

7. Front axle

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7.1. Problem solving

Hard steering

- Upper cone track nut too tight
- Broken taper bearing
- Low front tyre pressure

Steering unstable

- Warped front rim
- Bent front axle
- Unbalanced tyre
- Upper cone track nut loose

Steering goes to one side

- Bent fork tube
- Bent handlebar
- Bent front axle
- Defective taper bearings

Soft front suspension

- Spring free length below service limit
- Insufficient hydraulic oil

Poor front brake

- Air in the hydraulic system
- Worn pads
- Warped disc
- Contaminated disc or pads
- Expired brake fluid
- Clogged pipe
- Worn caliper/pump piston retaining gasket

7.2. Front axle characteristics

Element	Service limit
Front axle deformation	0.2 mm
Radial deformation of the front rim	2.0 mm
Axial deformation of the front rim	2.0 mm
Front brake disc thickness	4.0 mm
Deformation of the front brake disc	0.3 mm
Fork spring free length	190 mm
Fork oil capacity per tube	142 cc
Fork oil viscosity	Fork oil no. 46

7.3. Tightening torques

Element	Net	Tightening torque
Steering shaft lock nut		70 Nm
Handlebar base nut		45 Nm
Steering shaft pin screw	M10x45	45 Nm
Handlebar bridge screws	M8x30	25 Nm
Upper cone track nut		20 Nm
Front brake disc fixing screw	M8x25	25 Nm
Front axle		55 Nm
Fork cylinder base axle fixing screw	M6x25	10 Nm
Brake caliper fixing screw	M10x60	45 Nm
Pin pads screw		15-20 Nm
Fork rod screw	M10x45	45 Nm
Pipe guide screw in rod	M6x12	10-12 Nm
Brake pump support screw on handlebar		3-5 Nm
Caliper bleed valve		5.5 Nm
Pipe screws	M8x35	20-25 Nm

7.4. Removing the front brake calipers

Necessary tools



8mm Allen key

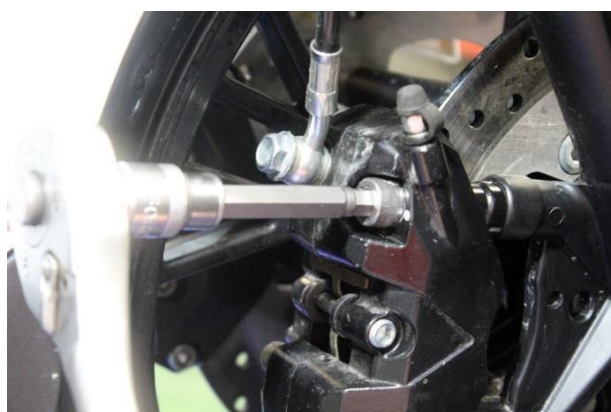


Large flat
screwdriver

Remove the screw that holds the caliper to the cylinder from its bottom using an 8mm Allen key.



Remove the screw that holds the caliper to the cylinder at the top using an 8mm Allen key.



Manually extract the brake caliper from the front suspension anchor.

Tightening torque

Front caliper fixing screw: 45 Nm



For assembly, follow the previous steps ones in reverse order, and separate the pads so that you can insert the brake disc between them with sufficient clearance using a large flat screwdriver. This will cause the caliper pistons to pull inward.

The process described for the right front caliper is the same as the left front caliper.



7.5. Brake pad replacement

WARNINGS

- The process for replacing the left caliper pads is the same as explained for the right caliper.
- Avoid oil and grease on the pads or disc.
- If the pads are contaminated, replace them with new ones.
- Use a disc cleaner to remove grease or oil from the disc surfaces.

Preliminary operations:

- Disassemble the front brake calipers (➊ Refer to point 7.4 Front brake caliper removal)

Necessary tools



Large flat
screwdriver



5 and 8mm
Allen key

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



Once the caliper is removed, remove the pad pin screw using a 5mm Allen key.

Tightening torque

Pin pads screw: 15-20 Nm



Remove the spring plate from the caliper.



Extract the pads from their housing in the caliper.



Insert the new pads into the caliper.



Separate the pads so that you can insert the brake disc between them with enough clearance using a large flathead screwdriver. Return the elastic plate to its position. Cross the pads with the through screw and screw it in without tightening it completely.



Put the caliper in place, inserting the disc between the pads, and install and tighten the caliper mounting screws. Tighten the pin screw to the recommended torque.

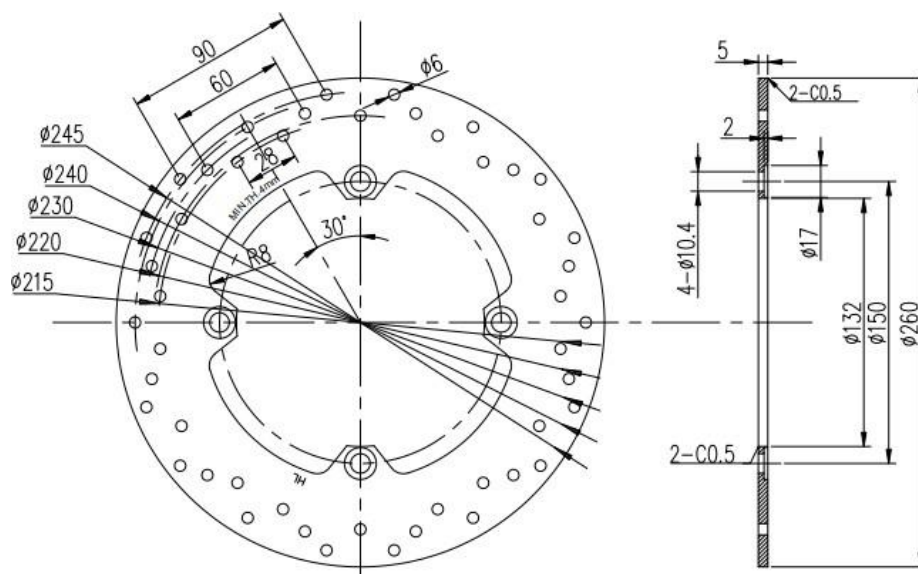


Tightening torques:

Caliper fixing screw. 45 Nm

7.6. Checking the brake disc

Diagram



Preliminary operations:

- Use a suitable support or kickstand to place under the centre portion of the scooter and hold the rear portion of the scooter with straps so that the front wheel of the scooter is elevated and can turn.

Necessary tools



Comparator



Micrometer

Measure the disc deformation using a comparator. The distortion is half the maximum reading.

Service limit: 0.3 mm



Measure the disc thickness using a micrometer in the pad friction area.

Service limit: 4 mm

NOTE: The procedure and service limits are the same for the left front disc.



7.7. Checking the rim

Preliminary operations:

- Use a suitable support or kickstand to place under the centre portion of the scooter and hold the rear portion of the scooter with straps so that the front wheel of the scooter is elevated and can turn.

Necessary tools



Comparator

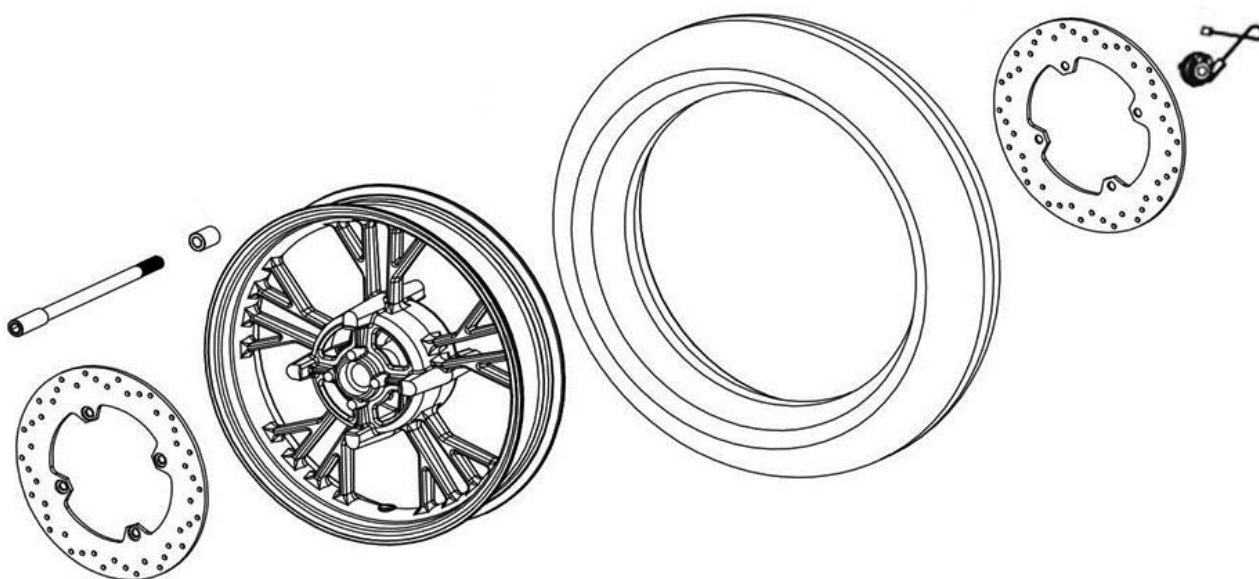
Measure the axial deformation of the rim by pressing a dial gauge against the side wall of the rim.

Service limit: 0.3 mm



7.8. Removing the front wheel

Diagram



Preliminary operations:

- Disassemble the front brake calipers (➊ See point 7.4. Removing the front brake calipers)
- Use a suitable support or kickstand to place under the centre portion of the scooter and hold the rear portion of the scooter with straps so that the front wheel of the scooter is elevated and the vehicle is stable when removing that wheel.

Necessary tools



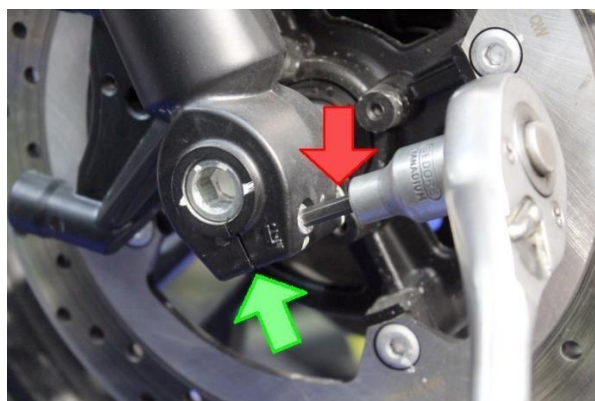
Large flat
screwdriver



5 and 12 mm
Allen key

Remove the two screws holding the front wheel axle into the right front suspension anchor using a 5mm Allen key.

If you notice that the wheel axle is having trouble coming out, open the opening in the front suspension anchor slightly using a large flathead screwdriver.



Loosen the front wheel axle using a 12mm Allen key. Once free from the left cylinder anchor thread, manually extract the axle.



Remove the socket located between the right cylinder and the right side of the front wheel.



Remove the speedometer plug that is located between the left cylinder and the left side of the wheel.

When installing, insert the groove of the speedometer socket (indicated by a blue arrow in the figure) with the protrusion inside the left cylinder.



Take the front wheel out of the fork.



Assembly is carried out in reverse order to disassembly.

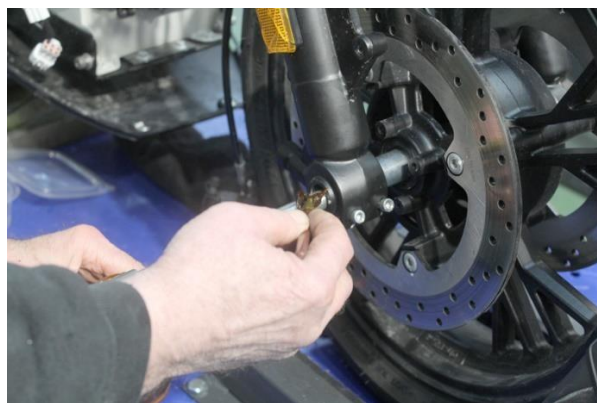
Grease the front wheel axle before inserting it.

Tightening torques

Right front suspension anchor screw:

10 Nm

Front wheel axle: 55 Nm



7.9. Removal of the front brake disc

Preliminary operations:

- Disassemble the front brake calipers (🔧 See point 7.4. Removing the front brake calipers)
- Use a suitable support or kickstand to place under the centre portion of the scooter and hold the rear portion of the scooter with straps so that the front wheel of the scooter is elevated and the vehicle is stable when removing that wheel.
- Remove the front wheel (🔧 See point 7.8 Removing the front wheel)

Necessary tools



5mm Allen key

Remove the four screws holding the front brake rotor to the rim using a 5mm Allen key.

Tightening torque:

Front disc fixing screw 25 Nm.

Manually remove the brake disc.

NOTE: The process is the same as for the left front brake disc.



7.10. Replacing the front wheel bearings

Preliminary operations:

- Disassemble the front brake calipers (🔧 Refer to point 7.4 Front brake caliper removal)
- Remove the front wheel (🔧 See point 7.8 Removing the front wheel)

Necessary tools



Flat
screwdriver

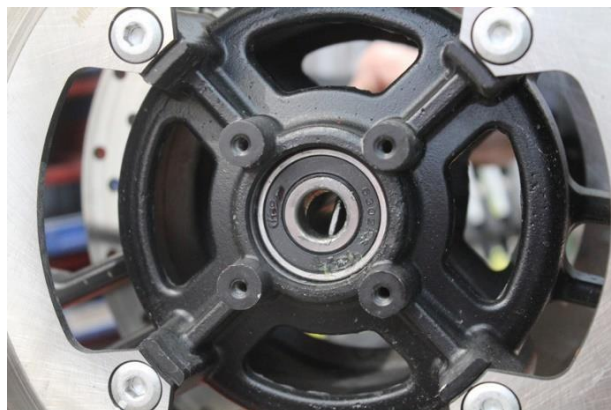


5 and 12 mm
Allen key

Remove the dust cover from the right side of the front wheel by forcing it out of its housing using a flathead screwdriver.



Remove the bearing to be replaced by tapping from the inside of the wheel with a rod on the inner track. Remove this bearing.



Install the new bearing into its housing on the inner spacer using a socket wrench whose outer diameter coincides with the outer track diameter of the bearing and tapping it with a hammer so that it fits vertically completely.



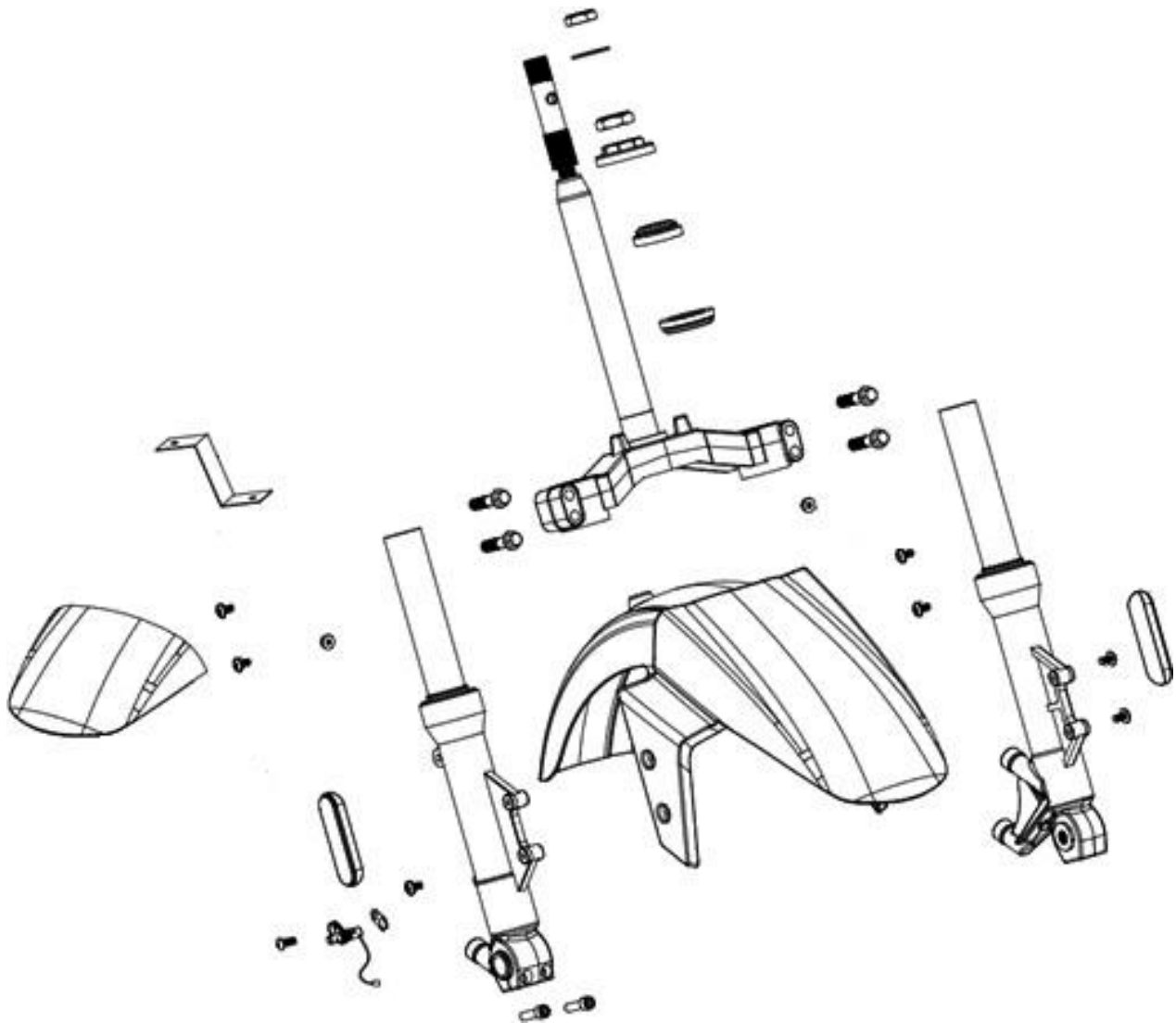
Check the dust cover for damage or wear and replace it if necessary. Insert the dust cover into its housing on the right side of the wheel, applying a light layer of grease to the lip.

Mount the wheel between the fork tubes (🔧 10.8) and brake calipers (🔧 10.4)



7.11. Removal of fork tubes

Diagram



Preliminary operations:

- Removing the front mudguard (🔧 See point 1.3.10. Front mudguard)
- Removing the front wheel (🔧 See point 7.8. Removing the front wheel)

Necessary tools

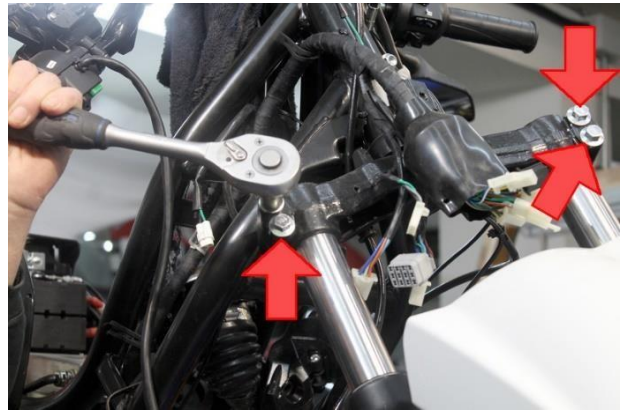


Large flat
screwdriver



12 mm Allen key

Loosen the rod screws corresponding to the fork tube you wish to remove using a 12mm socket. The rod screws do not need to be removed.



Extract the tube from the rod by rotating and pulling it downwards.

The assembly sequence is the reverse of that of disassembly, the rods must have a stop for each tube.

Tightening torque:

Stem screw: 45 Nm



7.12. Steering adjustment

Preliminary operations:

- Remove the handlebar covers (⑦ See point 1.3.8. Handlebar Covers)

Necessary tools



27/15 mm socket wrench



12mm ratchet wrench



46mm flat wrench



32 mm counter-angled wrench

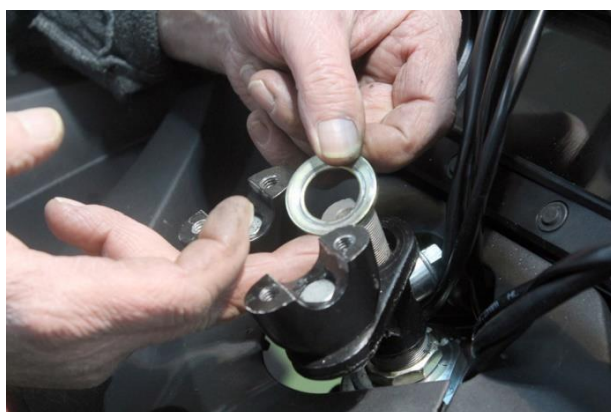
Loosen and remove the upper steering shaft nut using a 27mm socket.

Tightening torque:

Handlebar base nut 45 Nm



Remove the washer appearing under the nut.



Hold the head of the pin screw that holds the handlebar bracket to the steering shaft using a 12mm ratchet, and loosen and remove the nut using a 15mm socket mm.

Tightening torque:

Pin screw 45 Nm.



Turn the steering to one side and take out the pin screw and socket. Press down on the handlebar base body so you can release the screw.



Separate the handlebar base from the steering shaft.



Tighten the steering upper cone track nut using a 46 mm open-end wrench so that the steering turns from right to left and vice versa smoothly without exhibiting vertical play. Rotate the steering several times to install the bearing.



Tightening torque:

Upper cone track nut 20 Nm.

Once properly tightened, hold the upper cone track nut with the 46mm open-end wrench while tightening the locknut with a 32mm offset wrench.



Tightening torque:

Steering shaft lock nut 70 Nm.

7.13. Steering shaft bearing replacements

Preliminary operations:

- Remove the handlebar covers (🔧 See point 1.3.8. Handlebar Covers)
- Removing the front mudguard (🔧 See point 1.3.10. Front mudguard)
- Removing the fork tubes (🔧 See point 7.11. Removing the fork tubes)
- Removing the handlebar covers (🔧 See point 1.1.4. Handlebar Covers)

The photos were taken without the front bodywork in order to get a better view of the process. However, the front plastic parts do not need to be removed for this operation.

Necessary tools



Chisel



Hammer



Stem



46 mm counter-angled wrench



32 mm counter-angled wrench



10 mm socket wrench

Remove the bolt holding the right front brake pipe guide using a 10mm socket wrench.

Repeat the process for the left side screw.

Tightening torque:

Pipe guide screw in rod: 10-12 Nm

Loosen and remove the upper steering shaft nut using a 27mm socket.

Tightening torque:

Handlebar base nut 45 Nm.



Remove the washer appearing under the nut.



Hold the head of the pin screw that holds the handlebar bracket to the steering shaft using a 12mm ratchet, and loosen and remove the nut using a 15mm socket mm.



Tightening torque:

Pin screw 45 Nm.

Turn the steering to one side and take out the pin screw and socket. Press down on the handlebar base body so you can release the screw.



Separate the handlebar base from the steering shaft.



Remove the steering shaft locknut using a 32mm counter wrench or 32mm socket long enough for the rod to pass through. It does not matter, if when removing the upper lock nut, the upper steering track nut is dragged.



Remove the upper steering track nut by loosening it manually using a 46mm open end wrench or a 46mm socket long enough for the rod to penetrate.

Hold the rod to prevent it from falling.



Manually remove the washer located on the upper tapered bearing.



Remove the rod with the steering shaft by pulling it downwards.



If you need to replace the lower tapered bearing, use a chisel and a hammer to remove the lower tapered bearing by tapping on its entire surface perimeter without damaging the steering rod or shaft.

Insert a new lower taper bearing by pushing it up the rod using a suitable tube resting on the inner track of the bearing.



Pull out the upper tapered bearing manually.



If you need to replace the upper conical track, extract it using a rod resting on the inside edge of the track and striking from the bottom with a hammer.

Once outside, insert a new track vertically into its housing until it stops, tapping on a suitable socket resting on the track and which can penetrate inside the steering column.



Before inserting the rod with the steering shaft and a new bearing, cover the rollers of the lower tapered bearing with grease.



Cover the upper taper bearing rollers with grease.



Insert the rod/lower taper bearing/steering shaft assembly into the steering column and place the upper taper bearing and washer on the upper track.



Replace the top nut loosely so that the steering can turn smoothly from right to left without vertical play. Once this tightening with smooth rotation has been obtained, mount the counter nut and, without moving the upper nut, immobilise the upper nut using a 46 mm open-end wrench while tightening the counter nut using a 32mm ratchet wrench.



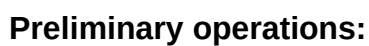
Double check that the steering turns freely without vertical play.

Tightening torque

Upper conical track nut 20 Nm.

Steering shaft counter nut 70 Nm.

Diagram



- 7-25

Necessary tools



Vice



Small flat
screwdriver



12 and 8mm Allen
key

Wrap the fork cylinder in a cloth and clamp it in a vice, the jaws of which are equipped with aluminium guards.



Using a small flathead screwdriver, remove the dust cover from its housing. If damaged or worn, replace it with a new one during assembly.

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



Remove the circlip from the cylinder groove by forcing it with a small flathead screwdriver on its interior bulges.



Remove the cylinders from the vice and hold the tubes in the vice at the top, using aluminium guards on the jaws to prevent damage to the tubes.

Remove the tube cap using a 12mm Allen key.

Remove the cap and the spring will appear.

Pull out on the spring with your fingers. As it is immersed in oil, place it in a metal tray so as not to stain.

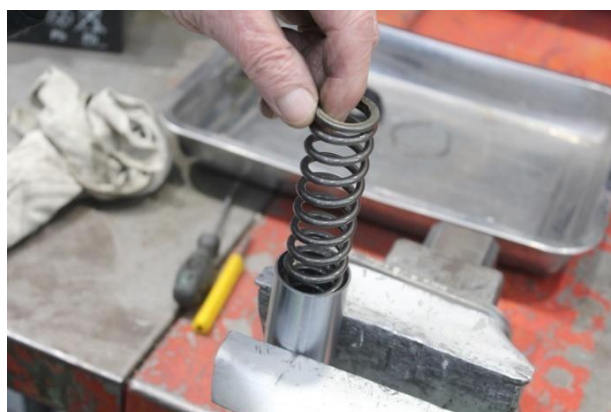
Measure the free length of the spring without tension. If the length is less than the service limit, the spring is weakened and must be replaced with a new one.

Service limit: 190 mm

Standard free length: 237 mm

Oil capacity per tube: 142 ml

Oil viscosity: HM 46 fork oil (SAE 20 equivalent)



If you need to extract the tube or hydraulics from the cylinder, you will need to remove the screw that holds the hydraulics to the fork leg using an 8mm Allen key.



7.15. Brake fluid filling

Necessary tools



#2 Phillips
screwdriver



Hose for
purging



8 mm ratchet
wrench

WARNINGS

- If the brake fluid level is low, it means the brake pads are worn or there is a brake fluid leak. First check if this is the case.
- Use DOT 4 brake fluid from a recently opened container.
- Avoid splashing brake fluid on painted, plastic or chrome surfaces. As a precaution, wrap the surfaces in a cloth. Brake fluid is very corrosive.
- The brake fluid filling procedure is the same for the front brake pump as for the rear one.

Check the brake fluid level with the scooter mounted on its central stand and the handlebars turned so that the pump is horizontal.

If it is close to the LOWER mark and the brake pads are not worn or there is no brake fluid leak, you will need to top up the brake fluid in order to avoid the air entering the hydraulic circuit.

Remove the two screws holding the brake fluid reservoir cover to the pump using a #2 narrow screwdriver.

Tightening torque:

Tank cover screw 1.6 Nm.



Remove the brake fluid reservoir cover.



Remove the plastic cover and rubber membrane.



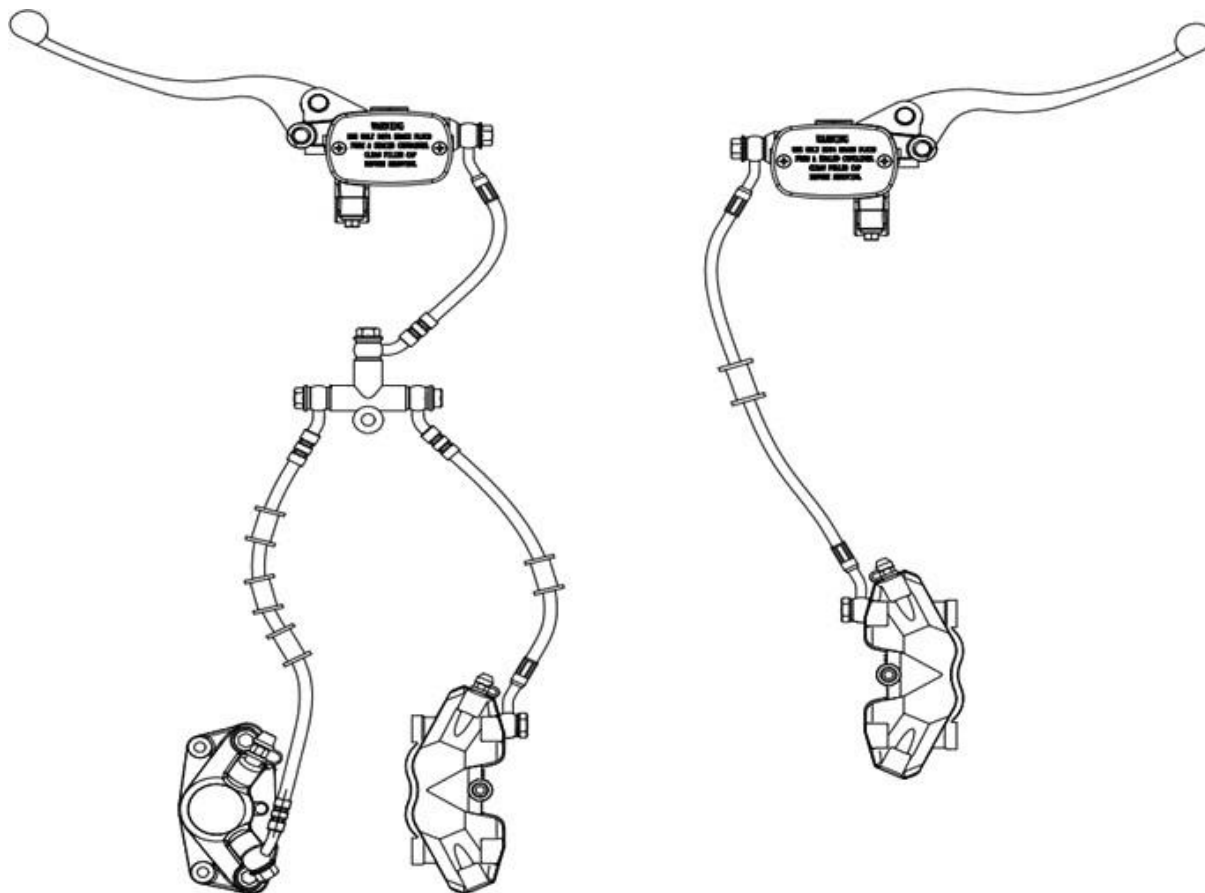
Fill a sealed container with DOT 4 brake fluid.

The assembly procedure is the reverse of that of disassembly.



7.16. Bleeding the hydraulic system

Diagram



Necessary tools



#2 Phillips
screwdriver



Hose for
purging



8 mm ratchet
wrench

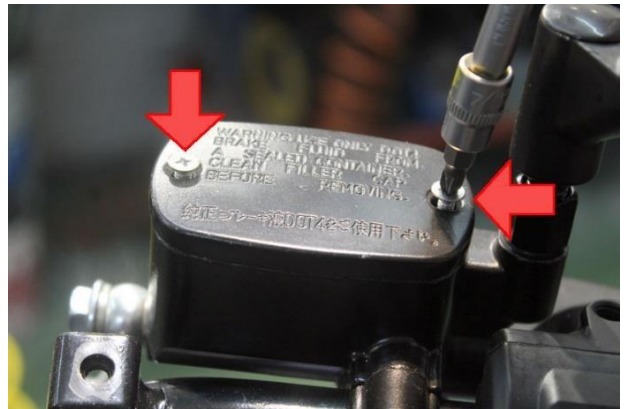
WARNINGS

- Use DOT 4 brake fluid from a recently opened container.
- Avoid splashing brake fluid on painted, plastic or chrome surfaces. As a precaution, wrap the surfaces in a cloth. Brake fluid is very corrosive.
- Dispose of used brake fluid at a collection point.
- The right lever bleeding procedure should only be carried out on the right front disc, since the left is combined with the rear one.

Remove the rubber plug that covers the bleeder valve and connect a transparent tube that ends in a suitable container to catch the escaping brake fluid.



Remove the two screws holding the brake fluid reservoir cover to the pump using a #2 narrow screwdriver.



Remove the brake fluid reservoir cover.



Remove the plastic cover and rubber membrane.



Initial stage:

Loosen the bleeder valve using an 8mm ratchet.

Tightening torque:

Purge valve 5.5 Nm

Pump the lever several times of the front brake and check that bubble-free brake fluid comes out through the transparent hose. Stop pumping and keep the front brake lever fully depressed while closing the bleeder valve.

Logically, this operation must be carried out by two people: one takes care of the brake lever and the other of the bleeder valve.

Check that the brake fluid level in the reservoir does not fall below the minimum value to avoid air entering the hydraulic system. Fill with DOT 4 brake fluid.

Repeat the process from the beginning until the brake fluid coming out of the hose contains no bubbles and the feel of the lever is not spongy.



7.17. Counterweight installation

Necessary tools



Allen key

Take the washer or socket. This socket acts as a stop between the handlebars and the counterweight.



Place the socket inside the handle.



Mount the counterweight with the expansion piece as shown in the photo.

Take into account that the hexagonal part must be on the opposite side of the counterweight, since the nut must be placed in this recess.



7. FRONT AXLE

Carefully insert the counterweight into the end of the handlebar and push it all the way in.



Finally, insert the screw and adjust it using an Allen key.



The counterweight is now attached.

