

# Introduction

Nitron Racing Systems was formed in 1998 by founder and CEO Guy Evans with the aim of supplying the best possible race shocks made to the highest specifications. Nitron continually develops its products with top level riders achieving podiums across the world. Nitron strive to supply the highest quality and value, always focusing on delivering serious performance without compromising on design and build quality.

# Thank You!

Thank you for purchasing a Nitron shock absorber. Nitron have invested heavily in developing the technology, materials and performance of our racing shocks and we are pleased to be able to pass on this experience to our customers. All our shock designs are based on many hours of track testing and racing. This race DNA is then hand built into your shock by our skilled suspension technicians.

Nitron have made the NTR race shocks simple to install, setup and use but please take a moment to accustom yourself with your new shock and its adjustment system outlined in this manual.

# Before Installation

Carefully study this manual and reference any notes against the motorcycle manufacturer's guidelines before installing your new shock. Nitron's online technical help database can be found at [www.nitron.co.uk](http://www.nitron.co.uk) for additional information regarding installation and setup. Any uncertainty regarding your shock or its installation should be clarified with your Nitron dealer.



## Safety Notice



Warnings are given by this symbol. This will indicate that your safety is involved and careful attention should be made to observe these instructions. Severe injury or fatality may occur if these instructions are not observed.

**CAUTION:** Indicates that special precautions must be taken to avoid damage to the suspension or Motorcycle.

**NOTE:** Highlights important information regarding procedures or recommendations on the products installation or use.

## Recycling

Nitron take the environment seriously and as a company we do our best to reduce waste wherever possible.

Nitron are happy to recycle any of its products from our customers and will offer recommendation as to the appropriate disposal methods upon request.

## Continual Improvement

ISSUE: 1.A.01.13

Nitron products are subject to continual improvement and development. Every effort is made to reduce any differences between this manual and your shock absorber. Please consult your Nitron dealer if you have any questions with regard to the contents of this manual. Printed in the UK.

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Nitron shock absorbers should be installed by a qualified technician.

Installing a shock absorber that is not approved by the manufacturer may affect the handling of your motorcycle.

Nitron will not be held responsible for any damage or injury caused through incorrect fitment, modification or incorrect application of any Nitron shock absorbers or related products.

# Your New Shock

Your shock has been designed and hand built in the UK using components and materials derived from top level racing so you can be sure of the quality and performance.

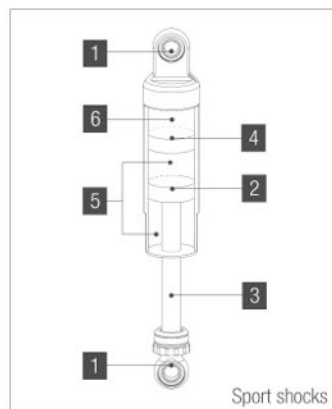
Please take a moment to familiarise yourself with the components and controls of your new shock.

The worlds best performing race shocks are high pressure nitrogen gas mono-tube designs. Every single Nitron shock is engineered to this design. The basic principle involves moving a valved piston through a quality suspension fluid under very high pressure with nitrogen gas, separated by a floating piston. The pressure exerted on the system prevents the suspension fluid from 'cavitating' which offers consistent and fade free damping of the motorcycle. For this reason, Nitron NTR shocks do not have any internal user serviceable parts and should only be opened by authorised Nitron service technicians.

## Exceptional Features as Standard

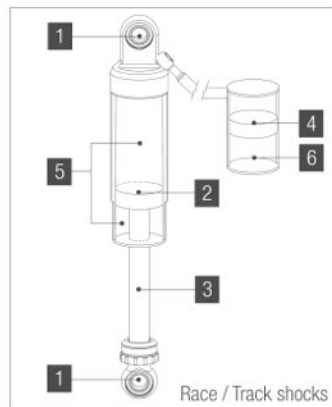
All Nitron NTR shocks owe their exceptional performance to the quality of materials and design, featuring:

- Lightweight, fully titanium and hard anodised aluminium construction
- Fully CNC billet machined and screwed together
- Fully re-buildable and re-valvable
- Infinite range of bump/rebound ratios controlled by fully sealed adjuster mechanisms
- Ultra low friction design
- Induction hardened super-polished chromium plated piston rod
- Low friction rod seal, double acting rod scraper and cellular progressive bumpstop
- Superior 40mm or 46mm Teflon piston and floating piston
- 15mm bore PTFE lined bearings



## Basic Shock Design

1. End Eye / Clevis
2. Damper Piston & Shim Stack
3. Shaft / Rod
4. Floating / Seperator Piston
5. Suspension Oil
6. Compressed Nitrogen Gas



## NTS Street Shock (2-way, Single Damping Adjuster)

Combining the years of road and race suspension experience, manufacturing skill and Nitron's unique technology – the NTS Street Shock has been produced. Available for all popular motorcycles, these hand-built shocks will improve any road bike and offer a lifetime of enjoyable riding through its fully serviceable long-life components.

## NTR Sport Shock (2-way, Single Damping Adjuster)

Evolved from Nitron's multi-adjustable full race damper; many of the lessons learned from the racetrack have been incorporated as standard features. The combined damping adjuster knob varies the compression and rebound damping simultaneously. Every sport shock features adjustable spring pre-load and adjustable length (where possible) without the need for a remote reservoir.

## NTR Track Shock (2-Way, Double Damping Adjuster)

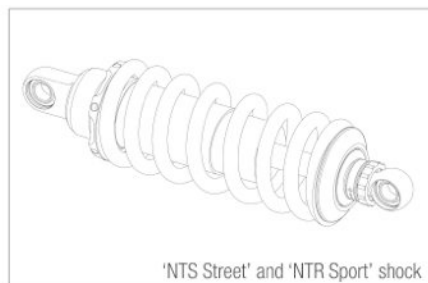
Track shocks have been designed primarily as a track-day upgrade. Evolved from Nitron's multi-adjustable full race damper where the philosophy has been to produce a gas monotube damper that is totally reliable and fade resistant with ultra low friction characteristics. A remote (or piggyback) reservoir allows for independent adjustment of compression and rebound, as well as spring pre-load and length adjustment (where possible).

## NTR Race Shock (3-Way, Triple Damping Adjuster) (Inc. NTR SideCar Shocks)

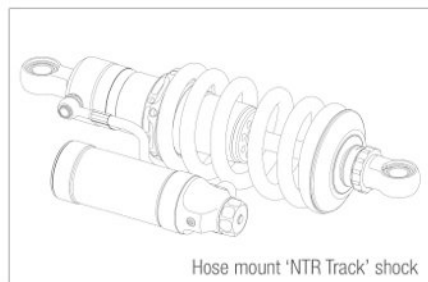
Race shocks are primarily designed for racing, incorporating both high and low speed compression adjusters for the most precise tuning. The 3-way adjustable dampers feature adjustable spring pre-load and adjustable length. Nitron have pursued ultra low friction component design to produce a damper that is virtually fade free, light-weight and totally dependable.

## NTR RacePro Shock (3-Way, Triple Damping Adjuster)

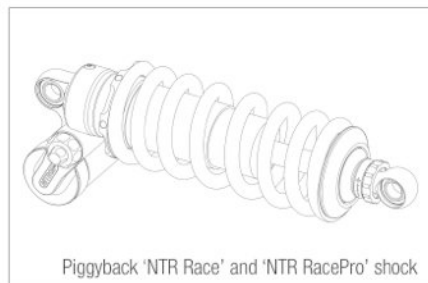
Nitron have developed a new line of 5-axis CNC machined shocks for the most demanding racers. The NTR RacePro has all the great features of the 3-way adjustable NTR Race shock whilst additionally benefitting from a class leading 46mm CNC ported piston and 16mm rod offering an even higher level of damping control and fade resistance required for TT and Superbike levels of performance.



'NTS Street' and 'NTR Sport' shock



Hose mount 'NTR Track' shock



Piggyback 'NTR Race' and 'NTR RacePro' shock

# Installation

In most cases your shock will be a direct replacement for the original and will not require any specific installation instructions. The correct procedure for shock replacement using the correct torque settings can be found in the motorcycle manufacturers workshop manual. Nitron recommend that a qualified technician carry out the installation of all safety critical components.



Improper installation of the shock absorber could result in serious injury or death.

If you have any questions regarding the installation of your NTR shock, please contact your Nitron dealer.

NOTE: After installing the shock absorber, the fitment of all other cycle parts should be checked for conformity against the manufacturer's manual.

## Before Adjusting Your Shock...

Before you start adjusting the shock, please note the base settings set by the factory on your build card. Nitron recommend that you keep a note of the changes you make and list down your chosen settings for future reference.

NOTE: Ensure that your motorcycle is in a serviceable condition. Correct chain/drive settings, tyre pressures, bearing condition and wheel alignment should all be to the manufacturer's specification before you install or adjust your shock.

# Suspension Setup

## Dialling-in your settings

The main purpose of your suspension is to keep the tyres in even contact with the ground to maximise grip in all circumstances. By 'tuning' or adjusting your shock, you will be able to achieve the best possible results from your riding; whether for comfort or a full track/race use.

## Setting the Spring Pre-load

Spring preload refers to the amount the spring is compressed from its open length to its length when installed on the motorcycle (when the rear wheel is off the ground). The primary reason for changing the preload on the spring is to adjust the motorcycles ride height and its geometry. By changing the spring preload the spring does not become 'stiffer' or 'softer' (a springs rate remains constant regardless of how much the spring is 'preloaded').

Your Nitron shock is supplied with a peg type c-spanner which locates in the holes of the spring platform, allowing you to either increase or decrease the preload on the spring.

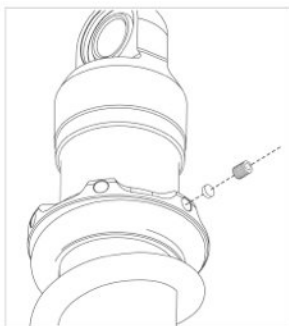
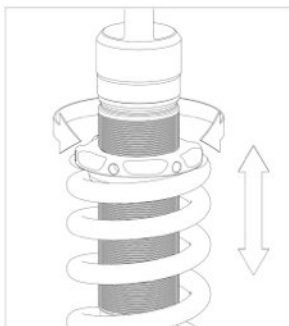
To increase the preload turn the spring platform in a clockwise direction (compressing the spring).

To decrease the preload turn the spring platform in an anti-clockwise direction (unloading the spring).

Some NITRON shocks have a grub screw located in the top collet. When adjusting the preload on your shock you will need to loosen the small grub screw located in the top collet as per the diagram on the right.

Failure to loosen the grub screw may result in damage to the body tube.

Any damage caused due to not loosening the grub screw will not be covered by NITRON's warranty.



## Hydraulic Preload Adjuster (Optional)

If your shock has a hydraulic spring preload adjuster it can be adjusted by turning the gold knob. The 'HPA' has a total range of 10mm of spring preload, graded through 50 clicks of adjustment on the actuating handle.



The hydraulic cylinder may be repositioned on the shock body by turning the lock ring to adjust the range of motion that the HPA operates within. For Sport, Track and Race shocks it is advised that this is done with the spring removed. RacePro shocks have an exposed lock ring and can be adjusted with the spring installed.

### Too much preload:

- Shock will 'top-out' (fully extend) too early
- Instability under braking
- Trail will be decreased affecting the straight line stability and increasing the steering response

### Too Little Preload:

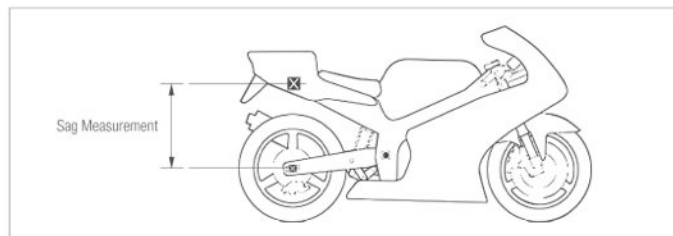
- Shock will be more likely to 'bottom out' and overload the tyre rapidly
- The motorcycle will squat more and run wide in corners
- Reduced steering response and feedback

NOTE: When carrying pillion and/or luggage it may be necessary to increase the spring preload to compensate for the extra load.

## Setting 'Sag'

'Sag' refers to the static compression of the suspension and determines the motorcycle's 'ride height'. It is measured both with ('laden') and without ('unladen') the rider onboard the motorcycle.

Through compressing the spring and applying more spring preload, the motorcycle's 'sag' will be reduced and the rear ride height effectively raised.



NOTE: The 'sag' figures given within this manual are to be viewed as a guideline only. You should refer to your motorcycle manufacturer's owner's manual for specific settings.

Your Nitron shock comes preset with our recommended factory 'sag' settings. Adjustment to the motorcycle's 'sag' should be made to suit rider preference and road conditions. For road biased motorcycles, Nitron recommend:

Unladen 'sag' between 5-15mm (generally equating to 15% of total suspension travel)

Laden 'sag' between 30-40mm (generally equating to 25% of total suspension travel).

Race bikes will tend to run less 'laden sag' of around 25-35mm.

NOTE: Altering your 'sag' affects the motorcycle's geometry, including the rake and trail aspects of the front forks. Please consult your motorcycle manufacturer's owner's manual for specific 'sag' and geometry settings.

## Length Adjustment

In most cases and where the design of the bike allows it, adjustable shock length is a standard feature. Length adjustment can be used to alter the geometry of your motorcycle without affecting the spring pre-load. The length adjuster has a total range of 7mm with each full turn of the end eye or clevis resulting in 1mm of length adjustment. There is a small circular indentation on the threaded portion of the end eye or clevis which when exposed indicates the maximum length has been reached.

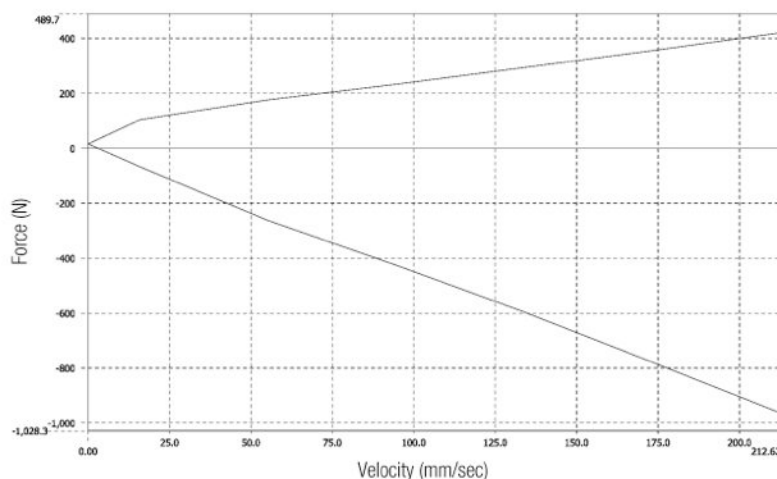
CAUTION: It is very important that you do not unscrew the length adjuster beyond the indicator mark.

## What is Damping?

Your shock has been built to your specified weight with factory damping settings (adjuster 'clicks'). Nitron recommend that you ride your motorcycle with these damping settings before making any adjustments.

Dampers produce a force proportional to the speed at which the shock shaft moves into or out of the shock. Compressing a damper slowly generates less resistant force than is produced if the damper is moved at a faster rate. To the right is a force / velocity graph produced by testing an NTR shock on a dynamometer. This is a machine that compresses and extends the damper at various known speeds and measures the forces produced in doing so. By adjusting the damper settings via the adjuster knob(s) you are able to change the rate of rebound and compression damping that the shock produces.

Rebound Closed / Compression Open



NOTE: Suspension setup is a complex subject and should not be considered in isolation to other components and functions of the motorcycle and rider.

# Rebound Damping

Rebound damping controls the motion of the motorcycles wheel as it returns towards the ground following a bump or compression. A lack of rebound damping will give the motorcycle a 'springy' or 'bouncy' feel. Rebound is the first and simplest damping adjustment to set.

# Compression Damping

Compression damping controls the speed at which the wheel moves up into the motorcycle and compresses the spring. Compression occurs as a result of two differing inputs which can be simplified as either;

'High Speed' - Hitting a 'bump' or undulation in the road surface, or

'Low Speed' - Dynamic loading in cornering and as a response to riders inputs of braking.

'High' and 'Low' speed damping adjustment do not relate to the speed at which the motorcycle is travelling.

When hitting a bump in the road or riding over a surface change, the speed at which the wheel is required to react is said to be 'high speed'. This is exemplified by riding up a curb at 5mph where the motorcycle is moving slowly but the shock has to react very quickly to absorb the impact. By moving at a high velocity, the shock absorbs the impact and keeps the machine stable.

When cornering or riding over steady undulations, the speed at which the shock needs to move is said to be 'low speed'. Low speed damping is 'felt' by the rider as they maneuver through a corner.

All Nitron NTR shocks allow the motorcycle to react quickly to surface interruptions whilst giving a controlled and consistent feel to corner entry and exit, on the road or on the track.

## General Damping Rules

	Too Much	Not Enough
Rebound	<ul style="list-style-type: none"><li>- 'Rebound packing' or 'jacking down'; the suspension will not return soon enough after a series of bumps</li><li>- Rear wheel is unable to follow the road surface as it 'skips' across the peaks of bumps</li></ul>	<ul style="list-style-type: none"><li>- Excessive weight transfer to the front of the motorcycle under shallow braking</li></ul>
Compression	<ul style="list-style-type: none"><li>- Wheel 'chatters' over irregularities in the road and is unable to squat in a corner</li></ul>	<ul style="list-style-type: none"><li>- Prone to bottoming</li><li>- Harsh landing over large bumps</li><li>- Motorcycle unable to hold a corner line</li></ul>

# Damping Adjustment

Nitron NTR shock absorbers have a class leading level of adjustment giving you excellent tuning potential. By changing the damping settings on the shock, you can control how the bike handles and feels for various riding conditions. If you are inexperienced with motorcycle suspension setup, the most effective way to understand how the controls affect the motorcycle is through calculated trial and testing; changing one adjustment at a time to avoid confusion.

Damper settings are always adjusted from the 'full hard' or full '+' setting and noted as a negative figure from this position. Therefore, a '-10R' reference would denote that the rebound damping has been set 10 clicks from full hard. The '-10R' setting is achieved by turning the rebound adjuster clockwise until no further clicks are felt, followed by 10 clicks of anti-clockwise turning. Never force the adjuster knobs as this may result in damage.



## Sport Shocks

The Sport shock has a single combined damping adjuster which controls both rebound and compression damping at the same time. This allows very quick and easy changes to the setup of your machine. The adjuster is located at the bottom of the shock and offers approximately 24 'clicks' of linear damping adjustment. To increase the level of damping the adjuster should be turned clockwise. Beyond 20 'clicks' from full hard the adjuster will have reduced affect.

## Track Shock

The Track shock has independent rebound and compression damping adjustment by employing a separate gas reservoir either mounted remotely through a hose or 'piggybacked' to the main shock body. The rebound adjustment is the same as that found on the Sport shock and is located at the bottom of the piston rod with approximately 24 'clicks' of adjustment.

The compression damping adjuster is the blue knob found either at the top of the shock or on the remote reservoir. This knob has 16 'clicks' of adjustment.

## Race and RacePro Shocks

The Race and RacePro shock controls are similar to the Track shock with the addition of a small low-speed compression adjuster knob mounted above the larger blue compression adjuster. With the addition of this extra adjuster, the Race and RacePro shocks separate the 'Hi' and 'Lo' speed compression adjustment and offer excellent fine control over the handling of the motorcycle. The low-speed compression adjuster independently controls the 'low' speed compression damping with a minimum of 26 'clicks' whilst the blue compression dial provides 16 'clicks' overall compression adjustment.

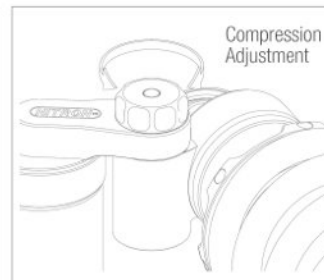
NOTE: Clockwise adjustment in the direction of the '+' symbol increases damping.



Rebound Adjustment



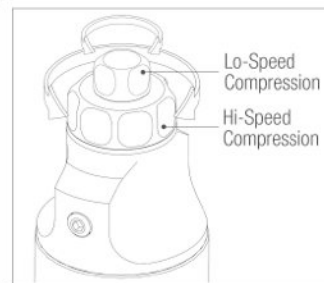
Rebound Adjustment



Compression Adjustment


















Rebound Adjustment



Lo-Speed Compression  
Hi-Speed Compression

# Handling Trouble-Shooting

Situation	Symptom	Likely Cause	Solution
Straight Line	Bike wallows over rolling, smooth bumps	Insufficient compression damping	 COMP
	Bottoms out in depressions	Insufficient high speed compression damping	 COMP
	Harsh over bumps	Excessive Compression damping	 COMP
	Low frequency headshake	Insufficient compression and rebound damping	 COMP  REB
	Harsh over bumps, progressively unstable	Excessive rebound damping	 REB
	Motorcycle feels loose and unstable	Insufficient rebound damping	 REB
Braking	Rear wheel leaves the road surface	Excessive rebound damping not allowing the wheel to track the road	 REB
Corner Entry	Resists lean angles and unstable in transitions	Insufficient rebound damping allowing for excessive chassis unloading	 REB
Mid Corner	Limited traction and loss of grip over bumps	Excessive compression and rebound damping	 COMP  REB
	Bike feels loose and bouncy	Insufficient rebound damping	 REB
	Chassis feels harsh and rough	Suspension is 'packing' with excessive rebound damping	 REB
Corner Exit	Bike runs wide	Excessive squat causing front wheel to unload due to insufficient compression damping	 COMP
	Sudden loss of traction under acceleration	Insufficient rear squat due to excessive compression damping and spring preload	 COMP
	Excessive chassis pitching	Excessive weight transfer due to insufficient low speed compression damping	 COMP

# Inspection & Maintenance

As with any other part on your bike and to ensure your Nitron shock gives you many years of service, it is necessary to carry out periodic maintenance.



Do not use the vehicle if you are in any doubt regarding the road-going safety of the motorcycle.

The shock absorber should be externally cleaned with a soft cloth and household detergent. A light spray of a water repelling oil or lubricant should be applied to the shock and in particular the chrome shaft if the motorcycle is to be left standing for considerable time. The bump stop should be pushed towards the shock body with a soft instrument to allow cleaning and application of lubricant underneath the shaft.

CAUTION: Never use strong detergents, thinners or brake cleaner as they can damage the surface finish of the shock and seals. The use of compressed air or pressure washers is not recommended.

## Inspection Points:

1. Check that the shock is securely fitted to the motorcycle
2. Check the bearings for excessive play
3. Check the shock absorber for damage or surface wear from external components
4. Check the shaft for corrosion or markings / striations
5. Check the condition of the shaft underneath the bump stop
6. Check the free motion of the adjusters
7. Check the routing and quality of any braided hoses fitted
8. Check for wear on composite materials including the end-eye bearing seals

# Warranty

Nitron warrant all its products and accessories against design and material defect for a period of 1 year from date of purchase. The warranty does not cover any such failure due to incorrect fitment or use and does not extend to any other part of the motorcycle.

All NTR shocks require specific maintenance detailed herein. Failure to comply with the installation and maintenance procedures may result in avoidable damage caused to the shock or motorcycle.

Your Nitron shock has been designed and built to provide you with many years of exceptional performance, however it is recommended that they are serviced by a Nitron approved service centre.

## Recommended Service Intervals:

Race and track use: Every 10-15 hours

Street / Road use: Every 20,000 – 30,000 Kilometres / 12,000 – 18,000 Miles

Nitron offer a 12 month warranty on all shocks that are serviced by an approved centre. It is recommended that all Nitron shocks comply with the service schedule outlined on the unique service schedule card included with the original documentation. Please see website for further details and promotions.

NOTE: Any given warranty will be void if the shock is serviced outside of an authorised service centre. A list of authorised service centre's can be found at [www.nitron.co.uk](http://www.nitron.co.uk).

Tel: +44 (0)1993 849449 | [sales@nitron.co.uk](mailto:sales@nitron.co.uk) | [www.nitron.co.uk](http://www.nitron.co.uk)

# Setup

Nitron have provided this setup table for you to fill in to help you keep track of fine tuning and adjustment of your NTR shock.

## Factory Setting

For Factory Nitron settings of your NTR shock please refer to the 'Custom Built Shock Details & Service Record Card' that came with your shock.

FRONT	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5
Fork Spring	N/mm	N/mm	N/mm	N/mm	N/mm
Fork Preload	turns	turns	turns	turns	turns
Laden Sag	mm	mm	mm	mm	mm
Unladen Sag	mm	mm	mm	mm	mm
Fork Height	mm	mm	mm	mm	mm
Airgap	mm	mm	mm	mm	mm
Fork Comp Hi	clicks	clicks	clicks	clicks	clicks
Fork Comp Low	clicks	clicks	clicks	clicks	clicks
Fork Rebound	clicks	clicks	clicks	clicks	clicks
REAR					
Shock Spring	N/mm	N/mm	N/mm	N/mm	N/mm
Spring Preload	mm	mm	mm	mm	mm
Rear Laden Sag	mm	mm	mm	mm	mm
Unladen Sag	mm	mm	mm	mm	mm
Shock Comp Hi	clicks	clicks	clicks	clicks	clicks
Shock Comp Low	clicks	clicks	clicks	clicks	clicks
Shock Rebound	clicks	clicks	clicks	clicks	clicks
Shock Length	mm	mm	mm	mm	mm

# Notes



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Motorcycle User Manual