INSTALLATION MANUAL

DIGISHOX by bitubo

QUALITY SYSTEM CERTIFICATED UNI EN ISO 9001:2008 50 100 9149

Code: S0093DSR019
Model: SUZUKI GSX-R 1000A L7-L8

Rev. 01	Mod. ISTR. MONT. DS
Date: 29/10/18	Pag. 27 / 52

SERIAL N°:

(SEE PAGE 1)

TO BE MENTIONATED IN CASE OF CLAIM

FIRST YOUR SAFETY !

The Sospension KIT is an important component of the motorcycle and this manual describes the correct way to assemble it.

NOTE: The Sospension KIT must be installed exclusively in a specialised workshop; if you have any doubts regarding these instructions, please contact a Bitubo engineer straight away.

Bitubo cannot be held responsible for any modifications to the Sospension KIT not described in this handbook or not authorised in writing. Moreover Bitubo cannot be held responsible for the incorrect installation of Sospension KIT.

Read this handbook carefully so that you can get the best performance and efficiency out of the Sospensions.

NOTE: **The warranty for the Sospension KIT will be invalidated by incorrect installation or modifications carried out without Bitubo's written authorisation.**

Bitubo cannot be held responsible for any damages to the product or injuries to people if the instructions of this handbook are not followed to the letter or if the KIT is not fitted in a specialised workshop or by qualified personnel.

BITUBO RECOMMENDS FUCHS Silkolene

Pictures and notes reported are purely as an indications; Bitubo s.r.l. reserves the faculty to make any modification or changes.

INSTALLATION MANUAL INDEX:

Index

PRESENTATION OF THE PRODUCT

The Bitubo DigiShox DS system is a cutting-edge product that incorporates high technology, high performance and simplicity of interaction for use on the track, road and off-road.
The innovation introduced by this Sospension KIT (front cartridges, rear shock absorber and control unit) consists in a very-quickly and efficient electronic management of the compression, extension and spring preload adjustments.
The Bitubo ECH cartridge, on the front, is equipped with hydraulic spring preload adjustment and electronic adjustment of compression and extension.
The Bitubo XXT shock absorber, at the rear, is equipped with electronic adjustment of compression and rebound, and hydraulic spring preload.
The electronic regulation takes place thanks to the use of micro-motors that allow a very high regulation speed.
The control unit is equipped with 9 settings preset by the House, not editable. You can add other 3 customized settings by the appropriate application, downloadable from the most known Appstore in your smartphone.

PRECAUTIONS AND SAFETY

Before removing the motorbike fork, take note of the sag values and fork assembly position compared to the steering plates, in the currently used configuration.
To identify the adjustment position, see page 37.

Before mounting the shock absorber on the bike, take note of all values of sag, length, hydraulic adjustments and mounting position of the bike fork as standard configuration. Check that Bitubo base setting (length, spring preload and hydraulic adjustments) is according to the data written on the chart at page 46.

Once the shock gets installed, check that there are no interferences with the frame of the bike or moving parts.

Considering that during the production steps the shock and the fork are lubricated, you could find out some trace of oil and grease on the suspension.

WARRANTY

Bitubo cannot be held liable for product installation operations other than those described herein. Furthermore, Bitubo cannot be held liable for any modifications to the product not described in this manual or not authorised in writing.
Read this manual carefully to obtain the best performance.

The product warranty will be invalidated by incorrect installation or modifications carried out without Bitubo's written authorisation.

WARNINGS

- The Bitubo shock absorber contains pressurised nitrogen gas.
- If no specific mounting instructions are supplied, observe the procedures described in the Technical Manuals of the motorbike Constructor.
- Please keep this manual in a safe place since it contains information on the initial set-up in addition to the serial number to be used for warranty service.

DigiShox COMPONENTS LIST

The System is composed by the following components:

A. 1 Led Panel (Trident): Coloured leds dashboard.

B. 1 Selector: Handlebar selector.

C. 1 CPU (Neptuny): Adjustment unit control.

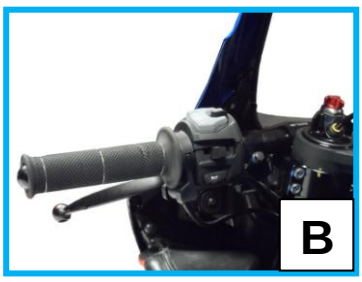
D. 1 GPS sensor (E-Shark).

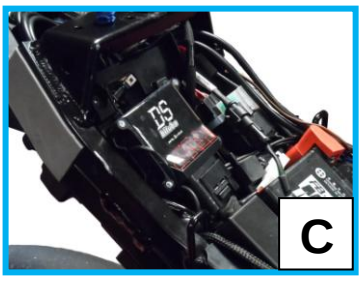
E. 1 Wiring: Plug and play wiring.

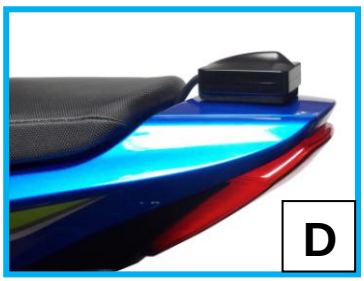
F. 1 KIT JBHG1: Fork cartridges with electronically controlled hydraulic adjustment; hydraulic spring preload.

G. 1 KIT XXTC1: Rear shock absorber with electronically controlled hydraulic adjustment; electronically controlled hydraulic spring preload.

H. IOS / Android App for the customization of the adjusment.







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WIRING and CONTROL UNITS

WARNING:

- Before the installation of the Bitubo Wiring it is advised to disconnect the vehicle battery.

- The Bitubo Wiring is equipped with identified connectors.
This system speeds up and simplifies the placing of the connectors in the vehicle.

- Do not allow that the Bitubo Wiring be crushed while the fuel tank mounting.

- The Bitubo wiring must be arranged so as not to be forced (pulled) or crushed during the steering movement.

- The Bitubo wiring must not interpose with the clutch control wire and the accelerator control wires.

- Pictures and notes reported are purely as an indications.

Bitubo Wiring is composed by 3 parts:

a. MAIN WIRING
b. CONNECTION WIRING (LINEA CAN-BUS)
c. POWER SUPPLY WIRING

Bitubo wiring assembly:

1) Connect the MAIN WIRING to the POWER SUPPLY WIRING by the connectors identified with the name: “NEPTUNY-POWER”

2) Connect the MAIN WIRING to the CONNECTION WIRING by the connectors identified with the name: “CAN-BUS”

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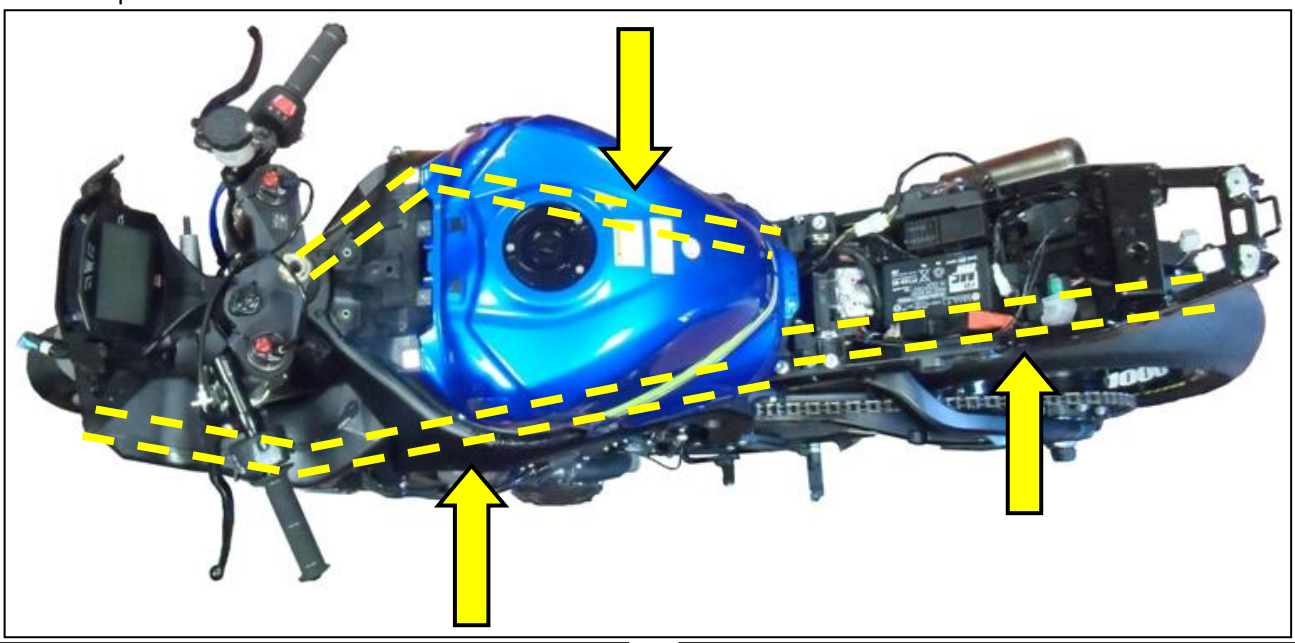
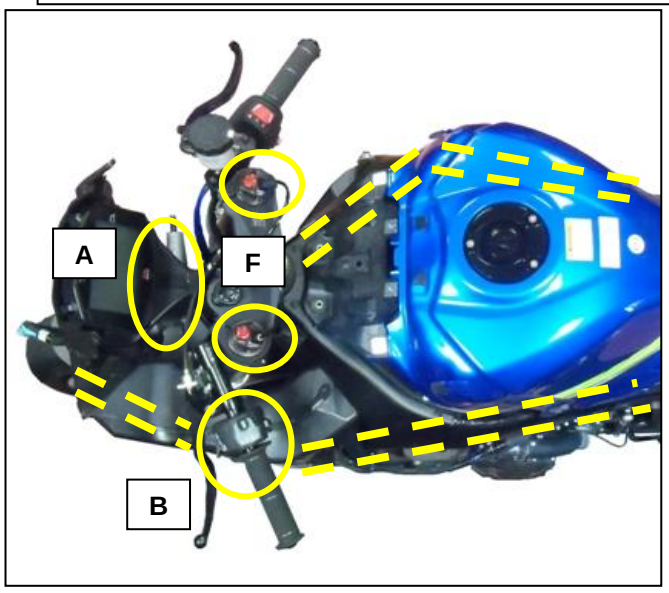
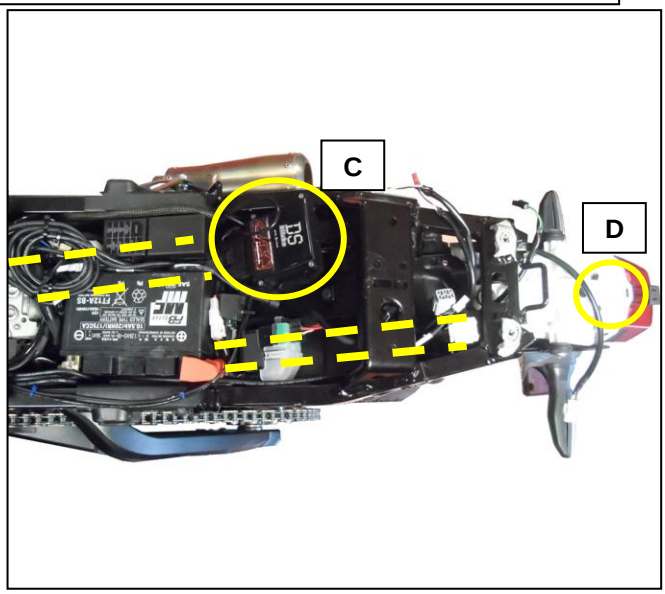
INSTALLATION OF THE BITUBO WIRING ON THE VEHICLE:

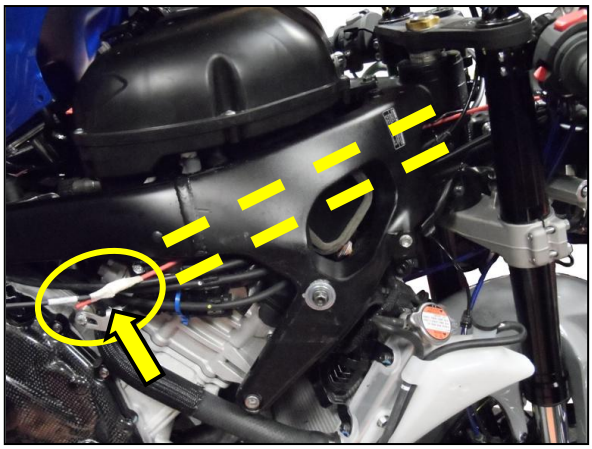
1) The Bitubo wiring must be arranged, if possible, next to the main motorcycle wiring, so as to place the CPU in the area of the pigtail / underseat and the battery power cables in the battery compartment.

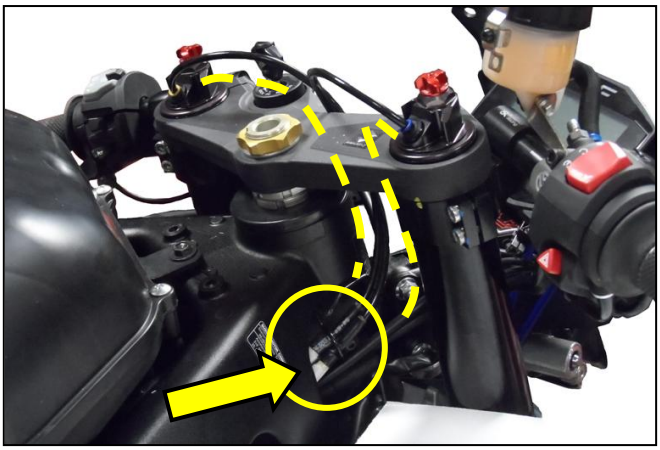






a. Direct the wires with connectors identified with the following names towards the forecarriage of the vehicle:
   - Right side of the vehicle (is suggested to remove the suction line)
     - COMPRESSION FRONT
     - REBOUND FRONT





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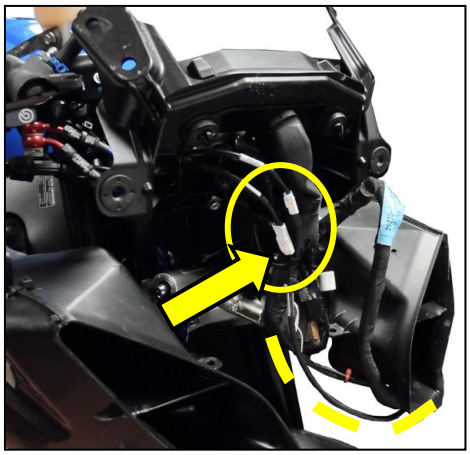
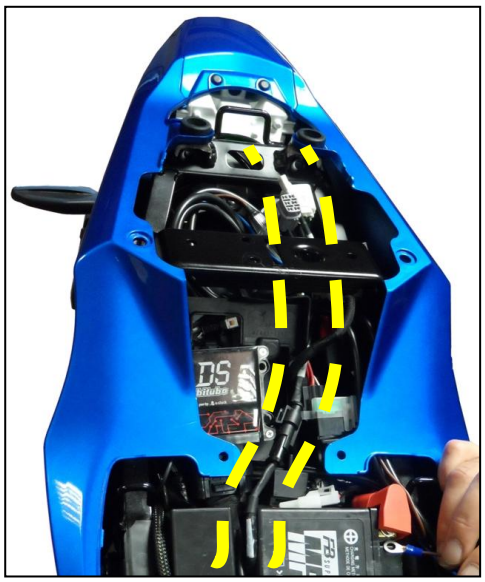
- Left side of the vehicle
  - TRIDENT



b. Direct the wire with connector identified with the following name towards the rear area of the vehicle:
   - GPS



c. Direct the wires with connectors identified with the following names towards the central area of the vehicle:
   - COMPRESSION REAR
   - REBOUND REAR

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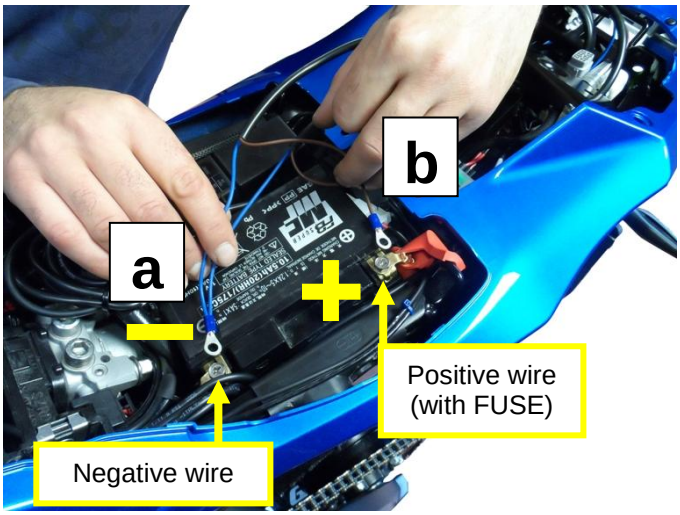
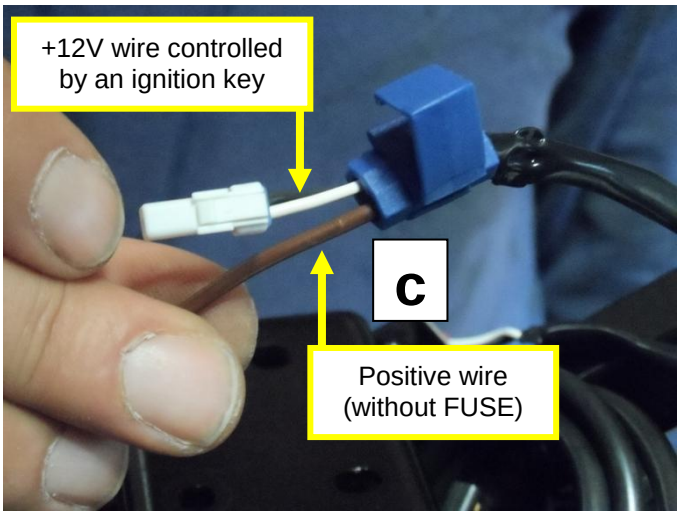
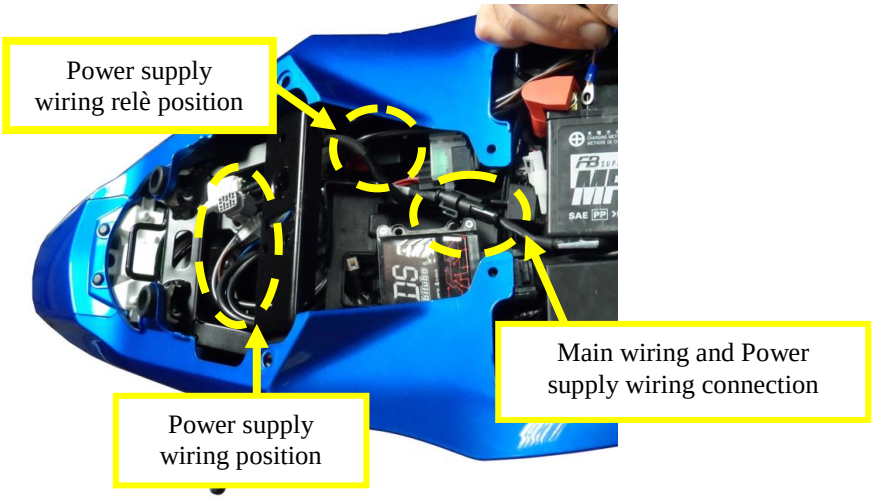
2) The system powered occur by BLUE wires (-) and BROWN wires (+):
   a. The BLUE wires have to be connected directly to the negative pole of the battery.
   b. The BROWN wire with the FUSE has to be connected to the positive pole of the battery.
   c. The single BROWN wire has to be connected with a quick splice connector to a **+ 12v wire controlled by an ignition key**: for convenience and clarity we recommend to use the license plate light cable.





If the exposed cables length of the Power supply wiring in not enough, the wiring sheath can be removed for the required length.
The packing includes the quick splice connector and the fastons for the connection to the battery.



3) The Led Panel (TRIDENT) Bitubo has to be placed and fixed near the dashboard of the vehicle or above the upper plate. It has to be visible during the riding. Place the wires behind the dashboard.

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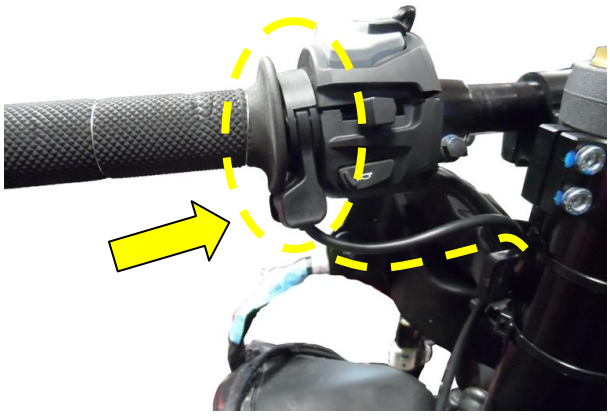
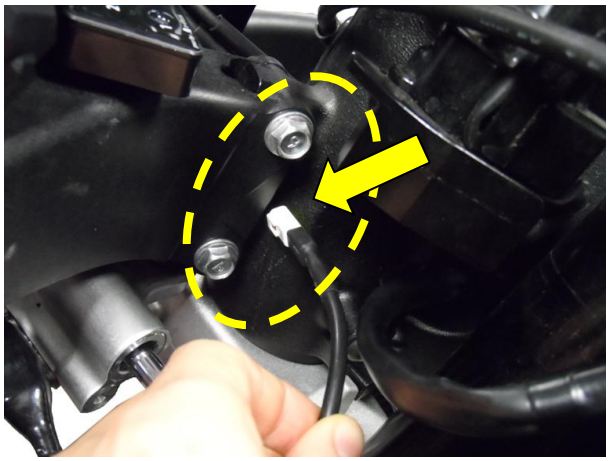
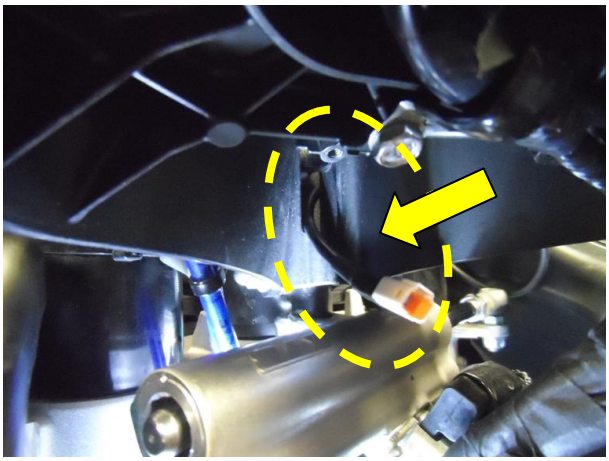
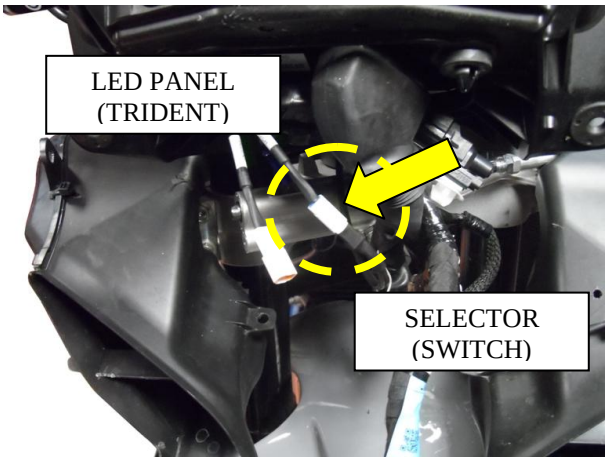
4) The Selector (SWITCH) Bitubo has to be placed on the LEFT side of the handlebar between the grip and the light controls. Place it in a pratical and confortable position.
Arrange the Selector cable (SWITCH) along the light control wiring, insert the connector inside the junction between the dash board frame and the main frame and place id behind the dashboard.
Connect the connectors.



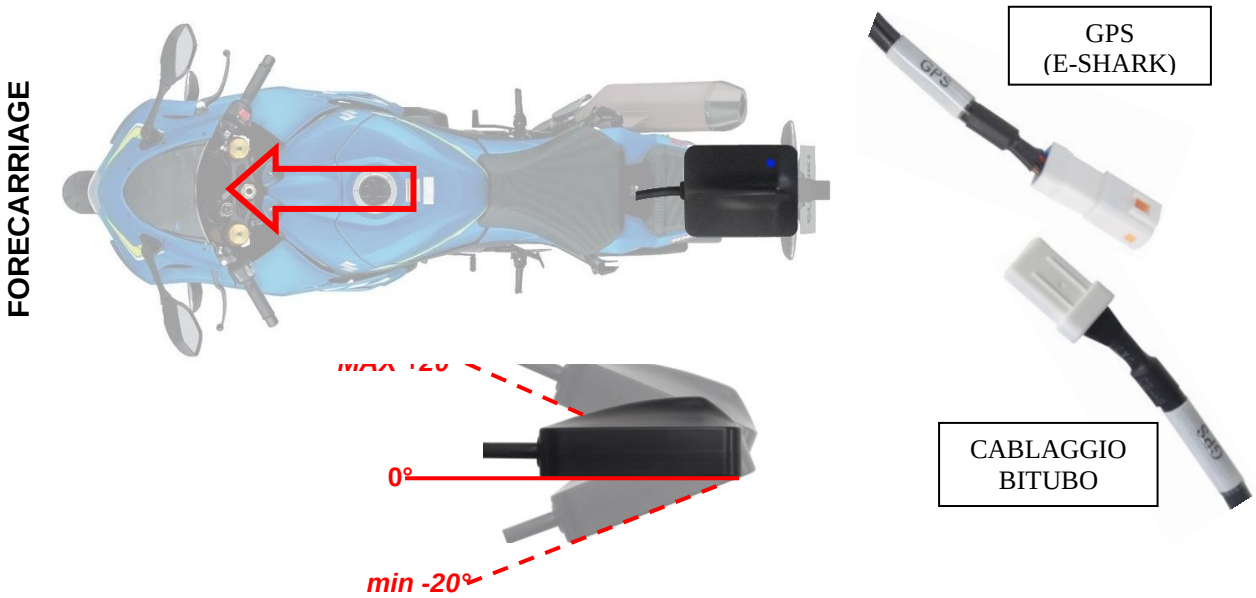






5) The GPS sensor (E-Shark) Bitubo has to be placed on the rear side of the vehicle (ex. rear tail). It is not necessary that the sensor is exposed, it can also be placed inside the fairing.

<u>For the position of the GPS sensor (E-Shark) refer to the scheme here below:</u>



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FRONT FORK CARTRIDGES

Gambale forcella ***Fork leg***	***Setting***	**Cost. Molla** ***Spring rate [kg/mm]***	**Cost. Molla interna** ***Top out Spring rate [kg/mm]***	**Precarico** ***Preload [mm]***	**Regolazione Smorzamento** ***Damping Adjuster [clicks]***	**Livello olio** ***Oil level [mm]***	**Sfilamento forcella** ***Fork strip out Q [mm]***	**Differenza interasse dall'originale** ***Length difference From the original [mm]***
COMP.	***GR50165***	***1,05***	***0,74***	***5***	***11***	***160***	***Orig.***	***0***
REB.	***GR50166***	***1,05***	***0,74***	***5***	***10***	***160***		

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CARTRIDGES ADJUSTMENT

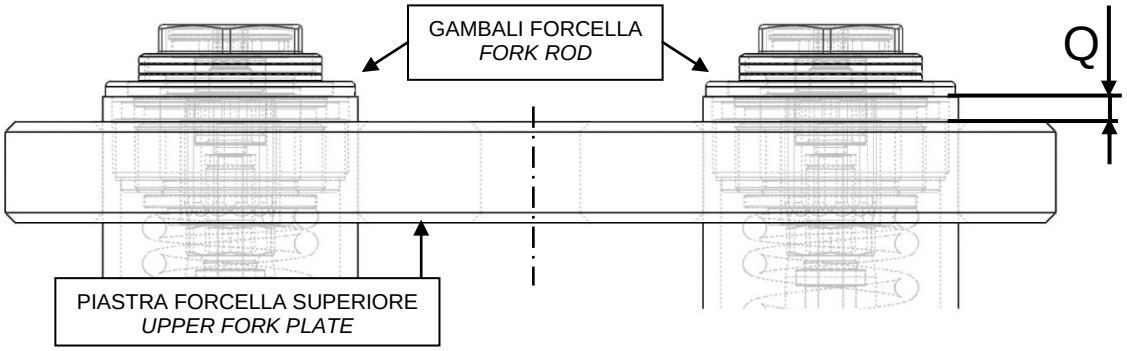
Spring pre-load and hydraulic compression and rebound regulations are found on the upper cap. The two cartridges perform separate hydraulic functions: the cartridge with the ***yellow identifier*** performs hydraulic compression while the cartridge with the **blue *identifier*** performs hydraulic rebound.
Thus is it normal that hydraulic rebound force is not felt when the fork leg on which the compression cartridge is installed is compressed and vice versa for the rebound fork leg.

HOW TO ADJUST THE FORK CARTRIDGES

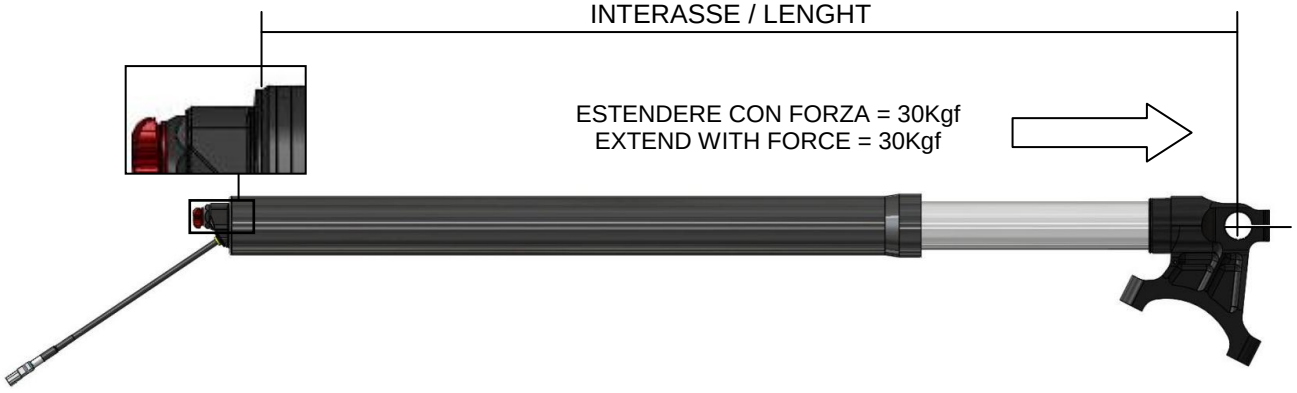
The hydraulic adjustments of Compression and Rebound are electronically adjusted by **Bitubo Digishox** system.
For all the functionality, refer to the **"System User's Guide"**.

FORK SLIPPING ADJUSTMENT

The Bitubo cartridges are of the same length (at maximum extension) as the original cartridges, since equipped with internal spring. Bitubo also supplies cartridges with lengths other than the original.
In these cases, the "distance difference from the original" value is indicated in the "base setting" table on page 36.
Thus, restore the correct front axle height (see drawing below):
the **Q** quota is indicated in the “base setting” table on page 36:
Q = orig. → the measurement is like the original assembly (refer to the vehicle technical manual).
Q = value (example: +/- 5mm) → change the original fork slipping by the indicated value.



WARNING: The riding quotas are the result of long tests by the manufacturer, and the **Q** quote was set to provide safe manageability and stability. A 2 or 3mm adjustment changes the vehicle's behaviour.
Changing the Q quote changes some riding quotas recommended by the vehicle manufacturer and can reduce vehicle stability, both when riding and parking (on the central or lateral stand), jeopardising riding behaviour and safety.



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SPRING PRE-LOAD ADJUSTMENT

The adjustment range is 12mm (12 clicks).
Each click (½ adjuster knob turn) corresponds to 1mm spring pre-load.

1 complete turn (2 clicks) = 2mm

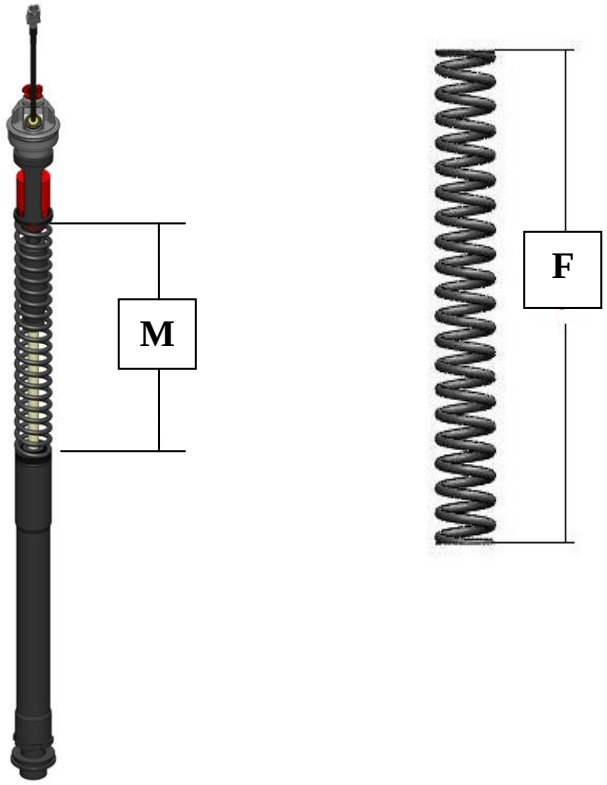
To increase the spring pre-load value rotate the adjuster knob clockwise. To decrease the pre-load value, rotate it counter-clockwise.

For better handling of the preload adjuster kno, you can use the tool (cod. 00416) included in the Cartridge Kit.

The pre-load values are as important as the fork slipping quota**.** Pre-load set the bike height off the ground and the dynamic trim in curves thus the fork angle, front axle values, etc., that characterise vehicle behaviour. **Generally, the optimal pre-load values range from 3 to 8mm**. To optimise the pre-load adjustment, see paragraph "SAG ADJUSTMENT AND MEASUREMENTS".

WARNING: this type of fork cartridge is equipped with an internal spring. Thus, check the fully extended suspension measurements not only lifting the bike off the ground, but forcing the suspension, extending them, to fully compress the internal counter-spring.

Spring pre-load is the crushing it suffers when installed on the cartridge → **PRELOAD=F-M**



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MOUNTING INSTRUCTIONS

WARNING:

- ***The upper cap and the lower spacer of the cartridge are not tightened by Bitubo since it must be removed and subsequently tightened for assembly.***

1- Safely position the vehicle making sure the front wheel is off the ground, use a suitable tool to work on the fork free of restrictions.
2- Find the **Q** quote indicated in the table in paragraph "*FORK SLIPPING ADJUSTMENT*" on page 37 and refer to the indicated technical recommendations.
3- Loosen the upper steering plate screws that secure the fork legs (photo 1) and loosen the upper original fork caps 1 turn.

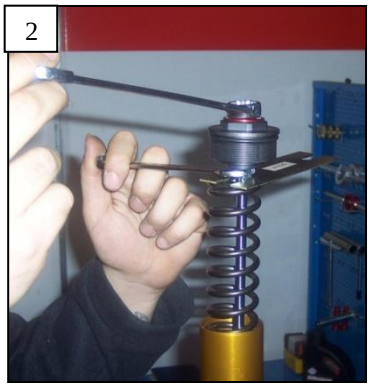
1

4- Remove the fork legs from the vehicle: to remove the fork legs and original parts, follow the vehicle manufacturer's instructions (User/Maintenance handbook - Garage Manual).

OPERATIONS ON BOTH THE FORK LEGS

5- Secure the fork foot in a clamp being careful not to damage it (we recommend using a clamp with soft aluminium or plastic jaws).
6- Unscrew the upper fork leg original cap, loosened to point 3 of the outer tube.
7- Slowly lower the outer tube and unscrew the cap from the rod inside the cartridge and remove it (see example in photo 2).

2



8- Remove the spacers and the original spring.
9- Remove the original cartridge complete with all its components and separate the outer tube from the stem; given the variety of forks, refer to the vehicle manufacturer's instructions (User/Maintenance handbook - Garage manual).

ECH CARTRIDGES INSTALLATION

10- Secure the foot of the fork in a vice with the rod upwards.
11- Fix the fork rod with the tool 00243 together the bushing 00323 (Ø43mm).
12- Remove the locking grub screw placed on the foot (photo 3). With the heat gun heat the copuling area (photo) and unscrew the rod from the foot.
(**WARNING:** Heat the zone to an high temperature, so that the original glue loosens.)

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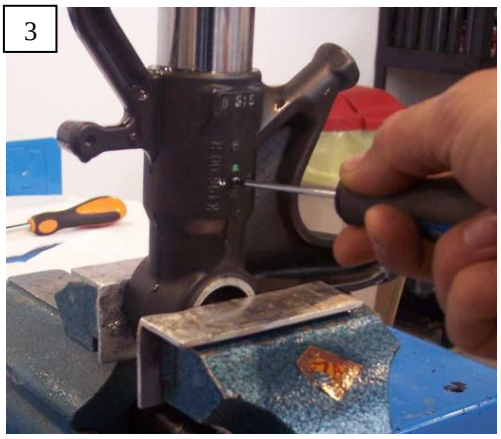

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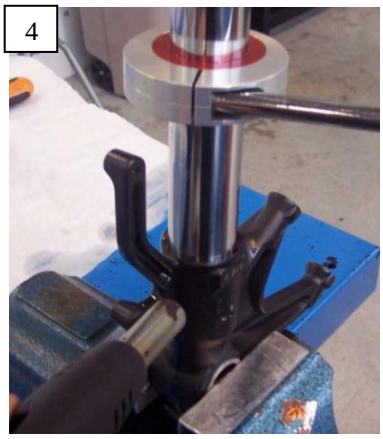
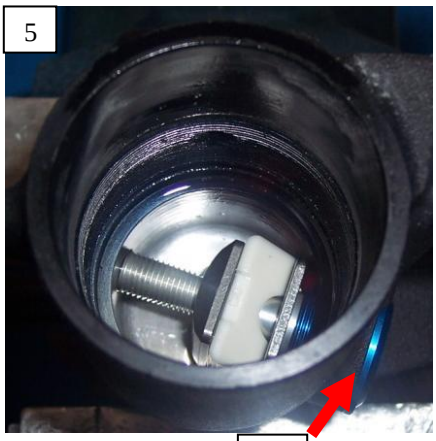


13- Remove the original OR of the foot an the washer (it will not be reused).
14- Remove all the components of the original spring preload control placed in to the foot, they will not be reused. (photo 5-6-7).

5



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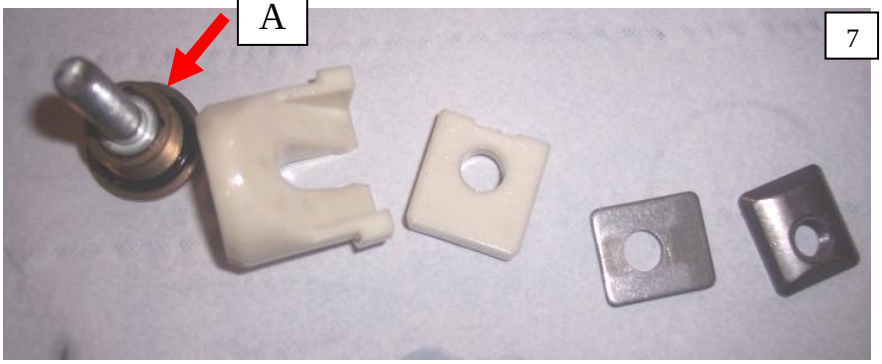
A

7



15- Clean all of the original parts carefully, and remove glue residues .
16- Screw the red Bitubo plugs that you will find inside the packaging to replace the external ring "A" (Photo 8). Tighten to 12Nm.

8

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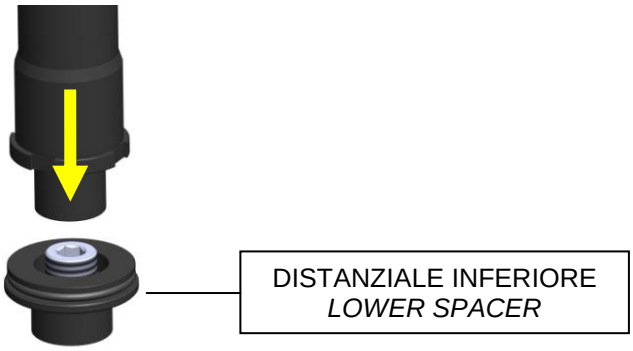
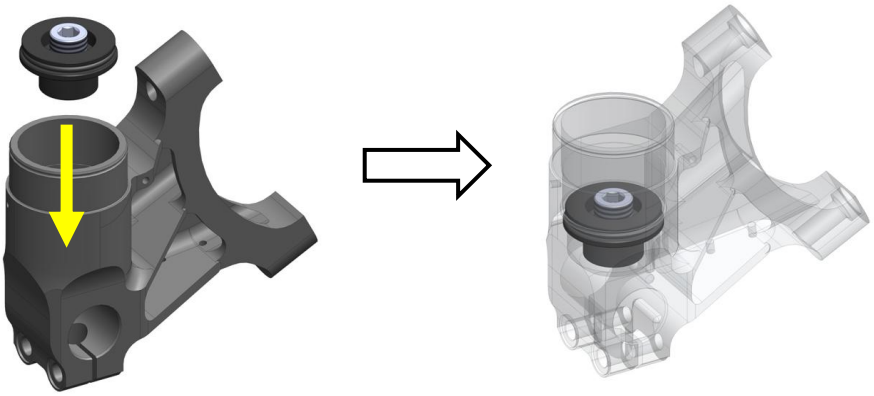
17- Remove the lower spacers from the cartridges (manually screwed).

9



18- Insert the original OR inside the foot, and then insert the lower cartridge spacer until it reach the bottom of the foot (the spacer must be forced into the passage of the OR) (Photo10).

10



19- Evenly apply Loctite 243 on the thread of the rod and screw it onto the foot. Using the tool 00415 + 00323 (Ø43), tighten the rod to the torque specified by the manufacturer.

20- It is suggested to insert a fork stroke reference ring on the rod of one of the fork legs.

21- To re-insert the outer tube in the rod, given the variety of forks, refer to the vehicle manufacturer's instructions (User/Maintenance handbook - Garage manual).

N.B.: For better sliding, we recommend you check outer tube-stem bushing play: upper bushings from 0.10 to 0.15 mm, lower from 0.08 to 0.12 mm. Otherwise the bushings must be adjusted or replaced. In alternative, see the ***Bitubo*** catalogue to check whether the ***"KITS" sliding kit*** made up of bushings with tolerances already optimised by the *Bitubo Race Department* and high sliding oil guards can be applied.
When assembled, adequately grease with the specific Bitubo grease, code 997608.

22- Remove the upper cap, the spacers (if used) and the spring from the ***ECH Bitubo*** cartridge: to make easier the operation hold the lock nut with the tool 00531, after that unscrew manually the upper cap. (photo 11)

WARNING: once the upper cap is removed, do not touch the adjuster knobs.

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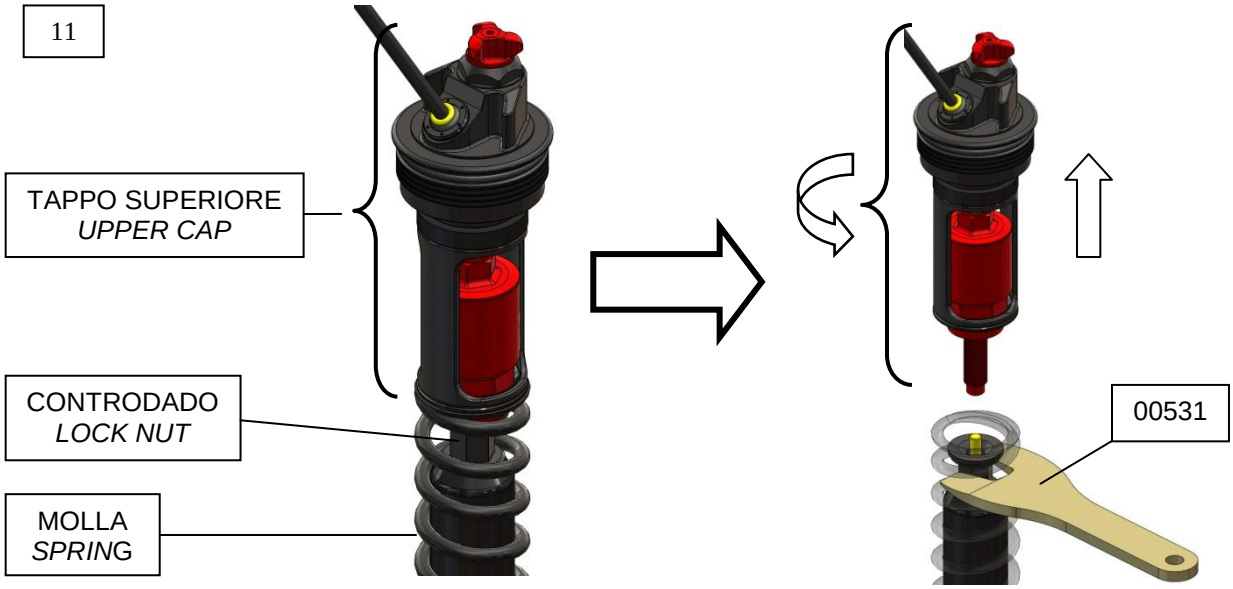
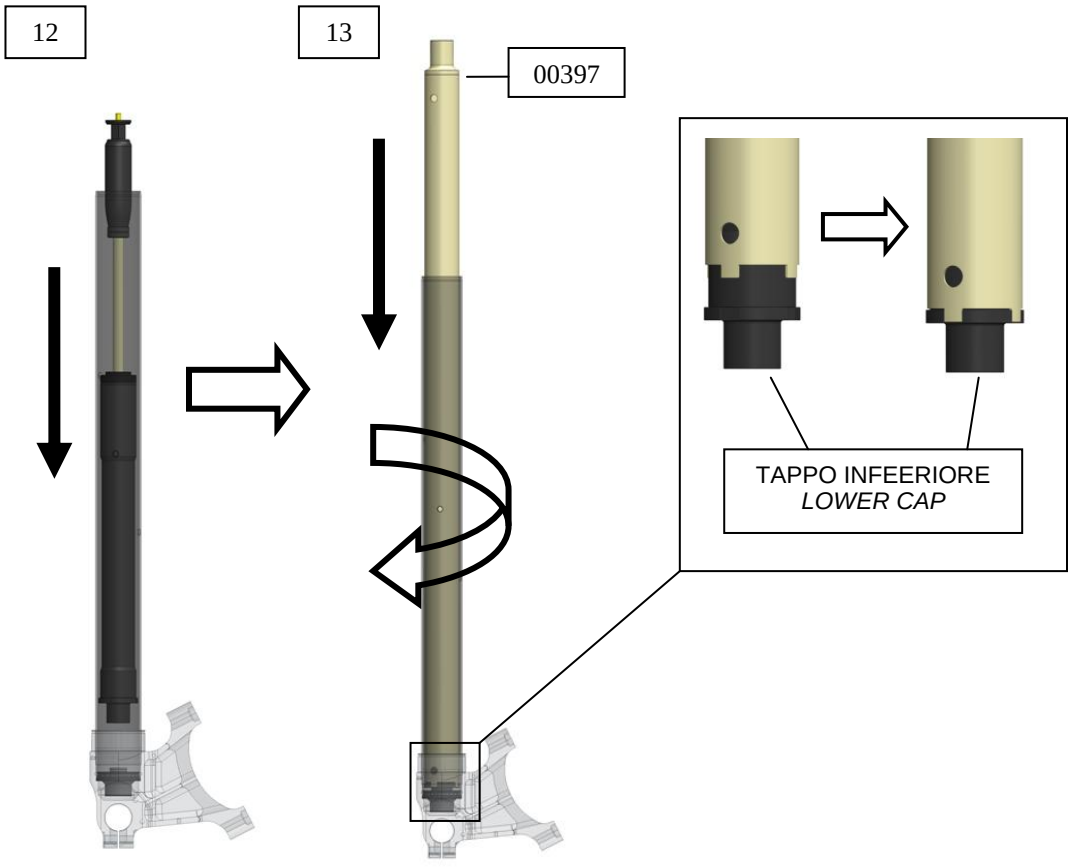


23- Insert the cartridge inside the fork leg and screw it onto the lower spacer previously inserted (Photo_12).
Insert the tool 00397, sectors end towards the lower spacer, hook the lower cap and tighten the cartridge on the lower spacer to the torque of 28Nm (Photo_13).

WARNING: Insert the compression cartridge on the left and the rebound cartridge on the right.



24- Bright both the outer tube and piston rod to the maximum compression position for correct oil level: compress the piston rod strictly using tool code 00512. Pour ***Bitubo* 997637** oil to the level, from the outer tube edge, indicted in the "base setting" table on page 36. Perform some outer tube compression-extension movements to drain any air.

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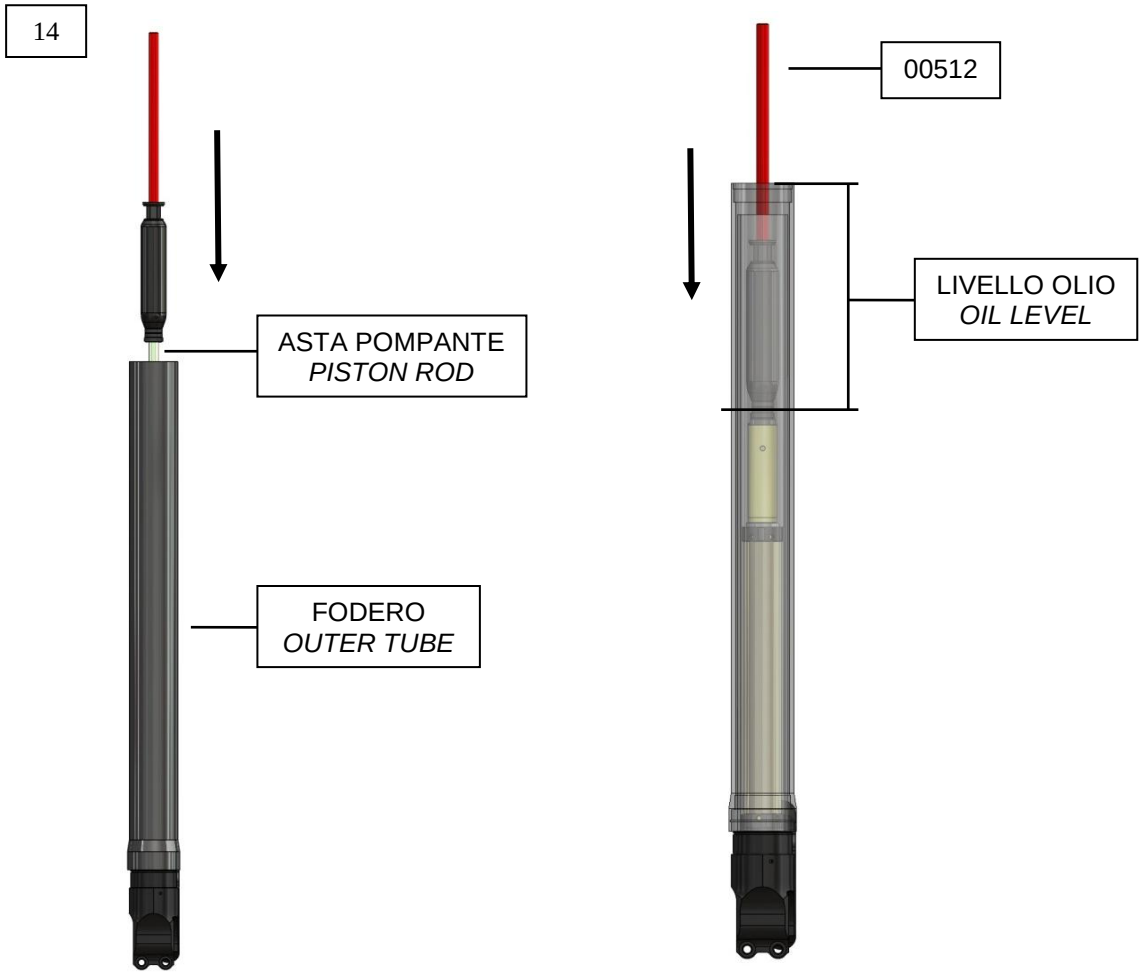
14

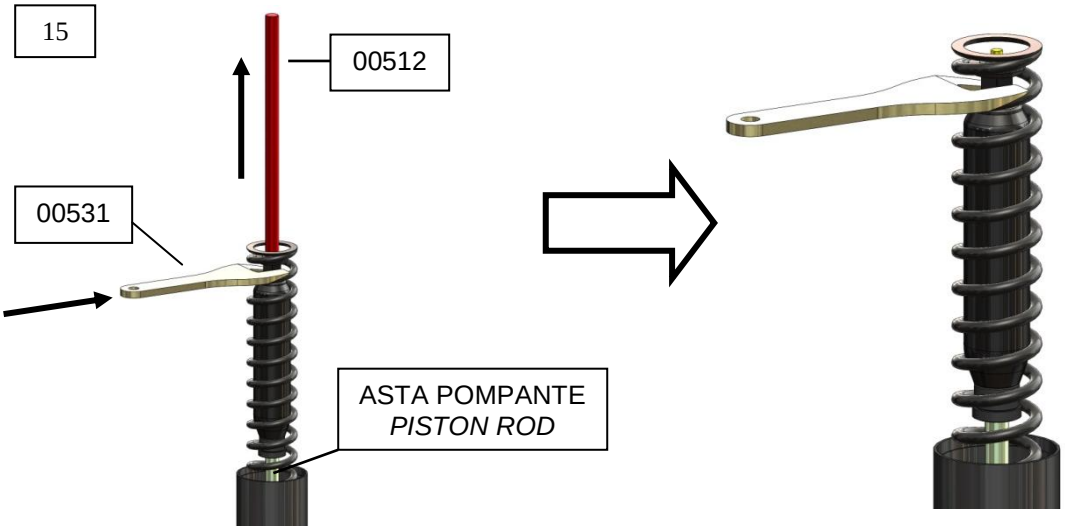


25- Perform some compression-extension movements of the outer tube and re-check the oil level repeating the operations of point 24.

26- Insert the spring, removed in point 2 (end with engraved constant elastic K towards the cap).

27- Hold and extend the piston rod with the tool 00512 so keep the lock nut with the tool 00531. After that removed the tool 00512.

15



28- Screw manually the upper cap on the lock nut until il reaches limit stop.

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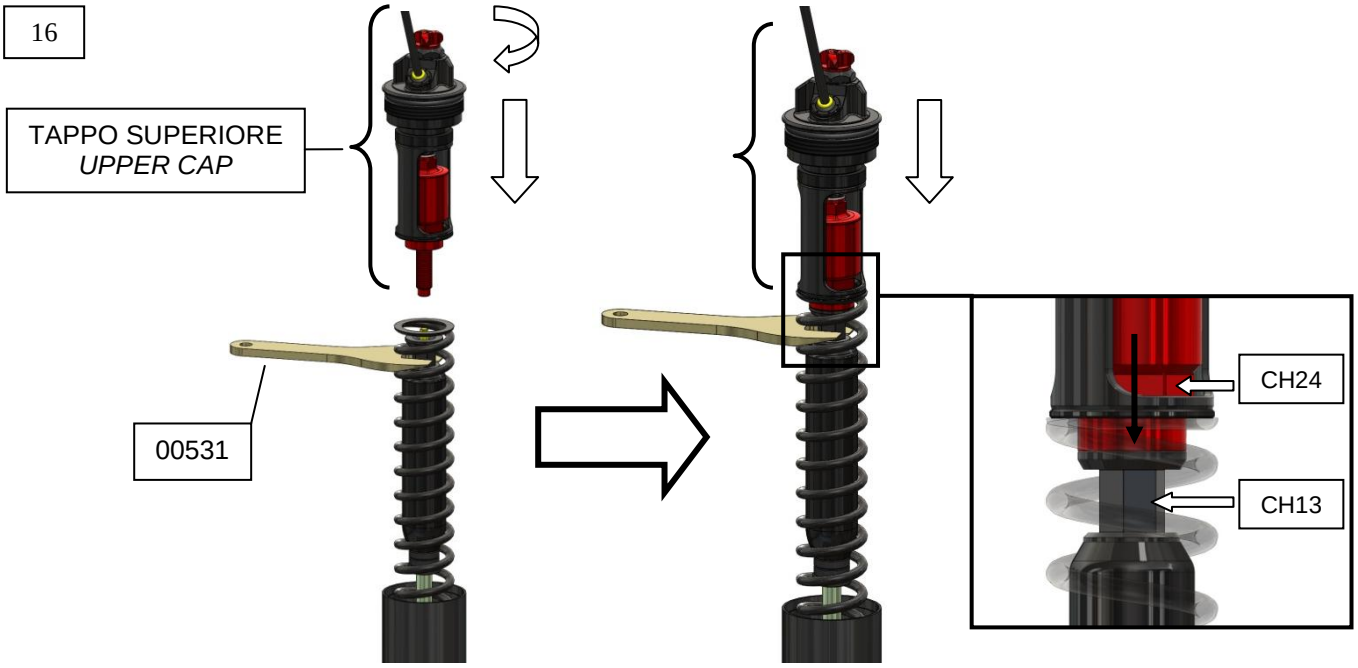
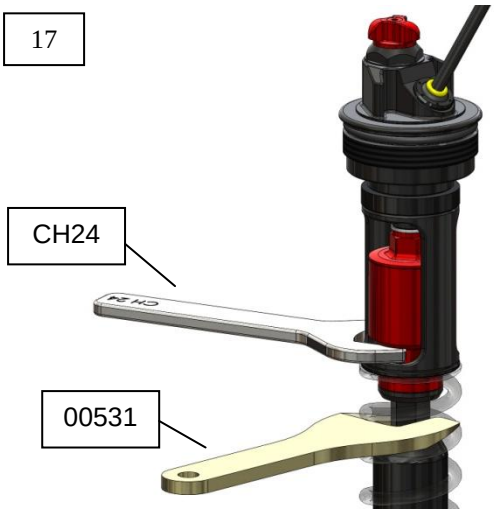


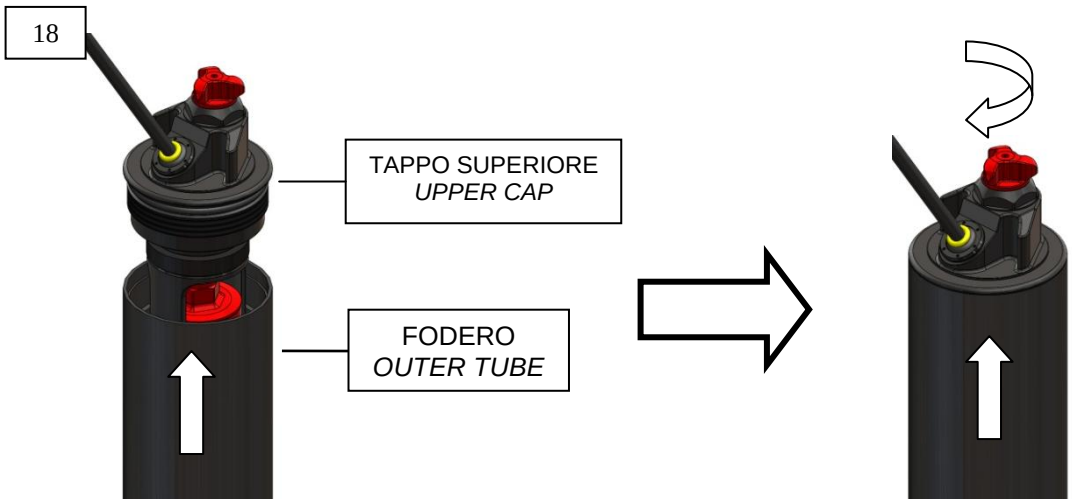
29- Tighten the lock nut to the upper cap. Tighten to 9 Nm.

17



30- Bring the outer tube towards the upper cap. Screw the upper cap without tighten.

18



31- Reassemble the fork legs on the bike following the instructions in the vehicle manufacturer's Garage manual. Restore sliding **Q** indicated in the table on page 37 and tighten the screws of the lower plate.

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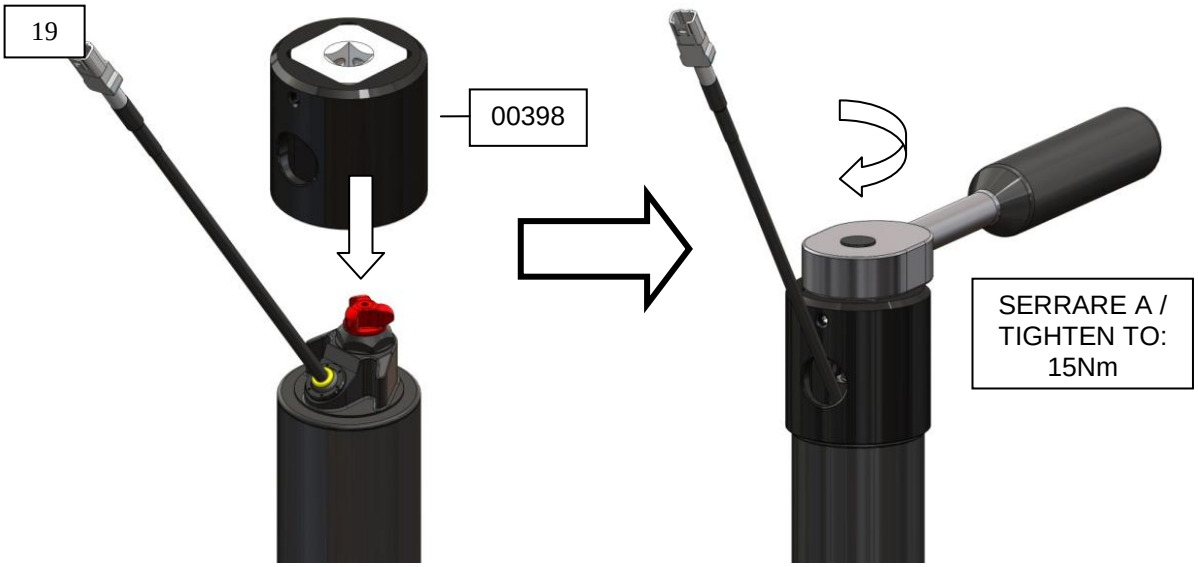
32- tighten the upper caps to the torque of 15Nm using the tool 00398. After that tighten the screws of the upper plate.



33- Connect the cartridges connectors to the Bitubo wiring:

a. COMPRESSION cartridge connector to the Bitubo wiring connector identified as “COMPRESSION FRONT”.

b. REBOUND cartridge connector to the Bitubo wiring connector identified as “REBOUND FRONT”.

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REAR SHOCK ABSORBER

Schema comp. / Comp. Scheme / Druck-stufen Schema / Compression regime	*Schema est. / Rebound. Scheme / Zugstufen Schema / Extension regime*	*Rigidezza molla / Spring rate / Federrate / Ressort [kg/mm]*	*Rigidezza molla interna / Top Out Spring rate / Innenfederrate [kg/mm]*	*Precarico molla / Spring Preload / Vor-spannung / Precontrainte du ressort [mm]*	*Estensione/ Rebound/ Zugstuf / Extension [clicks]*	*Compressione/ Compression/ Druckstufe/ Compression [clicks]*	*Interasse / Length / Länge / Entraxe [mm]*
GR7213	*GR7210*	*11,0*	*15,0*	*13,0*	*12*	*11*	*312,0*

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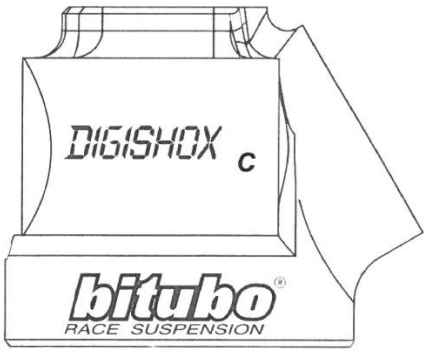
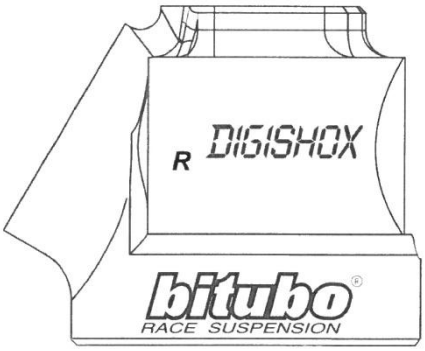
REAR SHOCK ABSORBER SDJUSTMENT

The hydraulic adjustments of Compression and Rebound are electronically adjusted by **Bitubo Digishox** system.
For all the functionality, refer to the **"System User's Guide"**.

C - COMPRESSION



R - REBOUND



SPRING PRELOAD ADJUSTMENT

The adjustment range is **10mm**.

The hydraulic spring preload is electronically adjusted by **Bitubo Digishox** system.
For all the functionality, refer to the **"System User's Guide"**.

The preload defines the height of the bike from the ground as well as the dynamic set-up on a bend, therefore also the angle values of the fork, the front, etc. which characterize the behaviour of the vehicle.

WARNING: this kind of damper is provided by an internal top out spring. Verify the measures at completely extended suspension, not only by lifting the bike from the ground, but forcing the suspension in extension too, in order to compress totally the top out spring.

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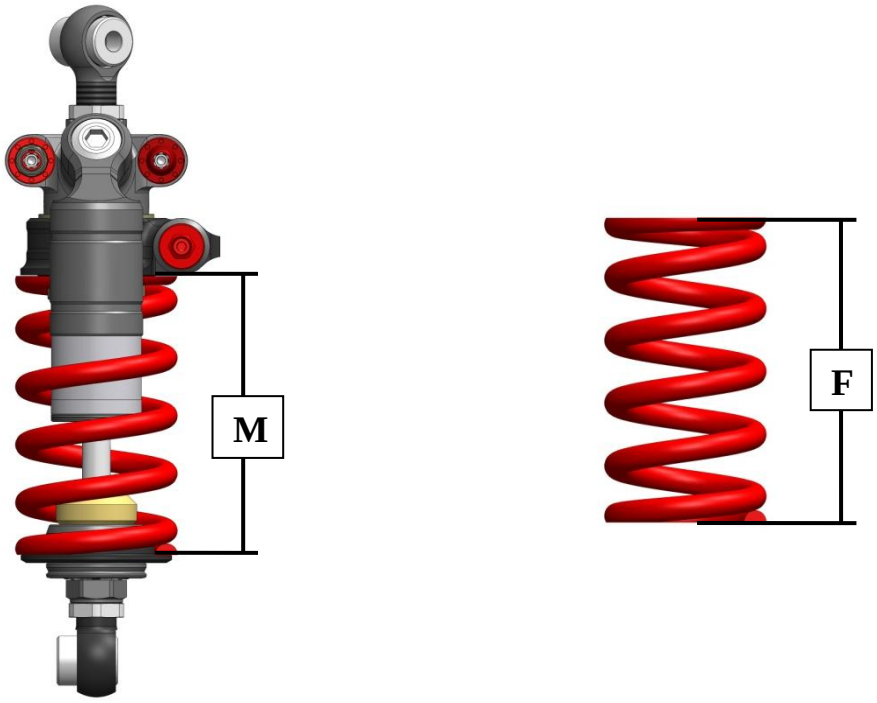
The spring preload is the pressure to the spring when it is installed on the shock. → **PRELOAD=F-M**

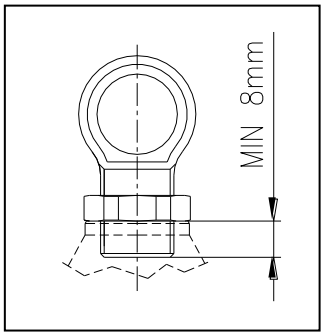


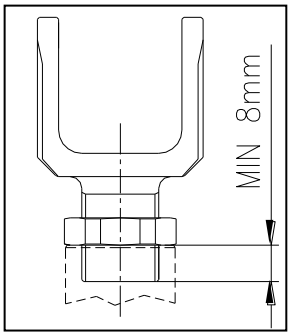
LENGTH ADJUSTMENT

WARNING: The riding quotas are the result of long tests by the manufacturer, and the **Q** quote was set to provide safe manageability and stability. A 2 or 3mm adjustment changes the vehicle's behaviour. Changing the Q quote changes some riding quotas recommended by the vehicle manufacturer and can reduce vehicle stability, both when riding and parking (on the central or lateral stand), jeopardising riding behaviour and safety

The length has to be adjusted only on the lower attachment (unless different information reported on the specific instruction) because the upper attachment adjustment change the position of the shock absorber refer to the vehicle frame and it could get interference with the other parts.

WARNING: adjust the lower attachment being sure that inside the boss you keep at least 8 mm thread.





According to the lower head layout (with holes – left figures; with nut – right figures), insert the Ø8mm tool, supplied inside the package, inside one of the holes or 27mm key in the nut.
After positioning the bike on a special stand so to avoid any weight on the rear swing arm, loosen the lock nut with 27mm key as for the picture.

If the shock absorber is removed from the bike:
- Unscrew the lower head for **increasing** the length
- Screw the lower head for **decreasing** the length

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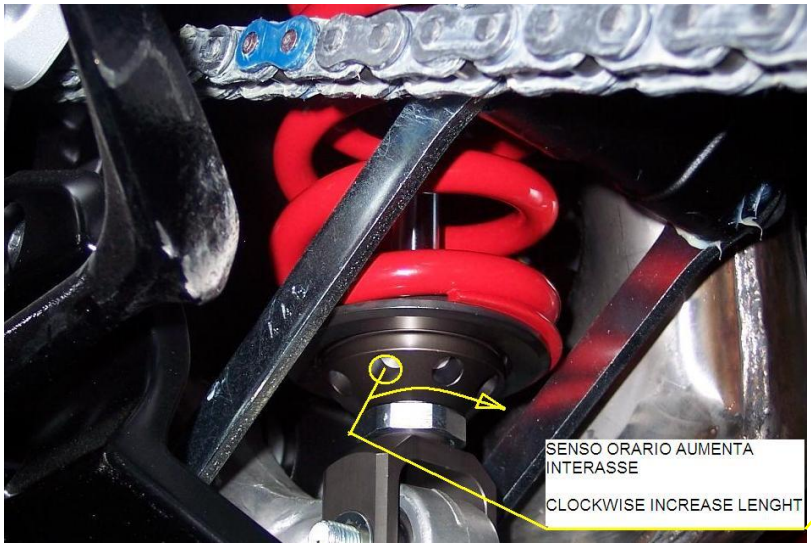
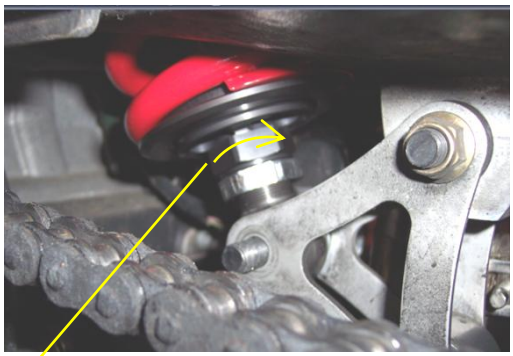
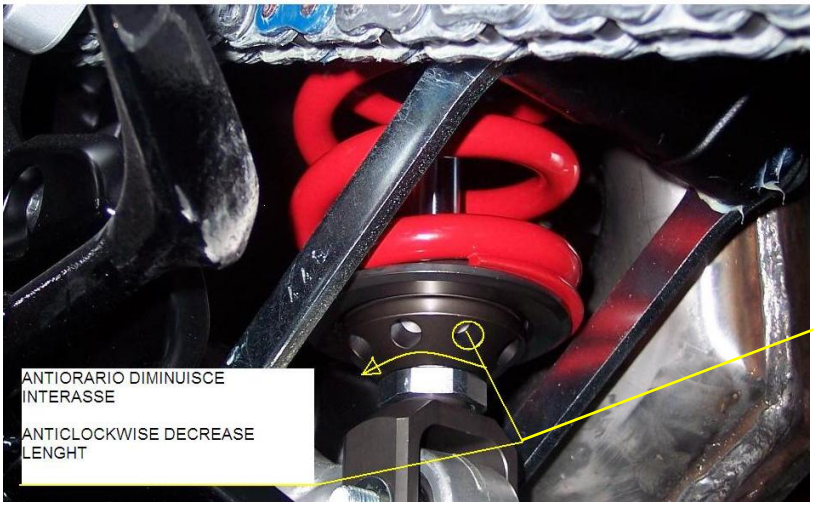
If the shock absorber is mounted in the bike:

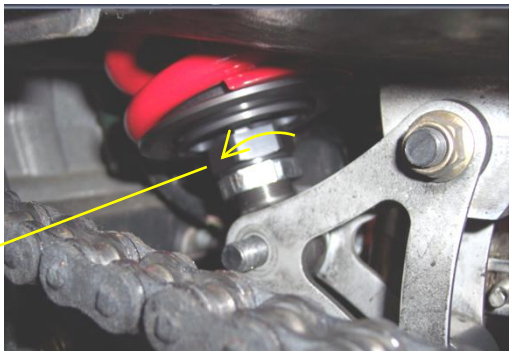
- Turn clockwise the lower attachment for **increasing** the length





- turn anticlockwise the lower attachment for **decreasing** the length





Note: One complete turn of the length adjuster modifies the shock absorber length for 1mm

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MOUNTING INSTRUCTIONS

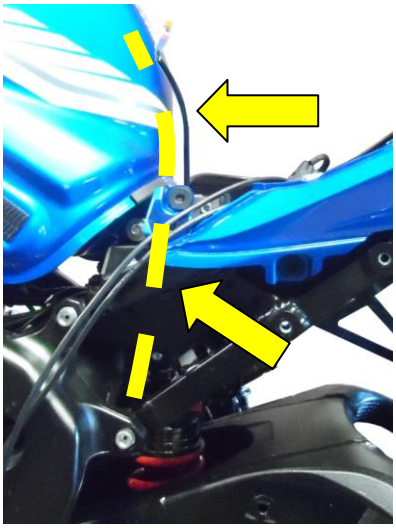
ATTENTION: for all assembling and disassembling operations, and the torque settings of the retaining pins, follow the Manufacturer's instructions carefully (Workshop Manual).

1) Place the motorbike on a suitable support and lift the back wheel off the ground without any load on the suspension.

1) Remove the original shock absorber. For disassembling, refer to the vehicle Manufacturer's instructions (Use/Service manual – Workshop manual).

2) Insert the Bitubo shock absorber in the same way as the original. insert the original screws and bolts in the upper and lower attack screwing it in without tightening.

3) Put the electric actuators cables through the fairing and the frame in order to reach the under seat compartment.



4) Put down the vehicle and test the rear suspension, then tighten the upper and lower bolts of the shock absorber.

5) Refit all the original components (if removed), following the instructions supplied by the Manufacturer.

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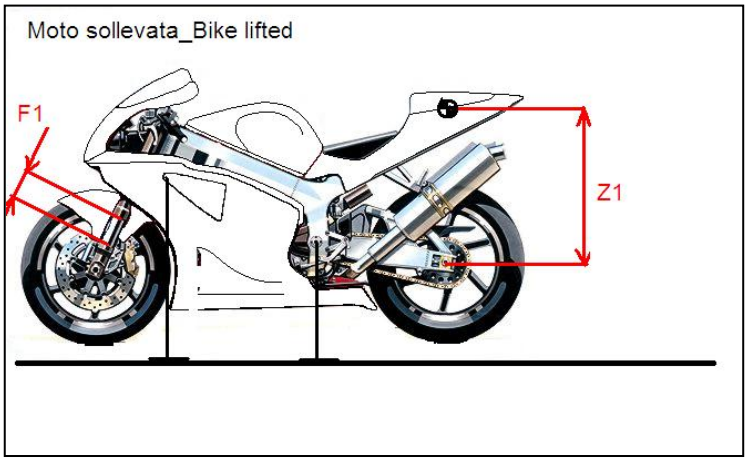
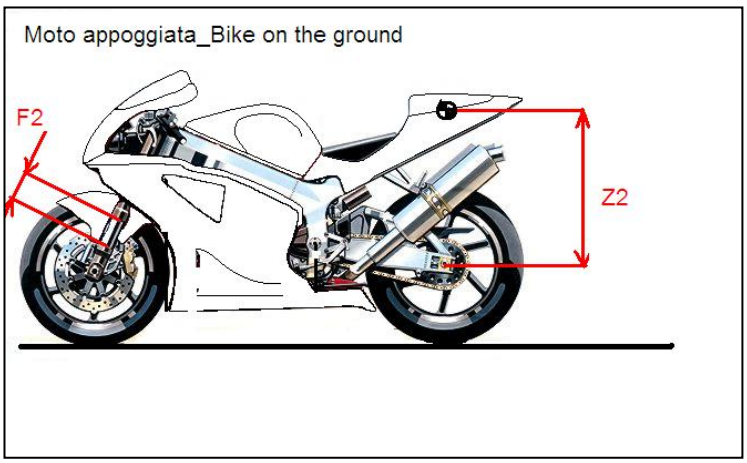
ADJUSTMENT AND MEASUREMENT OF SAG



1) Lift the bike (fork free from loading and lifted tyre from the ground) and press the spring retainer forcing the full extension of the kinematic mechanism of the rear suspension. Follow the same procedure also on the fore-carriage.

2) Individuate two reference points on the vertical axe of the tyre pin: one on the centre, the other one fixed on the little frame under the seat of the bike. Both points shall be precise and well defined in order to make this operation again more and more times. Follow the same procedure on the fore-carriage.

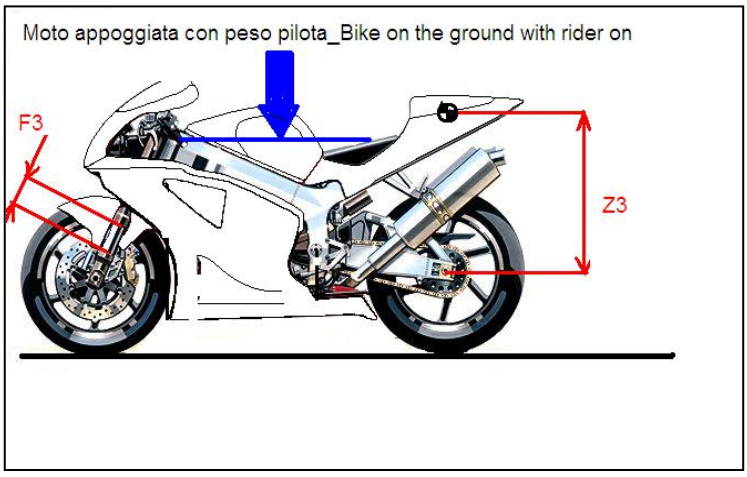


3) Measure the distance between the two points Z1 and F1.

4) Place the bike to the ground with both tyres, press slowly the suspension twice and leave it then be extended freely.

5) Measure the new distance between the two points Z2 and F2.

6) **Z2-Z1 (static sag)** shall be included between **5mm and 15mm** for road replica bikes, between **10mm and 20mm** for road and naked bikes, between **15 and 25mm** for enduro tourism bikes; **F2-F1 (static sag)** shall be included between 2**5mm and 32mm** for road and naked bikes; **between 30mm and 40mm** for enduro tourism bikes.



7) Make all measurements again having the rider on the bike in position of riding.

8) **Z3-Z1 (rider sag)** shall be included between **25mm and 30mm** for road replica and naked bikes. For enduro and tourism bikes the value shall be included between **30mm and 40mm**. **F3-F1 (rider sag)** shall be included between **35mm and 40mm** for road race replica and naked bikes. For enduro tourism bikes the value should be included between **40mm** and **50mm.**

In order to decrease the value of static sag, you shall increase the spring preload adjusting it clockwise (screwing); on the other hand, in order to increase the static sag, you shall decrease the spring preload anti-clockwise (unscrewing the adjustment).

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MAINTENANCE

FRONT FORK

- Fork cleaning and maintenance prevents premature wear and increases performance over time.
- When cleaning the vehicle, be careful not to aim pressurised water jets directly on the fork rod oil guards or upper fork leg caps (upper steering plate).
- Clean the fork and upper caps using non aggressive detergent.
- We recommend checking correct cartridge operations every 10000 Km or at least once a year.
- Every 24 months or 20,000 km of use, we advise you to have the cartridge overhauled at a BITUBO Authorised Service Centre.
- We recommend you periodically check cartridge efficiency checking the damping forces with hydraulic regulations fully open and fully closed. A change in damping is a positive result.
- For best purchased product performance, BITUBO recommends you use its lubricants.

REAR SHOCK ABSORBER

- Cleaning and lubricating your shock prevents its early wear and tear and increases its performances longer.
- On clearing the bike, pay attention not to turn the water jet at high pressure directly to the body and head of the shock absorber.
- Keep clean the shock absorber from dust, ground and any other impurities using a non-aggressive detergent.
- After cleaning vaporize on the shock some cleaner like WD40 or similar and then dry with compressed air jet.
- Bitubo recommends to check yearly, or after 10000Km, the correct work of the shock absorber:
    - inspection the joints of upper and/or lower attachments, clean with a proper cleaner and lubricant the moving parts.
    - inspection the shock and check if there are any components leaking oil.
    - check the internal gas pressure.
- Bitubo recommends the service every 2 years or 20.000 km.
- Bitubo recommends to check periodically the efficiency of the shock absorber performing some compression and extension movement set the hydraulic adjustments from “fully-open” to ”fully-closed”. The positive result is the damping change.

Maintenance and overhaul frequency suggested by Bitubo at Bitubo service centres (service centre list in the "service" section at *www.bitubo.com*).

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