

# SHOCK-ABSORBERS SETTING MANUAL

Thank you for your confidence in buying PROTLUM shock absorbers. In the development phase we pay close attention to your maximal satisfaction with their function. As the close cooperation with our customers is very important to us please feel free to contact us with any questions. We will advise you with the setup. As a part of our customer service we also offer our assistance in the chassis adjustments with participation in testing sessions at reasonable prices. Only thorough testing can return excellent results! The table overleaf shows the basic setting for your vehicle which serves as a reference in case that you reach an impasse during testing and adjusting.

## Before you begin

Before you start to change anything in the suspension settings, please keep in mind these basic advices:

- Obtaining optimal suspension settings for the track profile and weather conditions requires a lot of experience, testing and patience and is dependent on riding style and other factors, such as tire choice, tire pressure, weight distribution and especially suitable geometry settings. Therefore just do not expect miracles and do not throw in the towel after first unsuccessful attempts. On the contrary. Record carefully all the data in a summary table for further careful analysis.
- In every setting change please adjust just one parameter at a time. When changing several parameters at once it is very difficult to evaluate the benefits of the changes.
- Make a test ride after every change. In order that your testing makes sense it is necessary to compare the behavior of the car always on the same road section, under same conditions and in the shortest period of time. The feeling of the driver is very important to the chassis setting so it is crucial that he remembers the car's behavior before the change. There is no universal setting for each. The key is that the driver is trusting his car and it's behavior is predictable for him.
- If you feel that the change has a positive effect go back to the previous setting to verify that the behavior of the car corresponds. If the assessed attribute really worsen you can be sure that you are heading in the right direction.

- Before changing the attenuation characteristics check the current adjuster settings by clicking to the end minus position ("softest" setting) and count clicks. Then return the setting back. The following adjuster settings are always meant from the "softest" setting - position 0. The higher the value the "harder" is the characteristic.
- Technology of our dampers allows very fine tuning of the damping characteristics therefore only a very experienced driver is able to recognize one single click on the adjuster. Therefore at the beginning of each test step change the position of the adjuster by 3 positions at once for high-speed (HS) settings and by 2 positions for low-speed (LS) settings. Only after finding the approximate setting try to fine-tune by changing by one position.

## Height of the car adjustment

By positioning the threaded spring plates you can adjust the ride height of your car. For the best driving characteristics a proper weight distribution of the car is also very important. It can be partially influenced by setting the ride height individually on each damper. Therefore we recommend to balance the car on the scales during the ride height adjustment (of course with all the equipment, fillings and crew). To adjust the ride height follow these steps:

1. Before starting be sure to allow the securing screw M5 – see Fig. 1 (Caution – the screw is locked with a sealant so you will need a little over-power).
2. Adjust the ride height using the hook wrench – the ride height decreases by unscrewing the spring plate, increases by tightening. One turn of the threaded plate represents the height change of 1.5 mm.
3. After finding the optimal height do not forget to tighten the securing screw gently again as it ensures the threaded plate against loosening with the help of a nylon washer!



Fig. 1

Caution – many customers assume that the spring preload also makes the car setting "harder" or "softer". This assumption is wrong. What changes is only the ride height and the ratio between static compression (a) and the usable length for compression (b) – see Figure 2:

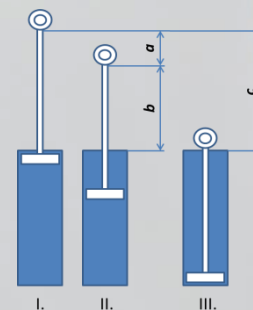


Fig. 2

Pos. I.: Damper in maximum stretch position (car in the air)

Pos. II.: Damper in „car on wheels“ position (without dynamic forces)

a – static spring reaction

b – available compress. length

c – overall damper stroke

Pos. III.: Damper at maximum compression (eg. after jump)

Fig. tightening of the spring plate by 10 mm (spring preloading) will increase the car ride height by the same value (if no linkage is present) while the static spring reaction shortens and the available compression length enlarges by the same values.

## Gas pressure setting in the compensation reservoirs

By changing the working pressure in the compensation reservoir you can affect the stiffness of the damper compression. The pressure acts essentially as an additional spring and it's increasing makes the setup "harder" and vice versa. The usable operating pressure is in the range of 3-9 bar. Caution – to change the pressure always use the supplied pump! The gas volume in the reservoir is very small and using a classic car pump drains all the gas just by connecting the valve on! The reservoirs are filled with nitrogen. Increasing the pressure makes a mixture of nitrogen and air. Full restoration of the nitrogen content can be done during a factory revision.



Fig. 3

Always measure the pressure before the test run on a cold and fully extended damper. When driving the shock absorbers get heated and the pressure slightly rises. To fix the pump outlet on the valve follow these steps:

1. Unscrew the purple unlocking needle as much as possible.
2. Place the pump outlet onto the valve and tighten the yellow nut gently.
3. Tighten the purple needle until the valve opens and the actual pressure is shown.
4. The working pressure can be increased by pumping or decreased by briefly pressing the red button near the gauge.
5. When removing be sure to allow the purple unlocking needle as first and then the yellow nut to release the pump outlet otherwise you drain the gas again!



Fig. 4-6

### Compression and rebound characteristics

Compression means a process in which the length of the damper shortens while during rebound the length of the damper is extended. Eg. when landing after jump first the damper is compressed and then extended again when the motion forces are absorbed. Compression damping characteristic has a direct influence on the stability and responsiveness of the car while rebound characteristic affects especially ride comfort and traction. However both of them influence the behavior of the car mutually so we cannot treat them separately.

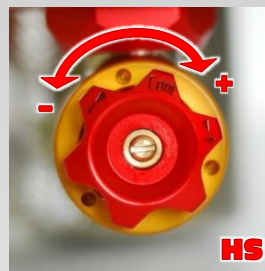
### Relation between high-speed and low-speed compression characteristic

You can adjust the curve of the compression damping characteristic by high speed regulation (HIGH SPEED – HS) and low-speed regulation (LOW SPEED – LS). In this case speed does

not mean vehicle speed but the speed of the piston movement in the damper. High-speed damping characteristic influences the behavior of the car at rapid (sudden) changes – jumps, holes, large surface irregularities, while the behavior of the car in the corners, tilt and minor roughness is affected by low-speed characteristic. Although adjusting of both characteristics is separate they influence each other upon major changes. Therefore changing the high-speed characteristic by 5 or more positions should be followed by compensation on low-speed by 1-2 positions in the opposite direction. (Eg. when you change HS +5 you should change LS -1 to preserve the original low-speed setting.)

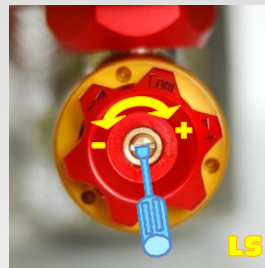
### Adjusting of compression characteristic-COMPRESSION

High-speed compression damping characteristic is set manually with the red wheel (knob) marked Com – see Fig. 7. Turning the wheel clockwise (tightening, symbol +) the characteristic will get "harder". On the contrary turning it counterclockwise (allowing, symbol –) the characteristic will get "softer".



HS

Low-speed compression damping characteristic is set with the brass screw in the middle of the adjuster wheel – see. Fig. 8. Use a small flat screwdriver to adjust. Again turning it clockwise (tightening, symbol +) the characteristic will get "harder" while counterclockwise (allowing, symbol –) it will get "softer".



LS

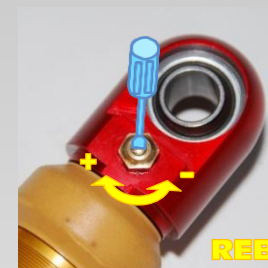
Fig. 7-8

### Adjusting of rebound characteristic-REBOUND

On McPherson struts the rebound damping characteristic is set with the brass screw on the piston rod in the topmount area – see. Fig. 9. Use a small flat screwdriver to adjust. For telescopic shock absorbers we use three types of adjuster elements according to the damper design. Either it's again a brass screw on the top of the piston rod as on Fig.9, or on the side of the piston rod eye – see Fig. 10, or by hand wheel (knob) labeled Reb



REB



REB

Fig. 9-10

In the piston rod axle – see Fig. 11. For all types it is again valid that turning it clockwise (tightening, symbol +) the characteristic will get "harder" while turning the adjuster element counterclockwise (allowing, symbol –) the damping characteristic will get "softer".



REB

Fig. 11

### Basic setting

Car:	
Customer:	

DAMPER SETTINGS – FRONT AXLE				WEIGHT DISTRIBUTION	
Pressure	HS Com	LS Com	Reb	kg	kg
bar					

DAMPER SETTINGS – REAR AXLE				WEIGHT DISTRIBUTION	
Pressure	HS Com	LS Com	Reb	kg	kg
bar					

TOTAL:		kg
--------	--	----

### Notes