REPAIR MANUAL 2013

WWW.KTM.COM

1190 Adventure EU
1190 Adventure AUS
1190 Adventure FR
1190 Adventure JP

Art. no. 3206173en

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 will not be specified here. It is assumed that the repair work will be performed by a fully trained mechanic.

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ISO 9001(12 100 6061)
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KTM-Sportmotorcycle AG
5230 Mattighofen, Austria

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

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 some of the work. These are not included with the vehicle and can be ordered under the number in parentheses. Ex: valve spring mounter (59029019000)
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.
Where thread lockers are used on screw connections (e.g., **Loctite®**), follow the instructions for use from the manufacturer.
Parts that you want to reuse following repairs and servicing should be cleaned and checked for damage and wear. Change damaged or worn parts.
Following repairs or servicing, the vehicle must be checked for roadworthiness.

3 IMPORTANT INFORMATION

3.1 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 and 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 and 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.

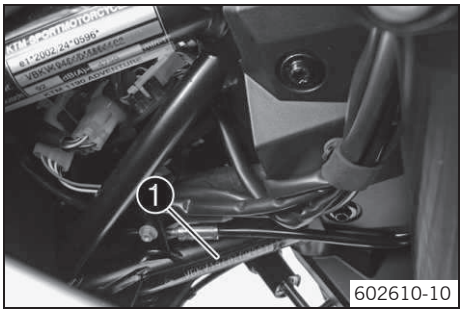
The current **KTM PowerParts** for your vehicle can be found on the KTM website.
International KTM Website: http://www.ktm.com

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.

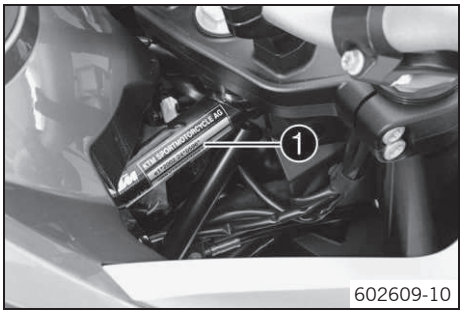
4 SERIAL NUMBERS

4.1 Chassis number



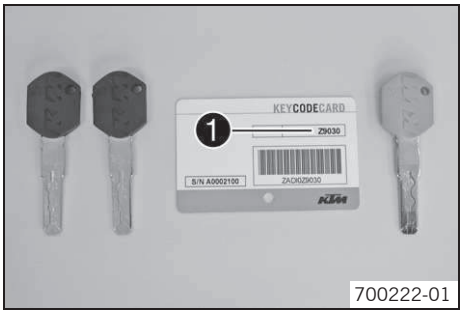
The chassis number ❶ is stamped on the bottom right of the frame behind the steering head.
The chassis number is also shown on the type label.

4.2 Type label



The type label ❶ is on the top right of the frame behind the steering head.

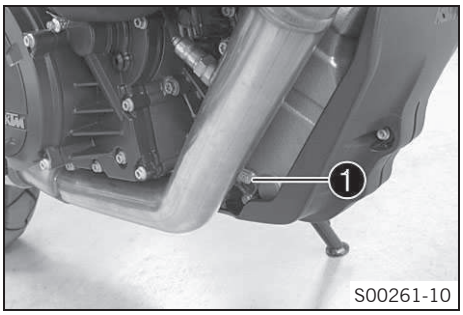
4.3 Key number



The key number **Code number** ❶ can be found on the **KEYCODECARD**.

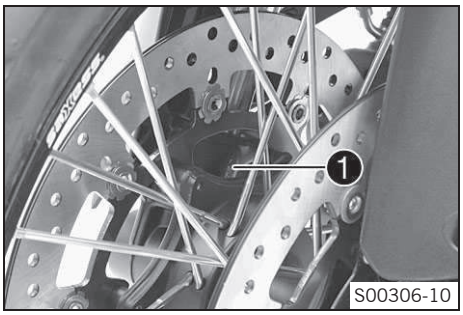
Info
You need the key number to order a spare key. Keep the **KEYCODECARD** in a safe place.
Use the orange programming key to activate and deactivate the black ignition key. Keep the orange programming key in a safe place: it must only be used for learning and programming functions.

4.4 Engine number



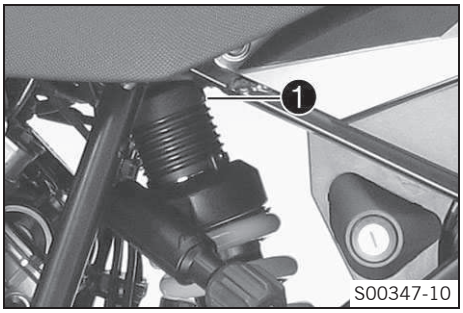
The engine number ❶ is stamped on the right side of the engine.

4.5 Fork part number



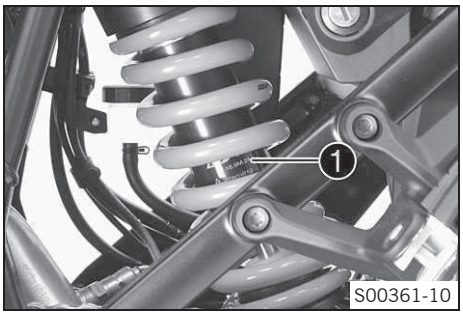
The fork part number ❶ is stamped on the inner side of the fork stub.

4.6 Shock absorber part number



(Option: Without EDS)

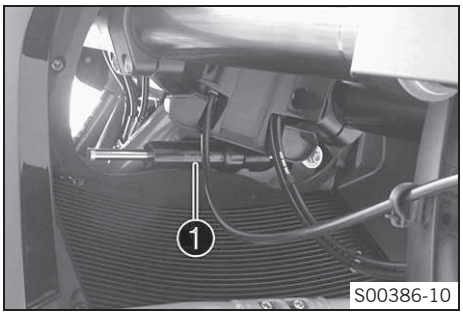
The shock absorber part number ❶ is stamped on the top part of the shock absorber.



(Option: With EDS)

The shock absorber part number ❶ is shown on a sticker applied to the shock absorber case below the spring.

4.7 Steering damper item number



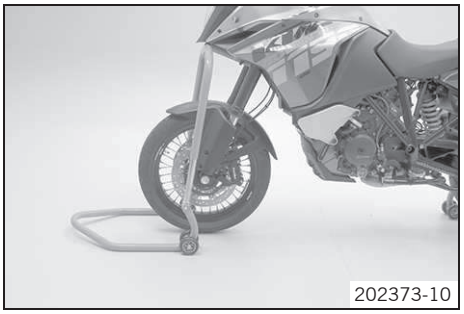
Steering damper item number ❶ is embossed on the underside of the steering damper.

5.1 Lifting the motorcycle with the front lifting gear

Note

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

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


202373-10

Preparatory work

– Lift the motorcycle with the rear lifting gear. (☛ p. 11)
– Remove the bottom triple clamp cover. (☛ p. 80)

Main work

– Move the handlebar to the straight-ahead position.
– Attach the front lifting gear with the adapters on the steering stem.

Adapter (61029955620) (☛ p. 275)
Front wheel stand (61029055500) (☛ p. 275)

– Direct the front lifting gear towards the fork legs.

Info
Always raise the motorcycle at the rear first.

– Raise the motorcycle at the front.

5.2 Taking the motorcycle from the front lifting gear

Note

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

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

Main work

– Secure the motorcycle against falling over.
– Remove the front lifting gear.

Finishing work

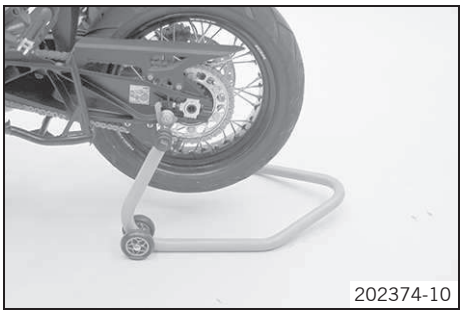
– Install the bottom triple clamp cover. (☛ p. 80)

5.3 Lifting the motorcycle with the rear lifting gear

Note

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

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


202374-10

– Mount lifting bushings on the swingarm.
– Place the adapter into the rear lifting gear.

Adapter (61029055120) (☛ p. 274)
Rear wheel stand (61029055400) (☛ p. 275)

– Place the motorcycle vertically, use the adapters to direct the lifting gear towards the swingarm and lift the motorcycle.

5.4 Removing the rear of motorcycle from the lifting gear

Note

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

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

– Secure the motorcycle against falling over.
– Remove the lifting gear from the rear and lean the vehicle on the side stand.
– Remove the lifting bushings from the swingarm.

5.5 Raising the vehicle with the center stand (Option: Center stand)

Note

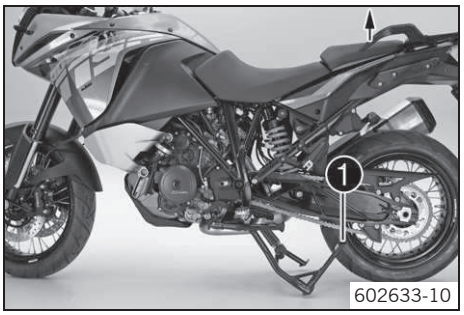
Danger of damage The parked vehicle may roll away or fall over.

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

Note

Material damage Damage and destruction of components from excessive load.

– The center stand is only designed for the weight of the motorcycle and the baggage. Do no sit on the motorcycle when it is resting on the center stand. The center stand or the frame may become damaged and the motorcycle may fall over.
– Pull the motorcycle up onto the center stand at the grab handles.



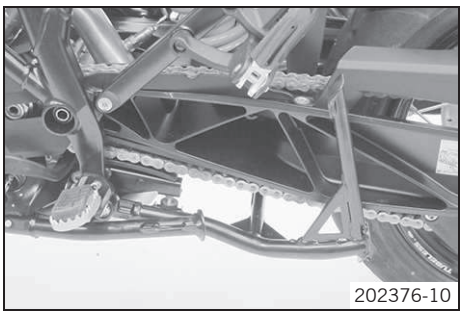
– Stand to the left of the vehicle.
– Hold the handlebar with your left hand and push the center stand onto the ground with your right foot.
– Put your entire weight on arm ❶ of the center stand while pulling the vehicle up at the left grab handle until the center stand folds out all the way.

5.6 Removing the vehicle from the center stand (Option: Center stand)

Note

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

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



– Unlock the steering and move the vehicle forward with both hands on the handlebar.
– While the vehicle tips off of the center stand, activate the front brake to stop the vehicle from rolling away.
– Check that the center stand is folded all the way up.

5.7 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.

Caution

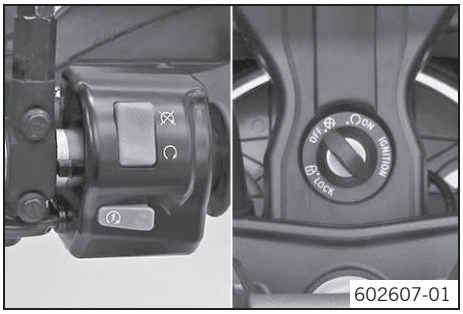
Danger of accidents If the vehicle is operated with a discharged battery or without a battery, electronic components and safety equipment may be damaged.

– Never operate the vehicle with a discharged battery or without a battery.

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.



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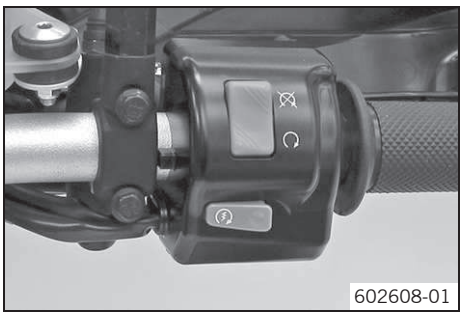

602608-01

– Press the emergency OFF switch to the position **ON** ○.
– Switch on the ignition by turning the black ignition key to the position **ON** ○.
  ✓ After you switch on the ignition, you can hear the fuel pump working for about two seconds. The function check of the combination instrument is run at the same time.
  ✓ The ABS lamp lights up and goes back out after starting off.
– Shift the transmission to idle N.
  ✓ The green idling speed indicator lamp N lights up.
– Press the electric starter button Ⓢ.

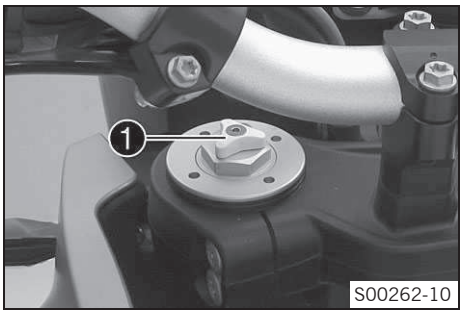
Info

Do not press the electric starter button until the combination instrument function check is finished.
When starting, **DO NOT** open the throttle. If you open the throttle during the starting procedure, fuel is not injected by the engine management system and the engine cannot start.
Press the electric starter button Ⓢ for at most 5 seconds. Wait for a least 5 seconds before trying again.
This motorcycle is equipped with a safety starting system. You can only start the engine if the transmission is in neutral or if the clutch lever is pulled when a gear is engaged. If the side stand is folded out and you shift into gear, the engine stops.

– Remove the motorcycle from the center stand or side stand.

6.1 Adjusting the compression damping of the fork (Option: Without EDS)

Info
The hydraulic compression damping determines the fork suspension behavior.



– Turn the white adjusting screw ❶ all the way clockwise.

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

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

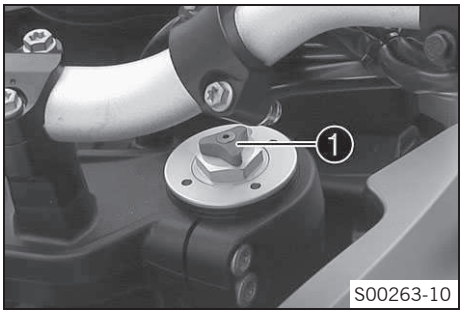
Guideline

Compression damping	
Comfort	17 clicks
Standard	12 clicks
Sport	7 clicks
Full payload	7 clicks

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

6.2 Adjusting the rebound damping of the fork (Option: Without EDS)

Info
The hydraulic rebound damping determines the fork suspension behavior.



– Turn the red adjusting screw ❶ all the way clockwise.

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

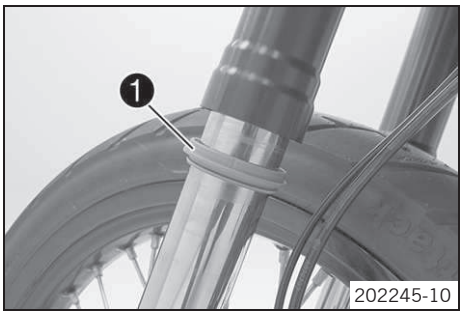
– Turn counterclockwise by the number of clicks corresponding to the fork type.

Guideline

Rebound damping	
Comfort	17 clicks
Standard	12 clicks
Sport	7 clicks
Full payload	7 clicks

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

6.3 Cleaning the dust boots of the fork legs



Preparatory work

(Option: Center stand)

– Raise the vehicle with the center stand. (☛ p. 12)

– Remove the front fender. (☛ p. 80)

Main work

– Push dust boot ❶ of both fork legs downwards.

Info

The dust boots should remove dust and coarse dirt particles from the 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. 269)

– Press the dust boots back into their normal position.

– Remove excess oil.

Finishing work

– Install the front fender. (☛ p. 80)

(Option: Center stand)

– Remove the vehicle from the center stand. (☛ p. 12)

6.4 Removing the fork legs

Preparatory work

(Option: Center stand)

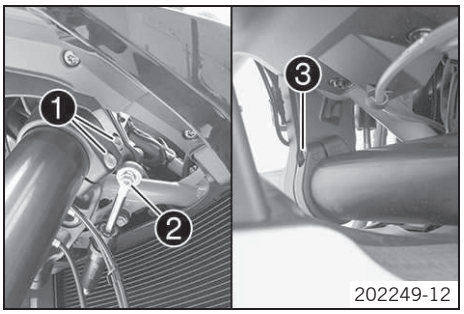
– Raise the vehicle with the center stand. (☛ p. 12)

– Clamp down the rear of the vehicle.

– Remove the front fender. (☛ p. 80)

– Remove the front wheel. (☛ p. 84)

– Remove the bottom triple clamp cover. (☛ p. 80)



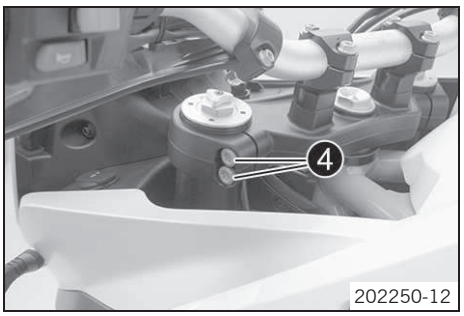
Main work

– Loosen screws ❶ of the lower triple clamp.

– Repeat the procedure on the other fork leg.

– Remove screw ❷ of the steering damper.

– Loosen screw ❸ of the steering damper clamp.

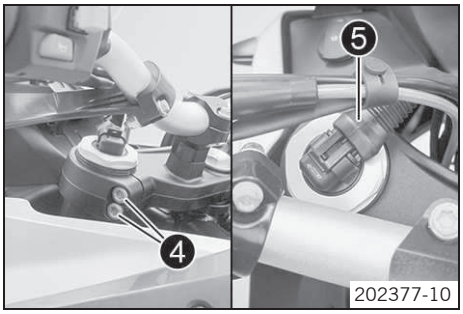


(Option: Without EDS)

– Loosen screws ❹ of the upper triple clamp.

– Remove the fork leg downward.

– Repeat the procedure on the other fork leg.



(Option: With EDS)

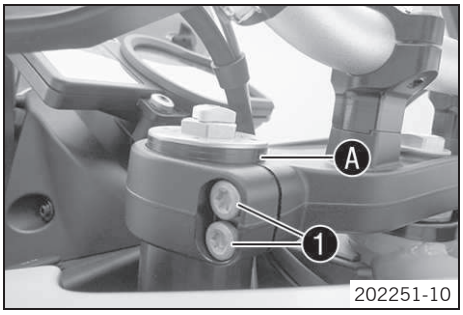
– Loosen screws ❹ of the upper triple clamp.
– Detach connector ❺.
– Remove the fork leg downward.
– Repeat the procedure on the other fork leg.

6.5 Installing the fork legs

Warning

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

– Following modifications, ride slowly at first to get the feel of the new ride behavior.



Main work

(Option: Without EDS)

– Slide the left-hand fork leg into the triple clamps and the steering damper clamp.
  ✔ The left-hand fork leg has a white adjuster; the right-hand fork leg has a red adjuster.
– Align the fork leg in the specified position by means of fork rings ❹.

  Guideline

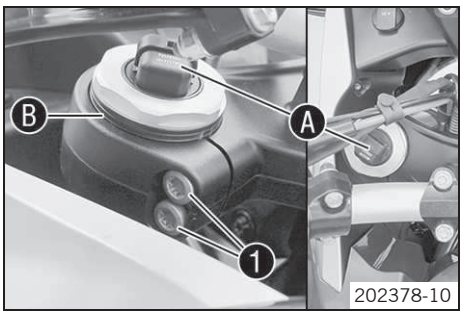
Upper triple clamp flush with 2nd ring of fork legs.

– Tighten screws ❶ of the upper triple clamp.

  Guideline

Screw, top triple clamp	M8	15 Nm (11.1 lbf ft)

– Repeat the procedure on the other fork leg.



(Option: With EDS)

– Slide the left-hand fork leg into the triple clamps and the steering damper clamp.
  ✔ The connector ❹ faces forward at an angle toward the center of the vehicle.
  ✔ The left-hand fork leg has a white color coding; the right-hand fork leg has a red color coding.
– Align the fork leg in the specified position by means of fork rings ❹.

  Guideline

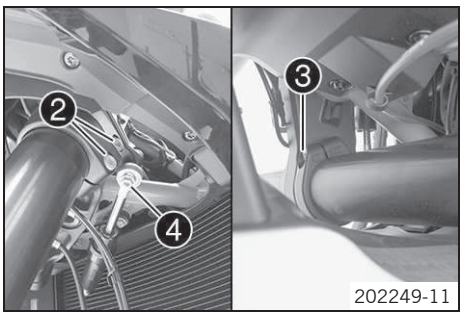
Upper triple clamp flush with 2nd ring of fork legs.

– Tighten screws ❶ of the upper triple clamp.

  Guideline

Screw, top triple clamp	M8	15 Nm (11.1 lbf ft)

– Plug in connector.
– Repeat the procedure on the other fork leg.



– Tighten screws ❷ of the lower triple clamp.

  Guideline

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

– Repeat the procedure on the other fork leg.
– Align the steering damper clamp to the lower triple clamp.
– Tighten screw ❸.

  Guideline

Screw, steering damper clamp	M8	12 Nm (8.9 lbf ft)

– Mount and tighten screw ❹.

Guideline

Screw, steering damper	M8	20^{+5}_{0} Nm ($14.8^{+3.7}_{0}$ lbf ft)	**Loctite® 2701™**

Finishing work

– Install the bottom triple clamp cover. (☛ p. 80)
– Install the front wheel. (☛ p. 85)
– Install the front fender. (☛ p. 80)

6.6 Checking the steering head bearing play

Warning

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

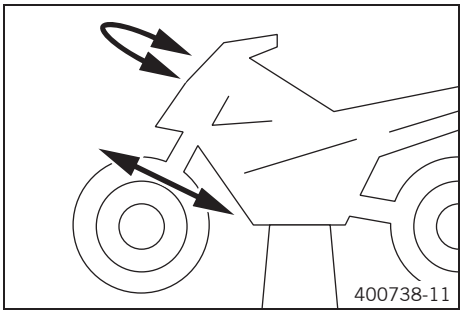
– Adjust the steering head bearing play without delay.

Info

If the vehicle is operated for a lengthy period with play in the steering head bearing, the bearings and the bearing seats in the frame can become damaged over time.

Preparatory work
(Option: Center stand)

– Raise the vehicle with the center stand. (☛ p. 12)



Main work

– Place a load on the rear of the vehicle.

✓ The front wheel is not in contact with the ground.

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

Play should not be detectable on the steering head bearing.

» If there is no detectable play:

– Adjust the steering head bearing play. (☛ p. 17)

– Move the handlebar to and fro over the entire steering range.

It must be possible to move the handlebar easily over the entire steering range. There should be no detectable detent positions.

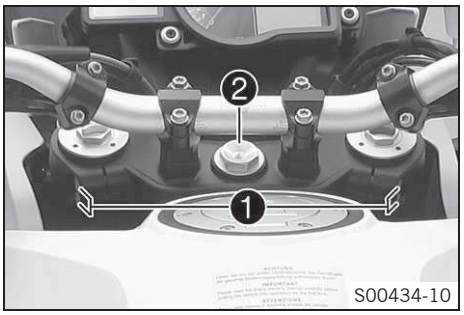
» If detent positions are detected:

– Adjust the steering head bearing play. (☛ p. 17)
– Check the steering head bearing and adjust if necessary.

6.7 Adjusting the steering head bearing play

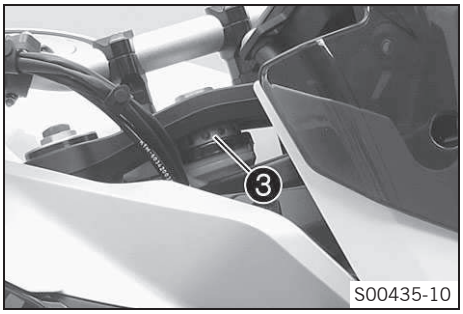
Preparatory work
(Option: Center stand)

– Raise the vehicle with the center stand. (☛ p. 12)



Main work
(Option: Without EDS)

– Loosen screws ❶ and ❷.



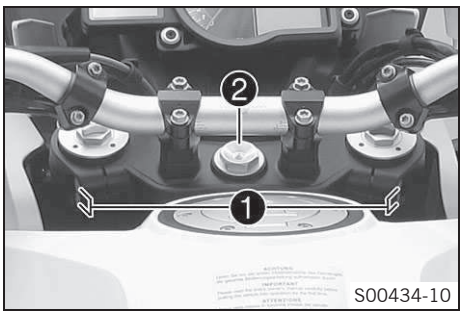
– Loosen and retighten screw ❸.

Guideline

Nut, steering head, top	M28x1.0	12 Nm (8.9 lbf ft)

Torque wrench with various accessories in set (58429094000) (☛ p. 272)
Mount for torque wrench (58429094100) (☛ p. 272)

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



– Tighten screw ❷.

Guideline

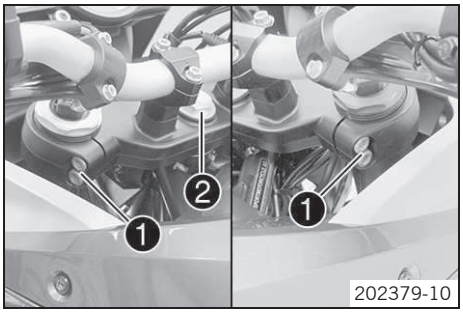
Screw, steering head, top	M22x1.5	46.5 Nm (34.3 lbf ft)	Only applies when using: Key for steering head bearing (45229050000) (☛ p. 270)

– Tighten screws ❶.

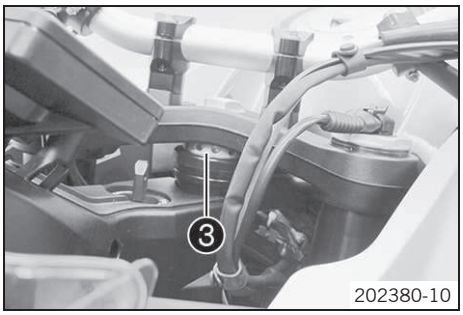
Guideline

Screw, top triple clamp	M8	15 Nm (11.1 lbf ft)

(Option: With EDS)



– Loosen screws ❶ and ❷.



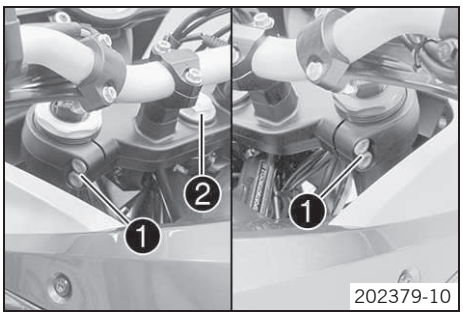
– Loosen and retighten screw ❸.

Guideline

Nut, steering head, top	M28x1.0	12 Nm (8.9 lbf ft)

Torque wrench with various accessories in set (58429094000) (☛ p. 272)
Mount for torque wrench (58429094100) (☛ p. 272)

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



– Tighten screw ❷.

Guideline

Screw, steering head, top	M22x1.5	46.5 Nm (34.3 lbf ft)	Only applies when using: Key for steering head bearing (45229050000) (☛ p. 270)

– Tighten screws ❶.

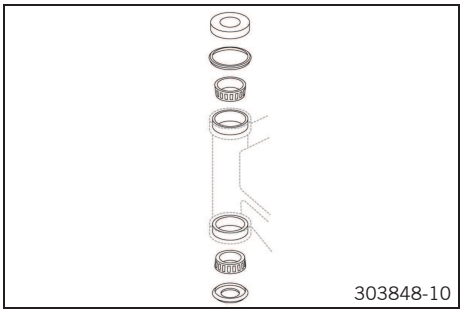
Guideline

Screw, top triple clamp	M8	15 Nm (11.1 lbf ft)

Finishing work

– Check the steering head bearing play. (☛ p. 17)

6.8 Lubricating the steering head bearing

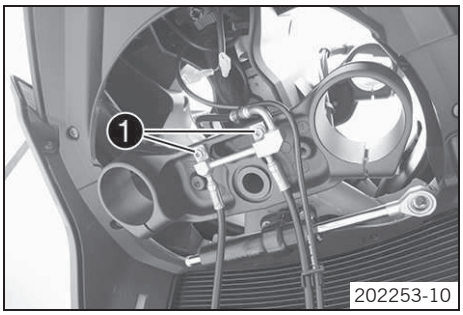

303848-10

– Remove the lower triple clamp. (☛ p. 19)
– Install the lower triple clamp. (☛ p. 20)

6.9 Removing the lower triple clamp

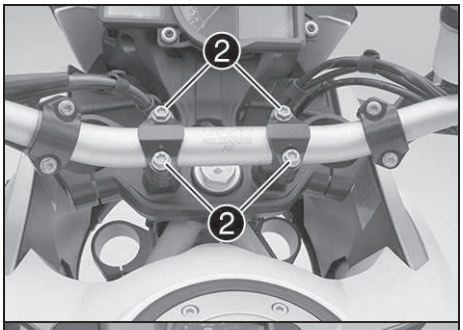
Preparatory work
(Option: Center stand)
– Raise the vehicle with the center stand. (☛ p. 12)
– Clamp down the rear of the vehicle.
– Remove the front fender. (☛ p. 80)
– Remove the front wheel. (☛ p. 84)
– Remove the bottom triple clamp cover. (☛ p. 80)
– Remove the fork legs. (☛ p. 15)

Main work



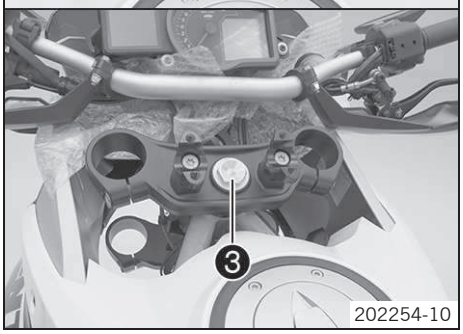
202253-10

– Remove screws ❶. Take off the brake line and hang it to the side.



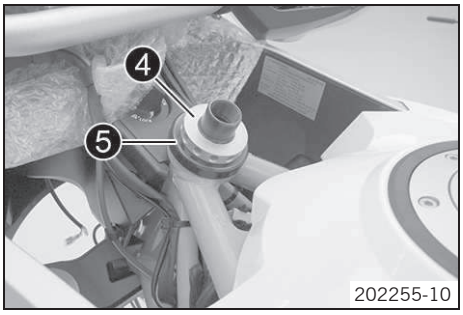
– Remove screws ❷ with the handlebar clamps.
– Remove the handlebar and lay it to one side.

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



202254-10

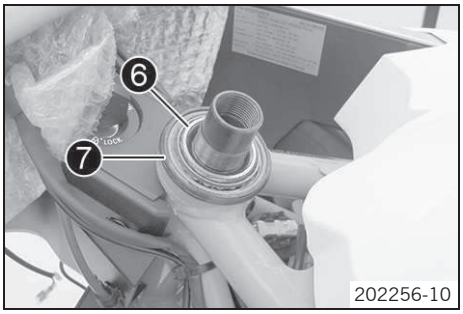
– Remove screw ❸.
– Remove upper triple clamp.



202255-10

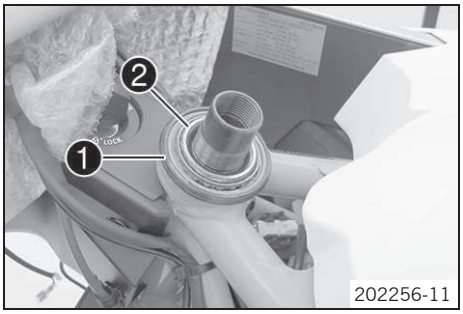
– Remove steering head nut ❹. Remove protective ring ❺.

Info
Hold the lower triple clamp.



– Take out the lower triple clamp with the steering stem.
– Take out upper steering head bearing ❻.
– Remove steering head seal ❼.

6.10 Installing the lower triple clamp

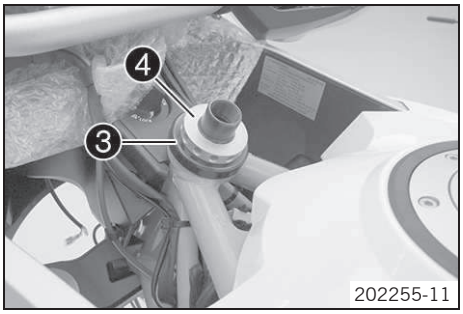


Main work

– Grease the bearing, clean the sealing elements, and check for damage.

High viscosity grease (☛ p. 268)

– Push on steering head seal ❶.
– Insert the lower triple clamp with the steering stem. Mount upper steering head bearing ❷.

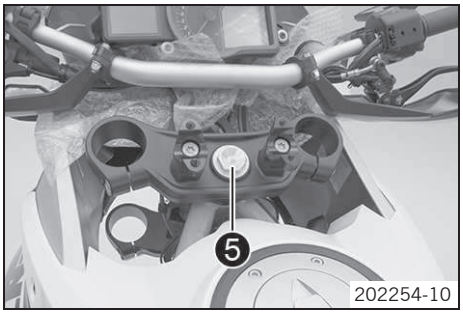


– Push on protective ring ❸.
– Mount and tighten steering head nut ❹.

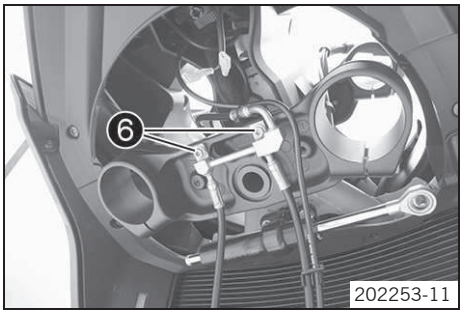
Guideline

Nut, steering head, top	M28x1.0	12 Nm (8.9 lbf ft)

Torque wrench with various accessories in set (58429094000) (☛ p. 272)
Mount for torque wrench (58429094100) (☛ p. 272)



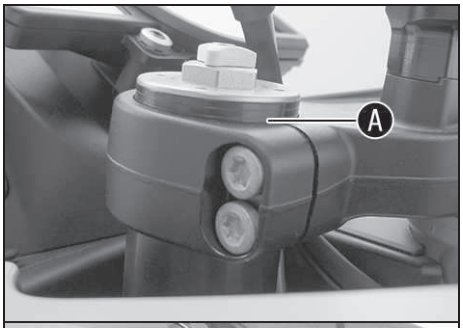
– Position the upper triple clamp.
– Mount screw ❺ but do not tighten yet.

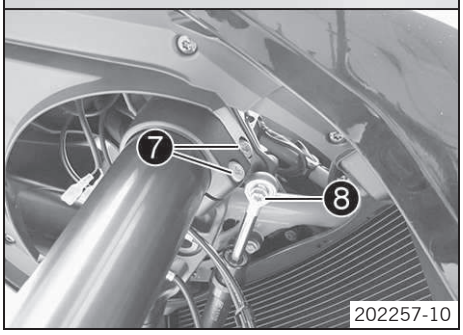


– Position the brake lines. Mount and tighten screws ❻.

Guideline

Remaining chassis screws	M6	10 Nm (7.4 lbf ft)





(Option: Without EDS)

– Slide the left-hand fork leg into the triple clamps and the steering damper clamp.

✓ The left-hand fork leg has a white adjuster; the right-hand fork leg has a red adjuster.

– Align the fork leg in the specified position by means of fork rings ❹.

Guideline

Upper triple clamp flush with 2nd ring of fork legs.

– Tighten screws ❼ of the lower triple clamp.

Guideline

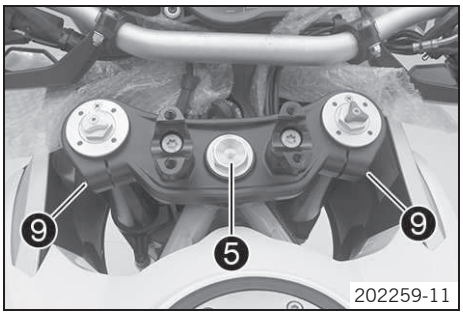
Screw, bottom triple clamp	M8	12 Nm (8.9 lbf ft)

– Repeat the procedure on the other fork leg.

– Mount and tighten screw ❽.

Guideline

Screw, steering damper	M8	20^{+5}_{0} Nm ($14.8^{+3.7}_{0}$ lbf ft)	**Loctite® 2701™**



– Tighten screw ❺.

Guideline

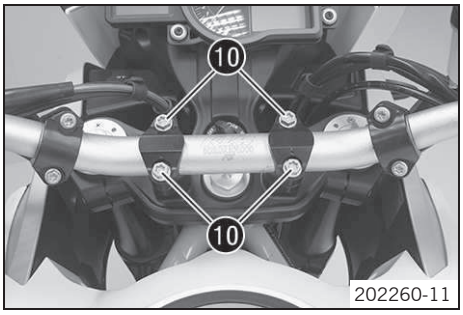
Screw, steering head, top	M22x1.5	50 Nm (36.9 lbf ft)

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

– Tighten screws ❾ of the upper triple clamp.

Guideline

Screw, top triple clamp	M8	15 Nm (11.1 lbf ft)

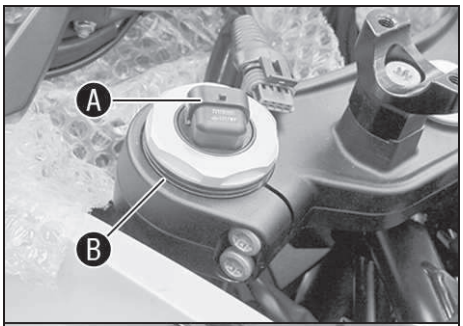


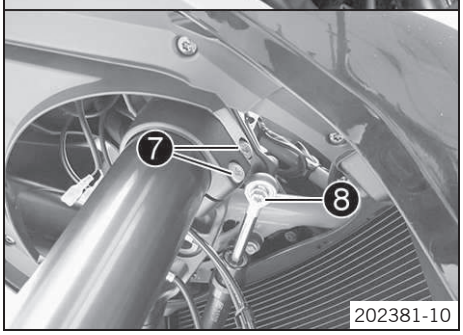
– Position the handlebar.

– Position the handlebar clamps. Mount and tighten screws ❿.

Guideline

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





(Option: With EDS)

– Slide the left-hand fork leg into the triple clamps and the steering damper clamp.

✓ The connector ❹ faces forward at an angle toward the center of the vehicle.

✓ The left-hand fork leg has a white color coding; the right-hand fork leg has a red color coding.

– Align the fork leg in the specified position by means of fork rings ❸.

Guideline

Upper triple clamp flush with 2nd ring of fork legs.

– Tighten screws ❼ of the lower triple clamp.

Guideline

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

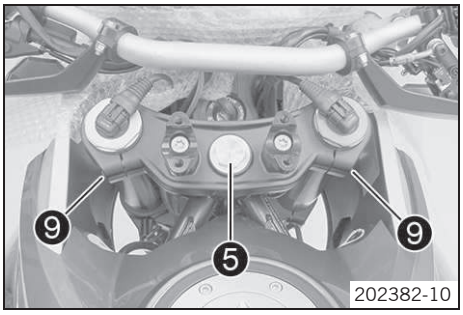
– Plug in connector.

– Repeat the procedure on the other fork leg.

– Mount and tighten screw ❽.

Guideline

Screw, steering damper	M8	20^{+5}_{0} Nm ($14.8^{+3.7}_{0}$ lbf ft)	**Loctite® 2701™**



– Tighten screw ❺.

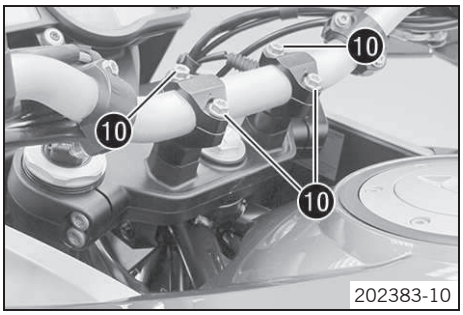
Guideline

Screw, steering head, top	M22x1.5	50 Nm (36.9 lbf ft)

– Using a plastic hammer, tap lightly on the upper triple clamp to avoid strains.
– Tighten screws ❾ of the upper triple clamp.

Guideline

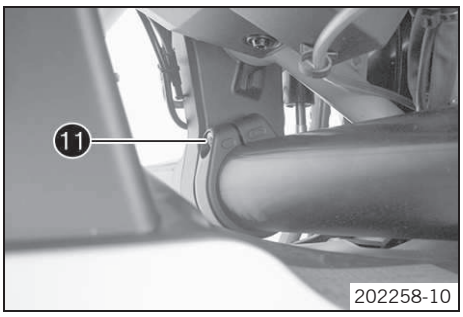
Screw, top triple clamp	M8	15 Nm (11.1 lbf ft)



– Position the handlebar.
– Position the handlebar clamps. Mount and tighten screws ❿.

Guideline

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



– Align the steering damper clamp to the lower triple clamp.
– Tighten screw ⓫.

Guideline

Screw, steering damper clamp	M8	12 Nm (8.9 lbf ft)

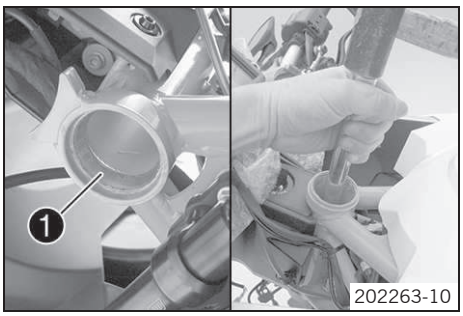
Finishing work

– Install the bottom triple clamp cover. (☛ p. 80)
– Install the front wheel. (☛ p. 85)
– Install the front fender. (☛ p. 80)
– Check the steering head bearing play. (☛ p. 17)

6.11 Changing the steering head bearing

Preparatory work
(Option: Center stand)

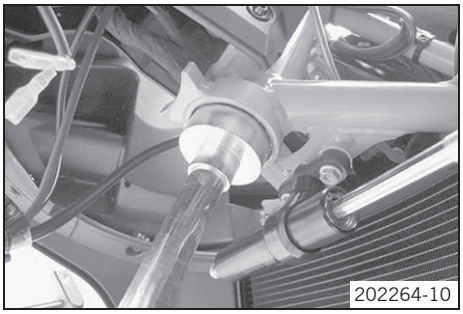
– Raise the vehicle with the center stand. (☛ p. 12)
– Clamp down the rear of the vehicle.
– Remove the front fender. (☛ p. 80)
– Remove the front wheel. (☛ p. 84)
– Remove the bottom triple clamp cover. (☛ p. 80)
– Remove the fork legs. (☛ p. 15)
– Remove the lower triple clamp. (☛ p. 19)



Main work

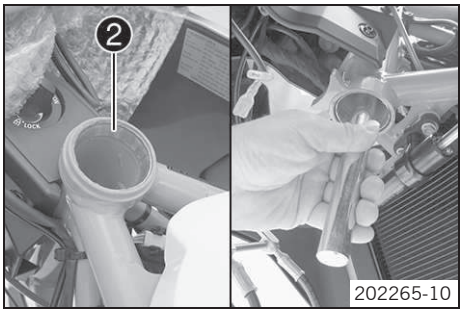
– Remove lower bearing ring ❶.

Tool bracket (58429089000) (☛ p. 271)
Press-out tool (58429092000) (☛ p. 272)



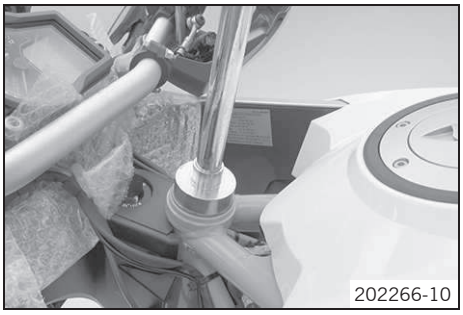
– Press in the new bearing ring as far as it will go.

Tool bracket (58429089000) (☛ p. 271)
Press-in tool (58429091000) (☛ p. 272)



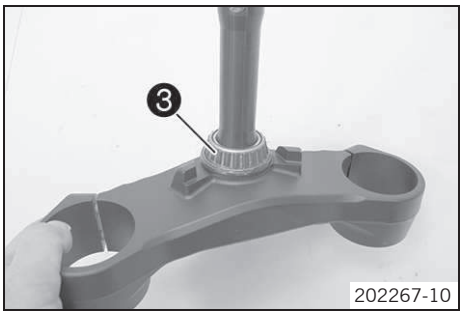
– Remove upper bearing ring ❷.

Tool bracket (58429089000) (☛ p. 271)
Press-out tool (58429092000) (☛ p. 272)



– Press in the new bearing ring as far as it will go.

Tool bracket (58429089000) (☛ p. 271)
Press-in tool (58429091000) (☛ p. 272)

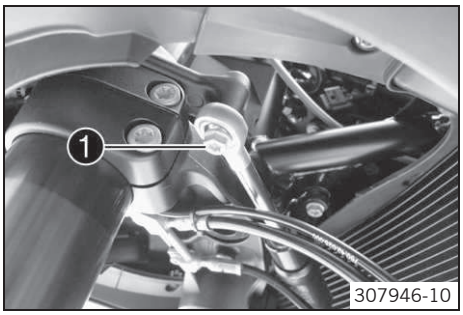


– Remove lower steering head bearing ❸.
– Press on the new bearing with a suitable tube as far as it will go.

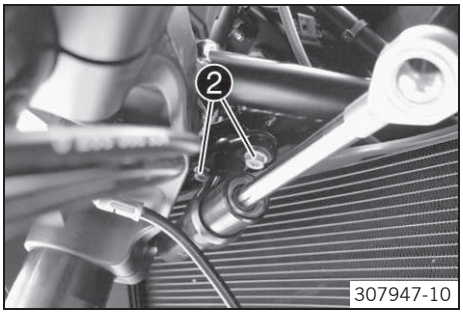
Info
Only press the bearing in via the inner ring.

6.12 Changing the steering damper

Preparatory work
– Remove the bottom triple clamp cover. (☛ p. 80)



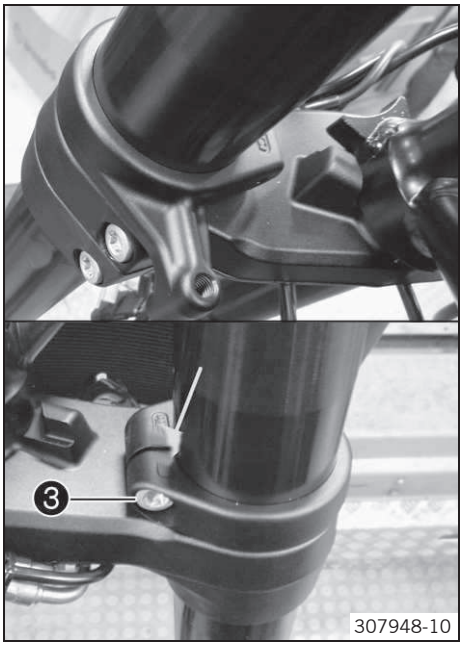
Main work
– Remove screw ❶.



– Remove screws ❷.
– Remove the steering damper.
– Position the new steering damper.
– Mount and tighten screws ❷.

Guideline

Screw, steering damper	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**



– Check that the clamp is seated correctly.

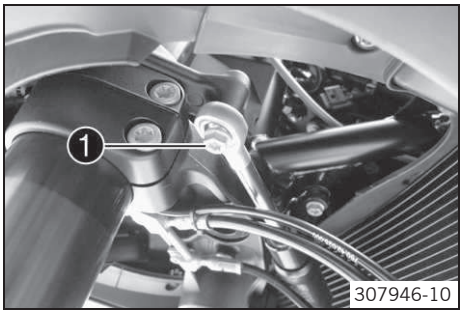
Info
For purposes of illustration, the following operations are shown with the headlight mask deinstalled.

The clamp is aligned with the contour of the lower triple clamp and lies on top of the lower triple clamp.

» If the clamp is not aligned with the contour of the lower triple clamp or does not lie on top of the lower triple clamp:
  – Loosen screw ❸ and the position clamp.
  – Mount and tighten screw ❸.

  Guideline

Screw, steering damper clamp	M8	12 Nm (8.9 lbf ft)



– Mount and tighten screw ❶.

Guideline

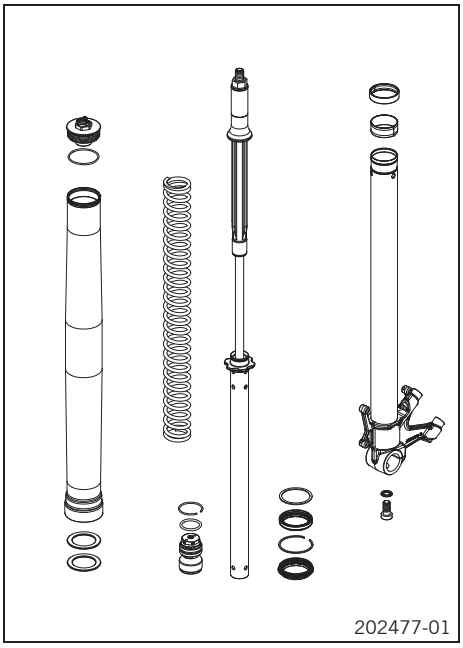
Screw, steering damper	M8	20^{+5}_{0} Nm ($14.8^{+3.7}_{0}$ lbf ft)	**Loctite® 2701™**

Finishing work
– Install the bottom triple clamp cover. (☛ p. 80)

6.13 Option: Without EDS

6.13.1 Performing a fork service

Condition
The fork legs have been removed.

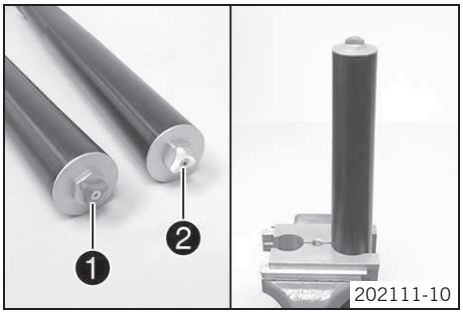


- Disassemble the fork legs. (☛ p. 25)
- Remove the spring. (☛ p. 27)
- Disassemble the fork legs. (☛ p. 27)
- Install the tap compression. (☛ p. 29)
- Check the fork legs. (☛ p. 27)
- Install the spring. (☛ p. 29)
- Assemble the fork legs. (☛ p. 29)

6.13.2 Disassembling the fork legs

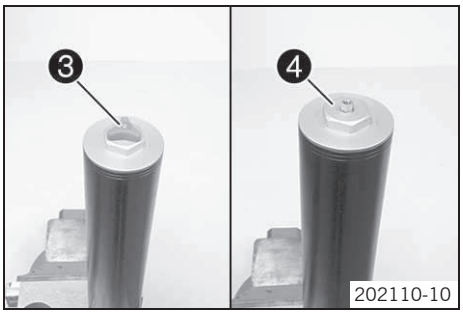
Info
These operations are the same on both fork legs.

Condition
The fork legs have been removed.



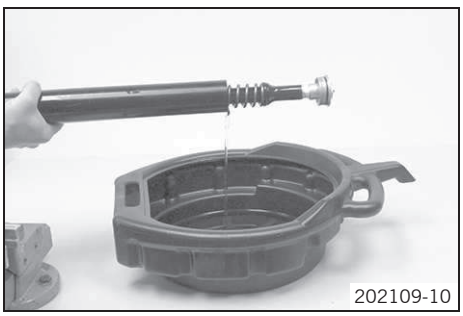
- Note down the current state of the rebound ❶ and compression damping ❷.
- Open the adjusters of the rebound and compression damping completely.
- Clamp the fork leg in the area of the lower triple clamp.

Clamping stand (T1403S) (☛ p. 281)

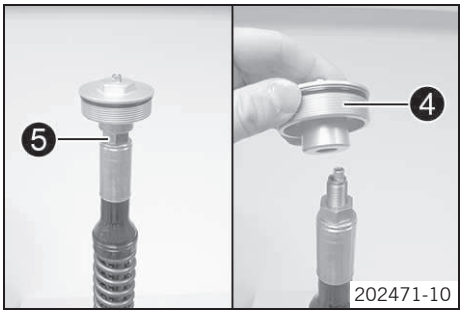


- Remove adjuster ❸.
- Release screw cap ❹.

Info
The screw cap cannot be removed yet.



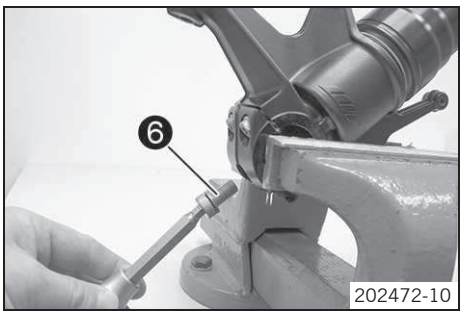
- Unclamp the fork.
- Drain the fork oil.



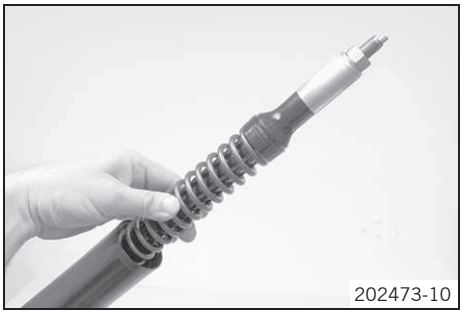
– Clamp the fork leg with the axle clamp.

Info
Use soft jaws.

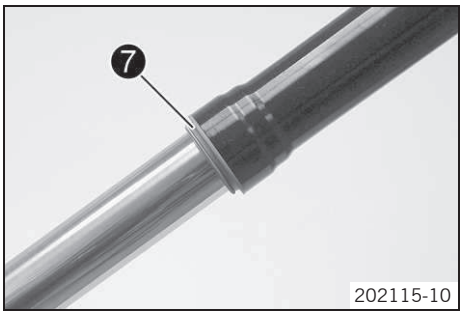
– Hold nut ❺ and remove screw cap ❹.



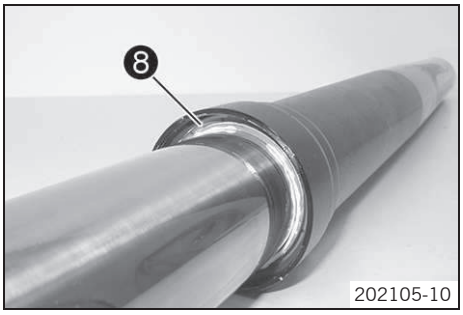
– Remove cartridge screw ❻ with the washer.



– Remove the cartridge.

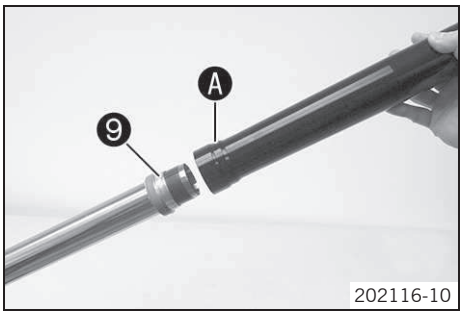


– Remove dust boot ❼.



– Remove lock ring ❽.

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

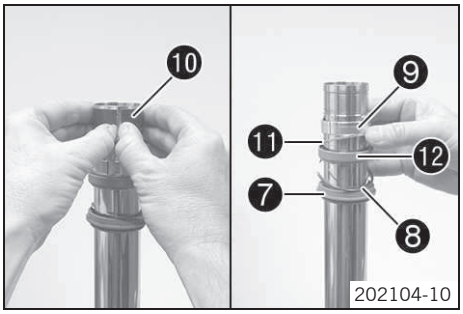


– Heat up the outer tube in area Ⓐ of the lower sliding bushings.
Guideline

50 °C (122 °F)

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

Info
The lower sliding bushing ❾ must be pulled from its bearing seat.



– Remove the upper sliding bushing ❿.

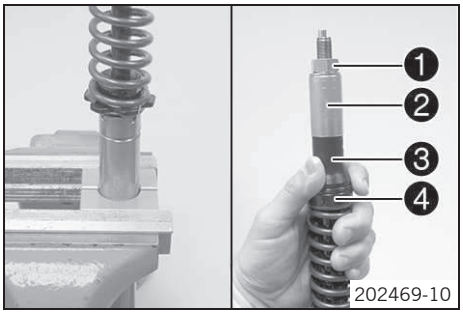
Info
Without using a tool, carefully pull the stack apart by hand.

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

6.13.3 Removing the spring

Info
These operations are the same on both fork legs.

Preparatory work
– Disassemble the fork legs. (☛ p. 25)



Main work
– Clamp the cartridge into a vise.

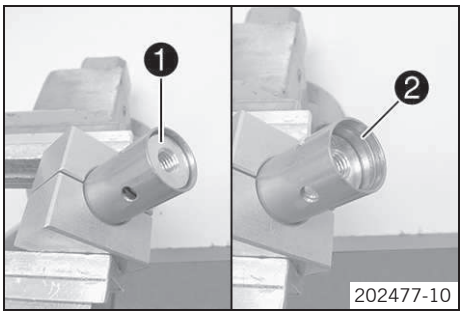
Clamping stand (T14015S) (☛ p. 281)

– Pull the spring down and remove nut ❶ with the washer.
– Remove sleeve ❷ and spring guide ❸ with preload spacer(s) ❹.
– Remove the spring. Unclamp the cartridge.

6.13.4 Removing the tap compression

Info
These operations are the same on both fork legs.

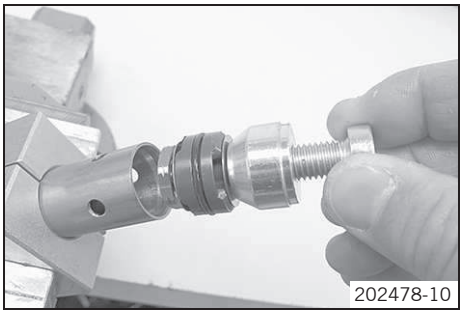
Condition
The spring has been removed.



– Clamp the cartridge in place.

Clamping stand (T14015S) (☛ p. 281)

– Slide tap compression ❶ into the cartridge.
– Remove lock ring ❷.

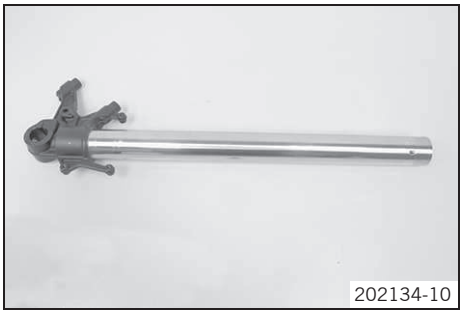


– Remove the tap compression.

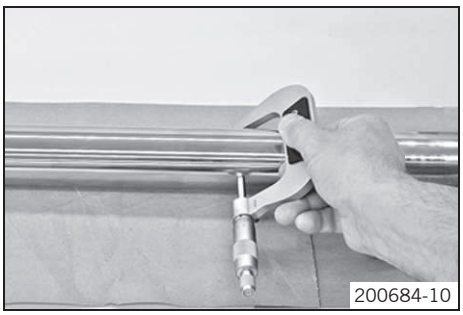
Info
Use a fitting screw.

6.13.5 Checking the fork legs

Condition
Fork disassembled.


202134-10

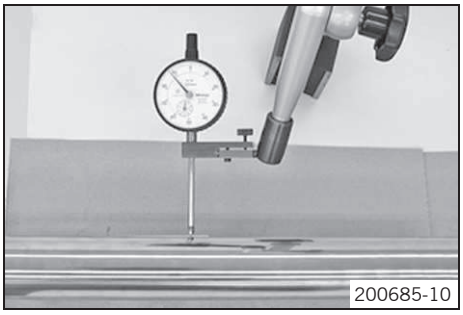
– Check the inner tube and axle clamp for damage.
  » If there is damage:
    – Change the inner tube.


200684-10

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

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

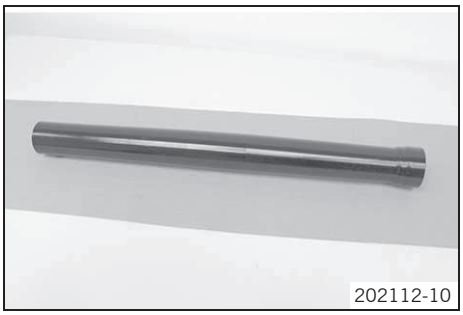
  » If the measured value is less than the specified value:
    – Change the inner tube.


200685-10

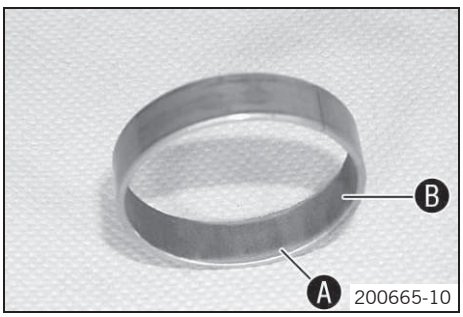
– Measure the run-out of the inner tube.

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

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

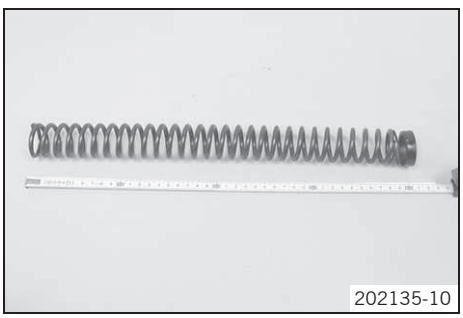

202112-10

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



200665-10

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


202135-10

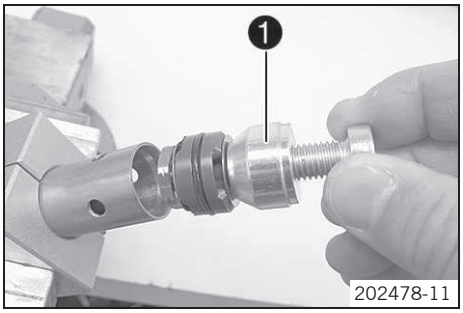
– Check the spring length.
  Guideline

Spring length with preload spacer(s)	393 mm (15.47 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.

6.13.6 Installing the tap compression

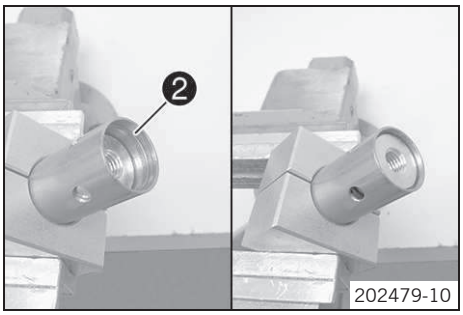
Info
These operations are the same on both fork legs.



– Clamp the cartridge into a vise.

Clamping stand (T14015S) (☛ p. 281)

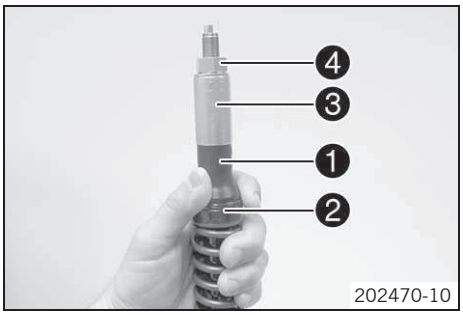
– Slide tap compression ❶ into the cartridge.



– Mount lock ring ❷.
– Pull out the tap compression all the way to the stop.

6.13.7 Installing the spring

Info
These operations are the same on both fork legs.



– Clamp the cartridge into a vise.

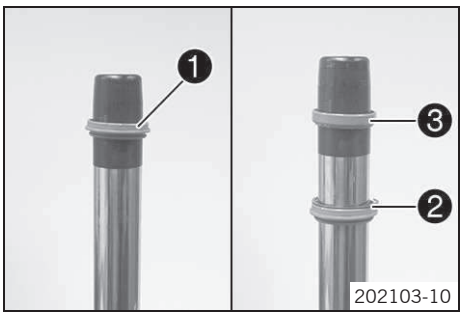
Clamping stand (T14015S) (☛ p. 281)

– Position the spring.
– Position spring guide ❶ with preload spacer(s) ❷.
– Position sleeve ❸.
– Pull the spring down and mount nut ❹ with the washer. Screw the nut all the way down.

6.13.8 Assembling the fork legs

Info
These operations are the same on both fork legs.

Preparatory work
– Check the fork legs. (☛ p. 27)
– Install the spring. (☛ p. 29)



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

Use soft jaws.

– Mount the special tool.

Protecting sleeve (T1401) (☛ p. 280)

– Grease and push on dust boot ❶.

Lubricant (T511) (☛ p. 268)

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

– Push on lock ring ❷.
– Grease and push on seal ring ❸.

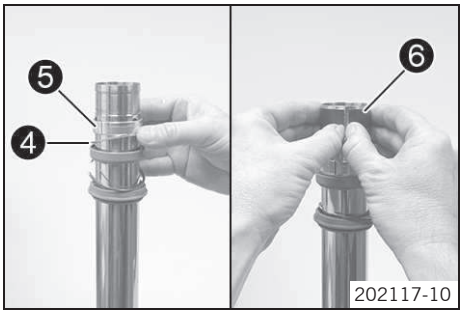
Lubricant (T511) (☛ p. 268)

Info
Sealing lip downward, open side upward.

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

Fork oil (SAE 4) (48601166S1) (☛ p. 267)

– Push on the lower sliding bushing ❺.
– Mount the upper sliding bushing ❻.



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

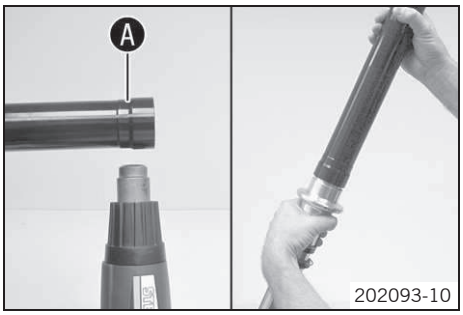
– Heat up the outer tube in area Ⓐ of the lower sliding bushings.
Guideline

50 °C (122 °F)

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

Mounting tool (T528S) (☛ p. 282)

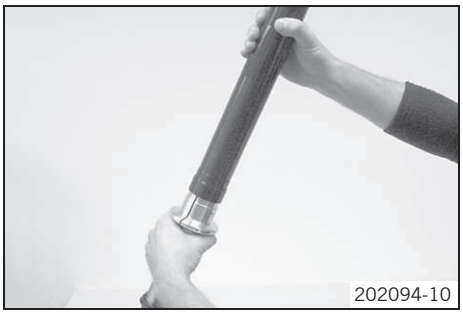
– Slide on the outer tube.
– Push the sliding bushing all the way into the outer tube.



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

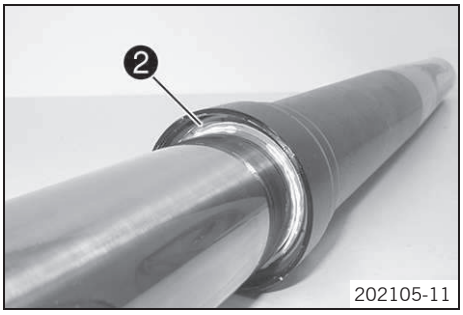
Mounting tool (T528S) (☛ p. 282)

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

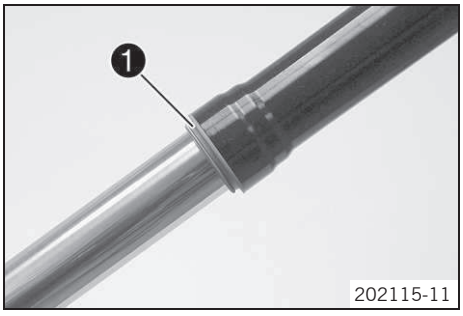


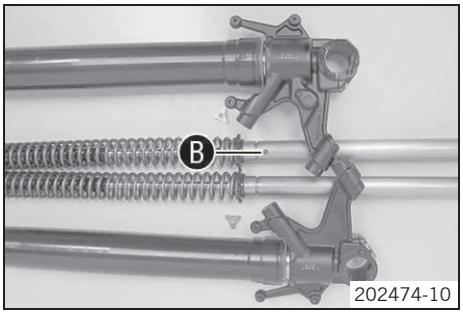
– Mount lock ring ❷.

Info
The lock ring must engage audibly.



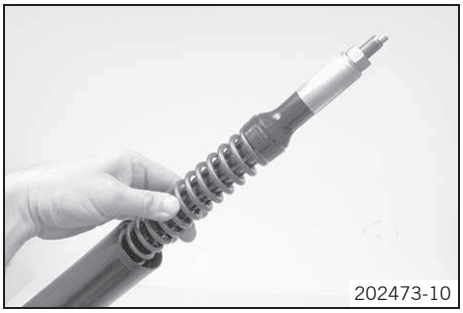
– Mount dust boot ❶.



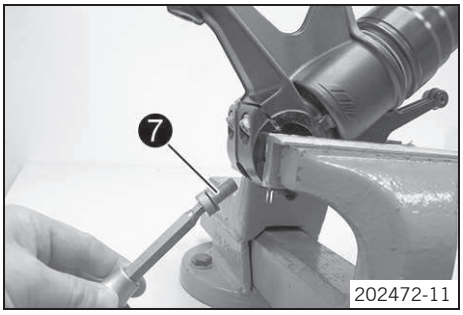


– Assemble related individual components accordingly.

Info
Compression damping side: cartridge with additional oil holes ❽, white adjuster, axle clamp marked **L**.
Rebound damping side: cartridge without additional oil holes, red adjuster, axle clamp marked **R**.



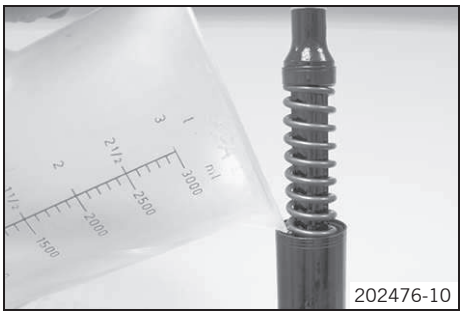
– Slide the cartridge into the inner tube.



– Mount cartridge screw ❼ with the washer and tighten.

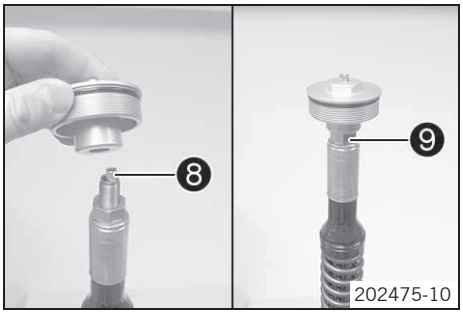
Guideline

Screw, cartridge	M12x1	25 Nm (18.4 lbf ft)

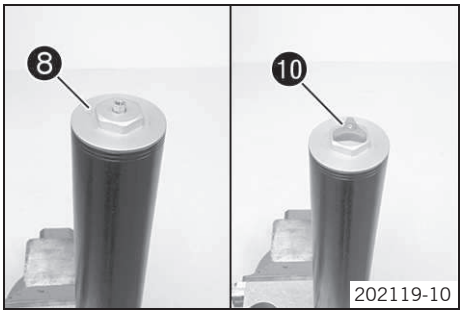


– Clamp the fork vertically.
– Add fork oil.

Fork oil per fork leg	675 ml (22.82 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 267)



– Screw on screw cap ❽ all the way.
– Hold the screw cap and tighten nut ❾.



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

Clamping stand (T612S) (☛ p. 282)

– Lubricate the O-ring of the screw cap.

Lubricant (T158) (☛ p. 269)

– Screw on screw cap ❽ and tighten.

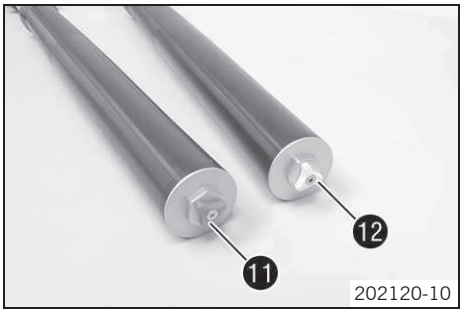
Guideline

Screw cover on outer tube	M47x1.5	40 Nm (29.5 lbf ft)

– Mount adjuster ⓾. Tighten the screw.

Guideline

Adapter	M4x0.5	1.5 Nm (1.11 lbf ft)



Alternative 1

– Turn the adjusting screw of rebound damping ⓫ and the adjusting screw of compression damping ⓬ clockwise as far as possible.

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

Guideline

Rebound damping	
Comfort	17 clicks
Standard	12 clicks
Sport	7 clicks
Full payload	7 clicks
Compression damping	
Comfort	17 clicks
Standard	12 clicks
Sport	7 clicks
Full payload	7 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.

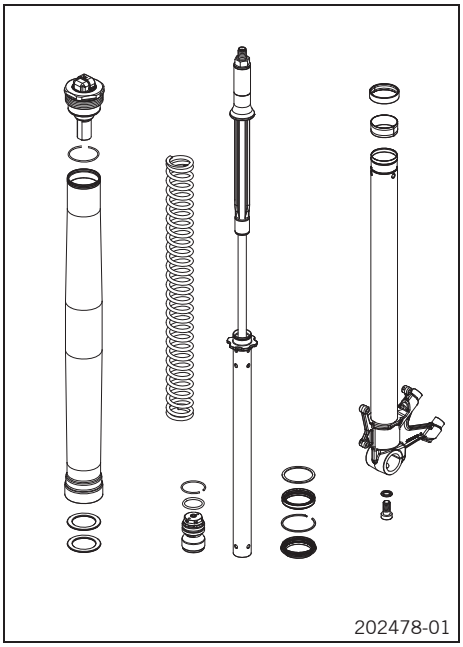
– Only make adjustments within the recommended range.

– After making adjustments, ride slowly at first to get the feel of the new ride behavior.

– Return the adjusting screws to the position determined when the unit was disassembled.

6.14 Option: With EDS

6.14.1 Performing a fork service



Condition

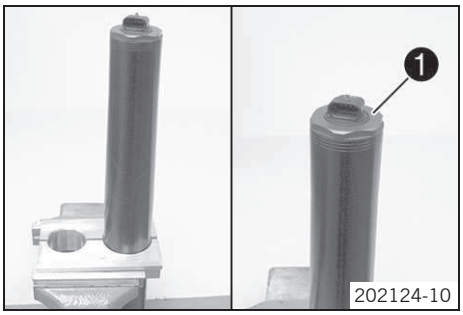
The fork legs have been removed.

– Disassemble the fork legs. (☛ p. 33)
– Remove the spring. (☛ p. 34)
– Disassemble the fork legs. (☛ p. 35)
– Install the tap compression. (☛ p. 36)
– Check the fork legs. (☛ p. 35)
– Install the spring. (☛ p. 36)
– Assemble the fork legs. (☛ p. 37)

6.14.2 Disassembling the fork legs

Info
These operations are the same on both fork legs.

Condition
The fork legs have been removed.



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

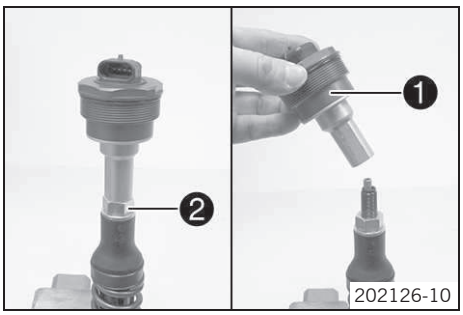
Clamping stand (T1403S) (☛ p. 281)

– Release screw cap ❶.

Ring wrench (T14017) (☛ p. 281)

Info
The screw cap cannot be removed yet.

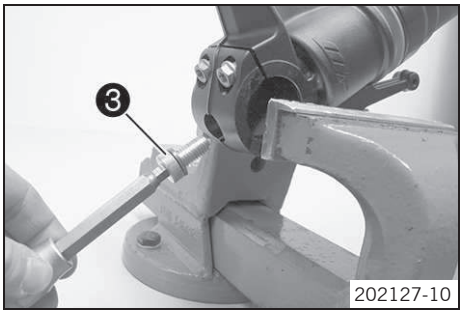
– Unclamp the fork.
– Drain the fork oil.



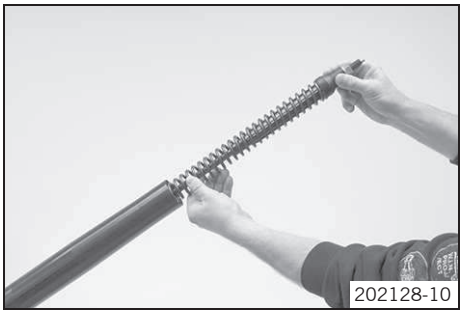
– Clamp the fork leg with the axle clamp.
Guideline

Use soft jaws.

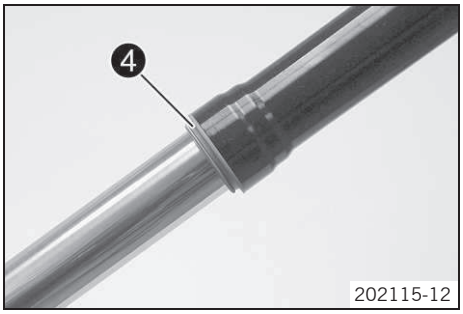
– Hold nut ❷ and remove screw cap ❶.



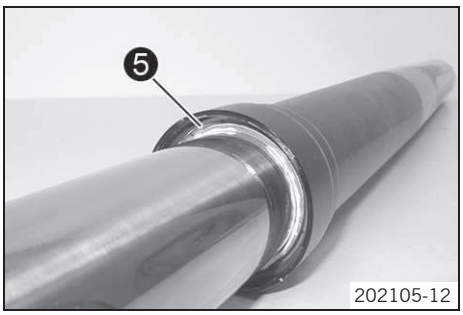
– Remove cartridge screw ❸ with the washer.



– Remove the cartridge.

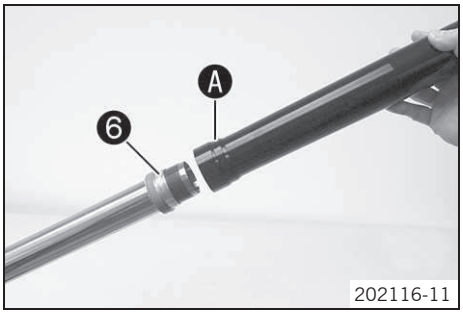


– Remove dust boot ❹.



– Remove lock ring ❺.

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

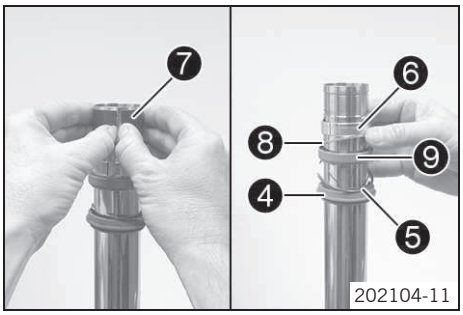


– Heat up the outer tube in area Ⓐ of the lower sliding bushings.
Guideline

50 °C (122 °F)

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

Info
The lower sliding bushing ❻ must be pulled from its bearing seat.



– Remove the upper sliding bushing ❼.

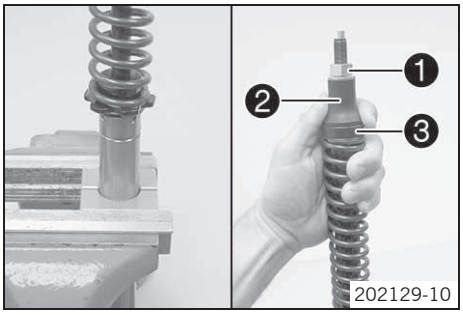
Info
Without using a tool, carefully pull the stack apart by hand.

– Take off the lower sliding bushing ❻.
– Take off support ring ❽.
– Take off seal ring ❾.
– Take off lock ring ❺.
– Take off dust boot ❹.
– Unclamp the fork leg.

6.14.3 Removing the spring

Info
These operations are the same on both fork legs.

Preparatory work
– Disassemble the fork legs. (☛ p. 33)



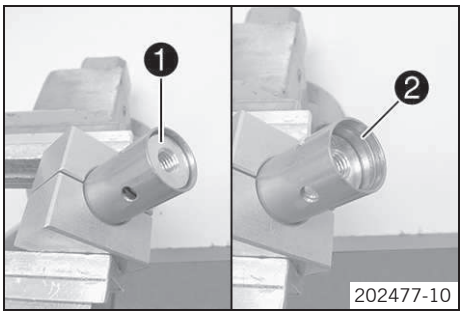
Main work
– Clamp the cartridge into a vise.

Clamping stand (T14015S) (☛ p. 281)

– Pull the spring down and remove nut ❶ with the washer.
– Remove spring guide ❷ with preload spacer ❸.
– Remove the spring. Unclamp the cartridge.

6.14.4 Removing the tap compression

Info
These operations are the same on both fork legs.

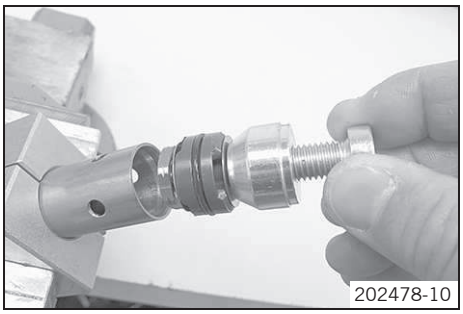


Condition
The spring has been removed.

– Clamp the cartridge in place.

Clamping stand (T14015S) (☛ p. 281)

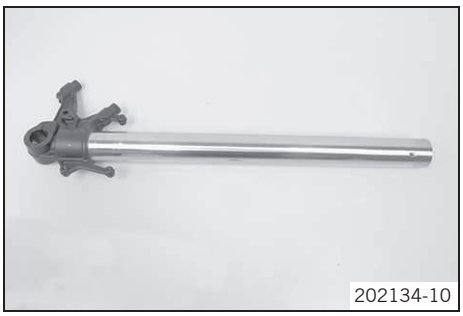
– Slide tap compression ❶ into the cartridge.
– Remove lock ring ❷.



– Remove the tap compression.

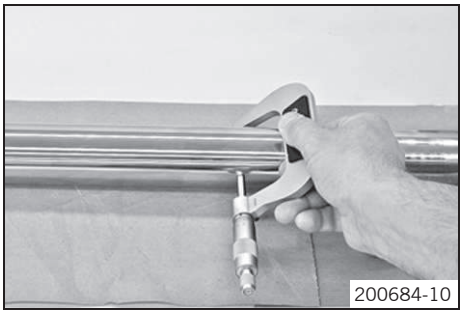
Info
Use a fitting screw.

6.14.5 Checking the fork legs



Condition
Fork disassembled.

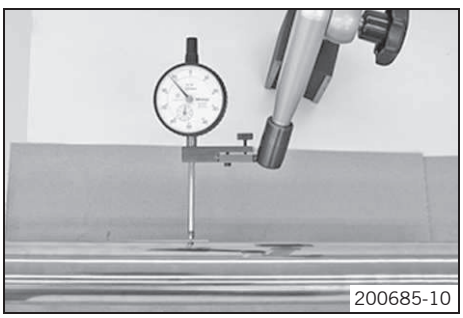
– Check the inner tube and axle clamp for damage.
  » If there is damage:
    – Change the inner tube.



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

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

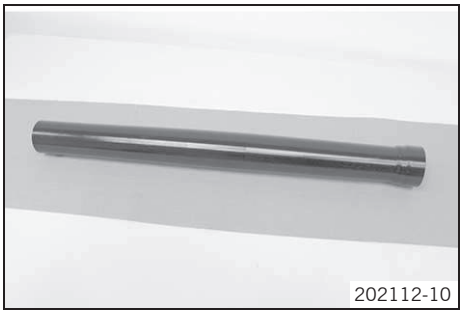
  » If the measured value is less than the specified value:
    – Change the inner tube.



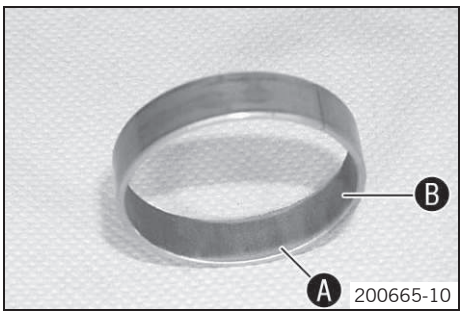
– Measure the run-out of the inner tube.

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

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

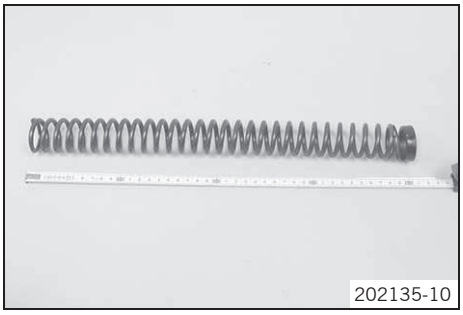

202112-10

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



200665-10

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


202135-10

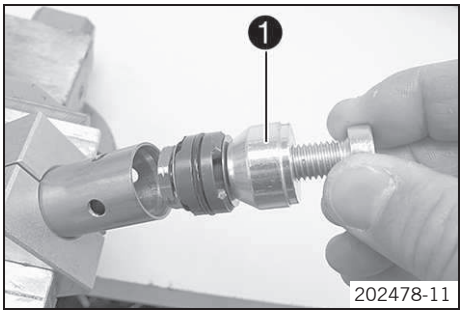
– Check the spring length.
  Guideline

Spring length with preload spacer(s)	393 mm (15.47 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.

6.14.6 Installing the tap compression

Info
These operations are the same on both fork legs.

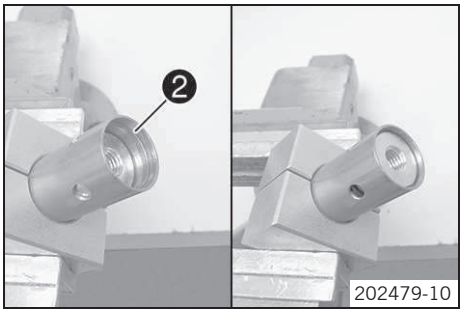


202478-11

– Clamp the cartridge into a vise.

Clamping stand (T14015S) (☛ p. 281)

– Slide tap compression ❶ into the cartridge.

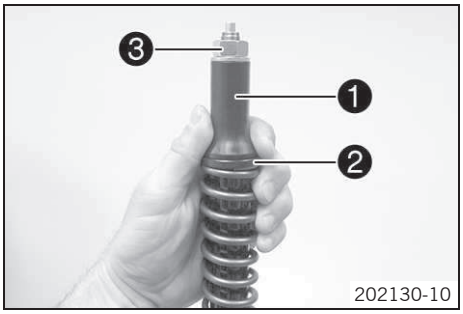


202479-10

– Mount lock ring ❷.
– Pull out the tap compression all the way to the stop.

6.14.7 Installing the spring

Info
These operations are the same on both fork legs.



– Clamp the cartridge into a vise.

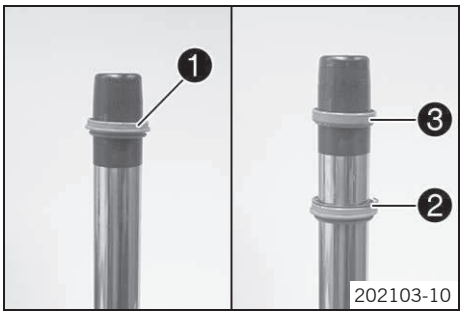
Clamping stand (T14015S) (☛ p. 281)

– Position the spring.
– Position spring guide ❶ with preload spacer ❷.
– Pull the spring down and mount nut ❸ with the washer. Screw the nut all the way down.

6.14.8 Assembling the fork legs

Info
These operations are the same on both fork legs.

Preparatory work
– Check the fork legs. (☛ p. 35)
– Install the spring. (☛ p. 36)



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

Use soft jaws.

– Mount the special tool.

Protecting sleeve (T1401) (☛ p. 280)

– Grease and push on dust boot ❶.

Lubricant (T511) (☛ p. 268)

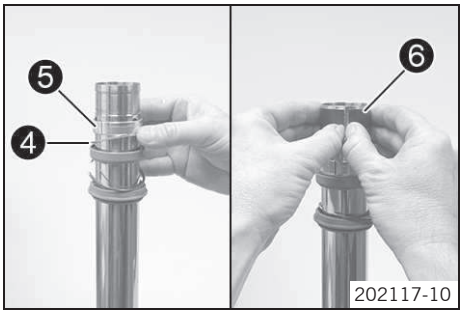
Info
Always change the dust boot, seal ring, lock ring, and support ring.
Mount the sealing lip with the spring expander facing down.

– Push on lock ring ❷.
– Grease and push on seal ring ❸.

Lubricant (T511) (☛ p. 268)

Info
Sealing lip downward, open side upward.

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

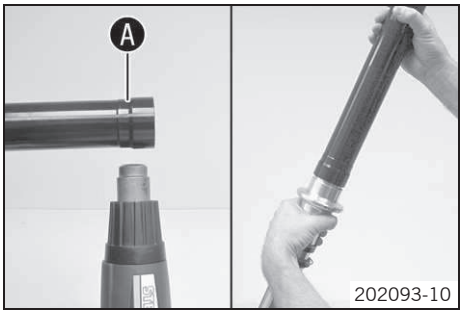


– Sand the edges of the sliding bushings with 600-grain sandpaper, then clean and grease them.

Fork oil (SAE 4) (48601166S1) (☛ p. 267)

– Push on the lower sliding bushing ❺.
– Mount the upper sliding bushing ❻.

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



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

50 °C (122 °F)

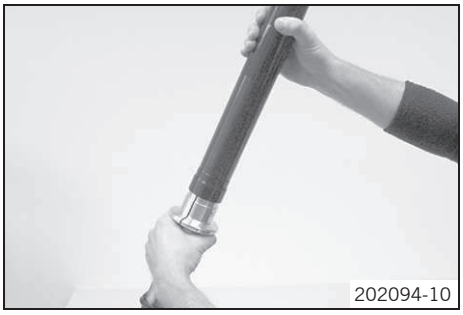
– Hold the lower sliding bushing with the longer side of the special tool.

Mounting tool (T14040S) (☛ p. 281)

– Slide on the outer tube.
– Push the sliding bushing all the way into the outer tube.
– Position the support ring.
– Hold the seal ring with the shorter side of the special tool.

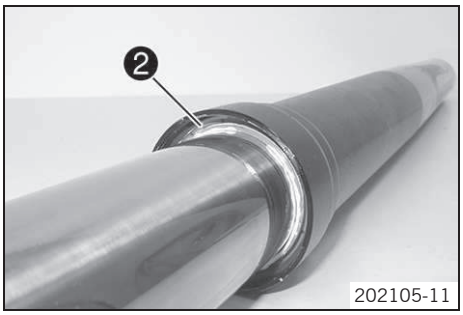
Mounting tool (T14040S) (☛ p. 281)

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


202094-10

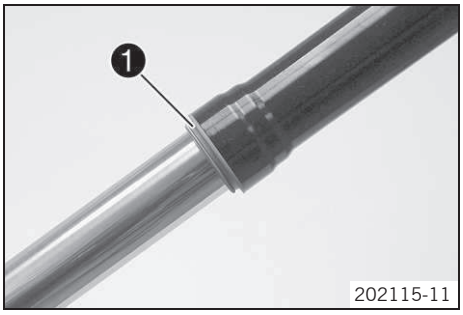
– Mount lock ring ❷.

Info
The lock ring must engage audibly.



202105-11

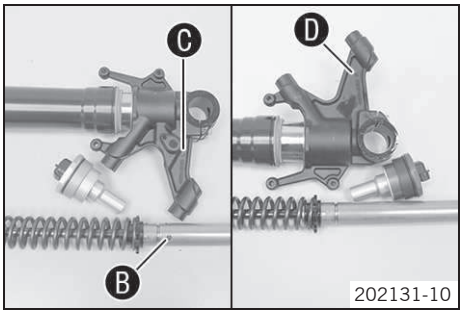
– Mount dust boot ❶.



202115-11

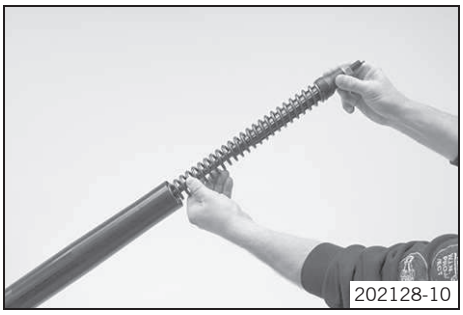
– Assemble related individual components accordingly.

Info
Compression side (left fork leg): cartridge with additional oil holes ❽, white screw cap and adjusting needle, axle clamp with marking **L** ❸.
Rebound side (right fork leg): cartridge without additional oil holes, red screw cap and adjusting needle, axle clamp with marking **R** ❹.



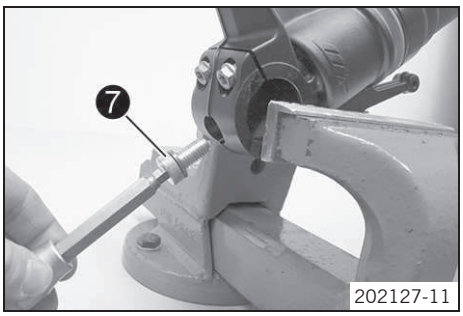
202131-10

– Slide the cartridge into the inner tube.


202128-10

– Mount the cartridge screw ❼ with the washer and tighten.
Guideline

Screw, cartridge	M12x1	25 Nm (18.4 lbf ft)

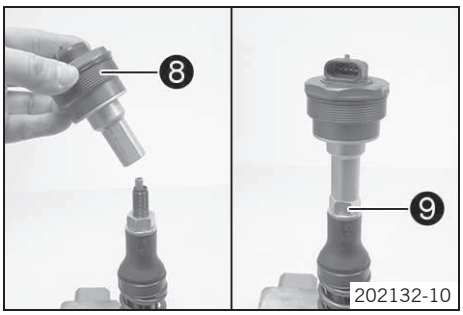


202127-11


202121-10

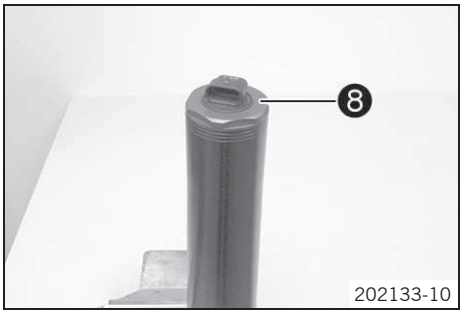
– Clamp the fork vertically.
– Add fork oil.

Fork oil per fork leg	675 ml (22.82 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 267)



202132-10

– Screw on screw cap ❽ all the way.
– Hold the screw cap and tighten nut ❾.



202133-10

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

Clamping stand (T1403S) (☛ p. 281)

– Lubricate the O-ring of the screw cap.

Lubricant (T158) (☛ p. 269)

– Screw on screw cap ❽ and tighten.
Guideline

Screw cover on outer tube	M47x1.5	40 Nm (29.5 lbf ft)

7.1 Adjusting the basic setting of the clutch lever

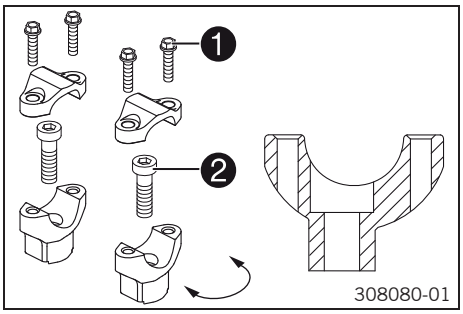
– Adjust the basic setting of the clutch lever to your hand size by turning adjusting screw ❶.

Info
Turn the adjusting screw clockwise to increase the distance between the clutch lever and the handlebar.
Turn the adjusting screw counterclockwise to decrease 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!

7.2 Adjusting the handlebar position

Warning
Danger of accidents Handlebar breakage.

– If the handlebar is bent or straightened it will cause material fatigue, and the handlebar can break. Always replace handlebar.



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

Info
Protect the motorcycle and its attachments 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.

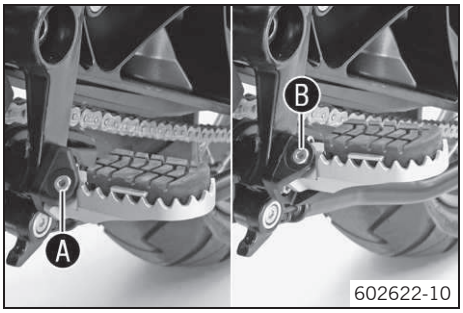
Info
Make sure cables and wiring are positioned correctly.

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

Guideline

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

8.1 Rider footrests



The rider footrests can be mounted in one of two positions.

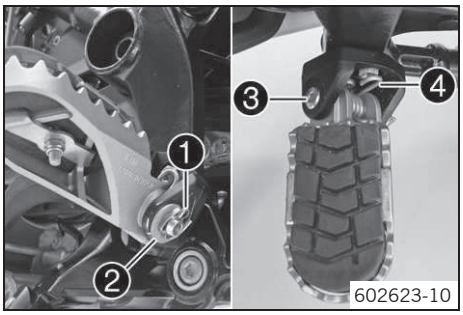
Possible states

- Rider footrests, low ❹
- Rider footrests, high ❺

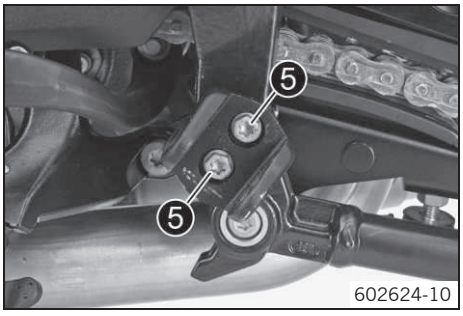
8.2 Adjusting the footrests

Info

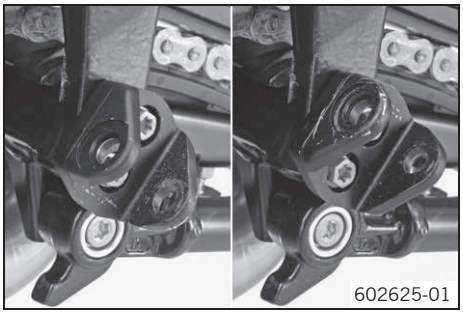
The operations are the same for the left and right sides.



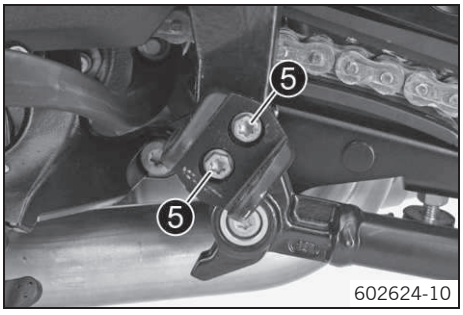
– Remove cotter pin ❶ with washer ❷.
– Remove pin ❸ of the rider footrest.
– Take off the rider footrest ❹ with the spring.



– Remove screws ❺.



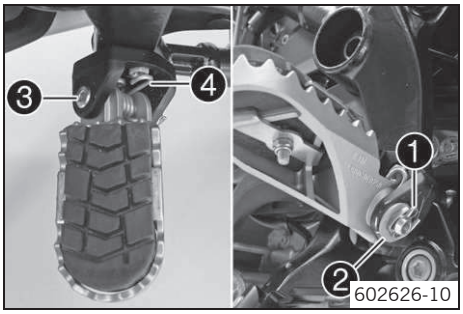
– Adjust the footrest bracket to the desired position.



– Mount and tighten screws ❺.

Guideline

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

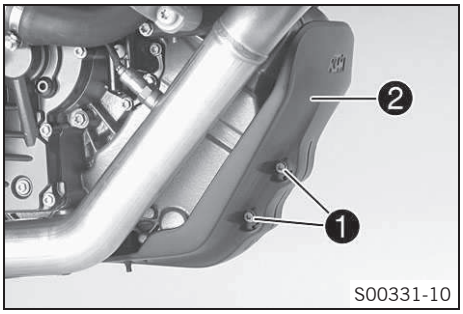


– Mount the rider footrest with spring ❹ and pin ❸.

Pliers for footrest spring (58429083000) (☛ p. 271)

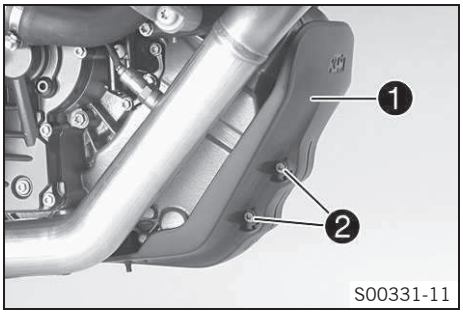
– Mount washer ❷ and cotter pin ❶.

8.3 Removing the engine guard



– Remove screws ❶ and engine guard ❷.

8.4 Installing the engine guard



– Position engine guard ❶. Mount and tighten screws ❷.

Guideline

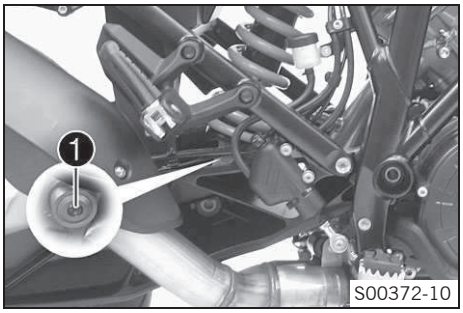
Screw, engine guard	M6	10 Nm (7.4 lbf ft)

9.1 Adjusting the rebound damping of the shock absorber (Option: Without EDS)

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	
Comfort	17 clicks
Standard	12 clicks
Sport	7 clicks
Full payload	7 clicks

Info

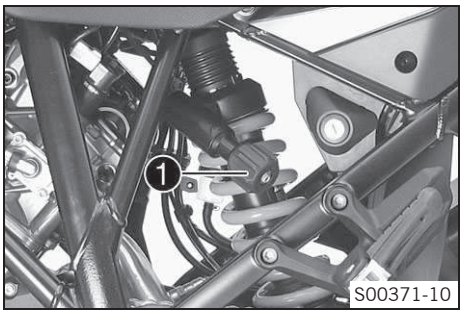
Turn clockwise to increase damping; turn counterclockwise to reduce damping.

9.2 Adjusting the spring preload of the shock absorber (Option: Without EDS)

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 handwheel ❶ counterclockwise as far as it will go.
– Turn it clockwise by the number of turns corresponding to the shock absorber type and use.

Guideline

Spring preload	
Comfort	4 turns
Standard	4 turns
Sport	4 turns
Full payload	12 turns

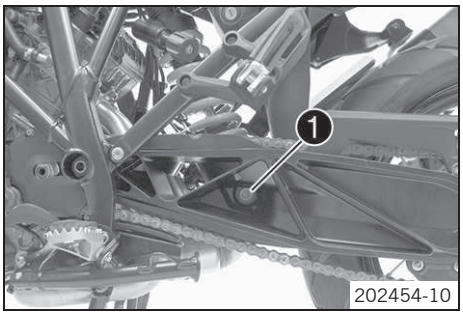
Info

Turn clockwise to increase the spring preload; turn counterclockwise to reduce the spring preload.

9.3 Removing the shock absorber

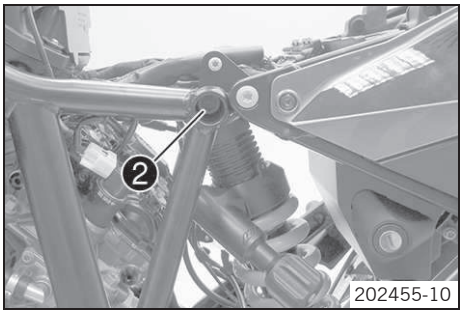
Preparatory work
(Option: Center stand)

– Raise the vehicle with the center stand. (☛ p. 12)
– Remove the passenger seat. (☛ p. 62)
– Remove the driver's seat. (☛ p. 62)

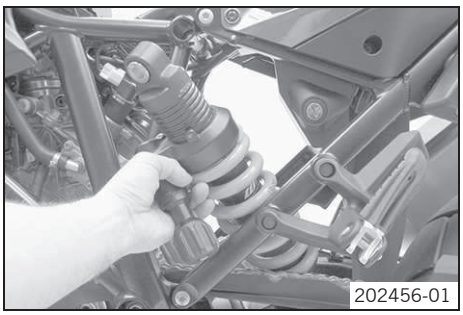


Main work
(Option: Without EDS)

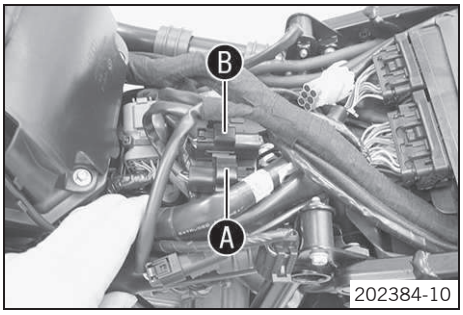
– Remove screw ❶.
– Lower the swingarm.



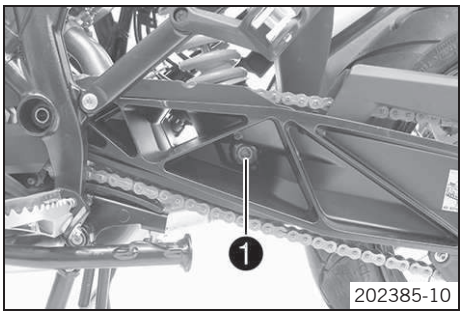
– Remove screw ❷.
– Lower the shock absorber.



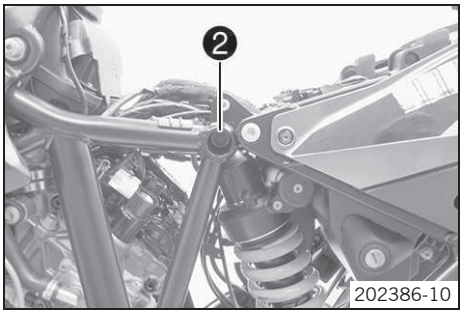
– Remove the shock absorber.



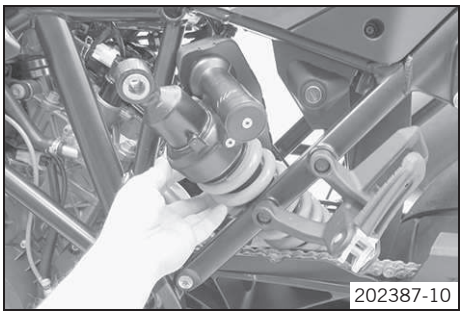
(Option: With EDS)
– Disconnect connectors Ⓐ and Ⓑ.
– Slip out the wiring harnesses.



– Remove screw ❶.
– Lower the swingarm.

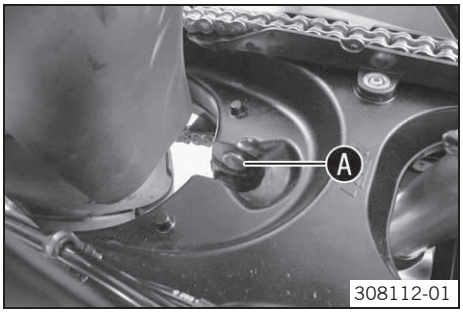


– Remove screw ❷.
– Lower the shock absorber.



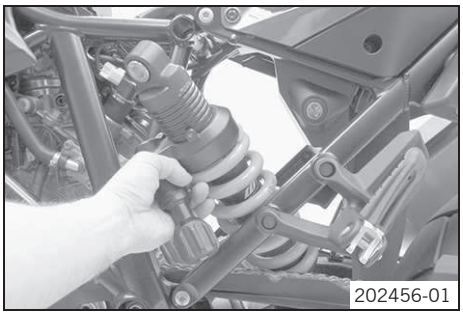
– Remove the shock absorber.

9.4 Installing the shock absorber



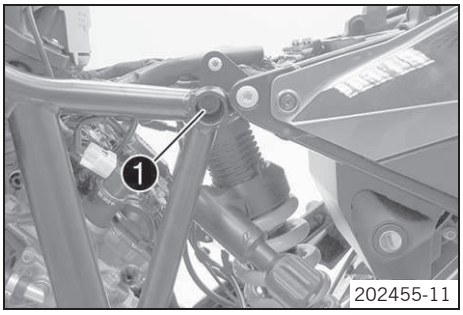
Main work

– Tap bushing ❹ gently back into the swingarm.



(Option: Without EDS)

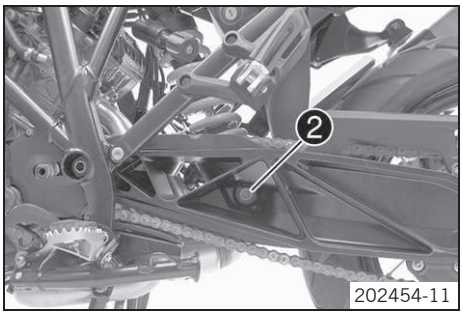
– Position the shock absorber.



– Mount and tighten screw ❶.

Guideline

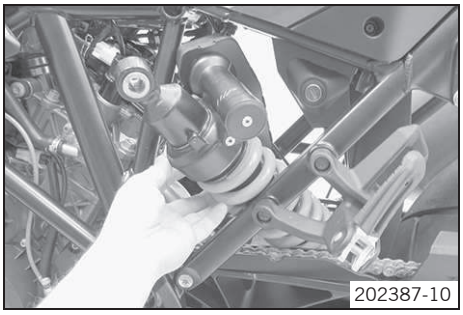
Screw, top shock absorber	M14x1.5	80 Nm (59 lbf ft)	Thread greased



– Lift the swingarm and position the shock absorber.
– Mount and tighten screw ❷.

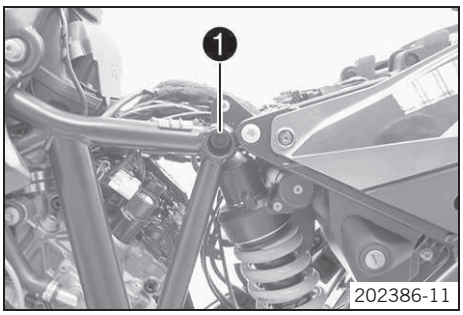
Guideline

Screw, bottom shock absorber	M14x1.5	80 Nm (59 lbf ft)	Thread greased



(Option: With EDS)

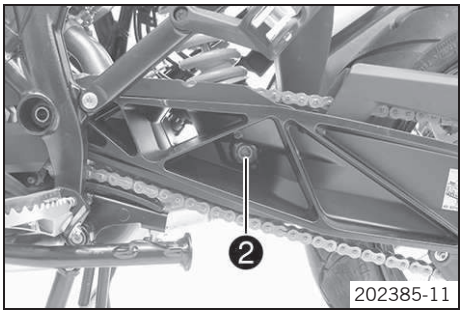
– Position the shock absorber.



– Mount and tighten screw ❶.

Guideline

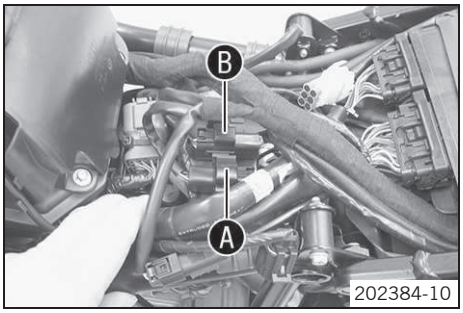
Screw, top shock absorber	M14x1.5	80 Nm (59 lbf ft)	Thread greased



– Lift the swingarm and position the shock absorber.
– Mount and tighten screw ❷.

Guideline

Screw, bottom shock absorber	M14x1.5	80 Nm (59 lbf ft)	Thread greased



– Position the wiring harnesses.
– Plug in connectors Ⓐ and Ⓑ. Position the connectors in the holder.

Finishing work

– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)

(Option: Center stand)

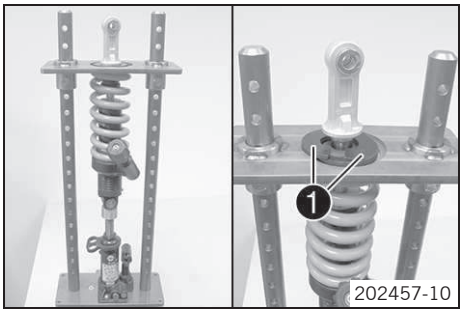
– Remove the vehicle from the center stand. (☛ p. 12)

9.5 Option: Without EDS

9.5.1 Removing the spring

Condition

The shock absorber has been removed.

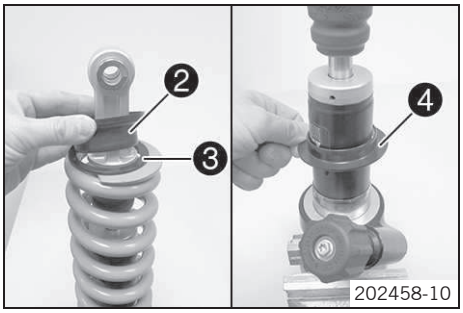


– Clamp the shock absorber in the special tool.

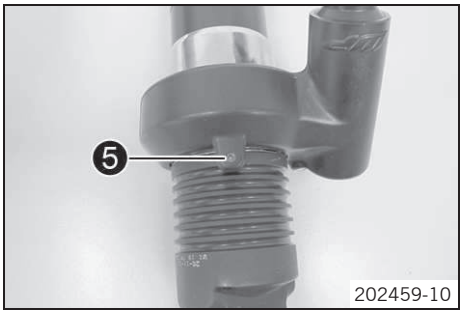
Spring compressor (T14050S) (☛ p. 282)

Info
Use a fitting washer of the special tool as a spring pad.

– Compress the spring. Remove half washers ❶.

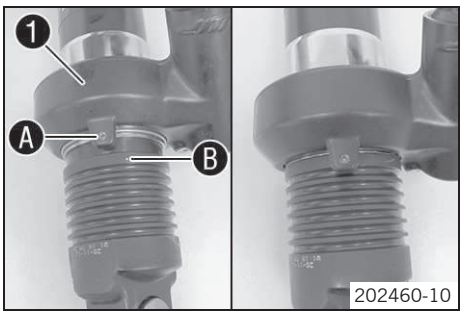


– Release the spring. Unclamp the shock absorber.
– Remove spring retainer ❷ with washer ❸ and spring.
– Remove washer ❹.



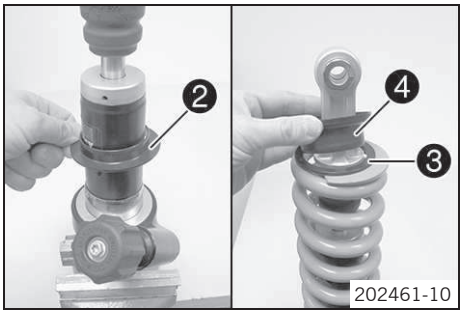
– Loosen screw ❺.
– Remove **WP** sticker.
– Remove **Preload-Adjuster**.

9.5.2 Installing the spring

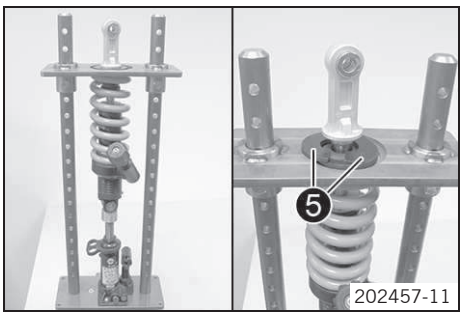


– Mount **Preload-Adjuster** ❶.
  ✓ Screw Ⓐ is aligned with screw mark Ⓑ.
– Tighten the screw.
  Guideline

Screw **Preload Adjuster**	M4	1 Nm (0.7 lbf ft)



– Mount washer ❷.
– Position spring, washer ❸, and spring retainer ❹.



– Clamp the shock absorber in the special tool.

Spring compressor (T14050S) (☛ p. 282)

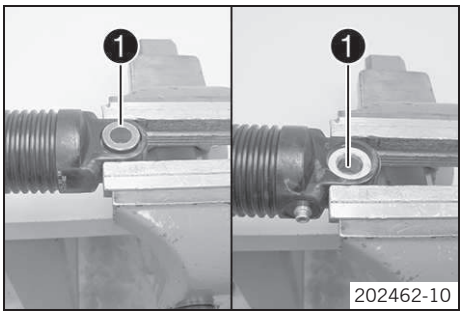
Info
Use a fitting washer of the special tool as a spring pad.

– Compress the spring. Mount half washers ❺.
– Release the spring. Unclamp the shock absorber.

9.5.3 Removing the heim joint

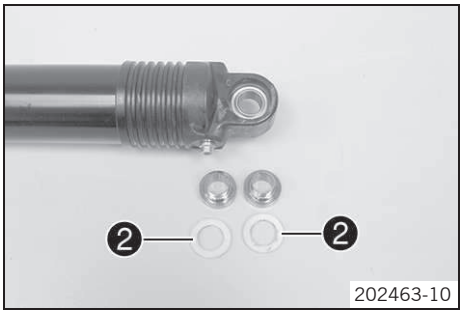
Info
The operations are the same for the top and bottom heim joints.

Condition
The shock absorber has been removed.

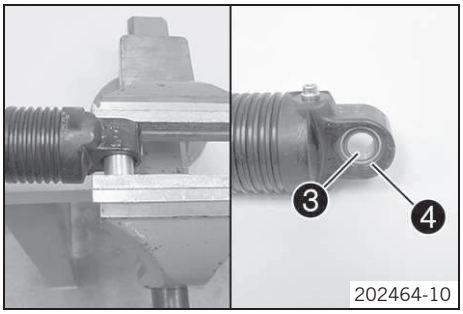


– Clamp the shock absorber into the vise with soft jaws.
– Remove both collar bushings ❶ of the heim joint with a drift.

Pin (T120) (☛ p. 280)



– Remove seal rings ❷ on both sides.

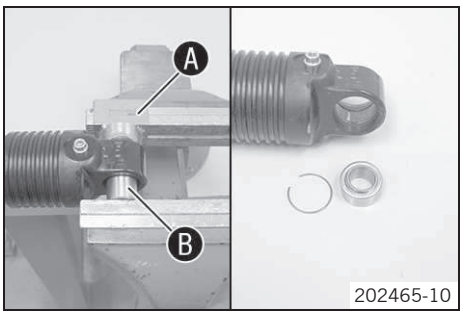


– Press heim joint ❸ to the side.

Pressing tool (T1207S) (☛ p. 280)

✓ The heim joint rests against a lock ring.

– Remove the other lock ring ❹.

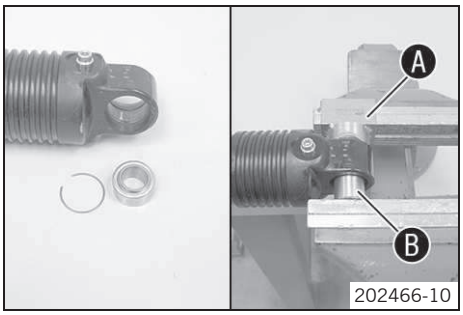


– Place special tool Ⓐ underneath and press out the heim joint with special tool Ⓑ.

Pressing tool (T1207S) (☛ p. 280)

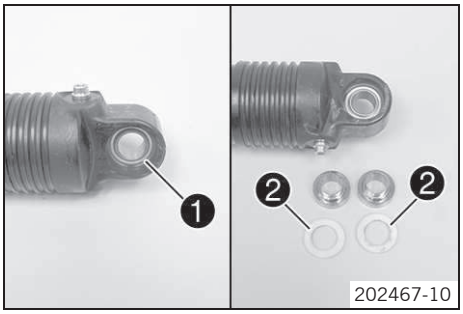
9.5.4 Installing the heim joint

Info
The operations are the same for the top and bottom heim joints.



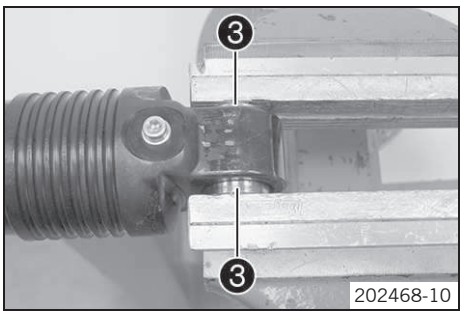
– Place special tool Ⓐ underneath and press out the heim joint up to the lock ring with special tool Ⓑ.

Pressing tool (T1207S) (☛ p. 280)



– Mount a second lock ring ❶.
– Mount seal rings ❷ on both sides and grease.

Lubricant (T158) (☛ p. 269)

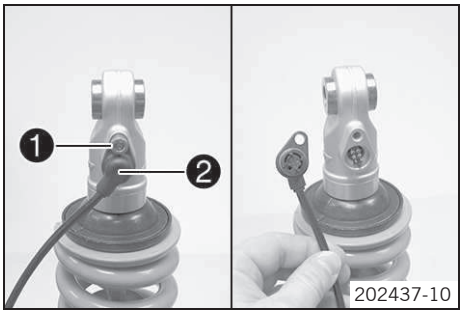


– Press in both collar bushings ❸ of the heim joint.

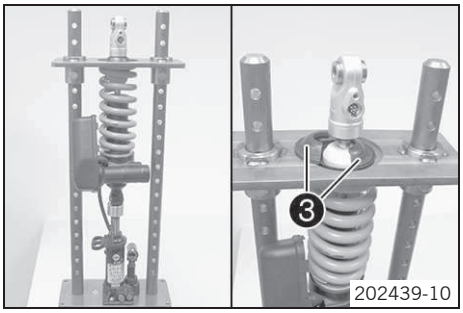
9.6 Option: With EDS

9.6.1 Removing the spring

Condition
The shock absorber has been removed.



– Remove screw ❶. Remove rebound adjuster cable ❷.

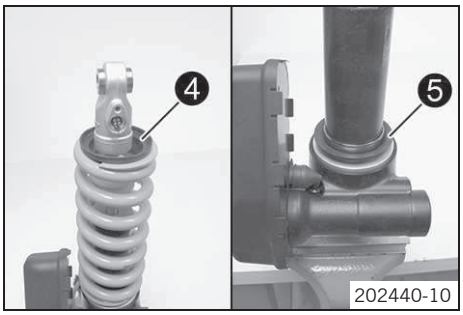


– Clamp the shock absorber in the special tool.

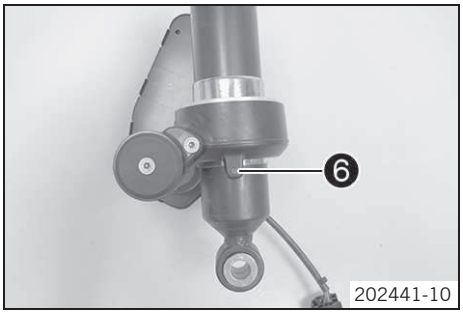
Spring compressor (T14050S) (☛ p. 282)

Info
Use a fitting washer of the special tool as a spring pad.

– Compress the spring. Remove half washers ❸.

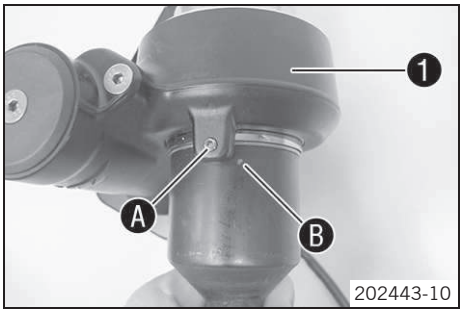


– Release the spring. Unclamp the shock absorber.
– Remove spring retainer ❹ and the spring.
– Remove washer ❺.



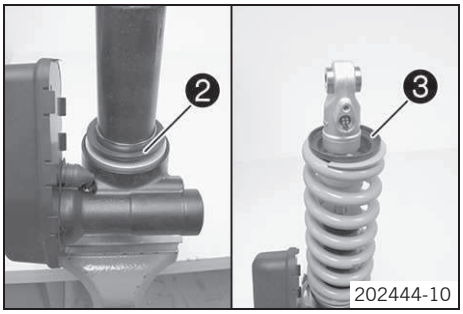
– Loosen screw ❻.
– Remove **Preload-Adjuster**.

9.6.2 Installing the spring

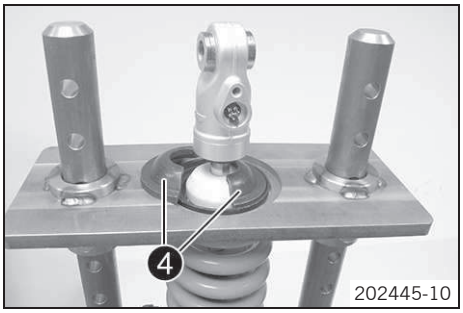


– Mount **Preload-Adjuster** ❶.
✓ Screw Ⓐ is aligned with screw mark Ⓑ.
– Tighten screw.
Guideline

Screw **Preload Adjuster**	M4	1 Nm (0.7 lbf ft)



– Mount washer ❷.
– Position spring and spring retainer ❸.

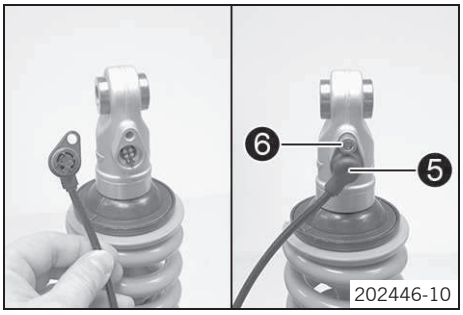


– Clamp the shock absorber in the special tool.

Spring compressor (T14050S) (☛ p. 282)

Info
Use a fitting washer of the special tool as a spring pad.

– Compress the spring. Mount half washers ❹.
– Release the spring. Unclamp the shock absorber.



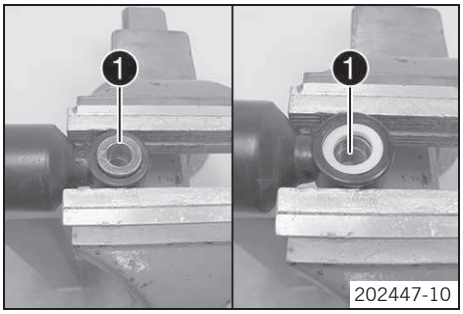
– Plug in rebound adjuster cable ❺. Mount and tighten screw ❻.
Guideline

Screw, rebound adjuster cable	M6	8 Nm (5.9 lbf ft)	**Loctite® 243™**

9.6.3 Removing the heim joint

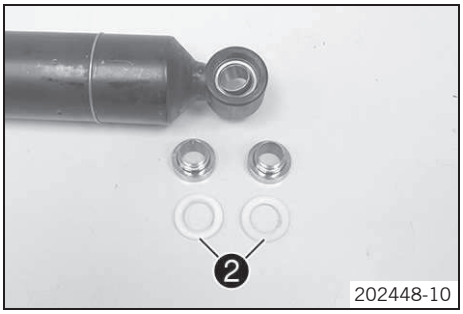
Info
The operations are the same for the top and bottom heim joints.

Condition
The shock absorber has been removed.

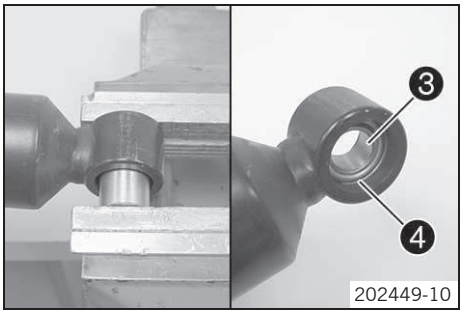


– Clamp the shock absorber into the vise with soft jaws.
– Remove both collar bushings ❶ of the heim joint with a drift.

Pin (T120) (☛ p. 280)



– Remove seal rings ❷ on both sides.

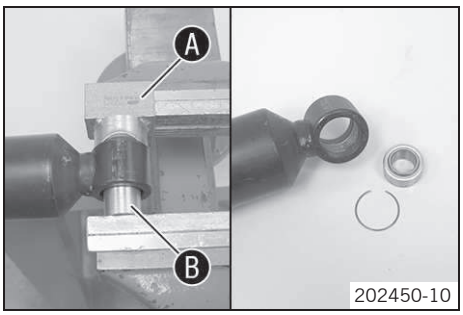


– Press heim joint ❸ to the side.

Pressing tool (T1207S) (☛ p. 280)

✓ The heim joint rests against a lock ring.

– Remove the other lock ring ❹.

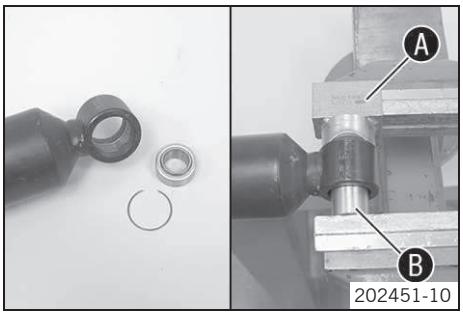


– Place special tool Ⓐ underneath and press out the heim joint with special tool Ⓑ.

Pressing tool (T1207S) (☛ p. 280)

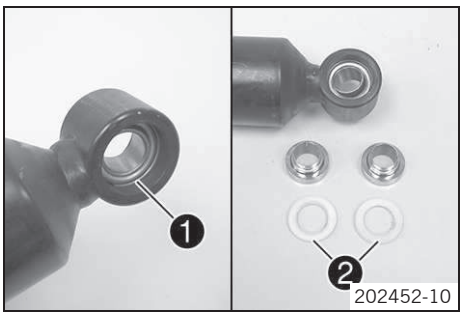
9.6.4 Installing the heim joint

Info
The operations are the same for the top and bottom heim joints.



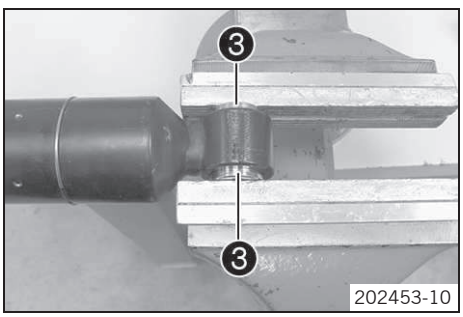
– Place special tool Ⓐ underneath and press out the heim joint up to the lock ring with special tool Ⓑ.

Pressing tool (T1207S) (☛ p. 280)



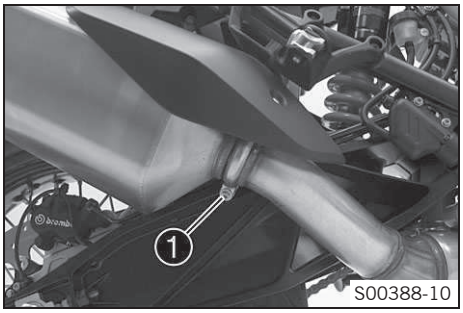
– Mount a second lock ring ❶.
– Mount seal rings ❷ on both sides and grease.

Lubricant (T158) (☛ p. 269)

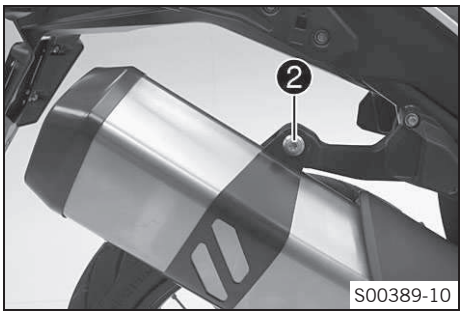


– Press in both collar bushings ❸ of the heim joint.

10.1 Disassembling the main silencer

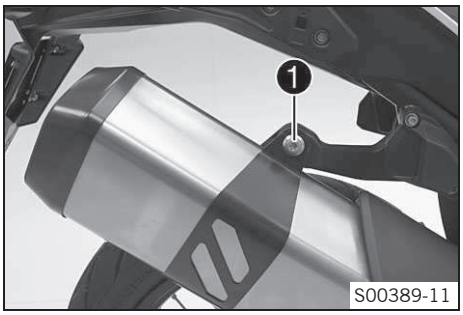


– Remove screw ❶.
– Remove the exhaust clamp.

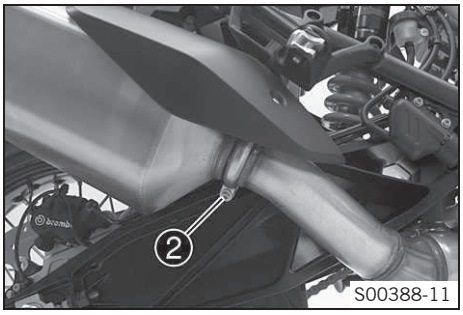


– Remove screw ❷ with the washer.
– Remove the main silencer with the main silencer clamp.

10.2 Installing the main silencer



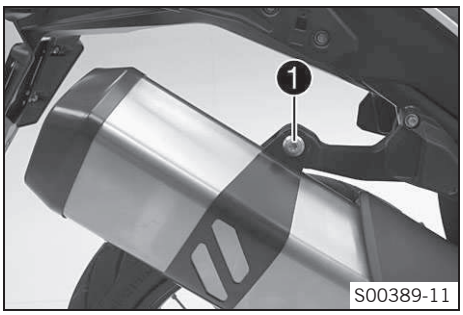
– Position the main silencer with the main silencer clamp.
– Mount screw ❶ with the washer but do not tighten yet.



– Position the exhaust clamp.
– Mount and tighten screw ❷.

Guideline

Screw, exhaust clamp	M6	12 Nm (8.9 lbf ft)



– Tighten screw ❶.

Guideline

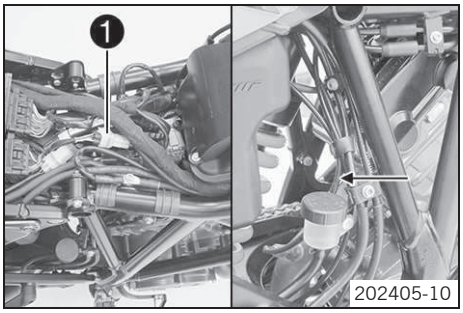
Screw, exhaust clamp	M8	12 Nm (8.9 lbf ft)

10.3 Disassembling the manifold

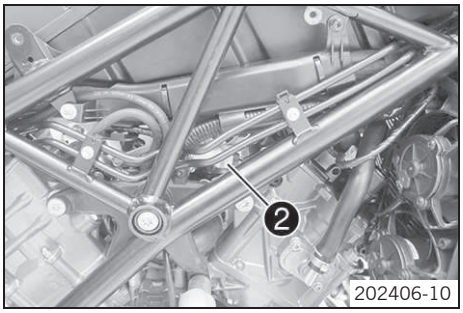
Preparatory work

- Disassemble the main silencer. (☛ p. 52)
- Remove the passenger seat. (☛ p. 62)
- Remove the driver's seat. (☛ p. 62)
- Remove the front side cover. (☛ p. 75)
- Remove the tank cover. (☛ p. 76)
- Remove the mask spoiler. (☛ p. 77)
- Remove the fuel tank. (☛ p. 63)

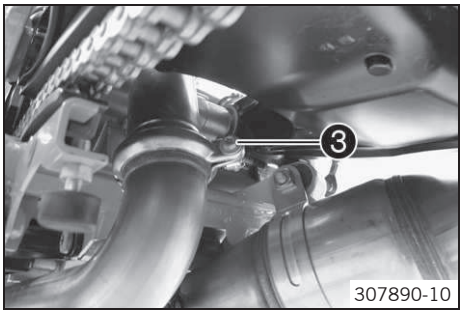
Main work



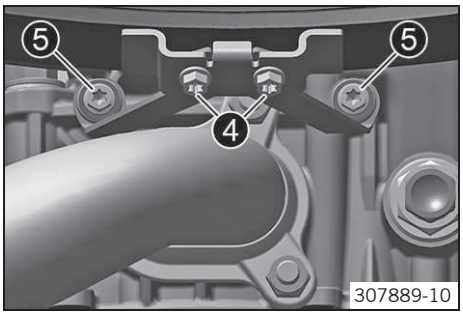
- Remove plug ❶ from the plug holder and unplug it.
- Expose the cable.



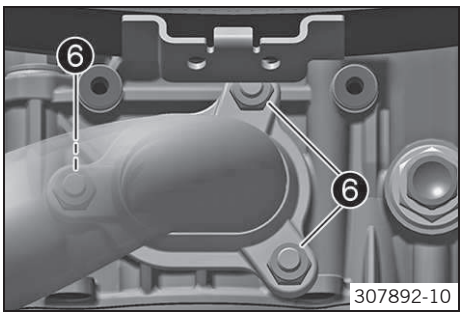
- Detach connector ❷.
- Expose the cable.



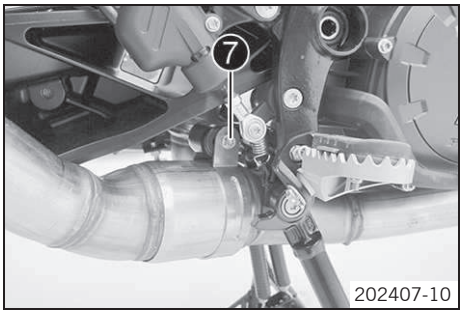
- Remove screw ❸.
- Remove the exhaust clamp.



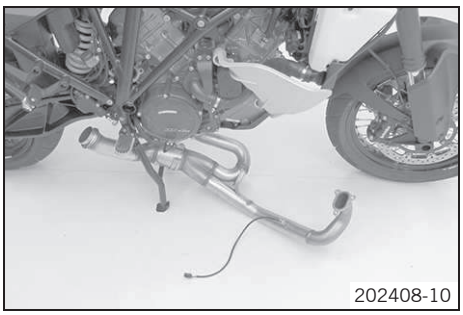
- Remove screws ❹.
- Remove screws ❺.
- Take off the retaining bracket.



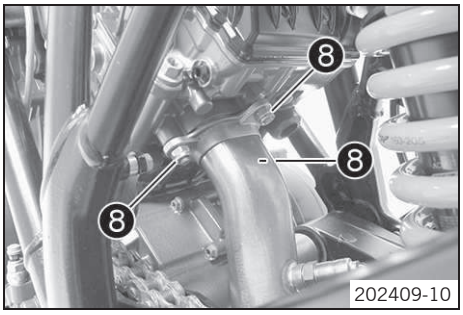
- Remove nuts ❻.



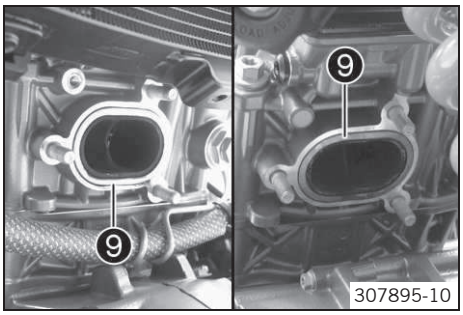
– Remove screw ❼.



– Lower manifold and remove it in a forward direction.

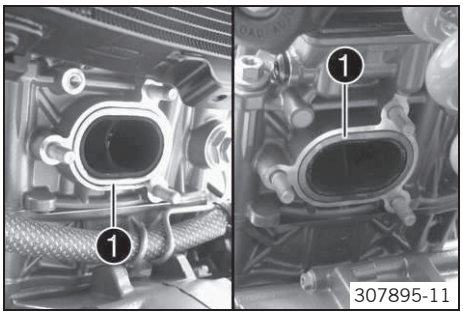


– Remove nuts ❽.
– Remove the manifold in a downward direction.

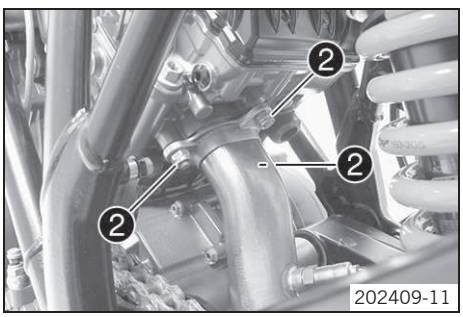


– Remove exhaust gaskets ❾.

10.4 Installing the manifold



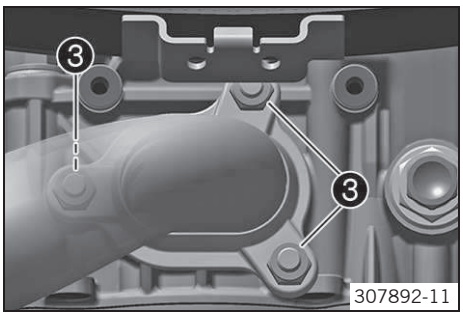
Main work
– Position exhaust gaskets ❶.



– Position the manifold from below.
– Mount nuts ❷ but do not tighten yet.

Guideline

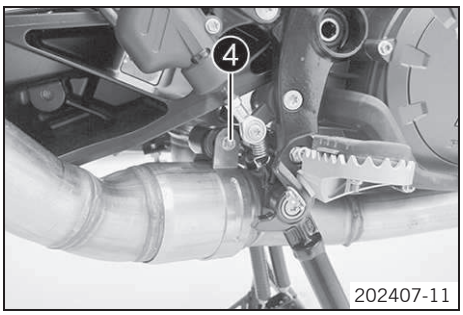
Nut, manifold on cylinder head	M8	Tightening sequence: Tighten the nuts evenly. Do not bend the metal.



– Position the manifold at the front.
– Mount nuts ❸ but do not tighten yet.

Guideline

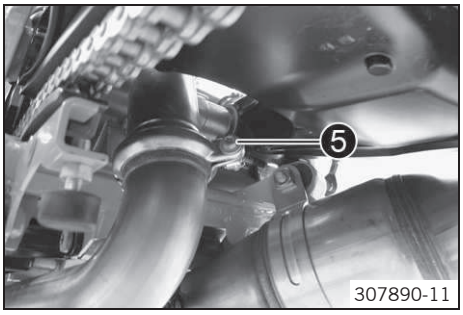
Nut, manifold on cylinder head	M8	Tightening sequence: Tighten the nuts evenly. Do not bend the metal.



– Mount and tighten screw ❹.

Guideline

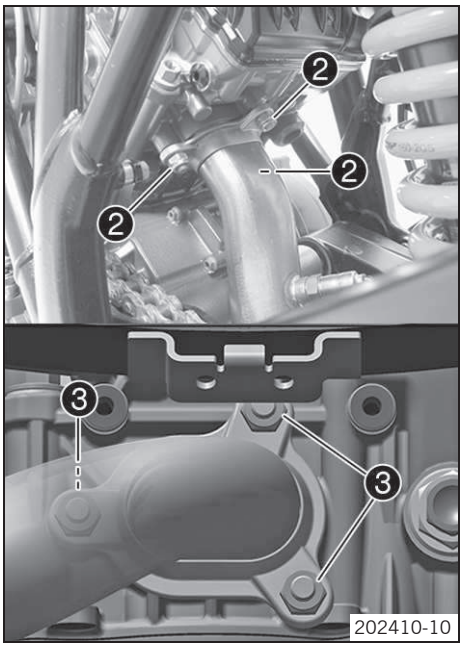
Screw, exhaust clamp	M8	12 Nm (8.9 lbf ft)



– Position the exhaust clamp.
– Mount and tighten screw ❺.

Guideline

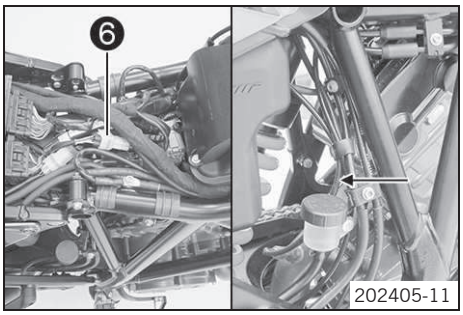
Screw, exhaust clamp	M6	12 Nm (8.9 lbf ft)



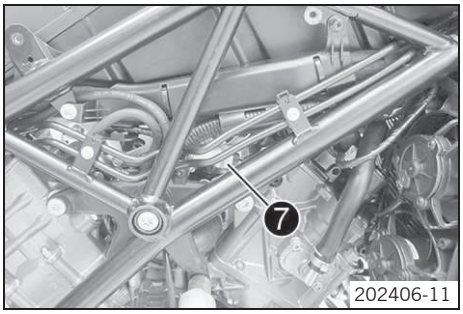
– Tighten nuts ❷ and ❸.

Guideline

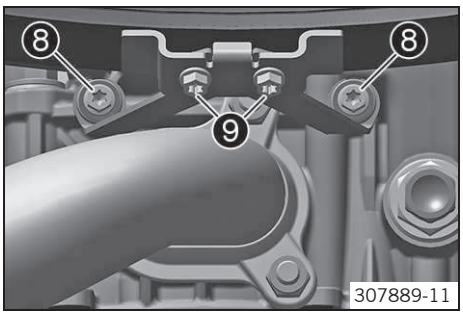
Nut, manifold on cylinder head	M8	Tightening sequence: Tighten the nuts evenly. Do not bend the metal.



– Route the cable so it is not under tension and secure with a cable binder.
– Plug in plug ❻ and position it in the plug holder.



– Route the cable so it is not under tension and secure with a cable binder.
– Plug in connector ❼.



– Position the retaining bracket.
– Mount and tighten screws ❽.
  Guideline

Screw, cooler retaining bracket	M6	7 Nm (5.2 lbf ft)

– Mount and tighten screws ❾.
  Guideline

Remaining screws, chassis	M5	5 Nm (3.7 lbf ft)

Finishing work

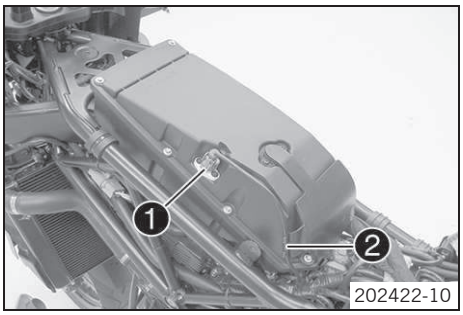
– Install the fuel tank. (☛ p. 64)
– Install the mask spoiler. (☛ p. 78)
– Install the tank cover. (☛ p. 77)
– Install the front side cover. (☛ p. 75)
– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)
– Install the main silencer. (☛ p. 52)

11 AIR FILTER

11.1 Removing the upper part of the air filter box

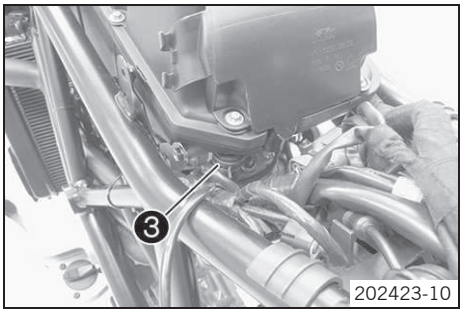
Preparatory work

- Remove the passenger seat. (☛ p. 62)
- Remove the driver's seat. (☛ p. 62)
- Remove the front side cover. (☛ p. 75)
- Remove the tank cover. (☛ p. 76)
- Remove the mask spoiler. (☛ p. 77)
- Remove the fuel tank. (☛ p. 63)



Main work

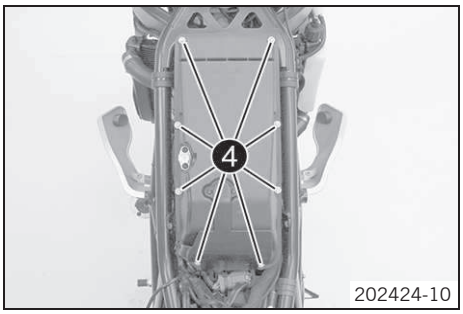
- Detach connector ❶.
- Expose cable ❷.



- Push spring band clamp ❸ back.

Pliers for spring band clamp (60029057100) (☛ p. 274)

- Pull off the vent hose.

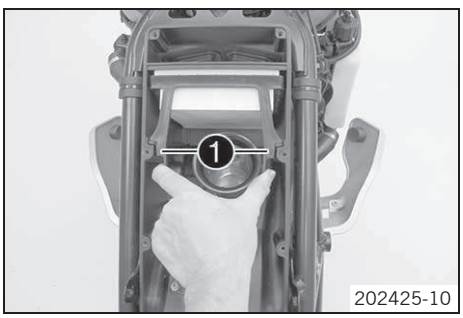


- Remove screws ❹.
- Remove the upper part of the air filter box.

11.2 Changing the air filter

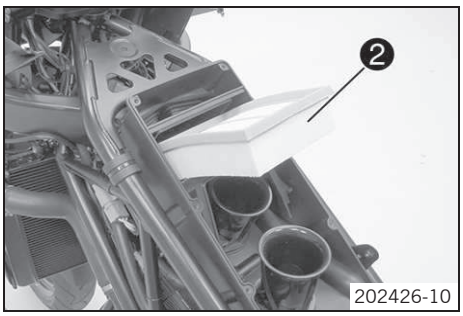
Preparatory work

- Remove the passenger seat. (☛ p. 62)
- Remove the driver's seat. (☛ p. 62)
- Remove the front side cover. (☛ p. 75)
- Remove the tank cover. (☛ p. 76)
- Remove the mask spoiler. (☛ p. 77)
- Remove the fuel tank. (☛ p. 63)
- Remove the upper part of the air filter box. (☛ p. 57)

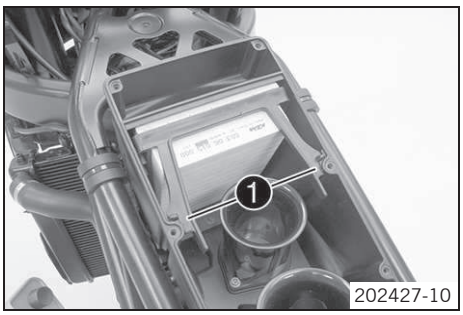


Main work

- Press holding brackets ❶ together and fold back.



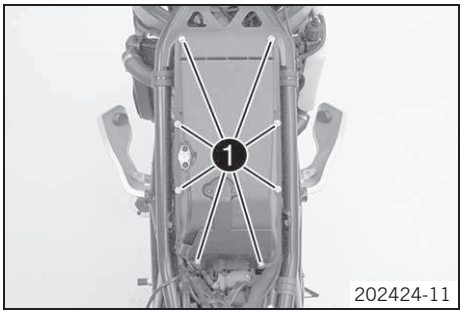
– Remove air filter ❷.
– Position new air filter ❷ in the filter frame.



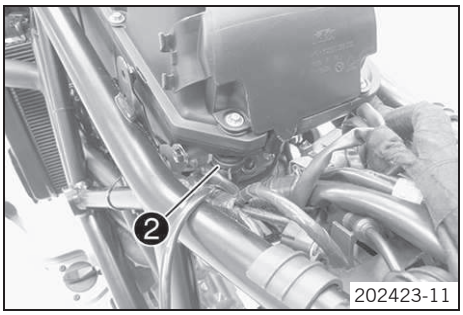
– Press holding brackets ❶ together and allow them to engage.

Finishing work
– Install the upper part of the air filter box. (☛ p. 58)
– Install the fuel tank. (☛ p. 64)
– Install the mask spoiler. (☛ p. 78)
– Install the tank cover. (☛ p. 77)
– Install the front side cover. (☛ p. 75)
– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)

11.3 Installing the upper part of the air filter box

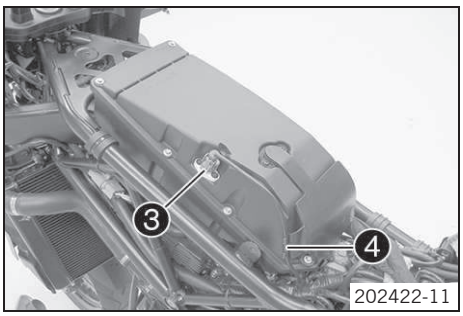


Main work
– Position the upper part of the air filter box.
– Mount and tighten screws ❶.



– Mount the vent hose.
– Position spring band clamp ❷.

Pliers for spring band clamp (60029057100) (☛ p. 274)



– Plug in connector ❸.
– Position cable ❹.

Finishing work
– Install the fuel tank. (☛ p. 64)

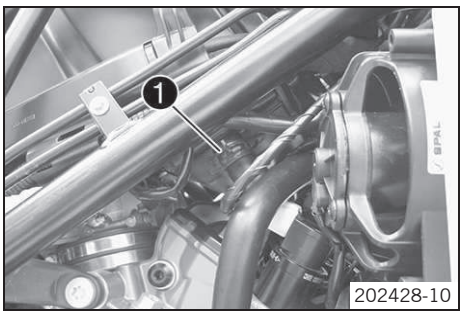
– Install the mask spoiler. (☛ p. 78)
– Install the tank cover. (☛ p. 77)
– Install the front side cover. (☛ p. 75)
– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)

11.4 Removing the lower part of the air filter box

Preparatory work

– Remove the passenger seat. (☛ p. 62)
– Remove the driver's seat. (☛ p. 62)
– Remove the front side cover. (☛ p. 75)
– Remove the tank cover. (☛ p. 76)
– Remove the mask spoiler. (☛ p. 77)
– Remove the fuel tank. (☛ p. 63)
– Remove the upper part of the air filter box. (☛ p. 57)

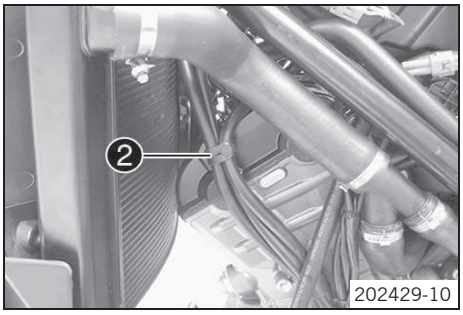
Main work



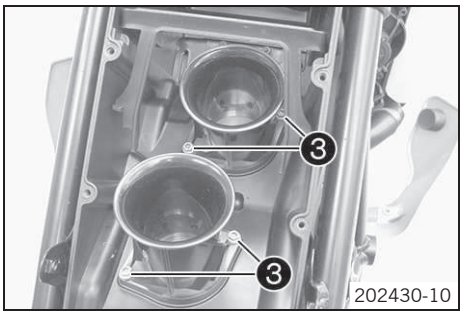
– Remove spring band clamp ❶.

Pliers for spring band clamp (60029057100) (☛ p. 274)

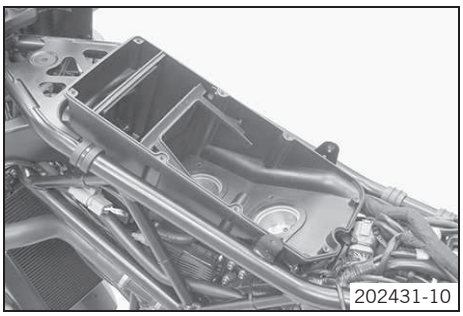
– Pull off the vent hose.



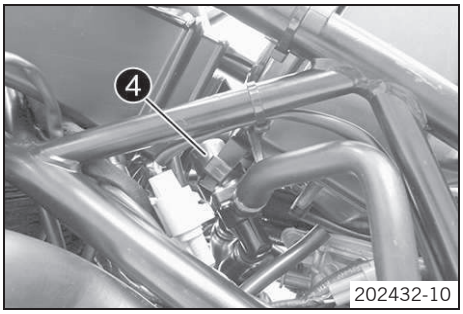
– Remove cable binder ❷.



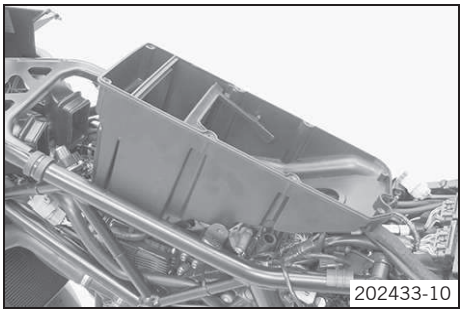
– Remove screws ❸.
– Remove the intake trumpet.



– Raise the lower part of the air filter box and pull it back gently.

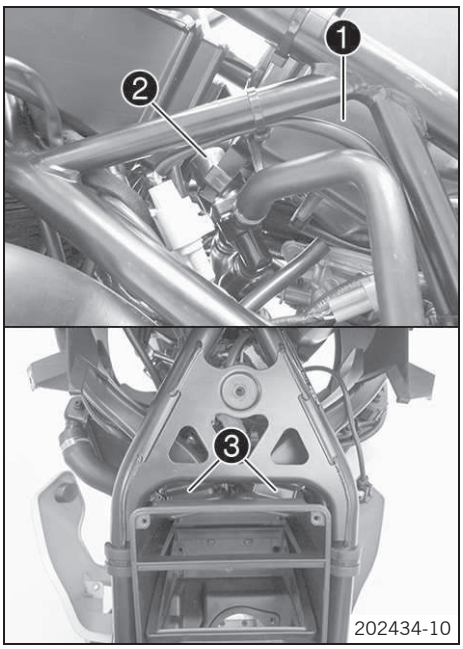


– Remove SLS valve ❹ from the holder.



– Remove the lower part of the air filter box.

11.5 Installing the lower part of the air filter box



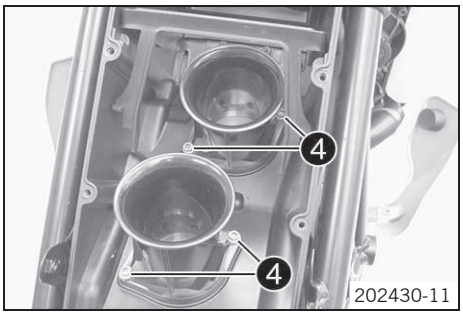
Main work

– Position the lower part of air filter box ❶ in the frame.

Info
Ensure that the O-rings are seated correctly.

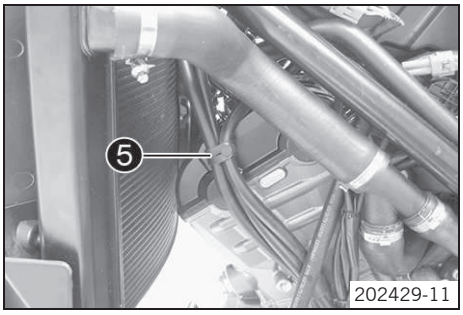
– Mount SLS valve ❷ on holder.
– Position intake ducts ❸.

Info
Ensure that the seals are seated correctly.

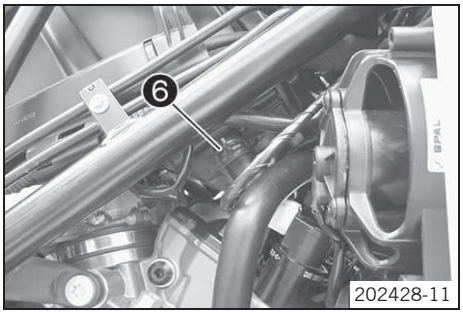


– Position the intake trumpet and mount and tighten screws ❹ with bushing.
Guideline

Remaining screws, chassis	M5	5 Nm (3.7 lbf ft)



– Route the hose without kinks.
– Mount cable binder ❺.



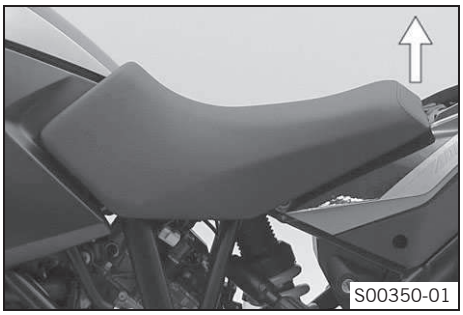
– Mount the vent hose.
– Position spring band clamp ❻ with special tool.

Pliers for spring band clamp (60029057100) (☛ p. 274)

Finishing work

– Install the upper part of the air filter box. (☛ p. 58)
– Install the fuel tank. (☛ p. 64)
– Install the mask spoiler. (☛ p. 78)
– Install the tank cover. (☛ p. 77)
– Install the front side cover. (☛ p. 75)
– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)

12.1 Removing the driver's seat



Preparatory work

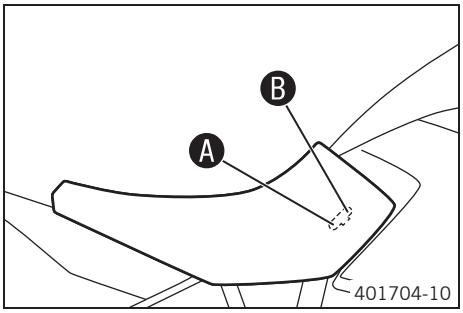
– Remove the passenger seat. (☛ p. 62)

Main work

– Raise the rear of the driver's seat.

– Detach the front of the driver's seat and remove it.

12.2 Mounting the driver's seat



Main work

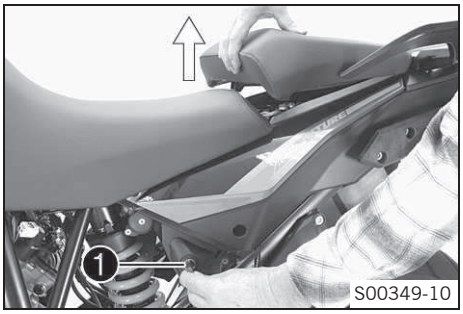
– Attach the recesses on the driver's seat to the fuel tank at the desired seat position Ⓐ or Ⓑ, and push the driver's seat forward while lowering it at the rear.

– Finally, check that the driver's seat is correctly mounted.

Finishing work

– Mount the passenger seat. (☛ p. 62)

12.3 Removing the passenger seat

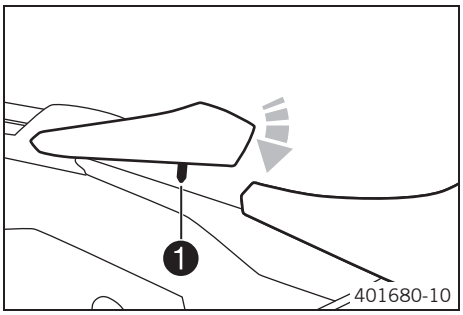


– Insert the ignition key in seat lock ❶ and turn it clockwise.

– Raise the front of the passenger seat, pull it toward the tank, and remove it upward.

– Remove the ignition key.

12.4 Mounting the passenger seat



– Attach the hooks on the passenger seat to the brackets on the subframe, and lower at the front while pushing toward the rear.

– Insert locking pin ❶ into the lock housing and push down the front of the passenger seat until the locking pin engages with a click.

– Check that the passenger seat is correctly mounted.

12.5 Removing the fuel tank

Danger

Fire hazard Fuel is highly flammable.

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

Warning

Danger of poisoning Fuel is poisonous and a health hazard.

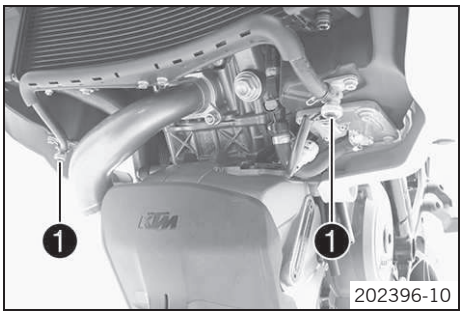
- Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician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

Preparatory work

- Remove the passenger seat. (☛ p. 62)
- Remove the driver's seat. (☛ p. 62)
- Remove the front side cover. (☛ p. 75)
- Remove the tank cover. (☛ p. 76)
- Remove the mask spoiler. (☛ p. 77)

Main work

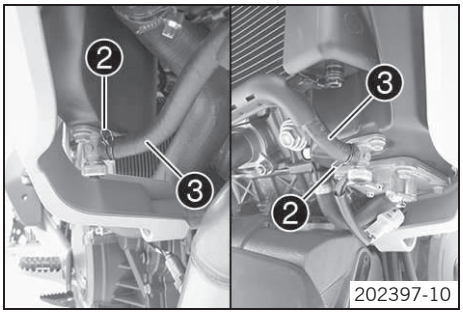
- Close fuel cocks ❶.



- Push back hose clips ❷ and remove fuel hose ❸.

Info

Remaining fuel may flow out of the fuel hose.



- Thoroughly clean the plug-in connection of the fuel line using compressed air.

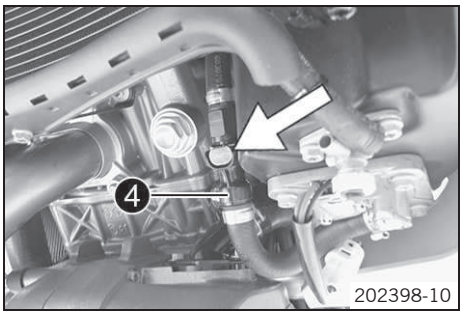
Info

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

- Press down the metal plate and disconnect the fuel hose connection ❹.

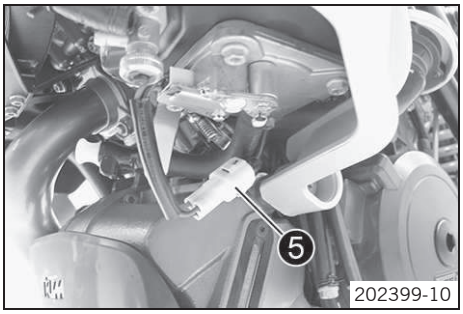
Info

Remaining fuel may flow out of the fuel hose.

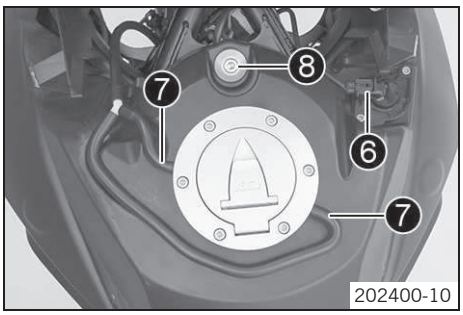


- Assemble the wash cap set.

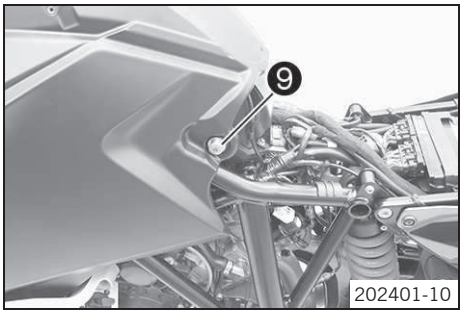
Wash cap set (81212016000)



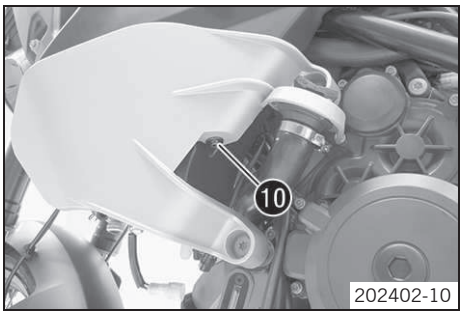
– Detach connector ❺.



– Detach connector ❻.
– Remove bleeder hoses ❼.
– Remove screw ❽.



– Remove screws ❾ on both sides.



– Remove screws ❿ on both sides.
– Take off the fuel tank.

Info
Pay attention to the inside cover.

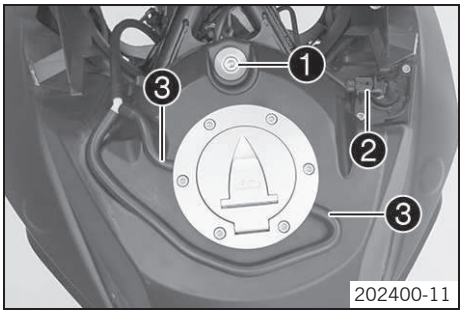
12.6 Installing the fuel tank

Danger
Fire hazard Fuel is highly flammable.

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

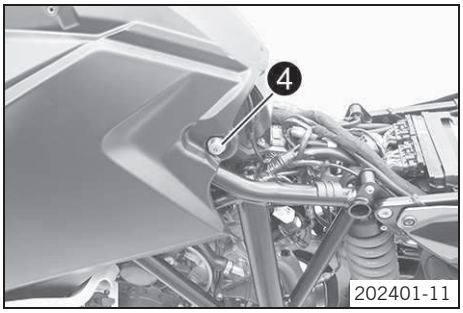
Warning
Danger of poisoning Fuel is poisonous and a health hazard.

– Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that is contaminated with fuel. Store fuel properly in a suitable canister and keep away from children.



Main work

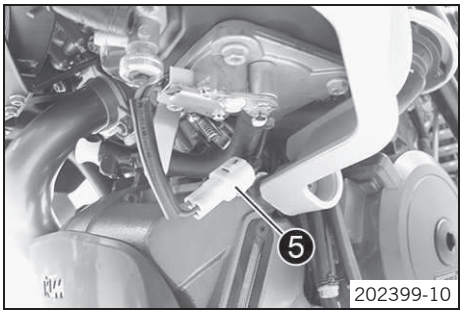
– Position the fuel tank.
– Mount and tighten screw ❶ with bearing sleeve and rubber bushings.
– Plug in connector ❷.
– Mount bleeder hoses ❸.



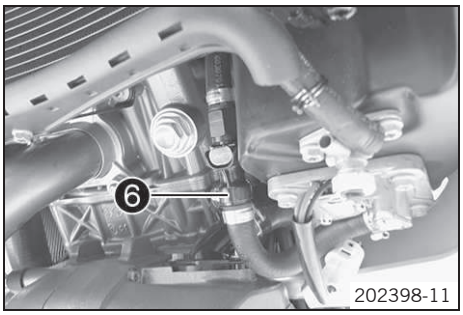
– Mount and tighten screws ❹ with bushings.

Guideline

Screw, fuel tank	M6	10 Nm (7.4 lbf ft)



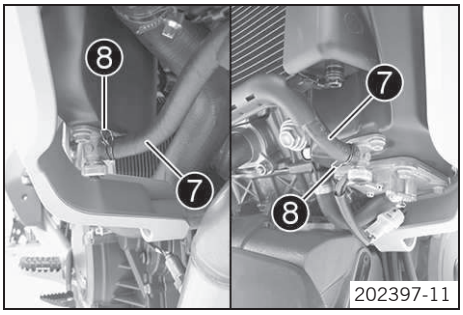
– Plug in connector ❺.



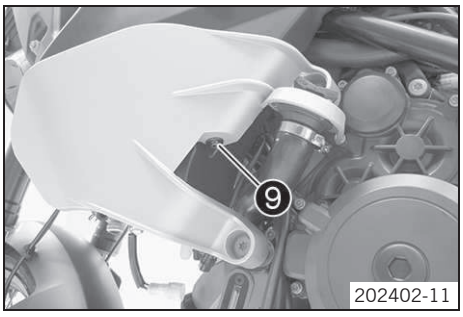
– Remove the wash cap set.
– Thoroughly clean the plug-in connection of the fuel line using compressed air.

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

– Join fuel hose connection ❻.



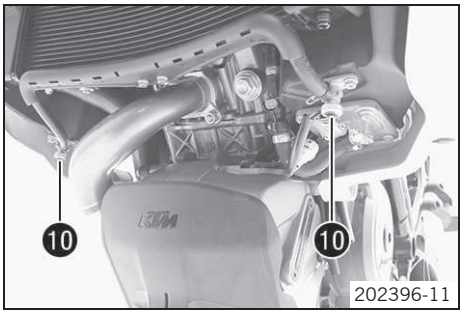
– Mount fuel hose ❼.
– Position hose clips ❽.



– Mount and tighten screws ❾ on both sides.

Guideline

Remaining screws, chassis	M5	5 Nm (3.7 lbf ft)



– Open fuel cocks ❿.

Finishing work

– Install the mask spoiler. (☛ p. 78)
– Install the tank cover. (☛ p. 77)
– Install the front side cover. (☛ p. 75)
– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)

12.7 Checking the fuel pressure

Danger

Fire hazard Fuel is highly flammable.

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

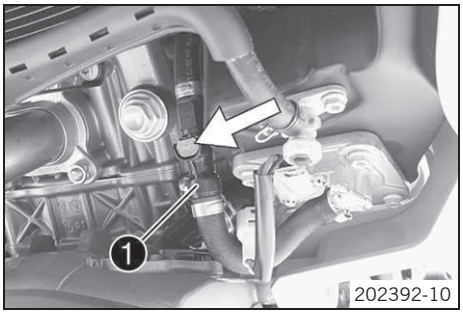
Warning

Danger of poisoning Fuel is poisonous and a health hazard.

– Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that is contaminated with fuel. Store fuel properly in a suitable canister and keep away from children.

Condition

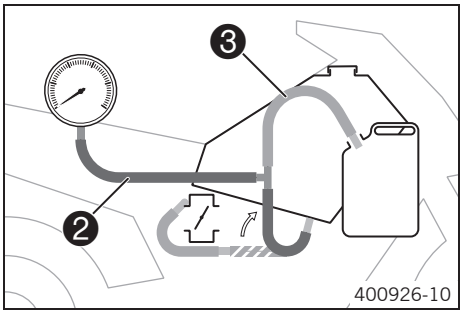
The fuel tank is full.
Ensure that the battery voltage does not drop below 12.5 V.
The ignition is off.
The diagnostic tool is connected.



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

Info

Remaining fuel may flow out of the fuel hose.



– Mount special tool ❷.

Pressure testing tool (61029094000) (☛ p. 275)

– Mount special tool ❸ with nozzle code **1,05**.

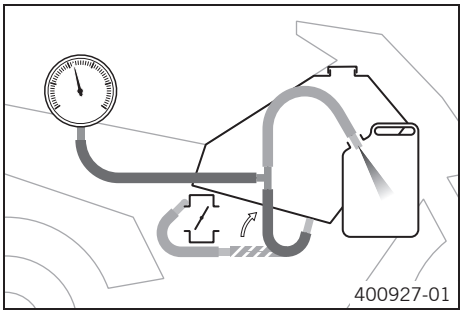
Testing hose (61029093000) (☛ p. 275)

– Position the hose end in a fuel can.

Guideline

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

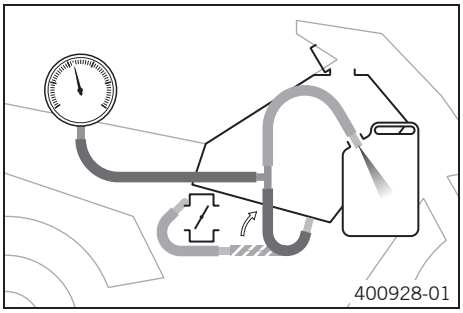
– Connect the diagnostic tool and start it.
– Perform the **"Engine Electronics"** > **"Actuator Test"** > **"Function test of fuel pump control"**.


400927-01

– Check the fuel pressure with the filler cap closed.

Fuel pressure	
When the fuel pump is active	3.8... 4.2 bar (55... 61 psi)

» If the specification is not reached:
– Open the filler cap.
– Check the tank air vent system.

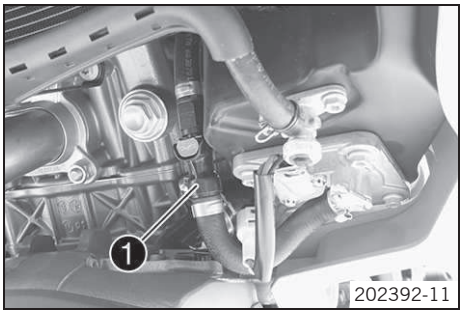

400928-01

– Check the fuel pressure with the filler cap open.

Fuel pressure	
When the fuel pump is active	3.8... 4.2 bar (55... 61 psi)

» If the specification is not reached:
– Check that the fuel line is clear.
– Change the fuel filter. (☛ p. 69)
– Change the fuel pump. (☛ p. 67)

– Finish the actuator test.
– Remove the special tools.



202392-11

– Thoroughly clean the plug-in connection of the fuel line using compressed air.

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

– Join fuel hose connection ❶.

12.8 Changing the fuel pump

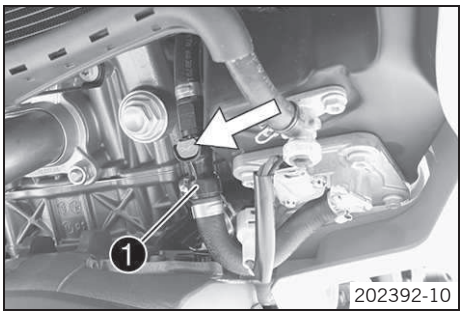
Danger
Fire hazard Fuel is highly flammable.

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

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

– Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that is contaminated with fuel. Store fuel properly in a suitable canister and keep away from children.

Preparatory work
– Drain the fuel from the fuel tank into a suitable container.



202392-10

Main work
– Thoroughly clean the plug-in connection of the fuel line using compressed air.

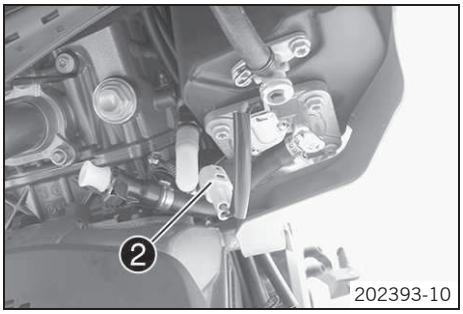
Info
Under no circumstances should dirt enter into the fuel line. Dirt in the fuel line clogs the injection valve.

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

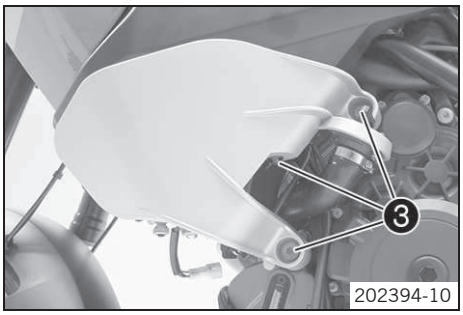
Info
Remaining fuel may flow out of the fuel hose.

– Assemble the wash cap set.

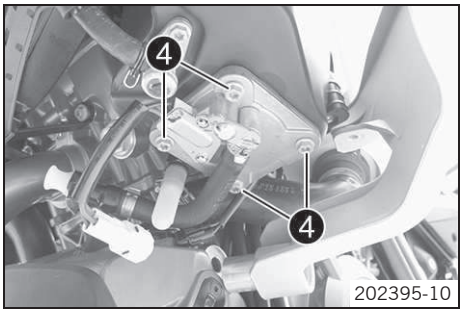
Wash cap set (81212016000)



– Detach connector ❷.



– Remove screws ❸.
– Hang the tank guard to one side.



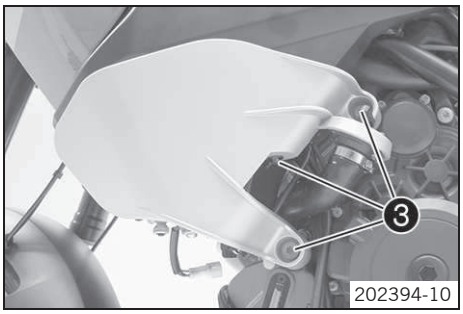
– Remove screws ❹.
– Pull out the fuel pump.

Info
Remaining fuel may flow out of the fuel tank.
Place a suitable container under the engine.

– Position the new fuel pump with O-ring in the fuel tank.
– Mount and tighten screws ❹.

Guideline

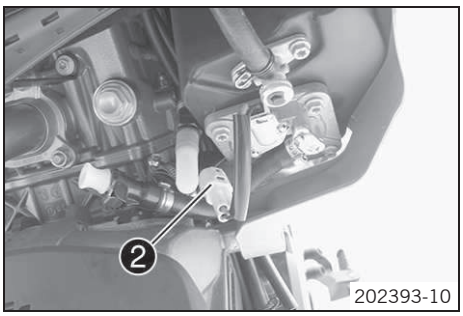
Screw, fuel pump	M6	6 Nm (4.4 lbf ft)



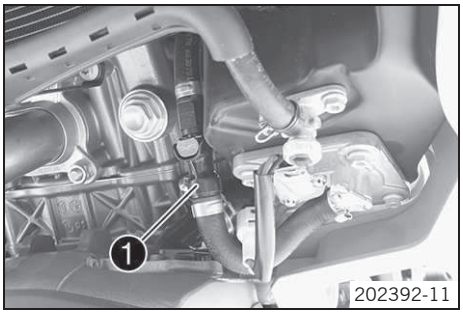
– Position the tank guard.
– Mount and tighten screws ❸.

Guideline

Remaining chassis screws	M6	10 Nm (7.4 lbf ft)
Remaining chassis screws	M10	45 Nm (33.2 lbf ft)



– Plug in connector ❷.



– Remove the wash cap set.
– Thoroughly clean the plug-in connection of the fuel line using compressed air.

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

– Join fuel hose connection ❶.

12.9 Changing the fuel filter

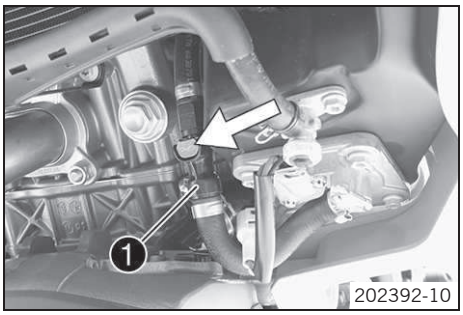
Danger
Fire hazard Fuel is highly flammable.

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

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

– Fuel must not come into contact with the skin, eyes, or clothing. Do not breathe in the fuel vapors. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If fuel is swallowed, contact a physician immediately. Change clothing that is contaminated with fuel. Store fuel properly in a suitable canister and keep away from children.

Preparatory work
– Drain the fuel from the fuel tank into a suitable container.



Main work
– Thoroughly clean the plug-in connection of the fuel line using compressed air.

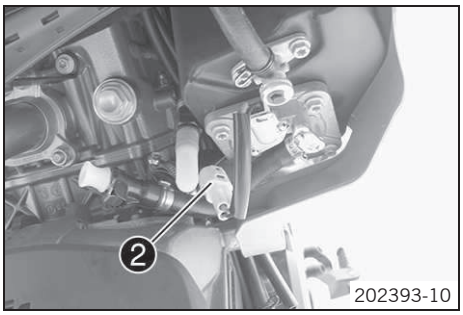
Info
Under no circumstances should dirt enter into the fuel line. Dirt in the fuel line clogs the injection valve.

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

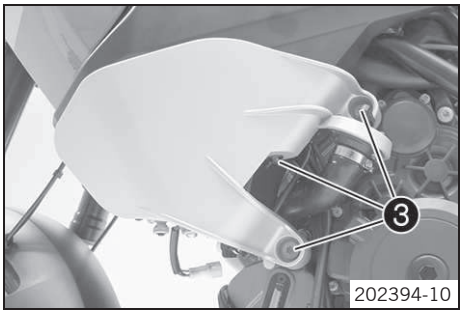
Info
Remaining fuel may flow out of the fuel hose.

– Assemble the wash cap set.

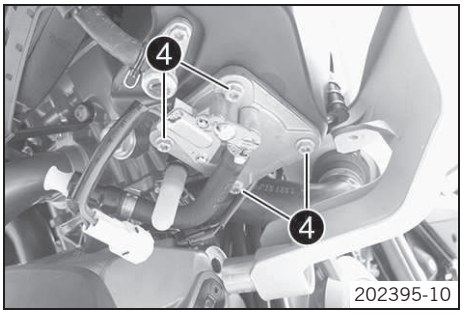
Wash cap set (81212016000)



– Detach connector ❷.

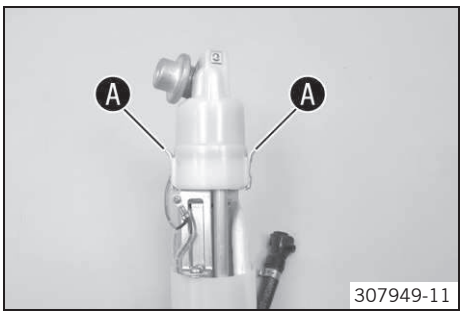


– Remove screws ❸.
– Hang the tank guard to one side.

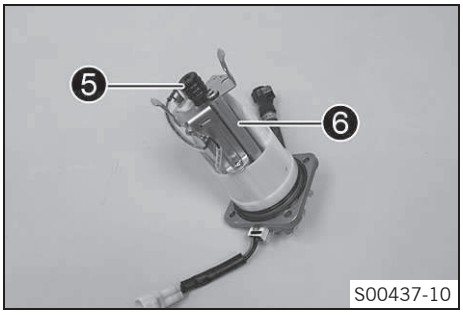


– Remove screws ❹.
– Pull out the fuel pump.

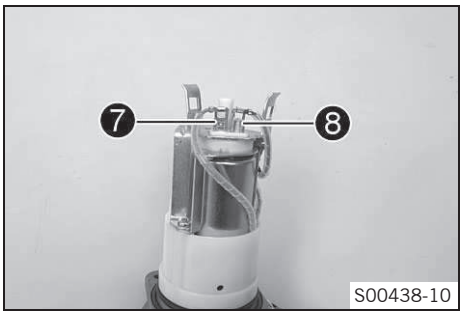
Info
Remaining fuel may flow out of the fuel tank.
Place a suitable container under the engine.



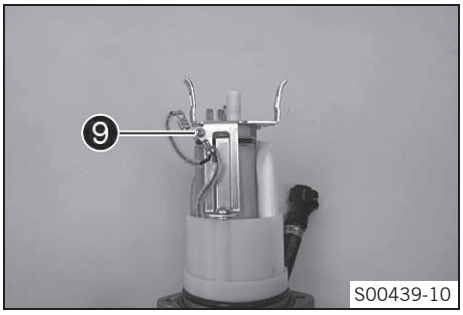
– Push clamps Ⓐ outward.
– Take off the fuel filter housing.



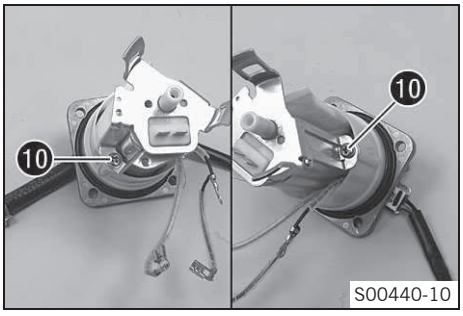
– Remove gasket ❺.
– Take off fuel pipe ❻.



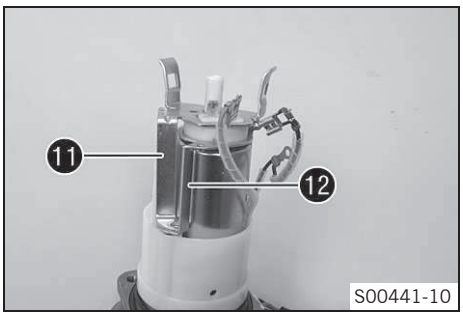
– Detach connectors ❼ and ❽.



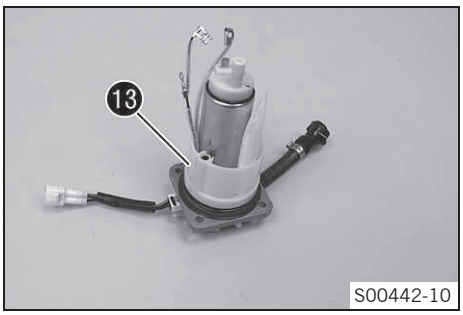
– Remove screw ❾ with the washer.



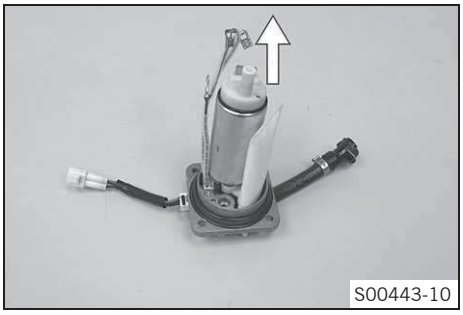
– Remove screws ❿.



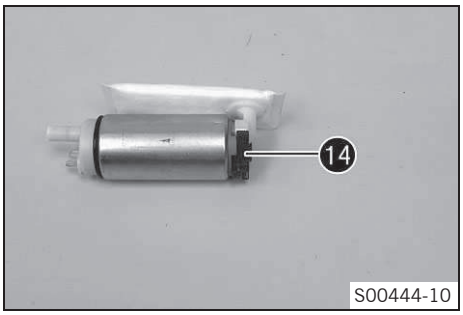
– Remove retaining brackets ⓫ and ⓬.



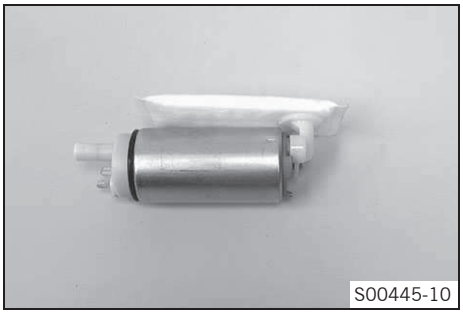
– Remove plastic housing ⓭ with the distance sleeves.



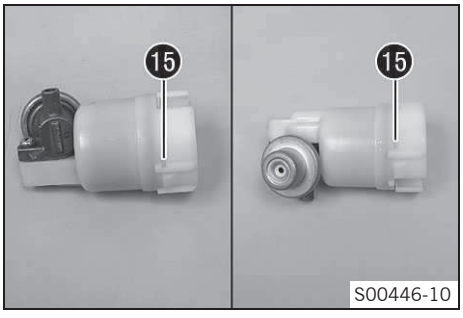
– Take the fuel pump out of the fuel pump cover.



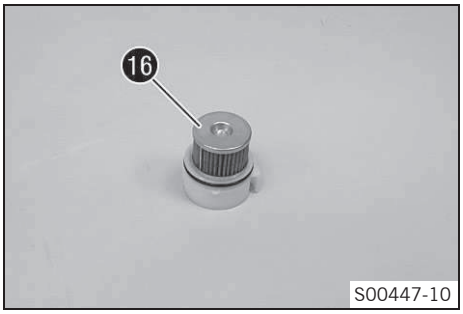
– Take off sealing element ⓮.



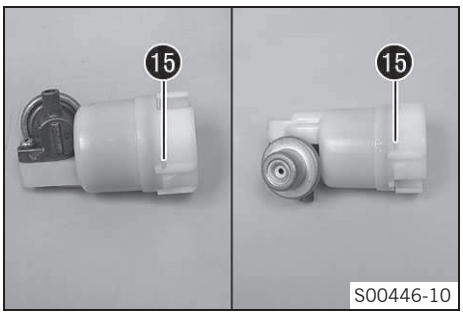
– Remove the fuel filter.
– Mount the new fuel filter.



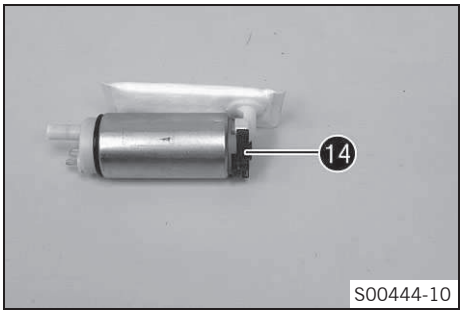
– Release latch ⓯.
– Pull off the outer fuel filter housing.



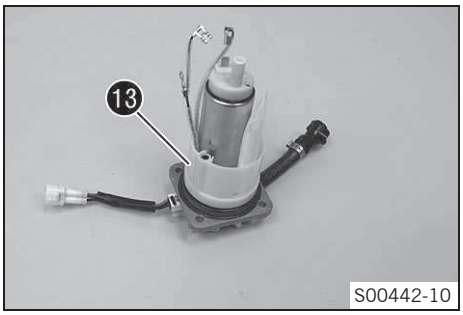
– Take off fuel filter ⓰.
– Mount the new fuel filter.



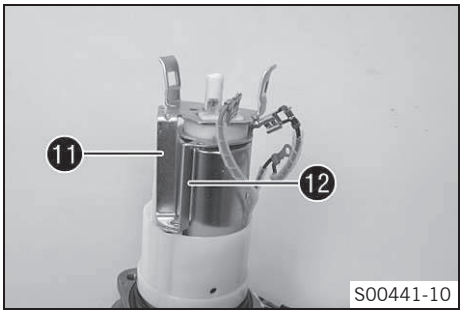
– Mount the outer fuel filter housing.
  ✓ Locking mechanism ⓯ engages in the fuel filter housing.



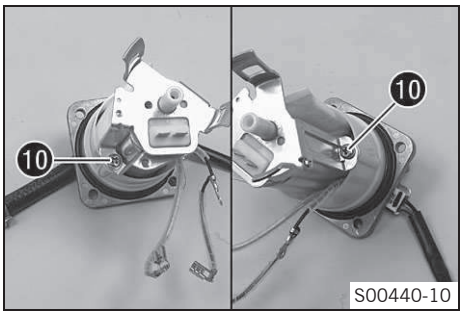
– Mount sealing element ⓮.
– Position the fuel pump in the fuel pump cover.



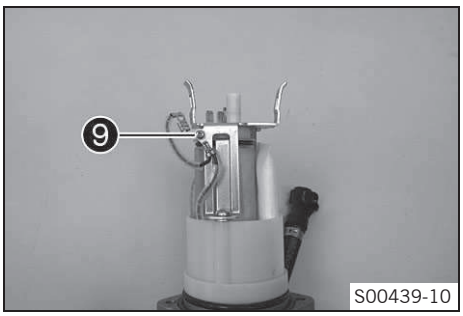
– Mount plastic housing ⓭ with the distance sleeves.
  ✓ The lugs of the plastic housing engage in the holes of the fuel pump cover.



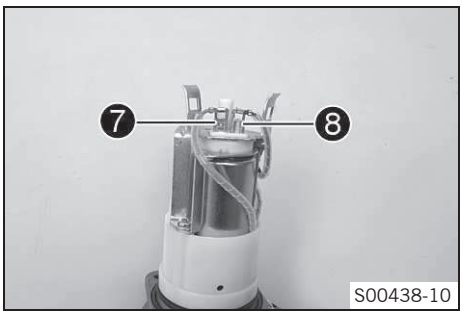
– Mount retaining brackets ⓫ and ⓬.



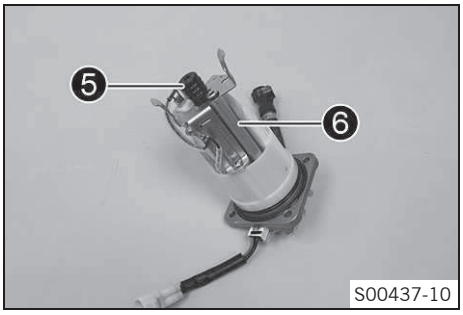
– Mount and tighten screws ⓾.



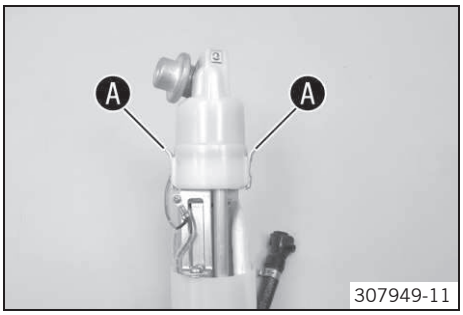
– Mount and tighten screw ❾ with the washer.



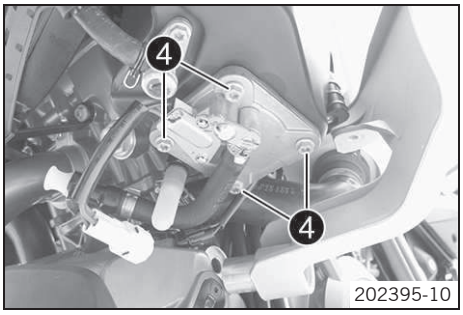
– Plug in connectors ❼ and ❽.



– Mount fuel pipe ❻.
– Mount gasket ❺.



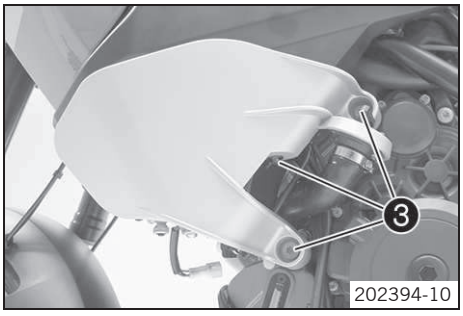
– Mount the fuel filter housing.
  ✓ Clamps Ⓐ must engage.



– Lubricate the O-ring.
– Position the fuel pump in the fuel tank.
– Mount and tighten screws ❹.

Guideline

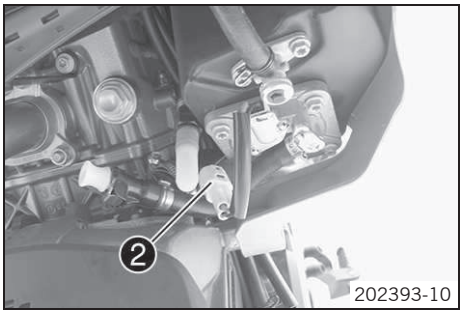
Screw, fuel pump	M6	6 Nm (4.4 lbf ft)



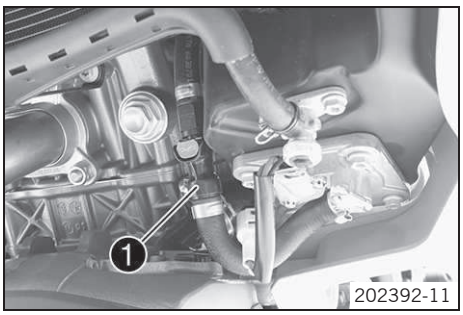
– Position the tank guard.
– Mount and tighten screws ❸.

Guideline

Remaining chassis screws	M6	10 Nm (7.4 lbf ft)
Remaining chassis screws	M10	45 Nm (33.2 lbf ft)



– Plug in connector ❷.

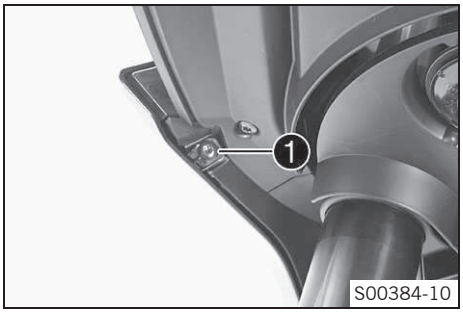


– Remove the wash cap set.
– Thoroughly clean the plug-in connection of the fuel line using compressed air.

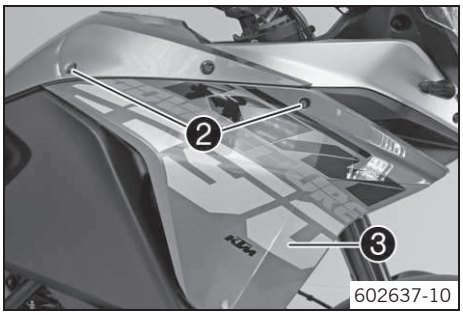
Info
Under no circumstances should dirt enter into the fuel line. Dirt in the fuel line clogs the injection valve.

– Join fuel hose connection ❶.

13.1 Removing the front side cover

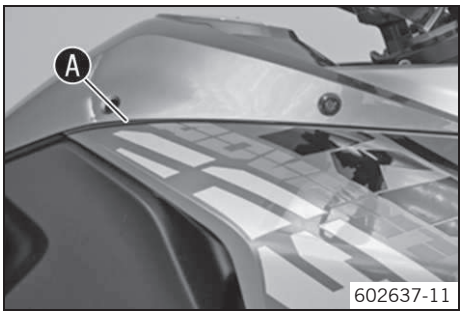


– Remove screw ❶.

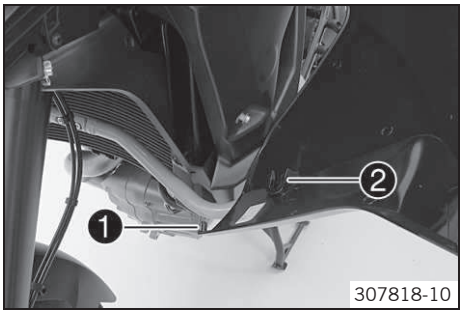


– Remove screws ❷.
– Remove side cover ❸.
– Repeat the operation on the opposite side.

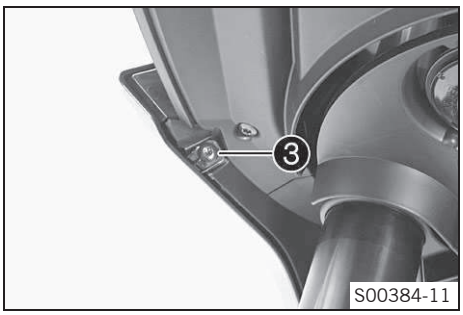
13.2 Installing the front side cover



– Position the side cover in the Ⓐ area under the tank cover.



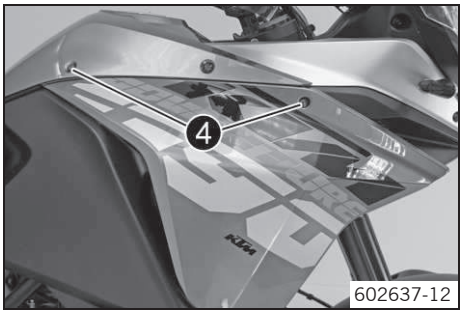
– Attach catch ❶ and bracket ❷ of the side cover to the fuel tank and position the side cover.



– Mount and tighten screw ❸.

Guideline

Screw, cover part	M5x12	3.5 Nm (2.58 lbf ft)



– Mount and tighten screws ❹.

Guideline

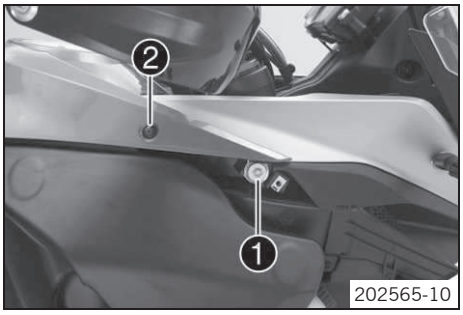
Screw, cover part	M5x12	3.5 Nm (2.58 lbf ft)

– Repeat the operation on the opposite side.

13.3 Removing the tank cover

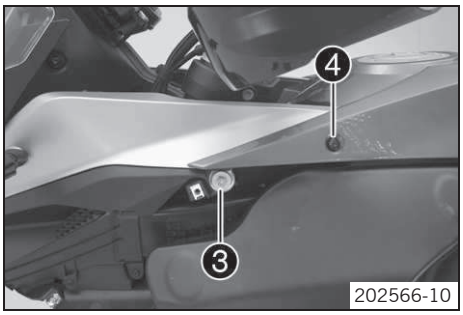
Preparatory work

– Remove the passenger seat. (☛ p. 62)
– Remove the driver's seat. (☛ p. 62)
– Remove the front side cover. (☛ p. 75)

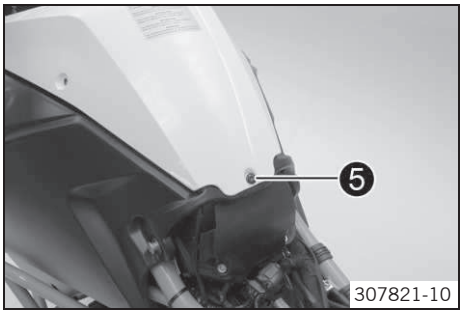


Main work

– Remove screw ❶.
– Remove screw ❷.



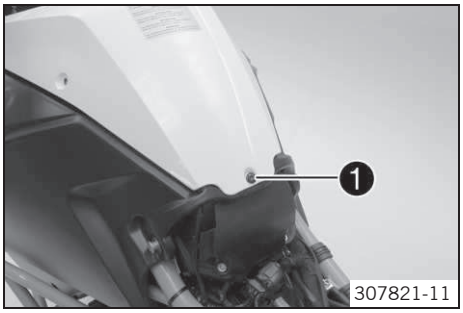
– Remove screw ❸.
– Remove screw ❹.

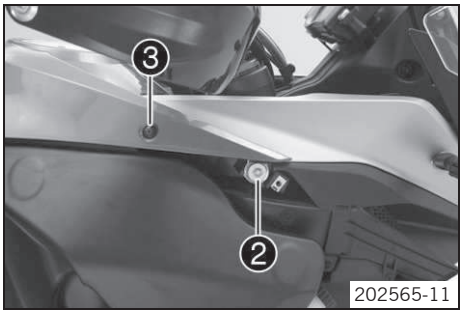


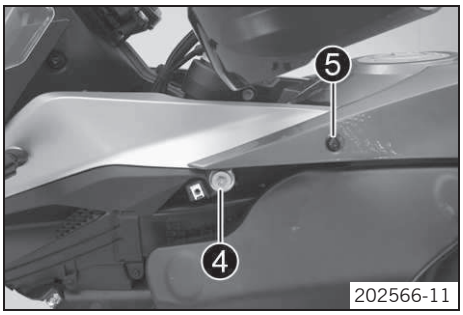
– Remove screw ❺.

– Raise the tank cover at the rear and remove it in a forward direction.

13.4 Installing the tank cover







Main work

– Position the tank cover.

Info
Note the sealing lip.

– Mount and tighten screw ❶.

Guideline

Screw, cover part	M5x12	3.5 Nm (2.58 lbf ft)

– Mount and tighten screw ❷.

Guideline

Screw, cover part	M6	6 Nm (4.4 lbf ft)

– Mount and tighten screw ❸.

Guideline

Screw, cover part	M5x12	3.5 Nm (2.58 lbf ft)

– Mount and tighten screw ❹.

Guideline

Screw, cover part	M6	6 Nm (4.4 lbf ft)

– Mount and tighten screw ❺.

Guideline

Screw, cover part	M5x12	3.5 Nm (2.58 lbf ft)

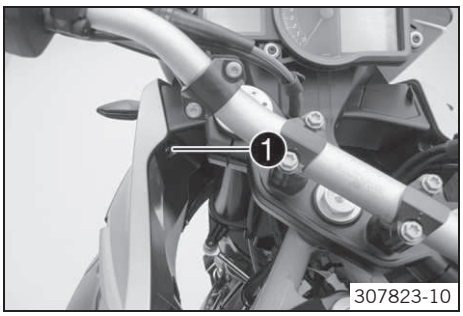
Finishing work

– Install the front side cover. (☛ p. 75)
– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)

13.5 Removing the mask spoiler

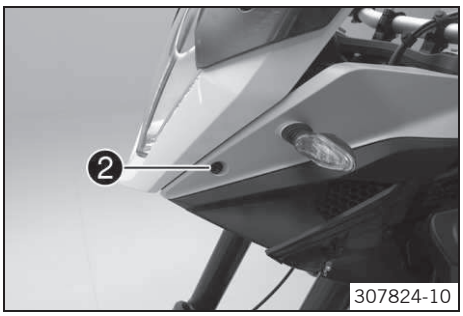
Preparatory work

– Remove the passenger seat. (☛ p. 62)
– Remove the driver's seat. (☛ p. 62)
– Remove the front side cover. (☛ p. 75)
– Remove the tank cover. (☛ p. 76)

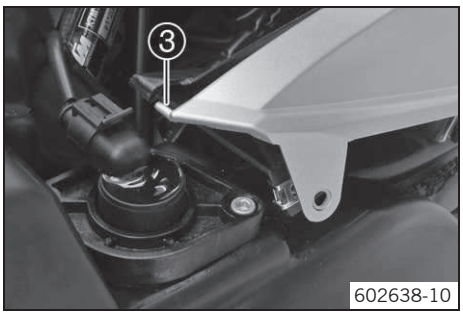


Main work

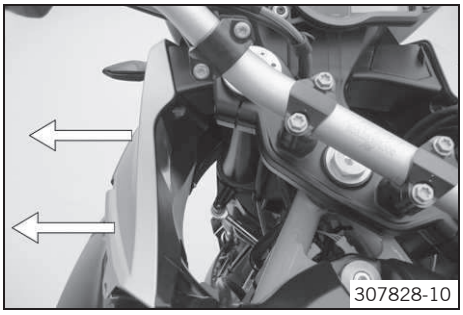
– Remove screw ❶.



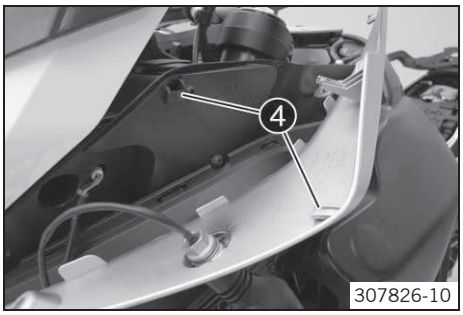
– Remove screw ❷.



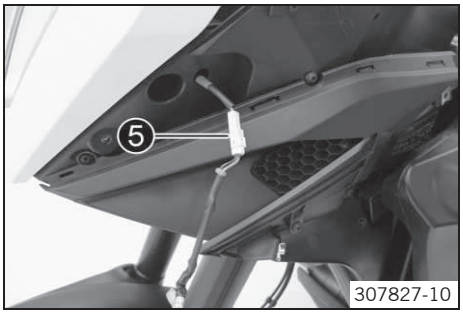
– Loosen holding lug ❸ from the inside cover.



– Remove the mask spoiler laterally from the supports.

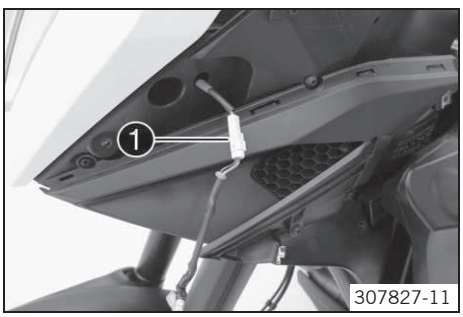


– Pull the mask spoiler upward from bracket ❹.



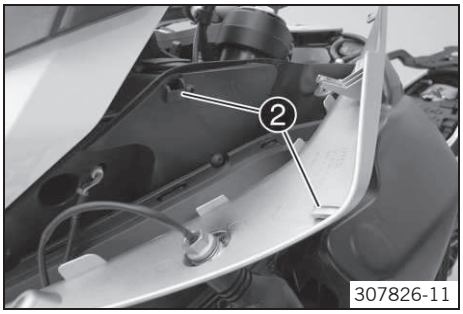
– Detach connector ❺.
– Remove the mask spoiler with the turn signal.
– Repeat the operation on the opposite side.

13.6 Installing the mask spoiler



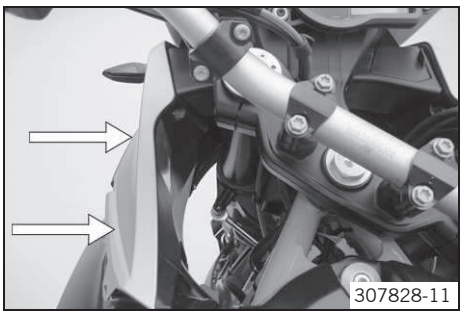
Main work

– Plug in connector ❶.

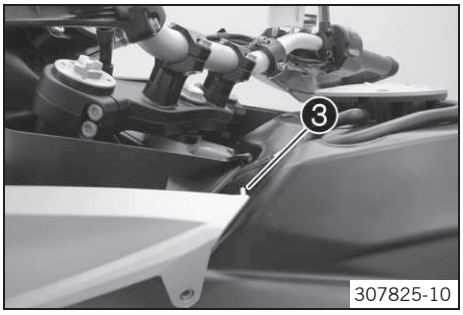


– Position the mask spoiler in bracket ❷.

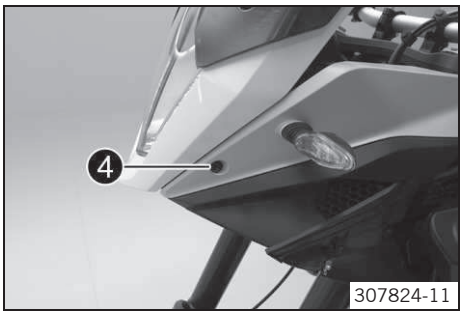
Info
Ensure that the turn signal cable is placed correctly.



– Press the mask spoiler laterally into the supports.

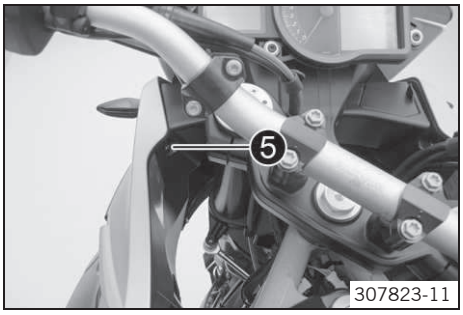


– Position holding lug ❸ in the drill hole.



– Mount and tighten screw ❹.
Guideline

Screw, mask spoiler	M5x17	3.5 Nm (2.58 lbf ft)



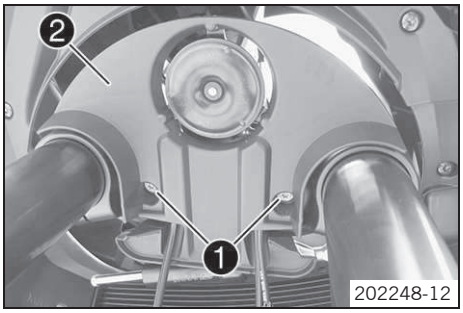
– Mount and tighten screw ❺.
Guideline

Screw, mask spoiler	M5x17	3.5 Nm (2.58 lbf ft)

– Repeat the operation on the opposite side.

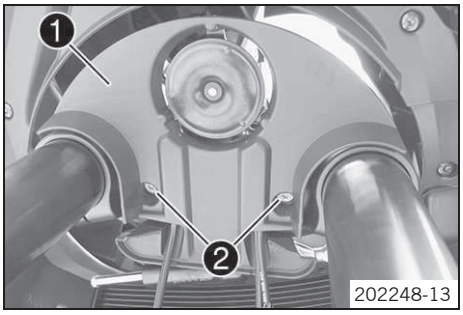
Finishing work
– Install the tank cover. (☛ p. 77)
– Install the front side cover. (☛ p. 75)
– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)

13.7 Removing the bottom triple clamp cover



– Remove screws ❶.
– Plug out the horn.
– Remove the triple clamp cover ❷.

13.8 Installing the bottom triple clamp cover

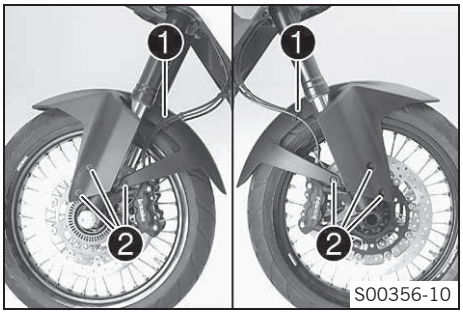


– Position the triple clamp cover ❶.
– Plug in the horn.
– Mount and tighten screws ❷.

Guideline

Remaining chassis screws	M6	10 Nm (7.4 lbf ft)

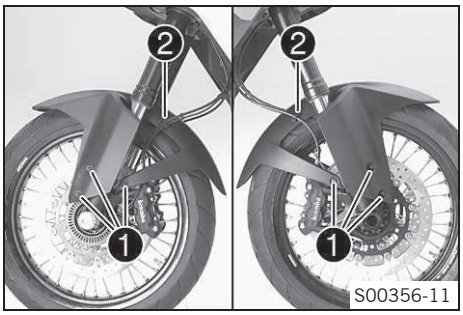
13.9 Removing the front fender



– Remove holder ❶ from the front fender.
– Remove screws ❷.
– Remove the fender in a forward direction.

Info
Pay attention to the brake lines.

13.10 Installing the front fender



– Position the fender.

Info
Pay attention to where the brake lines are placed.

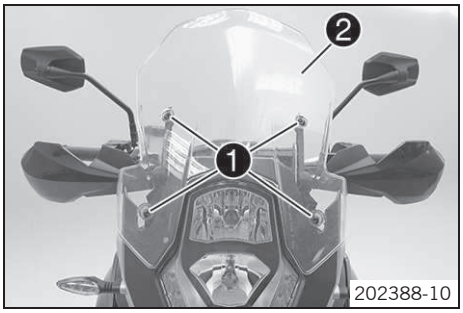
– Mount and tighten screws ❶.

Guideline

Screw, fender	M5x12	3.5 Nm (2.58 lbf ft)

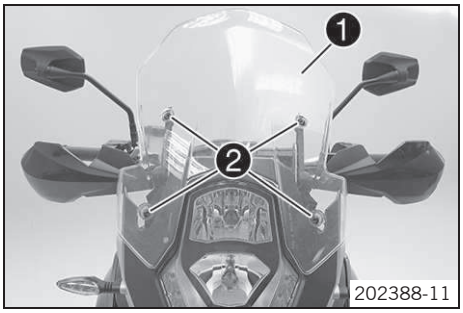
– Mount holder ❷ with the brake line on the fender.

13.11 Removing the wind shield



– Remove screws ❶ and wind shield ❷.

13.12 Installing the wind shield



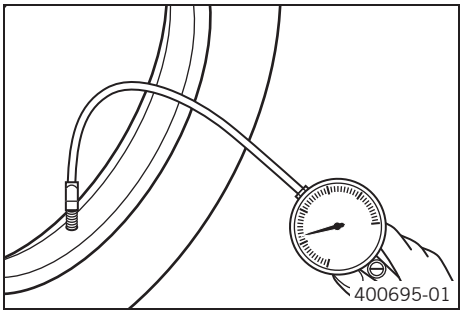
– Position wind shield ❶.
– Mount and tighten screws ❷.

Guideline

Screw, wind shield	M5	3.5 Nm (2.58 lbf ft)

14.1 Checking the tire air pressure

Info
Low tire air pressure leads to abnormal wear and overheating of the tire.
Correct tire air pressure ensures optimal riding comfort and maximum tire service life.



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

Tire air pressure, solo/with passenger/full payload	
Front: with cold tires	2.4 bar (35 psi)
Rear: with cold tires	2.9 bar (42 psi)

» If the tire pressure does not meet specifications:
– Correct the tire pressure.
– Mount the dust cap.

14.2 Checking the tire condition

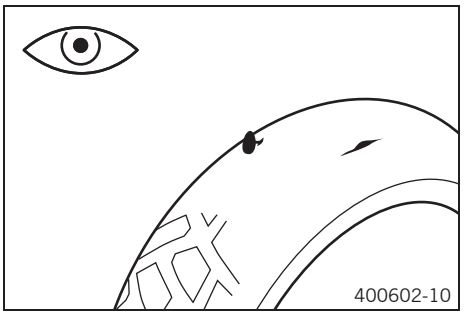
Warning
Danger of accidents Uncontrollable vehicle handling in the event of a flat tire.
– In the interest of safety, replace damaged or worn tires immediately.

Warning
Danger of crashing Poor vehicle handling due to different tire tread patterns on front and rear wheels.
– The front and rear wheels must be fitted with tires with similar tread patterns to prevent loss of control over the vehicle.

Warning
Danger of accidents Uncontrollable handling characteristic due to non-approved and/or non-recommended tires/wheels.
– Only tires/wheels approved by KTM and with the corresponding speed index should be used.

Warning
Danger of accidents Reduced road grip with new tires.
– New tires have a smooth rolling surface and therefore cannot provide full road grip. The entire rolling surface must be roughened in the first 200 kilometers (124.3 miles) by moderate riding at alternating angles. The full grip levels are not achieved until the tires have been run in.

Info
The type, condition and air pressure of the tires all have an impact on the braking and riding response of the vehicle.
Worn tires have a negative effect on vehicle handling, especially on wet surfaces.



– Check the front and rear tires for cuts, run-in objects and other damage.
» If the tires exhibit cuts, run-in objects or other damage:
– Change the tires.
– Check the depth of the tread.

Info
Note local national regulations concerning the minimum tread depth.

Minimum tread depth	≥ 2 mm (≥ 0.08 in)

» If the tread depth is less than the minimum permissible depth:
– Change the tires.
– Check the age of the tires.

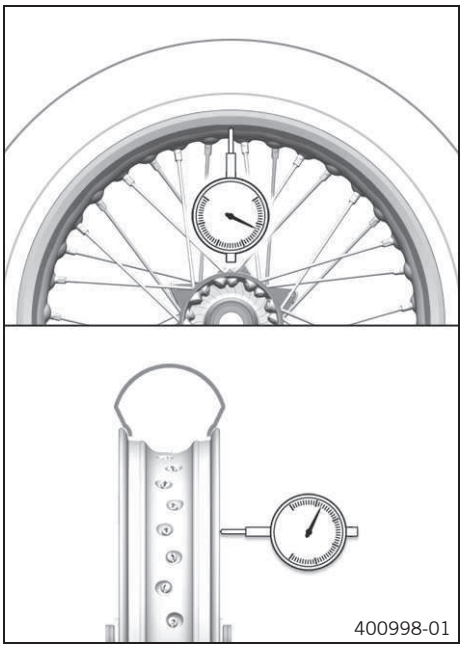
Info
The tire's date of manufacture is usually part of the tire markings and is indicated by the last four digits of the **DOT** marking. The first two digits refer to the week of manufacture and last two digits refer to the year of manufacture.
KTM recommends that the tires be changed after 5 years at the latest, regardless of the actual state of wear.

» If a tire is more than five years old:
– Change the tires.

14.3 Checking the rim run-out

Warning
Danger of accidents Instable handling due to incorrect spoke tension.
– Ensure that the spoke tension is correct.

Info
A loose spoke can unbalance the wheel and other spokes may loosen within a short period.
If the spokes are too tight, they can break due to local overload.
Check the spoke tension regularly, especially on a new motorcycle.



– Check for lateral and radial run-out of the rims.

Lateral runout	
outside the rim joint	< 1.8 mm (< 0.071 in)

Radial runout	
outside the rim joint	< 1.8 mm (< 0.071 in)

» If the measured value is greater than the specified value:
– Center the rim.

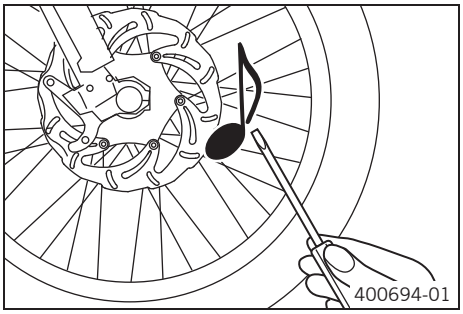
Info
Center the rim by pulling the spoke nipple on the other side of the rim run-out. If there is significant deformation, change the rim.

– Correct the spoke tension.

14.4 Checking spoke tension

Warning
Danger of accidents Instable handling due to incorrect spoke tension.
– Ensure that the spoke tension is correct.

Info
A loose spoke can easily cause lateral or radial runout on the wheel. More spokes loosen in a short period.
If the spokes are too tight, they can break due to local overload.
Check the spoke tension regularly, especially on a new motorcycle.



– Strike each spoke briefly using a screwdriver blade.

Info
The frequency of the sound is a function of the spoke length and spoke diameter.
If spokes of the same length and diameter vibrate with a different tone, this is an indication that the spoke tensions differ.

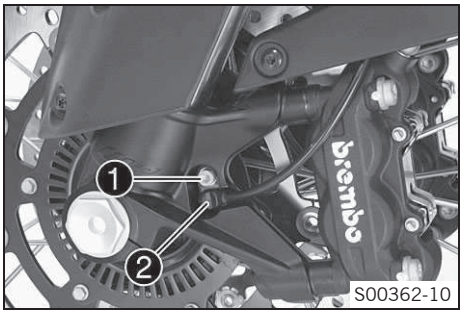
You should hear a high note.

» If the spoke tension differs:
  – Correct the spoke tension.

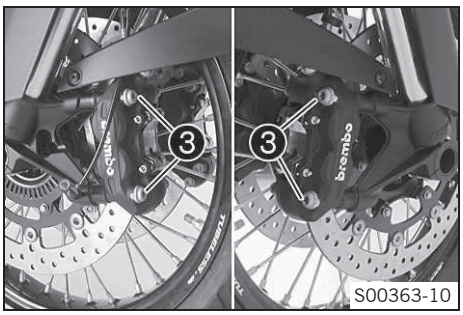
14.5 Front wheel

14.5.1 Removing the front wheel

Preparatory work
(Option: Center stand)
– Raise the vehicle with the center stand. (☛ p. 12)

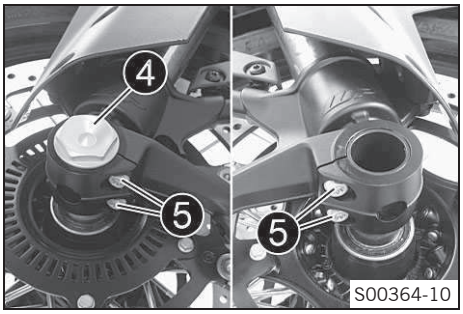


Main work
– Place a load on the rear of the vehicle.
  ✓ The front wheel is not in contact with the ground.
– Remove screw ❶ and pull wheel speed sensor ❷ out of the hole.



– Remove screws ❸ from both brake calipers.
– Press back the brake linings with a light lateral tilting of the brake calipers on the brake disc. Pull the brake calipers carefully back from the brake discs and hang them to one side.

Info
Do not pull the hand brake lever when the brake caliper has been removed.

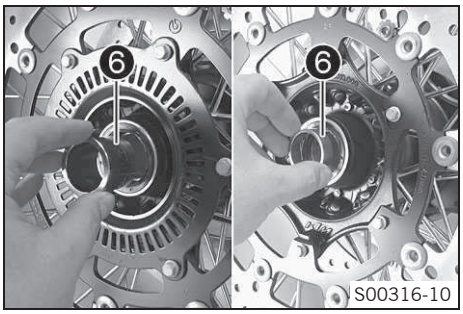


– Loosen screws ❹ and ❺.
– Unscrew screw ❹ about six turns and press your hand on the screw to push the wheel spindle out of the axle clamp. Remove screw ❹.

Warning
Danger of accidents Reduced braking efficiency due to damaged brake discs.
  – Always lay down the wheel in such a way that the brake discs are not damaged.

– Holding the front wheel, withdraw the wheel spindle. Take the front wheel out of the fork.

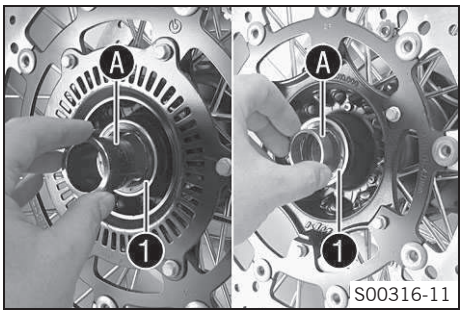
Info
Do not pull the hand brake lever when the front wheel is removed.



– Remove spacers ❻.

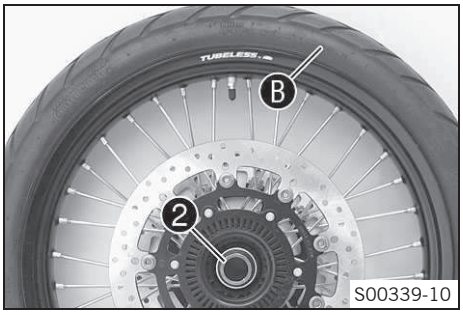
14.5.2 Installing the front wheel

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.

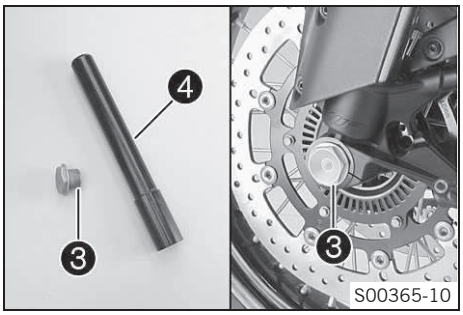
Long-life grease (☛ p. 268)



– Insert the wide spacer ❷ on the left in the direction of travel.

Info
The arrow Ⓑ indicates the direction of travel of the front wheel.
The ABS sensor wheel is on the left-hand side when looking in the direction of travel.

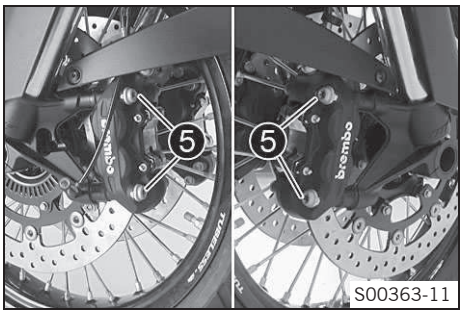
– Insert the narrow spacer on the right in the direction of travel.



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 screw ❸ and wheel spindle ❹.
– Lift the front wheel into the fork, position it, and insert the wheel spindle.
– Mount and tighten screw ❸.
Guideline

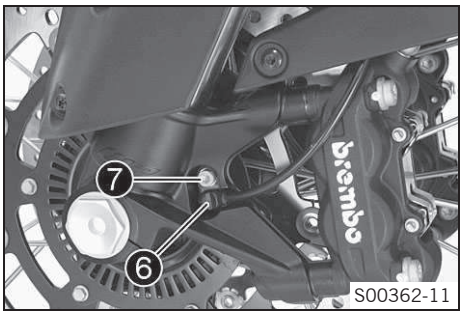
Screw, front wheel spindle	M25x1.5	45 Nm (33.2 lbf ft)



– Position the brake calipers and check that the brake linings are seated correctly.
– Mount screws ❺ on both brake calipers but do not tighten yet.
– Operate the hand brake lever repeatedly until the brake linings are in contact with the brake disc and there is a pressure point. Fix the hand brake lever in the activated position.
✔ The brake calipers straighten.
– Tighten screws ❺ on both brake calipers.
Guideline

Screw, front brake caliper	M10	45 Nm (33.2 lbf ft)	**Loctite® 243™**

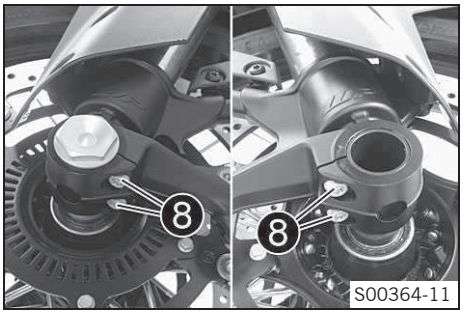
– Remove the fixation of the hand brake lever.



– Insert wheel speed sensor ❻ into the hole and position it.
– Mount and tighten screw ❼.
Guideline

Remaining chassis screws	M6	10 Nm (7.4 lbf ft)

(Option: Center stand)
– Remove the vehicle from the center stand. (☛ p. 12)



– Pull the front brake and compress the fork forcefully a few times.
  ✓ The fork legs straighten.
– Tighten screws ❽.

Guideline

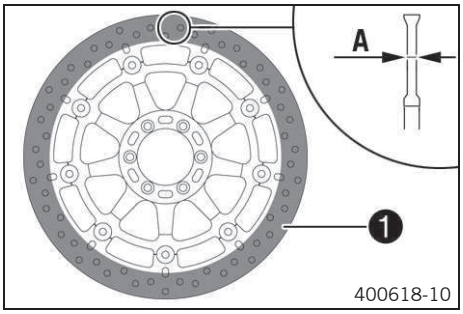
Screw, fork stub	M8	15 Nm (11.1 lbf ft)

14.5.3 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 multiple points on each brake disc to ensure it is at least thickness ❹.

Info

Wear will reduce the thickness of the brake disc at the contact surface ❶ of the brake linings.

Brake discs - wear limit	
Front	4 mm (0.16 in)
Rear	4.5 mm (0.177 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 exhibits damage, cracking, or deformation:
  – Change the brake disc.

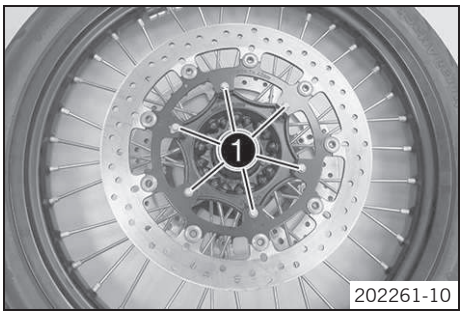
14.5.4 Changing the front brake discs

Preparatory work

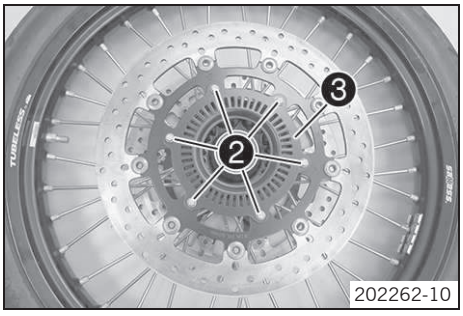
(Option: Center stand)

– Raise the vehicle with the center stand. (☛ p. 12)
– Remove the front wheel. (☛ p. 84)

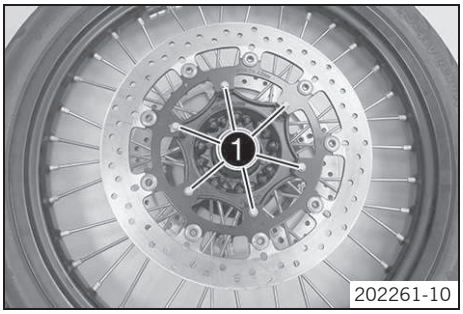
Main work



– Remove screws ❶. Take off the right-hand brake disc.



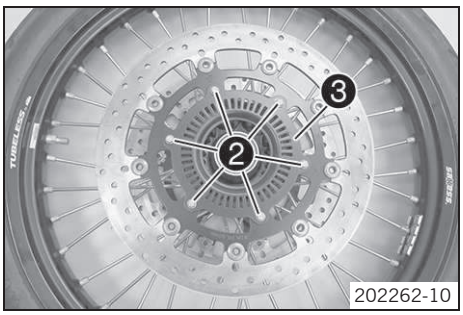
– Remove screws ❷. Remove left-hand brake disc with ABS sensor wheel ❸.



– 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™**



– Clean the contact surface of the brake disc.
– Position the brake disc with the label facing outward. Position the ABS sensor wheel ❸. Mount and tighten screws ❷.

Guideline

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

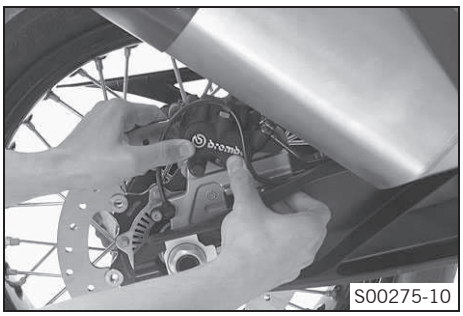
✓ The ABS sensor wheel is on the left-hand side when looking in the direction of travel.

Finishing work
– Install the front wheel. (☛ p. 85)

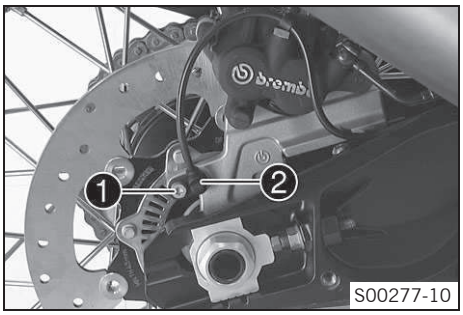
14.6 Rear wheel

14.6.1 Removing the rear wheel

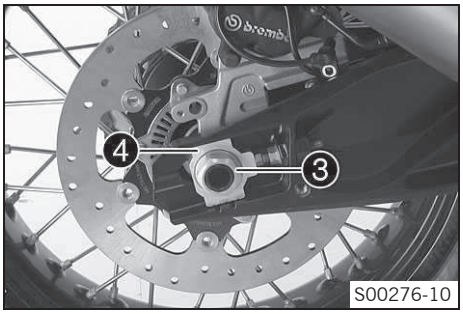
Preparatory work
(Option: Center stand)
– Raise the vehicle with the center stand. (☛ p. 12)



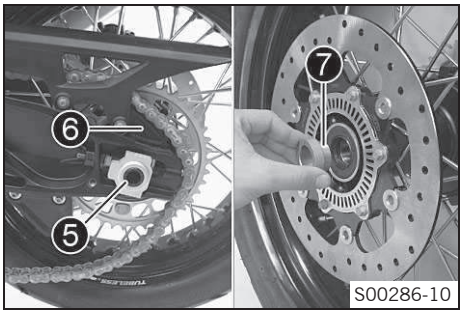
Main work
– Press the brake caliper by hand on to the brake disc in order to press back the brake pistons.



– Remove screw ❶ and pull wheel speed sensor ❷ out of the hole.



– Remove nut ❸. Remove chain adjuster ❹.



– Pull out wheel spindle ❺ only far enough to allow the rear wheel to be pushed forward.
– Push the rear wheel forward as far as possible. Take the chain off of the rear sprocket and place it on chain sprocket guard ❻.

Warning
Danger of accidents Reduced braking effect caused by damaged brake discs.
– Always lay the wheel down in such a way that the brake discs are not damaged.

– Holding the rear wheel, withdraw the wheel spindle. Take the rear wheel out of the swing arm.

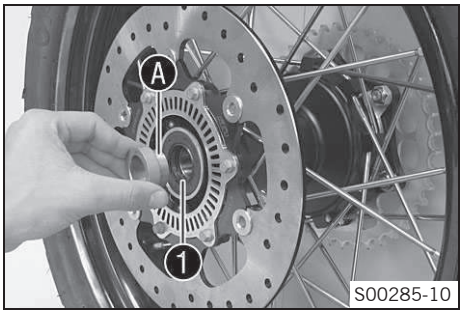
Info
Do not operate the foot brake when the rear wheel is removed.

– Remove the spacer ❼.

14.6.2 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.

Warning
Danger of accidents No braking effect when operating the rear brake.
– After installing the rear wheel, always operate the foot brake until the pressure point is reached.



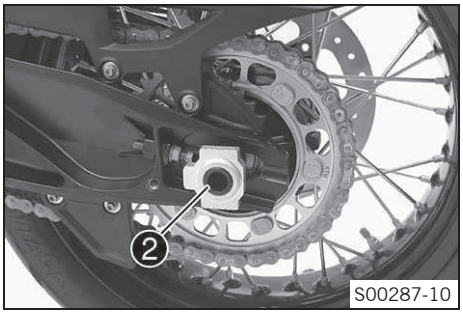
– Check the rear hub rubber dampers. (☛ p. 92)
– Check the wheel bearing for damage and wear.
» If the wheel bearing is damaged or worn:
– Change the wheel bearing.
– Clean and grease shaft seal ring ❶ and contact surface Ⓐ of the spacer.

Long-life grease (☛ p. 268)

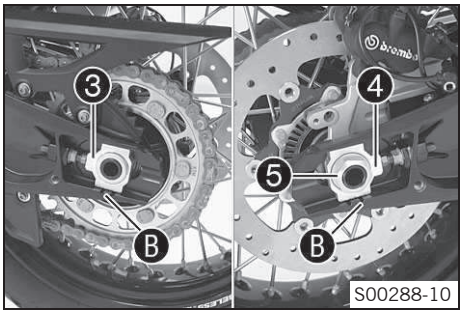
– Clean and grease the thread of the wheel spindle and nut.

Long-life grease (☛ p. 268)

– Mount the rubber dampers and rear sprocket carrier in the rear wheel.
– Place the rear wheel in the swingarm and bring the brake disc on the brake caliper into contact.



– Mount wheel spindle ❷ but do not push it in all the way.
– Push the rear wheel as far forward as possible and place the chain on the rear sprocket.



– Push the wheel spindle in all the way and mount chain adjuster ❹ and nut ❺.

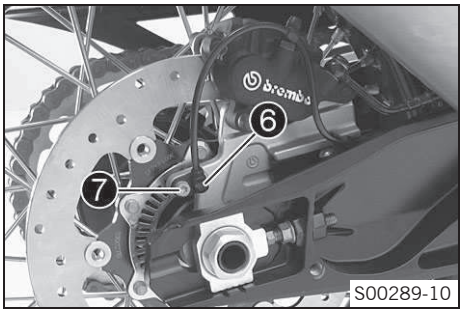
Info
Mount chain adjusters ❸ and ❹ in the same position.

– Push the rear wheel forward so that the chain adjusters are in contact with the tensioning screws, and tighten nut ❺.

Guideline

In order for the rear wheel to be correctly aligned, the markings on the left and right chain adjusters must be in the same position relative to the reference marks Ⓑ.

Nut, rear wheel spindle	M25x1.5	90 Nm (66.4 lbf ft)	Thread greased



– Insert wheel speed sensor ❻ into the hole. Mount and tighten screw ❼.

Guideline

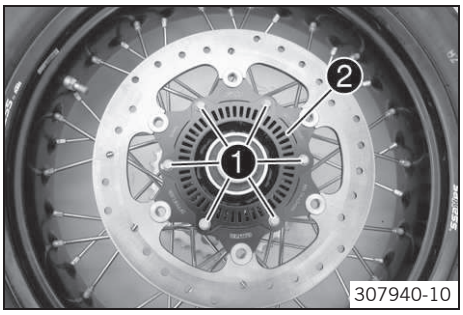
Remaining chassis screws	M6	10 Nm (7.4 lbf ft)

– Operate the foot brake lever repeatedly until the brake linings are in contact with the brake disc and there is a pressure point.

14.6.3 Changing the rear brake discs

Preparatory work
(Option: Center stand)

– Raise the vehicle with the center stand. (☛ p. 12)
– Remove the rear wheel. (☛ p. 87)



Main work

– Remove screws ❶.
– Remove brake disc with ABS sensor wheel ❷.
– Clean the contact surface of the brake disc.
– Position the new brake disc with the label facing outward.
– Position ABS sensor wheel ❷.
– Mount and tighten screws ❶.

Guideline

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

Finishing work

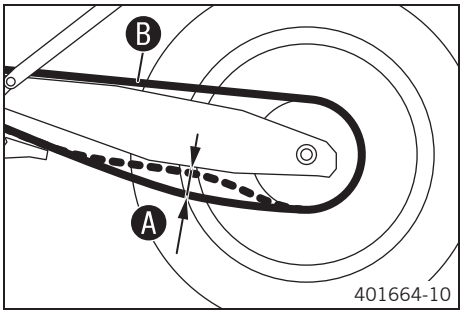
– Install the rear wheel. (☛ p. 88)

14.6.4 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.



– Place the motorcycle onto the side stand.
– Shift the transmission to idle N.
– In the area in front of the chain guide, push the chain up and determine chain tension Ⓐ.

Info

The upper part of the chain Ⓑ must be taut.
Chain wear is not always even, so you should repeat this measurement at different chain positions.

Chain tension	40... 45 mm (1.57... 1.77 in)

» If the chain tension does not meet the specification:

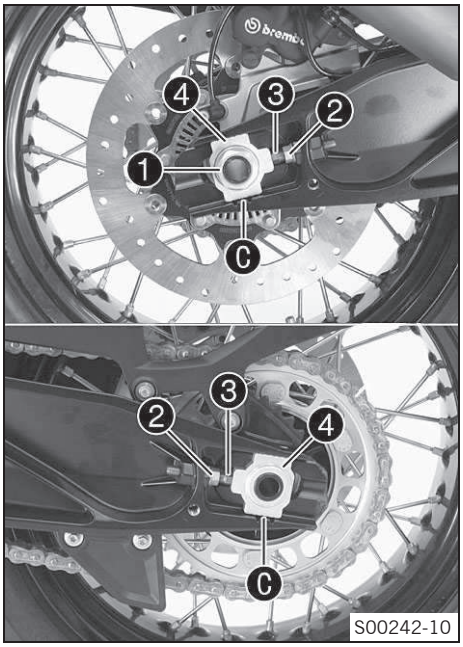
– Adjust the chain tension. (☛ p. 90)

14.6.5 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.



S00242-10

Preparatory work

– Check the chain tension. (☛ p. 89)

Main work

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

Guideline

Chain tension	40... 45 mm (1.57... 1.77 in)
Turn adjusting screws ❸ on the left and right so that the markings on the left and right chain adjusters ❹ are in the same position in relation to reference marks ❻. The rear wheel is then correctly aligned.	

Info

The upper part of the chain must be taut.
Chain wear is not always even, so you should check the setting at different chain positions.

– Tighten nuts ❷.
– Make sure that chain adjusters ❹ are resting against adjusting screws ❸.
– Tighten nut ❶.

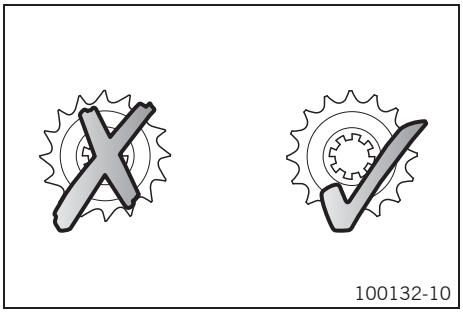
Guideline

Nut, rear wheel spindle	M25x1.5	90 Nm (66.4 lbf ft)	Thread greased

Info

Chain adjusters ❹ can be turned through 180°.

14.6.6 Checking the chain, rear sprocket and engine sprocket


100132-10

Preparatory work

(Option: Center stand)

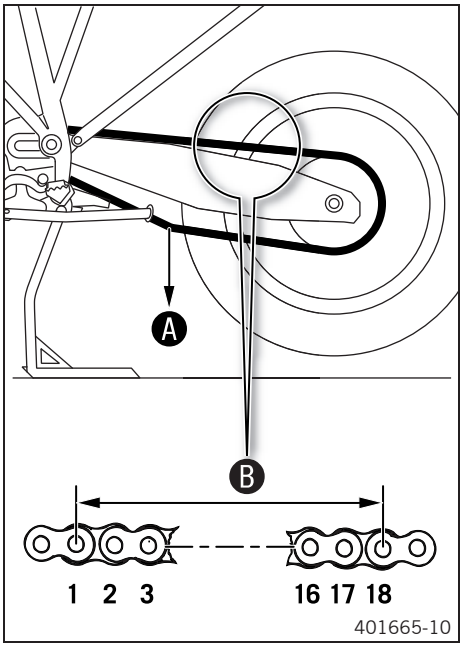
– Raise the vehicle with the center stand. (☛ p. 12)

Main work

– Check the rear sprocket and engine sprocket for wear.
  » If the rear sprocket or engine sprocket is worn:
    – Change the power set.

Info

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



– Shift the transmission to idle N.
– Pull the lower chain section with specified weight Ⓐ.

Guideline

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

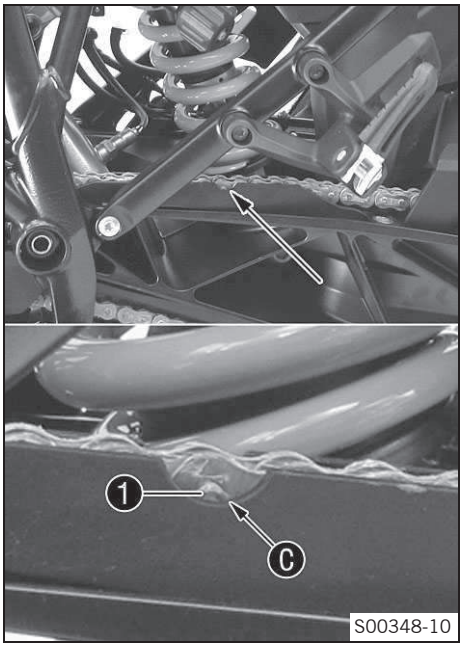
– Measure the distance Ⓑ of 18 chain links in the lower chain section.

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

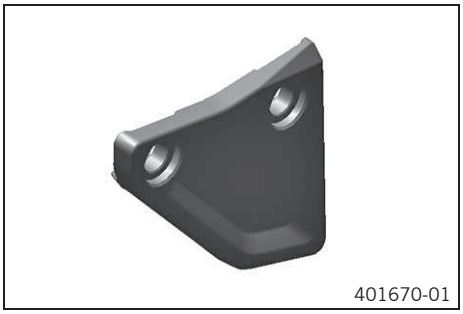
Info
When the chain is replaced, the rear sprocket and engine sprocket should also be changed.
New chains wear out faster on old, worn sprockets.
For safety reasons, the chain has no chain joint.



– Check the chain sliding guard for wear at the cutout.
» If rivet ❶ of the chain is no longer visible at the lower edge Ⓒ of the recess of the chain sliding guard:
– Change the chain sliding guard.
– Check the chain sliding guard for tightness.
» If the chain sliding guard is loose:
– Tighten the chain sliding guard.

Guideline

Screw, chain sliding guard	M5	5 Nm (3.7 lbf ft)



– Check the chain guide for wear.
» If the chain guide is worn:
– Change the chain guide.
– Check the chain guide for tightness.
» If the chain guide is loose:
– Tighten the chain guide.

Guideline

Screw, chain guide	M6	5 Nm (3.7 lbf ft)	**Loctite® 243™**

Finishing work
(Option: Center stand)
– Remove the vehicle from the center stand. (☛ p. 12)

14.6.7 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.

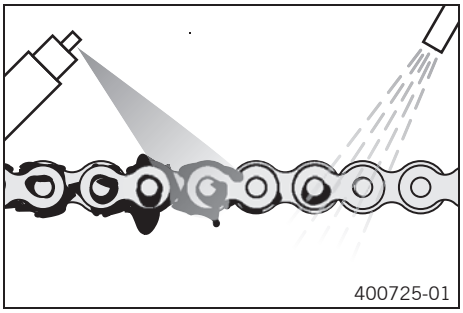
Warning
Danger of accidents Reduced braking efficiency due to oil or grease on the brake discs.

– 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.


400725-01

– Clean the chain regularly.
– Rinse off loose dirt with a soft jet of water.
– Remove old grease remains with chain cleaner.

Chain cleaner (☛ p. 268)

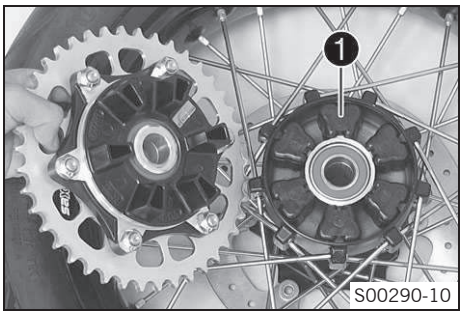
– After drying, apply chain spray.

Chain lube for road use (☛ p. 268)

14.6.8 Checking the rear hub rubber dampers

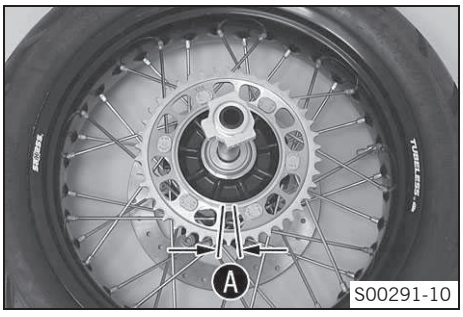
Info
The engine power is transmitted from the rear sprocket to the rear wheel via 6 rubber dampers. The rubber dampers wear out during operation. If the rubber dampers are not changed in time, the rear sprocket carrier and the rear hub will be damaged.

Preparatory work
(Option: Center stand)
– Raise the vehicle with the center stand. (☛ p. 12)
– Remove the rear wheel. (☛ p. 87)



S00290-10

Main work
– Check the rubber dampers ❶ of the rear hub for damage and wear.
» If the rubber dampers of the rear hub are damaged or worn:
– Change all rubber dampers in the rear hub.



S00291-10

– Lay the rear wheel on a workbench with the rear sprocket facing upwards and insert the wheel spindle in the hub.
– Check the rear sprocket play Ⓐ.

Info
Measure the play on the outside of the rear sprocket.

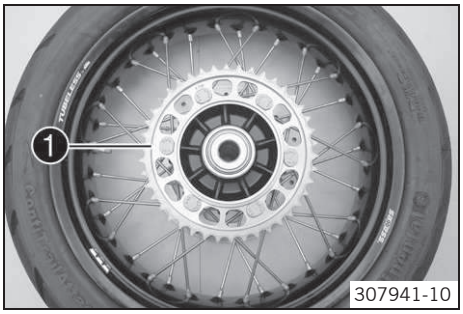
Play in rubber dampers, rear wheel	≤ 5 mm (≤ 0.2 in)

» If clearance Ⓐ larger than the specified value:
– Change all rubber dampers in the rear hub.

Finishing work
– Install the rear wheel. (☛ p. 88)

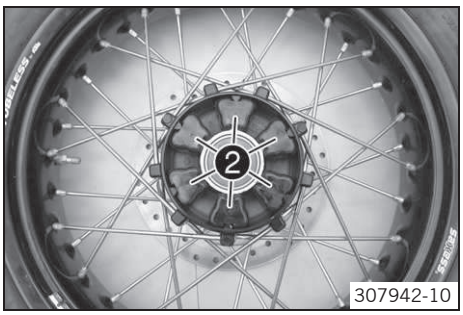
14.6.9 Changing the rubber dampers in the rear hub

Preparatory work
(Option: Center stand)
– Raise the vehicle with the center stand. (☛ p. 12)
– Remove the rear wheel. (☛ p. 87)

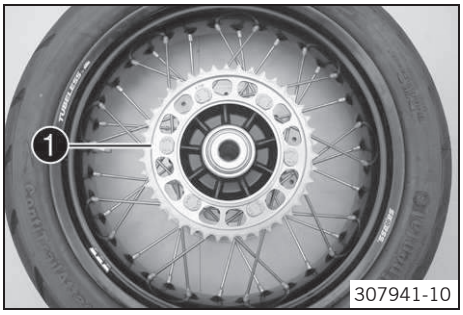


Main work

– Remove rear sprocket carrier ❶.



– Remove all rubber dampers ❷.
– Position new rubber dampers.



– Mount rear sprocket carriers ❶.

Finishing work

– Install the rear wheel. (☛ p. 88)

15.1 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.

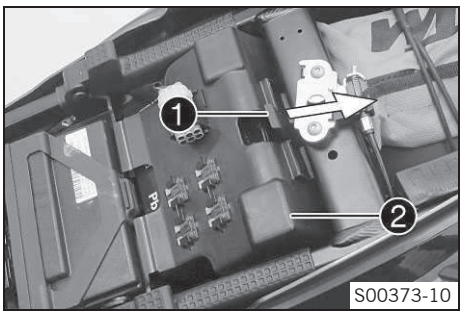
Caution

Danger of accidents If the vehicle is operated with a discharged battery or without a battery, electronic components and safety equipment may be damaged.

- Never operate the vehicle with a discharged battery or without a battery.

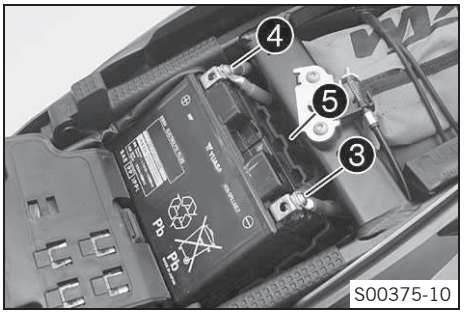
Preparatory work

- Switch off all power consumers and switch off the engine.
- Remove the passenger seat. (☛ p. 62)
- Remove the driver's seat. (☛ p. 62)



Main work

- Pull locking mechanism ❶ in the direction of the arrow.
- Fold open cover ❷.



- Disconnect negative cable ❸ of the battery.
- Disconnect the positive cable ❹ of the battery.
- Take the battery and battery case ❺ out of the battery compartment.

15.2 Installing the battery

Warning

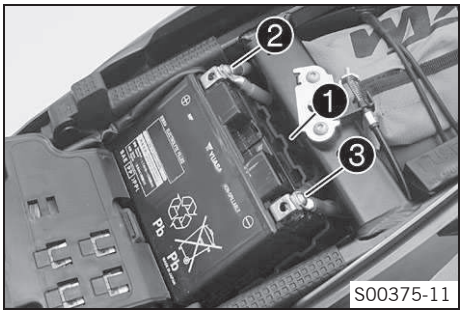
Risk of injury Battery acid and battery gases cause serious chemical burns.

- 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.

Caution

Danger of accidents If the vehicle is operated with a discharged battery or without a battery, electronic components and safety equipment may be damaged.

- Never operate the vehicle with a discharged battery or without a battery.



Main work

– Insert the battery into battery case ❶.

Info
The even side of the battery case must be opposite the poles.

– Insert the battery and battery case into the battery compartment.
– Connect both positive cables ❷.

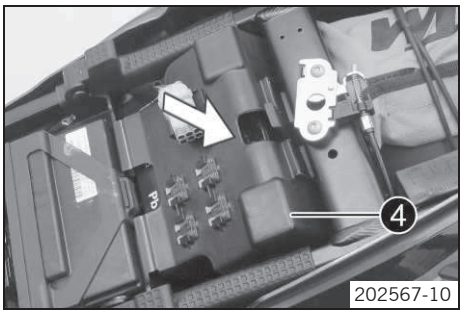
Guideline

Screw, battery terminal	M6	4.5 Nm (3.32 lbf ft)

– Connect both negative cables ❸.

Guideline

Screw, battery terminal	M6	4.5 Nm (3.32 lbf ft)



– Fold down cover ❹ and let it lock by pushing down lightly.

Finishing work

– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)
– Set the time and date.

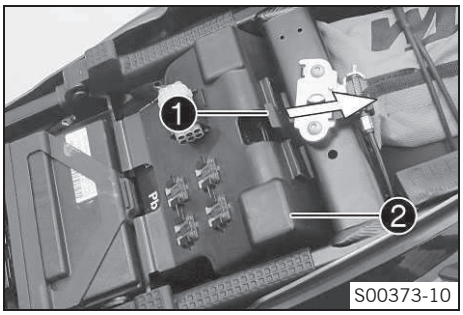
15.3 Disconnecting the negative (minus) cable of the battery

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

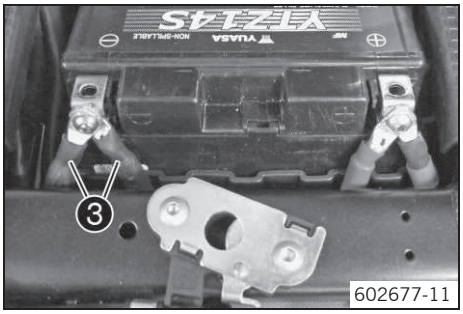
– Keep batteries out of the reach of children.
– Wear suitable protective clothing and goggles.
– Avoid contact with battery acid and battery gases.
– Keep sparks and open flames away from the battery. Only charge in well-ventilated rooms.
– In the event of skin contact, rinse with large amounts of water.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

Caution
Danger of accidents If the vehicle is operated with a discharged battery or without a battery, electronic components and safety equipment may be damaged.

– Never operate the vehicle with a discharged battery or without a battery.



– Pull locking mechanism ❶ in the direction of the arrow.
– Fold open cover ❷.



– Disconnect negative cable ❸ of the battery.

15.4 Connecting the negative cable of the battery

Warning

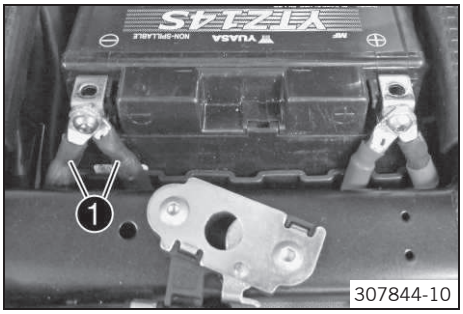
Risk of injury Battery acid and battery gases cause serious chemical burns.

– 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.

Caution

Danger of accidents If the vehicle is operated with a discharged battery or without a battery, electronic components and safety equipment may be damaged.

– Never operate the vehicle with a discharged battery or without a battery.

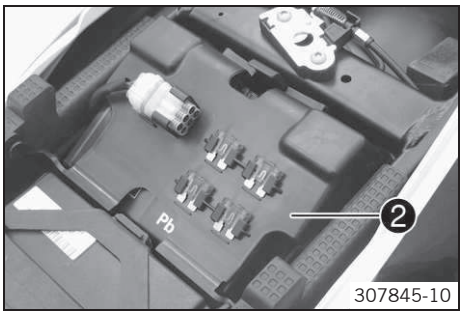


Main work

– Connect both negative cables ❶ of the battery.

Guideline

Screw, battery terminal	M6	4.5 Nm (3.32 lbf ft)



– Fold down cover ❷ and let it lock by pushing down lightly.

Finishing work

– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)
– Set the time and date.

15.5 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.

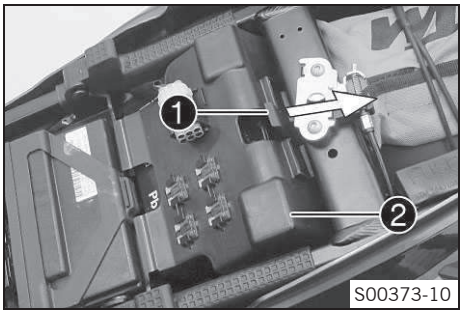
- Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

Info

Even when there is no load on the battery, it discharges 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.
If the battery is not charged using the KTM battery charger, the battery must be removed for charging. Otherwise, overvoltage may damage electronic components. Charge the battery according to the instructions on the battery housing.

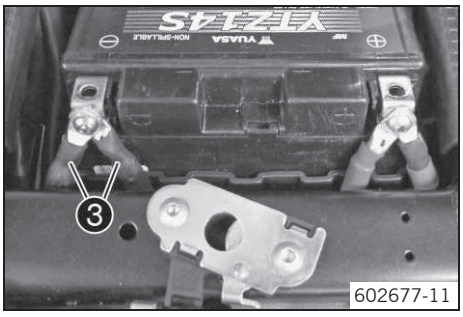
Preparatory work

- Switch off all power consumers and switch off the engine.
- Remove the passenger seat. (☛ p. 62)
- Remove the driver's seat. (☛ p. 62)

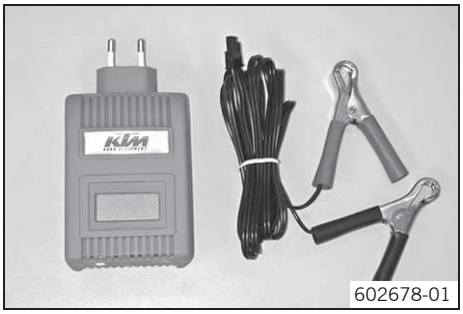


Main work

- Pull locking mechanism ❶ in the direction of the arrow.
- Fold open cover ❷.



- Disconnect the negative cable ❸ of the battery to avoid damage to the motorcycle's electronics.


602678-01

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

Battery charger (58429074000)

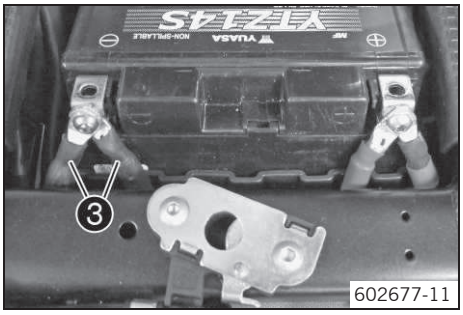
You can also use the battery charger to test the open-circuit voltage and start potential of the battery, and to test the alternator. With this device, you cannot overcharge the battery.

Info
Charge the battery with a maximum of 10% of the capacity specified on the battery housing.

– Switch off and disconnect the battery charger after charging.

Guideline

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

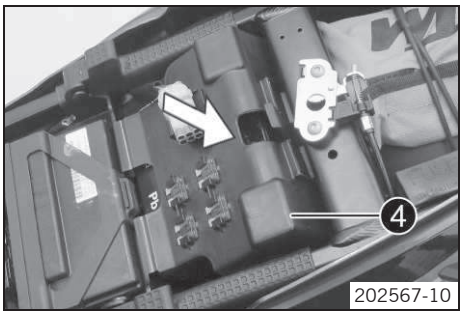


602677-11

– Connect both negative cables ❸.

Guideline

Screw, battery terminal	M6	4.5 Nm (3.32 lbf ft)



202567-10

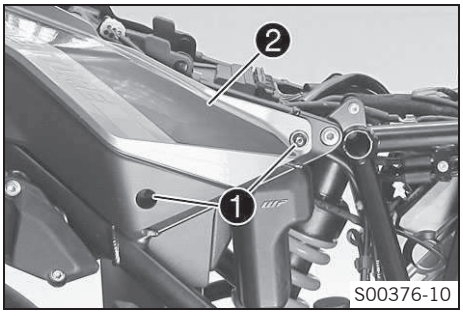
– Fold down cover ❹ and let it lock by pushing down lightly.

Finishing work
– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)
– Set the time and date.

15.6 Changing the main fuse

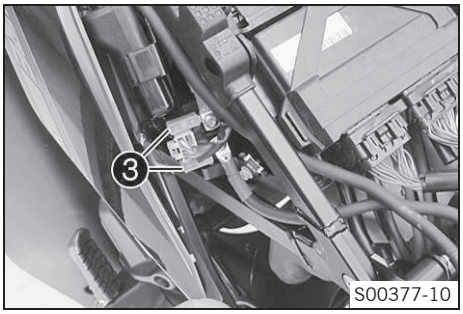
Warning
Fire hazard The electrical system can be overloaded if the wrong fuses are used.
– Use only fuses with the prescribed amperage. Never by-pass or repair fuses.

Preparatory work
– Switch off all power consumers and switch off the engine.
– Remove the passenger seat. (☛ p. 62)
– Remove the driver's seat. (☛ p. 62)

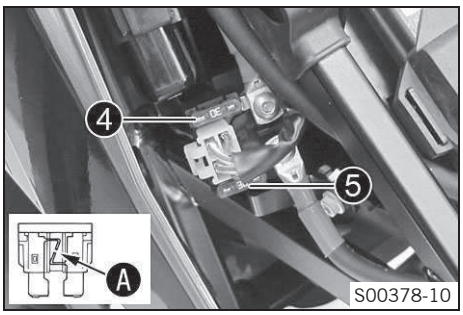


S00376-10

Main work
– Remove screws ❶.
– Raise rear fairing ❷ slightly.



– Remove protection caps ❸.



– Remove the faulty main fuse ❹.

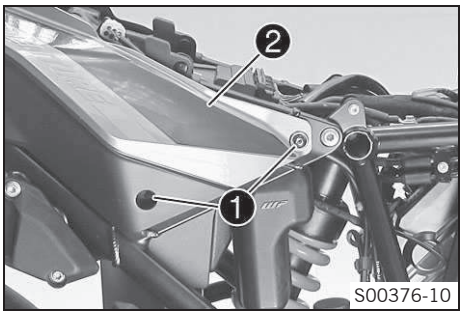
Info
A defective fuse is indicated by a burned-out fuse wire Ⓐ.
A reserve fuse ❺ is located in the starter relay.
The main fuse protects all power consumers of the vehicle.

– Install a new main fuse.

Fuse (58011109130) (☛ p. 232)

– Check that the electrical equipment is functioning properly.
– Mount protection covers.

Tip
Insert a new spare fuse into the starter relay to have it available when needed.



– Position rear fairing ❷.
– Mount and tighten screws ❶.

Guideline

Screw, cover part	M5x12	3.5 Nm (2.58 lbf ft)

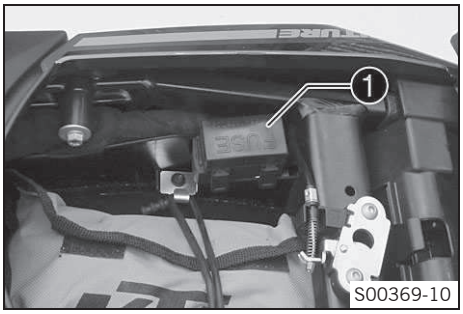
Finishing work
– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)
– Set the time and date.

15.7 Changing the fuses in the fuse box

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.

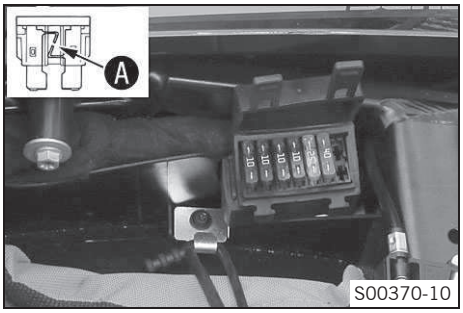
Info
The fuse box containing the fuses of individual power consumers is located under the seat.

Preparatory work
– Switch off all power consumers and switch off the engine.
– Remove the passenger seat. (☛ p. 62)



Main work

– Open fuse box cover ❶.



(Option: Without EDS)

– Check the fuses.

Info
A defective fuse is indicated by a burned-out fuse wire Ⓐ.

– Remove the defective fuse.

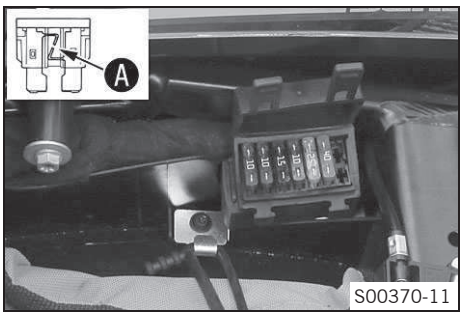
Guideline

Fuse **res** - 10 A - spare fuses
Fuse **1** - 10 A - power supply for control units and components
Fuse **2** - 10 A - socket (ACC1)
Fuse **3** - 25 A - ABS hydraulic unit
Fuse **4** - 40 A - ABS return pump
Fuse **5** - not used

– Use spare fuses with the correct rating only.

Fuse (58011109110) (☛ p. 232)
Fuse (58011109125) (☛ p. 232)
Fuse (58011109140) (☛ p. 232)

Tip
Insert a spare fuse so that it is available if needed.



(Option: With EDS)

– Check the fuses.

Info
A defective fuse is indicated by a burned-out fuse wire Ⓐ.

– Remove the defective fuse.

Guideline

Fuse **res** - 10 A - spare fuse
Fuse **res** - 15 A - spare fuse
Fuse **1** - 15 A - power supply for control units and components
Fuse **2** - 10 A - socket (ACC1)
Fuse **3** - 25 A - ABS hydraulic unit
Fuse **4** - 40 A - ABS return pump
Fuse **5** - not used

– Use spare fuses with the correct rating only.

Fuse (58011109110) (☛ p. 232)
Fuse (58011109115)
Fuse (58011109125) (☛ p. 232)
Fuse (58011109140) (☛ p. 232)

Tip
Insert a spare fuse so that it is available if needed.

– Check that the power consumer is functioning properly.
– Close the fuse box cover.

Finishing work

– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)

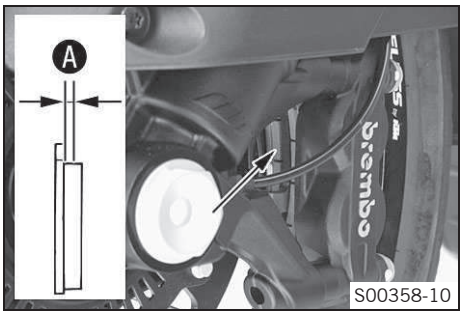
16.1 Checking the front brake linings

Warning
Danger of accidents Reduced braking efficiency caused by worn brake linings.

– Change worn brake linings immediately.

Note
Danger of accidents Reduced braking efficiency caused by damaged brake discs.

– If the brake linings are not changed in time, the steel brake lining carriers grind on the brake disc. The braking effect is greatly reduced and the brake discs are destroyed. Check the brake linings regularly.



– Check all brake linings on both brake calipers to ensure they have minimum thickness Ⓐ.

Minimum thickness	≥ 1 mm (≥ 0.04 in)

» If the minimum thickness is less than specified:
– Change the front brake linings. (☛ p. 102)

– Check all brake linings on both brake calipers for damage and cracking.

» If there is damage or cracking:
– Change the front brake linings. (☛ p. 102)

16.2 Changing the front 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
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.

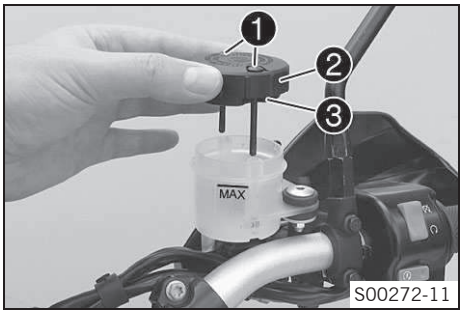
Warning
Danger of accidents Reduced braking efficiency due to use of non-approved brake linings.

– Brake linings available from accessory suppliers are often not tested and approved for use on KTM vehicles. The construction and friction factor of the brake linings and therefore the brake power can differ considerably from the original KTM brake linings. If brake linings are used that differ from the originals, there is no guarantee that they comply with the original license. The vehicle no longer corresponds to the condition at delivery, and the warranty is no longer valid.

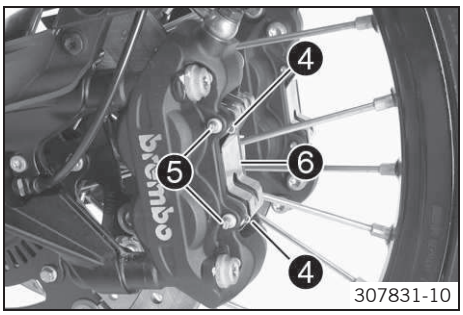
Warning
Environmental hazard Hazardous substances cause environmental damage.

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

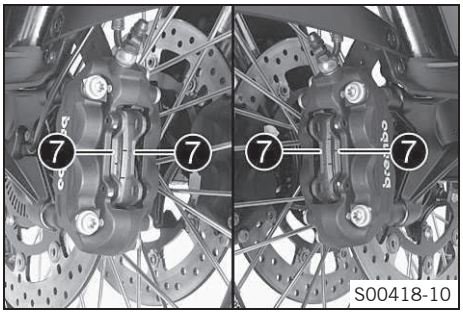
Info
Never use DOT 5 brake fluid! It is silicone-based and purple in color. Oil seals and brake lines are not designed for DOT 5 brake fluid.
Avoid contact between brake fluid and painted parts. Brake fluid attacks paint!
Use only clean brake fluid from a sealed container.



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

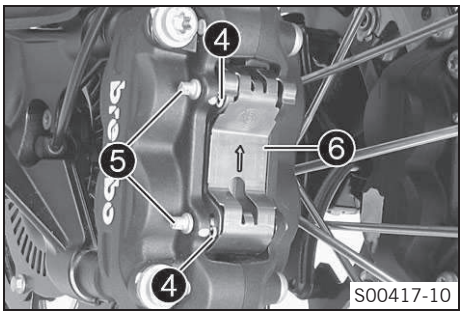


– Press the brake piston back into the basic position and ensure that brake fluid does not flow out of the brake fluid reservoir, sucking it away if necessary.
– Remove cotter pins ❹ and pull out pin ❺.
– Remove retaining bracket ❻.

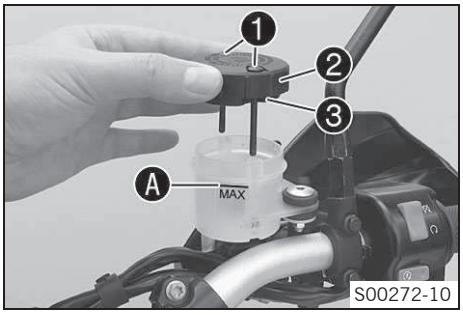


– Remove brake linings ❼.
– Clean the brake caliper.
– Mount new brake linings ❼.

Info
Always change the brake linings in pairs and on both sides.



– Position retaining bracket ❻.
✓ The arrow on the retaining bracket points in the direction of motion.
– Mount pin ❺ and cotter pins ❹.
– Repeat the operation on the opposite side.



– Operate the hand brake lever repeatedly until the brake linings are in contact with the brake disc and there is a pressure point.
– Correct the brake fluid to **MAX** marking Ⓐ.

Brake fluid DOT 4 / DOT 5.1 (☛ p. 266)

– Position cover ❷ with membrane ❸.

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

– Mount and tighten screws ❶.

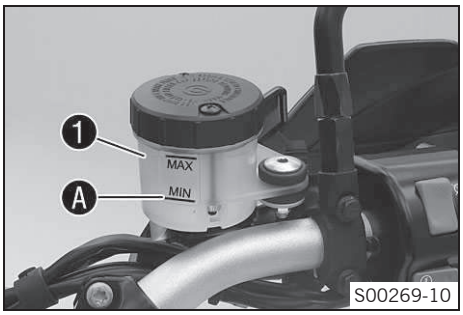
16.3 Checking the brake fluid level of the front brake

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 brake fluid reservoir ❶.
  » If the brake fluid has dropped below marking **MIN**Ⓐ:
    – Add front brake fluid. (☛ p. 104)

16.4 Adding front brake fluid

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
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.

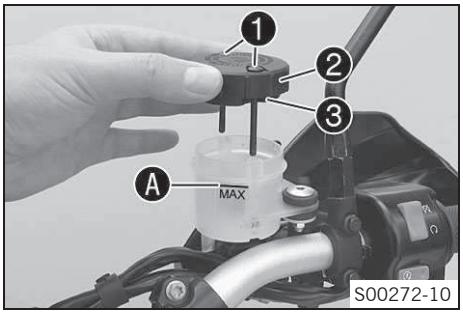
Warning
Danger of accidents Reduced braking efficiency due to old brake fluid.

– 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. 102)

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 the **MAX** mark Ⓐ.

Brake fluid DOT 4 / DOT 5.1 (☛ p. 266)

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

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

16.5 Changing the front brake fluid

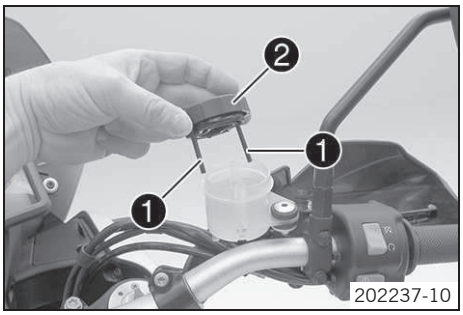
Warning
Skin irritation Brake fluid can cause skin irritation on contact.

– 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.

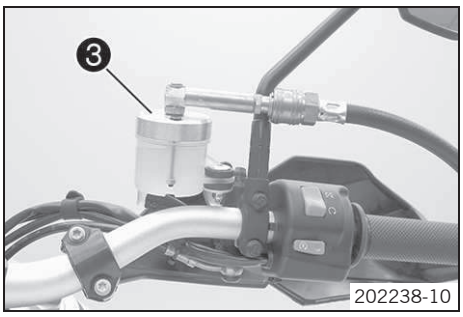
– Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

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 the membrane.
– Extract the old brake fluid from the brake fluid reservoir with a syringe and add fresh brake fluid.

Bleed syringe (50329050000) (☛ p. 271)
Brake fluid DOT 4 / DOT 5.1 (☛ p. 266)

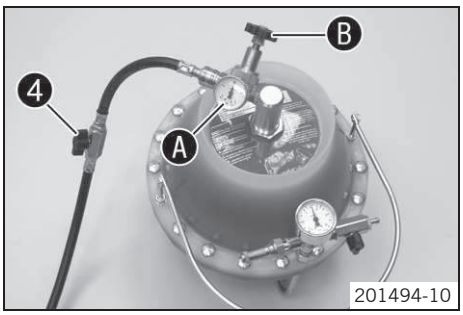


– Mount the corresponding bleeder cover ❸ from the special tool set.

Bleeder cover (00029013002) (☛ p. 270)

– Connect the bleeder device.

Bleeding device (00029013100) (☛ p. 270)



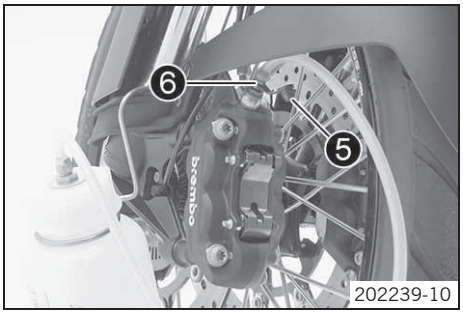
– Open shut-off valve ❹.

Info
Follow the operating instructions of the bleeding device.

– Ensure that the filling pressure is set on pressure gauge Ⓐ. Adjust the filling pressure on pressure regulator Ⓑ if necessary.

Guideline

Filling pressure	2... 2.5 bar (29... 36 psi)



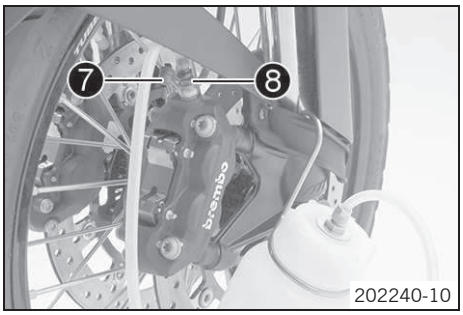
– Pull off protection cap ❺ of the bleeder screw of the left brake caliper. Connect the hose of the bleeder bottle.

Bleeding device (00029013100) (☛ p. 270)

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

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

– Tighten the bleeder screw. Remove the hose of the bleeder bottle. Mount the protection cap.



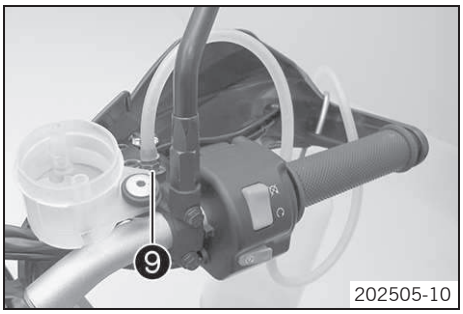
– Pull off protection cap ❼ of the bleeder screw of the right brake caliper. Connect the hose of the bleeder bottle.

Bleeding device (00029013100) (☛ p. 270)

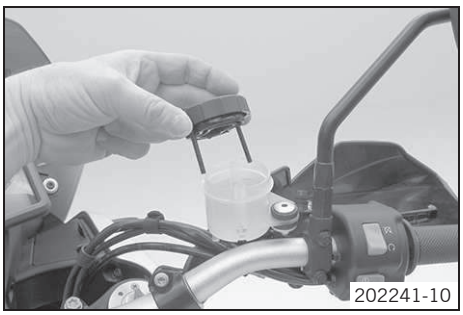
– Open bleeder screw ❽ by approx. one-half turn.

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

– Tighten the bleeder screw.
– Close shut-off valve ❹.
– Open the bleeder screw again until brake fluid stops emerging.
✓ This prevents overfilling of the brake fluid reservoir.
– Tighten the bleeder screw. Remove the hose of the bleeder bottle. Mount the protection cap.
– Lock the bleeding device. Remove the bleeder cover.



– Remove the protection cap of the hand brake cylinder bleeder screw. Connect the hose of the bleeder bottle.
– Open bleeder screw ❾ by approx. one-half turn. Operate the hand brake lever repeatedly until fresh brake fluid emerges from the hose of the bleeder bottle without bubbles. Tighten the bleeder screw.
– Remove the hose of the bleeder bottle. Mount the protection cap.



– Correct the brake fluid to the **MAX** marking.

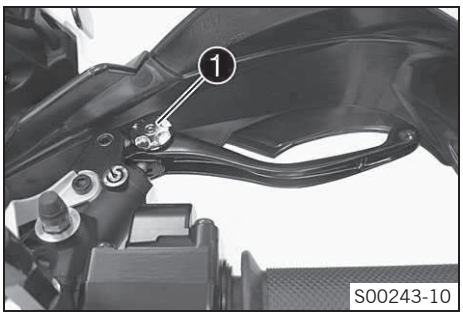
Brake fluid DOT 4 / DOT 5.1 (☛ p. 266)

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

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

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

16.6 Adjusting the basic position of the hand brake lever



– Adjust the basic position of the hand brake lever to your hand size by turning adjusting wheel ❶.

Info
Push the hand brake lever forward and turn the adjusting wheel.
Do not make any adjustments while riding.

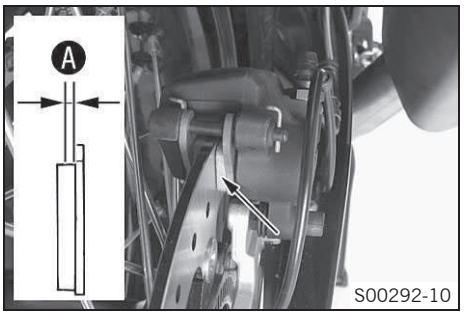
16.7 Checking the rear brake linings

Warning
Danger of accidents Reduced braking efficiency caused by worn brake linings.

– Change worn brake linings immediately.

Note
Danger of accidents Reduced braking efficiency caused by damaged brake discs.

– If the brake linings are not changed in time, the steel brake lining carriers grind on the brake disc. The braking effect is greatly reduced and the brake discs are destroyed. Check the brake linings regularly.



– 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. 107)

– Check the brake linings for damage and cracking.

» If there is wear or tearing:
– Change the rear brake linings. (☛ p. 107)

16.8 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
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.

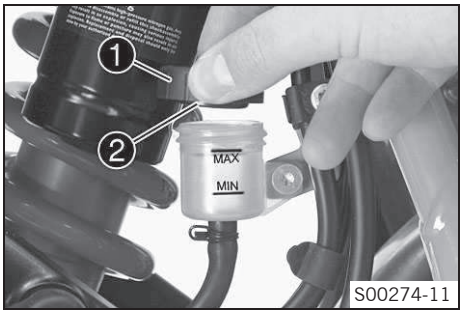
Warning
Danger of accidents Reduced braking efficiency due to use of non-approved brake linings.

– Brake linings available from accessory suppliers are often not tested and approved for use on KTM vehicles. The construction and friction factor of the brake linings and therefore the brake power can differ considerably from the original KTM brake linings. If brake linings are used that differ from the originals, there is no guarantee that they comply with the original license. The vehicle no longer corresponds to the condition at delivery, and the warranty is no longer valid.

Warning
Environmental hazard Hazardous substances cause environmental damage.

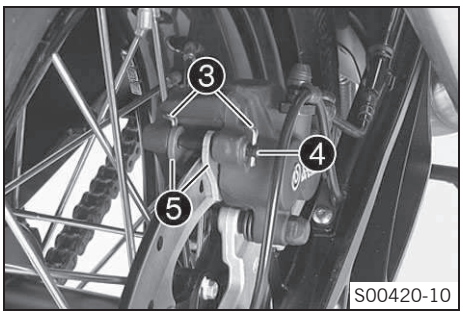
– Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

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.

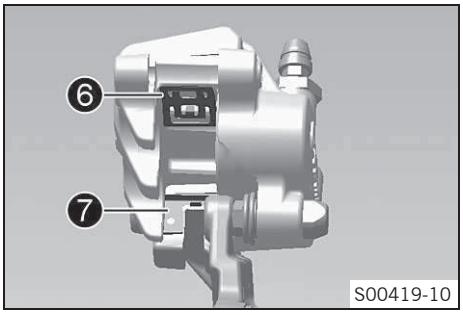


– Stand the vehicle upright.
– Remove screw cap ❶ with the membrane ❷.
– Press the brake caliper onto the brake disc by hand in order to push back the brake piston. Ensure that brake fluid does not overflow from the brake fluid reservoir, using suction to remove it if it does.

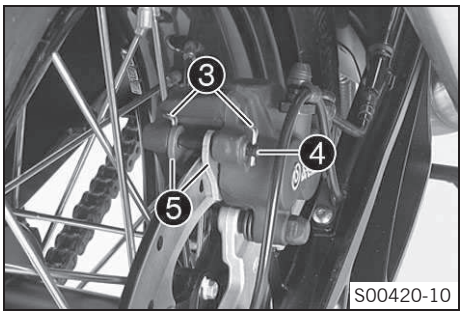
Info
Ensure that the brake caliper is not pressed against the spokes when the brake piston is pushed back.



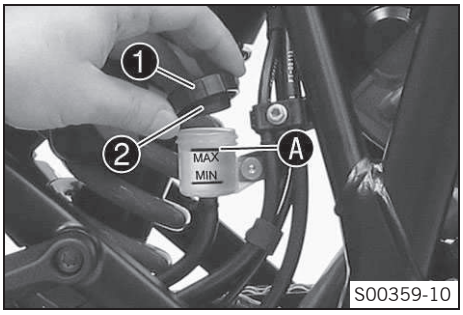
– Remove spring pins ❸.
– Remove pin ❹ and brake linings ❺.
– Clean the brake caliper and brake caliper support.



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



– Position brake linings ❺.
– Mount pin ❹ and spring pins ❸.



– Operate the foot brake lever repeatedly until the brake linings are in contact with the brake disc and there is a pressure point.
– Correct the brake fluid level to the **MAX** marking Ⓐ.

Brake fluid DOT 4 / DOT 5.1 (☛ p. 266)

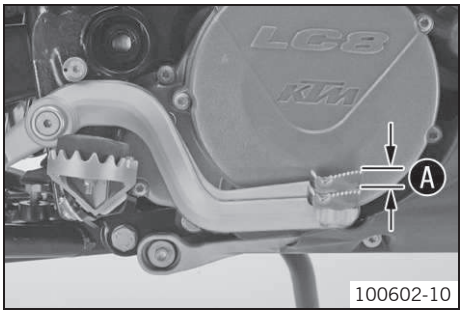
– Mount and tighten screw cap ❶ with membrane ❷.

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

16.9 Checking the free travel 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.



– 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)

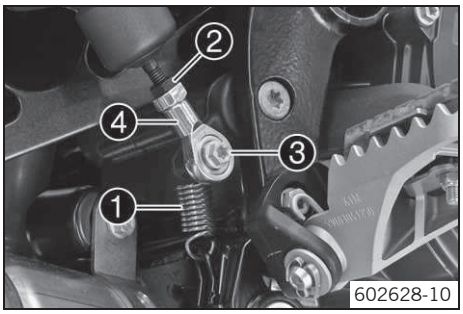
Info
You will know that contact has been made with the foot brake cylinder piston when there is increased resistance when you activate the foot brake lever.

» If the free travel does not equal the specification:
– Adjust the basic position of the foot brake lever. (☛ p. 109)

16.10 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 ❷.
– Remove screw ❸.
– To adjust the basic position of the foot brake lever to individual requirements, turn ball joint ❹ accordingly.

Info
The range of adjustment is limited.
The screw must be screwed into the ball joint by at least 5 turns.

– Hold ball joint ❹ and tighten nut ❷.

Guideline

Remaining chassis nuts	M6	10 Nm (7.4 lbf ft)

– Mount and tighten screw ❸.

Guideline

Remaining chassis nuts	M6	10 Nm (7.4 lbf ft)

– Attach spring ❶.

16.11 Checking the rear brake fluid level

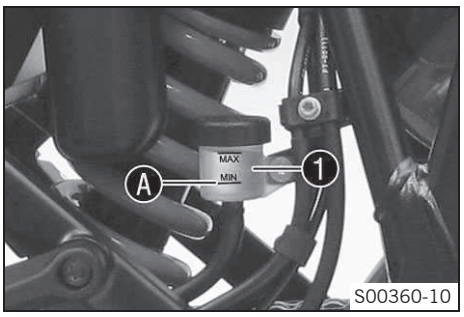
Warning
Danger of accidents Failure of the brake system.

– 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.

Preparatory work
(Option: Center stand)
– Raise the vehicle with the center stand. (☛ p. 12)



Main work

– Check the brake fluid level in the brake fluid reservoir ❶.
  » If the fluid level reaches the **MIN** marking Ⓐ:
    – Add rear brake fluid. (☛ p. 110)

16.12 Adding rear brake fluid

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

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

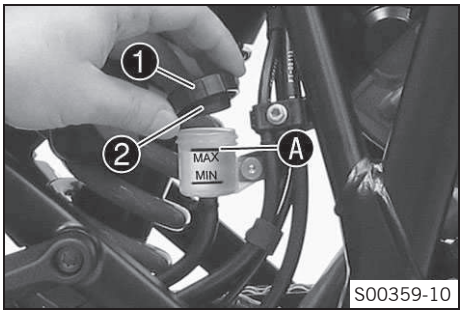
Never use DOT 5 brake fluid! It is silicone-based and purple in color. Oil seals and brake lines are not designed for DOT 5 brake fluid.
Avoid contact between brake fluid and painted parts. Brake fluid attacks paint!
Use only clean brake fluid from a sealed container.

Preparatory work

(Option: Center stand)

  – Raise the vehicle with the center stand. (☛ p. 12)

– Check the rear brake linings. (☛ p. 107)



Main work

– Remove screw cap ❶ with membrane ❷.
– Add brake fluid to the **MAX** mark Ⓐ.

Brake fluid DOT 4 / DOT 5.1 (☛ p. 266)

– Mount and tighten screw cap ❶ with membrane ❷.

Info

Clean up overflowed or spilt brake fluid immediately with water.

16.13 Changing the rear brake fluid

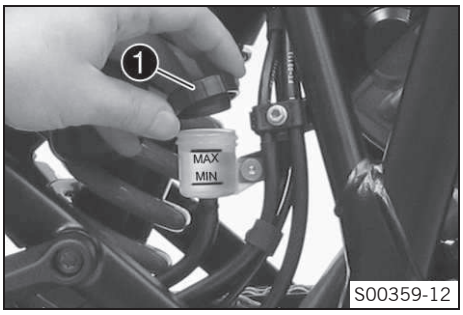
Warning
Skin irritation Brake fluid can cause skin irritation on contact.

- 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.

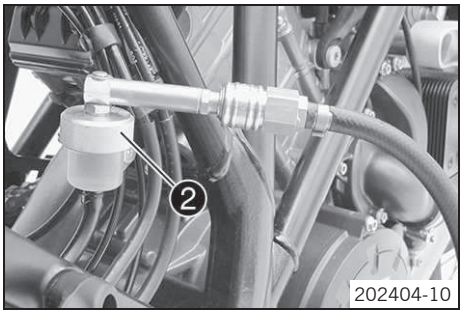
- Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

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.
- Extract the old brake fluid from the brake fluid reservoir with a syringe and add fresh brake fluid.

Bleed syringe (50329050000) (☛ p. 271)
Brake fluid DOT 4 / DOT 5.1 (☛ p. 266)

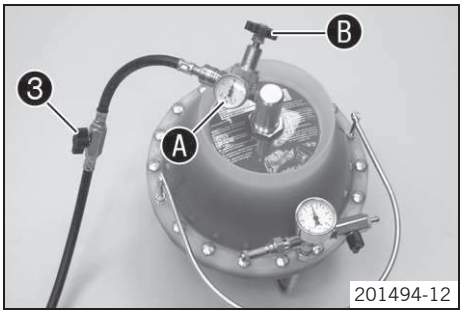


- Mount bleeder cover ❷.

Bleeder cover (00029013004) (☛ p. 270)

- Connect the bleeder device.

Bleeding device (00029013100) (☛ p. 270)



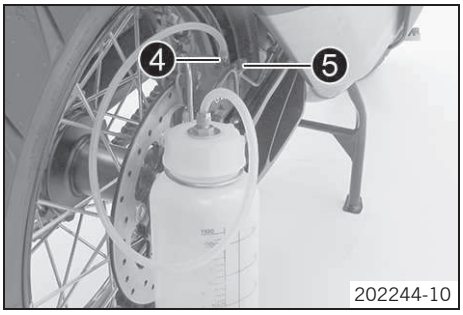
- Open shut-off valve ❸.

Info
Follow the operating instructions of the bleeding device.

- Ensure that the filling pressure is set on pressure gauge Ⓐ. Adjust the filling pressure on pressure regulator Ⓑ if necessary.

Guideline

Filling pressure	2... 2.5 bar (29... 36 psi)



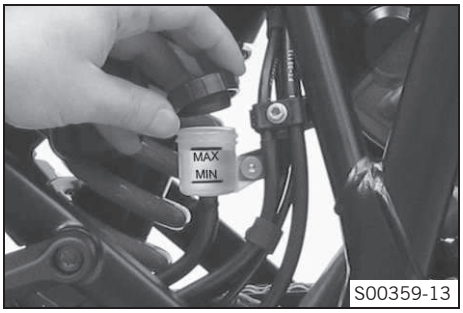
- Pull off protection cap ❹ of the bleeder screw. Connect the hose of the bleeder bottle.

Bleeding device (00029013100) (☛ p. 270)

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

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

- Tighten the bleeder screw.
- Close shut-off valve ❸.
- Open the bleeder screw again until brake fluid stops emerging.
  ✓ This prevents overfilling of the brake fluid reservoir.



– Tighten the bleeder screw. Remove the hose of the bleeder bottle. Mount the protection cap.
– Lock the bleeding device. Remove the bleeder cover.
– Correct the brake fluid to the **MAX** marking.

Brake fluid DOT 4 / DOT 5.1 (☛ p. 266)

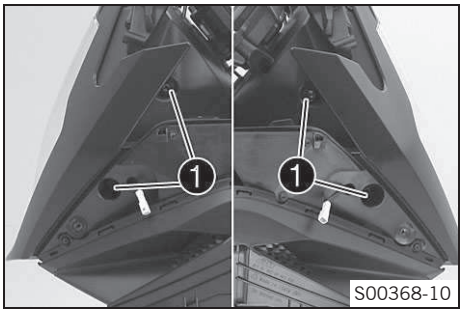
– Mount and tighten the screw cap with the membrane.

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

17.1 Removing the headlight mask with the headlight

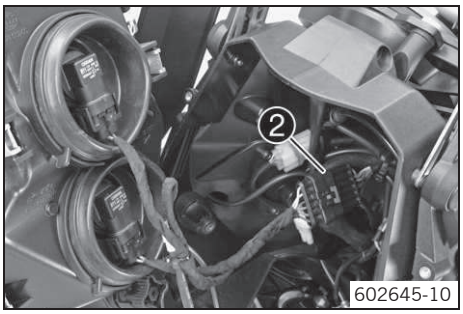
Preparatory work

- Switch off all power consumers and switch off the engine.
- Remove the passenger seat. (☛ p. 62)
- Remove the driver's seat. (☛ p. 62)
- Remove the front side cover. (☛ p. 75)
- Remove the tank cover. (☛ p. 76)
- Remove the mask spoiler. (☛ p. 77)
- Remove the wind shield. (☛ p. 80)



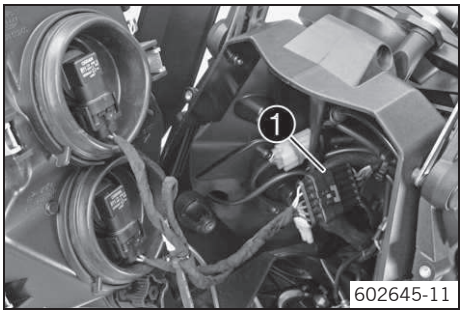
Main work

- Remove screws ❶.
- Remove the headlight mask forward.



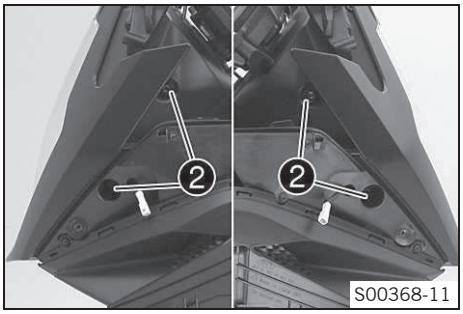
- Disconnect plug ❷.
- Place the headlight mask onto a soft cloth so that the headlight is not damaged.

17.2 Refitting the headlight mask with the headlight



Main work

- Connect connector ❶ of the headlight.
- Check that the lighting is functioning properly.
- Position the headlight mask.



- Mount and tighten screws ❷.

  Guideline

Remaining chassis screws	M6	10 Nm (7.4 lbf ft)

Finishing work

- Install the wind shield. (☛ p. 81)
- Install the mask spoiler. (☛ p. 78)
- Install the tank cover. (☛ p. 77)
- Install the front side cover. (☛ p. 75)
- Mount the driver's seat. (☛ p. 62)
- Mount the passenger seat. (☛ p. 62)
- Check the headlight setting. (☛ p. 115)

17.3 Changing the low beam bulb

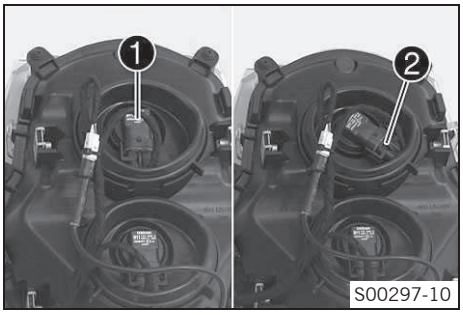
Note

Damage to reflector Reduced brightness.

– Grease on the lamp will evaporate due to the heat and be deposited on the reflector. Clean the lamp and keep it free of grease before mounting.

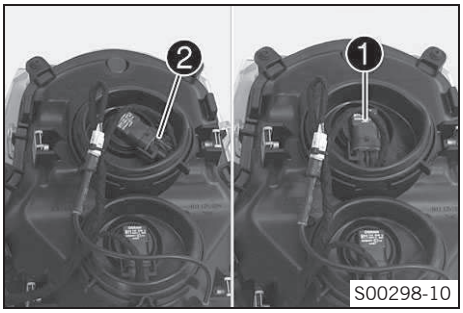
Preparatory work

– Switch off all power consumers and switch off the engine.
– Remove the passenger seat. (☛ p. 62)
– Remove the driver's seat. (☛ p. 62)
– Remove the front side cover. (☛ p. 75)
– Remove the tank cover. (☛ p. 76)
– Remove the mask spoiler. (☛ p. 77)
– Remove the wind shield. (☛ p. 80)
– Remove the headlight mask with the headlight. (☛ p. 113)



Main work

– Push headlight bulb ❶ lightly into the bulb socket, turn it all the way counterclockwise, and pull it out.
– Disconnect plug ❷.



– Plug connector ❷ into the new headlight bulb.

Low beam (H11/socket PGJ19-2) (☛ p. 232)

– Position headlight bulb ❶ into the bulb socket and turn it all the way clockwise.

✓ The headlight bulb is locked into the bulb socket.

Finishing work

– Refit the headlight mask with the headlight. (☛ p. 113)
– Install the wind shield. (☛ p. 81)
– Install the mask spoiler. (☛ p. 78)
– Install the tank cover. (☛ p. 77)
– Install the front side cover. (☛ p. 75)
– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)
– Check the headlight setting. (☛ p. 115)

17.4 Changing the high beam bulb

Note

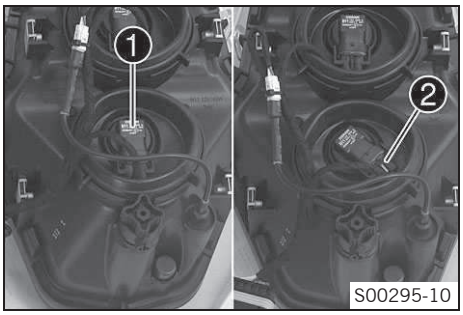
Damage to reflector Reduced brightness.

– Grease on the lamp will evaporate due to the heat and be deposited on the reflector. Clean the lamp and keep it free of grease before mounting.

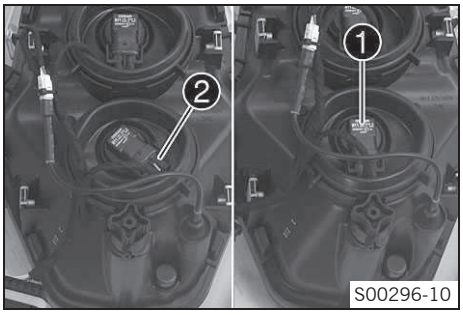
Preparatory work

– Switch off all power consumers and switch off the engine.
– Remove the passenger seat. (☛ p. 62)
– Remove the driver's seat. (☛ p. 62)
– Remove the front side cover. (☛ p. 75)
– Remove the tank cover. (☛ p. 76)

– Remove the mask spoiler. (☛ p. 77)
– Remove the wind shield. (☛ p. 80)
– Remove the headlight mask with the headlight. (☛ p. 113)



Main work
– Push headlight bulb ❶ lightly into the bulb socket, turn it all the way counterclockwise, and pull it out.
– Disconnect plug ❷.



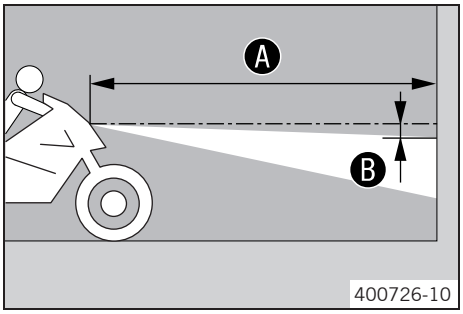
– Plug connector ❷ into the new headlight bulb.

High beam (H11/socket PGJ19-2) (☛ p. 232)

– Position headlight bulb ❶ into the bulb socket and turn it all the way clockwise.
✓ The headlight bulb is locked into the bulb socket.

Finishing work
– Refit the headlight mask with the headlight. (☛ p. 113)
– Install the wind shield. (☛ p. 81)
– Install the mask spoiler. (☛ p. 78)
– Install the tank cover. (☛ p. 77)
– Install the front side cover. (☛ p. 75)
– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)
– Check the headlight setting. (☛ p. 115)

17.5 Checking the headlight setting



– Park the vehicle on a horizontal surface in front of a light-colored wall and make a mark at the height of the center of the low beam headlight.
– Make another mark at a distance Ⓑ under the first mark.
Guideline

Distance Ⓑ	5 cm (2 in)

– Position the vehicle perpendicular to the wall at a distance Ⓐ from the wall and switch on the low beam.
Guideline

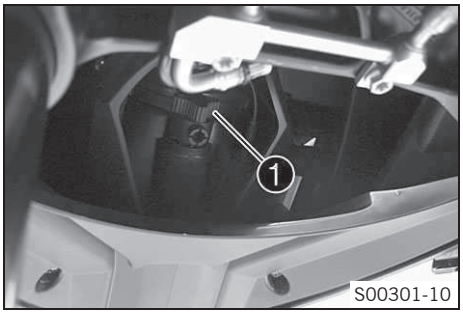
Distance Ⓐ	5 m (16 ft)

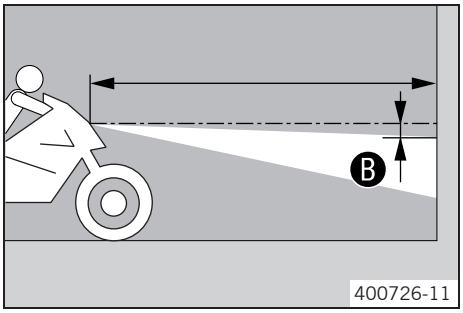
– The rider, with luggage and passenger if applicable, now mounts the motorcycle.
– Check the headlight setting.

The light-dark boundary must lie exactly on the lower mark when the motorcycle is ready to operate with the rider mounted along with any baggage and a passenger if applicable.

» If the boundary between light and dark does not meet specifications:
– Adjust the headlight range. (☛ p. 116)

17.6 Adjusting the headlight range





Preparatory work

– Check the headlight setting. (☛ p. 115)
– Remove the bottom triple clamp cover. (☛ p. 80)

Main work

– Turn adjusting screw ❶ to adjust the headlight range.

Info

Turn clockwise to increase the headlight range; turn counterclockwise to reduce the headlight range.
If you have a payload, you may have to correct the headlight range.

– Set the headlight to marking Ⓑ.

Guideline

The light-dark boundary must lie exactly on the lower mark Ⓑ when the motorcycle is ready to operate with the rider mounted along with any luggage and a passenger if applicable.

Finishing work

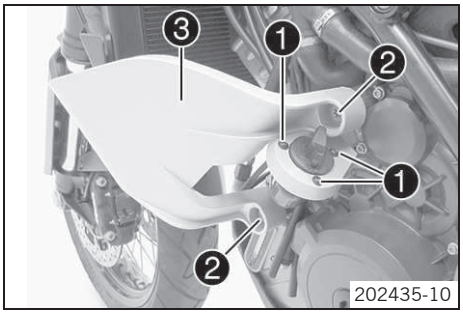
– Install the bottom triple clamp cover. (☛ p. 80)

18.1 Removing the engine

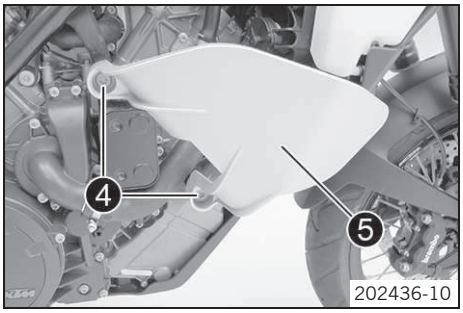
Preparatory work
(Option: Center stand)

– Raise the vehicle with the center stand. (☛ p. 12)
– Remove the engine guard. (☛ p. 42)
– Remove the passenger seat. (☛ p. 62)
– Remove the driver's seat. (☛ p. 62)
– Remove the front side cover. (☛ p. 75)
– Remove the tank cover. (☛ p. 76)
– Remove the mask spoiler. (☛ p. 77)
– Remove the fuel tank. (☛ p. 63)
– Remove the upper part of the air filter box. (☛ p. 57)
– Remove the lower part of the air filter box. (☛ p. 59)
– Remove the throttle valve body. (☛ p. 224)
– Drain the coolant. (☛ p. 206)
– Disassemble the main silencer. (☛ p. 52)
– Disassemble the manifold. (☛ p. 53)

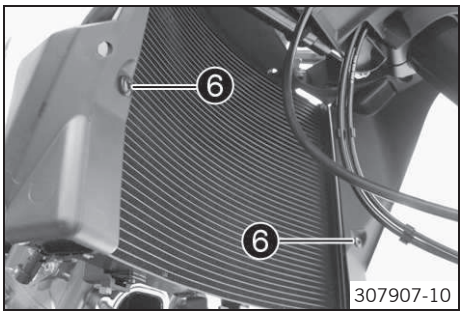
Main work



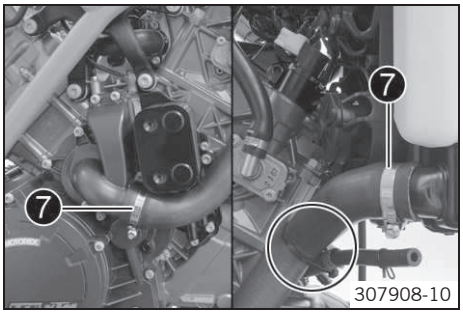
– Remove screws ❶.
– Remove screws ❷. Remove tank guard ❸.



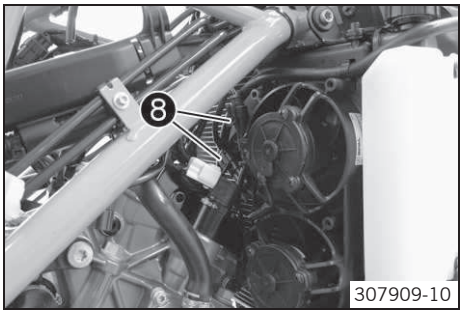
– Remove screws ❹. Remove tank guard ❺.



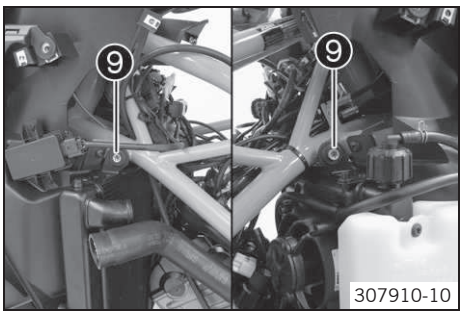
– Remove screws ❻.



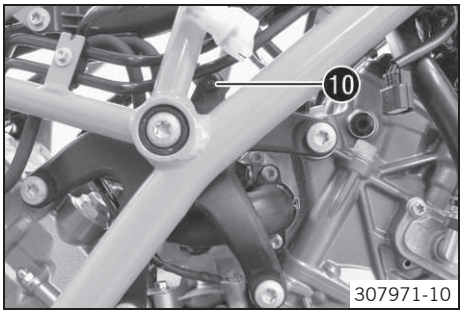
– Remove the cable binder.
– Loosen hose clips ❼.
– Remove the radiator hose.



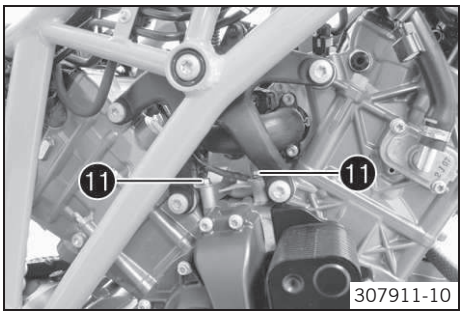
– Pull both connectors ❽ off the holder and disconnect them.



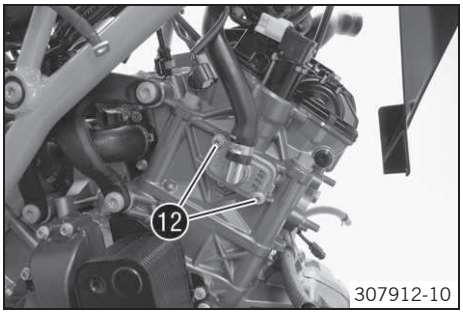
– Remove screws ❾.
– Remove the radiator in a downward direction.



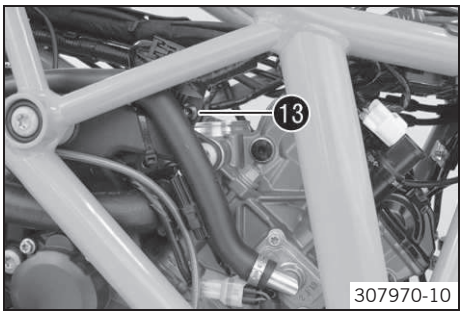
– Remove screw ❿.



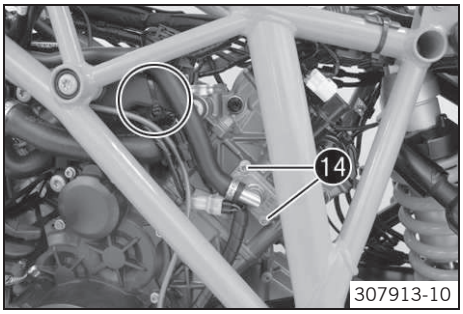
– Remove screws ⓫.
– Hang the ground wire to the side.



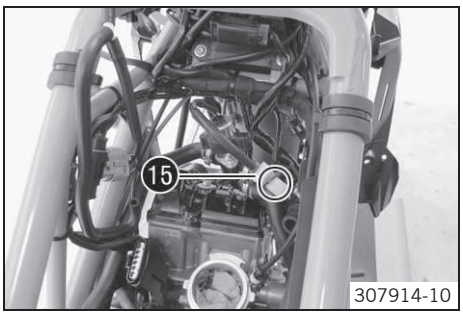
– Remove screws ⓬.



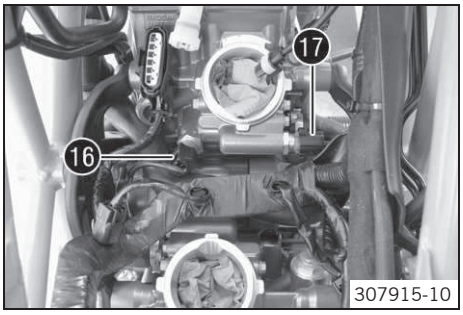
– Remove screw ⓭.



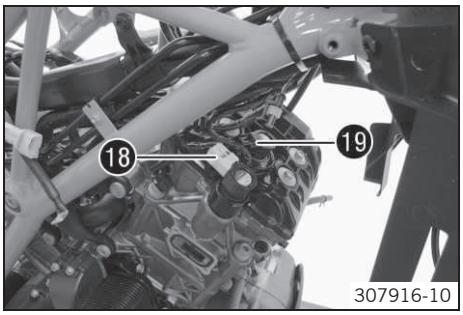
– Remove screws ⓮.
– Remove the cable binder.



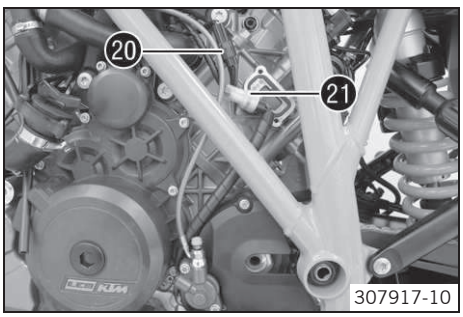
– Remove the cable binder.
– Detach connector ⓯.
– Remove the SLS valve with hoses.



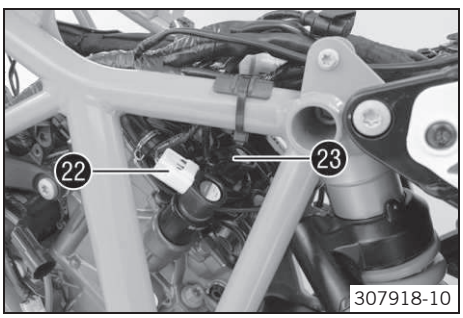
– Detach connector ⓰.
– Detach connector ⓱.



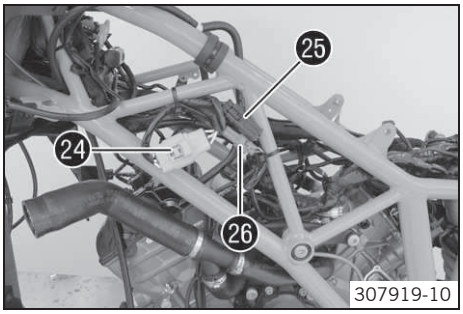
– Detach connector ⓲.
– Detach connector ⓳.



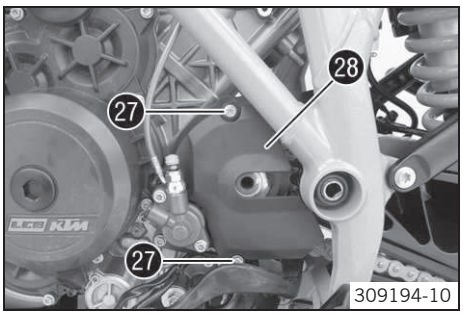
– Remove the cable guard.
– Detach connector ⓴.
– Detach connector ㉑.
– Expose the cable.



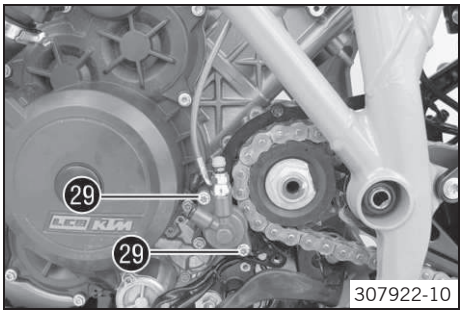
– Detach connector ㉒.
– Detach connector ㉓.



– Detach connector ㉔.
– Detach connector ㉕.
– Detach connector ㉖.
– Expose the cable.



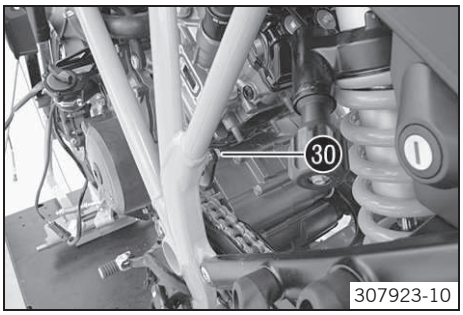
– Remove screws ㉗.
– Take off engine sprocket cover ㉘.



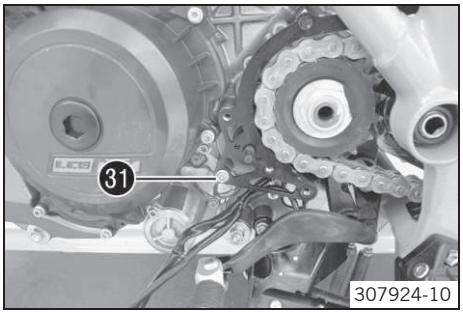
– Remove screws ㉙.
– Take off the clutch slave cylinder and hang it to the side.

Info
Do not operate the clutch lever when the clutch slave cylinder screw is disassembled.
Do not bend the clutch line.

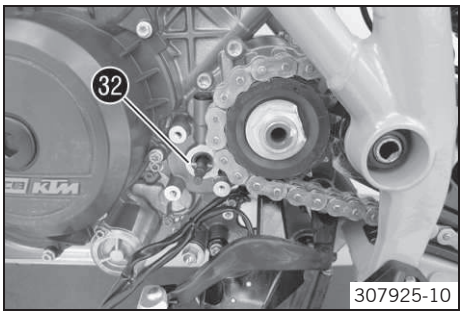
– Remove the spacer with sleeves.



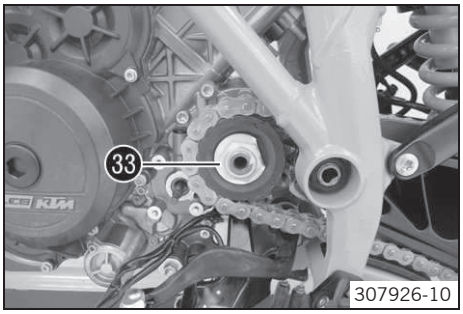
– Remove screw ㉚.



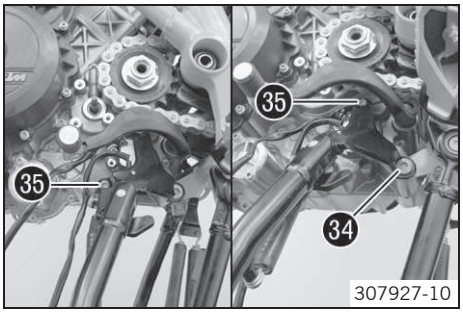
– Remove screw ㉛.
– Remove the chain securing guide with the spacer.



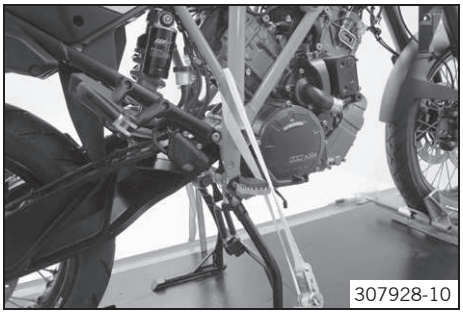
– Remove pin ㉜.



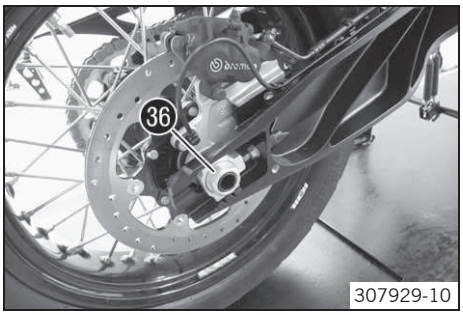
– Have an assistant operate the rear brake.
– Bend up the lock washer.
– Loosen nut ㉝.



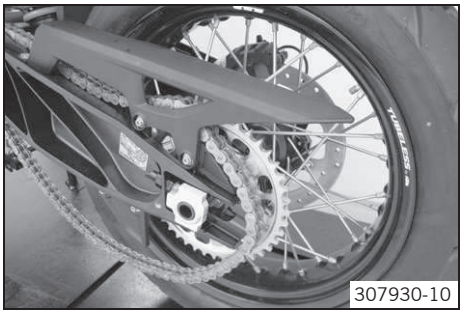
– Remove screw ㉞.
– Remove screws ㉟.
– Remove the side stand bracket.



– Secure the motorcycle against falling over with belts.

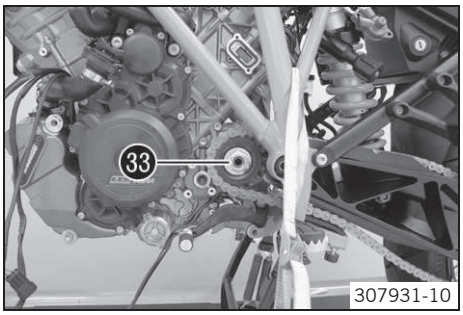


– Remove nut ㊱.
– Remove the chain adjuster.

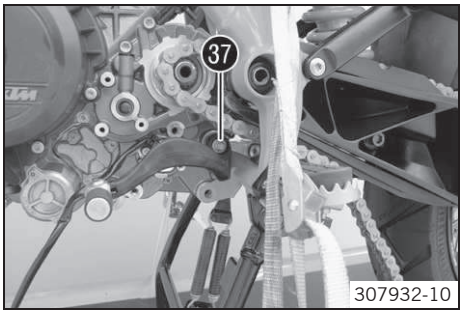


– Push the rear wheel into the foremost position.
– Remove the chain from the rear sprocket.

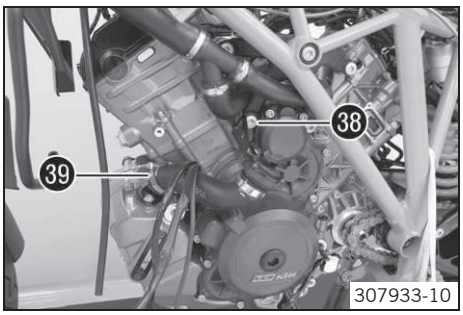
Info
Protect the swingarm and attachments from damage.



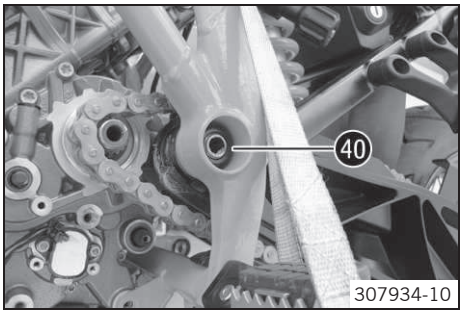
– Remove nut ㉝ with lock washer.
– Take off the engine sprocket.



– Remove screw ❸❼ with the washer.
– Remove the shift lever.



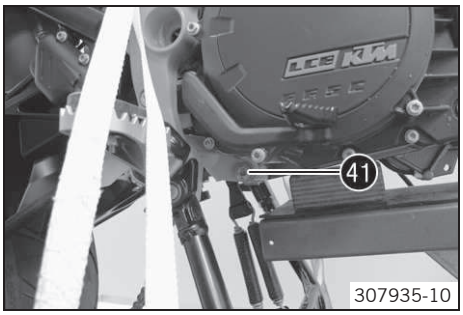
– Remove screw ❸❽.
– Loosen hose clip ❸❾.
– Remove oil filler tube.
– Cover the filling hole with a cloth.



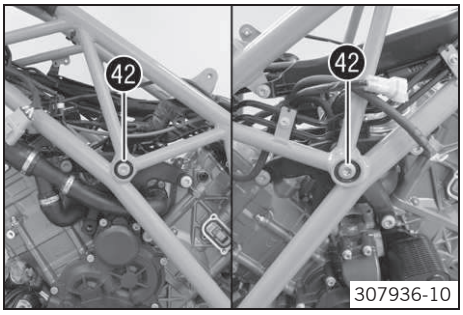
– Position the jack under the engine.

Info
It is a good idea to have assistance when carrying out the following procedures.

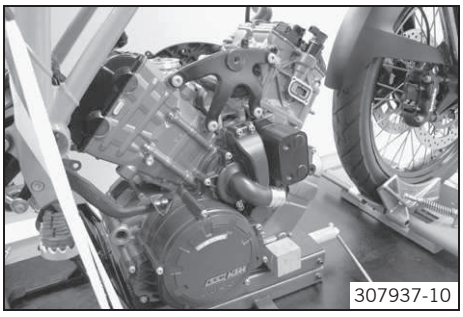
– Remove nut ❹❿.
– Pull out the swingarm pivot.



– Remove screw ❹❶.



– Remove screws ❹❷ with bearing.

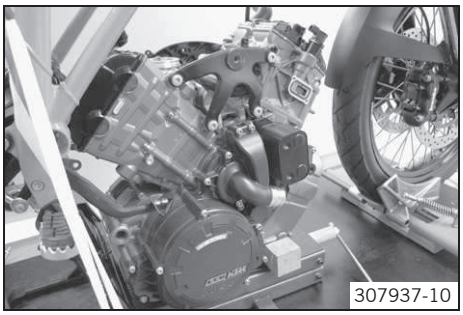


– Pull the engine forward slightly and lower carefully.

18.2 Installing the engine

Preparatory work

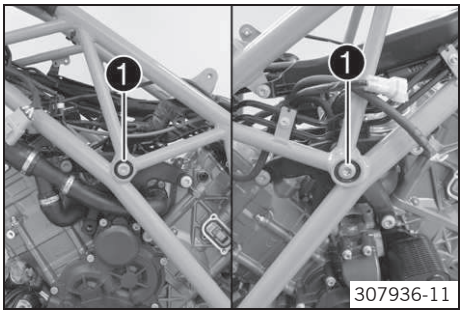
– Prepare the engine for installation. (☛ p. 130)


307937-10

Main work

– Position the engine on a jack under the vehicle.

Info
It is a good idea to have assistance when carrying out this operation.

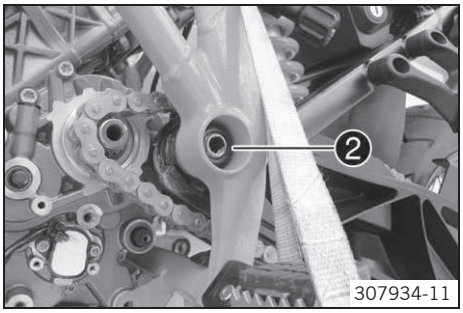


307936-11

– Position the engine in the frame.
– Position screws ❶ with bearing, but do not tighten yet.

Guideline

Engine carrying screw	M10	45 Nm (33.2 lbf ft)

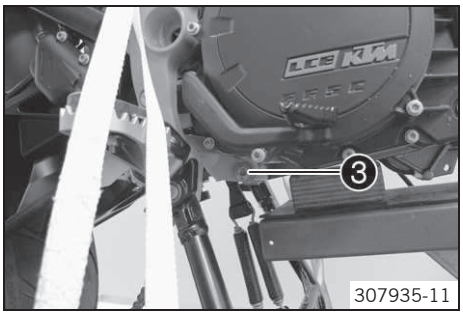


307934-11

– Mount the swingarm pivot.
– Mount nut ❷ but do not tighten yet.

Guideline

Nut, swingarm pivot	M19x1.5	130 Nm (95.9 lbf ft)	Thread greased

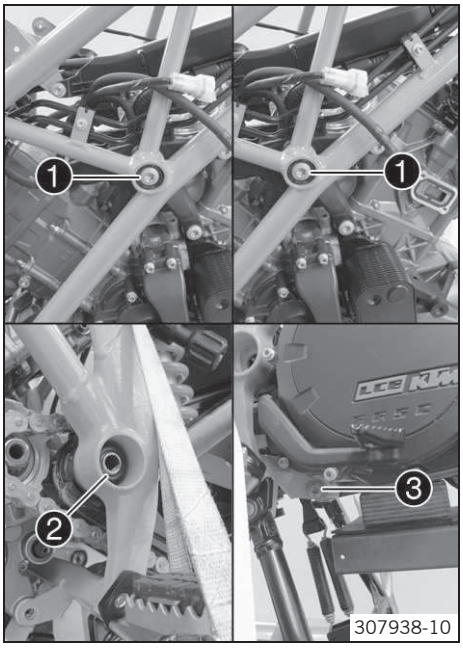


307935-11

– Mount screw ❸ but do not tighten yet.

Guideline

Engine carrying screw	M10	45 Nm (33.2 lbf ft)



– Tighten screws ❶.

Guideline

Engine carrying screw	M10	45 Nm (33.2 lbf ft)	

– Tighten nut ❷.

Guideline

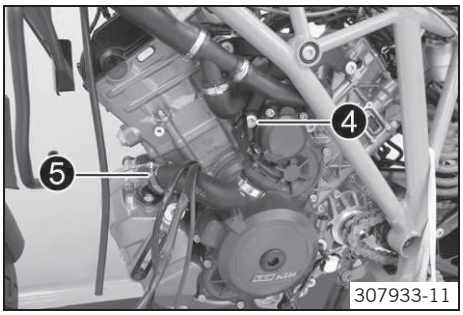
Nut, swingarm pivot	M19x1.5	130 Nm (95.9 lbf ft)	Thread greased

– Tighten screw ❸.

Guideline

Engine carrying screw	M10	45 Nm (33.2 lbf ft)	

– Remove the jack.

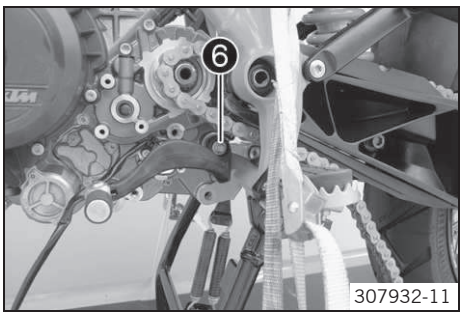


– Remove the cloth.
– Assemble the oil filler tube.
– Mount and tighten screw ❹.

Guideline

Engine carrying screw	M10	45 Nm (33.2 lbf ft)	

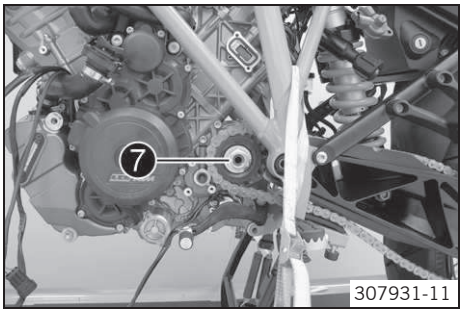
– Position and tighten hose clip ❺.



– Position the shift lever.
– Position and tighten screw ❻ with washer.

Guideline

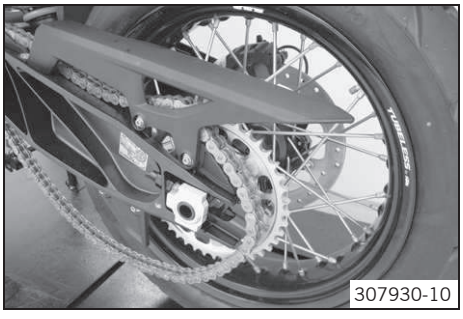
Screw, shift lever	M6	18 Nm (13.3 lbf ft)	**Loctite® 243™**



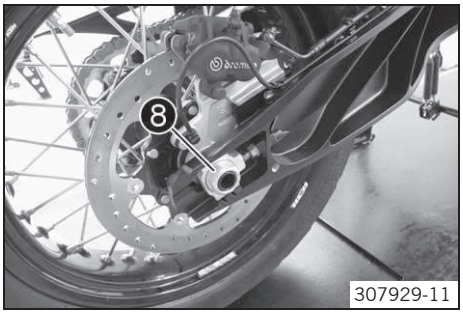
– Lay a chain over the engine sprocket.
– Mount the engine sprocket.
– Mount nut ❼ with the lock washer, but do not tighten yet.

Guideline

Nut of engine sprocket	M20x1.5	100 Nm (73.8 lbf ft)	**Loctite® 243™**



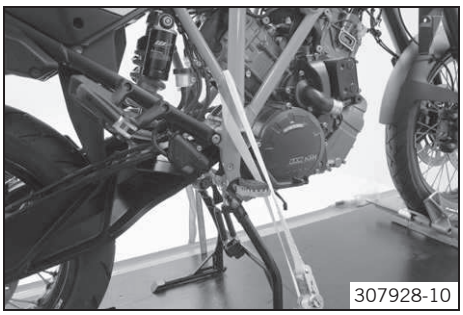
– Lay a chain over the rear sprocket.



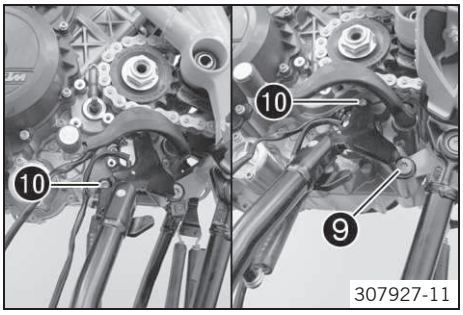
– Slide the wheel spindle in as far as it will go.
– Mount the chain adjuster.
– Push the rear wheel forward so that the chain adjusters are in contact with the screws, and tighten nut ❽.

Guideline

Nut, rear wheel spindle	M25x1.5	90 Nm (66.4 lbf ft)	Thread greased



– Remove the belts.



– Position the side stand bracket.
– Mount screw ❾ but do not tighten yet.

Guideline

Screw, side stand bracket	M10	45 Nm (33.2 lbf ft)	**Loctite® 243™**

– Mount and tighten screws ❿.

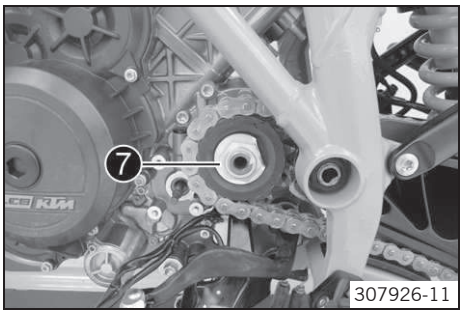
Guideline

Screw, side stand bracket	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**

– Tighten screw ❾.

Guideline

Screw, side stand bracket	M10	45 Nm (33.2 lbf ft)	**Loctite® 243™**

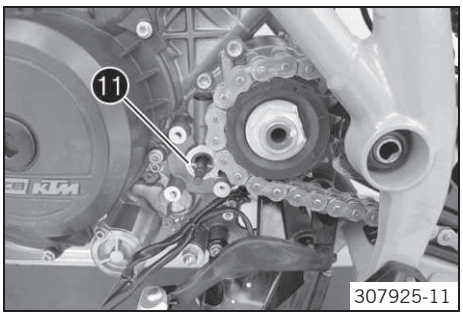


– Have an assistant operate the rear brake.
– Tighten nut ❼.

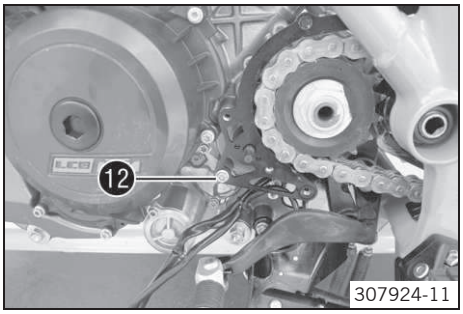
Guideline

Nut of engine sprocket	M20x1.5	100 Nm (73.8 lbf ft)	**Loctite® 243™**

– Secure the nut with the lock washer.

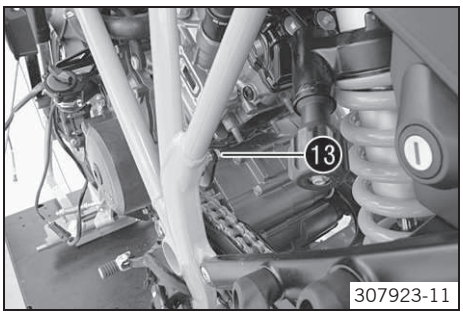


– Mount pin ⓫.



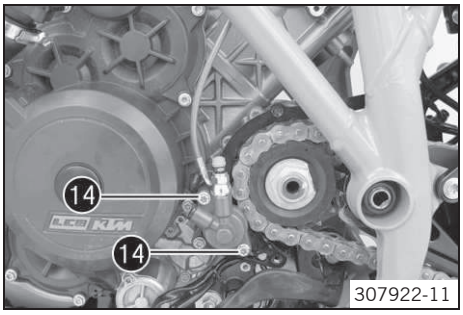
– Mount the chain securing guide with the spacer.
– Mount and tighten screw ⓬.
Guideline

Remaining chassis screws	M6	10 Nm (7.4 lbf ft)



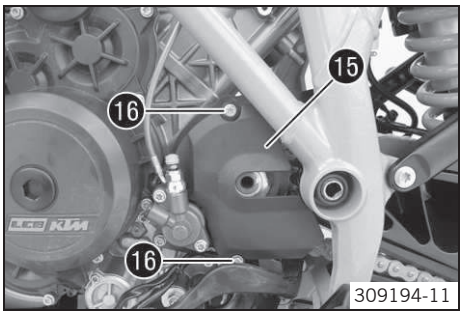
– Mount and tighten screw ⓭.
Guideline

Remaining chassis screws	M8	25 Nm (18.4 lbf ft)



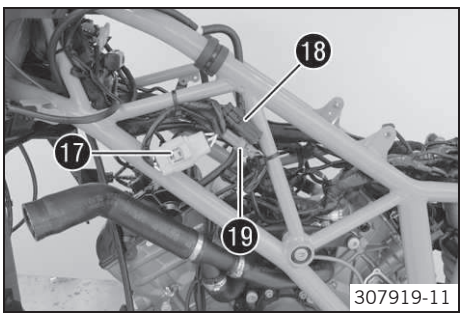
– Mount the clutch slave cylinder screw with spacer and sleeves.
– Route the clutch line without kinks.
– Mount and tighten screws ⓮.
Guideline

Clutch slave cylinder screw	M6	10 Nm (7.4 lbf ft)

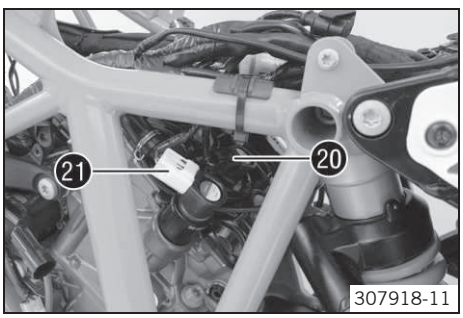


– Position engine sprocket cover ⓯.
– Mount and tighten screws ⓰.
Guideline

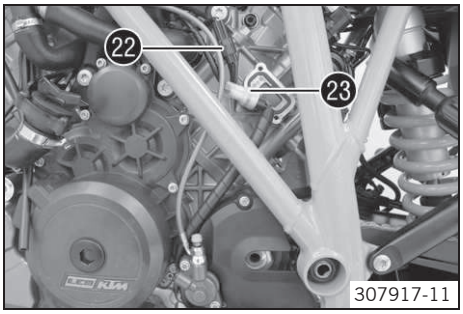
Remaining chassis screws	M6	10 Nm (7.4 lbf ft)



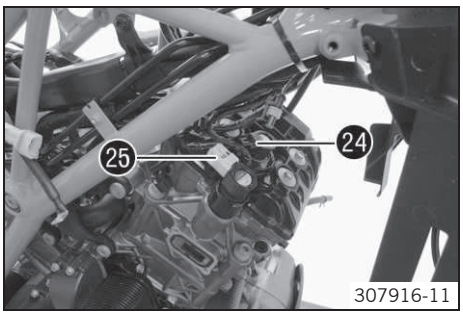
– Plug in connector ⓱.
– Plug in connector ⓲.
– Plug in connector ⓳.
– Route the cable so it is not under tension and secure with a cable binder.



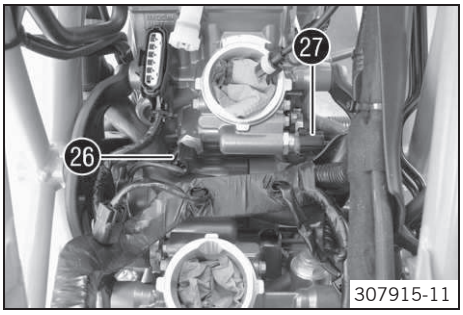
– Plug in connector ⓴.
– Plug in connector ㉑.
✓ The cable with the white marking is connected to the outer ignition coil.



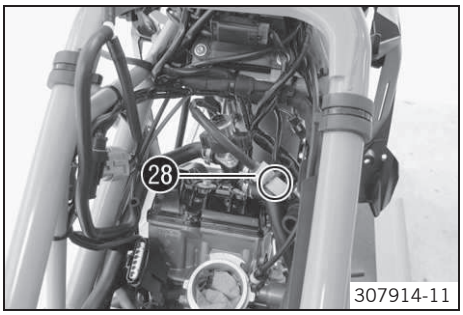
– Plug in connector ㉒.
– Plug in connector ㉓.
– Route the cable so it is not under tension and secure with a cable binder and a cable guard.



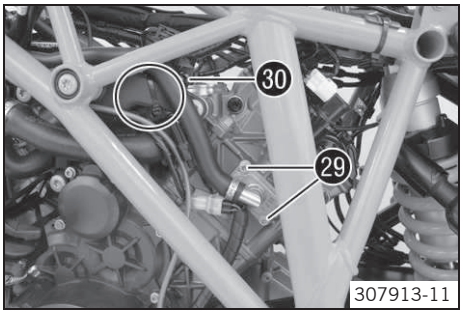
– Plug in connector ㉔.
– Plug in connector ㉕.
✔ The cable with the white marking is connected to the outer ignition coil.



– Plug in connector ㉖.
– Plug in connector ㉗.



– Position the SLS valve with hoses.
– Plug in connector ㉘.
– Position the cable binder.



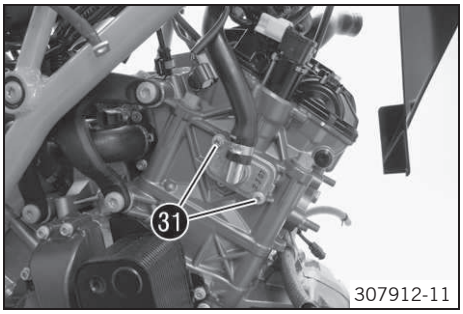
– Position the SLS cover.
– Mount and tighten screws ㉙.
Guideline

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

– Position the wiring harness.
– Mount and tighten screw ㉚.
Guideline

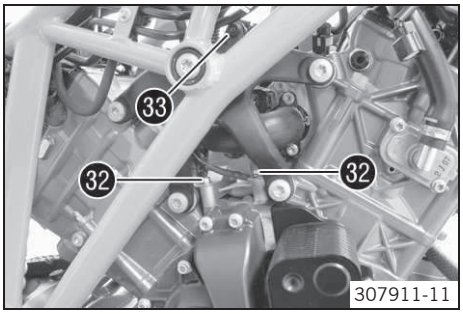
Remaining screws, chassis	M5	5 Nm (3.7 lbf ft)

– Mount the cable binder.



– Position the SLS cover.
– Mount and tighten screws ㉛.
Guideline

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

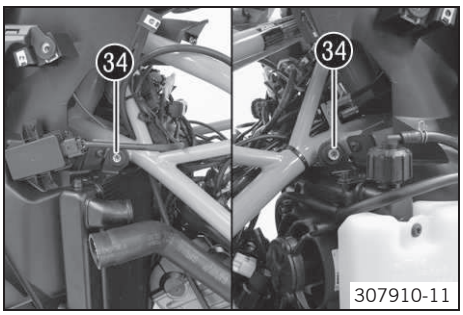


– Position the ground wire.
– Mount and tighten screws ❷❷.
Guideline

Screw, starter motor	M6	10 Nm (7.4 lbf ft)

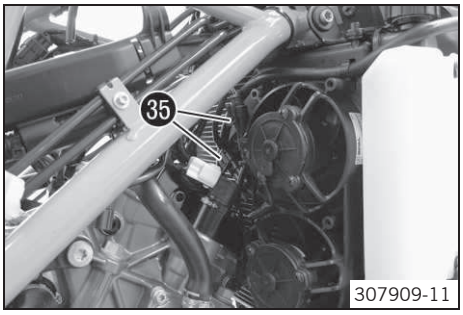
– Position the wiring harness.
– Mount and tighten screw ❷❸.
Guideline

Remaining screws, chassis	M5	5 Nm (3.7 lbf ft)

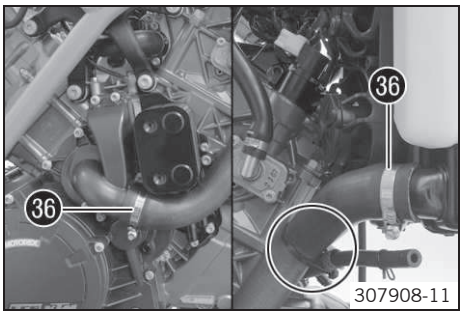


– Position the radiator.
– Mount and tighten screws ❷❹.
Guideline

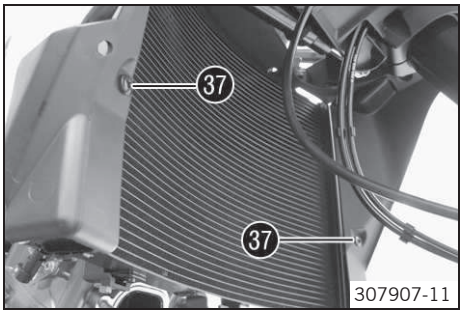
Remaining chassis screws	M6	10 Nm (7.4 lbf ft)



– Plug in both plugs ❷❺ and position them in the holder.

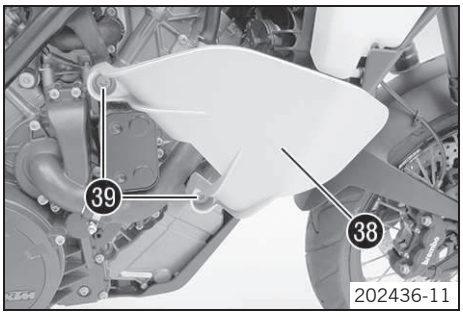


– Mount the radiator hose.
– Position and tighten hose clips ❷❻.
– Mount the cable binder.



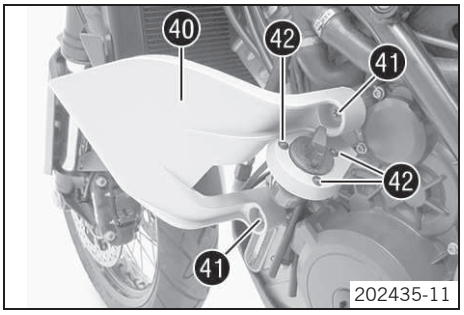
– Mount and tighten screws ❷❼.
Guideline

Remaining screws, chassis	M5	5 Nm (3.7 lbf ft)



– Position tank guard ❷❽.
– Mount and tighten screws ❷❾.
Guideline

Remaining chassis screws	M8	25 Nm (18.4 lbf ft)



– Position tank guard ㊵.
– Mount and tighten screws ㊶.
Guideline

Remaining chassis screws	M8	25 Nm (18.4 lbf ft)

– Mount and tighten screws ㊷.
Guideline

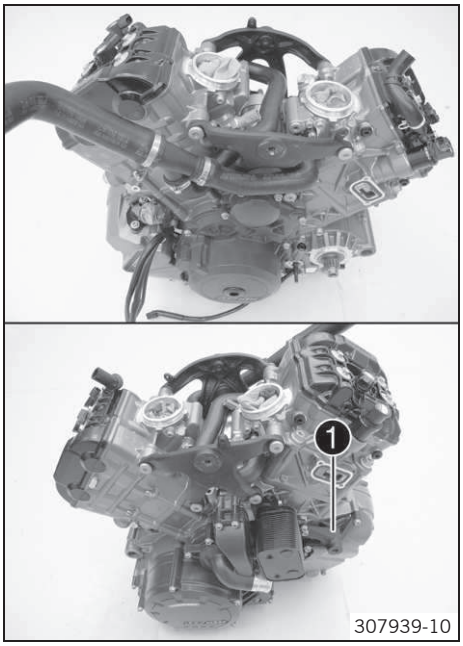
Remaining chassis screws	M6	10 Nm (7.4 lbf ft)

Finishing work
– Install the throttle valve body. (☛ p. 225)
– Install the lower part of the air filter box. (☛ p. 60)
– Install the upper part of the air filter box. (☛ p. 58)
– Add coolant/bleed the cooling system. (☛ p. 207)
– Install the manifold. (☛ p. 54)
– Install the main silencer. (☛ p. 52)
– Install the engine guard. (☛ p. 42)
– Install the fuel tank. (☛ p. 64)
– Install the mask spoiler. (☛ p. 78)
– Install the tank cover. (☛ p. 77)
– Install the front side cover. (☛ p. 75)
– Connect the negative cable of the battery. (☛ p. 96)
– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)
– Set the time and date.

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.
– Remove the screw plug and add the remaining engine oil to the upper marking on the engine oil level viewer.
– Mount the screw plug.
– Execute the initialization run. (☛ p. 226)
– Check the lubrication system for leaks.
– Check the cooling system for leaks.
– Take a short test ride.
– Read out the fault memory using the KTM diagnostics tool.
– Check the engine oil level. (☛ p. 218)
– Check the coolant level in the compensating tank. (☛ p. 205)

18.3 Preparing the engine for installation



– Position both radiator hoses. Position and tighten the hose clips.
– Position the bleeder hoses.
– Remove engine fixing arm ❶.

Engine fixing arm (69003006000)

– Mount the engine fixing arm.

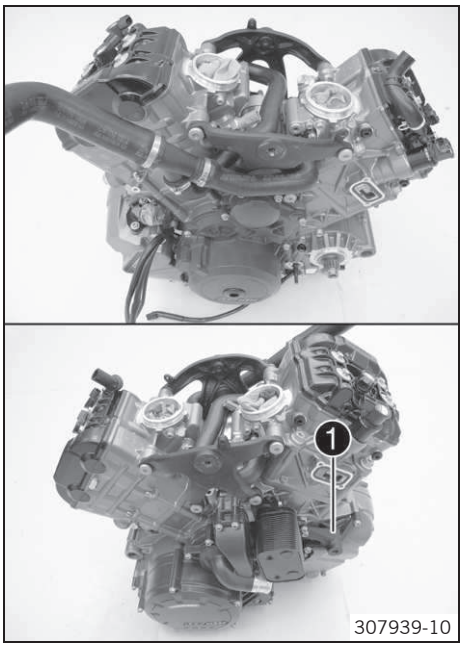
Engine fixing arm (60303006000)

– Mount and tighten the screws.

Guideline

Engine carrying screw	M10	45 Nm (33.2 lbf ft)

18.4 Preparing the engine for clamping in the engine assembly stand



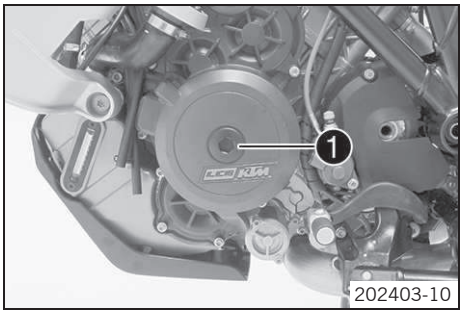
– Remove the hose clips.
– Remove both radiator hoses.
– Remove the bleeder hoses.
– Remove engine fixing arm ❶.
– Mount the engine fixing arm.

Engine fixing arm (69003006000)

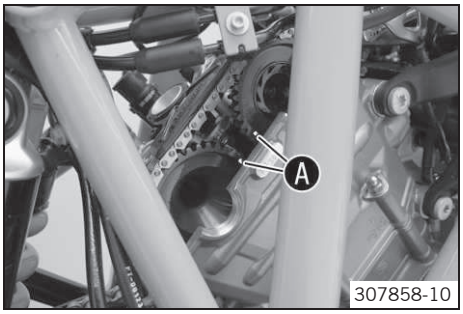
18.5 Setting the engine to ignition top dead center of the rear cylinder

Condition

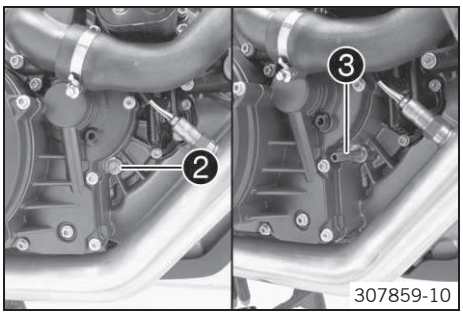
The valve cover has been removed.



– Remove screw ❶ of the alternator cover.



– Turn the crankshaft counterclockwise until markings ❹ are flush with the edge of the cylinder head.



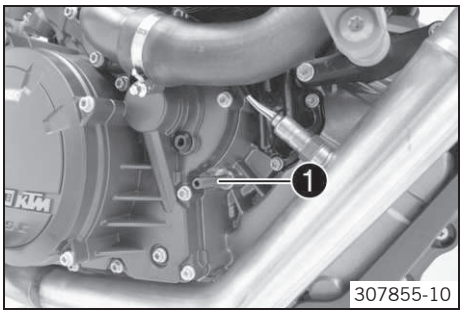
– Remove screw ❷.
– Look through the hole to check that the position notch of the crankshaft is visible.
– Screw in special tool ❸.

Engine blocking screw (61229015000) (☛ p. 277)

18.6 Setting the engine to ignition top dead center of the front cylinder

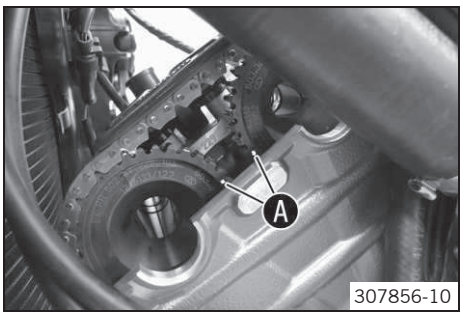
Condition

The engine is positioned at ignition top dead center of the rear cylinder.



– Loosen special tool ❶ by several turns.

Engine blocking screw (61229015000) (☛ p. 277)



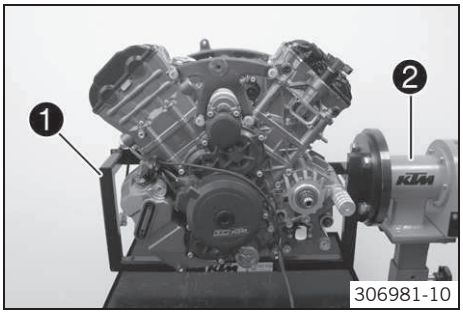
– Keep turning the crankshaft counterclockwise until markings ❹ are flush with the edge of the cylinder head.
– Screw special tool ❶ back in.

18.7 Engine disassembly

18.7.1 Clamping the engine into the engine assembly stand

Preparatory work

– Prepare the engine for clamping in the engine assembly stand. (☛ p. 130)



Main work

– Mount special tool ❶ on engine work stand ❷.

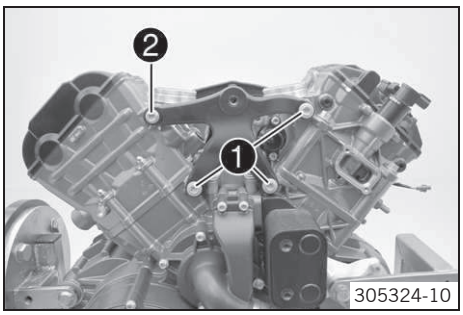
Engine assembly stand (61229001000) (☛ p. 276)
Engine holder (61229002000) (☛ p. 276)

– Mount the engine on special tool ❶.

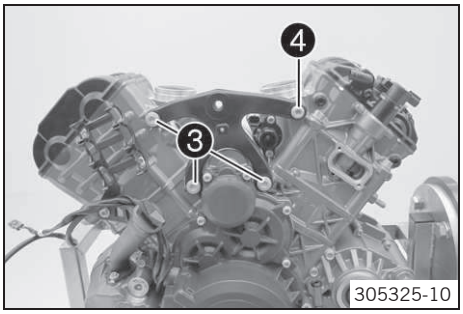
Info

Have an assistant help you or use a crane.

18.7.2 Removing the engine bracket

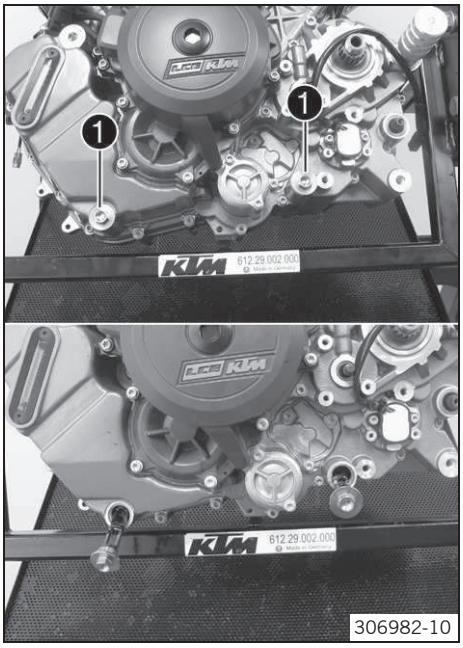


– Remove screws ❶.
– Remove screw ❷ and take off the engine bracket.



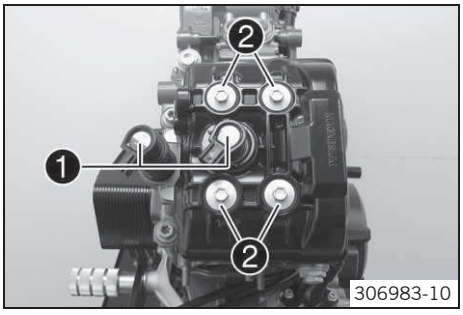
– Remove screws ❸.
– Remove screw ❹ and take off the engine bracket.

18.7.3 Draining the engine oil



– Remove oil drain plug ❶ with the magnet, O-rings and oil screen.
– Completely drain the engine oil.

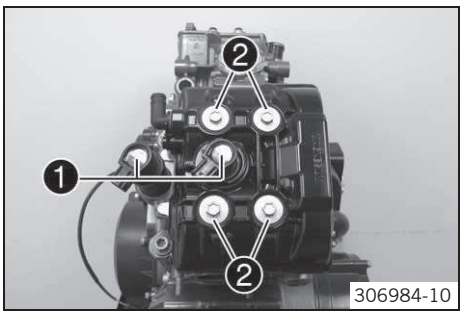
18.7.4 Removing the front valve cover



– Remove ignition coils ❶.
– Remove screws ❷. Take off the valve cover with the valve cover seal.
– Remove the spark plugs using the special tool.

Spark plug wrench (75029172000) (☛ p. 279)

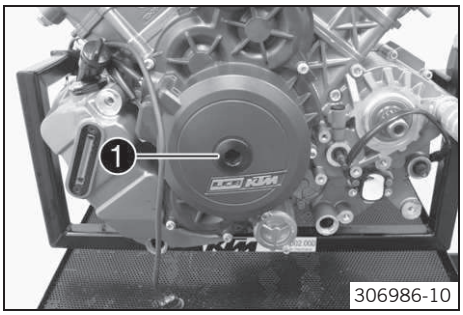
18.7.5 Removing the rear valve cover



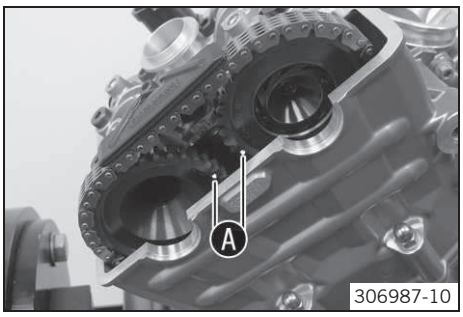
– Remove ignition coils ❶.
– Remove screws ❷. Take off the valve cover with the valve cover seal.
– Remove the spark plugs using the special tool.

Spark plug wrench (75029172000) (☛ p. 279)

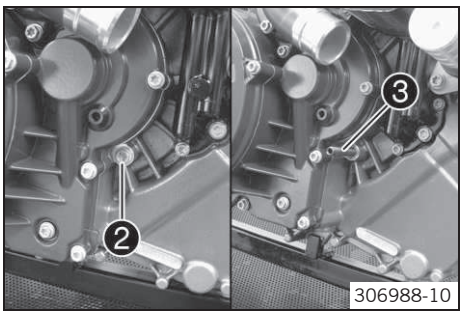
18.7.6 Setting the engine to ignition top dead center of the rear cylinder



– Remove screw ❶ of the alternator cover.



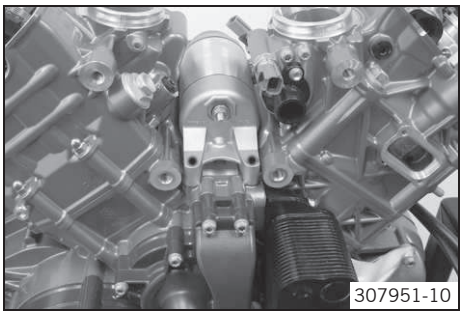
– Turn the crankshaft counterclockwise until markings Ⓐ of the rear camshafts are flush with the edge of the cylinder head.



– Remove screw ❷.
– Look through the hole to check that the position notch of the crankshaft is visible.
– Screw in special tool ❸.

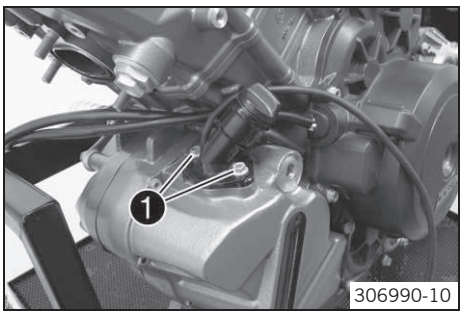
Engine blocking screw (61229015000) (☛ p. 277)

18.7.7 Removing the starter motor



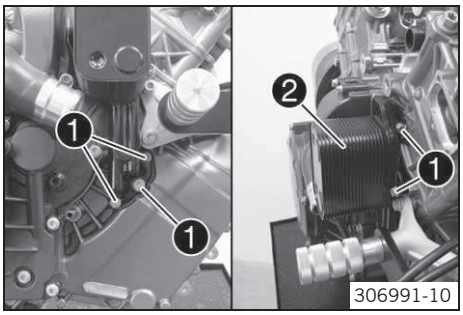
– Take off the starter motor.

18.7.8 Removing the oil filler tube

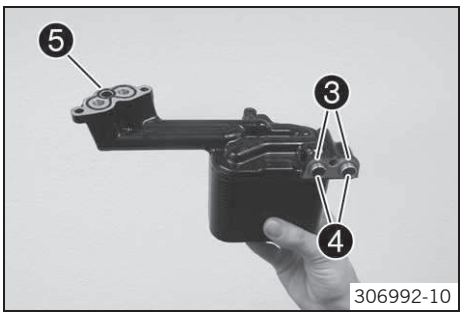


– Remove screws ❶.
– Remove the oil filler tube with the O-ring.

18.7.9 Removing the heat exchanger

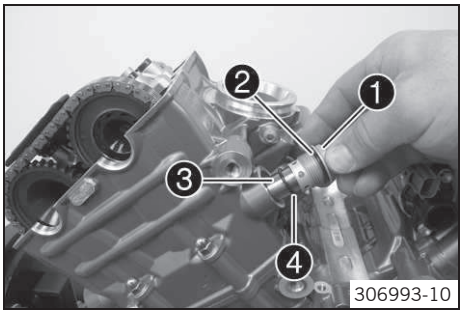


– Remove screws ❶ of heat exchanger ❷.
– Remove the heat exchanger.



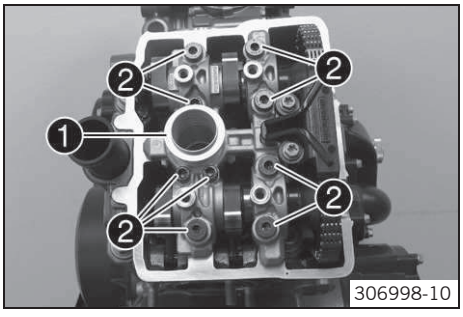
– Remove O-rings ❸ and sleeves ❹.
– Remove seal ❺.

18.7.10 Removing the rear timing chain tensioner



– Remove screw ❶ with O-ring ❷.
– Remove timing chain tensioner ❸ with O-ring ❹.

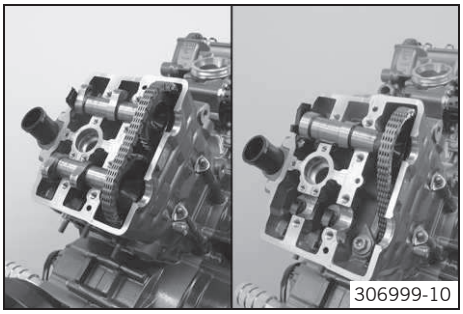
18.7.11 Removing the rear camshaft



– Remove spark plug shaft insert ❶.
– Loosen and remove screws ❷ from the outside to the inside.

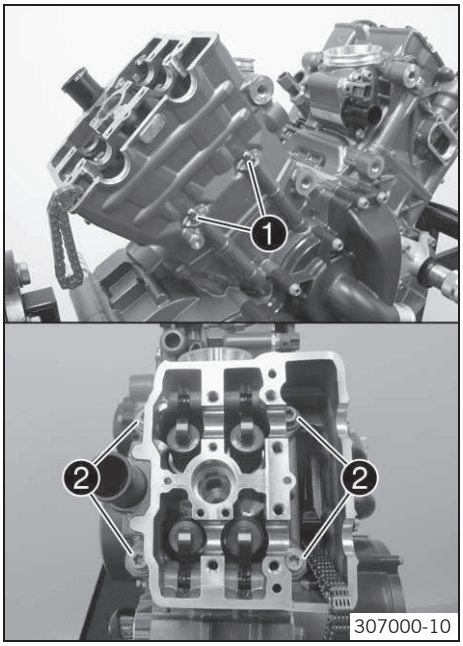
Info
The cams should not activate the valves.

– Remove the camshaft bearing bridge.


306999-10

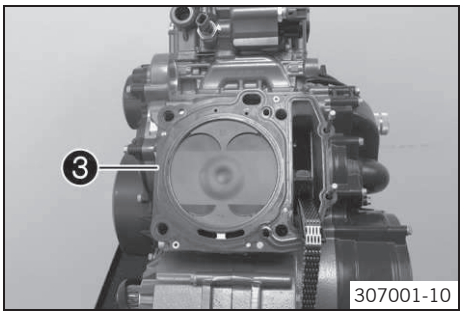
– Raise the camshaft at the rear and take the timing chain off of the rear sprocket. Remove the camshaft.

18.7.12 Removing the rear cylinder head



307000-10

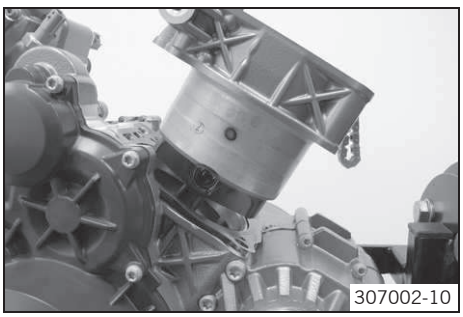
– Remove nuts ❶ with the washers.
– Alternately loosen screws ❷ and remove them.
– Take off the cylinder head.



307001-10

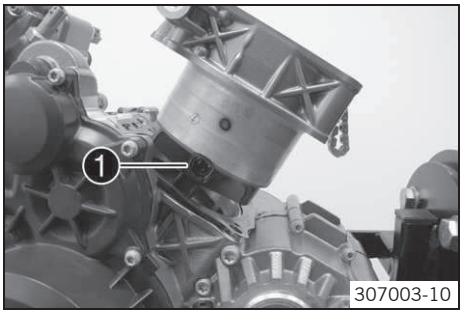
– Remove cylinder head gasket ❸.

18.7.13 Removing the rear piston


307002-10

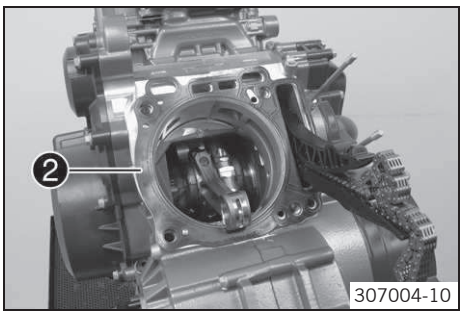
– Push the cylinder up.

Info
Push the cylinder up until the piston pin can be removed.
Make sure that the two pins remain in place.



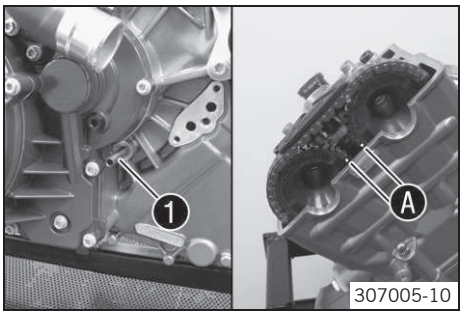
– Remove piston pin retainer ❶.
– Remove the piston pin.
– Remove the cylinder with the piston.
– Push the piston upward out of the cylinder.

Info
If no additional work needs to be performed on the cylinder and piston, the piston can remain in the cylinder.



– Remove cylinder base gasket ❷.

18.7.14 Setting the engine to ignition top dead center of the front cylinder

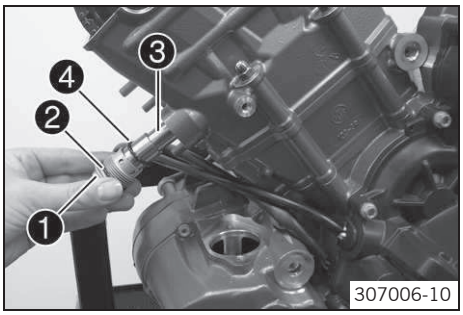


– Loosen special tool ❶ by several turns.

Engine blocking screw (61229015000) (☛ p. 277)

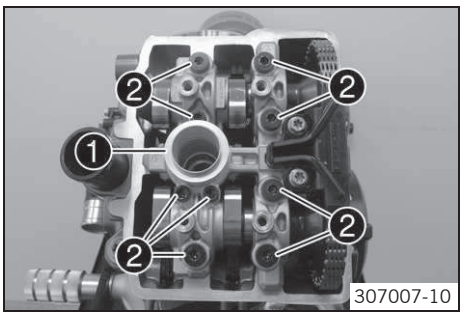
– Keep the timing chain tensioned.
– Continue turning the crankshaft counterclockwise until markings Ⓐ of the front camshafts are flush with the edge of the cylinder head.
– Screw special tool ❶ back in.

18.7.15 Removing the front timing chain tensioner



– Remove screw ❶ with O-ring ❷.
– Remove timing chain tensioner ❸ with O-ring ❹.

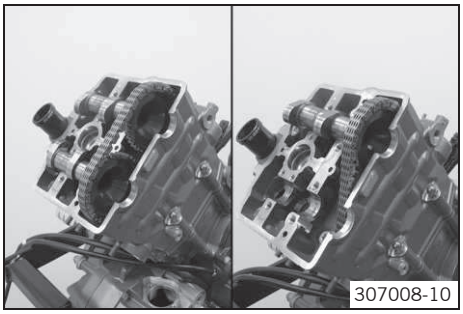
18.7.16 Removing the front camshafts



– Remove spark plug shaft insert ❶.
– Loosen and remove screws ❷ from the outside to the inside.

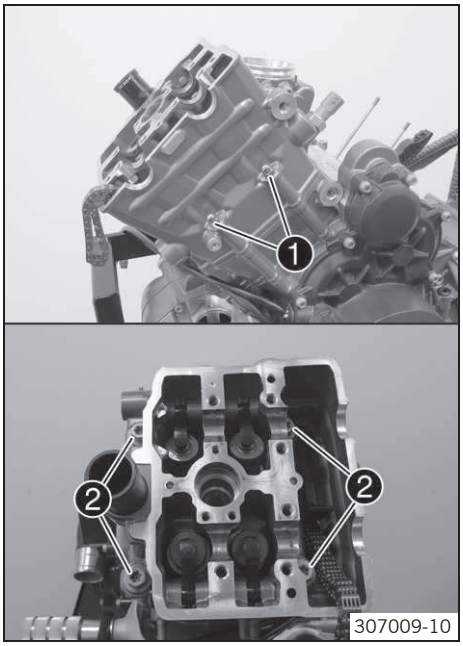
Info
The cams should not activate the valves.

– Remove the camshaft bearing bridge.



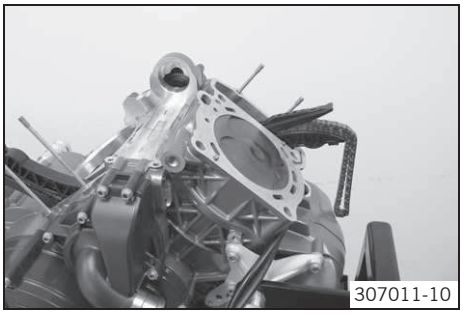
– Raise the camshaft at the rear and take the timing chain off of the rear sprocket. Remove the camshaft.

18.7.17 Removing the front cylinder head



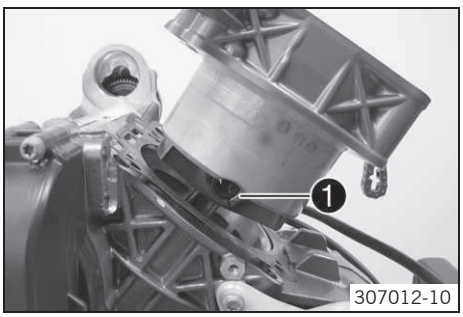
– Remove nuts ❶ with the washers.
– Alternately loosen screws ❷ and remove them.
– Take off the cylinder head. Remove the cylinder head gasket.

18.7.18 Removing the front piston



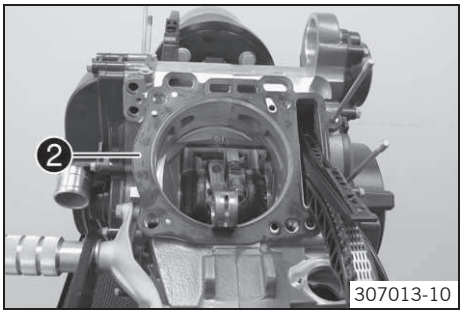
– Push the cylinder up.

Info
Push the cylinder up until the piston pin can be removed.
Make sure that the two pins remain in place.



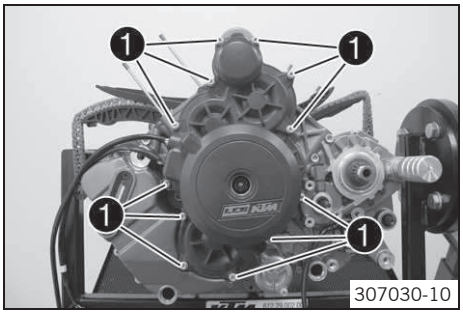
– Remove piston pin retainer ❶.
– Remove the piston pin.
– Remove the cylinder with the piston.
– Push the piston upward out of the cylinder.

Info
If no additional work needs to be performed on the cylinder and piston, the piston can remain in the cylinder.

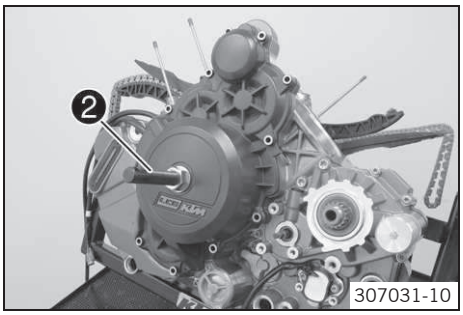


– Remove cylinder base gasket ❷.

18.7.19 Removing the alternator cover



– Remove screws ❶.



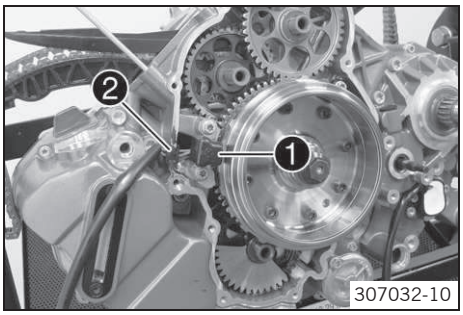
– Screw in special tool ❷ and pull off the alternator cover.

Extractor (61229010000) (☛ p. 276)

Info
Strike the alternator cover lightly with a rubber mallet to prevent strain.

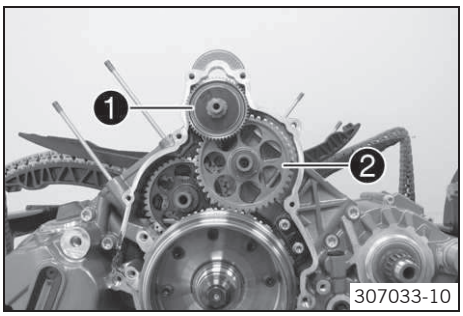
– Take off the alternator cover seal. Take off the dowels.

18.7.20 Removing the ignition pulse generator



– Remove the screws of ignition pulse generator ❶.
– Pull cable support sleeve ❷ out of the engine case. Take off the ignition pulse generator.

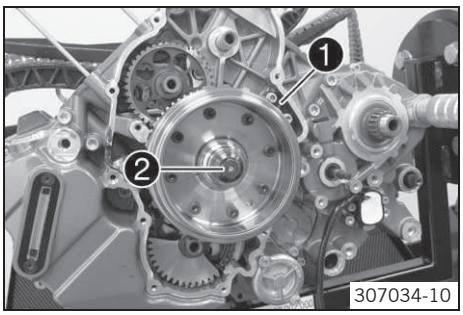
18.7.21 Removing the torque limiter and idler



– Take off torque limiter ❶.
– Remove idler ❷ with the washers and needle bearing.

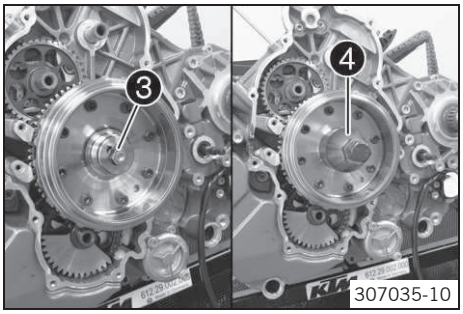
Info
The idler has one disk at the front and one at the rear; the front washer usually sticks to the alternator cover.

18.7.22 Removing the rotor



– Remove the screws and take off freewheel holder ❶.
– Loosen and remove screw ❷ of the rotor.

Info
The crankshaft must be blocked.



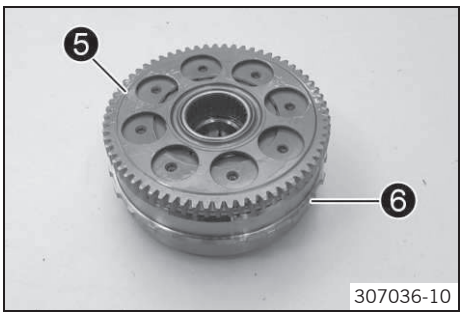
– Screw special tool ❸ into the crankshaft.

Pressure piece (61229008000) (☛ p. 276)

– Mount special tool ❹ on the rotor, apply counterpressure, and pull off the rotor by screwing in the screw.

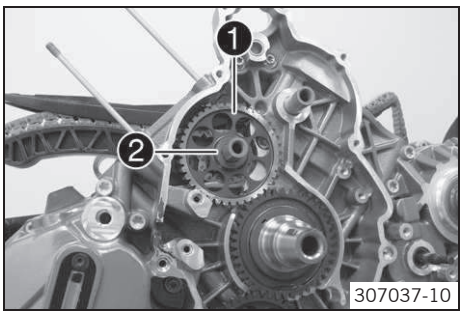
Extractor (75029021000) (☛ p. 279)

– Remove the special tools.

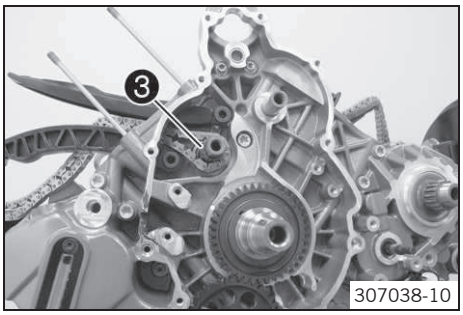


– Take freewheel gear ❺ from rotor ❻.

18.7.23 Removing the idler and timing chain on the left



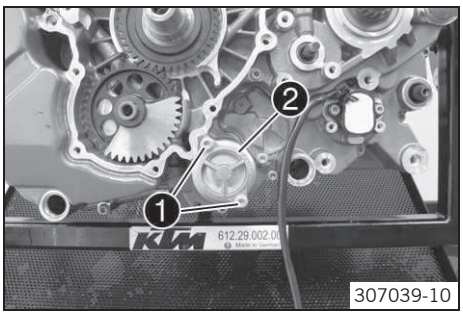
– Take off idler ❶ with washer ❷.



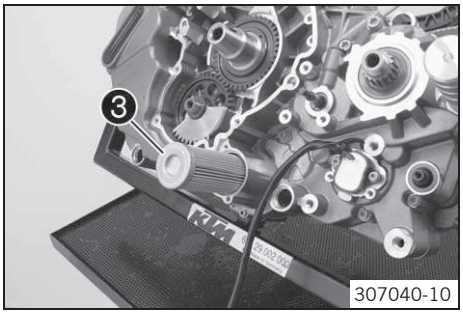
– Remove the timing chain, needle bearing ❸ and the washer lying behind it.

Info
If the timing chain is to be used again, note the direction of travel and the cylinder on which it was used.

18.7.24 Removing the oil filter



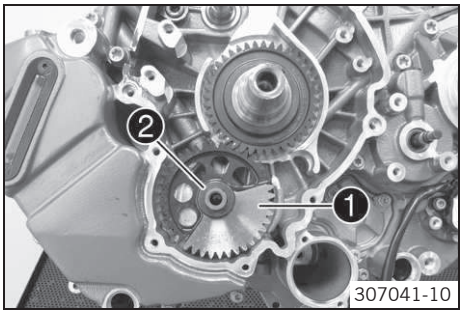
– Remove screws ❶. Take off oil filter cover ❷ with the O-ring.



– Pull oil filter ❸ out of the oil filter housing.

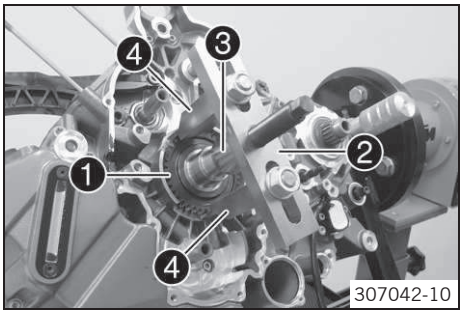
Circlip pliers reverse (51012011000) (☛ p. 271)

18.7.25 Removing the balancer shaft



– Remove balancer shaft ❶ with washer ❷.
– Mount the needle bearing and the rear washer.

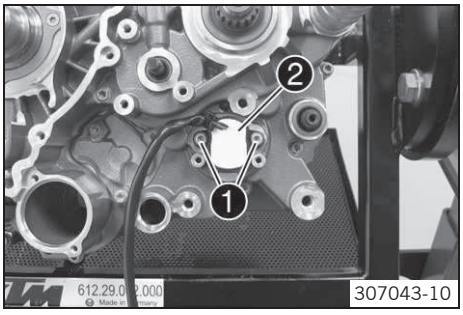
18.7.26 Removing the drive wheel of the balancer shaft



– Remove the drive wheel of balancer shaft ❶ using special tools ❷, ❸ and ❹.

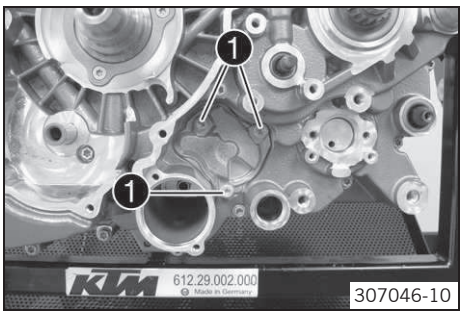
Puller, 2-arm (78029033100) (☛ p. 280)
Pressure piece (61229018000) (☛ p. 277)
Arms for extractor 78029033100 (61229017000) (☛ p. 277)

18.7.27 Removing the gear position sensor

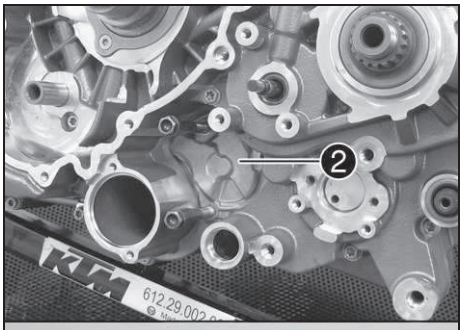


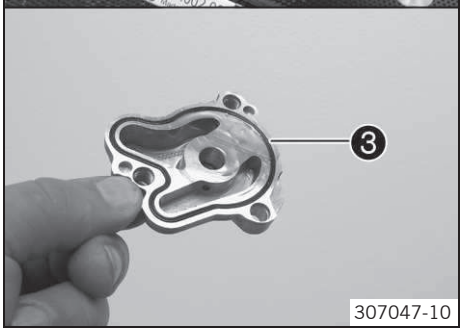
– Remove screws ❶ with the washers.
– Remove gear position sensor ❷ with the O-ring.

18.7.28 Removing the left suction pump

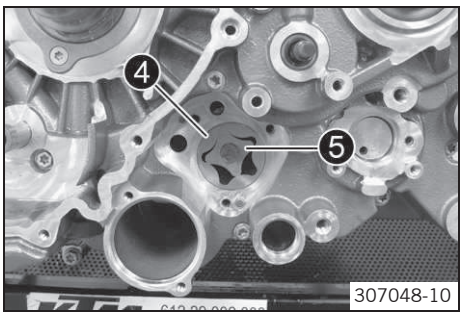


– Remove screws ❶.

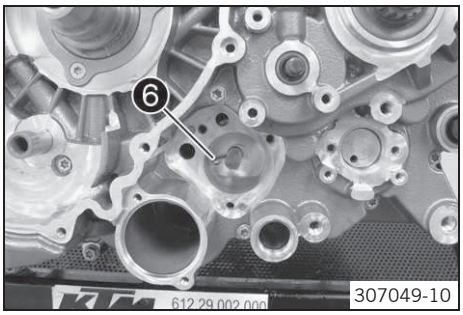




– Screw fitting screws into the oil pump cover.
– Remove the oil pump cover by screwing in the screws.
– Remove oil pump cover ❷.
– Remove seal ❸.

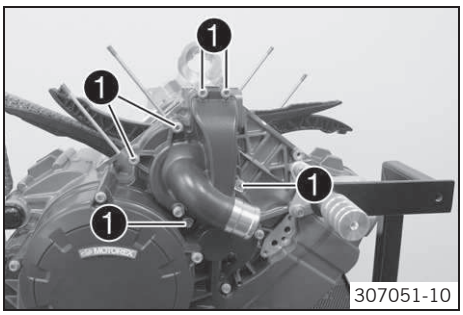


– Remove external rotor ❹ and internal rotor ❺.

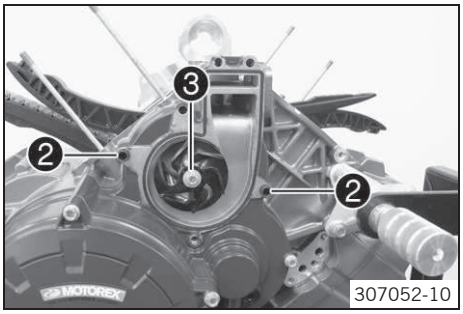


– Remove pin ❻.

18.7.29 Removing the water pump wheel

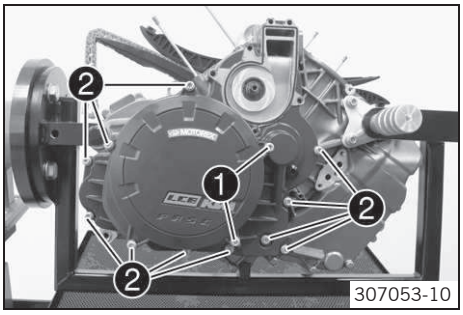


– Remove screws ❶.
– Take off the water pump cover.

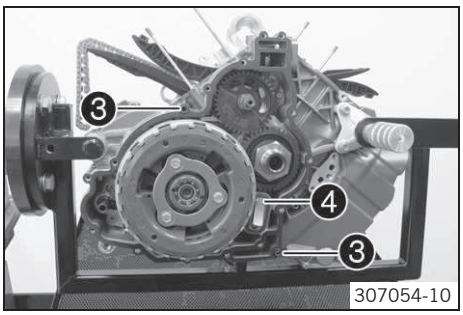


– Remove dowels ❷.
– Remove screw ❸. Take off the water pump wheel with the washer below it.

18.7.30 Removing the clutch cover

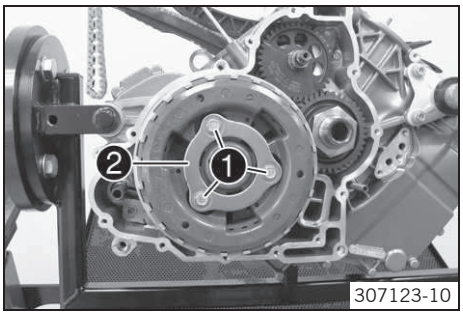


– Loosen screws ❶ of the outer clutch cover.
– Remove screws ❷.
– Take off the clutch cover.

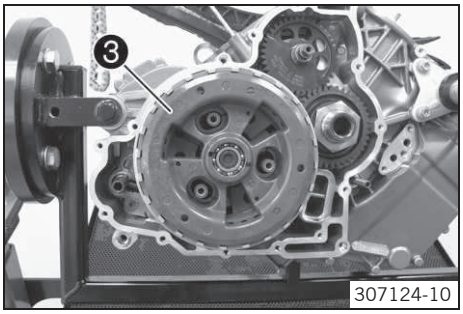


– Take off dowels ❸. Remove the clutch cover seal.
– Remove check valve ❹.

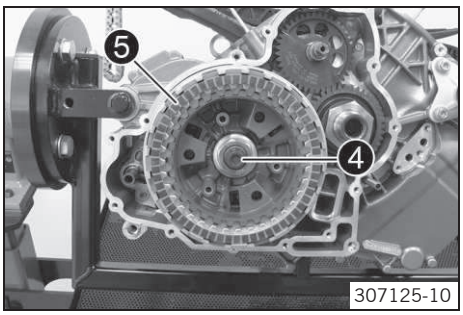
18.7.31 Removing the clutch discs



– Remove screws ❶.
– Take off clutch center ❷ and the springs.

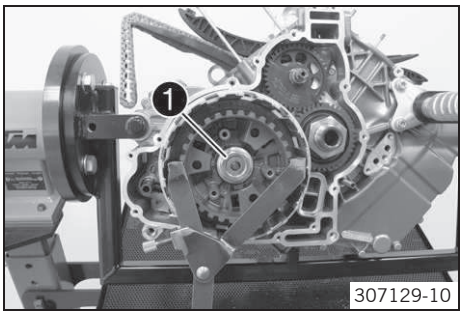


– Remove clutch pressure cap ❸.



– Remove push rod ❹.
– Remove clutch discs ❺, support ring, and pretension ring.

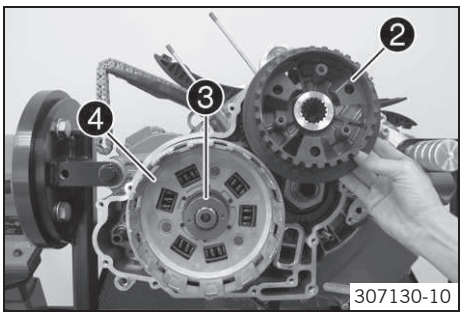
18.7.32 Removing the clutch basket



– Hold the inner clutch hub with the special tool.

Clutch holder (51129003000) (☛ p. 271)

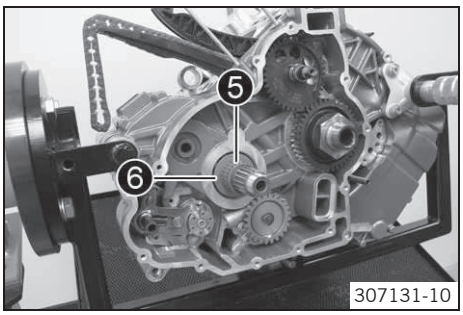
– Remove nut ❶ with the washer.



– Take off inner clutch hub ❷ and washer ❸.

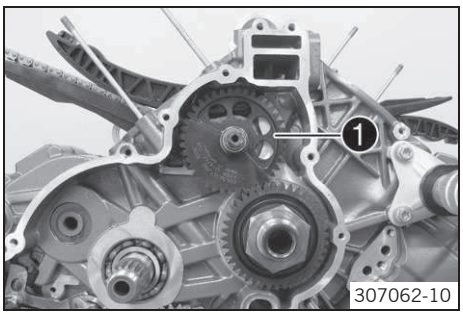
Info
The washer usually sticks to the inner clutch hub.

– Take off clutch basket ❹.



– Remove needle bearing ❺ and washer ❻.

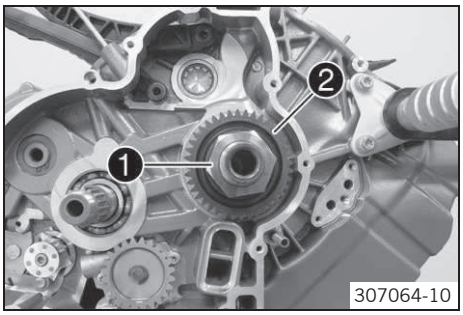
18.7.33 Removing the idler and timing chain on the right



– Remove idler ❶.
– Take off the timing chain.

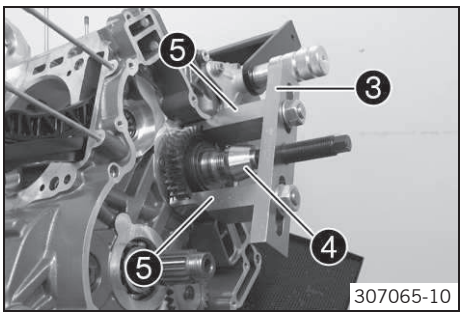
Info
If the timing chain is to be used again, note the direction of travel and the cylinder on which it was used.

18.7.34 Removing the primary gear



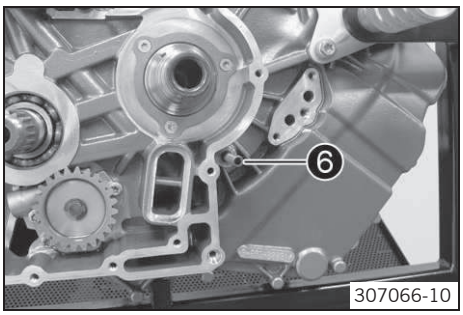
– Remove nut ❶ of primary gear ❷ with the washer.

Info
Left-handed thread!
Make sure that the crankshaft is blocked.



– Remove the primary gear with special tools ❸, ❹ and ❺.

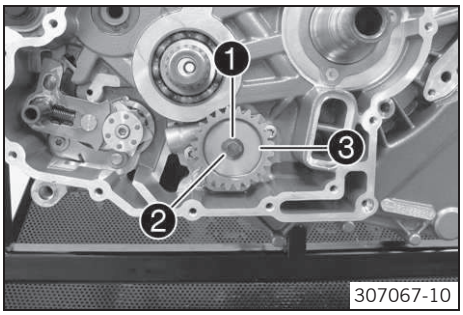
Puller, 2-arm (78029033100) (☛ p. 280)
Pressure piece (61229018000) (☛ p. 277)
Arms for extractor 78029033100 (61229017000) (☛ p. 277)



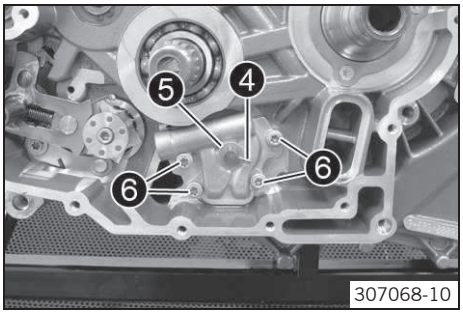
– Remove special tool ❻.

Engine blocking screw (61229015000) (☛ p. 277)

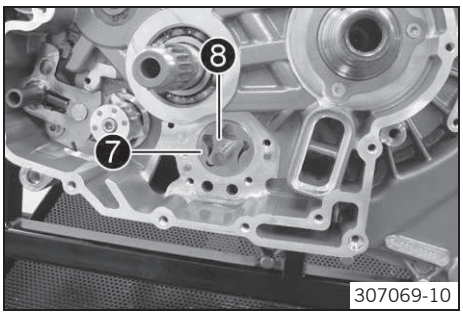
18.7.35 Removing the force pump



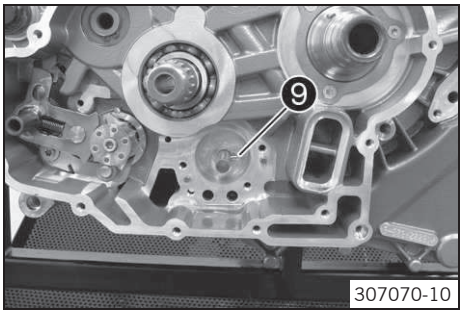
– Remove lock washer ❶ and washer ❷.
– Remove oil pump gear wheel ❸.



– Remove pin ❹ and washer ❺.
– Remove screws ❻.
– Remove the oil pump cover.

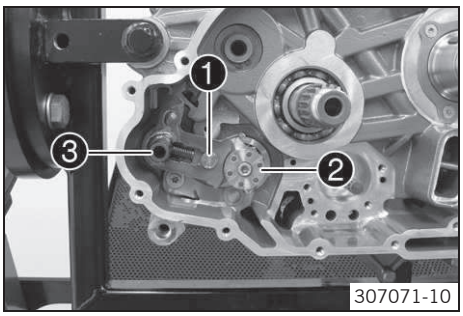


– Remove external rotor ❼ and internal rotor ❽.



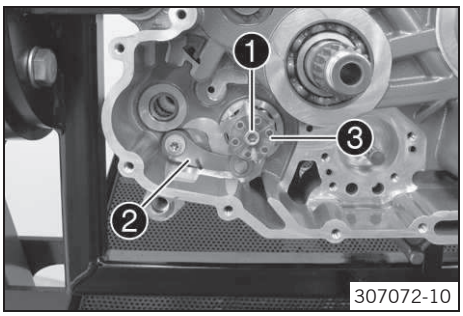
– Remove pin ❾.

18.7.36 Removing the shift shaft



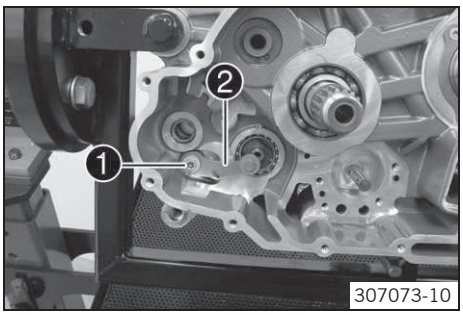
– Push sliding plate ❶ away from the shift drum locating ❷. Remove shift shaft ❸ with the washer.

18.7.37 Removing the shift drum locating



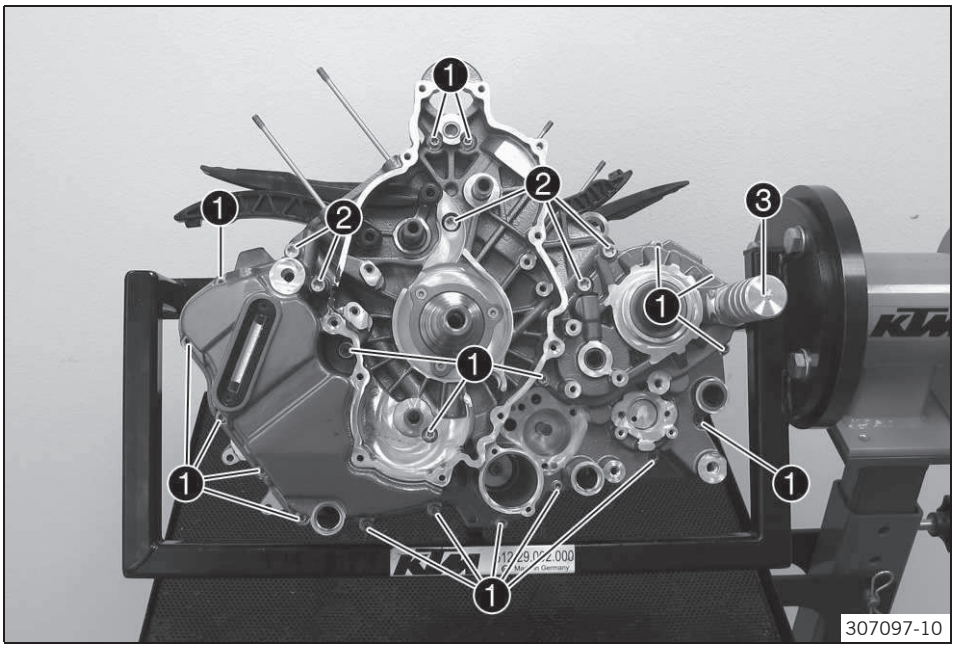
– Remove screw ❶.
– Press locking lever ❷ away from shift drum locating ❸ and take off the shift drum locating.
– Release the locking lever.

18.7.38 Removing the locking lever

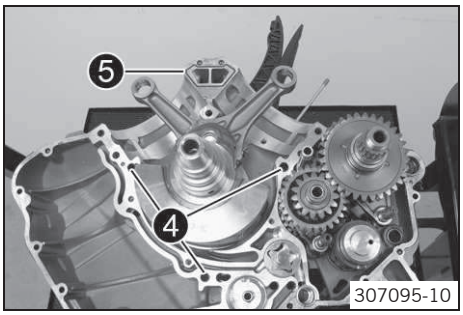


– Remove screw ❶.
– Take off locking lever ❷ with the sleeve and spring.

18.7.39 Removing the left engine case

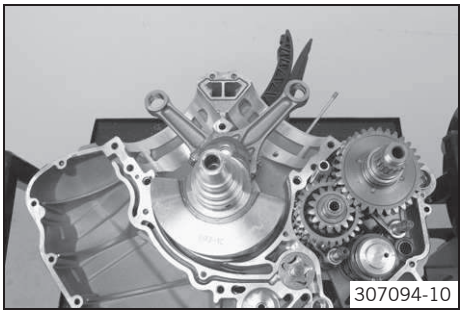


– Remove screws ❶ and ❷.
– Swing the left section of the engine case upward. Remove screw ❸.
– Loosen the left section of the engine case by striking it lightly with a plastic hammer and remove it.



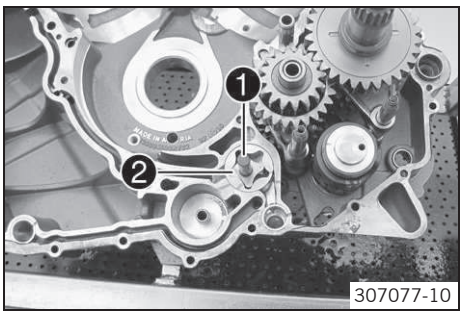
– Remove dowels ❹.
– Remove seal ❺.

18.7.40 Removing the crankshaft

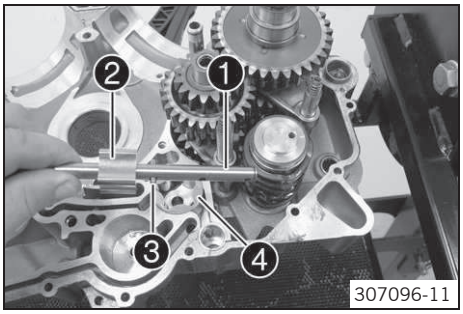


– Remove the crankshaft.

18.7.41 Removing the middle suction pump

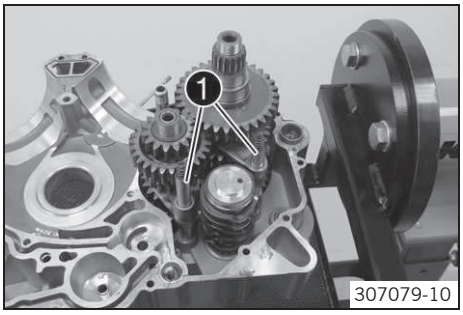


– Take off oil pump shaft ❶ with internal rotor ❷.

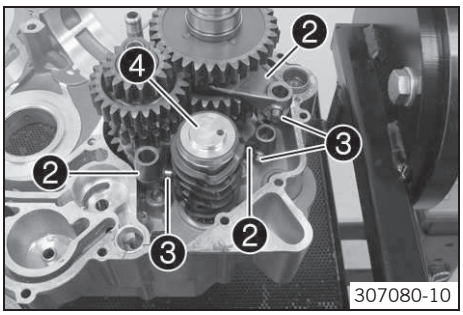


– Remove internal rotor ❷ and pin ❸ from the oil pump shaft ❶.
– Remove external rotor ❹.

18.7.42 Removing the transmission shaft



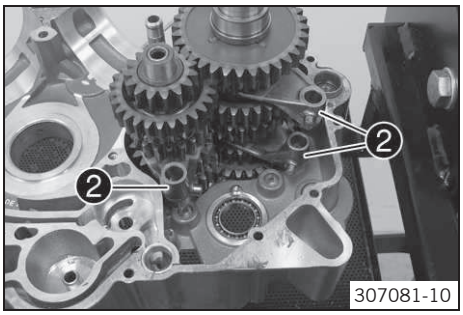
– Remove shift rails ❶ with the springs.



– Swing shift forks ❷ to one side.

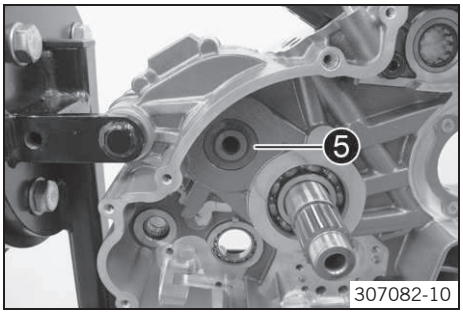
Info
Make sure not to misplace shift rollers ❸.

– Remove shift drum ❹.

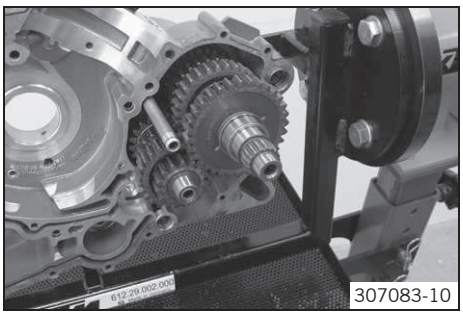


– Remove shift forks ❷.

Info
Make sure not to misplace the shift rollers.

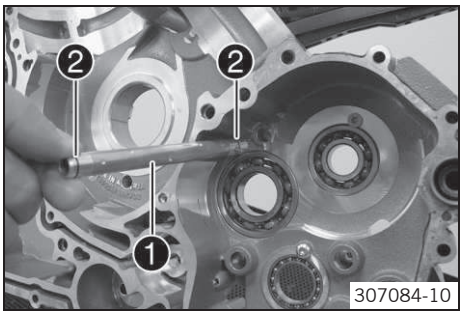


– Place the engine in an upright position.
– Remove lock ring ❺ and the stop disk.



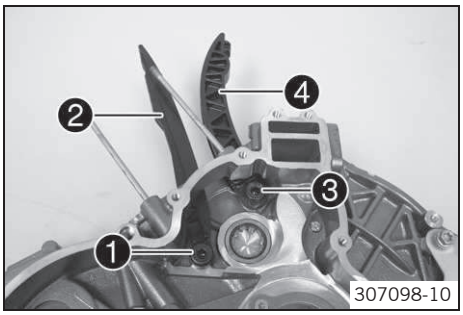
– Pull both transmission shafts out of the bearing seats together.

18.7.43 Removing the oil spray tube



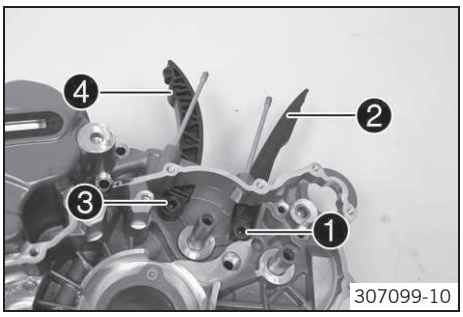
– Remove oil spray tube ❶. Remove O-rings ❷.

18.7.44 Removing the timing chain rails of the right engine case section



– Remove screw ❶. Remove timing chain guide rail ❷.
– Remove screw ❸. Remove timing chain tensioning rail ❹.

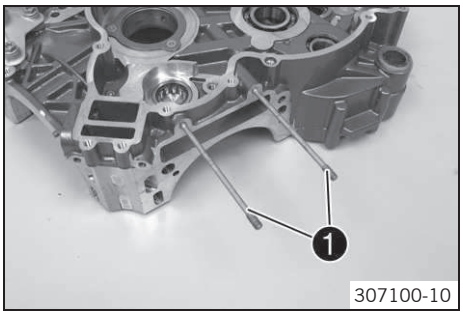
18.7.45 Removing the timing chain rails of the left engine case section



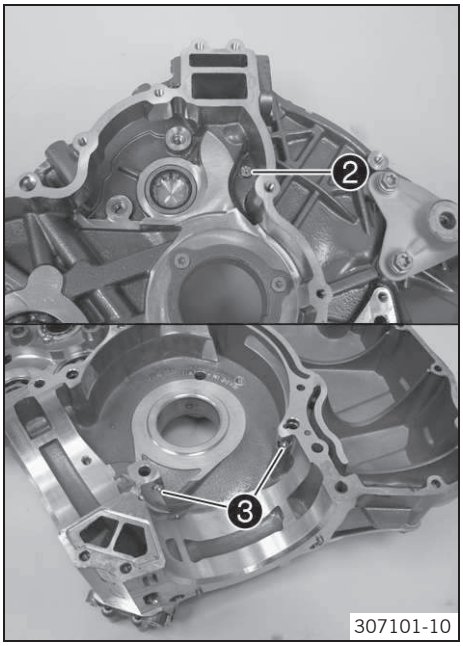
– Remove screw ❶. Remove timing chain guide rail ❷.
– Remove screw ❸. Remove timing chain tensioning rail ❹.

18.8 Work on individual parts

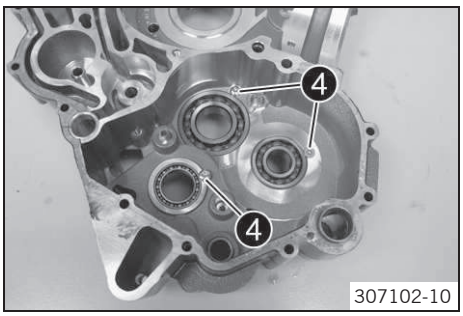
18.8.1 Work on the right section of the engine case



– Remove studs ❶.



– Remove nozzle ❷.
– Remove oil nozzles ❸.



– Remove bearing retainers ❹.
– Remove the dowels.
– 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.

– Warm the engine case section again.

Guideline

150 °C (302 °F)

– Insert the new cold bearings into the bearing seats of the hot engine case section and, if necessary, use a suitable press drift to push the bearing from the inside to the outside, all the way to the stop or so it is 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.

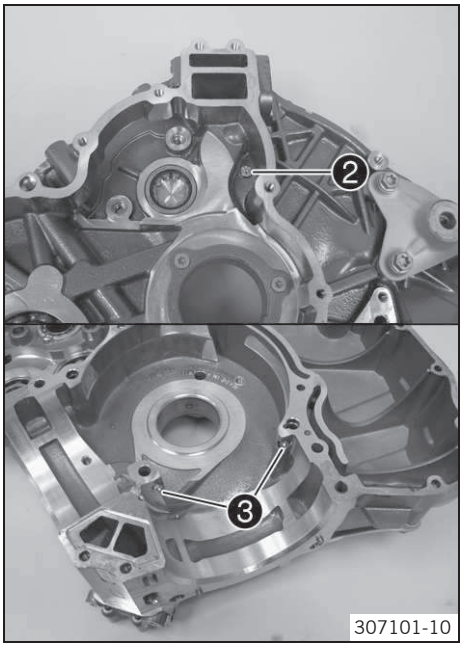
– After the engine case section has cooled, check that the bearings are firmly seated.

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 and tighten bearing retainers ❹.

Guideline

Screw, bearing retainer	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**



– Mount and tighten nozzle ❷.

Guideline

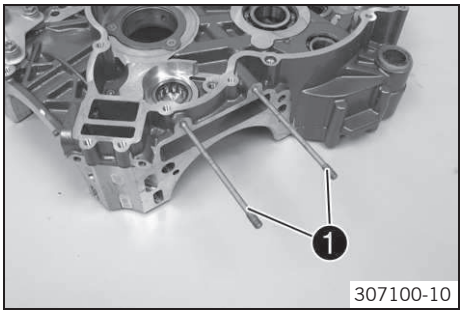
Nozzle 140	M6x0.75	4 Nm (3 lbf ft)	**Loctite® 243™**

– Mount and tighten oil nozzles ❸.

Guideline

Oil nozzle	M6x0.75	4 Nm (3 lbf ft)	**Loctite® 243™**

– Mount the dowels.



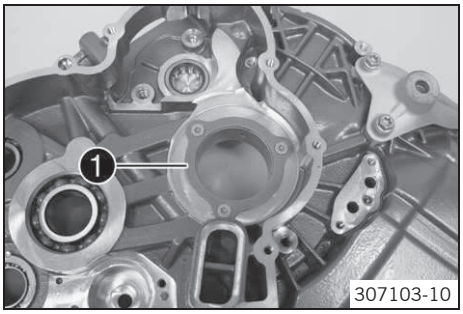
– Mount studs ❶.

Guideline

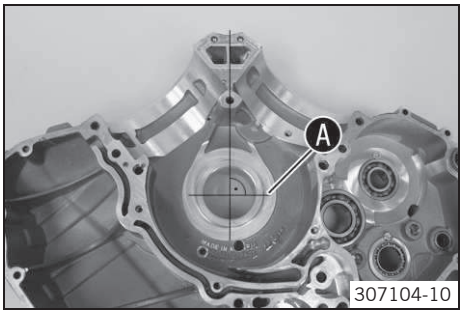
Stud, chain shaft	M6	8 Nm (5.9 lbf ft)

– Blow compressed air through all oil channels and check that they are clear.

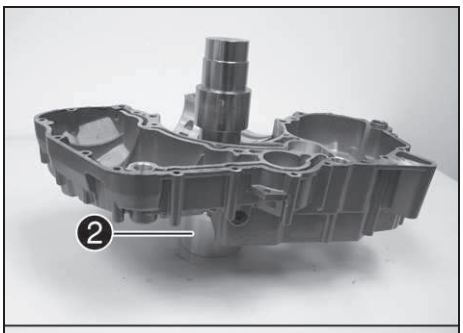
18.8.2 Removing the right main bearing

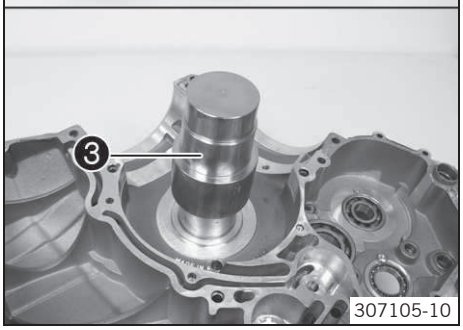


– Remove the screws and take off bearing shell bracket ❶.



– Mark face ❹ of the main bearing shells as shown in the figure.





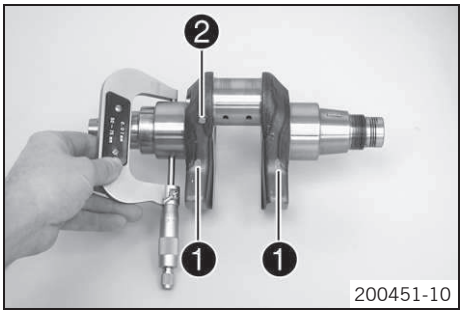
– Place the engine case section on special tool ❷.

Press sleeve (61229045000) (☛ p. 279)

– Place special tool ❸ with the smaller diameter on the bearing shells and press from the inside to the outside.

Press drift/press sleeve (61229044000) (☛ p. 278)

18.8.3 Selecting the main bearing shells



New crankshaft

– Select the new bearing shells according to color marking ❶.

Info
Color marking ❷ refers to the conrod bearing.

Used crankshaft

– Measure both pivot points and select the new bearing shells accordingly.

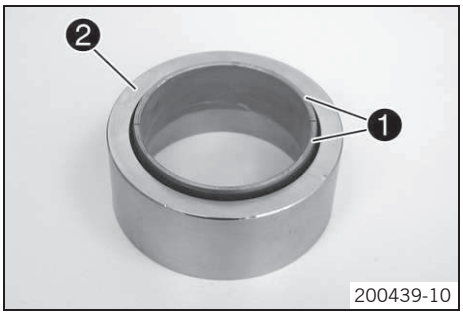
Guideline

Crankshaft - main bearing diameter	
Yellow	52.965... 52.975 mm (2.08523... 2.08563 in)
Blue	52.976... 52.985 mm (2.08567... 2.08602 in)
Red	52.986... 52.995 mm (2.08606... 2.08641 in)

18.8.4 Installing the right main bearing

Preparatory work

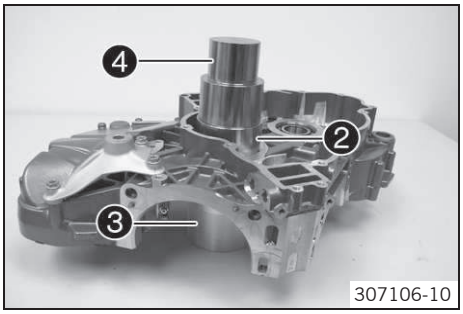
– Select the main bearing shells. (☛ p. 151)



Main work

– Center the new main bearing shells ❶ using special tool ❷.

Press drift/press sleeve (61229044000) (☛ p. 278)

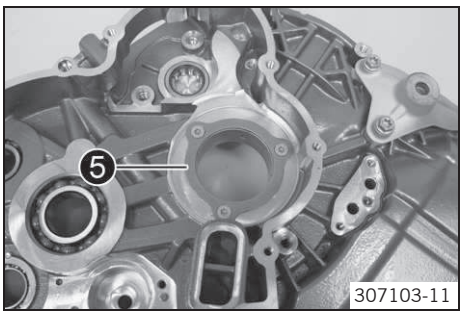


– Place the inside of the engine case section on special tool ❸.

Press sleeve (61229045000) (☛ p. 279)

– Align the face of the new bearing shell with the marking made when it was disassembled.
– Press the bearing shells with the stepped side of special tool ❹ through press sleeve ❷ from the outside to the inside, all the way to the stop.

Press drift/press sleeve (61229044000) (☛ p. 278)

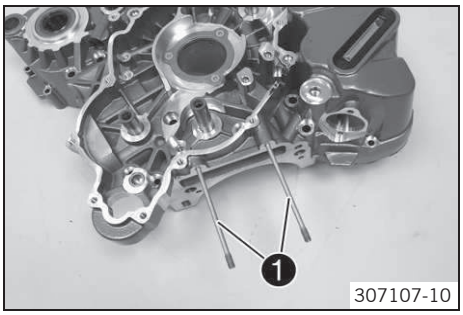


– Position bearing shell bracket ❺. Mount and tighten the screws.

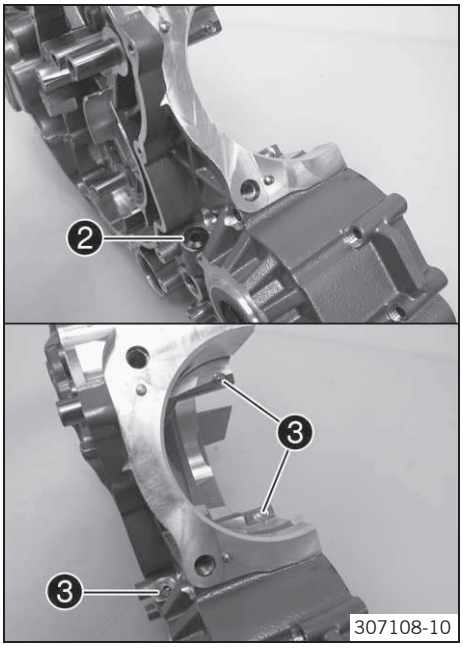
Guideline

Screw, bearing retainer	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**

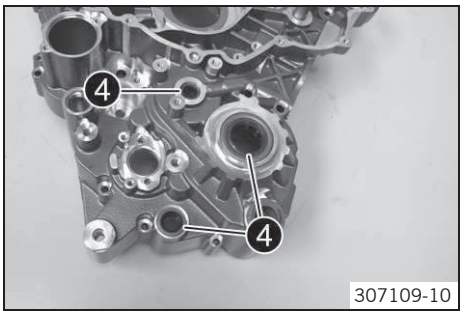
18.8.5 Work on the left section of the engine case



– Remove studs ❶.



– Remove screw ❷.
– Remove oil nozzles ❸.



– Remove shaft seal rings ❹.
– 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.

– Warm the engine case section again.

Guideline

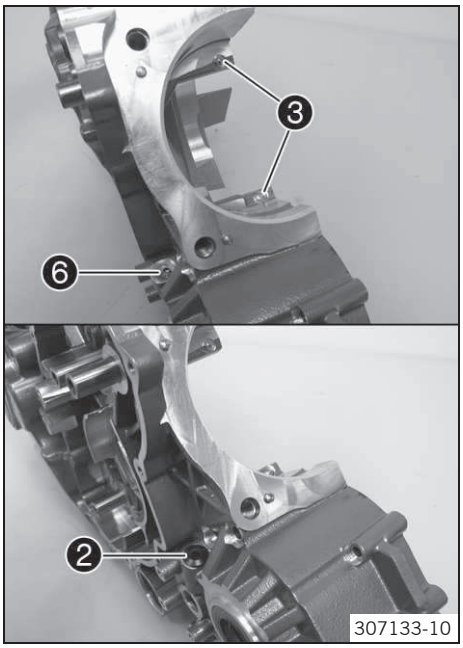
150 °C (302 °F)

– Insert the new cold bearings into the bearing seats of the hot engine case section and, if necessary, use a suitable press drift to push the bearing from the inside to the outside, all the way to the stop or so it is 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 oil nozzles ❸.

Guideline

Oil nozzle	M6x0.75	4 Nm (3 lbf ft)	**Loctite® 243™**

– Mount oil nozzle ❻.

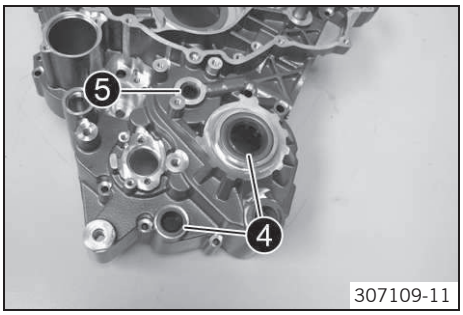
Guideline

Oil nozzle for clutch lubrication	M6x0.75	4 Nm (3 lbf ft)

– Mount and tighten screw ❷.

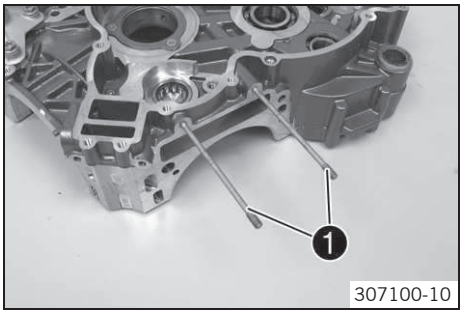
Guideline

Plug, clutch lubrication	M10x1	12 Nm (8.9 lbf ft)



– Press in shaft seal rings ❹ until they are flush.
– Press in the shaft seal ring of push rod ❺.

Press drift (61229013000) (☛ p. 277)



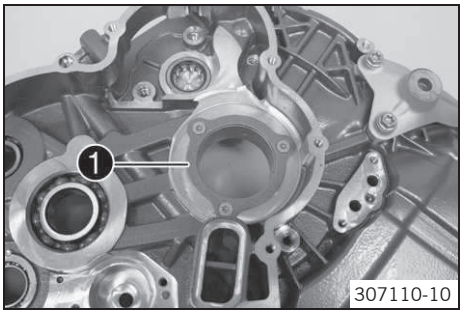
– Mount studs ❶.

Guideline

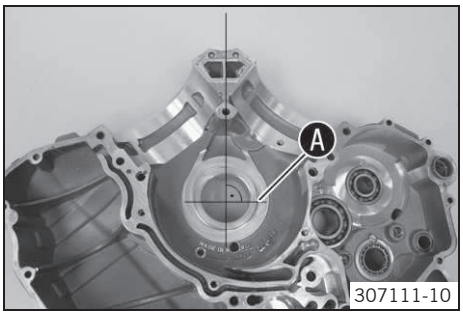
Stud, chain shaft	M6	8 Nm (5.9 lbf ft)

– Blow compressed air through all oil channels and check that they are clear.

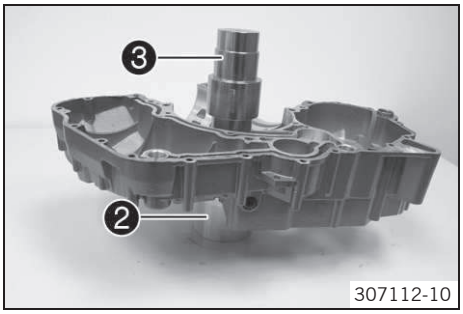
18.8.6 Removing the left main bearing



– Remove the screws and take off bearing shell bracket ❶.



– Mark joint Ⓐ of the main bearing shells as shown in the figure.



– Place the engine case section on special tool ❷.

Press sleeve (61229045000) (☛ p. 279)

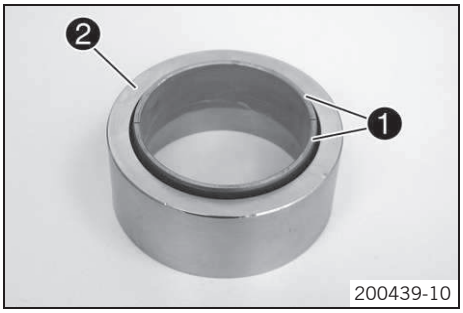
– Place special tool ❸ with the smaller diameter on the bearing shells and press from the inside to the outside.

Press drift/press sleeve (61229044000) (☛ p. 278)

18.8.7 Installing the left main bearing

Preparatory work

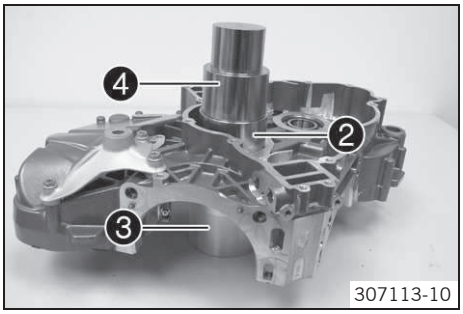
– Select the main bearing shells. (☛ p. 151)



Main work

– Center the new main bearing shells ❶ using special tool ❷.

Press drift/press sleeve (61229044000) (☛ p. 278)

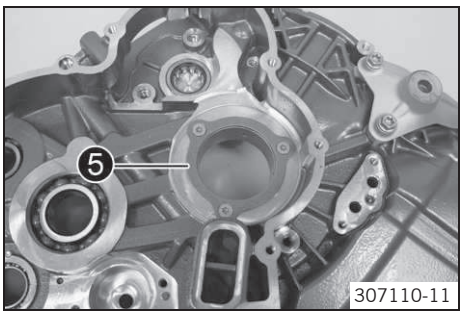


– Place the inside of the engine case section on special tool ❸.

Press sleeve (61229045000) (☛ p. 279)

– Align the face of the new bearing shell with the marking made when it was disassembled.
– Press the bearing shells with the stepped side of special tool ❹ through press sleeve ❷ from the outside to the inside, all the way to the stop.

Press drift/press sleeve (61229044000) (☛ p. 278)



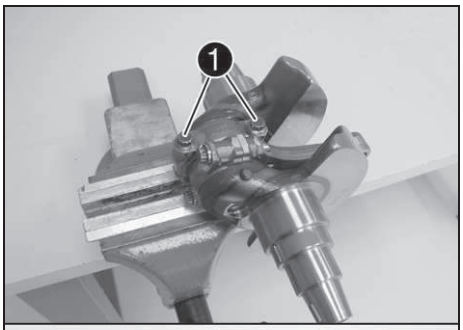
– Position bearing shell bracket ❺. Mount and tighten the screws.

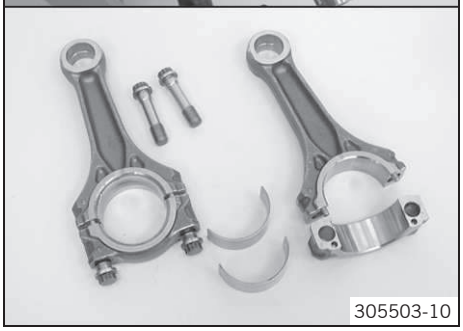
Guideline

Screw, bearing retainer	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**

18.8.8 Changing the conrod bearing

Info
Perform the operation on both connecting rods.



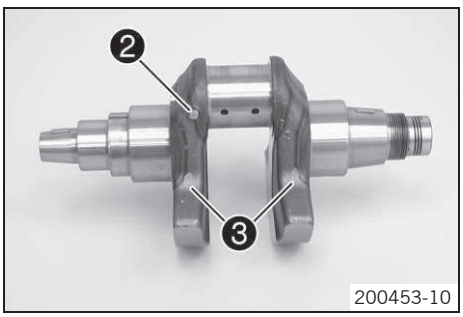


– Clamp each connecting rod separately using soft jaws.
– Remove screws ❶.

Multi-tooth wrench socket 10 mm; ½" drive (60029075000) (☛ p. 274)

– Take off the bearing cap and connecting rod. Remove the bearing shells.

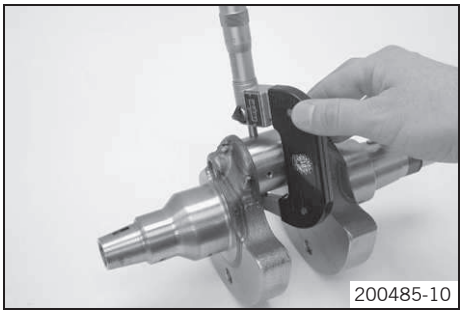
Info
Mark the connecting rod bearing cap and connecting rod to ensure that each connecting rod bearing cap will be mounted on the same connecting rod.



New crankshaft

– Select the new bearing shells according to color marking ❷.

Info
Color marking ❸ refers to the crankshaft bearing.



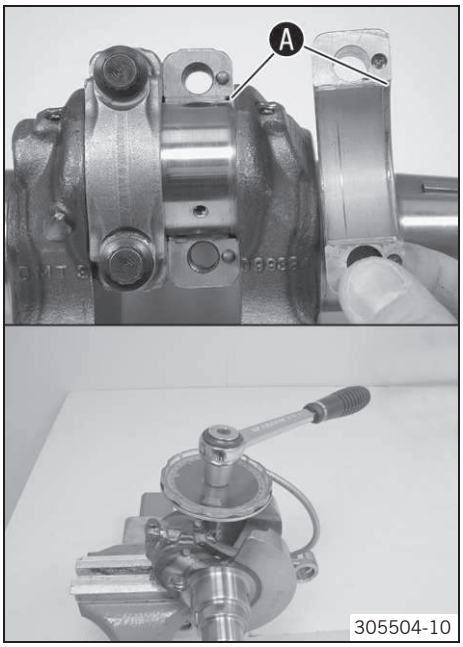
Used crankshaft

– Measure the crank pin diameter and select the new bearing shells accordingly.

Guideline

Crankshaft - crank pin diameter	
Yellow	41.978... 41.989 mm (1.65267... 1.65311 in)
Blue	41.990... 42.000 mm (1.65315... 1.65354 in)
Red	42.001... 42.011 mm (1.65358... 1.65397 in)

– Check the radial clearance of the bottom connecting rod bearing. (☛ p. 158)



– Oil the bearing shells.
– Position the connecting rod bearing cap according to the markings made when they were disassembled. Mount the new connecting rod screws and tighten them using the special tool.

Guideline

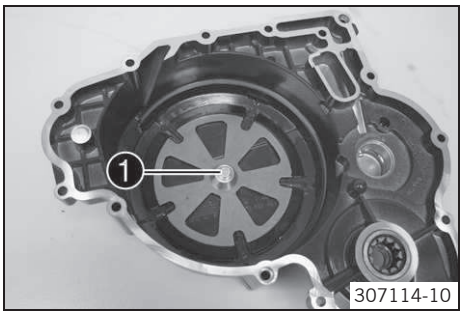
Screw, conrod bearing	M10x1	Step 1 25 Nm (18.4 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 90°

Multi-tooth wrench socket 10 mm; ½" drive (60029075000) (☛ p. 274)
Graduated disc (60029010000) (☛ p. 273)

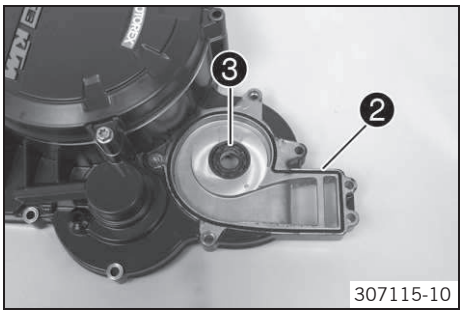
Info

The conrod bearing shells are positioned laterally offset in the connecting rod to make space for radius ❹ of the crank shaft. If mounted in reverse, the bearing shells push on the radius and the connecting rods block.

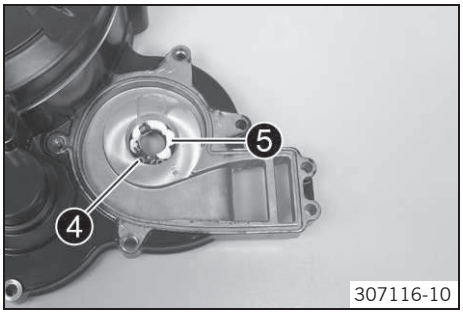
18.8.9 Work on the clutch cover



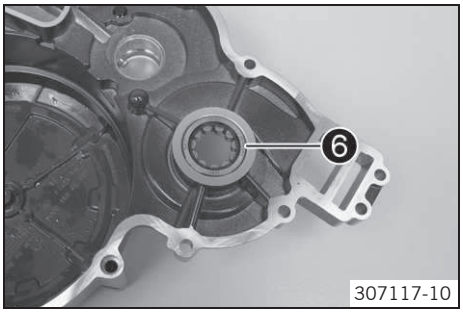
– Remove screw ❶ with the bushing.
– Remove the damping plate.



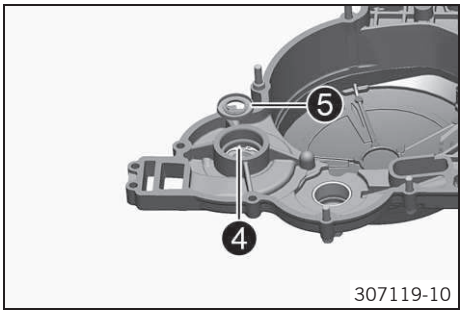
– Remove water pump cover seal ❷.
– Remove the outer shaft seal ring ❸.



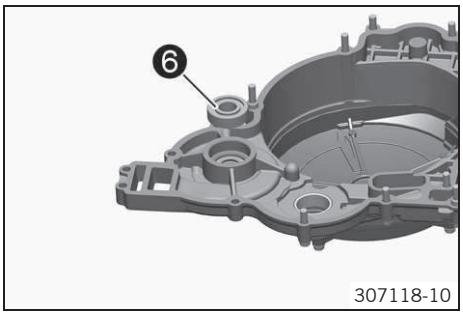
– Remove lock ring ❹.
– Remove the inner shaft seal ring ❺.



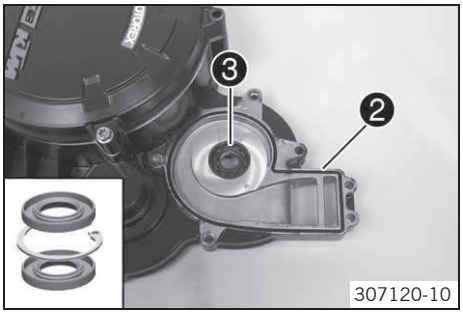
– Press bearing ❻ out of the clutch cover from the outside to the inside using a suitable tool.
– Change the step bearing of the crankshaft. (☛ p. 158)



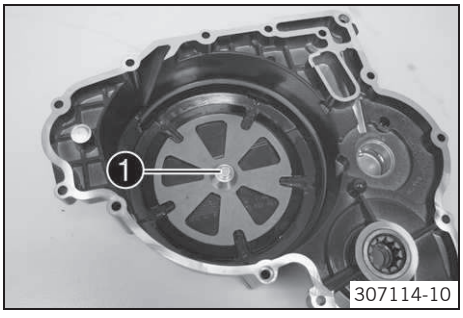
– Mount lock ring ❹.
– Press in the inner shaft seal ring ❺ all the way with the closed side facing the lock ring.



– Using a suitable tool, press in the new bearing ❻ from the inside to the outside until it is flush.



– Press in the outer shaft seal ring ❸, with the open side flush and facing outwards.
– Insert water pump cover seal ❷.

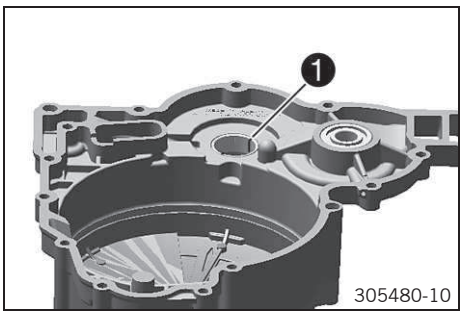


– Position the damping plate.
– Mount and tighten screw ❶ with the bushing.

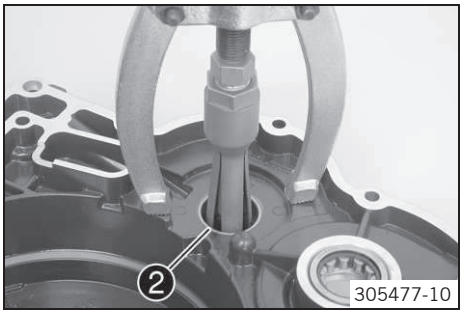
Guideline

Screw, damping plate	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

18.8.10 Changing the step bearing of the crankshaft

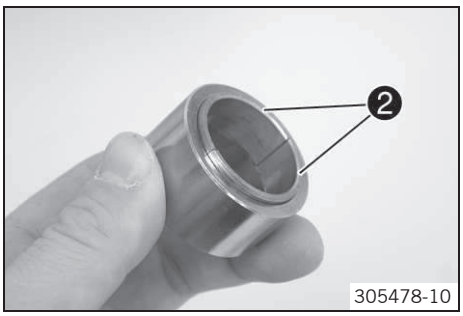


– Mark the position of the bearing joint ❶.



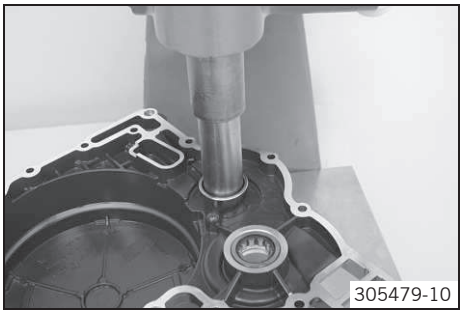
– Pull out the step bearing shells ❷ using the special tool.

Bearing puller (15112017000) (☛ p. 270)
Insert for bearing puller (60029018000) (☛ p. 274)



– Center the new main bearing shells ❷ using the special tool.

Step bearing tool (60029046028) (☛ p. 274)

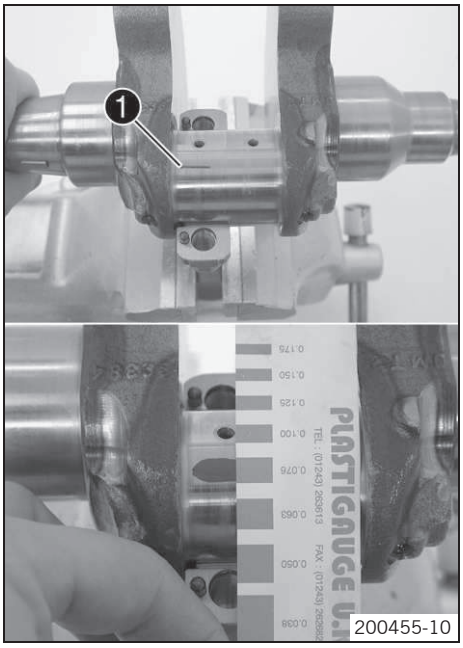


– Support the clutch cover directly under the step bearing. Press in the step bearing shells using the special tool until they are flush.

Step bearing tool (60029046028) (☛ p. 274)

18.8.11 Checking the radial clearance of the bottom connecting rod bearing

Info
Perform the operation on both connecting rods.



– Position the bearing shells. Insert the **Plastigauge** measuring strips ❶ offset by 90° from the bearing joint.

Plastigauge measuring strips (60029012000) (☛ p. 273)

– Position the connecting rod bearing cap. Mount and tighten the screws.

Guideline

Screw, conrod bearing	M10x1	Step 1 25 Nm (18.4 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 90°

Info
Do not twist the connecting rod.

– Remove the connecting rod bearing cap again. Compare the **Plastigauge** measuring strip with the specifications on the packaging.

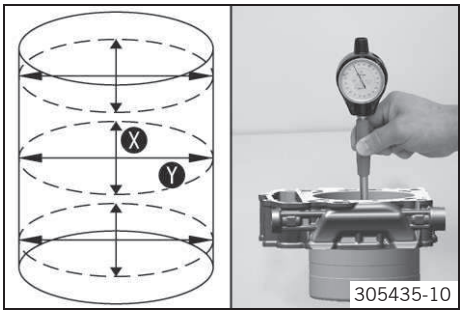
Guideline

Connecting rod - radial clearance of lower conrod bearing	
New condition	0.030... 0.060 mm (0.00118... 0.00236 in)
Wear limit	0.080 mm (0.00315 in)

Info
The width of the **Plastigauge** measuring strips indicates the bearing play.

– Clean the parts.

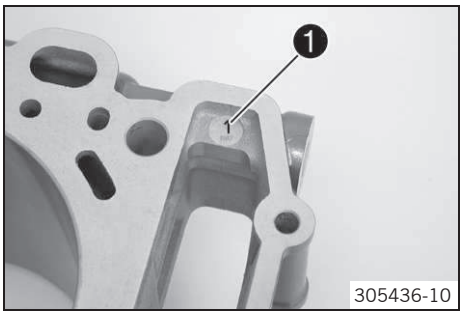
18.8.12 Checking/measuring the cylinder



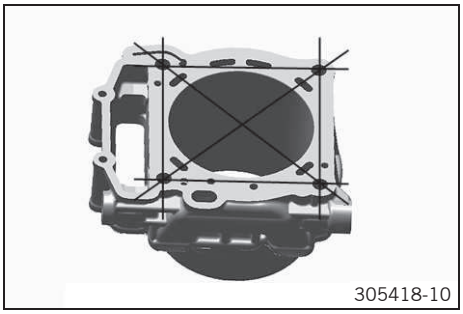
– Check the cylinder bearing surface for damage.
  » If the cylinder bearing surface is damaged:
    – Change the cylinder and piston.
– Measure the cylinder diameter at several places on the contact surface in the ❌ and ❾ axes using a micrometer to check for oval wear.

Guideline

Cylinder - bore diameter	
Size I	105.000... 105.012 mm (4.13385... 4.13432 in)
Size II	105.012... 105.025 mm (4.13432... 4.13483 in)



– The cylinder size ❶ is labeled on the side of the cylinder.



– Check the sealing area of the cylinder head for distortion using a straight edge and the special tool.

Feeler gauge (59029041100) (☛ p. 273)

Cylinder/cylinder head - sealing area distortion	≤ 0.05 mm (≤ 0.002 in)

» If the measured value does not equal the specified value:
– Change the cylinder.

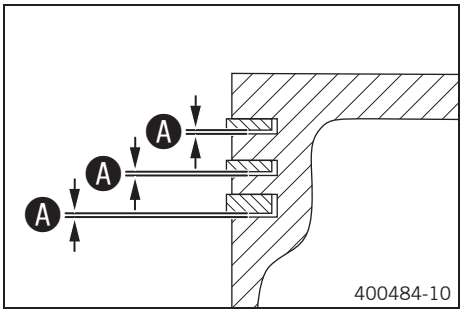
18.8.13 Checking/measuring the piston

– Check the piston bearing surface for damage.
» If the piston bearing surface is damaged:
– Change the piston and, if necessary, the cylinder.
– Check that the piston rings can move easily in the piston ring grooves.
» If the piston ring is stiff:
– Clean the piston ring groove.

Tip
Use an old piston ring 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.

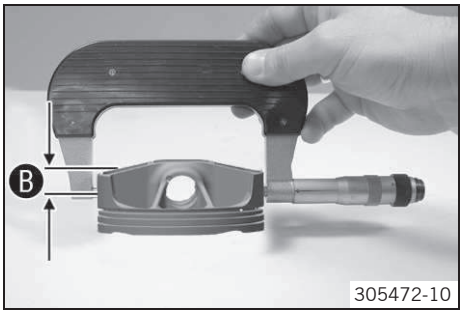


– Use the special tool to measure clearance Ⓐ of the piston rings in the piston ring groove.
Guideline

Piston ring - groove clearance	
First ring (rectangular ring)	≤ 0.105 mm (≤ 0.00413 in)
Second ring (lower compression ring)	≤ 0.150 mm (≤ 0.00591 in)
Oil scraper ring	≤ 0.180 mm (≤ 0.00709 in)

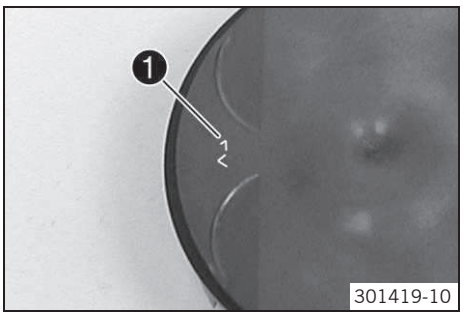
Feeler gauge (59029041100) (☛ p. 273)

» If clearance Ⓐ is larger than the specified value:
– Change the piston and piston rings.
– Check/measure the cylinder. (☛ p. 159)
– Check the piston pin for discoloration or signs of wear.
» If the piston pin has strong discoloration/signs of wear:
– Change the piston pin.
– Insert the piston pin into the connecting rod and check the bearing for play.
» If the piston pin bearing has too much play:
– Change the connecting rod and the piston pin.



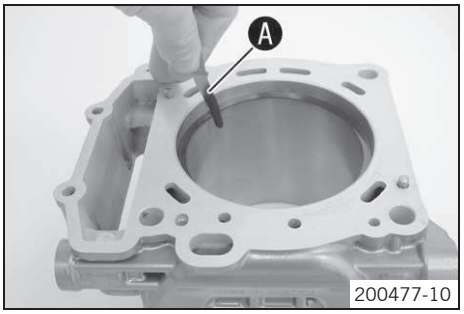
– Measure the piston at the piston skirt, at right angles to the piston pin, at a distance Ⓑ.
Guideline

Piston - diameter	
Size I	104.955... 104.985 mm (4.13208... 4.13326 in)
Size II	104.965... 104.995 mm (4.13247... 4.13365 in)
Distance Ⓑ	6 mm (0.24 in)



– Piston size ❶ is marked on the piston head.

18.8.14 Checking the piston ring end gap



– Remove the piston ring from the piston.
– Place the piston ring in the cylinder and align it with the piston.

Guideline

Under the upper edge of the cylinder	10 mm (0.39 in)

– Measure the end gap with special tool Ⓐ.

Guideline

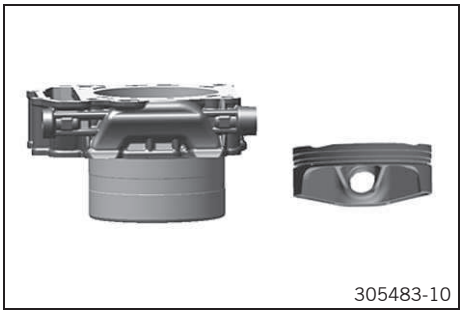
Piston ring end gap	≤ 0.5 mm (≤ 0.02 in)

Feeler gauge (59029041100) (☛ p. 273)

» If the end gap is greater than the specified value:
  – Check/measure the cylinder. (☛ p. 159)
» If the cylinder wear is within the tolerance range:
  – Change the piston ring.

– Mount the piston ring with the marking facing toward the piston head.

18.8.15 Checking the piston/cylinder mounting clearance



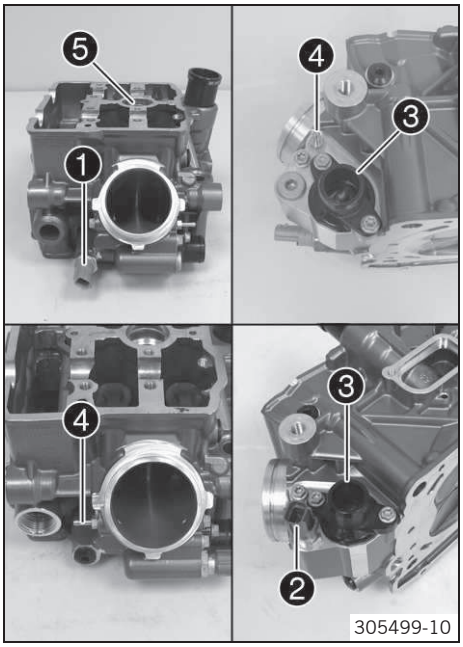
– Check/measure the cylinder. (☛ p. 159)
– Check/measure the piston. (☛ p. 160)
– The smallest piston/cylinder mounting clearance is the result of the smallest cylinder bore diameter minus the largest piston diameter. The largest piston/cylinder mounting clearance is the result of the largest cylinder bore diameter minus the smallest piston diameter.

Guideline

Piston/cylinder - mounting clearance	
New condition	0.015... 0.057 mm (0.00059... 0.00224 in)
Wear limit	0.150 mm (0.00591 in)

18.8.16 Work on the cylinder head

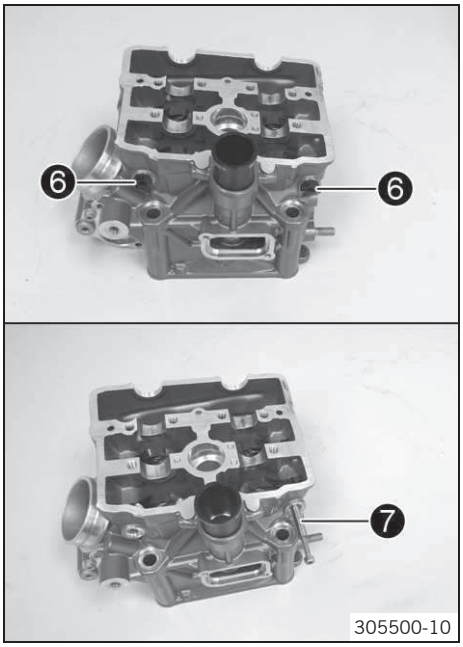
Info
The following operations apply to both cylinder heads.



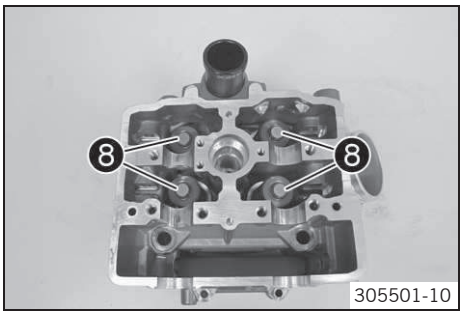
– Remove oil pressure switch ❶.

Info
This only applies to the front cylinder head!

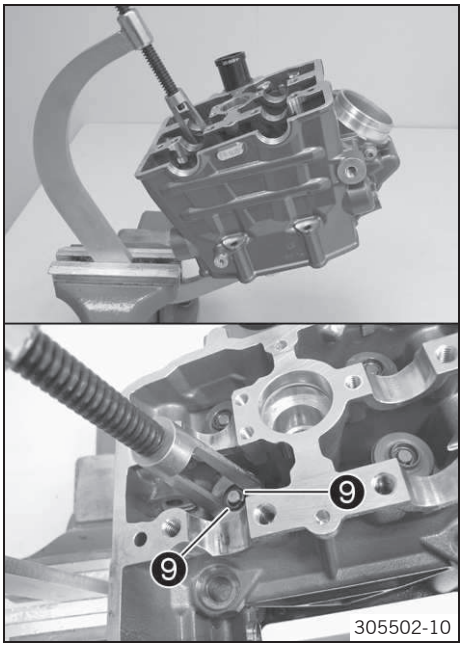
– Remove engine coolant temperature sensor ❷.
– Remove screws.
– Remove thermostat case ❸ and the thermostat.
– Remove vacuum connection ❹.
– Remove O-rings ❺.



– Remove plugs ❻ with the O-ring.
– Pull out cam lever shafts ❼ with a suitable M5 screw and remove the cam lever.



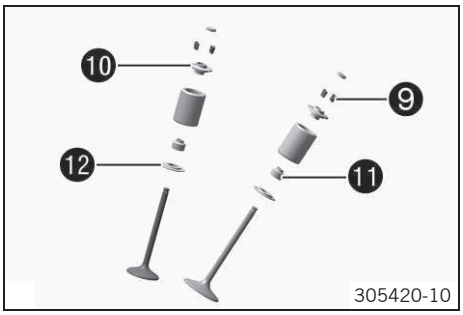
– Remove shims ❽ and label the normal built-in position.



– Tension the valve spring with a special tool.

Valve spring compressor (59029019000) (☛ p. 272)
Valve spring mounting device (78029060000) (☛ p. 280)

– Remove valve keys ❾ and release tension on the valve spring.

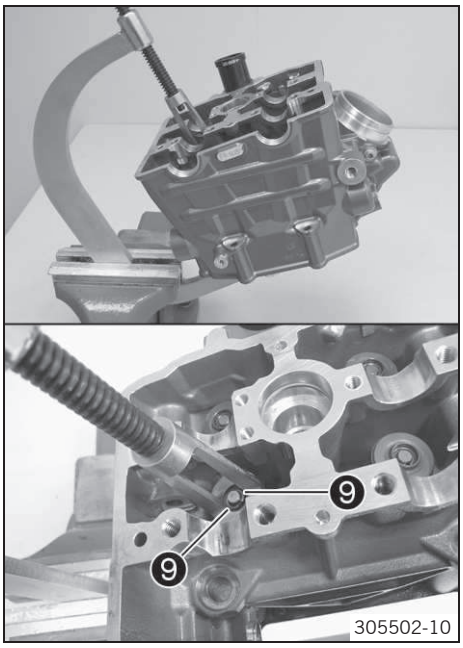


– Remove valve spring retainer ❿, valve spring, valve stem seals ⓫ and valve spring supports ⓬.

Info
Place the valves in a carton corresponding to their installation position and label them.

– Check the cylinder head. (☛ p. 164)
– Mount valve spring searts ⓬ and new valve stem seals ⓫.
– Mount valve spring and valve spring retainer ❿.

✓ The tight winding of the valve spring is at the bottom.

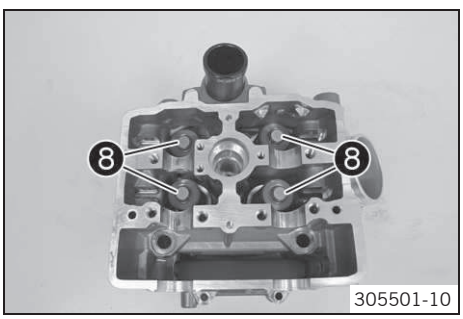


– Tension the valve spring with a special tool.

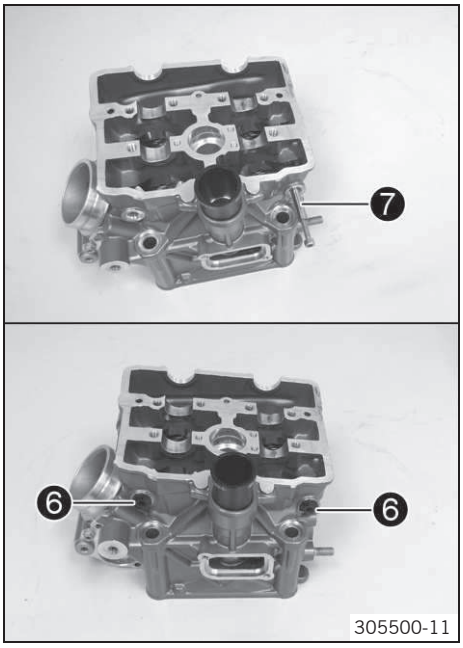
Valve spring compressor (59029019000) (☛ p. 272)
Valve spring mounting device (78029060000) (☛ p. 280)

– Mount valve keys ❾. Release the tension on the valve spring.

Info
When mounting the valve keys, check that they are seated correctly; preferably, fix the valve keys to the valve with a little grease.



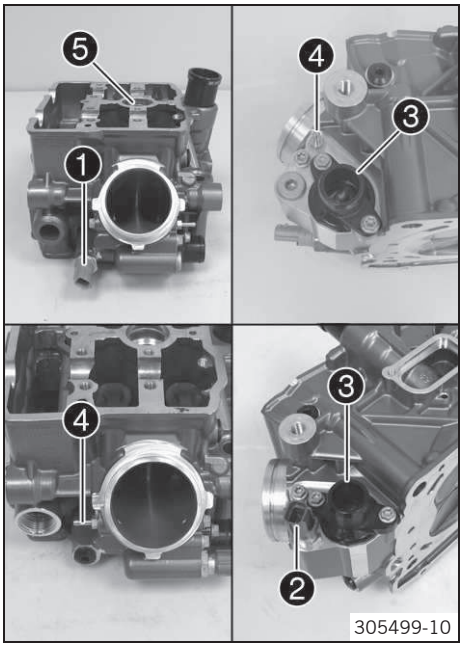
– Place shims ❽ into the valve spring retainer according to their normal built-in position.



– Position the cam lever and mount cam lever shafts ❼.
– Mount plugs ❻ with new O-rings.

Guideline

Plug, cam lever axis	M10x1	15 Nm (11.1 lbf ft)



– Mount oil pressure sensor ❶.

Guideline

Oil pressure sensor	M10x1	10 Nm (7.4 lbf ft)

Info
This only applies to the front cylinder head!

– Mount engine coolant temperature sensor ❷.

Guideline

Coolant temperature sensor	M12x1.5	12 Nm (8.9 lbf ft)

– Mount the thermostat and thermostat case ❸.
– Mount and tighten screw.

Guideline

Screw, thermostat case	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

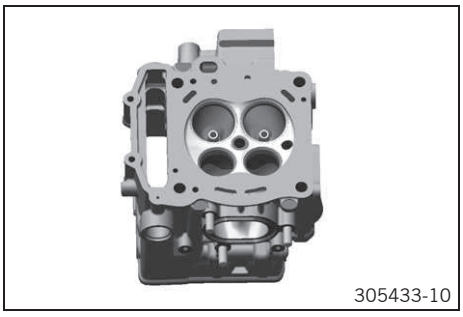
– Mount vacuum connection ❹.

Guideline

Vacuum connection	M6	2.5 Nm (1.84 lbf ft)	**Loctite® 243™**

– Mount and grease O-rings ❺.

18.8.17 Checking the cylinder head

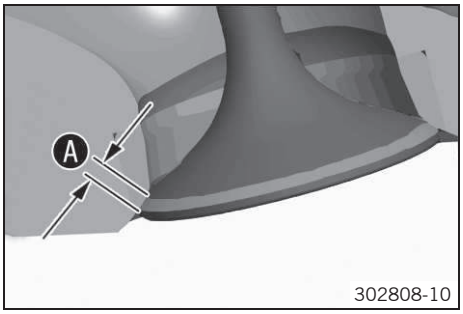


– Check the sealing area of the spark plug thread and the valve seats for damage and tearing.
  » If there is wear or tearing:
    – Change the cylinder head.
– Check the valve guides using the special tool.

Limit plug gauge (59029026006) (☛ p. 273)

Valve guide - diameter	
New condition	6.004… 6.016 mm (0.23638… 0.23685 in)
Wear limit	6.150 mm (0.24213 in)

  » If the special tool is easy to insert into the valve guide:
    – Change the valve guide and valve.

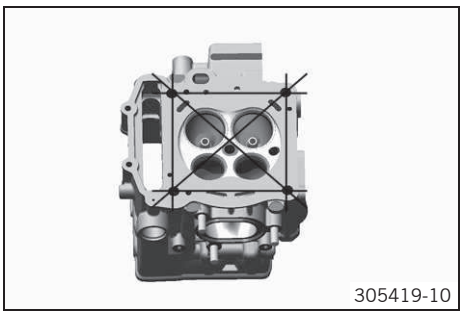


302808-10

– Check sealing seat Ⓐ of the valves.

Valve - sealing seat width	
Intake: New condition	0.90 mm (0.0354 in)
Intake: Wear limit	1.7 mm (0.067 in)
Exhaust: New condition	1.0 mm (0.039 in)
Exhaust: Wear limit	2.0 mm (0.079 in)

» If the measured value does not equal the specified value:
– Machine the valve seat.


305419-10

– Check the sealing area of the cylinder for distortion using a straight edge and the special tool.

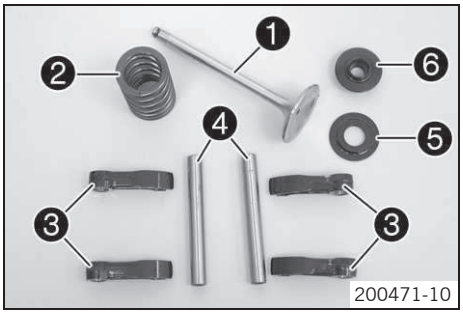
Feeler gauge (59029041100) (☛ p. 273)

Cylinder/cylinder head - sealing area distortion	≤ 0.05 mm (≤ 0.002 in)

» If the measured value does not equal the specified value:
– Change the cylinder head.

– Check the pivot points of the camshafts in the cylinder head and in the camshaft bearing bridge for damage and wear.

» If there is damage or wear:
– Change the cylinder head with the camshaft bearing bridge.



200471-10

– Check valve ❶ for damage and wear.

» If there is damage or wear:
– Change the valve.

– Check the valve for run-out.

Valve - run-out	
On the valve stem	≤ 0.05 mm (≤ 0.002 in)
On the valve plate: New condition	≤ 0.016 mm (≤ 0.00063 in)
On the valve plate: Wear limit	≤ 0.030 mm (≤ 0.00118 in)

» If the measured value does not equal the specified value:
– Change the valve.

– Check the valve stem diameter.

Valve - valve stem diameter	
Exhaust	5.890... 5.970 mm (0.23189... 0.23504 in)
Intake	5.890... 5.970 mm (0.23189... 0.23504 in)

» If the measured value does not equal the specified value:
– Change the valve.

– Check valve spring ❷ for damage and wear.

» If there is damage or wear:
– Change the valve spring.

– Measure the valve spring lengths.

Valve spring - length	
New condition	42.70 mm (1.6811 in)
Wear limit	41.2 mm (1.622 in)

» If the measured value does not equal the specified value:
– Change the valve springs.

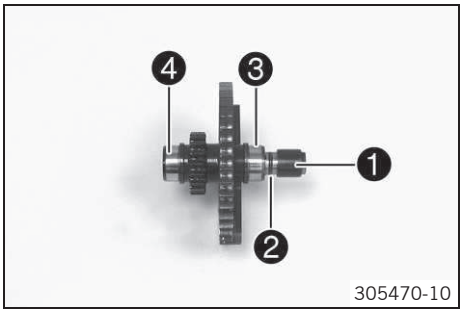
– Check cam lever ❸ for damage and wear.

» If there is damage or wear:
– Change the cam lever.

– Check cam lever shaft ❹ for damage and wear.

» If there is damage or wear:
– Change the cam lever shaft.
– Check valve spring support ❺ for damage and wear.
» If there is damage or wear:
– Change the valve spring seat.
– Check valve spring retainer ❻ for damage and wear.
» If there is damage or wear:
– Change the valve spring retainer.

18.8.18 Work on the right idler

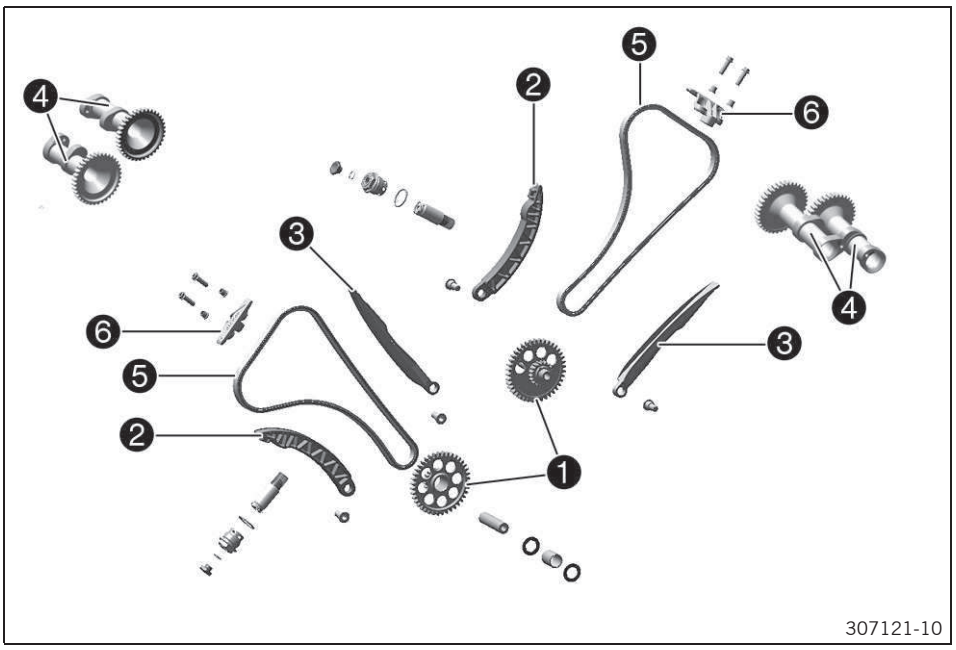


– Remove bushing ❶.
– Remove O-ring ❷.
– Remove inner bearing races ❸ and ❹.

Extractor (61229020000) (☛ p. 278)

– Push on new bearing inner races ❸ and ❹.
– Mount the new O-ring ❷.
– Mount the new bushing ❶.

18.8.19 Checking the timing assembly



– Clean all parts well.
– Check idler ❶ for damage and wear.
» If there is damage or wear:
– Change the idler.
– Check timing chain tensioning rail ❷ for damage and wear.
» If there is damage or wear:
– Change the timing chain tensioning rail.
– Check timing chain guide rail ❸ for damage and wear.
» If there is damage or wear:
– Change the timing chain guide rail.
– Check camshaft ❹ for damage and wear.
» If there is damage or wear:
– Change the camshaft.
– If the cam surface is damaged, check the oil supply to the camshaft and cam lever.

– Measure the cam height.

Guideline

Camshaft - cam height	
Intake	39.150... 39.291 mm (1.54134... 1.54689 in)
Exhaust	38.390... 38.542 mm (1.51141... 1.5174 in)

» If cam wear is outside of the tolerance range:

– Change the camshaft.

– Check timing chain ❺ for damage and wear.

» If there is damage or wear:

– Change the timing chain.

– Check that the timing chain links move easily. Let the timing chain hang down freely.

» If the chain links no longer straighten out:

– Change the timing chain.

– Check guide rail ❻ for damage and wear.

» If there is damage or wear:

– Change the guide rail.

18.8.20 Preparing the timing chain tensioner for installation


200171-10

– Fully compress the timing chain tensioner.

Info
This requires considerable force since the oil has to be pressed out.

– Release the timing chain tensioner.

✓ Without pressure, the timing chain tensioner expands fully.


200172-10

– Place two compensating disks or similar aids next to the timing chain tensioner piston. This should ensure that when pushed down, the piston does not fully withdraw.

Guideline

Thickness of the compensating disks	2... 2.5 mm (0.08... 0.098 in)

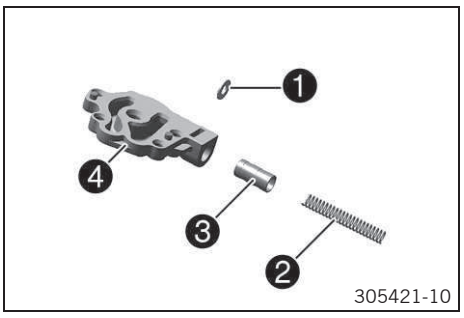
– Release the timing chain tensioner.

✓ The latching system locks and the piston stops moving.

End position of piston after latching	3 mm (0.12 in)

Info
This position is necessary for installation.
If the timing chain tensioner is now pressed in once more (while it is installed) and then pulled out no more than halfway (preventing it from coming out fully), the latching system locks and the timing chain tensioner can no longer be compacted; this function is necessary to ensure sufficient tension of the timing chain, even at low oil pressure.

18.8.21 Checking the oil pressure regulator valve



305421-10

– Remove supporting plate ❶ and spring ❷.

– Measure the length of spring ❷.

Oil pressure regulator valve - minimum spring length	39.5 mm (1.555 in)

» If the measured length is less than the specified value:

– Change the spring.

– Check control piston ❸ for damage and wear.

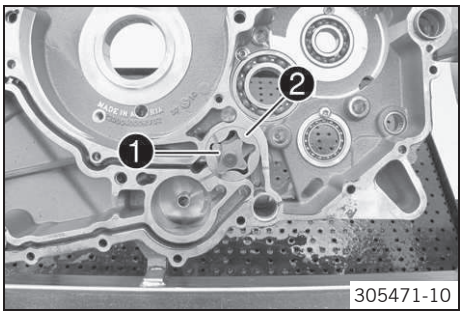
» If there is damage or wear:

– Change the control piston.

– Check the control piston hole in oil pump cover ❹ for damage and wear.
  » If there is damage or wear:
    – Change the oil pump cover.
– Oil control piston ❸ and spring ❷ well and mount them.
– Mount supporting plate ❶.

18.8.22 Checking the lubrication system

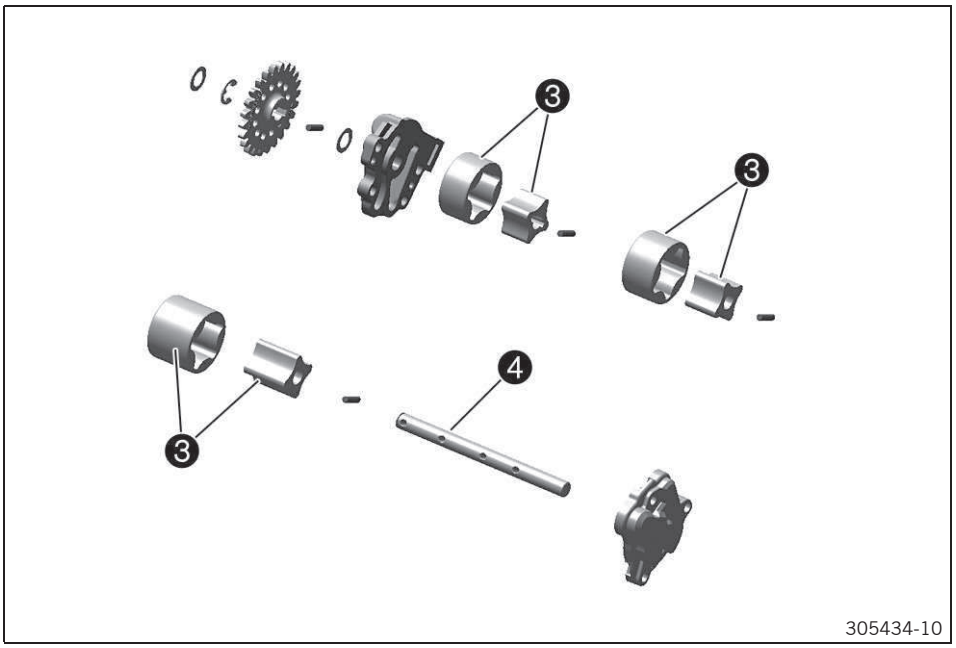
Info
The following operations apply to all three oil pumps.



– Check the clearance between internal rotor ❶ and external rotor ❷ and between the external rotor and the engine case.

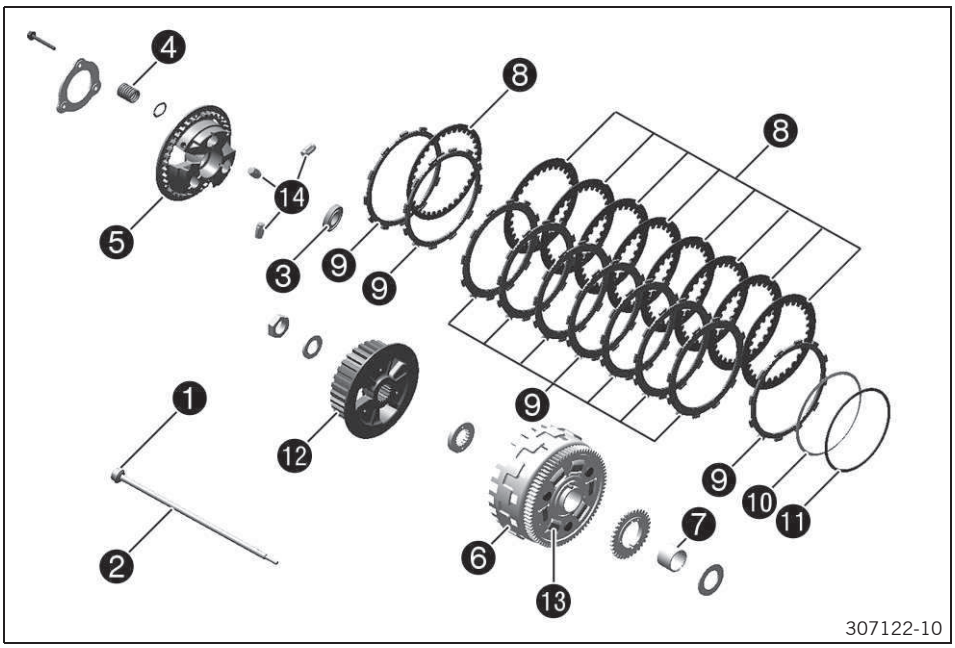
Oil pumps	
Clearance between external rotor and engine case	0.20... 0.40 mm (0.0079... 0.0157 in)
Clearance between external rotor and internal rotor	0.10... 0.25 mm (0.0039... 0.0098 in)
Axial clearance	0.04... 0.25 mm (0.0016... 0.0098 in)

  » If the clearance exceeds the specifications:
    – Change the oil pump and, if necessary, the engine case.



– Check the internal rotor and external rotor of oil pumps ❸ for damage and wear.
  » If there is damage or wear:
    – Change the oil pumps.
– Check oil pump shaft ❹ 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.

18.8.23 Checking the clutch



– Check pressure piece ❶ for damage and wear.
  » If there is damage or wear:
    – Change the push rod.
– Place push rod ❷ on a level surface and check it for run-out.
  » If there is run-out:
    – Change the push rod.
– Check axial bearing ❸ for damage and wear.
  » If there is damage or wear:
    – Change the axial bearing.
– Check the length of clutch springs ❹.

Clutch spring - length	45.70... 46.70 mm (1.7992... 1.8386 in)

  » If the clutch spring length is less than the specified value:
    – Change all clutch springs.
– Check the contact surface of clutch pressure cap ❺ for damage and wear.
  » If there is damage or wear:
    – Change the clutch pressure cap.
– Check the thrust surfaces of the clutch facing discs in clutch basket ❻ for wear.

Clutch basket - thrust surface of clutch facing discs	
Wear limit	0.5 mm (0.02 in)

  » If the thrust surface is very worn:
    – Change the clutch facing discs and the clutch basket.
– Check needle bearing ❼ for damage and wear.
  » If there is damage or wear:
    – Change the needle bearing.
– Check the intermediate clutch discs ❽ for damage and wear.
  » If the intermediate clutch discs are not level and have pittings:
    – Change all intermediate clutch discs.
– Check the thickness of intermediate clutch discs ❽.

Intermediate disk - thickness	
New condition	1.55... 1.65 mm (0.061... 0.065 in)
Wear limit	1.45 mm (0.0571 in)

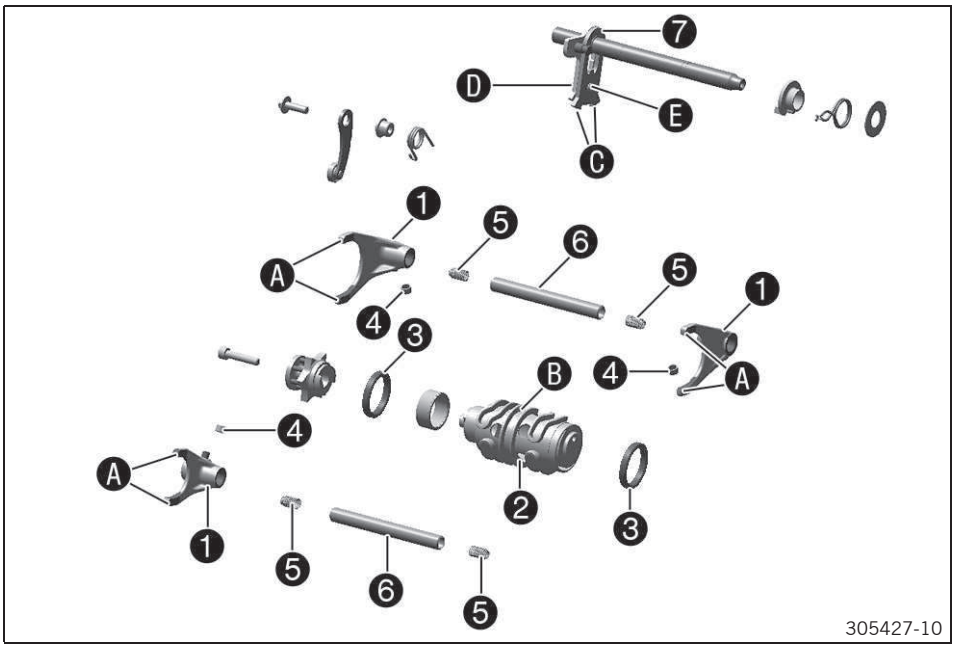
  » If the intermediate clutch discs do not meet specifications:

  - Change all intermediate clutch discs.
- Check clutch facing discs ❾ for discoloration and scoring.
  - » If there is discoloration or scoring:
    - Change all clutch facing discs.
- Check the thickness of clutch facing discs ❾.

Clutch facing disc - thickness	
New condition	2.92... 3.08 mm (0.115... 0.1213 in)
Wear limit	2.85 mm (0.1122 in)

  - » If the clutch facing discs do not meet specifications:
    - Change all clutch facing discs.
- Check pretension ring ❿ and support ring ⓫ for damage and wear.
  - » If there is damage or wear:
    - Change the pretension ring and support ring.
- Check inner clutch hub ⓬ for damage and wear.
  - » If there is damage or wear:
    - Change the inner clutch hub.
- Check the springs of clutch basket ⓭ for damage and wear.
  - » If there is damage, wear or play in the direction of rotation:
    - Change the clutch basket.
- Check damper ⓮ for damage and wear.
  - » If there is damage or wear:
    - Change the damper.

18.8.24 Checking the shift mechanism



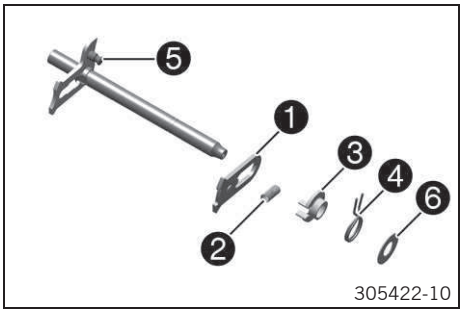
- Check shift forks ❶ at leaf Ⓐ for wear.

Shift fork	
Thickness at leaf	4.85... 4.95 mm (0.1909... 0.1949 in)
Clearance in the sliding gear groove: New condition	0.35... 0.55 mm (0.0138... 0.0217 in)
Clearance in the sliding gear groove: Wear limit	0.70 mm (0.0276 in)

  - » If the measured value does not equal the specified value:
    - Change the shift fork and gear wheel pair.
- Check shift grooves Ⓑ of shift drum ❷ for wear.
  - » If the shift groove is worn:
    - Change the shift drum.

– Check the seat of the shift drum in grooved ball bearings ❸.
  » If the shift drum is not seated correctly:
    – Change the shift drum and/or the grooved ball bearing.
– Check grooved ball bearing ❸ for stiffness and wear.
  » If the grooved ball bearings do not move freely or are worn:
    – Change the grooved ball bearing.
– Check shift drums ❹ for ovality, surface damage and cracking.
  » If the shift drum is oval, or shows signs of surface damage or cracks:
    – Change the shift drum.
– Check springs ❺ of the shift rails for damage and wear.
  » If the spring is broken or worn:
    – Change the spring of the shift rail.
– Check the shift rails ❻ on a flat surface for run-out.
  » If there is run-out:
    – Change the shift rail.
– Check shift rails for scoring, signs of corrosion and stiffness in the shift fork.
  » If there is scoring or corrosion, or if the shift fork is stiff:
    – Change the shift rail.
– Check sliding plate ❼ in contact areas Ⓒ for wear.
  » If the sliding plate is worn:
    – Change the sliding plate.
– Check return surface Ⓓ on the sliding plate for wear.
  » If deep notches are present:
    – Change the sliding plate.
– Check guide pin Ⓔ for looseness and wear.
  » If the guide pin is loose and/or worn:
    – Change the sliding plate.

18.8.25 Preassembling the shift shaft



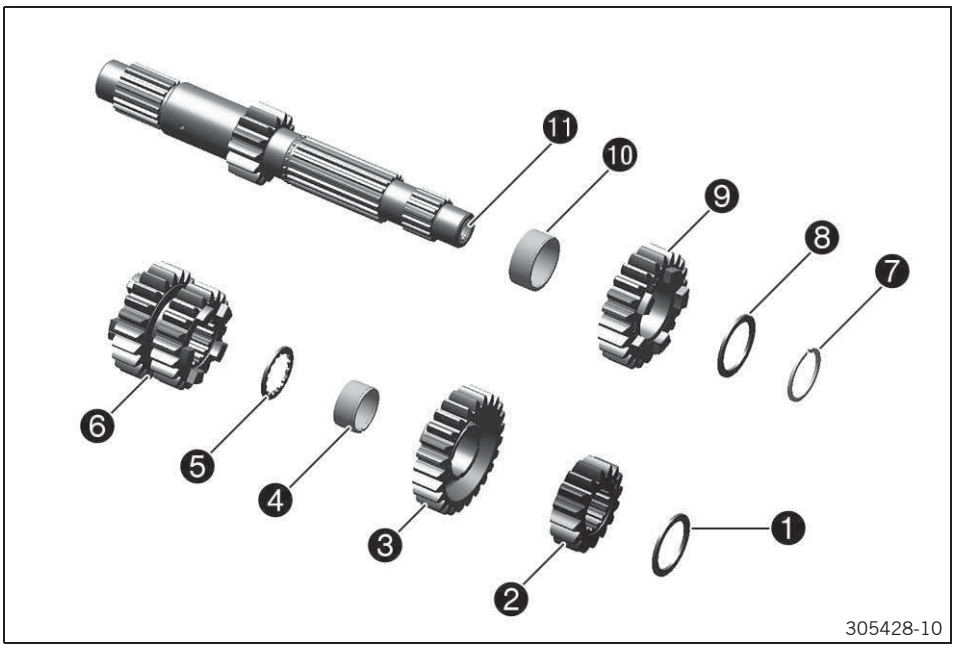
– Fix the short end of the shift shaft in a vise.

  Guideline

Use soft jaws.

– Mount sliding plate ❶ with the guide pin facing down and attach the guide pin to the shift quadrant.
– Mount preload spring ❷.
– Push on spring guide ❸, push return spring ❹ over the spring guide with the offset end facing upward and lift the offset end over abutment bolt ❺.
– Mount stop disk ❻.

18.8.26 Disassembling the main shaft



– Secure the main shaft with the toothed end facing downward in the bench vise.

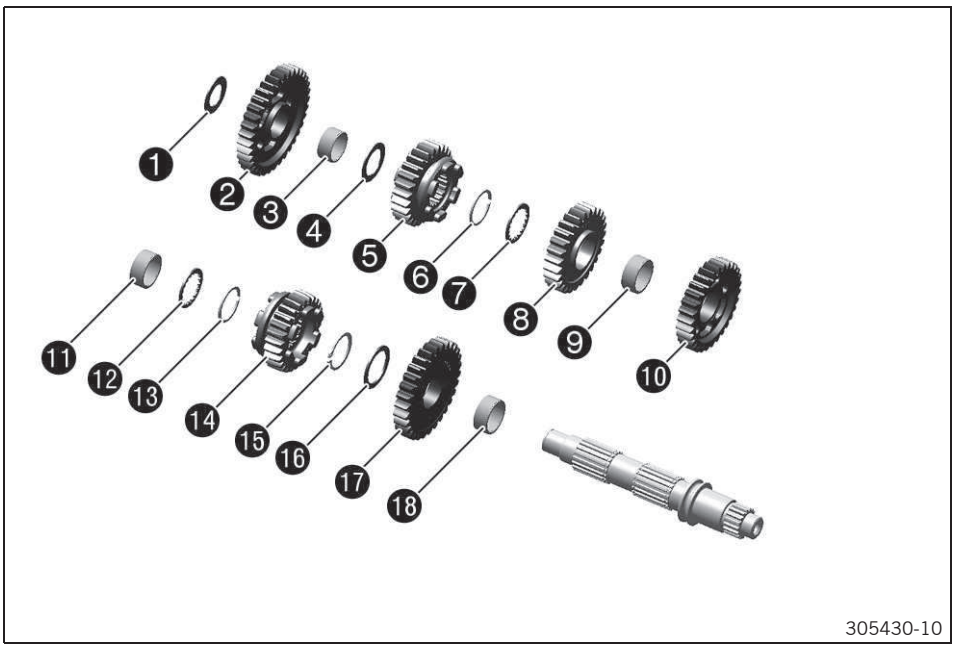
  Guideline

Use soft jaws.

– Remove stop disk ❶ and second-gear fixed gear ❷.
– Remove sixth-gear idler gear ❸.
– Remove needle bearing ❹ and stop disk ❺.
– Remove third/fourth-gear sliding gear ❻.
– Remove lock ring ❼.
– Remove stop disk ❽ and fifth-gear idler gear ❾.
– Remove needle bearing ❿.
– Remove needle bushing ⓫ with a suitable tool.

Info
Only needs to be removed in case of wear.

18.8.27 Disassembling the countershaft



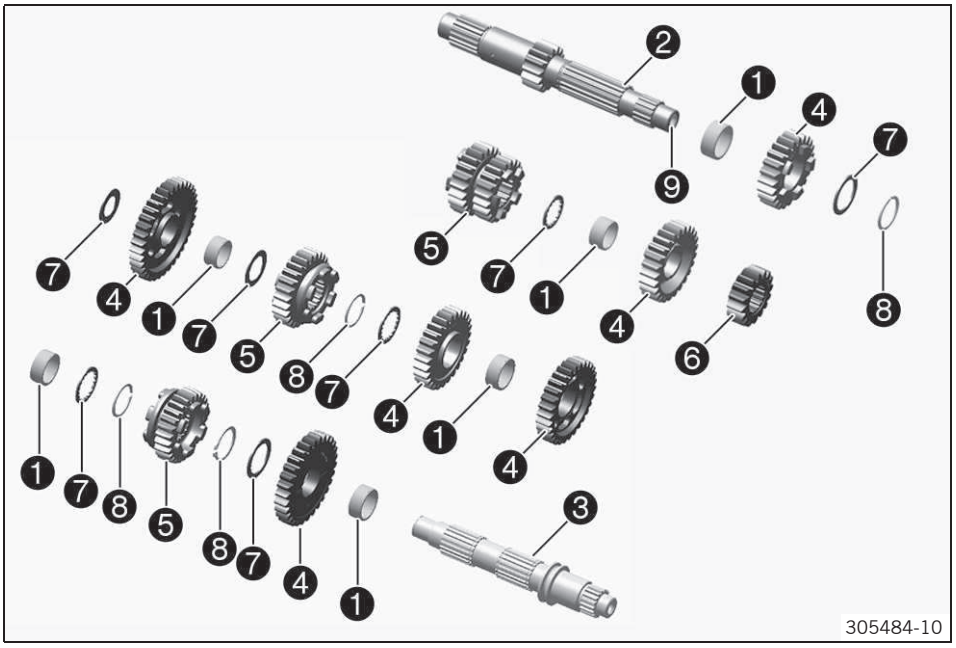
– Secure the countershaft with the toothed end facing downward in the bench vise.

  Guideline

Use soft jaws

– Remove stop disk ❶ and first-gear idler gear ❷.
– Remove needle bearing ❸ and stop disk ❹.
– Remove the fifth-gear sliding gear ❺ and lock ring ❻.
– Remove stop disk ❼ and fourth-gear idler gear ❽.
– Remove needle bearing ❾ and third-gear idler gear ❿.
– Remove needle bearing ⓫ and stop disk ⓬.
– Remove lock ring ⓭ and sixth-gear sliding gear ⓮.
– Remove lock ring ⓯ and stop disk ⓰.
– Remove second-gear idler gear ⓱ and needle bearing ⓲.

18.8.28 Checking the transmission



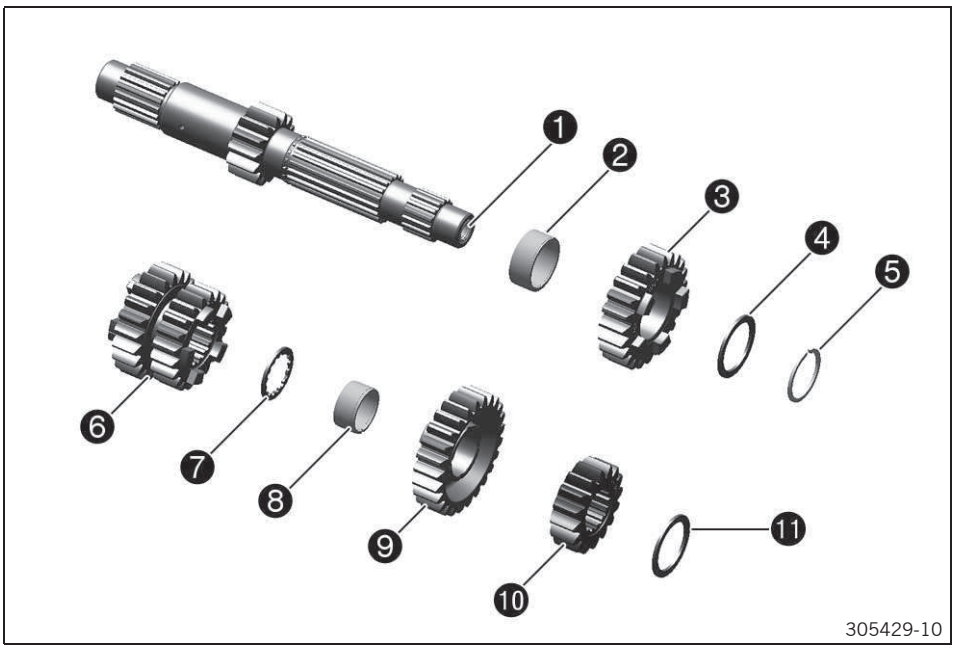
– Check needle bearings ❶ for damage and wear.

» If there is damage or wear:
– Change the needle bearing.
– 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 gear ❺ for smooth operation in the profile of main shaft ❷.
» If the solid gear does not move freely:
– Change the sliding gear or the main shaft.
– Check sliding gears ❺ for smooth operation in the profile of countershaft ❸.
» If the solid gear does not move freely:
– Change the sliding gear or the 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.
– Check stop disks ❾ for damage and wear.
» If there is damage or wear:
– Change the needle bearing.

18.8.29 Assembling the main shaft

Info
Use new lock rings and new stop disks with every repair.

Preparatory work
– Oil all parts carefully before assembling.
– Check the transmission. (☛ p. 173)



Main work

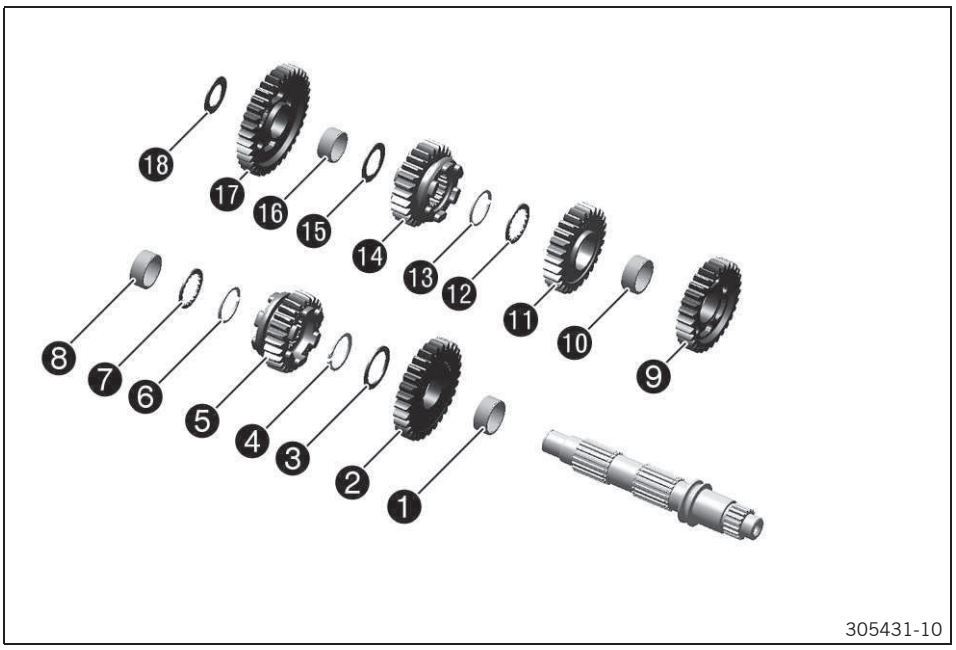
– Secure the main shaft with the toothed end facing downward in the bench vise.
  Guideline
Use soft jaws
– If removed, mount the new needle bushing ❶ with suitable tools.
– Mount needle bearing ❷ and mount fifth-gear idler gear ❸ with the shift dogs facing up.
– Mount stop disk ❹ and lock ring ❺.
– Mount third/fourth-gear sliding gear ❻ with the small gear wheel facing up.
– Mount stop disk ❼ and needle bearing ❽.
– Attach sixth gear idler gear ❾ with the shift dog facing downward.
– Attach second-gear fixed gear ❿ with the collar facing downward and stop disk ⓫.
– Finally, check all gear wheels for smooth operation.

18.8.30 Assembling the countershaft

Info
Use new lock rings and new stop disks with every repair.

Preparatory work

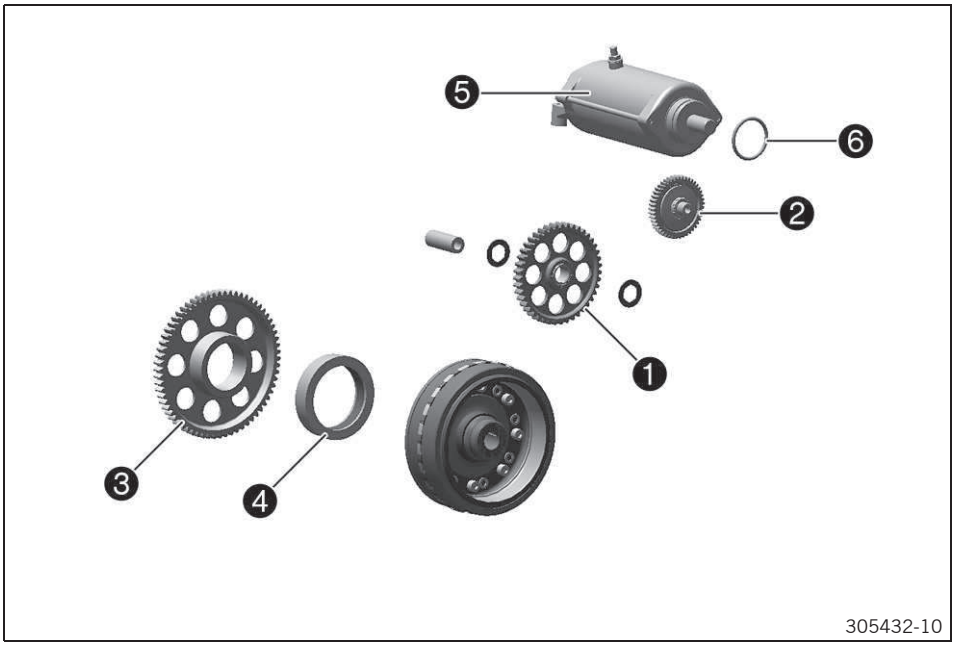
– Oil all parts carefully before assembling.
– Check the transmission. (☛ p. 173)



Main work

– Secure the countershaft with the toothed end facing downward in the bench vise.
  Guideline
Use soft jaws
– Mount needle bearing ❶ and second-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 the new lock ring ❻ and stop disk ❼.
– Mount needle bearing ❽ and the third-gear idler gear ❾ with the collar facing up.
– Mount needle bearing ❿ and the fourth-gear idler gear ⓫ with the collar facing down.
– Mount stop disk ⓬ and new 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.

18.8.31 Checking electric starter operation



– 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 free-wheel-gear and/or the bearing.

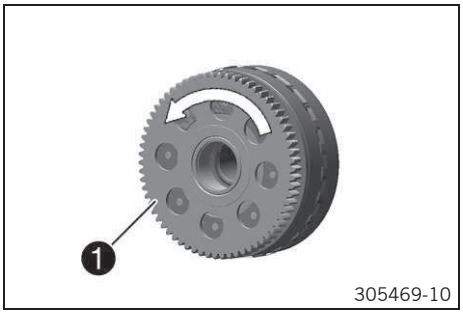
– Check freewheel ❹ for damage and wear.
» If there is damage or wear:
– Change the freewheel.

– Checking 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 connector of the starter motor.
» If the starter motor does not turn when the circuit is closed:
– Change the starter motor.

18.8.32 Checking the free-wheel

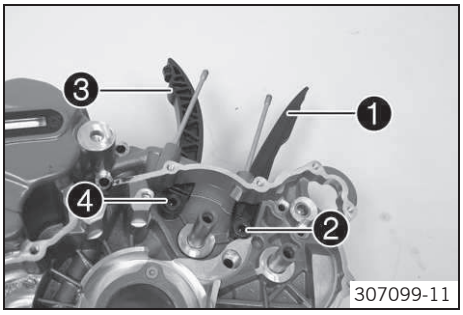


– Insert freewheel gear ❶ into the freewheel hub while turning the freewheel gear counterclockwise; do not wedge it.

– Check the locking action of free-wheel-gear ❶.
» The freewheel gear cannot be turned counterclockwise and does not block clockwise:
– Change the freewheel.

18.9 Engine assembly

18.9.1 Installing the timing chain rails of the left engine case section



– Position timing chain guide rail ❶. Mount and tighten screw ❷.

Guideline

Screw, timing chain guide rail	M8	15 Nm (11.1 lbf ft)	**Loctite® 243™**

Info
Ensure that there is no thread locker on the collar of the screw; otherwise, the timing chain guide rail may block and brake.

– Position timing chain tensioning rail ❸. Mount and tighten screw ❹.

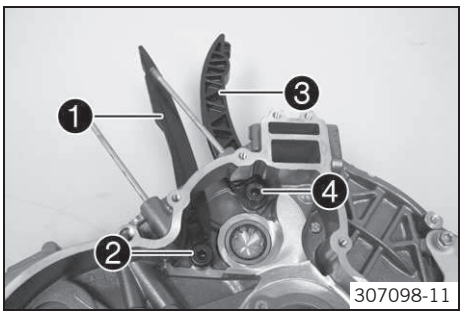
Guideline

Screw, timing chain tensioning rail	M8	15 Nm (11.1 lbf ft)	**Loctite® 243™**

Info
Ensure that there is no thread locker on the collar of the screw; otherwise, the timing chain tensioning rail may block and brake.

– Check both timing chain rails for freedom of motion.

18.9.2 Installing the timing chain rails of the right engine case section



– Position timing chain guide rail ❶. Mount and tighten screw ❷.

Guideline

Screw, timing chain guide rail	M8	15 Nm (11.1 lbf ft)	**Loctite® 243™**

Info
Ensure that there is no thread locker on the collar of the screw; otherwise, the timing chain guide rail may block and brake.

– Position timing chain tensioning rail ❸. Mount and tighten screw ❹.

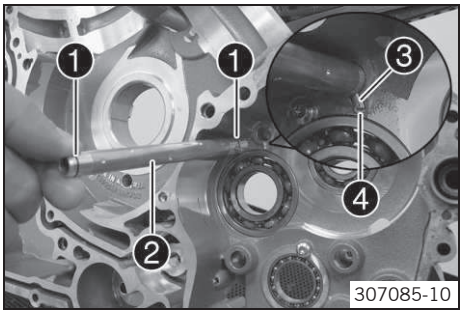
Guideline

Screw, timing chain tensioning rail	M8	15 Nm (11.1 lbf ft)	**Loctite® 243™**

Info
Ensure that there is no thread locker on the collar of the screw; otherwise, the timing chain tensioning rail may block and brake.

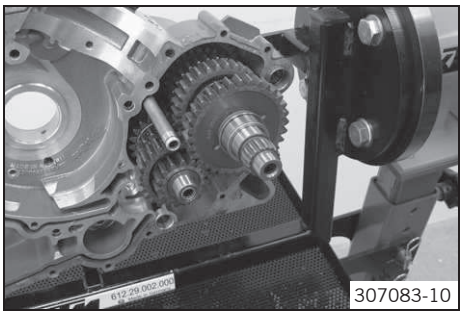
– Check both timing chain rails for freedom of motion.

18.9.3 Installing the oil spray tube



– Mount new O-rings ❶ on oil spray tube ❷.
– Mount the oil spray tube.
✓ Pin ❸ must engage in recess ❹.

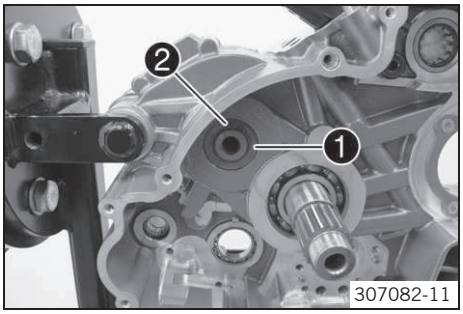
18.9.4 Installing the transmission shaft



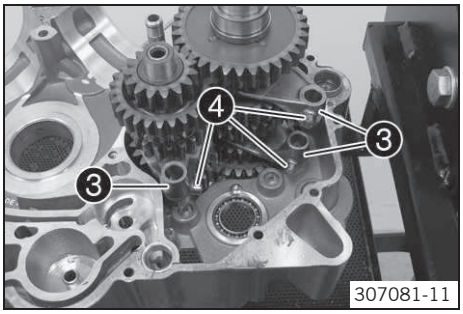
– Clamp the right section of the engine case.

Engine assembly stand (61229001000) (☛ p. 276)
Engine holder (61229002000) (☛ p. 276)

– Assemble the two transmission shafts and slide them into the bearing seats together.

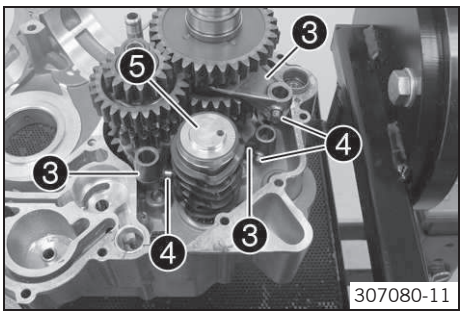


– Mount stop disk ❶ and lock ring ❷ of the countershaft.



– Tilt the engine.
– Mount shift forks ❸ with shift rollers ❹.

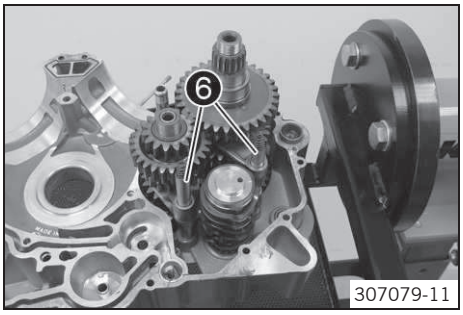
Info
Use a small amount of grease to fix the shift rollers to the shift forks.



– Swing shift forks ❸ to one side.

Info
Watch out for the shift rollers ❹.

– Insert shift drum ❺ into the bearing seat.
– Let the shift forks engage in the shift grooves.

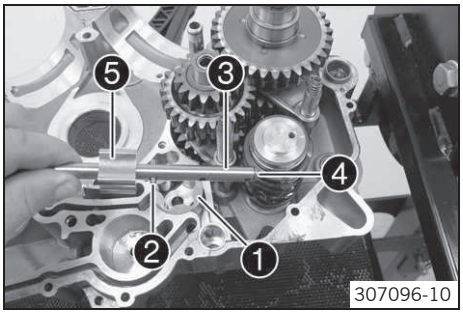


– Mount shift rails ❻ with the springs.

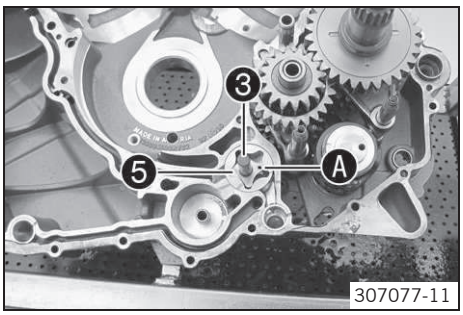
Info
Affix the springs to the shift rails with grease.

– Check the transmission for smooth operation.

18.9.5 Installing the middle suction pump

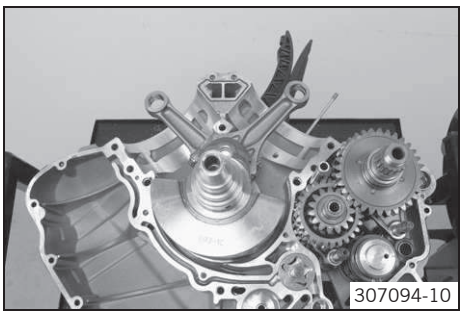


– Mount external rotor ❶ with the marking facing downward.
  ✓ The marking is not visible after mounting.
– Mount pin ❷ into the third hole of oil pump shaft ❸ after shaft keyway ❹.
– Slide internal rotor ❺ over the pin.



– Mount oil pump shaft ❸ with internal rotor ❺.
  ✓ Marking Ⓐ of the internal rotor is visible after mounting while that of the external rotor is not.
– Oil the parts.

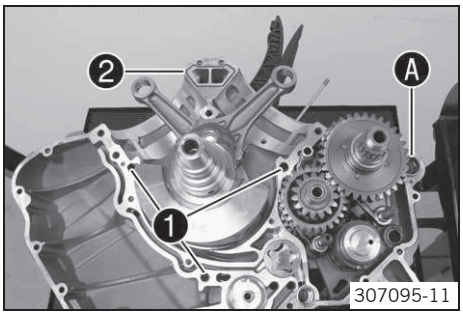
18.9.6 Installing the crankshaft



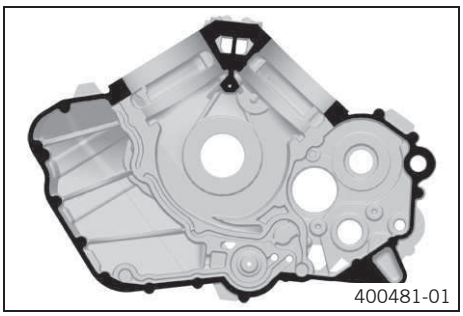
– Oil the bearing shells.
– Slide the crankshaft into the bearing seat.

Info
Position the connecting rod as shown in the photo.

18.9.7 Installing the left engine case



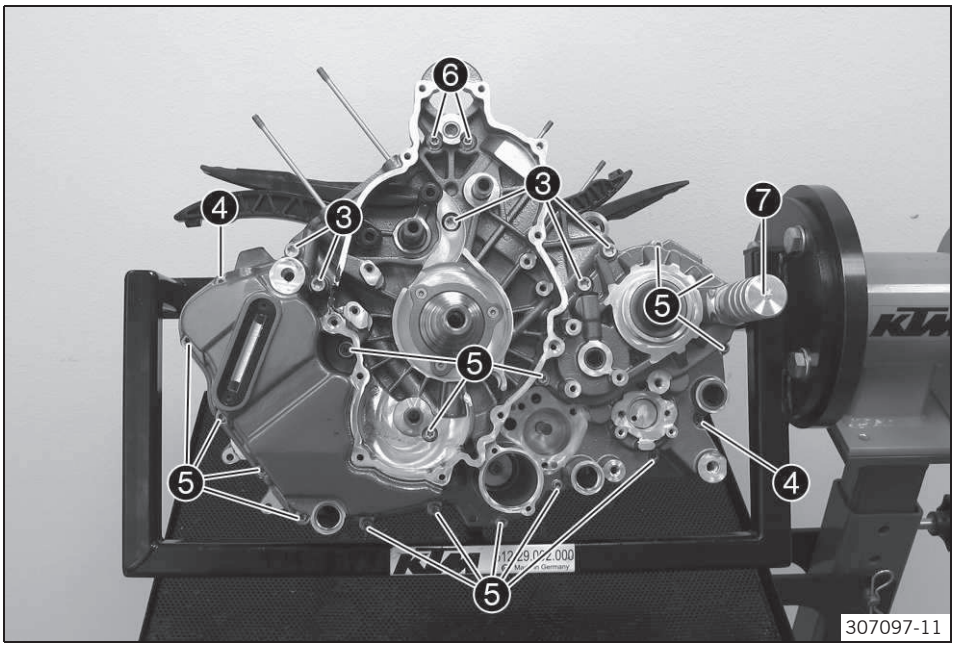
– Mount dowels ❶.
– Mount gasket ❷.
– Check that dowel Ⓐ is correctly seated.



– Degrease the sealing area and coat thinly with sealant.

Loctite® 5910

Info
Only coat the sealing area around the outside (see figure).



– Attach the left engine case, using a plastic hammer if necessary to seat it properly.

Info
Do not tighten the engine case sections using the screws.

– Mount and tighten screws ❸.

Guideline

Screw, engine case	M8	18 Nm (13.3 lbf ft)

– Mount and tighten screws ❹.
Guideline

Screw, engine case	M6x60	10 Nm (7.4 lbf ft)

– Mount and tighten screws ❺.
Guideline

Screw, engine case	M6x80	10 Nm (7.4 lbf ft)

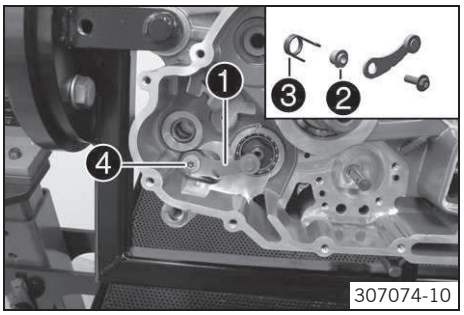
– Mount and tighten screws ❻.
Guideline

Screw, engine case	M6x90	10 Nm (7.4 lbf ft)

Info
Screws ❻ must always be replaced with new screws.

– Mount screw ❼.

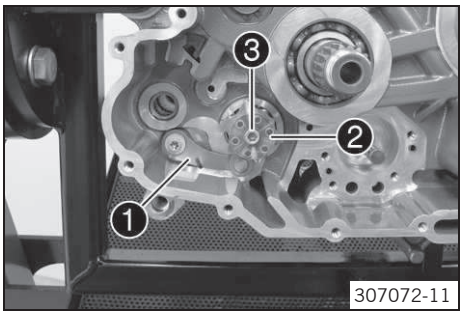
18.9.8 Installing the locking lever



– Position locking lever ❶ with sleeve ❷ and spring ❸.
– Mount and tighten screw ❹.
Guideline

Screw, locking lever	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

18.9.9 Installing the shift drum locating



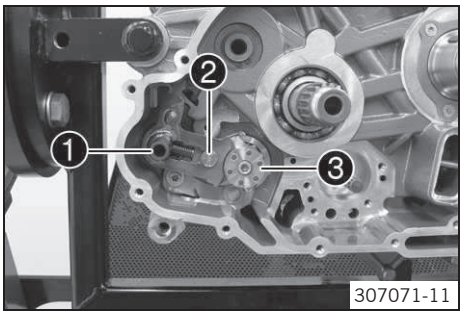
– Press locking lever ❶ down and position shift drum locating ❷.

Info
The flat surfaces of the shift drum locating unit are not symmetric.

– Release the locking lever.
– Mount and tighten screw ❸.
Guideline

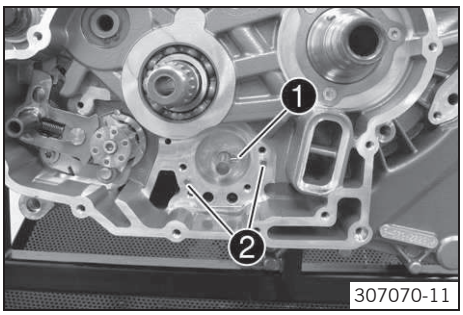
Screw, shift drum locating	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

18.9.10 Installing the shift shaft



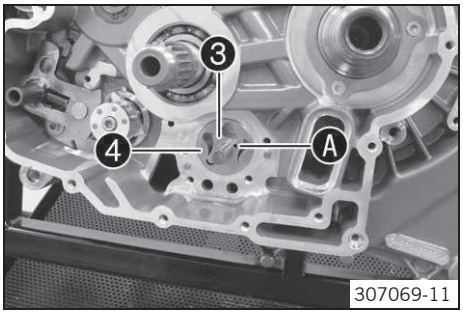
– Slide shift shaft ❶ with the washer into the bearing seat.
– Push sliding plate ❷ away from the shift drum locating ❸.
– Insert the shift shaft all the way.
– Let the sliding plate engage in the shift drum locating.
– Shift through the transmission.

18.9.11 Installing the force pump

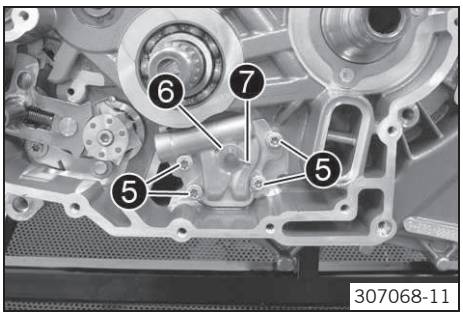


– Mount pin ❶.

Info
Ensure that pins ❷ are seated correctly.



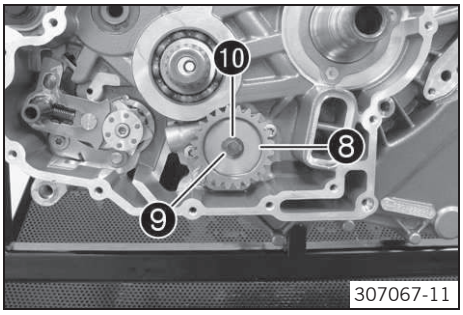
– Mount internal rotor ❸ and external rotor ❹.
✓ Marking Ⓐ of the internal rotor is visible after mounting while that of the external rotor is not.
– Oil the parts.



– Position the oil pump cover. Mount and tighten screws ❺.
Guideline

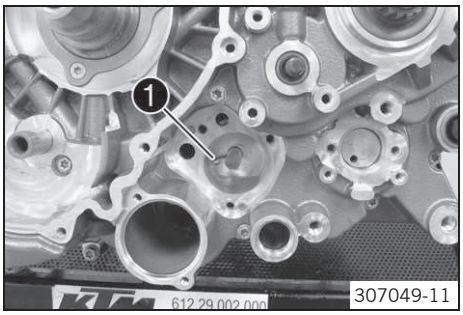
Screw, oil pump cover	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

– Mount washer ❻ and pin ❼.

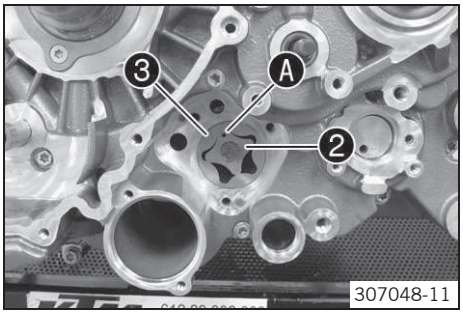


– Mount oil pump gear wheel ❽, washer ❾ and lock washer ❿.

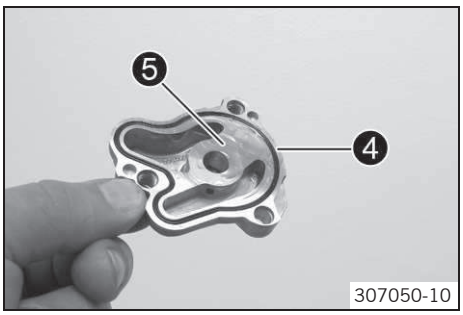
18.9.12 Installing the left suction pump



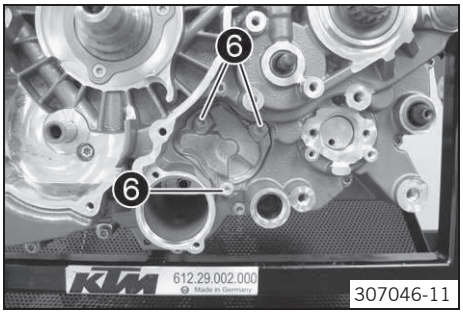
– Mount pin ❶.



– Mount internal rotor ❷ and external rotor ❸.
  ✓ Marking Ⓐ of the internal rotor is visible after mounting while that of the external rotor is not.
– Oil the parts.



– Insert new gasket ❹ into the oil pump cover.
– Position the oil pump cover ❺.

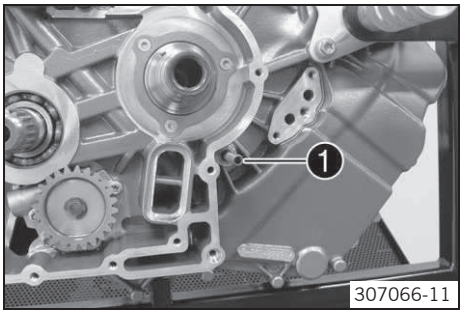


– Mount and tighten screws ❻.
  Guideline

Screw, oil pump cover	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

– Turn the oil pump gear wheel and check the oil pumps for smooth operation.

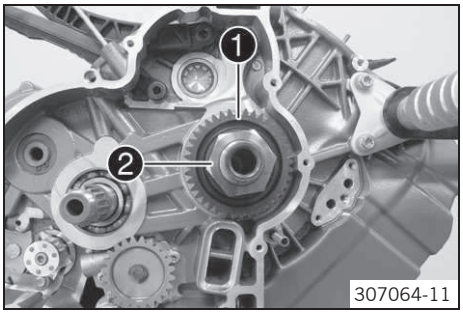
18.9.13 Setting the engine to ignition top dead center of the rear cylinder



– Set the crankshaft to top dead center of the rear cylinder.
  ✓ The position notch of the crankshaft is visible in the hole.
– Screw in special tool ❶.

Engine blocking screw (61229015000) (☛ p. 277)

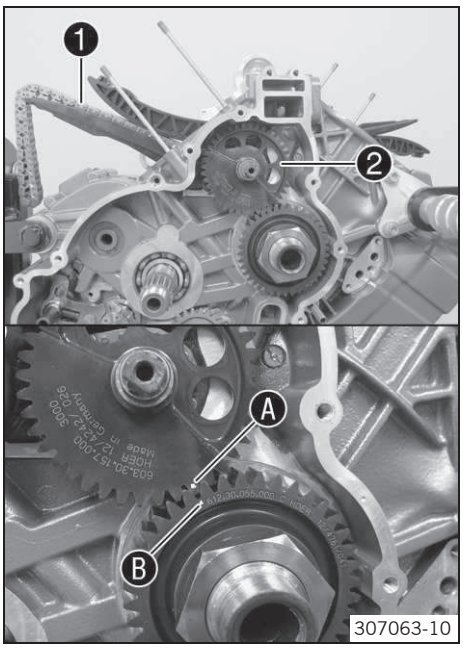
18.9.14 Installing the primary gear



– Ensure that the spring washer is seated properly.
– Mount primary gear ❶.
– Mount the washer and nut ❷ and tighten the nut.
  Guideline

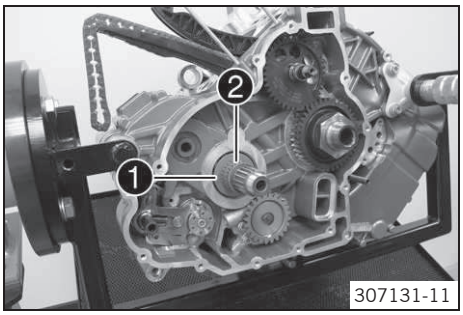
Nut, primary gear	M33LHx1.5	130 Nm (95.9 lbf ft)	**Loctite® 243™**

18.9.15 Installing the idler and timing chain on the right

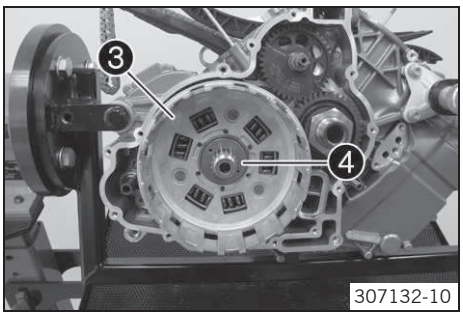


– Position timing chain ❶ according to the direction of travel.
– Place the timing chain over the toothing of idler ❷. Align markings Ⓐ and Ⓑ.
– Slide on the idler.

18.9.16 Installing the clutch basket

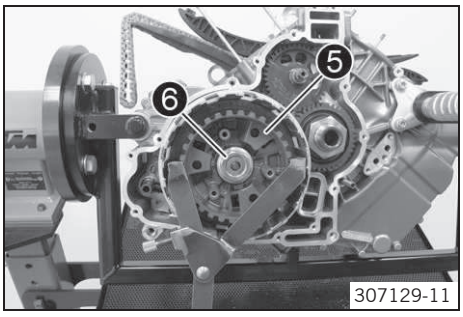


– Mount washer ❶ and needle bearing ❷.



– Mount clutch basket ❸ and washer ❹.

Info
Turn the clutch basket and oil pump gear wheel backwards and forwards slightly to help them mesh more easily.



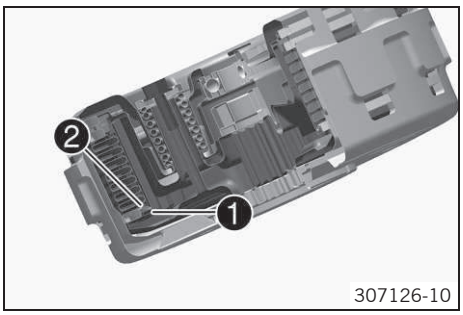
– Mount inner clutch hub ❺.
– Mount nut ❻ with the washer.
– Tighten the nut, holding the inner clutch hub with a special tool.

Guideline

Nut, inner clutch hub	M22x1.5	130 Nm (95.9 lbf ft)	**Loctite® 243™**

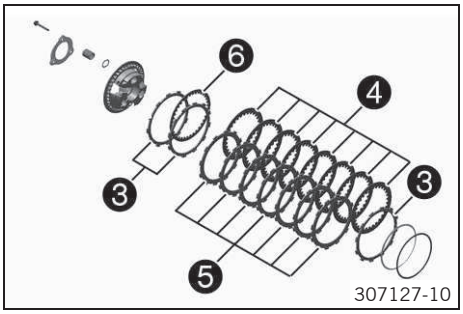
Clutch holder (51129003000) (☛ p. 271)

18.9.17 Installing the clutch discs

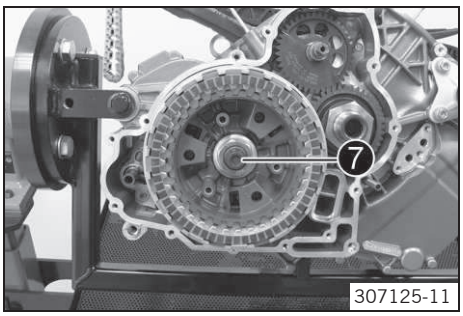


– Mount support ring ❶ and pretension ring ❷.

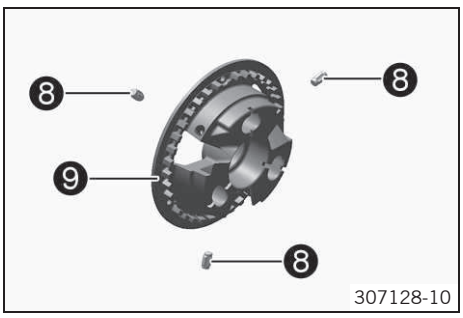
✓ The pretension ring rests against the support ring on the inside and the outside faces away from the support ring.



– Thoroughly oil the clutch facing discs.
– Mount a clutch facing disc ❸ with a larger inside diameter.
– Alternately mount 8 intermediate clutch discs ❹ and 7 of the same clutch facing discs ❺.
– Alternately mount 2 clutch facing discs ❸ and an intermediate clutch disc ❻ with a larger inside diameter.

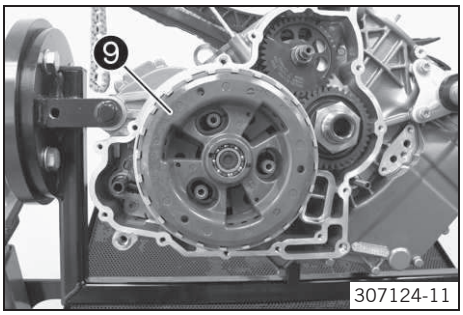


– Mount push rod ❼.



– Mount damper ❽ in the clutch pressure cap ❾.

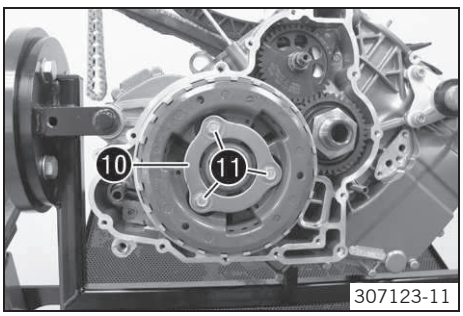
Info
When changing the clutch discs, always renew the damper.



– Position clutch pressure cap ❾.

✓ The teeth of the outer intermediate clutch disc engages in the clutch pressure cap.

✓ The clutch pressure cap rests flush against the outer lining disc.

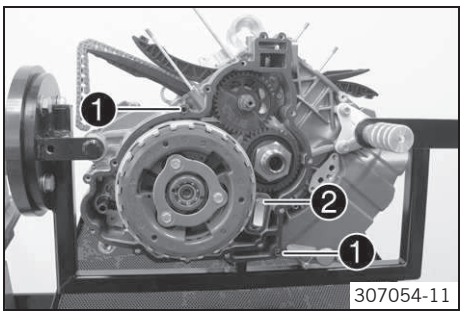


– Position clutch center ❿ and the springs.
– Mount and tighten screws ⓫.

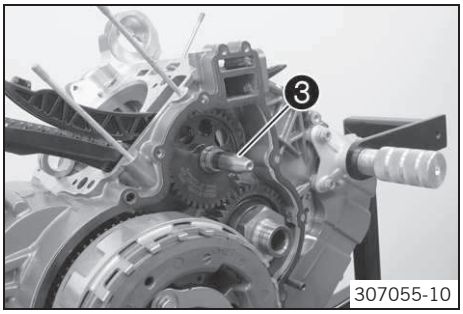
Guideline

Screw, clutch spring	M6	12 Nm (8.9 lbf ft)

18.9.18 Installing the clutch cover

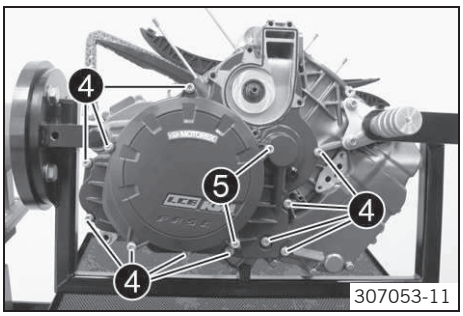


– Mount dowels ❶ and position the clutch cover gasket.
– Mount check valve ❷.



– Slide special tool ❸ onto the water pump shaft.

Mounting sleeve (61229005000) (☛ p. 276)

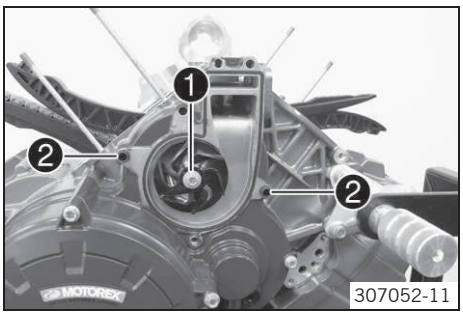


– Mount the clutch cover. Mount and tighten screws ❹ and ❺.
Guideline

Screw, clutch cover	M6	10 Nm (7.4 lbf ft)

– Remove the special tool.

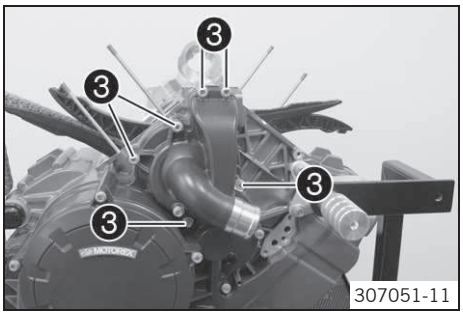
18.9.19 Installing the water pump wheel



– Mount the washer and water pump wheel.
– Mount and tighten screw ❶.
Guideline

Screw, water pump wheel	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

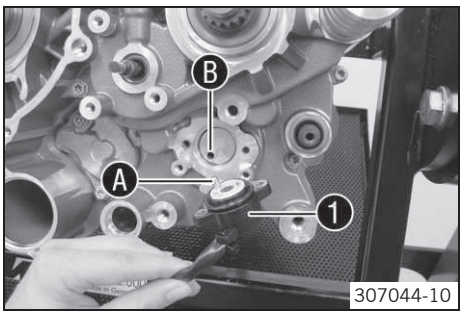
– Mount dowels ❷.
– Replace the seal.



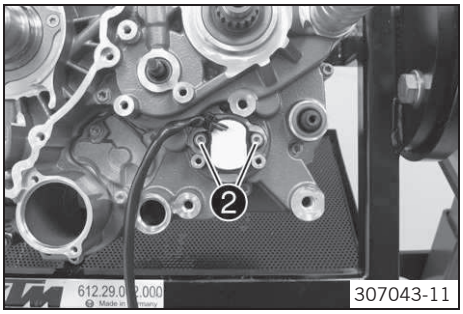
– Mount the water pump cover.
– Mount and tighten screws ❸.
Guideline

Screw, water pump cover	M6	10 Nm (7.4 lbf ft)

18.9.20 Installing the gear position sensor



– Mount gear position sensor ❶ with the O-ring.
  ✔ Pin Ⓐ engages in hole Ⓑ.

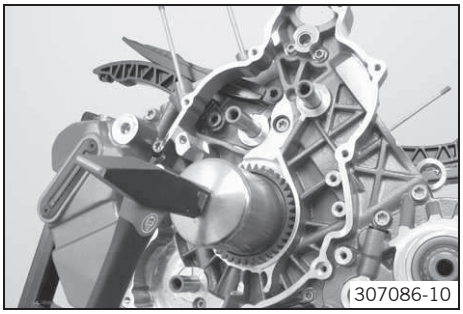


– Mount and tighten screws ❷ with the washers.

Guideline

Screw, gear sensor	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**

18.9.21 Installing the drive wheel of the balancer shaft



– Heat the drive wheel of the balancer shaft.

Guideline

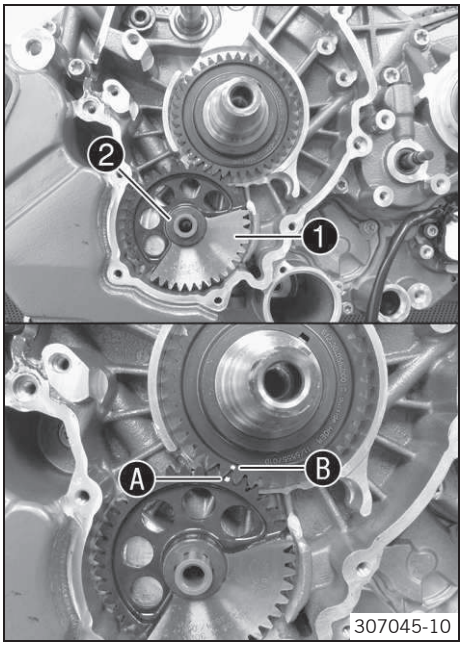
200 °C (392 °F)

– Ensure that the woodruff key is seated properly. Mount the drive wheel of the balancer shaft with the beveled edge facing forward.

Pressure bell (61229016000) (☛ p. 277)

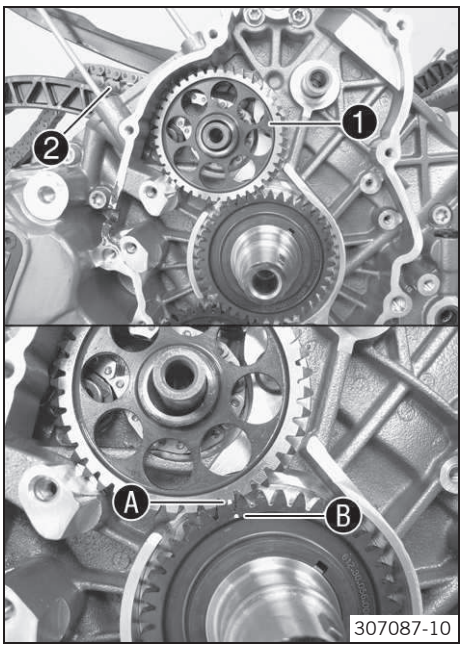
  ✔ The markings are visible after mounting.

18.9.22 Installing the balancer shaft

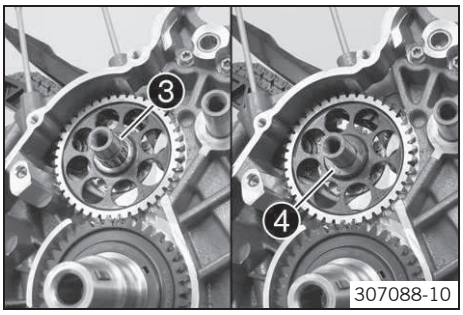


– Mount the rear washer and needle bearing.
– Mount balancer shaft ❶.
  ✔ Markings Ⓐ and Ⓑ are aligned.
– Mount washer ❷.

18.9.23 Installing the idler and timing chain on the left

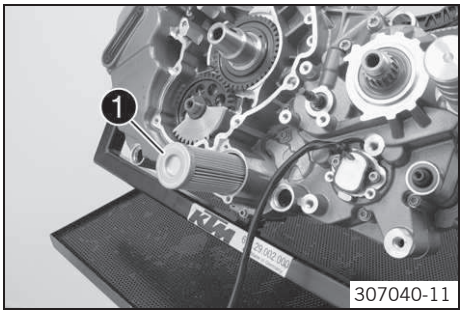


– Mount the rear washer.
– Mount idle gear ❶ with timing chain ❷ in accordance with the direction of travel.
  ✔ Markings Ⓐ and Ⓑ are aligned.

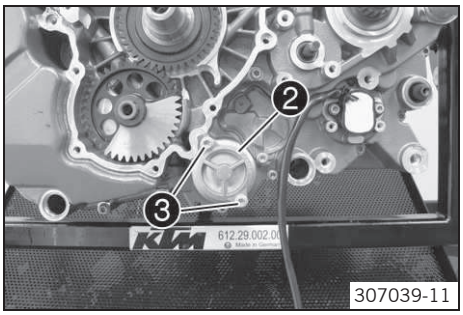


– Mount needle bearing ❸.
– Mount washer ❹.

18.9.24 Installing the oil filter



– Tilt the engine sideways and fill the oil filter housing to about ⅓ full with engine oil.
– Insert oil filter ❶.

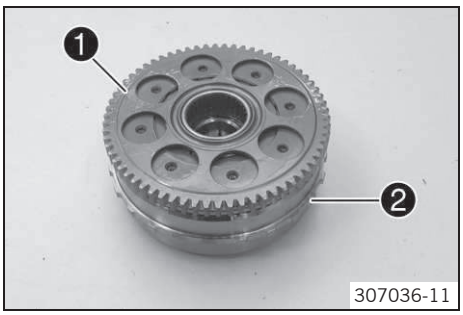


– Lubricate the O-ring of oil filter cover ❷. Mount the oil filter cover.
– Mount and tighten screws ❸.

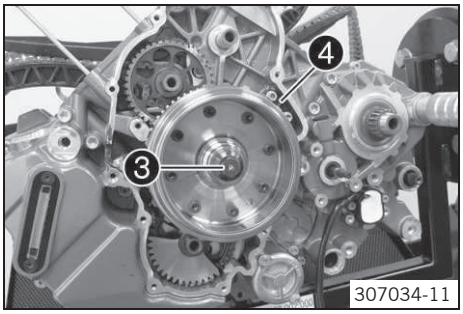
Guideline

Remaining engine screws	M5	6 Nm (4.4 lbf ft)

18.9.25 Installing the rotor



– Turn the free-wheel-gear ❶ counterclockwise and mount it in rotor ❷.



– Mount the rotor with the freewheel gear.

Info
Ensure that the spring washers are seated properly.

– Thoroughly clean the oil nozzle of the rotor screw and blow it out with compressed air.
– Mount and tighten rotor screw ❸.

Guideline

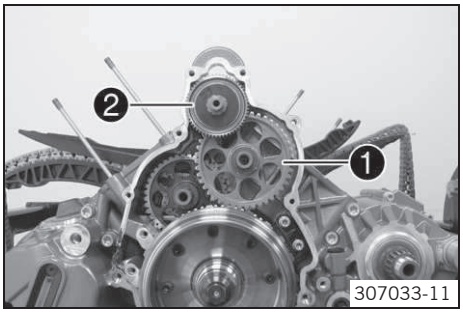
Rotor screw	M12x1.5	90 Nm (66.4 lbf ft)

– Position freewheel holder ❹. Mount and tighten the screws.

Guideline

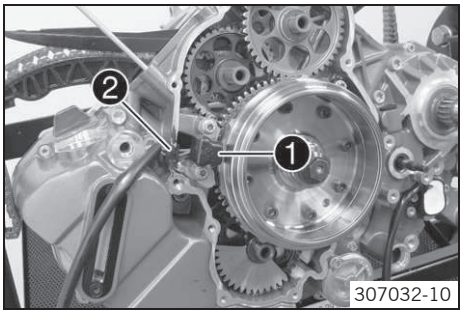
Screw, freewheel holder	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

18.9.26 Installing the torque limiter and idler



– Mount the rear washer, needle bearing, idler ❶ and front washer.
– Mount torque limiter ❷ with the rear washer.

18.9.27 Installing the ignition pulse generator



– Position the ignition pulse generator ❶.
– Mount and tighten the screws.

Guideline

Screw, pulse generator	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**

– Position the cable, thinly coat cable support sleeve ❷ with the sealing compound and insert it in the engine case.

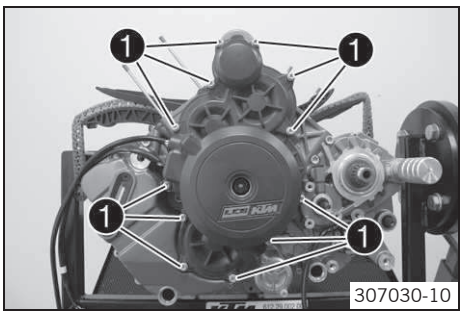
Loctite® 5910

– Check the distance between the ignition pulse generator and rotor.

Guideline

Crankshaft position sensor/rotor - gap	0.70 mm (0.0276 in)

18.9.28 Installing the alternator cover

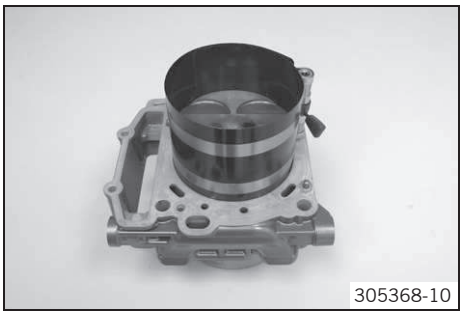


– Mount the new alternator cover seal and dowels.
– Position the alternator cover.
– Mount and tighten screws ❶.

Guideline

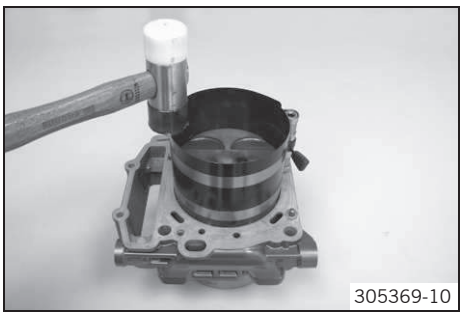
Remaining engine screws	M6	10 Nm (7.4 lbf ft)

18.9.29 Installing the rear piston



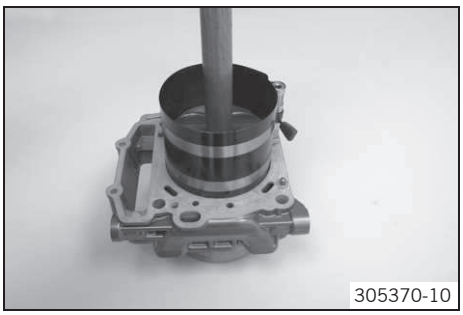
– Shift the joint of the piston rings by 120°.
– Place the oiled piston on the cylinder. Tighten the piston rings using the special tool.

Piston ring mounting tool (60029015000) (☛ p. 273)



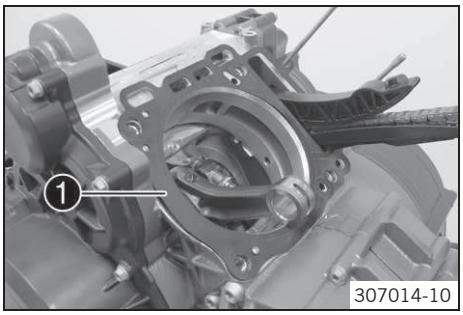
– Using a hammer, lightly strike the special tool from above until it is flush with the cylinder.

✔ The special tool must squeeze the piston rings together well and lie flush against the cylinder.

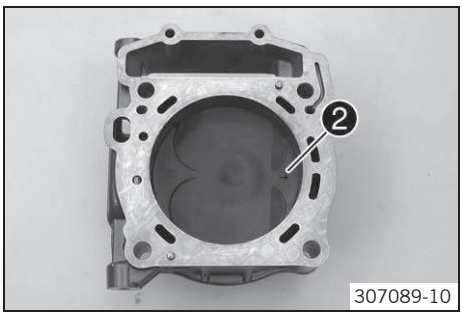


– Carefully tap the piston into the cylinder using the hammer shaft.

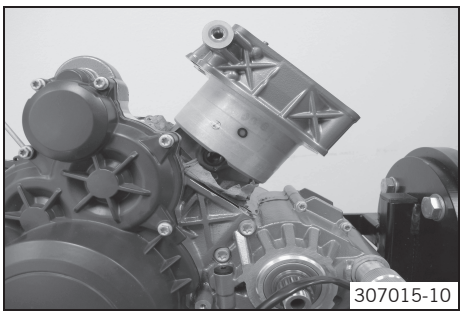
✔ The piston rings should not become caught; otherwise, they may be damaged.



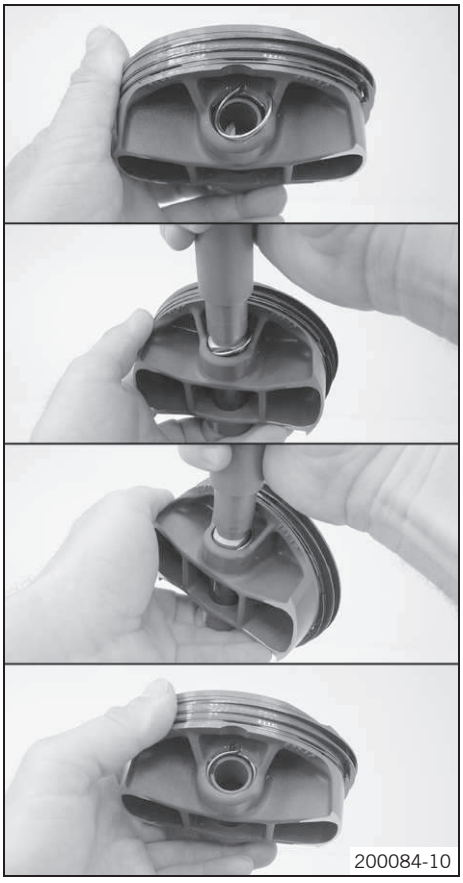
– Position the new cylinder base gasket ❶.



– Ensure that piston marking ❷ faces the outfeed side.



– Cover the engine case opening with a cloth. Thread the timing chain through the timing chain shaft. Mount the piston pin.



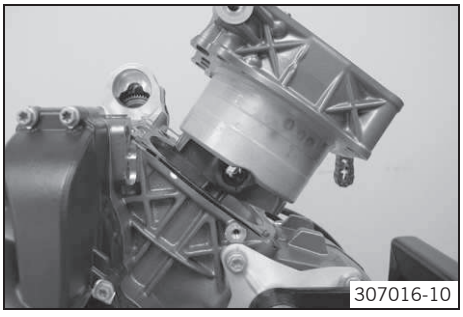
– Position the new piston pin retainer.

Info
For clarity, the following steps are illustrated using a disassembled piston.

– Insert the special tool and firmly press it toward the piston.
– Turn the special tool counterclockwise, thereby pressing the piston pin retainer into the groove.

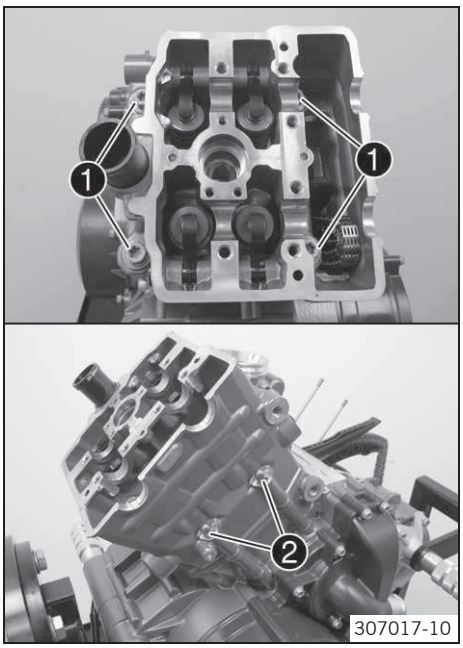
Insertion for piston ring lock (75029035000) (☛ p. 279)

– Ensure that the piston pin retainer is correctly seated on both sides.



– Remove the cloth.
– Keep the timing chain tensioned. Push the cylinder down carefully and let the dowel pins engage.

18.9.30 Installing the rear cylinder head



– Mount the new cylinder head gasket.
– Position the cylinder head and mount and tighten the new cylinder head screws ❶ with washers.

Guideline

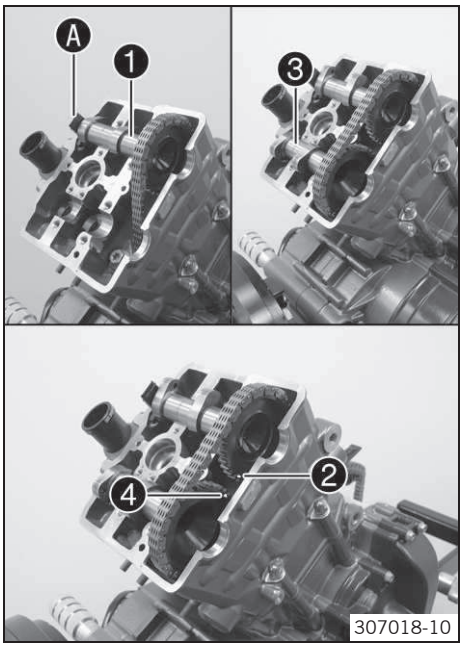
Cylinder head screw	M11x1.5	Tightening sequence: Using a criss-cross pattern Step 1 15 Nm (11.1 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 90° Step 4 90°	Lubricated with engine oil

– Mount and tighten nuts ❷ with the washers.

Guideline

Nut, cylinder head	M6	9 Nm (6.6 lbf ft)

18.9.31 Installing the rear camshafts



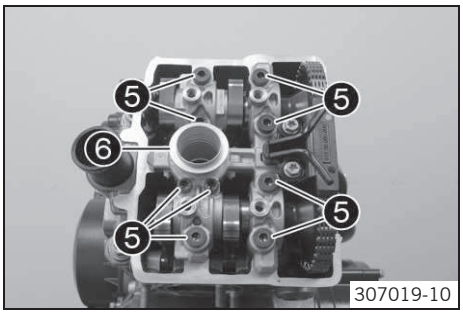
– Pull up the timing chain and insert intake camshaft ❶.

Info
The intake camshaft is labeled with **eh**.

– Place the timing chain over the rear sprocket of the intake camshaft.
✓ Marking ❷ is aligned.
– Ensure that bleeder Ⓐ is seated correctly.
– Position exhaust camshaft ❸.

Info
The exhaust camshaft is labeled with **ah**.

– Place the timing chain over the rear sprocket and position the camshaft in the bearing seat.
✓ Marking ❹ is aligned.



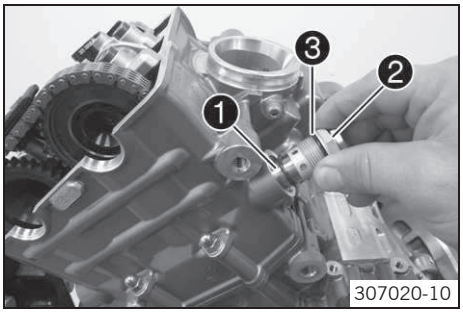
– Thoroughly clean all oil nozzles and blow them out with compressed air.
– Position the camshaft bearing bridge.
– Mount screws ❺ and tighten them from the inside to the outside.

Guideline

Screw, camshaft bearing support	M6 – 10.9	10 Nm (7.4 lbf ft)
Screw, camshaft bearing support	M8 – 10.9	Step 1 10 Nm (7.4 lbf ft) Step 2 18 Nm (13.3 lbf ft)

– Grease the O-rings and mount spark plug shaft insert ❻.

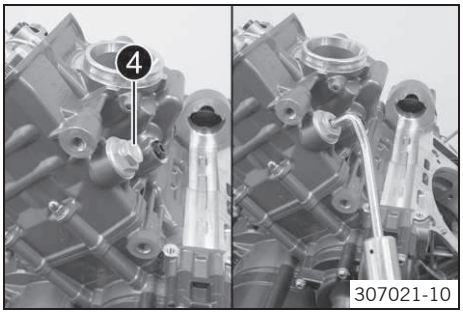
18.9.32 Installing the rear timing chain tensioner



– After it has been positioned in the installation location, insert timing chain tensioner ❶ with a new O-ring.
– Mount and tighten plug ❷ with the new seal ring ❸.

Guideline

Plug, timing-chain tensioner	M24x1.5	25 Nm (18.4 lbf ft)



– Remove screw ❹ and use the special tool to push the timing chain tensioner toward the timing chain.

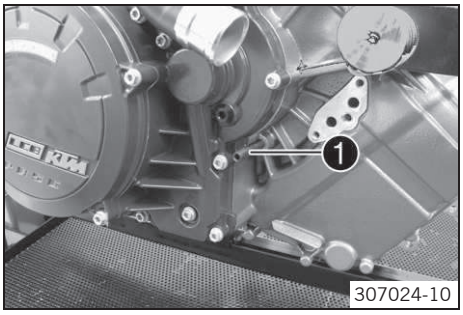
Release device for timing chain tensioner (61229021000) (☛ p. 278)

✔ The timing chain tensioner unlocks.
– Mount and tighten screw ❹.

Guideline

Screw, timing chain tensioner release	M10x1	10 Nm (7.4 lbf ft)

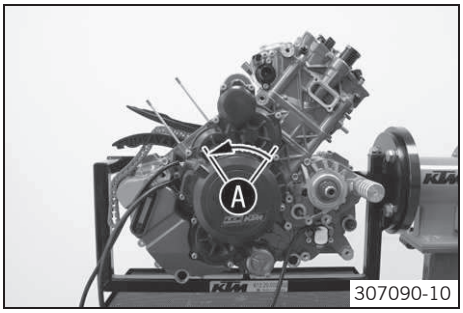
18.9.33 Setting the engine to ignition top dead center of the front cylinder



– Remove special tool ❶.
– Keep the timing chain tensioned.
– Turn the crankshaft counterclockwise by the specified value.

Guideline

1 turn



– Turn the crankshaft counterclockwise by the specified value Ⓐ.

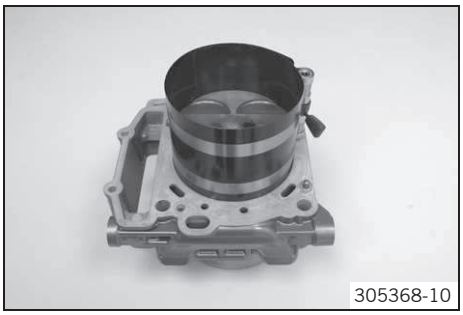
Guideline

75°

✔ The position notch of the crankshaft is visible in the hole.
– Screw in special tool ❶.

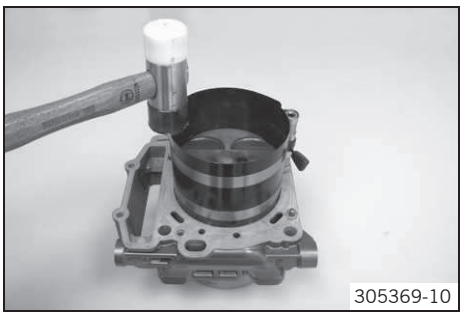
Engine blocking screw (61229015000) (☛ p. 277)

18.9.34 Installing the front piston



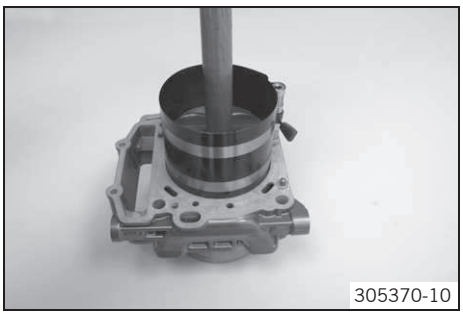
– Shift the joint of the piston rings by 120°.
– Place the oiled piston on the cylinder. Tighten the piston rings using the special tool.

Piston ring mounting tool (60029015000) (☛ p. 273)



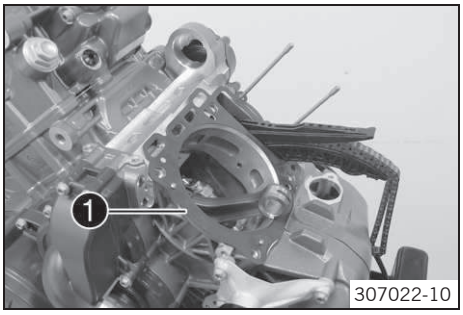
– Using a hammer, lightly strike the special tool from above until it is flush with the cylinder.

✓ The special tool must squeeze the piston rings together well and lie flush against the cylinder.

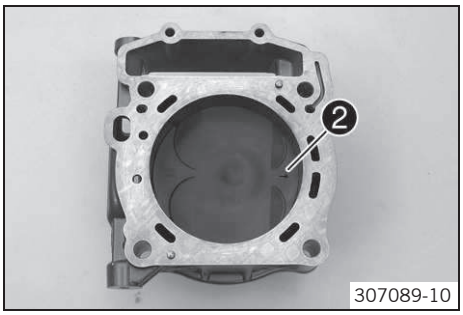


– Carefully knock the piston into the cylinder using the hammer shaft.

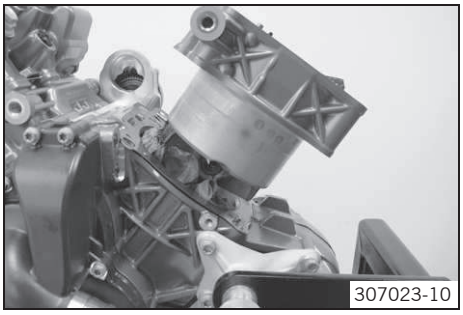
✓ The piston rings should not become caught; otherwise, they may be damaged.



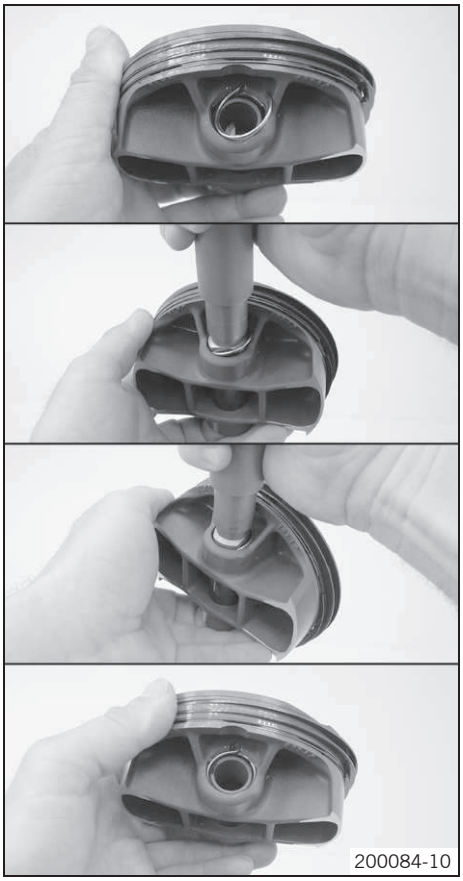
– Position the new cylinder base gasket ❶.



– Ensure that piston marking ❷ faces the outfeed side.



– Cover the engine case opening with a cloth. Thread the timing chain through the timing chain shaft. Mount the piston pin.


200084-10

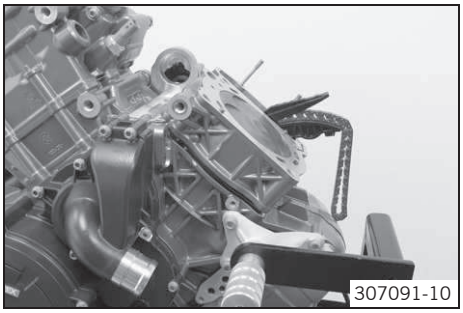
– Position the new piston pin retainer.

Info
For clarity, the following steps are illustrated using a disassembled piston.

– Insert the special tool and firmly press it toward the piston.
– Turn the special tool counterclockwise, thereby pressing the piston pin retainer into the groove.

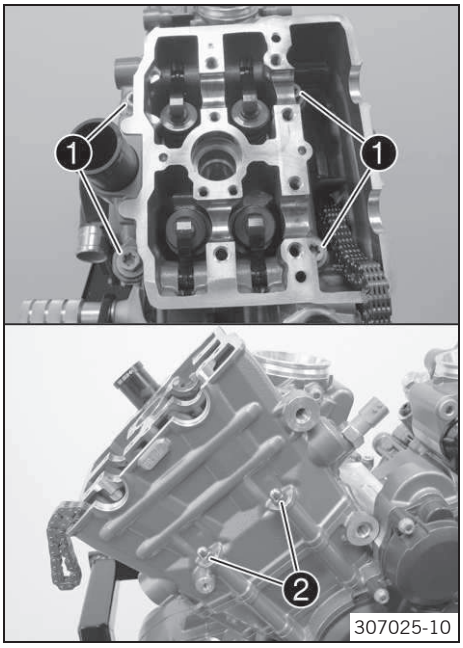
Insertion for piston ring lock (75029035000) (☛ p. 279)

– Ensure that the piston pin retainer is correctly seated on both sides.


307091-10

– Remove the cloth.
– Keep the timing chain tensioned. Push the cylinder down carefully and let the dowel pins engage.

18.9.35 Installing the front cylinder head



307025-10

– Mount the new cylinder head gasket.
– Mount the cylinder head. Mount and tighten the new cylinder head screws ❶ with washers.

Guideline

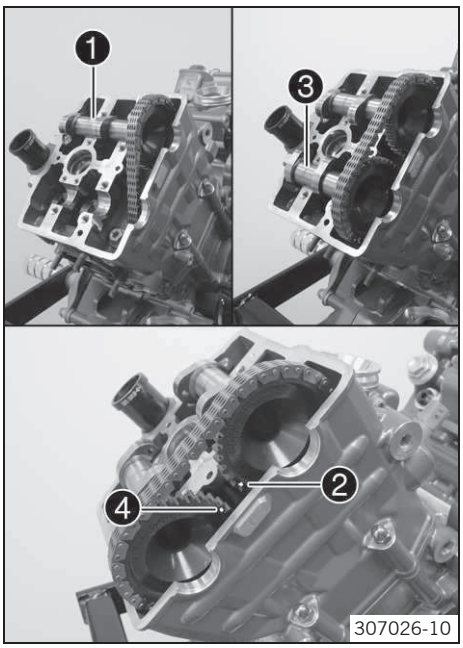
Cylinder head screw	M11x1.5	Tightening sequence: Using a criss-cross pattern Step 1 15 Nm (11.1 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 90° Step 4 90°	Lubricated with engine oil

– Mount and tighten nuts ❷ with the washers.

Guideline

Nut, cylinder head	M6	9 Nm (6.6 lbf ft)

18.9.36 Installing the front camshafts



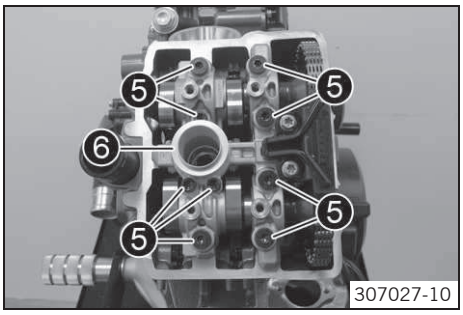
– Pull up the timing chain and insert intake camshaft ❶.

Info
The intake camshaft is labeled with **ev**.

– Place the timing chain over the rear sprocket of the intake camshaft.
✔ Marking ❷ is aligned.
– Position exhaust camshaft ❸.

Info
The exhaust camshaft is labeled with **av**.

– Place the timing chain over the rear sprocket and position the camshaft in the bearing seat.
✔ Marking ❹ is aligned.

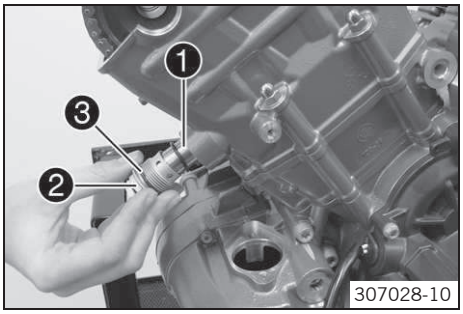


– Thoroughly clean all oil nozzles and blow them out with compressed air.
– Position the camshaft bearing bridge.
– Mount screws ❺ and tighten them from the inside to the outside.
Guideline

Screw, camshaft bearing support	M6 – 10.9	10 Nm (7.4 lbf ft)
Screw, camshaft bearing support	M8 – 10.9	Step 1 10 Nm (7.4 lbf ft) Step 2 18 Nm (13.3 lbf ft)

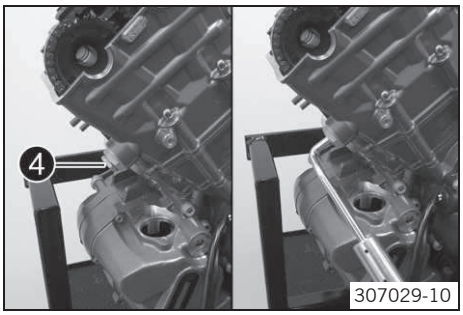
– Grease the O-rings and mount spark plug shaft insert ❻.

18.9.37 Installing the front timing chain tensioner



– After it has been positioned in the installation location, insert timing chain tensioner ❶ with a new O-ring.
– Mount and tighten plug ❷ with the new seal ring ❸.
Guideline

Plug, timing-chain tensioner	M24x1.5	25 Nm (18.4 lbf ft)



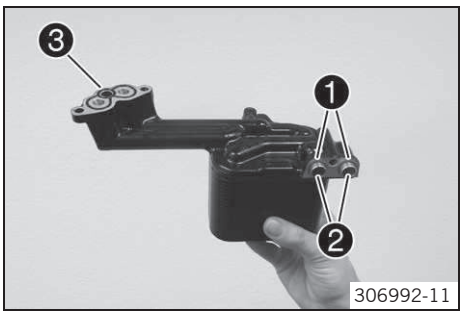
– Remove screw ❹ and use the special tool to push the timing chain tensioner toward the timing chain.

Release device for timing chain tensioner (61229021000) (☛ p. 278)

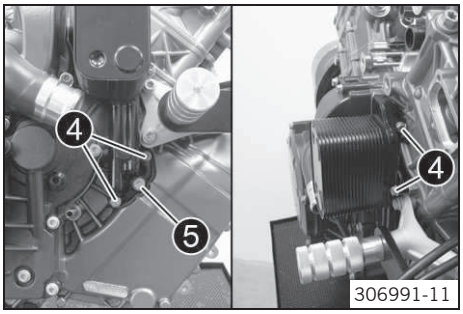
✔ The timing chain tensioner is unlocked.
– Mount and tighten screw ❹.
Guideline

Screw, timing chain tensioner release	M10x1	10 Nm (7.4 lbf ft)

18.9.38 Installing the heat exchanger



– Oil and mount O-rings ❶.
– Mount sleeves ❷.
– Mount gasket ❸.



– Position the heat exchanger.
– Mount and tighten screws ❹.

Guideline

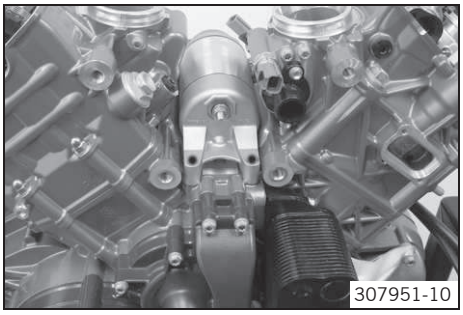
Remaining engine screws	M6	10 Nm (7.4 lbf ft)

– Mount and tighten screw ❺.

Guideline

Screw, heat exchanger	M8	15 Nm (11.1 lbf ft)

18.9.39 Installing the starter motor

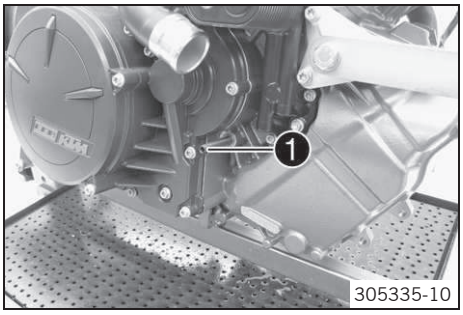


– Grease the O-ring. Position the starter motor.

Long-life grease (☛ p. 268)

Info
The screws are mounted only in the vehicle.

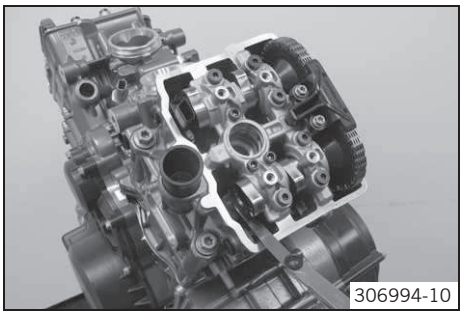
18.9.40 Checking the rear valve clearance



– Remove special tool ❶.

Engine blocking screw (61229015000) (☛ p. 277)

– Crank the engine several times.
– Set the engine to ignition top dead center of the rear cylinder. (☛ p. 133)



– On all valves, check the valve clearance between the camshaft and cam lever.

Guideline

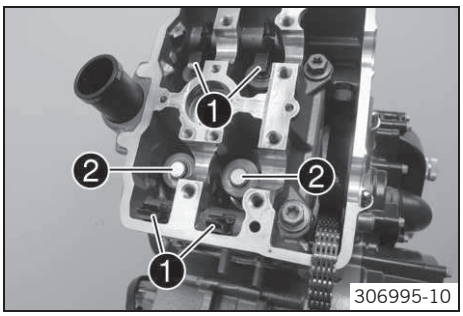
Valve clearance	
Exhaust at: 20 °C (68 °F)	0.25... 0.30 mm (0.0098... 0.0118 in)
Intake at: 20 °C (68 °F)	0.10... 0.15 mm (0.0039... 0.0059 in)

Feeler gauge (59029041100) (☛ p. 273)

» If valve clearance does not meet specifications:
– Adjust the rear valve clearance. (☛ p. 197)

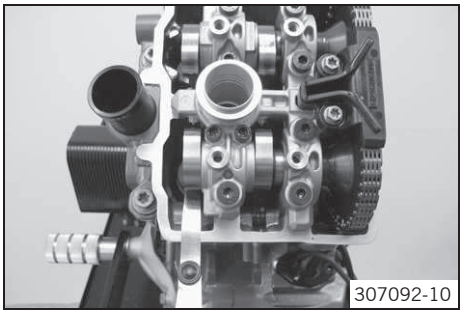
18.9.41 Adjusting the rear valve clearance

– Remove the rear timing chain tensioner. (☛ p. 134)
– Remove the rear camshaft. (☛ p. 134)



– Swing up cam lever ❶.
– Remove shims ❷ and set them down according to the installation position.
– Correct the shims as indicated by the results of the valve clearance check.
– Insert suitable shims.
– Install the rear camshaft. (☛ p. 192)
– Install the rear timing chain tensioner. (☛ p. 193)
– Check the rear valve clearance. (☛ p. 197)

18.9.42 Checking the front valve clearance



– Remove the special tool.

Engine blocking screw (61229015000) (☛ p. 277)

– Crank the engine several times.
– Set the engine to ignition top dead center of the front cylinder. (☛ p. 136)
– On all valves, check the valve clearance between the camshaft and cam lever.

Guideline

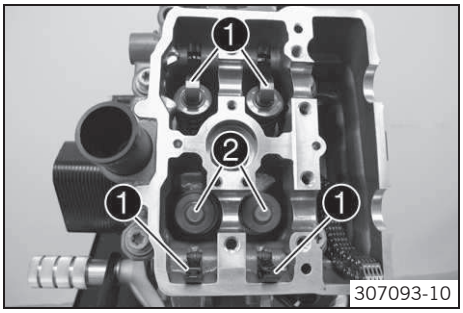
Valve clearance	
Exhaust at: 20 °C (68 °F)	0.25... 0.30 mm (0.0098... 0.0118 in)
Intake at: 20 °C (68 °F)	0.10... 0.15 mm (0.0039... 0.0059 in)

Feeler gauge (59029041100) (☛ p. 273)

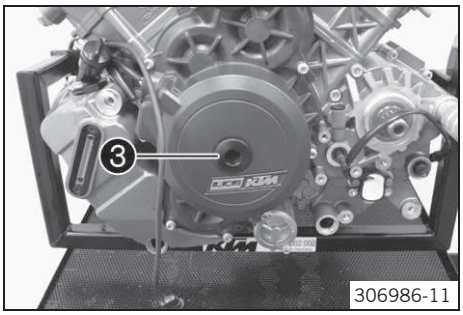
» If valve clearance does not meet specifications:
– Adjust the front valve clearance. (☛ p. 198)

18.9.43 Adjusting the front valve clearance

– Remove the front timing chain tensioner. (☛ p. 136)
– Remove the front camshafts. (☛ p. 136)



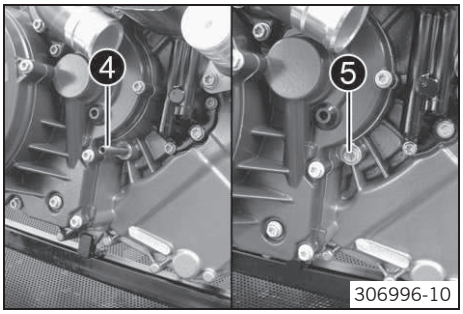
– Swing up cam lever ❶.
– Remove shims ❷ and set them down according to the installation position.
– Correct the shims as indicated by the results of the valve clearance check.
– Insert suitable shims.
– Install the front camshafts. (☛ p. 196)
– Install the front timing chain tensioner. (☛ p. 196)
– Check the front valve clearance. (☛ p. 198)



– Mount and tighten the screw of alternator cover ❸.

Guideline

Screw in alternator cover	M24x1.5	8 Nm (5.9 lbf ft)

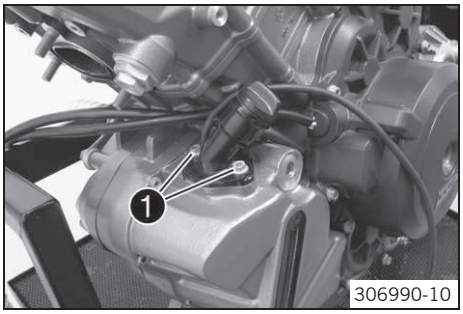


– Remove special tool ❹. Mount and tighten screw ❺.

Guideline

Plug, crankshaft retainer	M8	15 Nm (11.1 lbf ft)

18.9.44 Installing the oil filler tube

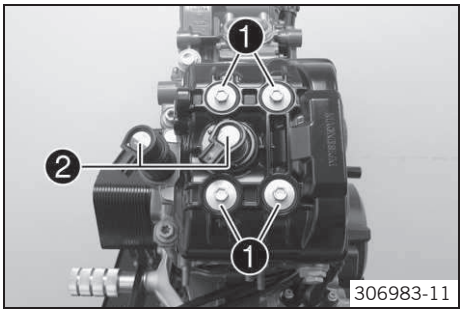


– Mount the oil filler tube with the O-ring.
– Mount and tighten screws ❶.

Guideline

Remaining engine screws	M6	10 Nm (7.4 lbf ft)

18.9.45 Installing the front valve cover



– Position the valve cover seal.
– Put the valve cover in place with the seal. Mount and tighten screws ❶.

Guideline

Screw, valve cover	M6	10 Nm (7.4 lbf ft)

Info
The front valve cover is not equipped with a connector for the engine vent.

– Mount and tighten the spark plugs using a special tool.

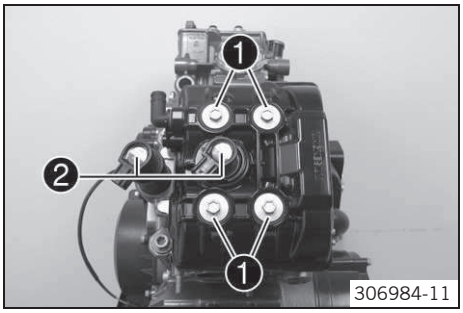
Guideline

Spark plug	M12x1.5	15 Nm (11.1 lbf ft)
Spark plug	M10x1	15 Nm (11.1 lbf ft)

Spark plug wrench (75029172000) (☛ p. 279)

– Mount ignition coils ❷.

18.9.46 Installing the rear valve cover



– Position the valve cover seal.
– Put the valve cover in place with the seal. Mount and tighten screws ❶.

Guideline

Screw, valve cover	M6	10 Nm (7.4 lbf ft)

Info
The rear valve cover is equipped with a connector for the engine vent.

– Mount and tighten the spark plugs using a special tool.

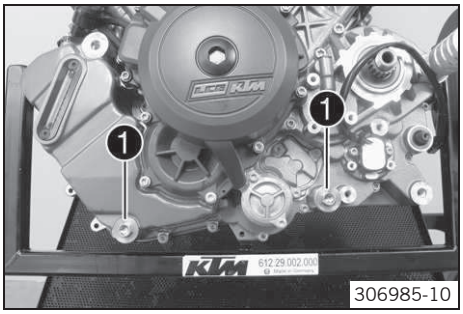
Guideline

Spark plug	M12x1.5	15 Nm (11.1 lbf ft)
Spark plug	M10x1	15 Nm (11.1 lbf ft)

Spark plug wrench (75029172000) (☛ p. 279)

– Mount ignition coils ❷.

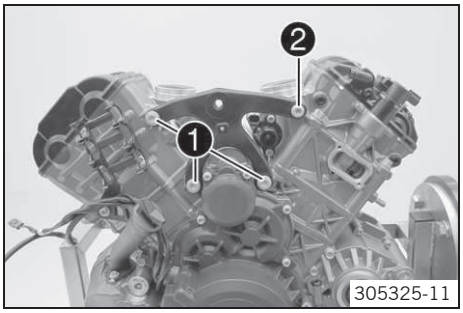
18.9.47 Installing the oil drain plug



– Mount the new O-rings.
– Mount and tighten oil drain plug ❶ with the magnet, O-rings and oil screen.
Guideline

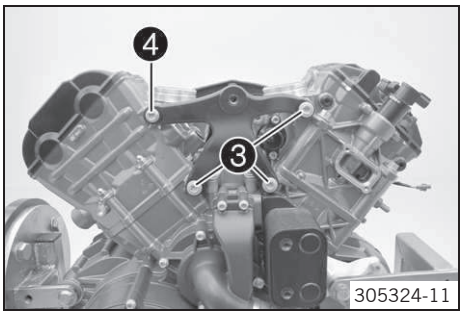
Oil drain plug	M20x1.5	20 Nm (14.8 lbf ft)

18.9.48 Mounting the engine bracket



– Position the engine bracket.
– Mount and tighten screws ❶ and ❷.
Guideline

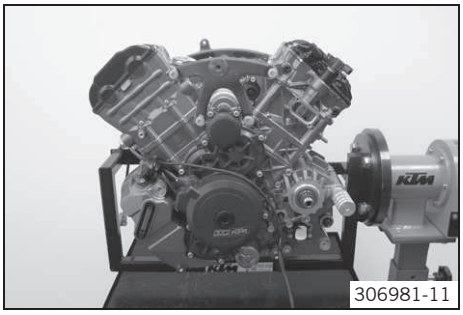
Screw, engine console	M8	20 Nm (14.8 lbf ft)	**Loctite® 243™**



– Position the engine bracket.
– Mount and tighten screws ❸ and ❹.
Guideline

Screw, engine console	M8	20 Nm (14.8 lbf ft)	**Loctite® 243™**

18.9.49 Removing the engine from the engine assembly stand

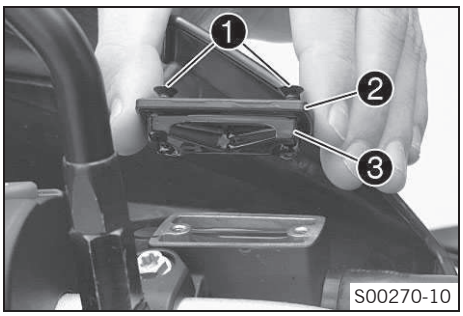


– Remove the screw connections.
– Remove the engine from the engine assembly stand.

Info
Have an assistant help you or use a crane.

19.1 Checking/rectifying the fluid level of the hydraulic clutch

Info
The fluid level rises with increasing wear of the clutch lining disc.
Do not use brake fluid.



– 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 top edge of container	4 mm (0.16 in)

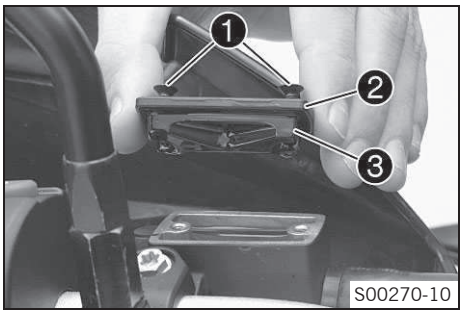
» If the coolant level does not meet specifications:
– Correct the fluid level of the hydraulic clutch.

Hydraulic fluid (15) (☛ p. 267)

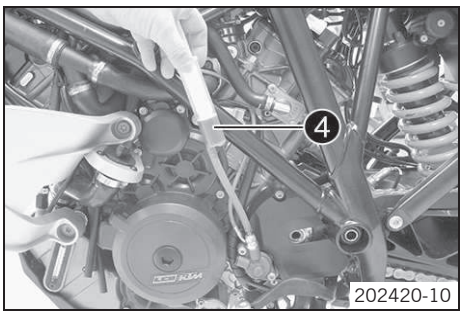
– Position the cover with the membrane. Mount and tighten the screws.

19.2 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.



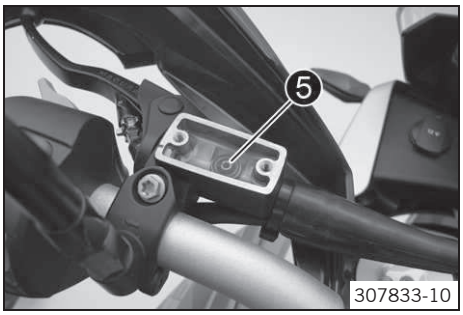
– Move the clutch fluid reservoir mounted on the handlebar to a horizontal position.
– Remove screws ❶.
– Remove cover ❷ with membrane ❸.



– Fill bleeding syringe ❹ with the appropriate hydraulic fluid.

Bleed syringe (50329050000) (☛ p. 271)
Hydraulic fluid (15) (☛ p. 267)

– On the slave cylinder, remove bleeder screw and mount bleeding syringe ❹.

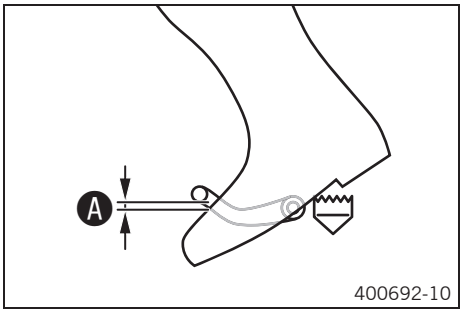


– Inject the liquid into the system until it escapes from hole ❺ of the master cylinder without bubbles.
– To prevent overflow, drain fluid occasionally from the master cylinder reservoir.
– Remove the bleeding syringe. Mount and tighten the bleeder screw.
– Correct the fluid level of the hydraulic clutch.
Guideline

Fluid level below container rim	4 mm (0.16 in)

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

20.1 Checking the basic position of the shift lever

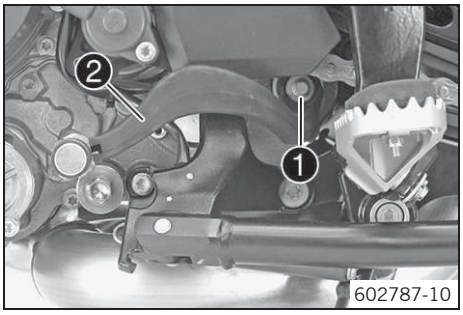


– Sit on the vehicle in the riding position and determine distance Ⓐ between the upper edge of your boot and the shift lever.

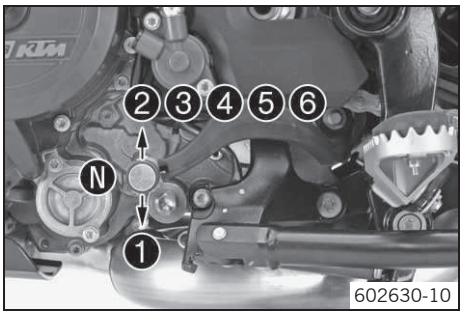
Distance between shift lever and upper edge of boot	10... 20 mm (0.39... 0.79 in)

» If the distance does not meet specifications:
– Adjust the basic position of the shift lever. (☛ p. 202)

20.2 Adjusting the basic position of the shift lever



– Remove screw ❶ and take off shift lever ❷.



– Clean gear teeth Ⓐ of the shift lever and shift shaft.
– Mount the shift lever on the shift shaft in the required position and engage the gearing.

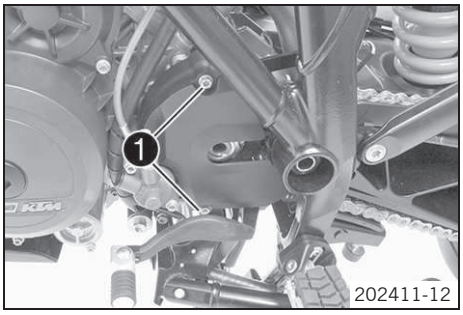
Info
The range of adjustment is limited.
The shift lever must not come into contact with any other vehicle components during the shift procedure.

– Mount and tighten the screw.

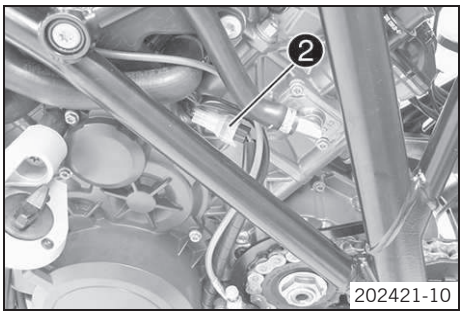
Guideline

Screw, shift lever	M6	18 Nm (13.3 lbf ft)	**Loctite® 243™**

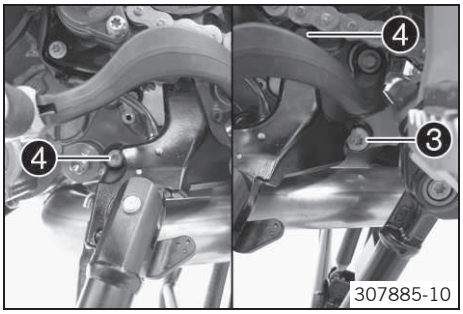
20.3 Changing the gear position sensor



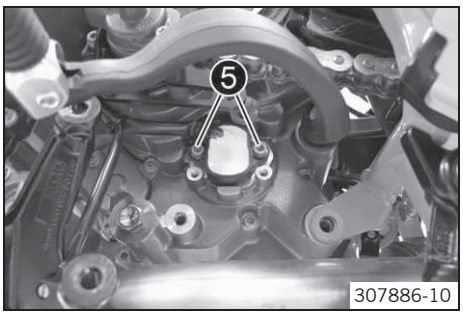
Main work
– Remove screws ❶.
– Take off the engine sprocket cover.



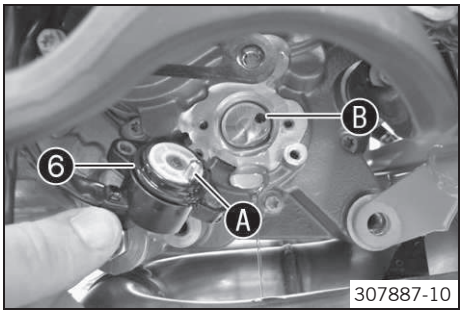
– Detach connector ❷.
– Expose the cable.



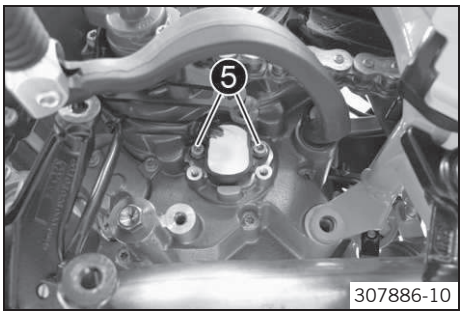
– Remove screw ❸.
– Remove screws ❹.
– Remove the side stand bracket and hang it to one side.



– Remove screws ❺ with the washers.
– Remove the gear position sensor.

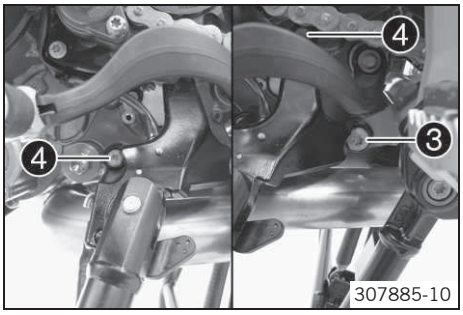


– Lubricate O-ring ❻ of the new gear position sensor.
– Position the gear position sensor.
  ✔ Pin Ⓐ engages in hole Ⓑ.



– Mount and tighten screws ❺ with the washers.
  Guideline

Screw, gear sensor	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**



– Position the side stand bracket.
– Mount screw ❸ but do not tighten yet.
  Guideline

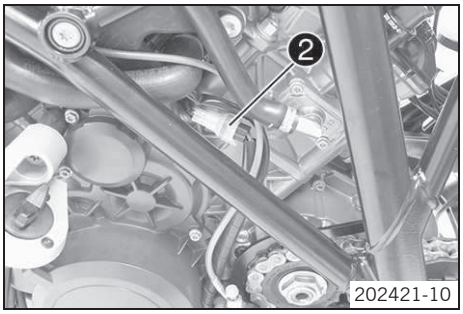
Screw, side stand bracket	M10	45 Nm (33.2 lbf ft)	**Loctite® 243™**

– Mount and tighten screws ❹.
  Guideline

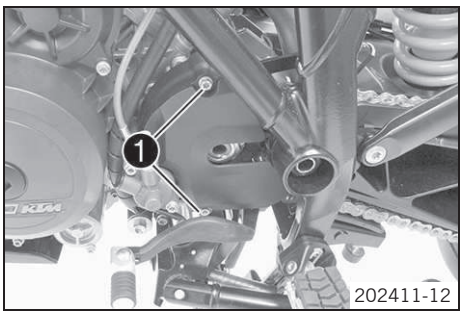
Screw, side stand bracket	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**

– Tighten screw ❸.
  Guideline

Screw, side stand bracket	M10	45 Nm (33.2 lbf ft)	**Loctite® 243™**



– Plug in connector ❷.
– Route the cable so it is not under tension and secure with a cable binder and a cable guard.



– Position the engine sprocket cover.
– Mount and tighten screws ❶.

Guideline

Remaining chassis screws	M6	10 Nm (7.4 lbf ft)

Finishing work

– Program the gear position sensor. (☛ p. 204)

20.4 Programming gear position sensor

Condition

The diagnostic tool is connected and running.

– Execute **"Engine electronics"** > **"Functions"** > **"Program gear position sensor"**.
– Switch off the ignition and switch it on again.
  ✔ The green idling speed indicator lamp **N** lights up.

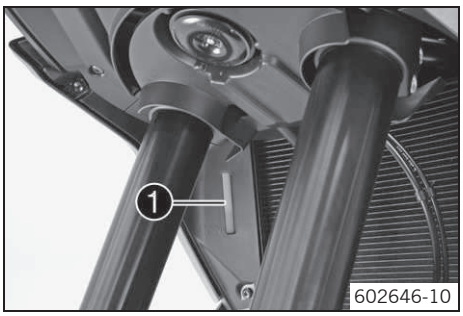
21.1 Checking the coolant level in the compensating tank

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.
The radiator is completely full.

– Park the motorcycle on a horizontal surface.
– Check the coolant level in the compensating tank ❶.

The coolant level must be between **MIN** and **MAX**.

» If there is no coolant in the compensating tank:
– Check the cooling system for leaks.

Info
Do not start up the motorcycle!

– Add coolant/bleed the cooling system. (☛ p. 207)

» If the coolant in the compensating tank is not at the required level, but the tank is not empty:
– Correct the coolant level in the compensating tank. (☛ p. 208)

21.2 Checking the coolant fill level and antifreeze

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.

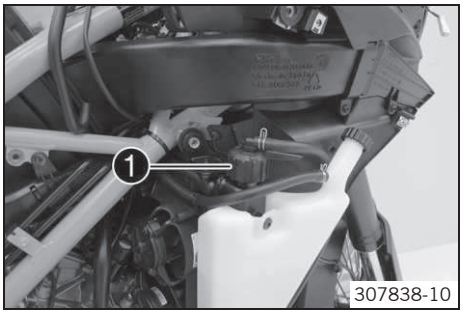
Warning
Danger of poisoning Coolant is poisonous and a health hazard.

– 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.

Preparatory work
– Park the motorcycle on a horizontal surface.

(Option: Center stand)
– Raise the vehicle with the center stand. (☛ p. 12)
– Remove the passenger seat. (☛ p. 62)
– Remove the driver's seat. (☛ p. 62)
– Remove the front side cover. (☛ p. 75)
– Remove the tank cover. (☛ p. 76)
– Remove the mask spoiler. (☛ p. 77)
– Remove the fuel tank. (☛ p. 63)



Main work
- Remove radiator cap ❶ and the cover of the compensating tank.
- Check the antifreeze in the coolant.

−25... −45 °C (−13... −49 °F)

» If the antifreeze in the coolant does not equal the specified value:
- Correct the antifreeze in the coolant.

- Check the coolant level.

The radiator must be filled completely.

The coolant level in the compensating tank must be between **MIN** and **MAX**.

» If the coolant level does not equal the specified value:
- Check the coolant level and the reason for the loss.

- Mount the radiator cap and the cover of the compensating tank.

Finishing work
- Install the fuel tank. (☛ p. 64)
- Install the mask spoiler. (☛ p. 78)
- Install the tank cover. (☛ p. 77)
- Install the front side cover. (☛ p. 75)
- Mount the driver's seat. (☛ p. 62)
- Mount the passenger seat. (☛ p. 62)

(Option: Center stand)
- Remove the vehicle from the center stand. (☛ p. 12)

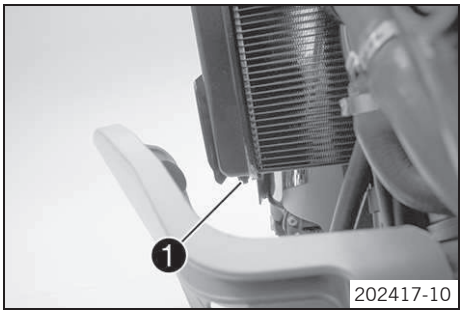
21.3 Draining the coolant

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.

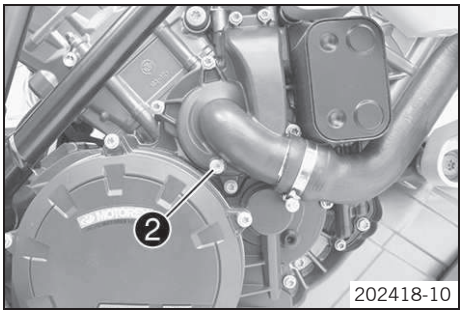
Preparatory work
(Option: Center stand)
- Raise the vehicle with the center stand. (☛ p. 12)
- Remove the passenger seat. (☛ p. 62)
- Remove the driver's seat. (☛ p. 62)
- Remove the front side cover. (☛ p. 75)
- Remove the tank cover. (☛ p. 76)
- Remove the mask spoiler. (☛ p. 77)
- Remove the fuel tank. (☛ p. 63)



Main work
- Place a suitable container under the radiator.
- Remove screw ❶.
- Remove radiator cap.
- Completely drain the coolant.
- Mount screw ❶ with a new seal ring and tighten it.

Guideline

Remaining chassis screws	M6	10 Nm (7.4 lbf ft)



– Place a suitable container under the engine.
– Remove screw ❷.
– Completely drain the coolant.
– Mount screw ❷ with a new seal ring and tighten it.

Guideline

Screw, water pump cover	M6	10 Nm (7.4 lbf ft)

21.4 Adding coolant/bleeding the cooling system

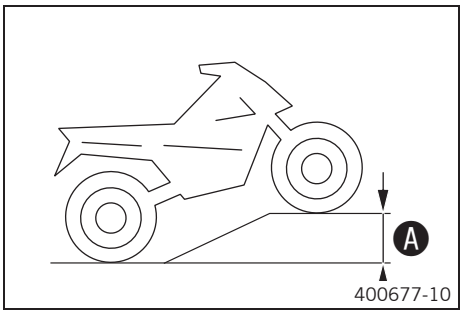
Warning

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

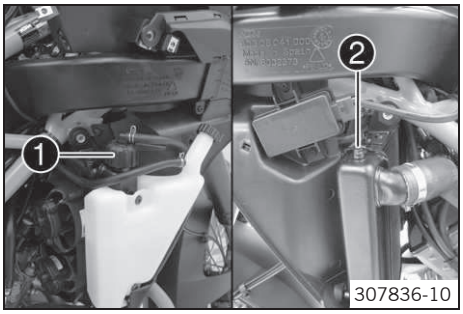
The fuel tank is removed.



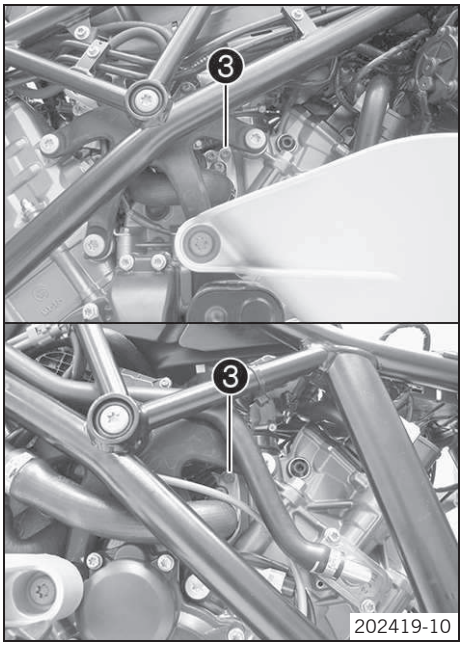
– Position the vehicle as shown and secure it against rolling. Height difference Ⓐ must be reached.

Guideline

Height difference Ⓐ	50 cm (19.7 in)



– Remove radiator cap ❶ and bleeder screw ❷ of the radiator.



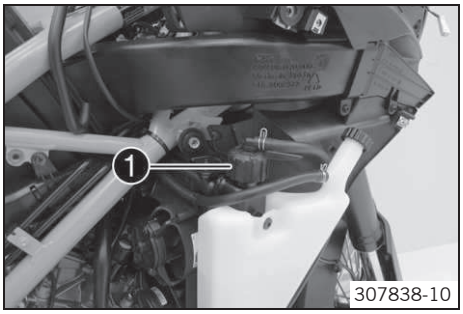
– Remove bleeder screws ❸ of the cylinder heads.
– Add coolant until it exits from the vent hole without bubbles.

Coolant	2.40 l (2.54 qt.)	Coolant (☛ p. 266)
		Coolant (mixed ready to use) (☛ p. 266)

– Mount and tighten the bleeder screws with the seal rings.

Guideline

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



– Completely fill the radiator with coolant and close it with radiator cap ❶.
– Position the vehicle on a level surface.
– Remove the cover of the compensating tank.
– Add coolant to the compensating tank until the coolant reaches the specified level.
  Guideline
  | The coolant level must be between **MIN** and **MAX**. |
– Mount the cover of the compensating tank.

21.5 Correcting the coolant level in the compensating tank

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.

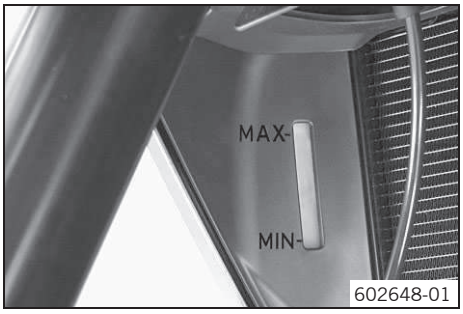
– Coolant must not come into contact with the skin, eyes, or clothing. If contact occurs with the eyes, rinse with water immediately and contact a physician. Immediately clean contaminated areas on the skin with soap and water. If coolant is swallowed, contact a physician immediately. Change clothing that is contaminated with coolant. Keep coolant out of reach of children.

Condition
The engine is cold.
The radiator is completely full.

Preparatory work
– Check the coolant level in the compensating tank. (☛ p. 205)
– Remove the front side cover. (☛ p. 75)

Info
Only disassemble the right-hand side.

Main work
– Remove cover ❶ of the compensating tank.



– Add coolant until the coolant reaches the specified level.
  Guideline
  | The coolant level must be between **MIN** and **MAX**. |
  Alternative 1
  | Coolant (☛ p. 266) |
  Alternative 2
  | Coolant (mixed ready to use) (☛ p. 266) |
– Mount the cover of the compensating tank.

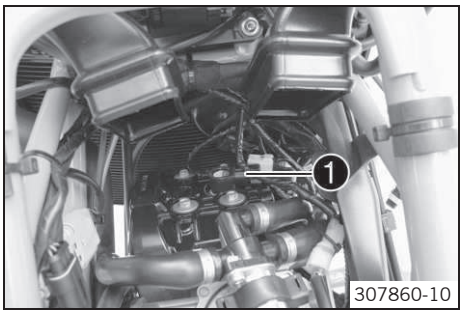
Finishing work
– Install the front side cover. (☛ p. 75)

22.1 Checking the valve clearance

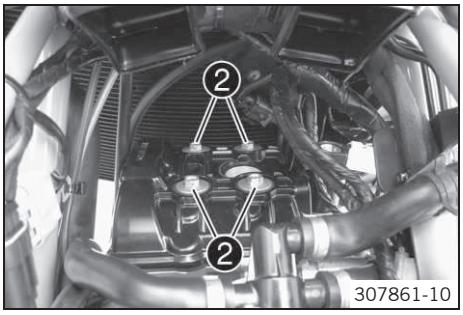
Preparatory work

- Remove the passenger seat. (☛ p. 62)
- Remove the driver's seat. (☛ p. 62)
- Remove the front side cover. (☛ p. 75)
- Remove the tank cover. (☛ p. 76)
- Remove the mask spoiler. (☛ p. 77)
- Remove the fuel tank. (☛ p. 63)
- Remove the upper part of the air filter box. (☛ p. 57)
- Remove the lower part of the air filter box. (☛ p. 59)

Main work



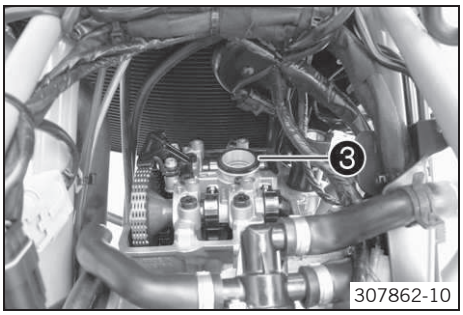
- Detach connector ❶ of the ignition coil.
- Remove the ignition coil.



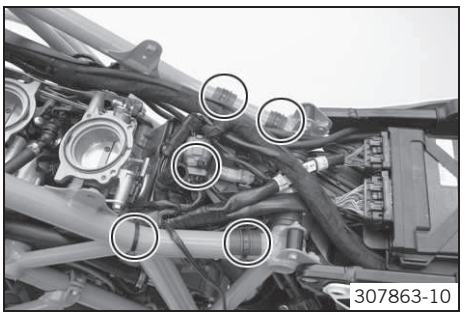
- Remove screws ❷ and take off the valve cover.
- Remove the spark plug using the special tool.

Spark plug wrench (75029172000) (☛ p. 279)

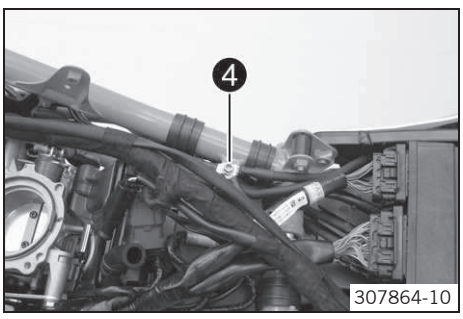
- Remove the valve cover with the gasket.



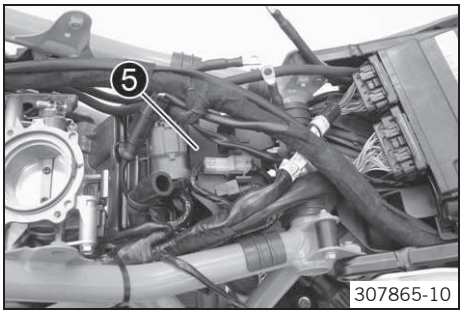
- Remove gasket ❸.



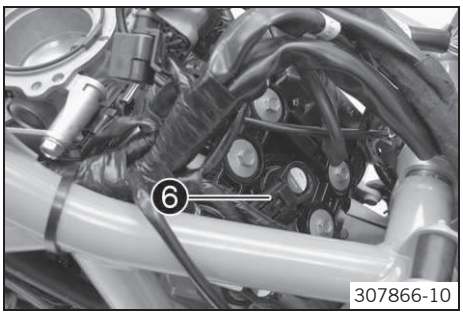
- Remove the cable binder.



- Remove screw ❹ with the washer.

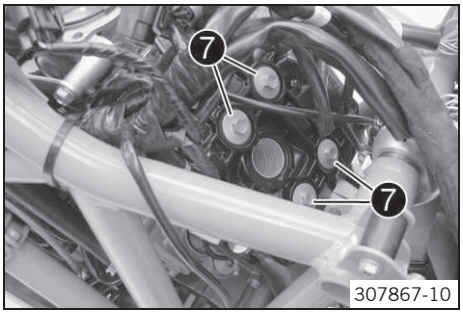


– Remove the plug from plug holder ❺.
– Remove the plug holder.

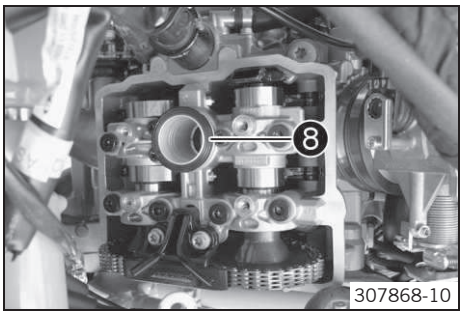


– Detach connector ❻ of the ignition coil.
– Remove the ignition coil.
– Remove the spark plug using the special tool.

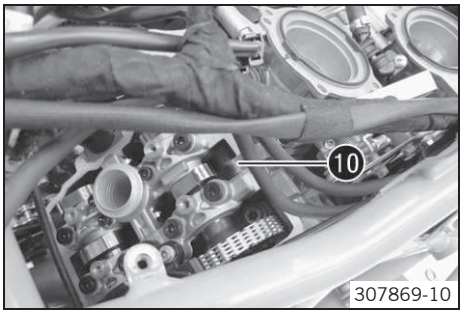
Spark plug wrench (75029172000) (☛ p. 279)



– Remove screws ❼.
– Remove the valve cover with the gasket.



– Remove gasket ❽.
– Set the engine to ignition top dead center of the rear cylinder. (☛ p. 130)



– On all valves, check the valve clearance between the camshaft and cam lever with special tool ❿.

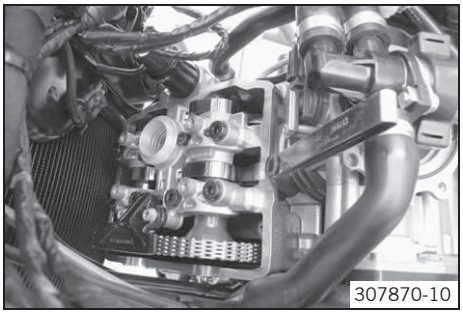
Guideline

Valve clearance	
Exhaust at: 20 °C (68 °F)	0.25... 0.30 mm (0.0098... 0.0118 in)
Intake at: 20 °C (68 °F)	0.10... 0.15 mm (0.0039... 0.0059 in)

Feeler gauge (59029041100) (☛ p. 273)

» If valve clearance does not meet specifications:
  – Set the valve clearance of the rear cylinder. (☛ p. 213)

– Set the engine to ignition top dead center of the front cylinder. (☛ p. 131)


307870-10

– On all valves, check the valve clearance between the camshaft and cam lever with the special tool.

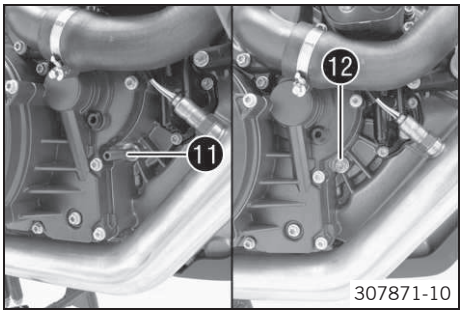
Guideline

Valve clearance	
Exhaust at: 20 °C (68 °F)	0.25... 0.30 mm (0.0098... 0.0118 in)
Intake at: 20 °C (68 °F)	0.10... 0.15 mm (0.0039... 0.0059 in)

Feeler gauge (59029041100) (☛ p. 273)

» If valve clearance does not meet specifications:

– Set the valve clearance of the front cylinder. (☛ p. 213)

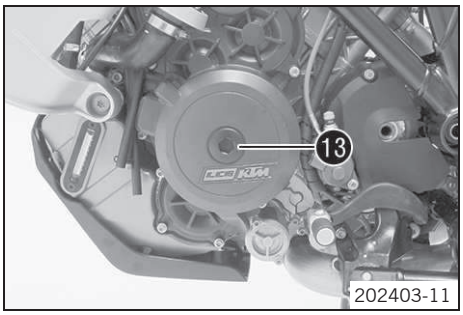


307871-10

– Remove special tool ⓫.
– Crank the engine several times. Check the valve clearance and correct it if necessary.
– Remove special tool ⓫ and mount and tighten screw ⓬.

Guideline

Plug, crankshaft retainer	M8	15 Nm (11.1 lbf ft)

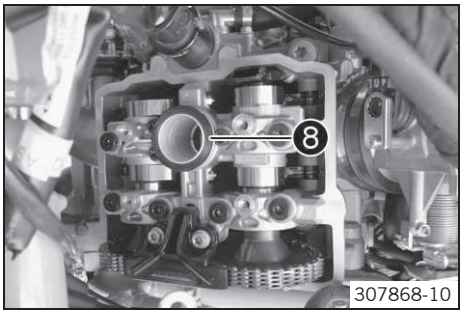


202403-11

– Mount and tighten screw ⓭ of the alternator cover.

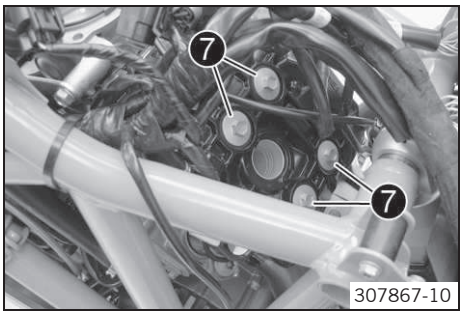
Guideline

Screw in alternator cover	M24x1.5	8 Nm (5.9 lbf ft)



307868-10

– Mount gasket ❽.



307867-10

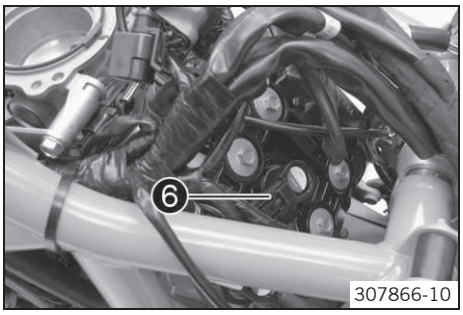
– Position the valve cover seal.

Info
The rear valve cover is equipped with a connector for the engine vent.
The front valve cover is not equipped with a connector for the engine vent.

– Put the valve cover in place with the gasket. Mount and tighten screws ❼.

Guideline

Screw, valve cover	M6	10 Nm (7.4 lbf ft)



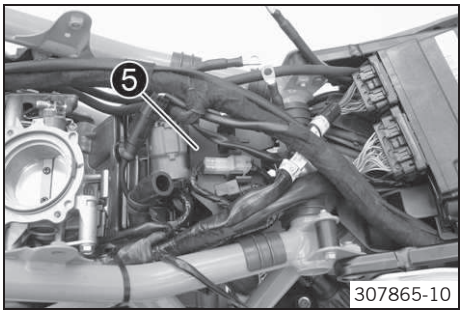
307866-10

– Mount and tighten the spark plug using a special tool.

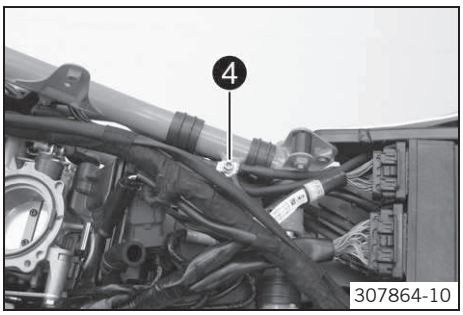
Spark plug wrench (75029172000) (☛ p. 279)

– Mount the ignition coil.
– Attach connector ❻ of the ignition coil.

✓ The cable with the white marking is connected to the outer ignition coil.

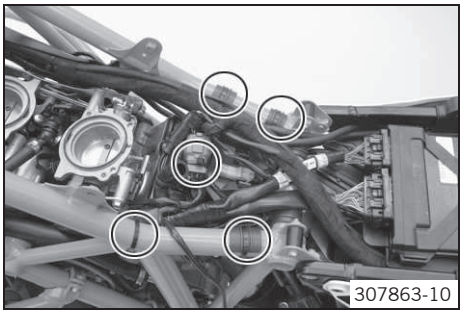


– Position the plug holder.
– Position the plug in plug holder ❺.

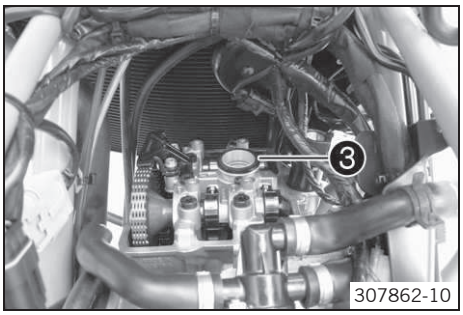


– Mount and tighten screw ❹ with the washer.
Guideline

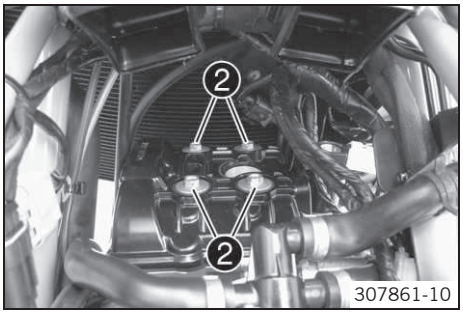
Remaining chassis screws	M6	10 Nm (7.4 lbf ft)



– Mount cable binders.

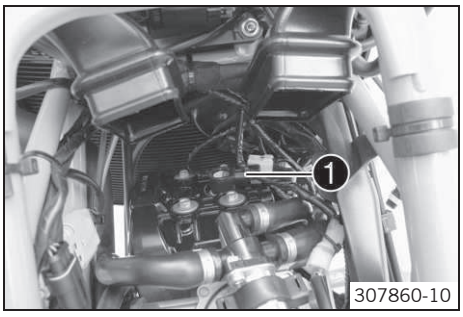


– Position gasket ❸.



– Mount the valve cover with the gasket.
– Mount and tighten screws ❷.
Guideline

Screw, valve cover	M6	10 Nm (7.4 lbf ft)



– Mount and tighten the spark plug using a special tool.

Spark plug wrench (75029172000) (☛ p. 279)

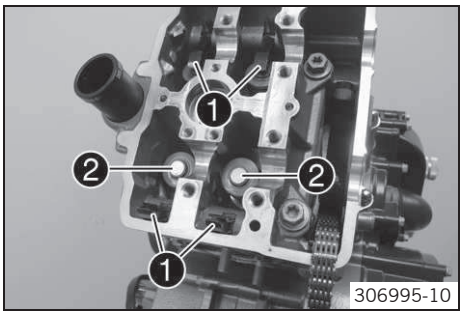
– Mount the ignition coil.
– Attach connector ❶ of the ignition coil.
✓ The cable with the white marking is connected to the outer ignition coil.

Finishing work
– Install the lower part of the air filter box. (☛ p. 60)
– Install the upper part of the air filter box. (☛ p. 58)

– Install the fuel tank. (☛ p. 64)
– Install the mask spoiler. (☛ p. 78)
– Install the tank cover. (☛ p. 77)
– Install the front side cover. (☛ p. 75)
– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)

22.2 Setting the valve clearance of the rear cylinder

Info
For purposes of illustration, the following operations are shown with the engine deinstalled.
Removal is not necessary.



Condition
The engine is positioned at ignition top dead center of the rear cylinder

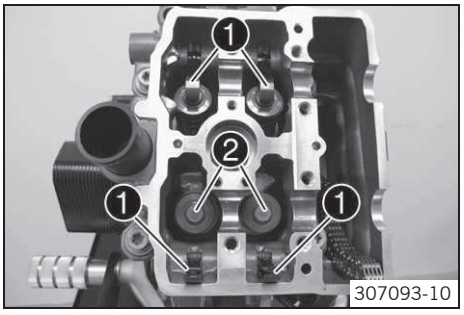
Preparatory work
– Disassemble the camshafts of the rear cylinder. (☛ p. 214)

Main work
– Lift cam lever ❶.
– Remove shims ❷ and set them down according to the installation position.
– Correct and insert the shims as indicated by the results of the valve clearance check.

Finishing work
– Install the camshafts of the rear cylinder. (☛ p. 214)

22.3 Setting the valve clearance of the front cylinder

Info
For purposes of illustration, the following operations are shown with the engine deinstalled.
Removal is not necessary.



Condition
The engine is positioned at ignition top dead center of the front cylinder

Preparatory work
– Disassemble the camshafts of the front cylinder. (☛ p. 215)

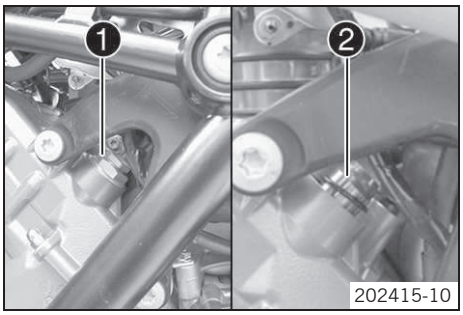
Main work
– Lift cam lever ❶.
– Remove shims ❷ and set them down according to the installation position.
– Correct and insert the shims as indicated by the results of the valve clearance check.

Finishing work
– Install the camshafts of the front cylinder. (☛ p. 216)

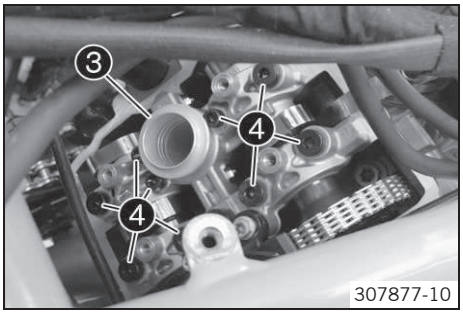
22.4 Disassembling the camshafts of the rear cylinder

Condition

The engine is positioned at ignition top dead center of the rear cylinder



– Remove screw ❶ with the O-ring.
– Pull out timing chain tensioner ❷.

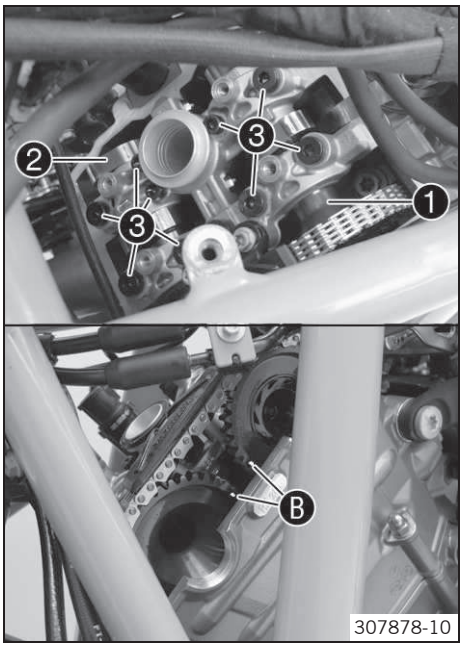


– Remove spark plug shaft insert ❸.
– Loosen and remove screws ❹ from the outside to the inside.

Info
The cams should not activate the valves.

– Remove the camshaft bearing bridge.
– Remove the timing chain from the rear sprocket. Remove the camshafts.

22.5 Installing the camshafts of the rear cylinder



– Pull up the timing chain and insert intake camshaft ❶.

Info
The intake camshaft is labeled with **eh**.

– Place the timing chain over the rear sprocket of the intake camshaft.
– Ensure that bleeder is seated correctly.
– Position exhaust camshaft ❷.

Info
The exhaust camshaft is labeled with **ah**.

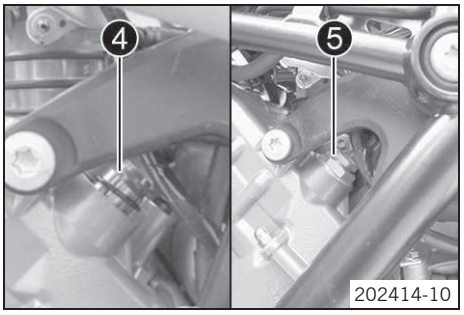
– Place the timing chain over the rear sprocket and position the camshaft in the bearing seat.
✓ Markings Ⓑ must be flush with the edge of the cylinder head.
– Position the camshaft bearing bridge.
– Mount screws ❸ and tighten them from the inside to the outside.

Guideline

Screw, camshaft bearing support	M6 – 10.9	10 Nm (7.4 lbf ft)	–
Screw, camshaft bearing support	M8 – 10.9	Step 1 10 Nm (7.4 lbf ft) Step 2 18 Nm (13.3 lbf ft)	–
Screw, camshaft bearing support	M8 – 10.9	Step 1 8.5 Nm (6.27 lbf ft) Step 2 14.5 Nm (10.7 lbf ft)	Only applies when using: Hex key bit (61229025000) (☛ p. 278)

Hex key bit (61229025000) (☛ p. 278)

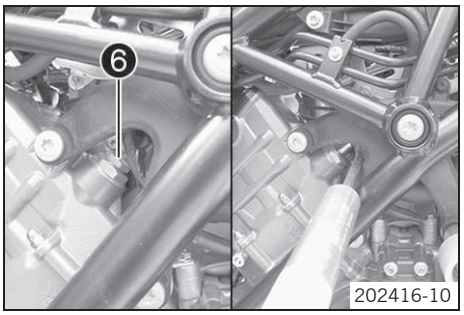
– Grease the O-rings and mount the spark plug shaft insert.
– Prepare the timing chain tensioner for installation. (☛ p. 167)



– After it has been positioned in the installation location, insert timing chain tensioner ❹ with a new O-ring.
– Mount and tighten screw plug ❺ with a new seal ring.

Guideline

Plug, timing-chain tensioner	M24x1.5	25 Nm (18.4 lbf ft)



– Remove screw ❻ and use the special tool to push the timing chain tensioner toward the timing chain.

Release device for timing chain tensioner (61229021000) (☛ p. 278)

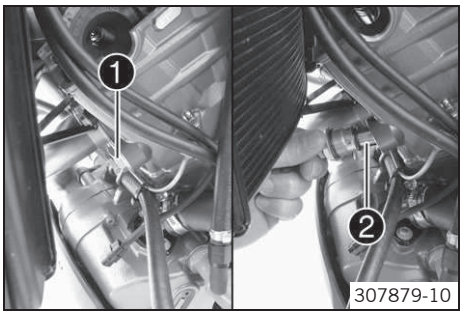
✓ The timing chain tensioner unlocks.
– Mount and tighten screw ❻.

Guideline

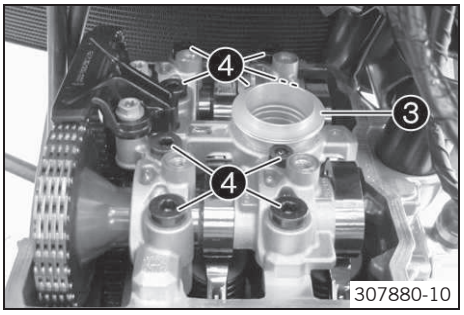
Screw, timing chain tensioner release	M10x1	10 Nm (7.4 lbf ft)

22.6 Disassembling the camshafts of the front cylinder

Condition
The engine is positioned at ignition top dead center of the front cylinder



– Remove screw ❶ with the O-ring.
– Pull out timing chain tensioner ❷.

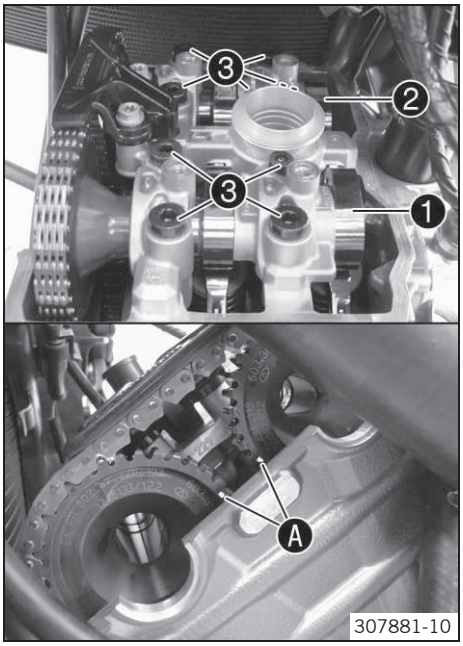


– Remove spark plug shaft insert ❸.
– Loosen and remove screws ❹ from the outside to the inside.

Info
The cams should not activate the valves.

– Remove the camshaft bearing bridge.
– Remove the timing chain from the rear sprocket. Remove the camshafts.

22.7 Installing the camshafts of the front cylinder



– Pull up the timing chain and insert intake camshaft ❶.

Info
The intake camshaft is labeled with **ev**.

– Place the timing chain over the rear sprocket of the intake camshaft.
– Position exhaust camshaft ❷.

Info
The exhaust camshaft is labeled with **av**.

– Place the timing chain over the rear sprocket and position the camshaft in the bearing seat.

✓ Markings Ⓐ must be flush with the edge of the cylinder head.

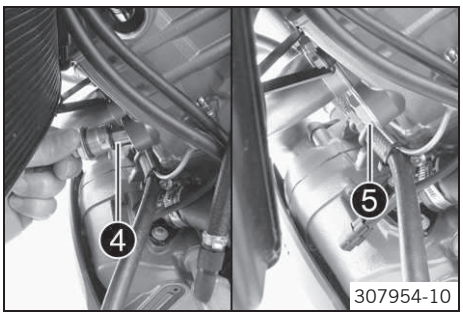
– Position the camshaft bearing bridge.
– Mount screws ❸ and tighten them from the inside to the outside.

Guideline

Screw, camshaft bearing support	M6 – 10.9	10 Nm (7.4 lbf ft)	–
Screw, camshaft bearing support	M8 – 10.9	Step 1 10 Nm (7.4 lbf ft) Step 2 18 Nm (13.3 lbf ft)	–
Screw, camshaft bearing support	M8 – 10.9	Step 1 8.5 Nm (6.27 lbf ft) Step 2 14.5 Nm (10.7 lbf ft)	Only applies when using: Hex key bit (61229025000) (☛ p. 278)

Hex key bit (61229025000) (☛ p. 278)

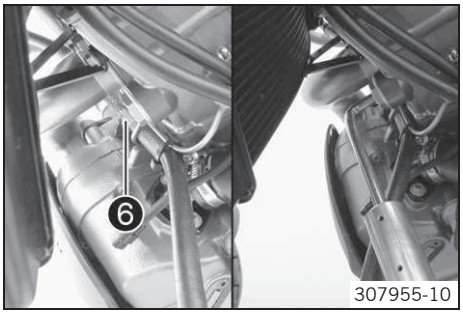
– Grease the O-rings and mount the spark plug shaft insert.
– Prepare the timing chain tensioner for installation. (☛ p. 167)



– After it has been positioned in the installation location, insert timing chain tensioner ❹ with a new O-ring.
– Mount and tighten screw plug ❺ with a new seal ring.

Guideline

Plug, timing-chain tensioner	M24x1.5	25 Nm (18.4 lbf ft)



– Remove screw ❻ and use the special tool to push the timing chain tensioner toward the timing chain.

Release device for timing chain tensioner (61229021000) (☛ p. 278)

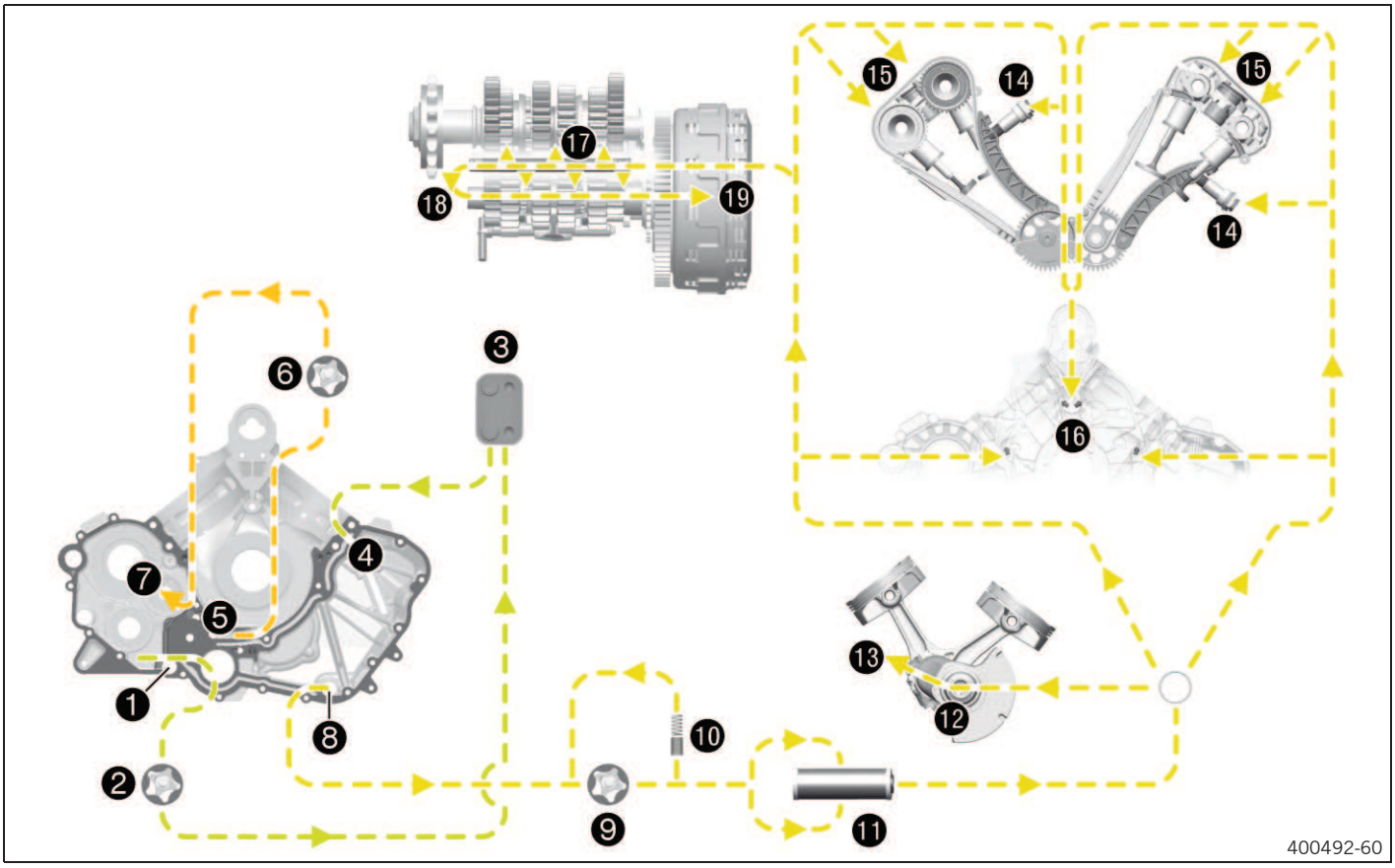
✓ The timing chain tensioner is unlocked.

– Mount and tighten screw ❻.

Guideline

Screw, timing chain tensioner release	M10x1	10 Nm (7.4 lbf ft)

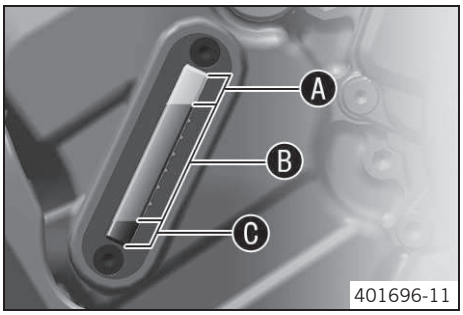
23.1 Oil circuit



Oil circuit of middle suction pump	
1	Oil screen of oil drain plug in gearbox
2	Middle suction pump
3	Heat exchanger
4	Oil exit in oil tank
Oil circuit of left suction pump	
5	Crankcase
6	Left suction pump
7	Lubricating slots in gearbox
Oil circuit of force pump	
8	Oil screen of oil drain plug in oil tank
9	Force pump
10	Oil pressure regulator valve
11	Oil filter
12	Crankshaft
13	Oil nozzle for alternator cooling
14	Timing chain tensioner
15	Camshaft lubrication/oil nozzles for valve gear lubrication
16	Oil nozzles for piston cooling
17	Oil spray tube
18	Oil nozzle for clutch lubrication
19	Clutch

23.2 Checking the engine oil level

Info
Oil consumption depends on the riding style and the operating conditions.



Condition
The engine is at operating temperature.

Preparatory work
– Stand the motorcycle upright on a horizontal surface.

Main work
– Check the engine oil level in the engine oil level viewer.

Info
After switching off the engine, wait one minute before checking the level.

The engine oil level should be in the upper area ❽ of the engine oil level viewer.

» When the engine oil level is in area ❹ of the engine oil level viewer:
– Do not add engine oil.
» When the engine oil level is in area ❽ of the engine oil level viewer:
– Engine oil can be added.
» When the engine oil level is in area ❿ of the engine oil level viewer:
– Add engine oil. (☛ p. 220)

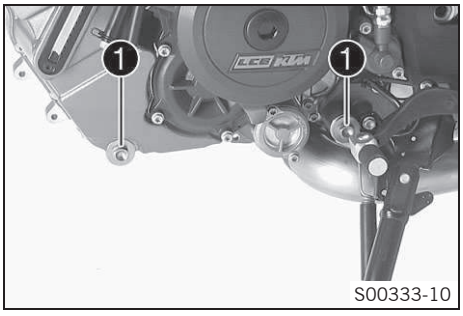
23.3 Changing the engine oil and filter, cleaning the oil screens

Warning
Danger of scalding Engine oil and gear oil get very hot when the motorcycle is ridden.
– Wear appropriate protective clothing and safety gloves. In case of burns, rinse immediately with lukewarm water.

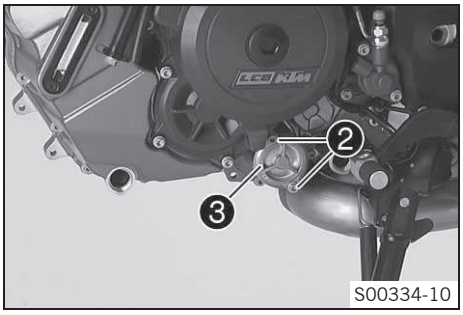
Warning
Environmental hazard Hazardous substances cause environmental damage.
– Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

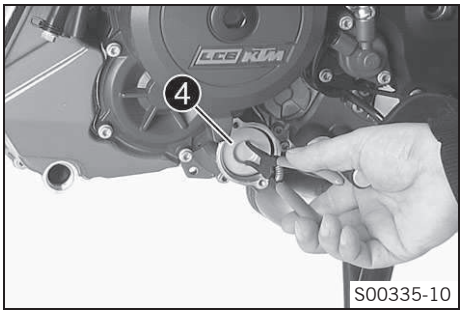
Preparatory work
– Remove the engine guard. (☛ p. 42)

Main work
– Stand the motorcycle on its side stand on a horizontal surface.
– Place a suitable container under the engine.
– Remove oil drain plugs ❶ with the magnet, O-rings, and oil screen.



– Remove screws ❷. Remove the oil filter cover ❸ with the O-ring.

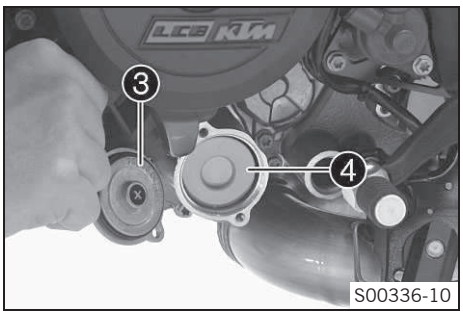




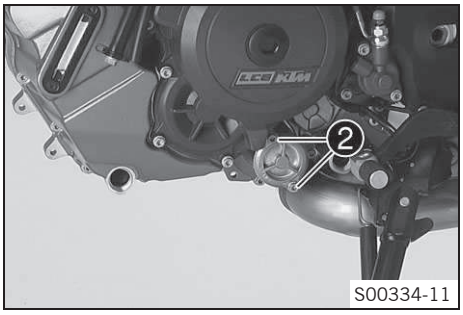
– Pull oil filter ❹ out of the oil filter housing.

Circlip pliers reverse (51012011000) (☛ p. 271)

– Completely drain the engine oil.
– Thoroughly clean the parts and sealing surface.

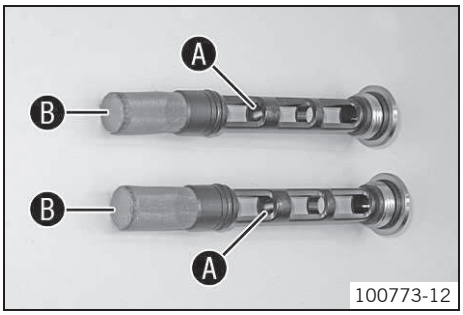


– Insert oil filter ❹.
– Lubricate the O-ring of the oil filter cover. Mount the oil filter cover ❸.

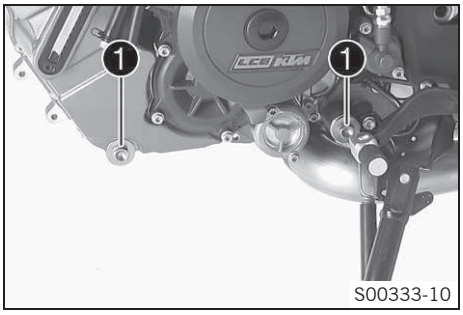


– Mount and tighten screws ❷.
Guideline

Remaining engine screws	M5	6 Nm (4.4 lbf ft)

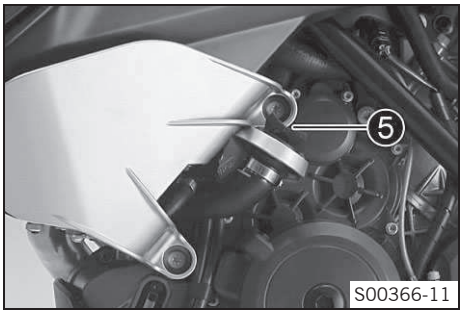


– Thoroughly clean magnet Ⓐ and oil screen Ⓑ of the oil drain plugs.



– Mount and tighten oil drain plugs ❶ with the magnet, O-rings, and oil screen.
Guideline

Oil drain plug	M20x1.5	20 Nm (14.8 lbf ft)



– The oil must be added in two steps.

Engine oil	3.60 l (3.8 qt.)	Outside temperature: ≥ 0 °C (≥ 32 °F)	Engine oil (SAE 10W/50) (☛ p. 266)
		Outside temperature: < 0 °C (< 32 °F)	Engine oil (SAE 5W/40) (☛ p. 266)

– Remove screw plug ❺ and fill in engine oil.

Engine oil (1st quantity) approx.	3.0 l (3.2 qt.)	Outside temperature: ≥ 0 °C (≥ 32 °F)	Engine oil (SAE 10W/50) (☛ p. 266)

Engine oil (1st quantity) approx.	3.0 l (3.2 qt.)	Outside temperature: < 0 °C (< 32 °F)	Engine oil (SAE 5W/40) (☛ p. 266)

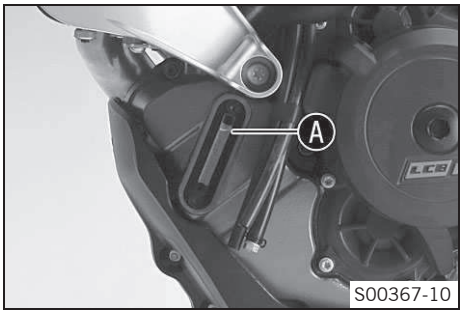
– Mount screw plug ❺.

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.



– Remove the screw plug and add the remaining engine oil to the upper marking Ⓐ on the engine oil level viewer.
– Mount the screw plug.

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. 218)
– Install the engine guard. (☛ p. 42)

23.4 Adding engine oil

Info

Too little engine oil or poor-quality engine oil results in premature wear to the engine.
The engine may be damaged if the engine oil level is too high.

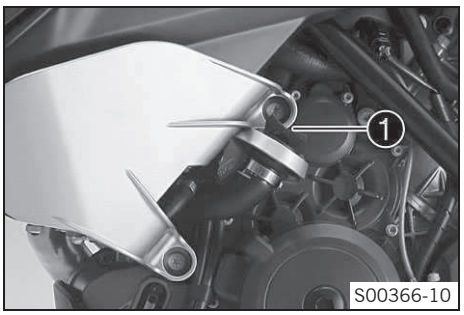
Condition

The engine is at operating temperature.

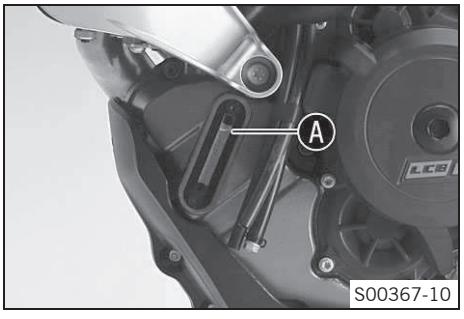
Preparatory work

– Stand the motorcycle upright on a horizontal surface.
– Check the engine oil level. (☛ p. 218)

Main work



– Remove screw plug ❶.



– Add engine oil to the upper marking Ⓐ on the engine oil level viewer.

Condition

Outside temperature: ≥ 0 °C (≥ 32 °F)

Engine oil (SAE 10W/50) (☛ p. 266)

Condition

Outside temperature: < 0 °C (< 32 °F)

Engine oil (SAE 5W/40) (☛ p. 266)

Info
In order to achieve optimal engine performance, it is not advisable to mix different engine oils.
KTM recommends changing the engine oil.

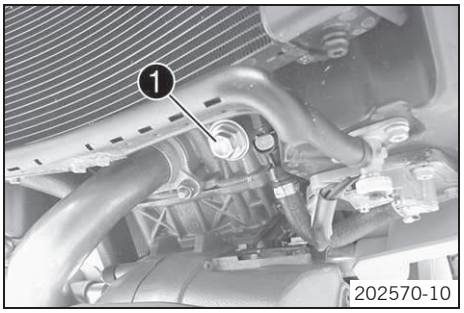
– Mount the screw plug.

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.

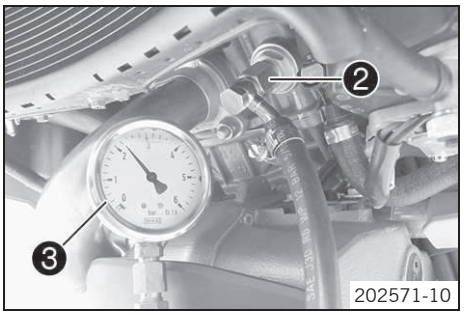
– Start the engine and check that it is oil-tight.

Finishing work
– Check the engine oil level. (☛ p. 218)

23.5 Checking the engine oil pressure



– Check the engine oil level. (☛ p. 218)
– Remove screw ❶.



– Mount and tighten special tool ❷.

Guideline

Oil pressure adapter	M10x1	10 Nm (7.4 lbf ft)

Oil pressure adapter (77329006000) (☛ p. 279)

– Connect pressure tester ❸ without the t-plate on the special tool.

Pressure testing tool (61029094000) (☛ p. 275)

Danger
Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.
– When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.

– Start the engine and let it warm up.
– Check the engine oil pressure.

Engine oil pressure	
Coolant temperature: ≥ 60 °C (≥ 140 °F) Idle	2.0... 4.8 bar (29... 70 psi)

» If the specification is not reached:
– Check the oil pumps for wear. Check all oil holes for free flow.

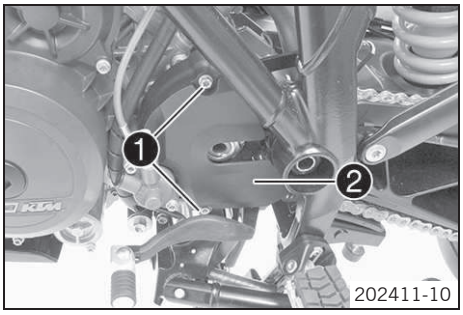
– Switch off the engine.

Warning
Danger of burns Some vehicle components get very hot when the machine is driven.
– Wear appropriate protective clothing and safety gloves. In case of burns, rinse immediately with lukewarm water.

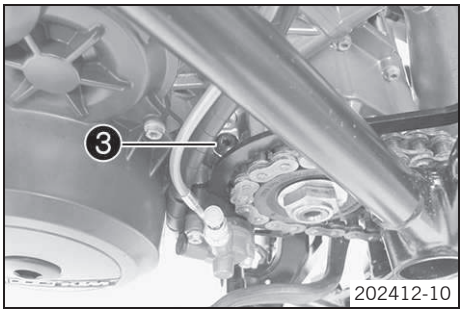
– Remove the special tools.
– Mount and tighten screw ❶.
Guideline

Screw, timing chain tensioner release	M10x1	10 Nm (7.4 lbf ft)

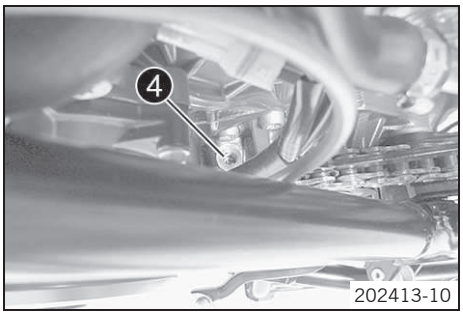
23.6 Removing the oil nozzle for the clutch lubrication



– Remove screws ❶.
– Take off engine sprocket cover ❷.



– Remove screw plug ❸ with O-ring.



– Remove oil nozzle ❹.

Oil nozzle assembly tool (61229035000) (☛ p. 278)

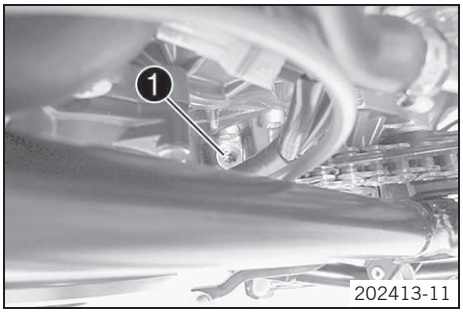
23.7 Checking/cleaning the oil nozzle for clutch lubrication

Preparatory work
– Remove the oil nozzle for the clutch lubrication. (☛ p. 222)

Main work
– Check that the oil nozzle for clutch lubrication is not blocked.
» If the oil nozzle is blocked:
– Clean the oil nozzle and change as necessary.

Finishing work
– Install the oil nozzle for the clutch lubrication. (☛ p. 223)

23.8 Installing the oil nozzle for the clutch lubrication

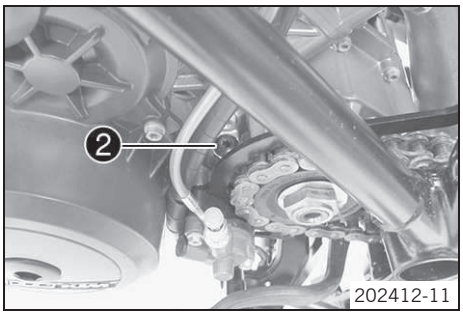


– Mount and tighten oil nozzle ❶.

Guideline

Oil nozzle for clutch lubrication	M6x0.75	4 Nm (3 lbf ft)

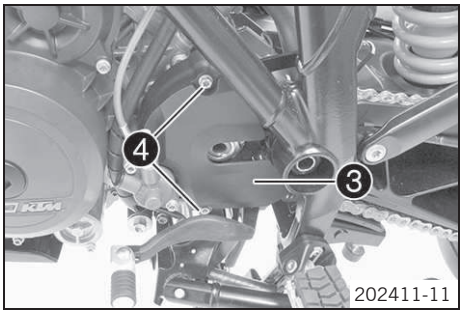
Oil nozzle assembly tool (61229035000) (☛ p. 278)



– Mount and tighten screw plug ❷ with the O-ring.

Guideline

Plug, clutch lubrication	M10x1	12 Nm (8.9 lbf ft)



– Position engine sprocket cover ❸.
– Mount and tighten screws ❹.

Guideline

Remaining chassis screws	M6	10 Nm (7.4 lbf ft)

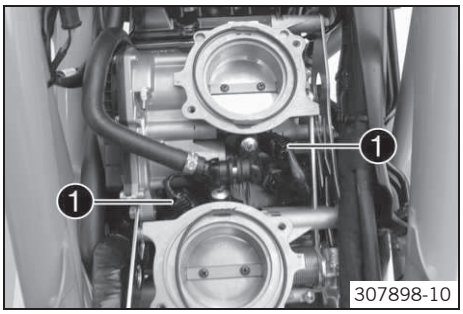
24 THROTTLE VALVE BODY

24.1 Removing the throttle valve body

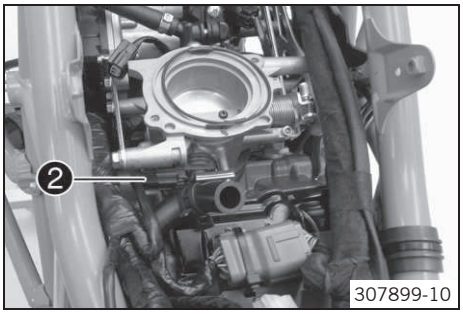
Preparatory work

- Remove the passenger seat. (☛ p. 62)
- Remove the driver's seat. (☛ p. 62)
- Remove the front side cover. (☛ p. 75)
- Remove the tank cover. (☛ p. 76)
- Remove the mask spoiler. (☛ p. 77)
- Remove the fuel tank. (☛ p. 63)
- Remove the upper part of the air filter box. (☛ p. 57)
- Remove the lower part of the air filter box. (☛ p. 59)

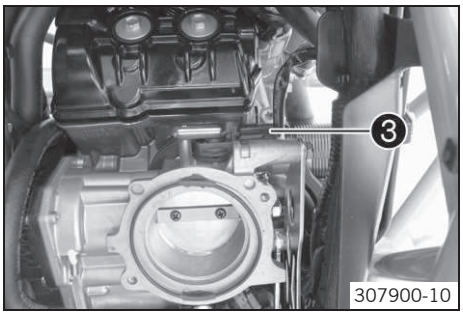
Main work



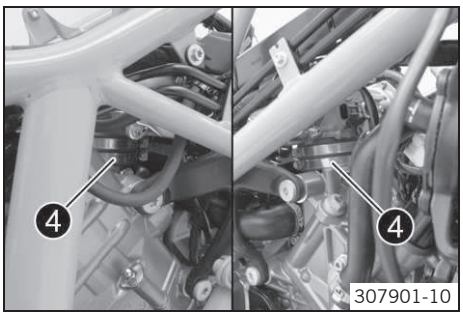
- Detach connector ❶.



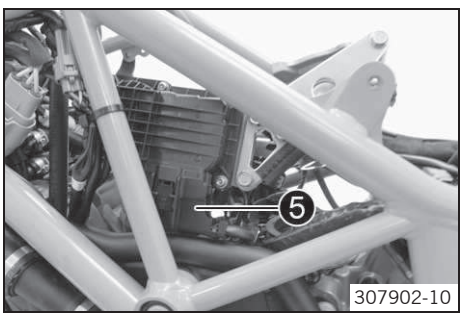
- Detach connector ❷.



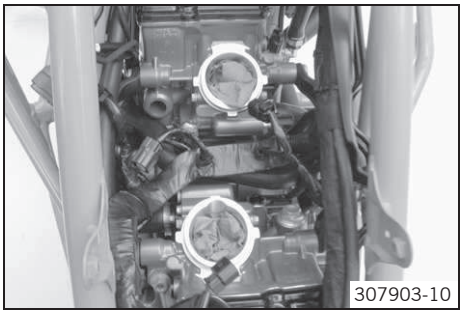
- Detach connector ❸.



- Loosen clamps ❹.

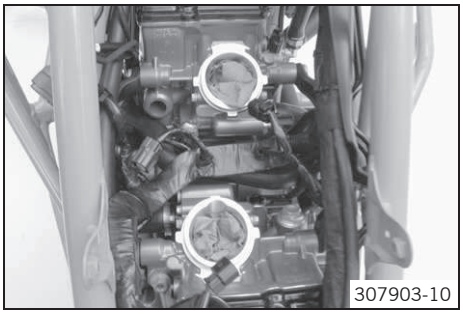


- Detach connectors ❺ and remove the throttle valve body.



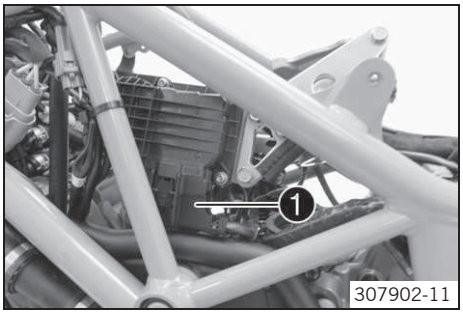
– Cover the intake duct with a cloth.

24.2 Installing the throttle valve body

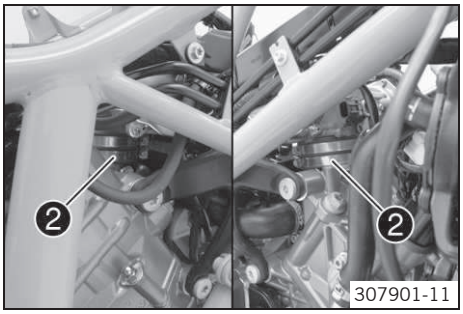


Main work

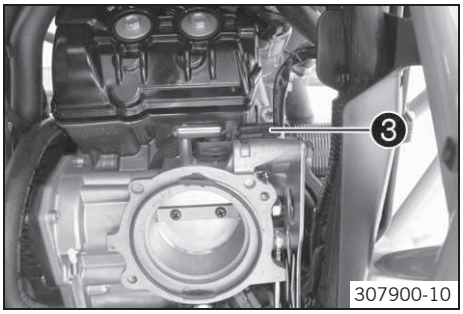
– Remove the cloth from the intake duct.



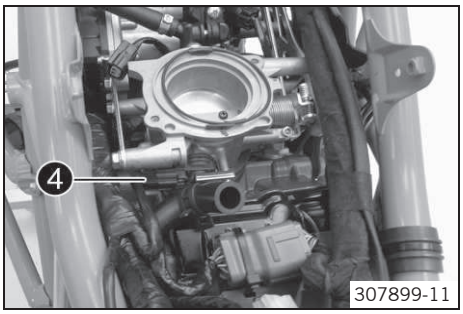
– Plug in connector ❶.
– Position the throttle valve body.



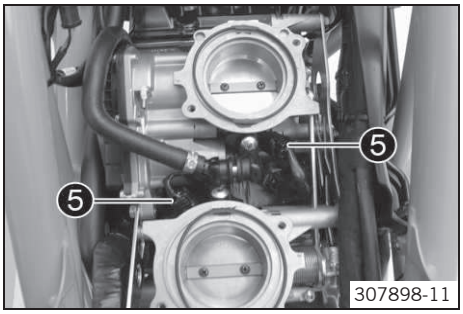
– Position and tighten clamps ❷.



– Plug in connector ❸.



– Plug in connector ❹.



– Plug in connector ❺.

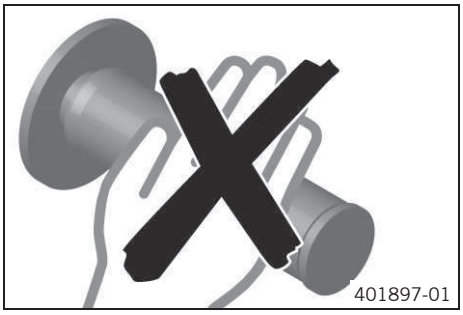
Finishing work

– Install the lower part of the air filter box. (☛ p. 60)
– Install the upper part of the air filter box. (☛ p. 58)
– Install the fuel tank. (☛ p. 64)
– Install the mask spoiler. (☛ p. 78)
– Install the tank cover. (☛ p. 77)
– Install the front side cover. (☛ p. 75)
– Mount the driver's seat. (☛ p. 62)
– Mount the passenger seat. (☛ p. 62)
– Execute the initialization run. (☛ p. 226)

24.3 Executing the initialization run

Condition

The diagnostic tool is connected and running.



– Execute **"Engine electronics"** > **"Functions"** > **"Deleting adaption figures"**.

✓ The adaption figures are deleted.

– Select **"Engine electronics"** > **"Measured values"** > **"Temperature sensor - coolant (TW1)"**.

✓ The coolant temperature is displayed during the initialization run.

Danger

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

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

– Start the engine without operating the throttle grip.

Guideline

Coolant temperature	< 25 °C (< 77 °F)

– Let the engine idle until it reaches the specified temperature.

Guideline

Coolant temperature	80... 90 °C (176... 194 °F)

Info

Do not operate the throttle grip during the initialization process.

– Switch off the ignition as soon as the specified temperature is reached.

Info

If the initialization is not completed or the initialization process is interrupted, the entire process must be restarted.

25 TECHNICAL DATA

25.1 Engine

Design	2-cylinder 4-stroke Otto engine, 75° V arrangement, water-cooled
Displacement	1,195 cm³ (72.92 cu in)
Stroke	69 mm (2.72 in)
Bore	105 mm (4.13 in)
Compression ratio	12.5:1
Idle speed	1,300... 1,500 rpm
Control	DOHC, 4 valves per cylinder, chain-driven
Valve - valve stem diameter	
Intake	42 mm (1.65 in)
Exhaust	34 mm (1.34 in)
Valve clearance	
Exhaust at: 20 °C (68 °F)	0.25... 0.30 mm (0.0098... 0.0118 in)
Intake at: 20 °C (68 °F)	0.10... 0.15 mm (0.0039... 0.0059 in)
Crankshaft bearing	Sleeve bearing
Conrod bearing	Sleeve bearing
Piston	Forged light alloy
Piston ring	1 upper compression (rectangular) ring, 1 lower compression ring, 1 oil scraper ring
Engine lubrication	Dry sump lubrication system with three rotor pumps
Primary transmission	40:76
Clutch	Antihopping clutch in oil bath/hydraulically operated
Transmission	6-speed claw gears
Transmission ratio	
1st gear	12:35
2nd gear	15:32
3rd gear	18:30
4th gear	20:27
5th gear	24:27
6th gear	27:26
Mixture preparation	Electronically controlled fuel injection
Ignition system	Contactless controlled fully electronic ignition with digital ignition adjustment
Alternator	12 V, 450 W
Spark plug	
Inside spark plug	NGK LKAR9BI9
Outside spark plug	NGK LMAR7A-9
Electrode gap, spark plug	0.8... 0.9 mm (0.031... 0.035 in)
Cooling	Water cooling, permanent circulation of coolant by water pump
Cold start device	Electric starter

25.2 Engine tolerance, wear limits

Camshaft - cam height	
Intake	39.150... 39.291 mm (1.54134... 1.54689 in)
Exhaust	38.390... 38.542 mm (1.51141... 1.5174 in)
Camshaft - bearing pin	23.959... 23.980 mm (0.94327... 0.94409 in)
Camshaft bearing - radial clearance	
New condition	0.020... 0.062 mm (0.00079... 0.00244 in)
Wear limit	0.09 mm (0.0035 in)
Valve guide - diameter	
New condition	6.004... 6.016 mm (0.23638... 0.23685 in)

Wear limit	6.150 mm (0.24213 in)
Valve - sealing seat width	
Intake: New condition	0.90 mm (0.0354 in)
Intake: Wear limit	1.7 mm (0.067 in)
Exhaust: New condition	1.0 mm (0.039 in)
Exhaust: Wear limit	2.0 mm (0.079 in)
Valve - run-out	
On the valve stem	≤ 0.05 mm (≤ 0.002 in)
On the valve plate: New condition	≤ 0.016 mm (≤ 0.00063 in)
On the valve plate: Wear limit	≤ 0.030 mm (≤ 0.00118 in)
Valve - valve stem diameter	
Exhaust	5.890... 5.970 mm (0.23189... 0.23504 in)
Intake	5.890... 5.970 mm (0.23189... 0.23504 in)
Valve spring - length	
New condition	42.70 mm (1.6811 in)
Wear limit	41.2 mm (1.622 in)
Cylinder head - bearing hole of camshaft	24.000... 24.021 mm (0.94488... 0.94571 in)
Cylinder/cylinder head - sealing area distortion	≤ 0.05 mm (≤ 0.002 in)
Cylinder - bore diameter	
Size I	105.000... 105.012 mm (4.13385... 4.13432 in)
Size II	105.012... 105.025 mm (4.13432... 4.13483 in)
Piston - diameter	
Size I	104.955... 104.985 mm (4.13208... 4.13326 in)
Size II	104.965... 104.995 mm (4.13247... 4.13365 in)
Piston/cylinder - mounting clearance	
New condition	0.015... 0.057 mm (0.00059... 0.00224 in)
Wear limit	0.150 mm (0.00591 in)
Piston - piston pin hole diameter	20.010... 20.020 mm (0.78779... 0.78819 in)
Piston ring	
Width, first ring (rectangular ring)	1.170... 1.200 mm (0.04606... 0.04724 in)
Width, second ring (lower compression ring)	1.170... 1.200 mm (0.04606... 0.04724 in)
Width, oil scraper ring	1.970... 2.000 mm (0.07756... 0.07874 in)
Piston ring - groove clearance	
First ring (rectangular ring)	≤ 0.105 mm (≤ 0.00413 in)
Second ring (lower compression ring)	≤ 0.150 mm (≤ 0.00591 in)
Oil scraper ring	≤ 0.180 mm (≤ 0.00709 in)
Piston ring end gap	≤ 0.5 mm (≤ 0.02 in)
Piston pin - diameter	19.995... 20.004 mm (0.7872... 0.78756 in)
Connecting rod - diameter of upper conrod eye	20.000... 20.013 mm (0.7874... 0.78791 in)
Connecting rod - axial clearance of lower conrod bearing	
New condition	0.10... 0.25 mm (0.0039... 0.0098 in)
Wear limit	0.40 mm (0.0157 in)
Connecting rod - radial clearance of lower conrod bearing	
New condition	0.030... 0.060 mm (0.00118... 0.00236 in)
Wear limit	0.080 mm (0.00315 in)
Connecting rod - large end width	20.950... 21.000 mm (0.8248... 0.82677 in)
Crankshaft - axial clearance	
New condition	0.15... 0.43 mm (0.0059... 0.0169 in)
Wear limit	1.00 mm (0.0394 in)
Crankshaft - crank pin width	42.100... 42.150 mm (1.65748... 1.65945 in)
Crankshaft - crank pin diameter	
Yellow	41.978... 41.989 mm (1.65267... 1.65311 in)

Blue	41.990... 42.000 mm (1.65315... 1.65354 in)
Red	42.001... 42.011 mm (1.65358... 1.65397 in)
Crankshaft - main bearing diameter	
Yellow	52.965... 52.975 mm (2.08523... 2.08563 in)
Blue	52.976... 52.985 mm (2.08567... 2.08602 in)
Red	52.986... 52.995 mm (2.08606... 2.08641 in)
Crankshaft - radial clearance of main bearing	
New condition	0.025... 0.055 mm (0.00098... 0.00217 in)
Wear limit	0.080 mm (0.00315 in)
Crankshaft - step bearing diameter	27.985... 28.000 mm (1.10177... 1.10236 in)
Crankshaft - radial clearance of step bearing	
New condition	0.030... 0.070 mm (0.00118... 0.00276 in)
Wear limit	0.090 mm (0.00354 in)
Clutch facing disc - thickness	
New condition	2.92... 3.08 mm (0.115... 0.1213 in)
Wear limit	2.85 mm (0.1122 in)
Intermediate disk - thickness	
New condition	1.55... 1.65 mm (0.061... 0.065 in)
Wear limit	1.45 mm (0.0571 in)
Clutch discs - thickness of total package	
New condition	47.20... 48.00 mm (1.8583... 1.8898 in)
Wear limit	46.50 mm (1.8307 in)
Clutch spring - length	45.70... 46.70 mm (1.7992... 1.8386 in)
Clutch basket - thrust surface of clutch facing discs	
Wear limit	0.5 mm (0.02 in)
Oil pressure regulator valve - minimum spring length	39.5 mm (1.555 in)
Oil pumps	
Clearance between external rotor and engine case	0.20... 0.40 mm (0.0079... 0.0157 in)
Clearance between external rotor and internal rotor	0.10... 0.25 mm (0.0039... 0.0098 in)
Axial clearance	0.04... 0.25 mm (0.0016... 0.0098 in)
Engine oil pressure	
Coolant temperature: ≥ 60 °C (≥ 140 °F) Idle	2.0... 4.8 bar (29... 70 psi)
Oil consumption	
After the vehicle is run-in	≤ 0.6 l/1.000 km (≤ 0.6 qt./600 mi) **Info** Oil consumption depends on the riding style and the operating conditions.
Shift fork	
Thickness at leaf	4.85... 4.95 mm (0.1909... 0.1949 in)
Clearance in the sliding gear groove: New condition	0.35... 0.55 mm (0.0138... 0.0217 in)
Clearance in the sliding gear groove: Wear limit	0.70 mm (0.0276 in)
Shift shaft - play in sliding plate/shift quadrant	0.40... 0.80 mm (0.0157... 0.0315 in)
Sliding gear - width of shift fork groove	5.30... 5.40 mm (0.2087... 0.2126 in)
Transmission shaft - axial clearance	0.05... 0.15 mm (0.002... 0.0059 in)

25.3 Engine tightening torques

Screw, retaining bracket, valve cover, rear	EJOT Altracs M6x10	10 Nm (7.4 lbf ft)	–
Hose clip, intake flange	M4	1.5 Nm (1.11 lbf ft)	–
Remaining engine screws	M5	6 Nm (4.4 lbf ft)	–
Screw, bearing retainer	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Screw, bearing shell retaining bracket	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Screw, engine oil level viewer	M5	4 Nm (3 lbf ft)	–
Screw, gear sensor	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Screw, pulse generator	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Bleeder screw, water pump cover	M6	10 Nm (7.4 lbf ft)	–
Camshaft drive sprocket bolt	M6	14 Nm (10.3 lbf ft)	–
Clutch slave cylinder screw	M6	10 Nm (7.4 lbf ft)	–
Freewheel ring bolt	M6 – 10.9	15 Nm (11.1 lbf ft)	**Loctite® 648™**
Nut, cylinder head	M6	9 Nm (6.6 lbf ft)	–
Plug, vacuum connection	M6	5 Nm (3.7 lbf ft)	**Loctite® 243™**
Remaining engine screws	M6	10 Nm (7.4 lbf ft)	–
Remaining screws, engine	M6	10 Nm (7.4 lbf ft)	–
Screw, camshaft bearing support	M6 – 10.9	10 Nm (7.4 lbf ft)	–
Screw, clutch cover	M6	10 Nm (7.4 lbf ft)	–
Screw, clutch spring	M6	12 Nm (8.9 lbf ft)	–
Screw, coolant connection on cylinder head	M6	10 Nm (7.4 lbf ft)	–
Screw, damping plate	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, engine case	M6x60	10 Nm (7.4 lbf ft)	–
Screw, engine case	M6x80	10 Nm (7.4 lbf ft)	–
Screw, engine case	M6x90	10 Nm (7.4 lbf ft)	–
Screw, freewheel holder	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, locking lever	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, oil pump cover	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, shift drum locating	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, shift lever	M6	18 Nm (13.3 lbf ft)	**Loctite® 243™**
Screw, starter motor	M6	10 Nm (7.4 lbf ft)	–
Screw, stator	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, thermostat case	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, valve cover	M6	10 Nm (7.4 lbf ft)	–
Screw, water pump cover	M6	10 Nm (7.4 lbf ft)	–
Screw, water pump wheel	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Stud, chain shaft	M6	8 Nm (5.9 lbf ft)	–
Vacuum connection	M6	2.5 Nm (1.84 lbf ft)	**Loctite® 243™**
Nozzle 100	M6x0.75	4 Nm (3 lbf ft)	**Loctite® 243™**
Nozzle 140	M6x0.75	4 Nm (3 lbf ft)	**Loctite® 243™**
Oil nozzle	M6x0.75	4 Nm (3 lbf ft)	**Loctite® 243™**
Oil nozzle for clutch lubrication	M6x0.75	4 Nm (3 lbf ft)	–
Plug, crankshaft retainer	M8	15 Nm (11.1 lbf ft)	–
Screw, camshaft bearing support	M8 – 10.9	Step 1 8.5 Nm (6.27 lbf ft) Step 2 14.5 Nm (10.7 lbf ft)	Only applies when using: Hex key bit (61229025000) (☛ p. 278)
Screw, camshaft bearing support	M8 – 10.9	Step 1 10 Nm (7.4 lbf ft) Step 2 18 Nm (13.3 lbf ft)	–

Screw, engine case	M8	18 Nm (13.3 lbf ft)	–
Screw, engine console	M8	20 Nm (14.8 lbf ft)	**Loctite® 243™**
Screw, heat exchanger	M8	15 Nm (11.1 lbf ft)	–
Screw, timing chain guide rail	M8	15 Nm (11.1 lbf ft)	**Loctite® 243™**
Screw, timing chain tensioning rail	M8	15 Nm (11.1 lbf ft)	**Loctite® 243™**
Stud, exhaust flange	M8	10 Nm (7.4 lbf ft)	–
Oil pressure sensor	M10x1	10 Nm (7.4 lbf ft)	–
Plug, cam lever axis	M10x1	15 Nm (11.1 lbf ft)	–
Plug, clutch lubrication	M10x1	12 Nm (8.9 lbf ft)	–
Screw, conrod bearing	M10x1	Step 1 25 Nm (18.4 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 90°	–
Screw, timing chain tensioner release	M10x1	10 Nm (7.4 lbf ft)	–
Spark plug	M10x1	15 Nm (11.1 lbf ft)	–
Cylinder head screw	M11x1.5	Tightening sequence: Using a crisscross pattern Step 1 15 Nm (11.1 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 90° Step 4 90°	Lubricated with engine oil
Coolant temperature sensor	M12x1.5	12 Nm (8.9 lbf ft)	–
Rotor screw	M12x1.5	90 Nm (66.4 lbf ft)	–
Spark plug	M12x1.5	15 Nm (11.1 lbf ft)	–
Nut of engine sprocket	M20x1.5	100 Nm (73.8 lbf ft)	**Loctite® 243™**
Oil drain plug	M20x1.5	20 Nm (14.8 lbf ft)	–
Nut, inner clutch hub	M22x1.5	130 Nm (95.9 lbf ft)	**Loctite® 243™**
Plug, timing-chain tensioner	M24x1.5	25 Nm (18.4 lbf ft)	–
Screw in alternator cover	M24x1.5	8 Nm (5.9 lbf ft)	–
Nut, primary gear	M33LHx1.5	130 Nm (95.9 lbf ft)	**Loctite® 243™**

25.4 Capacities

25.4.1 Engine oil

Engine oil	3.60 l (3.8 qt.)	Outside temperature: ≥ 0 °C (≥ 32 °F)	Engine oil (SAE 10W/50) (☛ p. 266)
		Outside temperature: < 0 °C (< 32 °F)	Engine oil (SAE 5W/40) (☛ p. 266)

25.4.2 Coolant

Coolant	2.40 l (2.54 qt.)	Coolant (☛ p. 266)
		Coolant (mixed ready to use) (☛ p. 266)

25.4.3 Fuel

Total fuel tank capacity, approx.	23 l (6.1 US gal)	Super unleaded (ROZ 95/RON 95/PON 91) (☛ p. 267)

Fuel reserve, approx.	3.5 l (3.7 qt.)

25.5 Chassis

Frame	Lattice frame made of chrome molybdenum steel tubing, powder-coated
Fork	**WP Suspension** 4860 ROTA SPLIT
Shock absorber	**WP Suspension** 4618 Emulsion
Shock absorber	**WP Suspension** 4614 WAD EDS
Suspension travel	
Front	190 mm (7.48 in)
Rear	190 mm (7.48 in)
Brake system	
Front	Double disc brake with radially mounted four-pot brake calipers, floating brake discs
Rear	Single disc brake with dual-piston brake caliper, floating brake disc
Brake discs - diameter	
Front	320 mm (12.6 in)
Rear	267 mm (10.51 in)
Brake discs - wear limit	
Front	4 mm (0.16 in)
Rear	4.5 mm (0.177 in)
Tire air pressure, solo/with passenger/full payload	
Front: with cold tires	2.4 bar (35 psi)
Rear: with cold tires	2.9 bar (42 psi)
Secondary drive ratio	17:42
Chain	5/8 x 5/16” (525) X-ring
Steering head angle	64°
Wheelbase	1,560 mm (61.42 in)
Seat height, unloaded	860/875 mm (860/875 in)
Ground clearance, unloaded	220 mm (8.66 in)
Weight without fuel, approx.	212 kg (467 lb.)
Maximum permissible front axle load	159 kg (351 lb.)
Maximum permissible rear axle load	281 kg (619 lb.)
Maximum permissible total weight	440 kg (970 lb.)

25.6 Electrical system

Battery	YTZ14S	Battery voltage: 12 V Nominal capacity: 11.2 Ah maintenance-free
Fuse	58011109110	10 A
Fuse	58011109125	25 A
Fuse	58011109130	30 A
Fuse	58011109140	40 A
Low beam	H11/socket PGJ19-2	12 V 55 W
High beam	H11/socket PGJ19-2	12 V 55 W
Parking light	LED	
Instrument lights and indicator lamps	LED	
Turn signal	LED	
Tail light	LED	
Brake light	LED	
License plate lamp	LED	

25.7 Tires

Front tires	Rear tires
120/70 ZR 19 M/C 60W TL Continental ContiTrailATTACK 2 K	**170/60 ZR 17 M/C 72W TL** Continental ContiTrailATTACK 2 K
Additional information is available in the Service section under: http://www.ktm.com	

25.8 Fork

25.8.1 Option: Without EDS

Fork part number	14.18.8M.24
Fork	**WP Suspension** 4860 ROTA SPLIT
Compression damping	
Comfort	17 clicks
Standard	12 clicks
Sport	7 clicks
Full payload	7 clicks
Rebound damping	
Comfort	17 clicks
Standard	12 clicks
Sport	7 clicks
Full payload	7 clicks
Spring length with preload spacer(s)	393 mm (15.47 in)
Spring rate	
Medium (standard)	6.0 N/mm (34.3 lb/in)
Fork length	885 mm (34.84 in)

Fork oil per fork leg	675 ml (22.82 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 267)

25.8.2 Option: With EDS

Fork part number	14.18.9M.24
Fork	**WP Suspension** 4860 ROTA SPLIT
Spring length with preload spacer(s)	393 mm (15.47 in)
Spring rate	
Medium (standard)	6.0 N/mm (34.3 lb/in)
Fork length	885 mm (34.84 in)

Fork oil per fork leg	675 ml (22.82 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 267)

25.9 Shock absorber

25.9.1 Option: Without EDS

Shock absorber part number	01.18.7M.24
Shock absorber	**WP Suspension** 4618 Emulsion
Rebound damping	
Comfort	17 clicks
Standard	12 clicks
Sport	7 clicks
Full payload	7 clicks
Spring preload	
Comfort	10 mm (0.39 in)
Standard	10 mm (0.39 in)
Sport	10 mm (0.39 in)

Full payload	14 mm (0.55 in)
Spring rate	
Medium (standard)	170 N/mm (971 lb/in)
Spring length	205 mm (8.07 in)
Static sag	25 mm (0.98 in)
Riding sag	55 mm (2.17 in)
Fitted length	402 mm (15.83 in)

25.9.2 Option: With EDS

Shock absorber part number	11.18.9M.24
Shock absorber	**WP Suspension** 4614 WAD EDS
Spring rate	
Medium (standard)	160 N/mm (914 lb/in)
Spring length	205 mm (8.07 in)
Static sag	25 mm (0.98 in)
Riding sag	55 mm (2.17 in)
Fitted length	403 mm (15.87 in)

25.10 Chassis tightening torques

Screw, combination switch, left	M4	2 Nm (1.5 lbf ft)	–
Screw, side stand switch	M4	2 Nm (1.5 lbf ft)	–
Remaining screws, chassis	M5	5 Nm (3.7 lbf ft)	–
Screw, brake line holder on swingarm	M5	5 Nm (3.7 lbf ft)	–
Screw, cable channel	M5	5 Nm (3.7 lbf ft)	–
Screw, cable guide, wheel speed sensor, rear	M5	3 Nm (2.2 lbf ft)	–
Screw, chain sliding guard	M5	5 Nm (3.7 lbf ft)	–
Screw, combination switch, right	M5	3.5 Nm (2.58 lbf ft)	–
Screw, cover part	M5x12	3.5 Nm (2.58 lbf ft)	–
Screw, fender	M5x12	3.5 Nm (2.58 lbf ft)	–
Screw, filler cap	M5	5 Nm (3.7 lbf ft)	–
Screw, foot brake lever stub	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Screw, fuel level indicator	M5	3 Nm (2.2 lbf ft)	–
Screw, heat guard on main silencer	M5	4 Nm (3 lbf ft)	–
Screw, mask spoiler	M5x17	3.5 Nm (2.58 lbf ft)	–
Screw, wind shield	M5	3.5 Nm (2.58 lbf ft)	–
Spoke nipple	M5	4... 6 Nm (3... 4.4 lbf ft)	–
Ground fitting on frame	M6	6 Nm (4.4 lbf ft)	–
Nut, ABS unit fixation	M6	8 Nm (5.9 lbf ft)	–
Remaining chassis nuts	M6	10 Nm (7.4 lbf ft)	–
Remaining chassis screws	M6	10 Nm (7.4 lbf ft)	–
Screw, battery terminal	M6	4.5 Nm (3.32 lbf ft)	–
Screw, brake line holder on bottom triple clamp	M6	8 Nm (5.9 lbf ft)	**Loctite® 243™**
Screw, cable channel	M6	5 Nm (3.7 lbf ft)	–
Screw, chain guide	M6	5 Nm (3.7 lbf ft)	**Loctite® 243™**
Screw, clutch assembly	M6	5 Nm (3.7 lbf ft)	–
Screw, cooler retaining bracket	M6	7 Nm (5.2 lbf ft)	–
Screw, cover part	M6	6 Nm (4.4 lbf ft)	–
Screw, engine guard	M6	10 Nm (7.4 lbf ft)	–
Screw, exhaust clamp	M6	12 Nm (8.9 lbf ft)	–
Screw, foot brake cylinder	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

Screw, front brake disc	M6	14 Nm (10.3 lbf ft)	**Loctite® 243™**
Screw, fuel pump	M6	6 Nm (4.4 lbf ft)	–
Screw, fuel tank	M6	10 Nm (7.4 lbf ft)	–
Screw, fuel tap	M6	6 Nm (4.4 lbf ft)	–
Screw, lower rear part	M6	6 Nm (4.4 lbf ft)	–
Screw, magnetic holder on side stand	M6	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Screw, manifold holder	M6	12 Nm (8.9 lbf ft)	**Loctite® 243™**
Screw, rear brake disc	M6	14 Nm (10.3 lbf ft)	**Loctite® 243™**
Screw, steering damper	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, voltage regulator	M6	6 Nm (4.4 lbf ft)	–
Screw, wheel speed sensor, front	M6	10 Nm (7.4 lbf ft)	–
Screw, wheel speed sensor, rear	M6	10 Nm (7.4 lbf ft)	–
Nut, manifold on cylinder head	M8	Tightening sequence: Tighten the nuts evenly. Do not bend the metal.	–
Remaining chassis nuts	M8	25 Nm (18.4 lbf ft)	–
Remaining chassis screws	M8	25 Nm (18.4 lbf ft)	–
Screw, bottom triple clamp	M8	12 Nm (8.9 lbf ft)	–
Screw, exhaust clamp	M8	12 Nm (8.9 lbf ft)	–
Screw, foot brake lever	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**
Screw, fork stub	M8	15 Nm (11.1 lbf ft)	–
Screw, front footrest bracket	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**
Screw, handlebar clamp	M8	20 Nm (14.8 lbf ft)	–
Screw, ignition lock (tamper-proof screw)	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**
Screw, rear footrest bracket	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**
Screw, side stand bracket	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**
Screw, steering damper	M8	20^{+5}_{0} Nm ($14.8^{+3.7}_{0}$ lbf ft)	**Loctite® 2701™**
Screw, steering damper clamp	M8	12 Nm (8.9 lbf ft)	–
Screw, suitcase hook	M8	20 Nm (14.8 lbf ft)	–
Screw, top triple clamp	M8	15 Nm (11.1 lbf ft)	–
Engine carrying screw	M10	45 Nm (33.2 lbf ft)	–
Remaining chassis nuts	M10	45 Nm (33.2 lbf ft)	–
Remaining chassis screws	M10	45 Nm (33.2 lbf ft)	–
Screw, front brake caliper	M10	45 Nm (33.2 lbf ft)	**Loctite® 243™**
Screw, handlebar support	M10	40 Nm (29.5 lbf ft)	**Loctite® 243™**
Screw, side stand	M10	35 Nm (25.8 lbf ft)	**Loctite® 243™**
Screw, side stand bracket	M10	45 Nm (33.2 lbf ft)	**Loctite® 243™**
Banjo bolt, brake line	M10x1	25 Nm (18.4 lbf ft)	–
Nut, tire pressure sensor	M10x1	12 Nm (8.9 lbf ft)	–
Screw, subframe	M10x1.25	45 Nm (33.2 lbf ft)	**Loctite® 243™**
Lambda sensor	M12x1.25	25 Nm (18.4 lbf ft)	–
Screw, bottom shock absorber	M14x1.5	80 Nm (59 lbf ft)	Thread greased
Screw, top shock absorber	M14x1.5	80 Nm (59 lbf ft)	Thread greased
Nut, socket	M18x1	4 Nm (3 lbf ft)	–
Nut, swingarm pivot	M19x1.5	130 Nm (95.9 lbf ft)	Thread greased
Screw, steering head, top	M22x1.5	50 Nm (36.9 lbf ft)	–
Screw, steering head, top	M22x1.5	46.5 Nm (34.3 lbf ft)	Only applies when using: Key for steering head bearing (45229050000) (☛ p. 270)
Nut, rear wheel spindle	M25x1.5	90 Nm (66.4 lbf ft)	Thread greased
Screw, front wheel spindle	M25x1.5	45 Nm (33.2 lbf ft)	–

Nut, steering head, top	M28x1.0	12 Nm (8.9 lbf ft)	–

26.1 Cleaning 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.

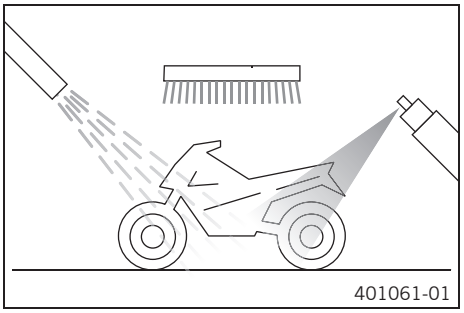
Warning

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.


401061-01

– 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 brush.

Motorcycle cleaner (☛ p. 269)

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.
If the vehicle was operated in road salt, clean it with cold water. Warm water would enhance the corrosive effects of salt.

– 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 the vehicle a short distance until the engine warms up.

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. 91)
– Treat bare metal parts (except for brake discs and exhaust system) with corrosion inhibitor.

Cleaning and preserving materials for metal, rubber and plastic (☛ p. 268)

– Treat the painted parts with a mild paint polish.

High-luster polish for paint (☛ p. 268)

– Treat the plastic parts and powder-coated parts with a mild cleaning and care product.

Paint cleaner and polish for high-gloss and matte finishes, bare metal and plastic surfaces (☛ p. 269)

– Oil the ignition/steering lock, tank lock, and seat lock.

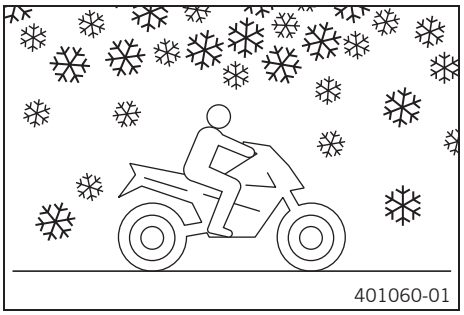
Universal oil spray (☛ p. 269)

26.2 Checks and maintenance steps for winter operation

Info

If you use the motorcycle in winter, you must expect salt on the roads. You should therefore take precautions against aggressive road salt.

If the vehicle was operated in road salt, clean it with cold water after riding. Warm water would enhance the corrosive effects of salt.



401060-01

– Clean the motorcycle. (☛ p. 237)
– Clean the brakes.

Info

After **EVERY** trip on salted roads, thoroughly wash the brake calipers and brake linings with cold water and dry carefully. This should be done after the parts are cooled down and while they are installed.

After riding on salted roads, thoroughly wash the motorcycle with cold water and dry it well.

– Treat the engine, the swingarm, and all other bare or galvanized parts (except brake discs) with a wax-based corrosion inhibitor.

Info

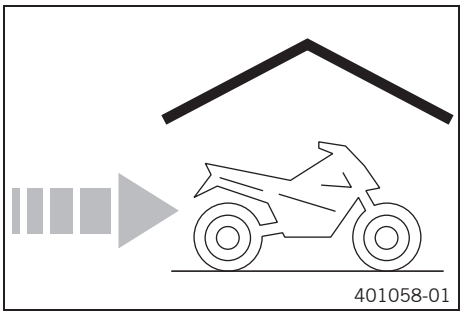
Corrosion inhibitor must not come into contact with the brake discs. This would severely lower the braking effect.

– Clean the chain. (☛ p. 91)

27.1 Storage

Info

If you plan to garage the motorcycle for a longer period, perform the following steps or have them performed.
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. 268)

– Clean the motorcycle. (☛ p. 237)
– Change the engine oil and filter, clean the oil screens. (☛ p. 218)
– Check the coolant fill level and antifreeze. (☛ p. 205)
– Check the tire air pressure. (☛ p. 82)
– Remove the battery. (☛ p. 94)

Guideline

Storage temperature of battery without direct sunshine	0… 35 °C (32… 95 °F)

– Recharge the battery. (☛ p. 97)
– Store the vehicle in a dry location that is not subject to large fluctuations in temperature.

(Option: Center stand)

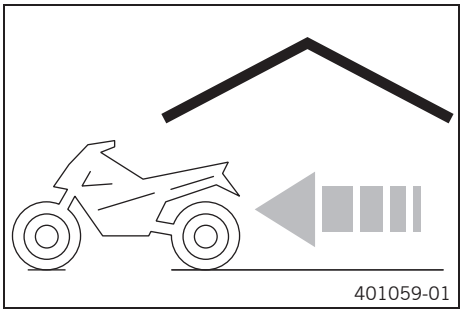
– Raise the vehicle with the center stand. (☛ p. 12)

– Cover the vehicle with a tarp or similar 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 the exhaust system to rust.

27.2 Preparing for use after storage


401059-01

(Option: Center stand)

– Remove the vehicle from the center stand. (☛ p. 12)

– Recharge the battery. (☛ p. 97)
– Install the battery. (☛ p. 94)

Info

If the battery was disconnected, the time and date must be set.

– Refuel.
– Perform checks and maintenance measures when preparing for use.
– Take a test ride.

28 SERVICE SCHEDULE

28.1 Additional information

Any further work that results from the required work or from the recommended work must be ordered separately and can be invoiced separately.

28.2 Required work

					Every two years
				Every year	
			Every 30,000 km (18,600 mi)		
		Every 15,000 km (9,300 mi)			
	After 1,000 km (620 mi)				
Read out the trouble code memory using the KTM diagnostics tool.	○	●	●	●	●
Check the fuel pressure.		●	●	●	●
Check the functioning of the electrical equipment.	○	●	●	●	●
Change the engine oil and filter, clean the oil screens. (☛ p. 218)	○	●	●	●	●
Check the brake discs. (☛ p. 86)	○	●	●	●	●
Check the front brake linings. (☛ p. 102)	○	●	●	●	●
Check the rear brake linings. (☛ p. 107)	○	●	●	●	●
Retighten the spokes.	○				
Check the spoke tension. (☛ p. 83)		●	●	●	●
Check the rim run-out.	○	●	●	●	●
Check the tire condition. (☛ p. 82)	○	●	●	●	●
Check the tire air pressure. (☛ p. 82)	○	●	●	●	●
Check the rear brake fluid level. (☛ p. 109)	○	●	●	●	
Check the shock absorber and fork for leaks. Perform a fork service and shock absorber service as needed and depending on how the vehicle will be used.	○	●	●	●	●
Check the chain, rear sprocket and engine sprocket. (☛ p. 90)		●	●	●	●
Check the chain tension. (☛ p. 89)	○	●	●	●	●
Check the brake lines for damage and leakage.	○	●	●	●	●
Check the brake fluid level of the front brake. (☛ p. 104)	○	●	●	●	
Check the coolant level in the compensating tank. (☛ p. 205)	○	●	●	●	●
Change the air filter. Clean the air filter box.		●	●		
Check the cables for damage and routing without sharp bends. (fuel tank removed)		●	●	●	●
Change the spark plugs. (air filter removed)			●		
Check the valve clearance. (air filter and spark plugs removed)			●		
Change the secondary air system membranes.			●		
Change the front brake fluid. (☛ p. 105)					●
Change the rear brake fluid. (☛ p. 111)					●
Check the steering head bearing play. (☛ p. 17)	○	●	●	●	●
Check the headlight setting. (☛ p. 115)	○	●	●		
Final check: Check the vehicle for roadworthiness and take a test ride.	○	●	●	●	●
Read out the error memory after the test ride using the KTM diagnostics tool.	○	●	●	●	●
Check the CO adjustment with the KTM diagnostics tool.	○	●	●		
Make the service entry in the **KTM DEALER.NET** and in the Service and Warranty Booklet.	○	●	●	●	●

○ One-time interval

● Periodic interval

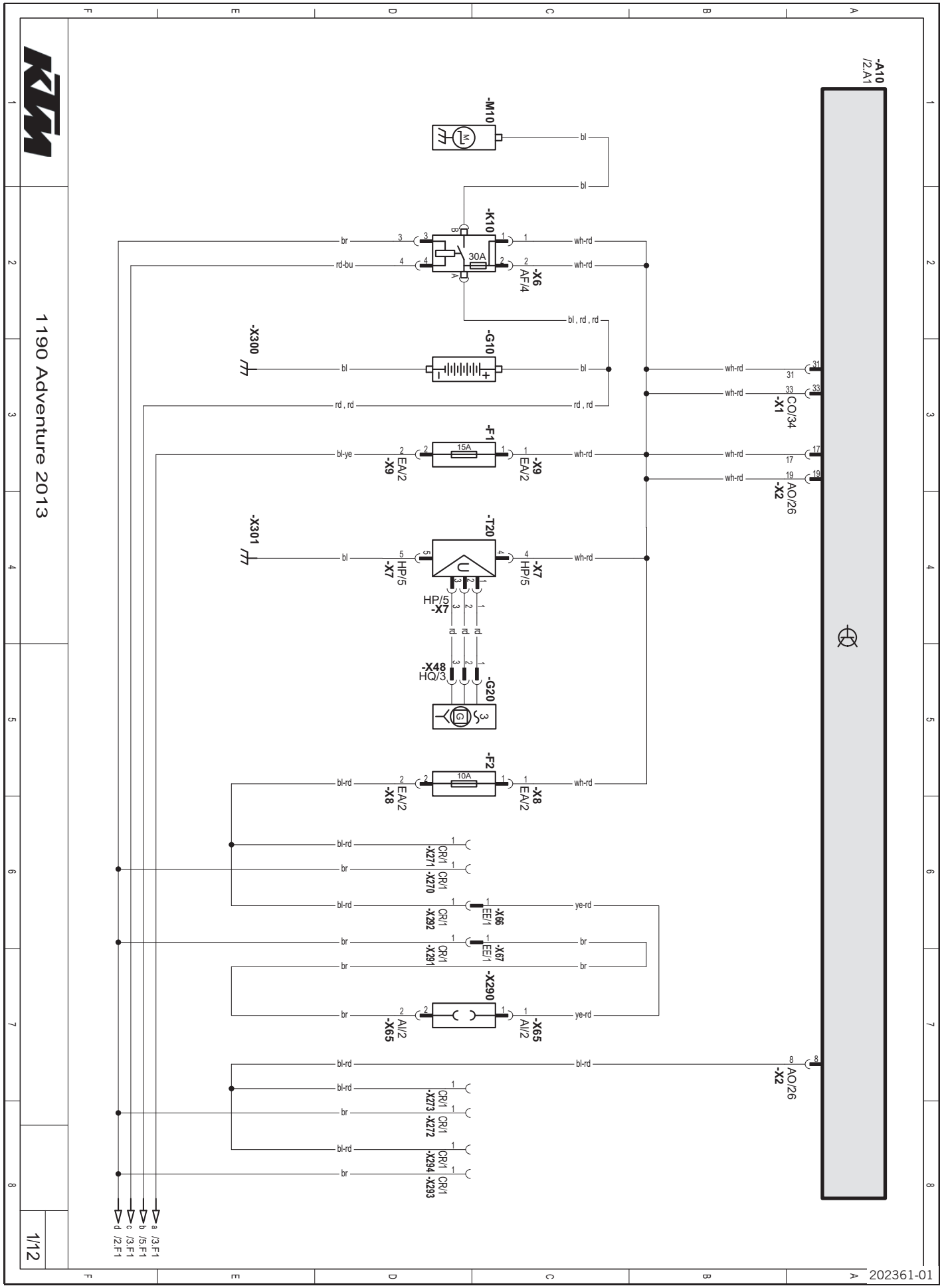
28.3 Recommended work

	Every four years	Every two years	Every year	Every 15,000 km (9,300 mi)	After 1,000 km (620 mi)
Check the oil jet for the clutch lubrication.				●	○
Check the swingarm bearing.				●	
Check the wheel bearing for play.				●	
Grease all moving parts (e.g., side stand, hand lever, chain, ...) and check for smooth operation.	●	●	●	●	○
Check all hoses (e.g. fuel, cooling, bleeder, drainage, etc.) and sleeves for cracking, leaks, and incorrect routing.	●	●	●	●	
Check the antifreeze.	●	●	●	●	○
Check/rectify the fluid level of the hydraulic clutch. (☛ p. 201)			●	●	
Change the hydraulic clutch fluid. (☛ p. 201)	●	●			
Check the screws and nuts for tightness.	●	●	●	●	○
Change the coolant.	●				

○ One-time interval

● Periodic interval

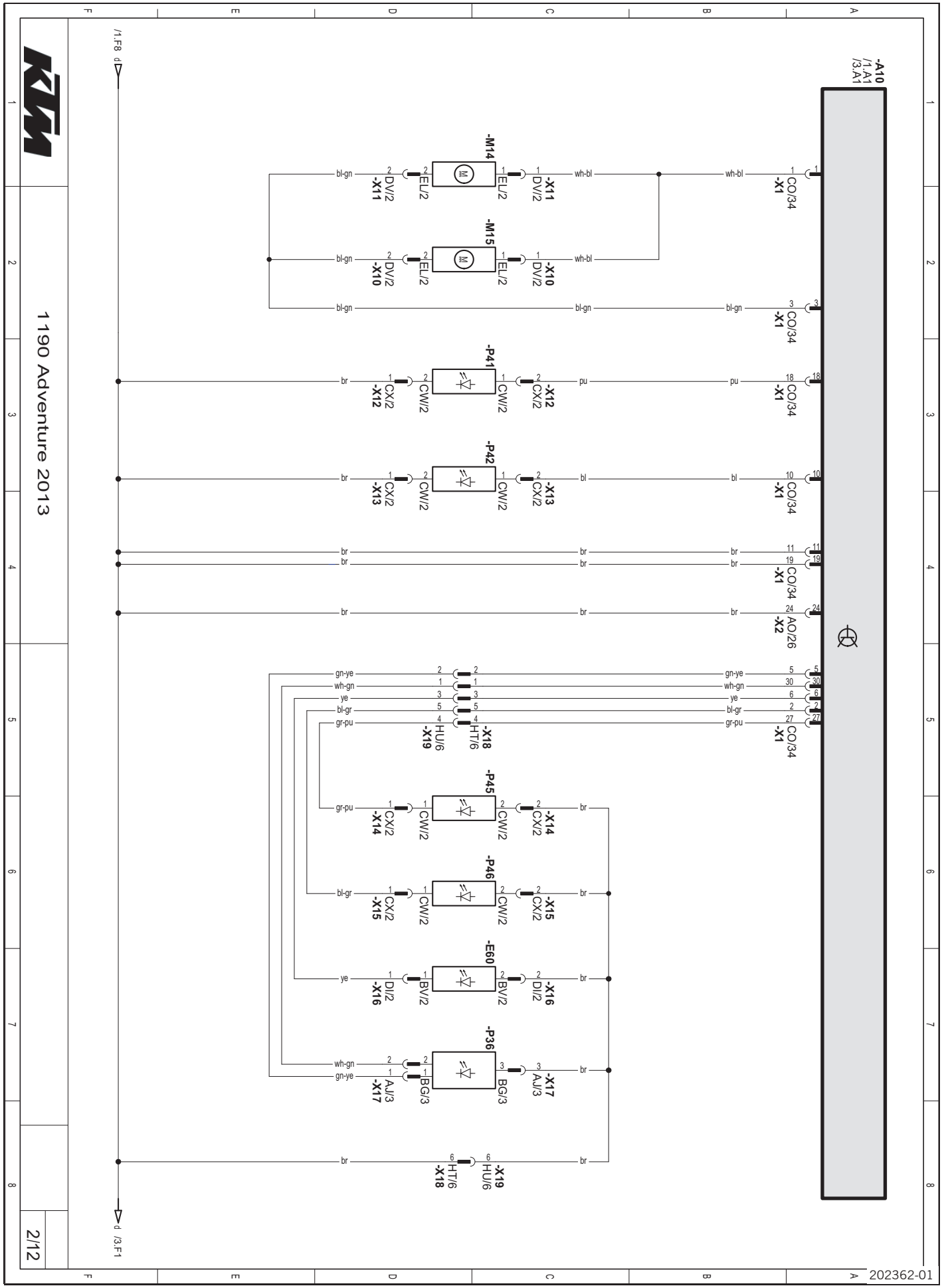
29.1 Page 1 of 12



Components:

A10	Vehicle electronics control unit
F1	Fuse
F2	Fuse
G10	Battery
G20	Alternator
K10	Starter relay with main fuse
M10	Starter motor
T20	Voltage regulator
X270	Connector for accessory ground (terminal 31) **ACC 1** (not assigned)
X271	Connector for accessory plus (terminal 30) **ACC 1** (not assigned)
X272	Connector for accessory ground (terminal 31) **ACC 2** (not assigned)
X273	Connector for accessory plus (terminal 15) **ACC 2** (not assigned)
X290	Socket
X291	Connector for accessory ground (terminal 31) **ACC 1** (not assigned)
X292	Connector for accessory plus (terminal 30) **ACC 1** (not assigned)
X293	Connector for accessory ground (terminal 31) **ACC 2** (not assigned)
X294	Connector for accessory plus (terminal 15) **ACC 2** (not assigned)

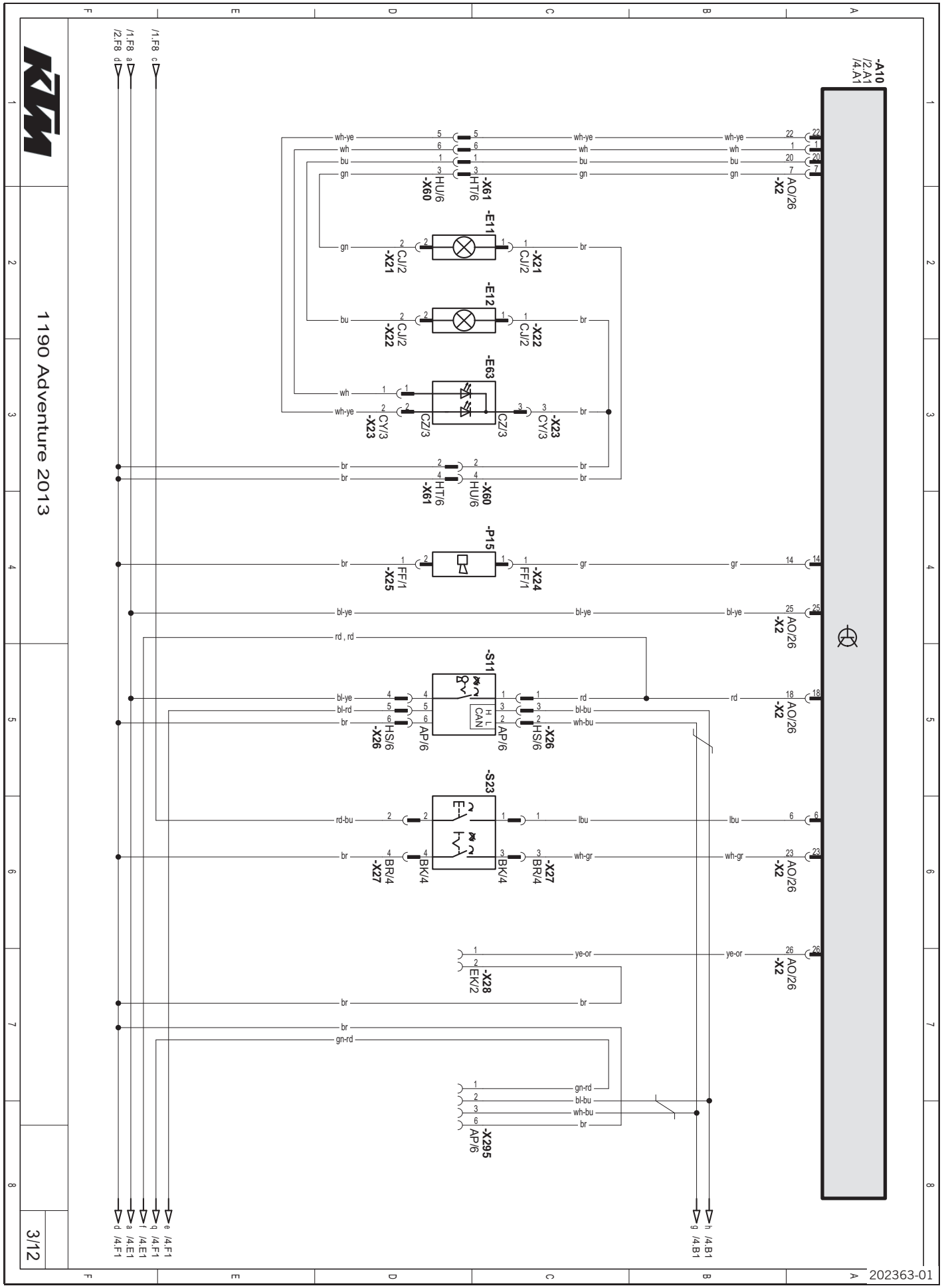
29.2 Page 2 of 12



Components:

A10	Vehicle electronics control unit
E60	License plate lamp
M14	Fan
M15	Fan
P36	Tail light/brake light
P41	Front left turn signal
P42	Front right turn signal
P45	Rear left turn signal
P46	Rear right turn signal

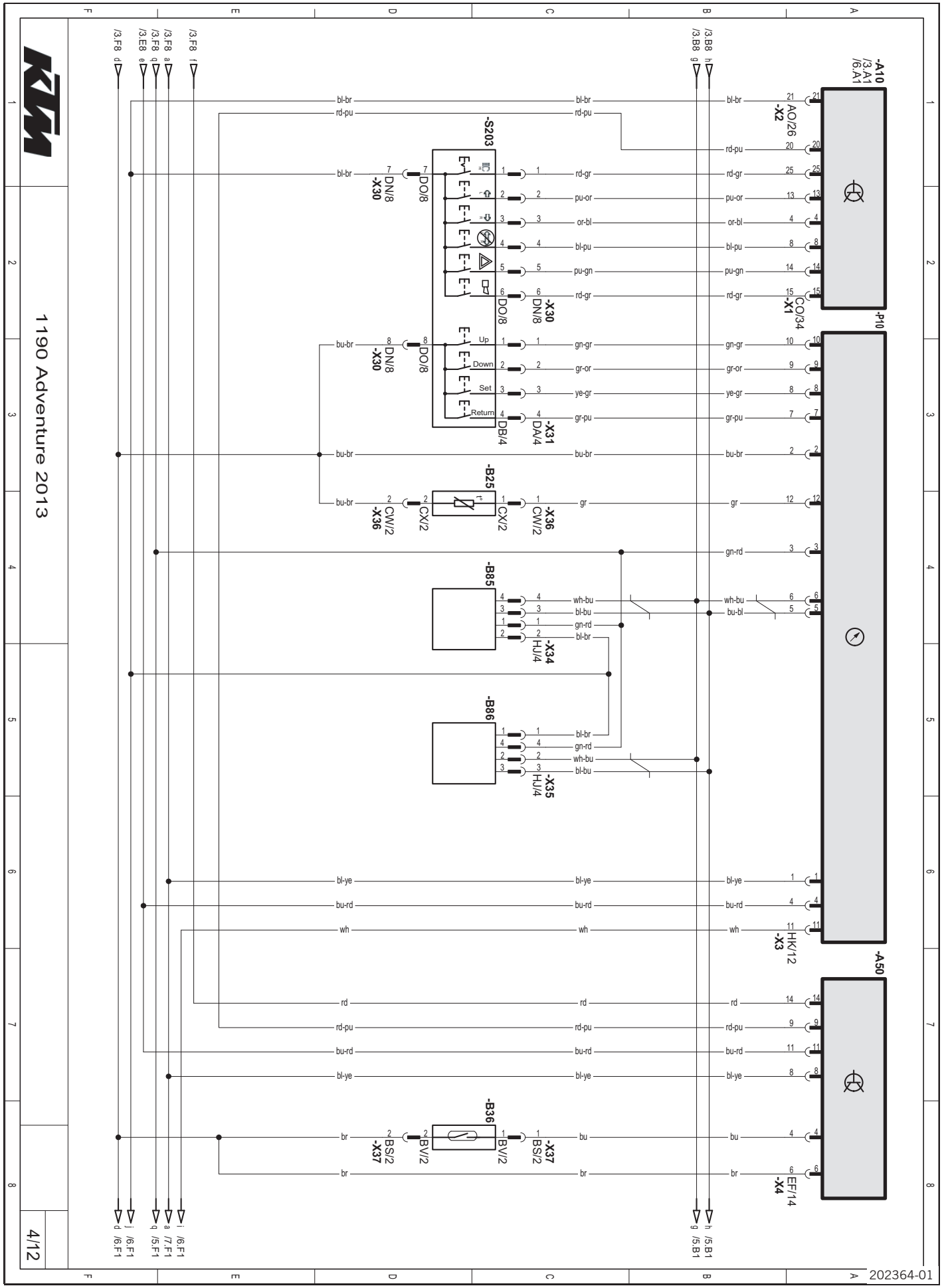
29.3 Page 3 of 12



Components:

A10	Vehicle electronics control unit
E11	Low beam
E12	High beam
E63	Parking light, daytime running light
P15	Horn
S11	Ignition/steering lock
S23	Emergency OFF switch, electric starter button
X28	Heated grip connector
X295	Diagnostics connector

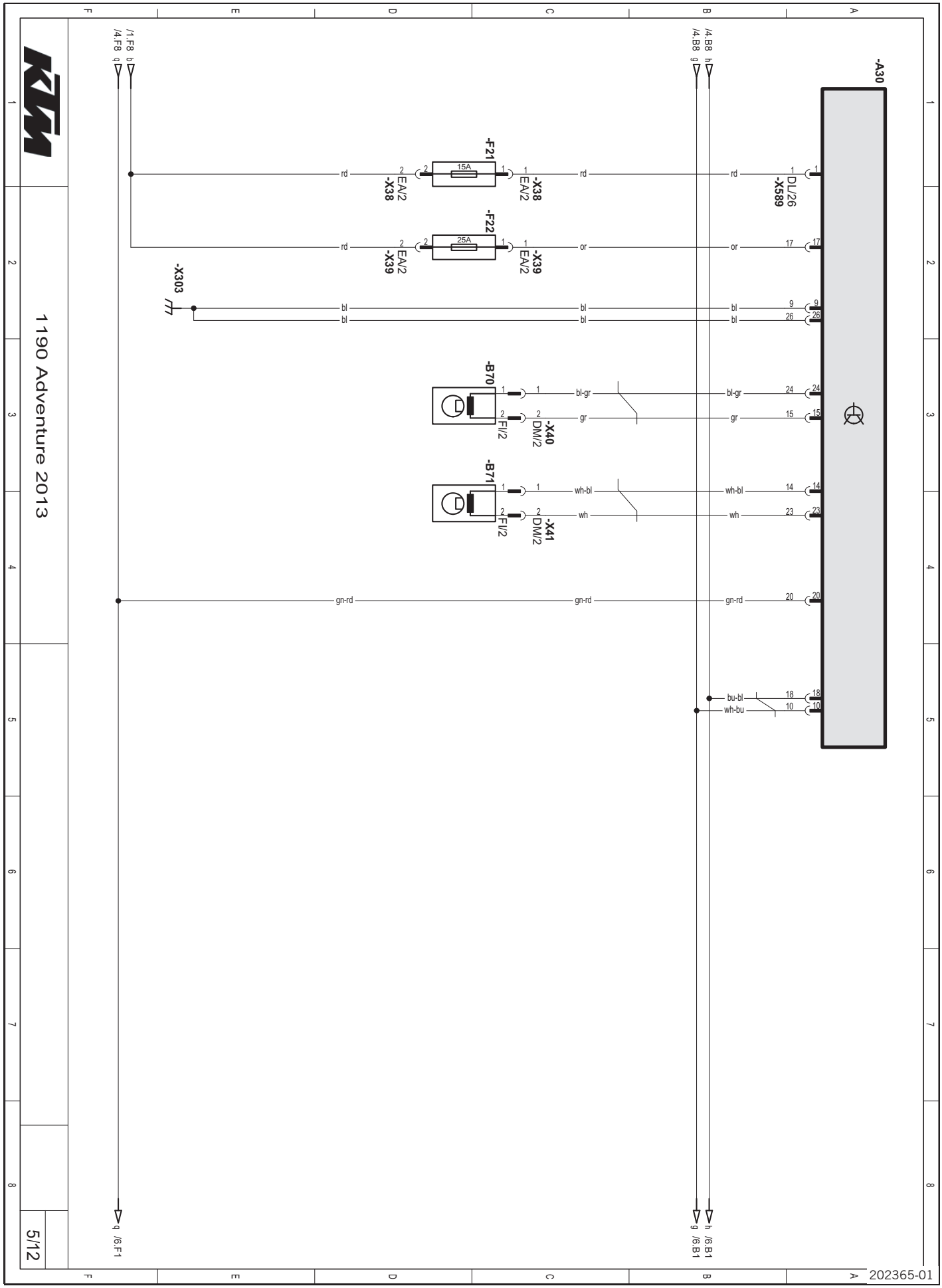
29.4 Page 4 of 12



Components:

A10	Vehicle electronics control unit
A50	Alarm system
B25	Ambient air temperature sensor
B36	Seat contact alarm system
B85	Tire pressure monitor control unit
B86	Acceleration sensor
P10	Combination instrument
S203	Combination switch, on left side of handlebar

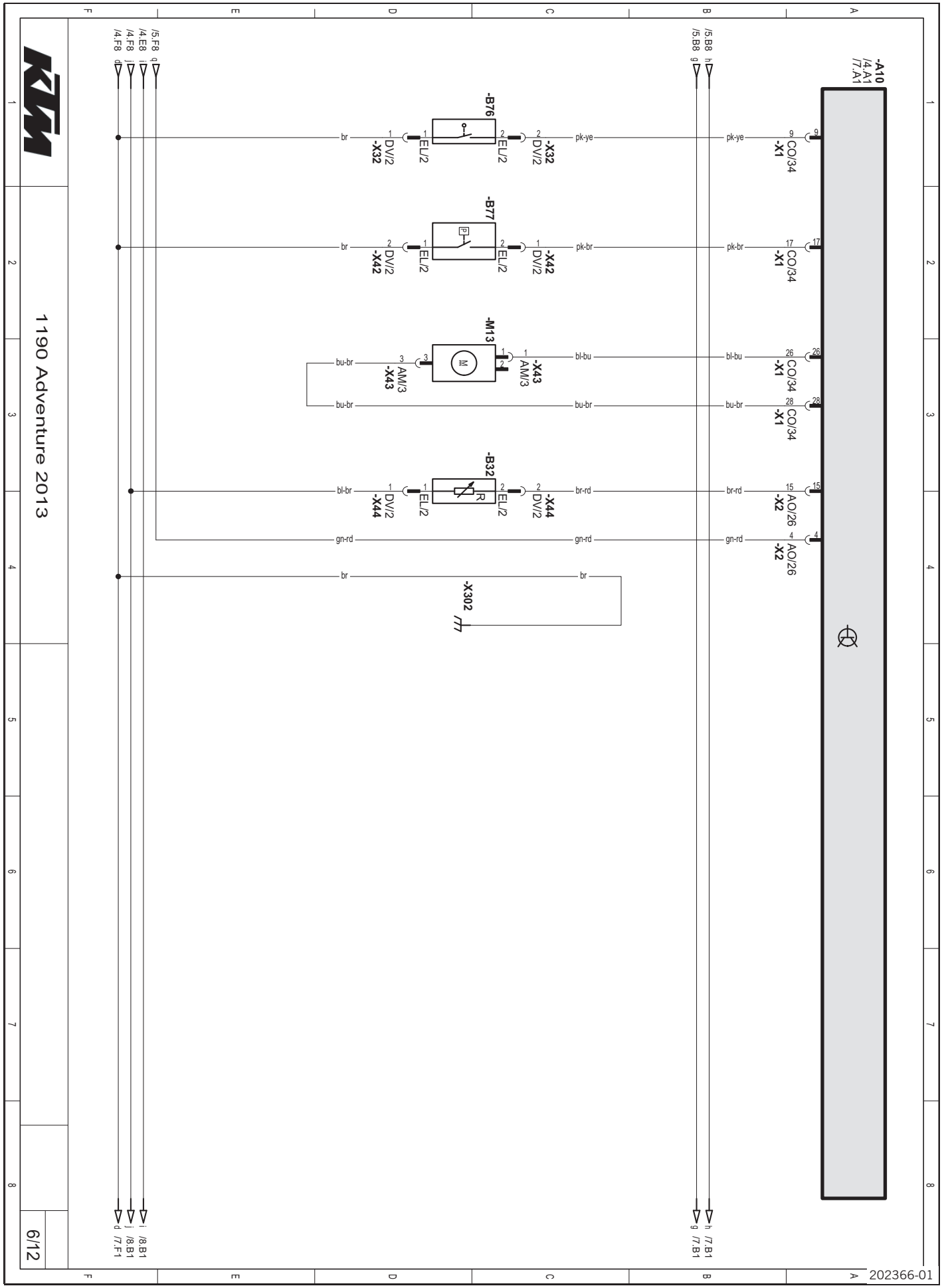
29.5 Page 5 of 12



Components:

A30	ABS control unit
B70	Front wheel speed sensor
B71	Rear wheel speed sensor
F21	ABS fuse
F22	ABS fuse

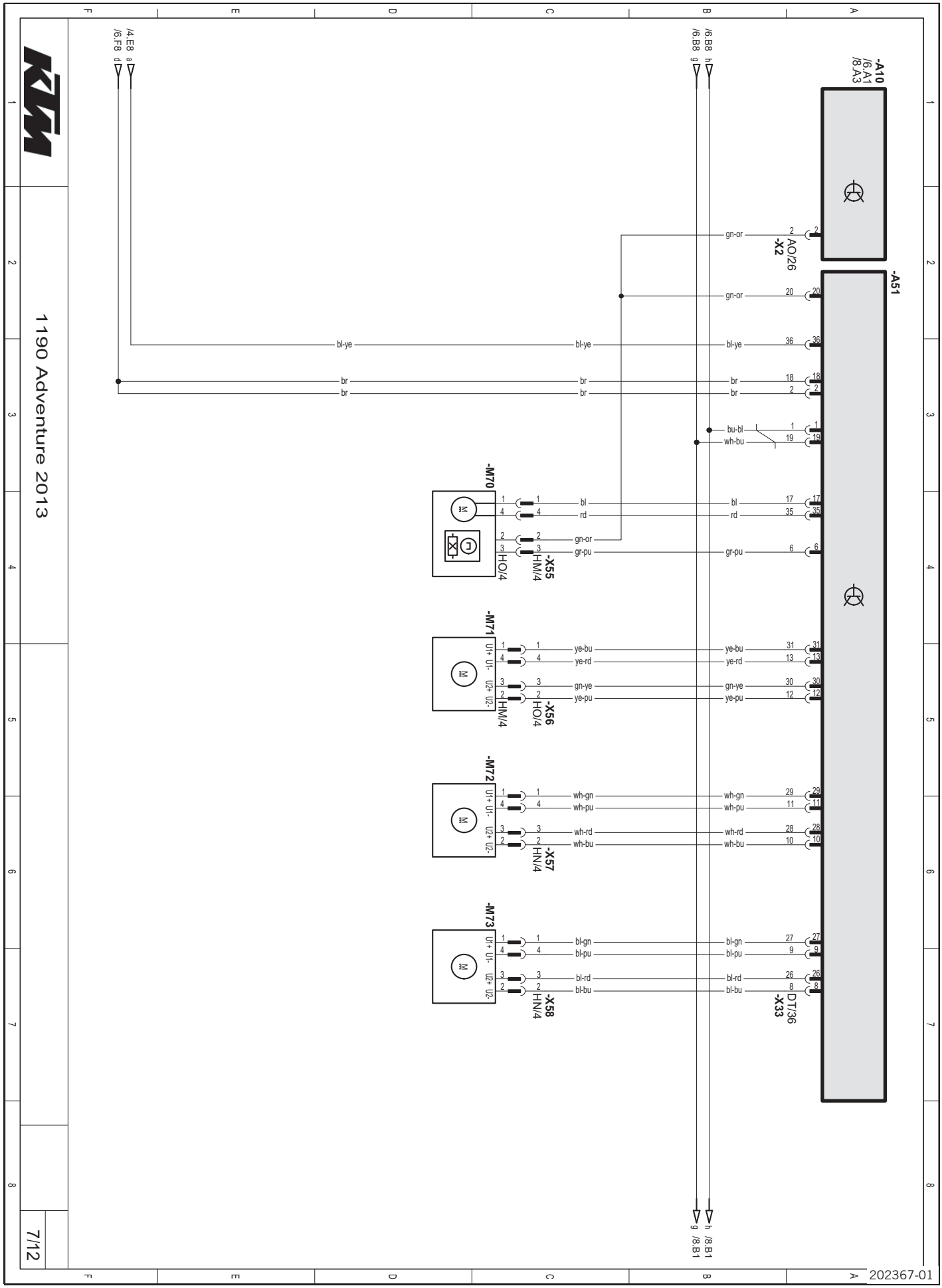
29.6 Page 6 of 12



Components:

A10	Vehicle control unit
B32	Fuel tank sensor
B76	Front brake light switch
B77	Rear brake light switch
M13	Fuel pump

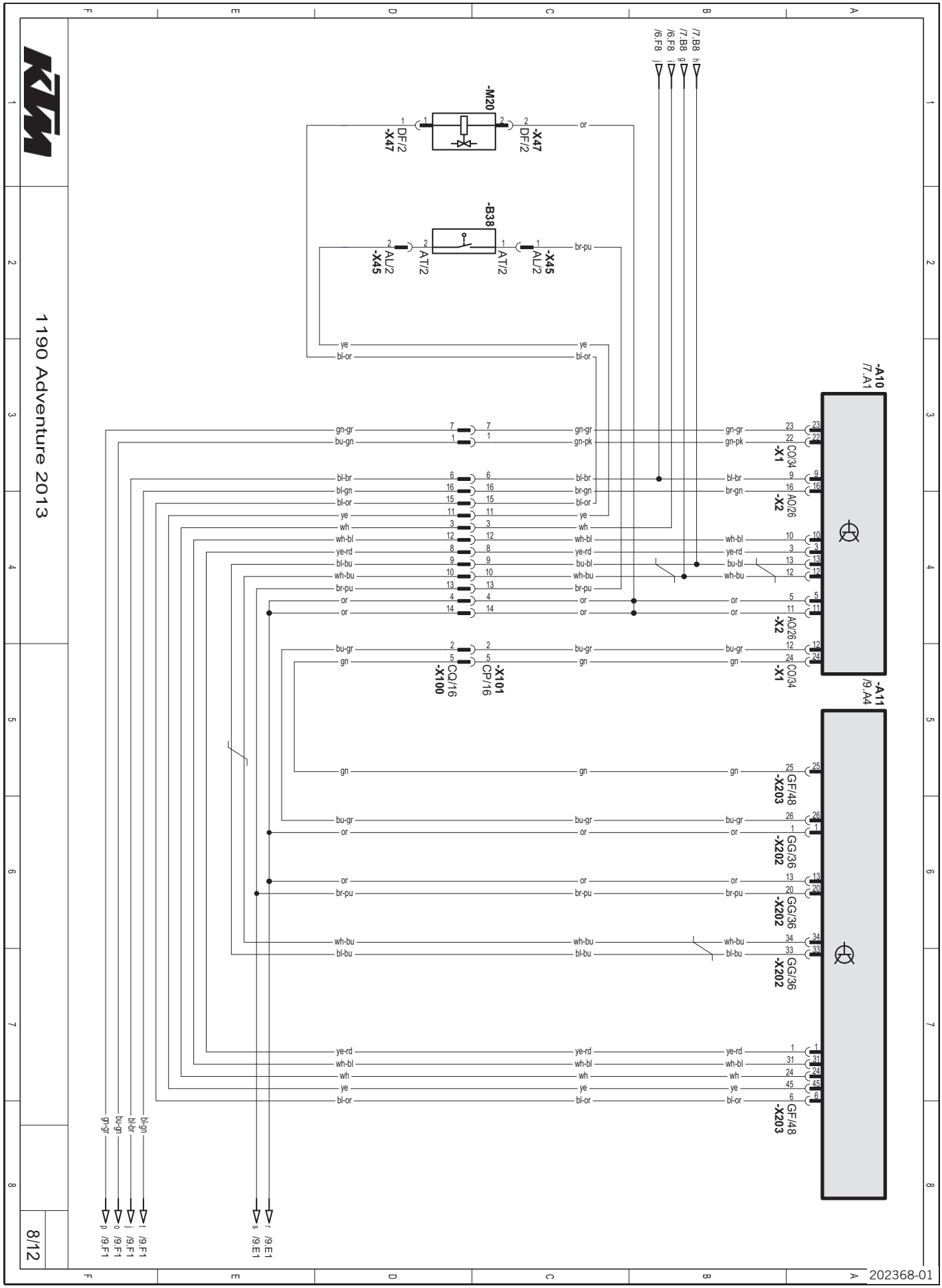
29.7 Page 7 of 12



Components:

A10	Central electrical system control unit
A51	EDS control unit
M70	Spring preload control motor with hall sensor
M71	Shock absorber rebound damping control motor
M72	Fork leg compression damping control motor
M73	Fork leg rebound damping control motor

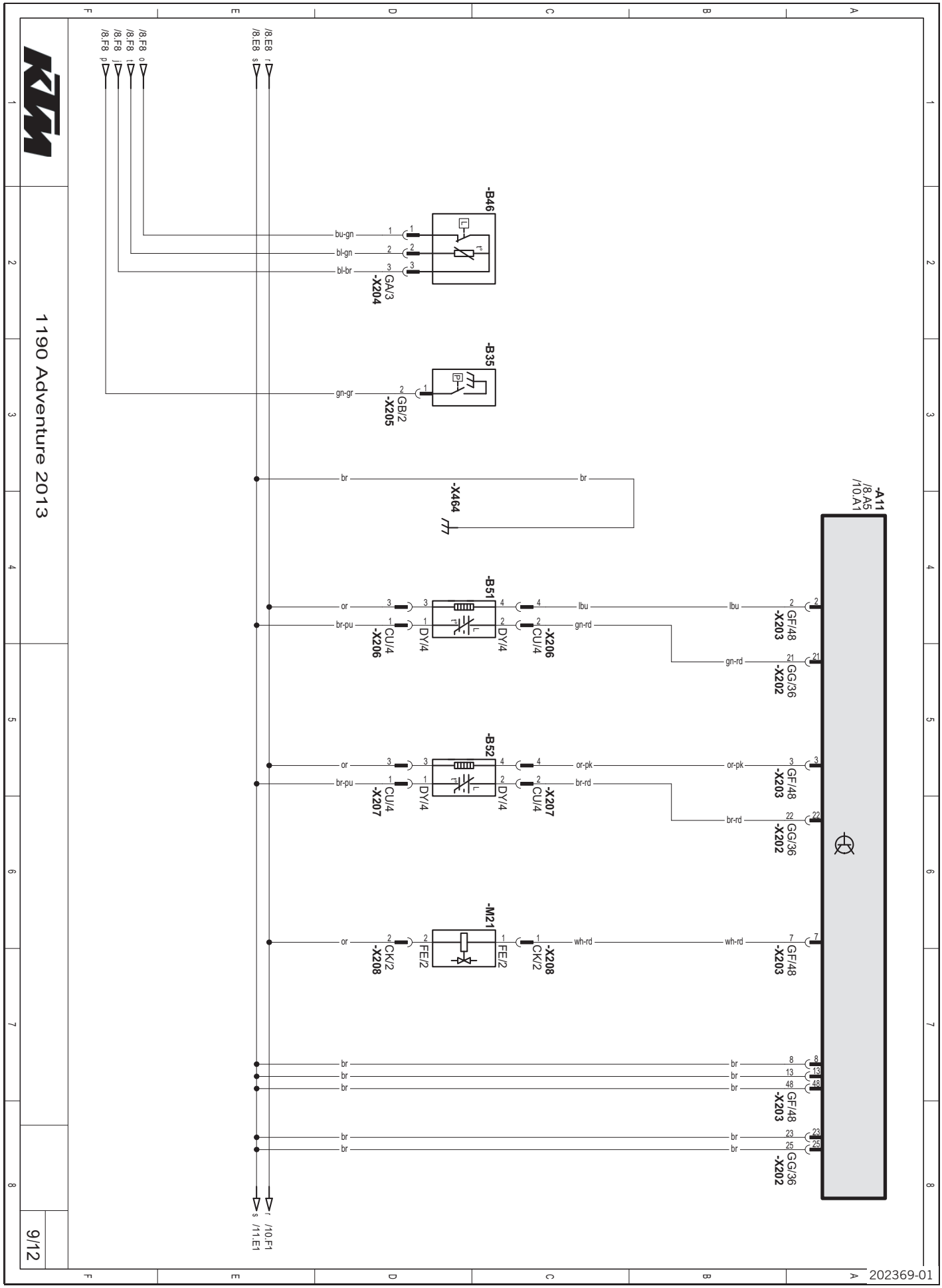
29.8 Page 8 of 12



Components:

A10	Vehicle control unit
A11	EFI control unit
B38	Clutch switch
M20	Fuel evaporation valve

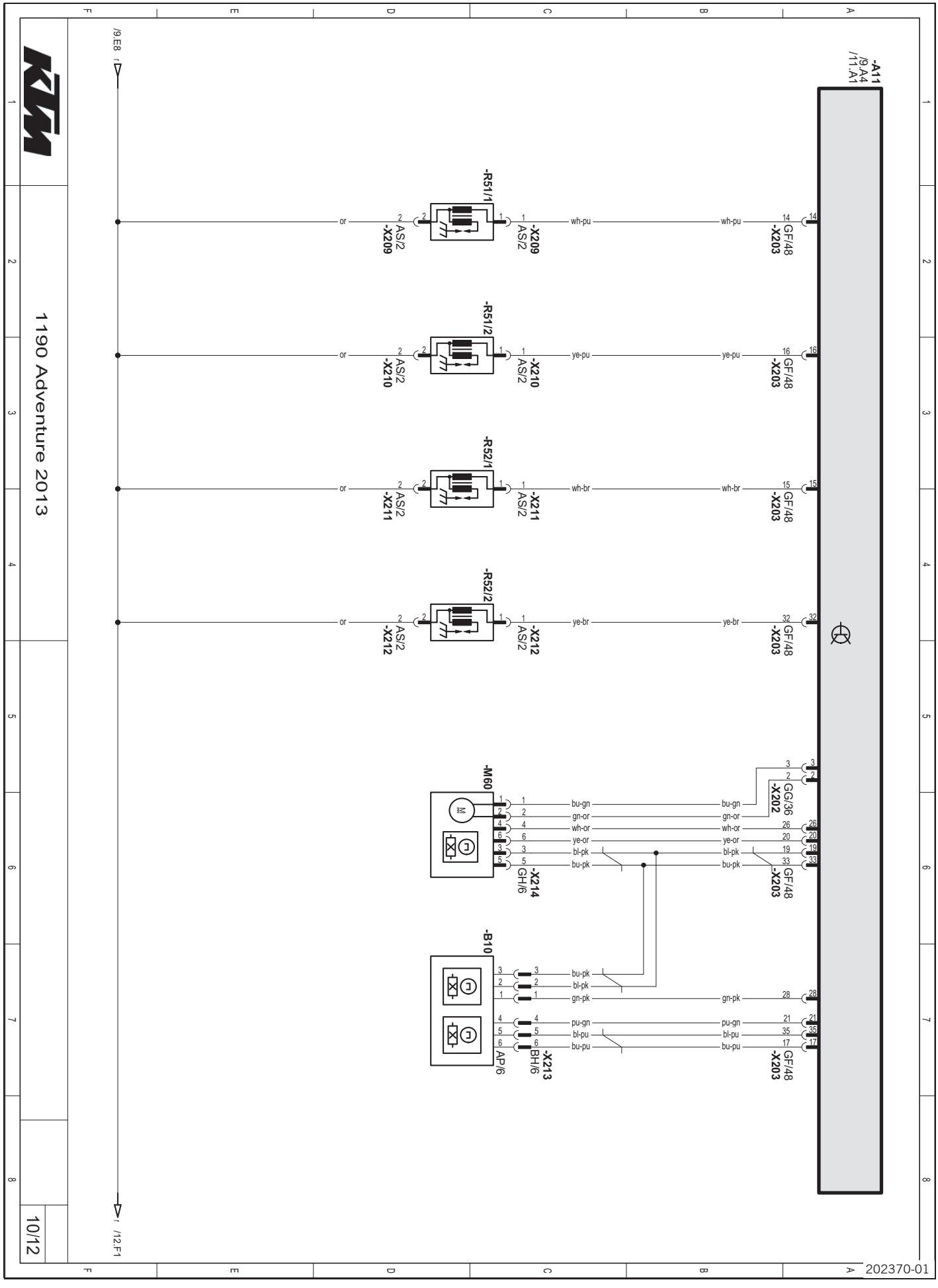
29.9 Page 9 of 12



Components:

A11	EFI control unit
B35	Oil pressure sensor
B46	Oil temperature/oil level sensor
B51	Lambda sensor, cylinder 1
B52	Lambda sensor, cylinder 2
M21	Secondary air valve

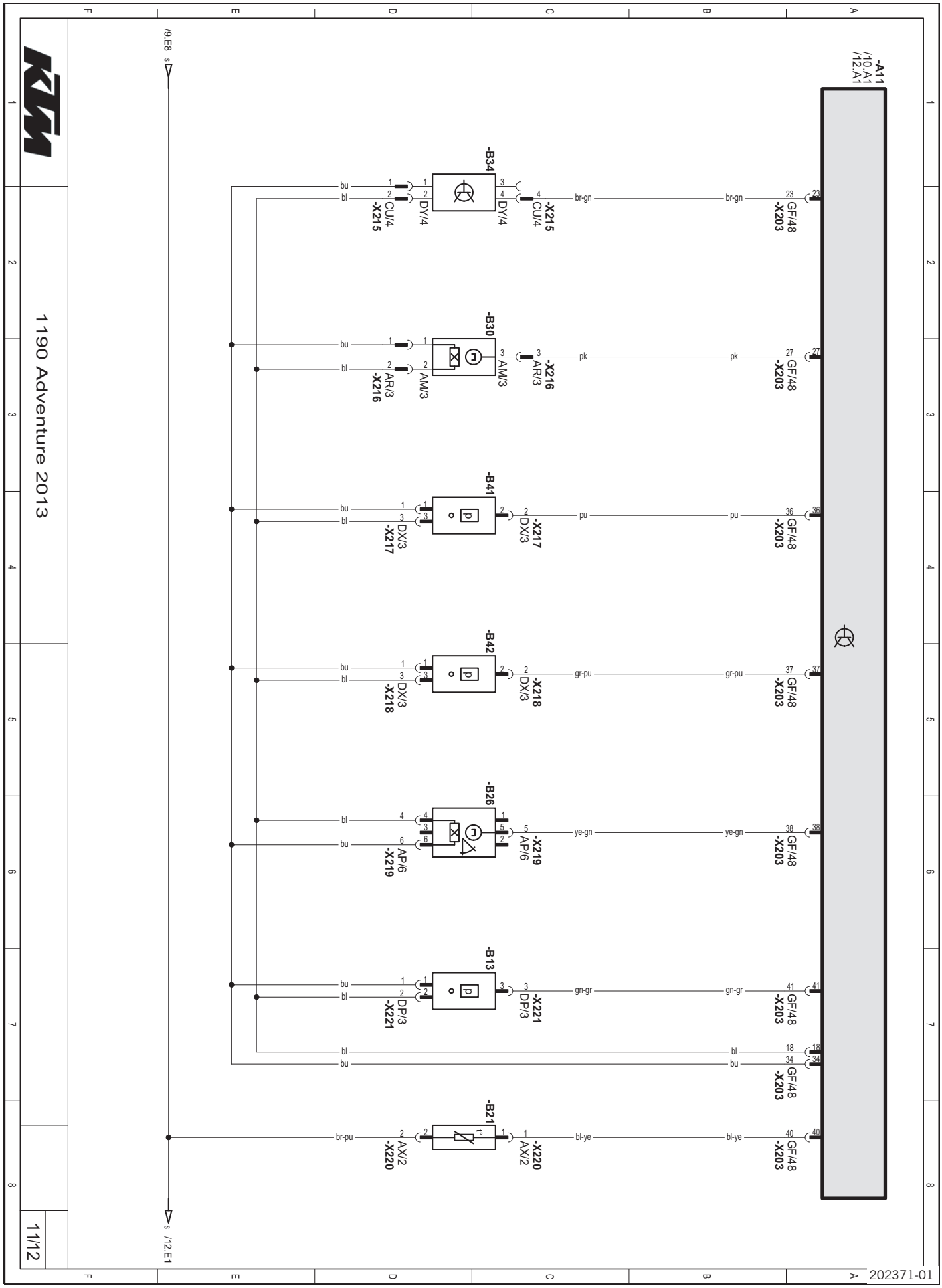
29.10 Page 10 of 12



Components:

A11	EFI control unit
B10	Throttle position sensor circuit A
M60	Motor drive
R51/1	Ignition coil 1, cylinder 1
R51/2	Ignition coil 2, cylinder 1
R52/1	Ignition coil 1, cylinder 2
R52/2	Ignition coil 2, cylinder 2

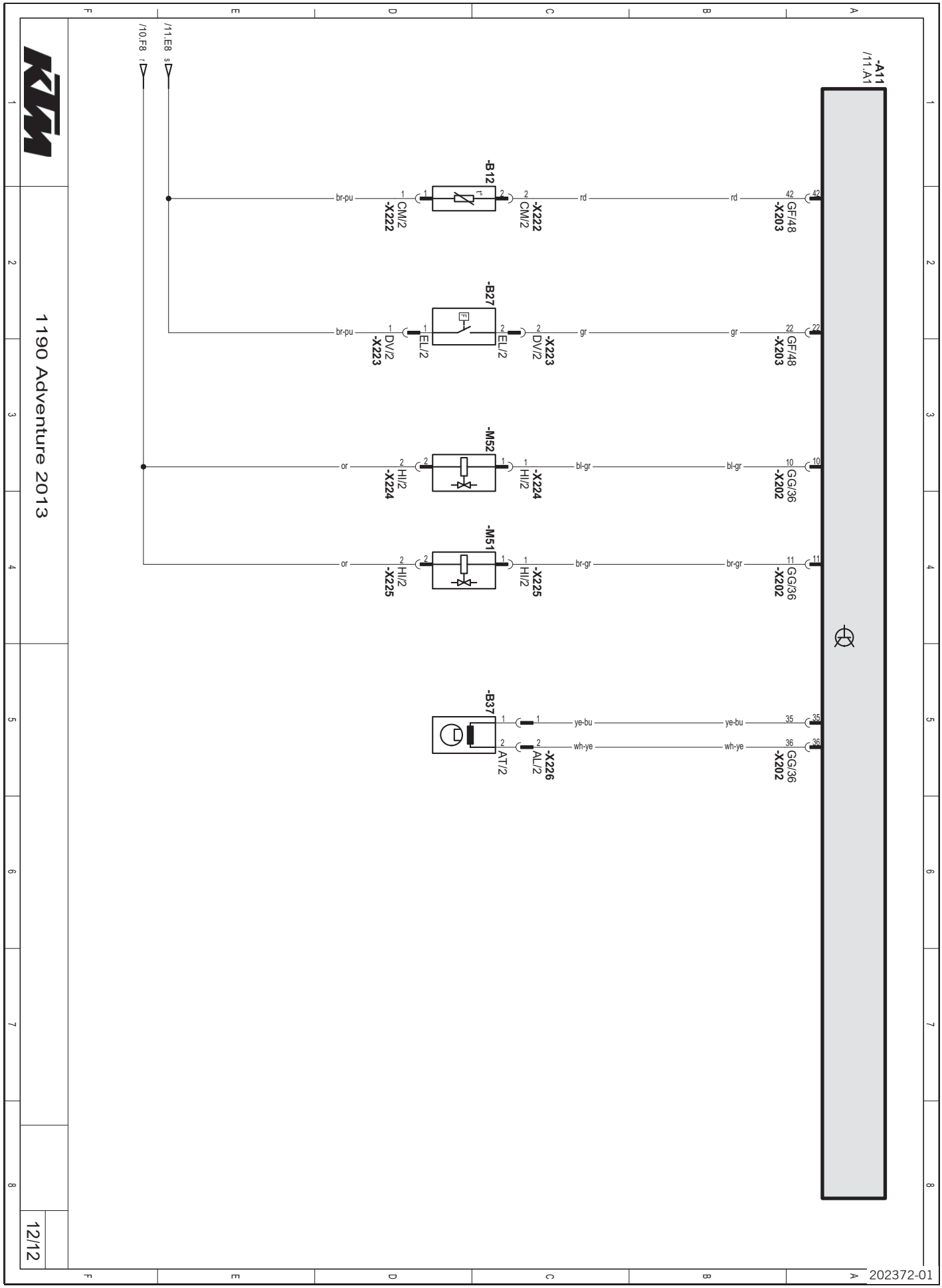
29.11 Page 11 of 12



Components:

A11	EFI control unit
B13	Ambient air pressure sensor
B21	Engine coolant temperature sensor, cylinder 1
B26	Rollover sensor
B30	Side stand switch
B34	Gear position sensor
B41	Manifold absolute pressure sensor, cylinder 1
B42	Manifold absolute pressure sensor, cylinder 2

29.12 Page 12 of 12



Components:	
A11	EFI control unit
B12	Intake air temperature sensor
B27	Quick shifter
B37	Crankshaft position sensor
M51	Injection valve cylinder 1
M52	Injection valve cylinder 2
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

According to
– DOT

Guideline
– Use only brake fluid that complies with the specified standard (see specifications on the container) and that possesses the corresponding properties. KTM recommends **Castrol** and **Motorex®** products.

Supplier
Castrol
– **RESPONSE BRAKE FLUID SUPER DOT 4**

Motorex®
– **Brake Fluid DOT 5.1**

Coolant

Guideline
– Use only suitable coolant (also in countries with high temperatures). Use of low-quality antifreeze can lead to corrosion and foaming. KTM recommends **Motorex®** products.

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)

Supplier
Motorex®
– **COOLANT G48**

Engine oil (SAE 10W/50)

According to
– JASO T903 MA (☛ p. 283)
– SAE (☛ p. 283) (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. KTM recommends **Motorex®** products.

Fully synthetic engine oil

Supplier
Motorex®
– **Power Synt 4T**

Engine oil (SAE 5W/40)

According to
– JASO T903 MA (☛ p. 283)
– SAE (☛ p. 283) (SAE 5W/40)

Guideline
– Use only engine oils that comply with the specified standards (see specifications on the container) and that possess the corresponding properties. KTM recommends **Motorex®** products.

Synthetic engine oil

Supplier
Motorex®
– **Power Synt 4T**

Fork oil (SAE 4) (48601166S1)

According to
– SAE (☛ p. 283) (SAE 4)

Guideline
– Use only oils that comply with the specified standards (see specifications on the container) and that possess the corresponding properties.

Hydraulic fluid (15)

According to
– ISO VG (15)

Guideline
– Use only hydraulic oil that complies with the specified standard (see specifications on the container) and that possesses the corresponding properties. KTM recommends **Motorex®** products.

Supplier
Motorex®
– **Hydraulic Fluid 75**

Super unleaded (ROZ 95/RON 95/PON 91)

According to
– 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).

Chain cleaner

Guideline
– KTM recommends **Motorex®** products.

Supplier
Motorex®
– **Chain Clean**

Chain lube for road use

Guideline
– KTM recommends **Motorex®** products.

Supplier
Motorex®
– **Chainlube Road**

Cleaning and preserving materials for metal, rubber and plastic

Guideline
– KTM recommends **Motorex®** products.

Supplier
Motorex®
– **Protect & Shine**

Fuel additive

Guideline
– KTM recommends **Motorex®** products.

Supplier
Motorex®
– **Fuel Stabilizer**

High viscosity grease

Guideline
– KTM recommends **SKF®** products.

Supplier
SKF®
– **LGHB 2**

High-luster polish for paint

Guideline
– KTM recommends **Motorex®** products.

Supplier
Motorex®
– **Moto Polish**

Long-life grease

Guideline
– KTM recommends **Motorex®** products.

Supplier
Motorex®
– **Bike Grease 2000**

Lubricant (T511)

Guideline
– KTM recommends **Lubcon®** products.

Supplier
Lubcon®
– **Turmsilon® GTI 300 P**

Lubricant (T158)

Guideline
– KTM recommends **Lubcon®** products.

Supplier
Lubcon®
– **Turmogrease® PP 300**

Motorcycle cleaner

Guideline
– KTM recommends **Motorex®** products.

Supplier
Motorex®
– **Moto Clean 900**

Paint cleaner and polish for high-gloss and matte finishes, bare metal and plastic surfaces

Guideline
– KTM recommends **Motorex®** products.

Supplier
Motorex®
– **Clean & Polish**

Universal oil spray

Guideline
– KTM recommends **Motorex®** products.

Supplier
Motorex®
– **Joker 440 Synthetic**

Bleeder cover

Art. no.: 00029013002

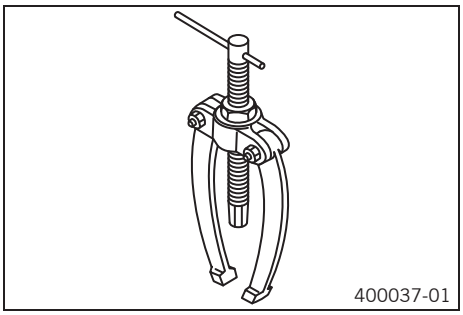
Bleeder cover

Art. no.: 00029013004

Bleeding device

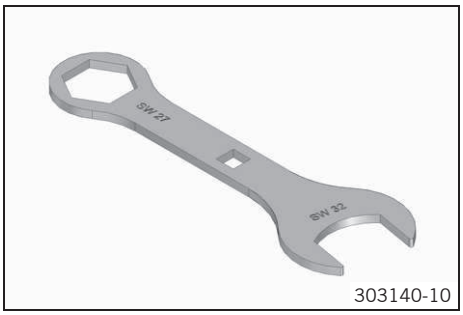
Art. no.: 00029013100

Bearing puller



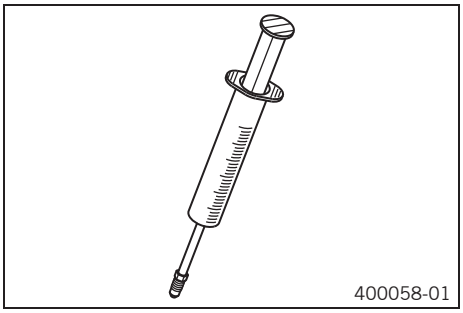
Art. no.: 15112017000

Key for steering head bearing



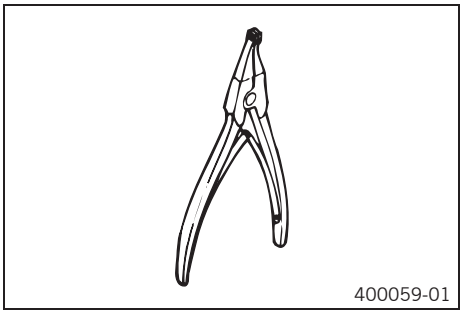
Art. no.: 45229050000

Bleed syringe



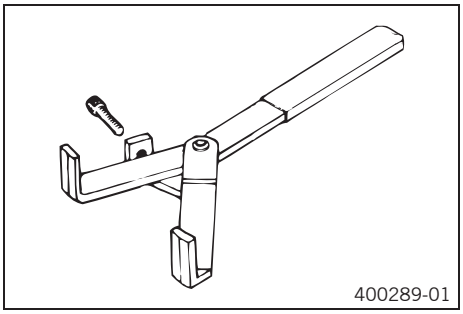
Art. no.: 50329050000

Circlip pliers reverse



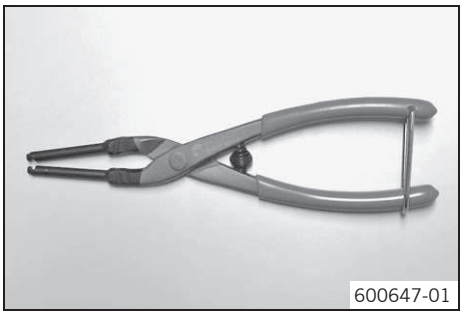
Art. no.: 51012011000

Clutch holder



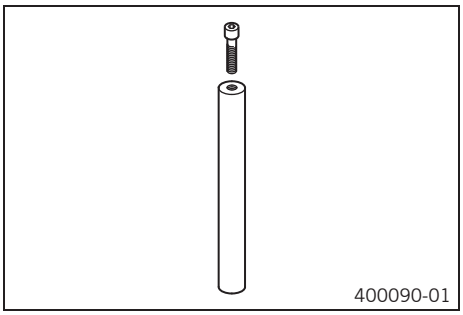
Art. no.: 51129003000

Pliers for footrest spring



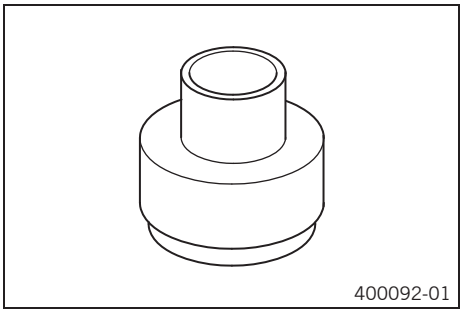
Art. no.: 58429083000

Tool bracket



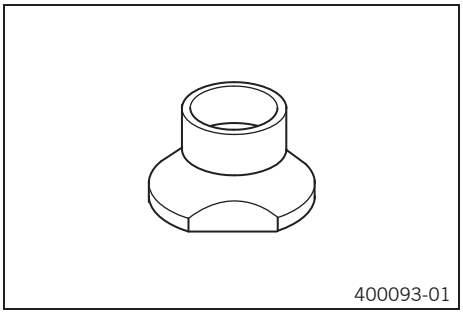
Art. no.: 58429089000

Press-in tool



Art. no.: 58429091000

Press-out tool

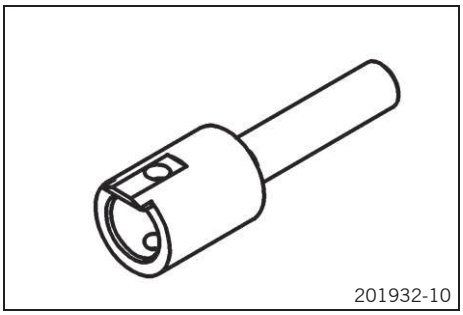


Art. no.: 58429092000

Torque wrench with various accessories in set

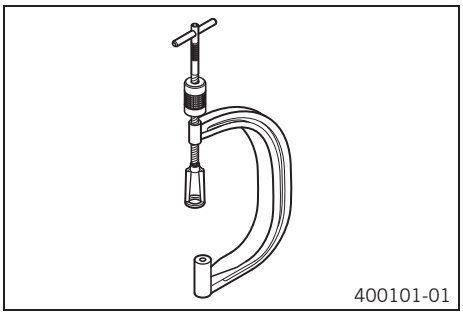
Art. no.: 58429094000

Mount for torque wrench



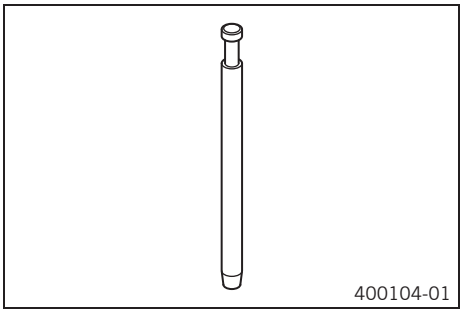
Art. no.: 58429094100

Valve spring compressor



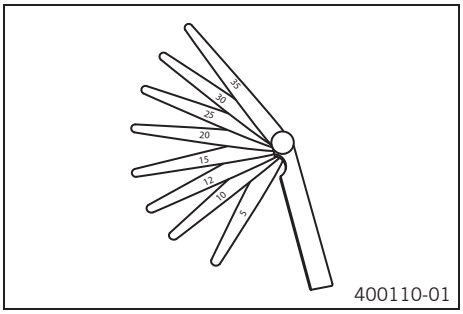
Art. no.: 59029019000

Limit plug gauge



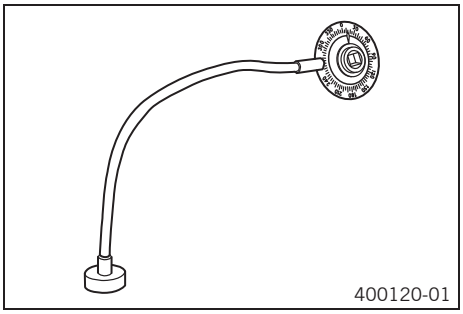
Art. no.: 59029026006

Feeler gauge



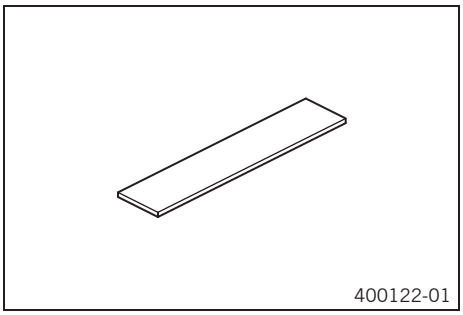
Art. no.: 59029041100

Graduated disc



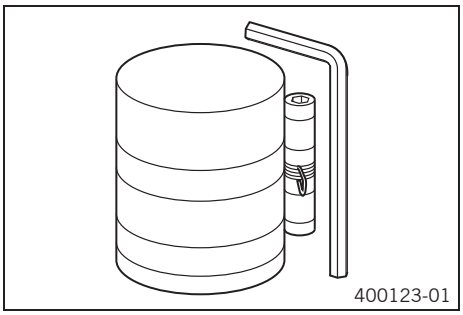
Art. no.: 60029010000

Plastigauge measuring strips



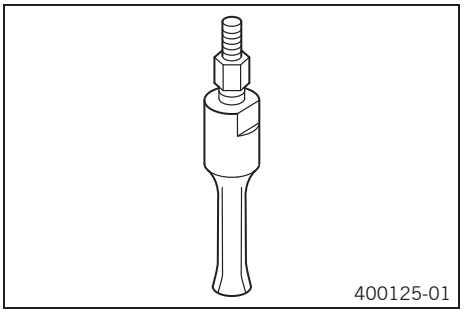
Art. no.: 60029012000

Piston ring mounting tool



Art. no.: 60029015000

Insert for bearing puller

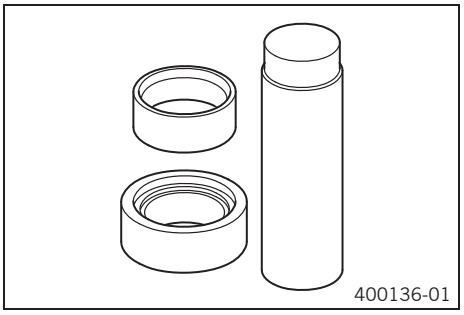


Art. no.: 60029018000

Feature

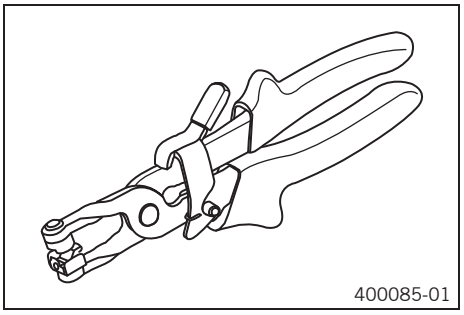
23... 28 mm (0.91... 1.1 in)

Step bearing tool



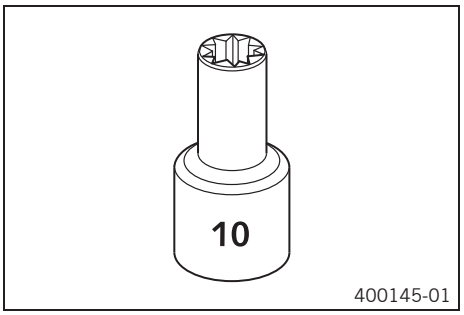
Art. no.: 60029046028

Pliers for spring band clamp



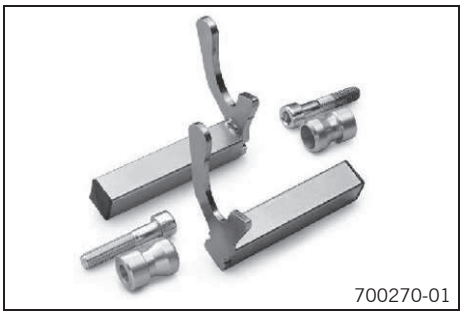
Art. no.: 60029057100

Multi-tooth wrench socket 10 mm; ½" drive



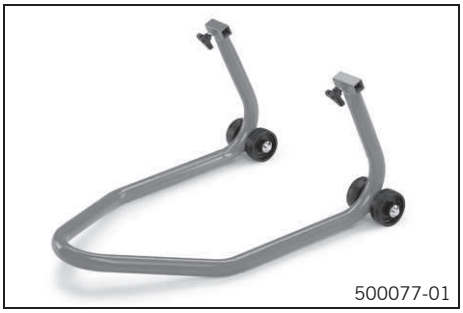
Art. no.: 60029075000

Adapter



Art. no.: 61029055120

Rear wheel stand

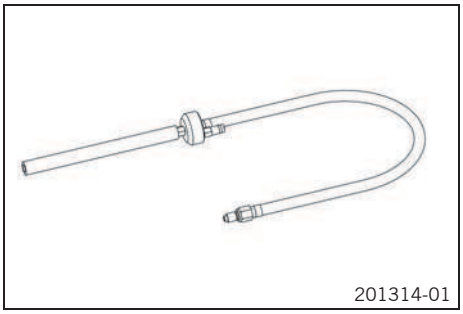


Art. no.: 61029055400

Front wheel stand

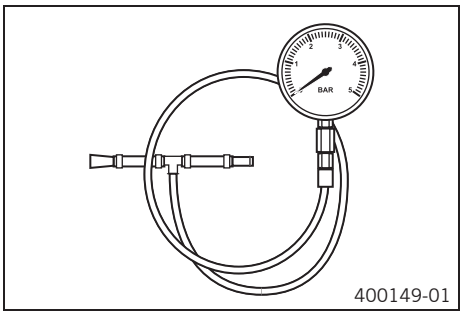
Art. no.: 61029055500

Testing hose



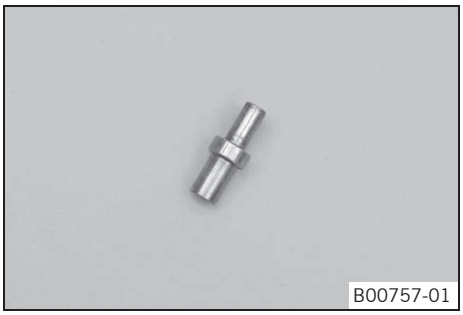
Art. no.: 61029093000

Pressure testing tool



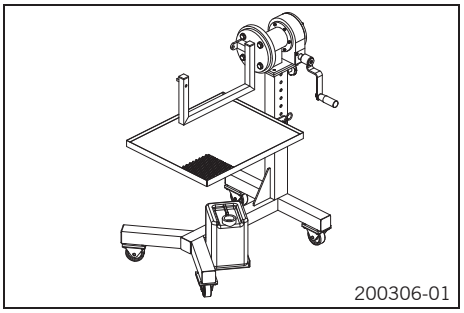
Art. no.: 61029094000

Adapter



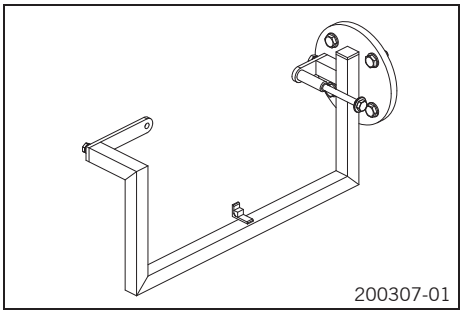
Art. no.: 61029955620

Engine assembly stand



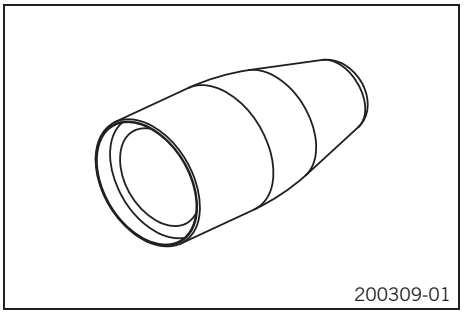
Art. no.: 61229001000

Engine holder



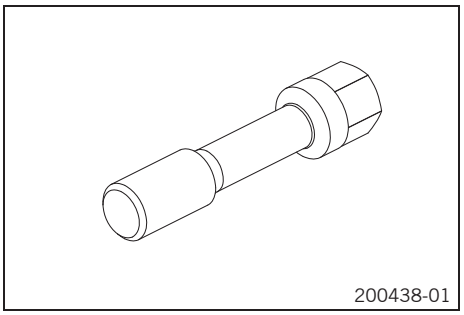
Art. no.: 61229002000

Mounting sleeve



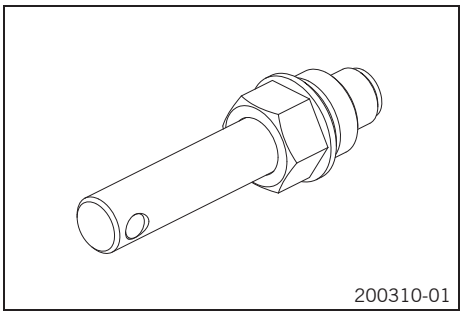
Art. no.: 61229005000

Pressure piece



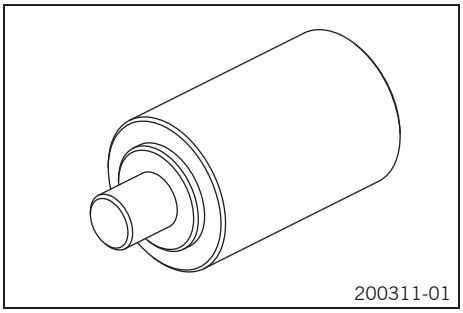
Art. no.: 61229008000

Extractor



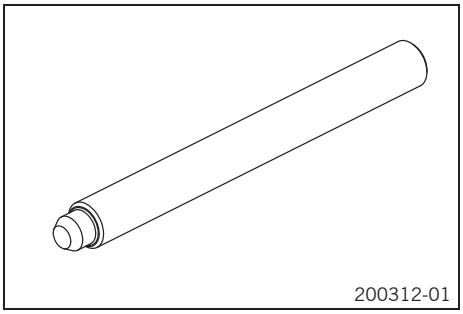
Art. no.: 61229010000

Press drift



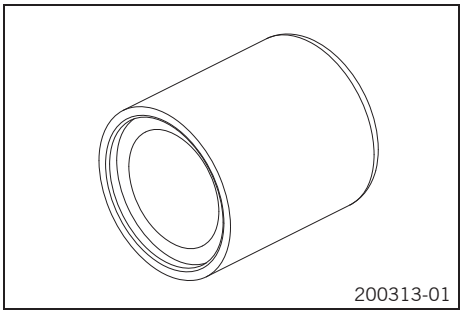
Art. no.: 61229013000

Engine blocking screw



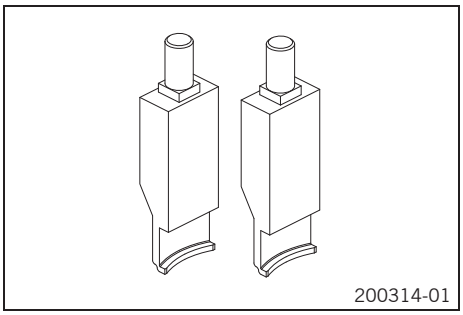
Art. no.: 61229015000

Pressure bell



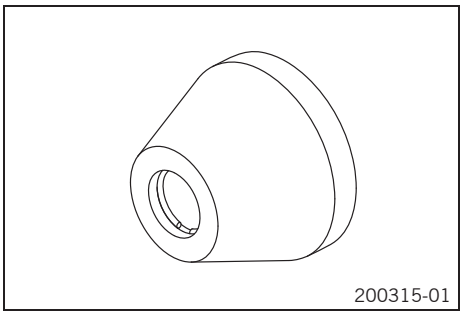
Art. no.: 61229016000

Arms for extractor 78029033100



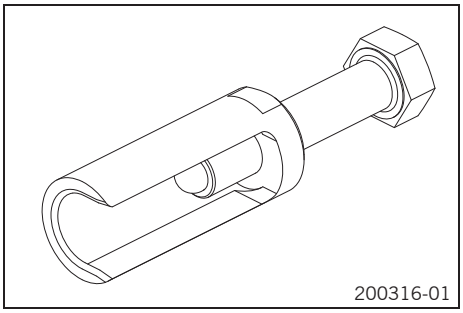
Art. no.: 61229017000

Pressure piece



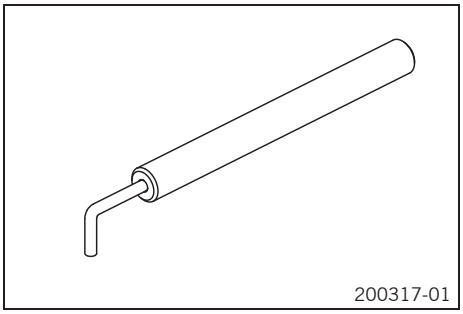
Art. no.: 61229018000

Extractor



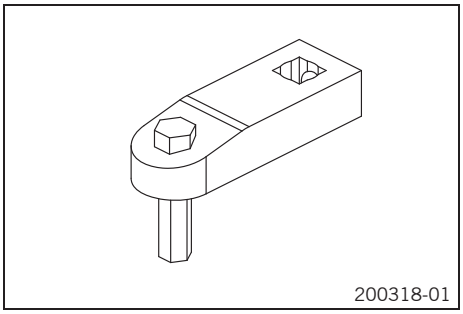
Art. no.: 61229020000

Release device for timing chain tensioner



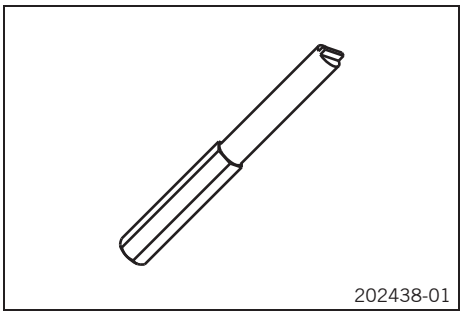
Art. no.: 61229021000

Hex key bit



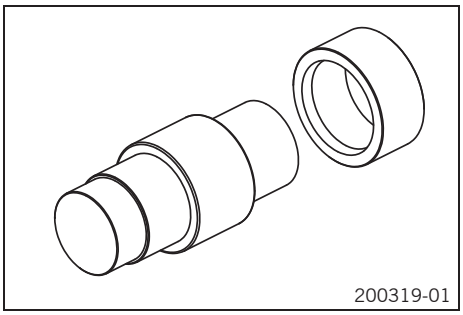
Art. no.: 61229025000

Oil nozzle assembly tool



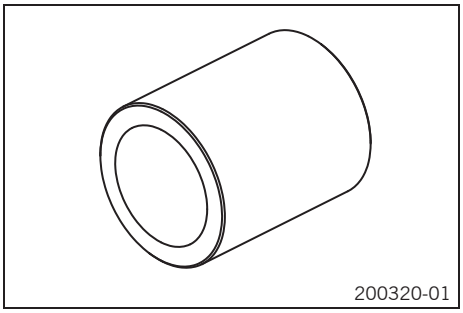
Art. no.: 61229035000

Press drift/press sleeve



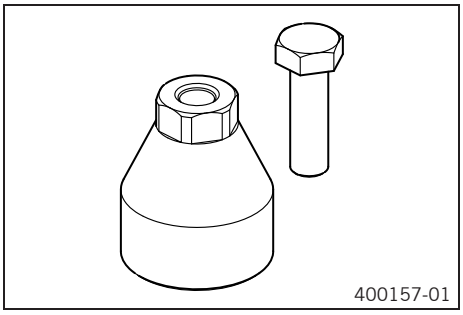
Art. no.: 61229044000

Press sleeve



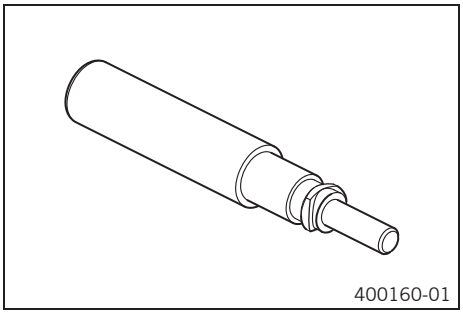
Art. no.: 61229045000

Extractor



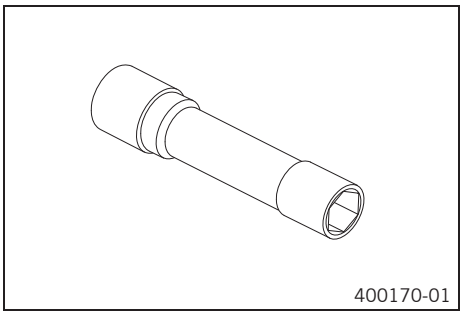
Art. no.: 75029021000

Insertion for piston ring lock



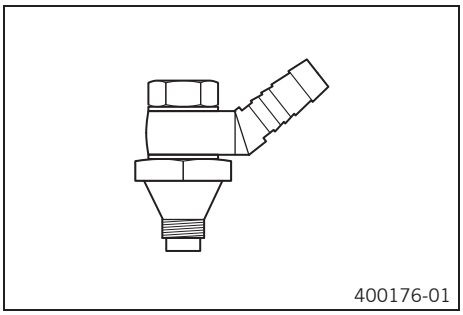
Art. no.: 75029035000

Spark plug wrench



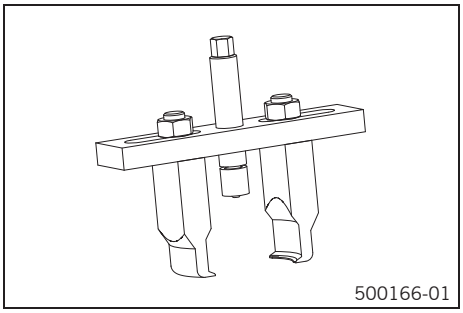
Art. no.: 75029172000

Oil pressure adapter



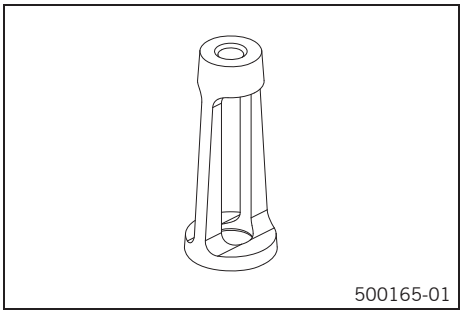
Art. no.: 77329006000

Puller, 2-arm



Art. no.: 78029033100

Valve spring mounting device



Art. no.: 78029060000

Pin

Art. no.: T120

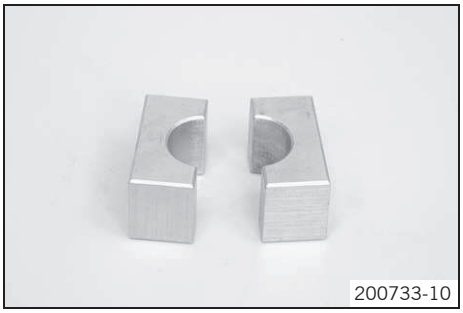
Pressing tool

Art. no.: T1207S

Protecting sleeve

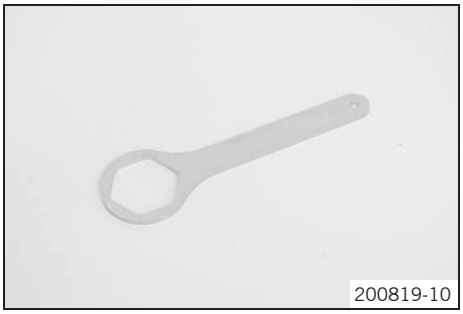
Art. no.: T1401

Clamping stand



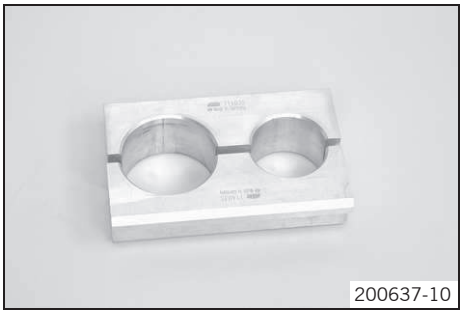
Art. no.: T14015S

Ring wrench



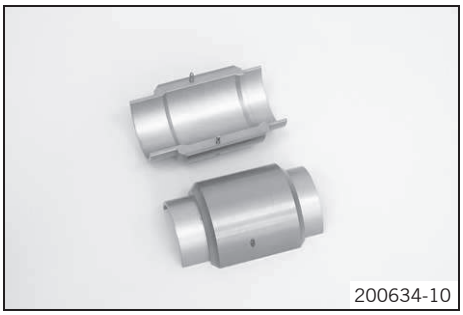
Art. no.: T14017

Clamping stand



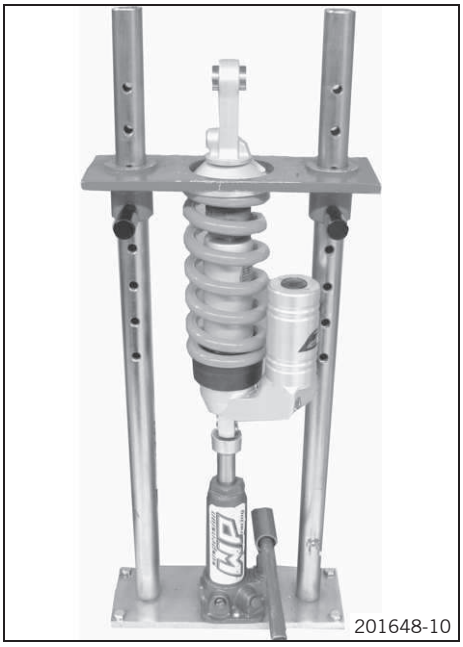
Art. no.: T1403S

Mounting tool



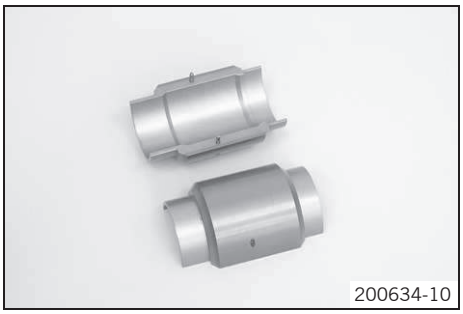
Art. no.: T14040S

Spring compressor



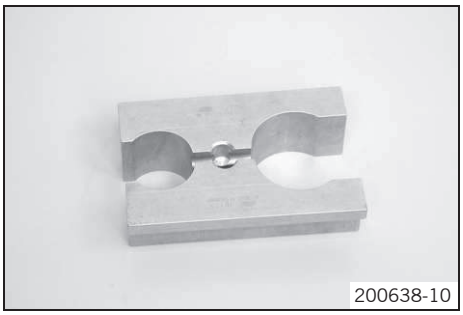
Art. no.: T14050S

Mounting tool



Art. no.: T528S

Clamping stand



Art. no.: T612S

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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