

450 SX-F
450 XC-F

Art. no. 3206248en



KTM

Read this repair manual carefully and thoroughly before beginning work.

The vehicle will only be able to meet the demands placed on it if the specified service work is performed regularly and properly.

This repair manual was written to correspond to the latest state of this model series. We reserve the right to make changes in the interest of technical advancement without updating this repair manual at the same time.

We shall not provide a description of general workshop methods. Likewise, safety rules that apply in a workshop are not specified here. It is assumed that the repair work will be performed by a fully trained mechanic.

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KTM Sportmotorcycle GmbH
5230 Mattighofen, Austria

This document is valid for the following models:

450 SX-F EU (F8401P5)

450 SX-F US (F8475P5)

450 XC-F US (F8475P0)



3206248en

07/2015

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1.1 Symbols used

The meaning of specific symbols is described below.



Indicates an expected reaction (e.g. of a work step or a function).



Indicates an unexpected reaction (e.g. of a work step or a function).



Indicates a page reference (more information is provided on the specified page).



Indicates information with more details or tips.



Indicates the result of a testing step.



Denotes a voltage measurement.



Denotes a current measurement.



Denotes a resistance measurement.

1.2 Formats used

The typographical formats used in this document are explained below.

Proprietary name	Identifies a proprietary name.
Name®	Identifies a protected name.
Brand™	Identifies a trademark.
<u>Underlined terms</u>	Refer to technical details of the vehicle or indicate technical terms, which are explained in the glossary.

2.1 Repair Manual

Read this Repair Manual carefully and thoroughly before beginning work. It contains useful information and tips that will help you repair and maintain your vehicle.

This manual assumes that the necessary special KTM tools and KTM workplace and workshop equipment are available.

2.2 Safety advice

A number of safety instructions need to be followed to operate the vehicle safely. Therefore, read this manual carefully. The safety instructions are highlighted in the text and are referred to at the relevant passages.

 **Info**
The vehicle has various information and warning labels at prominent locations. Do not remove information/warning labels. If they are missing, you or others may not recognize dangers and may therefore be injured.

2.3 Degrees of risk and symbols

 **Danger**
Indicates a danger that will immediately and invariably lead to fatal or serious permanent injury if the appropriate measures are not taken.

 **Warning**
Indicates a danger that is likely to lead to fatal or serious injury if the appropriate measures are not taken.

 **Caution**
Indicates a danger that may lead to minor injuries if the appropriate measures are not taken.

Note
Indicates a danger that will lead to considerable machine and material damage if the appropriate measures are not taken.

 **Warning**
Indicates a danger that will lead to environmental damage if the appropriate measures are not taken.

2.4 Work rules

Special tools are necessary for certain tasks. The tools are not contained in the vehicle but can be ordered under the number in parentheses. E.g.: bearing puller (15112017000)

During assembly, non-reusable parts (e.g. self-locking screws and nuts, seals and seal rings, O-rings, pins, lock washers) must be replaced by new parts.

In some instances, a thread locker (e.g. **Loctite®**) is required. The manufacturer instructions for use must be followed.

After disassembly, clean the parts that are to be reused and check them for damage and wear. Change damaged or worn parts.

After you complete the repair or service work, check the operating safety of the vehicle.

3.1 Manufacturer and implied warranty

The work specified in the service schedule may only be performed in an authorized KTM workshop and must be recorded in both the Service & Warranty Booklet and in **KTM Dealer.net**, otherwise any warranty coverage will become void. Damage or secondary damage caused by tampering with and/or conversions on the vehicle are not covered by the warranty.

Additional information on the manufacturer or implied warranty and the procedures involved can be found in the Service & Warranty Booklet.

3.2 Operating and auxiliary substances



Warning

Environmental hazard Improper handling of fuel is a danger to the environment.

- Do not allow fuel to get into the ground water, the ground, or the sewage system.

Use the operating and auxiliary substances (such as fuel and lubricants) as specified in the manual.

3.3 Spare parts, accessories

Only use spare parts and accessories approved and/or recommended by KTM. KTM accepts no liability for other products and any resulting damage or loss.

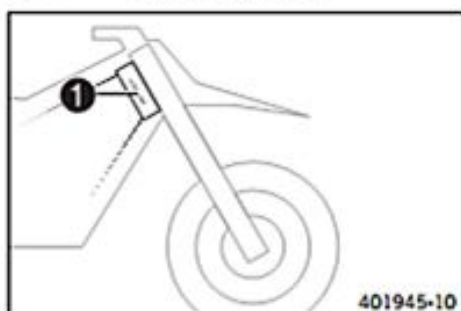
The current **KTM PowerParts** for your vehicle can be found on the KTM website.
International KTM Website: <http://www.ktm.com>

3.4 Figures

The figures contained in the manual may depict special equipment.

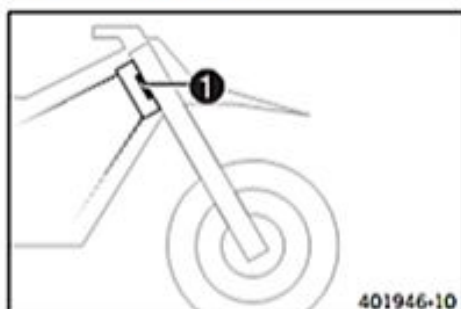
In the interest of clarity, some components may be shown disassembled or may not be shown at all. It is not always necessary to disassemble the component to perform the activity in question. Please follow the instructions in the text.

4.1 Chassis number



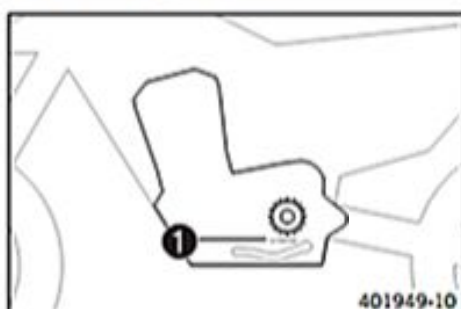
The chassis number ① is stamped on the right side of the steering head.

4.2 Type label



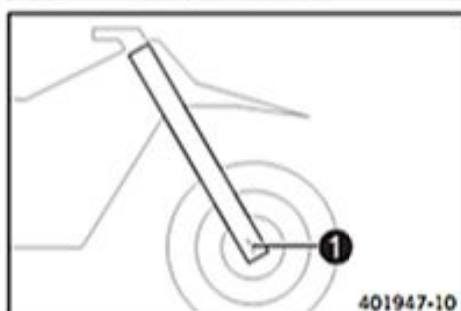
The type label ① is fixed to the front of the steering head.

4.3 Engine number



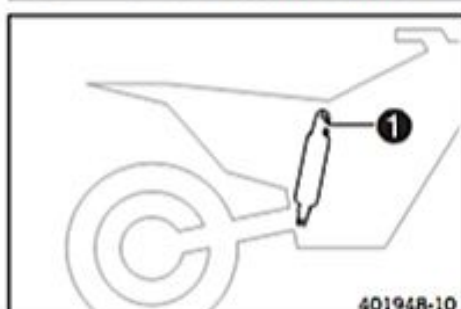
The engine number ① is stamped on the left side of the engine under the engine sprocket.

4.4 Fork part number



The fork part number ① is stamped on the inner side of the axle clamp.

4.5 Shock absorber article number



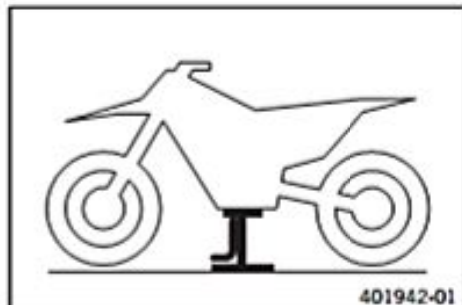
The shock absorber article number ① is stamped on the top of the shock absorber above the adjusting ring towards the engine side.

5.1 Raising the motorcycle with a lift stand

Note

Danger of damage The parked vehicle may roll away or fall over.

- Always place the vehicle on a firm and even surface.



- Raise the motorcycle at the frame underneath the engine.

Lift stand (78129955100) (☞ p. 301)

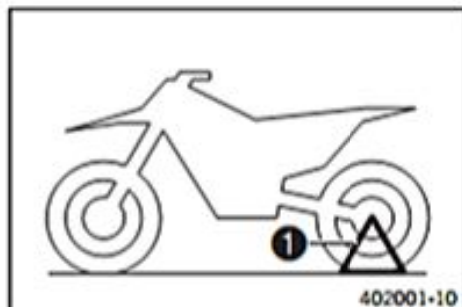
- ✓ Neither wheel is in contact with the ground.
- Secure the motorcycle against falling over.

5.2 Removing the motorcycle from the lift stand

Note

Danger of damage The parked vehicle may roll away or fall over.

- Always place the vehicle on a firm and even surface.



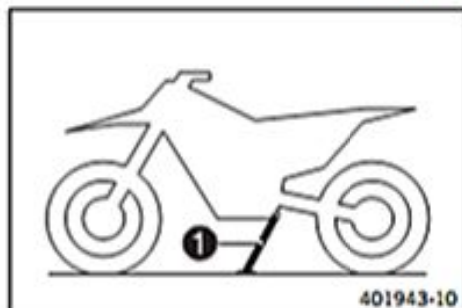
(All SX-F models)

- Remove the motorcycle from the lift stand.
- Remove the lift stand.
- To park the motorcycle, insert plug-in stand ① into the left side of the wheel spindle.



Info

Remove the plug-in stand before riding.



(XC-F US)

- Remove the motorcycle from the lift stand.
- Remove the lift stand.
- To park the motorcycle, press side stand ① to the ground with your foot and lean the motorcycle on it.



Info

When you are riding, the side stand must be folded up and secured with the rubber band.

5.3 Starting



Danger

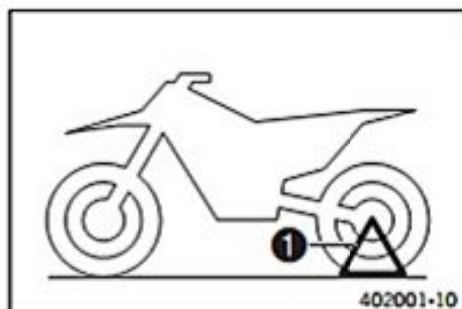
Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.

- When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.

Note

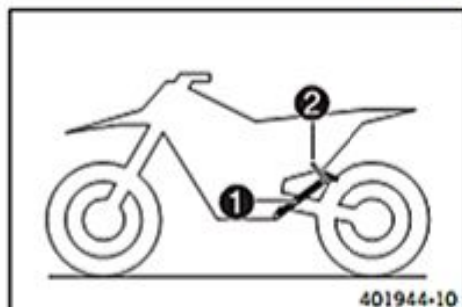
Engine failure High engine speeds in cold engines have a negative effect on the service life of the engine.

- Always warm up the engine at low engine speeds.



(All SX-F models)

- Remove plug-in stand ①.



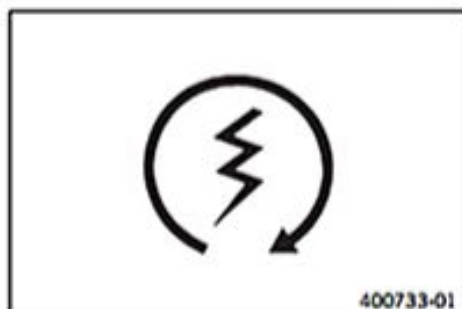
(XC-F US)

- Take the motorcycle off the side stand ① and secure the side stand with the rubber band ②.
- Shift the transmission to idle.

Condition

Ambient temperature: < 20 °C (< 68 °F)

- Push the cold start button in all the way.



- Press the electric starter button ①.



Info

Press the electric starter button for a maximum of 5 seconds. Wait for 30 seconds before a further attempt at starting.

At temperatures below 15 °C (60 °F), several attempts at starting may be necessary to warm-up the lithium-ion battery and thereby increase the starting power.

When starting FI warning lamp lights up briefly as a function check.

5.4 Starting the motorcycle for a check



Danger

Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.

- When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.



Info

Press the starter for a maximum of 5 seconds. Wait for at least 5 seconds before trying again.



- Shift the transmission to idle.
- Press the electric starter button ①.



Info

Do not open the throttle.

6.1 SX-F EU

6.1.1 Air suspension AER 48



Air suspension **WP Performance Systems AER 48** is used in the fork.

In this system, suspension is located in the left fork leg and damping in the right fork leg.

As fork springs are no longer required, a significant weight advantage is achieved when compared to conventional forks. The response on slightly uneven surfaces is significantly improved.

In normal driving mode, suspension is provided exclusively by an air cushion. A steel spring is located in the left fork leg as an end stop.

i Info

If the fork is frequently overloaded, then the air pressure in the fork must be increased to avoid damage to the fork and frame.

The air pressure in the fork can be quickly adjusted for the rider's weight, surface conditions and the rider's preference using a fork pump. The fork does not have to be detached. The time consuming mounting of harder or softer fork springs is not required.

i Info

A suitable fork pump is available within our **KTM PowerParts** range.

If the air chamber loses air due to a damaged seal, the fork will still not sag. In this case the air is retained in the fork. The suspension travel is maintained as far as possible. The damping becomes harder and the riding comfort reduces.

As with a conventional fork, the damping can be adjusted in rebound and compression stages.

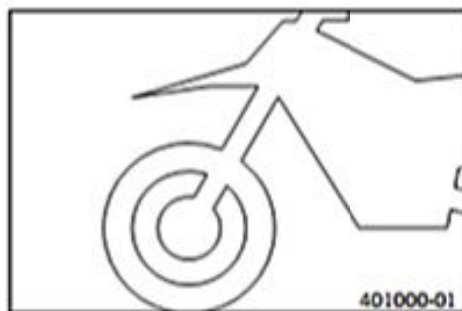
The rebound adjuster is located at the lower end of the right fork leg.

The compression adjuster is located at the upper end of the right fork leg.

6.1.2 Checking the basic setting of the fork

i Info

For various reasons, no exact riding sag can be determined for the forks.



- As with the shock absorber, smaller differences in the rider's weight can be compensated by the spring preload.
- However, if the fork is often overloaded (hard end stop on compression), harder springs must be fit to avoid damage to the fork and frame.

6.1.3 Adjusting the fork air pressure

Warning

Danger of accident Modifications to the suspension setting may seriously alter the handling characteristic.

Extreme modifications to the suspension setting may cause a serious deterioration in the handling characteristic and overload components.

- Only make adjustments within the recommended range.
- Ride slowly to start with after making adjustments to get the feel of the new handling characteristic.

i Info

Check or adjust the air pressure under the same conditions at the earliest 5 minutes after switching off the engine. The air suspension is located in the left fork leg. The pressure and rebound damping is located in the right fork leg.

Preparatory work

- Raise the motorcycle with a lift stand. (☛ p. 10)

**Main work**

- Remove protection cap ①.
- Push fork pump ② together fully.

Fork pump (79412966000) (☛ p. 302)

- Connect the fork pump to the left fork leg.
 - ✓ The fork pump indicator switches on automatically.
 - ✓ A little air escapes from the fork leg when connecting.

**Info**

This is due to the volume of the hose and not due to a defect in the fork pump or the fork.

Read the accompanying **KTM PowerParts** instructions.

- Adjust the air pressure as specified.

Guideline

Air pressure	10.8 bar (157 psi)
Gradual changing of the air pressure in steps of	0.2 bar (3 psi)
Minimum air pressure	7 bar (102 psi)
Maximum air pressure	15 bar (218 psi)

**Info**

Never set the air pressure to a value outside the stated range.

- Disconnect the fork pump from the left fork.
 - ✓ When disconnecting, excess pressure will escape from the hose – the fork leg itself does not lose any air.
 - ✓ The fork pump indicator switches off automatically after 80 seconds.
- Mount the protection cap.

Finishing work

- Remove the motorcycle from the lift stand. (☛ p. 10)

6.1.4 Adjusting the compression damping of the fork**Info**

The hydraulic compression damping determines the fork suspension behavior.



- Turn adjusting screw ① clockwise all the way.

**Info**

The adjusting screw ① is located at the upper end of the right fork leg.

- Turn counterclockwise by the number of clicks corresponding to the fork type.

Guideline

Compression damping	
Comfort	20 clicks
Standard	17 clicks
Sport	12 clicks

**Info**

Turn clockwise to increase damping; turn counterclockwise to reduce damping.

6.1.5 Adjusting the rebound damping of the fork**Info**

The hydraulic rebound damping determines the fork suspension behavior.



- Remove protection cap 1.
- Turn adjusting screw 2 clockwise all the way.

**Info**

The adjusting screw 2 is located at the lower end of the right fork leg.

- Turn counterclockwise by the number of clicks corresponding to the fork type.

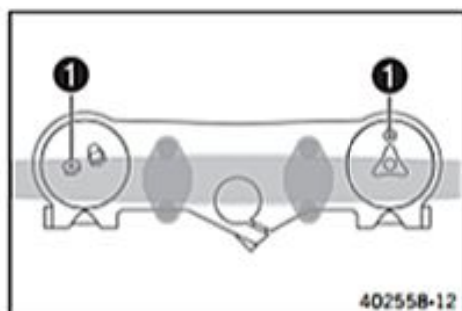
Guideline

Rebound damping	
Comfort	20 clicks
Standard	17 clicks
Sport	12 clicks

**Info**

Turn clockwise to increase damping; turn counterclockwise to reduce damping.

- Mount protection caps 1.

6.1.6 Bleeding the fork legs**Preparatory work**

- Raise the motorcycle with a lift stand. (☞ p. 10)

Main work

- Release bleeder screws 1.
- ✓ Any excess pressure escapes from the interior of the fork.
- Tighten the bleeder screws.

Finishing work

- Remove the motorcycle from the lift stand. (☞ p. 10)

6.1.7 Cleaning the dust boots of the fork legs**Preparatory work**

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the fork protector. (☞ p. 16)

Main work

- Push dust boots 1 of both fork legs downward.

**Info**

The dust boots remove dust and coarse dirt particles from the inside fork tubes. Over time, dirt can penetrate behind the dust boots. If this dirt is not removed, the oil seals behind can start to leak.

**Warning**

Danger of accidents Reduced braking efficiency due to oil or grease on the brake discs.

- Always keep the brake discs free of oil and grease, and clean them with brake cleaner when necessary.

- Clean and oil the dust boots and inner fork tube of both fork legs.

Universal oil spray (☞ p. 293)

- Press the dust boots back into their normal position.
- Remove excess oil.

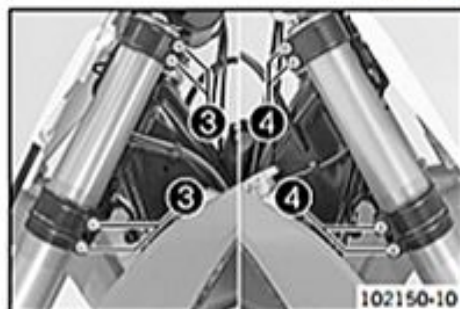
Finishing work

- Install the fork protector. (☞ p. 16)
- Remove the motorcycle from the lift stand. (☞ p. 10)

6.1.8 Removing the fork legs



102149-10



102150-10

Preparatory work

- Raise the motorcycle with a lift stand. (☛ p. 10)
- Remove the front wheel. (☛ p. 139)

Main work

- Remove screws ① and take off the clamp.
- Remove screws ② and take off the brake caliper.
- Allow the brake caliper and brake line to hang tension-free to the side.

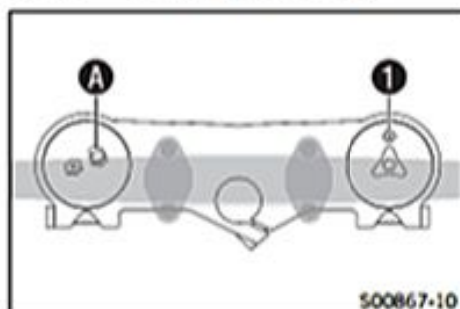


Info

Do not pull the hand brake lever if the front wheel has been removed.

- Loosen screws ③. Take out the left fork leg.
- Unscrew screws ④. Take out the right fork leg.

6.1.9 Installing the fork legs



500867-10

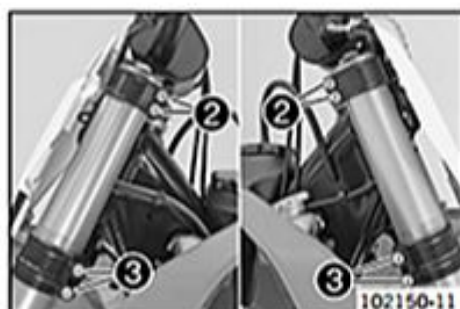
Main work

- Position the fork legs.
 - ✓ The air release screw ① of the right fork leg is positioned to the front.
 - ✓ The left fork leg valve A is positioned approx. 20° further forward.



Info

Grooves are milled into the side of the upper end of the fork legs. The second milled groove (from the top) must be flush with the top edge of the upper triple clamp. The air suspension is located in the left fork leg. The pressure and rebound damping is located in the right fork leg.



102150-11

- Tighten screws ②.

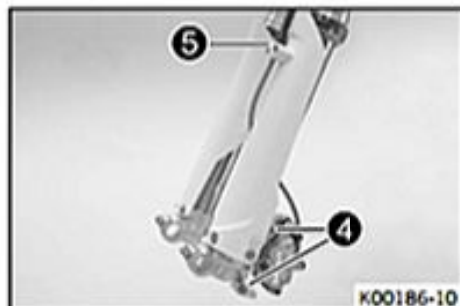
Guideline

Screw, top triple clamp	M8	17 Nm (12.5 lbf ft)
-------------------------	----	------------------------

- Tighten screws ③.

Guideline

Screw, bottom triple clamp	M8	12 Nm (8.9 lbf ft)
----------------------------	----	--------------------



K00186-10

- Position the brake caliper. Mount and tighten screws ④.

Guideline

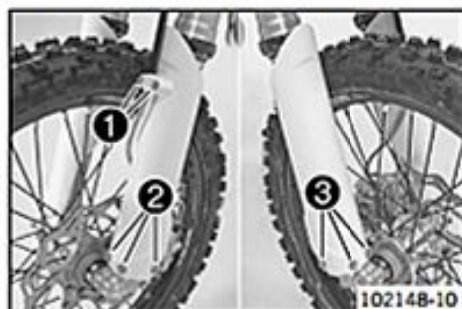
Screw, front brake caliper	M8	25 Nm (18.4 lbf ft)	Loctite® 243™
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- Position the brake line and clamp. Mount and tighten screws ⑤.

Finishing work

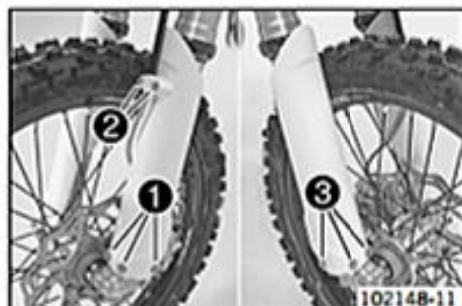
- Install the front wheel. (☛ p. 140)

6.1.10 Removing the fork protector



- Remove screws ①. Take off the clamp.
- Remove screws ②. Take off the left fork protector.
- Remove screws ③. Take off the right fork protector.

6.1.11 Installing the fork protector



- Position the fork protection on the left fork leg. Mount and tighten screws ①.

Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------

- Position the brake line and clamp. Mount and tighten screws ②.
- Position the fork protector on the right fork leg. Mount and tighten screws ③.

Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------

6.1.12 Servicing the fork

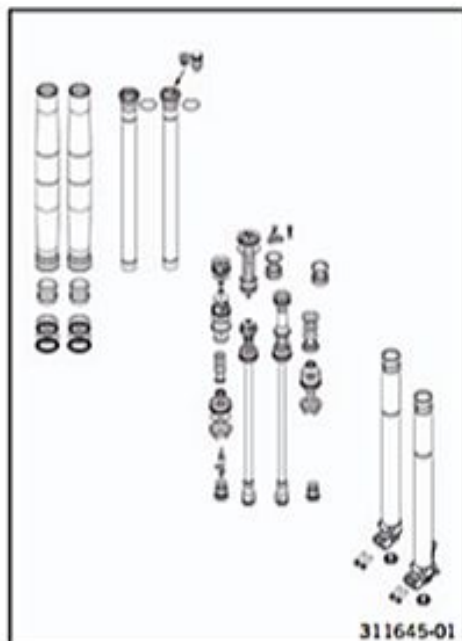
**Caution****Danger of accidents** Disassembling pressurized parts can cause injuries.

- The fork is filled with compressed air. Please follow the description provided.

Condition

The fork legs have been removed.

- Disassemble the fork legs. (☛ p. 16)
- Disassemble the air cartridge. (☛ p. 20)
- Disassemble the shock absorber cartridge. (☛ p. 21)
- Check the fork legs. (☛ p. 23)
- Assemble the shock absorber cartridge. (☛ p. 24)
- Assemble the air cartridge. (☛ p. 25)
- Assemble the fork legs. (☛ p. 27)



6.1.13 Disassembling the fork legs

**Caution****Danger of accidents** Disassembling pressurized parts can cause injuries.

- The fork is filled with compressed air. Please follow the description provided.

Condition

The fork legs have been removed.



Left fork leg

- Clamp the fork leg in the area of the lower triple clamp.

Clamping stand (T1403S) (☛ p. 306)

- Release cartridge (1) using special tool (2).

Ring wrench (T14017) (☛ p. 306)



Info

The cartridge cannot be taken off yet.

- Unclamp the fork leg.
- Drain the fork oil.

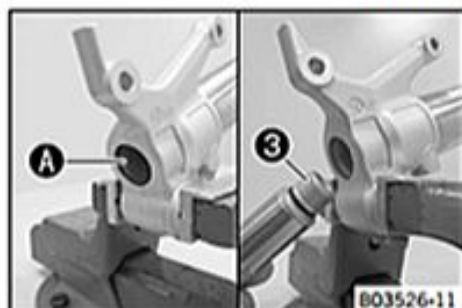


- Clamp the fork leg with the axle clamp.

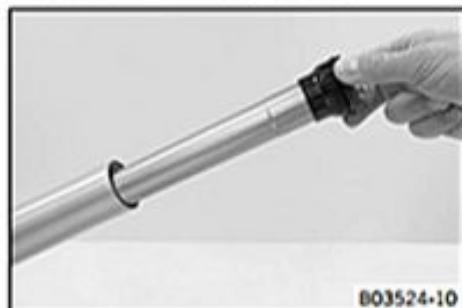
Guideline

Use soft jaws.

- Remove protection cap (A).
- Remove screw (3).



- Remove the cartridge.

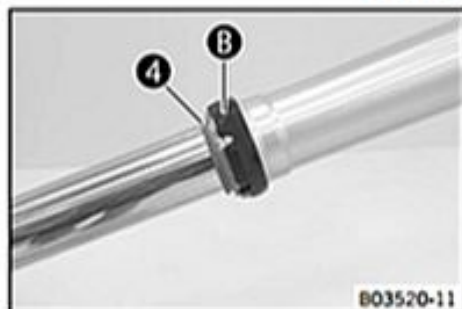


- Remove dust boot (4).
- Remove fork protector ring (B).



Info

The fork protector ring does not necessarily need to be removed for repair work.

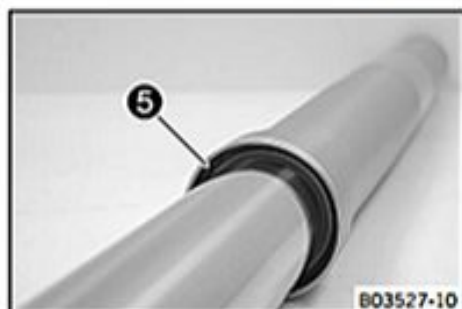


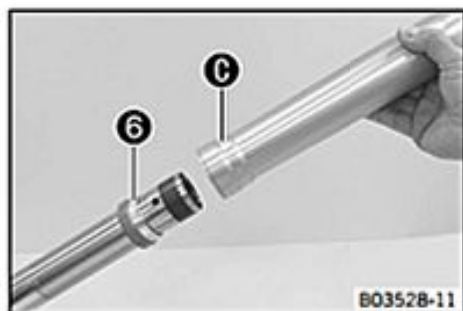
- Remove lock ring (5).



Info

The lock ring has a beveled end where a screwdriver can be applied.





- Warm up outer tube in **6** of the lower sliding bushing.

Guideline

50 °C (122 °F)

- Pull the outer tube from the inner tube with a jerk.



Info

Lower sliding bushing **6** must be pulled from its bearing seat.



- Remove upper sliding bushing **7**.



Info

Without using a tool, pull the stack slightly apart by hand.

- Take off lower sliding bushing **6**.
- Take off support ring **8**.
- Take off seal ring **9**.
- Take off lock ring **5**.
- Take off dust boot **4**.
- Unclamp the fork leg.

Right fork leg

- Remove protection cap **A**.
- Make a note of the present state of rebound **1** and compression damping **2**.
- Open the adjusters of the rebound and compression damping completely.



- Clamp the fork leg in the area of the lower triple clamp.

Clamping stand (T1403S) (☛ p. 306)



- Remove the screw. Remove adjuster **3** on compression damping.



- Loosen cartridge **4**.

Ring wrench (T14017) (☛ p. 306)



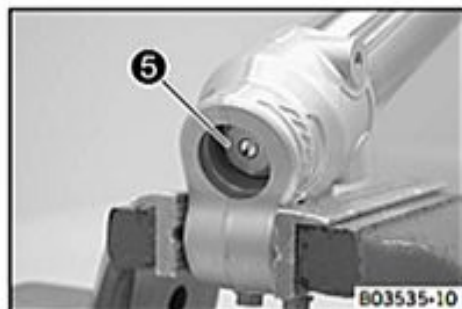
Info

The cartridge cannot be taken off yet.





- Unclamp the fork leg.
- Drain the fork oil.



- Clamp the fork leg with the axle clamp.

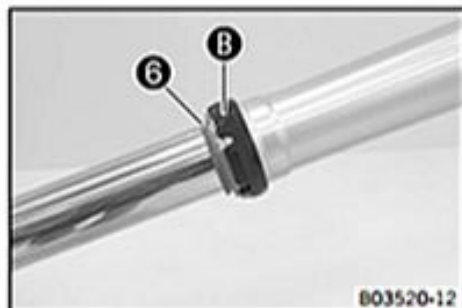
Guideline

Use soft jaws.

- Remove rebound adjuster 5.



- Remove the cartridge.

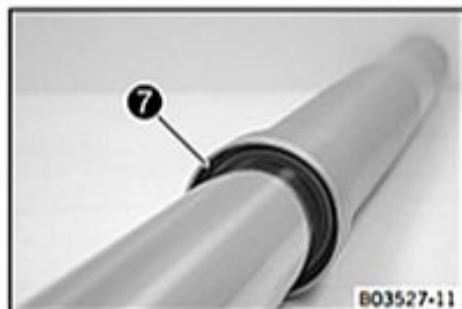


- Remove dust boot 6.
- Remove fork protector ring B.



Info

The fork protector ring does not necessarily need to be removed for repair work.

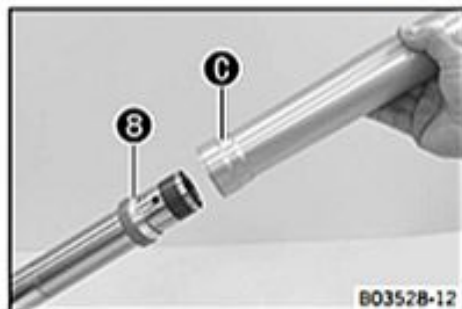


- Remove lock ring 7.



Info

The lock ring has a beveled end where a screwdriver can be applied.



- Warm up outer tube in C of the lower sliding bushing.

Guideline

50 °C (122 °F)

- Pull the outer tube from the inner tube with a jerk.



Info

Lower sliding bushing 8 must be pulled from its bearing seat.



- Remove upper sliding bushing 9.

**Info**

Without using a tool, pull the stack slightly apart by hand.

- Take off lower sliding bushing 8.
- Take off support ring 10.
- Take off seal ring 11.
- Take off lock ring 7.
- Take off dust boot 6.
- Unclamp the fork leg.

6.1.14 Disassembling the air cartridge

**Caution**

Danger of accidents Disassembling pressurized parts can cause injuries.

- The fork is filled with compressed air. Please follow the description provided.

Preparatory work

- Disassemble the fork legs. (☛ p. 16)

Main work

- Remove valve cap 1.
- Slowly release the pressure from the air cartridge.

**Info**

Hold the piston rod in extended position to allow the air pressure to balance between the positive air chamber and the negative air chamber.

- Remove valve core 2.

- Clamp the air cartridge.

Clamping stand (T14072) (☛ p. 307)

- Remove lock ring 3.
- Remove fluid barrier 4.

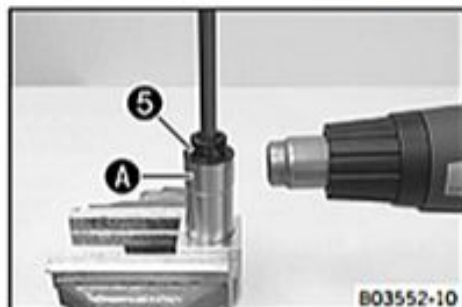
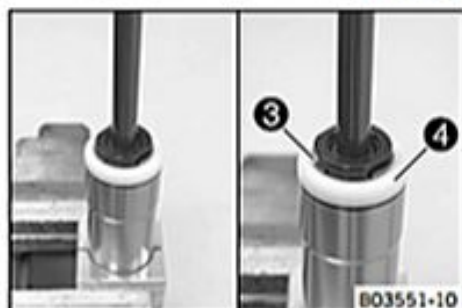
- Heat up thread area of air cartridge A.

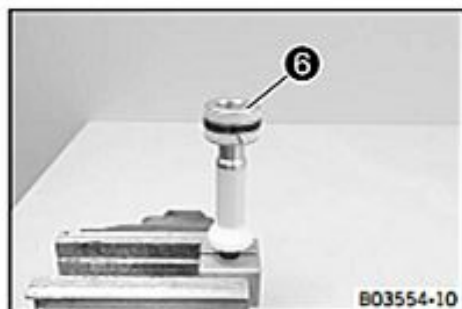
Guideline

50 °C (122 °F)

- Loosen gasket support 5.

- Remove the piston rod with the seal ring retainer.

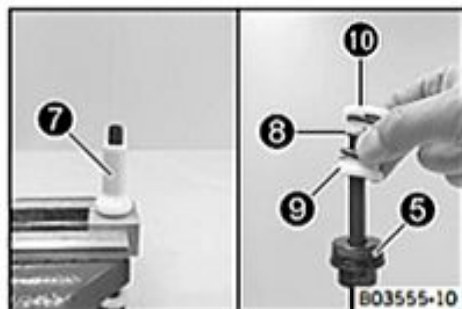




- Degrease and clamp the top of the piston rod.

Clamping stand (T14016S) (☛ p. 305)

- Remove piston ⑥.



- Remove end stop ⑦.
- Remove spring ⑧ with spring support ⑨ and spring support ⑩.
- Remove seal ring retainer ⑤.

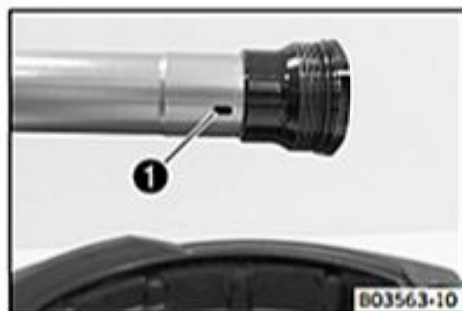
6.1.15 Disassembling the shock absorber cartridge

Preparatory work

- Disassemble the fork legs. (☛ p. 16)

Main work

- Allow oil to drain from breathing hole ①.



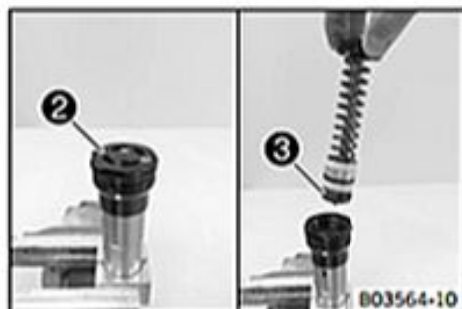
- Degrease and clamp the top of the shock absorber cartridge.

Clamping stand (T14072) (☛ p. 307)

- Loosen screw cap ②.

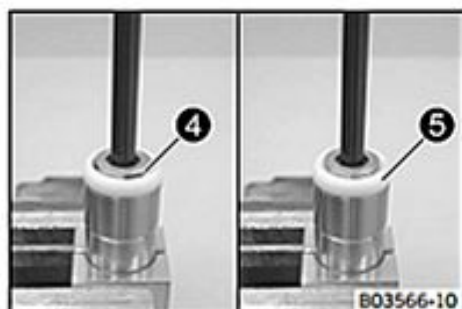
Special socket (T14047) (☛ p. 306)

- Remove screw cap with shock absorber unit ③.



- Drain the shock absorber cartridge.

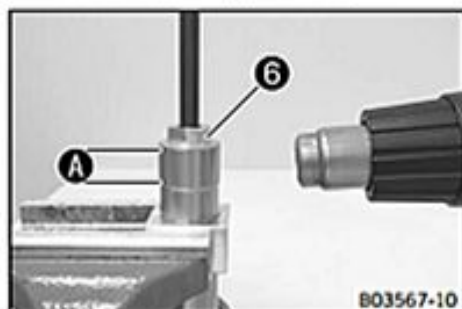




- Turn the shock absorber cartridge, degrease and clamp at the bottom.

Clamping stand (T14072) (☛ p. 307)

- Remove lock ring 4.
- Remove fluid barrier 5.



- Heat up thread area of shock absorber cartridge A.

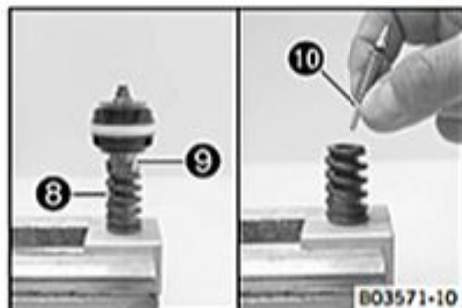
Guideline

50 °C (122 °F)

- Loosen seal ring retainer 6.



- Remove piston rod with seal ring retainer and shock absorber unit 7.



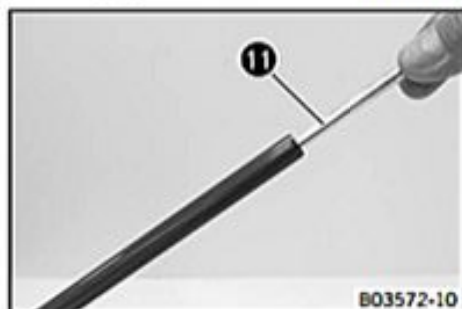
- Degrease piston rod and clamp underneath spring 8.

Clamping stand (T14016S) (☛ p. 305)

- Remove piston retainer 9 with the shock absorber unit.
- Remove adjustment valve 10 with the spring from the piston rod.
- Remove spring 8 with the spring seat.



- Remove the seal ring retainer from the piston rod.



- Remove adjusting tube 11 from the piston rod.

6.1.16 Checking the fork legs

Condition

The fork legs have been disassembled.

- Check the inner tube and the axle clamp for damage.

- If damage is found:
 - Change the inner tube.



B03581-10

- Measure the outside diameter of the inner tube in several places.

Outside diameter of inner tube	47.975... 48.005 mm (1.88878... 1.88996 in)
--------------------------------	---

- If the measured value is less than the specified value:
 - Change the inner tube.

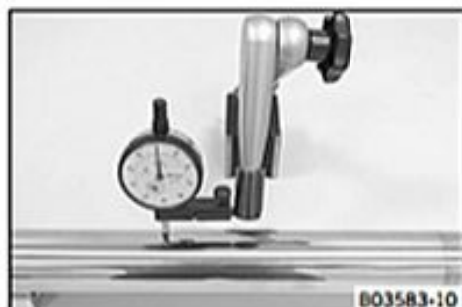


B03582-10

- Measure the run-out of the inner tube.

Run-out of the inner tube	≤ 0.20 mm (≤ 0.0079 in)
---------------------------	-------------------------

- If the measured value is greater than the specified value:
 - Change the inner tube.



B03583-10

- Measure the inside diameter at multiple locations of the outer tube.

Inside diameter of outer tube	≤ 49.20 mm (≤ 1.937 in)
-------------------------------	-------------------------

- If the measured value is greater than the specified value:
 - Change the outer tube.

- Check the outer tube for damage.

- If damage is found:
 - Change the outer tube.



B03584-10

- Check the surface of the sliding bushings.

- If bronze-colored layer **A** under sliding layer **B** is visible or the surface is rough:

- Change the sliding bushings.



200665-10



B03585-10

- Check the piston rod for damage.
 - If damage is found:
 - Replace the piston rod.
- Measure the outside diameter of the piston rod at several locations.

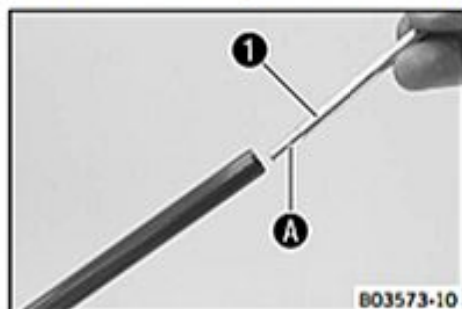
Outside diameter of the piston rod	$\geq 11.965 \text{ mm } (\geq 0.47106 \text{ in})$
------------------------------------	---

- If the measured value is less than the specified value:
 - Replace the piston rod.
- Measure the run-out of the piston rod.

Run-out of the piston rod	$\leq 0.40 \text{ mm } (\leq 0.0157 \text{ in})$
---------------------------	--

- If the measured value is greater than the specified value:
 - Replace the piston rod.

6.1.17 Assembling the shock absorber cartridge



B03573-10

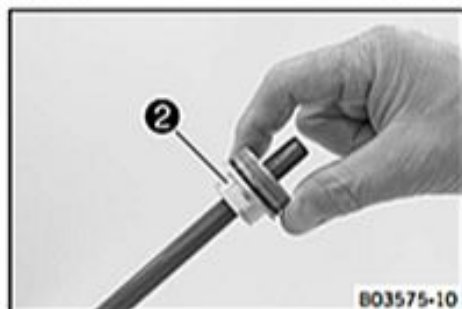
- Lubricate and mount adjusting tube ①.

Fork oil (SAE 4) (48601166S1) (☞ p. 290)
--



Info

Mount detached end A at the bottom.

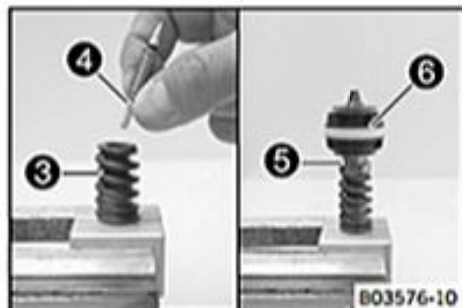


B03575-10

- Lubricate seals on seal ring retainer ②.

Lubricant (T511) (☞ p. 292)

- Push the seal ring retainer onto the piston rod.
- ✓ The thread faces upward.



B03576-10

- Degrease and clamp the top of the piston rod.

Clamping stand (T14016S) (☞ p. 305)

- Mount spring ③.



Info

Mount the spring retainer at the bottom.

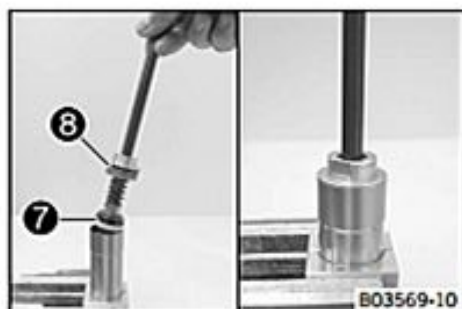
- Mount adjusting valve ④ in the piston rod with spring and new O-ring.
- ✓ The tip faces upward.
- Lubricate O-ring of adjustment valve.

Lubricant (T158) (☞ p. 292)

- Mount and tighten piston retainer ⑤ with shock absorber unit ⑥.

Guideline

Piston retainer on piston rod	M9x1	20 Nm (14.8 lbf ft)	Loctite® 2701™
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- Clamp the shock absorber cartridge at the bottom.

Clamping stand (T14072) (☞ p. 307)

- Lubricate friction ring ⑦ on the shock absorber cartridge.

Fork oil (SAE 4) (48601166S1) (☞ p. 290)

- Push the piston rod into the shock absorber cartridge.
- Lubricate O-ring ⑧ of the seal ring retainer.

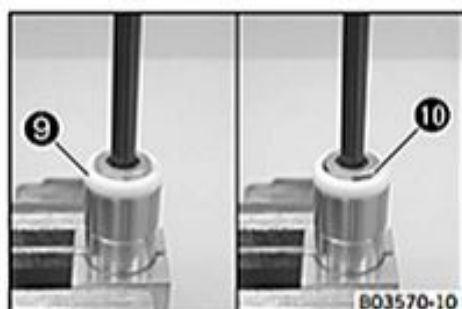
Lubricant (T158) (☞ p. 292)

- Mount and tighten the seal ring retainer.

Guideline

Seal ring retainer on cartridge	M35.5x0.8	40 Nm (29.5 lbf ft)	Loctite® 2701™
---------------------------------	-----------	------------------------	----------------

- Position fluid barrier ⑨.
- Mount lock ring ⑩.



- Turn the shock absorber cartridge around and clamp at top.

Clamping stand (T14016S) (☞ p. 305)

- Fill it with fork oil.

Oil capacity, right cartridge	380 ml (12.85 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☞ p. 290)
-------------------------------	---------------------------	---



Info

To bleed the oil, move the piston rod up and down multiple times until air bubbles stop rising.

- Lubricate seals ⑪ and friction rings ⑫.

Fork oil (SAE 4) (48601166S1) (☞ p. 290)

- Lubricate O-ring ⑬ on the screw cover.

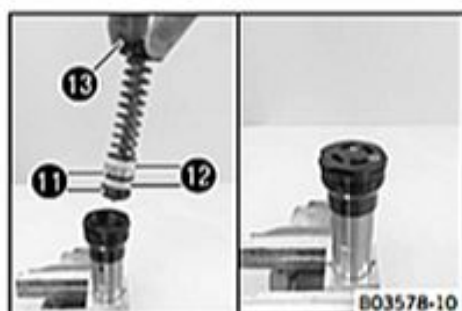
Lubricant (T158) (☞ p. 292)

- Mount the screw cover with pressure stage unit; tighten with special tool.

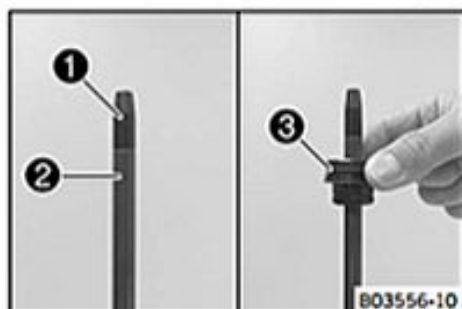
Guideline

Pressure stage unit on shock absorber cartridge	M44x1	40 Nm (29.5 lbf ft)
---	-------	------------------------

Special socket (T14047) (☞ p. 306)



6.1.18 Assembling the air cartridge



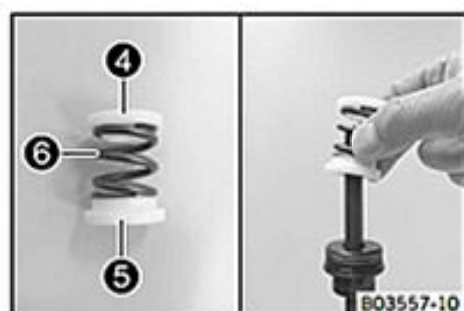
- Slot special tool ① over thread on piston rod ②.

Protecting sleeve (T14073) (☞ p. 307)

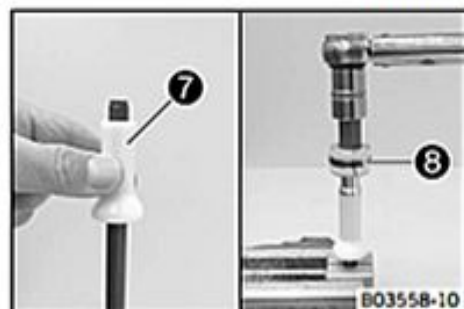
- Lubricate inner seals on seal ring retainer ③.

Lubricant (T511) (☞ p. 292)

- Mount the seal ring retainer.
- ✓ The thread faces upward.



- Push spring guide 4 and spring guide 5 onto spring 6.
- Mount the spring.
 - ✓ The narrow spring guide is located at the top.
 - ✓ The wide spring guide is located at the bottom.



- Slot end stop 7 onto piston rod.
 - ✓ The cone points downward.
- Clamp the piston rod underneath the end stop.

Clamping stand (T14016S) (☛ p. 305)

- Mount and tighten piston 8.

Guideline

Piston on piston rod	M12x1	20 Nm (14.8 lbf ft)	Loctite® 2701™
----------------------	-------	------------------------	----------------



- Lubricate piston in area of A and inside of the cartridge.

Grease capacity, left cartridge	11 ml (0.37 fl. oz.)	Multi-purpose grease (00062010051) (☛ p. 290)
---------------------------------	-------------------------	--

- Clamp the air cartridge.

Clamping stand (T14072) (☛ p. 307)

- Push the piston rod into the air cartridge.



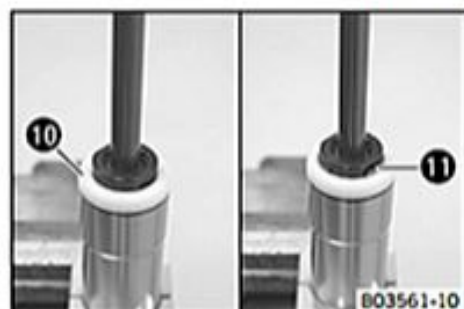
- Lubricate O-ring 9 of seal ring retainer 3.

Lubricant (T158) (☛ p. 292)

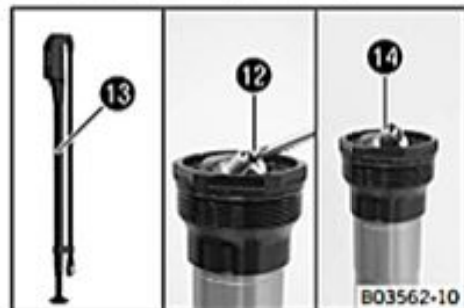
- Mount and tighten the seal ring retainer.

Guideline

Seal ring retainer on cartridge	M35.5x0.8	40 Nm (29.5 lbf ft)	Loctite® 2701™
---------------------------------	-----------	------------------------	----------------



- Position fluid barrier 10.
- Mount lock ring 11.



- Mount and tighten valve core 12.
- Fill the cartridge with air.

Info
Maximum 14 bar!

- Adjust air pressure with special tool 13 as per specifications.

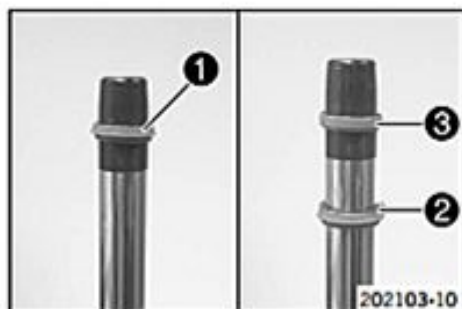
Guideline

Air pressure	10.8 bar (157 psi)
--------------	--------------------

Fork pump (79412966000) (☛ p. 302)

- Mount protection cap 14.

6.1.19 Assembling the fork legs



Preparatory work

- Check the fork legs. (☛ p. 23)

Left fork leg

- Clamp the inner tube with the axle clamp.

Guideline

Use soft jaws.

- Mount the special tool.

Protecting sleeve (T1401) (☛ p. 305)

- Grease and push on dust boot 1.

Lubricant (T511) (☛ p. 292)

✓ The sealing lip is mounted with the spring expander facing down.



Info

Always replace the dust boot, seal ring, lock ring, and support ring.

- Push on lock ring 2.

- Grease and push on seal ring 3.

Lubricant (T511) (☛ p. 292)

✓ The sealing lip points downward, the open side upward.

- Remove the special tool.

- Push on support ring 4.

- Sand the edges of the sliding bushings with 600-grit sandpaper, then clean and grease them.

Fork oil (SAE 4) (48601166S1) (☛ p. 290)

- Push on lower sliding bushing 5.

- Mount upper sliding bushing 6.



Info

Without using a tool, pull the stack slightly apart by hand.

- Heat up outer tube in area A of the lower sliding bushings.

Guideline

50 °C (122 °F)

- Hold the lower sliding bushing with the longer side of the special tool.

Mounting tool (T14040S) (☛ p. 306)

- Push on the outer tube.

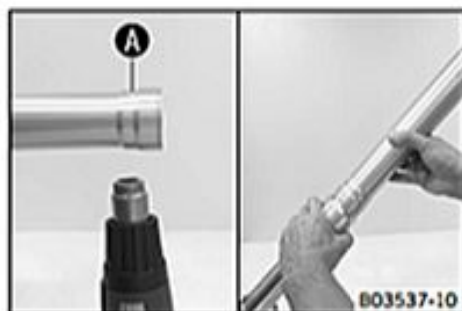
- Press the sliding bushing all the way into the outer tube.

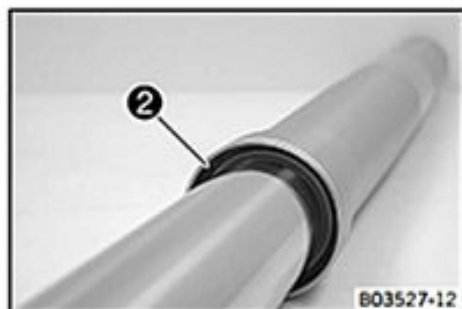
- Position the support ring.

- Hold the seal ring with the shorter side of the special tool.

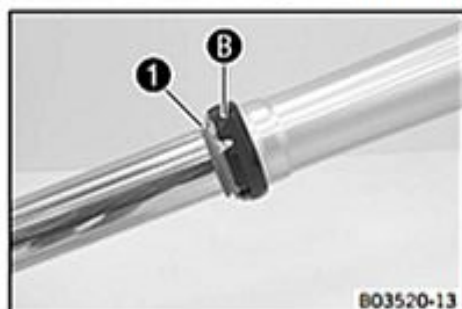
Mounting tool (T14040S) (☛ p. 306)

- Press the seal ring and support ring all the way into the outer tube.





- Mount lock ring **2**.
✓ The lock ring engages audibly.



- Mount dust boot **1**.
- Mount fork protector ring **B**.



- Assemble the individual components that belong together.

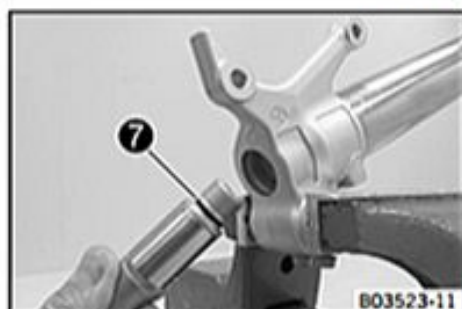


Info

Air cartridge (left fork leg): cartridge with blue adapter **C**, axle clamp with brake mount and outer tube with warning label **D**, screw cartridge **E**.



- Slide the cartridge into the inner tube.



- Lubricate O-ring **7**.

Lubricant (T158) (☞ p. 292)

- Mount and tighten the screw.

Guideline

Screw, air cartridge on axle clamp	M20x1	45 Nm (33.2 lbf ft)
------------------------------------	-------	------------------------

- Clamp the left fork leg vertically.

Guideline

Use soft jaws.

- Fill it with fork oil.

Oil capacity external mechanism left	200 ± 3 ml (6.76 ± 0.22 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☞ p. 290)
--------------------------------------	-------------------------------------	---





- Lubricate O-ring **8** on the air cartridge.

Lubricant (T158) (☛ p. 292)

- Push the outer tube upward.
- Clamp the outer tube in the area of the lower triple clamp.

Clamping stand (T1403S) (☛ p. 306)



- Tighten air cartridge **9**.

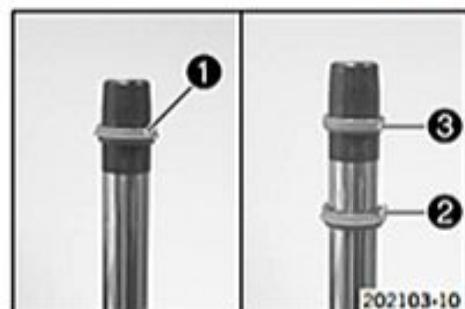
Guideline

Damper cartridge on outer tube

M51x1.5

50 Nm
(36.9 lbf ft)

Ring wrench (T14017) (☛ p. 306)



Right fork leg

- Clamp the inner tube with the axle clamp.

Guideline

Use soft jaws.

- Mount the special tool.

Protecting sleeve (T1401) (☛ p. 305)

- Grease and push on dust boot **1**.

Lubricant (T511) (☛ p. 292)

✓ The sealing lip is mounted with the spring expander facing down.



Info

Always replace the dust boot, seal ring, lock ring, and support ring.

- Push on lock ring **2**.
- Grease and push on seal ring **3**.

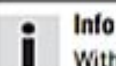
Lubricant (T511) (☛ p. 292)

✓ The sealing lip points downward, the open side upward.

- Remove the special tool.
- Push on support ring **4**.
- Sand the edges of the sliding bushings with 600-grit sandpaper, then clean and grease them.

Fork oil (SAE 4) (48601166S1) (☛ p. 290)

- Push on lower sliding bushing **5**.
- Mount upper sliding bushing **6**.



Info

Without using a tool, pull the stack slightly apart by hand.

- Heat up outer tube in area **A** of the lower sliding bushings.

Guideline

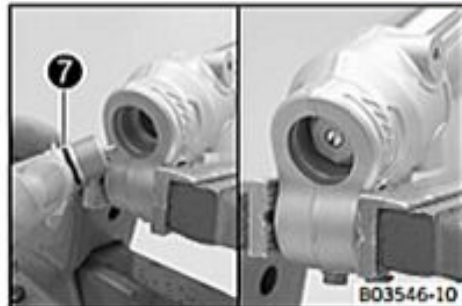
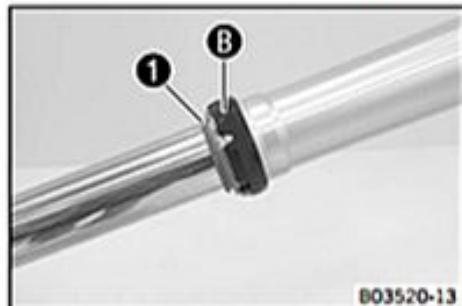
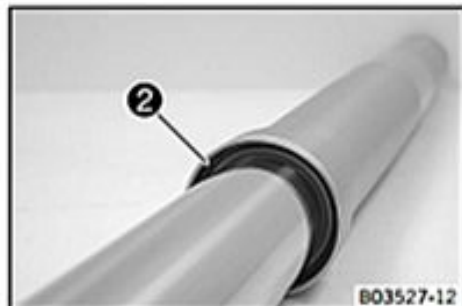
50 °C (122 °F)

- Hold the lower sliding bushing with the longer side of the special tool.

Mounting tool (T14040S) (☛ p. 306)

- Push on the outer tube.





- Press the sliding bushing all the way into the outer tube.
 - Position the support ring.
 - Hold the seal ring with the shorter side of the special tool.
- Mounting tool (T14040S) (☛ p. 306)
- Press the seal ring and support ring all the way into the outer tube.

- Mount lock ring (2).
- ✓ The lock ring engages audibly.

- Mount dust boot (1).
- Mount fork protector ring (B).

- Assemble the individual components that belong together.



Info

Shock absorber cartridge (right fork leg): cartridge with silver adapter (C), axle clamp without brake mount, and outer tube without warning label, rebound adjuster (D).

- Slide shock absorber cartridge into inner tube.

- Lubricate O-ring (7) on the rebound adjuster.

Lubricant (T158) (☛ p. 292)

- Mount and tighten the rebound adjuster.

Guideline

Rebound adjuster on the axle clamp	M20x1	45 Nm (33.2 lbf ft)
------------------------------------	-------	------------------------



- Clamp the left fork leg vertically.

Guideline

Use soft jaws.

- Fill it with fork oil.

Oil capacity external mechanism right	200 $\pm$ 3 ml (6.76 $\pm$ 0.22 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 290)
---------------------------------------	---	---

- Lubricate O-ring 8 on the shock absorber cartridge.

Lubricant (T158) (☛ p. 292)

- Push the outer tube up and screw in the shock absorber cartridge.
- Clamp the outer tube in the area of the lower triple clamp.

Clamping stand (T1403S) (☛ p. 306)

- Tighten the shock absorber cartridge.

Guideline

Damper cartridge on outer tube	M51x1.5	50 Nm (36.9 lbf ft)
--------------------------------	---------	------------------------

Ring wrench (T14017) (☛ p. 306)

- Mount adjuster 9 of the compression damping. Mount and tighten the screw.

Guideline

Screw, compression adjuster	M4x0.5	1.5 Nm (1.11 lbf ft)
-----------------------------	--------	-------------------------

Condition

Value not determined on removal:

- Turn compression damping adjusting screw 10 and rebound damping adjusting screw 11 clockwise all the way.
- Turn counterclockwise by the number of clicks corresponding to the fork type.

Guideline

Compression damping	
Comfort	20 clicks
Standard	17 clicks
Sport	12 clicks
Rebound damping	
Comfort	20 clicks
Standard	17 clicks
Sport	12 clicks

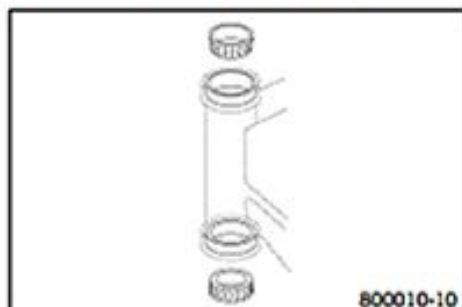
- Mount protection cap 12.

Condition

Value determined on removal:

- Turn compression damping adjusting screw 10 and rebound damping adjusting screw 11 clockwise all the way.
- Turn the adjusting screws to the position they were in before dismantling.
- Mount protection cap 12.

6.1.20 Greasing the steering head bearing



- Remove the lower triple clamp. (☛ p. 32)
- Install the lower triple clamp. (☛ p. 33)

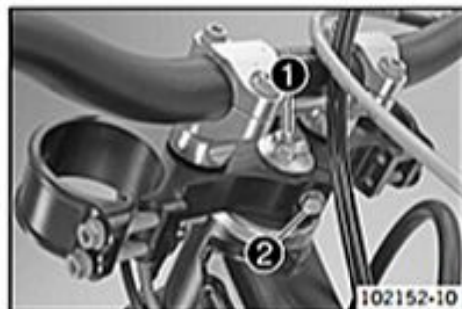
6.1.21 Removing the lower triple clamp

Preparatory work

- Raise the motorcycle with a lift stand. (☛ p. 10)
- Remove the front wheel. (☛ p. 139)
- Remove the fork legs. (☛ p. 38)
- Remove the start number plate. (☛ p. 135)
- Remove the front fender. (☛ p. 135)
- Remove the handlebar cushion.

Main work

- Remove the holder with FI warning lamp.
- Remove screw ①.
- Remove screw ②.
- Take off the top triple clamp with the handlebar and set it aside.



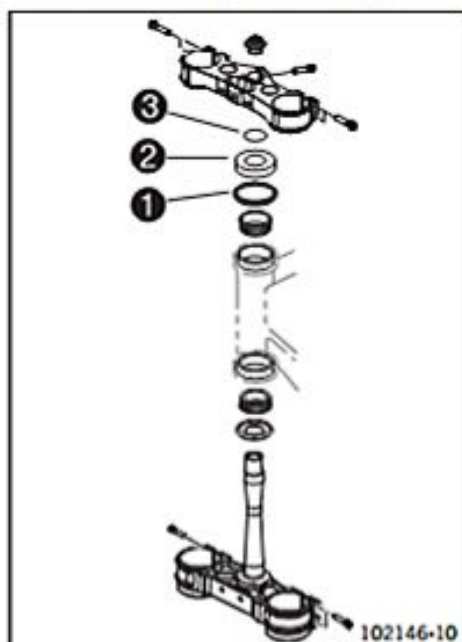
Info

Cover the components to protect them against damage.
Do not bend the cables and lines.



- Remove O-ring ③. Remove protective ring ④.
- Take out the lower triple clamp with the steering stem.
- Take out the upper steering head bearing.

6.1.22 Installing the lower triple clamp



Main work

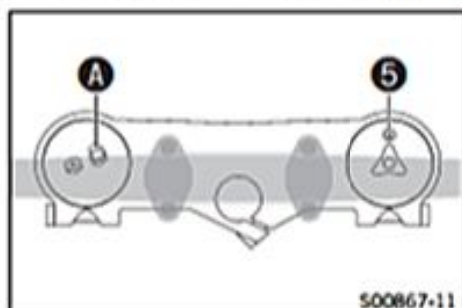
- Clean the bearing and sealing elements, check for damage, and grease.

High viscosity grease (☞ p. 292)

- Insert the lower triple clamp with the steering stem. Mount the upper steering head bearing.
- Check whether the upper steering head seal ① is correctly positioned.
- Slide on protective ring ② and O-ring ③.



- Position the upper triple clamp with the handlebar.
- Mount screw ④ but do not tighten yet.

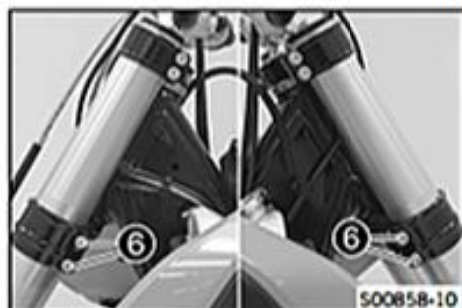


- Position the fork legs.
 - ✓ The air release screw ⑤ of the right fork leg is positioned to the front.
 - ✓ The left fork leg valve A is positioned approx. 20° further forward.



Info

Grooves are milled into the side of the upper end of the fork legs. The second milled groove (from the top) must be flush with the top edge of the upper triple clamp.



- Tighten screws ⑥.

Guideline

Screw, bottom triple clamp	M8	12 Nm (8.9 lbf ft)
----------------------------	----	--------------------



- Tighten screw ④.

Guideline

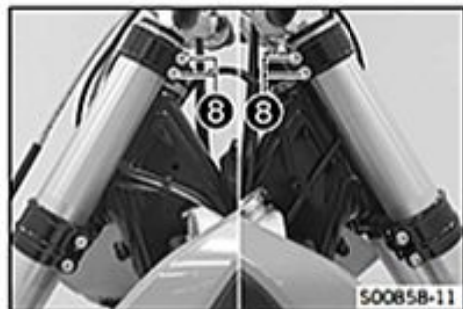
Screw, top steering head	M20x1.5	12 Nm (8.9 lbf ft)
--------------------------	---------	--------------------



- Mount and tighten screw 7.

Guideline

Screw, top steering stem	M8	20 Nm (14.8 lbf ft)	Loctite® 243™
--------------------------	----	------------------------	---------------



- Using a plastic hammer, tap lightly on the upper triple clamp to avoid strains.
- Tighten screws 8.

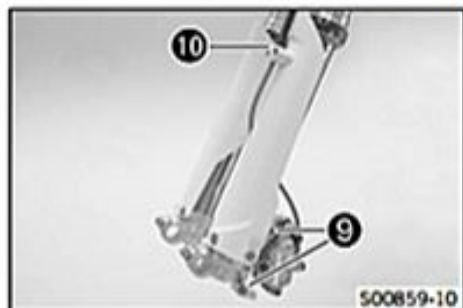
Guideline

Screw, top triple clamp	M8	17 Nm (12.5 lbf ft)	
-------------------------	----	------------------------	--

- Mount the holder with FI warning lamp.

Guideline

Remaining nuts, chassis	M6	10 Nm (7.4 lbf ft)	
-------------------------	----	--------------------	--



- Position the brake caliper. Mount and tighten screws 9.

Guideline

Screw, front brake caliper	M8	25 Nm (18.4 lbf ft)	Loctite® 243™
----------------------------	----	------------------------	---------------

- Position the brake line and clamp. Mount and tighten screws 10.

Finishing work

- Install the front fender. (☛ p. 135)
- Mount the handlebar cushion.
- Install the start number plate. (☛ p. 136)
- Install the front wheel. (☛ p. 140)
- Check that the wiring harness, throttle cables, and brake and clutch lines can move freely and are routed correctly.
- Check the steering head bearing play. (☛ p. 34)
- Remove the motorcycle from the lift stand. (☛ p. 10)

6.1.23 Checking the steering head bearing play



Warning

Danger of accidents Unstable vehicle handling from incorrect steering head bearing play.

- Adjust the steering head bearing play without delay.

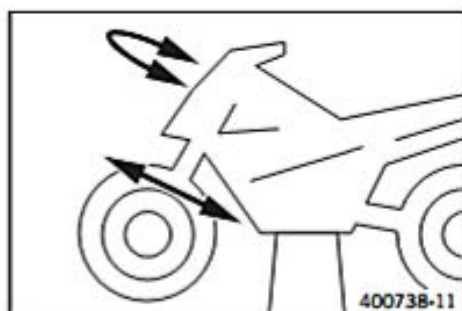


Info

If the bike is ridden with play in the steering head bearing, the bearing and the bearing seats in the frame can become damaged over time.

Preparatory work

- Raise the motorcycle with a lift stand. (☛ p. 10)

**Main work**

- Move the handlebar to the straight-ahead position. Move the fork legs to and fro in the direction of travel.

No play should be noticeable in the steering head bearing.

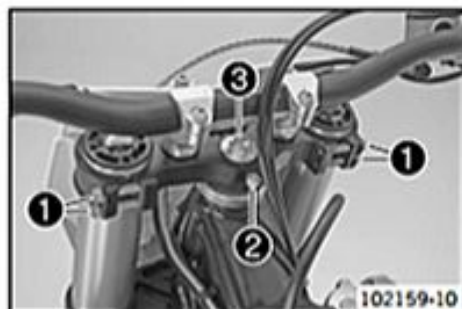
- If there is noticeable play present:
 - Adjust the steering head bearing play. (☛ p. 35)
- Move the handlebar to and fro over the entire steering range.

The handlebar must be able to move easily over the entire steering range. No resting locations should be noticeable.

- If click positions are noticeable:
 - Adjust the steering head bearing play. (☛ p. 35)
 - Check the steering head bearing and change if necessary.

Finishing work

- Remove the motorcycle from the lift stand. (☛ p. 10)

6.1.24 Adjusting the steering head bearing play**Preparatory work**

- Raise the motorcycle with a lift stand. (☛ p. 10)
- Remove the handlebar cushion.

Main work

- Loosen screws ①. Remove screw ②.
- Loosen and retighten screw ③.

Guideline

Screw, top steering head	M20x1.5	12 Nm (8.9 lbf ft)
--------------------------	---------	--------------------

- Using a plastic hammer, tap lightly on the upper triple clamp to avoid strains.
- Mount and tighten screw ②.

Guideline

Screw, top steering stem	M8	20 Nm (14.8 lbf ft)	Loctite® 243™
--------------------------	----	---------------------	---------------

- Tighten screws ①.

Guideline

Screw, top triple clamp	M8	17 Nm (12.5 lbf ft)
-------------------------	----	---------------------

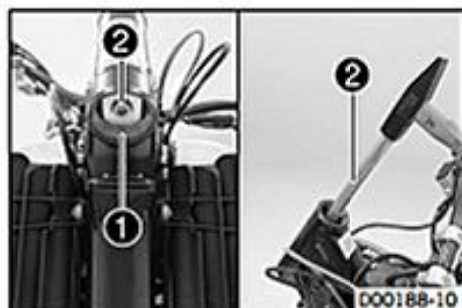
- Check the steering head bearing play. (☛ p. 34)

Finishing work

- Mount the handlebar cushion.
- Remove the motorcycle from the lift stand. (☛ p. 10)

6.1.25 Changing the steering head bearing**Preparatory work**

- Raise the motorcycle with a lift stand. (☛ p. 10)
- Remove the front wheel. (☛ p. 139)
- Remove the fork legs. (☛ p. 38)
- Remove the start number plate. (☛ p. 135)
- Remove the front fender. (☛ p. 135)
- Remove the handlebar cushion.
- Remove the lower triple clamp. (☛ p. 32)

**Main work**

- Remove lower bearing ring (1) with special tool (2).

Tool bracket (58429089000) (☞ p. 296)

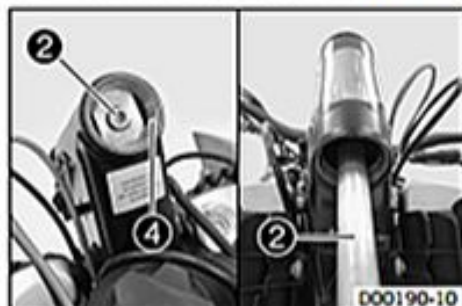
Press-out tool (58429092000) (☞ p. 296)



- Press the new bearing ring up to the stop with special tool (3).

Tool bracket (58429089000) (☞ p. 296)

Press-in tool (58429091000) (☞ p. 296)



- Remove upper bearing ring (4) with special tool (2).

Tool bracket (58429089000) (☞ p. 296)

Press-out tool (58429092000) (☞ p. 296)

- Remove the seal ring.



- Press the new bearing ring up to the stop with special tool (3).

Tool bracket (58429089000) (☞ p. 296)

Press-in tool (58429091000) (☞ p. 296)

- Grease and mount the new seal ring.



- Remove lower steering head bearing (5).
- Remove the seal ring retainer.
- Remove the O-ring.
- Grease the new O-ring and mount with the seal ring retainer.
- Press on the new bearing with a suitable tube as far as it will go.

**Info**

Only press the bearing in via the inner ring.

Finishing work

- Install the lower triple clamp. (☞ p. 33)
- Install the front fender. (☞ p. 135)
- Mount the handlebar cushion.
- Install the start number plate. (☞ p. 136)
- Install the front wheel. (☞ p. 140)
- Check that the wiring harness, throttle cables, and brake and clutch lines can move freely and are routed correctly.
- Check the steering head bearing play. (☞ p. 34)
- Remove the motorcycle from the lift stand. (☞ p. 10)

6.2 SX-F US

6.2.1 Adjusting the compression damping of the fork



Info

The hydraulic compression damping determines the fork suspension behavior.



- Turn the white adjusting screw **1** all the way clockwise.



Info

The adjusting screw **1** is located at the upper end of the left fork leg. The compression damping is located in the left fork leg **COMP** (white adjusting screw). The rebound damping is located in the right fork leg **REB** (red adjusting screw).

- Turn counterclockwise by the number of clicks corresponding to the fork type.

Guideline

Compression damping	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks



Info

Turn clockwise to increase damping; turn counterclockwise to reduce damping.

6.2.2 Adjusting the rebound damping of the fork



Info

The hydraulic rebound damping determines the fork suspension behavior.



- Turn the red adjusting screw **1** all the way clockwise.



Info

The adjusting screw **1** is located at the upper end of the right fork leg. The rebound damping is located in the right fork leg **REB** (red adjusting screw). The compression damping is located in the left fork leg **COMP** (white adjusting screw).

- Turn counterclockwise by the number of clicks corresponding to the fork type.

Guideline

Rebound damping	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks



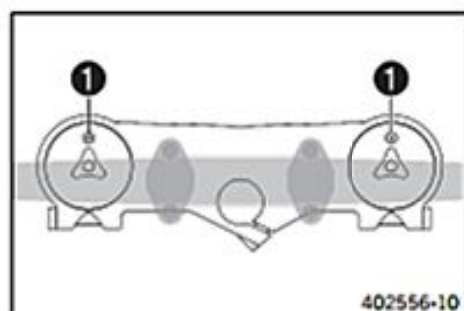
Info

Turn clockwise to increase damping; turn counterclockwise to reduce damping.

6.2.3 Bleeding the fork legs

Preparatory work

- Raise the motorcycle with a lift stand. (☛ p. 10)



Main work

- Release bleeder screws ①.
- ✓ Any excess pressure escapes from the interior of the fork.
- Tighten the bleeder screws.

Finishing work

- Remove the motorcycle from the lift stand. (☞ p. 10)

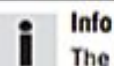
6.2.4 Cleaning the dust boots of the fork legs

Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the fork protector. (☞ p. 39)

Main work

- Push dust boots ① of both fork legs downward.



Info

The dust boots remove dust and coarse dirt particles from the inside fork tubes. Over time, dirt can penetrate behind the dust boots. If this dirt is not removed, the oil seals behind can start to leak.



Warning

Danger of accidents Reduced braking efficiency due to oil or grease on the brake discs.

- Always keep the brake discs free of oil and grease, and clean them with brake cleaner when necessary.

- Clean and oil the dust boots and inner fork tube of both fork legs.

Universal oil spray (☞ p. 293)

- Press the dust boots back into their normal position.
- Remove excess oil.

Finishing work

- Install the fork protector. (☞ p. 40)
- Remove the motorcycle from the lift stand. (☞ p. 10)

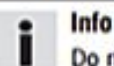
6.2.5 Removing the fork legs

Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the front wheel. (☞ p. 139)

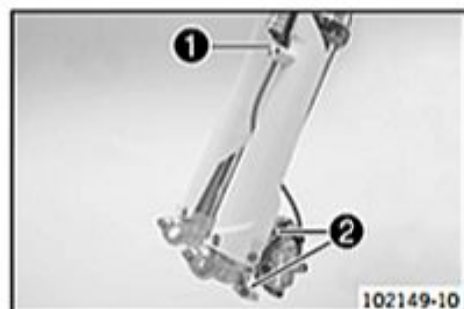
Main work

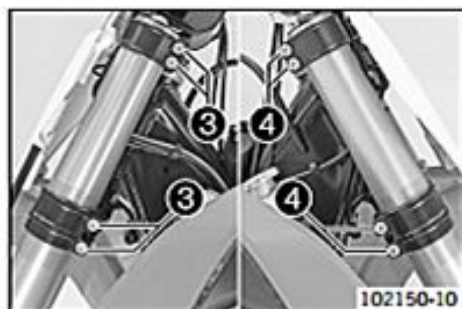
- Remove screws ① and take off the clamp.
- Remove screws ② and take off the brake caliper.
- Allow the brake caliper and brake line to hang tension-free to the side.



Info

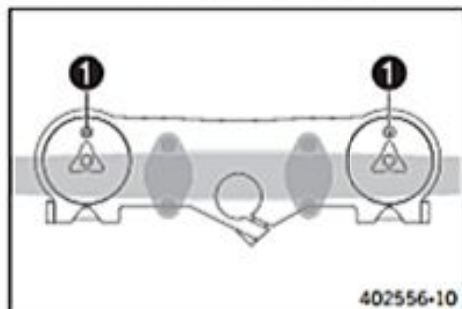
Do not pull the hand brake lever if the front wheel has been removed.





- Loosen screws ③. Take out the left fork leg.
- Unscrew screws ④. Take out the right fork leg.

6.2.6 Installing the fork legs

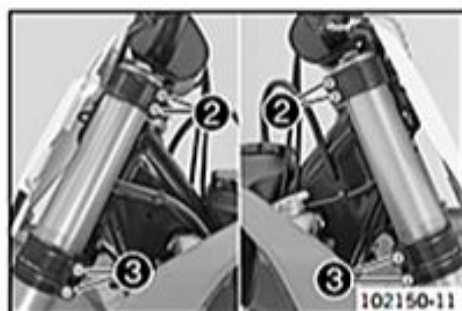


Main work

- Position the fork legs.
- ✓ Bleeder screws ① are positioned toward the front.

Info

The rebound damping is located in the right fork leg (red adjusting screw). The compression damping is located in the left fork leg (white adjusting screw). Grooves are milled into the side of the upper end of the fork legs. The second milled groove (from the top) must be flush with the top edge of the upper triple clamp.



- Tighten screws ②.

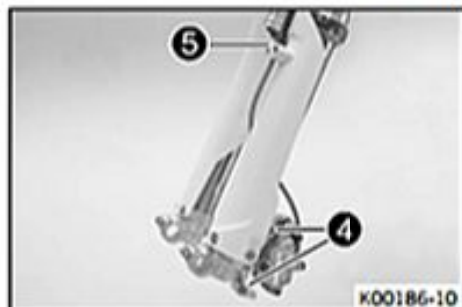
Guideline

Screw, top triple clamp	M8	17 Nm (12.5 lbf ft)
-------------------------	----	------------------------

- Tighten screws ③.

Guideline

Screw, bottom triple clamp	M8	12 Nm (8.9 lbf ft)
----------------------------	----	--------------------



- Position the brake caliper. Mount and tighten screws ④.

Guideline

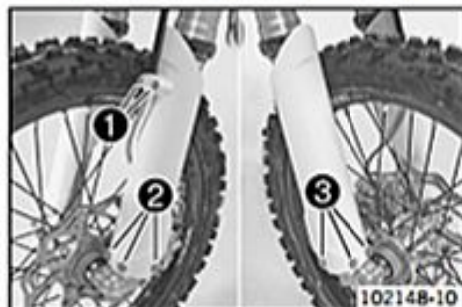
Screw, front brake caliper	M8	25 Nm (18.4 lbf ft)	Loctite® 243™
----------------------------	----	------------------------	---------------

- Position the brake line and clamp. Mount and tighten screws ⑤.

Finishing work

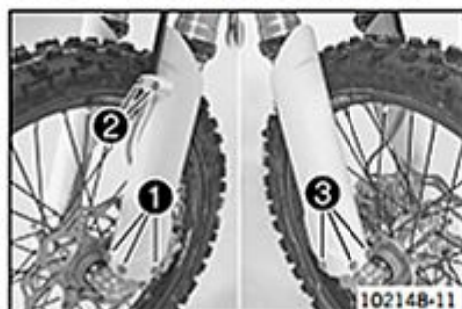
- Install the front wheel. (☛ p. 140)

6.2.7 Removing the fork protector



- Remove screws ①. Take off the clamp.
- Remove screws ②. Take off the left fork protector.
- Remove screws ③. Take off the right fork protector.

6.2.8 Installing the fork protector



- Position the fork protection on the left fork leg. Mount and tighten screws **1**.

Guideline

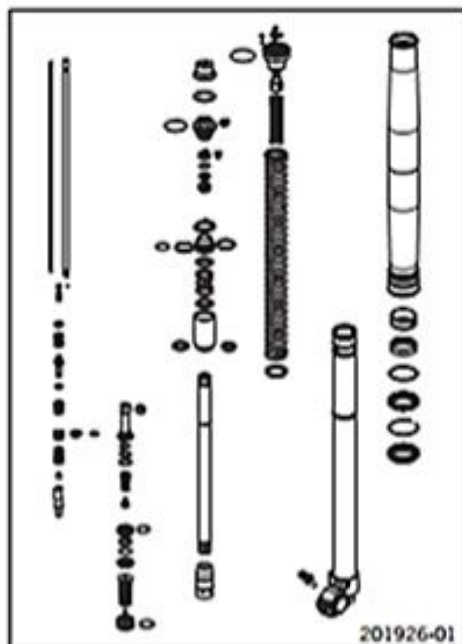
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------

- Position the brake line and clamp. Mount and tighten screws **2**.
- Position the fork protector on the right fork leg. Mount and tighten screws **3**.

Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------

6.2.9 Performing a fork service



Condition

The fork legs have been removed.

- Disassemble the fork legs. (p. 40)
- Remove the spring. (p. 42)
- Disassemble the cartridge. (p. 43)
- Disassemble the piston rod. (p. 44)
- Disassemble the hydrostop unit. (p. 45)
- Disassemble the seal ring retainer. (p. 46)
- Check the fork legs. (p. 46)
- Assemble the seal ring retainer. (p. 47)
- Assemble the hydrostop unit. (p. 47)
- Assemble the piston rod. (p. 48)
- Assemble the cartridge. (p. 49)
- Assemble the fork legs. (p. 51)

6.2.10 Disassembling the fork legs

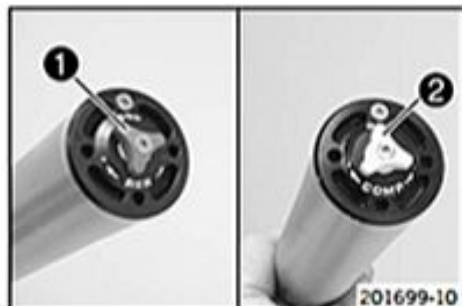


Info

The steps are identical for both fork legs.

Condition

The fork legs are disassembled.



- Note down the current state of rebound damping **1** **REB** (red adjuster of right fork leg).
- Note down the current state of compression damping **2** **COMP** (white adjuster of left fork leg).
- Fully open the adjusters of the rebound and compression damping.



- Clamp the fork leg in the area of the lower triple clamp.

Clamping stand (T1403S) (☛ p. 306)

- Remove the screw. Remove adjuster (3).



- Release screw cap (4).

Special socket (T14047) (☛ p. 306)

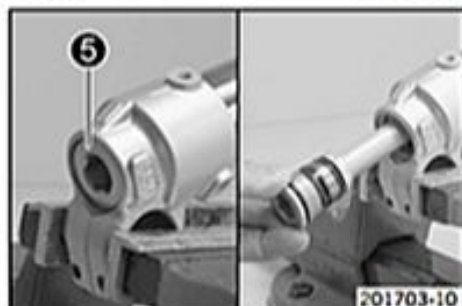


Info

The cartridge cannot be taken off yet.



- Unclamp the fork leg.
- Push the outer tube down. Drain the fork oil.

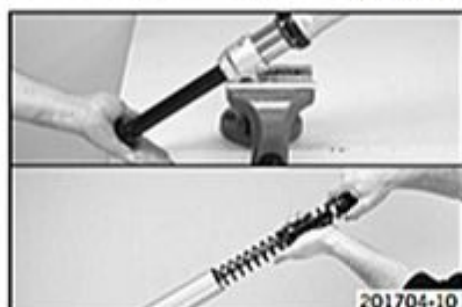


- Clamp the fork leg with the axle clamp.
- Release hydrostop unit (5) and remove it.



Info

Do not use an impact wrench.
Place a pan underneath since oil will run out.



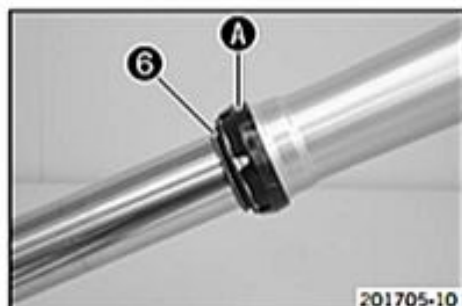
- Remove the cartridge from the fork leg.

Press-out tool (T14051) (☛ p. 307)



Info

Removing the O-ring seat from the cartridge usually requires the application of force.



- Remove dust boot (6).
- Remove fork protection ring (A).



Info

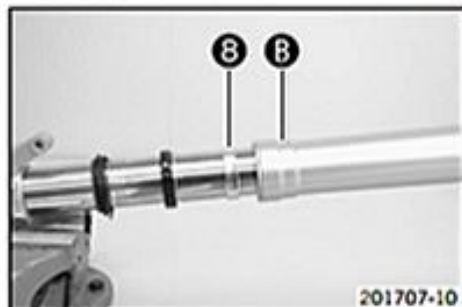
The fork protection ring does not necessarily need to be removed for repair work.



- Remove lock ring **7**.


Info

The lock ring has a ground end against which a screwdriver can be positioned.



- Warm the outer tube in area **8** of the lower sliding bushing.

Guideline

50 °C (122 °F)

- Pull the outer tube forcefully off of the inner tube.


Info

The lower sliding bushing **8** must be pulled out of its bearing seat.



- Remove the upper sliding bushing **9**.


Info

Do not use a tool; pull the ends apart slightly by hand.



- Take off the lower sliding bushing **8**.
- Take off support ring **10**.
- Take off seal ring **11**.
- Take off lock ring **7**.
- Take off dust boot **6**.
- Unclamp the fork leg.

6.2.11 Removing the spring


Info

The steps are identical for both fork legs.

Preparatory work

- Disassemble the fork legs. (☛ p. 40)

Main work

- Pull the spring down. Mount the open end wrench on the hexagonal part.





- Clamp the open end wrench in the vise. Release screw cap **1** but do not remove it yet.

Special socket (T14047) (☞ p. 306)



- Pull the spring down. Remove the open end wrench.
- Remove the screw cap.
- Remove the spring with the preload spacer(s).

6.2.12 Disassembling the cartridge



Info

The steps are identical for both fork legs.

Preparatory work

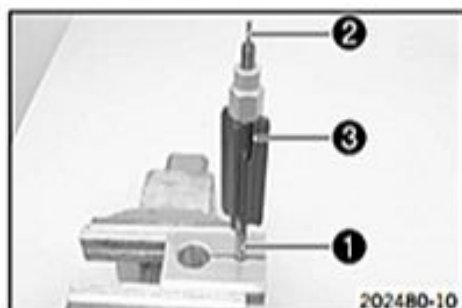
- Disassemble the fork legs. (☞ p. 40)
- Remove the spring. (☞ p. 42)

Main work

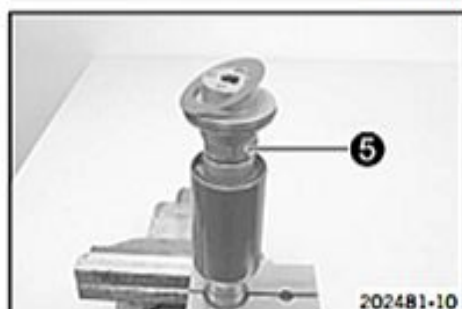
- Degrease piston rod **1** and clamp it in the vise.

Clamping stand (T14049S) (☞ p. 306)

- Remove adjusting tube **2**. Unscrew spring guide **3**.



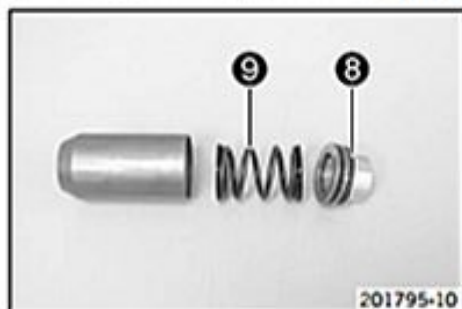
- Remove spring seat **4**.
- Pull the piston rod out of the cartridge.



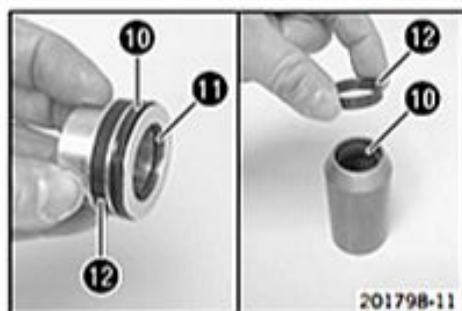
- Clamp the tube of the cartridge into a vise.
- Clamping stand (T14049S) (☞ p. 306)
- Release seal ring retainer **5** and remove with the washer.



- Remove lock ring **6**.
- Pull reservoir **7** off of the tube.



- Pull sleeve **8** out of the reservoir.
- Remove spring **9**.



- Remove seal rings **10** and O-ring **11**.
- Remove pilot bushings **12**.

6.2.13 Disassembling the piston rod



Info

The steps are identical for both fork legs, except for the hydrostop needle and valve.

Preparatory work

- Disassemble the fork legs. (☞ p. 40)
- Remove the spring. (☞ p. 42)
- Disassemble the cartridge. (☞ p. 43)

Main work

- Degrease the piston rod.
- Clamp the piston rod with the special tool as far up as possible.

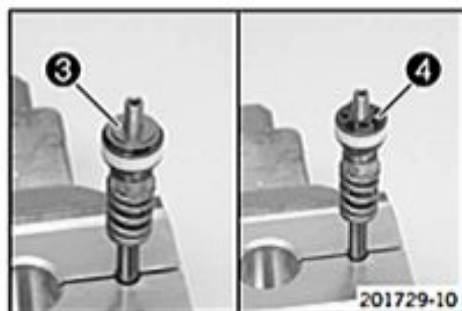
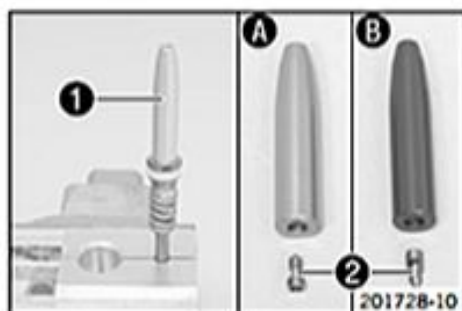
Clamping stand (T14049S) (☞ p. 306)

- Release hydrostop needle **1** and remove it from the piston rod.
- ✓ The valve **2** usually remains in the hydrostop needle.

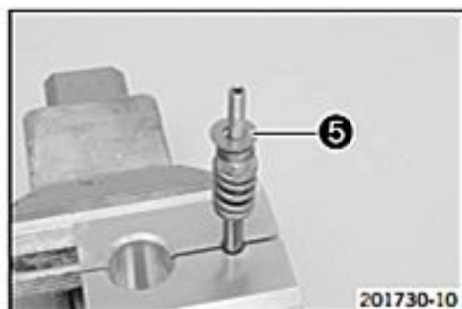


Info

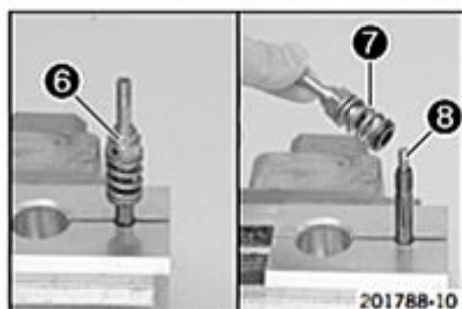
- A** – silver hydrostop needle on compression damping side.
- B** – red hydrostop needle on rebound damping side.



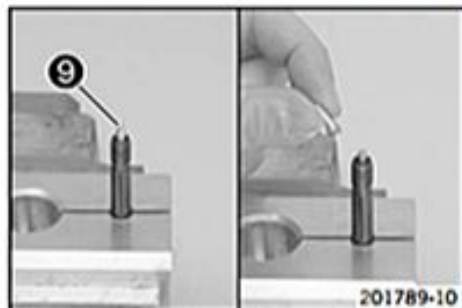
- Remove the rebound shim stack **3**.
- Remove piston **4**.



- Remove the compression shim stack (5).
- Remove spring.



- Remove adapter (6) with spring (7) and washer.
- Remove spring (8).



- Remove valve needle (9) from the piston rod.


Info

The adjusting tube can be used for this.

6.2.14 Disassembling the hydrostop unit


Info

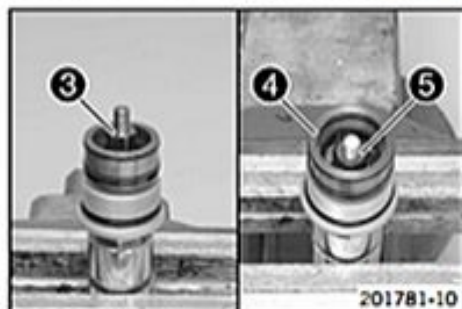
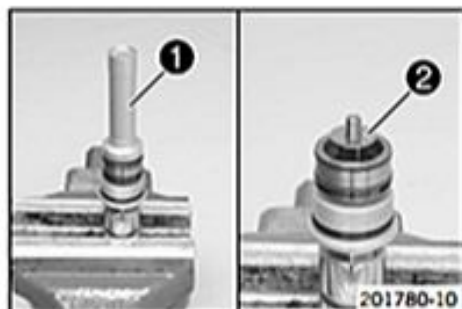
The steps are identical for both fork legs.

Preparatory work

- Disassemble the fork legs. (☛ p. 40)

Main work

- Mount the hydrostop unit on a fitting hexagon socket and clamp into a vice.
- Remove sleeve (1).
- Remove shim stack (2).

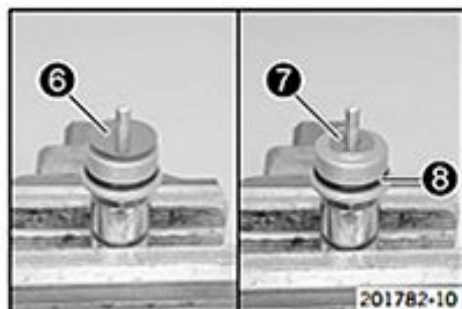


- Remove adapter (3).
- Remove hub (4) with washers (5).


Info

It is possible that only one washer or no washer is present.

- Remove the O-ring from the hub.



- Remove shim stack ⑥.
- Remove washer ⑦.
- Remove O-ring ⑧.

6.2.15 Disassembling the seal ring retainer



Info

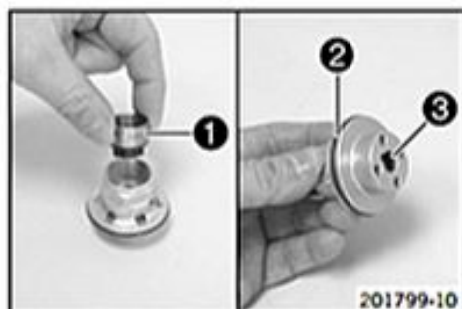
The steps are identical for both fork legs.

Preparatory work

- Disassemble the fork legs. (☛ p. 40)
- Remove the spring. (☛ p. 42)
- Disassemble the cartridge. (☛ p. 43)

Main work

- Remove pilot bushing support ①.
- Remove O-ring ② and seal ring ③.

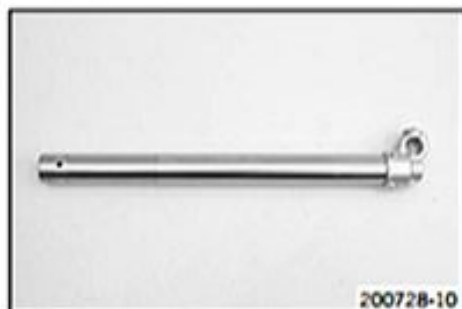


6.2.16 Checking the fork legs

Condition

The fork legs have been disassembled.

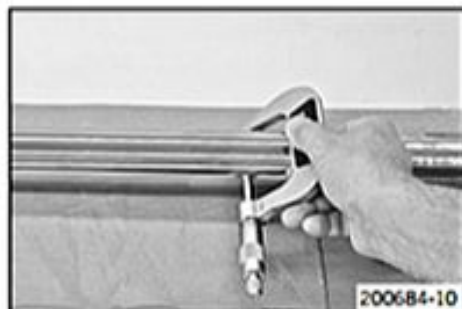
- Check the inner tube and axle clamp for damage.
 - If there is damage:
 - Change the inner tube.

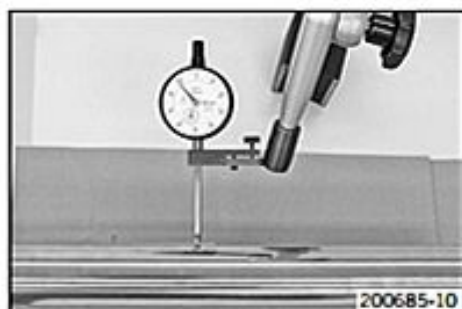


- Measure the outside diameter at multiple locations of the inner tube.

Outside diameter of inner tube	47.975... 48.005 mm (1.88878... 1.88996 in)
--------------------------------	---

- If the measured value is smaller than the specified value:
 - Change the inner tube.

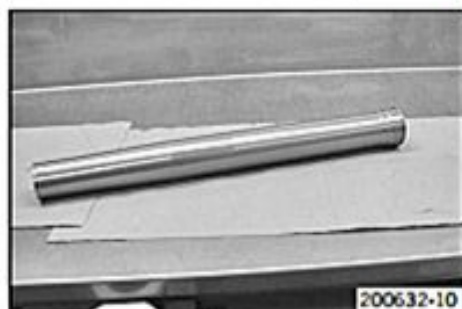




- Measure the run-out of the inner tube.

Inner tube run-out	$\leq 0.20 \text{ mm } (\leq 0.0079 \text{ in})$
--------------------	--

- If the measured value is larger than the specified value:
 - Change the inner tube.



- Measure the inside diameter at multiple locations of the outer tube.

Inside diameter of outer tube	$\leq 49.20 \text{ mm } (\leq 1.937 \text{ in})$
-------------------------------	--

- If the measured value is larger than the specified value:
 - Change the outer tube.

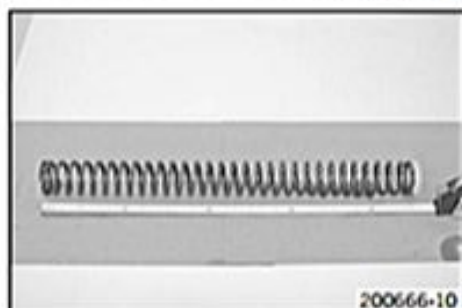
- Check the outer tube for damage.

- If there is damage:
 - Change the outer tube.



- Check the surface of the sliding bushings.

- If the bronze-colored layer **A** under sliding layer **B** is visible or the surface is rough:
 - Change the sliding bushings.



- Check the spring length.

Guideline

Spring length with preload spacer(s)	477 mm (18.78 in)
--------------------------------------	-------------------

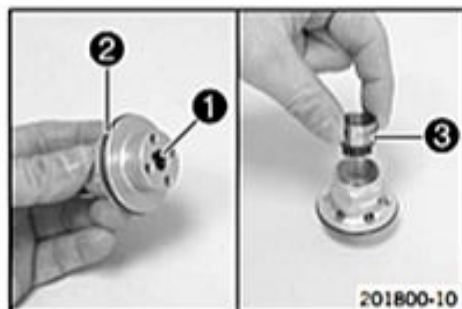
- If the measured value is larger than the specified value:
 - Reduce the thickness of the preload spacers.
- If the measured value is smaller than the specified value:
 - Increase the thickness of the preload spacers.

6.2.17 Assembling the seal ring retainer



Info

The steps are identical for both fork legs.



- Mount and grease seal ring **1**.

Lubricant (T158) (☛ p. 292)

- Mount and grease O-ring **2**.

Lubricant (T158) (☛ p. 292)

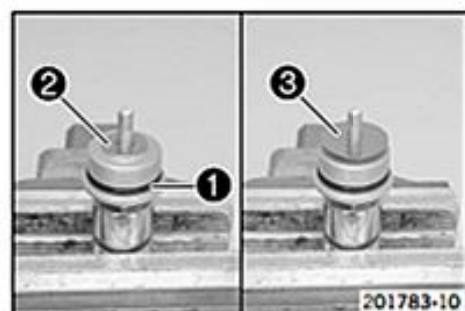
- Position pilot bushing support **3**.

6.2.18 Assembling the hydrostop unit



Info

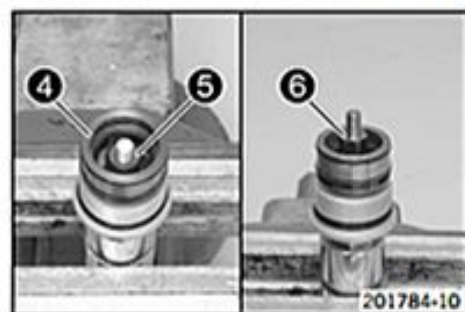
The steps are identical for both fork legs.



- Mount and grease O-ring ①.

Lubricant (T158) (☞ p. 292)

- Mount washer ②.
- Mount shim stack ③ with the smaller washers facing downward.



- Mount the new O-ring on hub ④.
- Mount the hub with washers ⑤.

**Info**

It is possible that only one or no washer is present.

- Mount and tighten adapter ⑥.

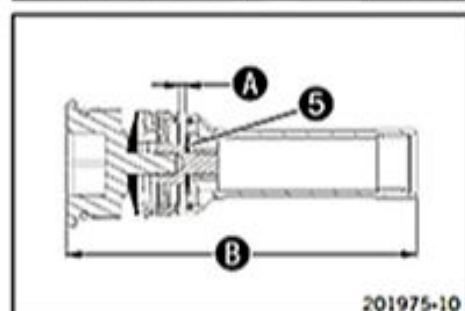
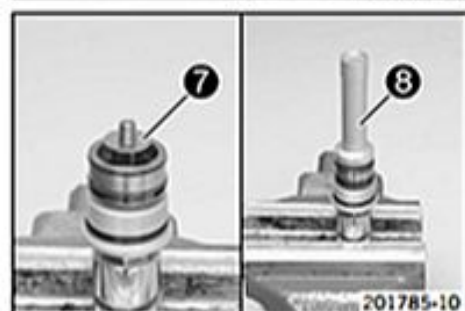
Guideline

Hydrostop unit adapter	M6x0.5	7 Nm (5.2 lbf ft)
------------------------	--------	-------------------

- Mount shim stack ⑦ with the smaller washers facing downward.
- Mount and tighten sleeve ⑧.

Guideline

Hydrostop unit sleeve	M6x0.5	7 Nm (5.2 lbf ft)
-----------------------	--------	-------------------



- Check distance ① and total length ② of the hydrostop.

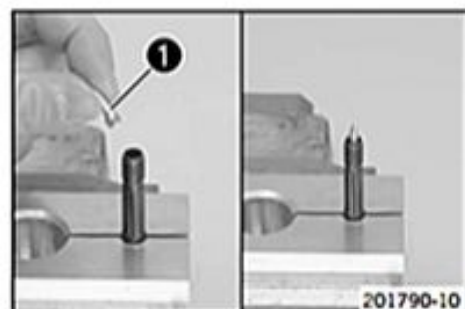
Guideline

Hydrostop distance	≥ 1.5 mm (≥ 0.059 in)
Hydrostop length	108.5... 109.5 mm (4.272... 4.311 in)

- If the dimensions are out of tolerance:
 - Add or remove washers ⑤.

6.2.19 Assembling the piston rod**Info**

The steps are identical for both fork legs, except for the hydrostop needle and valve.

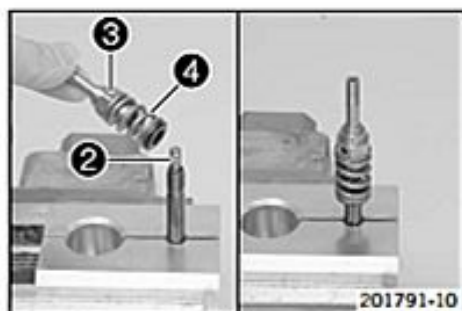


- Degrease the piston rod.
- Clamp the piston rod with the special tool.

Clamping stand (T14049S) (☞ p. 306)

- Lubricate the O-ring. Mount valve needle ① in the piston rod.

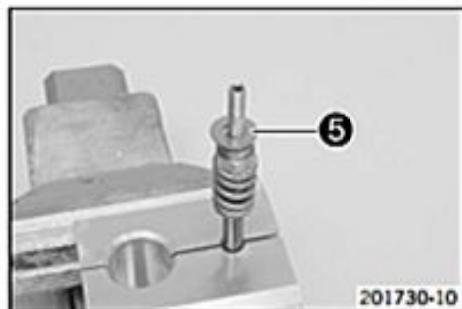
Lubricant (T158) (☞ p. 292)



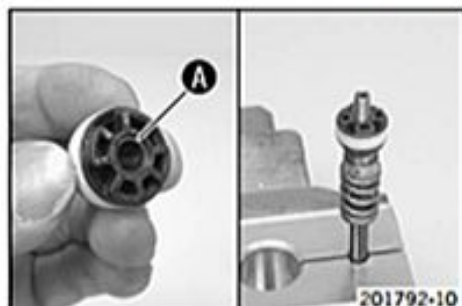
- Mount spring 2.
- Mount and tighten adapter 3 with spring 4 and washer.

Guideline

Adapter of piston rod	M6x0.5	12 Nm (8.9 lbf ft)
-----------------------	--------	--------------------



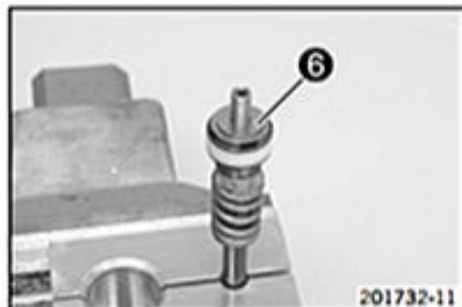
- Position the spring.
- Mount the compression shim stack 5 with the smaller washers facing downward.



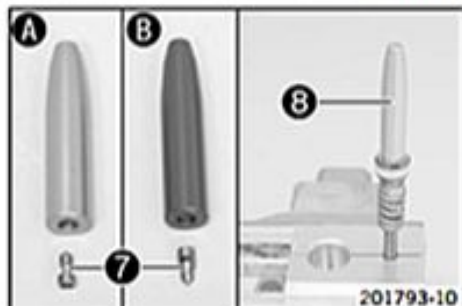
- Grind the piston on both sides on a surfacing plate using 1200 grit sandpaper.
- Clean the piston.
- Lubricate the piston ring.

Fork oil (SAE 4) (48601166S1) (☞ p. 290)

- Mount the piston with chamfer A facing down.



- Mount the rebound shim stack 6 with the smaller washers facing upward.



- Press the piston downward against the spring.
✓ The piston should not squeeze the shims.
- Position valve 7 in the hydrostop needle 8. Mount and tighten the hydrostop needle.

Guideline

Hydrostop needle on piston rod	M6x0.5	7 Nm (5.2 lbf ft)
--------------------------------	--------	-------------------

i Info

- A - silver hydrostop needle on compression damping side.
- B - red hydrostop needle on rebound damping side.

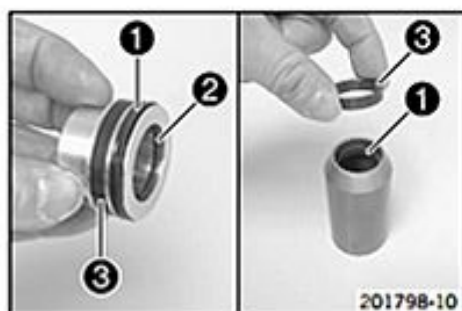
- Unclamp the piston rod.

6.2.20 Assembling the cartridge**Info**

The steps are identical for both fork legs.

Preparatory work

- Assemble the seal ring retainer. (☞ p. 47)
- Assemble the piston rod. (☞ p. 48)

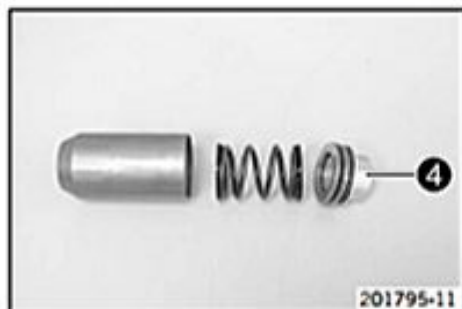
**Main work**

- Mount and grease seal rings 1 and O-ring 2.

Lubricant (T158) (☞ p. 292)

- Mount and lubricate pilot bushings 3.

Fork oil (SAE 4) (48601166S1) (☞ p. 290)



- Check the length of the reservoir spring.

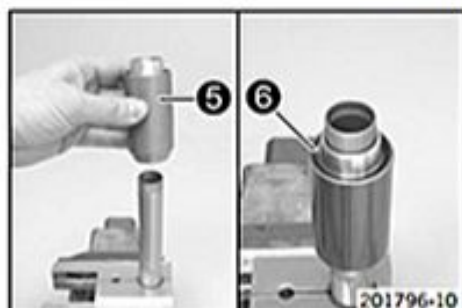
Guideline

Reservoir spring length with preload spacer	46 mm (1.81 in)
---	-----------------

- If the length is out of tolerance:

- Correct the preload spacers.

- Position the spring with the preload spacers in the reservoir.
- Position sleeve 4 in the reservoir.



- Clamp the tube of the cartridge into a vise.

Clamping stand (T14049S) (☞ p. 306)

- Slide reservoir 5 onto the tube.

**Info**

Hold the sleeve in the reservoir to prevent it from sliding out.

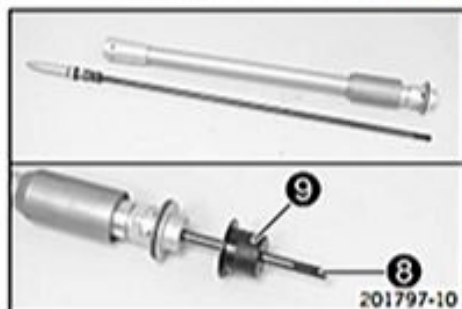
- Mount lock ring 6.

- Mount seal ring retainer 7 with the washer and tighten.

Guideline

Seal ring retainer	M23.5x0.75	46 Nm (33.9 lbf ft)	Loctite® 2701™
--------------------	------------	------------------------	----------------

- Unclamp the cartridge.

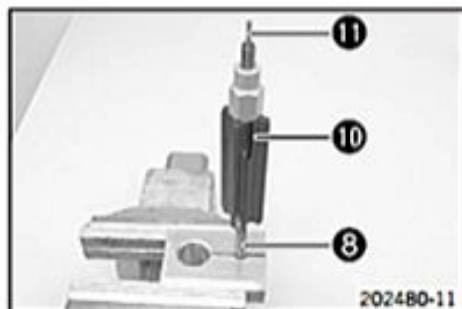


- Slide piston rod 8 into the cartridge.

**Info**

Ensure that the piston ring is seated correctly.

- Mount spring seat 9.



- Degrease piston rod 8 and clamp in the vise.

Clamping stand (T14049S) (☞ p. 306)

- Screw spring guide 10 all the way on.

**Info**

The nut must be firmly tightened against the stop by hand. Do not use a tool.

- Mount adjusting tube 11.

- Unclamp the piston rod. Mount the preload spacer(s).

6.2.21 Assembling the fork legs

- i Info**
When assembling, ensure that the right cartridge is mounted in the corresponding inner tube and the right adjuster is mounted on the corresponding screw cap.
Compression damping side – screw cap with mark **COMP**, brake caliper holder, white adjuster.
Rebound damping side – screw cap with mark **REB**, no brake caliper holder, red adjuster.

**Preparatory work**

- Assemble the hydrostop unit. (☛ p. 47)

Main work

- Clamp the inner tube with the axle clamp.

Guideline

Use soft jaws.

- Mount special tool.

Protecting sleeve (T1401) (☛ p. 305)

- Lubricate and mount dust boot ①.

Lubricant (T511) (☛ p. 292)

**Info**

Always change the dust boot, seal ring, lock ring and support ring.
Mount the sealing lip with the spring expander facing downward.

- Slide on lock ring ②.
- Lubricate and slide on seal ring ③.

Lubricant (T511) (☛ p. 292)

**Info**

Mount with the sealing lip facing down and the open side facing up.

- Slide on support ring ④.
- Remove the special tool.
- Grind the edges of the sliding bushings with sandpaper grit 600, clean the bushings and lubricate them.

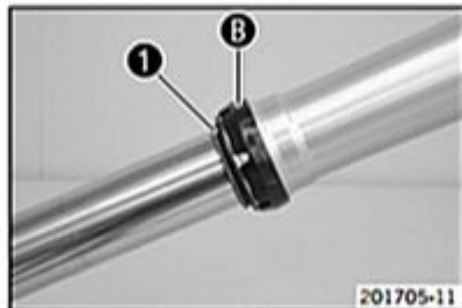
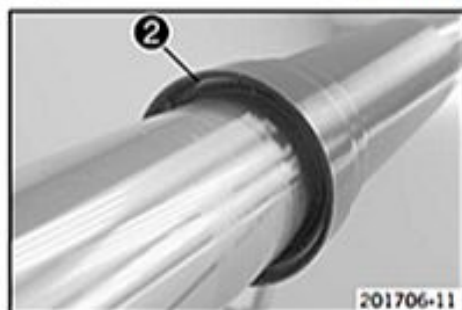
Fork oil (SAE 4) (48601166S1) (☛ p. 290)



- Slide on the lower sliding bushing ⑤.
- Mount the upper sliding bushing ⑥.

**Info**

Do not use a tool; pull the ends apart slightly by hand.



- Warm the outer tube in area **A** of the lower sliding bushing.

Guideline

50 °C (122 °F)

- Slide the outer tube onto the inner tube.
- Hold the lower sliding bushing with the longer section of the special tool.

Mounting tool (T14040S) (☛ p. 306)

- Push the sliding bushing all the way into the outer tube.

- Position the support ring.
- Hold the seal ring with the shorter section of the special tool.

Mounting tool (T14040S) (☛ p. 306)

- Push the seal ring and support ring all the way into the outer tube.

- Mount lock ring **2**.



Info

The lock ring must engage audibly.

- Mount dust boot **1**.
- Mount fork protection ring **B**.

- Lubricate the O-ring. Slide the cartridge all the way into the fork leg.

Fork oil (SAE 4) (48601166S1) (☛ p. 290)

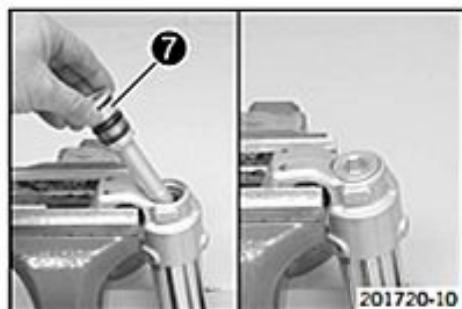
- Turn the fork. Have the entire filling quantity of fork oil available.

Oil capacity per fork leg	670 ml (22.65 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 290)
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- Add some of the fork oil while pulling out and pushing in the piston rod numerous times.

Guideline

Fork oil quantity	510 ml (17.24 fl. oz.)
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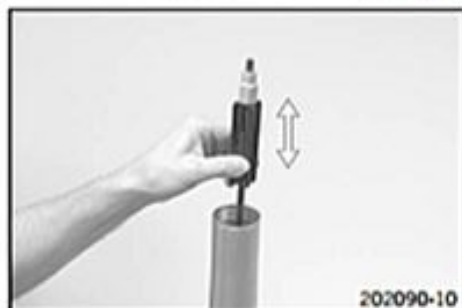
- Mount and tighten hydrostop unit **7**.

Guideline

Hydrostop unit	M30x1	40 Nm (29.5 lbf ft)
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- Clamp the fork vertically.
- Add the remaining quantity of fork oil.

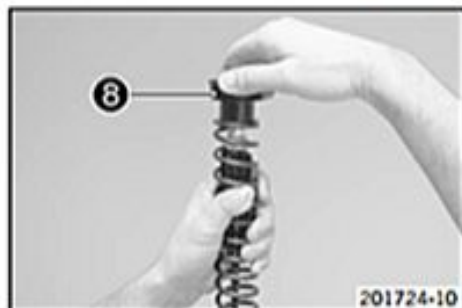


- Pull out the piston rod and push it back in numerous times while pressing it to one side slightly.
 - ✓ Air bubbles emerge and the cartridge is bled.
- Keep bleeding until no more air bubbles emerge.
 - ✓ The piston rod moves out automatically to the middle of the total stroke distance.



Info

When fully bled, the correct air chamber length is achieved automatically.



- Position spring.
- Pull the spring down. Mount screw cap **8**.



Info

When assembling, ensure that the screw caps are correctly mounted according to the hydrostop needles.

Rebound damping side – red hydrostop needle, screw cap with mark **REB**.
Compression damping side – silver hydrostop needle, screw cap with mark **COMP**.

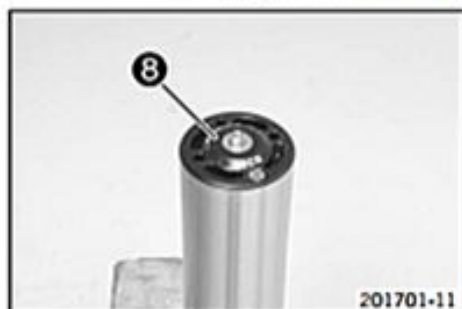


- Pull the spring down. Mount the open end wrench on the hexagonal part.
- Hold the open end wrench. Tighten screw cap **8**.

Guideline

Screw cap on piston rod	M8x0.75	18 Nm (13.3 lbf ft)
-------------------------	---------	------------------------

Special socket (T14047) (☛ p. 306)



- Push the outer tube up.
- Clamp the outer tube in the area of the lower triple clamp.

Clamping stand (T1403S) (☛ p. 306)

- Tighten screw cap **8**.

Guideline

Cartridge on outer tube	M51x1.5	40 Nm (29.5 lbf ft)
-------------------------	---------	------------------------

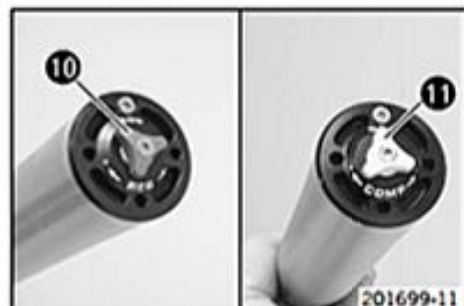
Special socket (T14047) (☛ p. 306)



- Mount the adjuster. Mount and tighten screw 9.

Guideline

Screw, adjuster	M4x0.5	2.5 Nm (1.84 lbf ft)
-----------------	--------	-------------------------



Alternative 1

- Turn the adjuster of compression damping 10 (mark COMP) and the adjuster of rebound damping 11 (mark REB) all the way clockwise.

Guideline

Rebound damping	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Compression damping	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks

- Turn counterclockwise by the number of clicks corresponding to the fork type.

Alternative 2



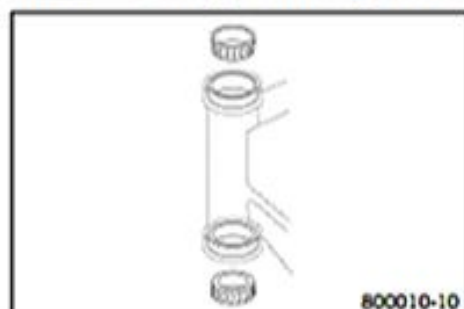
Warning

Danger of accident Modifications to the suspension setting may seriously alter the handling characteristic.

Extreme modifications to the suspension setting may cause a serious deterioration in the handling characteristic and overload components.

- Only make adjustments within the recommended range.
 - Ride slowly to start with after making adjustments to get the feel of the new handling characteristic.
-
- Set the adjusters to the positions determined upon removal.

6.2.22 Greasing the steering head bearing

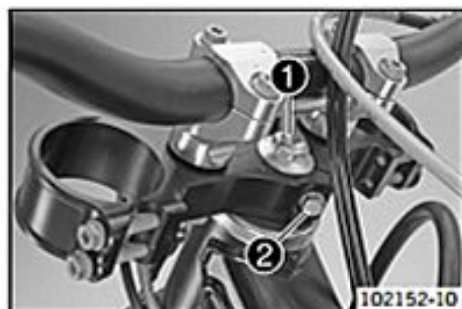


- Remove the lower triple clamp. (☞ p. 54)
- Install the lower triple clamp. (☞ p. 55)

6.2.23 Removing the lower triple clamp

Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the front wheel. (☞ p. 139)
- Remove the fork legs. (☞ p. 60)
- Remove the start number plate. (☞ p. 135)
- Remove the front fender. (☞ p. 135)
- Remove the handlebar cushion.

**Main work**

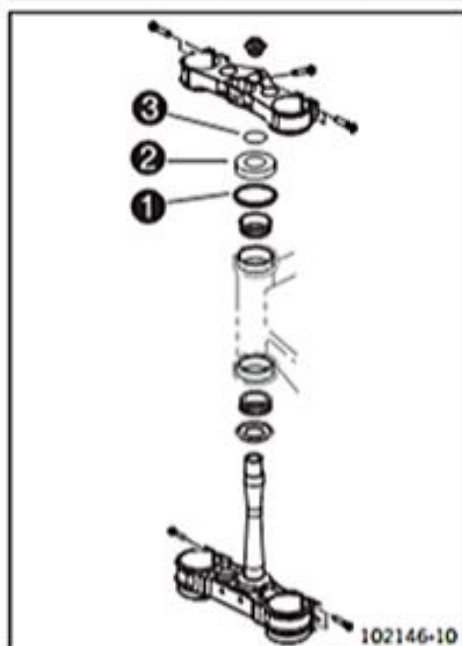
- Remove the holder with FI warning lamp.
- Remove screw 1.
- Remove screw 2.
- Take off the top triple clamp with the handlebar and set it aside.

i Info

Cover the components to protect them against damage.
Do not bend the cables and lines.



- Remove O-ring 3. Remove protective ring 4.
- Take out the lower triple clamp with the steering stem.
- Take out the upper steering head bearing.

6.2.24 Installing the lower triple clamp**Main work**

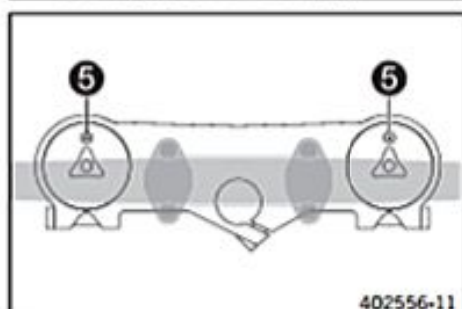
- Clean the bearing and sealing elements, check for damage, and grease.

High viscosity grease (☛ p. 292)

- Insert the lower triple clamp with the steering stem. Mount the upper steering head bearing.
- Check whether the upper steering head seal 1 is correctly positioned.
- Slide on protective ring 2 and O-ring 3.



- Position the upper triple clamp with the handlebar.
- Mount screw 4 but do not tighten yet.

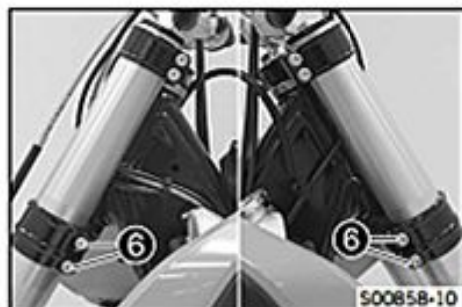


- Position the fork legs.
- ✓ Bleeder screws 5 are positioned toward the front.

i Info

The rebound damping is located in the right fork leg (red adjusting screw).
The compression damping is located in the left fork leg (white adjusting screw).

Grooves are milled into the side of the upper end of the fork legs. The second milled groove (from the top) must be flush with the top edge of the upper triple clamp.



- Tighten screws 6.

Guideline

Screw, bottom triple clamp	M8	12 Nm (8.9 lbf ft)
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- Tighten screw 4.

Guideline

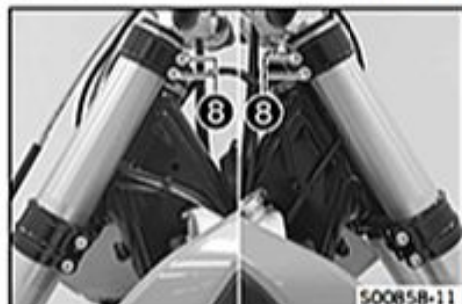
Screw, top steering head	M20x1.5	12 Nm (8.9 lbf ft)
--------------------------	---------	--------------------



- Mount and tighten screw 7.

Guideline

Screw, top steering stem	M8	20 Nm (14.8 lbf ft)	Loctite® 243™
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- Using a plastic hammer, tap lightly on the upper triple clamp to avoid strains.

- Tighten screws 8.

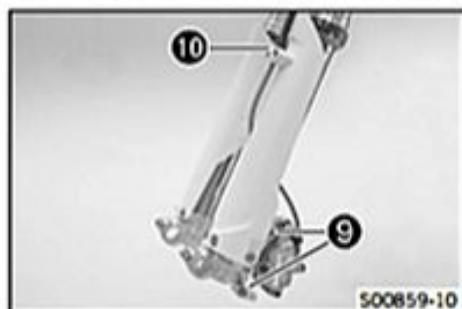
Guideline

Screw, top triple clamp	M8	17 Nm (12.5 lbf ft)
-------------------------	----	---------------------

- Mount the holder with FI warning lamp.

Guideline

Remaining nuts, chassis	M6	10 Nm (7.4 lbf ft)
-------------------------	----	--------------------



- Position the brake caliper. Mount and tighten screws 9.

Guideline

Screw, front brake caliper	M8	25 Nm (18.4 lbf ft)	Loctite® 243™
----------------------------	----	---------------------	---------------

- Position the brake line and clamp. Mount and tighten screws 10.

Finishing work

- Install the front fender. (☛ p. 135)
- Mount the handlebar cushion.
- Install the start number plate. (☛ p. 136)
- Install the front wheel. (☛ p. 140)
- Check that the wiring harness, throttle cables, and brake and clutch lines can move freely and are routed correctly.
- Check the steering head bearing play. (☛ p. 57)
- Remove the motorcycle from the lift stand. (☛ p. 10)

6.2.25 Checking the steering head bearing play

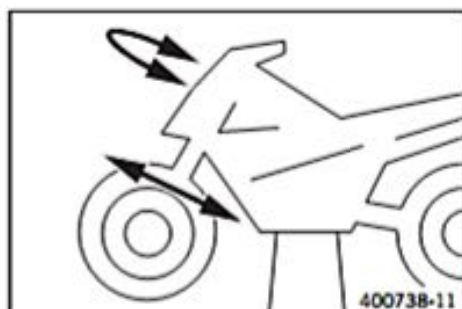
**Warning**

Danger of accidents Unstable vehicle handling from incorrect steering head bearing play.

- Adjust the steering head bearing play without delay.

**Info**

If the bike is ridden with play in the steering head bearing, the bearing and the bearing seats in the frame can become damaged over time.

**Preparatory work**

- Raise the motorcycle with a lift stand. (☞ p. 10)

Main work

- Move the handlebar to the straight-ahead position. Move the fork legs to and fro in the direction of travel.

No play should be noticeable in the steering head bearing.

- If there is noticeable play present:
 - Adjust the steering head bearing play. (☞ p. 57)
- Move the handlebar to and fro over the entire steering range.

The handlebar must be able to move easily over the entire steering range. No resting locations should be noticeable.

- If click positions are noticeable:
 - Adjust the steering head bearing play. (☞ p. 57)
 - Check the steering head bearing and change if necessary.

Finishing work

- Remove the motorcycle from the lift stand. (☞ p. 10)

6.2.26 Adjusting the steering head bearing play

**Preparatory work**

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the handlebar cushion.

Main work

- Loosen screws ①. Remove screw ②.
- Loosen and retighten screw ③.

Guideline

Screw, top steering head	M20x1.5	12 Nm (8.9 lbf ft)
--------------------------	---------	--------------------

- Using a plastic hammer, tap lightly on the upper triple clamp to avoid strains.
- Mount and tighten screw ②.

Guideline

Screw, top steering stem	M8	20 Nm (14.8 lbf ft)	Loctite® 243™
--------------------------	----	---------------------	---------------

- Tighten screws ①.

Guideline

Screw, top triple clamp	M8	17 Nm (12.5 lbf ft)
-------------------------	----	---------------------

- Check the steering head bearing play. (☞ p. 57)

Finishing work

- Mount the handlebar cushion.
- Remove the motorcycle from the lift stand. (☞ p. 10)

6.2.27 Changing the steering head bearing

Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the front wheel. (☞ p. 139)
- Remove the fork legs. (☞ p. 60)

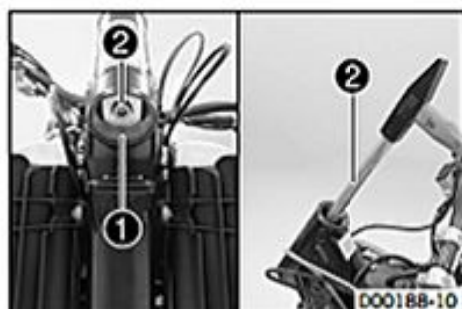
- Remove the start number plate. (☛ p. 135)
- Remove the front fender. (☛ p. 135)
- Remove the handlebar cushion.
- Remove the lower triple clamp. (☛ p. 54)

Main work

- Remove lower bearing ring ❶ with special tool ❷.

Tool bracket (58429089000) (☛ p. 296)

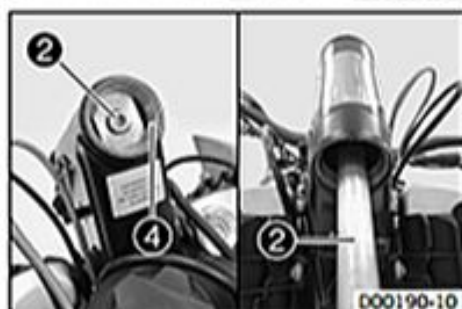
Press-out tool (58429092000) (☛ p. 296)



- Press the new bearing ring up to the stop with special tool ❸.

Tool bracket (58429089000) (☛ p. 296)

Press-in tool (58429091000) (☛ p. 296)



- Remove upper bearing ring ❹ with special tool ❷.

Tool bracket (58429089000) (☛ p. 296)

Press-out tool (58429092000) (☛ p. 296)

- Remove the seal ring.



- Press the new bearing ring up to the stop with special tool ❸.

Tool bracket (58429089000) (☛ p. 296)

Press-in tool (58429091000) (☛ p. 296)

- Grease and mount the new seal ring.



- Remove lower steering head bearing ❺.
- Remove the seal ring retainer.
- Remove the O-ring.
- Grease the new O-ring and mount with the seal ring retainer.
- Press on the new bearing with a suitable tube as far as it will go.



Info

Only press the bearing in via the inner ring.

Finishing work

- Install the lower triple clamp. (☛ p. 55)
- Install the front fender. (☛ p. 135)
- Mount the handlebar cushion.
- Install the start number plate. (☛ p. 136)
- Install the front wheel. (☛ p. 140)

- Check that the wiring harness, throttle cables, and brake and clutch lines can move freely and are routed correctly.
- Check the steering head bearing play. (☞ p. 57)
- Remove the motorcycle from the lift stand. (☞ p. 10)

6.3 XC-F US

6.3.1 Adjusting the compression damping of the fork



Info

The hydraulic compression damping determines the fork suspension behavior.



- Turn the white adjusting screw ① all the way clockwise.



Info

The adjusting screw ① is located at the upper end of the left fork leg. The compression damping is located in the left fork leg **COMP** (white adjusting screw). The rebound damping is located in the right fork leg **REB** (red adjusting screw).

- Turn counterclockwise by the number of clicks corresponding to the fork type.

Guideline

Compression damping	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks



Info

Turn clockwise to increase damping; turn counterclockwise to reduce damping.

6.3.2 Adjusting the rebound damping of the fork



Info

The hydraulic rebound damping determines the fork suspension behavior.



- Turn the red adjusting screw ① all the way clockwise.



Info

The adjusting screw ① is located at the upper end of the right fork leg. The rebound damping is located in the right fork leg **REB** (red adjusting screw). The compression damping is located in the left fork leg **COMP** (white adjusting screw).

- Turn counterclockwise by the number of clicks corresponding to the fork type.

Guideline

Rebound damping	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks



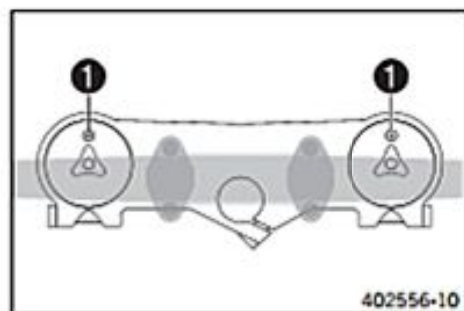
Info

Turn clockwise to increase damping; turn counterclockwise to reduce damping.

6.3.3 Bleeding the fork legs

Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)



Main work

- Release bleeder screws **1**.
- ✓ Any excess pressure escapes from the interior of the fork.
- Tighten the bleeder screws.

Finishing work

- Remove the motorcycle from the lift stand. (☞ p. 10)

6.3.4 Cleaning the dust boots of the fork legs



Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the fork protector. (☞ p. 61)

Main work

- Push dust boots **1** of both fork legs downward.



Info

The dust boots remove dust and coarse dirt particles from the inside fork tubes. Over time, dirt can penetrate behind the dust boots. If this dirt is not removed, the oil seals behind can start to leak.



Warning

Danger of accidents Reduced braking efficiency due to oil or grease on the brake discs.

- Always keep the brake discs free of oil and grease, and clean them with brake cleaner when necessary.

- Clean and oil the dust boots and inner fork tube of both fork legs.

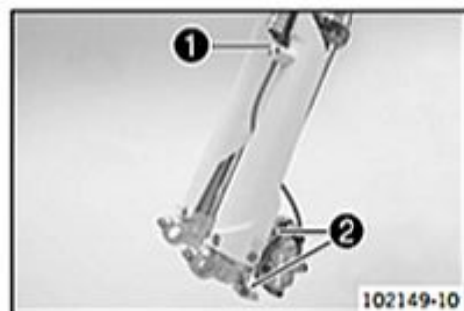
Universal oil spray (☞ p. 293)

- Press the dust boots back into their normal position.
- Remove excess oil.

Finishing work

- Install the fork protector. (☞ p. 62)
- Remove the motorcycle from the lift stand. (☞ p. 10)

6.3.5 Removing the fork legs



Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the front wheel. (☞ p. 139)

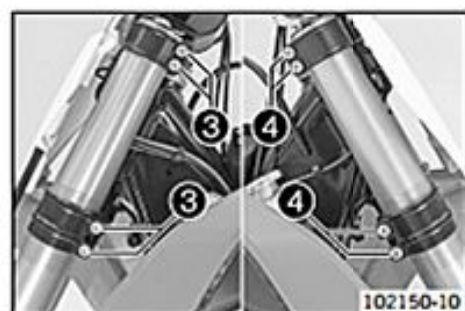
Main work

- Remove screws **1** and take off the clamp.
- Remove screws **2** and take off the brake caliper.
- Allow the brake caliper and brake line to hang tension-free to the side.



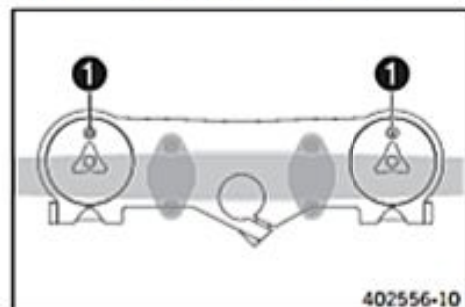
Info

Do not pull the hand brake lever if the front wheel has been removed.



- Loosen screws ③. Take out the left fork leg.
- Unscrew screws ④. Take out the right fork leg.

6.3.6 Installing the fork legs



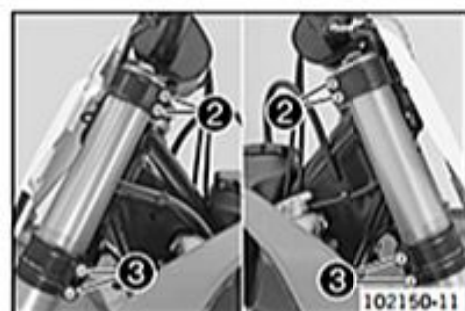
Main work

- Position the fork legs.
- ✓ Bleeder screws ① are positioned toward the front.

Info

The rebound damping is located in the right fork leg (red adjusting screw). The compression damping is located in the left fork leg (white adjusting screw).

Grooves are milled into the side of the upper end of the fork legs. The second milled groove (from the top) must be flush with the top edge of the upper triple clamp.



- Tighten screws ②.

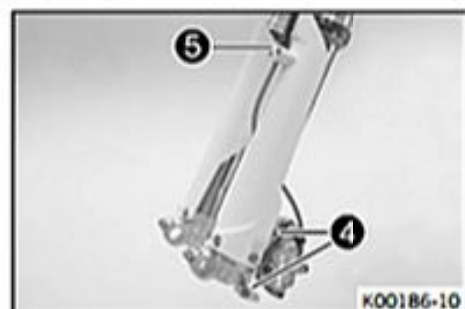
Guideline

Screw, top triple clamp	M8	17 Nm (12.5 lbf ft)
-------------------------	----	------------------------

- Tighten screws ③.

Guideline

Screw, bottom triple clamp	M8	12 Nm (8.9 lbf ft)
----------------------------	----	--------------------



- Position the brake caliper. Mount and tighten screws ④.

Guideline

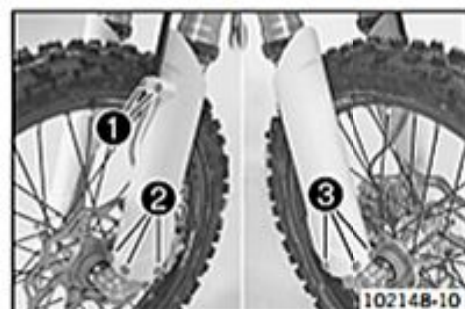
Screw, front brake caliper	M8	25 Nm (18.4 lbf ft)	Loctite® 243™
----------------------------	----	------------------------	---------------

- Position the brake line and clamp. Mount and tighten screws ⑤.

Finishing work

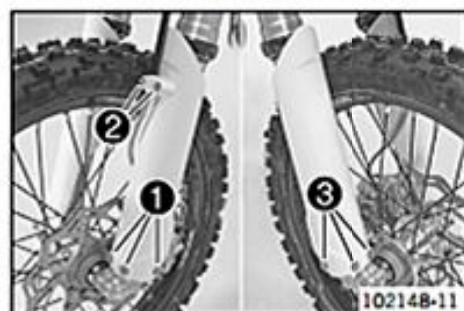
- Install the front wheel. (☛ p. 140)

6.3.7 Removing the fork protector



- Remove screws ①. Take off the clamp.
- Remove screws ②. Take off the left fork protector.
- Remove screws ③. Take off the right fork protector.

6.3.8 Installing the fork protector



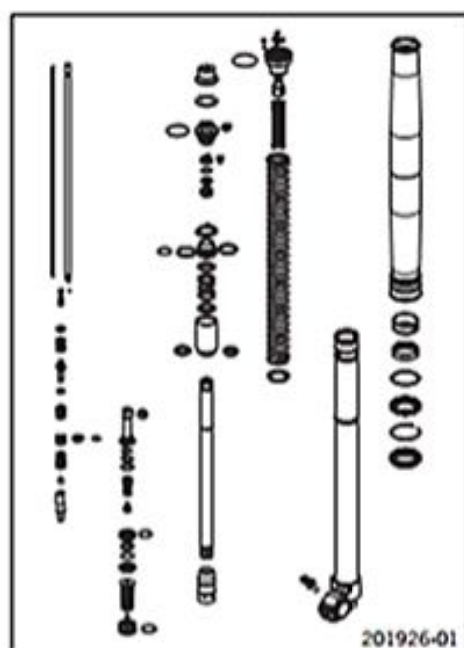
- Position the fork protection on the left fork leg. Mount and tighten screws **1**.
Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------

- Position the brake line and clamp. Mount and tighten screws **2**.
- Position the fork protector on the right fork leg. Mount and tighten screws **3**.
Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------

6.3.9 Performing a fork service



Condition

The fork legs have been removed.

- Disassemble the fork legs. (p. 62)
- Remove the spring. (p. 64)
- Disassemble the cartridge. (p. 65)
- Disassemble the piston rod. (p. 66)
- Disassemble the hydrostop unit. (p. 67)
- Disassemble the seal ring retainer. (p. 68)
- Check the fork legs. (p. 68)
- Assemble the seal ring retainer. (p. 69)
- Assemble the hydrostop unit. (p. 69)
- Assemble the piston rod. (p. 70)
- Assemble the cartridge. (p. 71)
- Assemble the fork legs. (p. 73)

6.3.10 Disassembling the fork legs

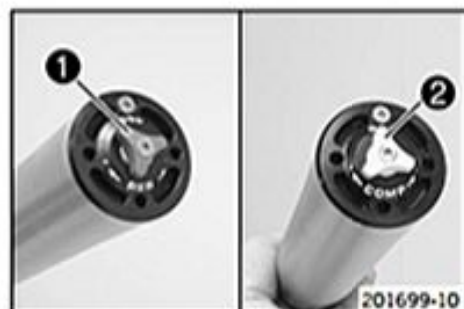


Info

The steps are identical for both fork legs.

Condition

The fork legs are disassembled.



- Note down the current state of rebound damping **1** **REB** (red adjuster of right fork leg).
- Note down the current state of compression damping **2** **COMP** (white adjuster of left fork leg).
- Fully open the adjusters of the rebound and compression damping.



- Clamp the fork leg in the area of the lower triple clamp.

Clamping stand (T1403S) (☛ p. 306)

- Remove the screw. Remove adjuster (3).



- Release screw cap (4).

Special socket (T14047) (☛ p. 306)

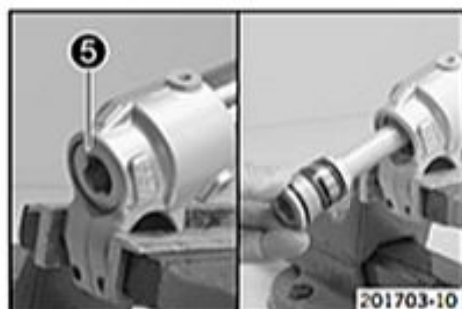


Info

The cartridge cannot be taken off yet.



- Unclamp the fork leg.
- Push the outer tube down. Drain the fork oil.

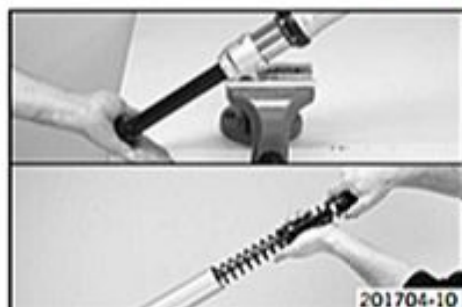


- Clamp the fork leg with the axle clamp.
- Release hydrostop unit (5) and remove it.



Info

Do not use an impact wrench.
Place a pan underneath since oil will run out.



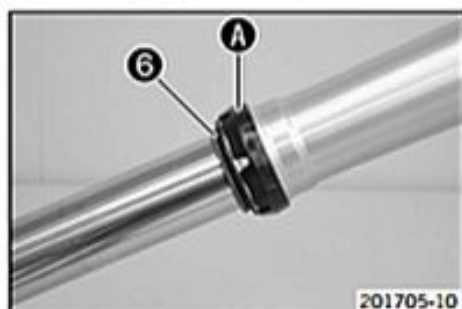
- Remove the cartridge from the fork leg.

Press-out tool (T14051) (☛ p. 307)



Info

Removing the O-ring seat from the cartridge usually requires the application of force.

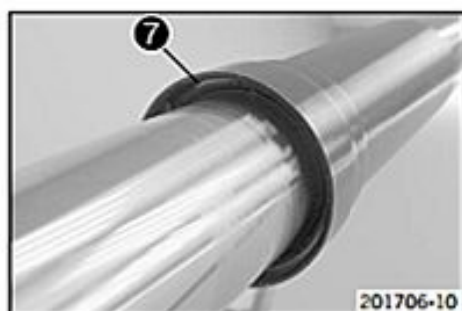


- Remove dust boot (6).
- Remove fork protection ring (A).



Info

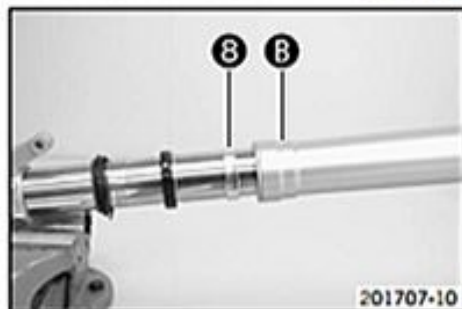
The fork protection ring does not necessarily need to be removed for repair work.



- Remove lock ring **7**.


Info

The lock ring has a ground end against which a screwdriver can be positioned.



- Warm the outer tube in area **8** of the lower sliding bushing.

Guideline

50 °C (122 °F)

- Pull the outer tube forcefully off of the inner tube.


Info

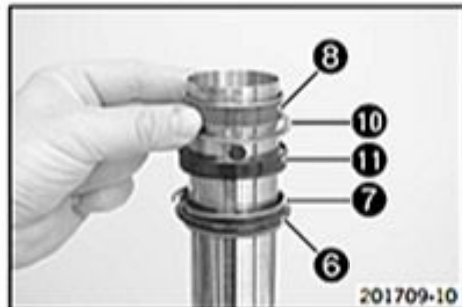
The lower sliding bushing **8** must be pulled out of its bearing seat.



- Remove the upper sliding bushing **9**.


Info

Do not use a tool; pull the ends apart slightly by hand.



- Take off the lower sliding bushing **8**.
- Take off support ring **10**.
- Take off seal ring **11**.
- Take off lock ring **7**.
- Take off dust boot **6**.
- Unclamp the fork leg.

6.3.11 Removing the spring


Info

The steps are identical for both fork legs.

Preparatory work

- Disassemble the fork legs. (☛ p. 62)

Main work

- Pull the spring down. Mount the open end wrench on the hexagonal part.





- Clamp the open end wrench in the vise. Release screw cap **1** but do not remove it yet.

Special socket (T14047) (☞ p. 306)



- Pull the spring down. Remove the open end wrench.
- Remove the screw cap.
- Remove the spring with the preload spacer(s).

6.3.12 Disassembling the cartridge



Info

The steps are identical for both fork legs.

Preparatory work

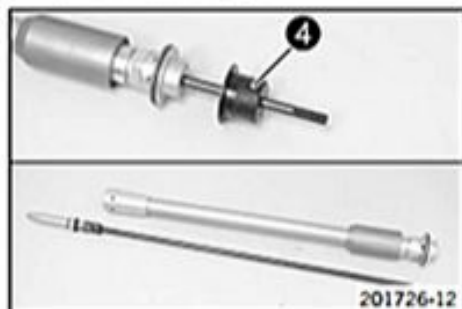
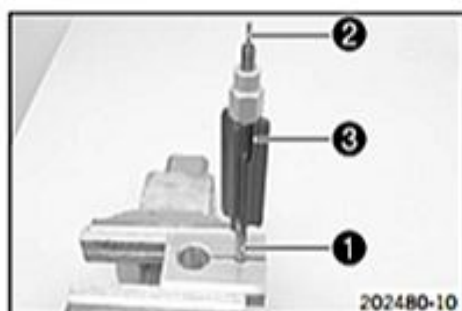
- Disassemble the fork legs. (☞ p. 62)
- Remove the spring. (☞ p. 64)

Main work

- Degrease piston rod **1** and clamp it in the vise.

Clamping stand (T14049S) (☞ p. 306)

- Remove adjusting tube **2**. Unscrew spring guide **3**.



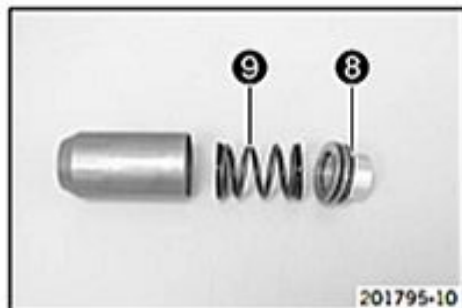
- Remove spring seat **4**.
- Pull the piston rod out of the cartridge.



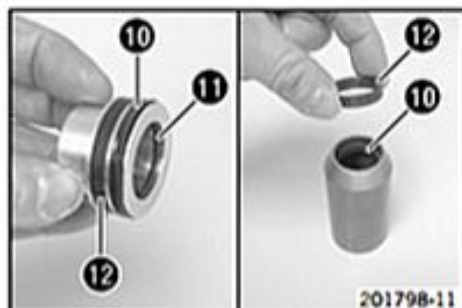
- Clamp the tube of the cartridge into a vise.
- Clamping stand (T14049S) (☞ p. 306)
- Release seal ring retainer **5** and remove with the washer.



- Remove lock ring **6**.
- Pull reservoir **7** off of the tube.



- Pull sleeve **8** out of the reservoir.
- Remove spring **9**.



- Remove seal rings **10** and O-ring **11**.
- Remove pilot bushings **12**.

6.3.13 Disassembling the piston rod



Info

The steps are identical for both fork legs, except for the hydrostop needle and valve.

Preparatory work

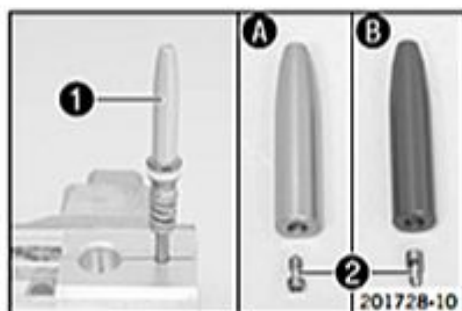
- Disassemble the fork legs. (☛ p. 62)
- Remove the spring. (☛ p. 64)
- Disassemble the cartridge. (☛ p. 65)

Main work

- Degrease the piston rod.
- Clamp the piston rod with the special tool as far up as possible.

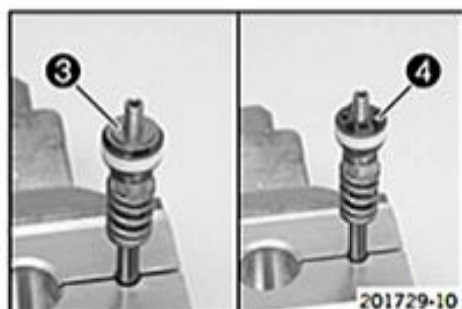
Clamping stand (T14049S) (☛ p. 306)

- Release hydrostop needle **1** and remove it from the piston rod.
- ✓ The valve **2** usually remains in the hydrostop needle.

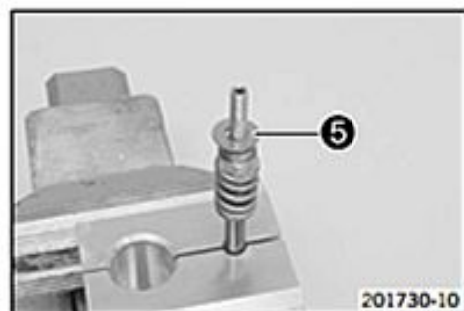


Info

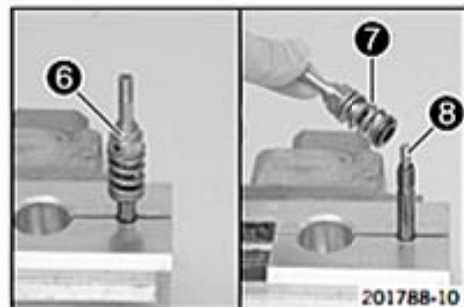
- A** - silver hydrostop needle on compression damping side.
- B** - red hydrostop needle on rebound damping side.



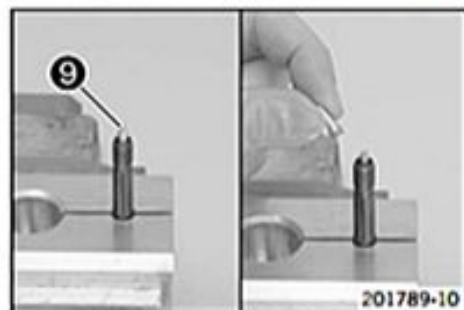
- Remove the rebound shim stack **3**.
- Remove piston **4**.



- Remove the compression shim stack (5).
- Remove spring.



- Remove adapter (6) with spring (7) and washer.
- Remove spring (8).



- Remove valve needle (9) from the piston rod.

**Info**

The adjusting tube can be used for this.

6.3.14 Disassembling the hydrostop unit

**Info**

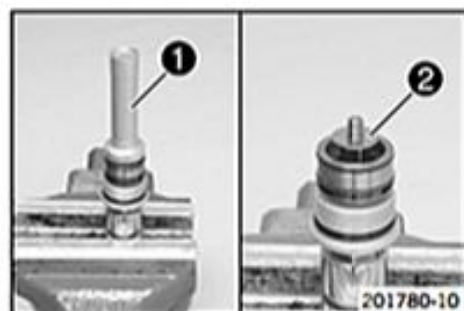
The steps are identical for both fork legs.

Preparatory work

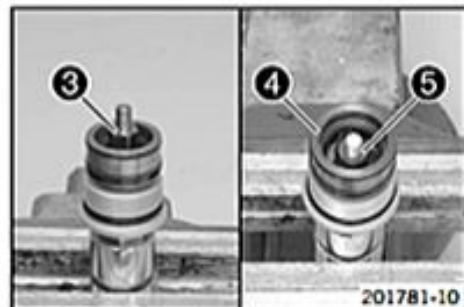
- Disassemble the fork legs. (☛ p. 62)

Main work

- Mount the hydrostop unit on a fitting hexagon socket and clamp into a vice.



- Remove sleeve (1).
- Remove shim stack (2).

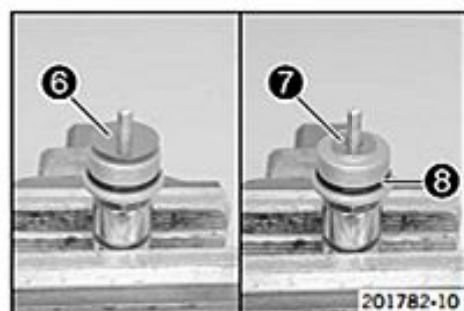


- Remove adapter (3).
- Remove hub (4) with washers (5).

**Info**

It is possible that only one washer or no washer is present.

- Remove the O-ring from the hub.



- Remove shim stack ⑥.
- Remove washer ⑦.
- Remove O-ring ⑧.

6.3.15 Disassembling the seal ring retainer



Info

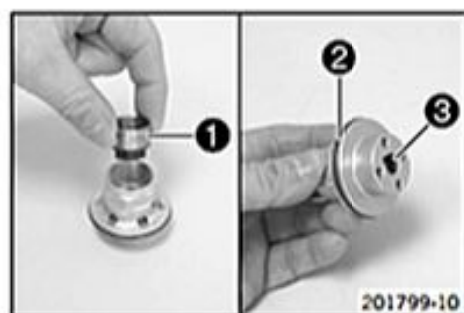
The steps are identical for both fork legs.

Preparatory work

- Disassemble the fork legs. (☛ p. 62)
- Remove the spring. (☛ p. 64)
- Disassemble the cartridge. (☛ p. 65)

Main work

- Remove pilot bushing support ①.
- Remove O-ring ② and seal ring ③.

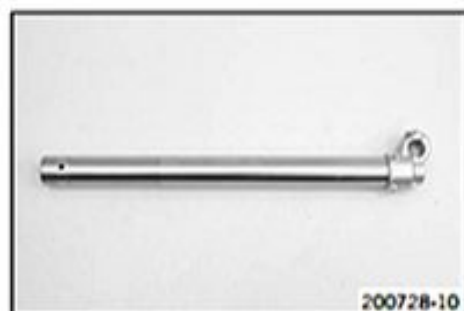


6.3.16 Checking the fork legs

Condition

The fork legs have been disassembled.

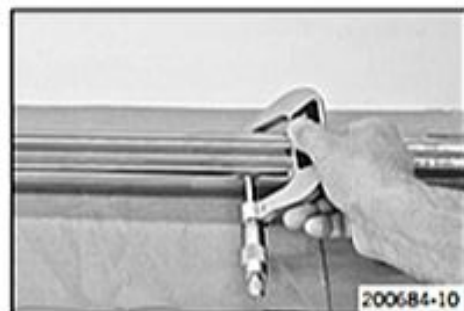
- Check the inner tube and axle clamp for damage.
 - If there is damage:
 - Change the inner tube.

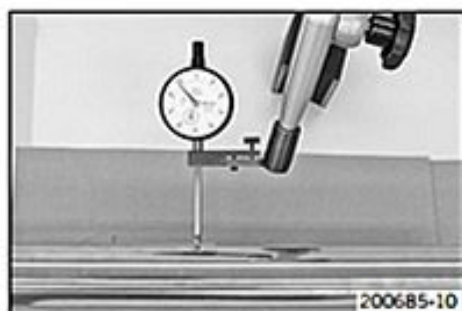


- Measure the outside diameter at multiple locations of the inner tube.

Outside diameter of inner tube	47.975... 48.005 mm (1.88878... 1.88996 in)
--------------------------------	---

- If the measured value is smaller than the specified value:
 - Change the inner tube.

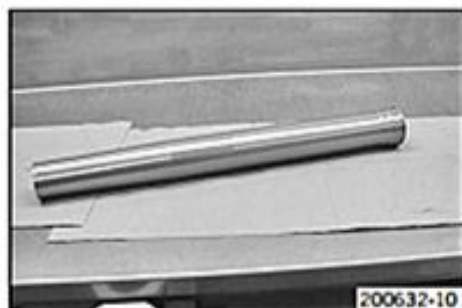




- Measure the run-out of the inner tube.

Inner tube run-out	$\leq 0.20 \text{ mm } (\leq 0.0079 \text{ in})$
--------------------	--

- If the measured value is larger than the specified value:
 - Change the inner tube.



- Measure the inside diameter at multiple locations of the outer tube.

Inside diameter of outer tube	$\leq 49.20 \text{ mm } (\leq 1.937 \text{ in})$
-------------------------------	--

- If the measured value is larger than the specified value:
 - Change the outer tube.

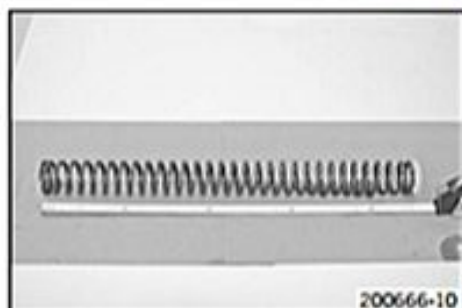
- Check the outer tube for damage.

- If there is damage:
 - Change the outer tube.



- Check the surface of the sliding bushings.

- If the bronze-colored layer **A** under sliding layer **B** is visible or the surface is rough:
 - Change the sliding bushings.



- Check the spring length.

Guideline

Spring length with preload spacer(s)	477 mm (18.78 in)
--------------------------------------	-------------------

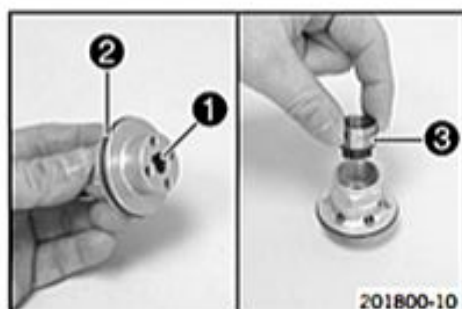
- If the measured value is larger than the specified value:
 - Reduce the thickness of the preload spacers.
- If the measured value is smaller than the specified value:
 - Increase the thickness of the preload spacers.

6.3.17 Assembling the seal ring retainer



Info

The steps are identical for both fork legs.



- Mount and grease seal ring **1**.

Lubricant (T158) (☞ p. 292)

- Mount and grease O-ring **2**.

Lubricant (T158) (☞ p. 292)

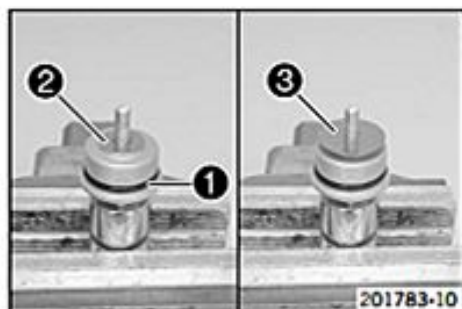
- Position pilot bushing support **3**.

6.3.18 Assembling the hydrostop unit



Info

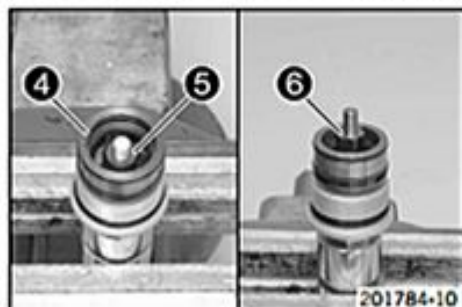
The steps are identical for both fork legs.



- Mount and grease O-ring ①.

Lubricant (T158) (☞ p. 292)

- Mount washer ②.
- Mount shim stack ③ with the smaller washers facing downward.



- Mount the new O-ring on hub ④.
- Mount the hub with washers ⑤.



Info

It is possible that only one or no washer is present.

- Mount and tighten adapter ⑥.

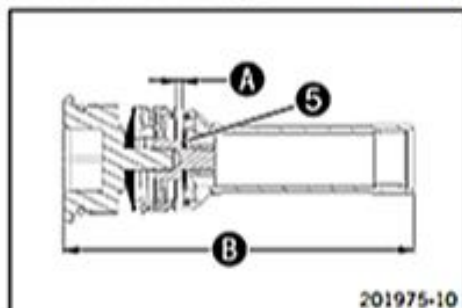
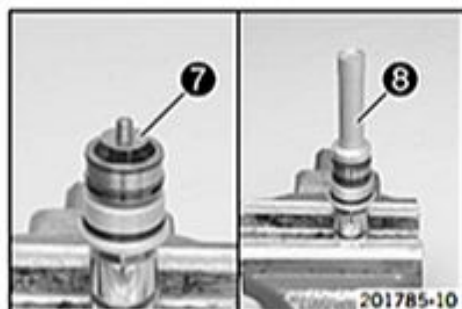
Guideline

Hydrostop unit adapter	M6x0.5	7 Nm (5.2 lbf ft)
------------------------	--------	-------------------

- Mount shim stack ⑦ with the smaller washers facing downward.
- Mount and tighten sleeve ⑧.

Guideline

Hydrostop unit sleeve	M6x0.5	7 Nm (5.2 lbf ft)
-----------------------	--------	-------------------



- Check distance A and total length B of the hydrostop.

Guideline

Hydrostop distance	$\geq 1.5 \text{ mm } (\geq 0.059 \text{ in})$
Hydrostop length	108.5... 109.5 mm (4.272... 4.311 in)

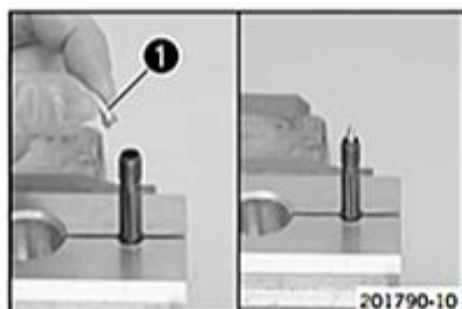
- If the dimensions are out of tolerance:
 - Add or remove washers ⑤.

6.3.19 Assembling the piston rod



Info

The steps are identical for both fork legs, except for the hydrostop needle and valve.

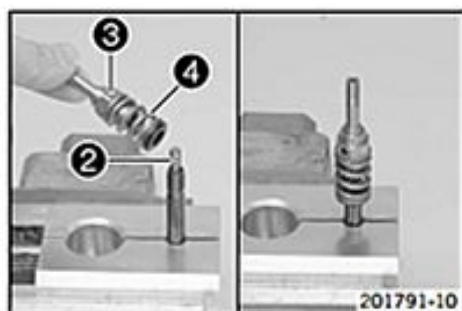


- Degrease the piston rod.
- Clamp the piston rod with the special tool.

Clamping stand (T14049S) (☞ p. 306)

- Lubricate the O-ring. Mount valve needle ① in the piston rod.

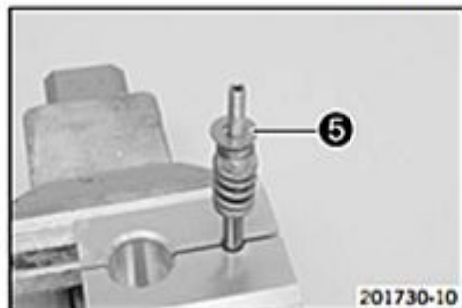
Lubricant (T158) (☞ p. 292)



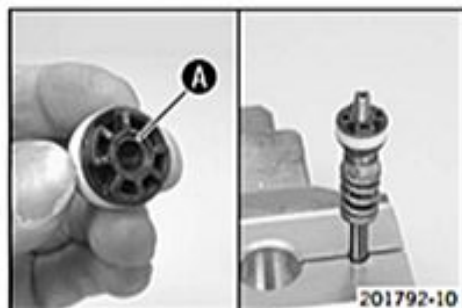
- Mount spring ②.
- Mount and tighten adapter ③ with spring ④ and washer.

Guideline

Adapter of piston rod	M6x0.5	12 Nm (8.9 lbf ft)
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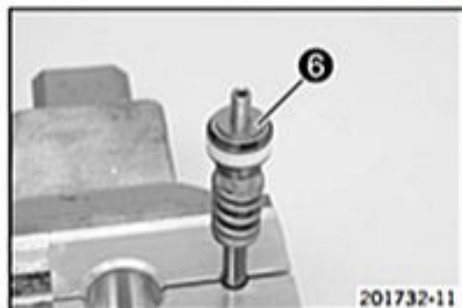
- Position the spring.
- Mount the compression shim stack ⑤ with the smaller washers facing downward.



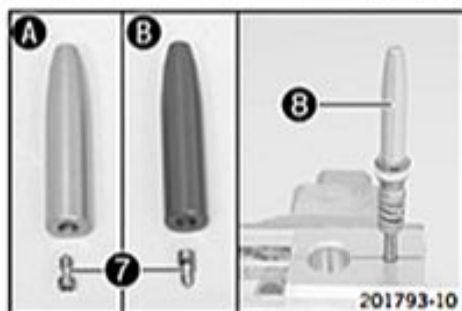
- Grind the piston on both sides on a surfacing plate using 1200 grit sandpaper.
- Clean the piston.
- Lubricate the piston ring.

Fork oil (SAE 4) (48601166S1) (☞ p. 290)

- Mount the piston with chamfer A facing down.



- Mount the rebound shim stack ⑥ with the smaller washers facing upward.



- Press the piston downward against the spring.
✓ The piston should not squeeze the shims.
- Position valve ⑦ in the hydrostop needle ⑧. Mount and tighten the hydrostop needle.

Guideline

Hydrostop needle on piston rod	M6x0.5	7 Nm (5.2 lbf ft)
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Info

- A - silver hydrostop needle on compression damping side.
- B - red hydrostop needle on rebound damping side.

- Unclamp the piston rod.

6.3.20 Assembling the cartridge

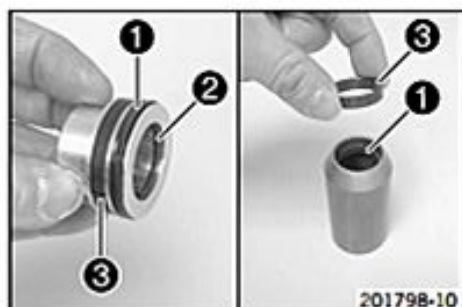


Info

The steps are identical for both fork legs.

Preparatory work

- Assemble the seal ring retainer. (☞ p. 69)
- Assemble the piston rod. (☞ p. 70)



Main work

- Mount and grease seal rings 1 and O-ring 2.

Lubricant (T158) (☞ p. 292)

- Mount and lubricate pilot bushings 3.

Fork oil (SAE 4) (48601166S1) (☞ p. 290)



- Check the length of the reservoir spring.

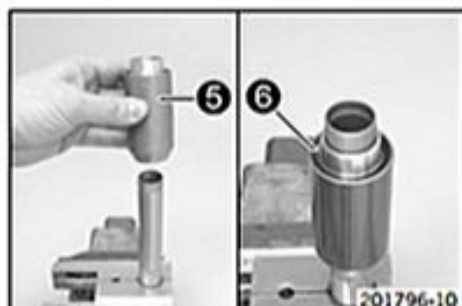
Guideline

Reservoir spring length with preload spacer	46 mm (1.81 in)
---	-----------------

- If the length is out of tolerance:

- Correct the preload spacers.

- Position the spring with the preload spacers in the reservoir.
- Position sleeve 4 in the reservoir.



- Clamp the tube of the cartridge into a vise.

Clamping stand (T14049S) (☞ p. 306)

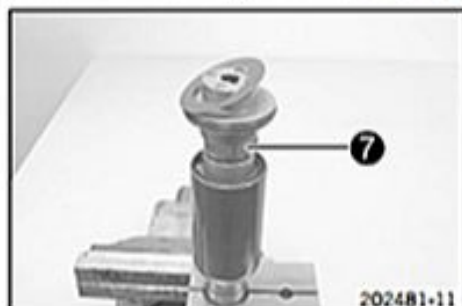
- Slide reservoir 5 onto the tube.



Info

Hold the sleeve in the reservoir to prevent it from sliding out.

- Mount lock ring 6.



- Mount seal ring retainer 7 with the washer and tighten.

Guideline

Seal ring retainer	M23.5x0.75	46 Nm (33.9 lbf ft)	Loctite® 2701™
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- Unclamp the cartridge.



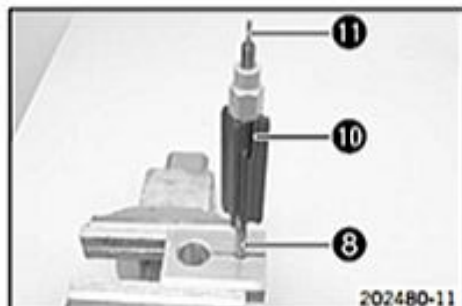
- Slide piston rod 8 into the cartridge.



Info

Ensure that the piston ring is seated correctly.

- Mount spring seat 9.



- Degrease piston rod 8 and clamp in the vise.

Clamping stand (T14049S) (☞ p. 306)

- Screw spring guide 10 all the way on.



Info

The nut must be firmly tightened against the stop by hand. Do not use a tool.

- Mount adjusting tube 11.
- Unclamp the piston rod. Mount the preload spacer(s).

6.3.21 Assembling the fork legs

- i Info**
When assembling, ensure that the right cartridge is mounted in the corresponding inner tube and the right adjuster is mounted on the corresponding screw cap.
Compression damping side – screw cap with mark **COMP**, brake caliper holder, white adjuster.
Rebound damping side – screw cap with mark **REB**, no brake caliper holder, red adjuster.

**Preparatory work**

- Assemble the hydrostop unit. (☛ p. 69)

Main work

- Clamp the inner tube with the axle clamp.

Guideline

Use soft jaws.

- Mount special tool.

Protecting sleeve (T1401) (☛ p. 305)

- Lubricate and mount dust boot ①.

Lubricant (T511) (☛ p. 292)

i Info

Always change the dust boot, seal ring, lock ring and support ring.
Mount the sealing lip with the spring expander facing downward.

- Slide on lock ring ②.
- Lubricate and slide on seal ring ③.

Lubricant (T511) (☛ p. 292)

i Info

Mount with the sealing lip facing down and the open side facing up.

- Slide on support ring ④.
- Remove the special tool.
- Grind the edges of the sliding bushings with sandpaper grit 600, clean the bushings and lubricate them.

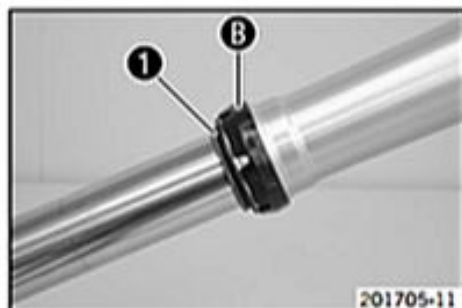
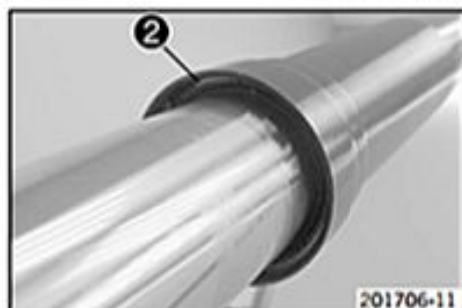
Fork oil (SAE 4) (48601166S1) (☛ p. 290)



- Slide on the lower sliding bushing ⑤.
- Mount the upper sliding bushing ⑥.

i Info

Do not use a tool; pull the ends apart slightly by hand.



- Warm the outer tube in area **A** of the lower sliding bushing.

Guideline

50 °C (122 °F)

- Slide the outer tube onto the inner tube.
- Hold the lower sliding bushing with the longer section of the special tool.

Mounting tool (T14040S) (☞ p. 306)

- Push the sliding bushing all the way into the outer tube.

- Position the support ring.
- Hold the seal ring with the shorter section of the special tool.

Mounting tool (T14040S) (☞ p. 306)

- Push the seal ring and support ring all the way into the outer tube.

- Mount lock ring **2**.



Info

The lock ring must engage audibly.

- Mount dust boot **1**.
- Mount fork protection ring **B**.

- Lubricate the O-ring. Slide the cartridge all the way into the fork leg.

Fork oil (SAE 4) (48601166S1) (☞ p. 290)

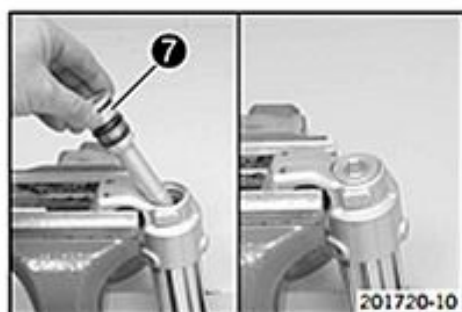
- Turn the fork. Have the entire filling quantity of fork oil available.

Oil capacity per fork leg	670 ml (22.65 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☞ p. 290)
---------------------------	------------------------	--

- Add some of the fork oil while pulling out and pushing in the piston rod numerous times.

Guideline

Fork oil quantity 510 ml (17.24 fl. oz.)



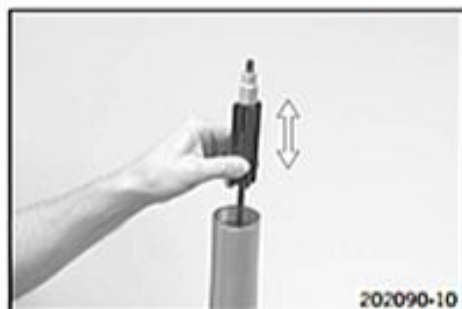
- Mount and tighten hydrostop unit **7**.

Guideline

Hydrostop unit	M30x1	40 Nm (29.5 lbf ft)
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- Clamp the fork vertically.
- Add the remaining quantity of fork oil.

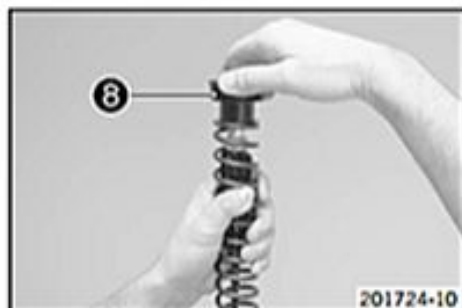


- Pull out the piston rod and push it back in numerous times while pressing it to one side slightly.
 - ✓ Air bubbles emerge and the cartridge is bled.
- Keep bleeding until no more air bubbles emerge.
 - ✓ The piston rod moves out automatically to the middle of the total stroke distance.



Info

When fully bled, the correct air chamber length is achieved automatically.



- Position spring.
- Pull the spring down. Mount screw cap **8**.



Info

When assembling, ensure that the screw caps are correctly mounted according to the hydrostop needles.
Rebound damping side – red hydrostop needle, screw cap with mark **REB**.
Compression damping side – silver hydrostop needle, screw cap with mark **COMP**.



- Pull the spring down. Mount the open end wrench on the hexagonal part.
- Hold the open end wrench. Tighten screw cap **8**.

Guideline

Screw cap on piston rod	M8x0.75	18 Nm (13.3 lbf ft)
-------------------------	---------	------------------------

Special socket (T14047) (☛ p. 306)



- Push the outer tube up.
- Clamp the outer tube in the area of the lower triple clamp.

Clamping stand (T1403S) (☛ p. 306)

- Tighten screw cap **8**.

Guideline

Cartridge on outer tube	M51x1.5	40 Nm (29.5 lbf ft)
-------------------------	---------	------------------------

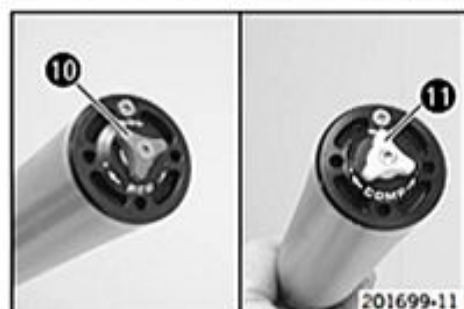
Special socket (T14047) (☛ p. 306)



- Mount the adjuster. Mount and tighten screw **9**.

Guideline

Screw, adjuster	M4x0.5	2.5 Nm (1.84 lbf ft)
-----------------	--------	-------------------------



Alternative 1

- Turn the adjuster of compression damping **10** (mark **COMP**) and the adjuster of rebound damping **11** (mark **REB**) all the way clockwise.

Guideline

Rebound damping	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Compression damping	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks

- Turn counterclockwise by the number of clicks corresponding to the fork type.

Alternative 2



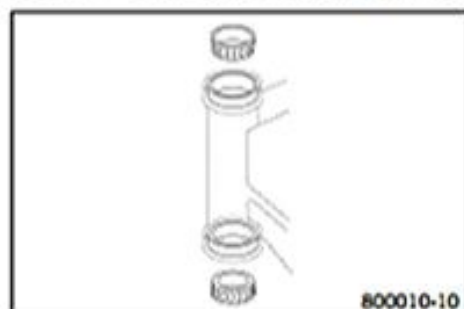
Warning

Danger of accident Modifications to the suspension setting may seriously alter the handling characteristic.

Extreme modifications to the suspension setting may cause a serious deterioration in the handling characteristic and overload components.

- Only make adjustments within the recommended range.
 - Ride slowly to start with after making adjustments to get the feel of the new handling characteristic.
-
- Set the adjusters to the positions determined upon removal.

6.3.22 Greasing the steering head bearing



- Remove the lower triple clamp. (☛ p. 76)
- Install the lower triple clamp. (☛ p. 77)

6.3.23 Removing the lower triple clamp

Preparatory work

- Raise the motorcycle with a lift stand. (☛ p. 10)
- Remove the front wheel. (☛ p. 139)
- Remove the fork legs. (☛ p. 60)
- Remove the start number plate. (☛ p. 135)
- Remove the front fender. (☛ p. 135)
- Remove the handlebar cushion.

**Main work**

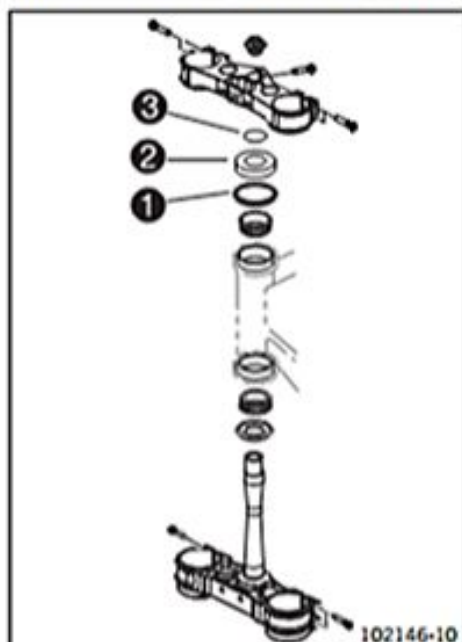
- Remove the holder with FI warning lamp.
- Remove screw ①.
- Remove screw ②.
- Take off the top triple clamp with the handlebar and set it aside.

**Info**

Cover the components to protect them against damage.
Do not bend the cables and lines.



- Remove O-ring ③. Remove protective ring ④.
- Take out the lower triple clamp with the steering stem.
- Take out the upper steering head bearing.

6.3.24 Installing the lower triple clamp**Main work**

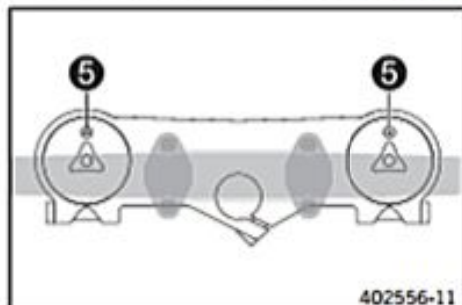
- Clean the bearing and sealing elements, check for damage, and grease.

High viscosity grease (☛ p. 292)

- Insert the lower triple clamp with the steering stem. Mount the upper steering head bearing.
- Check whether the upper steering head seal ① is correctly positioned.
- Slide on protective ring ② and O-ring ③.



- Position the upper triple clamp with the handlebar.
- Mount screw ④ but do not tighten yet.

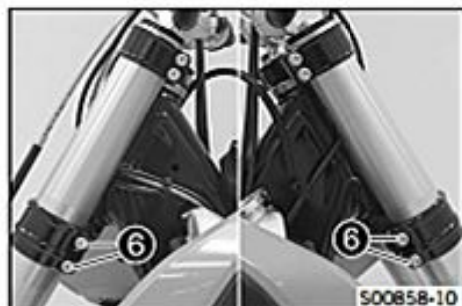


- Position the fork legs.
- ✓ Bleeder screws ⑤ are positioned toward the front.

**Info**

The rebound damping is located in the right fork leg (red adjusting screw).
The compression damping is located in the left fork leg (white adjusting screw).

Grooves are milled into the side of the upper end of the fork legs. The second milled groove (from the top) must be flush with the top edge of the upper triple clamp.



- Tighten screws 6.

Guideline

Screw, bottom triple clamp	M8	12 Nm (8.9 lbf ft)
----------------------------	----	--------------------



- Tighten screw 4.

Guideline

Screw, top steering head	M20x1.5	12 Nm (8.9 lbf ft)
--------------------------	---------	--------------------



- Mount and tighten screw 7.

Guideline

Screw, top steering stem	M8	20 Nm (14.8 lbf ft)	Loctite® 243™
--------------------------	----	---------------------	---------------



- Using a plastic hammer, tap lightly on the upper triple clamp to avoid strains.

- Tighten screws 8.

Guideline

Screw, top triple clamp	M8	17 Nm (12.5 lbf ft)
-------------------------	----	---------------------

- Mount the holder with FI warning lamp.

Guideline

Remaining nuts, chassis	M6	10 Nm (7.4 lbf ft)
-------------------------	----	--------------------



- Position the brake caliper. Mount and tighten screws 9.

Guideline

Screw, front brake caliper	M8	25 Nm (18.4 lbf ft)	Loctite® 243™
----------------------------	----	---------------------	---------------

- Position the brake line and clamp. Mount and tighten screws 10.

Finishing work

- Install the front fender. (☞ p. 135)
- Mount the handlebar cushion.
- Install the start number plate. (☞ p. 136)
- Install the front wheel. (☞ p. 140)
- Check that the wiring harness, throttle cables, and brake and clutch lines can move freely and are routed correctly.
- Check the steering head bearing play. (☞ p. 79)
- Remove the motorcycle from the lift stand. (☞ p. 10)

6.3.25 Checking the steering head bearing play

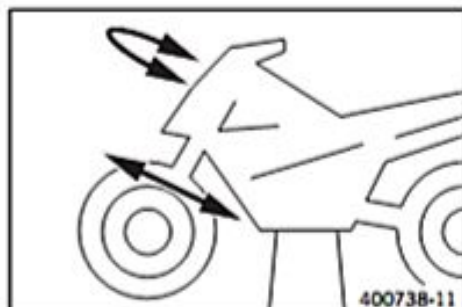
**Warning**

Danger of accidents Unstable vehicle handling from incorrect steering head bearing play.

- Adjust the steering head bearing play without delay.

**Info**

If the bike is ridden with play in the steering head bearing, the bearing and the bearing seats in the frame can become damaged over time.

**Preparatory work**

- Raise the motorcycle with a lift stand. (☞ p. 10)

Main work

- Move the handlebar to the straight-ahead position. Move the fork legs to and fro in the direction of travel.

No play should be noticeable in the steering head bearing.

- If there is noticeable play present:
 - Adjust the steering head bearing play. (☞ p. 79)
- Move the handlebar to and fro over the entire steering range.

The handlebar must be able to move easily over the entire steering range. No resting locations should be noticeable.

- If click positions are noticeable:
 - Adjust the steering head bearing play. (☞ p. 79)
 - Check the steering head bearing and change if necessary.

Finishing work

- Remove the motorcycle from the lift stand. (☞ p. 10)

6.3.26 Adjusting the steering head bearing play

**Preparatory work**

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the handlebar cushion.

Main work

- Loosen screws ①. Remove screw ②.
- Loosen and retighten screw ③.

Guideline

Screw, top steering head	M20x1.5	12 Nm (8.9 lbf ft)
--------------------------	---------	--------------------

- Using a plastic hammer, tap lightly on the upper triple clamp to avoid strains.
- Mount and tighten screw ②.

Guideline

Screw, top steering stem	M8	20 Nm (14.8 lbf ft)	Loctite® 243™
--------------------------	----	---------------------	---------------

- Tighten screws ①.

Guideline

Screw, top triple clamp	M8	17 Nm (12.5 lbf ft)
-------------------------	----	---------------------

- Check the steering head bearing play. (☞ p. 79)

Finishing work

- Mount the handlebar cushion.
- Remove the motorcycle from the lift stand. (☞ p. 10)

6.3.27 Changing the steering head bearing

Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the front wheel. (☞ p. 139)
- Remove the fork legs. (☞ p. 60)

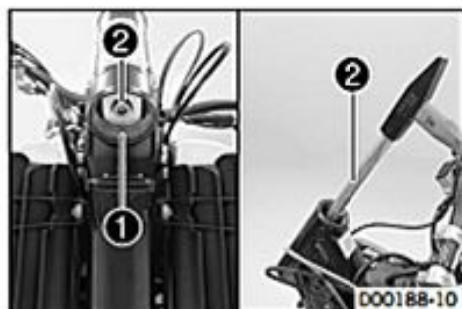
- Remove the start number plate. (☛ p. 135)
- Remove the front fender. (☛ p. 135)
- Remove the handlebar cushion.
- Remove the lower triple clamp. (☛ p. 76)

Main work

- Remove lower bearing ring ① with special tool ②.

Tool bracket (58429089000) (☛ p. 296)

Press-out tool (58429092000) (☛ p. 296)



D00188-10

- Press the new bearing ring up to the stop with special tool ③.

Tool bracket (58429089000) (☛ p. 296)

Press-in tool (58429091000) (☛ p. 296)
--

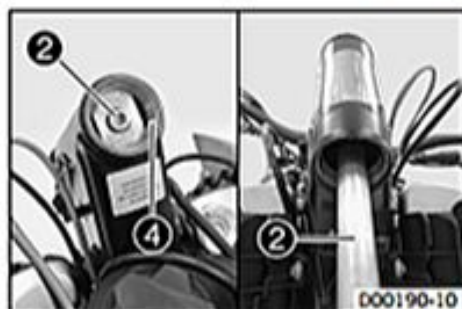


D00189-10

- Remove upper bearing ring ④ with special tool ②.

Tool bracket (58429089000) (☛ p. 296)

Press-out tool (58429092000) (☛ p. 296)



D00190-10

- Remove the seal ring.

- Press the new bearing ring up to the stop with special tool ③.

Tool bracket (58429089000) (☛ p. 296)

Press-in tool (58429091000) (☛ p. 296)
--



D00191-10

- Grease and mount the new seal ring.

- Remove lower steering head bearing ⑤.
- Remove the seal ring retainer.
- Remove the O-ring.
- Grease the new O-ring and mount with the seal ring retainer.
- Press on the new bearing with a suitable tube as far as it will go.

**Info**

Only press the bearing in via the inner ring.



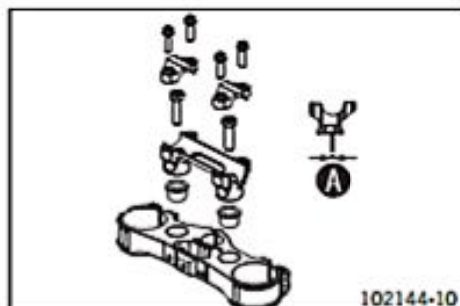
D00075-10

Finishing work

- Install the lower triple clamp. (☛ p. 77)
- Install the front fender. (☛ p. 135)
- Mount the handlebar cushion.
- Install the start number plate. (☛ p. 136)
- Install the front wheel. (☛ p. 140)

- Check that the wiring harness, throttle cables, and brake and clutch lines can move freely and are routed correctly.
- Check the steering head bearing play. (☛ p. 79)
- Remove the motorcycle from the lift stand. (☛ p. 10)

7.1 Handlebar position

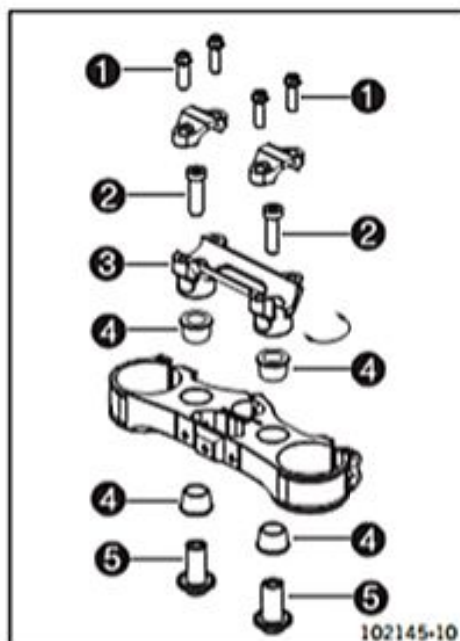


The holes on the handlebar support are placed at a distance of **A** from the center.

Hole distance A	3.5 mm (0.138 in)
-----------------	-------------------

The handlebar can be mounted in two different positions. In this way, the handlebar can be mounted in the position that is most comfortable for the rider.

7.2 Adjusting the handlebar position



Preparatory work

- Remove the handlebar cushion.

Main work

- Remove screws **1**. Take off the handlebar clamps. Remove the handlebar and lay it to one side.



Info

Cover the components to protect them against damage.
Do not kink the cables and lines.

- Remove screws **2**. Remove handlebar support **3**.
- Position rubber bushings **4** and push through nuts **5** from below.
- Place the handlebar support in the required position. Mount and tighten screws **2**.

Guideline

Screw, handlebar support	M10	40 Nm (29.5 lbf ft)	Loctite® 243™
--------------------------	-----	------------------------	---------------

- Position the handlebar.



Info

Make sure the cables and wiring are positioned correctly.

- Position the handlebar clamps. Mount screws **1**. Screw the handlebar clamps so that both parts touch at the front and tighten all of the screws.

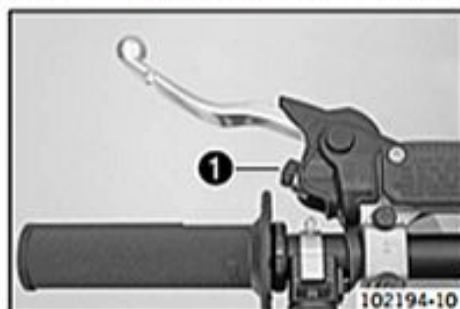
Guideline

Screw, handlebar clamp	M8	20 Nm (14.8 lbf ft)
------------------------	----	------------------------

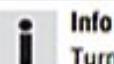
Finishing work

- Mount the handlebar cushion.

7.3 Adjusting the basic position of the clutch lever



- Adjust the basic setting of the clutch lever to your hand size by turning adjusting screw **1**.



Info

Turn the adjusting screw counterclockwise to decrease the distance between the clutch lever and the handlebar.

Turn the adjusting screw clockwise to increase the distance between the clutch lever and the handlebar.

The range of adjustment is limited.

Turn the adjusting screw by hand only, and do not apply any force.

Do not make any adjustments while riding!

7.4 Checking the throttle cable routing



Preparatory work

- Remove the seat. (☛ p. 126)
- Remove the fuel tank. (☛ p. 126)

Main work

- Check the throttle cable routing.

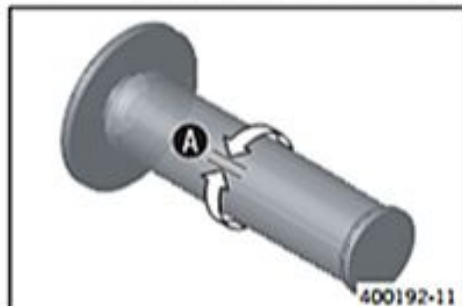
Both throttle cables must be routed to the throttle valve body side by side behind the handlebars and above the fuel tank bracket.

- If the throttle cable is not routed as specified:
 - Correct the throttle cable routing.

Finishing work

- Install the fuel tank. (☛ p. 127)
- Mount the seat. (☛ p. 126)

7.5 Checking the play in the throttle cable



- Check the throttle grip for smooth operation.
- Move the handlebar to the straight-ahead position. Turn the throttle grip back and forth slightly and determine the play in throttle cable **A**.

Play in throttle cable	3... 5 mm (0.12... 0.2 in)
------------------------	----------------------------

- If the throttle cable play does not meet specifications:
 - Adjust the play in the throttle cable. (☛ p. 84)



Danger

Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.

- When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.

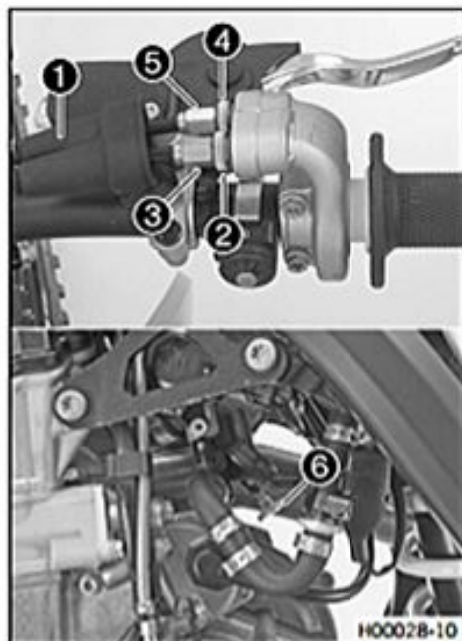
- Start the engine and let it run idle. Move the handlebar to and fro over the entire steering range.

The idle speed must not change.

- If the idle speed changes:
 - Adjust the play in the throttle cable. (☛ p. 84)

7.6 Adjusting the play in the throttle cable

i Info
If the correct routing of the throttle cables has already been secured, the fuel tank does not need to be removed.

**Preparatory work**

- Remove the seat. (☛ p. 126)
- Remove the fuel tank. (☛ p. 126)
- Check the throttle cable routing. (☛ p. 83)

Main work

- Move the handlebar to the straight-ahead position.
- Push back sleeve ①.
- Loosen nut ②. Turn adjusting screw ③ in as far as possible.
- Loosen nut ④.
- Push cold start button ⑥ all the way to the stop.
- Turn adjusting screw ⑤ so that the cold start button moves to the basic position when the throttle grip is turned to the front.
- Tighten nut ④.
- Turn adjusting screw ③ so that there is play in the throttle cable at the throttle grip.

Guideline

Play in throttle cable	3... 5 mm (0.12... 0.2 in)
------------------------	----------------------------

- Tighten nut ②.
- Slide on sleeve ①. Check the throttle grip for smooth operation.

Finishing work

- Check the play in the throttle cable. (☛ p. 83)

8.1 Changing the footrests



Info

The procedures are the same on both footrests.

Condition

The frame protector has been removed on the left and right.

- Remove split pin ① and take off the washer.

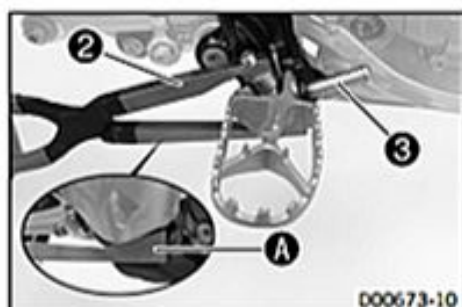


- Press the spring with special tool ②.

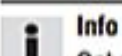
Pliers for footrest spring (79029083000) (☞ p. 301)

- ✓ The special tool is applied to area A on the footrest.

- Remove pin ③.



- Position the new footrest and pin.



Info

Only insert the pin to the extent that the spring can still be mounted.

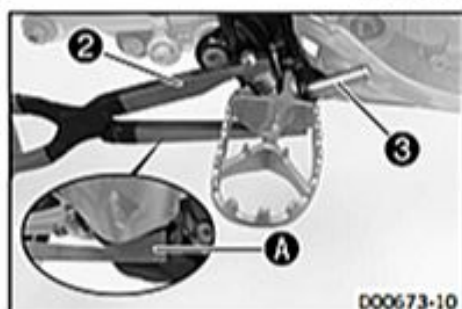


- Press the spring with special tool ②.

Pliers for footrest spring (79029083000) (☞ p. 301)

- ✓ The special tool is applied to area A on the footrest.

- Mount pin ③.



- Mount the washer and split pin ①.



9.1 Adjusting the high-speed compression damping of the shock absorber



Caution

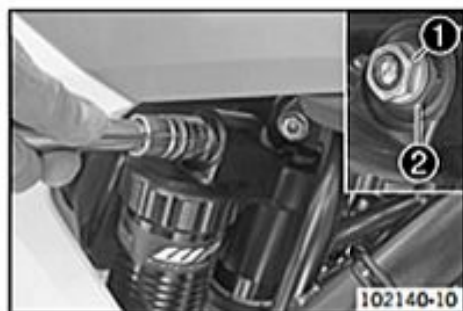
Danger of accidents Disassembly of pressurized parts can lead to injury.

- The shock absorber is filled with high density nitrogen. Adhere to the description provided.



Info

The high-speed setting can be seen during the fast compression of the shock absorber.



- Turn adjusting screw **1** all the way clockwise with a socket wrench.



Info

Do not loosen fitting **2**!

- Turn counterclockwise by the number of turns corresponding to the shock absorber type.

Guideline

Compression damping, high-speed (SX-F EU)	
Comfort	2.5 turns
Standard	2 turns
Sport	1.5 turns
Compression damping, high-speed (SX-F US)	
Comfort	2.5 turns
Standard	2 turns
Sport	1.5 turns
Compression damping, high-speed (XC-F US)	
Comfort	2.5 turns
Standard	2 turns
Sport	1.5 turns



Info

Turn clockwise to increase damping; turn counterclockwise to reduce damping.

9.2 Adjusting the low-speed compression damping of the shock absorber



Caution

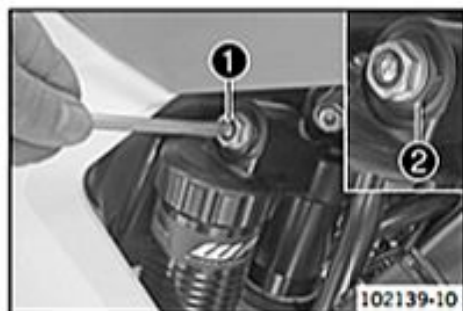
Danger of accidents Disassembly of pressurized parts can lead to injury.

- The shock absorber is filled with high density nitrogen. Adhere to the description provided.

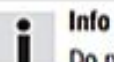


Info

The low-speed setting can be seen during the slow to normal compression of the shock absorber.



- Turn adjusting screw **1** clockwise with a screwdriver up to the last perceptible click.



Info

Do not loosen fitting **2**!

- Turn counterclockwise by the number of clicks corresponding to the shock absorber type.

Guideline

Compression damping, low-speed (SX-F EU)	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Compression damping, low-speed (SX-F US)	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Compression damping, low-speed (XC-F US)	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks



Info

Turn clockwise to increase damping; turn counterclockwise to reduce damping.

9.3 Adjusting the rebound damping of the shock absorber



Caution

Danger of accidents Disassembly of pressurized parts can lead to injury.

- The shock absorber is filled with high density nitrogen. Adhere to the description provided.



- Turn adjusting screw ① clockwise up to the last perceptible click.
- Turn counterclockwise by the number of clicks corresponding to the shock absorber type.

Guideline

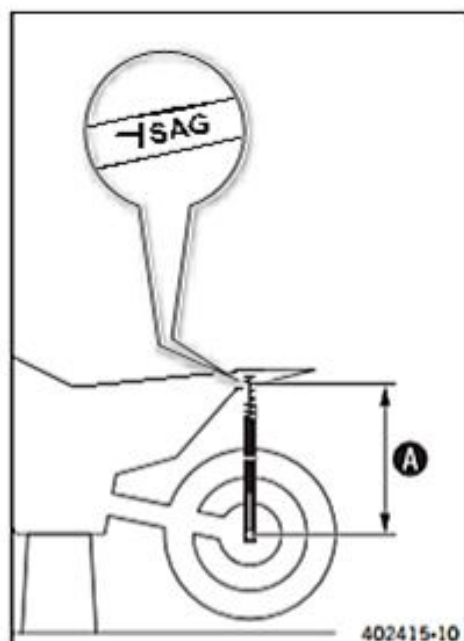
Rebound damping (SX-F EU)	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Rebound damping (SX-F US)	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Rebound damping (XC-F US)	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks



Info

Turn clockwise to increase damping; turn counterclockwise to reduce damping.

9.4 Measuring rear wheel sag unloaded



Preparatory work

- Raise the motorcycle with a lift stand. (☛ p. 10)

Main work

- Position the sag gauge in the rear axle and measure the distance to marking **SAG** on the rear fender.

Sag gauge (00029090000)

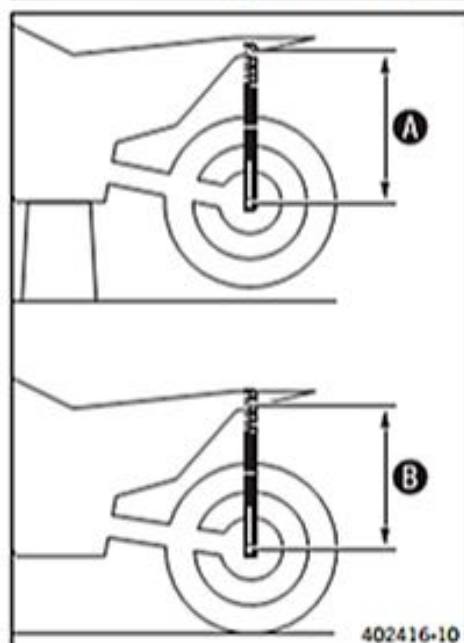
Pin for sag gauge (00029990010)

- Note down the value as dimension **A**.

Finishing work

- Remove the motorcycle from the lift stand. (☛ p. 10)

9.5 Checking the static sag of the shock absorber



- Measure distance **A** of rear wheel unloaded. (☛ p. 88)
- Hold the motorcycle upright with the aid of an assistant.
- Again measure the distance between the rear axle and marking **SAG** on the rear fender using the sag gauge.
- Note down the value as dimension **B**.



Info

The static sag is the difference between measurements **A** and **B**.

- Check the static sag.

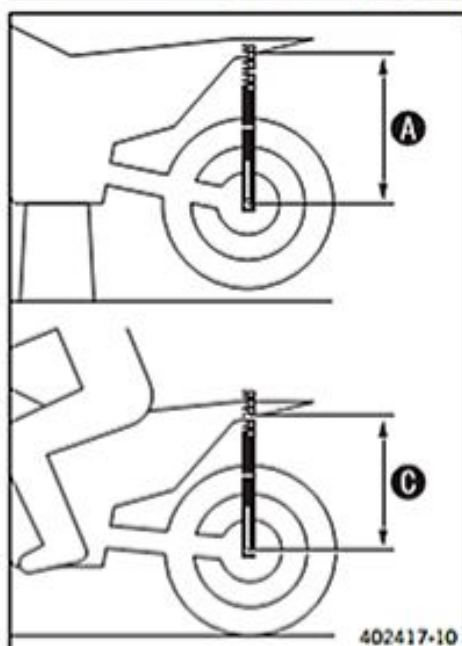
Static sag (SX-F EU)	38 mm (1.5 in)
----------------------	----------------

Static sag (SX-F US)	40 mm (1.57 in)
----------------------	-----------------

Static sag (XC-F US)	40 mm (1.57 in)
----------------------	-----------------

- If the static sag is less or more than the specified value:
 - Adjust the spring preload of the shock absorber. (☛ p. 89)

9.6 Checking the riding sag of the shock absorber



- Measure distance **A** of rear wheel unloaded. (☞ p. 88)
- With another person holding the motorcycle, the rider, wearing full protective clothing, sits on the seat in a normal sitting position (feet on footrests) and bounces up and down a few times.
 - ✓ The rear wheel suspension levels out.
- Another person again measures the distance between the rear axle and marking **SAG** on the rear fender using the sag gauge.
- Note down the value as dimension **C**.

Info

The riding sag is the difference between measurements **A** and **C**.

- Check the riding sag.

Riding sag (SX-F EU)	110 mm (4.33 in)
Riding sag (SX-F US)	110 mm (4.33 in)
Riding sag (XC-F US)	110 mm (4.33 in)

- If the riding sag differs from the specified measurement:
 - Adjust the riding sag. (☞ p. 90)

9.7 Adjusting the spring preload of the shock absorber



Caution

Danger of accidents Disassembly of pressurized parts can lead to injury.

- The shock absorber is filled with high density nitrogen. Adhere to the description provided.



Info

Before changing the spring preload, make a note of the present setting, e.g., by measuring the length of the spring.

Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the shock absorber. (☞ p. 90)
- After removing the shock absorber, clean it thoroughly.

Main work

- Loosen screw **1**.
- Turn adjusting ring **2** until the spring is no longer under tension.

Hook wrench (T106S) (☞ p. 303)

- Measure the overall spring length while the spring is not under tension.
- Tighten the spring by turning adjusting ring **2** to measurement **A**.

Guideline

Spring preload (SX-F EU)	5 mm (0.2 in)
Spring preload (SX-F US)	7 mm (0.28 in)
Spring preload (XC-F US)	7 mm (0.28 in)

Info

Depending on the static sag and/or the riding sag, it may be necessary to increase or decrease the spring preload.

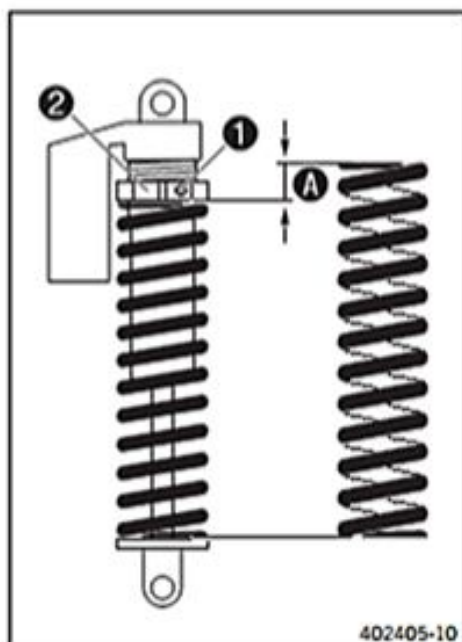
- Tighten screw **1**.

Guideline

Screw, shock absorber adjusting ring	M5	5 Nm (3.7 lbf ft)
--------------------------------------	----	-------------------

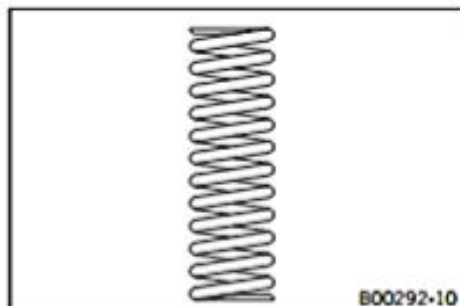
Finishing work

- Install the shock absorber. (☞ p. 92)
- Check the free travel of the foot brake lever. (☞ p. 164)



- Remove the motorcycle from the lift stand. (☛ p. 10)

9.8 Adjusting the riding sag



Preparatory work

- Raise the motorcycle with a lift stand. (☛ p. 10)
- Remove the shock absorber. (☛ p. 90)
- After removing the shock absorber, clean it thoroughly.

Main work

- Choose and mount a suitable spring.

Guideline

Spring rate (SX-F EU)	
Weight of rider: 65... 75 kg (143... 165 lb.)	45 N/mm (257 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	48 N/mm (274 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	51 N/mm (291 lb/in)
Spring rate (SX-F US)	
Weight of rider: 65... 75 kg (143... 165 lb.)	45 N/mm (257 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	48 N/mm (274 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	51 N/mm (291 lb/in)
Spring rate (XC-F US)	
Weight of rider: 65... 75 kg (143... 165 lb.)	45 N/mm (257 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	48 N/mm (274 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	51 N/mm (291 lb/in)



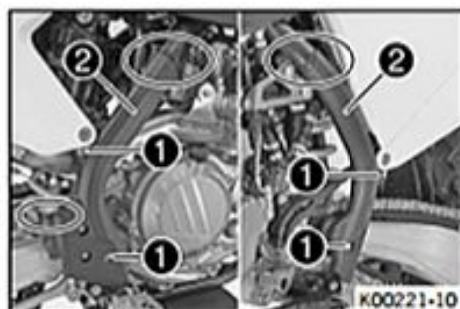
Info

The spring rate is shown on the outside of the spring.

Finishing work

- Install the shock absorber. (☛ p. 92)
- Check the free travel of the foot brake lever. (☛ p. 164)
- Check the static sag of the shock absorber. (☛ p. 88)
- Check the riding sag of the shock absorber. (☛ p. 89)
- Adjust the rebound damping of the shock absorber. (☛ p. 87)
- Remove the motorcycle from the lift stand. (☛ p. 10)

9.9 Removing the shock absorber

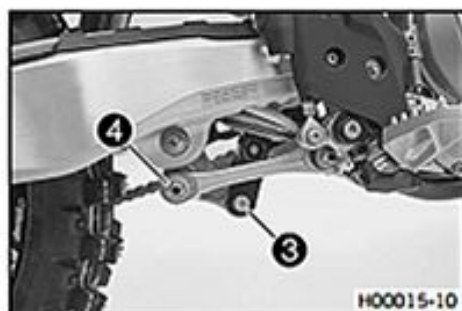


Preparatory work

- Raise the motorcycle with a lift stand. (☛ p. 10)

Main work

- Remove the cable tie(s).
- Remove screws ① with the washers.
- Take off frame protector ② on both sides.



- Remove screw 3 and fitting 4.



Info

Raise the wheel slightly to make it easier to remove the screw.



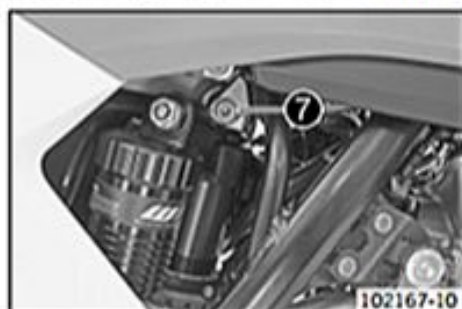
- Remove screws 5.



- Remove the connecting link of the chain.
- Take off the chain.



- Remove nut 6 and pull out the swingarm pivot.
- Push the swingarm back and secure it against falling over.



- Remove screw 7.



- Carefully take the shock absorber out of the vehicle toward the bottom.

9.10 Installing the shock absorber



Main work

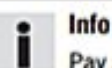
- Carefully position the shock absorber into the vehicle from the bottom.
- Mount and tighten screw **1**.

Guideline

Screw, top shock absorber	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
---------------------------	-----	------------------------	----------------



- Position the swingarm and mount the swingarm pivot.



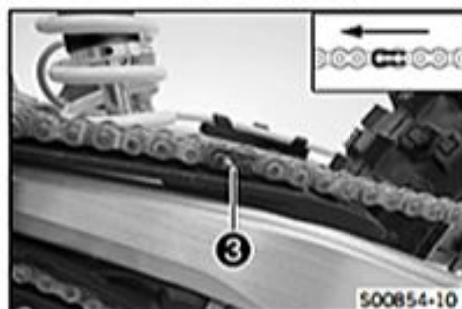
Info

Pay attention to flat area **A**.

- Mount and tighten nut **2**.

Guideline

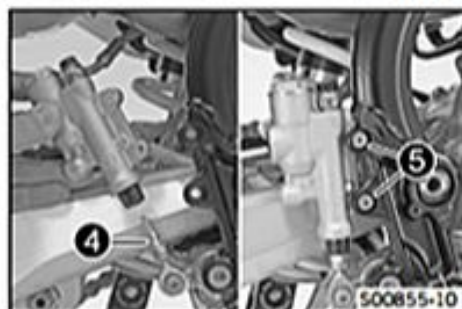
Nut, swingarm pivot	M16x1.5	100 Nm (73.8 lbf ft)
---------------------	---------	-------------------------



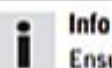
- Mount the chain.
- Connect the chain with connecting link **3**.

Guideline

The closed side of the chain joint lock must face in the direction of travel.



- Position the foot brake cylinder.
- ✓ Push rod **4** engages in the foot brake cylinder.



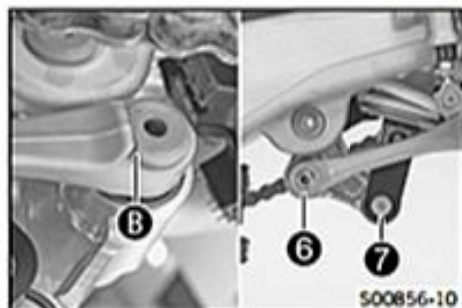
Info

Ensure that the dust boot is correctly seated.

- Mount and tighten screws **5**.

Guideline

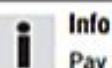
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------



- Position the angle lever and linkage lever.
- Mount and tighten fitting **6**.

Guideline

Nut, linkage lever to angle lever	M14x1.5	80 Nm (59 lbf ft)
-----------------------------------	---------	-------------------



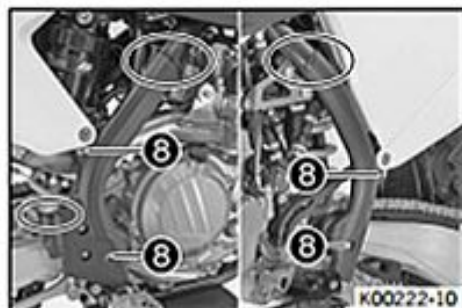
Info

Pay attention to flat area **B**.

- Mount and tighten screw **7**.

Guideline

Screw, bottom shock absorber	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
------------------------------	-----	------------------------	----------------



- Position the frame protector on the left and right.
- Mount and tighten screws **8** with the washers.

Guideline

Screw, frame protector	M5	3 Nm (2.2 lbf ft)
------------------------	----	-------------------

- Mount the new cable ties.

Finishing work

- Check the free travel of the foot brake lever. (☞ p. 164)
- Remove the motorcycle from the lift stand. (☞ p. 10)

9.11 Checking the shock absorber linkage

Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)

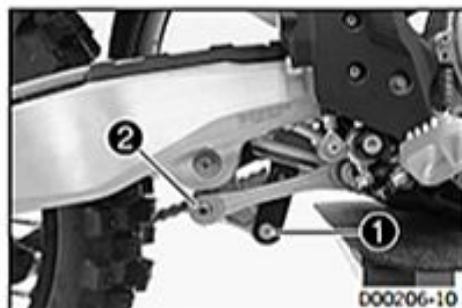
Main work

- Remove screw **1**.
- Remove fitting **2**.

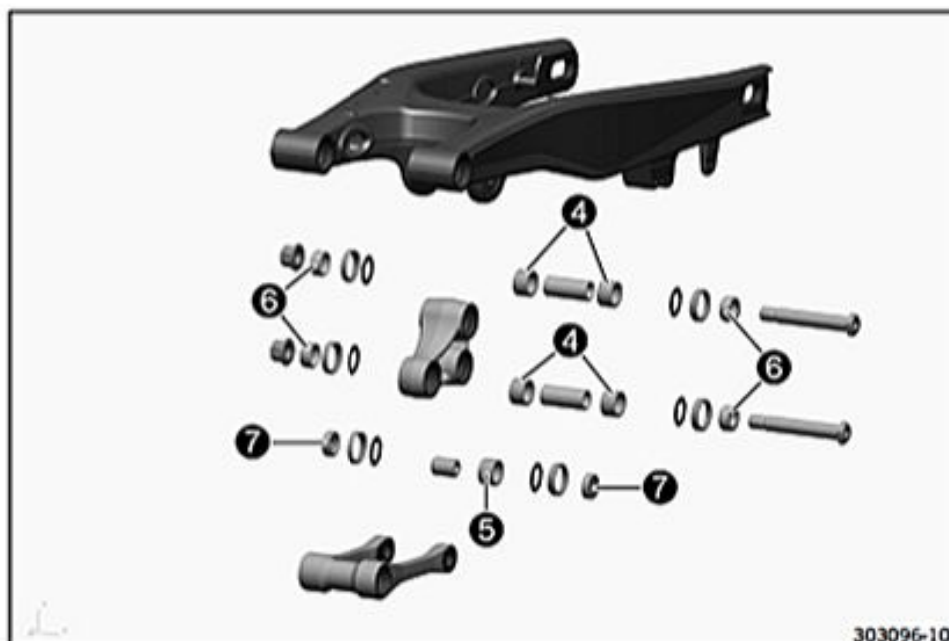


Info

Raise the wheel slightly to be able to remove the screws more easily.

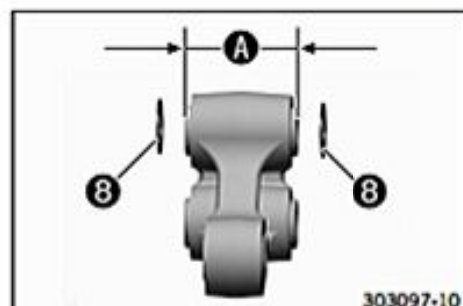


- Remove fitting **3**.
- Take off the angle lever.



- Check needle bearings **4** and **5** for damage and wear.
 - If there is damage or wear:

- Change the needle bearings.
- Check spacers ⑥ and ⑦ for damage and wear.
 - If there is damage or wear:
 - Change the spacers.
- Check the shaft seal rings for damage and wear.
 - If there is damage or wear:
 - Change the shaft seal rings.



- Check dimension A.

54.91... 55.00 mm (2.1618... 2.1654 in)

- If dimension A is below the specified value:
 - Add the necessary spacing washers ⑧.



- Position the angle lever.
- Mount fitting ③ but do not tighten yet.

Guideline

Nut, linkage lever on swingarm	M14x1.5	80 Nm (59 lbf ft)
--------------------------------	---------	-------------------



- Mount screw ① but do not tighten yet.

Guideline

Screw, bottom shock absorber	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
------------------------------	-----	---------------------	----------------



Info

Raise the wheel slightly to be able to mount the screw more easily.



- Position the linkage lever.
- Mount and tighten fitting ②.

Guideline

Nut, linkage lever to angle lever	M14x1.5	80 Nm (59 lbf ft)
-----------------------------------	---------	-------------------



Info

Raise the wheel slightly to be able to mount the screw more easily.

- Tighten screws ①.

Guideline

Screw, bottom shock absorber	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
------------------------------	-----	---------------------	----------------

- Tighten fitting ③.

Guideline

Nut, linkage lever on swingarm	M14x1.5	80 Nm (59 lbf ft)
--------------------------------	---------	-------------------

Finishing work

- Remove the motorcycle from the lift stand. (☞ p. 10)

9.12 Servicing the shock absorber



Caution

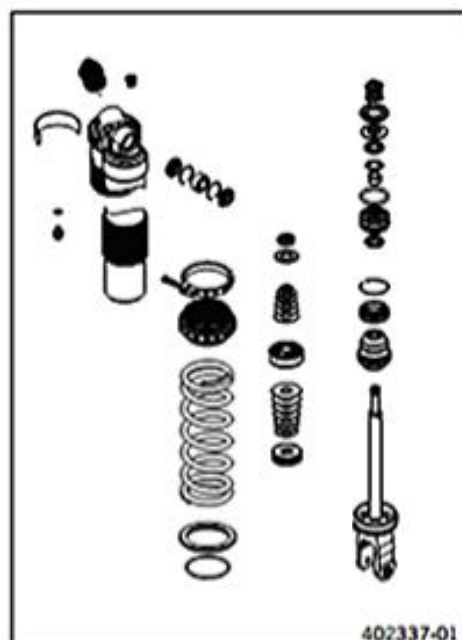
Danger of accidents Disassembly of pressurized parts can lead to injury.

- The shock absorber is filled with high density nitrogen. Adhere to the description provided.

Condition

The shock absorber has been removed.

- Remove the spring. (☛ p. 95)
- Disassemble the damper. (☛ p. 96)
- Disassemble the piston rod. (☛ p. 97)
- Disassemble the seal ring retainer. (☛ p. 98)
- Check the damper. (☛ p. 99)
- Remove the heim joint. (☛ p. 100)
- Install the heim joint. (☛ p. 101)
- Assemble the seal ring retainer. (☛ p. 101)
- Assemble the piston rod. (☛ p. 102)
- Assemble the damper. (☛ p. 103)
- Install the spring. (☛ p. 108)



9.13 Removing the spring

Condition

The shock absorber has been removed.

- Clamp the shock absorber into the vise with soft jaws.
- Measure and note down the spring length in the preloaded state.
- Loosen screw ①.
- Turn the adjusting ring until the spring is completely without tension.

Hook wrench (T106S) (☛ p. 303)



- Remove ring ②.
- Remove spring retainer ③.
- Remove the spring.

9.14 Disassembling the damper

Preparatory work

- Remove the spring. (☞ p. 95)

Main work

- Make a note of the present state of rebound ❶ and compression damping ❷.
- Open the adjusters of the rebound and compression damping completely.



- Slowly open screw ❸.
- ✓ The nitrogen pressure dissipates.

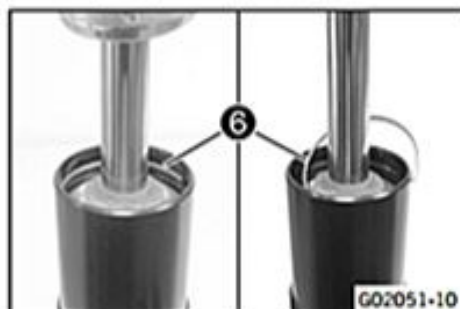


- Remove locking cap ❹.



- Press in seal ring retainer ❺ using the special tool.

Disassembly tool (T1216) (☞ p. 305)



- Remove lock ring ❻.



Info

Check inner surface; do not scratch. Remove any burrs with sandpaper if needed.



- Remove the piston rod.



- Remove adjusting ring 7 with the intermediate washer.
- Drain the oil.



- Remove compression adjuster 8. Remove the spring and piston.

9.15 Disassembling the piston rod

Preparatory work

- Remove the spring. (☛ p. 95)
- Disassemble the damper. (☛ p. 96)

Main work

- Clamp the piston rod with the fork in a vise.

Guideline

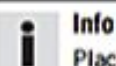
Use soft jaws.



- Remove nut 1.
- Remove washer 2.



- Remove rebound shim stack 3.



Info

Place the rebound shim stack onto a screwdriver and set it down as a unit.

- Remove piston 4.



- Remove compression shim stack 5.


Info

Place the compression shim stack onto a screwdriver and set it down as a unit.

- Remove rebound washer 6.



- Remove seal ring retainer 7.
- Remove locking cap 8 and rubber buffer 9.

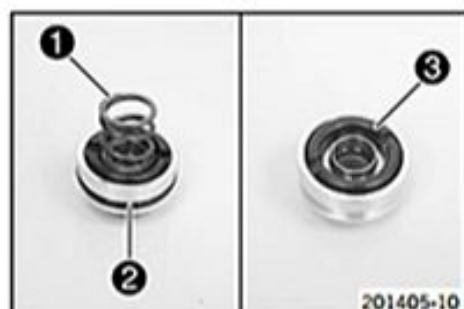
9.16 Disassembling the seal ring retainer

Preparatory work

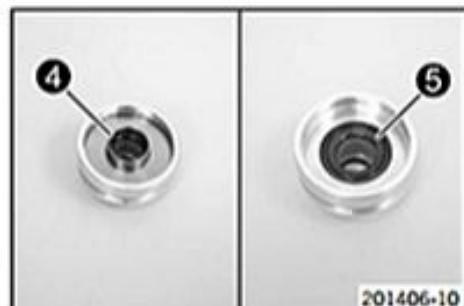
- Remove the spring. (☞ p. 95)
- Disassemble the damper. (☞ p. 96)
- Disassemble the piston rod. (☞ p. 97)

Main work

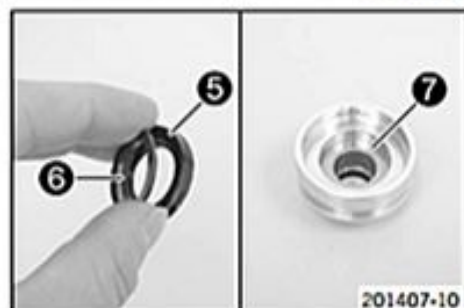
- Remove spring 1.
- Remove O-ring 2.
- Remove rebound rubber 3.



- Remove centering disk 4.
- Remove seal ring 5.



- Remove washer 6 for seal ring 5.
- Remove washer 7.
- Remove dust boot.



9.17 Changing the pilot bushing

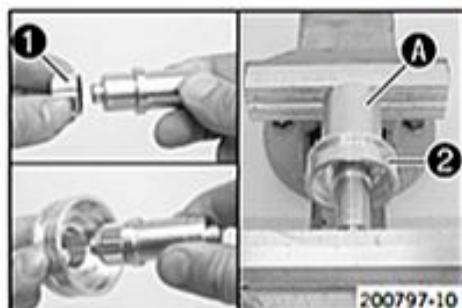
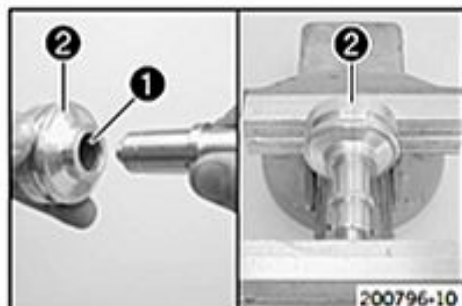
Preparatory work

- Remove the spring. (☞ p. 95)
- Disassemble the damper. (☞ p. 96)
- Disassemble the piston rod. (☞ p. 97)
- Disassemble the seal ring retainer. (☞ p. 98)

Main work

- Press pilot bushing ① out of seal ring retainer ② with the special tool.

Press drift (T1504) (☞ p. 307)



- Slide the new pilot bushing ① onto the special tool.

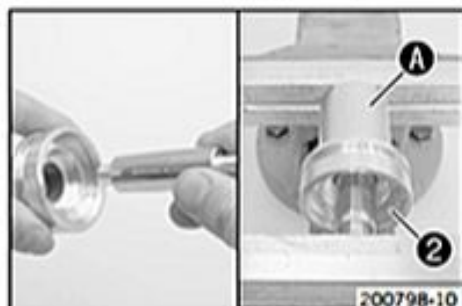
Press drift (T1504) (☞ p. 307)

- Position the pilot bushing in the seal ring retainer using the special tool.

Press drift (T1504) (☞ p. 307)

- Support seal ring retainer ② with sleeve A of the special tool. Press the pilot bushing all the way in.

Assembly tool (T150S) (☞ p. 307)



- Lubricate the special tool.

Shock absorber fluid (SAE 2.5) (50180751S1) (☞ p. 290)

Calibration pin (T1205) (☞ p. 304)

- Support seal ring retainer ② with sleeve A of the special tool.

Assembly tool (T150S) (☞ p. 307)

- Press the special tool through the new pilot bushing.

Calibration pin (T1205) (☞ p. 304)

✓ The pilot bushing is calibrated.

Finishing work

- Assemble the seal ring retainer. (☞ p. 101)

9.18 Checking the damper

Condition

The damper has been disassembled.

- Measure the inside diameter on both ends and in the middle of the damper cartridge.

Damper cartridge

Diameter	≤ 50.08 mm (≤ 1.9716 in)
----------	--------------------------

- If the measured value is greater than the specified value:
 - Change the damper cartridge.
- Check the damper cartridge for damage and wear.
 - If there is damage or wear:
 - Change the damper cartridge.
- Check the heim joint for damage and wear.
 - If there is damage or wear:
 - Change the heim joint.





- Measure the diameter of the piston rod.

Piston rod	
Diameter	$\geq 17.95 \text{ mm } (\geq 0.7067 \text{ in})$

- If the measured value is less than the specified value:
 - Change the piston rod.

- Measure the run-out of the piston rod.

Piston rod	
Run-out	$\leq 0.02 \text{ mm } (\leq 0.0008 \text{ in})$

- If the measured value is greater than the specified value:
 - Change the piston rod.

- Check the piston rod for damage and wear.

- If there is damage or wear:
 - Change the piston rod.

- Check the piston rings for damage and wear.

- If damage or a bronze-colored surface is visible:
 - Change the piston.



9.19 Removing the heim joint

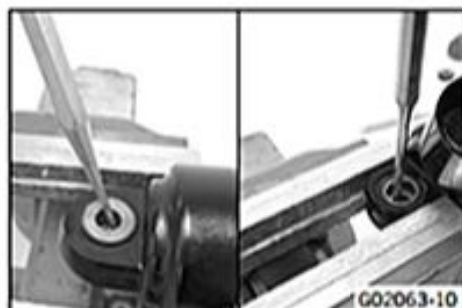
Condition

The shock absorber has been removed.

- Clamp the shock absorber into the vise with soft jaws.
- Remove the collar bushing of the heim joint.

Pin (T120) (☞ p. 304)

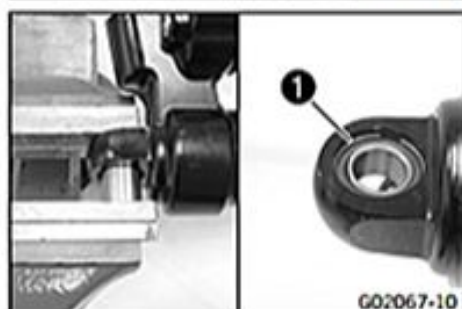
- Turn the shock absorber and remove the second collar bushing of the heim joint.



- Press the heim joint against a lock ring using the special tool.

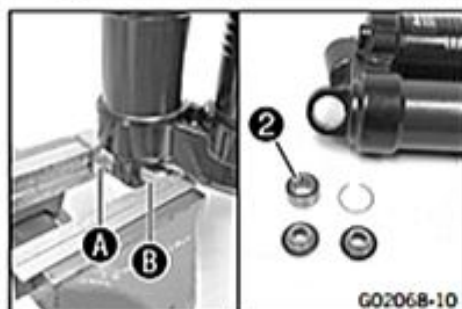
Pressing tool (T1207S) (☞ p. 304)

- Remove second lock ring ❶.



- Place special tool ❶ underneath and press out heim joint ❷ using special tool ❷.

Pressing tool (T1207S) (☞ p. 304)



9.20 Installing the heim joint



- Position the new heim joint **1** and the special tool in the bench vise.

Guideline

Use soft jaws.

Pressing tool (T1206) (☞ p. 304)

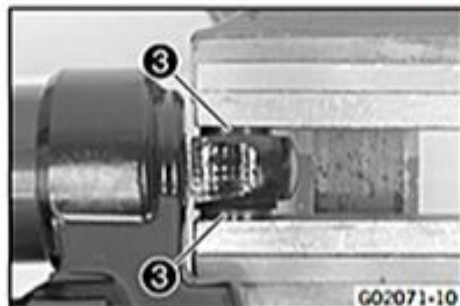
- Press the heim joint all the way in.



- Press the heim joint against the lock ring using the special tool.

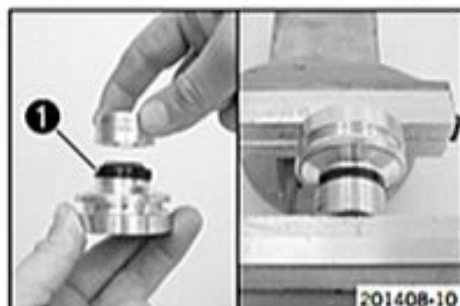
Pressing tool (T1207S) (☞ p. 304)

- Mount second lock ring **2**.



- Position both collar bushings **3** and press in.

9.21 Assembling the seal ring retainer



- Mount dust boot **1** using the special tool.

Mounting sleeve (T1204) (☞ p. 304)

- Lubricate the sealing lip of the dust boot.

Lubricant (T625) (☞ p. 292)



- Mount washer **2**.

- Position washer **3** on seal ring **4**.



- Grease seal ring (4) and mount with the washer facing downward.

Lubricant (T511) (☛ p. 292)

- Mount centering disk (5).



- Mount rebound rubber (6).
- Lubricate the groove of the O-ring.

Lubricant (T158) (☛ p. 292)

- Mount O-ring (7).
- Mount spring (8).

9.22 Assembling the piston rod

Preparatory work

- Assemble the seal ring retainer. (☛ p. 101)

Main work

- Clamp the piston rod with the fork in a vise.

Guideline

Use soft jaws.

- Mount rubber buffer (1) and locking cap (2).
- Position special tool on the piston rod.

Mounting sleeve (T1215) (☛ p. 305)

- Grease the dust boot and push seal ring retainer (3) onto the piston rod.

Lubricant (T625) (☛ p. 292)

- Remove the special tool.

- Mount rebound washer (4) with the cut-out facing downward.



- Mount the compression shim stack (5) with the smaller shims facing downward.



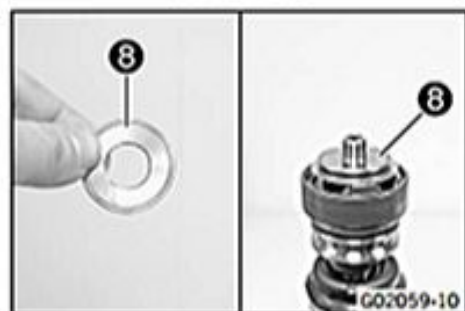
- Sand both sides of piston **6** on a surface plate using 1200-grit sandpaper.
- Clean the piston.
- Assemble the piston.

Guideline

View A	Piston from above
View B	Piston from below



- Mount the rebound shim stack **7** with the smaller shims facing upward.



- Mount washer **8** with the collar facing downward.



- Grease the thread of the piston rod.

Lubricant (T152) (☞ p. 292)

- Mount and tighten nut **9**.

Guideline

Nut, piston rod	M16x1	45 Nm (33.2 lbf ft)
-----------------	-------	------------------------

9.23 Assembling the damper

Preparatory work

- Assemble the seal ring retainer. (☞ p. 101)
- Assemble the piston rod. (☞ p. 102)

Main work

- Lubricate the O-rings of the compression adjuster.

Lubricant (T158) (☞ p. 292)

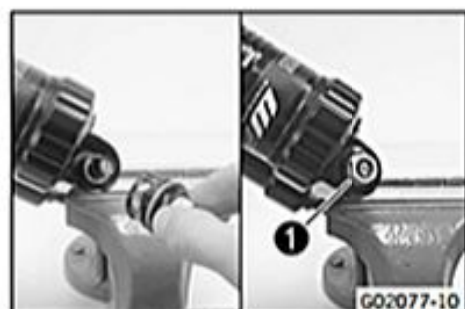
- Lubricate the thread.

Lubricant (T159) (☞ p. 292)

- Mount the piston with the spring.
- Mount and tighten compression adjuster **1**.

Guideline

Compression adjuster	M31x1	45 Nm (33.2 lbf ft)
----------------------	-------	------------------------





- Clamp the damper in a bench vise.

Guideline

Use soft jaws.

- Mount adjusting ring (2) with the intermediate washer.



Info

The adjusting ring cannot be mounted after the piston rod has been mounted.



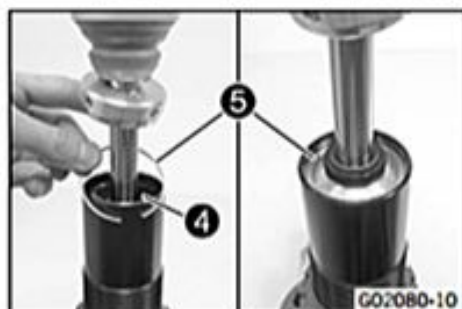
- Fill the damper cartridge about half full.

Shock absorber fluid (SAE 2.5) (50180751S1) (☛ p. 290)

- Lubricate O-ring (3) of the seal ring retainer.

Lubricant (T158) (☛ p. 292)

- Mount the piston rod carefully.



- Mount seal ring retainer (4) and slide it under the ring groove.

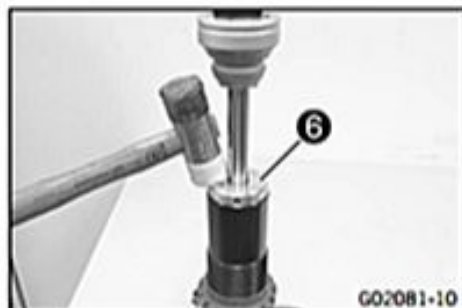
- Mount lock ring (5).



Info

Do not scratch the inside surface.

- Pull out the piston rod until the seal ring retainer is flush with the lock ring.



- Mount locking cap (6) of the damper cartridge.

- Bleed and fill the damper. (☛ p. 105)

- Fill the damper with nitrogen. (☛ p. 107)



Alternative 1

- Turn adjusting screw (7) clockwise with a screwdriver up to the last perceptible click.
- Turn counterclockwise by the number of clicks corresponding to the shock absorber type.

Guideline

Compression damping, low-speed	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks

- Turn adjusting screw (8) all the way clockwise with a socket wrench.
- Turn counterclockwise by the number of turns corresponding to the shock absorber type.

Guideline

Compression damping, high-speed	
Comfort	2.5 turns
Standard	2 turns
Sport	1.5 turns

- Turn adjusting screw ⑨ clockwise up to the last perceptible click.
- Turn counterclockwise by the number of clicks corresponding to the shock absorber type.

Guideline

Rebound damping	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks

Alternative 2



Warning

Danger of accident Modifications to the suspension setting may seriously alter the handling characteristic.

Extreme modifications to the suspension setting may cause a serious deterioration in the handling characteristic and overload components.

- Only make adjustments within the recommended range.
 - Ride slowly to start with after making adjustments to get the feel of the new handling characteristic.
-
- Position adjusting screws ⑦, ⑧, and ⑨ in the location determined during disassembly.

9.24 Bleeding and filling the damper



Info

Before working with the vacuum pump, be sure to read the operating instructions carefully. Completely open the adjusters of the rebound and compression damping.



- Remove the screw of the filling port.
- Install adapter ① on the damper.



Info

Tighten only hand-tight, without the use of tools.

- Connect the adapter ① to connector ② of the vacuum pump.

Vacuum pump (T1240S) (☛ p. 305)

- Clamp the damper with soft jaws or hold it as shown in the figure.



Info

Clamp the damper only lightly.

The filling port must be at the highest point.

The piston rod slides in and out during filling - do not hold it tight with your hand!

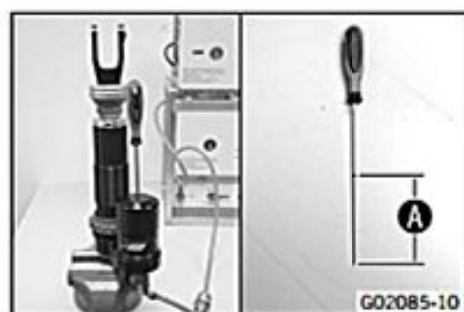


- Clamp the control lever as shown in the figure.
 - ✓ The External tank ③ control lever is on Closed, Damper ④ on Vacuum, and Oil reservoir ⑤ on Vacuum.
- Operate the On/Off switch ⑥.
 - ✓ The vacuum pump process starts.
 - ✓ Pressure gauge ⑦ drops to the specified value.

< 0 bar

- ✓ The vacuum gauge ⑧ falls to the specified value.

4 mbar



- Measure distance **A** between the floating piston and reservoir hole with the special tool.

Depth micrometer (T107S) (p. 303)

- ✓ The floating piston is positioned all the way at the bottom.



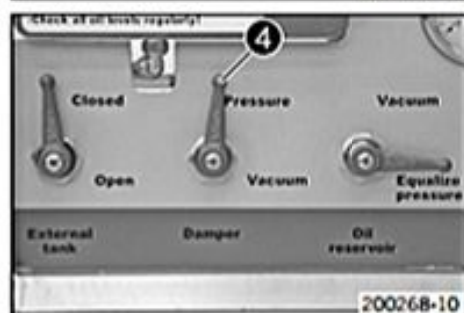
- When the vacuum pressure gauge reaches the specified value, turn the **Oil reservoir** control lever **5** to **Equalize pressure**.

Guideline

4 mbar

- ✓ The pressure gauge increases to the specified value.

0 bar



- When the pressure gauge reaches the specified value, turn the **Damper** control lever **4** to **Pressure**.

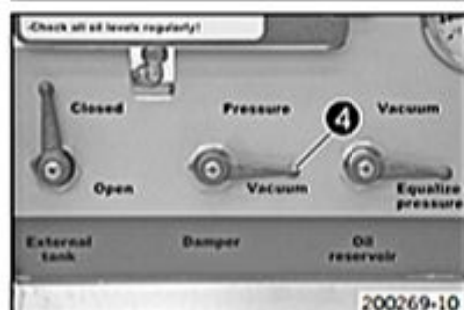
Guideline

0 bar

- ✓ Oil is pumped into the damper.

- ✓ The pressure gauge increases to the specified value.

3 bar



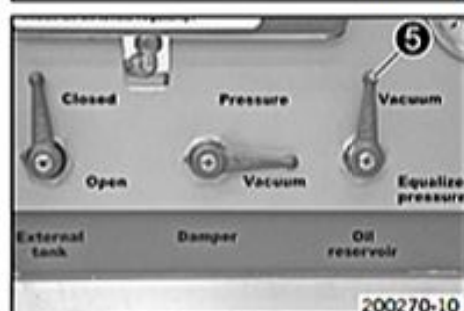
- When the pressure gauge reaches the specified value, turn the **Damper** control lever **4** to **Vacuum**.

Guideline

3 bar

- ✓ The pressure gauge drops to the specified value.

0 bar



- When the pressure gauge reaches the specified value, turn the **Oil reservoir** control lever **5** to **Vacuum**.

Guideline

0 bar

- ✓ The vacuum gauge falls to the specified value.

8 mbar



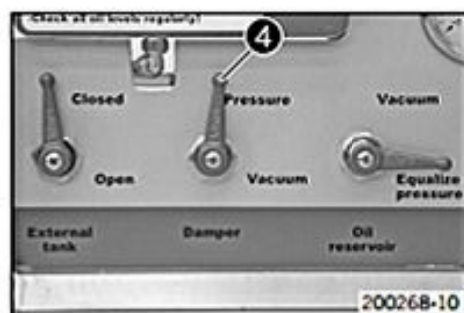
- When the vacuum pressure gauge reaches the specified value, turn the **Oil reservoir** control lever **5** to **Equalize Pressure**.

Guideline

8 mbar

- ✓ The pressure gauge drops to the specified value.

0 bar



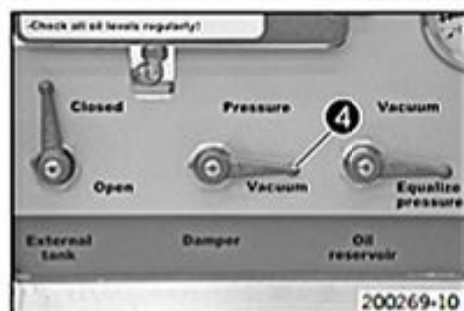
- When the pressure gauge reaches the specified value, turn the **Damper control lever 4** to **Pressure**.

Guideline

0 bar

- ✓ Oil is pumped into the damper.
- ✓ The pressure gauge increases to the specified value.

3 bar



- When the pressure gauge reaches the specified value, turn the **Damper 4** control lever to **Vacuum**.

Guideline

3 bar

- ✓ The pressure gauge drops to the specified value.

0 bar

- When the pressure gauge reaches the specified value, operate the **On/Off** switch.

Guideline

0 bar

- ✓ The vacuum pump is switched off.

- Slide O-ring **B** to the end of the special tool by the specified value (distance **A** minus specified value).

Guideline

10 mm

Depth micrometer (T107S) (p. 303)

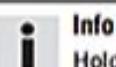
- Slide the floating piston into the reservoir to the shortened position using the special tool.



Info

The floating piston must be positioned at exactly this point when the rod is fully extended; otherwise, damage will occur during compression of the shock absorber.

- Remove the special tool.
- Remove adapter **1** from connection **2** of the vacuum pump.



Info

Hold the damper so that the filling port is at the highest point.

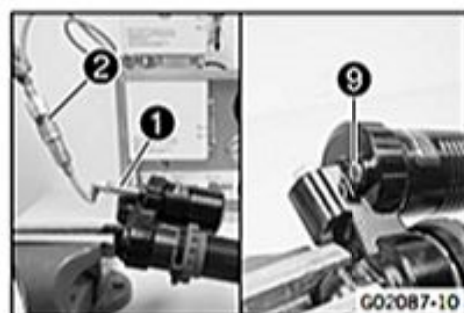
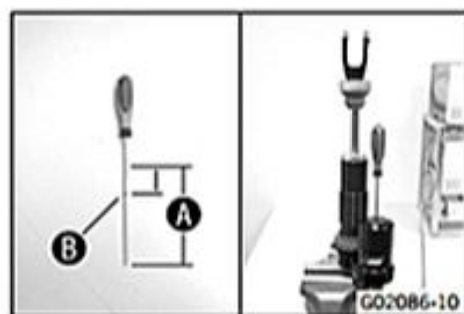
- Remove the adapter.
- Mount and tighten screw **9**.

Guideline

Screw, filling port

M10x1

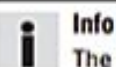
14 Nm
(10.3 lbf ft)



9.25 Filling the damper with nitrogen



- Screw in screw **1** by approx. 2 rotations but do not tighten.



Info

The piston rod is fully extended.



- Clamp the special tool in the vise.

Nitrogen filling tool (T170S1) (☞ p. 308)

- Connect the special tool to the pressure regulator of the filling cylinder.

Filling gas - nitrogen

- Adjust the pressure regulator.

Guideline

Gas pressure	10 bar (145 psi)
--------------	------------------

- Position the damper in the special tool.

✓ The hexagonal part of the tap handle (A) engages in the hexagon socket of the filling port screw.

- Open filler tap (B).

- Fill the damper for at least 15 seconds.

Guideline

Gas pressure	10 bar (145 psi)
--------------	------------------



Info

Watch the pressure regulator dial.

Make sure that the damper is filled to the specified pressure.

- Close the filling port screw using tap handle (A).

- Close spigot (B) and take the damper out of the special tool.

- Tighten the filling port screw.

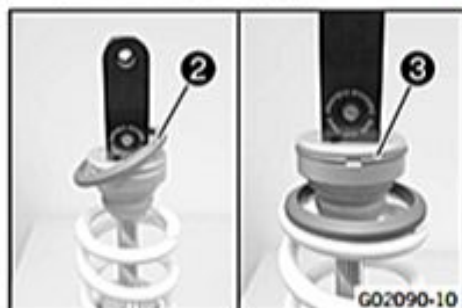
Guideline

Screw, reservoir filling port	M5	3 Nm (2.2 lbf ft)
-------------------------------	----	-------------------

9.26 Installing the spring (SX-F EU)



- Ensure that adjusting ring (1) is screwed on with the intermediate washer.



- Measure the overall spring length while the spring is not under tension.

- Position the spring.

Guideline

Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	45 N/mm (257 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	48 N/mm (274 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	51 N/mm (291 lb/in)

- Mount spring retainer (2).

- Mount ring (3).

Alternative 1

- Tension the spring by turning the adjusting ring to the prescribed value.

Guideline

Spring preload	5 mm (0.2 in)
----------------	---------------

Hook wrench (T106S) (☞ p. 303)

Alternative 2



Warning

Danger of accident Modifications to the suspension setting may seriously alter the handling characteristic.

Extreme modifications to the suspension setting may cause a serious deterioration in the handling characteristic and overload components.

- Only make adjustments within the recommended range.
- Ride slowly to start with after making adjustments to get the feel of the new handling characteristic.

- Tension the spring to the length measured during disassembly by turning the adjusting ring.

Hook wrench (T106S) (☞ p. 303)

- Tighten screw 4.

Guideline

Screw, shock absorber adjusting ring	M5	5 Nm (3.7 lbf ft)
--------------------------------------	----	-------------------



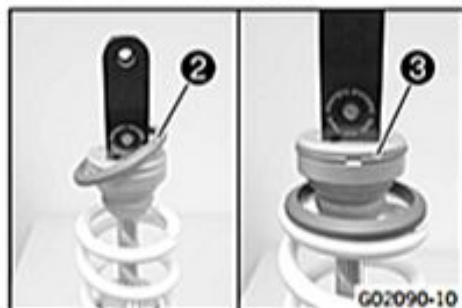
G02091-10

9.27 Installing the spring (SX-F US)



G02089-10

- Ensure that adjusting ring 1 is screwed on with the intermediate washer.



G02090-10

- Measure the overall spring length while the spring is not under tension.
- Position the spring.

Guideline

Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	45 N/mm (257 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	48 N/mm (274 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	51 N/mm (291 lb/in)

- Mount spring retainer 2.
- Mount ring 3.

Alternative 1

- Tension the spring by turning the adjusting ring to the prescribed value.

Guideline

Spring preload	7 mm (0.28 in)
----------------	----------------

Hook wrench (T106S) (☞ p. 303)

Alternative 2

**Warning**

Danger of accident Modifications to the suspension setting may seriously alter the handling characteristic.

Extreme modifications to the suspension setting may cause a serious deterioration in the handling characteristic and overload components.

- Only make adjustments within the recommended range.
- Ride slowly to start with after making adjustments to get the feel of the new handling characteristic.

- Tension the spring to the length measured during disassembly by turning the adjusting ring.

Hook wrench (T106S) (☛ p. 303)



- Tighten screw (4).

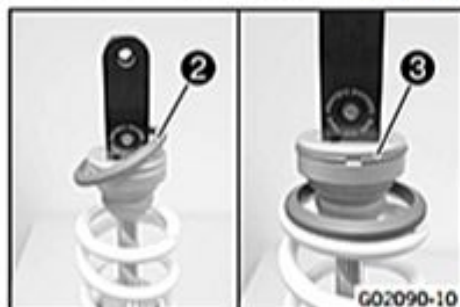
Guideline

Screw, shock absorber adjusting ring	M5	5 Nm (3.7 lbf ft)
--------------------------------------	----	-------------------

9.28 Installing the spring (XC-F US)



- Ensure that adjusting ring (1) is screwed on with the intermediate washer.



- Measure the overall spring length while the spring is not under tension.
- Position the spring.

Guideline

Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	45 N/mm (257 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	48 N/mm (274 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	51 N/mm (291 lb/in)

- Mount spring retainer (2).
- Mount ring (3).

Alternative 1

- Tension the spring by turning the adjusting ring to the prescribed value.

Guideline

Spring preload	7 mm (0.28 in)
----------------	----------------

Hook wrench (T106S) (☛ p. 303)

Alternative 2

**Warning**

Danger of accident Modifications to the suspension setting may seriously alter the handling characteristic.

Extreme modifications to the suspension setting may cause a serious deterioration in the handling characteristic and overload components.

- Only make adjustments within the recommended range.
- Ride slowly to start with after making adjustments to get the feel of the new handling characteristic.

- Tension the spring to the length measured during disassembly by turning the adjusting ring.

Hook wrench (T106S) (☞ p. 303)

- Tighten screw 4.

Guideline

Screw, shock absorber adjusting ring	M5	5 Nm (3.7 lbf ft)
--------------------------------------	----	-------------------



9.29 Checking the swingarm bearing for play

Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Place a load on the front of the vehicle.
- ✓ The rear wheel is not in contact with the ground.

Main work

- Move the swingarm up and down.
 - If there is detectable play:
 - Change the swingarm bearing. (☞ p. 115)
- Move the swingarm from one side to the other.
 - If there is detectable play:
 - Change the swingarm bearing. (☞ p. 115)

**Finishing work**

- Remove the motorcycle from the lift stand. (☞ p. 10)

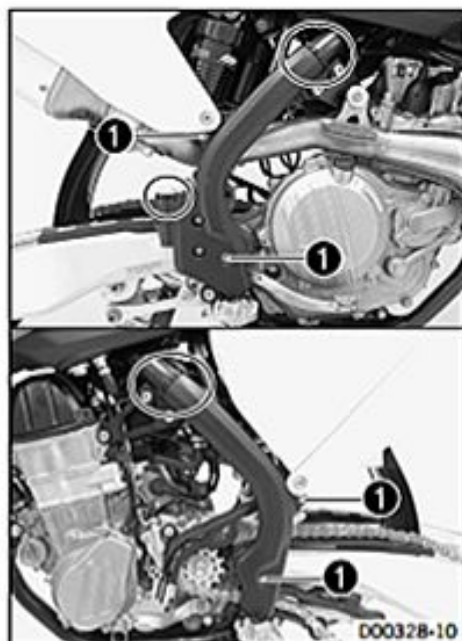
9.30 Removing the swingarm

Preparatory work

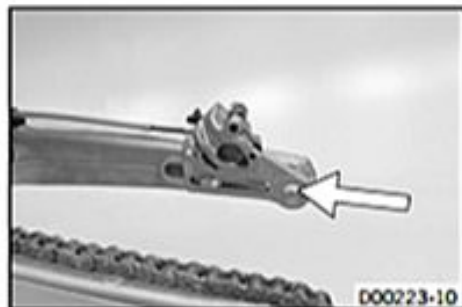
- Raise the motorcycle with a lift stand. (☛ p. 10)
- Remove the rear wheel. (☛ p. 142)

Main work

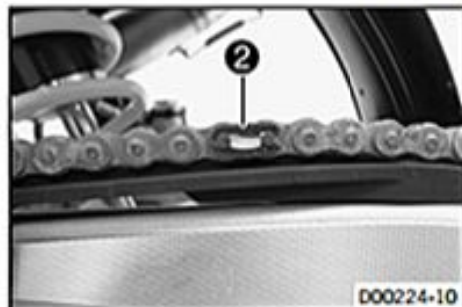
- Remove screws ① with the washer.
- Remove the cable tie(s).
- Take off the frame protector on both sides.



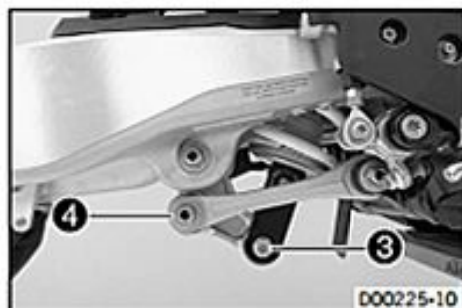
- Take the brake line out of the guide.



- Push the brake caliper forward, remove it, and hang it to the side.



- Remove connecting link ② of the chain.
- Take off the chain.



- Remove screw 3.
- Remove fitting 4.


Info

Raise the link fork slightly to be able to remove the screws more easily.



- Remove fitting 5.
- Take off the angle lever.



- Remove nut 6.



- Remove the swingarm pivot. Take off the swingarm.

9.31 Installing the swingarm


Main work

- Position the swingarm. Mount the swingarm pivot.



- Mount and tighten nut 1.

Guideline

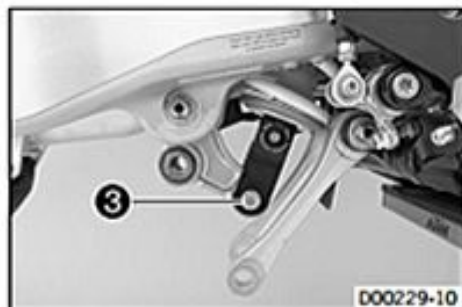
Nut, swingarm pivot	M16x1.5	100 Nm (73.8 lbf ft)
---------------------	---------	-------------------------



- Position the angle lever.
- Mount fitting 2 but do not tighten yet.

Guideline

Nut, linkage lever on swingarm	M14x1.5	80 Nm (59 lbf ft)
--------------------------------	---------	-------------------



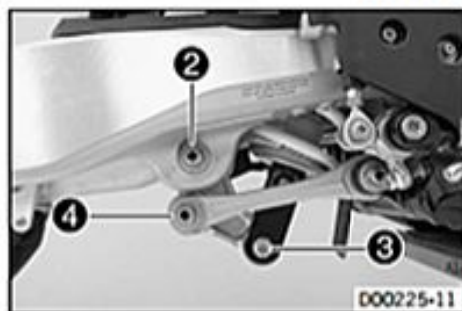
- Mount screw 3 but do not tighten yet.

Guideline

Screw, bottom shock absorber	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
------------------------------	-----	---------------------	----------------

i Info

Raise the link fork slightly to be able to mount the screw more easily.



- Position the linkage lever.
- Mount and tighten fitting 4.

Guideline

Nut, linkage lever to angle lever	M14x1.5	80 Nm (59 lbf ft)
-----------------------------------	---------	-------------------

i Info

Raise the link fork slightly to be able to mount the screw more easily.

- Tighten screw 3.

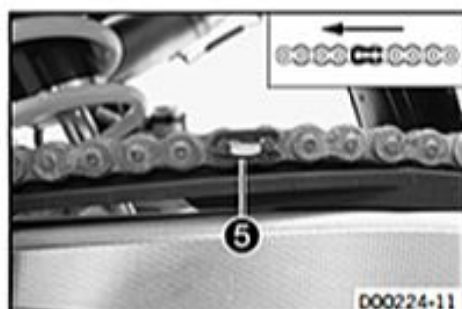
Guideline

Screw, bottom shock absorber	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
------------------------------	-----	---------------------	----------------

- Tighten fitting 2.

Guideline

Nut, linkage lever on swingarm	M14x1.5	80 Nm (59 lbf ft)
--------------------------------	---------	-------------------



- Mount the chain.
- Connect the chain with connecting piece 5.

Guideline

The closed side of the chain joint lock must face in the direction of travel.



- Position the brake caliper.



- Position the brake line in the guide.

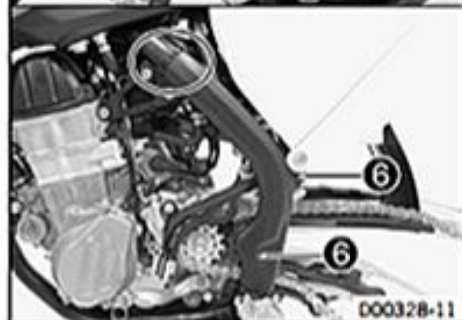


- Position the frame protector on the left and right.
- Mount and tighten screws (6) with the washers.

Guideline

Screw, frame protector	M5	3 Nm (2.2 lbf ft)
------------------------	----	-------------------

- Mount the cable tie(s).



Finishing work

- Install the rear wheel. (☞ p. 142)
- Check the chain tension. (☞ p. 145)
- Remove the motorcycle from the lift stand. (☞ p. 10)

9.32 Changing the swingarm bearing



Info

These operations are the same on both swingarm bearings.

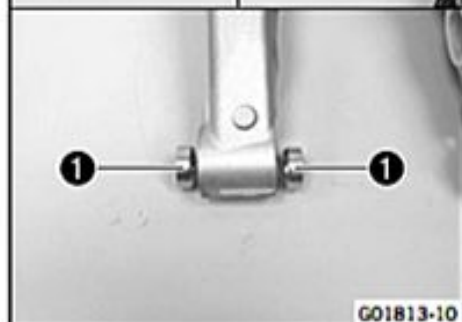
Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the rear wheel. (☞ p. 142)
- Remove the swingarm. (☞ p. 112)

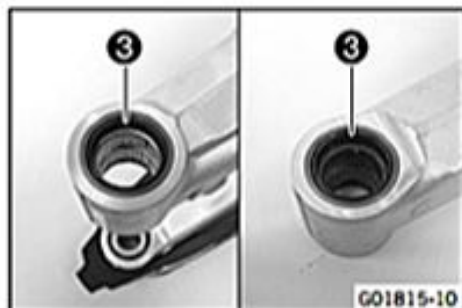


Main work

- Remove outer collar bushings ①.



- Remove bushing ②.



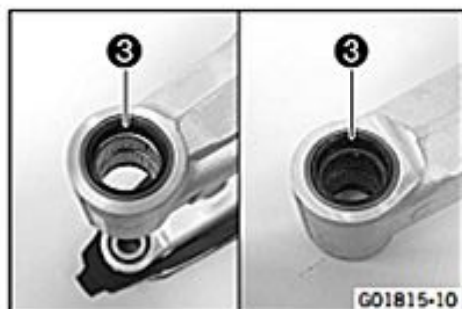
- Remove shaft seal rings ③ using a suitable tool.



- Press out the bearing with a suitable tool.



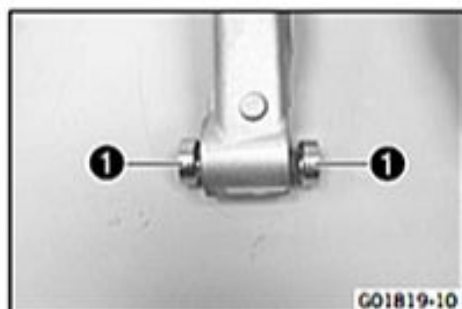
- Press in the new bearing until it is flush using a suitable tool.



- Press in shaft seal rings ③.



- Mount bushing ②.



- Grease the shaft seal rings.

Long-life grease (☛ p. 292)

- Position collar bushings ① with the shoulder facing inward.

Finishing work

- Install the swingarm. (☛ p. 113)
- Install the rear wheel. (☛ p. 142)
- Check the chain tension. (☛ p. 145)
- Remove the motorcycle from the lift stand. (☛ p. 10)

10.1 Removing the manifold

Preparatory work

- Raise the motorcycle with a lift stand. (☛ p. 10)
- Remove the main silencer. (☛ p. 120)

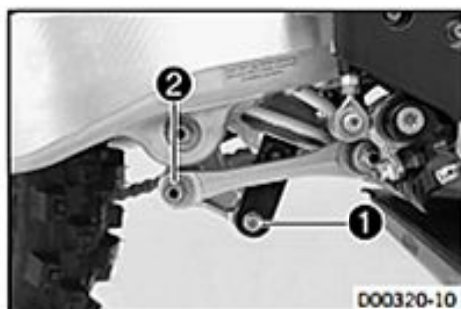
Main work

- Remove screw ①.
- Remove fitting ②.



Info

Raise the link fork slightly to be able to remove the screws more easily.

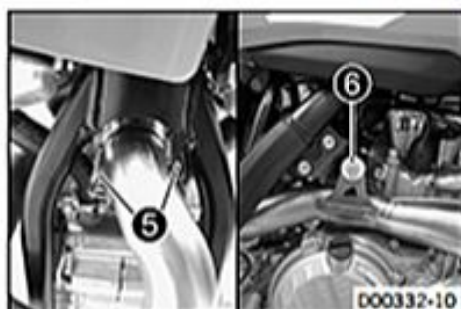


D00320-10



D00322-10

- Press angle lever ③ toward the rear.
- Press linkage lever ④ downward.



D00332-10

- Detach springs ⑤.

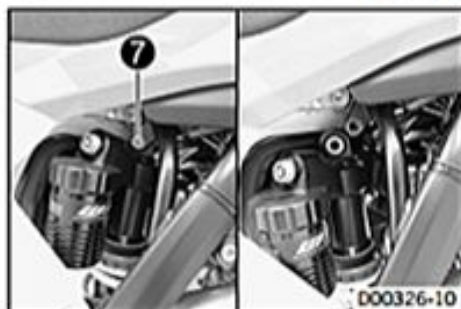
Spring hook (50305017000) (☛ p. 295)

- Remove screw ⑥.



D00334-10

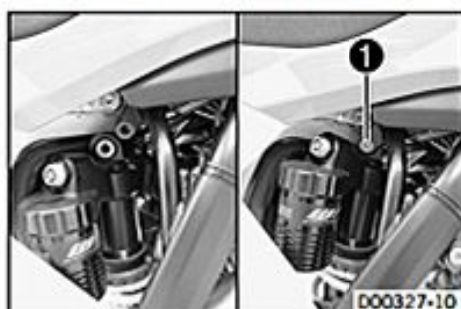
- Lift the swingarm.



D00326-10

- Remove screw ⑦.
- Turn the shock absorber and lower it.
- Take off the manifold.

10.2 Installing the manifold



Main work

- Slip in the manifold and position it.
- Position the shock absorber and mount and tighten screw ①.

Guideline

Screw, top shock absorber	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
---------------------------	-----	------------------------	----------------



- Mount screw ② but do not tighten yet.

Guideline

Remaining screws, chassis	M8	25 Nm (18.4 lbf ft)	
---------------------------	----	------------------------	--

- Attach springs ③.

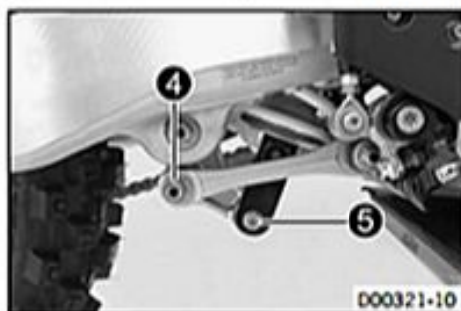
Spring hook (50305017000) (☞ p. 295)

- Tighten screw ②.

Guideline

Remaining screws, chassis	M8	25 Nm (18.4 lbf ft)	
---------------------------	----	------------------------	--

- Lower the swingarm.



- Position the angle lever and linkage lever.
- Mount and tighten fitting ④.

Guideline

Nut, linkage lever to angle lever	M14x1.5	80 Nm (59 lbf ft)	
-----------------------------------	---------	-------------------	--



Info

Raise the link fork slightly to be able to mount the screw more easily.

- Mount and tighten screw ⑤.

Guideline

Screw, bottom shock absorber	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
------------------------------	-----	------------------------	----------------

Finishing work

- Install the main silencer. (☞ p. 120)
- Remove the motorcycle from the lift stand. (☞ p. 10)

10.3 Removing the main silencer

**Warning**

Danger of burns The exhaust system gets very hot when the vehicle is driven.

- Allow the exhaust system to cool down. Do not touch hot components.



- Disconnect spring ①.

Spring hook (50305017000) (☞ p. 295)

- Remove screws ② and take off the main silencer.

10.4 Installing the main silencer



- Position the main silencer.
- Mount screws ① but do not tighten yet.
- Reconnect spring ②.

Spring hook (50305017000) (☞ p. 295)

- Tighten screws ①.

Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------

10.5 Changing the glass fiber yarn filling of the main silencer

**Warning**

Danger of burns The exhaust system gets very hot when the vehicle is driven.

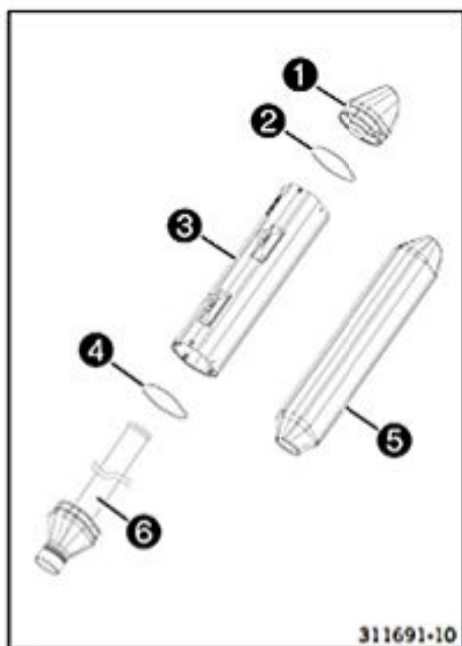
- Allow the exhaust system to cool down. Do not touch hot components.

**Info**

Over time, the fibers of the glass fiber yarn escape and the damper "burns" out. Not only is the noise level higher, the performance characteristic changes.

Preparatory work

- Remove the main silencer. (☞ p. 120)



Main work

- Remove all screws on the main silencer.
- Take off silencer cap ① and O-ring ②.
- Take off outer tube ③ and O-ring ④.
- Pull glass fiber yarn filling ⑤ off of inner tube ⑥.
- Clean the parts that need to be reinstalled.
- Mount new glass fiber yarn ⑤ on inner tube ⑥.
- Slide O-ring ④ and outer tube ③ over the glass fiber yarn filling ⑤.
- Insert O-ring ② and silencer cap ① into outer tube ③.
- Mount and tighten all of the screws.

Guideline

Screws on the main silencer	M5	7 Nm (5.2 lbf ft)
-----------------------------	----	-------------------

Finishing work

- Install the main silencer. (☞ p. 120)

11.1 Removing the air filter box cover



Condition

The air filter box cover is secured.

- Remove screw 1.



- Pull off the air filter box cover in area A sideways and remove it toward the front.

11.2 Installing the air filter box cover



- Insert the air filter box cover in area A and clip it into area B.



Condition

The air filter box cover is secured.

- Mount and tighten screw 1.

Guideline

Screw, air filter box cover	EJOT PT® K60x20-Z	3 Nm (2.2 lbf ft)
-----------------------------	----------------------	-------------------

11.3 Removing the air filter

Note

Engine failure Unfiltered intake air has a negative effect on the service life of the engine.

- Never operate the vehicle without an air filter as dust and dirt will enter the engine and lead to increased wear.



Warning

Environmental hazard Hazardous substances cause environmental damage.

- Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

Preparatory work

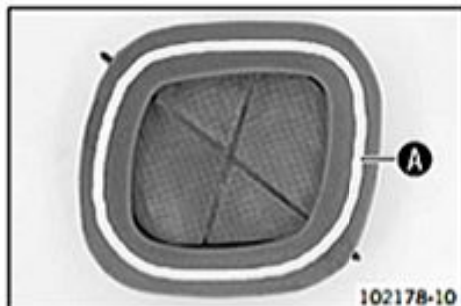
- Remove the air filter box cover. (☛ p. 122)



Main work

- Detach **1** retaining tab. Remove air filter with air filter support.
- Take off air filter from air filter support.

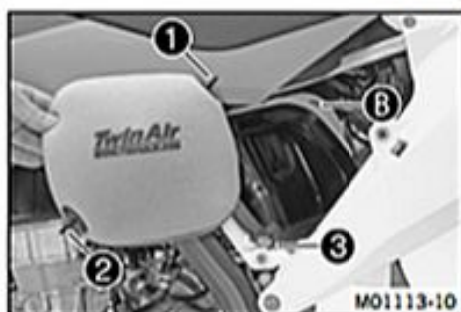
11.4 Installing the air filter



Main work

- Mount the clean air filter on the air filter support.
- Grease the air filter in area **A**.

Long-life grease (☞ p. 292)



- Insert air filter and position retaining pin **1** in bushing **B**.
✓ The air filter is correctly positioned.
- Insert **3** retaining tab.
✓ Retaining pin **2** is secured by retaining tab **3**.



Info

If the air filter is not mounted correctly, dust and dirt may enter the engine and result in damage.

Finishing work

- Install the air filter box cover. (☞ p. 122)

11.5 Cleaning the air filter and air filter box



Warning

Environmental hazard Hazardous substances cause environmental damage.

- Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.



Info

Do not clean the air filter with fuel or petroleum since these substances attack the foam.

Preparatory work

- Remove the air filter box cover. (☞ p. 122)
- Remove the air filter. (☞ p. 122)

Main work

- Wash the air filter thoroughly in special cleaning liquid and allow it to dry properly.

Air filter cleaner (☞ p. 292)



Info

Only press the air filter to dry it, never wring it out.

- Oil the dry air filter with a high quality filter oil.

Oil for foam air filter (☞ p. 293)

- Clean the air filter box.



- Clean the intake flange and check it for damage and tightness.

Finishing work

- Install the air filter. (☛ p. 123)
- Install the air filter box cover. (☛ p. 122)

11.6 Sealing the air filter box



Preparatory work

- Remove the air filter box cover. (☛ p. 122)

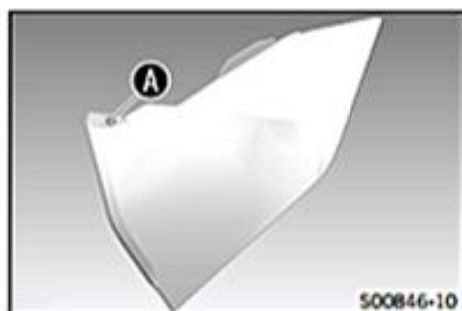
Main work

- Seal the air filter box in marked area **A**.

Finishing work

- Install the air filter box cover. (☛ p. 122)

11.7 Securing the air filter box cover



Preparatory work

- Remove the air filter box cover. (☛ p. 122)

Main work

- Drill a hole at marking **A**.

Guideline

Diameter	6 mm (0.24 in)
----------	----------------

Finishing work

- Install the air filter box cover. (☛ p. 122)

12.1 Opening the filler cap

**Danger****Fire hazard** Fuel is highly flammable.

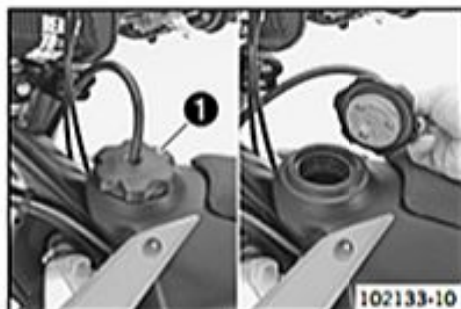
- Never refuel the vehicle near open flames or burning cigarettes, and always switch off the engine first. Be careful that no fuel is spilt, especially on hot vehicle components. Clean up spilt fuel immediately.
- The fuel in the fuel tank expands when warm and may emerge if overfilled. Follow the instructions on refueling.

**Warning****Danger of poisoning** Fuel is poisonous and a health hazard.

- Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that has been contaminated with fuel. Store fuel properly in a suitable canister and keep away from children.

**Warning****Environmental hazard** Improper handling of fuel is a danger to the environment.

- Do not allow fuel to get into the ground water, the ground, or the sewage system.



(All SX-F models)

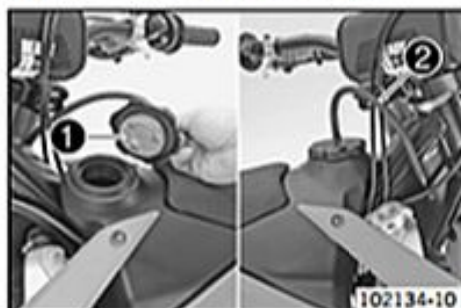
- Turn filler cap ① counterclockwise and lift it off.



(XC-F US)

- Press release button ①, turn the filler cap counterclockwise, and lift it off.

12.2 Closing the filler cap

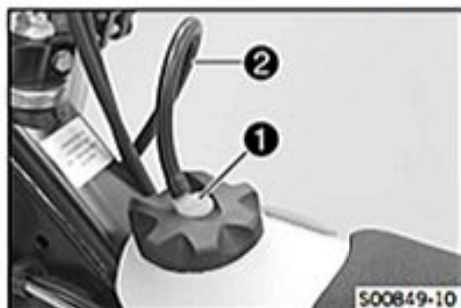


(All SX-F models)

- Mount the filler cap ① and turn it clockwise until the tank is firmly closed.

**Info**

Run the fuel tank breather hose ② without kinks.



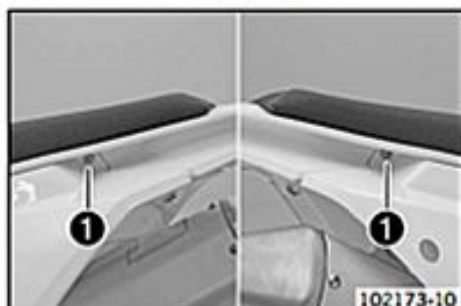
(XC-F US)

- Replace the filler cap and turn clockwise until the release button ① locks in place.

**Info**

Run the fuel tank breather hose ② without kinks.

12.3 Removing the seat



- Remove screws 1.

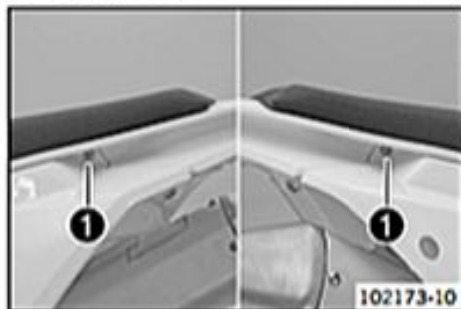


- Raise the rear of the seat, push the seat back, and lift it off.

12.4 Mounting the seat



- Hook in the front of the seat at the collar bushing of the fuel tank, lower it at the rear and simultaneously push it forward.
✓ Seat is correctly latched.



- Mount and tighten the seat fixing screws 1.

Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------

12.5 Removing the fuel tank

**Danger**

Fire hazard Fuel is highly flammable.

- Never refuel the vehicle near open flames or burning cigarettes, and always switch off the engine first. Be careful that no fuel is spilt, especially on hot vehicle components. Clean up spilt fuel immediately.
- The fuel in the fuel tank expands when warm and may emerge if overfilled. Follow the instructions on refueling.

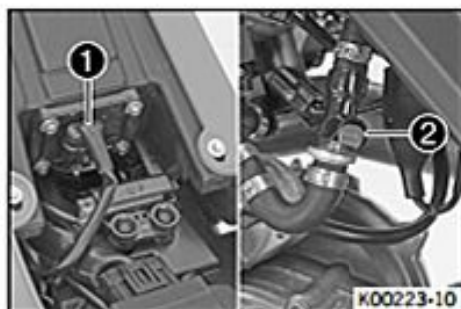
**Warning**

Danger of poisoning Fuel is poisonous and a health hazard.

- Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that has been contaminated with fuel. Store fuel properly in a suitable canister and keep away from children.

Preparatory work

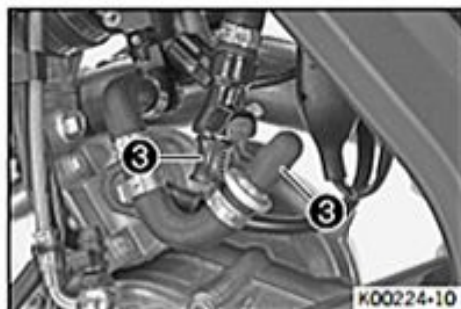
- Remove the seat. (☛ p. 126)

**Main work**

- Unplug connector **1** of the fuel pump.
- Clean the plug-in connection **2** of the fuel line thoroughly with compressed air.

**Info**

Under no circumstances should dirt enter into the fuel line. Dirt in the fuel line clogs the injection valve!



- Disconnect the plug-in connection of the fuel line.

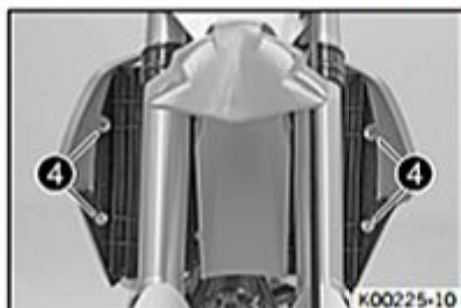
**Info**

Remaining fuel may flow out of the fuel hose.

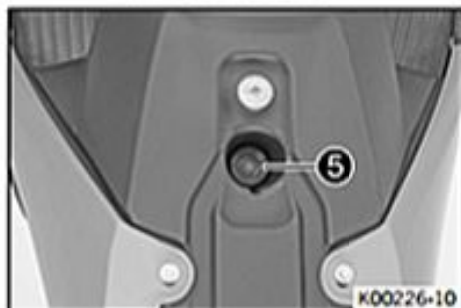
- Mount the wash cap set **3**.

Wash cap set (81212016100)

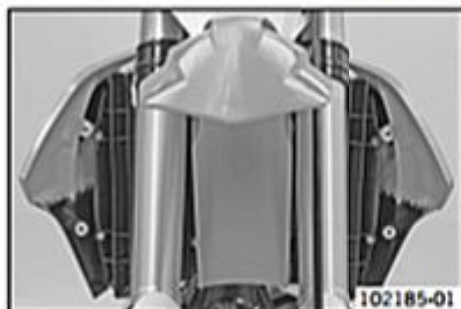
- Pull the hose off the fuel tank breather on the tank lid.



- Remove screws **4** with the collar bushing.



- Remove screw **5** with the rubber bushing.



- Pull both spoilers off of the sides of the radiator bracket and lift off the fuel tank.

12.6 Installing the fuel tank

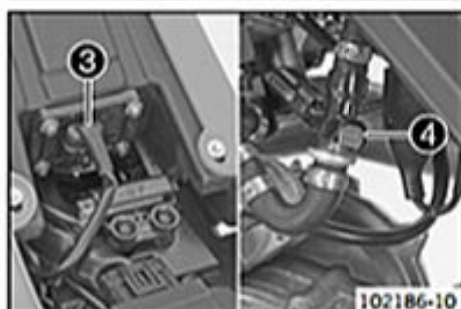
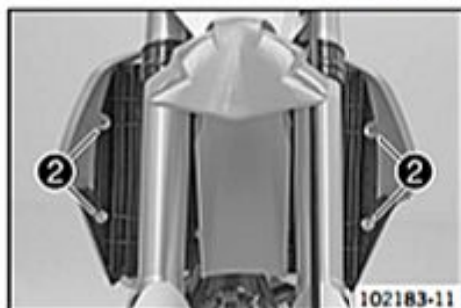
**Danger**

Fire hazard Fuel is highly flammable.

- Never refuel the vehicle near open flames or burning cigarettes, and always switch off the engine first. Be careful that no fuel is spilt, especially on hot vehicle components. Clean up spilt fuel immediately.
- The fuel in the fuel tank expands when warm and may emerge if overfilled. Follow the instructions on refueling.

**Warning****Danger of poisoning** Fuel is poisonous and a health hazard.

- Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that is contaminated with fuel.

**Main work**

- Check the throttle cable routing. (☞ p. 83)
- Position the fuel tank and fit the two spoilers to the sides of the radiator bracket.
- Make sure that no cables are trapped or damaged.
- Attach the hose to the fuel tank breather on the tank lid.
- Mount and tighten screw **1** with the rubber bushing.

Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------

- Mount and tighten screws **2** with the collar bushing.

Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------

- Plug in the connector **3** for the fuel pump.
- Remove the wash cap set. Thoroughly clean the plug-in connection of the fuel line using compressed air.

**Info**

Under no circumstances should dirt enter into the fuel line. Dirt in the fuel line clogs the injection valve!

- Lubricate the O-ring and connect the plug-in connection **4** for the fuel line.

**Info**

Route the cable and fuel line at a safe distance from the exhaust system.

Finishing work

- Mount the seat. (☞ p. 126)

12.7 Checking the fuel pressure**Danger****Fire hazard** Fuel is highly flammable.

- Never refuel the vehicle near open flames or burning cigarettes, and always switch off the engine first. Be careful that no fuel is spilt, especially on hot vehicle components. Clean up spilt fuel immediately.
- The fuel in the fuel tank expands when warm and may emerge if overfilled. Follow the instructions on refueling.

**Warning****Danger of poisoning** Fuel is poisonous and a health hazard.

- Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that has been contaminated with fuel. Store fuel properly in a suitable canister and keep away from children.

Condition

The fuel tank is full.

Ensure that the battery voltage does not drop below 12.5 V.

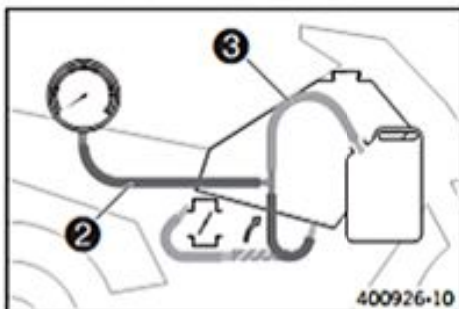
The diagnostic tool is disconnected.



- Press on the small metal plate and disconnect fuel hose connection ①.

**Info**

Remaining fuel may flow out of the fuel hose.



- Mount special tool ②.

Pressure tester (61029094000) (☛ p. 298)
--

- Mount special tool ③ with nozzle label 0,60.

Testing hose (61029093000) (☛ p. 298)

- Position the hose end in a fuel cannister.

Guideline

Minimum size of fuel cannister	10 l (2.6 US gal)
--------------------------------	-------------------

- Connect the diagnostic tool and start it.

- Select the "Function test of fuel pump control" actuator test.

Guideline

Maximum duration of the actuator test	3 min
---------------------------------------	-------

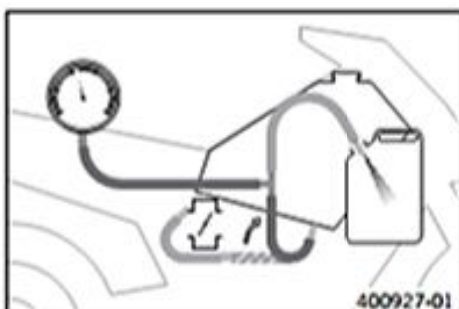
- Check the fuel pressure with the filler cap closed.

Fuel pressure

When the fuel pump is active	3.3... 3.7 bar (48... 54 psi)
------------------------------	-------------------------------

- If the specification is not reached:

- Open the filler cap. (☛ p. 125)
- Check the tank air vent system.



- Check the fuel pressure with the filler cap open.

Fuel pressure

When the fuel pump is active	3.3... 3.7 bar (48... 54 psi)
------------------------------	-------------------------------

- If the specification is not reached:

- Check that the fuel line is clear.
- Change the fuel filter. (☛ p. 131)
- Change the fuel pump. (☛ p. 129)

- Stop the "Function test of fuel pump control" actuator test by pressing the "Quit" button.

- Remove the special tools.

- Join the fuel hose connection.

12.8 Changing the fuel pump

**Danger**

Fire hazard Fuel is highly flammable.

- Never refuel the vehicle near open flames or burning cigarettes, and always switch off the engine first. Be careful that no fuel is spilt, especially on hot vehicle components. Clean up spilt fuel immediately.
- The fuel in the fuel tank expands when warm and may emerge if overfilled. Follow the instructions on refueling.

**Warning**

Danger of poisoning Fuel is poisonous and a health hazard.

- Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that has been contaminated with fuel. Store fuel properly in a suitable canister and keep away from children.



Warning

Environmental hazard Improper handling of fuel is a danger to the environment.

- Do not allow fuel to get into the ground water, the ground, or the sewage system.

Preparatory work

- Drain the fuel from the fuel tank into a suitable container.
- Remove the seat. (↖ p. 126)
- Remove the fuel tank. (↖ p. 126)

Main work

- Remove nut ① with the gasket.
- Remove fuel connection ② with the gasket.



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D00246-10

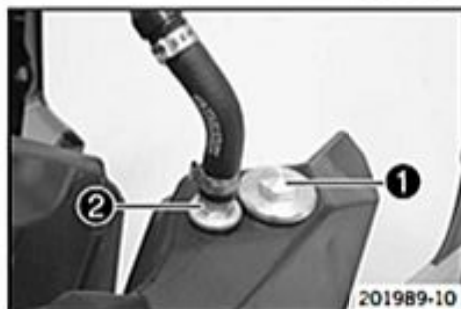
- Remove screws ③.



- Pull out the fuel pump.



D00248-10



201989-10

- Position the fuel pump.
- Mount fuel connection ② with the gasket but do not tighten yet.
- Mount and tighten nut ① with the gasket.

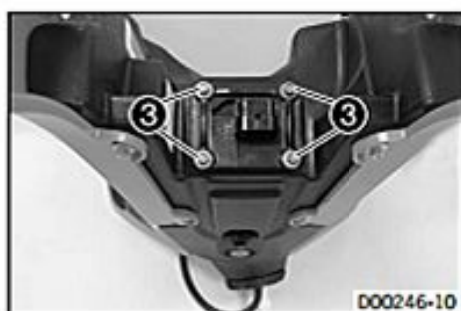
Guideline

Nut, fuel pump fastener	M12x1.75	15 Nm (11.1 lbf ft)
-------------------------	----------	------------------------

- Tighten fuel connection ②.

Guideline

Fuel connection on fuel tank	M8x1.25	10 Nm (7.4 lbf ft)
------------------------------	---------	--------------------



- Mount and tighten screws ③.

Guideline

Screw, fuel pump	EJOT	2.3 Nm (1.7 lbf ft)
------------------	------	------------------------

Finishing work

- Install the fuel tank. (☛ p. 127)
- Mount the seat. (☛ p. 126)

12.9 Changing the fuel filter



Danger

Fire hazard Fuel is highly flammable.

- Never refuel the vehicle near open flames or burning cigarettes, and always switch off the engine first. Be careful that no fuel is spilt, especially on hot vehicle components. Clean up spilt fuel immediately.
- The fuel in the fuel tank expands when warm and may emerge if overfilled. Follow the instructions on refueling.



Warning

Danger of poisoning Fuel is poisonous and a health hazard.

- Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that has been contaminated with fuel. Store fuel properly in a suitable canister and keep away from children.



Warning

Environmental hazard Improper handling of fuel is a danger to the environment.

- Do not allow fuel to get into the ground water, the ground, or the sewage system.

Preparatory work

- Drain the fuel from the fuel tank into a suitable container.
- Remove the seat. (☛ p. 126)
- Remove the fuel tank. (☛ p. 126)

Main work

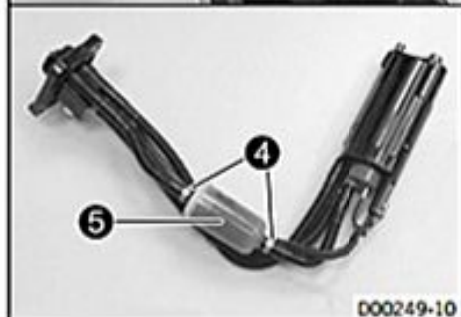
- Remove nut ① with the gasket.
- Remove fuel connection ② with the gasket.



- Remove screws ③.



- Pull out the fuel pump.
- Remove hose clamps ④.
- Remove fuel filter ⑤.

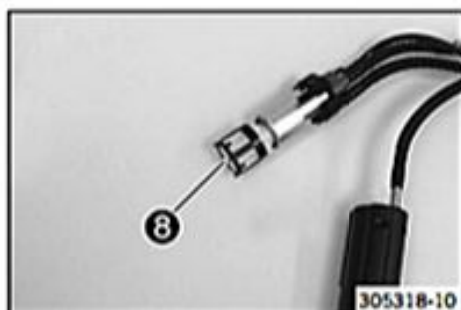


D00249-10



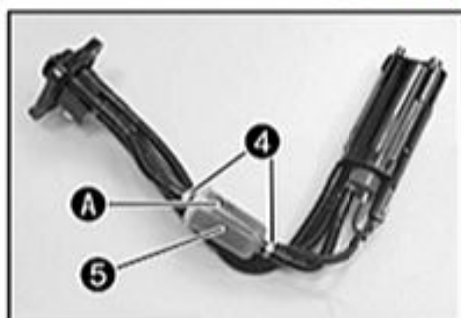
305317-10

- Press locking mechanism ⑥.
- Pull back fuel pump housing ⑦.



305318-10

- Change fuel screen ⑧.
- Mount the fuel pump housing.



- Mount fuel filter ⑤.
- ✓ Arrow ① points away from the fuel pump.
- Mount hose clamps ④.

Hose clamp pliers (60029057000) (☞ p. 298)



D00250-10



- Position the fuel pump.
- Mount fuel connection (2) with the gasket but do not tighten yet.
- Mount and tighten nut (1) with the gasket.

Guideline

Nut, fuel pump fastener	M12x1.75	15 Nm (11.1 lbf ft)
-------------------------	----------	------------------------

- Tighten fuel connection (2).

Guideline

Fuel connection on fuel tank	M8x1.25	10 Nm (7.4 lbf ft)
------------------------------	---------	--------------------

- Mount and tighten screws (3).

Guideline

Screw, fuel pump	EJOT	2.3 Nm (1.7 lbf ft)
------------------	------	------------------------



Finishing work

- Install the fuel tank. (☛ p. 127)
- Mount the seat. (☛ p. 126)

12.10 Changing the fuel screen



Danger

Fire hazard Fuel is highly flammable.

- Never refuel the vehicle near open flames or burning cigarettes, and always switch off the engine first. Be careful that no fuel is spilt, especially on hot vehicle components. Clean up spilt fuel immediately.
- The fuel in the fuel tank expands when warm and may emerge if overfilled. Follow the instructions on refueling.



Warning

Danger of poisoning Fuel is poisonous and a health hazard.

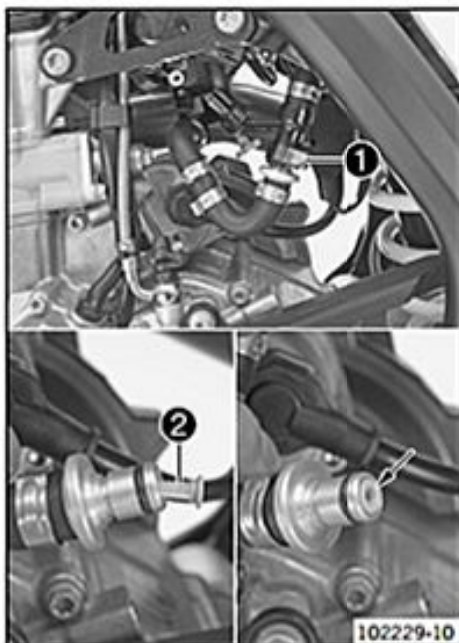
- Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that is contaminated with fuel.



Warning

Environmental hazard Improper handling of fuel is a danger to the environment.

- Do not allow fuel to get into the ground water, the ground, or the sewage system.



- Clean the plug-in connection ① of the fuel line thoroughly with compressed air.

**Info**

Under no circumstances should dirt enter into the fuel line. Dirt in the fuel line clogs the injection valve!

- Disconnect the plug-in connection of the fuel line.

**Info**

Remaining fuel may flow out of the fuel hose.

- Pull fuel screen ② out of the connecting piece.
- Slide the new fuel screen all the way into the connecting piece.
- Lubricate the O-ring and connect plug-in connection of the fuel line.

**Danger**

Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.

- When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.
- Start the engine and check the response.

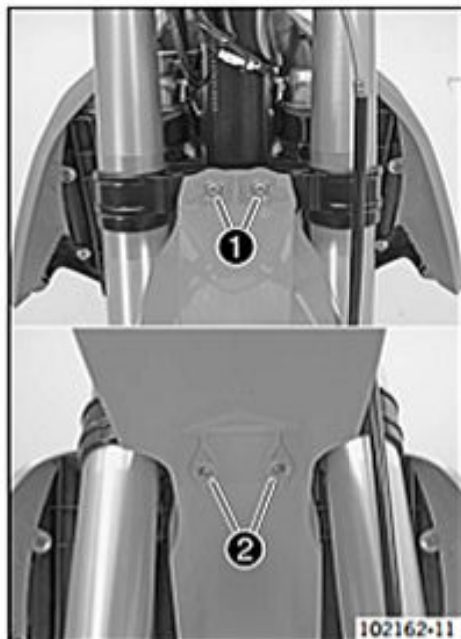
13.1 Removing the front fender

Preparatory work

- Remove the start number plate. (☛ p. 135)

Main work

- Remove screws ① and ②. Remove the front fender.



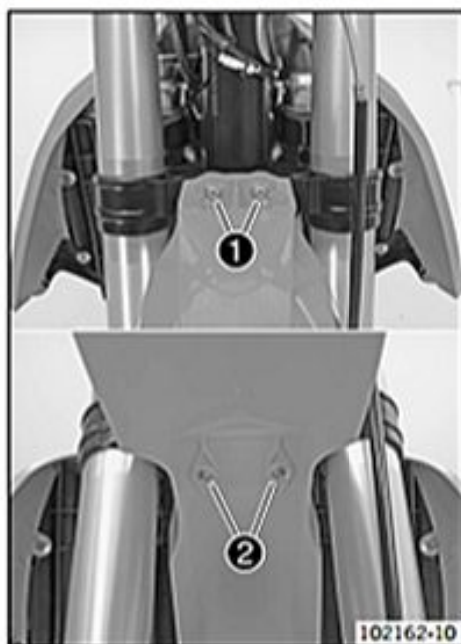
13.2 Installing the front fender

Main work

- Position the front fender. Mount and tighten screws ① and ②.

Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------

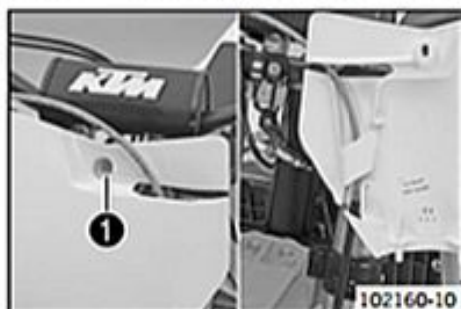


Finishing work

- Install the start number plate. (☛ p. 136)

13.3 Removing the start number plate

- Remove screw ①.
- Unhook the start number plate from the brake line and remove it.



13.4 Installing the start number plate



- Attach the start number plate to the brake line.
- Position the start number plate. Mount and tighten screw ①.

Guideline

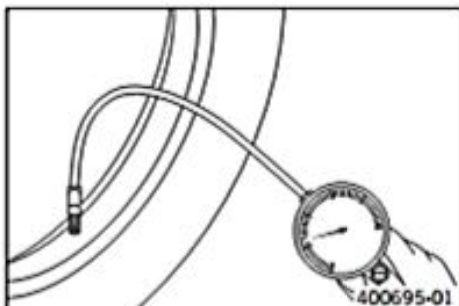
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------

- ✓ The holding lugs engage in the fender.

14.1 Checking the tire air pressure

**Info**

Low tire air pressure leads to abnormal wear and overheating of the tire.
Correct tire air pressure ensures optimal riding comfort and maximum tire service life.



- Remove the protection cap.
- Check the tire air pressure when the tires are cold.

Tire air pressure off road

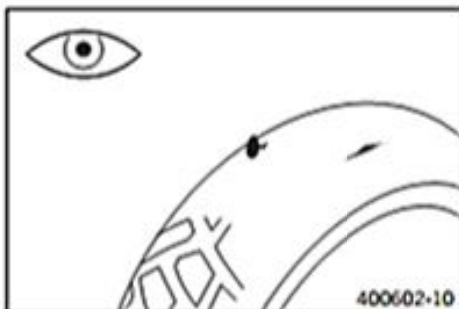
Front	1.0 bar (15 psi)
Rear	1.0 bar (15 psi)

- If the tire pressure does not meet specifications:
 - Correct the tire pressure.
- Mount the protection cap.

14.2 Checking the tire condition

**Info**

Only mount tires approved and/or recommended by KTM.
Other tires could have a negative effect on handling characteristics.
The type, condition and air pressure of the tires all have an important impact on the handling characteristics of the motorcycle.
The front and rear wheels must be mounted with tires with similar profiles.
Worn tires have a negative effect on handling characteristics, especially on wet surfaces.



- Check the front and rear tires for cuts, run-in objects and other damage.
 - If the tire exhibits cuts, run-in objects or other damage:
 - Change the tire.
- Check the depth of the tread.

**Info**

Note local national regulations concerning the minimum tread depth.

Minimum tread depth	≥ 2 mm (≥ 0.08 in)
---------------------	--------------------

- If the tread depth is less than the minimum permissible depth:
 - Change the tire.
- Check the tire age.

**Info**

The tire's date of manufacture is usually part of the tire markings and is indicated by the last four digits of the **DOT** marking. The first two digits indicate the week of manufacture and the last two digits the year of manufacture.
KTM recommends that the tires be changed after 5 years at the latest, regardless of the actual state of wear.

- If the tire is older than five years:
 - Change the tire.

14.3 Checking the wheel bearing for play

Preparatory work

- Raise the motorcycle with a lift stand. (↖ p. 10)
- Place a load on the rear of the vehicle.
- ✓ The front wheel is not in contact with the ground.

**Main work**

- Move the front wheel from side to side.

**Info**

Hold the fork leg to check it.

- If there is detectable play:
 - Change the front wheel bearing. (☛ p. 141)



- Place a load on the front of the vehicle.
 - ✓ The rear wheel is not in contact with the ground.
- Move the rear wheel from side to side.

**Info**

Hold the swingarm to check it.

- If there is detectable play:
 - Change the rear wheel bearing. (☛ p. 143)

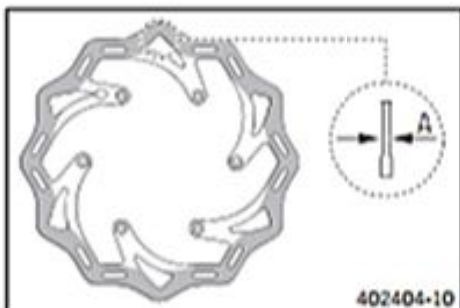
Finishing work

- Remove the motorcycle from the lift stand. (☛ p. 10)

14.4 Checking the brake discs**Warning**

Danger of accidents Reduced braking efficiency due to worn brake disc(s).

- Change the worn brake disc(s) without delay.



- Check the thickness of the front and rear brake discs at several places on the disk to see if it conforms to measurement **A**.

**Info**

Wear reduces the thickness of the brake disc around the area used by the brake linings.

Brake discs - wear limit

Brake discs - wear limit	
Front	2.5 mm (0.098 in)
Rear	3.5 mm (0.138 in)

- If the brake disc thickness is less than the specified value:
 - Change the brake disc.
- Check the front and rear brake discs for damage, cracking and deformation.
 - If the brake disc shows signs of damage, cracking or deformation:
 - Change the brake disc.

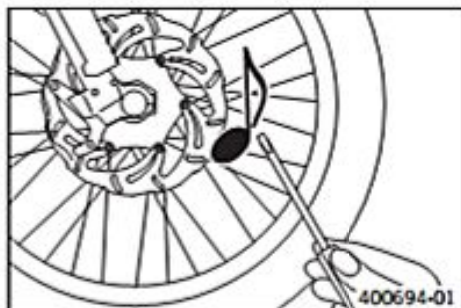
14.5 Checking the spoke tension**Warning**

Danger of accidents Instable handling due to incorrect spoke tension.

- Ensure that the spoke tension is correct.

**Info**

A loose spoke causes wheel imbalance and rapidly leads to more loose spokes. If the spokes are too tight, they can break due to local overload. Check the spoke tension regularly, especially on a new motorcycle.



- Briefly strike each spoke with the tip of a screwdriver.

**Info**

The tone frequency depends on the length of the spoke and the spoke diameter.

If you hear different tone frequencies from different spokes of equal length and diameter, this is an indication of different spoke tensions.

You should hear a high note.

- If the spoke tension varies:
 - Correct the spoke tension.
- Check the spoke torque.

Guideline

Spoke nipple, front wheel	M4.5	6 Nm (4.4 lbf ft)
Spoke nipple, rear wheel	M4.5	6 Nm (4.4 lbf ft)

Torque wrench with various accessories in set (58429094000) (☛ p. 297)

14.6 Front wheel**14.6.1 Removing the front wheel****Preparatory work**

- Raise the motorcycle with a lift stand. (☛ p. 10)

Main work

- Press the brake caliper onto the brake disc by hand in order to push back the brake pistons.

**Info**

Make sure when pushing back the brake pistons that you do not press the brake caliper against the spokes.



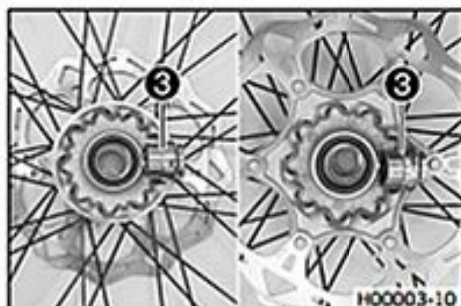
- Loosen screw ① by several turns.
- Loosen screws ②.
- Press on screw ① to push the wheel spindle out of the axle clamp.
- Remove screw ①.



- Holding the front wheel, withdraw the wheel spindle. Take the front wheel out of the fork.

**Info**

Do not pull the hand brake lever when the front wheel is removed. Always lay the wheel down in such a way that the brake disc is not damaged.



- Remove spacers (3).

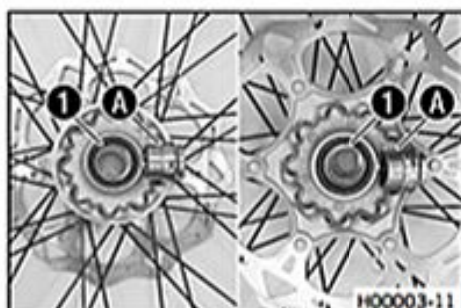
14.6.2 Installing the front wheel



Warning

Danger of accidents Reduced braking efficiency due to oil or grease on the brake discs.

- Always keep the brake discs free of oil and grease, and clean them with brake cleaner when necessary.



- Check the wheel bearing for damage and wear.
 - If the wheel bearing is damaged or worn:
 - Change the front wheel bearing. (☞ p. 141)
- Clean and grease shaft seal rings (1) and bearing surface (A) of the spacers.

Long-life grease (☞ p. 292)

- Insert the spacers.
- Position the front wheel and insert the wheel spindle.
 - ✓ The brake linings are correctly positioned.
- Mount and tighten screw (2).

Guideline

Screw, front wheel spindle	M20x1.5	35 Nm (25.8 lbf ft)
----------------------------	---------	------------------------

- Operate the hand brake lever several times until the brake linings are lying correctly against the brake disc.
- Remove the motorcycle from the lift stand. (☞ p. 10)
- Operate the front brake and compress the fork a few times firmly.
 - ✓ The fork legs straighten.
- Tighten screws (3).

Guideline

Screw, fork stub	M8	15 Nm (11.1 lbf ft)
------------------	----	------------------------



14.6.3 Changing the front brake discs

Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the front wheel. (☞ p. 139)

Main work

- Remove screws (1). Remove the brake disc.
- Clean the contact surface of the brake disc.
- Position the new brake disc with the label facing outward.
- Mount and tighten screws (1).

Guideline

Screw, front brake disc	M6	14 Nm (10.3 lbf ft)	Loctite® 243™
-------------------------	----	------------------------	---------------



Finishing work

- Install the front wheel. (☞ p. 140)

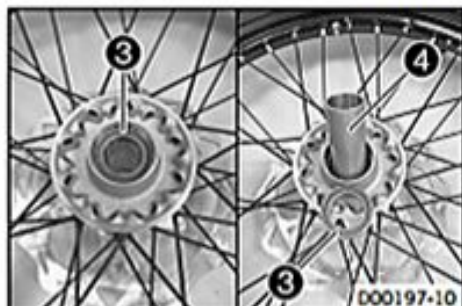
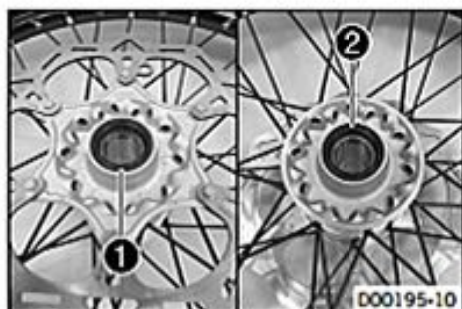
14.6.4 Changing the front wheel bearing

Preparatory work

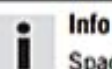
- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the front wheel. (☞ p. 139)

Main work

- Remove shaft seal rings ① and ②.



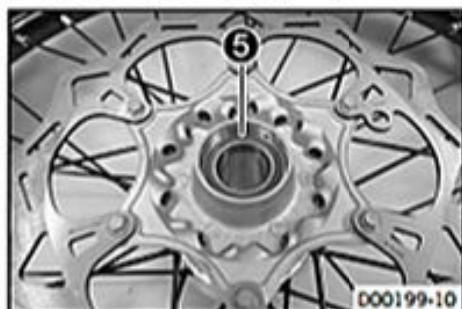
- Press out bearing ③ using a suitable tool.



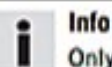
Info

Spacing tube ④ can be pushed aside.

- Remove spacing tube ④.

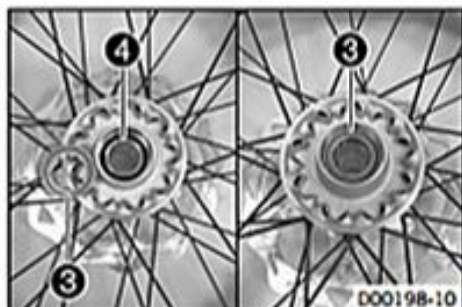


- Press out bearing ⑤ using a suitable tool.
- Press in the new bearing ⑤ all the way using a suitable tool.

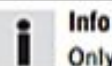


Info

Only press the bearing in via the outer ring; otherwise, the bearing will be damaged when it is pressed in.

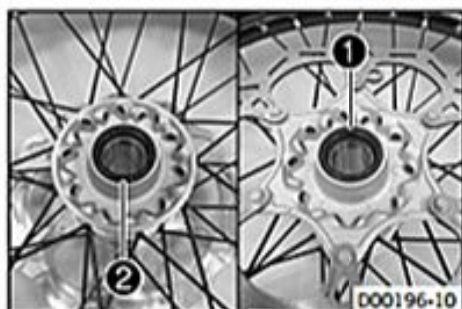


- Position spacing tube ④.
- Press in the new bearing ③ all the way using a suitable tool.



Info

Only press the bearing in via the outer ring; otherwise, the bearing will be damaged when it is pressed in.



- Grease the new shaft seal rings ② and ① and press in until they are flush.

Finishing work

- Install the front wheel. (☞ p. 140)

14.7 Rear wheel

14.7.1 Removing the rear wheel



Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)

Main work

- Press the brake caliper onto the brake disc by hand in order to push back the brake piston.



Info

Make sure when pushing back the brake piston that you do not press the brake caliper against the spokes.

- Remove nut 1.
- Remove chain adjuster 2. Withdraw wheel spindle 3 only enough to allow the rear wheel to be pushed forward.
- Push the rear wheel forward as far as possible. Remove the chain from the rear sprocket.



Info

Protect the motorcycle and its attachments against damage by covering them.

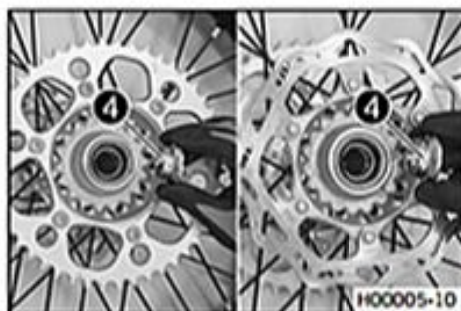
- Holding the rear wheel, withdraw the wheel spindle. Take the rear wheel out of the swing arm.



Info

Do not operate the foot brake when the rear wheel is removed. Always lay the wheel down in such a way that the brake disc is not damaged.

- Remove spacers 4.



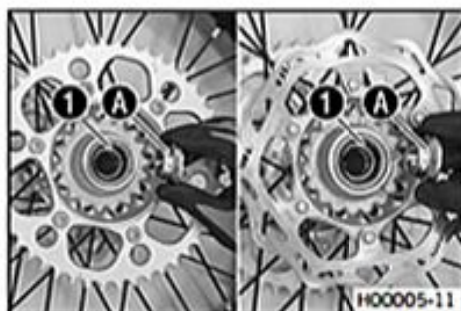
14.7.2 Installing the rear wheel



Warning

Danger of accidents Reduced braking efficiency due to oil or grease on the brake discs.

- Always keep the brake discs free of oil and grease, and clean them with brake cleaner when necessary.



Main work

- Check the wheel bearing for damage and wear.
 - If the wheel bearing is damaged or worn:
 - Change the rear wheel bearing. (☞ p. 143)
- Clean and grease shaft seal rings 1 and contact surface A of the spacers.

Long-life grease (☞ p. 292)

- Insert the spacers.



- Position the rear wheel and insert wheel spindle ②.
- ✓ The brake linings are correctly positioned.
- Mount the chain.



- Position chain adjuster ③. Mount nut ④, but do not tighten it yet.
- Make sure that chain adjusters ③ are fitted correctly on adjusting screws ⑤.
- Check the chain tension. (☞ p. 145)
- Tighten nut ④.

Guideline

Nut, rear wheel spindle	M25x1.5	80 Nm (59 lbf ft)
-------------------------	---------	-------------------



Info

The wide adjustment range of the chain adjusters (32 mm (1.26 in)) enables different secondary ratios with the same chain length. Chain adjusters ③ can be turned by 180°.

- Operate the foot brake lever repeatedly until the brake linings are in contact with the brake disc and there is a pressure point.



Finishing work

- Remove the motorcycle from the lift stand. (☞ p. 10)

14.7.3 Changing the rear brake discs

Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the rear wheel. (☞ p. 142)

Main work

- Remove screws ①. Remove the brake disc.
- Clean the contact surface of the brake disc.
- Position the new brake disc with the label facing outward.
- Mount and tighten screws ①.

Guideline

Screw, rear brake disc	M6	14 Nm (10.3 lbf ft)	Loctite® 243™
------------------------	----	------------------------	---------------



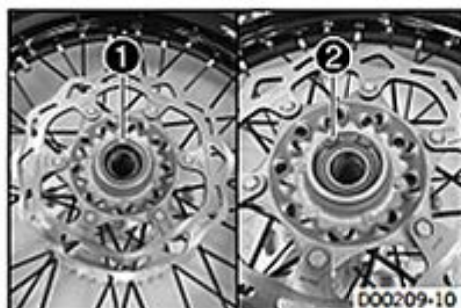
Finishing work

- Install the rear wheel. (☞ p. 142)
- Remove the motorcycle from the lift stand. (☞ p. 10)

14.7.4 Changing the rear wheel bearing

Preparatory work

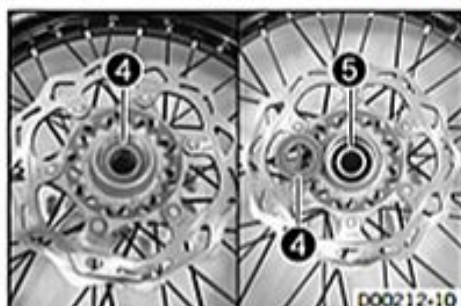
- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the rear wheel. (☞ p. 142)

**Main work**

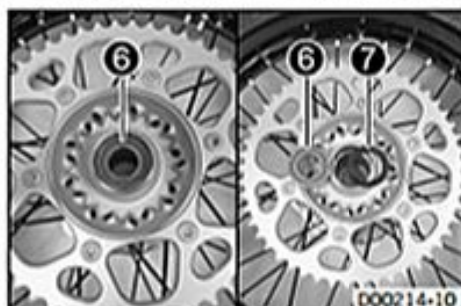
- Remove shaft seal ring ①.
- Remove lock ring ②.



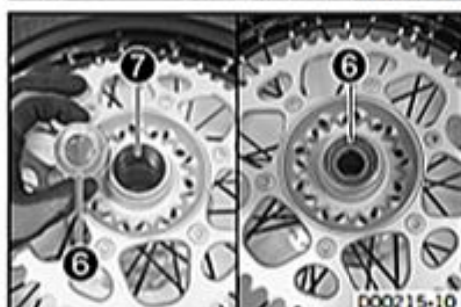
- Remove shaft seal ring ③.



- Using a suitable tool, press bearing ④ out from the inside to the outside.
- Remove spacing tube ⑤.



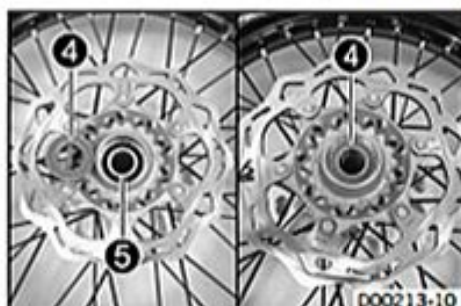
- Using a suitable tool, press bearing ⑥ out from the inside to the outside.



- Press the new bearing ⑥ all the way in from the outside to the inside.

Info

Only press the bearing in via the outer ring; otherwise, the bearing will be damaged when it is pressed in.



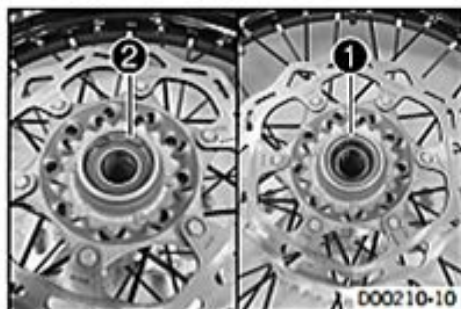
- Clean, grease, and mount spacing tube ⑤.

Long-life grease (☛ p. 292)

- Press the new bearing ④ all the way in from the outside to the inside.

Info

Only press the bearing in via the outer ring; otherwise, the bearing will be damaged when it is pressed in.



- Grease the new shaft seal ring (3) and press it in until it is flush.
- Mount lock ring (2).
✓ The lock ring engages audibly.
- Grease the new shaft seal ring (1) and press it in until it is flush.

Finishing work

- Install the rear wheel. (☛ p. 142)
- Remove the motorcycle from the lift stand. (☛ p. 10)

14.7.5 Checking the chain tension



Warning

Danger of accidents Danger caused by incorrect chain tension.

- If the chain is too taut, the components of the secondary power transmission (chain, engine sprocket, rear sprocket, bearings in the transmission and in the rear wheel) will be under additional load. In addition to premature wear, this can cause the chain or the countershaft of the transmission to break in extreme cases. If the chain is too loose, however, it may fall off the engine sprocket or rear sprocket and block the rear wheel or damage the engine. Ensure that the chain tension is correct and adjust it if necessary.



Preparatory work

- Raise the motorcycle with a lift stand. (☛ p. 10)

Main work

- Pull the chain at the end of the chain sliding component upwards to measure chain tension (A).



Info

The lower chain section (1) must be taut.

Chain wear is not always even, so you should repeat this measurement at different chain positions.

Chain tension	55... 58 mm (2.17... 2.28 in)
---------------	-------------------------------

- If the chain tension does not meet specifications:
 - Adjust the chain tension. (☛ p. 145)

Finishing work

- Remove the motorcycle from the lift stand. (☛ p. 10)

14.7.6 Adjusting the chain tension



Warning

Danger of accidents Danger caused by incorrect chain tension.

- If the chain is too taut, the components of the secondary power transmission (chain, engine sprocket, rear sprocket, bearings in the transmission and in the rear wheel) will be under additional load. In addition to premature wear, this can cause the chain or the countershaft of the transmission to break in extreme cases. If the chain is too loose, however, it may fall off the engine sprocket or rear sprocket and block the rear wheel or damage the engine. Ensure that the chain tension is correct and adjust it if necessary.

**Preparatory work**

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Check the chain tension. (☞ p. 145)

Main work

- Loosen nut ①.
- Loosen nuts ②.
- Adjust the chain tension by turning adjusting screws ③ left and right.

Guideline

Chain tension	55... 58 mm (2.17... 2.28 in)
Turn adjusting screws ③ on the left and right so that the markings on the left and right chain adjusters are in the same position relative to reference marks A. The rear wheel is then correctly aligned.	

- Tighten nuts ②.
- Make sure that chain adjusters ④ are fitted correctly on adjusting screws ③.
- Tighten nut ①.

Guideline

Nut, rear wheel spindle	M25x1.5	80 Nm (59 lbf ft)
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**Info**

The wide adjustment range of the chain adjusters (32 mm (1.18 in)) enables different secondary ratios with the same chain length. Chain adjusters ④ can be turned by 180°.

Finishing work

- Remove the motorcycle from the lift stand. (☞ p. 10)

14.7.7 Checking the chain, rear sprocket, engine sprocket, and chain guide**Preparatory work**

- Raise the motorcycle with a lift stand. (☞ p. 10)

Main work

- Shift the transmission to idle.
- Check the rear sprocket and engine sprocket for wear.
 - If the rear sprocket and engine sprocket are worn:
 - Change the drivetrain kit. (☞ p. 148)

**Info**

The engine sprocket, rear sprocket, and chain should always be replaced together.

- Pull at the top part of the chain with the specified weight A.

Guideline

Weight, chain wear measurement	10... 15 kg (22... 33 lb.)
--------------------------------	----------------------------

- Measure the distance B of 18 chain links in the lower chain section.

**Info**

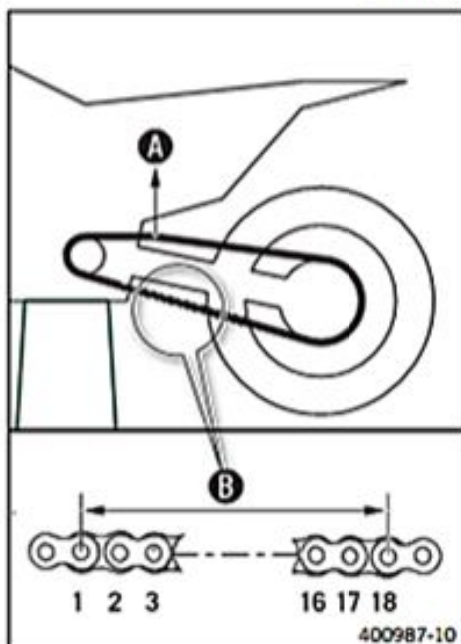
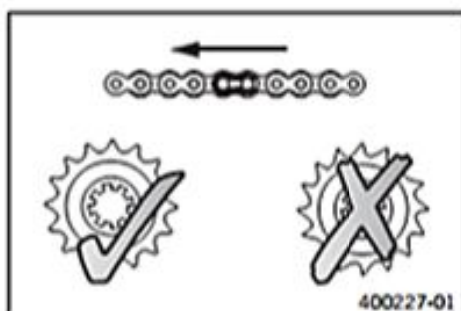
Chain wear is not always even, so you should repeat this measurement at different chain positions.

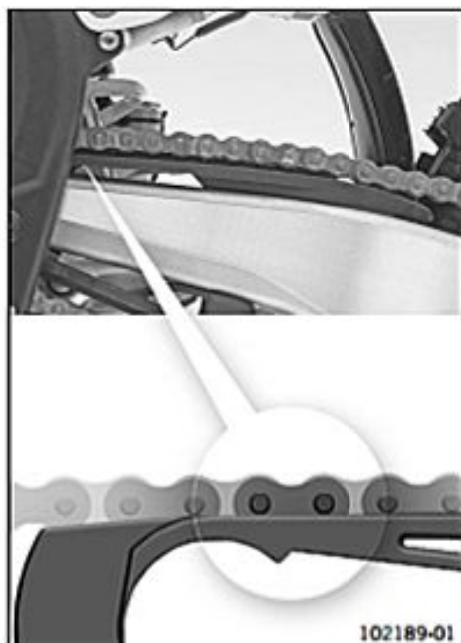
Maximum distance B at the longest chain section	272 mm (10.71 in)
---	-------------------

- If the distance B is greater than the specified measurement:
 - Change the drivetrain kit. (☞ p. 148)

**Info**

When the chain is replaced, the rear sprocket and engine sprocket should also be changed. New chains wear out faster on old, worn sprockets.





- Check the chain sliding guard for wear.
 - If the lower edge of the chain pin is at the level of or below the chain sliding guard:
 - Change the chain sliding guard.
- Check that the chain sliding guard is firmly seated.
 - If the chain sliding guard is loose:
 - Tighten the screws on the chain sliding guard.

Guideline

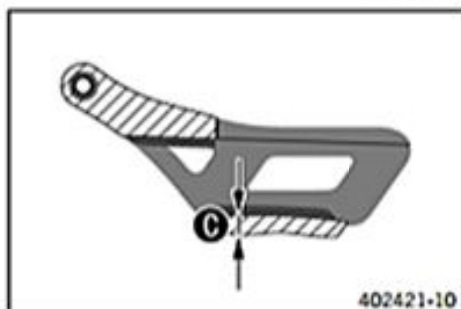
Screw, chain sliding guard	M6	6 Nm (4.4 lbf ft)	Loctite® 243™
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- Check the chain sliding piece for wear.
 - If the lower edge of the chain pins is in line with or below the chain sliding piece:
 - Change the chain sliding piece.
- Check that the chain sliding piece is firmly seated.
 - If the chain sliding piece is loose:
 - Tighten the screw of the chain sliding piece.

Guideline

Screw, chain sliding piece	M8	15 Nm (11.1 lbf ft)
----------------------------	----	------------------------



- Check the chain guide with a slide gauge for dimension **C**.

Minimum thickness C of the chain guide	6 mm (0.24 in)
---	----------------

- If the measured value is less than the specification:
 - Change the chain guide.



- Check that the chain guide is firmly seated.
 - If the chain guide is loose:
 - Tighten the screws on the chain guide.

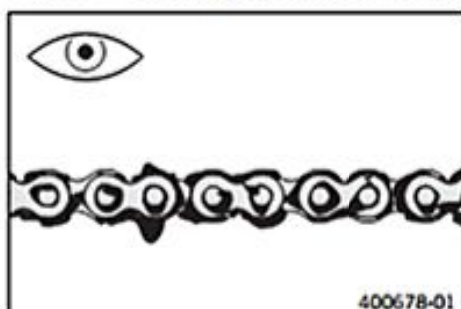
Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	-----------------------

Finishing work

- Remove the motorcycle from the lift stand. (☛ p. 10)

14.7.8 Checking for chain dirt accumulation



- Check the chain for coarse dirt accumulation.
 - If the chain is very dirty:
 - Clean the chain. (☞ p. 148)

14.7.9 Cleaning the chain

**Warning**

Danger of accidents Oil or grease on the tires reduces their grip.

- Remove oil and grease with a suitable cleaning material.

**Warning**

Danger of accidents Reduced braking efficiency due to oil or grease on the brake discs.

- Always keep the brake discs free of oil and grease, and clean them with brake cleaner when necessary.

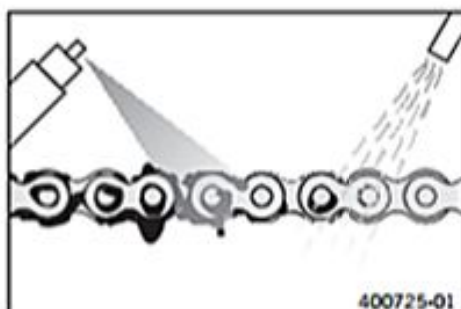
**Warning**

Environmental hazard Hazardous substances cause environmental damage.

- Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

**Info**

The service life of the chain depends largely on its maintenance.

**Preparatory work**

- Raise the motorcycle with a lift stand. (☞ p. 10)

Main work

- Clean the chain regularly and then treat with chain spray.

Chain cleaner (☞ p. 292)
Off-road chain spray (☞ p. 293)

Finishing work

- Remove the motorcycle from the lift stand. (☞ p. 10)

14.7.10 Changing the drivetrain kit

**Preparatory work**

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the air filter box cover. (☞ p. 122)

Main work

- Remove screw ①.
- Remove screw ②.
- Take the engine sprocket cover off to the front.



- Have an assistant operate the rear brake.
- Remove screw 3 with washers.

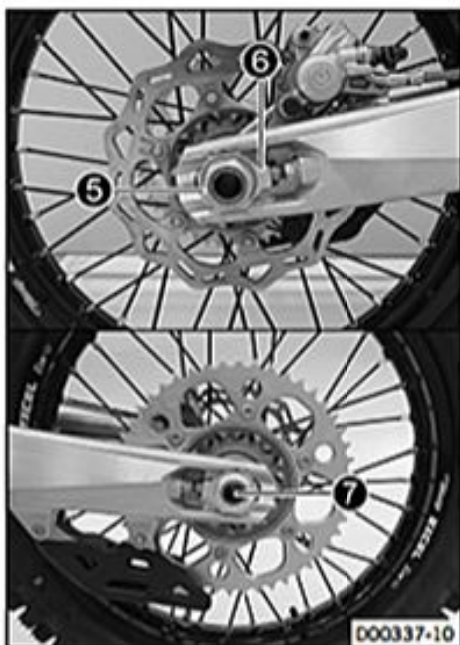


- Remove connecting link 4 of the chain.

**Info**

Cover the components to protect them against damage.

- Take off the chain.



- Remove nut 5.
- Remove chain adjuster 6.
- Hold the rear wheel and remove the wheel spindle 7.
- Take the rear wheel out of the swingarm.

**Info**

Do not operate the rear brake lever when the rear wheel is removed. Always lay the wheel down in such a way that the brake disc is not damaged.



- Remove engine sprocket 8.



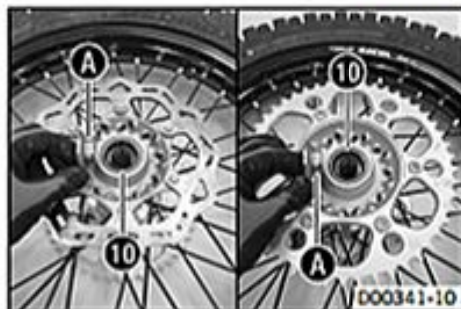
- Remove fittings 9. Remove the rear sprocket.
- Position the new rear sprocket. Mount and tighten fittings.

Guideline

Nut, rear sprocket screw	M8	35 Nm (25.8 lbf ft)	Loctite® 2701™
--------------------------	----	------------------------	----------------



- Slide the new engine sprocket (8) onto the countershaft.



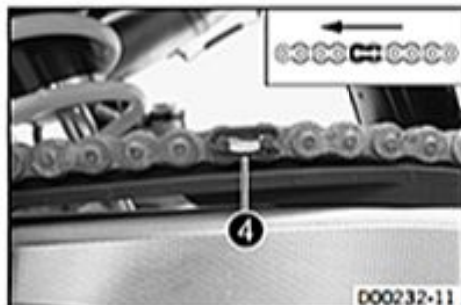
- Check the wheel bearing for damage and wear.
 - If the wheel bearing is damaged or worn:
 - Change the rear wheel bearing. (☞ p. 143)
- Remove the spacers.
- Clean and grease shaft seal rings (10) and contact surface (A) of the spacers.

Long-life grease (☞ p. 292)

- Insert the spacers.



- Position the rear wheel.
 - ✓ The brake linings are correctly positioned.
- Insert wheel spindle (7).



- Mount the new chain.
- Connect the chain with connecting link (4).

Guideline

The closed side of the chain joint lock must face in the direction of travel.



- Position chain adjuster (6). Mount nut (5), but do not tighten it yet.
- Make sure that chain adjusters (6) are fitted correctly on adjusting screws (11).
- Check the chain tension. (☞ p. 145)
- Tighten nut (5).

Guideline

Nut, rear wheel spindle	M25x1.5	80 Nm (59 lbf ft)
-------------------------	---------	-------------------



Info

The wide adjustment range of the chain adjusters enables different secondary ratios with the same chain length.

Chain adjusters (6) can be turned by 180°.

- Operate the rear brake lever several times until the brake linings are in contact with the brake disc and there is a pressure point.



- Have an assistant operate the rear brake.
- Mount and tighten screw ③ with washer.

Guideline

Screw, engine sprocket	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
------------------------	-----	------------------------	----------------



- Position the engine sprocket cover and mount it in the holder.
- Mount and tighten screw ①.

Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
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- Mount and tighten screw ②.

Guideline

Remaining screws, chassis	M8	25 Nm (18.4 lbf ft)
---------------------------	----	------------------------

Finishing work

- Install the air filter box cover. (☛ p. 122)
- Remove the motorcycle from the lift stand. (☛ p. 10)

15.1 Changing the main fuse



Warning

Fire hazard The electrical system can be overloaded if the wrong fuses are used.

- Use only fuses with the prescribed amperage. Never bypass or repair fuses.



Info

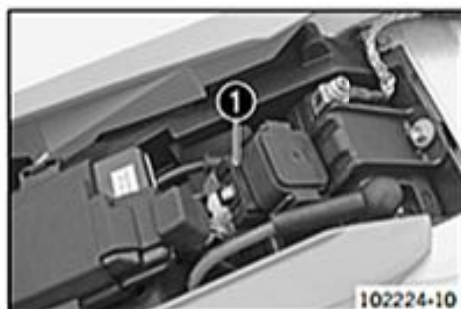
The main fuse protects all power consumers of the vehicle. It is located in the starter relay housing under the seat.

Preparatory work

- Switch off all power consumers and switch off the engine.
- Remove the seat. (↖ p. 126)

Main work

- Pull starter relay ① from the holder.



- Remove protection caps ②.
- Remove the faulty main fuse ③.



Info

A defective fuse can be identified by the burned-out fuse wire ①. A spare fuse ④ is located in the starter relay.

- Install a new main fuse.

Fuse (58011109110) (↖ p. 268)

- Check that the electrical equipment is functioning properly.



Tip

Insert the spare fuse so that it is available if needed.

- Mount the protection caps.
- Mount the starter relay onto the holder and lay the cable.

Finishing work

- Mount the seat. (↖ p. 126)

15.2 Removing the battery



Warning

Risk of injury Batteries contain harmful substances.

- Keep batteries out of the reach of children.
- Keep sparks and open flames away from the battery.
- Only charge in well-ventilated rooms.
- Maintain the minimum clearance to inflammable materials while charging.
Minimum clearance 1 m (3 ft)
- Over-discharged batteries with a charge of less than 9 V are not permitted to be charged. They must be disposed of.

Preparatory work

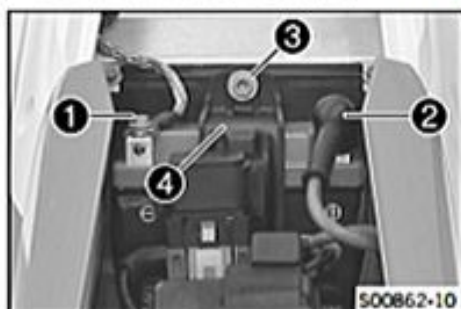
- Switch off all power consumers and switch off the engine.
- Remove the seat. (☛ p. 126)

Main work**(All SX-F models)**

- Disconnect negative cable ① from the battery.
- Pull back positive terminal cover ② and disconnect the positive cable from the battery.
- Remove screw ③.
- Pull holding bracket ④ forward and remove battery toward the top.



102221-10



500862-10

(XC-F US)

- Disconnect negative cable ① from the battery.
- Pull back positive terminal cover ② and disconnect the positive cable from the battery.
- Remove screw ③.
- Pull holding bracket ④ forward and remove battery toward the top.

15.3 Installing the battery**Main work****(All SX-F models)**

- Insert the battery into the battery compartment with the terminals facing forward and secure with the holding bracket ①.

Battery (C22S) (☛ p. 268)

- Mount and tighten screw ②.

Guideline

Remaining nuts, chassis	M6	10 Nm (7.4 lbf ft)
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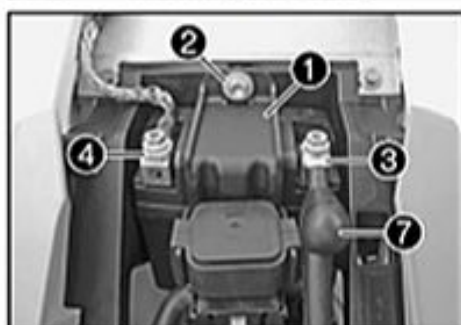
- Connect positive cable ③ and negative cable ④ with the battery.

Guideline

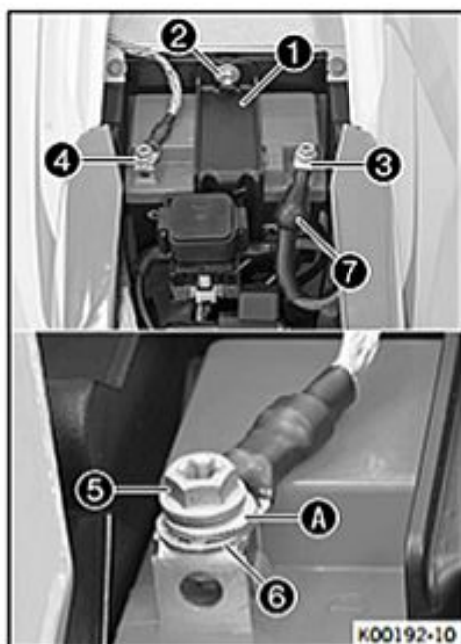
Screw, battery terminal	M5	2.5 Nm (1.84 lbf ft)
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Contact disks ① must be mounted between screws ⑤ and cable sockets ⑥ with the claws facing down.

- Slide positive terminal cover ⑦ over the positive terminal.



102222-10



(XC-F US)

- Insert the battery into the battery compartment with the terminals facing forward and secure with the holding bracket ①.

Battery (HJT25S-FP) (☞ p. 268)

- Mount and tighten screw ②.

Guideline

Remaining nuts, chassis	M6	10 Nm (7.4 lbf ft)
-------------------------	----	-----------------------

- Connect positive cable ③ and negative cable ④ with the battery.

Guideline

Screw, battery terminal	M5	2.5 Nm (1.84 lbf ft)
-------------------------	----	-------------------------

Contact disks A must be mounted between screws ⑤ and cable sockets ⑥ with the claws facing down.

- Slide positive terminal cover ⑦ over the positive terminal.

Finishing work

- Mount the seat. (☞ p. 126)

15.4 Checking the charging voltage

Condition

The battery must be fully functional and completely charged.

Preparatory work

- Remove the seat. (☞ p. 126)

Main work

- Pull back the positive terminal cover.
- Start the motorcycle for a check. (☞ p. 11)
- V** Measure the voltage between the specified points.
Measuring point Plus (+) – Measuring point Ground (–)

Charging voltage	
5,000 rpm	13.5... 15.0 V

- If the displayed value is less than the specified value:
 - Check the plug-in connections from the alternator to the voltage regulator.
 - Check the plug-in connections from the voltage regulator to the wiring harness.
 - Check the stator winding of the alternator. (☞ p. 258)
- If the displayed value is greater than the specified value:
 - Change the voltage regulator.

Finishing work

- Mount the seat. (☞ p. 126)



15.5 Checking the quiescent current

Preparatory work

- Switch off all power consumers and switch off the engine.
- Remove the seat. (☞ p. 126)

Main work

- Disconnect the negative cable from the battery.
- Measure the current between battery ground (–) and the negative cable.



Info

The value of the quiescent current applies only to vehicles in the original state, i.e. without additional power consumers.

Maximum quiescent current	< 1.0 mA
---------------------------	----------

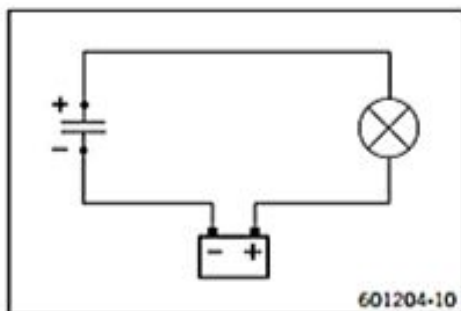


- If the measured value is higher than the specified value:
 - Disconnect the voltage regulator from the wiring harness and perform the measurement again.
 - Check the capacitor. (↖ p. 155)

Finishing work

- Mount the seat. (↖ p. 126)

15.6 Checking the capacitor



Condition

The battery is disconnected.

- Remove the capacitor.
- Discharge the capacitor by bridging the two contacts.
- Connect the capacitor with a 12 V test lamp on one connector and connect it to the battery as shown in the figure.



Info

As the charge of the capacitor increases, the test lamp becomes dimmer.

- The lamp lights up for: 0.5... 2.0 s
The capacitor is functional.
- The lamp lights up for: < 0.5 s
Change the capacitor.
- The lamp lights up for: > 2.0 s
Change the capacitor.

- Discharge the capacitor with a 12 V test lamp as shown in the figure.



Info

As the charge of the capacitor decreases, the test lamp becomes dimmer.

- The lamp lights up for: 0.5... 2.0 s
The capacitor is functional.
- The lamp lights up for: < 0.5 s
Change the capacitor.
- The lamp lights up for: > 2.0 s
Change the capacitor.

- Install the capacitor.

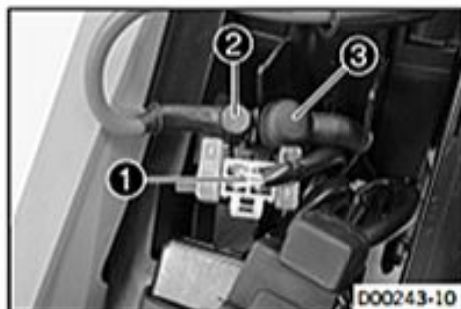
15.7 Checking the starter relay

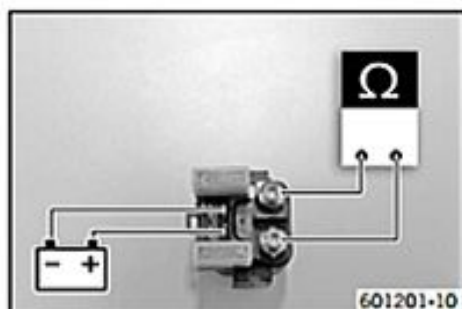
Preparatory work

- Switch off all power consumers and switch off the engine.
- Remove the seat. (↖ p. 126)
- Remove the air filter box cover. (↖ p. 122)

Main work

- Disconnect the negative cable of the battery.
- Pull the starter relay off of the bracket.
- Pull off connector ①.
- Disconnect cables ② and ③ on the starter relay.





- Connect the starter relay to a 12 V power supply as shown.
- Measure the resistance between the specified points.

Resistance of open circuit

0 Ω

- If the value displayed does not meet specifications:
 - Change the starter relay.

Finishing work

- Install the air filter box cover. (☛ p. 122)
- Mount the seat. (☛ p. 126)

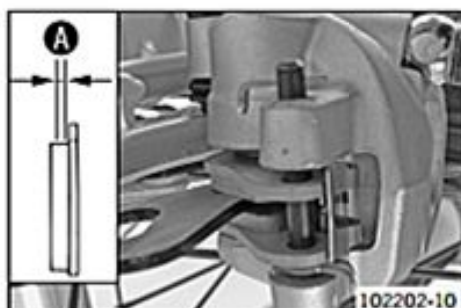
16.1 Checking the front brake linings



Warning

Danger of accidents Reduced braking efficiency caused by worn brake linings.

- Change worn brake linings immediately.



- Check the brake linings for minimum thickness **A**.

Minimum thickness A	$\geq 1 \text{ mm } (\geq 0.04 \text{ in})$
----------------------------	---

- If the minimum thickness is less than specified:
 - Change the front brake linings. (↪ p. 157)
- Check the brake linings for damage and cracking.
 - If damage or cracking is visible:
 - Change the front brake linings. (↪ p. 157)

16.2 Changing the front brake linings



Warning

Danger of accident Brake system failure.

- Maintenance work and repairs must be carried out professionally.



Warning

Skin irritation Brake fluid can cause skin irritation on contact.

- Avoid contact with skin and eyes, and keep out of the reach of children.
- Wear suitable protective clothing and goggles.
- If brake fluid comes into contact with the eyes, flush the eyes thoroughly with water and consult a physician immediately.



Warning

Danger of accidents Reduced braking efficiency due to old brake fluid.

- Change the brake fluid of the front and rear brake according to the service schedule.



Warning

Environmental hazard Hazardous substances cause environmental damage.

- Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

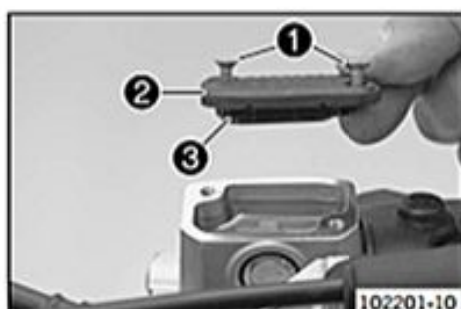


Info

Never use DOT 5 brake fluid! It is silicone-based and purple in color. Oil seals and brake lines are not designed for DOT 5 brake fluid.

Avoid contact between brake fluid and painted parts. Brake fluid attacks paint!

Use only clean brake fluid from a sealed container.



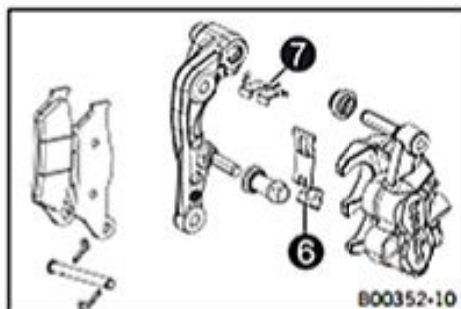
- Move the brake fluid reservoir mounted on the handlebar to a horizontal position.
- Remove screws **1**.
- Remove cover **2** with membrane **3**.



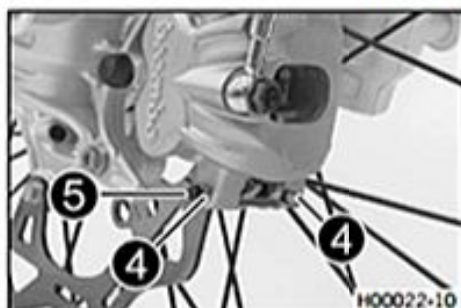
- Manually press the brake caliper to the brake disc to push back the brake pistons. Ensure that brake fluid does not flow out of the brake fluid reservoir, extracting it by suction if it does.

i Info

Make sure when pushing back the brake pistons that you do not press the brake caliper against the spokes.



- Remove cotter pins (4), pull out pin (5), and remove the brake linings.
- Clean the brake caliper and brake caliper support.
- Check that leaf spring (6) in the brake caliper and sliding plate (7) in the brake caliper support are seated correctly.

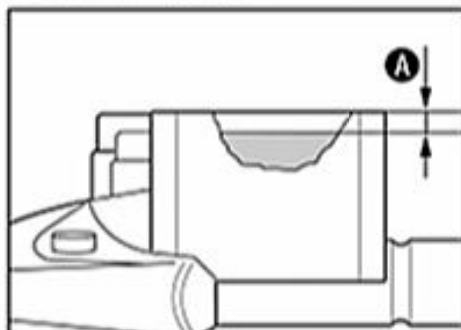


- Insert the new brake linings, insert pin (5), and mount cotter pins (4).

i Info

Always change the brake linings in pairs.

- Operate the hand brake lever repeatedly until the brake linings are in contact with the brake disc and there is a pressure point.



- Add brake fluid to level A.

Guideline

Dimension A (brake fluid level below top edge of container)

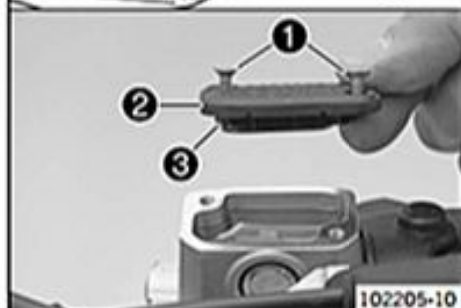
5 mm (0.2 in)

Brake fluid DOT 4 / DOT 5.1 (☞ p. 290)

- Position cover (2) with membrane (3).
- Mount and tighten screws (1).

i Info

Clean up overflowed or spilt brake fluid immediately with water.

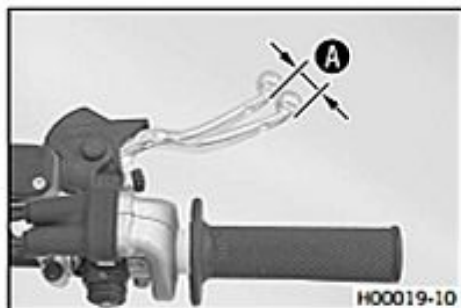


16.3 Checking the free travel of the hand brake lever

Warning

Danger of accidents Brake system failure.

- If there is no free travel on the hand brake lever, pressure builds up on the front brake circuit. The front brake can fail due to overheating. Adjust the free travel on hand brake lever according to specifications.

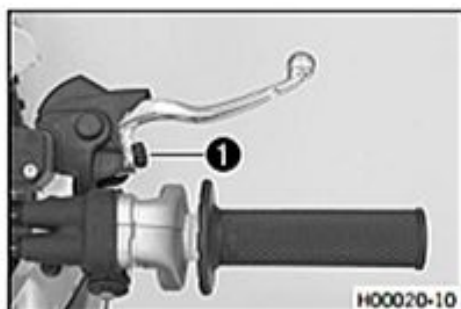


- Push the hand brake lever forward and check free travel **A**.

Free travel of hand brake lever	$\geq 3 \text{ mm}$ ($\geq 0.12 \text{ in}$)
---------------------------------	--

- If the free travel does not meet specifications:
 - Adjust the basic position of the hand brake lever. (☛ p. 159)

16.4 Adjusting the basic position of the hand brake lever



Preparatory work

- Check the free travel of the hand brake lever. (☛ p. 158)

Main work

- Adjust the basic setting of the hand brake lever to your hand size by turning adjusting screw **1**.

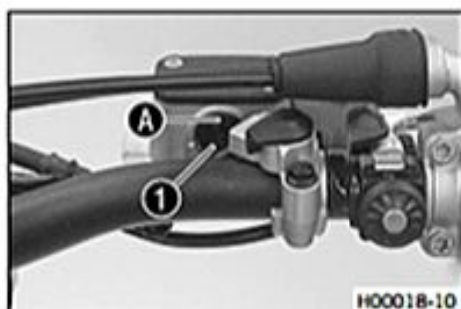


Info

Turn the adjusting screw clockwise to increase the distance between the hand brake lever and the handlebar.
 Turn the adjusting screw counterclockwise to decrease the distance between the hand brake lever and the handlebar.
 The range of adjustment is limited.
 Turn the adjusting screw by hand only, and do not apply any force.
 Do not make any adjustments while riding!

16.5 Checking the brake fluid level of the front brake

- Warning**
Danger of accidents Brake system failure.
- If the brake fluid level drops below the specified marking or the specified value, this is an indication that the brake system is leaking or that the brake linings are completely worn down. Check the brake system and do not continue riding.
- Warning**
Danger of accidents Reduced braking efficiency due to old brake fluid.
- Change the brake fluid of the front and rear brake according to the service schedule.



Preparatory work

- Check the front brake linings. (☛ p. 157)

Main work

- Move the brake fluid reservoir mounted on the handlebar to a horizontal position.
- Check the brake fluid level in level viewer **1**.
 - If the brake fluid level has dropped below marking **A**:
 - Add front brake fluid. (☛ p. 160)

16.6 Adding front brake fluid

- Warning**
Danger of accidents Brake system failure.
- If the brake fluid level drops below the specified marking or the specified value, this is an indication that the brake system is leaking or that the brake linings are completely worn down. Check the brake system and do not continue riding.
- Warning**
Skin irritation Brake fluid can cause skin irritation on contact.
- Avoid contact with skin and eyes, and keep out of the reach of children.
 - Wear suitable protective clothing and goggles.
 - If brake fluid comes into contact with the eyes, flush the eyes thoroughly with water and consult a physician immediately.
- Warning**
Danger of accidents Reduced braking efficiency due to old brake fluid.
- Change the brake fluid of the front and rear brake according to the service schedule.
- Warning**
Environmental hazard Hazardous substances cause environmental damage.
- Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

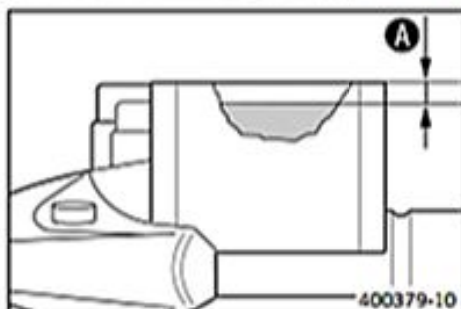
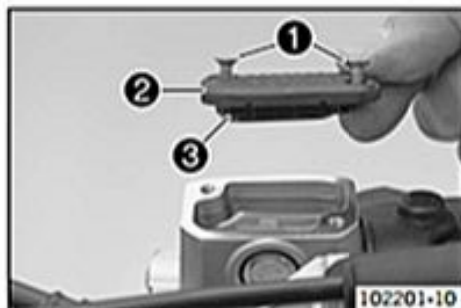
- i Info**
 Never use DOT 5 brake fluid. It is silicone-based and purple in color. Oil seals and brake lines are not designed for DOT 5 brake fluid.
 Avoid contact between brake fluid and painted parts. Brake fluid attacks paint!
 Use only clean brake fluid from a sealed container.

Preparatory work

- Check the front brake linings. (☛ p. 157)

Main work

- Move the brake fluid reservoir mounted on the handlebar to a horizontal position.
- Remove screws ①.
- Remove cover ② with membrane ③.

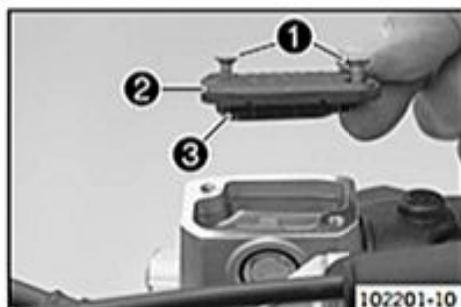


- Add brake fluid to level A.

Guideline

Level A (brake fluid level below container rim)	5 mm (0.2 in)
---	---------------

Brake fluid DOT 4 / DOT 5.1 (☛ p. 290)



- Position cover ② with membrane ③. Mount and tighten screws ①.

i Info

Clean up overflowed or spilled brake fluid immediately with water.

16.7 Changing the front brake fluid

**Warning****Skin irritation** Brake fluid can cause skin irritation on contact.

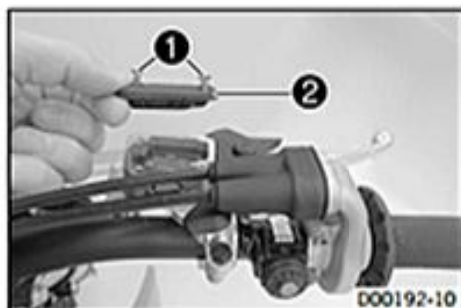
- Avoid contact with skin and eyes, and keep out of the reach of children.
- Wear suitable protective clothing and goggles.
- If brake fluid comes into contact with the eyes, flush the eyes thoroughly with water and consult a physician immediately.

**Warning****Environmental hazard** Hazardous substances cause environmental damage.

- Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

**Info**

Avoid contact between brake fluid and painted parts. Brake fluid attacks paint!
Use only clean brake fluid from a sealed container.



- Move the brake fluid reservoir mounted on the handlebar to a horizontal position.
- Cover the painted parts.
- Remove screws ①.
- Remove cover ② with the membrane.
- Draw the old brake fluid out of the brake fluid reservoir using a syringe and fill with fresh brake fluid.

Bleed syringe (50329050000) (☞ p. 295)

Brake fluid DOT 4 / DOT 5.1 (☞ p. 290)

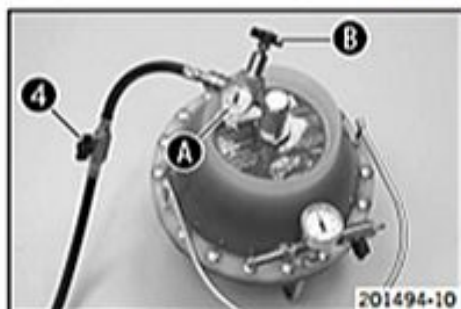


- Mount bleeder cover ③.

Bleeder cover (00029013005) (☞ p. 294)

- Connect the bleeding device.

Bleeding device (00029013100) (☞ p. 294)



- Open shut-off valve ④.

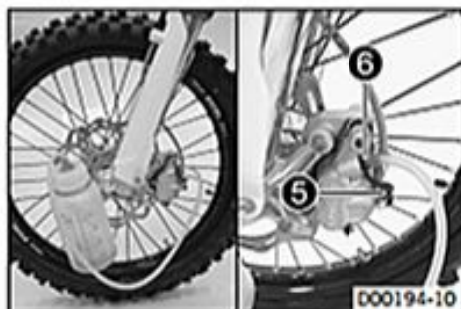
**Info**

Follow the operating instructions of the bleeding device.

- Ensure that the filling pressure is set on pressure gauge ①. Adjust the filling pressure on pressure regulator ② if necessary.

Guideline

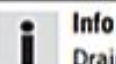
Filling pressure	2... 2.5 bar (29... 36 psi)
------------------	-----------------------------



- Pull off protection cap ⑤ of the brake caliper bleeder screw. Connect the hose of the bleeder bottle.

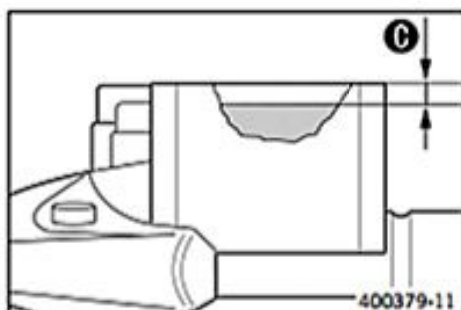
Bleeding device (00029013100) (☞ p. 294)

- Open bleeder screw ⑥ by approx. one-half turn.

**Info**

Drain until the fresh brake fluid emerges from the hose of the bleeder bottle without bubbles.

- Tighten the bleeder screw.
- Close shut-off valve ④.



- Open the bleeder screw again until brake fluid stops emerging.



Info

This prevents overfilling of the brake fluid reservoir.

- Tighten the bleeder screw. Remove the hose of the bleeder bottle. Mount the protection cap.
- Lock the bleeding device. Remove the bleeder cover.
- Correct the brake fluid to level **C**.

Guideline

Level C (brake fluid level below container rim)	5 mm (0.2 in)
--	---------------

Brake fluid DOT 4 / DOT 5.1 (☞ p. 290)
--

- Position the cover with the membrane. Mount and tighten the screws.



Info

Clean up overflowed or spilt brake fluid immediately with water.

- Check the hand brake lever for a firm pressure point.

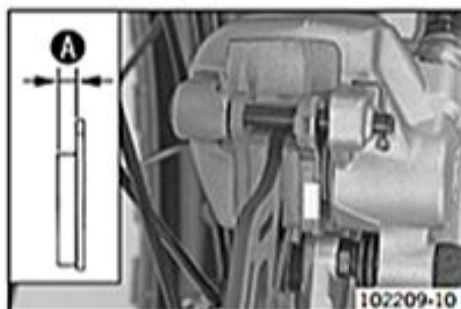
16.8 Checking the rear brake linings



Warning

Danger of accidents Reduced braking efficiency caused by worn brake linings.

- Change worn brake linings immediately.



- Check the brake linings for minimum thickness **A**.

Minimum thickness A	≥ 1 mm (≥ 0.04 in)
----------------------------	--------------------

- If the minimum thickness is less than specified:
 - Change the rear brake linings. (☞ p. 162)
- Check the brake linings for damage and cracking.
 - If damage or cracking is visible:
 - Change the rear brake linings. (☞ p. 162)

16.9 Changing the rear brake linings



Warning

Danger of accident Brake system failure.

- Maintenance work and repairs must be carried out professionally.



Warning

Skin irritation Brake fluid can cause skin irritation on contact.

- Avoid contact with skin and eyes, and keep out of the reach of children.
- Wear suitable protective clothing and goggles.
- If brake fluid comes into contact with the eyes, flush the eyes thoroughly with water and consult a physician immediately.



Warning

Danger of accidents Reduced braking efficiency due to old brake fluid.

- Change the brake fluid of the front and rear brake according to the service schedule.



Warning

Environmental hazard Hazardous substances cause environmental damage.

- Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

i Info

Never use DOT 5 brake fluid! It is silicone-based and purple in color. Oil seals and brake lines are not designed for DOT 5 brake fluid.

Avoid contact between brake fluid and painted parts. Brake fluid attacks paint!

Use only clean brake fluid from a sealed container.



- Stand the vehicle upright.
- Remove screw cap **1** with membrane **2** and the O-ring.



- Manually press the brake caliper to the brake disc to push back the brake piston. Ensure that brake fluid does not flow out of the brake fluid reservoir, extracting it by suction if it does.

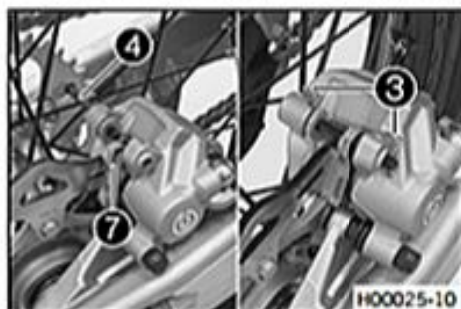
i Info

Make sure when pushing back the brake piston that you do not press the brake caliper against the spokes.

- Remove cotter pins **3**, pull out pin **4**, and remove the brake linings.
- Clean the brake caliper and brake caliper support.
- Check that leaf spring **5** in the brake caliper and sliding plate **6** in the brake caliper support are seated correctly.

i Info

The arrow on the leaf spring points in the rotation direction of the brake disc.



- Insert the new brake linings, insert pin **4**, and mount cotter pins **3**.

i Info

Always change the brake linings in pairs.

Make sure that the decoupling plate **7** is mounted on the piston side of the brake lining.

- Operate the foot brake lever repeatedly until the brake linings are in contact with the brake disc and there is a pressure point.

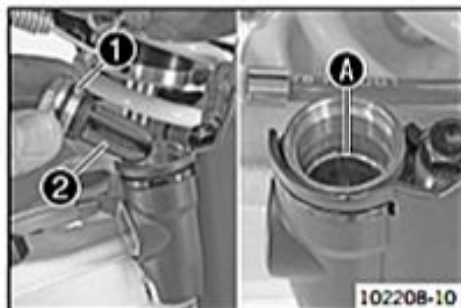
- Add brake fluid to level **A**.

Brake fluid DOT 4 / DOT 5.1 (☞ p. 290)

- Mount and tighten screw cap **1** with membrane **2** and the O-ring.

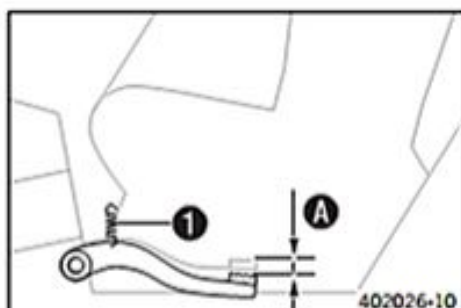
i Info

Clean up overflowed or spilt brake fluid immediately with water.



16.10 Checking the free travel of foot brake lever

- Warning**
Danger of accidents Brake system failure.
- If there is no free travel on the foot brake lever, pressure builds up on the rear brake circuit. The rear brake can fail due to overheating. Adjust the free travel on foot brake lever according to specifications.



- Disconnect spring ①.
- Move the foot brake lever back and forth between the end stop and the contact to the foot brake cylinder piston and check free travel A.

Guideline

Free travel at foot brake lever	3... 5 mm (0.12... 0.2 in)
---------------------------------	----------------------------

- If the free travel does not meet specifications:
 - Adjust the basic position of the foot brake lever. (↖ p. 164)
- Reconnect spring ①.

16.11 Adjusting the basic position of the foot brake lever

- Warning**
Danger of accidents Brake system failure.
- If there is no free travel on the foot brake lever, pressure builds up on the rear brake circuit. The rear brake can fail due to overheating. Adjust the free travel on foot brake lever according to specifications.



- Disconnect spring ①.
- Loosen nut ④ and, with push rod ⑤, turn it back until you have maximum free travel.
- To adjust the basic position of the foot brake lever individually, loosen nut ② and turn screw ③ accordingly.



Info

The range of adjustment is limited.

- Turn push rod ⑤ accordingly until you have free travel A. If necessary, adjust the basic position of the foot brake lever.

Guideline

Free travel at foot brake lever	3... 5 mm (0.12... 0.2 in)
---------------------------------	----------------------------

- Hold screw ③ and tighten nut ②.

Guideline

Nut, foot brake lever stop	M8	20 Nm (14.8 lbf ft)
----------------------------	----	------------------------

- Hold push rod ⑤ and tighten nut ④.

Guideline

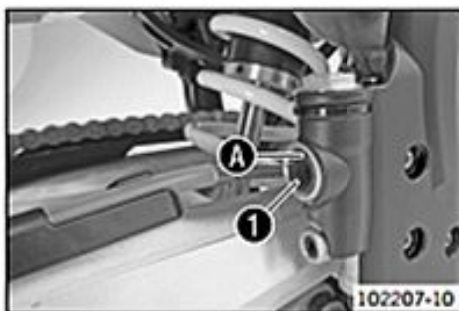
Remaining nuts, chassis	M6	10 Nm (7.4 lbf ft)
-------------------------	----	--------------------

- Reconnect spring ①.

16.12 Checking the rear brake fluid level

- Warning**
Danger of accidents Brake system failure.
- If the brake fluid level drops below the specified marking or the specified value, this is an indication that the brake system is leaking or that the brake linings are completely worn down. Check the brake system and do not continue riding.

- Warning**
Danger of accidents Reduced braking efficiency due to old brake fluid.
- Change the brake fluid of the front and rear brake according to the service schedule.

**Preparatory work**

- Check the rear brake linings. (☞ p. 162)

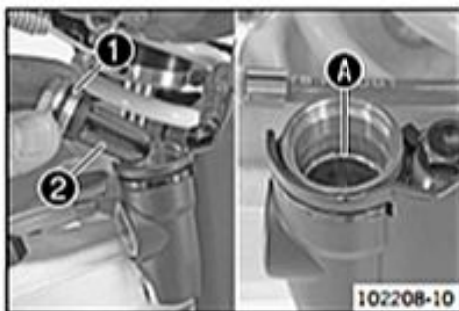
Main work

- Stand the vehicle upright.
- Check the brake fluid level in the viewer **1**.
 - If the brake fluid level drops below marking **A**:
 - Add rear brake fluid. (☞ p. 165)

16.13 Adding rear brake fluid

- Warning**
Danger of accidents Brake system failure.
- If the brake fluid level drops below the specified marking or the specified value, this is an indication that the brake system is leaking or that the brake linings are completely worn down. Check the brake system and do not continue riding.
- Warning**
Skin irritation Brake fluid can cause skin irritation on contact.
- Avoid contact with skin and eyes, and keep out of the reach of children.
 - Wear suitable protective clothing and goggles.
 - If brake fluid comes into contact with the eyes, flush the eyes thoroughly with water and consult a physician immediately.
- Warning**
Danger of accidents Reduced braking efficiency due to old brake fluid.
- Change the brake fluid of the front and rear brake according to the service schedule.
- Warning**
Environmental hazard Hazardous substances cause environmental damage.
- Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

- i Info**
 Never use DOT 5 brake fluid! It is silicone-based and purple in color. Oil seals and brake lines are not designed for DOT 5 brake fluid.
 Avoid contact between brake fluid and painted parts. Brake fluid attacks paint!
 Use only clean brake fluid from a sealed container.

**Preparatory work**

- Check the rear brake linings. (☞ p. 162)

Main work

- Stand the vehicle upright.
- Remove screw cap **1** with membrane **2** and the O-ring.
- Add brake fluid to level **A**.

Brake fluid DOT 4 / DOT 5.1 (☞ p. 290)

- Mount and tighten the screw cap with the membrane and O-ring.

- i Info**
 Clean up overflowed or spilt brake fluid immediately with water.

16.14 Changing the rear brake fluid

- Warning**
Skin irritation Brake fluid can cause skin irritation on contact.
- Avoid contact with skin and eyes, and keep out of the reach of children.
 - Wear suitable protective clothing and goggles.
 - If brake fluid comes into contact with the eyes, flush the eyes thoroughly with water and consult a physician immediately.

- Warning**
Environmental hazard Hazardous substances cause environmental damage.
- Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

- i Info**
 Avoid contact between brake fluid and painted parts. Brake fluid attacks paint!
 Use only clean brake fluid from a sealed container.



- Cover the painted parts.
- Remove screw cap 1 with membrane and the O-ring.
- Draw the old brake fluid out of the brake fluid reservoir using a syringe and fill with fresh brake fluid.

Bleed syringe (50329050000) (☞ p. 295)

Brake fluid DOT 4 / DOT 5.1 (☞ p. 290)

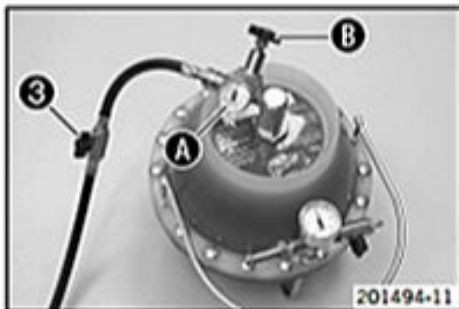


- Mount bleeder cover 2.

Bleeder cover (00029013006) (☞ p. 294)

- Connect the bleeding device.

Bleeding device (00029013100) (☞ p. 294)



- Open shut-off valve 3.

- i Info**
 Follow the operating instructions of the bleeding device.

- Ensure that the filling pressure is set on pressure gauge A. Adjust the filling pressure on pressure regulator B if necessary.

Guideline

Filling pressure 2... 2.5 bar (29... 36 psi)



- Pull off protection cap 4 of the bleeder screw. Connect the hose of the bleeder bottle.

Bleeding device (00029013100) (☞ p. 294)

- Open bleeder screw 5 by approx. one-half turn.

- i Info**
 Drain until the fresh brake fluid emerges from the hose of the bleeder bottle without bubbles.

- Tighten the bleeder screw.
- Close shut-off valve 3.

- Open the bleeder screw again until brake fluid stops emerging.



Info

This prevents overfilling of the brake fluid reservoir.

- Tighten the bleeder screw. Remove the hose of the bleeder bottle. Mount the protection cap.
- Lock the bleeding device. Remove the bleeder cover.
- Stand the vehicle upright.
- Correct the brake fluid to marking **C**.

Brake fluid DOT 4 / DOT 5.1 (↖ p. 290)

- Mount and tighten the screw cap with the membrane and O-ring.



Info

Clean up overflowed or spilt brake fluid immediately with water.

- Check the foot brake lever for a firm pressure point.



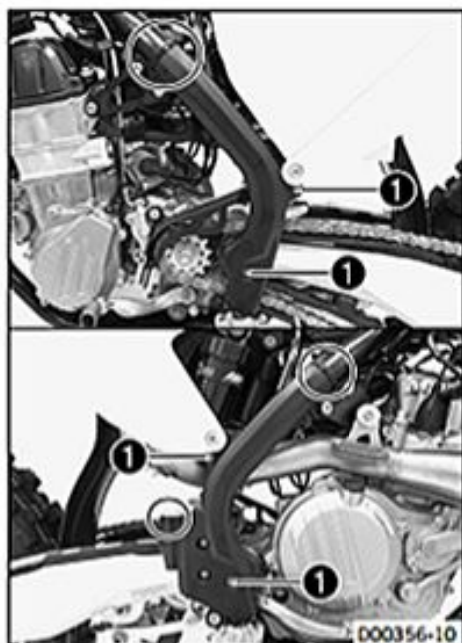
17.1 Removing the engine

Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Drain the coolant. (☞ p. 251)
- Remove the seat. (☞ p. 126)
- Remove the fuel tank. (☞ p. 126)
- Remove the main silencer. (☞ p. 120)

Main work

- Remove screws ❶ with the washers.
- Remove the cable tie(s).
- Take off the frame protector on both sides.
- Remove the air filter box cover. (☞ p. 122)



- Disconnect the negative cable of the battery.



- Loosen hose clip ❷.



- Push back protection cap ❸.
- Unplug the connector.



- Pull rollover sensor 4 away from the holder and hang to one side.



- Push back hose clamp 5 and pull off the vent hose.



- Remove screw 6.
- Loosen screw 7.
- Repeat these steps on the opposite side.



- Pivot up the subframe and secure it.

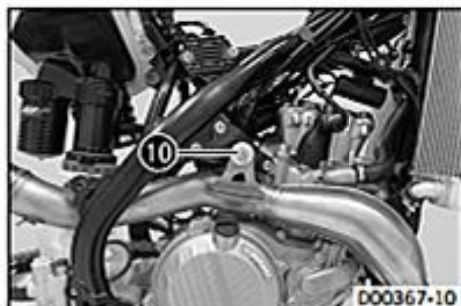


- Remove screw 8.
- Pivot the shock absorber toward the rear and twist it slightly.



- Remove springs 9.

Spring hook (50305017000) (☛ p. 295)



- Remove screw 10 with the washer.
- Take off the manifold.



- Remove fittings 11.
- Take off the engine brace.



- Disconnect plug-in connector 12.
- Disconnect plug-in connectors 13.



- Disconnect plug-in connector 14.



- Remove the cable tie(s).
- Remove the cable clamps and expose the cable.



- Push back protection cap **15**.
- Unplug the connector.



- Loosen hose clip **16**.
- Pull off the radiator hose.



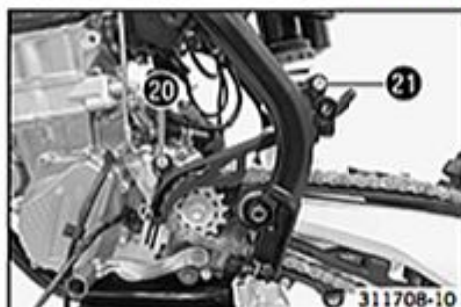
- Loosen hose clips **17**.
- Pull off the radiator hoses.



- Pull capacitor **18** away from the holder and hang to one side.



- Pull off spark plug connector **19**.



- Remove screw **20**.
- Remove screw **21**.
- Take off the engine sprocket cover.



- Remove screws 22.
- Take off the slave cylinder of the clutch and hang it to one side.

**Info**

Do not kink the clutch line.
Do not activate the clutch lever while the slave cylinder of the clutch is removed.



- Activate the foot brake lever.
- Loosen screw 23.

**Info**

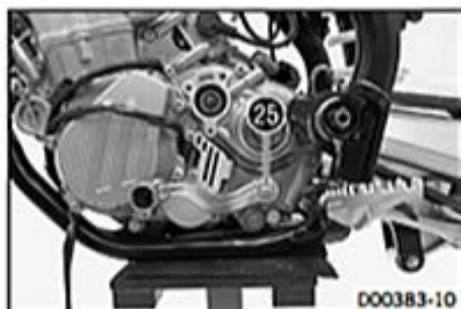
The help of an assistant is useful in this step.



- Remove connecting link 24 of the chain.
- Take off the chain.



- Remove screw 23.
- Take off the engine sprocket.



- Remove screw 25 with the washers.
- Take off the shift lever.



- Loosen hose clip 26.
- Pull the throttle valve body off of the cylinder head toward the rear and hang it to one side.



- Push back protection cap 27 and remove the nut.
- Hang the positive cable to side.



- Remove spring 28.



- Remove fitting 29.



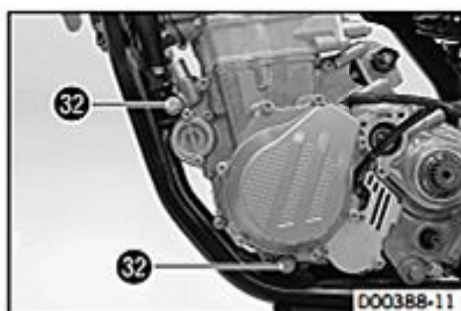
- Remove screws 30.
- Remove the foot brake cylinder and allow it to hang tension-free to the side.



- Take the brake line out of the guide.



- Remove nut 31.
- Remove the swingarm pivot.
- Carefully pull the swingarm back, and secure the swingarm.



- Remove screws 32.



- Lift out the engine sideways.

**Info**

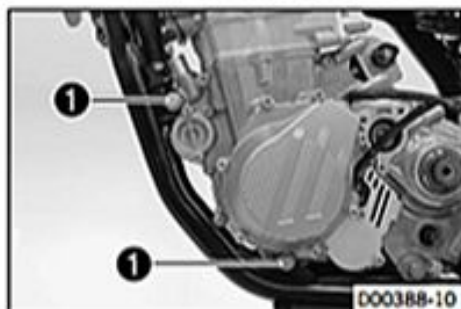
The help of an assistant is useful in this step.
Make sure that the engine is sufficiently secured against falling over.
Protect the frame and attachments against damage.

17.2 Installing the engine**Main work**

- Position the engine in the frame.

**Info**

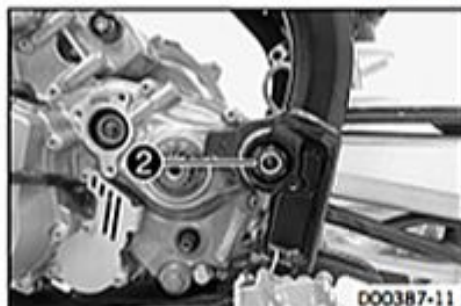
The help of an assistant is useful in this step.
Make sure that the engine is sufficiently secured against falling over.
Protect the frame and attachments against damage.



- Mount screws 1, but do not tighten yet.

Guideline

Engine carrying screw	M10	60 Nm (44.3 lbf ft)
-----------------------	-----	------------------------



- Position the swingarm.
- Mount the swingarm pivot.
- Mount and tighten nut 2.

Guideline

Nut, swingarm pivot	M16x1.5	100 Nm (73.8 lbf ft)
---------------------	---------	-------------------------



- Position the brake line in the guide.



- Mount the foot brake cylinder on push rod ③ and position it.

**Info**

Ensure that the dust boot is correctly seated.

- Mount and tighten screws ④.

Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------



- Position the linkage lever.
- Mount and tighten fitting ⑤.

Guideline

Nut, linkage lever to angle lever	M14x1.5	80 Nm (59 lbf ft)
-----------------------------------	---------	-------------------

**Info**

Raise the wheel slightly to be able to mount the screw more easily.

- Mount spring ⑥.



- Position the positive cable on the starter motor.
- Mount and tighten the nut.

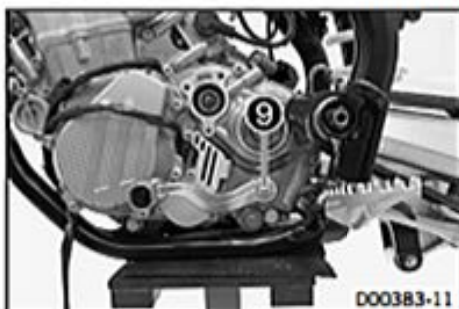
Guideline

Remaining nuts, chassis	M6	10 Nm (7.4 lbf ft)
-------------------------	----	--------------------

- Position protection cap ⑦.



- Position the throttle valve body.
- Tighten hose clip ⑧.



- Position the shift lever.
- Mount and tighten screw ⑨ with the washers.

Guideline

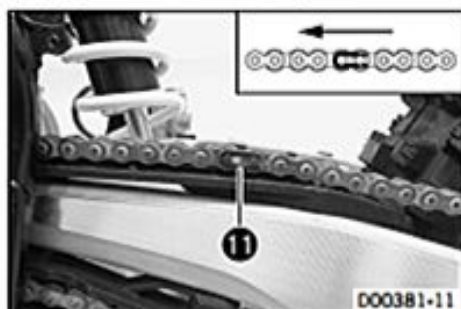
Screw, shift lever	M6	14 Nm (10.3 lbf ft)	Loctite® 243™
--------------------	----	---------------------	---------------



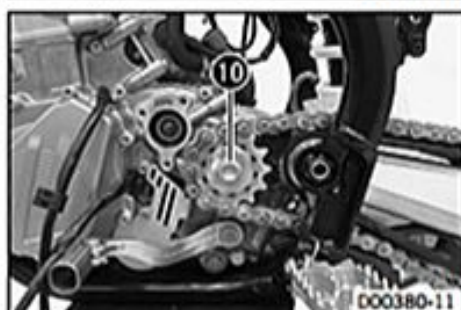
- Slide on the engine sprocket with the collar facing the engine.
- Mount screw 10 with the washer but do not tighten yet.

Guideline

Screw, engine sprocket	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
------------------------	-----	------------------------	----------------



- Mount the chain.
- Connect the chain with connecting link 11.



- Activate the foot brake lever.
- Tighten screw 10.

Guideline

Screw, engine sprocket	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
------------------------	-----	------------------------	----------------



Info

The help of an assistant is useful in this step.



- Position the clutch slave cylinder with the gasket.
- Mount and tighten screws 12.

Guideline

Screw, clutch slave cylinder	M6	10 Nm (7.4 lbf ft)
------------------------------	----	--------------------



- Position the engine sprocket cover.
- Mount and tighten screw 13.

Guideline

Screw, clutch slave cylinder	M6	10 Nm (7.4 lbf ft)
------------------------------	----	--------------------

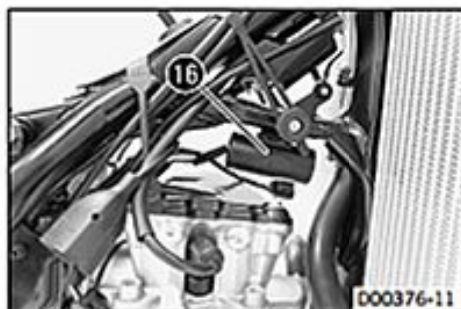
- Mount and tighten screw 14.

Guideline

Remaining screws, chassis	M8	25 Nm (18.4 lbf ft)
---------------------------	----	------------------------



- Mount spark plug connector 15.



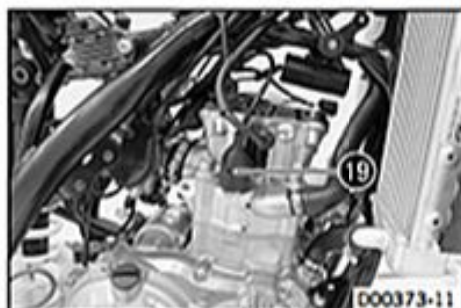
- Mount capacitor 16.



- Mount the radiator hoses.
- Position and tighten hose clips 17.



- Mount the radiator hose.
- Position and tighten hose clip 18.



- Plug in the connector.
- Mount protection cap 19.



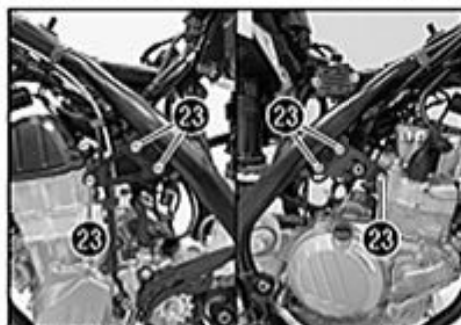
- Route the cable without tension and secure with cable clips and cable ties.



- Connect plug-in connector 20 of the gear position sensor.



- Connect plug-in connector 21 of the crankshaft position sensor.
- Connect plug-in connectors 22 of the alternator.
- Route the cable without tension.



- Position the engine brace.
- Mount and tighten fittings 23.

Guideline

Screw, engine brace	M8	25 Nm (18.4 lbf ft)	Loctite® 2701™
---------------------	----	------------------------	----------------

- Tighten screws 1.

Guideline

Engine carrying screw	M10	60 Nm (44.3 lbf ft)	
-----------------------	-----	------------------------	--



- Position the manifold.
- Mount screw 24 with the washer but do not tighten yet.

Guideline

Remaining screws, chassis	M8	25 Nm (18.4 lbf ft)	
---------------------------	----	------------------------	--



- Mount springs 25.

Spring hook (50305017000) (☞ p. 295)

- Tighten screw 24.

Guideline

Remaining screws, chassis	M8	25 Nm (18.4 lbf ft)	
---------------------------	----	------------------------	--



- Position the shock absorber.
- Mount and tighten screw 26.

Guideline

Screw, top shock absorber	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
---------------------------	-----	------------------------	----------------



- Remove the fixation and position the subframe.

**Info**

Watch out for the intake flange.

- Mount and tighten screw 27.

Guideline

Screw, subframe	M8	35 Nm (25.8 lbf ft)	Loctite® 2701™
-----------------	----	------------------------	----------------

- Remove screw 28.
- Mount and tighten screw 28.

Guideline

Screw, subframe	M8	35 Nm (25.8 lbf ft)	Loctite® 2701™
-----------------	----	------------------------	----------------

- Repeat the operation on the opposite side.
- Mount the vent hose and hose clamp 29.



- Mount rollover sensor 30.



- Plug in the connector.
- Mount protection cap 31.



- Position and tighten hose clip 32.



- Attach negative cable (33).

Guideline

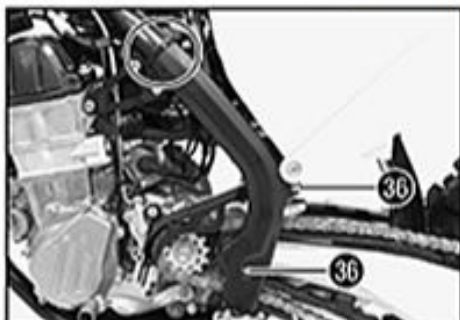
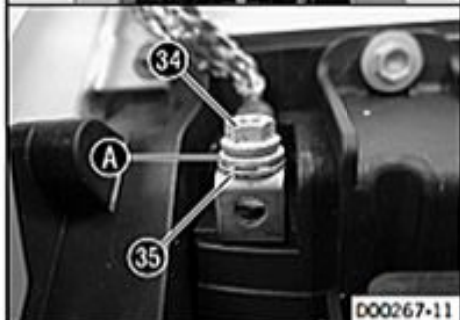
Screw, battery terminal	M5	2.5 Nm (1.84 lbf ft)
-------------------------	----	-------------------------



Info

Contact disk (A) must be mounted between screw (34) and cable lug (35) with the claws facing down.

- Install the air filter box cover. (☛ p. 122)



- Position the frame protector on both sides.
- Mount and tighten screws (36) with the washers.

Guideline

Screw, frame protector	M5	3 Nm (2.2 lbf ft)
------------------------	----	-------------------

- Attach the frame protector with cable tie(s).



- Remove filler plug (37) and add engine oil.

Engine oil	1.20 l (1.27 qt.)	Engine oil (SAE 10W/50) (☛ p. 290)
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- Mount and tighten filler plug (37).

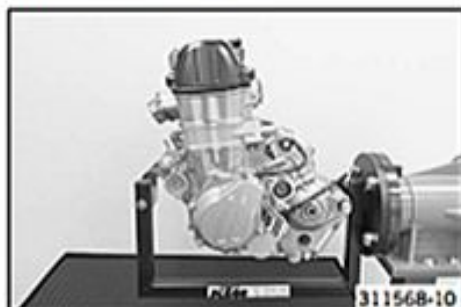
Finishing work

- Install the main silencer. (☛ p. 120)
- Install the fuel tank. (☛ p. 127)
- Mount the seat. (☛ p. 126)
- Remove the motorcycle from the lift stand. (☛ p. 10)
- Refill the coolant. (☛ p. 251)
- Execute the initialization run. (☛ p. 264)
- Go for a short test ride.
- Read out the fault memory using the KTM diagnostics tool.

- Check the engine for leak tightness.
- Check the engine oil level. (☞ p. 253)
- Check the coolant level. (☞ p. 250)

17.3 Engine disassembly

17.3.1 Preparations



- Mount the special tool on the engine assembly stand.

Engine fixing arm (79429002050) (☞ p. 302)

Engine assembly stand (61229001000) (☞ p. 298)

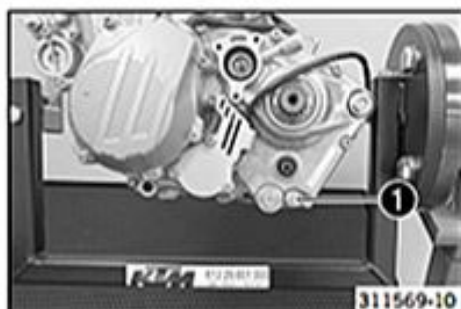
- Mount the engine on the special tool.



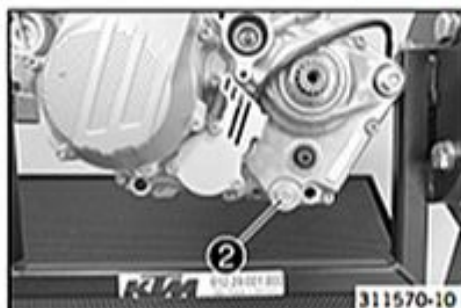
Info

Work with an assistant or a motorized hoist.

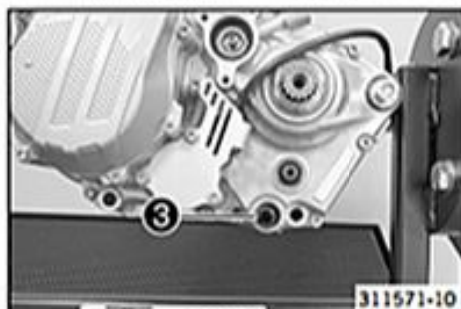
17.3.2 Draining the engine oil



- Remove oil drain plug ① with the magnet and seal ring.



- Remove screw plug ②.
- Completely drain the engine oil.

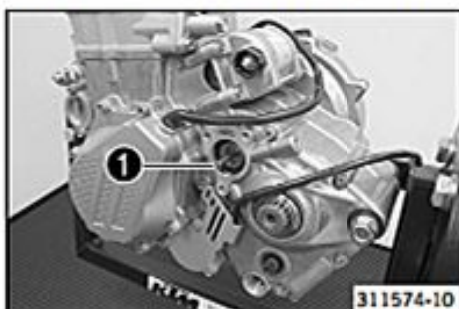


- Remove the long oil screen ③.



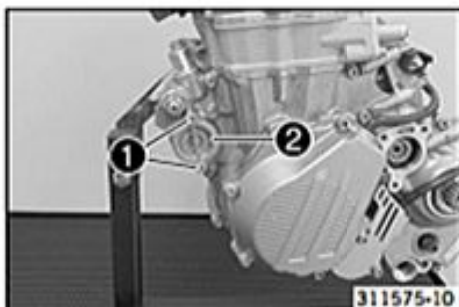
- Remove screw plug ④ with the short oil screen.

17.3.3 Removing the clutch push rod

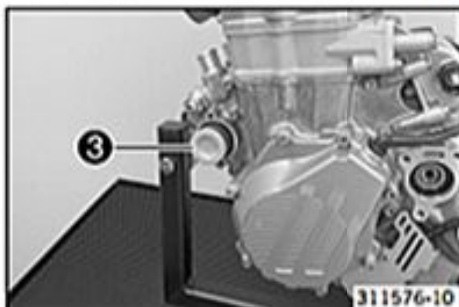


- Remove clutch push rod ①.

17.3.4 Removing the oil filter



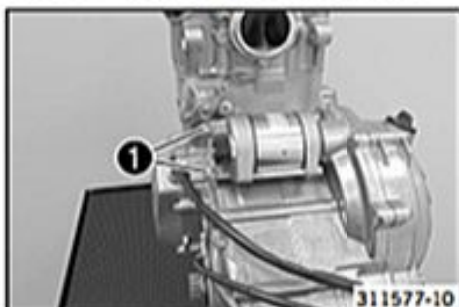
- Remove screws ①.
- Remove the oil filter cover ② with the O-ring.



- Pull oil filter ③ out of the oil filter housing.

Circlip pliers reverse (51012011000) (☛ p. 295)

17.3.5 Removing the starter motor



- Remove screws ① and take off the starter motor.

17.3.6 Removing the spark plug



- Remove the spark plug using the special tool.

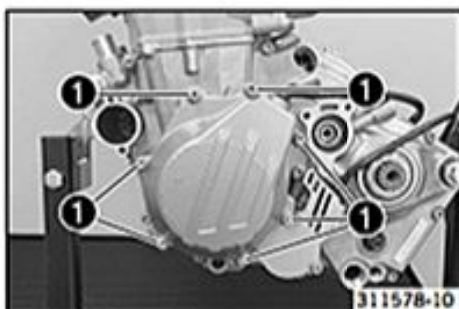
Spark plug wrench (77229172000) (☛ p. 300)

17.3.7 Removing the valve cover

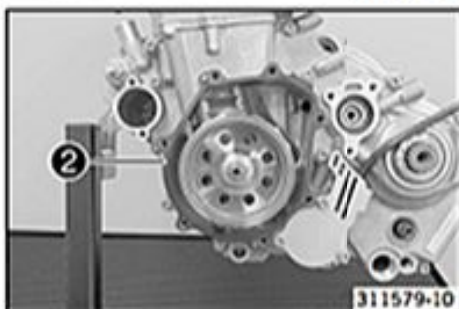


- Remove screws **1**.
- Take off the valve cover with the valve cover seal.

17.3.8 Removing the alternator cover

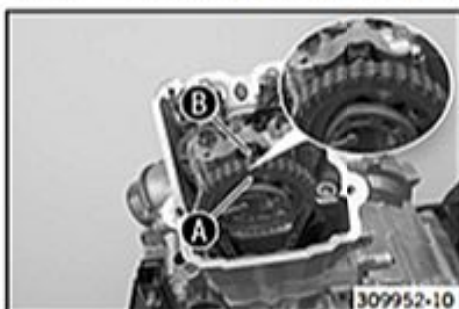


- Remove screws **1**.
- Take off the alternator cover.



- Take off alternator cover gasket **2**.

17.3.9 Positioning the engine at ignition top dead center



- Align camshaft marking **A** with the center of screw **B** on the cylinder head.



- Remove screw **1** with the washer.



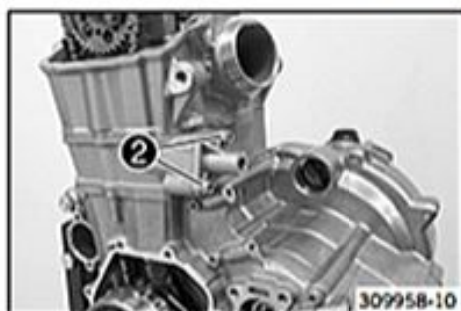
- Screw in special tool ②.

Locking screw (113080802) (☛ p. 294)

17.3.10 Removing the timing chain tensioner

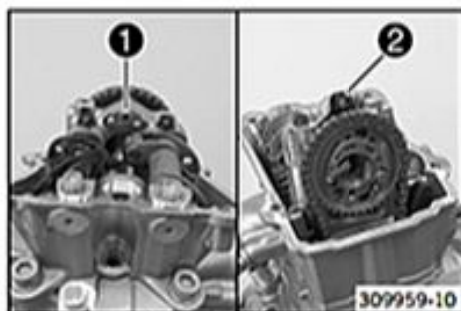


- Remove screw ① with the washer and spring.



- Remove screws ②.
- Take off the chain adjuster with the gasket.

17.3.11 Removing the camshaft

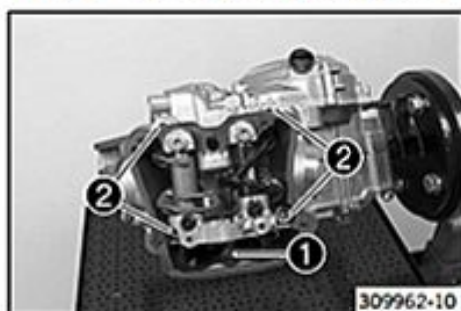


- Remove screw ①. Remove the camshaft support plate ②.

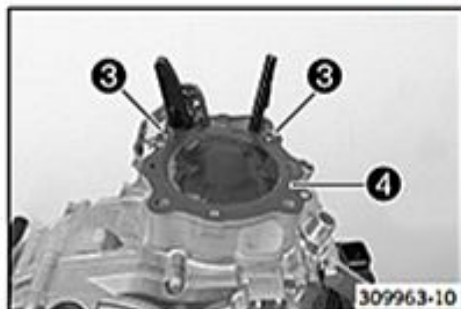


- Pull the camshaft out of the bearing seats. Take the timing chain off the camshaft gear. Remove the camshaft.

17.3.12 Removing the cylinder head



- Remove screw 1.
- Unscrew screws 2 in a crisscross pattern and remove.
- Remove the cylinder head.



- Take off dowels 3.
- Remove cylinder head gasket 4.

17.3.13 Removing the piston



- Push the cylinder upward.

i Info

Only push the cylinder as far up as necessary to take the piston pin out.

- Remove piston ring lock 1.
- Remove the piston pin.
- Take off the cylinder and piston.
- Push the piston upward out of the cylinder.

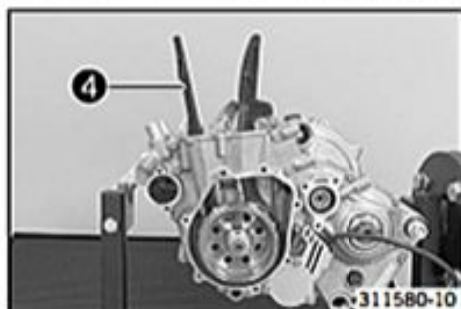
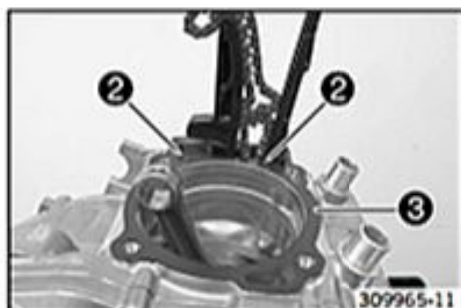
i Info

If no further work is to be performed on the cylinder and piston, the piston can remain in the cylinder.

- Remove cylinder base gasket 3.

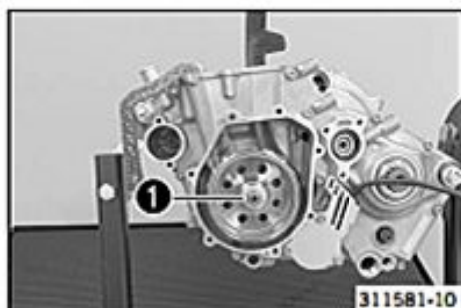
i Info

Ensure locating pins 2 remain in place.

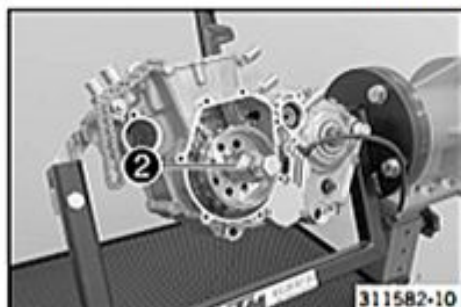


- Remove timing chain guide rail 4 from the top.

17.3.14 Removing the rotor



- Remove nut **1** with the spring washer.

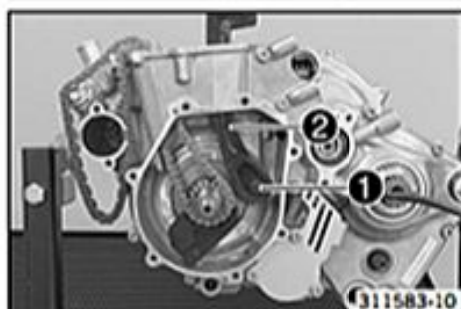


- Mount special tool **2** on the rotor.

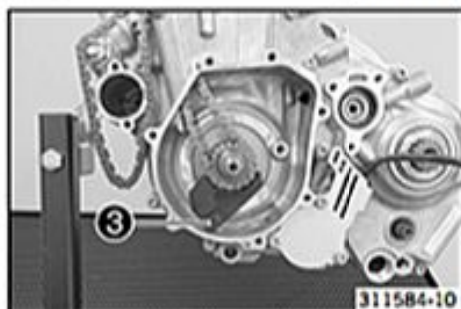
Extractor (79229032044) (p. 301)

- Hold it tight using the special tool and pull off the rotor by turning the screw in.
- Remove the woodruff key.

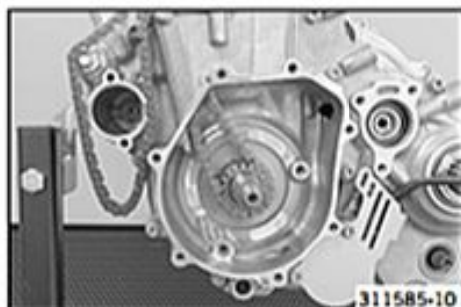
17.3.15 Removing the timing chain



- Remove screw **1**.
- Remove timing chain tensioning rail **2** toward the top.



- Remove screw **3**.
- Remove the timing chain securing guide.



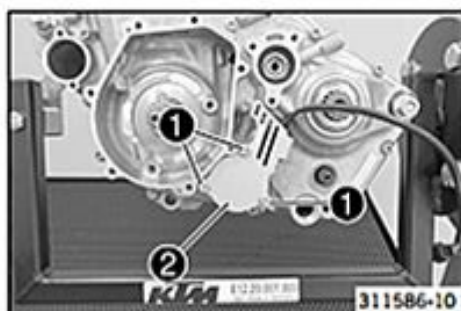
- Take off the timing chain.



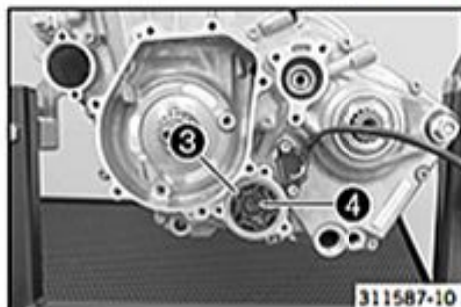
Info

If the timing chain is to be reused, mark the direction of travel.

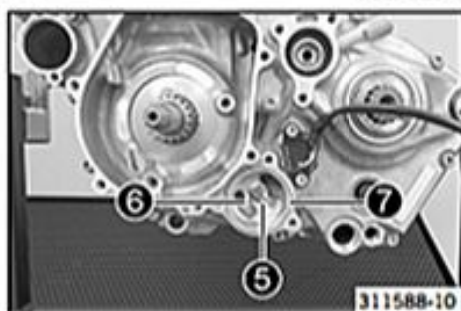
17.3.16 Removing the suction pump



- Remove screws 1.
- Take off oil pump cover 2 of the suction pump.

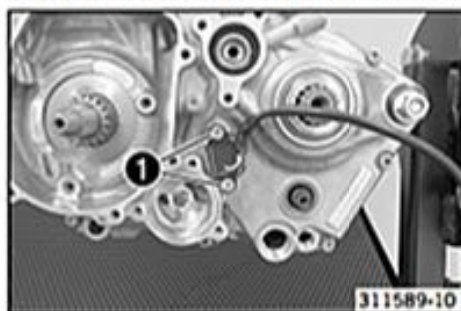


- Remove external rotor 3 and internal rotor 4.



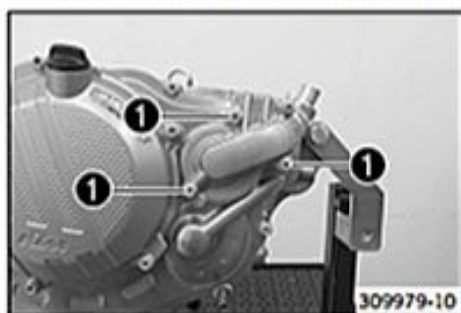
- Take off pin 5.
- Remove pin 6 upward.
- Remove O-ring 7.

17.3.17 Removing the gear position sensor



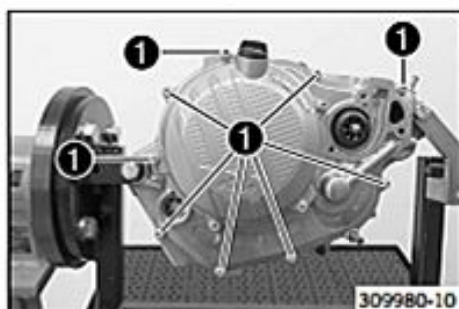
- Remove screws 1.
- Take off the gear position sensor.

17.3.18 Removing the water pump cover



- Remove screws 1. Take off the water pump cover.
- Take off the water pump cover seal.

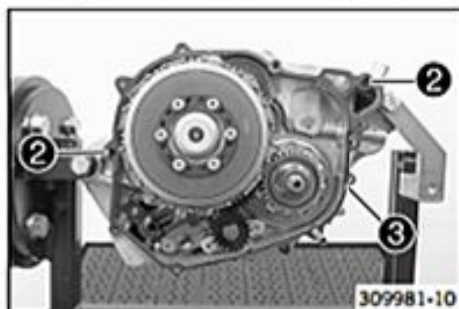
17.3.19 Removing the clutch cover



- Remove screws **1**.
- Take off the clutch cover.

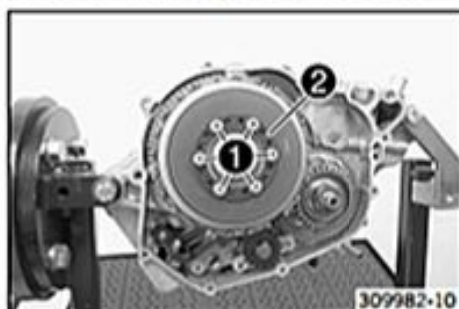
**Info**

If work is to be performed on the water pump, unscrew the nut of the water pump impeller.

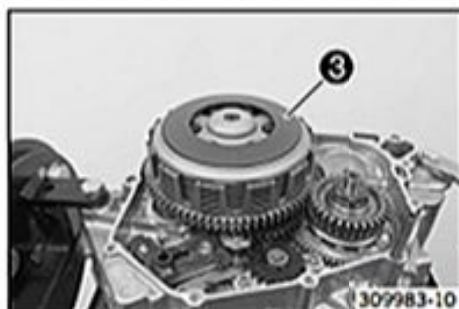


- Remove dowels **2**.
- Take off clutch cover gasket **3**.

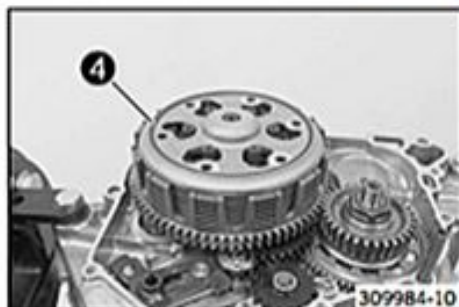
17.3.20 Removing the clutch discs



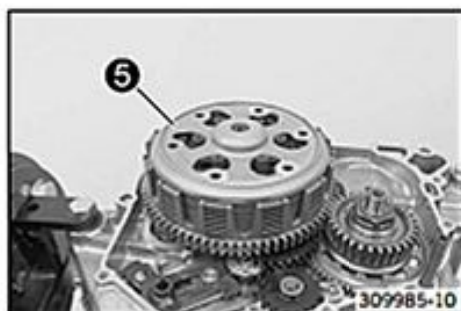
- Alternately loosen screws **1** and remove them.
- Take off spring retainer **2**.



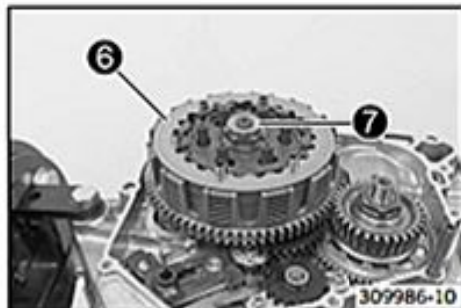
- Take off spring washer **3**.



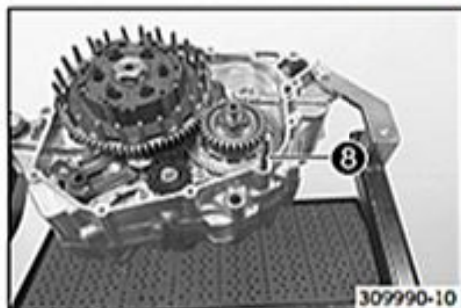
- Take off pretension ring **4**.



- Take off pressure cap (5).



- Remove clutch disc pack (6) entirely.
- Remove clutch throw-out (7).



- Remove special tool (8).

Locking screw (113080802) (☞ p. 294)

17.3.21 Removing the outer clutch hub

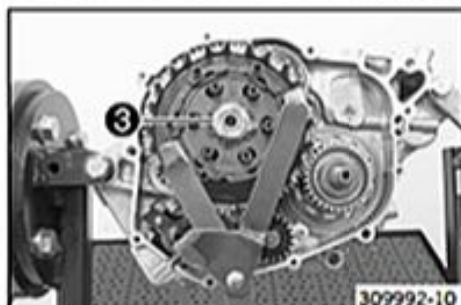


- Lock the outer clutch hub and primary gear using special tool (1).

Gear segment (80029004000) (☞ p. 303)

- Remove nut (2).

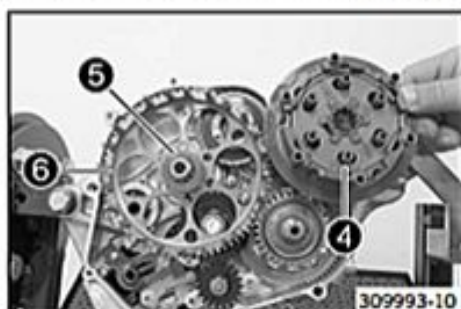
i Info
Left-handed thread.



- Bend up the lock washer.
- Hold the inner clutch hub with the special tool.

Clutch holder (51129003000) (☞ p. 296)

- Remove nut (3) with the lock washer.



- Take off inner clutch hub (4) and washer (5).

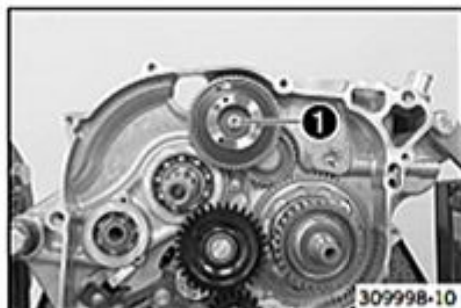
i Info
The washer usually sticks to the inner clutch hub.

- Take off (6).



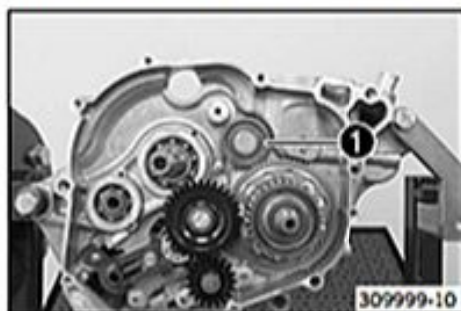
- Take off both needle bearings **7** and collar bushing **8**.

17.3.22 Removing the torque limiter



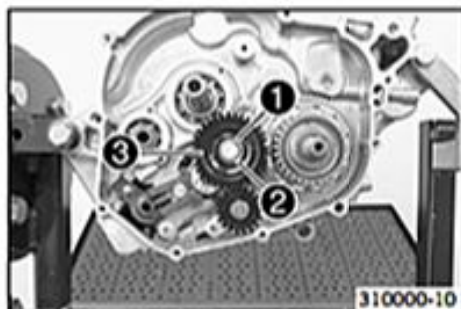
- Remove screw **1** with the washer.
- Take off the torque limiter.

17.3.23 Removing the starter idler gear

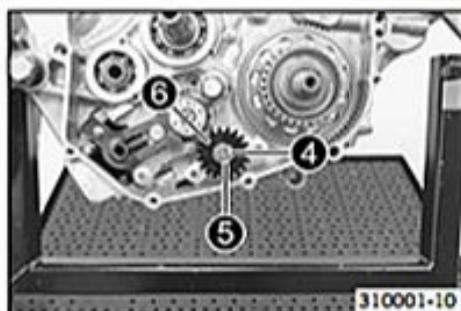


- Take off starter idler gear **1**.

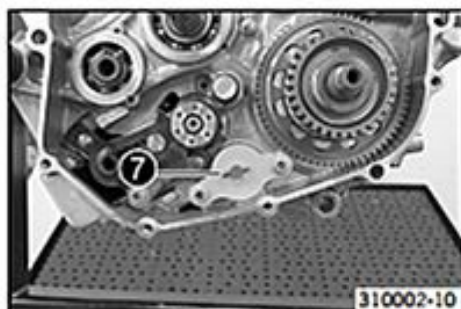
17.3.24 Removing the force pump



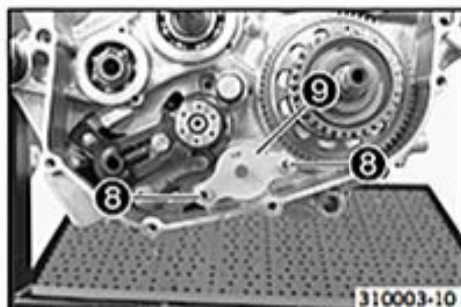
- Remove lock ring **1**.
- Take off washer **2**.
- Remove oil pump idler gear **3**.



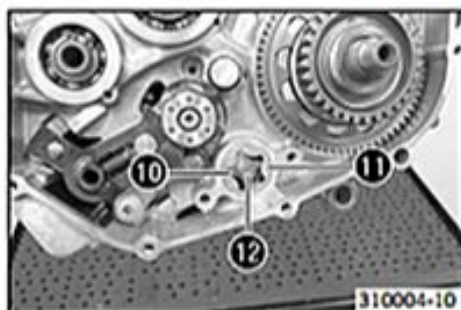
- Remove lock washer **4**.
- Take off washer **5**.
- Take off oil pump gear wheel **6**.



- Remove pin 7.

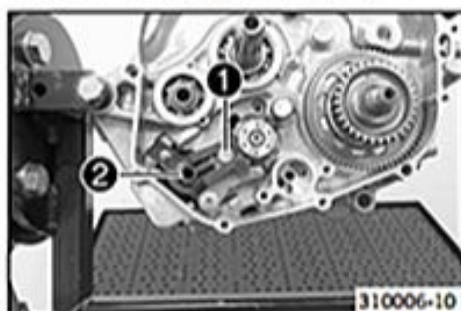


- Remove screws 8.
- Take off oil pump cover 9.



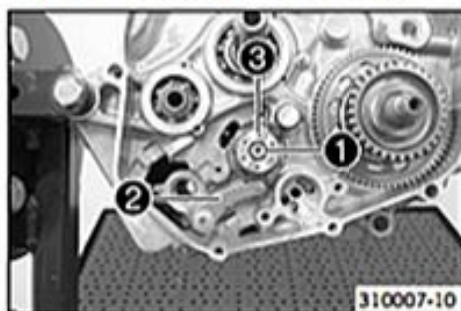
- Remove internal rotor 10 and external rotor 11.
- Remove the pin.
- Push oil pump shaft 12 inward and take it out of the engine from the ignition side.

17.3.25 Removing the shift shaft



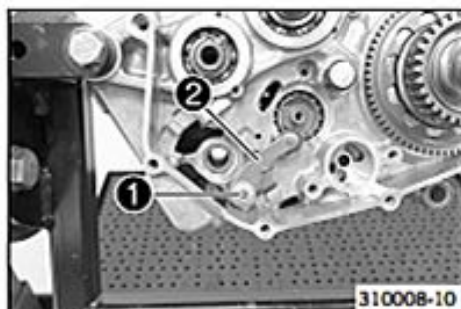
- Push sliding plate 1 away from the shift drum locating unit.
- Remove shift shaft 2 with the washer.

17.3.26 Removing the shift drum locating unit



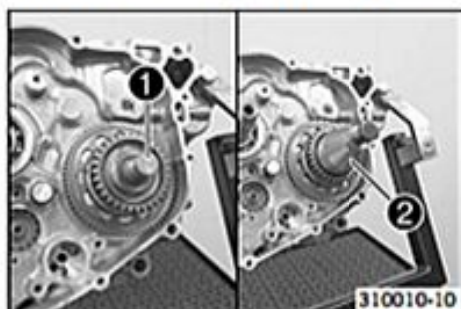
- Remove screw 1.
- Push away locking lever 2 from shift drum locating unit 3 and remove the shift drum locating unit.
- Relieve tension from the locking lever.

17.3.27 Removing the locking lever



- Unscrew 1 and remove together with locking lever 2, washer, sleeve and spring.

17.3.28 Removing the primary gear



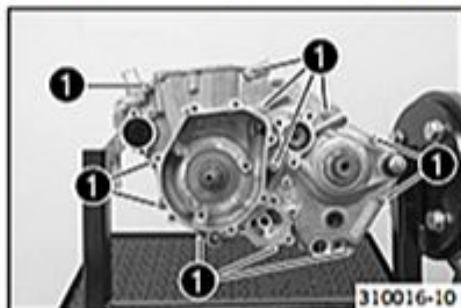
- Insert special tool 1 in the crankshaft.
Protection cap (75029090000) (☛ p. 300)
- Install special tool 2.
Extractor (75029021000) (☛ p. 299)
- Hold it using the special tool and pull off the primary gear by turning the screw in.
- Remove the special tools.

17.3.29 Removing the freewheel gear



- Remove woodruff key 1.
- Take off freewheel gear 2.

17.3.30 Removing the left engine case section



- Remove screws 1.



- Mount special tool **2** with suitable screws.

Case separating tool (79229048000) (☞ p. 302)

**Info**

Use the 794 drill hole.

- Tilt the left section of the engine case upward and remove the fitting of the engine fixing arm.
- Pull off the section of the engine case.

**Info**

Ensure that washer **A** is not damaged.
Do not tension the section of the engine case.

- Remove the special tool.
- Take off the left section of the engine case.

- Remove spacer **3**.

(SX-F EU)

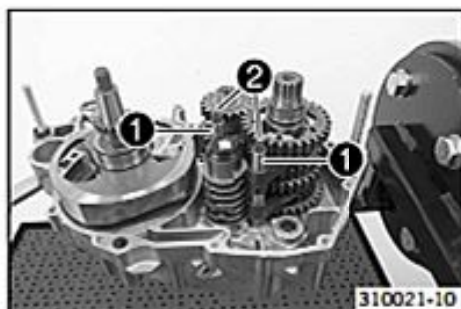
- Remove dowel **4**.

(All US models)

- Remove dowel **4**.

17.3.31 Removing the shift rails**(SX-F EU)**

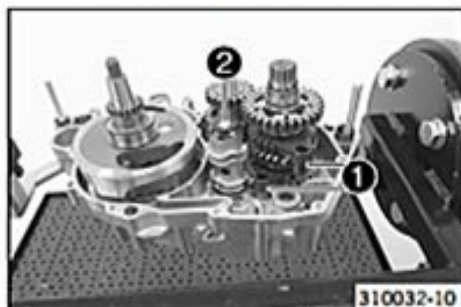
- Remove shift rail **1** together with upper spring **2** and the lower spring.



(All US models)

- Remove shift rails **1** together with upper springs **2** and lower springs.

17.3.32 Removing the shift drum



(SX-F EU)

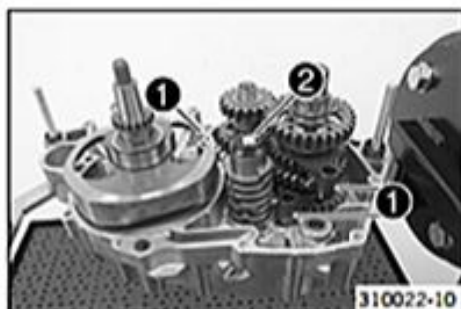
- Swing shift forks **1** to one side.



Info

Do not misplace the shift rollers.

- Remove shift drum **2**.



(All US models)

- Swing shift forks **1** to one side.

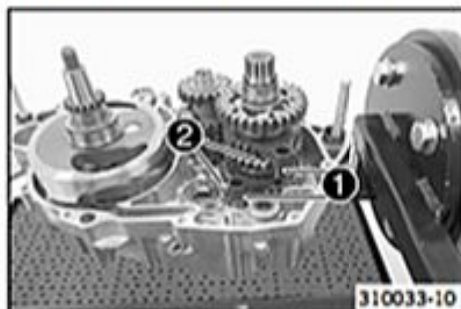


Info

Do not misplace the shift rollers.

- Remove shift drum **2**.

17.3.33 Removing the shift forks

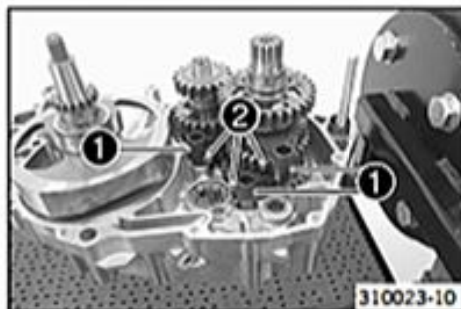


(SX-F EU)

- Take shift forks **1** out of the shift grooves.



Info

Do not misplace shift rollers **2**.

(All US models)

- Take shift forks **1** out of the shift grooves.



Info

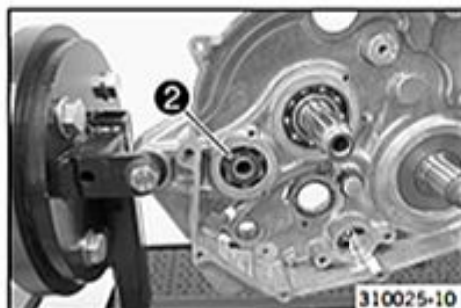
Do not misplace shift rollers **2**.

17.3.34 Removing the transmission shafts

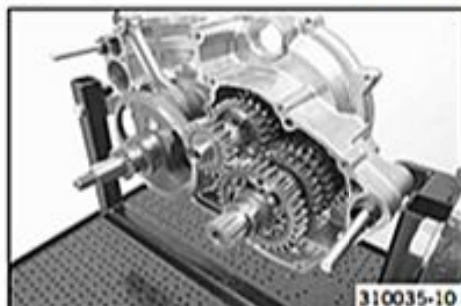


(SX-F EU)

- Remove O-ring ①.



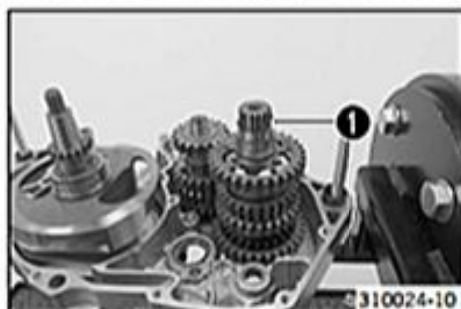
- Position the engine upright.
- Remove lock ring ②.



- Pull both transmission shafts out of the bearing seats together.

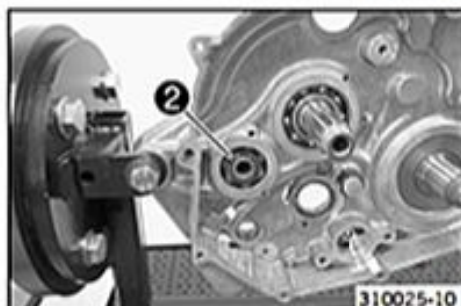
**Info**

Make sure not to misplace the washers.



(All US models)

- Remove O-ring ①.



- Position the engine upright.
- Remove lock ring ②.

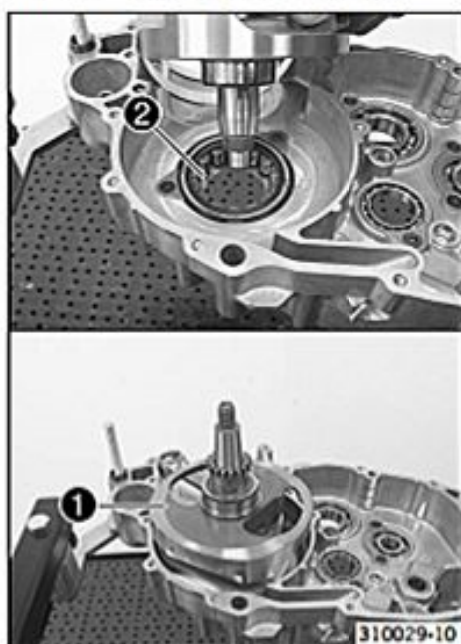


- Pull both transmission shafts out of the bearing seats together.

**Info**

Make sure not to misplace the washers.

17.3.35 Removing the crankshaft



- Remove crankshaft ①.

**Info**

Ensure that washer ② is not damaged.

- Take off the right section of the engine case.

17.4 Work on individual parts

17.4.1 Working on the right section of the engine case

Preparatory work

- Remove the oil pressure regulator valve. (☛ p. 198)

Main work

- Remove all remaining dowels.
- Remove oil nozzle ①.
- Remove screws ② and take off the bearing retainers.
- Remove the bearing retainer of main shaft bearing ③, of countershaft bearing ④ and of shift drum bearing ⑤.
- Remove any remnants of sealing compound and clean the engine case section thoroughly.
- Warm the engine case section in an oven.

Guideline

150 °C (302 °F)

- Knock the engine case section against a level wooden board. This will cause the bearings to drop out of the bearing seats.

**Info**

Any bearings that remain in the engine case section must be removed using a suitable tool.

- Remove washer ⑥.
- Warm the engine case section again.

Guideline

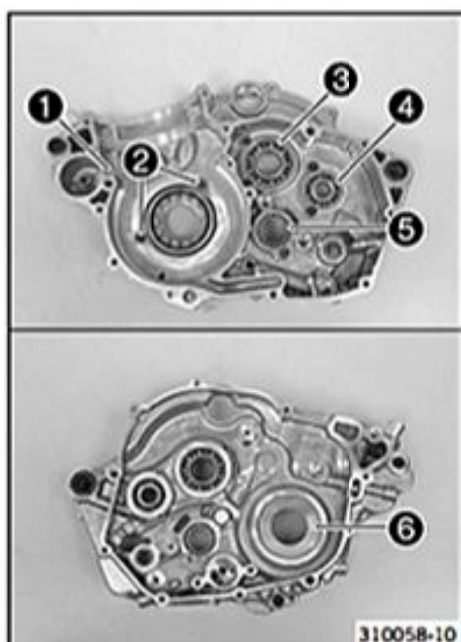
150 °C (302 °F)

- Position washer ⑥.
- Insert the new cold bearings into the bearing seats of the hot engine case section and, if necessary, use a suitable press drift to push the bearings from the inside to the outside, all the way to the stop or so it is flush.

**Info**

When pressing the bearings in, ensure that the engine case section is level to prevent damage.

Only press the bearings in via the outer bearing race; otherwise, the bearings will be damaged when they are pressed in.



- After the engine case section has cooled, check that the bearings are firmly seated.

**Info**

If the bearings are not firmly seated after cooling, it is likely that they will rotate in the engine case when warm. In this case, the engine case must be renewed.

- Position all bearing retainers. Mount and tighten the screws.

Guideline

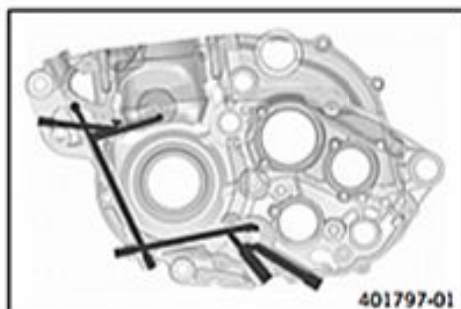
Screw, bearing retainer	M5	6 Nm (4.4 lbf ft)	Loctite® 243™
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- Mount and tighten oil nozzle ①.

Guideline

Oil nozzle, piston cooling	M5	2 Nm (1.5 lbf ft)	Loctite® 243™
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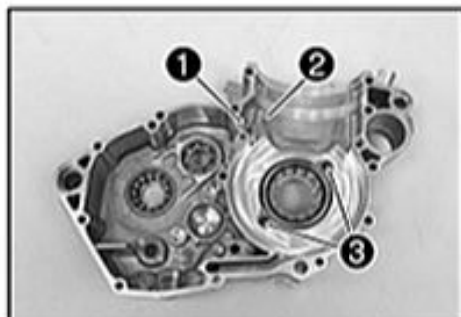
- Blow compressed air through all oil channels and check that they are clear.



401797-01

Finishing work

- Install the oil pressure regulator valve. (☛ p. 199)

17.4.2 Working on the left section of the engine case

310057-10

- Remove all remaining dowels.
- Remove screw ①.
- Remove oil spray tube ②.
- Remove screws ③.
- Remove the bearing retainers.
- Remove shaft seal ring ④ of the countershaft and shaft seal ring ⑤ of the shift shaft.
- Remove any remnants of sealing compound and clean the engine case section thoroughly.
- Warm the engine case section in an oven.

Guideline

150 °C (302 °F)

- Knock the engine case section against a level wooden board. This will cause the bearings to drop out of the bearing seats.

**Info**

Any bearings that remain in the engine case section must be removed using a suitable tool.

- Remove washer ⑥.
- Warm the engine case section again.

Guideline

150 °C (302 °F)

- Position washer ⑥.
- Insert the new cold bearings in the bearing seats of the heated section of the engine case; if necessary, use a suitable press drift to push them all the way in and make them flush.

**Info**

When pressing the bearing in, ensure that the engine case section is level to prevent damage.

Only press the bearings in via the outer bearing race; otherwise, the bearings will be damaged when they are pressed in.

- After the engine case section has cooled, check that the bearings are firmly seated.

**Info**

If the bearings are not firmly seated after cooling, it is likely that they will rotate in the engine case when warm. In this case, the engine case must be renewed.

- Press in shaft seal ring ④ of the countershaft and shaft seal ring ⑤ of the shift shaft with the open side facing inward until it is flush.
- Position the bearing retainers.
- Mount and tighten screws ③.

Guideline

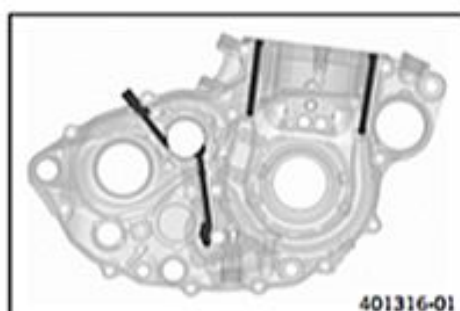
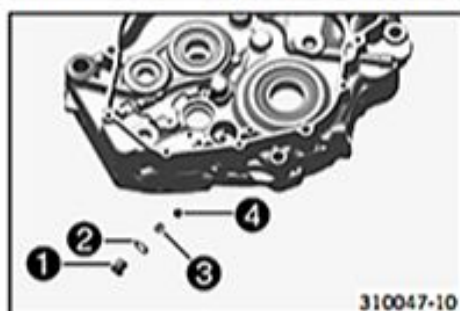
Screw, bearing retainer	M5	6 Nm (4.4 lbf ft)	Loctite® 243™
-------------------------	----	----------------------	---------------

- Position oil spray tube ②.
- Mount and tighten screw ①.

Guideline

Screw, oil spray tube	M4	5 Nm (3.7 lbf ft)	Loctite® 243™
-----------------------	----	----------------------	---------------

- Mount the dowels.
- Blow compressed air through all oil channels and check that they are clear.

**17.4.3 Removing the oil pressure regulator valve**

- Remove screw plug ① with sealing washer ②.
- Remove pressure spring ③ and ball ④.

17.4.4 Checking spring length of oil pressure regulator valve**Preparatory work**

- Remove the oil pressure regulator valve. (↖ p. 198)

**Main work**

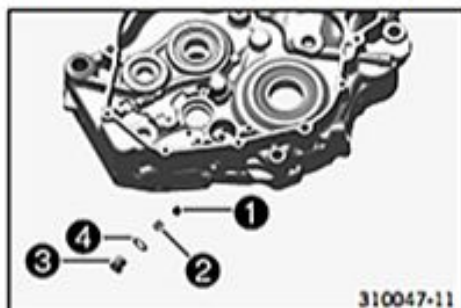
- Measure the spring length of the oil pressure regulator valve.

Oil pressure regulator valve	
Minimum length of preload spring	24.5 mm (0.965 in)

- If the measured value does not meet specifications:
 - Change the spring.

Finishing work

- Install the oil pressure regulator valve. (☛ p. 199)

17.4.5 Installing the oil pressure regulator valve

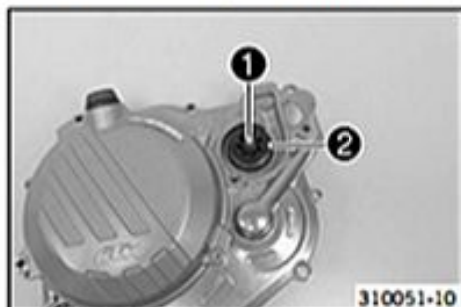
- Install ball ① and pressure spring ②.
- Mount and tighten plug ③ with sealing washer ④.

Guideline

Plug, oil pressure regulator valve	M12x1.5	20 Nm (14.8 lbf ft)
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17.4.6 Changing the crankshaft seal ring in the clutch cover

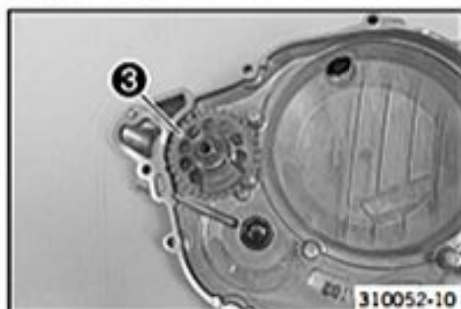
- Remove lock ring ①.
- Remove crankshaft seal ring ②.
- Press the new crankshaft seal ring into the clutch cover with the open side facing inward until it is flush.
- Mount lock ring ①.
- Grease the sealing lip.

17.4.7 Removing the water pump

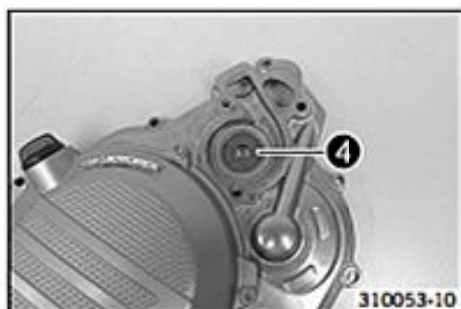
- Remove nut ①.
- Remove water pump impeller ②.

Info

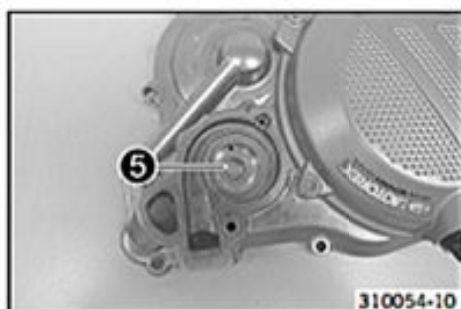
If the water pump impeller cannot be detached, then the water pump shaft can be pressed out toward the inside.



- Remove balancer shaft ③.



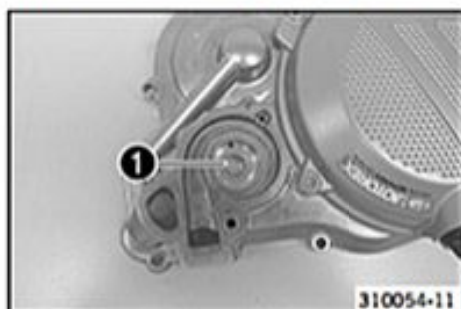
- Remove shaft seal ring **4**.



- Press out water pump shaft bearing **5** toward the inside with an appropriate tool.

**Info**

Suitably support the clutch cover while pressing it out.

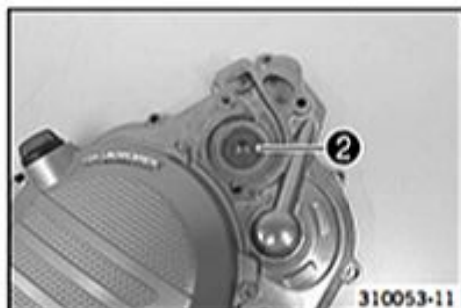
17.4.8 Installing the water pump

- Press bearing **1** of the water pump shaft up to the stop with a suitable tool.

Push-in drift (79429006000) (☞ p. 302)

**Info**

Provide suitable support for the clutch cover while pressing in.



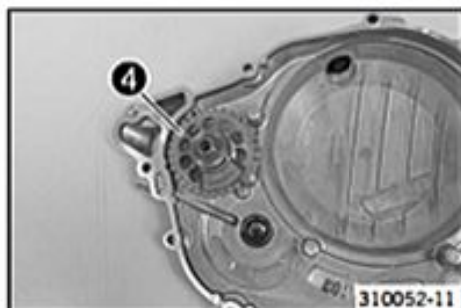
- Press shaft seal ring **2** all the way in.

Press drift (60029043040) (☞ p. 298)



- Mount special tool **3** on the water pump shaft.

Mounting sleeve (90129005000) (☞ p. 303)



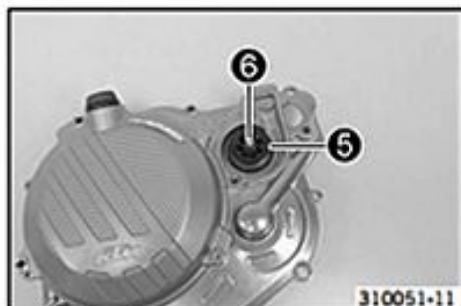
- Mount balancer shaft **4**.

**Info**

Be careful not to damage the shaft seal rings.

- Remove the special tool.

Mounting sleeve (90129005000) (☞ p. 303)

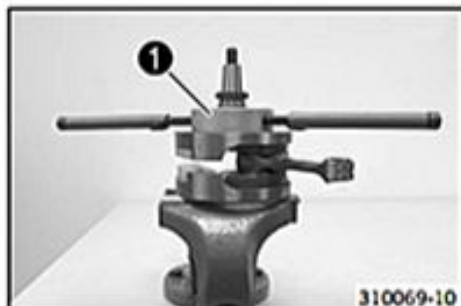


- Mount water pump impeller (5).
- Mount and tighten nut (6).

Guideline

Nut, water-pump wheel	M6	8 Nm (5.9 lbf ft)	Loctite® 243™
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17.4.9 Removing the crankshaft bearing inner race



- Fix the crankshaft in the vise.



Info

Use soft jaws.

- Warm up special tool (1).

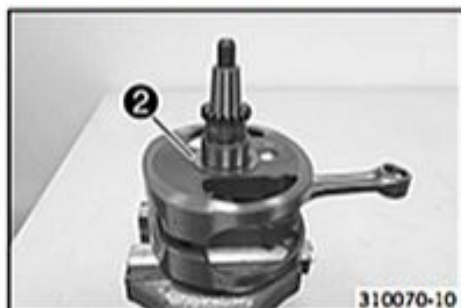
Guideline

150 °C (302 °F)

Tool for inner bearing race (58429037043) (☛ p. 296)

- Push the warmed up special tool (1) onto the crankshaft bearing inner race, press firmly together, and pull jointly from the crankshaft.
- Take off the compensating disk.
- Repeat these steps on the opposite side.

17.4.10 Installing the crankshaft bearing inner race



Main work

- Fix the crankshaft in the vise.



Info

Use soft jaws.

- Slide on compensating disk (1).



Info

The compensating disks have a larger diameter than the crankshaft stub. Ensure that the compensating disks are centered and fixed with a small amount of grease. Only add the compensating disks on the ignition side.

- Heat the crankshaft bearing inner race in special tool (2) and mount together.

Guideline

120 °C (248 °F)

Tool for inner bearing race (58429037043) (☛ p. 296)

- Repeat these steps on the opposite side.
- Ensure that the new crankshaft bearing inner race is flush.

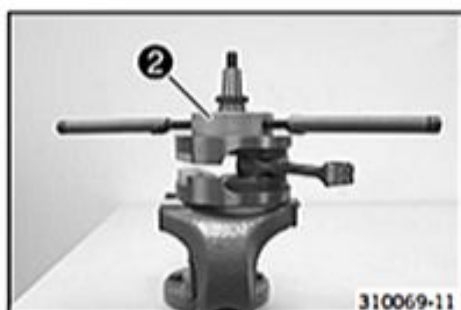


Info

After replacing the crankshaft bearings, the crankshaft end play must be measured.

Finishing work

- Measure the crankshaft end play. (☛ p. 203)



17.4.11 Changing the connecting rod, conrod bearing, and crank pin



Main work

- Position the crankshaft with special tool 1 in the press.

Separator plate (79429009000) (☞ p. 302)

- Press the crank pin out of the upper crankweb with special tool 2.

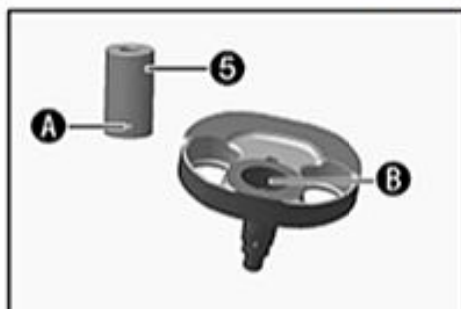
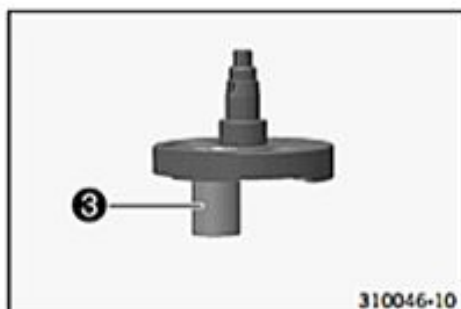
Pressing tool for crankshaft, complete (75029047000) (☞ p. 299)



Info

Hold the lower crankweb.

- Remove the connecting rod and bearing.
- Press crank pin 3 out of the lower crankweb.



- Place the crankweb onto special tool 4.

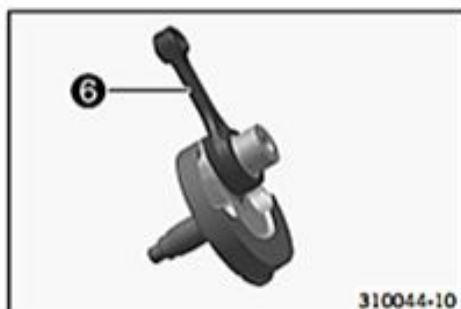
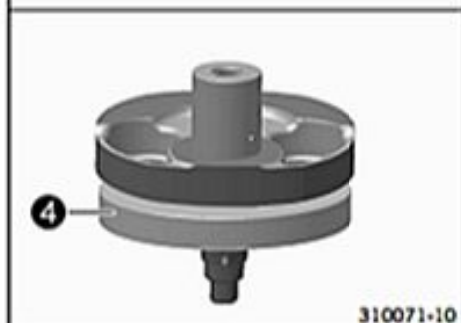
Insert for crankshaft pressing tool (78929008000) (☞ p. 301)



Info

The special tool must be positioned with the flat surface facing downward.

- Press in new crank pin 5 all the way.
 - ✓ Oil channel A is aligned with oil channel B.
 - ✗ If the oil channels are not correctly aligned, the conrod bearing will not be supplied with oil.
- Blow compressed air through the oil channels to check that they are clear.



- Mount new connecting rod 6.



Info

Thoroughly lubricate the bearing.



- Position special tools 7 and 8 on the press.

Pressing tool for crankshaft, complete (75029047000) (☞ p. 299)

Insert for crankshaft pressing tool (78929008000) (☞ p. 301)

- Insert the crankweb with the connecting rod and bearing. Position the second crankweb.



- Position special tool 4 with the heel pointing down.

Insert for crankshaft pressing tool (78929008000) (☞ p. 301)

- Press in the upper crankweb as far as possible.



Info

The press mandrel must be positioned over the crank pin.

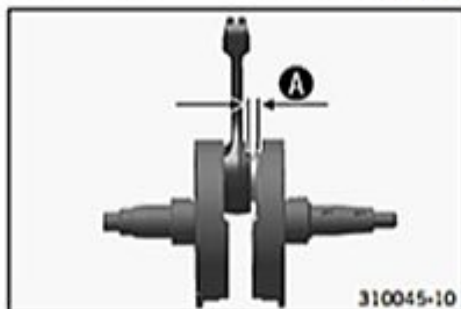
- Take the crankshaft out of the special tool and check that the connecting rod can move freely.

- Measure axial play A between the connecting rod and the crankwebs using the special tool.

Feeler gauge (59029041100) (☞ p. 297)

Connecting rod - end play of lower con-rod bearing	0.20... 0.45 mm (0.0079... 0.0177 in)
--	---------------------------------------

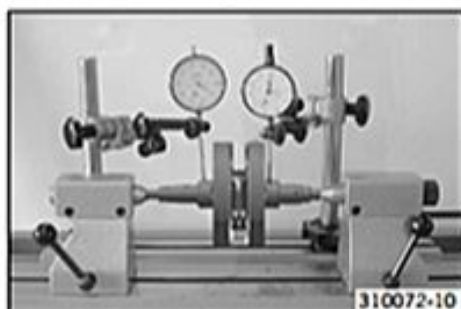
- If the measured value is less than the specification:
 - Correct it so the dimension is equal to the specified value.



Finishing work

- Check the crankshaft run-out at bearing pin. (☞ p. 203)

17.4.12 Checking crankshaft run-out at bearing pin



- Position the crankshaft on a roller block.
- Turn the crankshaft slowly.
- Check the crankshaft run-out on both bearing pins.

Crankshaft - run-out on bearing pin	≤ 0.03 mm (≤ 0.0012 in)
-------------------------------------	-------------------------

- If the crankshaft run-out at the bearing pin is larger than the specification:
 - Align the crankshaft.

17.4.13 Measuring the crankshaft end play



- Insert the crankshaft into the right section of the engine case.



Info

Do not forget the fitted bushings.

- Mount the left section of the engine case.
- Mount and tighten the screws.

Guideline

Screw, engine case	M6	10 Nm (7.4 lbf ft)
--------------------	----	--------------------

- Mount the dial gauge support on the engine case and measure and note down the crankshaft end play.

Guideline

Crankshaft - axial play	0.50... 0.60 mm (0.0197... 0.0236 in)
-------------------------	---------------------------------------

- If the measured value does not meet specifications:
 - Remove the crankshaft.
 - Remove the crankshaft bearing inner race. (☛ p. 201)
 - Calculate the thickness of the compensating disks.
 - Add or remove compensating disks equally on both sides.

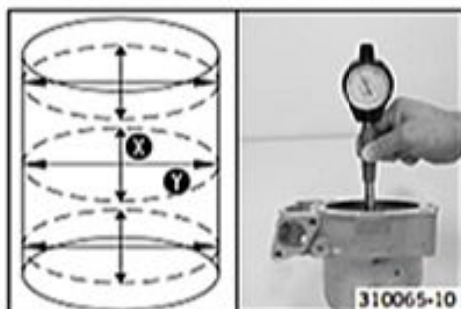
**Info**

If the end play is too small, remove compensating disks.
If the end play is too large, add compensating disks.

- Install the crankshaft bearing inner race. (☛ p. 201)

17.4.14 Cylinder - Nikasil® coating

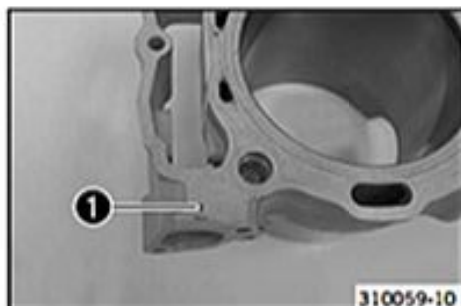
Nikasil® is a surface protection layer for a coating procedure developed by Mahle. The name is derived from the two materials used in this procedure - a layer of nickel into which is embedded the particularly hard silicone carbide. The most important advantages of the **Nikasil®** coating are very good heat conductivity, resulting in much improved performance, low wear, and a lightweight cylinder.

17.4.15 Checking/measuring the cylinder

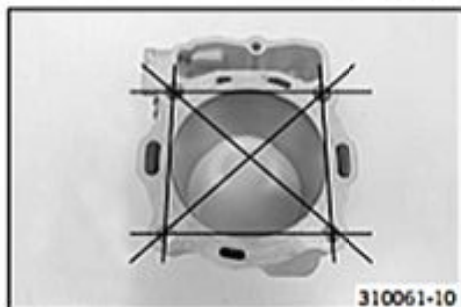
- Check the cylinder bearing surface for damage.
 - If the cylinder bearing surface is damaged:
 - Change the cylinder and piston.
- Measure the cylinder diameter at several locations on the **X**- and **Y**-axes using a micrometer to identify oval wear.

Guideline

Cylinder - drill hole diameter	
Size I	95.000... 95.012 mm (3.74015... 3.74062 in)
Size II	95.013... 95.025 mm (3.74066... 3.74113 in)



- The cylinder size **1** is labeled on the side of the cylinder.



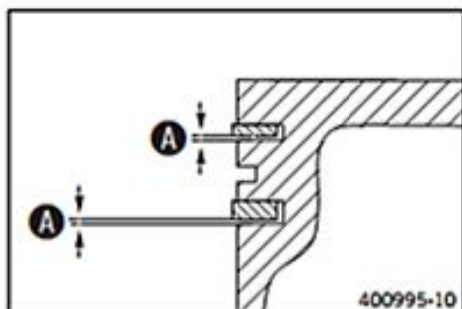
- Using a straightedge and the special tool, check the sealing area of the cylinder head for distortion.

Feeler gauge (59029041100) (☛ p. 297)

Cylinder/cylinder head - sealing area distortion	≤ 0.10 mm (≤ 0.0039 in)
--	-------------------------

- If the measured value does not meet specifications:
 - Change the cylinder.

17.4.16 Checking/measuring the piston



- Use the special tool to measure clearance **A** of the piston rings in the piston ring groove.

Guideline

Piston ring - groove clearance	$\leq 0.08 \text{ mm } (\leq 0.0031 \text{ in})$
--------------------------------	--

Feeler gauge (59029041100) (☞ p. 297)

- If clearance **A** larger than the specified value:
 - Change the piston and piston rings.
 - Check/measure the cylinder. (☞ p. 204)
- Check the piston bearing surface for damage.
 - If the piston bearing surface is damaged:
 - Replace the piston and, if necessary, the cylinder.
- Check that the piston rings move easily in the piston ring grooves.
 - If the piston ring is stiff:
 - Clean the piston ring groove.



Tip

An old piston ring can be used to clean the piston ring groove.

- Check the piston rings for damage.
 - If the piston ring is damaged:
 - Change the piston ring.



Info

Mount the piston ring with the marking facing upward.

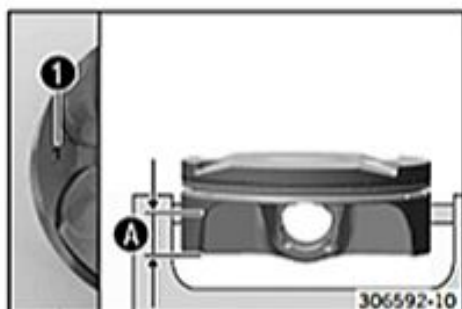
- Check the piston pins for discoloration or signs of wear.
 - If the piston pin shows severe discoloration/signs of wear:
 - Change the piston pin.
- Place the piston pin in the connecting rod and check the seating for play.
 - If the piston pin seating has excessive play:
 - Change the connecting rod and piston pin.
- Place the piston pin in the piston and check the seating for play.
 - If the piston pin seating has excessive play:
 - Replace the piston and, if necessary, the cylinder and piston pin.
- Measure the piston at the piston skirt, at right angles to the piston pin, at a distance **A**.

Guideline

Distance A	7 mm (0.28 in)
-------------------	----------------

Piston - diameter

Size I	94.93... 94.96 mm (3.7374... 3.7386 in)
Size II	94.94... 94.97 mm (3.7378... 3.739 in)



Info

Piston dimensions **1** are marked on the piston head.

17.4.17 Checking the piston ring end gap



- Remove the piston ring from the piston.
- Place the piston ring in the cylinder and align with the piston.

Guideline

Below the upper edge of the cylinder	10 mm (0.39 in)
--------------------------------------	-----------------

- Using special tool ①, measure the end gap.

Guideline

Piston ring end gap	
Compression ring	$\leq 1.00 \text{ mm } (\leq 0.0394 \text{ in})$
Oil scraper ring	$\leq 1.20 \text{ mm } (\leq 0.0472 \text{ in})$

Feeler gauge (59029041100) (☞ p. 297)

- If the end gap is greater than the specified value:
 - Check/measure the cylinder. (☞ p. 204)
- If cylinder wear lies within the specified tolerance:
 - Change the piston ring.
- Mount the piston ring with the marking facing upward.

17.4.18 Measuring the piston/cylinder mounting clearance



- Check/measure the cylinder. (☞ p. 204)
- Check/measure the piston. (☞ p. 205)
- The smallest piston/cylinder mounting clearance equals the smallest cylinder bore diameter minus the largest piston diameter. The largest piston/cylinder mounting clearance equals the largest cylinder bore diameter minus the smallest piston diameter.

Guideline

Piston/cylinder - mounting clearance	
Size I	0.040... 0.082 mm (0.00157... 0.00323 in)
Size II	0.043... 0.085 mm (0.00169... 0.00335 in)
Wear limit	0.120 mm (0.00472 in)

17.4.19 Checking the oil pumps



Info

The following steps apply to both oil pumps.



- Use special tool ① to measure the play between the external rotor and the engine case.

Feeler gauge (59029041100) (☞ p. 297)

Oil pump	
External rotor/engine case clearance	$\leq 0.20 \text{ mm } (\leq 0.0079 \text{ in})$

- If the measured value does not meet specifications:
 - Change the oil pump and, if necessary, the engine case.
- Use special tool ① to measure the play between the external rotor and the internal rotor.

Feeler gauge (59029041100) (☞ p. 297)

Oil pump	
External rotor/internal rotor clearance	$\leq 0.20 \text{ mm } (\leq 0.0079 \text{ in})$

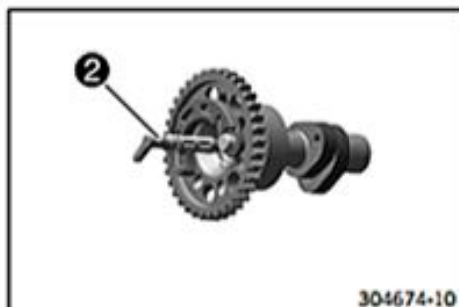


- If the measured value does not meet specifications:
 - Replace the oil pump.

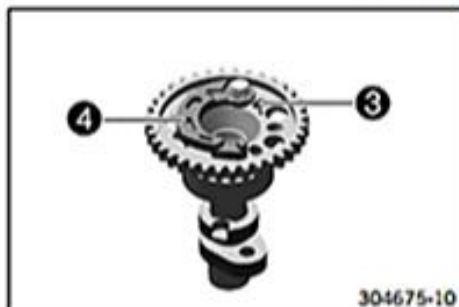
17.4.20 Disassembling the autodecompressor



- Take lock ring **1** from the autodecompression shaft and dispose of it.



- Pull autodecompression shaft **2** out of the camshaft.



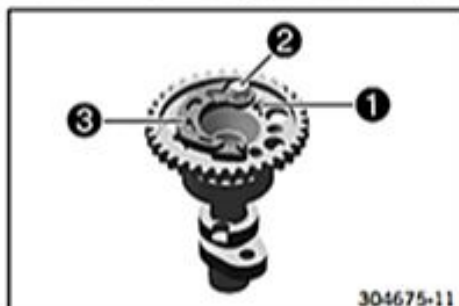
- Release and remove autodecompression spring **3**.



Info

Autodecompression weight **4** cannot be taken off.

17.4.21 Assembling the autodecompressor



- Insert long flange **1** of the autodecompression spring in the hole, push the autodecompression spring over bearing bolt **2** and hook it into autodecompression weight **3**.



- Mount autodecompression shaft **4** in the camshaft.



- Mount new lock ring **5**.
- Perform a function check.
 - The autodecompression spring does not turn the autodecompression shaft back to the stop:
 - Pre-tension the autodecompression spring more or replace it.

17.4.22 Checking camshaft

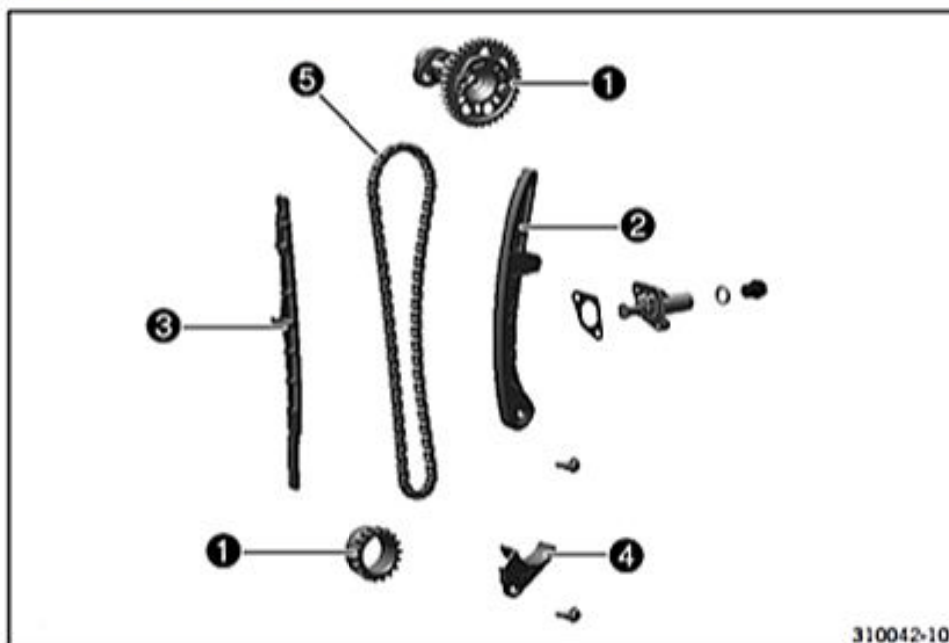


- Check the camshaft for damage and wear.
 - If there is damage or wear:
 - Change the camshaft.
 - If the camshaft surface is damaged, check the oil supply of the camshaft and the rocker arm.
- Measure the cams of the camshaft.

Camshaft - cam height	
Exhaust	33.10... 33.30 mm (1.3031... 1.311 in)
Intake	33.90... 34.10 mm (1.3346... 1.3425 in)

- If the measured value does not meet specifications:
 - Change the camshaft.

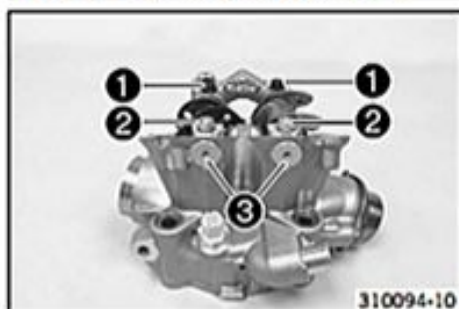
17.4.23 Checking the timing assembly



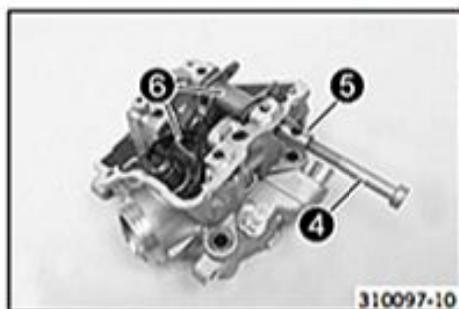
- Clean all parts well.
- Check the timing chain gear/timing chain sprocket **1** for damage and wear.
 - If there is damage or wear:
 - Change the camshaft/timing chain sprocket.
- Check the timing chain tensioning rail **2** for damage and wear.
 - If there is damage or wear:
 - Replace the timing chain tensioning rail.
- Check the timing chain guide rail **3** for damage and wear.
 - If there is damage or wear:

- Replace the timing chain guide rail.
- Check the timing chain securing guide **4** for damage and wear.
 - If there is damage or wear:
 - Replace the timing chain securing guide.
- Check timing chain **5** for damage and wear.
 - If there is damage or wear:
 - Replace the timing chain.
- Check the timing chain links for smooth operation. Let the timing chain hang down freely.
 - The chain links no longer align in a straight line:
 - Replace the timing chain.

17.4.24 Removing the rocker arm

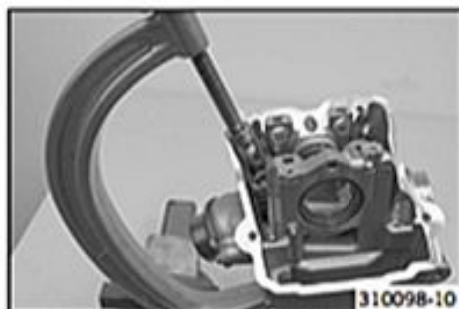


- Remove screws **1** and **2** of the rocker arm shafts.
- Remove plugs **3** with the O-rings.



- Screw appropriate screw **4** into the rocker arm shafts. Pull out rocker arm shafts **5**.
- Take off rocker arm **6**.

17.4.25 Removing the valves

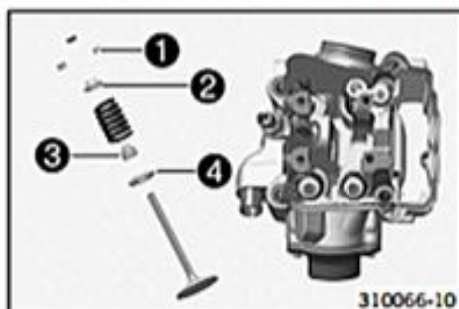


- Take the shims out of the valve spring retainers and lay them to one side according to their normal built-in position.
- Pretension the valve springs using the special tool.

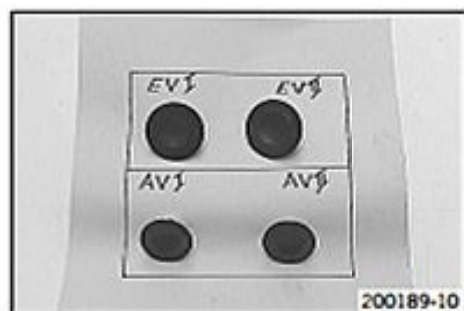
Valve spring mounter (59029019000) (☞ p. 297)

Insert for valve spring lever (77029041200) (☞ p. 300)

- Remove valve keys **1** and relax the valve springs.



- Remove valve spring retainer **2** and the valve spring.
- Pull the valve out of the valve guide from below and remove valve stem seal **3** and valve spring seat **4**.



- Mark the valves corresponding to their installation position.

**Info**

Place the valves in a carton corresponding to their installation position and label them.

17.4.26 Changing the camshaft bearing**Condition**

The valves are removed and the exhaust flange is removed.

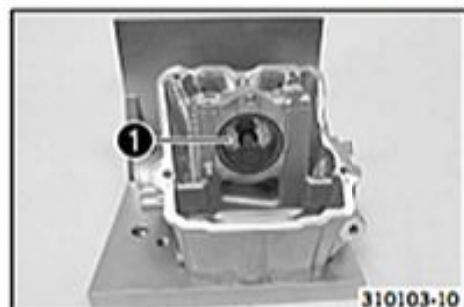
- Mount the cylinder head.

Clamping plate (75029050000) (☛ p. 299)



- Remove the large camshaft bearing using special tool ①.

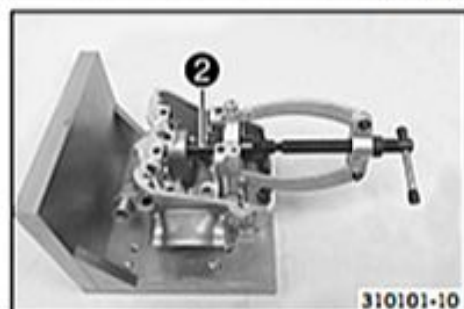
Push-out drift (75029051000) (☛ p. 300)



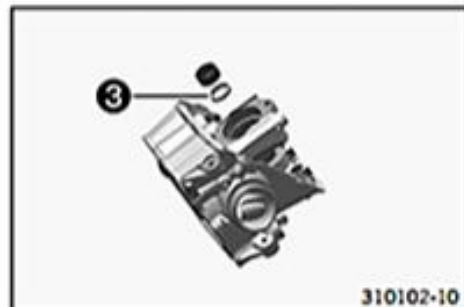
- Remove small camshaft bearing ② using the special tool.

Bearing puller (15112017000) (☛ p. 294)

Internal bearing puller (15112018100) (☛ p. 295)



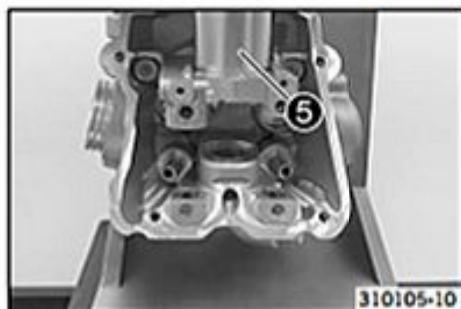
- Remove shaft seal ring ③ using a suitable tool.
- Press the new shaft seal ring in all the way with the open side facing down.





- Press the small camshaft bearing in until flush using special tool ④.

Push-in drift (75029044020) (☛ p. 299)



- Press the large camshaft bearing in all the way using special tool ⑤.

Push-in drift (75029044010) (☛ p. 299)

17.4.27 Checking the valves



Info

The valve stem is hard-chrome plated; wear generally appears at the valve guide.

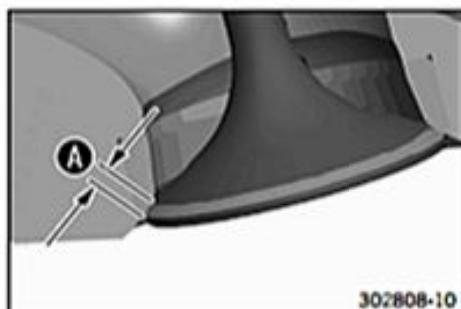


- Check the valve plate for run-out.

Valve

Run-out at valve plate	≤ 0.05 mm (≤ 0.002 in)
------------------------	------------------------

- If the measured value does not meet specifications:
 - Change the valve.



- Check sealing seat ① on valve for damage and wear.
 - If the sealing surface is damaged or worn:
 - Machine the valve seat.

17.4.28 Checking valve springs



- Check the valve springs for breakage and wear (visual check).
 - If the valve spring is broken or worn:
 - Change the valve spring.
- Measure the length of the valve springs.

Valve spring

Intake minimum length (without valve spring seat)	40.7 mm (1.602 in)
---	--------------------

Valve spring

Exhaust minimum length (without valve spring seat)	40.7 mm (1.602 in)
--	--------------------

- ▶ If the measured value does not meet specifications:
 - Change the valve spring.

17.4.29 Checking valve spring seat

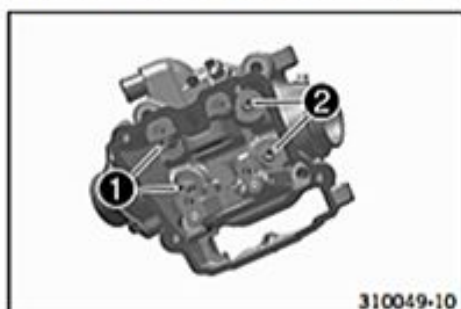


- Check the valve spring seat for breakage and wear (visual check).
 - ▶ If the valve spring seat is broken or worn:
 - Change the valve spring seat.
- Measure the thickness of the valve spring seat.

Valve spring	
Valve spring seat	1.8 mm (0.071 in)

- ▶ If the measured value does not meet specifications:
 - Change the valve spring seat.

17.4.30 Checking the cylinder head



- Check exhaust valve guides **1** using the special tool.

Limit plug gauge (59029026006) (☞ p. 297)

- ▶ If the special tool is easy to insert in the valve guide:
 - Change the valve guide and valve.

- Check intake valve guides **2** using the special tool.

Limit plug gauge (59029026006) (☞ p. 297)

- ▶ If the special tool is easy to insert in the valve guide:
 - Change the valve guide and valve.

- Check the sealing area of the spark plug thread and the valve seats from damage and cracking.

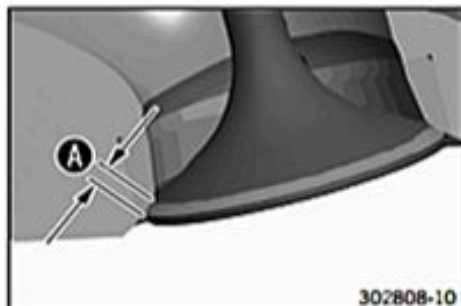
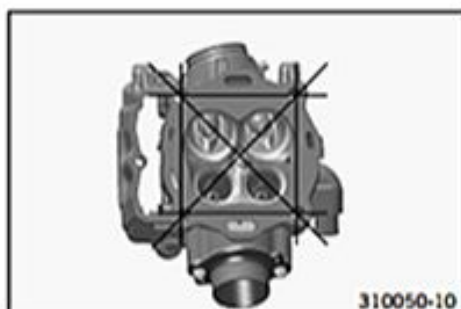
- ▶ If there is damage or cracking:
 - Change the cylinder head.

- Using a straightedge and the special tool, check the sealing area of the cylinder for distortion.

Feeler gauge (59029041100) (☞ p. 297)

Cylinder/cylinder head - sealing area distortion	≤ 0.10 mm (≤ 0.0039 in)
--	-------------------------

- ▶ If the measured value does not meet specifications:
 - Change the cylinder head.



- Check sealing seat **A** of the valves.

Valve	
Intake sealing seat width	2.00 mm (0.0787 in)

Valve	
Exhaust sealing seat width	2.00 mm (0.0787 in)

- ▶ If the measured value does not meet specifications:
 - Rework the valve seat.

- Blow compressed air through all oil channels and check that they are clear.

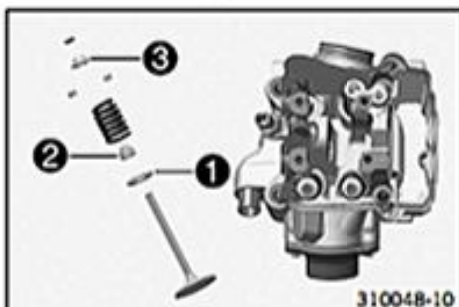
17.4.31 Checking the rocker arm shafts



306609-10

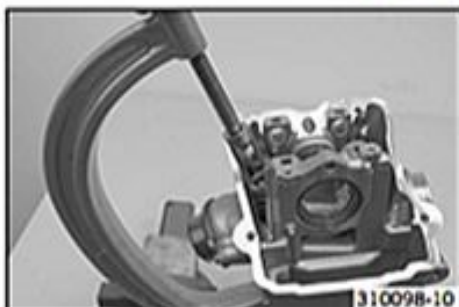
- Check the rocker arm shafts for damage and wear.
 - If there is damage or wear:
 - Change the rocker arm shafts.

17.4.32 Installing the valves



310048-10

- Position valve spring seats **1**. Mount the new valve stem seals **2**.
- Mount the valves according to their normal built-in position.
- Mount the springs and spring retainers **3**.



310098-10

- Pretension the valve springs using the special tool.

Valve spring mounter (59029019000) (☞ p. 297)

Insert for valve spring lever (77029041200) (☞ p. 300)



310099-10

- Mount the valve keys.

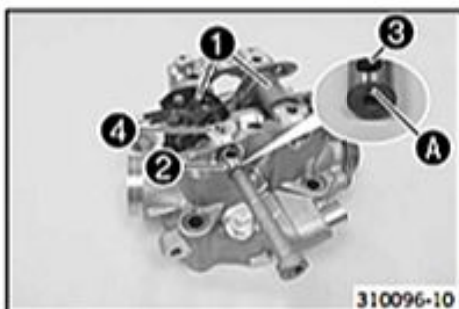


Info

When mounting the valve keys, check that they are seated correctly; preferably, fix the valve keys to the valve with a little grease.

- Place shims into the valve spring retainers according to the installation position.

17.4.33 Installing the rocker arm



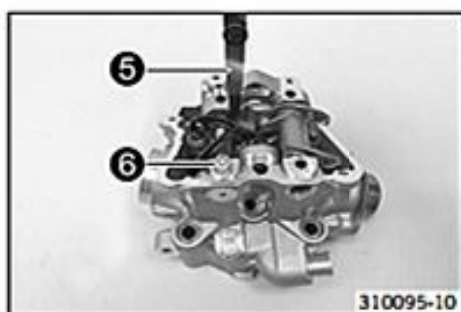
310096-10

- Position rocker arm **1** and mount rocker arm shaft **2**.
 - ✓ The rocker arm shaft with marking **A** is installed on the intake side.
 - ✓ Markings **A** face upward.



Info

Make sure that the tapped hole of the rocker arm shaft is facing outward. Align drill holes **3** of the rocker arm shafts with drill holes **4** of the cylinder head.



- Use special tool **5** to set the distance of the intake rocker arm.

Guideline

Rocker arm - axial play	0.10 mm (0.0039 in)
-------------------------	---------------------

Feeler gauge (59029041100) (☛ p. 297)

- Press the rocker arm shaft of the intake side all the way into the cylinder head.
- Mount and tighten screw **6**.

Guideline

Screw, rocker arm bearing	M7	15 Nm (11.1 lbf ft)
---------------------------	----	------------------------

- Remove special tool **5**.

Feeler gauge (59029041100) (☛ p. 297)

- Repeat these operations on the rocker arm of the exhaust side.
- Mount and tighten screws **7**.

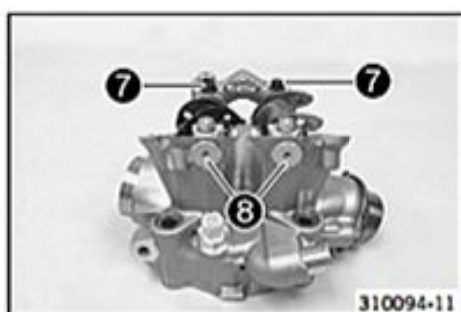
Guideline

Screw, rocker arm bearing	M7	15 Nm (11.1 lbf ft)
---------------------------	----	------------------------

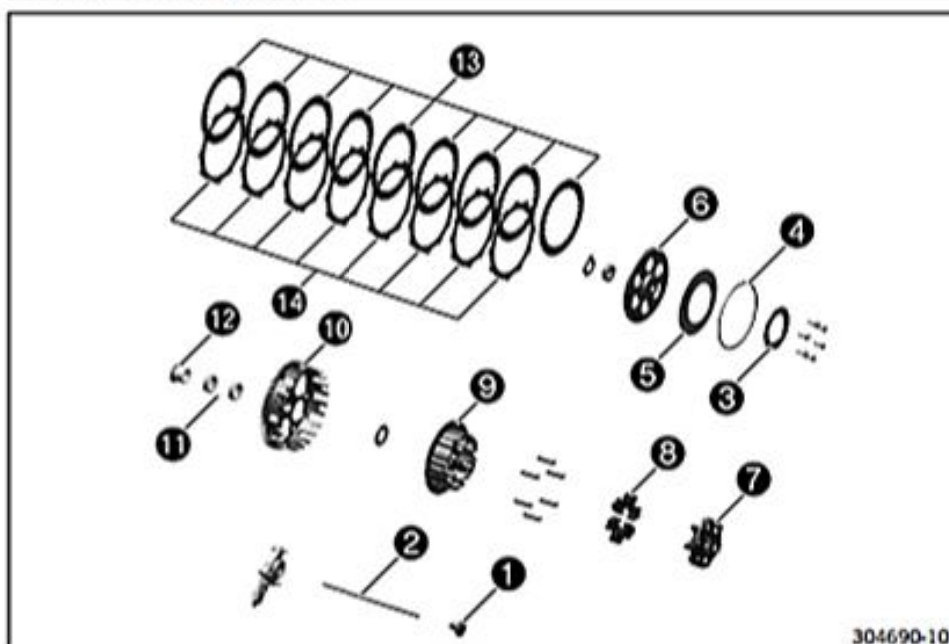
- Mount and tighten screw plugs **8** with the O-ring.

Guideline

Screw plug, rocker arm shaft	M10x1.25	10 Nm (7.4 lbf ft)
------------------------------	----------	--------------------



17.4.34 Checking the clutch



304690-10

- Check pressure piece **1** for damage and wear.
 - If there is damage or wear:
 - Change the clutch throw-out.
- Place push rod **2** on a level surface and check for run-out.
 - If there is run-out:
 - Change the push rod.
- Check spring retainer **3** for damage and wear.
 - If there is damage or wear:
 - Change the spring retainer.
- Check pretension ring **4** for damage and wear.

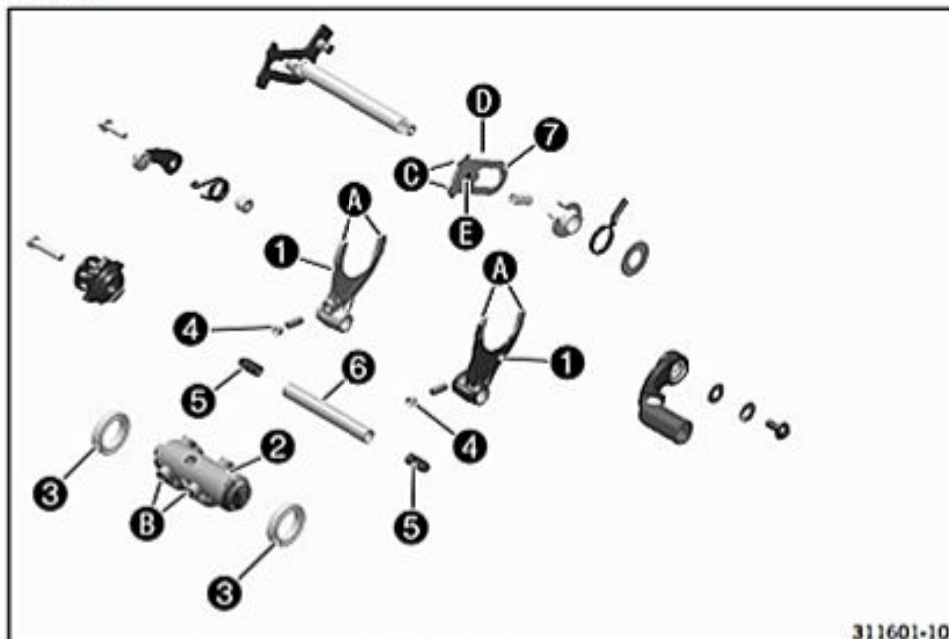
- If there is damage or wear:
 - Change the pretension ring.
- Check spring washer ⑤ for damage and wear.
 - If there is damage or wear:
 - Change the spring washer.
- Check the contact surface of pressure cap ⑥ for damage and wear.
 - If there is damage or wear:
 - Change the pressure cap.
- Check clutch center ⑦ for damage and wear.
 - If there is damage or wear:
 - Change the clutch center.
- Check damping rubber pieces ⑧ for damage and wear.
 - If there is damage or wear:
 - Change the damping rubber pieces.
- Check inner clutch hub ⑨ for damage and wear.
 - If there is damage or wear:
 - Change the inner clutch hub.
- Check the thrust surfaces of the clutch facing discs in clutch basket ⑩ for damage and wear.
 - If there is damage or wear:
 - Change the clutch facing discs and the clutch basket.
- Check needle bearings ⑪ and collar bushing ⑫ for damage and wear.
 - If there is damage or wear:
 - Change the needle bearings and collar bushing.
- Check intermediate clutch discs ⑬ for damage and wear.
 - If the intermediate clutch discs are not level and are pitted:
 - Change all intermediate clutch discs.
- Check clutch facing discs ⑭ for discoloration and scoring.
 - If there is discoloration or scoring:
 - Change all clutch facing discs.
- Check the thickness of the clutch pack.

Clutch pack - thickness	
Wear limit	≥ 26.4 mm (≥ 1.039 in)

- If the clutch pack does not meet specifications:
 - Change the clutch pack.

17.4.35 Checking the shift mechanism

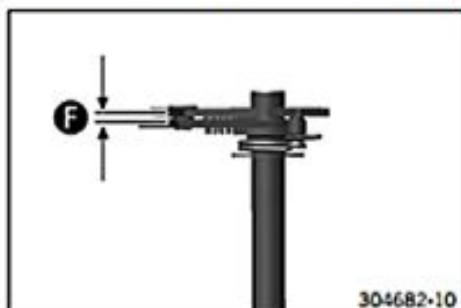
(SX-F EU)



311601-10

- Check shift forks **1** on plate **A** for damage and wear (visual check).
 - If there is damage or wear:
 - Change the shift fork.
- Check shift grooves **B** of shift drum **2** for wear.
 - If the shift groove is worn:
 - Change the shift drum.
- Check the seat of shift drum in bearing **3**.
 - If the shift drum is not seated correctly:
 - Change the shift drum and/or the bearing.
- Check bearing **3** for stiffness and wear.
 - If the bearing is stiff or worn:
 - Change the bearings.
- Check shift rollers **4** for surface damage and cracking.
 - If the shift roller exhibits surface damage or cracking:
 - Change the shift roller.
- Check springs **5** of the shift rails for damage and wear.
 - If the spring is broken or worn:
 - Change the spring of the shift rail.
- Check shift rails **6** on a flat surface for run-out.
 - If there is run-out:
 - Change the shift rail.
- Check the shift rails for scoring, seizure marks, and stiffness in the shift fork.
 - If the shift rail has scoring, seizure marks, or does not move easily in the shift fork:
 - Change the shift rail.
- Check sliding plate **7** in contact areas **C** for wear.
 - If the sliding plate is worn:
 - Change the sliding plate.
- Check return surface **D** on the sliding plate for wear.
 - If deep notches are present:
 - Change the sliding plate.
- Check guide pin **E** for looseness and wear.

- If the guide pin is loose and/or worn:
 - Change the sliding plate.
- Preassemble the shift shaft. (☛ p. 218)

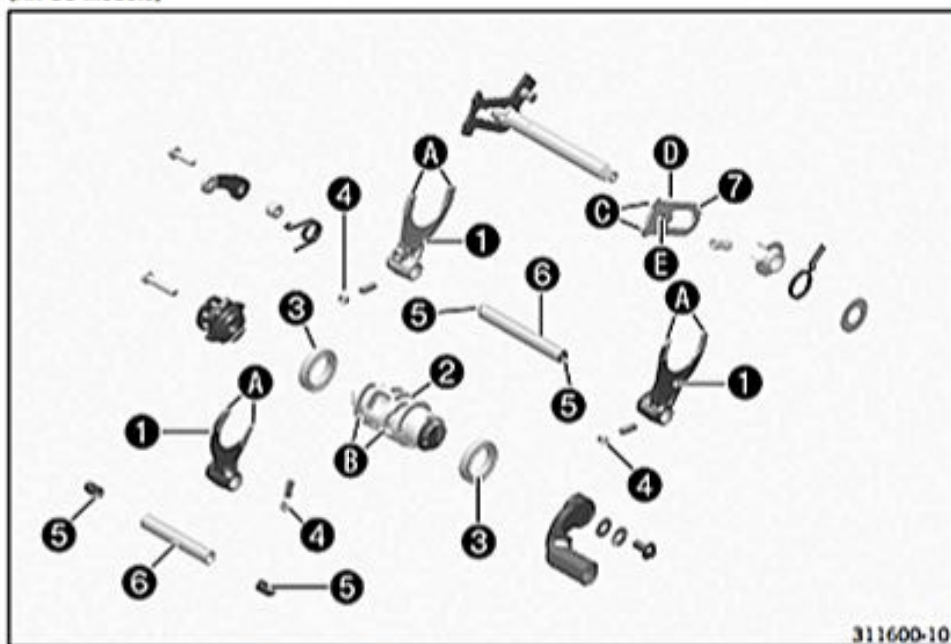


- Check clearance **F** between the sliding plate and the shift quadrant.

Shift shaft - play in sliding plate/shift quadrant	0.40... 0.80 mm (0.0157... 0.0315 in)
--	---------------------------------------

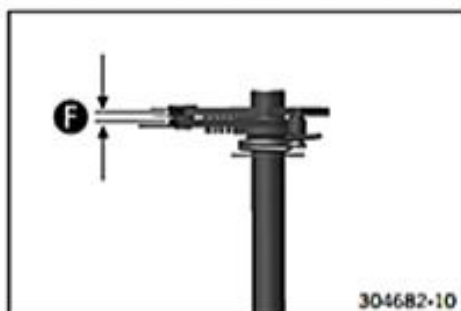
- If the measured value does not meet specifications:
 - Change the sliding plate.

(All US models)



- Check shift forks **1** on plate **A** for damage and wear (visual check).
 - If there is damage or wear:
 - Change the shift fork.
- Check shift grooves **B** of shift drum **2** for wear.
 - If the shift groove is worn:
 - Change the shift drum.
- Check the seat of the shift drum in bearing **3**.
 - If the shift drum is not seated correctly:
 - Change the shift drum and/or the bearing.
- Check bearing **3** for stiffness and wear.
 - If the bearing is stiff or worn:
 - Change the bearings.
- Check shift rollers **4** for surface damage and cracking.
 - If the shift roller exhibits surface damage or cracking:
 - Change the shift roller.
- Check springs **5** of the shift rails for damage and wear.
 - If the spring is broken or worn:
 - Change the spring of the shift rail.
- Check shift rails **6** on a flat surface for run-out.
 - If there is run-out:
 - Change the shift rail.

- Check the shift rails for scoring, seizure marks, and stiffness in the shift fork.
 - » If the shift rail has scoring, seizure marks, or does not move easily in the shift fork:
 - Change the shift rail.
- Check sliding plate **7** in contact areas **C** for wear.
 - » If the sliding plate is worn:
 - Change the sliding plate.
- Check return surface **D** on the sliding plate for wear.
 - » If deep notches are present:
 - Change the sliding plate.
- Check guide pin **E** for looseness and wear.
 - » If the guide pin is loose and/or worn:
 - Change the sliding plate.
- Preassemble the shift shaft. (☛ p. 218)

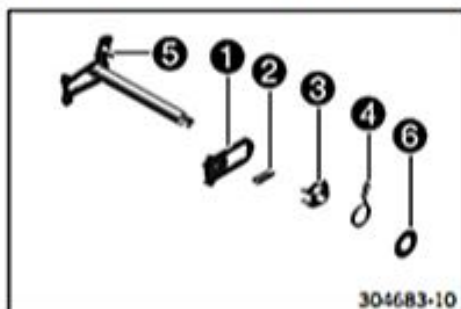


- Check clearance **F** between the sliding plate and the shift quadrant.

Shift shaft - play in sliding plate/shift quadrant	0.40... 0.80 mm (0.0157... 0.0315 in)
--	---------------------------------------

- » If the measured value does not meet specifications:
 - Change the sliding plate.

17.4.36 Preassembling the shift shaft



- Secure the short end of the shift shaft in the bench vise.

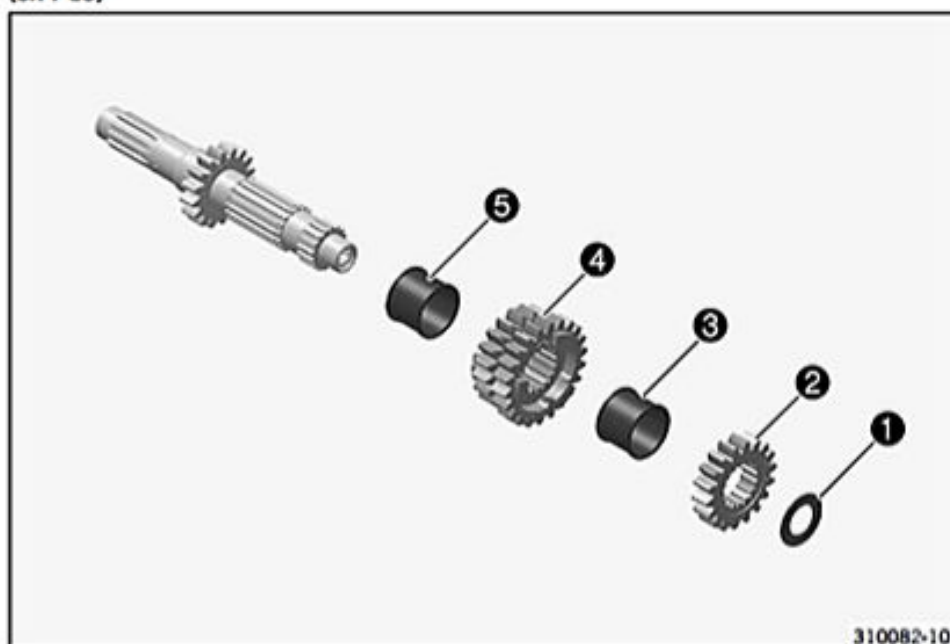
Guideline

Use soft jaws.

- Mount sliding plate **1** with the guide pin facing downward and put the guide pin on the shift quadrant.
- Mount pressure spring **2**.
- Slide on spring guide **3**, push return spring **4**, with the offset end facing upward, over the spring guide and lift the offset end over abutment bolt **5**.
- Mount stop disk **6**.

17.4.37 Disassembling the main shaft

(SX-F EU)



310082-10

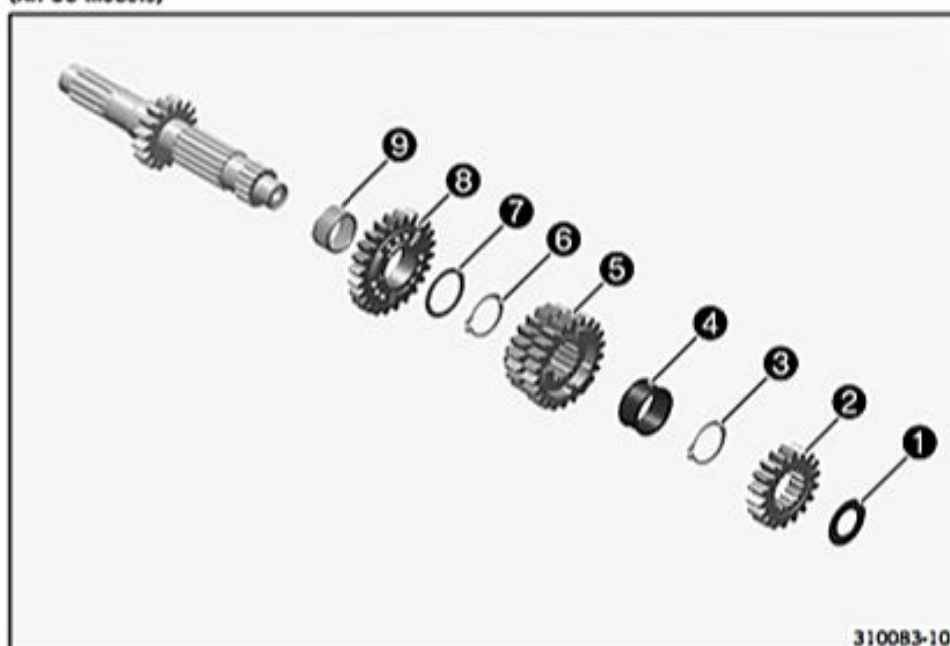
- Secure the main shaft with the toothed end facing downward in the vice.

Guideline

Use soft jaws.

- Remove stop disk ① and second-gear fixed gear ②.
- Remove distance sleeve ③.
- Remove third/fourth-gear sliding gear ④.
- Remove distance sleeve ⑤.

(All US models)



310083-10

- Secure the main shaft with the toothed end facing downward in the vice.

Guideline

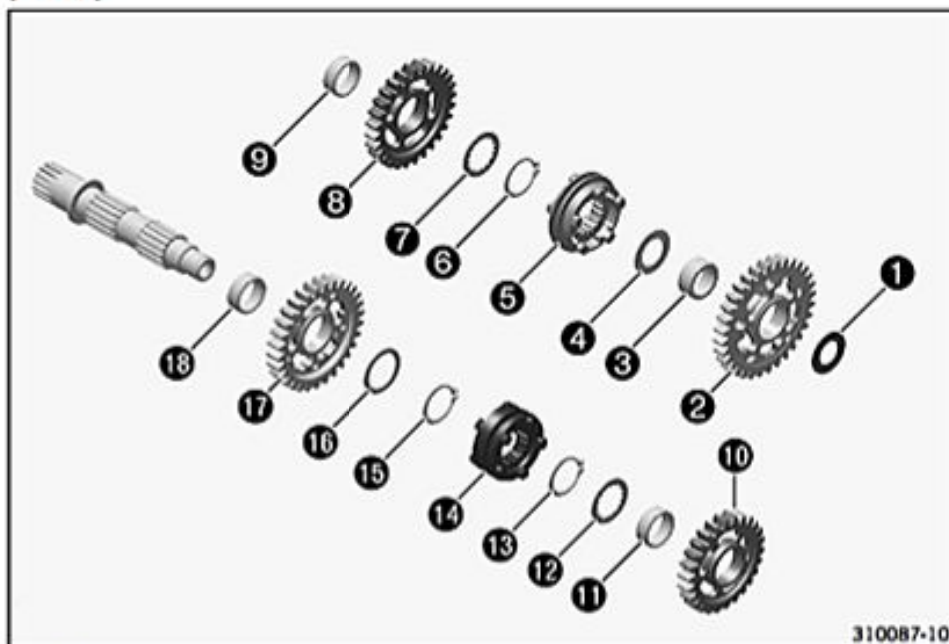
Use soft jaws.

- Remove stop disk ① and second-gear fixed gear ②.
- Remove lock ring ③.
- Remove distance sleeve ④.

- Remove third/fourth-gear sliding gear 5.
- Remove lock ring 6 and stop disk 7.
- Remove fifth-gear idler gear 8.
- Remove needle bearing 9.

17.4.38 Disassembling the countershaft

(SX-F EU)



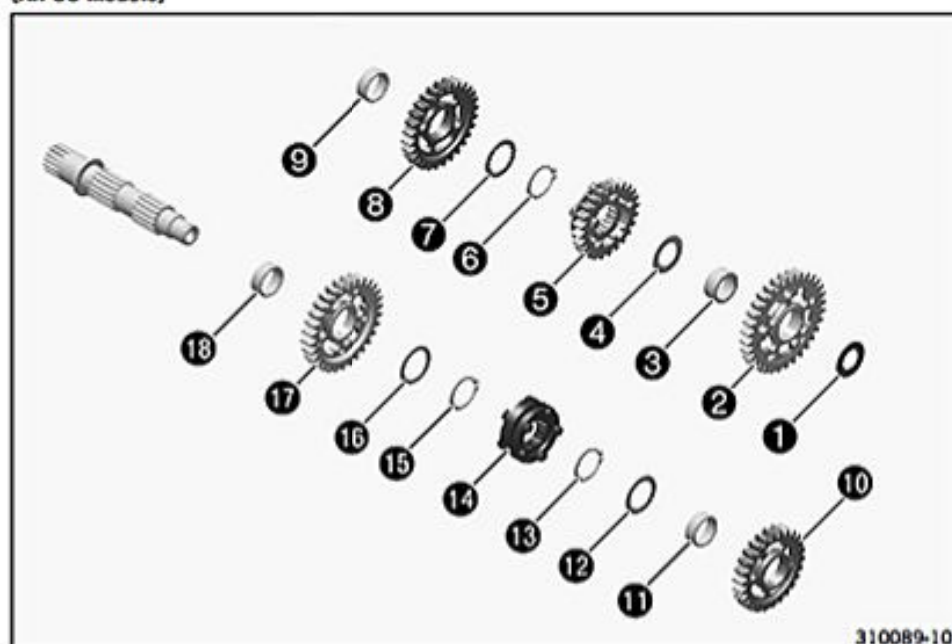
- Fix the countershaft in the vice with the toothed end facing downward.

Guideline

Use soft jaws

- Remove stop disk 1 and 1st-gear idler gear 2.
- Remove needle bearing 3 and stop disk 4.
- Remove 1st/3rd-gear shift collar 5 and lock ring 6.
- Remove stop disk 7 and 3rd-gear idler gear 8.
- Remove needle bearing 9 and 4th-gear idler gear 10.
- Remove needle bearing 11 and stop disk 12.
- Remove lock ring 13 and 2nd/4th gear shift collar 14.
- Remove lock ring 15 and stop disk 16.
- Remove 2nd-gear idler gear 17 and needle bearing 18.

(All US models)



- Fix the countershaft in the vice with the toothed end facing downward.

Guideline

Use soft jaws

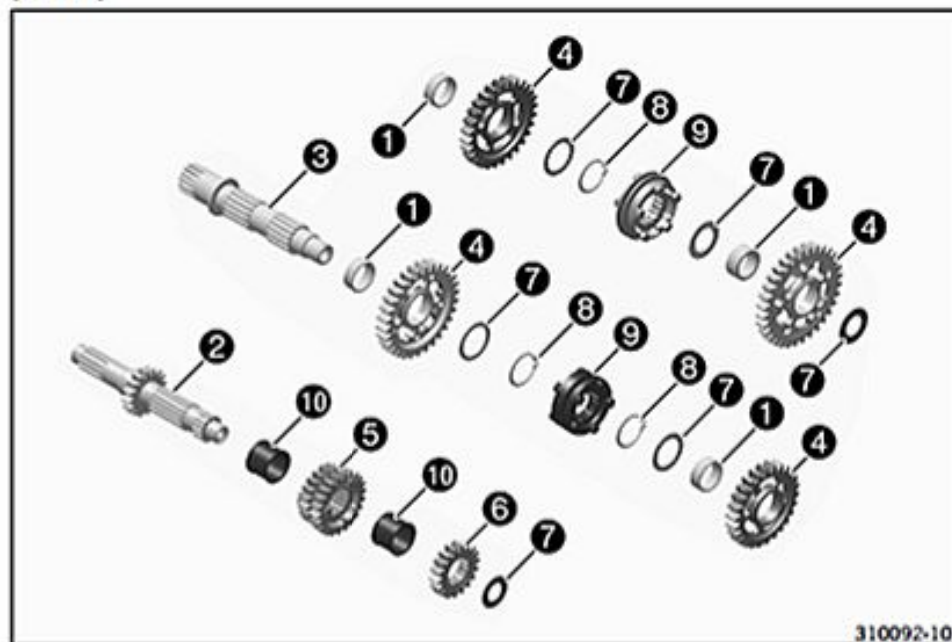
- Remove stop disk 1 and 1st-gear idler gear 2.
- Remove needle bearing 3 and stop disk 4.
- Remove 5th-gear sliding gear 5 and lock ring 6.
- Remove stop disk 7 and 3rd-gear idler gear 8.
- Remove needle bearing 9 and 4th-gear idler gear 10.
- Remove needle bearing 11 and stop disk 12.
- Remove lock ring 13 and 2nd/4th gear shift collar 14.
- Remove lock ring 15 and stop disk 16.
- Remove 2nd-gear idler gear 17 and needle bearing 18.

17.4.39 Checking the transmission

Condition

The transmission has been disassembled.

(SX-F EU)

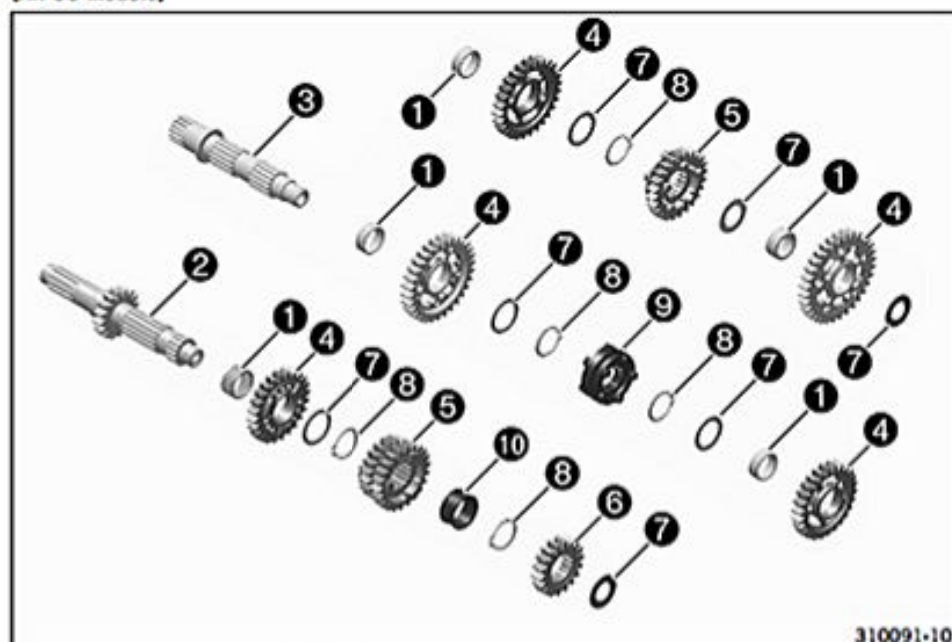


310092-10

- Check needle bearings **1** for damage and wear.
 - If there is damage or wear:
 - Change the needle bearings.
- Check the pivot points of main shaft **2** and countershaft **3** for damage and wear.
 - If there is damage or wear:
 - Change the main shaft and/or countershaft.
- Check the tooth profiles of main shaft **2** and countershaft **3** for damage and wear.
 - If there is damage or wear:
 - Change the main shaft and/or countershaft.
- Check the pivot points of idler gears **4** for damage and wear.
 - If there is damage or wear:
 - Change the gear wheel pair.
- Check the shift dogs of idler gears **4**, of shift collars **9**, and of sliding gear **5** for damage and wear.
 - If there is damage or wear:
 - Change the gear wheel pair or shift collar.
- Check the tooth faces of idler gears **4**, of sliding gear **5**, and of fixed gear **6** for damage and wear.
 - If there is damage or wear:
 - Change the gear wheel pair.
- Check the tooth profiles of sliding gear **5** for damage and wear.
 - If there is damage or wear:
 - Change the gear wheel pair.
- Check sliding gear **5** for smooth operation in the profile of main shaft **2**.
 - If the sliding gear does not move freely:
 - Change the sliding gear or the main shaft.
- Check shift collars **9** for damage and wear.
 - If there is damage or wear:
 - Change the shift collars.
- Check shift collars **9** for smooth operation in the profile of the countershaft **3**.
 - If the shift collar is stiff:
 - Change the shift collar or countershaft.
- Check stop disks **7** for damage and wear.
 - If there is damage or wear:
 - Change the stop disks.

- Use new lock rings **8** with every repair.
- Check distance sleeves **10** for damage and wear.
 - If there is damage or wear:
 - Change the distance sleeves.

(All US models)



- Check needle bearings **1** for damage and wear.
 - If there is damage or wear:
 - Change the needle bearings.
- Check the pivot points of main shaft **2** and countershaft **3** for damage and wear.
 - If there is damage or wear:
 - Change the main shaft and/or countershaft.
- Check the tooth profiles of main shaft **2** and countershaft **3** for damage and wear.
 - If there is damage or wear:
 - Change the main shaft and/or countershaft.
- Check the pivot points of idler gears **4** for damage and wear.
 - If there is damage or wear:
 - Change the gear wheel pair.
- Check the shift dogs of idler gears **4** and sliding gears **5** for damage and wear.
 - If there is damage or wear:
 - Change the gear wheel pair.
- Check the tooth faces of idler gears **4**, sliding gears **5**, and fixed gear **6** for damage and wear.
 - If there is damage or wear:
 - Change the gear wheel pair.
- Check the tooth profiles of sliding gears **5** for damage and wear.
 - If there is damage or wear:
 - Change the gear wheel pair.
- Check sliding gear **5** for smooth operation in the profile of main shaft **2**.
 - If the sliding gear does not move freely:
 - Change the sliding gear or the main shaft.
- Check shift collar **9** for damage and wear.
 - If there is damage or wear:
 - Change the shift collar.
- Check sliding gear **5** and shift collar **9** for smooth operation in the profile of countershaft **3**.

- If the sliding gear or shift collar is stiff:
 - Change the sliding gear, shift collar, or countershaft.
- Check stop disks 7 for damage and wear.
 - If there is damage or wear:
 - Change the stop disks.
- Use new lock rings 8 with every repair.
- Check distance sleeves 10 for damage and wear.
 - If there is damage or wear:
 - Change the distance sleeves.

17.4.40 Assembling the main shaft



Info

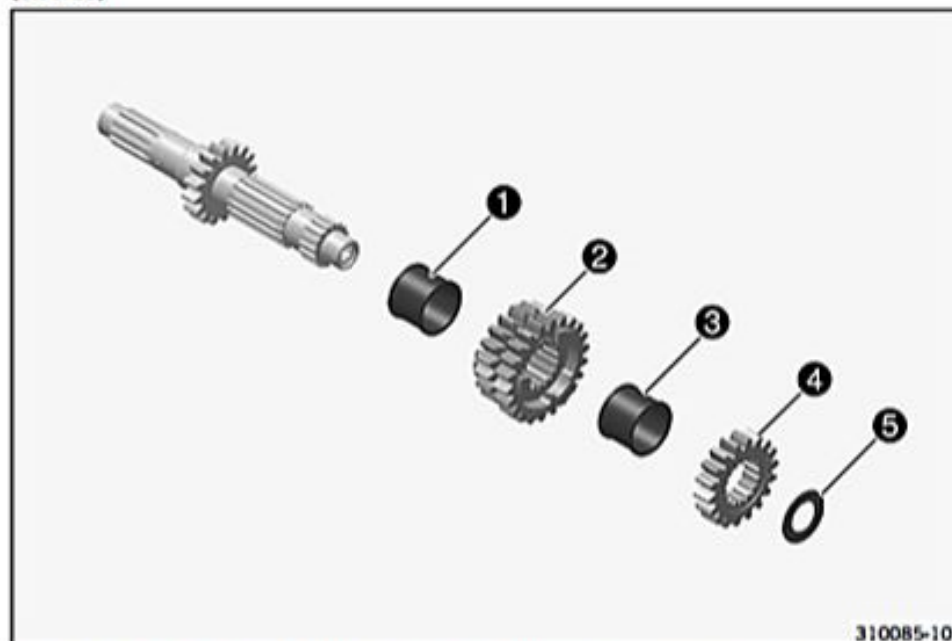
Use new lock rings with every repair.

Preparatory work

- Lubricate all parts carefully before assembling.
- Check the transmission. (↖ p. 221)

Main work

(SX-F EU)



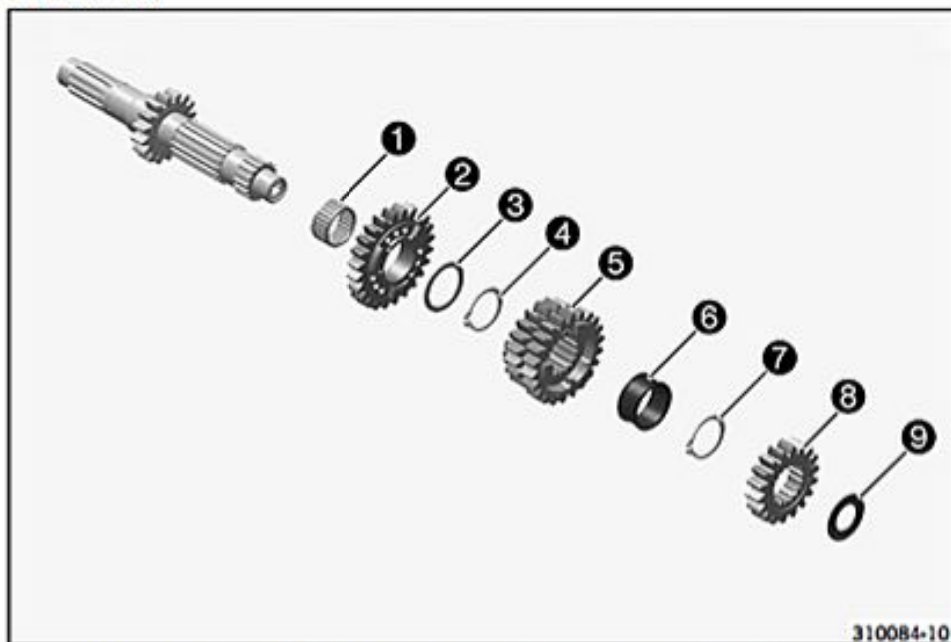
- Secure the main shaft with the toothed end facing downward in the vice.

Guideline

Use soft jaws.

- Mount distance sleeve 1.
- Mount third/fourth-gear sliding gear 2 with the small gear wheel facing downward.
- Mount distance sleeve 3.
- Attach second-gear fixed gear 4 with the collar facing downward and stop disk 5.
- Finally, check all gear wheels for smooth operation.

(All US models)



310084-10

- Secure the main shaft with the toothed end facing downward in the vice.

Guideline

Use soft jaws.

- Mount needle bearing ①, and mount fifth-gear idler gear ② with the shift dogs facing up.
- Mount stop disk ③ and lock ring ④.
- Mount third/fourth-gear sliding gear ⑤ with the small gear wheel facing downward.
- Mount distance sleeve ⑥.
- Mount lock ring ⑦.
- Mount second-gear fixed gear ⑧ with the collar facing down and mount stop disk ⑨.
- Finally, check all gear wheels for smooth operation.

17.4.41 Assembling the countershaft

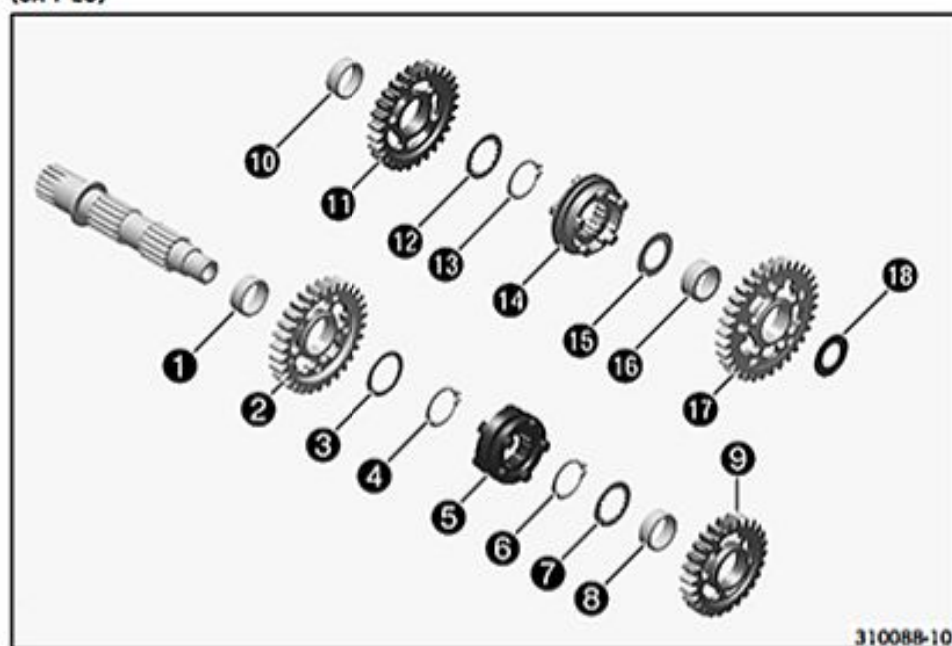


Info

Use new lock rings with every repair.

Preparatory work

- Carefully grease all parts before assembling.
- Check the transmission. (☛ p. 221)

Main work
(SX-F EU)

310088-10

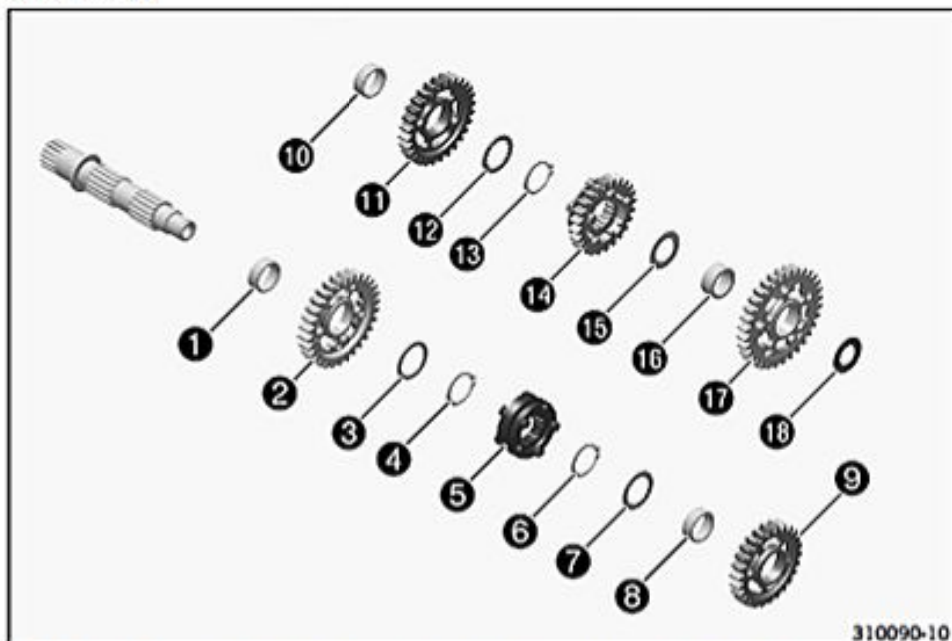
- Fix the countershaft in the vice with the toothed end facing downward.

Guideline

Use soft jaws

- Mount needle bearing ① and 2nd-gear idler gear ② onto the countershaft with the protruding collar facing downward.
- Mount stop disk ③ and lock ring ④.
- Mount 2nd/4th gear shift collar ⑤ with the shift groove facing up.
- Mount lock ring ⑥ and stop disk ⑦.
- Mount needle bearing ⑧ and the 4th-gear idler gear ⑨ with the collar facing up.
- Mount needle bearing ⑩ and the 3rd-gear idler gear ⑪ with the collar facing down.
- Mount stop disk ⑫ and lock ring ⑬.
- Mount the 1st/3rd-gear shift collar ⑭ with the shift groove facing downward and stop disk ⑮.
- Mount needle bearing ⑯, 1st-gear idler gear ⑰ with the recess facing down and stop disk ⑱.
- Finally, check all gear wheels for smooth operation.

(All US models)



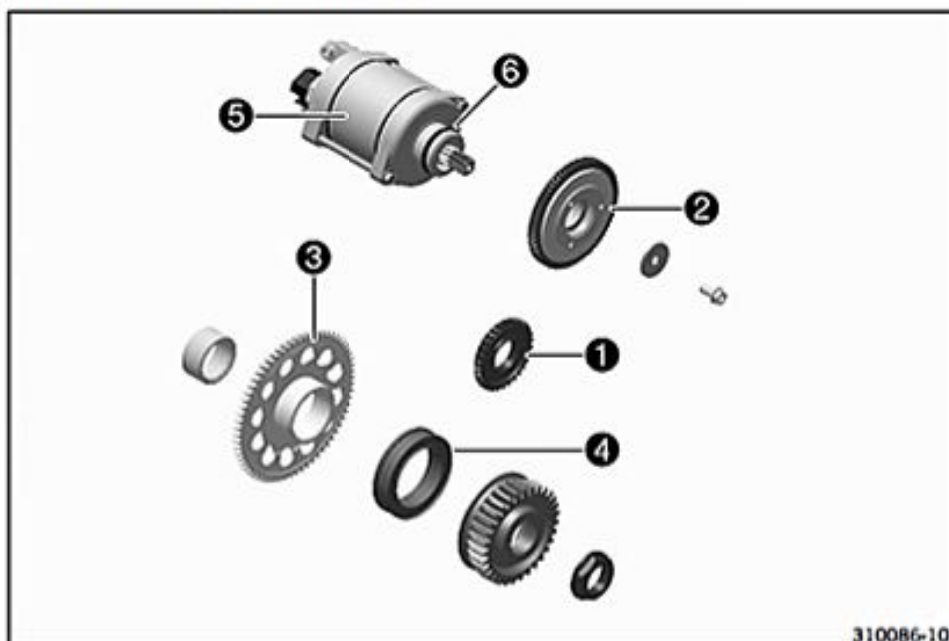
- Fix the countershaft in the vice with the toothed end facing downward.

Guideline

Use soft jaws

- Mount needle bearing ① and 2nd-gear idler gear ② onto the countershaft with the protruding collar facing downward.
- Mount stop disk ③ and lock ring ④.
- Mount 2nd/4th gear shift collar ⑤ with the shift groove facing up.
- Mount lock ring ⑥ and stop disk ⑦.
- Mount needle bearing ⑧ and the 4th-gear idler gear ⑨ with the collar facing up.
- Mount needle bearing ⑩ and the 3rd-gear idler gear ⑪ with the collar facing down.
- Mount stop disk ⑫ and lock ring ⑬.
- Mount the 5th-gear sliding gear ⑭ with the shift groove facing down and stop disk ⑮.
- Mount needle bearing ⑯, 1st-gear idler gear ⑰ with the recess facing down and stop disk ⑱.
- Finally, check all gear wheels for smooth operation.

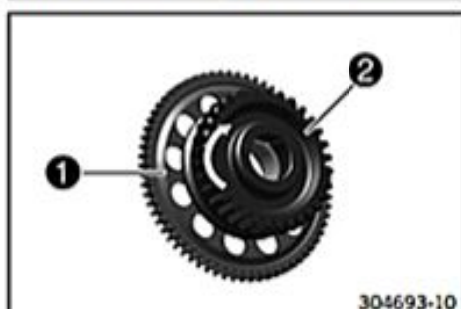
17.4.42 Checking the starter drive



310086-10

- Check the gear mesh and bearing of starter idler gear **1** for damage and wear.
 - If there is damage or wear:
 - Change the starter idler gear.
- Check the gear mesh and bearing of torque limiter **2** for damage and wear.
 - If there is damage or wear:
 - Change the torque limiter.
- Check the gear mesh and bearing of freewheel gear **3** for damage and wear.
 - If there is damage or wear:
 - Change the freewheel gear or bearing.
- Check freewheel **4** for damage and wear when it is disassembled.
 - If there is damage or wear:
 - Change the freewheel.
- Check the gear mesh of starter motor **5** for damage and wear.
 - If there is damage or wear:
 - Change the starter motor.
- Change the O-ring **6** of the starter motor.
- Connect the negative cable of a 12 volt power supply to the housing of the starter motor. Connect the positive cable of the power supply briefly with connector of the starter motor.
 - If the starter motor does not turn when the circuit is closed:
 - Change the starter motor.

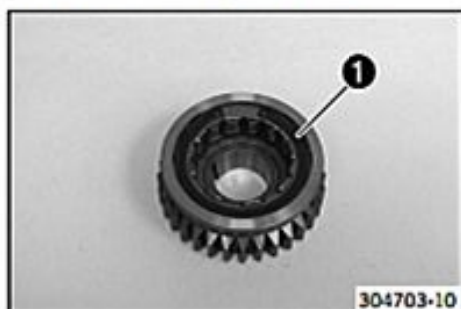
17.4.43 Checking the freewheel



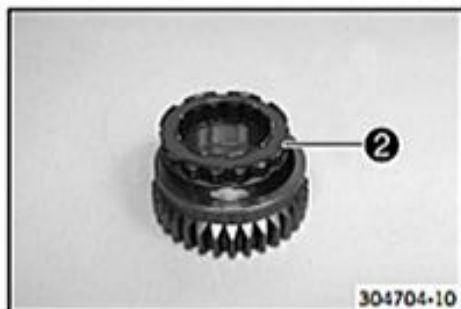
304693-10

- Insert freewheel gear **1** into primary gear **2**, turning the primary gear clockwise; do not wedge!
- Check the locking action of freewheel gear **1**.
 - If the primary gear does not turn clockwise or if it does not lock counterclockwise:
 - Change the freewheel.

17.4.44 Removing the freewheel

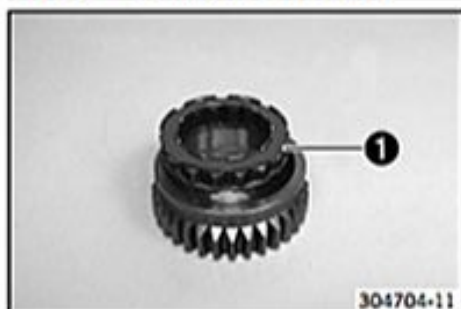


- Press expansion ring **1** together with suitable pliers and take off.



- Take the freewheel **2** out of the primary gear.

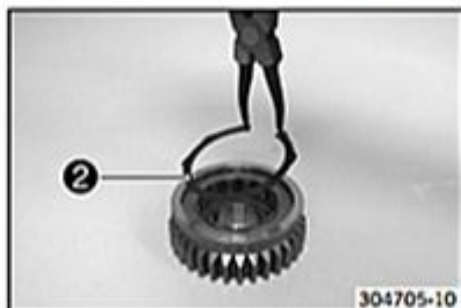
17.4.45 Installing the freewheel



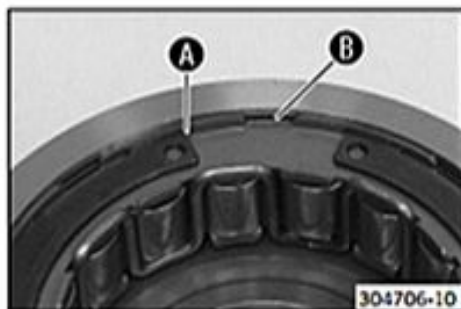
- Thoroughly oil all parts.
- Push the freewheel **1** into the primary gear.

**Info**

Note the direction of rotation.



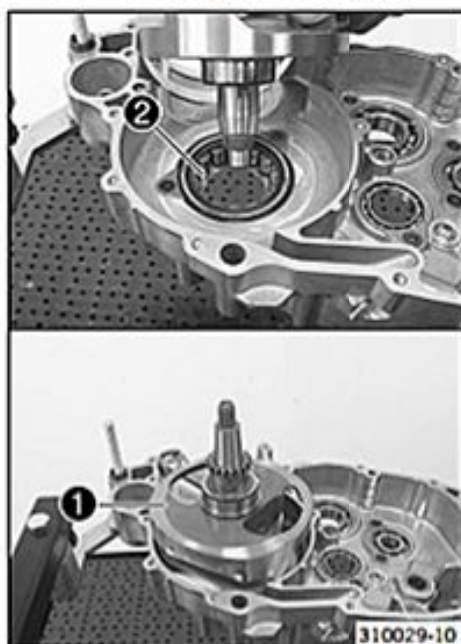
- Mount spreader ring **2**.



- Ensure that all lugs of the spreader ring pass through slots **A** of the freewheel and engage in groove **B** of the primary gear.

17.5 Engine assembly

17.5.1 Installing the crankshaft



- Position the right section of the engine case in the engine work stand.
- Oil the bearing.

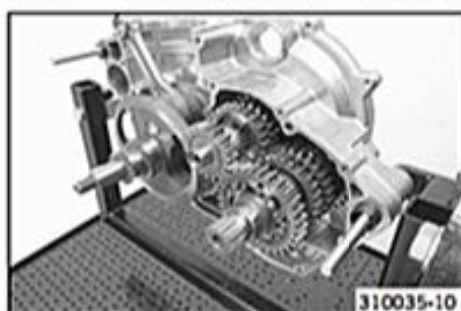
Engine oil (SAE 10W/50) (☞ p. 290)

- Slide crankshaft **1** into the bearing seat.

**Info**

Ensure that washer **2** is not damaged.

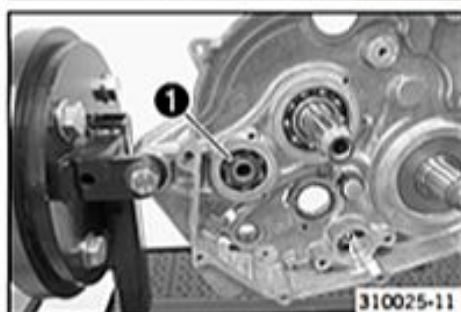
17.5.2 Installing the transmission shafts

**(SX-F EU)**

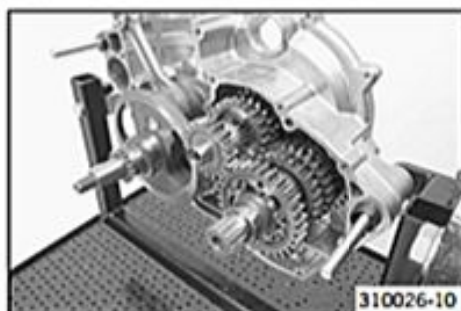
- Lubricate all bearings.
- Slide both transmission shafts into the bearing seats.

**Info**

Make sure not to misplace the washers.



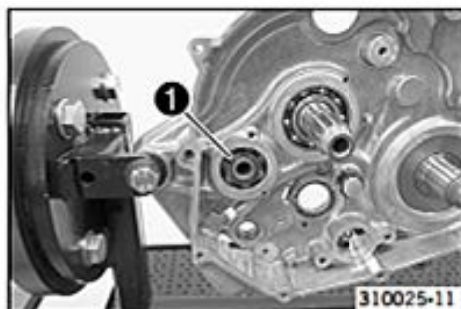
- Mount lock ring **1**.

**(All US models)**

- Lubricate all bearings.
- Slide both transmission shafts into the bearing seats.

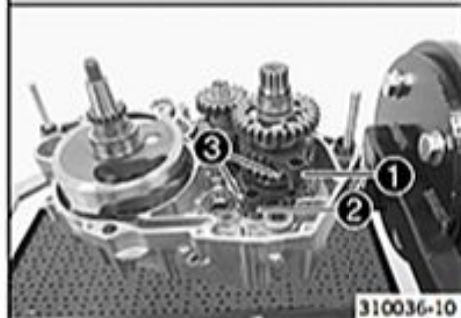
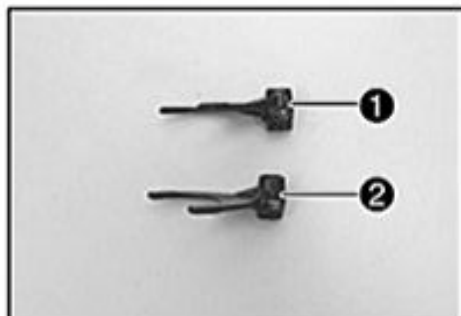
**Info**

Make sure not to misplace the washers.



- Mount lock ring 1.

17.5.3 Installing the shift forks



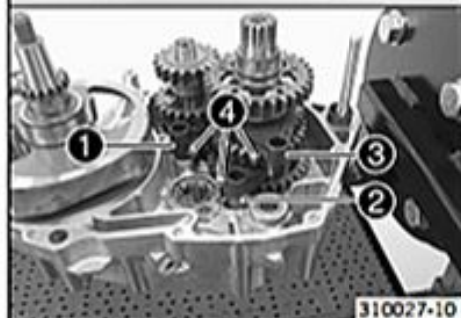
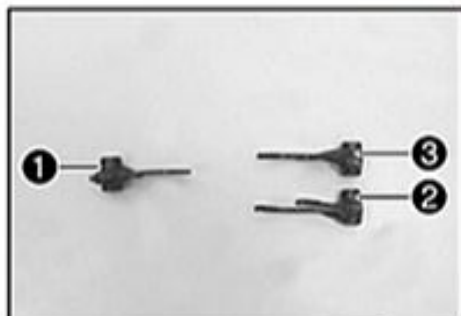
(SX-F EU)

- Lubricate all parts thoroughly.
- Mount shift fork 1 in the upper shift groove of the countershaft.
- Mount shift fork 2 in the lower shift groove of the countershaft.
- Slide on shift rollers 3.



Info

Fix the shift rollers in the shift forks with grease.



(All US models)

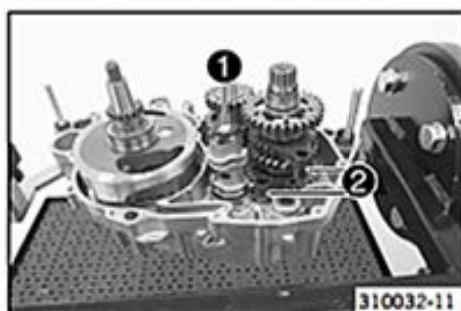
- Lubricate all parts thoroughly.
- Mount shift fork 1 in the upper shift groove of the main shaft.
- Mount shift fork 2 in the lower shift groove of the countershaft.
- Mount shift fork 3 in the upper shift groove of the countershaft.
- Mount shift rollers 4.



Info

Fix the shift rollers in the shift forks with grease.

17.5.4 Installing the shift drum

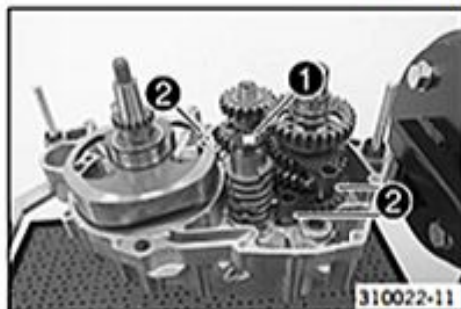


(SX-F EU)

- Push shift drum **1** into the bearing seat.
- Put shift forks **2** in the shift drum.

**Info**

Do not misplace the shift rollers.



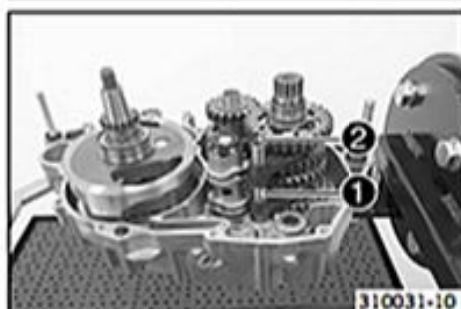
(All US models)

- Push shift drum **1** into the bearing seat.
- Put shift forks **2** in the shift drum.

**Info**

Do not misplace the shift rollers.

17.5.5 Installing the shift rails

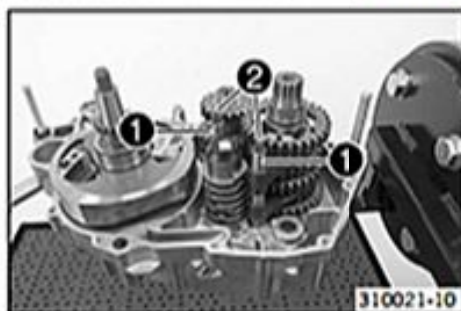


(SX-F EU)

- Install shift rail **1** together with upper spring **2** and the lower spring.

**Info**

Fix the springs in the shift rail with grease.



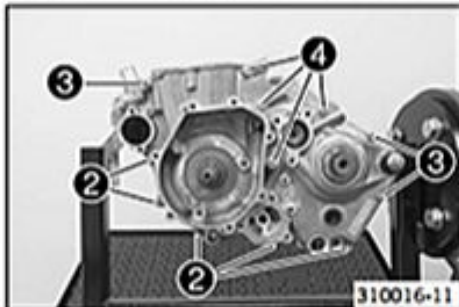
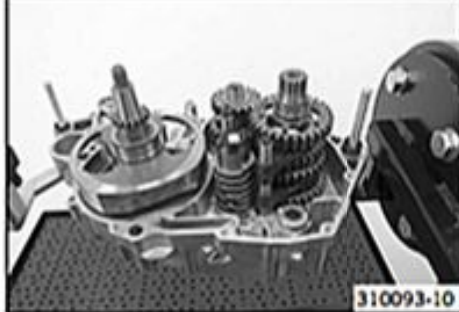
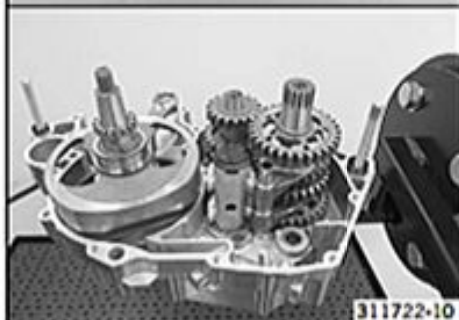
(All US models)

- Install shift rails **1** together with upper springs **2** and lower springs.

**Info**

Fix the springs in the shift rails with grease.

17.5.6 Installing the left engine case



(SX-F EU)

- Install dowel ①.
- Degrease the sealing surfaces. Apply sealing compound to the left section of the engine case.

Loctite® 5910



Info

To prevent sealing compound from entering into the oil channel, dowel ① must be mounted first.

(All US models)

- Install dowel ①.
- Degrease the sealing surfaces. Apply sealing compound to the left section of the engine case.

Loctite® 5910



Info

To prevent sealing compound from entering into the oil channel, dowel ① must be mounted first.

- Mount the left section of the engine case. If necessary, strike lightly with a rubber mallet.



Info

Do not use the screws to pull the two sections of the engine case together.

- Mount screws ②, but do not tighten yet.

Guideline

Screw, engine case	M6x60	10 Nm (7.4 lbf ft)
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- Mount screws ③, but do not tighten yet.

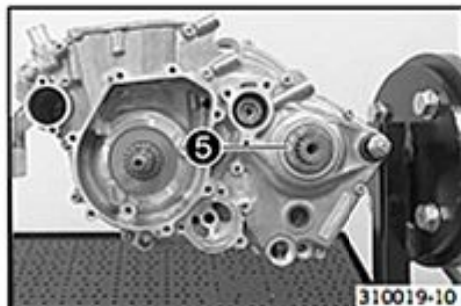
Guideline

Screw, engine case	M6x70	10 Nm (7.4 lbf ft)
--------------------	-------	--------------------

- Mount screws ④ and tighten all screws in a crisscross pattern.

Guideline

Screw, engine case	M6x80	10 Nm (7.4 lbf ft)
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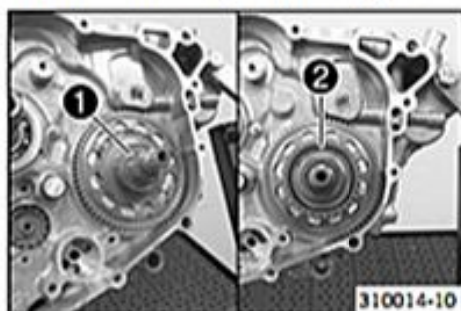
- Mount the O-ring on the countershaft.
- Lightly grease and mount spacer ⑤.

17.5.7 Installing the freewheel gear



- Mount freewheel gear ①.

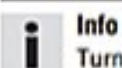
17.5.8 Installing the primary gear



- Mount woodruff key ①.
- Degrease the cone and thinly apply thread locker to it.

Loctite® 243™

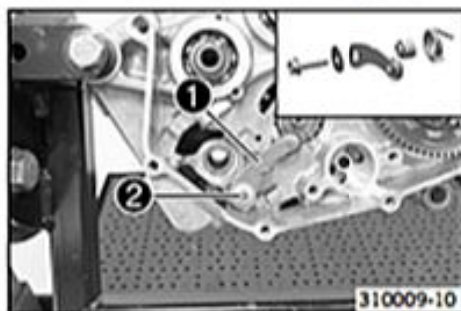
- Mount primary gear ②.



Info

Turn the freewheel gear to ease engagement.

17.5.9 Installing the locking lever



- Mount locking lever ① with the washer, sleeve and spring.
- Mount and tighten screw ②.

Guideline

Screw, locking lever	M5	6 Nm (4.4 lbf ft)	Loctite® 243™
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17.5.10 Installing the shift drum locating unit



- Push away locking lever ① from the shift drum locating unit and position the shift drum locating unit ②.



Info

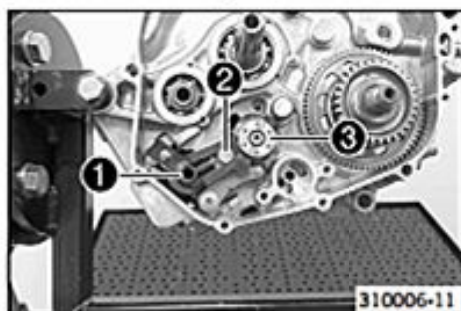
The flat areas of the shift drum locating unit are not symmetric.

- Relieve tension from the locking lever.
- Mount and tighten screw ③.

Guideline

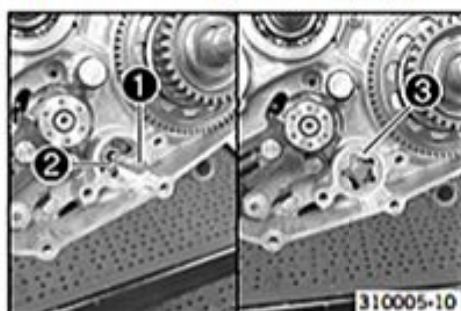
Screw, shift drum locating	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
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17.5.11 Installing the shift shaft

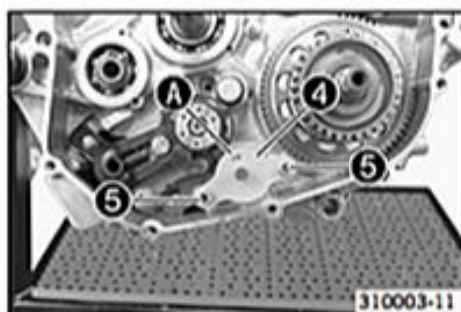


- Slide shift shaft ① with the washer into the bearing seat.
- Push sliding plate ② away from the shift drum locating unit and insert the shift shaft all the way.
- Let the sliding plate engage in the shift drum locating unit ③.
- Shift through the transmission.

17.5.12 Installing the force pump



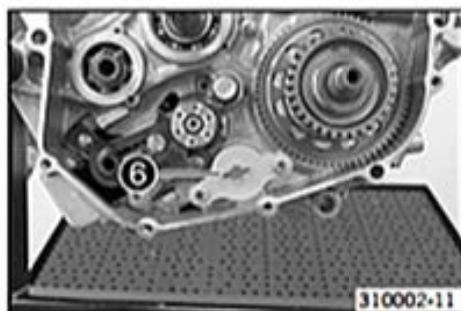
- Oil the oil pump shaft, internal rotor and external rotor before assembly.
- Mount oil pump shaft ①.
- Mount pin ②.
- Mount the internal rotor with the recess facing inward.
- Mount external rotor ③ with the bevel facing inward.



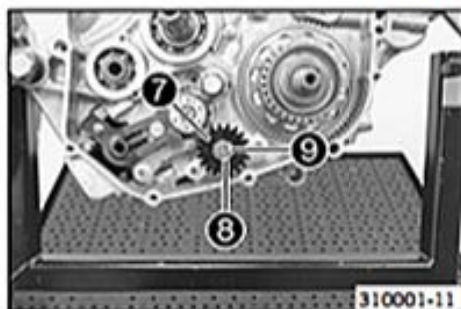
- Position oil pump cover ④.
- ✓ The Top marking A faces up.
- Mount and tighten screws ⑤.

Guideline

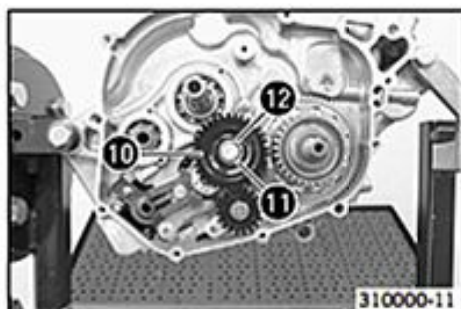
Screw, pressure pump cover	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
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- Insert pin ⑥.



- Position oil pump gear wheel ⑦.
- Position washers ⑧.
- Mount lock washer ⑨.



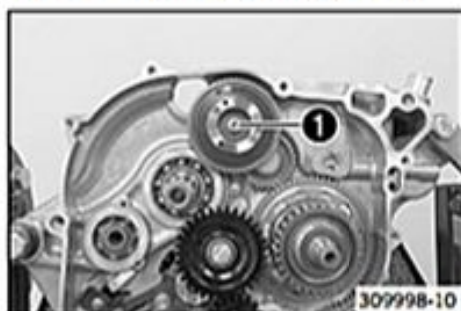
- Mount oil pump idler gear 10.
- Mount washer 11 and lock ring 12.
- Crank the oil pump gear wheels and ensure that they can move easily.

17.5.13 Installing the starter idler gear



- Slide on starter idler gear 1 with the collar facing the engine case.

17.5.14 Installing the torque limiter

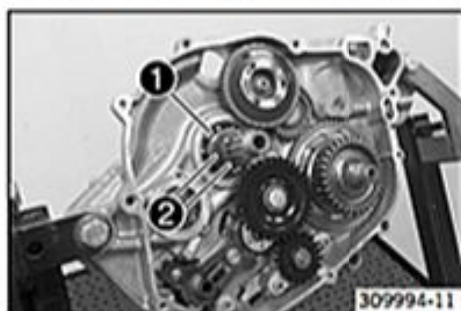


- Position the washer.
- Mount the torque limiter.
- Mount and tighten screw 1 with the washer.

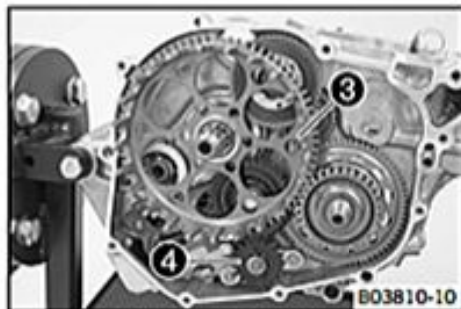
Guideline

Screw, bearing bolt, torque limiter	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
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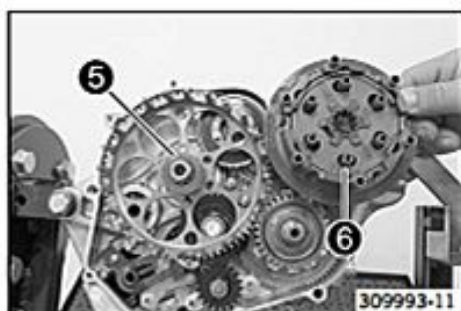
17.5.15 Installing the outer clutch hub



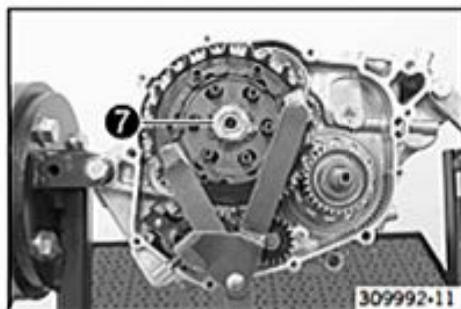
- Mount collar bushing 1 and both needle bearings 2.



- Slide the outer clutch hub 3 onto the gearbox main shaft.
- Turn oil pump gear wheel 4 until the gear teeth of the clutch basket engage.



- Slide on washer (5) and inner clutch hub (6).



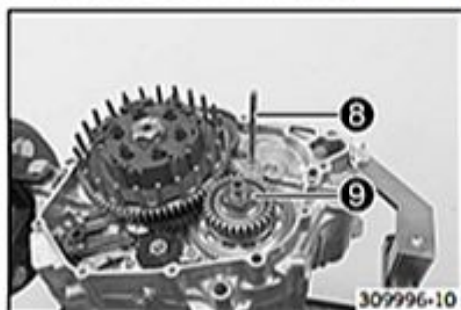
- Position the new lock washer and mount nut (7). Tighten the nut, holding the inner clutch hub with a special tool.

Guideline

Nut, inner clutch hub	M18x1.5	80 Nm (59 lbf ft)
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Clutch holder (51129003000) (☛ p. 296)

- Secure the nut with the lock washer.



- Lock the outer clutch hub and primary gear using special tool (8).

Gear segment (80029004000) (☛ p. 303)

- Mount and tighten nut (9).

Guideline

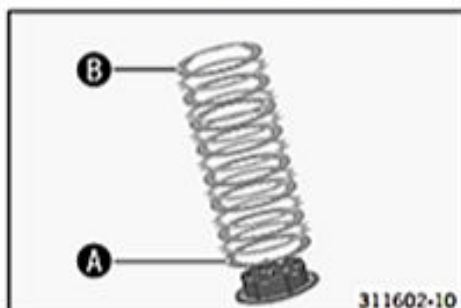
Nut, primary gear	M20LHx1.5	100 Nm (73.8 lbf ft)	Loctite® 243™
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- Set the crankshaft to top dead center and lock it with special tool (10).

Locking screw (113080802) (☛ p. 294)

17.5.16 Installing the clutch discs



- Thoroughly oil the clutch facing discs.
- Mount intermediate clutch disc (A) with marking S.

Guideline

Thickness of intermediate clutch disc (A)	1.0 mm (0.039 in)
---	-------------------

- Alternately place the clutch facing and 7 intermediate discs into the clutch basket.

Guideline

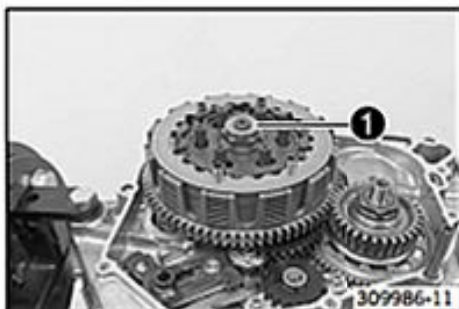
Thickness of intermediate clutch discs	1.4 mm (0.055 in)
--	-------------------

- Place intermediate clutch disc (B) into the clutch basket.

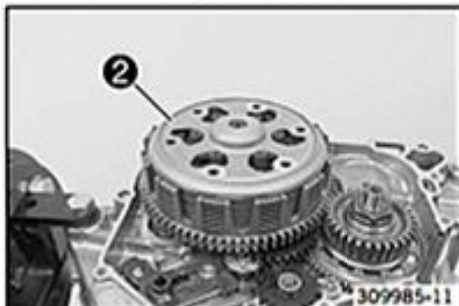
Guideline

Thickness of intermediate clutch disc (B)	1.0 mm (0.039 in)
---	-------------------

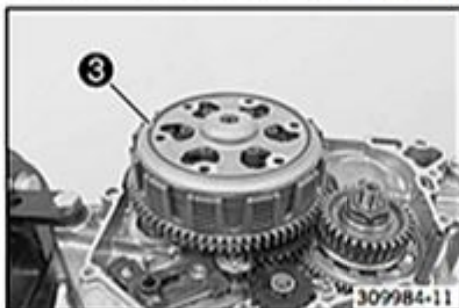
- Place clutch facing disc into the clutch basket.



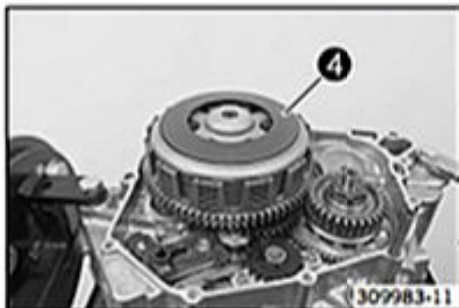
- Mount clutch throw-out **1**.



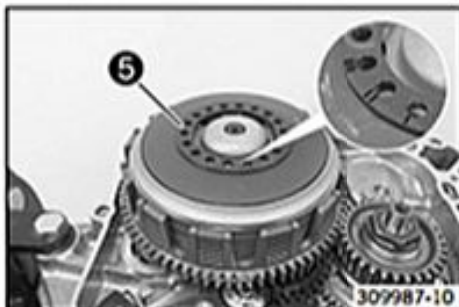
- Position pressure cap **2**.



- Mount pretension ring **3** with marking **Top** facing up.



- Position spring washer **4**.



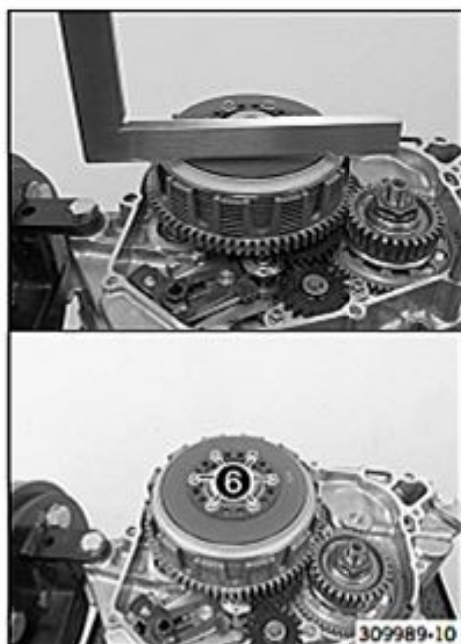
- Position spring retainer **5** with marking **I**.



- Mount screws **6** and tighten in a crisscross pattern.

Guideline

Screw, clutch spring retainer	M5	6 Nm (4,4 lbf ft)
-------------------------------	----	-------------------



- Using a straightedge and the special tool, check the spring washer for distortion.

Feeler gauge (59029041100) (☛ p. 297)

Spring washer distortion	0... 0.10 mm (0... 0.0039 in)
--------------------------	-------------------------------

- If the specified value is not reached:

- Remove screws 6 and mount the spring retainer with marking II.

- Using a straightedge and the special tool, check the spring washer for distortion.

Feeler gauge (59029041100) (☛ p. 297)

Spring washer distortion	0... 0.10 mm (0... 0.0039 in)
--------------------------	-------------------------------

- If the specified value is not reached:

- Remove screws 6 and mount the spring retainer with marking III.

- Using a straightedge and the special tool, check the spring washer for distortion.

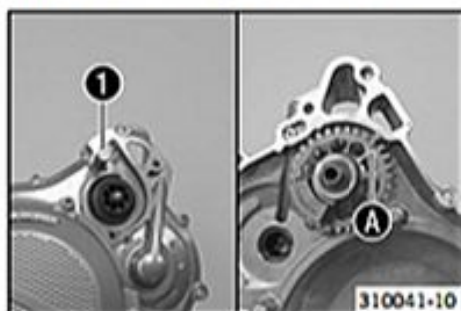
Feeler gauge (59029041100) (☛ p. 297)

Spring washer distortion	0... 0.10 mm (0... 0.0039 in)
--------------------------	-------------------------------

- If the specified value is not reached:

- Change the clutch facing discs.

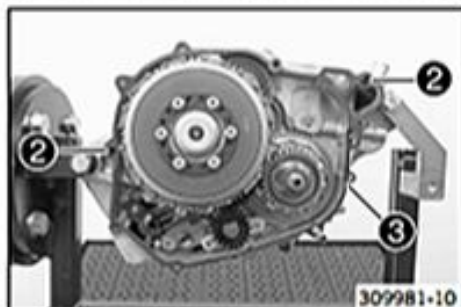
17.5.17 Installing the clutch cover



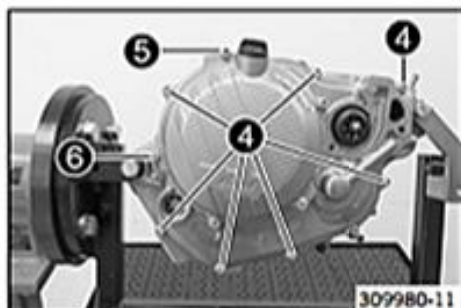
- Position the balancer shaft with special tool 1.

Fixing drift (78129032000) (☛ p. 301)

- ✓ Marking A and the special tool are aligned.



- Mount dowels 2 and position the clutch cover gasket 3.



- Mount the clutch cover.

- Mount screws 4 but do not tighten them yet.

Guideline

Screw, clutch cover	M6x25	10 Nm (7.4 lbf ft)
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- Mount screw 5 but do not tighten yet.

Guideline

Screw, clutch cover	M6x55	10 Nm (7.4 lbf ft)
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- Mount screw 6 and tighten all screws in a crisscross pattern.

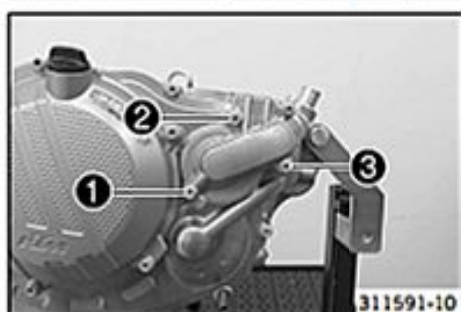
Guideline

Screw, clutch cover	M6x30	10 Nm (7.4 lbf ft)
---------------------	-------	--------------------

- Remove the special tool.

Fixing drift (78129032000) (☛ p. 301)

17.5.18 Installing the water pump cover



- Put the water pump cover seal in place.
- Mount the water pump cover.
- Mount screw ① with the sealing washer but do not tighten yet.

Guideline

Screw, water pump cover	M6x25	10 Nm (7.4 lbf ft)
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- Mount screw ② but do not tighten yet.

Guideline

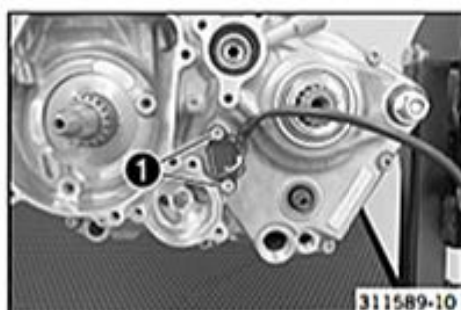
Screw, water pump cover	M6x25	10 Nm (7.4 lbf ft)	Loctite® 243™
-------------------------	-------	--------------------	---------------

- Mount screw ③ and tighten all screws in a crisscross pattern.

Guideline

Screw, water pump cover	M6x55	10 Nm (7.4 lbf ft)
-------------------------	-------	--------------------

17.5.19 Installing the gear position sensor

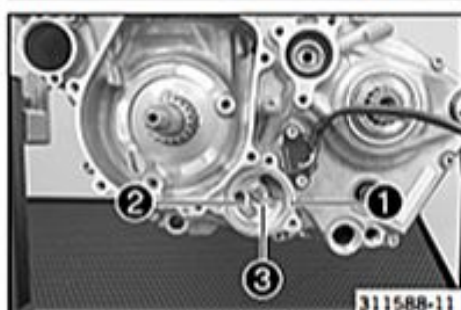


- Position gear position sensor.
- Mount and tighten screws ①.

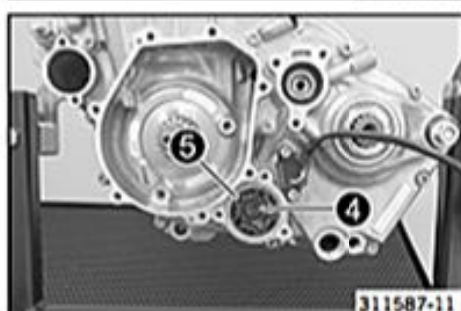
Guideline

Screw, gear position sensor	M5	5 Nm (3.7 lbf ft)	Loctite® 243™
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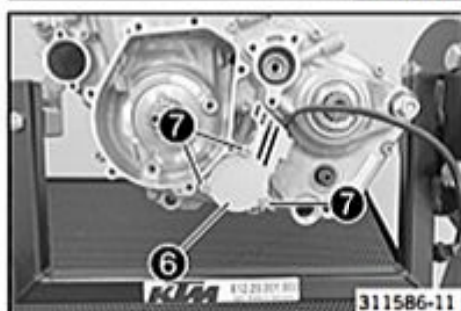
17.5.20 Installing the suction pump



- Oil the internal rotor and external rotor before mounting.
- Insert O-ring ①.
- Position pin ② into the oil pump shaft from above.
- Position pin ③.



- Mount internal rotor ④ and external rotor ⑤.
- ✓ The rounded sides of the external rotor face the engine case.



- Position oil pump cover ⑥. Mount and tighten screws ⑦.

Guideline

Screw, suction pump cover	M5	6 Nm (4.4 lbf ft)	Loctite® 243™
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17.5.21 Installing the timing chain



- Thread in the timing chain and place it over the timing chain sprocket.

**Info**

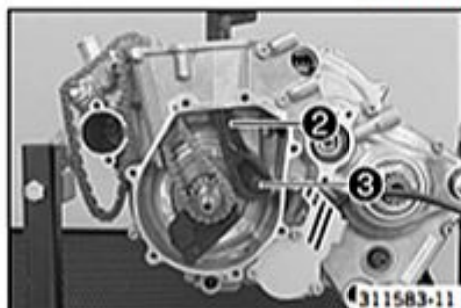
If the timing chain was used before, ensure it is running in the correct direction.



- Position the timing chain securing guide.
- Mount and tighten screw ①.

Guideline

Screw, timing chain securing guide	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
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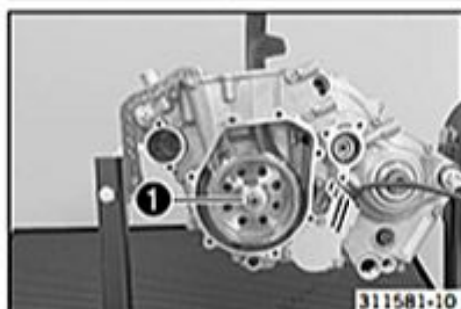


- Thread in timing chain tensioning rail ② from above.
- Mount and tighten screw ③.

Guideline

Screw, timing chain tensioning rail	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
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17.5.22 Installing the rotor



- Mount the woodruff key.
- Mount the rotor.
- Mount and tighten nut ① with the spring washer.

Guideline

Nut, rotor	M12x1	60 Nm (44.3 lbf ft)	Thread, oiled with engine oil/cone degreased
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17.5.23 Installing the piston



- Move the joints of the compression ring and oil scraper ring so they are offset by 180°.
- Place the oiled piston on the cylinder.
- Clamp the piston rings together using the special tool.

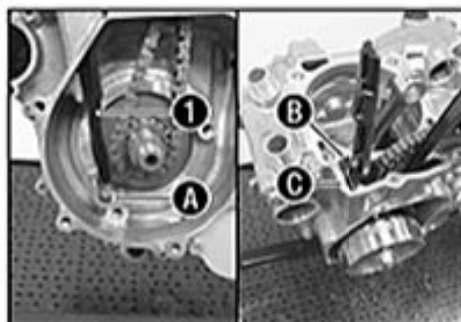
Piston ring mounting tool (60029015000) (☞ p. 297)



- Tap lightly on the piston ring mounting tool from above with a plastic hammer so that it lies flush with the cylinder.
- ✓ The special tool must press the piston rings together properly and lie flush with the cylinder.



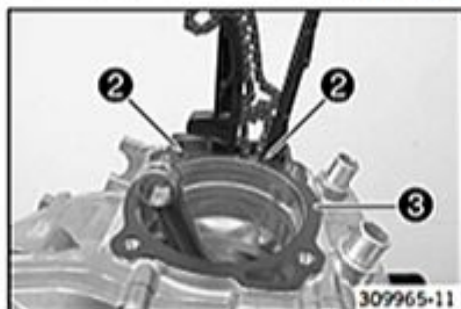
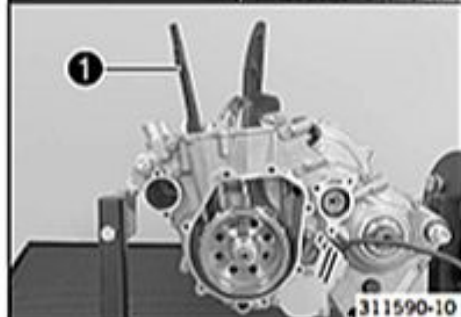
- Drive the piston into the cylinder by striking it carefully with the hammer handle.
- ✓ The piston rings should not catch or they will be damaged.



- Mount timing chain guide rail (1) from above.
- ✓ Catch (B) engages in recess (C).
- ✓ The timing chain guide rail engages in recess (A).

**Info**

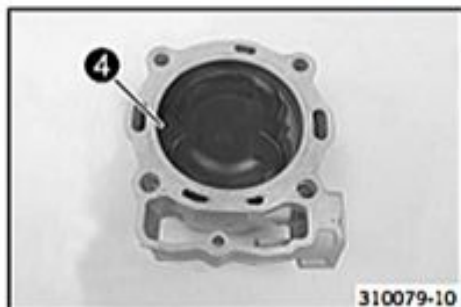
This step is illustrated with the rotor removed for a clearer view.



- Mount cylinder base gasket (3).

**Info**

Ensure that locating pins (2) are seated properly.



- Ensure that piston marking (4) faces the exhaust side.



- Cover the engine case opening with a cloth.
- Feed the timing chain through the timing chain shaft and mount the piston pin.

**Info**

For purposes of illustration, the following operations are shown on the deinstalled piston.

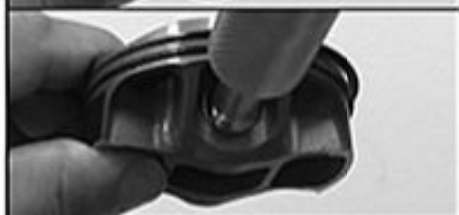


- Position the piston ring lock.



- Insert the special tool and press it with force towards the piston.
- Turn the special tool clockwise, thereby pushing the piston ring lock into the groove.

Insertion tool for piston ring lock (77329030100) (☛ p. 300)



- Ensure that the piston ring lock is in the correct position on both sides.

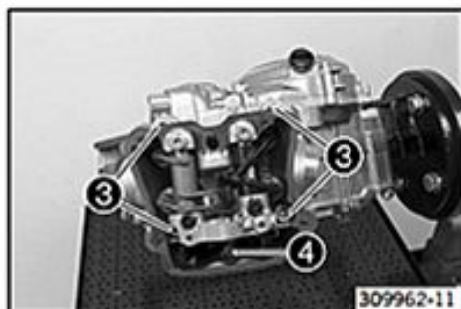


- Remove the cloth. Keep the timing chain taut.
- Carefully push the cylinder downward, letting the dowels engage.

17.5.24 Installing the cylinder head



- Mount dowels ① and fit cylinder head gasket ②.



- Put the cylinder head in place.
- Mount screws (3) with the washers and tighten them in a crisscross pattern.

Guideline

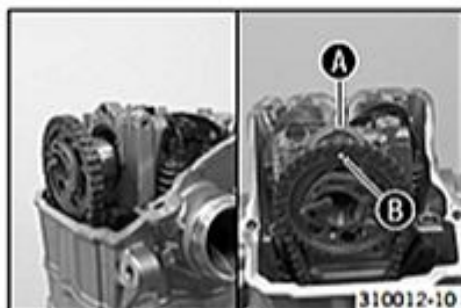
Screw, cylinder head	M10x1.25	Step 1 10 Nm (7.4 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 50 Nm (36.9 lbf ft)	Lubricated with engine oil
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- Mount and tighten screw (4).

Guideline

Screw, cylinder head	M6	10 Nm (7.4 lbf ft)
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17.5.25 Installing the camshaft

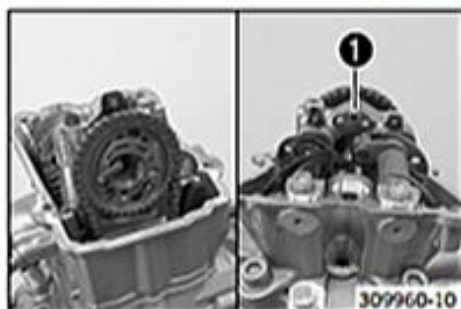


- Place the timing chain over the camshaft gear.
- Push the camshaft into the bearing seats.
- ✓ Marking (B) on the camshaft and hole (A) on the cylinder head are lined up with each other.



Info

Make sure that the crankshaft is at top dead center.

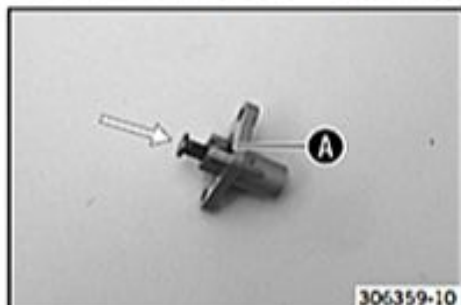


- Position the camshaft support plate.
- Mount and tighten screw (1).

Guideline

Screw, camshaft support plate	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
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17.5.26 Installing the timing chain tensioner



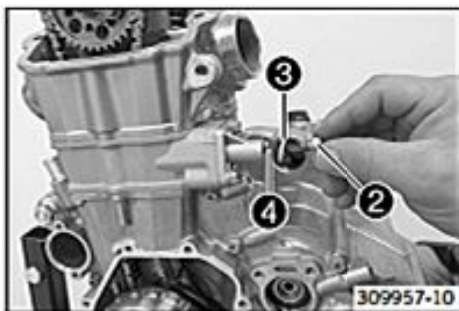
- Activate release (A) and push the timing chain tensioner all the way back.



- Position the timing chain tensioner with the gasket.
- Mount and tighten screws (1).

Guideline

Screw, timing chain tensioner	M6	10 Nm (7.4 lbf ft)
-------------------------------	----	--------------------

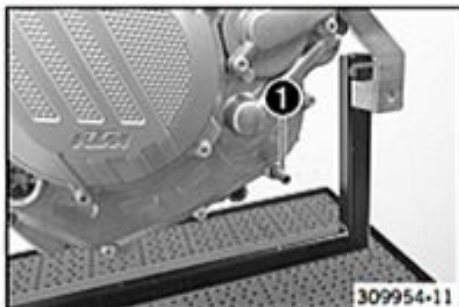


- Mount and tighten screw plug (2) with washer (3) and spring (4).

Guideline

Plug, timing chain tensioner	M8	8 Nm (5.9 lbf ft)
------------------------------	----	-------------------

17.5.27 Checking the valve clearance



- Remove special tool (1).

Locking screw (113080802) (☞ p. 294)

- Crank the engine several times.
- Position the engine at ignition top dead center. (☞ p. 183)



- Check the valve clearance at all valves between the valve and rocker arm.

Guideline

Valve clearance	
Intake at: 20 °C (68 °F)	0.10... 0.15 mm (0.0039... 0.0059 in)
Exhaust at: 20 °C (68 °F)	0.12... 0.17 mm (0.0047... 0.0067 in)

Feeler gauge (59029041100) (☞ p. 297)

- If the valve clearance does not meet specifications:
 - Adjust the valve clearance. (☞ p. 245)

- Remove the special tool.

Locking screw (113080802) (☞ p. 294)

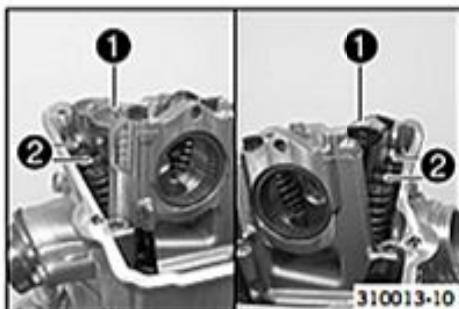
- Mount and tighten screw (2) with washer.

Guideline

Screw plug, crankshaft location	M8	10 Nm (7.4 lbf ft)
---------------------------------	----	--------------------



17.5.28 Adjusting the valve clearance



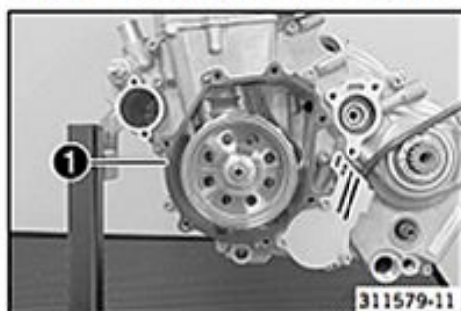
Main work

- Remove the timing chain tensioner. (☞ p. 184)
- Remove the camshaft. (☞ p. 184)
- Raise rocker arm (1) on the outside.
- Remove shims (2) and set them down according to the installation position.
- Correct the shims based on the results of the valve clearance check.
- Insert suitable shims.
- Install the camshaft. (☞ p. 244)
- Install the timing chain tensioner. (☞ p. 244)

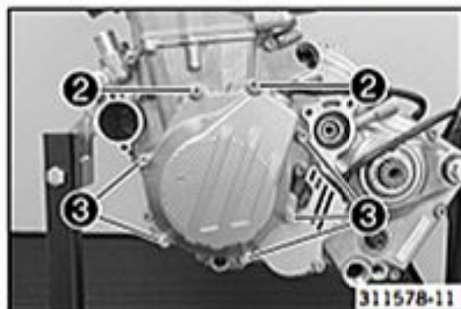
Finishing work

- Check the valve clearance. (☞ p. 245)

17.5.29 Installing the alternator cover



- Position alternator cover gasket ①.



- Position the alternator cover.
- Mount screws ② with the washers, but do not tighten yet.

Guideline

Screw, alternator cover	M6x25	10 Nm (7.4 lbf ft)
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- Mount screws ③ and tighten all screws in a crisscross pattern.

Guideline

Screw, alternator cover	M6x25	10 Nm (7.4 lbf ft)
-------------------------	-------	--------------------

17.5.30 Installing the valve cover



- Position the valve cover seal.
- Position the valve cover.
- Mount and tighten screws ①.

Guideline

Screw, valve cover	M6	10 Nm (7.4 lbf ft)
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17.5.31 Installing the spark plug



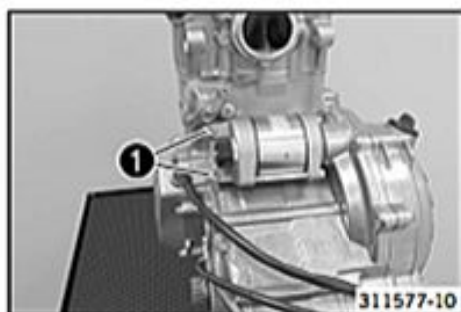
- Mount and tighten the spark plug using the special tool.

Guideline

Spark plug	M10x1	10... 12 Nm (7.4... 8.9 lbf ft)
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Spark plug wrench (77229172000) (☛ p. 300)

17.5.32 Installing the starter motor



- Grease the O-ring.
- Mount the starter motor.

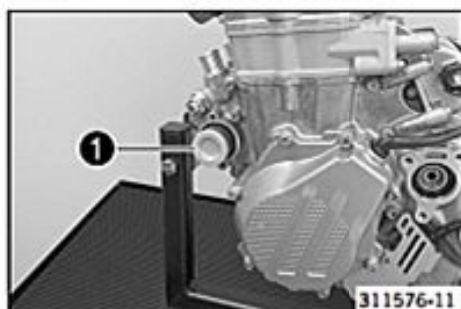
Long-life grease (☛ p. 292)

- Mount and tighten screws ①.

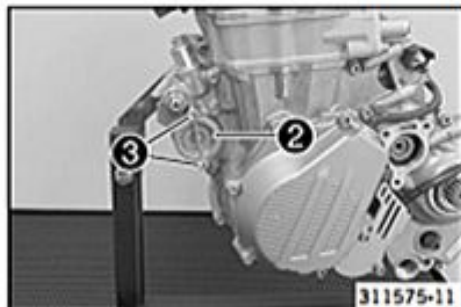
Guideline

Screw, starter motor	M6	10 Nm (7.4 lbf ft)
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17.5.33 Installing the oil filter



- Tilt the motorcycle to one side and fill the oil filter housing to about 1/3 full with engine oil.
- Insert oil filter **1** into the oil filter housing.

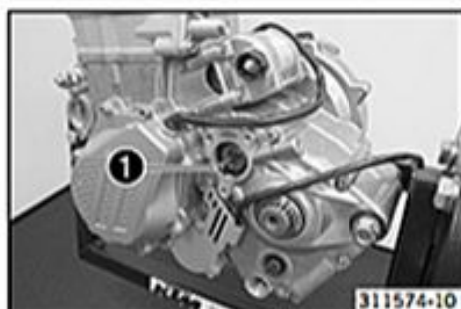


- Oil the O-ring of the oil filter cover.
- Mount oil filter cover **2**.
- Mount and tighten screws **3**.

Guideline

Screw, oil filter cover	M6	10 Nm (7.4 lbf ft)
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17.5.34 Installing the clutch push rod



- Mount clutch push rod **1**.

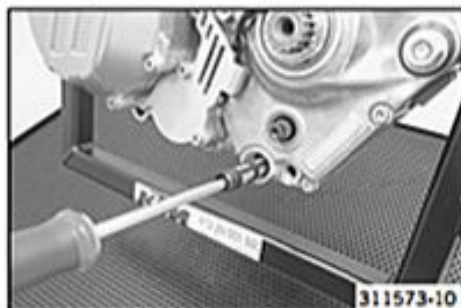
17.5.35 Installing the oil screens



- Mount and tighten screw plug **1** with the short oil screen and the O-ring.

Guideline

Screw plug, oil screen	M20x1.5	15 Nm (11.1 lbf ft)
------------------------	---------	------------------------



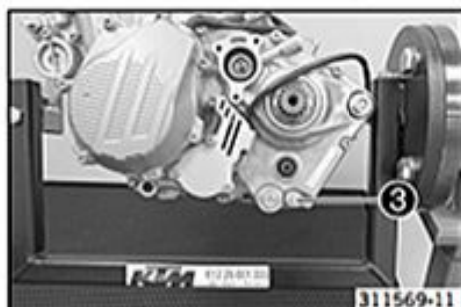
- Position the long oil screen with the O-rings on a pin wrench.
- Position the pin wrench through the drilled hole of the screw plug in the opposite section of the engine case.
- Push the oil screen all the way into the engine case.



- Mount and tighten screw plug 2 with the O-ring.

Guideline

Screw plug, oil screen	M20x1.5	15 Nm (11.1 lbf ft)
------------------------	---------	------------------------

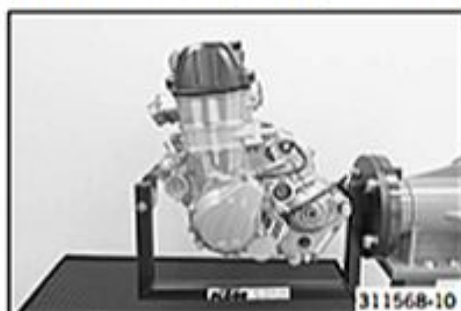


- Mount and tighten oil drain plug 3 with the magnet and a new seal ring.

Guideline

Oil drain plug with magnet	M12x1.5	20 Nm (14.8 lbf ft)
----------------------------	---------	------------------------

17.5.36 Removing the engine from the engine assembly stand



- Remove the fitting from the special tool.

Engine fixing arm (79429002050) (☞ p. 302)

- Remove the engine from the engine assembly stand.

i Info

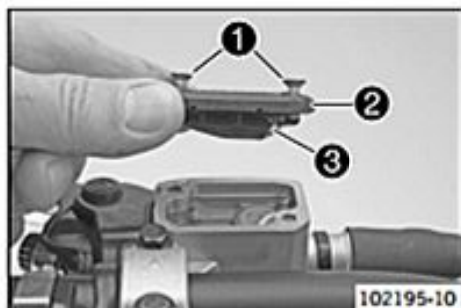
Work with an assistant or a motorized hoist.

18.1 Checking/correcting the fluid level of the hydraulic clutch



Info

The fluid level rises with increased wear of the clutch lining discs.



- Move the clutch fluid reservoir mounted on the handlebar to a horizontal position.
- Remove screws ①.
- Remove cover ② with membrane ③.
- Check the fluid level.

Fluid level below container rim	4 mm (0.16 in)
---------------------------------	----------------

- If the fluid level does not meet specifications:
 - Correct the fluid level of the hydraulic clutch.

Brake fluid DOT 4 / DOT 5.1 (☞ p. 290)
--

- Position the cover with the membrane. Mount and tighten the screws.

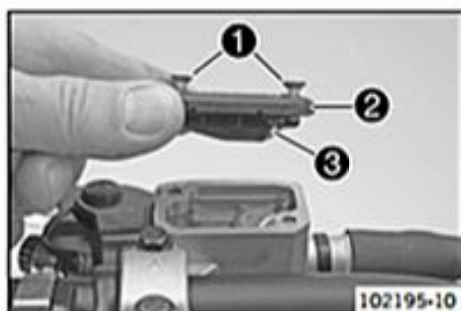
18.2 Changing the hydraulic clutch fluid



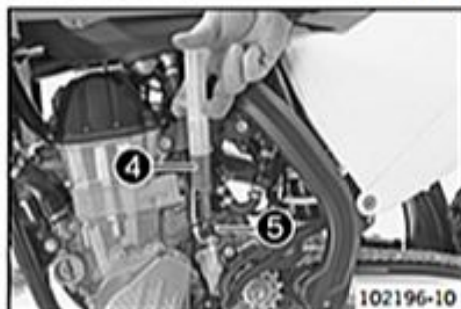
Warning

Environmental hazard Hazardous substances cause environmental damage.

- Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.



- Move the clutch fluid reservoir mounted on the handlebar to a horizontal position.
- Remove screws ①.
- Remove cover ② with membrane ③.



- Fill bleeding syringe ④ with the appropriate hydraulic fluid.

Bleed syringe (50329050000) (☞ p. 295)
--

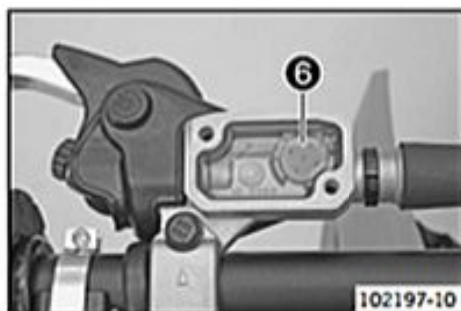
Brake fluid DOT 4 / DOT 5.1 (☞ p. 290)
--

- Remove bleeder screw ⑤.
- Mount the bleeding syringe ④ on the clutch slave cylinder.



Info

Clean up overflowed or spilled brake fluid immediately with water!
Avoid contact between brake fluid and painted parts. Brake fluid attacks paint!
Use only clean brake fluid from a sealed container!



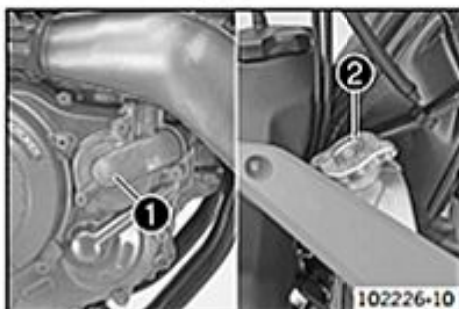
- Inject the liquid into the system until it escapes from drill hole ⑥ of the master cylinder without bubbles.
- Drain fluid occasionally from the master cylinder reservoir, to prevent overflow.
- Remove the bleeding syringe. Mount and tighten screws bleeder screw.
- Correct the fluid level of the hydraulic clutch.

Guideline

Fluid level below container rim	4 mm (0.16 in)
---------------------------------	----------------

- Position the cover with the membrane. Mount and tighten the screws.

19.1 Cooling system



Water pump **1** in the engine circulates the coolant.

The pressure resulting from the warming of the cooling system is regulated by a valve in radiator cap **2**. This ensures that operating the vehicle at the specified coolant temperature will not result in a risk of malfunctions.

120 °C (248 °F)

Cooling is effected by the air stream.

The lower the speed, the less the cooling effect. Dirty cooling fins also reduce the cooling effect.

19.2 Checking the antifreeze and coolant level



Warning

Danger of scalding During motorcycle operation, the coolant gets very hot and is under pressure.

- Do not remove the radiator cap, radiator hoses or other cooling system components when the engine is hot. Allow the engine and cooling system to cool down. In case of scalding, rinse immediately with lukewarm water.



Warning

Danger of poisoning Coolant is poisonous and a health hazard.

- Coolant must not come into contact with the skin, eyes, or clothing. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that is contaminated with coolant. Keep coolant out of reach of children.

Condition

The engine is cold.

- Stand the motorcycle upright on a horizontal surface.
- Remove the radiator cap.
- Check antifreeze of coolant.

-25... -45 °C (-13... -49 °F)

- If the antifreeze in the coolant does not match the specified value:
 - Correct the antifreeze of the coolant.

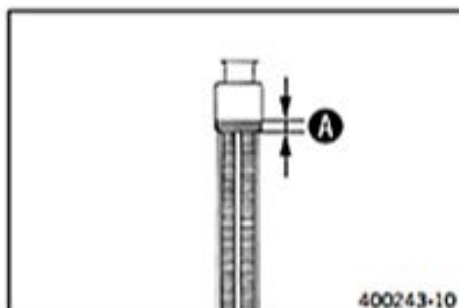
- Check the coolant level in the radiator.

Coolant level A above the radiator fins	10 mm (0.39 in)
--	-----------------

- If the coolant level does not match the specified value:
 - Correct the coolant level.

Coolant (☛ p. 290)

- Mount the radiator cap.



19.3 Checking the coolant level



Warning

Danger of scalding During motorcycle operation, the coolant gets very hot and is under pressure.

- Do not remove the radiator cap, radiator hoses or other cooling system components when the engine is hot. Allow the engine and cooling system to cool down. In case of scalding, rinse immediately with lukewarm water.



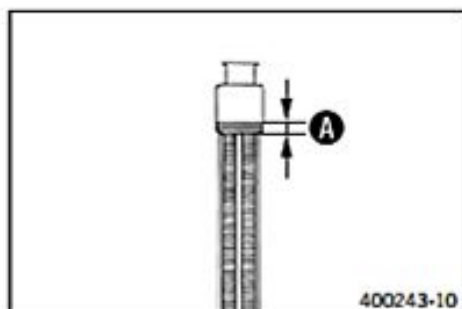
Warning

Danger of poisoning Coolant is poisonous and a health hazard.

- Coolant must not come into contact with the skin, eyes, or clothing. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that is contaminated with coolant. Keep coolant out of reach of children.

Condition

The engine is cold.



- Stand the motorcycle upright on a horizontal surface.
- Remove the radiator cap.
- Check the coolant level in the radiator.

Coolant level A above the radiator fins	10 mm (0.39 in)
--	-----------------

- If the coolant level does not match the specified value:
 - Correct the coolant level.

Coolant (↖ p. 290)

- Mount the radiator cap.

19.4 Draining the coolant



Warning

Danger of scalding During motorcycle operation, the coolant gets very hot and is under pressure.

- Do not remove the radiator cap, radiator hoses or other cooling system components when the engine is hot. Allow the engine and cooling system to cool down. In case of scalding, rinse immediately with lukewarm water.



Warning

Danger of poisoning Coolant is poisonous and a health hazard.

- Coolant must not come into contact with the skin, eyes, or clothing. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that is contaminated with coolant. Keep coolant out of reach of children.

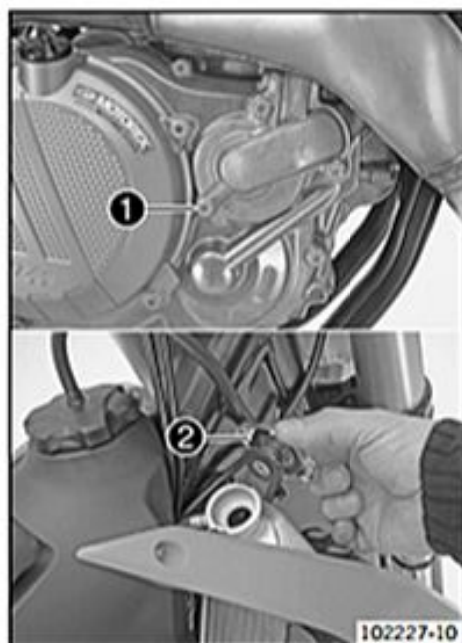
Condition

The engine is cold.

- Position the motorcycle upright.
- Place a suitable container under the water pump cover.
- Remove screw **1**. Take off radiator cap **2**.
- Completely drain the coolant.
- Mount and tighten screw **1** with a new seal ring.

Guideline

Screw, water pump cover	M6	10 Nm (7.4 lbf ft)
-------------------------	----	--------------------



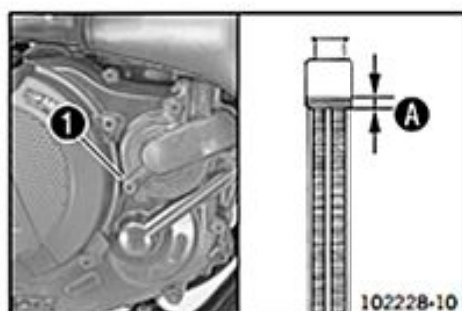
19.5 Refilling coolant



Warning

Danger of poisoning Coolant is poisonous and a health hazard.

- Coolant must not come into contact with the skin, eyes, or clothing. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that is contaminated with coolant. Keep coolant out of reach of children.



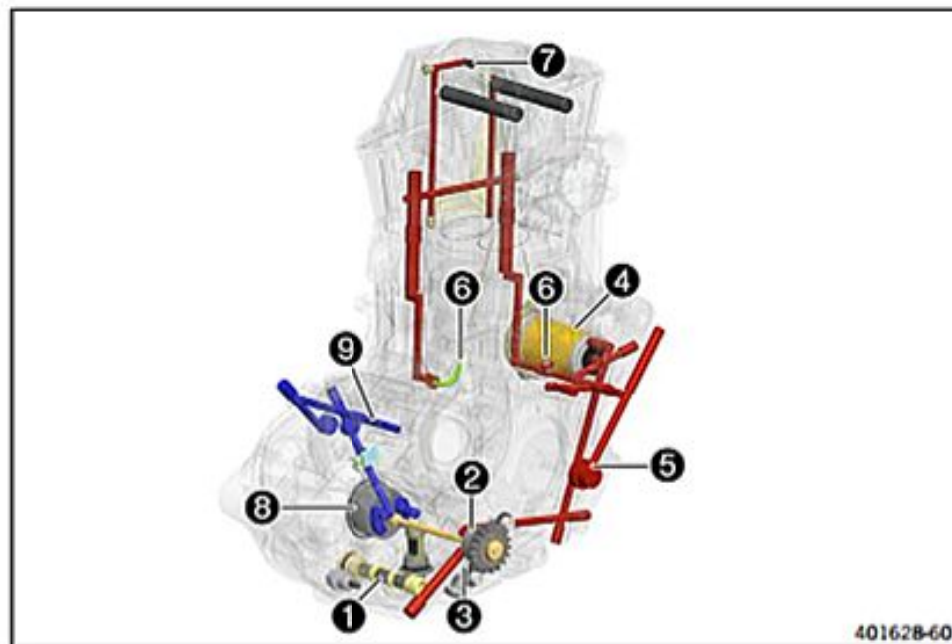
- Make sure that screw **1** is tightened.
- Position the motorcycle upright.
- Pour coolant in up to measurement **A** above the radiator fins.

Guideline

Dimension A over the radiator fins	10 mm (0.39 in)	
Coolant	1.20 l (1.27 qt.)	Coolant (☛ p. 290)

- Mount the radiator cap.
- Take a short test ride.
- Check the coolant level. (☛ p. 250)

20.1 Oil circuit



- | | |
|---|---|
| 1 | Oil screen |
| 2 | Force pump |
| 3 | Oil pressure regulator valve |
| 4 | Oil filter |
| 5 | Oil nozzle for conrod bearing lubrication |
| 6 | Oil nozzle, piston cooling |
| 7 | Oil nozzle for cam follower lubrication |
| 8 | Suction pump |
| 9 | Oil channel, transmission lubrication |

20.2 Checking the engine oil level



Info

The engine oil level can be checked when the engine is cold or warm.

Preparatory work

- Stand the motorcycle upright on a horizontal surface.

Condition

The engine is cold.

- Check the engine oil level.

The engine oil reaches the middle of level viewer **A**.

- If the engine oil does not reach the middle of the level viewer:
 - Add engine oil. (p. 256)



Condition

The engine is at operating temperature.

- Check the engine oil level.



Info

After switching off the engine, wait one minute before checking the level.

The engine oil level is between the middle of the level viewer **A** and the upper edge of the level viewer **B**.



- If the engine oil does not reach the middle of level viewer **A**:
 - Add engine oil. (➤ p. 256)

20.3 Changing the engine oil and oil filter, cleaning the oil screens



Warning

Danger of scalding Engine oil and gear oil get very hot when the motorcycle is ridden.

- Wear appropriate protective clothing and safety gloves. In case of burns, rinse immediately with lukewarm water.



Warning

Environmental hazard Hazardous substances cause environmental damage.

- Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.



Info

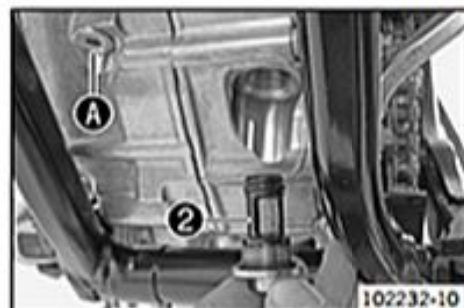
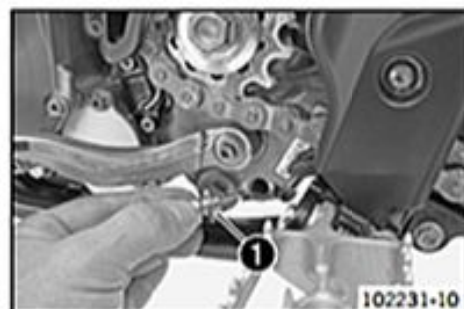
Drain the engine oil only when the engine is warm.

Preparatory work

- Park the motorcycle on a level surface.

Main work

- Place a suitable container under the engine.
- Remove oil drain plug **1** with the magnet and seal ring.

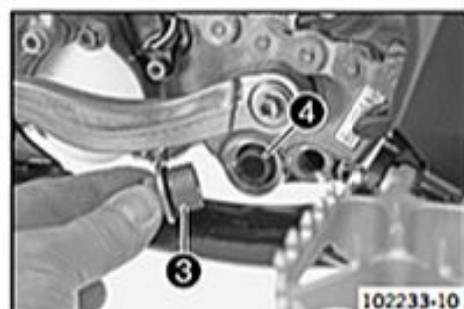


- Remove screw plug **2** with the short oil screen and the O-rings.



Info

Do not remove screw **A**.



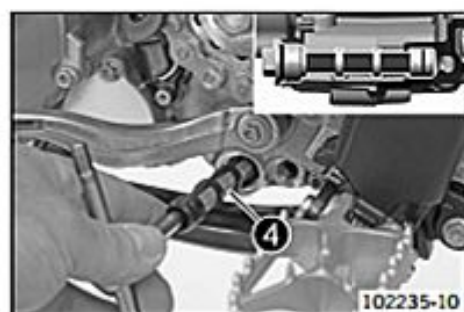
- Remove screw plug **3** with the long oil screen **4** and the O-rings.
- Completely drain the engine oil.
- Thoroughly clean the parts and sealing surfaces.



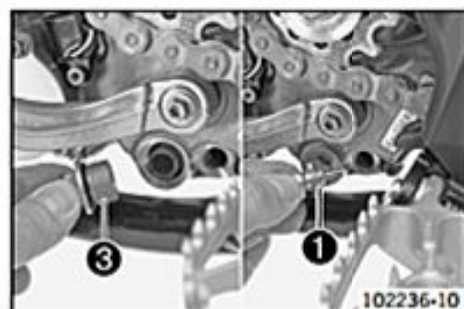
- Mount and tighten screw plug **2** with the short oil screen and the O-rings.

Guideline

Screw plug, oil screen	M20x1.5	15 Nm (11.1 lbf ft)
------------------------	---------	------------------------



- Position oil screen **4** with the O-rings on a pin wrench.
- Position the pin wrench through the drilled hole of the screw plug in the opposite section of the engine case.
- Push the oil screen all the way into the engine case.



- Mount and tighten screw plug **3** with the O-ring.

Guideline

Screw plug, oil screen	M20x1.5	15 Nm (11.1 lbf ft)
------------------------	---------	------------------------

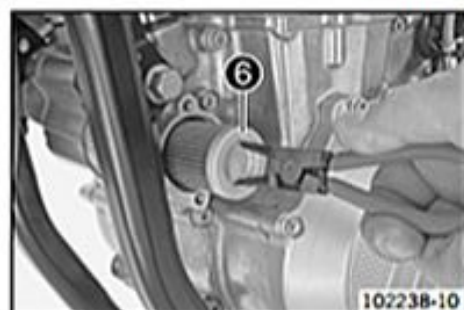
- Mount and tighten oil drain plug **1** with the magnet and a new seal ring.

Guideline

Oil drain plug with magnet	M12x1.5	20 Nm (14.8 lbf ft)
----------------------------	---------	------------------------



- Remove screws **5**. Remove the oil filter cover with the O-ring.



- Pull oil filter **6** out of the oil filter housing.

Circlip pliers reverse (51012011000) (☞ p. 295)

- Completely drain the engine oil.
- Thoroughly clean the parts and sealing area.



- Lay the motorcycle on its side and fill the oil filter housing to about 1/3 full with engine oil.
- Insert the oil filter into the oil filter housing.
- Lubricate the O-ring of the oil filter cover and mount it with the oil filter cover **7**.
- Mount and tighten the screws.

Guideline

Screw, oil filter cover	M6	10 Nm (7.4 lbf ft)
-------------------------	----	--------------------

- Stand the motorcycle upright.



- Remove the oil filler plug **8** with the O-ring from the clutch cover and fill up with engine oil.

Engine oil	1.20 l (1.27 qt.)	Engine oil (SAE 10W/50) (☞ p. 290)
------------	-------------------	------------------------------------



Info

Too little engine oil or poor-quality engine oil results in premature wear to the engine.

- Install and tighten the oil filler plug with O-ring.

**Danger**

Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.

- When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.

- Start the engine and check that it is oil-tight.

Finishing work

- Check the engine oil level. (☞ p. 253)

20.4 Adding engine oil**Info**

Too little engine oil or poor-quality engine oil results in premature wear to the engine.



- Remove the oil filler plug ① with the O-ring from the clutch cover.
- Add the same engine oil that was used when the motor was changed.

Engine oil (SAE 10W/50) (☞ p. 290)

**Info**

For optimal performance of the engine oil, do not mix different types of engine oil.

If appropriate, change the engine oil.

- Install and tighten the oil filler plug with O-ring.

**Danger**

Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.

- When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.

- Start the engine and check that it is oil-tight.

20.5 Checking the engine oil pressure**Main work**

- Place a suitable container under the engine.
- Remove screws ①. Remove the oil filter cover with the O-ring.
- Remove the oil filter.

Circclip pliers reverse (51012011000) (☞ p. 295)



- Position special tool ② with the O-ring. Mount and tighten the screws.

Guideline

Screw, oil filter cover	M6	10 Nm (7.4 lbf ft)
-------------------------	----	--------------------

Oil pressure adapter (79429094000) (☞ p. 303)

- Connect the pressure tester to the special tool without the T-plate.

Pressure tester (61029094000) (☞ p. 298)

- Check the engine oil level. (☞ p. 253)

**Danger**

Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.

- When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.

- Start the engine and let it warm up.
- Check the engine oil pressure.

Engine oil pressure	
Engine oil temperature: 80 °C (176 °F) Engine speed: 1,600 rpm	1.0 bar (15 psi)
Engine oil temperature: 80 °C (176 °F) Engine speed: 6,000 rpm	1.7 bar (25 psi)

- If the measured value is less than the specification:
 - Check the oil pumps for wear. Check all oil channels for free flow.
- Switch off the engine.

**Warning**

Danger of burns Some vehicle components get very hot when the machine is driven.

- Wear appropriate protective clothing and safety gloves. In case of burns, rinse immediately with lukewarm water.

- Remove the special tools.
- Grease the O-ring of the oil filter cover. Mount the oil filter cover.
- Mount and tighten the screws.

Guideline

Screw, oil filter cover	M6	10 Nm (7.4 lbf ft)
-------------------------	----	--------------------

Finishing work

- Check the engine oil level. (☛ p. 253)

21.1 Ignition coil - checking the secondary winding

Condition

Ignition coil cylinder 1 is disconnected.

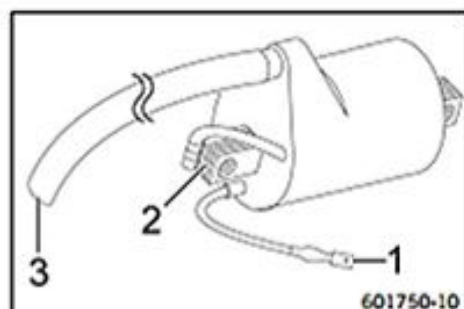
Spark plug connector cylinder 1 has been removed.

Ignition coil cylinder 1 - check the secondary winding resistance

-  Measure the resistance between the specified points.
Ignition coil cylinder 1 pin 2 (-) – Ignition coil cylinder 1 pin 3

Ignition coil	
Secondary winding resistance at: 20 °C (68 °F)	11.075... 15.525 kΩ

- If the displayed value does not correspond to specifications:
 - Change the ignition coil.



21.2 Checking the spark plug connector

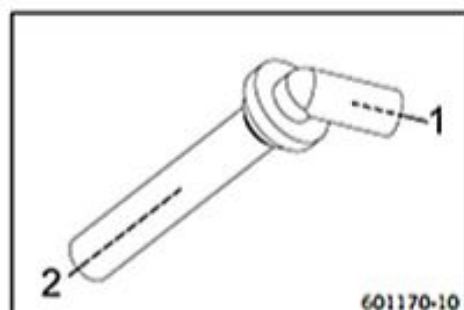
Condition

Spark plug connector cylinder 1 has been removed.

-  Measure the resistance between the specified points.
Measuring point 1 – Measuring point 2

Spark plug connector	
Resistance at: 20 °C (68 °F)	3.75... 6.25 kΩ

- If the specification is not reached:
 - Change the spark plug connector.



21.3 Alternator - checking stator winding

Condition

The alternator is disconnected.

Stator winding - checking the resistance

-  Measure the resistance between the specified points.
Alternator, connector CR pin 1 – Alternator, connector CR pin 1

Alternator	
Resistance of stator winding at: 20 °C (68 °F)	1.19... 1.61 Ω

- If the displayed value does meet specifications:
 - Change the stator.



Stator winding - check the short circuit to ground (terminal 31)

-  Measure the resistance between the specified points.
Alternator, connector CR pin 1 – Measuring point Ground (-)

Resistance	∞ Ω
------------	-----

- If the displayed value does meet specifications:
 - Change the stator.

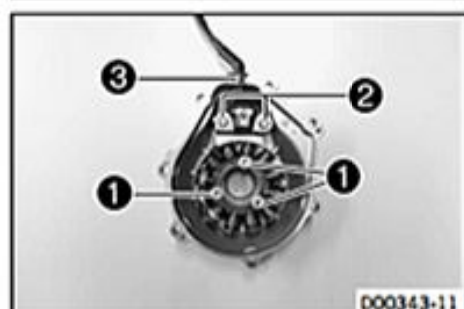
21.4 Removing the stator

**Condition**

The alternator cover has been removed.

- Remove screws ①.
- Remove the retaining bracket.
- Remove screws ②.
- Remove cable support sleeve ③ from the alternator cover.
- Take the stator out of the alternator cover.

21.5 Installing the stator



- Position the stator in the alternator cover.
- Mount and tighten screws ①.

Guideline

Screw, stator	M5	6 Nm (4.4 lbf ft)	Loctite® 243™
---------------	----	----------------------	---------------

- Position the retaining bracket.
- Mount and tighten screws ②.

Guideline

Pulse generator screw and cable retainer	M5	6 Nm (4.4 lbf ft)	Loctite® 243™
--	----	----------------------	---------------

- Position cable sleeve ③ in the alternator cover.

22.1 Checking the valve clearance

Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the seat. (☞ p. 126)
- Remove the fuel tank. (☞ p. 126)

Main work

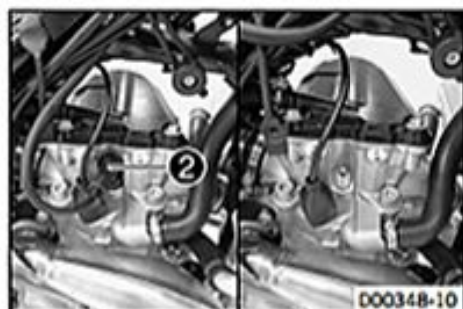
- Pull capacitor ① away from the holder and hang to one side.



D00347-10

- Disconnect spark plug connector ②.
- Remove the spark plug using the special tool.

Spark plug wrench (77229172000) (☞ p. 300)



D00348-10

- Push back hose clamp ③.
- Pull off the vent hose.
- Remove screws ④.
- Remove the valve cover with the gasket.



D00350-10

- Engage the highest gear.
- Turn the rear wheel until the engine is at ignition top dead center.
- ✓ The markings ① on the camshaft and screw ② on the cylinder head are lined up with each other.

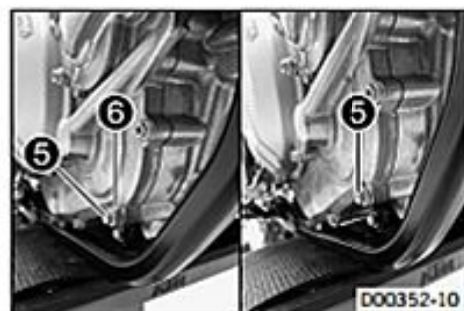


Info

Make sure that the crankshaft is at top dead center.



D00351-10



- Unscrew and remove screw 5.
- Remove washer 6.
- Mount and tighten screw 5 without the washer.

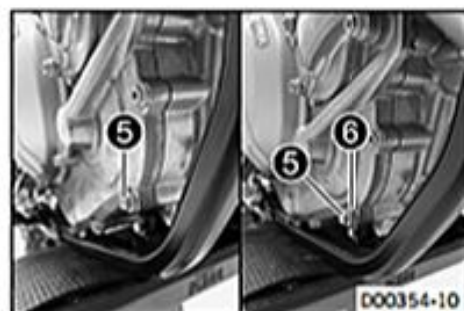


- Check the valve clearance at all valves between the valve and rocker arm.
- Guideline

Valve clearance	
Intake at: 20 °C (68 °F)	0.10... 0.15 mm (0.0039... 0.0059 in)
Exhaust at: 20 °C (68 °F)	0.12... 0.17 mm (0.0047... 0.0067 in)

Feeler gauge (59029041100) (☞ p. 297)

- If the valve clearance does not meet specifications:
 - Adjust the valve clearance. (☞ p. 245)



- Remove locking screw 5.
- Crank the engine several times.
- Check the valve clearance and correct it if necessary.
- Mount and tighten screw 5 with washer 6.

Guideline

Screw plug, crankshaft location	M8	10 Nm (7.4 lbf ft)
---------------------------------	----	--------------------

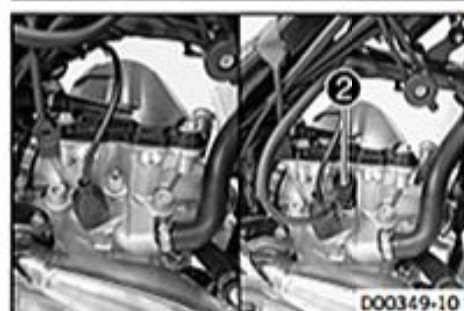


- Position the valve cover with the gasket. Mount and tighten screws 4.

Guideline

Screw, valve cover	M6	10 Nm (7.4 lbf ft)
--------------------	----	--------------------

- Mount the vent hose and hose clamp 3.



- Mount and tighten the spark plug using the special tool.

Guideline

Spark plug	M10x1	10... 12 Nm (7.4... 8.9 lbf ft)
------------	-------	---------------------------------

Spark plug wrench (77229172000) (☞ p. 300)

- Plug in spark plug connector 2.



- Mount capacitor 1.

Finishing work

- Install the fuel tank. (☞ p. 127)
- Mount the seat. (☞ p. 126)
- Remove the motorcycle from the lift stand. (☞ p. 10)

22.2 Adjusting the valve clearance**Info**

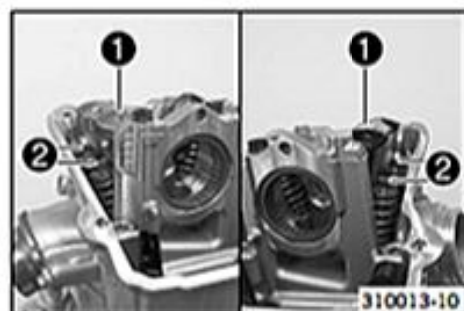
For purposes of illustration, the following operations are shown with the engine removed.
Removal is not necessary.

Preparatory work

- Raise the motorcycle with a lift stand. (☞ p. 10)
- Remove the seat. (☞ p. 126)
- Remove the fuel tank. (☞ p. 126)
- Check the valve clearance. (☞ p. 260)
- Remove the timing chain tensioner. (☞ p. 184)
- Remove the camshaft. (☞ p. 184)

Main work

- Raise rocker arm ① on the outside.
- Remove shims ② and set them down according to the installation position.
- Correct the shims based on the results of the valve clearance check.
- Insert suitable shims.

**Finishing work**

- Install the camshaft. (☞ p. 244)
- Install the timing chain tensioner. (☞ p. 244)
- Check the valve clearance. (☞ p. 260)
- Install the fuel tank. (☞ p. 127)
- Mount the seat. (☞ p. 126)
- Remove the motorcycle from the lift stand. (☞ p. 10)

23.1 Checking the starter motor



Condition

The starter motor has been removed.

- Connect the negative cable of a 12 volt power supply to the housing of the starter motor. Connect the positive cable of the power supply briefly with connector ① of the starter motor.
 - If the starter motor does not turn when the circuit is closed:
 - Change the starter motor.

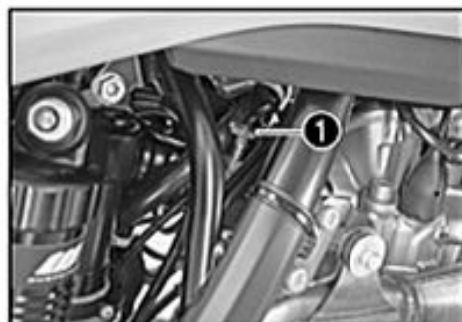
24.1 Adjusting the idle speed



Warning

Danger of accidents The engine may go out spontaneously if the idle speed is set too low.

- Set the idle speed to the specified value.



402407-10

- Run the engine until warm.
- ✓ The cold start button is deactivated.



Danger

Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.

- When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.

- Set the idle speed by turning the idle speed adjusting screw **1**.

Guideline

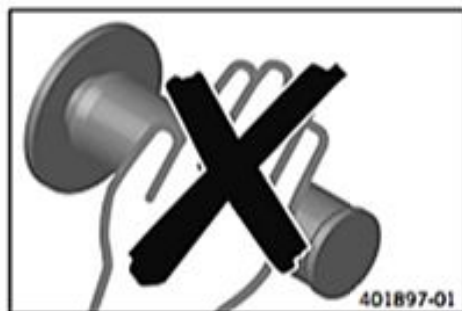
Idle speed	2,250... 2,350 rpm
Tachometer (45129075000) (☛ p. 295)	



Info

Turning counterclockwise lowers the idle speed.
Turning clockwise raises the idle speed.

24.2 Executing the initialization run



401897-01

Condition

The diagnostic tool is connected and running.

- Execute "Engine electronics" > "Functions" > "Deleting adaptation values".
- ✓ The adaptation values are deleted.
- Select "Engine electronics" > "Measured values" > "Engine coolant temperature sensor (TW1)".
- ✓ The coolant temperature is displayed during the initialization run.



Danger

Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.

- When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.

- Start the engine without operating the throttle grip.

Guideline

Coolant temperature	< 25 °C (< 77 °F)
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- Let the engine idle until it reaches the specified temperature.

Guideline

Coolant temperature	80... 90 °C (176... 194 °F)
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Info

Do not operate the throttle grip during the initialization process.

- As soon as the specified temperature is reached, switch off the ignition.



Info

If the initialization is not completed or the initialization process is interrupted, the entire process must be restarted.

25.1 Engine

Design	1-cylinder 4-stroke engine, water-cooled
Displacement	449.9 cm ³ (27.455 cu in)
Stroke	63.4 mm (2.496 in)
Bore	95 mm (3.74 in)
Compression ratio	12.75:1
Idle speed	2,250... 2,350 rpm
Control	OHC, 4 valves controlled via rocker arm
Valve diameter, intake	40 mm (1.57 in)
Valve diameter, exhaust	33 mm (1.3 in)
Valve clearance	
Intake at: 20 °C (68 °F)	0.10... 0.15 mm (0.0039... 0.0059 in)
Exhaust at: 20 °C (68 °F)	0.12... 0.17 mm (0.0047... 0.0067 in)
Crankshaft bearing	2 cylinder roller bearing
Conrod bearing	Slide bearing
Piston pin bearing	Not a bearing bush - DLC-plated piston pins
Pistons	Forged light alloy
Piston rings	1 compression ring, 1 oil scraper ring
Engine lubrication	Pressure circulation lubrication with two Eaton pumps
Primary transmission	31:76
Clutch	Multidisc clutch in oil bath, hydraulically activated
Gearbox (SX-F EU)	4-gear, claw shifted
Gearbox (All US models)	5-gear, claw shifted
Transmission ratio (SX-F EU)	
First gear	16:32
Second gear	18:30
Third gear	20:28
Fourth gear	22:26
Transmission ratio (All US models)	
First gear	16:32
Second gear	18:30
Third gear	20:28
Fourth gear	22:26
Fifth gear	24:24
Alternator	12 V, 75 W
Ignition	Contactless controlled fully electronic ignition with digital ignition adjustment
Spark plug	NGK LMAR9AI-8
Spark plug electrode gap	0.8 mm (0.031 in)
Cooling	Water cooling, permanent circulation of coolant by water pump
Starting aid	Electric starter

25.2 Engine tolerance, wear limits

Camshaft - cam height	
Exhaust	33.10... 33.30 mm (1.3031... 1.311 in)
Intake	33.90... 34.10 mm (1.3346... 1.3425 in)
Valve spring	
Intake minimum length (without valve spring seat)	40.7 mm (1.602 in)
Exhaust minimum length (without valve spring seat)	40.7 mm (1.602 in)
Valve spring seat	1.8 mm (0.071 in)
Cylinder/cylinder head - sealing area distortion	≤ 0.10 mm (≤ 0.0039 in)
Piston - diameter	

Size I	94.93... 94.96 mm (3.7374... 3.7386 in)
Size II	94.94... 94.97 mm (3.7378... 3.739 in)
Cylinder - drill hole diameter	
Size I	95.000... 95.012 mm (3.74015... 3.74062 in)
Size II	95.013... 95.025 mm (3.74066... 3.74113 in)
Piston/cylinder - mounting clearance	
Size I	0.040... 0.082 mm (0.00157... 0.00323 in)
Size II	0.043... 0.085 mm (0.00169... 0.00335 in)
Wear limit	0.120 mm (0.00472 in)
Piston ring end gap	
Compression ring	≤ 1.00 mm (≤ 0.0394 in)
Oil scraper ring	≤ 1.20 mm (≤ 0.0472 in)
Piston ring - groove clearance	≤ 0.08 mm (≤ 0.0031 in)
Connecting rod - end play of lower conrod bearing	0.20... 0.45 mm (0.0079... 0.0177 in)
Crankshaft - axial play	0.50... 0.60 mm (0.0197... 0.0236 in)
Crankshaft - run-out on bearing pin	≤ 0.03 mm (≤ 0.0012 in)
Clutch pack - thickness	
Wear limit	≥ 26.4 mm (≥ 1.039 in)
Thrust surface, clutch facing discs in outer clutch hub	≤ 0.5 mm (≤ 0.02 in)
Oil pressure regulator valve	
Minimum length of preload spring	24.5 mm (0.965 in)
Shift shaft - play in sliding plate/shift quadrant	0.40... 0.80 mm (0.0157... 0.0315 in)

25.3 Engine tightening torques

Screw, oil jet for piston cooling	M4	2 Nm (1.5 lbf ft)	Loctite® 243™
Oil nozzle for clutch lubrication	M5	2 Nm (1.5 lbf ft)	Loctite® 243™
Oil nozzle, piston cooling	M5	2 Nm (1.5 lbf ft)	Loctite® 243™
Oil nozzle, rocker arm lubrication	M5	2 Nm (1.5 lbf ft)	Loctite® 243™
Pulse generator screw and cable retainer	M5	6 Nm (4.4 lbf ft)	Loctite® 243™
Screw, bearing retainer	M5	6 Nm (4.4 lbf ft)	Loctite® 243™
Screw, clutch spring retainer	M5	6 Nm (4.4 lbf ft)	–
Screw, gear position sensor	M5	5 Nm (3.7 lbf ft)	Loctite® 243™
Screw, locking lever	M5	6 Nm (4.4 lbf ft)	Loctite® 243™
Screw, stator	M5	6 Nm (4.4 lbf ft)	Loctite® 243™
Screw, suction pump cover	M5	6 Nm (4.4 lbf ft)	Loctite® 243™
Nut, water-pump wheel	M6	8 Nm (5.9 lbf ft)	Loctite® 243™
Screw, alternator cover	M6	10 Nm (7.4 lbf ft)	–
Screw, bearing bolt, torque limiter	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
Screw, camshaft support plate	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
Screw, clutch cover	M6	10 Nm (7.4 lbf ft)	–
Screw, cylinder head	M6	10 Nm (7.4 lbf ft)	–
Screw, engine case	M6	10 Nm (7.4 lbf ft)	–
Screw, exhaust flange	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
Screw, oil filter cover	M6	10 Nm (7.4 lbf ft)	–
Screw, pressure pump cover	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
Screw, shift drum locating	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
Screw, shift lever	M6	14 Nm (10.3 lbf ft)	Loctite® 243™
Screw, starter motor	M6	10 Nm (7.4 lbf ft)	–
Screw, timing chain guide rail	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
Screw, timing chain securing guide	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
Screw, timing chain tensioner	M6	10 Nm (7.4 lbf ft)	–

Screw, timing chain tensioning rail	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
Screw, valve cover	M6	10 Nm (7.4 lbf ft)	–
Screw, water pump cover	M6	10 Nm (7.4 lbf ft)	–
Oil nozzle for conrod bearing lubrication	M6x0.75	4 Nm (3 lbf ft)	Loctite® 243™
Plug, oil channel	M7	9 Nm (6.6 lbf ft)	Loctite® 243™
Screw, rocker arm bearing	M7	15 Nm (11.1 lbf ft)	–
Plug, timing chain tensioner	M8	8 Nm (5.9 lbf ft)	–
Screw plug, crankshaft location	M8	10 Nm (7.4 lbf ft)	–
Plug, oil channel	M10	15 Nm (11.1 lbf ft)	Loctite® 243™
Screw, engine sprocket	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
Spark plug	M10x1	10... 12 Nm (7.4... 8.9 lbf ft)	–
Engine coolant temperature sensor	M10x1.25	12 Nm (8.9 lbf ft)	–
Screw plug, rocker arm shaft	M10x1.25	10 Nm (7.4 lbf ft)	–
Screw, cylinder head	M10x1.25	Step 1 10 Nm (7.4 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 50 Nm (36.9 lbf ft)	Lubricated with engine oil
Nut, rotor	M12x1	60 Nm (44.3 lbf ft)	Thread, oiled with engine oil/cone degreased
Oil drain plug with magnet	M12x1.5	20 Nm (14.8 lbf ft)	–
Plug, oil pressure regulator valve	M12x1.5	20 Nm (14.8 lbf ft)	–
Nut, inner clutch hub	M18x1.5	80 Nm (59 lbf ft)	–
Nut, primary gear	M20LHx1.5	100 Nm (73.8 lbf ft)	Loctite® 243™
Screw plug, oil screen	M20x1.5	15 Nm (11.1 lbf ft)	–

25.4 Capacities

25.4.1 Engine oil

Engine oil	1.20 l (1.27 qt.)	Engine oil (SAE 10W/50) (☛ p. 290)
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25.4.2 Coolant

Coolant	1.20 l (1.27 qt.)	Coolant (☛ p. 290)
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25.4.3 Fuel

Total fuel tank capacity, approx. (All SX-F models)	7.5 l (1.98 US gal)	Super unleaded (ROZ 95/RON 95/PON 91) (☛ p. 291)
Total fuel tank capacity, approx. (XC-F US)	8.5 l (2.25 US gal)	Super unleaded (ROZ 95/RON 95/PON 91) (☛ p. 291)
Fuel reserve, approx. (XC-F US)	1.5 l (1.6 qt.)	

25.5 Chassis

Frame	Central tube frame made of chrome molybdenum steel tubing	
Fork (SX-F EU)	WP Performance Systems Upside down AER 48	
Fork (All US models)	WP Performance Systems Up Side Down 4860 MXMA 4CS	
Suspension travel (SX-F EU)		
front	310 mm (12.2 in)	
rear	300 mm (11.81 in)	
Suspension travel (All US models)		
front	300 mm (11.81 in)	

rear	300 mm (11.81 in)
Fork offset	22 mm (0.87 in)
Shock absorber (SX-F EU)	WP Performance Systems 5018 BAVP DCC
Shock absorber (SX-F US)	WP Performance Systems 5018 BAVP DCC
Shock absorber (XC-F US)	WP Performance Systems 5018 BAVP DCC
Brake system	Disc brakes, brake calipers on floating bearings
Brake discs - diameter	
Front	260 mm (10.24 in)
Rear	220 mm (8.66 in)
Brake discs - wear limit	
Front	2.5 mm (0.098 in)
Rear	3.5 mm (0.138 in)
Tire air pressure off road	
Front	1.0 bar (15 psi)
Rear	1.0 bar (15 psi)
Secondary ratio	13:48
Chain	5/8 x 1/4"
Rear sprockets available	38, 40, 42, 45, 48, 49, 50, 51, 52
Steering head angle	63.9°
Wheelbase	1,485±10 mm (58.46±0.39 in)
Ground clearance, unloaded	370 mm (14.57 in)
Seat height, unloaded	960 mm (37.8 in)
Weight without fuel, approx. (SX-F EU)	100.4 kg (221.3 lb.)
Weight without fuel, approx. (SX-F US)	101.9 kg (224.6 lb.)
Weight without fuel, approx. (XC-F US)	102.9 kg (226.9 lb.)
Maximum permissible front axle load	145 kg (320 lb.)
Maximum permissible rear axle load	190 kg (419 lb.)
Maximum permissible overall weight	335 kg (739 lb.)

25.6 Electrical system

Battery (All SX-F models)	C22S	Lithium-ion battery Battery voltage: 12 V Nominal capacity: 2.2 Ah maintenance-free
Battery (XC-F US)	HJT25S-FP	Lithium-ion battery Battery voltage: 12 V Nominal capacity: 2.0 Ah maintenance-free
Fuse	58011109110	10 A
FI warning lamp	LED	
Remaining indicator lamps (XC-F US)	W2.3W/socket W2x4.6d	12 V 2.3 W

25.7 Tires

Validity	Front tires	Rear tires
(SX-F EU)	80/100 - 21 M/C 51M TT Dunlop GEOMAX MX 32 F	110/80 - 19 62M TT Dunlop GEOMAX MX 32
(SX-F US)	80/100 - 21 M/C 51M TT Dunlop GEOMAX MX 32 F	120/80 - 19 62M TT Dunlop GEOMAX MX 32
(XC-F US)	90/90 - 21 54M TT Dunlop GEOMAX AT81F	110/100 - 18 64M TT Dunlop GEOMAX AT81

Additional information is available in the Service section under:
<http://www.ktm.com>

25.8 Fork**25.8.1 SX-F EU**

Fork part number	34.18.8P.09	
Fork	WP Performance Systems Upside down AER 48	
Compression damping		
Comfort	20 clicks	
Standard	17 clicks	
Sport	12 clicks	
Rebound damping		
Comfort	20 clicks	
Standard	17 clicks	
Sport	12 clicks	
Air pressure	10.8 bar (157 psi)	
Fork length	950 mm (37.4 in)	
Oil capacity external mechanism left	200; 200 ml (6.76; 6.76 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 290)
Oil capacity external mechanism right	200; 200 ml (6.76; 6.76 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 290)
Oil capacity, right cartridge	380 ml (12.85 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 290)

25.8.2 SX-F US

Fork part number	24.18.7P.59	
Fork	WP Performance Systems Up Side Down 4860 MXMA 4CS	
Compression damping		
Comfort	17 clicks	
Standard	15 clicks	
Sport	13 clicks	
Rebound damping		
Comfort	17 clicks	
Standard	15 clicks	
Sport	13 clicks	
Spring length with preload spacer(s)	477 mm (18.78 in)	
Spring rate		
Weight of rider: 65... 75 kg (143... 165 lb.)	4.6 N/mm (26.3 lb/in)	
Weight of rider: 75... 85 kg (165... 187 lb.)	4.8 N/mm (27.4 lb/in)	
Weight of rider: 85... 95 kg (187... 209 lb.)	5.0 N/mm (28.6 lb/in)	
Fork length	940 mm (37.01 in)	
Oil capacity per fork leg	670 ml (22.65 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 290)

25.8.3 XC-F US

Fork part number	24.18.7P.79
Fork	WP Performance Systems Up Side Down 4860 MXMA 4CS
Compression damping	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Rebound damping	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks

Spring length with preload spacer(s)	477 mm (18.78 in)
Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	4.6 N/mm (26.3 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	4.8 N/mm (27.4 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	5.0 N/mm (28.6 lb/in)
Fork length	940 mm (37.01 in)
Oil capacity per fork leg	670 ml (22.65 fl. oz.)
Fork oil (SAE 4) (48601166S1) (☛ p. 290)	

25.9 Shock absorber

25.9.1 SX-F EU

Shock absorber part number	18.18.7P.09
Shock absorber	WP Performance Systems 5018 BAVP DCC
Compression damping, low-speed	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Compression damping, high-speed	
Comfort	2.5 turns
Standard	2 turns
Sport	1.5 turns
Rebound damping	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Spring preload	5 mm (0.2 in)
Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	45 N/mm (257 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	48 N/mm (274 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	51 N/mm (291 lb/in)
Spring length	
Weight of rider: 65... 75 kg (143... 165 lb.)	247 N/mm (1,410 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	247 N/mm (1,410 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	252 N/mm (1,439 lb/in)
Gas pressure	10 bar (145 psi)
Static sag	38 mm (1.5 in)
Riding sag	110 mm (4.33 in)
Fitted length	477 mm (18.78 in)
Shock absorber oil	Shock absorber fluid (SAE 2.5) (50180751S1) (☛ p. 290)

25.9.2 SX-F US

Shock absorber article number	18.18.7P.59
Shock absorber	WP Performance Systems 5018 BAVP DCC
Compression damping, low-speed	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Compression damping, high-speed	
Comfort	2.5 turns
Standard	2 turns
Sport	1.5 turns

Rebound damping	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Spring preload	7 mm (0.28 in)
Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	45 N/mm (257 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	48 N/mm (274 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	51 N/mm (291 lb/in)
Spring length	
Weight of rider: 65... 75 kg (143... 165 lb.)	247 mm (9.72 in)
Weight of rider: 75... 85 kg (165... 187 lb.)	247 mm (9.72 in)
Weight of rider: 85... 95 kg (187... 209 lb.)	252 mm (9.92 in)
Gas pressure	10 bar (145 psi)
Static sag	40 mm (1.57 in)
Riding sag	110 mm (4.33 in)
Fitted length	477 mm (18.78 in)
Shock absorber oil	Shock absorber fluid (SAE 2.5) (50180751S1) (☛ p. 290)

25.9.3 XC-F US

Shock absorber part number	18.18.7P.79
Shock absorber	WP Performance Systems 5018 BAVP DCC
Compression damping, low-speed	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Compression damping, high-speed	
Comfort	2.5 turns
Standard	2 turns
Sport	1.5 turns
Rebound damping	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Spring preload	7 mm (0.28 in)
Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	45 N/mm (257 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	48 N/mm (274 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	51 N/mm (291 lb/in)
Spring length	
Weight of rider: 65... 75 kg (143... 165 lb.)	245 N/mm (1,399 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	247 N/mm (1,410 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	252 N/mm (1,439 lb/in)
Gas pressure	10 bar (145 psi)
Static sag	40 mm (1.57 in)
Riding sag	110 mm (4.33 in)
Fitted length	477 mm (18.78 in)
Shock absorber oil	Shock absorber fluid (SAE 2.5) (50180751S1) (☛ p. 290)

25.10 Chassis tightening torques

Screw air intake temperature sensor	EJOT DELTA PT® 45x12-Z	0.7 Nm (0.52 lbf ft)	–
Screw, air filter box cover	EJOT PT® K60x20-Z	3 Nm (2.2 lbf ft)	–
Screw, pressure regulator	EJOT PT® K60x25-Z	3 Nm (2.2 lbf ft)	–
Screw, handle bar fixed grip, left	M4	5 Nm (3.7 lbf ft)	Loctite® 243™
Spoke nipple, front wheel	M4.5	6 Nm (4.4 lbf ft)	–
Spoke nipple, rear wheel	M4.5	6 Nm (4.4 lbf ft)	–
Remaining nuts, chassis	M5	5 Nm (3.7 lbf ft)	–
Remaining screws, chassis	M5	5 Nm (3.7 lbf ft)	–
Screw, battery terminal	M5	2.5 Nm (1.84 lbf ft)	–
Screw, shock absorber adjusting ring	M5	5 Nm (3.7 lbf ft)	–
Nut, cable on starter motor	M6	4 Nm (3 lbf ft)	–
Remaining nuts, chassis	M6	10 Nm (7.4 lbf ft)	–
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)	–
Screw, ball joint of push rod on foot brake cylinder	M6	10 Nm (7.4 lbf ft)	Loctite® 243™
Screw, chain sliding guard	M6	6 Nm (4.4 lbf ft)	Loctite® 243™
Screw, front brake disc	M6	14 Nm (10.3 lbf ft)	Loctite® 243™
Screw, rear brake disc	M6	14 Nm (10.3 lbf ft)	Loctite® 243™
Screw, throttle grip	M6	5 Nm (3.7 lbf ft)	–
Fuel connection on fuel tank	M8	10 Nm (7.4 lbf ft)	–
Nut, foot brake lever stop	M8	20 Nm (14.8 lbf ft)	–
Nut, rear sprocket screw	M8	35 Nm (25.8 lbf ft)	Loctite® 2701™
Nut, rim lock	M8	12 Nm (8.9 lbf ft)	–
Remaining nuts, chassis	M8	25 Nm (18.4 lbf ft)	–
Remaining screws, chassis	M8	25 Nm (18.4 lbf ft)	–
Screw manifold on cylinder head brace	M8	25 Nm (18.4 lbf ft)	–
Screw side stand attachment (XC-F US)	M8	35 Nm (25.8 lbf ft)	Loctite® 2701™
Screw, bottom triple clamp	M8	12 Nm (8.9 lbf ft)	–
Screw, chain sliding piece	M8	15 Nm (11.1 lbf ft)	–
Screw, engine brace	M8	25 Nm (18.4 lbf ft)	Loctite® 2701™
Screw, fork stub	M8	15 Nm (11.1 lbf ft)	–
Screw, front brake caliper	M8	25 Nm (18.4 lbf ft)	Loctite® 243™
Screw, handlebar clamp	M8	20 Nm (14.8 lbf ft)	–
Screw, subframe	M8	35 Nm (25.8 lbf ft)	Loctite® 2701™
Screw, top steering stem	M8	20 Nm (14.8 lbf ft)	Loctite® 243™
Screw, top triple clamp	M8	17 Nm (12.5 lbf ft)	–
Engine carrying screw	M10	60 Nm (44.3 lbf ft)	–
Remaining nuts, chassis	M10	45 Nm (33.2 lbf ft)	–
Remaining screws, chassis	M10	45 Nm (33.2 lbf ft)	–
Screw, bottom shock absorber	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
Screw, handlebar support	M10	40 Nm (29.5 lbf ft)	Loctite® 243™
Screw, top shock absorber	M10	60 Nm (44.3 lbf ft)	Loctite® 2701™
Nut, fuel pump	M12	15 Nm (11.1 lbf ft)	–
Nut, frame to linkage lever	M14x1.5	80 Nm (59 lbf ft)	–
Nut, linkage lever on swingarm	M14x1.5	80 Nm (59 lbf ft)	–
Nut, linkage lever to angle lever	M14x1.5	80 Nm (59 lbf ft)	–
Nut, swingarm pivot	M16x1.5	100 Nm (73.8 lbf ft)	–
Screw, front wheel spindle	M20x1.5	35 Nm (25.8 lbf ft)	–
Screw, top steering head	M20x1.5	12 Nm (8.9 lbf ft)	–
Screw-in nozzles, cooling system	M20x1.5	12 Nm (8.9 lbf ft)	Loctite® 243™

Nut, rear wheel spindle	M25x1.5	80 Nm (59 lbf ft)	-
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26.1 Cleaning the motorcycle

Note

Material damage Damage and destruction of components by high-pressure cleaning equipment.

- When cleaning the vehicle with a pressure cleaner, do not point the water jet directly onto electrical components, connectors, cables, bearings, etc. Maintain a minimum distance of 60 cm between the nozzle of the pressure cleaner and the component. Excessive pressure can cause malfunctions or destroy these parts.

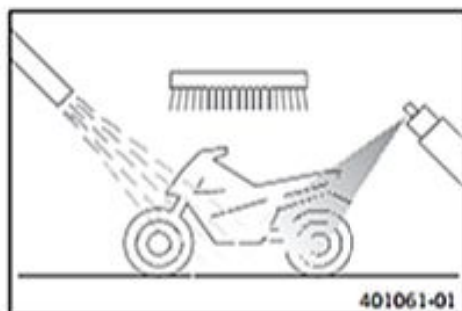
**Warning**

Environmental hazard Hazardous substances cause environmental damage.

- Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

**Info**

If you clean the motorcycle regularly, its value and appearance will be maintained over a long period. Avoid direct sunshine on the motorcycle during cleaning.



- Close off the exhaust system to prevent water from entering.
- First remove coarse dirt particles with a gentle spray of water.
- Spray very dirty areas with a normal motorcycle cleaner and then clean with a paintbrush.

Motorcycle cleaner (☛ p. 292)

**Info**

Use warm water containing normal motorcycle cleaner and a soft sponge. Never apply motorcycle cleaner to the dry vehicle; always rinse with water first.

- After rinsing the motorcycle with a gentle spray of water, allow it to dry thoroughly.
- Remove the plug from the exhaust system.

**Warning**

Danger of accidents Reduced braking efficiency due to a wet or dirty brake system.

- Clean or dry a dirty or wet brake system by riding and braking gently.

- After cleaning, ride a short distance until the engine reaches operating temperature.

**Info**

The heat produced causes water at inaccessible locations in the engine and the brake system to evaporate.

- Push back the protection caps of the handlebar controls to allow any water that has penetrated to evaporate.
- After the motorcycle has cooled off, lubricate all moving parts and bearings.
- Clean the chain. (☛ p. 148)
- Treat bare metal parts (except for brake discs and the exhaust system) with a corrosion inhibitor.

Preserving materials for paints, metal and rubber (☛ p. 293)

- Treat all plastic parts and powder-coated parts with a mild cleaning and care agent.

Special cleaner for glossy and matte paint finishes, metal and plastic surfaces (☛ p. 293)

27.1 Storage

**Warning**

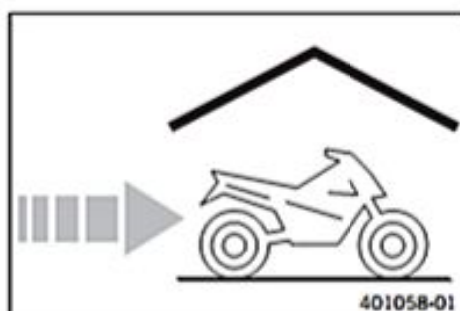
Danger of poisoning Fuel is poisonous and a health hazard.

- Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that has been contaminated with fuel. Store fuel properly in a suitable canister and keep away from children.

**Info**

If you want to garage the motorcycle for a longer period, take the following steps.

Before storing the motorcycle, check all parts for function and wear. If service, repairs or replacements are necessary, you should do this during the storage period (less workshop overload). In this way, you can avoid long workshop waiting times at the start of the new season.



- When refueling for the last time before taking the motorcycle out of service, add fuel additive. (☛ p. 292)

Fuel additive (☛ p. 292)

- Refuel.
- Clean the motorcycle. (☛ p. 274)
- Change the engine oil and oil filter and clean the oil screens. (☛ p. 254)
- Check the antifreeze and coolant level. (☛ p. 250)
- Check the tire air pressure. (☛ p. 137)
- Remove the battery. (☛ p. 152)
- Recharge the battery.

Guideline

Storage temperature of battery without direct sunlight	0... 35 °C (32... 95 °F)
--	--------------------------

- Store the vehicle in a dry location that is not subject to large fluctuations in temperature.

**Info**

KTM recommends raising the motorcycle.

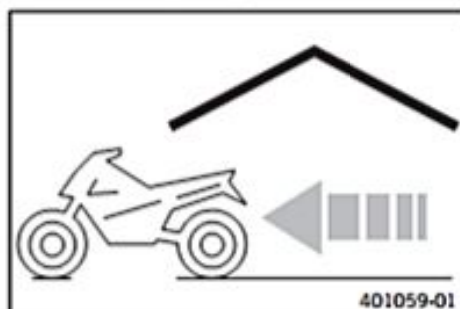
- Raise the motorcycle with a lift stand. (☛ p. 10)
- Cover the vehicle with a tarp or a cover that is permeable to air.

**Info**

Do not use non-porous materials since they prevent humidity from escaping, thus causing corrosion.

Avoid running the engine for a short time only. Since the engine cannot warm up properly, the water vapor produced during combustion condenses and causes valves and exhaust system to rust.

27.2 Preparing for use after storage



- Install the battery. (☛ p. 153)
- Remove the motorcycle from the lift stand. (☛ p. 10)
- Perform checks and maintenance work when preparing the vehicle for use.
- Make a test ride.

28.1 Additional information

Any further work that results from the required work or from the recommended work must be ordered separately and can be invoiced separately.

28.2 Required work

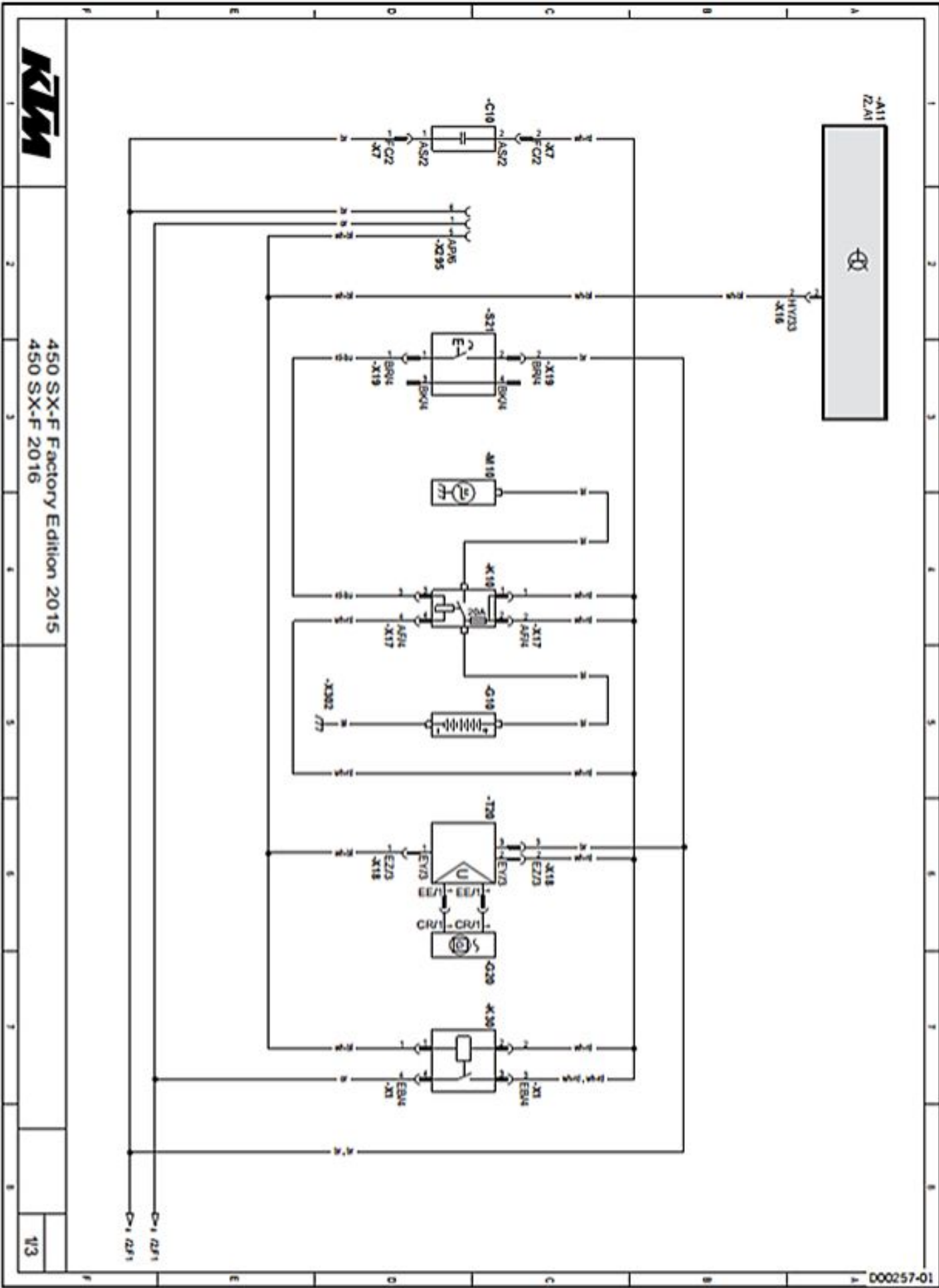
	Every 30 operating hours	Every 20 operating hours	Every 10 operating hours/after every race	Once after 1 operating hour
Read out the fault memory using the KTM diagnostics tool.	○	●	●	●
Check and charge the battery.		●	●	●
Check the front brake linings. (☞ p. 157)		●	●	●
Check the rear brake linings. (☞ p. 162)		●	●	●
Check the brake discs. (☞ p. 138)		●	●	●
Check the brake lines for damage and leakage.		●	●	●
Check the rear brake fluid level. (☞ p. 164)		●	●	●
Check the free travel of the foot brake lever. (☞ p. 164)		●	●	●
Check the frame and swingarm.		●	●	●
Check the swingarm bearing for play. (☞ p. 111)			●	
Check the shock absorber linkage. (☞ p. 93)		●	●	●
Check the tire condition. (☞ p. 137)	○	●	●	●
Check the tire air pressure. (☞ p. 137)	○	●	●	●
Check the wheel bearing for play. (☞ p. 137)		●	●	●
Check the wheel hubs.		●	●	●
Check the rim run-out.	○	●	●	●
Check the spoke tension. (☞ p. 138)	○	●	●	●
Check the chain, rear sprocket, engine sprocket, and chain guide. (☞ p. 146)		●	●	●
Check the chain tension. (☞ p. 145)	○	●	●	●
Grease all moving parts (e.g., hand lever, chain, ...) and check for smooth operation.		●	●	●
Check/correct the fluid level of the hydraulic clutch. (☞ p. 249)		●	●	●
Check the brake fluid level of the front brake. (☞ p. 159)		●	●	●
Check the free travel of the hand brake lever. (☞ p. 158)		●	●	●
Check the steering head bearing play. (☞ p. 79)	○	●	●	●
Check the valve clearance. (☞ p. 260)	○			●
Check the clutch.		●	●	●
Change the engine oil and oil filter and clean the oil screens. (☞ p. 254)	○	●	●	●
Check all hoses (e.g. fuel, cooling, bleeder, drainage, etc.) and sleeves for cracking, leaks, and incorrect routing.	○	●	●	●
Check the antifreeze and coolant level. (☞ p. 250)	○	●	●	●
Check the cables for damage and routing without sharp bends.		●	●	●
Check that the throttle cables are undamaged, routed without sharp bends, and set correctly.	○	●	●	●
Clean the air filter and air filter box. (☞ p. 123)		●	●	●
Change the glass fiber yarn filling of the main silencer. (☞ p. 120)			●	
Check the screws and nuts for tightness.	○	●	●	●
Change fuel screen. (☞ p. 133)	○	●	●	●
Check the fuel pressure. (☞ p. 128)		●	●	●
Check idle.	○	●	●	●
Final check: Check the vehicle for safe operation and take a test ride.	○	●	●	●
Read out the fault memory using the KTM diagnostics tool after a test ride.	○	●	●	●
Make the service entry in the KTM Dealer.net and in the Service and Warranty Booklet.	○	●	●	●

- One-time interval
- Periodic interval

28.3 Recommended work

	Annually			
	Every 100 operating hours			
	Every 50 operating hours			
	Every 40 operating hours			
	Once after 20 operating hours			
	Once after 10 operating hours			
Change the front brake fluid. (☛ p. 161)				●
Change the rear brake fluid. (☛ p. 166)				●
Change the hydraulic clutch fluid. (☛ p. 249)				●
Grease the steering head bearing. (☛ p. 76)				●
Perform a fork service. (All US models) (☛ p. 40)	○	●		
Service the fork. (SX-F EU) (☛ p. 16)	○	●		
Service the shock absorber. (☛ p. 95)		○	●	
Change the fuel filter. (☛ p. 131)				●
Perform minor engine service, engine has been installed. (Change spark plug and spark plug connector. Change piston, check and measure cylinder; check cylinder head. Check the camshaft, rocker arm and rocker arm shafts. Check timing assembly.)			●	●
Perform major engine service including removing and installing engine. (Change valves, valve springs, valve spring seats and valve spring retainers. Change the connecting rod, conrod bearing, and crank pin. Check the transmission and shift mechanism. Check the oil pressure regulator valve. Change the suction pump. Check the force pump and lubrication system. Change timing chain. Change all engine bearings. Change the shaft seal rings and bearing seals of the main bearing.)				●

- One-time interval
- Periodic interval

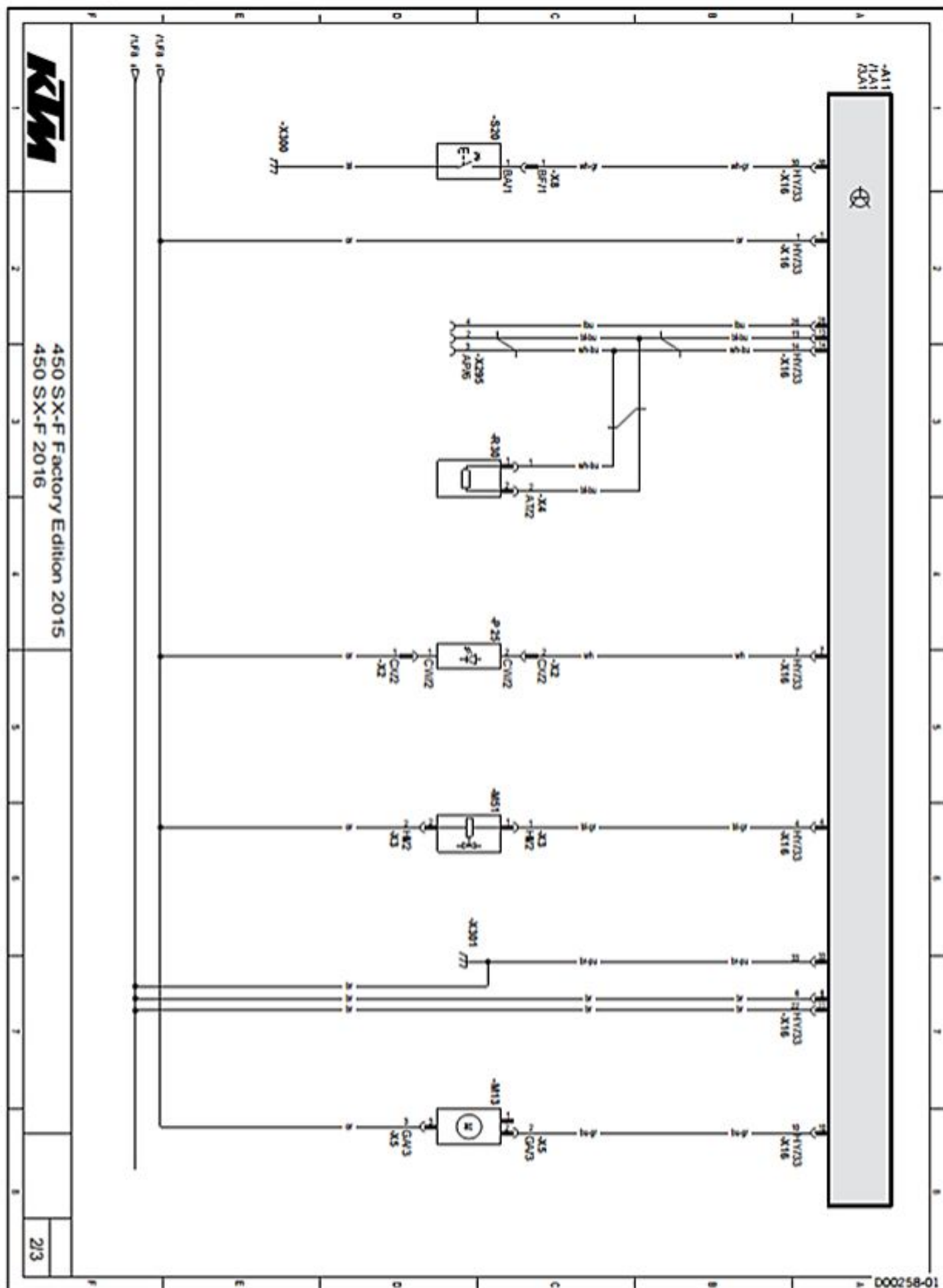


450 SX-F Factory Edition 2015
450 SX-F 2016

Components:

A11	EFI control unit
C10	Capacitor
G10	Battery
G20	Alternator
K10	Starter relay with main fuse
K30	Power relay
M10	Starter motor
T20	Voltage regulator
S21	Electric starter button
X295	Diagnostics connector

29.2 Page 2 of 3 (All SX-F models)

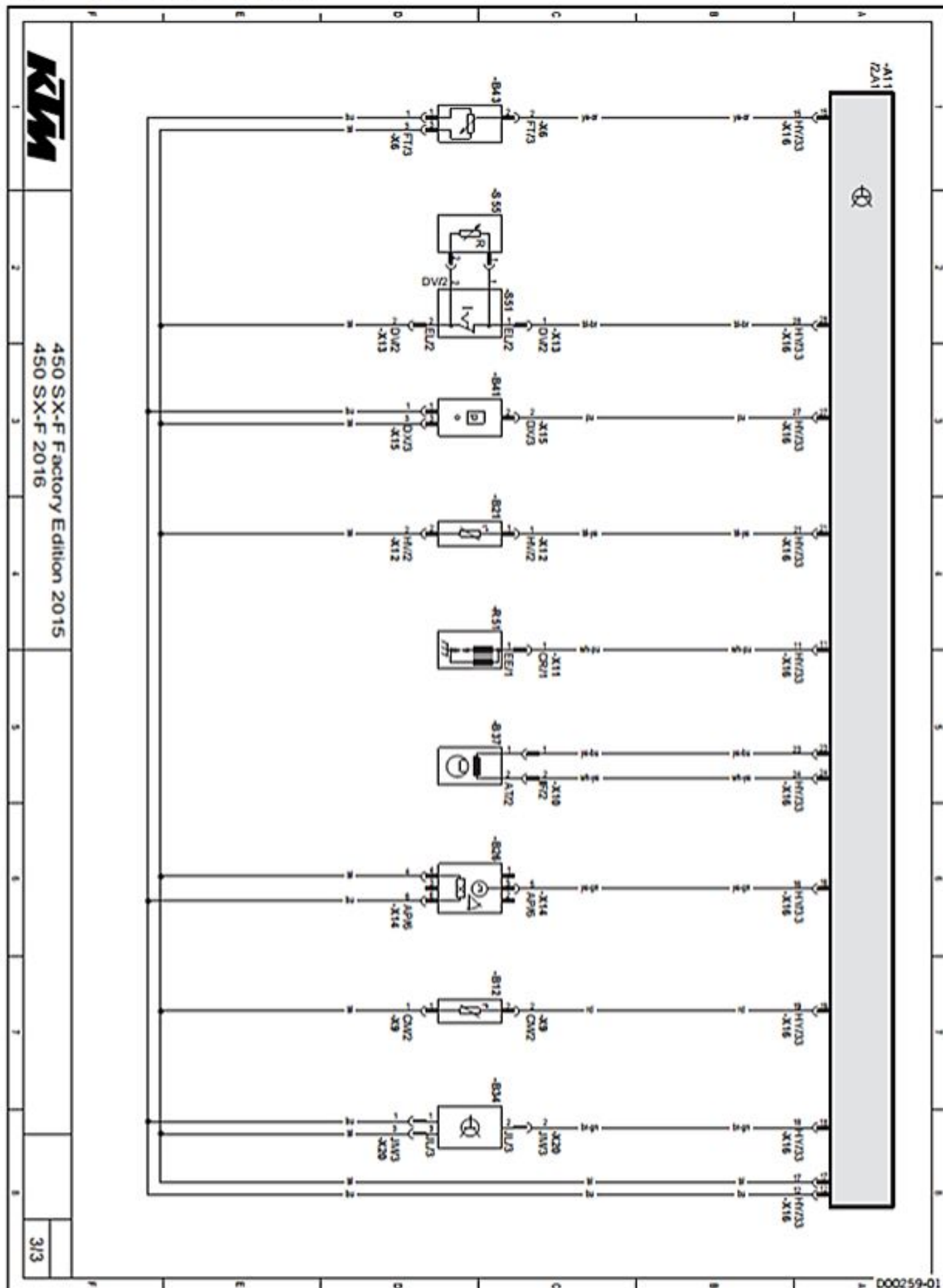

KTM

450 SX-F Factory Edition 2015
450 SX-F 2016

Components:

A11	EFI control unit
M13	Fuel pump
M51	Injector (cylinder 1)
P25	FI warning lamp (MIL)
R30	CAN-Bus terminating resistor
S20	Kill switch
X295	Diagnostics connector

29.3 Page 3 of 3 (All SX-F models)

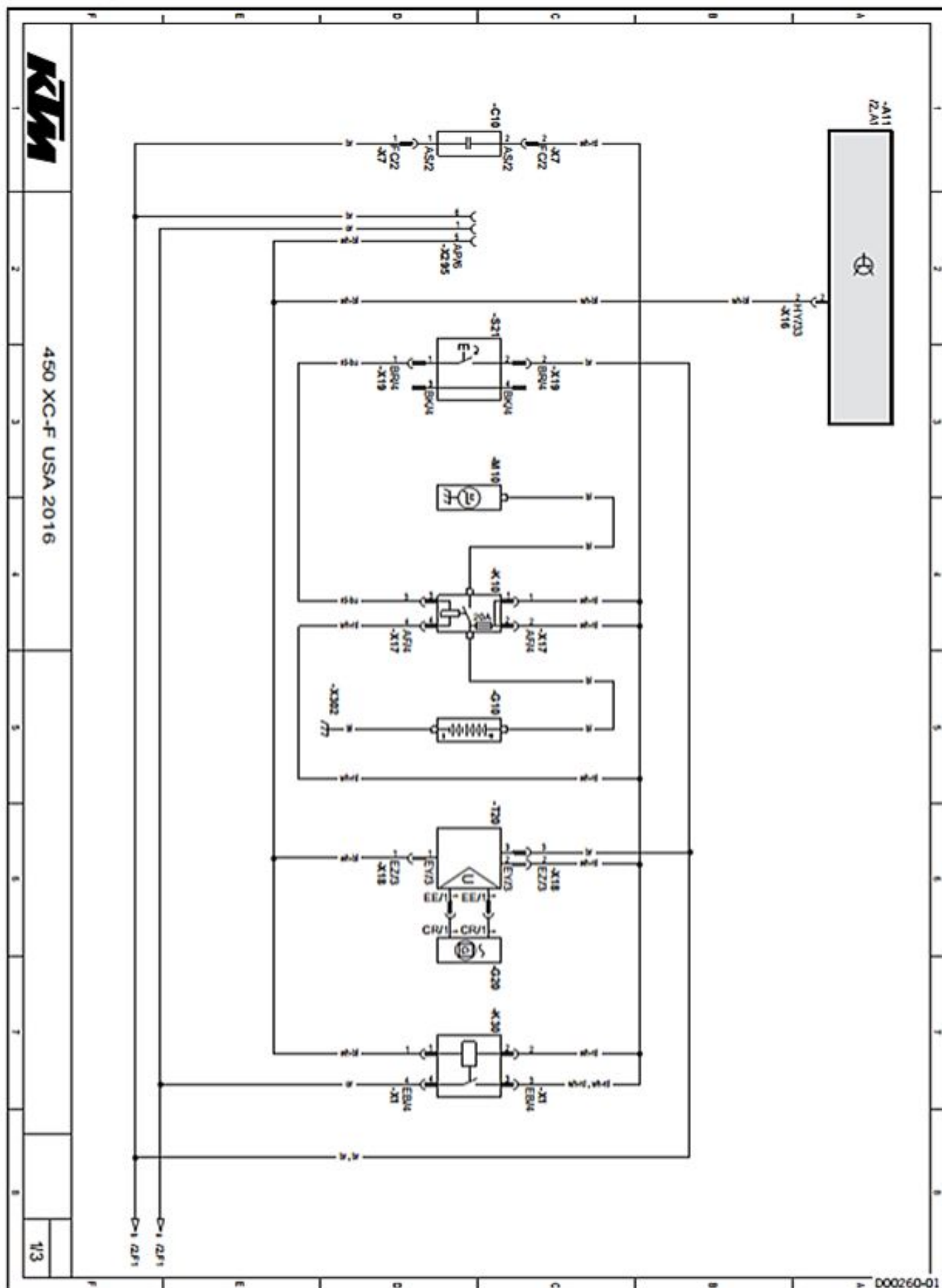


Components:

A11	EFI control unit
B12	Intake air temperature sensor
B21	Coolant temperature sensor, cylinder 1
B26	Rollover sensor
B34	Gear position sensor
B37	Crankshaft position sensor
B41	Manifold absolute pressure sensor cylinder 1
B43	Throttle position sensor
R51	Ignition coil (cylinder 1)
S51	Map switch for ride mode (optional)
S55	Map-Select switch (optional)

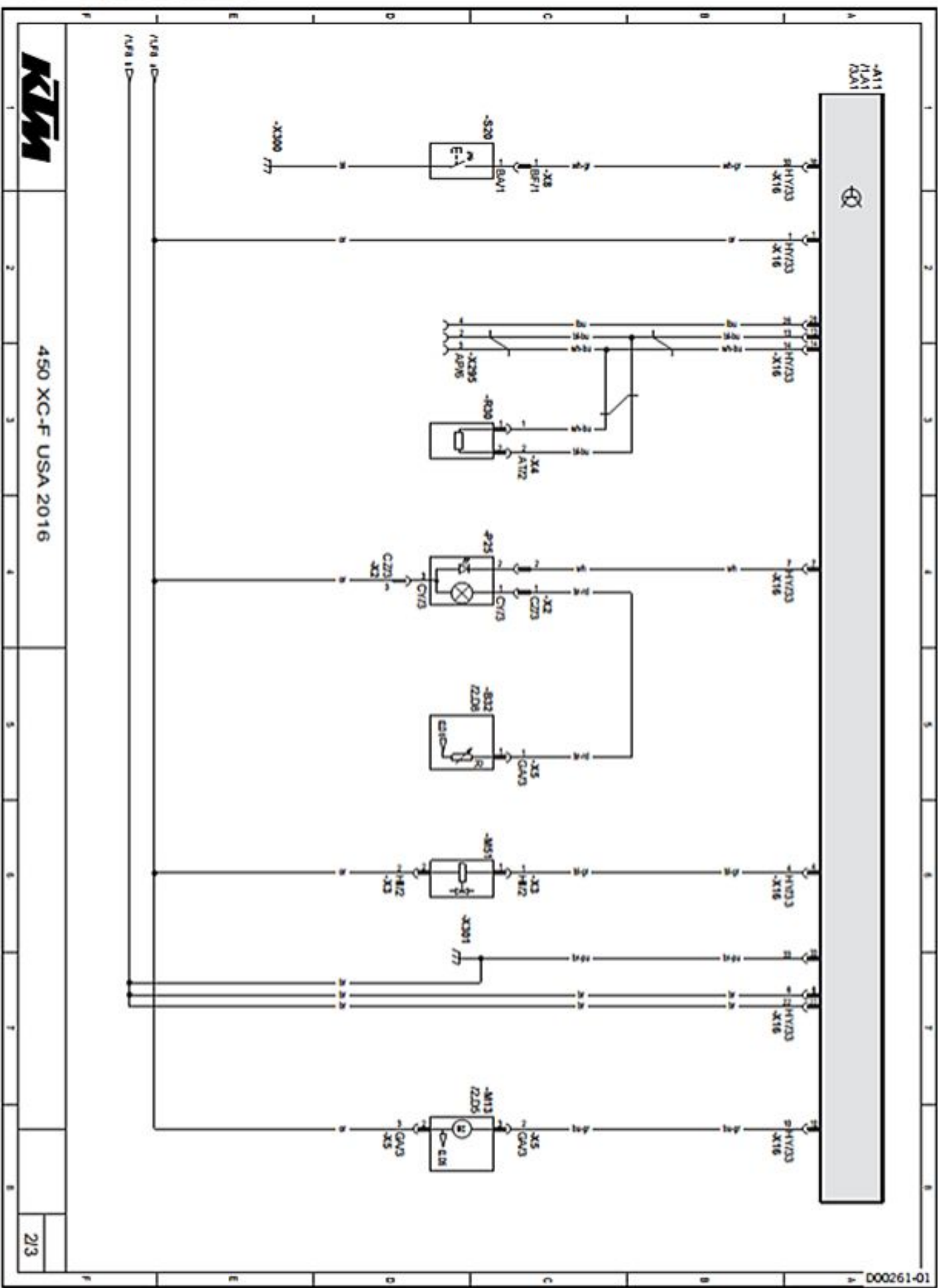
Cable colors:

bl	Black
br	Brown
bu	Blue
gn	Green
gr	Gray
lbu	Light blue
or	Orange
pk	Pink
pu	Violet
rd	Red
wh	White
ye	Yellow



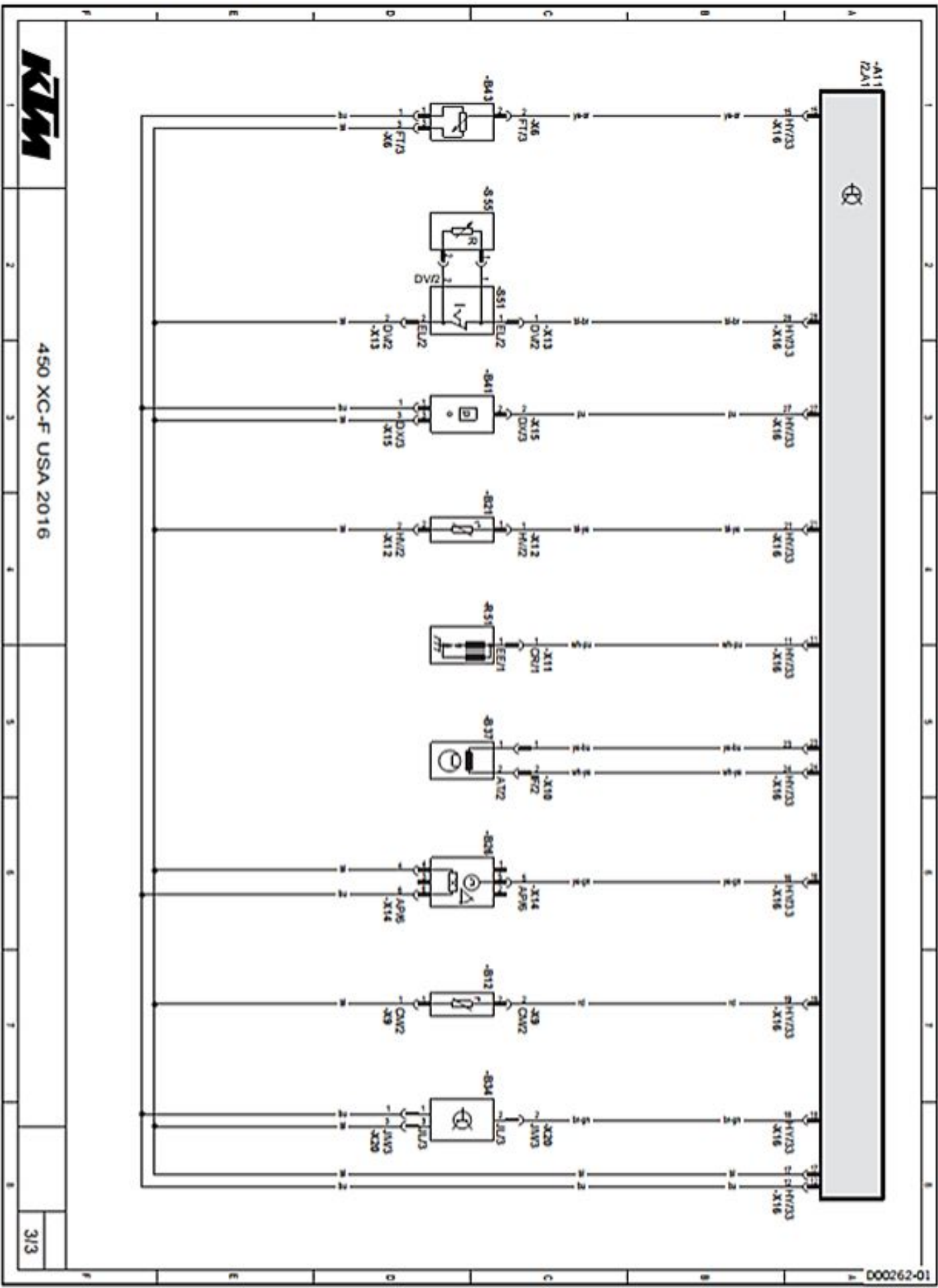
Components:

A11	EFI control unit
C10	Capacitor
G10	Battery
G20	Alternator
K10	Starter relay with main fuse
K30	Power relay
M10	Starter motor
T20	Voltage regulator
S21	Electric starter button
X295	Diagnostics connector



Components:

A11	EFI control unit
B32	Fuel level sensor
M13	Fuel pump
M51	Injection valve (cylinder 1)
P25	FI warning lamp
R30	CAN bus terminating resistor
S20	Kill switch
X295	Diagnostics connector



Components:

A11	EFI control unit
B12	Intake air temperature sensor
B21	Coolant temperature sensor (cylinder 1)
B26	Rollover sensor
B34	Gear position sensor
B37	Crankshaft position sensor
B41	Manifold absolute pressure sensor (cylinder 1)
B43	Throttle position sensor
R51	Ignition coil (cylinder 1)
S51	Map switch for ride mode (optional)
S55	Map-Select switch (optional)

Cable colors:

bl	Black
br	Brown
bu	Blue
gn	Green
gr	Gray
lbu	Light blue
or	Orange
pk	Pink
pu	Violet
rd	Red
wh	White
ye	Yellow

Brake fluid DOT 4 / DOT 5.1**Standard/classification**

- DOT

Guideline

- Use only brake fluid that complies with the specified standard (see specifications on the container) and that exhibits the corresponding properties.

Recommended supplier**Castrol**

- RESPONSE BRAKE FLUID SUPER DOT 4

Motorex®

- Brake Fluid DOT 5.1

Coolant**Guideline**

- Only use high quality coolant with corrosion inhibitor for aluminum motors (even in countries with high temperatures). Using inferior antifreeze can result in corrosion and foaming.

Mixture ratio

Antifreeze protection: -25... -45 °C (-13... -49 °F)	anti-corrosion/antifreeze distilled water
--	--

Recommended supplier**Motorex®**

- COOLANT M3.0

Engine oil (SAE 10W/50)**Standard/classification**

- JASO T903 MA (☛ p. 309)
- SAE (☛ p. 309) (SAE 10W/50)

Guideline

- Use only engine oils that comply with the specified standards (see specifications on the container) and that possess the corresponding properties.

Synthetic engine oil

Recommended supplier**Motorex®**

- Cross Power 4T

Fork oil (SAE 4) (48601166S1)**Standard/classification**

- SAE (☛ p. 309) (SAE 4)

Guideline

- Use only oils that comply with the specified standards (see specifications on the container) and that exhibit the corresponding properties.

Multi-purpose grease (00062010051)**Recommended supplier****Klüber Lubrication®**

- CENTOPLEX 2 EP

Shock absorber fluid (SAE 2.5) (50180751S1)**Standard/classification**

- SAE (☛ p. 309) (SAE 2.5)

Guideline

- Use only oils that comply with the specified standards (see specifications on the container) and that exhibit the corresponding properties.

Super unleaded (ROZ 95/RON 95/PON 91)

Standard/classification

- DIN EN 228 (ROZ 95/RON 95/PON 91)

Guideline

- Only use unleaded super fuel that matches or is equivalent to the specified fuel grade.
- Fuel with an ethanol content of up to 10 % (E10 fuel) is safe to use.



Info

Do not use fuel containing methanol (e. g. M15, M85, M100) or more than 10 % ethanol (e. g. E15, E25, E85, E100).

Air filter cleaner

Recommended supplier

Motorex®

- Racing Bio Dirt Remover

Chain cleaner

Recommended supplier

Motorex®

- Chain Clean

Fuel additive

Recommended supplier

Motorex®

- Fuel Stabilizer

High viscosity grease

Recommended supplier

SKF®

- LGHB 2

Long-life grease

Recommended supplier

Motorex®

- Bike Grease 2000

Lubricant (T511)

Recommended supplier

Lubcon®

- Turmsilon® GTI 300 P

Lubricant (T158)

Recommended supplier

Lubcon®

- Turmogrease® PP 300

Lubricant (T625)

Recommended supplier

Molykote®

- 33 Medium

Lubricant (T152)

Recommended supplier

Bel-Ray®

- Molytube® Anti-Seize

Lubricant (T159)

Recommended supplier

Bel-Ray®

- MC-11®

Motorcycle cleaner

Recommended supplier

Motorex®

- Moto Clean

Off-road chain spray

Recommended supplier

Motorex®

- Chainlube Offroad

Oil for foam air filter

Recommended supplier

Motorex®

- Racing Bio Liquid Power

Preserving materials for paints, metal and rubber

Recommended supplier

Motorex®

- Moto Protect

Special cleaner for glossy and matte paint finishes, metal and plastic surfaces

Recommended supplier

Motorex®

- Quick Cleaner

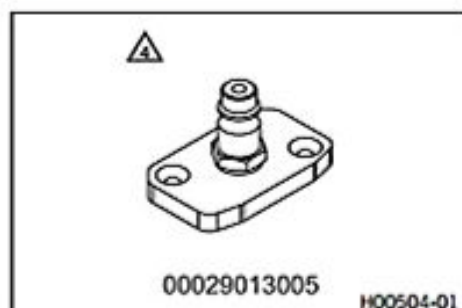
Universal oil spray

Recommended supplier

Motorex®

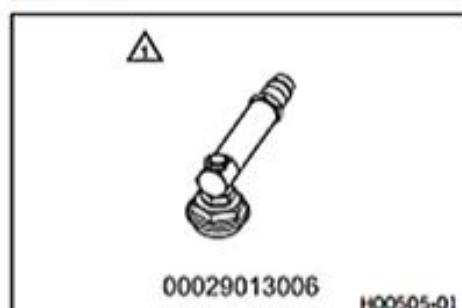
- Joker 440 Synthetic

Bleeder cover



Art. no.: 00029013005

Bleeder cover



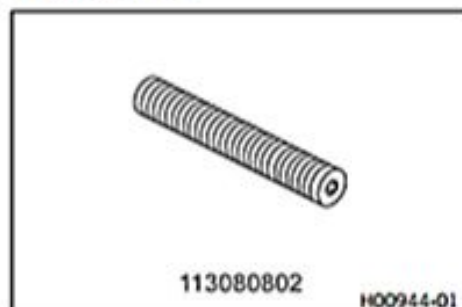
Art. no.: 00029013006

Bleeding device



Art. no.: 00029013100

Locking screw



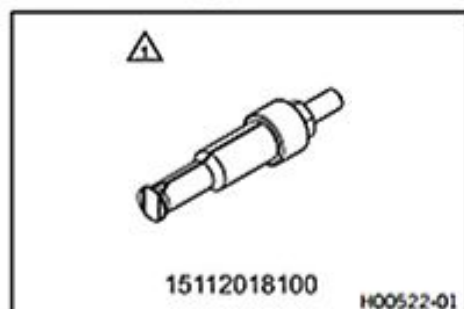
Art. no.: 113080802

Bearing puller



Art. no.: 15112017000

Internal bearing puller

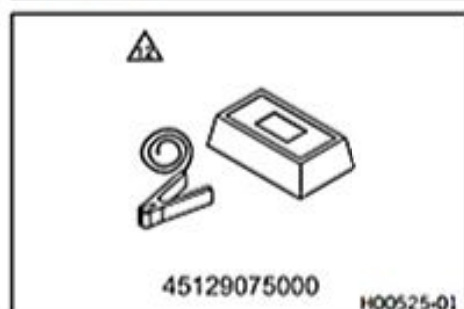


Art. no.: 15112018100

Feature

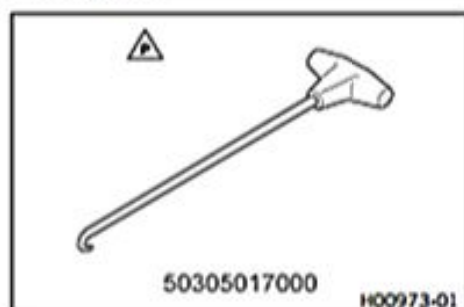
18... 23 mm (0.71... 0.91 in)

Tachometer



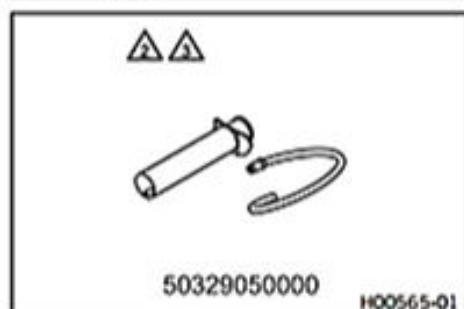
Art. no.: 45129075000

Spring hook



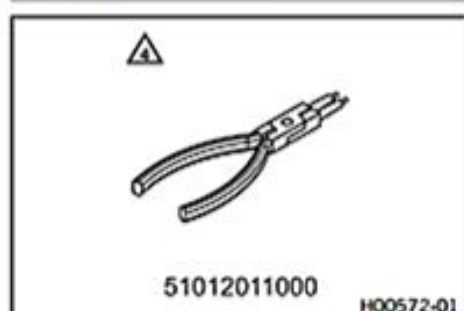
Art. no.: 50305017000

Bleed syringe



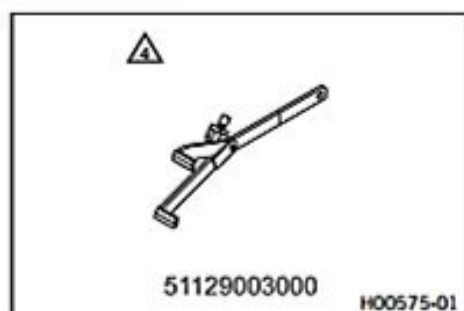
Art. no.: 50329050000

Circlip pliers reverse



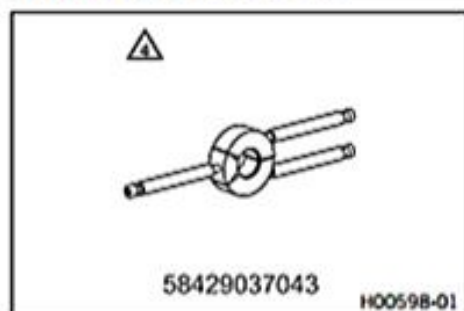
Art. no.: 51012011000

Clutch holder



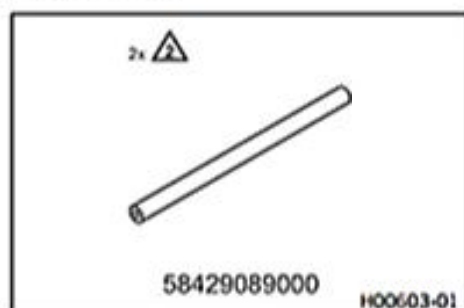
Art. no.: 51129003000

Tool for inner bearing race



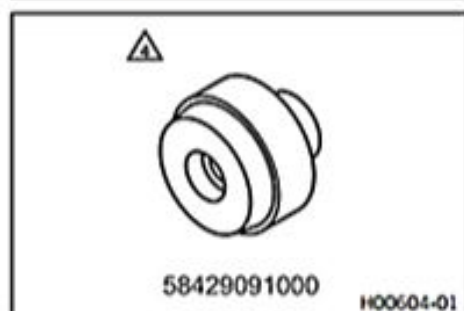
Art. no.: 58429037043

Tool bracket



Art. no.: 58429089000

Press-in tool



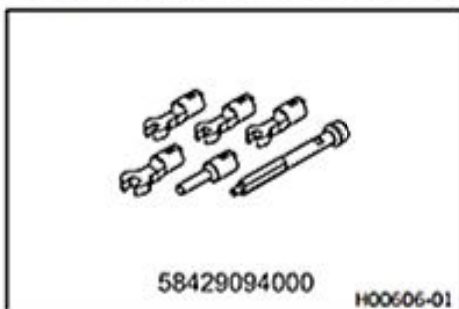
Art. no.: 58429091000

Press-out tool



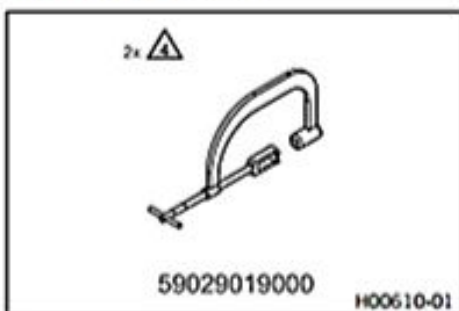
Art. no.: 58429092000

Torque wrench with various accessories in set



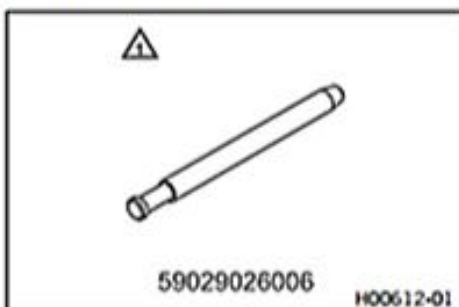
Art. no.: 58429094000

Valve spring mounter



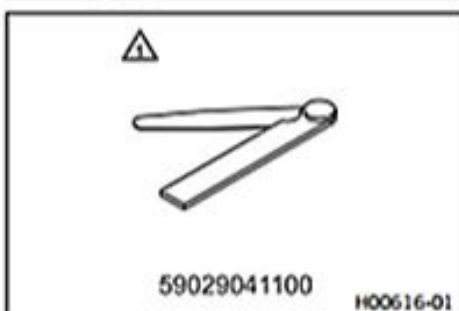
Art. no.: 59029019000

Limit plug gauge



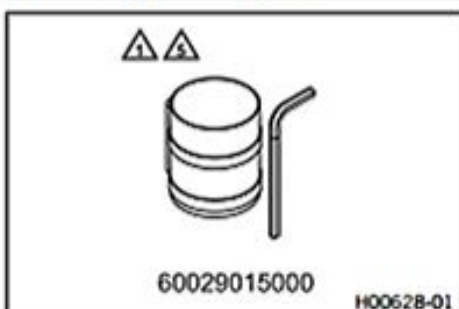
Art. no.: 59029026006

Feeler gauge



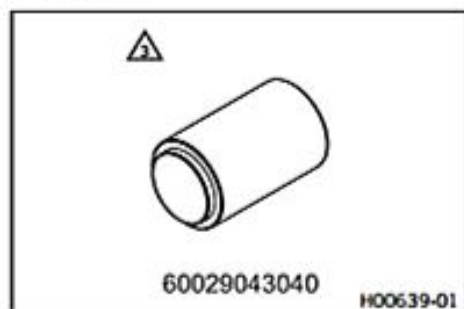
Art. no.: 59029041100

Piston ring mounting tool



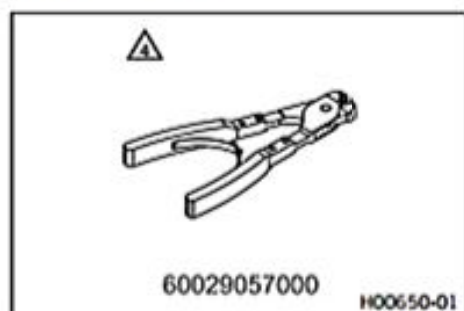
Art. no.: 60029015000

Press drift



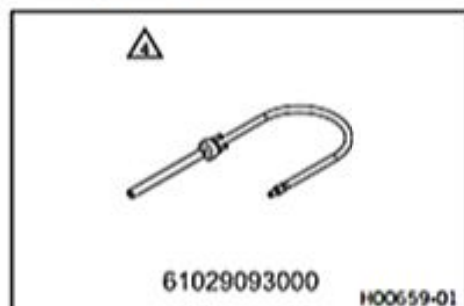
Art. no.: 60029043040

Hose clamp pliers



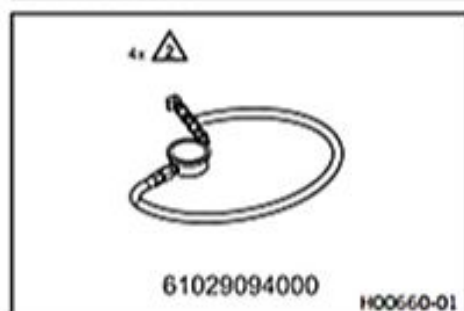
Art. no.: 60029057000

Testing hose



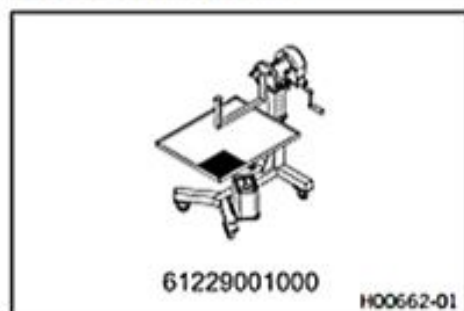
Art. no.: 61029093000

Pressure tester



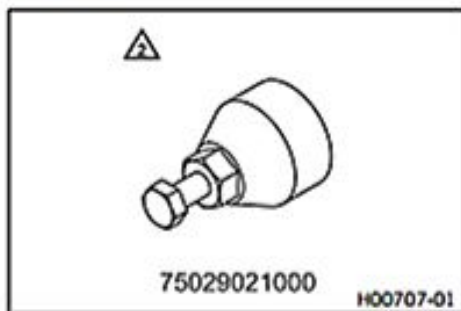
Art. no.: 61029094000

Engine assembly stand



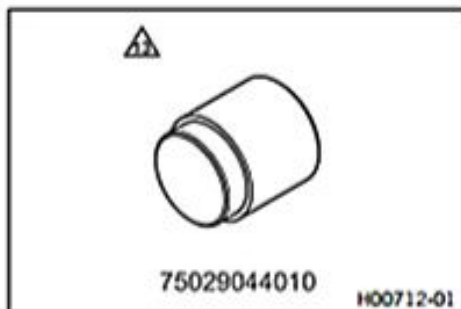
Art. no.: 61229001000

Extractor



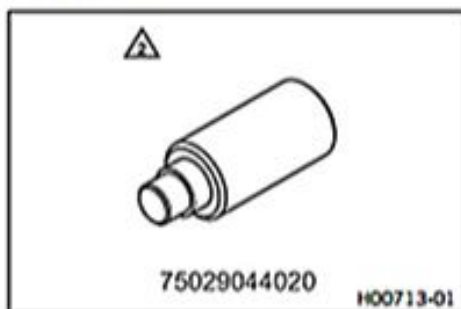
Art. no.: 75029021000

Push-in drift



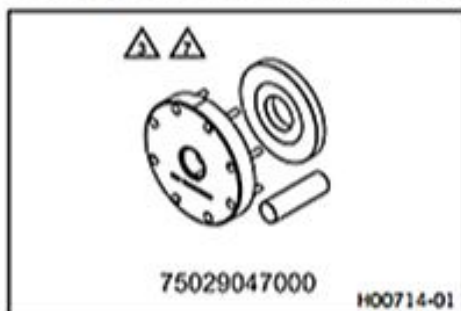
Art. no.: 75029044010

Push-in drift



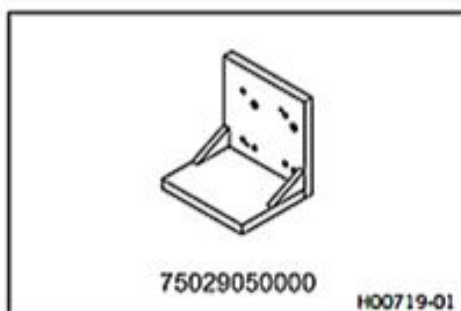
Art. no.: 75029044020

Pressing tool for crankshaft, complete



Art. no.: 75029047000

Clamping plate



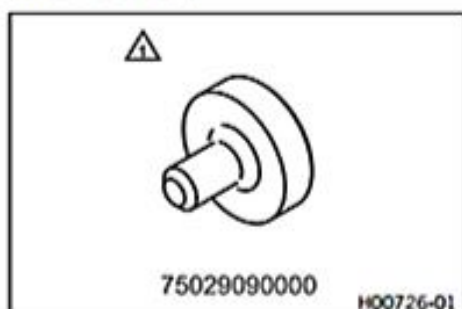
Art. no.: 75029050000

Push-out drift



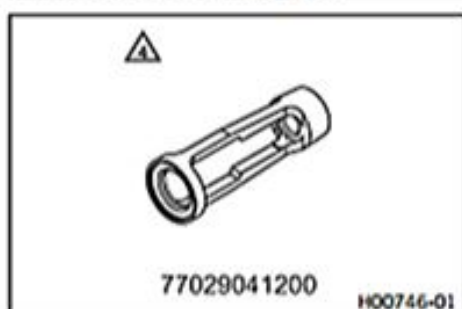
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Protection cap



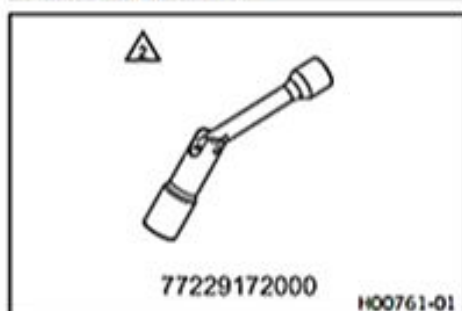
Art. no.: 75029090000

Insert for valve spring lever



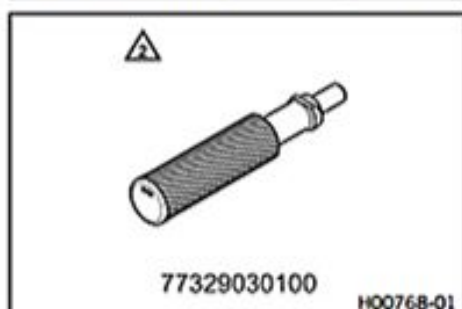
Art. no.: 77029041200

Spark plug wrench



Art. no.: 77229172000

Insertion tool for piston ring lock



Art. no.: 77329030100

Fixing drift



Art. no.: 78129032000

Lift stand



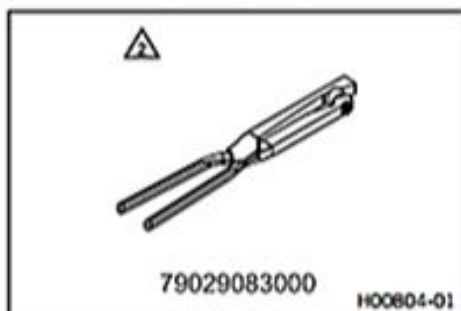
Art. no.: 78129955100

Insert for crankshaft pressing tool



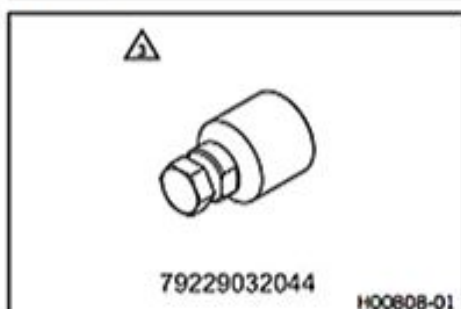
Art. no.: 78929008000

Pliers for footrest spring



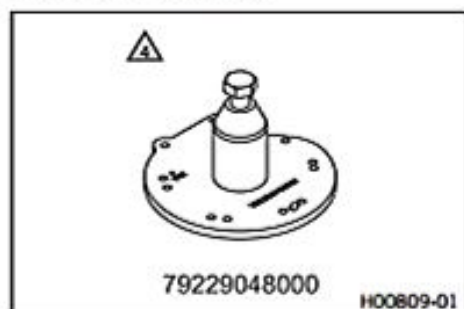
Art. no.: 79029083000

Extractor



Art. no.: 79229032044

Case separating tool



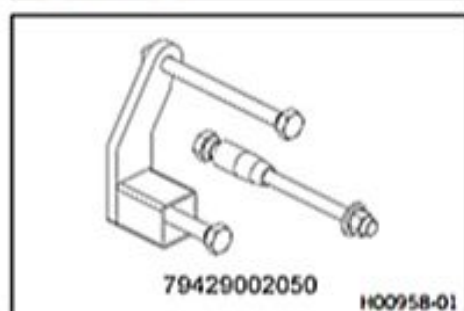
Art. no.: 79229048000

Fork pump



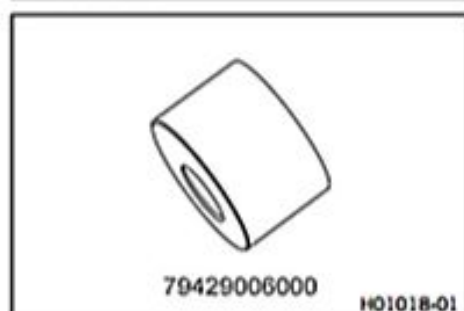
Art. no.: 79412966000

Engine fixing arm



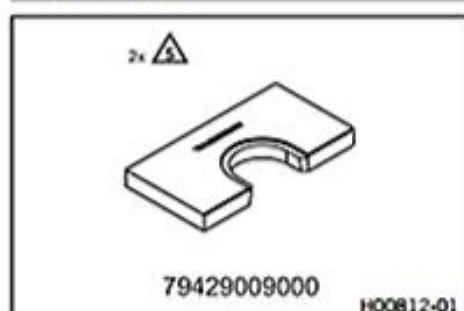
Art. no.: 79429002050

Push-in drift



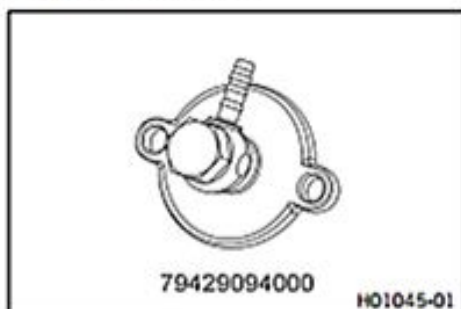
Art. no.: 79429006000

Separator plate



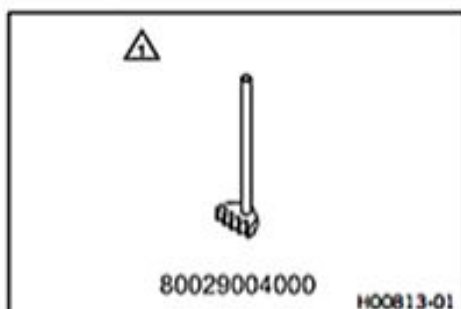
Art. no.: 79429009000

Oil pressure adapter



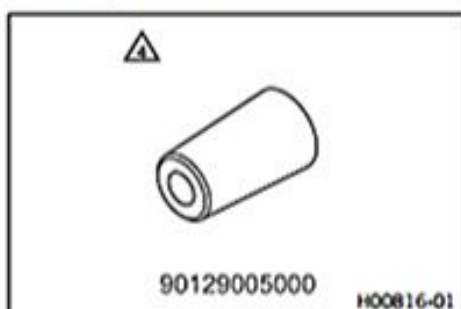
Art. no.: 79429094000

Gear segment



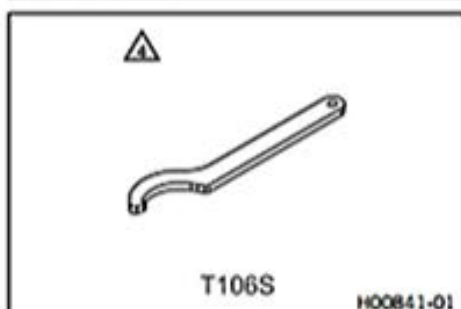
Art. no.: 80029004000

Mounting sleeve



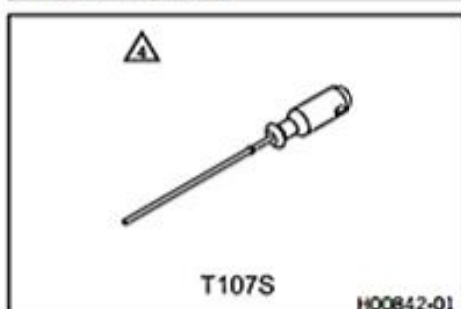
Art. no.: 90129005000

Hook wrench



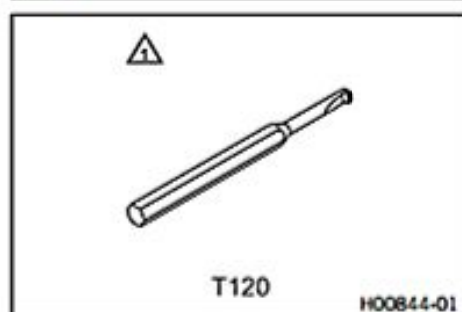
Art. no.: T106S

Depth micrometer



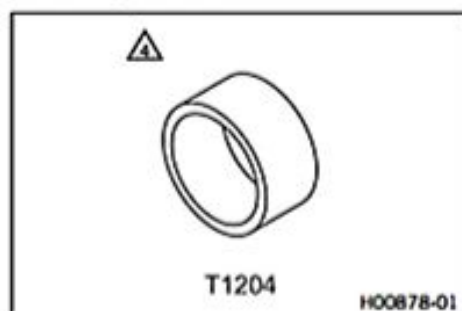
Art. no.: T107S

Pin



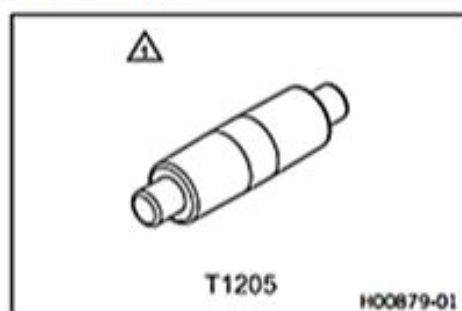
Art. no.: T120

Mounting sleeve



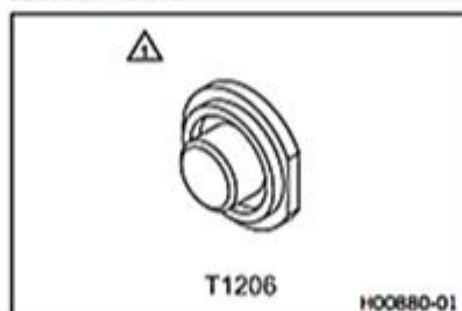
Art. no.: T1204

Calibration pin



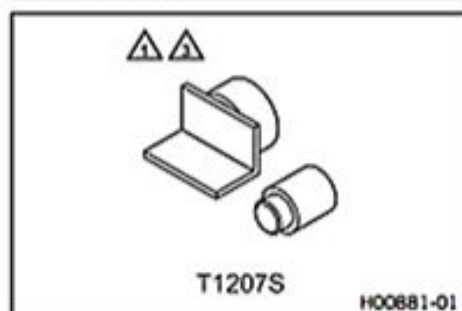
Art. no.: T1205

Pressing tool



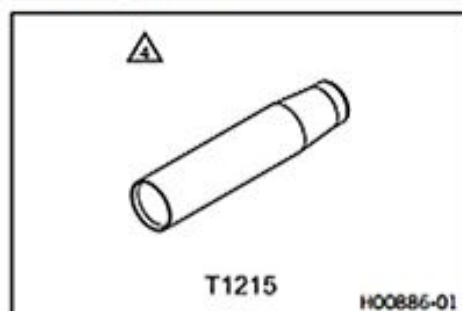
Art. no.: T1206

Pressing tool



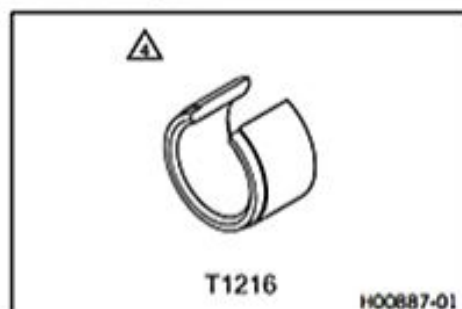
Art. no.: T1207S

Mounting sleeve



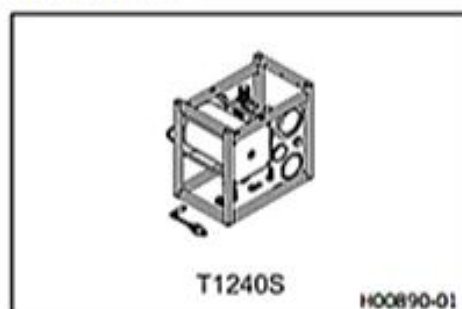
Art. no.: T1215

Disassembly tool



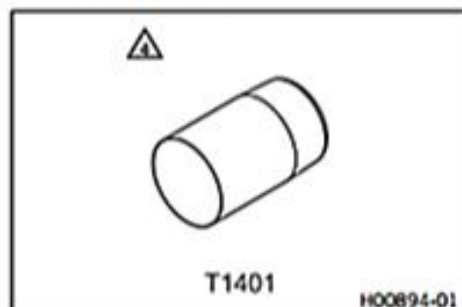
Art. no.: T1216

Vacuum pump



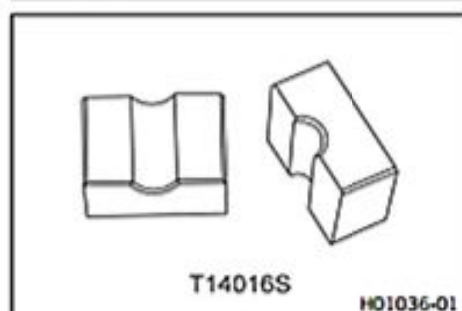
Art. no.: T1240S

Protecting sleeve



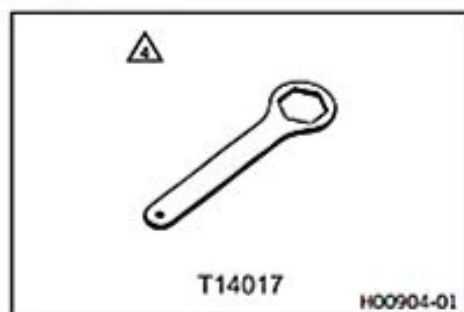
Art. no.: T1401

Clamping stand



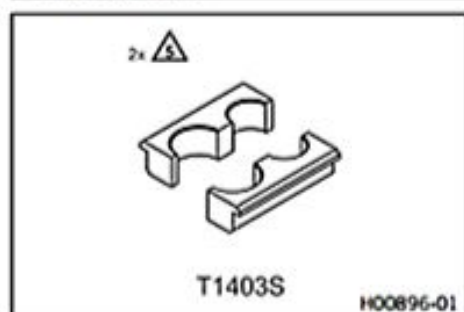
Art. no.: T14016S

Ring wrench



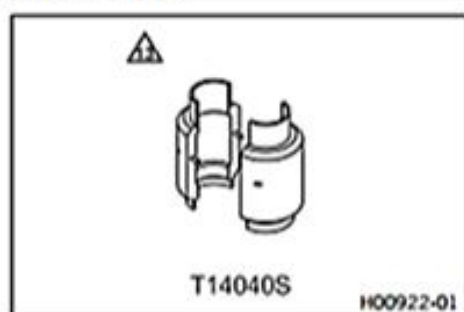
Art. no.: T14017

Clamping stand



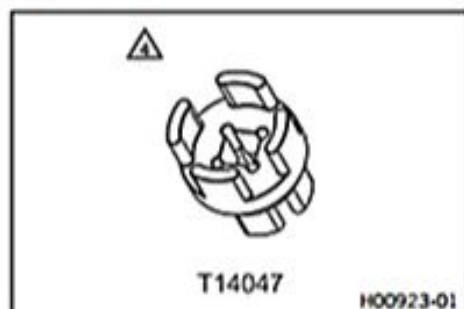
Art. no.: T1403S

Mounting tool



Art. no.: T14040S

Special socket



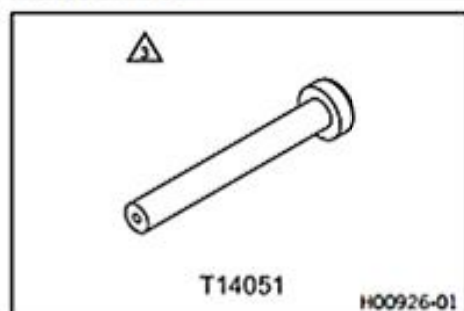
Art. no.: T14047

Clamping stand



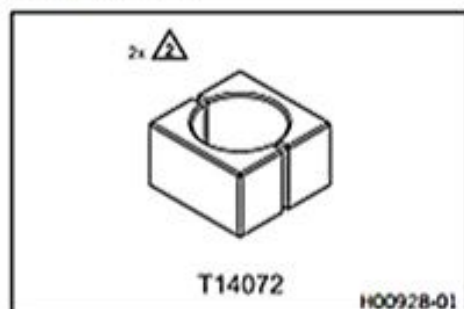
Art. no.: T14049S

Press-out tool



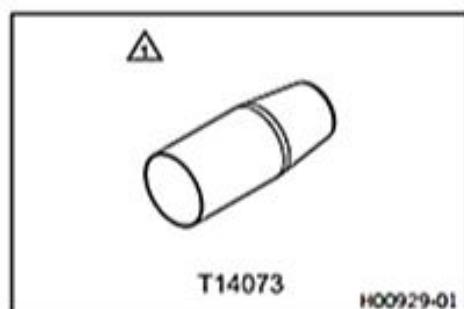
Art. no.: T14051

Clamping stand



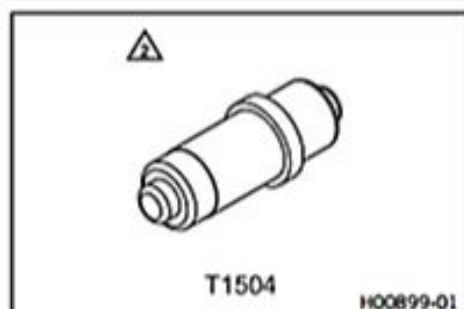
Art. no.: T14072

Protecting sleeve



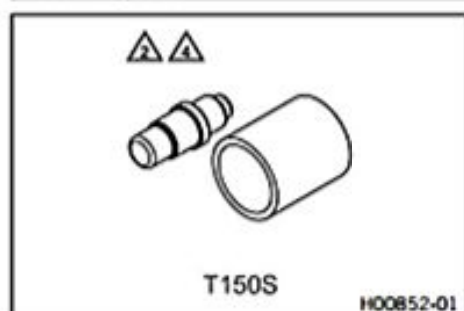
Art. no.: T14073

Press drift



Art. no.: T1504

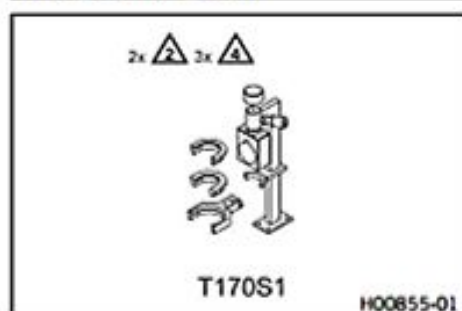
Assembly tool



Art. no.: T150S

Nitrogen filling tool

Art. no.: T170S1



JASO T903 MA

Different technical development directions required a new specification for 4-stroke motorcycles – the JASO T903 MA Standard. Earlier, engine oils from the automobile industry were used for 4-stroke motorcycles because there was no separate motorcycle specification. Whereas long service intervals are demanded for automobile engines, high performance at high engine speeds are in the foreground for motorcycle engines. In most motorcycles, the gearbox and the clutch are lubricated with the same oil as the engine. The JASO MA Standard meets these special requirements.

SAE

The SAE viscosity classes were defined by the Society of Automotive Engineers and are used for classifying oils according to their viscosity. The viscosity describes only one property of oil and says nothing about quality.

Art. no.	Article number
ca.	circa
cf.	compare
e.g.	for example
etc.	et cetera
i.a.	inter alia
no.	number
poss.	possibly

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