



Öhlins Shock Absorber

# ***TTX22M Metric***

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 continually 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 almost 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 Shock Absorber. More than two hundred World Championships and other major world titles are definitive proof that Öhlins shock absorbers 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 almost 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 shock absorber on your bike you have made a clear statement... you are a serious rider with focus on getting the maximum handling and outstanding feedback from your bike. Along comes the fact that your shock absorber 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

## **Note!**

*The shock absorber is an important part of the bike and will affect the stability.*

## **Note!**

*Read and ensure you understand the information in this manual and other technical documents provided by the bike manufacturer before using the product.*

## **Note!**

*Öhlins Racing AB can not be held responsible for any damage to the shock absorber, bike, other property or injury to persons, if the instructions for mounting, usage and maintenance are not followed exactly.*

## **Warning!**

*After you have installed the Öhlins product, take a test ride at low speed to ensure that the 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 MTB authorized Öhlins service center. Products for Specialized bikes can also be handled by an authorized Specialized service center.*

## **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 an MTB authorized Öhlins service center. Products for Specialized bikes can also be handled by an authorized Specialized service center.*

## **Note!**

*When working with the Öhlins product, always read the bike manufacturer's manuals.*

## **Note!**

*This manual shall be considered as a part of the product and shall therefore 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.*

### **Warning!**

*This product was developed and designed for the bike industry and shall only be installed on to related vehicles, including pedal-assisted motorized cycles that produces a maximum of 250 watts of power. DO NOT use any Öhlins bicycle suspension product on any throttle-equipped motorized cycle or any vehicle carrying more than one operator or rider, such as a tandem bicycle or heavy utility bicycle. Any use outside of these terms must be approved by Öhlins on a case-by-case basis. Any such unauthorized misuse may result in failure of the suspension, which may cause a crash and result in property damage, SERIOUS INJURY OR DEATH, and void warranty.*

### **Warning!**

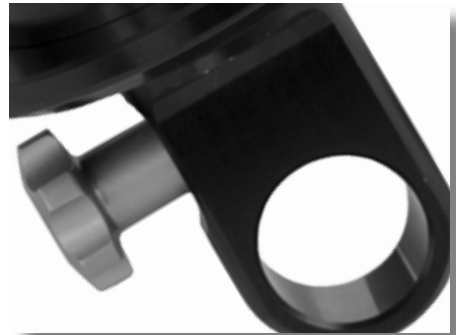
*This product contains pressurized nitrogen gas (N<sub>2</sub>). Do not open, service or modify this product without proper education and proper tools. Service must only be done by an MTB authorized Öhlins service center. Products for Specialized bikes can also be handled by an authorized Specialized service center. In some cases the shock absorber may need to be sent to another region for service.*

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# CONTENTS

## In this manual

Design.....	3
Spring preload .....	6
Compression and rebound.....	7
Setting up your bike .....	8
Inspection and Maintenance .....	10



## DESIGN

Congratulations on choosing the Öhlins TTX22M bike shock absorber - the most unique high-performance racing shock absorber available today. This shock absorber design is the culmination of two decades of Öhlins successful participation in World Championship events.

This shock absorber draws on all the expertise developed by Öhlins while winning more than two hundred World Championships.

The TTX22M shock absorber is designed to handle the most challenging World Cup Downhill tracks while still providing a pedal efficiency for the flat and uphill sections.

The Öhlins TTX22M features a patented concept with a unique twin tube design that allows for the gas pressure to always back-up the low-pressure side of the piston to keep pressure at a controlled level. This ensures consistent damping performance on all types of terrain and improves damping response to give outstanding control of the bike and tire movements.

As a rider you will experience improved traction, riding comfort and control which gives the confidence and possibility to go faster down the track or up the hill.

The twin tube design also gives the possibility to have totally separated adjusters for compression and rebound damping.

Temperature stability is maintained by using a flow restriction design in the bleed valves, that creates a turbulent flow at very low piston velocities. Also, materials with different thermal expansion rates are used to compensate for the viscosity change in the fluid due to temperature changes.

The Öhlins shim system offers infinite combinations of shim stacks with a wide spectrum of different character using the same piston.

The whole system is pressurized by nitrogen gas behind a bladder to ensure gas and fluid being separated.



# DESIGN

## Inside the shock absorber

When the shock absorber moves, the fluid inside is forced to flow through two types of orifices, bleed valves and shim valves;

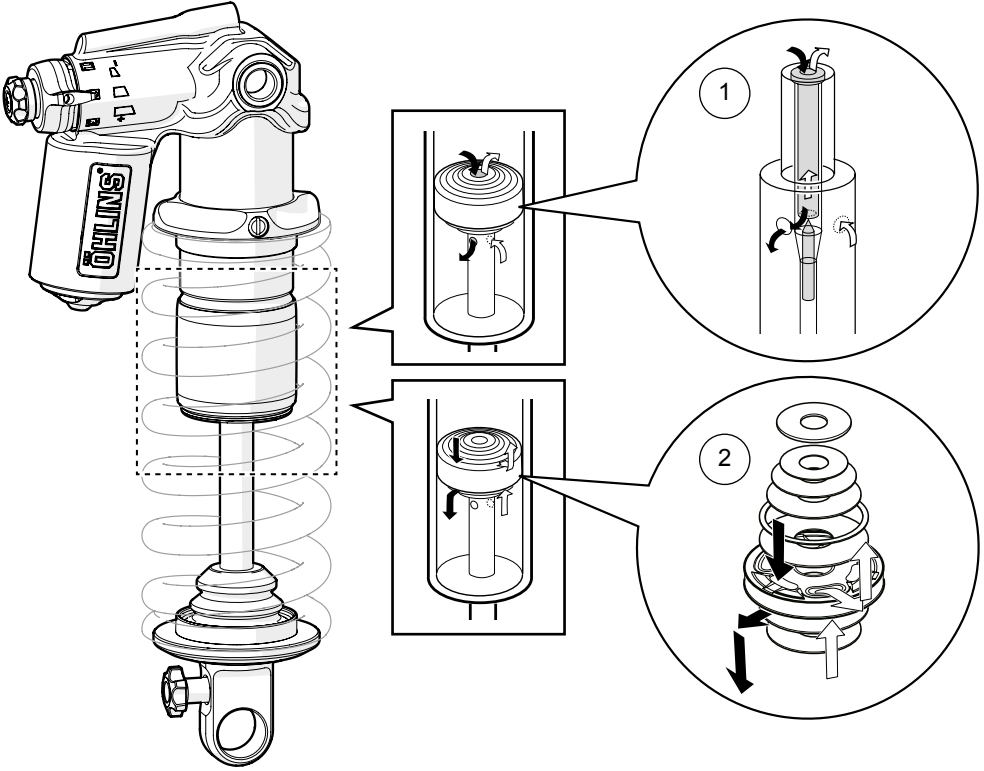
**Bleed valves** (Fig.1), small orifices that create a flow restriction simply by being small and **shim valves** (Fig.2) where fluid pressure has to deflect thin steel washers (shims) to open up an orifice to allow fluid to flow through it.

To control damping force the bleed valves can be changed in size by the external adjusters, compression and rebound.

The characteristics of the damping action can be changed by changing the size of the shim stack (number, thickness, diameter and shape) on the shim valve.

**Note!**

*Only authorized service centers must make changes of the shim stack.*



## Compression Damping

When movement of the bike causes compression of the shock absorber, (Fig. 3) the fluid above the piston is pressurized, and needs to move. The fluid then has three different escape routes:

1. Piston compression shim valve
2. Compression adjuster bleed valve
3. Compression adjuster shim valve

The fluid will at every compression movement flow through all these routes but at low damper velocities, the percentage going through the bleed is higher, and at higher velocities the shim valves take care of most of the flow. The TTX twin tube concept offers more adjustability from the compression valve without increasing internal pressures due to its optional flow path.

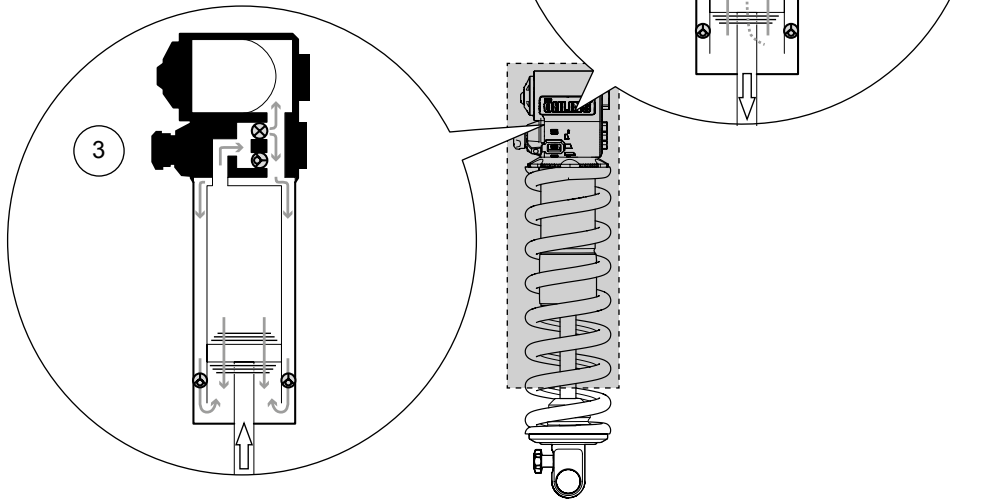
During compression movement, the piston rod volume is entering the main body and the corresponding volume of damper fluid has to flow into the reservoir through the compression valve, the bladder compresses, resulting in an increased gas pressure.

## Rebound Damping

When the spring forces the shock absorber to extend again (Fig. 4), the fluid below the piston is pressurized and forced to move. Due to the check valve design all flow will go through the piston where the flow takes two different routes:

1. Rebound adjuster bleed valve
2. Piston rebound shim valve

This helps to increase rebound adjustment range which makes it easier to set up the shock absorber for a wide variety of spring stiffness's and rider preferences without the need to change the rebound shim stack. The fluid that was displaced into the reservoir during compression movement is now pushed back into the main body by the gas pressure.



# SPRING RATE

When you change the spring rate or adjust the spring preload by moving the spring seat, you will lower or raise the bike ride height.

The sag is essential for the function of the suspension. If you use a spring with incorrect spring rate or the preload is incorrectly set, any other adjustments will not help to get the intended performance from the suspension.

## Change spring and set spring preload

1

Use a 2.5 mm allen key to remove the rebound knob.

2

Loosen the plastic stop screws and turn the spring seat to move it towards the cylinder head.

3

Push the spring clip up to access and remove the circlip.

4

Remove the spring and replace it with one with the proper spring rate.

5

Install the spring clip.

6

Turn the spring seat against the spring. Preload the spring a maximum of 2 full turns. Gently tighten the plastic stop screws to lock the adjuster in place.

### **Note!**

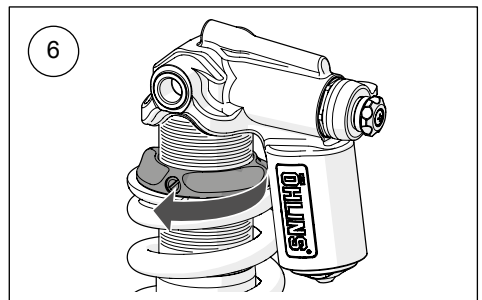
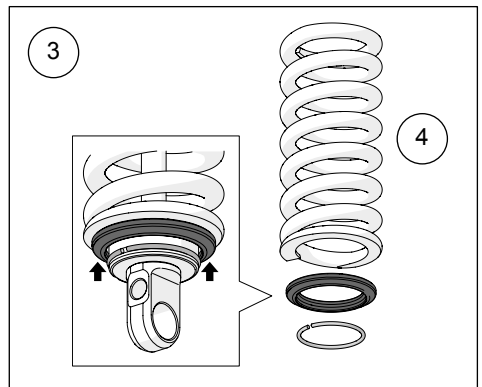
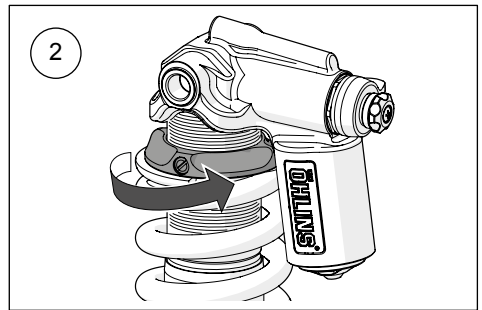
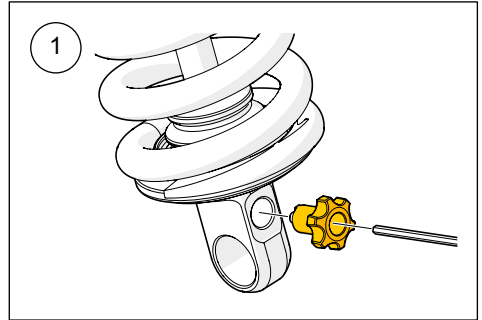
Very low torque is required to achieve the required function.

7

Install the rebound knob.

### **Note!**

If you preload the spring 1-2 full turns and do not get a proper sag you may need to change the spring rate. Contact an authorized service center for advice.





# COMPRESSION AND REBOUND

*Compression damping controls the energy absorption when the shock absorber is being compressed, thus controls how easily the shock absorber compresses when you hit 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.*

## To set the adjusters

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.

### ⚠ Caution!

*Turn gently not to damage delicate sealing surfaces. Tighten with your hand only.*

## Compression damping adjuster

### 1. Adjust low speed

To adjust, turn the blue colored adjuster on the side of the cylinder head. Turn clockwise to increase damping, turn counter clockwise to decrease.

### 2. Adjust high speed

To adjust, turn the black colored adjuster on the side of the cylinder head.

#### Position

I	soft
II	medium
III	hard

### 👁 Note!

*For certain models the third position is a pedal platform and will thus increase the damping substantially. This position is only recommended for prolonged climbs or stretches of transportation to the trail head.*

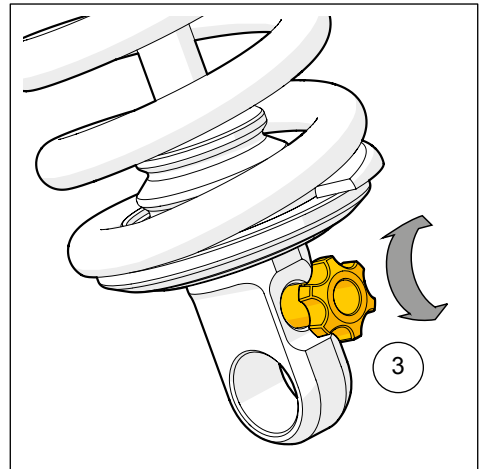
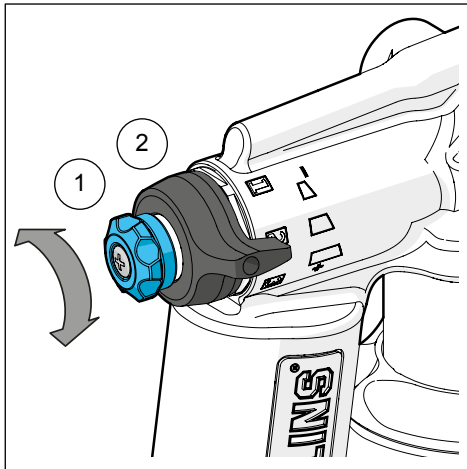
## Rebound damping adjuster

### 3. Adjust rebound

Turn the gold colored adjuster on the end eye/ bracket. Turn clockwise to increase damping, turn counter clockwise to decrease.

### 👁 Note!

*The rebound adjuster is designed to compensate for temperature changes, the number of clicks may differ slightly between a cold and a warm shock absorber. The recommended setting applies for room temperature.*





# SETTING UP YOUR BIKE

## **⚠ Warning!**

*Before you ride, always make sure that the recommended settings set at delivery from Öhlins are intact. Adjust in small steps, take notes and make only one adjustment at a time.*

## **Setting sag and preload**

Setting the sag is a crucial part of setting your bike since it affects the height of the bike and the fork angle.

## **👁 Note!**

*This procedure must be performed on a flat surface. Do not jump or bounce on your bike as it will result in an inaccurate sag measurement.*

**1**

Push the bump rubber up against the stop cap.

**2**

Sit carefully on the bike in normal riding position, properly outfitted in your riding gear.

**3**

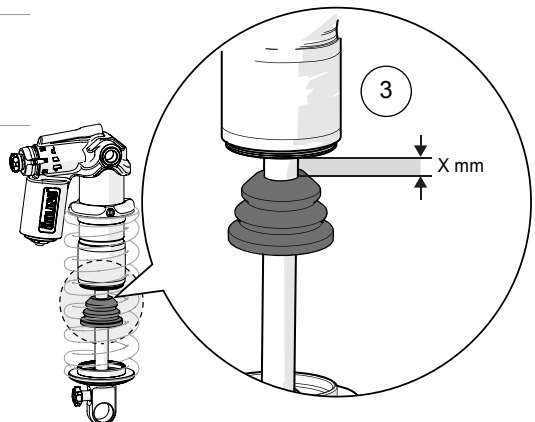
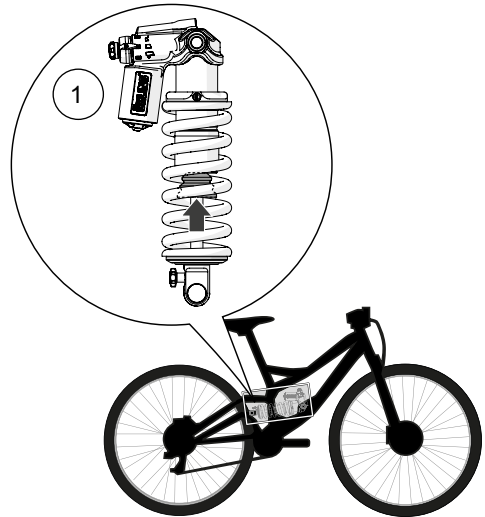
Carefully step off the bike and measure the distance between the stop cap and the bump rubber.

Correct sag depends on the bike model and the rider's preferences.

A general guideline for recommended sag is 25-35% of the stroke. For more details contact an authorized service center.

## **⚠ Warning!**

*Incorrect spring rate may produce a fork angle that is too steep or too flat. This may give a tendency for over- or understeering, which could seriously affect the handling characteristics of the bike.*



# SETTING UP YOUR BIKE

## Stability and traction

All bikes are designed with a suspension geometry that include height and fork angle. Changing components may affect this and it is therefore essential that the front and rear ends match each other. Changing to Öhlins suspension gives optimum performance only when both the front fork and the rear suspension interact properly. It is very important that the front and the rear ride heights are within the specified values.

## General setup

By adjusting the shock absorber and testing by trial and error you can learn how the different settings affect your bike. Always begin your setup process by taking a test ride with all adjustments at their recommended basic setting. Choose a short run of varying character, for example with long as well as sharp bends, hard and soft bumps. Stay on the same run and adjust only one setting at a time.

When you set up your bike you need to do it together with the front fork and on all types of tracks that you want to optimize, there are no setups that will be 100% perfect on all tracks, compromises need to be made.

Keep priority at

- safe feeling
- stability
- comfort

This will allow you to ride safer, with more confidence and use less energy.

## Rebound damping

The rebound adjuster controls the low speed rebound damping.

If the bike feels loose, nervous and is transferring a lot of movement during acceleration and braking and/or if the bike feels nervous over bumpy sections, close the rebound adjuster one click.

If the bike feels hard, harsh (no comfort), packs down under bumps and is difficult to enter corners with or does not stay in line over bumpy sections, open the rebound adjuster one click.

If the bike feels

- unstable
  - loose
  - bouncy
- Increase rebound damping

If the bike feels

- hard
  - nervous
  - low traction
- Decrease rebound damping

## Low speed compression damping

The low speed adjuster is used to control the chassis movement towards the ground.

If you feel that the shock absorber feels soft, spongy, or the bike feels unstable (for example when going into a corner), close two clicks (clockwise).

If you feel that the bike feels hard and has poor traction, open two clicks (counter-clockwise).

## High speed compression damping

The high speed adjuster has three positions, I soft, II medium and III hard/pedal platform.

The shocks are delivered with the adjuster set to position II. This is the best all-round set up and has the function that should suit most riders and tracks.

If you feel that the shock absorber is hard and harsh on small bumps and corners and have poor traction for the rear tire, go to position I.

If the bike feels soft, has a low riding position and easily goes through the stroke or bottoms on landing after a jump, work with low speed compression and spring stiffness.

If the bike feels

- soft
  - low
  - is bottoming
- Increase compression damping

If the bike feels

- harsh
  - hard
- Decrease compression damping

# INSPECTION AND MAINTENANCE

Preventive maintenance and regular inspection reduces the risk of poor performance. If there is any need for additional service, please contact an authorized service center.

## Cleaning

Clean the shock absorber externally with a mild detergent. Use compressed air. Make sure to remove all dirt. 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.

### **Caution!**

*Do not spray water directly on the adjuster knobs and/or on the mounting hardware.*

## Inspection

1. Check the mounting hardware for possible excessive play or sticking.
2. Check the piston shaft for leakage and/or damage.
3. Check the shock absorber body for external damage.
4. Check the rubber components for wear.
5. Check the attachment points of the shock absorber to the vehicle.

## Recommended service intervals

100 hours service or annually.

## Disposal

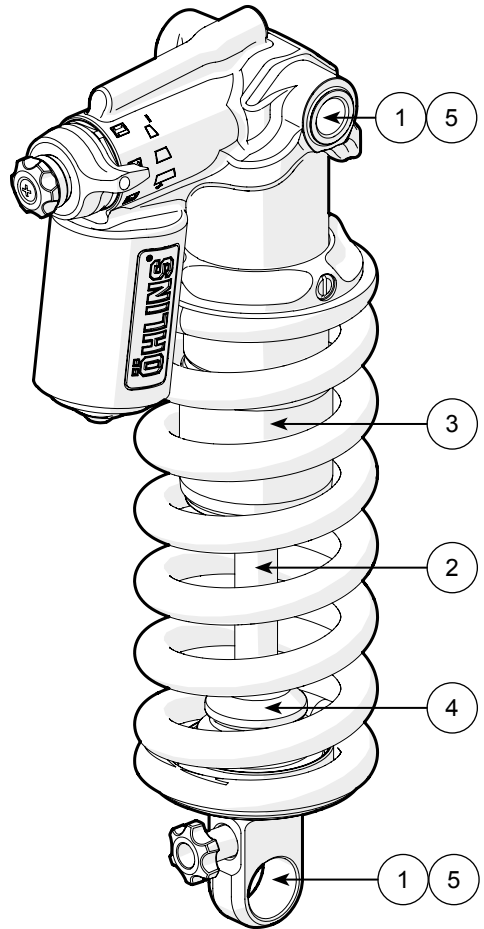
Hand over your discarded Öhlins products to an authorized service center for proper disposal.

### **Note!**

*The Öhlins shock absorber must only be filled with Öhlins Shock Absorber Fluid, part no (01304-01). Contact an authorized service center for advice.*

### **Warning!**

*Do not change the gas pressure. Proper knowledge, special purpose charging equipment and access to nitrogen is required.*



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