vehicle has maintained stability.

⚠ Warning!
If the suspension makes an abnormal noise, or the function is irregular, or if you notice any leakage from the product, stop the vehicle immediately and return the product to an Öhlins dealer.

⚠ Warning!
The product warranty shall only apply if the product has been operated and maintained in accordance with recommendations in this manual. If you have any questions regarding usage, service, inspection and/or maintenance please contact Öhlins.

⚠ Note!
When working with the Öhlins product, always read the vehicle service manual.

⚠ Note!
This manual shall be considered as a part of the product and shall accompany the product throughout its life cycle.

SAFETY SYMBOLS

In this manual, mounting instructions and other technical documents, important information concerning safety is distinguished by the following symbols:

⚠ The Safety Alert Symbol means: Warning! Your safety is involved.

⚠ Warning!
The Warning Symbol means: Failure to follow warning instructions can result in severe or fatal injury to anyone working with, inspecting or using the shock absorber, or to bystanders.

✋ Caution!
The Caution Symbol means: Special precautions must be taken to avoid damage to the shock absorber.

⚠ Note!
The Note Symbol indicates information that is important regarding procedures.

Product Specific Warnings

⚠ Warning!
This product was developed and designed exclusively for a specific vehicle model and shall only be installed on the intended vehicle model in its original condition as delivered from the vehicle manufacturer.
Straight from the champions - the new TTX GP is Öhlins latest range of shock absorbers for sport and supersport bikes. Based on the highly regarded TTX technology and developed from Öhlins vast experience in MotoGP.

More than 10 years have passed since the TTX36 was introduced to the supersport motorcycle scene. It has been used on road and at tracks around the world, both as aftermarket and OEM. This variety of users and customers inspires Öhlins to constantly work our hardest to improve this product for you.

This version of TTX36 GP features a number of upgrades, targeting areas like performance, consistency and ease of use. You will experience an improved bump absorption AND at the same time better chassis stability, due to the new compression valve design. This will help you keep a precise line through turns. A new main piston and piston band gives you improved consistency and durability. Adjusting the TTX36 GP’s compression and rebound is still possible to do by hand or with a tool, but thanks to new adjustment knobs is now easier to do by hand than before.

We hope you will be more than satisfied with your new TTX36 GP!

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Inside the TTX GP

When the shock absorber moves
When the shock absorber moves, the fluid inside is forced to flow through the compression valve or the rebound valve, depending on the direction of the movement, followed by going through either the rebound check valve or compression check valve and to the other side of the main piston (figure 2 and 3). The piston rod displaces the fluid into or out of the reservoir.

The reservoir
The reservoir is connected to the damping system in a way that regardless of the direction of the movement the reservoir will be connected to the low pressure side of the main piston.

The compression and rebound valves
The compression and rebound valves have three flow paths for the fluid, the bleed valve, shim valve and the check valve.

The bleed valve (figure 1 center grey arrows) is a small orifice giving a flow restriction by its small size. In the shim valve (figure 1 black arrows) the fluid pressure must deflect the thin steel washers to open up the valve to allow fluid to flow through. The check valve (figure 1 outer white arrows) contains a spring preloaded shim that opens easily for return flow of fluid when the movement direction changes.

The bleed valve and the shim valve build up the damping force. At slow stroke speeds the amount of fluid going through the bleed valve is higher. At a fast stroke the shim valve takes care of most of the fluid flow. The check valve, together with the bleed valve (since it can flow both directions), handle return flow.

Basic flow during compression stroke.
Control the damping force

When you turn the compression or rebound adjuster you change the size of the bleed valve. Depending on which direction you turn the adjuster you either increase or decrease the damping force. The characteristics of the damping action can be changed by changing the shim stack set up, like for example shim thickness, diameter and shape as well as number of shims. Please note that only approved Öhlins personnel must change the shim stack set up.

Compression damping

When the motorcycle movement compresses the shock absorber, the fluid above the main piston is pressurized (more than the gas pressure set in the shock absorber). The pressurized fluid then goes through:
- the compression adjuster bleed valve
- the compression adjuster shim valve
- the channel connected to the reservoir
- the rebound adjuster check valve and between the inner and the outer tube to the other side of the main piston.

During compression stroke the piston rod goes into the shock absorber body and the displaced volume of damper fluid flows into the reservoir. The fluid moves the separating piston inside the reservoir.

Rebound damping

When the spring forces the shock absorber to extend, the fluid below the piston is pressurized (more than the gas pressure set in the shock absorber) and must move. The flow goes through:
- the rebound adjuster bleed valve
- the rebound adjuster shim valve
- the channel connected to the reservoir
- the compression adjuster check valve into the inner tube and to the upper side of the main piston.

The fluid that was displaced into the reservoir during compression stroke is now pushed back into the shock absorber main body by the gas pressure. The separating piston will move inside the reservoir as the fluid is pushed out.
**2 SPRING PRELOAD**

**Spring preload and rear ride height**

When you set the spring preload you move the spring seat. This will decrease or increase the initial spring force, which will lower or raise the motorcycle rear ride height.

The spring preload is important for the shock absorber’s performance. If the preload is incorrectly set, any other adjustments will not help to get the intended performance from the shock absorber. The spring preload is the difference between the free spring length and the installed spring length.

![Diagram](image)

A Free spring length  
B Installed spring length  

*Shock absorber fully extended*  
A - B = Spring Preload

**Set the spring preload**

**Hydraulic spring preload adjuster**

Turn the hexagon screw or the knob on the hydraulic adjuster to set the spring preload. Turn clockwise to increase the spring preload and turn counter clockwise to decrease the spring preload.

**Mechanical spring preload adjuster**

Use two C-spanners. Hold the lock nut with one C-spanner and turn the spring platform to the desired position with the other C-spanner.
**Compression and rebound**

Compression damping controls the energy absorption when the shock absorber is being compressed, thus controls how easy the shock absorber compresses when the rear wheel is being loaded or hits a bump.

Rebound damping controls the energy absorption when the shock absorber is being extended and controls how fast the shock absorber returns to its normal position after being compressed.

**Set compression and rebound**

Use a 3 mm Allen key, or your fingers, to adjust the compression and rebound damping.

Turn clockwise to increase the damping, turn counter clockwise to decrease the damping.

**How to set**

The adjusters have a normal right hand thread. Turn the adjuster clockwise to fully closed position (position zero [0]). Then, turn counter clockwise to open, and count the clicks until you reach the recommended number of clicks. See recommended Setup data in the Mounting Instructions for your shock absorber.

**Caution!**

*Turn the adjusters gently not to damage delicate sealing surfaces.*

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**Length**

When you change the shock absorber length, you change the steering geometry as well as the chain force.

A shorter shock absorber gives a lower motorcycle. The fork angle as well as the trail will increase, and normally the chain force will be reduced with less anti-squat as a result. Another result when you change the length is a slight change of center of gravity.

A longer shock absorber gives a higher motorcycle. The fork angle and trail will decrease and normally the chain force will increase with more anti-squat as a result. Another result is a slight change of center of gravity.

**Warning!**

*Change the length moderately on modern supersport and race bikes. A small change can make a big difference.*

**Change shock absorber length**

1. Measure the ride height before and after you change the length (see chapter 5).
2. Remove the shock absorber from the vehicle.
3. Use two 24 mm wrenches. Hold the upper nut with one hand and at the same time loosen the lock nut (lower nut).
4. Turn the end eye/bracket to the desired length. 1 turn is the same as 1 mm shock absorber length.
5. Tighten to 40 Nm.

**Warning!**

*Make sure that you tighten the lock nut after you have changed the length.*

**Warning!**

*Do not thread out the adjustable end eye/bracket more than that the groove is fully visible beneath the lock nut. This is maximum length.*
⚠ Warning!
Before you ride, make sure that the setup is according to recommended setup in the Mounting instructions. Take notes, adjust in small steps and make only one adjustment at a time.

Step 1

Spring Preload - Free Sag - Ride Height
Spring preload is a crucial part of setting your motorcycle since it affects the height of the motorcycle and the fork angle.

1. Work on a flat surface. Put the motorcycle on a work stand so that both wheels are off the ground and the suspension is unloaded.
2. Make a mark, for example with a piece of tape, at a point immediately above the rear wheel axle.
3. Measure the distance from the marked point to a fixed point, for example the wheel axle (R1).
4. Measure the distance from the bottom of the upper triple clamp to a fixed point, for example the front wheel axle (F1).
5. Put the motorcycle on the ground so that the front and the rear suspensions are slightly compressed. Repeat the measuring procedures (R2 and F2).
6. Sit on the motorcycle in normal riding position, properly outfitted in your riding gear. Repeat the measuring procedure (R3 and F3).

Recommended Measures
If no other recommendations are given in the Mounting Instructions follow these measures:

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<table>
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<tbody>
<tr>
<td><strong>Free sag</strong></td>
<td></td>
</tr>
<tr>
<td>Rear (R1-R2)</td>
<td>8-18 mm</td>
</tr>
<tr>
<td>Front (F1-F2)</td>
<td>23-33 mm</td>
</tr>
</tbody>
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<tbody>
<tr>
<td><strong>Ride height</strong></td>
<td></td>
</tr>
<tr>
<td>Rear (R1-R3)</td>
<td>25-35 mm</td>
</tr>
<tr>
<td>Front (F1-F3)</td>
<td>33-45 mm</td>
</tr>
</tbody>
</table>

⚠ Note!
Check the Öhlins web site www.ohlins.com or contact an Öhlins dealer for the latest information.

Step 2

Adjust Spring Preload
1. If your measures differ significantly from the recommendations in the Mounting Instructions or the table above, adjust the spring preload. (See section Spring Preload in this manual).
2. If the ride height still differs from the recommendations, you may need to change to softer/harder spring. Contact an Öhlins dealer for advice.

⚠ Warning!
Incorrect spring rate may result in a front geometry that is either too steep or too flat. This can result in a tendency of under or over steering, that could seriously affect the handling characteristics of the motorcycle.
Stability and Traction
All motorcycles are designed with a suspension geometry that includes ride height and fork angle. If you change any of the components, the suspension geometry can be changed. Therefore it is very important that the front and the rear ends match each other. The front and the rear loaded heights must be within the recommended measures.

Front Fork Springs
Öhlins Racing has a variety of front fork springs available for a large number of motorcycle models. The springs combined with the Öhlins shock absorbers give a superior stability and traction. Contact Öhlins for more information.

⚠ Warning!
If there are no matching springs for your motorcycle model, use the original springs, however, they must be in good condition and not fatigued.

Setting up
If you test by trial and error and change the different adjustment possibilities you can learn how the different settings affect your motorcycle.

Always begin your setting by taking a test ride with all adjustments at the recommended set up. Choose a short run of varying character, for example with long as well as sharp bends, hard as well as soft bumps. Stay on the same run and adjust only one setting at a time.

Recommended adjustment range
Rebound and compression damping: ±5 clicks from original (basic) setting.

For original setting see the Mounting Instructions for your shock absorber. Set up your rear suspension together with the front fork and for all types of tracks that you want to optimize, there are no set-ups that will be 100% perfect on all tracks, you will need to compromise.

To ride safely and use less energy, prioritize:
• safety
• stability
• comfort

Basic guidelines
Rebound Damping
If the bike with spring, preload and the ride height feels good but the bike runs low and packs down under acceleration bumps, with too wide line and/or lost comfort and traction, open the rebound adjuster two [2] clicks.

If the bike is nervous and moving a lot or has a high feeling entering corners, close the rebound adjuster two [2] clicks. Fine tune one [1] click at the time. Test run and make the necessary adjustments.

Compression Damping
If the bike feels soft, unstable, is using too much wheel travel although you have the perfect spring for you; close the compression adjuster two [2] clicks. This will control the wheel during acceleration more, plus, it will help ride height and falling through the stroke too quickly.

If the bike feels high, has bad grip at throttle

FGK and FKR kits
Öhlins Racing also produces complete Racing Cartridge Systems to upgrade your front fork to a higher performance level.

FGK

FKR
4 ADJUSTMENT AND SET UP

opening and feels uneven over small or medium bumps during acceleration; open the compression adjuster two [2] clicks. Test run and make necessary corrections. When you experience an improvement, go back to where you started and check once again. Note other relevant factors such as tires, temperature etc. Test run to see if you need to make any further fine adjustments.

5 INSPECTION AND MAINTENANCE

Preventive maintenance and periodic inspection procedures help to keep the shock absorber in proper condition. For additional service, please contact an approved Öhlins dealer.

**Cleaning**
Clean the external parts of the shock absorber with a soft detergent. Use compressed air. Make sure that all dirt is removed. Lift the bump rubber and clean the area below. Keep the shock absorber clean and spray it with oil (WD40, CRC 5-56 or equivalent) after washing. Wipe off excessive oil with a cloth.

**Caution!**
*Do not use strong detergent such as contact cleaner or equivalent. Do not spray water directly into the adjuster knobs and/or the ball joints.*

**Inspection**
1. Check ball joints for possible excessive play or stiction.
2. Check the piston shaft for leakage and damage.
3. Check the shock absorber body for damage.
4. Check the reservoir for external damage that can prevent the floating piston from moving freely.
5. Check the rubber components for wear.
6. Check the attachment points of the shock absorber to the vehicle.

**Recommended Service Intervals**
- Racing: Every 10 hours of operation. Maximum 20 hours of operation without service and oil change.
- Regular street use: Every 30,000 km

<table>
<thead>
<tr>
<th>If the bike feels:</th>
<th>Try this:</th>
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</thead>
<tbody>
<tr>
<td>Unstable, loose, bouncy</td>
<td>→ Increase rebound damping</td>
</tr>
<tr>
<td>Hard, bumpy</td>
<td>→ Decrease rebound damping</td>
</tr>
<tr>
<td>Unstable, soft, low and bike is bottoming</td>
<td>→ Increase compression damping</td>
</tr>
<tr>
<td>Harsh, hard and has bad grip</td>
<td>→ Decrease compression damping</td>
</tr>
</tbody>
</table>

**Disposal**
Hand over your discarded Öhlins products to an Öhlins dealer for proper disposal.

**Note!**
The Öhlins shock absorber should only be filled with Öhlins High Performance Shock Absorber Fluid. Contact an Öhlins dealer for advice.

**Warning!**
*Do not change the gas pressure. Special purpose charging equipment and access to nitrogen is required.*