REPAIR MANUAL 2013

WWW.KTM.COM

250 SX-F EU
250 SX-F USA
250 XC-F USA

Art. no. 3206149en

KTM

INTRODUCTION

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 series. We reserve the right to make changes in the interest of technical advancement without at the same time updating this repair manual.
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.

All specifications are non-binding. KTM Sportmotorcycle AG specifically reserves the right to modify or delete technical specifications, prices, colors, forms, materials, services, designs, equipment, etc., without prior notice and without specifying reasons, to adapt these to local conditions, as well as to stop production of a particular model without prior notice. KTM accepts no liability for delivery options, deviations from illustrations and descriptions, as well as misprints and other errors. The models portrayed partly contain special equipment that does not belong to the regular scope of supply.

REG.NO. 12 100 6061

ISO 9001(12 100 6061)
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Issued by: TÜV Management Service

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5230 Mattighofen, Austria

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1 MEANS OF REPRESENTATION

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).
i	Indicates information with more details or tips.
»	Indicates the result of a testing step.
V	Denotes a voltage measurement.
A	Denotes a current measurement.
Ω	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.

2 SAFETY ADVICE

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

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

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

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

Warning
Identifies 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 IMPORTANT NOTES

3.1 Guarantee, warranty

The work prescribed in the service schedule must be carried out by an authorized KTM workshop only and confirmed in the customer's Service & Warranty Booklet and in the **KTM dealer.net**; otherwise, all warranty claims will be void. No warranty claims can be considered for damage resulting from manipulations and/or alterations to the vehicle.
Additional information on the guarantee or 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.

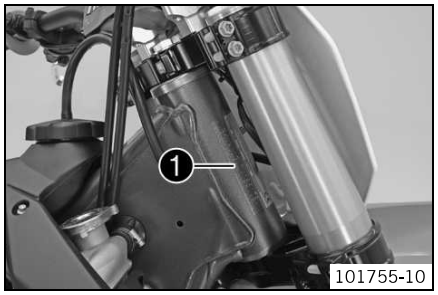
The current **KTM PowerParts** for your vehicle can be found on the KTM website.
International KTM Website: http://www.ktm.com

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.

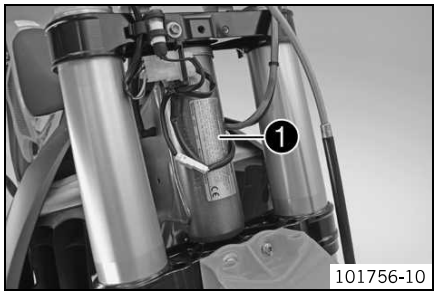
4 SERIAL NUMBERS

4.1 Chassis number



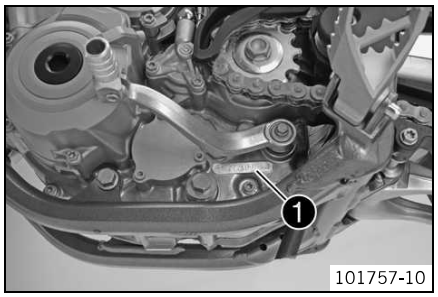
The chassis number ❶ is stamped on the right side of the steering head.

4.2 Type label



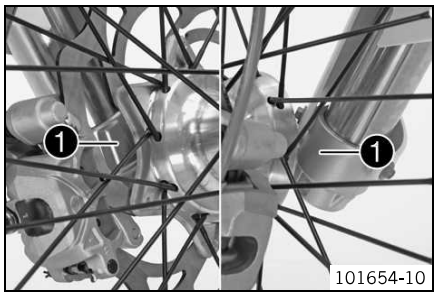
The type label ❶ is fixed to the front of the steering head.

4.3 Engine number



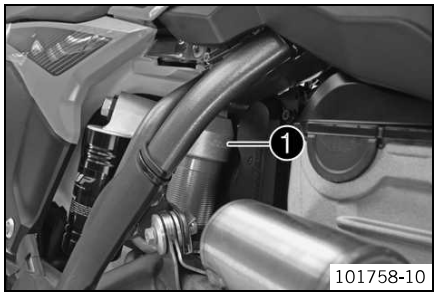
The engine number ❶ is stamped on the left side of the engine under the engine sprocket.

4.4 Fork part number



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

4.5 Shock absorber part number



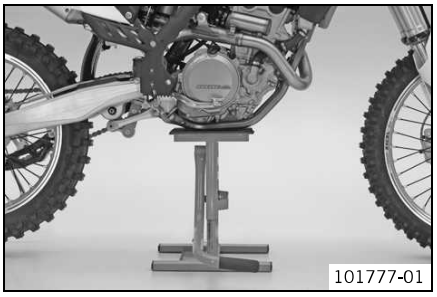
The shock absorber part number ❶ is stamped on the top of the shock absorber above the adjusting ring on the engine side.

5.1 Raising the motorcycle with 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.



– Raise the motorcycle at the frame underneath the engine.
  ✓ The wheels must no longer touch the ground.
– Secure the motorcycle against falling over.

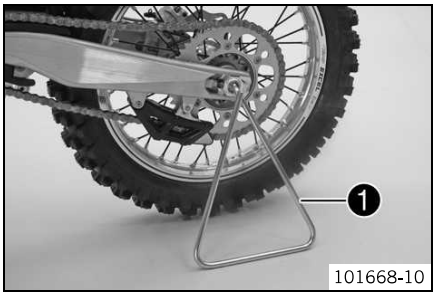
Lift stand (54829055000) (☛ p. 227)

5.2 Removing the motorcycle from the lift stand

Note

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

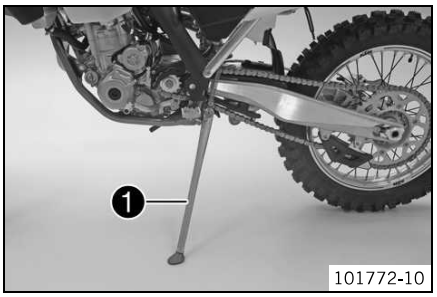
– Always place the vehicle on a firm and even surface.



(All SX-F models)

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

Info
Remove the plug-in stand before starting on a trip.



(XC-F)

– Remove the motorcycle from the lift stand.
– Remove the lift stand.
– To park the motorcycle, press side stand ❶ 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.

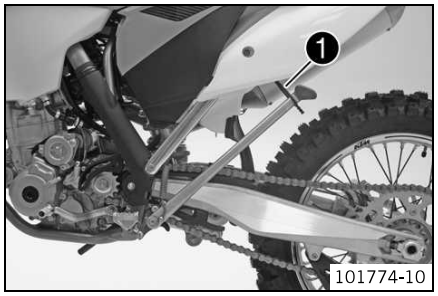
Note

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 the plug-in stand.



(XC-F)

– Raise the motorcycle off of the stand and secure the stand with the rubber band ❶.

– Shift gear to neutral.

Condition

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

– Pull the cold start button out all the way.

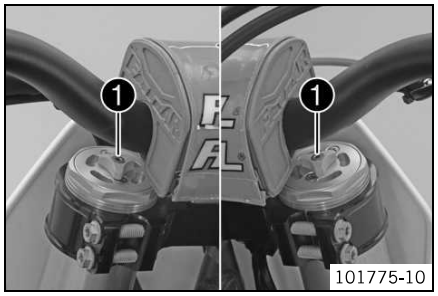
– Press the electric starter button.

Info

Press the electric starter button for at most 5 seconds. Wait for a least 5 seconds before trying again.
FI warning lamp lights up briefly as a functional control when starting.

6.1 Adjusting the compression damping of the fork

Info
The hydraulic compression damping determines the fork suspension behavior.



– Turn adjusting screws ❶ clockwise all the way.

Info
Adjusting screws ❶ are located at the top end of the fork legs.
Make the same adjustment on both fork legs.

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

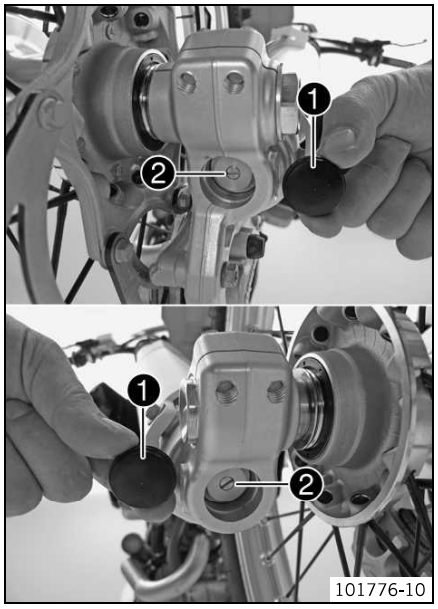
Guideline

Compression damping (SX-F EU)	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks
Compression damping (SX-F USA)	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks
Compression damping (XC-F)	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks

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

6.2 Adjusting the rebound damping of the fork

Info
The hydraulic rebound damping determines the fork suspension behavior.



– Remove protection caps ❶.
– Turn adjusting screws ❷ clockwise all the way.

Info
Adjusting screws ❷ are located at the bottom end of the fork legs.
Make the same adjustment on both fork legs.

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

Guideline

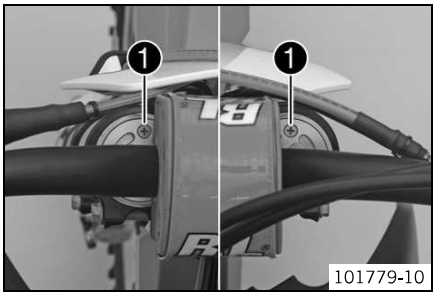
Rebound damping (SX-F EU)	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks
Rebound damping (SX-F USA)	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks
Rebound damping (XC-F)	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks

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

– Mount protection caps ❶.

6.3 Bleeding the fork legs

Preparatory work
– Raise the motorcycle with the lift stand. (☛ p. 10)

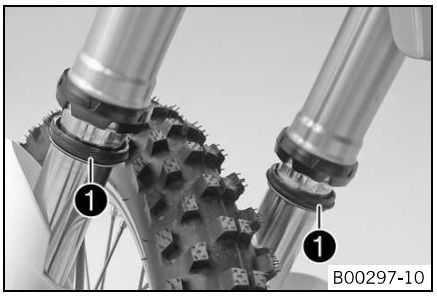


Main work
– Release bleeder screws ❶.
✓ Any excess pressure escapes from the interior of the fork.
– Mount and tighten bleeder screws.

Finishing work
– Remove the motorcycle from the lift stand. (☛ p. 10)

6.4 Cleaning the dust boots of the fork legs

Preparatory work
– Raise the motorcycle with the lift stand. (☛ p. 10)
– Loosen the fork protection. (☛ p. 13)



Main work
– Push dust boots ❶ of both fork legs downwards.

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.

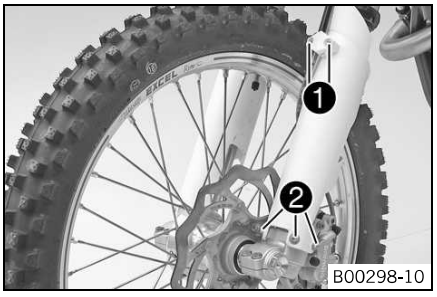
– Clean and oil the dust boots and inner fork tube of both fork legs.

Universal oil spray (☛ p. 225)

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

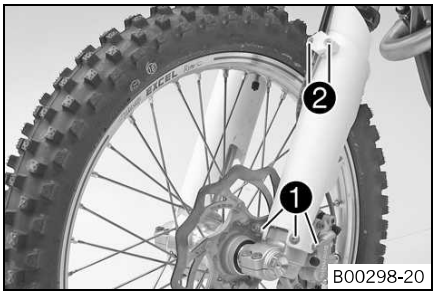
Finishing work
– Position the fork protection. (☛ p. 14)
– Remove the motorcycle from the lift stand. (☛ p. 10)

6.5 Loosening the fork protection



– Remove screws ❶ and take off the clamp.
– Remove screws ❷ on the left fork leg. Push the fork protection downwards.
– Remove the screws on the right fork leg. Push the fork protection downwards.

6.6 Positioning the fork protection



– Position the fork protection on the left fork leg. Mount and tighten screws ❶.

Guideline

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

– Position the brake line and clamp. Mount and tighten screws ❷.
– Position the fork protection on the right fork leg. Mount and tighten the screws.

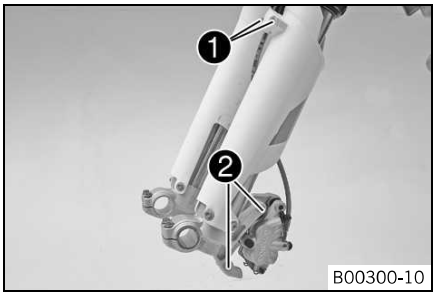
Guideline

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

6.7 Removing the fork legs

Preparatory work

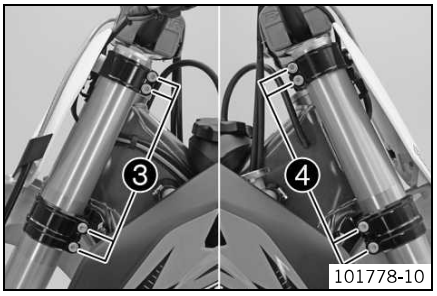
– Raise the motorcycle with the lift stand. (☛ p. 10)
– Remove the front wheel. (☛ p. 96)



Main work

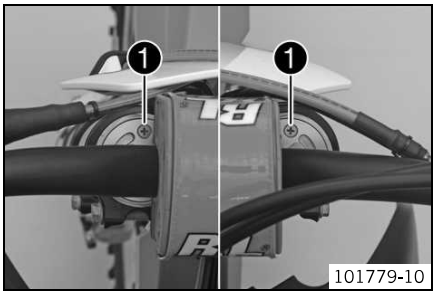
– Remove screws ❶ and take off the clamp.
– Remove screws ❷ and take off the brake caliper.
– Allow the brake caliper and brake line to hang tension-free to the side.

Info
Do not pull the hand brake lever when the front wheel is removed.



– Loosen screws ❸. Take out the left fork leg.
– Unscrew screws ❹. Take out the right fork leg.

6.8 Installing the fork legs

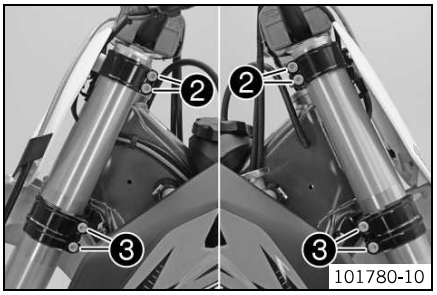


Main work

– Position the fork legs.

✓ Bleeder screws ❶ face 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 ❷.

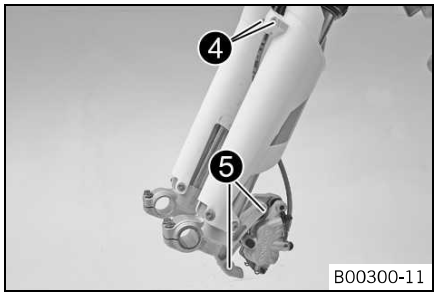
Guideline

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

– Tighten screws ❸.

Guideline

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



– Position the brake caliper. Mount and tighten screws ❺.
Guideline

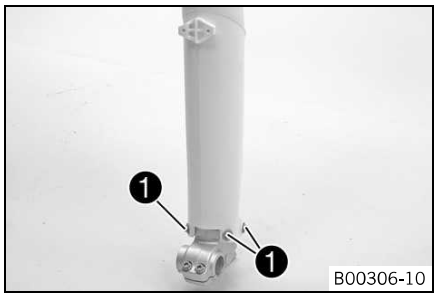
Screw, front brake caliper	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**

– Position the brake line and clamp. Mount and tighten screws ❹.

Finishing work
– Install the front wheel. (☛ p. 97)

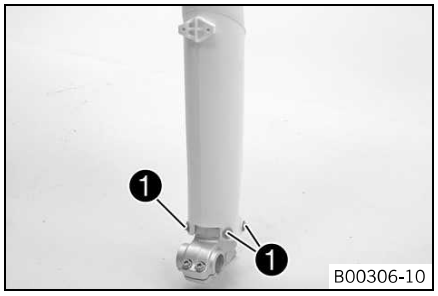
6.9 Removing the fork protector

Preparatory work
– Raise the motorcycle with the lift stand. (☛ p. 10)
– Remove the front wheel. (☛ p. 96)
– Remove the fork legs. (☛ p. 14)



Main work
– Remove screws ❶ on the left fork leg. Remove the fork protector from above.
– Remove the screws on the right fork leg. Remove the fork protector from above.

6.10 Installing the fork protector



Main work
– Position the fork protection on the left fork leg. Mount and tighten screws ❶.
Guideline

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

– Position the fork protection on the right fork leg. Mount and tighten the screws.
Guideline

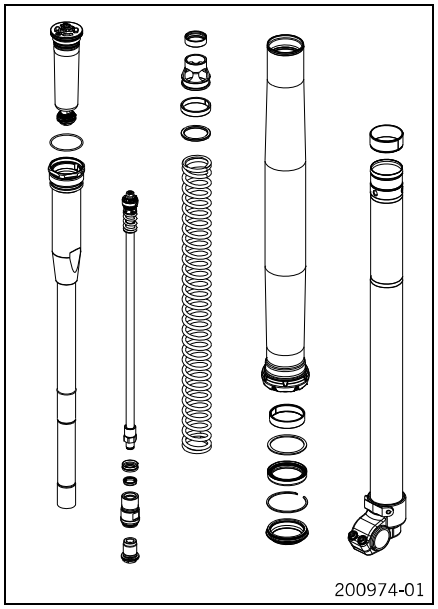
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)

Finishing work
– Install the fork legs. (☛ p. 14)
– Install the front wheel. (☛ p. 97)

6.11 Conducting major fork service

Info
The steps are identical for both fork legs.

Condition
The fork legs are disassembled.

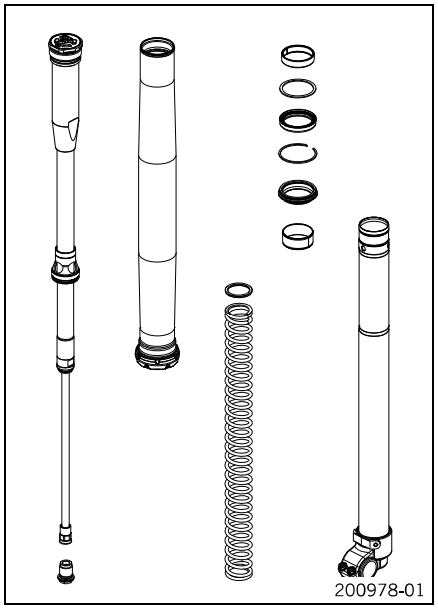


- Disassemble the fork legs. (☛ p. 16)
- Disassemble the cartridge. (☛ p. 19)
- Disassemble the piston rod. (☛ p. 21)
- Disassemble the screw cap with the membrane holder. (☛ p. 22)
- Disassemble the screw sleeve. (☛ p. 23)
- Check the fork legs. (☛ p. 24)
- Change the pilot bushing. (☛ p. 32)
- Assemble the screw sleeve. (☛ p. 33)
- Assemble the screw cap with the membrane holder. (☛ p. 33)
- Assemble the piston rod. (☛ p. 34)
- Assemble the cartridge. (☛ p. 35)
- Assemble the fork legs. (☛ p. 37)

6.12 Conducting minor fork service

Info
The steps are identical for both fork legs.

Condition
The fork legs are disassembled.

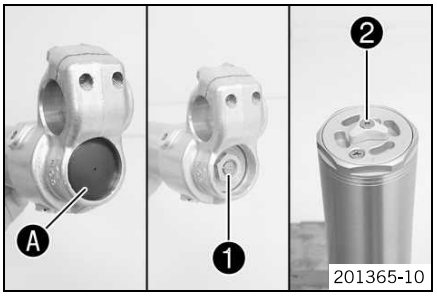


- Disassemble the fork legs. (☛ p. 16)
- Check the fork legs - during a minor fork service. (☛ p. 28)
- Assemble the fork legs. (☛ p. 37)

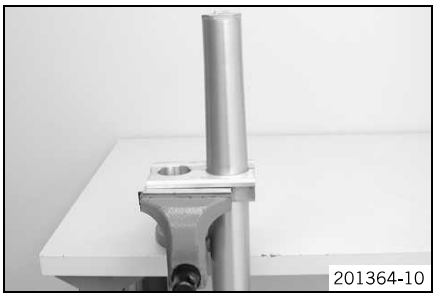
6.13 Disassembling the fork legs

Info
The steps are identical for both fork legs.

Condition
The fork legs are disassembled.



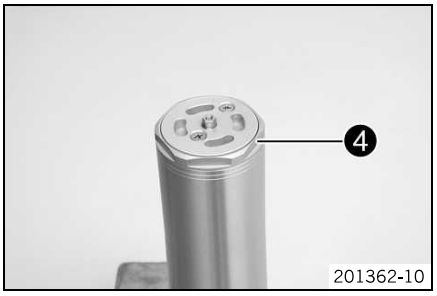
– Remove protection cap Ⓐ.
– Note down the present state of rebound damping ❶ and compression damping ❷.
– Fully open the adjusters of the rebound and compression damping.



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

Clamping stand (T1403S) (☛ p. 237)

– Remove the screw. Remove adjuster ❸ of the compression damping.

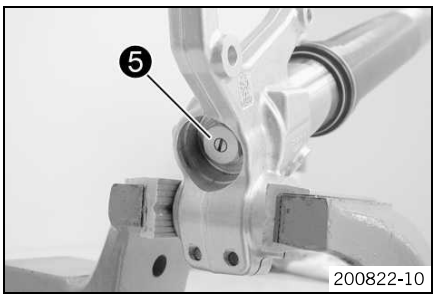


– Loosen cartridge ❹.

Ring wrench (T14017) (☛ p. 236)

Info
The cartridge cannot be taken off yet.

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

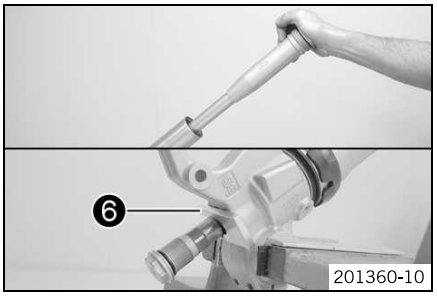


– Clamp the fork leg with the axle clamp.
Guideline

Use soft jaws.

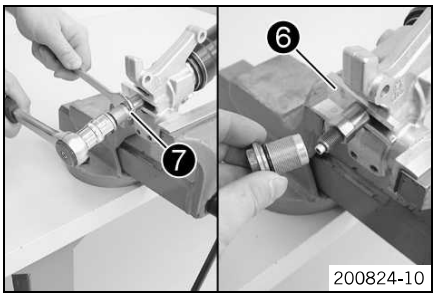
– Loosen rebound adjustment ❺.

Info
Do not use an impact wrench.
Place a fluid collector beneath it, as usually some oil will drain out.
The rebound adjustment cannot be removed yet.

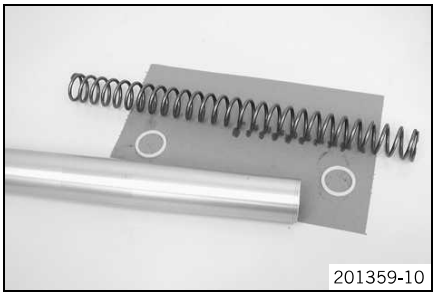


– Press the cartridge against the spring and mount special tool ❻ on the piston rod.

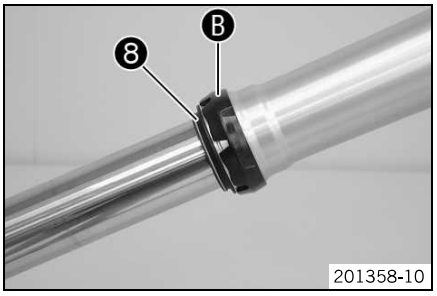
Support tool (T14020) (☛ p. 236)



– Hold nut ❼ and remove the rebound adjuster.
– Press the cartridge against the spring and remove special tool ❻.
– Remove the cartridge from the fork leg.
– Unclamp the fork leg.

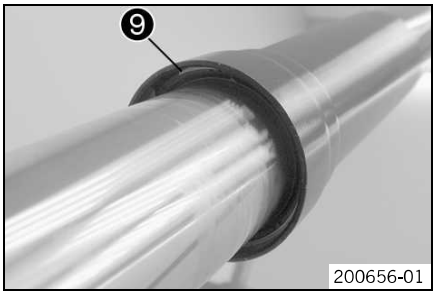


– Remove the preload spacers and spring.



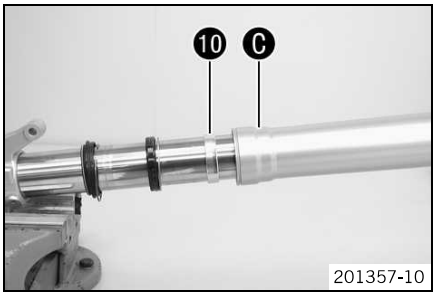
– Remove dust boot ❽.
– Remove fork protection ring Ⓑ.

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



– Remove lock ring ❾.

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



– Warm the outer tube in area Ⓒ of the lower sliding bushing.

Guideline

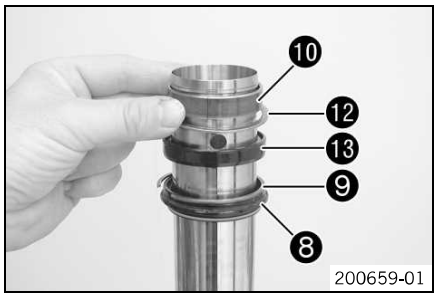
50 °C (122 °F)

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

Info
The lower sliding bushing ❿ must be pulled out of its bearing seat.

– Remove upper sliding bushing ⓫.

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



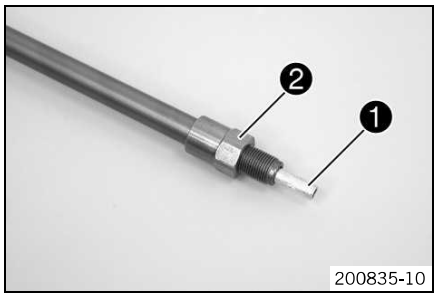
– Take off the lower sliding bushing ⓾.
– Take off support ring ⓬.
– Take off seal ring ⓭.
– Take off lock ring ❾.
– Take off dust boot ❽.
– Unclamp the fork leg.

6.14 Disassembling the cartridge

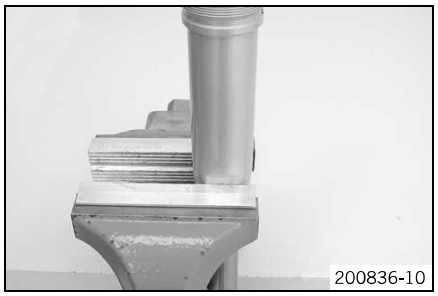
Info
The steps are identical for both fork legs.

Preparatory work
– Disassemble the fork legs. (☛ p. 16)

Main work

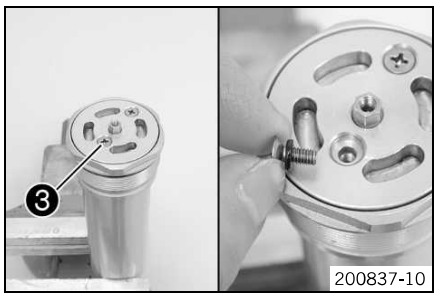


– Remove adjusting tube ❶ and nut ❷.



– Clamp the cartridge into a vise.

Info
Use soft jaws.

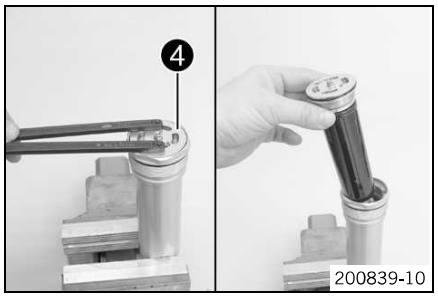


– Remove filling screw ❸.

– Pierce the membrane with the needle of the special tool.

Nitrogen charging tool (T14019) (☛ p. 236)

✓ The pressurized nitrogen is bled off.

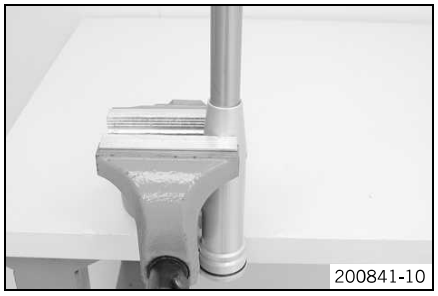


– Loosen and remove screw cap ❹ with the membrane holder.

Pin wrench (T103) (☛ p. 233)

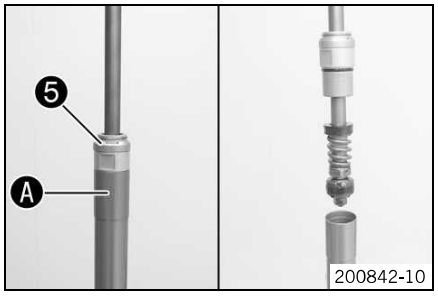
– Unclamp the cartridge.

– Empty the cartridge.



– Reclamp the cartridge upside down.
Guideline

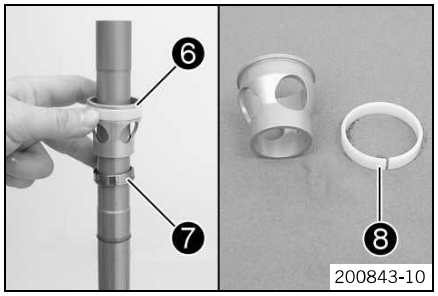
Use soft jaws.



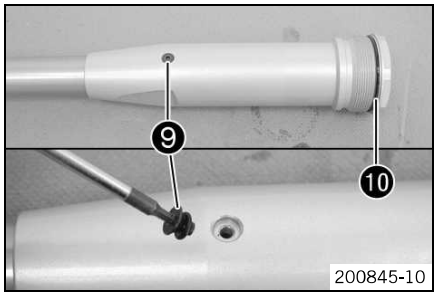
– Heat the cartridge in area Ⓐ of pilot bushing ❺.
Guideline

100 °C (212 °F)

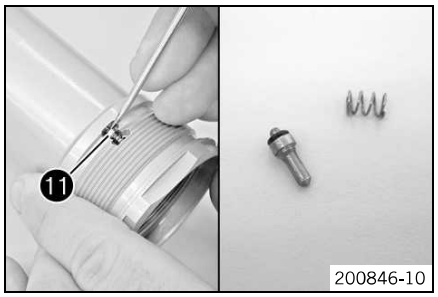
– Loosen the screw sleeve and remove the piston rod.



– Remove spring guide ❻ and ring ❼.
– Remove guide ring ❽.



– Remove filling screw ❾ and O-ring ❿.



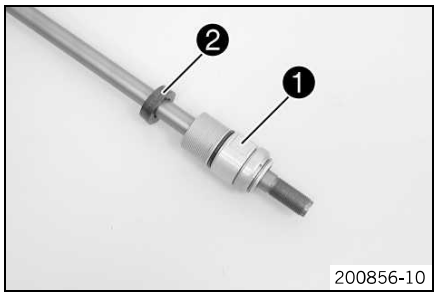
– Press check valve ⓫ against the spring and remove it.

6.15 Disassembling the piston rod

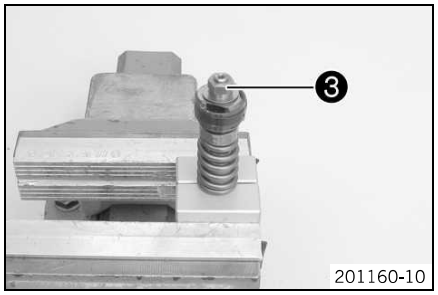
Info
The steps are identical for both fork legs.

Preparatory work
– Disassemble the fork legs. (☛ p. 16)
– Disassemble the cartridge. (☛ p. 19)

Main work



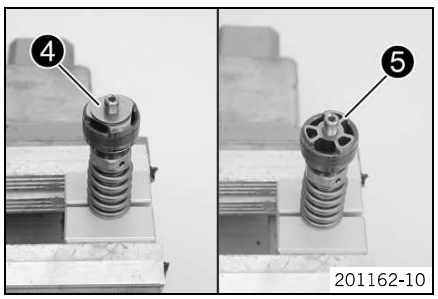
– Remove screw sleeve ❶ and washer ❷ from the piston rod.



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

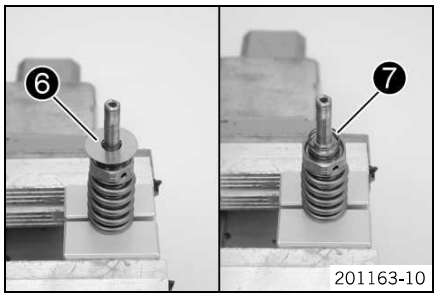
Clamping stand (T14016S) (☛ p. 235)

– Remove nut ❸.

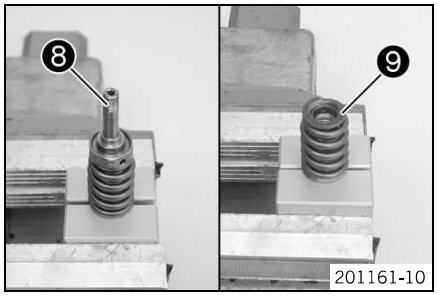


– Remove rebound shim stack ❹.
– Remove rebound piston ❺.

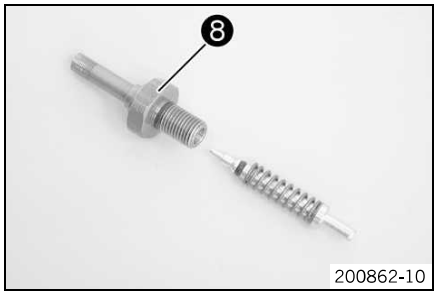
– Remove the piston ring from the piston.



– Remove compression shim stack ❻.
– Remove spring ❼.



– Remove tap rebound ❽.
– Remove spring ❾ with the sleeve.



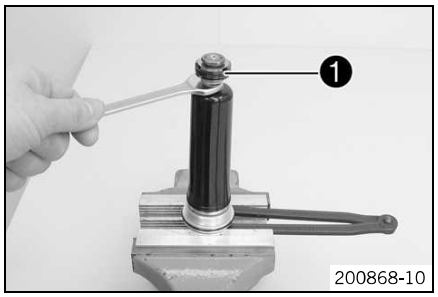
– Remove the valve with the spring from tap rebound ❽.
– Remove the O-rings.

6.16 Disassembling the screw cap with the membrane holder

Info
The steps are identical for both fork legs.

Preparatory work
– Disassemble the fork legs. (☛ p. 16)
– Disassemble the cartridge. (☛ p. 19)

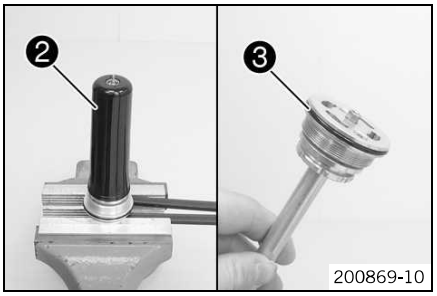
Main work



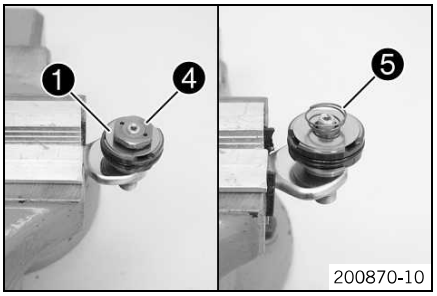
– Clamp the screw cap with the membrane holder and the special tool into a vise.
Guideline
Use soft jaws.
Pin wrench (T103) (☛ p. 233)

Info
Only tighten the vise lightly.

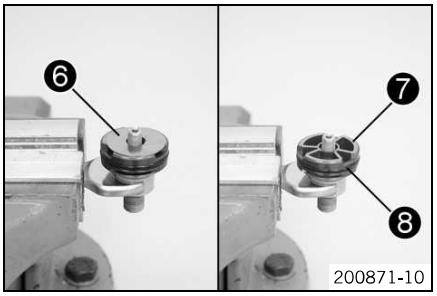
– Remove compression holder ❶.



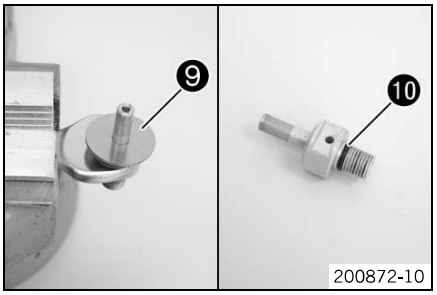
– Remove membrane ❷. Unclamp the special tool.
– Remove O-ring ❸.



– Clamp the open end wrench in a vise. Position compression holder ❶.
– Remove nut ❹.
– Remove spring ❺.



– Remove rebound washer ❻.
– Remove compression piston ❼. Remove O-ring ❽.

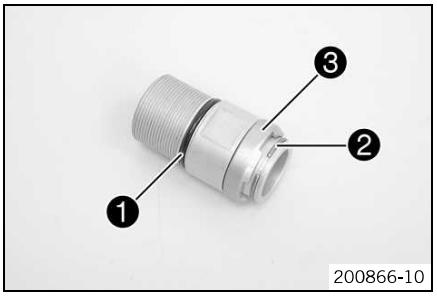


– Remove compression shim stack ❾.
– Remove O-ring ❿.

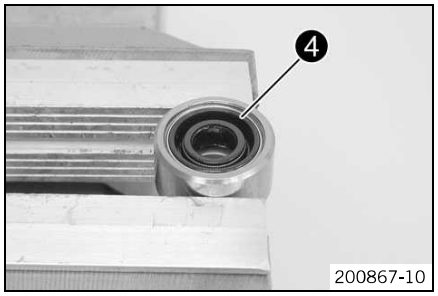
6.17 Disassembling the screw sleeve

Info
The steps are identical for both fork legs.

Preparatory work
– Disassemble the fork legs. (☛ p. 16)
– Disassemble the cartridge. (☛ p. 19)
– Disassemble the piston rod. (☛ p. 21)



Main work
– Remove O-ring ❶.
– Remove lock ring ❷. Remove ring ❸.



– Screw the special tool onto the screw sleeve.

Threaded bushing (T14023) (☛ p. 237)

✓ The special tool must have an overhang to protect the thread.

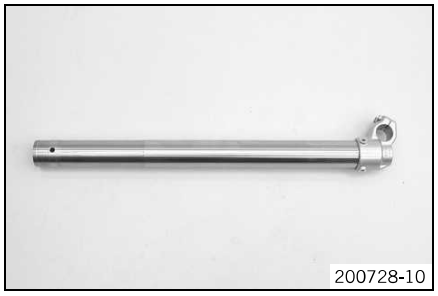
Overhang	1 mm (0.04 in)

– Pry out seal ring ❹, being sure only to brace the lever against the special tool.

6.18 Checking the fork legs (SX-F EU)

Condition

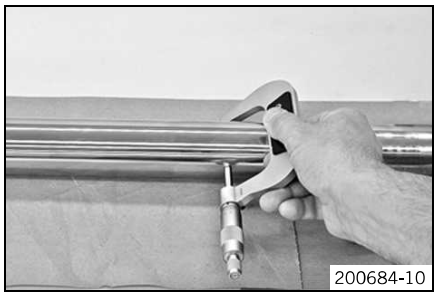
The fork legs have been disassembled.



– Check the inner tube and axle clamp for damage.

» If there is damage:

– Change the inner tube.

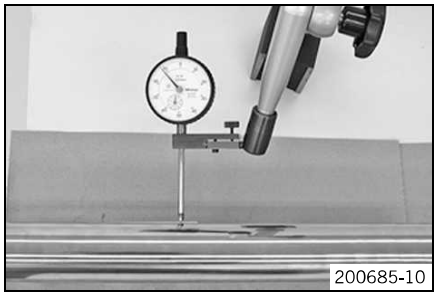


– Measure the outside diameter of the inner tube at several locations.

Outside diameter of the 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.

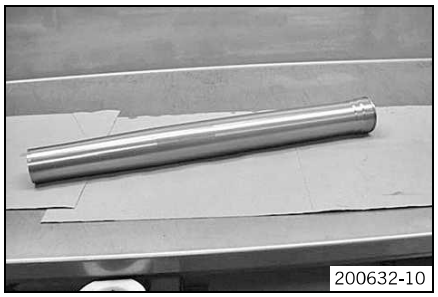


– Measure the run-out of the inner tube.

Inner tube run-out	≤ 0.20 mm (≤ 0.0079 in)

» If the measured value is greater than the specified value:

– Change the inner tube.



– Measure the inside diameter of the outer tube at several locations.

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

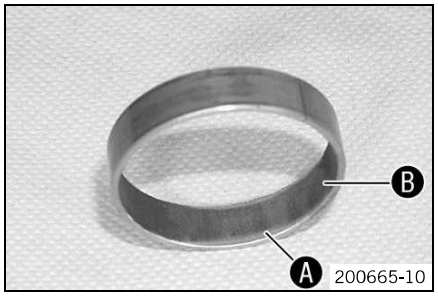
» If the measured value is greater than the specified value:

– Change the outer tube.

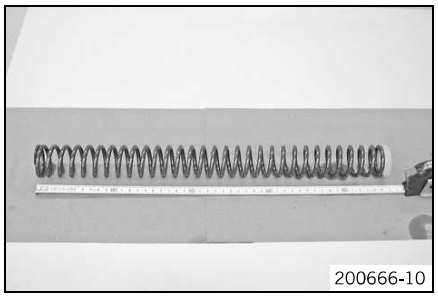
– Check the outer tube for damage.

» If there is damage:

– Change the outer tube.



– Check the surface of the sliding bushing.
  » If the bronze-colored layer Ⓐ under the sliding layer Ⓑ is visible or the surface is rough:
    – Replace the sliding bushing.

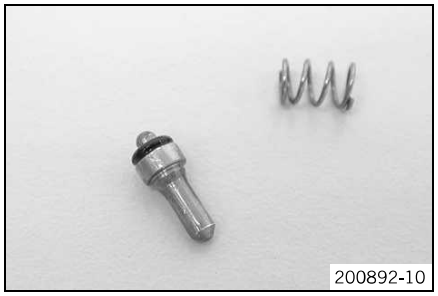


– Check the spring length.

Guideline

Spring length with preload spacer(s)	497 mm (19.57 in)

  » If the measured value is greater than the specified value:
    – Reduce the thickness of the preload spacers.
  » If the measured value is less than the specified value:
    – Increase the thickness of the preload spacers.

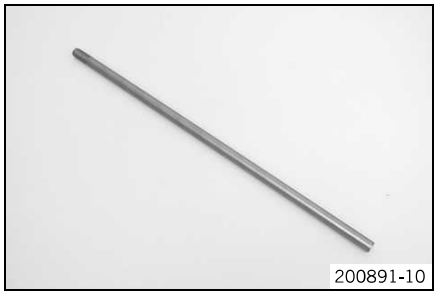


– Check the check valve spring length.

Guideline

Spring length of the check valve	≥ 5.8 mm (≥ 0.228 in)

  » If the measured value is less than the specified value:
    – Change the spring.



– Check the piston rod for damage.
  » If there is damage:
    – Replace the piston rod.
– Measure the outside diameter of the piston rod at several locations.

Outside diameter of the piston rod	≥ 11.965 mm (≥ 0.47106 in)

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

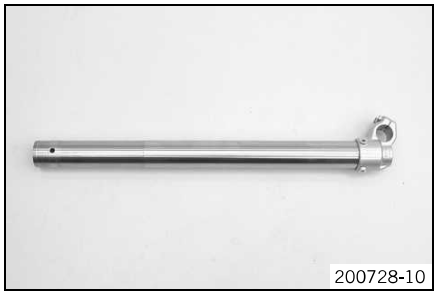
Run-out of the piston rod	≤ 0.40 mm (≤ 0.0157 in)

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

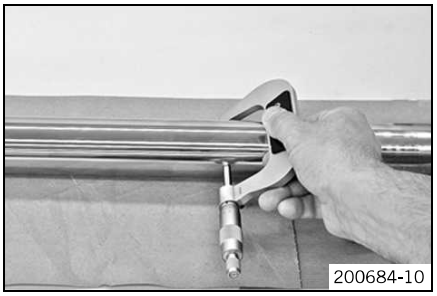
6.19 Checking the fork legs (SX-F USA)

Condition

The fork legs have been disassembled.



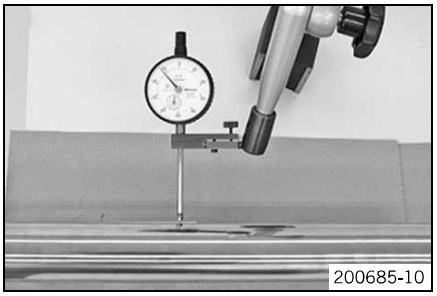
– Check the inner tube and axle clamp for damage.
  » If there is damage:
    – Change the inner tube.



– Measure the outside diameter of the inner tube at several locations.

Outside diameter of the inner tube	47.975… 48.005 mm (1.88878… 1.88996 in)

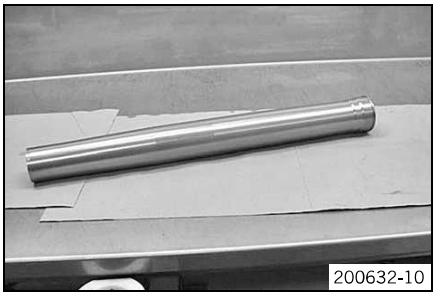
» If the measured value is less than the specified value:
– Change the inner tube.



– Measure the run-out of the inner tube.

Inner tube run-out	≤ 0.20 mm (≤ 0.0079 in)

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



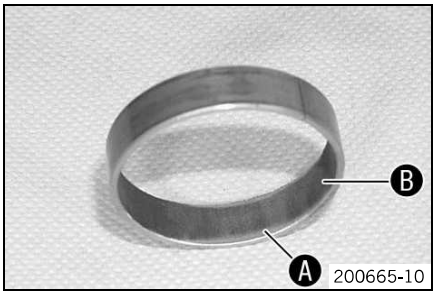
– Measure the inside diameter of the outer tube at several locations.

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

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

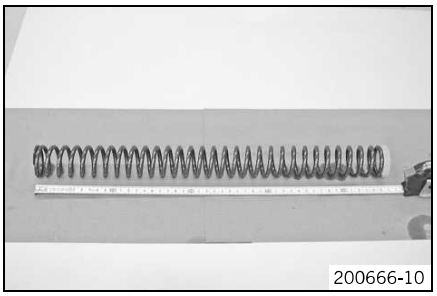
– Check the outer tube for damage.

» If there is damage:
– Change the outer tube.



– Check the surface of the sliding bushing.

» If the bronze-colored layer Ⓐ under the sliding layer Ⓑ is visible or the surface is rough:
– Replace the sliding bushing.



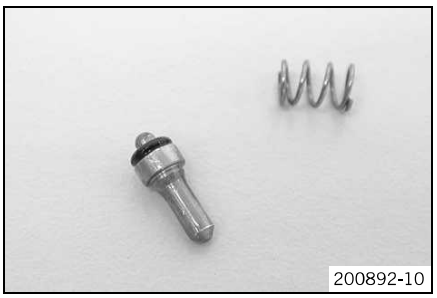
– Check the spring length.

Guideline

Spring length with preload spacer(s)	494 mm (19.45 in)

» If the measured value is greater than the specified value:
– Reduce the thickness of the preload spacers.

» If the measured value is less than the specified value:
– Increase the thickness of the preload spacers.

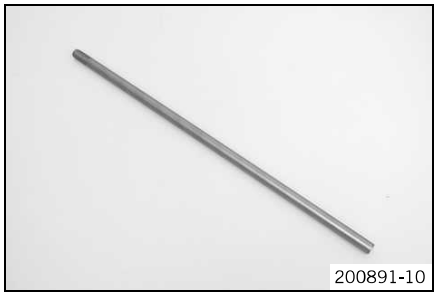


– Check the check valve spring length.

Guideline

Spring length of the check valve	≥ 5.8 mm (≥ 0.228 in)

» If the measured value is less than the specified value:
– Change the spring.



– Check the piston rod for damage.
  » If there is damage:
    – Replace the piston rod.
– Measure the outside diameter of the piston rod at several locations.

Outside diameter of the piston rod	≥ 11.965 mm (≥ 0.47106 in)

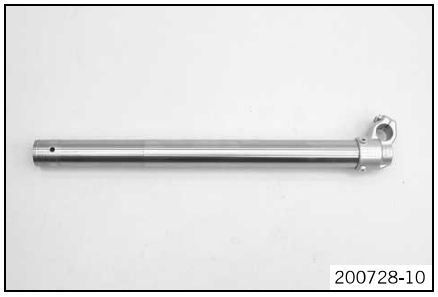
  » If the measured value is less than the specified value:
    – Replace the piston rod.
– Measure the run-out of the piston rod.

Run-out of the piston rod	≤ 0.40 mm (≤ 0.0157 in)

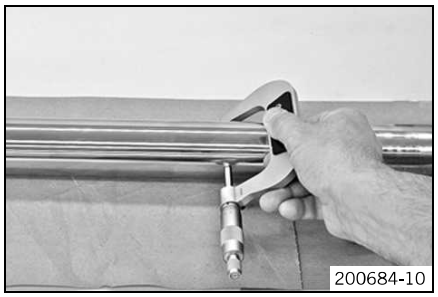
  » If the measured value is greater than the specified value:
    – Replace the piston rod.

6.20 Checking the fork legs (XC-F)

Condition
The fork legs have been disassembled.



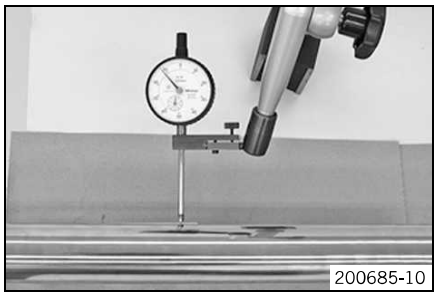
– Check the inner tube and axle clamp for damage.
  » If there is damage:
    – Change the inner tube.



– Measure the outside diameter of the inner tube at several locations.

Outside diameter of the inner tube	47.975… 48.005 mm (1.88878… 1.88996 in)

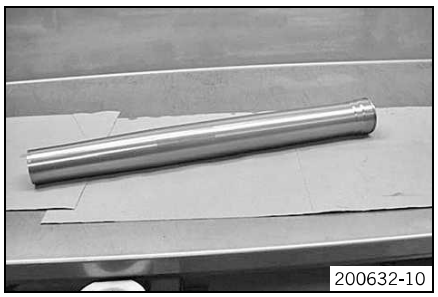
  » If the measured value is less than the specified value:
    – Change the inner tube.



– Measure the run-out of the inner tube.

Inner tube run-out	≤ 0.20 mm (≤ 0.0079 in)

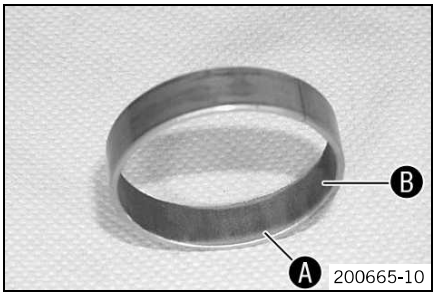
  » If the measured value is greater than the specified value:
    – Change the inner tube.



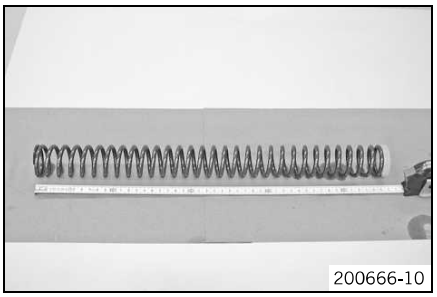
– Measure the inside diameter of the outer tube at several locations.

Inside diameter of the 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 there is damage:
    – Change the outer tube.



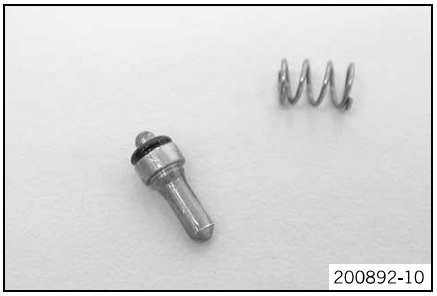
– Check the surface of the sliding bushing.
  » If the bronze-colored layer Ⓐ under the sliding layer Ⓑ is visible or the surface is rough:
    – Replace the sliding bushing.



– Check the spring length.
  Guideline

Spring length with preload spacer(s)	492 mm (19.37 in)

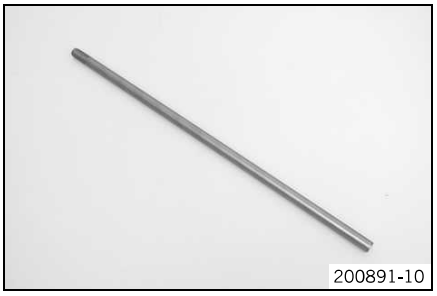
  » If the measured value is greater than the specified value:
    – Reduce the thickness of the preload spacers.
  » If the measured value is less than the specified value:
    – Increase the thickness of the preload spacers.



– Check the check valve spring length.
  Guideline

Spring length of the check valve	≥ 5.8 mm (≥ 0.228 in)

  » If the measured value is less than the specified value:
    – Change the spring.



– Check the piston rod for damage.
  » If there is damage:
    – Replace the piston rod.
– Measure the outside diameter of the piston rod at several locations.

Outside diameter of the piston rod	≥ 11.965 mm (≥ 0.47106 in)

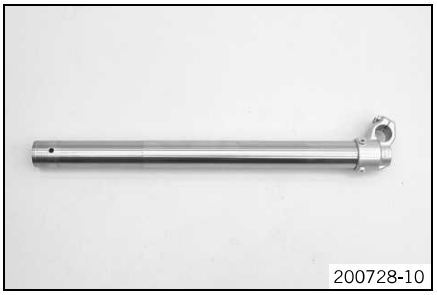
  » If the measured value is less than the specified value:
    – Replace the piston rod.
– Measure the run-out of the piston rod.

Run-out of the piston rod	≤ 0.40 mm (≤ 0.0157 in)

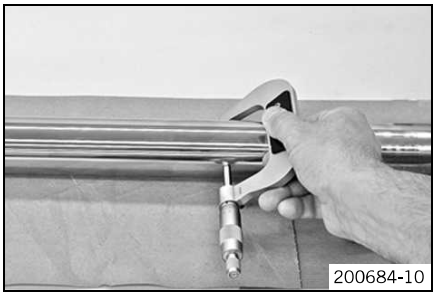
  » If the measured value is greater than the specified value:
    – Replace the piston rod.

6.21 Checking the fork legs - during a minor fork service (SX-F EU)

Condition
The fork legs have been disassembled.



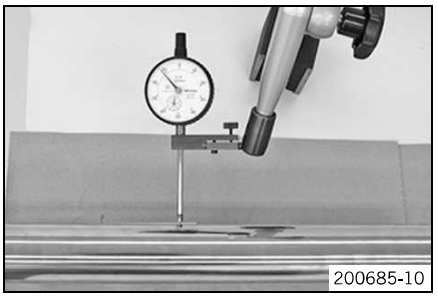
– Check the inner tube and axle clamp for damage.
  » If there is damage:
    – Change the inner tube.



– Measure the outside diameter of the inner tube at several locations.

Outside diameter of the inner tube	47.975… 48.005 mm (1.88878… 1.88996 in)

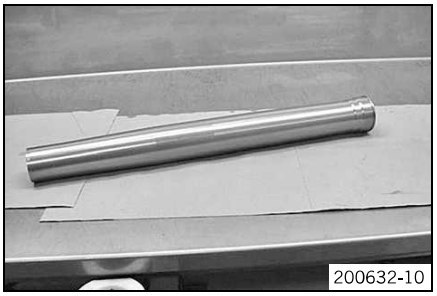
» If the measured value is less than the specified value:
– Change the inner tube.



– Measure the run-out of the inner tube.

Inner tube run-out	≤ 0.20 mm (≤ 0.0079 in)

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



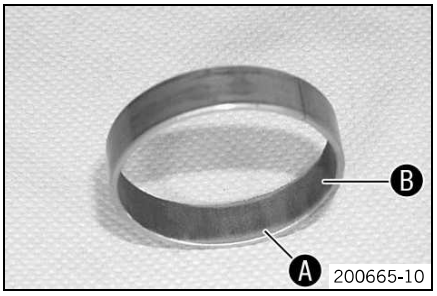
– Measure the inside diameter of the outer tube at several locations.

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

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

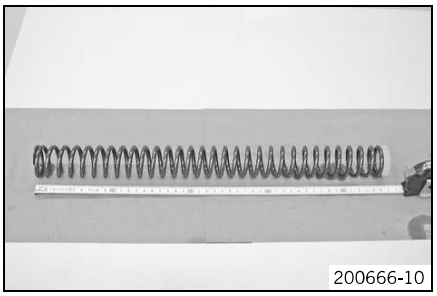
– Check the outer tube for damage.

» If there is damage:
– Change the outer tube.



– Check the surface of the sliding bushing.

» If the bronze-colored layer Ⓐ under the sliding layer Ⓑ is visible or the surface is rough:
– Replace the sliding bushing.



– Check the spring length.

Guideline

Spring length with preload spacer(s)	497 mm (19.57 in)

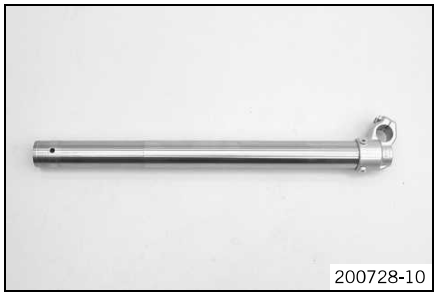
» If the measured value is greater than the specified value:
– Reduce the thickness of the preload spacers.

» If the measured value is less than the specified value:
– Increase the thickness of the preload spacers.

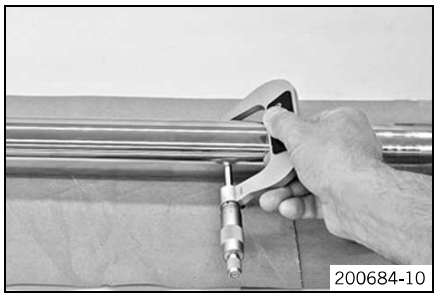
6.22 Checking the fork legs - during a minor fork service (SX-F USA)

Condition

The fork legs have been disassembled.


200728-10

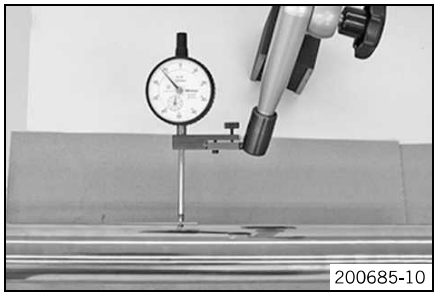
– Check the inner tube and axle clamp for damage.
  » If there is damage:
    – Change the inner tube.


200684-10

– Measure the outside diameter of the inner tube at several locations.

Outside diameter of the inner tube	47.975… 48.005 mm (1.88878… 1.88996 in)

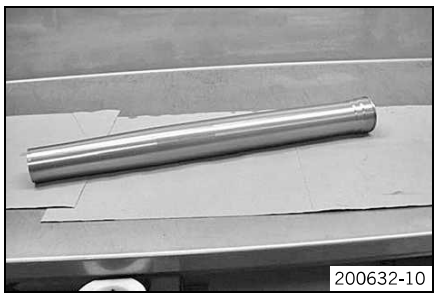
  » If the measured value is less than the specified value:
    – Change the inner tube.


200685-10

– Measure the run-out of the inner tube.

Inner tube run-out	≤ 0.20 mm (≤ 0.0079 in)

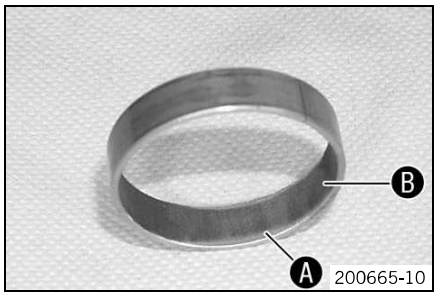
  » If the measured value is greater than the specified value:
    – Change the inner tube.


200632-10

– Measure the inside diameter of the outer tube at several locations.

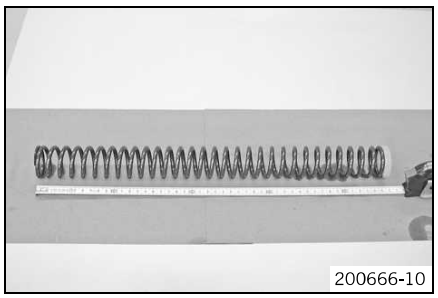
Inside diameter of the outer tube	≤ 49.20 mm (≤ 1.937 in)

  » If the measured value is greater than the specified value:
    – Change the outer tube.
– Check the outer tube for damage.
  » If there is damage:
    – Change the outer tube.



200665-10

– Check the surface of the sliding bushing.
  » If the bronze-colored layer Ⓐ under the sliding layer Ⓑ is visible or the surface is rough:
    – Replace the sliding bushing.


200666-10

– Check the spring length.

Guideline

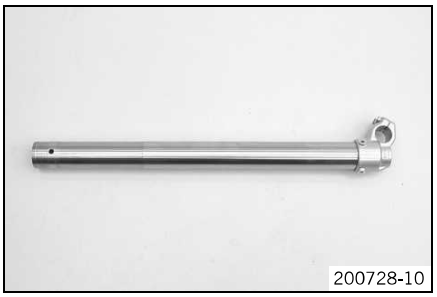
Spring length with preload spacer(s)	494 mm (19.45 in)

  » If the measured value is greater than the specified value:
    – Reduce the thickness of the preload spacers.
  » If the measured value is less than the specified value:
    – Increase the thickness of the preload spacers.

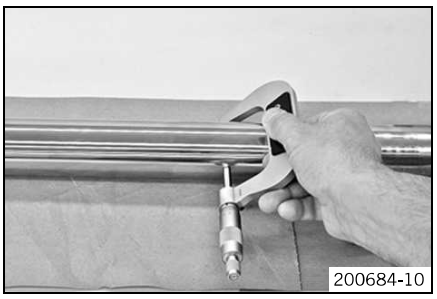
6.23 Checking the fork legs - during a minor fork service (XC-F)

Condition

The fork legs have been disassembled.



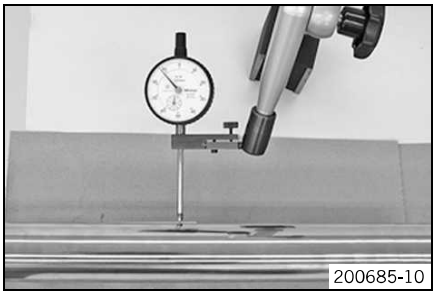
– Check the inner tube and axle clamp for damage.
  » If there is damage:
    – Change the inner tube.



– Measure the outside diameter of the inner tube at several locations.

Outside diameter of the inner tube	47.975… 48.005 mm (1.88878… 1.88996 in)

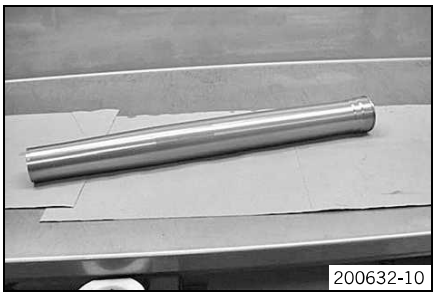
  » If the measured value is less than the specified value:
    – Change the inner tube.



– Measure the run-out of the inner tube.

Inner tube run-out	≤ 0.20 mm (≤ 0.0079 in)

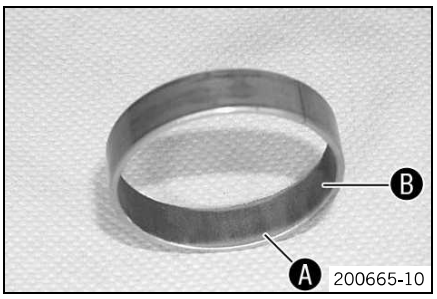
  » If the measured value is greater than the specified value:
    – Change the inner tube.



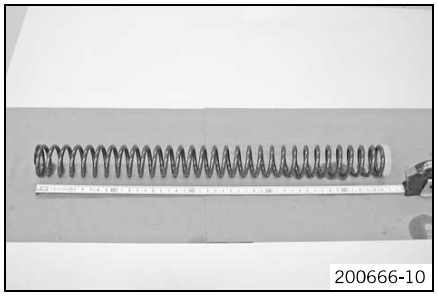
– Measure the inside diameter of the outer tube at several locations.

Inside diameter of the 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 there is damage:
    – Change the outer tube.



– Check the surface of the sliding bushing.
  » If the bronze-colored layer Ⓐ under the sliding layer Ⓑ is visible or the surface is rough:
    – Replace the sliding bushing.


200666-10

– Check the spring length.

Guideline

Spring length with preload spacer(s)	492 mm (19.37 in)

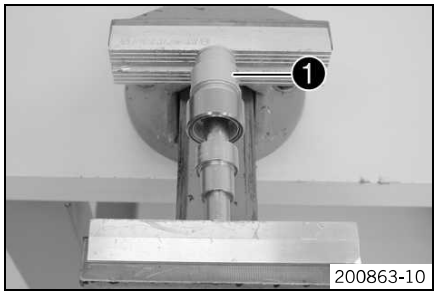
» If the measured value is greater than the specified value:
  – Reduce the thickness of the preload spacers.
» If the measured value is less than the specified value:
  – Increase the thickness of the preload spacers.

6.24 Changing the pilot bushing

Preparatory work

– Disassemble the fork legs. (☛ p. 16)
– Disassemble the cartridge. (☛ p. 19)
– Disassemble the piston rod. (☛ p. 21)
– Disassemble the screw sleeve. (☛ p. 23)

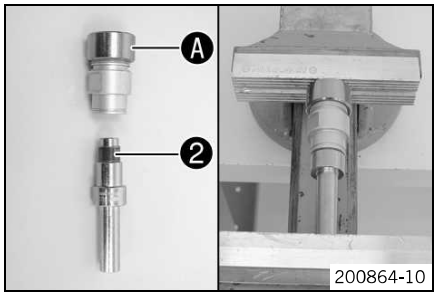
Main work



200863-10

– Press the pilot bushing out of screw sleeve ❶ using the special tool.

Mounting tool (T14022) (☛ p. 236)



200864-10

– Slide the new pilot bushing ❷ onto the special tool.

Mounting tool (T14022) (☛ p. 236)

– Ensure that special tool Ⓐ is mounted and that there is an overhang to protect the thread.

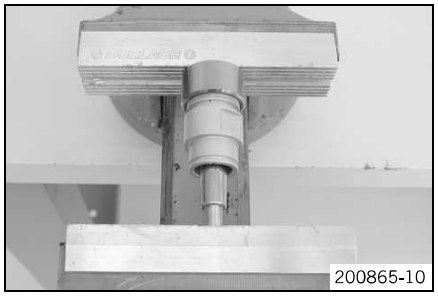
Guideline

Overhang	1 mm (0.04 in)

Threaded bushing (T14023) (☛ p. 237)

– Position the pilot bushing in the screw sleeve with the special tool and press it in all the way.

Mounting tool (T14022) (☛ p. 236)


200865-10

– Lubricate the special tool.

Fork oil (SAE 4) (48601166S1) (☛ p. 223)
Calibrating unit (T14021) (☛ p. 236)

– Press the special tool through the new pilot bushing a number of times.

Calibrating unit (T14021) (☛ p. 236)

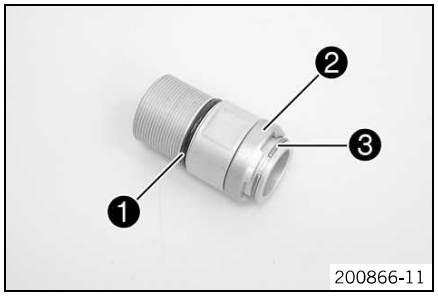
✓ The pilot bushing is calibrated.

Finishing work

– Assemble the screw sleeve. (☛ p. 33)

6.25 Assembling the screw sleeve

Info
The steps are identical for both fork legs.



– Mount and lubricate O-ring ❶.

Lubricant (T158) (☛ p. 224)

– Mount ring ❷.
– Mount lock ring ❸.

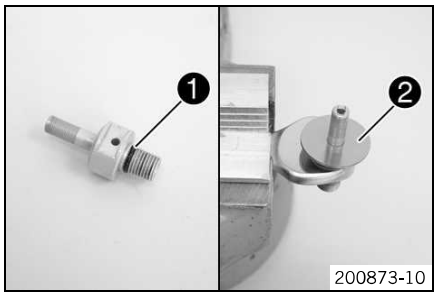
Info
The seal ring is mounted when the piston rod is assembled.

6.26 Assembling the screw cap with the membrane holder

Info
The steps are identical for both fork legs.

Preparatory work
– Check the fork legs. (☛ p. 24)

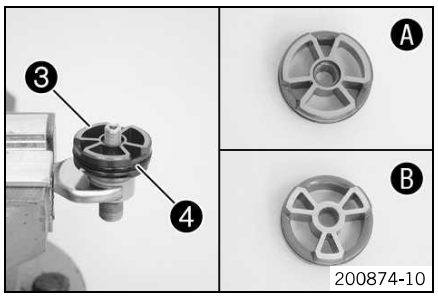
Main work



– Lubricate and mount O-ring ❶.

Lubricant (T158) (☛ p. 224)

– Clamp the open end wrench in a vase. Position compression holder.
– Mount the compression shim stack ❷ with the smaller shims facing downward.

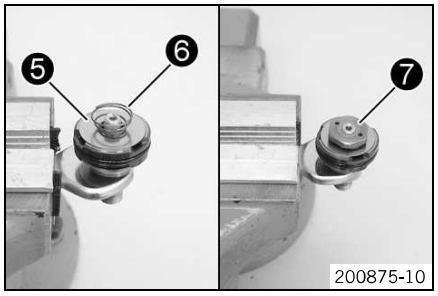


– Grind compression piston ❸ on both sides on a surfacing plate using 1200 grit sandpaper.
– Clean the compression piston.
– Mount and grease O-ring ❹.

Lubricant (T158) (☛ p. 224)

– Mount the compression piston.
Guideline

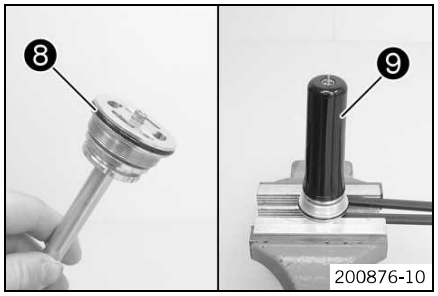
View Ⓐ	Compression piston from above
View Ⓑ	Compression piston from below

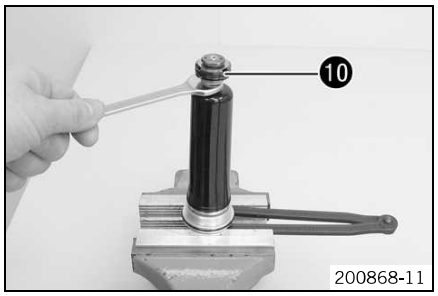


– Mount rebound damping washer ❺.
– Mount spring ❻ with the tighter coil at the bottom.
– Mount and tighten new nut ❼ with the collar facing downward.
Guideline

Nut, compression piston	M6x0.5	3 Nm (2.2 lbf ft)

✓ The collar centers the rebound washer and the spring.
– Check the freedom of movement of the rebound washer against the spring.
– Secure the nut by locking.





– Mount and grease O-ring ❽.

Lubricant (T158) (☛ p. 224)

– Clamp the screw cap with the membrane holder and the special tool into a vise.

Pin wrench (T103) (☛ p. 233)

Info
Only tighten the vise lightly.

– Mount membrane ❾.
– Mount and tighten compression holder ❿.

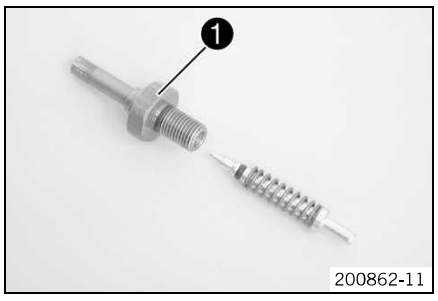
Guideline

Compression holder	M9x1	8 Nm (5.9 lbf ft)	**Loctite® 241**

– Unclamp the special tool.

6.27 Assembling the piston rod

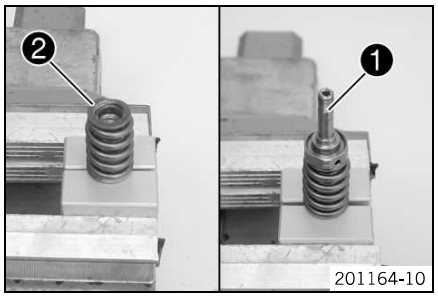
Info
The steps are identical for both fork legs.



– Mount and grease the O-rings of tap rebound ❶ and the valve.

Lubricant (T158) (☛ p. 224)

– Position the valve with the spring in the tap rebound.



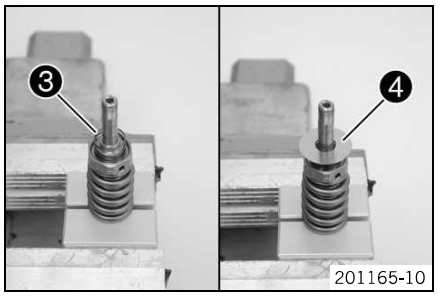
– Degrease the piston rod.
– Clamp the piston rod with the special tool.

Clamping stand (T14016S) (☛ p. 235)

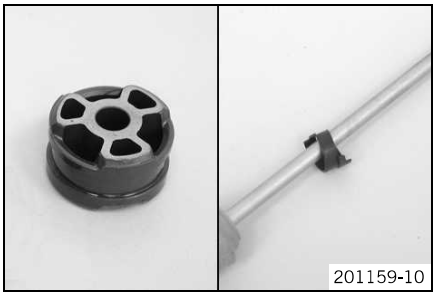
– Mount spring ❷ with the sleeve.
– Mount and tighten tap rebound ❶.

Guideline

Tap rebound	M9x1	18 Nm (13.3 lbf ft)	**Loctite® 2701™**

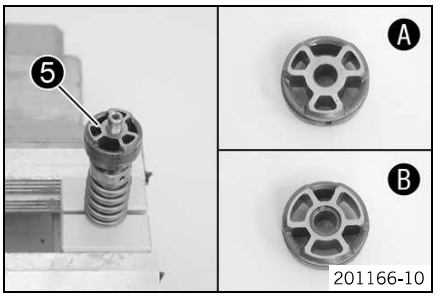


– Mount spring ❸.
– Mount compression shim stack ❹ with the smaller washer facing downward.



– Grind the rebound piston on both sides on a surface plate with 1200 grit sandpaper.
– Clean the rebound piston.
– Wrap the piston ring around the shaft of a screwdriver before mounting.
– Mount the piston ring.
– Lubricate the piston ring.

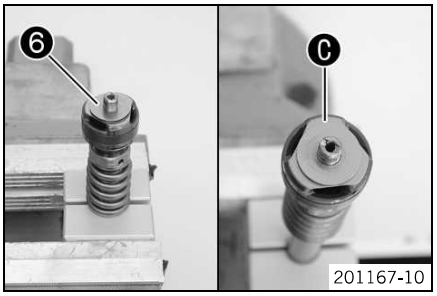
Fork oil (SAE 4) (48601166S1) (☛ p. 223)



– Mount rebound piston ❺.

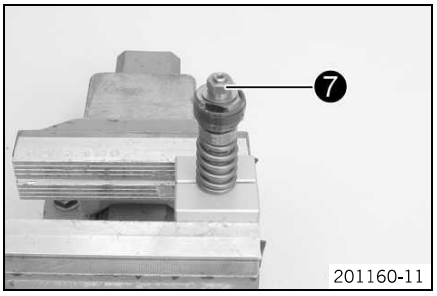
Guideline

View Ⓐ	Rebound piston from above
View Ⓑ	Rebound piston from below



– Mount rebound shim stack ❻.

Info
Align triangular plates Ⓒ exactly with the openings of the rebound piston.



– Mount and tighten new nut ❼ with the collar facing downward.

Guideline

Rebound nut	M6x0.5	5 Nm (3.7 lbf ft)

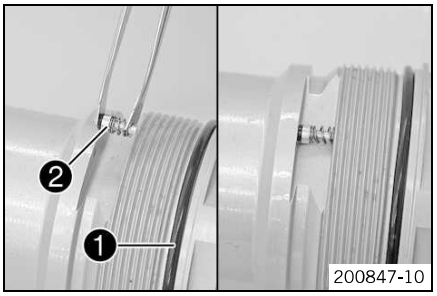
Info
Do not twist the triangular plates!

– Secure the nut by locking.
– Take out the piston rod.

6.28 Assembling the cartridge

Info
The steps are identical for both fork legs.

Preparatory work
– Check the fork legs. (☛ p. 24)
– Assemble the screw cap with the membrane holder. (☛ p. 33)
– Assemble the piston rod. (☛ p. 34)



Main work
– Lubricate and mount O-ring ❶.

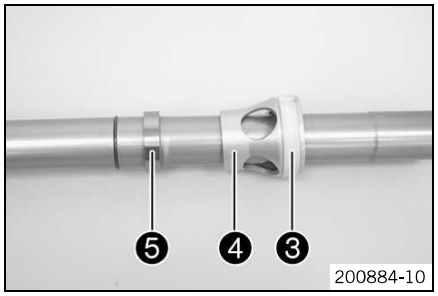
Lubricant (T158) (☛ p. 224)

– Mount the spring and O-ring on check valve ❷.

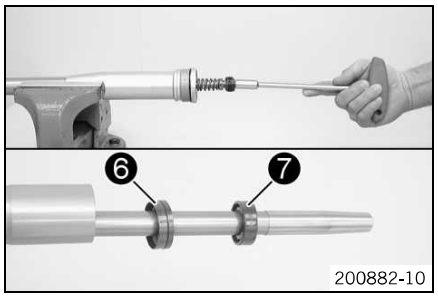
Lubricant (T158) (☛ p. 224)

– Mount the check valve with the special tool.

Tweezers (T14033) (☛ p. 237)



– Mount guide ring ❸.
– Mount spring guide ❹ and ring ❺.



– Clamp the cartridge in a bench vise.
Guideline

Use soft jaws.

– Push the piston rod into the cartridge.

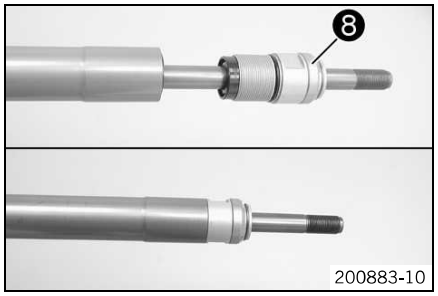
Info
Check that the piston ring is correctly seated.

– Slide washer ❻ onto the piston rod with the open side forward.
– Place the special tool onto the piston rod.

Mounting sleeve (T14029) (☛ p. 237)

– Grease seal ring ❼ and slide onto the piston rod with the open side forward. Remove the special tool.

Lubricant (T511) (☛ p. 224)

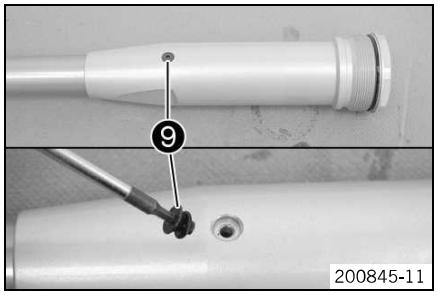


– Slide screw sleeve ❽ onto the piston rod.
– Press the seal ring flush into the screw sleeve.
– Grease the O-ring of the screw sleeve.

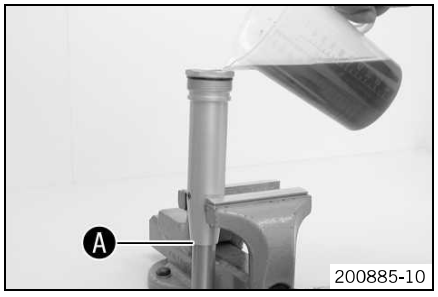
Lubricant (T158) (☛ p. 224)

– Tighten the screw sleeve.
Guideline

Screw sleeve on the cartridge	M24x1	40 Nm (29.5 lbf ft)	**Loctite® 241**



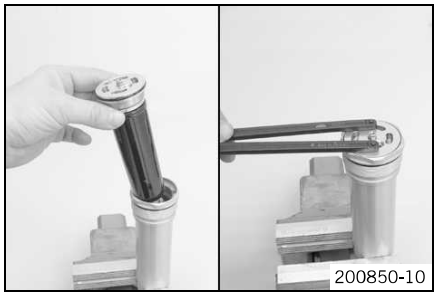
– Mount filling screw ❾ with the O-ring.



– Clamp the cartridge vertically and fill with fork oil to the lower edge Ⓐ of the upper part of the cartridge.

Fork oil (SAE 4) (48601166S1) (☛ p. 223)

✓ The piston rod is fully extended.

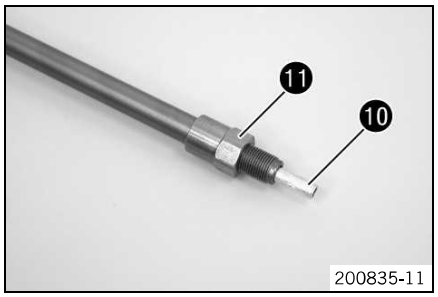


– Mount the screw cap with the membrane holder and tighten with the special tool.
Guideline

Screw cap on the cartridge	M41x1	30 Nm (22.1 lbf ft)

Pin wrench (T103) (☛ p. 233)

– Bleed and fill the cartridge. (☛ p. 44)
– Fill the cartridge with nitrogen. (☛ p. 45)



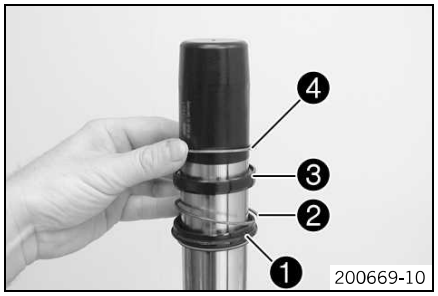
– Mount adjusting tube ❿.
– Screw nut ⓫ all the way on with the collar facing forward.

Info
The nut must be screwed tightly against the stop. Do not use a tool.

6.29 Assembling the fork legs (All SX-F models)

Info
The steps are identical for both fork legs.

Preparatory work
– Check the fork legs. (☛ p. 24)
– Assemble the screw cap with the membrane holder. (☛ p. 33)
– Assemble the piston rod. (☛ p. 34)
– Assemble the cartridge. (☛ p. 35)



Main work
– Clamp in the inner tube with the axle clamp.
Guideline

Use soft jaws.

– Mount the special tool.

Protecting sleeve (T1401) (☛ p. 235)

– Lubricate and slide on dust boot ❶.

Lubricant (T511) (☛ p. 224)

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

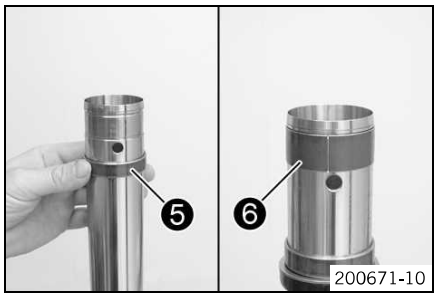
– Slide on lock ring ❷.
– Lubricate and slide on seal ring ❸.

Lubricant (T511) (☛ p. 224)

✓ Mount with the sealing lip facing downward the open side facing upward.
– Slide on support ring ❹.
– Remove the special tool.

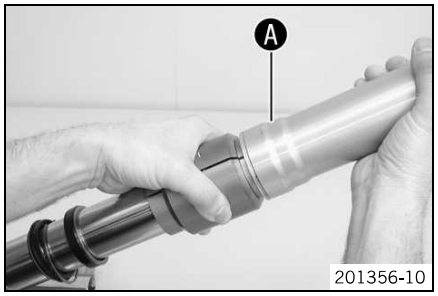
– Roughen, clean and lubricate the edges of the sliding bushings using 600 grit sandpaper.

Fork oil (SAE 4) (48601166S1) (☛ p. 223)



– Slide on lower sliding bushing ❺.
– Mount upper sliding bushing ❻.

Info
Gently pull them apart without using a tool.



– Slide on the outer tube.
– Warm up the outer tube in area Ⓐ of the lower sliding bushing.
Guideline

50 °C (122 °F)

– Hold the lower sliding bushing with the longer shoulder of the special tool.

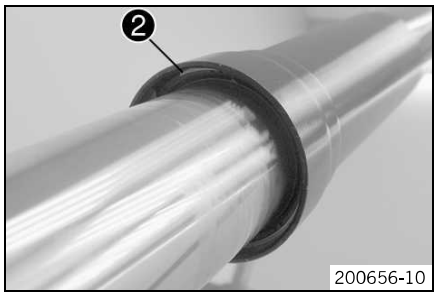
Mounting tool (T14040S) (☛ p. 238)

– Press the outer tube all the way in.

– Position the support ring.
– Hold the seal ring with the shorter shoulder of the special tool.

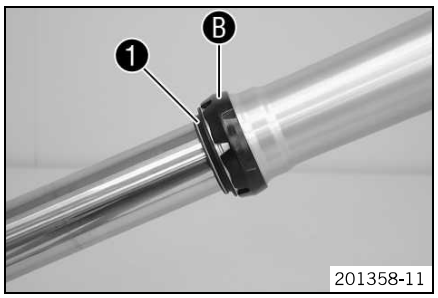
Mounting tool (T14040S) (☛ p. 238)

– Press the outer tube all the way in.

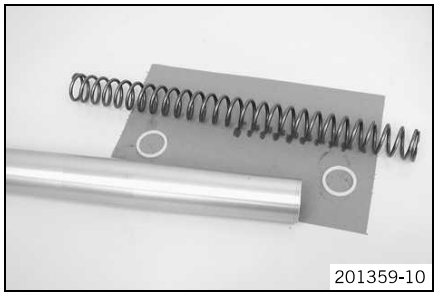


– Mount lock ring ❷.

Info
The lock ring must audibly lock into place.



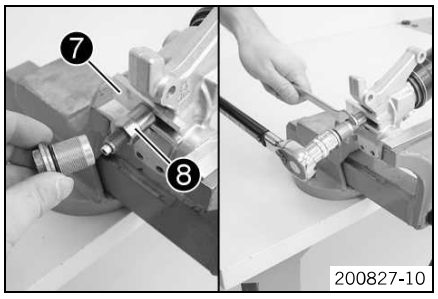
– Install dust boot ❶.
– Mount fork protector ring Ⓑ.



– Mount the preload spacers and spring.

Guideline

Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	4.4 N/mm (25.1 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	4.6 N/mm (26.3 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	4.8 N/mm (27.4 lb/in)



– Push the cartridge into the fork leg.
– Press the cartridge against the spring and mount special tool 7.

Support tool (T14020) (☛ p. 236)

– Grease the O-ring of the rebound adjuster.

Lubricant (T158) (☛ p. 224)

– Mount the rebound adjuster.

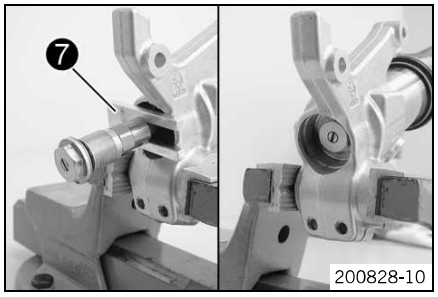
✓ The rebound adjuster must reach the stop before the piston rod turns with it. In case of tight piston rod threads, it must be held to keep it from turning.

✗ If the rebound adjuster is not turned all the way to the stop, the rebound damping cannot be correctly adjusted.

– Hold onto nut 8 and tighten the rebound adjuster.

Guideline

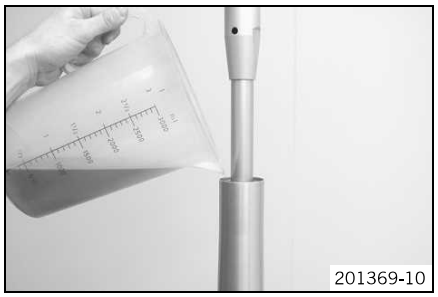
Rebound adjuster on the piston rod	M12x1	30 Nm (22.1 lbf ft)



– Press the cartridge against the spring and remove special tool 7.
– Tighten the rebound adjuster.

Guideline

Rebound adjuster on the axle clamp	M20x1	30 Nm (22.1 lbf ft)



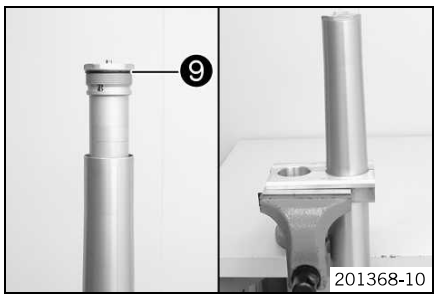
– Clamp in the fork vertically.

Guideline

Use soft jaws.

– Fill with fork oil.

Oil capacity fork leg without cartridge	390 ml (13.19 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 223)

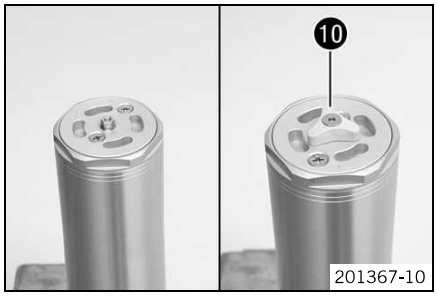


– Lubricate O-ring 9 of the cartridge.

Lubricant (T158) (☛ p. 224)

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

Clamping stand (T1403S) (☛ p. 237)



– Tighten the cartridge.

Guideline

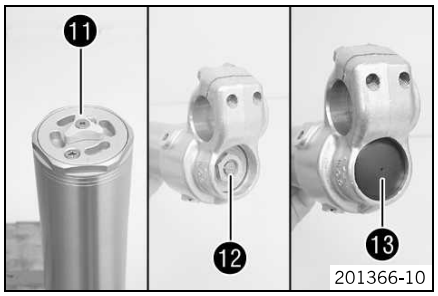
Cartridge on the outer tube	M51x1.5	50 Nm (36.9 lbf ft)

Ring wrench (T14017) (☛ p. 236)

– Mount adjuster ⑩ of the compression damping. Mount and tighten the screw.

Guideline

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



Alternative 1

– Turn adjusting screw of compression damping ⑪ and adjusting screw of rebound damping ⑫ clockwise all the way.
– Turn back counterclockwise by the number of clicks corresponding to the fork type.

Guideline

Rebound damping	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks
Compression damping	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks

Alternative 2

Warning

Danger of accidents Modifications to the suspension settings can seriously alter the vehicle's ride behavior.

– Extreme modifications to the adjustment of the suspension components can cause a serious deterioration in the handling characteristics and overload some components.
– Only make adjustments within the recommended range.
– After making adjustments, ride slowly at first to get the feel of the new ride behavior.

– Set the adjusting screws to the position determined before removal.
– Mount protection cap ⑬.

6.30 Assembling the fork legs (XC-F)

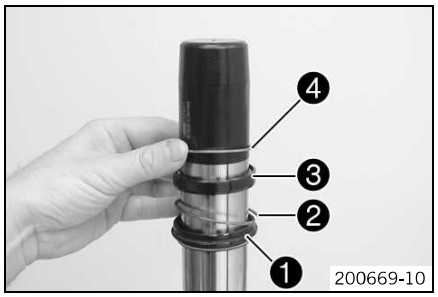
Info

The steps are identical for both fork legs.

Preparatory work

– Check the fork legs. (☛ p. 27)
– Assemble the screw cap with the membrane holder. (☛ p. 33)
– Assemble the piston rod. (☛ p. 34)
– Assemble the cartridge. (☛ p. 35)

Main work



– Clamp in the inner tube with the axle clamp.

Guideline

Use soft jaws.

– Mount the special tool.

Protecting sleeve (T1401) (☛ p. 235)

– Lubricate and slide on dust boot ❶.

Lubricant (T511) (☛ p. 224)

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 ❷.
– Lubricate and slide on seal ring ❸.

Lubricant (T511) (☛ p. 224)

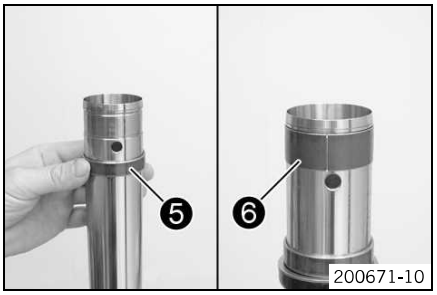
✓ Mount with the sealing lip facing downward the open side facing upward.

– Slide on support ring ❹.
– Remove the special tool.


200670-10

– Roughen, clean and lubricate the edges of the sliding bushings using 600 grit sandpaper.

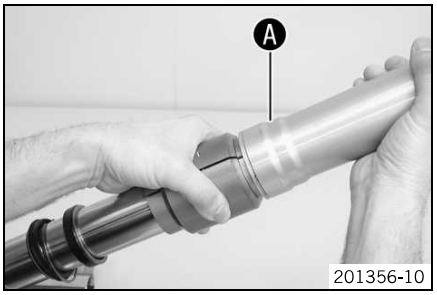
Fork oil (SAE 4) (48601166S1) (☛ p. 223)



200671-10

– Slide on lower sliding bushing ❺.
– Mount upper sliding bushing ❻.

Info
Gently pull them apart without using a tool.



201356-10

– Slide on the outer tube.
– Warm up the outer tube in area Ⓐ of the lower sliding bushing.
Guideline

50 °C (122 °F)

– Hold the lower sliding bushing with the longer shoulder of the special tool.

Mounting tool (T14040S) (☛ p. 238)

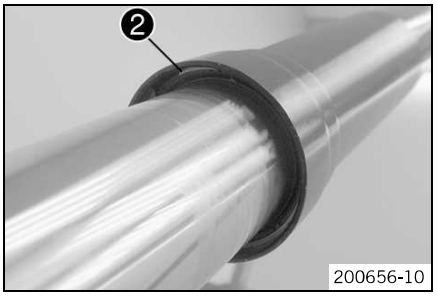
– Press the outer tube all the way in.


201355-10

– Position the support ring.
– Hold the seal ring with the shorter shoulder of the special tool.

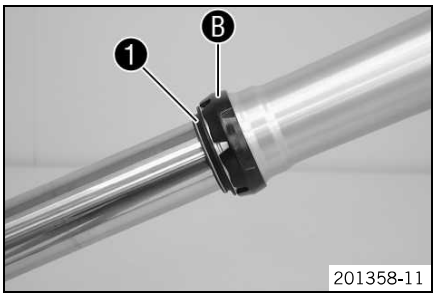
Mounting tool (T14040S) (☛ p. 238)

– Press the outer tube all the way in.

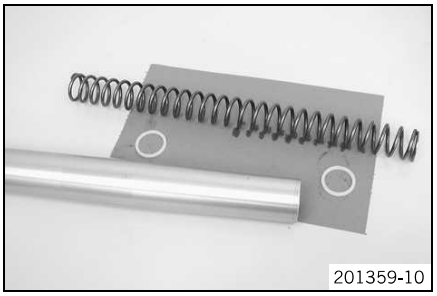


– Mount lock ring ❷.

Info
The lock ring must audibly lock into place.



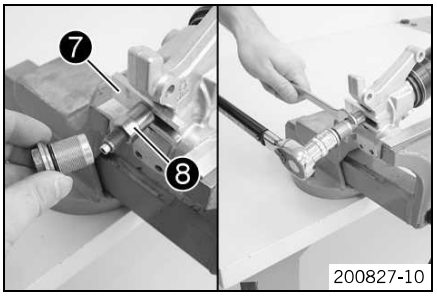
– Install dust boot ❶.
– Mount fork protector ring Ⓑ.



– Mount the preload spacers and spring.

Guideline

Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	4.2 N/mm (24 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	4.4 N/mm (25.1 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	4.6 N/mm (26.3 lb/in)



– Push the cartridge into the fork leg.
– Press the cartridge against the spring and mount special tool ❼.

Support tool (T14020) (☛ p. 236)

– Grease the O-ring of the rebound adjuster.

Lubricant (T158) (☛ p. 224)

– Mount the rebound adjuster.

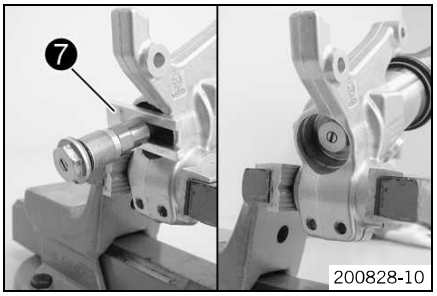
✓ The rebound adjuster must reach the stop before the piston rod turns with it. In case of tight piston rod threads, it must be held to keep it from turning.

✗ If the rebound adjuster is not turned all the way to the stop, the rebound damping cannot be correctly adjusted.

– Hold onto nut ❽ and tighten the rebound adjuster.

Guideline

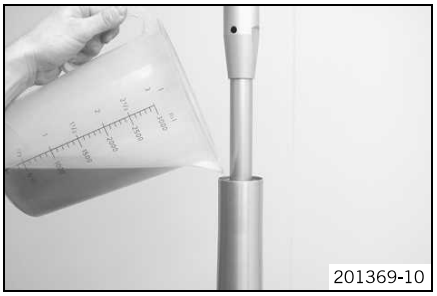
Rebound adjuster on the piston rod	M12x1	30 Nm (22.1 lbf ft)



– Press the cartridge against the spring and remove special tool ❼.
– Tighten the rebound adjuster.

Guideline

Rebound adjuster on the axle clamp	M20x1	30 Nm (22.1 lbf ft)



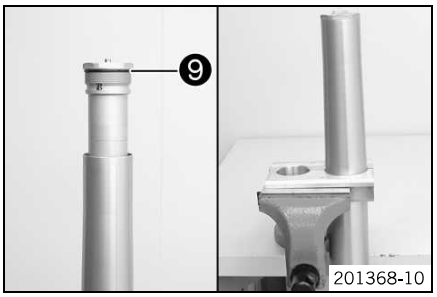
– Clamp in the fork vertically.

Guideline

Use soft jaws.

– Fill with fork oil.

Oil capacity fork leg without cartridge	380 ml (12.85 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 223)

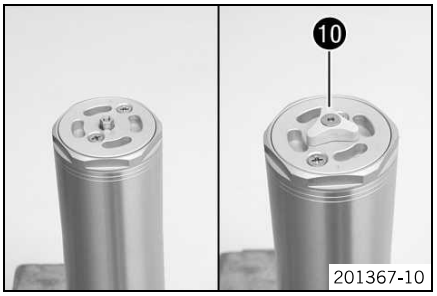


– Lubricate O-ring ❾ of the cartridge.

Lubricant (T158) (☛ p. 224)

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

Clamping stand (T1403S) (☛ p. 237)



– Tighten the cartridge.

Guideline

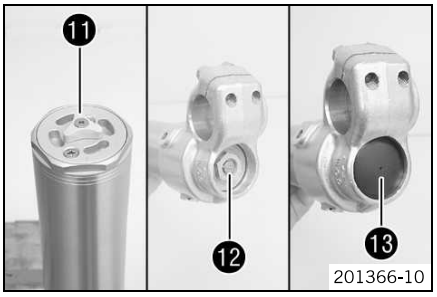
Cartridge on the outer tube	M51x1.5	50 Nm (36.9 lbf ft)

Ring wrench (T14017) (☛ p. 236)

– Mount adjuster ❿ of the compression damping. Mount and tighten the screw.

Guideline

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



Alternative 1

– Turn adjusting screw of compression damping ⓫ and adjusting screw of rebound damping ⓬ clockwise all the way.
– Turn back counterclockwise by the number of clicks corresponding to the fork type.

Guideline

Rebound damping	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks
Compression damping	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks

Alternative 2

Warning

Danger of accidents Modifications to the suspension settings can seriously alter the vehicle's ride behavior.

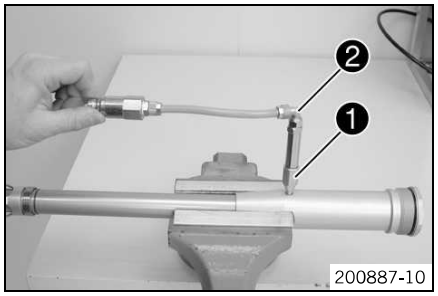
– Extreme modifications to the adjustment of the suspension components can cause a serious deterioration in the handling characteristics and overload some components.
– Only make adjustments within the recommended range.
– After making adjustments, ride slowly at first to get the feel of the new ride behavior.

– Set the adjusting screws to the position determined before removal.

– Mount protection cap ⓭.

6.31 Bleeding and filling the cartridge

Info
Before working with the vacuum pump, carefully read the vacuum pump operating manual.



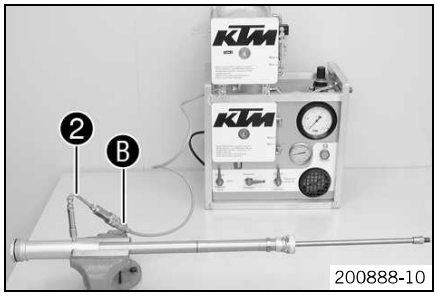
– Clamp the cartridge as shown in the figure.
Guideline
Use soft jaws.

Info
Clamp the cartridge only lightly.
The filling port must be located at the highest point.
During the filling procedure, the cartridge must be lower than the oil tank of the vacuum pump.
The piston rod moves in and out during filling; do not immobilize it by holding it with your hand.

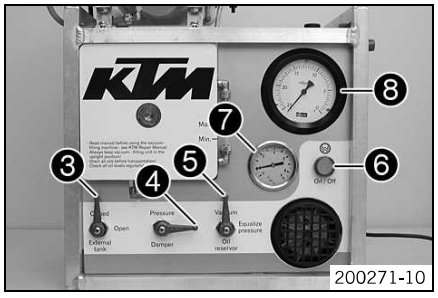
– Remove the screw of the filling port.
– Mount special tool ❶ on the cartridge.
Filling adapter (T14030) (☛ p. 237)

Info
Hand-tighten only without using a tool.

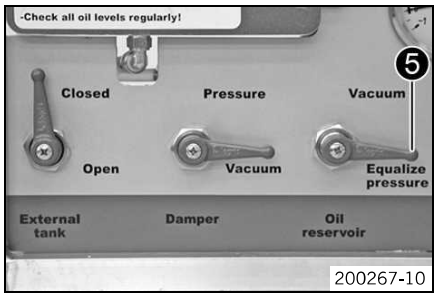
– Connect adapter ❷ to special tool ❶.



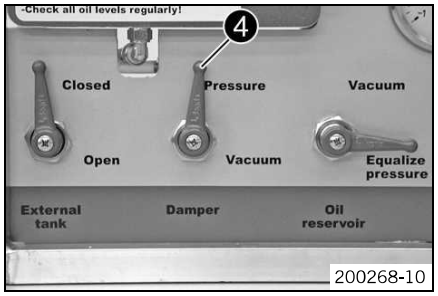
– Connect adapter ❷ to the filling port of vacuum pump Ⓑ.
Vacuum pump (T1240S) (☛ p. 235)



– Clamp the control lever as shown in the figure.
✓ Control lever **External tank** ❸ is set to **Closed**; **Damper** ❹ is set to **Vacuum**; and **Oil reservoir** ❺ is set to **Vacuum**.
– Activate **On/Off** switch ❻.
✓ The suction process begins.
✓ Pressure gauge ❼ drops to the required value.
< 0 bar
✓ Vacuum gauge ❽ drops to the required value.
10 mbar



– When the vacuum gauge reaches the required value, turn control lever **Oil reservoir** ❺ to **Equalize pressure**.
Guideline
10 mbar
✓ The pressure gauge increases to the required value.
0 bar



– When the pressure gauge reaches the required value, turn control lever **Damper** ❹ to **Pressure**.

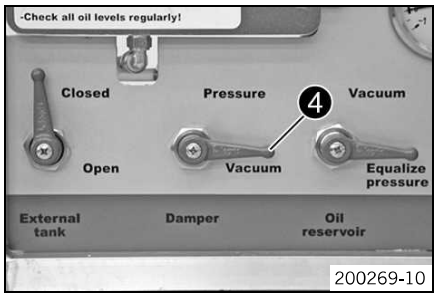
Guideline

0 bar

✔ Oil is pumped into the cartridge.

✔ The pressure gauge increases to the required value.

3 bar



– When the pressure gauge reaches the required value, turn control lever **Damper** ❹ to **Vacuum**.

Guideline

3 bar

✔ The pressure gauge drops to the required value.

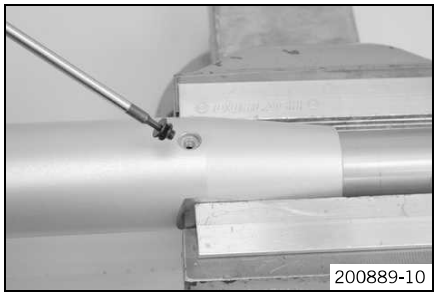
0 bar

– When the pressure gauge reaches the required value, activate the **On/Off** switch.

Guideline

0 bar

✔ The vacuum pump is switched off.



– Disconnect the vacuum pump. Remove the special tool.

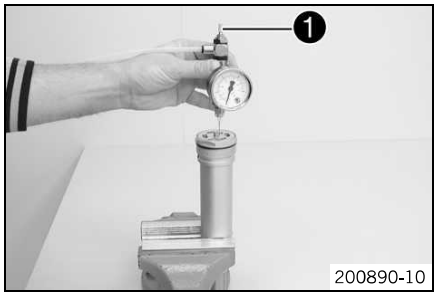
Info
The filling port must be positioned at the highest point.

– Mount and tighten the filling screw with the O-ring.

Guideline

Cartridge filling screw	M4x0.5	2 Nm (1.5 lbf ft)

6.32 Filling the cartridge with nitrogen



– Clamp the cartridge in a vise using soft jaws.

Info
Clamp the cartridge only lightly.

– Connect the connector of the special tool to the pressure regulator of the nitrogen bottle.

Nitrogen charging tool (T14019) (☛ p. 236)
Filling gas - nitrogen

– Adjust the pressure regulator of the nitrogen bottle.

Guideline

Gas pressure	1.2 bar (17 psi)

– Pierce the membrane with the needle of the special tool.

– Open valve ❶.

– Fill the cartridge for at least 15 seconds.

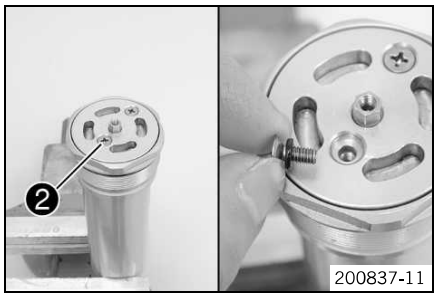
Guideline

Gas pressure	1.2 bar (17 psi)

Info
Watch the pressure regulator dial.
Ensure that the cartridge is filled to the specified pressure.

– Close the valve.

– Close the nitrogen bottle.

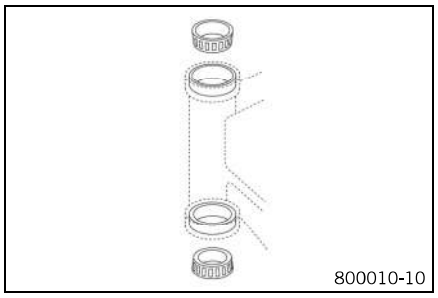


– Remove the special tool.
– Mount and tighten filling screw ❷ with the O-ring.

Guideline

Nitrogen filling screw of the fork leg	M4x0.5	2.5 Nm (1.84 lbf ft)

6.33 Greasing the steering head bearing



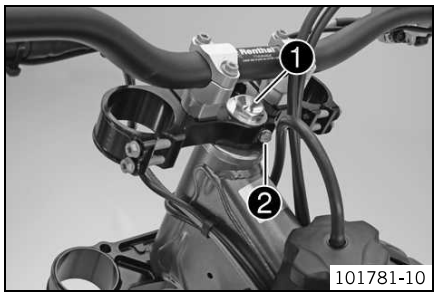
– Remove the lower triple clamp. (☛ p. 46)
– Install the lower triple clamp. (☛ p. 47)

6.34 Removing the lower triple clamp

Preparatory work

– Raise the motorcycle with the lift stand. (☛ p. 10)
– Remove the front wheel. (☛ p. 96)
– Remove the fork legs. (☛ p. 14)
– Remove the start number plate. (☛ p. 93)
– Remove the front fender. (☛ p. 93)
– Remove the handlebar cushion.

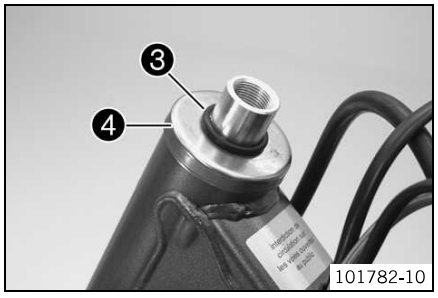
Main work



– Remove screw ❶.
– Remove screw ❷.
– Take off the top triple clamp with the handlebar and set it aside.

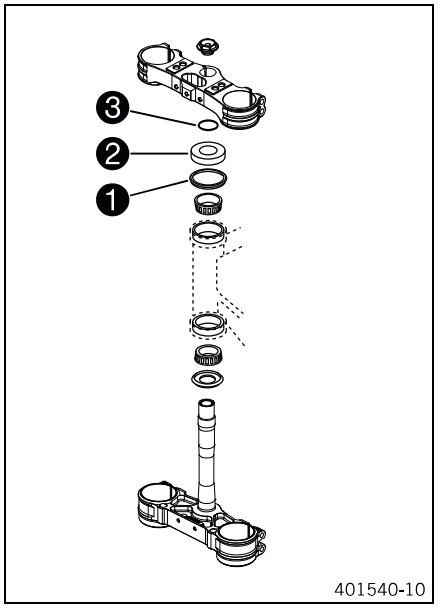
Info

Protect the motorcycle and its attachments against damage by covering them.
Do not bend the cables and lines.



– Remove O-ring ❸. Remove protective ring ❹.
– Take out the lower triple clamp with the steering stem.
– Take out the upper steering head bearing.

6.35 Installing the lower triple clamp

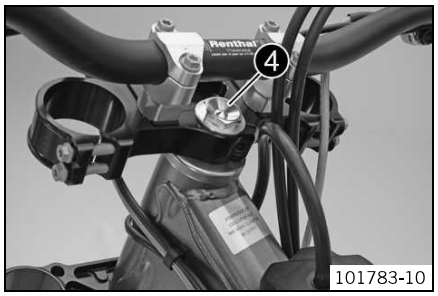


Main work

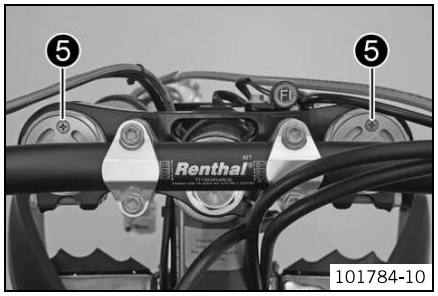
– Clean the bearing and sealing elements, check for damage, and grease.

High viscosity grease (☛ p. 224)

– Insert the lower triple clamp with the steering stem. Mount the upper steering head bearing.
– Check whether the top steering head seal ❶ is correctly positioned.
– Slide on protective ring ❷ and O-ring ❸.



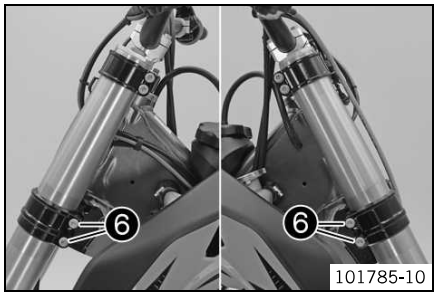
– Position the upper triple clamp with the steering.
– Mount screw ❹ but do not tighten yet.



– Position the fork legs.

✓ Bleeder screws ❺ face forward.

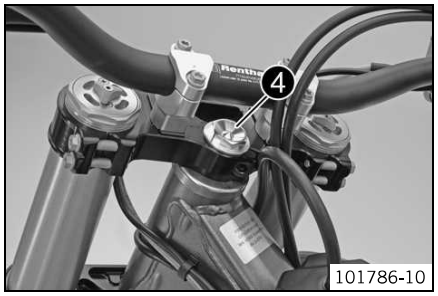
Info
Grooves are milled into the side of the upper end of the fork legs. The second milled groove (from the top) must be flush with the top edge of the upper triple clamp.



– Fully tighten screws ❻.

Guideline

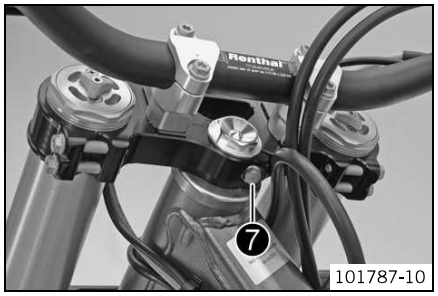
Screw, bottom triple clamp	M8	12 Nm (8.9 lbf ft)



– Tighten screw ❹.

Guideline

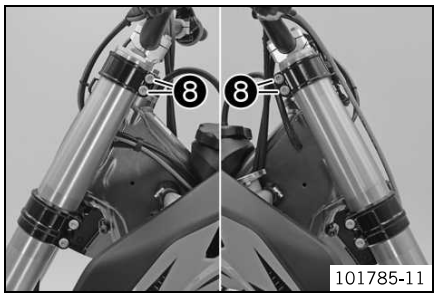
Screw, top steering head	M20x1.5	12 Nm (8.9 lbf ft)



– Mount and tighten screw ❼.

Guideline

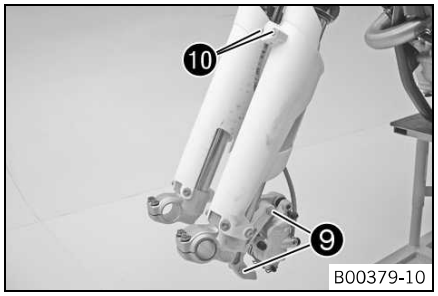
Screw, top steering stem	M8	17 Nm (12.5 lbf ft)	**Loctite® 243™**



– Fully tighten screws ❽.

Guideline

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



– Position the brake caliper. Mount and tighten screws ❾.

Guideline

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

– Position the brake line and clamp. Mount and tighten screws ❿.

Finishing work

– Install the front fender. (☛ p. 93)
– Mount the handlebar cushion.
– Install the start number plate. (☛ p. 94)
– Install the front wheel. (☛ p. 97)
– Check that the wiring harness, cables, and brake and clutch lines can move freely and are routed correctly.
– Check the steering head bearing play. (☛ p. 48)
– Remove the motorcycle from the lift stand. (☛ p. 10)

6.36 Checking the steering head bearing play

Warning

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

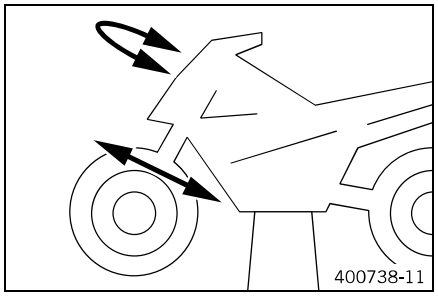
– Adjust the steering head bearing play without delay.

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 the 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 play of the steering head bearing. (☛ p. 49)

– 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 play of the steering head bearing. (☛ p. 49)

– Check the steering head bearing and change if necessary.

Finishing work

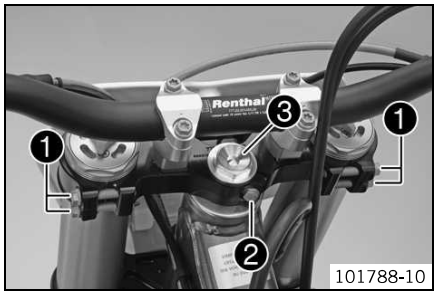
– Remove the motorcycle from the lift stand. (☛ p. 10)

6.37 Adjusting the play of the steering head bearing

Preparatory work

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

– Remove the handlebar cushion.



Main work

– Loosen screws ❶. Remove screw ❷.

– Loosen and retighten screw ❸.

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.

– Fully tighten screws ❶.

Guideline

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

– Mount and tighten screw ❷.

Guideline

Screw, top steering stem	M8	17 Nm (12.5 lbf ft)	**Loctite® 243™**

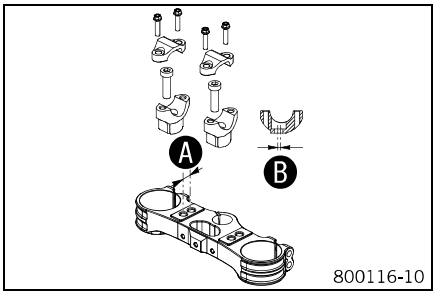
Finishing work

– Check the steering head bearing play. (☛ p. 48)

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

– Mount the handlebar cushion.

7.1 Handlebar position



On the upper triple clamp, there are two holes at a distance of Ⓐ to each other.

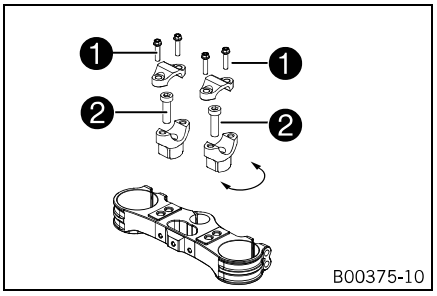
Hole distance A	15 mm (0.59 in)

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

Hole distance B	3.5 mm (0.138 in)

The handlebar can be mounted in four 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



– Remove screws ❶. Take off the handlebar clamps. Take off the handlebar and lay it to one side.

Info
Protect the components against damage by covering them.
Do not bend the cables and lines.

– Remove screws ❷. Remove the handlebar support.
– Place the handlebar support in the required position. Mount and tighten screws ❷.

Guideline

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

Info
Position the left and right handlebar supports evenly.

– Position the handlebar.

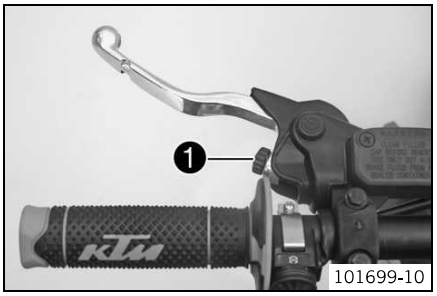
Info
Make sure the cables and wiring are positioned correctly.

– Position the handlebar clamps. Mount and tighten screws ❶ evenly.

Guideline

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

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 ❶.

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. 84)
– Remove the fuel tank. (☛ p. 84)

Main work

– Check the throttle cable routing.

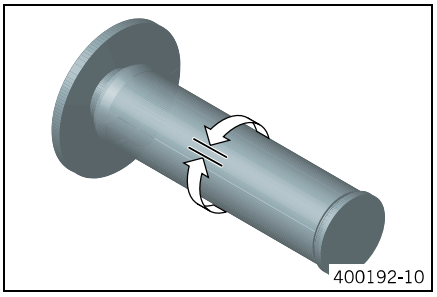
Both throttle cables must be routed to the throttle valve body side by side behind the handlebars and above the fuel tank bearing.

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

Finishing work

– Install the fuel tank. (☛ p. 85)
– Mount the seat. (☛ p. 84)

7.5 Checking the play in the throttle cable



– Check the throttle grip for smooth operation.
– Move the handlebar to the straight-ahead position. Move the throttle grip backwards and forwards to ascertain the play in the throttle cable.

Throttle cable play	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. 52)

Danger

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

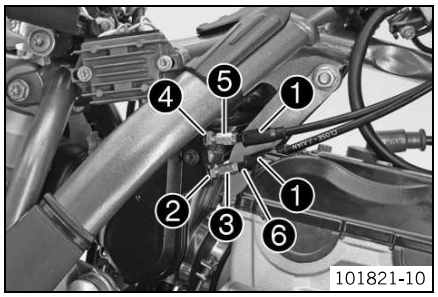
– When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.

– 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. 52)

7.6 Adjusting the play in the throttle cable



Preparatory work

– Remove the seat. (☛ p. 84)
– Remove the fuel tank. (☛ p. 84)
– Check the throttle cable routing. (☛ p. 51)

Main work

– Move the handlebar to the straight-ahead position.
– Push back sleeves ❶.
– Loosen nut ❷. Turn adjusting screw ❸ in as far as possible.
– Loosen nut ❹. Turn adjusting screw ❺ so that there is play in the throttle cable at the throttle grip.

  Guideline

Throttle cable play	3... 5 mm (0.12... 0.2 in)

– Tighten nut ❹.
– Press and hold the throttle grip in the closed setting. Turn adjusting screw ❸ out until there is no play in the throttle cable ❻.
– Tighten nut ❷.
– Push sleeves ❶ on. Check the throttle grip for smooth operation.

Finishing work

– Install the fuel tank. (☛ p. 85)
– Mount the seat. (☛ p. 84)
– Check the play in the throttle cable. (☛ p. 51)

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

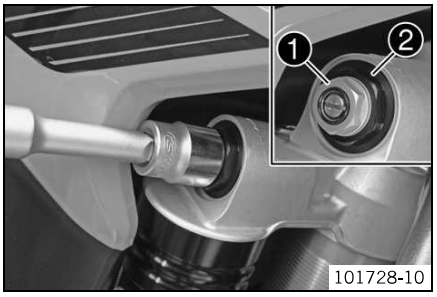
Caution

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 ❶ all the way clockwise with a socket wrench.

Info

Do not loosen fitting ❷.

– 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 USA)	
Comfort	2.5 turns
Standard	2 turns
Sport	1.5 turns
Compression damping, high-speed (XC-F)	
Comfort	2.5 turns
Standard	2 turns
Sport	1.5 turns

Info

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

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

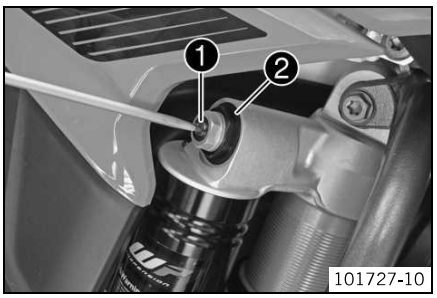
Caution

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 ❶ clockwise with a screwdriver up to the last perceptible click.

Info

Do not loosen fitting ❷.

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

Guideline

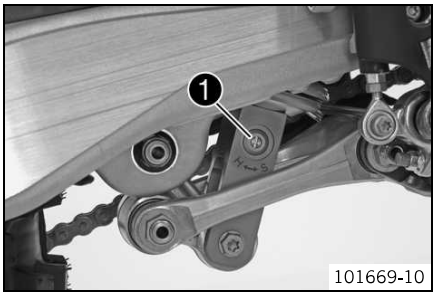
Compression damping, low-speed (SX-F EU)	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Compression damping, low-speed (SX-F USA)	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks
Compression damping, low-speed (XC-F)	
Comfort	17 clicks
Standard	15 clicks
Sport	13 clicks

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

8.3 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.



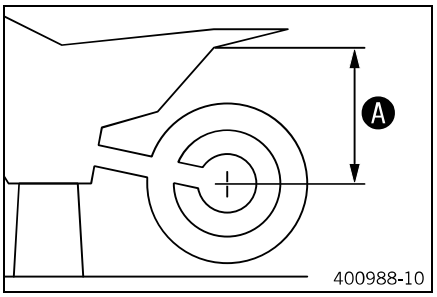
– Turn adjusting screw ❶ clockwise up to the last perceptible click.
– Turn counterclockwise by the number of clicks corresponding to the shock absorber type.

Guideline

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

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

8.4 Measuring rear wheel sag unloaded



Preparatory work

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

Main work

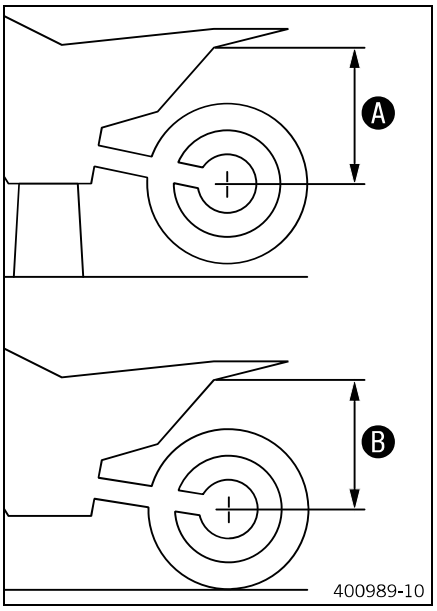
– Measure the distance – as vertical as possible – between the rear axle and a fixed point, for example, a mark on the side cover.

– Note down the value as dimension Ⓐ.

Finishing work

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

8.5 Checking the static sag of the shock absorber



– Measure distance Ⓐ of rear wheel unloaded. (☛ p. 55)

– Hold the motorcycle upright with the aid of an assistant.

– Measure the distance between the rear axle and the fixed point again.

– Note down the value as dimension Ⓑ.

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

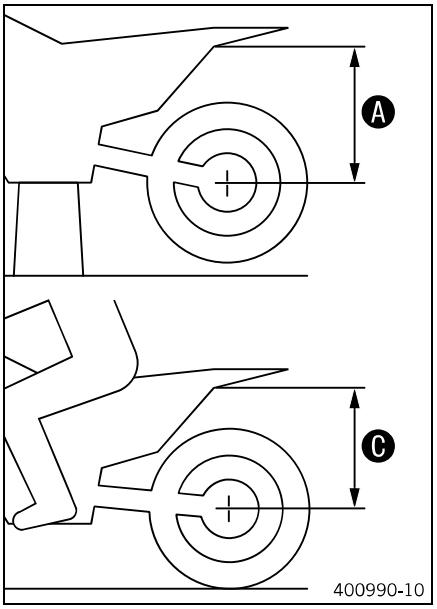
– Check the static sag.

Static sag (SX-F EU)	30 mm (1.18 in)
Static sag (SX-F USA)	30 mm (1.18 in)
Static sag (XC-F)	30 mm (1.18 in)

» If the static sag is less or more than the specified value:

– Adjust the spring preload of the shock absorber. (☛ p. 56)

8.6 Checking the riding sag of the shock absorber



– Measure distance Ⓐ of rear wheel unloaded. (☛ p. 55)

– 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 now measures the distance between the rear axle and the fixed point.

– Note down the value as dimension Ⓒ.

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

– Check the riding sag.

Riding sag (SX-F EU)	90 mm (3.54 in)
Riding sag (SX-F USA)	100 mm (3.94 in)
Riding sag (XC-F)	100 mm (3.94 in)

» If the riding sag differs from the specified measurement:

– Adjust the riding sag. (☛ p. 56)

8.7 Adjusting the spring preload of the shock absorber

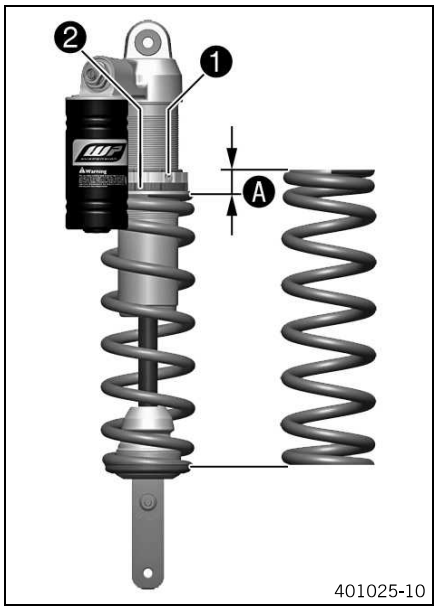
Caution

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.



401025-10

Preparatory work

– Raise the motorcycle with the lift stand. (☛ p. 10)
– Remove the shock absorber. (☛ p. 57)
– After removing the shock absorber, clean it thoroughly.

Main work

– Loosen screw ❶.
– Turn adjusting ring ❷ until the spring is no longer under tension.

Hook wrench (T106S) (☛ p. 233)

– Measure the overall spring length while the spring is not under tension.
– Tighten the spring by turning adjusting ring ❷ to measurement Ⓐ.

Guideline

Spring preload (SX-F EU)	13 mm (0.51 in)
Spring preload (SX-F USA)	12 mm (0.47 in)
Spring preload (XC-F)	12 mm (0.47 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 ❶.

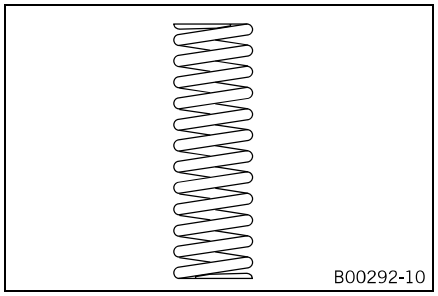
Guideline

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

Finishing work

– Install the shock absorber. (☛ p. 58)
– Remove the motorcycle from the lift stand. (☛ p. 10)

8.8 Adjusting the riding sag


B00292-10

Preparatory work

– Raise the motorcycle with the lift stand. (☛ p. 10)
– Remove the shock absorber. (☛ p. 57)
– 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.)	51 N/mm (291 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	54 N/mm (308 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	57 N/mm (325 lb/in)
Spring rate (SX-F USA)	
Weight of rider: 65... 75 kg (143... 165 lb.)	51 N/mm (291 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	54 N/mm (308 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	57 N/mm (325 lb/in)
Spring rate (XC-F)	
Weight of rider: 65... 75 kg (143... 165 lb.)	51 N/mm (291 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	54 N/mm (308 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	57 N/mm (325 lb/in)

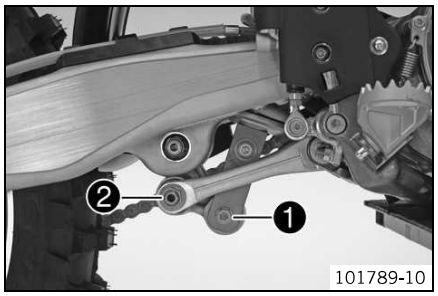
Info
The spring rate is shown on the outside of the spring.

Finishing work
- Install the shock absorber. (☛ p. 58)
- Check the static sag of the shock absorber. (☛ p. 55)
- Check the riding sag of the shock absorber. (☛ p. 55)
- Adjust the rebound damping of the shock absorber. (☛ p. 54)
- Remove the motorcycle from the lift stand. (☛ p. 10)

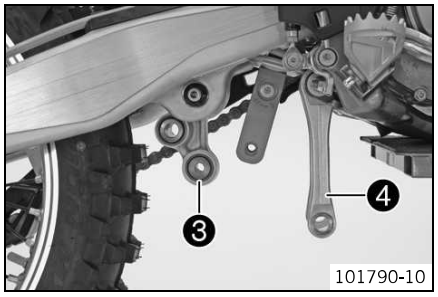
8.9 Removing the shock absorber

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

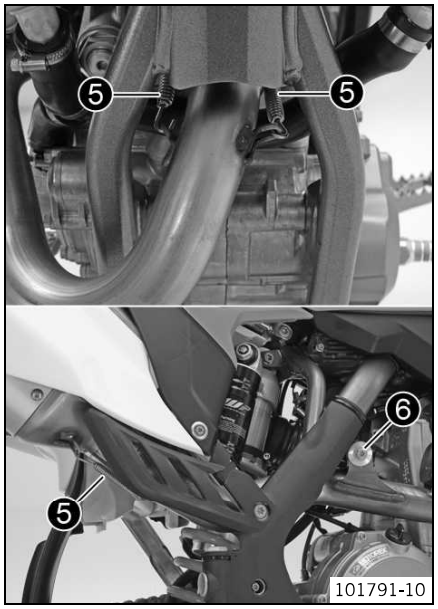
Main work



- Remove screw ❶.
- Remove screw cap ❷.



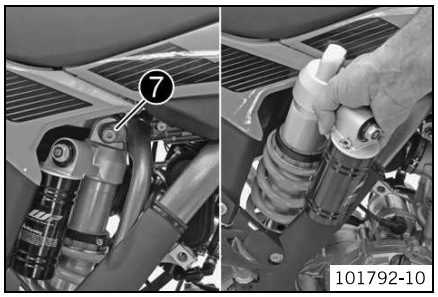
- Press angle lever ❸ toward the rear.
- Press linkage lever ❹ downward.



– Detach springs ❺.

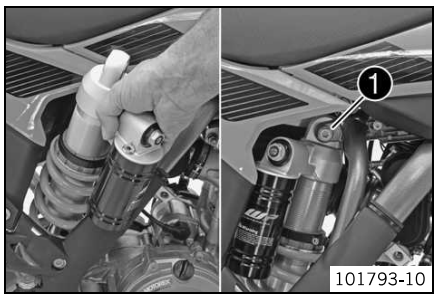
Spring hooks (50305017000) (☛ p. 226)

– Remove screw ❻.
– Press the shock absorber toward the rear and remove the manifold.



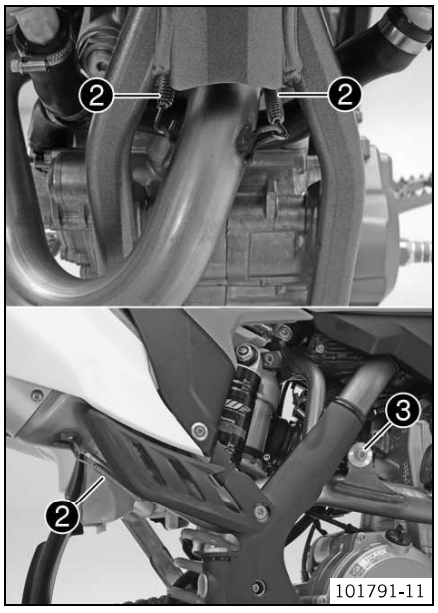
– Remove screw ❼.
– Remove the shock absorber from the top.

8.10 Installing the shock absorber



Main work
– Insert the shock absorber from above.
– Position the shock absorber.
– Mount and tighten screw ❶.
Guideline

Screw, top shock absorber	M10	60 Nm (44.3 lbf ft)	**Loctite® 2701™**

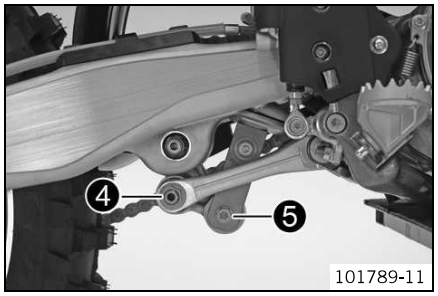


– Position the manifold.
– Attach springs ❷.

Spring hooks (50305017000) (☛ p. 226)

– Mount and tighten screw ❸.
Guideline

Remaining screws, chassis	M8	25 Nm (18.4 lbf ft)



– Position the angle lever and linkage lever.
– Mount and tighten fitting ❹.

Guideline

Nut, linkage lever to angle lever	M14x1.5	80 Nm (59 lbf ft)

– Mount and tighten screw ❺.

Guideline

Screw, bottom shock absorber	M10	60 Nm (44.3 lbf ft)	**Loctite® 2701™**

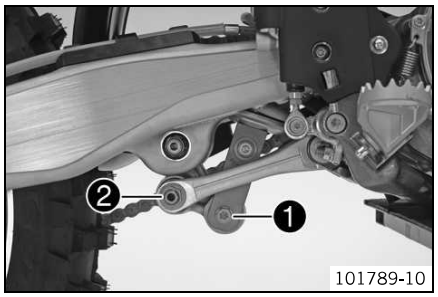
Finishing work

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

8.11 Checking the shock absorber linkage

Preparatory work

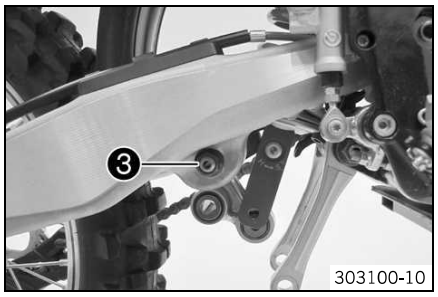
– Raise the motorcycle with the lift stand. (☛ p. 10)



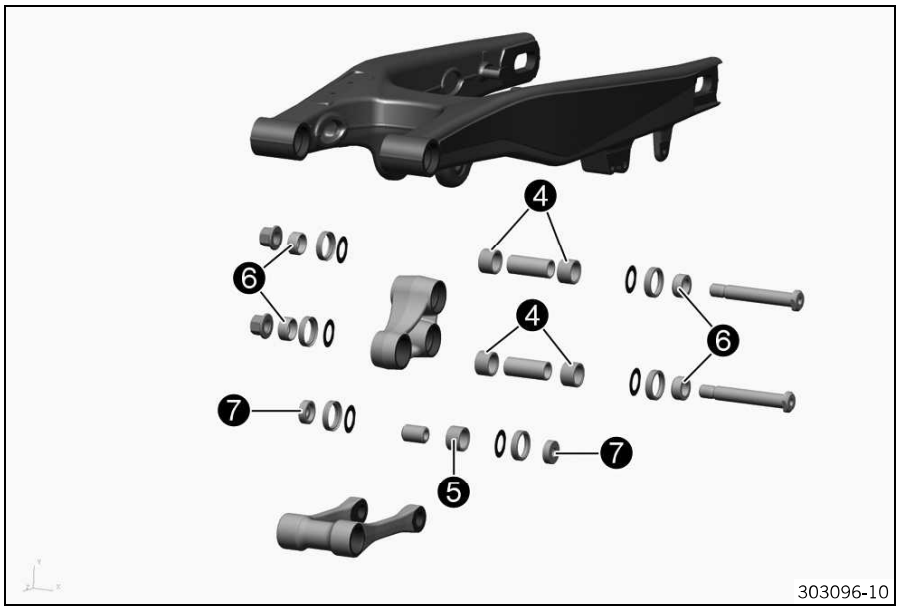
Main work

– Remove screw ❶.
– Remove screw cap ❷.

Info
Raise the wheel slightly to make it easier to remove the screws.

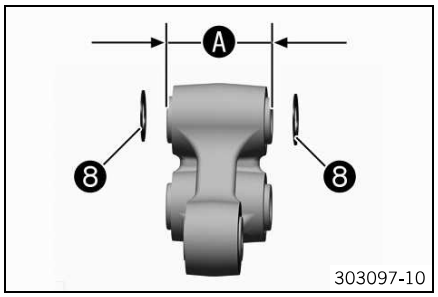


– Remove screw connection ❸.
– Take off the angle lever.



– Check needle bearing ❹ and ❺ for damage and wear.
  » If there is damage or wear:
    – Change the needle bearing.

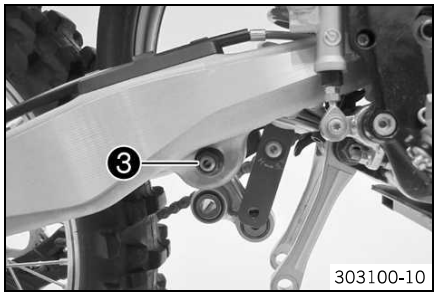
– Check spacers ❻ and ❼ for damage and wear.
  » If there is damage or wear:
    – Change the spacers.
– Check the shaft seal rings for damage and wear.
  » If there is damage or wear:
    – Change the shaft seal rings.



– Check dimension Ⓐ.

54.91... 55.00 mm (2.1618... 2.1654 in)

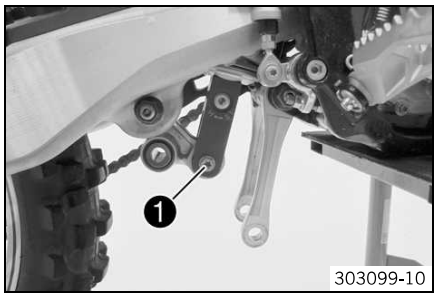
  » If dimension Ⓐ is less than the specified value:
    – Add the corresponding spacing washers ❽.



– Position the angle lever.
– Mount screw connection ❸ but do not tighten yet.

Guideline

Nut, linkage lever on swingarm	M14x1.5	80 Nm (59 lbf ft)

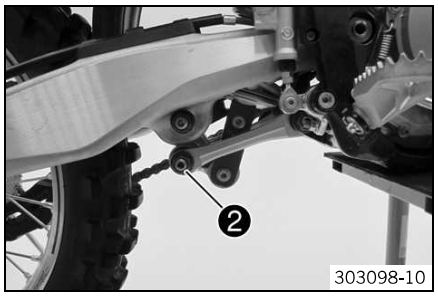


– Mount screw ❶ but do not tighten yet.

Guideline

Screw, bottom shock absorber	M10	60 Nm (44.3 lbf ft)	**Loctite® 2701™**

Info
Raise the wheel slightly to make it easier to mount the screw.



– Position the linkage lever.
– Mount and tighten fitting ❷.

Guideline

Nut, linkage lever to angle lever	M14x1.5	80 Nm (59 lbf ft)

Info
Raise the wheel slightly to make it easier to mount the screw.

– Tighten screws ❶.

Guideline

Screw, bottom shock absorber	M10	60 Nm (44.3 lbf ft)	**Loctite® 2701™**

– Tighten fitting ❸.

Guideline

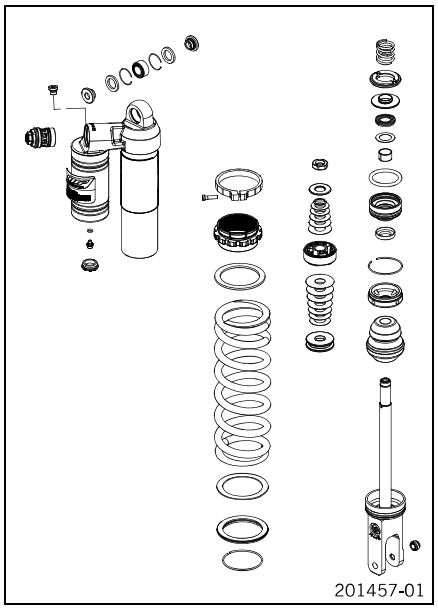
Nut, linkage lever on swingarm	M14x1.5	80 Nm (59 lbf ft)

8.12 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. 61)
– Disassemble the damper. (☛ p. 62)
– Disassemble the piston rod. (☛ p. 63)
– Disassemble the seal ring retainer. (☛ p. 64)
– Check the damper. (☛ p. 65)
– Remove the heim joint. (☛ p. 66)
– Install the heim joint. (☛ p. 67)
– Assemble the seal ring retainer. (☛ p. 68)
– Assemble the piston rod. (☛ p. 68)
– Assemble the damper. (☛ p. 70)
– Install the spring. (☛ p. 75)

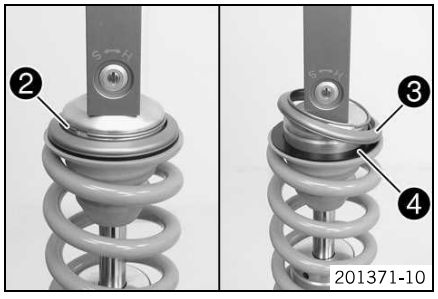
8.13 Removing the spring

Condition

The shock absorber has been removed.

– Clamp the shock absorber in the vise using soft jaws for protection.
– Measure and note spring length in its preloaded state.
– Loosen screw ❶.
– Turn adjusting ring until the spring is no longer under tension.

Hook wrench (T106S) (☛ p. 233)



– Remove ring ❷.
– Remove spring retainer ❸ and intermediate washer ❹.
– Remove the spring.

8.14 Disassembling the damper

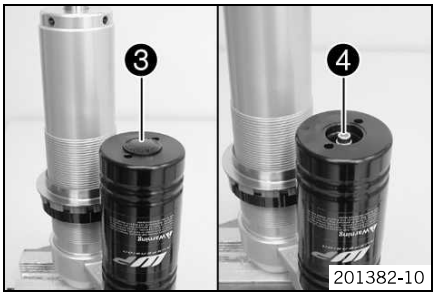
Preparatory work

– Remove the spring. (☛ p. 61)

Main work

– Note down the current state of rebound damping ❶ and compression damping ❷.

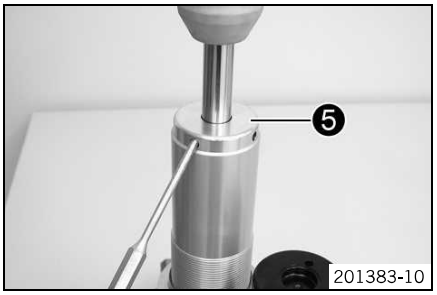
– Completely open the adjusters of the rebound and compression damping.



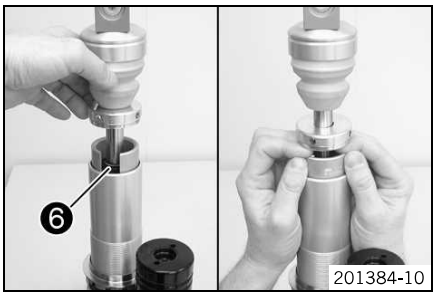
– Remove rubber cap ❸ of the reservoir.

– Open screw ❹ slowly.

✓ The pressurized nitrogen escapes.

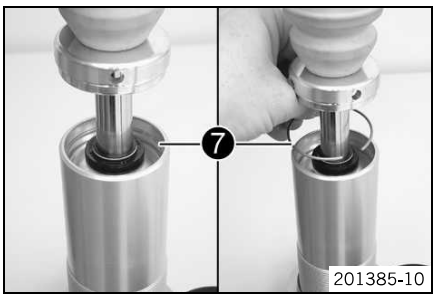


– Remove locking cap ❺.



– Press in seal ring retainer ❻ using the special tool.

Disassembly tool (T1216) (☛ p. 235)



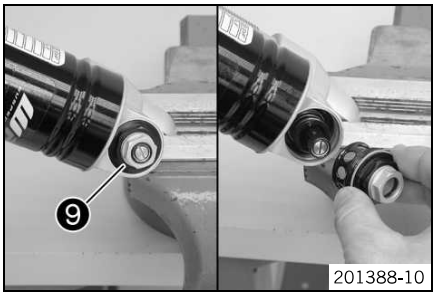
– Remove lock ring ❼.

Info

Do not scratch the inner surface.

– Remove the piston rod.

– Remove adjusting ring ❽ with the intermediate washer.
– Drain the oil.



– Remove compression adjuster ❾. Remove the spring and piston.

8.15 Disassembling the piston rod

Preparatory work

– Remove the spring. (☛ p. 61)
– Disassemble the damper. (☛ p. 62)

Main work

– Clamp the piston rod with the fork in a vise.

  Guideline

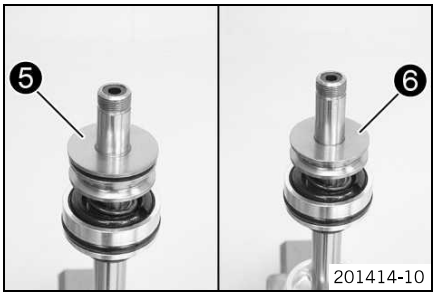
Use soft jaws.

– Remove nut ❶.
– Remove washer ❷.

– Remove rebound shim stack ❸.

Info
Place the rebound shim stack onto a screwdriver and set it down as a unit.

– Remove piston ❹.



– Remove compression shim stack ❺.

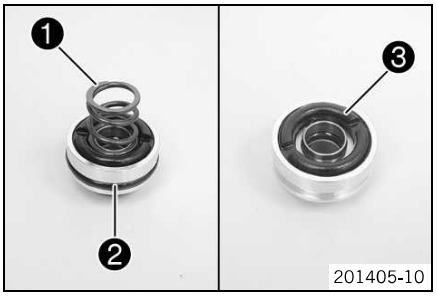
Info
Place the compression shim stack onto a screwdriver and set it down as a unit.

– Remove rebound washer ❻.

– Remove seal ring retainer ❼.
– Remove locking cap ❽ and rubber buffer ❾.

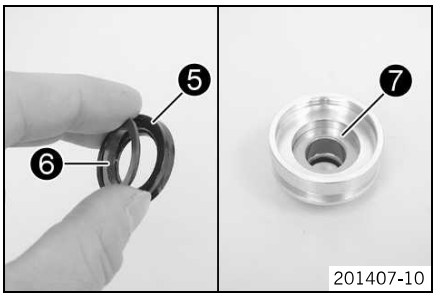
8.16 Disassembling the seal ring retainer

Preparatory work
– Remove the spring. (☛ p. 61)
– Disassemble the damper. (☛ p. 62)
– Disassemble the piston rod. (☛ p. 63)



Main work
– Remove spring ❶.
– Remove O-ring ❷.
– Remove rebound rubber ❸.

– Remove centering disk ❹.
– Remove seal ring ❺.

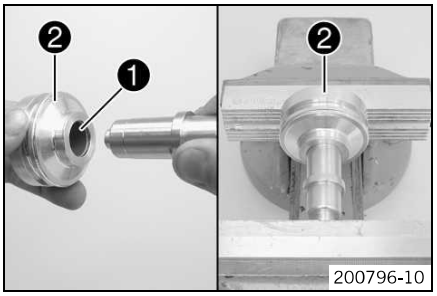


– Remove washer ❻ for seal ring ❺.
– Remove washer ❼.
– Remove dust boot.

8.17 Changing the pilot bushing

Preparatory work

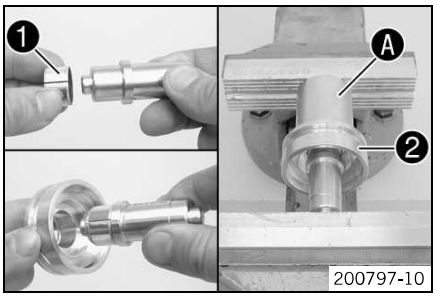
– Remove the spring. (☛ p. 61)
– Disassemble the damper. (☛ p. 62)
– Disassemble the piston rod. (☛ p. 63)
– Disassemble the seal ring retainer. (☛ p. 64)



Main work

– Press pilot bushing ❶ out of seal ring retainer ❷ with the special tool.

Press drift (T1504) (☛ p. 238)



– Slide the new pilot bushing ❶ onto the special tool.

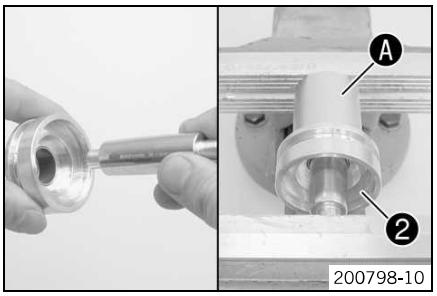
Press drift (T1504) (☛ p. 238)

– Position the pilot bushing in the seal ring retainer using the special tool.

Press drift (T1504) (☛ p. 238)

– Support seal ring retainer ❷ with sleeve Ⓐ of the special tool. Press the pilot bushing all the way in.

Assembly tool (T150S) (☛ p. 238)



– Lubricate the special tool.

Shock absorber oil (SAE 2.5) (50180342S1) (☛ p. 223)
Calibration pin (T1205) (☛ p. 234)

– Support seal ring retainer ❷ with sleeve Ⓐ of the special tool.

Assembly tool (T150S) (☛ p. 238)

– Press the special tool through the new pilot bushing.

Calibration pin (T1205) (☛ p. 234)

✓ The pilot bushing is calibrated.

Finishing work

– Assemble the seal ring retainer. (☛ p. 68)

8.18 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)

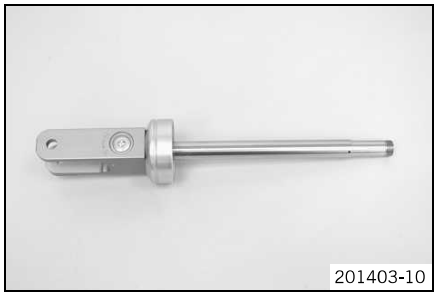
» If the measured value is greater than the specified value:
  – Change the damper cartridge.

– 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.


201403-10

– Measure the diameter of the piston rod.

Piston rod	
Diameter	≥ 17.95 mm (≥ 0.7067 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	≤ 0.02 mm (≤ 0.0008 in)

» If the measured value is greater than the specified value:
– Change the piston rod.

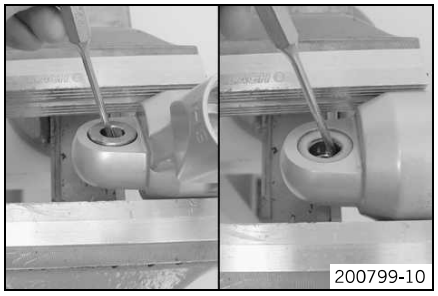
– Check the piston rod for damage and wear.
» If there is damage or wear:
– Change the piston rod.


201404-10

– Check the piston rings for damage and wear.
» If damage or a bronze-colored surface is visible:
– Change the piston.

8.19 Removing the heim joint

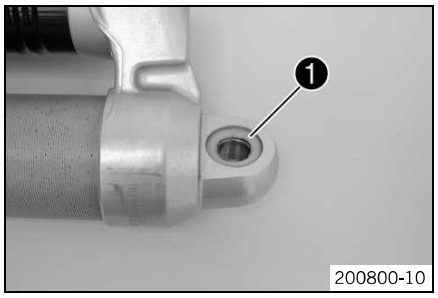
Condition
The shock absorber has been removed.


200799-10

– Clamp the shock absorber in the vise using soft jaws for protection.
– Remove the collar bushing of the heim joint.

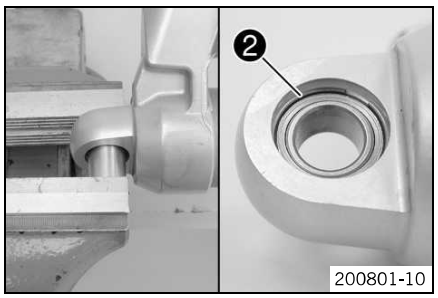
Pin (T120) (☛ p. 234)

– Turn the shock absorber and remove the second collar bushing of the heim joint.



200800-10

– Remove seal rings ❶ on both sides.

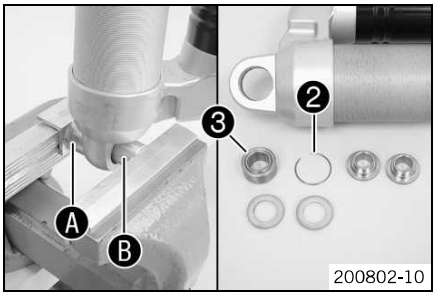


200801-10

– Press the heim joint against a lock ring using the special tool.

Pressing tool (T1207S) (☛ p. 234)

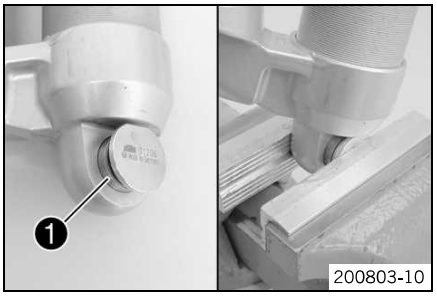
– Remove the second lock ring ❷.



– Place special tool Ⓐ underneath and press out heim joint ❸ with special tool Ⓑ.

Pressing tool (T1207S) (☛ p. 234)

8.20 Installing the heim joint



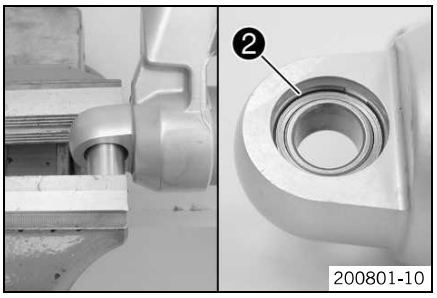
– Position the new heim joint ❶ and the special tool into a vise as shown.

Guideline

Use soft jaws.

Pressing tool (T1206) (☛ p. 234)

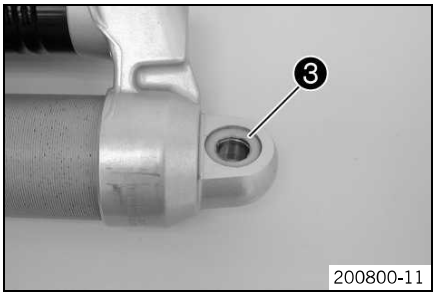
– Press the heim joint all the way in.



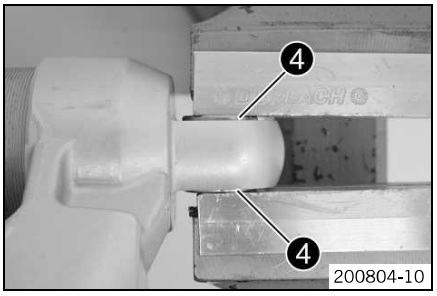
– Press the heim joint against the lock ring using the special tool.

Pressing tool (T1207S) (☛ p. 234)

– Mount the second lock ring ❷.



– Mount seal rings ❸ on both sides.



– Position both collar bushings ❹ and press them in.

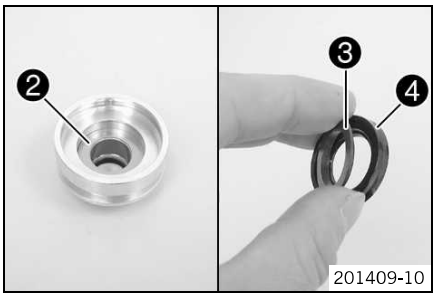
8.21 Assembling the seal ring retainer

– Mount dust boot ❶ using the special tool.

Mounting sleeve (T1204) (☛ p. 234)

– Lubricate the sealing lip of the dust boot.

Lubricant (T625) (☛ p. 224)

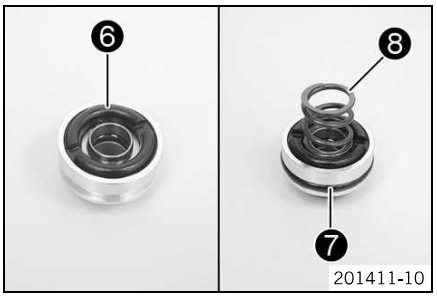


– Mount washer ❷.
– Position washer ❸ on seal ring ❹.

– Grease seal ring ❹ and mount with the washer facing downward.

Lubricant (T511) (☛ p. 224)

– Mount centering disk ❺.



– Mount rebound rubber ❻.
– Lubricate the groove of the O-ring.

Lubricant (T158) (☛ p. 224)

– Mount O-ring ❼.
– Mount spring ❽.

8.22 Assembling the piston rod

Preparatory work

– Assemble the seal ring retainer. (☛ p. 68)

Main work

– Clamp the piston rod with the fork in a vise.

  Guideline

Use soft jaws.

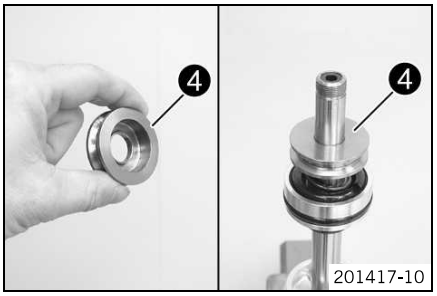
– Mount rubber buffer ❶ and locking cap ❷.
– Position special tool on the piston rod.

Mounting sleeve (T1215) (☛ p. 235)

– Grease the dust boot and push seal ring retainer ❸ onto the piston rod.

Lubricant (T625) (☛ p. 224)

– Remove the special tool.



– Mount rebound washer ❹ with the cut-out facing downward.

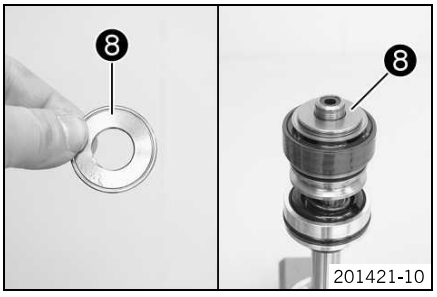
– Mount the compression shim stack ❺ with the smaller shims facing downward.

– Sand both sides of piston ❻ on a surface plate using 1200-grit sandpaper.
– Clean the piston.
– Assemble the piston.

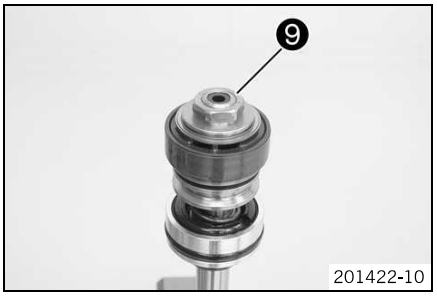
Guideline

View Ⓐ	Piston from above
View Ⓑ	Piston from below

– Mount the rebound shim stack ❼ with the smaller shims facing upward.



– Mount washer ❽ with the collar facing downward.



– Grease the thread of the piston rod.

Lubricant (T152) (☛ p. 224)

– Mount and tighten nut ❾.

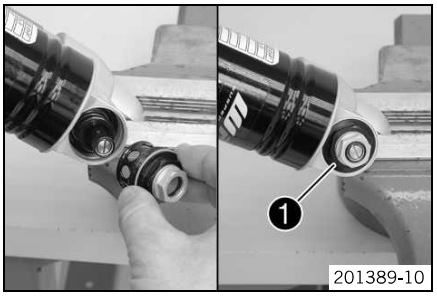
Guideline

Nut, piston rod	M16x1	45 Nm (33.2 lbf ft)

8.23 Assembling the damper

Preparatory work

- Assemble the seal ring retainer. (☛ p. 68)
- Assemble the piston rod. (☛ p. 68)



Main work

- Lubricate the O-rings of the compression adjuster.

  Lubricant (T158) (☛ p. 224)

- Lubricate the threads.

  Lubricant (T159) (☛ p. 224)

- Mount the piston with the spring.
- Mount and tighten the compression adjuster ❶.

  Guideline

Compression adjuster	M31x1	45 Nm (33.2 lbf ft)

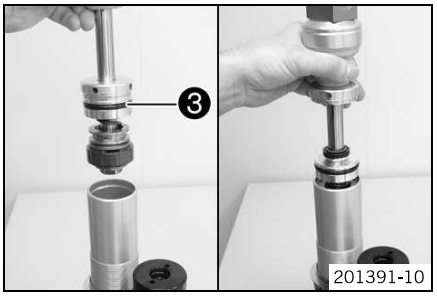
- Clamp the damper in a bench vise.

  Guideline

  Use soft jaws.

- Mount adjusting ring ❷ with the intermediate washer.

Info
The adjusting ring cannot be mounted after the piston rod is mounted.



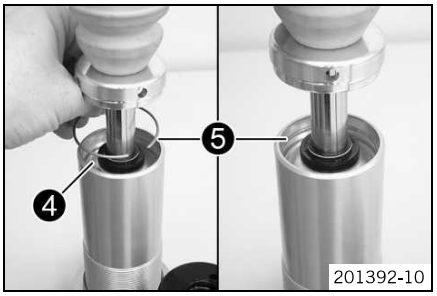
- Fill the damper cartridge about half full.

  Shock absorber oil (SAE 2.5) (50180342S1) (☛ p. 223)

- Lubricate O-ring ❸ of the seal ring retainer.

  Lubricant (T158) (☛ p. 224)

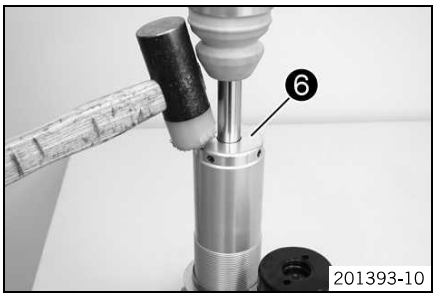
- Mount the piston rod carefully.



- Install the seal ring bearer ❹ and push it under the ring groove.
- Mount lock ring ❺.

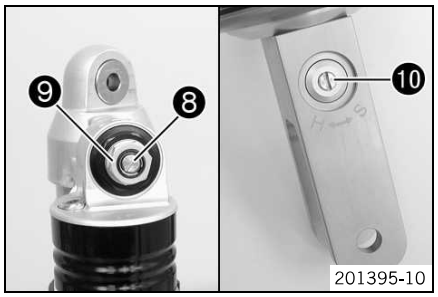
Info
Do not scratch the inner surface.

- Pull out the piston rod so that the seal ring retainer rests against the lock ring.



- Mount locking cap ❻ of the damper cartridge.
- Bleed and fill the damper. (☛ p. 72)
- Fill the damper with nitrogen. (☛ p. 74)

– Mount rubber cap ❼ of the reservoir.



Alternative 1

– Turn adjusting screw ❽ 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 ❾ 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 ❿ 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

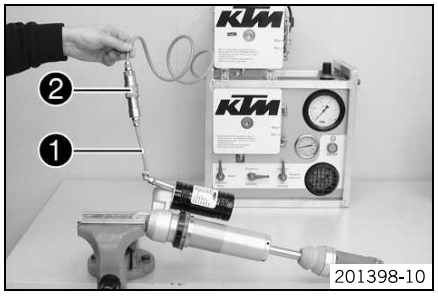
Danger of accidents Modifications to the suspension settings can seriously alter the vehicle's ride behavior.

– Extreme modifications to the adjustment of the suspension components can cause a serious deterioration in the handling characteristics and overload some components.
– Only make adjustments within the recommended range.
– After making adjustments, ride slowly at first to get the feel of the new ride behavior.

– Turn adjusting screws ❽, ❾ and ❿ to the position determined during disassembly.

8.24 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 ❶ on the damper.

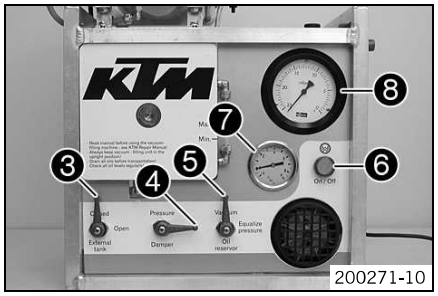
Info
Tighten only hand-tight, without the use of tools.

– Connect the adapter ❶ to connector ❷ of the vacuum pump.

Vacuum pump (T1240S) (☛ p. 235)

– 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!

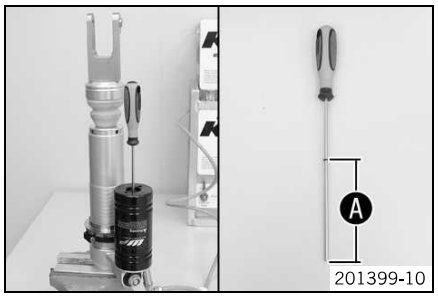


– Clamp the control lever as shown in the figure.
✓ The **External tank** ❸ control lever is on **Closed**, **Damper** ❹ on **Vacuum**, and **Oil reservoir** ❺ on **Vacuum**.
– Operate the **On/Off** switch ❻.
✓ The vacuum pump process starts.
✓ Pressure gauge ❼ drops to the specified value.

< 0 bar

✓ The vacuum gauge ❽ falls to the specified value.

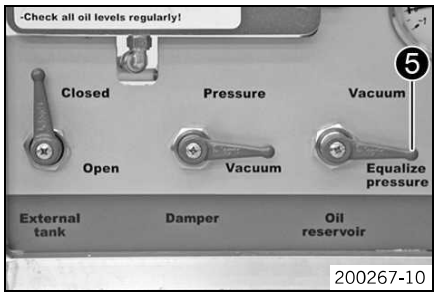
4 mbar



– Measure distance Ⓐ between the floating piston and reservoir hole with the special tool.

Depth micrometer (T107S) (☛ p. 233)

✓ The floating piston is positioned all the way at the bottom.



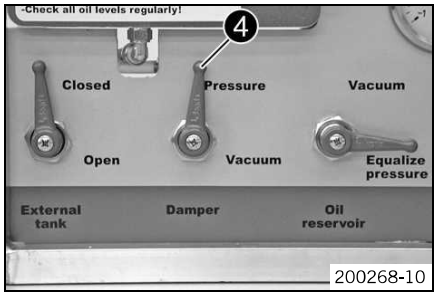
– When the vacuum pressure gauge reaches the specified value, turn the **Oil reservoir** control lever ❺ to **Equalize pressure**.

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 ❹ to **Pressure**.

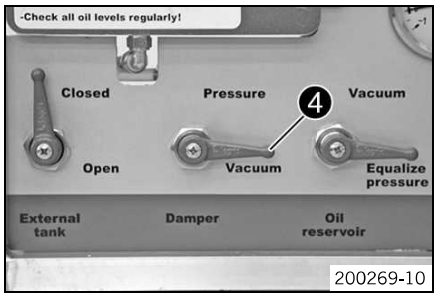
Guideline

0 bar

✓ Oil is pumped into the damper.

✓ The pressure gauge increases to the specified value.

3 bar



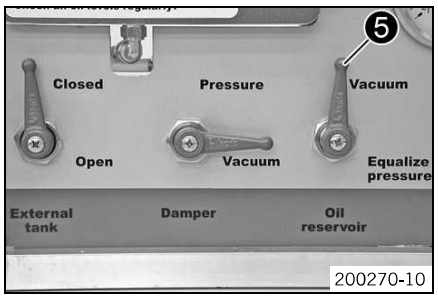
– When the pressure gauge reaches the specified value, turn the **Damper** ❹ control lever to **Vacuum**.

Guideline

3 bar

✓ The pressure gauge drops to the specified value.

0 bar



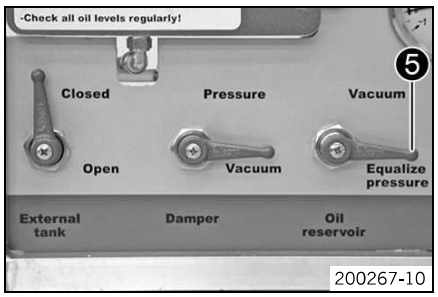
– When the pressure gauge reaches the specified value, turn the **Oil reservoir** ❺ control lever to **Vacuum**.

Guideline

0 bar

✓ The vacuum gauge falls to the specified value.

8 mbar



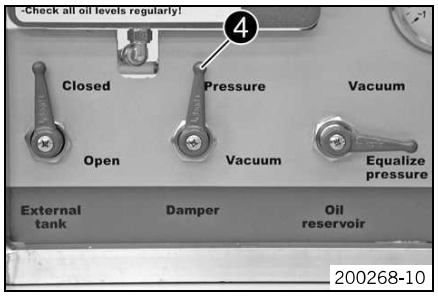
– When the vacuum pressure gauge reaches the specified value, turn the **Oil reservoir** control lever ❺ to **Equalize Pressure**.

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 ❹ to **Pressure**.

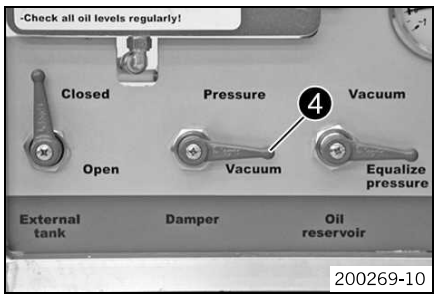
Guideline

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** ❹ control lever to **Vacuum**.

Guideline

3 bar

✓ The pressure gauge drops to the specified value.

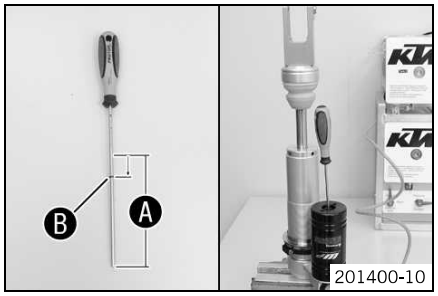
0 bar

– 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 Ⓑ to the end of the special tool by the specified value (distance Ⓐ minus specified value).

Guideline

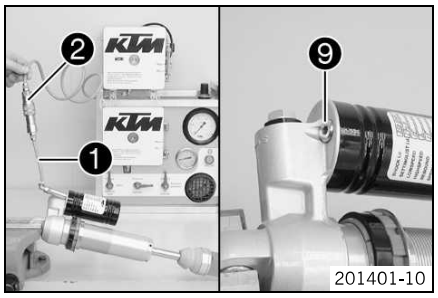
10 mm

Depth micrometer (T107S) (☛ p. 233)

– 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 ❶ from connection ❷ 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 ❾.

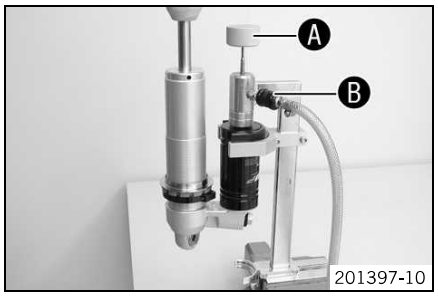
Guideline

Screw, filling port	M10x1	14 Nm (10.3 lbf ft)

8.25 Filling the damper with nitrogen

– Screw in screw ❶ 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. 238)

– 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 Ⓐ engages in the hexagon socket of the filling port screw.
– Open filler tap Ⓑ.
– 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 Ⓐ.

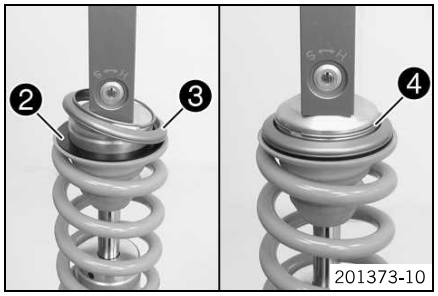
– Close spigot Ⓑ and take the damper out of the special tool.
– Tighten the filling port screw.

Guideline

Screw, reservoir filling port	M5	3 Nm (2.2 lbf ft)

8.26 Installing the spring (SX-F EU)

– Ensure that adjusting ring ❶ is screwed on with the intermediate washer.



– Measure the overall spring length while the spring is not under tension.
– Position spring.

Guideline

Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	51 N/mm (291 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	54 N/mm (308 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	57 N/mm (325 lb/in)

– Mount intermediate washer ❷ and spring retainer ❸.
– Mount ring ❹.

Alternative 1

– Tension the spring to the prescribed amount by turning the adjusting ring.

Guideline

Spring preload	13 mm (0.51 in)

Hook wrench (T106S) (☛ p. 233)

Alternative 2

Warning

Danger of accidents Modifications to the suspension settings can seriously alter the vehicle's ride behavior.

– Extreme modifications to the adjustment of the suspension components can cause a serious deterioration in the handling characteristics and overload some components.
– Only make adjustments within the recommended range.
– After making adjustments, ride slowly at first to get the feel of the new ride behavior.

– Tension the spring to the amount measured during dismantling by turning the adjusting ring.

Hook wrench (T106S) (☛ p. 233)

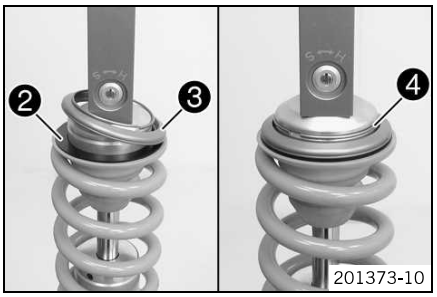
– Tighten screw ❺.

Guideline

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

8.27 Installing the spring (SX-F USA)

– Ensure that adjusting ring ❶ is screwed on with the intermediate washer.



– Measure the overall spring length while the spring is not under tension.
– Position spring.

Guideline

Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	51 N/mm (291 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	54 N/mm (308 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	57 N/mm (325 lb/in)

– Mount intermediate washer ❷ and spring retainer ❸.
– Mount ring ❹.

Alternative 1

– Tension the spring to the prescribed amount by turning the adjusting ring.

Guideline

Spring preload	12 mm (0.47 in)

Hook wrench (T106S) (☛ p. 233)

Alternative 2

Warning

Danger of accidents Modifications to the suspension settings can seriously alter the vehicle's ride behavior.

– Extreme modifications to the adjustment of the suspension components can cause a serious deterioration in the handling characteristics and overload some components.
– Only make adjustments within the recommended range.
– After making adjustments, ride slowly at first to get the feel of the new ride behavior.

– Tension the spring to the amount measured during dismantling by turning the adjusting ring.

Hook wrench (T106S) (☛ p. 233)

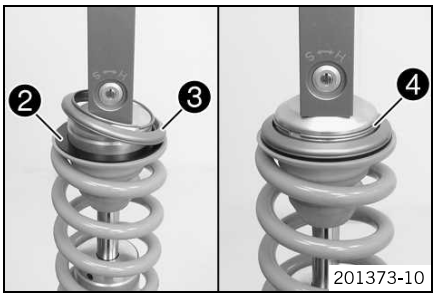
– Tighten screw ❺.

Guideline

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

8.28 Installing the spring (XC-F)

– Ensure that adjusting ring ❶ is screwed on with the intermediate washer.



– Measure the overall spring length while the spring is not under tension.
– Position spring.

Guideline

Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	51 N/mm (291 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	54 N/mm (308 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	57 N/mm (325 lb/in)

– Mount intermediate washer ❷ and spring retainer ❸.
– Mount ring ❹.

Alternative 1

– Tension the spring to the prescribed amount by turning the adjusting ring.

Guideline

Spring preload	12 mm (0.47 in)

Hook wrench (T106S) (☛ p. 233)

Alternative 2

Warning

Danger of accidents Modifications to the suspension settings can seriously alter the vehicle's ride behavior.

– Extreme modifications to the adjustment of the suspension components can cause a serious deterioration in the handling characteristics and overload some components.
– Only make adjustments within the recommended range.
– After making adjustments, ride slowly at first to get the feel of the new ride behavior.

– Tension the spring to the amount measured during dismantling by turning the adjusting ring.

Hook wrench (T106S) (☛ p. 233)

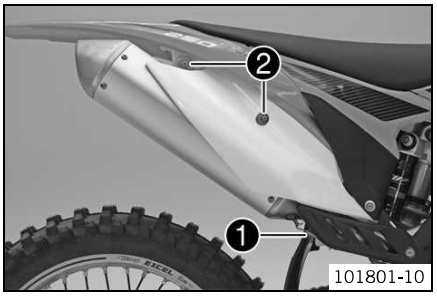
– Tighten screw ❺.

Guideline

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

9.1 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.

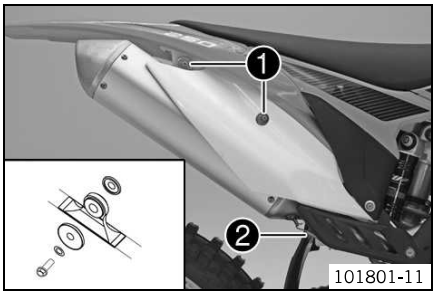


– Disconnect spring ❶.

Spring hooks (50305017000) (☛ p. 226)

– Remove screws ❷ and take off the main silencer.

9.2 Installing the main silencer



– Position the main silencer. Mount screws ❶ but do not tighten them yet.
Guideline

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

– Reconnect spring ❷.

Spring hooks (50305017000) (☛ p. 226)

– Tighten screws ❶.
Guideline

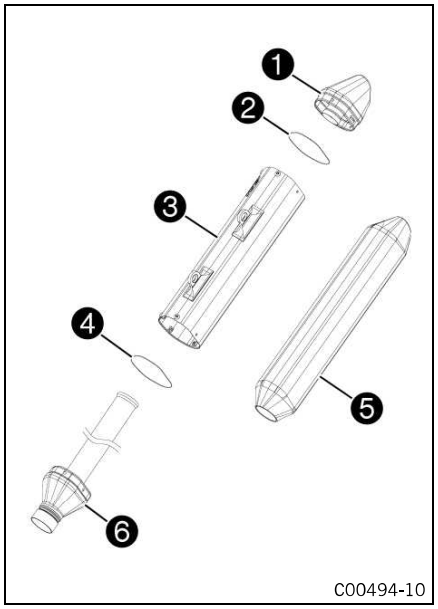
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)

9.3 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. 78)



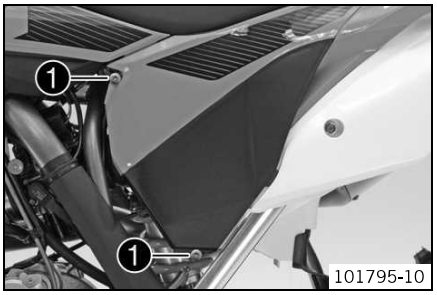
Main work

– Remove all screws from the main silencer.
– Take off silencer cap ❶ and O-ring ❷.
– Take off outer tube ❸ and O-ring ❹.
– Pull the glass fiber yarn filling ❺ from inner tube ❻.
– Clean the parts that are to be reinstalled.
– Mount the new glass fiber yarn filling ❺ on the inner tube.
– Slide O-ring ❹ and outer tube ❸ over the glass fiber yarn filling.
– Insert O-ring ❷ and silencer cap ❶ into the outer tube.
– Mount and tighten all screws.

Finishing work

– Install the main silencer. (☛ p. 78)

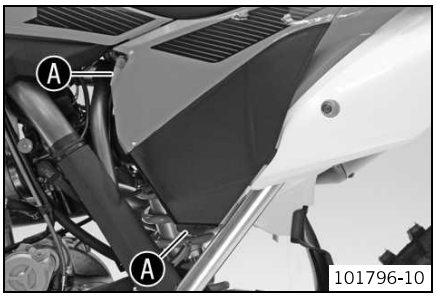
10.1 Removing the air filter box lid



Condition

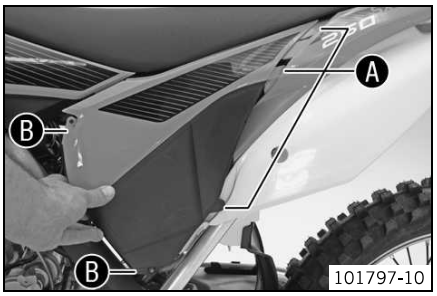
The air filter box lid is secured.

– Remove screws ❶.

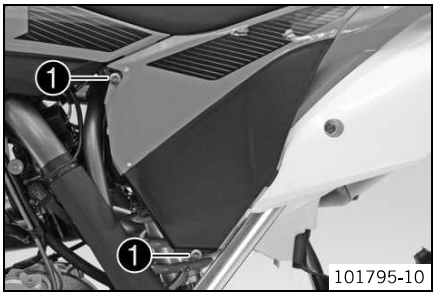


– Pull off the air filter box lid in area Ⓐ sideways and remove it toward the front.

10.2 Installing the air filter box lid



– Insert the air filter box lid into rear area Ⓐ and clip it into front area Ⓑ.



Condition

The air filter box lid is secured.

– Mount and tighten screws ❶.

Guideline

Screw, air filter box lid	**EJOT PT®** K60x20-Z	3 Nm (2.2 lbf ft)

EJOT PT screw (0017060204)

10.3 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.

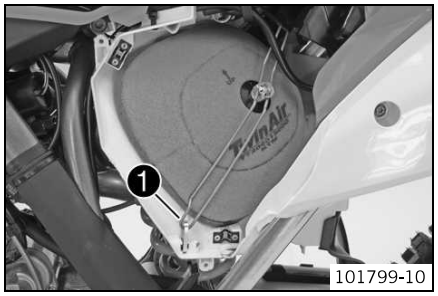
Warning

Environmental hazard Hazardous substances cause environmental damage.

– Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

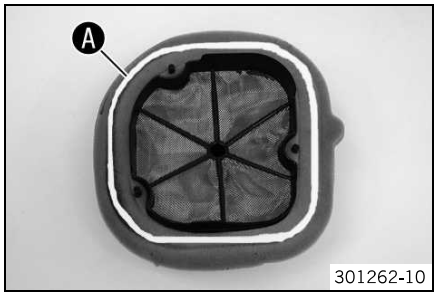
Preparatory work

– Remove the air filter box lid. (☛ p. 80)



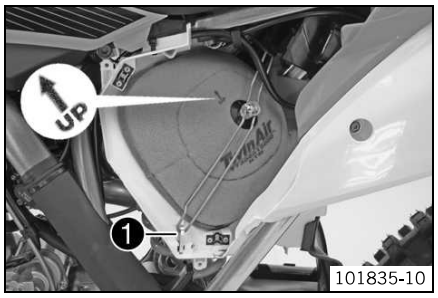
Main work
- Detach air filter holder ❶ at the bottom and swing it to one side. Remove the air filter with the air filter support.
- Remove the air filter from the air filter support.

10.4 Installing the air filter



Main work
- Mount the clean air filter on the air filter support.
- Grease the air filter in area Ⓐ.

Long-life grease (☛ p. 224)



- Insert both parts together, position them, and fasten them using air filter holder ❶.

✓ The arrow of marking **UP** faces up.

Info
If the air filter is not correctly mounted, dust and dirt can enter the engine and cause damage.

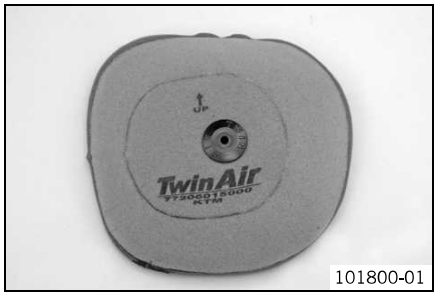
Finishing work
- Install the air filter box lid. (☛ p. 80)

10.5 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 lid. (☛ p. 80)
- Remove the air filter. (☛ p. 80)



Main work
- Wash the air filter thoroughly in special cleaning liquid and allow it to dry properly.

Air filter cleaner (☛ p. 224)

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. 225)

- Clean the air filter box.

– Clean the intake flange and check it for damage and tightness.

Finishing work

– Install the air filter. (☛ p. 81)
– Install the air filter box lid. (☛ p. 80)

11.1 Opening the filler cap

Danger
Fire hazard Fuel is highly flammable.

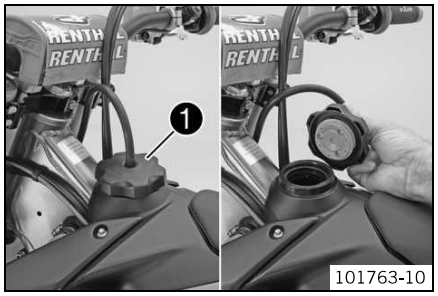
- Never refuel the vehicle near open flames or burning cigarettes, and always switch off the engine first. Be careful that no fuel is spilt, especially on hot vehicle components. Clean up spilt fuel immediately.
- The fuel in the fuel tank expands when warm and may emerge if overfilled. Follow the instructions on refueling.

Warning
Danger of poisoning Fuel is poisonous and a health hazard.

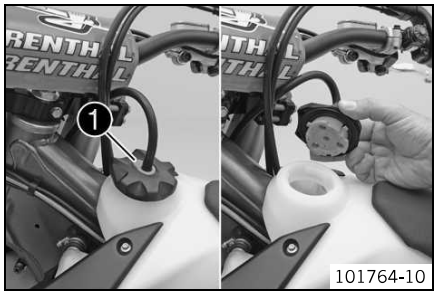
- Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that is 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.

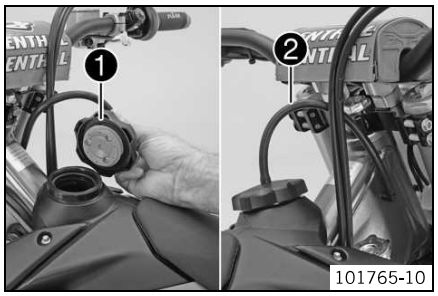


(All SX-F models)
- Turn filler cap ❶ counterclockwise and lift it off.



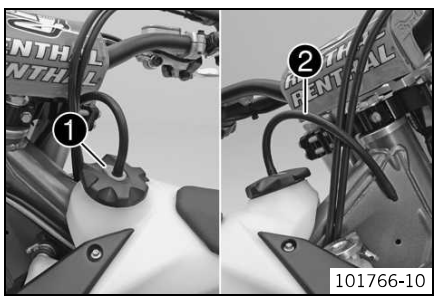
(XC-F)
- Press release button ❶, turn the filler cap counterclockwise, and lift it off.

11.2 Closing the filler cap



(All SX-F models)
- Mount filler cap ❶ and turn it clockwise until the fuel tank is tightly closed.

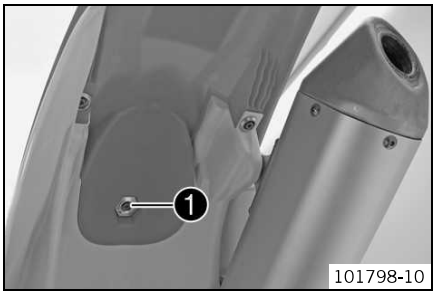
Info
Run the fuel tank breather hose ❷ without kinks.



(XC-F)
- Replace the filler cap and turn clockwise until the release button ❶ locks in place.

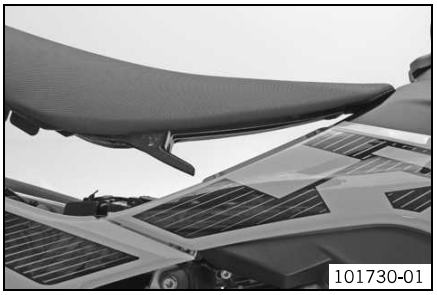
Info
Run the fuel tank breather hose ❷ without kinks.

11.3 Removing the seat



– Remove screw ❶.
– Lift up the seat at the rear, pull it back and then remove it from above.

11.4 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.
– Make sure that the seat is correctly locked in.
– Mount and tighten the screw of the seat fixation.

Guideline

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

11.5 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

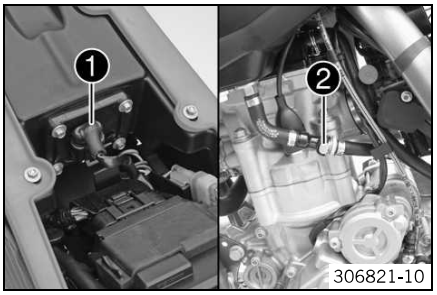
Danger of poisoning Fuel is poisonous and a health hazard.

– 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 is contaminated with fuel. Store fuel properly in a suitable canister and keep away from children.

Preparatory work

– Remove the seat. (☛ p. 84)

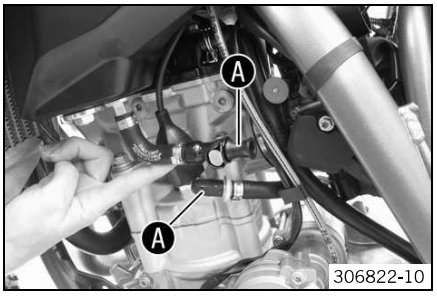
Main work



– Disconnect electric plug-in connection ❶ of the fuel pump.
– Thoroughly clean plug-in connection ❷ of the fuel line using compressed air.

Info

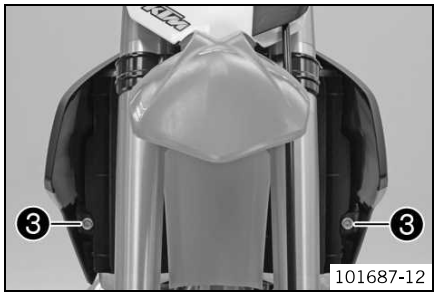
Under no circumstances should dirt enter into the fuel line. Dirt in the fuel line clogs the injection valve.



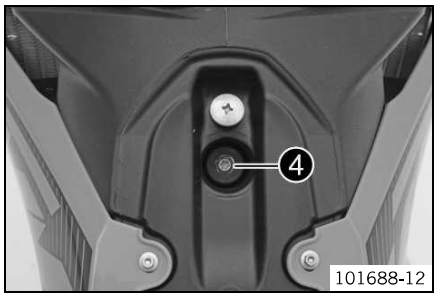
– Disconnect the plug-in connection of the fuel line.
– Mount wash cap set Ⓐ.

Wash cap set (81212016000)

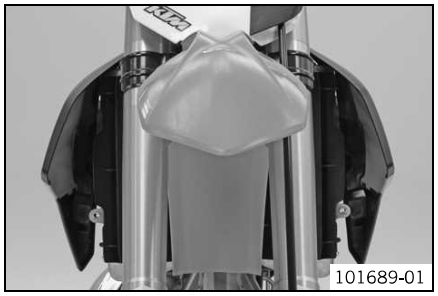
– Remove the tube from the fuel tank breather.



– Remove screws ❸ with the collar bushing.



– Remove screw ❹ with the rubber bushing.



– Pull both spoilers off of the sides of the radiator bracket and lift off the fuel tank.

11.6 Installing the fuel tank

Danger

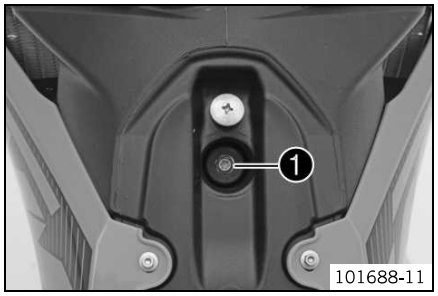
Fire hazard Fuel is highly flammable.

– 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.

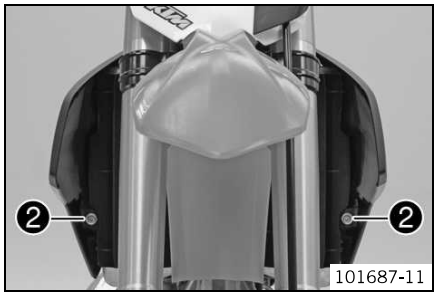


Main work

– Check the throttle cable routing. (☛ p. 51)
– 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.
– Mount the fuel tank breather.
– Mount and tighten screw ❶ with the rubber bushing.

Guideline

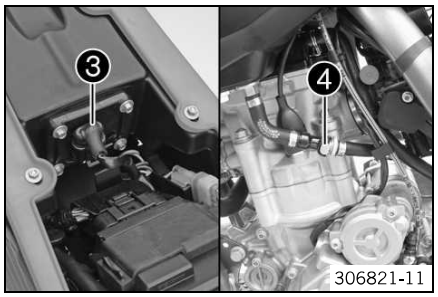
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)



– Mount and tighten screws ❷ with the collar bushing.

Guideline

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



– Connect the electrical plug-in connection ❸.
– Remove the wash cap set and clean the plug-in connection 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.

– Lubricate the O-ring and connect plug-in connection ❹ of the fuel line.

Info
Route the cable and fuel line at a safe distance from the exhaust system.

Finishing work
– Mount the seat. (☛ p. 84)

11.7 Checking the fuel pressure

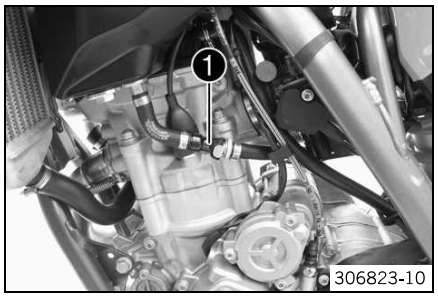
Danger
Fire hazard Fuel is highly flammable.

– 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.

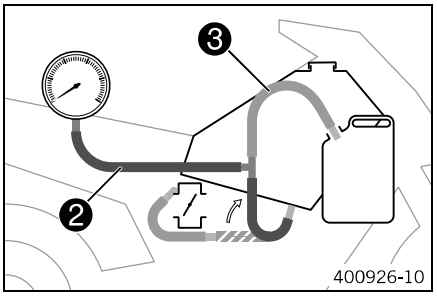
– Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that is 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 diagnostics tool is disconnected.



– Press on the small metal plate and disconnect fuel hose connection ❶.

Info
Remaining fuel may flow out of the fuel hose.



– Mount special tool ❷.

Pressure testing tool (61029094000) (☛ p. 229)

– Mount special tool ❸ with nozzle label **0,60**.

Testing hose (61029093000) (☛ p. 229)

– Position the hose end in a fuel cannister.

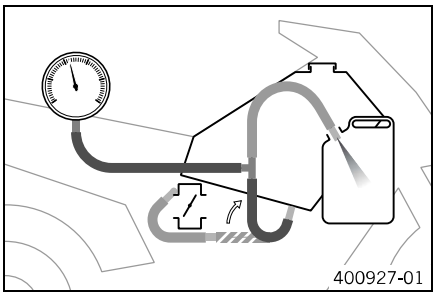
Guideline

Minimum size of fuel cannister	10 l (2.6 US gal)

– Connect the diagnostics tool and start it.
– Select the **"Function test of fuel pump control"** actuator test.

Guideline

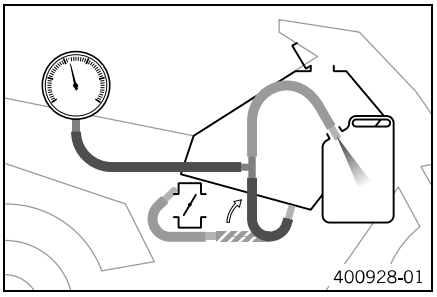
Maximum duration of the actuator test	3 min



– 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. 83)
– 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. 89)
– Change the fuel pump. (☛ p. 87)

– Stop the **"Function test of fuel pump control"** actuator test by pressing the **"Quit"** button.
– Remove the special tools.
– Join the fuel hose connection.

11.8 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.

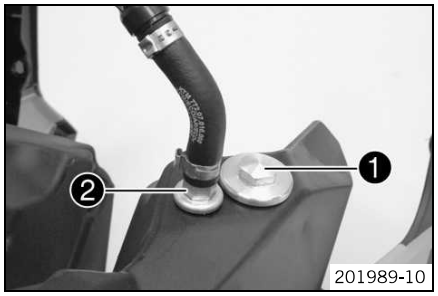
Warning
Danger of poisoning Fuel is poisonous and a health hazard.

– 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 is 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.

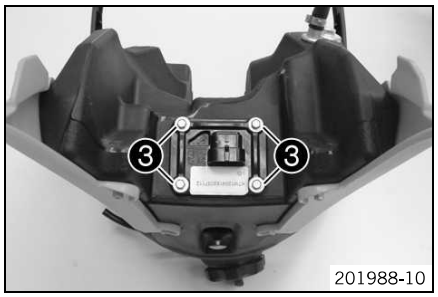
– Do not allow fuel to get into the ground water, the ground, or the sewage system.

Preparatory work
– Drain the fuel from the fuel tank into a suitable container.
– Remove the seat. (☛ p. 84)
– Remove the fuel tank. (☛ p. 84)

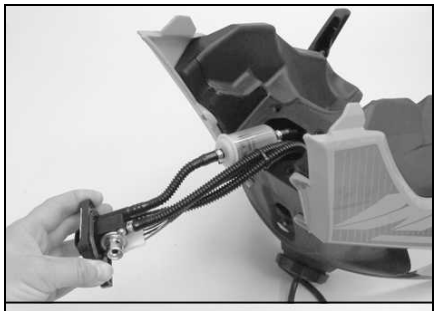


Main work

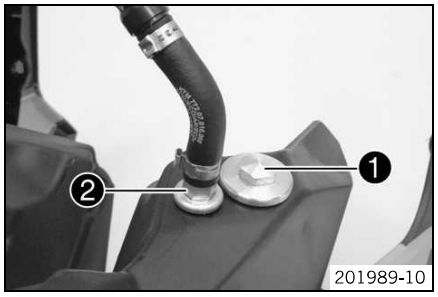
– Remove nut ❶ with the gasket.
– Remove fuel connection ❷ with the gasket.



– Remove screws ❸.



– Pull out the fuel pump.



– Position the fuel pump.
– Mount fuel connection ❷ with the gasket but do not tighten yet.
– Mount and tighten nut ❶ with the gasket.

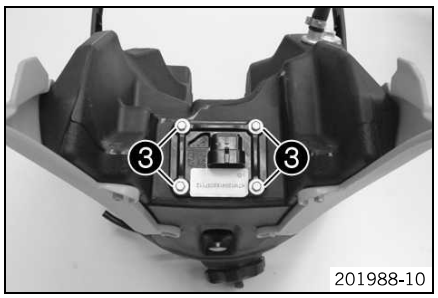
Guideline

Nut, fuel pump fixation	M12x1.75	15 Nm (11.1 lbf ft)

– Tighten fuel connection ❷.

Guideline

Fuel connection on fuel tank	M8x1.25	10 Nm (7.4 lbf ft)



– Mount and tighten screws ❸.

Guideline

Screw, fuel pump	EJOT	3 Nm (2.2 lbf ft)

Finishing work

– Install the fuel tank. (☛ p. 85)

– Mount the seat. (☛ p. 84)

11.9 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 is contaminated with fuel. Store fuel properly in a suitable canister and keep away from children.

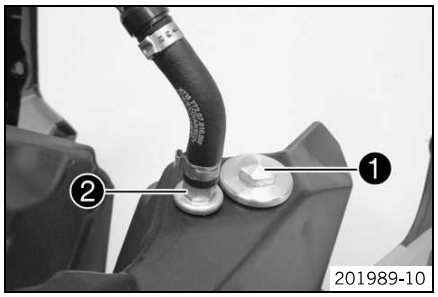
Warning

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.

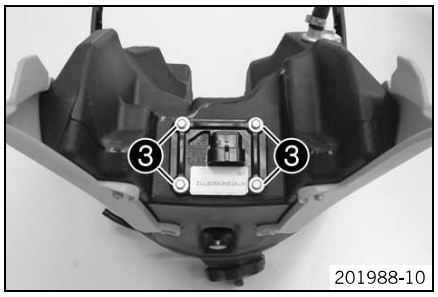
Preparatory work

– Drain the fuel from the fuel tank into a suitable container.
– Remove the seat. (☛ p. 84)
– Remove the fuel tank. (☛ p. 84)

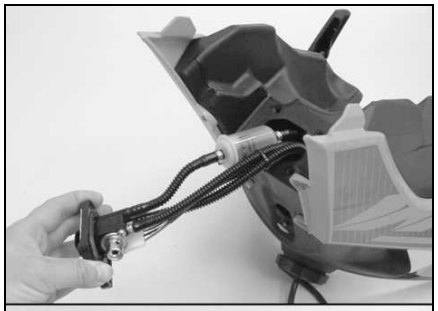


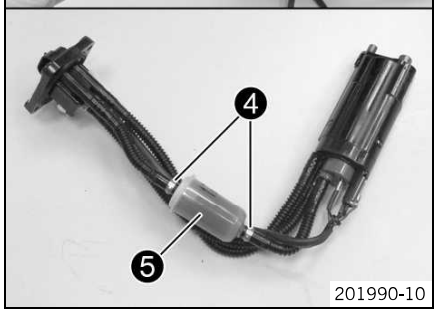
Main work

– Remove nut ❶ with the gasket.
– Remove fuel connection ❷ with the gasket.

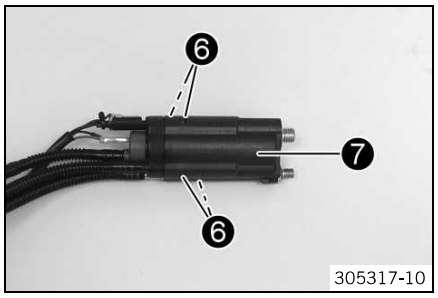


– Remove screws ❸.

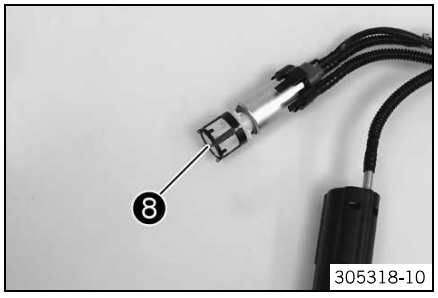




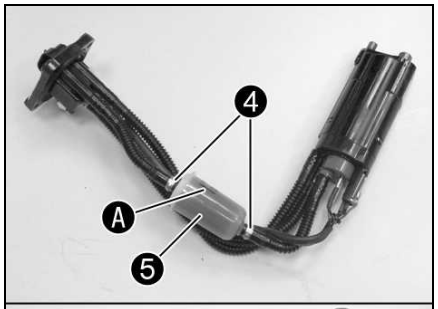
– Pull out the fuel pump.
– Remove hose clamps ❹.
– Remove fuel filter ❺.

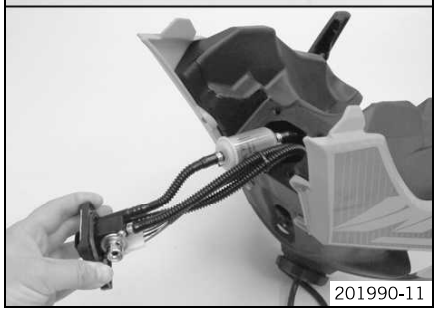


– Press lock ❻.
– Pull back fuel pump housing ❼.



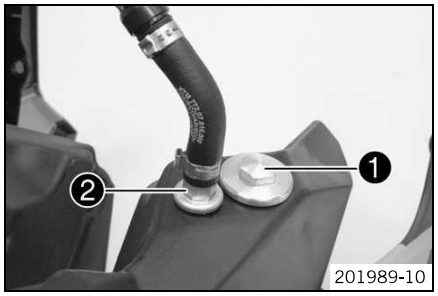
– Change fuel screen ❽.
– Mount the fuel pump housing.

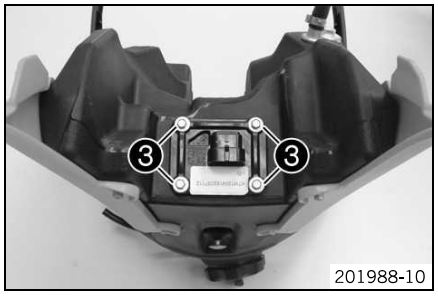




– Mount fuel filter ❺.
  ✔ Arrow Ⓐ points away from the fuel pump.
– Mount hose clamps ❹.

Hose clamp pliers (60029057000) (☛ p. 229)





– Position the fuel pump.
– Mount fuel connection ❷ with the gasket but do not tighten yet.
– Mount and tighten nut ❶ with the gasket.

Guideline

Nut, fuel pump fixation	M12x1.75	15 Nm (11.1 lbf ft)

– Tighten fuel connection ❷.

Guideline

Fuel connection on fuel tank	M8x1.25	10 Nm (7.4 lbf ft)

– Mount and tighten screws ❸.

Guideline

Screw, fuel pump	EJOT	3 Nm (2.2 lbf ft)

Finishing work

– Install the fuel tank. (☛ p. 85)
– Mount the seat. (☛ p. 84)

11.10 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

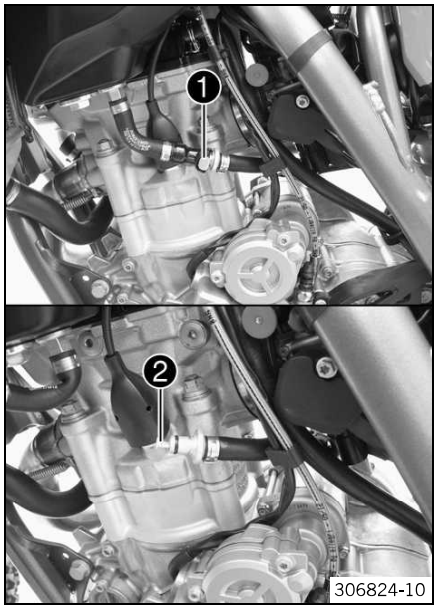
Danger of poisoning Fuel is poisonous and a health hazard.

– 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 ❶ of the fuel line thoroughly with compressed air.

Info
Under no circumstances should dirt enter into the fuel line. Dirt clogs the injection valve.

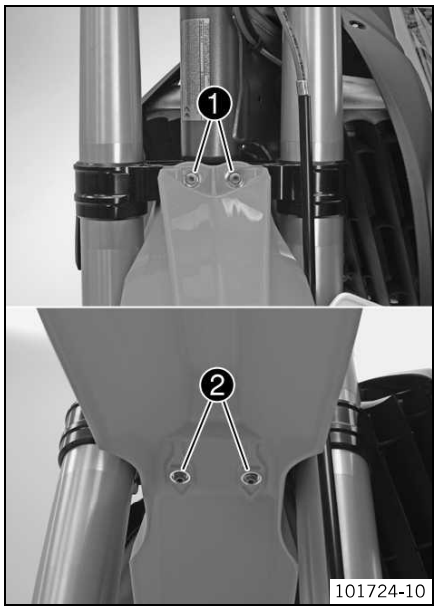
– Disconnect the plug-in connection of the fuel line.
– Pull fuel screen ❷ out of the connecting piece.
– Insert the new fuel screen all the way into the connecting piece.
– Lubricate the O-ring and connect the plug-in connection of the fuel line.

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.

12.1 Removing the front fender



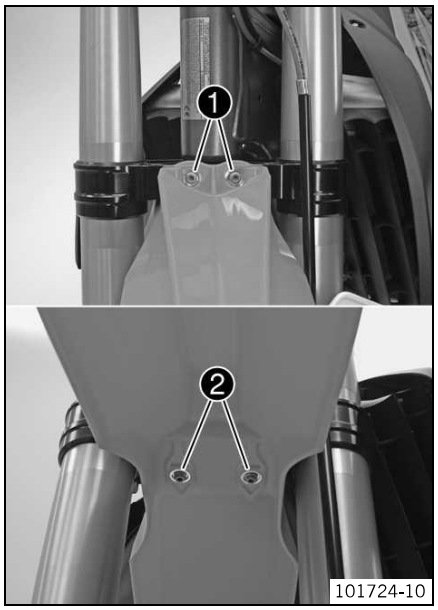
Preparatory work

– Remove the start number plate. (☛ p. 93)

Main work

– Remove screws ❶ and ❷. Remove the front fender.

12.2 Installing the front fender



Main work

– Position the front fender. Mount and tighten screws ❶ and ❷.

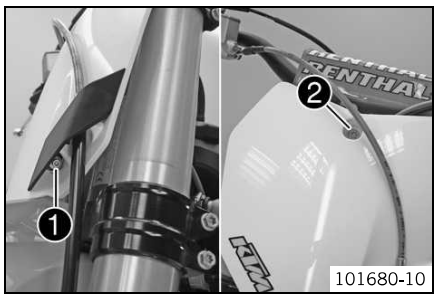
Guideline

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

Finishing work

– Install the start number plate. (☛ p. 94)

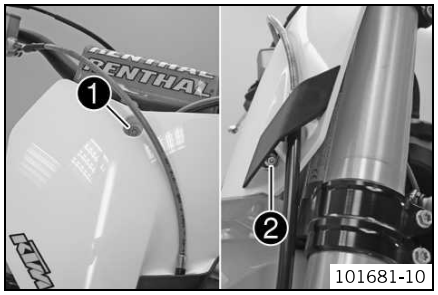
12.3 Removing the start number plate



– Remove screw ❶ and take off the clamp.

– Remove screw ❷. Take off the start number plate.

12.4 Installing the start number plate



– Position the start number plate. Mount and tighten screw ❶.

Guideline

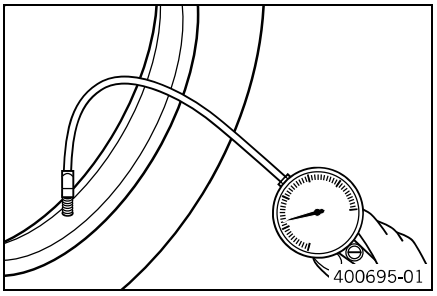
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)

Info
Make sure that the holding lugs engage in the fender.

– Position the brake line and clamp. Mount and tighten screw ❷.

13.1 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.



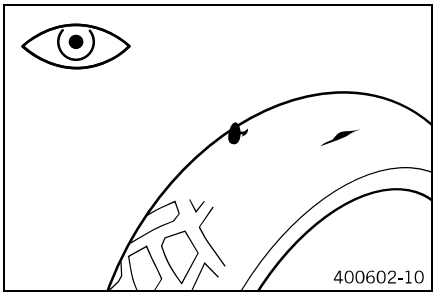
– Remove the protection cap.
– Check the tire air pressure when the tires are cold.

Tire air pressure, offroad	
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.

13.2 Checking the tire condition

Info
Only mount tires approved and/or recommended by KTM.
Other tires could have a negative effect on riding behavior.
The type, condition and air pressure of the tires all have an important impact on the riding behavior of the motorcycle.
The tires mounted on the front and rear wheels must have a similar profile.
Worn tires have a negative effect on riding behavior, especially on wet surfaces.



– Examine the front and rear tires for cuts, foreign bodies and other damage.
» If you find cuts, foreign bodies or other damage on a tire:
– 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 allowable depth:
– Change the tire.
– Check the tire age.

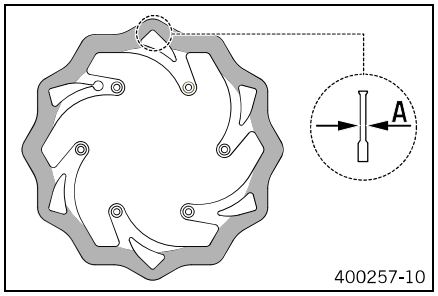
Info
The tire manufacture date is usually included in the tire identification number and comprises the last four digits of the **DOT** code. The first two digits indicate the week of manufacture and the last two digits the year of manufacture.
KTM recommends that the tires be changed after 5 years at the latest, regardless of the actual state of wear.

» If the tire is older than five years:
– Change the tire.

13.3 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 Ⓐ.

Info
Wear reduces the thickness of the brake disc around the area used by the brake linings.

Brake discs - wear limit	
Front	2.5 mm (0.098 in)
Rear	3.5 mm (0.138 in)

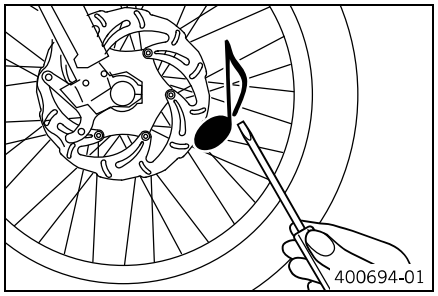
» If the brake disc thickness is less than the specified value:
– Change the brake disc.

– 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.

13.4 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

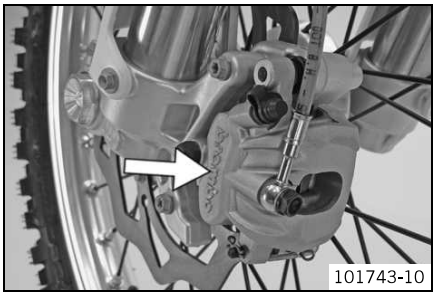
Spoke nipple, front wheel	M4.5	5… 6 Nm (3.7… 4.4 lbf ft)
Spoke nipple, rear wheel	M4.5	5… 6 Nm (3.7… 4.4 lbf ft)

Torque wrench with various accessories in set (58429094000) (☛ p. 228)

13.5 Front wheel

13.5.1 Removing the front wheel

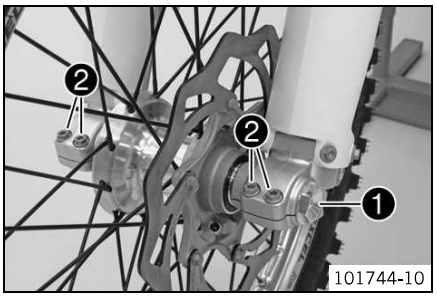
Preparatory work
– Raise the motorcycle with the lift stand. (☛ p. 10)



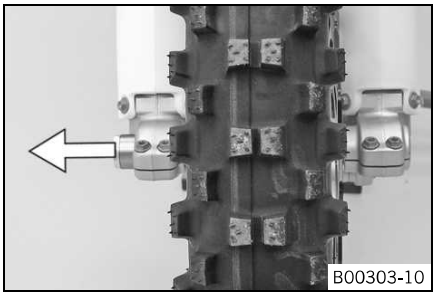
Main work

– 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.

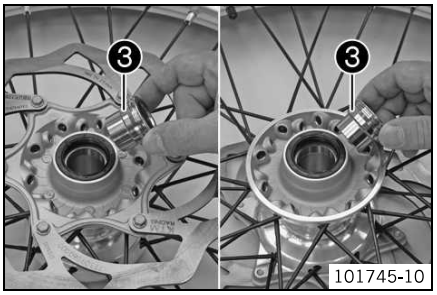


– Loosen screw ❶ by several turns.
– Loosen screws ❷.
– Press on screw ❶ to push the wheel spindle out of the axle clamp.
– Remove screw ❶.



– 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.

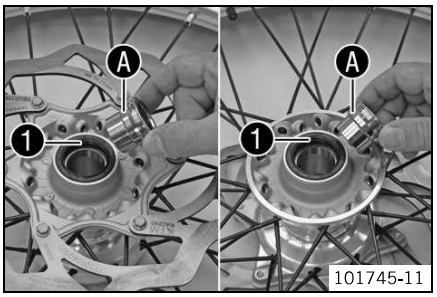


– Remove spacers ❸.

13.5.2 Installing the front wheel

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

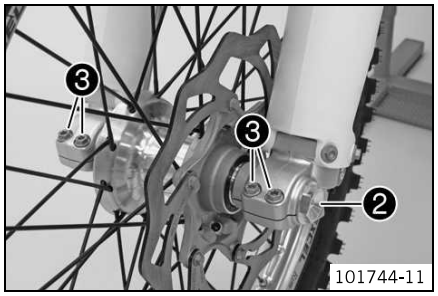
– Always keep the brake discs free of oil and grease, and clean them with brake cleaner when necessary.



– Check the wheel bearing for damage and wear.
  » If the wheel bearing is damaged or worn:
    – Change the wheel bearing.
– Clean and grease the shaft seal rings ❶ and contact surface Ⓐ of the spacers.

Long-life grease (☛ p. 224)

– Insert the spacers.
– Position the front wheel and insert the wheel spindle.
  ✓ The brake linings are correctly positioned.



– Mount and tighten screw ❷.

Guideline

Screw, front wheel spindle	M24x1.5	45 Nm (33.2 lbf ft)

– Activate the hand brake lever multiple times until the brake linings are in contact with the brake disc.
– Remove the motorcycle from the lift stand. (☛ p. 10)
– Pull the front brake and compress the fork powerfully a few times.

✓ The fork legs straighten.

– Tighten screws ❸.

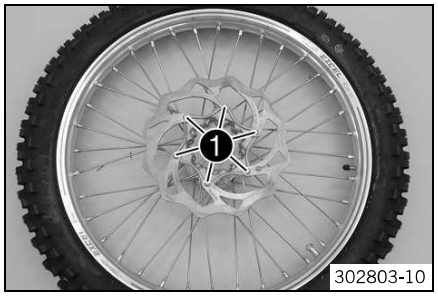
Guideline

Screw, fork stub	M8	15 Nm (11.1 lbf ft)

13.5.3 Removing the brake disc of the front brake

Preparatory work

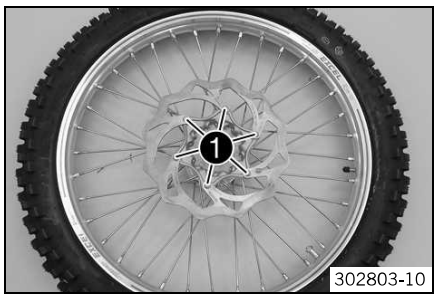
– Raise the motorcycle with the lift stand. (☛ p. 10)
– Remove the front wheel. (☛ p. 96)



Main work

– Remove screws ❶. Take off the brake disc.

13.5.4 Installing the brake disc of the front brake



Main work

– Clean the contact surface of the brake disc.
– Position the brake disc with the label facing outward. Mount and tighten screws ❶.

Guideline

Screw, front brake disc	M6	14 Nm (10.3 lbf ft)	**Loctite® 243™**

Finishing work

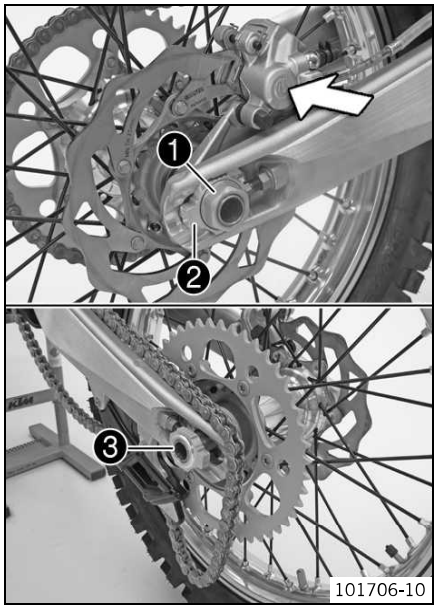
– Install the front wheel. (☛ p. 97)

13.6 Rear wheel

13.6.1 Removing the rear wheel

Preparatory work

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



Main work

– Press the brake caliper onto the brake disc by hand in order to push back the brake piston.

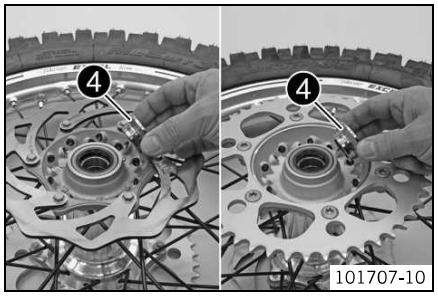
Info
Make sure when pushing back the brake piston that you do not press the brake caliper against the spokes.

– Remove nut ❶.
– Remove chain adjuster ❷. Withdraw wheel spindle ❸ 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 components 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.

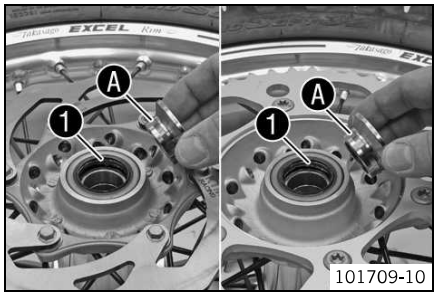


– Remove spacers ❹.

13.6.2 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.

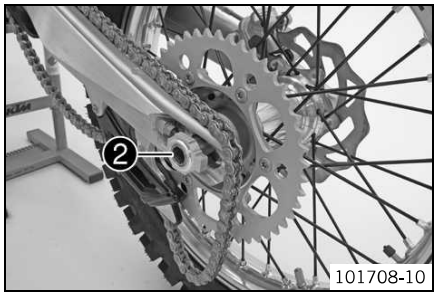


Main work

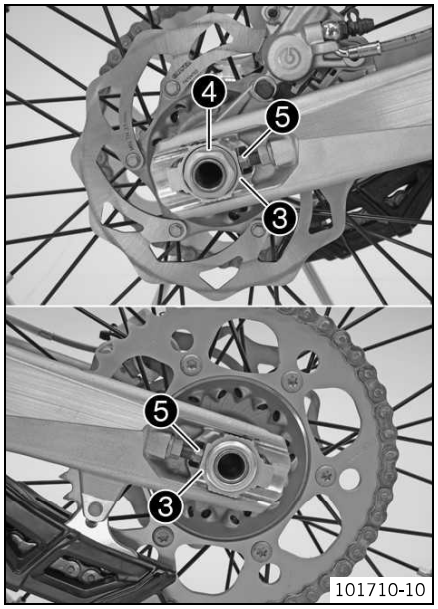
– Check the wheel bearing for damage and wear.
  » If the wheel bearing is damaged or worn:
    – Change the wheel bearing.
– Clean and grease the shaft seal rings ❶ and contact surface Ⓐ of the spacers.

Long-life grease (☛ p. 224)

– Insert the spacers.



– Position the rear wheel and insert wheel spindle ❷.
  ✓ The brake linings are correctly positioned.
– Put the chain on.



– Position chain adjuster ❸. Mount nut ❹, but do not tighten it yet.
– Make sure that chain adjusters ❸ are fitted correctly on adjusting screws ❺.
– Check the chain tension. (☛ p. 100)
– Tighten nut ❹.

Guideline

Nut, rear wheel spindle	M25x1.5	80 Nm (59 lbf ft)

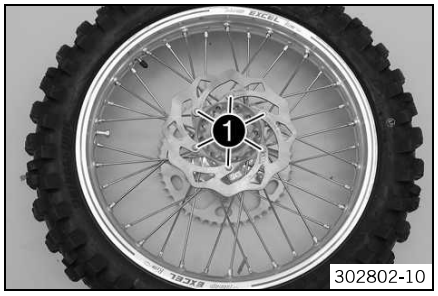
Info
The wide adjustment range of the chain adjusters (32 mm (1.18 in)) enables different secondary ratios with the same chain length.
Chain adjusters ❸ can be turned by 180°.

– 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)

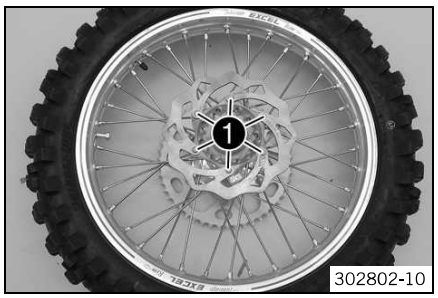
13.6.3 Removing the brake disc of the rear brake

Preparatory work
– Raise the motorcycle with the lift stand. (☛ p. 10)
– Remove the rear wheel. (☛ p. 98)



Main work
– Remove screws ❶. Take off the brake disc.

13.6.4 Installing the brake disc of the rear brake



– Clean the contact surface of the brake disc.
– Position the brake disc with the label facing outward. Mount and tighten screws ❶.

Guideline

Screw, rear brake disc	M6	14 Nm (10.3 lbf ft)	**Loctite® 243™**

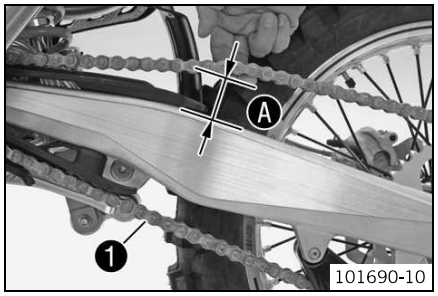
– Install the rear wheel. (☛ p. 99)

13.6.5 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 the lift stand. (☛ p. 10)



Main work

– Push the chain at the end of the chain sliding component upwards to measure the chain tension Ⓐ.

Info

The lower chain section ❶ 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. 101)

Finishing work

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

13.6.6 Adjusting the chain tension

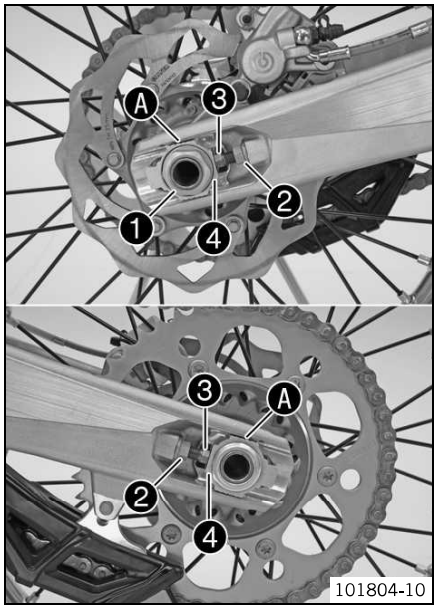
Warning

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 the lift stand. (☛ p. 10)
– Check the chain tension. (☛ p. 100)



Main work

– Loosen nut ❶.
– Loosen nuts ❷.
– Adjust the chain tension by turning the adjusting screws ❸ left and right.

Guideline

Chain tension	55… 58 mm (2.17… 2.28 in)
Turn adjusting screws ❸ on the left and right so that the markings on the left and right chain adjusters are in the same position relative to the reference marks Ⓐ. The rear wheel is then correctly aligned.	

– Tighten nuts ❷.
– Make sure that chain adjusters ❹ are fitted correctly on adjusting screws ❸.
– Tighten nut ❶.

Guideline

Nut, rear wheel spindle	M25x1.5	80 Nm (59 lbf ft)

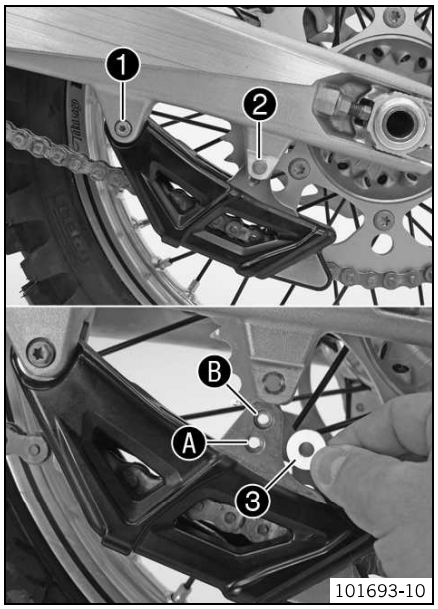
Info

The wide adjustment range of the chain adjusters (32 mm (1.18 in)) enables different secondary ratios with the same chain length.
Chain adjusters ❹ can be turned by 180°.

Finishing work

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

13.6.7 Adjusting the chain guide



– Loosen screw ❶. Remove screw ❷. Swing the chain guide down.

Condition

Number of teeth: ≤ 44 teeth

– Insert collar bushing ❸ into drill hole Ⓐ. Position the chain guide.
– Mount and tighten screw ❷. Tighten screw ❶.

Guideline

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

Condition

Number of teeth: ≥ 45 teeth

– Insert collar bushing ❸ into drill hole Ⓑ. Position the chain guide.
– Mount and tighten screw ❷. Tighten screw ❶.

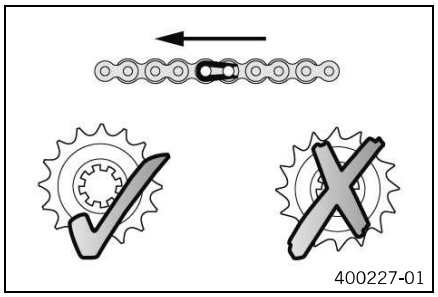
Guideline

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

13.6.8 Checking the chain, rear sprocket, engine sprocket and chain guide

Preparatory work

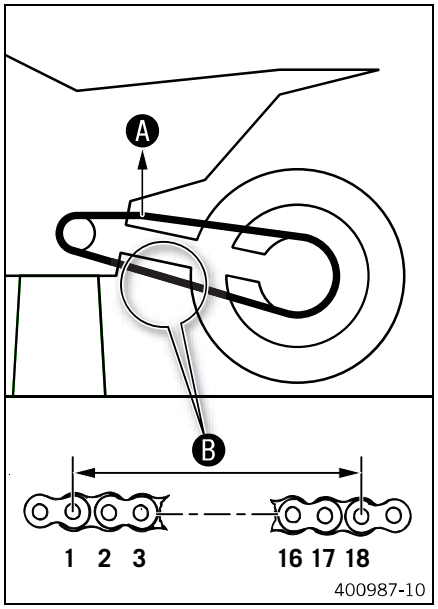
– Raise the motorcycle with the lift stand. (☛ p. 10)



Main work

– Shift gear to neutral.
– Check the rear sprocket and engine sprocket for wear.
» If the rear sprocket and engine sprocket are worn:
– Change the power set.

Info
The engine sprocket, rear sprocket and chain should always be replaced together.



– Pull on the upper part of the chain with the specified weight Ⓐ.

Guideline

Weight, chain wear measurement	10… 15 kg (22… 33 lb.)

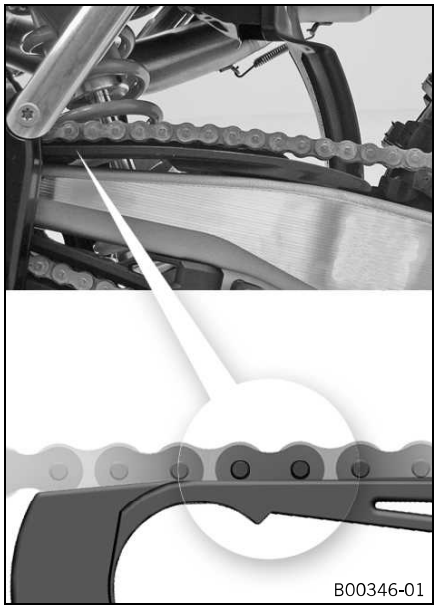
– Measure the distance Ⓑ of 18 chain links in the lower chain section.

Info
Chain wear is not always even, so you should repeat this measurement at different chain positions.

Maximum distance Ⓑ at the longest chain section	272 mm (10.71 in)

» If the distance Ⓑ is greater than the specified measurement:
– Change the power set.

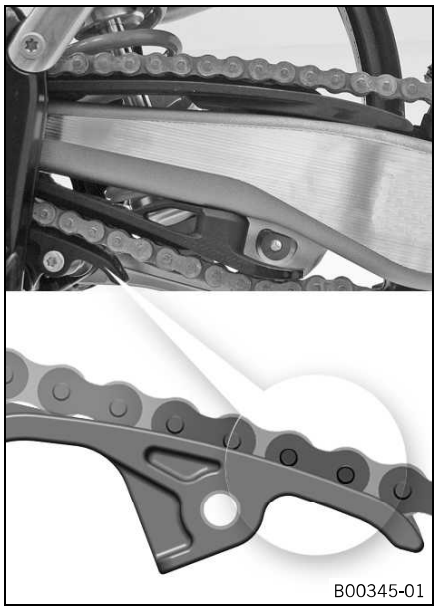
Info
When the chain is replaced, the rear sprocket and engine sprocket should also be changed.
New chains wear out faster on old, worn sprockets.


B00346-01

– Check the chain sliding guard for wear.
  » If the bottom edge of the chain bolt is in line with 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 chain sliding guard.

Guideline

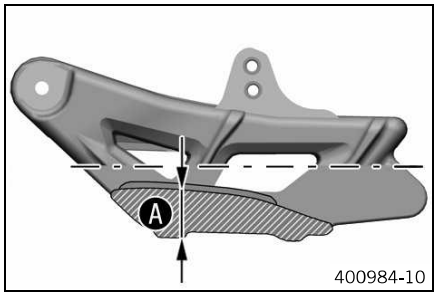
Screw, chain sliding guard	M6	6 Nm (4.4 lbf ft)	**Loctite® 243™**


B00345-01

– Check the chain sliding piece for wear.
  » If the bottom edge of the chain bolt 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 chain sliding piece.

Guideline

Screw, chain sliding piece	M8	15 Nm (11.1 lbf ft)

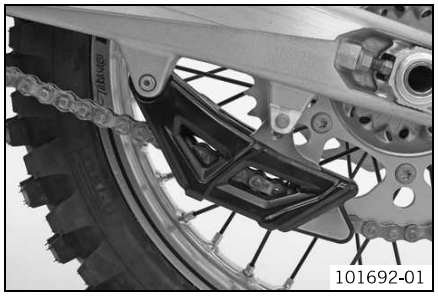


400984-10

– Measure material thickness Ⓐ at the bottom of the chain guide.

Minimum distance Ⓐ at the lowest point	12 mm (0.47 in)

  » If distance Ⓐ is less than the specified measurement:
    – Change the chain guide.


101692-01

– Check that the chain guide is firmly seated.
  » If the chain guide is loose:
    – Tighten the chain guide.

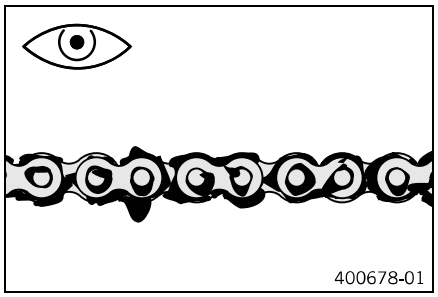
Guideline

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

Finishing work

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

13.6.9 Checking for chain dirt accumulation



– Check the chain for coarse dirt accumulation.
  » If the chain is very dirty:
    – Clean the chain. (☛ p. 104)

13.6.10 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.

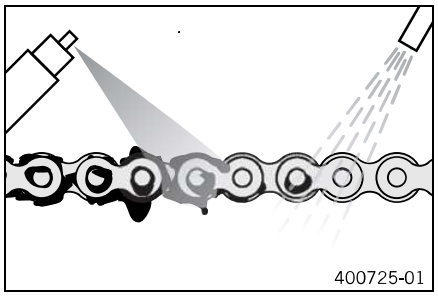
Warning
Danger of accidents Reduced braking efficiency due to oil or grease on the brake discs.

– 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.



– Clean the chain regularly and then treat with chain spray.

Chain cleaner (☛ p. 224)
Off-road chain spray (☛ p. 225)

14.1 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 by-pass or repair fuses.

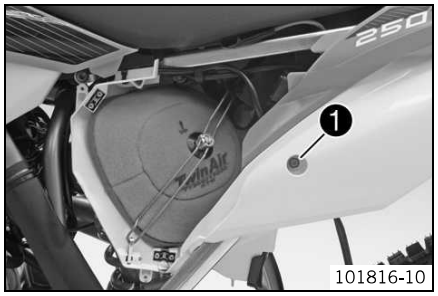
Info

The main fuse protects all power consumers of the vehicle. It is located in the starter relay housing under the air filter box lid.

Preparatory work

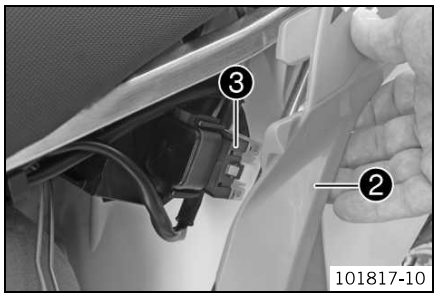
– Switch off all power consumers and switch off the engine.

– Remove the air filter box lid. (☛ p. 80)

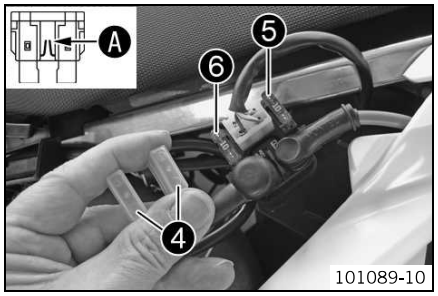


Main work

– Remove screw ❶.



– Lift rear fairing ❷ slightly and pull starter relay ❸ out of the holder.



– Remove protection caps ❹.

– Remove the faulty main fuse ❺.

Info

A defective fuse is indicated by a burned-out fuse wire Ⓐ.
A reserve fuse ❻ is located in the starter relay.

– Install a new main fuse.

Fuse (58011109110) (☛ p. 201)

– Check that the electrical equipment is functioning.

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.

– Position the rear fairing. Mount and tighten the screw.

Guideline

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

Finishing work

– Install the air filter box lid. (☛ p. 80)

14.2 Removing the battery

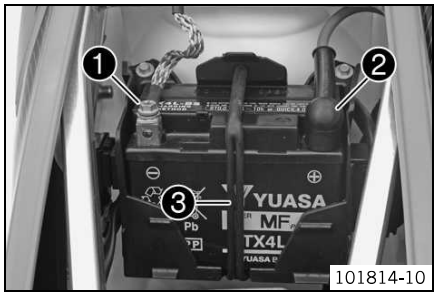
Warning

Risk of injury Battery acid and battery gases cause serious chemical burns.

- Keep batteries out of the reach of children.
- Wear suitable protective clothing and goggles.
- Avoid contact with battery acid and battery gases.
- Keep sparks and open flames away from the battery. Only charge in well-ventilated rooms.
- In the event of skin contact, rinse with large amounts of water. If battery acid gets in the eyes, rinse with water for at least 15 minutes and contact a physician.

Preparatory work

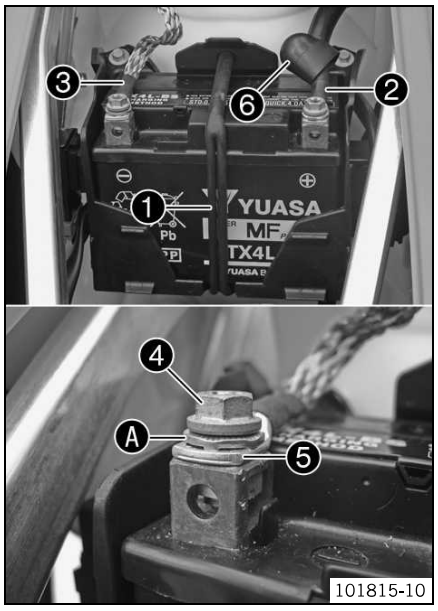
- Switch off all power consumers and switch off the engine.
- Remove the seat. (☛ p. 84)



Main work

- Disconnect the negative (minus) cable ❶ of the battery.
- Pull back the positive terminal cover ❷ and disconnect the positive (plus) cable of the battery.
- Detach rubber band ❸ from the bottom.
- Lift the battery out.

14.3 Installing the battery



Main work

- Insert the battery into the battery compartment with the terminals facing to the front.

  (All SX-F models)

Battery (YTX4L-BS) (☛ p. 201)

  (XC-F)

Battery (YTX5L-BS) (☛ p. 201)

- Reconnect rubber band ❶.
- Connect positive cable ❷.

  Guideline

Screw, battery terminal	M5	2.5 Nm (1.84 lbf ft)

Info

Contact disks Ⓐ must be mounted between screws ❹ and cable sockets ❺ with the claws facing down.

- Slide positive terminal cover ❻ over the positive terminal.
- Connect negative cable ❸.

  Guideline

Screw, battery terminal	M5	2.5 Nm (1.84 lbf ft)

Info

Contact disk Ⓐ must be mounted between screw ❹ and cable socket ❺ with the claws facing down.

Finishing work

- Mount the seat. (☛ p. 84)

14.4 Recharging the battery

Warning

Risk of injury Battery acid and battery gases cause serious chemical burns.

- Keep batteries out of the reach of children.
- Wear suitable protective clothing and goggles.
- Avoid contact with battery acid and battery gases.
- Keep sparks and open flames away from the battery. Only charge in well-ventilated rooms.
- In the event of skin contact, rinse with large amounts of water. If battery acid gets in the eyes, rinse with water for at least 15 minutes and contact a physician.

Warning

Environmental hazard The battery contains elements that are harmful to the environment.

- Do not discard batteries with the household waste. Dispose of faulty batteries in an environmentally compatible manner. Give the battery to your authorized KTM dealer or dispose of it at a collection point for used batteries.

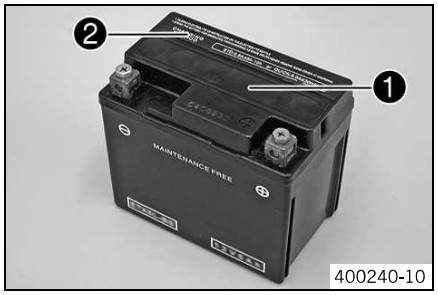
Warning

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

Even when there is no load on the battery, it still loses power steadily.
The charge state and the type of charge are very important for the service life of the battery.
Rapid recharging with a high charging current shortens the battery's service life.
If the charging current, charging voltage and charging time are exceeded, electrolyte escapes through the safety valves. This reduces the battery capacity.
If the battery is depleted from starting the vehicle repeatedly, the battery must be charged immediately.
If the battery is left in a discharged state for an extended period, it will become over-discharged and sulfate, destroying the battery.
The battery is maintenance-free, i.e., the acid level does not have to be checked.



Preparatory work

- Switch off all power consumers and switch off the engine.
- Remove the seat. (☛ p. 84)
- Disconnect the negative (minus) cable of the battery to avoid damage to the motorcycle's electronics.

Main work

- Connect the battery charger to the battery. Switch on the battery charger.

Battery charger (58429074000)

You can also use the battery charger to test rest potential and start potential of the battery, and to test the alternator. With this device, you cannot overcharge the battery.

Info

Never remove cover ❶.
Charge the battery with a maximum of 10% of the capacity specified on the battery housing ❷.

- Switch off the charger after charging. Disconnect the battery.

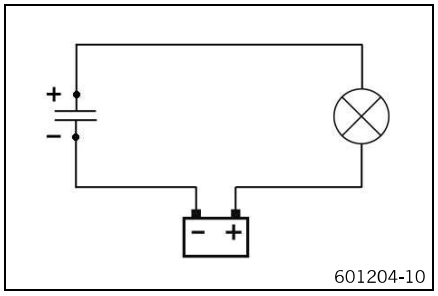
Guideline

The charge current, charge voltage and charge time must not be exceeded.	
Charge the battery regularly when the motorcycle is not in use	3 months

Finishing work

- Mount the seat. (☛ p. 84)

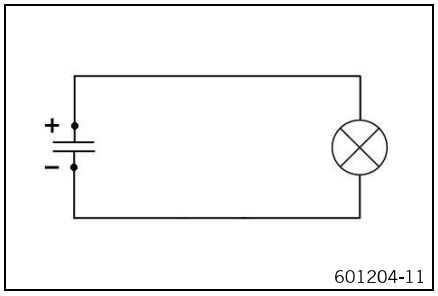
14.5 Checking the capacitor



– 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.

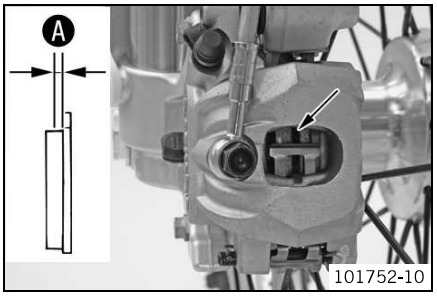
» The lamp lights up for: 0.5… 2.0 s
The capacitor is functional.
» The lamp lights up for: < 0.5 s
Change the capacitor.
» The lamp lights up for: > 2.0 s
Change the capacitor.

– Install the capacitor.

15.1 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 Ⓐ.

Minimum thickness Ⓐ	≥ 1 mm (≥ 0.04 in)

» If the minimum thickness is less than specified:
– Change the front brake linings. (☛ p. 109)

– Check the brake linings for damage and cracking.

» If damage or cracking is visible:
– Change the front brake linings. (☛ p. 109)

15.2 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.

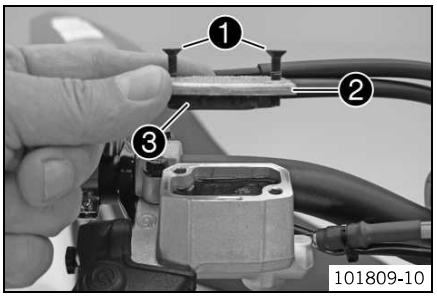
Warning
Environmental hazard Hazardous substances cause environmental damage.

– Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

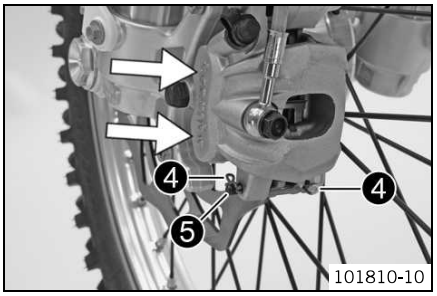
Warning
Environmental hazard Hazardous substances cause environmental damage.

– 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.



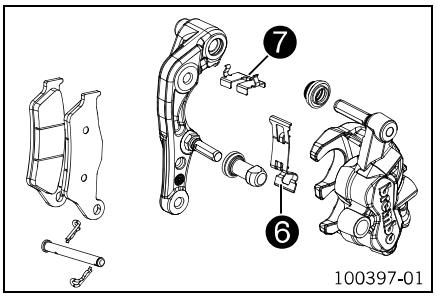
– Move the brake fluid reservoir mounted on the handlebar to a horizontal position.
– Remove screws ❶.
– Remove cover ❷ with membrane ❸.



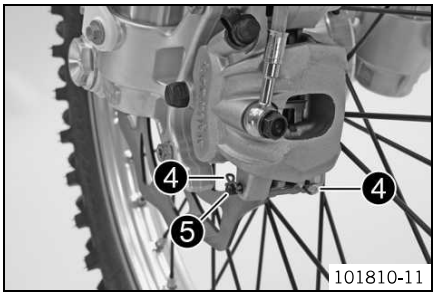
– Manually press the brake caliper to the brake disc to push back the brake pistons. Ensure that brake fluid does not flow out of the brake fluid reservoir, extracting it by suction if it does.

Info
Make sure when pushing back the brake pistons that you do not press the brake caliper against the spokes.

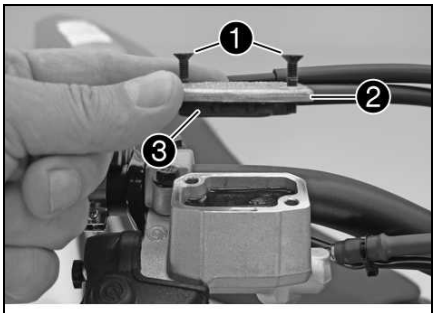
– Remove cotter pin ❹, pull out pin ❺, and remove the brake linings.
– Clean the brake caliper and brake caliper support.

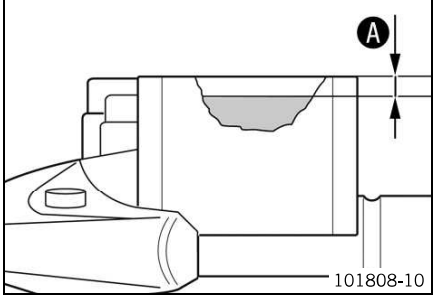


– Check that leaf spring ❻ in the brake caliper and sliding plate ❼ in the brake caliper support are seated correctly.



– Insert the brake linings, insert pin ❺, and mount cotter pins ❹.
– 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 Ⓐ.

Guideline

Dimension Ⓐ (brake fluid level below top edge of container)	5 mm (0.2 in)

Brake fluid DOT 4 / DOT 5.1 (☛ p. 222)

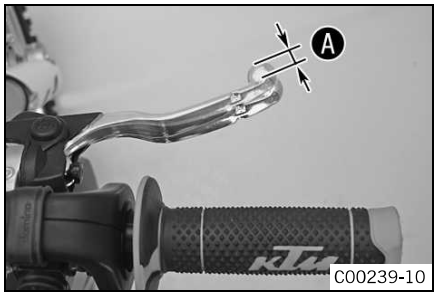
– Position cover ❷ with membrane ❸.
– Mount and tighten screws ❶.

Info
Clean up overflowed or spilt brake fluid immediately with water.

15.3 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.

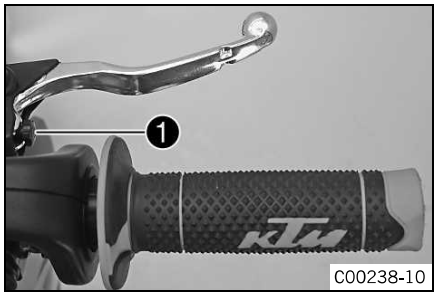


– Push the hand brake lever forward and check free travel Ⓐ.

Free travel of hand brake lever	≥ 3 mm (≥ 0.12 in)

» If the free travel does not meet specifications:
– Adjust the basic position of the hand brake lever. (☛ p. 111)

15.4 Adjusting the basic position of the hand brake lever



– Check the free travel of the hand brake lever. (☛ p. 110)
– Adjust the basic setting of the hand brake lever to your hand size by turning adjusting screw ❶.

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!

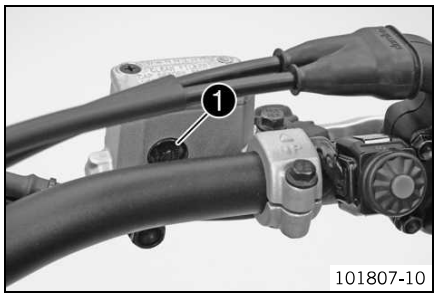
15.5 Checking the front brake fluid level

Warning
Danger of accidents Failure of the brake system.

– If the brake fluid level falls below the **MIN** mark, this indicates a leakage in the brake system or worn-out brake linings. 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.



– Move the brake fluid reservoir mounted on the handlebar to a horizontal position.
– Check the brake fluid level in the viewer ❶.
» When the brake fluid level drops below the **MIN** mark:
– Add front brake fluid. (☛ p. 111)

15.6 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.

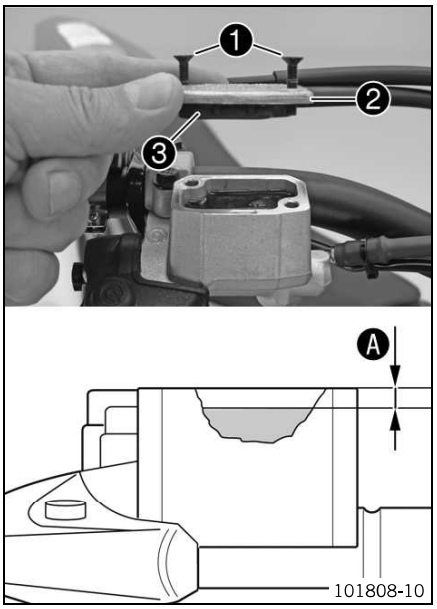
Warning
Danger of accidents Reduced braking efficiency due to old brake fluid.

– 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.

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. 109)

Main work
– Move the brake fluid reservoir mounted on the handlebar to a horizontal position.
– Remove screws ❶.
– Remove cover ❷ with membrane ❸.
– Add brake fluid to level Ⓐ.

Guideline

Dimension Ⓐ (brake fluid level below top edge of container)	5 mm (0.2 in)

Brake fluid DOT 4 / DOT 5.1 (☛ p. 222)

– Position the cover with the membrane. Mount and tighten the screws.

Info
Clean up overflowed or spilt brake fluid immediately with water.

15.7 Changing the front brake fluid

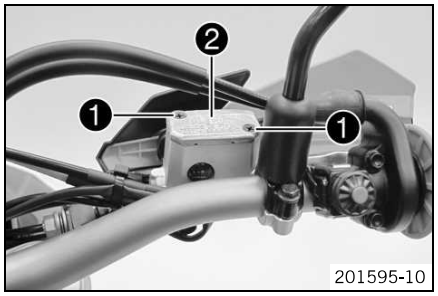
Warning
Skin irritation Brake fluid can cause skin irritation on contact.

– 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.

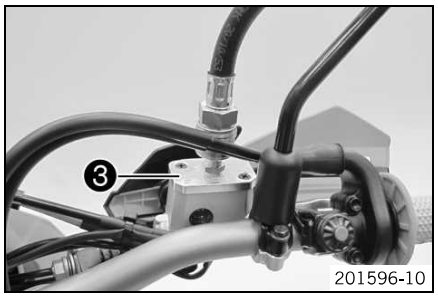
– Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

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 ❶.
– Remove cover ❷ with 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. 227)
Brake fluid DOT 4 / DOT 5.1 (☛ p. 222)

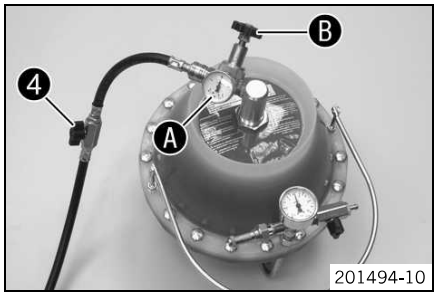


– Mount bleeder cover ❸.

Bleeder cover (00029013005) (☛ p. 226)

– Connect the bleeding device.

Bleeding device (00029013100) (☛ p. 226)



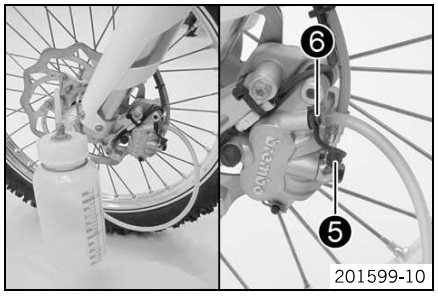
– Open shut-off valve ❹.

Info
Follow the operating instructions of the bleeding device.

– Ensure that the inflation pressure is correctly set at pressure gauge Ⓐ. If necessary, adjust the inflation pressure at pressure regulator Ⓑ.

Guideline

Inflation pressure	2… 2.5 bar (29… 36 psi)



– Pull off protection cap ❺ of the brake caliper bleeder screw. Connect the hose of the bleeder bottle.

Bleeding device (00029013100) (☛ p. 226)

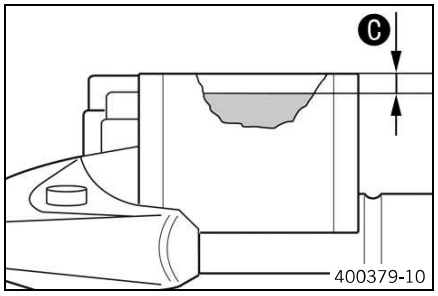
– Open bleeder screw ❻ by approx. one half turn.

Info
Bleed until fresh brake fluid emerges from the bleeder bottle hose without bubbles.

– Tighten the bleeder screw.
– Close shut-off valve ❹.
– 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.
– Disconnect the bleeding device. Remove the bleeder cover.



– Correct the brake fluid to level Ⓒ.

Guideline

Level Ⓒ (brake fluid level below container rim)	5 mm (0.2 in)

Brake fluid DOT 4 / DOT 5.1 (☛ p. 222)

– Position the cover with the membrane. Mount and tighten the screws.

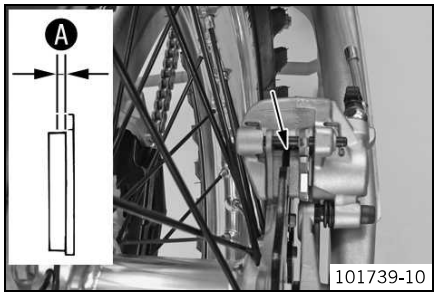
Info
Clean up overflowed or spilt brake fluid immediately with water.

– Check the hand brake lever for a firm pressure point.

15.8 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 Ⓐ.

Minimum thickness Ⓐ	≥ 1 mm (≥ 0.04 in)

» If the minimum thickness is less than specified:
– Change the rear brake linings. (☛ p. 114)

– Check the brake linings for damage and cracking.

» If damage or cracking is visible:
– Change the rear brake linings. (☛ p. 114)

15.9 Changing the rear brake linings

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.

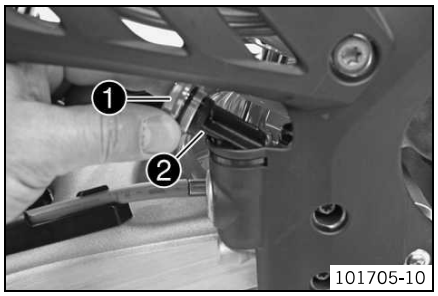
Warning
Danger of accidents Reduced braking efficiency due to old brake fluid.

– Change the brake fluid of the front and rear brake according to the service schedule.

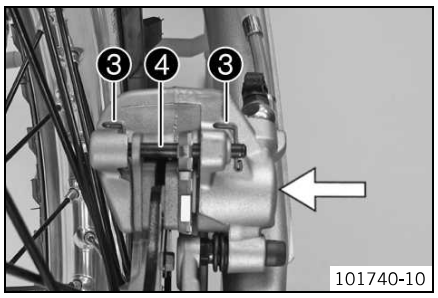
Warning
Environmental hazard Hazardous substances cause environmental damage.

– 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.



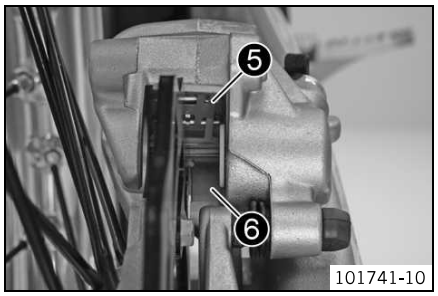
– Stand the vehicle upright.
– Remove screw cap ❶ with membrane ❷ and the O-ring.



– Press the brake caliper toward the brake disc to push back the brake piston and ensure that no brake fluid runs out of the brake fluid reservoir, sucking it off if it does.

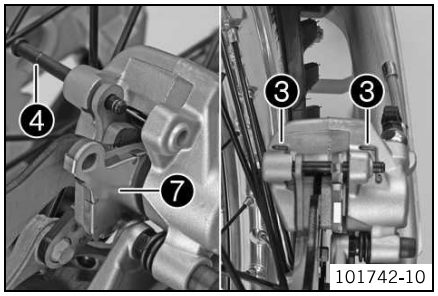
Info
Make sure when pushing back the brake piston that you do not press the brake caliper against the spokes.

– Remove locking split pins ❸, withdraw pin ❹, and take out the brake linings.
– Clean the brake caliper and brake caliper support.
– Check that leaf spring ❺ in the brake caliper and sliding plate ❻ in the brake caliper support are seated correctly.



Info
The arrow on the leaf spring points in the rotation direction of the brake disc.

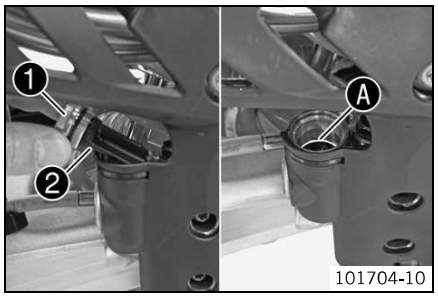
– Insert new brake linings, insert pin ❹, and mount locking split pins ❸.



Info
Always change the full set of brake linings.

Info
Make sure that the decoupling plate ❼ 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 Ⓐ.



Brake fluid DOT 4 / DOT 5.1 (☛ p. 222)

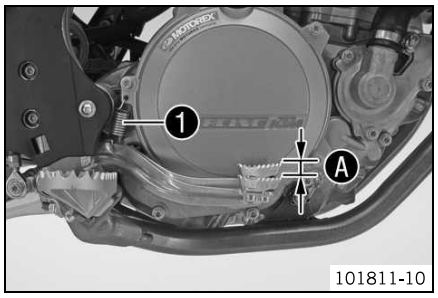
– Mount and tighten screw cap ❶ with membrane ❷ and the O-ring.

Info
Clean up overflowed or spilt brake fluid immediately with water.

15.10 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 ❶.
– 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 Ⓐ.

Guideline

Free travel at foot brake lever	3… 5 mm (0.12… 0.2 in)

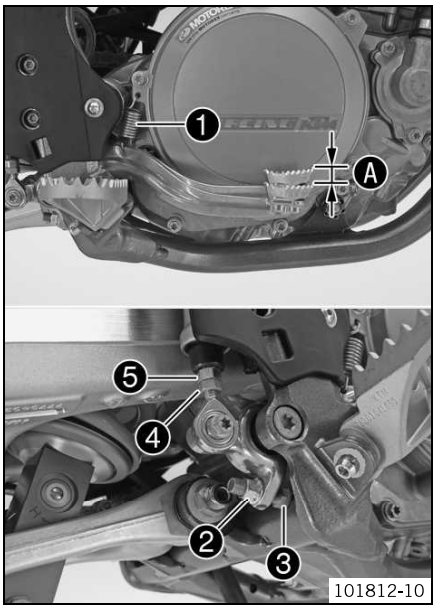
» If the free travel does not meet specifications:
– Adjust the basic position of the foot brake lever. (☛ p. 116)

– Reconnect spring ❶.

15.11 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 ❶.
– Loosen nut ❹ and, with push rod ❺, turn it back until you have maximum free travel.
– To adjust the basic position of the foot brake lever individually, loosen nut ❷ and turn screw ❸ accordingly.

Info
The range of adjustment is limited.

– Turn push rod ❺ accordingly until you have free travel Ⓐ. 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 push rod ❺ and tighten nut ❹.

Guideline

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

– Hold screw ❸ and tighten nut ❷.

Guideline

Nut, foot brake lever stop	M8	20 Nm (14.8 lbf ft)

– Reconnect spring ❶.

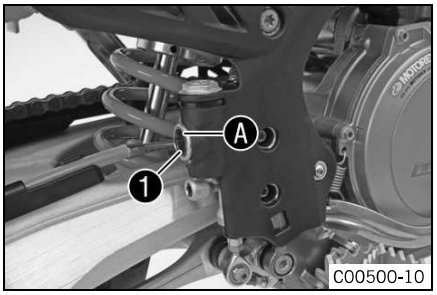
15.12 Checking the rear brake fluid level

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.



– Stand the vehicle upright.
– Check the brake fluid level in level viewer ❶.
» If the brake fluid has dropped below marking Ⓐ:
– Add rear brake fluid. (☛ p. 117)

15.13 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.

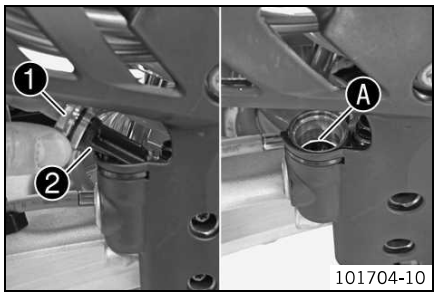
Warning
Danger of accidents Reduced braking efficiency due to old brake fluid.

– 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.

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. 114)

Main work
– Stand the vehicle upright.
– Remove screw cap ❶ with membrane ❷ and the O-ring.
– Add brake fluid to level Ⓐ.

Brake fluid DOT 4 / DOT 5.1 (☛ p. 222)

– Mount and tighten the screw cap with the membrane and O-ring.

Info
Clean up overflowed or spilt brake fluid immediately with water.

15.14 Changing the rear brake fluid

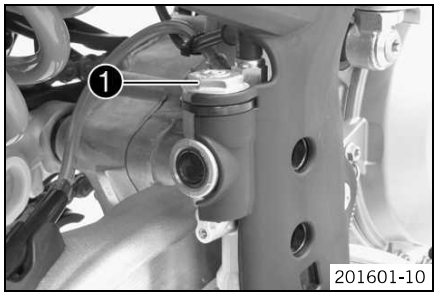
Warning
Skin irritation Brake fluid can cause skin irritation on contact.

– 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.

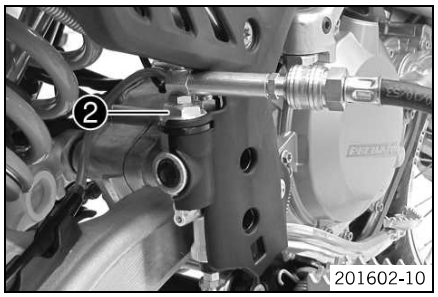
– Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

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 ❶ with the membrane and 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. 227)
Brake fluid DOT 4 / DOT 5.1 (☛ p. 222)

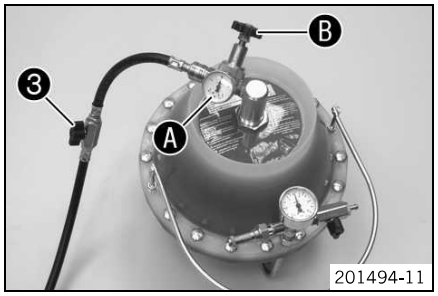


– Mount bleeder cover ❷.

Bleeder cover (00029013006) (☛ p. 226)

– Connect the bleeding device.

Bleeding device (00029013100) (☛ p. 226)



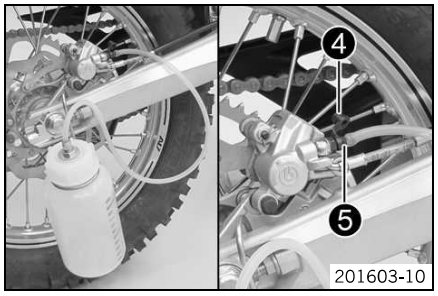
– Open shut-off valve ❸.

Info
Follow the operating instructions of the bleeding device.

– Ensure that the inflation pressure is correctly set at pressure gauge Ⓐ. If necessary, adjust the inflation pressure at pressure regulator Ⓑ.

Guideline

Inflation pressure	2… 2.5 bar (29… 36 psi)



– Pull off protection cap ❹ of the bleeder screw. Connect the hose of the bleeder bottle.

Bleeding device (00029013100) (☛ p. 226)

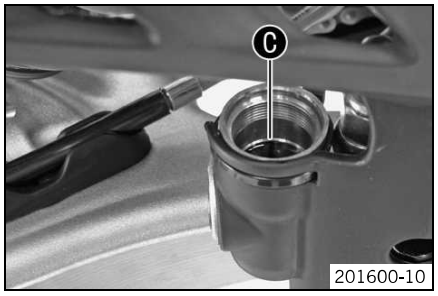
– Open bleeder screw ❺ by approx. one-half turn.

Info
Bleed until fresh brake fluid emerges from the bleeder bottle hose without bubbles.

– Tighten the bleeder screw.
– Close shut-off valve ❸.
– 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.
– Disconnect the bleeding device. Remove the bleeder cover.
– Stand the vehicle upright.



– Correct the brake fluid up to marking Ⓒ.

Brake fluid DOT 4 / DOT 5.1 (☛ p. 222)

– 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.

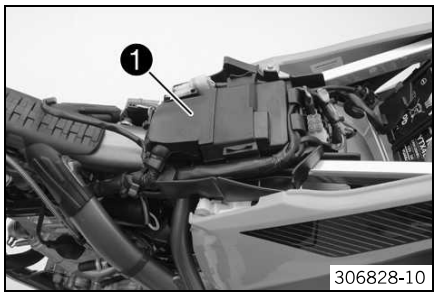
16.1 Removing the engine

Preparatory work

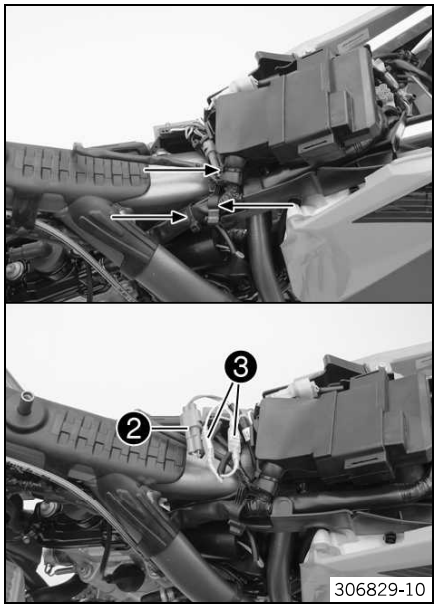
– Raise the motorcycle with the lift stand. (☛ p. 10)
– Drain the coolant. (☛ p. 187)
– Remove the seat. (☛ p. 84)
– Remove the fuel tank. (☛ p. 84)
– Remove the main silencer. (☛ p. 78)

Main work

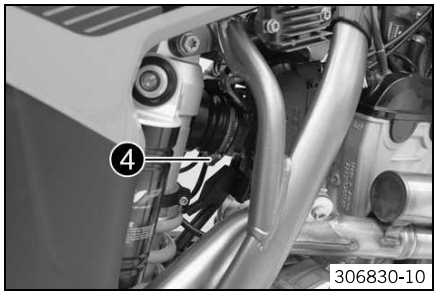
– Connect the negative cable of the battery.



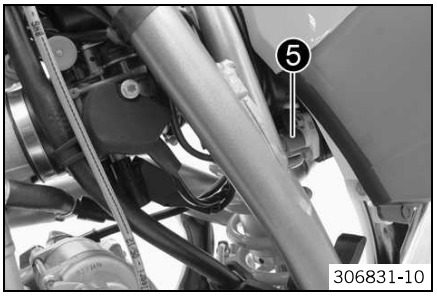
– Pull the EFI control unit ❶ from the holder and hang it to one side.



– Remove the cable binders and expose the cable.
– Disconnect connector ❷.
– Disconnect connector ❸.

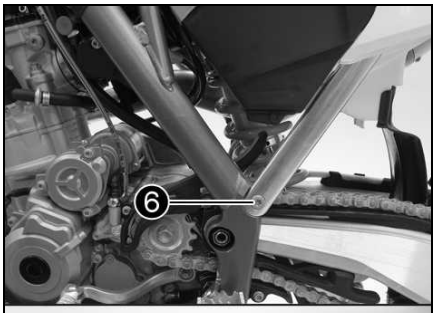


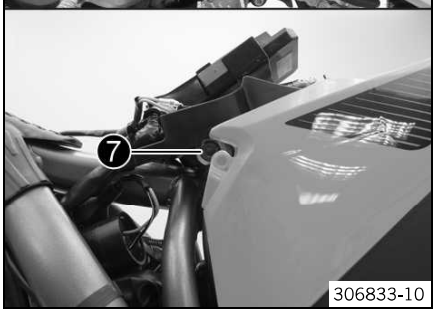
– Loosen hose clip ❹.



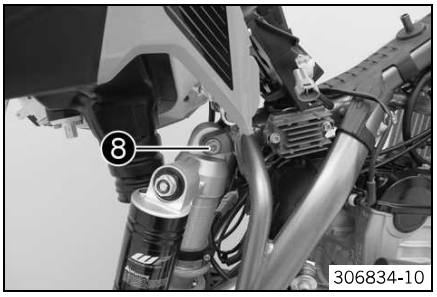
– Detach connector ❺.

– Remove the cable clips and expose the cable.

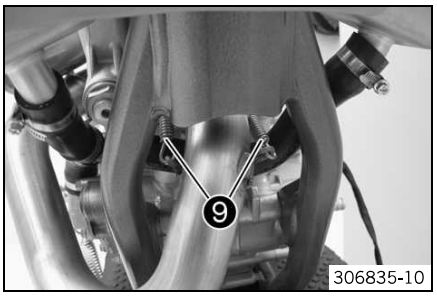




– Remove screw ❻.
– Loosen screw ❼.
– Repeat the operation on the opposite side.
– Swing up the subframe and secure it.

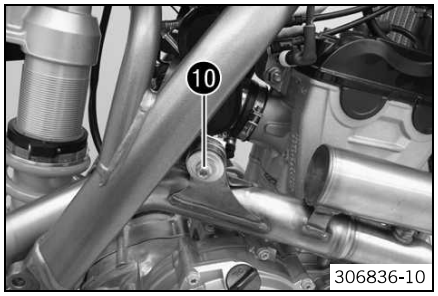


– Remove screw ❽.
– Swing the shock absorber to the rear and twist it slightly.

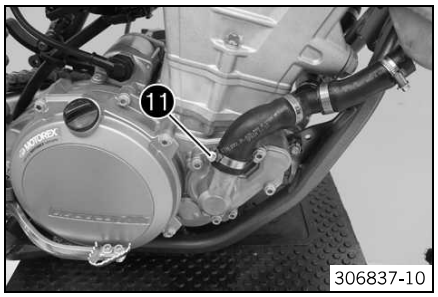


– Remove springs ❾.

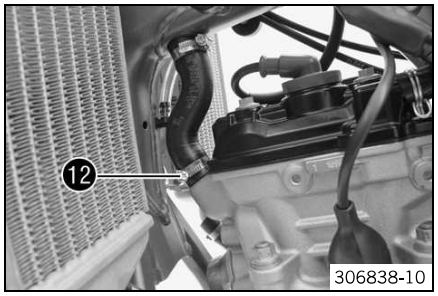
Spring hooks (50305017000) (☛ p. 226)



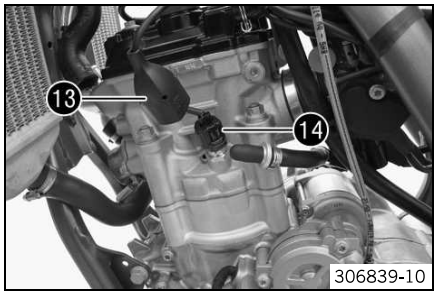
– Remove screw ⑩.
– Take off the manifold.



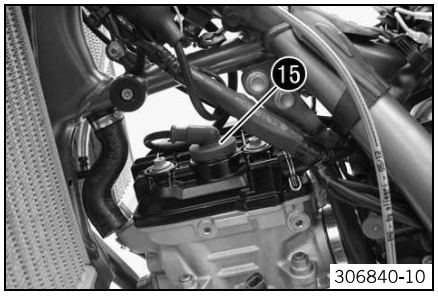
– Loosen hose clip ⑪.
– Take off the radiator hose.



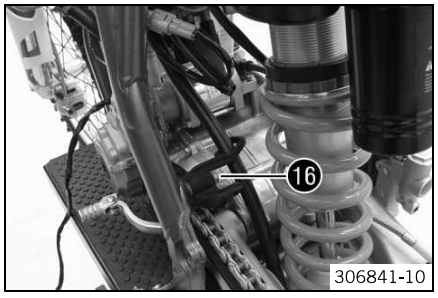
– Loosen hose clip ⑫.
– Take off the radiator hose.



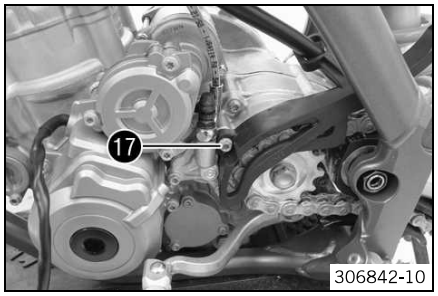
– Push back protection cap ⑬.
– Detach connector ⑭.



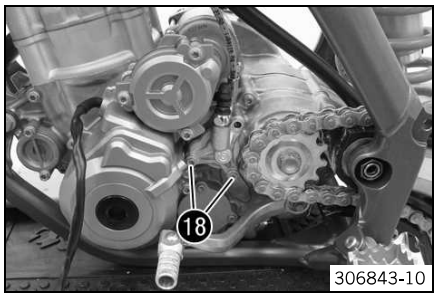
– Pull off spark plug connectors ⑮.



– Remove screw ⑯.

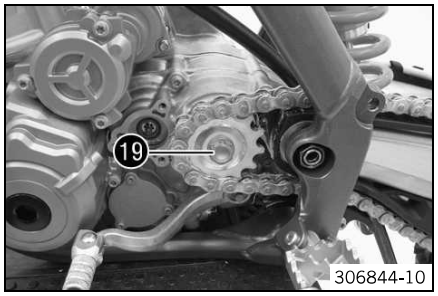


– Remove screw 17.
– Take off the engine sprocket cover.



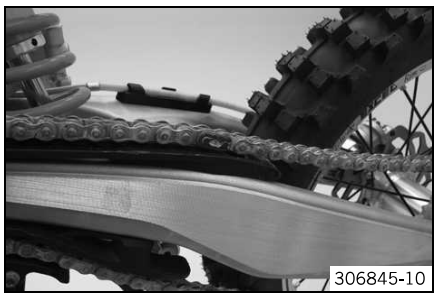
– Remove screws 18.
– Remove the cable binders.
– Take off the clutch slave cylinder and hang it to the side.

Info
Do not kink the clutch line.
Do not activate the clutch lever if the clutch slave cylinder has been removed.

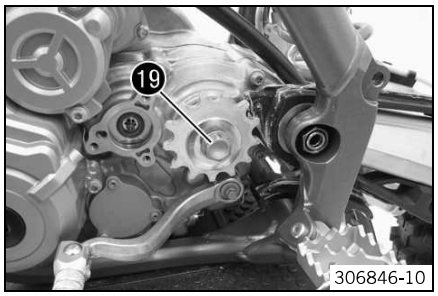


– Activate the foot brake lever.
– Loosen screw 19.

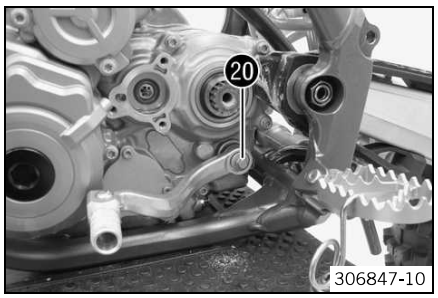
Info
You should have an assistant for this step.



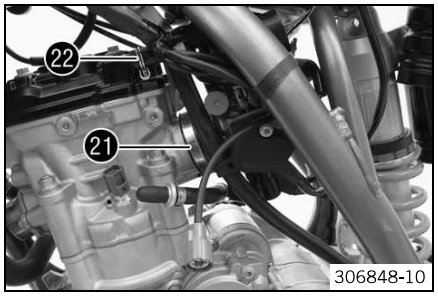
– Remove the connecting link of the chain.
– Take off the chain.



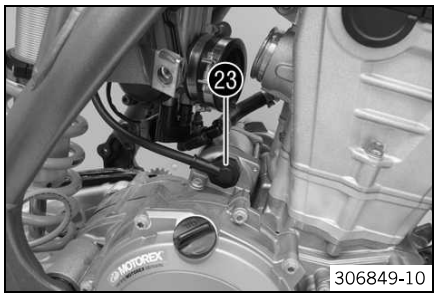
– Remove screw 19.
– Take off the engine sprocket.



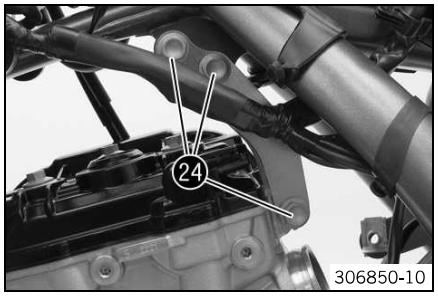
– Remove screw 20.
– Take off the shift lever.



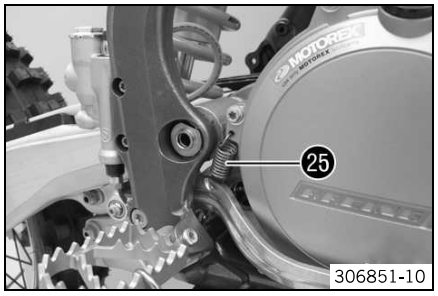
– Loosen hose clip 21.
– Pull the throttle valve body off of the cylinder head toward the rear and hang it to one side.
– Push back hose clamp 22 and take off the vent hose.



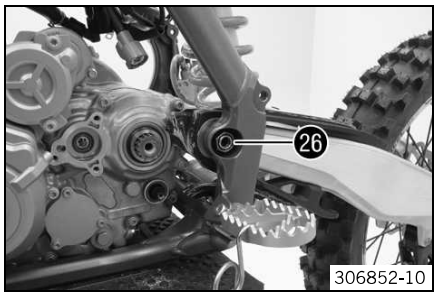
– Push back protection cap 23 and remove the nut.



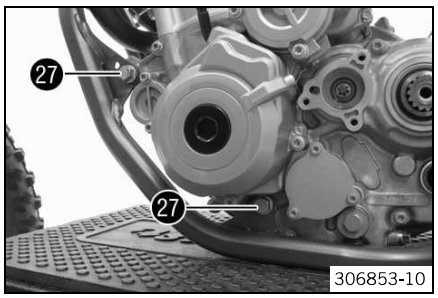
– Remove fittings 24.
– Remove the engine braces.



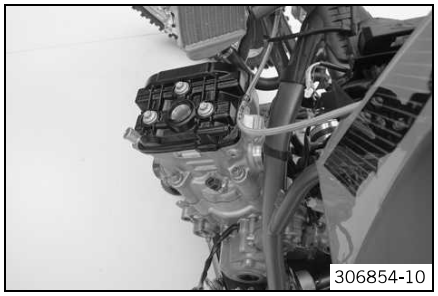
– Remove spring 25.



– Remove nut 26.
– Remove the swingarm pivot.
– Pull the swingarm slightly toward the rear.



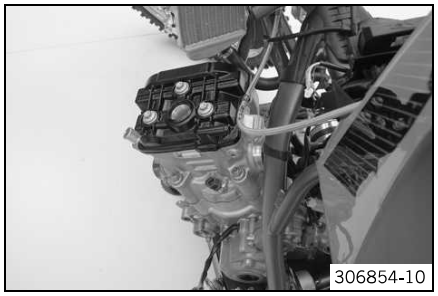
– Remove screws 27.


306854-10

– Lift out the engine from the side.

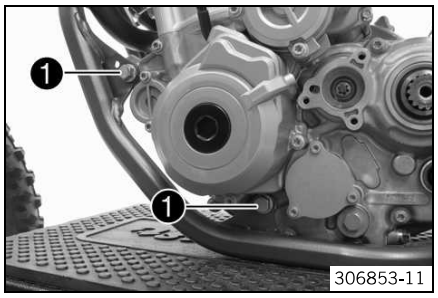
Info
You should have an assistant for this step.
Make sure that the motorcycle is sufficiently secured against falling over.
Protect the frame and attachments from damage.

16.2 Installing the engine


306854-10

Main work
– Position the engine in the frame.

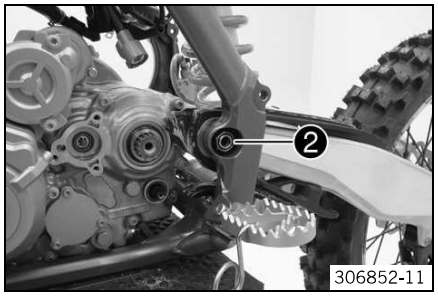
Info
You should have an assistant for this step.
Make sure that the motorcycle is sufficiently secured against falling over.
Protect the frame and attachments from damage.



306853-11

– Mount screws ❶ but do not tighten yet.
Guideline

Engine carrying screw	M10	60 Nm (44.3 lbf ft)



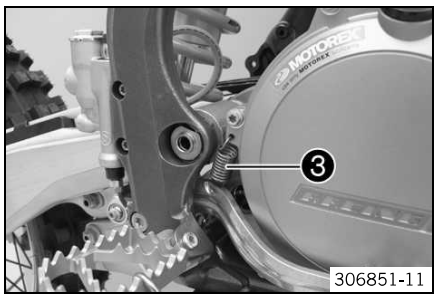
306852-11

– Position the swingarm.
– Insert the swingarm pivot.
– Mount and tighten nut ❷.
Guideline

Nut, swingarm pivot	M16x1.5	100 Nm (73.8 lbf ft)

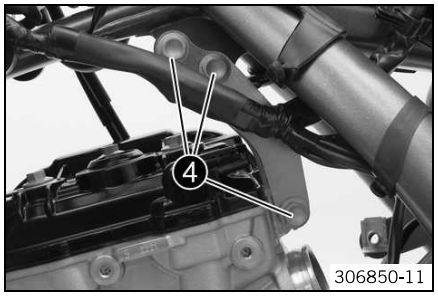
– Tighten screws ❶.
Guideline

Engine carrying screw	M10	60 Nm (44.3 lbf ft)



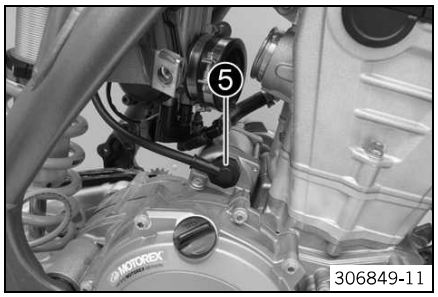
306851-11

– Mount spring ❸.



– Position the engine braces.
– Mount and tighten screws ❹.
Guideline

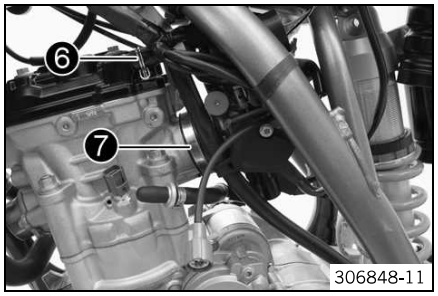
Screw, engine brace	M8	33 Nm (24.3 lbf ft)



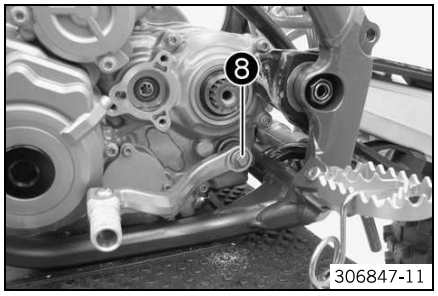
– Position the positive cable on the starter motor.
– Mount and tighten nut.
Guideline

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

– Position protection cap ❺.

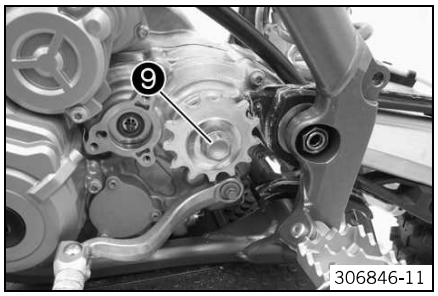


– Position the vent hose and mount hose clamp ❻.
– Position the throttle valve body.
– Tighten hose clip ❼.



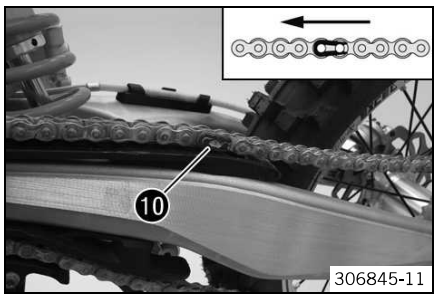
– Position the shift lever.
– Mount and tighten screw ❽.
Guideline

Screw, shift lever	M6	14 Nm (10.3 lbf ft)	**Loctite® 243™**

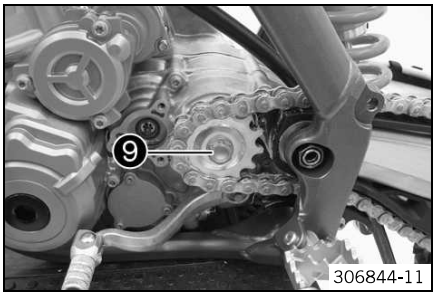


– Slide on the engine sprocket with the collar facing the engine.
– Mount screw ❾ with the washer but to not tighten yet.
Guideline

Screw, engine sprocket	M10	60 Nm (44.3 lbf ft)	**Loctite® 2701™**



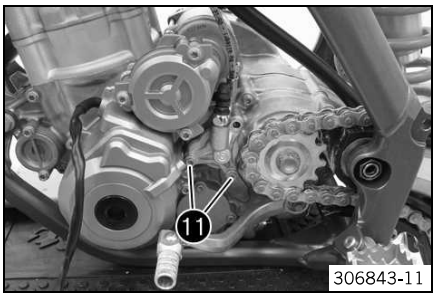
– Mount the chain.
– Connect the chain with connecting link ❿.



– Activate the foot brake lever.
– Tighten screw ❾.
Guideline

Screw, engine sprocket	M10	60 Nm (44.3 lbf ft)	**Loctite® 2701™**

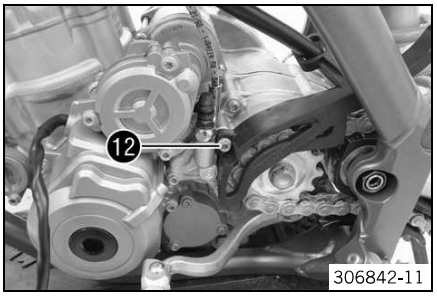
Info
You should have an assistant for this step.



– Position the clutch slave cylinder with the gasket.
– Mount and tighten screws ⓫.
Guideline

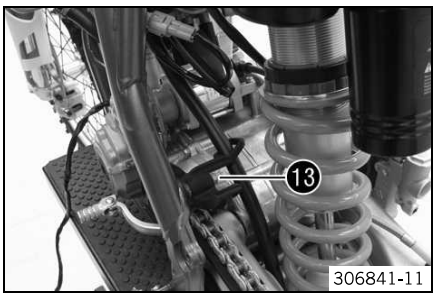
Screw, clutch slave cylinder	M6	10 Nm (7.4 lbf ft)

– Mount the cable binder.



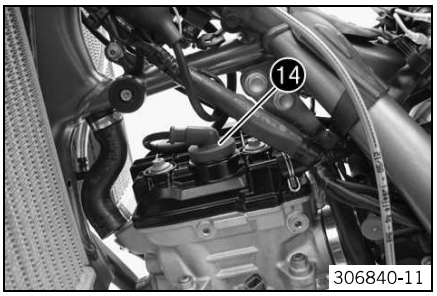
– Position the engine sprocket cover.
– Mount and tighten screw ⓬.
Guideline

Screw, clutch slave cylinder	M6	10 Nm (7.4 lbf ft)

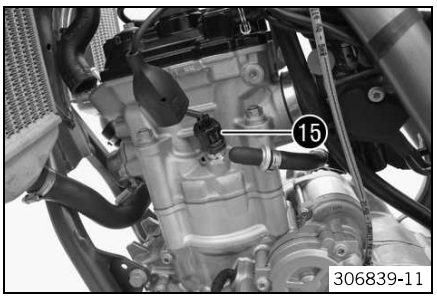


– Mount and tighten screw ⓭.
Guideline

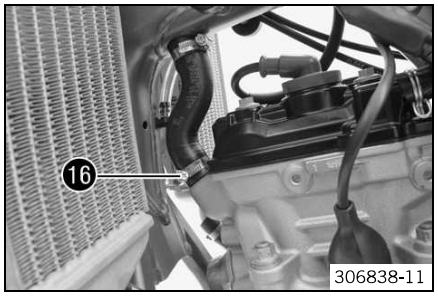
Remaining screws, chassis	M8	25 Nm (18.4 lbf ft)



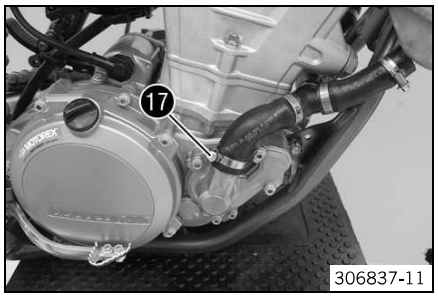
– Connect spark plug connector ⓮.



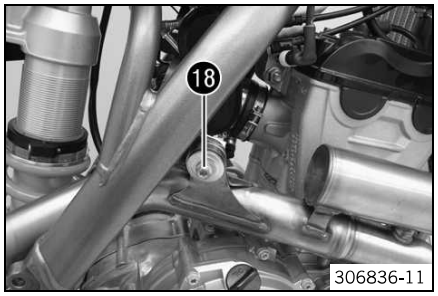
– Plug in connector ⓯.
– Mount the protection cap.



– Mount the radiator hose.
– Position and tighten hose clip ⑯.



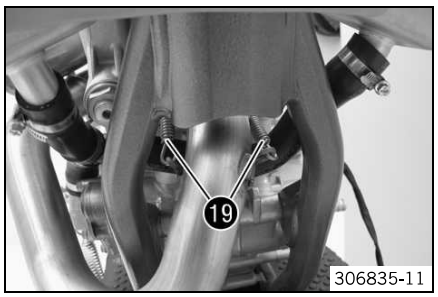
– Mount the radiator hose.
– Position and tighten hose clip ⑰.



– Slip in the manifold.
– Mount screw ⑱ but do not tighten yet.

Guideline

Remaining screws, chassis	M8	25 Nm (18.4 lbf ft)



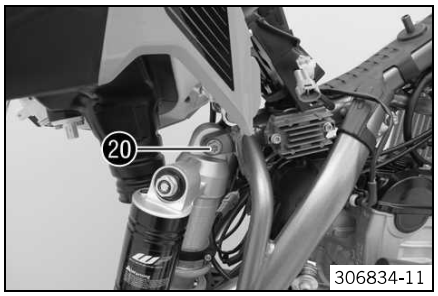
– Mount springs ⑲.

Spring hooks (50305017000) (☛ p. 226)

– Tighten screw ⑱.

Guideline

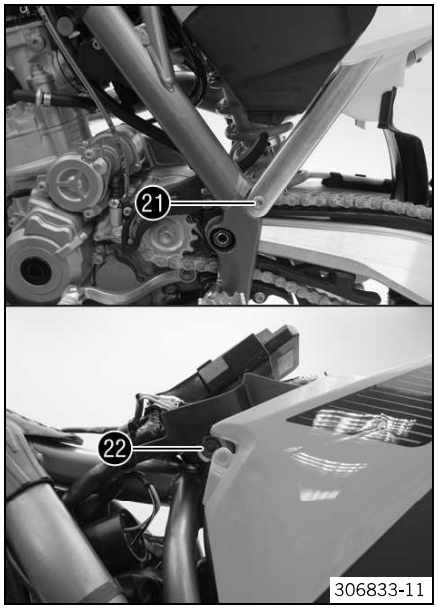
Remaining screws, chassis	M8	25 Nm (18.4 lbf ft)



– Position the shock absorber.
– Mount and tighten screw ⑳.

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 21.

Guideline

Screw, subframe	M8	35 Nm (25.8 lbf ft)	**Loctite® 2701™**

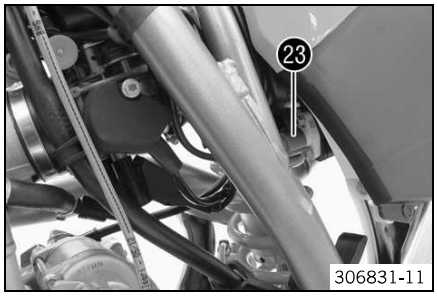
– Remove screw 22.
– Mount and tighten screw 22.

Guideline

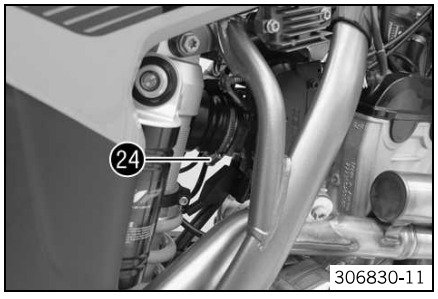
Screw, subframe	M8	35 Nm (25.8 lbf ft)	**Loctite® 2701™**

– Repeat the operation on the opposite side.

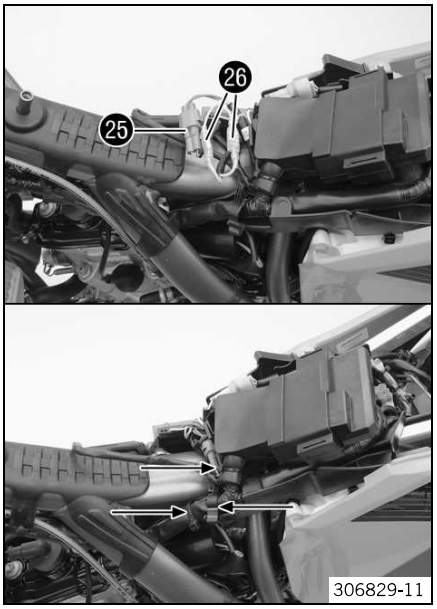
– Route the cable without tension and secure it with cable clips.



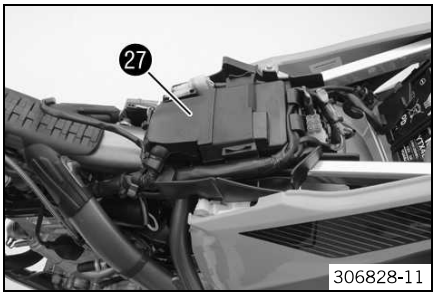
– Plug in connector 23.



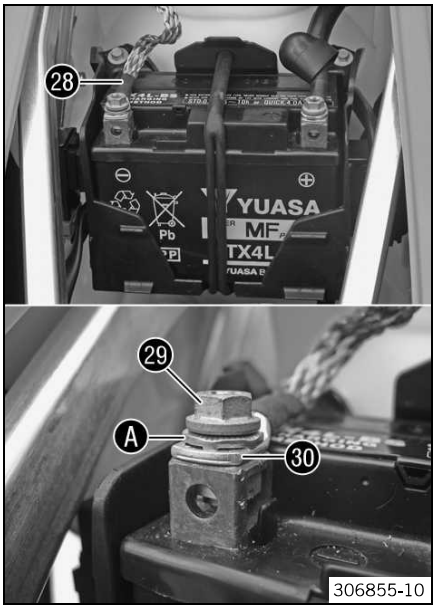
– Position and tighten hose clip 24.



– Plug in connector (25) of the ignition pulse generator.
– Attach connector (26) of the alternator.
– Route the cable without tension and secure it with cable binders.



– Mount EFI control unit (27).

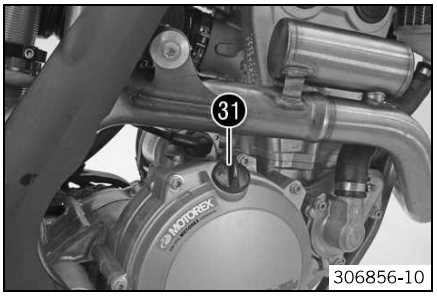


– Connect negative cable (28).

Guideline

Screw, battery terminal	M5	2.5 Nm (1.84 lbf ft)

Info
Contact disk (A) must be mounted between screw (29) and cable socket (30) with the claws facing down.



– Remove filler plug (31) and the engine oil.

Engine oil	1.10 l (1.16 qt.)	Engine oil (SAE 10W/50) (☛ p. 222)	
		Alternative engine oil for harsh operating conditions and increased performance	Engine oil (SAE 10W/60) (00062010035) (☛ p. 222)

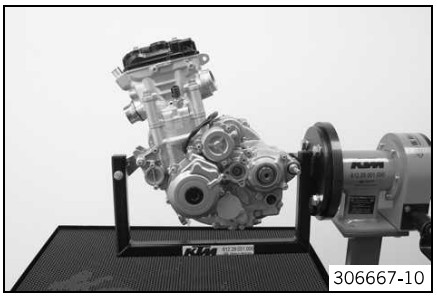
– Mount and tighten filler plug (31).

Finishing work
– Install the main silencer. (☛ p. 78)

- Install the fuel tank. (☛ p. 85)
- Mount the seat. (☛ p. 84)
- Remove the motorcycle from the lift stand. (☛ p. 10)
- Refill the coolant. (☛ p. 188)
- Take a short test ride.
- Read out the fault memory using the KTM diagnostics tool.
- Check the engine for leakage.
- Check the engine oil level. (☛ p. 189)
- Check the coolant level. (☛ p. 187)

16.3 Engine disassembly

16.3.1 Preparations


306667-10

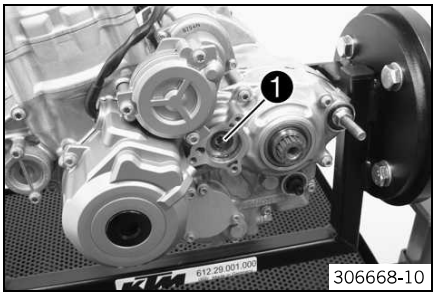
- Mount the special tool on the engine mounting block.

Engine fixing arm (77229002000) (☛ p. 231)
Engine assembly stand (61229001000) (☛ p. 230)

- Mount the engine on the special tool.

Info
Work with an assistant or a motorized hoist.

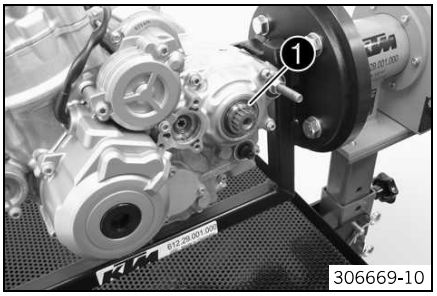
16.3.2 Removing the clutch push rod



306668-10

- Remove clutch push rod ❶.

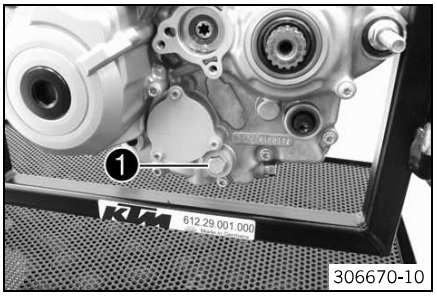
16.3.3 Removing the spacer



306669-10

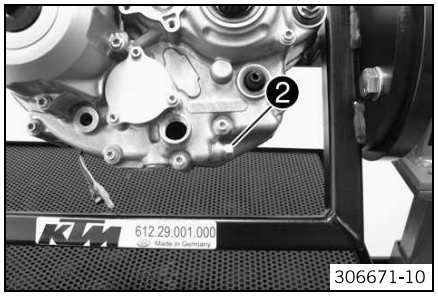
- Remove spacer ❶ of the countershaft.
- Remove O-ring.

16.3.4 Draining the engine oil

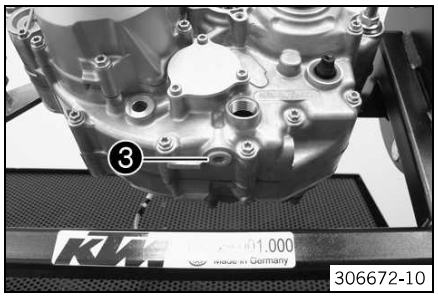


306670-10

- Remove plug ❶ with oil screen and the O-rings.

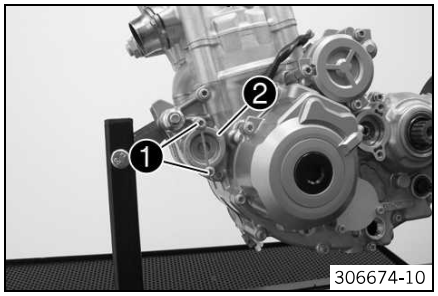


– Remove the oil drain plug ❷ with the magnet and seal ring.

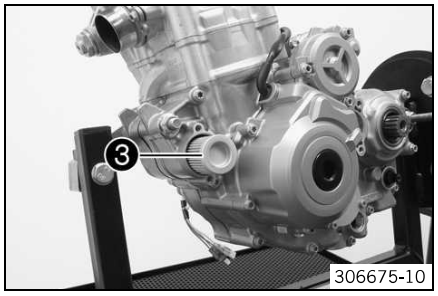


– Remove oil drain plug ❸ with the O-ring.
– Completely drain the engine oil.

16.3.5 Removing the oil filter



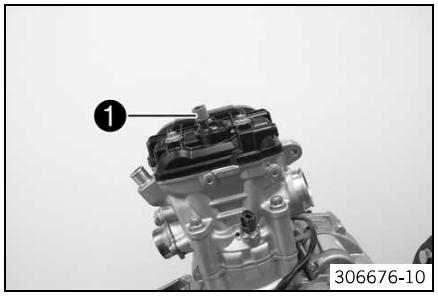
– Remove screws ❶. Remove the oil filter cover ❷ with the O-ring.



– Pull oil filter ❸ out of the oil filter housing.

Circlip pliers reverse (51012011000) (☛ p. 227)

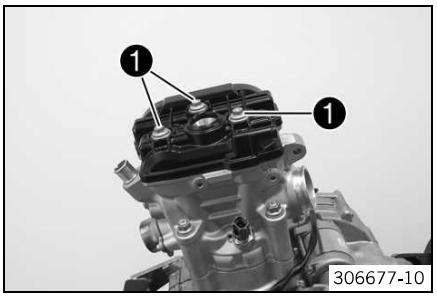
16.3.6 Removing the spark plug



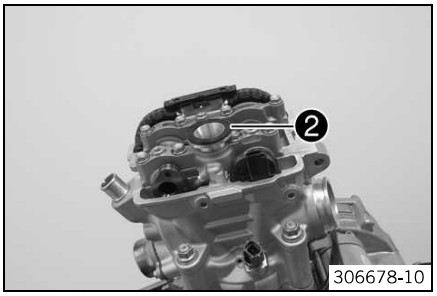
– Remove the spark plug using special tool ❶.

Spark plug wrench (77229072000) (☛ p. 232)

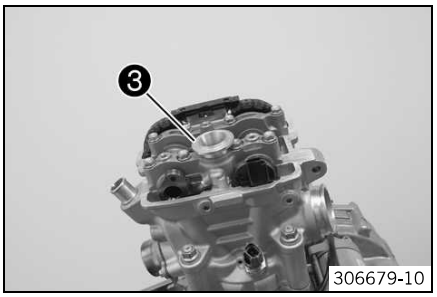
16.3.7 Removing the valve cover



– Remove screws ❶.
– Remove the valve cover with the valve cover seal.

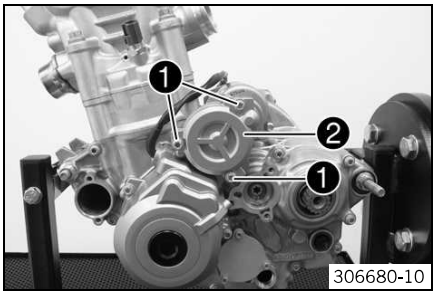


– Remove gasket ❷.

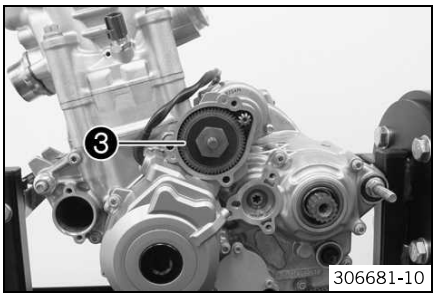


– Remove spark plug shaft insert ❸.

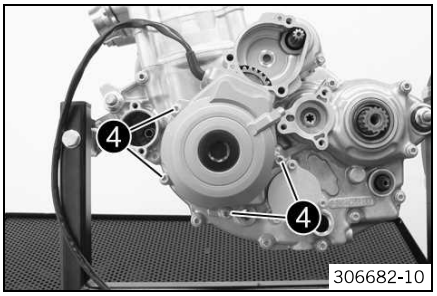
16.3.8 Removing the starter motor



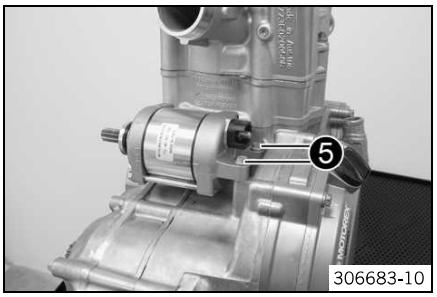
– Remove screws ❶ and take off cover ❷.
– Take off the gasket.



– Remove torque limiter ❸.

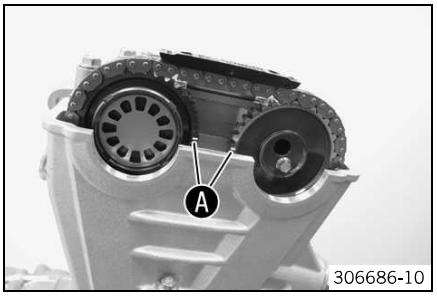


– Remove screws ❹.
– Remove the alternator cover.

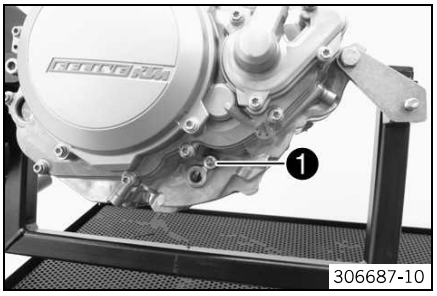


– Remove screws ❺ and take off the starter motor.

16.3.9 Positioning the engine at ignition top dead center



– Turn the crankshaft counterclockwise until marking Ⓐ is flush with the edge of the cylinder head.

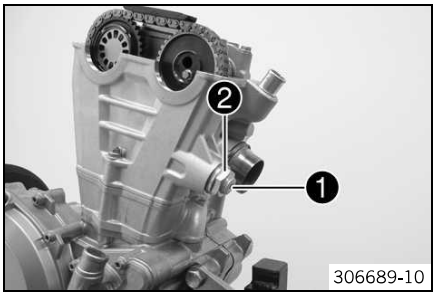


– Remove screw ❶.

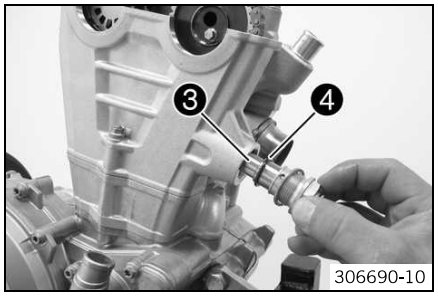
Info
Check through the hole whether the position notch of the crankshaft is visible.

– Mount and tighten screw ❶ without the washer.

16.3.10 Removing the timing chain tensioner

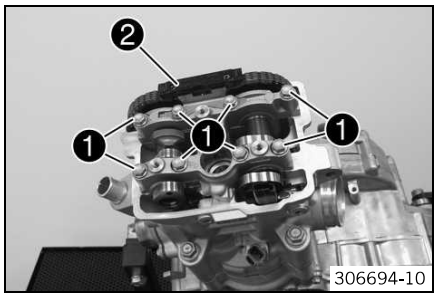


– Loosen screw ❶.
– Remove screw ❷ with the seal ring.



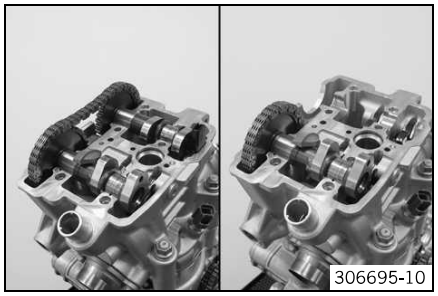
– Pull out timing chain tensioner ❸. Remove O-ring ❹.

16.3.11 Removing the camshaft



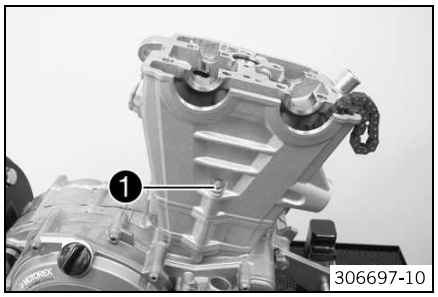
– Loosen screws ❶ from the outside to the inside and remove.
– Take off guide rail ❷.
– Take off the camshaft bearing bridge.

Info
Ensure that the dowel pins remain in place.

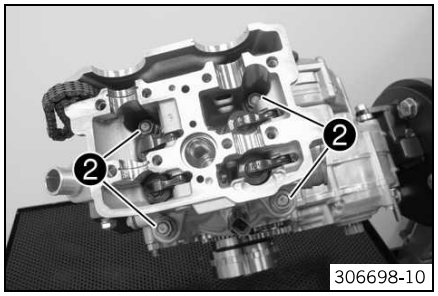


– Take the timing chain off the camshaft gear.
– Remove the camshafts.

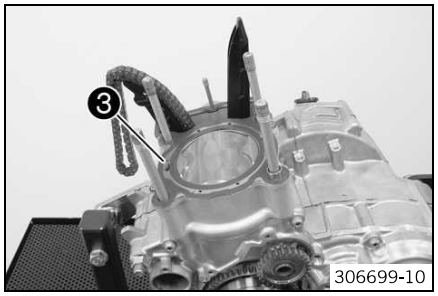
16.3.12 Removing the cylinder head



– Remove nut ❶ with the washer.

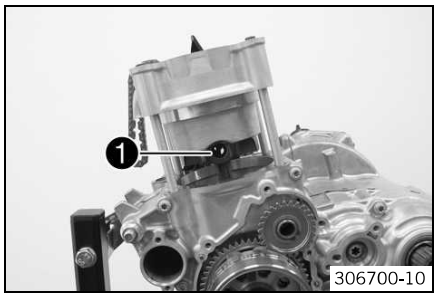


– Loosen nuts ❷ in a crisscross pattern and remove them with the washers.
– Remove the cylinder head.



– Remove cylinder head gasket ❸.

16.3.13 Removing the piston

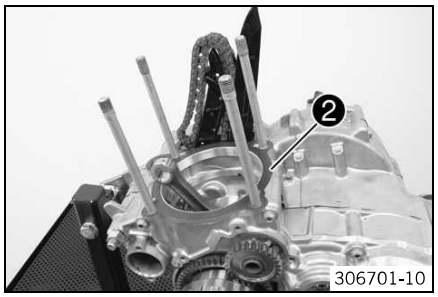


– Push the cylinder upward.

Info
Only push the cylinder as far up as necessary to take the piston pin out.

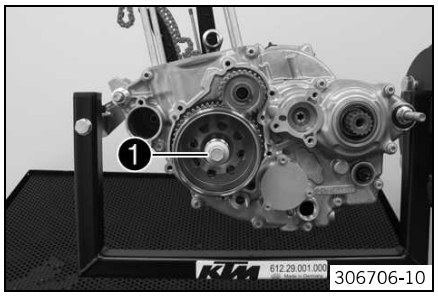
– Remove the piston pin retainer ❶.
– Remove the piston pin.
– Take off the cylinder and piston.
– Push the piston upward out of the cylinder.

Info
If no further work is to be performed on the cylinder and piston, the piston can remain in the cylinder.

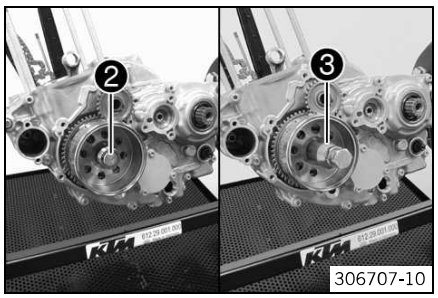


– Take off cylinder base gasket ❷.

16.3.14 Removing the rotor



– Remove screw ❶.



– Insert special tool ❷ in the crankshaft.

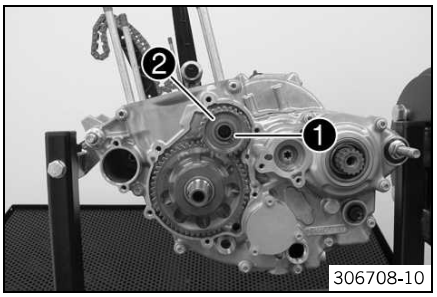
Protection cover (75029090000) (☛ p. 230)

– Attach special tool ❸ to the rotor. Hold the special tool and pull off the rotor by turning in the screw.

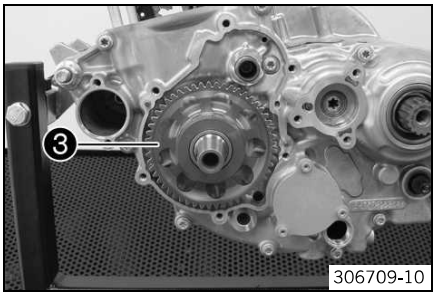
Extractor (58012009000) (☛ p. 227)

Info
Ensure that the spring washers remain in place.

16.3.15 Removing the starter drive

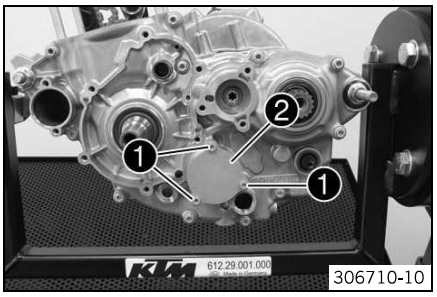


– Remove lock ring ❶.
– Take off the starter idler gear ❷ with the washer.

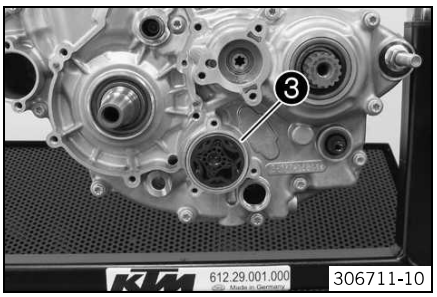


– Take off freewheel gear ❸.

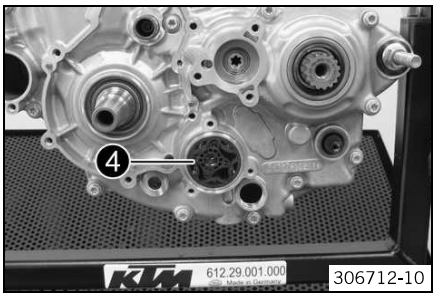
16.3.16 Removing the suction pump



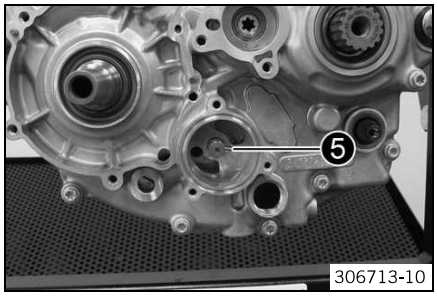
– Remove screws ❶.
– Take off oil pump cover ❷.



– Remove O-ring ❸.

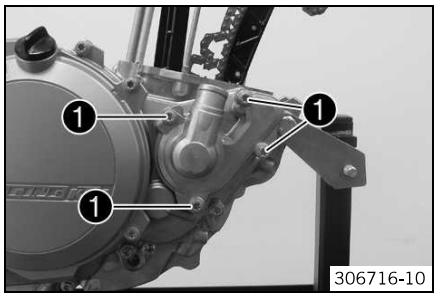


– Take off suction pump ❹.

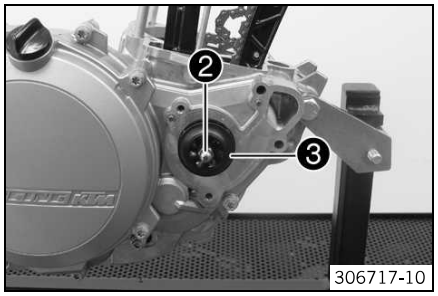


– Remove needle roller ❺.

16.3.17 Removing the water pump wheel

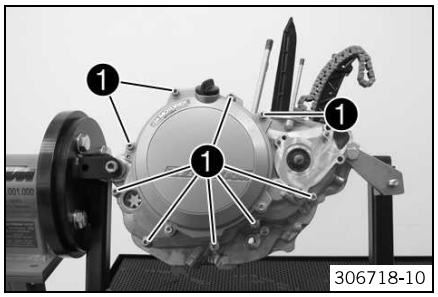


– Remove screws ❶. Take off the water pump cover.



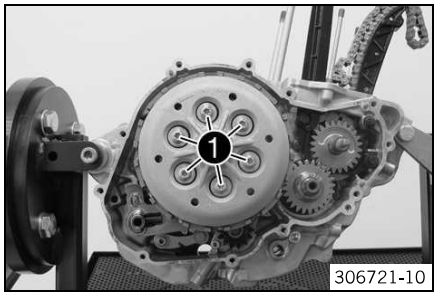
– Remove nut ❷.
– Take off the two-part water pump impeller ❸.

16.3.18 Removing the clutch cover

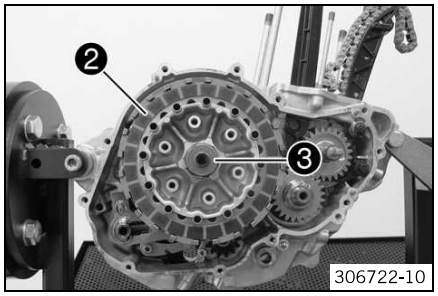


– Remove screws ❶.
– Take off the clutch cover.
– Remove the clutch cover seal.

16.3.19 Removing the clutch discs

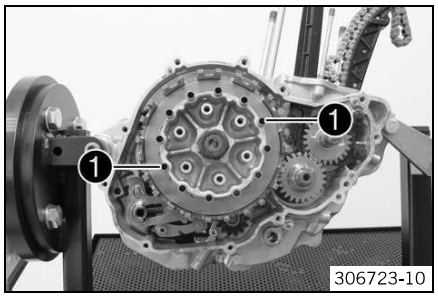


– Loosen screws ❶ and remove together with the washers and springs.
– Take off the pressure cap.

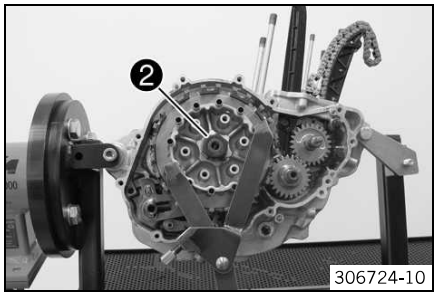


– Completely remove clutch discs ❷.
– Remove pressure piece ❸.

16.3.20 Removing the clutch basket



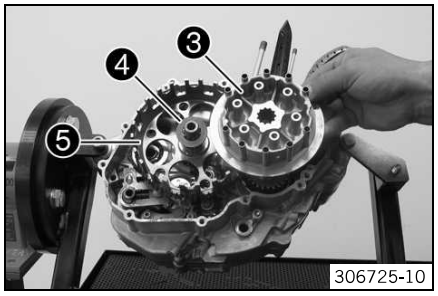
– Remove two opposite sleeves ❶.



– Bend up the lock washer.
– Hold the inner clutch hub with the special tool. Loosen nut ❷.

Clutch holder (51129003000) (☛ p. 227)

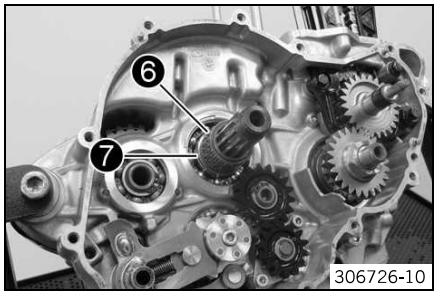
– Remove the nut with the lock washer.



– Take off inner clutch hub ❸ and washer ❹.

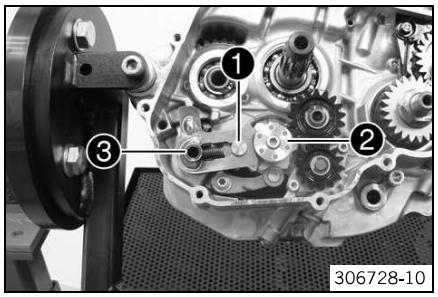
Info
The washer usually sticks to the inner clutch hub.

– Take off clutch basket ❺.



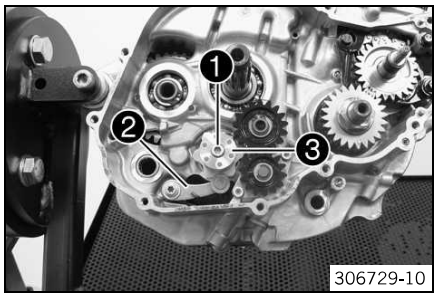
– Take off needle bearing ❻ and collar sleeve ❼.

16.3.21 Removing the shift shaft



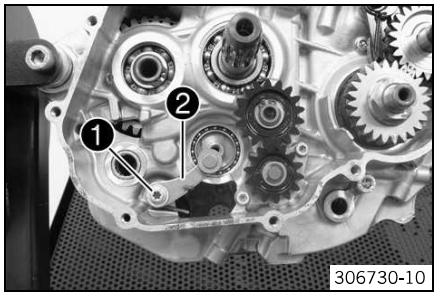
– Push sliding plate ❶ away from the shift drum locating unit ❷. Remove shift shaft ❸ with the washer.

16.3.22 Removing the shift drum locating unit



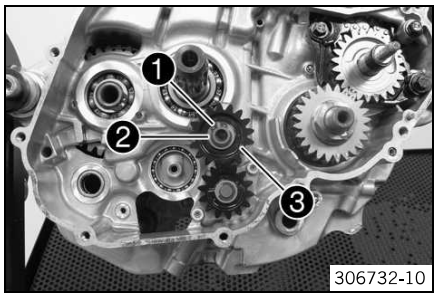
– Remove screw ❶.
– Push away locking lever ❷ from shift drum locating unit ❸ and remove the shift drum locating unit.
– Relieve tension from the locking lever.

16.3.23 Removing the locking lever

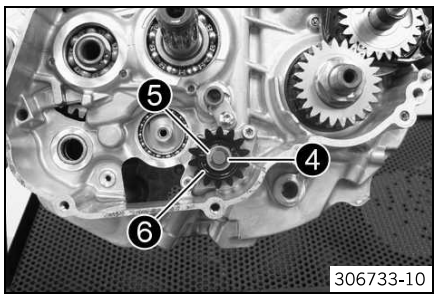


– Unscrew ❶ and remove together with locking lever ❷, washer, sleeve and spring.

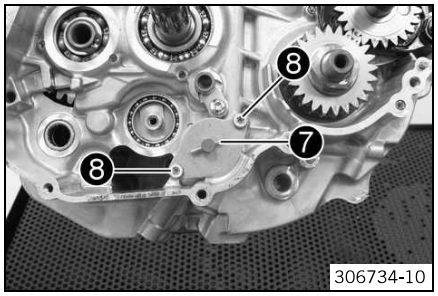
16.3.24 Removing the force pump



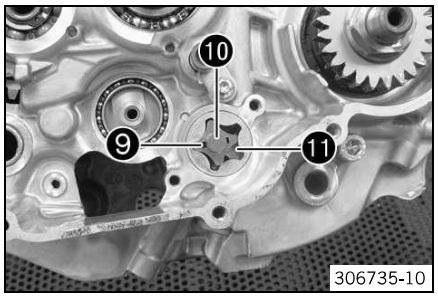
– Remove lock ring ❶.
– Take off washer ❷.
– Take off oil pump idler gear ❸ with the washer.



– Remove lock ring ❹.
– Take off washer ❺.
– Remove oil pump gear ❻.

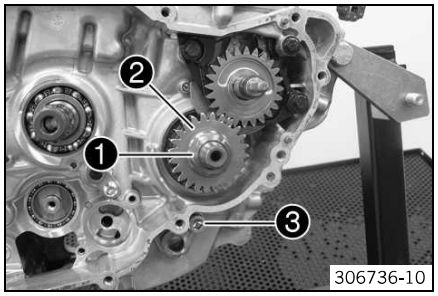


– Remove pin ❼.
– Remove screws ❽.
– Take off the oil pump cover.



– Remove pin ❾.
– Remove oil pump shaft ❿ from below.
– Remove force pump ⓫.

16.3.25 Removing the primary gear



– Remove nut ❶.

Info
Left-handed thread!

– Position the special tool in the crankshaft.

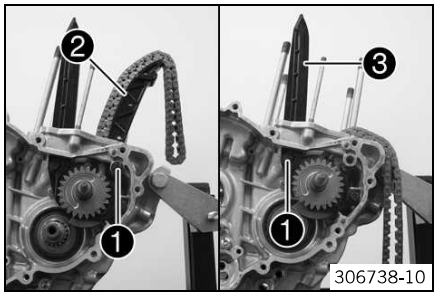
Protection cover (75029090000) (☛ p. 230)

– Pull off primary gear ❷ using the special tool.

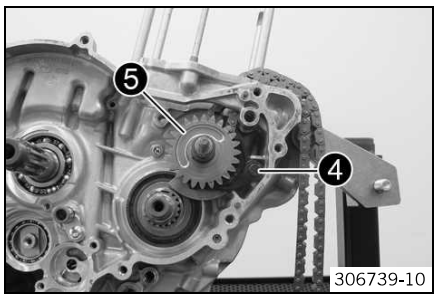
Extractor (46129021000) (☛ p. 226)

– Remove screw ❸.

16.3.26 Removing the timing chain



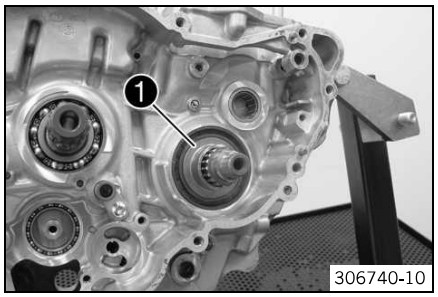
– Remove screws ❶.
– Remove the timing chain tensioning rail ❷.
– Remove the timing chain guide rail ❸.



– Remove screw ❹.
– Take off balancer shaft ❺ with the timing chain and timing chain securing guide.

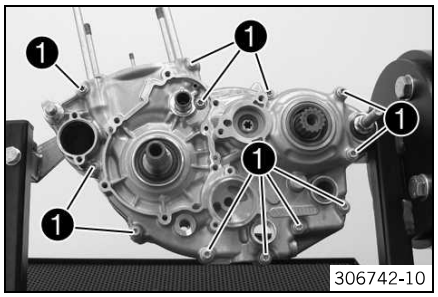
Info
If the timing chain is going to be used again, mark its direction of travel.

16.3.27 Removing the spacer

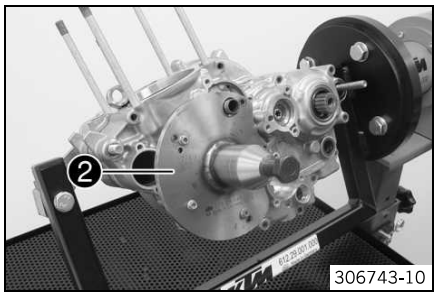


– Remove spacer ❶ of the crankshaft.

16.3.28 Removing the left section of the engine case



– Remove screws ❶.
– Tilt the left section of the engine case upward and remove the screw connections of the engine fixing arm.



– Insert the special tool into the crankshaft.

Protection cover (75029090000) (☛ p. 230)

– Mount special tool ❷ with the appropriate screws.

Puller (77229048000) (☛ p. 232)

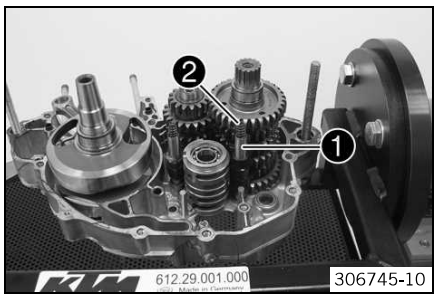
Info
Use the drill hole marked with **772**.

– Take off the section of the engine case.

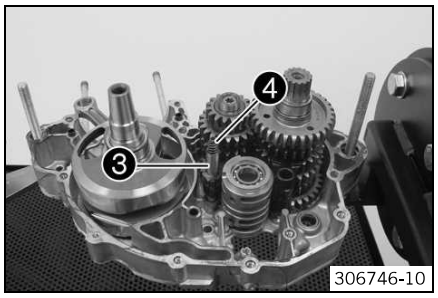
Info
Do not subject the section of the engine case to any stress.
The washer of the main shaft usually adheres to the bearing.

– Take off the left section of the engine case.
– Remove the special tool.

16.3.29 Removing the shift rails

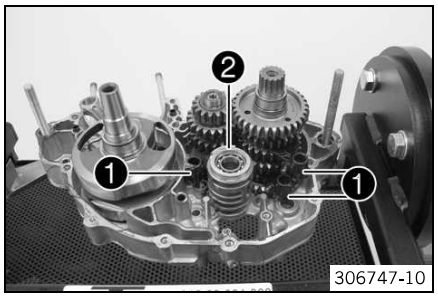


– Remove shift rail ❶ together with upper spring ❷.



– Remove shift rail ❸ together with upper spring ❹ and the lower spring.

16.3.30 Removing the shift drum

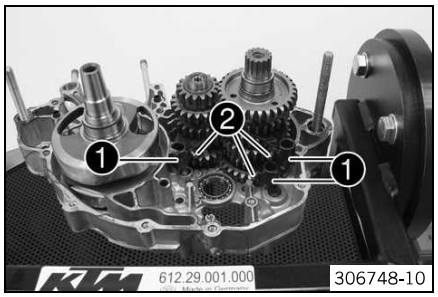


– Tilt shift forks ❶ to the side.

Info
Do not misplace the shift rollers.

– Remove shift drum ❷.

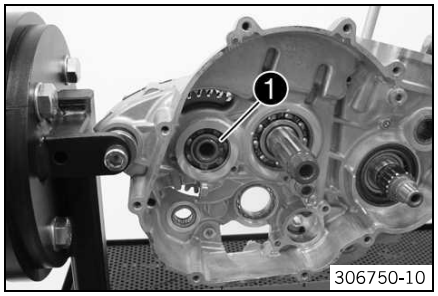
16.3.31 Removing the shift forks



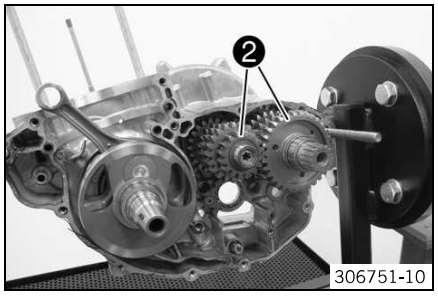
– Remove shift forks ❶.

Info
Do not misplace shift rollers ❷.

16.3.32 Removing the transmission shafts

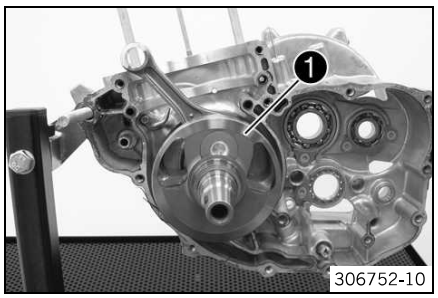


– Remove lock ring ❶.



– Pull both transmission shafts ❷ out of the bearing seats together.

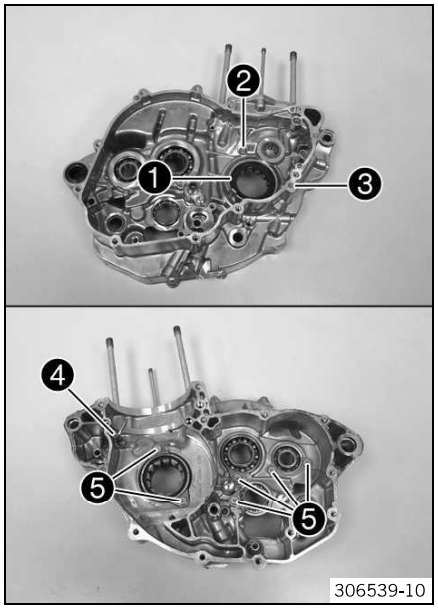
16.3.33 Removing the crankshaft

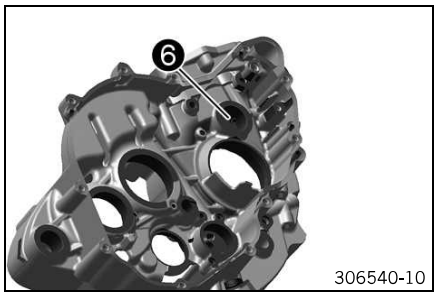


– Take out crankshaft ❶.
– Take off the right section of the engine case.

16.4 Work on individual parts

16.4.1 Work on the right section of the engine case





- Remove all dowels.
- Remove shaft seal ring ❶ of the crankshaft.
- Remove nozzle ❷.
- Remove oil nozzle ❸ for conrod bearing lubrication.
- Remove screw ❹.
- Remove oil nozzle for piston cooling.
- Remove screws ❺. Remove the bearing retainers.
- Remove any sealing mass remnants 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 plate. 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.

- Blow out oil nozzle ❻ with compressed air and check that it is clear.

  Guideline

Oil nozzle for balancer shaft lubrication	M4	2 Nm (1.5 lbf ft)	**Loctite® 243™**

- 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.

- Mount the dowels.
- Press in shaft seal ring ❶ of the crankshaft with the open side facing out so it is flush.
- Mount and tighten nozzle ❷.

  Guideline

Nozzle, crank chamber ventilation	M4	2 Nm (1.5 lbf ft)	**Loctite® 243™**

- Mount and tighten the oil nozzle ❸.

  Guideline

Oil nozzle for conrod bearing lubrication	M4	2 Nm (1.5 lbf ft)	**Loctite® 243™**

- Mount the oil nozzle for piston cooling.
- Mount and tighten screw ❹.

  Guideline

Screw, oil nozzle for piston cooling	M4	2 Nm (1.5 lbf ft)	**Loctite® 243™**

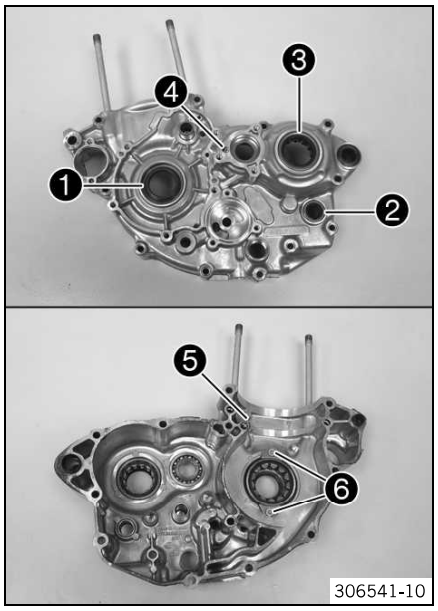
– Position all bearing locks.
– Mount and tighten screws ❺.

Guideline

Locking screw for bearing	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**

– Blow out the oil channel with compressed air and check that it is clear.

16.4.2 Work on the left section of the engine case



– Remove all dowels.
– Remove shaft seal ring ❶ of the crankshaft, ❷ shift shaft and ❸ countershaft.
– Remove oil nozzle ❹ for clutch lubrication.
– Remove oil nozzle ❺ for piston cooling.
– Remove screws ❻. Remove the bearing retainers.
– Remove any sealing mass remnants 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 plate. 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.

– 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.

– Mount the dowels.
– Press in shaft seal ring ❶ of the crankshaft with the open side facing out so it is flush.
– Press in shaft seal ring ❷ of the shift shaft so it is flush with the open side facing in.
– Press in shaft seal ring ❸ of the countershaft so it is flush with the open side facing in.
– Mount and tighten oil nozzle ❹.

Guideline

Oil nozzle for clutch lubrication	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**

– Mount and tighten oil nozzle ❺.

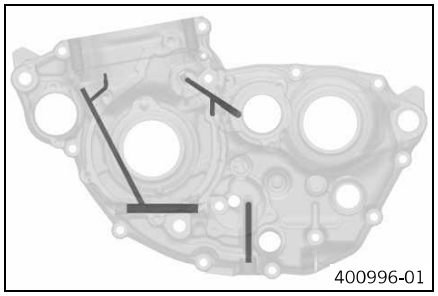
Guideline

Oil nozzle, piston cooling	M5	2 Nm (1.5 lbf ft)	**Loctite® 243™**

– Position all bearing locks.
– Mount and tighten screws ❻.

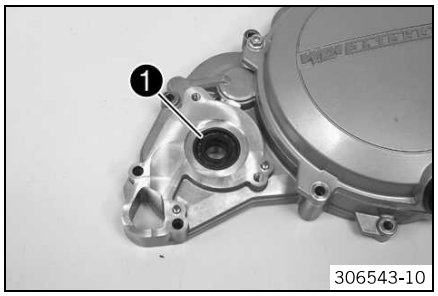
Guideline

Locking screw for bearing	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**

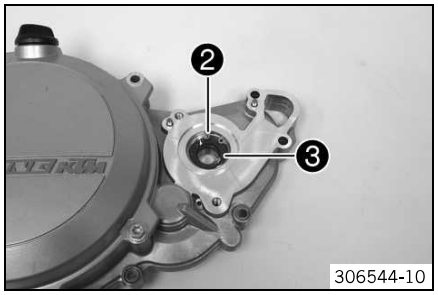


– Blow out the oil channel with compressed air and check that it is clear.

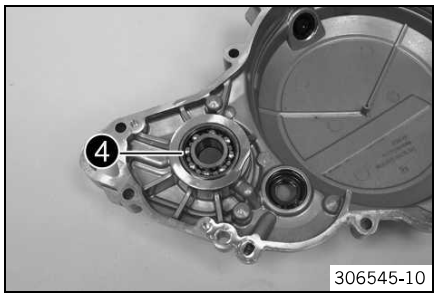
16.4.3 Work on the clutch cover



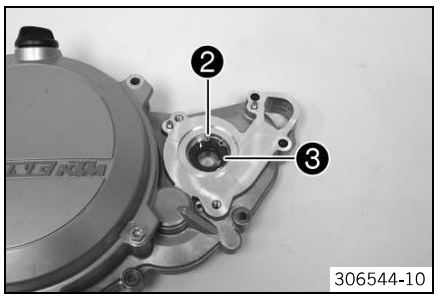
– Remove shaft seal ring ❶.



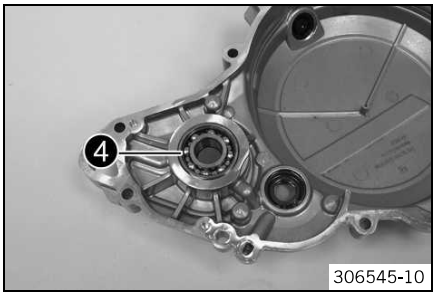
– Remove lock ring ❷.
– Remove shaft seal ring ❸.



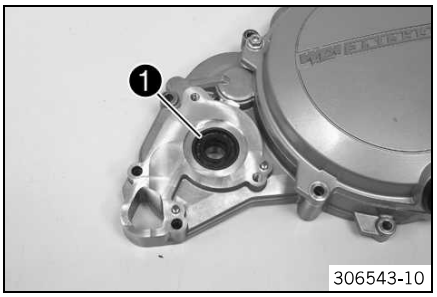
– Press out bearing ❹ toward the inside.



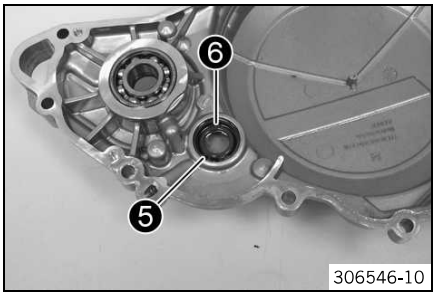
– Mount lock ring ❷.
– Press the shaft seal ring ❸ all the way in from the inside to the outside with the open side facing in.



– Press the new bearing ❹ all the way in from the inside to the outside using a suitable tool.



– Press in shaft seal ring ❶ all the way, with the open side facing outward.

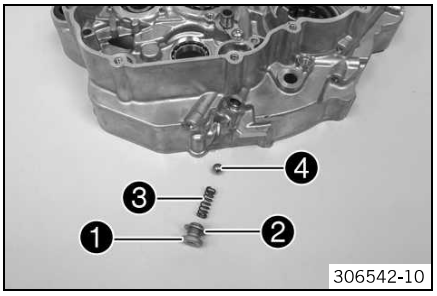


– Remove lock ring ❺.
– Remove shaft seal ring ❻ of the crankshaft.
– Press the new shaft seal ring in with the open side facing inward.

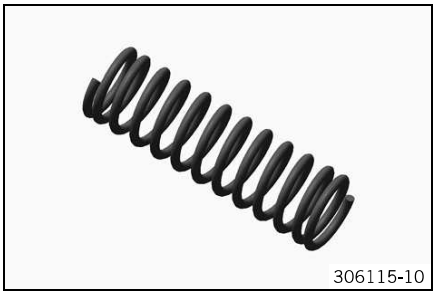
Info
Press the shaft seal ring inward to the point where the lock ring can be mounted.
Provide suitable support for the clutch cover while pressing in.

– Mount lock ring ❺.
– Blow out the oil channel with compressed air and check that it is clear.

16.4.4 Checking the oil pressure regulator valve



– Remove screw plug ❶ with sealing washer ❷.
– Remove pressure spring ❸ and ball ❹.

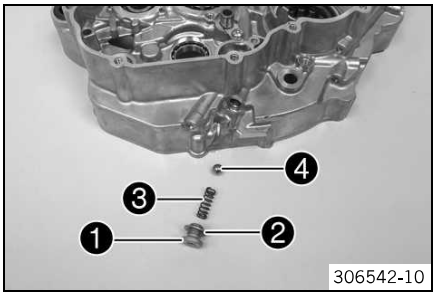


– Measure the spring length of the oil pressure regulator valve.

Oil pressure regulator valve	
Minimum length of pressure spring	23.5 mm (0.925 in)

» If the measured value does not meet specifications:
– Change the spring.

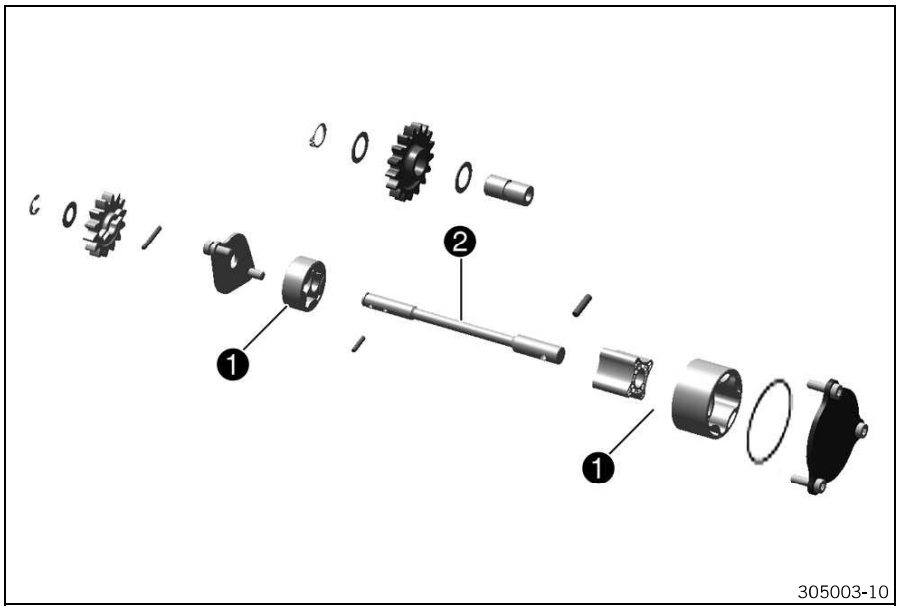
– Check ball ❹ and the sealing seat.
» If there is damage or wear:
– Change the ball and machine the sealing seat.



– Install ball ❹ and pressure spring ❸.
– Mount and tighten screw plug ❶ with sealing washer ❷.
Guideline

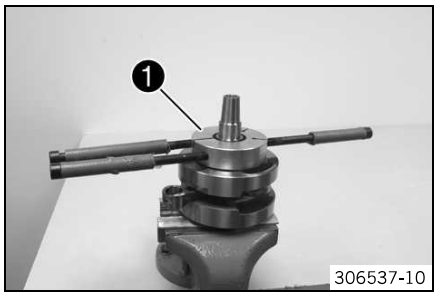
Plug, oil pressure regulator valve	M12x1.5	20 Nm (14.8 lbf ft)

16.4.5 Checking the lubrication system



– Check the internal rotor and external rotor of oil pumps ❶ for damage and wear.
  » If there is damage or wear:
    – Change the oil pumps.
– Check oil pump shaft ❷ for damage and wear.
  » If there is damage or wear:
    – Change the oil pump shaft.
– Check the oil pump cover for damage and wear.
  » If there is damage or wear:
    – Change the oil pump cover.

16.4.6 Removing the crankshaft bearing inner race



– Fix the crankshaft in the vise.

Info
Use soft jaws.

– Warm up special tool ❶.

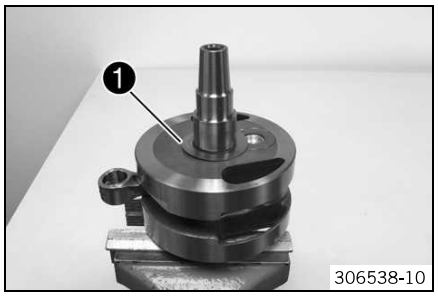
Guideline

150 °C (302 °F)

Tool for inner bearing race (58429037037) (☛ p. 228)

– Push the warmed up special tool ❶ onto the crankshaft bearing inner race, press firmly together and pull jointly from the crankshaft.
– Take off the compensating disk.
– Repeat the operation on the opposite side.

16.4.7 Installing the crankshaft bearing inner race



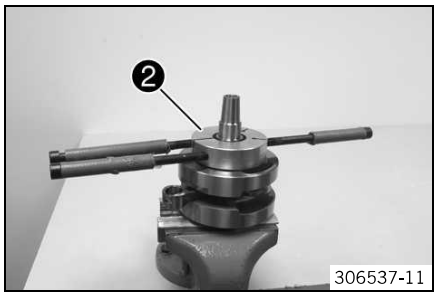
Main work

– Fix the crankshaft in the vise.

Info
Use soft jaws.

– Slide on compensating disk ❶.

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.
Add compensating disks equally on both sides.



– Heat the crankshaft bearing inner race in special tool ❷ and mount together.

Guideline

120 °C (248 °F)

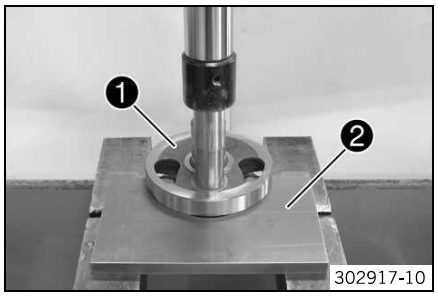
Tool for inner bearing race (58429037037) (☛ p. 228)

– Repeat the operation 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. 150)

16.4.8 Changing the connecting rod, conrod bearing, and crank pin



Main work
– Position crankshaft ❶ in the press using special tool ❷.

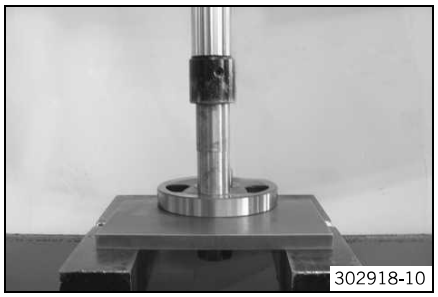
Separator plate (77029009001) (☛ p. 230)

– Push the crank pin out of the upper crankweb using the special tool.

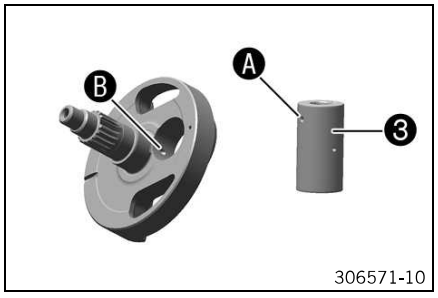
Pressing device for crankshaft, complete (75029047000) (☛ p. 230)

Info
Hold the lower crank web.

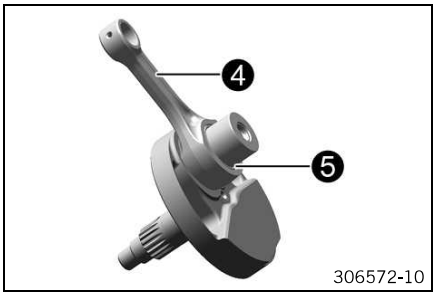
– Remove the connecting rod.



– Press the crank pin out of the lower crank web.

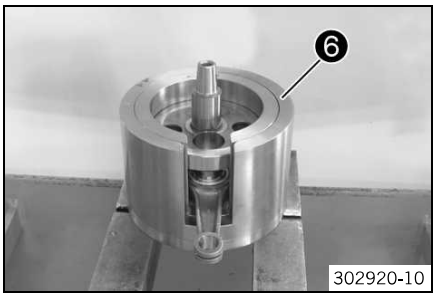


– Press in the new crank pin ❸ as far as possible.
  ✓ Oil hole Ⓐ is aligned with oil hole Ⓑ.
  ✗ If the oil holes are not correctly aligned, the conrod bearing will not be supplied with oil.
– Check that the oil channel is clear using compressed air.



– Mount new connecting rod ❹.

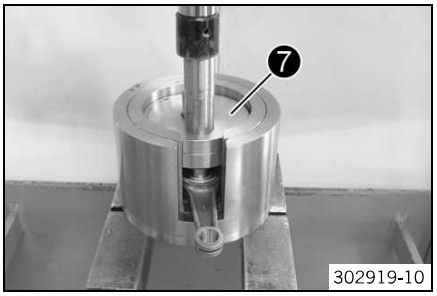
Info
Thoroughly oil bearing ❺.



– Position special tool ❻ on the press.

Pressing device for crankshaft, complete (75029047000) (☛ p. 230)
Insert for crankshaft pressing tool (77729008000) (☛ p. 233)

– Insert the crank web with connecting rod and bearing. Position the second crank web.



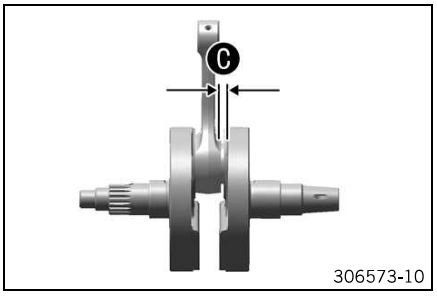
– Position special tool ❼ with the heel pointing down.

Insert for crankshaft pressing tool (77729008000) (☛ p. 233)

– Press in the upper crank web 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 ❻ between the connecting rod and the crank webs using the special tool.

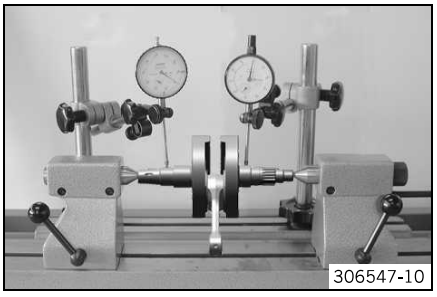
Feeler gauge (59029041100) (☛ p. 228)

Connecting rod - axial play of lower conrod bearing	0.20… 0.45 mm (0.0079… 0.0177 in)

» If the specification is not reached:
– Correct it so the dimension is equal to the specified value.

Finishing work
– Check the crankshaft run-out at the bearing pin. (☛ p. 149)

16.4.9 Checking the crankshaft run-out at the bearing pin

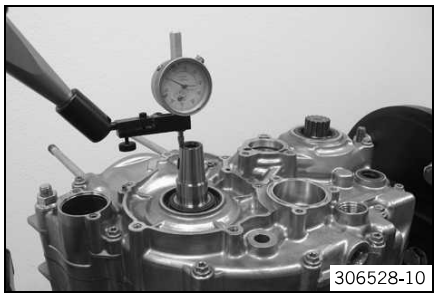


– Position the crankshaft on a roller block.
– Turn the crankshaft slowly.
– Check the crankshaft run-out on both bearing pins.

Crankshaft - run-out at 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.

16.4.10 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 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

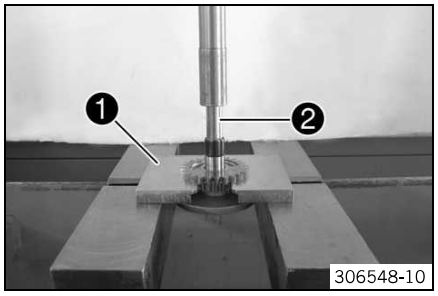
Crankshaft - axial play	0.30… 0.40 mm (0.0118… 0.0157 in)

» If the measured value does not meet specifications:
– Remove the crankshaft.
– Remove the crankshaft bearing inner race. (☛ p. 147)
– Calculate the thickness of the compensating disks.
– Add or remove compensating disks equally on both sides.

Info
If the axial play is too small, remove compensating disks.
If the axial play is too large, add compensating disks.

– Install the crankshaft bearing inner race. (☛ p. 147)

16.4.11 Removing the drive wheel of the balancer shaft



– Position the balancer shaft in the press with special tool ❶.

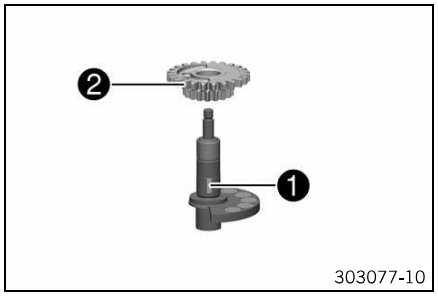
Separator plate (77229032000) (☛ p. 232)

– Mount special tool ❷.

Protection cap (77229031000) (☛ p. 231)

– Press out the drive wheel of the balancer shaft.

16.4.12 Installing the drive wheel of the balancer shaft



– Ensure that spring washer ❶ is seated properly.
– Warm drive wheel ❷ of the balancer shaft and push it onto the balancer shaft.

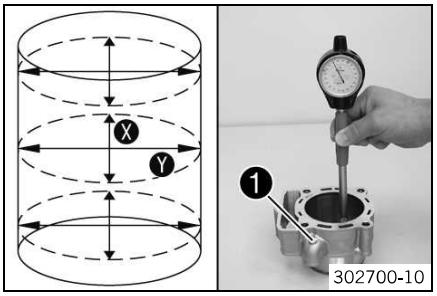
Guideline

100 °C (212 °F)

16.4.13 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.

16.4.14 Checking/measuring the cylinder

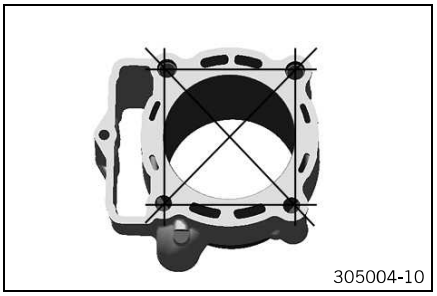


– Check the cylinder bearing surface for damage.
  » If the cylinder bearing surface is damaged:
    – Change the cylinder and piston.
– Measure the cylinder diameter at several locations on the X- and Y-axes using a micrometer to identify oval wear.

Guideline

Cylinder - drill hole diameter	
Size I	78.000... 78.012 mm (3.07086... 3.07133 in)
Size II	78.012... 78.025 mm (3.07133... 3.07184 in)

Info
The cylinder size 1 is marked on the cylinder collar.

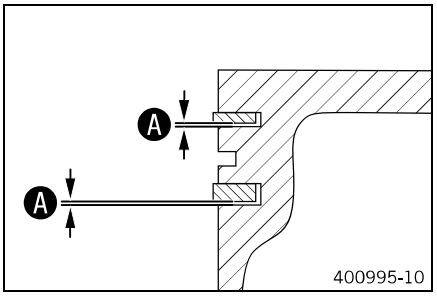


– Using a straightedge and the special tool, check the sealing area of the cylinder head for distortion.

Feeler gauge (59029041100) (☛ p. 228)	
Cylinder/cylinder head - distortion of sealing area	≤ 0.10 mm (≤ 0.0039 in)

  » If the measured value does not meet specifications:
    – Change the cylinder.

16.4.15 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	≤ 0.08 mm (≤ 0.0031 in)

Feeler gauge (59029041100) (☛ p. 228)

  » If play A is larger than the specified value:
    – Change the piston and piston rings.
    – Check/measure the cylinder. (☛ p. 151)

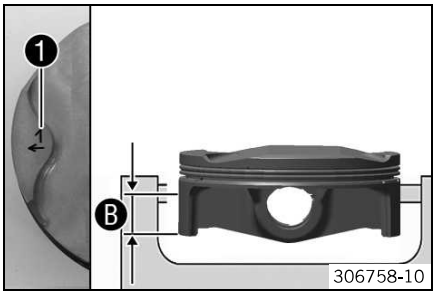
– Check the piston sliding surface for damage.
  » If the piston sliding surface is damaged:
    – Replace the piston and, if necessary, the cylinder.
– Check that the piston rings move easily in the piston ring grooves.
  » If the piston ring is stiff:
    – Clean the piston ring groove.

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.



– Measure the piston at the piston skirt, at right angles to the piston pin, at a distance Ⓑ.

Guideline

Distance Ⓑ	27 mm (1.06 in)
Piston - diameter	
Size I	77.955… 77.965 mm (3.06909… 3.06948 in)
Size II	77.965… 77.975 mm (3.06948… 3.06988 in)

> **Info**
> Piston dimensions ❶ are marked on the piston head.

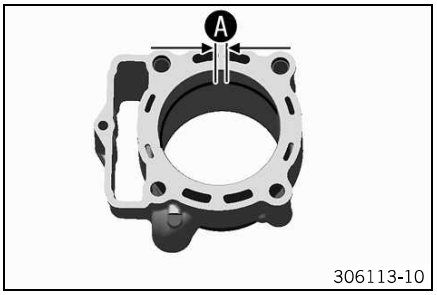
16.4.16 Measuring the piston/cylinder mounting clearance

– Check/measure the cylinder. (☛ p. 151)
– Check/measure the piston. (☛ p. 151)
– 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	0.035… 0.057 mm (0.00138… 0.00224 in)
Size II	0.037… 0.060 mm (0.00146… 0.00236 in)
Wear limit	0.070 mm (0.00276 in)

16.4.17 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	20 mm (0.79 in)

– Measure end gap Ⓐ with a feeler gauge.

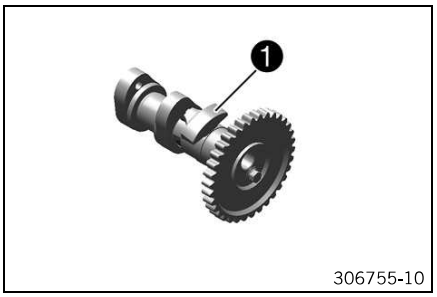
Guideline

Piston ring - end gap	
Compression ring	≤ 0.40 mm (≤ 0.0157 in)
Oil scraper ring	≤ 0.70 mm (≤ 0.0276 in)

  » If the end gap is greater than the specified measurement:
    – Check/measure the cylinder. (☛ p. 151)
  » If cylinder wear lies within the specified tolerance:

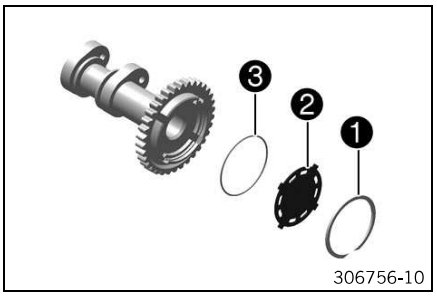
– Replace the piston ring.
– Mount the piston ring with the marking facing toward the piston head.

16.4.18 Checking the camshafts



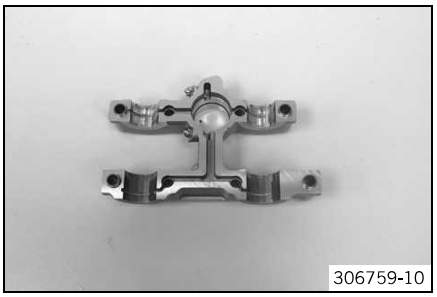
– Check the camshaft for damage and wear.
  » If there is damage or wear:
    – Change the camshaft.
    – If the surface of the cams is damaged, check the oil supply to the camshaft and cam lever.
– Check the autodecompressor ❶ for damage and wear.
  » If there is damage or wear:
    – Change the exhaust camshaft.

16.4.19 Work on the intake camshaft

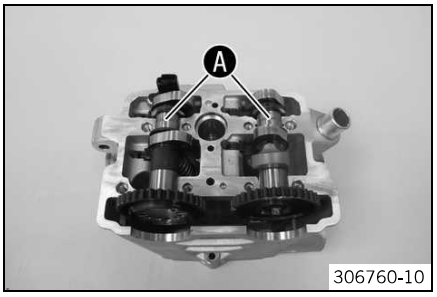


– Remove lock ring ❶.
– Take off bleeder plate ❷.
– Remove O-ring ❸.
– Check the parts of the bleeder and replace if necessary.
– Mount the new O-ring.
– Position bleeder plate ❷.
– Mount lock ring ❶.

16.4.20 Checking the pivot points of the camshafts

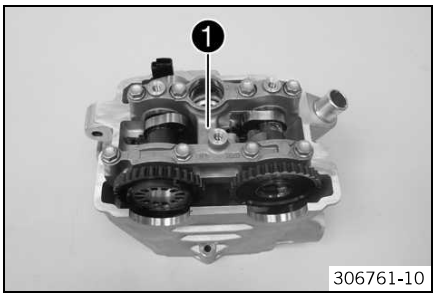


– Check the pivot points of the camshafts.
  » If there is damage or wear:
    – Change the cylinder head with the camshaft bearing bridge.



– Position the camshafts.
  ✓ The valves are not activated.
– Insert the **Plastigauge** clearance gauge in area Ⓐ.

Plastigauge measuring strips (60029012000) (☛ p. 229)

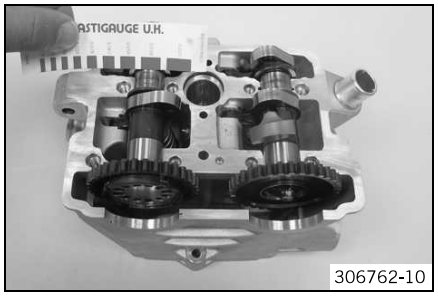


– Position camshaft bearing bridge ❶. Mount and tighten the screws.

Guideline

Screw, camshaft bearing bridge	M7x1	14 Nm (10.3 lbf ft)	Lubricated with engine oil

Info
Ensure that the dowel pins are seated properly.
Do not turn the camshaft.



– Remove camshaft bearing bridge ❶ again. Compare the **Plastigauge** clearance gauge with the specifications on the packaging.

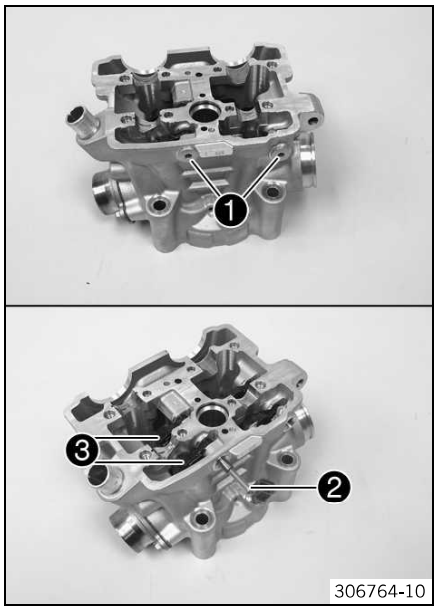
Guideline

Camshaft bearing - sleeve bearing	
Radial clearance	0.020... 0.054 mm (0.00079... 0.00213 in)
Wear limit	0.065 mm (0.00256 in)

Info
The width of the **Plastigauge** clearance gauge is a measure of the bearing play.

– Take off the camshafts and clean the parts.

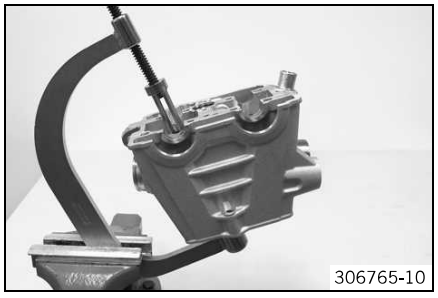
16.4.21 Removing the valves



– Remove screw plugs ❶ with the O-ring.
– Screw appropriate screw ❷ into the cam lever shaft.
– Hold cam levers ❸ and remove the cam lever shaft.

Info
If the cam levers will continue to be used, note down their installation position.

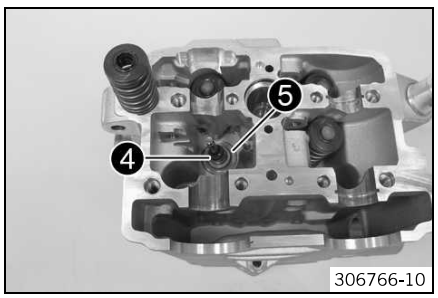
– Take the shims from the valve spring retainers and put them aside corresponding to their installation position.



– Pre-tension the valve spring using the special tool.

Valve spring compressor (59029019000) (☛ p. 228)
Insert for valve spring lever (77229060000) (☛ p. 232)

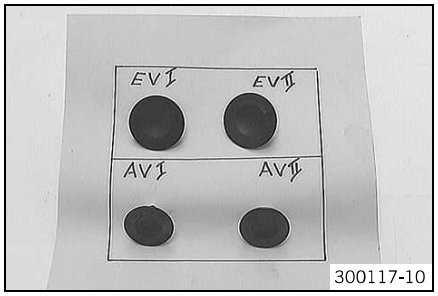
– Remove the valve keys and unload the valve spring.



– Remove the valve spring retainer and valve springs.
– Mark the valve spring according to its normal built-in position.
– Pull the valve down out of the valve guide.
– Remove valve stem seal ❹ with the special tool.

Pliers for valve stem seals (77229010000) (☛ p. 231)

– Remove valve spring seat ❺.



– Mark the valves corresponding to their installation position.

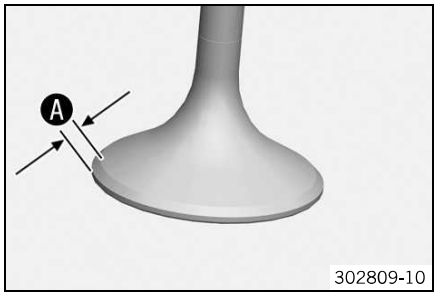
Info
Place the valves in a carton corresponding to their installation position and label them.

16.4.22 Checking the valves

– Check the valve plate for run-out.

Valve - run-out	
At the valve plate	≤ 0.05 mm (≤ 0.002 in)

» If the measured value does not meet specifications:
– Change the valve.



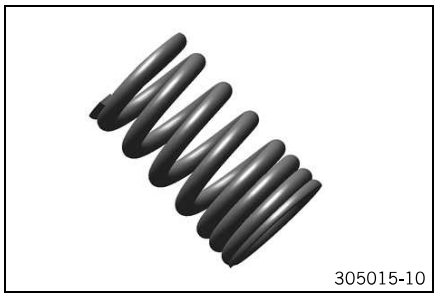
– Check sealing seat Ⓐ on the valve.

Valve - sealing seat width	
Intake	1.40 mm (0.0551 in)

Valve - sealing seat width	
Exhaust	1.40 mm (0.0551 in)

» If the sealing seat is not centered on the valve seat or deviates from the specification:
– Rework the valve seat.

16.4.23 Checking the valve springs



– Check the valve springs for breakage and wear (visual check).

Info
Intake valves are marked with a green color coding.
Exhaust valves are marked with a brown color coding.

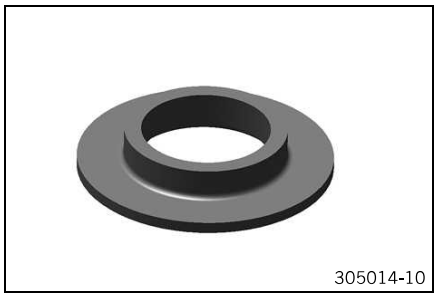
» If the valve spring is broken or worn:
– Change the valve spring.

– Measure the length of the valve springs.

Valve spring	
Minimum length of intake valve	41.20 mm (1.622 in)
Minimum length of exhaust valve	41.10 mm (1.6181 in)

» If the measured value does not meet specifications:
– Change the valve springs.

16.4.24 Checking the 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.

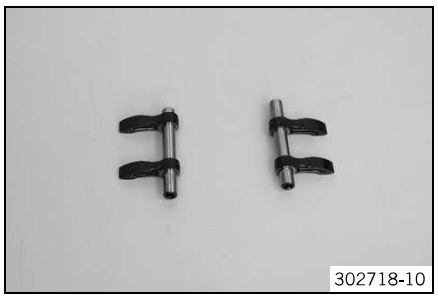
– Measure the thickness of the valve spring seat.

Valve spring seat - thickness	1.40... 1.50 mm (0.0551... 0.0591 in)

» If the measured value does not meet specifications:

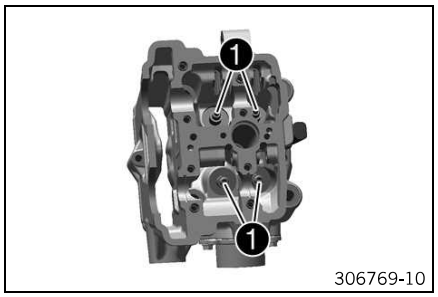
– Change the valve spring seat.

16.4.25 Checking the cam levers


302718-10

– Check the cam levers and cam lever shafts for damage and wear.
  » If there is damage or wear:
    – Change the cam levers and/or cam lever shafts.

16.4.26 Checking the cylinder head

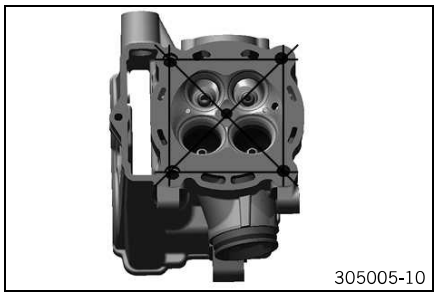


306769-10

– Check valve guides ❶ using the special tool.

Limit plug gauge (77229026000) (☛ p. 231)

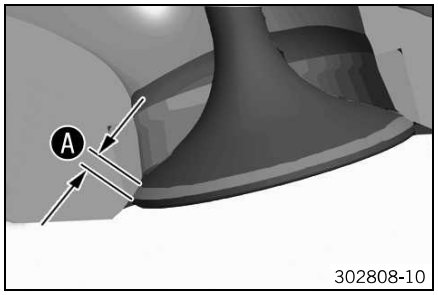
  » If the special tool is easy to insert in the valve guide:
    – Change the valve guide and valve.
– Check the sealing area of the spark plug thread and the valve seats from damage and cracking.
  » If there is damage or cracking:
    – Change the cylinder head.


305005-10

– Using a straightedge and the special tool, check the sealing area of the cylinder for distortion.

Feeler gauge (59029041100) (☛ p. 228)	
Cylinder/cylinder head - distortion of sealing area	≤ 0.10 mm (≤ 0.0039 in)

  » If the measured value does not meet specifications:
    – Change the cylinder head.



302808-10

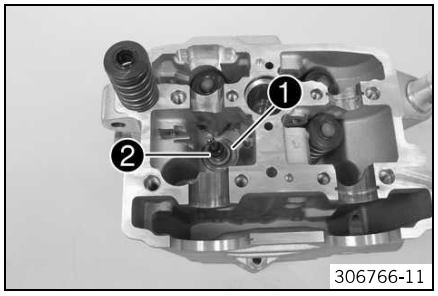
– Check sealing seat Ⓐ of the valves.

Valve - sealing seat width	
Intake	1.40 mm (0.0551 in)

Valve - sealing seat width	
Exhaust	1.40 mm (0.0551 in)

  » If the measured value does not meet specifications:
    – Rework the valve seat.
– Blow compressed air through all oil holes and check that they are clear.

16.4.27 Installing the valves

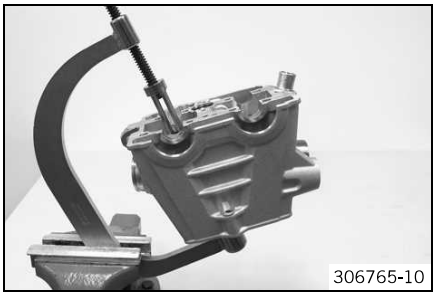


306766-11

– Position valve spring seat ❶. Mount valve stem seal ❷.
– Mount the valve corresponding to its installation position.
– Mount the valve spring with the tighter coil facing downward according to the built-in position.

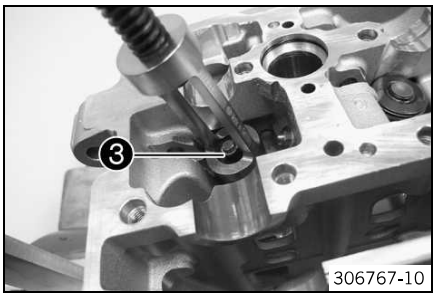
Info
Intake valves are marked with a green color coding.
Exhaust valves are marked with a brown color coding.

– Mount the valve spring retainers.


306765-10

– Pre-tension the valve spring using the special tool.

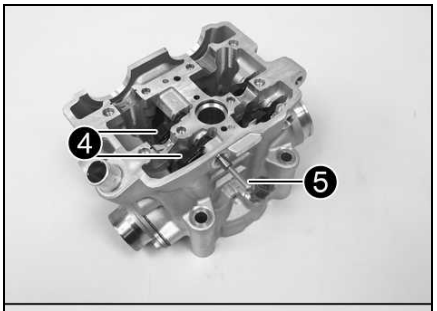
Valve spring compressor (59029019000) (☛ p. 228)
Insert for valve spring lever (77229060000) (☛ p. 232)

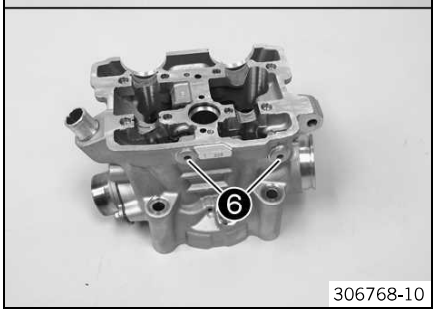


306767-10

– Mount valve keys ❸.

Info
When mounting the valve keys, ensure that they are seated properly; it is recommended to adhere the valve keys to the valves with a small amount of grease.





306768-10

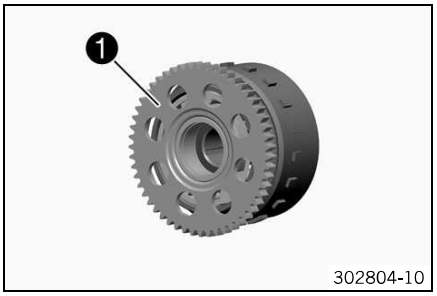
– Position cam levers ❹ in the positions they had before they were removed.
– Mount the cam lever shafts.
– Remove screw ❺.
– Mount and tighten screw plugs ❻.

Guideline

Screw plug, cam lever axis	M10x1	10 Nm (7.4 lbf ft)

– Place the shims in the valve spring retainers corresponding to their installation position.

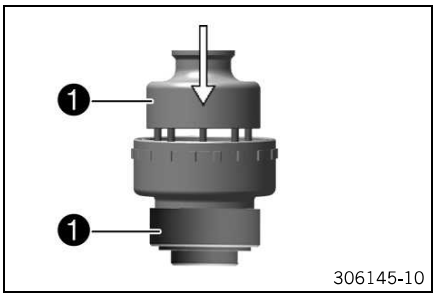
16.4.28 Checking the freewheel



302804-10

– Insert freewheel gear ❶ into the freewheel hub, turning the freewheel gear clockwise; do not wedge.
– Check the locking action of starter wheel ❶.
  » If the freewheel gear does not turn clockwise or if it does not lock counterclockwise:
    – Change the free wheel.

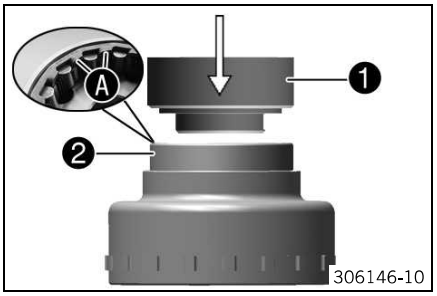
16.4.29 Changing the free wheel



– Position the rotor in the press with special tool ❶.

Pressing tool for freewheel (77829083044) (☛ p. 233)

– Press out the freewheel.

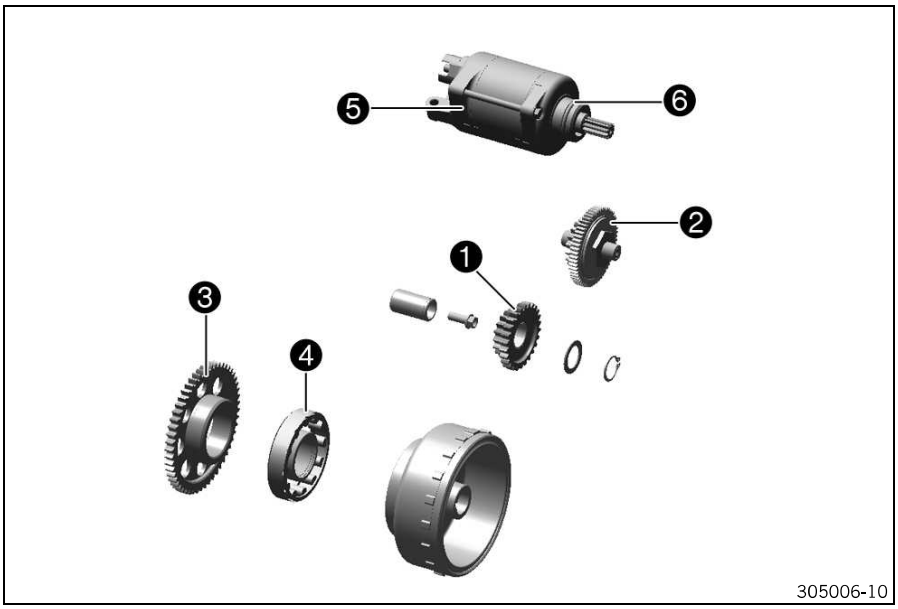


– Position the new freewheel ❷ in the rotor.
  ✔ Shift dogs Ⓐ face upward.
– Position the rotor in the press with the freewheel and special tool ❶.

Pressing tool for freewheel (77829083044) (☛ p. 233)

– Press the freewheel all the way in.

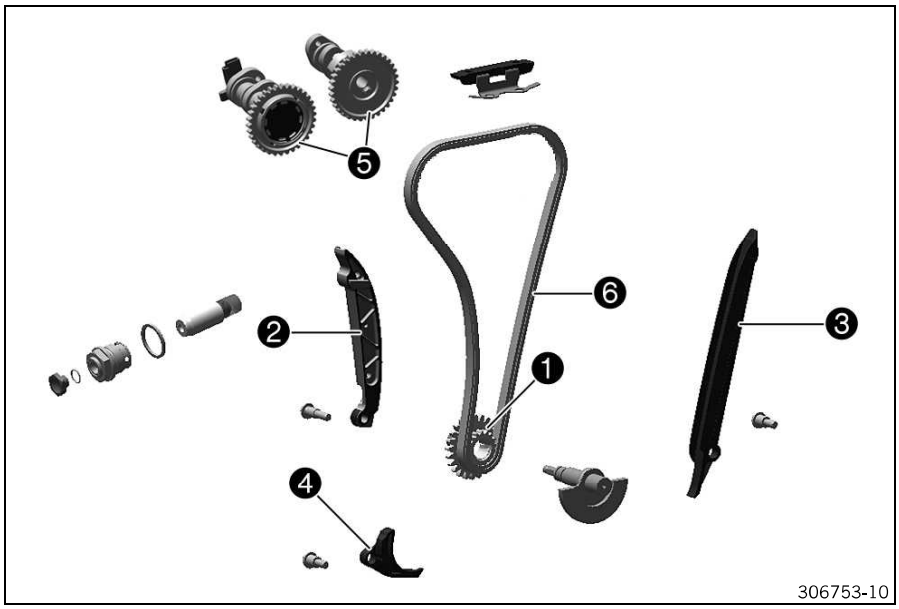
16.4.30 Checking the electric starter drive



– Check the gear mesh and bearing of starter idler gear ❶ for damage and wear.
  » If there is damage or wear:
    – Change the starter idler gear.
– Check the gear mesh and bearing of torque limiter ❷ for damage and wear.
  » If there is damage or wear:
    – Change the torque limiter.
– Check the gear mesh and bearing of freewheel gear ❸ for damage and wear.
  » If there is damage or wear:
    – Change the freewheel gear or bearing.
– Check freewheel ❹ for damage and wear.
  » If there is damage or wear:
    – Change the free wheel.
– Check the gear mesh of starter motor ❺ for damage and wear.
  » If there is damage or wear:

  - Change the starter motor.
- Change O-ring ❻ 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 the connector of the starter motor.
  - » If the starter motor does not turn when the circuit is closed:
    - Change the starter motor.

16.4.31 Checking the timing assembly



- Check timing chain sprocket ❶ for damage and wear.
  - » If there is damage or wear:
    - Change the timing chain sprocket.
- Check the timing chain tensioning rail ❷ for damage and wear.
  - » If there is damage or wear:
    - Replace the timing chain tensioning rail.
- Check the timing chain guide rail ❸ for damage and wear.
  - » If there is damage or wear:
    - Replace the timing chain guide rail.
- Check the timing chain securing guide ❹ for damage and wear.
  - » If there is damage or wear:
    - Replace the timing chain securing guide.
- Check camshaft gears ❺ for damage and wear.
  - » If there is damage or wear:
    - Change the camshaft.
- Check timing chain ❻ for damage and wear.
  - » If there is damage or wear:
    - Change the timing chain.
- Let the timing chain hang down freely. Check the timing chain links for smooth operation.
  - » The chain links no longer align in a straight line:
    - Change the timing chain.

16.4.32 Preparing the timing chain tensioner for installation

– Press the timing chain tensioner together completely.

Info
This requires some force, as the oil must be pressed out.

– Release the timing chain tensioner.

✔ Without pressure, the timing chain tensioner expands fully.

– Place two compensating disks or similar aids next to the timing chain tensioner piston. This ensures that, when pressed in, the piston cannot go in all the way.

Guideline

Thickness of the compensating disks	2... 2.5 mm (0.08... 0.098 in)

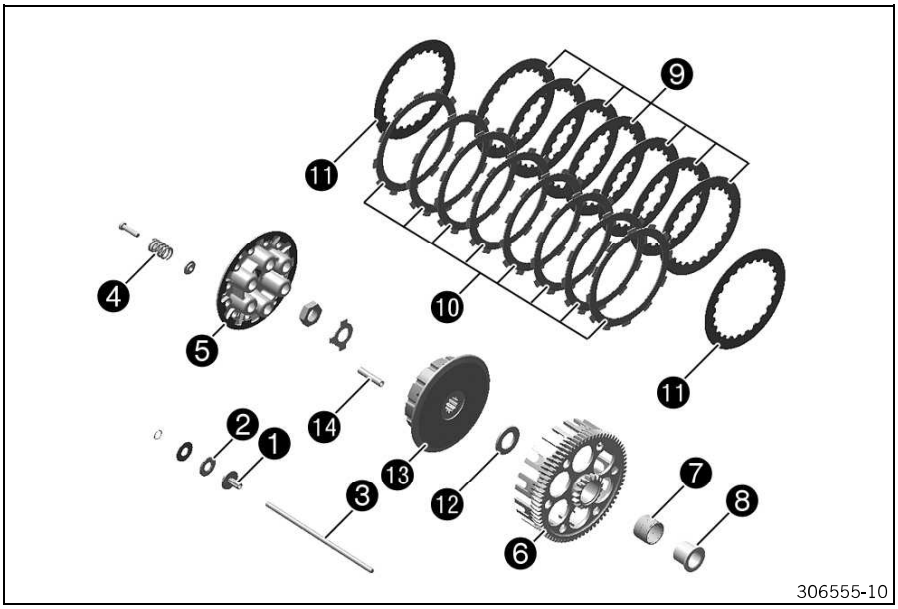
– Release the timing chain tensioner.

✔ The detent mechanism engages and the piston remains in place.

Final position of the piston after engagement	3 mm (0.12 in)

Info
This position is necessary for installation.
If the timing chain tensioner is now pressed again and is only extended a maximum of half way (it is prevented from extending completely). This locks the detent mechanism and the timing chain tensioner can no longer be squeezed together. This function is necessary in order to ensure sufficient timing chain tension even at low oil pressures.

16.4.33 Checking the clutch



– Check pressure piece ❶ for damage and wear.
  » If there is damage or wear:
    – Change the pressure piece.
– Check axial bearing ❷ for damage and wear.
  » If there is damage or wear:
    – Change the axial bearing.
– Place push rod ❸ on a level surface and check for run-out.

» If there is run-out:
– Change the push rod.

– Check the length of clutch springs ❹.

Clutch spring - length	≥ 38.5 mm (≥ 1.516 in)

» If the clutch spring length is less than the specified value:
– Change all clutch springs.

– Check the thrust face of pressure cap ❺ for damage and wear.
» If there is damage or wear:
– Change the pressure cap.

– Check the thrust surfaces of the clutch facing discs in the outer clutch hub ❻ for wear.

Contact surface of clutch facing discs in outer clutch hub	≤ 0.5 mm (≤ 0.02 in)

» If the contact surface exhibits significant wear:
– Change the clutch facing discs and the outer clutch hub.

– Check needle bearing ❼ and collar sleeve ❽ for damage and wear.
» If there is damage or wear:
– Change the needle bearing and collar sleeve.

– Check intermediate clutch discs ❾ and ⓫ for damage and wear.
» If the intermediate clutch discs are not even or are pitted:
– Change all intermediate clutch discs.

– Check clutch facing discs ❿ for discoloration and scoring.
» If there is discoloration or scoring:
– Change all clutch facing discs.

– Check the thickness of clutch facing discs ❿.

Clutch facing discs - thickness of total package	≥ 26.4 mm (≥ 1.039 in)

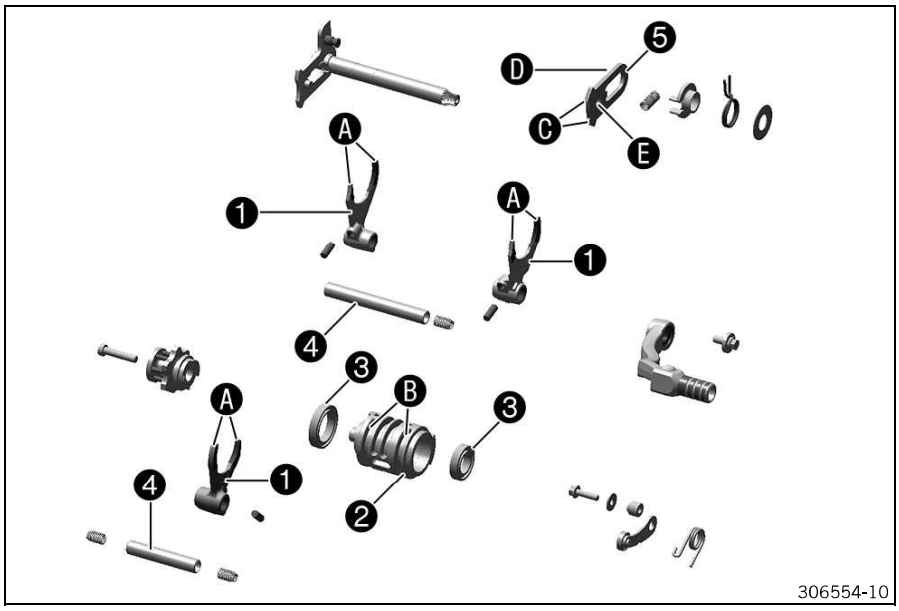
» If the clutch facing discs do not meet specifications:
– Change all clutch facing discs.

– Check disc ⓬ for damage and wear.
» If there is damage or wear:
– Change the disc.

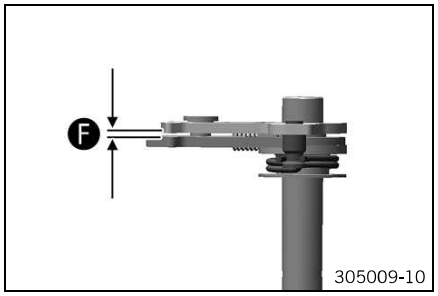
– Check the inner clutch hub ⓭ for damage and wear.
» If there is damage or wear:
– Change the inner clutch hub.

– Check sleeve ⓮ for damage and wear.
» If there is damage or wear:
– Change the sleeve.

16.4.34 Checking the shift mechanism



– Check shift forks ❶ on disc Ⓐ for damage and wear (visual check).
  » If there is damage or wear:
    – Change the shift fork.
– Check shift grooves Ⓑ of shift drum ❷ for wear.
  » If the shift groove is worn:
    – Change the shift drum.
– Check the seating of the shift drum in the grooved ball bearings ❸.
  » If the shift drum is not correctly seated:
    – Change the shift drum and/or the grooved ball bearing.
– Check grooved ball bearing ❸ for smooth operation and wear.
  » If the grooved ball bearings are stiff or worn:
    – Change the grooved ball bearing.
– Check the shift rollers for damage and wear.
  » If there is damage or wear:
    – Change the shift rollers.
– Check the springs of shift rails ❹ for damage and wear.
  » If the spring is damaged or worn:
    – Change the spring of the shift rail.
– Check the shift rails ❹ for run-out on a flat surface.
  » If there is run-out:
    – Change the shift rail.
– Check the shift rails for scoring, wear and smooth operation in the shift forks.
  » If scoring or wear is present or of the shift fork is stiff:
    – Change the shift rail.
– Check sliding plate ❺ for wear on contact areas Ⓒ.
  » If the sliding plate is worn:
    – Change the sliding plate.
– Check return surface Ⓓ on the sliding plate for wear.
  » If there is severe grooving:
    – Change the sliding plate.
– Check guide bolts Ⓔ for firm seating and wear.
  » If the guide bolts are loose or worn:
    – Change the sliding plate.

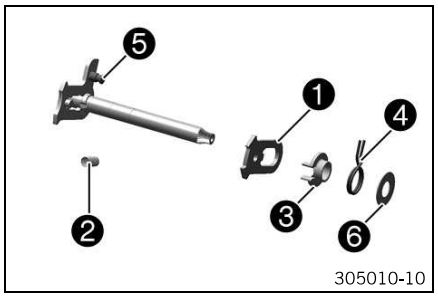


– Preassemble the shift shaft. (☛ p. 163)
– Check clearance Ⓕ between the sliding plate and the shift quadrant.

Shift shaft - sliding plate/shift quadrant clearance	0.40… 0.80 mm (0.0157… 0.0315 in)

» If the measured value does not meet specifications:
– Change the sliding plate.

16.4.35 Preassembling the shift shaft

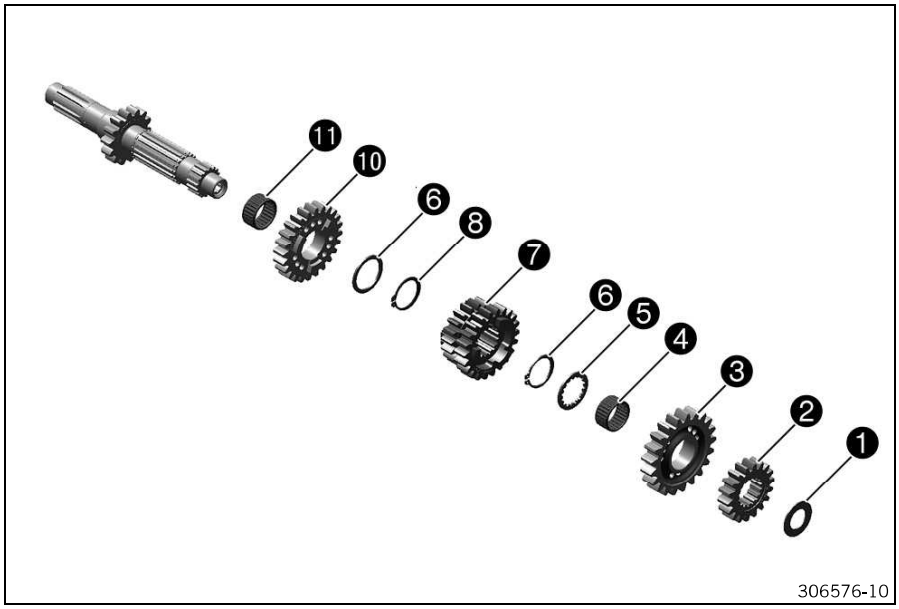


– Secure the short end of the shift shaft in the bench vise.
Guideline

Use soft jaws.

– Mount sliding plate ❶ with the guide pin facing downward and put the guide pin on the shift quadrant.
– Mount pressure spring ❷.
– Slide on spring guide ❸, push return spring ❹, with the offset end facing upward, over the spring guide and lift the offset end over abutment bolt ❺.
– Mount washer ❻.

16.4.36 Disassembling the main shaft

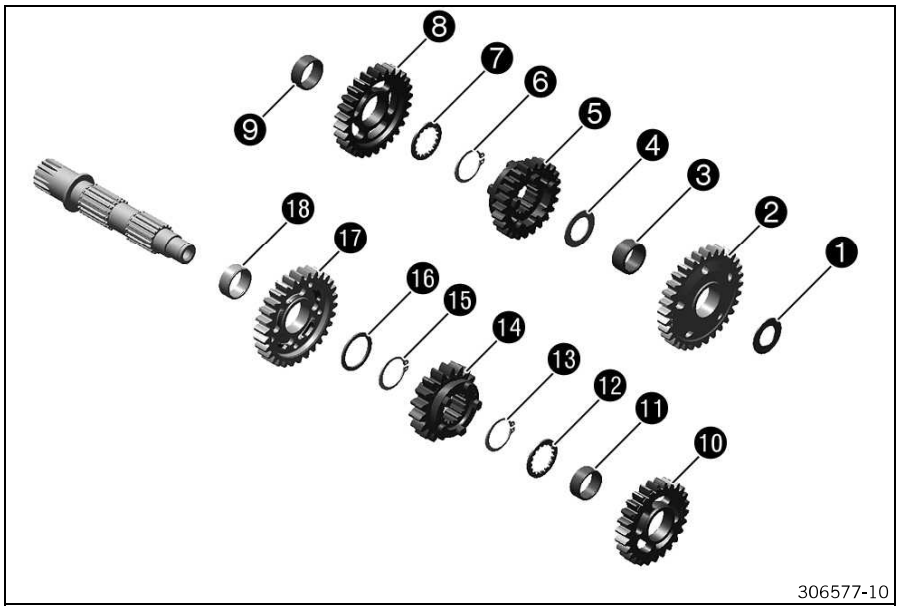


– Secure the main shaft with the toothed end facing downward in the vise.
Guideline

Use soft jaws.

– Remove stop disk ❶ and 2nd-gear fixed gear ❷.
– Remove sixth-gear idler gear ❸.
– Remove needle bearing ❹ and stop disk ❺.
– Remove lock ring ❻.
– Remove 3rd/4th-gear sliding gear ❼.
– Remove lock ring ❽.
– Remove stop disk ❾ and fifth-gear idler gear ❿.
– Remove needle bearing ⓫.

16.4.37 Disassembling the countershaft



– Fix the countershaft in the vice with the toothed end facing downward.

Guideline

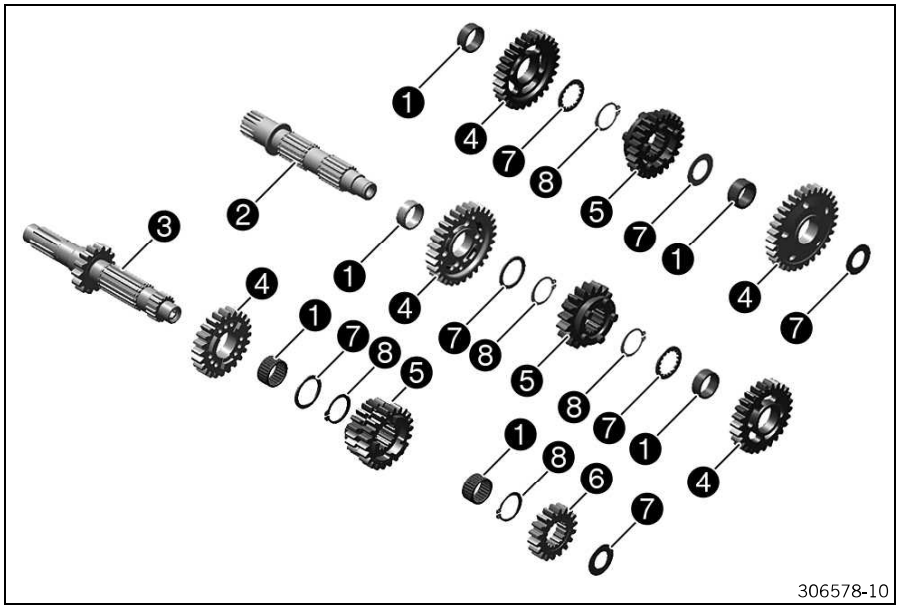
Use soft jaws

– Remove stop disk ❶ and 1st-gear idler gear ❷.
– Remove needle bearing ❸ and stop disk ❹.
– Remove 6th-gear sliding gear ❺.
– Remove lock ring ❻.
– Remove stop disk ❼.
– Remove third-gear idler gear ❽ and needle bearing ❾.
– Remove fourth-gear idler gear ❿.
– Remove needle bearing ⓫.
– Remove stop disk ⓬.
– Remove lock ring ⓭.
– Remove 5th-gear sliding gear ⓮.
– Remove lock ring ⓯.
– Remove stop disk ⓰.
– Remove 2nd-gear idler gear ⓱ and needle bearing ⓲.

16.4.38 Checking the transmission

Condition

The transmission has been disassembled.

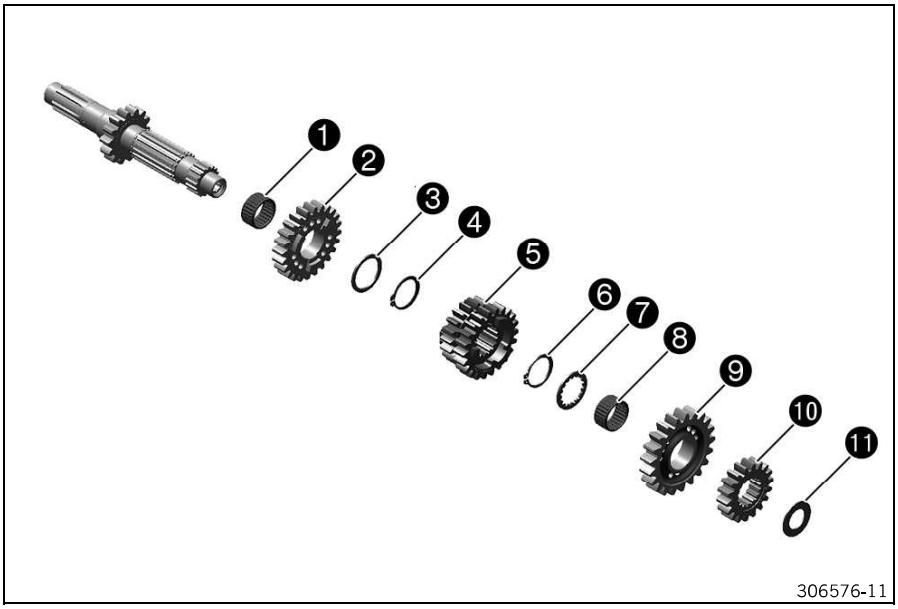


– Check needle bearings ❶ for damage and wear.
  » If there is damage or wear:
    – Change the needle bearings.
– Check the pivot points of main shaft ❷ and countershaft ❸ for damage and wear.
  » If there is damage or wear:
    – Change the main shaft and/or countershaft.
– Check the tooth profiles of main shaft ❷ and countershaft ❸ for damage and wear.
  » If there is damage or wear:
    – Change the main shaft and/or countershaft.
– Check the pivot points of idler gears ❹ for damage and wear.
  » If there is damage or wear:
    – Change the gear wheel pair.
– Check the shift dogs of idler gears ❹ and sliding gears ❺ for damage and wear.
  » If there is damage or wear:
    – Change the gear wheel pair.
– Check the tooth faces of idler gears ❹, sliding gears ❺, and fixed gear ❻ for damage and wear.
  » If there is damage or wear:
    – Change the gear wheel pair.
– Check the tooth profiles of sliding gears ❺ for damage and wear.
  » If there is damage or wear:
    – Change the gear wheel pair.
– Check sliding gears ❺ for smooth operation in the profile of main shaft ❷.
  » If the sliding gear is stiff:
    – Change the sliding gear or main shaft.
– Check sliding gears ❺ for smooth operation in the profile of countershaft ❸.
  » If the sliding gear is stiff:
    – Change the sliding gear or countershaft.
– Check stop disks ❼ for damage and wear.
  » If there is damage or wear:
    – Change the stop disks.
– Use new lock rings ❽ with every repair.

16.4.39 Assembling the main shaft

Info
Use new lock rings with every repair.

Preparatory work
- Check the transmission. (☛ p. 164)
- Carefully lubricate all parts before assembling.



Main work
- Secure the main shaft with the toothed end facing downward in the vise.

  Guideline

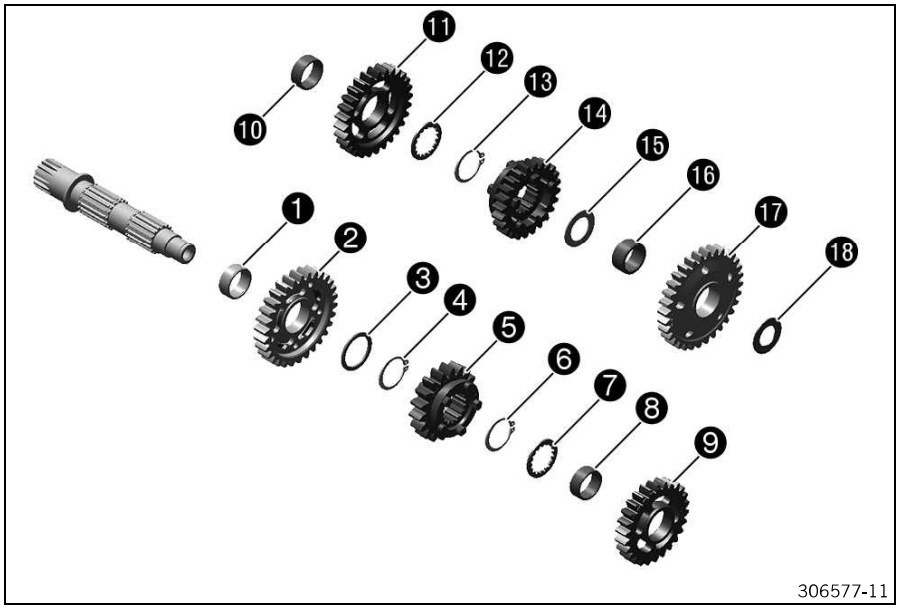
Use soft jaws

- Mount needle bearing ❶ and mount fifth-gear idler gear ❷ with the shift dogs facing up.
- Mount stop disk ❸ and lock ring ❹.
- Attach third/fourth-gear sliding gear ❺ with the small gear wheel facing down and mount lock ring ❻.
- Mount stop disk ❼ and needle bearing ❽.
- Mount sixth-gear idler gear ❾ with the shift dogs facing downward.
- Mount second-gear fixed gear ❿ with the collar facing down and mount stop disk ⓫.
- Finally, check all gear wheels for smooth operation.

16.4.40 Assembling the countershaft

Info
Use new lock rings with every repair.

Preparatory work
- Check the transmission. (☛ p. 164)
- Carefully lubricate all parts before assembling.



Main work

– Fix the countershaft in the vice with the toothed end facing downward.

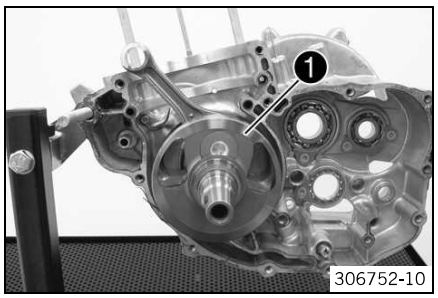
Guideline

Use soft jaws

– Mount needle bearing ❶ and 2nd-gear idler gear ❷ onto the countershaft with the protruding collar facing downward.
– Mount stop disk ❸ and lock ring ❹.
– Mount sixth-gear sliding gear ❺ with the shift groove facing up.
– Mount lock ring ❻ and stop disk ❼.
– Mount needle bearing ❽ and fourth-gear idler gear ❾ with the collar facing up.
– Mount needle bearing ❿ and third-gear idler gear ⓫ with the collar facing down.
– Mount stop disk ⓬ and lock ring ⓭.
– Mount fifth-gear sliding gear ⓮ with the shift groove facing down and mount stop disk ⓯.
– Mount needle bearing ⓰, first-gear idler gear ⓱ with the recess facing down, and stop disk ⓲.
– Finally, check all gear wheels for smooth operation.

16.5 Engine assembly

16.5.1 Installing the crankshaft

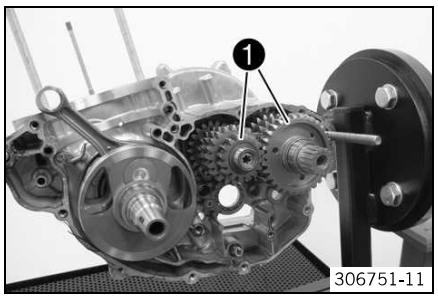


– Position the right section of the engine case in the engine work stand.
– Oil the bearing.

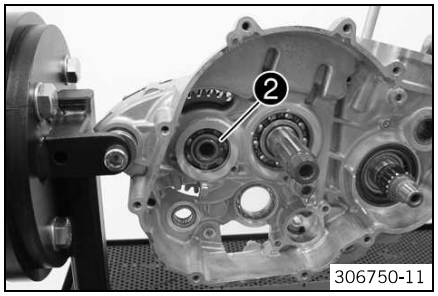
Engine oil (SAE 10W/50) (☛ p. 222)

– Push crankshaft ❶ into the bearing seat.

16.5.2 Installing the transmission shafts

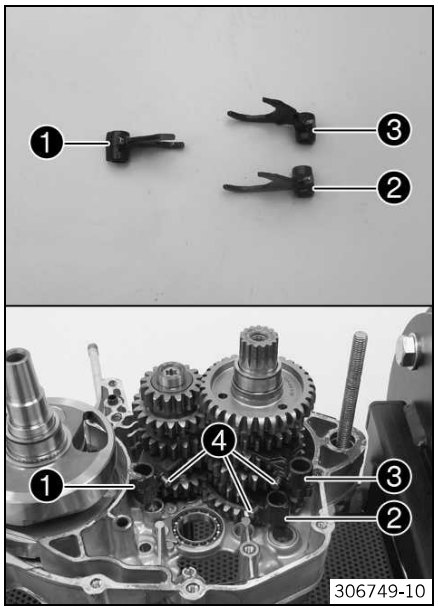


– Oil the bearing.
– Slide both transmission shafts ❶ into the bearing seats together.



– Mount lock ring ❷.

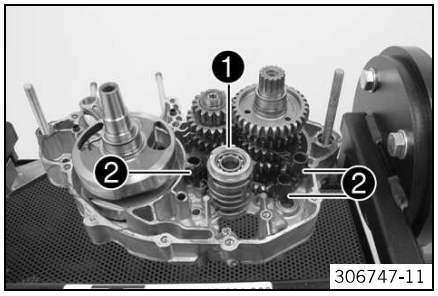
16.5.3 Installing the shift forks



– Shift fork ❶ has a smaller inside diameter; mount this in the shift groove of the main shaft.
– Mount shift fork ❷ in the lower shift groove of the countershaft.
– Mount shift fork ❸ in the upper shift groove of the countershaft.
– Slide on shift rollers ❹.

Tip
Fix the shift rollers in the shift forks with grease.

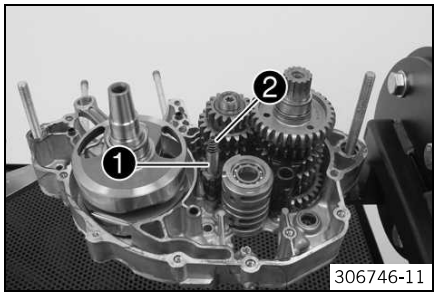
16.5.4 Installing the shift drum



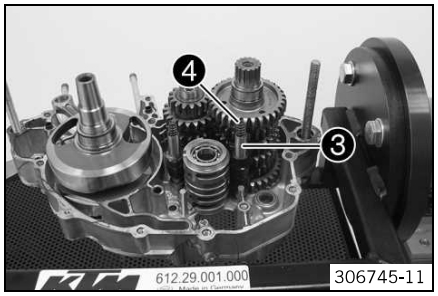
– Push shift drum ❶ into the bearing seat.
– Put shift forks ❷ in the shift drum.

Info
Do not misplace the shift rollers.

16.5.5 Installing the shift rails

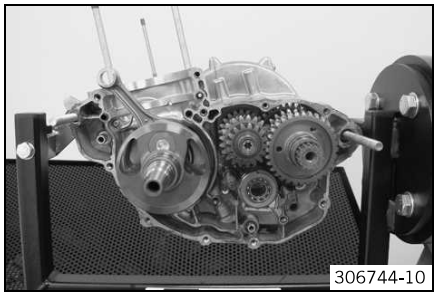


– Install shift rail ❶ together with upper spring ❷ and the lower spring.



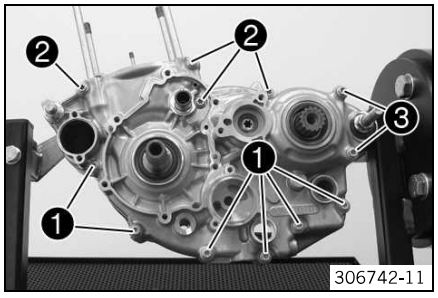
– Install shift rail ❸ together with upper spring ❹.

16.5.6 Installing the left engine case



– Mount the dowels.
– Degrease the sealing area. Apply the sealing compound to the left section of the engine case.

Loctite® 5910



– Mount the left section of the engine case. If necessary, strike it lightly with a rubber mallet and turn the transmission shafts.

Info
Do not use the screws to pull the two sections of the engine case together.

– Mount screws ❶ but do not tighten yet.

Guideline

Screw, engine case	M6x55	10 Nm (7.4 lbf ft)

– Mount screws ❷ but do not tighten yet.

Guideline

Screw, engine case	M6x65	10 Nm (7.4 lbf ft)

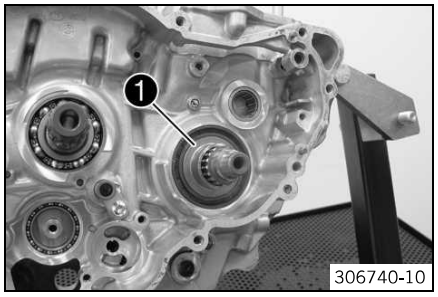
– Mount screws ❸ and tighten all screws in a crisscross pattern.

Guideline

Screw, engine case	M6x85	10 Nm (7.4 lbf ft)

– Mount the screw connection of the engine fixing arm.

16.5.7 Installing the spacer

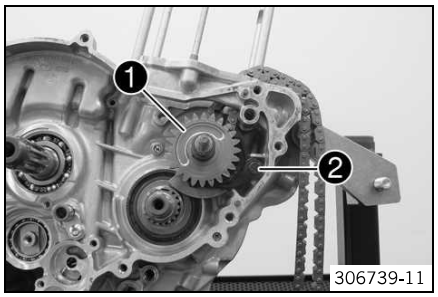


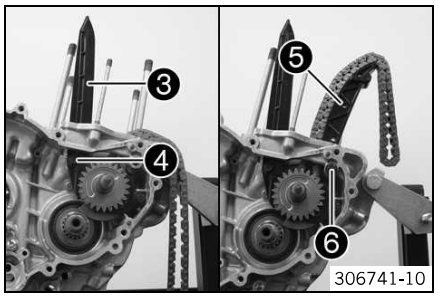
– Grease the shaft seal ring.

Long-life grease (☛ p. 224)

– Mount spacer ❶.

16.5.8 Installing the timing chain





– Mount balancer shaft ❶ with the timing chain and timing chain securing guide.

Info
If the timing chain was used before, ensure it is running in the correct direction.

– Mount and tighten screw ❷.

Guideline

Screw, timing chain securing guide	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

– Position timing chain guide rail ❸.
– Mount and tighten screw ❹.

Guideline

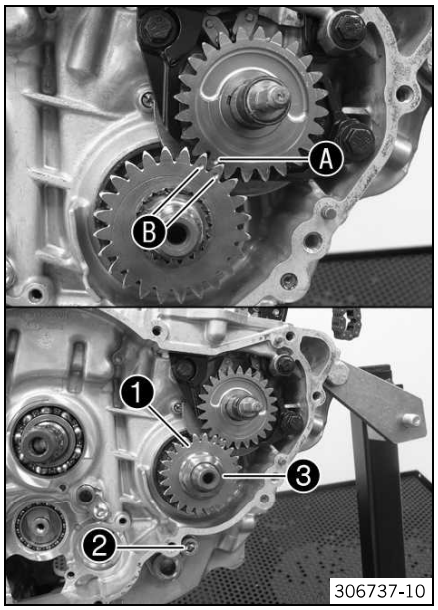
Screw, timing chain guide rail	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

– Position timing chain tensioning rail ❺.
– Mount and tighten screw ❻.

Guideline

Screw, timing chain tensioning rail	M8	15 Nm (11.1 lbf ft)	**Loctite® 243™**

16.5.9 Installing the primary gear

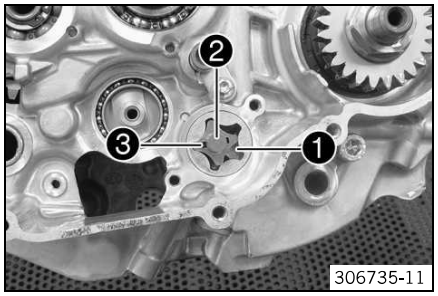


– Position primary gear ❶.
✓ Markings Ⓐ and Ⓑ are aligned.
– Set the crankshaft to top dead center and lock it with screw ❷.
– Mount and tighten nut ❸.

Guideline

Nut, primary gear	M18LHx1.5	100 Nm (73.8 lbf ft)	**Loctite® 243™**

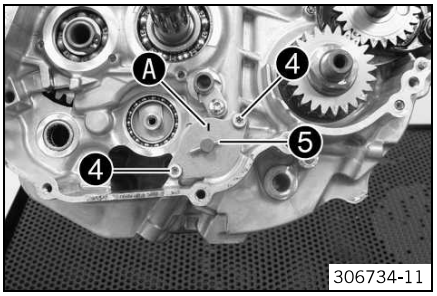
16.5.10 Installing the force pump



– Oil the oil pump shaft, internal rotor and external rotor before assembly.

Engine oil (SAE 10W/50) (☛ p. 222)

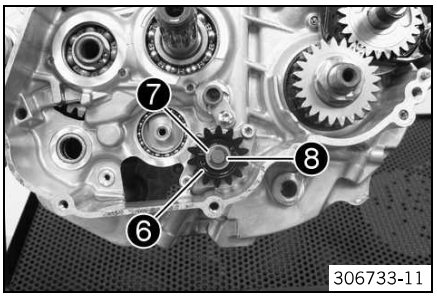
– Position force pump ❶.
✓ The rounded side of the force pump faces the engine case.
– Mount the oil pump shaft ❷ from the ignition side.
– Mount pin ❸.



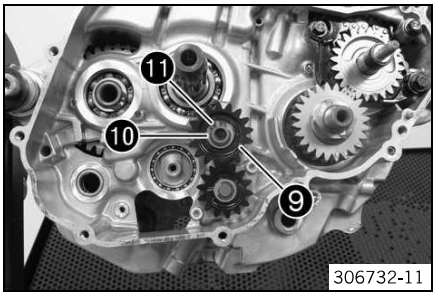
– Position the oil pump cover.
  ✓ Marking Ⓐ faces upward.
– Mount and tighten screws ❹.
  Guideline

Screw, oil pump cover	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**

– Insert pin ❺.

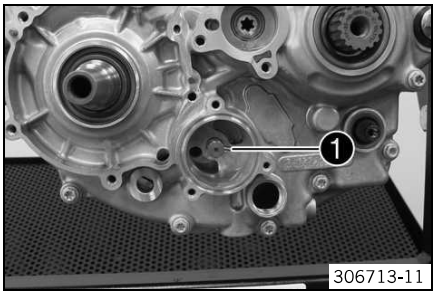


– Position oil pump gear ❻.
– Mount washer ❼.
– Mount lock ring ❽.
– Crank the oil pump gear and ensure that it can move easily.

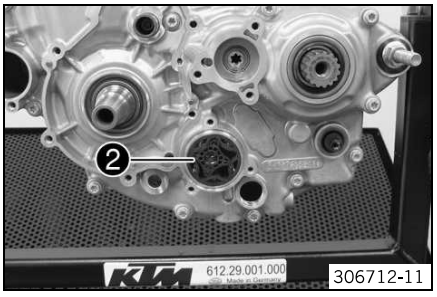


– Mount oil pump idler gear ❾ with the washer.
– Mount washers ❿.
– Mount lock ring ⓫.

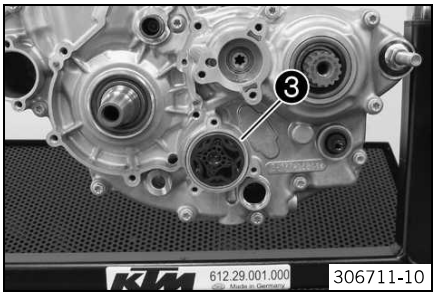
16.5.11 Installing the suction pump



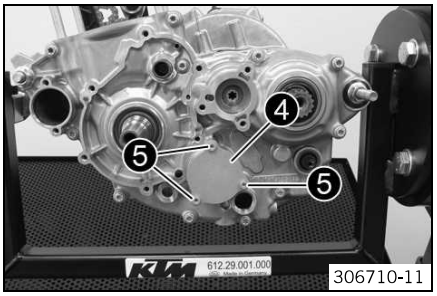
– Insert needle roller ❶.



– Position suction pump ❷.
– Crank the oil pump gear wheel and ensure that it can move easily.



– Mount O-ring ❸.

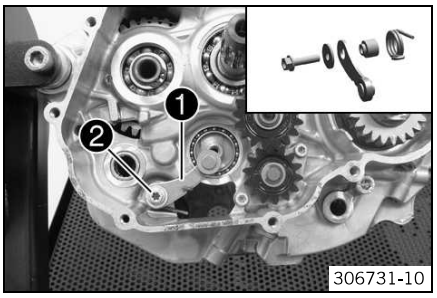


– Position oil pump cover ❹.
– Mount and tighten screws ❺.

Guideline

Screw, oil pump cover	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**

16.5.12 Installing the locking lever

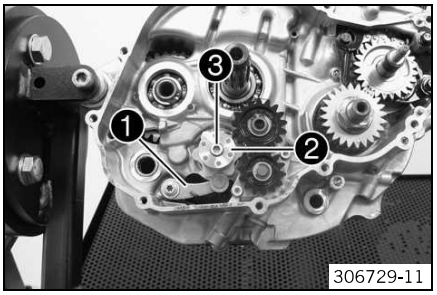


– Mount locking lever ❶ with the washer, sleeve and spring.
– Mount and tighten screw ❷.

Guideline

Screw, locking lever	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**

16.5.13 Installing the shift drum locating unit



– Push away locking lever ❶ from the shift drum locating unit and position the shift drum locating unit ❷.

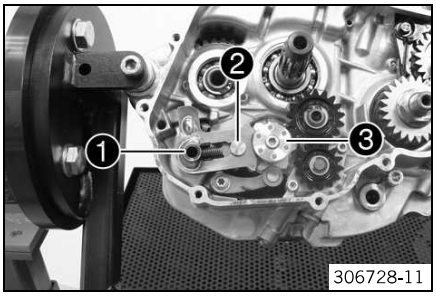
Info
The flat areas of the shift drum locating unit are not symmetric.

– Relieve tension from the locking lever.
– Mount and tighten screw ❸.

Guideline

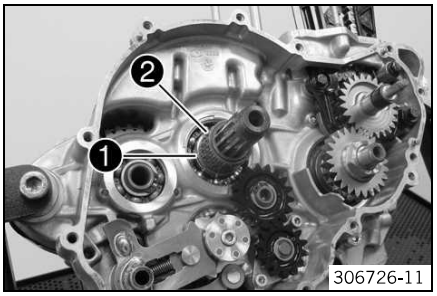
Screw, shift drum locating	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

16.5.14 Installing the shift shaft

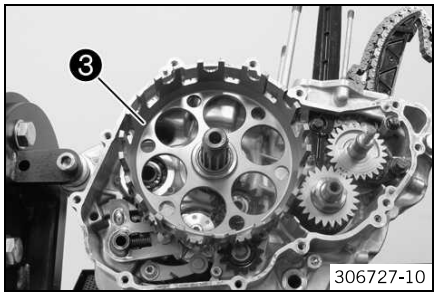


– Slide shift shaft ❶ with the washer into the bearing seat.
– Push sliding plate ❷ away from the shift drum locating unit ❸. Insert the shift shaft all the way.
– Let the sliding plate engage in the shift drum locating unit.
– Shift through the transmission.

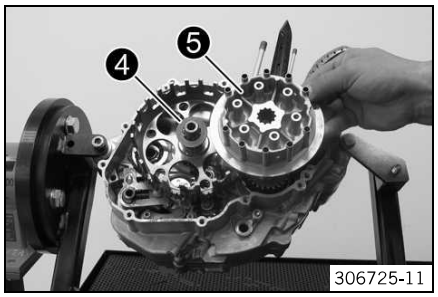
16.5.15 Installing the clutch basket



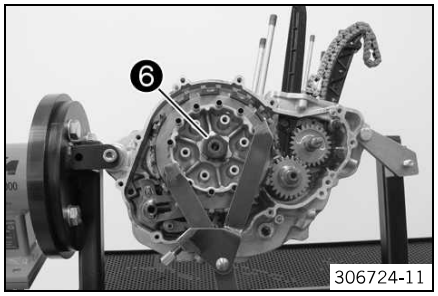
– Mount collar sleeve ❶ and needle bearing ❷.



– Slide the clutch basket ❸ onto the gearbox main shaft. Turn the oil pump gear until the gear of the clutch basket meshes.



– Slide on washer ❹ and inner clutch hub ❺.



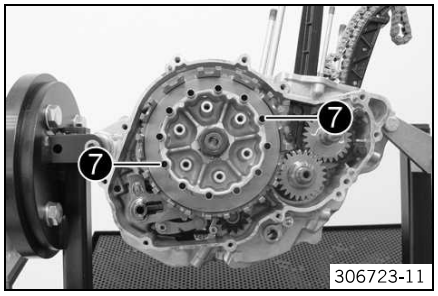
– Position the new lock washer and mount nut ❻. Tighten the nut, holding the inner clutch hub with a special tool.

Guideline

Nut, inner clutch hub	M18x1.5	100 Nm (73.8 lbf ft)	**Loctite® 243™**

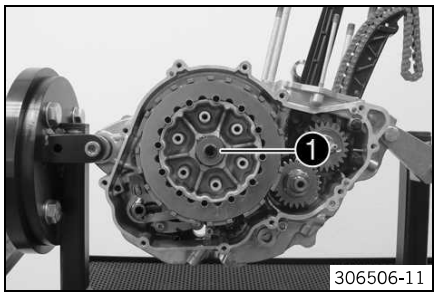
Clutch holder (51129003000) (☛ p. 227)

– Secure the nut with the lock washer.



– Mount sleeves ❼.

16.5.16 Installing the clutch discs



– Thoroughly oil the clutch facing discs.

Engine oil (SAE 10W/50) (☛ p. 222)

– Insert the intermediate clutch disc.

Guideline

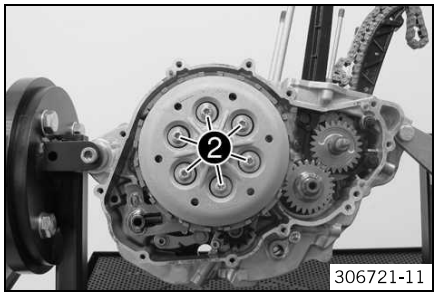
Thickness	1 mm (0.04 in)

– Place the clutch facing and intermediate discs into the outer clutch hub.
– Insert the intermediate clutch disc.

Guideline

Thickness	1 mm (0.04 in)

– Mount pressure piece ❶.

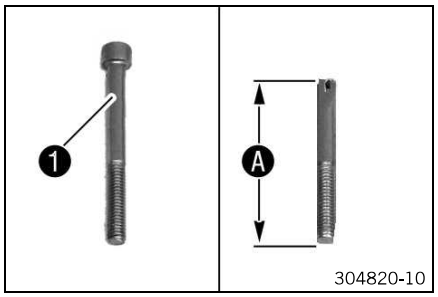


– Position the pressure cap. Mount screws ❷ with the washers and springs. Tighten the screws in a crisscross pattern.

Guideline

Screw, clutch spring	M6	10 Nm (7.4 lbf ft)

16.5.17 Installing the clutch cover



Prepare the tool (special screw):

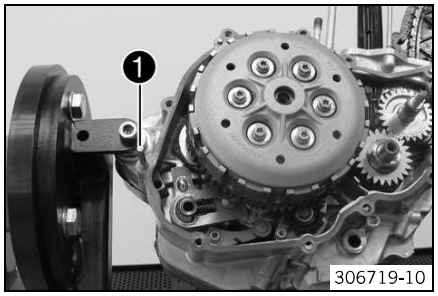
A conventional screw is required.

– Cut screw ❶ to length Ⓐ.

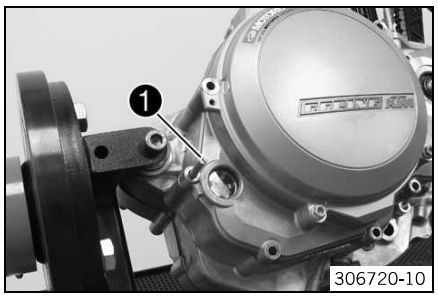
Guideline

Screw	M6x70
Length Ⓐ	60 mm (2.36 in)

– Cut a slot into the top end of the screw.



– Mount and hand-tighten screw ❶.



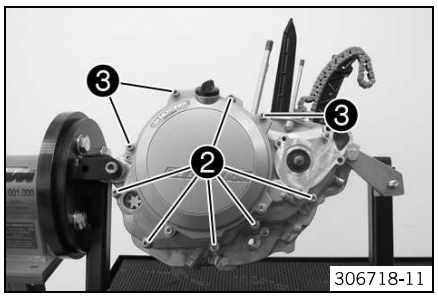
– Put on the clutch cover gasket.

Info
Ensure that the dowel pins are seated properly.

– Position the clutch cover.

Info
Ensure that the shaft seal rings of the water pump and the crankshaft are not damaged.

– Remove screw ❶.



– Mount screws ❷ but do not tighten yet.

Guideline

Screw, clutch cover	M6x25	10 Nm (7.4 lbf ft)

– Mount screws ❸ but do not tighten yet.

Guideline

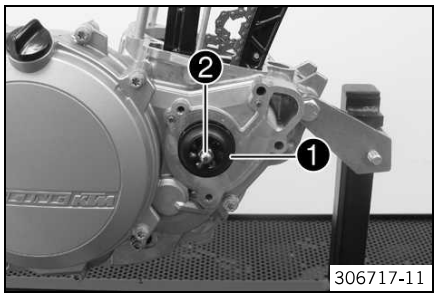
Screw, clutch cover	M6x45	10 Nm (7.4 lbf ft)

– Tighten all screws in a crisscross pattern.

Guideline

Screw, clutch cover	M6	10 Nm (7.4 lbf ft)

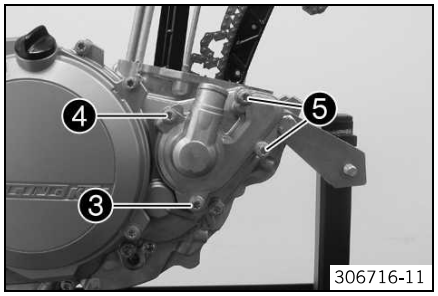
16.5.18 Installing the water pump cover



– Mount the two-part water pump impeller ❶.
– Mount and tighten nut ❷.

Guideline

Nut, water-pump wheel	M6	6 Nm (4.4 lbf ft)	**Loctite® 243™**



– Mount the water pump cover with the seal ring.

Info
Ensure that the dowel pins are seated properly.

– Mount screw ❸ with the seal ring but to not tighten yet.

Guideline

Screw, water pump cover	M6x25	10 Nm (7.4 lbf ft)

– Mount screw ❹ but do not tighten yet.

Guideline

Screw, water pump cover	M6x25	10 Nm (7.4 lbf ft)

– Mount and tighten screws ❺.

Guideline

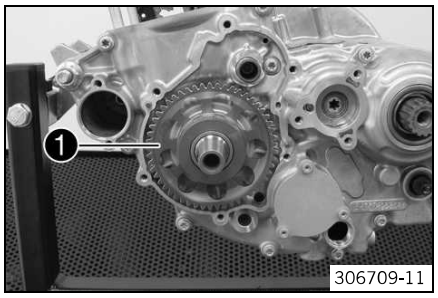
Screw, water pump cover	M6x40	10 Nm (7.4 lbf ft)

– Tighten screws ❸ and ❹.

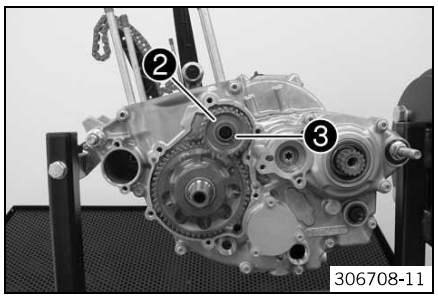
Guideline

Screw, water pump cover	M6x25	10 Nm (7.4 lbf ft)

16.5.19 Installing the starter drive

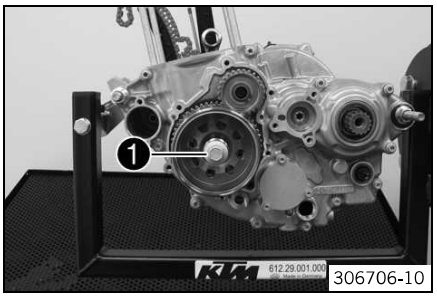


– Position freewheel gear ❶.



– Mount the starter idler gear ❷ with the washer.
– Mount lock ring ❸.

16.5.20 Installing the rotor and ignition pulse generator



– Ensure that the spring washers are seated properly. Mount the rotor.

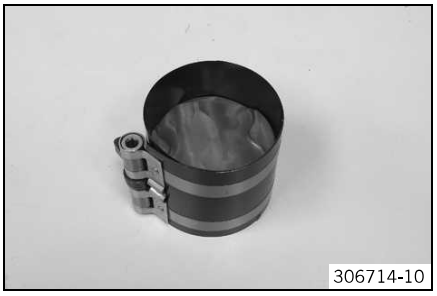
Info
For easier mounting, turn the starter idler gear counterclockwise.

– Mount and tighten screw ❶.

Guideline

Rotor screw	M10x1	70 Nm (51.6 lbf ft)	Thread, oiled with engine oil/cone degreased

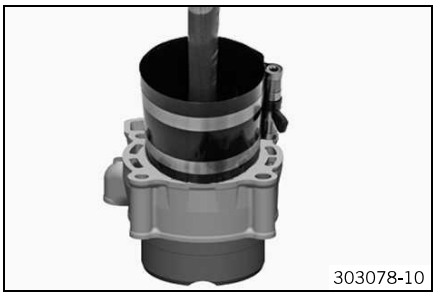
16.5.21 Installing the piston



– Shift the joint of the piston rings by 120°.
– Place the special tool on the oiled piston. Compress the piston rings using the special tool.

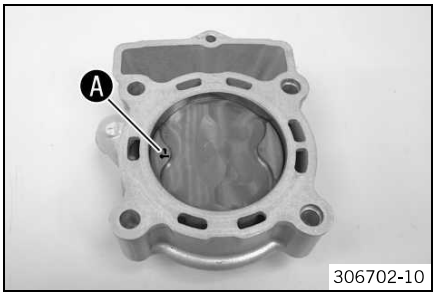
Piston ring mounting tool (60029015000) (☛ p. 229)

✓ The piston rings are pushed together all the way.

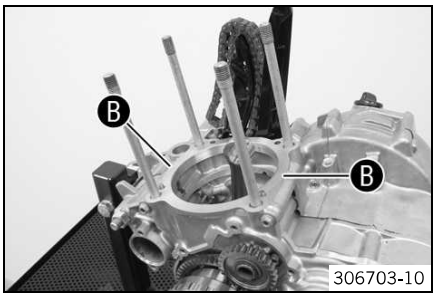


– Position the piston on the cylinder using the special tool.
– Push the piston carefully into the cylinder from above.

Info
The piston rings should not catch or they will be damaged.



– Ensure that piston mark Ⓐ faces the exhaust side.



– Apply a thin layer of sealing compound in area Ⓑ.

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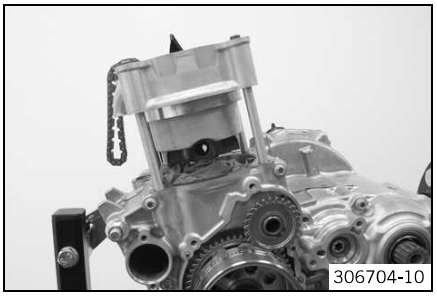
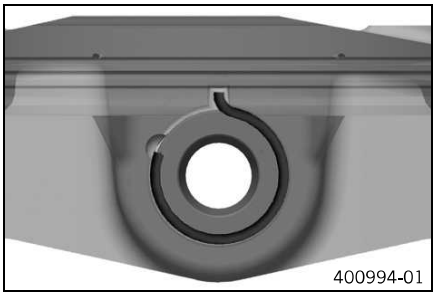
– Place the cylinder base gasket on.

Info
Ensure that the dowel pins are seated properly.

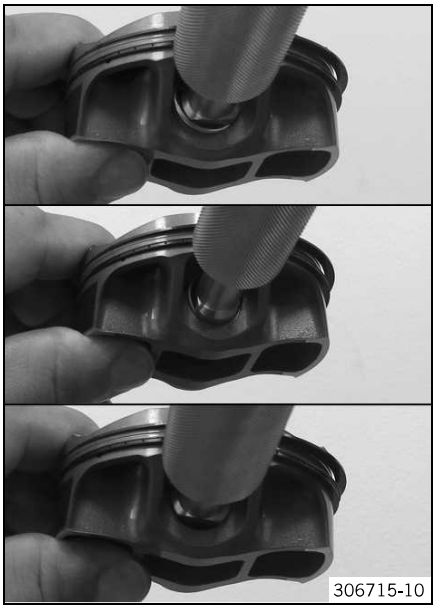

306704-10

– Cover the engine case opening with a cloth. Thread the timing chain through the chain shaft. Mount the piston pin.

Info
In order to present them more clearly, the following steps are shown with a removed piston.


400994-01

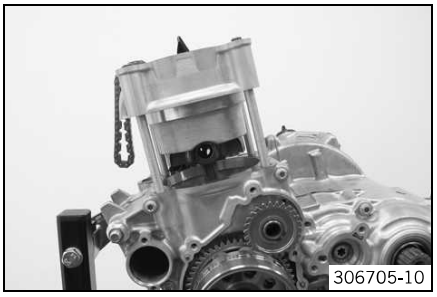
– Position the piston pin retainer.


306715-10

– Insert the special tool and press it forcefully to the piston.
– Turn the special tool clockwise, thereby pushing the piston pin retainer into the groove.

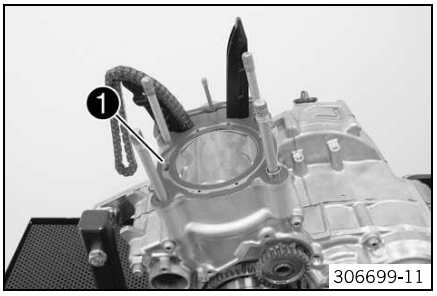
Insertion for piston ring lock (77229030000) (☛ p. 231)

– Ensure that the piston pin retainer is seated properly on both sides.


306705-10

– Remove the cloth.
– Keep the timing chain taut. Push the cylinder down carefully and let the dowel pins engage.

16.5.22 Installing the cylinder head

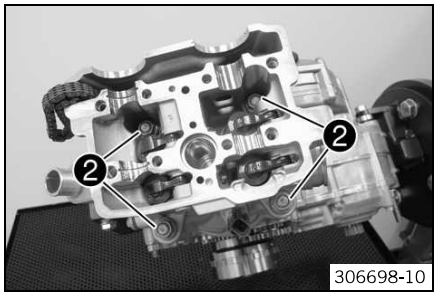


306699-11

– Position cylinder head gasket ❶.

Info
Ensure that the dowel pins are seated properly.

– Put the cylinder head in place.

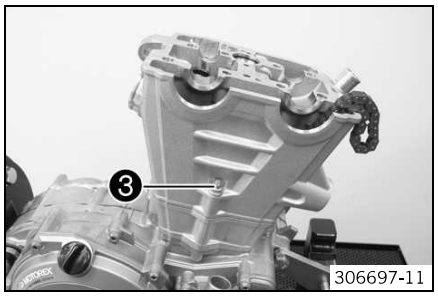


– Mount nuts ❷ with the washers and tighten in a crisscross pattern.

Guideline

Nut, cylinder head	M10x1.25	Tightening sequence: Tighten diagonally. 1st tightening stage 10 Nm (7.4 lbf ft) 2nd tightening stage 30 Nm (22.1 lbf ft) 3rd tightening stage 50 Nm (36.9 lbf ft)	Thread, oiled with engine oil/cone greased

Graduated disc (60029010000) (☛ p. 228)

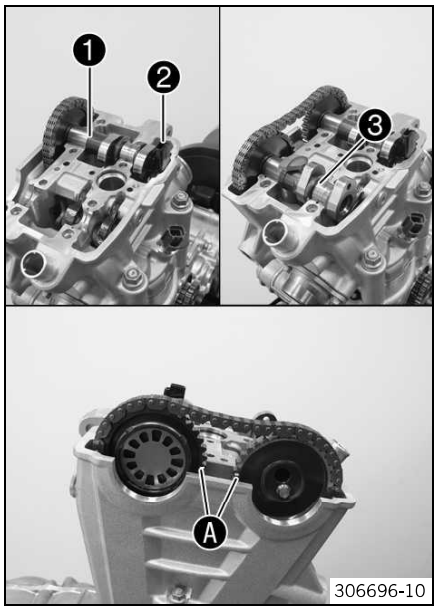


– Mount and tighten nut ❸.

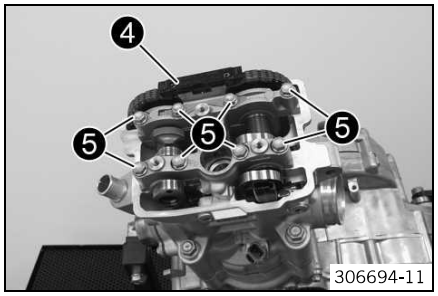
Guideline

Nut, cylinder head	M6	10 Nm (7.4 lbf ft)	Lubricated with engine oil

16.5.23 Installing the camshafts



– Pull up the timing chain and insert the intake camshaft ❶.
– Place the timing chain over the camshaft gear of intake camshaft.
  ✓ Marking Ⓐ is positioned and is aligned with the edge of the cylinder head.
– Ensure that bleeder ❷ is correctly positioned.
– Slip in exhaust camshaft ❸.
– Place the timing chain over the camshaft gear and position the camshaft in the bearing seat.
  ✓ Marking Ⓐ is positioned and is aligned with the edge of the cylinder head.



– Clean all oil nozzles thoroughly and blow out with compressed air.
– Mount the camshaft bearing bridge.

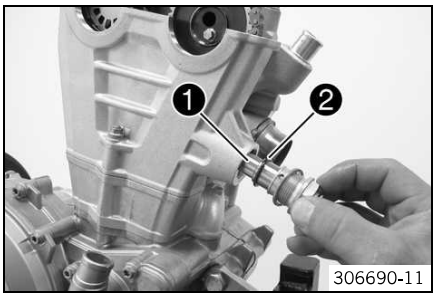
Info
Ensure that the dowel pins are seated properly.

– Position guide rail ❹.
– Mount screws ❺ and tighten from the inside to the outside.

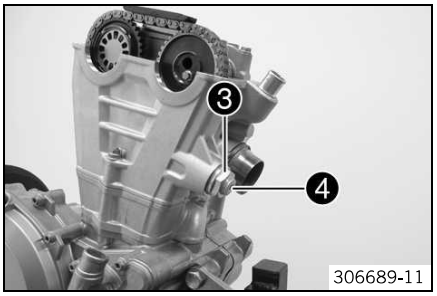
Guideline

Screw, camshaft bearing bridge	M7x1	14 Nm (10.3 lbf ft)	Lubricated with engine oil

16.5.24 Installing the timing chain tensioner



– Position timing chain tensioner ❶ and insert it with new O-ring ❷.

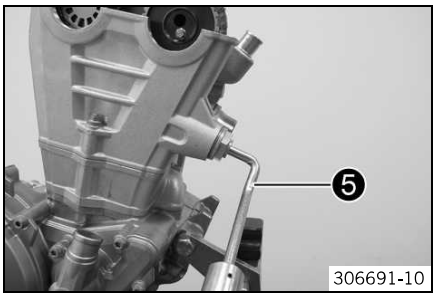


– Mount and tighten screw plug ❸ with the seal ring.

Guideline

Plug, timing chain tensioner	M24x1.5	25 Nm (18.4 lbf ft)

– Remove screw ❹.



– Press the timing chain tensioner toward the timing chain using special tool ❺.

Release device for timing chain tensioner (61229021000) (☛ p. 230)

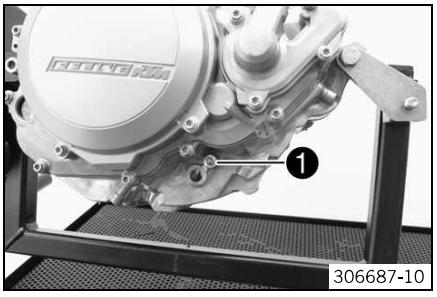
✓ The timing chain tensioner unlocks.

– Mount and tighten screw ❹.

Guideline

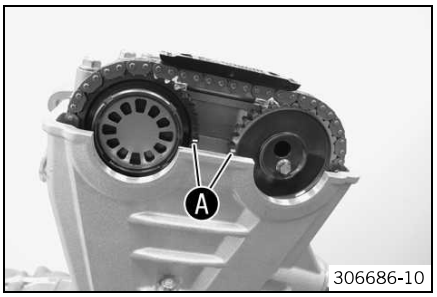
Screw, unlocking of timing chain tensioner	M10x1	10 Nm (7.4 lbf ft)

16.5.25 Checking the valve clearance



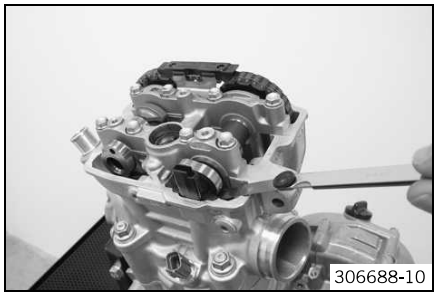
– Remove screw ❶.

– Crank over the engine repeatedly.



– Position the engine at ignition top dead center.

✓ Marking Ⓐ are aligned with the edge of the cylinder head.


306688-10

– Check the valve clearance at all valves between the camshaft and cam levers.

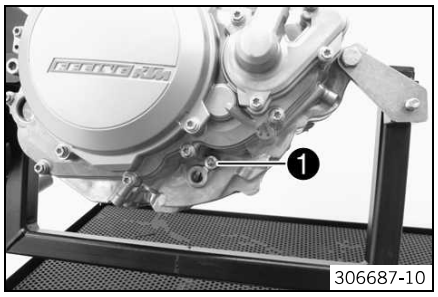
Guideline

Valve clearance	
Intake at: 20 °C (68 °F)	0.10... 0.15 mm (0.0039... 0.0059 in)
Exhaust at: 20 °C (68 °F)	0.13... 0.18 mm (0.0051... 0.0071 in)

Feeler gauge (59029041100) (☛ p. 228)

» If the valve clearance does not meet specifications:

– Adjust the valve clearance. (☛ p. 180)



306687-10

– Mount and tighten screw ❶ with the washer.

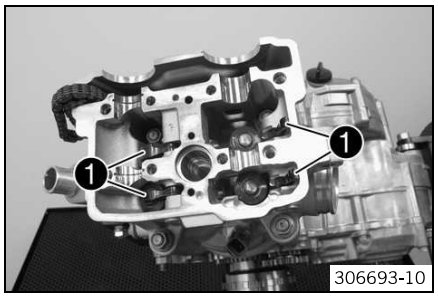
Guideline

Screw plug, crankshaft location	M8	10 Nm (7.4 lbf ft)

16.5.26 Adjusting the valve clearance

Main work

– Remove the timing chain tensioner. (☛ p. 133)
– Remove the camshaft. (☛ p. 134)



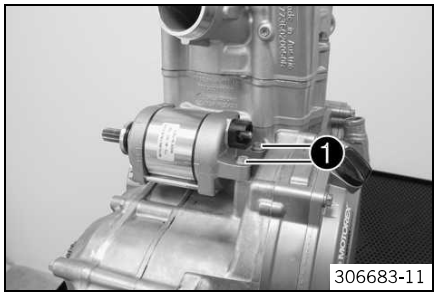
306693-10

– Raise cam levers ❶.
– Correct the shims according to the findings from checking the valve clearance.
– Install the camshafts. (☛ p. 178)
– Install the timing chain tensioner. (☛ p. 179)

Finishing work

– Check the valve clearance. (☛ p. 179)

16.5.27 Installing the starter motor



306683-11

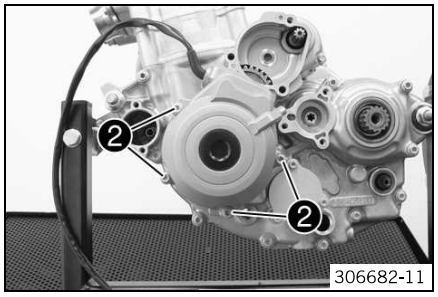
– Grease the O-ring. Position the starter motor.

Long-life grease (☛ p. 224)

– Mount screws ❶ but do not tighten yet.

Guideline

Screw, starter motor	M6	10 Nm (7.4 lbf ft)



306682-11

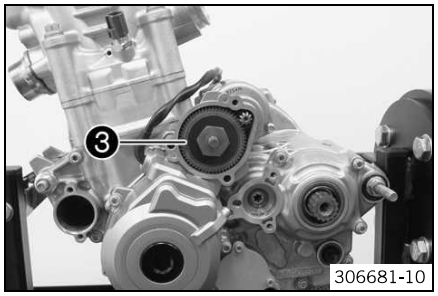
– Position the gasket.

Info
Ensure that the dowel pins are seated properly.

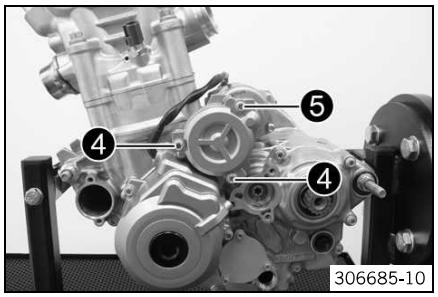
– Position the alternator cover.
– Mount and tighten screws ❷.

Guideline

Screw, alternator cover	M6	10 Nm (7.4 lbf ft)



– Position torque limiter ❸.



– Position the gasket.

Info
Ensure that the dowel pins are seated properly.

– Position the cover.
– Mount and tighten screws ❹.

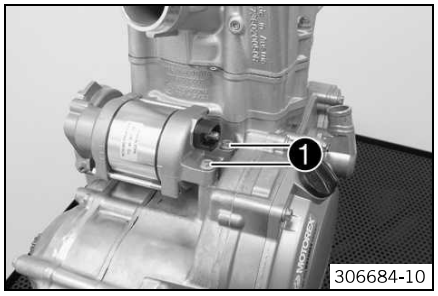
Guideline

Screw, cover of torque limiter	M6x50	10 Nm (7.4 lbf ft)

– Mount and tighten screw ❺.

Guideline

Screw, cover of torque limiter	M6x25	10 Nm (7.4 lbf ft)

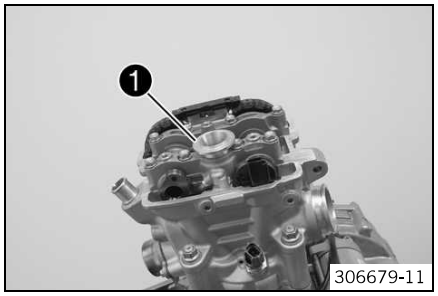


– Tighten screws ❶.

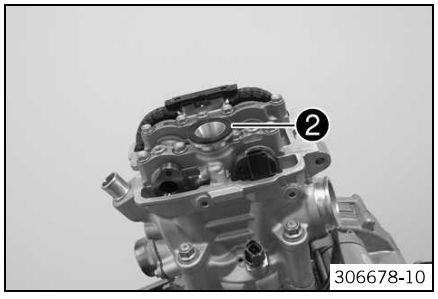
Guideline

Screw, starter motor	M6	10 Nm (7.4 lbf ft)

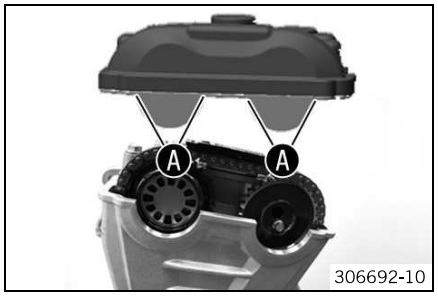
16.5.28 Installing the valve cover



– Grease O-rings and mount spark plug shaft insert ❶.



– Position gasket ❷.



– Apply a thin layer of sealing compound in area Ⓐ.

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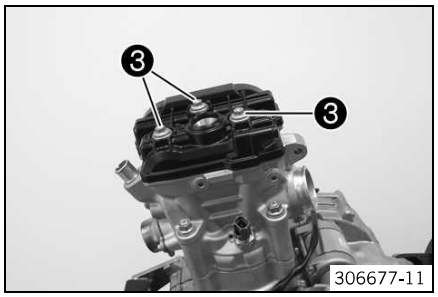
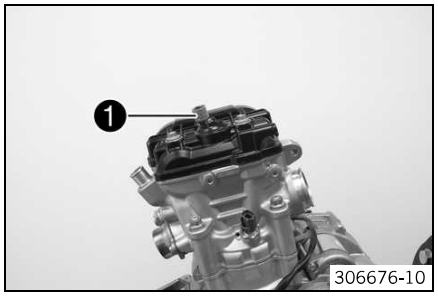


– Position the valve cover with the gasket.
– Mount and tighten screws ❸.

Guideline

Screw, valve cover	M6	8 Nm (5.9 lbf ft)

16.5.29 Installing the spark plug



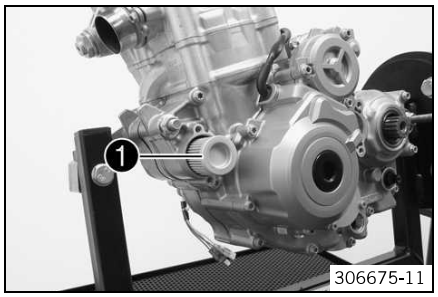
– Mount and tighten the spark plug with special tool ❶.

Guideline

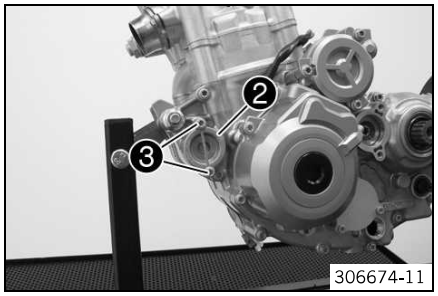
Spark plug	M10x1	10... 12 Nm (7.4... 8.9 lbf ft)

Spark plug wrench (77229072000) (☛ p. 232)

16.5.30 Installing the oil filter



– Tilt the motorcycle to one side and fill the oil filter housing to about ⅓ full with engine oil.
– Insert oil filter ❶ into the oil filter housing.

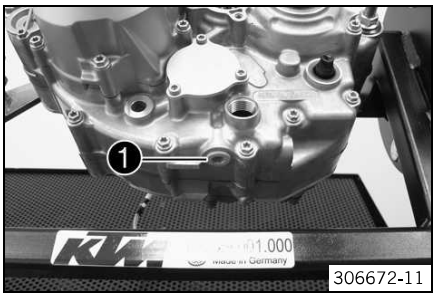


– Oil the O-ring of the oil filter cover.
– Mount oil filter cover ❷.
– Mount and tighten screws ❸.

Guideline

Screw, oil filter cover	M6	10 Nm (7.4 lbf ft)

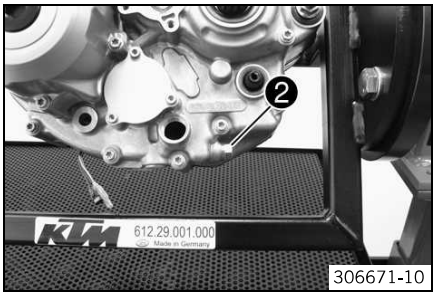
16.5.31 Installing the oil screen



– Mount and tighten screw plug ❶ with the O-ring.

Guideline

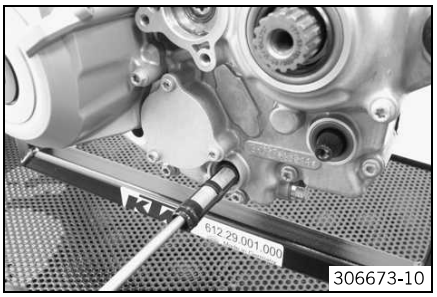
Oil drain plug	M14x1.5	15 Nm (11.1 lbf ft)



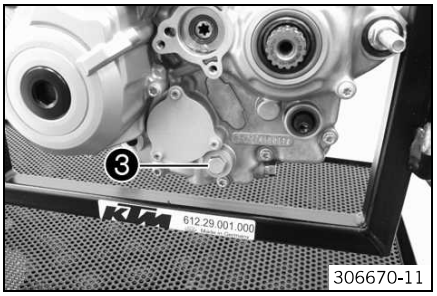
– Mount and tighten the oil drain plug ❷ with the magnet and the new seal ring.

Guideline

Oil drain plug with magnet	M12x1.5	20 Nm (14.8 lbf ft)



– Push the oil screen with O-rings onto a pin wrench.
– Push the pin wrench through the opening into the drill hole of the opposite engine case wall and push the oil screen as far as possible into the engine case.

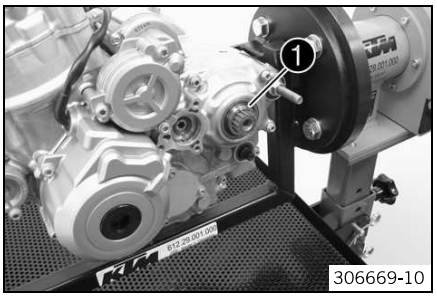


– Mount and tighten screw plug ❸ with the O-ring.

Guideline

Screw plug, oil screen	M20x1.5	15 Nm (11.1 lbf ft)

16.5.32 Installing the spacer

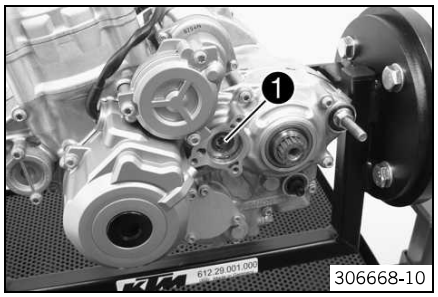


– Grease the shaft seal ring before mounting.

Long-life grease (☛ p. 224)

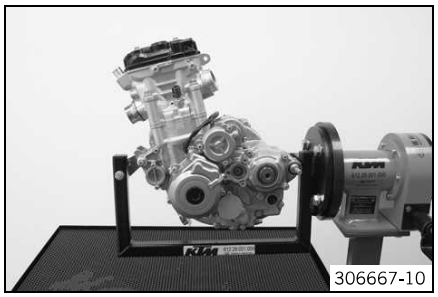
– Position the O-ring. Mount spacer ❶ with the bevel facing inward.

16.5.33 Installing the clutch push rod



– Mount clutch push rod ❶.

16.5.34 Removing the engine from the engine assembly stand



– Remove the screw connection from the special tool.

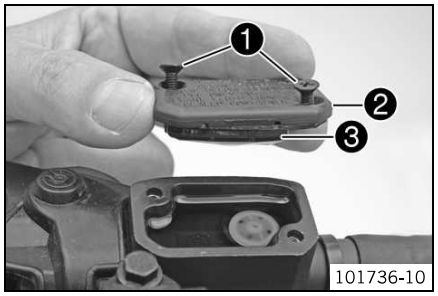
Engine fixing arm (77229002000) (☛ p. 231)

– Remove the engine from the engine assembly stand.

Info
Work with an assistant or a motorized hoist.

17.1 Checking/rectifying 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 ❶.
– Remove cover ❷ with membrane ❸.
– 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.

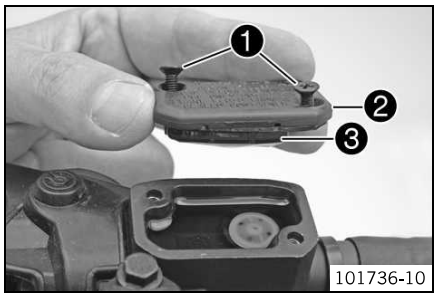
Brake fluid DOT 4 / DOT 5.1 (☛ p. 222)

– Position the cover with the membrane. Mount and tighten the screws.

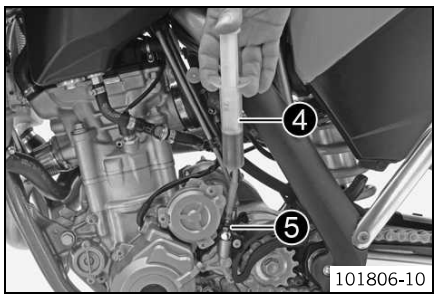
Info
Clean up overflowed or spilt brake fluid immediately with water.

17.2 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 ❶.
– Remove cover ❷ with membrane ❸.

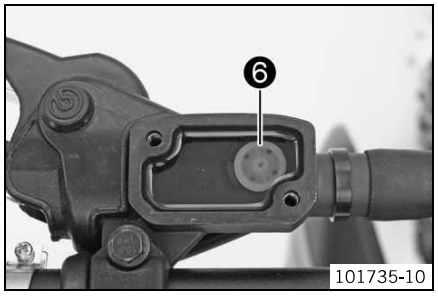


– Fill bleeding syringe ❹ with the appropriate hydraulic fluid.

Bleed syringe (50329050000) (☛ p. 227)
Brake fluid DOT 4 / DOT 5.1 (☛ p. 222)

– Mount bleeding syringe ❹ on bleeder screw ❺ with a suitable hose piece.
– On the clutch slave cylinder, only release bleeder screw ❺ to the point where filling is possible.

Info
Wash off overflowing 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.

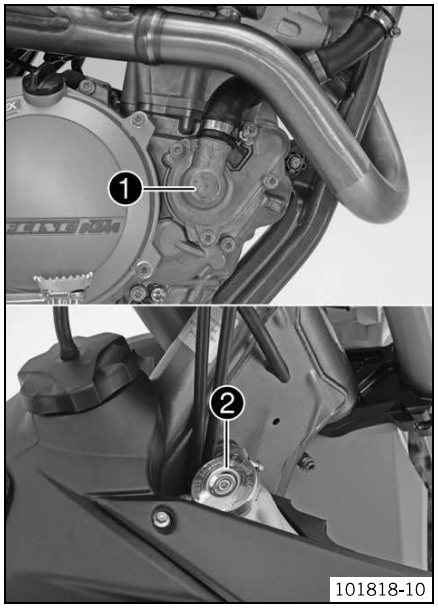


– Inject the liquid into the system until it escapes from openings ❻ of the master cylinder without bubbles.
– To prevent overflow, drain fluid occasionally from the master cylinder reservoir.
– Tighten the bleeder screw and remove the bleeding syringe with the hose.
– Correct the fluid level of the hydraulic clutch.
Guideline

Fluid level below container rim	4 mm (0.16 in)

– Position the cover with the membrane. Mount and tighten the screws.

18.1 Cooling system



Water pump ❶ in the engine circulates the coolant.
The pressure resulting from the warming of the cooling system is regulated by a valve in radiator cap ❷. 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.

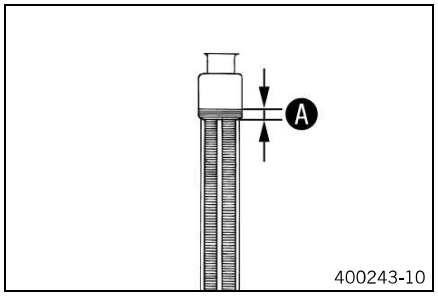
18.2 Checking the antifreeze and coolant level

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 coolant 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 antifreeze of the coolant.

–25… –45 °C (–13… –49 °F)

» If the antifreeze of the coolant does not meet specifications:
– Correct the antifreeze of the coolant.

– Check the coolant level in the radiator.

Coolant level Ⓐ above radiator fins.	10 mm (0.39 in)

» If the coolant level does not meet specifications:
– Correct the coolant level.

Alternative 1

Coolant (☛ p. 222)

Alternative 2

Coolant (mixed ready to use) (☛ p. 222)

– Mount the radiator cap.

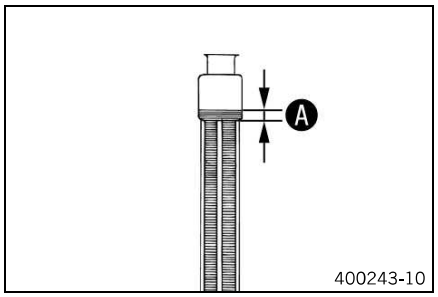
18.3 Checking the coolant level

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 coolant 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 Ⓐ above radiator fins.	10 mm (0.39 in)

» If the coolant level does not meet specifications:
– Correct the coolant level.

Alternative 1

Coolant (☛ p. 222)

Alternative 2

Coolant (mixed ready to use) (☛ p. 222)

– Mount the radiator cap.

18.4 Draining the coolant

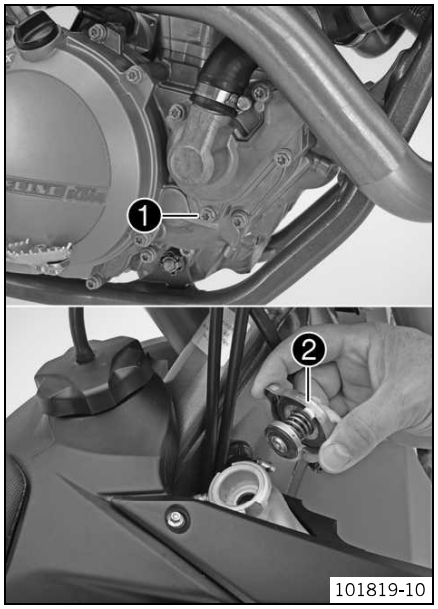
Warning
Danger of scalding During motorcycle operation, the coolant gets very hot and is under pressure.

– 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 coolant 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.



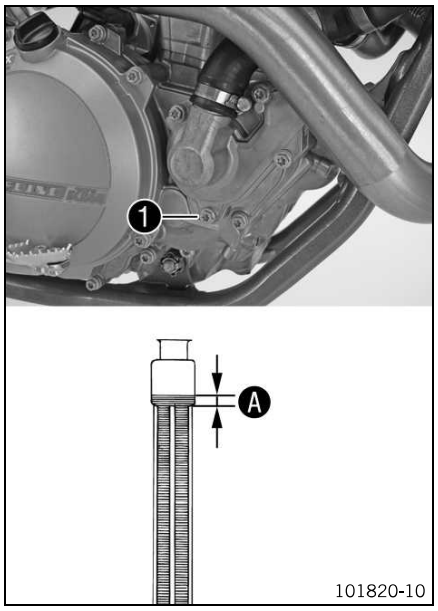
– Position the motorcycle upright.
– Place a suitable container under the water pump cover.
– Remove screw ❶. Take off radiator cap ❷.
– Completely drain the coolant.
– Mount and tighten screw ❶ with a new seal ring.
Guideline

Screw, water pump cover	M6	10 Nm (7.4 lbf ft)

18.5 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 coolant is swallowed, contact a physician immediately. Change clothing that is contaminated with coolant. Keep coolant out of reach of children.



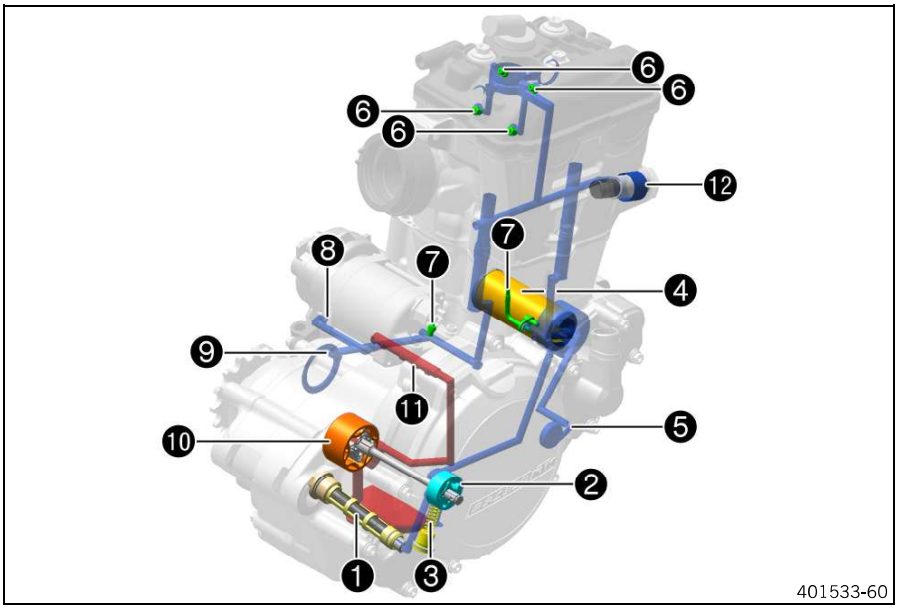
– Make sure that screw ❶ is tightened.
– Position the motorcycle upright.
– Pour coolant in up to measurement Ⓐ above the radiator fins.
Guideline

Dimension Ⓐ over the radiator fins	10 mm (0.39 in)

Coolant	1.2 l (1.3 qt.)	Coolant (☛ p. 222)
		Coolant (mixed ready to use) (☛ p. 222)

– Mount the radiator cap.
– Take a short test ride.
– Check the coolant level. (☛ p. 187)

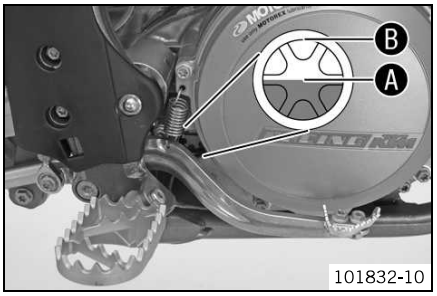
19.1 Oil circuit



1	Oil screen
2	Force pump
3	Oil pressure regulator valve
4	Oil filter
5	Oil nozzle for conrod bearing lubrication
6	Oil nozzle for cam lever lubrication
7	Oil nozzle, piston cooling
8	Oil nozzle for alternator cooling
9	Oil nozzle for clutch lubrication
10	Suction pump
11	Oil channel, transmission lubrication
12	Timing chain tensioner

19.2 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 level is up to the middle Ⓐ of the level viewer.

» If the engine oil is not up to the middle of the level viewer:
– Add engine oil. (☛ p. 191)

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 is at a level between the middle Ⓐ and upper edge Ⓑ of the level viewer.

» If the engine oil is not up to the middle Ⓐ of the level viewer:
– Add engine oil. (☛ p. 191)

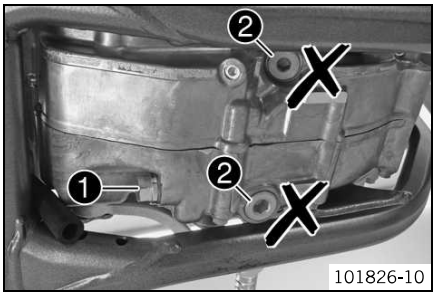
19.3 Changing the engine oil and oil filter, cleaning the oil screen

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.

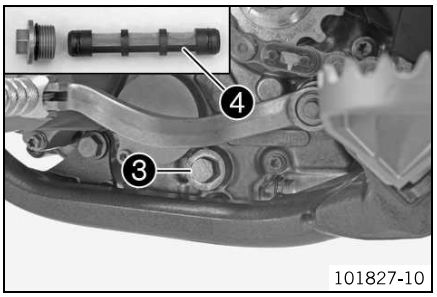
Preparatory work
– Park the motorcycle on a level surface.



101826-10

Main work
– Place a suitable container under the engine.
– Remove oil drain plug ❶ with the magnet and seal ring.

Info
Do not remove screws ❷ on both sides.

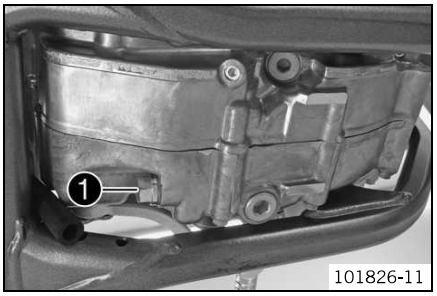


101827-10

– Remove screw plug ❸ with oil screen ❹.
– Completely drain the engine oil.
– Thoroughly clean the parts and sealing surfaces.
– Push the oil screen with O-rings onto a pin wrench.
– Push the pin wrench through the opening into the drill hole of the opposite engine case wall and push the oil screen as far as possible into the engine case.
– Mount and tighten screw plug ❸ with the O-ring.

Guideline

Screw plug, oil screen	M20x1.5	15 Nm (11.1 lbf ft)

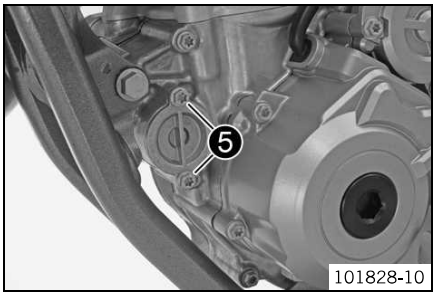


101826-11

– Mount and tighten the oil drain plug ❶ with the magnet and a new seal ring.

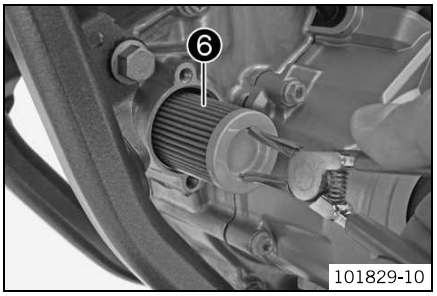
Guideline

Oil drain plug with magnet	M12x1.5	20 Nm (14.8 lbf ft)



101828-10

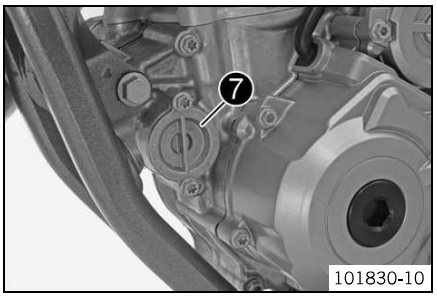
– Remove screws ❺. Remove the oil filter cover with the O-ring.



– Pull oil filter ❻ out of the oil filter housing.

Circlip pliers reverse (51012011000) (☛ p. 227)

– Completely drain the engine oil.
– Thoroughly clean the parts and sealing surfaces.

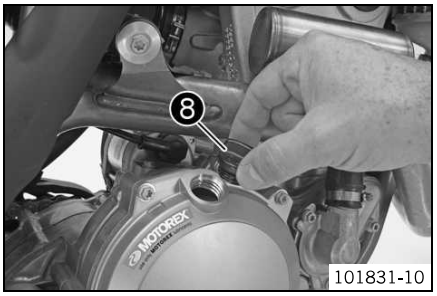


– Lay the motorcycle on its side and fill the oil filter housing to about ⅓ full with engine oil.
– Fill the oil filter with engine oil and place it in the oil filter housing.
– Oil the O-ring of the oil filter cover and mount it with the oil filter cover ❼.
– Mount and tighten the screws.

Guideline

Screw, oil filter cover	M6	10 Nm (7.4 lbf ft)

– Stand the motorcycle upright.



– Remove the oil filler plug ❽ with the O-ring from the clutch cover and fill up with engine oil.

Engine oil	1.10 l (1.16 qt.)	Engine oil (SAE 10W/50) (☛ p. 222)	
		Alternative engine oil for harsh operating conditions and increased performance	Engine oil (SAE 10W/60) (00062010035) (☛ p. 222)

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.

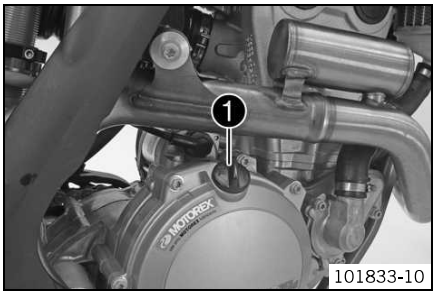
Danger
Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.
– When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.

– Start the engine and check that it is oil-tight.

Finishing work
– Check the engine oil level. (☛ p. 189)

19.4 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 ❶ 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. 222)

Alternative 1

Engine oil (SAE 10W/60) (00062010035) (☛ p. 222)

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.

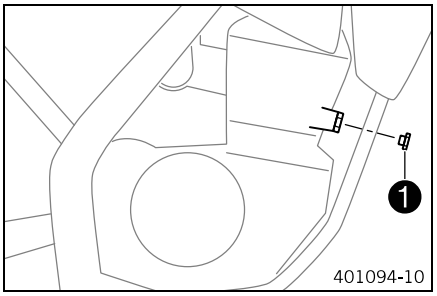
Danger
Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.
– When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.

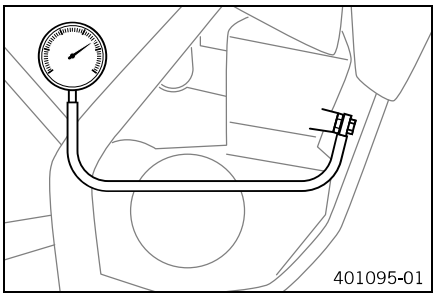
– Start the engine and check that it is oil-tight.

19.5 Checking the engine oil pressure

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.





Main work
– Remove screw ❶.

– Position the special tool. Mount and tighten the banjo bolt.
Guideline

Banjo bolt	M10x1	8 Nm (5.9 lbf ft)

Oil pressure adapter (77329006000) (☛ p. 232)

– Connect the pressure tester without the T-piece to the special tool.

Pressure testing tool (61029094000) (☛ p. 229)

– Check the engine oil level. (☛ p. 189)

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 run it until it is warm.
– Check the engine oil pressure.

Engine oil pressure	
Engine oil temperature: 80 °C (176 °F) Engine speed: 1,600 rpm	0.6 bar (9 psi)
Engine oil temperature: 80 °C (176 °F) Engine speed: 6,000 rpm	2.0 bar (29 psi)

» If the specification is not reached:
– Change the oil filter. Check the oil pumps for wear. Check that all oil holes are clear.

– 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.
– Mount and tighten screw ❶.

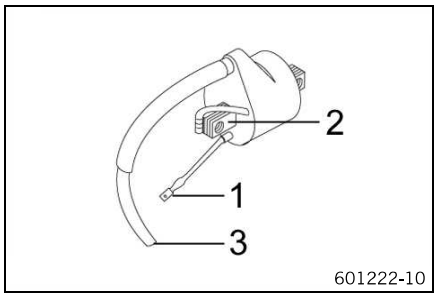
Guideline

Screw, unlocking of timing chain tensioner	M10x1	10 Nm (7.4 lbf ft)

Finishing work
– Check the engine oil level. (☛ p. 189)

20.1 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

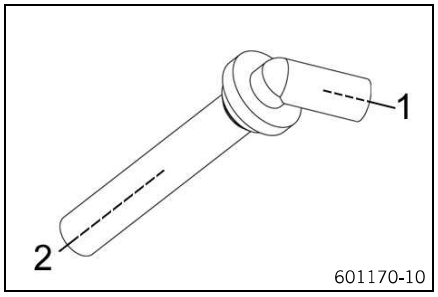
– Ω Measure the resistance between the specified points.
Ignition coil cylinder 1 pin **2 (–)** – Ignition coil cylinder 1 pin **3**

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.

20.2 Checking the spark plug connector

Condition
Spark plug connector cylinder 1 has been removed.



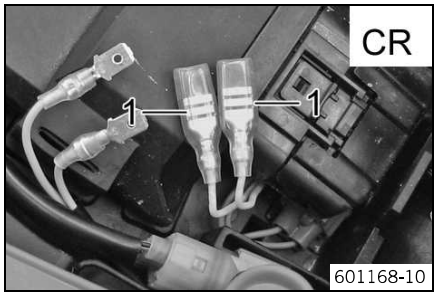
– Ω Measure the resistance between the specified points.
Measuring point 1 – Measuring point 2

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.

20.3 Alternator - checking the stator winding

Condition
The alternator has been disconnected.

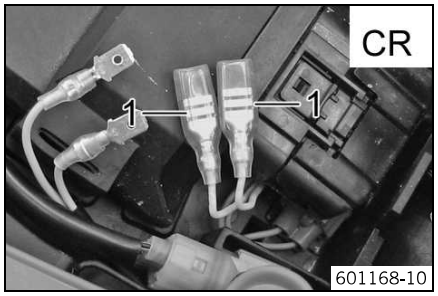


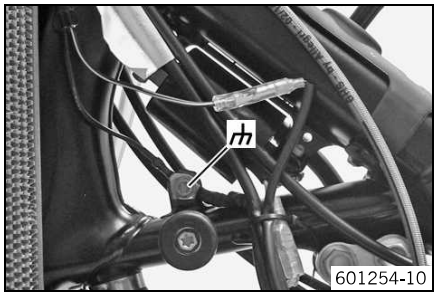
Stator winding - check the resistance

– Ω 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 not equal the setpoint value:
– Replace the stator.





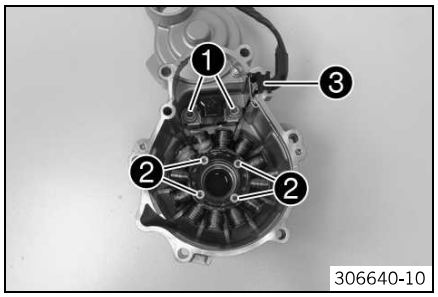
Stator winding - check for short circuit to ground (terminal 31)

– Ω Measure the resistance between the specified points.
Alternator, connector **CR** pin **1** – Measuring point Ground, wiring harness/frame

Resistance	∞ Ω

» If the displayed value does not equal the setpoint value:
– Replace the stator.

20.4 Removing the stator and ignition pulse generator

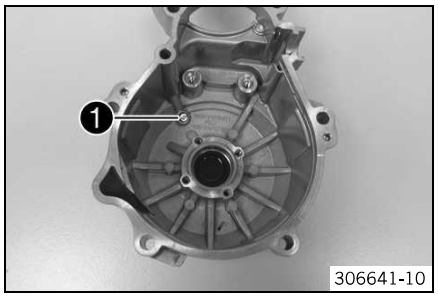


Condition

The alternator cover has been removed.

– Remove screw ❶.
– Remove retaining bracket.
– Remove screw ❷.
– Remove cable support sleeve ❸ from the alternator cover.
– Remove the stator and ignition pulse generator from the alternator cover.

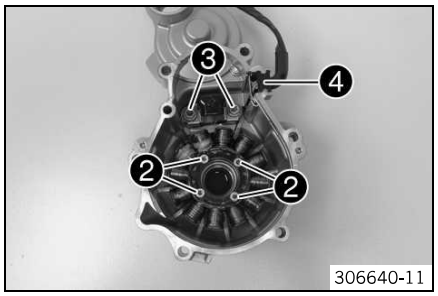
20.5 Installing the stator and ignition pulse generator



– Blow out oil nozzle ❶ with compressed air and check that it is clear.

Guideline

Oil nozzle for alternator cooling	M4	2 Nm (1.5 lbf ft)	**Locti e® 243™**



– Position the stator and ignition pulse generator in the alternator cover.
– Mount and tighten screws ❷.

Guideline

Screw, stator	M4	4 Nm (3 lbf ft)	**Loctite® 648™**

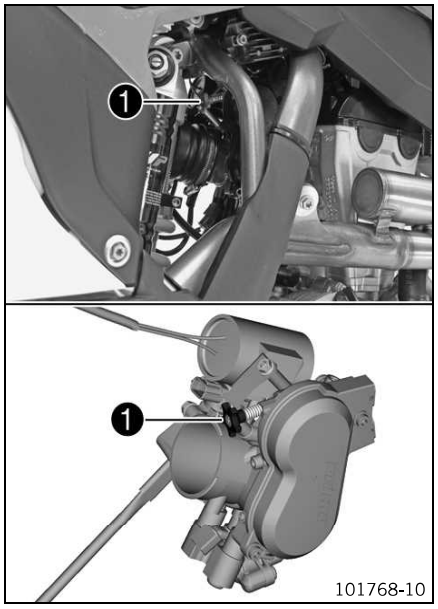
– Position retaining bracket.
– Mount and tighten screws ❸.

Guideline

Screw, crankshaft position sensor	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**

– Position cable support sleeve ❹ in the alternator cover.

21.1 Adjusting the idle speed



– Run the engine until warm.
– Set the desired idle speed by turning the idle speed adjusting screw ❶.

Guideline

Idle speed	2,250... 2,350 rpm

Info
Turn counterclockwise to decrease the idle speed.
Turn clockwise to increase the idle speed.

22.1 Engine

Design	1-cylinder 4-stroke engine, water-cooled
Displacement	249.91 cm³ (15.2505 cu in)
Stroke	52.3 mm (2.059 in)
Bore	78 mm (3.07 in)
Compression ratio	13.9:1
Idle speed	2,250... 2,350 rpm
Control	DOHC, four valves controlled via cam lever, drive via timing chain
Valve diameter, intake	32.5 mm (1.28 in)
Valve diameter, exhaust	26.5 mm (1.043 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)	0.13... 0.18 mm (0.0051... 0.0071 in)
Crankshaft bearing	2 cylinder bearings
Conrod bearing	Slide bearing
Piston pin bearing	Bearing bush
Pistons	Forged light alloy
Piston rings	1 compression ring, 1 oil scraper ring
Engine lubrication	Pressure circulation lubrication with two Eaton pumps
Primary transmission	24:73
Clutch	Multidisc clutch in oil bath/hydraulically activated
Transmission ratio (All SX-F models)	
1st gear	13:32
2nd gear	16:32
3rd gear	17:28
4th gear	19:26
5th gear	21:25
6th gear	22:24
Transmission ratio (XC-F)	
1st gear	13:32
2nd gear	16:30
3rd gear	16:24
4th gear	23:28
5th gear	23:23
6th gear	26:22
Alternator	12 V, 66 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

22.2 Engine tolerance, wear limits

Valve spring	
Minimum length of intake valve	41.20 mm (1.622 in)
Minimum length of exhaust valve	41.10 mm (1.6181 in)
Valve - sealing seat width	
Intake	1.40 mm (0.0551 in)
Exhaust	1.40 mm (0.0551 in)
Valve - run-out	
At the valve plate	≤ 0.05 mm (≤ 0.002 in)
Valve spring seat - thickness	1.40... 1.50 mm (0.0551... 0.0591 in)
Cylinder/cylinder head - distortion of sealing area	≤ 0.10 mm (≤ 0.0039 in)
Piston - diameter	
Size I	77.955... 77.965 mm (3.06909... 3.06948 in)
Size II	77.965... 77.975 mm (3.06948... 3.06988 in)
Cylinder - drill hole diameter	
Size I	78.000... 78.012 mm (3.07086... 3.07133 in)
Size II	78.012... 78.025 mm (3.07133... 3.07184 in)
Piston/cylinder - mounting clearance	
Size I	0.035... 0.057 mm (0.00138... 0.00224 in)
Size II	0.037... 0.060 mm (0.00146... 0.00236 in)
Wear limit	0.070 mm (0.00276 in)
Piston ring - end gap	
Compression ring	≤ 0.40 mm (≤ 0.0157 in)
Oil scraper ring	≤ 0.70 mm (≤ 0.0276 in)
Crankshaft - axial play	0.30... 0.40 mm (0.0118... 0.0157 in)
Connecting rod - axial play of lower conrod bearing	0.20... 0.45 mm (0.0079... 0.0177 in)
Crankshaft - run-out at bearing pin	≤ 0.03 mm (≤ 0.0012 in)
Connecting rod - axial play of lower conrod bearing	0.20... 0.45 mm (0.0079... 0.0177 in)
Clutch facing discs - thickness of total package	≥ 26.4 mm (≥ 1.039 in)
Clutch spring - length	≥ 38.5 mm (≥ 1.516 in)
Contact surface of clutch facing discs in outer clutch hub	≤ 0.5 mm (≤ 0.02 in)
Oil pressure regulator valve	
Minimum length of pressure spring	23.5 mm (0.925 in)
Shift shaft - sliding plate/shift quadrant clearance	0.40... 0.80 mm (0.0157... 0.0315 in)

22.3 Engine tightening torques

Nozzle, crank chamber ventilation	M4	2 Nm (1.5 lbf ft)	**Loctite® 243™**
Oil nozzle for alternator cooling	M4	2 Nm (1.5 lbf ft)	**Loctite® 243™**
Oil nozzle for balancer shaft lubrication	M4	2 Nm (1.5 lbf ft)	**Loctite® 243™**
Oil nozzle for conrod bearing lubrication	M4	2 Nm (1.5 lbf ft)	**Loctite® 243™**
Screw, oil nozzle for piston cooling	M4	2 Nm (1.5 lbf ft)	**Loctite® 243™**
Screw, stator	M4	4 Nm (3 lbf ft)	**Loctite® 648™**
Locking screw for bearing	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Oil nozzle for cam lever lubrication	M5	3 Nm (2.2 lbf ft)	**Loctite® 243™**
Oil nozzle for clutch lubrication	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Oil nozzle, piston cooling	M5	2 Nm (1.5 lbf ft)	**Loctite® 243™**
Screw cap, oil channel in alternator cover	M5	3 Nm (2.2 lbf ft)	**Loctite® 243™**
Screw, crankshaft position sensor	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Screw, locking lever	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Screw, oil pump cover	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**

Nut, cylinder head	M6	10 Nm (7.4 lbf ft)	Lubricated with engine oil
Nut, water-pump wheel	M6	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Screw, alternator cover	M6	10 Nm (7.4 lbf ft)	–
Screw, clutch cover	M6	10 Nm (7.4 lbf ft)	–
Screw, clutch slave cylinder	M6	10 Nm (7.4 lbf ft)	–
Screw, clutch spring	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, kick starter stop (XC-F)	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, oil filter cover	M6	10 Nm (7.4 lbf ft)	–
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, valve cover	M6	8 Nm (5.9 lbf ft)	–
Screw, water pump cover	M6	10 Nm (7.4 lbf ft)	–
Stud, cylinder head	M6	10 Nm (7.4 lbf ft)	–
Screw, autodecompression	M7x1	5 Nm (11.1 lbf ft)	**Loctite® 243™**
Screw, camshaft bearing bridge	M7x1	14 Nm (10.3 lbf ft)	Lubricated with engine oil
Screw plug, crankshaft location	M8	10 Nm (7.4 lbf ft)	–
Screw, timing chain tensioning rail	M8	15 Nm (11.1 lbf ft)	**Loctite® 243™**
Screw, engine sprocket	M10	60 Nm (44.3 lbf ft)	**Loctite® 2701™**
Plug, oil channel	M10x1	15 Nm (11.1 lbf ft)	**Loctite® 243™**
Rotor screw	M10x1	70 Nm (51.6 lbf ft)	Thread, oiled with engine oil/cone degreased
Screw plug, cam lever axis	M10x1	10 Nm (7.4 lbf ft)	–
Screw, unlocking of timing chain tensioner	M10x1	10 Nm (7.4 lbf ft)	–
Spark plug	M10x1	10... 12 Nm (7.4... 8.9 lbf ft)	–
Nut, cylinder head	M10x1.25	Tightening sequence: Tighten diagonally. 1st tightening stage 10 Nm (7.4 lbf ft) 2nd tightening stage 30 Nm (22.1 lbf ft) 3rd tightening stage 50 Nm (36.9 lbf ft)	Thread, oiled with engine oil/cone greased
Stud, cylinder head	M10x1.25	20 Nm (14.8 lbf ft)	**Loctite® 243™**
Engine coolant temperature sensor	M12x1.5	12 Nm (8.9 lbf ft)	–
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)	–
Oil drain plug	M14x1.5	15 Nm (11.1 lbf ft)	–
Nut, inner clutch hub	M18x1.5	100 Nm (73.8 lbf ft)	**Loctite® 243™**
Nut, primary gear	M18LHx1.5	100 Nm (73.8 lbf ft)	**Loctite® 243™**
Screw plug, oil screen	M20x1.5	15 Nm (11.1 lbf ft)	–
Plug, timing chain tensioner	M24x1.5	25 Nm (18.4 lbf ft)	–
Screw, alternator cover	M24x1.5	18 Nm (13.3 lbf ft)	–

22.4 capacities

22.4.1 Engine oil

Engine oil	1.10 l (1.16 qt.)	Engine oil (SAE 10W/50) (☛ p. 222)	
		Alternative engine oil for harsh operating conditions and increased performance	Engine oil (SAE 10W/60) (00062010035) (☛ p. 222)

22.4.2 Coolant

Coolant	1.2 l (1.3 qt.)	Coolant (☛ p. 222)
		Coolant (mixed ready to use) (☛ p. 222)

22.4.3 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. 223)
Total fuel tank capacity, approx. (XC-F)	9 l (2.4 US gal)	Super unleaded (ROZ 95/RON 95/PON 91) (☛ p. 223)

Fuel reserve, approx. (XC-F)	1.5 l (1.6 qt.)

22.5 Chassis

Frame	Central tube frame made of chrome molybdenum steel tubing
Fork	**WP Suspension** Up Side Down 4860 MXMA CC
Suspension travel	
Front	300 mm (11.81 in)
Suspension travel (SX-F EU)	
Rear	330 mm (12.99 in)
Suspension travel (SX-F USA, XC-F)	
Rear	317 mm (12.48 in)
Fork offset	22 mm (0.87 in)
Shock absorber	**WP Suspension** 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, offroad	
Front	1.0 bar (15 psi)
Rear	1.0 bar (15 psi)
Secondary ratio	13:50
Chain	5/8 x 1/4"
Available rear sprockets	38, 40, 42, 45, 48, 49, 50, 51, 52
Steering head angle	63.5°
Wheelbase	1,495±10 mm (58.86±0.39 in)
Seat height, unloaded	992 mm (39.06 in)
Ground clearance, unloaded	376 mm (14.8 in)
Weight without fuel, approx. (All SX-F models)	102.8 kg (226.6 lb.)
Weight without fuel, approx. (XC-F)	105.8 kg (233.2 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.)

22.6 Electrical system

Battery (All SX-F models)	YTX4L-BS	Battery voltage: 12 V Nominal capacity: 3 Ah Maintenance-free
Battery (XC-F)	YTX5L-BS	Battery voltage: 12 V Nominal capacity: 4 Ah Maintenance-free
Fuse	58011109110	10 A
FI warning lamp	LED	
Remaining indicator lamps (XC-F)	W2.3W/socket W2x4.6d	12 V 2.3 W

22.7 Tires

Validity	Front tires	Rear tires
(SX-F EU)	**80/100 - 21 M/C 51M TT** Pirelli SCORPION MX Midsoft 32	**100/90 - 19 62M TT** Pirelli SCORPION MX Midsoft 32
(SX-F USA)	**80/100 - 21 51M TT** Dunlop GEOMAX MX51F	**100/90 - 19 62M TT** Dunlop GEOMAX MX51
(XC-F)	**80/100 - 21 51M TT** Dunlop GEOMAX MX51F	**100/100 - 18 64M TT** Dunlop GEOMAX MX51
Additional information is available in the Service section under: http://www.ktm.com		

22.8 Fork

22.8.1 SX-F EU

Fork part number	14.18.7M.05
Fork	**WP Suspension** Up Side Down 4860 MXMA CC
Compression damping	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks
Rebound damping	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks
Spring length with preload spacer(s)	497 mm (19.57 in)
Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	4.4 N/mm (25.1 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	4.6 N/mm (26.3 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	4.8 N/mm (27.4 lb/in)
Gas pressure	1.2 bar (17 psi)
Fork length	940 mm (37.01 in)

Oil capacity per cartridge	195 ml (6.59 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 223)
Oil capacity fork leg without cartridge	390 ml (13.19 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 223)

22.8.2 SX-F USA

Fork part number	14.18.7M.55
Fork	**WP Suspension** Up Side Down 4860 MXMA CC
Compression damping	
Comfort	14 clicks
Standard	12 clicks

Sport	10 clicks
Rebound damping	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks
Spring length with preload spacer(s)	494 mm (19.45 in)
Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	4.4 N/mm (25.1 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	4.6 N/mm (26.3 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	4.8 N/mm (27.4 lb/in)
Gas pressure	1.2 bar (17 psi)
Fork length	940 mm (37.01 in)

Oil capacity per cartridge	195 ml (6.59 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 223)
Oil capacity fork leg without cartridge	390 ml (13.19 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 223)

22.8.3 XC-F

Fork part number	14.18.7M.75
Fork	**WP Suspension** Up Side Down 4860 MXMA CC
Compression damping	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks
Rebound damping	
Comfort	14 clicks
Standard	12 clicks
Sport	10 clicks
Spring length with preload spacer(s)	492 mm (19.37 in)
Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	4.2 N/mm (24 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	4.4 N/mm (25.1 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	4.6 N/mm (26.3 lb/in)
Gas pressure	1.2 bar (17 psi)
Fork length	940 mm (37.01 in)

Oil capacity per cartridge	195 ml (6.59 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 223)
Oil capacity fork leg without cartridge	380 ml (12.85 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 223)

22.9 Shock absorber

22.9.1 SX-F EU

Shock absorber part number	18.18.7M.05
Shock absorber	**WP Suspension** 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	13 mm (0.51 in)
Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	51 N/mm (291 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	54 N/mm (308 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	57 N/mm (325 lb/in)
Spring length	260 mm (10.24 in)
Gas pressure	10 bar (145 psi)
Static sag	30 mm (1.18 in)
Riding sag	90 mm (3.54 in)
Fitted length	490 mm (19.29 in)

Shock absorber oil	Shock absorber oil (SAE 2.5) (50180342S1) (☛ p. 223)

22.9.2 SX-F USA

Shock absorber part number	18.18.7M.55
Shock absorber	**WP Suspension** 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	12 mm (0.47 in)
Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	51 N/mm (291 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	54 N/mm (308 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	57 N/mm (325 lb/in)
Spring length	260 mm (10.24 in)
Gas pressure	10 bar (145 psi)
Static sag	30 mm (1.18 in)
Riding sag	100 mm (3.94 in)
Fitted length	486 mm (19.13 in)

Shock absorber oil	Shock absorber oil (SAE 2.5) (50180342S1) (☛ p. 223)

22.9.3 XC-F

Shock absorber part number	18.18.7M.75
Shock absorber	**WP Suspension** 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	12 mm (0.47 in)
Spring rate	
Weight of rider: 65... 75 kg (143... 165 lb.)	51 N/mm (291 lb/in)
Weight of rider: 75... 85 kg (165... 187 lb.)	54 N/mm (308 lb/in)
Weight of rider: 85... 95 kg (187... 209 lb.)	57 N/mm (325 lb/in)
Spring length	260 mm (10.24 in)
Gas pressure	10 bar (145 psi)
Static sag	30 mm (1.18 in)
Riding sag	100 mm (3.94 in)
Fitted length	486 mm (19.13 in)

Shock absorber oil	Shock absorber oil (SAE 2.5) (50180342S1) (☛ p. 223)

22.10 Chassis tightening torques

Spoke nipple, front wheel	M4.5	5... 6 Nm (3.7... 4.4 lbf ft)	–
Spoke nipple, rear wheel	M4.5	5... 6 Nm (3.7... 4.4 lbf ft)	–
Screw, intake air temperature sensor	M5	2 Nm (1.5 lbf ft)	–
Screw, shock absorber adjusting ring	M5	5 Nm (3.7 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™**
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, 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	33 Nm (24.3 lbf ft)	–
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, side stand attachment (XC-F)	M8	45 Nm (33.2 lbf ft)	**Loctite® 2701™**
Screw, subframe	M8	35 Nm (25.8 lbf ft)	**Loctite® 2701™**
Screw, top steering stem	M8	17 Nm (12.5 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, seat fixing	M12x1	20 Nm (14.8 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, 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™**
Screw, front wheel spindle	M24x1.5	45 Nm (33.2 lbf ft)	–
Nut, rear wheel spindle	M25x1.5	80 Nm (59 lbf ft)	–

23.1 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.

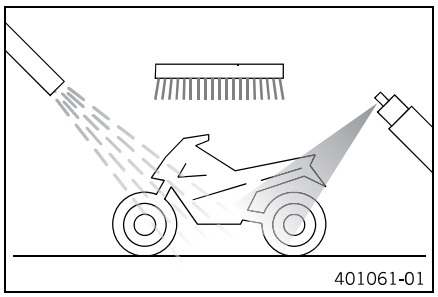
Warning

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 keep 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. 224)

Info

Use warm water containing normal motorcycle cleaner and a soft sponge. Never apply motorcycle cleaner to a dry vehicle; always rinse the vehicle with water first.

– After rinsing the motorcycle with a gentle spray of water, allow it to dry thoroughly.
– Remove the closure of 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 on 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. 104)
– Treat bare metal parts (except for brake discs and the exhaust system) with a corrosion inhibitor.

Preserving materials for paints, metal and rubber (☛ p. 225)

– 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. 225)

24.1 Storage

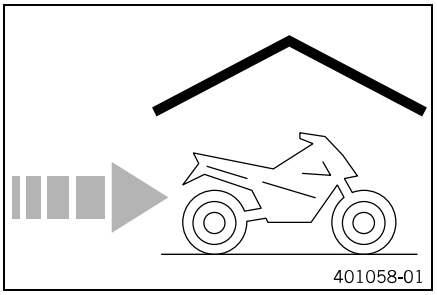
Warning

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 is 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.


401058-01

– When refueling for the last time before taking the motorcycle out of service, add fuel additive.

Fuel additive (☛ p. 224)

– Refuel.
– Clean the motorcycle. (☛ p. 206)
– Change the engine oil and oil filter, clean the oil screen. (☛ p. 190)
– Check the antifreeze and coolant level. (☛ p. 186)
– Drain the fuel from the fuel tanks into a suitable container.
– Check the tire air pressure. (☛ p. 95)
– Remove the battery. (☛ p. 106)
– Recharge the battery. (☛ p. 107)

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

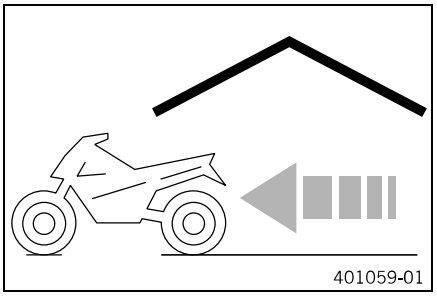
KTM recommends raising the motorcycle.

– Raise the motorcycle with the 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.

24.2 Putting into operation after storage


401059-01

– Remove the motorcycle from the lift stand. (☛ p. 10)
– Install the battery. (☛ p. 106)
– Perform checks and maintenance steps before putting into operation.
– Take a test ride.

25.1 Service schedule

	Once after 1 operating hour - corresponds to about 7 liters of fuel (1.8 US gal)	Every 10 operating hours - corresponds to about 70 liters of fuel (18.5 US gal) / after every race	Every 20 operating hours - corresponds to about 140 liters of fuel (37 US gal)	Every 30 operating hours - corresponds to about 210 liters of fuel (55.5 US gal)
Read out the fault memory using the KTM diagnostics tool.	○	●	●	●
Check and charge the attery.		●	●	●
Check the front brake linings. (☛ p. 109)		●	●	●
Check the rear brake linings. (☛ p. 114)		●	●	●
Check the brake discs. (☛ p. 95)		●	●	●
Check the brake lines for damage and leakage.		●	●	●
Check the rear brake fluid level. (☛ p. 116)		●	●	●
Check the free travel of the foot brake lever. (☛ p. 115)		●	●	●
Check the frame and swingarm.		●	●	●
Check the swingarm bearing.			●	
Check the shock absorber linkage.		●	●	●
Conduct a minor fork service. (☛ p. 16)		●	●	●
Conduct a major fork service. (☛ p. 15)				●
Check the tire condition. (☛ p. 95)	○	●	●	●
Check the tire air pressure. (☛ p. 95)	○	●	●	●
Check the wheel bearing for play.		●	●	●
Check the wheel hubs.		●	●	●
Check the rim run-out.	○	●	●	●
Check the spoke tension.	○	●	●	●
Check the chain, rear sprocket, engine sprocket and chain guide. (☛ p. 102)		●	●	●
Check the chain tension. (☛ p. 100)	○	●	●	●
Grease all moving parts (e.g., hand lever, chain, ...) and check for smooth operation.		●	●	●
Check/rectify the fluid level of the hydraulic clutch. (☛ p. 185)		●	●	●
Check the front brake fluid level. (☛ p. 111)		●	●	●
Check the free travel of the hand brake lever. (☛ p. 110)		●	●	●
Check the steering head bearing play. (☛ p. 48)	○	●	●	●
Check the valve clearance.	○			●
Check the clutch.			●	
Change the shaft seal rings of the water pump.				●
Change the engine oil and oil filter, clean the oil screen. (☛ p. 190)	○	●	●	●
Check all hoses (e. g. fuel, cooling, bleeding, drainage) and sleeves for tearing, leaks and incorrect routing.	○	●	●	●
Check the antifreeze and coolant level. (☛ p. 186)	○	●	●	●
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. 81)		●	●	●
Change the glass fiber yarn filling of the main silencer. (☛ p. 78)			●	
Check the screws and nuts for tightness.	○	●	●	●
Change the fuel screen. (☛ p. 91)	○	●	●	●
Check the fuel pressure. (☛ p. 86)		●	●	●
Check the idle.	○	●	●	●
Final check: Check the vehicle for roadworthiness and take a test ride.	○	●	●	●
Read out the fault memory using the KTM diagnostics tool after a test ride.	○	●	●	●
Make the service entry in **KTM DEALER.NET** and in the service record.	○	●	●	●

○ One-time interval

● Periodic interval

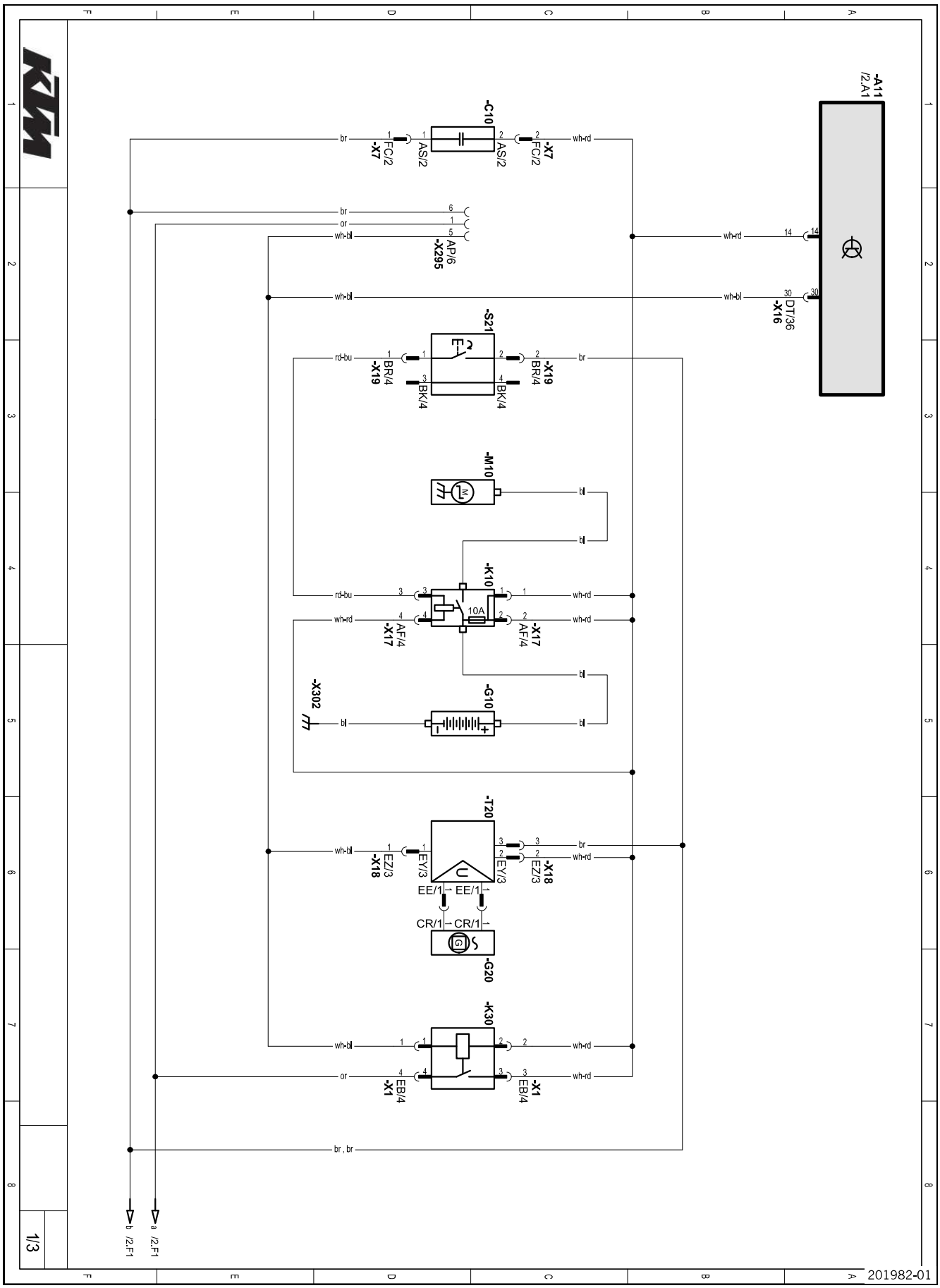
25.2 Service work (as additional order)

	Once after 20 operating hours	Every 40 operating hours - corresponds to about 280 liters of fuel (74 US gal)	Every 50 operating hours - corresponds to about 350 liters of fuel (92.5 US gal)	Every 100 operating hours - corresponds to about 700 liters of fuel (185 US gal)	Annually
Change the front brake fluid. (☛ p. 112)					●
Change the rear brake fluid. (☛ p. 117)					●
Change the hydraulic clutch fluid. (☛ p. 185)					●
Grease the steering head bearing. (☛ p. 46)					●
Service the shock absorber. (☛ p. 61)	○	●			
Change the spark plug and spark plug connector.				●	
Change the piston.			●	●	
Check/measure the cylinder.			●	●	
Check the cylinder head.			●	●	
Change the valves, valve springs and valve spring seats.				●	
Check the camshaft and cam lever.			●	●	
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 the timing chain.				●	
Check the timing assembly.			●	●	
Change all engine bearings.				●	

○ One-time interval

● Periodic interval

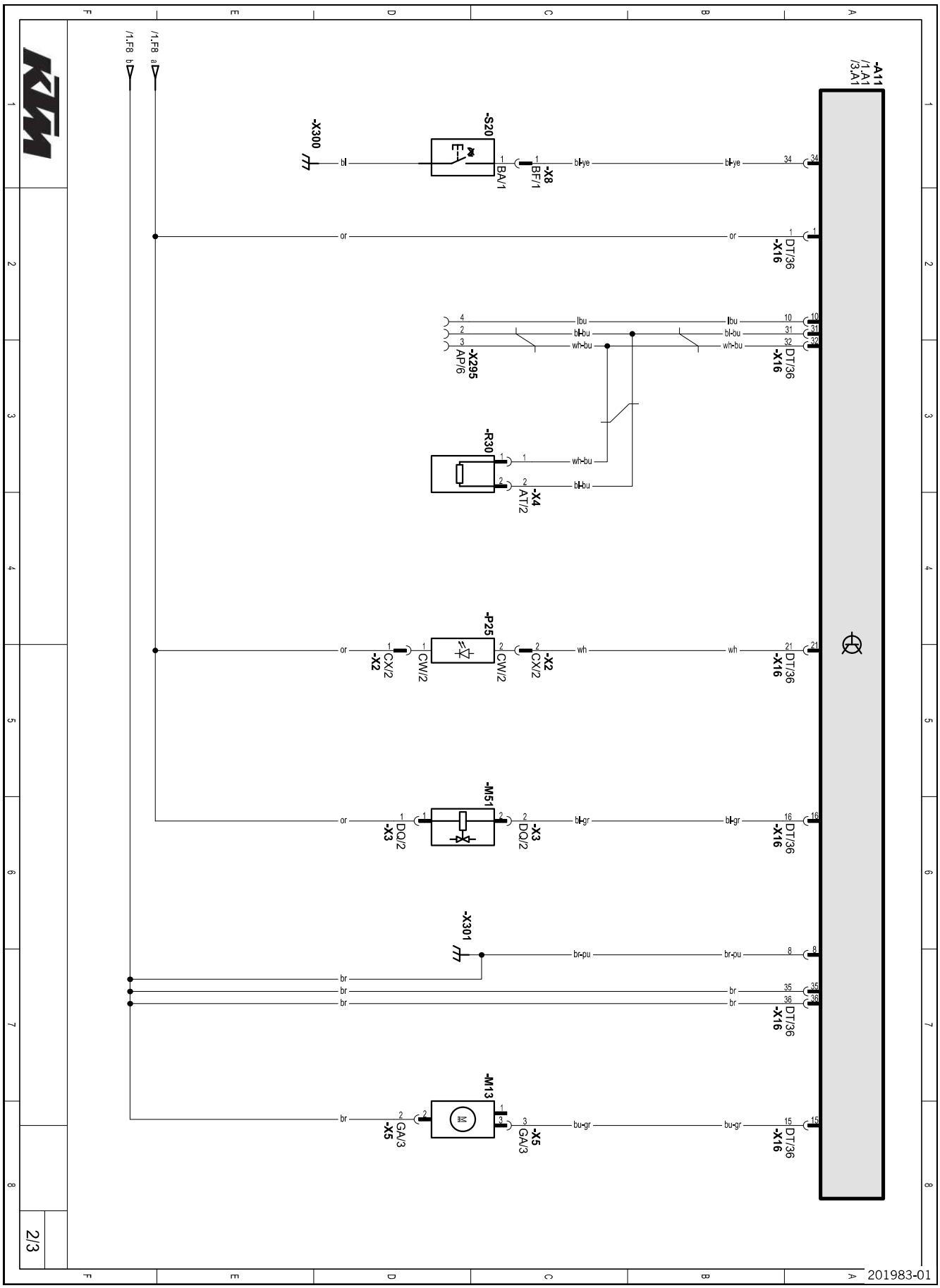
26.1 Page 1 of 3 (All SX-F models)



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

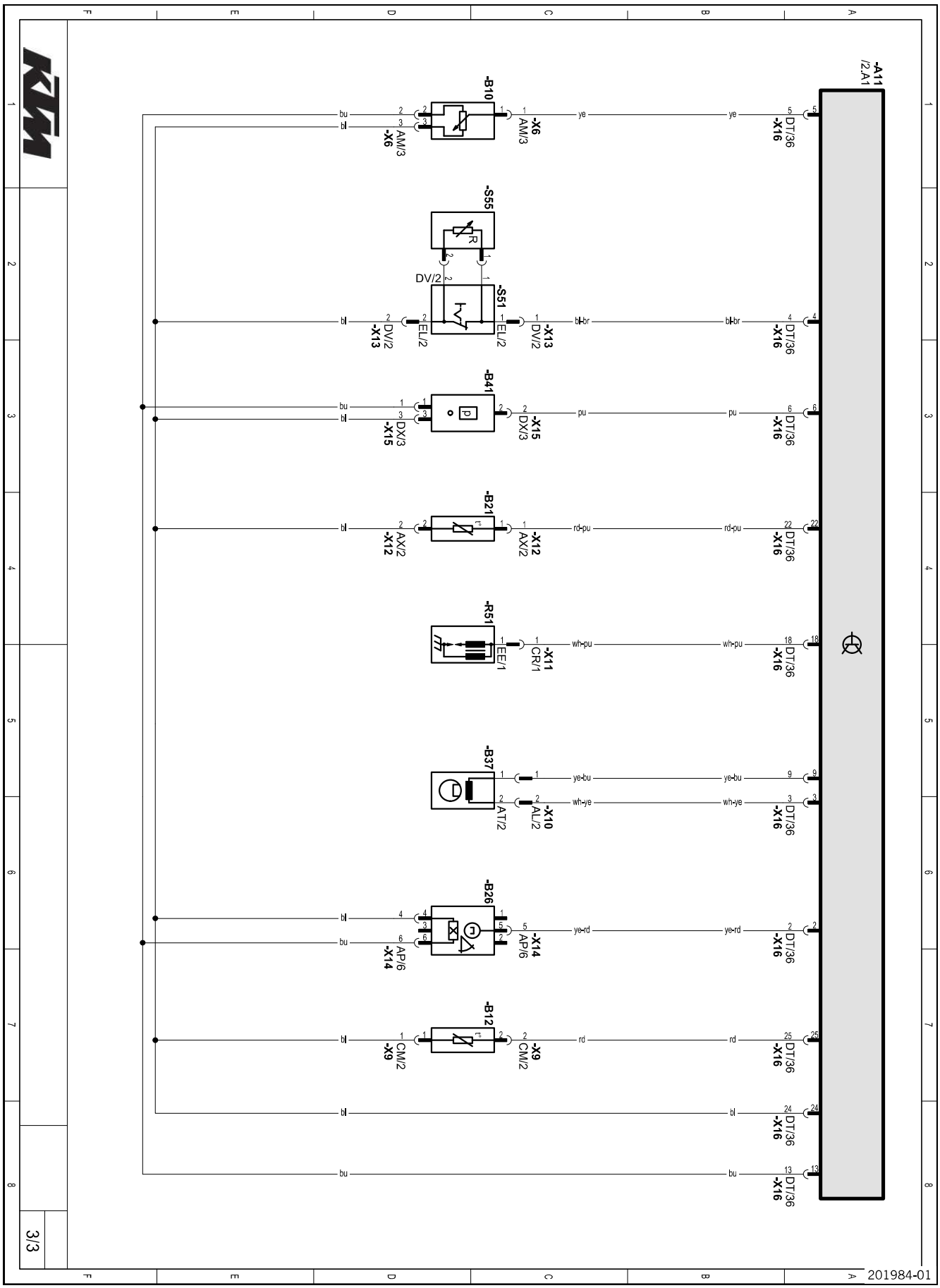
26.2 Page 2 of 3 (All SX-F models)



Components:

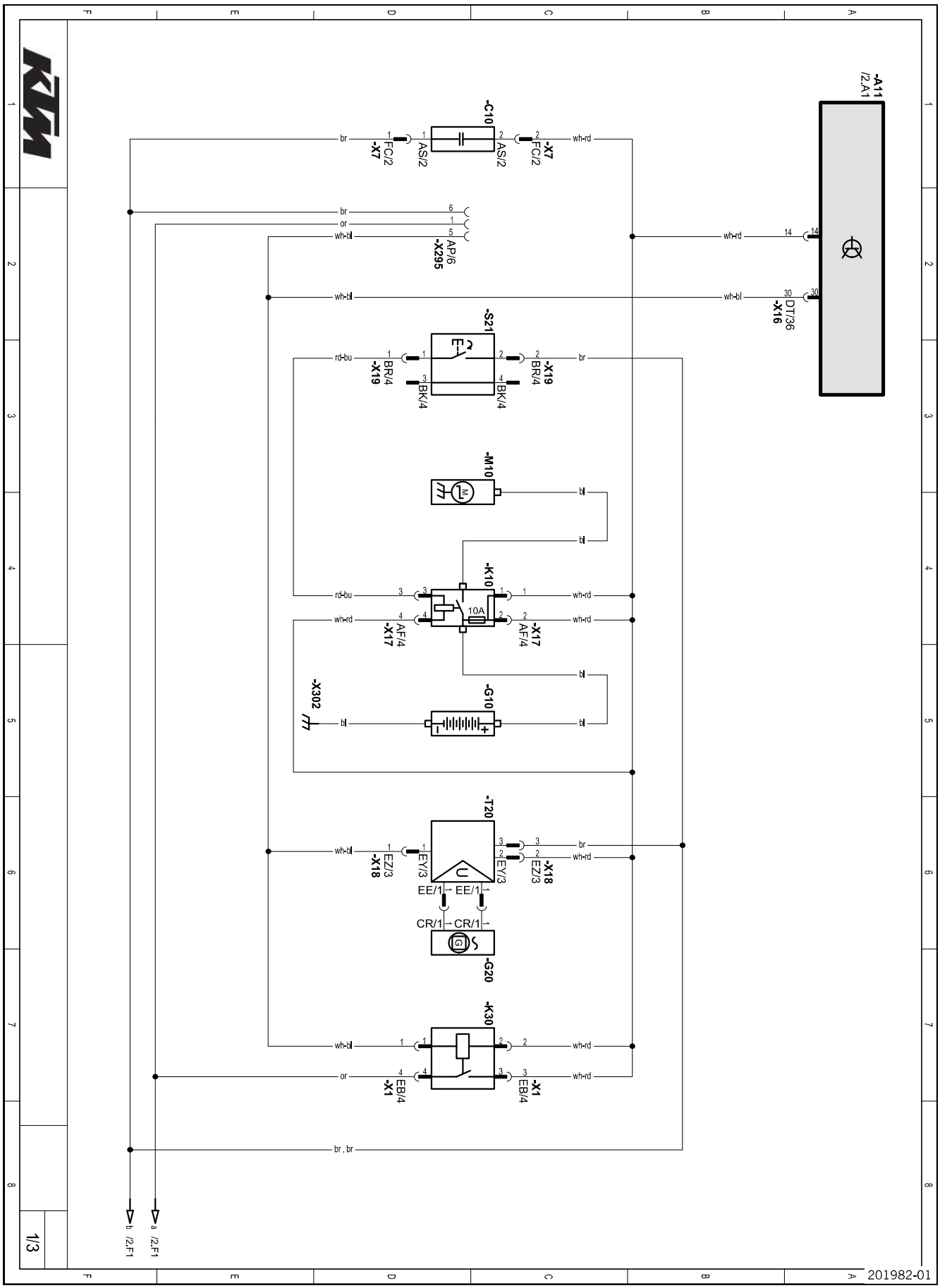
A11	EFI control unit
M13	Fuel pump
M51	Injector (cylinder 1)
P25	**FI** warning lamp (**MIL**)
R30	CAN-bus terminating resistor
S20	Kill switch
X295	Diagnostics connector

26.3 Page 3 of 3 (All SX-F models)



Components:	
A11	EFI control unit
B10	Throttle position sensor circuit A
B12	Intake air temperature sensor
B21	Engine coolant temperature sensor (cylinder 1)
B26	Rollover sensor
B37	Ignition pulse generator
B41	Manifold absolute pressure sensor (cylinder 1)
R51	Ignition coil (cylinder 1)
S51	**Map** switch for operation (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

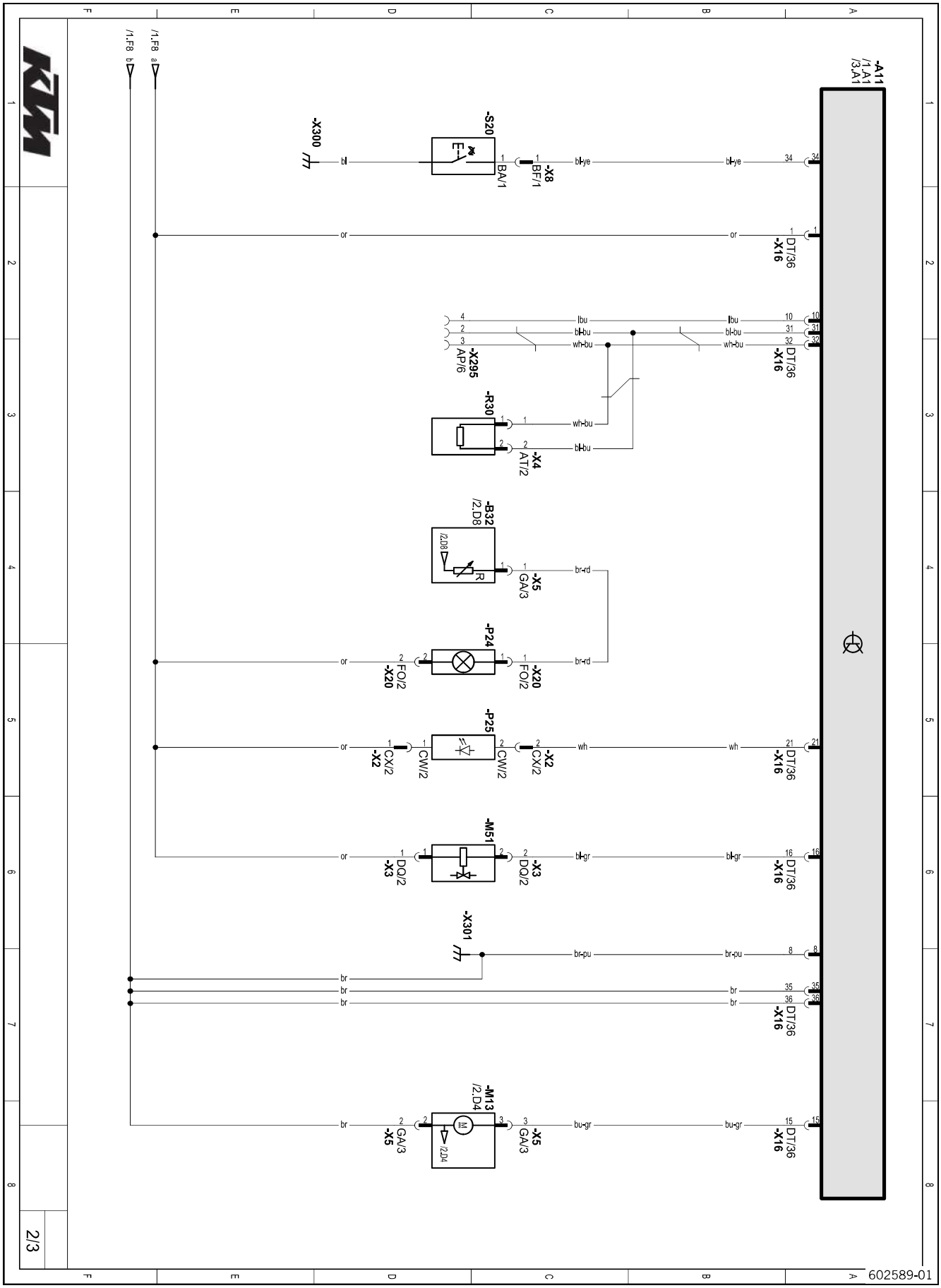
26.4 Page 1 of 3 (XC-F)



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

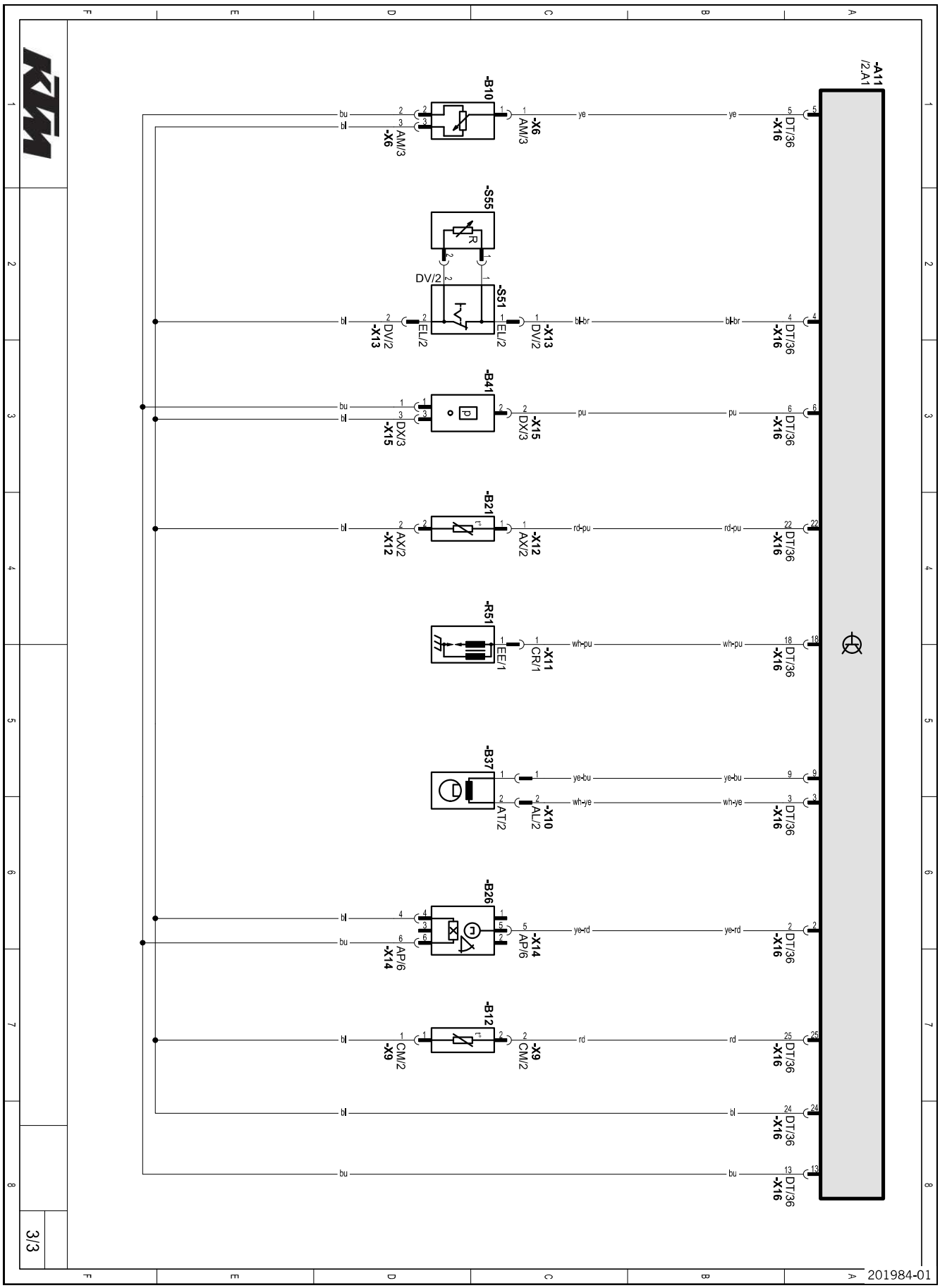
26.5 Page 2 of 3 (XC-F)



Components:

A11	EFI control unit
B32	Fuel level indicator
M13	Fuel pump
M51	Injector (cylinder 1)
P24	Low fuel warning lamp
P25	**FI** warning lamp (**MIL**)
R30	CAN-bus terminating resistor
S20	Kill switch
X295	Diagnostics connector

26.6 Page 3 of 3 (XC-F)



Components:	
A11	EFI control unit
B10	Throttle position sensor circuit A
B12	Intake air temperature sensor
B21	Engine coolant temperature sensor (cylinder 1)
B26	Rollover sensor
B37	Ignition pulse generator
B41	Manifold absolute pressure sensor (cylinder 1)
R51	Ignition coil (cylinder 1)
S51	**Map** switch for operation (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 possesses the corresponding properties.

Recommended supplier
Castrol
– **RESPONSE BRAKE FLUID SUPER DOT 4**

Motorex®
– **Brake Fluid DOT 5.1**

Coolant

Guideline
– Use only suitable coolant (even in countries with high temperatures). Using inferior antifreeze can result in corrosion and foaming.
– Use only coolant based on ethylene glycol.

Mixture ratio

Antifreeze protection: −25… −45 °C (−13… −49 °F)	50 % corrosion inhibitor/antifreeze 50 % distilled water

Coolant (mixed ready to use)

Antifreeze	−40 °C (−40 °F)

Recommended supplier
Motorex®
– **COOLANT M5.0**

Engine oil (SAE 10W/50)

Standard/classification
– JASO T903 MA (☛ p. 239)
– SAE (☛ p. 239) (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**

Engine oil (SAE 10W/60) (00062010035)

Standard/classification
– JASO T903 MA (☛ p. 239)
– SAE (☛ p. 239) (SAE 10W/60)
– KTM LC4 2007+

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. 239) (SAE 4)

Guideline

– Use only oils that comply with the specified standards (see specifications on the container) and that possess the corresponding properties.

Shock absorber oil (SAE 2.5) (50180342S1)

Standard/classification

– SAE (☛ p. 239) (SAE 2.5)

Guideline

– Use only oils that comply with the specified standards (see specifications on the container) and that possess 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®
– **Twin Air Dirt Bio 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 (T158)

Recommended supplier
Lubcon®
– **Turmogrease® PP 300**

Lubricant (T511)

Recommended supplier
Lubcon®
– **Turmsilon® GTI 300 P**

Lubricant (T625)

Recommended supplier
Molykote®
– **33 Medium**

Lubricant (T152)

Recommended supplier
Bel-Ray®
– **Molylube® 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®
– **Twin Air Liquid Bio Power**

Preserving materials for paints, metal and rubber

Recommended supplier
Motorex®
– **Moto Protect**

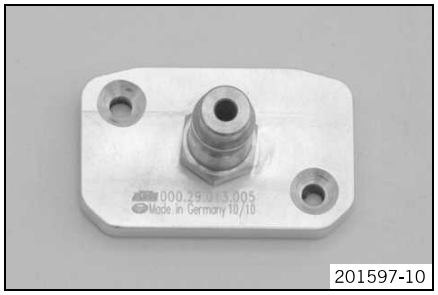
Special cleaner for glossy and matte paint finishes, metal and plastic surfaces

Recommended supplier
Motorex®
– **Quick Cleaner**

Universal oil spray

Recommended supplier
Motorex®
– **Joker 440 Synthetic**

Bleeder cover



Art. no.: 00029013005

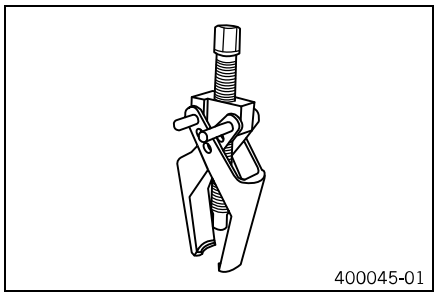
Bleeder cover

Art. no.: 00029013006

Bleeding device

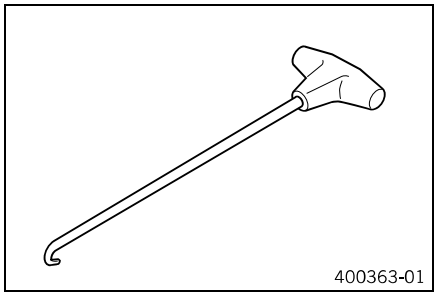
Art. no.: 00029013100

Extractor



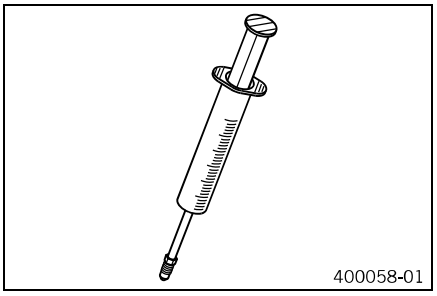
Art. no.: 46129021000

Spring hooks



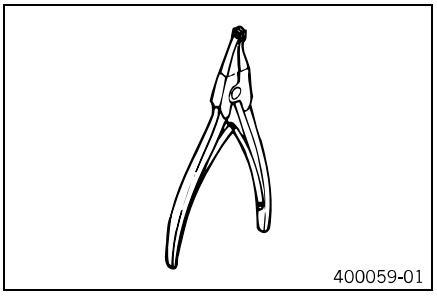
Art. no.: 50305017000

Bleed syringe



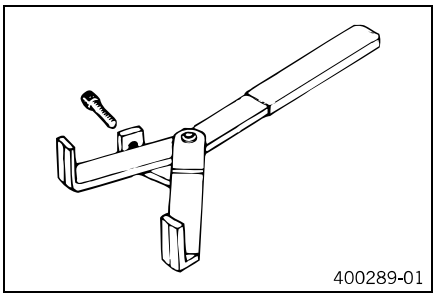
Art. no.: 50329050000

Circlip pliers reverse



Art. no.: 51012011000

Clutch holder

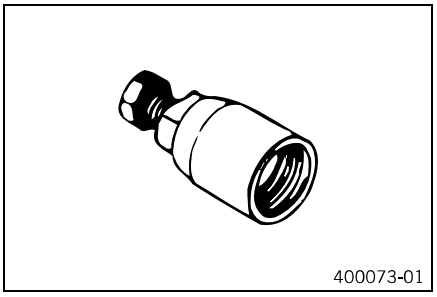


Art. no.: 51129003000

Lift stand

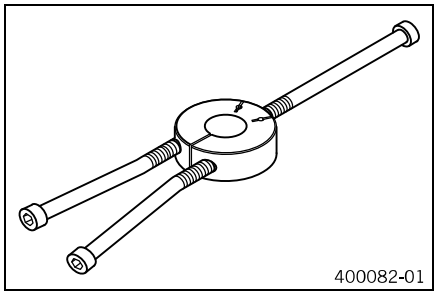
Art. no.: 54829055000

Extractor



Art. no.: 58012009000

Tool for inner bearing race

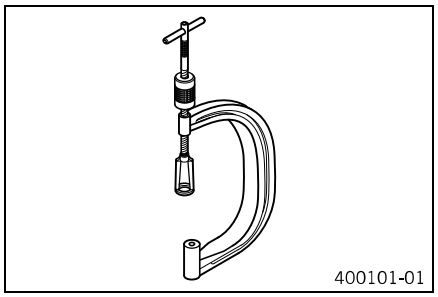


Art. no.: 58429037037

Torque wrench with various accessories in set

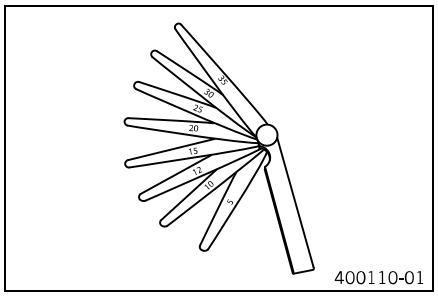
Art. no.: 58429094000

Valve spring compressor



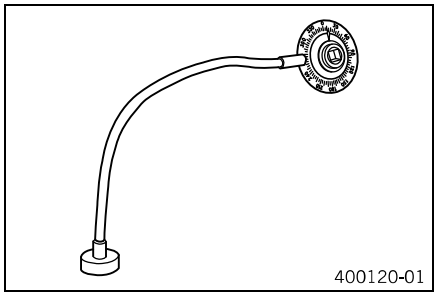
Art. no.: 59029019000

Feeler gauge



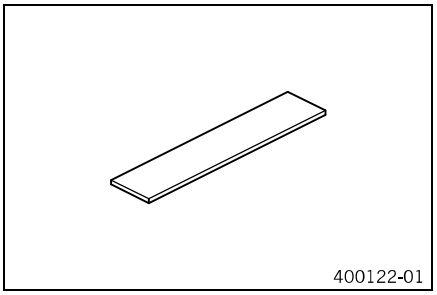
Art. no.: 59029041100

Graduated disc



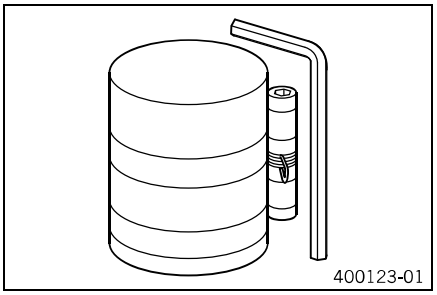
Art. no.: 60029010000

Plastigauge measuring strips



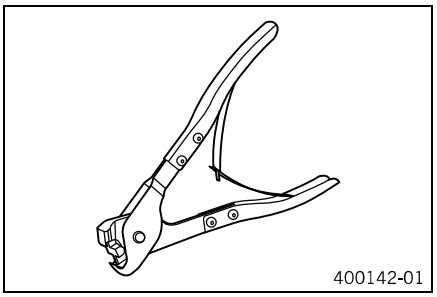
Art. no.: 60029012000

Piston ring mounting tool



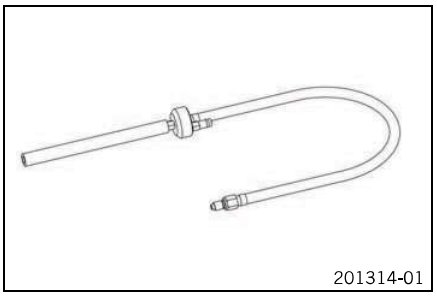
Art. no.: 60029015000

Hose clamp pliers



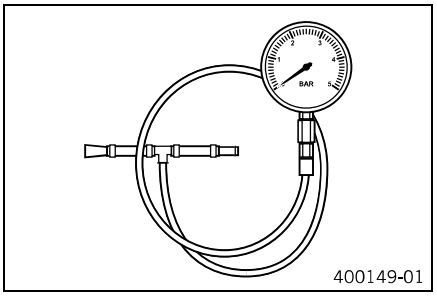
Art. no.: 60029057000

Testing hose



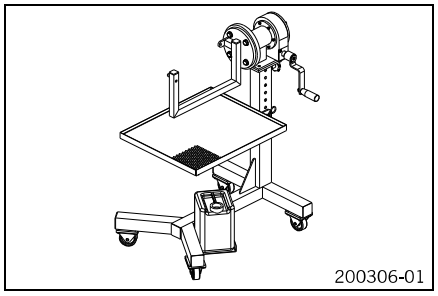
Art. no.: 61029093000

Pressure testing tool



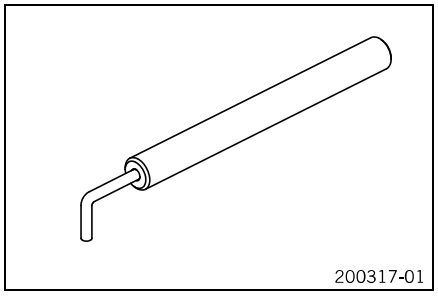
Art. no.: 61029094000

Engine assembly stand



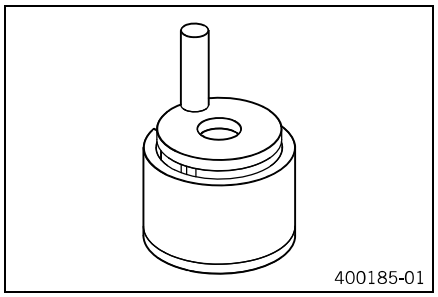
Art. no.: 61229001000

Release device for timing chain tensioner



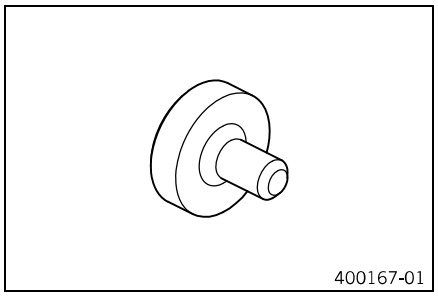
Art. no.: 61229021000

Pressing device for crankshaft, complete



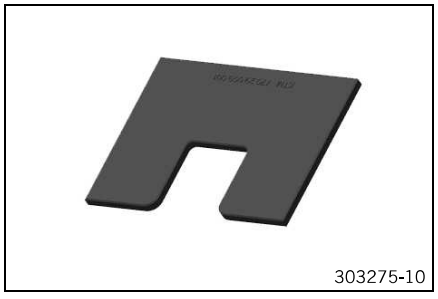
Art. no.: 75029047000

Protection cover



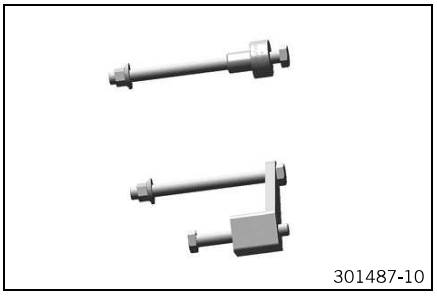
Art. no.: 75029090000

Separator plate



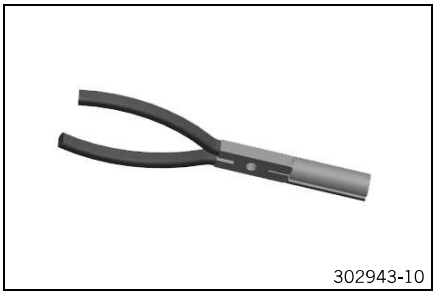
Art. no.: 77029009001

Engine fixing arm



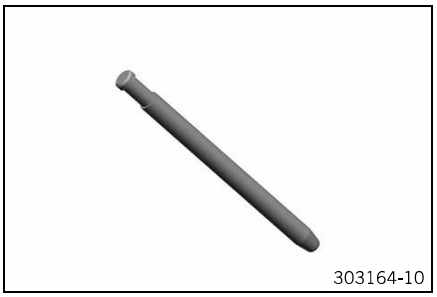
Art. no.: 77229002000

Pliers for valve stem seals



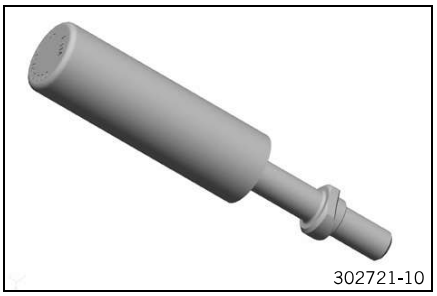
Art. no.: 77229010000

Limit plug gauge



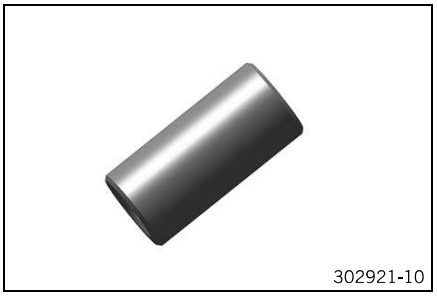
Art. no.: 77229026000

Insertion for piston ring lock



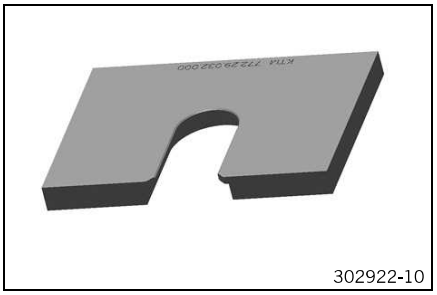
Art. no.: 77229030000

Protection cap



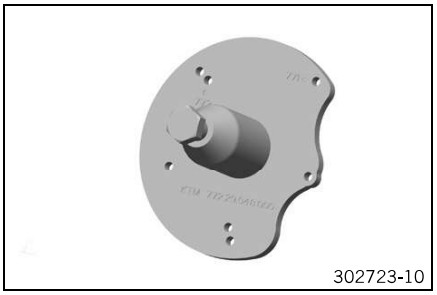
Art. no.: 77229031000

Separator plate



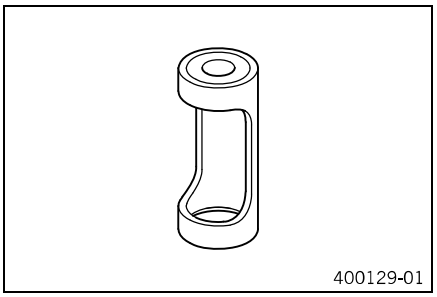
Art. no.: 77229032000

Puller



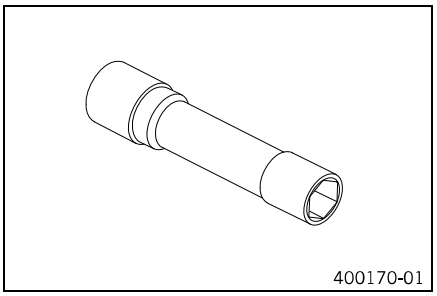
Art. no.: 77229048000

Insert for valve spring lever



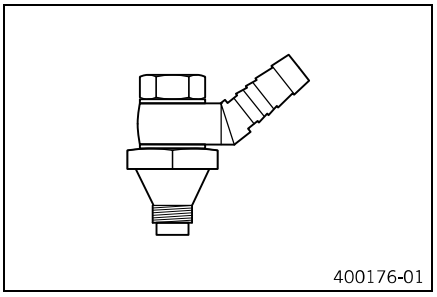
Art. no.: 77229060000

Spark plug wrench



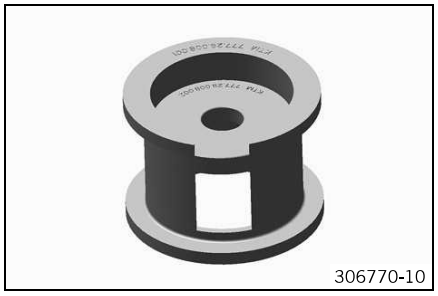
Art. no.: 77229072000

Oil pressure adapter



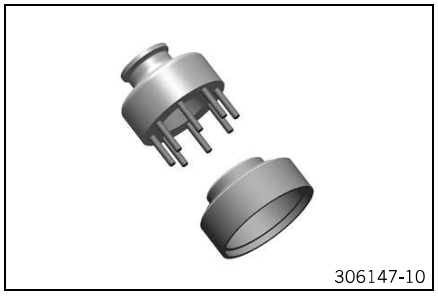
Art. no.: 77329006000

Insert for crankshaft pressing tool


306770-10

Art. no.: 77729008000

Pressing tool for freewheel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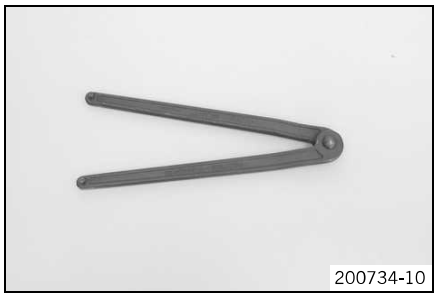
Art. no.: 77829083044

Pin wrench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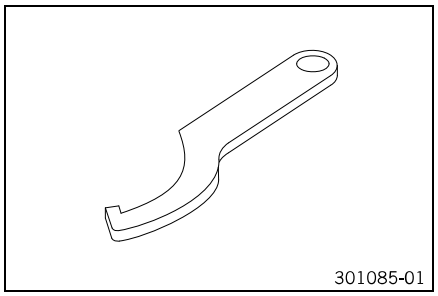
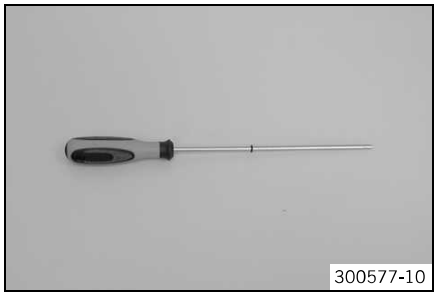
Art. no.: T103

Hook wrench


301085-01

Art. no.: T106S

Depth micrometer


300577-10

Art. no.: T107S

Pin

Art. no.: T120

Mounting sleeve

Art. no.: T1204

Calibration pin

Art. no.: T1205

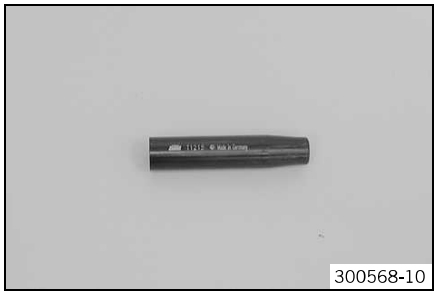
Pressing tool

Art. no.: T1206

Pressing tool

Art. no.: T1207S

Mounting sleeve



Art. no.: T1215

Disassembly tool

Art. no.: T1216

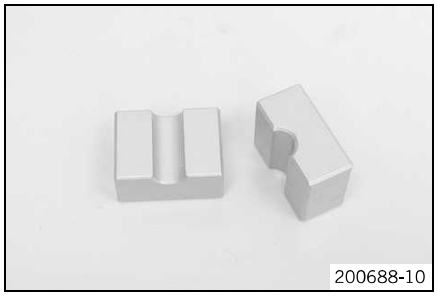
Vacuum pump

Art. no.: T1240S

Protecting sleeve

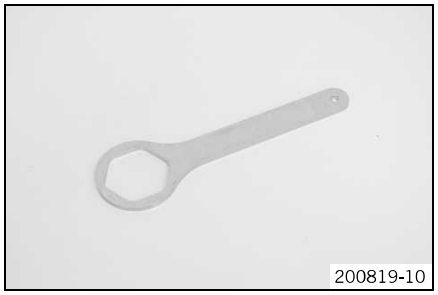
Art. no.: T1401

Clamping stand



Art. no.: T14016S

Ring wrench

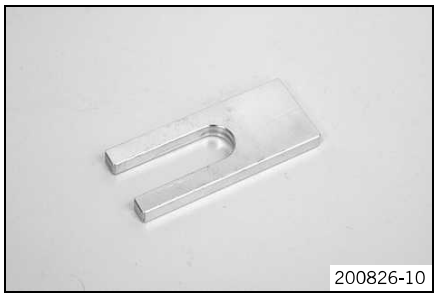


Art. no.: T14017

Nitrogen charging tool

Art. no.: T14019

Support tool



Art. no.: T14020

Calibrating unit

Art. no.: T14021

Mounting tool

Art. no.: T14022

Threaded bushing

Art. no.: T14023

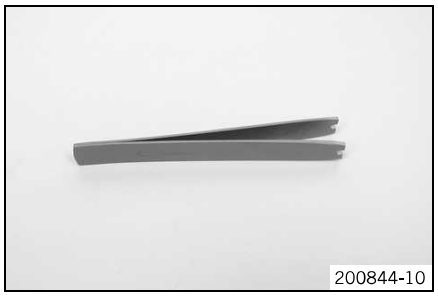
Mounting sleeve

Art. no.: T14029

Filling adapter

Art. no.: T14030

Tweezers

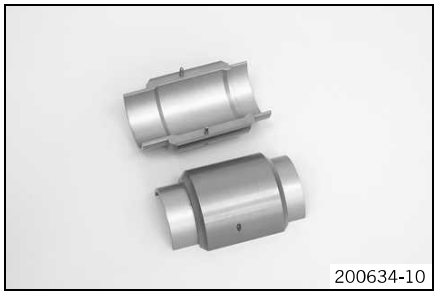


Art. no.: T14033

Clamping stand

Art. no.: T1403S

Mounting tool



Art. no.: T14040S

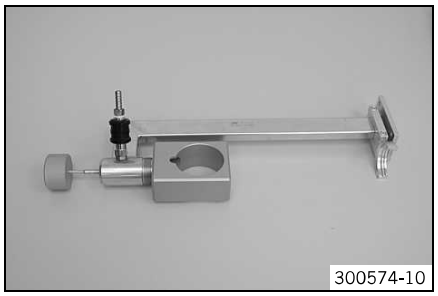
Press drift

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.

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11/2013

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