



Shock Absorber for MC Road & Track

TTX GP

Owner's Manual



ADVANCED SUSPENSION TECHNOLOGY



Öhlins Headquarters Upplands Väsby, Sweden

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 35 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 35 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!

SAFETY PRECAUTIONS

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.

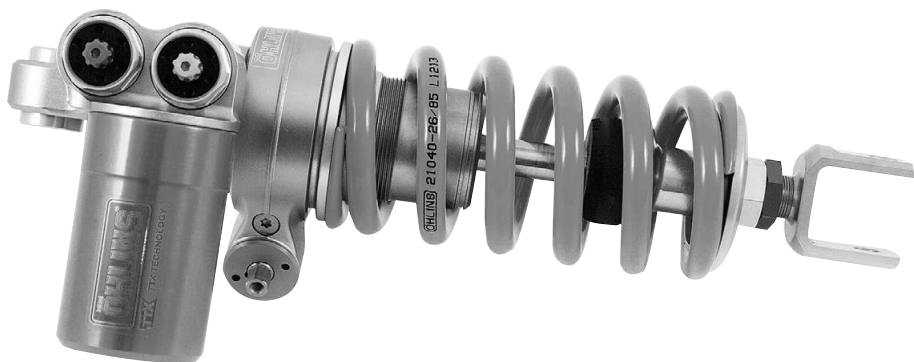
Note!

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 hypersport bikes. Based on the highly regarded TTX technology and developed from Öhlins vast experience in MotoGP.

So what's new compared to the TTX36 MkII? The compression and rebound adjusters have been improved even further with a new adjustment needle, providing better guidance and a different flow restriction behaviour. The function of the damper is more consistent with less variation and the adjusters work in a more precise manner. A new main piston completes the package, designed to improve traction and rider control. Did we mention that the weight is even more reduced?

Among the advantages are a much improved chassis feedback as well as enhanced performance. Also, the adjustment range is wider and with this new design, the variation in behaviour from one shock absorber to another is reduced - a proof of Öhlins commitment to precision. The TTX GP continues on the TTX36 path, sharing and improving on the benefits of one of the best shock absorbers in the world.

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1 DESIGN

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

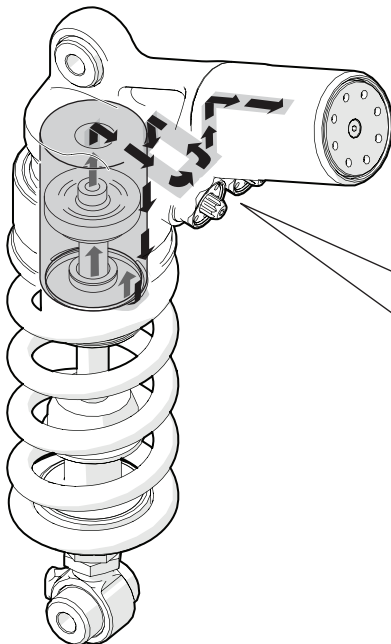
The reservoir is connected to the damping system in a way that regardless of the direction of the movement the reservoir will be connected to the low pressure side of the main piston.

The compression and rebound valves

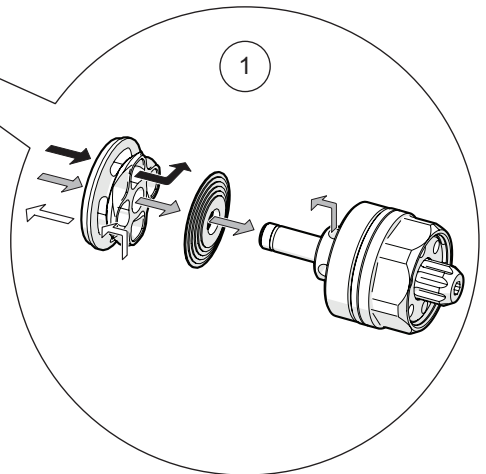
The compression and rebound valves have three flow paths for the fluid, the bleed valve, shim valve and the check valve.

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.



1 DESIGN

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.

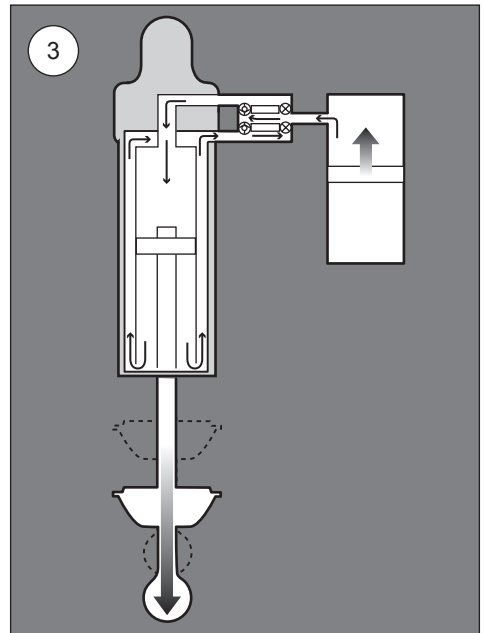
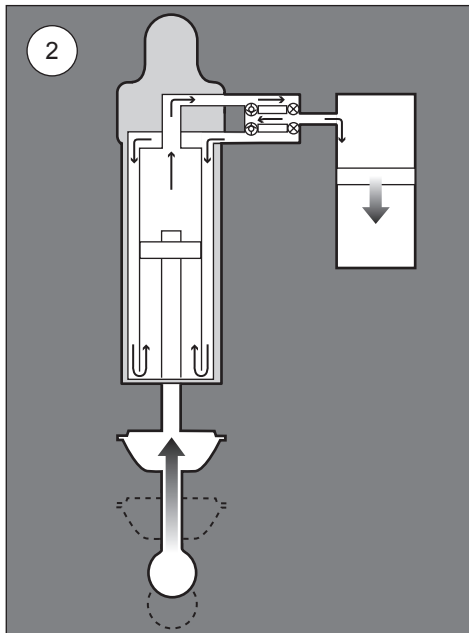
During compression stroke the piston rod goes into the shock absorber body and the displaced volume of damper fluid flows into the reservoir. The fluid moves the separating piston inside the reservoir.

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.

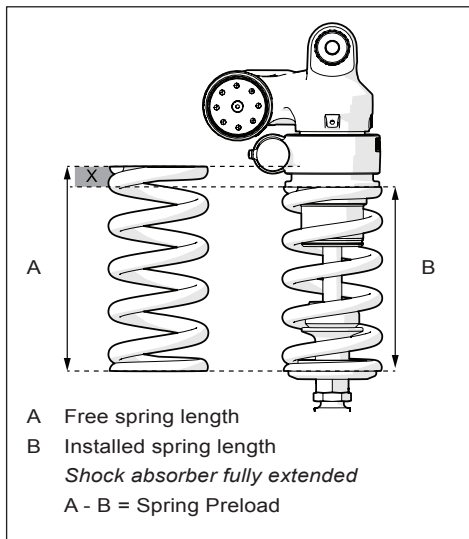


2 SPRING PRELOAD

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.



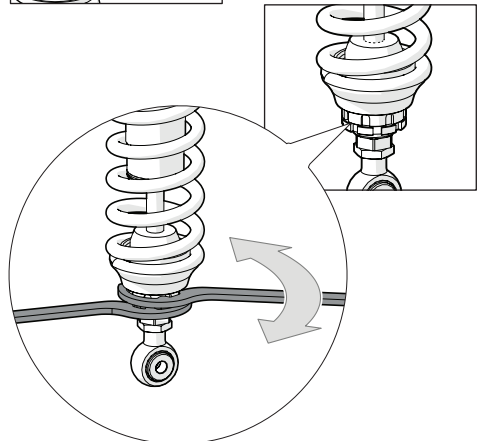
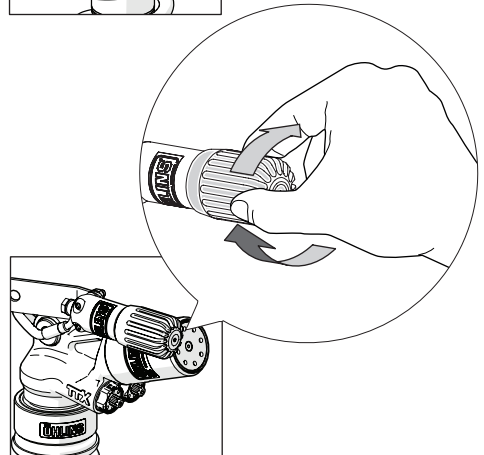
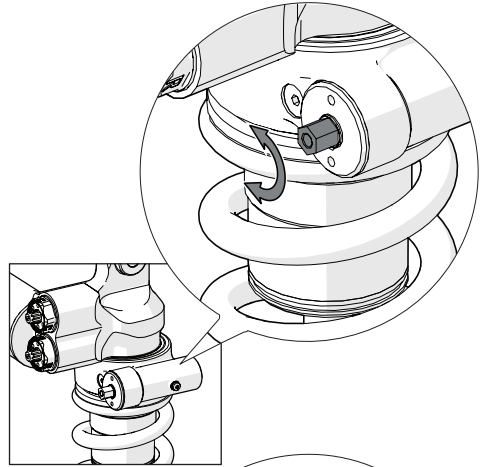
Set the spring preload

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.



3 COMPRESSION, REBOUND AND LENGTH

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.

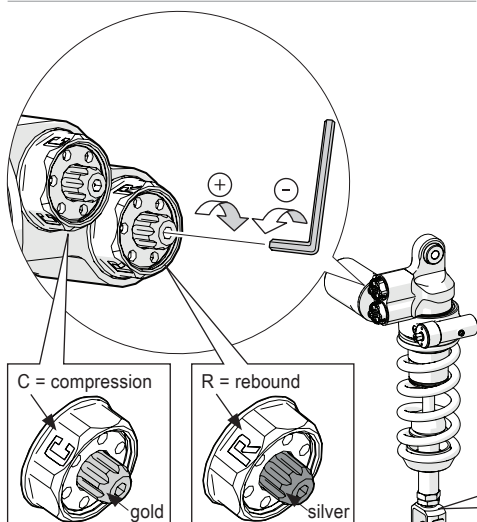
Turn clockwise to increase the damping, turn counter clockwise to decrease the damping.

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.



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 hypersport and race bikes. A small change can make a big difference.

Change shock absorber length

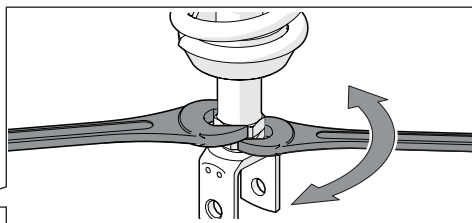
1. Measure the ride height before and after you change the length (see chapter 5).
2. Remove the shock absorber from the vehicle.
3. Use two 24 mm wrenches. Hold the upper nut with one hand and at the same time loosen the lock nut (lower nut).
4. Turn the end eye/bracket to the desired length. 1 turn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



4 ADJUSTMENT AND SET UP

⚠ 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:

Free sag	
Rear (R1-R2)	5-15 mm
Front (F1-F2)	20-30 mm
Ride height	
Rear (R1-R3)	25-35 mm
Front (F1-F3)	30-40 mm

👁 Note!

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

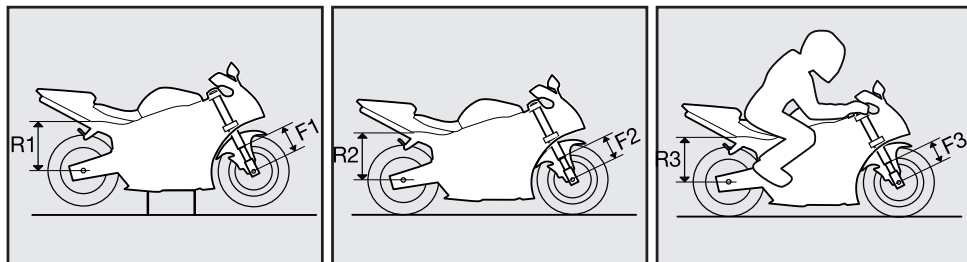
Step 2

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.



4 ADJUSTMENT AND SET UP

Stability and Traction

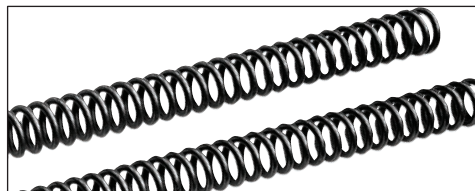
All motorcycles are designed with a suspension geometry that includes ride height and fork angle. If you change any of the components, the suspension geometry can be changed. Therefore it is very important that the front and the rear ends match each other. The front and the rear loaded heights must be 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.



FGK and FGR kits

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



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

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.

If the bike feels:	Try this:
Unstable, loose, bouncy	→ Increase rebound damping
Hard, bumpy	→ Decrease rebound damping
Unstable, soft, low and bike is bottoming	→ Increase compression damping
Harsh, hard and has bad grip	→ Decrease compression damping

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!

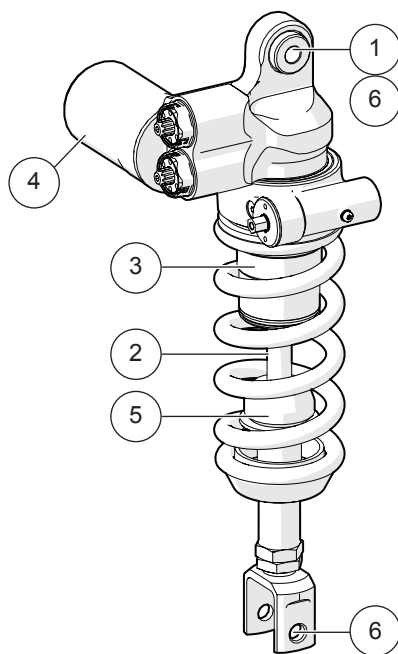
Do not use strong detergent such as contact cleaner or equivalent. Do not spray water directly into the adjuster knobs and/or the ball joints.

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



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.

Your Öhlins retailer:

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www.ohlins.com

