REPAIR MANUAL 2011

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690 Enduro R EU
690 Enduro R AUS/UK
690 Enduro R USA

Art. no. 3206121en

KTM

INTRODUCTION

It is important that you read this repair manual carefully and completely before the start of work.

This vehicle can only fulfill the demands placed on it in the long run if the specified service work is performed regularly by qualified experts.

The repair manual was written to correspond to the most current state of this model series. We reserve the right to make changes in the interest of technical advancement without, at the same time, updating this repair manual.
We shall not provide a description of general workshop methods. Likewise, safety rules that apply in a workshop are not specified here. It is assumed that repair work will be performed by a fully trained mechanic.

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

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ISO 9001(12 100 6061)
According to the international quality management standard ISO 9001, KTM uses quality assurance processes that lead to the maximum possible quality of the products.
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5230 Mattighofen, Austria

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1 MEANS OF REPRESENTATION

1.1 Symbols used

The meaning of specific symbols is described below.

✓	Indicates an expected reaction (e.g. of a work step or a function).
✗	Indicates an unexpected reaction (e.g. of a work step or a function).
☛	Indicates a page reference (more information is provided on the specified page).
i	Indicates information with more details or tips.
»	Indicates the result of a testing step.
V	Denotes a voltage measurement.
A	Denotes a current measurement.
Ω	Denotes a resistance measurement.

1.2 Formats used

The typographical formats used in this document are explained below.

Proprietary name	Identifies a proprietary name.
Name®	Identifies a protected name.
Brand™	Identifies a trademark.

2 SAFETY ADVICE

2.1 Repair Manual

Read this Repair Manual carefully and thoroughly before beginning work. It contains useful information and tips that will help you repair and maintain your vehicle.
This manual assumes that the necessary special KTM tools and KTM workplace and workshop equipment are available.

2.2 Safety advice

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

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

2.3 Degrees of risk and symbols

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

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

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

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

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

2.4 Work rules

Special tools are necessary for certain tasks. The tools are not contained in the vehicle but can be ordered under the number in parentheses. E.g.: bearing puller (15112017000)
During assembly, non-reusable parts (e.g. self-locking screws and nuts, seals and seal rings, O-rings, pins, lock washers) must be replaced by new parts.
In some instances, a thread locker (e.g. **Loctite®**) is required. The manufacturer instructions for use must be followed.
After disassembly, clean the parts that are to be reused and check them for damage and wear. Change damaged or worn parts.
After you complete the repair or service work, check the operating safety of the vehicle.

3 IMPORTANT NOTES

3.1 Guarantee, warranty

The work prescribed in the service schedule must be carried out by an authorized KTM workshop only and confirmed in the customer's service record 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 record.

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.

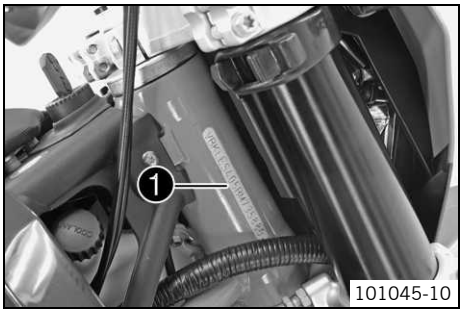
The current **KTM PowerParts** for your vehicle can be found on the KTM website.
International KTM Website: http://www.ktm.com

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.

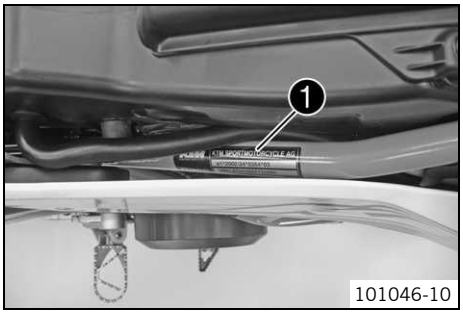
4 SERIAL NUMBERS

4.1 Chassis number



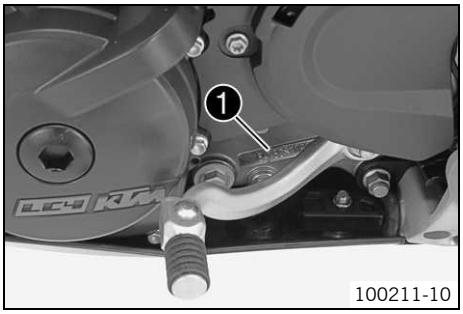
The chassis number ❶ is stamped on the steering head on the right.

4.2 Type label



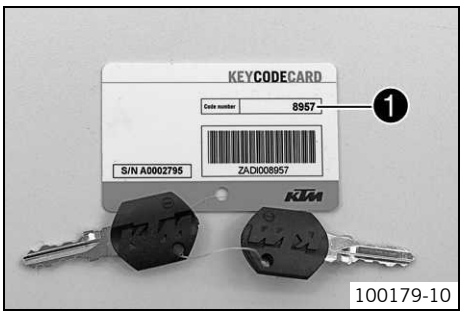
Type label ❶ is located on the upper right frame tube below the seat.

4.3 Engine number



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

4.4 Key number

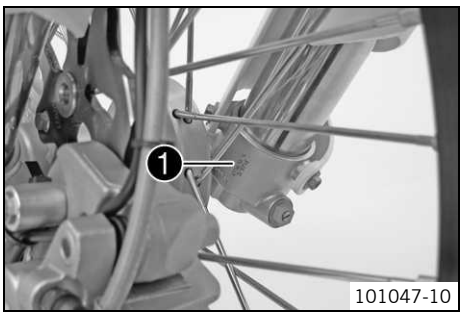


The key number ❶ can be found on the **KEYCODECARD**.

Info

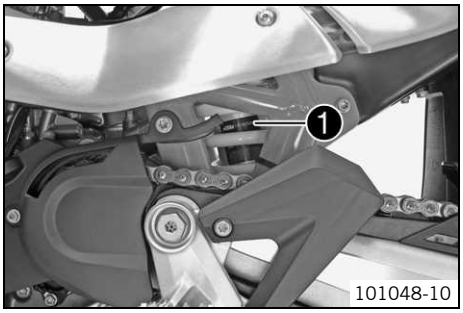
You need the key number to order a spare key. Keep the **KEYCODECARD** in a safe place.

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



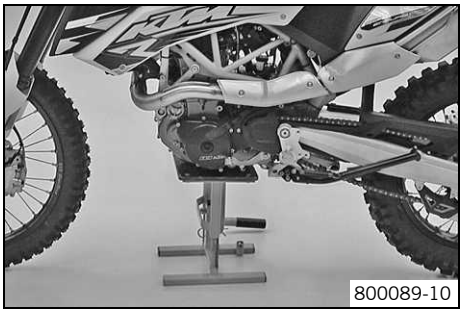
The shock absorber part number ❶ is on the left of the shock absorber.

5.1 Raising the motorcycle with the lift stand

Note

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

– Always place the vehicle on a firm and even surface.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– Raise the motorcycle using the underride guard under the motorcycle.
  ✓ The wheels must no longer touch the ground.
– Secure the motorcycle against falling over.

5.2 Removing the motorcycle from the lift stand

Note

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

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


B01290-01

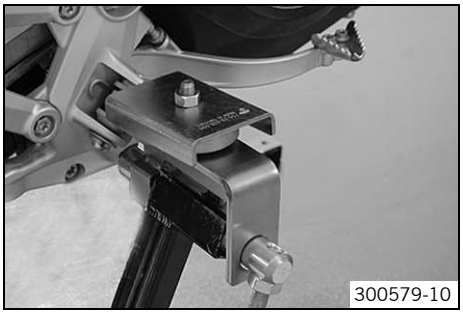
– Remove the motorcycle from the lift stand and rest it on its side stand.
– Remove the lift stand.

5.3 Raising the motorcycle with the work stand

Note

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

– Always place the vehicle on a firm and even surface.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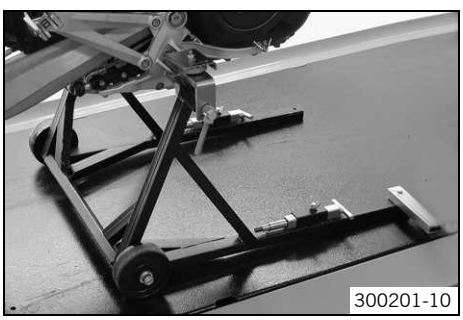
– Mount the special tool on the footrest.

Work stand adapter (75029036000) (☛ p. 220)


300201-10

– Position the motorcycle upright, align the special tool and raise the motorcycle.

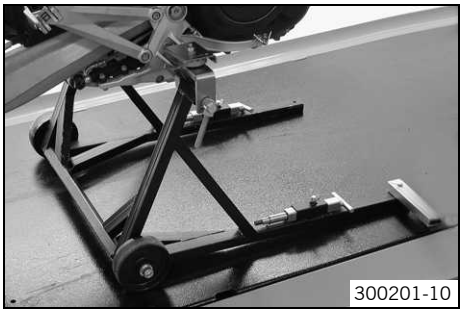
Work stand (62529055000) (☛ p. 219)

5.4 Removing the motorcycle from the work stand

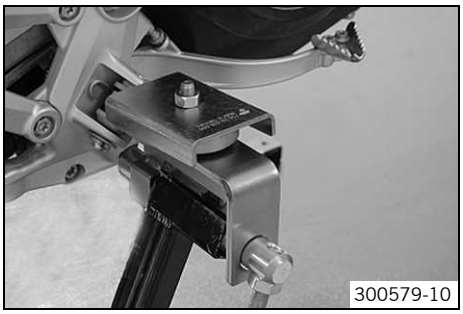
Note

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 work stand and lean the vehicle on the side stand.



– Remove the special tool.

5.5 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

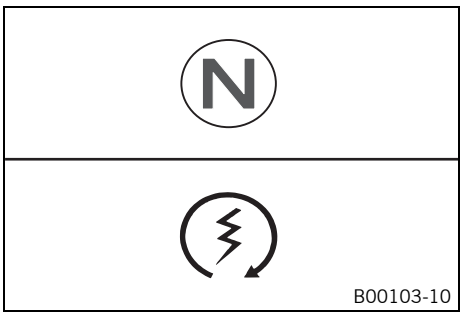
Danger of accidents If the vehicle is operated with a discharged battery or without a battery, electronic components and safety equipment may be damaged.

– 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.



– Turn the emergency OFF switch to the position ○.
– Switch on the ignition by turning the ignition key to 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.
– Shift gear to neutral.
  ✔ 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 starter for a maximum of 5 seconds. Wait for at 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 and release the clutch lever, the engine stops.

– Take the weight off the side stand and swing it back up with your foot as far as it will go.

5.6 Starting the motorcycle to make checks

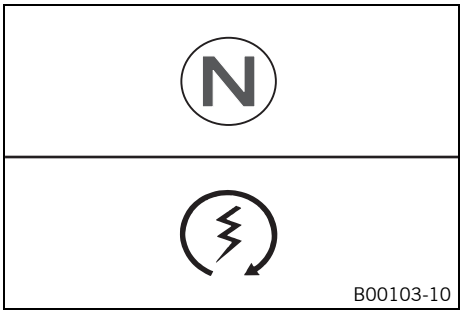
Danger

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

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

Info

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



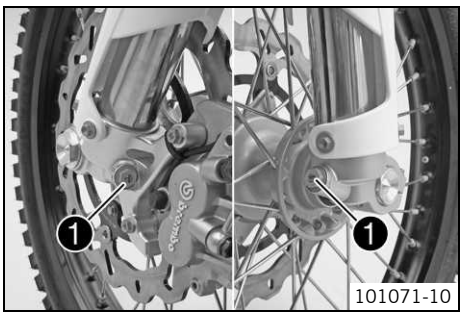
– Turn the emergency OFF switch to the position ○.
– Shift gear to neutral.
– Switch on the ignition.
– Press the electric starter button ⓢ.

Info

Do not open the throttle.

6.1 Adjusting the compression damping of the fork

Info
The hydraulic compression damping determines the fork suspension behavior.



– Turn adjusting screws ❶ clockwise until they stop.

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

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

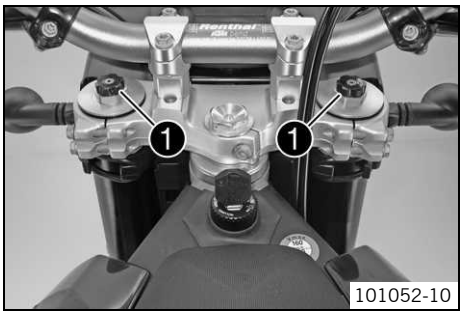
Guideline

Compression damping	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks

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

6.2 Adjusting the rebound damping of the fork

Info
The hydraulic rebound damping determines the fork rebound behavior.



– Turn adjusting screws ❶ clockwise until they stop.

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

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

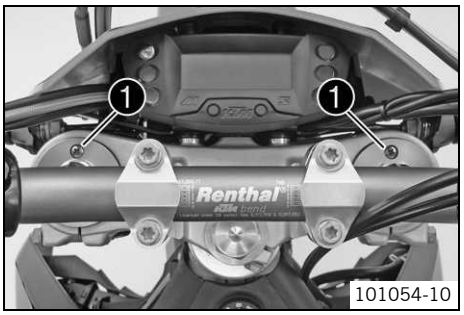
Guideline

Rebound damping	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks

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

6.3 Bleeding the fork legs

Preparatory work
– Lean the motorcycle on the side stand.



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

Info
Carry out this action on both fork legs.

6.4 Cleaning the dust boots of the fork legs

Preparatory work

– Raise the motorcycle with the lift stand. (☛ p. 10)
– Loosen the fork protection. (☛ p. 14)

Main work

– Push dust boot ❶ of both fork legs downwards.

Info

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

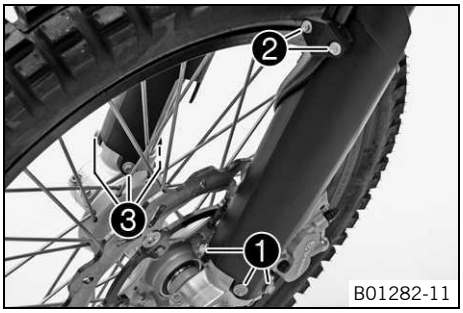
Universal oil spray (☛ p. 215)

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

Finishing work

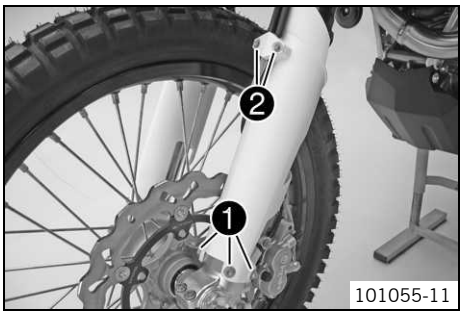
– Position the fork protection. (☛ p. 14)
– Remove the motorcycle from the lift stand. (☛ p. 10)

6.5 Loosening the fork protection



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

6.6 Positioning the fork protection



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

Guideline

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

– Position the brake line and wiring harness. Put the clamp on, mount and tighten screws ❷.
– Position the fork protection on the right fork leg. Mount and tighten the screws.

Guideline

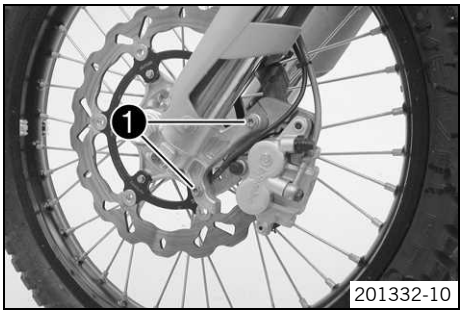
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)

6.7 Removing fork legs

Preparatory work

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

– Tie the rear of the vehicle down.



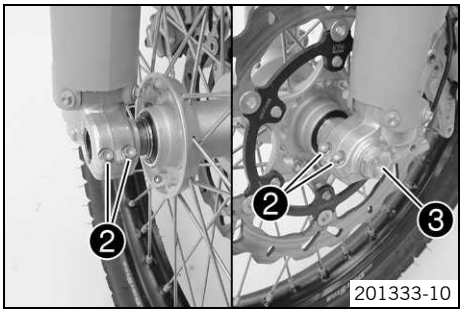
Main work

– Remove screws ❶.

– Press back the brake linings with a light lateral tilting of the brake caliper on the brake disc. Carefully pull the brake caliper backwards from the brake disc.

Info

Do not pull the handbrake lever when the brake caliper is removed.



– Loosen screws ❷ and screw ❸.

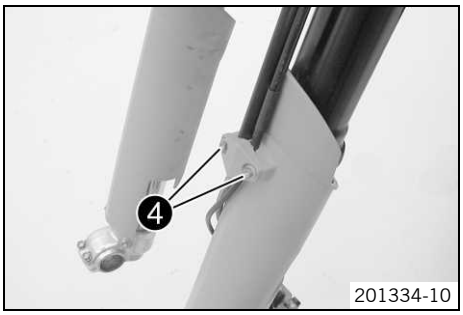
– Unscrew screw ❸ about 6 turns and press your hand on the screw to push the wheel spindle out of the axle clamp. Remove screw ❸.

Warning

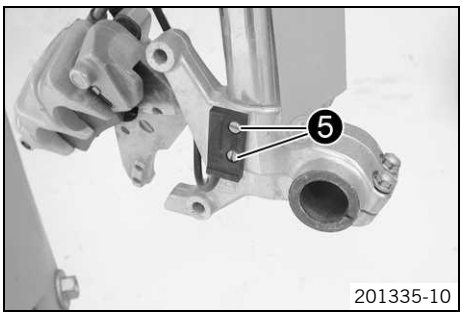
Danger of accidents Reduced braking effect caused by damaged brake discs.

– Always lay the wheel down in such a way that the brake discs are not damaged.

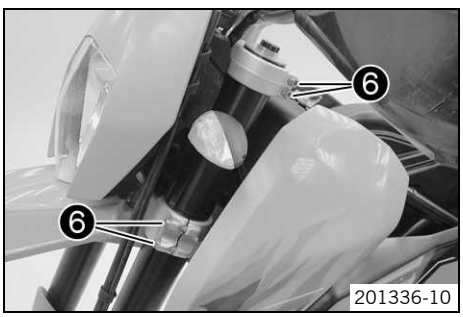
– Holding the front wheel, withdraw the wheel spindle. Take the front wheel out of the fork.



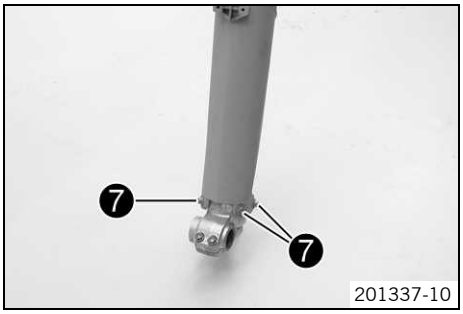
– Remove screws ❹. Take the brake line and wiring harness out of the clamp.



– Remove the screws of the wheel speed sensor ❺. Hang the wheel speed sensor to one side.

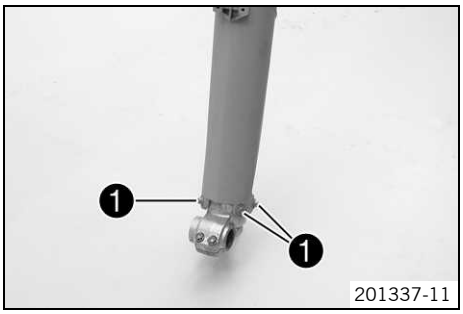


– Loosen screws ❻ of the triple clamp on both sides. Remove the fork legs from the bottom.



– Remove screws ❼. Remove the fork protector from above.

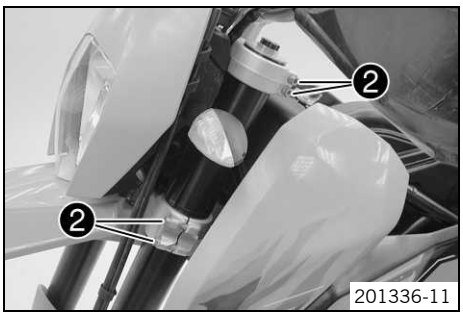
6.8 Installing the fork legs



– Slide on the fork protector from above and position it. Mount and tighten screws ❶.

Guideline

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



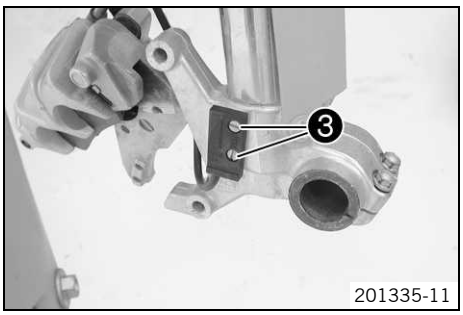
– Slide the fork legs into the triple clamps on both sides.

Info
The bleeder screws must face forward.
The topmost milled groove in the fork leg must be flush with the top edge of the upper triple clamp.
The upper fork projection must be the same on both sides.

– Tighten screws ❷ on both sides.

Guideline

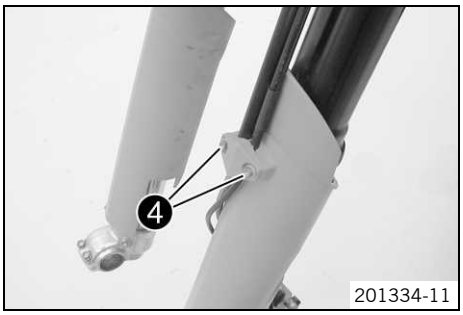
Screw, top triple clamp	M8	17 Nm (12.5 lbf ft)
Screw, bottom triple clamp	M8	12 Nm (8.9 lbf ft)



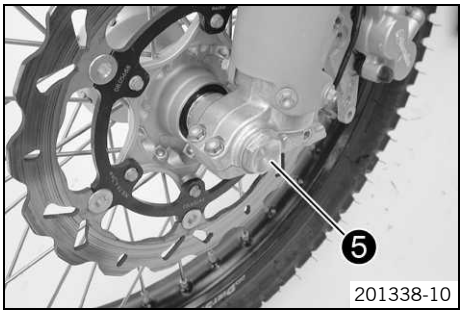
– Position the wheel speed sensor. Mount and tighten screws ❸.

Guideline

Screw, wheel speed sensor	M4	1 Nm (0.7 lbf ft)	**Loctite® 243™**



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



Warning

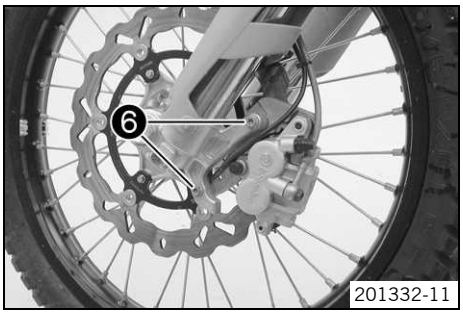
Danger of accidents Reduced braking efficiency due to oil or grease on the brake discs.

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

– Clean screw ❺ and the wheel spindle.
– Lift the front wheel into the fork, position it, and insert the wheel spindle.
– Mount and tighten screw ❺.

Guideline

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

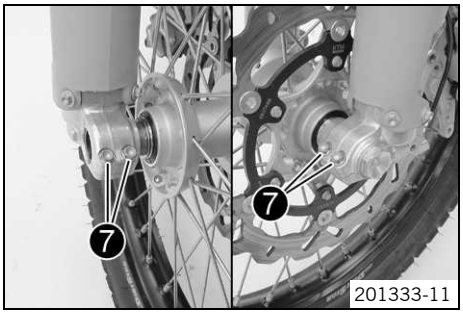


– Position the brake caliper and check that the brake linings are seated correctly.
– Mount and tighten screws ❻.

Guideline

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

– Unload the rear of the vehicle.
– Remove the motorcycle from the lift stand. (☛ p. 10)



– Pull the front brake and compress the fork powerfully a few times.

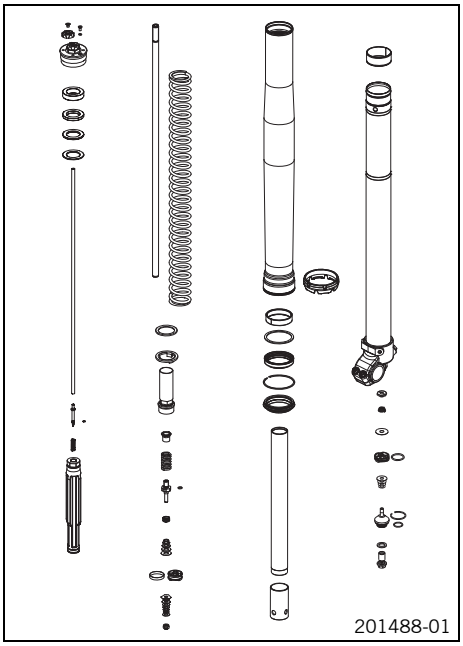
✓ The fork legs straighten.

– Tighten screws ❼.

Guideline

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

6.9 Servicing the fork



Condition

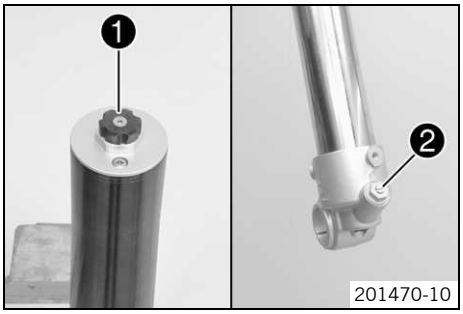
The fork legs have been removed.

– Disassemble the fork legs. (☛ p. 18)
– Disassemble the cartridge. (☛ p. 21)
– Disassemble the tap compression. (☛ p. 22)
– Check the fork legs. (☛ p. 23)
– Assemble the tap compression. (☛ p. 24)
– Assemble the cartridge. (☛ p. 25)
– Assemble the fork legs. (☛ p. 27)

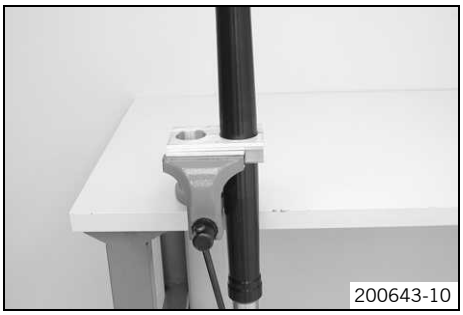
6.10 Disassembling the fork legs

Info
The steps are identical for both fork legs.

Condition
The fork legs are disassembled.

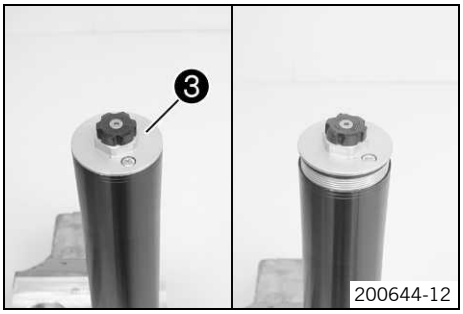


– Note down the present state of rebound damping ❶ and compression damping ❷.
– Completely open the adjusters of the rebound and compression damping.



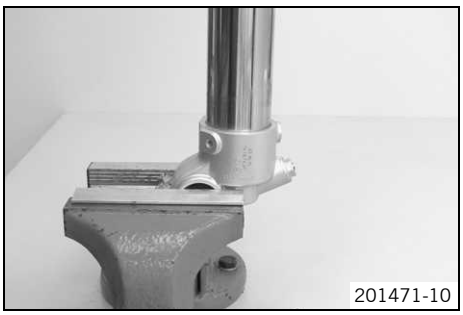
– Clamp the fork leg in the area of the lower triple clamp.

Clamping stand (T1403S) (☛ p. 227)



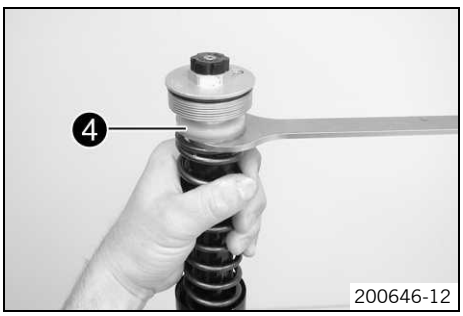
– Loosen screw cover ❸.

Info
The screw cover cannot be removed yet.



– Release the fork leg and clamp it with the axle clamp.

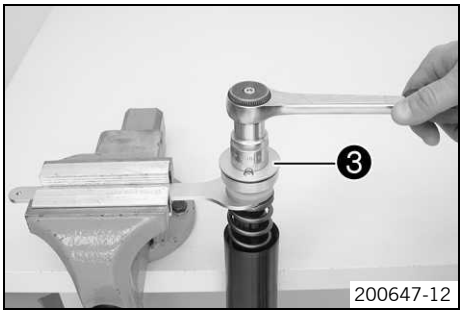
Info
Use soft jaws.



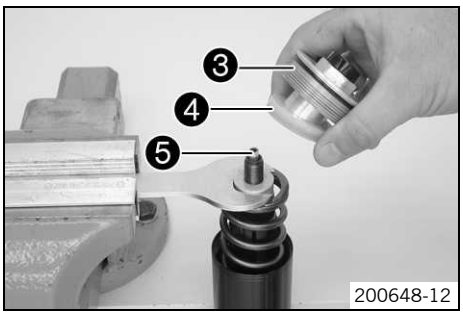
– Push the outer tube downward.
– Pull the spring down. Mount the special tool on the hexagonal part.

Open-end wrench (T14032) (☛ p. 226)

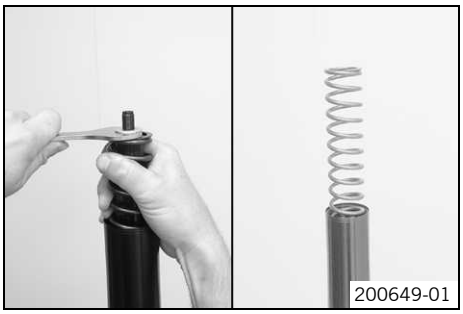
Info
Preload spacers ❹ should be above the special tool.



– Clamp the special tool in the vise. Loosen screw cover ❸.



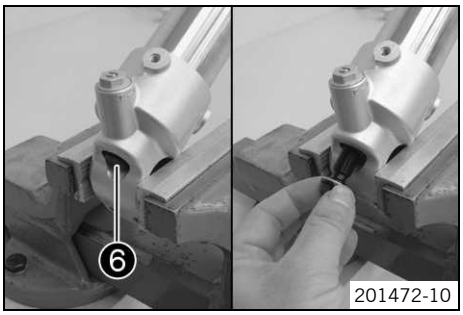
– Remove screw cover ❸ with preload spacers ❹.
– Remove adjusting tube ❺.



– Pull the spring down. Remove the special tool.
– Remove the spring.

– Drain the fork oil.

Info
Pull out and push in the piston rod a few times to empty the cartridge.

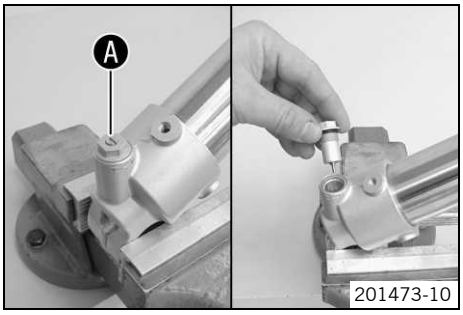


– Clamp the fork leg with the axle clamp.
Guideline

Use soft jaws.

– Loosen and remove screw ❻.

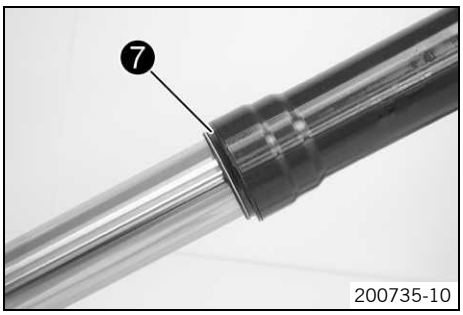
Info
Place a container underneath to catch any oil that may run out.



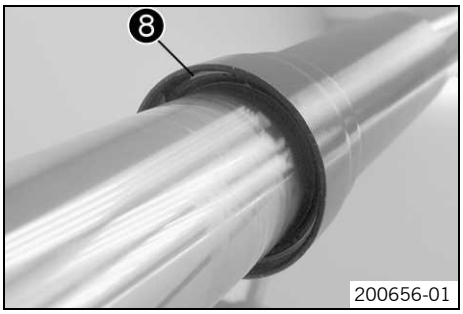
– Loosen and remove compression damping Ⓐ.

Info
This operation is not needed for further disassembly.

– Remove the cartridge.

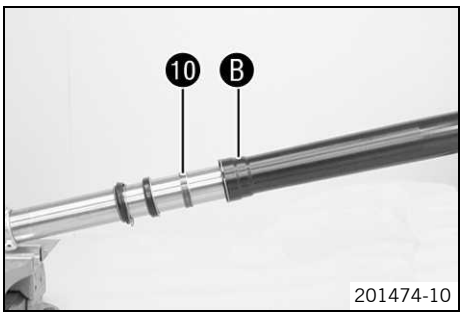


– Remove dust boot ❼.



– Remove lock ring ❽.

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



– Warm up the outer tube in area ❽ of the lower sliding bushings.

Guideline

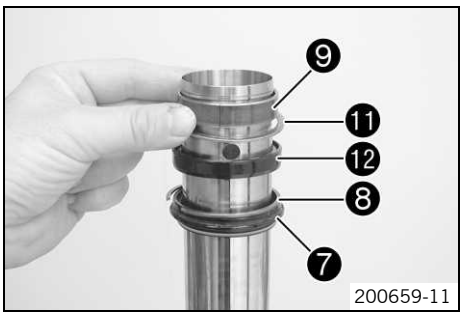
50 °C (122 °F)

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

Info
The lower sliding bushing ❾ must be pulled out of its bearing seat when doing this.

– Remove upper sliding bushing ❿.

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



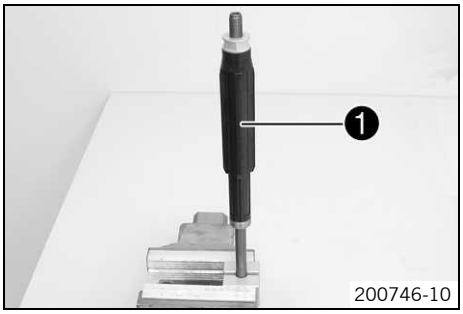
– Take off the lower sliding bushing ❾.
– Take off support ring ⓫.
– Take off seal ring ⓬.
– Take off lock ring ❽.
– Take off dust boot ❼.
– Unclamp the fork leg.

6.11 Disassembling the cartridge

Info
The steps are identical for both fork legs.

Preparatory work
– Disassemble the fork legs. (☛ p. 18)

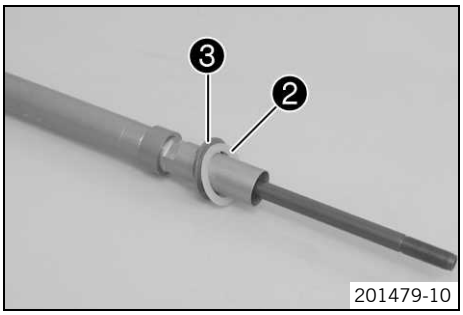
Main work



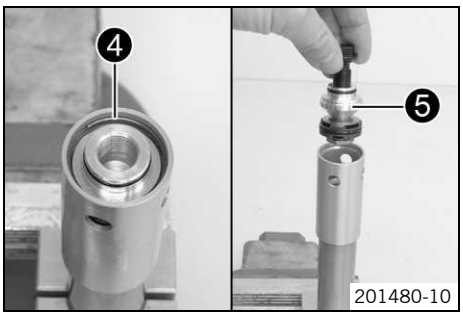
– Degrease the piston rod.
– Clamp the piston rod with the special tool.

Clamping stand (T14016S) (☛ p. 226)

– Remove fluid barrier ❶ from the piston rod.



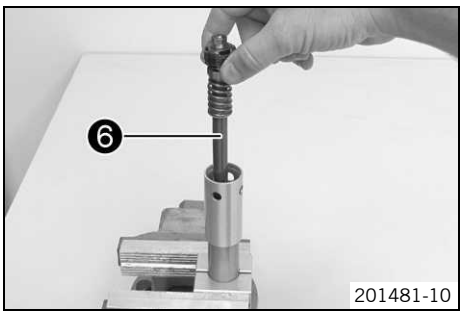
– Take washer ❷ and spring seat ❸ off of the cartridge.



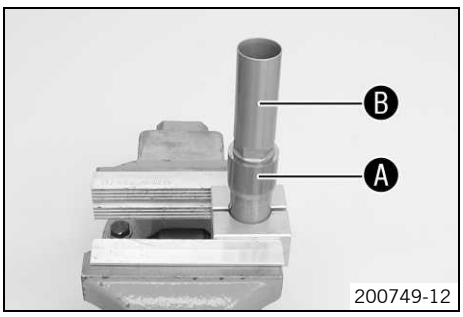
– Degrease the cartridge and clamp it with the special tool.

Clamping stand (T14015S) (☛ p. 226)

– Remove lock ring ❹.
– Pull tap compression ❺ out of the cartridge using a screw.



– Take piston rod ❻ out of the cartridge.



– Heat the cartridge in area Ⓐ.
Guideline

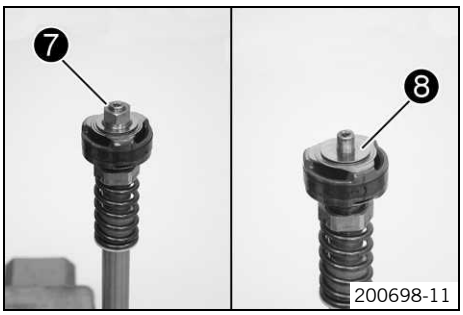
50 °C (122 °F)

– Unscrew and remove screw sleeve Ⓑ.

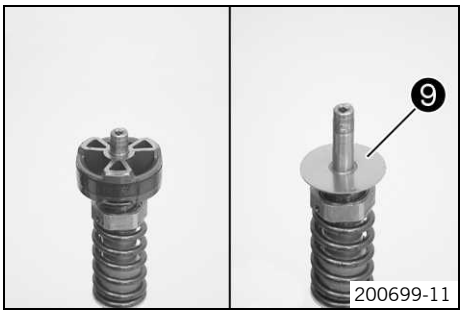
Info
This operation is not needed for further disassembly.

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

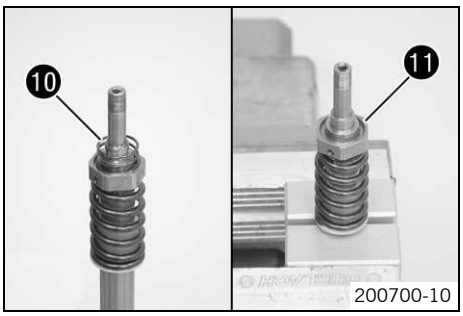
Clamping stand (T14016S) (☛ p. 226)



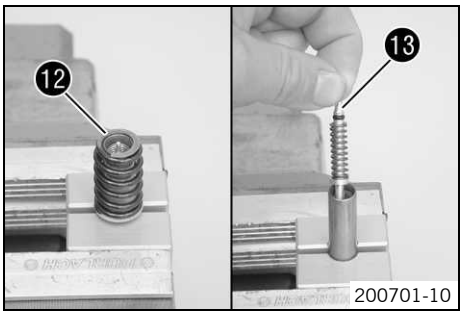
– Remove nut ❼.
– Remove shim stack ❽ completely.



– Remove the piston.
– Completely remove shim stack ❾.



– Remove spring ❿.
– Loosen and remove tap rebound ⓫.

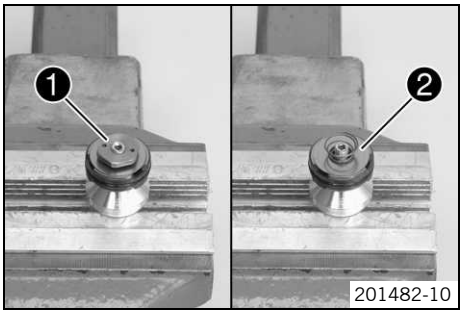


– Remove spring ⓬.
– Remove valve ⓭ of the rebound damping with the spring.
– Unclamp the piston rod.

6.12 Disassembling the tap compression

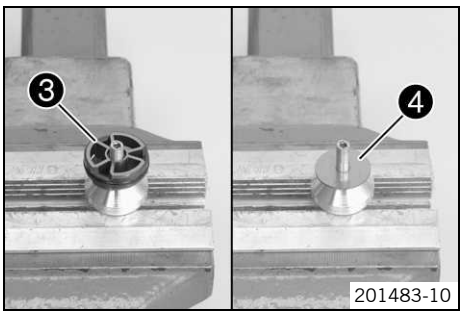
Info
The steps are identical for both fork legs.

Preparatory work
– Disassemble the fork legs. (☛ p. 18)

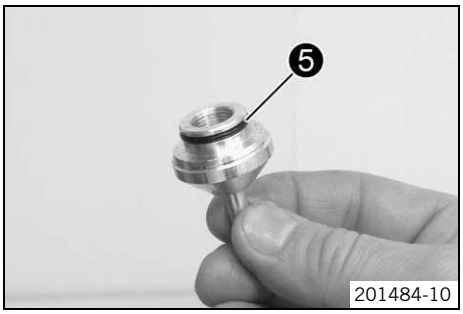


Main work

– Clamp the tap compression in a bench vise using soft jaws.
– Remove nut ❶.
– Remove the spring.
– Remove washer ❷.



– Remove piston ❸.
– Remove shim stack ❹.

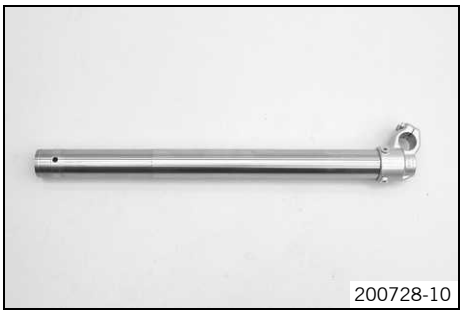


– Extract the tap compression.
– Remove O-ring ❺.

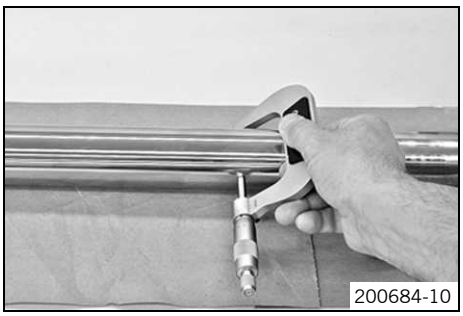
6.13 Checking the fork legs

Condition

Fork dismantled.



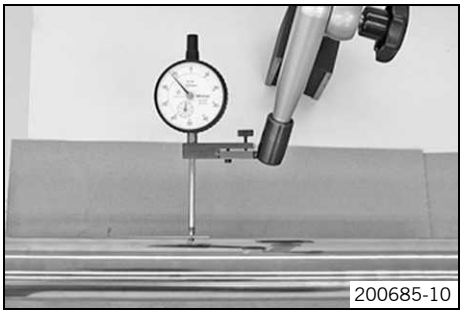
– Check the inner tube and the axle clamp for damage.
  » If damage is found:
    – Replace the inner tube.



– Measure the external diameter of the inner tube in several places.

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

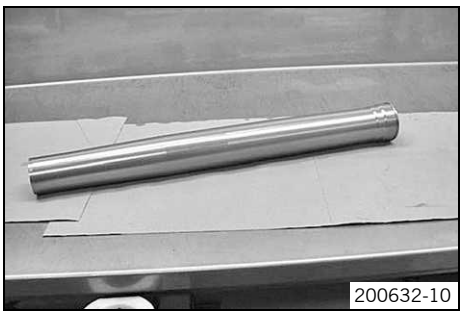
  » If the measured value is less than the specified value:
    – Replace the inner tube.


200685-10

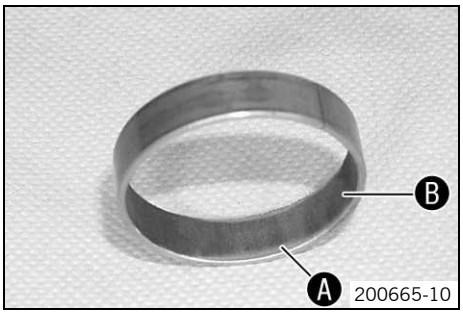
– Measure the run-out of the inner tube.

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

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

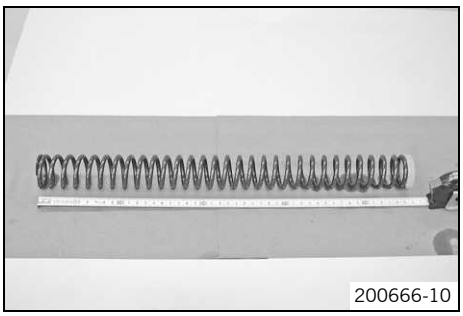

200632-10

– Check the outer tube for damage.
» If damage is found:
– Replace the outer tube.



200665-10

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


200666-10

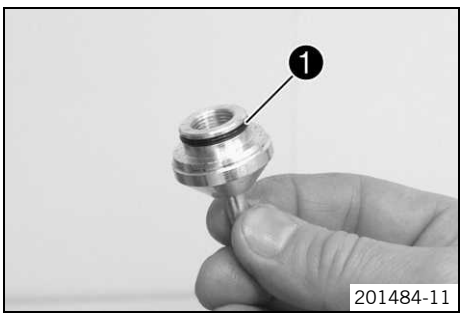
– Check the spring length.
Guideline

Spring length with preload spacer(s)	495 mm (19.49 in)

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

6.14 Assembling the tap compression

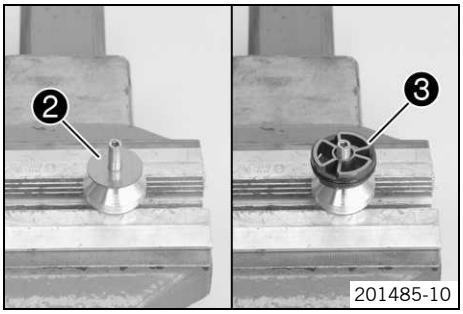
Info
The steps are identical for both fork legs.



201484-11

– Mount O-ring ❶.
– Lubricate the O-ring.

Lubricant (T158) (☛ p. 214)



– Clamp the tap compression in a bench vise using soft jaws.
– Mount shim stack ❷.

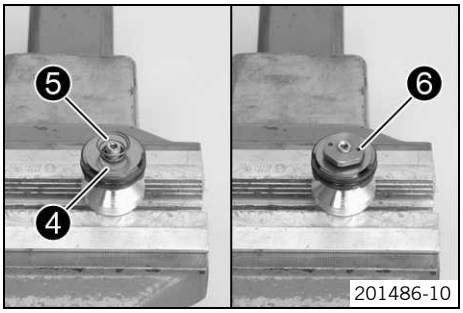
Info
Mount the smaller shims below.

– Mount pistons ❸ with O-ring.

Info
The side with the largest inside diameter faces upward.

– Grease the piston O-ring.

Fork oil (SAE 4) (48601166S1) (☛ p. 213)



– Mount washer ❹.
– Mount spring ❺ with the tighter coil facing downward.
– Mount and tighten the nut ❻.

Guideline

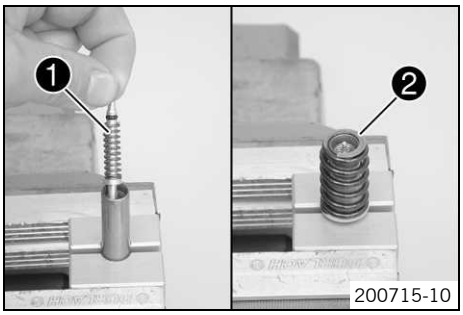
Tap compression nut	M6x0.5	3 Nm (2.2 lbf ft)

Info
Washer ❹ must be free to move against the spring force.

– Lock the nut using a punch.
– Extract the tap compression.

6.15 Assembling the cartridge

Info
The steps are identical for both fork legs.



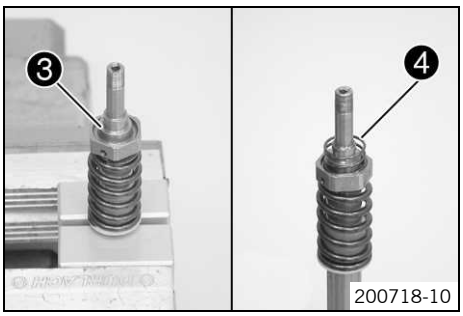
– Clamp in the piston rod.

Clamping stand (T14016S) (☛ p. 226)

– Mount valve ❶ of the rebound damping, with the spring and O-ring.
– Lubricate the O-ring.

Lubricant (T158) (☛ p. 214)

– Mount spring ❷.



– Grease the O-ring of tap rebound ❸.

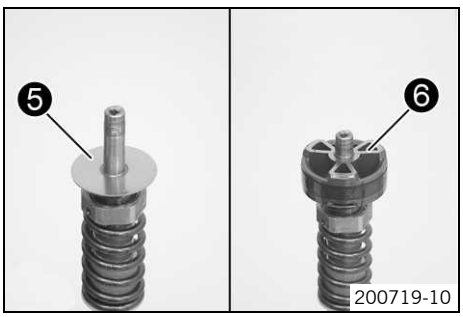
Lubricant (T158) (☛ p. 214)

– Mount and tighten the tap rebound.

Guideline

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

– Position spring ❹.



– Mount shim stack ❺.

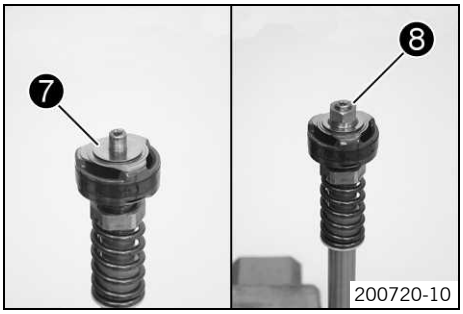
Info
Mount the smaller shims below.

– Press the shim stack downward against the spring force.

Info
The shim stack must be pressed downward over the collar.

– Mount piston ❻ with the piston ring.

Info
The side with the largest inside diameter faces downward.



– Mount shim stack ❼.

Info
Align the triangular plate exactly with the piston opening.

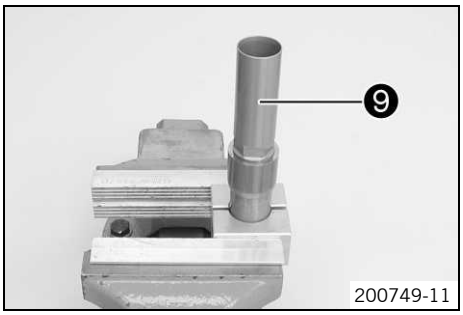
– Mount and tighten nut ❽.

Guideline

Tap rebound nut	M6x0.5	5 Nm (3.7 lbf ft)

Info
Mount the nut with the collar facing downward.

– Lock the nut using a punch.



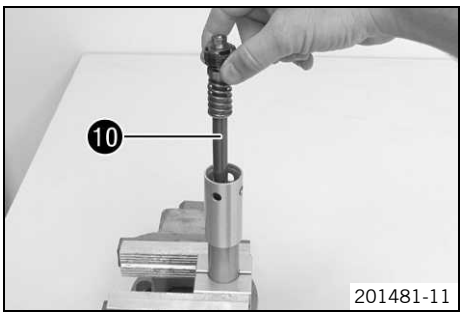
– Degrease the cartridge and clamp it with the special tool.

Clamping stand (T14015S) (☛ p. 226)

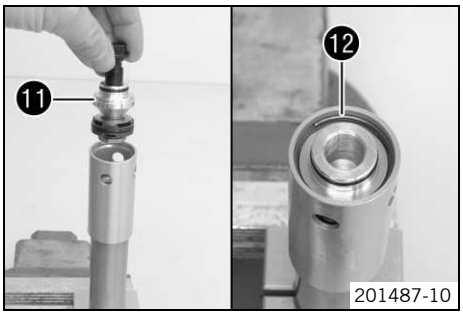
– Mount and tighten screw sleeve ❾.

Guideline

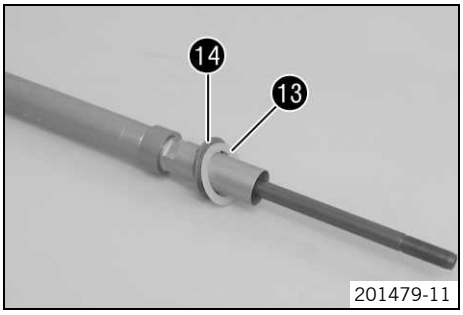
Screw sleeve	M29x1	46 Nm (33.9 lbf ft)	**Loctite® 241**



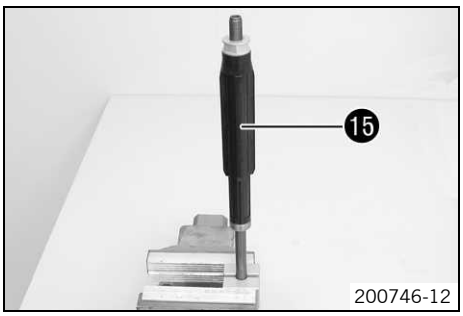
– Before mounting on the piston, wrap the piston ring around the shaft of a screwdriver.
– Slide piston rod ❿ into the cartridge.



– Mount tap compression ⓫ in the cartridge.
– Mount lock ring ⓬.



– Mount washer ⓭ and spring seat ⓮.



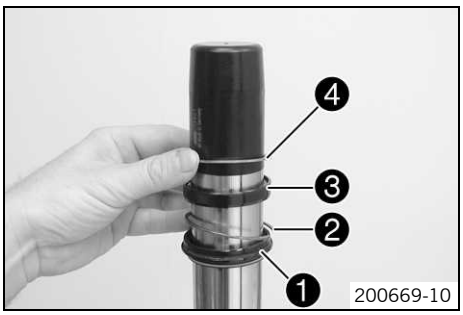
– Screw on fluid barrier ⓯ as far as it will go.

Info
The fluid barrier must be tightened as much as possible. Do not use tools.

6.16 Assembling the fork legs

Info
The steps are identical for both fork legs.

Preparatory work
– Check the fork legs. (☛ p. 23)
– Assemble the cartridge. (☛ p. 25)



Main work
– Clamp the inner tube with the axle clamp.
Guideline
Use soft jaws.
– Mount special tool.
Protecting sleeve (T1401) (☛ p. 225)
– Grease and push on dust boot ❶.
Lubricant (T511) (☛ p. 214)

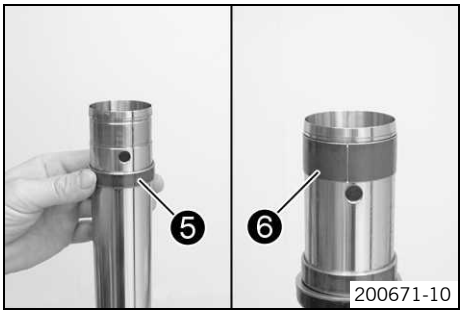
Info
Always change the dust boot, lock ring, seal ring, and support ring.
Mount the sealing lip with the spring expander facing downward.

– Push on lock ring ❷.
– Grease and slide on seal ring ❸.
Lubricant (T511) (☛ p. 214)

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

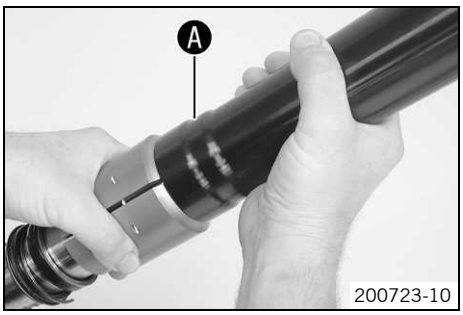
– Push on support ring ❹.
– Remove the special tool.

– Sand the edges of the sliding bushings with 600-grain sandpaper, then clean and grease them.
Fork oil (SAE 4) (48601166S1) (☛ p. 213)



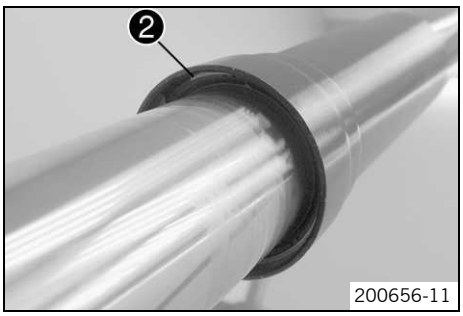
– Push on the lower sliding bushing ❺.
– Mount the upper sliding bushing ❻.

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



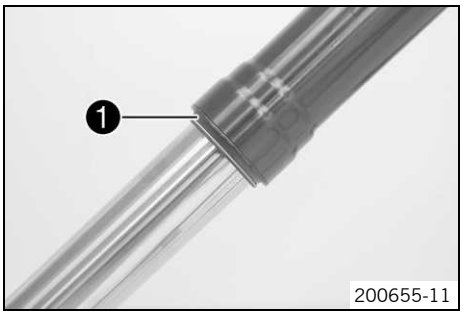
– Heat up the outer tube in area Ⓐ of the lower sliding bushings.
Guideline
50 °C (122 °F)
– Slide the outer tube onto the inner tube.
– Hold the lower sliding bushing with the longer side of the special tool.
Assembly tool (T1402S) (☛ p. 226)
– Push the sliding bushing all the way into the outer tube.

– Position the support ring.
– Hold the seal ring with the shorter side of the special tool.
Assembly tool (T1402S) (☛ p. 226)
– Push the seal ring and support ring all the way into the outer tube.

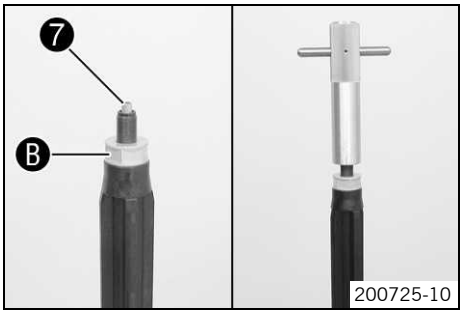


– Mount lock ring ❷.

Info
The lock ring must engage audibly.



– Mount dust boot ❶.

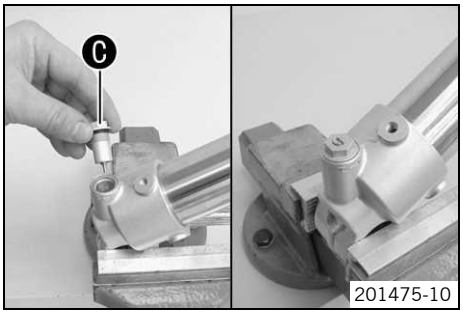


– Mount adjusting tube ❼ of the rebound damping in the cartridge.
✓ The adjusting tube protrudes 5 mm from the cartridge and can be pressed in against the resistance of the spring.
✗ The adjusting tube protrudes more than 7 mm from the cartridge and cannot be pressed in against the resistance of the spring.
– Screw on fluid barrier Ⓑ as far as it will go.

Info
The fluid barrier must be tightened as much as possible. Do not use tools.

– Install the special tool on the cartridge.
Gripping tool (T14026S1) (☛ p. 226)

Info
The special tool must be used to prevent the adjusting tube from being lifted and thus to prevent oil from reaching the piston rod.



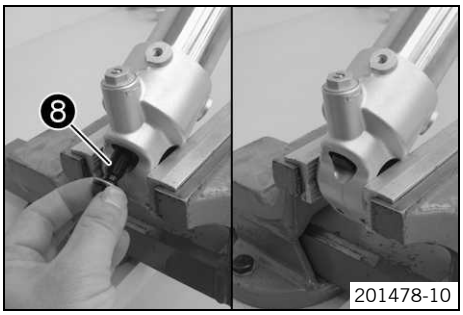
– Lubricate the O-ring.

Lubricant (T158) (☛ p. 214)

– Mount and tighten compression adjuster ❻.

Guideline

Compression adjuster	M14x1	18 Nm (13.3 lbf ft)	**Loctite® 241**



– Push the cartridge into the inner tube.
– Mount and tighten screw ❽ with the seal ring.

Guideline

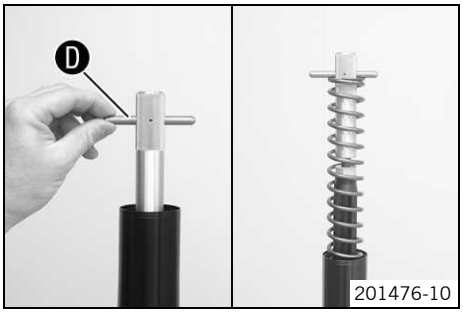
Cartridge screw	M12x1	25 Nm (18.4 lbf ft)

Info
If the cartridge turns as well, press the piston rod slightly to the side.

– Clamp the fork vertically.
– Fill it with fork oil.

Fork oil per fork leg	635 ml (21.47 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 213)

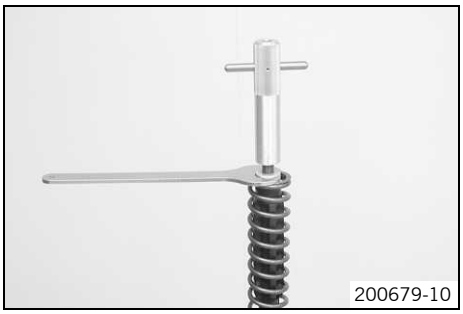
Info
Pull out the piston rod and push back in a number of times to bleed the cartridge.



– Remove pin ❹ of the special tool.

Gripping tool (T14026S1) (☛ p. 226)

– Pull out the piston rod. Mount the spring. Mount the pin again.



– Pull the spring down. Mount the special tool on the hexagonal part.

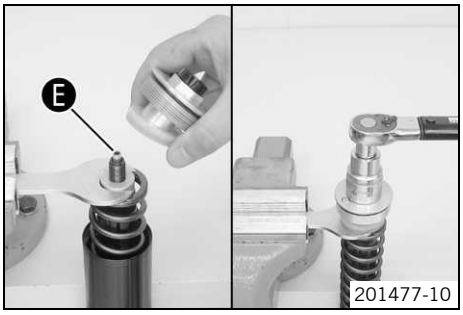
Guideline

Spring rate	
Soft	5.0 N/mm (28.6 lb/in)
Medium (standard)	5.2 N/mm (29.7 lb/in)
Hard	5.4 N/mm (30.8 lb/in)

Open-end wrench (T14032) (☛ p. 226)

– Remove the special tool.

Gripping tool (T14026S1) (☛ p. 226)



– Clamp the special tool in the vise.
– Grease the thread of the piston rod.

Lubricant (T159) (☛ p. 214)

– Grease the upper edge ❹ of the piston rod.

Lubricant (T158) (☛ p. 214)

– Screw the screw cover with the preload spacers on to the piston rod.

Info
The screw cover must be screwed to the stop before the piston rod starts to turn. If the thread of the piston rod is stiff, it must be held to prevent it from turning. If the screw cover is not screwed to the stop, the rebound adjustment will not work correctly.

– Tighten the screw cover.

Guideline

Screw cover on piston rod	M12x1	25 Nm (18.4 lbf ft)

– Release the special tool. Pull the spring downward and remove the special tool.

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

Clamping stand (T1403S) (☛ p. 227)

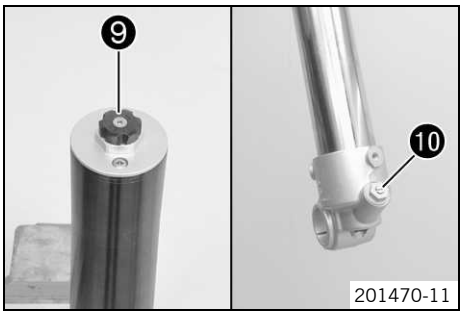
– Grease the O-ring of the screw cover.

Lubricant (T158) (☛ p. 214)

– Screw on and tighten the screw cover.

Guideline

Screw cover on outer tube	M51x1.5	50 Nm (36.9 lbf ft)



Alternative 1

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

Guideline

Rebound damping	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks
Compression damping	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks

Alternative 2

Warning

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

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

– Turn the adjusting screws to the position they were in before dismantling.

6.17 Checking the steering head bearing play

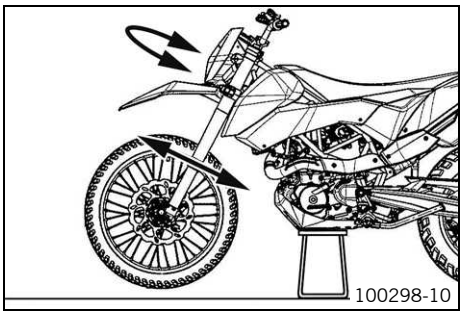
Warning

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

– Adjust the steering head bearing play without delay.

Info

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



Preparatory work

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

Main work

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

No play should be noticeable in the steering head bearing.

» If there is noticeable play present:

– Adjust the play of the steering head bearing. (☛ p. 31)

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

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

» If click positions are noticeable:

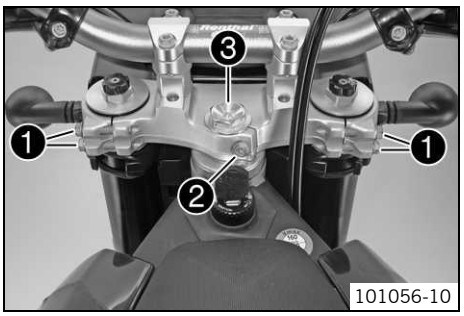
– Adjust the play of the steering head bearing. (☛ p. 31)

– Check the steering head bearing and change if necessary.

Finishing work

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

6.18 Adjusting the play of the steering head bearing



Preparatory work

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

Main work

– Loosen screw ❶. Remove screw ❷.

– Loosen and retighten screw ❸.

Guideline

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

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

– Fully tighten screws ❶.

Guideline

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

– Mount and tighten screw ❷.

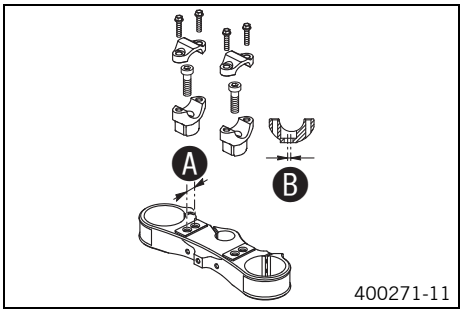
Guideline

Screw, steering stem	M8	20 Nm (14.8 lbf ft)

Finishing work

– Check the steering head bearing play. (☛ p. 31)
– Remove the motorcycle from the lift stand. (☛ p. 10)

7.1 Handlebar position



On the upper triple clamp, there are 2 holes at a distance Ⓐ to each other.

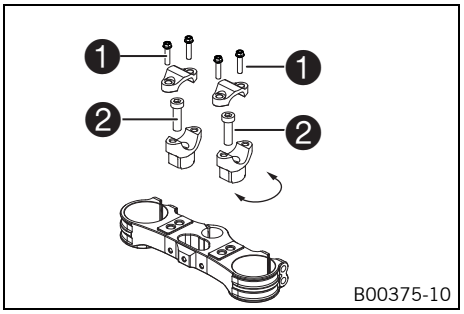
Distance Ⓐ between holes	15 mm (0.59 in)

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

Distance Ⓑ between holes	3.5 mm (0.138 in)

The handlebar can be mounted in 4 different positions. In this way, the handlebar can be installed in the position most comfortable for the rider.

7.2 Adjusting handlebar position



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

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

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

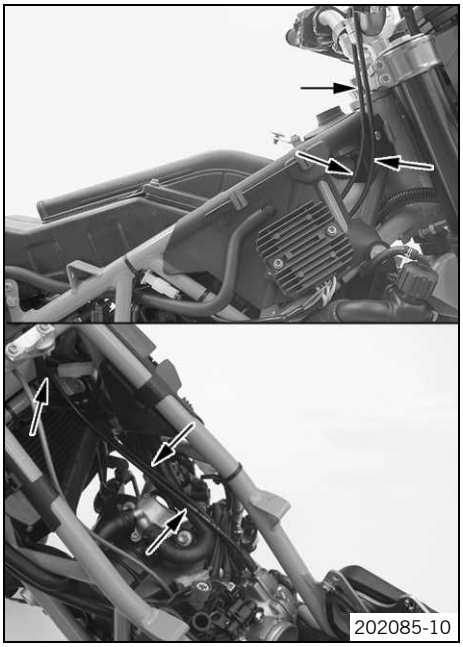
– Position the handlebar clamp. Fit and evenly tighten the four screws ❶.

Guideline

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

7.3 Checking the routing of the throttle cable

Preparatory work
– Remove the seat. (☛ p. 64)
– Take off the side cover. (☛ p. 65)


202085-10

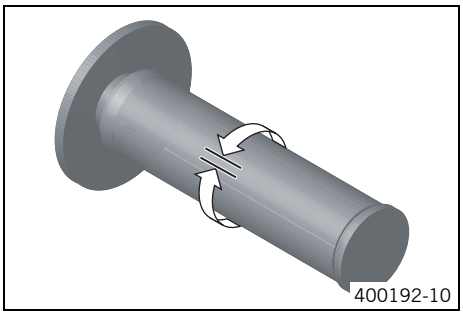
Main work
– Check the routing of the throttle cable.

Both throttle cables must be routed side by side, downward behind the handlebars and between the air filter box and frame to the throttle valve body.

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

Finishing work
– Mount the side cover. (☛ p. 65)
– Mount the seat. (☛ p. 65)

7.4 Checking the play in the throttle cable


400192-10

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

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

» If the throttle cable play does not meet specifications:
– Adjust the play in the throttle cable. (☛ p. 34)

Danger
Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.
– When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.

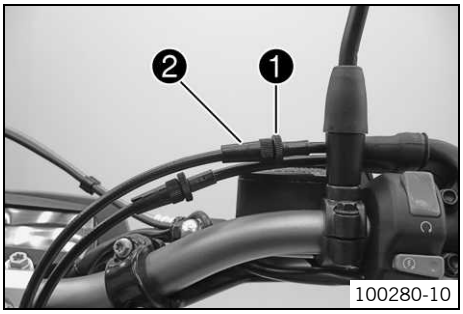
– Start the engine and let it run idle. Move the handlebar to and fro over the entire steering range.

The idle speed must not change.

» If the idle speed changes:
– Adjust the play in the throttle cable. (☛ p. 34)

7.5 Adjusting the play in the throttle cable

Preparatory work
– Remove the seat. (☛ p. 64)
– Take off the side cover. (☛ p. 65)
– Check the routing of the throttle cable. (☛ p. 33)



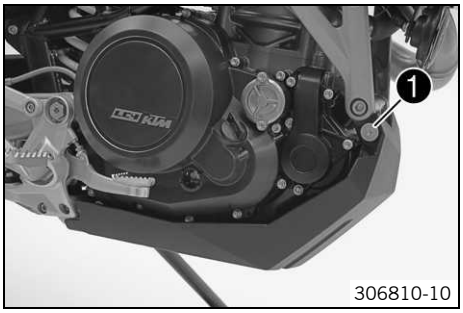
100280-10

Main work
– Move the handlebar to the straight-ahead position.
– Use the KTM diagnostics tool to set the motor drive to the basic position.
– Loosen counter nut ❶.
– Set the play in the throttle cable by turning the adjusting screw ❷.
Guideline

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

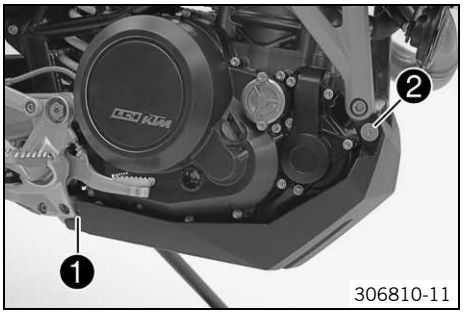
– Tighten counter nut ❶.

8.1 Removing the engine guard



– Remove screws ❶ on the left and right.
– Pull the engine guard forward out of the holders and set it down.

8.2 Installing the engine guard



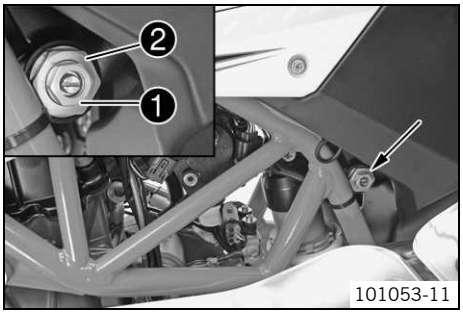
– Slide the engine guard into holders ❶ at the rear.
– Position the engine guard. Mount and tighten screws ❷.
Guideline

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

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

Caution
Danger of accidents Disassembly of pressurized parts can lead to injury.
– The shock absorber is filled with high density nitrogen. Adhere to the description provided.

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



– Turn adjusting screw ❶ all the way clockwise using a socket wrench.

Info
Do not loosen nut ❷!

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

Guideline

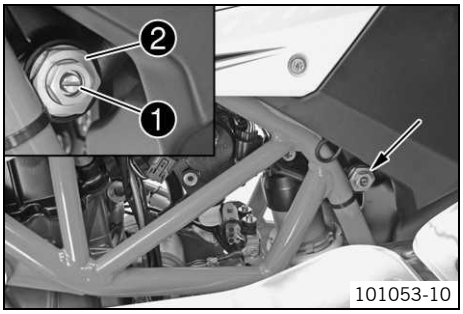
Compression damping, high-speed	
Comfort	2 turns
Standard	1.5 turns
Sport	1 turn
Full payload	1 turn

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

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

Caution
Danger of accidents Disassembly of pressurized parts can lead to injury.
– The shock absorber is filled with high density nitrogen. Adhere to the description provided.

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



– Turn the adjusting screw ❶ clockwise with a screwdriver up to the last perceptible click.

Info
Do not loosen nut ❷!

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

Guideline

Compression damping, low-speed	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks

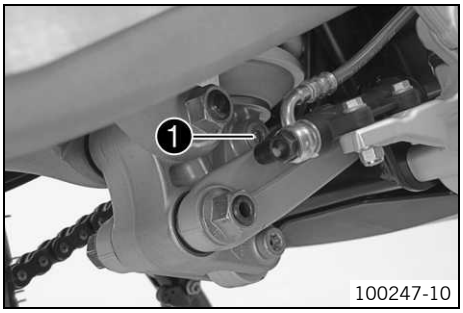
Info
Turn clockwise to increase damping; turn counterclockwise to reduce damping.

9.3 Adjusting the rebound damping of the shock absorber

Caution

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

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



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

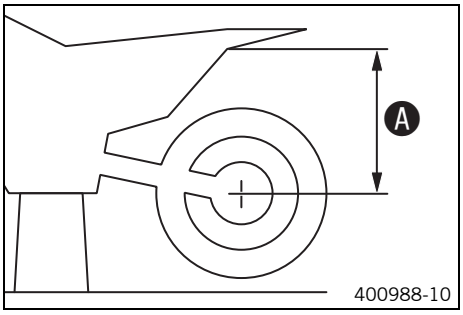
Guideline

Rebound damping	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks

Info

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

9.4 Measuring the unloaded rear wheel sag



Preparatory work

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

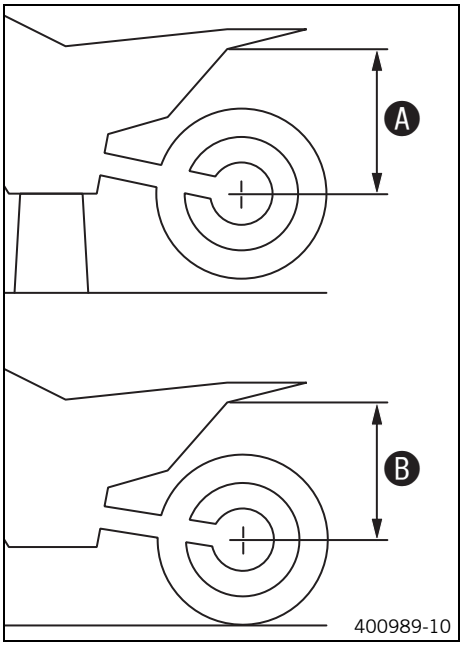
Main work

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

Finishing work

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

9.5 Checking the static sag of the shock absorber



– Measure distance Ⓐ of rear wheel unloaded. (☛ p. 38)
– Hold the motorcycle upright with the aid of an assistant.
– Measure the distance between the rear axle and the fixed point again.
– Note down the value as dimension Ⓑ.

Info

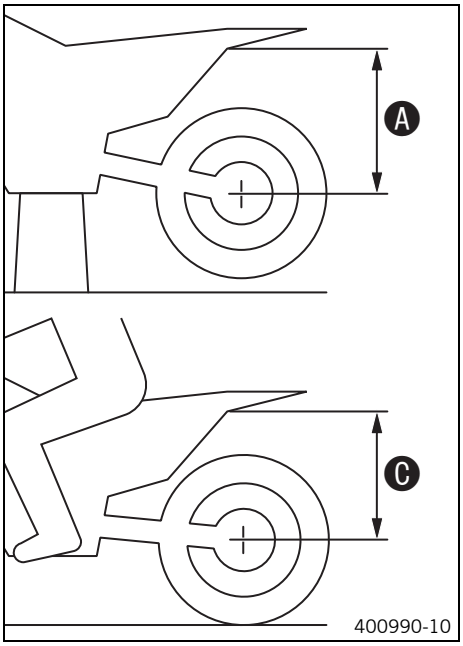
The static sag is the difference between measurements Ⓐ and Ⓑ.

– Check the static sag.

Static sag	25 mm (0.98 in)

» If the static sag is less or more than the specified value:
– Adjust the spring preload of the shock absorber. (☛ p. 39)

9.6 Checking the riding sag of the shock absorber



– Measure distance ❹ of rear wheel unloaded. (☛ p. 38)
– With another person holding the motorcycle, the rider, wearing full protective clothing, sits on the seat in a normal sitting position (feet on footrests) and bounces up and down a few times.

✓ The rear wheel suspension levels out.

– Another person now measures the distance between the rear axle and a fixed point.
– Note down the value as dimension ❸.

Info
The riding sag is the difference between measurements ❹ and ❸.

– Check the riding sag.

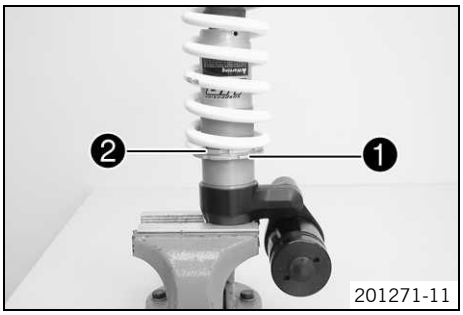
Riding sag	70... 80 mm (2.76... 3.15 in)

» If the riding sag differs from the specified measurement:
– Adjust the riding sag. (☛ p. 40)

9.7 Adjusting the spring preload of the shock absorber

Caution
Danger of accidents Disassembly of pressurized parts can lead to injury.
– The shock absorber is filled with high density nitrogen. Adhere to the description provided.

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



Preparatory work
– Raise the motorcycle with the work stand. (☛ p. 10)
– Remove the seat. (☛ p. 64)
– Take off the side cover. (☛ p. 65)
– Remove the shock absorber. (☛ p. 40)
– After removing the shock absorber, clean it thoroughly.

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

Hook wrench (T106S) (☛ p. 224)

– Measure the overall spring length without a load.
– Tension the spring by turning the adjusting ring ❷ to the prescribed value.

Guideline

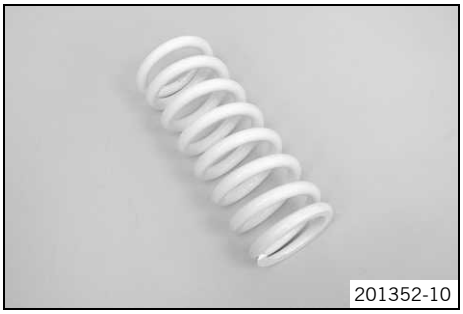
Spring preload	20 mm (0.79 in)

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

– Tighten locking ring ❶.

Finishing work
– Install the shock absorber. (☛ p. 41)
– Mount the side cover. (☛ p. 65)
– Mount the seat. (☛ p. 65)
– Remove the motorcycle from the work stand. (☛ p. 11)

9.8 Adjusting the riding sag



Preparatory work
- Raise the motorcycle with the work stand. (☛ p. 10)
- Remove the seat. (☛ p. 64)
- Take off the side cover. (☛ p. 65)
- Remove the shock absorber. (☛ p. 40)
- After removing the shock absorber, clean it thoroughly.

Main work
- Choose and mount a suitable spring.

  Guideline

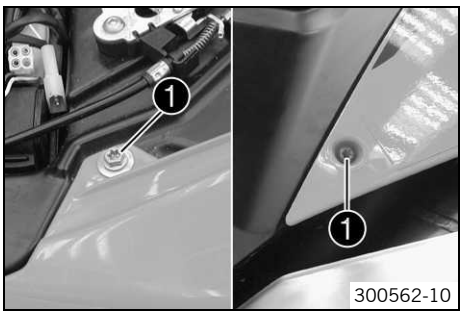
Spring rate	
Soft	75 N/mm (428 lb/in)
Medium (standard)	80 N/mm (457 lb/in)
Hard	85 N/mm (485 lb/in)

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

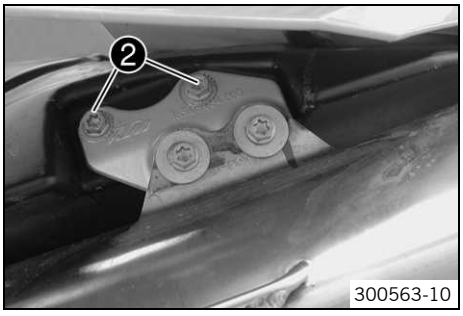
Finishing work
- Install the shock absorber. (☛ p. 41)
- Mount the side cover. (☛ p. 65)
- Mount the seat. (☛ p. 65)
- Remove the motorcycle from the work stand. (☛ p. 11)
- Check the static sag of the shock absorber. (☛ p. 38)
- Adjust the rebound damping of the shock absorber. (☛ p. 38)

9.9 Removing the shock absorber

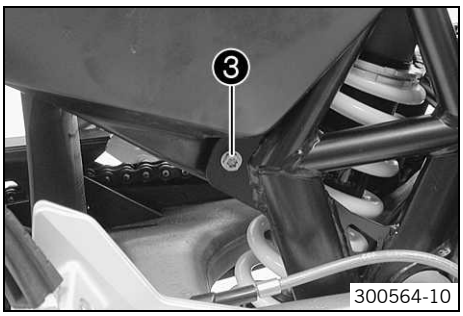
Preparatory work
- Raise the motorcycle with the work stand. (☛ p. 10)
- Remove the seat. (☛ p. 64)
- Take off the side cover. (☛ p. 65)



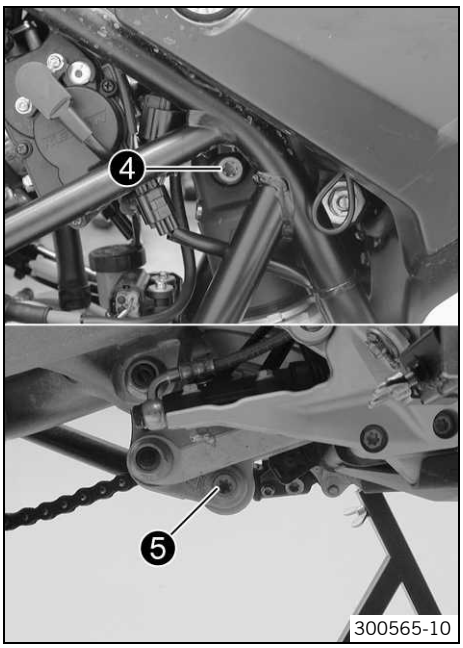
Main work
- Remove screws ❶.



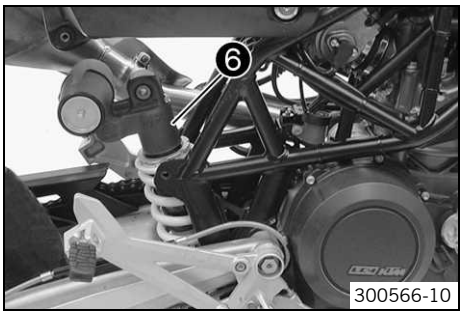
- Lift the rear fairing.
- Remove screws ❷.



– Remove screw ❸.
– Repeat the operation on the opposite side.

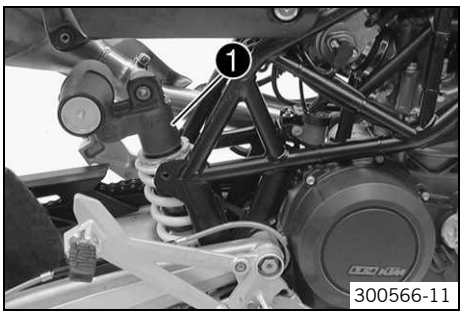


– Loosen screw ❹.
– Remove screw ❺.
– Remove screw ❹.



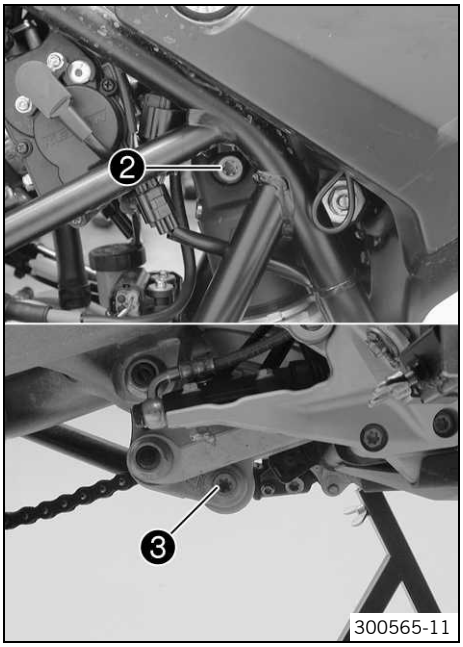
– Swing the rear end upwards.
– Lift shock absorber ❻ upwards and remove.

9.10 Installing the shock absorber



Main work

– Insert shock absorber ❶ from above.



– Mount screw ❷ but do not tighten yet.
– Mount and tighten screw ❸.

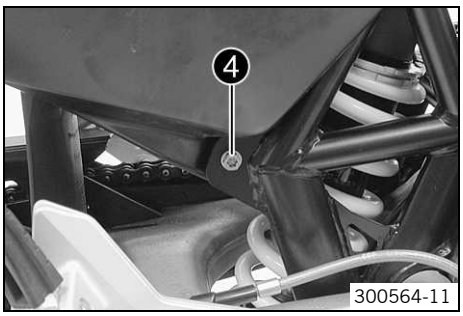
Guideline

Screw, bottom shock absorber	M10	45 Nm (33.2 lbf ft)	**Loctite® 243™**

– Tighten screw ❷.

Guideline

Screw, top shock absorber	M10	45 Nm (33.2 lbf ft)	**Loctite® 243™**

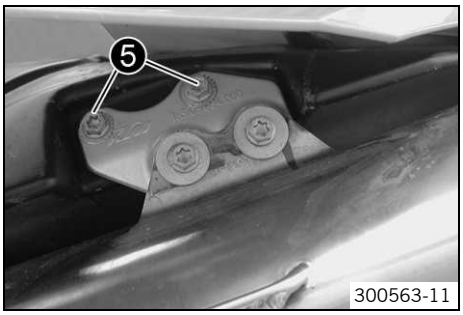


– Mount and tighten screw ❹.

Guideline

Screw, fuel tank, bottom	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**

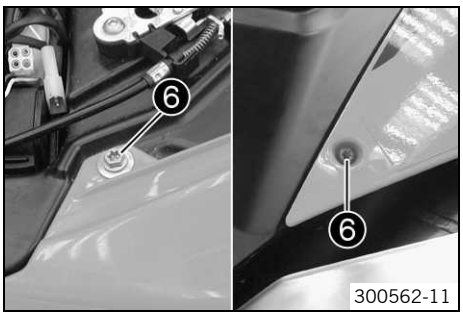
– Repeat the operation on the opposite side.



– Lift the rear fairing.
– Mount and tighten screws ❺.

Guideline

Screw, main silencer holder on fuel tank	M8	25 Nm (18.4 lbf ft)



– Mount and tighten screws ❻.

Guideline

Screw, side cover	M6	5 Nm (3.7 lbf ft)

Finishing work

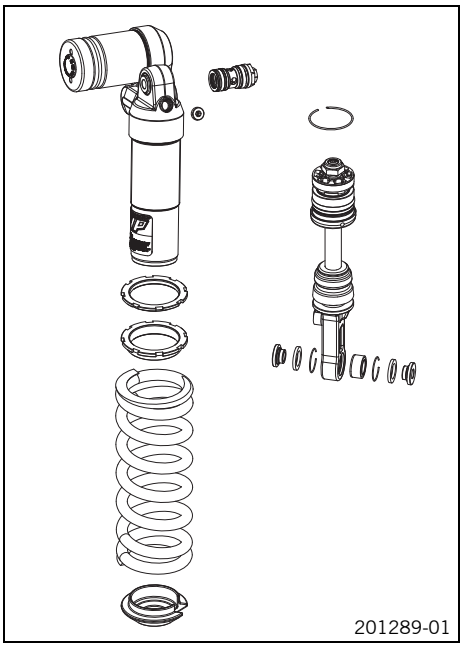
– Mount the side cover. (☛ p. 65)
– Mount the seat. (☛ p. 65)
– Remove the motorcycle from the work stand. (☛ p. 11)

9.11 Servicing the shock absorber

Caution

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

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



Condition

The shock absorber has been removed.

– Remove the spring. (☛ p. 43)
– Dismantle the damper. (☛ p. 44)
– Disassemble the piston rod. (☛ p. 45)
– Check the damper. (☛ p. 46)
– Remove the heim joint. (☛ p. 47)
– Install the heim joint. (☛ p. 48)
– Assemble the piston rod. (☛ p. 49)
– Assemble the damper. (☛ p. 50)
– Install the spring. (☛ p. 55)

9.12 Removing the spring

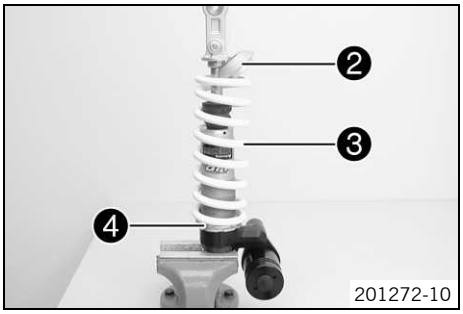
Condition

The shock absorber has been removed.

– Clamp the shock absorber in the vise using soft jaws for protection.
– Measure and note spring length in preloaded state.
– Loosen retaining ring ❶ and the adjusting ring with the special tool.

Hook wrench (T106S) (☛ p. 224)

– Turn the retaining ring and adjusting ring until the spring is fully relieved of tension.

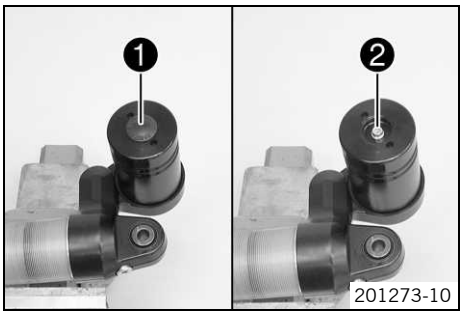


– Remove spring retainer ❷.
– Take off spring ❸ with the retaining ring and adjusting ring ❹.

9.13 Dismantling the damper

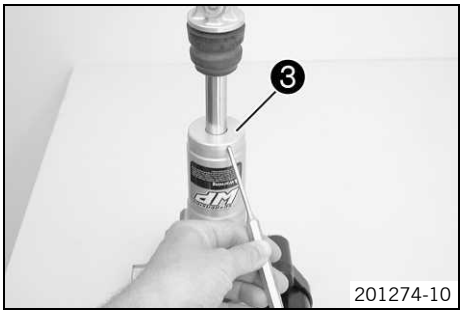
Preparatory work

– Remove the spring. (☛ p. 43)



Main work

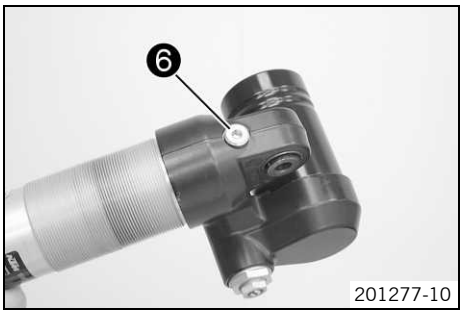
– Establish and note the current state of the rebound damping and compression damping.
– Completely open the adjusters of the rebound and compression damping.
– Remove rubber cap ❶ of the reservoir.
– Open screw ❷ slowly.
  ✓ The pressurized nitrogen escapes.



– Clamp the damper in the vise using soft jaws.
– Remove locking cap ❸.

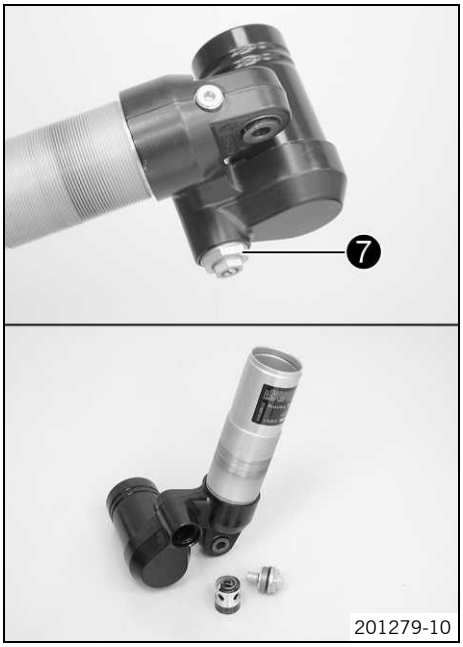
– Press in seal ring retainer ❹. Remove lock ring ❺.

Info
Do not scratch the inner surface.



– Remove screw ❻. Drain the oil.

– Remove the piston rod. Drain the remaining oil.

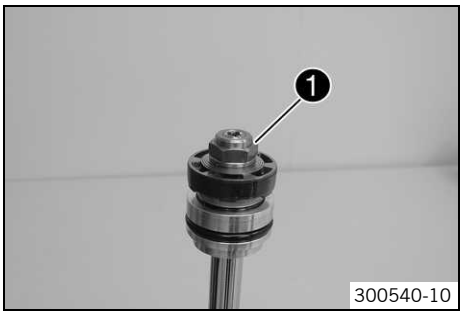


– Remove compression adjuster ❼. Remove the spring, sleeve, and piston.

9.14 Disassembling the piston rod

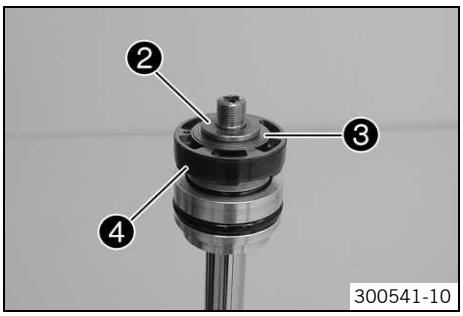
Preparatory work

– Remove the spring. (☛ p. 43)
– Dismantle the damper. (☛ p. 44)



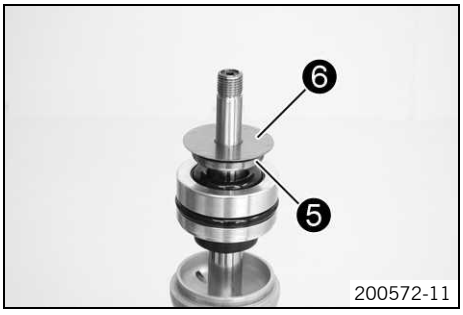
Main work

– Clamp the piston rod with the heim joint in a vise.
– Remove nut ❶.



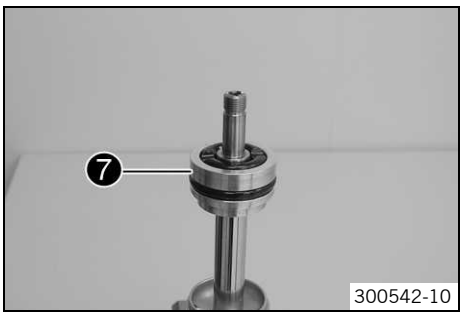
– Remove supporting plate ❷ and rebound shim stack ❸ together with piston ❹.

Info
Thread the rebound shim set on a screwdriver and set the parts down together.

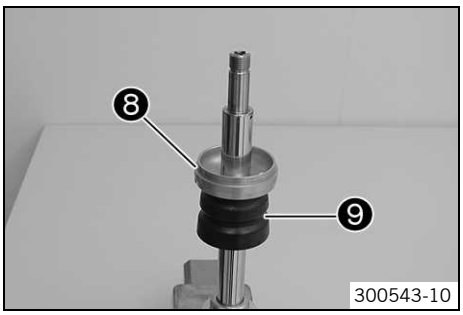


– Remove compression shim stack ❻ with supporting plate ❺.

Info
Thread the compression shim stack on a screwdriver and set the parts down together.



– Remove seal ring retainer ❼.



– Remove locking cap ❽ and rubber buffer ❾.

9.15 Checking the damper

Condition
The damper has been disassembled.

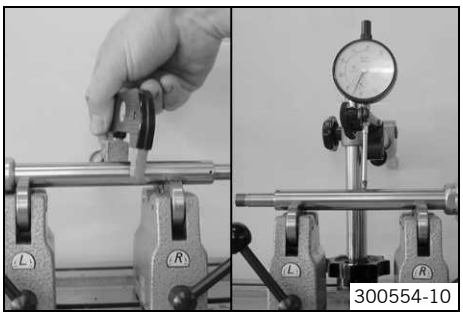
– Measure the inside diameter at both ends and in the center of the damper cartridge.

Damper cartridge	
Minimum diameter	46.10 mm (1.815 in)

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

– Check the damper cartridge for damage and wear.

» If there is damage or wear:
– Change the damper cartridge.



– Measure the diameter of the piston rod.

Piston rod	
Diameter	≥ 17.95 mm (≥ 0.7067 in)

» If the specification is not reached:
– Change the piston rod.

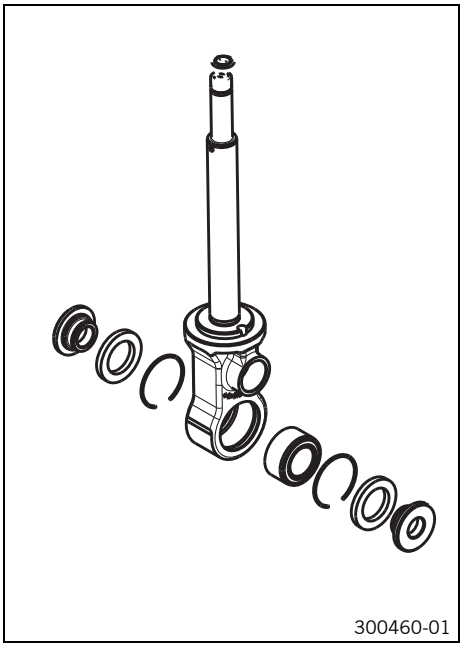
– Measure the run-out of the piston rod.

Piston rod	
Run-out	≤ 0.03 mm (≤ 0.0012 in)

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

– Check the piston rod for damage and wear.

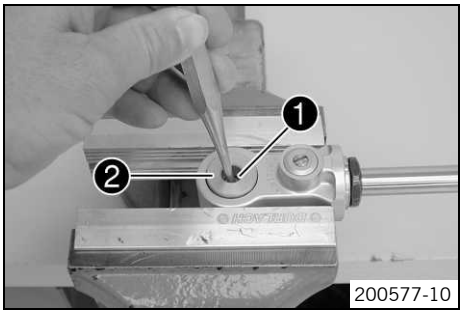
» If there is damage or wear:
– Change the piston rod.


300460-01

– Check the heim joint for damage and wear.
  » If there is damage or wear:
    – Change the heim joint.

9.16 Removing the heim joint

Condition
The shock absorber has been removed.



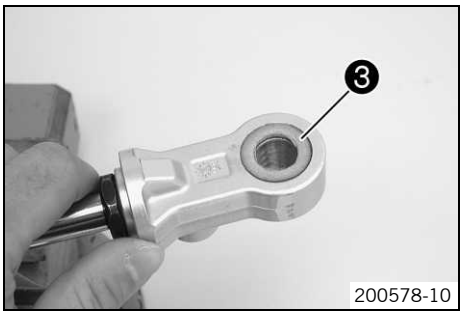
200577-10

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

Pin (T120) (☛ p. 224)

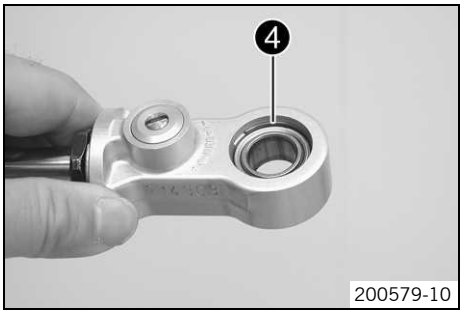
– Turn over the shock absorber and remove collar bushing ❷ of the heim joint.

Pin (T120) (☛ p. 224)



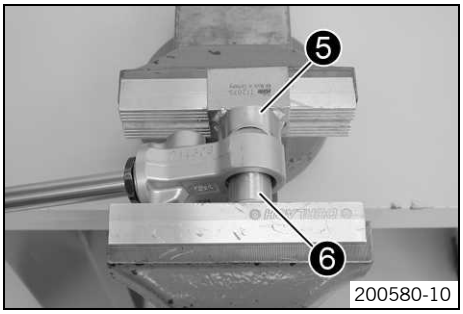
200578-10

– Remove seal rings ❸ on both sides.



200579-10

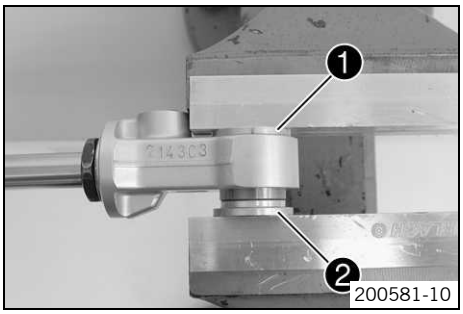
– Remove lock rings ❹ on both sides.



– Place special tool ❺ underneath and press out the heim joint with special tool ❻.

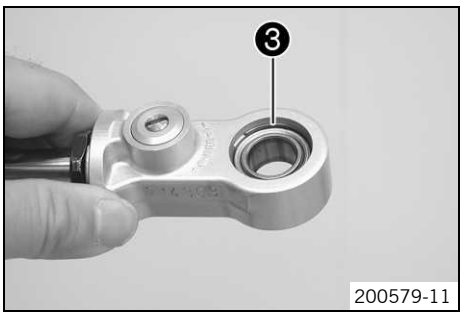
Pressing tool (T1207S) (☛ p. 225)

9.17 Installing the heim joint

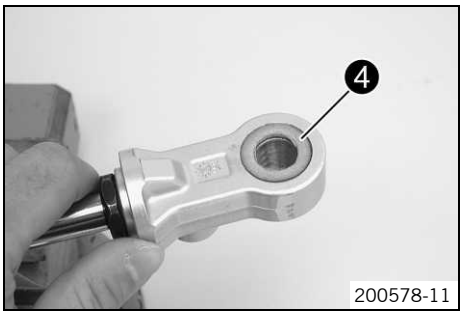


– Place special tool ❶ underneath and press in the heim joint as far as the center using special tool ❷.

Pressing tool (T1206) (☛ p. 225)
Pressing tool (T129) (☛ p. 225)

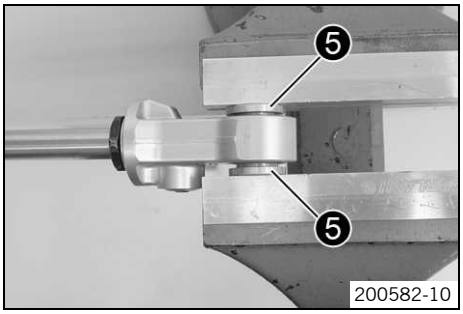


– Mount lock rings ❸ on both sides.



– Mount seal rings ❹ on both sides and grease them.

Lubricant (T158) (☛ p. 214)

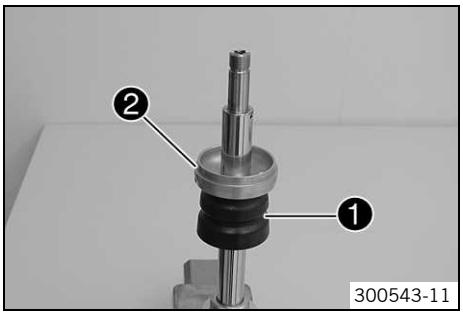


– Press in both collar sleeves ❺ of the heim joint.

9.18 Assembling the piston rod

Preparatory work

– Check the damper. (☛ p. 46)



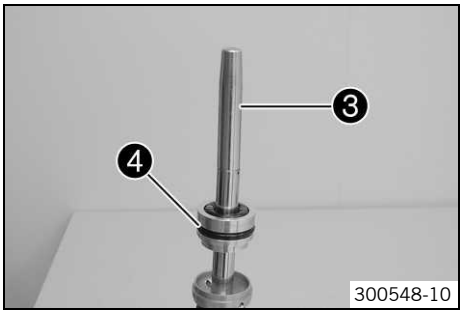
Main work

– Clamp the piston rod with the heim joint in a vise.

Guideline

Use soft jaws.

– Mount rubber buffer ❶ and locking cap ❷.



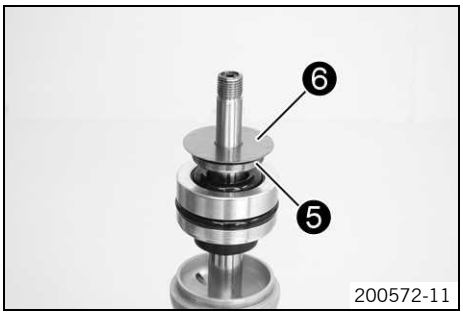
– Position special tool ❸ on the piston rod.

Mounting sleeve (T1515) (☛ p. 227)

– Grease the seal ring and push seal ring retainer ❹ on to the piston rod.

Lubricant (T625) (☛ p. 215)

– Remove the special tool.

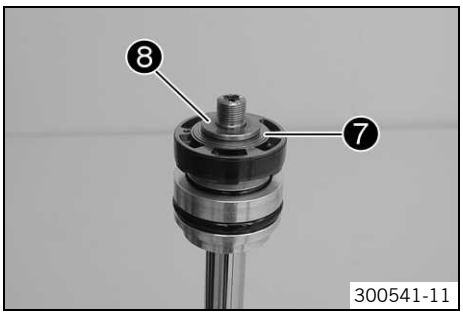


– Mount supporting plate ❺ with the rounded side facing downward.
– Mount the compression shim stack ❻ with the smaller shims facing downward.

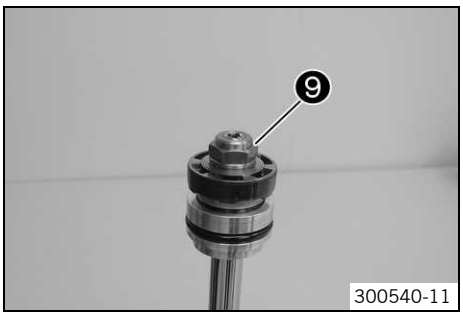
– Sand both sides of the piston on a surface plate using 1200-grit sandpaper.
– Clean the piston.
– Assemble the piston.

Guideline

View Ⓐ	Piston from above
View Ⓑ	Piston from below



– Mount the rebound shim stack ❼ with the smaller shims facing upward.
– Install supporting plate ❽.



– Mount and tighten nut ❾.

Guideline

Piston rod nut	M12x1	40 Nm (29.5 lbf ft)

9.19 Assembling the damper

Preparatory work

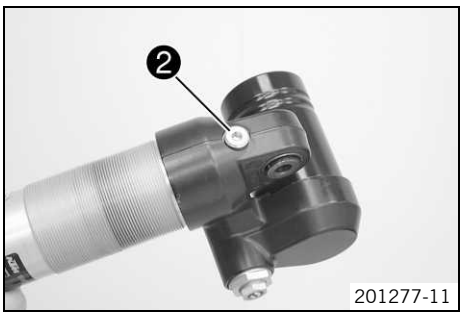
– Check the damper. (☛ p. 46)
– Assemble the piston rod. (☛ p. 49)

Main work

– Push the spring and sleeve onto the compression adjuster. Mount the piston.
– Mount and tighten compression adjuster ❶.

Guideline

Compression adjuster	M26x1	30 Nm (22.1 lbf ft)



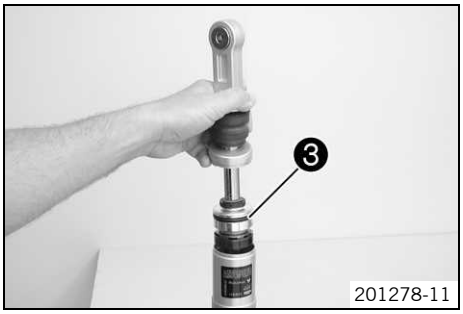
– Mount and tighten screw ❷.

Guideline

Filling port screw	M10x1	14 Nm (10.3 lbf ft)

– Clamp the damper in the vise using soft jaws.
– Fill the damper cartridge about half full.

Shock absorber oil (SAE 2.5) (50180342S1) (☛ p. 213)



– Grease O-ring ❸ of the seal ring retainer.

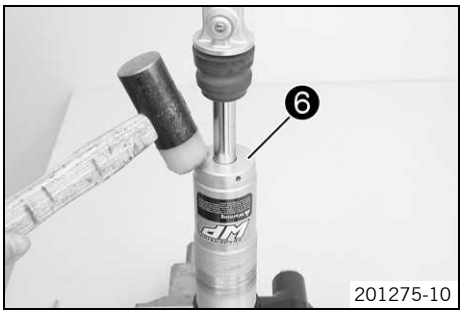
Lubricant (T158) (☛ p. 214)

– Mount the piston rod carefully.

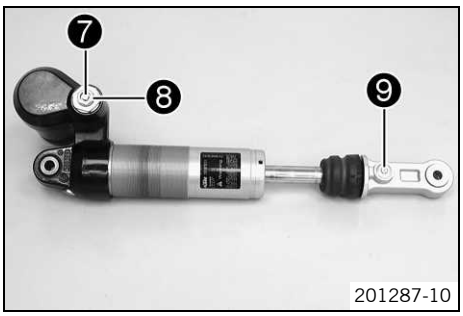
– Install the seal ring bearer ❹ and push it under the ring groove.
– Mount lock ring ❺.

Info
Do not scratch the inner surface.

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



– Mount locking cap ❻ of the damper cartridge.
– Bleed and fill the damper. (☛ p. 52)
– Fill the damper with nitrogen. (☛ p. 54)



Alternative 1

– Turn adjusting screw ❼ clockwise with a screwdriver up to the last perceptible click.
– Turn back counterclockwise by the number of clicks corresponding to the shock absorber type.

Guideline

Compression damping, low-speed	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks

– Turn adjusting screw ❽ all the way clockwise using a socket wrench.
– Turn back counterclockwise the number of turns corresponding to the shock absorber type.

Guideline

Compression damping, high-speed	
Comfort	2 turns
Standard	1.5 turns
Sport	1 turn
Full payload	1 turn

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

Guideline

Rebound damping	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks

Alternative 2

Warning

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

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

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

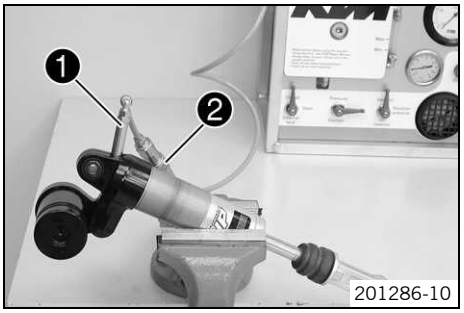
Finishing work

– Install the spring. (☛ p. 55)

9.20 Bleeding and filling the damper

Info

Before working with the vacuum pump, be sure to read the operating instructions carefully.
Completely open the adjusters of the rebound and compression damping.



– Remove the screw of the filling port.
– Install adapter ❶ on the damper.

Info

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

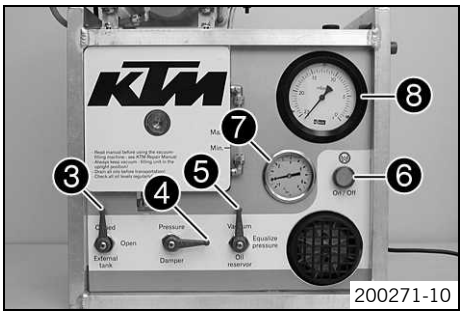
– Connect the adapter ❶ to connector ❷ of the vacuum pump.

Vacuum pump (T1240S) (☛ p. 225)

– Clamp the damper with soft jaws or hold it as shown in the photo.

Info

Clamp the damper only lightly.
The filling port must be at the highest point.
The piston rod slides in and out during filling - do not hold it tight with your hand!

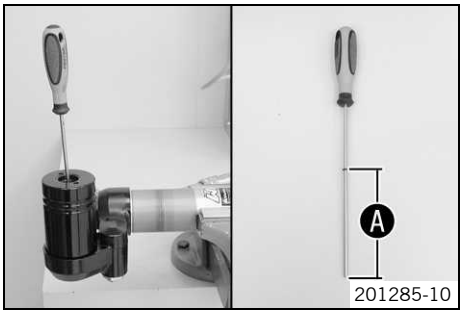


– Place the control lever as shown in the photo.
  ✓ The **External tank** ❸ control lever is on **Closed**, **Damper** ❹ on **Vacuum**, and **Oil reservoir** ❺ on **Vacuum**.
– Operate the **On/Off** switch ❻.
  ✓ The vacuum pump process starts.
  ✓ Pressure gauge ❼ falls to the specified value.

< 0 bar

  ✓ The vacuum gauge ❽ falls to the specified value.

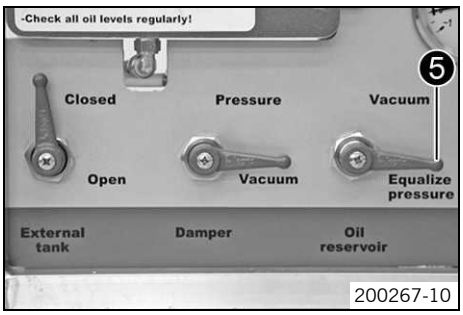
4 mbar



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

Depth micrometer (T107S) (☛ p. 224)

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



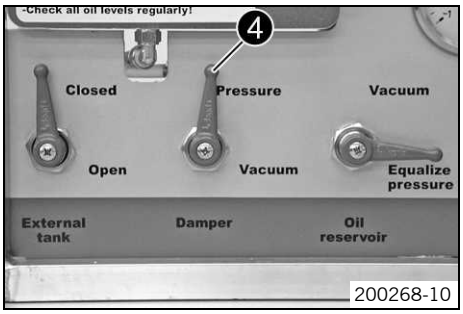
– When the vacuum pressure gauge reaches the specified value, turn the **Oil reservoir** control lever ❺ to **Equalize pressure**.

Guideline

4 mbar

✔ The pressure gauge rises to the specified value.

0 bar



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

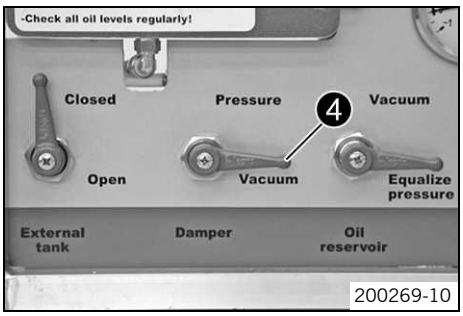
Guideline

0 bar

✔ Oil is pumped into the damper.

✔ The pressure gauge rises to the specified value.

3 bar



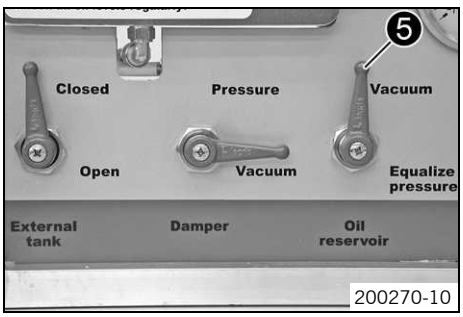
– When the pressure gauge reaches the specified value, turn the **Damper** ❹ control lever to **Vacuum**.

Guideline

3 bar

✔ The pressure gauge falls to the specified value.

0 bar



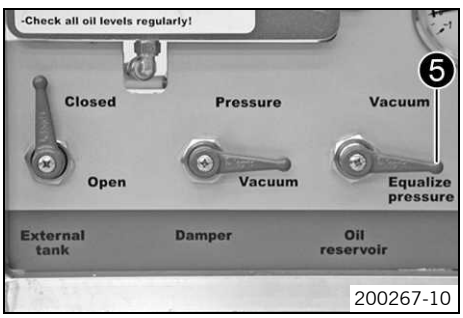
– When the pressure gauge reaches the specified value, turn the **Oil reservoir** ❺ control lever to **Vacuum**.

Guideline

0 bar

✔ The vacuum gauge falls to the specified value.

4 mbar



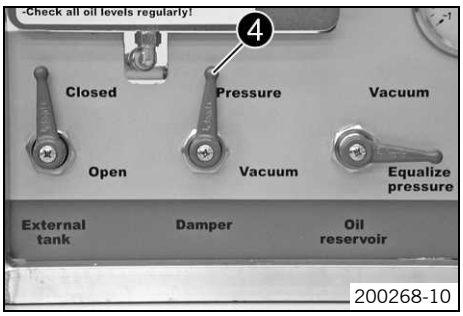
– When the vacuum pressure gauge reaches the specified value, turn the **Oil reservoir** control lever ❺ to **Equalize Pressure**.

Guideline

4 mbar

✔ The pressure gauge falls to the specified value.

0 bar



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

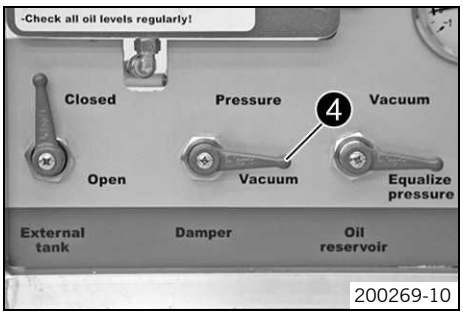
Guideline

0 bar

✔ Oil is pumped into the damper.

✔ The pressure gauge rises to the specified value.

3 bar



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

Guideline

3 bar

✔ The pressure gauge falls to the specified value.

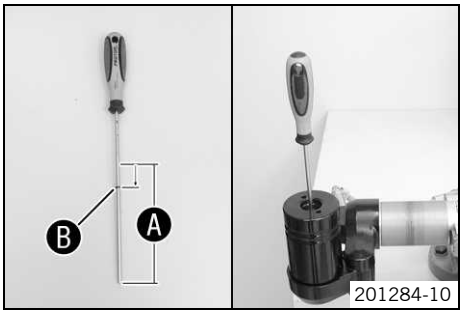
0 bar

– When the pressure gauge reaches the specified value, operate the **On/Off** switch.

Guideline

0 bar

✔ The vacuum pump is switched off.



– Slide O-ring ❽ to the end of the special tool by the specified value (distance ❹ minus specified value).

Guideline

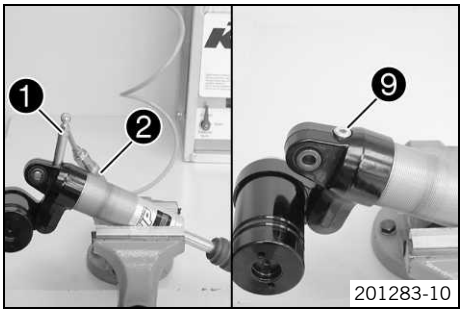
10 mm

Depth micrometer (T107S) (☛ p. 224)

– Slide the floating piston into the reservoir to the shortened position using the special tool.

Info
The floating piston must be positioned at exactly this point when the rod is fully extended; otherwise, damage will occur during compression of the shock absorber.

– Remove the special tool.



– Remove adapter ❶ from connection ❷ of the vacuum pump.

Info
Hold the damper so that the filling port is at the highest point.

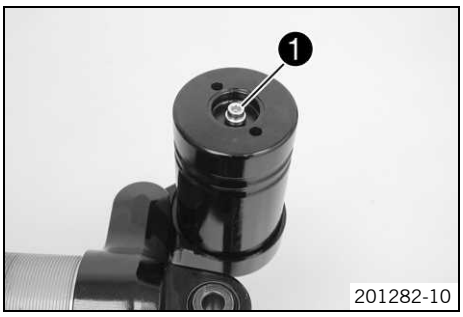
– Remove the adapter.

– Mount and tighten screw ❾.

Guideline

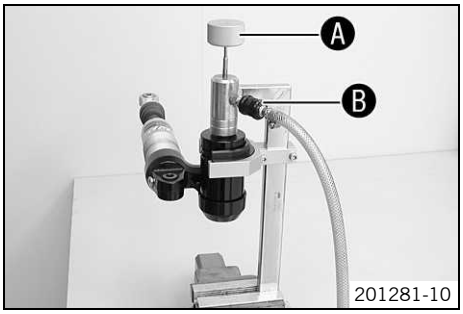
Filling port screw	M10x1	14 Nm (10.3 lbf ft)

9.21 Filling the damper with nitrogen



– Screw in screw ❶ by approx. 2 rotations but do not tighten.

Info
The piston rod is fully extended.



– Clamp special tool in the vise.

Nitrogen filling tool (T170S1) (☛ p. 227)

– Connect the special tool to the pressure regulator of the filling cylinder.

Filling gas - nitrogen

– Adjust pressure regulator.

Guideline

Gas pressure	10 bar (145 psi)

– Position the damper in the special tool.

✓ The hexagonal part of the tap handle ❶ engages in the hexagon socket of the filling port screw.

– Open filler tap ❷.

– Fill the damper for at least 15 seconds.

Guideline

Gas pressure	10 bar (145 psi)

Info

Watch the pressure regulator dial.
Make sure that the damper is filled to the specified pressure.

– Close the filling port screw using tap handle ❶.

– Close spigot ❷ and take the damper out of the special tool.

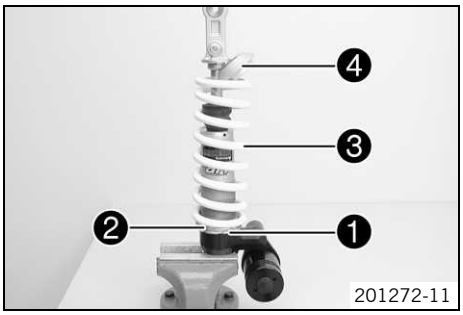
– Tighten the filling port screw.

Guideline

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

– Mount the rubber cap of the reservoir.

9.22 Installing the spring



– Clamp the damper in the vise using soft jaws.

– Install retaining ring ❶ and turn it down as far as possible.

✓ The collar points to the adjusting ring.

– Mount adjusting ring ❷ and turn it down as far as possible.

✓ The collar points to the spring.

– Measure the overall spring length without a load.

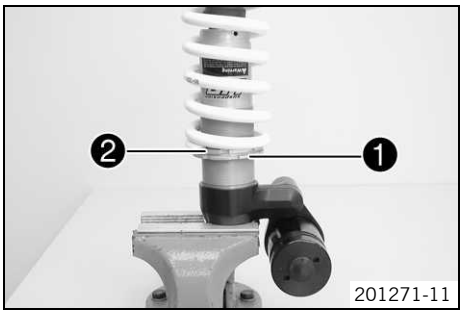
– Mount spring ❸.

Guideline

Spring rate	
Soft	75 N/mm (428 lb/in)
Medium (standard)	80 N/mm (457 lb/in)
Hard	85 N/mm (485 lb/in)

– Mount spring retainer ❹.

✓ The open end is opposite the spring end.



Alternative 1

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

Guideline

Spring preload	20 mm (0.79 in)

Hook wrench (T106S) (☛ p. 224)

Alternative 2

Warning

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

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

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

Hook wrench (T106S) (☛ p. 224)

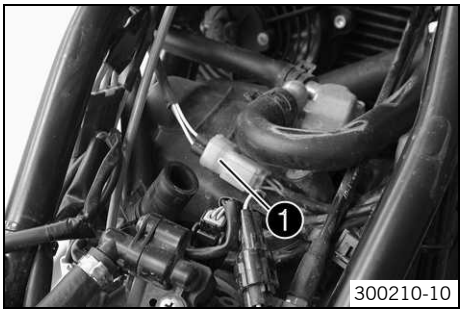
– Tighten lock nut ❶ and the adjusting ring.

10.1 Removing the manifold

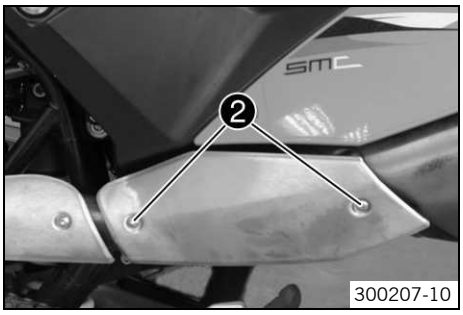
Warning
Danger of burns The exhaust system gets very hot when the vehicle is driven.
– Allow the exhaust system to cool down. Do not touch hot components.

Preparatory work
– Remove the seat. (☛ p. 64)
– Take off the side cover. (☛ p. 65)
– Remove the air filter box. (☛ p. 61)

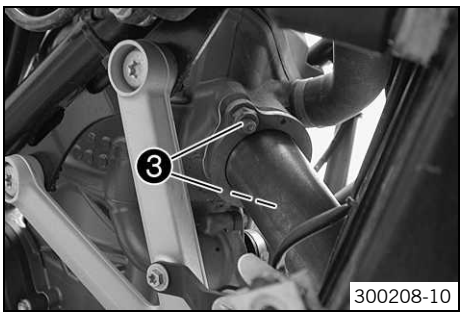
Main work



– Unplug connector ❶ of the lambda sensor. Open the cable binder.

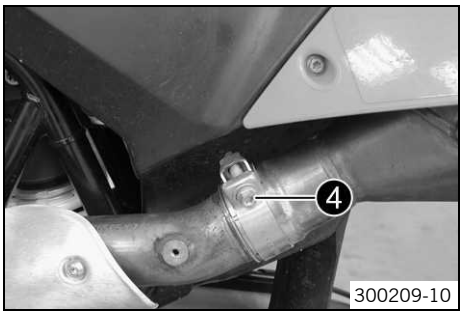


– Remove screws ❷.
– Remove the heat shield.



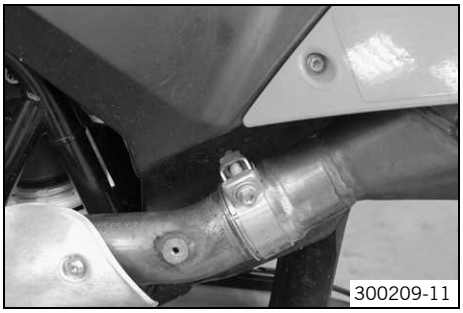
– Remove nuts ❸ of the manifold.

Info
Do not misplace the spacers.



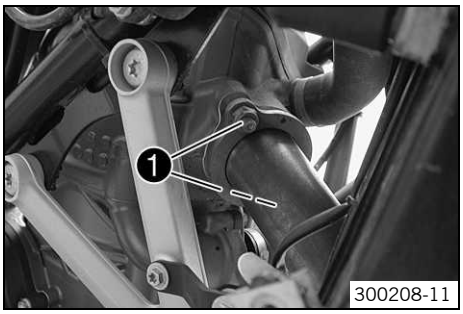
– Loosen screw ❹.
– Remove the manifold.

10.2 Installing the manifold



Main work

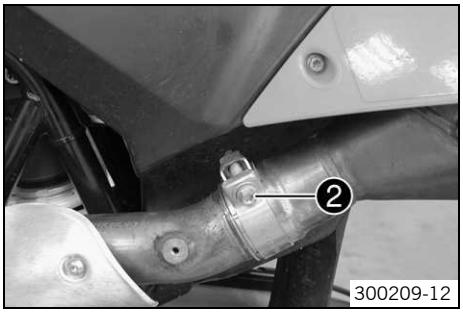
– Position the manifold with the seals.



– Position the spacer.
– Mount and tighten nuts ❶.

Guideline

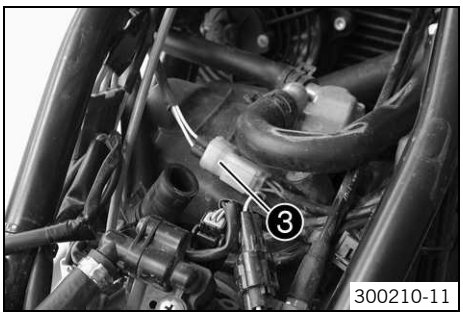
Nut, manifold on cylinder head	M8	20 Nm (14.8 lbf ft)	Copper paste



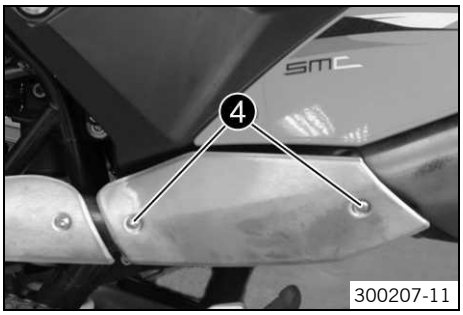
– Position the screw clamp.
– Tighten screw ❷.

Guideline

Screw, main silencer clamp	M8	12 Nm (8.9 lbf ft)	Copper paste



– Plug in the connector of the lambda sensor ❸. Secure the cable with the cable binders.



– Position the heat shield.
– Mount and tighten screws ❹.

Guideline

Screw, exhaust heat shield	M5	8 Nm (5.9 lbf ft)	**Loctite® 243™**

Finishing work

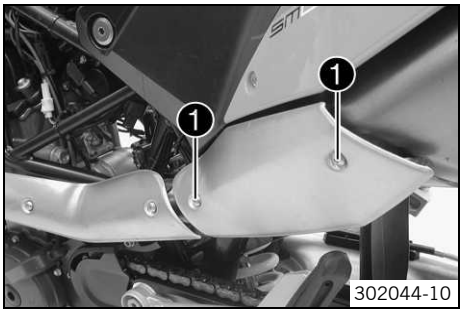
– Install the air filter box. (☛ p. 62)
– Mount the side cover. (☛ p. 65)
– Mount the seat. (☛ p. 65)

10.3 Removing the main silencer

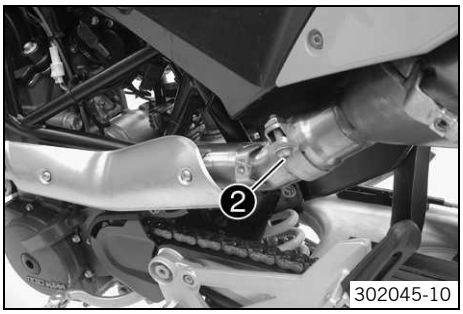
Warning

Danger of burns The exhaust system gets very hot when the vehicle is driven.

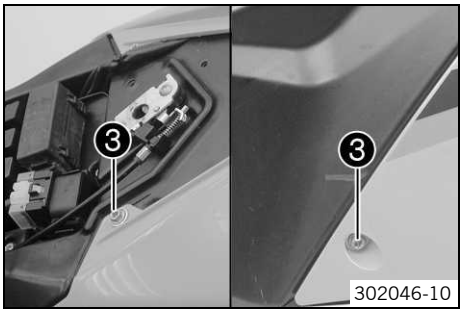
– Allow the exhaust system to cool down. Do not touch hot components.



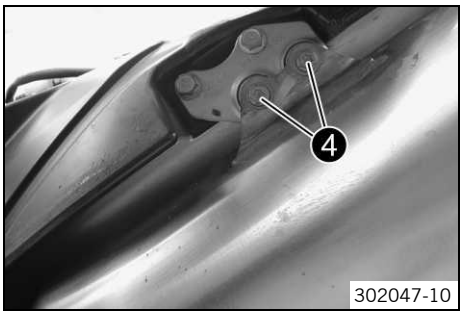
– Remove screws ❶.
– Take off the exhaust heat shield.



– Loosen screw ❷.

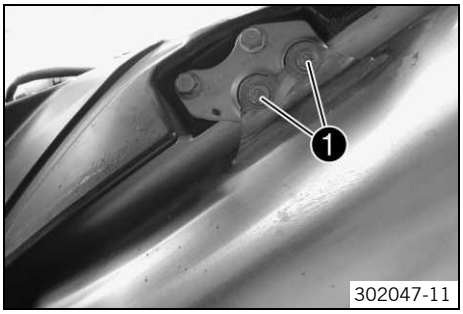


– Remove screws ❸.
– Lift the rear fairing.



– Remove screws ❹.
– Remove the main silencer.

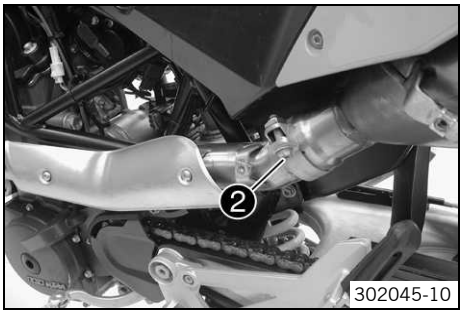
10.4 Installing the main silencer



– Position the main silencer.
– Mount and tighten screws ❶.

Guideline

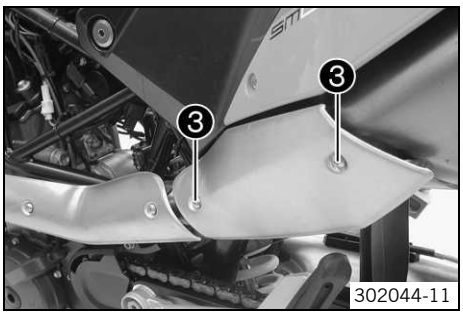
Screw, main silencer holder	M8	25 Nm (18.4 lbf ft)



– Position the screw clamp.
– Tighten screw ❷.

Guideline

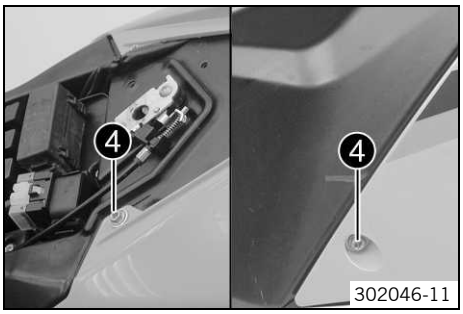
Screw, main silencer clamp	M8	12 Nm (8.9 lbf ft)	Copper paste



– Position the exhaust heat shield.
– Mount and tighten screws ❸.

Guideline

Screw, exhaust heat shield	M5	8 Nm (5.9 lbf ft)	**Loctite® 243™**



– Mount and tighten screws ❹.

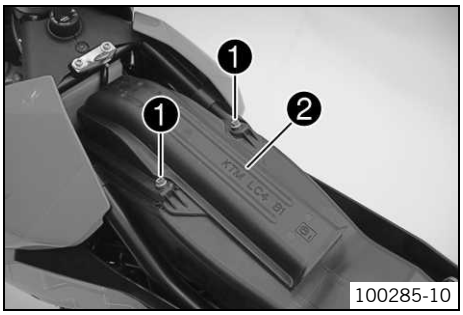
Guideline

Rear fairing screw	M6	5 Nm (3.7 lbf ft)

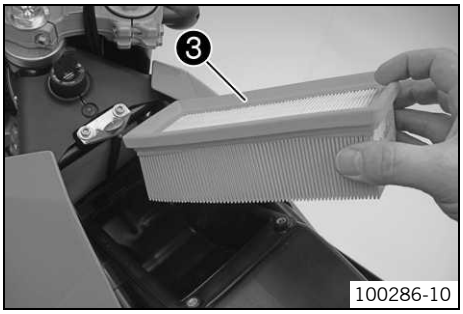
11 AIR FILTER

11.1 Removing the air filter

Preparatory work
– Remove the seat. (☛ p. 64)



Main work
– Remove screws ❶. Take off air filter box top ❷.



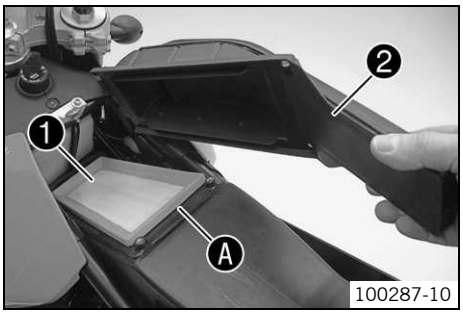
Note

Engine failure Unfiltered intake air has a negative effect on the service life of the engine.

– Never ride the vehicle without an air filter since dust and dirt can get into the engine and result in increased wear.

– Remove air filter ❸.

11.2 Installing the air filter



Main work
– Clean the air filter box.
– Mount air filter ❶.

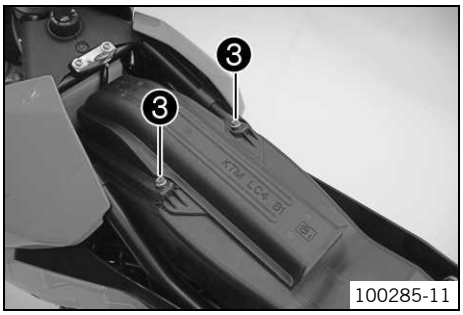
Info

The air filter must lie flush against the air filter box along the entire sealing surface Ⓐ.
If the air filter is not correctly mounted, dust and dirt can enter the engine and cause damage.

– Hook air filter box top ❷ into the front of the air filter box and swing down.
– Mount and tighten screws ❸.

Guideline

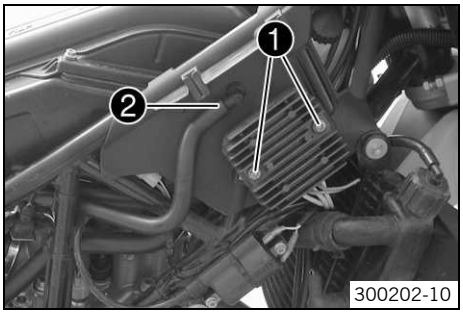
Screw, air filter box top	M6	2 Nm (1.5 lbf ft)



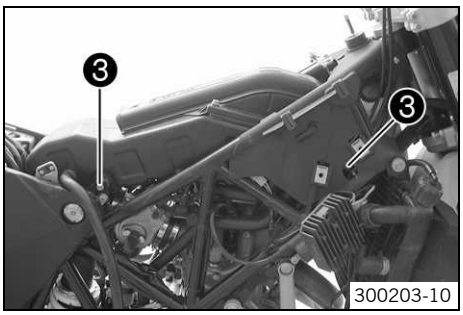
Finishing work
– Mount the seat. (☛ p. 65)

11.3 Removing the air filter box

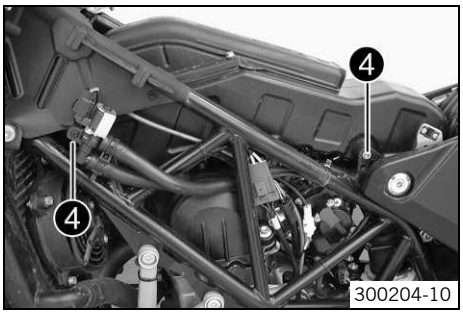
Preparatory work
– Remove the seat. (☛ p. 64)
– Take off the side cover. (☛ p. 65)



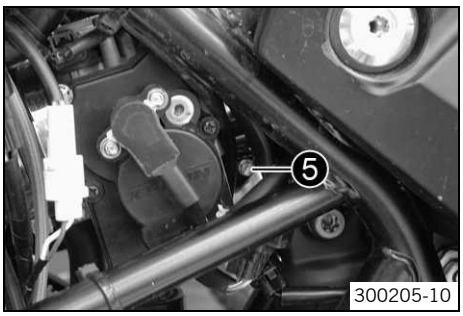
Main work
- Remove screws ❶.
- Take off the voltage regulator and hang it to the side in a de-energized state.
- Detach and expose hose ❷.



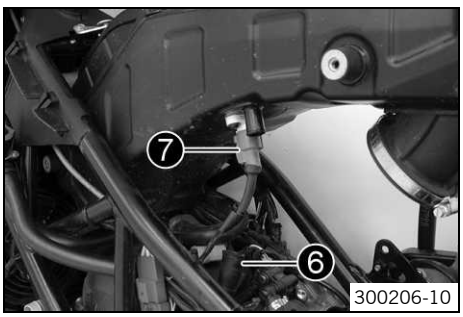
- Remove screws ❸.



- Remove screws ❹.



- Loosen hose clip ❺.

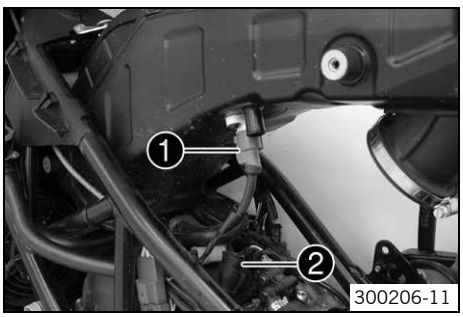


- Raise the air filter box at the rear.
- Loosen the spring-loaded band-type clamp with the special tool and detach bleed hose ❻.

Pliers for spring band clamp (60029057100) (☛ p. 218)

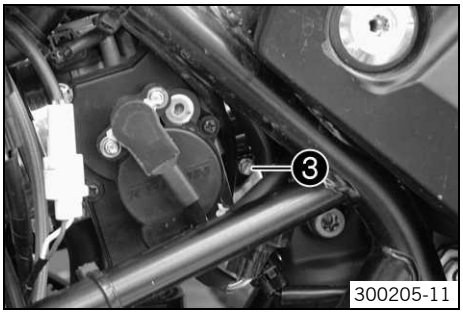
- Detach connector ❼ of the intake air temperature sensor.
- Take off the air filter box.

11.4 Installing the air filter box

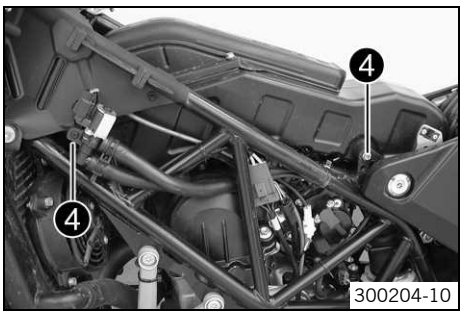


Main work
- Attach connector ❶ of the intake air temperature sensor.
- Mount bleed hose ❷. Mount the spring-loaded band-type clamp using the special tool.

Pliers for spring band clamp (60029057100) (☛ p. 218)

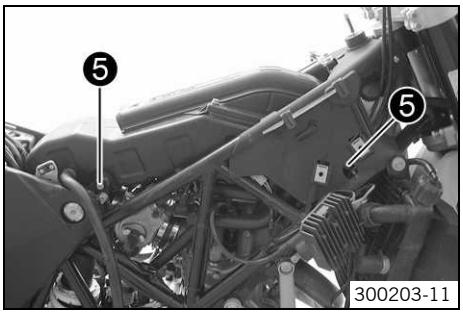


– Position the air filter box.
– Mount and tighten hose clip ❸.



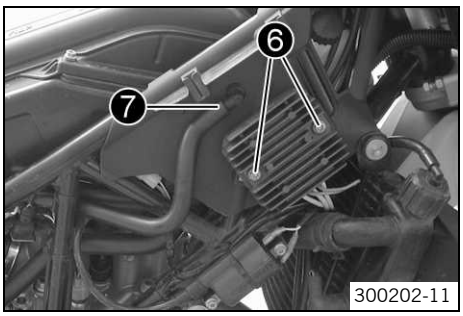
– Mount and tighten screws ❹.
Guideline

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



– Mount and tighten screws ❺.
Guideline

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



– Position the voltage regulator.
– Mount and tighten screws ❻.
Guideline

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

– Route and mount vent hose ❼ without kinking.

Finishing work
– Mount the side cover. (☛ p. 65)
– Mount the seat. (☛ p. 65)

12.1 Opening the filler cap

Danger

Fire hazard Fuel is highly flammable.

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

Warning

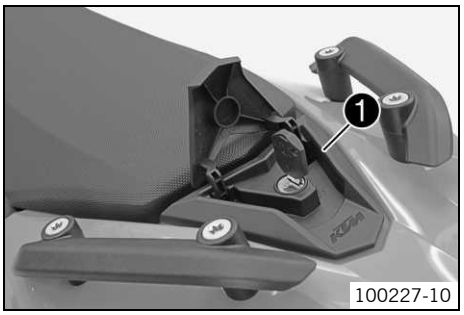
Danger of poisoning Fuel is poisonous and a health hazard.

- Avoid contact between fuel and skin, eyes and clothing. Do not inhale fuel vapors. If fuel gets into your eyes, rinse immediately with water and contact a doctor. Wash affected skin areas immediately with soap and water. If fuel is swallowed, contact a doctor immediately. Change clothing that has come into contact with fuel. Store fuel in a suitable canister according to regulations and keep it out of the reach of children.

Warning

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

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



- Lift the cover of filler cap ❶ and insert the ignition key.
- Turn the ignition key 90° counterclockwise and remove the filler cap.

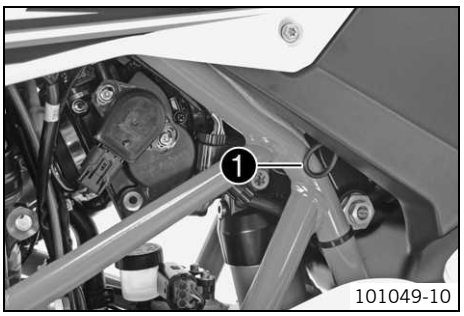
Info

The filler cap has a fuel tank breather.

12.2 Closing filler cap

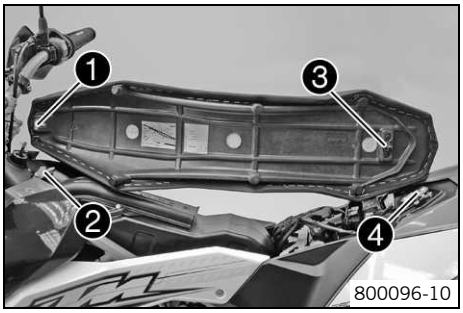
- Put the filler cap back on and turn the ignition key 90° clockwise.
- Remove the ignition key and fold down the cover.

12.3 Removing the seat



- Pull on strap ❶ and raise the rear of the seat at the same time.
- Pull back the seat and lift it off.

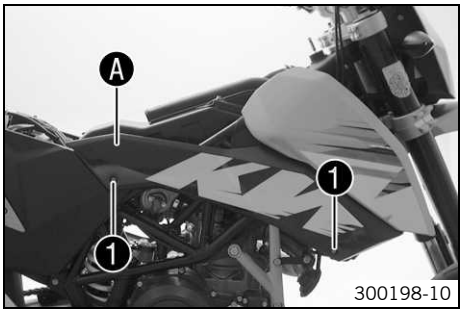
12.4 Mounting the seat



– Hook slot ❶ of the seat onto screw ❷, press the rear downward and at the same time push it forward.
– Push locking pin ❸ into lock housing ❹ and push the back of the seat down until the locking pin locks in place with an audible click.
– Finally, check that the seat is correctly mounted.

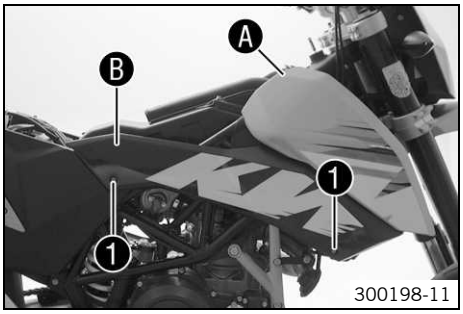
12.5 Taking off the side cover

Preparatory work
– Remove the seat. (☛ p. 64)



Main work
– Remove screws ❶.
– Pull off the side cover in area Ⓐ and take off from above.
– Repeat the operation on the opposite side.

12.6 Mounting the side cover



Main work
– Attach the side cover in area Ⓐ and engage it in area Ⓑ.
– Mount and tighten screws ❶.

Guideline

Screw, side cover	M6	5 Nm (3.7 lbf ft)

– Repeat the operation on the opposite side.

Finishing work
– Mount the seat. (☛ p. 65)

12.7 Checking the fuel pressure

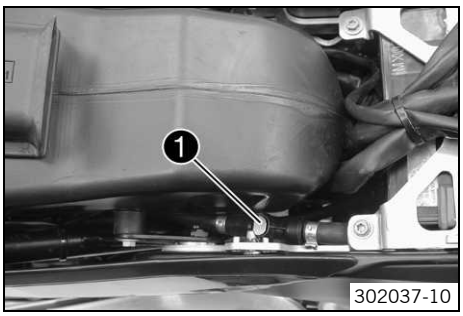
Danger
Fire hazard Fuel is highly flammable.

– 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.

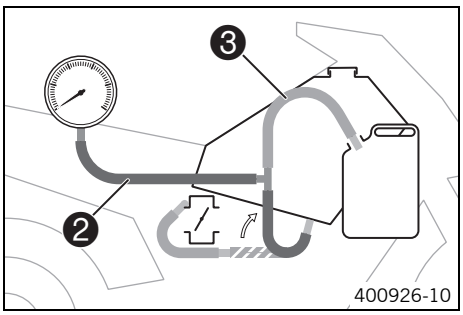
– Avoid contact between fuel and skin, eyes and clothing. Do not inhale fuel vapors. If fuel gets into your eyes, rinse immediately with water and contact a doctor. Wash affected skin areas immediately with soap and water. If fuel is swallowed, contact a doctor immediately. Change clothing that has come into contact with fuel. Store fuel in a suitable canister according to regulations and keep it out of the reach of children.

Condition
The fuel tank is completely full.
Ensure that the battery voltage does not drop below 12.5 V.
The ignition is on.
The diagnostics tool is connected.



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

Info
Remaining fuel may run out of the fuel hose.



– Mount special tool ❷.

Pressure testing tool (61029094000) (☛ p. 218)

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

Testing hose (61029093000) (☛ p. 218)

– Insert the hose end in a fuel canister.

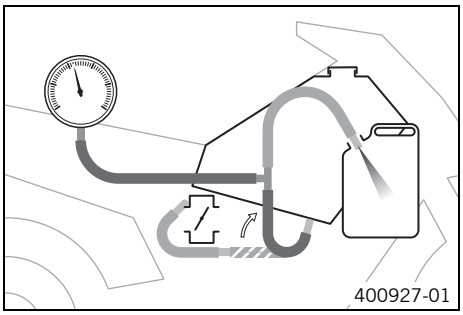
Guideline

Minimum fuel canister capacity	10 l (2.6 US gal)

– Perform the **"Actuator Test"** > **"Function test of fuel pump control"**.

Guideline

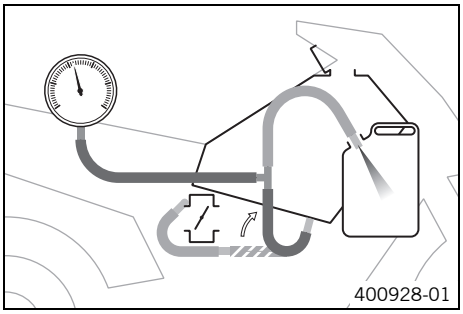
Maximum duration of actuator test	3 min



– Check the fuel pressure with the filler cap closed.

Fuel pressure	
When the fuel pump is active	3.3... 3.7 bar (48... 54 psi)

» If the specification is not reached:
  – Open the filler cap. (☛ p. 64)
  – Check the fuel tank breather.



– Check the fuel pressure with the filler cap open.

Fuel pressure	
When the fuel pump is active	3.3... 3.7 bar (48... 54 psi)

» If the specification is not reached:
  – Check that the fuel line is clear.
  – Change the fuel filter. (☛ p. 66)
  – Change the fuel pump. (☛ p. 69)

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

12.8 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.

– Avoid contact between fuel and skin, eyes and clothing. Do not inhale fuel vapors. If fuel gets into your eyes, rinse immediately with water and contact a doctor. Wash affected skin areas immediately with soap and water. If fuel is swallowed, contact a doctor immediately. Change clothing that has come into contact with fuel. Store fuel in a suitable canister according to regulations and keep it out of the reach of children.

Warning

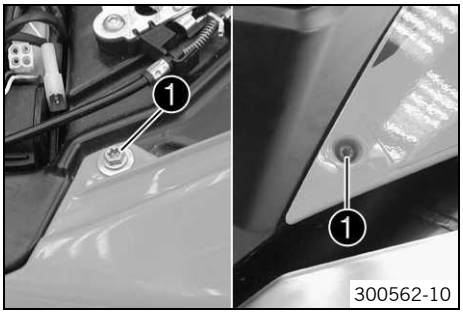
Environmental hazard Improper handling of fuel is a danger to the environment.

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

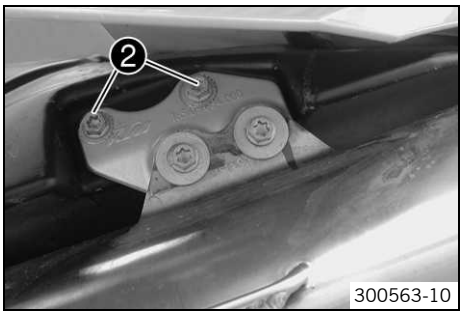
Preparatory work

– Switch off all power consumers and switch off the engine.
– Remove the seat. (☛ p. 64)
– Disconnect the battery. (☛ p. 84)
– Drain the fuel from the fuel tank into a suitable container.

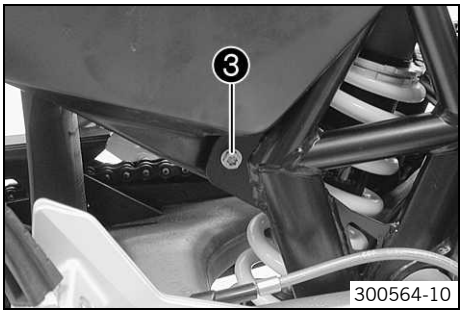
Main work



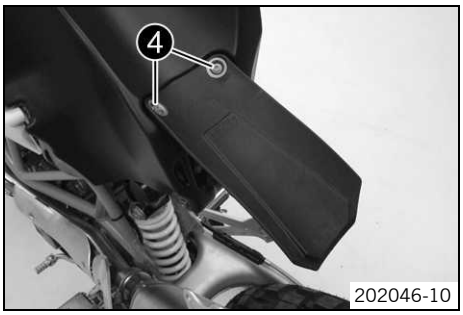
– Remove screws ❶.



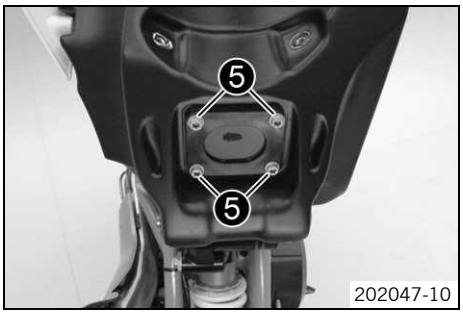
– Lift the rear fairing.
– Remove screws ❷.



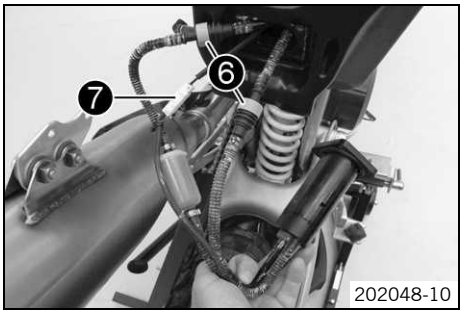
– Remove screw ❸ on both sides.
– Swing the rear end upwards and secure it.



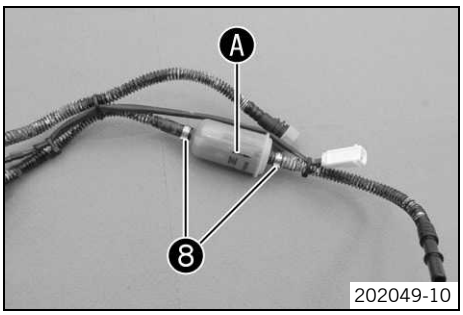
– Remove screws ❹ and the splash protector.



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

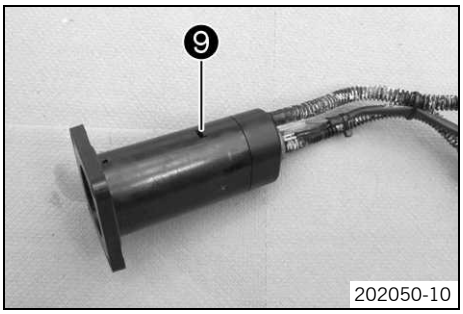


– Disconnect both fuel hose connections ❻.
– Unplug connector ❼. Remove the fuel pump.

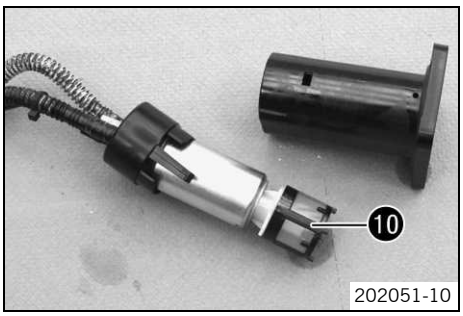


– Remove hose clamps ❽.
– Remove fuel filter.
– Mount the new fuel filter.
✓ Arrow Ⓐ points away from the fuel pump.
– Mount hose clamps ❽.

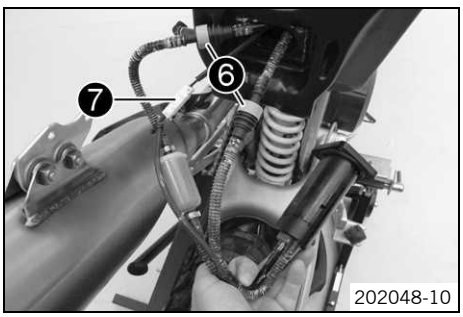
Hose clamp pliers (60029057000) (☛ p. 218)



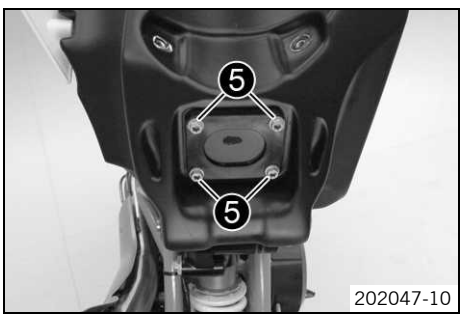
– Press locking mechanism ❾ on both sides.
– Pull off the fuel pump housing.



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

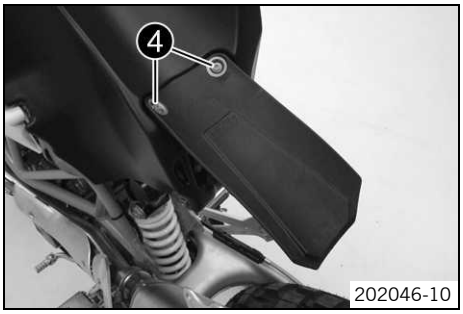


– Connect both fuel hose connections ❻.
– Attach connector ❼.



– Position the fuel pump.
– Mount and tighten screws ❺.
Guideline

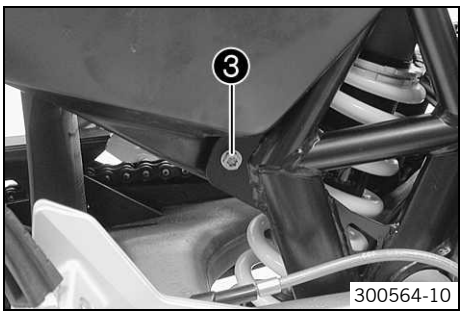
Screw, fuel pump	M5	4 Nm (3 lbf ft)



– Position the splash protector. Mount and tighten screws ❹.

Guideline

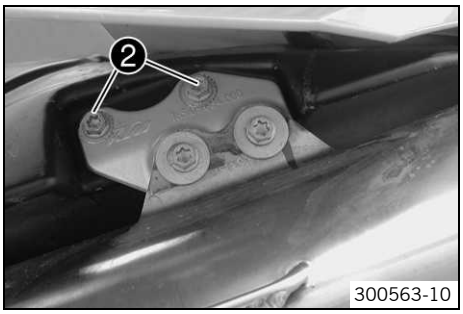
Remaining screws, chassis	M5	4 Nm (3 lbf ft)



– Position the rear end.
– Mount and tighten screw ❸ on both sides.

Guideline

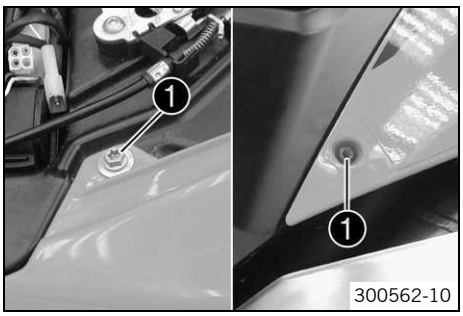
Screw, fuel tank, bottom	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**



– Lift the rear fairing.
– Mount and tighten screws ❷.

Guideline

Screw, main silencer holder on fuel tank	M8	25 Nm (18.4 lbf ft)



– Mount and tighten screws ❶.

Guideline

Screw, side cover	M6	5 Nm (3.7 lbf ft)

Finishing work

– Disconnect the battery. (☛ p. 85)
– Mount the seat. (☛ p. 65)
– Set the clock. (☛ p. 100)

12.9 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

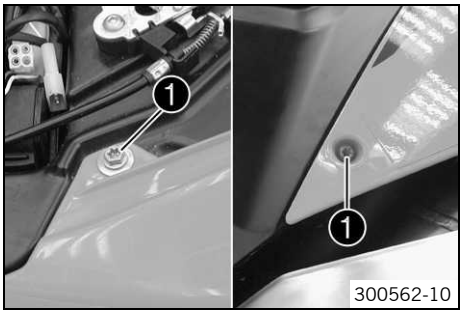
Danger of poisoning Fuel is poisonous and a health hazard.

– Avoid contact between fuel and skin, eyes and clothing. Do not inhale fuel vapors. If fuel gets into your eyes, rinse immediately with water and contact a doctor. Wash affected skin areas immediately with soap and water. If fuel is swallowed, contact a doctor immediately. Change clothing that has come into contact with fuel. Store fuel in a suitable canister according to regulations and keep it out of the reach of children.

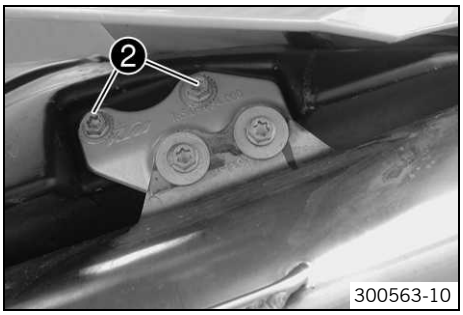
Warning
Environmental hazard Improper handling of fuel is a danger to the environment.
– Do not allow fuel to get into the ground water, the ground, or the sewage system.

Preparatory work
– Switch off all power consumers and switch off the engine.
– Remove the seat. (☛ p. 64)
– Disconnect the battery. (☛ p. 84)
– Drain the fuel from the fuel tank into a suitable container.

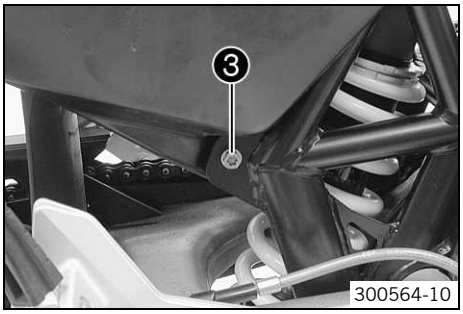
Main work



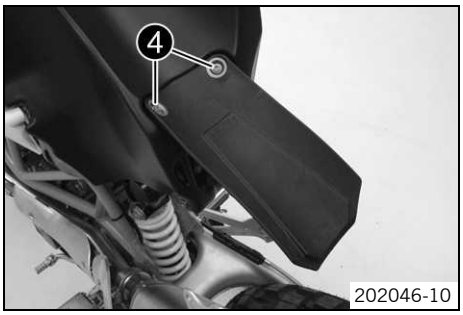
– Remove screws ❶.



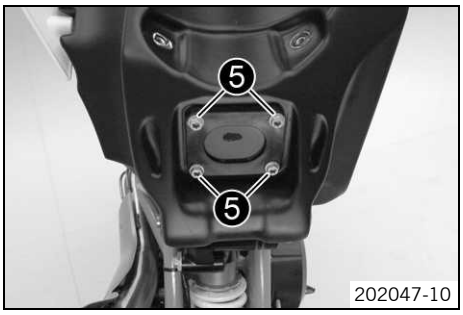
– Lift the rear fairing.
– Remove screws ❷.



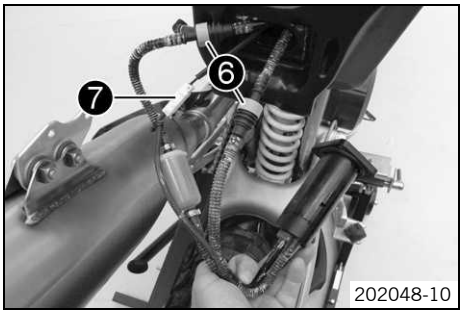
– Remove screw ❸ on both sides.
– Swing the rear end upward and secure it.



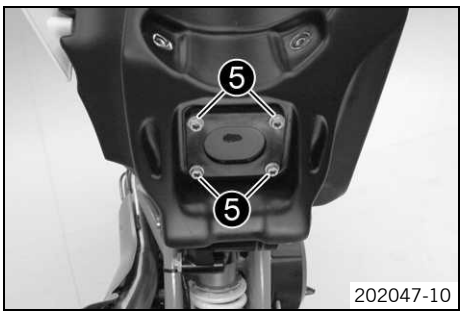
– Remove screws ❹ and the splash protector.



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



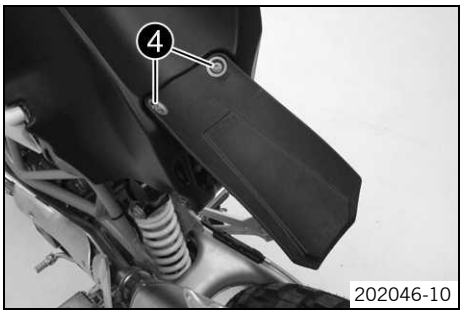
– Disconnect both fuel hose connections ❻.
– Unplug connector ❼. Remove the fuel pump.
– Connect the new fuel pump, attaching both fuel hose connections ❻.
– Attach connector ❼.



– Position the fuel pump.
– Mount and tighten screws ❺.

Guideline

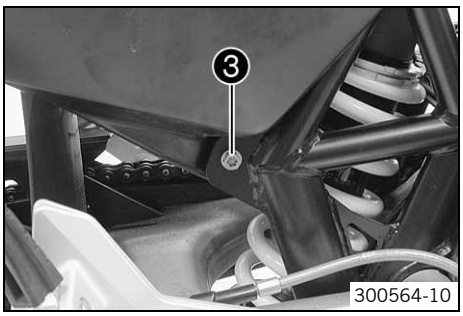
Screw, fuel pump	M5	4 Nm (3 lbf ft)



– Position the splash protector. Mount and tighten screws ❹.

Guideline

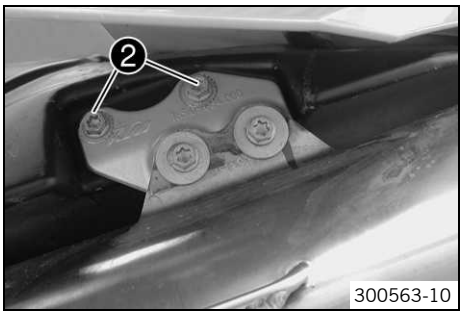
Remaining screws, chassis	M5	4 Nm (3 lbf ft)



– Position the rear end.
– Mount and tighten screw ❸ on both sides.

Guideline

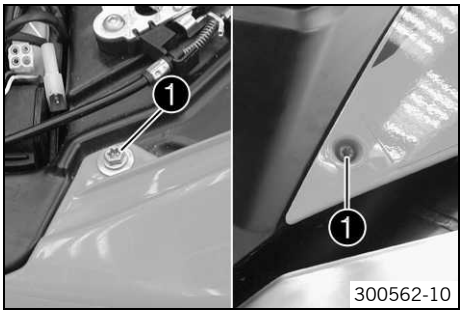
Screw, fuel tank, bottom	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**



– Lift the rear fairing.
– Mount and tighten screws ❷.

Guideline

Screw, main silencer holder on fuel tank	M8	25 Nm (18.4 lbf ft)



– Mount and tighten screws ❶.

Guideline

Screw, side cover	M6	5 Nm (3.7 lbf ft)

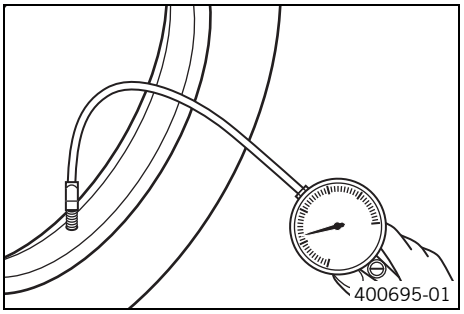
Finishing work

– Disconnect the battery. (☛ p. 85)
– Mount the seat. (☛ p. 65)

– Set the clock. (☛ p. 100)

13.1 Checking the tire air pressure

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



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

Tire air pressure, offroad, single rider	
Front	1.5 bar (22 psi)
Rear	1.5 bar (22 psi)

Tire air pressure, road, solo	
Front	1.8 bar (26 psi)
Rear	1.8 bar (26 psi)

Tire air pressure with passenger / fully loaded	
Front	2.0 bar (29 psi)
Rear	2.2 bar (32 psi)

» If the tire pressure does not meet specifications:
– Correct the tire pressure.
– Mount the protection cover.

13.2 Checking the tire condition

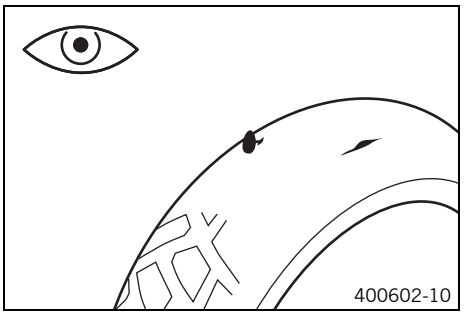
Warning
Danger of accidents Uncontrollable vehicle handling in the event of a flat tire.
– In the interest of safety, replace damaged or worn tires immediately.

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 a major impact on the riding behavior of the motorcycle.
Worn tires have a negative effect on riding behavior, 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.

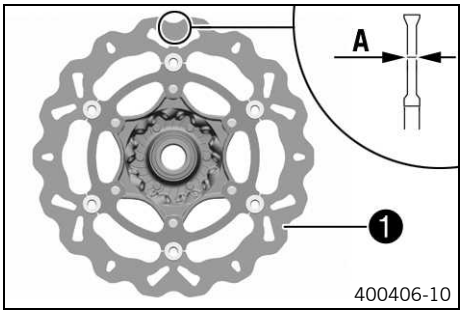
– Check the age of the tires.

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 are changed regardless of the actual wear, at the latest after 5 years.

» If a tire is more than 5 years old:
– Change the tires.

13.3 Checking the brake discs

Warning
Danger of accidents Reduced braking efficiency due to worn brake disc(s).
– Change the worn brake disc(s) without delay.



– Check the thickness of the front and rear brake discs in several places to ensure that it conforms to measurement Ⓐ.

Info
Wear reduces the thickness of the brake disc at the contact surface ❶ of the brake disc.

Brake discs - wear limit	
Front	4.5 mm (0.177 in)
Rear	3.5 mm (0.138 in)

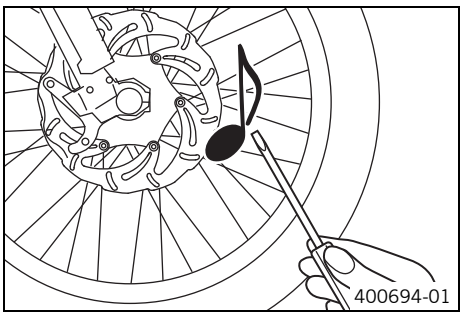
» If the brake disc thickness is less than the specified value:
– Replace the brake disc.

– Check the front and rear brake discs for damage, cracks, and deformation.
» If damage, cracks, or deformation are visible on the brake disc:
– Replace the brake disc.

13.4 Checking the spoke tension

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

Info
A loose spoke causes wheel imbalance and rapidly leads to more loose spokes.
If the spokes are too tight, they can break due to local overload.
Check the spoke tension regularly, especially on a new motorcycle.



– Briefly strike each spoke with a screwdriver blade.

Info
The frequency of the tone is a function of the spoke length and spoke diameter.
If you hear different tone frequencies from individual spokes of the same length and thickness, this is an indication of different spoke tensions.

You should hear a high note.

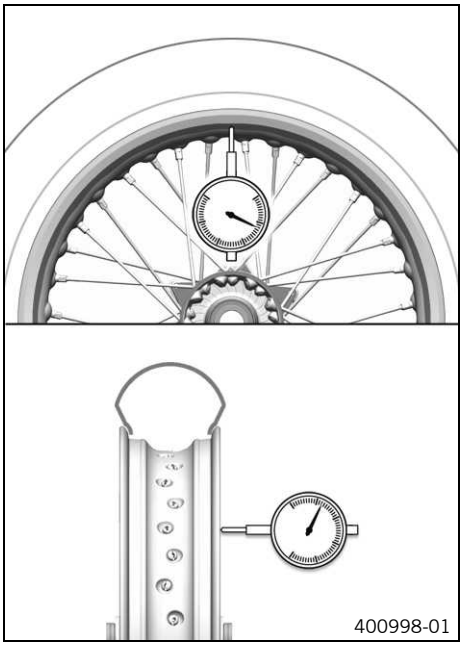
» If the spoke tensions differ:
– Correct the spoke tension.

13.5 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 cause wheel imbalance, which leads to more loose spokes in a short time.
If the spokes are too tight, they can break due to local overload.
Check the spoke tension regularly, especially on a new motorcycle.



– Check the axial run-out and radial run-out of the rim.

Axial run-out	
outside of the rim joint	< 1.8 mm (< 0.071 in)

Radial run-out	
outside of 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 tightening the spoke nipple on the opposite side of the rim run-out. Change the rim if it is excessively deformed.

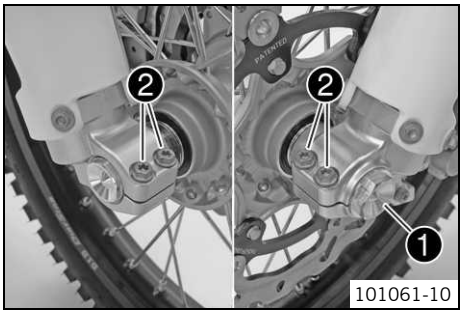
– Correct the spoke tension.

13.6 Front wheel

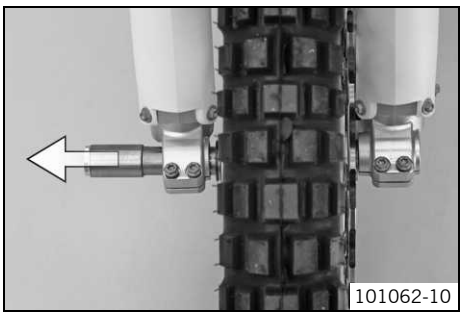
13.6.1 Removing the front wheel

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

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

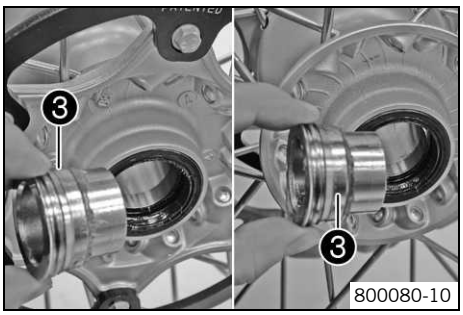


– Remove screw ❶.
– Loosen screw ❷.



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

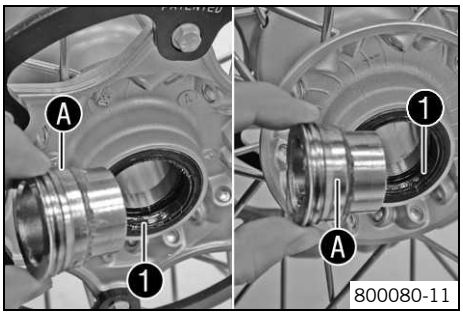
Info
Do not pull the hand brake lever when the front wheel is removed.
Always lay the wheel down in such a way that the brake disc is not damaged.



– Remove distance bushings ❸.

13.6.2 Installing the front wheel

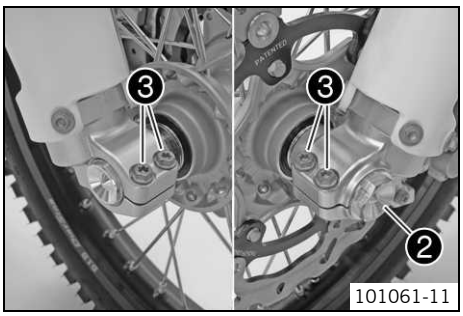
Warning
Danger of accidents Reduced braking efficiency due to oil or grease on the brake discs.
– Always keep the brake discs free of oil and grease, and clean them with brake cleaner when necessary.



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

Long-life grease (☛ p. 214)

– Insert the spacers.



– Position the front wheel and insert the wheel spindle.
  ✓ The brake linings are correctly positioned.
– Mount and tighten screw ❷.
  Guideline

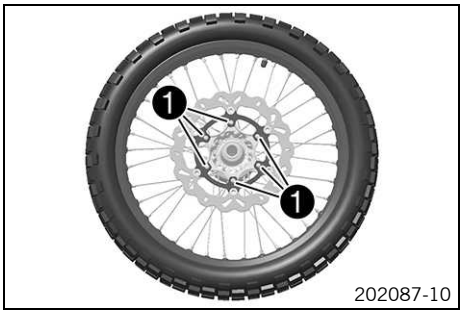
Screw, front wheel spindle	M24x1.5	45 Nm (33.2 lbf ft)

– Activate the hand brake lever multiple times until the brake linings are in contact with the brake disc.
– Remove the motorcycle from the lift stand. (☛ p. 10)
– Pull the front wheel brake and push down hard on the fork several times to align the fork legs.
– Tighten screws ❸.
  Guideline

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

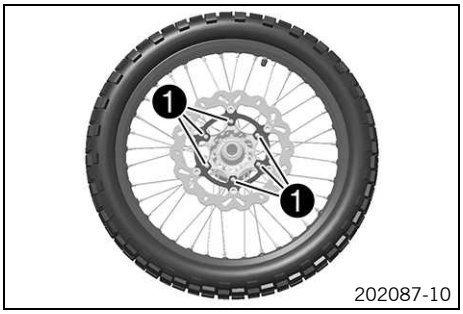
13.6.3 Removing the brake disc of the front brake

Preparatory work
– Raise the motorcycle with the lift stand. (☛ p. 10)
– Remove the front wheel. (☛ p. 75)



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

13.6.4 Installing the brake disc of the front brake



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

Guideline

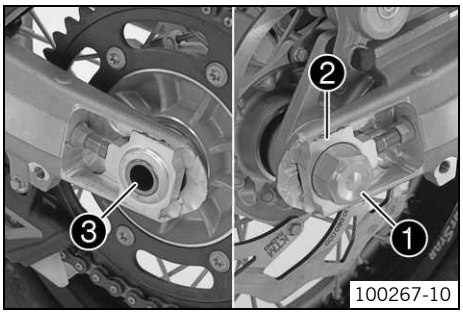
Screw, front brake disc	M6	14 Nm (10.3 lbf ft)	**Loctite® 243™**

Finishing work
– Install the front wheel. (☛ p. 76)

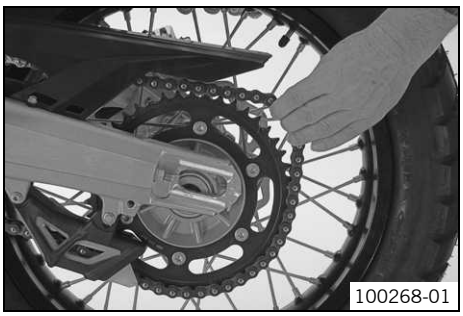
13.7 Rear wheel

13.7.1 Removing rear wheel

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



Main work
– Press the brake caliper by hand on to the brake disc in order to press back the brake piston.
– Remove nut ❶. Remove chain adjuster ❷.
– Holding the rear wheel, withdraw the wheel spindle ❸.



– Push the rear wheel forwards as far as possible and take the chain off the rear sprocket.

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.

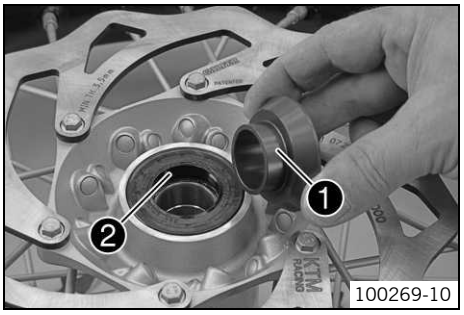
– Take the rear wheel out of the swing arm.

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

13.7.2 Installing the rear wheel

Warning
Danger of accidents Reduced braking efficiency due to oil or grease on the brake discs.
– Always keep the brake discs free of oil and grease, and clean them with brake cleaner when necessary.

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.



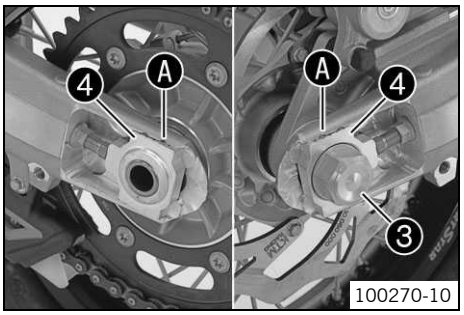
Main work
– Check the rear hub rubber dampers. (☛ p. 82)
– Check the wheel bearing for damage and wear.
» If the wheel bearing is damaged or worn:
– Replace the wheel bearing.
– Remove bushing ❶. Clean and grease the contact surfaces of the bushings of shaft seal ring ❷.

Long-life grease (☛ p. 214)

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

Long-life grease (☛ p. 214)

– Install the rubber damper and rear sprocket carrier in the rear wheel.
– Position the rear wheel.
✓ The brake linings are correctly positioned.



– Push the rear wheel forward as far as possible and lay the chain on the rear sprocket.
– Install the wheel spindle, the chain adjusters and the nut.
Guideline

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

Info
Mount the left and right chain adjusters ❹ in the same position.

– Tighten nut ❸.
Guideline

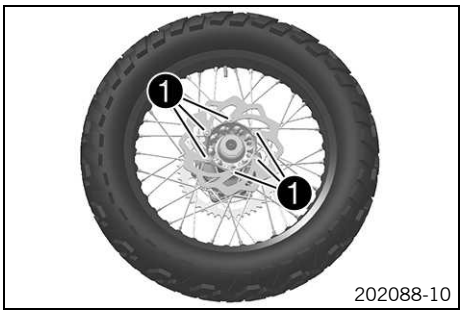
Nut, rear wheel spindle	M25x1.5	90 Nm (66.4 lbf ft)

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

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

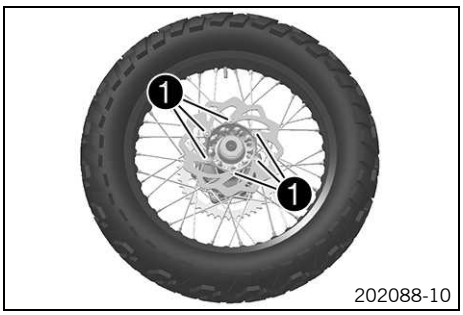
13.7.3 Removing the brake disc of the rear brake

Preparatory work
– Raise the motorcycle with the lift stand. (☛ p. 10)
– Remove the rear wheel. (☛ p. 77)



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

13.7.4 Installing the brake disc of the rear brake



Main work

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

Guideline

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

Finishing work

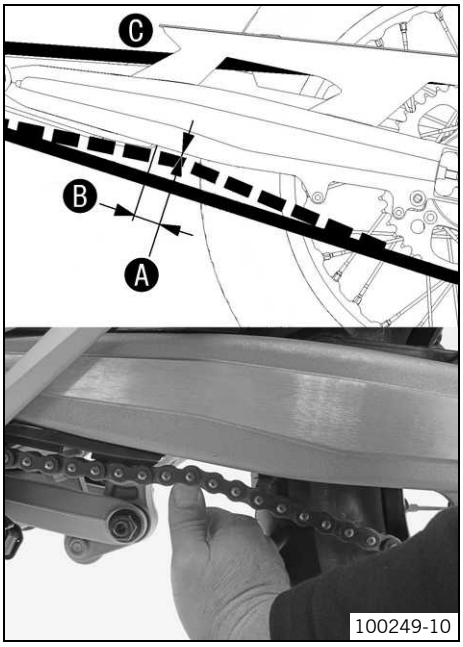
– Install the rear wheel. (☛ p. 77)
– Remove the motorcycle from the lift stand. (☛ p. 10)

13.7.5 Checking the chain tension

Warning

Danger of accidents Danger caused by incorrect chain tension.

– If the chain tension is too high, the components of the secondary power train (chain, engine sprocket, rear sprocket, bearings in transmission and rear wheel) are under additional load. Apart from premature wear, in extreme cases the chain can rupture or the countershaft of the transmission can break. On the other hand, if the chain is loose, it can fall off the engine sprocket or the rear sprocket and block the rear wheel or damage the engine. Check the chain tension and correct if necessary.



– Lean the motorcycle on the side stand.
– Shift gear to neutral.
– Push the chain upward at a distance ❸ from the chain sliding guard and determine the chain tension ❹.

Info

The upper chain section ❷ must be taut.
Chain wear is not always even. Repeat this measurement at different chain positions.

Chain tension	5 mm (0.2 in)

Distance to chain sliding guard	30 mm (1.18 in)

» If the chain tension does not meet specifications:
– Adjust the chain tension. (☛ p. 79)

13.7.6 Adjusting the chain tension

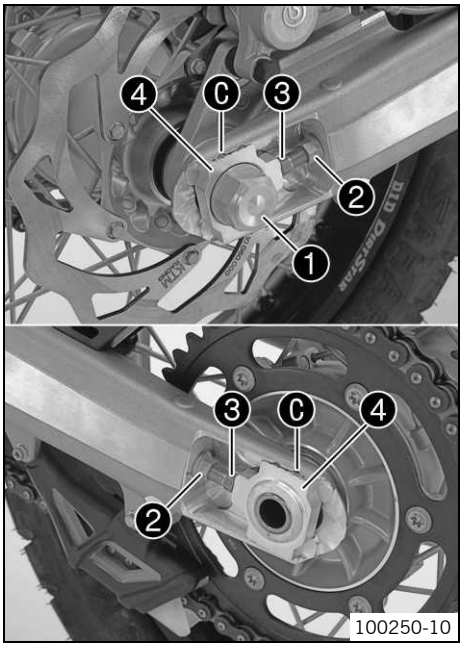
Warning

Danger of accidents Danger caused by incorrect chain tension.

– If the chain tension is too high, the components of the secondary power train (chain, engine sprocket, rear sprocket, bearings in transmission and rear wheel) are under additional load. Apart from premature wear, in extreme cases the chain can rupture or the countershaft of the transmission can break. On the other hand, if the chain is loose, it can fall off the engine sprocket or the rear sprocket and block the rear wheel or damage the engine. Check the chain tension and correct if necessary.

Preparatory work

– Check the chain tension. (☛ p. 79)



Main work

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

Guideline

Chain tension	5 mm (0.2 in)
Turn the left and right adjusting screws ❸ so that the markings on the left and right chain adjusters ❹ are in the same position relative to the reference marks ❻. The rear wheel is then correctly aligned.	

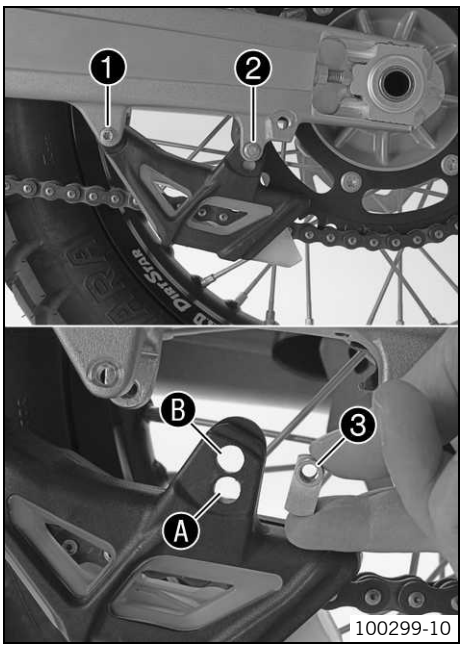
Info
The upper chain section must be taut.
Chain wear is not always even. Repeat this measurement at different chain positions.

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

Guideline

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

13.7.7 Adjusting chain guide



– Remove screws ❶ and ❷. Take off the chain guide.

Condition

Number of teeth: ≤ 44 teeth

– Insert nut ❸ in hole Ⓐ. Position the chain guide.
– Mount and tighten screws ❶ and ❷.

Guideline

Screw, chain guide	M6	8 Nm (5.9 lbf ft)

Condition

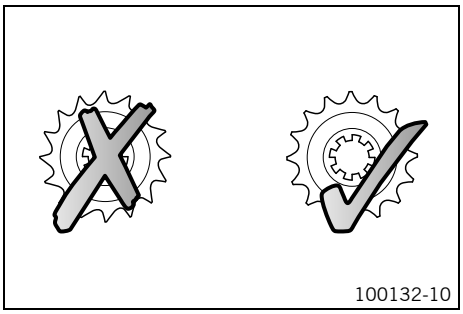
Number of teeth: ≥ 45 teeth

– Insert nut ❸ in hole Ⓑ. Position the chain guide.
– Mount and tighten screws ❶ and ❷.

Guideline

Screw, chain guide	M6	8 Nm (5.9 lbf ft)

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



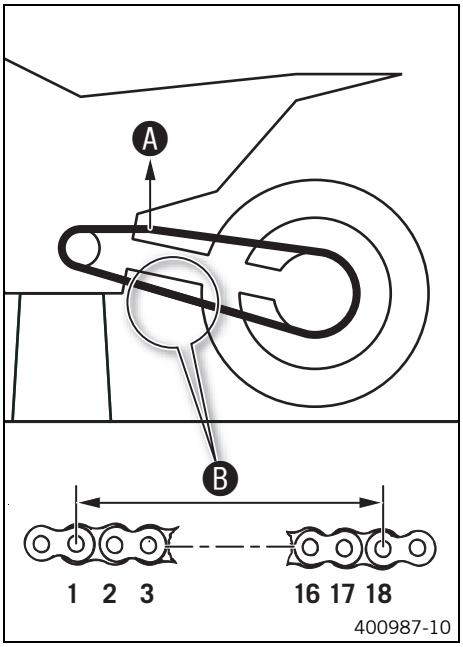
Preparatory work

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

Main work

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

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



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

Guideline

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

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

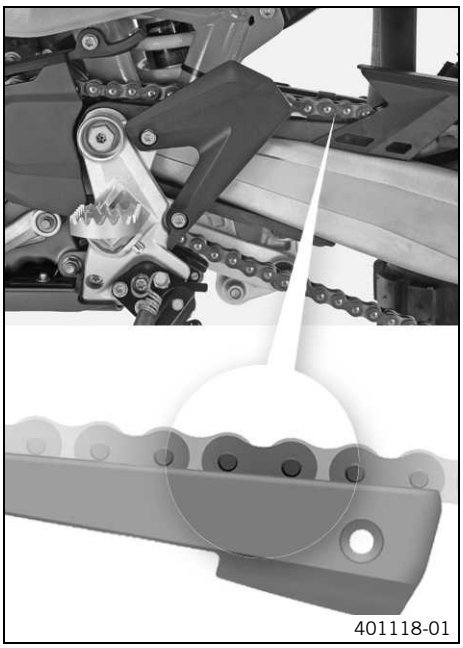
Info
Chain wear is not always even, so you should repeat this measurement at different chain positions.

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

» If the distance Ⓑ is greater than the specified measurement:

– Change the power set.

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



– Check the chain sliding guard for wear.

» If the lower edge of the chain pins is in line with or below the chain sliding guard:

– Replace the chain sliding guard.

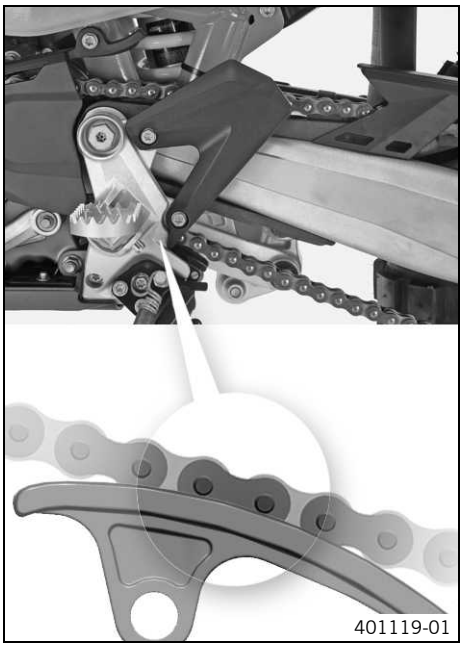
– Check that the chain sliding guard is firmly seated.

» If the chain sliding guard is loose:

– Tighten the chain sliding guard.

Guideline

Screw, chain sliding guard	M6	8 Nm (5.9 lbf ft)	**Loctite® 243™**



– Check the chain sliding piece for wear.

» If the lower edge of the chain pins is in line with or below the chain sliding piece:

– Change the chain sliding piece.

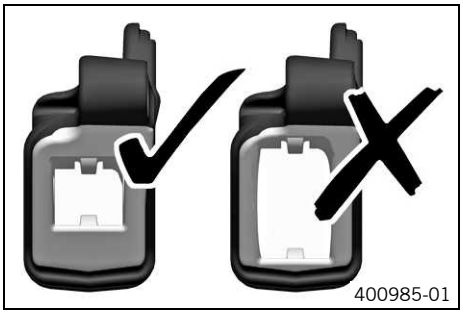
– Check that the chain sliding piece is firmly seated.

» If the chain sliding piece is loose:

– Tighten the chain sliding piece.

Guideline

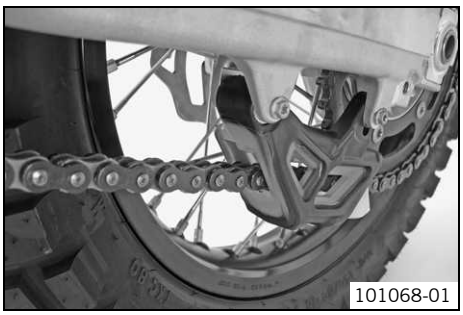
Screw, chain sliding piece	M8	15 Nm (11.1 lbf ft)



– Check the chain guide for wear.

Info
Wear is visible on the front of the chain guide.

» If the light part of the chain guide is worn:
– Change the chain guide.



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

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

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

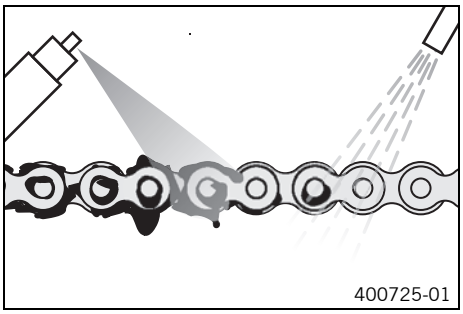
13.7.9 Cleaning the chain

Warning
Danger of accidents Oil or grease on the tires reduces their grip.
– Remove oil and grease with a suitable cleaning material.

Warning
Danger of accidents Reduced braking efficiency due to oil or grease on the brake discs.
– Always keep the brake discs free of oil and grease, and clean them with brake cleaner when necessary.

Warning
Environmental hazard Hazardous substances cause environmental damage.
– Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

Info
The service life of the chain depends largely on its maintenance.



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

Chain cleaner (☛ p. 214)

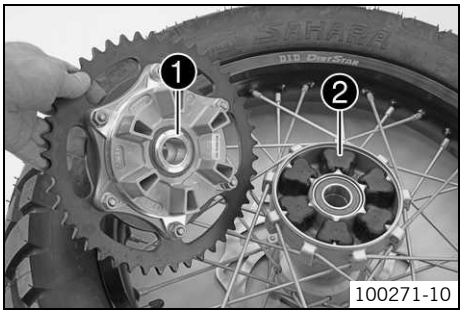
– After drying, apply chain spray.

Off-road chain spray (☛ p. 215)

13.7.10 Checking the rear hub rubber dampers

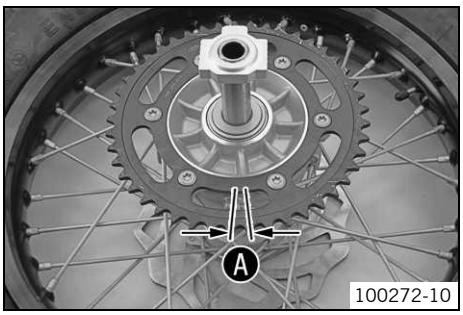
Info
The engine power is transmitted from the rear sprocket to the rear wheel via 6 rubber dampers. They eventually wear out during operation. If the rubber dampers are not changed in time, the rear sprocket carrier and the rear hub will be damaged.

Preparatory work
– Raise the motorcycle with the lift stand. (☛ p. 10)
– Remove the rear wheel. (☛ p. 77)



Main work

– Check bearing ❶.
  » If the bearing is damaged or worn:
    – Replace the bearings.
– Check rubber dampers ❷ 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.



– Lay the rear wheel on a workbench with the rear sprocket facing upwards and insert the wheel spindle in the hub.
– To check play Ⓐ, hold the rear wheel tight and try to rotate the rear sprocket with your hand.

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

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

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

Finishing work

– Install the rear wheel. (☛ p. 77)
– Remove the motorcycle from the lift stand. (☛ p. 10)

14 WIRING HARNESS, BATTERY

14.1 Removing the battery

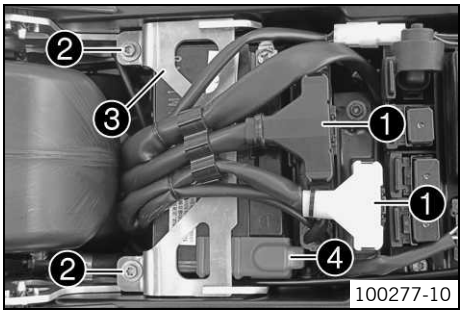
Warning

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.

Preparatory work

- Switch off all power consumers and switch off the engine.
- Remove the seat. (☛ p. 64)



100277-10

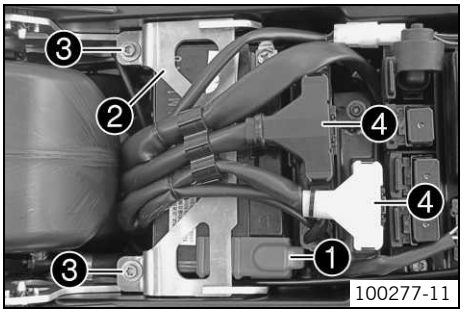
Main work

- Disconnect the negative (minus) cable of the battery.
- Pull plug ❶ off upward.
- Remove screws ❷.
- Pull the retaining bracket ❸ of the battery forward and remove it.
- Take off the positive pole cover ❹.
- Disconnect the positive (plus) cable of the battery.
- Push the wiring harness to the side and pull the battery out of the battery holder.

Info

Never operate the motorcycle with a discharged battery or without a battery. In both cases, electrical components and safety devices can be damaged. The vehicle is therefore no longer roadworthy.

14.2 Installing the battery



100277-11

Main work

- Slide the battery into the battery holder.

Info

The battery terminals must be at the rear.

- Attach the positive cable and mount positive terminal cover ❶.
- Position retaining bracket ❷.
- Mount and tighten screws ❸.

  Guideline

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

- Plug in connector ❹.
- Attach the minus cable .

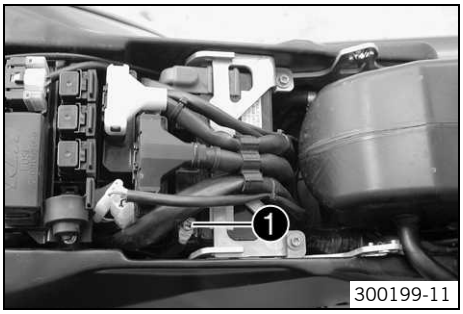
Finishing work

- Mount the seat. (☛ p. 65)
- Set the clock. (☛ p. 100)

14.3 Disconnecting the battery

Preparatory work

- Switch off all power consumers and switch off the engine.
- Remove the seat. (☛ p. 64)



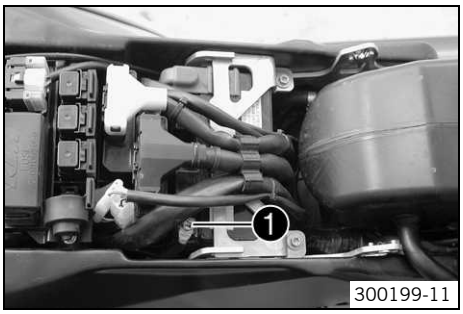
Main work

– Disconnect the negative (minus) cable ❶ of the battery.

Info

Never operate the motorcycle with a discharged battery or without a battery. In both cases, electrical components can safety equipment can be damaged. The vehicle is therefore no longer roadworthy.

14.4 Connecting the battery



Main work

– Reconnect minus cable ❶.

Finishing work

– Mount the seat. (☛ p. 65)
– Set the clock. (☛ p. 100)

14.5 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 trash. Dispose of a defective battery in an environmentally compatible manner. Give the battery to your KTM dealer or to a recycling center that accepts used batteries.

Warning

Environmental hazard Hazardous substances cause environmental damage.

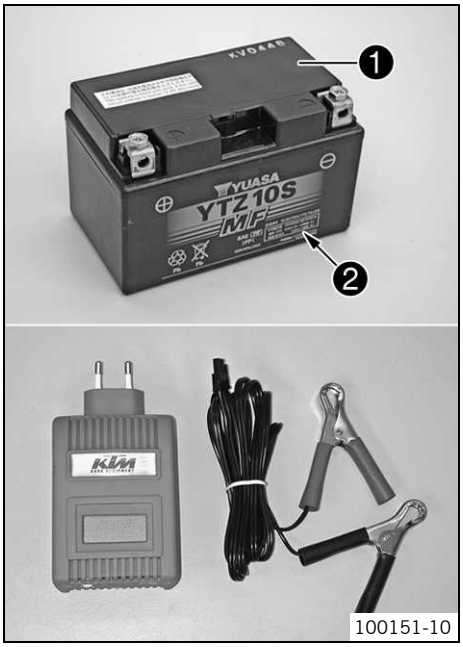
– Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

Info

Even when there is no load on the battery, it still loses power steadily.
The charging level and the method of charging 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, which means that the acid level does not need to be checked.

Preparatory work

– Switch off all power consumers and switch off the engine.
– Remove the seat. (☛ p. 64)
– Remove the battery. (☛ p. 84)



Main work

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

Battery charger (58429074000)

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

Info

Never remove lid ❶.

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

– Switch off and disconnect the charger after charging.

Guideline

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

Finishing work

– Install the battery. (☛ p. 84)
– Mount the seat. (☛ p. 65)
– Set the clock. (☛ p. 100)

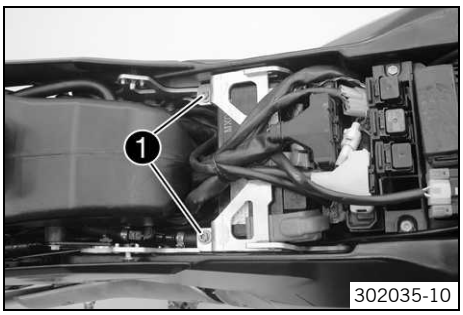
14.6 Checking the charging voltage

Condition

The battery must be fully functional and completely charged.

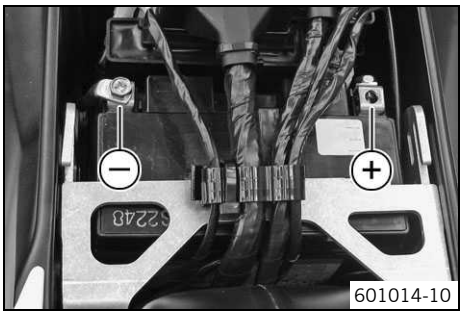
Preparatory work

– Remove the seat. (☛ p. 64)



Main work

– Remove screws ❶.
– Push the retaining bracket forward and take off the terminal cover.
– Start the motorcycle to make checks. (☛ p. 12)



– V Measure the voltage between the specified points.
Measuring point **Plus (+)** – Measuring point **Ground (–)**

Charging voltage	
5,000 rpm	13.5… 15.0 V

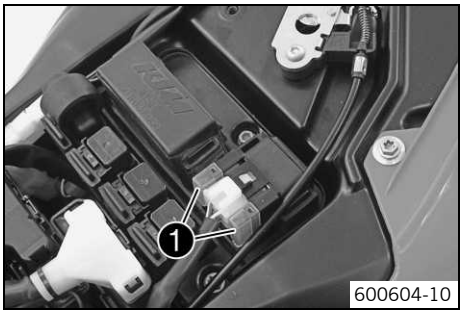
» If the displayed value is less than the specified value:
  – Check the plug-in connections from the alternator to the voltage regulator.
  – Check the plug-in connections from the voltage regulator to the wiring harness.
  – Check the stator winding of the alternator. (☛ p. 176)
» If the displayed value is greater than the specified value:
  – Change the voltage regulator.

14.7 Changing the main fuse

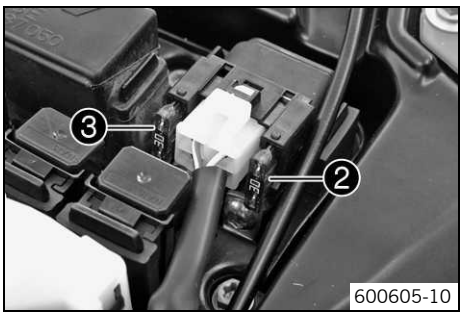
Warning
Fire hazard The electrical system can be overloaded if the wrong fuses are used.
– Use only fuses with the prescribed amperage. Never by-pass or repair fuses.

Info
The main fuse protects all power consumers in the vehicle. It is in the housing of the starter relay next to the battery.

Preparatory work
– Switch off all power consumers and switch off the engine.
– Remove the seat. (☛ p. 64)



Main work
– Remove protection covers ❶.



– Remove a defective main fuse ❷ with needle nose pliers.
– Install a new main fuse.

Fuse (58011109130) (☛ p. 182)

Info
A reserve fuse ❸ is located in the starter relay.

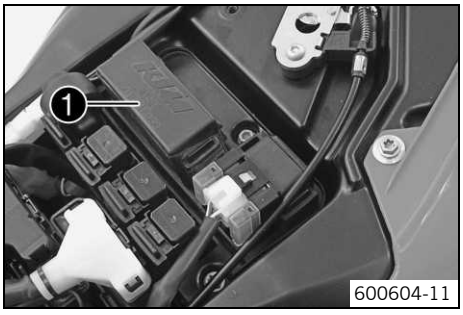
– Check the functioning of the electrical equipment.
– Mount the protection covers.

Finishing work
– Mount the seat. (☛ p. 65)
– Set the clock. (☛ p. 100)

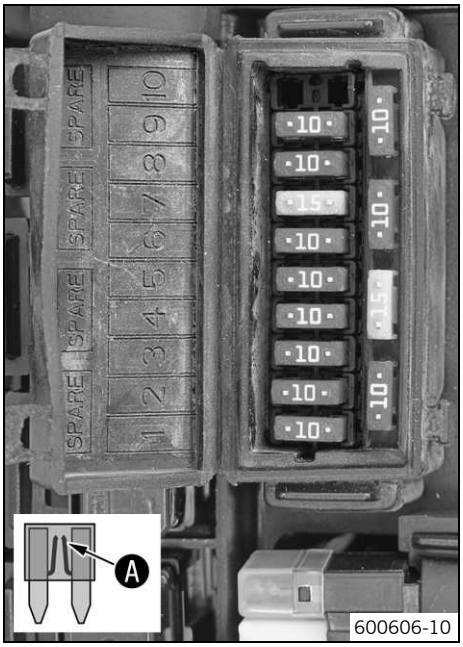
14.8 Changing fuses of individual power consumers

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 seat. (☛ p. 64)



Main work
– Open fuse box cover ❶.



– Remove the defective fuse.

Guideline

Fuse **1** - 10 A - ignition, combination instrument
Fuse **2** - 10 A - clock, ignition (EFI control unit)
Fuse **3** - 10 A - EPT control unit
Fuse **4** - 10 A - fuel pump
Fuse **5** - 10 A - radiator fan
Fuse **6** - 10 A - horn, brake light, turn signal
Fuse **7** - 15 A - high beam, low beam, parking light, tail light, license plate lamp
Fuse **8** - 10 A - for supplementary equipment (accessories connected with ignition switch)
Fuse **9** - 10 A - for accessories (permanent positive)
Fuse **10** - not used
Fuse **SPARE** - 10 A/15 A - spare fuses

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

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.

– Replace with a spare fuse of the right rating.

Fuse (75011088010) (☛ p. 182)
Fuse (75011088015) (☛ p. 182)

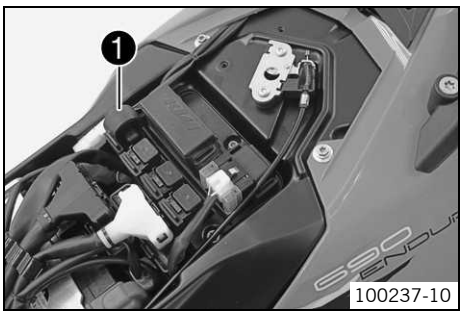
Tip
Put a new spare fuse in the fuse box for future use if needed.

– Check the function of power consumers.
– Close the fuse box cover.

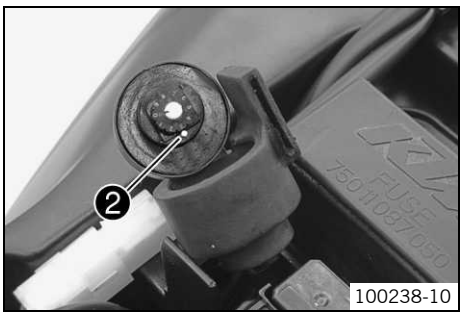
Finishing work
– Mount the seat. (☛ p. 65)

14.9 Adjusting the engine characteristic

Preparatory work
– Switch off the ignition by turning the ignition key to position **OFF** ⊠.
– Remove the seat. (☛ p. 64)



Main work
– Pull the **Map-Select** switch and holder ❶ upward off of the retaining bracket.
– Pull the **Map-Select** switch out of the holder.



– Turn the adjusting wheel until the desired digit is next to marking ❷.

Set the Map-Select switch to Soft.

– Set the adjusting wheel to position **1**.

✓ Soft – reduced homologated peak performance for better driveability.

Set the Map-Select switch to Advanced.

– Set the adjusting wheel to position **2**.

✓ Advanced – homologated performance with extremely direct responsiveness.

Set the Map-Select switch to Standard.

– Set the adjusting wheel to position **3**, **4**, **5**, **6**, **7**, **8** or **9**.

✓ Standard – homologated performance with balanced responsiveness.

Set the Map-Select switch to poor fuel quality.

– Set the adjusting wheel to position **0**.

✓ Poor fuel quality – homologated performance is reduced in accordance with the fuel quality, use for no more than 1 tank of fuel

– Position the **Map-Select** switch in the holder.

– Slide the **Map-Select** switch with the holder downward onto the retaining bracket.

Finishing work

– Mount the seat. (☛ p. 65)

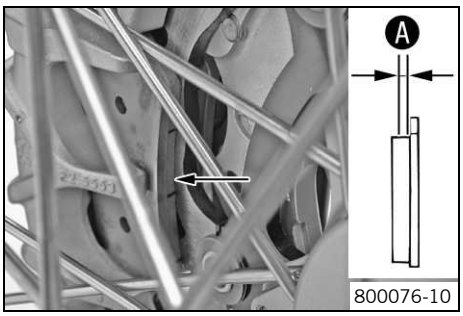
15.1 Checking the front brake linings

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 the brake linings for minimum thickness Ⓐ.

Minimum thickness Ⓐ	≥ 1 mm (≥ 0.04 in)

» If the minimum thickness is less than specified:
– Change the front brake linings. (☛ p. 90)

– Check the brake linings for damage and cracking.

» If there is wear or tearing:
– Change the front brake linings. (☛ p. 90)

15.2 Changing the front brake linings

Warning
Danger of accident Brake system failure.

– Maintenance work and repairs must be carried out professionally.

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

– Avoid contact with skin and eyes, and keep out of the reach of children.
– Wear suitable protective clothing and goggles.
– If brake fluid comes into contact with the eyes, flush the eyes thoroughly with water and consult a physician immediately.

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

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

Warning
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.

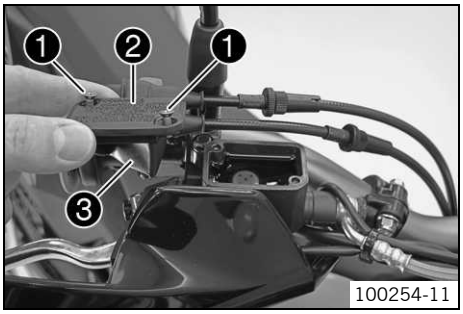
Warning
Danger of accidents Reduced braking efficiency due to use of non-approved brake linings.

– 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.

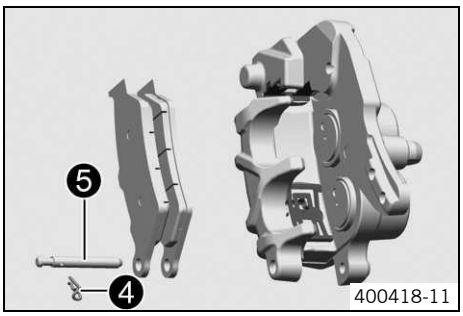
– Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

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.

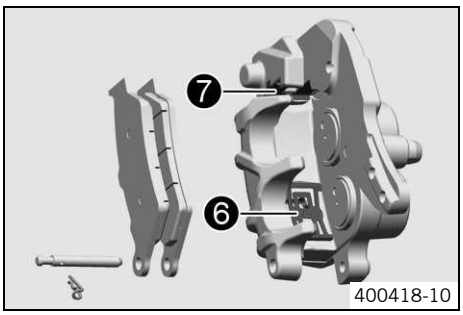


– Move the brake fluid reservoir mounted on the handlebar to a horizontal position.
– Remove screws ❶.
– Remove cover ❷ with membrane ❸.
– Press the brake caliper by hand onto the brake disc in order to retract the brake pistons. Ensure that brake fluid does not flow out of the brake fluid reservoir, extracting it by suction if it does.

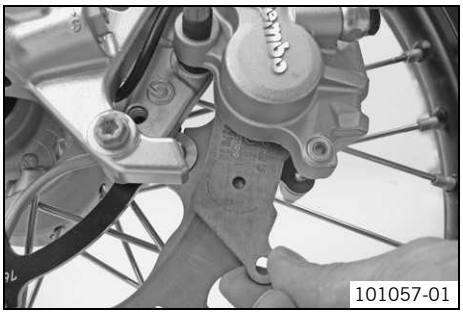
Info
Make sure when pushing back the brake pistons that you do not press the brake caliper against the spokes.



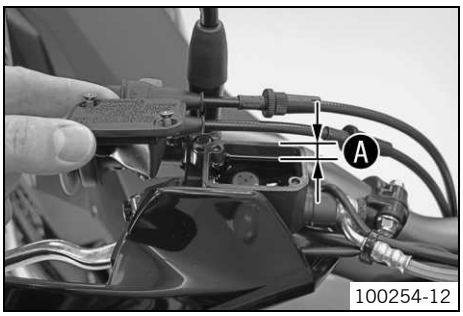
– Remove cotter pin ❹, remove pin ❺ toward the right by striking it, and remove the brake linings.
– Clean brake caliper and brake caliper support.



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



– Insert the brake linings, insert the pin, and mount the cotter pin.
– Operate the hand brake lever repeatedly until the brake linings are in contact with the brake disc and there is a pressure point.



– Adjust the brake fluid level to level Ⓐ.

Guideline

Measurement Ⓐ	5 mm (0.2 in)

Brake fluid DOT 4 / DOT 5.1 (☛ p. 212)

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

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

15.3 Checking the free travel of the hand brake lever

Warning
Danger of accidents Brake system failure.

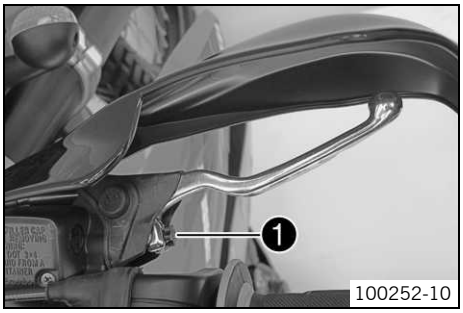
– If there is no free travel on the hand brake lever, pressure builds up on the front brake circuit. The front brake can fail due to overheating. Adjust the free travel on hand brake lever according to specifications.

– Push the hand brake to the handlebar and check free travel Ⓐ.

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

» If the free travel does not meet specifications:
– Adjust the free travel of the hand brake lever. (☛ p. 92)

15.4 Adjusting the free travel of the hand brake lever



– Check the free travel of the hand brake lever. (☛ p. 92)
– Adjust the free travel of the hand brake lever with adjusting screw ❶.

Info
Turn the adjusting screw clockwise to reduce free travel. The pressure point moves away from the handlebar.
Turn the adjusting screw counterclockwise to increase free travel. The pressure point moves towards the handlebar.
The range of adjustment is limited.
Turn the adjusting screw by hand only, and do not apply any force.
Do not make adjustments while riding.

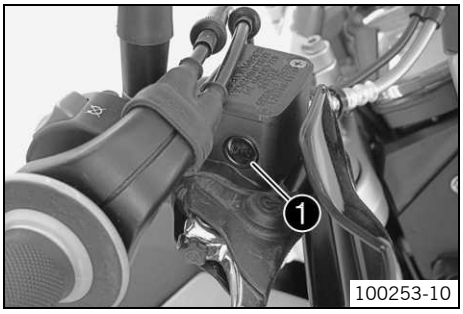
15.5 Checking the front brake fluid level

Warning
Danger of accidents Failure of the brake system.

– If the brake fluid level falls below the **MIN** mark, this indicates a leakage in the brake system or worn-out brake linings. Check the brake system and do not continue riding.

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

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



– Move the brake fluid reservoir mounted on the handlebar to a horizontal position.
– Check the brake fluid level in the viewer ❶.
» When the brake fluid level drops below the **MIN** mark:
– Add front brake fluid. (☛ p. 93)

15.6 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.

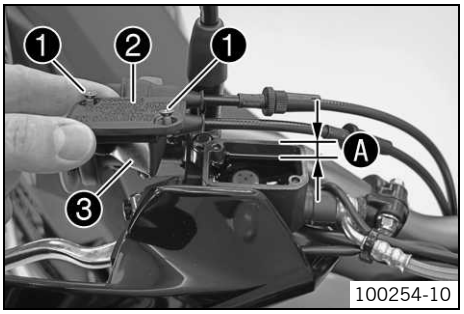
Warning
Danger of accidents Reduced braking efficiency due to old brake fluid.

– 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. 90)

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

Guideline

Measurement of Ⓐ	5 mm (0.2 in)

Brake fluid DOT 4 / DOT 5.1 (☛ p. 212)

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

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

15.7 Changing the front brake fluid

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

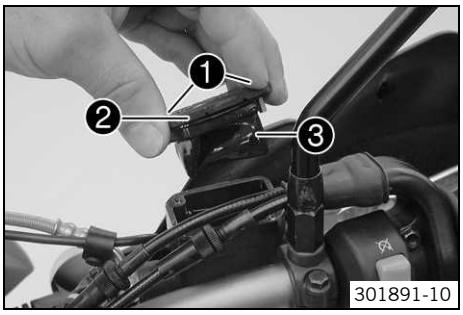
– Avoid contact with skin and eyes, and keep out of the reach of children.
– Wear suitable protective clothing and goggles.
– If brake fluid comes into contact with the eyes, flush the eyes thoroughly with water and consult a physician immediately.

Warning
Environmental hazard Hazardous substances cause environmental damage.

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

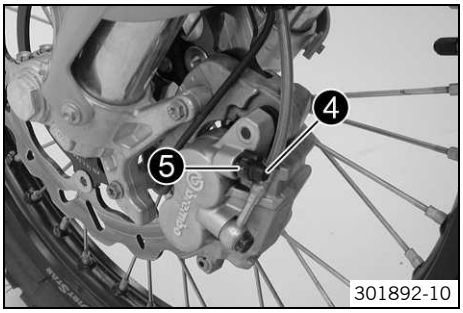
Info

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.
– Draw the old brake fluid out of the brake fluid reservoir using a syringe and fill with fresh brake fluid.

Bleed syringe (50329050000) (☛ p. 216)
Brake fluid DOT 4 / DOT 5.1 (☛ p. 212)

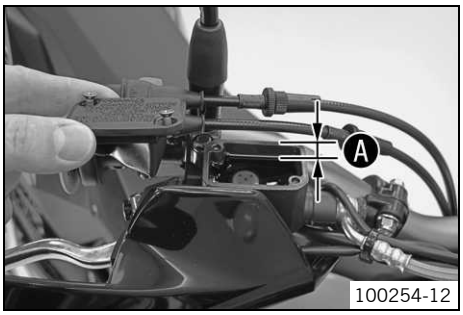


– Pull off protection cap ❹ and connect a commercially available suction device (standard workshop equipment).
– Release bleeder screw ❺ and draw out the old brake fluid.

Info

During suction, ensure that the brake fluid reservoir is always filled with a sufficient amount of fresh brake fluid.

– Tighten the bleeder screw. Remove the suction device and mount the protection cap.



– Add brake fluid to level Ⓐ.

Guideline

Measurement Ⓐ	5 mm (0.2 in)

Brake fluid DOT 4 / DOT 5.1 (☛ p. 212)

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

Info

Clean up overflowed or spilt brake fluid immediately with water.

15.8 Checking the rear brake linings

Warning

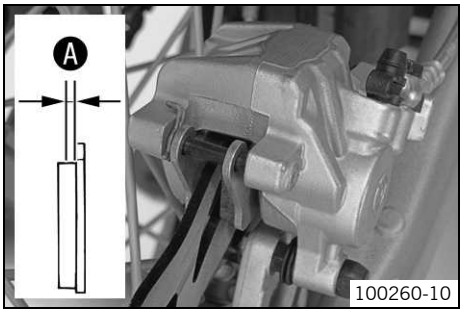
Danger of accidents Reduced braking efficiency caused by worn brake linings.

– 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. 95)

– Check the brake linings for damage and cracking.

» If there is wear or tearing:
– Change the rear brake linings. (☛ p. 95)

15.9 Changing the rear brake linings

Warning
Danger of accident Brake system failure.

– Maintenance work and repairs must be carried out professionally.

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

– Avoid contact with skin and eyes, and keep out of the reach of children.
– Wear suitable protective clothing and goggles.
– If brake fluid comes into contact with the eyes, flush the eyes thoroughly with water and consult a physician immediately.

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

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

Warning
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.

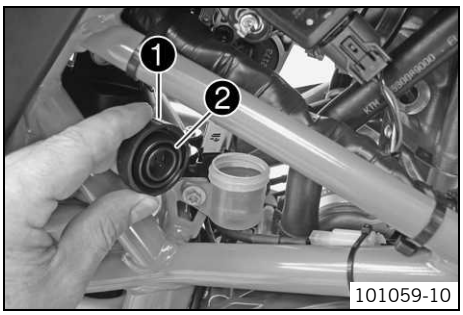
Warning
Danger of accidents Reduced braking efficiency due to use of non-approved brake linings.

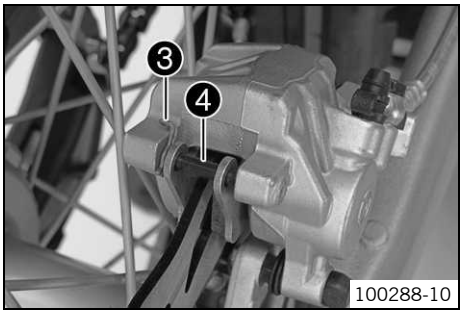
– Brake linings available from accessory suppliers are often not tested and approved for use on KTM vehicles. The construction and friction factor of the brake linings and therefore the brake power can differ considerably from the original KTM brake linings. If brake linings are used that differ from 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.

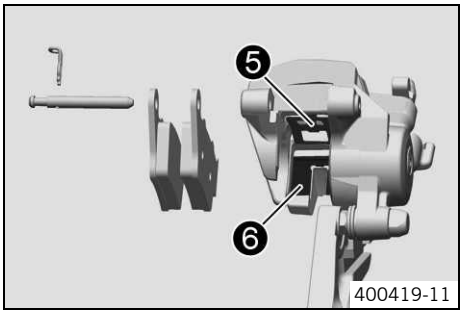




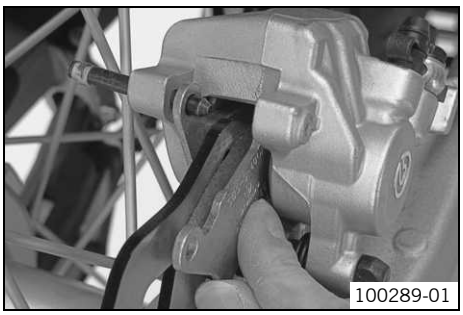
– Stand the vehicle upright.
– Remove screw cap ❶ with membrane ❷.
– Press the brake caliper by hand onto the brake disc in order to retract the brake piston. Ensure that brake fluid does not flow out of the brake fluid reservoir, extracting it by suction if it does.

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

– Remove cotter pin ❸, remove pin ❹ toward the left by striking it, and remove the brake linings.
– Clean brake caliper and brake caliper support.



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



– Insert the brake linings, insert the pin, and mount the cotter pin.
– Operate the foot brake lever repeatedly until the brake linings are in contact with the brake disc and there is a pressure point.
– Adjust the brake fluid level to the **MAX** mark.

Brake fluid DOT 4 / DOT 5.1 (☛ p. 212)

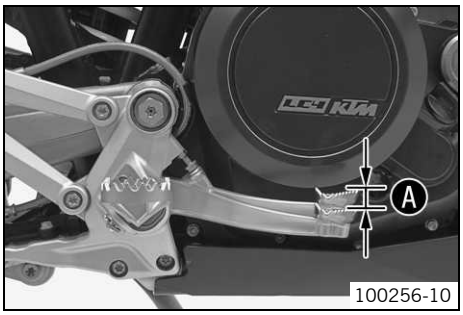
– Mount the screw cap with the membrane.

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

15.10 Checking the free travel of foot brake lever

Warning
Danger of accidents Brake system failure.

– If there is no free travel on the foot brake lever, pressure builds up on the rear brake circuit. The rear brake can fail due to overheating. Adjust the free travel on foot brake lever according to specifications.



– 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)

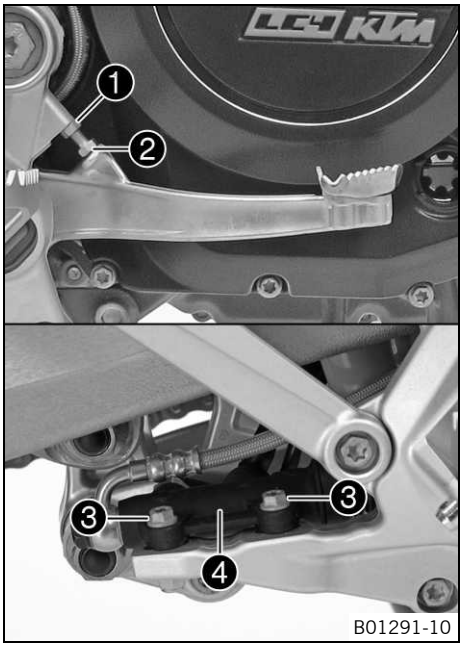
Info
You will know that contact has been made with the foot brake cylinder piston when there is increased resistance when you activate the foot brake lever.

» If the free travel does not meet specifications:
– Adjust the basic position of the foot brake lever. (☛ p. 96)

15.11 Adjusting the basic position of the foot brake lever

Warning
Danger of accidents Brake system failure.

– If there is no free travel on the foot brake lever, pressure builds up on the rear brake circuit. The rear brake can fail due to overheating. Adjust the free travel on foot brake lever according to specifications.



– Loosen fitting ❸ on foot brake cylinder ❹.
– To adjust the basic position of the foot brake lever individually, loosen nut ❶ and turn screw ❷ accordingly.

Info
The range of adjustment is limited. The screw must be screwed into the footrest bracket by at least four turns.

– Position foot brake cylinder ❹ so that the foot brake lever has the necessary free travel. Hold screws ❸ in place and tighten the nuts.

Guideline

Screw connection, foot brake cylinder	M6	10 Nm (7.4 lbf ft)

– Check the free travel of the foot brake lever. (☛ p. 96)
– Tighten nut ❶.

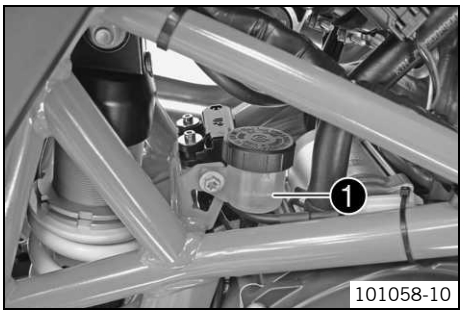
15.12 Checking rear brake fluid level

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.



– Stand the vehicle upright.
– Check the brake fluid level in the brake fluid reservoir.
  » If the fluid level reaches the **MIN** marking ❶:
    – Add rear brake fluid. (☛ p. 97)

15.13 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.

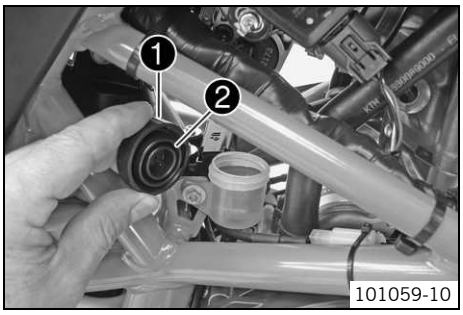
Warning
Danger of accidents Reduced braking efficiency due to old brake fluid.

– 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
– Check the rear brake linings. (☛ p. 94)

Main work
– Stand the vehicle upright.
– Remove screw cap ❶ with the washer and membrane ❷.
– Add brake fluid to the **MAX** mark.

Brake fluid DOT 4 / DOT 5.1 (☛ p. 212)

– Mount the screw cap with the washer and membrane.

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

15.14 Changing the rear brake fluid

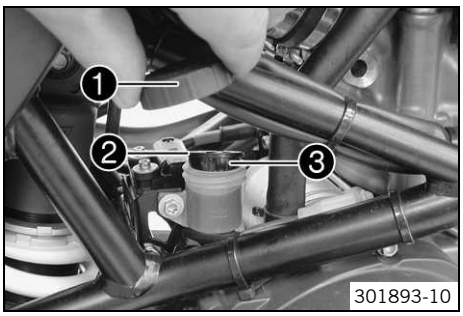
Warning
Skin irritation Brake fluid can cause skin irritation on contact.

– Avoid contact with skin and eyes, and keep out of the reach of children.
– Wear suitable protective clothing and goggles.
– If brake fluid comes into contact with the eyes, flush the eyes thoroughly with water and consult a physician immediately.

Warning
Environmental hazard Hazardous substances cause environmental damage.

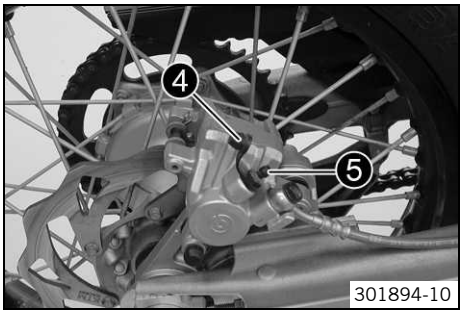
– Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

Info
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.



– Remove screw cap ❶ with washer ❸ and membrane ❷.
– Draw the old brake fluid out of the brake fluid reservoir using a syringe and fill with fresh brake fluid.

Bleed syringe (50329050000) (☛ p. 216)
Brake fluid DOT 4 / DOT 5.1 (☛ p. 212)



– Pull off protection cap ❹ and connect a commercially available suction device (standard workshop equipment).
– Release bleeder screw ❺ and draw out the old brake fluid.

Info
During suction, ensure that the brake fluid reservoir is always filled with a sufficient amount of fresh brake fluid.

– Tighten the bleeder screw. Remove the suction device and mount the protection cap.
– Add brake fluid to the **MAX** mark.

Brake fluid DOT 4 / DOT 5.1 (☛ p. 212)

– Mount the screw cap with the washer and membrane.
– Activate the foot brake lever until there is a firm pressure point.

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

16.1 Combination instrument

16.1.1 Setting kilometers or miles

Info
If you change the unit, the value is retained and converted accordingly.
Making the setting according to the country.

800083-15

Condition
The motorcycle is stationary.

– Switch on the ignition by turning the ignition key to position **ON** ○.
– Press the **M** button repeatedly until the **Odo** mode is active.
– Keep the **M** button pressed until the display mode changes from **km/h** to **mph** or from **mph** to **km/h**.

Guideline

Activation duration of **M** button	10 s

16.1.2 Setting the clock

800083-18

Condition
The motorcycle is stationary.

– Switch on the ignition by turning the ignition key to position **ON** ○.
– Press the **M** button repeatedly until the **Odo** mode is active.
– Keep the **M** button and the **S** button pressed simultaneously.
  ✔ The time display begins to flash.
– Press the **M** button to set the hour.
– Press the **S** button to set the minute.
– Keep the **M** button and the **S** button pressed simultaneously.
  ✔ The time is set.

16.1.3 Setting/resetting display TRIP 1

Info
The **TRIP 1** trip counter runs constantly and counts up to **999.9**.
The trip counter can be used to measure the distance covered during trips or between two refueling stops. After the value **999.9** is reached, the trip counter starts at **0.0** again.

800083-19

– Switch on the ignition by turning the ignition key to position **ON** ○.
– Press the **M** button repeatedly until the **Trip 1** mode is active.
– Keep the **S** button pressed.
  ✔ The **Trip 1** display is set to **0.00**.

16.1.4 Setting/resetting display TRIP 2

Info
The **TRIP 2** trip counter runs constantly and counts up to **999.9**.
The trip counter can be used to measure the distance covered during trips or between two refueling stops. After the value **999.9** is reached, the trip counter starts at **0.0** again.

800083-20

– Switch on the ignition by turning the ignition key to position **ON** ❍.
– Press the **M** button repeatedly until the **Trip 2** mode is active.
– Keep the **S** button pressed.
  ✔ The **Trip 2** display is set to **0.00**.

16.1.5 Setting the wheel circumference

Danger

Voiding of the government approval for road use and the insurance coverage The vehicle is only authorized for operation on public roads in the homologated version.

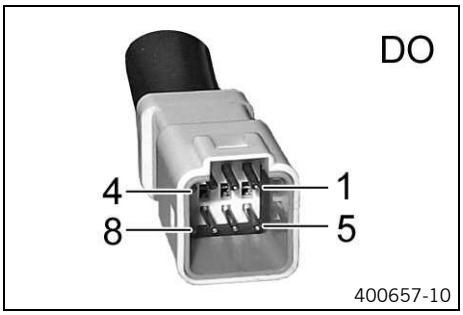
– If the vehicle is modified in any way, it may only be used on designated tracks away from public roads. Advise the vehicle owner and rider of this.
– If you undertake any modifications, please insist on receiving a signed workshop order from your customer in which you inform the customer in writing that these modifications are performed at the customer's own risk and that the vehicle will no longer be approved for use on public roads once modified.

Condition

The motorcycle is stationary.

Preparatory work

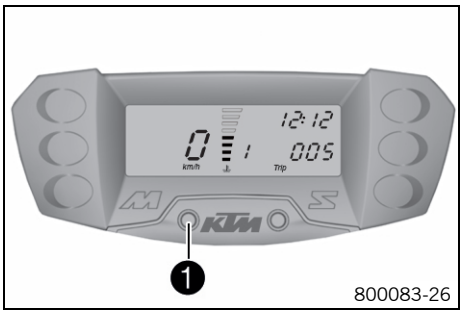
– Switch off all power consumers and switch off the engine.
– Remove the headlight mask with the headlight. (☛ p. 102)



400657-10

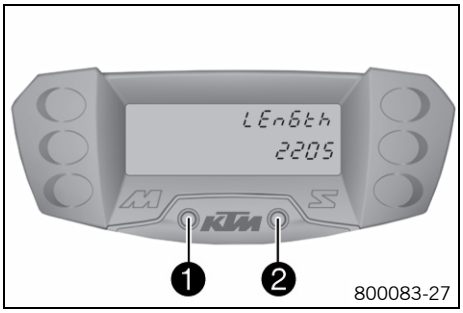
Main work

– Unplug connector **DO** from the combination instrument.



800083-26

– Switch on the ignition by turning the ignition key to position **ON** ❍.
– Press the **MODE** button repeatedly until the **TRIP 1** mode is active.
– Press and hold the **MODE** button for 10 seconds.
  ✔ The wheel circumference is displayed in millimeters.



800083-27

Increasing the wheel circumference

– Press the **MODE** button ❶.

Reducing the wheel circumference

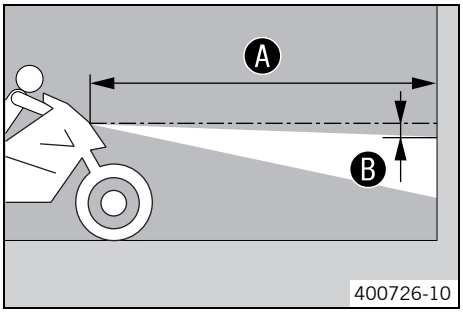
– Press the **SET** button ❷.

– Keep the **MODE** button and the **SET** button pressed simultaneously.
  ✔ The settings are saved and the Setup menu is closed.
– Switch off the ignition by turning the ignition key to position **OFF** ⊠.
– Plug connector **DO** into the combination instrument.

Finishing work

– Install the headlight mask with the headlight. (☛ p. 103)
– Check the headlight setting. (☛ p. 102)

16.2 Checking the headlight setting



– Stand the vehicle upright on a horizontal surface in front of a light wall and make a mark at the height of the center of the low beam headlight.
– Make another mark at a distance ❽ under the first mark.

Guideline

Distance ❽	5 cm (2 in)

– Position the vehicle vertically at a distance ❹ in front of the wall.

Guideline

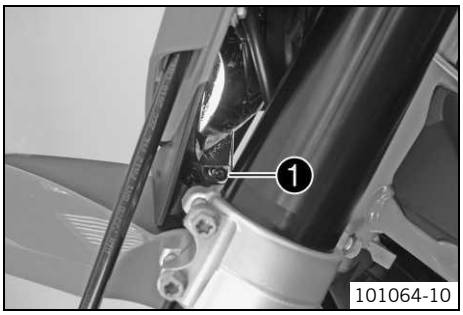
Distance ❹	5 m (16 ft)

– The rider, with luggage and a passenger if applicable, now sits down on the motorcycle.
– Switch on the low beam.
– Check the headlight setting.

For a ready-to-operate motorcycle with a rider, and with luggage and a passenger if applicable, the light-dark boundary must lie exactly on the lower mark.

» If the boundary between light and dark does not meet specifications:
– Adjust the headlight range. (☛ p. 102)

16.3 Adjusting the headlight range



Preparatory work
– Check the headlight setting. (☛ p. 102)

Main work
– Loosen screw ❶.
– Adjust the light range by swiveling the headlight.

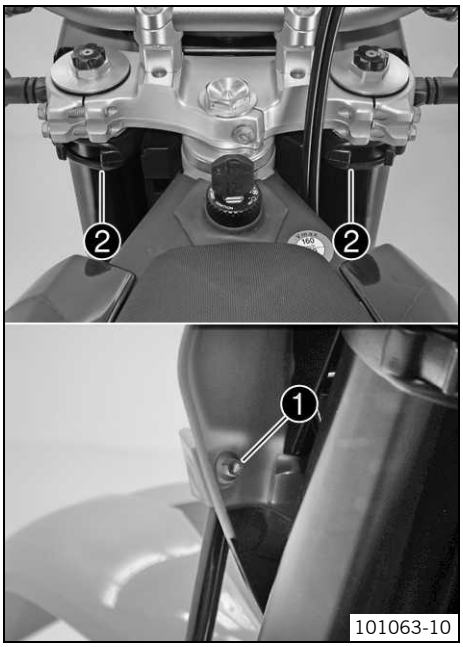
Guideline

The boundary between light and dark must be exactly on the lower mark for a motorcycle with a rider (instructions on how to apply the mark: Checking the headlight setting).

Info
If you have a heavy payload, you will need to correct the headlight range.

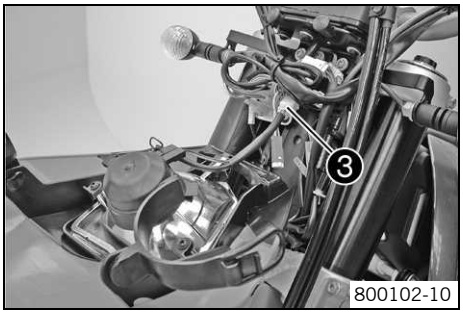
– Tighten screw ❶.

16.4 Removing the headlight mask with the headlight



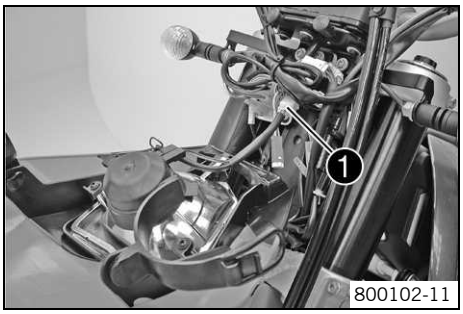
Preparatory work
– Switch off all power consumers and switch off the engine.

Main work
– Remove screw ❶ and take off the clamp.
– Release rubber band ❷. Slide the headlight mask upward and tilt it forward.



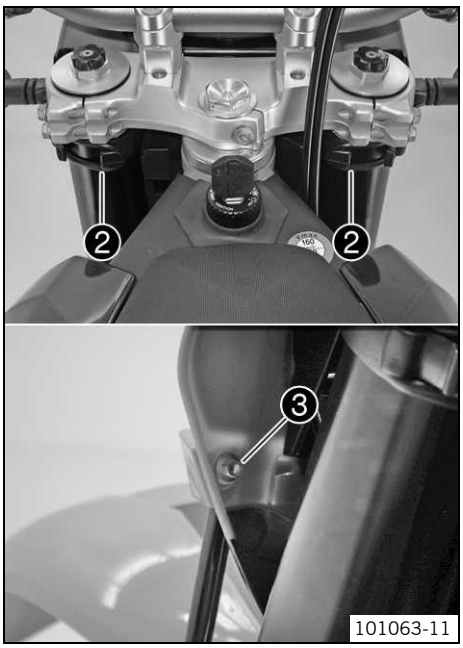
– Disconnect the electrical plug-in connection ❸ and remove the headlight mask with the headlight.

16.5 Installing the headlight mask with the headlight



Main work

– Connect the electrical plug-in connection ❶.



– Position the headlight mask and fix it with rubber band ❷.

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

– Position the brake line and wiring harness. Position the clamp, and mount and tighten screw ❸.

Finishing work

– Check the headlight setting. (☛ p. 102)

16.6 Changing the parking light bulb

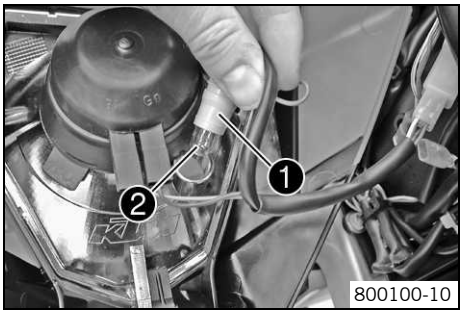
Note

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 headlight mask with the headlight. (☛ p. 102)



Main work
- Pull bulb socket ❶ out of the reflector.
- Pull parking light bulb ❷ out of the bulb socket.
- Insert a new parking light bulb in the bulb socket.

Parking light (W5W / socket W2.1x9.5d) (☛ p. 182)

- Insert the bulb socket in the reflector.

Finishing work
- Install the headlight mask with the headlight. (☛ p. 103)
- Check the headlight setting. (☛ p. 102)

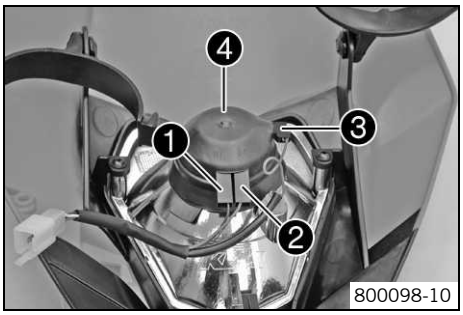
16.7 Changing the headlight bulb

Note

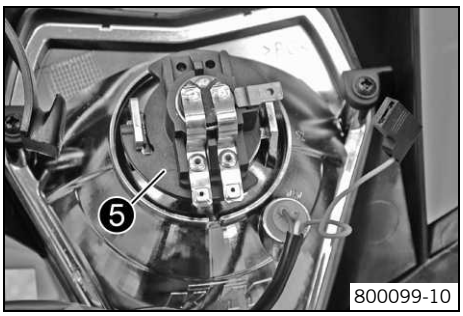
Damage to reflector Reduced brightness.

- 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 headlight mask with the headlight. (☛ p. 102)



Main work
- Pull off connectors ❶, ❷ and ❸.
- Take off protection cap ❹ of the headlight bulb.



- Turn holder ❺ about 30° counterclockwise and remove it.
- Remove headlight bulb.
- Insert a headlight bulb in the holder.

Headlight (S2 / socket BA20d) (☛ p. 182)

- Insert the holder into the headlight housing and fix it by turning it approx. 30° clockwise.
- Mount the protection cap. Attach the connector.

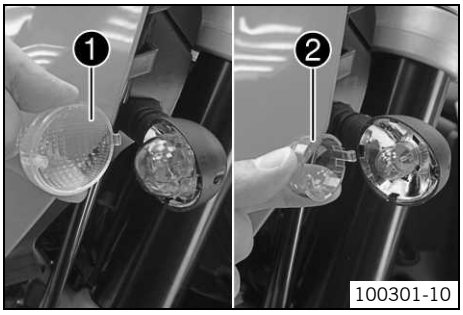
Finishing work
- Install the headlight mask with the headlight. (☛ p. 103)
- Check the headlight setting. (☛ p. 102)

16.8 Changing the turn signal 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.



Main work
(690 Enduro R EU/AUS/UK)

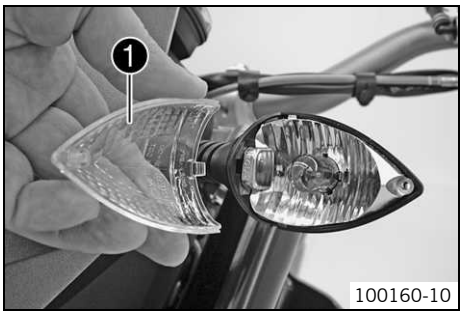
– Remove the screw on the rear of the turn signal housing.
– Tilt headlamp diffuser ❶ forward carefully and take it off.
– Lightly squeeze the orange plug ❷ in the area of the holding lugs and take it off.
– Press the turn signal bulb carefully into the socket, turn it counterclockwise by about 30°, and take it out of the socket.

Info
Do not touch the reflector with your fingers, and keep it free from grease.

– Press the new turn signal bulb carefully into the socket and turn it clockwise until it stops.

Turn signal (R10W / socket BA15s) (☛ p. 182)

– Mount the orange plug.
– Position the diffuser.
– Insert the screw and turn it counterclockwise first until it engages in the thread. Tighten the screw slightly.



(690 Enduro R USA)

– Remove the screw on the rear of the turn signal housing.
– Tilt headlamp diffuser ❶ forward carefully and take it off.
– Press the turn signal bulb carefully into the socket, turn it counterclockwise by about 30°, and take it out of the socket.

Info
Do not touch the reflector with your fingers, and keep it free from grease.

– Press the new turn signal bulb carefully into the socket and turn it clockwise until it stops.

Turn signal (RY10W / socket BAU15s) (☛ p. 182)

– Position the diffuser.
– Insert the screw and turn it counterclockwise first until it engages in the thread. Tighten the screw slightly.

Finishing work

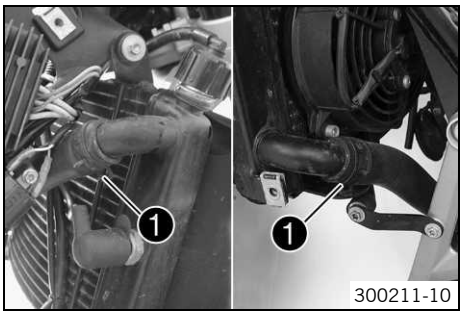
– Check that the turn signal system is functioning properly.

17.1 Removing the engine

Preparatory work

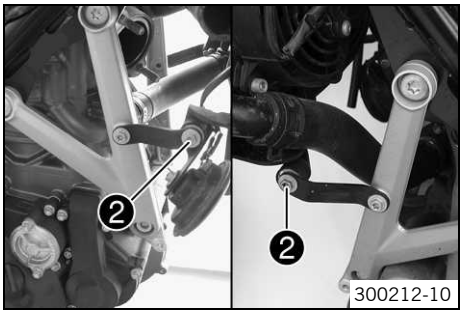
– Switch off all power consumers and switch off the engine.
– Remove the seat. (☛ p. 64)
– Disconnect the battery. (☛ p. 84)
– Raise the motorcycle with the work stand. (☛ p. 10)
– Take off the side cover. (☛ p. 65)
– Remove the air filter box. (☛ p. 61)
– Remove the manifold. (☛ p. 57)
– Remove the engine guard. (☛ p. 36)
– Drain the coolant. (☛ p. 167)

Main work

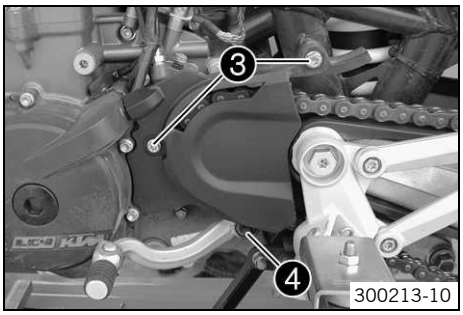


– Loosen the spring-loaded band-type clamp ❶ using the special tool. Detach the radiator hoses.

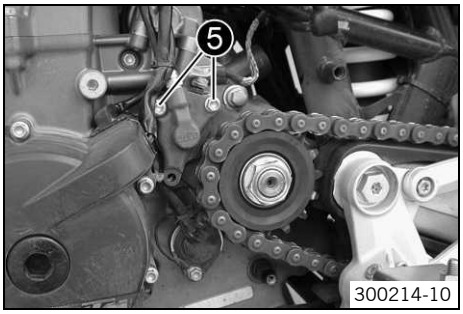
Pliers for spring band clamp (60029057100) (☛ p. 218)



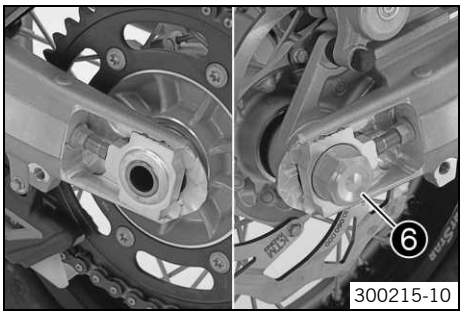
– Remove screws ❷.



– Remove screws ❸.
– Take off the engine sprocket cover.
– Remove screw ❹.
– Take off the shift lever.



– Have an assistant operate the rear brake.
– Bend up the lock washer.
– Remove the nut of the engine sprocket with the lock washer.
– Remove screws ❺.



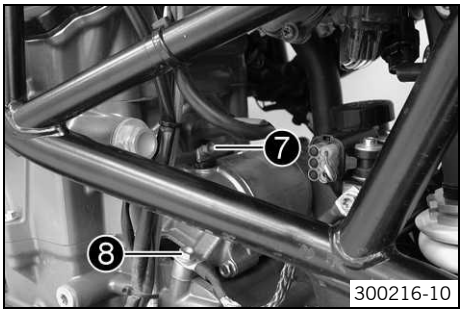
– Remove nut ❻. Remove the chain adjuster.
– Pull out the wheel spindle only far enough to allow the rear wheel to be pushed forward.
– Push the rear wheel forward as far as possible and take the chain off the rear sprocket.

Info
The rear wheel must be fully removed.

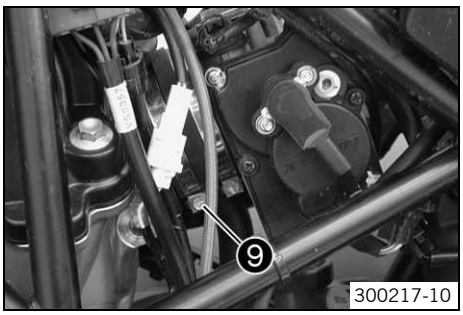
– Take off the engine sprocket.
– Take off the clutch slave cylinder and hang it to the side.

Info
Do not bend the clutch line.
Do not activate the clutch lever if the clutch slave cylinder has been removed.

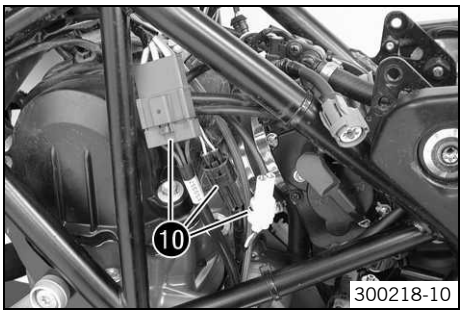
– Take off the clutch push rod.



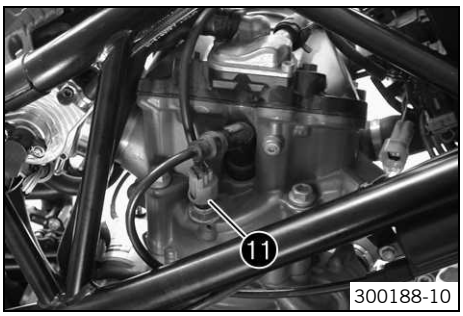
– Unscrew the electrical connection ❼ from the starter motor.
– Remove ground wire ❽ from the starter motor.



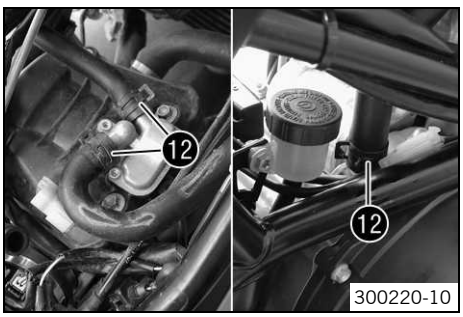
– Loosen hose clip ❾.
– Pull off the throttle valve body from the rear.



– Disconnect connector ❿ of the gear position sensor, the crankshaft position sensor, and the alternator.
– Remove the cable binders and release the cables.

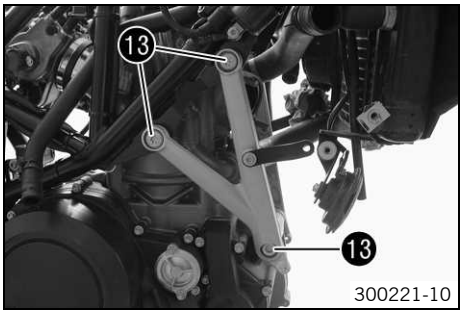


– Pull of the spark plug connector.
– Unplug the connector of the engine coolant temperature sensor ⓫.

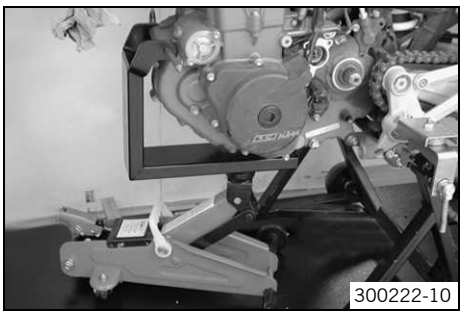


– Loosen the spring-loaded band-type clamp ⓬ from the breather, SLS and oil return line with the special tool.

Pliers for spring band clamp (60029057100) (☛ p. 218)

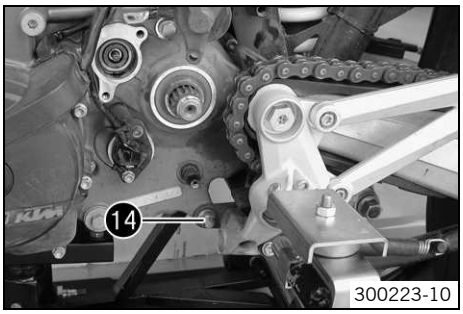


– Remove screws ⓭. Remove the engine bearer.

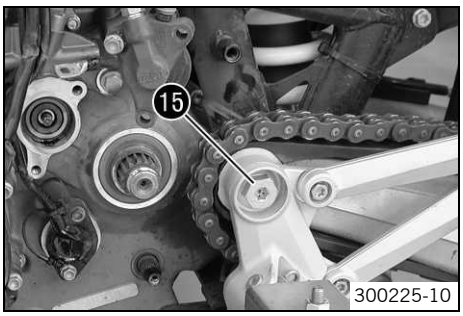


– Position the floor jack under the engine and fix it using the special tool.

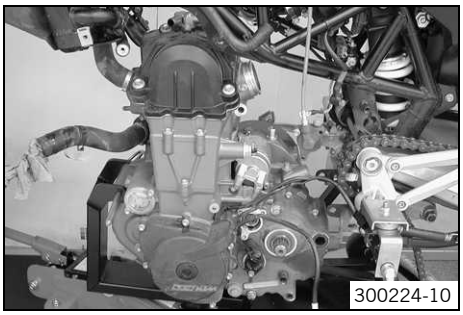
Floor jack attachment (75029055000) (☛ p. 222)



– Remove nut ⓮ of the lower engine bracket. Remove the screw.



– Remove screw ⓯ of the swingarm pivot.
– Remove the swingarm pivot.



– Lower the engine.

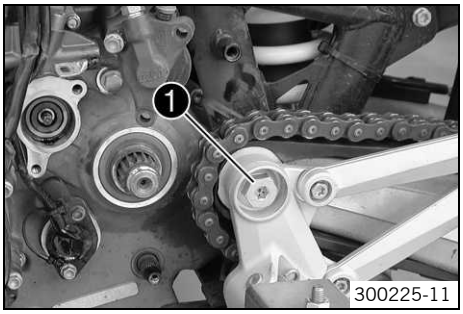
Info
You should have an assistant for this step.
Make sure that the engine is sufficiently secured against falling over.
Protect the frame and attachments from damage.

17.2 Installing the engine

Preparatory work

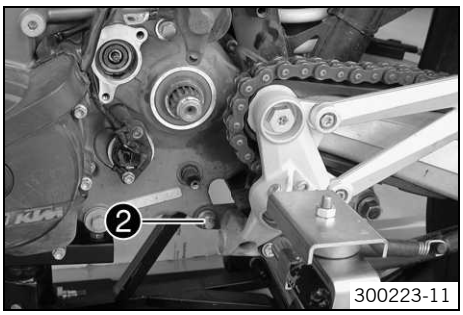
– Raise the engine onto the special tool and fix it.

Floor jack attachment (75029055000) (☛ p. 222)

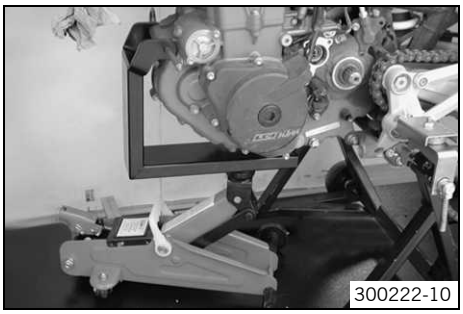


Main work

– Position the engine in the frame.
– Mount swingarm pivot ❶.
– Mount the screw of the swingarm pivot but do not tighten yet.

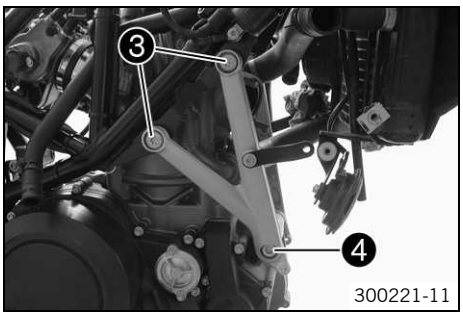


– Install the screw and nut ❷ of the lower engine bracket, but do not tighten them yet.



– Remove the floor jack with the special tool.

Floor jack attachment (75029055000) (☛ p. 222)



– Position the engine bearer.
– Mount and tighten screws ❸.

Guideline

Screw, engine bearer on frame	M10	45 Nm (33.2 lbf ft)

– Mount and tighten screw ❹ with nut.

Guideline

Engine carrying screw	M10	45 Nm (33.2 lbf ft)	**Loctite® 243™**

– Tighten the swingarm pivot.

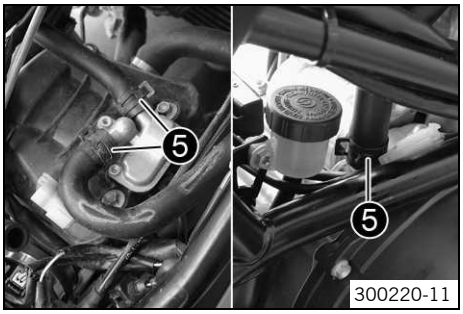
Guideline

Screw, swingarm pivot	M12	80 Nm (59 lbf ft)

– Tighten the lower engine bracket.

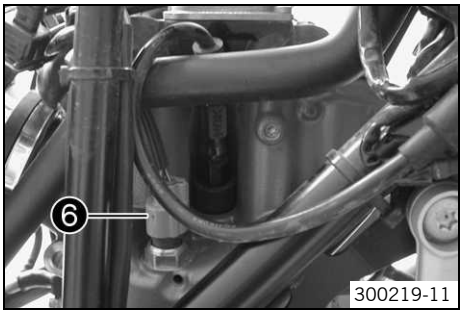
Guideline

Engine carrying screw	M10	45 Nm (33.2 lbf ft)	**Loctite® 243™**

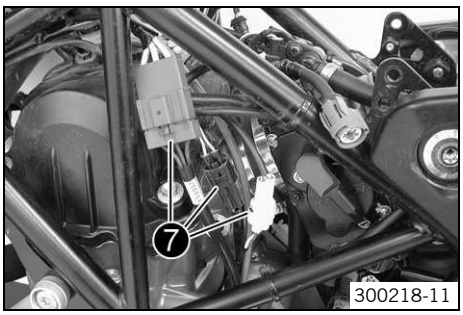


– Position the hoses of the engine breather, the SLS and the oil return line. Mount the spring band clamp ❺ using the special tool.

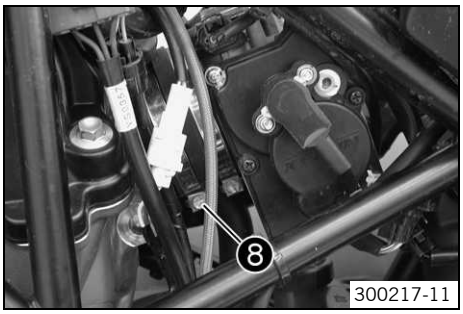
Pliers for spring band clamp (60029057100) (☛ p. 218)



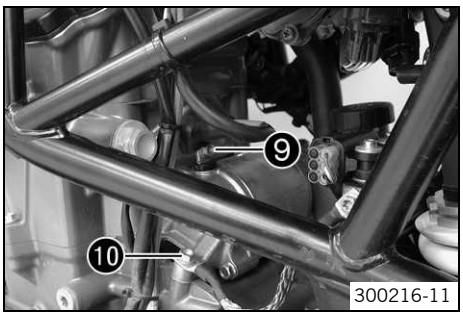
– Attach the spark plug connector.
– Plug in the connector of the engine coolant temperature sensor ❻.



– Reconnect plug-in connections ❼ of the gear position sensor, the crankshaft position sensor and the alternator.



– Position the throttle valve body.
– Position and tighten hose clip ❽.



– Position the electrical connection ❾ on the starter motor. Mount and tighten screw.

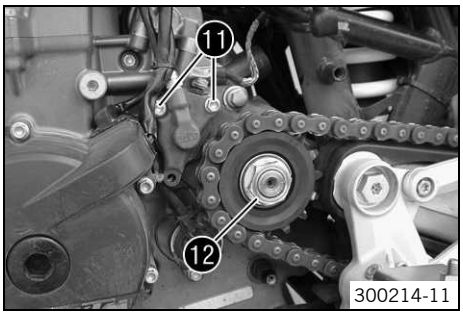
Guideline

Screw, cable on starter motor	M5	3 Nm (2.2 lbf ft)

– Position the ground wire on the starter motor. Mount and tighten screw ❿.

Guideline

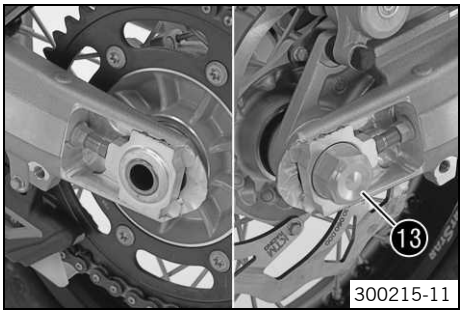
Screw, starter motor	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**



– Insert the clutch push rod.
– Position the clutch slave cylinder.
– Mount and tighten screws ⓫.

Guideline

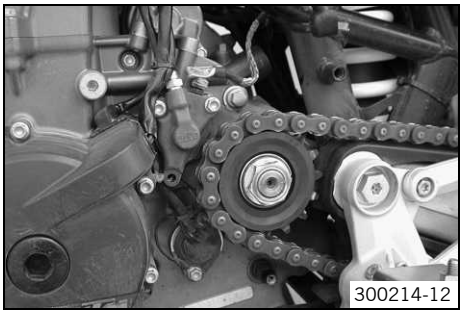
Screw, clutch slave cylinder	M6x20	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, clutch slave cylinder	M6x35	10 Nm (7.4 lbf ft)	–



– Mount the engine sprocket with the chain.
– Position the new lock washer and mount nut ⓬ but do not tighten yet.
– Position the rear wheel.
– Mount the chain adjuster and nut.
– Push the rear wheel forward so that the chain adjusters are on the tensioning screws, and tighten the nut ⓭.

Guideline

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

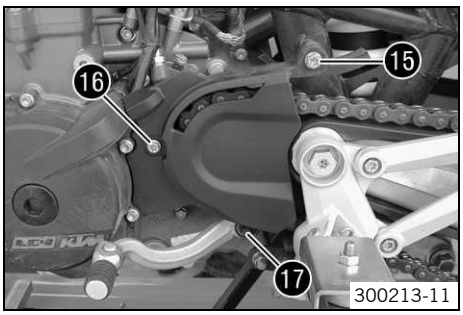


– Have an assistant operate the rear brake.
– Tighten the engine sprocket nut.

Guideline

Nut, engine sprocket	M20x1.5	80 Nm (59 lbf ft)	**Loctite® 243™**

– Secure the nut with the lock washer.



– Position the rear sprocket cover.
– Mount and tighten screw ⓯.

Guideline

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

– Mount and tighten screw ⓰.

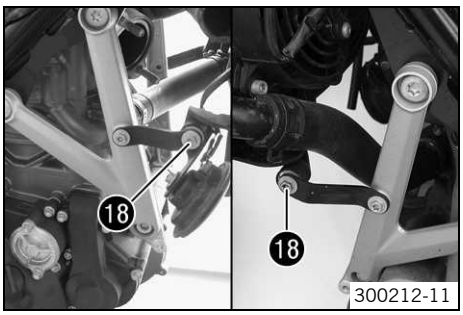
Guideline

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

– Position the shift lever.
– Mount and tighten screw ⓱.

Guideline

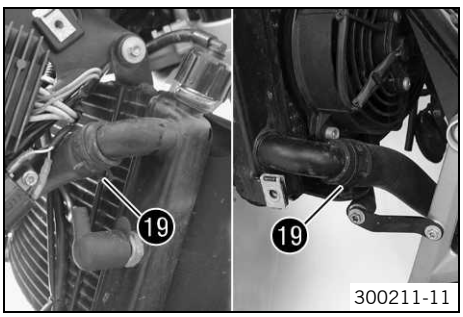
Screw, shift lever	M6	14 Nm (10.3 lbf ft)	**Loctite® 243™**



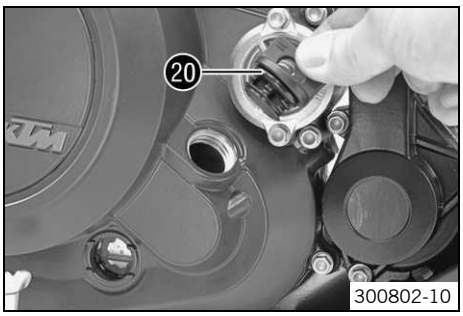
– Mount and tighten screws ⓲.

Guideline

Screw, upper radiator bracket	M6	10 Nm (7.4 lbf ft)



– Position the radiator hoses. Install the spring band clamps ⓳.
– Install the manifold. (☛ p. 58)
– Install the air filter box. (☛ p. 62)
– Disconnect the battery. (☛ p. 85)



– Remove the oil filler plug with O-ring ⓴ from the clutch cover and fill up with engine oil.

Engine oil	1.70 l (1.8 qt.)	Engine oil (SAE 10W/60) (00062010035) (☛ p. 212)	
		Alternative engine oil	Engine oil (SAE 10W/50) (☛ p. 212)

– Install and tighten the oil filler plug with O-ring ⓴.

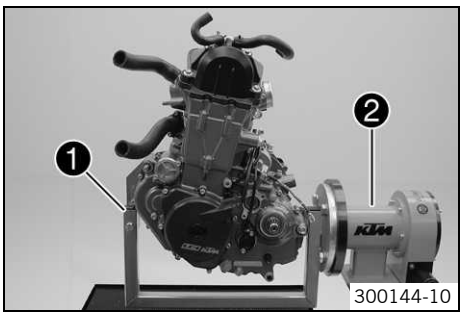
Finishing work

– Fill/bleed the cooling system. (☛ p. 167)
– Remove the motorcycle from the work stand. (☛ p. 11)
– Take a short test ride.
– Read out the fault memory using the KTM diagnostics tool.

– Check the engine for leakage.
– Check the engine oil level. (☛ p. 170)
– Check the coolant level. (☛ p. 169)

17.3 Engine disassembly

17.3.1 Clamping the engine into the engine assembly stand



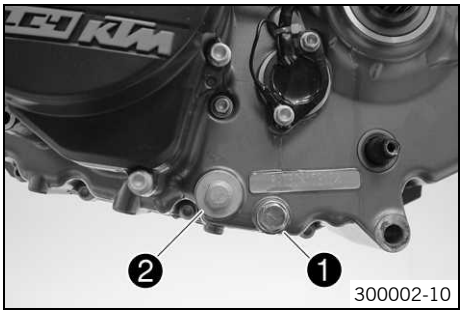
– Mount special tool ❶ on engine work stand ❷.

Engine assembly stand (61229001000) (☛ p. 219)
Support for engine assembly stand (75012001060) (☛ p. 219)
Holder for engine assembly stand (75012001070) (☛ p. 219)

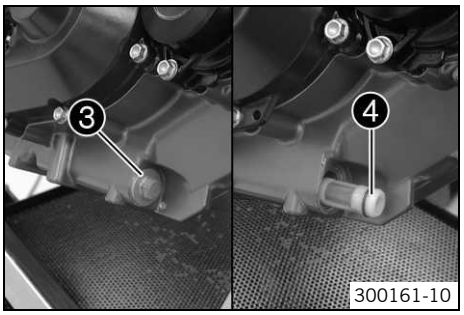
– Mount the engine on special tool ❶.

Info
Have an assistant help you or use a crane.

17.3.2 Draining the engine oil

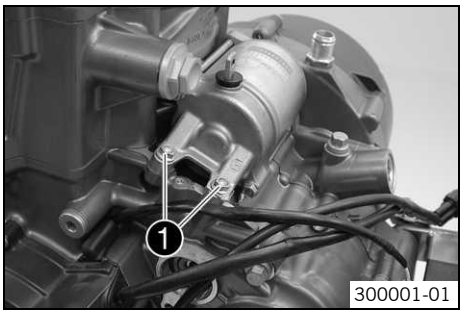


– Remove the oil drain plug ❶ with the magnet and seal ring.
– Remove plug ❷ with oil screen and the O-rings.



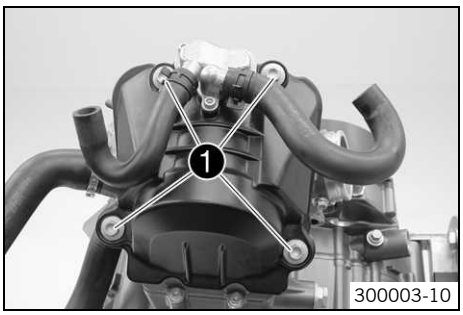
– Remove plug ❸ with oil screen ❹ and the O-rings.
– Completely drain the engine oil.

17.3.3 Removing starter motor



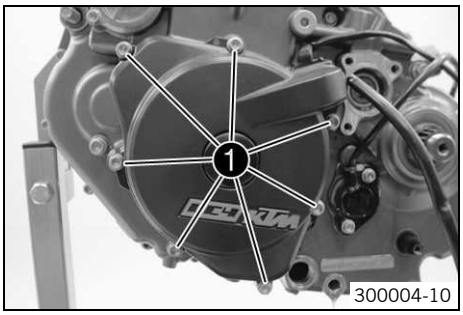
– Remove screws ❶. Take off the starter motor.

17.3.4 Removing valve cover



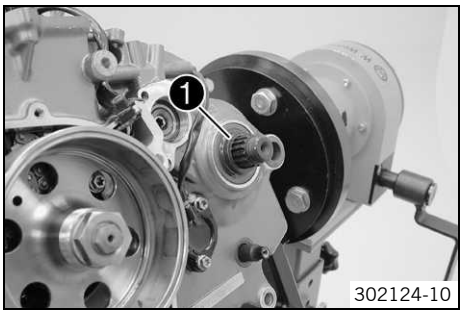
– Remove screws ❶. Take off the valve cover with the valve cover seal.

17.3.5 Removing the alternator cover



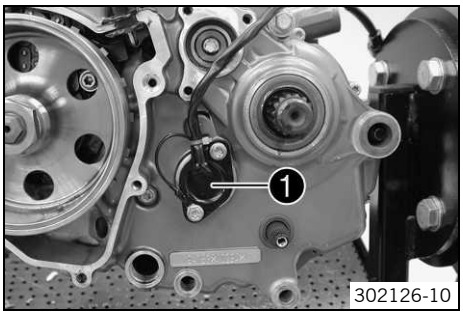
– Remove screws ❶. Take off the alternator cover.
– Remove dowels.

17.3.6 Removing spacer

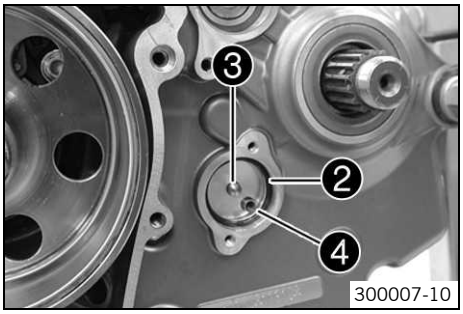


– Remove the spacer ❶ of the countershaft.

17.3.7 Removing gear position sensor

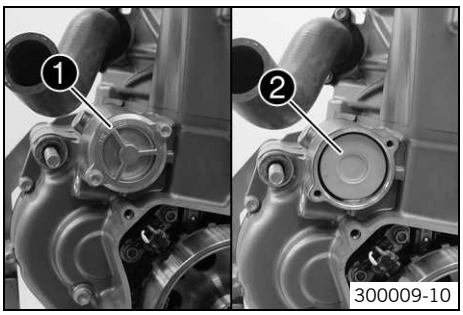


– Remove screws. Remove the gear position sensor ❶.



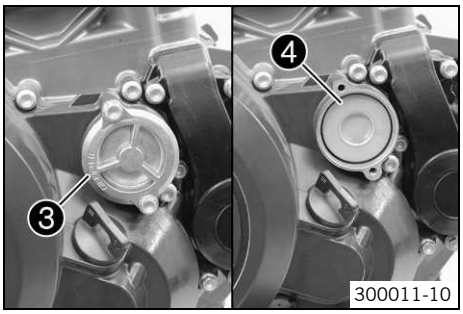
– Remove O-ring ❷.
– Remove contact pin ❸ and the contact springs ❹.

17.3.8 Removing oil filter



– Remove screws. Remove the oil filter cover ❶ with the O-ring.
– Pull oil filter ❷ out of the oil filter housing.

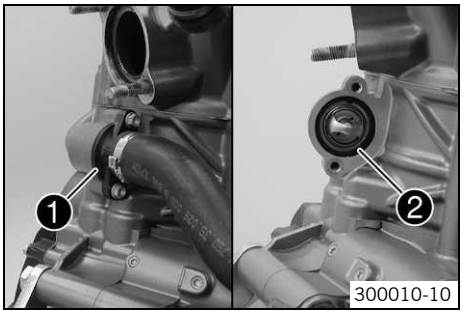
Circlip pliers reverse (51012011000) (☛ p. 216)



– Remove screws. Remove the oil filter cover ❸ with the O-ring.
– Pull oil filter ❹ out of the oil filter housing.

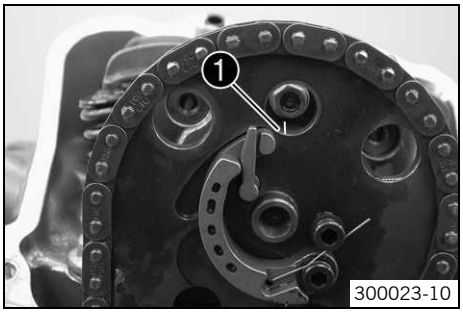
Circlip pliers reverse (51012011000) (☛ p. 216)

17.3.9 Removing thermostat

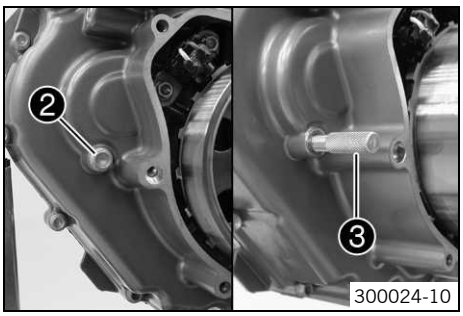


– Remove screws. Take off the thermostat case ❶ with the radiator hose.
– Pull out the thermostat ❷.

17.3.10 Setting engine to ignition top dead center



– Turn the crankshaft counterclockwise until markings ❶ of the camshafts are flush with the marks of the camshaft support plate.



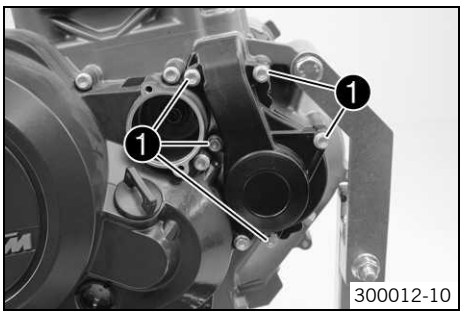
– Remove screw ❷.

Info
Look through the hole to check that the position hole of the balancer shaft is visible.

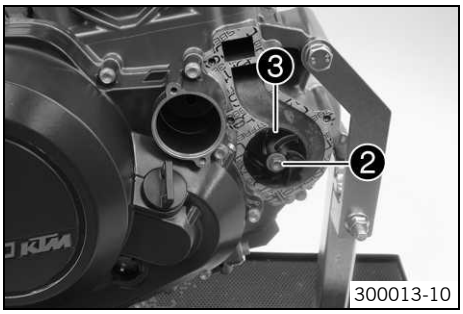
– Screw in special tool ❸.

Engine blocking screw (77329010000) (☛ p. 223)

17.3.11 Removing water pump wheel

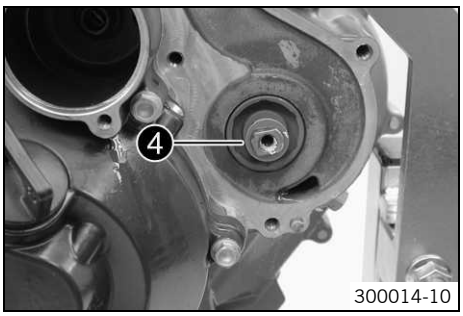


– Remove screws ❶. Take off the water pump cover.



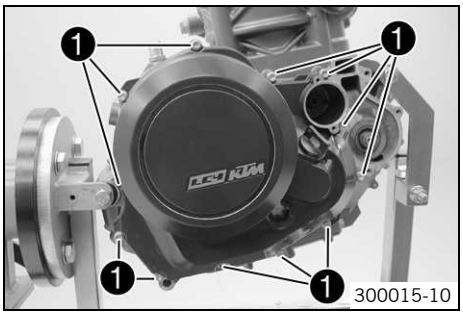
– Remove screw ❷. Take off the water pump wheel ❸.
– Take off the water pump cover seal.

Info
Do not lose the centering pins.



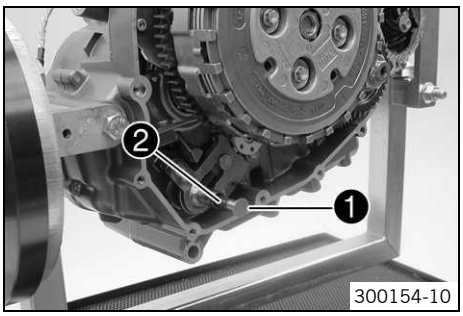
– Remove the shaped washer ❹.

17.3.12 Removing clutch cover



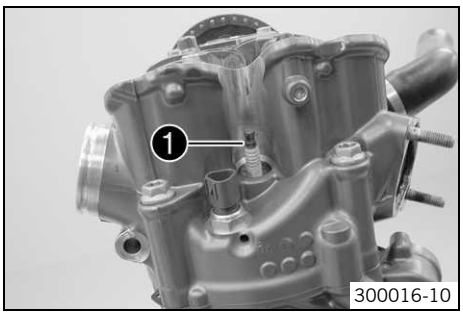
– Remove screws ❶. Take off the clutch cover.
– Take off the dowels. Remove the clutch cover seal.

17.3.13 Removing spacer and spring



– Remove the spacer ❶ and spring ❷ of the shift shaft.

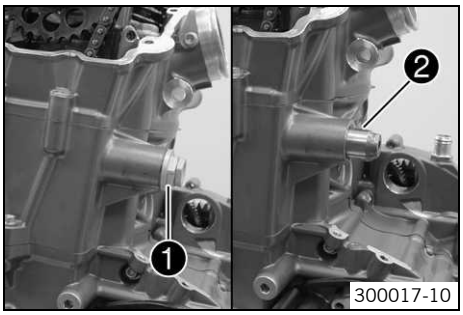
17.3.14 Removing spark plug



– Remove the spark plug using the special tool ❶.

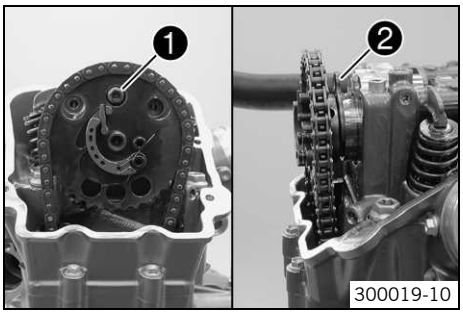
Spark plug wrench (75029172000) (☛ p. 223)

17.3.15 Removing timing chain tensioner

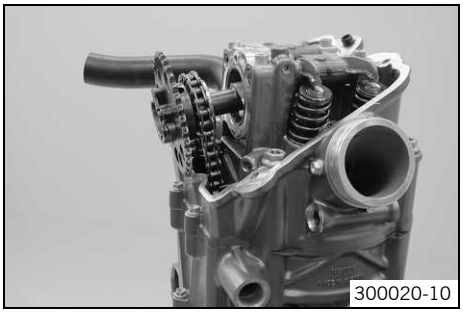


– Remove screw ❶. Take off the seal ring.
– Pull out timing chain tensioner ❷.

17.3.16 Removing camshafts

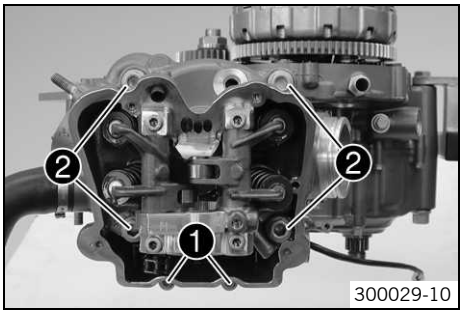


– Remove screw ❶. Take off the camshaft support plate ❷.



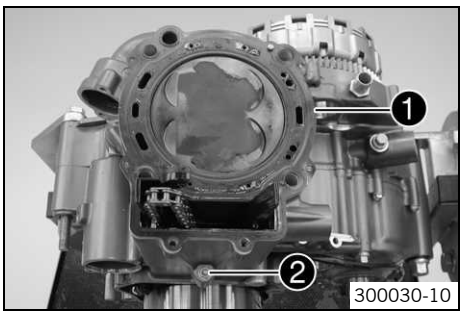
– Pull the camshaft out of the bearing seats. Take the timing chain off the camshaft gear. Remove the camshaft.

17.3.17 Removing cylinder head



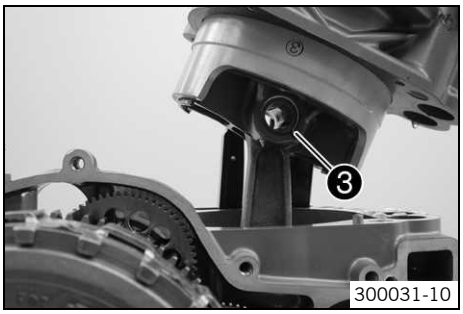
– Remove screws ❶.
– Alternately loosen screws ❷ and remove them.
– Take off the cylinder head.

17.3.18 Removing piston



– Take off the cylinder head gasket ❶.
– Remove screw ❷.
– Push the cylinder upward.

Info
Push the cylinder upward only far enough to allow removal of the piston pin. Ensure that the two grooved pins remain in place.



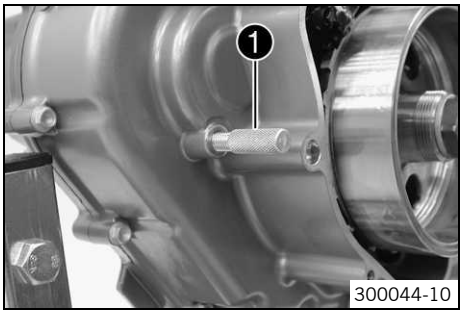
– Remove piston pin retainer ❸.
– Remove the piston pin.
– Take off the cylinder with the piston.
– Push the piston upward out of the cylinder.

Info
If no other work is required on the cylinder and the piston, you can leave the piston in the cylinder.

– Take off the cylinder base gasket.

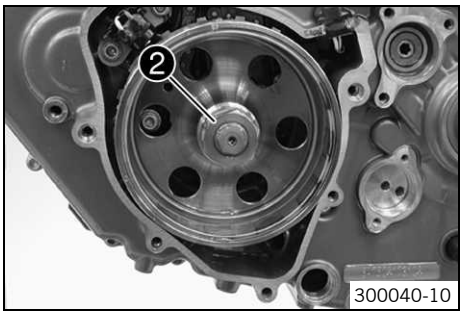
Info
Ensure that the two grooved pins remain in place.

17.3.19 Removing rotor



– Remove special tool ❶.

Engine blocking screw (77329010000) (☛ p. 223)

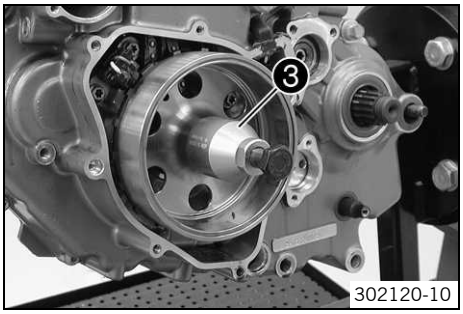


– Use the special tool to hold the rotor tight.

Holding spanner (75029091000) (☛ p. 223)

– Loosen the nut ❶ of the rotor and remove it with the tab washer.

Info
The crankshaft must not be blocked.

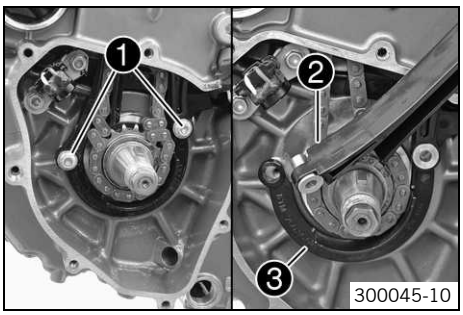


– Install the special tool ❷ on the rotor. Hold it tight using the special tool and pull off the rotor by turning the screw in.

Extractor (58429009000) (☛ p. 216)

– Remove the special tool.

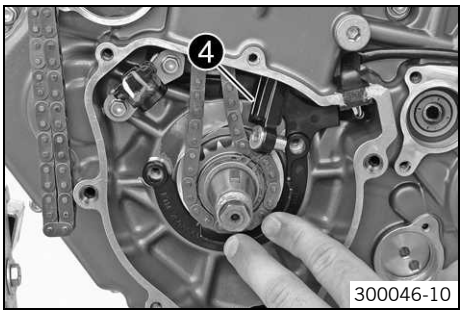
17.3.20 Removing timing chain rails



– Remove screws ❶.
– Pull the timing chain guide rails ❷ out of the timing chain securing guide ❸.

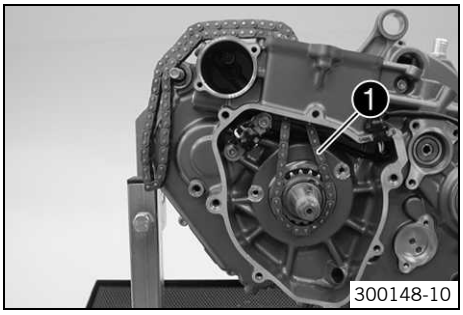
Info
The support bushing is plugged through the timing chain guide rails into the timing chain securing guide.

– Remove the timing chain guide rails upward out of the timing chain shaft.



– Hold the timing chain securing guide tight and pull the timing chain tensioning rail ❹ out of the timing chain securing guide.
– Remove the timing chain tensioning rail upward out of the timing chain shaft.
– Remove the timing chain securing guide ❸.

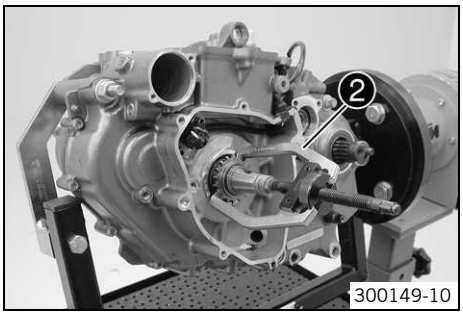
17.3.21 Removing timing chain and timing chain sprocket



– Slip out timing chain ❶.

Info
Mark the direction of travel.

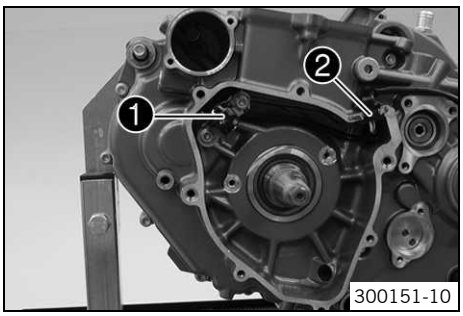
– Take off lock ring.



– Pull of the timing chain sprocket with the special tool ❷.

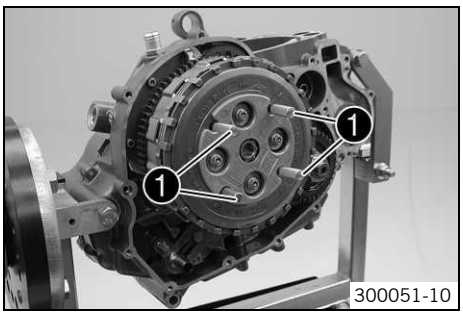
Extractor (59029033000) (☛ p. 217)

17.3.22 Removing crankshaft position sensor



– Remove the screws of crankshaft position sensor ❶.
– Pull cable support sleeve ❷ out of the engine case. Take off the crankshaft position sensor.

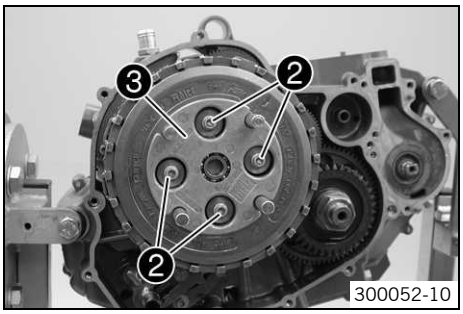
17.3.23 Removing clutch cage



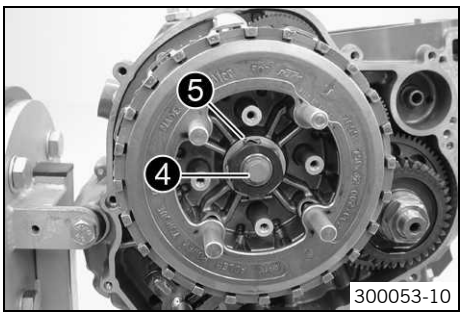
– Clamp the antihopping clutch with special tool ❶.

Assembly screws (75029033000) (☛ p. 220)

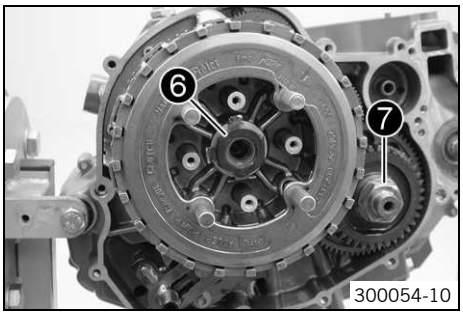
Info
Apply the special tool with the hand only, do not use another tool.



– Loosen the screws ❷ diagonally and remove them with their spring retainers and clutch springs.
– Remove the pressure cap ❸.



– Remove the pressure piece ❹.
– Bend up the lock washer ❺.



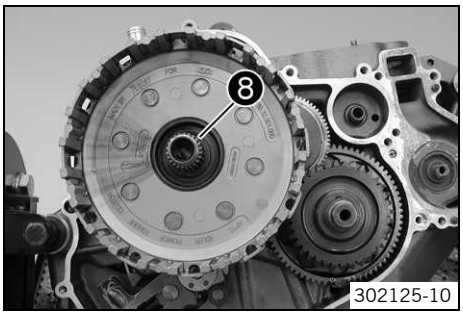
– Hold the clutch cage using the special tool and remove the nut ❻ of the inner clutch hub.

Gear segment (75029081000) (☛ p. 222)

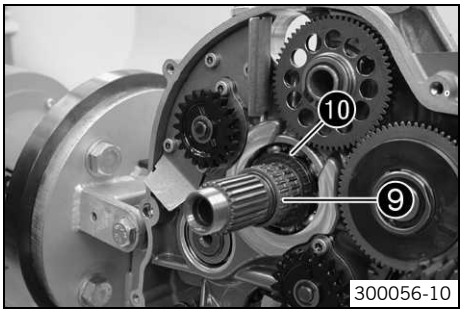
Info
Make sure that the crankshaft is not blocked.

– Remove the nut ❼ of the primary gear.

Info
Left-handed thread!

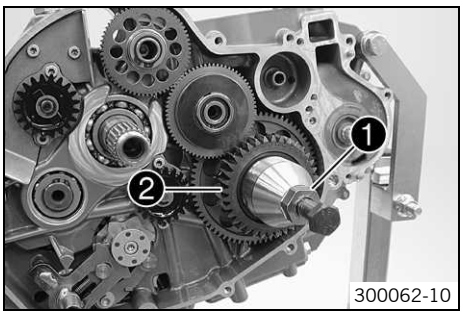


– Take off the stepped washer and remove the half-washers ❽.
– Take off the clutch cage.



– Remove needle bearing ❾ and supporting plate ❿.

17.3.24 Removing primary gear



– Plug the special tool into the crankshaft.

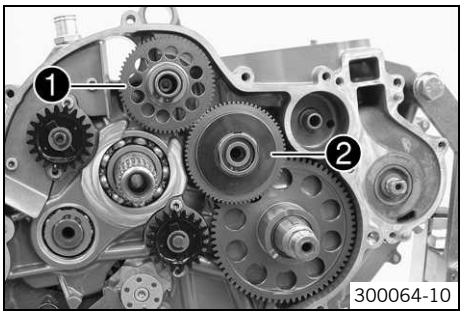
Protection cover (75029090000) (☛ p. 223)

– Screw the special tool ❶ on to the primary gear ❷.

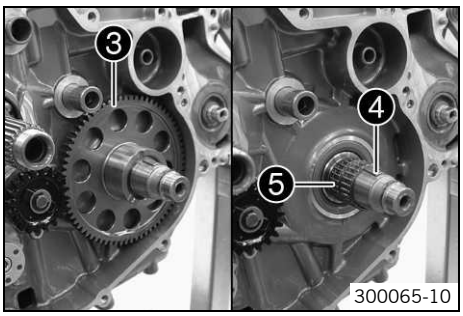
Extractor (75029021000) (☛ p. 220)

– Hold it using the special tool and pull off the primary gear by turning the screw in.
– Remove the special tools.

17.3.25 Removing starter drive

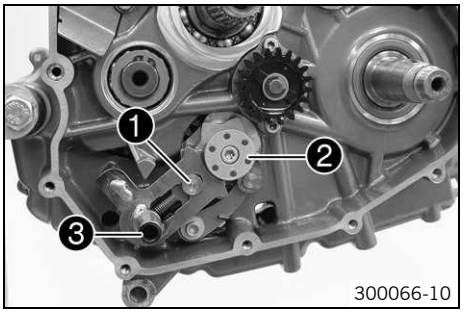


– Remove the lock ring of the starter idler gear ❶ and the torque limiter ❷.
– Take off the starter idler gear ❶ with the washers.
– Remove the torque limiter ❷ with the washers and needle bearing.



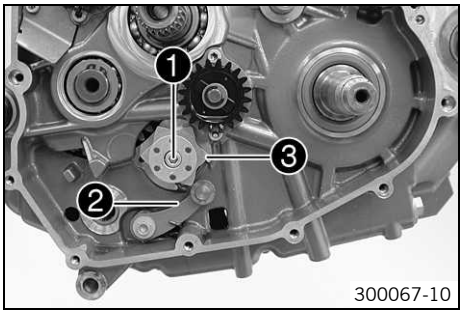
– Take off the free-wheel gear ❸.
– Remove the woodruff key ❹ and both needle bearings ❺.

17.3.26 Removing shift shaft



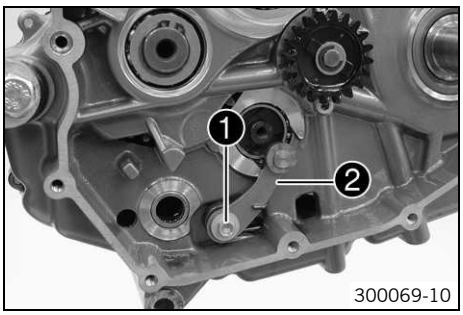
– Push sliding plate ❶ away from the shift drum locating ❷. Remove shift shaft ❸ with the washer.

17.3.27 Removing shift drum locating



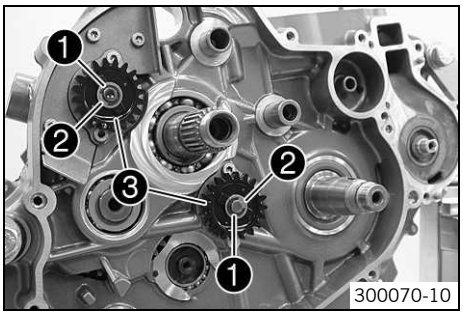
– Remove screw ❶.
– Press locking lever ❷ away from shift drum locating ❸ and take off the shift drum locating.
– Release the locking lever.

17.3.28 Removing locking lever

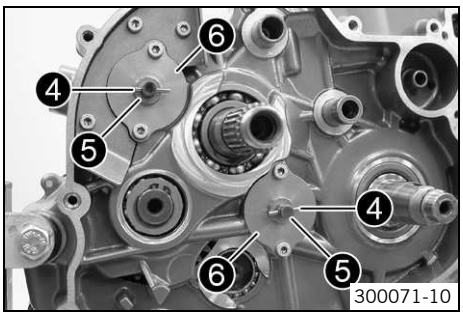


– Remove screw ❶.
– Take off locking lever ❷ with the sleeve and spring.

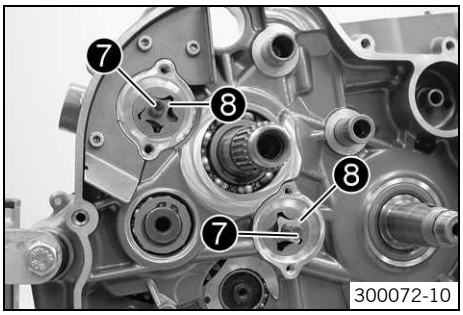
17.3.29 Removing oil pumps



– Remove the lock washers ❶ and normal washers ❷ from both oil pumps.
– Take off the oil pump toothed wheels ❸.

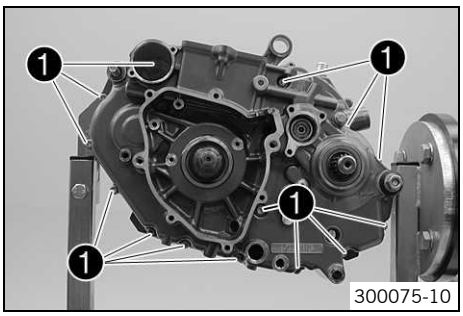


– Remove the pins ❹ and washers ❺.
– Remove screws. Take off the oil pump cover ❻.

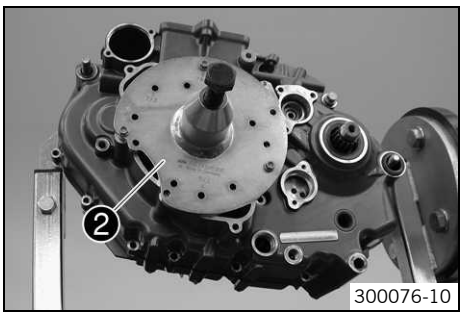


– Remove both oil pump shafts ❼ with internal rotors ❽.
– Take the external rotors out of the engine case.

17.3.30 Removing left engine case



– Remove screws ❶.
– Swing the left section of the engine case up and remove the nut or screw of the engine fixing arm.



– Install the special tool ❷ with suitable screws.

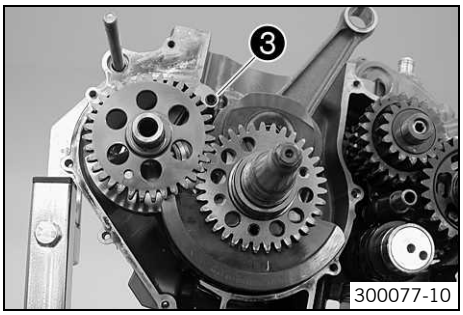
Extractor (75029048000) (☛ p. 221)

Info
Use the **750** drill hole.

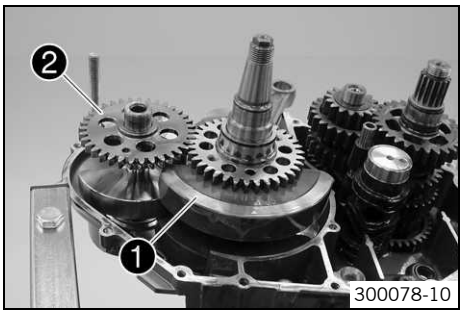
– Pull off the section of the engine case.

Info
Do not tension the section of the engine case.
The balancer shaft and the main shaft have a stop disk, these usually stick to the bearing.

– Take off the left section of the engine case.
– Remove the special tool.
– Remove dowels.
– Remove O-ring ❸.

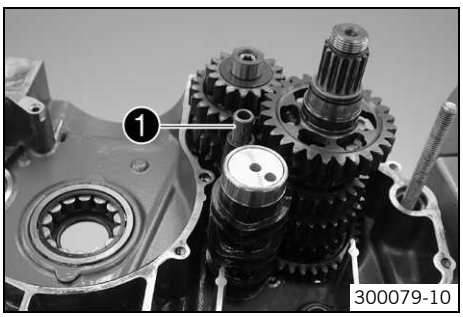


17.3.31 Removing crankshaft and balancer shaft

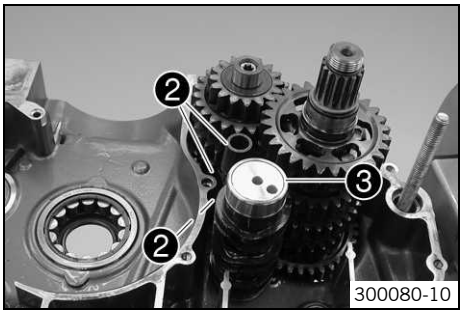


– Remove the crankshaft ❶ and the balancer shaft ❷.

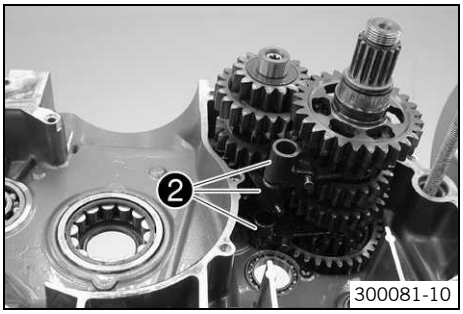
17.3.32 Removing transmission shafts



– Remove the shift rail ❶.

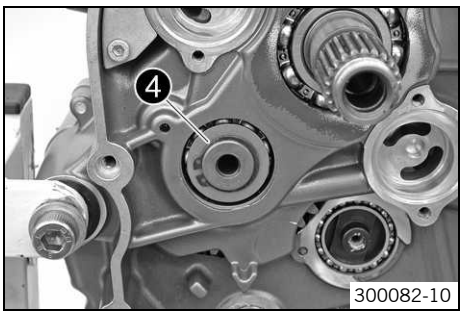


– Swing shift forks ❷ to one side.
– Remove shift drum ❸.

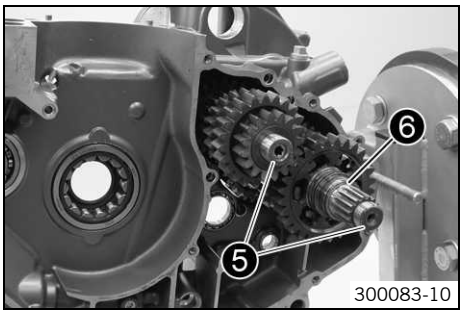


– Remove shift forks ❷.

Info
Ensure that the pins remain in place.



– Remove the lock ring ❹ and the stop disk.



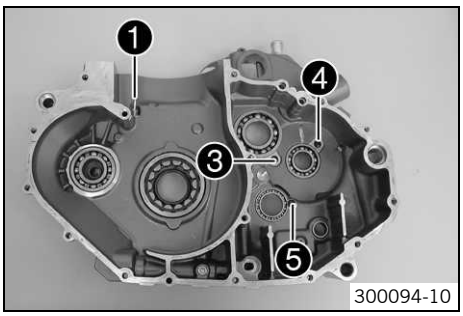
– Pull both transmission shafts ❺ out of the bearing seats together.

Info
The stop disk of the countershaft usually sticks to the bearing.

– Take the O-ring off the countershaft ❻.

17.4 Work on individual parts

17.4.1 Work on the right section of the engine case



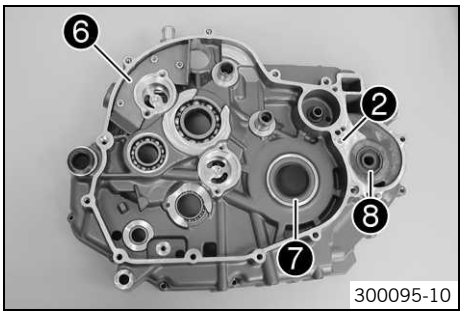
– Remove oil jet ❶.
– Remove bearing locks of the main shaft bearing ❸, of the countershaft bearing ❹, and of the shift drum bearing ❺.
– Remove any sealing mass remnants and clean the engine case section thoroughly.
– Pull the dowels out of the housing.
– Warm the engine case section in an oven.

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.

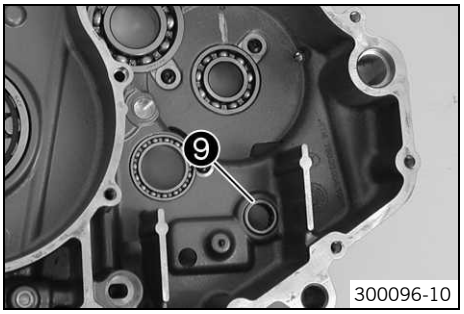
Info
Any bearings that remain in the engine case section must be removed using a suitable tool.



– Remove oil jet ❷.
– Remove the cover plate ❻ for the oil return line.
– Press out the shaft seal ring ❼ of the crankshaft from the inside to the outside.
– Remove the shaft seal rings ❽ of the water pump.
– Press in the shaft seal ring ❼ of the crankshaft from the outside to the inside with the open side facing in.

Info
The shaft seal ring must be flush on the outside.

– Press in the shaft seal rings of the water pump with the open side facing out so that it is flush.



– 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

The shift shaft bearing ❾ must be pressed in from the outside to the inside until it is flush.
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.

– Position all bearing locks. Mount and tighten the screws.

Guideline

Locking screw for bearing	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**

– Mount and tighten the oil jet ❶.

Guideline

Oil jet, piston cooling	M6x0.75	4 Nm (3 lbf ft)	**Loctite® 243™**

– Mount and tighten the oil jet ❷.

Guideline

Oil nozzle for conrod bearing lubrication	M4	2 Nm (1.5 lbf ft)	**Loctite® 243™**

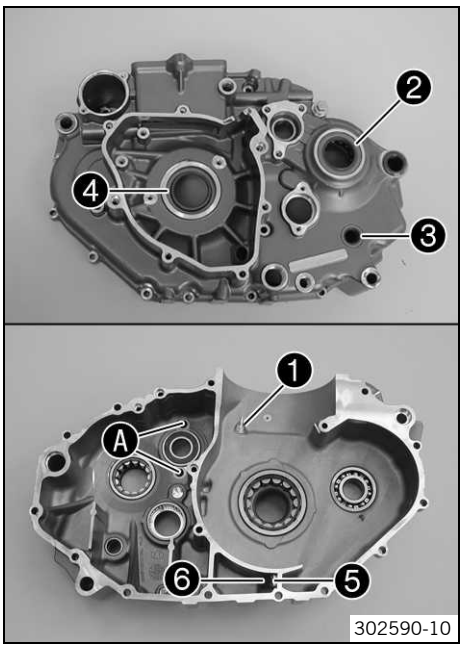
– Blow compressed air through all oil channels and check that they are clear.
– Position the cover plate ❻. Mount and tighten the screws.

Guideline

Screw, cover plate for oil return line	M5	6 Nm (4.4 lbf ft)

– Reinstall the dowels.

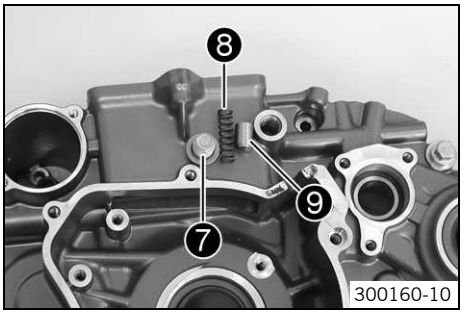
17.4.2 Work on the left section of the engine case



– Remove all dowels.
– Remove oil jet ❶.
– Remove the shaft seal ring of countershaft ❷ and shift shaft ❸.

Info
The shaft seal ring ❹ of the crankshaft cannot be removed before the crankshaft bearing.

– Screw off the membrane support plate ❺ and remove it together with membrane ❻.
– Remove screw Ⓐ with the washer.



– Remove screw plug ❼ and take pressure spring ❽ with piston valve ❾ out of the drill hole.
– 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.

– Press out the shaft seal ring of the crankshaft from the outside to the inside.
– Press in the shaft seal ring of the crankshaft from the inside to the outside with the open side facing out.

Info
The shaft seal ring must be flush on the outside.

– 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 all the way to the stop or so that 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 screw ❹ with the washer.

Guideline

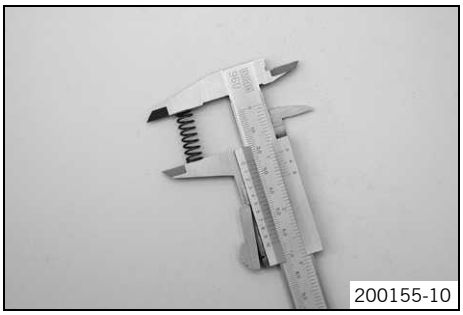
Locking screw for bearing	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**

– Press in the shaft seal ring of countershaft ❷ and shift shaft ❸ with the open side facing inwards so that it is flush.
– Mount and tighten the oil jet ❶.

Guideline

Oil jet, piston cooling	M6x0.75	4 Nm (3 lbf ft)	**Loctite® 243™**

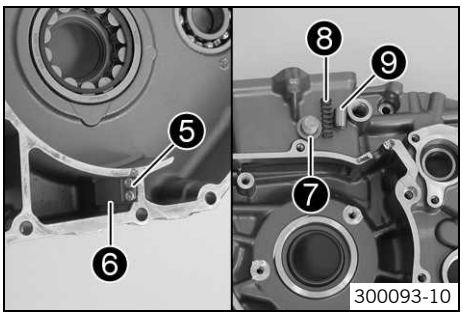
– Mount the dowels.
– Blow compressed air through all oil channels and check that they are clear.


200155-10

– Measure the spring length of the oil pressure regulator valve.

Oil pressure regulator valve - minimum spring length	25.36 mm (0.9984 in)

» If the measured value does not equal the specified value:
  – Change the spring.
– Check the piston valve for damage and wear.
» If there is damage or wear:
  – Replace the piston valve.



300093-10

– Lubricate piston valve ❾ and mount it with pressure spring ❽. Mount and tighten screw plug ❼ with the new seal ring.

Guideline

Oil pressure regulator valve plug	M12x1.5	20 Nm (14.8 lbf ft)

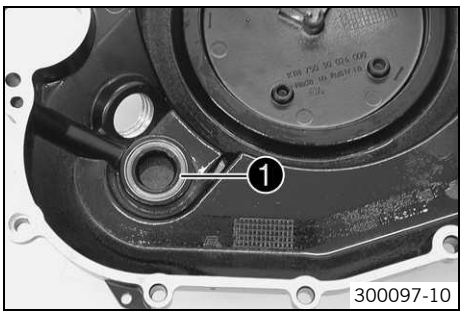
– Position the membrane support plate ❺ with membrane ❻. Mount and tighten the screws.

Guideline

Screw, membrane fixation	M3	2.5 Nm (1.84 lbf ft)	**Loctite® 243™**

Info
The membrane support plate is curved and must point away from the membrane.
An incorrectly installed membrane support plate results in loss of performance and increased oil consumption or leaks.
Do not apply thread locker between the membrane and the membrane support plate since this would impair their function.

17.4.3 Work on the clutch cover



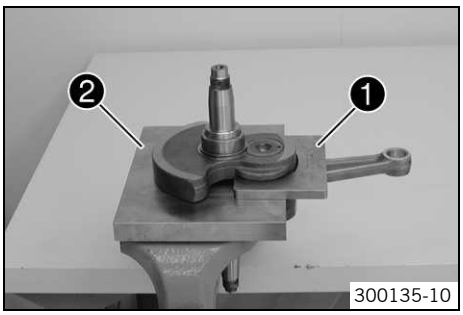
300097-10

– Remove the shaft seal ring ❶ of the crankshaft.
– Press in a new shaft seal ring with the open side facing inward until it stops.

Info
Support the clutch cover sufficiently when pressing in.

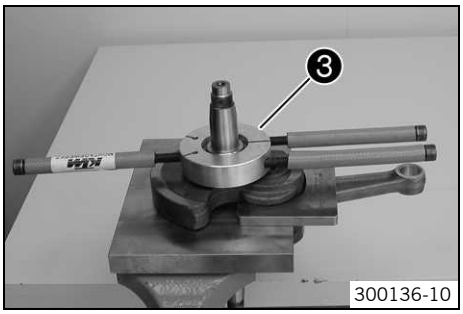
– Blow compressed air through the oil channel and check that it is clear.

17.4.4 Removing crankshaft bearing inner ring



– Fix the crankshaft with special tools ❶ and ❷ in the vise.

Upper part, pressing-out tool (75029047050) (☛ p. 221)
Under part, pressing-out tool (75029047051) (☛ p. 221)



– Heat the special tool ❸.

Guideline

150 °C (302 °F)

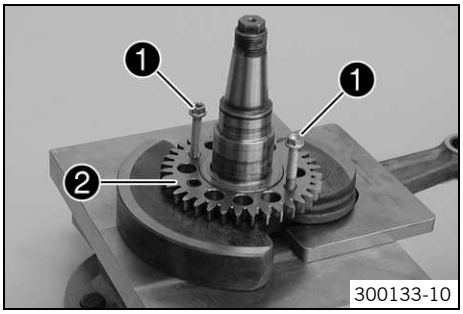
Tool for inner bearing race (58429037043) (☛ p. 217)

– Push the heated special tool ❸ on to the inner bearing race, press them hard together, and pull them together off the crankshaft.
– Take off the compensation shim.
– Repeat the operation on the opposite side.

17.4.5 Removing balancer shaft drive wheel

Preparatory work

– Remove the crankshaft bearing inner ring. (☛ p. 127)



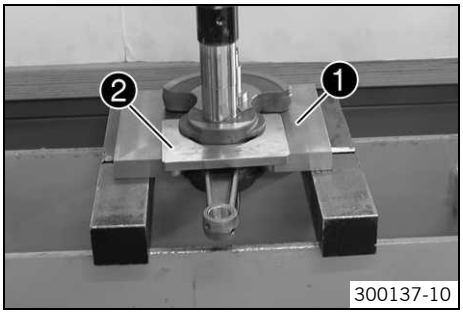
Main work

– Screw in 2 M6 screws ❶ in the threads. Tighten the two screws evenly to pull the drive wheel ❷ off the crankshaft.

17.4.6 Changing the connecting rod, conrod bearing, and crank pin

Preparatory work

– Remove the crankshaft bearing inner ring. (☛ p. 127)
– Remove the drive wheel of the balancer shaft. (☛ p. 127)



Main work

– Position the crankshaft with the special tool ❶ in the press.

Under part, pressing-out tool (75029047051) (☛ p. 221)

– Position the special tool ❷ between the crankwebs.

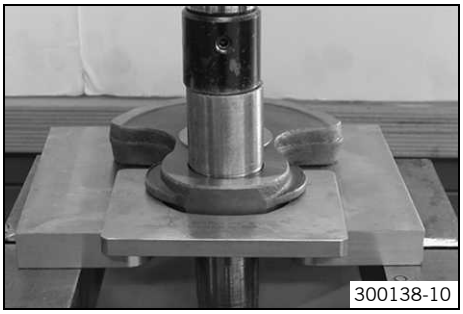
Upper part, pressing-out tool (75029047050) (☛ p. 221)

– Press the crank pin with the push-out drift of the special tool out of the upper crankweb.

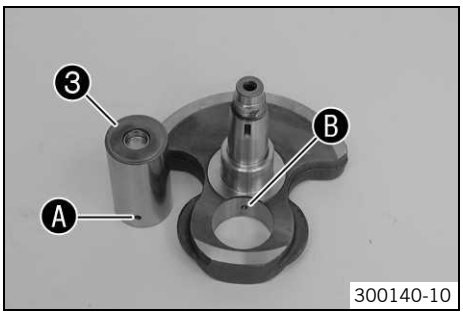
Pressing device for crankshaft, complete (75029047000) (☛ p. 221)

Info
Hold the lower crankweb.

– Take off the connecting rod and bearing.



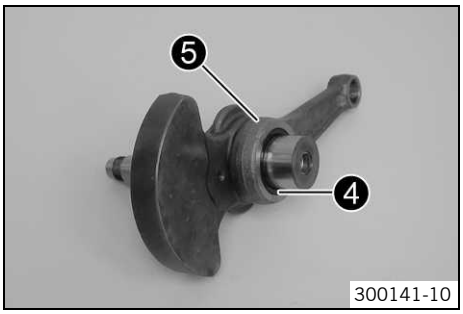
– Press the crank pin out of the crankweb.



– Press in the new crank pin ❸ as far as possible.

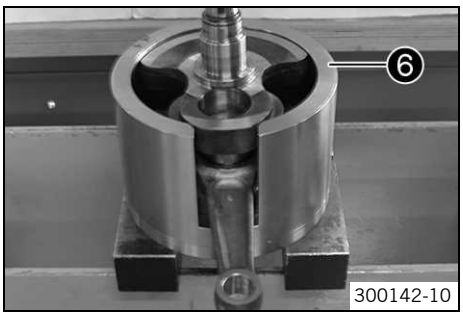
Info
The crank pin must be pressed in so that oil channel Ⓐ is aligned with oil channel Ⓑ.
If the oil channels are not correctly aligned, the conrod bearing will not be supplied with oil.

– Blow compressed air through the oil channel to check that it is clear.



– Install the bearing ❹ and the connecting rod ❺.

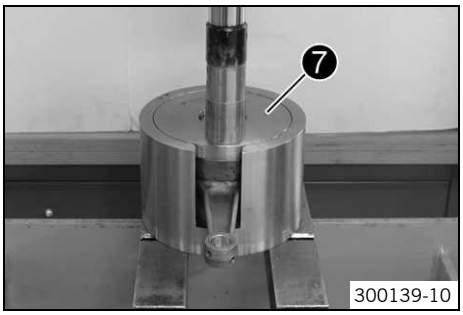
Info
Thoroughly lubricate the bearing.



– Position special tool ❻ on the press.

Pressing device for crankshaft, complete (75029047000) (☛ p. 221)

– Place the crankweb in with the connecting rod and the bearing. Position the second crankweb.



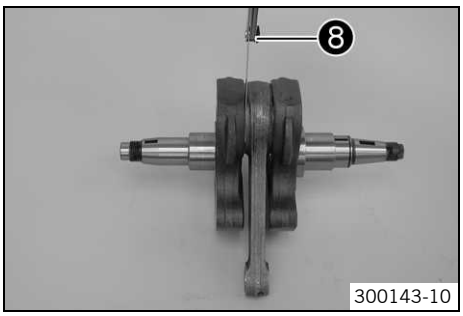
– Position the special tool ❼ with the heel at the bottom.

Pressing device for crankshaft, complete (75029047000) (☛ p. 221)

– Press the upper crankweb in as far as possible.

Info
The press mandrel must be applied above the crank pin.

– Take the crankshaft out of the special tool, and check the connecting rod for freedom of movement.



– Measure the axial clearance between the connecting rod and the crankwebs using the special tool ❽.

Feeler gauge (59029041100) (☛ p. 218)

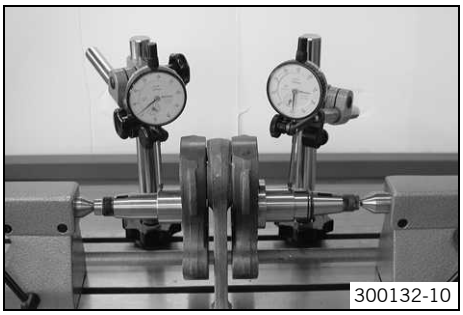
Connecting rod - axial clearance of lower conrod bearing	0.40… 0.60 mm (0.0157… 0.0236 in)

» If the specified value is not met:
– Correct until it complies with the specified value.

Finishing work
– Check the crankshaft run-out at the bearing pin. (☛ p. 129)
– Install the drive wheel of the balancer shaft. (☛ p. 129)

– Install the crankshaft bearing inner ring. (☛ p. 129)
– Measure the axial clearance of the crankshaft and the balancer shaft. (☛ p. 130)

17.4.7 Checking crankshaft run-out at bearing pin

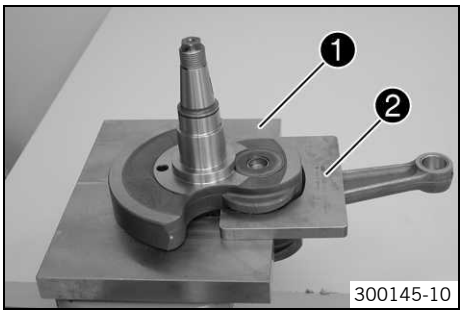


– Position the crankshaft on a roller block.
– Rotate the crankshaft slowly.
– Check the crankshaft run-out at both bearing pins.

Crankshaft run-out at bearing pin	≤ 0.10 mm (≤ 0.0039 in)

» If the crankshaft run-out at the bearing pin is greater than the specified value:
– Align the crankshaft.

17.4.8 Installing balancer shaft drive wheel

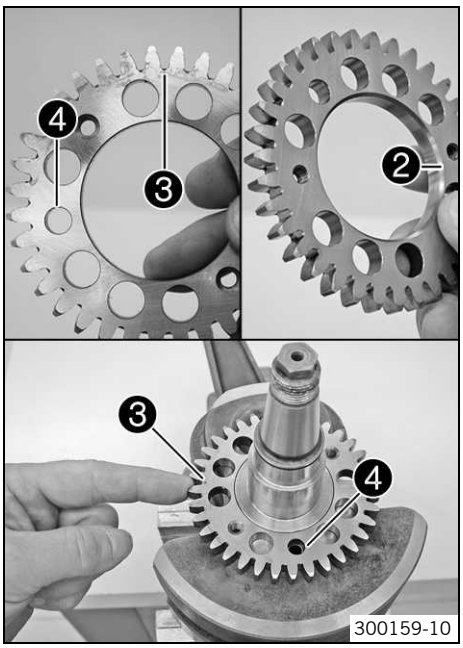


Main work
– Fix the crankshaft with special tools ❶ and ❷ in the vise.

Upper part, pressing-out tool (75029047050) (☛ p. 221)
Under part, pressing-out tool (75029047051) (☛ p. 221)

– Warm the drive wheel.
Guideline

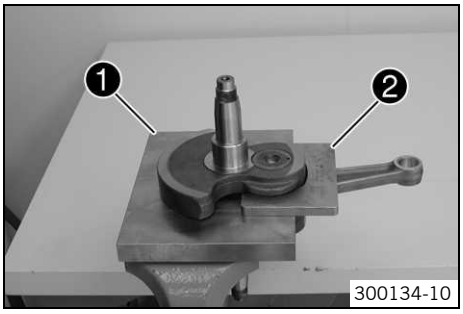
100 °C (212 °F)



– Place the drive wheel on the crankshaft.
✓ The dowel of the crankshaft must fit in the drill hole ❹.
✓ The side of the drive wheel with the punch mark ❸ must be visible after assembly, and the side with the bevel ❷ must be in contact with the crankweb.

Finishing work
– Install the crankshaft bearing inner ring. (☛ p. 129)
– Measure the axial clearance of the crankshaft and the balancer shaft. (☛ p. 130)

17.4.9 Installing crankshaft bearing inner ring



Main work
– Fix the crankshaft with special tools ❶ and ❷ in the vise.

Upper part, pressing-out tool (75029047050) (☛ p. 221)
Under part, pressing-out tool (75029047051) (☛ p. 221)

– Push on the compensation shim.
– Heat the special tool. Install the inner bearing race.
Guideline

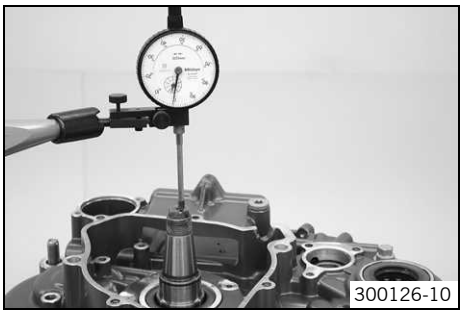
120 °C (248 °F)

– Repeat the operation on the opposite side.
– Make sure that the new inner bearing race is installed flush.

Info
After changing the crankshaft bearing and the conrod bearing, measure the axial play of the crankshaft.

Finishing work
– Measure the axial clearance of the crankshaft and the balancer shaft. (☛ p. 130)

17.4.10 Measuring axial clearance of crankshaft and balancer shaft


300126-10

– Insert the crankshaft and balancer shaft in the right engine casing.

Info
Do not forget the dowels.

– Mount the left engine casing.
– Mount and tighten the screws.
Guideline

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

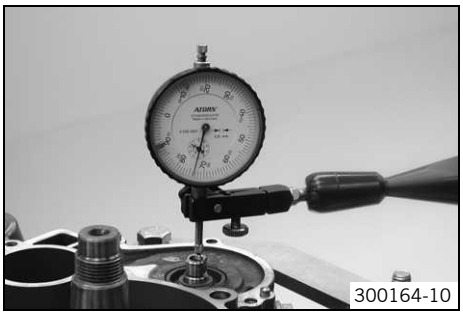
– Mount the dial gauge support on the engine case and measure and note the axial clearance of the crankshaft.
Guideline

Crankshaft - axial clearance	0.15... 0.25 mm (0.0059... 0.0098 in)

» If the measured value does not equal the specified value:
– Remove the crankshaft.
– Remove the crankshaft bearing inner ring. (☛ p. 127)
– Calculate the thickness of the compensation shims.
– Add or remove compensation shims equally on both sides.

Info
If the axial clearance is too small, remove compensation shims.
If the axial clearance is too large, add compensation shims.

– Install the crankshaft bearing inner ring. (☛ p. 129)


300164-10

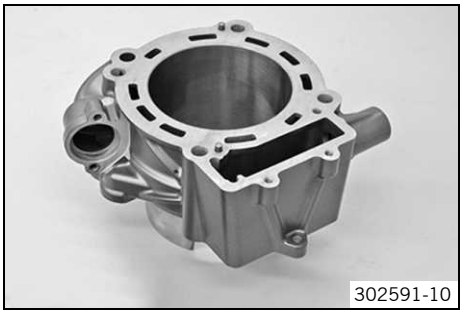
– Mount the dial gauge support on the engine case and measure and note the axial clearance of the balancer shaft.
Guideline

Balancer shaft axial clearance	0.05... 0.20 mm (0.002... 0.0079 in)

» If the measured value does not equal the specified value:
– Remove the balancer shaft.
– Calculate the thickness of the compensation shims.
– Add compensation shims to the ignition side only.

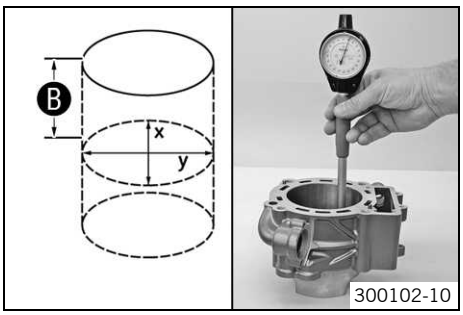
Info
If the axial clearance is too small, remove compensation shims.
If the axial clearance is too large, add compensation shims.

17.4.11 Cylinder - Nikasil® coating


302591-10

Nikasil® is a surface protection layer for a coating method developed by the Mahle company. The name is derived from the two materials used in this method - a layer of nickel, in which silicon carbide (a particularly hard substance) is embedded.
The most important advantages of the **Nikasil®** coating are the excellent heat conductivity resulting in better performance, less wear, and low cylinder weight.

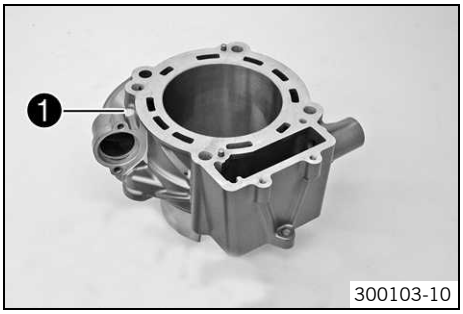
17.4.12 Checking/measuring the cylinder



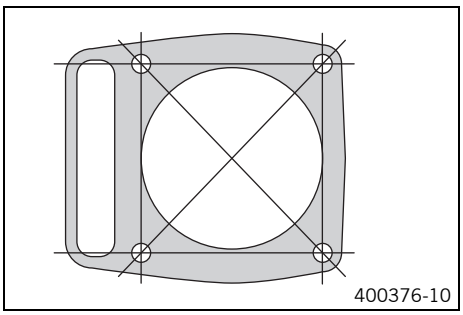
– Check the O-ring of the chain adjuster for damage and wear.
  » If there is damage or wear:
    – Replace the O-ring.
– Check the cylinder bearing surface for damage.
  » If the cylinder bearing surface is damaged:
    – Change the cylinder and piston.
– Measure the cylinder diameter at several places in the Ⓧ and Ⓨ axes using a micrometer to check for oval wear.
– To determine the size, measure the cylinder at a distance Ⓑ from the top edge of the cylinder.

Guideline

Distance Ⓑ	55 mm (2.17 in)
Cylinder - bore diameter	
Size I	102.000... 102.012 mm (4.01574... 4.01621 in)
Size II	102.013... 102.025 mm (4.01625... 4.01672 in)



– The cylinder size ❶ is marked on the side of the cylinder.



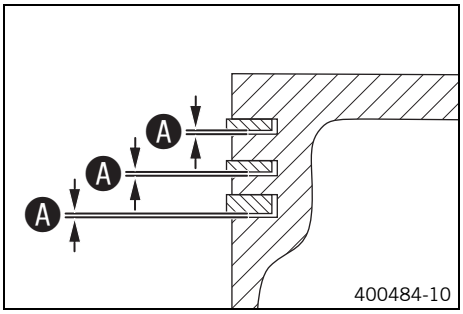
– Check the sealing area of the cylinder head for distortion using a straight edge and the special tool.

Feeler gauge (59029041100) (☛ p. 218)

Cylinder/cylinder head - sealing area distortion	≤ 0.10 mm (≤ 0.0039 in)

  » If the measured value does not equal the specified value:
    – Change the cylinder.

17.4.13 Checking/measuring the piston



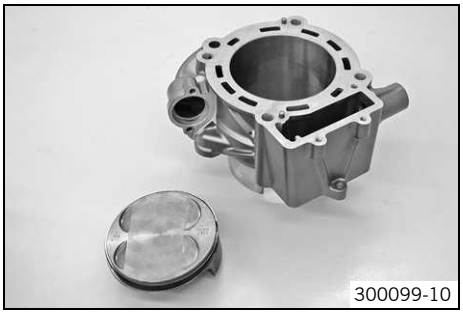
– Use the special tool to measure clearance Ⓐ of the piston rings in the piston ring groove.

Guideline

Piston ring - groove clearance	≤ 0.08 mm (≤ 0.0031 in)

Feeler gauge (59029041100) (☛ p. 218)

  » If clearance Ⓐ is larger than the specified value:
    – Change the piston and piston rings.
    – Check/measure the cylinder. (☛ p. 131)



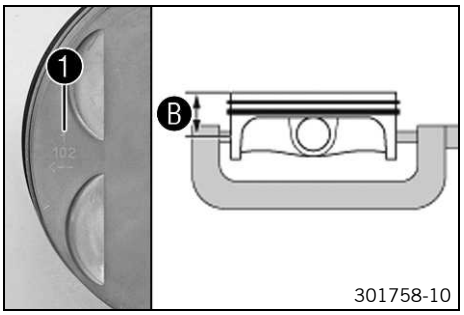
– Check the piston bearing surface for damage.
  » If the piston bearing surface is damaged:
    – Change the piston and, if necessary, the cylinder.
– Check that the piston rings can move easily in the piston ring grooves.
  » If the piston ring is stiff:
    – Clean the piston ring groove.

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.

– 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.



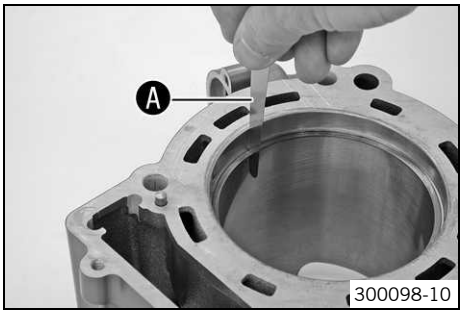
– Measure the piston at the piston skirt, at right angles to the piston pin, at a distance ❽.

Guideline

Distance ❽	31.5 mm (1.24 in)
Piston - diameter	
Size I	101.955... 101.965 mm (4.01397... 4.01436 in)
Size II	101.965... 101.975 mm (4.01436... 4.01476 in)

Info
Piston size ❶ is marked on the piston head.

17.4.14 Checking 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 a feeler gauge ❹.

Guideline

Piston ring end gap	
Compression rings	≤ 0.80 mm (≤ 0.0315 in)
Oil scraper ring	≤ 1.00 mm (≤ 0.0394 in)

  » If the end gap is more than the specified value:
    – Check/measure the cylinder. (☛ p. 131)
  » 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.

17.4.15 Checking piston/cylinder mounting clearance

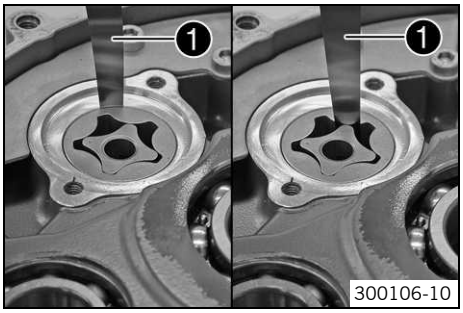
– Check/measure the cylinder. (☛ p. 131)
– Check/measure the piston. (☛ p. 131)
– The smallest piston/cylinder mounting clearance is the result of the smallest cylinder bore diameter minus the largest piston diameter. The largest piston/cylinder mounting clearance is the result of the largest cylinder bore diameter minus the smallest piston diameter.

Guideline

Piston/cylinder - mounting clearance	
New condition	0.035... 0.060 mm (0.00138... 0.00236 in)
Wear limit	0.10 mm (0.0039 in)

17.4.16 Checking oil pumps for wear

Info
The oil pump wear check shown here is on the suction pump but it applies to all oil pumps.

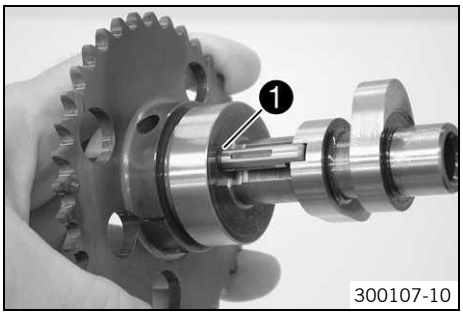


– Use a feeler gauge ❶ to measure the play between the external rotor and the engine case as well as between the external rotor and the internal rotor.

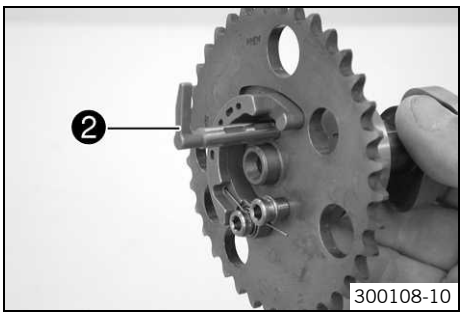
Oil pump	
Clearance between external rotor and engine case	≤ 0.20 mm (≤ 0.0079 in)
Clearance between external rotor and internal rotor	≤ 0.20 mm (≤ 0.0079 in)
Axial clearance	0.04… 0.08 mm (0.0016… 0.0031 in)

» If the measured value does not meet specifications:
– Change the oil pump and, if necessary, the engine case.

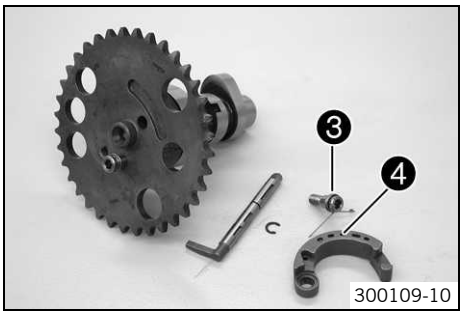
17.4.17 Replacing autodecompressor



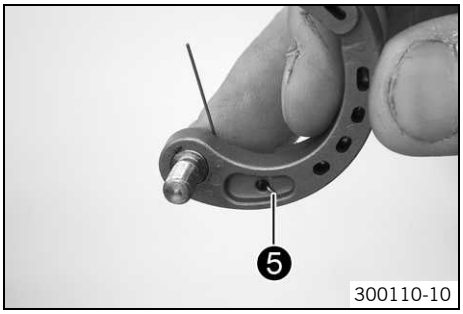
– Take the lock ring ❶ off the autodecompression shaft and dispose of it.



– Pull the autodecompression shaft ❷ from the camshaft.



– Disconnect the autodecompression spring. Loosen the screw ❸ and remove it together with the autodecompression spring and the autodecompression weight ❹.



– When assembling, first connect the autodecompression spring and then insert the screw through the autodecompression weight.
✓ The arm of the autodecompression spring ❺ is long enough to pass right through the autodecompression weight.
– Position the autodecompression weight. Mount and tighten screw ❸. Reconnect the autodecompression spring.

Guideline

Screw, autodecompression	M6	3… 4 Nm (2.2… 3 lbf ft)	**Loctite® 243™**

– Mount the autodecompression shaft in the camshaft. Install a new lock ring.
– Check the functioning.
  » If the autodecompression spring does not completely retract the autodecompression shaft:
    – Replace the autodecompression spring.

17.4.18 Preparing 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 piston of the timing chain tensioner. This should ensure that when pushed down, the piston does not fully withdraw.

Guideline

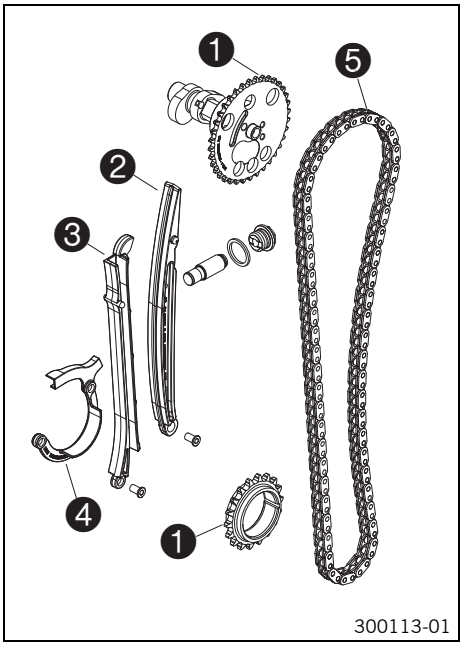
Thickness of the compensating disks	2... 2.5 mm (0.08... 0.098 in)

– 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.

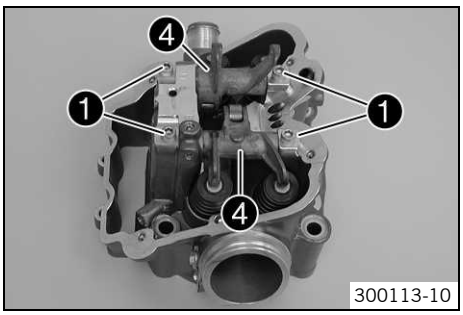
17.4.19 Checking timing assembly



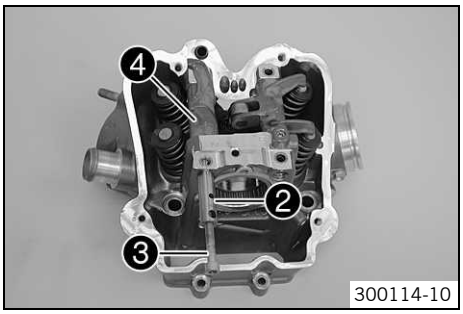
300113-01

– Clean all parts well.
– Check the timing chain gear / timing chain sprocket ❶ for damage and wear.
  » If there is damage or wear:
    – Replace the timing chain gear / timing chain sprocket.
– 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 timing chain securing guide ❹ for damage and wear.
  » If there is damage or wear:
    – Replace the timing chain securing guide.
– 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.

17.4.20 Removing rocker arm



– Remove screws ❶.



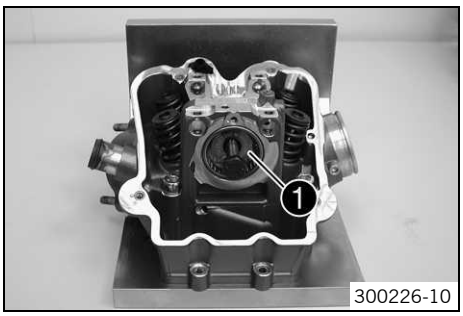
– Screw a suitable screw ❸ into the rocker arm shafts ❷. Pull out the rocker arm shafts.
– Take off the rocker arm ❹.

17.4.21 Changing camshaft bearing

Preparatory work

– Remove the rocker arm. (☛ p. 135)

Main work

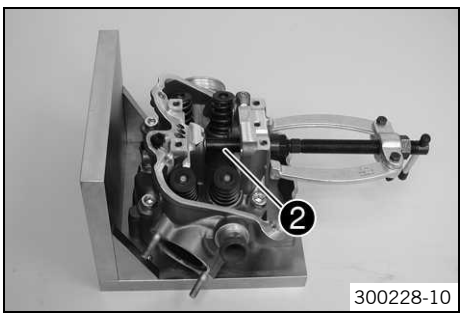


– Clamp the cylinder head.

Clamping plate (75029050000) (☛ p. 222)

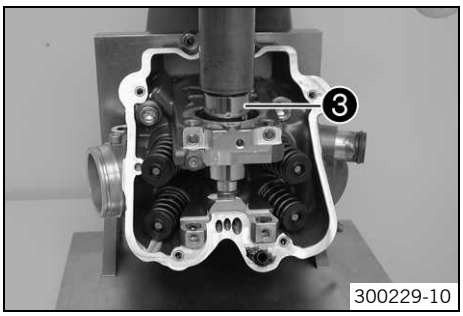
– Remove the large camshaft bearing using the special tool ❶.

Push-out drift (75029051000) (☛ p. 222)



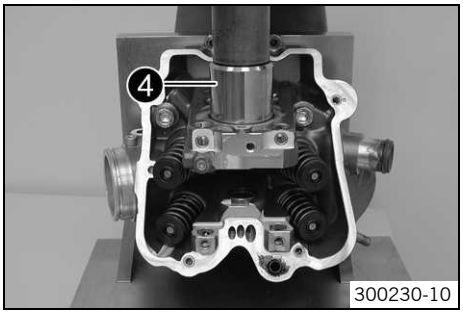
– Remove the small camshaft bearing using special tool ❷.

Insert for bearing puller (15112018100) (☛ p. 216)
Bearing puller (15112017000) (☛ p. 216)



– Press in the small camshaft bearing as far as possible using the special tool ❸.

Push-in drift (75029044020) (☛ p. 221)



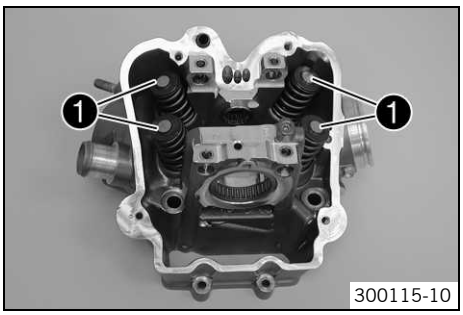
– Press in the large camshaft bearing as far as possible using the special tool ❹.

Push-in drift (75029044010) (☛ p. 220)

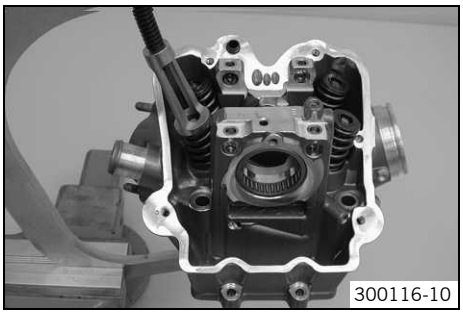
Finishing work

– Install the rocker arm. (☛ p. 139)

17.4.22 Removing valves



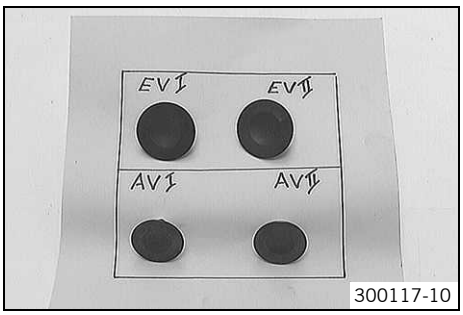
– Take shims ❶ out of the valve spring retainers and lay them to one side according to their normal built-in position.



– Pretension the valve springs using the special tool.

Valve spring compressor (59029019000) (☛ p. 217)
Valve spring mounting device (78029060000) (☛ p. 224)

– Remove valve keys and release tension on the valve springs.
– Remove spring retainers and spring.
– Pull the valve down and out of the valve guide, remove the valve stem seal and valve spring retainer.



– Mark the valves according to their normal built-in position.

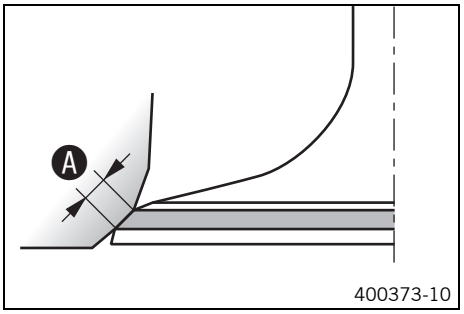
Info
Place the valves into a box according to the installation position and label the box.

17.4.23 Checking valves

– Check the run-out at the valve plate.

Valve - run-out	
On the valve plate	≤ 0.05 mm (≤ 0.002 in)

» If the measured value does not equal the specified value:
  – Change the valve.



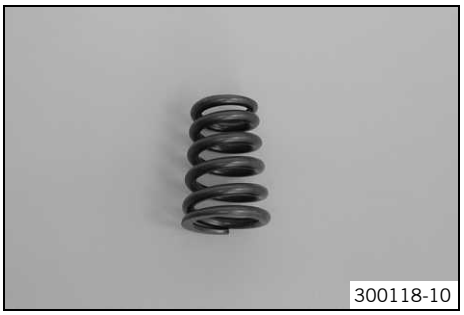
– Check the sealing seat ❹ on the valve.

Valve - sealing seat width	
Intake	1.60 mm (0.063 in)

Valve - sealing seat width	
Exhaust	2.00 mm (0.0787 in)

» If the sealing area is not in the center of the valve seat or deviates from the specified value:
– Machine the valve seat.

17.4.24 Checking valve springs

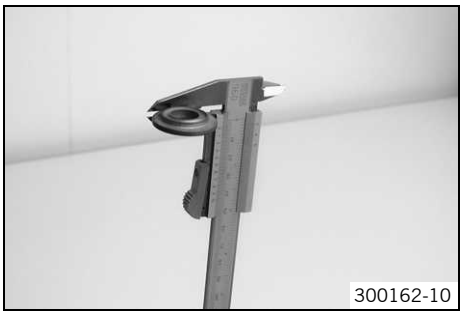


– Check the valve springs for fractures and wear (visual check).
» If the valve spring is fractured or worn:
– Change the valve spring.
– Measure the valve spring lengths.

Valve spring	
Minimum length (without valve spring cap)	42.3 mm (1.665 in)

» If the measured value does not equal the specified value:
– Change the valve spring.

17.4.25 Checking valve spring retainer

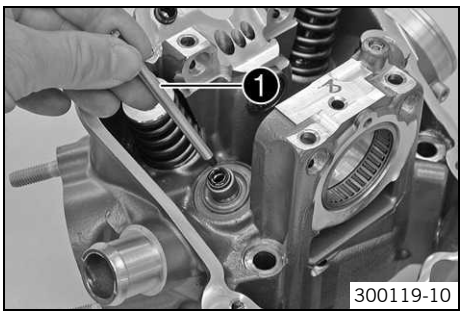


– Check the valve spring retainer for fractures and wear (visual check).
» If the valve spring retainer is fractured or worn:
– Change the valve spring retainer.
– Measure the thickness of the valve spring retainer.

Valve spring cap - thickness	2.4… 2.5 mm (0.094… 0.098 in)

» If the measured value does not equal the specified value:
– Change the valve spring retainer.

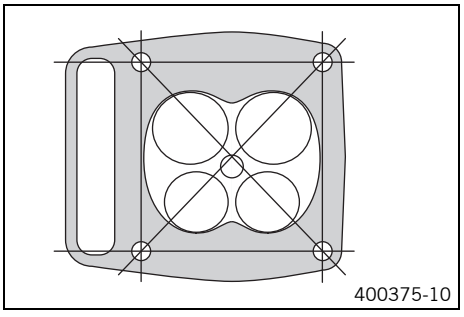
17.4.26 Checking cylinder head



– Check the valve guides using the special tool ❶.

Limit plug gauge (59029026006) (☛ p. 217)

» If the special tool is easy to insert into the valve guide:
– Change the valve guide and valve.
– 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.

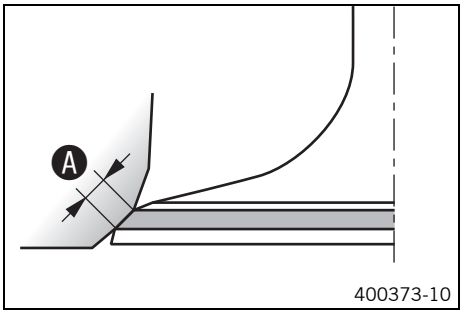


– Check the sealing area of the cylinder for distortion using a straight edge and the special tool.

Feeler gauge (59029041100) (☛ p. 218)

Cylinder/cylinder head - sealing area distortion	≤ 0.10 mm (≤ 0.0039 in)

» If the measured value does not equal the specified value:
– Change the cylinder head.



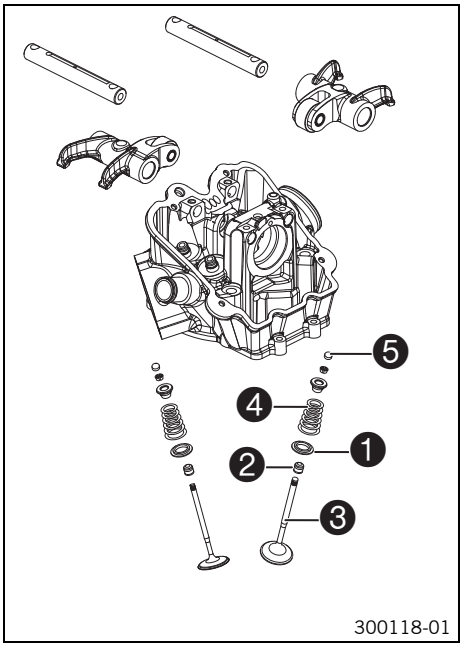
– Check sealing seat ❹ of the valves.

Valve - sealing seat width	
Intake	1.60 mm (0.063 in)

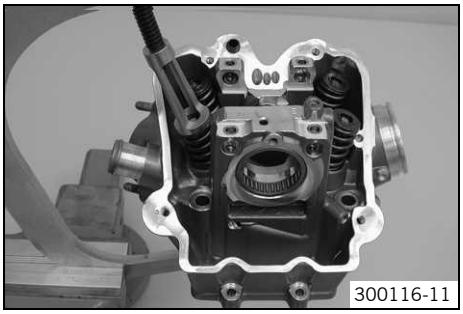
Valve - sealing seat width	
Exhaust	2.00 mm (0.0787 in)

» If the measured value does not equal the specified value:
  – Machine the valve seat.
– Blow compressed air through all oil channels and check that they are clear.

17.4.27 Installing valves

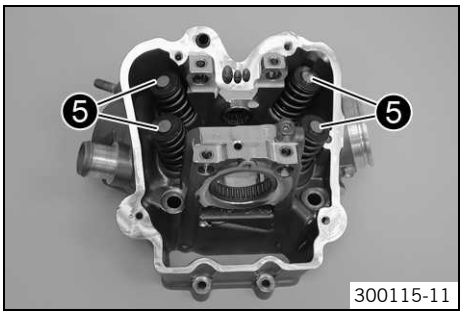


– Position the valve spring cap ❶. Install new valve stem seals ❷.
– Mount valves ❸ according to their normal built-in position.
– Install the valve springs ❹ and the spring retainers.



– Pretension the valve springs using the special tool.

Valve spring compressor (59029019000) (☛ p. 217)
Valve spring mounting device (78029060000) (☛ p. 224)

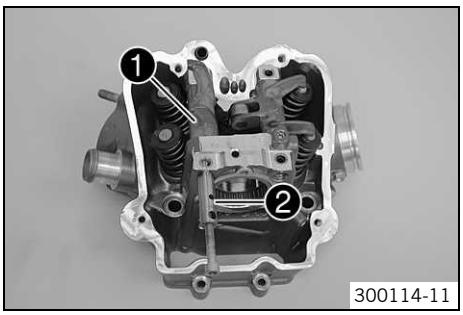


– Mount valve keys.

Info
When mounting the valve keys, check that they are seated correctly; preferably, fix the valve keys to the valve with a little grease.

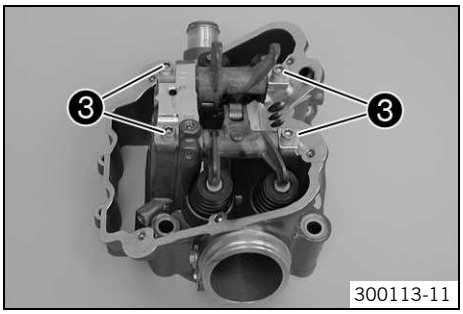
– Place shims ❺ into the valve spring retainers according to the installation position.

17.4.28 Installing rocker arm



– Position the rocker arm ❶ and push in the rocker arm shafts ❷.

Info
Make sure that the tapped hole of the rocker arm shaft is positioned facing outwards.
The small drill hole and the flat surface must point upwards.

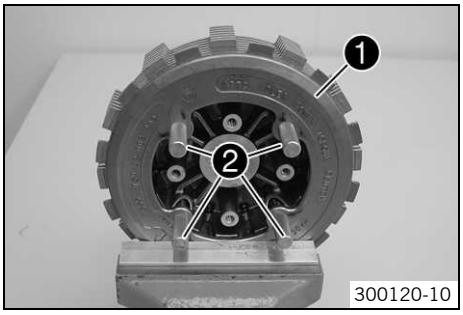


– Install and tighten the screws ❸ of the rocker arm shafts.

Guideline

Screw, rocker arm shaft	M6	12 Nm (8.9 lbf ft)

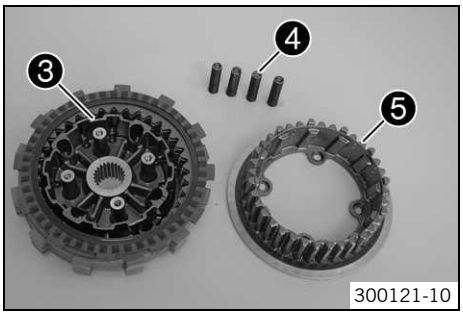
17.4.29 Disassembling the antihopping clutch



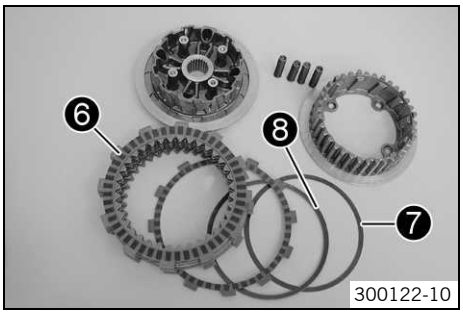
– Clamp the clutch ❶ in a vise.

Info
Use soft jaws.

– Carefully loosen and gradually remove the special tool ❷.



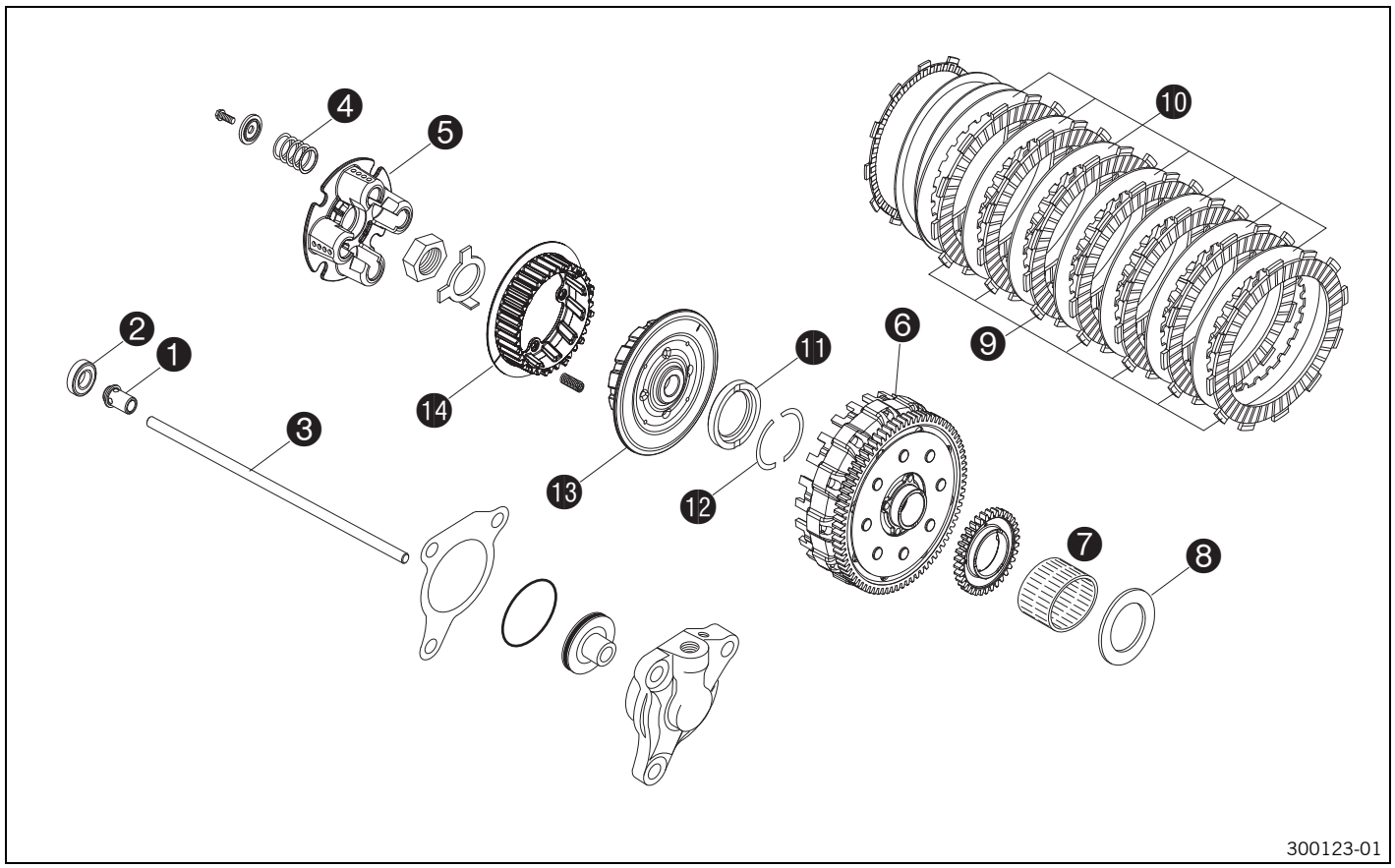
– Take the clutch out of the vise and lay it on a clean workbench with the outer clutch hub ❺ facing down.
– Take the inner clutch hub ❸ and release springs ❹ out of the outer clutch hub ❺.



– Take off the clutch facing discs ❻ from the inner clutch hub.
– Remove pretension ring ❼ and support ring ❽.
– Clean all parts well.
– Check the clutch. (☛ p. 139)

17.4.30 Checking the clutch

Preparatory work
– Disassemble the antihopping clutch. (☛ p. 139)



Main work

– Check pressure piece ❶ for damage and wear.
  » If there is damage or wear:
    – Replace the pressure piece.
– Check axial bearing ❷ for damage and wear.
  » If there is damage or wear:
    – Change the axial bearing.
– Place push rod ❸ on a level surface and check it for run-out.
  » If there is run-out:
    – Change the push rod.
– Check the length of clutch springs ❹.

Clutch spring - length	31.5... 33.5 mm (1.24... 1.319 in)

  » If the clutch spring length is less than the specified value:
    – Change all clutch springs.
– Check the contact surface of pressure cap ❺ for damage and wear.
  » If there is damage or wear:
    – Change the pressure cap.
– Check the contact surfaces of the clutch facing discs in the outer clutch hub ❻ for wear.

Clutch basket - contact surface of clutch facing discs	≤ 0.5 mm (≤ 0.02 in)

  » If the contact surface is very worn:
    – Change the clutch facing discs and the outer clutch hub.
– Check needle bearing ❼ and supporting plate ❽ for damage and wear.
  » If there is damage or wear:
    – Replace the needle bearing and supporting plate.
– Check the intermediate clutch discs ❾ for damage and wear.
  » If the intermediate clutch discs are not even or are pitted:
    – Change all intermediate clutch discs.

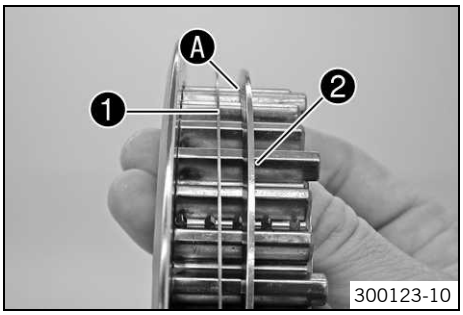
– Check clutch facing discs ❿ for discoloration and scoring.
  » If there is discoloration or scoring:
    – Change all clutch facing discs.
– Check the thickness of clutch facing discs ❿.

Clutch facing disc - thickness	≥ 2.5 mm (≥ 0.098 in)

  » If the clutch facing disc does not meet specifications:
    – Change all clutch facing discs.
– Check stepped washer ⓫ for damage and wear.
  » If there is damage or wear:
    – Replace the stepped washer.
– Check half washers ⓬ for damage and wear.
  » If there is damage or wear:
    – Replace the half washers.
– Check inner clutch hub ⓭ for damage and wear.
  » If there is damage or wear:
    – Replace the inner clutch hub.
– Check the outer clutch hub ⓮ for damage and wear.
  » If there is damage or wear:
    – Replace the outer clutch hub.

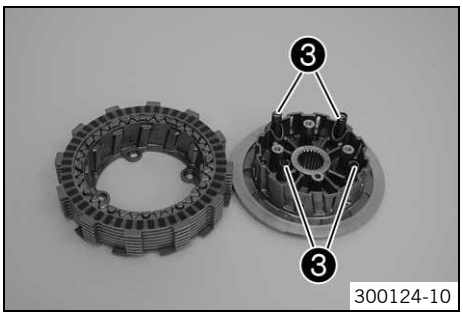
Finishing work
– Preassemble the antihopping clutch. (☛ p. 141)

17.4.31 Preassembling the antihopping clutch

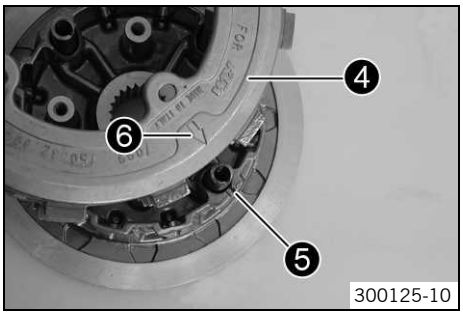


– Thoroughly oil the clutch facing discs.
– Push the support ring ❶ and the pretension ring ❷ on to the outer clutch hub.

Info
The pretension ring must be installed so that it is flush with the inner edge Ⓐ on the support ring.



– Position the trimmed clutch facing disc with the recess for the pretension ring on the outer clutch hub.
– Beginning with the coated intermediate clutch disc, position all further clutch facing discs and intermediate clutch discs alternately.
– Position the release springs ❸.

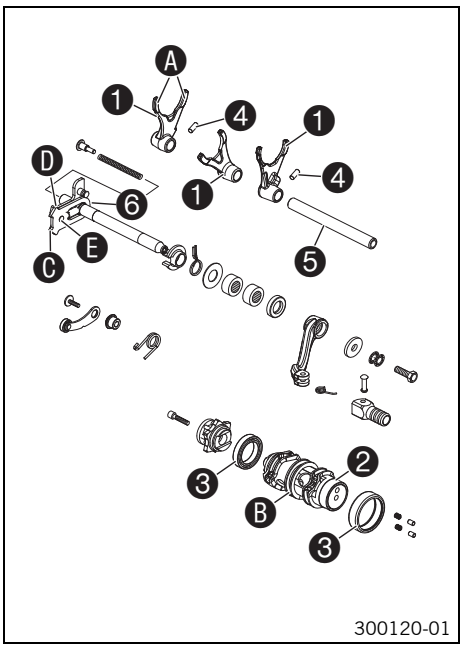


– Push on the outer clutch hub ❹ and pay attention to the markings.
  ✓ The arrow ❻ of the outer clutch hub must point to the notch ❺ of the inner clutch hub.
– Push the two clutch hubs firmly together and have an assistant screw in the special tool.

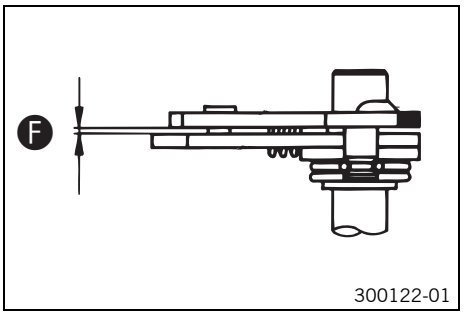
Assembly screws (75029033000) (☛ p. 220)

Info
Apply the special tool with the hand only, do not use another tool.
Apply the special tool only firmly enough so that the clutch facing discs can still be turned against each other since they still have to be aligned for mounting in the clutch basket.

17.4.32 Checking shift mechanism



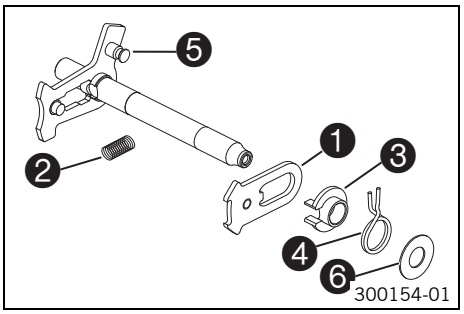
– Check the shift forks ❶ (see Ⓐ) for damage and wear (visual check).
  » If there is damage or wear:
    – Change the shift fork and gear wheel pair.
– Check shift grooves Ⓑ of shift drum ❷ for wear.
  » If the shift groove is worn:
    – Change the shift roller.
– Check the seat of the shift drum in the bearings ❸.
  » If the shift roller is not seated correctly:
    – Replace the shift drum and/or the bearing.
– Check bearing ❸ for stiffness and wear.
  » If the bearings do not move freely or are worn:
    – Replace the bearings.
– Check the needle bushing ❹ for stiffness and wear.
  » If the needle bushing does not move freely or is worn:
    – Replace the needle bushing.
– Check the shift rail ❺ on a flat surface for run-out.
  » If there is run-out:
    – Change the shift rail.
– Check the shift rail for scoring, signs of corrosion and stiffness in the shift forks.
  » If there is scoring or corrosion, or if the shift fork is stiff:
    – Change the shift rail.
– Check sliding plate ❻ 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.
– Preassemble the shift shaft. (☛ p. 142)
– Check the clearance Ⓕ between the sliding plate and the shift quadrant.



Shift shaft - play in sliding plate/shift quadrant	0.40... 0.80 mm (0.0157... 0.0315 in)

  » If the measured value does not equal the specified value:
    – Change the sliding plate.

17.4.33 Preassembling shift shaft

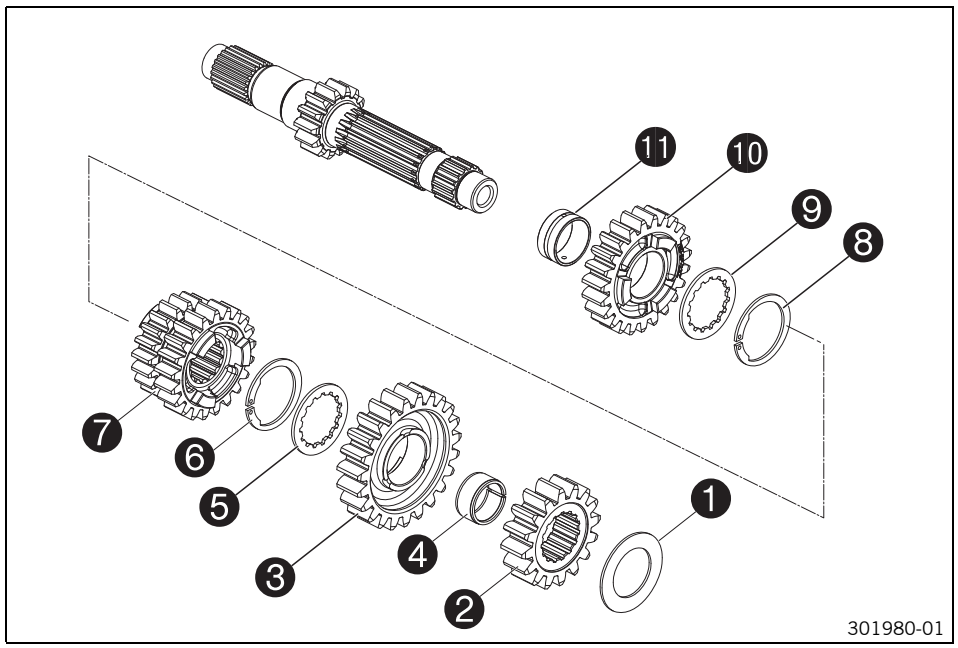


– Fix the short end of the shift shaft in a vise.
  Guideline

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.

17.4.34 Disassembling the main shaft

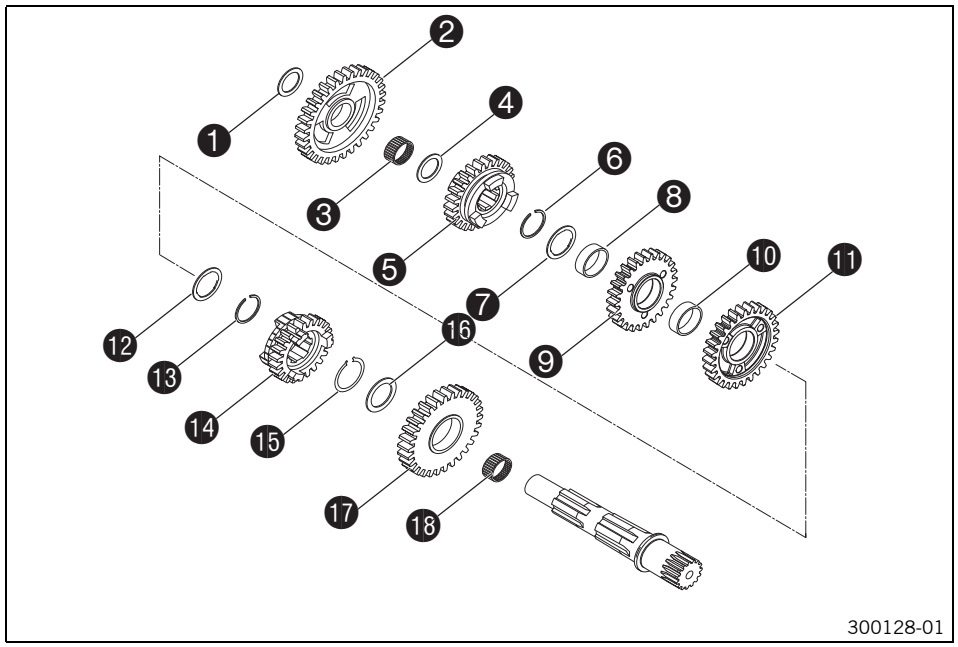


– Fix the main shaft in the vise with the geared end facing downward.
  Guideline

Use soft jaws.

– Remove stop disk ❶ and second-gear fixed gear ❷.
– Remove the sixth-gear idler gear ❸.
– Remove the split needle bearing ❹ and stop disk ❺.
– Remove lock ring ❻.
– Remove the third/fourth-gear sliding gear ❼.
– Remove lock ring ❽.
– Remove stop disk ❾ and fifth-gear idler gear ❿.
– Remove bearing bush ⓫.

17.4.35 Dismantling countershaft



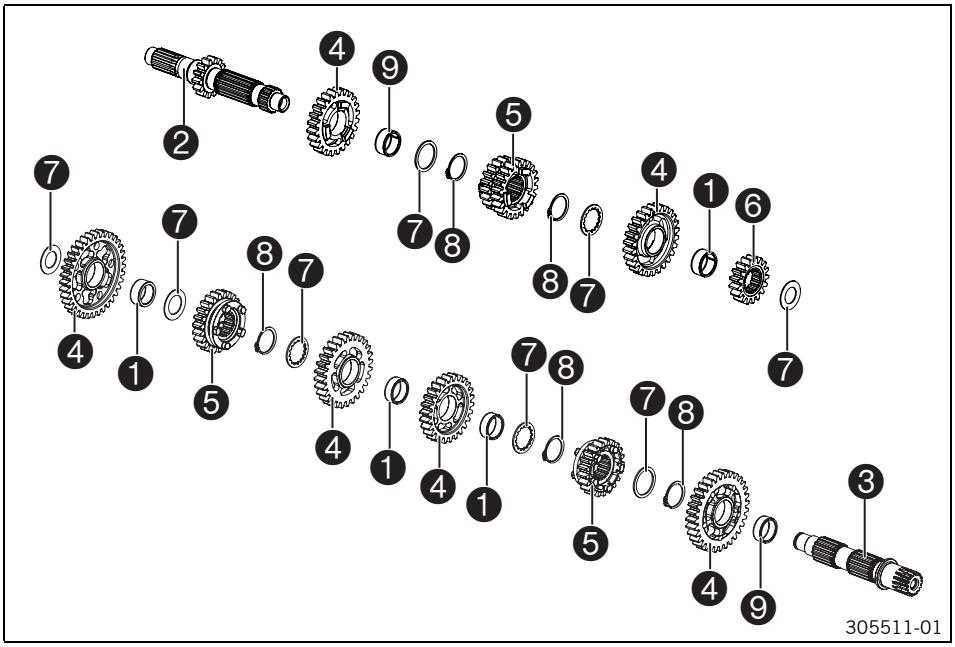
– Fix the countershaft in the vise with the geared end facing downward.
  Guideline

Use soft jaws

– Remove stop disk ❶ and first-gear idler gear ❷.
– Remove needle bearing ❸ and stop disk ❹.
– Remove fifth-gear sliding gear ❺ and lock ring ❻.
– Remove stop disk ❼ and third-gear idler gear ❾.
– Remove needle bearing ❽ and the fourth-gear idler gear ⓫.
– Remove needle bearing ⓾ and stop disk ⓬.
– Remove lock ring ⓭ and sixth-gear sliding gear ⓮.
– Remove lock ring ⓯ and stop disk ⓰.
– Remove the second-gear idler gear ⓱ and bearing bush ⓲.

17.4.36 Checking the transmission

Condition
The transmission has been disassembled.



– Check needle bearing 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, 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 faces of idler gears ❹, sliding gears ❺, and fixed gear ❻ for damage and wear.
  » If there is damage or wear:
    – Change the gear wheel pair.
– Check the tooth profiles of sliding gears ❺ for damage and wear.
  » If there is damage or wear:
    – Change the gear wheel pair.
– Check sliding gears ❺ for smooth operation in the profile of main shaft ❷.

» If the sliding gear does not move easily:
– Change the sliding gear or the main shaft.

– Check sliding gears ❺ for smooth operation in the profile of countershaft ❸.
» If the fixed gear does not move easily:
– Change the sliding gear or the countershaft.

– Check stop disks ❼ for damage and wear.
» If there is damage or wear:
– Change the stop disk.

– Use new lock rings ❽ in every repair job.

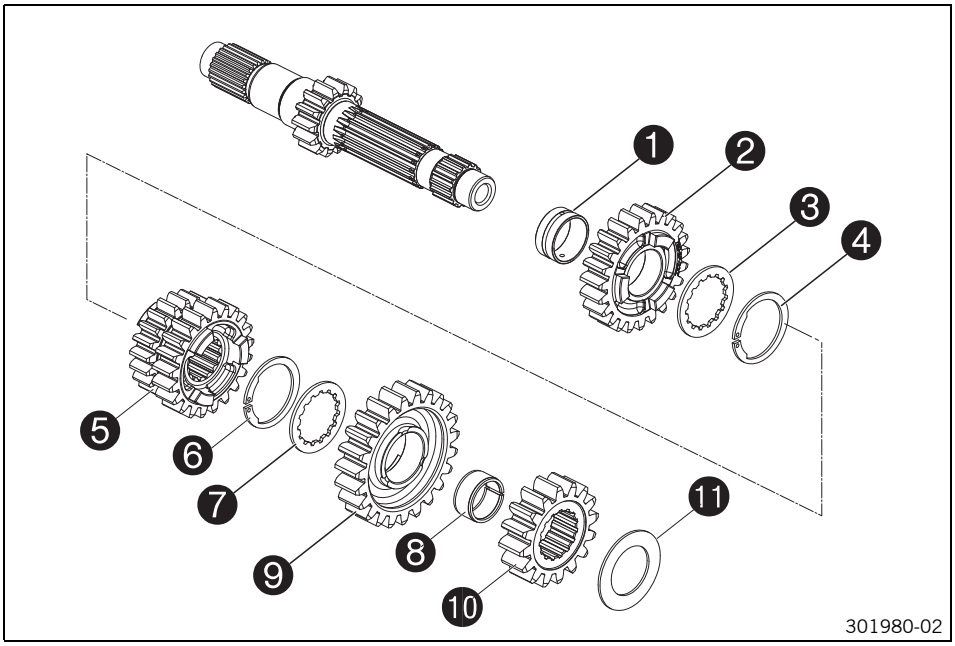
– Check bearing bushes ❾ for damage and wear.
» If there is damage or wear:
– Change the bearing bush.

17.4.37 Assembling the main shaft

Info
Use new lock rings in every repair job.

Preparatory work
– Oil all parts carefully before assembling.
– Check the transmission. (☛ p. 144)

Main work



– Fix the main shaft in the vise with the geared end facing downward.
Guideline

Use soft jaws

– Lubricate and mount bearing bush ❶.

Long-life grease (☛ p. 214)

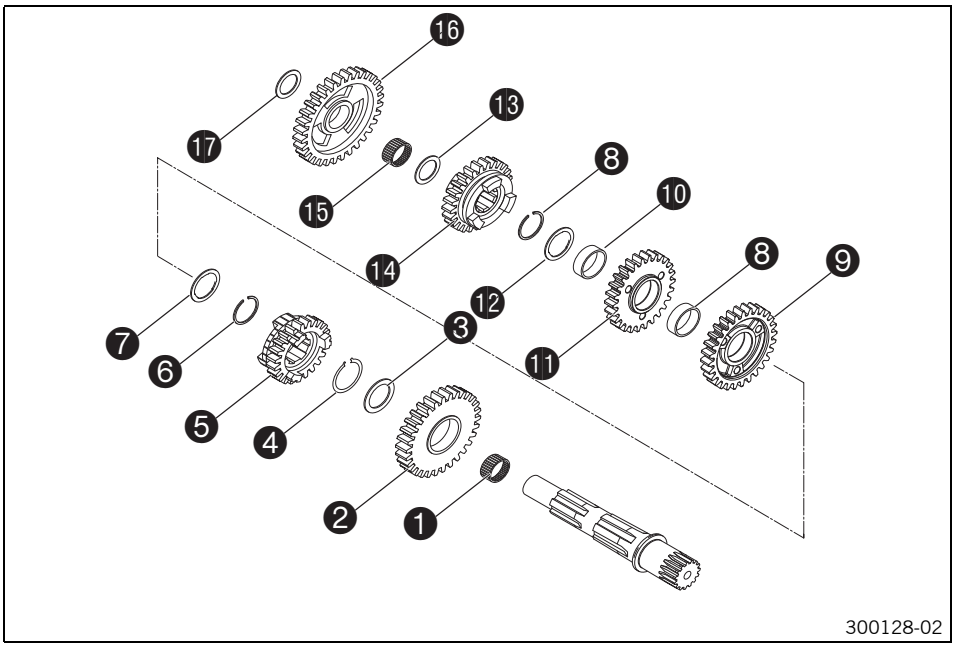
– Push on the fifth-gear idler gear ❷ with the shift dogs facing upward.
– Mount stop disk ❸ and lock ring ❹.
– Push on the third/fourth-gear sliding gear ❺ with the small gear wheel facing downward and mount lock ring ❻.
– Push on stop disk ❼ and split needle bearing ❽.
– Push on the sixth-gear idler gear ❾ with the shift dogs facing downward.
– Push on the second-gear fixed gear ❿ with the collar facing downward and mount stop disk ⓫.
– Finally, check all gear wheels for smooth operation.

17.4.38 Assembling countershaft

Info
Use new lock rings in every repair job.

Preparatory work
- Oil all parts carefully before assembling.
- Check the transmission. (☛ p. 144)

Main work



- Fix the countershaft in the vise with the geared end facing downward.

  Guideline

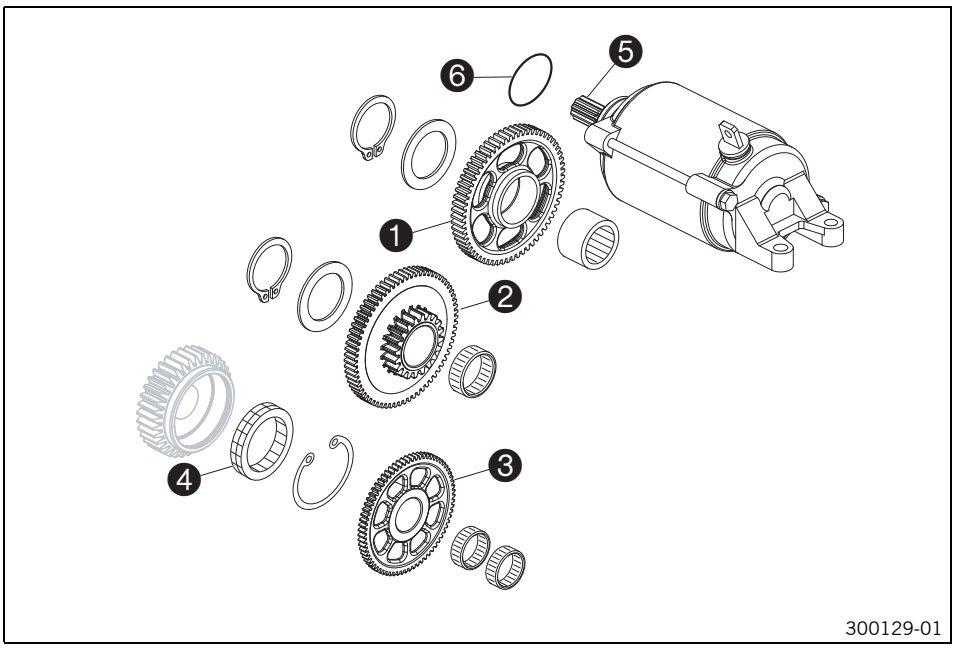
Use soft jaws

- Lubricate and mount bearing bush ❶.

Long-life grease (☛ p. 214)

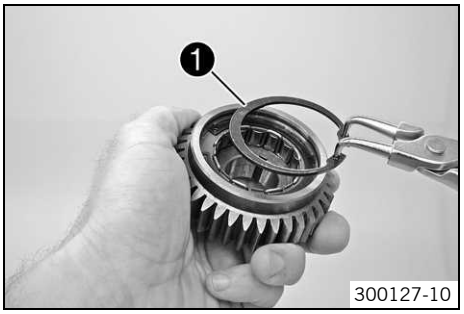
- Mount second-gear idler gear ❷ on the countershaft with the protruding collar facing downward.
- Mount stop disk ❸ and lock ring ❹.
- Mount the sixth-gear sliding gear ❺ with the shift groove facing upward.
- Mount lock ring ❻ and stop disk ❼.
- Mount needle bearing ❽ and the fourth-gear idler gear ❾ with the collar facing upward.
- Mount needle bearing ❿ and the third-gear idler gear ⓫ with the collar facing downward.
- Mount stop disk ⓬ and lock ring ⓭.
- Mount the fifth-gear sliding gear ⓮ with the shift groove facing downward and stop disk ⓯.
- Mount needle bearing ⓰, first-gear idler gear ⓱ with the recess facing downward, and stop disk ⓲.
- Finally, check all gear wheels for smooth operation.

17.4.39 Checking the starter drive

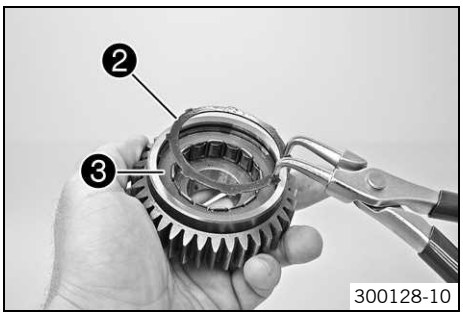


– Check the teeth and seating of the starter idler gear ❶ for damage and wear.
  » If there is damage or wear:
    – Replace the starter idler gear and/or needle bushing.
– Check the teeth and seating of the torque limiter ❷ for damage and wear.
  » If there is damage or wear:
    – Replace the torque limiter and/or needle bushing.
– Check freewheel gear ❸ and bearing when removed for damage and wear.
  » If there is damage or wear:
    – Replace the freewheel gear and/or the bearing.
– Check freewheel ❹ when removed for damage and wear.
  » If there is damage or wear:
    – Replace the freewheel.
– Check the toothing of the starter motor ❺ for damage and wear.
  » If there is damage or wear:
    – Replace the starter motor.
– Clamp the minus (negative) cable of a 12 Volt power supply to the starter motor housing. Briefly connect the plus (positive) cable of the power supply to the starter motor connection.
  » If the starter motor does not turn when you close the power circuit:
    – Replace the starter motor.
– Replace the O-ring ❻ of the starter motor.

17.4.40 Removing freewheel

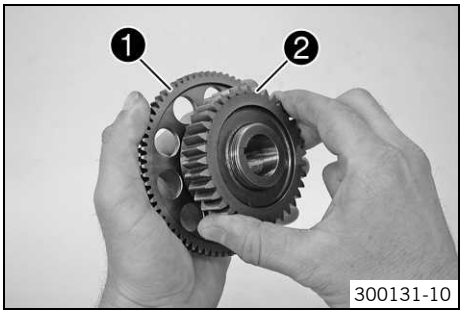


– Extract the lock ring ❶ from the groove using suitable pliers.



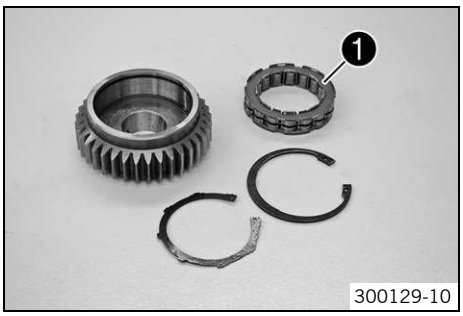
– Compress the expansion ring ❷ and remove it, using suitable pliers.
– Take the freewheel ❸ out of the primary gear.

17.4.41 Checking freewheel



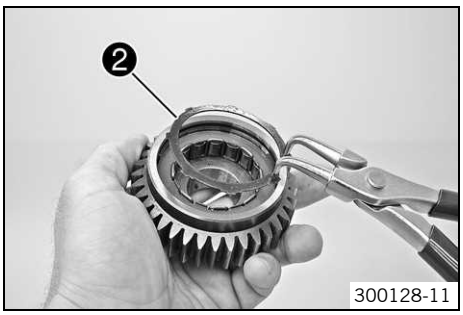
– Insert the freewheel gear ❶ in the primary gear ❷, turning the primary gear clockwise; do not twist!
– Check the locking action of the freewheel gear ❶.
  » If the primary gear does not turn clockwise or if it does not lock counterclockwise:
    – Remove the freewheel. (☛ p. 147)
    – Turn the freewheel 180°.
    – Install the freewheel. (☛ p. 148)

17.4.42 Installing freewheel

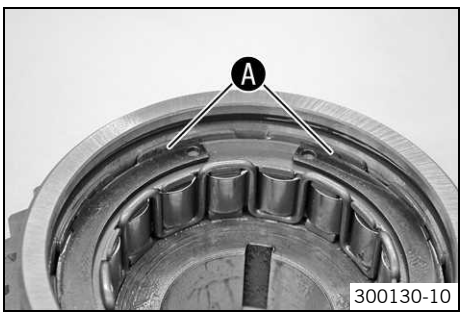


– Lubricate all parts thoroughly.
– Push the freewheel ❶ into the primary gear.

Info
Note the direction of rotation.

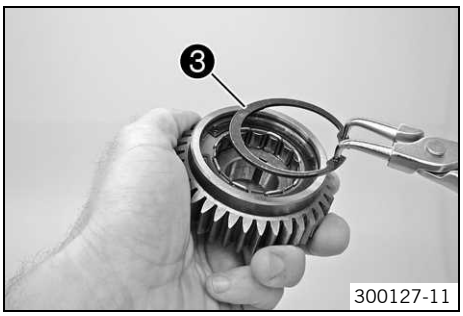


– Install the expansion ring ❷.



– Make sure that all lugs of the expansion ring locate in the slits Ⓐ of the freewheel.

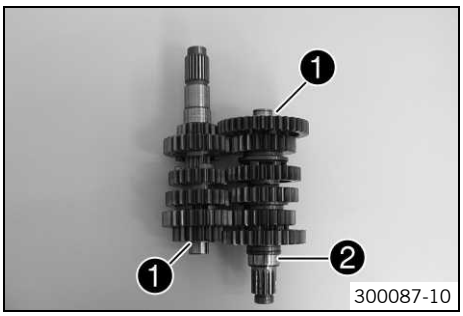
Info
If necessary, use a screwdriver to ease them in.



– Insert the lock ring ❸ into the groove with suitable pliers and check that it is seated correctly.

17.5 Engine assembly

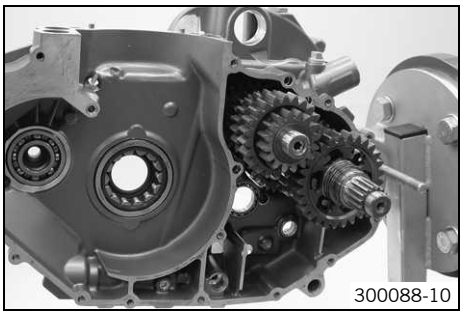
17.5.1 Installing transmission shafts



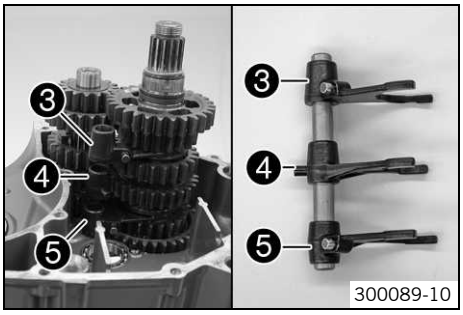
– Clamp the right section of the engine case.

Holder for engine assembly stand (75012001070) (☛ p. 219)
Support for engine assembly stand (75012001060) (☛ p. 219)
Engine assembly stand (61229001000) (☛ p. 219)

– Make sure that both stop disks ❶ are installed.
– Mount the inner bearing race ❷ on the countershaft.

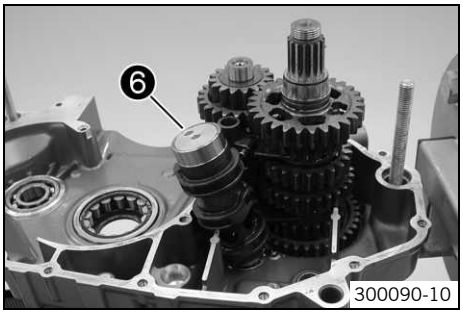


– Lubricate all bearings.
– Assemble the two transmission shafts and slide them into the bearing seats together.

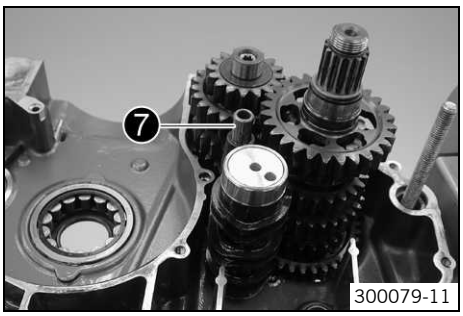


– Mount the upper shift fork ❸, the middle shift fork ❹, and the lower shift fork ❺.

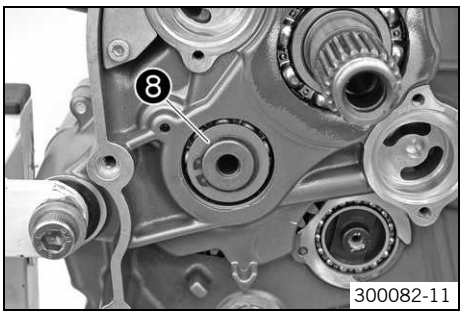
Info
For the assembly of the middle shift fork ❹, the sliding gear of the third/fourth gear must be lifted.



– Insert shift drum ❻ into the bearing seat.
– Hang the shift forks into the shift drum.

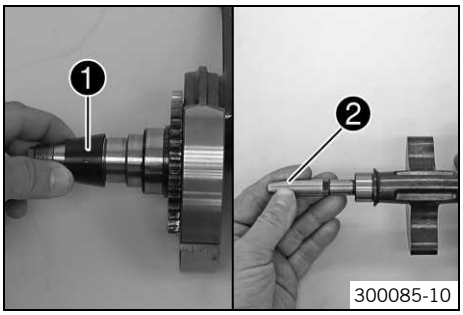


– Install the shift rail ❼.
– Check the transmission for smooth operation.



– Install the shim ❽ and lock ring of the countershaft.

17.5.2 Installing crankshaft and balancer shaft

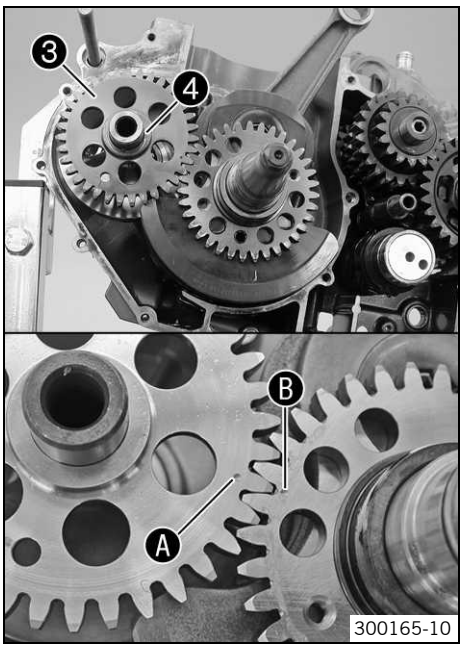


– Mount the special tool ❶ on the alternator side of the crankshaft.

Mounting sleeve (75029080000) (☛ p. 222)

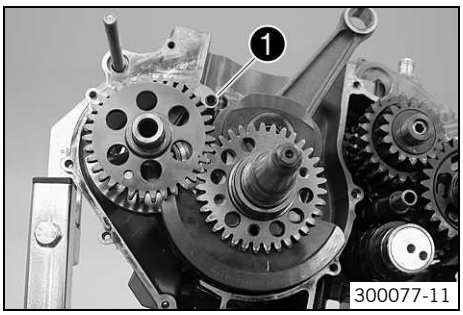
– Mount the special tool ❷ on the balancer shaft.

Mounting sleeve (58529005000) (☛ p. 217)



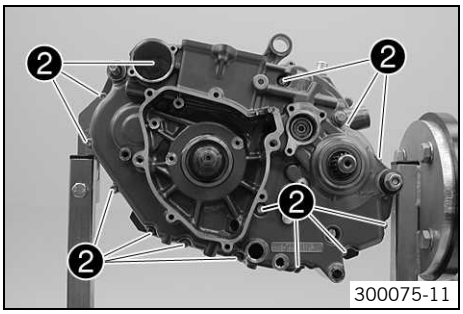
– Push the crankshaft into the bearing seat and take off the special tool.
– Grease the shaft seal rings of the balancer shaft.
– Push the balancer shaft ❸ into the bearing seat and take off the special tool.
  ✓ Align marks Ⓐ and Ⓑ.
– Mount stop disk ❹.

17.5.3 Installing left engine case



– Mount the dowels.
– Mount the O-ring ❶.
– Degrease the sealing area. Apply the sealing compound to the left engine case half.

Loctite® 5910



– Put on the left engine case half. If necessary, tap lightly with a rubber mallet and turn the transmission shafts.

Info
Do not tighten the engine case sections using the screws.

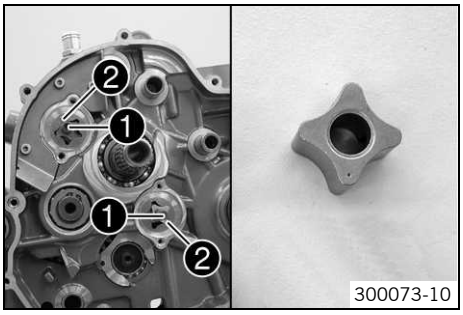
– Install the screws ❷ and tighten them diagonally.

Guideline

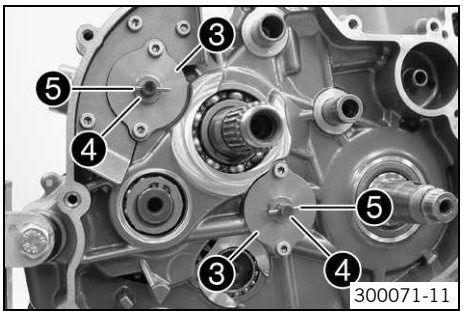
Screw, engine case	M6	10 Nm (7.4 lbf ft)

Info
Install the screw in the oil filter housing with a new copper washer.

17.5.4 Installing oil pumps



– Install pins and internal rotors on both oil pump shafts.
– Mount external rotors in the engine case.
✓ The marking is not visible after mounting.
– Mount the oil pump shafts ❶ with internal rotors ❷.
– Oil the parts.

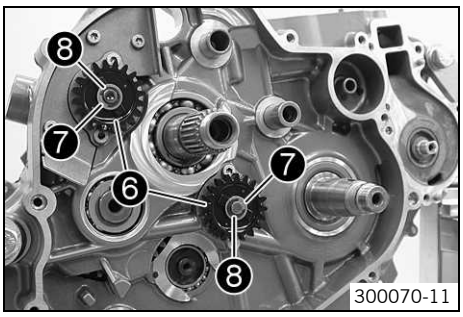


– Position both oil pump covers ❸. Mount and tighten the screws.

Guideline

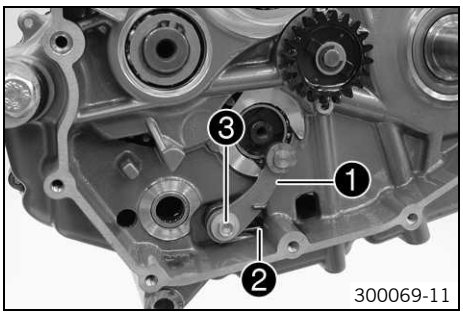
Screw, oil pump cover	M5	6 Nm (4.4 lbf ft)	Loctite® 243™

– Install washers ❹ and pins ❺.



– Mount the oil pump gears ❻, washers ❼ and lock washers ❽.

17.5.5 Installing locking lever

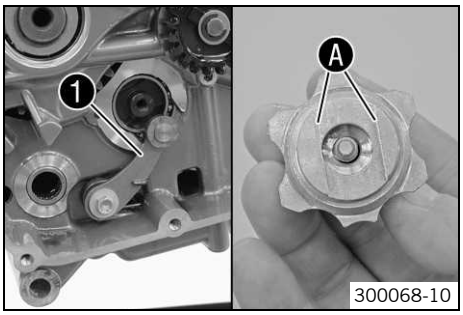


– Position locking lever ❶ with sleeve and spring ❷.
– Mount and tighten screw ❸.

Guideline

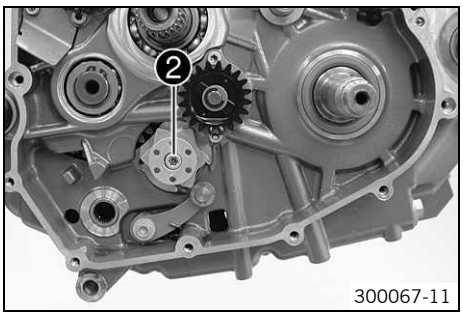
Screw, locking lever	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

17.5.6 Installing shift drum locating



– Press locking lever ❶ down and position shift drum locating.

Info
The flat surfaces Ⓐ of the shift drum locating are not symmetric.

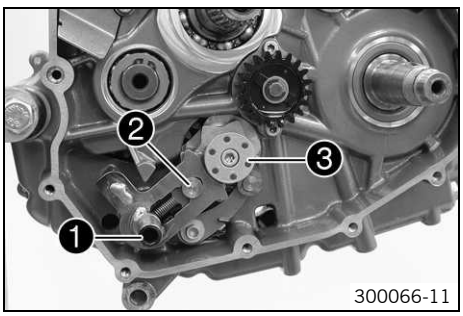


– Release the locking lever.
– Mount and tighten screw ❷.

Guideline

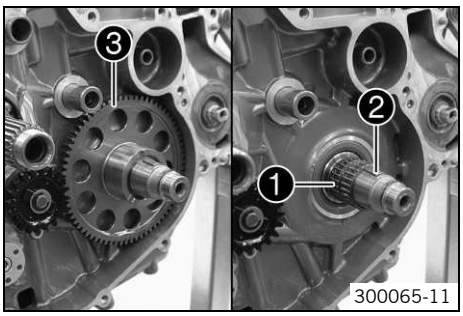
Screw, shift drum locating	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

17.5.7 Installing shift shaft

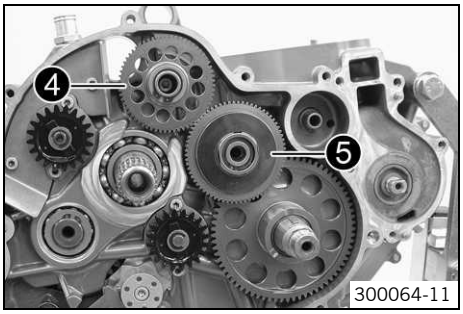


– Slide shift shaft ❶ with the washer into the bearing seat.
– Push sliding plate ❷ away from the shift drum locating ❸. Insert the shift shaft all the way.
– Let the sliding plate engage in the shift drum locating.
– Shift through the transmission.

17.5.8 Installing starter drive

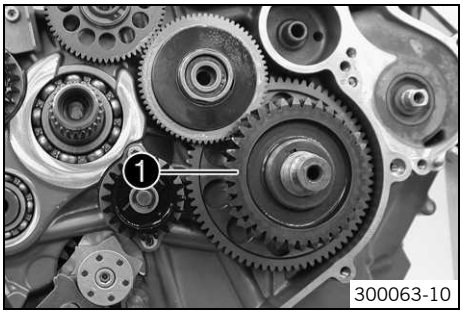


– Install the two needle bearings ❶ and the woodruff key ❷.
– Push on the freewheel gear ❸.



– Push on the starter idler gear ❹ with washer. Mount lock ring.
– Push on the needle bearing and torque limiter ❺ with washer. Mount lock ring.

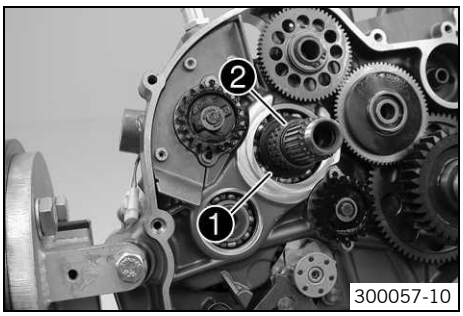
17.5.9 Installing primary gear



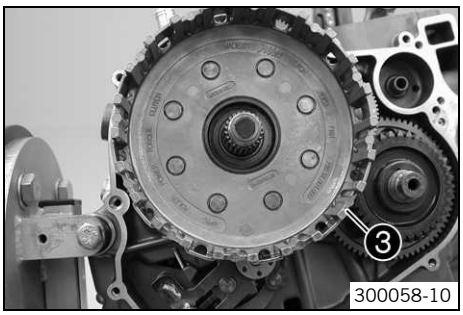
– Ensure that the spring washer is seated properly.
– Mount primary gear ❶.

Info
Turn freewheel gear backwards and forwards to ease meshing.

17.5.10 Installing clutch cage



– Install supporting plate ❶ and needle bearing ❷.



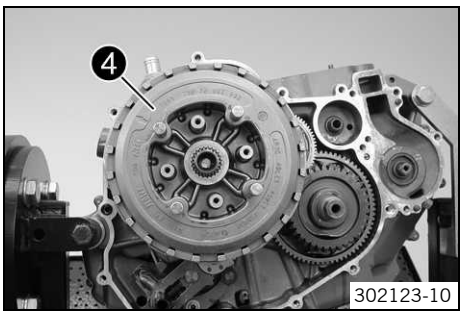
– Install the clutch cage ❸.

Info
Turn the clutch basket and oil pump gear wheels backwards and forwards slightly to help them mesh more easily.

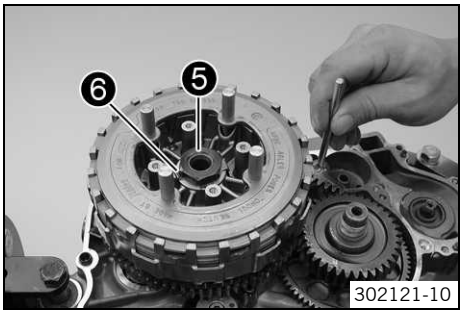
– Mount the half washers with the sharp edge facing outward.

Info
Grease the half washers to ease assembly.

– Position stepped washer with the recesses toward the half washers.
– Insert the clutch package ❹ in the clutch cage.



Info
If necessary, turn the main shaft a little to ease access.
Make sure that the upper clutch facing disc is offset by one notch.



– Position a new lock washer and install the nut ❺.
– Lock the clutch basket and primary gear using the special tool and tighten the nut.

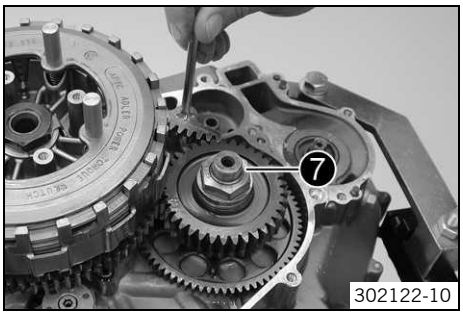
Guideline

Nut, inner clutch hub	M20x1.5	100 Nm (73.8 lbf ft)	**Loctite® 243™**

Gear segment (75029081000) (☛ p. 222)

Info
Make sure that the crankshaft is not blocked.

– Secure the nut with the lock washer ❻.



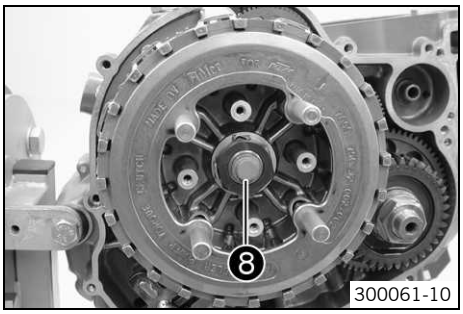
– Lock the clutch basket and primary gear using the special tool.

Gear segment (75029081000) (☛ p. 222)

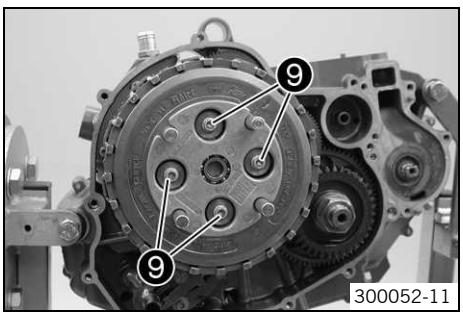
– Mount and tighten the nut ❼.

Guideline

Nut, primary gear	M20LHx1.5	90 Nm (66.4 lbf ft)	**Loctite® 243™**



– Insert the pressure piece ❽.



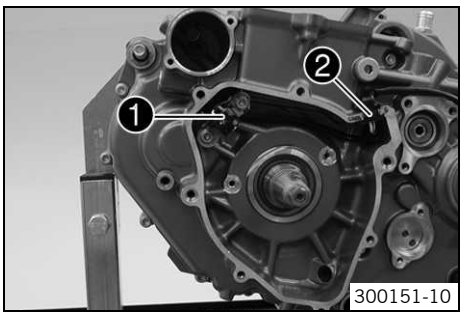
– Place the pressure cap on.
– Install and tighten the screws ❾ with the spring retainers and clutch springs.

Guideline

Screw, clutch spring	M5	6 Nm (4.4 lbf ft)

– Remove the special tool.

17.5.11 Installing crankshaft position sensor



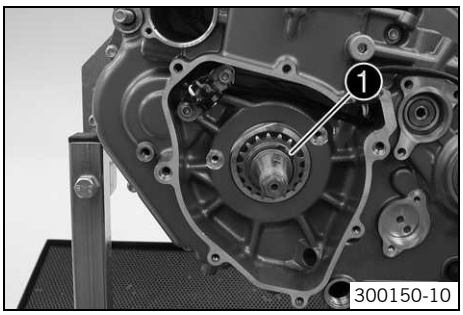
– Position the crankshaft position sensor ❶.
– Mount screws but do not tighten them yet.

Guideline

Screw, ignition pulse generator	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

– Position the cable and push the cable support sleeve ❷ into the engine case.

17.5.12 Installing timing chain and timing chain sprocket

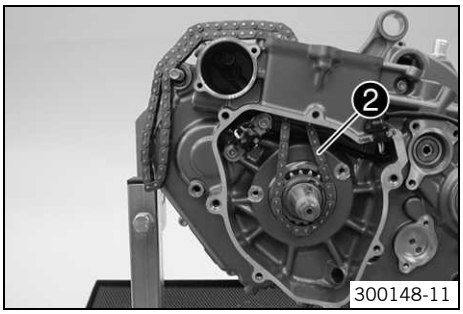


– Heat the timing chain sprocket and push it immediately on to the crankshaft.

Guideline

100 °C (212 °F)

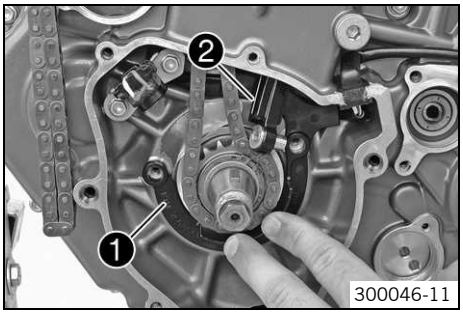
– Mount lock ring ❶.



– Thread the timing chain ❷ in and lay it over the timing chain sprocket.

Info
If the timing chain is not new, pay attention to the direction of travel.

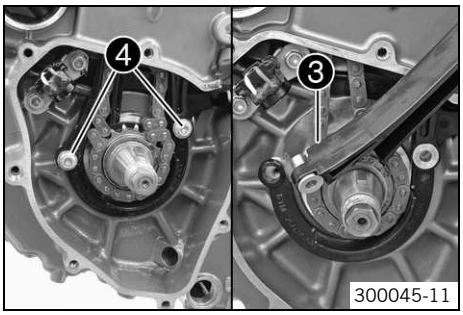
17.5.13 Installing timing chain rails



– Position the timing chain securing guide ❶.

Info
The cable of the crankshaft position sensor must be laid in the cable channel of the timing chain securing guide.

– Thread in the timing chain tensioning rail ❷ from above. Insert the support bushing into the timing chain securing guide.



– Thread in the timing chain guide rail ❸ from above. Insert the support bushing into the timing chain securing guide.
– Mount and tighten screws ❹.

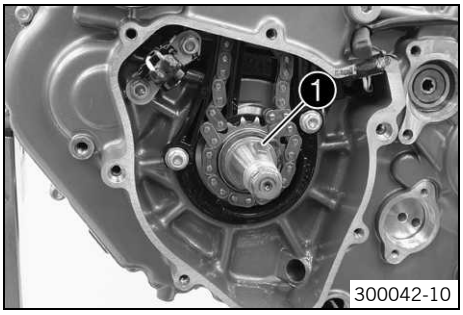
Guideline

Screw, timing chain guide rail	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, timing chain tensioning rail	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

Info
Ensure that there is no thread locking material at the collar of the screw; otherwise, the timing chain tension rail could lock and break.

– Check both timing chain rails for freedom of motion.

17.5.14 Installing rotor

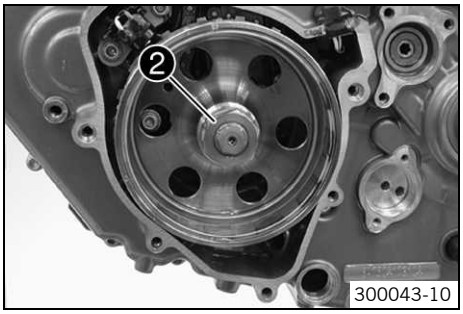


– Ensure that the spring washer ❶ is seated properly.
– Degrease the cone of the crankshaft and the rotor.
– Mount the rotor.

Info
Make sure that the crankshaft is not blocked.

– Use the special tool to hold the rotor tight.

Holding spanner (75029091000) (☛ p. 223)

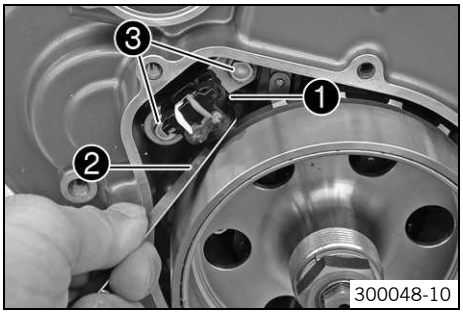


– Mount the tab washer and the nut ❷. Tighten nut.

Guideline

Rotor nut	M18x1.5	100 Nm (73.8 lbf ft)

17.5.15 Adjusting crankshaft position sensor distance



– Adjust the distance between the crankshaft position sensor ❶ and the conductive element of the rotor using the special tool ❷.

Guideline

Crankshaft position sensor/rotor - distance	0.70 mm (0.0276 in)

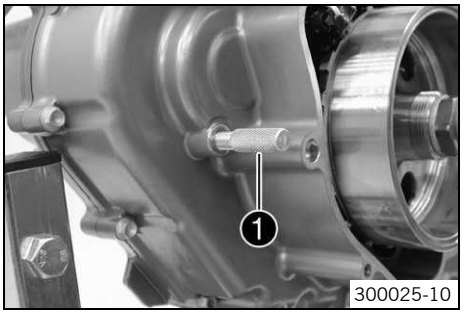
Feeler gauge (59029041100) (☛ p. 218)

– Fully tighten screws ❸.

Guideline

Screw, ignition pulse generator	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

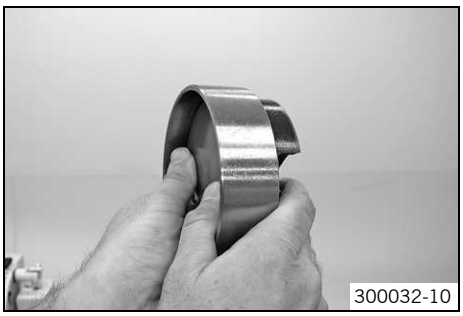
17.5.16 Setting engine to top dead center



– Set the crankshaft to top dead center and lock it with the special tool ❶.

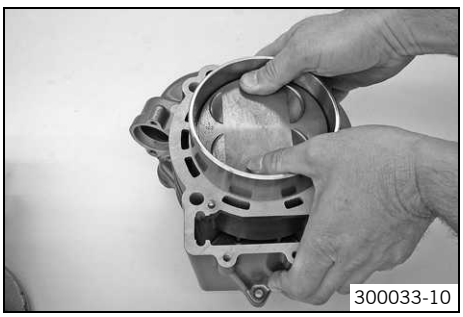
Engine blocking screw (77329010000) (☛ p. 223)

17.5.17 Installing piston

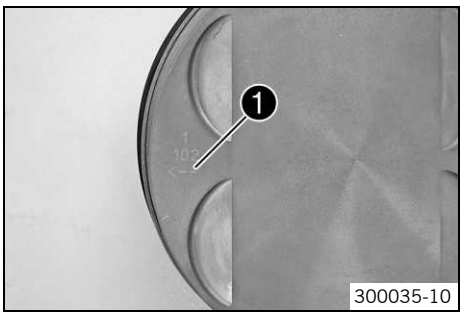


– Shift the joint of the piston rings by 120°.
– Push the oiled piston into the special tool.

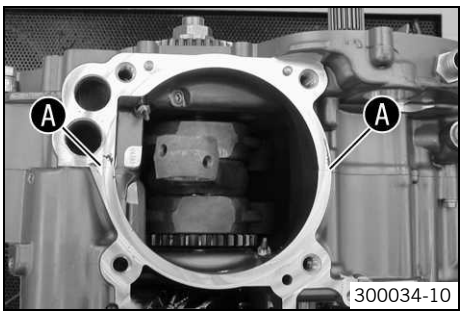
Piston assembly ring (75029015102) (☛ p. 219)



– Position the piston on the cylinder using the special tool.
– Push the piston carefully into the cylinder from above.
✔ The piston rings should not become caught; otherwise, they may be damaged.



– Ensure that piston marking ❶ faces the outfeed side.

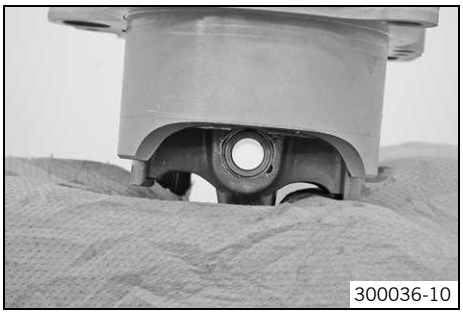


– Apply a thin layer of sealing compound in area Ⓐ.

Loctite® 5910

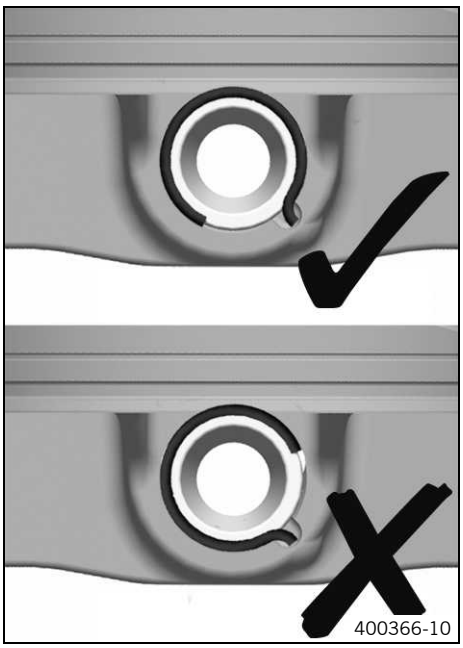
– Place the cylinder base gasket on.

Info
Make sure the grooved pins are seated correctly.

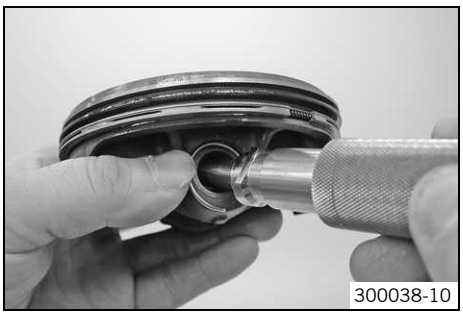


– Cover the engine case opening with a cloth. Thread the timing chain through the chain shaft. Mount the piston pin.

Info
For clarity, the following steps are illustrated using a disassembled piston.



– Position the piston pin retainer.



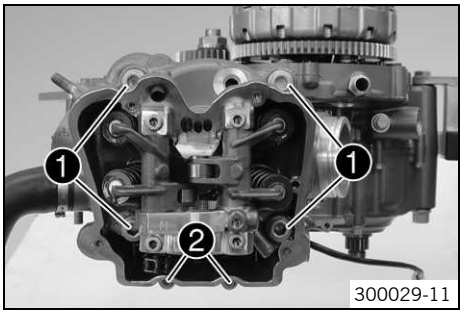
– Insert the special tool and firmly press it toward the piston.
– Turn the special tool counterclockwise, thereby pressing the piston pin retainer into the groove.

Insertion for piston ring lock (75029035000) (☛ p. 220)

– Make sure that the piston pin retainer is seated correctly on both sides.

– Remove the cloth.
– Keep the timing chain tensioned. Push the cylinder down carefully and let the grooved pins engage.

17.5.18 Installing cylinder head



– Put on the cylinder head gasket.

Info
Make sure the grooved pins are seated correctly.

– Mount the cylinder head. Mount and tighten cylinder head screw ❶ with the washers.

Guideline

Cylinder head screw	M10	Tightening sequence: Tighten diagonally, beginning with the rear screw on the timing chain shaft. Step 1 15 Nm (11.1 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 45 Nm (33.2 lbf ft) Step 4 60 Nm (44.3 lbf ft)	Lubricated with engine oil

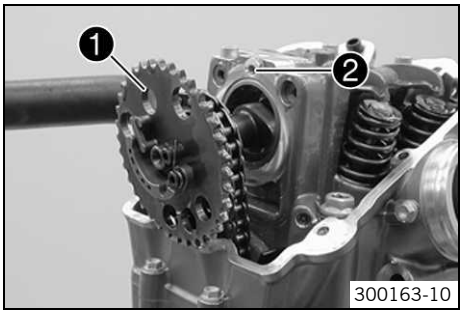
Info
Always use new cylinder head screws.

– Mount and tighten screws ❷.

Guideline

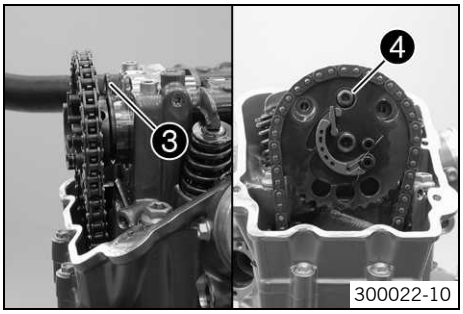
Screw, cylinder head	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

17.5.19 Installing camshafts



– Lay the timing chain over the camshaft. Push the timing chain into the bearing seats. The middle drill hole of the camshaft ❶ and the drill hole of the cylinder head ❷ must be aligned.

Info
Make sure that the crankshaft is at top dead center.

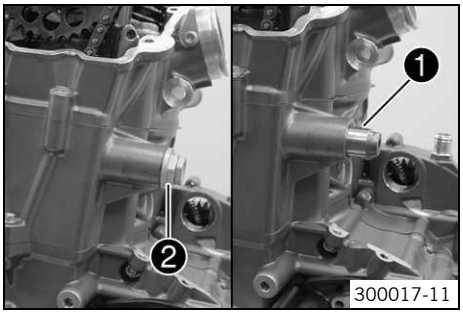


– Position the camshaft support plate ❸. Mount and tighten screw ❹.

Guideline

Screw, camshaft support plate	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

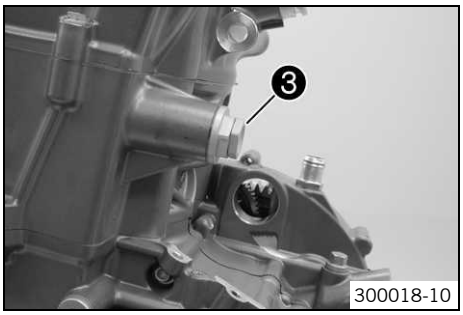
17.5.20 Installing timing chain tensioner



– Insert the timing chain tensioner ❶.
– Mount and tighten plug ❷ with the new seal ring.

Guideline

Plug, timing chain tensioner	M20x1.5	25 Nm (18.4 lbf ft)



– Remove screw ❸ and use the special tool to push the timing chain tensioner toward the timing chain.

Release device for timing chain tensioner (77329051000) (☛ p. 224)

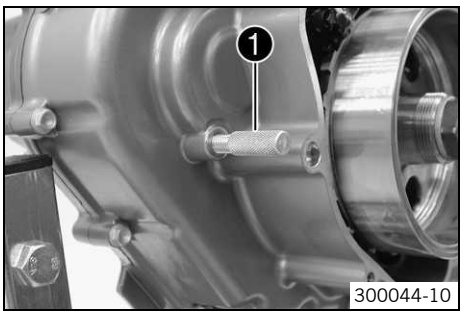
✓ The timing chain tensioner unlocks.

– Mount and tighten screw ❸.

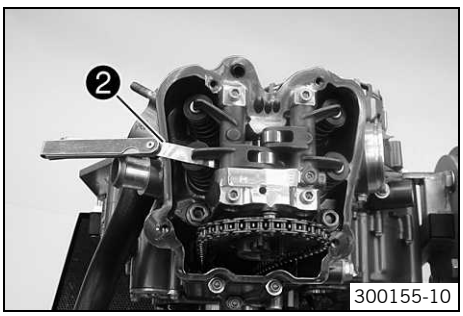
Guideline

Screw, unlocking of timing chain tensioner	M10x1	10 Nm (7.4 lbf ft)

17.5.21 Checking valve clearance



– Remove special tool ❶.
– Crank the engine several times.
– Set the engine to ignition top dead center. (☛ p. 114)



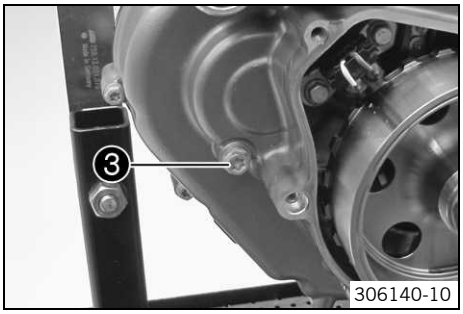
– Check the valve clearance on all valves between the valve and the rocker arm using the special tool ❷.

Guideline

Valve play, cold	0.07... 0.13 mm (0.0028... 0.0051 in)

Feeler gauge (59029041100) (☛ p. 218)

» If valve clearance does not meet specifications:
  – Adjust the valve clearance. (☛ p. 160)



– Remove the special tool.

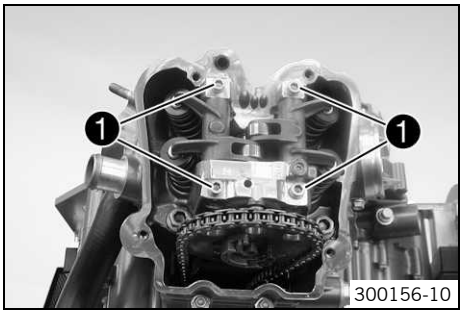
Engine blocking screw (77329010000) (☛ p. 223)

– Mount and tighten screw ❸ with the washer.

Guideline

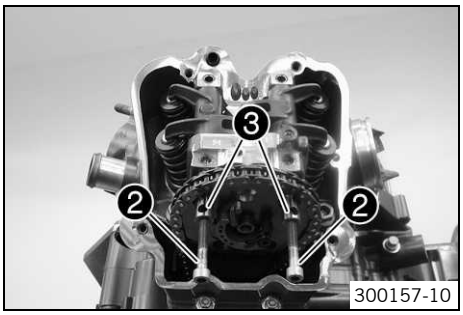
Screw plug, crankshaft clamp	M8	20 Nm (14.8 lbf ft)

17.5.22 Adjusting valve clearance

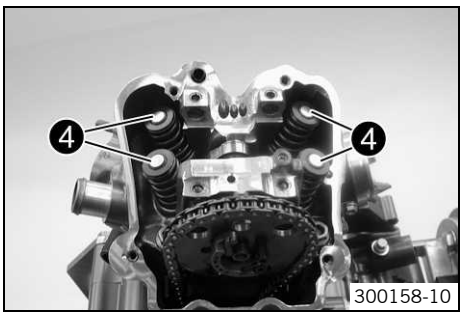


– Remove screws ❶.

Info
Make sure that the crankshaft is at top dead center.

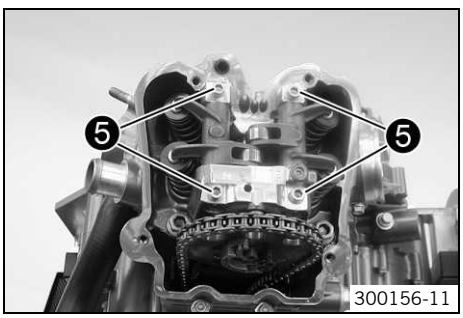


– Screw suitable screws ❷ into the rocker arm shafts ❸. Pull out the rocker arm shafts.
– Take off the rocker arm.



– Remove shims ❹ 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.
– Position the rocker arms and push in the rocker arm shafts.

Info
Make sure that the tapped hole of the rocker arm shaft is positioned facing outwards.
The small drill hole and the flat surface must point upwards.



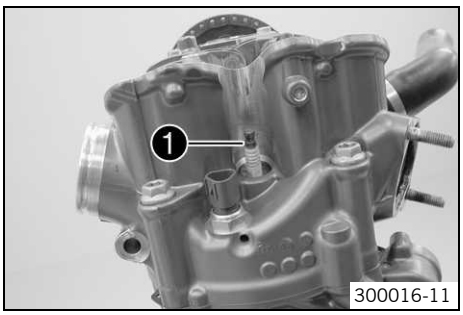
– Install and tighten the screws ❺ of the rocker arm shafts.

Guideline

Screw, rocker arm shaft	M6	12 Nm (8.9 lbf ft)

– Check the valve clearance. (☛ p. 159)

17.5.23 Installing spark plug



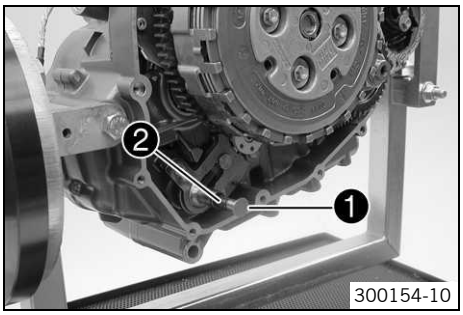
– Mount and tighten the spark plug ❶ using the special tool.

Guideline

Spark plug	M12x1.25	17 Nm (12.5 lbf ft)

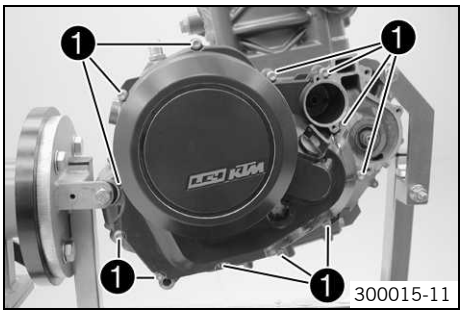
Spark plug wrench (75029172000) (☛ p. 223)

17.5.24 Installing spacer and spring



– Install the spacer ❶ and spring ❷ of the shift shaft.

17.5.25 Installing clutch cover

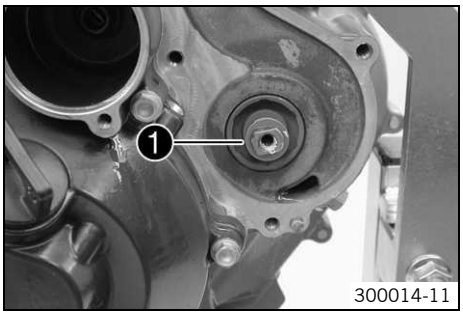


– Mount the dowels. Put on the clutch cover seal.
– Position the clutch cover. Mount and tighten screws ❶.

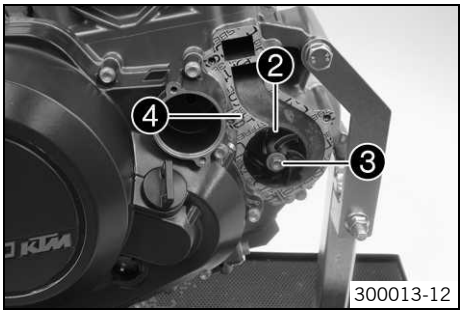
Guideline

Screw, clutch cover	M6	10 Nm (7.4 lbf ft)

17.5.26 Mounting water pump cover



– Push on the shaped washer ❶.

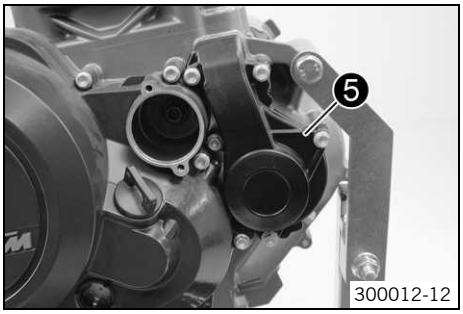


– Attach the water pump wheel ❷. Mount and tighten screw ❸

Guideline

Screw, water pump wheel	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

– Lay on the water pump cover seal ❹.

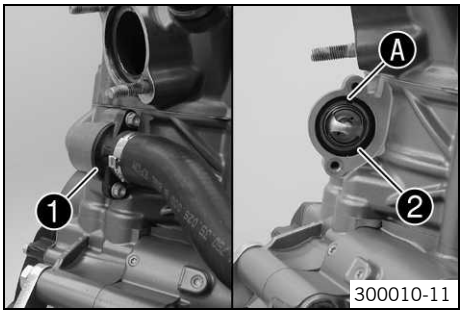


– Put on the water pump cover ❺. Mount and tighten screws.

Guideline

Screw, water pump cover	M6	10 Nm (7.4 lbf ft)

17.5.27 Installing thermostat

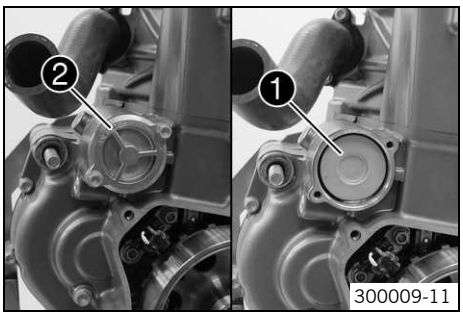


– Position the thermostat ❶ with the gasket.
  ✓ The drill hole Ⓐ must face upward.
– Install the thermostat case ❷ with the radiator hose.
– Mount and tighten the screws.

Guideline

Screw, thermostat housing	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

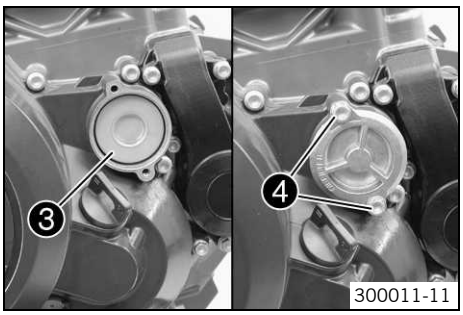
17.5.28 Installing the oil filter



– Insert the oil filter ❶.
– Lubricate the O-ring of the oil filter cover. Install the oil filter cover ❷.
– Mount and tighten the screws.

Guideline

Screw, oil filter cover	M5	6 Nm (4.4 lbf ft)

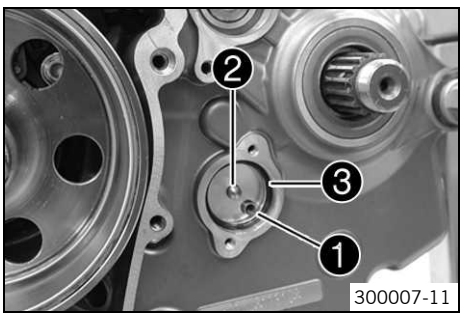


– Insert the oil filter ❸.
– Lubricate the O-ring of the oil filter cover. Install the oil filter cover ❹.
– Mount and tighten the screws.

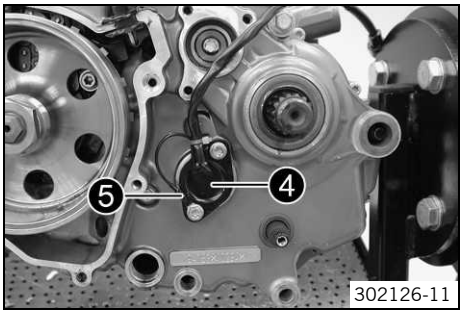
Guideline

Screw, oil filter cover	M5	6 Nm (4.4 lbf ft)

17.5.29 Installing gear position sensor



– Mount the contact springs ❶ and contact bolt ❷.
  ✓ The contact bolts are mounted with the flat side forward; the pointed sides face the sensor.
– Position O-ring ❸.

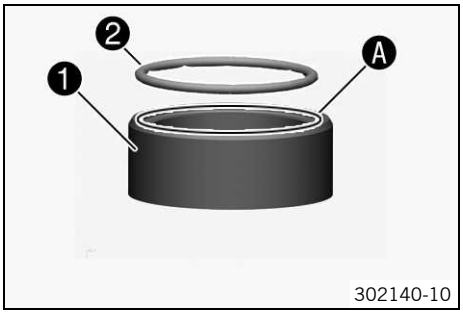


– Install the gear position sensor ❹.
– Position the ground wire ❺.
– Mount and tighten the screws.

Guideline

Screw, gear sensor	M5	5 Nm (3.7 lbf ft)	**Loctite® 243™**

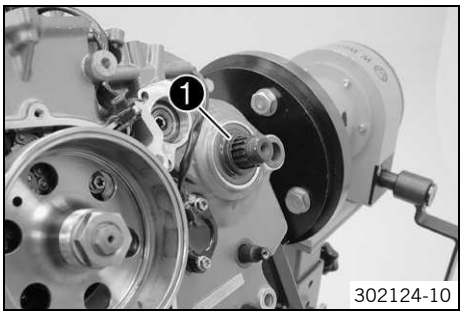
17.5.30 Installing the spacer



– Grease spacer ❶ in area Ⓐ and O-ring ❷ before mounting.

Long-life grease (☛ p. 214)

– Position the O-ring in the recess of the spacer.

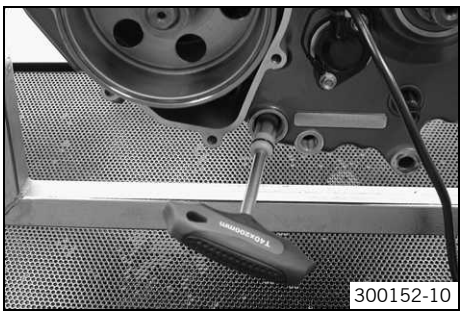


– Grease the shaft seal ring.

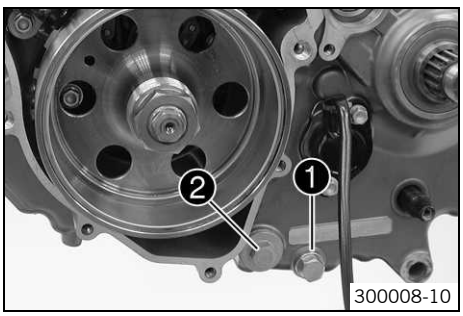
Long-life grease (☛ p. 214)

– Slide the spacer with the O-ring onto the countershaft with a twisting motion.
  ✓ The recess with the O-ring faces inward.
  ✓ The shaft seal ring rests against the spacer along its entire circumference.

17.5.31 Installing oil screens



– Push the oil screen with O-rings on to a pin wrench. Push the pin wrench through the opening into the drill hole of the opposite engine case wall and push the oil screen as far as possible into the engine case.



– Mount the oil drain plug ❶ with the magnet and a new seal ring and tighten it.

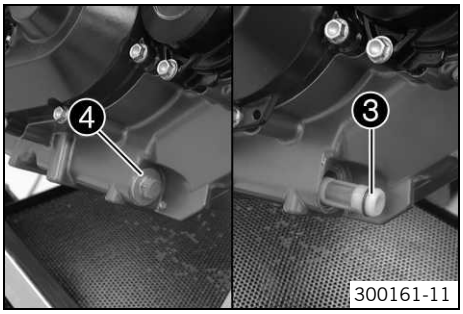
Guideline

Oil drain plug with magnet	M12x1.5	20 Nm (14.8 lbf ft)

– Mount and tighten screw plug ❷ with the O-ring.

Guideline

Plug, oil screen	M20x1.5	15 Nm (11.1 lbf ft)

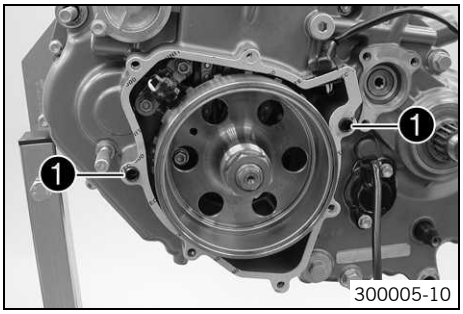


– Position the oil screen ❸ with O-rings.
– Mount and tighten screw plug ❹ with the O-ring.

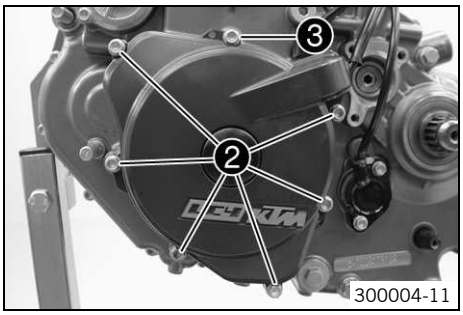
Guideline

Plug, oil screen	M20x1.5	15 Nm (11.1 lbf ft)

17.5.32 Installing alternator cover



– Apply sealing compound lightly in the area of the cable sleeve.
– Install the dowel ❶. Put on the alternator cover seal.



– Position the alternator cover.
– Mount and tighten screws ❷.

Guideline

Screw in alternator cover	M6	10 Nm (7.4 lbf ft)	

– Mount and tighten screw ❸.

Guideline

Screw, alternator cover (chain shaft through-hole)	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

– Remove special tool ❹.

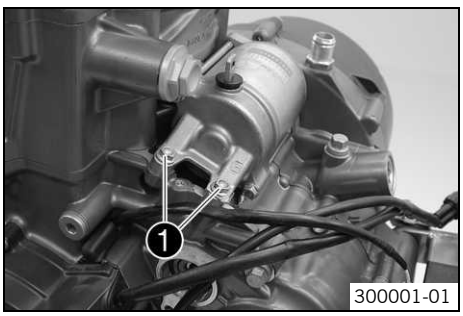
Engine blocking screw (77329010000) (☛ p. 223)

– Mount and tighten screw ❺.

Guideline

Screw plug, crankshaft clamp	M8	20 Nm (14.8 lbf ft)

17.5.33 Installing starter motor



– Grease O-ring. Mount the starter motor.

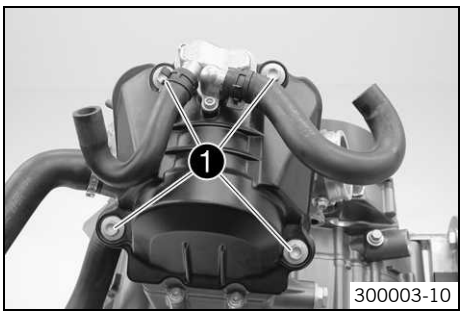
Long-life grease (☛ p. 214)

– Mount and tighten screws ❶.

Guideline

Screw, starter motor	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**

17.5.34 Installing valve cover

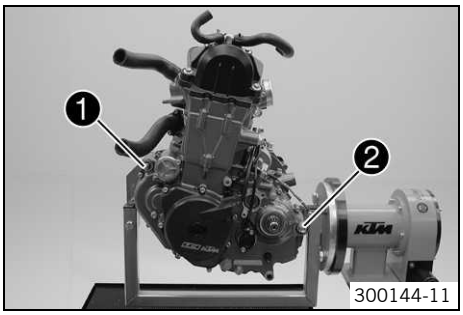


– Put the valve cover in place with the seal. Mount and tighten screws ❶.

Guideline

Screw, valve cover	M6	10 Nm (7.4 lbf ft)

17.5.35 Removing the engine from the engine assembly stand

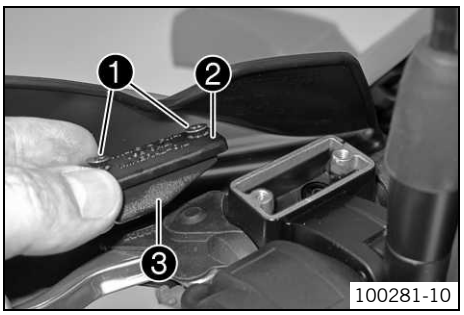


– Remove the screw ❶ or the nut ❷.
– Remove the engine from the engine assembly stand.

Info
Have an assistant help you or use a crane.

18.1 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 under top level of container	4 mm (0.16 in)

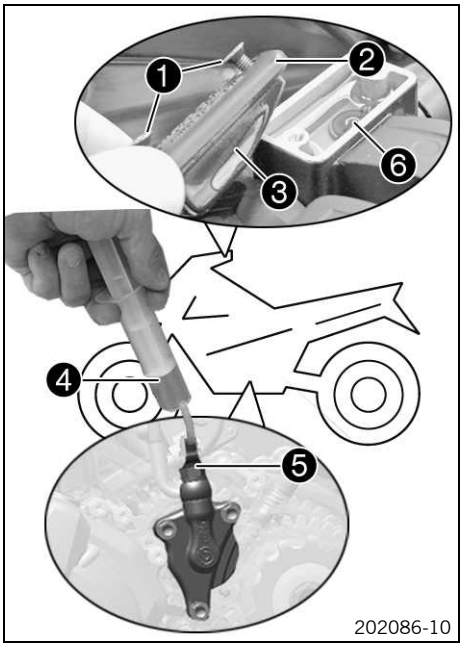
» If the level of the coolant does not meet specifications:
– Correct the fluid level of the hydraulic clutch.

Hydraulic fluid (15) (☛ p. 213)

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

18.2 Changing the hydraulic clutch fluid

Warning
Environmental hazard Hazardous substances cause environmental damage.
– Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.



– Move the clutch fluid reservoir mounted on the handlebar to a horizontal position.
– Remove screws ❶.
– Remove cover ❷ with membrane ❸.
– Fill bleeding syringe ❹ with the appropriate hydraulic fluid.

Bleed syringe (50329050000) (☛ p. 216)
Hydraulic fluid (15) (☛ p. 213)

– On the clutch slave cylinder, remove bleeder screw ❺ and mount bleeding syringe ❹.
– Inject the liquid into the system until it escapes from hole ❻ 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 top edge of container	4 mm (0.16 in)

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

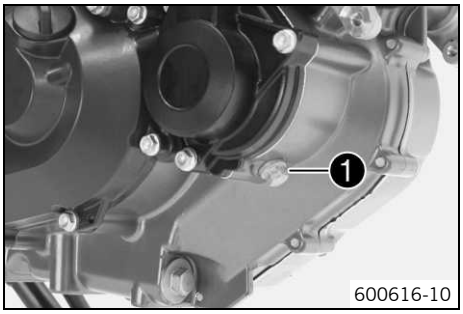
19.1 Draining the coolant

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.

– Avoid contact between coolant and skin, eyes and clothing. If it gets into your eyes, rinse immediately with water and contact a doctor. Wash affected skin areas immediately with soap and water. If coolant is swallowed, contact a doctor immediately. Change clothes that have come into contact with coolants. Keep coolant out of the reach of children.



Preparatory work
– Remove the engine guard. (☛ p. 36)

Main work
– Stand the motorcycle upright.
– Place a suitable container under the engine.
– Remove screw ❶. Remove the radiator cap.
– Completely drain the coolant.
– Mount screw ❶ with a new seal ring and tighten it.
Guideline

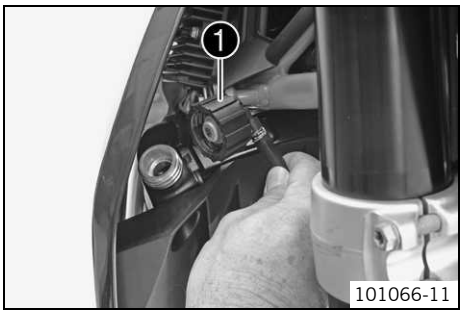
Plug, drain hole of water pump	M10x1	15 Nm (11.1 lbf ft)

Finishing work
– Install the engine guard. (☛ p. 36)

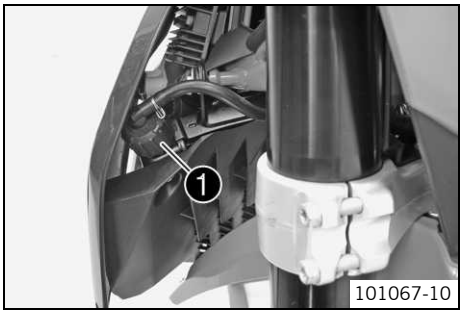
19.2 Filling/bleeding the cooling system

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

– Avoid contact between coolant and skin, eyes and clothing. If it gets into your eyes, rinse immediately with water and contact a doctor. Wash affected skin areas immediately with soap and water. If coolant is swallowed, contact a doctor immediately. Change clothes that have come into contact with coolants. Keep coolant out of the reach of children.



– Stand the motorcycle on its side stand on a horizontal surface.
– Remove radiator cap ❶.



– Refill the coolant.

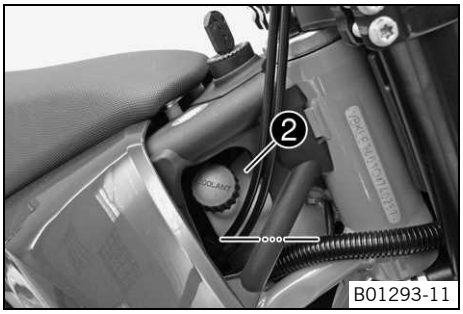
Alternative 1

Coolant (☛ p. 212)

Alternative 2

Coolant (mixed ready to use) (☛ p. 212)

– Fill the radiator completely with coolant. Mount radiator cap ❶.



– Remove the cap from compensating tank ❷ and add coolant to the level shown in the figure.
– Mount the cap of the compensating tank.

Danger

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

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

– Start the engine and run it until the 5th bar of the temperature indicator lights up.
– Switch off the engine and allow it to cool down.
– After the engine has cooled down, check the coolant level in the radiator and in the compensating tank again and add more coolant if necessary.
– Check the coolant level. (☛ p. 169)

19.3 Checking the antifreeze and coolant level

Warning

Danger of scalding During motorcycle operation, the coolant gets very hot and is under pressure.

– Do not remove the radiator cap, radiator hoses or other cooling system components when the engine is hot. Allow the engine and cooling system to cool down. In case of scalding, rinse immediately with lukewarm water.

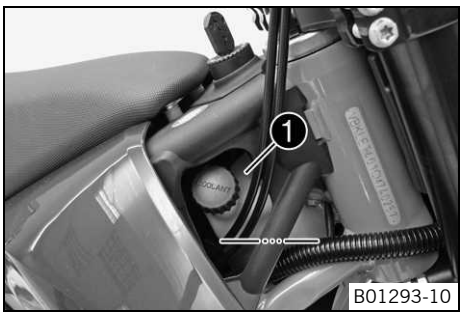
Warning

Danger of poisoning Coolant is poisonous and a health hazard.

– Avoid contact between coolant and skin, eyes and clothing. If it gets into your eyes, rinse immediately with water and contact a doctor. Wash affected skin areas immediately with soap and water. If coolant is swallowed, contact a doctor immediately. Change clothes that have come into contact with coolants. Keep coolant out of the reach of children.

Condition

Engine is cold.



– Stand the motorcycle on its side stand on a horizontal surface.
– Remove the cap of compensating tank ❶.
– Check antifreeze of coolant.

−25... −45 °C (−13... −49 °F)

» If the antifreeze of the coolant does not meet specifications:
– Correct the antifreeze of the coolant.

– Check the coolant level in the compensating tank.

The coolant level must be within the range shown in the figure.

» If the coolant level does not meet specifications:
– Correct the coolant level.

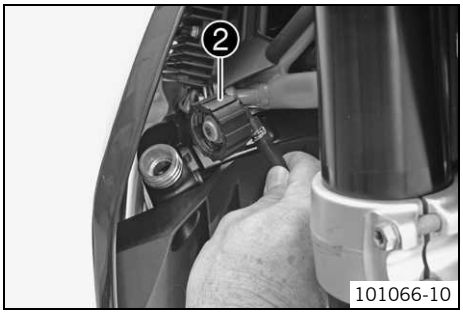
Alternative 1

Coolant (☛ p. 212)

Alternative 2

Coolant (mixed ready to use) (☛ p. 212)

– Mount the cap of the compensating tank.



– Screw off the radiator cap ❷.
– Check antifreeze of coolant.

−25... −45 °C (−13... −49 °F)

» If the antifreeze of the coolant does not meet specifications:
– Correct the antifreeze of the coolant.

– Check the coolant level in the radiator.

The radiator must be completely filled.

» If the coolant level does not meet specifications:
– Correct the coolant level and find out the cause of the loss.

Alternative 1

Coolant (☛ p. 212)

Alternative 2

Coolant (mixed ready to use) (☛ p. 212)

– Mount the radiator cap.

19.4 Checking the coolant level

Warning

Danger of scalding During motorcycle operation, the coolant gets very hot and is under pressure.

– Do not remove the radiator cap, radiator hoses or other cooling system components when the engine is hot. Allow the engine and cooling system to cool down. In case of scalding, rinse immediately with lukewarm water.

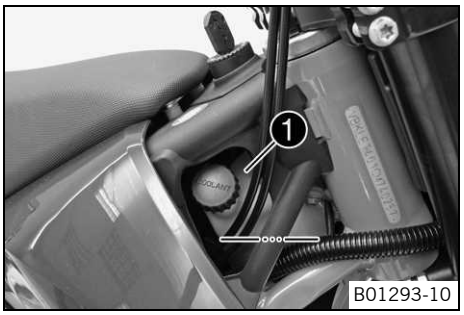
Warning

Danger of poisoning Coolant is poisonous and a health hazard.

– Avoid contact between coolant and skin, eyes and clothing. If it gets into your eyes, rinse immediately with water and contact a doctor. Wash affected skin areas immediately with soap and water. If coolant is swallowed, contact a doctor immediately. Change clothes that have come into contact with coolants. Keep coolant out of the reach of children.

Condition

Engine is cold.



– Stand the motorcycle on its side stand on a horizontal surface.
– Check the coolant level in the compensating tank ❶.

The coolant level must be within the range shown in the figure.

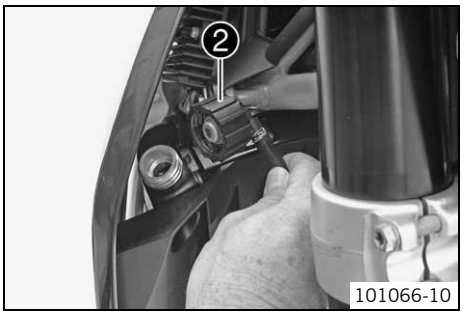
» If the coolant level does not meet specifications:
– Correct the coolant level.

Alternative 1

Coolant (☛ p. 212)

Alternative 2

Coolant (mixed ready to use) (☛ p. 212)



– Screw off the radiator cap ❷ and check the coolant level in the radiator.

The radiator must be completely filled.

» If the coolant level does not meet specifications:
– Correct the coolant level and find out the cause of the loss.

Alternative 1

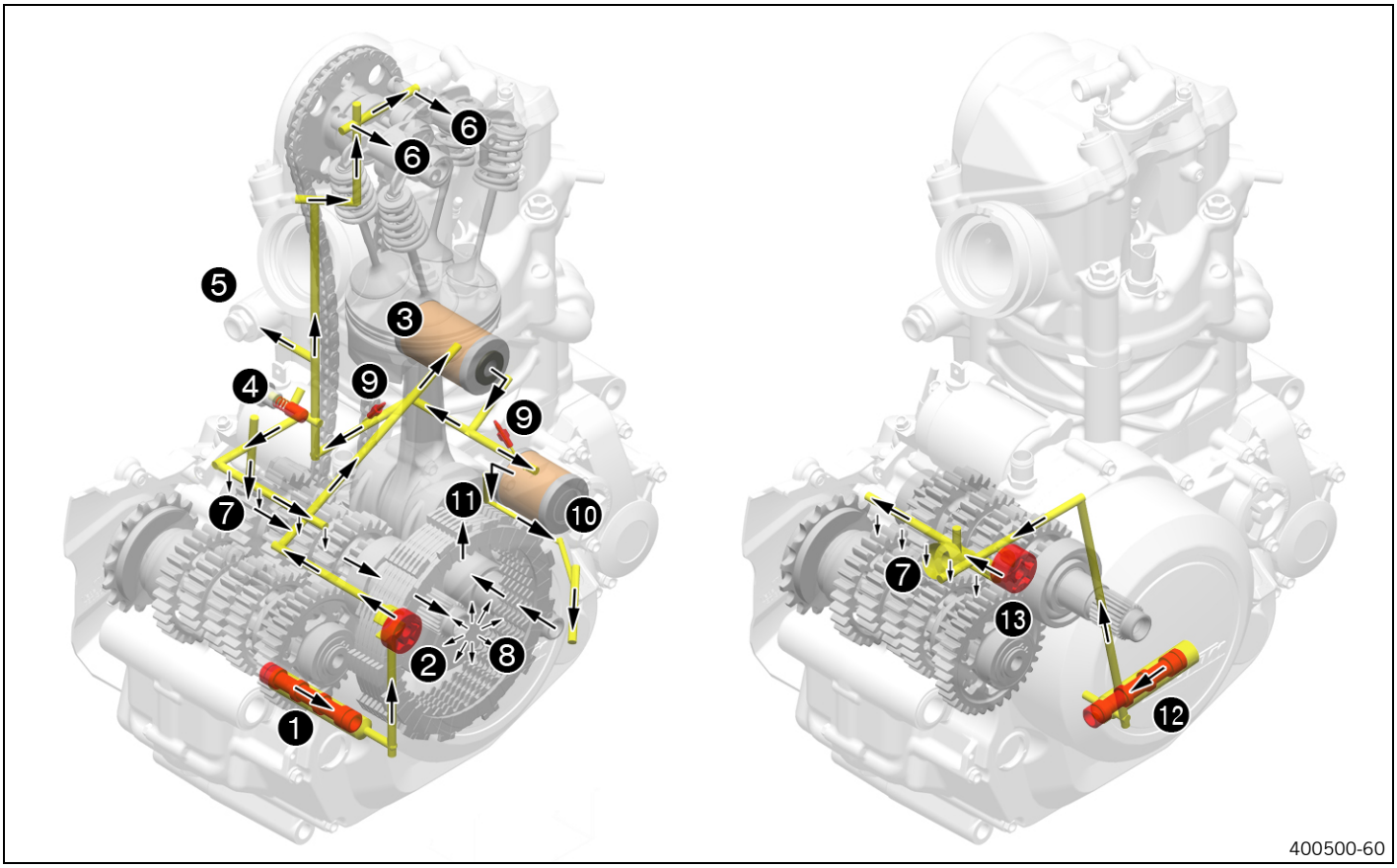
Coolant (☛ p. 212)

Alternative 2

Coolant (mixed ready to use) (☛ p. 212)

– Mount the radiator cap.

20.1 Oil circuit



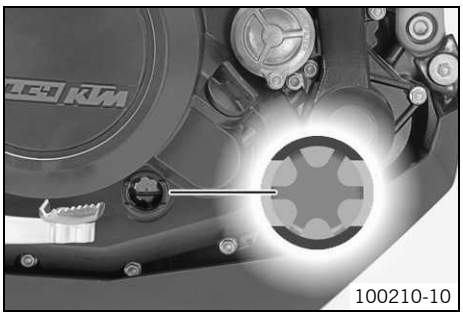
Oil circuit of force pump	
1	Oil screen
2	Force pump
3	Oil filter
4	Oil pressure regulator valve
5	Timing chain tensioner
6	Rocker arm shaft
7	Transmission
8	Clutch
9	Oil jet for piston cooling
10	Oil filter
11	Oil nozzle for conrod bearing lubrication
Oil circuit of suction pump	
12	Oil screen
13	Suction pump
7	Transmission

20.2 Checking the engine oil level

Info
The engine oil level must be checked when the engine is warm.

Condition
The engine is at operating temperature.

Preparatory work
– Stand the motorcycle upright on a horizontal surface.



Main work

– Check the engine oil level.

Info

After switching off the engine, wait one minute before checking the level.

The engine oil must be between the lower and upper edge of the oil level viewer.

» If the engine oil level is not at the specified level:

– Add the engine oil. (☛ p. 175)

20.3 Checking the engine oil pressure

Warning

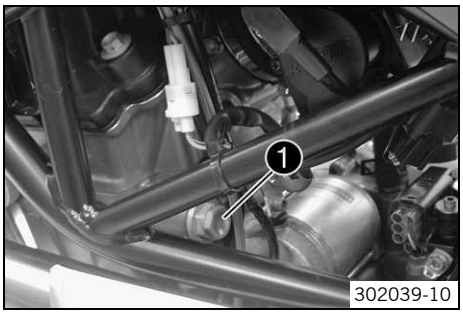
Danger of scalding Engine oil and gear oil get very hot when the motorcycle is ridden.

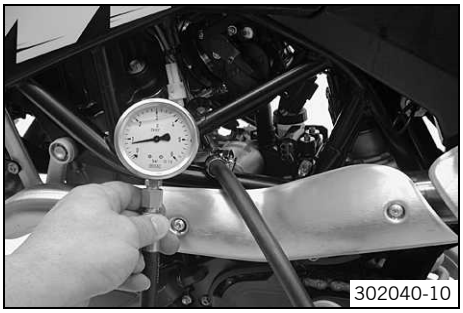
– Wear appropriate protective clothing and safety gloves. In case of burns, rinse immediately with lukewarm water.

Warning

Environmental hazard Hazardous substances cause environmental damage.

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





Main work

– Remove screw ❶.

– Position the banjo bolt with the connection and seal rings. Mount and tighten the banjo bolt.

Guideline

Banjo bolt	M10x1	8 Nm (5.9 lbf ft)

Oil pressure adapter (77329006000) (☛ p. 223)

– Connect the pressure tester to the special tool without the T-plate.

Pressure testing tool (61029094000) (☛ p. 218)

– Check the engine oil level. (☛ p. 170)

Danger

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

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

– Start the engine and let it run warm.

– Check the engine oil pressure.

Engine oil pressure	
Coolant temperature: ≥ 70 °C (≥ 158 °F) Engine speed: 1,500 rpm	≥ 0.4 bar (≥ 6 psi)
Coolant temperature: ≥ 70 °C (≥ 158 °F) Engine speed: 5,000 rpm	≥ 1.5 bar (≥ 22 psi)

» If the specification is not reached:

– Change the oil filter. Check oil pumps for wear. Check all oil channels for free flow.

– Switch off the engine.

Warning

Danger of burns Some vehicle components get very hot when the machine is driven.

– Wear appropriate protective clothing and safety gloves. In case of burns, rinse immediately with lukewarm water.

– Remove the special tools.

– Mount and tighten screw ❶.

Guideline

Screw, unlocking of timing chain tensioner	M10x1	10 Nm (7.4 lbf ft)

Finishing work

– Check the engine oil level. (☛ p. 170)

20.4 Changing the engine oil and filter, cleaning the oil screens

– Drain the engine oil. (☛ p. 172)

– Remove the oil filter. (☛ p. 173)

– Clean the oil screens. (☛ p. 174)

– Install the oil filter. (☛ p. 173)

– Fill up with engine oil. (☛ p. 175)

20.5 Draining the engine oil

Warning

Danger of scalding Engine oil and gear oil get very hot when the motorcycle is ridden.

– Wear appropriate protective clothing and safety gloves. In case of burns, rinse immediately with lukewarm water.

Warning

Environmental hazard Hazardous substances cause environmental damage.

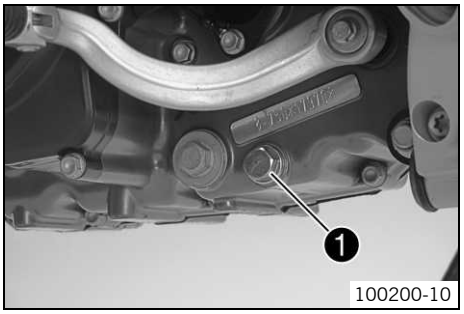
– Oil, grease, filters, fuel, cleaners, brake fluid, etc., should be disposed of as stipulated in applicable regulations.

Info

Drain the engine oil only when the engine is warm.

Preparatory work

– Remove the engine guard. (☛ p. 36)

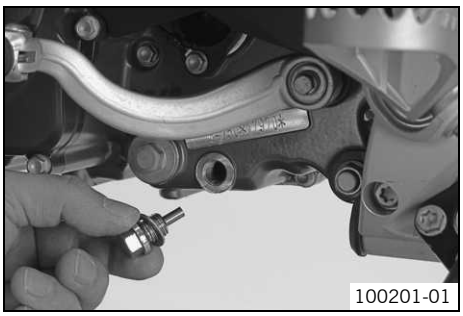


Main work

– Place a suitable container under the engine.

– Remove the oil drain plug ❶ with the magnet and seal ring.

– Completely drain the engine oil.


100201-01

– Thoroughly clean the oil drain plug with a magnet.
– Mount the oil drain plug with the magnet and seal ring and tighten it.
Guideline

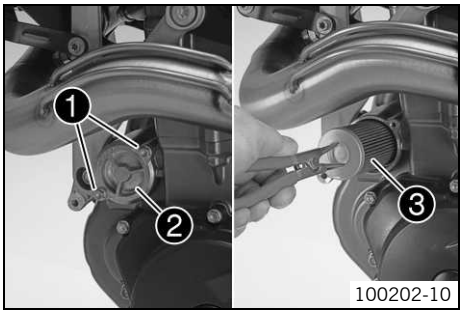
Oil drain plug with magnet	M12x1.5	20 Nm (14.8 lbf ft)

20.6 Removing the oil filter

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.

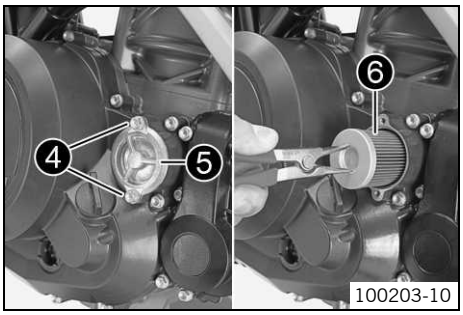
Preparatory work
– Place a suitable container under the engine.



100202-10

Main work
– Remove screws ❶. Remove the oil filter cover ❷ with the O-ring.
– Pull oil filter ❸ out of the oil filter housing.

Circlip pliers reverse (51012011000) (☛ p. 216)



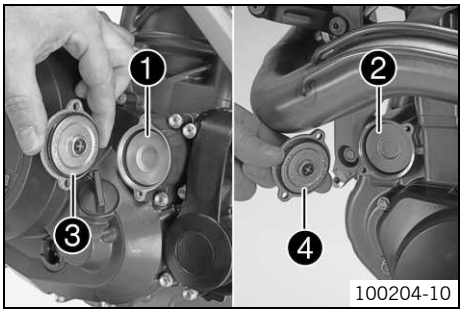
100203-10

– Remove screws ❹. Take off the oil filter cover ❺ with the O-ring.
– Pull oil filter ❻ out of the oil filter housing.

Circlip pliers reverse (51012011000) (☛ p. 216)

– Completely drain the engine oil.
– Thoroughly clean the parts and sealing area.

20.7 Installing the oil filter



100204-10

– Insert oil filters ❶ and ❷.
– Oil the O-rings of the oil filter covers. Mount oil filter covers ❸ and ❹.
– Mount and tighten the screws.
Guideline

Screw, oil filter cover	M5	6 Nm (4.4 lbf ft)

20.8 Cleaning the oil screens

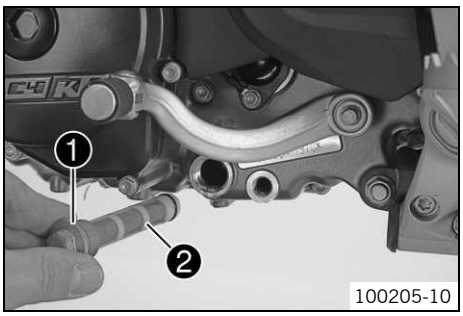
Warning
Danger of scalding Engine oil and gear oil get very hot when the motorcycle is ridden.

– Wear appropriate protective clothing and safety gloves. In case of burns, rinse immediately with lukewarm water.

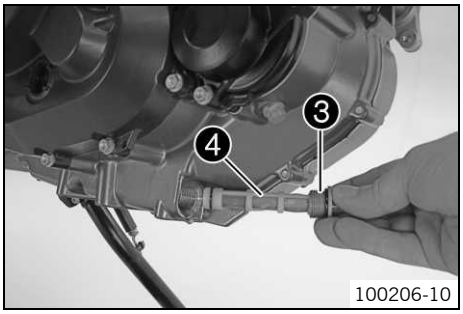
Warning
Environmental hazard Hazardous substances cause environmental damage.

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

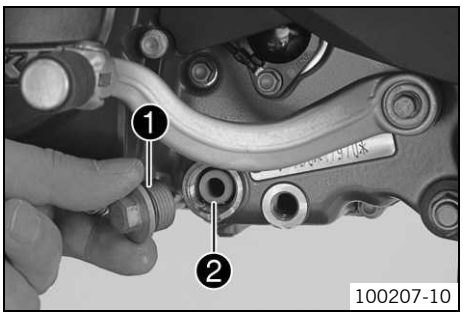
Preparatory work
– Place a suitable container under the engine.



Main work
– Remove plug ❶ with oil screen ❷ and the O-rings.

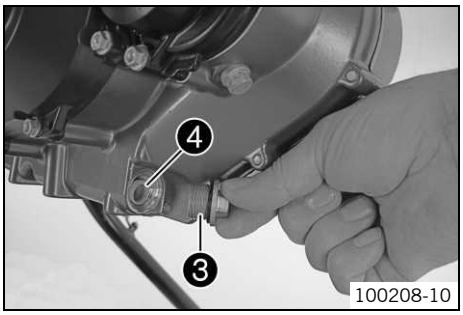


– Remove plug ❸ with oil screen ❹ and the O-rings.
– Completely drain the remaining engine oil.
– Thoroughly clean the parts and sealing area.



– Position oil screen ❷ with the O-rings.
– Mount and tighten screw plug ❶ with the O-ring.
Guideline

Plug, oil screen	M20x1.5	15 Nm (11.1 lbf ft)

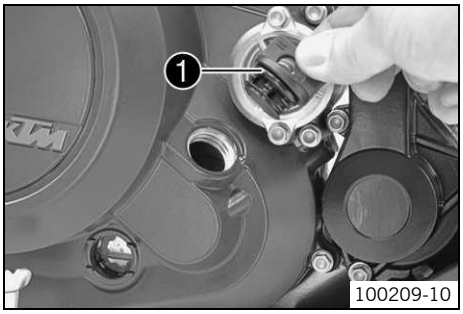


– Position oil screen ❹ with the O-rings.
– Mount and tighten screw plug ❸ with the O-ring.
Guideline

Plug, oil screen	M20x1.5	15 Nm (11.1 lbf ft)

20.9 Filling up with engine oil

Info
Too little engine oil or poor-quality engine oil results in premature wear to the engine.



Main work
– Remove filler plug with O-ring ❶ from the clutch cover and add engine oil.

Engine oil	1.70 l (1.8 qt.)	Engine oil (SAE 10W/60) (00062010035) (☛ p. 212)	
		Alternative engine oil	Engine oil (SAE 10W/50) (☛ p. 212)

– Refit plug with O-ring ❶ and tighten it.

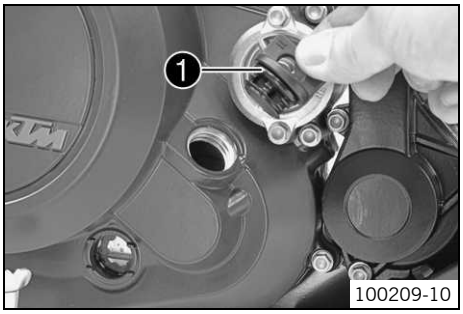
Danger
Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.
– When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.

– Start the engine and check that it is oil-tight.

Finishing work
– Install the engine guard. (☛ p. 36)
– Check the engine oil level. (☛ p. 170)

20.10 Adding engine oil

Info
Too little engine oil or poor-quality engine oil results in premature wear to the engine.



Main work
– Remove the oil filler plug ❶ with the O-ring from the clutch cover and fill up with engine oil.

Engine oil (SAE 10W/60) (00062010035) (☛ p. 212)
Engine oil (SAE 10W/50) (☛ p. 212)

Info
For optimal performance of the engine oil, do not mix different types of engine oil.
If appropriate, change the engine oil.

– Install and tighten the oil filler plug ❶ with the O-ring.

Danger
Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and/or death.
– When running the engine, always make sure there is sufficient ventilation, and do not start or run the engine in an enclosed space without an effective exhaust extraction system.

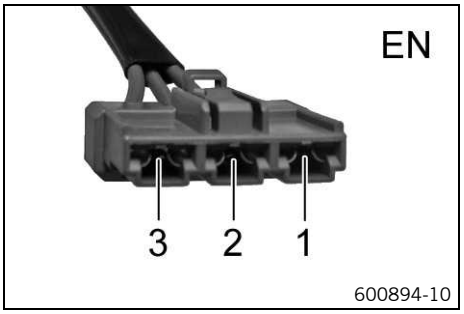
– Start the engine and check that it is oil-tight.

Finishing work
– Check the engine oil level. (☛ p. 170)

21.1 Alternator - checking the stator winding

Condition
The stator is disconnected.

Preparatory work
– Remove the seat. (☛ p. 64)
– Take off the side cover. (☛ p. 65)



Main work
Stator winding, measurement I - check the resistance
– Ω Measure the resistance between the specified points.
Stator, connector **EN** pin **1** – Stator, connector **EN** pin **2**

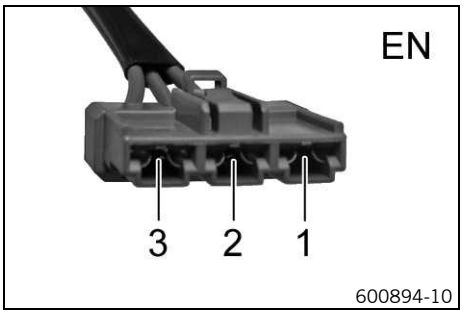
Alternator	
Resistance of stator winding at: 20 °C (68 °F)	≤ 1 Ω

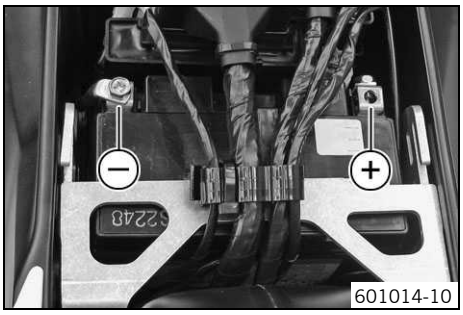
» If the displayed value is not equal to the setpoint value:
– Replace the stator.

Stator winding, measurement II - check the resistance
– Ω Measure the resistance between the specified points.
Stator, connector **EN** pin **1** – Stator, connector **EN** pin **3**

Alternator	
Resistance of stator winding at: 20 °C (68 °F)	≤ 1 Ω

» If the displayed value is not equal to the setpoint value:
– Replace the stator.



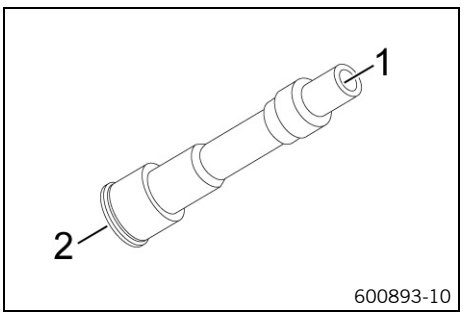


Stator winding - check for a short circuit to ground (terminal 31)
– Ω Measure the resistance between the specified points.
Stator, connector **EN** pin **1** – Measuring point **Ground (–)**

Resistance	∞ Ω

» If the displayed value is not equal to the setpoint value:
– Replace the stator.

21.2 Checking the spark plug connector



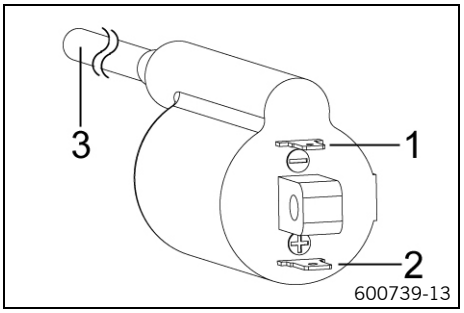
Condition
Spark plug connector cylinder 1 has been removed.

– Ω Measure the resistance between the specified points.
Measuring point 1 – Measuring point 2

Spark plug connector	
Resistance at: 20 °C (68 °F)	4.3… 5.7 kΩ

» If the specification is not reached:
– Change the spark plug connector.

21.3 Ignition coil - checking the secondary winding



Condition

Ignition coil cylinder 1 is disconnected.
Spark plug connector cylinder 1 has been removed.

Preparatory work

– Remove the seat. (☛ p. 64)
– Remove the fuel tank.

Main work

Ignition coil cylinder 1 - check the secondary winding resistance

– Ω Measure the resistance between the specified points.
Ignition coil pin **2 (+)** – Ignition coil pin **3**

Ignition coil	
Resistance of secondary winding at: 20 °C (68 °F)	10.4… 15.6 kΩ

» If the displayed value is not equal to the setpoint value:
– Replace the ignition coil.

22 TECHNICAL DATA

22.1 Engine

Design	1-cylinder 4-stroke engine, water-cooled
Displacement	654 cm³ (39.91 cu in)
Stroke	80 mm (3.15 in)
Bore	102 mm (4.02 in)
Compression ratio	11.8:1
Control	OHC, 4 valves controlled via rocker arm, chain drive
Valve diameter, intake	40 mm (1.57 in)
Valve diameter, exhaust	34 mm (1.34 in)
Valve play, cold	0.07... 0.13 mm (0.0028... 0.0051 in)
Crankshaft bearing	2 roller bearings
Conrod bearing	Needle bearing
Piston pin bearing	Bronze bush
Pistons	Forged light alloy
Piston rings	1 L-ring, 1 tapered compression piston ring, 1 oil scraper ring
Engine lubrication	Semi-dry sump lubrication with two rotor pumps
Primary transmission	36:79
Clutch	**APTC™** antihopping clutch in oil bath/hydraulically operated
Gearbox	6-gears, claw-shifted
Transmission ratio	
1st gear	14:35
2nd gear	16:28
3rd gear	21:28
4th gear	21:23
5th gear	23:22
6th gear	23:20
Mixture preparation	Electronic fuel injection
Ignition	Contactless controlled fully electronic ignition with digital ignition adjustment
Alternator	12 V, 224 W
Spark plug	NGK LKAR 8AI - 9
Spark plug electrode gap	0.9 mm (0.035 in)
Cooling	Water cooling, permanent circulation of coolant by water pump
Idle speed	
Coolant temperature: ≥ 70 °C (≥ 158 °F)	1,550... 1,650 rpm
Starting aid	Electric starter, automatic decompressor

22.2 Engine tolerance, wear limits

Camshafts - diameter, bearing pin	
Next to exhaust cam	≥ 39.95 mm (≥ 1.5728 in)
Next to inlet cam	≥ 17.96 mm (≥ 0.7071 in)
Valve spring	
Minimum length (without valve spring cap)	42.3 mm (1.665 in)
Valve spring cap - thickness	2.4... 2.5 mm (0.094... 0.098 in)
Valve - valve stem diameter	
Exhaust	≥ 5.93 mm (≥ 0.2335 in)
Intake	≥ 5.93 mm (≥ 0.2335 in)
Valve guide - diameter	
New condition	6.004... 6.016 mm (0.23638... 0.23685 in)
Wear limit	6.050 mm (0.23819 in)
Valve - sealing seat width	
Intake	1.60 mm (0.063 in)

Exhaust	2.00 mm (0.0787 in)
Valve - run-out	
On the valve plate	≤ 0.05 mm (≤ 0.002 in)
On the valve stem	≤ 0.05 mm (≤ 0.002 in)
Cylinder/cylinder head - sealing area distortion	≤ 0.10 mm (≤ 0.0039 in)
Cylinder - bore diameter	
Size I	102.000... 102.012 mm (4.01574... 4.01621 in)
Size II	102.013... 102.025 mm (4.01625... 4.01672 in)
Piston - diameter	
Size I	101.955... 101.965 mm (4.01397... 4.01436 in)
Size II	101.965... 101.975 mm (4.01436... 4.01476 in)
Piston/cylinder - mounting clearance	
New condition	0.035... 0.060 mm (0.00138... 0.00236 in)
Wear limit	0.10 mm (0.0039 in)
Piston ring - groove clearance	≤ 0.08 mm (≤ 0.0031 in)
Piston ring end gap	
Compression rings	≤ 0.80 mm (≤ 0.0315 in)
Oil scraper ring	≤ 1.00 mm (≤ 0.0394 in)
Piston - piston pin hole diameter	20.010... 20.020 mm (0.78779... 0.78819 in)
Piston pin - diameter	19.995... 20.004 mm (0.7872... 0.78756 in)
Connecting rod - axial clearance of lower conrod bearing	0.40... 0.60 mm (0.0157... 0.0236 in)
Connecting rod - radial clearance of lower conrod bearing	0.05 mm (0.002 in)
Crankshaft - axial clearance	0.15... 0.25 mm (0.0059... 0.0098 in)
Crankshaft run-out at bearing pin	≤ 0.10 mm (≤ 0.0039 in)
Balancer shaft axial clearance	0.05... 0.20 mm (0.002... 0.0079 in)
Clutch facing disc - thickness	≥ 2.5 mm (≥ 0.098 in)
Intermediate disk - thickness	≥ 1.35 mm (≥ 0.0531 in)
Clutch spring - length	31.5... 33.5 mm (1.24... 1.319 in)
Clutch basket - contact surface of clutch facing discs	≤ 0.5 mm (≤ 0.02 in)
Oil pressure regulator valve - minimum spring length	25.36 mm (0.9984 in)
Oil pump	
Clearance between external rotor and engine case	≤ 0.20 mm (≤ 0.0079 in)
Clearance between external rotor and internal rotor	≤ 0.20 mm (≤ 0.0079 in)
Axial clearance	0.04... 0.08 mm (0.0016... 0.0031 in)
Engine oil pressure	
Coolant temperature: ≥ 70 °C (≥ 158 °F) Engine speed: 1,500 rpm	≥ 0.4 bar (≥ 6 psi)
Coolant temperature: ≥ 70 °C (≥ 158 °F) Engine speed: 5,000 rpm	≥ 1.5 bar (≥ 22 psi)
Main shaft axial clearance	0.10... 0.40 mm (0.0039... 0.0157 in)
Transmission shaft run-out	≤ 0.025 mm (≤ 0.00098 in)
Shift shaft - play in sliding plate/shift quadrant	0.40... 0.80 mm (0.0157... 0.0315 in)
Fuel pressure	
Under every load condition	3.3... 3.7 bar (48... 54 psi)
Engine oil consumption	
After the vehicle is run-in	≤ 0.7 l/1.000 km (≤ 0.7 qt./600 mi) **Info** The oil consumption depends on the riding style and on the operating conditions.

22.3 Engine tightening torques

Screw, membrane fixation	M3	2.5 Nm (1.84 lbf ft)	**Loctite® 243™**
Hose clamp, intake flange	M4	2.5 Nm (1.84 lbf ft)	–
Oil nozzle for conrod bearing lubrication	M4	2 Nm (1.5 lbf ft)	**Loctite® 243™**
Locking screw for bearing	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Screw, breather cover on valve cover	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Screw, clutch spring	M5	6 Nm (4.4 lbf ft)	–
Screw, cover plate for oil return line	M5	6 Nm (4.4 lbf ft)	–
Screw, gear sensor	M5	5 Nm (3.7 lbf ft)	**Loctite® 243™**
Screw, oil filter cover	M5	6 Nm (4.4 lbf ft)	–
Screw, oil pump cover	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Plug, vacuum connection	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw in alternator cover	M6	10 Nm (7.4 lbf ft)	–
Screw, alternator cover (chain shaft through-hole)	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, autodecompression	M6	3... 4 Nm (2.2... 3 lbf ft)	**Loctite® 243™**
Screw, axial lock of camshaft	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, camshaft support plate	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, clutch cover	M6	10 Nm (7.4 lbf ft)	–
Screw, clutch slave cylinder	M6x20	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, clutch slave cylinder	M6x35	10 Nm (7.4 lbf ft)	–
Screw, cylinder	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, cylinder head	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, engine case	M6	10 Nm (7.4 lbf ft)	–
Screw, ignition pulse generator	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, locking lever	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, rocker arm shaft	M6	12 Nm (8.9 lbf ft)	–
Screw, shift drum locating	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, shift lever	M6	14 Nm (10.3 lbf ft)	**Loctite® 243™**
Screw, starter motor	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, stator	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, thermostat housing	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, timing chain guide rail	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, timing chain tensioning rail	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, valve cover	M6	10 Nm (7.4 lbf ft)	–
Screw, water pump cover	M6	10 Nm (7.4 lbf ft)	–
Screw, water pump wheel	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Oil jet, piston cooling	M6x0.75	4 Nm (3 lbf ft)	**Loctite® 243™**
Screw plug, crankshaft clamp	M8	20 Nm (14.8 lbf ft)	–
Stud, exhaust flange	M8	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Cylinder head screw	M10	Tightening sequence: Tighten diagonally, beginning with the rear screw on the timing chain shaft. Step 1 15 Nm (11.1 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 45 Nm (33.2 lbf ft) Step 4 60 Nm (44.3 lbf ft)	Lubricated with engine oil
Plug, drain hole of water pump	M10x1	15 Nm (11.1 lbf ft)	–

Screw plug, oil channel	M10x1	15 Nm (11.1 lbf ft)	**Loctite® 243™**
Screw plug, oil channel, for oil radiator	M10x1	15 Nm (11.1 lbf ft)	–
Screw, unlocking of timing chain tensioner	M10x1	10 Nm (7.4 lbf ft)	–
Spark plug	M12x1.25	17 Nm (12.5 lbf ft)	–
Coolant temperature sensor on cylinder head	M12x1.5	12 Nm (8.9 lbf ft)	–
Oil drain plug with magnet	M12x1.5	20 Nm (14.8 lbf ft)	–
Oil pressure regulator valve plug	M12x1.5	20 Nm (14.8 lbf ft)	–
Screw plug, oil channel	M14x1.5	15 Nm (11.1 lbf ft)	**Loctite® 243™**
Engine case stud	M16x1.5	25 Nm (18.4 lbf ft)	**Loctite® 243™**
Rotor nut	M18x1.5	100 Nm (73.8 lbf ft)	–
Nut, engine sprocket	M20x1.5	80 Nm (59 lbf ft)	**Loctite® 243™**
Nut, inner clutch hub	M20x1.5	100 Nm (73.8 lbf ft)	**Loctite® 243™**
Nut, primary gear	M20LHx1.5	90 Nm (66.4 lbf ft)	**Loctite® 243™**
Plug, oil screen	M20x1.5	15 Nm (11.1 lbf ft)	–
Plug, timing chain tensioner	M20x1.5	25 Nm (18.4 lbf ft)	–
Plug, oil thermostat	M24x1.5	15 Nm (11.1 lbf ft)	–
Screw in alternator cover	M24x1.5	8 Nm (5.9 lbf ft)	–

22.4 Capacities

22.4.1 Engine oil

Engine oil	1.70 l (1.8 qt.)	Engine oil (SAE 10W/60) (00062010035) (☛ p. 212)	
		Alternative engine oil	Engine oil (SAE 10W/50) (☛ p. 212)

22.4.2 Coolant

Coolant	1.20 l (1.27 qt.)	Coolant (☛ p. 212)
		Coolant (mixed ready to use) (☛ p. 212)

22.4.3 Fuel

Total fuel tank capacity, approx.	12 l (3.2 US gal)	Super unleaded (ROZ 95/RON 95/PON 91) (☛ p. 213)

Fuel reserve, approx.	2.5 l (2.6 qt.)

22.5 Chassis

Frame	Lattice frame made of chrome molybdenum steel tubing, powder-coated
Fork	**WP Suspension** 4860 MXMA
Shock absorber	**WP Suspension** 4618 with **Pro-Lever** deflector
Suspension travel	
Front	275 mm (10.83 in)
Rear	275 mm (10.83 in)
Brake system	
Front	Disc brake with dual-piston brake caliper, floating
Rear	Disc brake with single-piston brake caliper, floating
Brake discs - diameter	
Front	300 mm (11.81 in)
Rear	240 mm (9.45 in)
Brake discs - wear limit	
Front	4.5 mm (0.177 in)

Rear	3.5 mm (0.138 in)
Tire air pressure, road, solo	
Front	1.8 bar (26 psi)
Rear	1.8 bar (26 psi)
Tire air pressure with passenger / fully loaded	
Front	2.0 bar (29 psi)
Rear	2.2 bar (32 psi)
Tire air pressure, offroad, single rider	
Front	1.5 bar (22 psi)
Rear	1.5 bar (22 psi)
Secondary drive ratio	15:45
Chain	5/8 x 1/4" X-ring
Steering head angle	63°
Wheelbase	1,504±15 mm (59.21±0.59 in)
Seat height unloaded	930 mm (36.61 in)
Ground clearance unloaded	320 mm (12.6 in)
Weight without fuel, approx.	138.5 kg (305.3 lb.)
Maximum permissible front axle load	150 kg (331 lb.)
Maximum permissible rear axle load	200 kg (441 lb.)
Maximum permissible overall weight	350 kg (772 lb.)

22.6 Electrical system

Battery	YTZ10S	Battery voltage: 12 V Nominal capacity: 8.6 Ah maintenance-free
Fuse	58011109130	30 A
Fuse	75011088015	15 A
Fuse	75011088010	10 A
Headlight	S2 / socket BA20d	12 V 35/35 W
Parking light	W5W / socket W2.1x9.5d	12 V 5 W
Instrument lights and indicator lamps	LED	
Turn signal (690 Enduro R EU/AUS/UK)	R10W / socket BA15s	12 V 10 W
Turn signal (690 Enduro R USA)	RY10W / socket BAU15s	12 V 10 W
Brake/tail light (690 Enduro R EU/AUS/UK)	LED	
Brake/tail light (690 Enduro R USA)	P21/5W / socket BAY15d	12 V 21/5 W
License plate lamp	W5W / socket W2.1x9.5d	12 V 5 W

22.7 Tires

Validity	Front tires	Rear tires	Condition
(690 Enduro R EU/AUS/UK)	**90/90 - 21 M/C 54S M+S TT** Continental TKC 80	**140/80 - 18 M/C 70R M+S TT** Continental TKC 80	To max.: 160 km/h (99.4 mph)
(690 Enduro R USA)	**90/90 - 21 M/C 54R TT** Pirelli MT 21 RALLYCROSS	**140/80 - 18 M/C 70R TT** Pirelli MT 21 RALLYCROSS	
Additional information is available in the Service section under: http://www.ktm.com			

22.8 Fork

Fork part number	14.18.7K.41
Fork	**WP Suspension** 4860 MXMA
Compression damping	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks
Rebound damping	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks
Spring length with preload spacer(s)	495 mm (19.49 in)
Spring rate	
Soft	5.0 N/mm (28.6 lb/in)
Medium (standard)	5.2 N/mm (29.7 lb/in)
Hard	5.4 N/mm (30.8 lb/in)
Air chamber length	100^{+0}_{-20} mm ($3.94^{+0}_{-0.79}$ in)
Fork length	915 mm (36.02 in)

Fork oil per fork leg	635 ml (21.47 fl. oz.)	Fork oil (SAE 4) (48601166S1) (☛ p. 213)

22.9 Shock absorber

Shock absorber part number	15.18.7E.41
Shock absorber	**WP Suspension** 4618 with **Pro-Lever** deflector
Compression damping, high-speed	
Comfort	2 turns
Standard	1.5 turns
Sport	1 turn
Full payload	1 turn
Compression damping, low-speed	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks
Rebound damping	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks
Spring preload	20 mm (0.79 in)
Spring rate	
Soft	75 N/mm (428 lb/in)
Medium (standard)	80 N/mm (457 lb/in)
Hard	85 N/mm (485 lb/in)
Spring length	220 mm (8.66 in)
Gas pressure	10 bar (145 psi)
Static sag	25 mm (0.98 in)
Riding sag	70... 80 mm (2.76... 3.15 in)
Fitted length	405 mm (15.94 in)

Shock absorber fluid	Shock absorber oil (SAE 2.5) (50180342S1) (☛ p. 213)

22.10 Chassis tightening torques

Screw, chain guard	EJOT	2 Nm (1.5 lbf ft)	–
Screw, combination instrument	EJOT	1 Nm (0.7 lbf ft)	–
Screw, license plate holder, bottom	EJOT	3 Nm (2.2 lbf ft)	–
Screw, side stand switch	EJOT	2 Nm (1.5 lbf ft)	–
Screw, SLS valve	EJOT	2 Nm (1.5 lbf ft)	–
Fitting, side stand switch	M4	2 Nm (1.5 lbf ft)	–
Screw, fuel hose clamp on fuel tank	M4	2 Nm (1.5 lbf ft)	–
Screw, wheel speed sensor	M4	1 Nm (0.7 lbf ft)	**Loctite® 243™**
Spoke nipple, front wheel	M4.5	3... 6 Nm (2.2... 4.4 lbf ft)	–
Bolt, foot brake lever stub	M5	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Remaining screws, chassis	M5	4 Nm (3 lbf ft)	–
Screw, brake line holder on swingarm	M5	4 Nm (3 lbf ft)	–
Screw, cable on starter motor	M5	3 Nm (2.2 lbf ft)	–
Screw, electrical holder	M5	3 Nm (2.2 lbf ft)	–
Screw, exhaust heat shield	M5	8 Nm (5.9 lbf ft)	**Loctite® 243™**
Screw, fuel level sensor	M5	3 Nm (2.2 lbf ft)	–
Screw, fuel pump	M5	4 Nm (3 lbf ft)	–
Screw, fuel tank closure flange	M5	2.5 Nm (1.84 lbf ft)	–
Screw, pressure regulator	M5	4 Nm (3 lbf ft)	–
Spoke nipple, rear wheel	M5	3... 6 Nm (2.2... 4.4 lbf ft)	–
Remaining nuts, chassis	M6	10 Nm (7.4 lbf ft)	–
Remaining screws on fuel tank	M6	5 Nm (3.7 lbf ft)	–
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)	–
Screw connection, foot brake cylinder	M6	10 Nm (7.4 lbf ft)	–
Screw, air filter box top	M6	2 Nm (1.5 lbf ft)	–
Screw, ball joint of push rod on foot brake cylinder	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, brake fluid reservoir of rear brake	M6	5 Nm (3.7 lbf ft)	–
Screw, chain guard	M6	2 Nm (1.5 lbf ft)	**Loctite® 243™**
Screw, chain guide	M6	8 Nm (5.9 lbf ft)	–
Screw, chain sliding guard	M6	8 Nm (5.9 lbf ft)	**Loctite® 243™**
Screw, front brake disc	M6	14 Nm (10.3 lbf ft)	**Loctite® 243™**
Screw, ignition lock	M6	10 Nm (7.4 lbf ft)	**Loctite® 243™**
Screw, lower radiator bracket	M6	8 Nm (5.9 lbf ft)	–
Screw, magnetic holder on side stand	M6	6 Nm (4.4 lbf ft)	**Loctite® 243™**
Screw, radiator guard	M6	8 Nm (5.9 lbf ft)	–
Screw, rear brake disc	M6	14 Nm (10.3 lbf ft)	**Loctite® 243™**
Screw, seat lock	M6	5 Nm (3.7 lbf ft)	–
Screw, side cover	M6	5 Nm (3.7 lbf ft)	–
Screw, upper radiator bracket	M6	10 Nm (7.4 lbf ft)	–
Screw, voltage regulator	M6	8 Nm (5.9 lbf ft)	–
Nut, manifold on cylinder head	M8	20 Nm (14.8 lbf ft)	Copper paste
Nut, rear sprocket screw	M8	35 Nm (25.8 lbf ft)	**Loctite® 2701**
Remaining nuts, chassis	M8	25 Nm (18.4 lbf ft)	–
Remaining screws, chassis	M8	25 Nm (18.4 lbf ft)	–
Screw, bottom triple clamp	M8	12 Nm (8.9 lbf ft)	–
Screw, chain sliding piece	M8	15 Nm (11.1 lbf ft)	–
Screw, connection lever on frame	M8	30 Nm (22.1 lbf ft)	**Loctite® 243™**

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 brake caliper	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**
Screw, front footrest bracket	M8	25 Nm (18.4 lbf ft)	–
Screw, fuel tank bracket	M8	15 Nm (11.1 lbf ft)	–
Screw, fuel tank, bottom	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**
Screw, fuel tank, top	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**
Screw, handlebar clamp	M8	20 Nm (14.8 lbf ft)	–
Screw, handrail	M8	20 Nm (14.8 lbf ft)	–
Screw, heel protector	M8x12	5 Nm (3.7 lbf ft)	**Loctite® 243™**
Screw, license plate holder, top	M8	20 Nm (14.8 lbf ft)	–
Screw, main silencer clamp	M8	12 Nm (8.9 lbf ft)	Copper paste
Screw, main silencer holder	M8	25 Nm (18.4 lbf ft)	–
Screw, main silencer holder on fuel tank	M8	25 Nm (18.4 lbf ft)	–
Screw, rear footrest bracket	M8x16	25 Nm (18.4 lbf ft)	–
Screw, side stand bracket	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**
Screw, spring holder on side stand bracket	M8	25 Nm (18.4 lbf ft)	**Loctite® 243™**
Screw, steering stem	M8	20 Nm (14.8 lbf ft)	–
Screw, top triple clamp	M8	17 Nm (12.5 lbf ft)	–
Engine carrying screw	M10	45 Nm (33.2 lbf ft)	**Loctite® 243™**
Remaining nuts, chassis	M10	45 Nm (33.2 lbf ft)	–
Remaining screws, chassis	M10	45 Nm (33.2 lbf ft)	–
Screw, bottom shock absorber	M10	45 Nm (33.2 lbf ft)	**Loctite® 243™**
Screw, engine bearer on frame	M10	45 Nm (33.2 lbf ft)	–
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, top shock absorber	M10	45 Nm (33.2 lbf ft)	**Loctite® 243™**
Screw, swingarm pivot	M12	80 Nm (59 lbf ft)	–
Lambda sensor	M12x1.25	25 Nm (18.4 lbf ft)	Copper paste
Nut, linkage lever on swingarm	M14x1.5	100 Nm (73.8 lbf ft)	–
Nut, linkage lever to rocker arm	M14x1.5	100 Nm (73.8 lbf ft)	–
Screw, bottom steering head	M20x1.5	60 Nm (44.3 lbf ft)	**Loctite® 243™**
Screw, top steering head	M20x1.5	12 Nm (8.9 lbf ft)	–
Screw, front wheel spindle	M24x1.5	45 Nm (33.2 lbf ft)	–
Nut, rear wheel spindle	M25x1.5	90 Nm (66.4 lbf ft)	–

23.1 Cleaning the motorcycle

Note

Material damage Damage and destruction of components by high-pressure cleaning equipment.

– When cleaning the vehicle with a pressure cleaner, do not point the water jet directly onto electrical components, connectors, cables, bearings, etc. Maintain a minimum distance of 60 cm between the nozzle of the pressure cleaner and the component. Excessive pressure can cause malfunctions or destroy these parts.

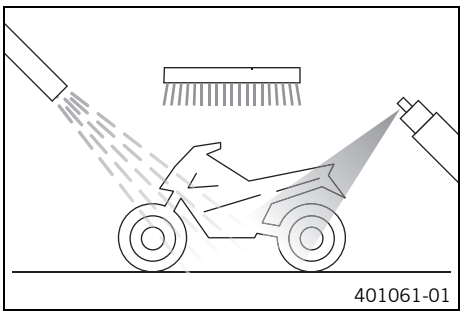
Warning

Environmental hazard Hazardous substances cause environmental damage.

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

Info

If you clean the motorcycle regularly, its value and appearance will be maintained over a long period.
Avoid direct sunshine on the motorcycle during cleaning.



– Seal the exhaust system to keep water out.
– 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. 215)

Info

Use warm water containing normal motorcycle cleaner and a soft sponge. Never apply motorcycle cleaner to the dry vehicle; always rinse with water first.
If the vehicle was operated in road salt, clean it with cold water. Warm water enhances the corrosive effects of salt.

– After rinsing the motorcycle with a gentle spray of water, allow it to dry thoroughly.
– Remove the plug from the exhaust system.

Warning

Danger of accidents Reduced braking efficiency due to a wet or dirty brake system.

– Clean or dry a dirty or wet brake system by riding and braking gently.

– After cleaning, ride a short distance until the engine reaches operating temperature.

Info

The heat produced causes water at inaccessible locations in the engine and brake system to evaporate.

– Push back the protection covers 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. 82)
– Treat bare metal parts (except for brake discs and exhaust system) with anti-corrosion materials.

Cleaning and preserving materials for metal, rubber and plastic (☛ p. 214)

– Treat all painted parts with a mild paint polish.

High-luster polish for paint (☛ p. 214)

– Treat all plastic parts and powder-coated parts with a mild cleaning and care agent.

Paint cleaner and polish for high-gloss and matte finishes, bare metal and plastic surfaces (☛ p. 215)

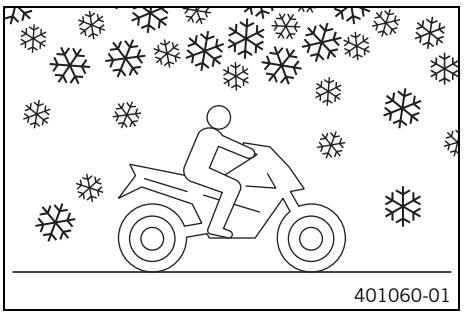
– Lubricate the ignition/steering lock.

Universal oil spray (☛ p. 215)

23.2 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.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– Clean the motorcycle. (☛ p. 186)
– Clean the brake system.

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 use on salted roads, clean the motorcycle thoroughly with cold water and dry it properly.

– Treat the engine, the swingarm, and all other bare or galvanized parts (except brake discs) with a wax-based anti-corrosion substance.

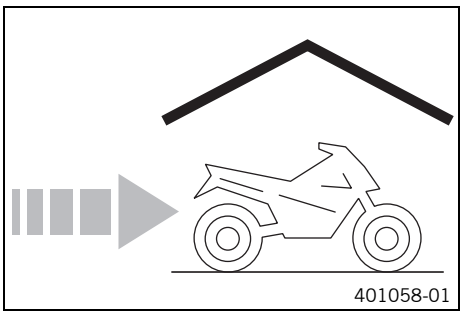
Info

To prevent serious reduction of the braking efficiency, make sure no anti-corrosion substance gets on to the brake discs.

– Clean the chain. (☛ p. 82)

24.1 Storage

Info
If you want to garage the motorcycle for a longer period, take the following actions.
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.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- When refueling for the last time before taking the motorcycle out of service, add fuel additive.

Fuel additive (☛ p. 214)

- Ride the motorcycle until the low fuel warning lamp lights up and the display changes to **TRIP F** so that you can fill up with fresh fuel when you take the motorcycle back into service.
- Clean the motorcycle. (☛ p. 186)
- Change the engine oil and filter, clean the oil screens. (☛ p. 172)
- Check the antifreeze and coolant level. (☛ p. 168)
- Check the tire air pressure. (☛ p. 73)
- Remove the battery. (☛ p. 84)
- Recharge the battery. (☛ p. 85)

  Guideline

Storage temperature of battery without direct sunshine	0… 35 °C (32… 95 °F)

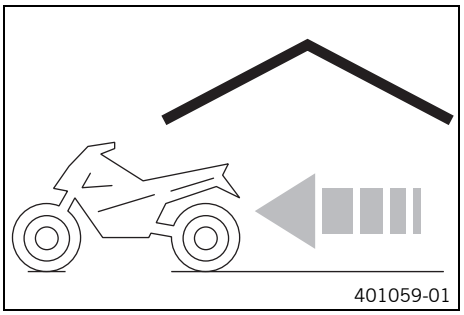
- Store the vehicle in a dry location that is not subject to large fluctuations in temperature.

Info
KTM recommends jacking up the motorcycle.

- Raise the motorcycle with the lift stand. (☛ p. 10)
- Cover the motorcycle 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 exhaust system to rust.

24.2 Preparing for use after storage


401059-01

- Remove the motorcycle from the lift stand. (☛ p. 10)
- Recharge the battery. (☛ p. 85)
- Install the battery. (☛ p. 84)
- Set the clock. (☛ p. 100)
- Refuel.
- Perform checks and vehicle care when preparing for use.
- Take a test ride.

25.1 Service schedule

	Once after 1,000 km (621.4 mi)	Every 7,500 km (4,660 mi) or annually	Every 15,000 km (9,321 mi) or every 2 years	Every 30,000 km (18,641 mi) or every 4 years
Check that the electrical equipment is functioning correctly.	○	●		
Read out the fault memory using the KTM diagnostics tool.	○	●		
Check the measured service values with the KTM diagnostics tool.		●		
Change the engine oil and filter, clean the oil screens. (☛ p. 172)	○	●		
Check the front brake linings. (☛ p. 90)	○	●		
Check the rear brake linings. (☛ p. 94)	○	●		
Check the brake discs. (☛ p. 74)	○	●		
Check the brake lines for damage and leakage.	○	●		
Check the rear brake fluid level. (☛ p. 97)	○	●		
Check the free travel of the foot brake lever. (☛ p. 96)	○	●		
Lubricate the linkage of the rear wheel suspension.				●
Check that the shock absorber and fork are leak tight. If necessary and depending on use, service the fork and shock absorber.	○	●		
Check the swingarm bearing.		●		
Check the wheel bearing for play.		●		
Check the tire condition. (☛ p. 73)	○	●		
Check the tire air pressure. (☛ p. 73)	○	●		
Check the spoke tension. (☛ p. 74)	○	●		
Check for rim run-out.	○	●		
Check the chain, rear sprocket, engine sprocket, and chain guide. (☛ p. 80)		●		
Check the chain tension. (☛ p. 79)	○	●		
Grease all moving parts (e.g. side stand, hand lever, chain, ...) and check for smooth operation.	○	●		
Clean the dust boots of the fork legs. (☛ p. 14)		●		
Check the front brake fluid level. (☛ p. 92)	○	●		
Bleed the fork legs. (☛ p. 13)		●		
Check the steering head bearing play. (☛ p. 31)	○	●		
Change the spark plug.			●	●
Check the valve clearance.		●		
Check all hoses (e.g. fuel, cooling, bleeder, drainage, etc.) and sleeves for cracking, leaks, and incorrect routing.			●	●
Check the antifreeze and coolant level. (☛ p. 168)	○	●		
Check the cables for damage and routing without sharp bends.		●		
Check that the throttle cables are undamaged, routed without sharp bends and set correctly.	○	●		
Change the air filter. Clean the air filter box.		●		
Check the fuel pressure.		●		
Check the CO adjustment with the KTM diagnostics tool.		●		
Check/rectify the fluid level of the hydraulic clutch. (☛ p. 166)		●		
Check the screws and nuts for tightness.	○	●		
Change the coolant.				●
Change the front brake fluid. (☛ p. 93)			●	●
Change the rear brake fluid. (☛ p. 98)			●	●
Check the clutch.			●	●
Check the headlight setting. (☛ p. 102)	○	●		
Check that the radiator fan is functioning properly.	○	●		
Final check: Check the vehicle for roadworthiness and take a test ride.	○	●		
Read out the fault memory using the KTM diagnostics tool after a test ride.	○	●		
Make the service entry in **KTM DEALER.NET** and in the service record.	○	●		

○ One-time interval
• Periodic interval

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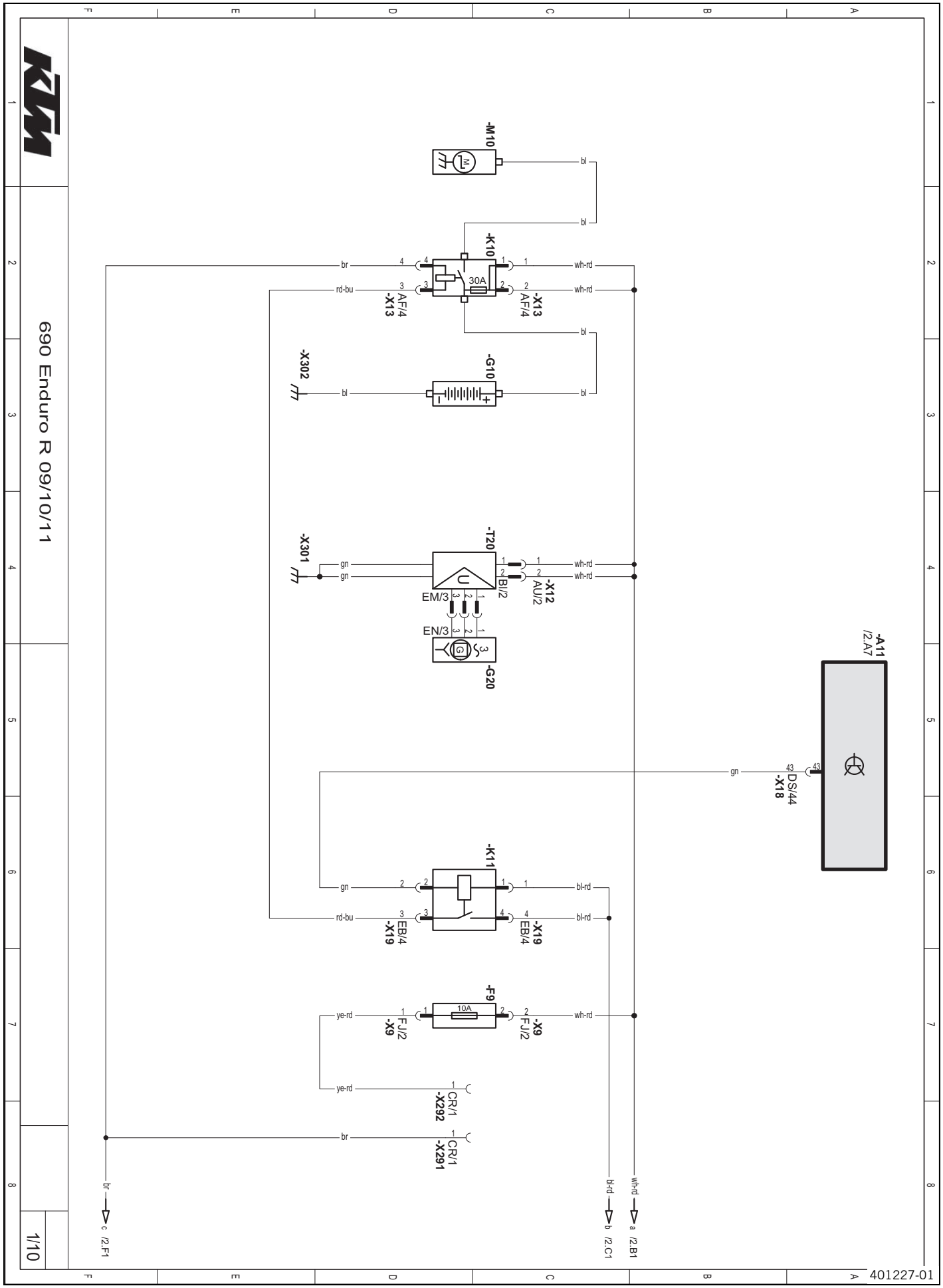

Components:

A11	EFI control unit
F9	Fuse
G10	Battery
G20	Alternator
K10	Starter relay with main fuse
K11	Start auxiliary relay
M10	Starter motor
T20	Voltage regulator
X291	Connector for accessory ground (terminal 31) **ACC 1** (not assigned)
X292	Connector for accessory plus (terminal 30) **ACC 1** (not assigned)

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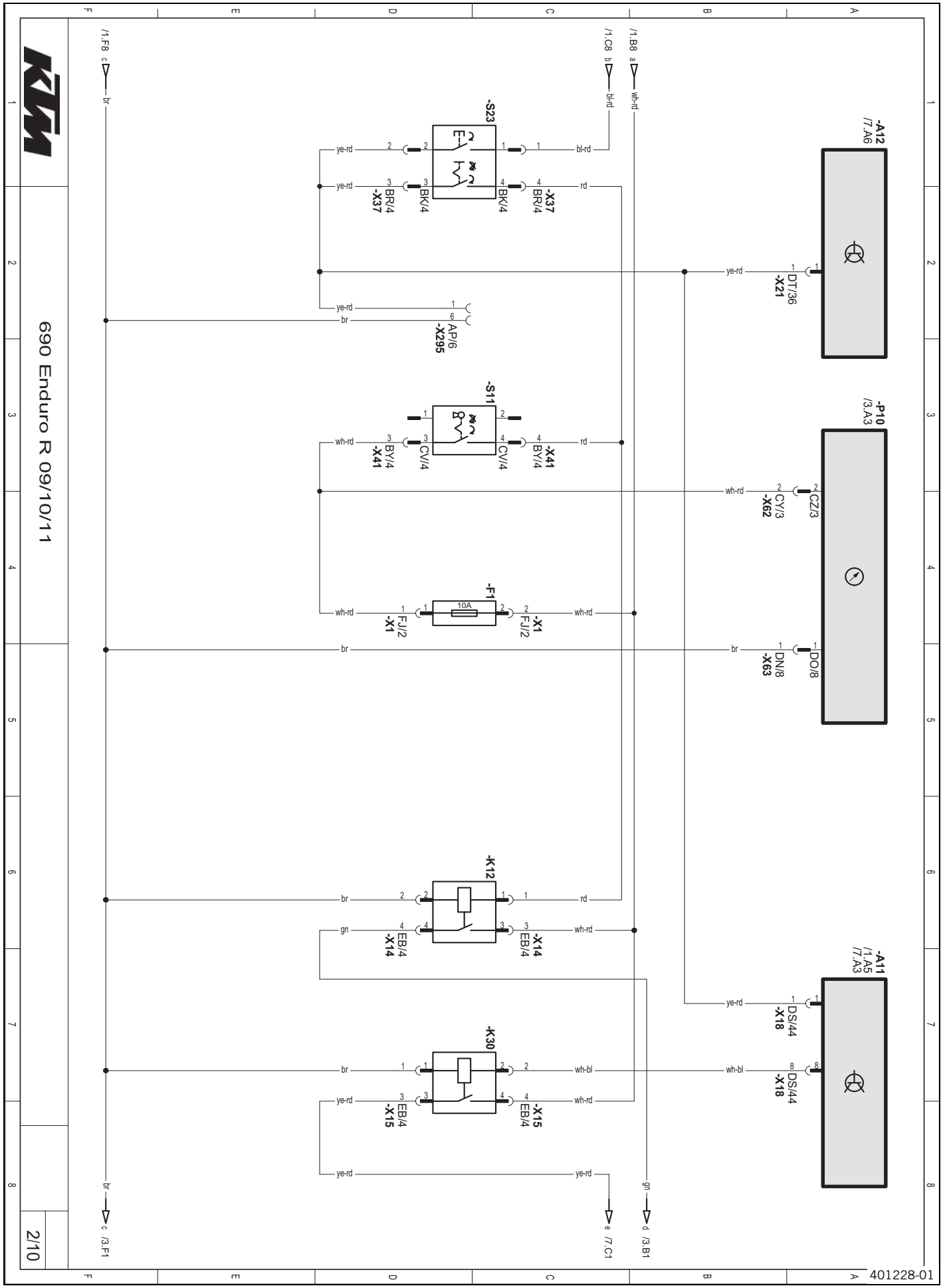
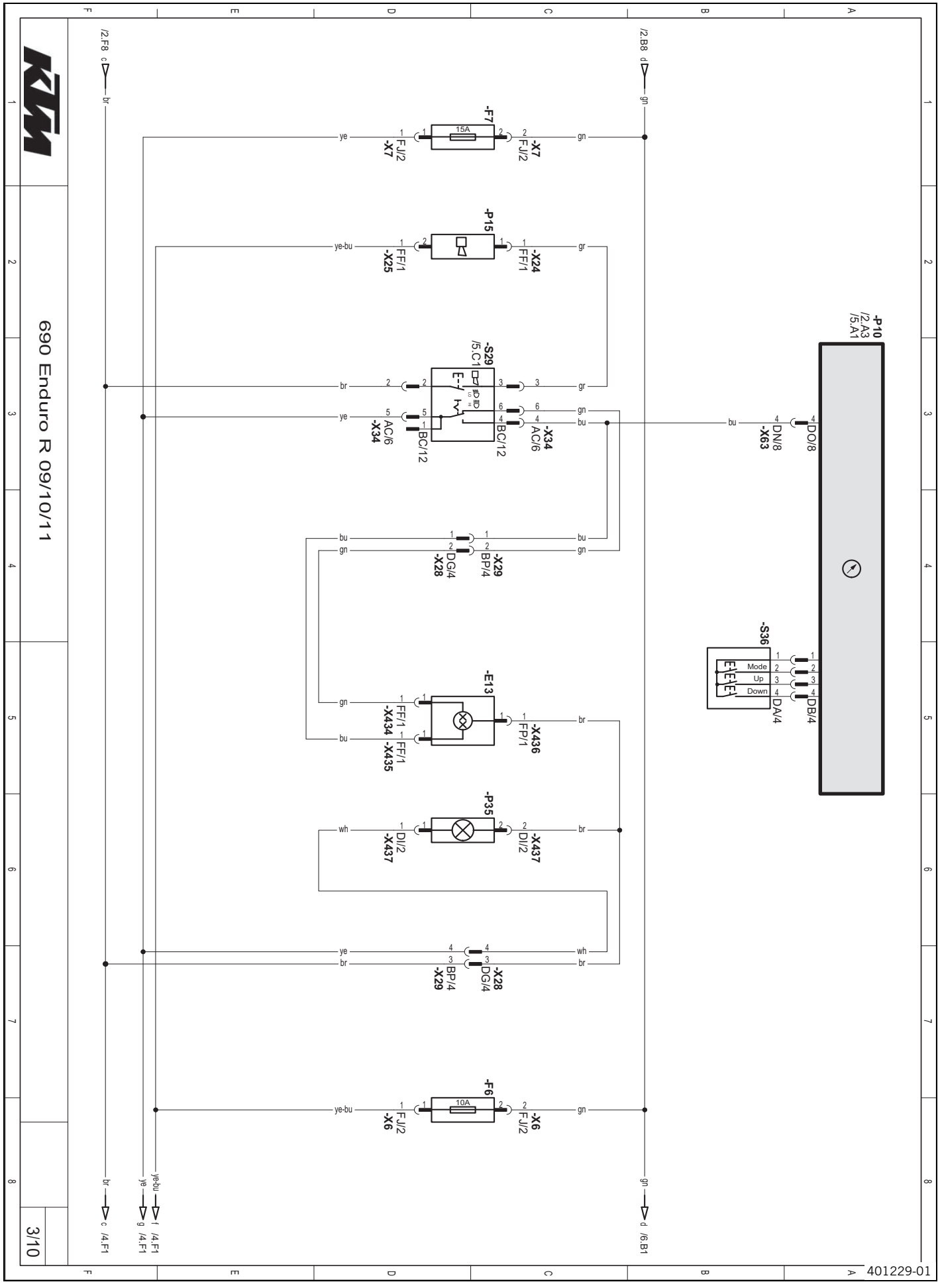


Components:

A11	EFI control unit
A12	EPT control unit
F1	Fuse
K12	Light relay
K30	Power relay
P10	Combination instrument
S11	Ignition/steering lock
S23	Emergency OFF switch, electric starter button
X295	Diagnostics connector

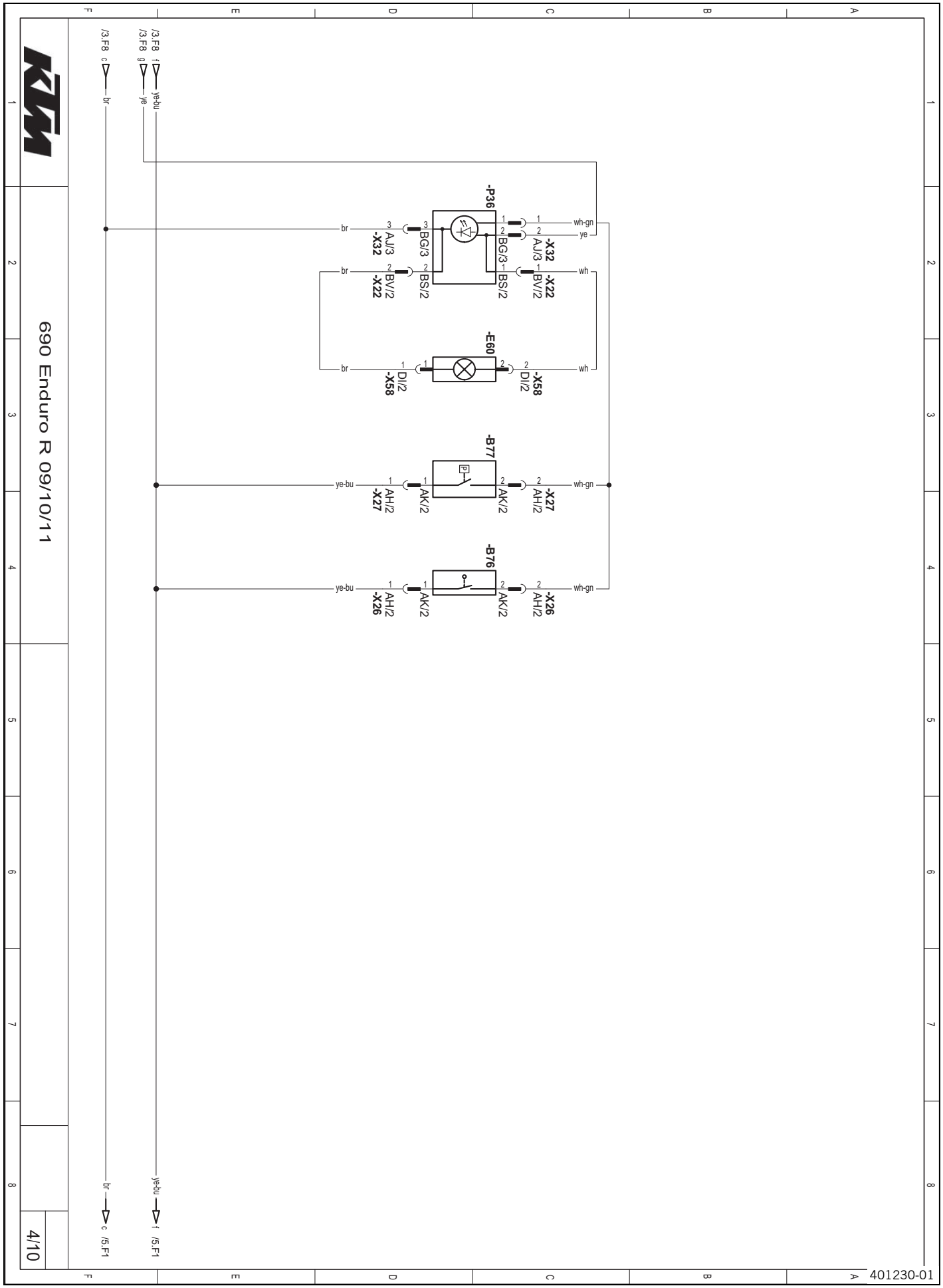
26.3 Page 03 of 10



Components:

E13	Low beam, high beam
F6	Fuse
F7	Fuse
P10	Combination instrument
P15	Horn
P35	Parking light
S29	High beam/low beam switch, horn button, turn signal switch
S36	Tripmaster switch (optional)

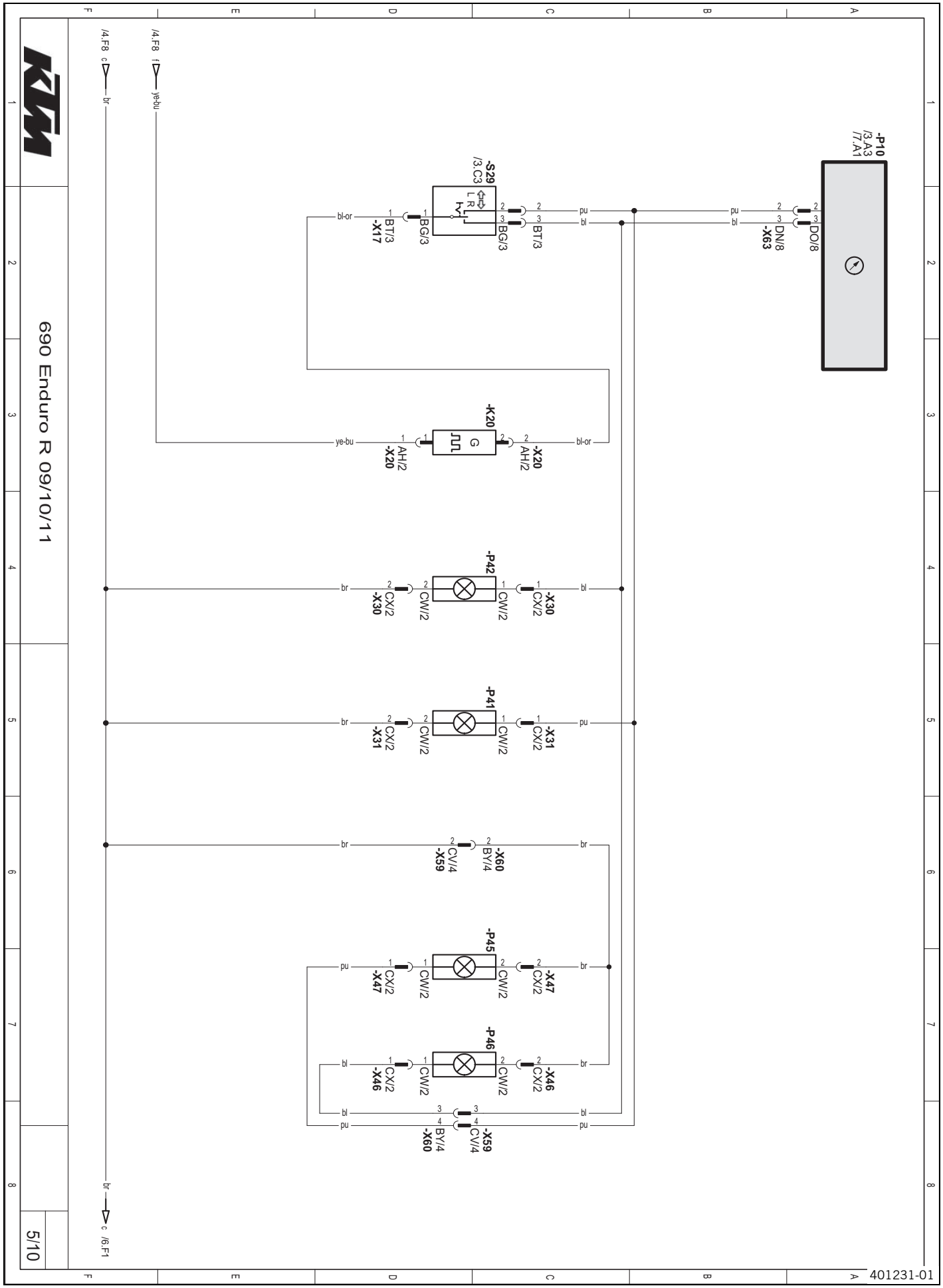
26.4 Page 04 of 10



Components:

B76	Front brake light switch
B77	Brake light switch, rear
E60	License plate lamp
P36	Brake/tail light

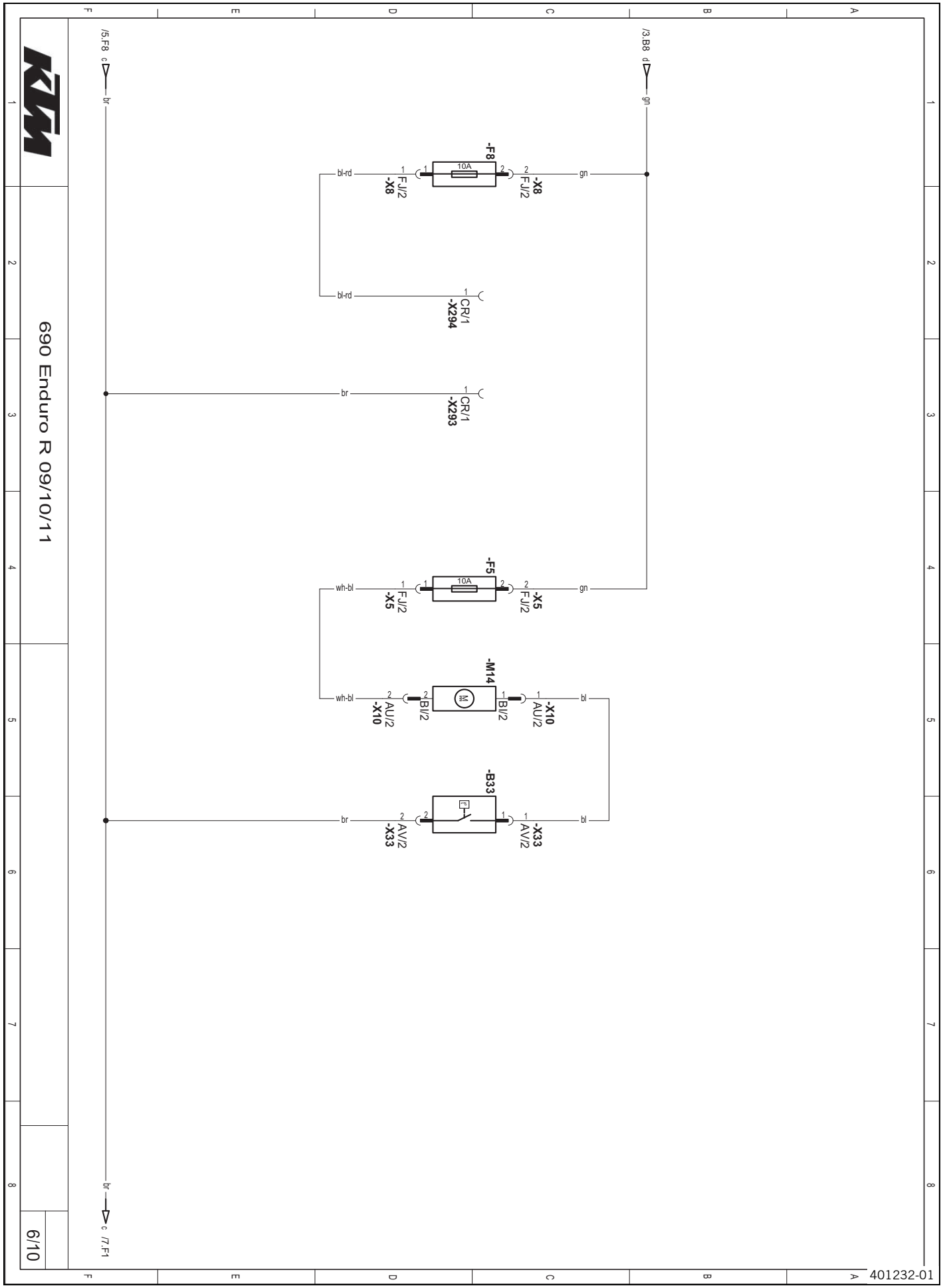
26.5 Page 05 of 10



Components:

K20	Turn signal relay
P10	Combination instrument
P41	Turn signal, front left
P42	Turn signal, front right
P45	Turn signal, rear left
P46	Turn signal, rear right
S29	High beam/low beam switch, horn button, turn signal switch

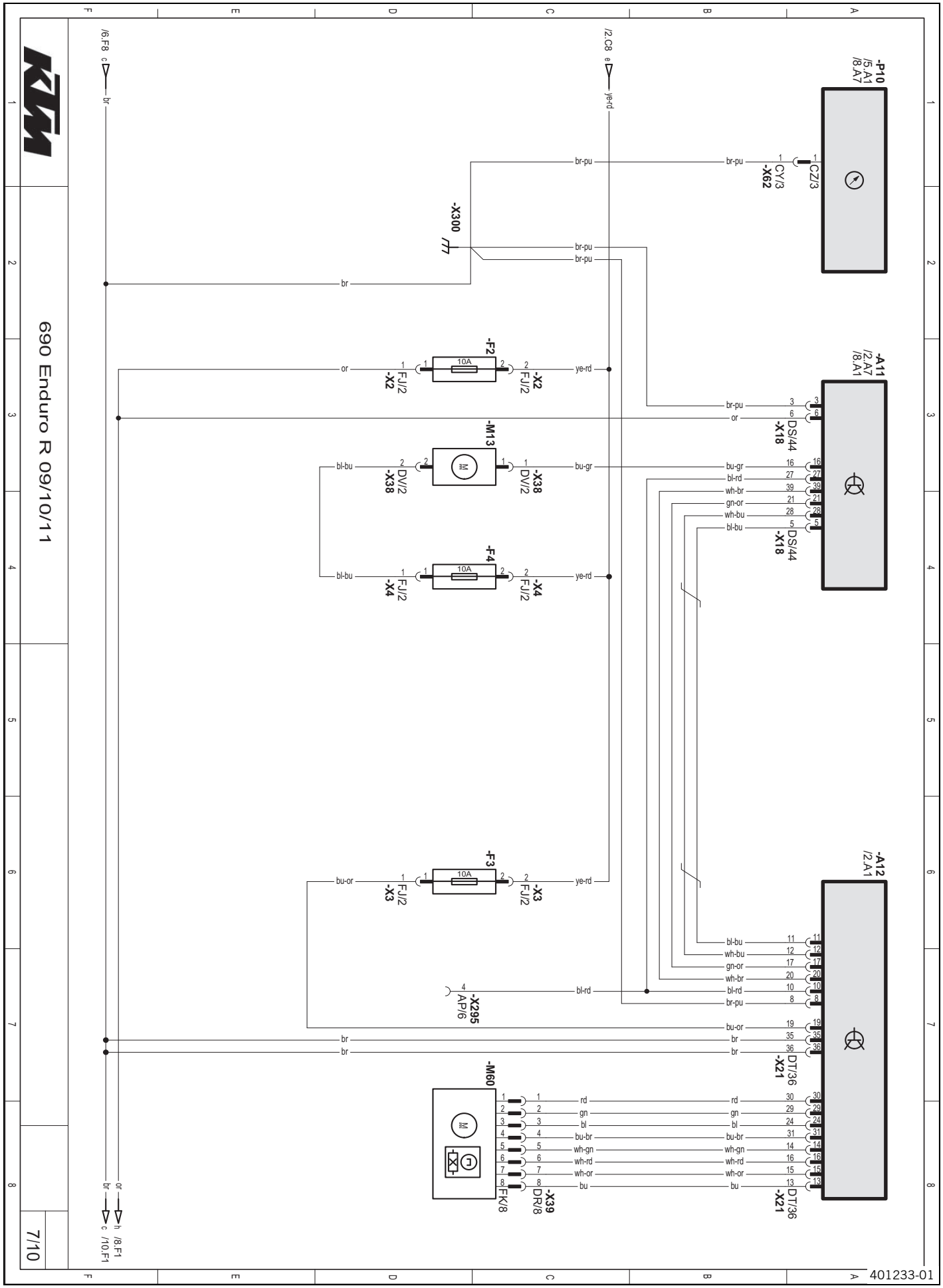
26.6 Page 06 of 10



Components:

B33	Temperature switch for radiator fan
F5	Fuse
F8	Fuse
M14	Radiator fan
X293	Connector for accessory ground (terminal 31) **ACC 2** (not assigned)
X294	Connector for accessory plus (terminal 15) **ACC 2** (not assigned)

26.7 Page 07 of 10



Components:

A11	EFI control unit
A12	EPT control unit
F2	Fuse
F3	Fuse
F4	Fuse
M13	Fuel pump
M60	Motor drive
P10	Combination instrument
X295	Diagnostics connector

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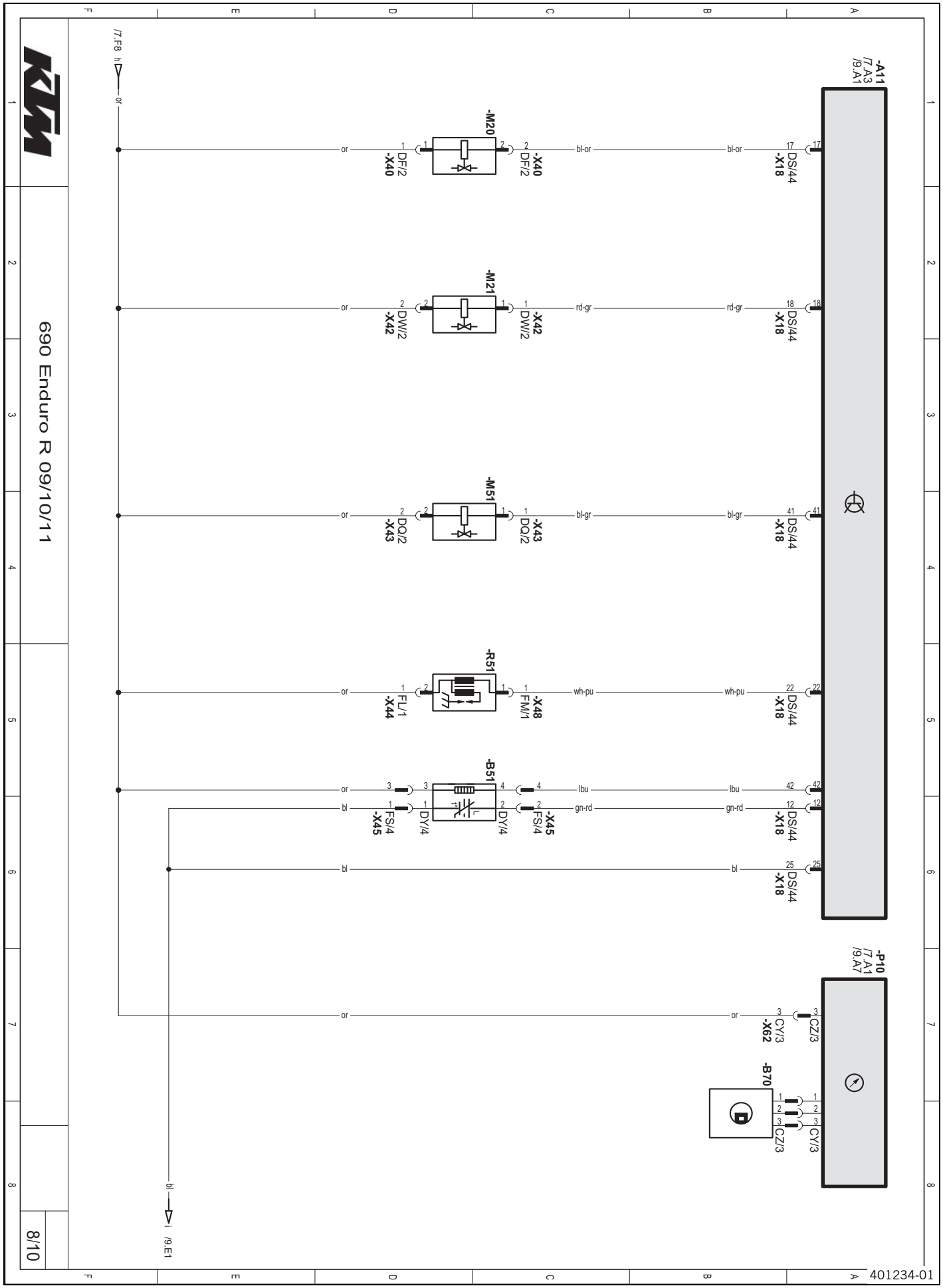

Components:

A11	EFI control unit
B51	Lambda sensor (cylinder 1)
B70	Front wheel speed sensor
M20	Fuel evaporation valve (USA version only)
M21	Secondary air valve
M51	Injector (cylinder 1)
P10	Combination instrument
R51	Ignition coil (cylinder 1)

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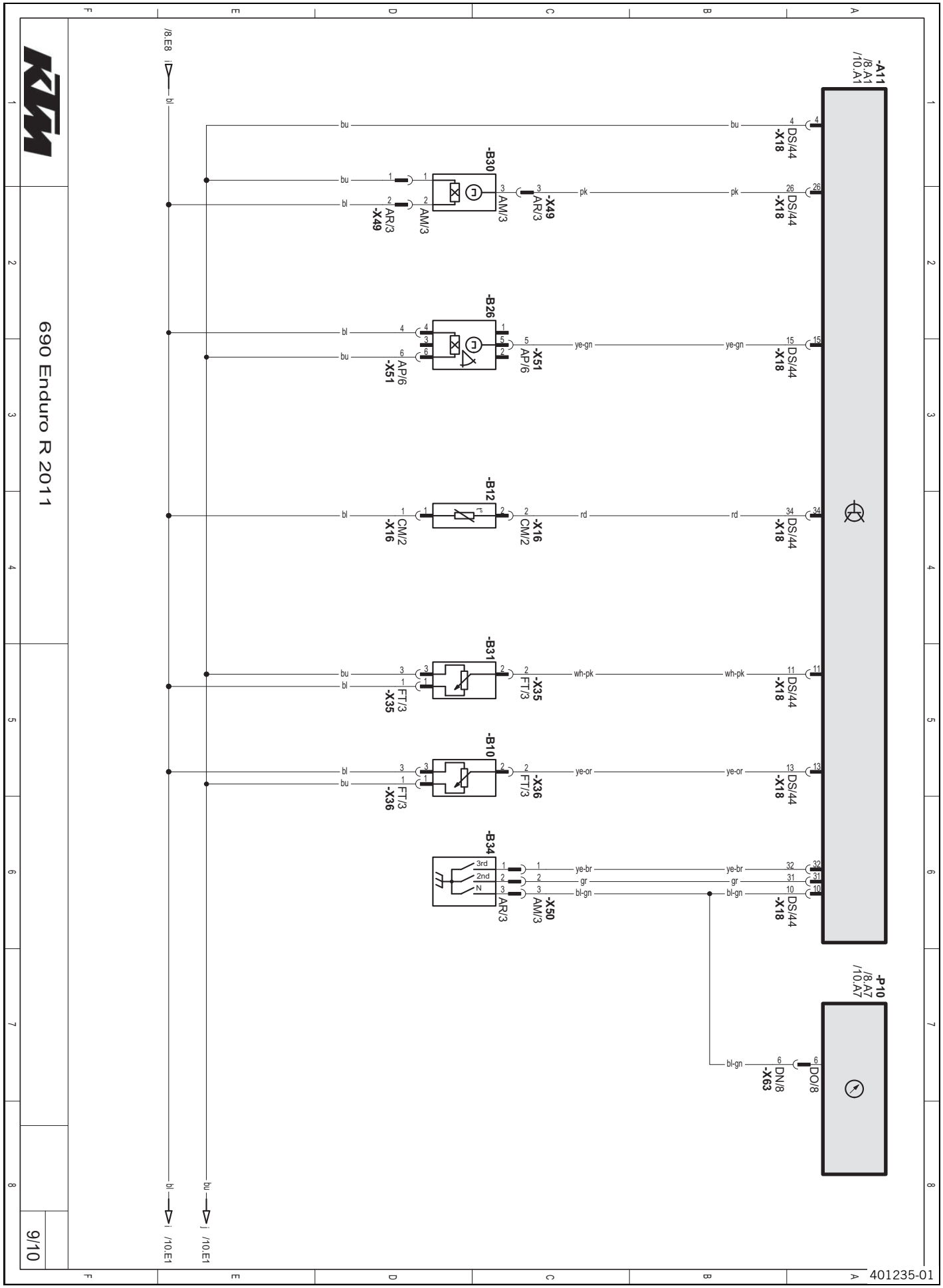

Components:

A11	EFI control unit
B10	Throttle position sensor circuit A
B12	Intake air temperature sensor
B26	Rollover sensor
B30	Side stand switch
B31	Accelerator position sensor
B34	Gear position sensor
P10	Combination instrument

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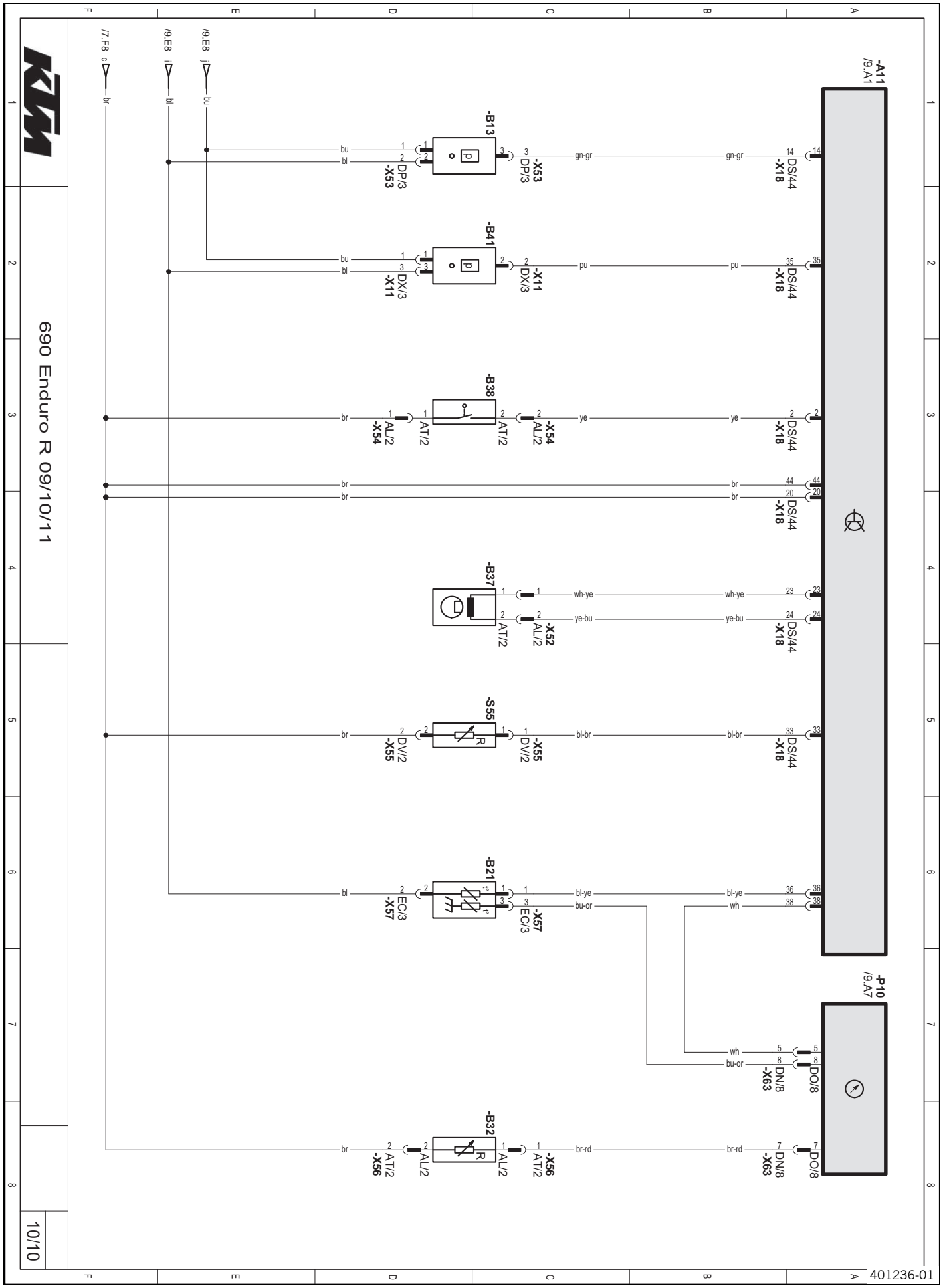


Components:	
A11	EFI control unit
B13	Ambient air pressure sensor
B21	Engine coolant temperature sensor (cylinder 1)
B32	Fuel level indicator
B37	Crankshaft position sensor
B38	Clutch switch
B41	Manifold absolute pressure sensor (cylinder 1)
P10	Combination instrument
S55	**Map-Select** Switch
Cable 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/60) (00062010035)

According to
– JASO T903 MA (☛ p. 228)
– SAE (☛ p. 228) (SAE 10W/60)
– KTM LC4 2007+

Guideline
– Use only engine oils that comply with the specified standards (see specifications on the container) and that possess the corresponding properties. KTM recommends **Motorex®** products.

Synthetic engine oil

Supplier
Motorex®
– **Cross Power 4T**

Engine oil (SAE 10W/50)

According to
– JASO T903 MA (☛ p. 228)
– SAE (☛ p. 228) (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**

Fork oil (SAE 4) (48601166S1)

According to
– SAE (☛ p. 228) (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**

Shock absorber oil (SAE 2.5) (50180342S1)

According to
– SAE (☛ p. 228) (SAE 2.5)

Guideline
– Use only oils that comply with the specified standards (see specifications on the container) and that possess the corresponding properties.

Super unleaded (ROZ 95/RON 95/PON 91)

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**

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-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 (T158)

Guideline
– KTM recommends **Lubcon®** products.

Supplier
Lubcon®
– **Turmogrease® PP 300**

Lubricant (T511)

Guideline
– KTM recommends **Lubcon®** products.

Supplier
Lubcon®
– **Turmsilon® GTI 300 P**

Lubricant (T159)

Guideline
– KTM recommends **Bel-Ray®** products.

Supplier
Bel-Ray®
– **MC-11®**

Lubricant (T625)

Guideline
– KTM recommends **Molykote®** products.

Supplier
Molykote®
– **33 Medium**

Motorcycle cleaner

Guideline
– KTM recommends **Motorex®** products.

Supplier
Motorex®
– **Moto Clean 900**

Off-road chain spray

Guideline
– KTM recommends **Motorex®** products.

Supplier
Motorex®
– **Chainlube Offroad**

Paint cleaner and polish for high-gloss and matte finishes, bare metal and plastic surfaces

Guideline
– KTM recommends **Motorex®** products.

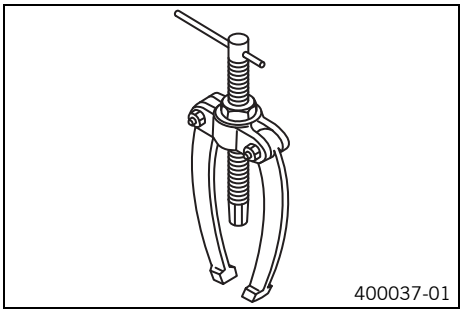
Supplier
Motorex®
– **Clean & Polish**

Universal oil spray

Guideline
– KTM recommends **Motorex®** products.

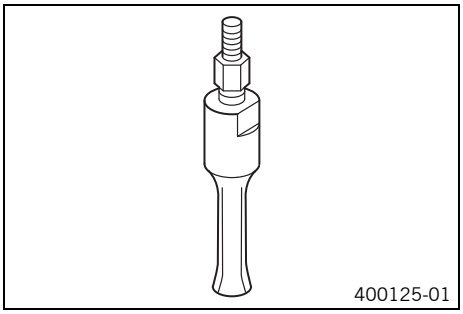
Supplier
Motorex®
– **Joker 440 Synthetic**

Bearing puller



Art. no.: 15112017000

Insert for bearing puller

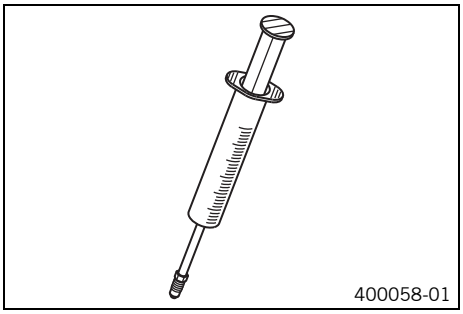


Art. no.: 15112018100

Feature

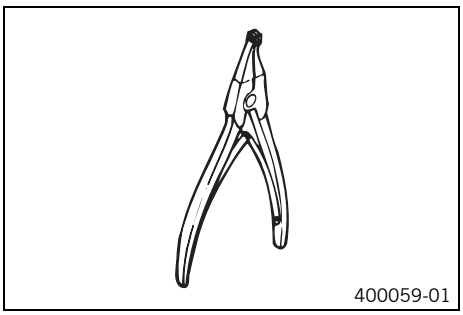
18... 23 mm (0.71... 0.91 in)

Bleed syringe



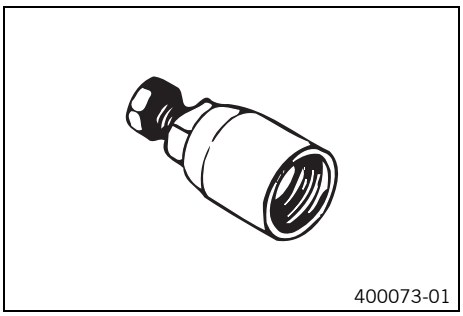
Art. no.: 50329050000

Circlip pliers reverse



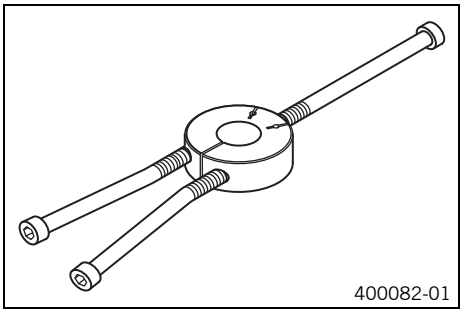
Art. no.: 51012011000

Extractor



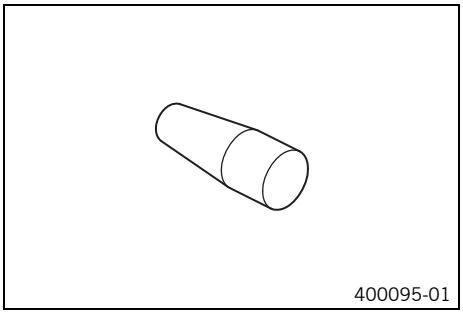
Art. no.: 58429009000

Tool for inner bearing race



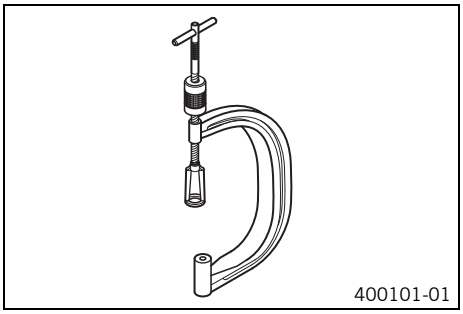
Art. no.: 58429037043

Mounting sleeve



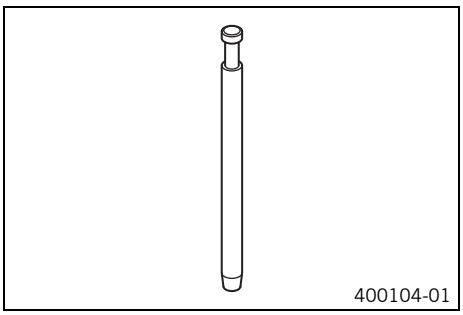
Art. no.: 58529005000

Valve spring compressor



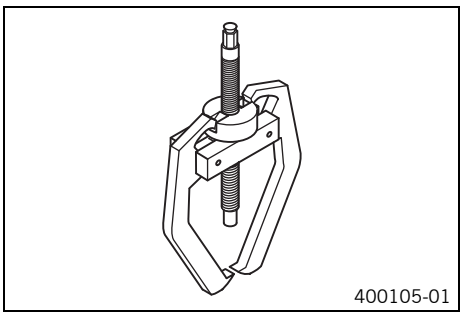
Art. no.: 59029019000

Limit plug gauge



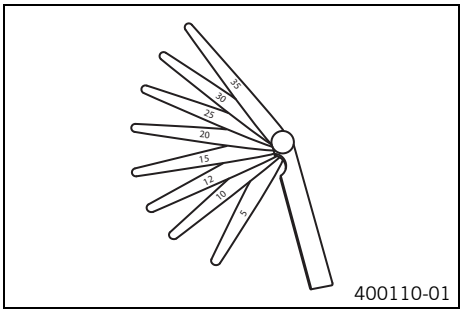
Art. no.: 59029026006

Extractor



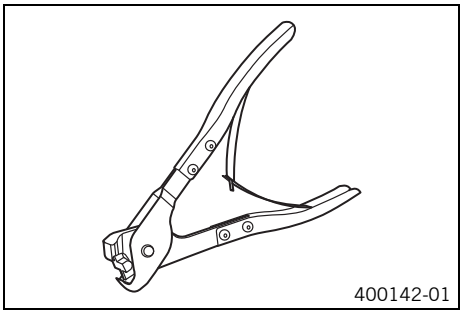
Art. no.: 59029033000

Feeler gauge



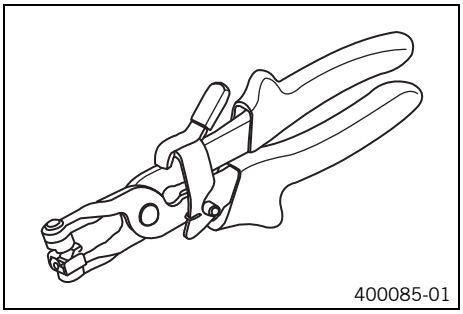
Art. no.: 59029041100

Hose clamp pliers



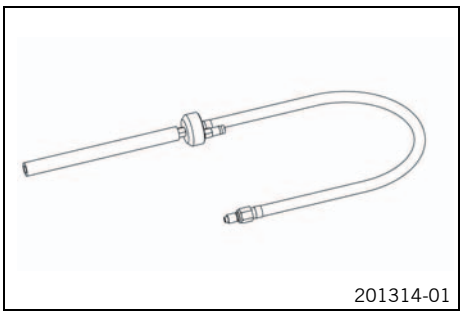
Art. no.: 60029057000

Pliers for spring band clamp



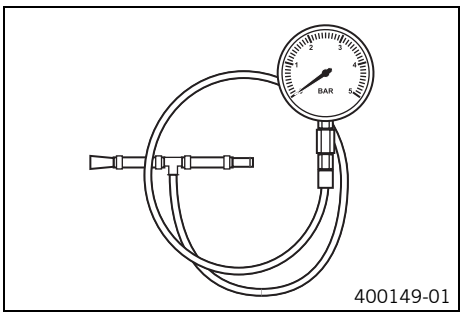
Art. no.: 60029057100

Testing hose



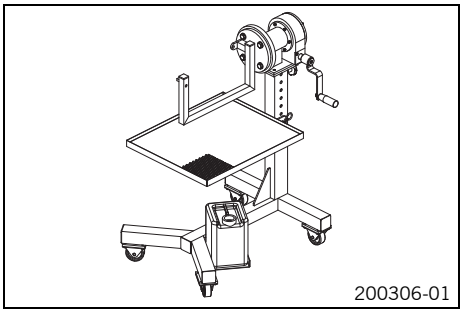
Art. no.: 61029093000

Pressure testing tool



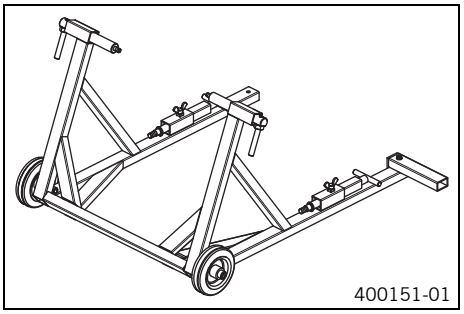
Art. no.: 61029094000

Engine assembly stand



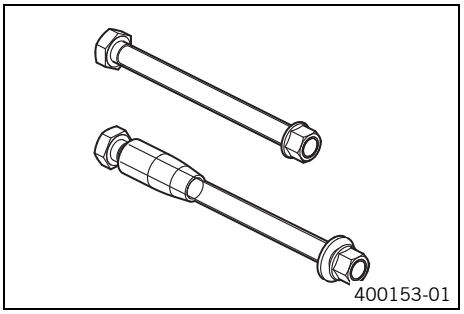
Art. no.: 61229001000

Work stand



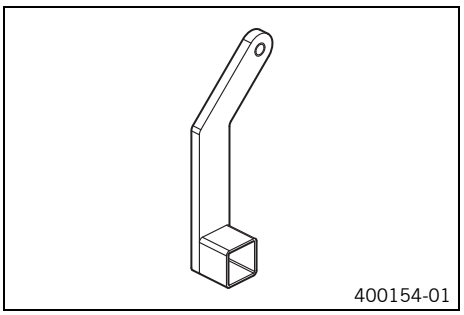
Art. no.: 62529055000

Support for engine assembly stand



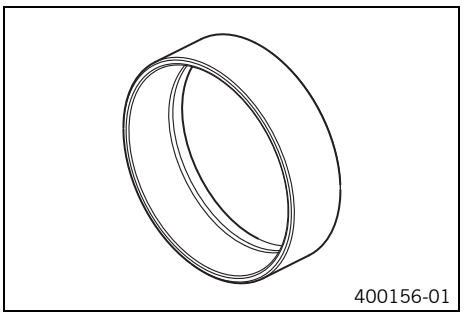
Art. no.: 75012001060

Holder for engine assembly stand



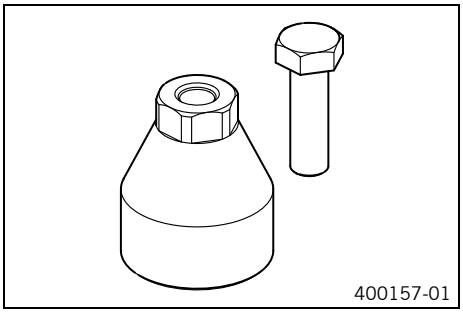
Art. no.: 75012001070

Piston assembly ring



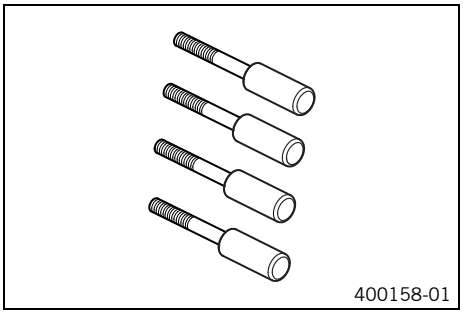
Art. no.: 75029015102

Extractor



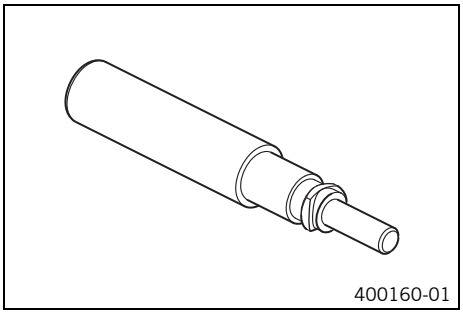
Art. no.: 75029021000

Assembly screws



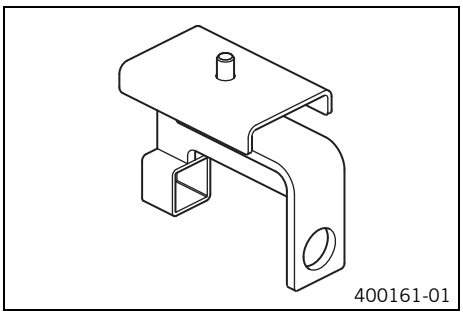
Art. no.: 75029033000

Insertion for piston ring lock



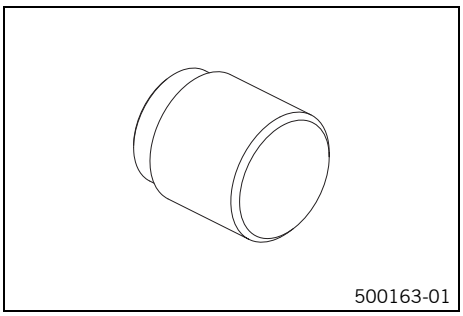
Art. no.: 75029035000

Work stand adapter



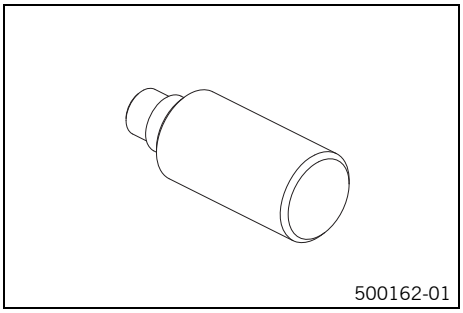
Art. no.: 75029036000

Push-in drift



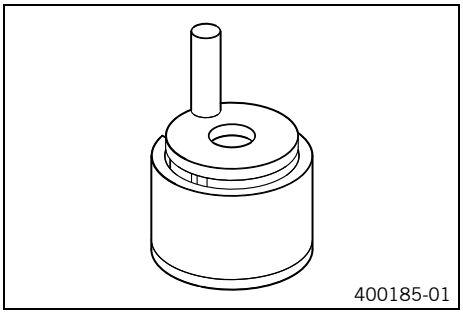
Art. no.: 75029044010

Push-in drift



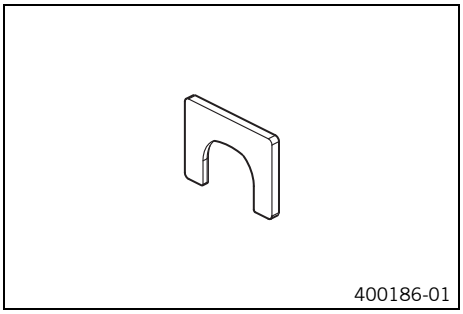
Art. no.: 75029044020

Pressing device for crankshaft, complete



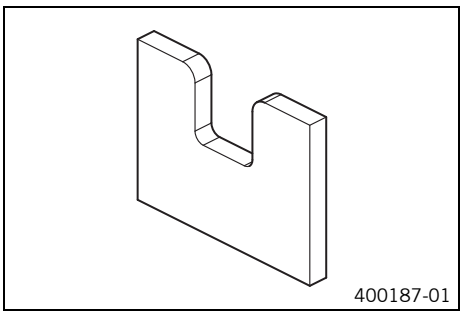
Art. no.: 75029047000

Upper part, pressing-out tool



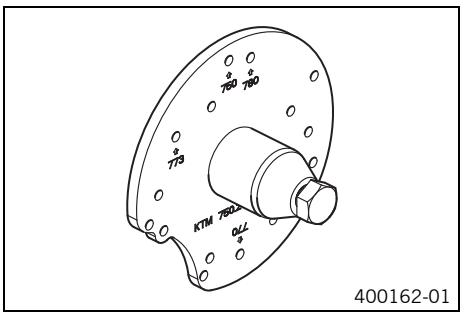
Art. no.: 75029047050

Under part, pressing-out tool



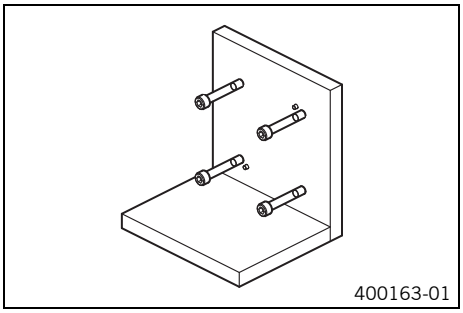
Art. no.: 75029047051

Extractor



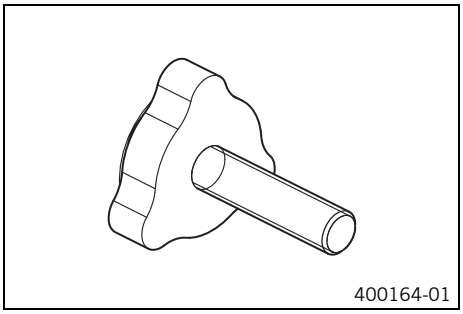
Art. no.: 75029048000

Clamping plate



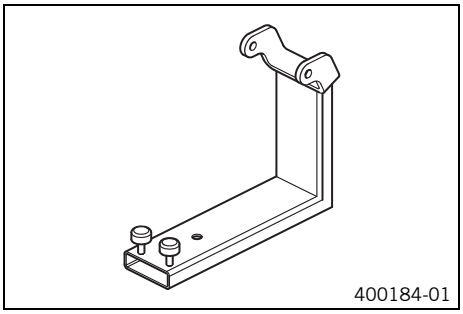
Art. no.: 75029050000

Push-out drift



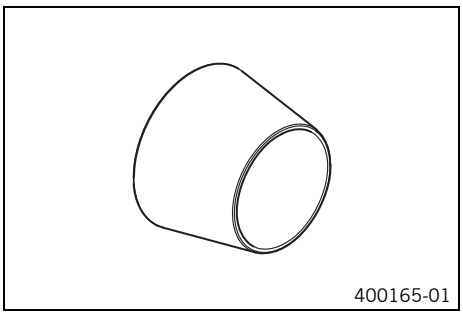
Art. no.: 75029051000

Floor jack attachment



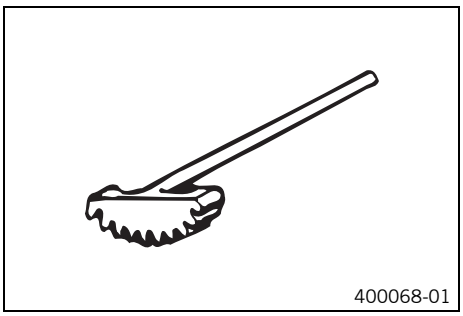
Art. no.: 75029055000

Mounting sleeve



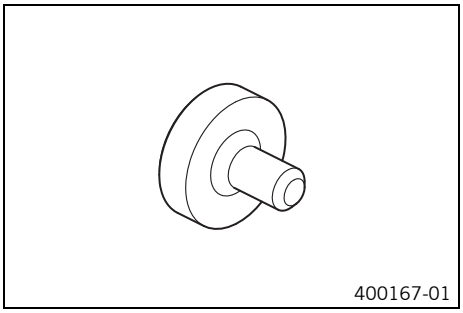
Art. no.: 75029080000

Gear segment



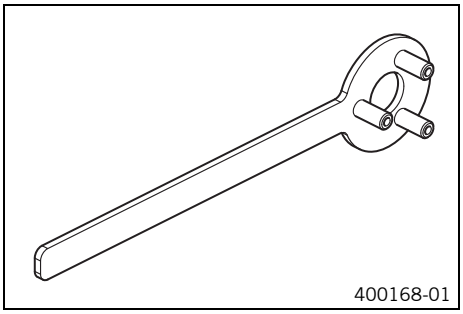
Art. no.: 75029081000

Protection cover



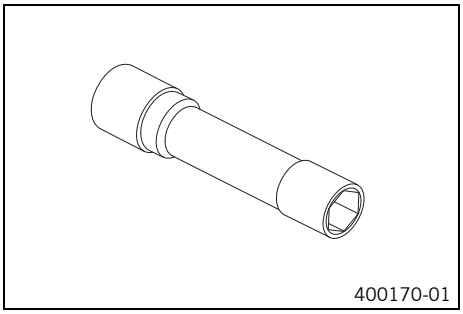
Art. no.: 75029090000

Holding spanner



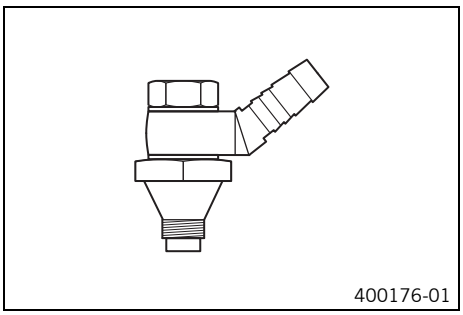
Art. no.: 75029091000

Spark plug wrench



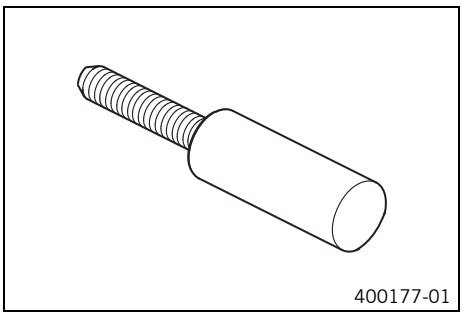
Art. no.: 75029172000

Oil pressure adapter



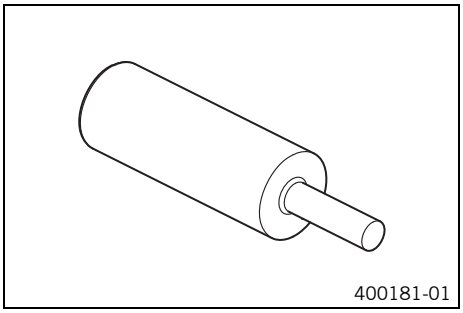
Art. no.: 77329006000

Engine blocking screw



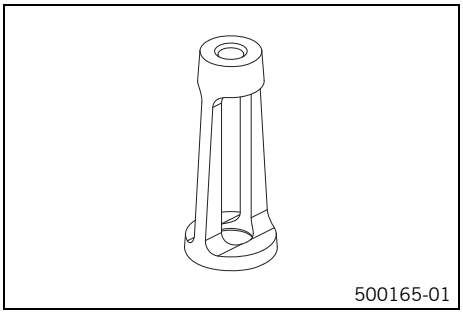
Art. no.: 77329010000

Release device for timing chain tensioner



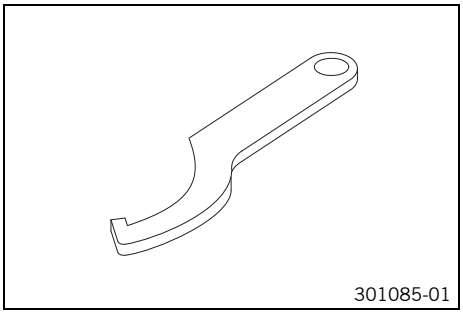
Art. no.: 77329051000

Valve spring mounting device



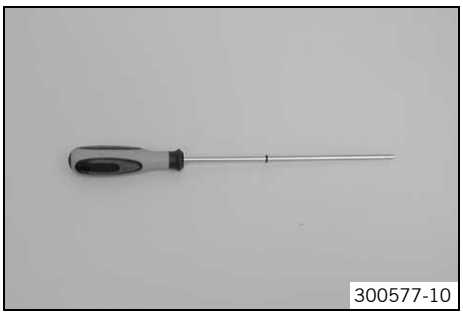
Art. no.: 78029060000

Hook wrench



Art. no.: T106S

Depth micrometer



Art. no.: T107S

Pin

Art. no.: T120

Pressing tool

Art. no.: T1206

Pressing tool

Art. no.: T1207S

Vacuum pump

Art. no.: T1240S

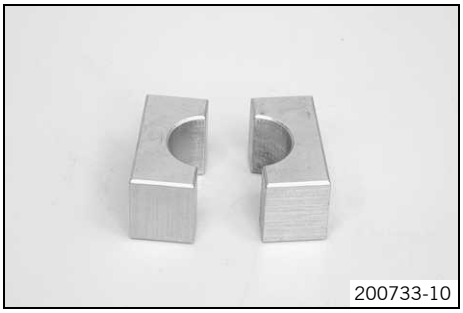
Pressing tool

Art. no.: T129

Protecting sleeve

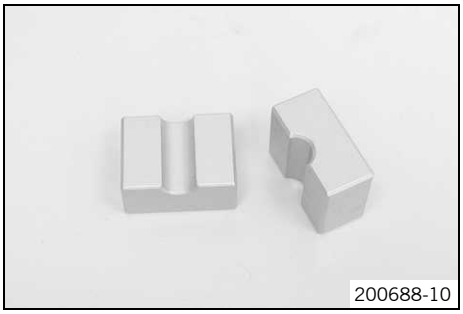
Art. no.: T1401

Clamping stand



Art. no.: T14015S

Clamping stand

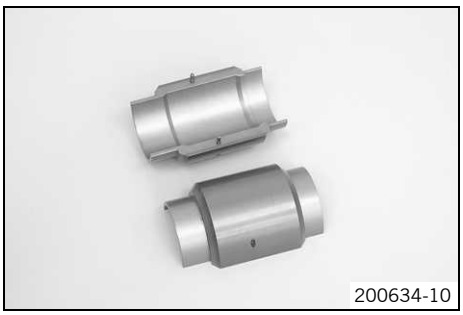


Art. no.: T14016S

Gripping tool

Art. no.: T14026S1

Assembly tool



Art. no.: T1402S

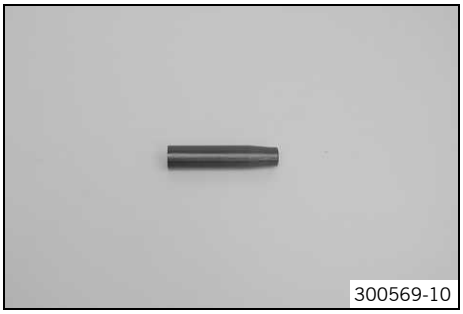
Open-end wrench

Art. no.: T14032

Clamping stand

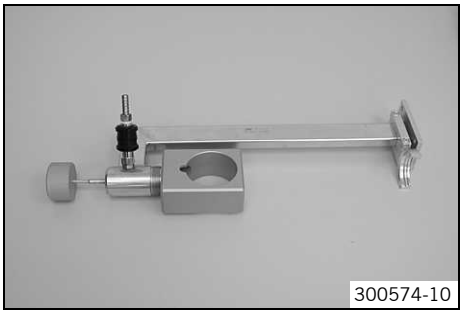
Art. no.: T1403S

Mounting sleeve



Art. no.: T1515

Nitrogen filling tool



Art. no.: T170S1

JASO T903 MA

Different technical development directions required a new specification for 4-stroke motorcycles – the JASO T903 MA Standard. Earlier, engine oils from the automobile industry were used for 4-stroke motorcycles because there was no separate motorcycle specification. Whereas long service intervals are demanded for automobile engines, high performance at high engine speeds are in the foreground for motorcycle engines. In most motorcycles, the gearbox and the clutch are lubricated with the same oil as the engine. The JASO MA Standard meets these special requirements.

SAE

The SAE viscosity classes were defined by the Society of Automotive Engineers and are used for classifying oils according to their viscosity. The viscosity describes only one property of oil and says nothing about quality.

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