7. Front axle

7.1. Troubleshooting

Hard steering

- Upper tapered bearing nut excessively tightened
- Broken tapered bearing
- Low front tyre pressure

Unstable steering

- Deformed front rim
- Bent front axle
- Unbalanced tyre
- Upper tapered bearing nut loose

Steering is deflected to one side

- Bent fork bar
- Double handlebar
- Bent front axle
- Defective tapered bearings

Soft front suspension

- Free length of spring below the service limit
- Insufficient hydraulic oil

Underpowered front brake

- Air in the hydraulic system
- Worn pads
- Warped disc
- Contaminated disc or pads
- Brake fluid out of date
- Clogged hose
- Worn caliper/pump piston seal

7.2. Undercarriage characteristics

Component	Standard size	Service limit
Front axle warping	—	0.2 mm
Radial front wheel warpage	—	2.0 mm
Axial front wheel warpage	—	2.0 mm
Front brake disc thickness	4.5 mm	3.0 mm
Front brake disc warpage	—	0.3 mm

7.3. Tightening torques

Component	Screw type	Tightening torque
Steering shaft locknut		45 Nm (4.5 kgfm)
Steering shaft pin bolt	M10x45	45 Nm (4.5 kgfm)
Handlebar bridging screws	M8x30	45 Nm (4.5 kgfm)
Front brake disc fixing screws	M8x25	25 Nm (2.5 kgfm)
Front axle		55 Nm (5.5 kgfm)
Screws for fixing the right cylinder foot shaft	M6x25	10 Nm (1.0 kgfm)
Brake caliper fixing screws	M10x60	45 Nm (4.5 kgfm)
Pads dowel screw		45 Nm (4.5 kgfm)
Fork post screws	M10x45	45 Nm (4.5 kgfm)
Brake pump reservoir cover screws		1.6 Nm (0.16 kgfm)
Brake pump-to-handlebars support screw		12 Nm (1.2 kgfm)
Clamp bleed valve		5.5 Nm (0.55 kgfm)
Brake hose mounting bolts		35 Nm (3.5 kgfm)

7.4. Removal of the front brake caliper

WARNING
• The process for removing the left clamp is the same as that explained for the right clamp.

Necessary tools

8 mm Allen key

Large flat screwdriver

Remove the two screws securing the clamp to the fork leg at the bottom using an 8 mm Allen key.

Remove the caliper from the fork leg disc by hand.

Tightening torque

Front caliper fixing screws: 45 Nm

For installation, follow the above steps in reverse order and use a large flat screwdriver to prise the brake pads apart beforehand so that the brake disc can fit between them with sufficient clearance. This will cause the caliper pistons to retract inwards.

7.5. Replacement of front brake pads

WARNINGS
• The process for changing the pads on the left caliper is the same as that explained for the right caliper. • Avoid oil and grease on the brake pads or disc. • If the brake pads are contaminated, replace them with new ones. • Use a disc cleaner to remove grease or oil from the disc surfaces. • Do not replace only one pad; replace both at the same time.

Required prior operations:

- Remove the front brake calipers (→ See 7.4. Removal of the front brake caliper)

Necessary tools

Large flat screwdriver

5 and 8 mm Allen key

Before removing the brake caliper, use a 5 mm Allen key to loosen (do not remove) the brake pad pin bolt with the caliper.

Once the caliper has been removed, remove the pin bolt from the pads with a 5 mm Allen key.

Tightening torque

Brake pad pin bolt: 15-20 Nm

Remove the elastic plate from the clamp.

Remove the clamps from their housing on the clamp.

Insert the new pads into the caliper.

Spread the brake pads apart so that the brake disc can fit between them with sufficient clearance using a large flat-blade screwdriver. Return the elastic plate to its position. Insert the brake pads with the bolt passed through and screw it in loosely.

Put the caliper in place, inserting the disc between the pads, and fit and tighten the caliper fixing bolts. Tighten the pin bolt to the recommended torque.

Tightening torques:

Clamp fixing screws. 45 Nm

7.6. Checking the front brake discs

WARNING
• The process for checking the left front brake disc is the same as that explained for the right front disc.

Required prior operations:

- Use a suitable stand or support to place under the centre of the scooter and strap the rear of the scooter so that the front wheel of the scooter is raised and can be rotated.

Necessary tools

Comparison engine

Micrometer

Easel or kickstands

Measure the disc warpage with a dial gauge. Warpage is half of the maximum reading.

Service limit: 0.3 mm

WARNING: Feel the disc with the dial gauge in an area without holes.

Measure the disc thickness with a micrometer or caliper in the area where the pads rub.

Service limit: 4 mm

7.7. Checking the rim

Required prior operations:

- Use a suitable stand or support to place under the centre of the scooter and strap the rear of the scooter so that the front wheel of the scooter is raised and can be rotated.

Necessary tools

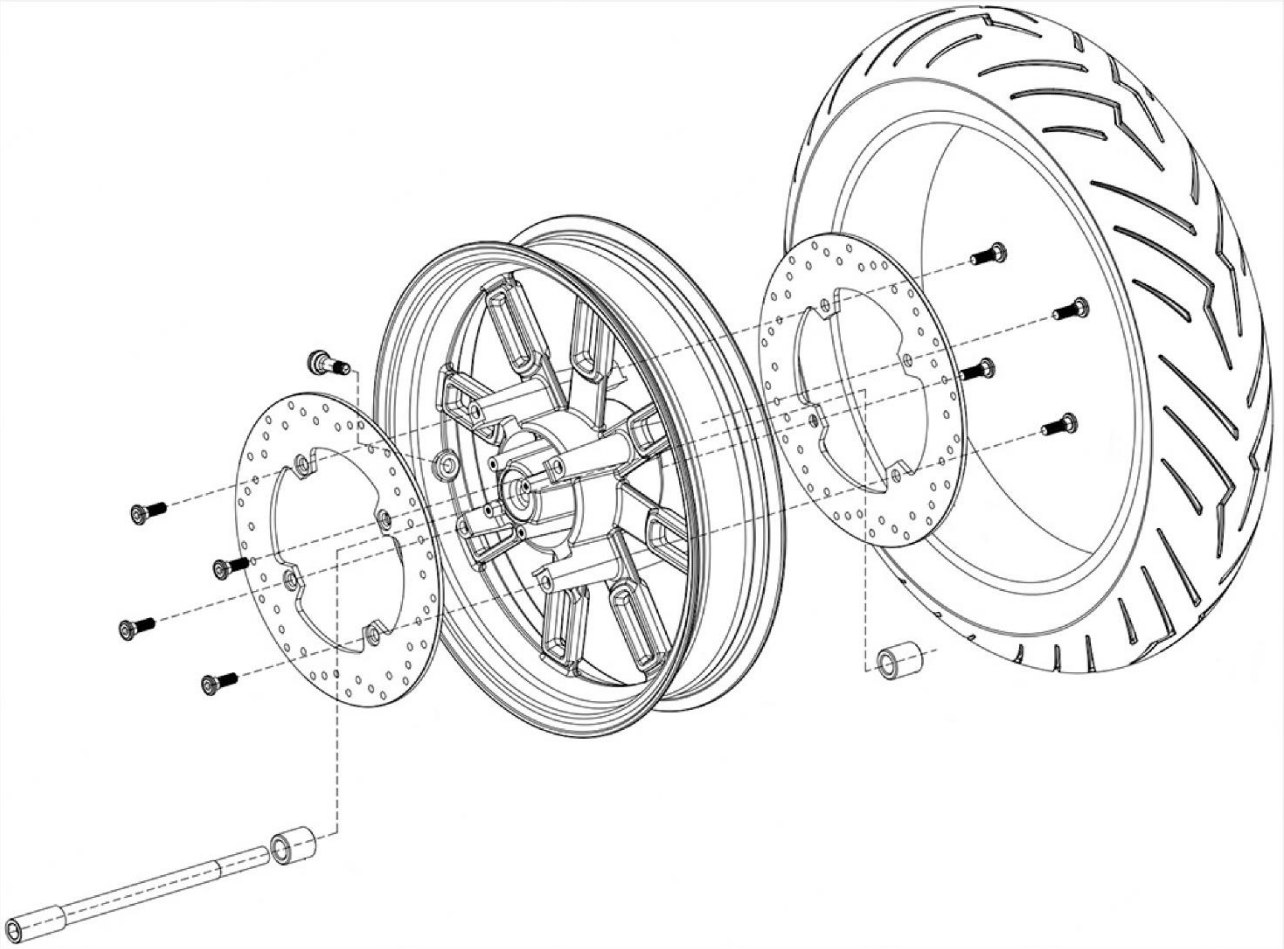
Comparison engine

Measure the axial runout of the rim by placing a dial gauge on the side wall of the rim flange.

Service limit: 0.3 mm

7.8. Front wheel removal

Diagram



Required prior operations:

- Remove the front brake calipers (→ See 7.4. Removal of the front brake caliper)
- Use a suitable stand or support to place under the centre of the scooter and strap the rear of the scooter so that the front wheel of the scooter is raised and the vehicle is stable when the front wheel is removed.

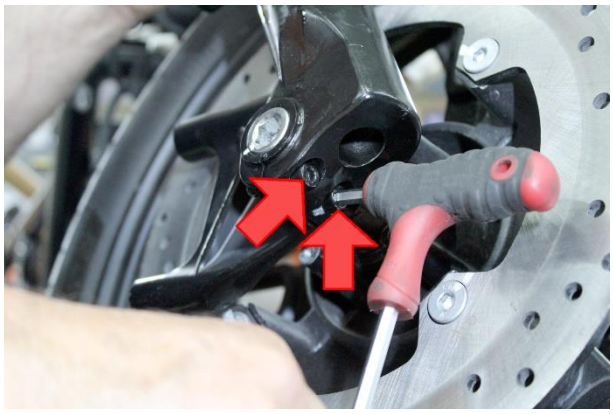
Necessary tools

Large flat screwdriver

Allen spanners 5 and 12 mm

Remove the two bolts that secure the front wheel axle in the right fork leg using a 5 mm Allen key.

If you notice that the wheel axle resists coming out, slightly widen the opening of the fork leg with a large flathead screwdriver.



Tightening torques

Bolts for the right fork leg: 10 Nm

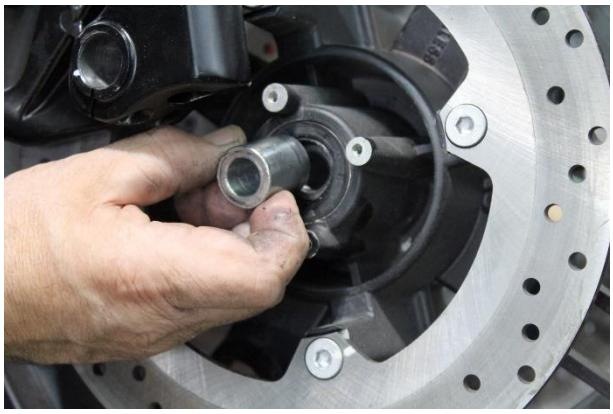
Loosen the front wheel axle with a 12 mm Allen key.

Tightening torques

Front wheel axle: 55 Nm

After the axle threads are free, remove it by hand with a twisting motion.

Remove the bushings located between the fork legs and both sides of the front wheel rim. These bushings are identical, so there is no problem positioning them during reassembly.



Remove the front wheel from the fork.

Assembly is in the reverse order of disassembly.

Grease the front wheel axle before inserting it.

7.9. Removal of the front disc brake

WARNING
• The process for removing the left front brake disc is the same as the one described for the right front disc.

Required prior operations:

- Remove the front brake calipers (→ See 7.4. Removal of the front brake caliper)
- Use a suitable stand or support to place under the centre of the scooter and strap the rear of the scooter so that the front wheel of the scooter is raised and the vehicle is stable when the front wheel is removed.
- Remove the front wheel (→ See 7.8. Front wheel removal)

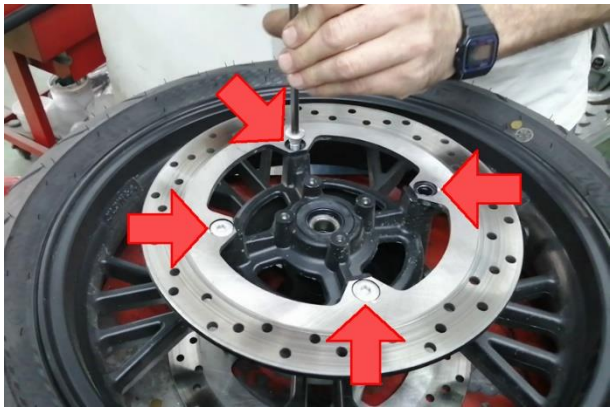
Necessary tools

Allen key 5

Remove the four screws securing the front brake disc to the rim with a 5 mm Allen key.

Tightening torques

Front disc fixing screw: 25 Nm



Remove the brake disc by hand.

7.10.Replacement of front wheel bearings

WARNING
• The process for removing the bearing on the left side of the front wheel is the same as the one described for the right side.

Required prior operations:

- Remove the front brake calipers (→ See 7.4. Removal of the front brake caliper)
- Use a suitable stand or support to place under the centre of the scooter and strap the rear of the scooter so that the front wheel of the scooter is raised and the vehicle is stable when the front wheel is removed.
- Remove the front wheel (→ See 7.8. Front wheel removal)

Necessary tools

Allen key 5

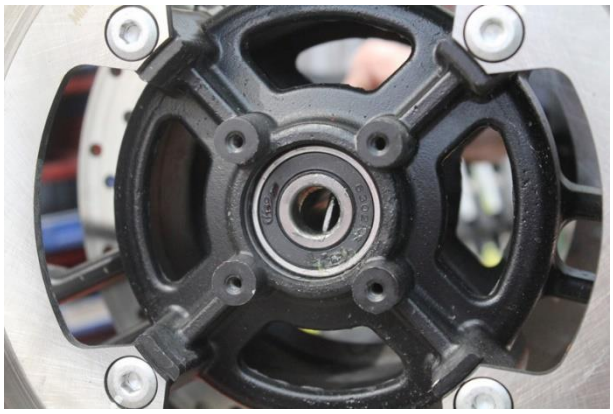
Flat screwdriver

Rod

Hammer

Remove the dust cover on the right-hand side of the front wheel by prising it out of its housing with a flat-blade screwdriver.

Remove the bearing to be replaced by tapping from inside the wheel with a rod on the inner race. Discard that bearing.

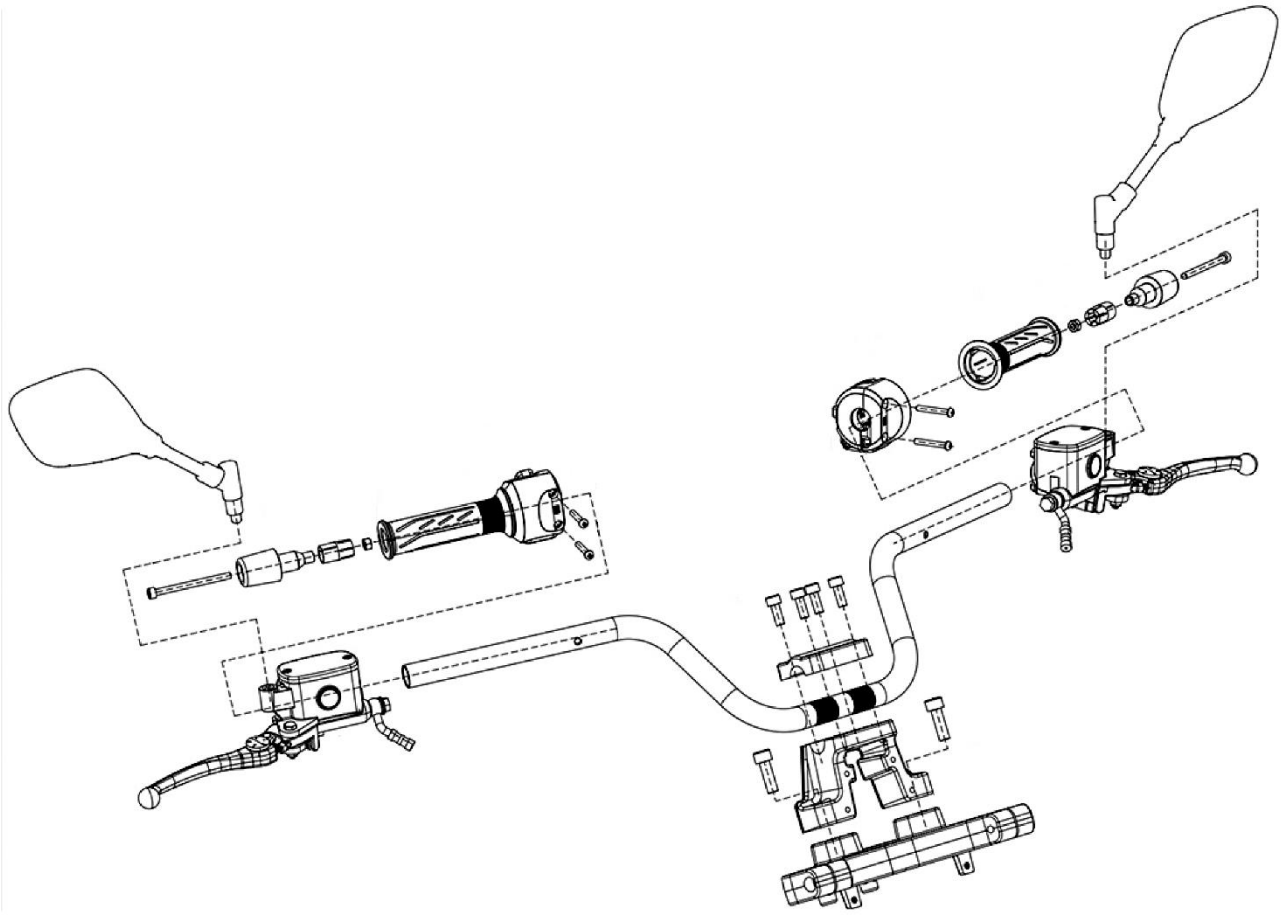


Fit a new bearing in its recess in the inner spacer bushing using a socket spanner whose outer diameter matches the diameter of the outer race of the bearing, tapping it with a hammer so that it goes in vertically all the way to the bottom.

Check the dust cover for any damage or wear, and replace it if necessary. Insert the dust cover into its recess on the right side of the wheel by applying a light coat of grease to the lip.

7.11.Dismantling the handlebar

Diagram



WARNING
• The procedure for the removal of the right-hand switchgear as well as the right-hand brake pump bracket, right-hand rear-view mirror and right-hand counterweight is the same as that explained for the same components on the left-hand side.

Required prior operations:

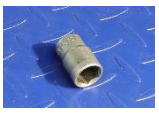
- Remove the front mudguard (→ See 1.12. Disassembly of the front mudguard)
- Remove the windscreen (→ See 1.13.1. Disassembly of the windscreen)
- Remove the headlamp (→ See 1.13.2. Disassembly of the headlamp)
- Remove the headlamp bracket (→ 1.13.3. Disassembly of the headlamp bracket)

Necessary tools

Phillips screwdriver with #2 tip.

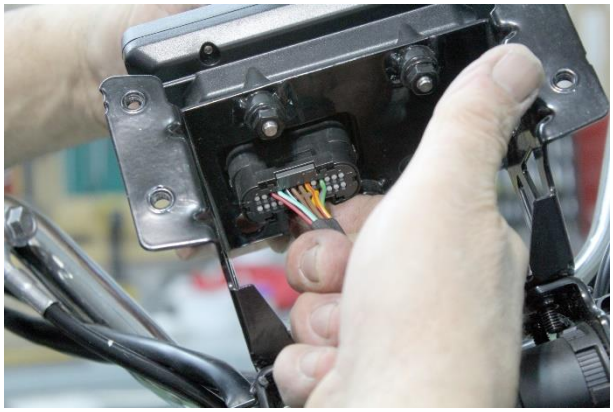
Allen spanners 5 and 6 mm

17 mm open-end spanner

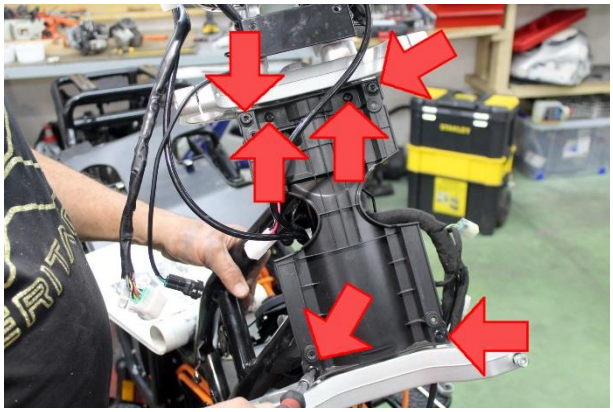


8 mm socket spanner

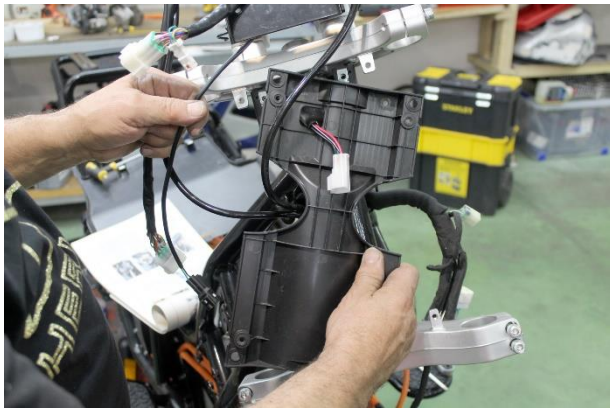
Disconnect the connector from the instrument cluster display.



Using a #2 Phillips screwdriver, remove the six screws that secure the moulding that covers the steering head pipe.



Remove the moulding covering the steering pipe.



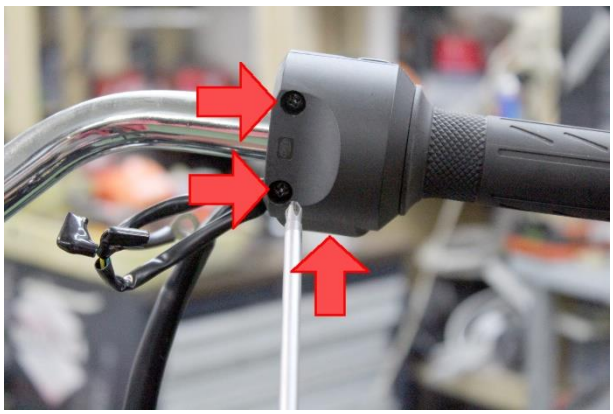
Use a 17 mm open-ended spanner to remove the left-hand mirror.

Disconnect the two faston terminals of the brake light button from the lever.

To remove the brake lever with its corresponding left-hand brake pump, remove the two screws securing the bracket with an 8 mm socket. During assembly, remember that the lower screw secures a grounding point for the wiring.

During assembly, position the bracket with the arrow mark and ‘UP’ facing upwards, aligning the inner peg with the handlebar hole (green arrows).

Using a #2 Phillips screwdriver, remove the three screws that secure the left handlebar switch assembly.

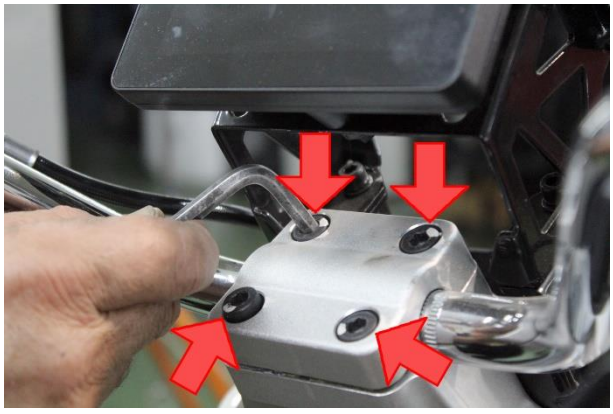


During assembly, remember to align the peg of the switch assembly with the handlebar hole (green arrows).

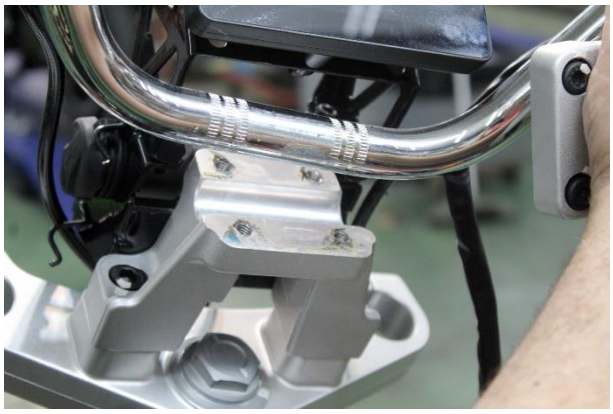
To remove the handlebar end weights, remove the screw using a 5 mm Allen key.

Remove the counterweight by pulling it outwards.

Remove the four screws from the clamp that secures the handlebar using a 6 mm Allen key.

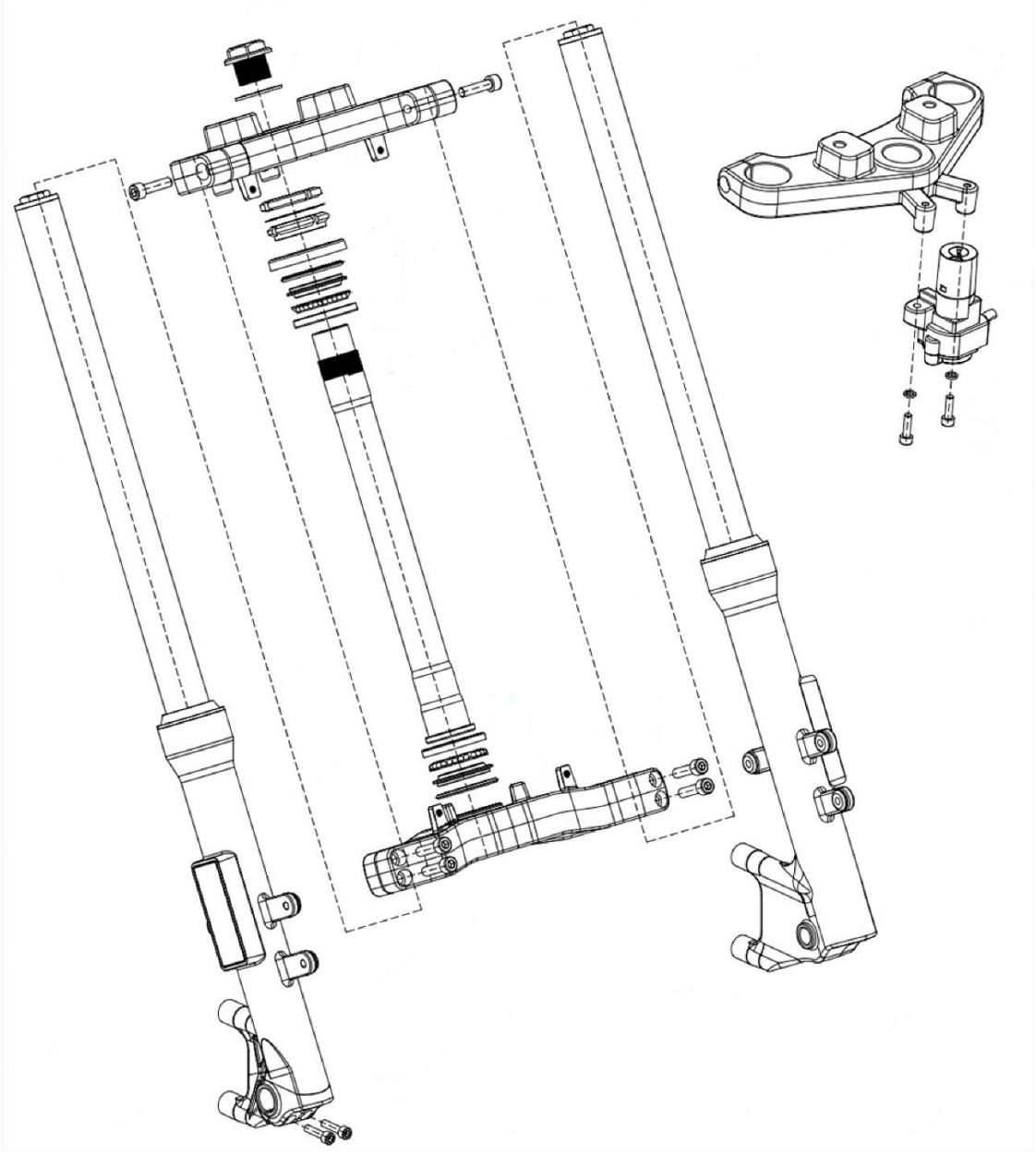


Set aside the handlebar clamp and the handlebar.



7.12.Removal of the fork stanchions

Diagram



WARNING
• The process for removing the left fork stanchion is the same as the one described for the right fork stanchion.

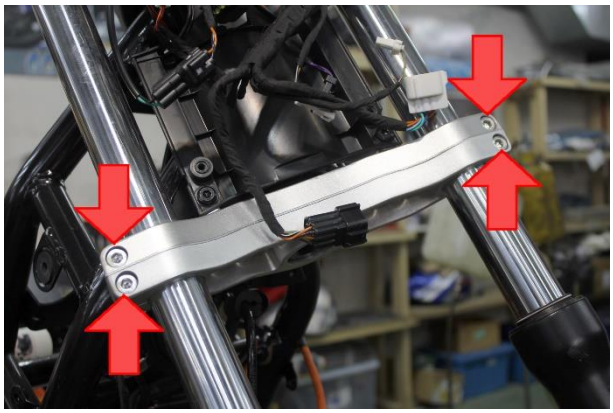
Required prior operations:

- Remove the front mudguard (→ See 1.12. Removal of the front mudguard)
- Remove the windscreen (→ See 1.13.1. Disassembly of the windscreen)
- Remove the headlamp (→ See 1.13.2. Disassembly of the headlamp)
- Remove the headlamp bracket (→ 1.13.3. Disassembly of the headlamp bracket)
- Remove the front brake calipers (→ See 7.4. Removal of the front brake caliper)
- Remove the front wheel (→ See 7.8. Front wheel removal)

Necessary tools

5 mm Allen key

Loosen (do not remove) the lower seat post bolts corresponding to the fork leg using a 5 mm Allen key.



Tightening torques

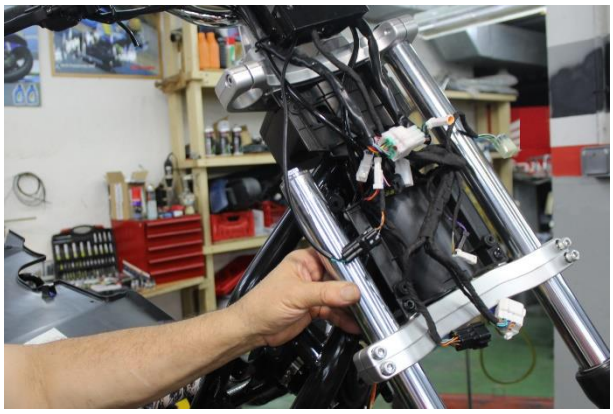
Lower seat post bolts: 25 Nm

Remove the upper seat post bolt with a 5 mm Allen key corresponding to the fork leg to be removed.

Tightening torques

Upper seatpost bolts: 25 Nm

Remove the bar from the seatposts by rotating and pulling the bar downwards.



The assembly sequence is the reverse of the disassembly sequence.

Secure the fork stanchions by aligning their top stop with the surface of the upper seat post, leaving the leg cap screw just above the seat post as shown in the image.

7.13. Replacement of steering axle bearings

Required prior operations:

- Remove the front mudguard (→ See 1.12. Removal of the front mudguard)
- Remove the windscreen (→ See 1.13.1. Disassembly of the windscreen)
- Remove the headlamp (→ See 1.13.2. Disassembly of the headlamp)
- Remove the headlamp bracket (→ 1.13.3. Disassembly of the headlamp bracket)
- Remove the front brake calipers (→ See 7.4. Removal of the front brake caliper)
- Remove the front wheel (→ See 7.8. Front wheel removal)
- Remove the handlebar (→ See 7.11. Dismantling the handlebar)
- Remove the fork rods (→ See 7.12. Removal of the fork rods)

Necessary tools

Chisel

Hammer and nylon hammer

Rod

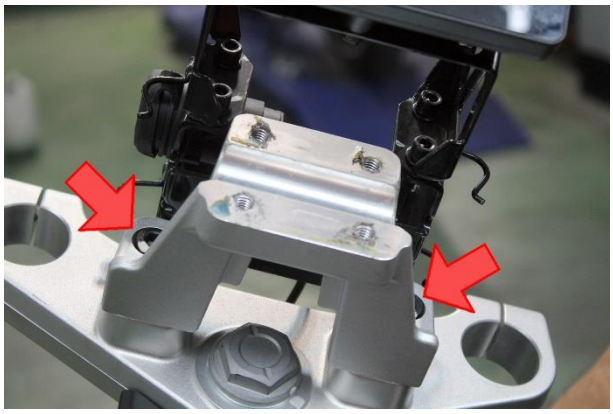
Phillips screwdriver with #2 tip

8 mm Allen key

30 mm socket spanner

Hook spanner

Remove the two bolts securing the handlebar turret to the top post with an 8 mm Allen key.

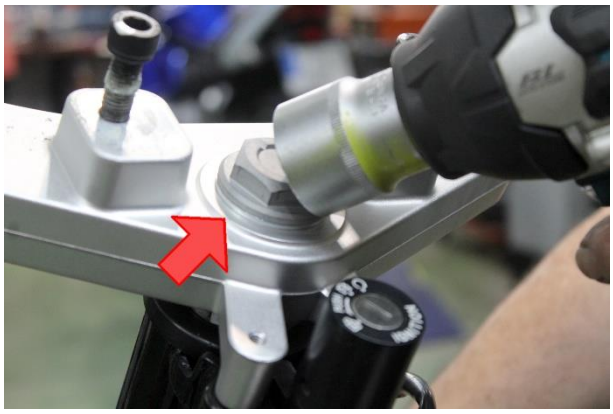


Remove the turret together with the TFT display assembly from the instrument panel.

Using a #2 Phillips screwdriver, remove the two screws securing the upper and lower trims of the ignition switch from the bottom of the ignition switch.

Remove the upper and lower contact lock mouldings.

Use a 30 mm socket spanner to remove the bolt from the upper seat post.



Tightening torque

Upper seatpost centre bolts: 90±10 Nm

Remove the screw from the upper seat post.

Remove the upper seat post. In case of difficulty, tap gently under the seat post with a nylon hammer.

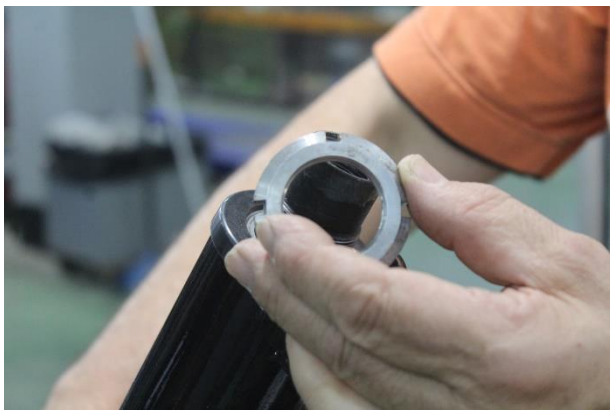
Using a hook spanner, loosen the lock nut on the steering shaft.

Remove the lock nut from the steering shaft.

Remove the tab washer that fits into the castellations of the steering nut.

Loosen the steering nut with a hook spanner.

When you are about to remove the steering nut, hold the lower seat post with your other hand to prevent it from falling out.



Remove the steering shaft cover while still holding the lower seat post.

Remove the lower seatpost with the axle by pulling it out from beneath the steering head.

Remove the spacing washer.

Remove the upper race from the upper bearing of the steering axle. Please note the upper step during installation.

Remove the upper bearing balls from the steering shaft with their cage.

To remove the upper race of the lower steering head bearing, use a rod to support that bearing, as indicated by the green arrow in the image.

The other end of the rod shall be struck with a hammer.

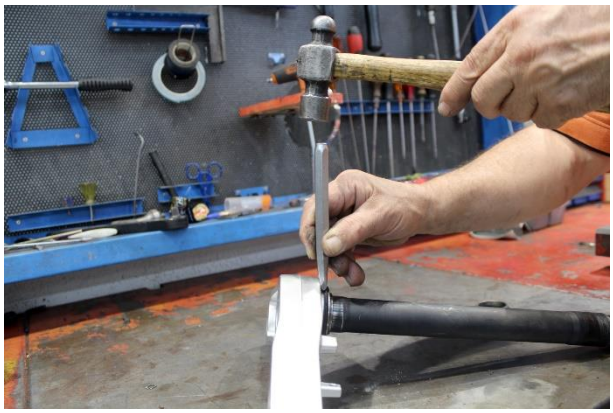
The top race of the bearing shall come out of its recess. Discard that bearing.

The same procedure of tapping on a rod resting against the race will be used to remove the lower race of the upper steering head bearing.

When tapping on that race, the entire bearing must be discarded.

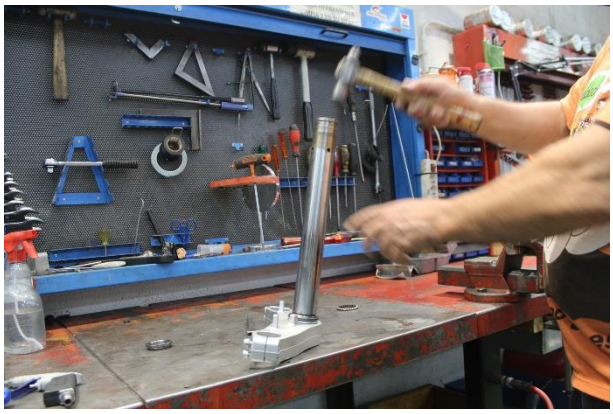
Remove the balls with their cages from the lower seatpost and steering shaft assembly.

If it is necessary to replace the lower bearing, use a chisel and hammer to remove the lower race by tapping along its perimeter without damaging the seat post and steering shaft.



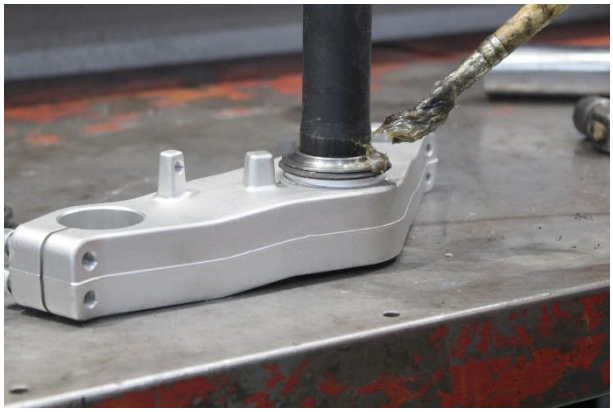
Remove the lower race from the lower bearing by sliding it along the shaft.

Insert a new lower race by pushing it into the seat post using a suitable tube resting on the upper edge of the bearing's inner race.



WARNING: Avoid damaging the race where the balls slide.

Apply a coat of grease to the bottom race of the bearing and reinsert a new ball and cage assembly.



Fit a new lower race of the upper steering bearing and fit it to the bottom of its recess using a suitable socket spanner that rests on the upper edge of the race.

Use this procedure to mount the upper race of the lower bearing.

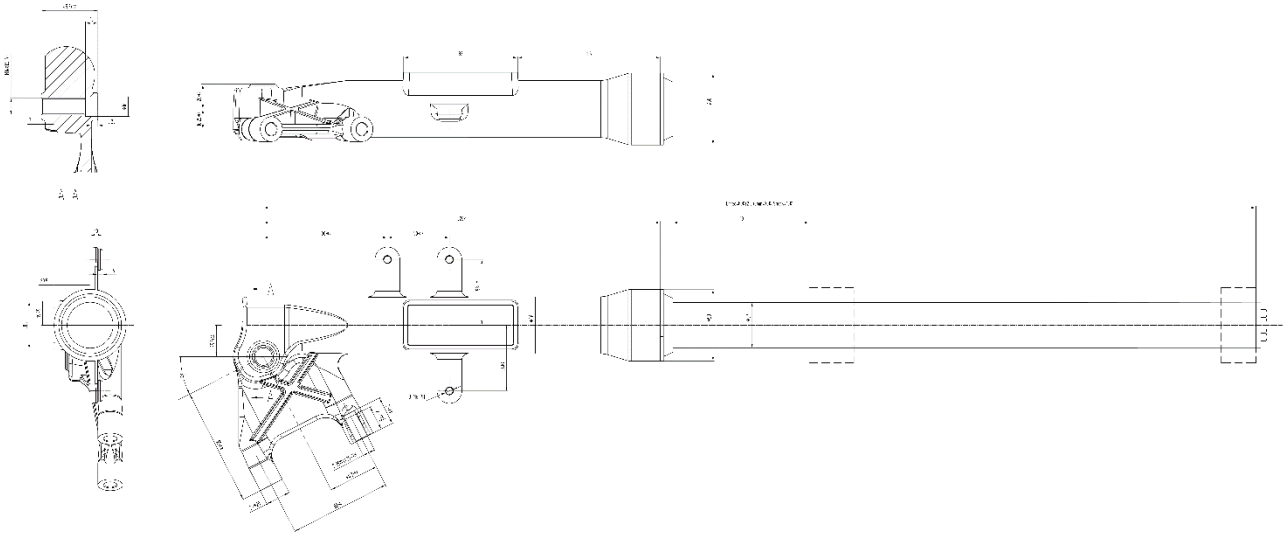
WARNING: Avoid damaging the race where the balls slide.

Apply a coat of grease to the lower race of the upper bearing and fit a new ball-cage and upper race assembly. Reassemble the remaining steering shaft components in the reverse order of disassembly.

Tighten the steering shaft nut to **40±4 Nm;** then **loosen the nut a ¼ turn** and retighten it to **12±2 Nm**. Place the flanged washer over the castellations and assemble the lock nut by aligning its castellations with those of the nut.

7.14. Disassembly of the fork

Diagram



WARNING
• The process for removing the left fork stanchion is the same as the one described for the right fork stanchion.

Required prior operations:

- Remove the front mudguard (→ See 1.12. Removal of the front mudguard)
- Remove the windscreen (→ See 1.13.1. Disassembly of the windscreen)
- Remove the headlamp (→ See 1.13.2. Disassembly of the headlamp)
- Remove the headlamp bracket (→ 1.13.3. Disassembly of the headlamp bracket)
- Remove the front brake calipers (→ See 7.4. Removal of the front brake caliper)
- Remove the front wheel (→ See 7.8. Front wheel removal)
- Remove the fork rods (→ See 7.12. Removal of the fork rods)

Necessary tools

Vise

Small and large flathead screwdriver

8 mm Allen key

22 mm socket spanner

Wrap the fork leg with a rag and clamp it in a vise or use aluminium guards on its jaws.

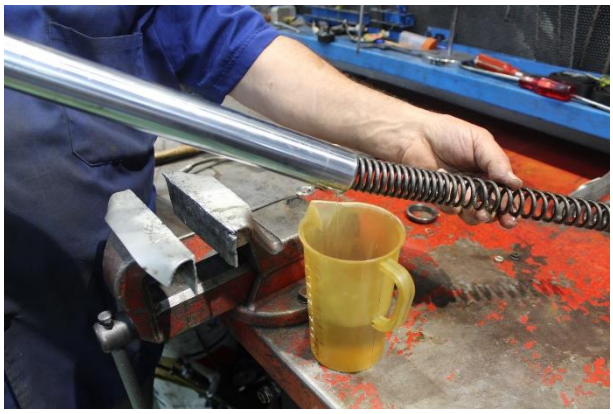
Loosen the bar plug with a 22mm socket.

Remove the plug from the fork leg.

Remove the spacer tube.

Remove the washer separating the spacer tube from the spring. You can use a magnet to remove it.

Collect the oil content from the rod by tilting it and slowly pulling out the spring to drain the oil. Please note for the assembly that the loops closest together are at the bottom.



Oil capacity per bar: 360 ml
Oil viscosity: SA46

Measure the free length of the unloaded spring. If the length is less than the service limit, the spring is weakened and must be replaced with a new one.

Service limit: 100 mm
Standard free length: 330 mm

Use a small flat-blade screwdriver to remove the dust cap from its housing. If it is damaged or worn, replace it at assembly with a new one.

When assembling, grease the lip of the dust cover with lithium grease No. 3.

Remove the circlip from the fork tube groove by prying it with a small flathead screwdriver on its inner protrusions.

If the fork leg is leaking oil at its connection to the cylinder, the oil seal must be replaced with a new one.

To do this, it is necessary to remove the fork tube along with the cartridge from the fork leg by loosening the 8 mm Allen screw at the bottom of the fork and simultaneously pulling the tube firmly outward to prevent the screw from spinning freely.

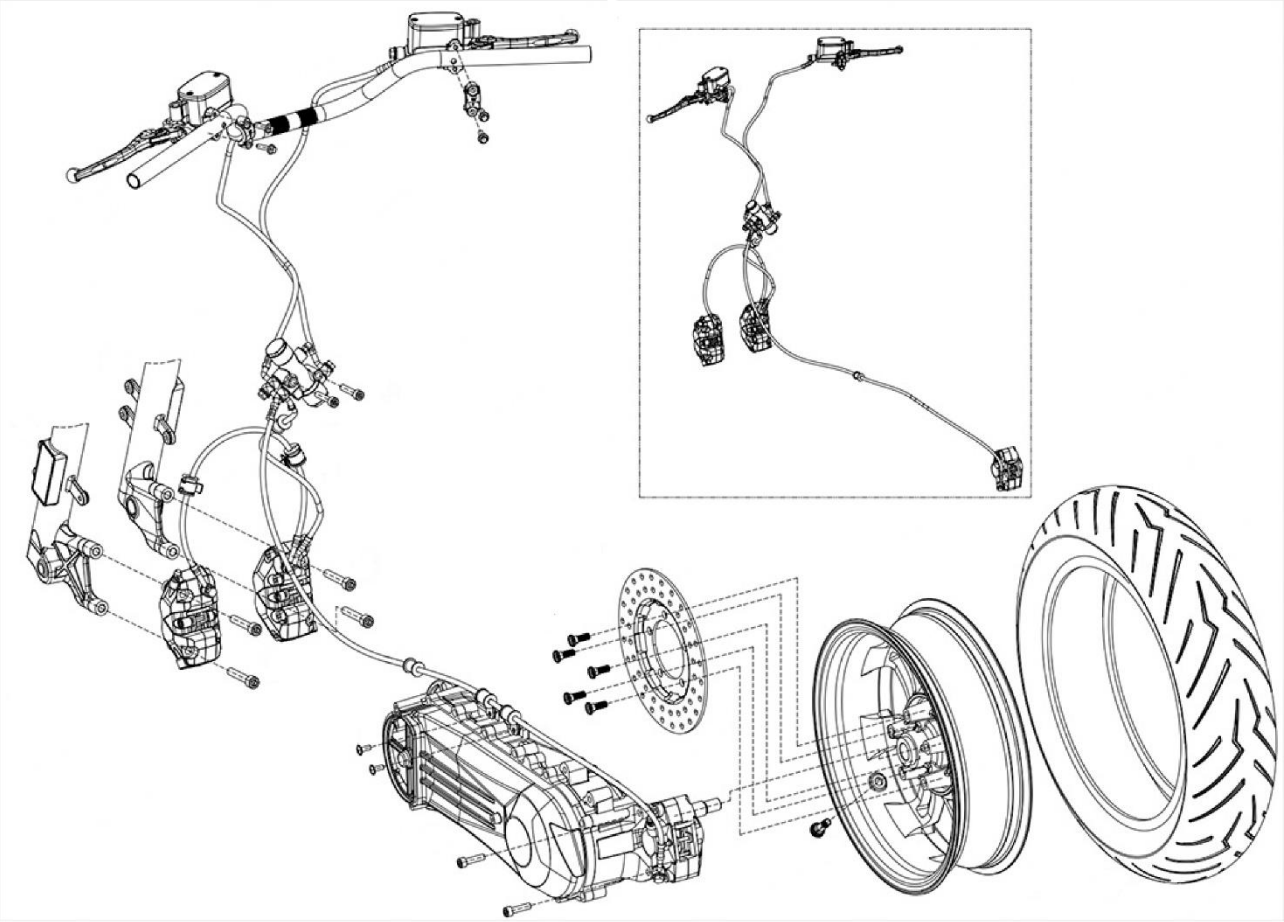
Once the fork tube is separated from the fork leg, the damaged seal should be removed by prying it out of its housing with a large flathead screwdriver.

With the old seal removed, insert a new one into its housing carefully, applying pressure to its outer perimeter without damaging the inner lip.

The process for assembling the fork tube is the reverse of disassembly.

7.15. Hydraulic system purging

Diagram



Necessary tools

Phillips screwdriver no. 2

Flushing tube

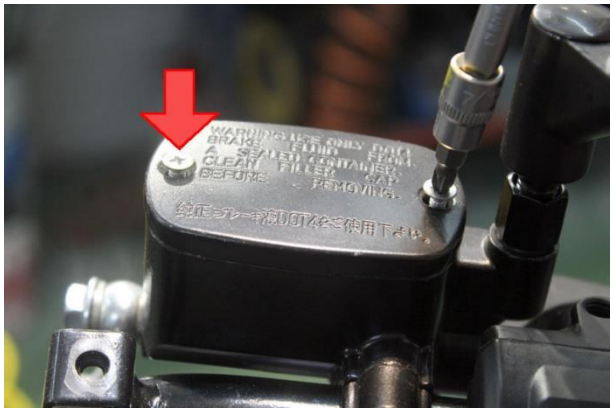
8 mm ring spanner

WARNINGS

- If the brake fluid level is low, it may be a symptom of brake pad wear or brake fluid leakage. Check beforehand whether this is the case.
- Use DOT 4 brake fluid from a freshly opened container.
- Avoid splashing brake fluid on painted, plastic or chrome-plated surfaces. As a precaution, wrap surfaces with a cloth. Brake fluid is very corrosive.
- Dispose of used brake fluid at an appropriate official waste disposal facility.
- The bleeding procedure is the same for the front and rear brake pump.

Remove the rubber plug covering the bleed valve and connect a transparent tube that ends in a suitable container to collect the brake fluid that comes out.

Remove the two screws securing the brake fluid reservoir cover from the pump using a narrow screwdriver with a #2 tip.



Remove the brake fluid reservoir cover.

Remove the plastic cap and the rubber diaphragm.

Initial step:

Loosen the bleed valve with an 8 mm ring spanner.

Pump the front brake lever several times and check that brake fluid with bubbles comes out of the transparent brake fluid hose. Stop pumping and keep the front brake lever fully actuated while closing the bleed valve.

Logically, this operation must be carried out by two people: one person is responsible for the handle, and the other for the bleed valve.

Check that the brake fluid level in the reservoir does not fall below the minimum level, so that no air enters the hydraulic system. Top up with DOT 4 brake fluid.

Repeat the process again from the initial step until the brake fluid seen coming out of the hose is free of bubbles and the feel of the lever is not Spongy.

Tightening torque:

Tank cap screws 1.6 Nm

Bleed valve 5.5 Nm