

1. Foreword

Congratulations on your purchase of a RapidLaser frame and chassis check-up tool kit.

No matter whether it's a road or track bike, perfect and intact chassis geometry is a must. The RapidLaser is your professional check-up tool, which will shed light on improper bike set-up and hidden frame and chassis damages/deviations.

One of the biggest advantages of the RapidLaser is that you can diagnose the bike without removing the fairings/bodywork, which is a real time-robbing exercise.

RapidLaser is a must-have kit for workshops, race teams, used bike dealers and used spare part handlers/breakers as well.

2. Features

➔ Rear wheel alignment check

Improper alignment of the rear wheel results in excessive wear on the sprocket teeth, drive chain, wheel bearings, cush-drive, axle and tire.

➔ Bent/twisted swingarm check

Just like a misaligned rear wheel, a bent/twisted swingarm results in a poorly handling motorcycle, uneven tire and drive-train (chain and rear sprocket) wear but in a more serious and dangerous way. For safety reasons, motorcycles with a bent/twisted swingarm shouldn't be used until the problem has been rectified. If the bike hasn't been dropped, check the swingarm bearings first.

➔ Bent/twisted fork leg check

A simple slow-speed low-side can easily bend the fork tubes and lower triple clamp in one go, so this is another crucial area of bike checks, while again, this has a very serious impact on handling.

➔ Bent/twisted headstock check

Motorcycle frames are prone to bending/twisting in case of a crash, even more in a frontal collision. Not only will the smallest deviation compared to the factory state render the bike useless, it is very dangerous for street and track riding and must be taken care of immediately. A frame damage is considered as one of the most serious damages of a motorcycle.

➔ Wheelbase measurement

An altered wheelbase can be a tell-tale sign of a frontal collision too, as a shorter wheelbase occurs only when the steering angle (rake) gets steeper (assuming stock geometry and factory suspension settings). In order to carry out a successful wheelbase measurement, you need to have the bike in a factory condition regarding the drive-train! New, oem spec chain (including chain slack), sprockets front and rear, as the values given from the manufacturers only apply in stock trim.

3. Package contents



- 1) Measuring scale
- 2) Long measuring rods, 3pcs
- 3) Short measuring rods, 2pcs
- 4) Laser module
- 5) Mirror module

- 6) Magnets, 2pcs
- 7) Fastener cone 60mm, 2pcs
- 8) Fastener cone 45mm, 2pcs
- 9) Fastener cone 30mm, 2pcs
- 10) Hex. axle adapter M14x1.5

- 11) Hex. axle adapter M16x1.5
- 12) Hex. axle adapter M18x1.5
- 13) Hex. axle adapter M20x1.5
- 14) M5x60mm puller bolts, 2pcs
- 15) Wheelbase measuring tape

4. Laser module

The laser module is equipped with a timer in order to save battery power.

Tapping the power button for a given time will result in different working intervals:

- < 1 s: Laser beam on for 10s
- 1–2 s: Laser beam on for 30s
- > 2 s: Laser beam off

Pressing the power button while the module is on, will switch it off.

Warning: Class 2 laser product, DO NOT STARE INTO BEAM!



⚙ Changing the battery

Remove the whole back assembly (including the power button) with a Phillips screwdriver carefully. This way you have access to the CR2032 type battery. Please observe correct polarity when replacing the battery. The positive (+) top side of the battery should face the spring.



5. Preparations before check-up

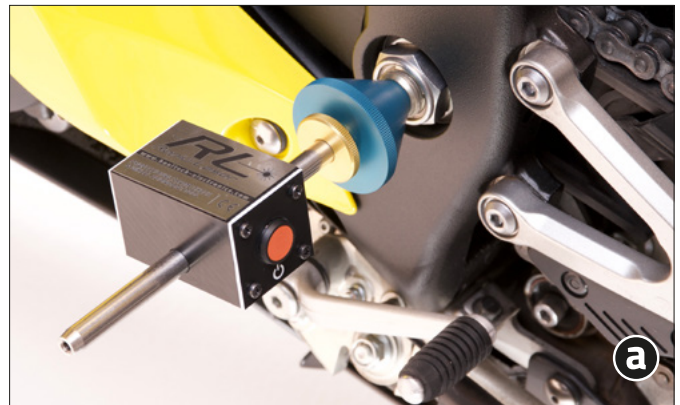
Always use a rear paddock stand. Lift the bike up on a flat, horizontal surface.

⚙ Mounting the measuring rods

As bikes differ from each other, for best mounting results and centralization, the measuring rods can be fixed in several ways (depending on the bike's setup and mounting possibilities):

a) With the supplied fastener cones

On bikes sporting hollow wheel axles, the rods can be pushed through. For best possible centralizing and mounting, we supply three different sizes of these conical fasteners. Always use the matching one in size. Any dirt/imperfections/damages on the axle surfaces can lead to false readings. It is very important to examine the contacting surfaces, making sure they are nice and smooth. Use sand paper or grinder if necessary.



b) With the puller bolts

For axles on which the rod can't be stuck all the way through, use the puller bolts. While using a conical fastener on the other side of the axle/rod, first tighten the puller bolt in the rod with approximately five full turns, and then tighten the plastic nut, so the whole assembly sits snugly in the axle.



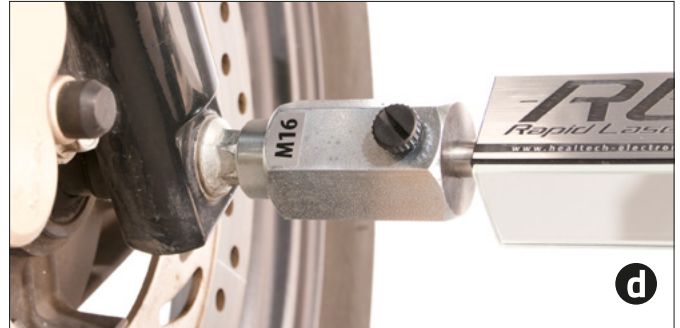
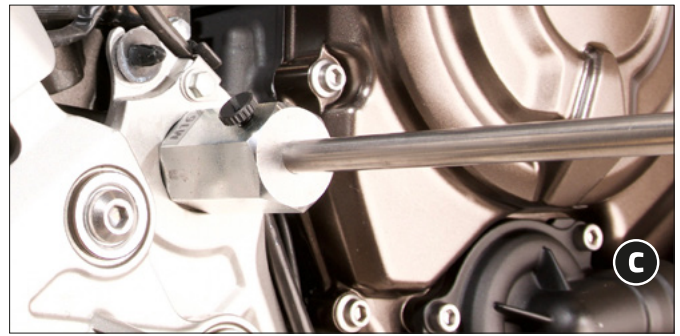
c) With the threaded hexagonal axle adapters

In case the axle is solid or blocked in some way (and threaded on the outside), use the suitable size hex adapters. Always remove the axle nut first, then bolt on the adapter onto the axle.

d) With the magnets and hex adapters

On solid and/or non threaded axles use the magnets with the hex adapters. First stick the magnet onto the end of the axle. It is very important here as well, that the end of the axle is intact. Any damages/deviations will lead to false readings. Use sanding paper/grinder if necessary to flatten and smoothen the contact surface. Use one of the short measuring rods in this case with the hex adapter. Repeat the check-up process, if you doubt the results as the axle's uneven end can lead to improper alignment of the laser/mirror module. Rotate /turn the axle 45 degrees before doing so.

Note: If you don't find the necessary part (a fastener cone or axle adapter) in the RapidLaser set for a specific bike, please contact us for advice.



6. Measurements / check-ups

With the RapidLaser you can perform five different measurements/check-ups as detailed in the following chapters.

6.1. Rear wheel alignment check

1) Mount one of the rods on the swingarm pivot axle with the suitable mounting adapter and fasten it.

2) Slide the laser module on the rod and fasten it with its fastener bolt at the bottom slightly. Make sure the module is facing the rear.

3) Mount one of the suitable rods to the rear wheel axle with one of the suitable adapters.

4) Slide the mirror module on the rod facing the laser module and fasten its fastener bolt at the bottom slightly. Make sure that nothing is blocking the laser beam reaching the mirror module.

5) Turn the laser module on. Rotate/fine tune the position and angle of both modules until the laser beam is reflected onto the scale on the laser module.

6) The beam should point right to the center of the scale. Acceptable tolerance is 2mm to either side of the scale. Anything above that should be corrected, i.e. the rear wheel needs to be aligned. When adjusting the rear wheel, consult the bike's Owner's Manual for the range of proper chain slack. (The two most common causes of premature chain wear are improperly aligned rear wheel and worn sprockets.)

Note: It's advised to mark the axle or axle blocks' position in the swingarm. This way you have some precise guides when carrying out maintenance tasks in the future.



Watch the tutorial video of the
'Rear wheel alignment check'

www.healtech-electronics.com/videos/RL01.htm

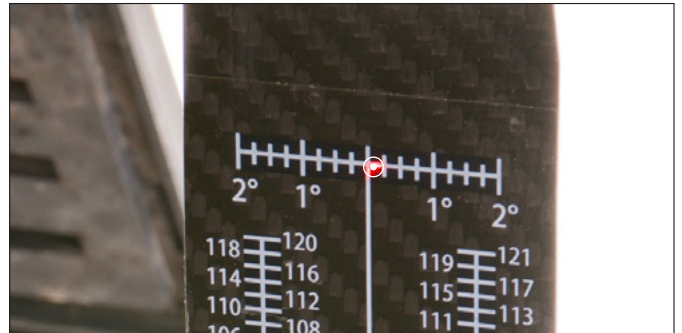
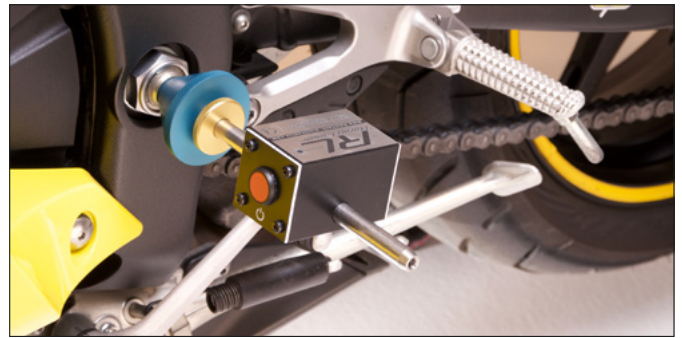


6.2. Bent/twisted swingarm check

Important: Make sure the rear wheel is properly aligned prior carrying out the swingarm check. Otherwise the result of the measurement won't be valid.
 > See chapter 6.1. for the 'Rear wheel alignment check.'

- 1) Mount one of the rods on the swingarm pivot axle with the suitable mounting adapter and fasten it.
- 2) Slide the laser module on the rod and fasten it with its fastener bolt on the lower side slightly. Make sure the module is facing the rear.
- 3) Mount one of the suitable rods to the rear wheel axle with one of the suitable adapters.
- 4) Slide the measurement scale vertically onto the rod, facing the laser module and fasten its fastener bolt slightly. Make sure nothing is blocking the laser beam reaching the scale.
- 5) Turn the laser module on. Rotate/fine tune the position and angle of both the laser module and the measurement scale until the laser beam is pointing to the middle of the 'crosshair' in the lower part of the scale.
- 6) Now start to rotate the laser module on the rod very carefully so the laser beam is wandering to the upper part of the scale until it reaches the markings.
- 7) The beam should point to the middle of the scale. The more it is offset from the center, the bent/twisted the swingarm is. The acceptable tolerance is one marking to either side, which is 0.25° .

Note: Examine the swingarm bearings and the linkage assembly first, before proceeding with swingarm repair/replacement.



Watch the tutorial video of the 'Bent/twisted swingarm check'

www.healtech-electronics.com/videos/RL02.htm



Measurement notes

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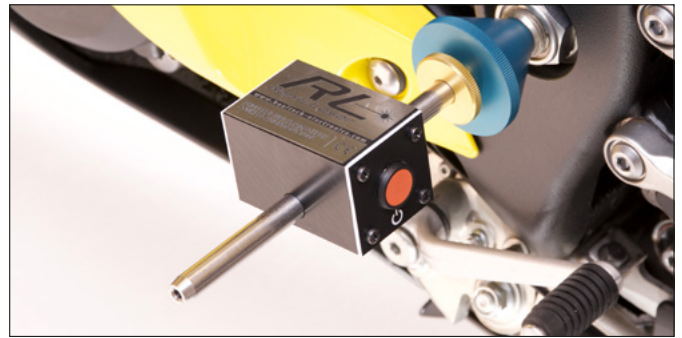
6.3. Bent/twisted fork leg check

Important: The condition of the headstock affects the result of this check-up. To make sure the frame is intact and you get the most precise readings, carry out a 'Bent/twisted headstock check'. (Otherwise the result of the measurement can't be trusted.)

› See chapter 6.4 for the 'Bent/twisted headstock check'.

- 1) First, you have to adjust the steering to the very center.
- 2) Lift the front of the bike with a paddock stand on a clean and flat, horizontal surface.
- 3) Mount one of the rods on the swingarm pivot axle with the suitable mounting adapter and fasten it.
- 4) Slide the laser module on the rod and fasten it with its fastener bolt on the lower side slightly. Make sure the module is facing the front.
- 5) Mount one of the suitable rods to the front wheel axle.
- 6) Slide the mirror module on the rod facing the laser module and fasten its fastener bolt at the bottom slightly. Make sure nothing is blocking the laser beam reaching the mirror module.
- 7) Turn the laser module on. Rotate/fine tune the position and angle of both modules until the laser beam is reflected back to the very middle of the scale on the laser module.
- 8) The beam should point right to the center of the scale.
- 9) Remove carefully the mirror module from the rod. Slide the measurement scale vertically onto the rod, facing the laser module and fasten its fastener bolt slightly. Make sure that nothing is blocking the laser beam reaching the scale.
- 10) Turn the laser module on. Rotate/fine tune the position and angle of the measurement scale until the laser beam is pointing to the middle of the 'crosshair' in the lower part of the scale.
- 11) Now start to rotate the laser module on the rod very carefully so the laser beam is wandering to the upper part of the scale until it reaches the markings.
- 12) The more it is oriented from the center, the bent/twisted the swingarm is. **The acceptable tolerance is one marking to either side, which is 0.25°.**

Note: If the headstock of the bike is intact according to the headstock check carried out previously, then the fork legs are bent/twisted. Should you need assurance, repeat the process(es).



Watch the tutorial video of the
'Fork leg check'

www.healtech-electronics.com/videos/RL03.htm



6.4. Headstock check

On bikes with hollow steering stem, it's possible to check the headstock without stripping down the bike entirely. On some bike types it might be necessary to remove the handlebar, fairings, etc. to reach specific areas of the motorcycle.

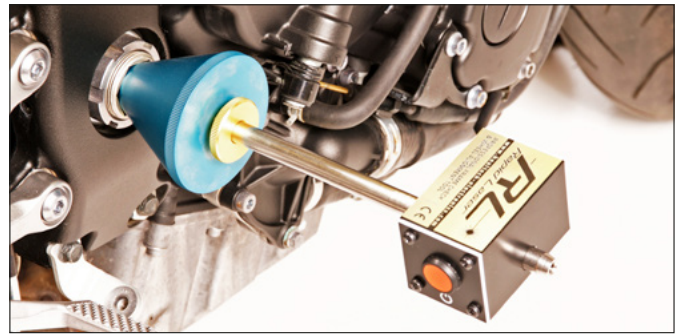
Be sure to examine/adjust the head bearings prior check-up, otherwise the result of the measurement won't be valid.

- 1) Mount one of the rods on the swingarm pivot axle with the suitable mounting adapter and fasten it.
- 2) Slide the laser module on the rod and fasten it with its fastener bolt on the lower side slightly. Make sure the module is facing the front.
- 3) Slide one of the suitable rods through the steering stem and mount it with the matching size fastener cones (on top and bottom).
- 4) Slide the measurement scale onto the rod, so it's sticking out the laser module side of the bike. Fasten its fastener bolt slightly. Make sure nothing is blocking the laser beam reaching the scale. You might need to turn the handlebars slightly.
- 5) Turn the laser module on. Rotate/fine tune the position and angle of both the laser module and the measurement scale until the laser beam is pointing to the scale, hitting the horizontal markings. Rotate the scale slightly to get the lowest possible value. Take note of the value.
- 6) Place the measurement sheet on the upper end of the rod, above the top yoke /clamp.
- 7) Turn the laser module on and rotate/fine tune the position and angle of both laser module and measurement scale until the laser beam is pointing to the scale, hitting the horizontal markings. Rotate the scale slightly to get the lowest possible value. Take note of the value.

Now compare the two values. The more they differ, the more bent/twisted the headstock is. If the values differ, repeat the measurement again, but before doing so, remove the scale from the rod, push down the front of the bike a few times (compressing the forks), then turn the handlebar from side-to-side a few times. This loosens up the front fork and the headraces.

Should the values differ just as the same in the previous check, the frame is damaged.

Important: The maximum tolerance between the two values is 2mm (which equals 0.25°)



Watch the tutorial video of the
'Headstock check'

www.healtech-electronics.com/videos/RL04.htm



⚙ BENDING/TWISTING VALUES

difference between the two values	1mm	2mm	3mm	4mm	5mm	6mm	7mm	8mm	9mm
twisting/bending	0.114°	0.23°	0.343°	0.45°	0.57°	0.68°	0.8°	0.91°	1.03°

6.5. Wheelbase measurement

Note: In order to carry out a successful wheelbase measurement, you need to have the bike in factory condition regarding the drive-train. New, oem spec chain (with the factory chain slack as noted in the service manual), oem spec new sprockets (front and rear). Furthermore both front and rear wheel must be aligned prior measuring the wheelbase.

For proper rear wheel alignment:

› See chapter 6.1. for 'Rear wheel alignment check.'

For proper front wheel alignment:

› See chapter 6.3. for 'Bent/twisted fork leg check,' steps 1–8

- 1) First, you have to adjust the steering to the very center.
- 2) Lift both the front and rear of the bike with paddock stands on a clean and flat, horizontal surface.
- 3) Mount one of the rods on the swingarm pivot axle with the suitable mounting adapter and fasten it.
- 4) Mount one of the suitable rods to the front wheel axle.
- 5) Slide the black plastic ring of the supplied tape measure on the front wheel rod.
- 6) The distance between the two rods is your actual wheelbase. Note it down and repeat the process on the other side of the bike. If the values match, the wheels are aligned perfectly and the frame is straight. Now, compare it with the factory value. If they match, the frame is intact.

Note: In case both front and rear wheels are perfectly aligned, mark the position of the rear wheel axle on the swingarm. This way you have some precise guides when carrying out maintenance tasks on this bike in the future.

Please check our website for the latest version of this document:

www.healtech-electronics.com/RL



7. Warranty

HealTech Electronics Ltd. warrants this product against defects in material and workmanship for the period of one (1) year. The warranty period starts with the date of original purchase shown on the invoice.



Smart Tech for your Ride!