

1090 Adventure R

Art. no. 3206327en



KTM

Read this repair manual carefully and thoroughly before beginning work.

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

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

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5230 Mattighofen, Austria

This document is valid for the following models:

1090 Adventure R EU (F9903RD)

1090 Adventure R CN (F9987RD)

1090 Adventure R US (F9975RD)



TABLE OF CONTENTS

1	MEANS OF REPRESENTATION	8	6.6	Removing the fork legs	21
1.1	Symbols used	8	6.7	Installing the fork legs	22
1.2	Formats used	8	6.8	Performing a fork service	23
2	SAFETY ADVICE	9	6.9	Disassembling the fork legs	23
2.1	Repair Manual	9	6.10	Checking the fork legs	26
2.2	Safety advice	9	6.11	Assembling the fork legs	28
2.3	Degrees of risk and symbols	9	6.12	Checking steering head bearing play	33
2.4	Work rules	9	6.13	Adjusting steering head bearing play	33
3	IMPORTANT NOTES	10	6.14	Lubricating the steering head bearing	34
3.1	Manufacturer warranty	10	6.15	Removing the lower triple clamp	34
3.2	Fuel, auxiliary substances	10	6.16	Installing the lower triple clamp	36
3.3	Spare parts, accessories	10	6.17	Changing the steering head bearing ...	38
3.4	Figures	10	7	HANDLEBAR, CONTROLS	40
4	SERIAL NUMBERS	11	7.1	Adjusting the basic position of the clutch lever	40
4.1	Vehicle identification number	11	7.2	Adjusting the handlebar position	40
4.2	Type label	11	7.3	Changing the throttle grip	41
4.3	Key number	12	8	FRAME	45
4.4	Engine number	12	8.1	Rider footrests	45
4.5	Fork part number	12	8.2	Adjusting the footrests	45
4.6	Shock absorber article number	12	8.3	Removing the engine guard	46
5	MOTORCYCLE	13	8.4	Installing the engine guard	47
5.1	Lifting the motorcycle with the front lifting gear	13	8.5	Checking the frame	47
5.2	Taking the motorcycle off the front lifting gear	13	9	SHOCK ABSORBER, LINK FORK	48
5.3	Raising the motorcycle with the rear lifting gear	14	9.1	Adjusting the low-speed compression damping of the shock absorber	48
5.4	Removing the rear of the motorcycle from the lifting gear	14	9.2	Adjusting the high-speed compression damping of the shock absorber	48
5.5	Raising the motorcycle with the work stand	14	9.3	Adjusting the rebound damping of the shock absorber	49
5.6	Removing the motorcycle from the work stand	15	9.4	Checking the static sag of the shock absorber	50
5.7	Raising the motorcycle with the work stand (inserted)	15	9.5	Measuring the rear wheel dimension unloaded	50
5.8	Removing the motorcycle from the work stand (inserted)	16	9.6	Adjusting the spring pretension of the shock absorber	50
5.9	Starting the vehicle	17	9.7	Checking the heim joint for play	51
5.10	Starting the motorcycle to check the function	18	9.8	Removing the shock absorber	51
6	FORK, TRIPLE CLAMP	19	9.9	Installing the shock absorber	52
6.1	Adjusting the compression damping of the fork	19	9.10	Changing the heim joint	54
6.2	Adjusting the rebound damping of the fork	19	9.11	Servicing the shock absorber	56
6.3	Adjusting the spring pretension of the fork	20	9.12	Removing the spring	57
6.4	Bleeding the fork legs	20	9.13	Disassembling the damper	58
6.5	Cleaning the dust boots of the fork legs	21	9.14	Disassembling the piston rod	59
			9.15	Checking the damper	61
			9.16	Removing the heim joint	62
			9.17	Installing the heim joint	63

9.18	Assembling the piston rod.....	63	14.2	Checking the tire condition	118
9.19	Assembling the damper	65	14.3	Checking the rim run-out	119
9.20	Bleeding and filling the damper	68	14.4	Checking the wheel bearing for play	120
9.21	Filling the damper with nitrogen	71	14.5	Checking spoke tension	121
9.22	Installing the spring	72	14.6	Front wheel	121
9.23	Checking the link fork	73	14.6.1	Removing the front wheel	121
9.24	Checking the fork bearing for play	73	14.6.2	Installing the front wheel	122
9.25	Removing the link fork.....	74	14.6.3	Removing the front wheel (work stand).....	124
9.26	Installing the link fork	76	14.6.4	Installing the front wheel (work stand).....	125
9.27	Changing the fork bearing.....	78	14.6.5	Changing the front wheel bearing	127
10	EXHAUST SYSTEM	82	14.6.6	Changing the front tubeless sealing profile.....	129
10.1	Removing the main silencer	82	14.6.7	Checking the brake discs.....	131
10.2	Installing the main silencer.....	82	14.6.8	Changing the front brake discs....	132
10.3	Removing the manifold.....	83	14.7	Rear wheel	133
10.4	Installing the manifold	85	14.7.1	Removing the rear wheel	133
11	AIR FILTER	88	14.7.2	Installing the rear wheel	134
11.1	Removing the upper part of the air filter box	88	14.7.3	Removing the rear wheel (work stand).....	135
11.2	Changing the air filter, cleaning the air filter box.....	88	14.7.4	Installing the rear wheel (work stand).....	136
11.3	Installing the upper part of the air filter box	90	14.7.5	Changing the rear wheel bearing	138
11.4	Removing the air filter box	91	14.7.6	Changing the rear tubeless sealing profile.....	140
11.5	Installing the lower part of the air filter box	93	14.7.7	Changing the rear brake disc.....	143
12	FUEL TANK, SEAT, TRIM	96	14.7.8	Checking the chain tension.....	143
12.1	Removing the seat	96	14.7.9	Adjusting the chain tension	144
12.2	Mounting the seat	96	14.7.10	Checking the chain, rear sprocket, and engine sprocket....	145
12.3	Removing the fuel tank.....	96	14.7.11	Cleaning the chain	147
12.4	Installing the fuel tank	98	14.7.12	Checking the rear hub damping rubber pieces	147
12.5	Checking the fuel pressure.....	100	14.7.13	Changing all the damping rubber pieces of the rear hub	148
12.6	Changing the fuel pump	102	14.7.14	Changing the bearing of the rear sprocket carrier.....	149
12.7	Changing the fuel filter.....	104	14.7.15	Opening the chain	150
13	MASK, FENDER, DECAL.....	110	14.7.16	Riveting the chain.....	150
13.1	Removing the front side cover	110	14.7.17	Changing the drivetrain kit.....	151
13.2	Installing the front side cover	110	15	WIRING HARNESS, BATTERY.....	157
13.3	Removing the fuel tank cover	111	15.1	Removing the 12-V battery.....	157
13.4	Installing the fuel tank cover	112	15.2	Installing the 12-V battery	158
13.5	Removing the mask spoiler	113	15.3	Disconnecting the negative cable of the 12-V battery.....	159
13.6	Installing the mask spoiler	114	15.4	Connecting the negative cable of the 12-V battery.....	160
13.7	Removing the bottom triple clamp cover	115	15.5	Charging the 12-V battery	161
13.8	Installing the bottom triple clamp cover	116	15.6	Changing the main fuse.....	162
13.9	Removing front fender	116	15.7	Changing the fuses in the fuse box.....	163
13.10	Installing front fender.....	117			
13.11	Removing the windshield	117			
13.12	Installing the windshield.....	117			
14	WHEELS	118			
14.1	Checking tire pressure	118			

TABLE OF CONTENTS

15.8	Checking the charging voltage.....	165	18.7.6	Setting the engine to ignition top dead center of the rear cylinder	212
15.9	Checking the open-circuit current....	165	18.7.7	Removing the starter motor.....	212
16	BRAKE SYSTEM	167	18.7.8	Removing the oil filler tube.....	213
16.1	Checking the front brake linings	167	18.7.9	Removing the heat exchanger.....	213
16.2	Changing the front brake linings.....	167	18.7.10	Removing the rear timing chain tensioner.....	213
16.3	Checking the front brake fluid level	169	18.7.11	Removing the rear camshafts	214
16.4	Adding front brake fluid.....	170	18.7.12	Removing the rear cylinder head.....	214
16.5	Changing the front brake fluid.....	171	18.7.13	Removing the rear piston.....	215
16.6	Adjusting the basic position of the hand brake lever	173	18.7.14	Setting the engine to ignition top dead center of the front cylinder	215
16.7	Checking the rear brake linings	173	18.7.15	Removing the front timing chain tensioner.....	216
16.8	Changing the rear brake linings	173	18.7.16	Removing the front camshafts.....	216
16.9	Adjusting the basic position of the foot brake lever.....	175	18.7.17	Removing the front cylinder head.....	217
16.10	Checking the rear brake fluid level	176	18.7.18	Removing the front piston.....	217
16.11	Adding rear brake fluid.....	176	18.7.19	Removing the alternator cover	218
16.12	Changing the rear brake fluid	177	18.7.20	Removing the crankshaft speed sensor.....	218
17	LIGHTING SYSTEM, INSTRUMENTS	180	18.7.21	Removing the torque limiter and the intermediate gear	218
17.1	Removing the headlight mask with the headlight.....	180	18.7.22	Removing the rotor.....	219
17.2	Installing the headlight mask with the headlight	180	18.7.23	Removing the intermediate gear and the timing chain on the left.....	219
17.3	Changing the low beam bulb	181	18.7.24	Removing the oil filter.....	220
17.4	Changing the high beam bulb.....	182	18.7.25	Removing the balancer shaft.....	220
17.5	Changing the turn signal bulb	183	18.7.26	Removing the drive gear wheel of the balancer shaft	221
17.6	Checking the headlight setting	183	18.7.27	Removing the gear position sensor.....	221
17.7	Adjusting the headlight range.....	184	18.7.28	Removing the left suction pump	221
17.8	Activating/deactivating the ignition key	184	18.7.29	Removing the water pump impeller	222
17.9	Resetting the service display using the KTM diagnostic tool.....	187	18.7.30	Removing the clutch cover.....	223
18	ENGINE	188	18.7.31	Removing the clutch discs.....	223
18.1	Removing the engine.....	188	18.7.32	Removing the clutch basket.....	224
18.2	Installing the engine.....	197	18.7.33	Removing the intermediate gear and the timing chain on the right	224
18.3	Preparing the engine for installation	208	18.7.34	Removing the primary gear wheel	225
18.4	Preparing the engine for clamping in the engine assembly stand	208	18.7.35	Removing the force pump.....	225
18.5	Setting the engine to ignition top dead center of the rear cylinder.....	209	18.7.36	Removing the shift shaft.....	226
18.6	Setting the engine to ignition top dead center of the front cylinder.....	209	18.7.37	Removing the shift drum locating	226
18.7	Engine disassembly.....	210	18.7.38	Removing the locking lever	227
18.7.1	Clamping the engine into the engine assembly stand	210	18.7.39	Removing the left engine case.....	227
18.7.2	Removing the engine bearer.....	210	18.7.40	Removing the crankshaft	228
18.7.3	Draining the engine oil	211			
18.7.4	Removing the front valve cover....	211			
18.7.5	Removing the rear valve cover	211			

18.7.41	Removing the middle suction pump	228	18.8.30	Assembling the countershaft.....	262
18.7.42	Removing the transmission shaft.....	228	18.8.31	Measuring the main shaft axial play.....	263
18.7.43	Removing the oil spray tube.....	229	18.8.32	Checking electric starter operation	264
18.7.44	Removing the timing chain rails of the right engine case section...	230	18.8.33	Checking the free-wheel	265
18.7.45	Removing the timing chain rails of the left engine case section.....	230	18.9	Engine assembly.....	265
18.8	Working on individual parts.....	230	18.9.1	Installing the timing chain rails of the left engine case section.....	265
18.8.1	Working on the right section of the engine case	230	18.9.2	Installing the timing chain rails of the right engine case section...	265
18.8.2	Removing the right main bearing	232	18.9.3	Installing the oil spray tube.....	266
18.8.3	Selecting the main bearing shells	233	18.9.4	Installing the transmission shaft.....	266
18.8.4	Installing the right main bearing	233	18.9.5	Installing middle suction pump...	267
18.8.5	Working on the left section of the engine case	234	18.9.6	Installing the crankshaft.....	268
18.8.6	Removing the left main bearing	237	18.9.7	Installing the left engine case	268
18.8.7	Installing the left main bearing ...	237	18.9.8	Installing the locking lever.....	270
18.8.8	Changing the conrod bearing.....	238	18.9.9	Installing the shift drum locating	270
18.8.9	Working on the clutch cover.....	240	18.9.10	Installing the shift shaft	270
18.8.10	Changing the support bearing of the crankshaft	241	18.9.11	Installing the force pump.....	270
18.8.11	Checking the radial clearance of the bottom connecting rod bearing	242	18.9.12	Installing the left suction pump	271
18.8.12	Checking/measuring the cylinder	243	18.9.13	Setting the engine to ignition top dead center of the rear cylinder	272
18.8.13	Checking/measuring the piston....	243	18.9.14	Installing the primary gear wheel	272
18.8.14	Checking the piston ring end gap.....	245	18.9.15	Installing the intermediate gear and the timing chain on the right	273
18.8.15	Checking the piston/cylinder mounting clearance.....	245	18.9.16	Installing the clutch basket.....	273
18.8.16	Working on the cylinder head	246	18.9.17	Installing the clutch discs.....	274
18.8.17	Checking the cylinder head.....	250	18.9.18	Installing the clutch cover	275
18.8.18	Working on the right intermediate gear.....	251	18.9.19	Installing the water pump wheel	276
18.8.19	Checking the timing assembly....	252	18.9.20	Installing the gear position sensor.....	276
18.8.20	Preparing the timing chain tensioner for installation	253	18.9.21	Installing the drive gear wheel of the balancer shaft.....	276
18.8.21	Checking the oil pressure control valve.....	253	18.9.22	Installing the balancer shaft.....	277
18.8.22	Checking the lubrication system	254	18.9.23	Installing the intermediate gear and the timing chain on the left	277
18.8.23	Checking the clutch	255	18.9.24	Installing the oil filter.....	278
18.8.24	Checking the shift mechanism	257	18.9.25	Installing the rotor	278
18.8.25	Preassembling the shift shaft.....	258	18.9.26	Installing the torque limiter and the intermediate gear	279
18.8.26	Disassembling the main shaft	258	18.9.27	Installing the crankshaft speed sensor.....	279
18.8.27	Disassembling the countershaft.....	259	18.9.28	Installing the alternator cover.....	279
18.8.28	Checking the transmission	260	18.9.29	Installing the rear piston.....	280
18.8.29	Assembling the main shaft.....	261	18.9.30	Installing rear cylinder head.....	282
			18.9.31	Installing the rear camshafts.....	282

TABLE OF CONTENTS

18.9.32	Installing the rear timing chain tensioner.....	283	22.5	Change the coolant	311
18.9.33	Setting the engine to ignition top dead center of the front cylinder	283	22.6	Correcting the coolant level in the compensating tank.....	314
18.9.34	Installing the front piston	284	23	CYLINDER HEAD	316
18.9.35	Installing the front cylinder head.....	286	23.1	Checking the valve clearance	316
18.9.36	Installing the front camshafts.....	286	23.2	Checking the valve clearance (air filter and spark plugs removed)	328
18.9.37	Installing the front timing chain tensioner.....	287	23.3	Setting the valve clearance of the rear cylinder	332
18.9.38	Installing the heat exchanger	287	23.4	Setting the valve clearance of the front cylinder.....	333
18.9.39	Installing the starter motor.....	288	23.5	Disassembling the camshafts of the rear cylinder	333
18.9.40	Checking the rear valve clearance	288	23.6	Installing the camshafts of the rear cylinder.....	334
18.9.41	Adjusting the rear valve clearance	288	23.7	Disassembling the camshafts of the front cylinder	335
18.9.42	Checking the front valve clearance	289	23.8	Installing the camshafts of the front cylinder	336
18.9.43	Adjusting the front valve clearance	289	24	LUBRICATION SYSTEM.....	338
18.9.44	Installing the oil filler tube	290	24.1	Oil circuit.....	338
18.9.45	Installing the front valve cover.....	290	24.2	Checking the engine oil level.....	339
18.9.46	Installing rear valve cover	291	24.3	Changing the engine oil and oil filter, cleaning the oil screens	339
18.9.47	Installing the oil drain plug.....	291	24.4	Adding engine oil.....	342
18.9.48	Mounting the engine bearer	292	24.5	Checking the oil pressure.....	343
18.9.49	Removing the engine from the engine assembly stand	292	24.6	Removing the oil nozzle for the clutch lubrication.....	344
19	SECONDARY AIR SYSTEM SAS.....	293	24.7	Checking/cleaning the oil nozzle for clutch lubrication.....	345
19.1	Changing the SAS membrane.....	293	24.8	Installing the oil nozzle for the clutch lubrication.....	345
20	CLUTCH.....	295	25	IGNITION SYSTEM.....	347
20.1	Checking/correcting the fluid level of the hydraulic clutch.....	295	25.1	Alternator - checking the stator winding.....	347
20.2	Changing the hydraulic clutch fluid	296	25.2	Changing spark plugs (air filter removed).....	349
20.3	Checking the clutch	296	26	THROTTLE VALVE BODY	361
21	SHIFT MECHANISM.....	303	26.1	Removing the throttle valve body	361
21.1	Checking the basic position of the shift lever.....	303	26.2	Installing the throttle valve body.....	362
21.2	Adjusting the basic position of the shift lever.....	303	26.3	Performing the initialization run	363
21.3	Changing the gear position sensor....	304	26.4	Checking the CO adjustment using the KTM diagnostics tool	364
21.4	Programming the gear position sensor.....	306	27	TECHNICAL DATA.....	366
22	WATER PUMP, COOLING SYSTEM	307	27.1	Engine	366
22.1	Checking the coolant level in the compensating tank.....	307	27.2	Tolerance, engine wear limits	367
22.2	Checking the coolant fill level and antifreeze.....	307	27.3	Engine tightening torques	369
22.3	Draining the coolant.....	309	27.4	Capacities	371
22.4	Adding coolant/bleeding the cooling system.....	310	27.4.1	Engine oil	371
			27.4.2	Coolant	371
			27.4.3	Fuel	371

27.5	Chassis	372
27.6	Electrical system.....	372
27.6.1	Diagnostics connector	373
27.6.2	Front ACC1 and ACC2	373
27.6.3	ACC1 and ACC2 rear.....	373
27.7	Tires.....	374
27.8	Fork.....	374
27.9	Shock absorber	374
27.10	Chassis tightening torques	375
28	CLEANING/PROTECTIVE TREATMENT	378
28.1	Cleaning the motorcycle	378
28.2	Checks and maintenance steps for winter operation.....	379
29	STORAGE.....	381
29.1	Storage	381
29.2	Preparing for use after storage.....	381
30	SERVICE SCHEDULE	382
30.1	Additional information.....	382
30.2	Required work	382
30.3	Recommended work	383
31	WIRING DIAGRAM	384
31.1	Page 1 of 11	384
31.2	Page 2 of 11	386
31.3	Page 3 of 11	388
31.4	Page 4 of 11	390
31.5	Page 5 of 11	392
31.6	Page 6 of 11	394
31.7	Page 7 of 11	396
31.8	Page 8 of 11	398
31.9	Page 9 of 11	400
31.10	Page 10 of 11	402
31.11	Page 11 of 11	404
32	SUBSTANCES	406
33	AUXILIARY SUBSTANCES	408
34	SPECIAL TOOLS	410
35	STANDARDS	430
36	INDEX OF SPECIAL TERMS	431
37	LIST OF ABBREVIATIONS.....	432
	INDEX.....	433

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).



Indicates information with more details or tips.



Indicates the result of a testing step.



Indicates a voltage measurement.



Indicates a current measurement.



Indicates a resistance measurement.



Indicates the end of an activity including potential rework.

1.2 Formats used

The typographical formats used in this document are explained below.

Proprietary name

Indicates a proprietary name.

Name®

Indicates a protected name.

Brand™

Indicates a brand available on the open market.

Underlined terms

Refer to technical details of the vehicle or indicate technical terms, which are explained in the glossary.

2.1 Repair Manual

Read this Repair Manual carefully and thoroughly before beginning work. It contains useful information and tips to help you repair and service 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 product described safely. Therefore read this instruction and all further instructions included carefully. The safety instructions are highlighted in the text and are referred to at the relevant passages.



Info

Various information and warning labels are attached in prominent locations on the product described. Do not remove any information or 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.



Note

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

2.4 Work rules

Special tools are necessary for certain tasks. The tools are not a component of the vehicle, but can be ordered using the number in parentheses. Example: valve spring mounter (59029019000)

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

Where thread lockers are used on screw connections (e.g. **Loctite**®), follow the instructions for use from the manufacturer.

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

After repairs or servicing, the vehicle must be checked to ensure that it is roadworthy.

3 IMPORTANT NOTES

3.1 Manufacturer warranty

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

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

3.2 Fuel, auxiliary substances



Note

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

- Do not allow fuel to enter the groundwater, the soil, or the sewage system.

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

3.3 Spare parts, accessories

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

The current **KTM PowerParts** for your vehicle can be found on the KTM website.

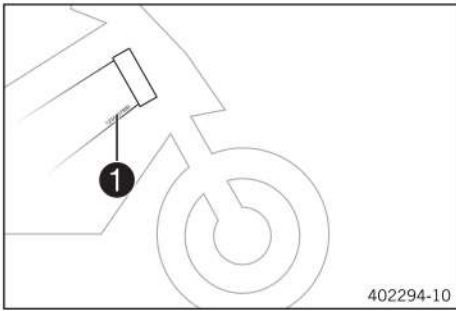
International KTM Website: <http://www.ktm.com>

3.4 Figures

The figures contained in the manual may depict special equipment.

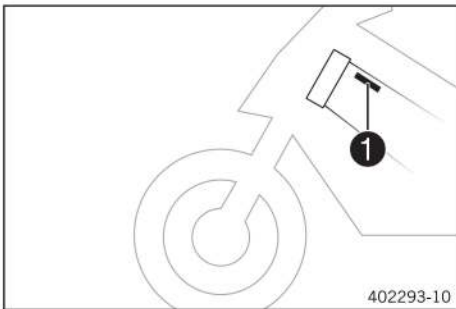
In the interest of clarity, some components may be shown disassembled or may not be shown at all. It is not always necessary to disassemble the component to perform the activity in question. Please follow the instructions in the text.

4.1 Vehicle identification number



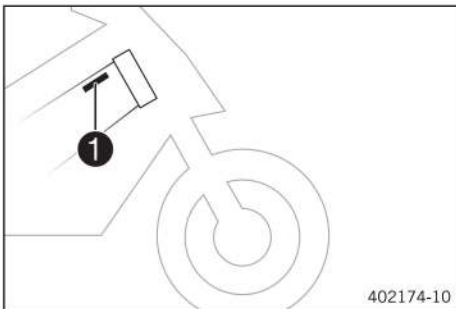
The vehicle identification number **1** is stamped on the bottom right of the frame behind the steering head.
The vehicle identification number is also shown on the type label.

4.2 Type label



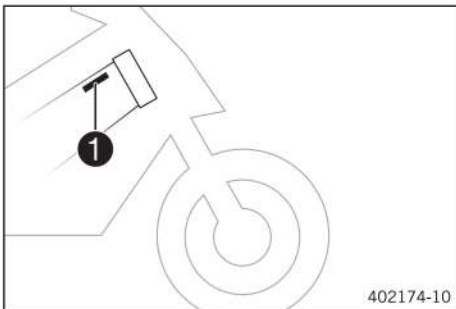
(EU)

Type label **1** is affixed to the top left of the frame behind the steering head.



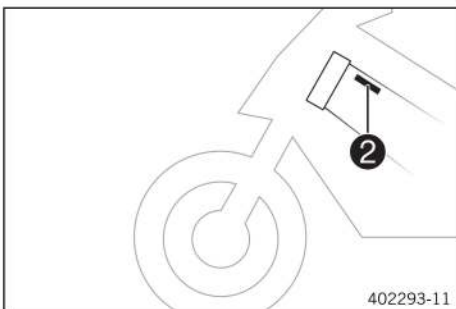
(CN)

Type label **1** is affixed the top right of the frame behind the steering head.



(US)

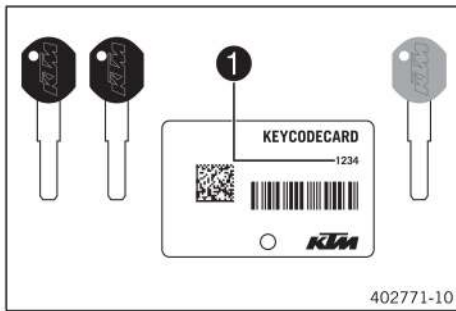
Type label USA **1** is affixed to the frame behind the steering head at the top right.



(US)

Type label Canada **2** is affixed to the frame behind the steering head at the top left.

4.3 Key number

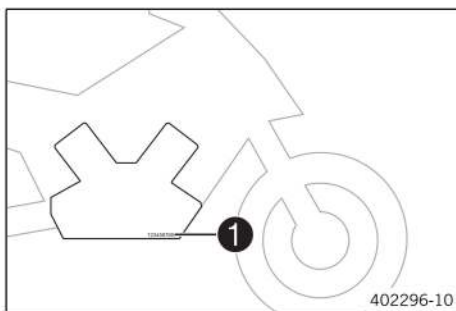


The key number **Code number 1** can be found on the **KEYCODECARD**.

i Info

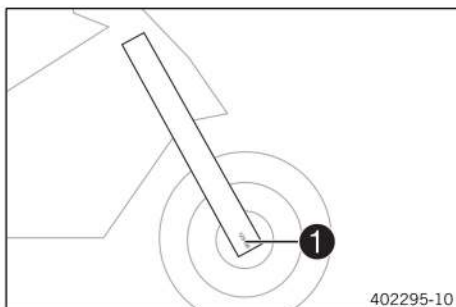
You need the key number to order a spare key. Keep the **KEYCODECARD** in a safe place. Use the orange programming key to activate and deactivate the black ignition key. Keep the orange programming key in a safe place: it must only be used for learning and programming functions.

4.4 Engine number



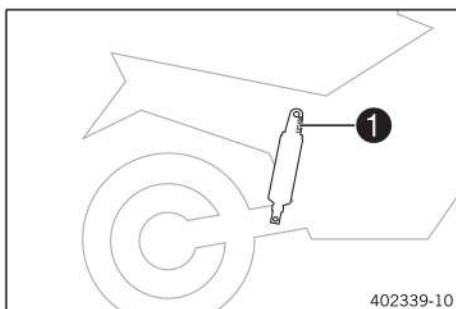
The engine number **1** is stamped on the right side of the engine.

4.5 Fork part number



The fork part number **1** is stamped on the inner side of the fork stub.

4.6 Shock absorber article number



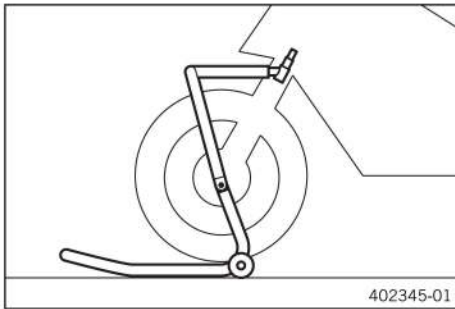
The shock absorber article number **1** is stamped on the top of the shock absorber.

5.1 Lifting the motorcycle with the front lifting gear

Note

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

- Park the vehicle on a firm and level surface.



Preparatory work

- Raise the motorcycle with the rear lifting gear. (📖 p. 14)
- Remove the bottom triple clamp cover. (📖 p. 115)

Main work

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

Mounting pin (69329965040) (📖 p. 422)

Front wheel work stand, large (69329965000) (📖 p. 422)

- Align the front lifting gear with the fork legs.



Info

Always raise the motorcycle at the rear first.

- Lift the motorcycle at the front.

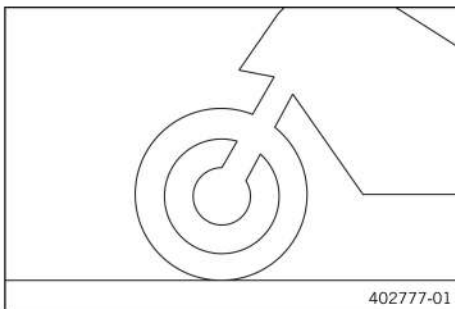


5.2 Taking the motorcycle off the front lifting gear

Note

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

- Park the vehicle on a firm and level surface.



Main work

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

Finishing work

- Install the bottom triple clamp cover. (📖 p. 116)

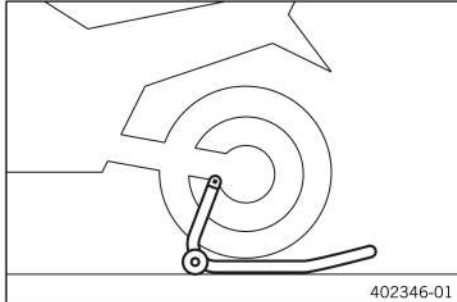


5.3 Raising the motorcycle with the rear lifting gear

Note

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

- Park the vehicle on a firm and level surface.



- Mount the retaining adapter on the link fork.
- Insert the adapter in the rear lifting gear.

Retaining adapter (61029955144) (📖 p. 416)
--

Rear wheel work stand (69329955000) (📖 p. 421)
--

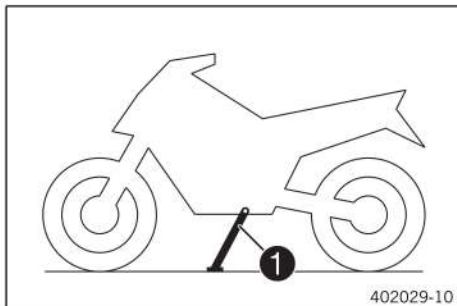
- Stand the motorcycle upright, align the lifting gear to the link fork with the adapters, and raise the motorcycle.

5.4 Removing the rear of the motorcycle from the lifting gear

Note

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

- Park the vehicle on a firm and level surface.



- Secure the motorcycle against falling over.
- Remove the rear lifting gear and lean the motorcycle on the side stand ❶.
- Remove the retaining adapter from the link fork.

5.5 Raising the motorcycle with the work stand

Note

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

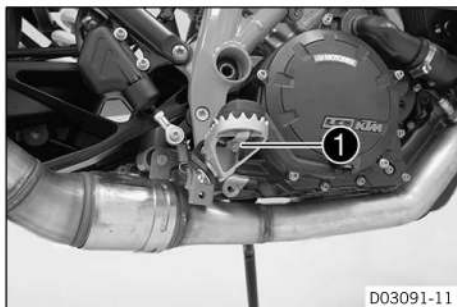
- Park the vehicle on a firm and level surface.

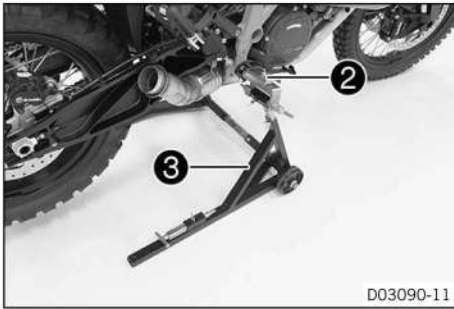
Preparatory work

- Remove the main silencer. (📖 p. 82)

Main work

- Remove nut ❶.
- Take off the footrest rubber and holder.





- Mount special tool ②.

Work stand attachments (75029036000) (📖 p. 423)

- Repeat these steps on the opposite side.

- Mount special tool ③.

Work stand (62529055200) (📖 p. 421)

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

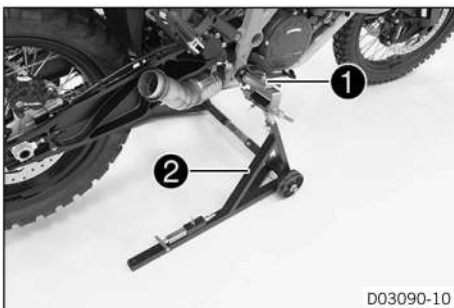


5.6 Removing the motorcycle from the work stand

Note

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

- Park the vehicle on a firm and level surface.

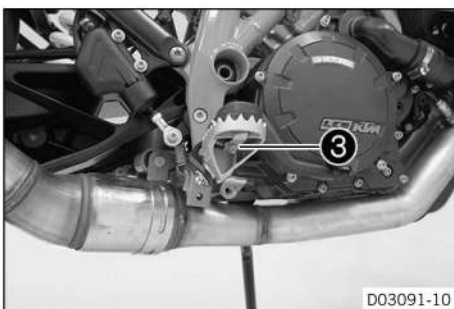


Main work

- Secure the motorcycle against falling over.
- Remove the special tool ① and ②.

Work stand (62529055200) (📖 p. 421)

Work stand attachments (75029036000) (📖 p. 423)



- Position the footrest rubber with the holder.
- Mount and tighten nut ③.

Guideline

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

- Repeat these steps on the opposite side.

Finishing work

- Install the main silencer. (📖 p. 82)

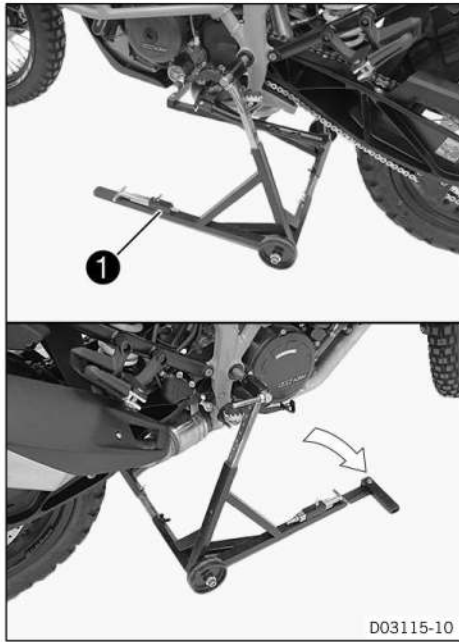


5.7 Raising the motorcycle with the work stand (inserted)

Note

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

- Park the vehicle on a firm and level surface.



- Fold up the rider footrests and secure them.
- The plastic bushing of work stand **1** should engage in the opening of the fork pivot.

Work stand (62529055200) (📖 p. 421)



Info

Set the work stand to an appropriate height and width.

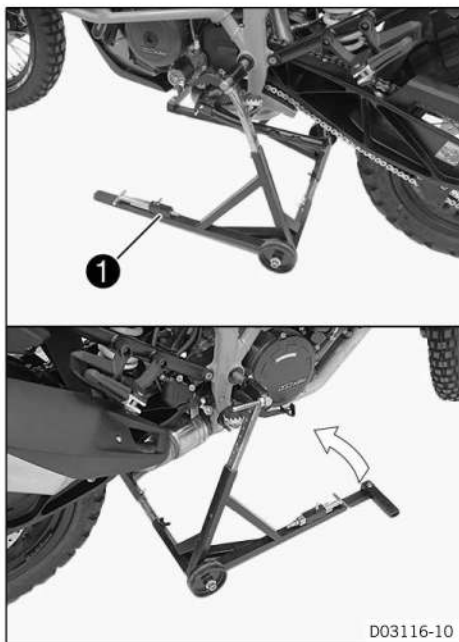
- Raise the motorcycle.
- Check that the work stand is properly seated.

5.8 Removing the motorcycle from the work stand (inserted)

Note

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

- Park the vehicle on a firm and level surface.



- Secure the motorcycle against falling over.
- Remove special tool **1**.

Work stand (62529055200) (📖 p. 421)



Info

To avoid damaging components, lower the motorcycle slowly from the work stand.
The assistance of a second person can be useful.

- Lean the motorcycle on the side stand.
- Remove the fixing means on the rider footrests.

5.9 Starting the vehicle



Danger

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

- Always make sure there is sufficient ventilation when running the engine.
- Use effective exhaust extraction when starting or running the engine in an enclosed space.



Caution

Danger of accidents Electronic components and safety devices will be damaged if the 12-V battery is discharged or missing.

- Never operate the vehicle with a discharged 12-V battery or without a 12-V battery.

Note

Engine damage High revving speed with a cold engine negatively impacts the lifespan of the engine.




- Always run the engine warm at a low speed.



S01777-01



S01776-01


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



Info

Do not press the electric starter button until the combination instrument function check is finished.

When starting, **DO NOT** open the throttle. If you open the throttle during the starting procedure, fuel is not injected by the engine management system and the engine cannot start.

Press the electric starter button  for 5 seconds at most. Wait for a least 5 seconds before trying again. This motorcycle is equipped with a safety starting system. You can only start the engine if the transmission is in neutral or if the clutch lever is pulled when a gear is engaged. If the side stand is folded out and you shift into gear, the engine stops.

- Remove the motorcycle from the side stand.

5.10 Starting the motorcycle to check the function



Danger

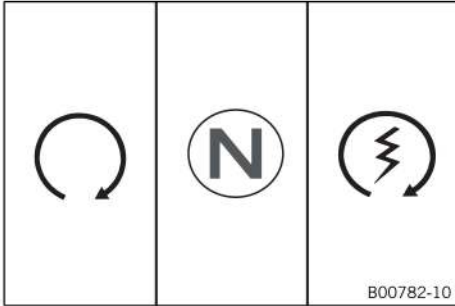
Danger of poisoning Exhaust gases are toxic and inhaling them may result in unconsciousness and death.

- Always make sure there is sufficient ventilation when running the engine.
- Use effective exhaust extraction when starting or running the engine in an enclosed space.



Info

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



- Press the emergency OFF switch to the position **ON**
- Switch on the ignition by turning the black ignition key to the position **ON**
- Shift the transmission into neutral **N**.
- Press the electric starter button



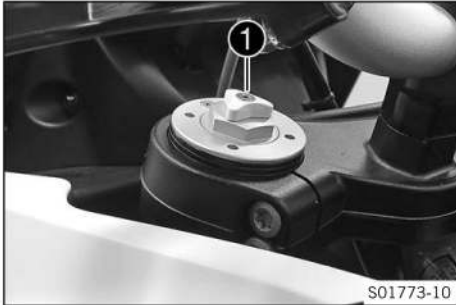
Info

Do not open the throttle.

6.1 Adjusting the compression damping of the fork

i **Info**

The hydraulic compression damping determines the fork suspension behavior.



- Turn white adjusting screw ① clockwise as far as it will go.

i **Info**

Adjusting screw ① is located at the upper end of the left fork leg.

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

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

Guideline

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

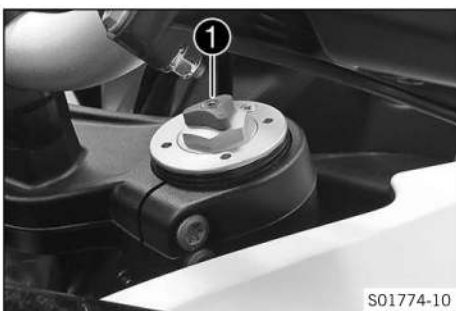
i **Info**

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

6.2 Adjusting the rebound damping of the fork

i **Info**

The hydraulic rebound damping determines the fork suspension behavior.



- Turn red adjusting screw ① clockwise as far as it will go.

i **Info**

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

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

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

Guideline

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

i Info

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

6.3 Adjusting the spring pretension of the fork



- Turn adjusting screws **1** counterclockwise all the way.

i Info

Make the same adjustment on both fork legs.

- Turn clockwise by the number of turns corresponding to the fork type.

Guideline

Spring preload - Preload Adjuster	
Comfort	2 turns
Standard	5 turns
Sport	5 turns
Full payload	8 turns

i Info

Turn clockwise to increase the spring pretension; turn counterclockwise to reduce the spring pretension. Adjusting the spring pretension has no influence on the absorption setting of the rebound damping. Basically, however, you should set the rebound damping higher with a higher spring pretension.

6.4 Bleeding the fork legs



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

i Info

Carry out this operation on both fork legs.

6.5 Cleaning the dust boots of the fork legs



Preparatory work

- Remove front fender. (📖 p. 116)
- Raise the motorcycle with the rear lifting gear. (📖 p. 14)
- Remove the bottom triple clamp cover. (📖 p. 115)
- Lift the motorcycle with the front lifting gear. (📖 p. 13)

Main work

- Push dust boots ❶ of both fork legs downward.



Info

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



Warning

Danger of accidents Oil or grease on the brake discs reduces the braking effect.

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

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

Universal oil spray (📖 p. 409)

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

Finishing work

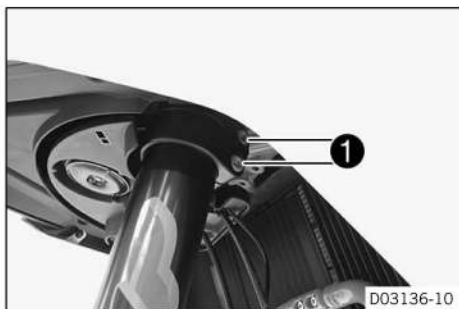
- Take the motorcycle off the front lifting gear. (📖 p. 13)
- Install the bottom triple clamp cover. (📖 p. 116)
- Remove the rear of the motorcycle from the lifting gear. (📖 p. 14)
- Install front fender. (📖 p. 117)

6.6 Removing the fork legs

Preparatory work

- Remove the main silencer. (📖 p. 82)
- Raise the motorcycle with the work stand. (📖 p. 14)
- Remove front fender. (📖 p. 116)
- Clamp down the rear of the vehicle.
- Remove the front wheel (work stand). (📖 p. 124)

6 FORK, TRIPLE CLAMP



Main work

- Loosen screws **1** of the lower triple clamp.



- Loosen screws **2** of the upper triple clamp.
- Remove the fork leg downward.
- Repeat the operation on the other fork leg.

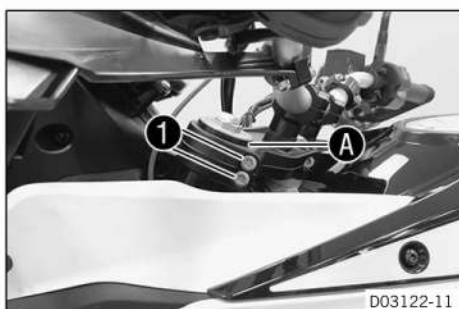
6.7 Installing the fork legs



Warning

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

- Ride slowly to start with after making adjustments to get the feel of the new handling characteristic.



Main work

- Push the left fork leg into the triple clamps.
 - ✓ Bleeder screws face forwards.
 - ✓ The left-hand fork leg has a white adjuster; the right-hand fork leg has a red adjuster.
- Align the fork leg in the specified position by means of the fork rings **A**.

Guideline

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

- Tighten screws **1** of the upper triple clamp.

Guideline

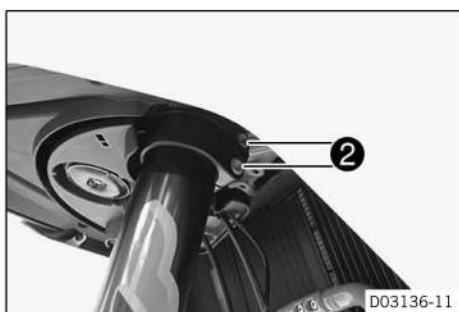
Screw, top triple clamp	M8	20 Nm (14.8 lbf ft)
-------------------------	----	---------------------

- Tighten screws **2** of the lower triple clamp.

Guideline

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

- Repeat the operation on the other fork leg.



Finishing work

- Install the front wheel (work stand). (📖 p. 125)
- Remove the motorcycle from the work stand. (📖 p. 15)
- Install the main silencer. (📖 p. 82)
- Install front fender. (📖 p. 117)

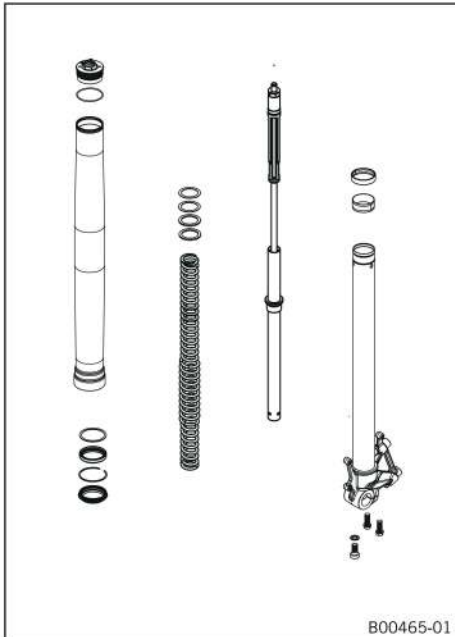


6.8 Performing a fork service

Condition

The fork legs have been removed.

- Disassemble the fork legs. (📖 p. 23)
- Check the fork legs. (📖 p. 26)
- Assemble the fork legs. (📖 p. 28)



6.9 Disassembling the fork legs



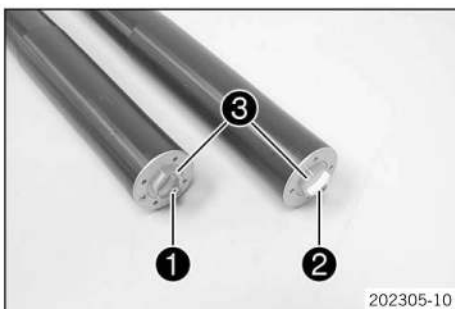
Info

The operations are the same on both fork legs.

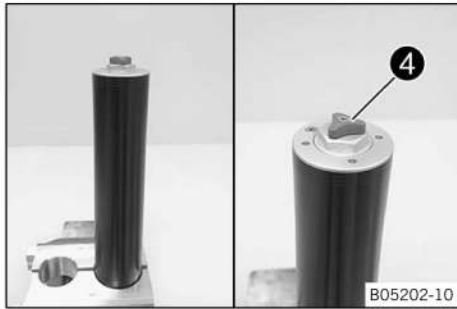
Condition

The fork legs have been removed.

- Make a note of the present state of rebound **1** and compression damping **2**.
- Note down the current state of the spring preload **3**.
- Completely open the adjusters of the rebound damping, compression damping, and spring preload.



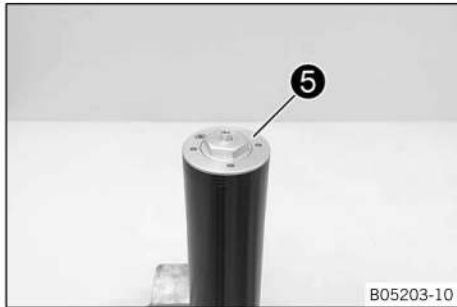
6 FORK, TRIPLE CLAMP



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

Clamping stand (T1403S) (📖 p. 428)

- Remove adjuster 4.



- Loosen preload adjuster 5.

Pin wrench (T103) (📖 p. 426)

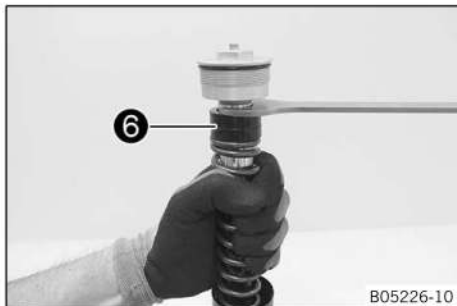


Info

The preload adjuster cannot be removed yet.



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



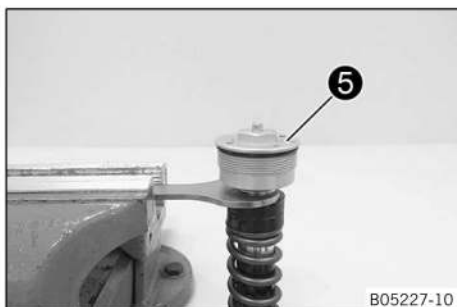
- Unclamp the fork leg with the axle clamp.

Guideline

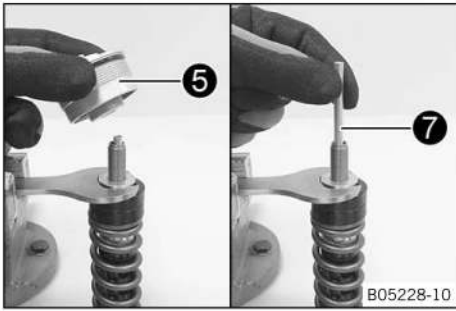
Use soft jaws.

- Push the outside fork tube downwards.
- Position the spring with preload spacers 6 and pull it down. Mount the special tool on the hexagonal part.

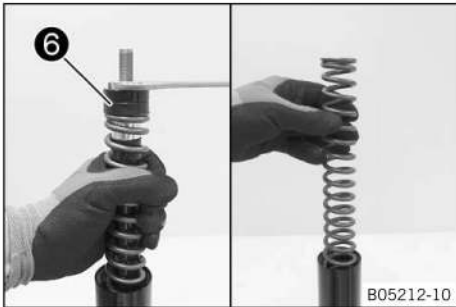
Open end wrench (T14032) (📖 p. 428)



- Clamp the special tool in the vise. Loosen preload adjuster 5.



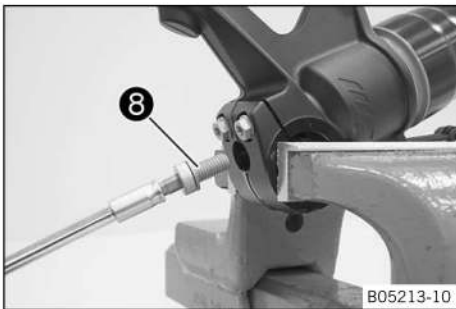
- Remove preload adjuster 5.
- Remove adjusting tube 7.



- Pull the spring downward. Remove the special tool.
- Remove preload spacers 6.

i Info
The number and thickness of the preload spacers may vary according to spring length.

- Remove the spring.

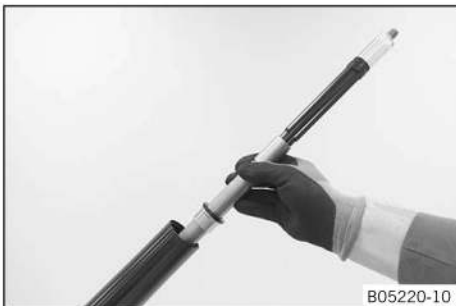


- Clamp the fork leg with the axle clamp.

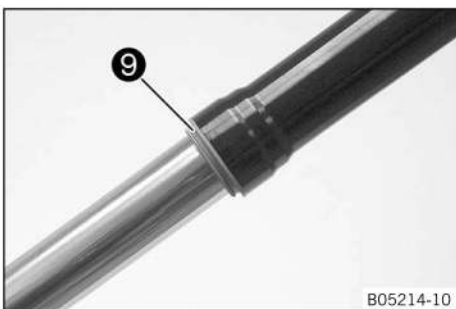
Guideline
Use soft jaws.

- Remove screw 8 with the washer.

i Info
Place a collecting container underneath as some oil will usually still run out.

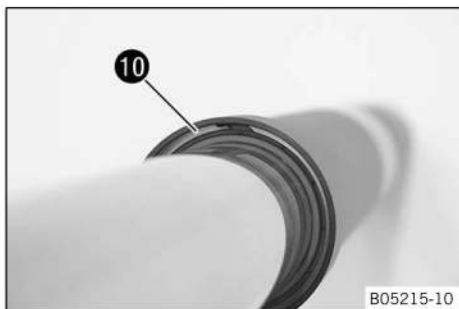


- Remove the cartridge.



- Remove dust boot 9.

6 FORK, TRIPLE CLAMP

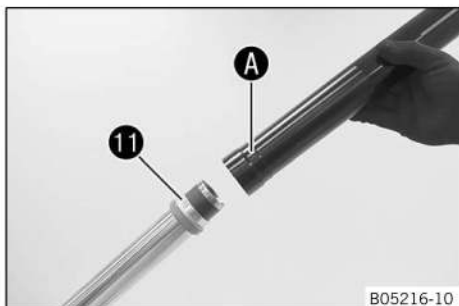


- Remove lock ring 10.



Info

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



- Warm up the outside fork tube in area A of the lower sliding bushing.

Guideline

50 °C (122 °F)

- Pull the outside fork tube off the inside fork tube with a jerk.



Info

Lower sliding bushing 11 must be drawn from its bearing seat.



- Remove upper sliding bushing 12.



Info

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

- Take off lower sliding bushing 11.
- Take off support ring 13.
- Take off seal ring 14.
- Take off lock ring 10.
- Take off dust boot 9.
- Unclamp the fork leg.

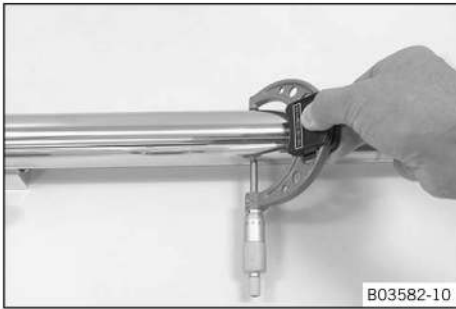
6.10 Checking the fork legs

Condition

The fork is disassembled.

- Check the inside fork tube and the axle clamp for damage.
 - » If damage is found:
 - Change the inside fork tube.

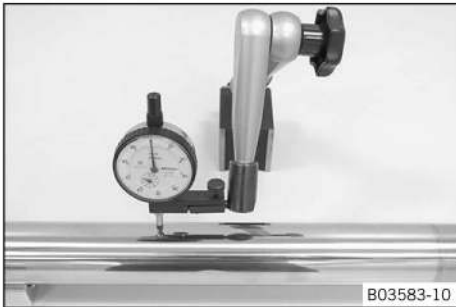




- Measure the outside diameter of the inside fork tube at several places.

Outside diameter of the inside fork tube	47.975 ... 48.005 mm (1.88878 ... 1.88996 in)
--	--

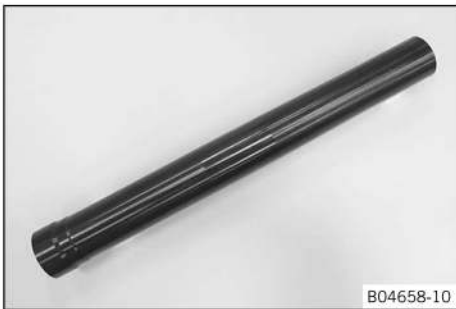
- » If the measured value is less than the specified value:
 - Change the inside fork tube.



- Measure the run-out of the inside fork tube.

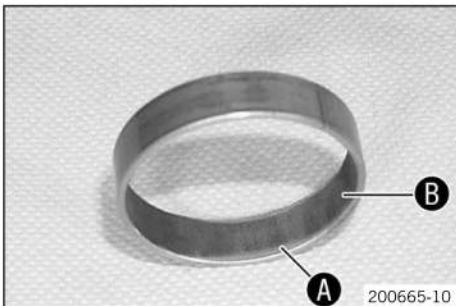
Run-out of the inside fork tube	≤ 0.20 mm (≤ 0.0079 in)
---------------------------------	------------------------------------

- » If the measured value is greater than the specified value:
 - Change the inside fork tube.



- Check the outside fork tube for damage.

- » If damage is found:
 - Change the outside fork tube.



- Check the surface of the sliding bushings.

- » When bronze-colored layer **A** becomes visible under gliding layer **B**:
 - Change the guiding bushes.



- Check the spring length.

Guideline

Spring length with preload spacer(s)	577 mm (22.72 in)
--------------------------------------	-------------------

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

6.11 Assembling the fork legs

i Info

The operations are the same on both fork legs.



Preparatory work

- Check the fork legs. (📖 p. 26)

Main work

- Clamp the inside fork tube using the axle clamp.

Guideline

Use soft jaws.

- Mount the special tool.

Protecting sleeve (T1401) (📖 p. 427)

- Grease and push on dust boot (1).

Lubricant (T14034) (📖 p. 408)

i Info

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

Mount the dust boot with the sealing lip and spring expander facing downward.

- Push on lock ring (2).

- Grease and push on seal ring (3).

Lubricant (T14034) (📖 p. 408)

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

- Push on support ring (4).

- Remove the special tool.

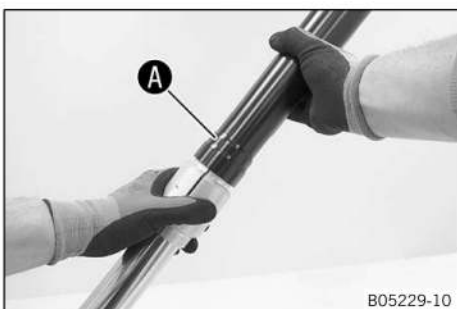
- Push on lower sliding bushing (5).

- Mount upper sliding bushing (6).



i Info

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



- Warm up the outside fork tube in area A of the lower sliding bushing.

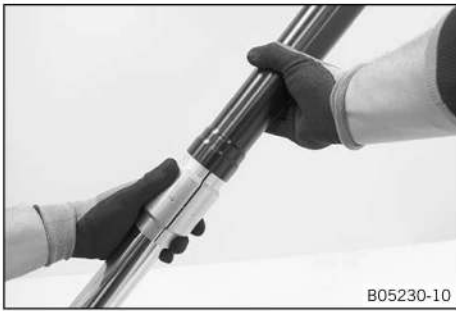
Guideline

50 °C (122 °F)

- Push the outside fork tube onto the inside fork tube.

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

Mounting tool (T14040S) (📖 p. 428)

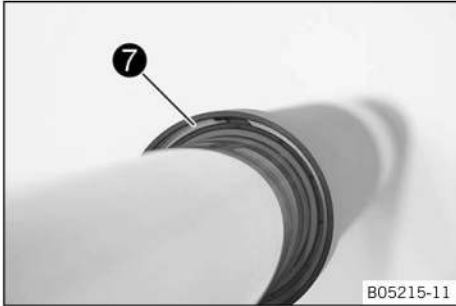


B05230-10

- Press the sliding bushing all the way into the outside fork tube.
- Position the support ring.
- Hold the seal ring with the shorter side of the special tool.

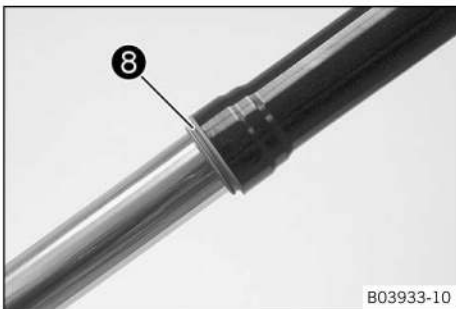
Mounting tool (T14040S) (📖 p. 428)

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



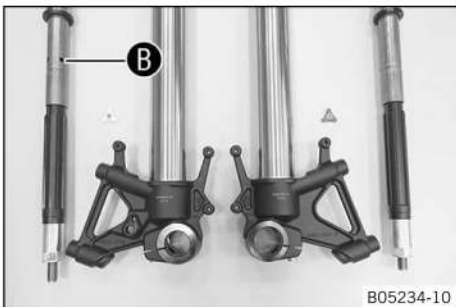
B05215-11

- Mount lock ring 7.
✓ The lock ring engages audibly.



B03933-10

- Mount dust boot 8.



B05234-10

- Assemble the individual components that belong together.

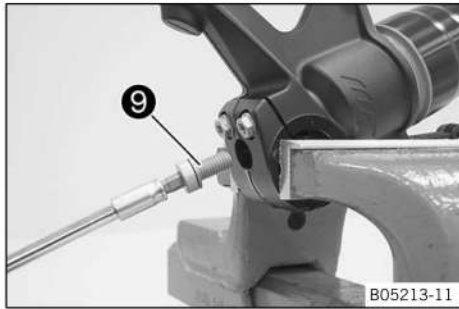
i Info
 Compression damping side: cartridge with additional oil holes **B**, white adjuster, axle clamp marked **L**.
 Rebound damping side: cartridge without additional oil holes, red adjuster, axle clamp marked **R**.



B05220-10

- Mount cartridge.

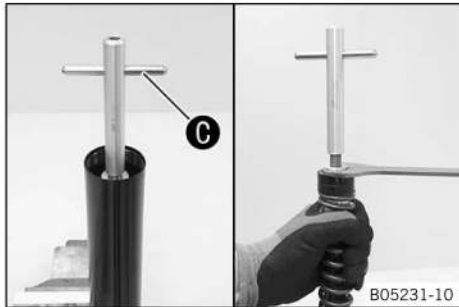
6 FORK, TRIPLE CLAMP



- Mount and tighten screw **9** with the washer.

Guideline

Screw, cartridge	M12x1	25 Nm (18.4 lbf ft)
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- Mount special tool on the cartridge; remove pin **C** of the special tool.

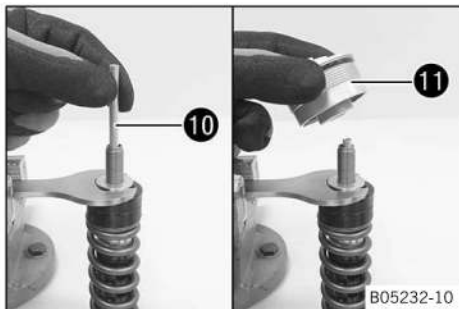
Support tool (T14026S1) (📖 p. 428)

- Pull out the piston rod. Mount spring with preload spacers. Mount the pin again.
- Pull up cartridge with special tool. Pull the spring with preload spacers downward and slide the special tool onto the hexagonal part.

Open end wrench (T14032) (📖 p. 428)

- Remove the special tool.

Support tool (T14026S1) (📖 p. 428)



- Clamp the special tool in the vise.
- Mount adjusting tube **10**.
 - ✓ The adjusting tube protrudes 5 mm (0.197 in) from the cartridge and can be pressed in against the resistance of the spring.
 - ✗ The adjusting tube protrudes more than 7 mm (0.275 in) from the cartridge and cannot be pressed in against the spring force.

- Lubricate the thread of the piston rod.

Lubricant (T159) (📖 p. 408)

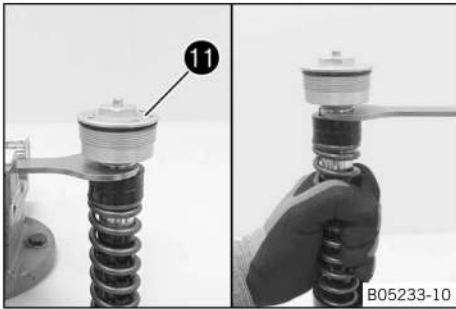
- Lubricate the upper edge of the piston rod.

Lubricant (T158) (📖 p. 408)

- Mount preload adjuster **11** on the piston rod.

i Info

The **Preload Adjuster** must reach the stop before the piston rod begins turning as well. If the thread on the piston rod is tight, it must be held to keep it from turning. If **Preload Adjuster** is not screwed in all the way, the rebound damping adjustment will not function properly.



- Tighten the preload adjuster 11.

Guideline

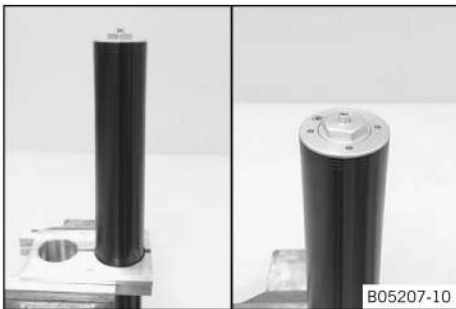
Nut, piston rod on screw cover	M12x1	25 Nm (18.4 lbf ft)
--------------------------------	-------	---------------------

- Release the special tool. Pull the spring downward. Remove the special tool.



- Clamp the fork vertically.
- Fill with fork oil.

Fork oil per fork leg	715 ml (24.17 fl. oz.)	Fork oil (SAE 4) (48601166S1) (📖 p. 407)
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- Push the outside fork tube upwards.
- Clamp the fork in the area of the lower triple clamp.

Clamping stand (T1403S) (📖 p. 428)

- Lubricate O-ring of the preload adjuster.

Lubricant (T14034) (📖 p. 408)

- Mount and tighten the preload adjuster.

Guideline

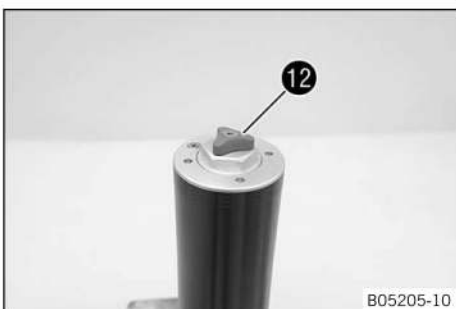
Screw cap on the outside fork tube	M47x1.5	40 Nm (29.5 lbf ft)
------------------------------------	---------	---------------------

Pin wrench (T103) (📖 p. 426)

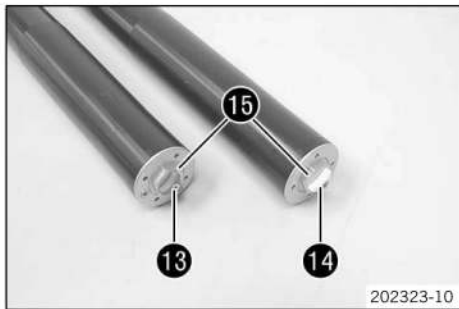
- Mount adjuster 12; mount and tighten the screw.

Guideline

Adapter	M4x0.5	1.5 Nm (1.11 lbf ft)
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i Info
 Compression damping side: white adjuster, axle clamp marked **L**.
 Rebound damping side: red adjuster, axle clamp marked **R**.



Alternative 1

- Turn the adjusting screw of rebound **13** and the adjusting screw of compression damping **14** clockwise as far as possible.
- Turn counterclockwise by the number of clicks corresponding to the fork type.

Guideline

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

- Turn spring preload **15** clockwise all the way.
- Turn counterclockwise by the number of rotations corresponding to the fork type.

Guideline

Spring preload - Preload Adjuster	
Comfort	2 turns
Standard	5 turns
Sport	5 turns
Full payload	8 turns

Alternative 2



Warning

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

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

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

- Turn the adjusting screws to the position they were in before removing.

6.12 Checking steering head bearing play



Warning

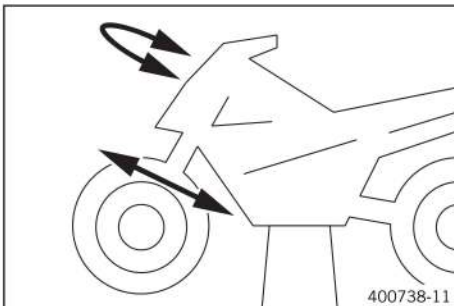
Danger of accidents Incorrect steering head bearing play impairs the handling characteristic and damages components.

- Correct incorrect steering head bearing play immediately.



Info

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



Preparatory work

- Raise the motorcycle with the work stand (inserted). (📖 p. 15)

Main work

- Place a load on the rear of the vehicle.
 - ✓ The front wheel is not in contact with the ground.
- Move the handlebar to the straight-ahead position. Move the fork legs back and forth in the direction of travel.

Play should not be detectable on the steering head bearing.

» If there is detectable play:

- Adjust steering head bearing play. (📖 p. 33)

- Move the handlebar back and forth over the entire steering range.

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

» If detent positions are detected:

- Adjust steering head bearing play. (📖 p. 33)
- Check the steering head bearing and adjust if necessary.

- Remove the motorcycle from the work stand (inserted). (📖 p. 16)

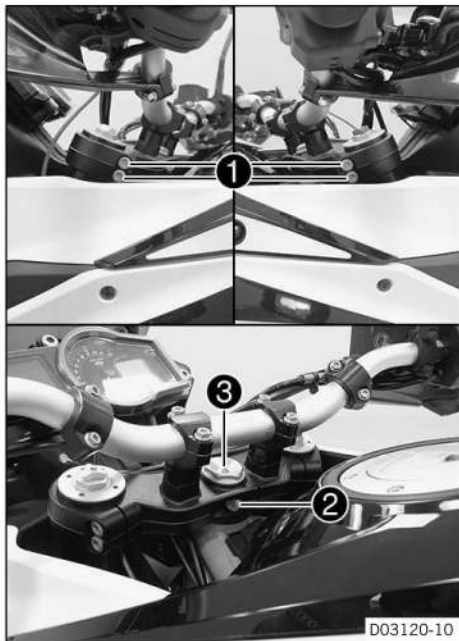


6.13 Adjusting steering head bearing play

Preparatory work

- Raise the motorcycle with the work stand (inserted). (📖 p. 15)

6 FORK, TRIPLE CLAMP



Main work

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

Guideline

Screw, steering head, top	M22x1.5	15 Nm (11.1 lbf ft) Only applies when using: Holding wrench (45229050000) (p. 412)
---------------------------	---------	--

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

- Tighten screws ①.

Guideline

Screw, top triple clamp	M8	20 Nm (14.8 lbf ft)
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- Tighten screw ②.

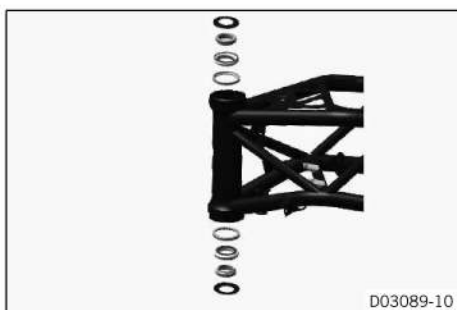
Guideline

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

- Check steering head bearing play. (p. 33)
- Remove the motorcycle from the work stand (inserted). (p. 16)

6.14 Lubricating the steering head bearing

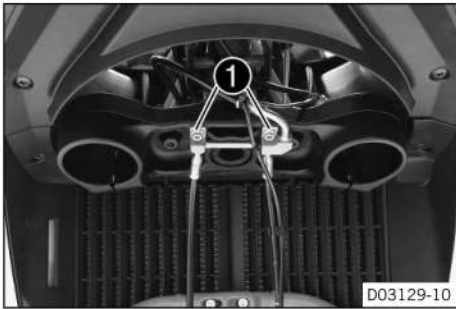


- Remove the lower triple clamp. (p. 34)
- Install the lower triple clamp. (p. 36)

6.15 Removing the lower triple clamp

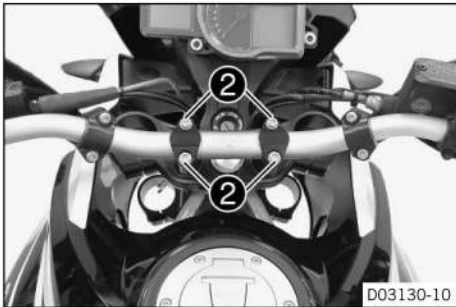
Preparatory work

- Remove the main silencer. (p. 82)
- Raise the motorcycle with the work stand. (p. 14)
- Remove front fender. (p. 116)
- Clamp down the rear of the vehicle.
- Remove the front wheel (work stand). (p. 124)
- Remove the fork legs. (p. 21)
- Remove the bottom triple clamp cover. (p. 115)



Main work

- Remove screws ①. Take off the brake line and hang to the side.



- Remove screws ② with the handlebar clamps.
- Remove the handlebar and lay it to one side.

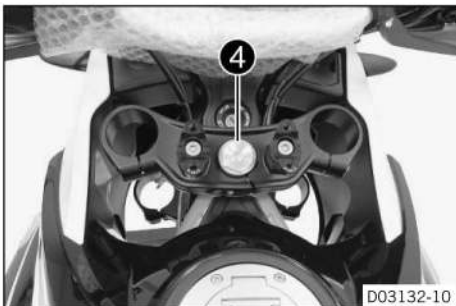


Info

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



- Loosen screw ③.

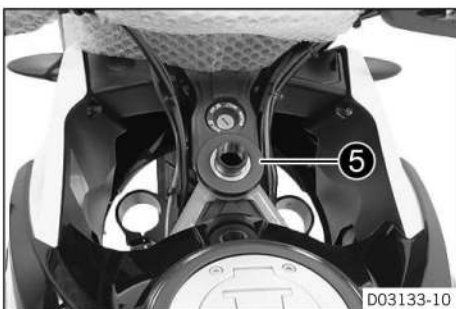


- Remove screw ④ with the washer.
- Remove upper triple clamp.

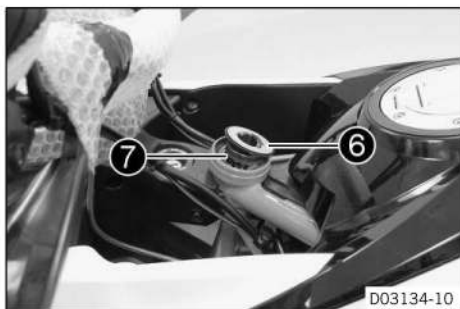


Info

Hold the lower triple clamp.

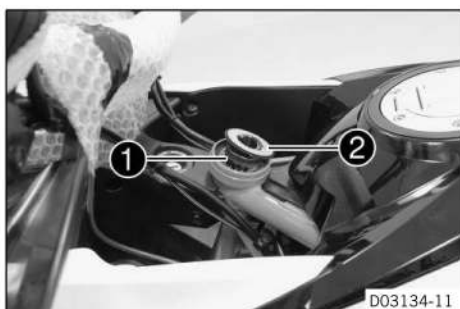


- Remove protective ring ⑤.



- Remove the lower triple clamp with the steering stem.
- Remove seal ring retainer **6**.
- Remove the upper steering head bearing **7**.

6.16 Installing the lower triple clamp

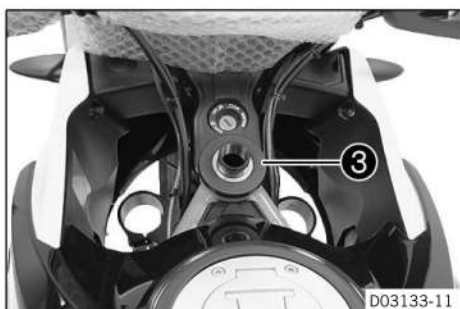


Main work

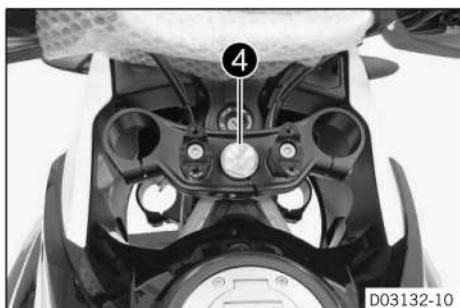
- Grease the bearing, clean the sealing elements, and check for damage.

High viscosity grease (📖 p. 408)

- Insert the lower triple clamp with the steering stem.
- Mount upper steering head bearing **1** and seal ring retainer **2**.



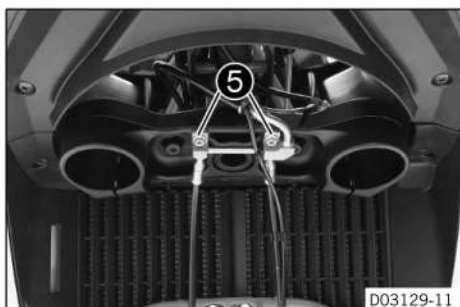
- Mount protective ring **3**.



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

Guideline

Screw, steering head, top	M22x1.5	18 Nm (13.3 lbf ft)
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- Position the brake lines.
- Mount and tighten screws **5**.

Guideline

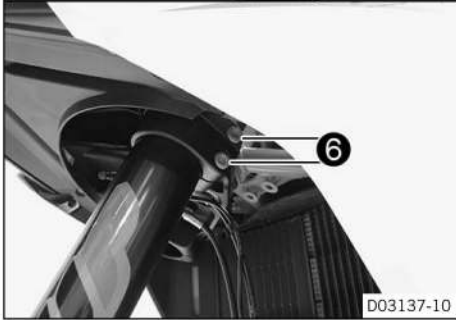
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------



- Push the left fork leg into the triple clamps.
 - ✓ Bleeder screws face forwards.
 - ✓ The left-hand fork leg has a white adjuster; the right-hand fork leg has a red adjuster.
- Align the fork leg in the specified position by means of the fork rings **A**.

Guideline

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

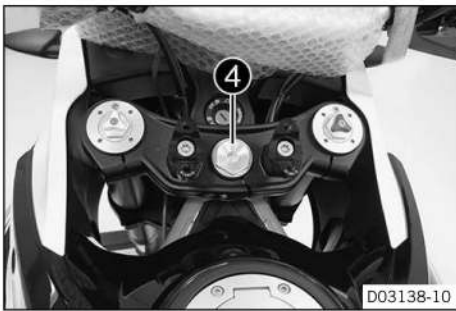


- Tighten screws **6** of the lower triple clamp.

Guideline

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

- Repeat the operation on the other fork leg.

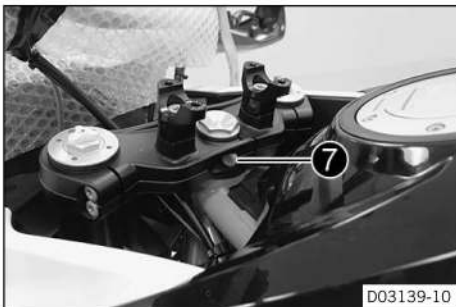


- Tighten screw **4**.

Guideline

Screw, steering head, top	M22x1.5	18 Nm (13.3 lbf ft)
---------------------------	---------	---------------------

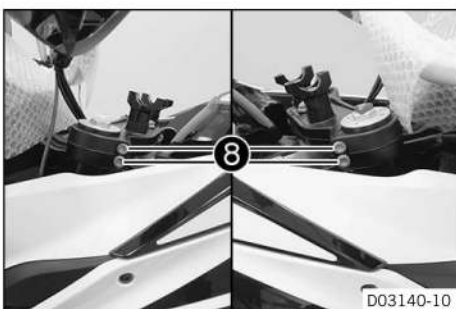
- Using a plastic hammer, tap lightly on the upper triple clamp to avoid stresses.



- Tighten screw **7**.

Guideline

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

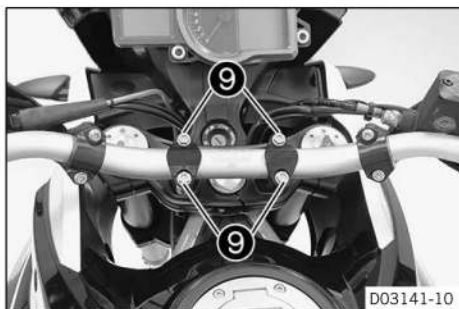


- Tighten screws **8** of the upper triple clamp.

Guideline

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

6 FORK, TRIPLE CLAMP



- Position handlebar.
- Position handlebar clamps. Mount and tighten screws 9.

Guideline

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

Finishing work

- Install the bottom triple clamp cover. (p. 116)
- Install the front wheel (work stand). (p. 125)
- Install front fender. (p. 117)
- Check steering head bearing play. (p. 33)
- Remove the motorcycle from the work stand. (p. 15)
- Install the main silencer. (p. 82)

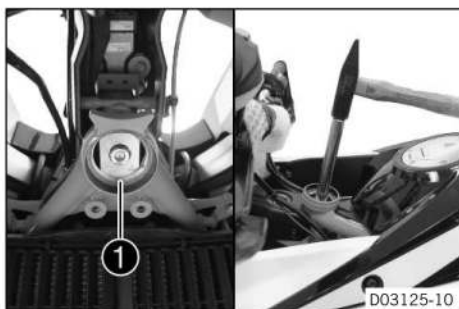
6.17 Changing the steering head bearing

Preparatory work

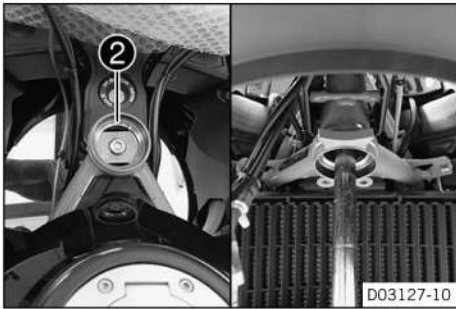
- Remove the main silencer. (p. 82)
- Raise the motorcycle with the work stand. (p. 14)
- Remove front fender. (p. 116)
- Clamp down the rear of the vehicle.
- Remove the front wheel (work stand). (p. 124)
- Remove the fork legs. (p. 21)
- Remove the bottom triple clamp cover. (p. 115)
- Remove the lower triple clamp. (p. 34)

Main work

- Remove the lower bearing race 1 using a suitable tool.



- Press in the new bearing ring all the way using a suitable tool.



- Remove the upper bearing race ② using a suitable tool.



- Press in the new bearing ring all the way using a suitable tool.



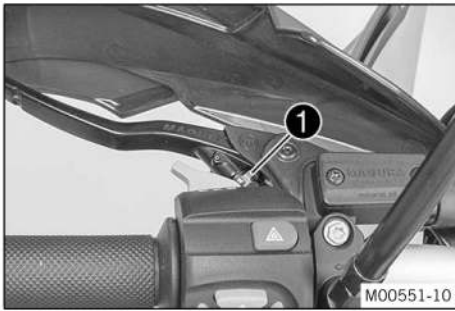
- Remove lower steering head bearing ③.
- Remove the seal ring retainer.
- Grease and mount the new seal ring retainer.
- Mount new bearing.

Finishing work

- Install the lower triple clamp. (📖 p. 36)
- Install the bottom triple clamp cover. (📖 p. 116)
- Install the front wheel (work stand). (📖 p. 125)
- Install front fender. (📖 p. 117)
- Check steering head bearing play. (📖 p. 33)
- Remove the motorcycle from the work stand. (📖 p. 15)
- Install the main silencer. (📖 p. 82)



7.1 Adjusting the basic position of the clutch lever



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



Info

When the adjusting screw is turned clockwise, the clutch lever moves closer to the handlebar. When the adjusting screw is turned counterclockwise, the clutch lever moves away from the handlebar. The range of adjustment is limited. Only turn the adjusting screw by hand, and do not use force. Do not make any adjustments while riding.

7.2 Adjusting the handlebar position

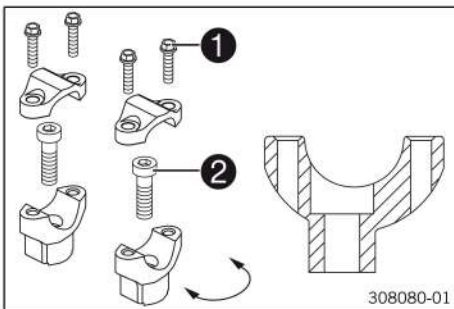


Warning

Danger of accidents A repaired handlebar poses a safety risk.

If the handlebar is bent or straightened, the material becomes fatigued. The handlebar may break as a result.

- Change the handlebar if the handlebar is damaged or bent.



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



Info

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

- Remove screws ②. Take off the handlebar supports.
- Place the handlebar supports in the required position. Mount and tighten screws ②.

Guideline

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



Info

Position the left and right handlebar supports evenly.

- Position the handlebar.



Info

Make sure the cables and wiring are positioned correctly.

- Position the handlebar clamps. Mount and evenly tighten screws ①.

Guideline

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

**Info**

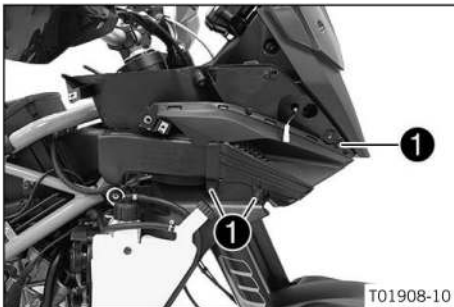
Make sure the gap widths are even.

7.3 Changing the throttle grip**Preparatory work**

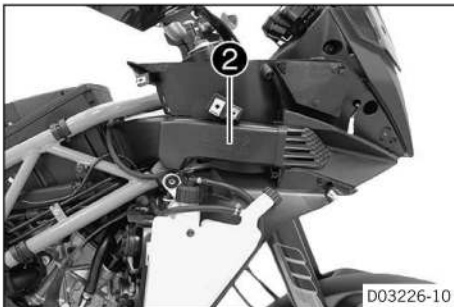
- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)
- Remove the fuel tank. (📖 p. 96)

Main work

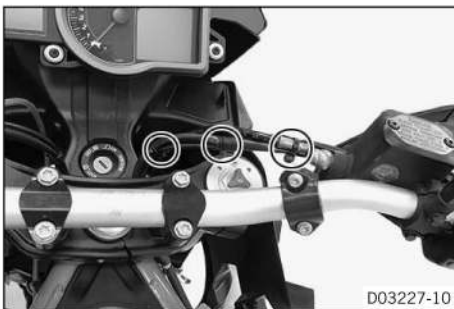
- Remove screws ①.
- Remove air inlet.



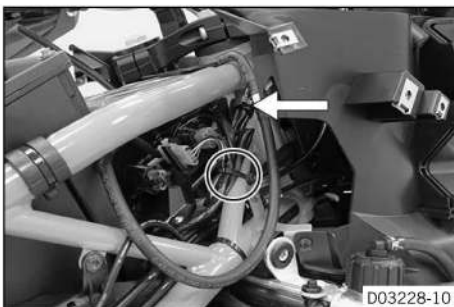
- Remove intake snorkel ②.



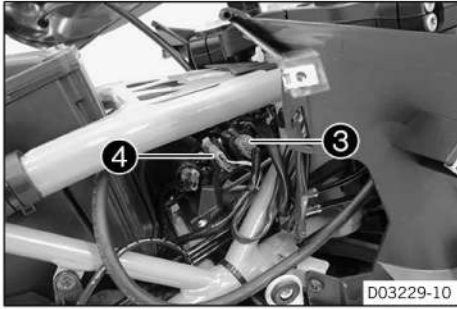
- Remove the cable ties.



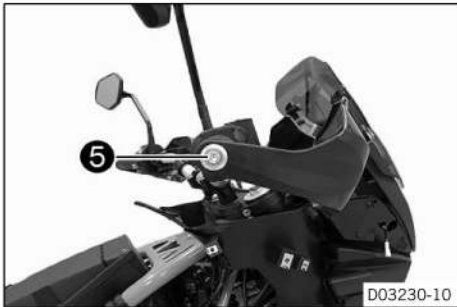
- Remove the cable tie and cable holder.



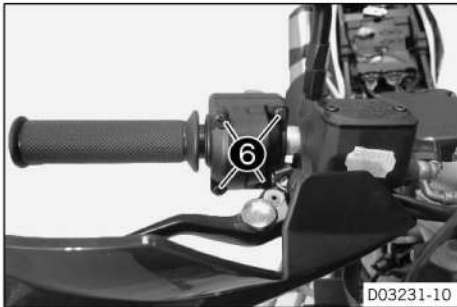
7 HANDLEBAR, CONTROLS



- Remove plug-in connectors **3** and **4** from the holder and disconnect.



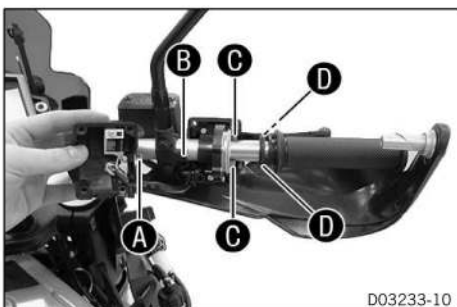
- Loosen screw **5**.
- Push the hand guard slightly to the side.



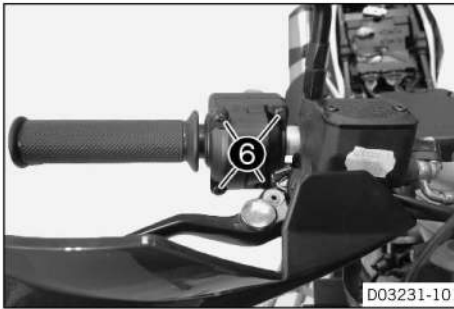
- Remove screws **6**.
- Take off the cover.



- Take off throttle grip with sensor unit.



- Position new throttle grip with sensor unit.
 - ✓ Holding lug **A** engages in recess **B**.
 - ✓ Holding lugs **C** engage in recesses **D**.



- Position the cover.
- Mount and tighten screws ⑥.

Guideline

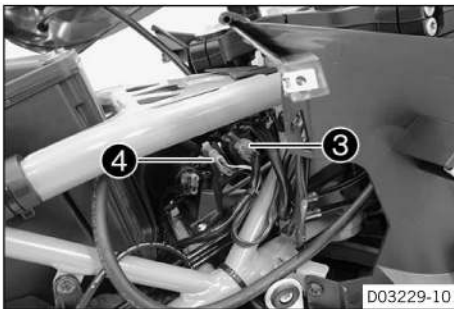
Remaining screws, chassis	M5	5 Nm (3.7 lbf ft)
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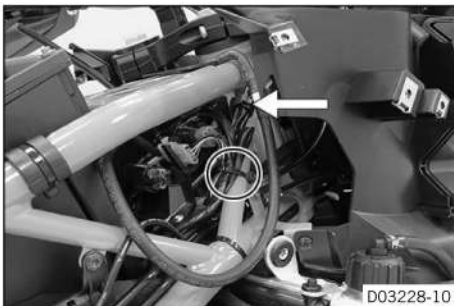
- Position hand guard.
- Tighten screw ⑤.

Guideline

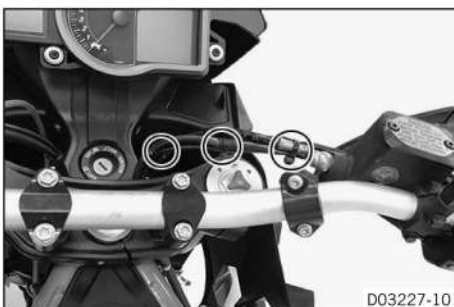
Screw, handle bar end hand guard	M8	25 Nm (18.4 lbf ft)
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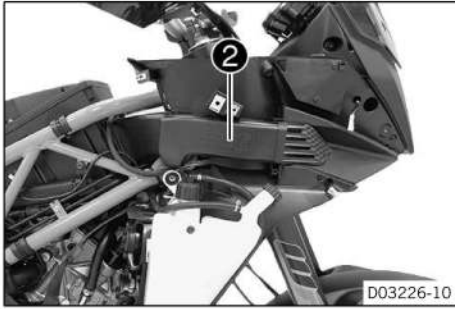
- Join plug-in connectors ③ and ④ and position them in the holder.



- Route the cable without tension and secure with cable holder and cable ties.



- Route the cable without tension and secure with a cable tie.

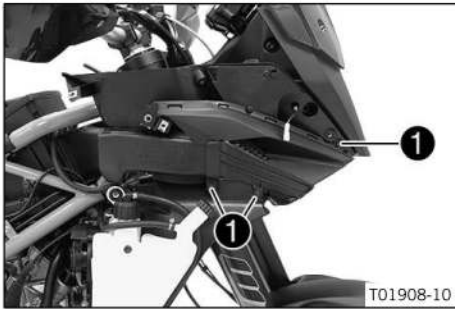


- Mount intake snorkel ②.



Info

Ensure that the seals are seated correctly.



- Position air inlet.
- Mount and tighten screws ①.

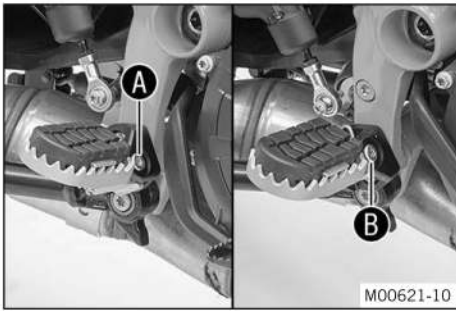
Guideline

Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
-------------------	----	-------------------------

Finishing work

- Install the fuel tank. (📖 p. 98)
- Install the mask spoiler. (📖 p. 114)
- Install the fuel tank cover. (📖 p. 112)
- Install the front side cover. (📖 p. 110)
- Mount the seat. (📖 p. 96)

8.1 Rider footrests



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

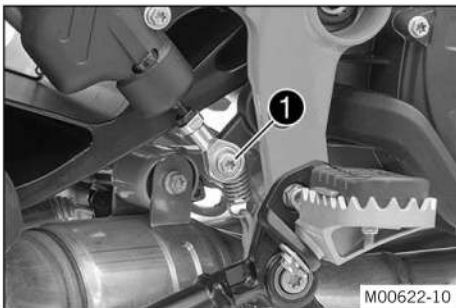
Possible states

- Rider footrests, low **A**
- Rider footrests, high **B**

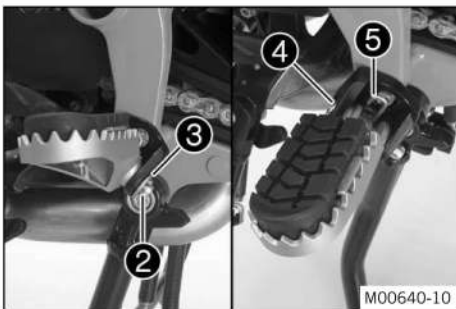
8.2 Adjusting the footrests

i Info

The operations on the footrest brackets are the same for the left and right sides.



- Remove screw **1**.
- ✓ The foot brake lever swings up to the stop.

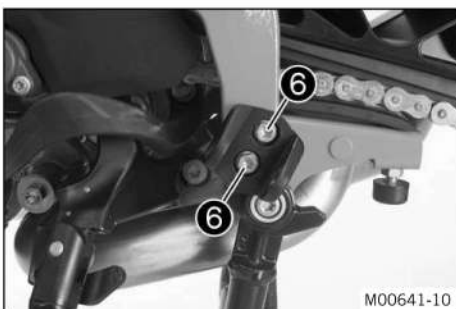


- Remove pin **2** with washer **3**.
- Carefully remove the pin **4** of the rider footrest.

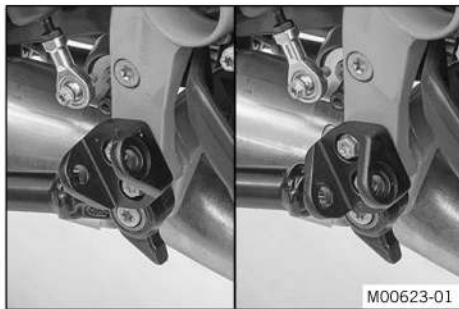
i Info

The spring is under high tension and can pop out when the pin is removed.

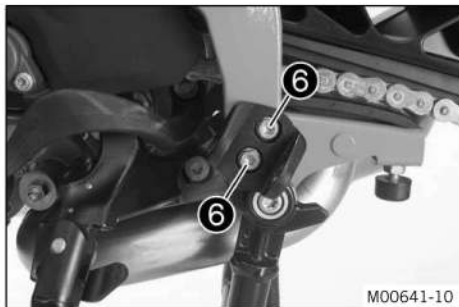
- Take off the rider footrest **5** with the spring.



- Remove screws **6**.



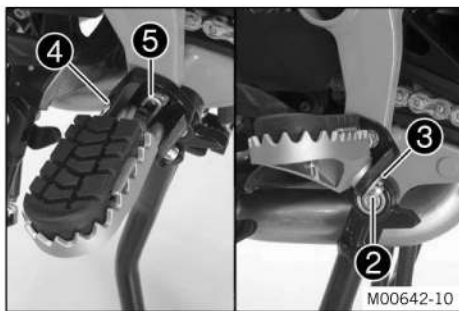
- Adjust the footrest bracket to the desired position.



- Mount and tighten screws **6**.

Guideline

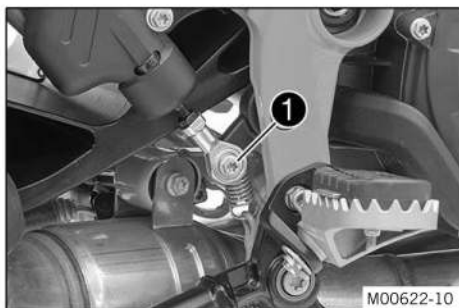
Screw, front footrest bracket	M8	25 Nm (18.4 lbf ft) Loctite®243™
-------------------------------	----	--



- Mount the rider footrest with spring **5** and pin **4**.

Footrest spring plier (58429083000) (📖 p. 413)

- Mount the washer **3** and pin **2**.

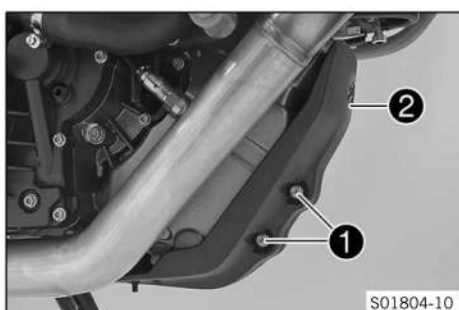


- Position the foot brake lever.
- Mount and tighten screw **1**.

Guideline

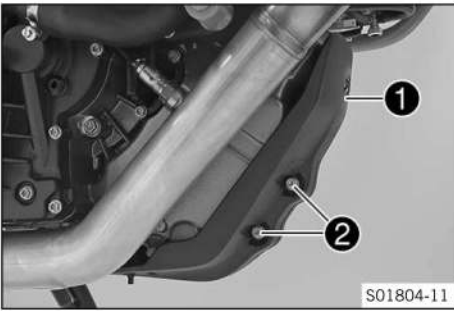
Screw, ball joint of push rod on foot brake cylinder	M6	10 Nm (7.4 lbf ft) Loctite®243™
--	----	---

8.3 Removing the engine guard



- Remove screws **1** with bushings and engine guard **2**.

8.4 Installing the engine guard

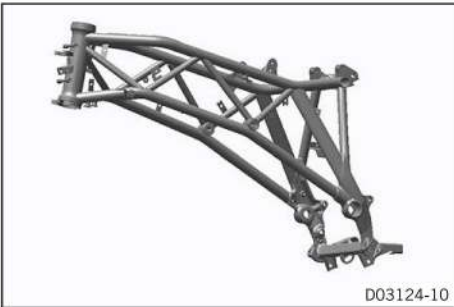


- Position engine guard **1**, mount screws **2** with bushings and tighten.

Guideline

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

8.5 Checking the frame



- Check the frame for cracks and deformation.
 - » If the frame exhibits cracks or deformation due to a mechanical impact:
 - Change the frame.



Info

Always replace a frame that has been damaged due to a mechanical impact. Repair of the frame is not authorized by KTM.

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



Caution

Risk of injury Parts of the shock absorber will move around if the shock absorber is detached incorrectly. The shock absorber is filled with highly compressed nitrogen.

- Please follow the description provided.



Info

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



- Turn adjusting screw **1** clockwise with a screwdriver as far as the last perceptible click.



Info

Do not loosen fitting **2**!

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

Guideline

Low-speed 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.

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



Caution

Risk of injury Parts of the shock absorber will move around if the shock absorber is detached incorrectly. The shock absorber is filled with highly compressed nitrogen.

- Please follow the description provided.



Info

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



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

i Info
Do not loosen fitting **2**!

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

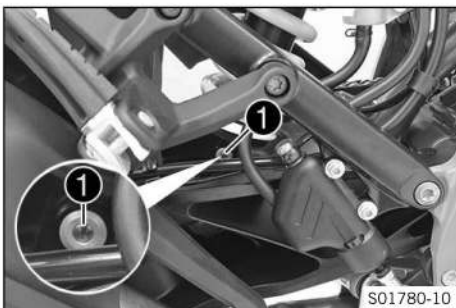
Guideline

High-speed compression damping	
Comfort	1.5 turns
Standard	1.5 turns
Sport	1 turn
Full payload	1 turn

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

9.3 Adjusting the rebound damping of the shock absorber

! Caution
Risk of injury Parts of the shock absorber will move around if the shock absorber is detached incorrectly. The shock absorber is filled with highly compressed nitrogen.
- Please follow the description provided.



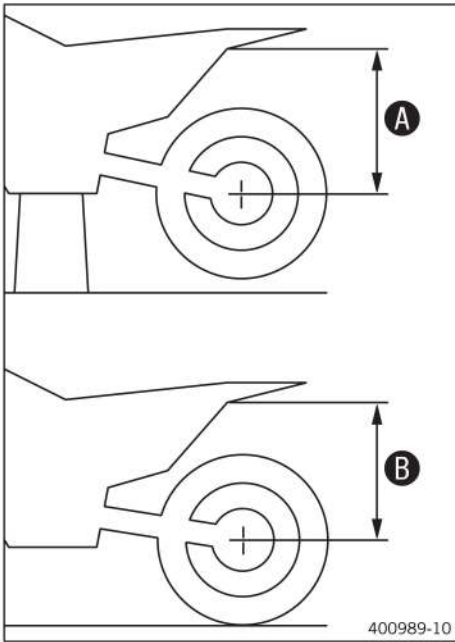
- Turn adjusting screw **1** clockwise up to the last perceptible click.
- Turn counterclockwise by the number of clicks corresponding to the shock absorber type.

Guideline

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

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

9.4 Checking the static sag of the shock absorber



- Measure dimension **A** of rear wheel unloaded. (📖 p. 50)
- 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 **B**.



Info

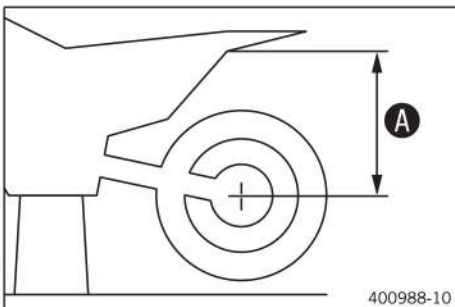
The static sag is the difference between measurements **A** and **B**.

- Check the static sag.

Full fuel tank	25 mm (0.98 in)
Empty fuel tank	20 mm (0.79 in)

- » If the static sag is less or more than the specified value:
 - Adjust the spring pretension of the shock absorber. (📖 p. 50)

9.5 Measuring the rear wheel dimension unloaded



Preparatory work

- Raise the motorcycle with the work stand (inserted). (📖 p. 15)

Main work

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

Finishing work

- Remove the motorcycle from the work stand (inserted). (📖 p. 16)

9.6 Adjusting the spring pretension of the shock absorber



- Turn handwheel **1** counterclockwise as far as it will go.
- Turn it clockwise by the number of turns corresponding to the shock absorber type and use.

Guideline

Spring preload	
Comfort	2 turns
Standard	2 turns
Sport	2 turns
Full payload	18 turns

**Info**

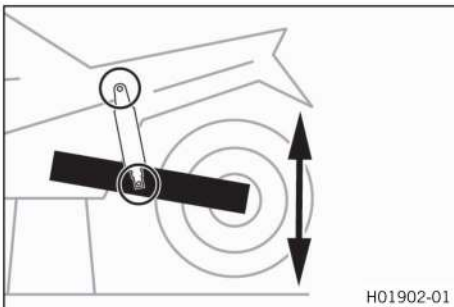
Turn clockwise to increase the spring pretension; turn counterclockwise to reduce the spring pretension.

9.7 Checking the heim joint for play**Preparatory work**

- Remove the main silencer. (📖 p. 82)
- Raise the motorcycle with the work stand. (📖 p. 14)
- Place a load on the front of the vehicle.
- ✓ The rear wheel is not in contact with the ground.

Main work

- Move the link fork up and down.
 - » If there is detectable play:
 - Change the heim joint. (📖 p. 54)

**Finishing work**

- Remove the motorcycle from the work stand. (📖 p. 15)
- Install the main silencer. (📖 p. 82)

9.8 Removing the shock absorber**Preparatory work**

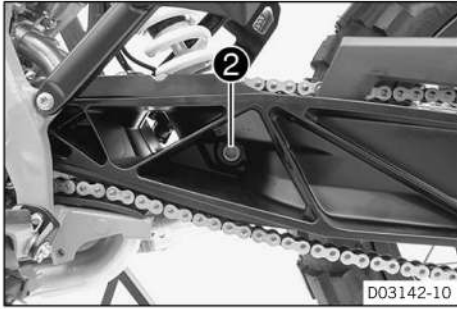
- Remove the main silencer. (📖 p. 82)
- Raise the motorcycle with the work stand. (📖 p. 14)
- Remove the seat. (📖 p. 96)

Main work

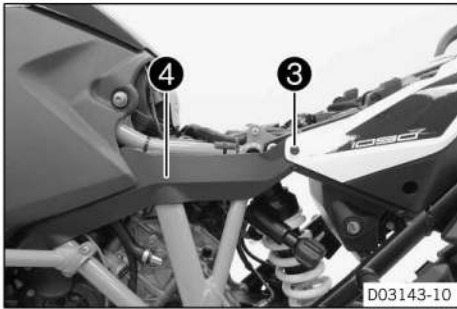
- Remove screws ①. Remove the splash protector.



9 SHOCK ABSORBER, LINK FORK



- Remove screw 2.
- Lower the link fork.



- Remove screw 3.
- Lift up heat protector 4.

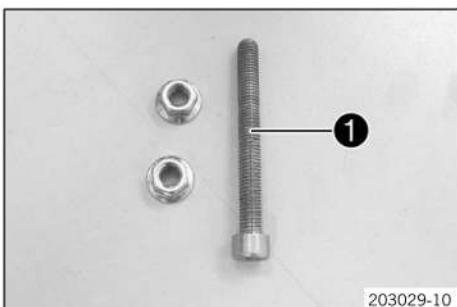


- Remove screw 5.
- Lower the shock absorber.



- Remove the shock absorber.

9.9 Installing the shock absorber

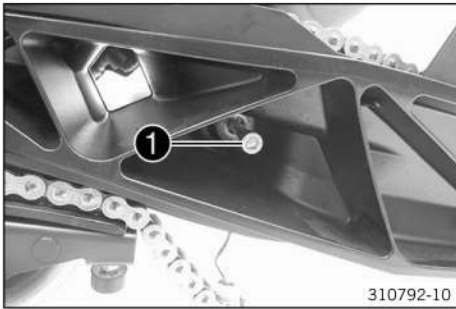


Procure tool (screw):

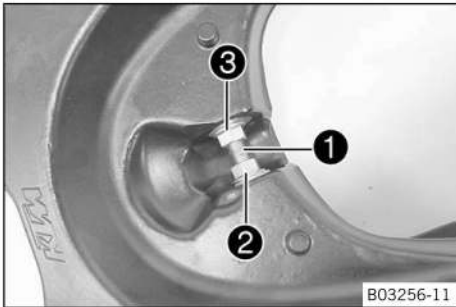
- Procure screw 1 and 2 collar nuts.

Guideline

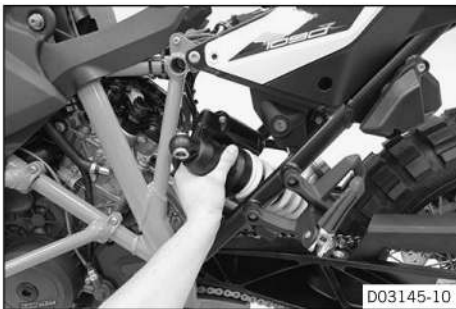
Screw	M10
Length	≥ 60 mm (≥ 2.36 in)



- Position screw **1** in the drill hole of the link fork.



- Mount both collar nuts **2** and **3** with the collar facing out.
- Hold screw **1**. Tighten collar nut **2** until it is in contact with the link fork.
 - ✓ Screw **1** rests against the link fork at collar nut **3**.
 - ✓ The centering bushing of the shock absorber is pressed into the link fork.
- Remove the screw and the nuts.



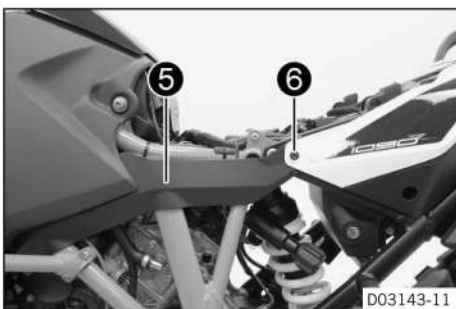
- Position the shock absorber.



- Mount and tighten screw **4**.

Guideline

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

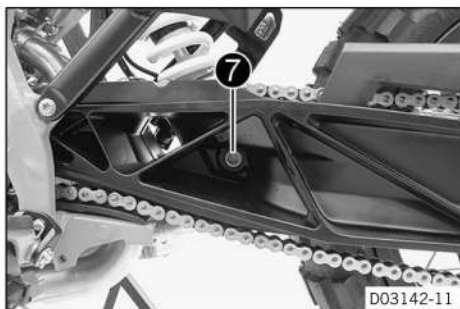


- Position heat protector **5**.
- Mount and tighten screw **6**.

Guideline

Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
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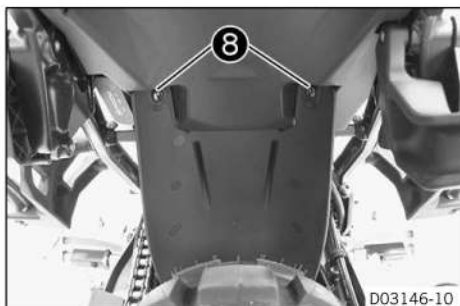
9 SHOCK ABSORBER, LINK FORK



- Lift the link fork and position the shock absorber.
- Mount and tighten screw 7.

Guideline

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



- Position the splash protector.
- Mount and tighten screws 8.

Guideline

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

Finishing work

- Mount the seat. (📖 p. 96)
- Remove the motorcycle from the work stand. (📖 p. 15)
- Install the main silencer. (📖 p. 82)

9.10 Changing the heim joint



Info

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

Preparatory work

- Remove the main silencer. (📖 p. 82)
- Raise the motorcycle with the work stand. (📖 p. 14)
- Remove the seat. (📖 p. 96)
- Remove the shock absorber. (📖 p. 51)

Main work

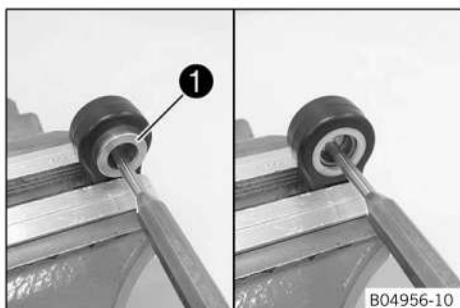
- Clamp the shock absorber into the vise.

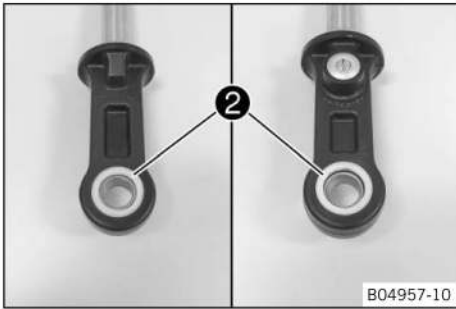
Guideline

Use soft jaws.

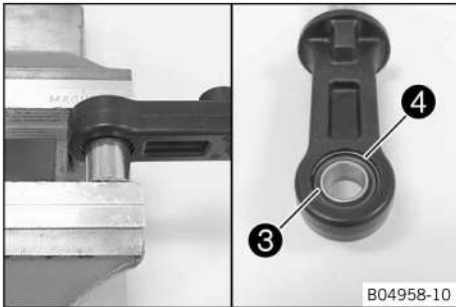
- Remove both collar bushings 1 of the heim joint with a drift.

Drift (T120) (📖 p. 426)





- Remove seal rings **2** on both sides.

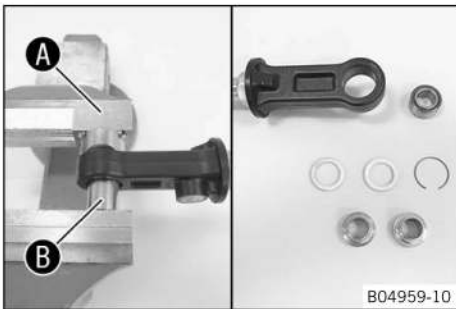


- Press heim joint **3** to the side.

Pressing tool (T1207S) (📖 p. 427)

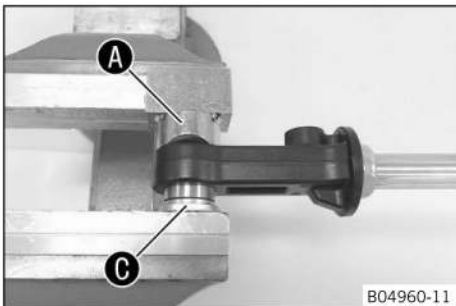
✓ The heim joint rests against a lock ring.

- Remove second lock ring **4**.



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

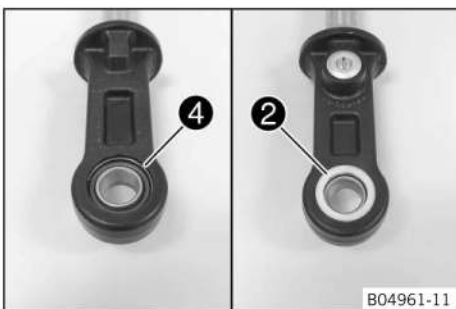
Pressing tool (T1207S) (📖 p. 427)



- Place special tool **A** underneath and, using special tool **C**, press the new heim joint up to the lock ring.

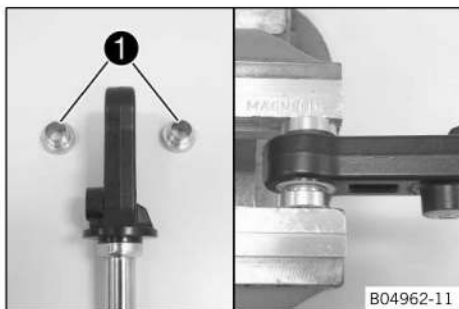
Pressing tool (T1207S) (📖 p. 427)

Pressing tool (T1206) (📖 p. 426)



- Mount second lock ring **4**.
- Mount and grease seal rings **2** on both sides.

Lubricant (T158) (📖 p. 408)



- Press in both collar bushings ❶ of the heim joint.

Finishing work

- Install the shock absorber. (📖 p. 52)
- Mount the seat. (📖 p. 96)
- Remove the motorcycle from the work stand. (📖 p. 15)
- Install the main silencer. (📖 p. 82)

9.11 Servicing the shock absorber



Caution

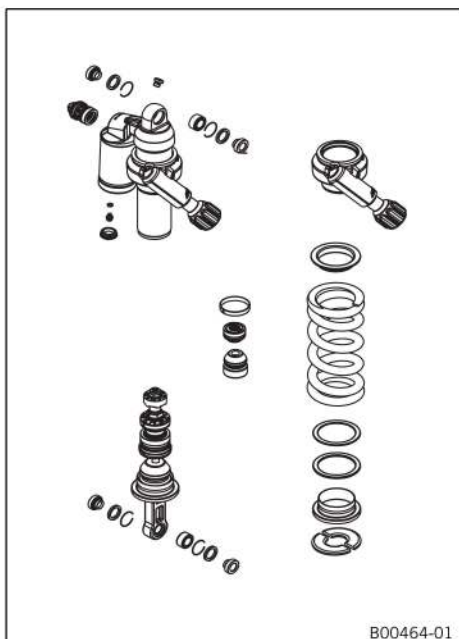
Risk of injury Parts of the shock absorber will move around if the shock absorber is detached incorrectly. The shock absorber is filled with highly compressed nitrogen.

- Please follow the description provided.

Condition

The shock absorber has been removed.

- Remove the spring. (📖 p. 57)
- Disassemble the damper. (📖 p. 58)
- Disassemble the piston rod. (📖 p. 59)
- Check the damper. (📖 p. 61)
- Remove the heim joint. (📖 p. 62)
- Install the heim joint. (📖 p. 63)
- Assemble the piston rod. (📖 p. 63)
- Assemble the damper. (📖 p. 65)
- Bleed and fill the damper. (📖 p. 68)
- Fill the damper with nitrogen. (📖 p. 71)
- Install the spring. (📖 p. 72)

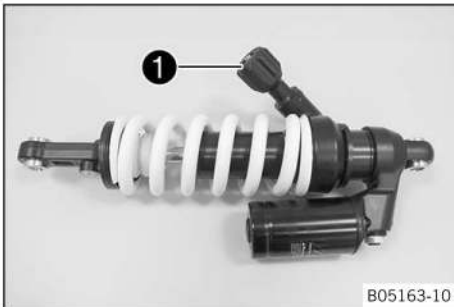


9.12 Removing the spring

Condition

The shock absorber has been removed.

- Note down the current state of the spring preload ①.
- Completely open the adjuster of the spring preload.



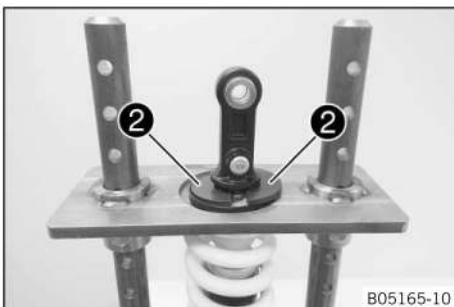
- Clamp the shock absorber into the special tool.

Spring compressor (T14050S) (📖 p. 429)

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



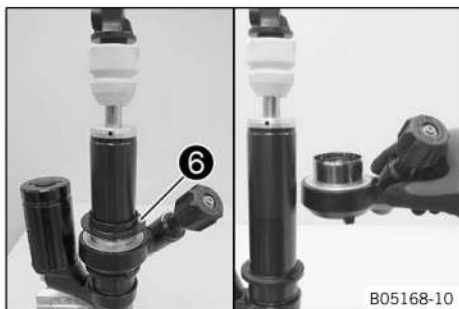
- Compress the spring. Remove half washers ②.
- Release the spring. Unclamp the shock absorber.



- Remove spring retainer ③.
- Remove washers ④ and ⑤.
- Remove the spring.



9 SHOCK ABSORBER, LINK FORK



- Remove spring seat ⑥.
- Take off preload adjuster.

9.13 Disassembling the damper

Preparatory work

- Remove the spring. (📖 p. 57)

Main work

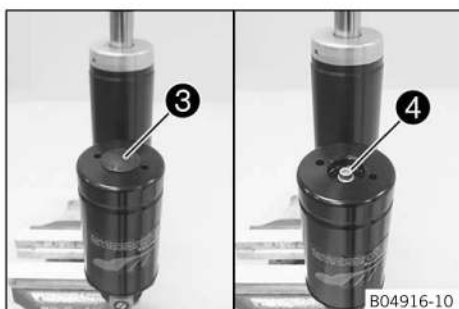
- Clamp the damper in the bench vise.

Guideline

Use soft jaws.



- Make a note of the present state of rebound ① and compression damping ②.
- Open the adjusters of the rebound and compression damping completely.



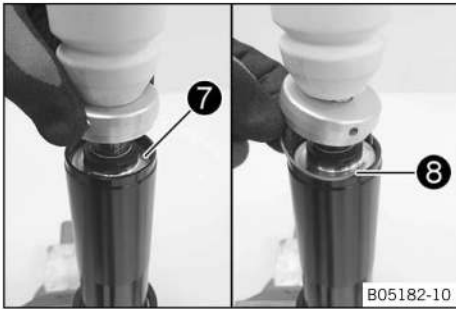
- Remove rubber cap ③ of the reservoir.
- Slowly open screw ④.
 - ✓ The nitrogen pressure dissipates.



- Remove screw ⑤. Let the oil drain. Mount the screw again.



- Remove locking cap ⑥.

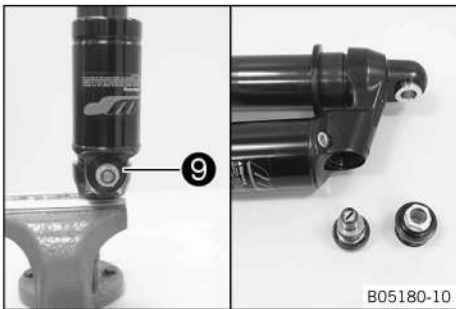


- Push in seal ring retainer 7.
- Remove lock ring 8.

i Info
Do not scratch the inside surface.



- Remove the piston rod. Drain the remaining oil.



- Remove compression adjuster 9. Remove the spring and piston.

9.14 Disassembling the piston rod

Preparatory work

- Remove the spring. (📖 p. 57)
- Disassemble the damper. (📖 p. 58)

Main work

- Clamp the piston rod into the vise.

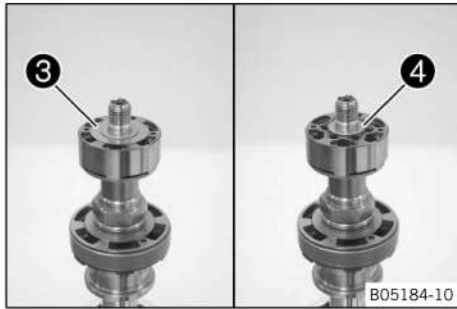
Guideline

Use soft jaws.

- Remove nut 1.
- Remove shim 2.



9 SHOCK ABSORBER, LINK FORK



- Remove shim ③ and washer ④.



Info

Put shims ②, ③ and washer ④ to one side together.

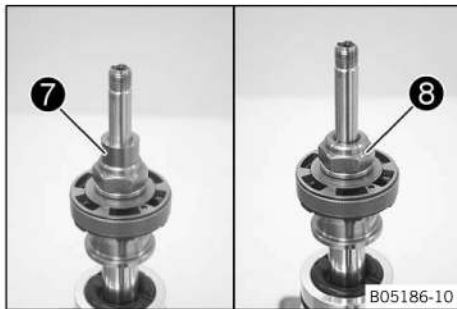


- Remove piston ⑤.
- Remove compression shim stack ⑥.



Info

Guide the compression shim stack onto a screwdriver and put them aside together.



- Remove distance sleeve ⑦.
- Remove nut ⑧.



- Remove washer ⑨.
- Remove rebound shim stack ⑩.



Info

Guide the rebound shim stack onto a screwdriver and put them aside together.



- Remove piston ⑪.
- Remove compression shim stack ⑫.

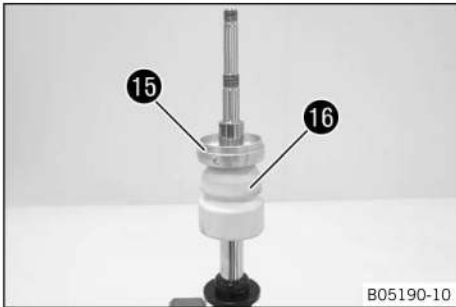


Info

Guide the compression shim stack onto a screwdriver and put them aside together.



- Remove rebound washer 13.
- Take off seal ring retainer 14.



- Remove locking cap 15 and rubber buffer 16.

9.15 Checking the damper

Condition

The damper has been disassembled.



- Measure the inside diameter at both ends and in the middle 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.
- Check the heim joint for damage and wear.
 - » If there is damage or wear:
 - Change the heim joint.
- Measure the diameter of the piston rod.

Piston rod	
Diameter	≥ 17.95 mm (≥ 0.7067 in)

- » If the specified value 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.

9.16 Removing the heim joint

i Info

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

Condition

The shock absorber has been removed.

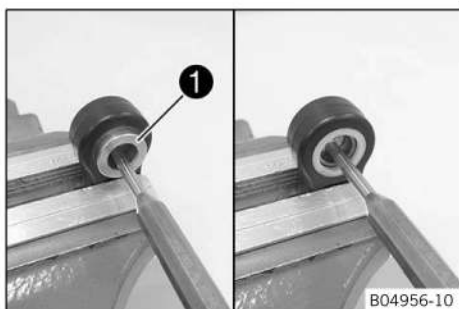
- Clamp the shock absorber into the vise.

Guideline

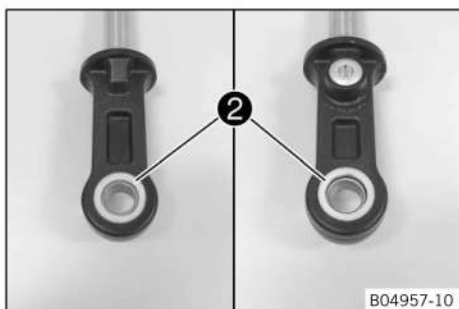
Use soft jaws.

- Remove both collar bushings **1** of the heim joint with a drift.

Drift (T120) (📖 p. 426)

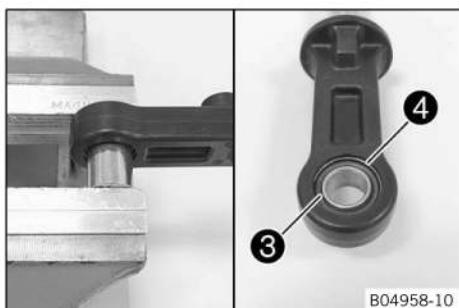


B04956-10



B04957-10

- Remove seal rings **2** on both sides.



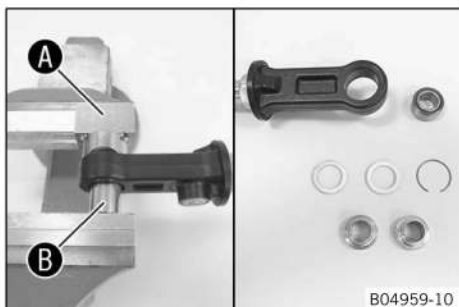
B04958-10

- Press heim joint **3** to the side.

Pressing tool (T1207S) (📖 p. 427)

- ✓ The heim joint rests against a lock ring.

- Remove the other lock ring **4**.



B04959-10

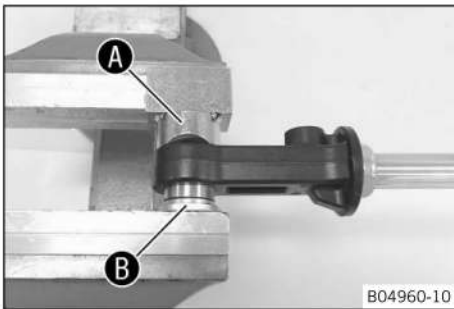
- Place special tool **A** underneath and press out the heim joint with special tool **B**.

Pressing tool (T1207S) (📖 p. 427)

9.17 Installing the heim joint

i Info

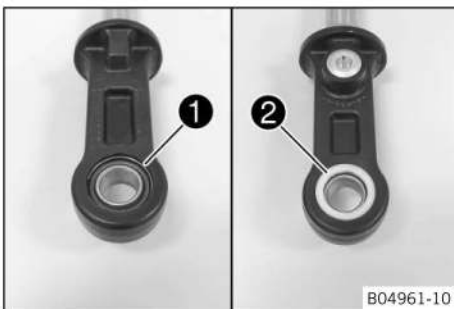
The operations are the same for the top and bottom heim joints.



- Place special tool **A** underneath and press in the heim joint to the lock ring using special tool **B**.

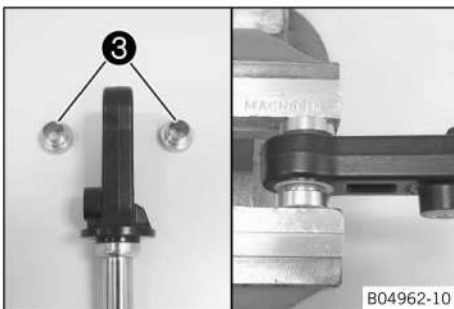
Pressing tool (T1207S) (📖 p. 427)

Pressing tool (T1206) (📖 p. 426)



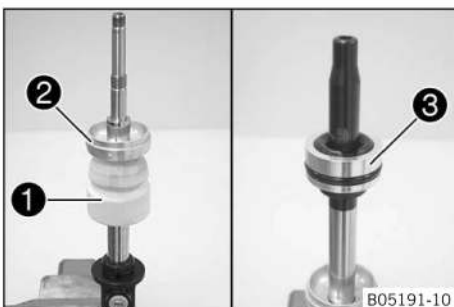
- Mount second lock ring **1**.
- Mount and grease seal rings **2** on both sides.

Lubricant (T158) (📖 p. 408)



- Press in both collar bushings **3** of the heim joint.

9.18 Assembling the piston rod



- Clamp the piston rod into the vise.

Guideline

Use soft jaws.

- Mount rubber buffer **1** and locking cap **2**.
- Position special tool on the piston rod.

Mounting sleeve (T1215) (📖 p. 427)

- Grease the dust boot and slide the seal ring retainer **3** onto the piston rod.

Lubricant (T625) (📖 p. 408)

- Remove the special tool.

9 SHOCK ABSORBER, LINK FORK



- Mount rebound washer **4**.
- Mount compression shim stack **5** with the smaller washers facing downward.



- Sand down piston **6** on both sides on a surface plate using 1200 grit sandpaper.
- Clean the piston.
- Mount the piston.

Guideline

View A	of piston from above
View B	of piston from below



- Mount rebound shim stack **7** with the smaller washers facing upward.
- Mount washer **8**.



- Lubricate the thread.

Lubricant (T152) (☞ p. 408)

- Mount and tighten nut **9** with the collar facing upward.

Guideline

Nut, piston rod	M12x1	40 Nm (29.5 lbf ft)
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- Mount distance sleeve **10**.



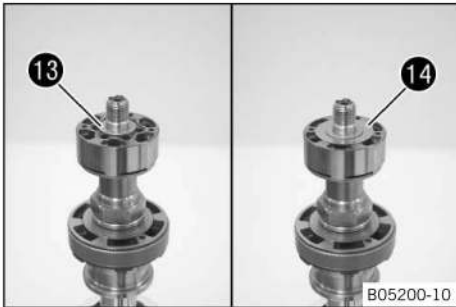
- Mount compression shim stack **11** with the smaller washers facing downward.



- Sand down piston 12 on both sides on a surface plate using 1200 grit sandpaper.
- Clean the piston.
- Mount the piston.

Guideline

View A	of piston from above
View B	of piston from below



- Mount washer 13 and shim 14.

i Info

Shim 14 is centered by washer 13.



- Mount shim 15.
- Mount and tighten nut 16 with the collar facing upward.

Guideline

Nut, piston rod, small rod	M10x1	30 Nm (22.1 lbf ft)
----------------------------	-------	---------------------

9.19 Assembling the damper

Preparatory work

- Assemble the piston rod. (📖 p. 63)

Main work

- Slide the spring and piston onto compression adjuster 1.
- Lubricate the O-rings.

Lubricant (T158) (📖 p. 408)

- Lubricate the thread.

Lubricant (T159) (📖 p. 408)

- Mount and tighten the compression adjuster.

Guideline

Compression damping adjuster	M31x1	35 Nm (25.8 lbf ft)
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9 SHOCK ABSORBER, LINK FORK



- Ensure that screw ② is mounted but not yet tightened.



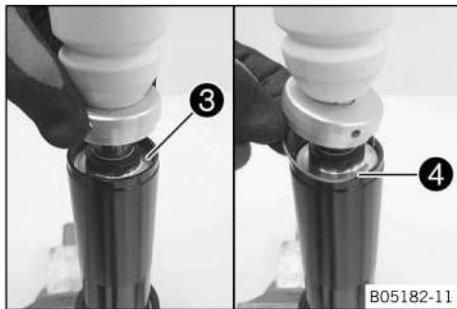
- Lubricate the O-ring of the seal ring retainer.

Lubricant (T158) (📖 p. 408)

- Fill the damper cartridge about half full.

Shock absorber fluid (SAE 2.5) (50180751S1) (📖 p. 407)

- Mount the piston rod carefully.



- Mount seal ring retainer ③ and slide it under the ring groove.

- Mount lock ring ④.



Info

Do not scratch the inside surface.

- Pull out the piston rod until the seal ring retainer is flush with the lock ring.



- Mount locking cap ⑤ of the damper cartridge.

- Bleed and fill the damper. (📖 p. 68)

- Fill the damper with nitrogen. (📖 p. 71)



- Mount rubber cap ⑥ of the reservoir.



Alternative 1

- Turn adjusting screw 7 clockwise up to the last perceptible click.
- Turn 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

- Turn adjusting screw 8 clockwise with a screwdriver as far as the last perceptible click.
- Turn counterclockwise by the number of clicks corresponding to the shock absorber type.

Guideline

Low-speed compression damping	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks

- Turn adjusting screw 9 all the way clockwise with a socket wrench.
- Turn counterclockwise by the number of turns corresponding to the shock absorber type.

Guideline

High-speed compression damping	
Comfort	1.5 turns
Standard	1.5 turns
Sport	1 turn
Full payload	1 turn

Alternative 2



Warning

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

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

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

- Position adjusting screws 7, 8, and 9 in the location determined during disassembly.

9.20 Bleeding and filling the damper

i Info

Before working with the vacuum pump, carefully read the operating manual included with the vacuum pump.
Open the adjusters of the rebound and compression damping completely.



- Remove the filling port screw.
- Mount adapter **1** on the damper.

i Info

Hand-tighten only without using a tool.

- Connect adapter **1** to connector **2** of the vacuum pump.

Vacuum pump (T1240S) (p. 427)

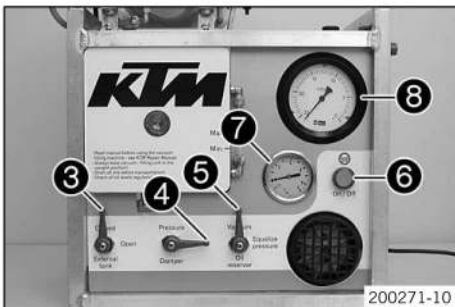
- Clamp the damper as shown.

Guideline

Use soft jaws.

i Info

Only clamp the damper lightly.
The filling port must be located at the highest position.
The piston rod moves in and out during filling; do not immobilize it by holding it with your hand.



- Adjust the control lever as shown.
 - ✓ Control lever **External tank 3** is set to **Closed**, **Damper 4** is set to **Vacuum** and **Oil reservoir 5** is set to **Vacuum**.

- Activate **On/Off switch 6**.

- ✓ The suction process begins.
- ✓ Pressure gauge **7** drops to the required value.

< 0 bar

- ✓ Vacuum gauge **8** drops to the required value.

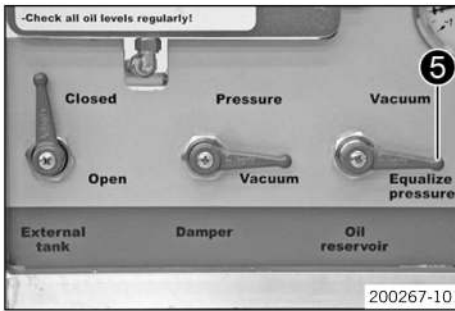
4 mbar



- Determine distance **A** between the floating piston and reservoir hole with the special tool.

Depth micrometer (T107S) (p. 426)

- ✓ The floating piston is located in the lowermost position.



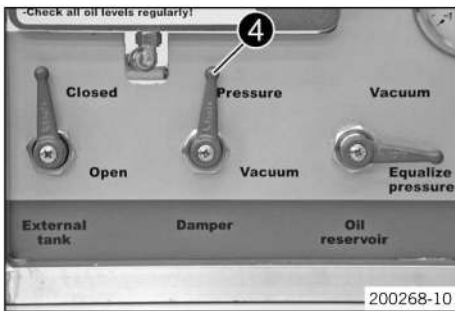
- When the vacuum gauge reaches the required value, turn control lever **Oil reservoir 5** to **Equalize pressure**.

Guideline

4 mbar

- ✓ The pressure gauge increases to the required value.

0 bar



- When the pressure gauge reaches the specified value, turn control lever **Damper 4** to **Pressure**.

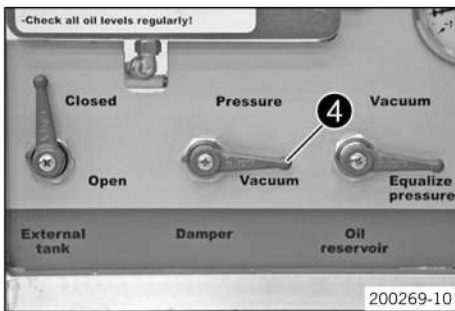
Guideline

0 bar

- ✓ Oil is pumped into the damper.

- ✓ The pressure gauge increases to the required value.

3 bar



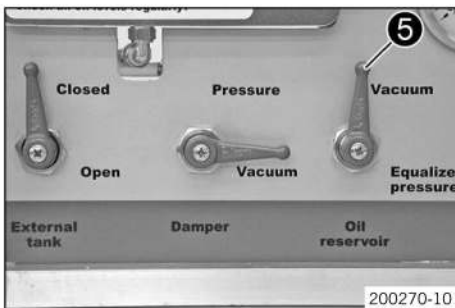
- When the pressure gauge reaches the specified value, turn control lever **Damper 4** to **Vacuum**.

Guideline

3 bar

- ✓ The pressure gauge drops to the required value.

0 bar



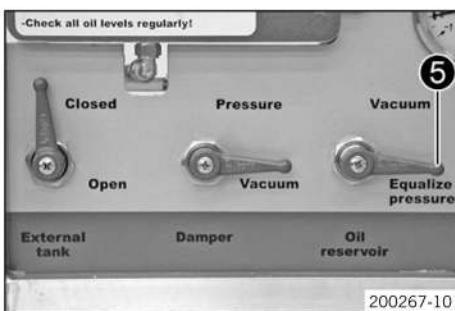
- When the pressure gauge reaches the specified value, turn control lever **Oil reservoir 5** to **Vacuum**.

Guideline

0 bar

- ✓ The vacuum gauge drops to the required value.

4 mbar



- When the vacuum gauge reaches the required value, turn control lever **Oil reservoir 5** to **Equalize Pressure**.

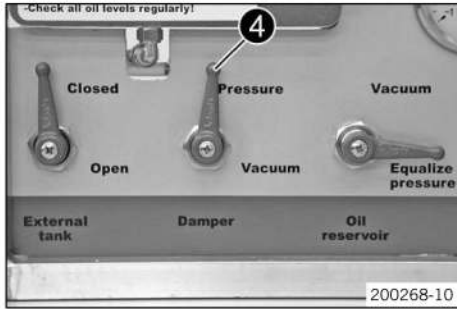
Guideline

4 mbar

- ✓ The pressure gauge drops to the required value.

0 bar

9 SHOCK ABSORBER, LINK FORK



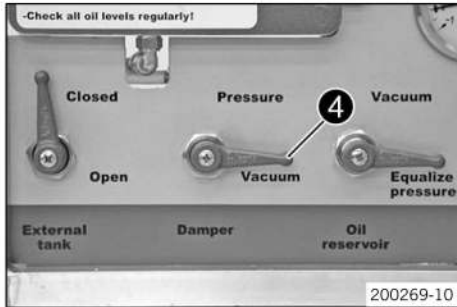
- When the pressure gauge reaches the specified value, turn control lever **Damper 4** to **Pressure**.

Guideline

0 bar

- ✓ Oil is pumped into the damper.
- ✓ The pressure gauge increases to the required value.

3 bar



- When the pressure gauge reaches the specified value, turn control lever **Damper 4** to **Vacuum**.

Guideline

3 bar

- ✓ The pressure gauge drops to the required value.

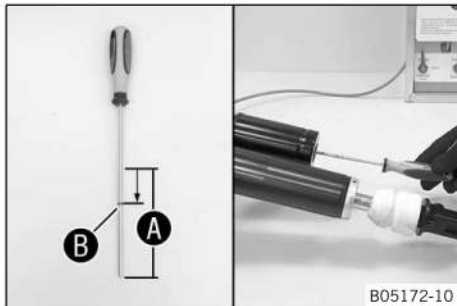
0 bar

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

Guideline

0 bar

- ✓ The vacuum pump is switched off.



- Slide O-ring **B** to the end of the special tool by the specified value (distance **A** minus specified value).

Guideline

5 mm

Depth micrometer (T107S) (p. 426)

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

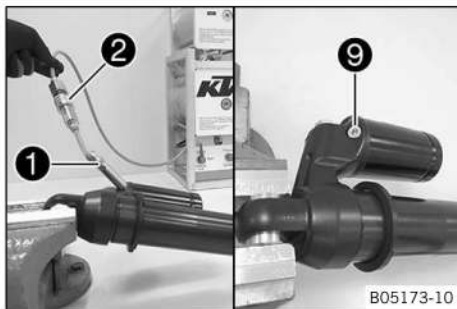
i Info

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

- Remove the special tool.
- Remove adapter **1** from connector **2** of the vacuum pump.

i Info

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



- Remove the adapter.
- Mount and tighten screw **9**.

Guideline

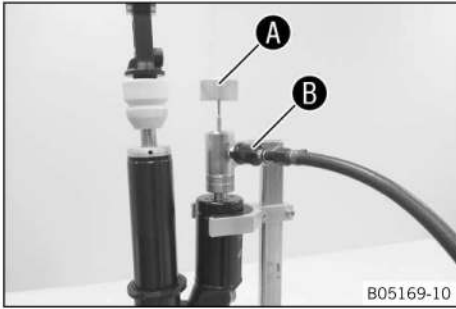
Screw, filling port	M10x1	14 Nm (10.3 lbf ft)
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9.21 Filling the damper with nitrogen



- Screw in screw **1** by approx. 2 turns but do not tighten.

i Info
The piston rod is fully extended.



- Fix the special tool in the vise.

Filling tool (T170S1) (📄 p. 429)

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

Filling gas - nitrogen

- Adjust the pressure regulator.

Guideline

Gas pressure	10 bar (145 psi)
--------------	------------------

- Position the damper in the special tool.

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

- Open filler tap **B**.
- Fill the damper for at least 15 seconds.

Guideline

Gas pressure	10 bar (145 psi)
--------------	------------------

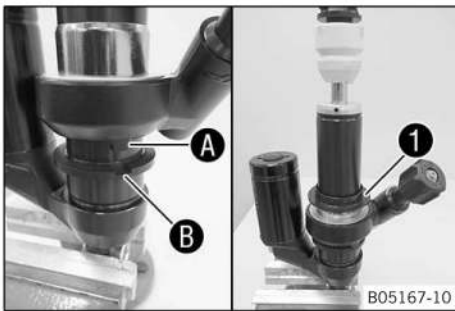
i Info
Watch the pressure regulator dial.
Ensure that the damper is filled to the specified pressure.

- Close the filling port screw using tap handle **A**.
- Close tap **B** and take the damper out of the special tool.
- Tighten the filling port screw.

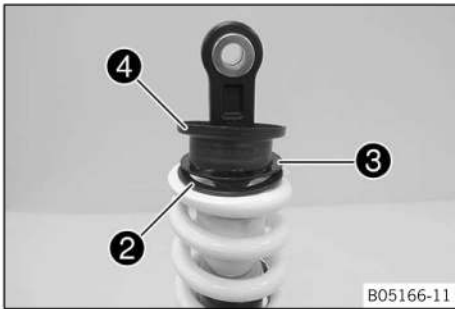
Guideline

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

9.22 Installing the spring



- Position preload adjuster.
- ✓ Holding lug **A** engages in groove **B**.
- Mount spring seat **1**.



- Position the spring.
- Position washers **2** and **3**.

i Info
Place on the thicker washers first.

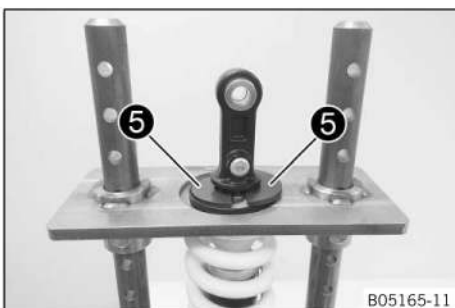
- Mount spring retainer **4**.



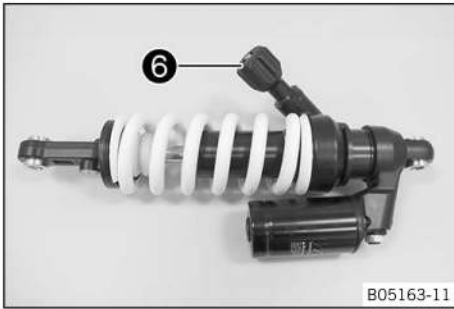
- Clamp the shock absorber into the special tool.

Spring compressor (T14050S) (📖 p. 429)

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



- Compress the spring. Mount half washers **5**.
- Release the spring. Unclamp the shock absorber.



Alternative 1

- Tension the spring by turning adjuster ⑥ to the specified value.

Guideline

Spring preload	
Comfort	2 turns
Standard	2 turns
Sport	2 turns
Full payload	18 turns

Alternative 2



Warning

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

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

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

- Tension the spring to the length measured during disassembly by turning the adjuster.

9.23 Checking the link fork



- Check the link fork for damage, cracking, and deformation.
 - » If the link fork exhibits damage, cracking, or deformation:
 - Change the link fork.



Info

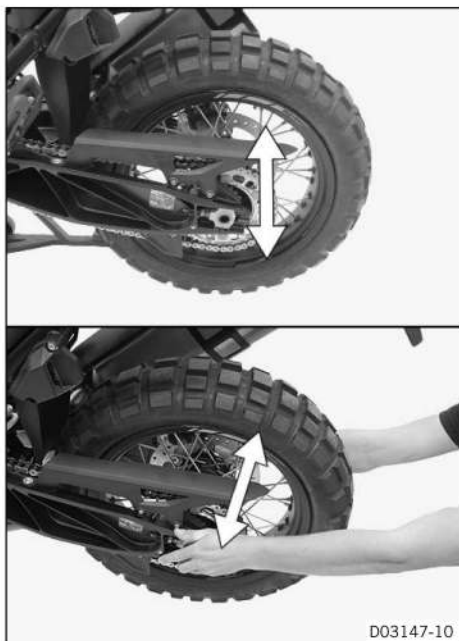
Always replace a damaged link fork. Repairing the link fork is not authorized by KTM.

9.24 Checking the fork bearing for play

Preparatory work

- Raise the motorcycle with the work stand (inserted). (📖 p. 15)
- Place a load on the front of the vehicle.
 - ✓ The rear wheel is not in contact with the ground.

9 SHOCK ABSORBER, LINK FORK



Main work

- Move the link fork up and down.
 - » If there is detectable play:
 - Change the fork bearing. (🔧 p. 78)
- Move the link fork from one side to the other.
 - » If there is detectable play:
 - Change the fork bearing. (🔧 p. 78)

Finishing work

- Remove the motorcycle from the work stand. (🔧 p. 15)
- Install the main silencer. (🔧 p. 82)

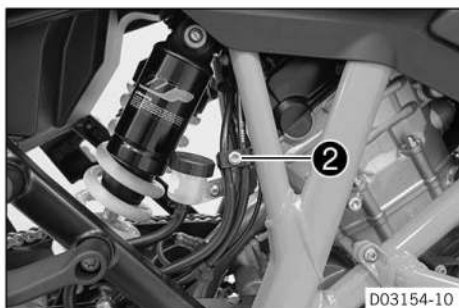
9.25 Removing the link fork

Preparatory work

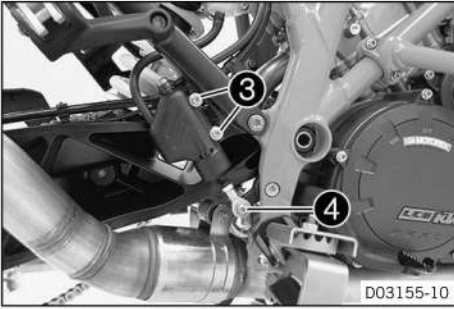
- Remove the main silencer. (🔧 p. 82)
- Raise the motorcycle with the work stand. (🔧 p. 14)
- Remove the rear wheel (work stand). (🔧 p. 135)

Main work

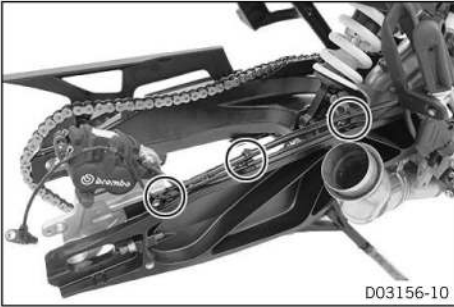
- Remove screws **1**. Remove the splash protector.



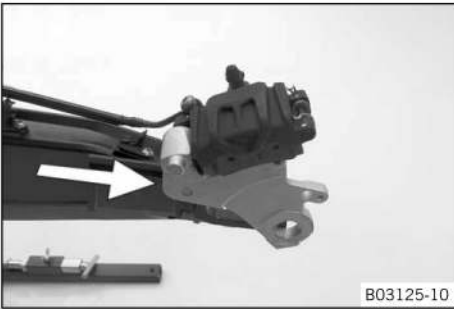
- Remove screw **2**.
- Take off the cable holder.



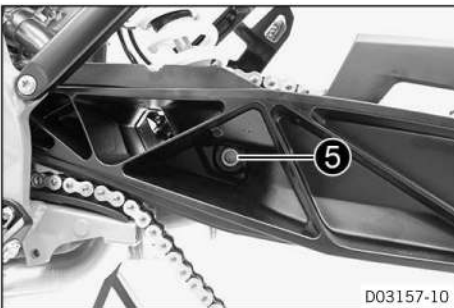
- Remove screws ③.
- Remove screw ④.
- Hang the foot brake cylinder to the side.



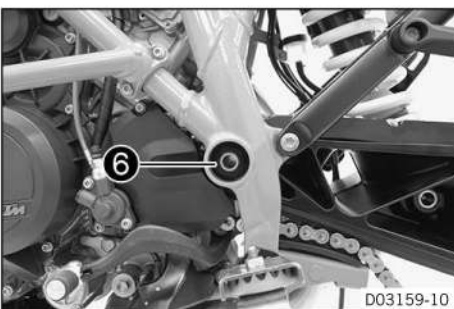
- Take the brake line and cable out of the holders.



- Pull brake caliper back and hang to the side.

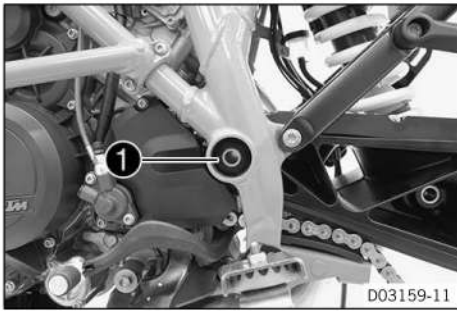


- Remove screw ⑤.
- Push the link fork down and away from the shock absorber.



- Remove nut ⑥.
- Remove the fork pivot.
- Take off the link fork.

9.26 Installing the link fork



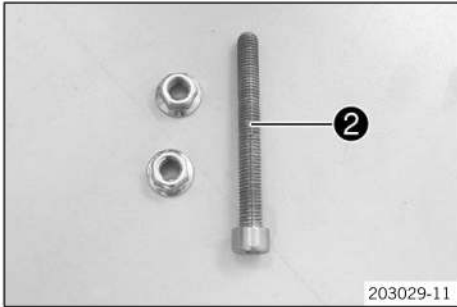
D03159-11

Main work

- Position the swingarm.
- Mount the fork pivot.
- Mount and tighten nut ①.

Guideline

Nut, fork pivot	M19x1.5	130 Nm (95.9 lbf ft) Thread greased
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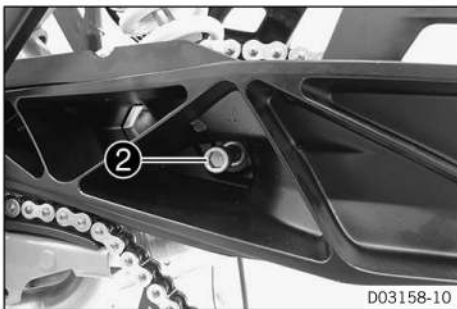
203029-11

Procure tool (screw):

- Procure screw ② and 2 collar nuts.

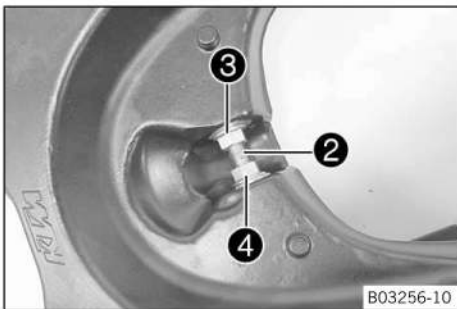
Guideline

Screw	M10
Length	≥ 60 mm (≥ 2.36 in)



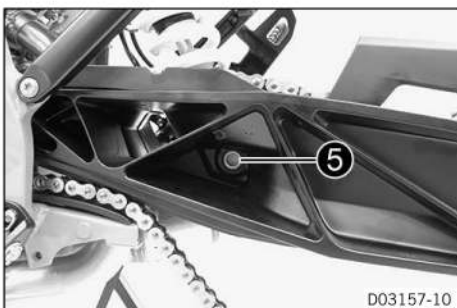
D03158-10

- Position screw ② in the drill hole of the link fork.



B03256-10

- Mount both collar nuts ③ and ④ with the collar facing out.
- Hold screw ②. Tighten collar nut ③ until it is in contact with the link fork.
- ✓ Screw ② rests against the link fork at collar nut ④.
- ✓ The centering bushing of the shock absorber is pressed into the link fork.
- Remove the screw and the nuts.

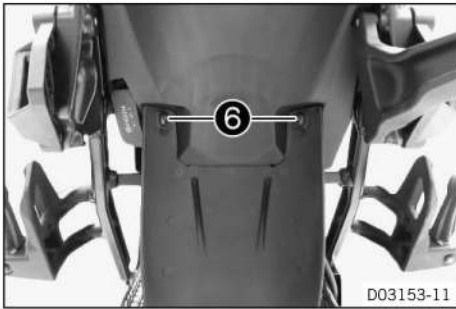


D03157-10

- Lift the link fork and position the shock absorber.
- Mount and tighten screw ⑤.

Guideline

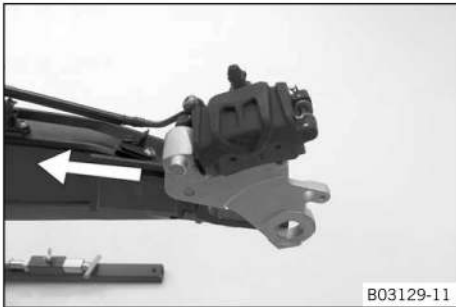
Screw, bottom shock absorber	M14x1.5	80 Nm (59 lbf ft) Thread greased
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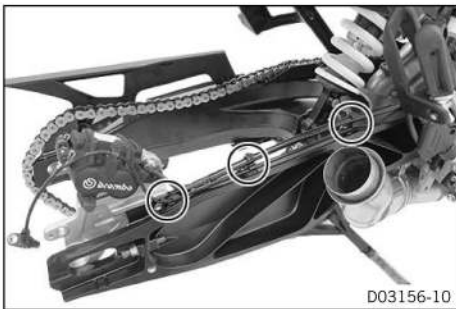
- Position the splash protector.
- Mount and tighten screws ⑥.

Guideline

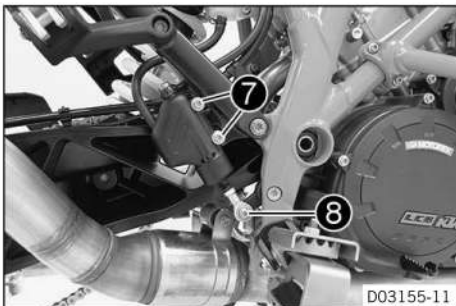
Remaining screws, chassis	M5	5 Nm (3.7 lbf ft)
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- Position the brake caliper.



- Secure the brake line and cable in the holders.



- Position the foot brake cylinder.
- Mount and tighten screws ⑦.

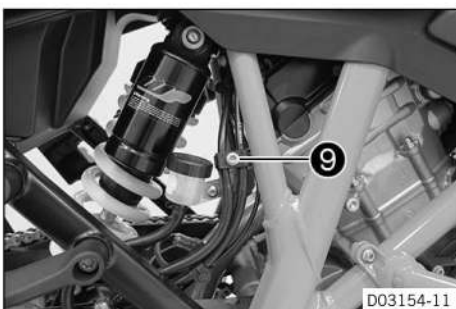
Guideline

Screw, foot brake cylinder	M6	10 Nm (7.4 lbf ft) Loctite®243™
----------------------------	----	---

- Mount and tighten screw ⑧.

Guideline

Screw, ball joint of push rod on foot brake cylinder	M6	10 Nm (7.4 lbf ft) Loctite®243™
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- Position the cable holder.
- Mount and tighten screw ⑨.

Guideline

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

Finishing work

- Install the rear wheel (work stand). (📖 p. 136)
- Remove the motorcycle from the work stand. (📖 p. 15)
- Install the main silencer. (📖 p. 82)
- Check the chain tension. (📖 p. 143)
- Remove the rear of the motorcycle from the lifting gear. (📖 p. 14)

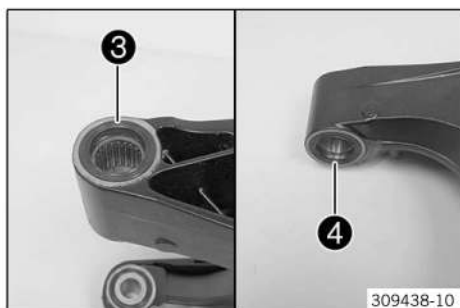
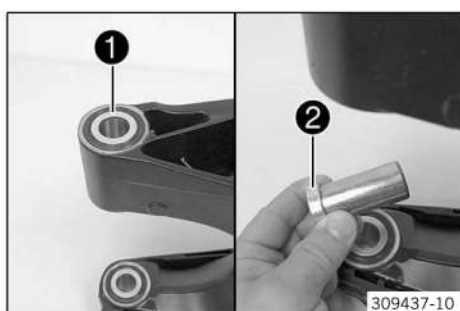
9.27 Changing the fork bearing

Preparatory work

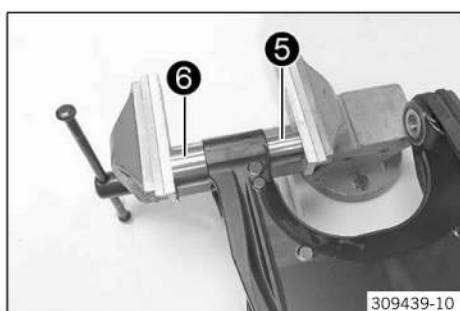
- Remove the main silencer. (📖 p. 82)
- Raise the motorcycle with the work stand. (📖 p. 14)
- Remove the rear wheel (work stand). (📖 p. 135)
- Remove the link fork. (📖 p. 74)

Right fork bearing

- Remove outer collar bushing **1**.
- Remove the inner collar bushing **2** together with the bushing.



- Remove shaft seal rings **3** and **4**.



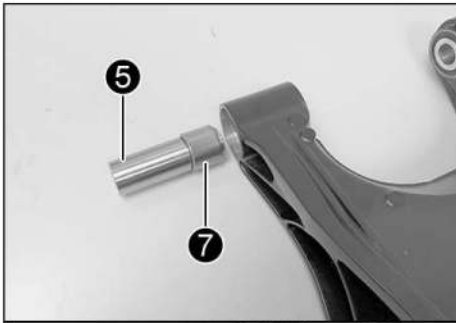
- Position special tool **5** in the needle bearing from the inside.

Pressing tool (61329004100) (📖 p. 420)

- Position special tool **6** on the link fork from the outside.

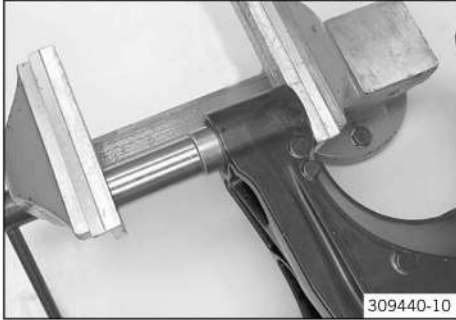
Pressing tool (61329004200) (📖 p. 421)

- Push out the needle bearing.

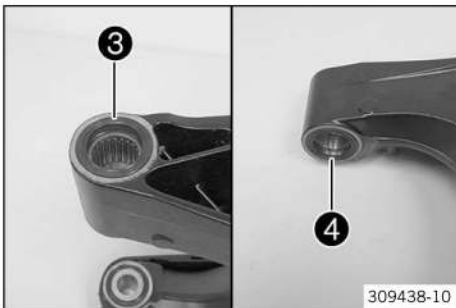


- Position the new needle bearing **7** on special tool **5**.

Pressing tool (61329004100) (📖 p. 420)

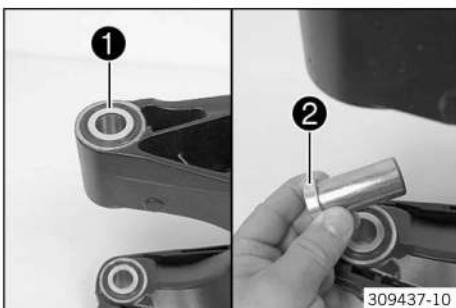


- Position the special tool with the bearing on the link fork from the outside.
- Push in the needle bearing until it is flush.



- Grease new shaft seal rings **3** and **4** and press in until they are flush.

Long-life grease (📖 p. 408)

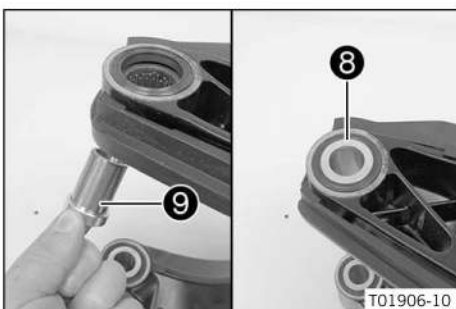


- Grease the needle bearing.

Long-life grease (📖 p. 408)

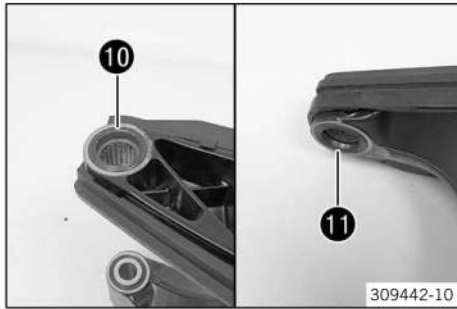
- Mount the inner collar bushing **2** together with the bushing.
- Mount the outer collar bushing **1**.

Left fork bearing

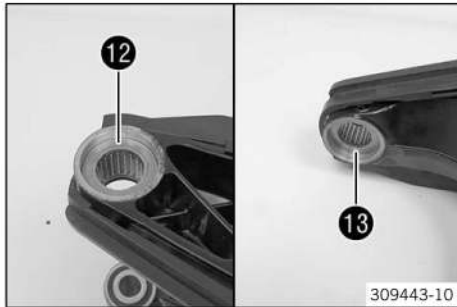


- Remove outer collar bushing **8**.
- Remove the inner collar bushing **9** together with the bushing.

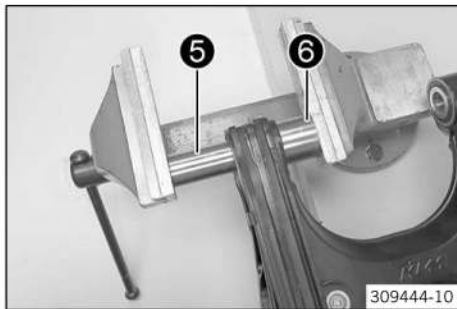
9 SHOCK ABSORBER, LINK FORK



- Remove shaft seal rings **10** and **11**.



- Remove stop disks **12** and **13**.



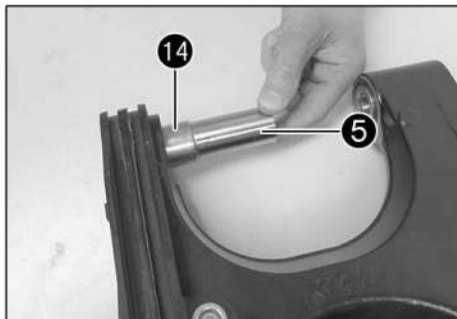
- Position special tool **5** in the needle bearing.

Pressing tool (61329004100) (📖 p. 420)

- Position the special tool **6** in the link fork.

Pressing tool (61329004200) (📖 p. 421)

- Push out the needle bearing.

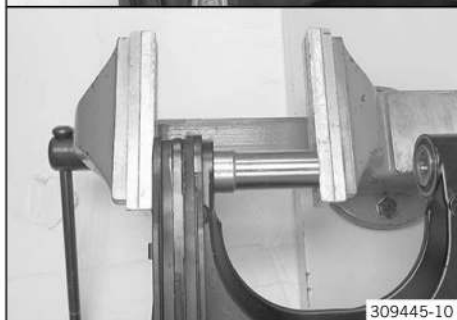


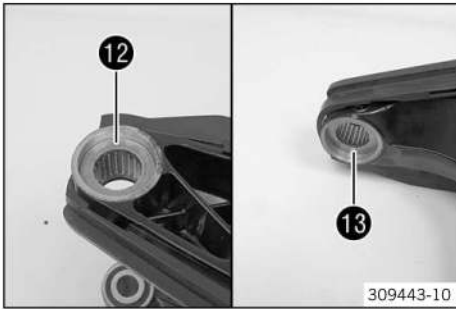
- Position the new needle bearing **14** on special tool **5**.

Pressing tool (61329004100) (📖 p. 420)

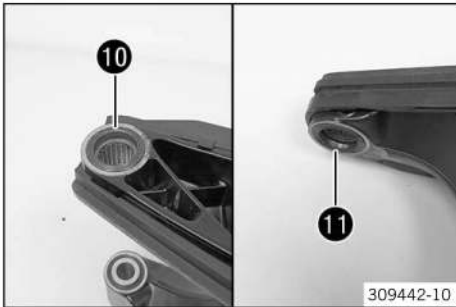
- Position the special tool with the bearing on the link fork.

- Push in the needle bearing until it is flush.



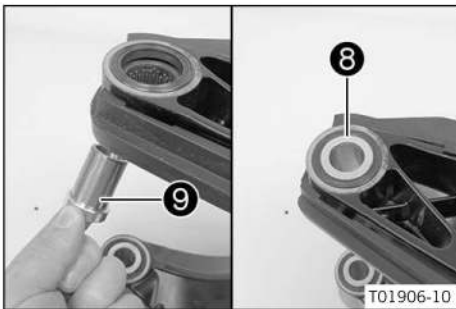


- Position stop disks **12** and **13**.



- Grease new shaft seal rings **10** and **11** and press in until they are flush.

Long-life grease (📖 p. 408)



- Grease the needle bearing.

Long-life grease (📖 p. 408)

- Mount the inner collar bushing **9** together with the bushing.
- Mount the outer collar bushing **8**.

Finishing work

- Install the link fork. (📖 p. 76)
- Install the rear wheel (work stand). (📖 p. 136)
- Remove the motorcycle from the work stand. (📖 p. 15)
- Install the main silencer. (📖 p. 82)
- Check the chain tension. (📖 p. 143)
- Remove the rear of the motorcycle from the lifting gear. (📖 p. 14)

10.1 Removing the main silencer



- Remove screw **1**.
- Take off the exhaust clamp.



- Remove screw **2** with the washer.
- Take off the main silencer with the main silencer clamp.

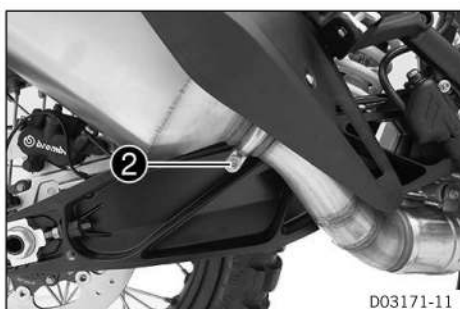
10.2 Installing the main silencer



- Position the main silencer with the main silencer clamp.
- Mount screw **1** with the washer but do not tighten yet.

Guideline

Screw, exhaust clamp	M8	25 Nm (18.4 lbf ft)
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- Position the exhaust clamp.
- Mount and tighten screw **2**.

Guideline

Screw, exhaust clamp	M6	8 Nm (5.9 lbf ft)
----------------------	----	-------------------



- Tighten screw **1**.

Guideline

Screw, exhaust clamp	M8	25 Nm (18.4 lbf ft)
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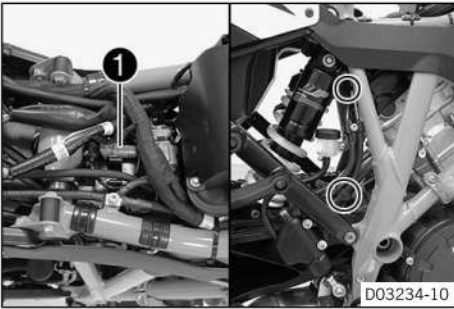
10.3 Removing the manifold

Preparatory work

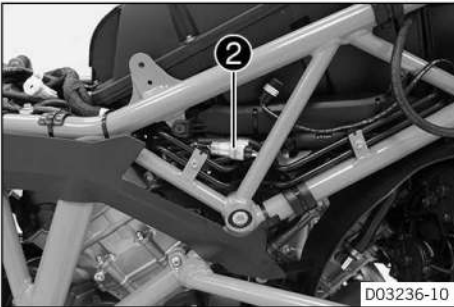
- Remove the main silencer. (📖 p. 82)
- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)
- Remove the fuel tank. (📖 p. 96)
- Raise the motorcycle with the work stand. (📖 p. 14)

Main work

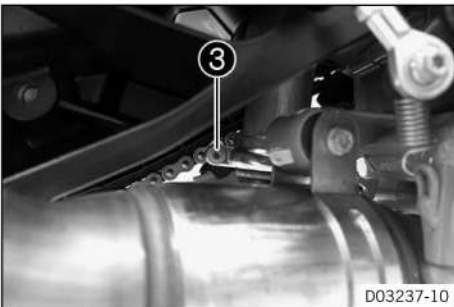
- Pull off plug-in connector ❶ from plug holder and disconnect.
- Remove the cable ties and expose the cable.



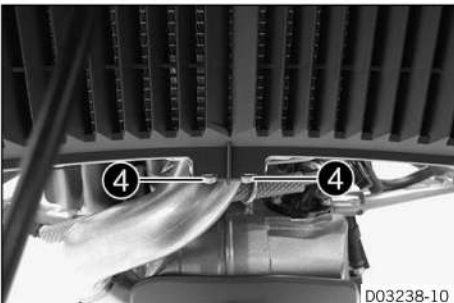
- Disconnect plug-in connector ❷.
- Expose the cable.



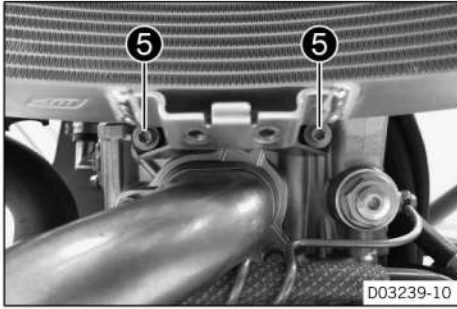
- Remove screw ❸.
- Take off the exhaust clamp.



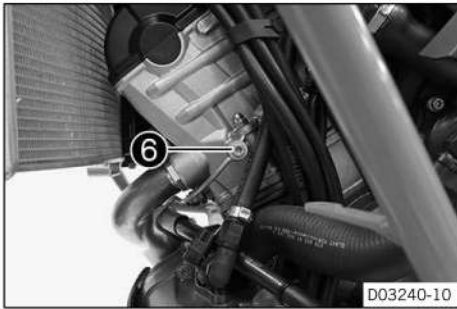
- Remove screws ❹.
- Remove the radiator shield.



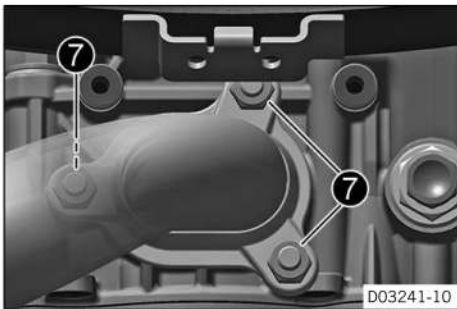
10 EXHAUST SYSTEM



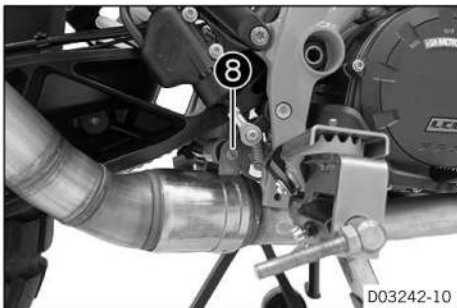
- Remove screws 5.
- Take off the retaining bracket.



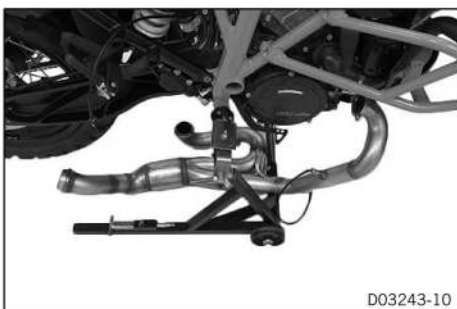
- Remove screw 6.
- Remove fuel hose connection with attachment.



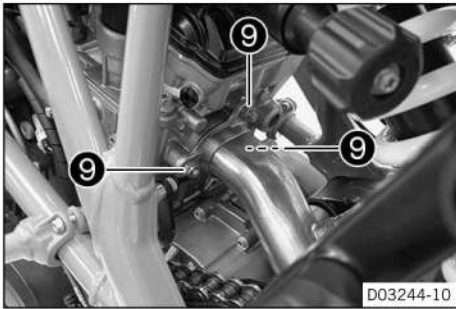
- Remove nuts 7.



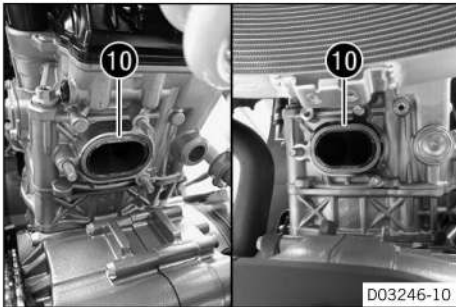
- Remove screw 8.



- Lower manifold and take off in a forward direction.

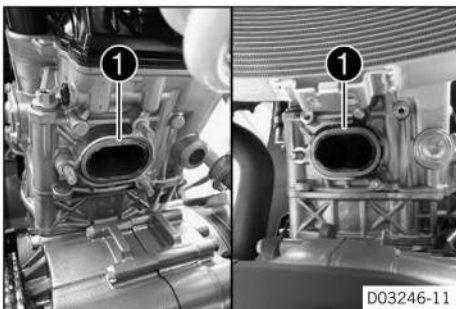


- Remove nuts 9.
- Remove the manifold in a downward direction.



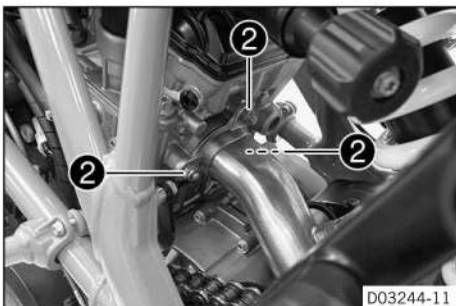
- Remove exhaust gaskets 10.

10.4 Installing the manifold



Main work

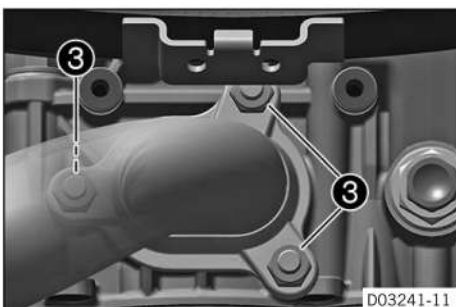
- Position exhaust gaskets 1.



- Position the manifold from below.
- Mount nuts 2, but do not tighten yet.

Guideline

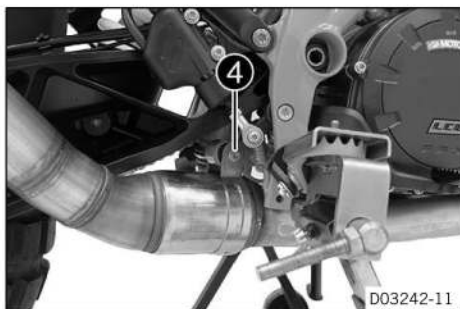
Nut, manifold on cylinder head	M8	Tightening sequence: Tighten the nuts evenly. Do not bend the metal. 25 Nm (18.4 lbf ft)
--------------------------------	----	--



- Position manifold to the front.
- Mount nuts 3, but do not tighten yet.

Guideline

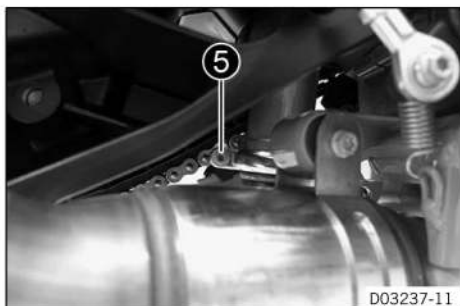
Nut, manifold on cylinder head	M8	Tightening sequence: Tighten the nuts evenly. Do not bend the metal. 25 Nm (18.4 lbf ft)
--------------------------------	----	--



- Mount and tighten screw 4.

Guideline

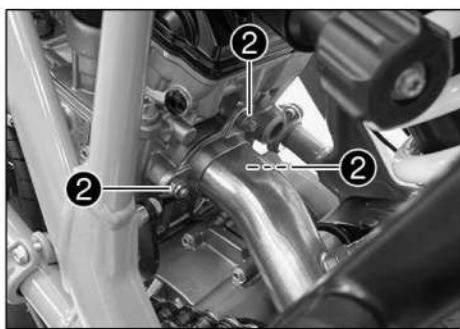
Screw, exhaust clamp	M8	25 Nm (18.4 lbf ft)
----------------------	----	---------------------



- Position the exhaust clamp.
- Mount and tighten screw 5.

Guideline

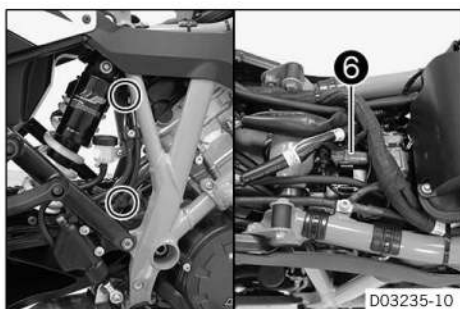
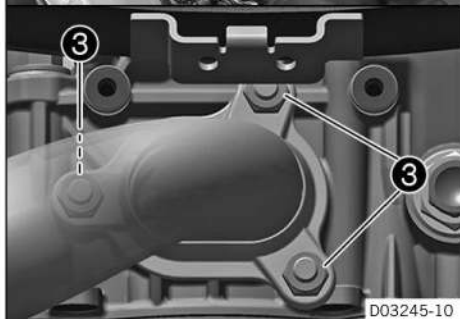
Screw, exhaust clamp	M6	8 Nm (5.9 lbf ft)
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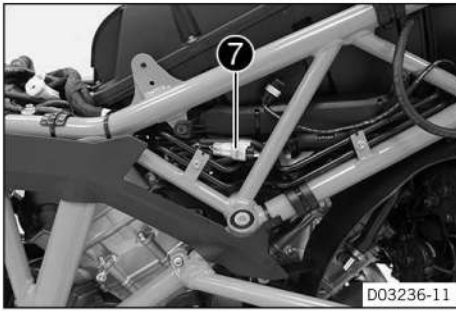
- Tighten nuts 2 and 3.

Guideline

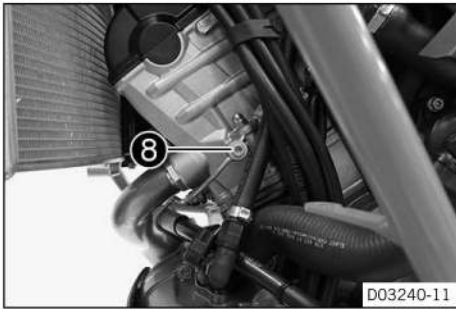
Nut, manifold on cylinder head	M8	Tightening sequence: Tighten the nuts evenly. Do not bend the metal. 25 Nm (18.4 lbf ft)
--------------------------------	----	--



- Route the cable without tension and secure with a cable tie.
- Join the plug-in connector 6 and position in the plug holder.



- Route the cable without tension.
- Join plug-in connector 7.



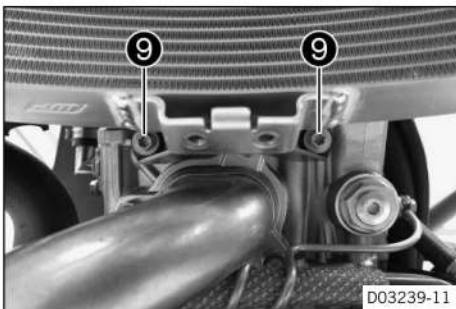
- Position fuel hose connection with bracket and press fully downwards.

i Info
The fuel hose connection must not touch the manifold.

- Mount and tighten screw 8.

Guideline

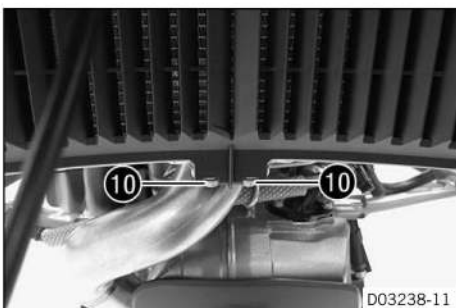
Fuel hose connection bracket	M6	10 Nm (7.4 lbf ft) Loctite®243™
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- Position the retaining bracket.
- Mount and tighten screws 9.

Guideline

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



- Position the radiator shield.
- Mount and tighten screws 10.

Guideline

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

Finishing work

- Install the fuel tank. (🔧 p. 98)
- Install the mask spoiler. (🔧 p. 114)
- Install the fuel tank cover. (🔧 p. 112)
- Install the front side cover. (🔧 p. 110)
- Mount the seat. (🔧 p. 96)
- Remove the motorcycle from the work stand. (🔧 p. 15)
- Install the main silencer. (🔧 p. 82)

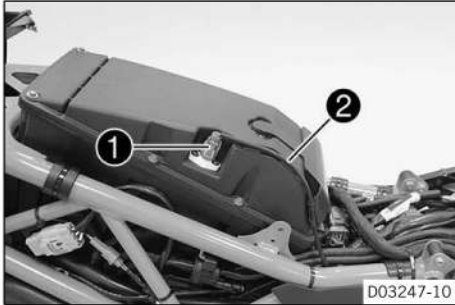
11.1 Removing the upper part of the air filter box

Preparatory work

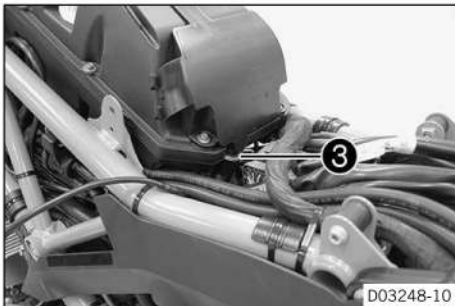
- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)
- Remove the fuel tank. (📖 p. 96)

Main work

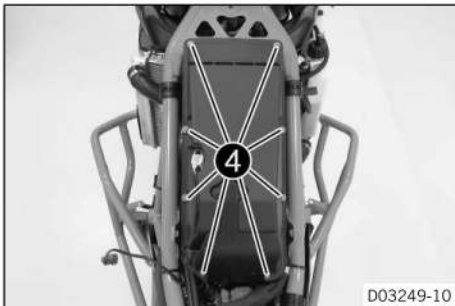
- Unplug connector ①.
- Expose cable ②.



- Push back hose clip ③.
- Pull off the air release hose.



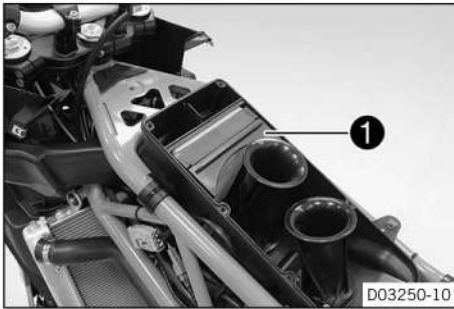
- Remove screws ④.
- Remove the upper part of the air filter box.



11.2 Changing the air filter, cleaning the air filter box

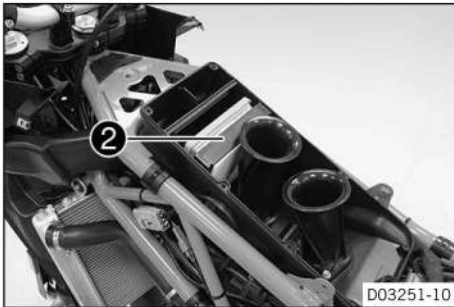
Preparatory work

- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)
- Remove the fuel tank. (📖 p. 96)
- Remove the upper part of the air filter box. (📖 p. 88)

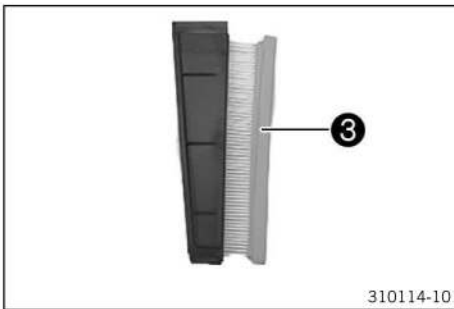


Main work

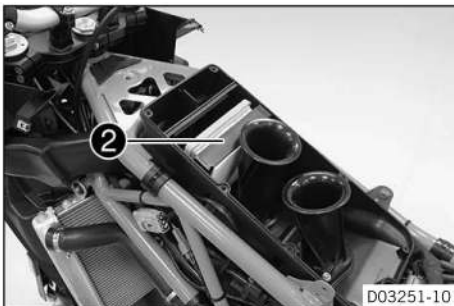
- Remove air filter clamping wedge **1** toward the top.



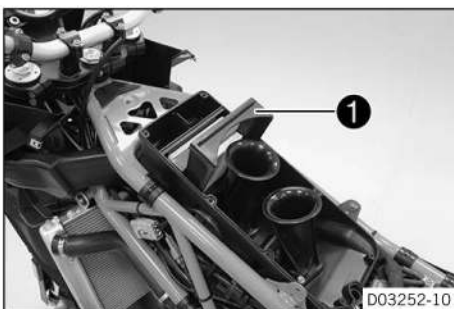
- Remove air filter frame **2** with the air filter.



- Clean the air filter box.
- Position new air filter **3** in the air filter frame.



- Position air filter frame **2** in the lower section of the air filter box together with the air filter.
- ✓ The broad side of the air filter frame faces the engine.



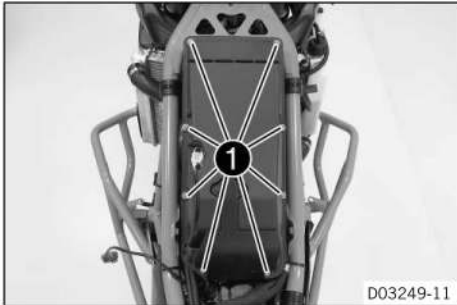
- Mount air filter clamping wedge **1**.
- ✓ The narrow side of the air filter clamping wedge faces the engine.

Finishing work

- Install the upper part of the air filter box. (📖 p. 90)
- Install the fuel tank. (📖 p. 98)
- Install the mask spoiler. (📖 p. 114)
- Install the fuel tank cover. (📖 p. 112)

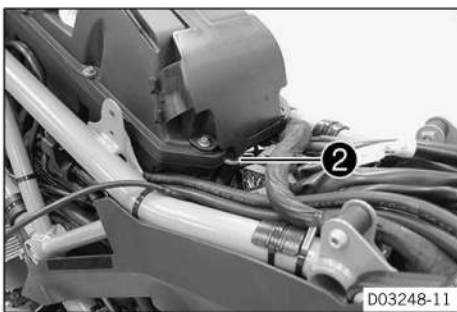
- Install the front side cover. (📖 p. 110)
- Mount the seat. (📖 p. 96)

11.3 Installing the upper part of the air filter box

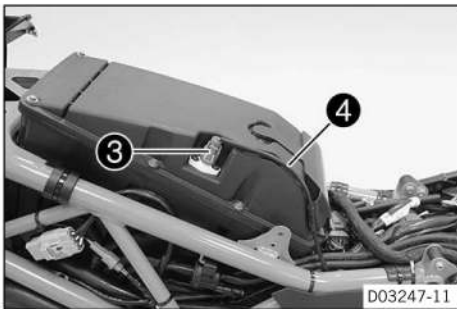


Main work

- Position the upper part of the air filter box.
- Mount and tighten screws ①.



- Mount the vent hose.
- Position hose clip ②.



- Plug in connector ③.
- Position cable ④.

Finishing work

- Install the fuel tank. (📖 p. 98)
- Install the mask spoiler. (📖 p. 114)
- Install the fuel tank cover. (📖 p. 112)
- Install the front side cover. (📖 p. 110)
- Mount the seat. (📖 p. 96)

11.4 Removing the air filter box

Preparatory work

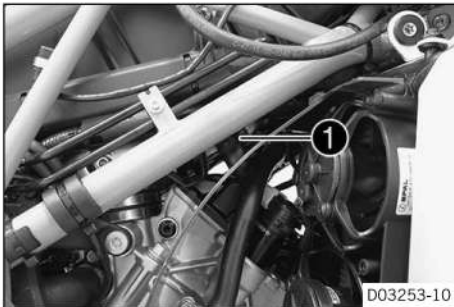
- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)
- Remove the fuel tank. (📖 p. 96)
- Remove the upper part of the air filter box. (📖 p. 88)

Main work

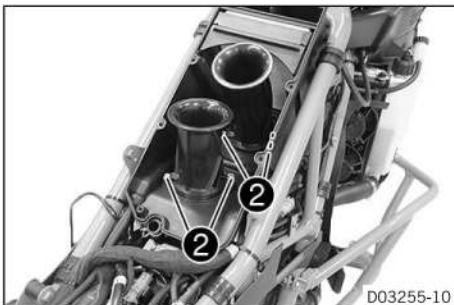
- Remove spring band clamp **1**.

Spring band clamps plier (60029057100) (📖 p. 415)

- Pull off the air release hose.



- Remove the cable ties.

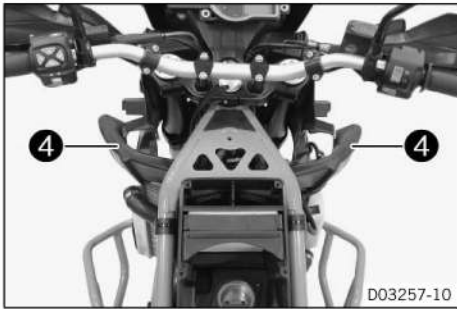
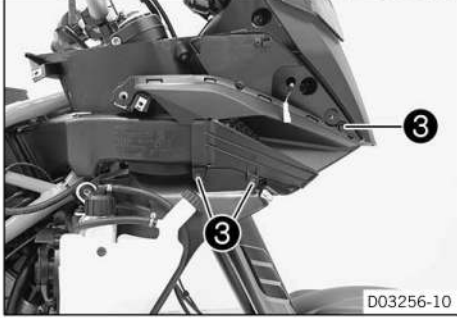


- Remove screws **2** with the bushings.
- Take off the intake trumpets.

11 AIR FILTER



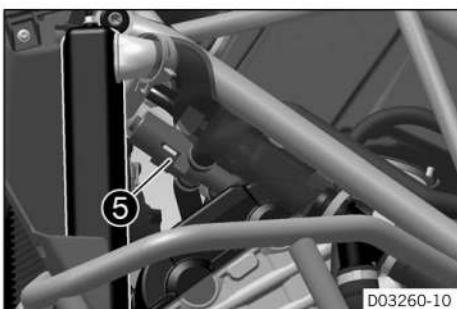
- Remove screws ③.
- Remove air inlets.



- Press intake snorkel ④ forwards out of the air filter box.



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

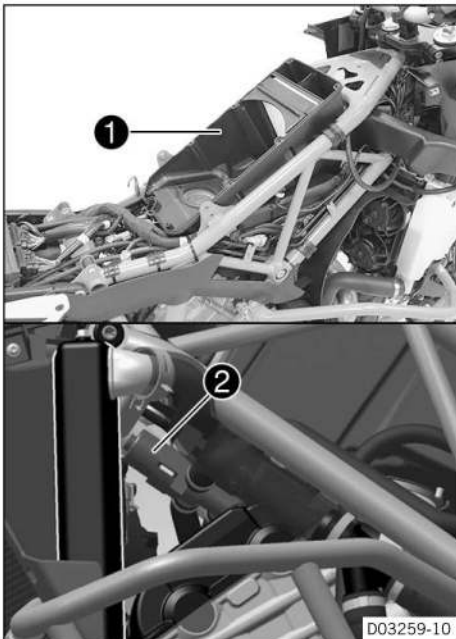


- Remove SAS valve ⑤ from the holder.



- Take off the lower part of the air filter box.

11.5 Installing the lower part of the air filter box

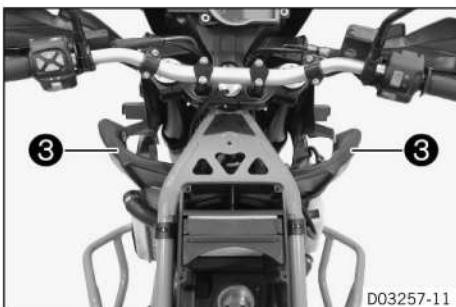


Main work

- Position the lower part of air filter box **1** in the frame.

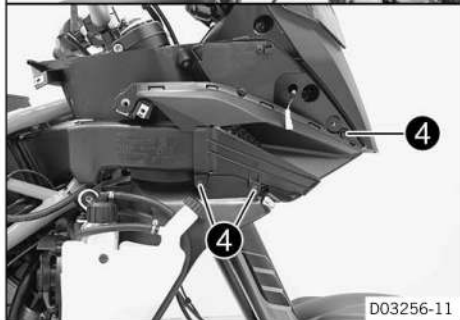
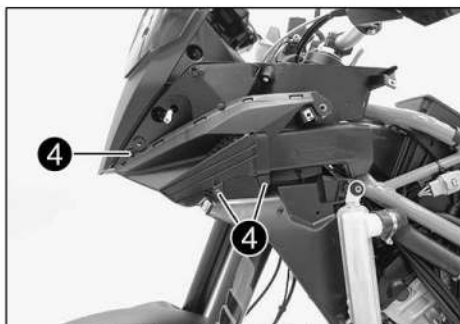
i **Info**
Ensure that the O-rings are seated correctly.

- Mount SAS valve **2** on the holder.



- Position intake snorkel **3**.

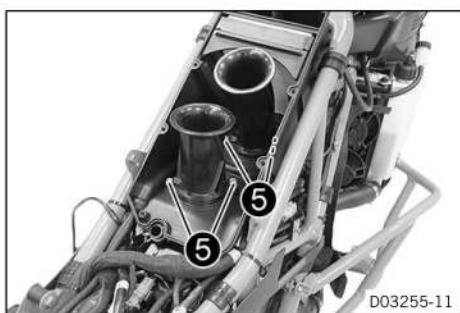
i **Info**
Ensure that the seals are seated correctly.



- Position air inlets.
- Mount and tighten screws 4.

Guideline

Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
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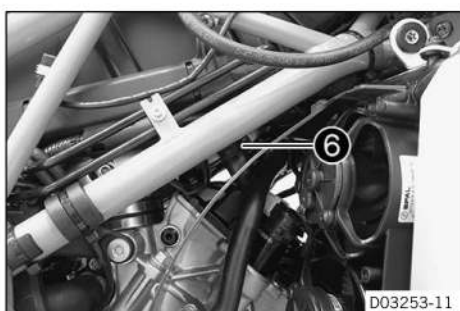
- Position the intake trumpets and mount and tighten screws 5 with the bushings.

Guideline

Remaining screws, chassis	M5	5 Nm (3.7 lbf ft)
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- Route the hose without kinks and secure it with cable ties.



- Mount the vent hose.
- Position spring band clamp 6 with special tool.

Spring band clamps plier (60029057100) (📖 p. 415)

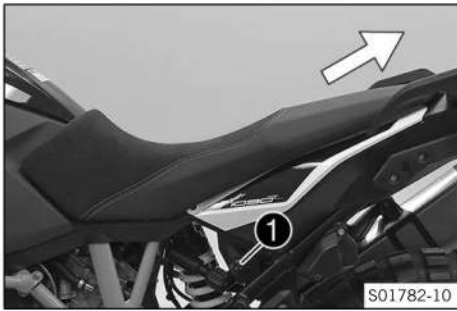
Finishing work

- Install the upper part of the air filter box. (📖 p. 90)
- Install the fuel tank. (📖 p. 98)
- Install the mask spoiler. (📖 p. 114)

- Install the fuel tank cover. (📖 p. 112)
- Install the front side cover. (📖 p. 110)
- Mount the seat. (📖 p. 96)

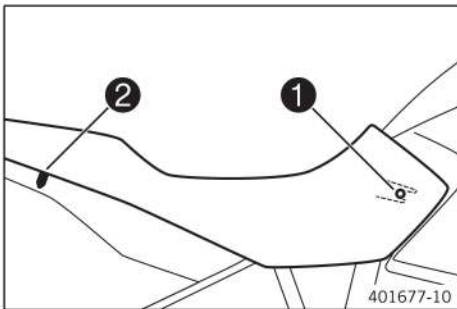


12.1 Removing the seat



- Insert the ignition key in the seat lock **1** and turn it clockwise by 45 °.
- Raise the rear of the seat, pull the seat back, and lift it off.
- Remove the ignition key.

12.2 Mounting the seat



- Hook holding lug **1** of the seat onto the fuel tank, lower the rear and push it forward.
- Insert the locking pin **2** into the lock housing and push down the rear of the seat until the locking pin engages with an audible click.
- Check that the seat is correctly mounted.

12.3 Removing the fuel tank



Danger

Fire hazard Fuel is highly flammable.

The fuel in the fuel tank expands when warm and can escape if overfilled.

- Do not refuel the vehicle in the vicinity of open flames or lit cigarettes.
- Switch off the engine for refueling.
- Make sure that no fuel is spilled; particularly not on hot parts of the vehicle.
- If any fuel is spilled, wipe it off immediately.
- Observe the specifications for refueling.



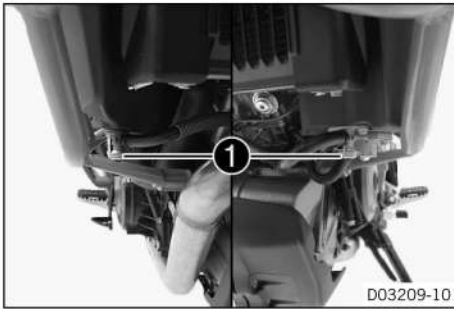
Warning

Danger of poisoning Fuel is poisonous and a health hazard.

- Avoid skin, eye and clothing contact with fuel.
- Immediately consult a doctor if you swallow fuel.
- Do not inhale fuel vapors.
- In case of skin contact, rinse the affected area with plenty of water.
- Rinse the eyes thoroughly with water, and consult a doctor in case of fuel contact with the eyes.
- Change your clothing in case of fuel spills on them.
- Keep fuels correctly in a suitable canister, and out of the reach of children.

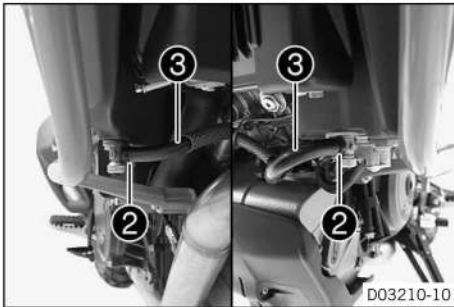
Preparatory work

- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)



Main work

- Close fuel cocks ①.

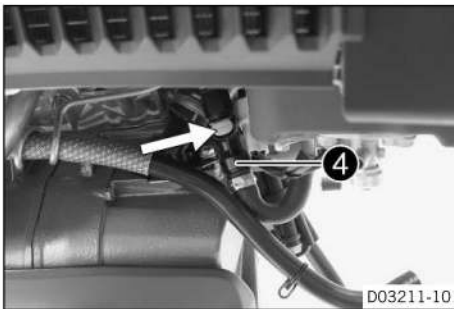


- Push back hose clips ② and remove fuel hose ③.



Info

Remaining fuel may flow out of the fuel hose.



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



Info

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

- Press on the small metal plate and disconnect fuel hose connection ④.

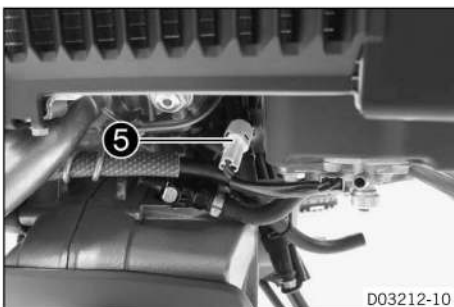


Info

Remaining fuel may flow out of the fuel hose.

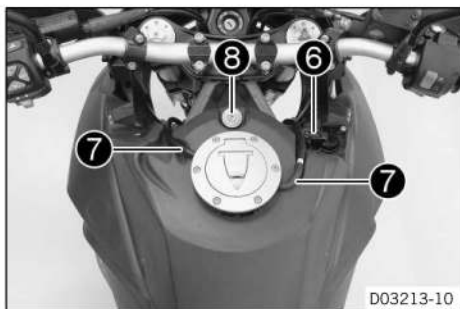
- Assemble the wash cap set.

Wash cap set (81212016000)

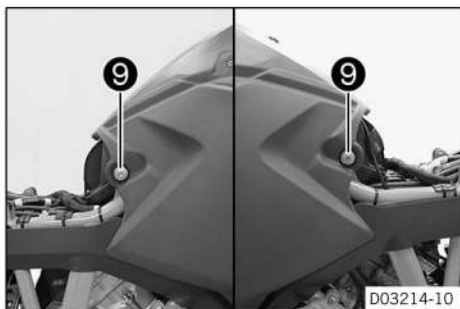


- Disconnect plug-in connector ⑤.

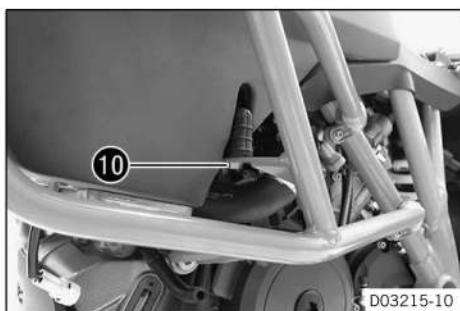
12 FUEL TANK, SEAT, TRIM



- Unplug connector ⑥.
- Detach vent hose ⑦.
- Remove screw ⑧ with bearing sleeve and rubber bushings.



- Remove screws ⑨ on both sides.



- Remove screws ⑩ on both sides.
- Take off the fuel tank.



Info

Pay attention to the inside cover.

12.4 Installing the fuel tank



Danger

Fire hazard Fuel is highly flammable.

The fuel in the fuel tank expands when warm and can escape if overfilled.

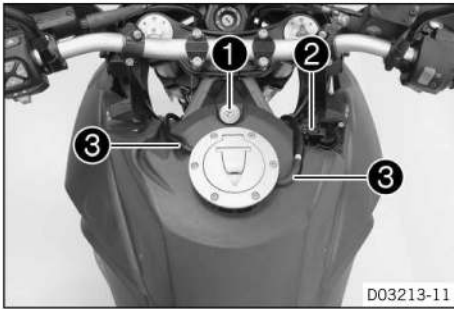
- Do not refuel the vehicle in the vicinity of open flames or lit cigarettes.
- Switch off the engine for refueling.
- Make sure that no fuel is spilled; particularly not on hot parts of the vehicle.
- If any fuel is spilled, wipe it off immediately.
- Observe the specifications for refueling.



Warning

Danger of poisoning Fuel is poisonous and a health hazard.

- Avoid skin, eye and clothing contact with fuel.
- Immediately consult a doctor if you swallow fuel.
- Do not inhale fuel vapors.
- In case of skin contact, rinse the affected area with plenty of water.
- Rinse the eyes thoroughly with water, and consult a doctor in case of fuel contact with the eyes.
- Change your clothing in case of fuel spills on them.
- Keep fuels correctly in a suitable canister, and out of the reach of children.



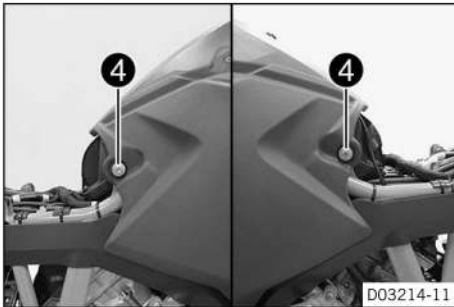
Main work

- Position the fuel tank.
- Mount and tighten screw **1** with bearing sleeve and rubber bushings.

Guideline

Screw, fuel tank	M8	15 Nm (11.1 lbf ft)
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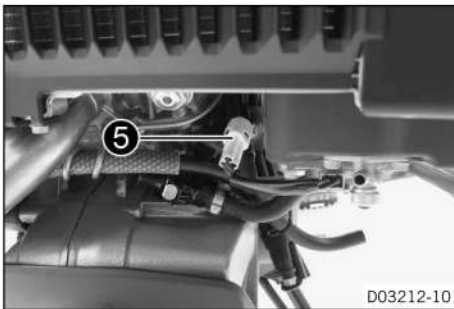
- Plug in connector **2**.
- Mount vent hoses **3**.



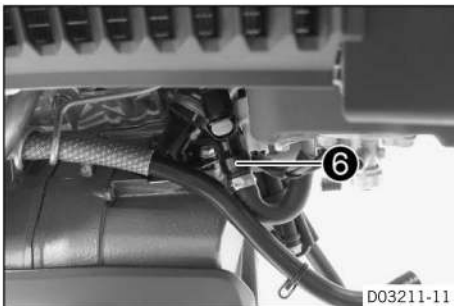
- Mount and tighten screws **4** with bushings.

Guideline

Screw, fuel tank	M6	10 Nm (7.4 lbf ft)
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- Join plug-in connector **5**.

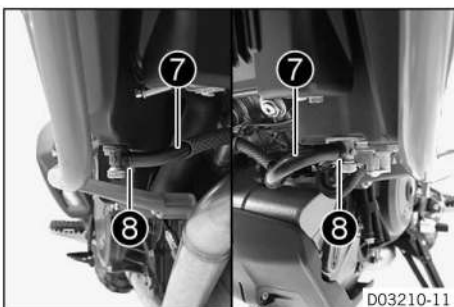


- Remove the wash cap set.
- Thoroughly clean the plug-in connection of the fuel line using compressed air.

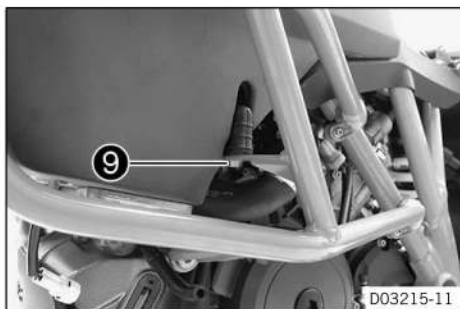
i Info

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

- Join the fuel hose connection **6**.



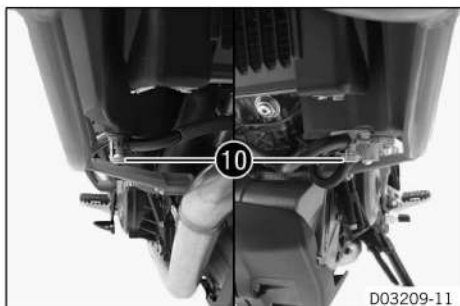
- Mount fuel hose **7**.
- Position hose clips **8**.



- Mount and tighten screws 9 on both sides.

Guideline

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



- Open fuel cocks 10.

Finishing work

- Install the mask spoiler. (📖 p. 114)
- Install the fuel tank cover. (📖 p. 112)
- Install the front side cover. (📖 p. 110)
- Mount the seat. (📖 p. 96)

12.5 Checking the fuel pressure



Danger

Fire hazard Fuel is highly flammable.

The fuel in the fuel tank expands when warm and can escape if overfilled.

- Do not refuel the vehicle in the vicinity of open flames or lit cigarettes.
- Switch off the engine for refueling.
- Make sure that no fuel is spilled; particularly not on hot parts of the vehicle.
- If any fuel is spilled, wipe it off immediately.
- Observe the specifications for refueling.



Warning

Danger of poisoning Fuel is poisonous and a health hazard.

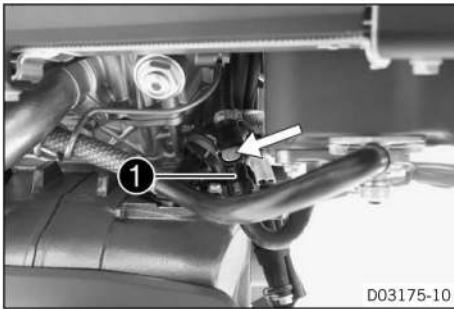
- Avoid skin, eye and clothing contact with fuel.
- Immediately consult a doctor if you swallow fuel.
- Do not inhale fuel vapors.
- In case of skin contact, rinse the affected area with plenty of water.
- Rinse the eyes thoroughly with water, and consult a doctor in case of fuel contact with the eyes.
- Change your clothing in case of fuel spills on them.
- Keep fuels correctly in a suitable canister, and 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.

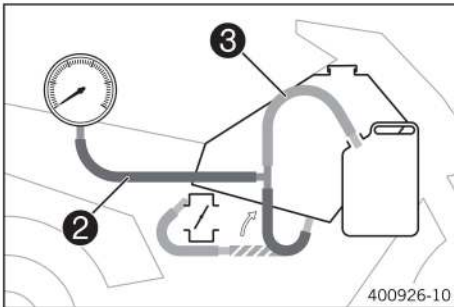
The ignition is off.
The diagnostic tool is connected.

- Press on the small metal plate and disconnect fuel hose connection **1**.



Info

Remaining fuel may flow out of the fuel hose.



- Mount special tool **2**.

Pressure testing tool (61029094000) (📄 p. 416)
--

- Mount special tool **3** with nozzle code **1,05**.

Testing hose (61029093000) (📄 p. 416)

- Position the hose end in a fuel can.

Guideline

Minimum size, fuel can	10 l (2.6 US gal)
------------------------	-------------------

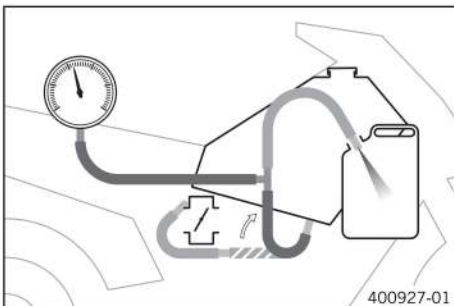
- Connect the diagnostic tool and start it.
- Execute **"Engine Electronics" > "Actuator Test" > "Function test of fuel pump controller"**.
- Check the fuel pressure with the fuel tank filler cap closed.

Fuel pressure

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

- » If the specification is not reached:

- Open the fuel tank filler cap.
- Check the fuel tank breather.



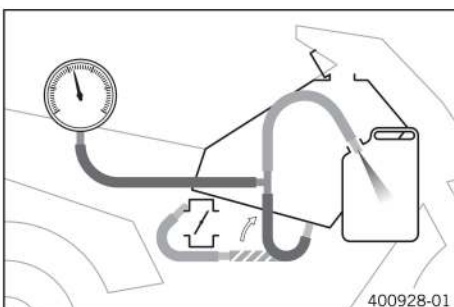
- Check the fuel pressure with the fuel tank filler cap open.

Fuel pressure

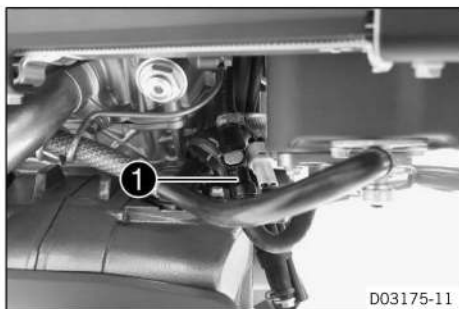
When the fuel pump is active	3.8 ... 4.2 bar (55 ... 61 psi)
------------------------------	---------------------------------

- » If the specification is not reached:

- Check that the fuel line is clear.
- Change the fuel filter. (📄 p. 104)
- Change the fuel pump. (📄 p. 102)



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



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

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

- Join the fuel hose connection ①.

12.6 Changing the fuel pump



Danger

Fire hazard Fuel is highly flammable.

The fuel in the fuel tank expands when warm and can escape if overfilled.

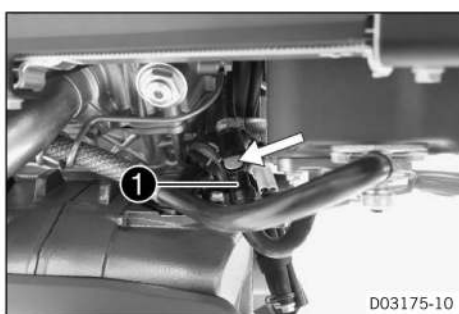
- Do not refuel the vehicle in the vicinity of open flames or lit cigarettes.
- Switch off the engine for refueling.
- Make sure that no fuel is spilled; particularly not on hot parts of the vehicle.
- If any fuel is spilled, wipe it off immediately.
- Observe the specifications for refueling.



Warning

Danger of poisoning Fuel is poisonous and a health hazard.

- Avoid skin, eye and clothing contact with fuel.
- Immediately consult a doctor if you swallow fuel.
- Do not inhale fuel vapors.
- In case of skin contact, rinse the affected area with plenty of water.
- Rinse the eyes thoroughly with water, and consult a doctor in case of fuel contact with the eyes.
- Change your clothing in case of fuel spills on them.
- Keep fuels correctly in a suitable canister, and out of the reach of children.



Preparatory work

- Drain the fuel from the fuel tank into a suitable container.

Main work

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

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

- Press on the small metal plate and disconnect fuel hose connection ①.

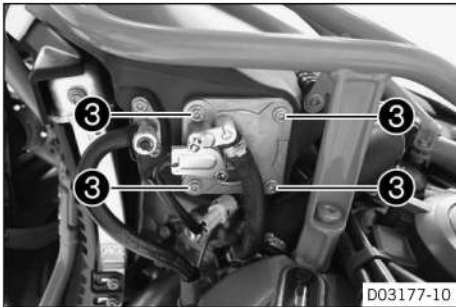
i Info
Remaining fuel may flow out of the fuel hose.

- Assemble the wash cap set.

Wash cap set (81212016000)



- Disconnect plug-in connector **2**.



- Remove screws **3**.
- Pull out the fuel pump.



Info

Remaining fuel may flow out of the fuel tank.
Place an appropriate container under the engine.

- Position the new fuel pump with O-ring in the fuel tank.
- Mount and tighten screws **3**.

Guideline

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

- Join plug-in connector **2**.



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



Info

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

- Join the fuel hose connection **1**.

12.7 Changing the fuel filter



Danger

Fire hazard Fuel is highly flammable.

The fuel in the fuel tank expands when warm and can escape if overfilled.

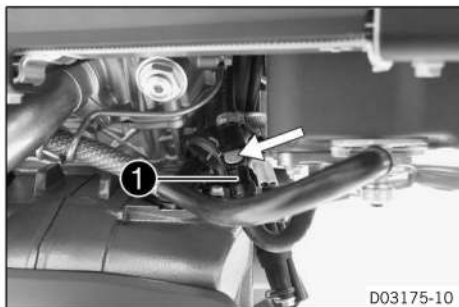
- Do not refuel the vehicle in the vicinity of open flames or lit cigarettes.
- Switch off the engine for refueling.
- Make sure that no fuel is spilled; particularly not on hot parts of the vehicle.
- If any fuel is spilled, wipe it off immediately.
- Observe the specifications for refueling.



Warning

Danger of poisoning Fuel is poisonous and a health hazard.

- Avoid skin, eye and clothing contact with fuel.
- Immediately consult a doctor if you swallow fuel.
- Do not inhale fuel vapors.
- In case of skin contact, rinse the affected area with plenty of water.
- Rinse the eyes thoroughly with water, and consult a doctor in case of fuel contact with the eyes.
- Change your clothing in case of fuel spills on them.
- Keep fuels correctly in a suitable canister, and out of the reach of children.



Preparatory work

- Drain the fuel from the fuel tank into a suitable container.

Main work

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



Info

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

- Press on the small metal plate and disconnect fuel hose connection **1**.



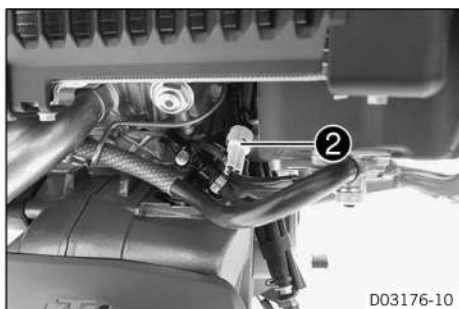
Info

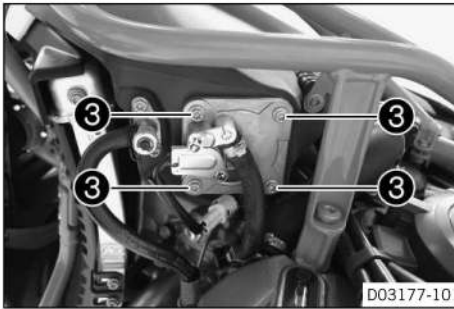
Remaining fuel may flow out of the fuel hose.

- Assemble the wash cap set.

Wash cap set (81212016000)

- Disconnect plug-in connector **2**.



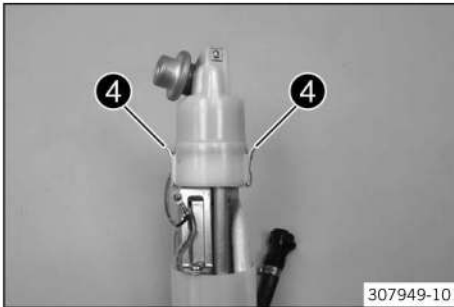


- Remove screws ③.
- Pull out the fuel pump.

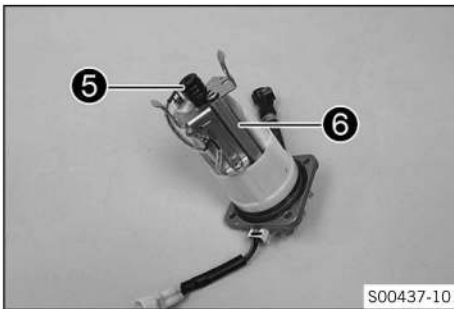


Info

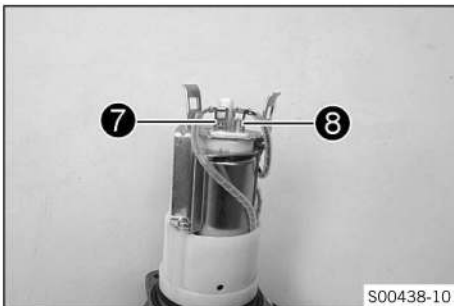
Remaining fuel may flow out of the fuel tank.
Place an appropriate container under the engine.



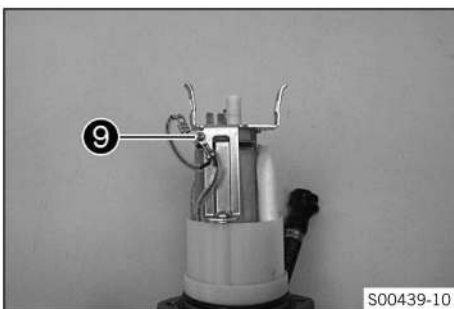
- Push clamps ④ outward.
- Take off the fuel filter housing.



- Remove gasket ⑤.
- Take off fuel pipe ⑥.

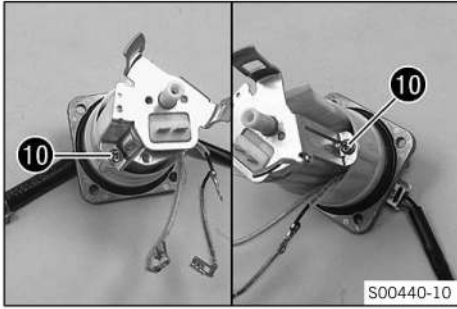


- Detach connectors ⑦ and ⑧.

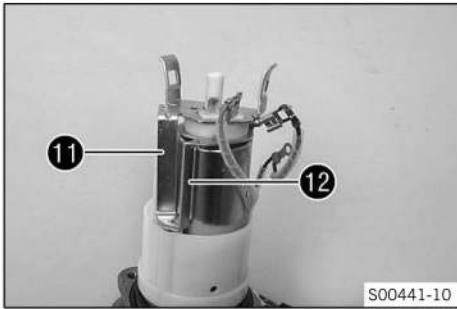


- Remove screw ⑨ with the washer.

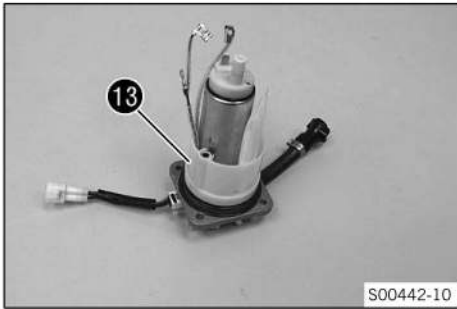
12 FUEL TANK, SEAT, TRIM



- Remove screws **10**.



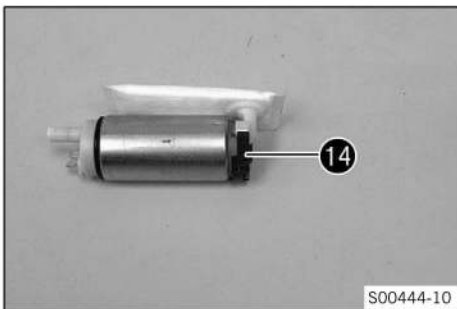
- Remove retaining brackets **11** and **12**.



- Remove plastic housing **13** with the distance sleeves.



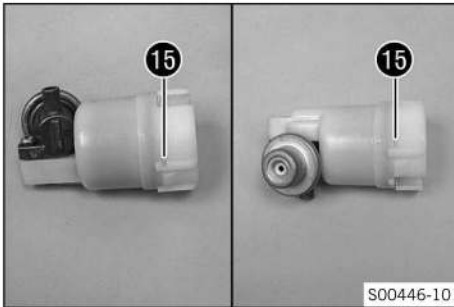
- Take the fuel pump out of the fuel pump cover.



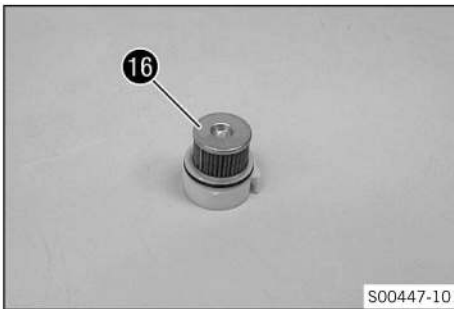
- Take off sealing element **14**.



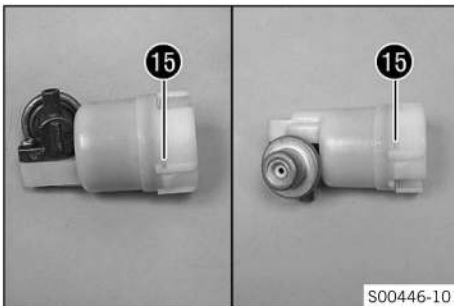
- Remove fuel filter.
- Mount the new fuel filter.



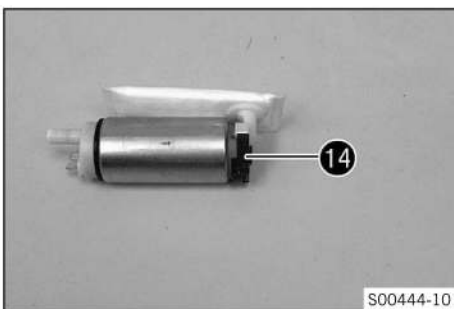
- Release latch 15.
- Pull off the outer fuel filter housing.



- Take off fuel filter 16.
- Mount the new fuel filter.

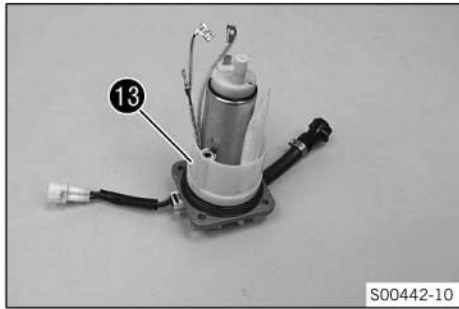


- Mount the outer fuel filter housing.
- ✓ Locking mechanism 15 engages in the fuel filter housing.

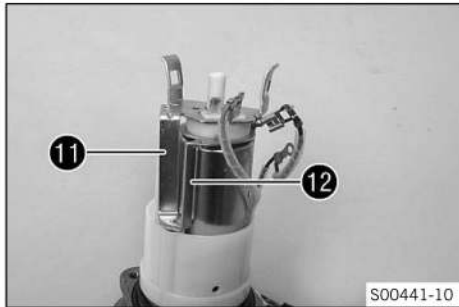


- Mount sealing element 14.
- Position the fuel pump in the fuel pump cover.

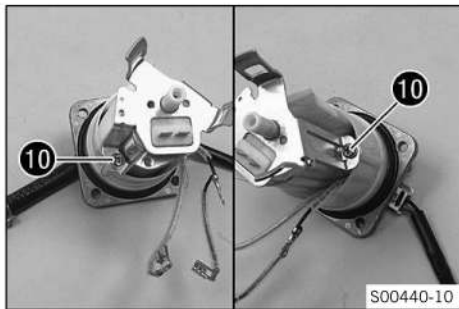
12 FUEL TANK, SEAT, TRIM



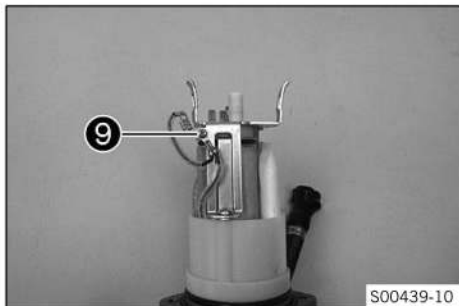
- Mount plastic housing **13** with the distance sleeves.
 - ✓ The holding lugs of the plastic housing engage in the holes of the fuel pump cover.



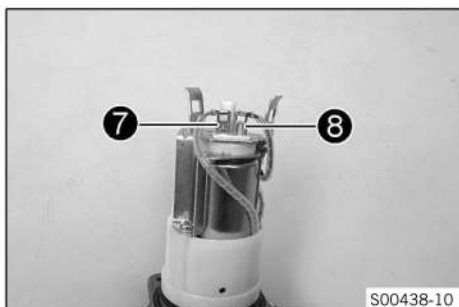
- Mount retaining brackets **11** and **12**.



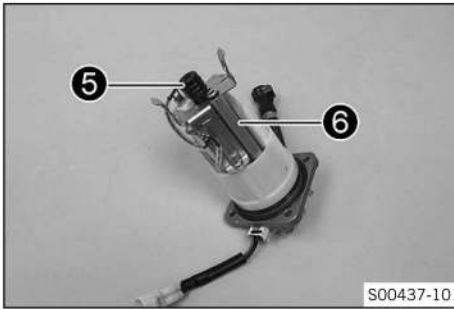
- Mount and tighten screws **10**.



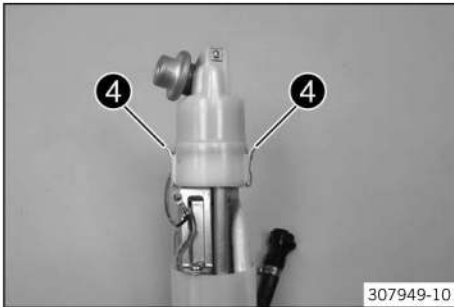
- Mount and tighten screw **9** with the washer.



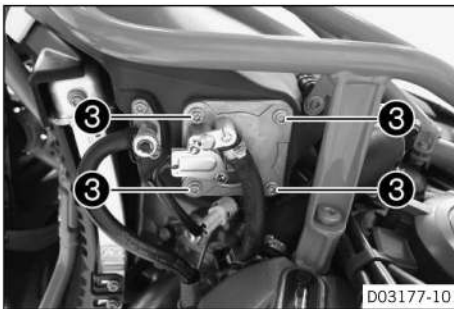
- Plug in connectors **7** and **8**.



- Mount fuel pipe ⑥.
- Mount gasket ⑤.



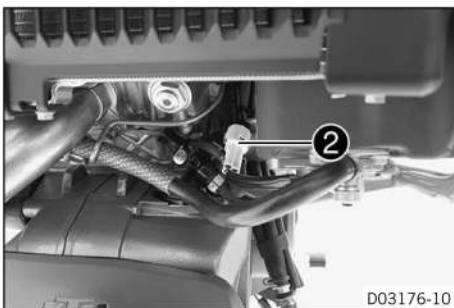
- Mount the fuel filter housing.
- ✓ Clamps ④ must engage.



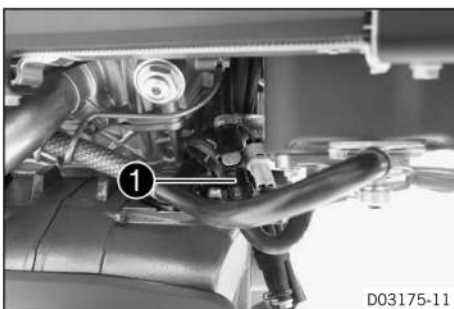
- Grease the O-ring.
- Position the fuel pump with O-ring in the fuel tank.
- Mount and tighten screws ③.

Guideline

Screw, fuel pump	M6	6 Nm (4.4 lbf ft)
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- Join plug-in connector ②.



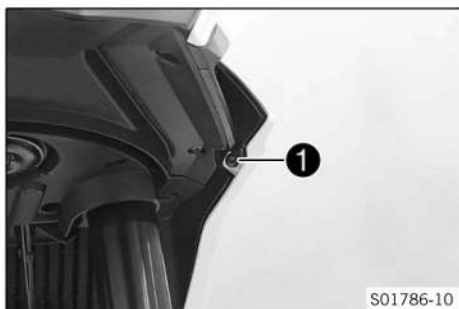
- Remove the wash cap set.
- Thoroughly clean the plug-in connection of the fuel line using compressed air.

i Info

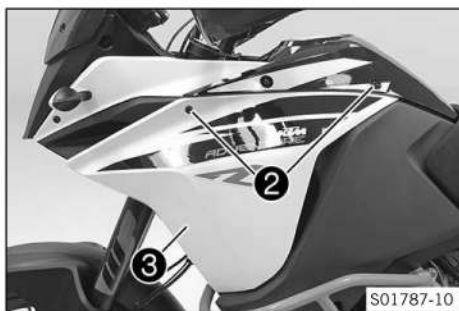
Under no circumstances should dirt enter into the fuel line. Dirt in the fuel line clogs the injection valve!

- Join the fuel hose connection ①.

13.1 Removing the front side cover



- Remove screw ①.

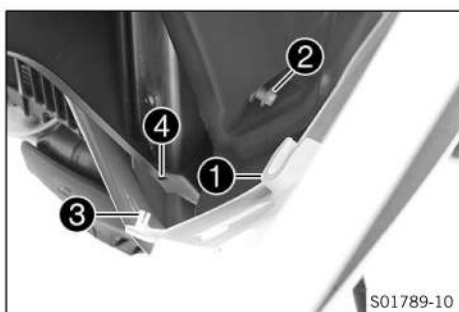


- Remove screws ②.
- Remove side cover ③.
- Repeat these steps on the opposite side.

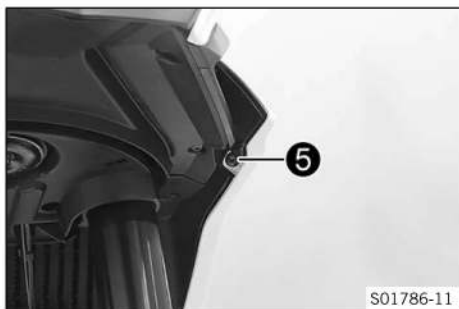
13.2 Installing the front side cover



- Position the side cover in area A under the fuel tank cover.



- Attach side cover to bracket ① using holding lug ② and position on the fuel tank.
 ✓ Holding lug ③ engages in hole ④.



- Mount and tighten screw ⑤.

Guideline

Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
-------------------	----	-------------------------



- Mount and tighten screws ⑥.

Guideline

Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
-------------------	----	-------------------------

- Repeat these steps on the opposite side.

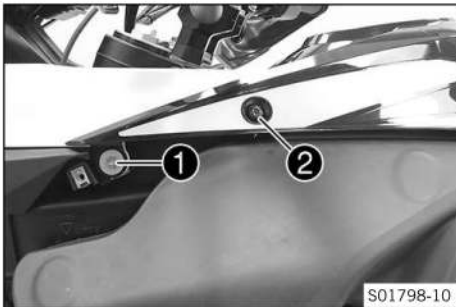
13.3 Removing the fuel tank cover

Preparatory work

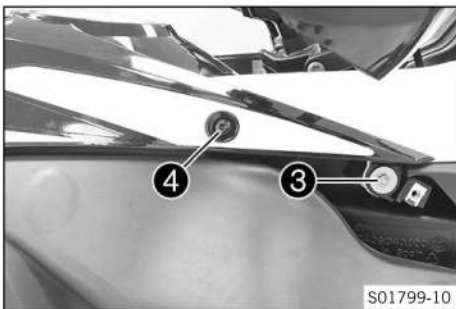
- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)

Main work

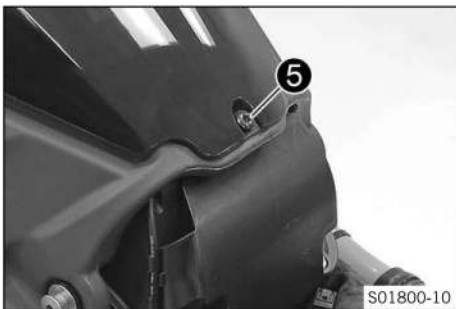
- Remove screw ①.
- Remove screw ②.



- Remove screw ③.
- Remove screw ④.



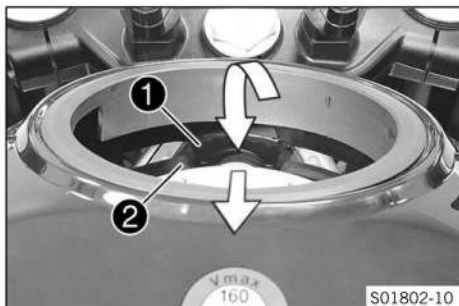
- Remove screw ⑤.





- Raise the fuel tank cover at the rear and take it off in a forward direction.

13.4 Installing the fuel tank cover

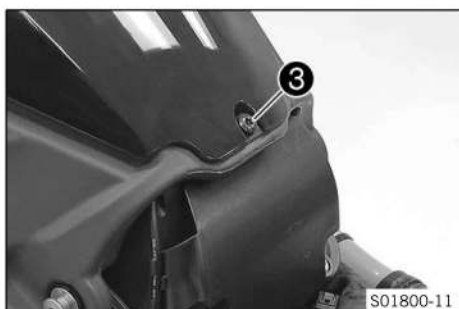


Main work

- Position the fuel tank cover.
- ✓ Holding lug ① engages under the fuel tank ②.

Info

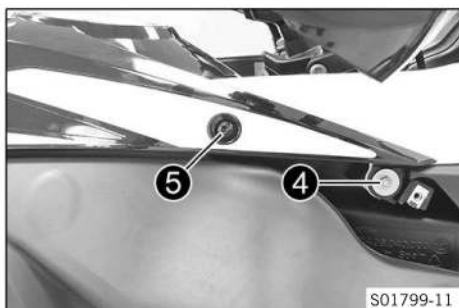
Pay attention to the sealing lip and the bleeder hose.



- Mount and tighten screw ③.

Guideline

Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
-------------------	----	-------------------------



- Mount and tighten screw ④.

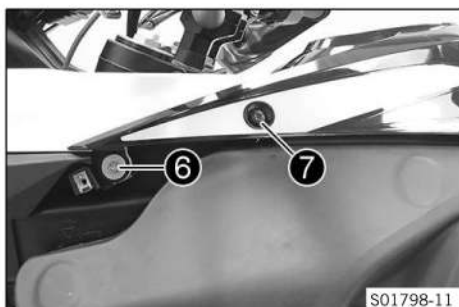
Guideline

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

- Mount and tighten screw ⑤.

Guideline

Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
-------------------	----	-------------------------



- Mount and tighten screw ⑥.

Guideline

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

- Mount and tighten screw ⑦.

Guideline

Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
-------------------	----	-------------------------

Finishing work

- Install the front side cover. (📖 p. 110)

- Mount the seat. (📖 p. 96)



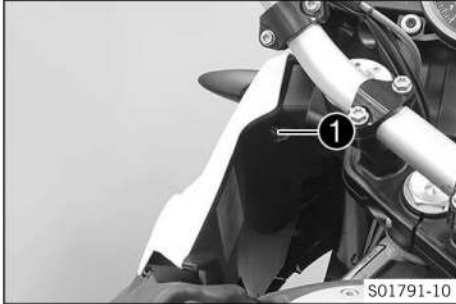
13.5 Removing the mask spoiler

Preparatory work

- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)

Main work

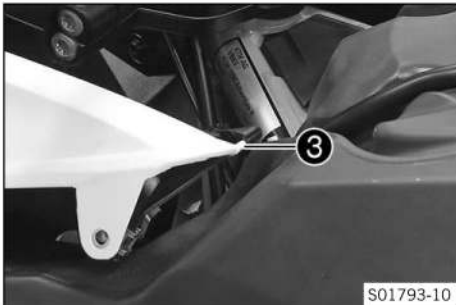
- Remove screw ❶.



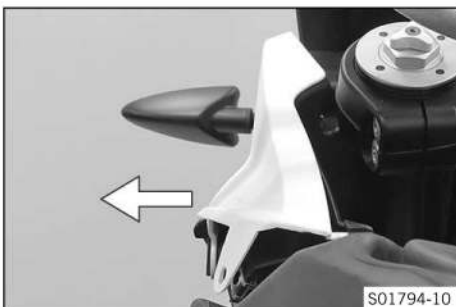
- Remove screw ❷.

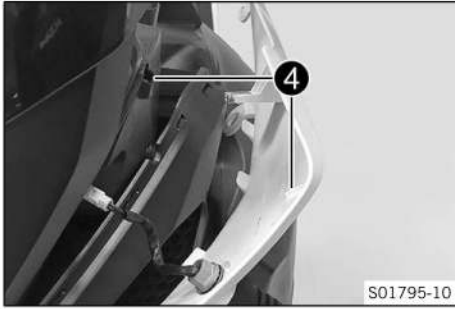


- Loosen holding lug ❸ from the inside cover.

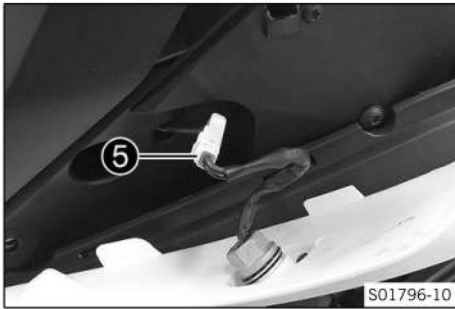


- Remove the mask spoiler laterally from the supports.





- Pull the mask spoiler upward from bracket ④.



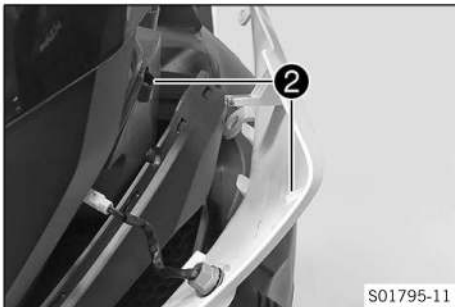
- Disconnect plug-in connector ⑤.
- Remove the mask spoiler with the turn signal.
- Repeat the operation on the opposite side.

13.6 Installing the mask spoiler



Main work

- Connect plug-in connector ①.

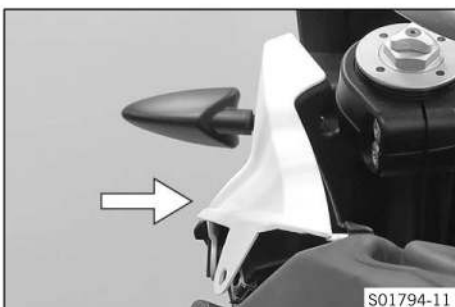


- Position the mask spoiler in bracket ②.

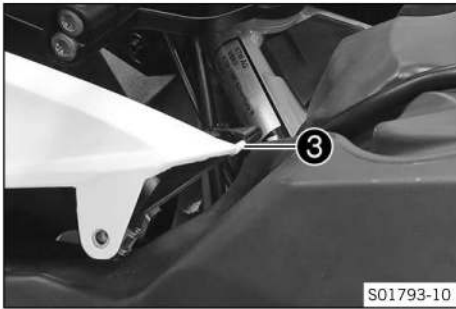


Info

Ensure that the turn signal cable is placed correctly.



- Press the mask spoiler laterally into the supports.



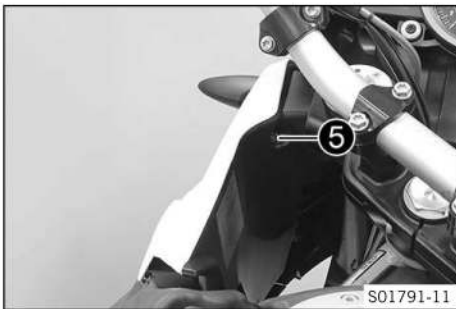
- Position holding lug ③ in the drill hole.



- Mount and tighten screw ④.

Guideline

Screw, mask spoiler	M5x17	3.5 Nm (2.58 lbf ft)
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- Mount and tighten screw ⑤.

Guideline

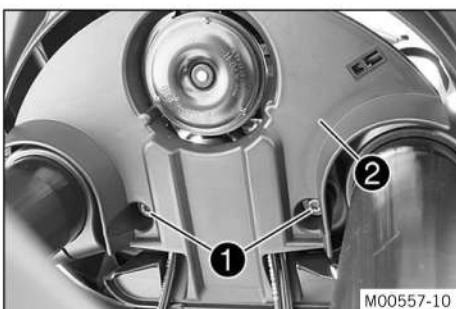
Screw, mask spoiler	M5x17	3.5 Nm (2.58 lbf ft)
---------------------	-------	-------------------------

- Repeat the operation on the opposite side.

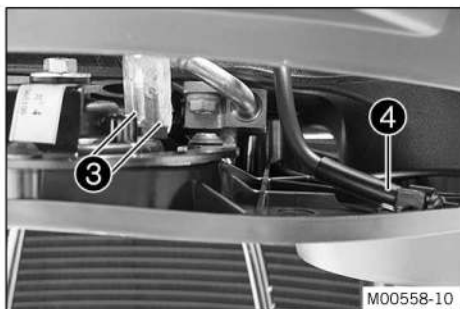
Finishing work

- Install the fuel tank cover. (📖 p. 112)
- Install the front side cover. (📖 p. 110)
- Mount the seat. (📖 p. 96)

13.7 Removing the bottom triple clamp cover

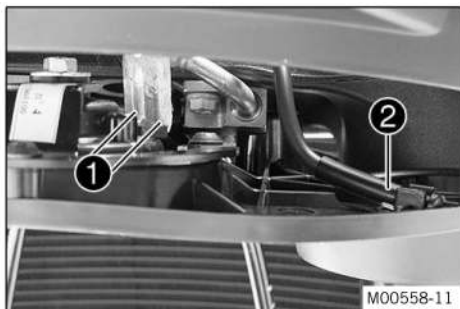


- Remove screws ①.
- Lower triple clamp cover ② slightly.

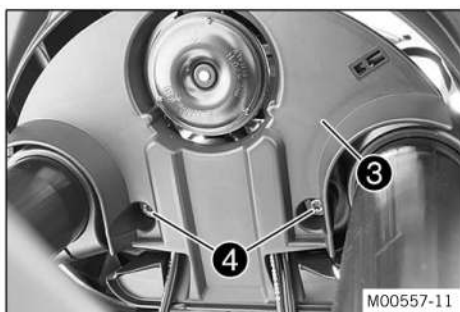


- Disconnect plugs **3** of the horn.
- Detach temperature sensor **4**.
- Remove the triple clamp cover.

13.8 Installing the bottom triple clamp cover



- Plug in connectors **1** of the horn.
- Attach temperature sensor **2**.

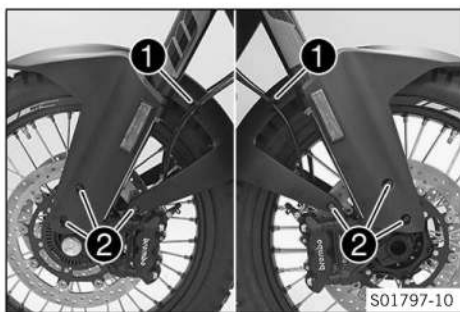


- Position the triple clamp cover **3**.
- Mount and tighten screws **4**.

Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
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13.9 Removing front fender

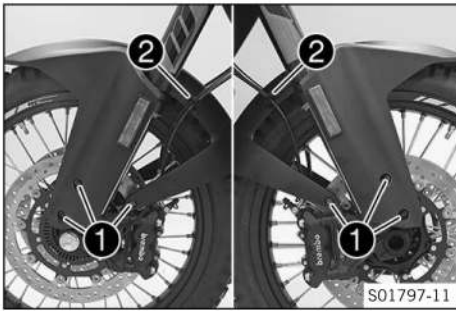


- Open holder **1** and detach the brake lines and cable.
- Remove screws **2**.
- Take the fender off to the front.

i Info

Pay attention to the brake lines and the cable.

13.10 Installing front fender



- Position the fender.

i Info
Pay attention to the routing of the brake lines and the cable.

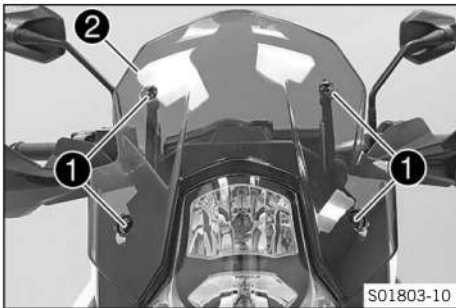
- Mount and tighten screws **1**.

Guideline

Screw, fender	M5x12	3.5 Nm (2.58 lbf ft)
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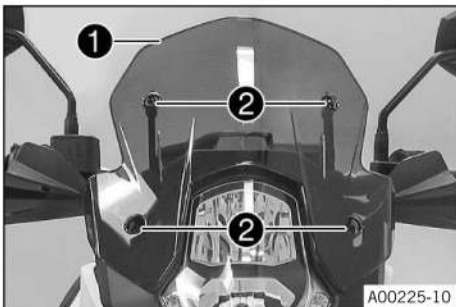
- Insert the brake lines and cable in brackets **2** and close the holder.

13.11 Removing the windshield



- Remove screws **1** with rubber bushing and windshield **2**.

13.12 Installing the windshield



- Position windshield **1**.
- Mount and tighten screws **2** with the rubber bushings.

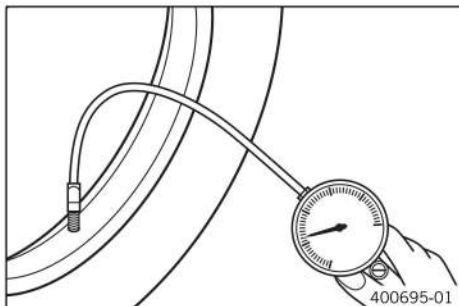
Guideline

Screw, wind shield	M5	3.5 Nm (2.58 lbf ft)
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14.1 Checking tire pressure

i Info

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



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

Tire pressure, solo / with passenger / full payload	
front: with cold tires	2.6 bar (38 psi)
rear: with cold tires	2.9 bar (42 psi)

- » If the tire pressure does not meet specifications:
 - Correct the tire pressure.
- Mount the protection cap.

14.2 Checking the tire condition



Warning

Danger of accidents If a tire bursts while riding, the vehicle becomes uncontrollable.

- Ensure that damaged or worn tires are replaced immediately.



Warning

Danger of crashing Different tire tread patterns on the front and rear wheel impair the handling characteristic.

Different tire tread patterns can make the vehicle significantly more difficult to control.

- Make sure that only tires with a similar tire tread pattern are fitted to the front and rear wheel.



Warning

Danger of accidents Non-approved or non-recommended tires and wheels impact the handling characteristic.

- Only use tires/wheels approved by KTM with the corresponding speed index.



Warning

Danger of accidents New tires have reduced road grip.

The contact surface on new tires is not yet roughened.

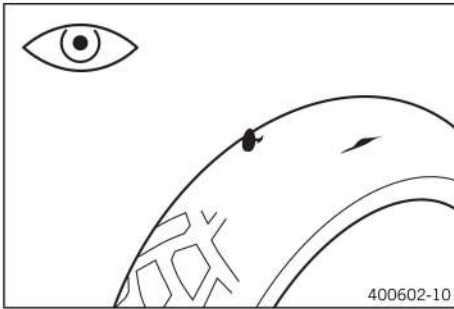
- Run in new tires with moderate riding at alternating angles.

Running-in phase 200 km (124 mi)

i Info

Tire type, tire condition, and tire pressure influence the braking and handling characteristics of the vehicle.

Worn tires are particularly unfavorable on wet surfaces.

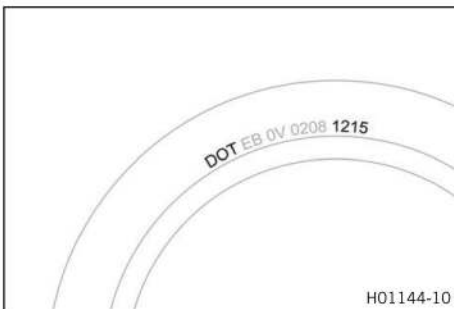


- Check the front and rear tires for cuts, run-in objects, and other damage.
 - » If the tires have cuts, run-in objects, or other damage:
 - Change the tires.
- Check the tread depth.

i Info Adhere to the legally required minimum tread depth.

Minimum tread depth	≥ 2 mm (≥ 0.08 in)
---------------------	--------------------

- » If the tread depth is less than the minimum tread depth:
 - Change the tires.



- Check the tire age.

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

- » If the tires are more than 5 years old:
 - Change the tires.

14.3 Checking the rim run-out

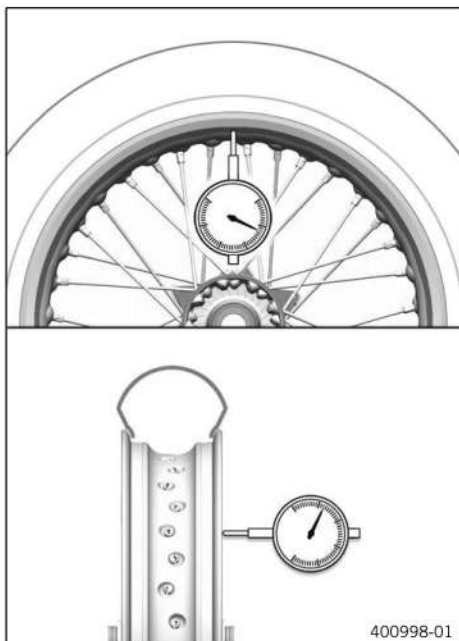


Warning

Danger of accidents Incorrectly tensioned spokes impair the handling characteristic and result in secondary damage.

The spokes break due to being overloaded if they are too tightly tensioned. If the tension in the spokes is too low, then lateral and radial run-out will form in the wheel. Other spokes will become looser as a result.

- Check spoke tension regularly, and in particular on a new vehicle.



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

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

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

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

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

- Correct the spoke tension.

14.4 Checking the wheel bearing for play

Preparatory work

- Place a load on the rear of the vehicle.
 - ✓ The front wheel is not in contact with the ground.

Main work

- Raise the motorcycle with the work stand (inserted). (📖 p. 15)
- Move the front wheel from side to side.



i Info
Hold the fork leg to check it.

- » If there is detectable play:
 - Change front wheel bearing. (📖 p. 127)



- Place a load on the front of the vehicle.
 - ✓ The rear wheel is not in contact with the ground.
- Move the rear wheel from side to side.

i Info
Hold the link fork to check it.

- » If there is detectable play:
 - Change the rear wheel bearing. (📖 p. 138)

Finishing work

- Remove the motorcycle from the work stand (inserted). (📖 p. 16)

14.5 Checking spoke tension

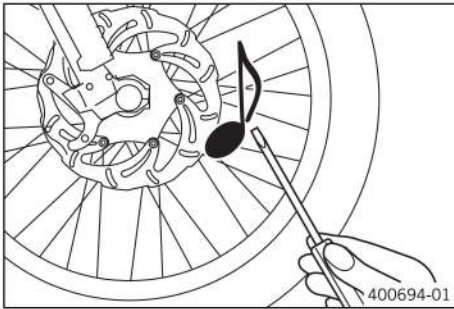


Warning

Danger of accidents Incorrectly tensioned spokes impair the handling characteristic and result in secondary damage.

The spokes break due to being overloaded if they are too tightly tensioned. If the tension in the spokes is too low, then lateral and radial run-out will form in the wheel. Other spokes will become looser as a result.

- Check spoke tension regularly, and in particular on a new vehicle.



- Strike each spoke briefly using a screwdriver blade.



Info

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

You should hear a high note.

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

14.6 Front wheel

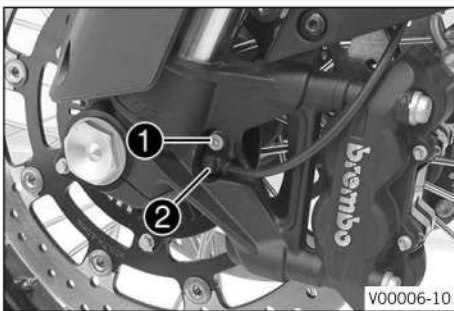
14.6.1 Removing the front wheel

Preparatory work

- Raise the motorcycle with the rear lifting gear. (📖 p. 14)
- Remove the bottom triple clamp cover. (📖 p. 115)
- Lift the motorcycle with the front lifting gear. (📖 p. 13)

Main work

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

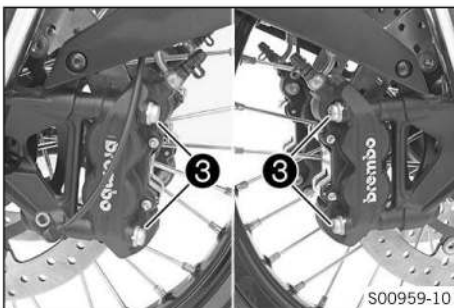


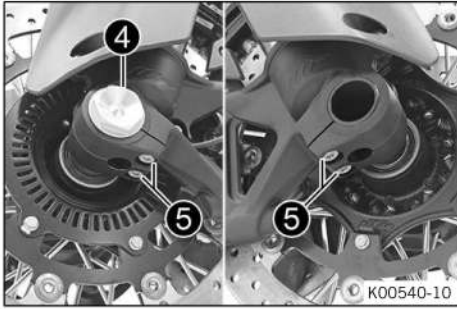
- Remove screws ❸ from both brake calipers.
- Press back the brake linings by slightly tilting the brake calipers laterally on the brake disc.
- Pull the brake calipers carefully back from the brake discs and hang to the side loosely.



Info

Do not operate the hand brake lever if the brake calipers have been removed.





- Loosen screw ④ by several rotations.
- Loosen screws ⑤.
- Press on screw ④ to push the wheel spindle out of the axle clamp.
- Remove screw ④.



Warning

Danger of accidents Damaged brake discs reduce the braking effect.

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

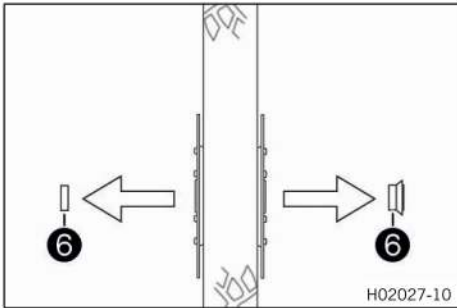
- Hold the front wheel and remove the wheel spindle. Take the front wheel out of the fork.



Info

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

- Remove spacers ⑥.



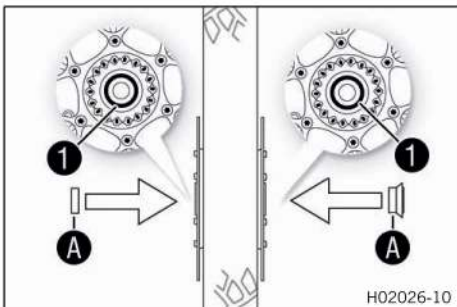
14.6.2 Installing the front wheel



Warning

Danger of accidents Oil or grease on the brake discs reduces the braking effect.

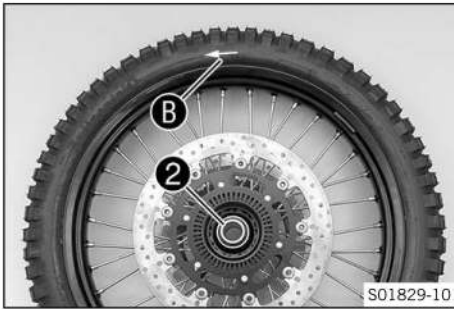
- Always keep the brake discs free of oil and grease.
- Clean the brake discs with brake cleaner when necessary.



Main work

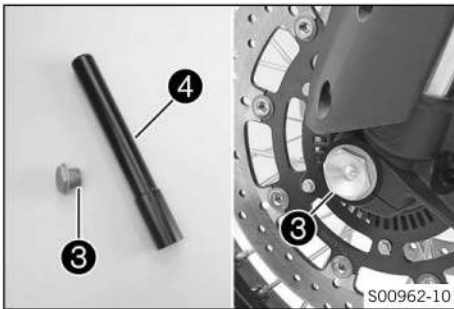
- Check the wheel bearing for damage and wear.
 - » If the wheel bearing is damaged or worn:
 - Change front wheel bearing. (📖 p. 127)
- Clean and grease shaft seal rings ① and contact surfaces ①A of the spacers.

Long-life grease (📖 p. 408)



- Insert wide spacer **2** on the left in the direction of travel.

i Info
 Arrow **B** indicates the direction of travel of the front wheel.
 The ABS sensor wheel is on the left viewed in the direction of travel.
 The position of the direction of travel indicator on the tires can vary.



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

! Warning
Danger of accidents Oil or grease on the brake discs reduces the braking effect.

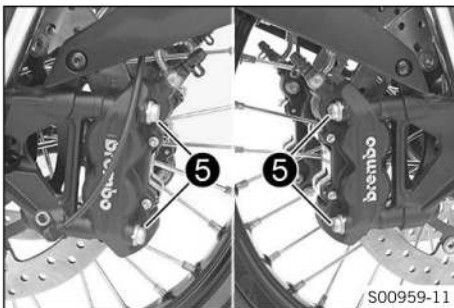
- Always keep the brake discs free of oil and grease.
- Clean the brake discs with brake cleaner when necessary.

- Clean and lightly grease screw **3** and wheel spindle **4**.

Long-life grease (📖 p. 408)

- Jack up the front wheel into the fork, position it, and insert the wheel spindle.
- Mount and tighten screw **3**.

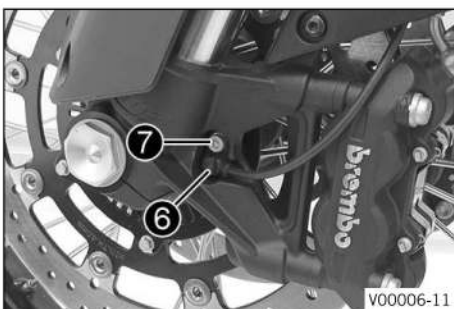
Guideline		
Screw, front wheel spindle	M25x1.5	45 Nm (33.2 lbf ft) Thread greased



- Position the brake calipers.
 - ✓ The brake linings are correctly positioned.
- Mount screws **5** on both brake calipers, but do not tighten yet.
- Operate the hand brake lever repeatedly until the brake linings are in contact with the brake disc and there is a pressure point. Fix the hand brake lever in the activated position.
 - ✓ The brake calipers straighten.
- Tighten screws **5** on both brake calipers.

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

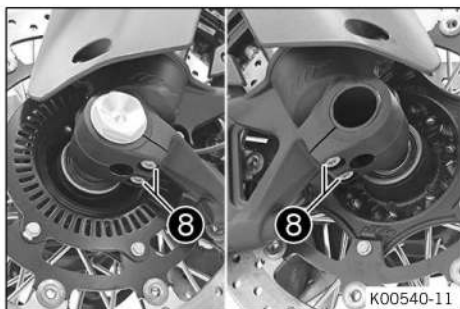
- Remove the locking piece of the hand brake lever.



- Position wheel speed sensor **6** in the hole.
- Mount and tighten screw **7**.

Guideline		
Screw, front wheel speed sensor	M6	10 Nm (7.4 lbf ft)

- Take the motorcycle off the front lifting gear. (📖 p. 13)
- Remove the rear of the motorcycle from the lifting gear. (📖 p. 14)



- Operate the front brake and compress the fork a few times firmly.

✓ The fork legs straighten.

- Tighten screws 8.

Guideline

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

- Install the bottom triple clamp cover. (p. 116)

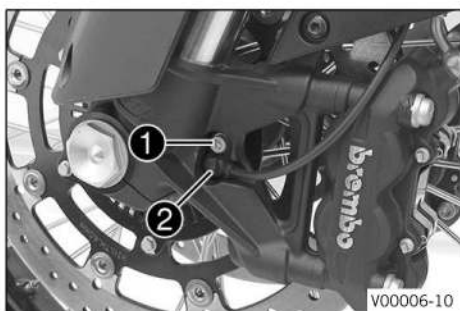
14.6.3 Removing the front wheel (work stand)

Preparatory work

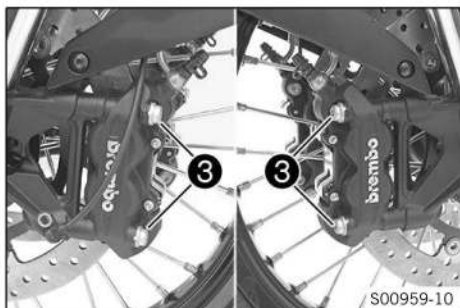
- Remove the main silencer. (p. 82)
- Raise the motorcycle with the work stand. (p. 14)
- Clamp down the rear of the vehicle.

Main work

- Remove screw 1 and pull wheel speed sensor 2 out of the hole.



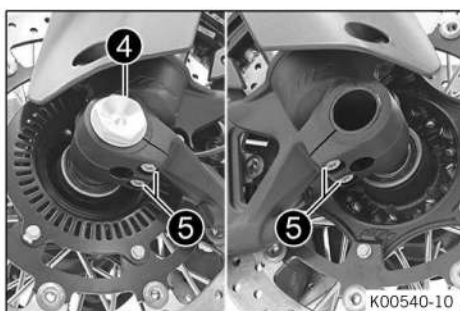
- Remove screws 3 from both brake calipers.
- Press back the brake linings by slightly tilting the brake calipers laterally on the brake disc.
- Pull the brake calipers carefully back from the brake discs and hang to the side loosely.



Info

Do not operate the hand brake lever if the brake calipers have been removed.

- Loosen screw 4 by several rotations.
- Loosen screws 5.
- Press on screw 4 to push the wheel spindle out of the axle clamp.
- Remove screw 4.



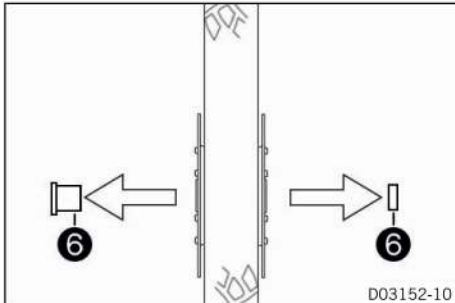
Warning

Danger of accidents Damaged brake discs reduce the braking effect.

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

- Hold the front wheel and remove the wheel spindle. Take the front wheel out of the fork.

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

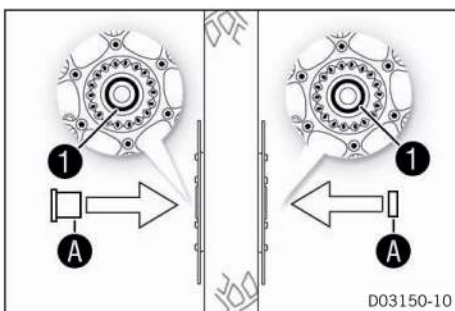


- Remove spacers 6.

14.6.4 Installing the front wheel (work stand)

! Warning
Danger of accidents Oil or grease on the brake discs reduces the braking effect.

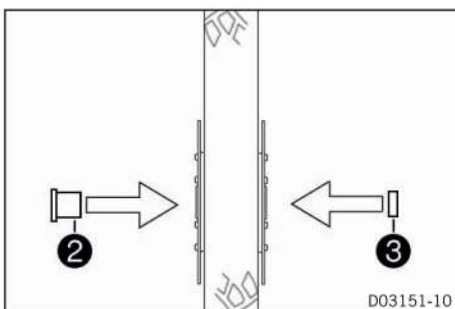
- Always keep the brake discs free of oil and grease.
- Clean the brake discs with brake cleaner when necessary.



Main work

- Check the wheel bearing for damage and wear.
 - » If the wheel bearing is damaged or worn:
 - Change front wheel bearing. (📖 p. 127)
- Clean and grease shaft seal rings 1 and contact surfaces A of the spacers.

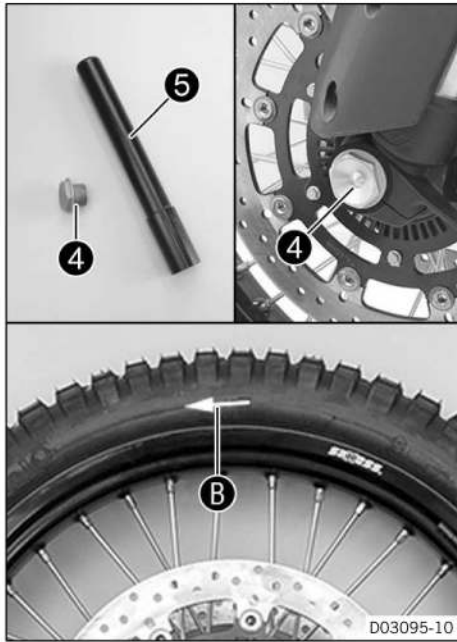
Long-life grease (📖 p. 408)



- Insert wide spacer 2 on the left in the direction of travel.

i Info
The ABS sensor wheel is on the left viewed in the direction of travel.

- Insert the narrow spacer 3 on the right in the direction of travel.



Warning

Danger of accidents Oil or grease on the brake discs reduces the braking effect.

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

- Clean and grease screw 4 and wheel spindle 5.

Long-life grease (📖 p. 408)

- Jack up the front wheel into the fork, position it, and insert the wheel spindle.

Info

The ABS sensor wheel is on the left viewed in the direction of travel.

The arrow B must point in the same direction of travel.

The position of the direction of travel indicator on the tires can vary.

- Mount and tighten screw 4.

Guideline

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

- Position the brake calipers.
 - ✓ The brake linings are correctly positioned.
- Mount screws 6 on both brake calipers, but do not tighten yet.
- Operate the hand brake lever repeatedly until the brake linings are in contact with the brake disc and there is a pressure point. Fix the hand brake lever in the activated position.
 - ✓ The brake calipers straighten.
- Tighten screws 6 on both brake calipers.

Guideline

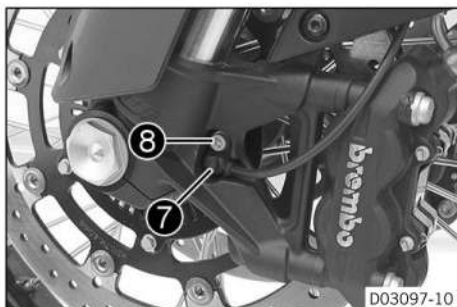
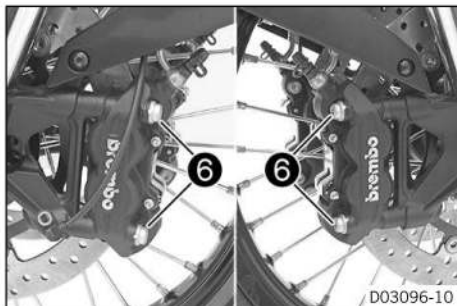
Screw, front brake caliper	M10	45 Nm (33.2 lbf ft) Loctite®243™
----------------------------	-----	--

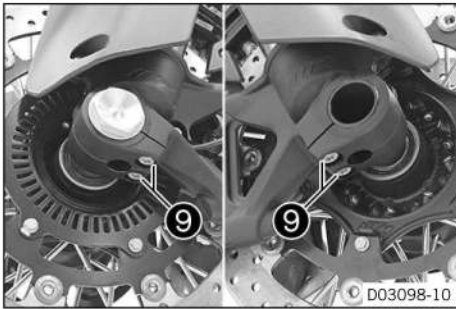
- Remove the locking piece of the hand brake lever.
- Position wheel speed sensor 7 in the hole.
- Mount and tighten screw 8.

Guideline

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

- Remove the load from the rear of the vehicle.





- Operate the front brake and compress the fork a few times firmly.
- ✓ The fork legs straighten.
- Tighten screws 9.

Guideline

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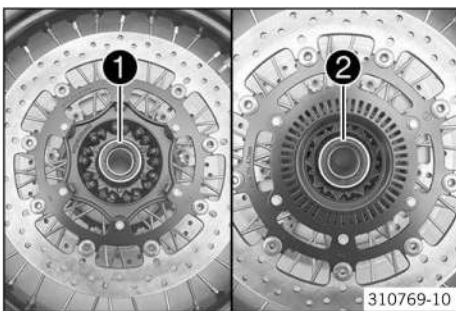
Finishing work

- Remove the motorcycle from the work stand. (📖 p. 15)
- Install the main silencer. (📖 p. 82)

14.6.5 Changing the front wheel bearing

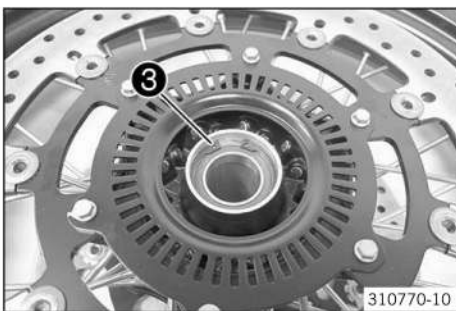
Preparatory work

- Raise the motorcycle with the rear lifting gear. (📖 p. 14)
- Remove the bottom triple clamp cover. (📖 p. 115)
- Lift the motorcycle with the front lifting gear. (📖 p. 13)
- Remove the front wheel. (📖 p. 121)

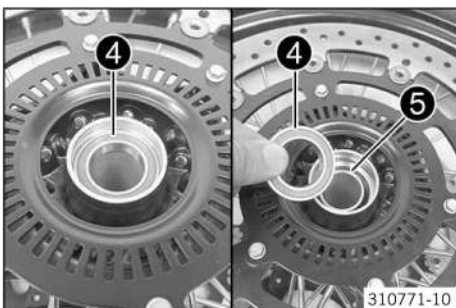


Main work

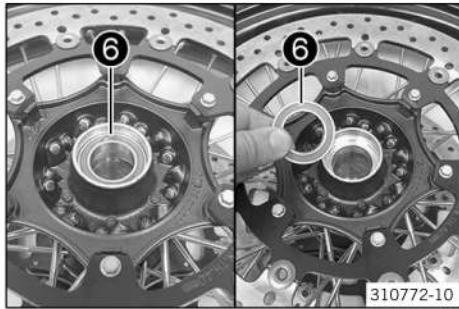
- Remove shaft seal rings 1 and 2.



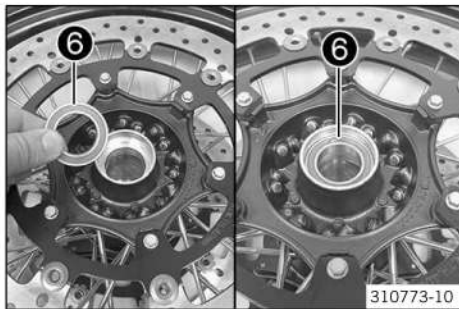
- Remove lock ring 3.



- Using a suitable tool, press bearing 4 out from the inside to the outside.
- Remove spacing tube 5.



- Using a suitable tool, press bearing 6 out from the inside to the outside.

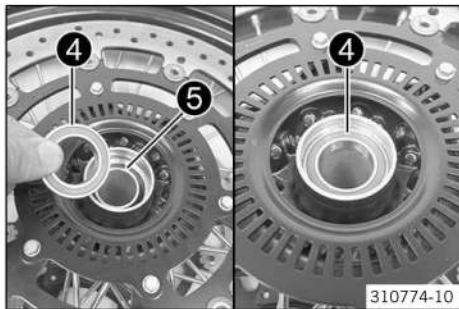


- Press new bearing 6 all the way in from the outside to the inside.



Info

Only press the bearing in via the outer bearing race otherwise the bearing will be damaged when it is pressed in.



- Clean, grease, and mount spacing tube 5.

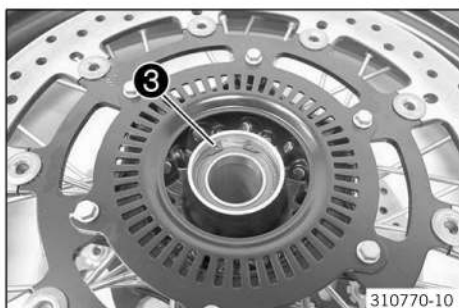
Long-life grease (📖 p. 408)

- Press new bearing 4 all the way in from the outside to the inside.

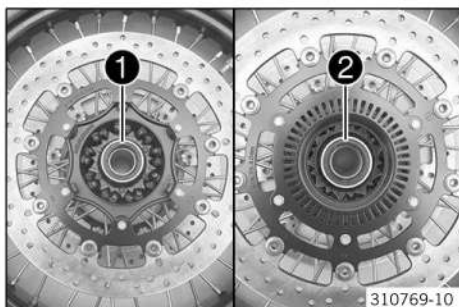


Info

Only press the bearing in via the outer bearing race otherwise the bearing will be damaged when it is pressed in.



- Mount lock ring 3.
✓ The lock ring engages audibly.



- Grease new shaft seal rings 1 and 2 and press in until they are flush.

Finishing work

- Install the front wheel. (📖 p. 122)
- Install the bottom triple clamp cover. (📖 p. 116)

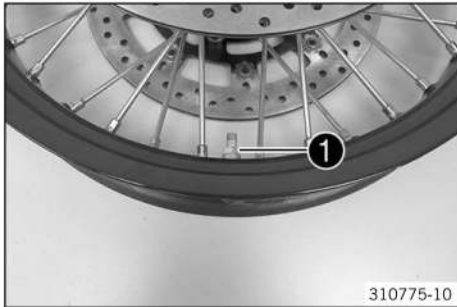
14.6.6 Changing the front tubeless sealing profile

Preparatory work

- Raise the motorcycle with the rear lifting gear. (📖 p. 14)
- Remove the bottom triple clamp cover. (📖 p. 115)
- Lift the motorcycle with the front lifting gear. (📖 p. 13)
- Remove the front wheel. (📖 p. 121)
- Remove wheel.

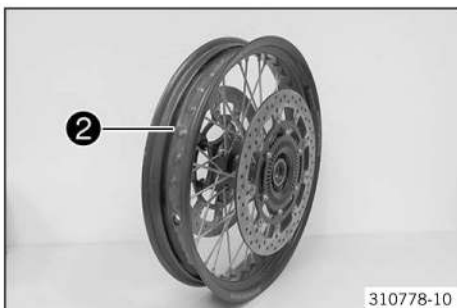
Main work

- Remove nut ❶.
- Take off the valve.

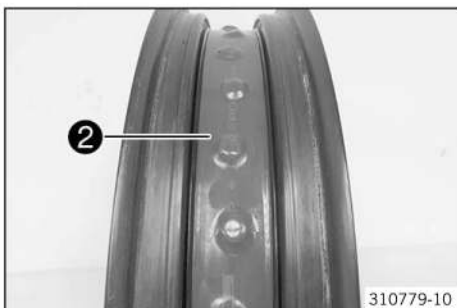


- Carefully cut through the tubeless sealing profile and pull it off.

i Tip
Raise the tubeless sealing profile slightly so that the rim tape is not damaged.

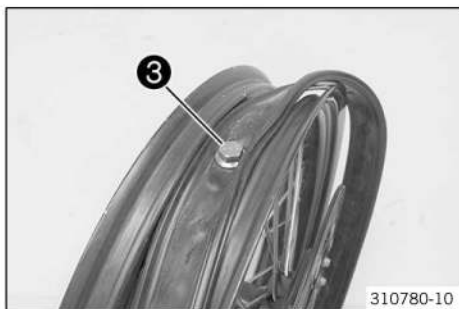


- Take off rim tape ❷.
- Clean the seal groove.
- Check the rim for damage and wear.
 - » If there is damage or wear:
 - Change the rim.
- Check the rim run-out. (📖 p. 119)



- Mount rim tape ❷.

i Info
Ensure that the rim tape is in exactly the right position.



- Lubricate the seal groove lightly.

Thinned tire mounting paste

- Position new tubeless sealing profile.



Tip

Using a suitable screw **3**, secure the holes of the tubeless sealing profile and the rim together. Do not tighten the screw so that the seal ring is not damaged.



- Pull the tubeless sealing profile evenly over the rim.



- Align the tubeless sealing profile.

- ✓ Both sides of the tubeless sealing profile are positioned in the bottom of the seal groove.

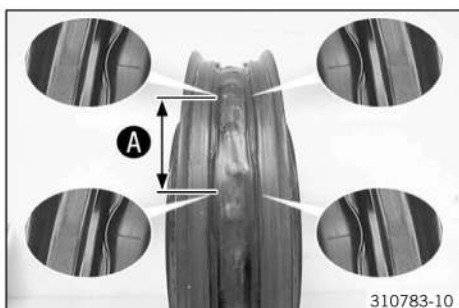
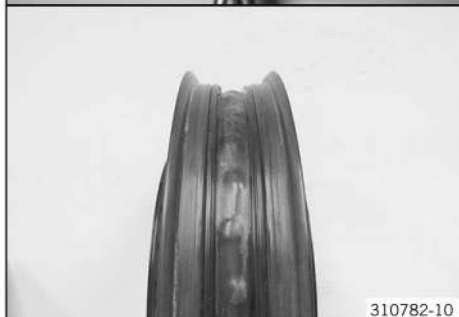


Info

Ensure that the tubeless sealing profile does not develop folds in the longitudinal direction.

- Lubricate the tubeless sealing profile at the edges.

Thinned tire mounting paste



- Using spacing **A**, press the tubeless sealing profile into the seal groove.

Guideline

Distance A	15 cm (5.9 in)
-------------------	----------------

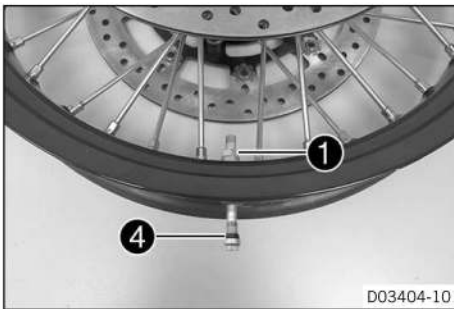


Info

This step aids in positioning, making it easier to mount the tubeless sealing profile. Press perpendicular to the rim to avoid shifting the profile in a radial direction.



- Press the tubeless sealing profile into the seal groove along the entire circumference.
- Check that the tubeless sealing profile is seated correctly around the entire circumference.
- ✓ The valve openings are aligned with each other.



- Grease O-ring 4 slightly.
- Position the valve.
- Mount and tighten nut 1.

Thinned tire mounting paste

Guideline

Nut, valve	ISO 10V2	12 Nm (8.9 lbf ft) Loctite®2701™
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Finishing work

- Mount and balance tires.
- Install the front wheel. (📖 p. 122)
- Install the bottom triple clamp cover. (📖 p. 116)

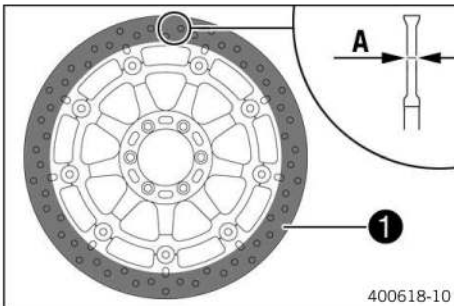
14.6.7 Checking the brake discs



Warning

Danger of accidents Worn-out brake discs reduce the braking effect.

- Make sure that worn-out brake discs are replaced immediately.



- Check the front and rear brake disc thickness at multiple points for the dimension A.



Info

Wear will reduce the thickness of the brake disc at contact surface 1 of the brake linings.

Brake discs - wear limit	
front	4 mm (0.16 in)
rear	4.5 mm (0.177 in)

- » If the brake disc thickness is less than the specified value.
 - Change the front brake discs. (📖 p. 132)
 - Change the rear brake disc. (📖 p. 143)
- Check the front and rear brake discs for damage, cracking, and deformation.
 - » If the brake disc exhibits damage, cracking, or deformation:
 - Change the front brake discs. (📖 p. 132)
 - Change the rear brake disc. (📖 p. 143)

14.6.8 Changing the front brake discs

i Info

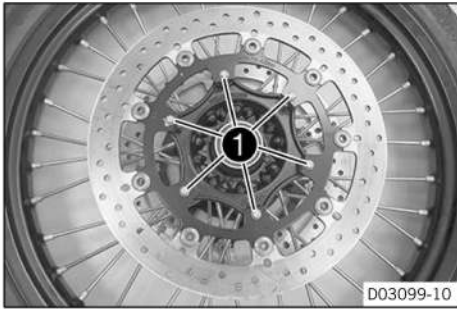
If the brake discs are changed, the brake linings must also be changed.

Preparatory work

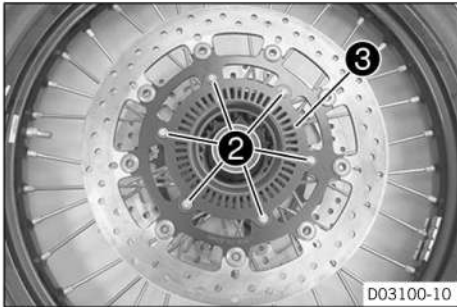
- Raise the motorcycle with the rear lifting gear. (📖 p. 14)
- Remove the bottom triple clamp cover. (📖 p. 115)
- Lift the motorcycle with the front lifting gear. (📖 p. 13)
- Remove the front wheel. (📖 p. 121)

Main work

- Remove screws **1**. Take off the right-hand brake disc.



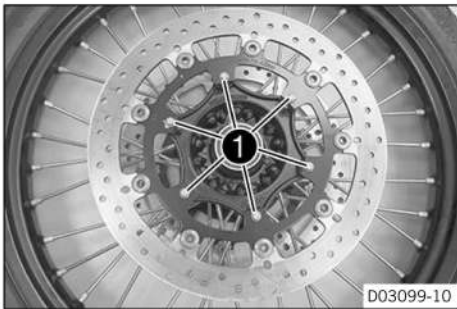
- Remove screws **2**. Take off the left-hand brake disc with ABS sensor wheel **3**.



- Clean the contact surface of the brake disc.
- Position the new brake disc with the label facing outward. Mount and tighten screws **1**.

Guideline

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

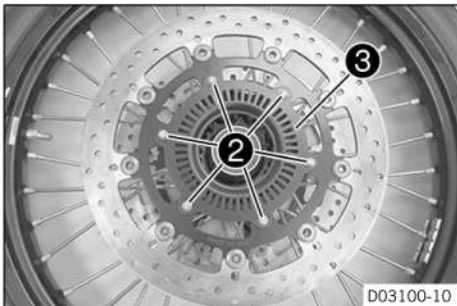


- Clean the contact surface of the brake disc.
- Position the new brake disc with the label facing outward. Position ABS sensor wheel **3**. Mount and tighten screws **2**.

Guideline

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

- ✓ The ABS sensor wheel is on the left viewed in the direction of travel.



Finishing work

- Install the front wheel. (📖 p. 122)
- Install the bottom triple clamp cover. (📖 p. 116)

14.7 Rear wheel

14.7.1 Removing the rear wheel

Preparatory work

- Raise the motorcycle with the rear lifting gear. (📖 p. 14)

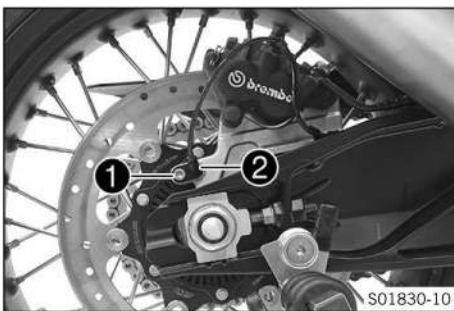
Main work

- Press the brake caliper onto the brake disc by hand in order to push back the brake pistons.



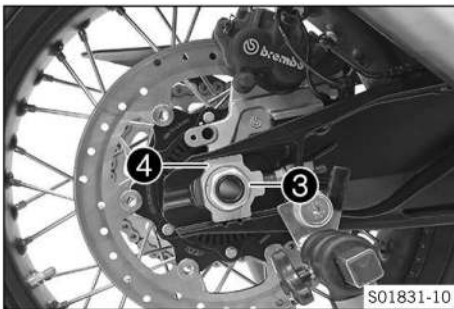
S01832-10

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



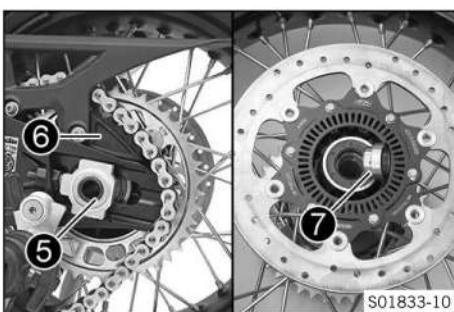
S01830-10

- Remove nut ❸. Remove chain adjuster ❹.



S01831-10

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



S01833-10



Warning

Danger of accidents Reduced braking efficiency due to damaged brake discs.

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

- Hold the rear wheel and remove the wheel spindle. Take the rear wheel out of the link fork.



Info

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

- Remove spacer ⑦.

14.7.2 Installing the rear wheel



Warning

Danger of accidents Oil or grease on the brake discs reduces the braking effect.

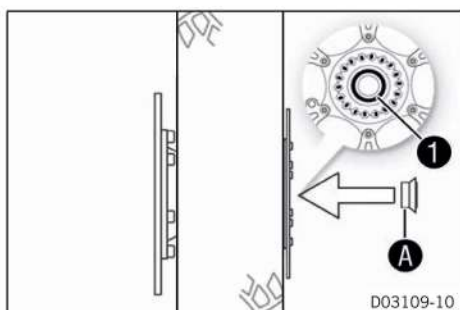
- Always keep the brake discs free of oil and grease.
- Clean the brake discs with brake cleaner when necessary.



Warning

Danger of accidents There is no braking effect to start with at the rear brake after installing the rear wheel.

- Actuate the foot brake several times before going on a ride until you can feel a firm pressure point.



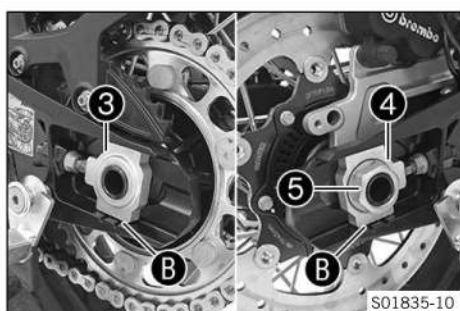
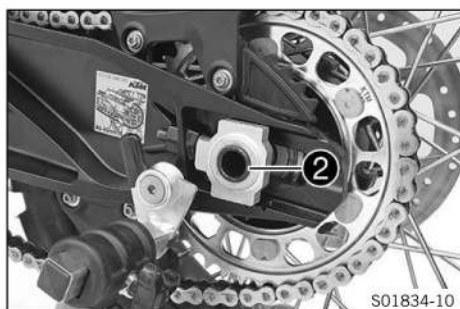
Main work

- Check the rear hub damping rubber pieces. (📖 p. 147)
- Check the wheel bearing for damage and wear.
 - » If the wheel bearing is damaged or worn:
 - Change the rear wheel bearing. (📖 p. 138)
- Clean and grease shaft seal ring ① and contact surface A of the spacer.

Long-life grease (📖 p. 408)

- Clean and lightly grease wheel spindle and nut.
- Mount the damping rubber pieces and rear sprocket carrier on the rear wheel.
- Place the rear wheel in the link fork and engage the brake disc with the brake caliper.
- Mount wheel spindle ②, but do not push it in all the way.
- Push the rear wheel forward as far as possible and lay the chain on the rear sprocket.

Long-life grease (📖 p. 408)



- Push the wheel spindle in all the way and mount chain adjuster ④ and nut ⑤.



Info

Mount chain adjusters ③ and ④ in the same position.

- Make sure that the chain adjusters are fitted correctly on the adjusting screws.

Guideline

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

- Tighten nut **5**.

Guideline

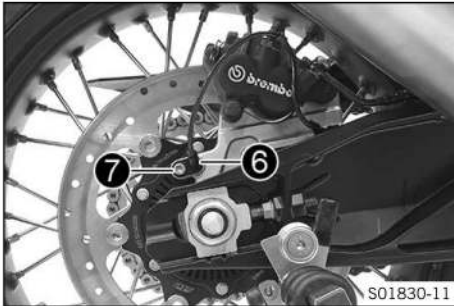
Nut, rear wheel spindle	M25x1.5	90 Nm (66.4 lbf ft) Thread greased
-------------------------	---------	---------------------------------------

- Position wheel speed sensor **6** in the hole.
- Mount and tighten screw **7**.

Guideline

Screw, rear wheel speed sensor	M6	10 Nm (7.4 lbf ft)
--------------------------------	----	--------------------

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



Finishing work

- Remove the rear of the motorcycle from the lifting gear. (p. 14)

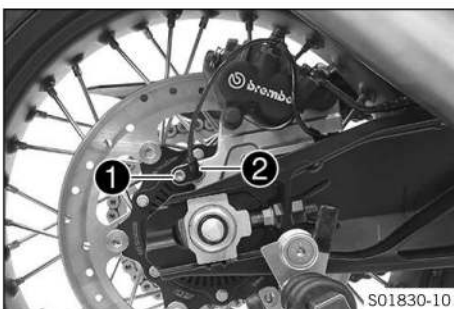
14.7.3 Removing the rear wheel (work stand)

Preparatory work

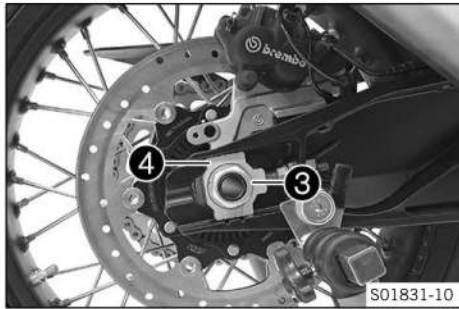
- Remove the main silencer. (p. 82)
- Raise the motorcycle with the work stand. (p. 14)

Main work

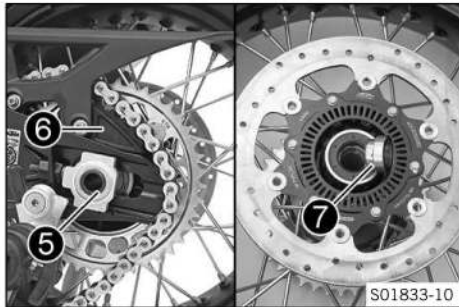
- Press the brake caliper onto the brake disc by hand in order to push back the brake pistons.



- Remove screw **1** and pull wheel speed sensor **2** out of the hole.



- Remove nut **3**. Remove chain adjuster **4**.



- Pull out wheel spindle **5** far enough to allow the rear wheel to be pushed forward.
- Push the rear wheel forward as far as possible. Take the chain off the rear sprocket and place it on chain sprocket guard **6**.



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.

- Hold the rear wheel and remove the wheel spindle. Take the rear wheel out of the link fork.



Info

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

- Remove spacer **7**.

14.7.4 Installing the rear wheel (work stand)



Warning

Danger of accidents Oil or grease on the brake discs reduces the braking effect.

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



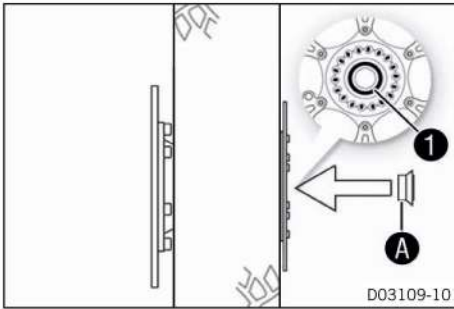
Warning

Danger of accidents There is no braking effect to start with at the rear brake after installing the rear wheel.

- Actuate the foot brake several times before going on a ride until you can feel a firm pressure point.

Main work

- Check the rear hub damping rubber pieces. (📖 p. 147)



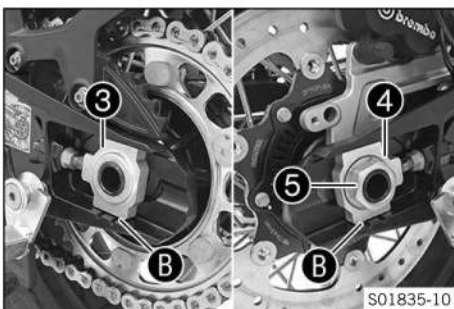
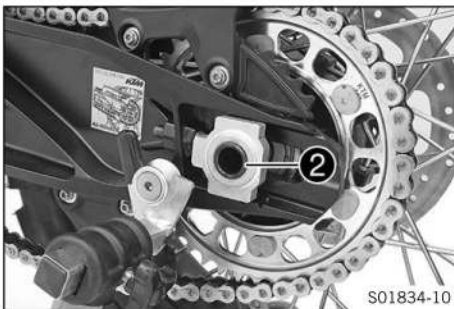
- Check the wheel bearing for damage and wear.
 - » If the wheel bearing is damaged or worn:
 - Change the rear wheel bearing. (📖 p. 138)
- Clean and grease shaft seal ring **1** and contact surface **A** of the spacer.

Long-life grease (📖 p. 408)

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

Long-life grease (📖 p. 408)

- Mount the damping rubber pieces and rear sprocket carrier on the rear wheel.
- Place the rear wheel in the link fork and engage the brake disc with the brake caliper.
- Mount wheel spindle **2**, but do not push it in all the way.
- Push the rear wheel as far forward as possible and place the chain on the rear sprocket.



- Push the wheel spindle in all the way and mount chain adjuster **4** and nut **5**.



Info

Mount chain adjusters **3** and **4** in the same position.

- Make sure that the chain adjusters are fitted correctly on the adjusting screws.

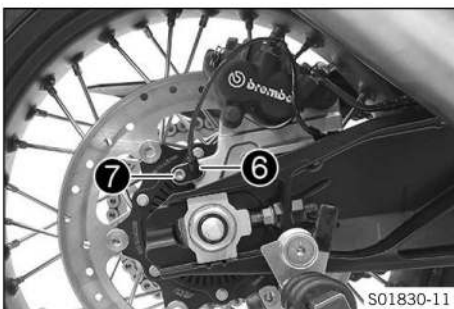
Guideline

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

- Tighten nut **5**.

Guideline

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



- Position wheel speed sensor **6** in the hole.
- Mount and tighten screw **7**.

Guideline

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

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

Finishing work

- Remove the motorcycle from the work stand. (📖 p. 15)
- Install the main silencer. (📖 p. 82)

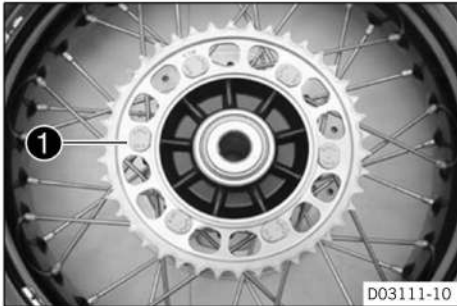
14.7.5 Changing the rear wheel bearing

Preparatory work

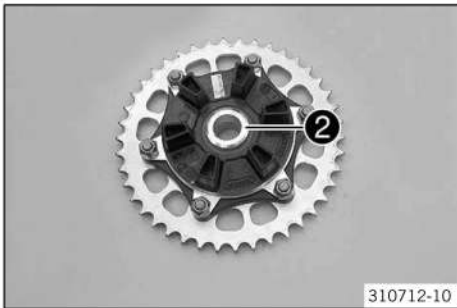
- Raise the motorcycle with the rear lifting gear. (📖 p. 14)
- Remove the rear wheel. (📖 p. 133)

Main work

- Remove rear sprocket carrier ❶.



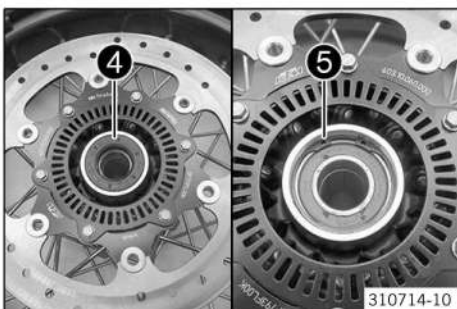
- Check both bearings ❷ for damage and wear.
 - » If the bearings are damaged or worn:
 - Change the bearing of the rear sprocket carrier. (📖 p. 149)

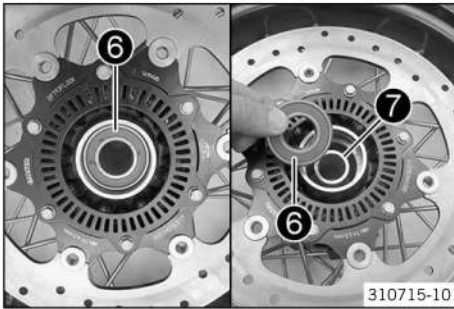


- Remove damping rubber pieces ❸.

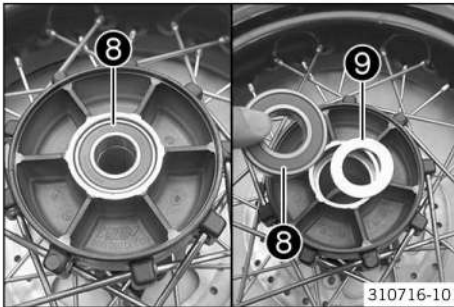


- Remove shaft seal ring ❹.
- Remove lock ring ❺.

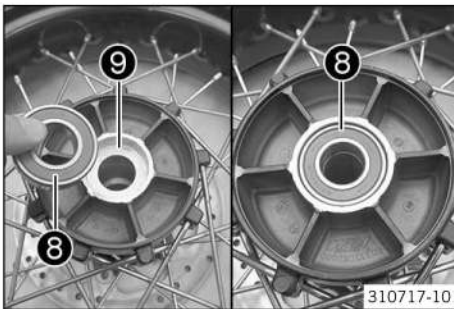




- Using a suitable tool, press bearing 6 out from the inside to the outside.
- Remove spacing tube 7.

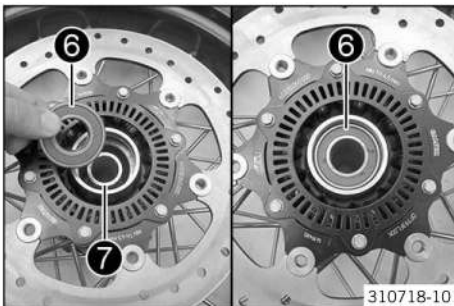


- Using a suitable tool, press bearing 8 out from the inside to the outside.
- Check spacer washer 9 for damage and wear.
 - » If the spacer washer is damaged or worn:
 - Replace the spacer washer.



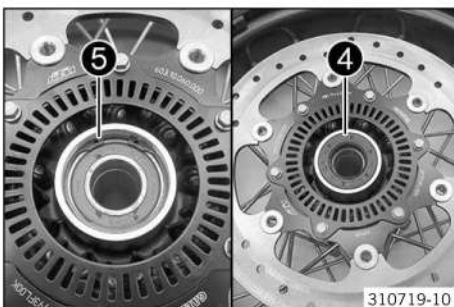
- Position spacer washer 9.
- Press new bearing 8 all the way in from the outside to the inside.

i Info
Only press the bearing in via the outer bearing race otherwise the bearing will be damaged when it is pressed in.



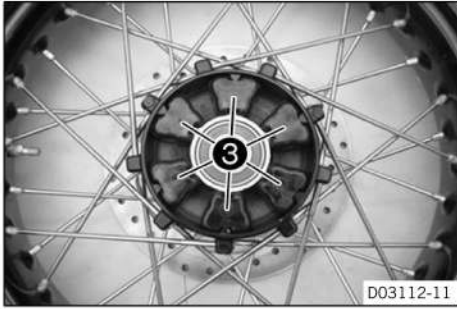
- Clean, grease, and mount spacing tube 7.
- Long-life grease (📖 p. 408)
- Press new bearing 6 all the way in from the outside to the inside.

i Info
Only press the bearing in via the outer bearing race otherwise the bearing will be damaged when it is pressed in.



- Mount lock ring 5.
 - ✓ The lock ring engages audibly.
- Grease new shaft seal ring 4 and press it in until it is flush.

Long-life grease (📖 p. 408)



- Position damping rubber pieces ③.



- Mount rear sprocket carriers ①.

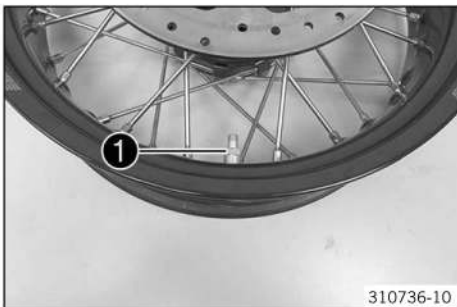
Finishing work

- Install the rear wheel. (📖 p. 134)
- Remove the rear of the motorcycle from the lifting gear. (📖 p. 14)

14.7.6 Changing the rear tubeless sealing profile

Preparatory work

- Raise the motorcycle with the rear lifting gear. (📖 p. 14)
- Remove the rear wheel. (📖 p. 133)
- Take off the rear sprocket carrier and the damping rubbers.
- Remove wheel.



Main work

- Remove nut ①.
- Take off the valve.

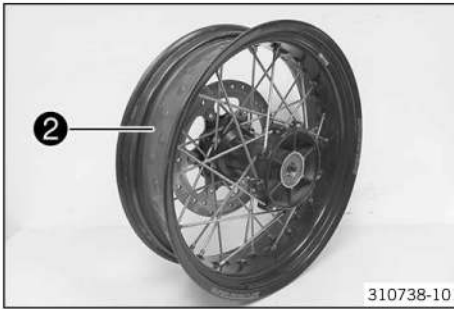


- Carefully cut through the tubeless sealing profile and pull it off.

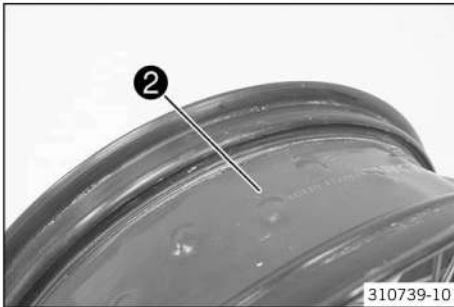


Tip

Raise the tubeless sealing profile slightly so that the rim tape is not damaged.

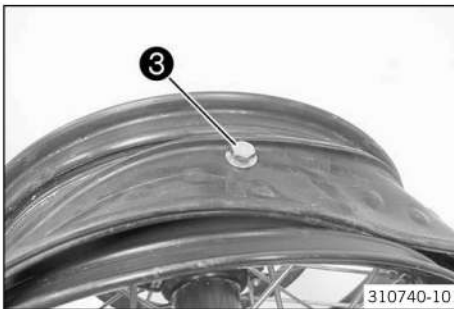


- Take off rim tape ②.
- Clean the seal groove.
- Check the rim for damage and wear.
 - » If there is damage or wear:
 - Change the rim.
- Check the rim run-out. (📖 p. 119)



- Mount rim tape ②.

i Info
Ensure that the rim tape is in exactly the right position.



- Lubricate the seal groove lightly.

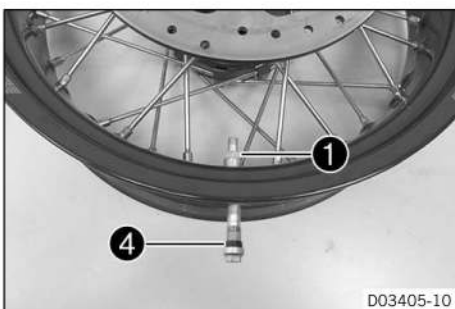
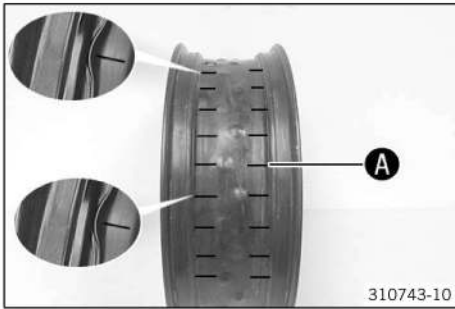
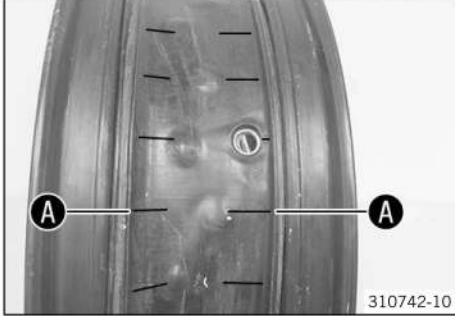
Thinned tire mounting paste

- Position new tubeless sealing profile.

i Tip
Using a suitable screw ③, secure the holes of the tubeless sealing profile and the rim together. Do not tighten the screw so that the seal ring is not damaged.



- Pull the tubeless sealing profile evenly over the rim.



- Align the tubeless sealing profile.
 - ✓ Both sides of the tubeless sealing profile are positioned in the bottom of the seal groove.
 - ✓ Markings **A** are aligned along the entire circumference of the rim.



Info

Ensure that the tubeless sealing profile does not develop folds in the longitudinal direction.

- Lubricate the tubeless sealing profile at the edges.

Thinned tire mounting paste

- Press the tubeless sealing profile into the seal groove at intervals that are 5 markings **A** apart.



Info

This step aids in positioning, making it easier to mount the tubeless sealing profile. Press perpendicular to the rim to avoid shifting the profile in a radial direction.

- Press the tubeless sealing profile into the seal groove along the entire circumference.
- Check that the tubeless sealing profile is seated correctly around the entire circumference.
 - ✓ The valve openings are aligned with each other.

- Grease O-ring **4** slightly.

Thinned tire mounting paste

- Position the valve.
- Mount and tighten nut **1**.

Guideline

Nut, valve	ISO 10V2	12 Nm (8.9 lbf ft) Loctite®2701™
------------	----------	--

Finishing work

- Mount and balance tires.
- Mount the damping rubbers and rear sprocket carrier.
- Install the rear wheel. (📖 p. 134)

- Remove the rear of the motorcycle from the lifting gear. (📖 p. 14)

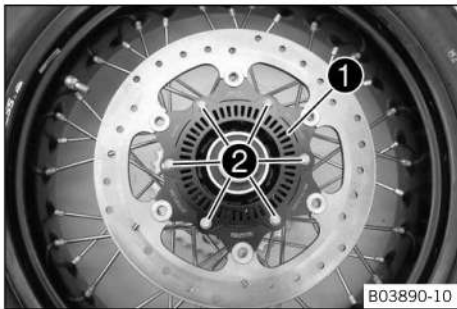


14.7.7 Changing the rear brake disc

Info
If the brake discs are changed, the brake linings must also be changed.

Preparatory work

- Raise the motorcycle with the rear lifting gear. (📖 p. 14)
- Remove the rear wheel. (📖 p. 133)



Main work

- Remove screws ①.
- Remove brake disc with ABS sensor wheel ②.
- Clean the contact surface of the brake disc.
- Position the new brake disc with the label facing outward.
- Position ABS sensor wheel ②.
- Mount and tighten screws ①.

Guideline

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

Finishing work

- Install the rear wheel. (📖 p. 134)
- Remove the rear of the motorcycle from the lifting gear. (📖 p. 14)



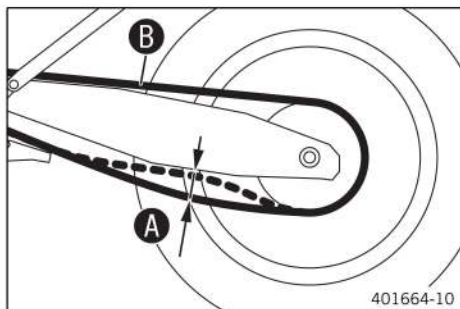
14.7.8 Checking the chain tension

Warning
Danger of accidents Incorrect chain tension damages components and results in accidents.
If the chain is tensioned too much, the chain, engine sprocket, rear sprocket, transmission and rear wheel bearings wear more quickly. Some components may break if overloaded.
If the chain is too loose, the chain may fall off the engine sprocket or the rear sprocket. As a result, the rear wheel locks or the engine will be damaged.

- Check the chain tension regularly.
- Set the chain tension in accordance with the specification.

Preparatory work

- Raise the motorcycle with the rear lifting gear. (📖 p. 14)



Main work

- Shift the transmission into neutral **N**.
- In the area in front of the chain guide, push the chain up and determine the chain tension **A**.

Info

Top chain section **B** must be taut. Chain wear is not always even, so you should repeat this measurement at different chain positions.

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

- » If the chain tension does not meet the specification:
 - Adjust the chain tension. (📖 p. 144)

Finishing work

- Remove the rear of the motorcycle from the lifting gear. (📖 p. 14)

14.7.9 Adjusting the chain tension



Warning

Danger of accidents Incorrect chain tension damages components and results in accidents.

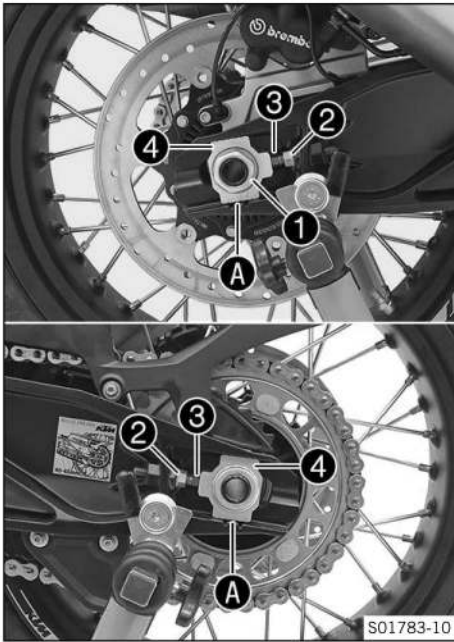
If the chain is tensioned too much, the chain, engine sprocket, rear sprocket, transmission and rear wheel bearings wear more quickly. Some components may break if overloaded.

If the chain is too loose, the chain may fall off the engine sprocket or the rear sprocket. As a result, the rear wheel locks or the engine will be damaged.

- Check the chain tension regularly.
- Set the chain tension in accordance with the specification.

Preparatory work

- Raise the motorcycle with the rear lifting gear. (📖 p. 14)
- Check the chain tension. (📖 p. 143)



Main work

- Loosen nut ①.
- Loosen nuts ②.
- Adjust the chain tension by turning adjusting screws ③ left and right.

Guideline

Chain tension	40 ... 45 mm (1.57 ... 1.77 in)
Turn the adjusting screws ③ on the left and right so that the markings on the left and right chain adjusters ④ are in the same position relative to the reference marks A. The rear wheel is then correctly aligned.	

i Info

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

- Tighten nuts ②.
- Make sure that chain adjusters ④ are fitted correctly on adjusting screws ③.
- Tighten nut ①.

Guideline

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

i Info

Chain adjusters ④ can be turned by 180°.

Finishing work

- Remove the rear of the motorcycle from the lifting gear. (📖 p. 14)

14.7.10 Checking the chain, rear sprocket, and engine sprocket

Preparatory work

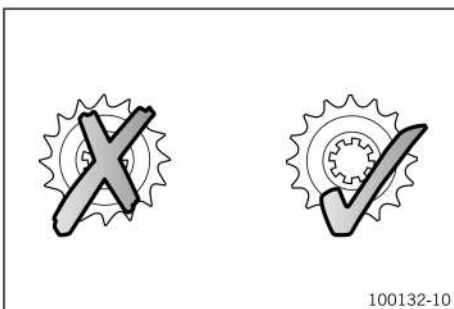
- Raise the motorcycle with the rear lifting gear. (📖 p. 14)

Main work

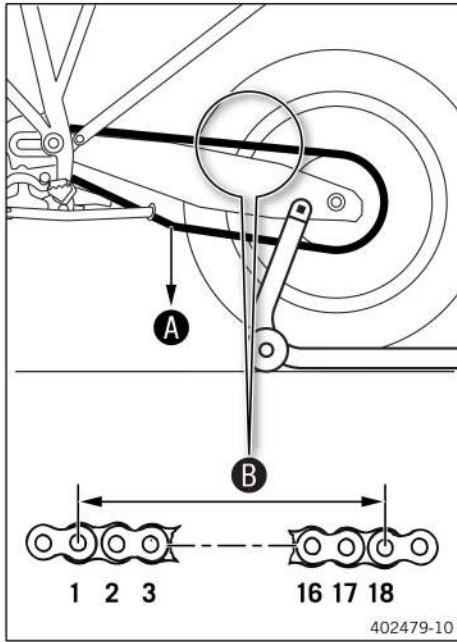
- Check the rear sprocket and engine sprocket for wear.
 - » If the rear sprocket and engine sprocket are worn:
 - Change the drivetrain kit. (📖 p. 151)

i Info

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



100132-10



- Shift the transmission into neutral **N**.
- Pull on the lower chain section with the specified weight **A**.

Guideline

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

- Measure distance **B** of 18 chain rollers in the upper chain section.

i Info

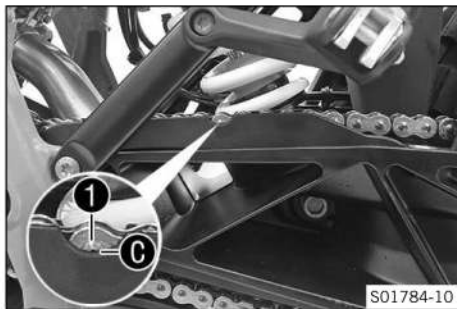
Chain wear is not always even, so you should repeat this measurement at different chain positions.

Maximum distance B from 18 chain rollers at the longest chain section	272 mm (10.71 in)
--	-------------------

- » If distance **B** is greater than the specified measurement:
 - Change the drivetrain kit. (📖 p. 151)

i Info

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



- Check the chain sliding guard for wear at the recess.

i Info

When the chain sliding guard is new, the rivets **1** are half visible at the bottom edge **C** of the recess.

- » When the rivets of the chain are no longer visible at the bottom edge of the recess of the chain sliding guard:
 - Change the chain sliding guard.

- Check that the chain sliding guard is firmly seated.
 - » If the chain sliding guard is loose:
 - Tighten the screws on the chain sliding guard.

Guideline

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



- Check the chain guide for wear.
 - » If 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 screws on the chain guide.

Guideline

Screw, chain guide	M6	5 Nm (3.7 lbf ft)
--------------------	----	-------------------

Finishing work

- Remove the rear of the motorcycle from the lifting gear. (📖 p. 14)



14.7.11 Cleaning the chain



Warning

Danger of accidents Lubricants on the tires reduces the road grip.

- Remove lubricants from the tires using a suitable cleaning agent.



Warning

Danger of accidents Oil or grease on the brake discs reduces the braking effect.

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



Note

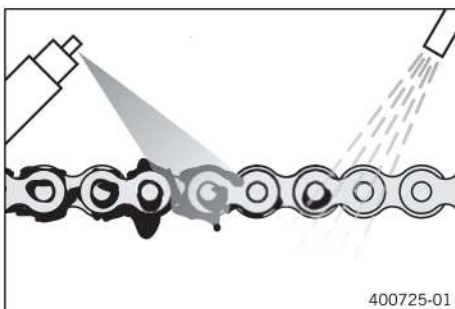
Environmental hazard Hazardous substances cause environmental damage.

- Dispose of oils, grease, filters, fuel, cleaning agents, brake fluid, etc., correctly and in compliance with the applicable regulations.



Info

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



Preparatory work

- Raise the motorcycle with the rear lifting gear. (📖 p. 14)

Main work

- Rinse off loose dirt with a soft jet of water.
- Remove old grease residue with chain cleaner.

Chain cleaner (📖 p. 408)

- After drying, apply chain spray.

Street chain spray (📖 p. 409)

Finishing work

- Remove the rear of the motorcycle from the lifting gear. (📖 p. 14)



14.7.12 Checking the rear hub damping rubber pieces

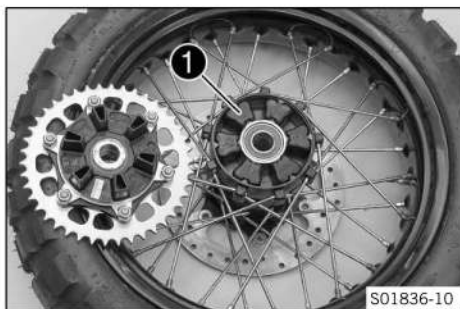


Info

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

Preparatory work

- Raise the motorcycle with the rear lifting gear. (📖 p. 14)
- Remove the rear wheel. (📖 p. 133)



Main work

- Check the damping rubber pieces **1** of the rear hub for damage and wear.
 - » If the damping rubber pieces of the rear hub are damaged or worn:
 - Change all the damping rubber pieces of the rear hub. (📖 p. 148)



- Lay the rear wheel on a workbench with the rear sprocket facing upward and insert the wheel spindle in the hub.
- Check the rear sprocket play **A**.

Info

Measure the play on the outside of the rear sprocket.

Play of damping rubber pieces on rear wheel	≤ 5 mm (≤ 0.2 in)
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- » If clearance **A** is larger than the specified value:
 - Change all the damping rubber pieces of the rear hub. (📖 p. 148)

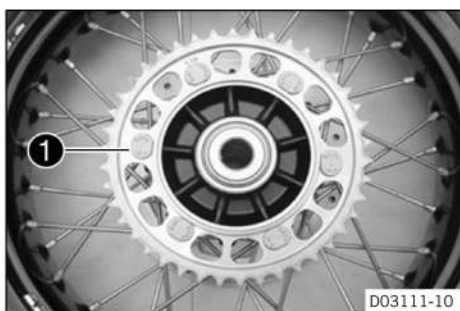
Finishing work

- Install the rear wheel. (📖 p. 134)
- Remove the rear of the motorcycle from the lifting gear. (📖 p. 14)

14.7.13 Changing all the damping rubber pieces of the rear hub

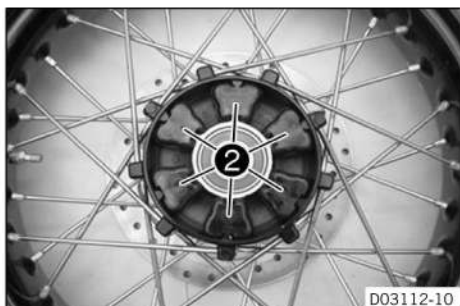
Preparatory work

- Raise the motorcycle with the rear lifting gear. (📖 p. 14)
- Remove the rear wheel. (📖 p. 133)

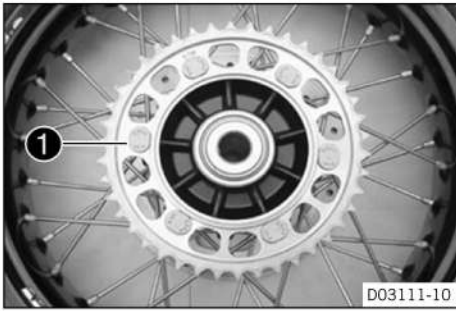


Main work

- Remove rear sprocket carrier **1**.



- Remove all damping rubber pieces **2**.
- Position new damping rubber pieces.



- Mount rear sprocket carriers **1**.

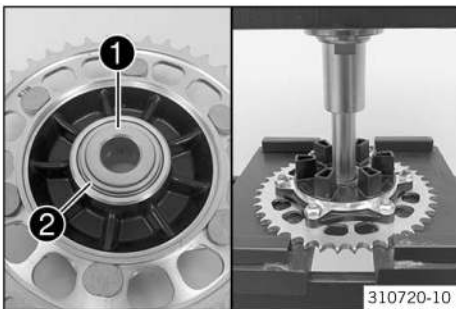
Finishing work

- Install the rear wheel. (🔧 p. 134)
- Remove the rear of the motorcycle from the lifting gear. (🔧 p. 14)

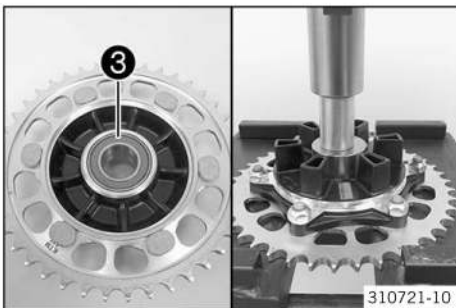
14.7.14 Changing the bearing of the rear sprocket carrier

Condition

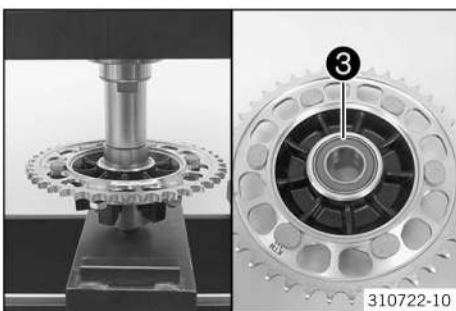
Rear sprocket carrier is removed.



- Using a shim **1**, press distance sleeve **2** from the inside to the outside.



- Using a suitable tool, press both bearings **3** out from the inside to the outside.

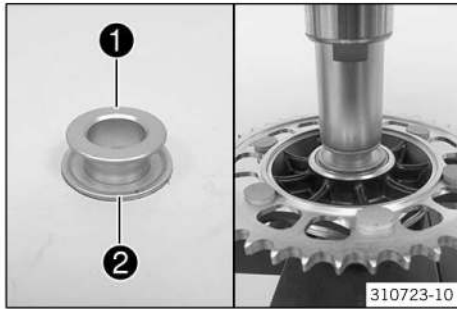


- Using a suitable tool, press in new bearings **3** from the outside to the inside until they are flush.



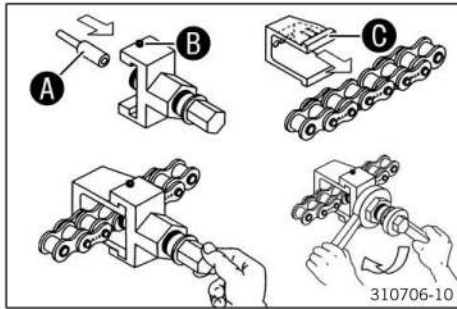
Info

Support rear sprocket carrier in the area of the bearing to avoid damage.



- Press in the distance sleeve **1** from the outside all the way to the inside using the shim **2**.

14.7.15 Opening the chain

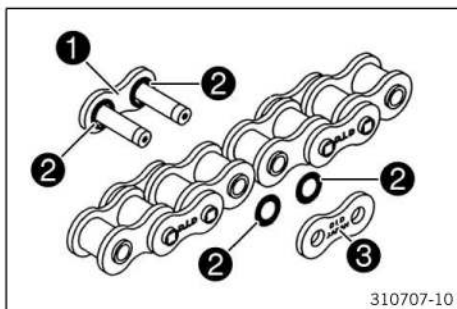


- Mount press drift **A** with the larger diameter in the spindle of the special tool. Turn the spindle counterclockwise.

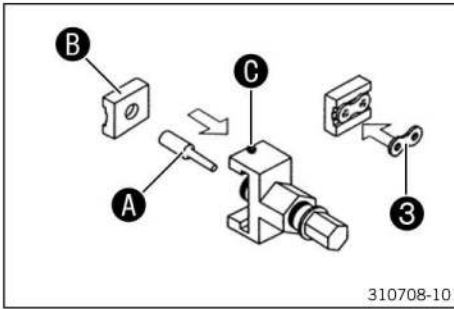
Chain rivet tool (60029020000) (📖 p. 415)

- Make the connecting link of the chain accessible. Fret the riveting point.
- Position the special tool with the press drift on one of the 2 pins of the connecting link of the chain.
 - ✓ Locking screw **B** points upwards.
- Position retaining clamp **C** of the special tool on the chain from the rear.
 - ✓ Markings **A** and **B** point upwards.
- Slide retaining clamp **C** of the special tool into the pressing tool.
 - ✓ The arrow of marking **A** points to locking screw **B**.
- Screw the locking screw hand-tight as far as it will go.
 - ✓ The retaining clamp is fixed.
- Hold the special tool and screw in the spindle.
 - ✓ The chain pin is pressed out through the retaining clamp drill hole.
- Unscrew the locking screw and remove the special tool.
- Repeat the process on the second pin of the chain link.

14.7.16 Riveting the chain



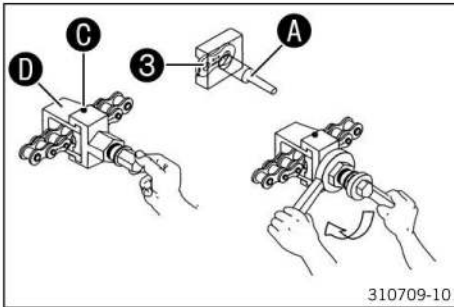
- Grease new connecting link **1** and position an X-ring **2** on each pin.
- Connect the chain ends with a connecting link.
- Position another X-ring **2** on each pin.



- Mount press drift **A** with the smaller diameter in the spindle of the special tool. Turn the spindle counterclockwise.

Chain rivet tool (60029020000) (📖 p. 415)

- Position press plate **B** of the special tool on the press drift.
- Position chain joint plate **3** in the press plate.



- Position the special tool on the chain.
 - ✓ Locking screw **C** points upwards.
- Position retaining clamp **D** of the special tool on the chain from the rear.
 - ✓ Markings **A** and **B** point upwards.
- Slide retaining clamp **D** of the special tool into the pressing tool.
 - ✓ The arrow of marking **A** points to locking screw **C**.
- Screw the locking screw hand-tight as far as it will go.
 - ✓ The retaining clamp is fixed.
- Hold the special tool and screw in the spindle.
 - ✓ Press drift **A** of the special tool presses against the center of the chain joint plate **3**.
 - ✓ The chain joint plate is pressed on.
- Unscrew the locking screw and remove the special tool.
- Rivet the two pins of the connecting link with special tool.

Chain rivet tool (60029020000) (📖 p. 415)

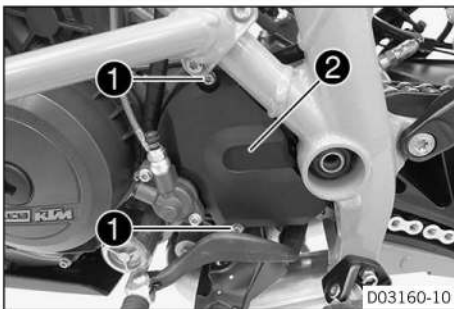
14.7.17 Changing the drivetrain kit

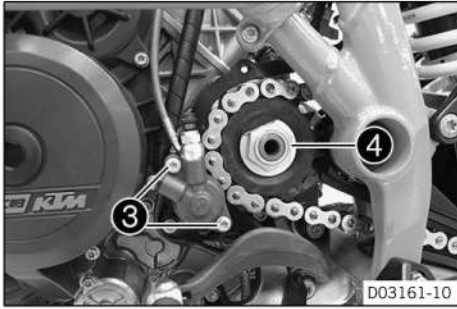
Preparatory work

- Raise the motorcycle with the rear lifting gear. (📖 p. 14)

Main work

- Remove screws **1**.
- Take off engine sprocket cover **2**.





- Remove screws ③.
- Take off the slave cylinder of the clutch and hang it to one side.



Info

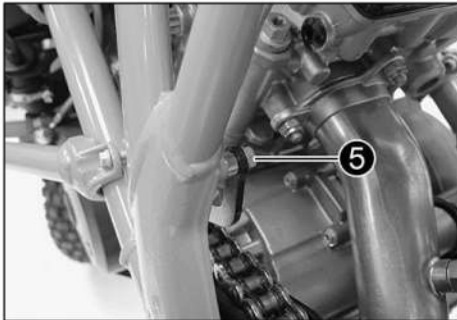
Do not activate the clutch lever while the slave cylinder of the clutch is removed.
Do not kink the clutch line.

- Remove the spacer with sleeves.
- Bend up the lock washer.
- Have an assistant operate the rear brake.
- Remove nut ④ with the lock washer.
- Remove screw ⑤.

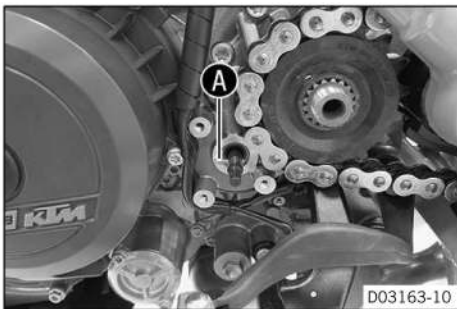
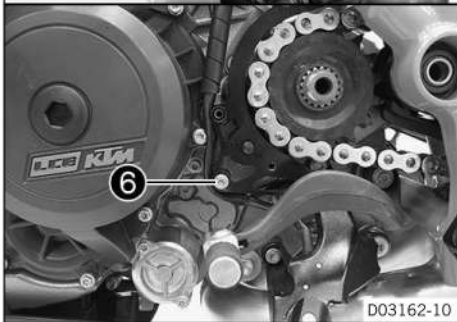


Info

Do not misplace the spacer.



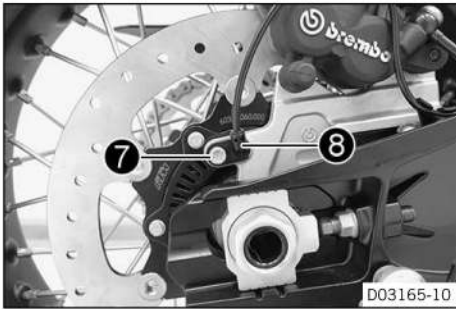
- Remove screw ⑥.
- Remove the chain securing guide with the spacer.



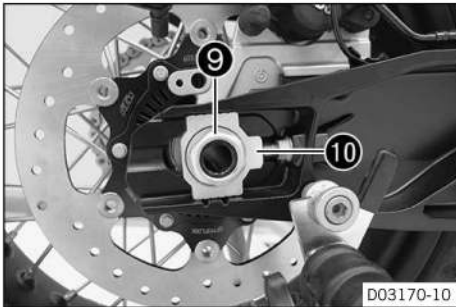
- Remove pin ①.



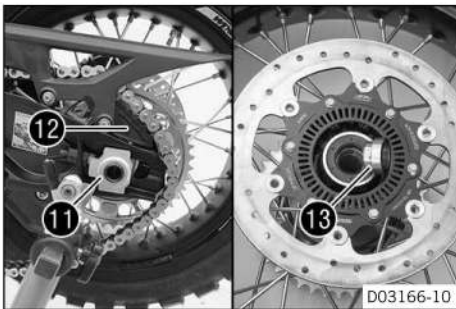
- Press the brake caliper onto the brake disc by hand in order to push back the brake pistons.



- Remove screw 7 and pull wheel speed sensor 8 out of the hole.



- Remove nut 9. Remove chain adjuster 10.



- Pull out wheel spindle 11 far enough to allow the rear wheel to be pushed forward.
- Push the rear wheel forward as far as possible. Take the chain off the rear sprocket and place it on chain sprocket guard 12.



Warning

Danger of accidents Reduced braking efficiency due to damaged brake discs.

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

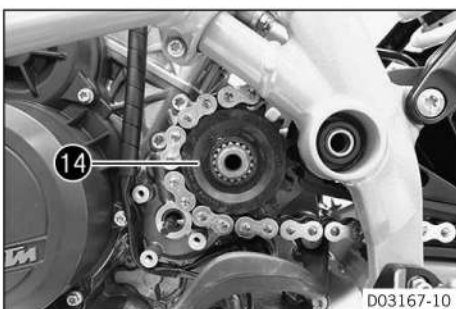
- Hold the rear wheel and remove the wheel spindle. Take the rear wheel out of the link fork.



Info

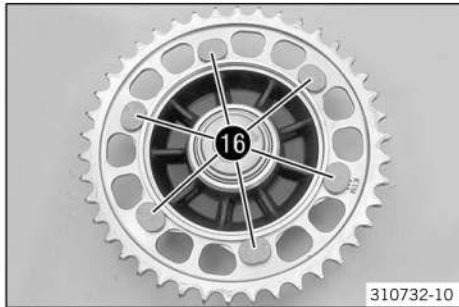
Do not operate the foot brake when the rear wheel is removed.

- Remove spacer 13.
- Remove engine sprocket 14.
- Open the chain. (📖 p. 150)
- Mount the new chain.
- Rivet the chain. (📖 p. 150)
- Position new engine sprocket 14 in the chain and mount on the countershaft.





- Remove rear sprocket carrier **15**.



- Fix the rear sprocket carrier in the vise.

Guideline

Use soft jaws.

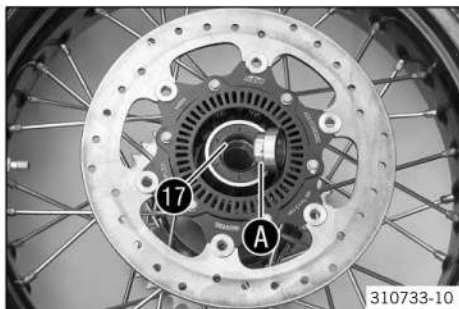
- Remove fittings **16** and take off the rear sprocket.
- Position the new rear sprocket.
- Mount and tighten fittings **16**.

Guideline

Nut, rear sprocket screw	M10x1.25	50 Nm (36.9 lbf ft) Loctite®243™
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- Mount rear sprocket carriers **15**.



- Check the wheel bearing for damage and wear.
 - » If the wheel bearing is damaged or worn:
 - Change the rear wheel bearing. (📖 p. 138)
- Clean and grease shaft seal ring **17** and contact surface **A** of the spacer.

Long-life grease (📖 p. 408)

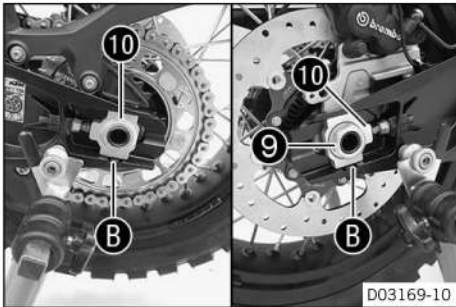
- Clean and grease the thread of the wheel spindle and nut.

Long-life grease (📖 p. 408)

- Mount the damping rubber pieces and rear sprocket carrier on the rear wheel.
- Place the rear wheel in the link fork and engage the brake disc with the brake caliper.



- Mount wheel spindle **11**, but do not push it in all the way.
- Push the rear wheel forward as far as possible and lay the chain on the rear sprocket.



- Slide the wheel spindle in as far as it will go.
- Mount chain adjuster **10** and nut **9**, but do not tighten it yet.

Guideline

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

i Info

Mount chain adjusters **10** in the same position.

- Make sure that the chain adjusters are fitted correctly on the adjusting screws.

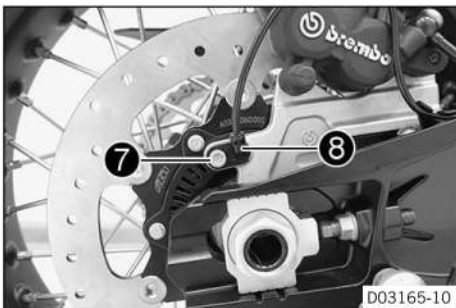
Guideline

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

- Tighten nut **9**.

Guideline

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



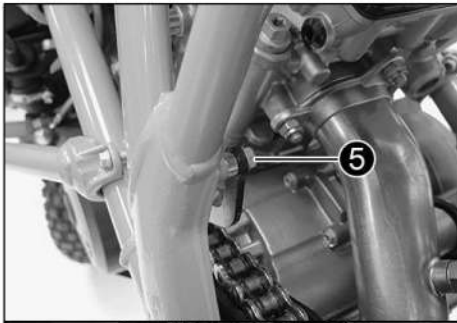
- Position wheel speed sensor **8** in the hole.
- Mount and tighten screw **7**.

Guideline

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



- Mount pin **A**.



- Position the chain securing guide with the spacer.
- Mount and tighten screw **5** with the spacer.

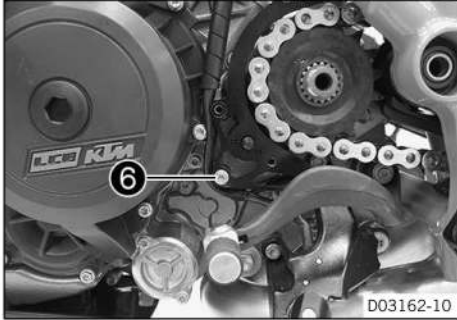
Guideline

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

- Mount and tighten screw **6**.

Guideline

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



- Have an assistant operate the rear brake.
- Mount nut with lock washer **4** and tighten.

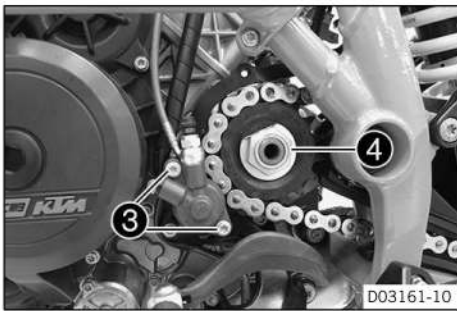
Guideline

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

- Secure the nut with the lock washer.
- Mount the clutch slave cylinder with spacer and sleeves.
- Mount and tighten screws **3**.

Guideline

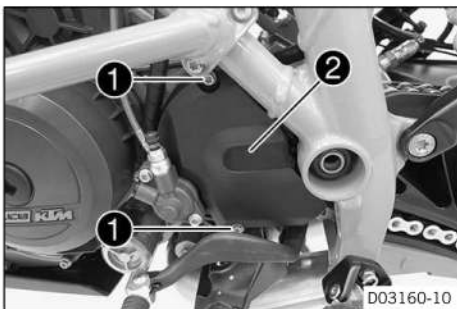
Clutch slave cylinder screw	M6	10 Nm (7.4 lbf ft)
-----------------------------	----	--------------------



- Position engine sprocket cover **2**.
- Mount and tighten screws **1**.

Guideline

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



Finishing work

- Check the chain tension. (📖 p. 143)
- Remove the rear of the motorcycle from the lifting gear. (📖 p. 14)

15.1 Removing the 12-V battery



Warning

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

- Keep 12 V batteries out of the reach of children.
- Wear suitable protective clothing and safety glasses.
- Avoid contact with battery acid and battery gases.
- Keep sparks or open flames away from the 12 V battery.
- Only charge 12 V batteries in well-ventilated rooms.
- Rinse the affected area immediately with plenty of water in the event of contact with the skin.
- Rinse eyes with water for at least 15 minutes and consult a doctor immediately if battery acid and battery gases get into the eyes.



Caution

Danger of accidents Electronic components and safety devices will be damaged if the 12-V battery is discharged or missing.

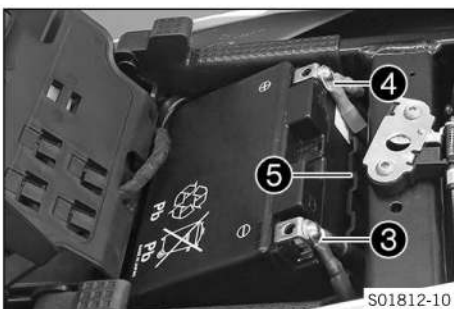
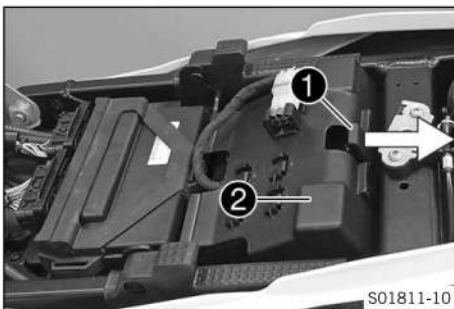
- Never operate the vehicle with a discharged 12-V battery or without a 12-V battery.

Preparatory work

- Switch off the ignition by turning the black ignition key to the position **OFF** ☒.
- Remove the seat. (🗨 p. 96)

Main work

- Pull locking mechanism ① in the direction of the arrow.
- Fold open cover ②.



- Disconnect both negative cables ③ from the 12-V battery.
- Disconnect both positive cables ④ from the 12-V battery.
- Take the 12-V battery and battery case ⑤ out of the battery compartment.

15.2 Installing the 12-V battery



Warning

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

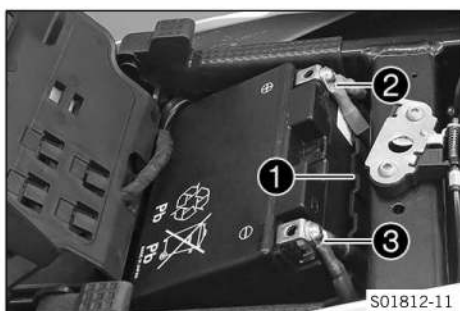
- Keep 12 V batteries out of the reach of children.
- Wear suitable protective clothing and safety glasses.
- Avoid contact with battery acid and battery gases.
- Keep sparks or open flames away from the 12 V battery.
- Only charge 12 V batteries in well-ventilated rooms.
- Rinse the affected area immediately with plenty of water in the event of contact with the skin.
- Rinse eyes with water for at least 15 minutes and consult a doctor immediately if battery acid and battery gases get into the eyes.



Caution

Danger of accidents Electronic components and safety devices will be damaged if the 12-V battery is discharged or missing.

- Never operate the vehicle with a discharged 12-V battery or without a 12-V battery.



Main work

- Position the 12-V battery in battery case ①.

Guideline

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

- Position the 12-V battery with the battery case in the battery compartment.
- Position both positive cables ② and mount and tighten the screw.

Guideline

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

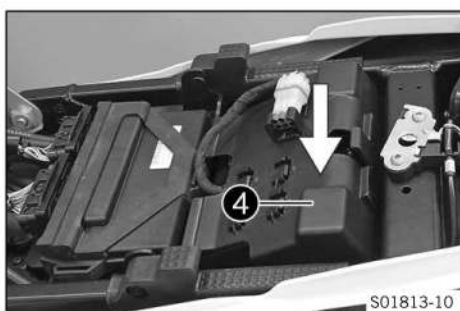
- Position the negative cable ③ and mount and tighten the screw.

Guideline

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

- Close cover ④ and gently push down.

✓ The cover engages with an audible click.



Finishing work

- Mount the seat. (📖 p. 96)
- Set the time and date.

15.3 Disconnecting the negative cable of the 12-V battery



Warning

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

- Keep 12 V batteries out of the reach of children.
- Wear suitable protective clothing and safety glasses.
- Avoid contact with battery acid and battery gases.
- Keep sparks or open flames away from the 12 V battery.
- Only charge 12 V batteries in well-ventilated rooms.
- Rinse the affected area immediately with plenty of water in the event of contact with the skin.
- Rinse eyes with water for at least 15 minutes and consult a doctor immediately if battery acid and battery gases get into the eyes.



Caution

Danger of accidents Electronic components and safety devices will be damaged if the 12-V battery is discharged or missing.

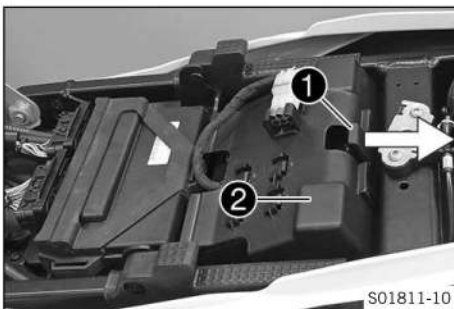
- Never operate the vehicle with a discharged 12-V battery or without a 12-V battery.

Preparatory work

- Switch off the ignition by turning the black ignition key to the position **OFF** ☒.
- Remove the seat. (📖 p. 96)

Main work

- Pull locking mechanism ① in the direction of the arrow.
- Fold open cover ②.



- Disconnect negative cables ③ of the 12-V battery.

15.4 Connecting the negative cable of the 12-V battery



Warning

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

- Keep 12 V batteries out of the reach of children.
- Wear suitable protective clothing and safety glasses.
- Avoid contact with battery acid and battery gases.
- Keep sparks or open flames away from the 12 V battery.
- Only charge 12 V batteries in well-ventilated rooms.
- Rinse the affected area immediately with plenty of water in the event of contact with the skin.
- Rinse eyes with water for at least 15 minutes and consult a doctor immediately if battery acid and battery gases get into the eyes.



Caution

Danger of accidents Electronic components and safety devices will be damaged if the 12-V battery is discharged or missing.

- Never operate the vehicle with a discharged 12-V battery or without a 12-V battery.

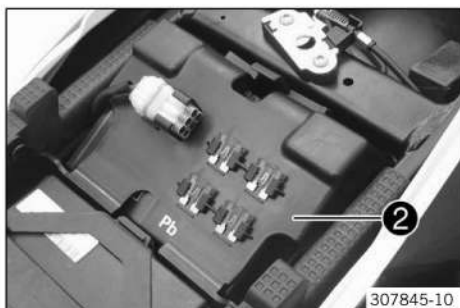


Main work

- Position the negative cables ① and mount and tighten the screw.

Guideline

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



- Fold down cover ② and let it lock by pushing down lightly.

Finishing work

- Mount the seat. (📖 p. 96)
- Set the time and date.

15.5 Charging the 12-V battery



Warning

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

- Keep 12 V batteries out of the reach of children.
- Wear suitable protective clothing and safety glasses.
- Avoid contact with battery acid and battery gases.
- Keep sparks or open flames away from the 12 V battery.
- Only charge 12 V batteries in well-ventilated rooms.
- Rinse the affected area immediately with plenty of water in the event of contact with the skin.
- Rinse eyes with water for at least 15 minutes and consult a doctor immediately if battery acid and battery gases get into the eyes.



Note

Environmental hazard 12 V batteries contain environmentally hazardous materials.

- Do not dispose of 12 V batteries as household waste.
- Dispose of 12 V batteries at a collection point for used batteries.



Note

Environmental hazard Hazardous substances cause environmental damage.

- Dispose of oils, grease, filters, fuel, cleaning agents, brake fluid, etc., correctly and in compliance with the applicable regulations.



Info

Even if there is no load on the 12-V battery, it discharges steadily each day.

The charging level and the method of charging are very important for the service life of the 12-V battery.

Rapid recharging with a high charging current shortens the service life of the battery.

If the charging current, charging voltage, and charging time are exceeded, the 12-V battery will be destroyed.

If the 12-V battery is depleted from starting the vehicle repeatedly, the battery must be charged immediately.

If the 12-V battery is left in a discharged state for an extended period, it will become deeply discharged and sulfating occurs, destroying the battery.

The 12-V battery is maintenance-free, i.e. the acid level does not have to be checked.

Preparatory work

- Switch off the ignition by turning the black ignition key to the position **OFF** ☒.
- Remove the seat. (📖 p. 96)
- Disconnect the negative cable of the 12-V battery. (📖 p. 159)

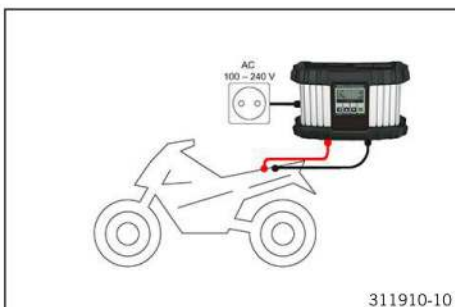
Main work

- Connect the battery charger to the 12-V battery. Adjust the battery charger.

EU battery charger **XCharge-professional** (00029095050)
(📖 p. 410)

Alternative 1

US battery charger **XCharge-professional**
(00029095051) (📖 p. 411)



Alternative 2

UK battery charger **XCharge-professional**
(00029095052) (📖 p. 411)

Alternative 3

CH battery charger **XCharge-professional**
(00029095053) (📖 p. 411)



Info

Follow the instructions of the charger and the manual.

- Disconnect the battery charger after charging the 12-V battery.
Guideline

The charging current, charging voltage, and charging time must not be exceeded.

Recharge the 12-V battery regularly when the motorcycle is not being used	3 months
---	----------

Finishing work

- Connect the negative cable of the 12-V battery. (📖 p. 160)
- Mount the seat. (📖 p. 96)
- Set the time and date.

15.6 Changing the main fuse



Warning

Fire hazard Incorrect fuses overload the electrical system.

- Only use fuses with the required ampere value.
- Do not bypass or repair fuses.

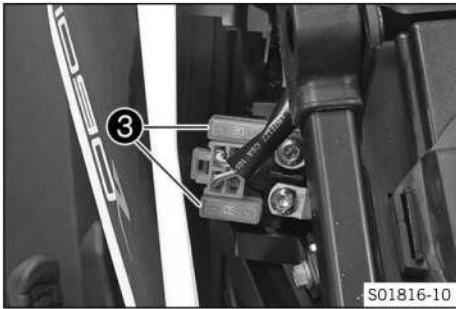
Preparatory work

- Switch off the ignition by turning the black ignition key to the position **OFF** ☒.
- Remove the seat. (📖 p. 96)

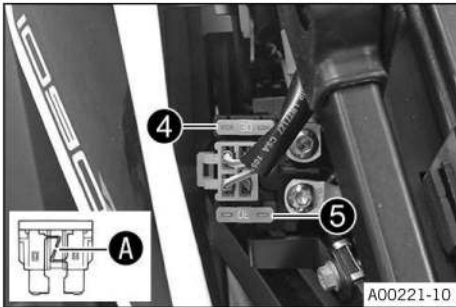
Main work

- Remove screws ①.
- Raise rear fairing ② slightly.





- Take off protection caps ③.



- Remove faulty main fuse ④.



Info

A faulty fuse has a burned-out fuse wire **A**.
A spare fuse **5** is located in the starter relay.
The main fuse protects all power consumers of the vehicle.

- Insert a new main fuse.

Fuse (58011109130) (📖 p. 372)

- Check that the electrical system is functioning properly.
- Mount the protection caps.



Tip

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



- Position rear fairing ②.
- Mount and tighten screws ①.

Guideline

Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
-------------------	----	-------------------------

Finishing work

- Mount the seat. (📖 p. 96)
- Set the time and date.

15.7 Changing the fuses in the fuse box



Warning

Fire hazard Incorrect fuses overload the electrical system.

- Only use fuses with the required ampere value.
- Do not bypass or repair fuses.



Info

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

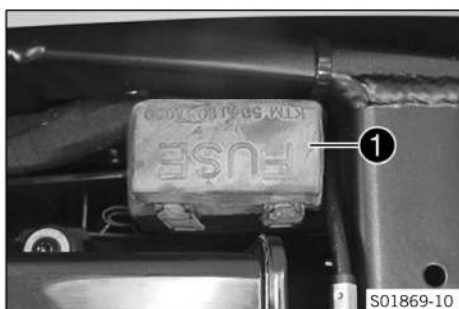
Preparatory work

- Switch off the ignition by turning the black ignition key to the position **OFF** ☒.
- Remove the seat. (📖 p. 96)



Main work (EU, CN)

- Open fuse box cover ❶.



(US)

- Open fuse box cover ❶.



- Check the fuses.

i Info

A faulty fuse has a burned-out fuse wire **A**.

- Remove the faulty fuse.

Guideline

Fuse res - 10 A - spare fuses
Fuse 1 - 10 A - power supply for control units and components
Fuse 2 - 10 A - permanent positive for auxiliary equipment (ACC1)
Fuse 3 - 15 A - ABS hydraulic unit
Fuse 4 - 25 A - ABS return pump
Fuse 5 - not assigned

- Insert a spare fuse with the correct rating.

Fuse (58011109110) (📖 p. 372)
Fuse (58011109115) (📖 p. 372)
Fuse (58011109125) (📖 p. 372)

i Tip

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

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

Finishing work

- Mount the seat. (📖 p. 96)

15.8 Checking the charging voltage

Condition

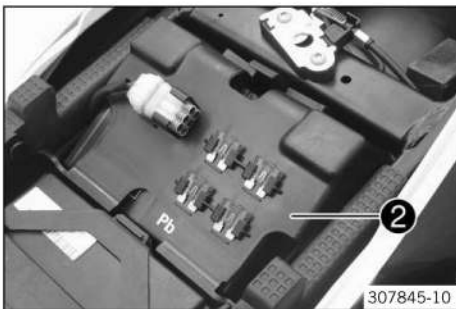
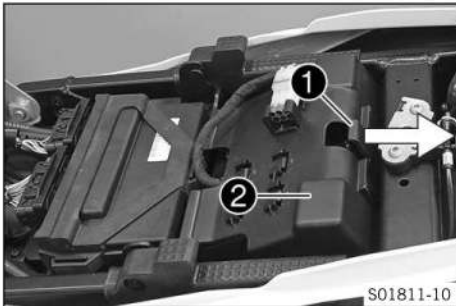
The 12-V battery must be fully functional and completely charged.

Preparatory work

- Remove the seat. (📖 p. 96)

Main work

- Pull locking mechanism ① in the direction of the arrow.
- Fold open cover ②.
- Start the motorcycle to check the function. (📖 p. 18)



- **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 greater than the specified value:
 - Change the voltage regulator.

- Close cover ② and gently push down.
✓ The cover engages with an audible click.

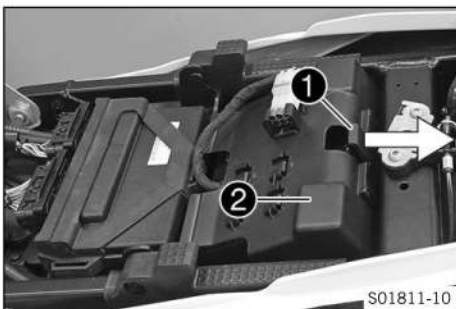
15.9 Checking the open-circuit current

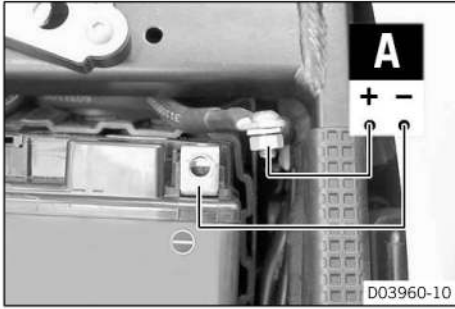
Preparatory work

- Switch off the ignition by turning the black ignition key to the position **OFF** ☒.
- Remove the seat. (📖 p. 96)

Main work

- Pull locking mechanism ① in the direction of the arrow.
- Fold open cover ②.





- Disconnect the negative cable of the 12-V battery.
- Connect the negative cable of the 12-V battery using an appropriate fitting.
- Measure the current between the 12-V battery ground (-) and the negative cable.

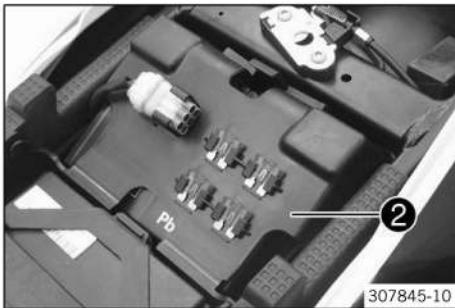


Info

The value of the open-circuit current only applies to vehicles in their original state without additional power consumers.
After switching off the ignition, wait 1 minute until the measurement.

Maximum open-circuit current	< 1.0 mA
------------------------------	----------

- » If the measured value is greater than the specified value:
 - Disconnect the voltage regulator from the wiring harness and perform the measurement again.
- Close cover ② and gently push down.
 - ✓ The cover engages with an audible click.



Finishing work

- Mount the seat. (📖 p. 96)

16.1 Checking the front brake linings



Warning

Danger of accidents Worn-out brake linings reduce the braking effect.

- Ensure that worn-out brake linings are replaced immediately.

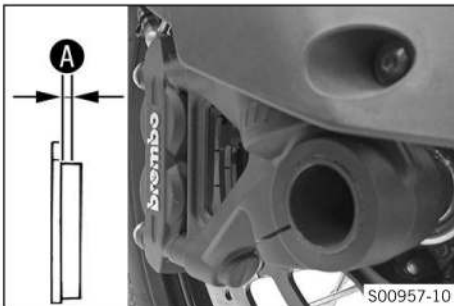


Warning

Danger of accidents Damaged brake discs reduce the braking effect.

If the brake linings are not changed in time, the brake lining carriers grind against the brake disc. As a consequence, the braking effect is greatly reduced and the brake discs are destroyed.

- Check the brake linings regularly.



- Check all brake linings on both brake calipers to ensure they have the minimum thickness **A**.

Minimum thickness A	$\geq 1 \text{ mm } (\geq 0.04 \text{ in})$
----------------------------	---

- » If the minimum thickness is less than specified:
 - Change the front brake linings. (📖 p. 167)
- Check all brake linings on both brake calipers for damage and cracking.
 - » If there is damage or cracking:
 - Change the front brake linings. (📖 p. 167)

16.2 Changing the front brake linings



Warning

Skin irritation Brake fluid causes skin irritation.

- Keep brake fluid out of the reach of children.
- Wear suitable protective clothing and safety glasses.
- Do not allow brake fluid to come into contact with the skin, the eyes or clothing.
- Consult a doctor immediately if brake fluid has been swallowed.
- Rinse the affected area with plenty of water in the event of contact with the skin.
- Rinse eyes thoroughly with water immediately and consult a doctor if brake fluid comes into contact with the eyes.
- If brake fluid spills on to your clothing, change the clothing.



Warning

Danger of accidents Old brake fluid reduces the braking effect.

- Make sure that brake fluid for the front and rear brake is changed in accordance with the service schedule.



Warning

Danger of accidents Oil or grease on the brake discs reduces the braking effect.

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



Warning

Danger of accidents Brake linings which have not been approved alter the braking efficiency.

Not all brake linings are tested and approved for KTM motorcycles. The structure and friction coefficient of the brake linings, and thus their brake power, may vary greatly from that of original brake linings. If brake linings are used that differ from the original equipment, compliance with the original homologation is not guaranteed. In this case, the vehicle no longer corresponds to its condition at delivery and the warranty shall be void.

- Only use brake linings approved and recommended by KTM.



Note

Environmental hazard Hazardous substances cause environmental damage.

- Dispose of oils, grease, filters, fuel, cleaning agents, brake fluid, etc., correctly and in compliance with the applicable regulations.

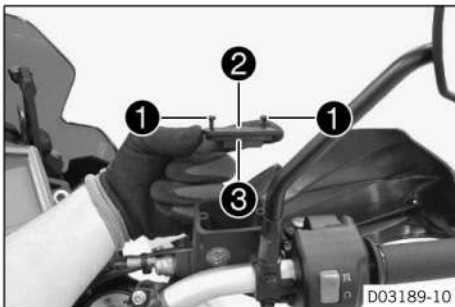


Info

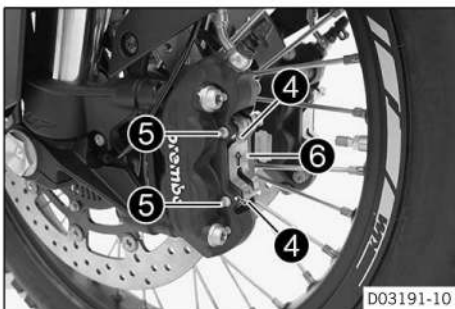
Never use DOT 5 brake fluid! It is silicone-based and purple in color. Oil seals and brake lines are not designed for DOT 5 brake fluid.

Avoid contact between brake fluid and painted parts. Brake fluid attacks paint!

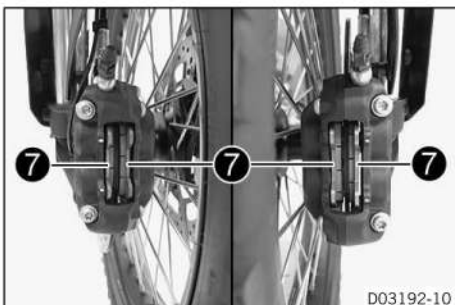
Use only clean brake fluid from a sealed container.



- Move the brake reservoir mounted on the handlebar to a horizontal position.
- Remove screws ①.
- Take off cover ② with membrane ③.



- Press the brake piston back into the basic position and ensure that brake fluid does not flow out of the brake fluid reservoir; extract some if necessary.
- Remove cotter pins ④ and pull out pins ⑤.
- Remove retaining bracket ⑥.

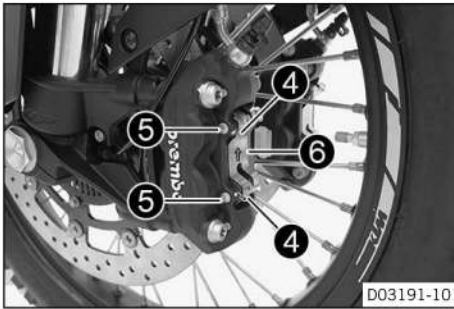


- Remove brake linings ⑦.
- Clean the brake caliper.
- Mount new brake linings ⑦.

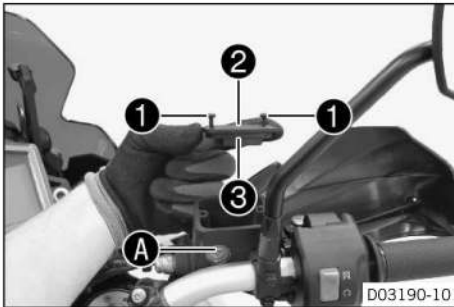


Info

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



- Position retaining bracket ⑥.
- ✓ The arrow on the retaining bracket points in the direction of travel.
- Mount pins ⑤ and cotter pins ④.
- Repeat these steps on the opposite side.



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

Brake fluid DOT 4 / DOT 5.1 (📖 p. 406)

- Position cover ② with membrane ③.

i Info

Clean up overflowed or spilled brake fluid immediately with water.

- Mount and tighten screws ①.

16.3 Checking the front brake fluid level



Warning

Danger of accidents An insufficient brake fluid level will cause the brake system to fail.

If the brake fluid level drops below the specified marking or the specified value, the brake system is leaking or the brake linings are worn down.

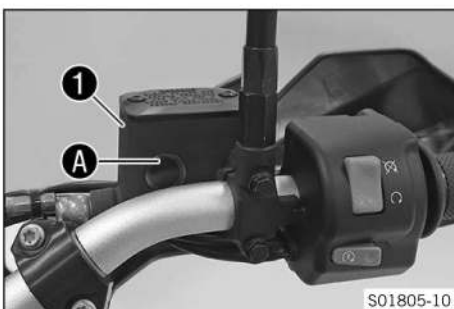
- Check the brake system and do not continue riding until the problem is eliminated.



Warning

Danger of accidents Old brake fluid reduces the braking effect.

- Make sure that brake fluid for the front and rear brake is changed in accordance with the service schedule.



- Move the brake reservoir mounted on the handlebar to a horizontal position.
- Check the brake fluid level in brake fluid reservoir ①.
 - » If an air bubble is visible at the marking A:
 - Add front brake fluid. (📖 p. 170)

16.4 Adding front brake fluid



Warning

Danger of accidents An insufficient brake fluid level will cause the brake system to fail.

If the brake fluid level drops below the specified marking or the specified value, the brake system is leaking or the brake linings are worn down.

- Check the brake system and do not continue riding until the problem is eliminated.



Warning

Skin irritation Brake fluid causes skin irritation.

- Keep brake fluid out of the reach of children.
- Wear suitable protective clothing and safety glasses.
- Do not allow brake fluid to come into contact with the skin, the eyes or clothing.
- Consult a doctor immediately if brake fluid has been swallowed.
- Rinse the affected area with plenty of water in the event of contact with the skin.
- Rinse eyes thoroughly with water immediately and consult a doctor if brake fluid comes into contact with the eyes.
- If brake fluid spills on to your clothing, change the clothing.



Warning

Danger of accidents Old brake fluid reduces the braking effect.

- Make sure that brake fluid for the front and rear brake is changed in accordance with the service schedule.



Note

Environmental hazard Hazardous substances cause environmental damage.

- Dispose of oils, grease, filters, fuel, cleaning agents, brake fluid, etc., correctly and in compliance with the applicable regulations.

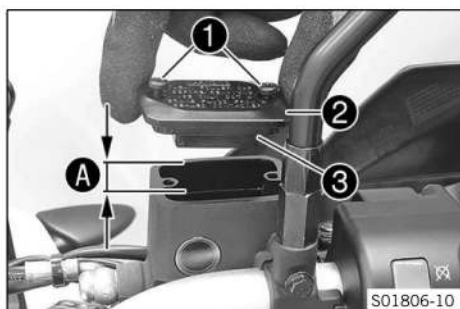


Info

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.

Only use clean brake fluid from a sealed container.



Preparatory work

- Check the front brake linings. (📖 p. 167)

Main work

- Move the brake reservoir mounted on the handlebar to a horizontal position.
- Remove screws ①.
- Take off cover ② with membrane ③.
- Add brake fluid to level A.

Guideline

Dimension A	7 mm (0.28 in)
-------------	----------------

Brake fluid DOT 4 / DOT 5.1 (📖 p. 406)
--

- Position cover ② with membrane ③.
- Mount and tighten screws ①.



Info

Clean up overflowed or spilled brake fluid immediately with water.

16.5 Changing the front brake fluid



Warning

Skin irritation Brake fluid causes skin irritation.

- Keep brake fluid out of the reach of children.
- Wear suitable protective clothing and safety glasses.
- Do not allow brake fluid to come into contact with the skin, the eyes or clothing.
- Consult a doctor immediately if brake fluid has been swallowed.
- Rinse the affected area with plenty of water in the event of contact with the skin.
- Rinse eyes thoroughly with water immediately and consult a doctor if brake fluid comes into contact with the eyes.
- If brake fluid spills on to your clothing, change the clothing.



Note

Environmental hazard Hazardous substances cause environmental damage.

- Dispose of oils, grease, filters, fuel, cleaning agents, brake fluid, etc., correctly and in compliance with the applicable regulations.

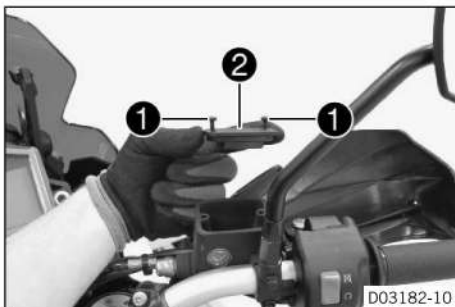


Info

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.

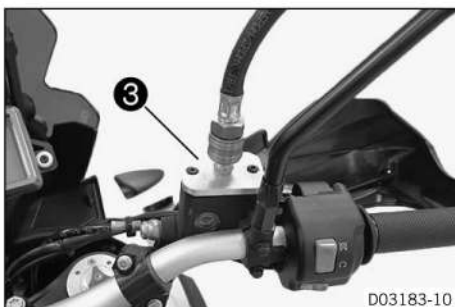
Only use clean brake fluid from a sealed container.



- Move the brake reservoir mounted on the handlebar to a horizontal position.
- Cover painted parts.
- Remove screws **1**.
- Take off cover **2** with the membrane.
- Extract the old brake fluid from the brake fluid reservoir using a syringe and fill with fresh brake fluid.

Syringe (50329050000) (📖 p. 412)

Brake fluid DOT 4 / DOT 5.1 (📖 p. 406)

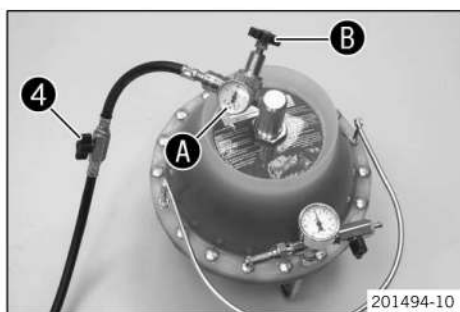


- Mount the corresponding bleeder cover **3** from the special tool set.

Bleeder cover (00029013015) (📖 p. 410)

- Connect the bleeding device.

Bleeding device (00029013100) (📖 p. 410)



- Open shut-off valve **4**.

i Info

Follow the instructions in the Owner's Manual of the bleeding device.

- Ensure that the inflation pressure is set at pressure gauge **A**. Correct the inflation pressure on pressure regulator **B** if necessary.

Guideline

Inflation pressure	2 ... 2.5 bar (29 ... 36 psi)
--------------------	-------------------------------

- Pull protection cap **5** off the bleeder screw of the left brake caliper. Connect the bleeder bottle hose.

Bleeding device (00029013100) (📖 p. 410)
--

- Open bleeder screw **6** by approx. one half turn.

i Info

Drain until fresh brake fluid emerges in the bleeder bottle hose without bubbles.

- Tighten the bleeder screw. Remove the bleeder bottle hose. Attach the protection cap.

- Pull protection cap **7** off the bleeder screw of the right brake caliper. Connect the bleeder bottle hose.

Bleeding device (00029013100) (📖 p. 410)
--

- Open bleeder screw **8** by approx. one half turn.

i Info

Drain until fresh brake fluid emerges in the bleeder bottle hose without bubbles.

- Tighten the bleeder screw.
- Close shut-off valve **4**.
- Open the bleeder screw again until brake fluid stops emerging.
 - ✓ Overfilling the brake fluid reservoir is prevented.
- Tighten the bleeder screw. Remove the bleeder bottle hose. Attach the protection cap.
- Disconnect the bleeding device. Remove the bleeder cover.

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

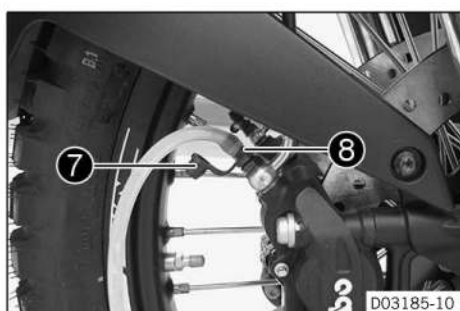
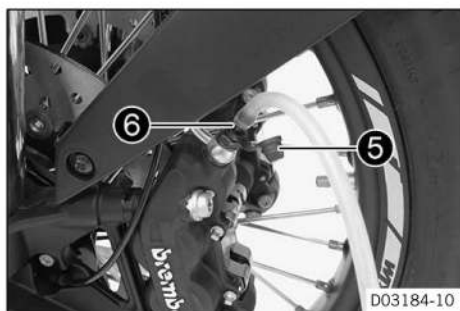
Brake fluid DOT 4 / DOT 5.1 (📖 p. 406)
--

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

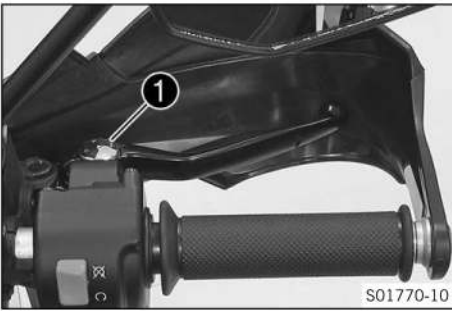
i Info

Clean up overflowed or spilled brake fluid immediately with water.

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



16.6 Adjusting the basic position of the hand brake lever



- Adjust the basic position of the hand brake lever to your hand size by turning adjusting wheel ①.



Info

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

16.7 Checking the rear brake linings



Warning

Danger of accidents Worn-out brake linings reduce the braking effect.

- Ensure that worn-out brake linings are replaced immediately.

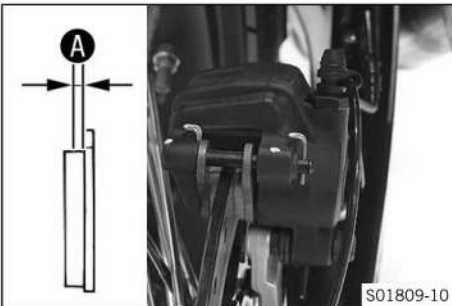


Warning

Danger of accidents Damaged brake discs reduce the braking effect.

If the brake linings are not changed in time, the brake lining carriers grind against the brake disc. As a consequence, the braking effect is greatly reduced and the brake discs are destroyed.

- Check the brake linings regularly.



- Check the brake linings for minimum thickness ①.

Minimum thickness ①	$\geq 1 \text{ mm } (\geq 0.04 \text{ in})$
---------------------	---

- » If the minimum thickness is less than specified:
 - Change the rear brake linings. (📖 p. 173)
- Check the brake linings for damage and cracking.
 - » If there is wear or tearing:
 - Change the rear brake linings. (📖 p. 173)

16.8 Changing the rear brake linings



Warning

Skin irritation Brake fluid causes skin irritation.

- Keep brake fluid out of the reach of children.
- Wear suitable protective clothing and safety glasses.
- Do not allow brake fluid to come into contact with the skin, the eyes or clothing.
- Consult a doctor immediately if brake fluid has been swallowed.
- Rinse the affected area with plenty of water in the event of contact with the skin.
- Rinse eyes thoroughly with water immediately and consult a doctor if brake fluid comes into contact with the eyes.
- If brake fluid spills on to your clothing, change the clothing.



Warning

Danger of accidents Old brake fluid reduces the braking effect.

- Make sure that brake fluid for the front and rear brake is changed in accordance with the service schedule.



Warning

Danger of accidents Oil or grease on the brake discs reduces the braking effect.

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



Warning

Danger of accidents Brake linings which have not been approved alter the braking efficiency.

Not all brake linings are tested and approved for KTM motorcycles. The structure and friction coefficient of the brake linings, and thus their brake power, may vary greatly from that of original brake linings. If brake linings are used that differ from the original equipment, compliance with the original homologation is not guaranteed. In this case, the vehicle no longer corresponds to its condition at delivery and the warranty shall be void.

- Only use brake linings approved and recommended by KTM.



Note

Environmental hazard Hazardous substances cause environmental damage.

- Dispose of oils, grease, filters, fuel, cleaning agents, brake fluid, etc., correctly and in compliance with the 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.

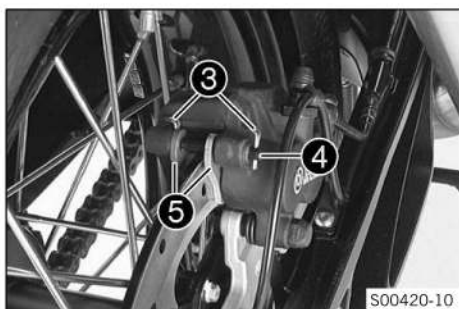


- Stand the vehicle upright.
- Remove screw cap ① with membrane ②.
- Press the brake caliper onto the brake disc by hand in order to push back the brake pistons. Ensure that brake fluid does not flow out of the brake fluid reservoir; extract some if necessary.

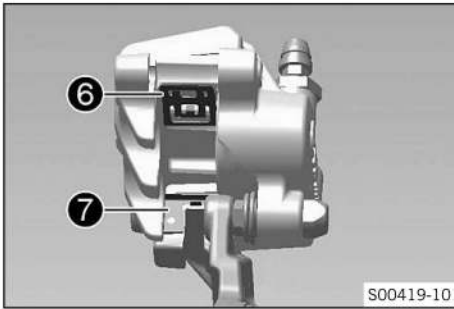


Info

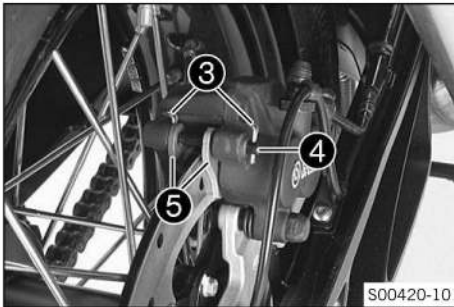
Make sure that you do not press the brake caliper against the spokes when pushing back the brake pistons.



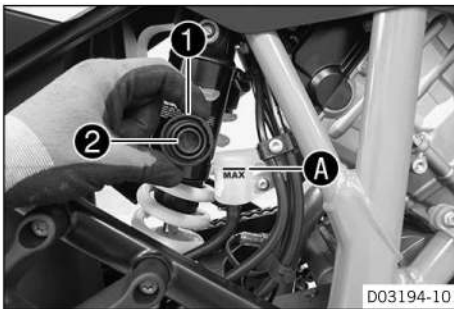
- Remove cotter pins ③.
- Remove pin ④ and brake linings ⑤.
- Clean the brake caliper and brake caliper bracket.



- Check that spring plate **6** and sliding plate **7** in the brake caliper are seated properly.



- Position the new brake linings **5**.
- Mount pins **4** and cotter pins **3**.



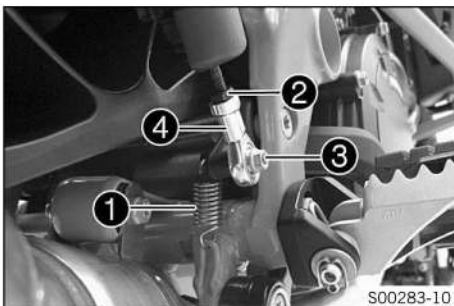
- Operate the foot brake lever repeatedly until the brake linings are in contact with the brake disc and there is a pressure point.
- Correct the brake fluid level to the **MAX** marking **A**.

Brake fluid DOT 4 / DOT 5.1 (p. 406)

- Mount and tighten screw cap **1** with membrane **2**.

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

16.9 Adjusting the basic position of the foot brake lever



- Detach spring **1**.
- Loosen nut **2**.
- Remove screw **3**.
- To adjust the basic position of the foot brake lever to individual requirements, turn ball joint **4** accordingly.

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

- Hold ball joint **4** and tighten nut **2**.

Guideline

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

- Mount and tighten screw **3**.

Guideline

Screw, ball joint of push rod on foot brake cylinder	M6	10 Nm (7.4 lbf ft) Loctite®243™
--	----	---

- Attach spring ①.

16.10 Checking the rear brake fluid level



Warning

Danger of accidents An insufficient brake fluid level will cause the brake system to fail.

If the brake fluid level drops below the **MIN** marking, the brake system is leaking or the brake linings are worn down.

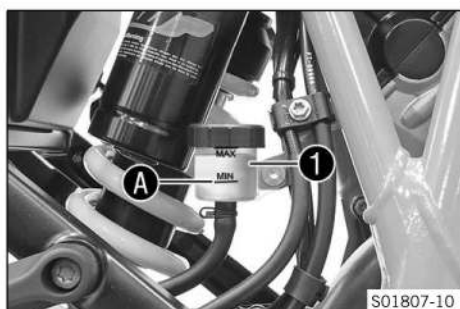
- Check the brake system and do not continue riding until the problem is eliminated.



Warning

Danger of accidents Old brake fluid reduces the braking effect.

- Make sure that brake fluid for the front and rear brake is changed in accordance with the service schedule.



- Check the brake fluid level in brake fluid reservoir ①.
 - » If the fluid level reaches the **MIN** marking A:
 - Add rear brake fluid. (📖 p. 176)

16.11 Adding rear brake fluid



Warning

Danger of accidents An insufficient brake fluid level will cause the brake system to fail.

If the brake fluid level drops below the **MIN** marking, the brake system is leaking or the brake linings are worn down.

- Check the brake system and do not continue riding until the problem is eliminated.



Warning

Skin irritation Brake fluid causes skin irritation.

- Keep brake fluid out of the reach of children.
- Wear suitable protective clothing and safety glasses.
- Do not allow brake fluid to come into contact with the skin, the eyes or clothing.
- Consult a doctor immediately if brake fluid has been swallowed.
- Rinse the affected area with plenty of water in the event of contact with the skin.
- Rinse eyes thoroughly with water immediately and consult a doctor if brake fluid comes into contact with the eyes.
- If brake fluid spills on to your clothing, change the clothing.

**Warning**

Danger of accidents Old brake fluid reduces the braking effect.

- Make sure that brake fluid for the front and rear brake is changed in accordance with the service schedule.

**Note**

Environmental hazard Hazardous substances cause environmental damage.

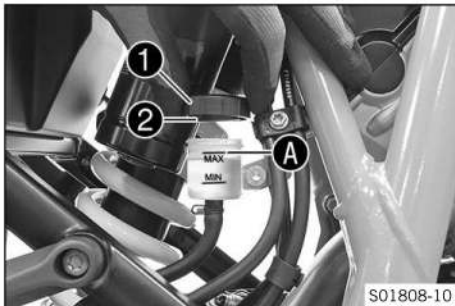
- Dispose of oils, grease, filters, fuel, cleaning agents, brake fluid, etc., correctly and in compliance with the applicable regulations.

**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.

Only use clean brake fluid from a sealed container.

**Preparatory work**

- Check the rear brake linings. (📖 p. 173)

Main work

- Remove screw cap ① with membrane ②.
- Add brake fluid up to **MAX** marking **A**.

Brake fluid DOT 4 / DOT 5.1 (📖 p. 406)

- Mount and tighten screw cap ① with membrane ②.

**Info**

Clean up overflowed or spilled brake fluid immediately with water.

16.12 Changing the rear brake fluid**Warning**

Skin irritation Brake fluid causes skin irritation.

- Keep brake fluid out of the reach of children.
- Wear suitable protective clothing and safety glasses.
- Do not allow brake fluid to come into contact with the skin, the eyes or clothing.
- Consult a doctor immediately if brake fluid has been swallowed.
- Rinse the affected area with plenty of water in the event of contact with the skin.
- Rinse eyes thoroughly with water immediately and consult a doctor if brake fluid comes into contact with the eyes.
- If brake fluid spills on to your clothing, change the clothing.

**Note**

Environmental hazard Hazardous substances cause environmental damage.

- Dispose of oils, grease, filters, fuel, cleaning agents, brake fluid, etc., correctly and in compliance with the applicable regulations.

i Info

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

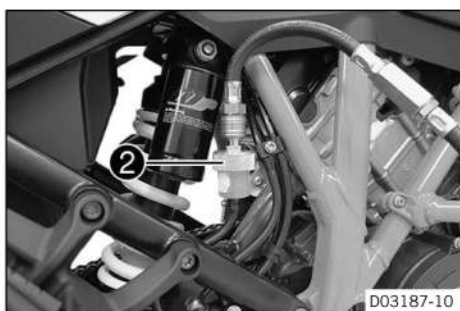


D03186-10

- Cover painted parts.
- Remove screw cap **1** with the membrane.
- Extract the old brake fluid from the brake fluid reservoir using a syringe and fill with fresh brake fluid.

Syringe (50329050000) (📖 p. 412)

Brake fluid DOT 4 / DOT 5.1 (📖 p. 406)
--



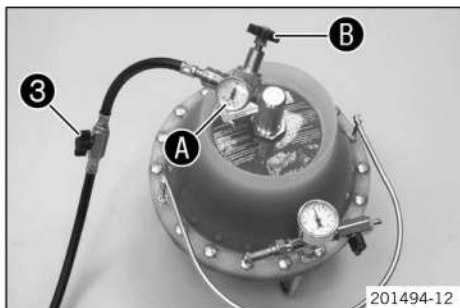
D03187-10

- Mount bleeder cover **2**.

Bleeder cover (00029013014) (📖 p. 410)
--

- Connect the bleeding device.

Bleeding device (00029013100) (📖 p. 410)
--



201494-12

- Open shut-off valve **3**.

i Info

Follow the instructions in the Owner's Manual of the bleeding device.

- Ensure that the inflation pressure is set at pressure gauge **A**. Correct the inflation pressure on pressure regulator **B** if necessary.

Guideline

Inflation pressure	2 ... 2.5 bar (29 ... 36 psi)
--------------------	-------------------------------

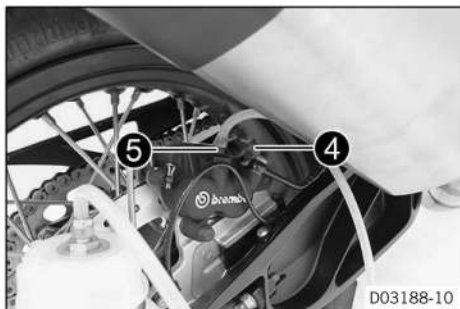
- Pull off protection cap **4** of the bleeder screw. Connect the bleeder bottle hose.

Bleeding device (00029013100) (📖 p. 410)
--

- Open bleeder screw **5** by approx. one half turn.

i Info

Drain until fresh brake fluid emerges in the bleeder bottle hose without bubbles.



D03188-10

- Tighten the bleeder screw.
- Close shut-off valve **3**.
- Open the bleeder screw again until brake fluid stops emerging.
- ✓ Overfilling the brake fluid reservoir is prevented.

- Tighten the bleeder screw. Remove the bleeder bottle hose. Attach the protection cap.
- Disconnect the bleeding device. Remove the bleeder cover.
- Correct the brake fluid to the **MAX** marking.

Brake fluid DOT 4 / DOT 5.1 (📖 p. 406)

- Mount and tighten the screw cap with the membrane.

**Info**

Clean up overflowed or spilled brake fluid immediately with water.

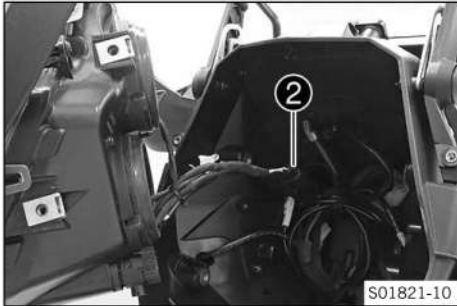
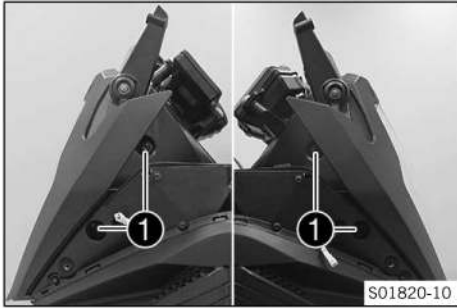
17.1 Removing the headlight mask with the headlight

Preparatory work

- Switch off the ignition by turning the black ignition key to the position **OFF** ☒.
- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)
- Remove the windshield. (📖 p. 117)

Main work

- Remove screws **1**.
- Take off the headlight mask toward the front.

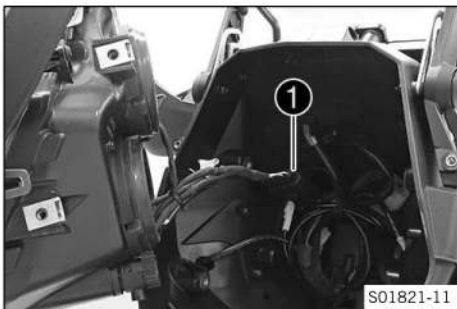


- Disconnect plug-in connector **2**.
- Place the headlight mask onto a soft cloth so that the headlight is not damaged.

17.2 Installing the headlight mask with the headlight

Main work

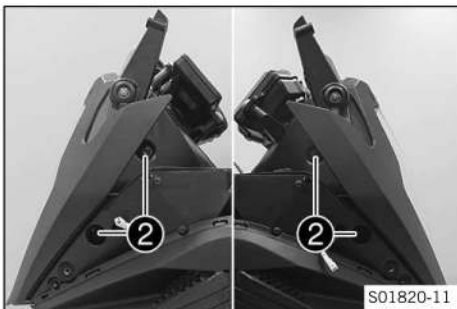
- Connect plug-in connector **1** of the headlight.
- Check that the lighting is functioning properly.
- Position the headlight mask.



- Mount and tighten screws **2**.

Guideline

Screw, headlight	M6	5 Nm (3.7 lbf ft)
------------------	----	-------------------



Finishing work

- Install the windshield. (📖 p. 117)
- Install the mask spoiler. (📖 p. 114)
- Install the fuel tank cover. (📖 p. 112)
- Install the front side cover. (📖 p. 110)
- Mount the seat. (📖 p. 96)
- Check the headlight setting. (📖 p. 183)

17.3 Changing the low beam bulb

Note

Damage to reflector Grease on the reflector reduces the light intensity.

Grease on the bulb will evaporate due to the heat and be deposited on the reflector.

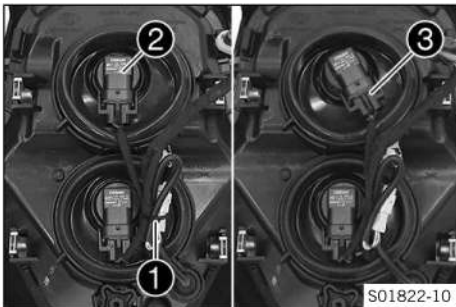
- Clean and degrease the bulbs before mounting.
- Do not touch the bulbs with your bare hands.

Preparatory work

- Switch off the ignition by turning the black ignition key to the position **OFF** ☒.
- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)
- Remove the windshield. (📖 p. 117)
- Remove the headlight mask with the headlight. (📖 p. 180)

Main work

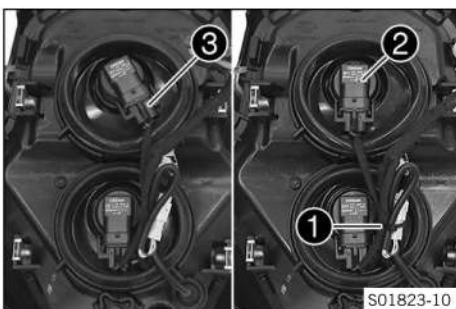
- Remove cable tie(s) ❶.
- Push headlight bulb ❷ lightly into the bulb socket, turn it all the way counterclockwise, and pull it out.
- Unplug connector ❸.



- Plug in connector ❸ into the new headlight bulb.

Low beam (H11/socket PGJ19-2) (📖 p. 372)
--

- Position headlight bulb ❷ into the bulb socket and turn it all the way clockwise.
 - ✓ The headlight bulb is locked into the bulb socket.
- Mount cable tie(s) ❶.



Finishing work

- Install the headlight mask with the headlight. (📖 p. 180)
- Install the windshield. (📖 p. 117)
- Install the mask spoiler. (📖 p. 114)
- Install the fuel tank cover. (📖 p. 112)
- Install the front side cover. (📖 p. 110)

- Mount the seat. (📖 p. 96)
- Check the headlight setting. (📖 p. 183)

17.4 Changing the high beam bulb

Note

Damage to reflector Grease on the reflector reduces the light intensity.

Grease on the bulb will evaporate due to the heat and be deposited on the reflector.

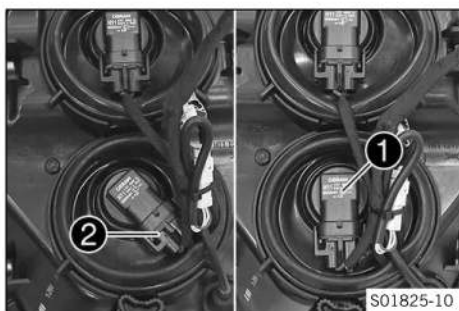
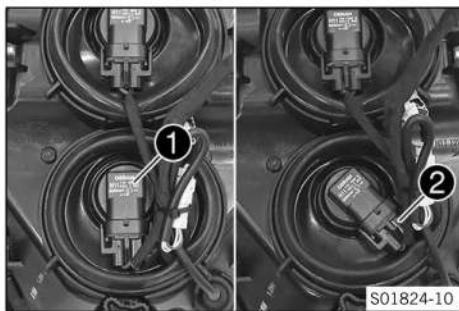
- Clean and degrease the bulbs before mounting.
- Do not touch the bulbs with your bare hands.

Preparatory work

- Switch off the ignition by turning the black ignition key to the position **OFF** ☒.
- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)
- Remove the windshield. (📖 p. 117)
- Remove the headlight mask with the headlight. (📖 p. 180)

Main work

- Push headlight bulb ❶ lightly into the bulb socket, turn it all the way counterclockwise, and pull it out.
- Unplug connector ❷.



- Plug connector ❷ into the new headlight bulb.

High beam (H11/socket PGJ19-2) (📖 p. 372)

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

Finishing work

- Install the headlight mask with the headlight. (📖 p. 180)
- Install the windshield. (📖 p. 117)
- Install the mask spoiler. (📖 p. 114)
- Install the fuel tank cover. (📖 p. 112)
- Install the front side cover. (📖 p. 110)
- Mount the seat. (📖 p. 96)
- Check the headlight setting. (📖 p. 183)

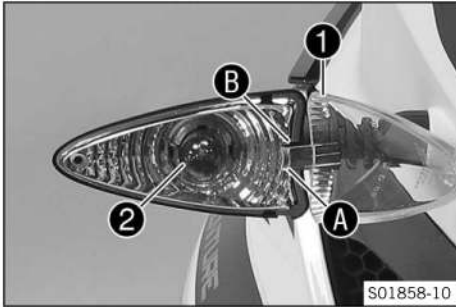
17.5 Changing the turn signal bulb

Note

Damage to reflector Grease on the reflector reduces the light intensity.

Grease on the bulb will evaporate due to the heat and be deposited on the reflector.

- Clean and degrease the bulbs before mounting.
- Do not touch the bulbs with your bare hands.



- Remove the screw on the front of the turn signal housing.
- Carefully remove turn signal glass 1.
- Press bulb 2 carefully into the socket, turn it counterclockwise by about 30°, and take it out of the socket.

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

- Push the new bulb gently into the socket and turn it clockwise all the way in.

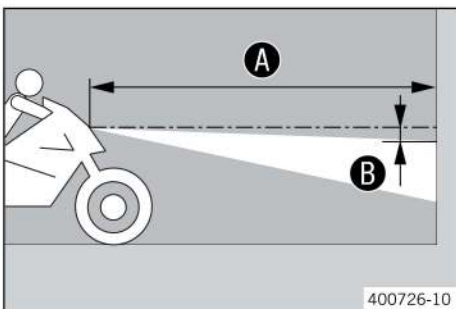
Turn signal (RY10W / Socket BAU15s) (📖 p. 373)
--

- Check that the turn signal is functioning properly.
- Position the turn signal glass.

i Info
Insert holding lug A into cut-out B.

- Insert the screw and first turn counterclockwise until it engages in the thread with a small jerk. Tighten the screw lightly.

17.6 Checking the headlight setting



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

Guideline

Distance B	5 cm (2 in)
------------	-------------

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

Guideline

Distance A	5 m (16 ft)
------------	-------------

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

The light-dark boundary must be exactly on the lower marking when the motorcycle is ready to be operated with the rider mounted along with any luggage and a passenger if applicable.

- » If the boundary between light and dark does not meet specifications:
 - Adjust the headlight range. (📖 p. 184)

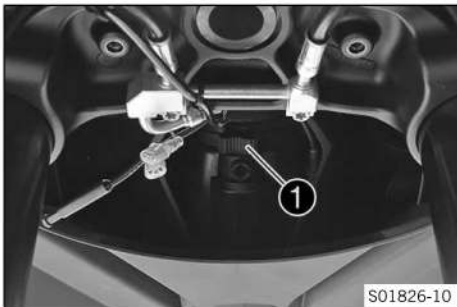
17.7 Adjusting the headlight range

Preparatory work

- Check the headlight setting. (📖 p. 183)
- Remove the bottom triple clamp cover. (📖 p. 115)

Main work

- Turn adjusting screw **1** to adjust the headlight range.



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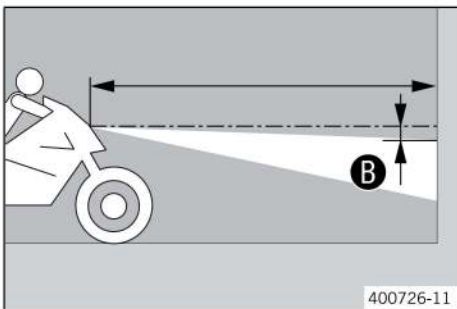
i Info

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

- Set the headlight to marking **B**.

Guideline

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



400726-11

Finishing work

- Install the bottom triple clamp cover. (📖 p. 116)

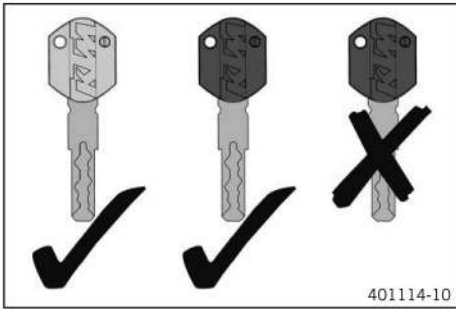
17.8 Activating/deactivating the ignition key

i Info

The orange programming key must only be used for activating and deactivating!




If a black ignition key is lost or needs to be replaced, the individual black ignition keys need to be enabled or disabled using the orange programming key. This prevents the vehicle from being operated with the lost black ignition key.

You can activate or deactivate up to four black ignition keys. Only the black ignition keys programmed during an activation procedure are valid. All black ignition keys not programmed during the activation procedure are invalid, but can be reprogrammed in a further activation procedure.



Loss of a black ignition key (additional black ignition keys are available):

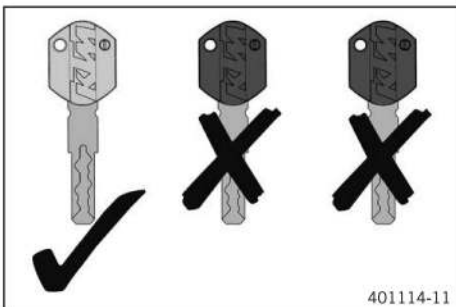
The following procedure deactivates all activated black ignition keys that are not included in the procedure.

- Press the emergency OFF switch to the position **ON** ○.
- Insert the orange programming key in the ignition lock.
- Switch on the ignition by turning the orange programming key to the position **ON** ○.
 - ✓ Immobilizer indicator lamp  lights up.
- Switch off the ignition by turning the orange programming key to the position **OFF** ☒.
- Pull out the orange programming key.
- Insert the black ignition key in the ignition lock.
- Switch on the ignition by turning the black ignition key to the position **ON** ○.
 - ✓ Immobilizer indicator lamp  lights up.
- Switch off the ignition by turning the black ignition key to the position **OFF** ☒.
- Remove the black ignition key.
- Insert the orange programming key in the ignition lock.
- Switch on the ignition by turning the orange programming key to the position **ON** ○.
 - ✓ The immobilizer indicator lamp  flashes according to the number of functional black ignition keys including the orange programming key. In this case, it flashes twice.
- Switch off the ignition by turning the orange programming key to the position **OFF** ☒.
- Pull out the orange programming key.
 - ✓ The lost black ignition key is deactivated.
 - ✓ The existing black ignition key is reactivated.

Loss of all black ignition keys (no black ignition keys are available):

This procedure is important to prevent misuse of the lost black ignition key.

- Press the emergency OFF switch to the position **ON** ○.





- Insert the orange programming key in the ignition lock.
- Switch on the ignition by turning the orange programming key to the position **ON** ○.
- ✓ Immobilizer indicator lamp ■ lights up.
- Switch off the ignition by turning the orange programming key to the position **OFF** ☒.
- Switch on the ignition by turning the orange programming key to the position **ON** ○.
- ✓ The immobilizer indicator lamp ■ flashes according to the number of functional black ignition keys including the orange programming key. In this case, it flashes once since all black ignition keys are deactivated.
- Switch off the ignition by turning the orange programming key to the position **OFF** ☒.
- Pull out the orange programming key.
- ✓ All black ignition keys are deactivated.
- Order a new black ignition key according to the key number on the **KEYCODECARD** and activate it.

To activate up to three black ignition keys:

- Press the emergency OFF switch to the position **ON** ○.
- Insert the orange programming key in the ignition lock.
- Switch on the ignition by turning the orange programming key to the position **ON** ○.
- ✓ Immobilizer indicator lamp ■ lights up.
- Switch off the ignition by turning the orange programming key to the position **OFF** ☒.
- Pull out the orange programming key.
- Insert the black ignition key in the ignition lock.
- Switch on the ignition by turning the black ignition key to the position **ON** ○.
- ✓ Immobilizer indicator lamp ■ lights up.
- Switch off the ignition by turning the black ignition key to the position **OFF** ☒.
- Remove the black ignition key.
- If two other black ignition keys are to be activated, repeat the last steps with the respective ignition key.
- If the last black ignition key was activated, insert the orange programming key into the ignition lock.
- Switch on the ignition by turning the orange programming key to the position **ON** ○.
- ✓ The immobilizer indicator lamp ■ flashes according to the number of functional black ignition keys including the orange programming key.
- Switch off the ignition by turning the orange programming key to the position **OFF** ☒.
- Pull out the orange programming key.



Info

Activation of the ignition key is finished.

To activate four black ignition keys:

- Press the emergency OFF switch to the position **ON** ○.
- Insert the orange programming key in the ignition lock.
- Switch on the ignition by turning the orange programming key to the position **ON** ○.
- ✓ Immobilizer indicator lamp ■ lights up.
- Switch off the ignition by turning the orange programming key to the position **OFF** ☒.
- Pull out the orange programming key.
- Insert the black ignition key in the ignition lock.
- Switch on the ignition by turning the black ignition key to the position **ON** ○.
- ✓ Immobilizer indicator lamp ■ lights up.
- Switch off the ignition by turning the black ignition key to the position **OFF** ☒.
- Remove the black ignition key.
- If three other black ignition keys are to be activated, repeat the last steps with the respective ignition key.



Info

As soon as the fourth black ignition key has been activated, programming is finished.

17.9 Resetting the service display using the KTM diagnostic tool



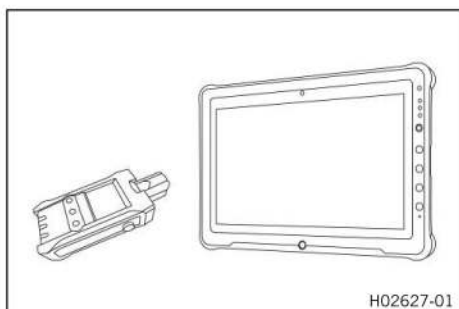
Info

The steps for adjusting the service display are the same for units **Km** and **Meilen**.

Condition

The diagnostic tool is connected and running.

- Select **"Combination instrument" > "Functions" > "Service interval"**.
- Enter the distance until the next service is due.
- Select the unit for the distance.
- Quit the process using **"Execute"**.



18.1 Removing the engine

Preparatory work

- Remove the engine guard. (📖 p. 46)
- Remove the seat. (📖 p. 96)
- Switch off the ignition by turning the black ignition key to the position **OFF** ☒.
- Disconnect the negative cable of the 12-V battery. (📖 p. 159)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)
- Remove the fuel tank. (📖 p. 96)
- Remove the upper part of the air filter box. (📖 p. 88)
- Remove the air filter box. (📖 p. 91)
- Remove the throttle valve body. (📖 p. 361)
- Drain the coolant. (📖 p. 309)
- Remove the main silencer. (📖 p. 82)
- Raise the motorcycle with the work stand. (📖 p. 14)
- Remove the manifold. (📖 p. 83)

Main work

- Remove fittings **1**.

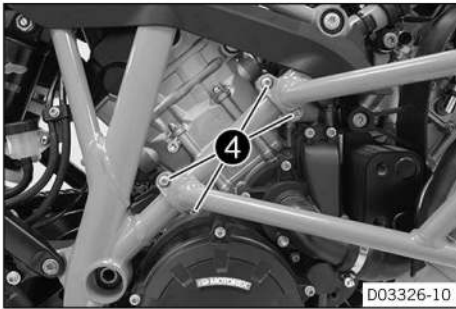


- Remove screws **2** and take off the clamp halves.

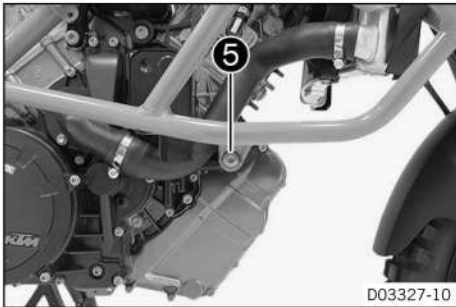


- Remove screw **3**.
- Take off the left crash bar.





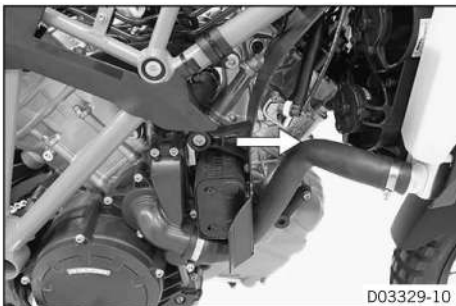
- Remove screws ④ and take off the clamp halves.



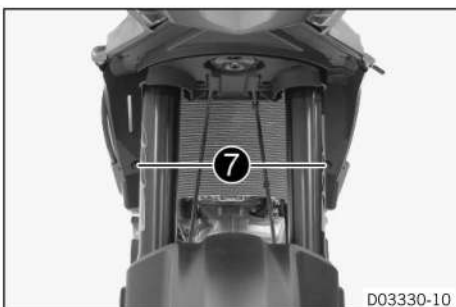
- Remove screw ⑤.
- Take off the right crash bar.



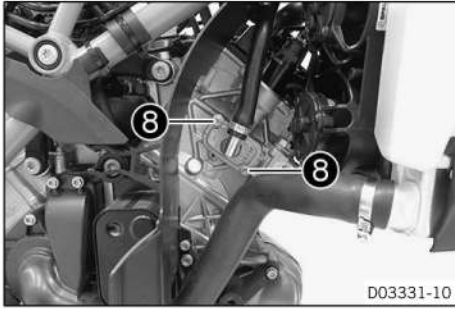
- Remove intake snorkel ⑥ toward the rear.



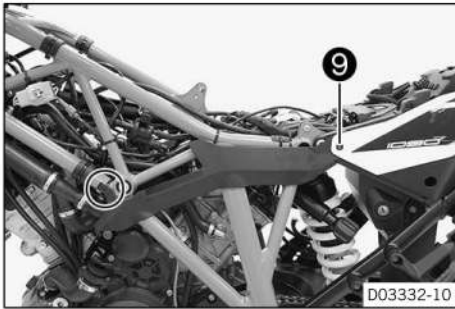
- Pull heat protector off the holder from the front.



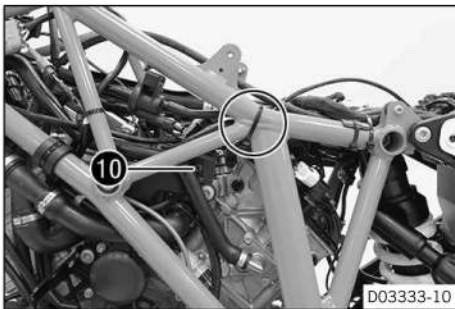
- Remove screws ⑦.



- Remove screws 8.



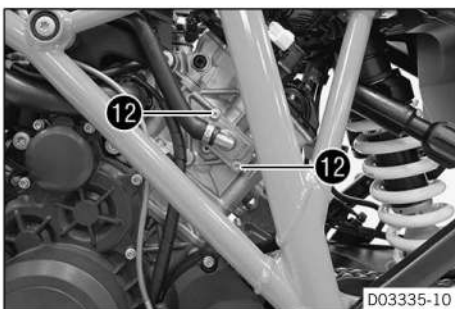
- Remove the cable ties.
- Remove screw 9.
- Remove heat protector.



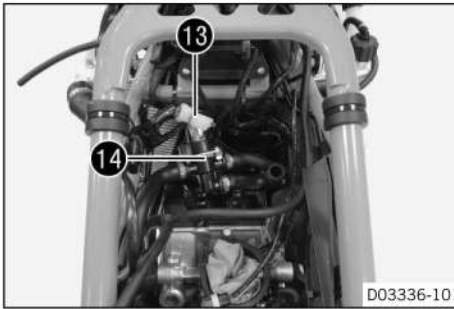
- Remove the cable ties.
- Remove screw 10.



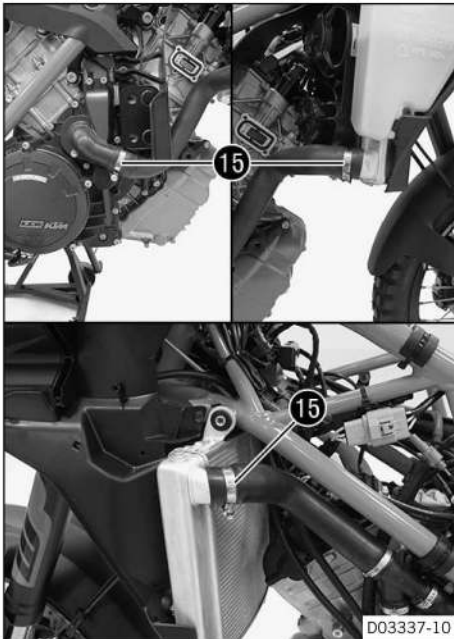
- Pull fuel evaporation valve 11 off the holder and hang to the side.



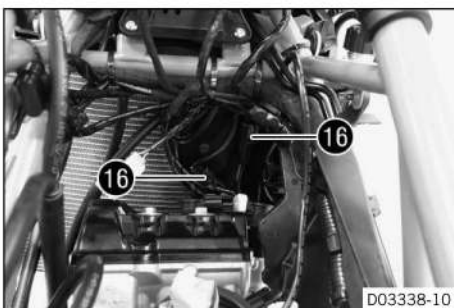
- Remove screws 12.



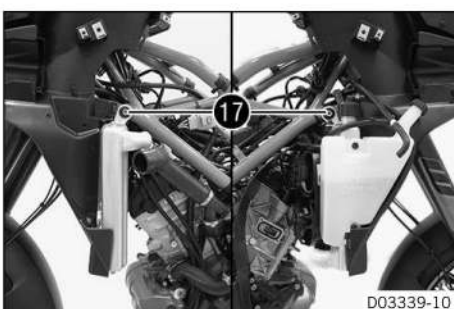
- Disconnect plug-in connector **13**.
- Remove the SAS valve **14** with hoses.



- Loosen hose clips **15**.
- Remove the radiator hose on the right.
- Pull off the radiator hose from the radiator on the left.



- Pull off and separate the two plug-in connectors **16** from the holder.



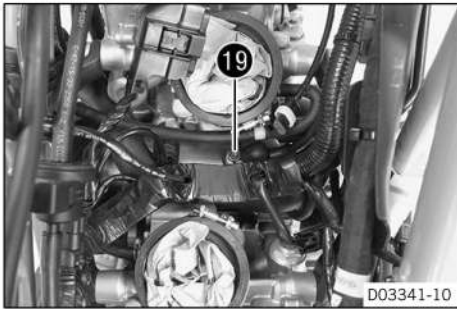
- Remove screws **17**.
- Remove the radiator in a downward direction.

**Info**

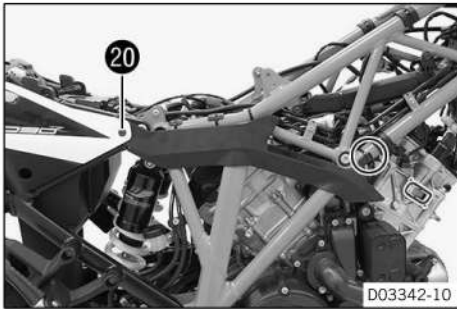
Pay attention to the cooling fins.



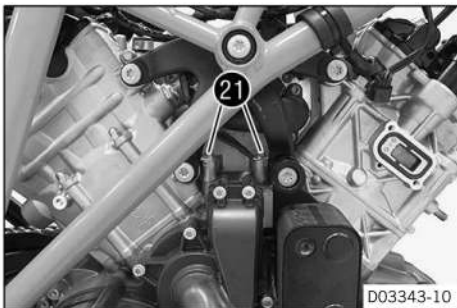
- Remove screw 18.



- Pull back the protection cap.
- Remove nut 19 and hang the positive cable to the side.



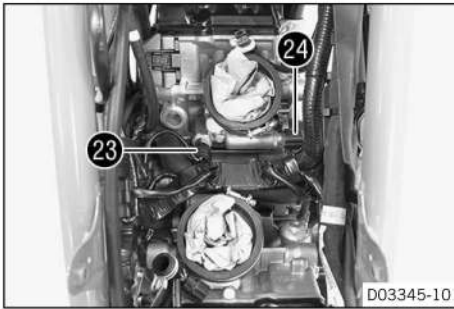
- Remove the cable ties.
- Remove screw 20.
- Remove heat protector.



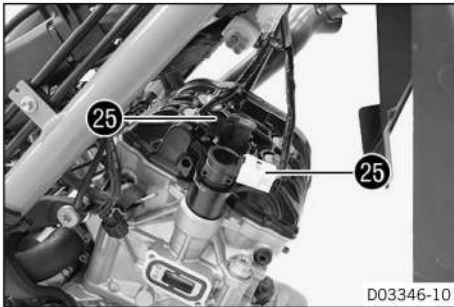
- Remove screws 21.
- Hang the ground wire to the side.



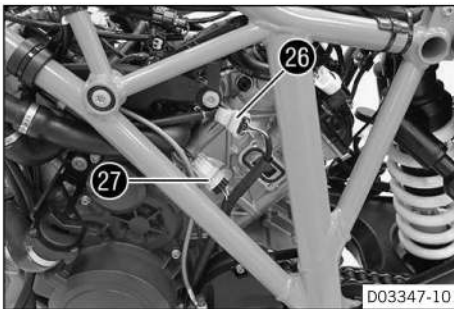
- Remove hose clamps 22.
- Pull off the hose from the cylinder head.



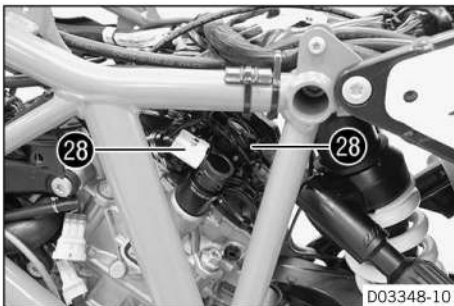
- Unplug connector 23.
- Unplug connector 24.



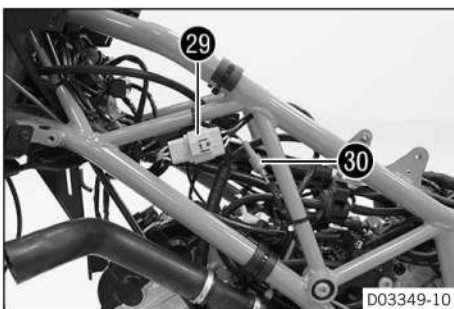
- Detach connector 25.



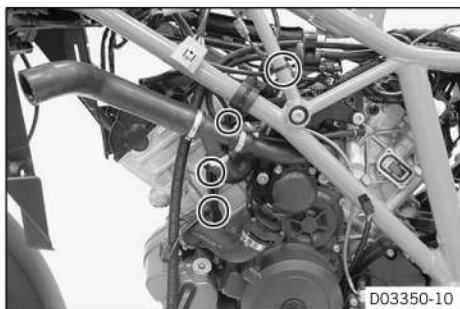
- Disconnect plug-in connector 26.
- Disconnect plug-in connector 27.
- Remove the cable guard.



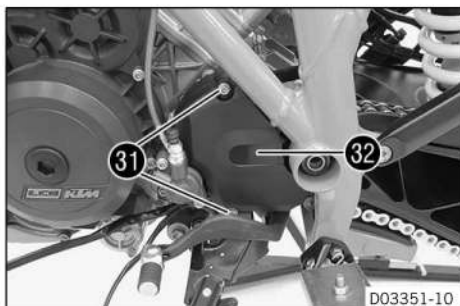
- Detach connector 28.



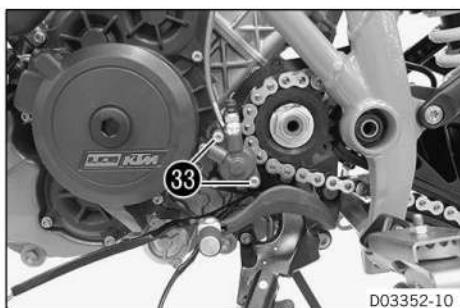
- Disconnect plug-in connector 29.
- Disconnect plug-in connector 30.



- Remove the cable ties and expose the cable.



- Remove screws 31.
- Take off engine sprocket cover 32.



- Remove screws 33.
- Take off the slave cylinder of the clutch and hang it to one side.



Info

Do not activate the clutch lever while the slave cylinder of the clutch is removed.
Do not kink the clutch line.

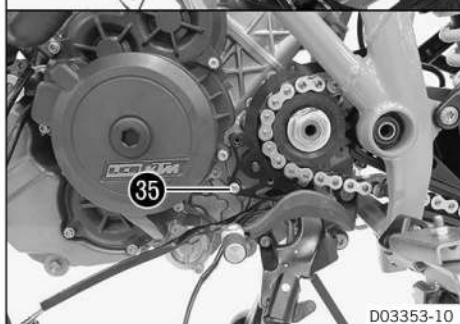


- Remove spacer.
- Remove screw 34.

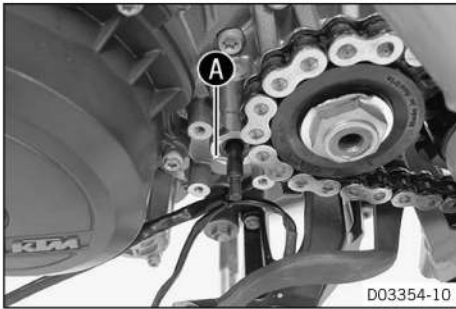


Info

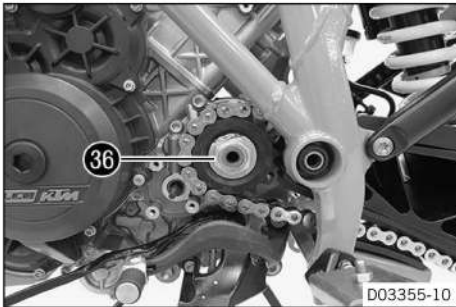
Do not misplace the spacer.



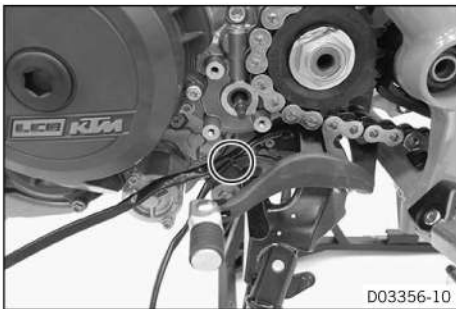
- Remove screw 35.
- Remove the chain securing guide with the spacer.



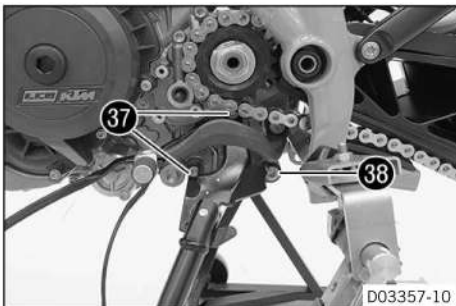
- Remove pin **A**.



- Bend up the lock washer.
- Have an assistant operate the rear brake.
- Loosen nut **36**.



- Remove the cable tie(s) and expose the cables.



- Remove screws **37**.
- Remove screw **38**.
- Remove the side stand bracket.



- Remove nut **39**.
- Remove the chain adjuster.

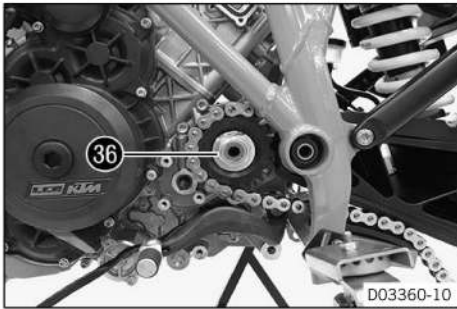


- Push the rear wheel into the foremost position.
- Remove the chain from the rear sprocket.

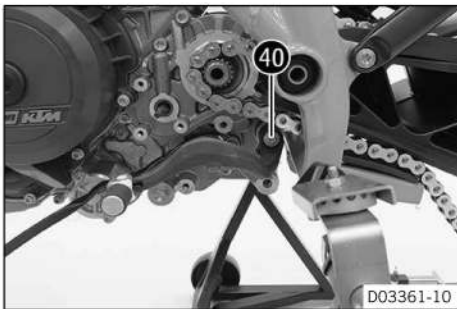


Info

Cover the components to protect them against damage.



- Remove nut **36** with the lock washer.
- Take off the engine sprocket.



- Remove screw **40** with the washers.
- Take off the shift lever.



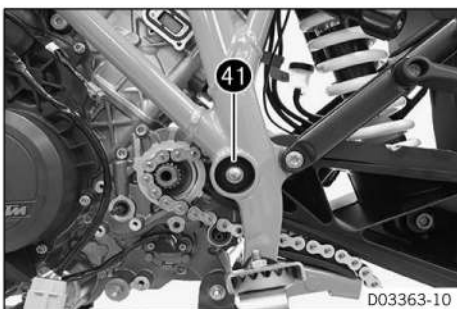
- Position the floor jack with the special tool.

Floor jack attachment (61329055000) (📖 p. 421)

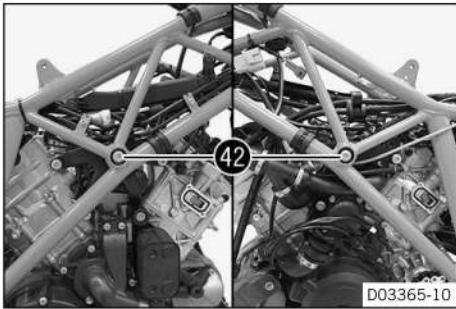


Info

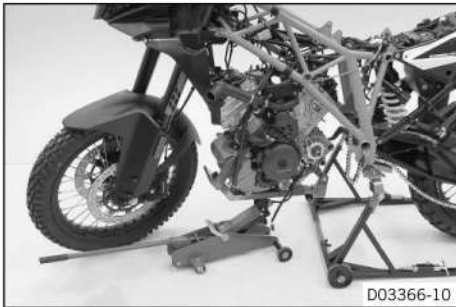
It is a good idea to have assistance when carrying out the following steps.



- Remove nut **41**.
- Pull out fork pivot.



- Remove screws 42 with seating.



- Pull the engine forward slightly and lower carefully.

18.2 Installing the engine

Preparatory work

- Prepare the engine for installation. (📖 p. 208)

Main work

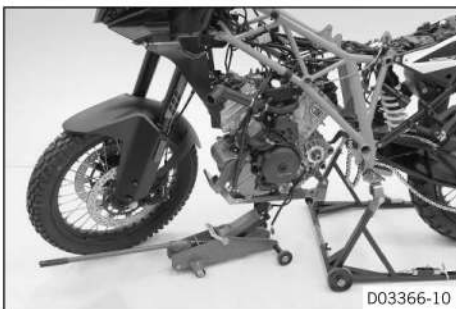
- Position the engine on a floor jack under the vehicle.

Floor jack attachment (61329055000) (📖 p. 421)



Info

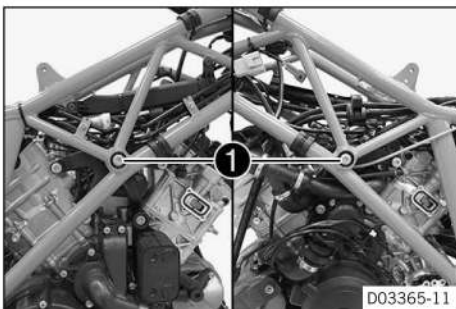
The help of an assistant is useful in this step.



- Position the engine in the frame.
- Position screws 1 with seating, but do not tighten yet.

Guideline

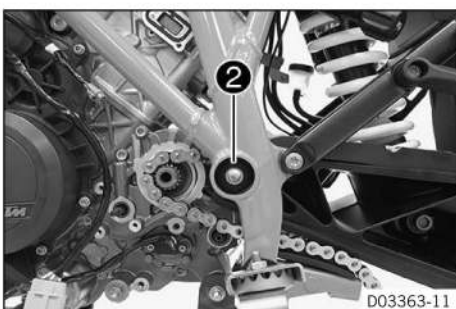
Engine carrying screw	M10	45 Nm (33.2 lbf ft)
-----------------------	-----	---------------------

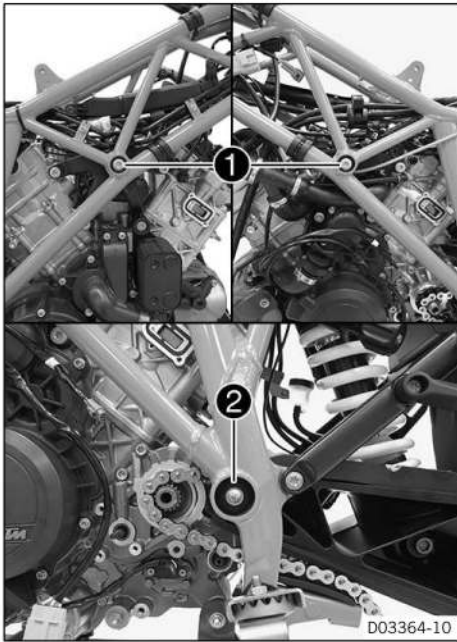


- Mount the fork pivot.
- Mount nut 2, but do not tighten it yet.

Guideline

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





- Tighten screws **1**.

Guideline

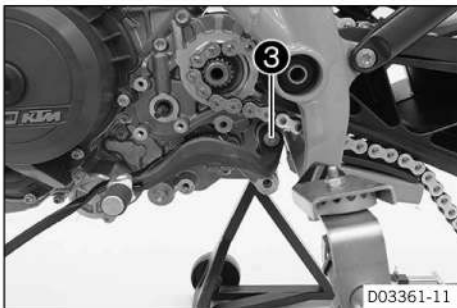
Engine carrying screw	M10	45 Nm (33.2 lbf ft)
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- Tighten nut **2**.

Guideline

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

- Remove the floor jack.

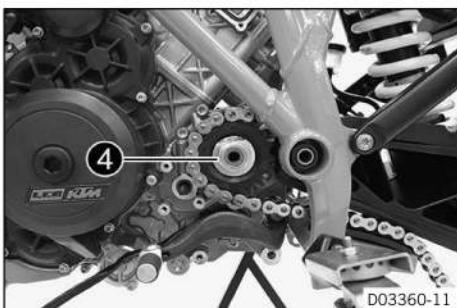


- Position shift lever.

- Position and tighten screw **3** with washers.

Guideline

Screw, shift lever	M6	15 Nm (11.1 lbf ft) Loctite®243™
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- Lay a chain over the engine sprocket.

- Mount the engine sprocket.

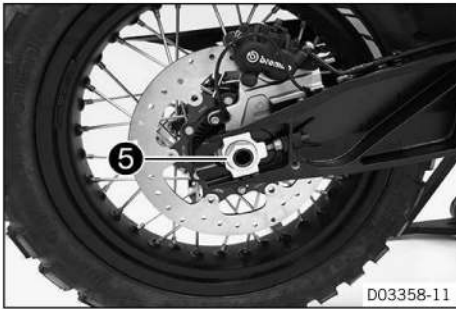
- Mount nut **4** with the lock washer, but do not tighten yet.

Guideline

Nut of engine sprocket	M20x1.5	100 Nm (73.8 lbf ft) Loctite®243™
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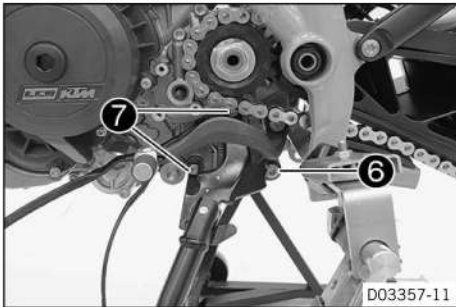
- Lay a chain over the rear sprocket.



- Slide the wheel spindle in as far as it will go.
- Mount the chain adjuster.
- Push the rear wheel forward so that the chain adjusters are in contact with the screws, and tighten nut **5**.

Guideline

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



- Position the side stand bracket.
- Mount screw **6**, but do not tighten yet.

Guideline

Screw, side stand bracket	M10	45 Nm (33.2 lbf ft) Loctite®243™
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- Mount and tighten screws **7**.

Guideline

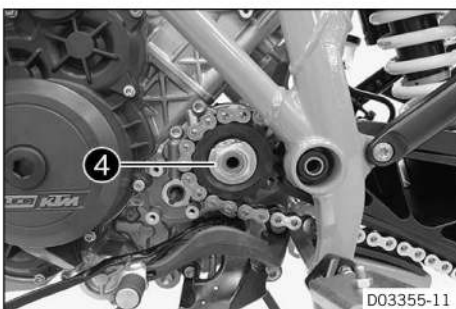
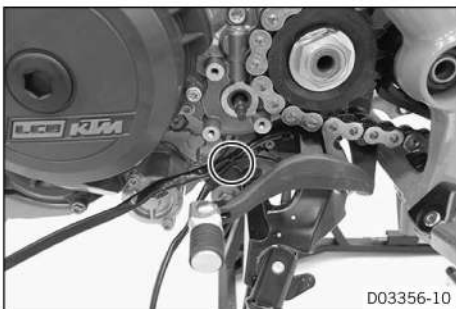
Screw, side stand bracket	M8	25 Nm (18.4 lbf ft)
---------------------------	----	---------------------

- Tighten screw **6**.

Guideline

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

- Route the cable without tension and secure with cable tie(s).



- Have an assistant operate the rear brake.
- Tighten nut **4**.

Guideline

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

- Secure the nut with the lock washer.



- Mount pin **A**.



- Position the chain securing guide with the spacer.
- Mount and tighten screw **8** with the spacer.

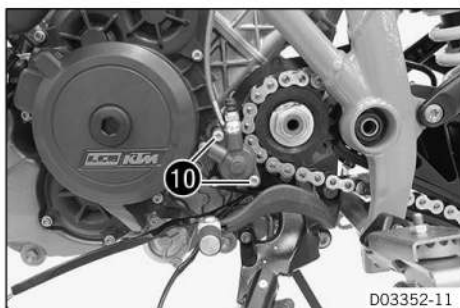
Guideline

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

- Mount and tighten screw **9**.

Guideline

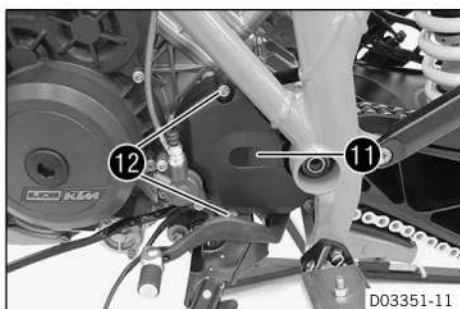
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
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- Mount clutch slave cylinder with spacer.
- Route the clutch line without kinks.
- Mount and tighten screws **10**.

Guideline

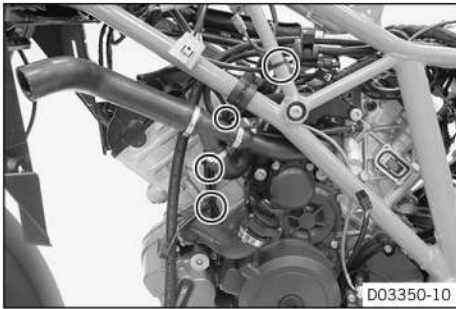
Clutch slave cylinder screw	M6	10 Nm (7.4 lbf ft)
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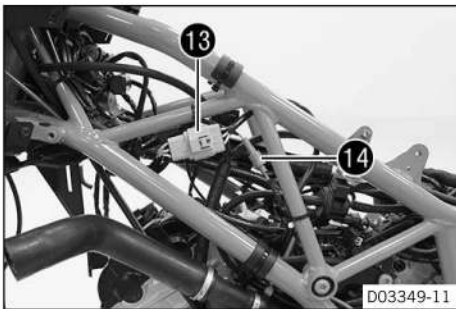
- Position engine sprocket cover **11**.
- Mount and tighten screws **12**.

Guideline

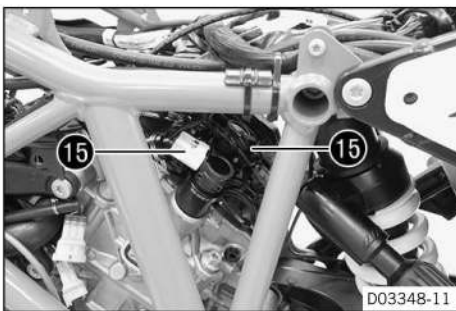
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
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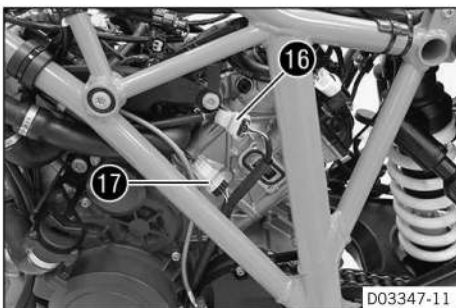
- Route the cable without tension and secure with cable tie.



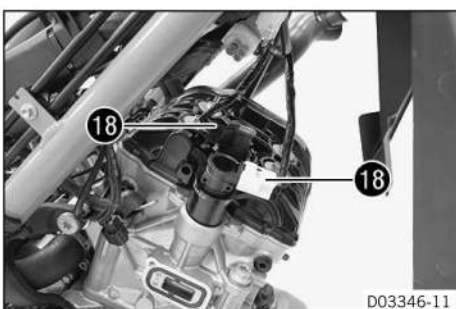
- Join plug-in connector 13.
- Join plug-in connector 14.



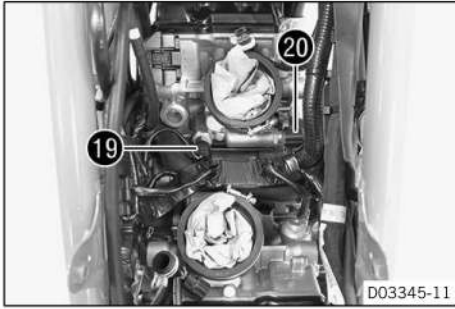
- Plug in the connectors 15.
- ✓ The white connector is connected to the outer ignition coil.



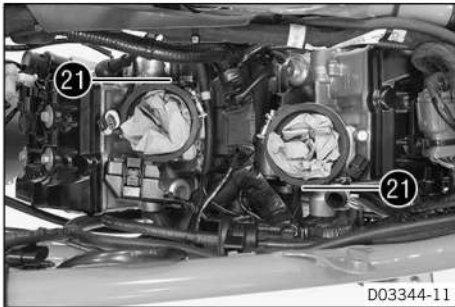
- Join plug-in connector 16.
- Join plug-in connector 17.
- Route the cable without tension and secure with cable protection.



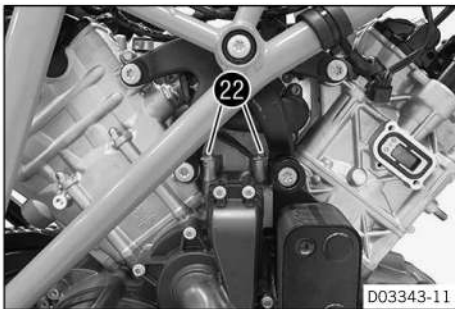
- Plug in the connectors 18.
- ✓ The white connector is connected to the outer ignition coil.



- Plug in connector 19.
- Plug in connector 20.



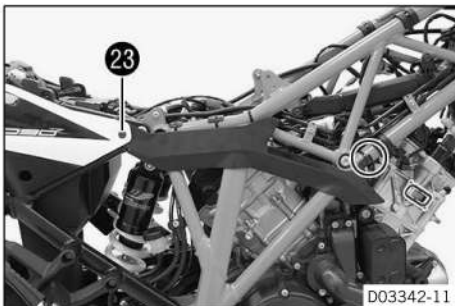
- Position hoses on the cylinder head and secure with hose clamps 21.



- Position the ground wire.
- Mount and tighten screws 22.

Guideline

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



- Position the heat protector.
- Mount the cable ties.
- Mount and tighten screw 23.

Guideline

Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
-------------------	----	-------------------------



- Position the positive cable on the starter motor.
- Mount and tighten nut 24.

Guideline

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

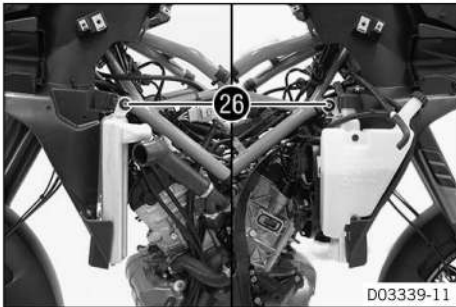
- Mount the protection cap.



- Position the wiring harness.
- Mount and tighten screw 25.

Guideline

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



- Position the radiator.



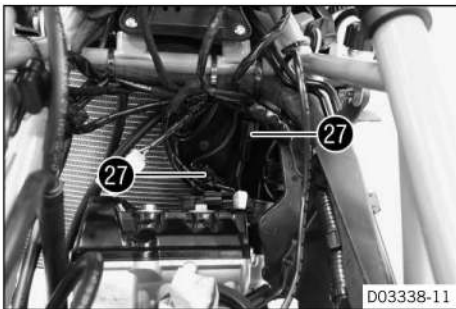
Info

Pay attention to the cooling fins.

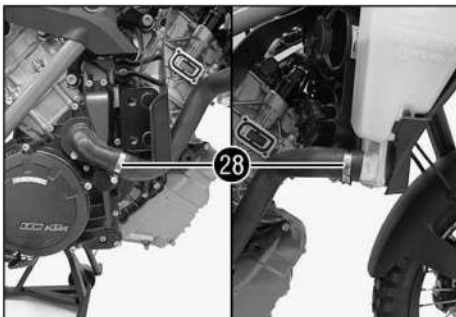
- Mount and tighten screws 26.

Guideline

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

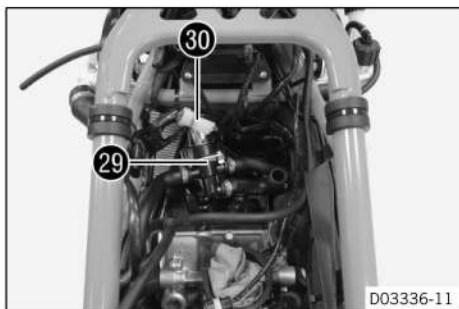


- Connect both plug-in connectors 27 and position them in the holder.

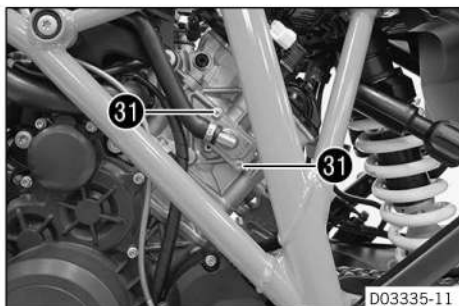


- Mount the radiator hoses.
- Position and tighten hose clips 28.





- Position the SAS valve 29 with hoses.
- Join plug-in connector 30.



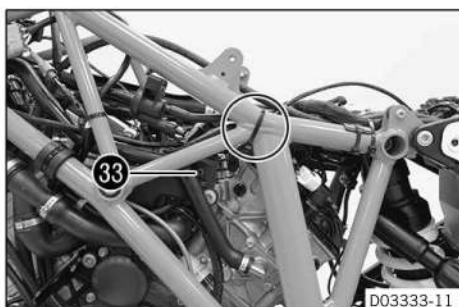
- Position the secondary air system cover.
- Mount and tighten screws 31.

Guideline

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



- Position fuel evaporation valve 32 on the holder.

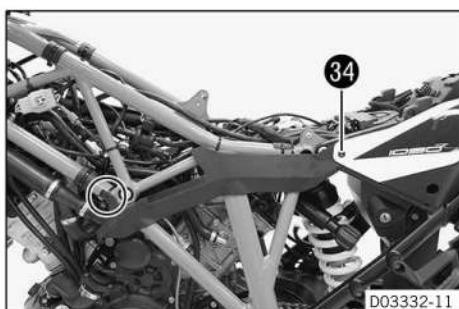


- Position the wiring harness.
- Mount and tighten screw 33.

Guideline

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

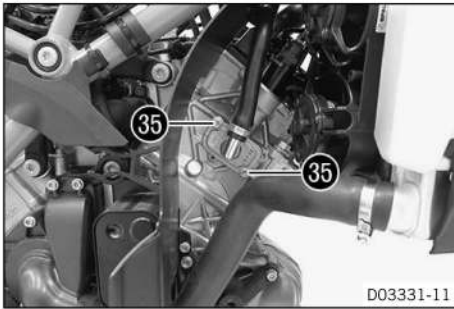
- Route the cable without tension and secure it with a cable tie.



- Position the heat protector.
- Mount the cable ties.
- Mount and tighten screw 34.

Guideline

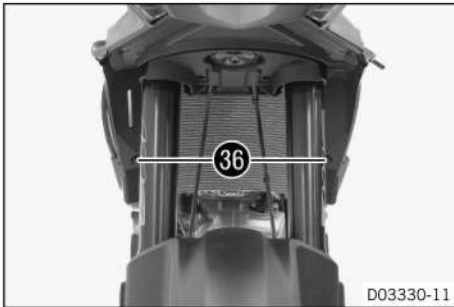
Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
-------------------	----	----------------------



- Position the secondary air system cover.
- Mount and tighten screws 35.

Guideline

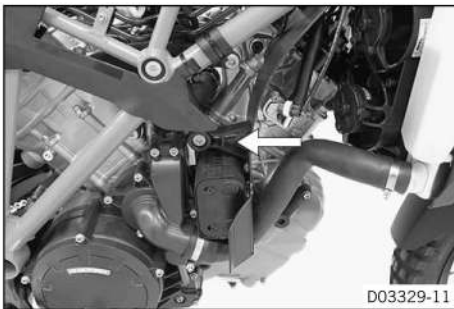
Remaining screws, engine	M6	10 Nm (7.4 lbf ft)
--------------------------	----	--------------------



- Mount and tighten screws 36.

Guideline

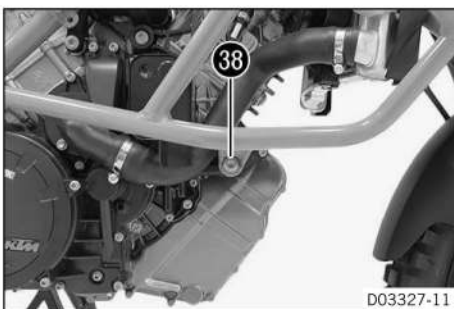
Remaining screws, chassis	M5	5 Nm (3.7 lbf ft)
---------------------------	----	-------------------



- Mount heat protector on the holder.



- Position intake snorkel 37.



- Position the right crash bar with the frame protector.



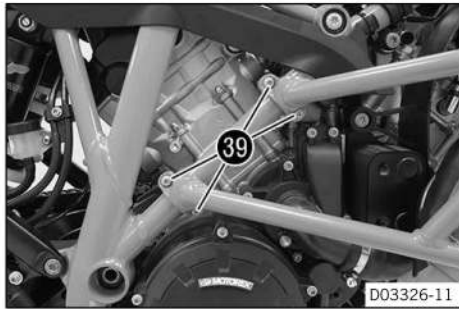
Info

Cover the components to protect them against damage.

- Mount screw 38, but do not tighten yet.

Guideline

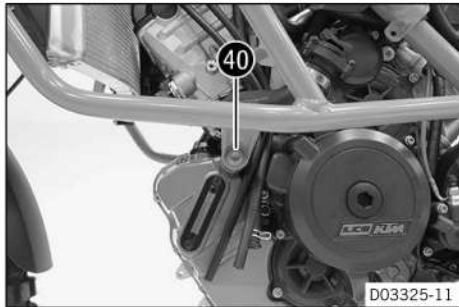
Remaining screws, chassis	M10	45 Nm (33.2 lbf ft)
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- Mount screws **39** with clamp halves, but do not tighten yet.

Guideline

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



- Position the left crash bar with the frame protector.

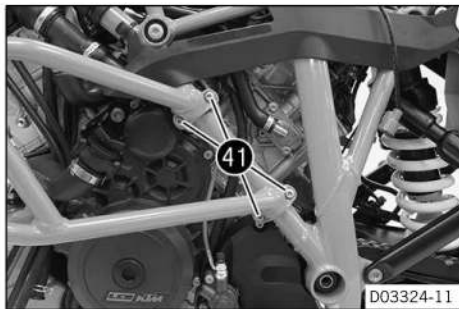
i Info

Cover the components to protect them against damage.

- Mount screw **40**, but do not tighten yet.

Guideline

Remaining screws, chassis	M10	45 Nm (33.2 lbf ft)
---------------------------	-----	---------------------



- Mount screws **41** with clamp halves, but do not tighten yet.

Guideline

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



- Mount and tighten fittings **42**.

Guideline

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

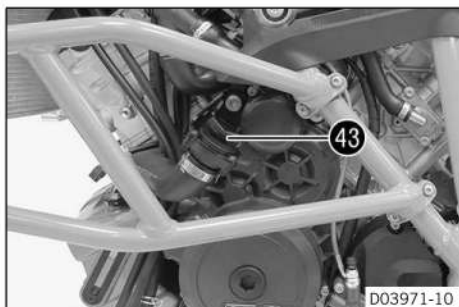
- ✓ The crash bars are equally aligned with each other.

- Tighten all the screws of the crash bar.

Guideline

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

Remaining screws, chassis	M10	45 Nm (33.2 lbf ft)
---------------------------	-----	---------------------



- Have the entire filling quantity available.

Engine oil Ambient temperature: $\geq 0\text{ }^{\circ}\text{C}$ ($\geq 32\text{ }^{\circ}\text{F}$)	3.60 l (3.8 qt.)	Engine oil (SAE 10W/50) (p. 406)
Engine oil Ambient temperature: $< 0\text{ }^{\circ}\text{C}$ ($< 32\text{ }^{\circ}\text{F}$)		Engine oil (SAE 5W/40) (p. 407)

- Remove screw plug **43** and fill up with initial partial quantity.

Engine oil (1st partial quantity) approx. Ambient temperature: $\geq 0\text{ }^{\circ}\text{C}$ ($\geq 32\text{ }^{\circ}\text{F}$)	3.0 l (3.2 qt.)	Engine oil (SAE 10W/50) (📖 p. 406)
Engine oil (1st partial quantity) approx. Ambient temperature: $< 0\text{ }^{\circ}\text{C}$ ($< 32\text{ }^{\circ}\text{F}$)		Engine oil (SAE 5W/40) (📖 p. 407)

- Mount screw plug **43**.

Finishing work

- Install the throttle valve body. (📖 p. 362)
- Install the lower part of the air filter box. (📖 p. 93)
- Install the upper part of the air filter box. (📖 p. 90)
- Add coolant/bleed the cooling system. (📖 p. 310)
- Install the manifold. (📖 p. 85)
- Remove the motorcycle from the work stand. (📖 p. 15)
- Install the main silencer. (📖 p. 82)
- Install the engine guard. (📖 p. 47)
- Install the fuel tank. (📖 p. 98)
- Install the mask spoiler. (📖 p. 114)
- Install the fuel tank cover. (📖 p. 112)
- Install the front side cover. (📖 p. 110)
- Connect the negative cable of the 12-V battery. (📖 p. 160)
- Mount the seat. (📖 p. 96)
- Set the time and date.



Danger

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

- Always make sure there is sufficient ventilation when running the engine.
- Use effective exhaust extraction when starting or running the engine in an enclosed space.

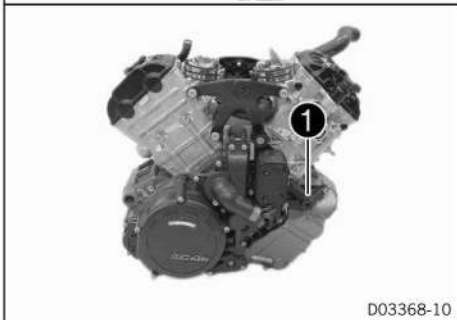
- Start the engine and check for leaks.
- Switch off the engine.
- Remove the screw plug and add the second partial quantity up to the upper marking on the engine oil level viewer.

Engine oil (2nd partial quantity) approx. Ambient temperature: $\geq 0\text{ }^{\circ}\text{C}$ ($\geq 32\text{ }^{\circ}\text{F}$)	0.60 l (0.63 qt.)	Engine oil (SAE 10W/50) (📖 p. 406)
Engine oil (2nd partial quantity) approx. Ambient temperature: $< 0\text{ }^{\circ}\text{C}$ ($< 32\text{ }^{\circ}\text{F}$)		Engine oil (SAE 5W/40) (📖 p. 407)

- Mount the screw plug.

- Perform the initialization run. (📖 p. 363)
- Check the lubrication system for leaks.
- Check the cooling system for leaks.
- Go for a short test ride.
- Read out the fault memory using the KTM diagnostics tool.
- Check the engine oil level. (📖 p. 339)
- Check the coolant level in the compensating tank. (📖 p. 307)

18.3 Preparing the engine for installation



- Position both radiator hoses. Position and tighten the hose clips.
- Position the vent hose.
- Mount the intake flanges.
- Remove engine fixing arm ①.

Engine fixing arm (61230066100)

- Mount the engine fixing arm.

Engine fixing arm (60303006000)

- Mount and tighten the screws.

Guideline

Screws, engine bearer	M8	20 Nm (14.8 lbf ft) Loctite®243™
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18.4 Preparing the engine for clamping in the engine assembly stand



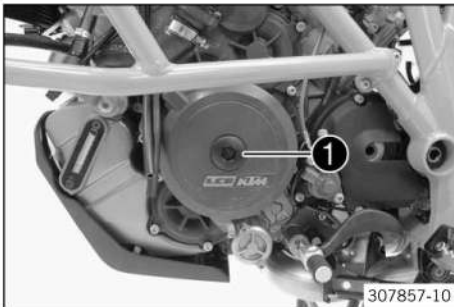
- Remove the hose clips.
- Remove both radiator hoses.
- Remove the vent hose.
- Remove the intake flanges.
- Remove engine fixing arm ①.
- Mount the engine fixing arm.

Engine fixing arm (61230066100)

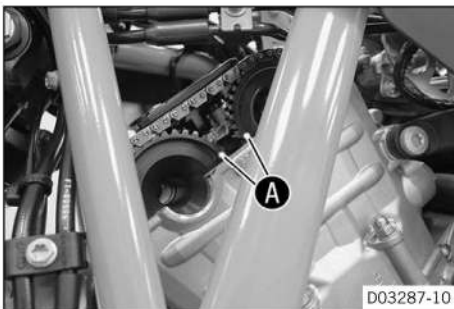
18.5 Setting the engine to ignition top dead center of the rear cylinder

Condition

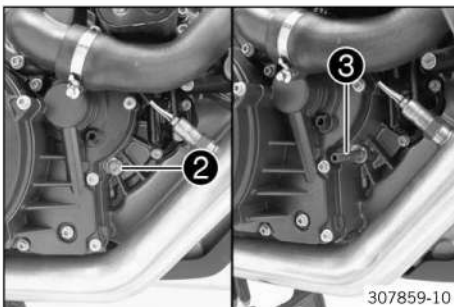
The valve cover has been removed.



- Remove screw plug **1** with O-ring.



- Turn the crankshaft counterclockwise until markings **A** are flush with the edge of the cylinder head.



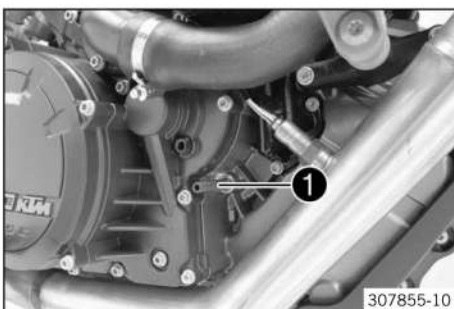
- Remove screw **2** with the washer.
- Look through the hole to check that the position notch of the crankshaft is visible.
- Screw in special tool **3**.

Locking screw (61229015000) (📖 p. 418)

18.6 Setting the engine to ignition top dead center of the front cylinder

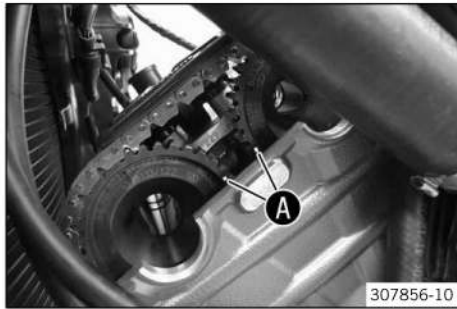
Condition

The engine is positioned at ignition top dead center of the rear cylinder.



- Loosen special tool **1** by several turns.

Locking screw (61229015000) (📖 p. 418)



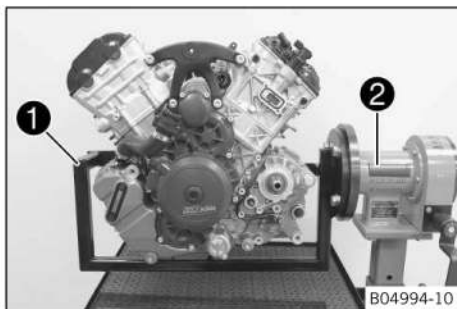
- Keep turning the crankshaft counterclockwise until markings **A** are flush with the edge of the cylinder head.
- Screw special tool **1** back in.

18.7 Engine disassembly

18.7.1 Clamping the engine into the engine assembly stand

Preparatory work

- Prepare the engine for clamping in the engine assembly stand. (p. 208)



Main work

- Mount special tool **1** on engine work stand **2**.

Engine assembly stand (61229001000) (p. 417)

Engine bracket for engine work stand (61229002000) (p. 417)

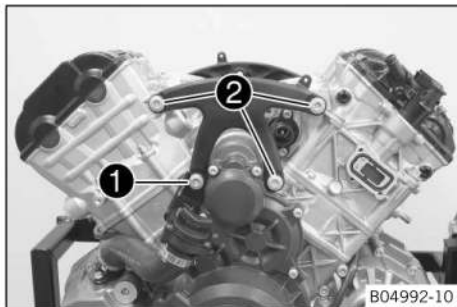
- Mount the engine on special tool **1**.



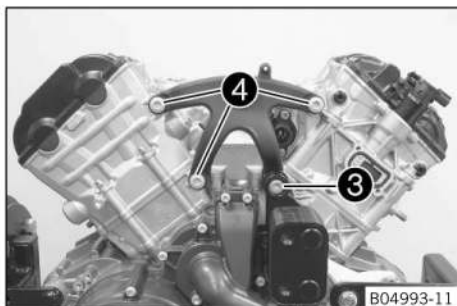
Info

Work with an assistant or a motorized hoist.

18.7.2 Removing the engine bearer

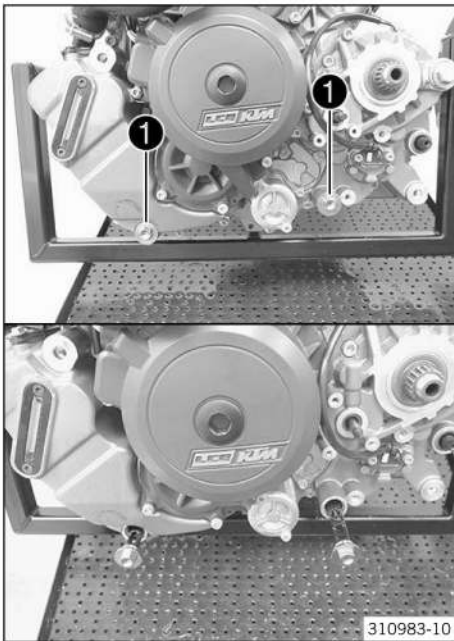


- Remove screw **1**.
- Swivel oil filler tube slightly to the side.
- Remove screws **2** and take off the engine bearer.



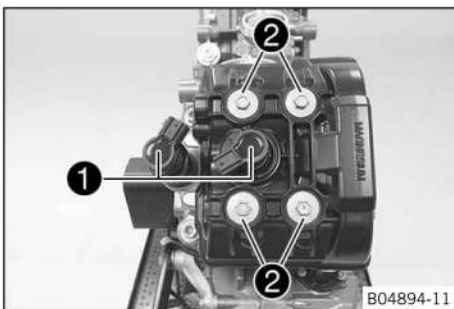
- Remove screw **3** with the collar sleeve.
- Remove screws **4** and take off the engine bearer.

18.7.3 Draining the engine oil



- Remove oil drain plug **1** with the magnet, O-rings and oil screen.
- Completely drain the engine oil.

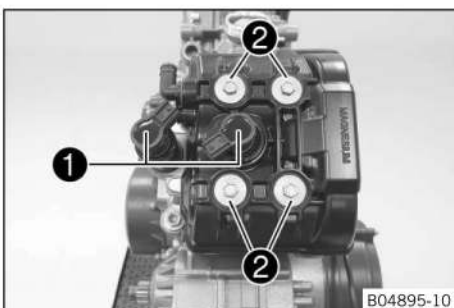
18.7.4 Removing the front valve cover



- Remove ignition coils **1**.
- Remove screws **2**. Take off the valve cover with the valve cover seal.
- Remove the spark plugs using the special tool.

Spark plug wrench with link (77229172000) (📖 p. 423)

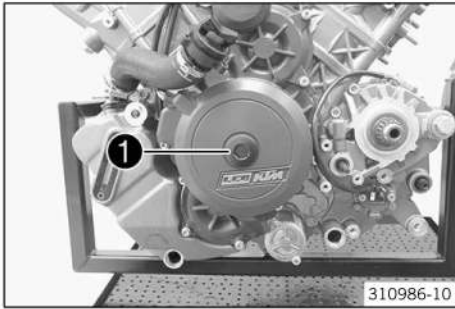
18.7.5 Removing the rear valve cover



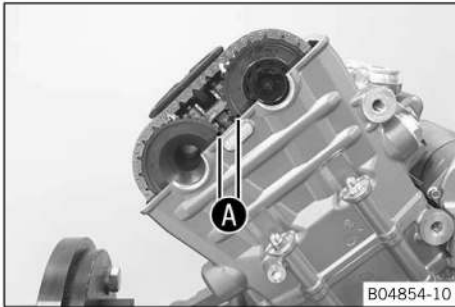
- Remove ignition coils **1**.
- Remove screws **2**. Take off the valve cover with the valve cover seal.
- Remove the spark plugs using the special tool.

Spark plug wrench with link (77229172000) (📖 p. 423)

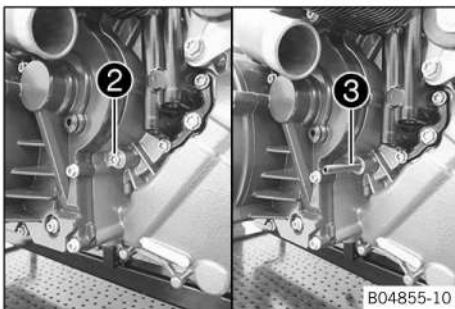
18.7.6 Setting the engine to ignition top dead center of the rear cylinder



- Remove screw plug **1** with O-ring.



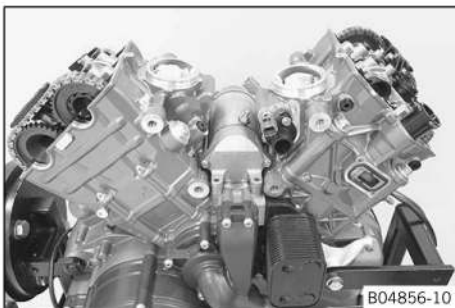
- Turn the crankshaft counterclockwise until markings **A** of the rear camshafts are flush with the edge of the cylinder head.



- Remove screw **2** with the washer.
- Look through the hole to check that the position notch of the crankshaft is visible.
- Screw in special tool **3**.

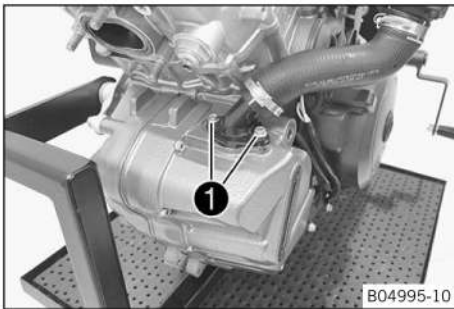
Locking screw (61229015000) (📖 p. 418)

18.7.7 Removing the starter motor



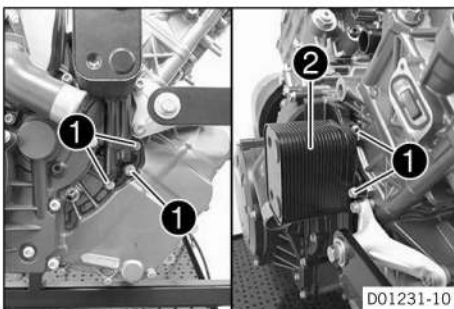
- Take off the starter motor.

18.7.8 Removing the oil filler tube

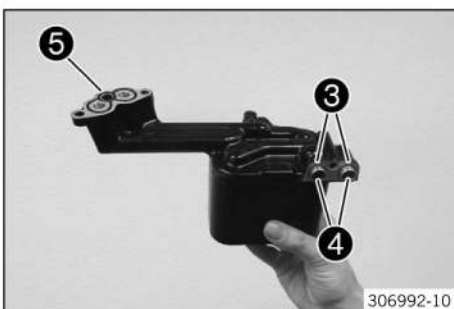


- Remove screws **1**.
- Remove the oil filler tube with the O-ring.

18.7.9 Removing the heat exchanger

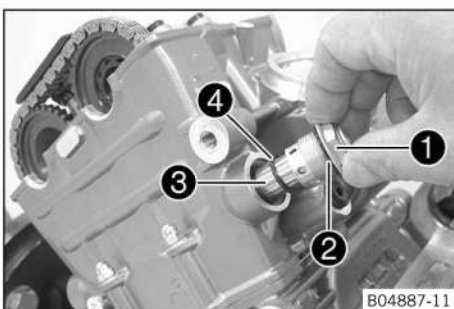


- Remove screws **1** of heat exchanger **2**.
- Remove the heat exchanger.



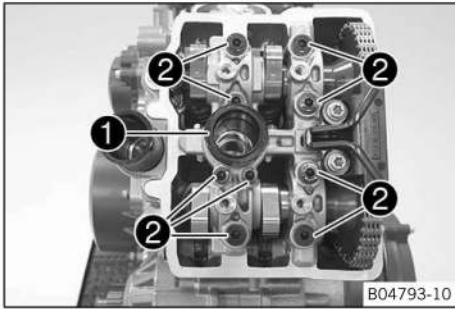
- Remove O-rings **3** and sleeves **4**.
- Remove seal **5**.

18.7.10 Removing the rear timing chain tensioner



- Remove screw **1** with O-ring **2**.
- Remove timing chain tensioner **3** with O-ring **4**.

18.7.11 Removing the rear camshafts



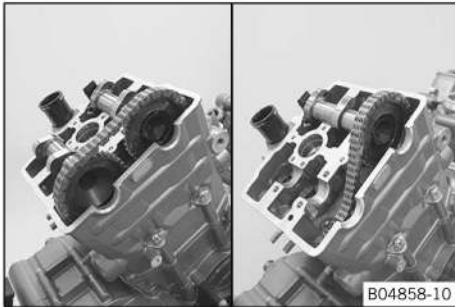
- Remove the spark plug shaft insert **1** with the gasket.
- Loosen and remove screws **2** from the outside to the inside.



Info

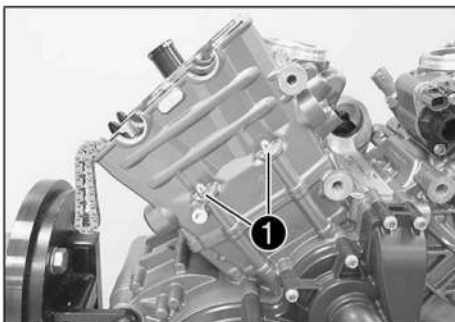
The cams should not activate the valves.

- Remove the camshaft bearing support.

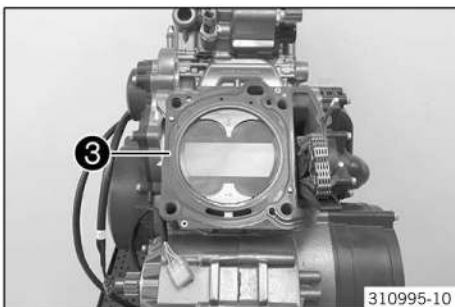
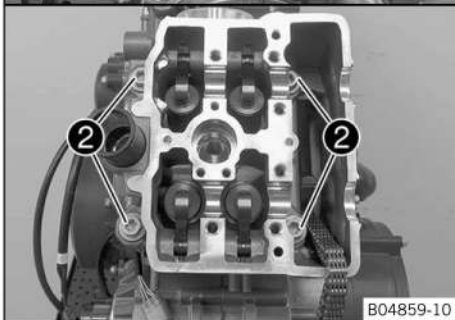


- Raise the camshafts at the rear and take the timing chain off the rear sprocket. Remove the camshafts.

18.7.12 Removing the rear cylinder head

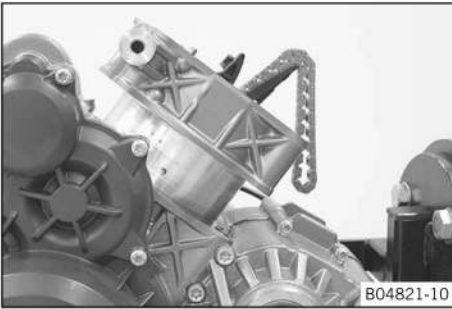


- Remove nuts **1** with the washers.
- Alternately loosen screws **2** and remove them.
- Take off the cylinder head.



- Remove cylinder head gasket **3**.

18.7.13 Removing the rear piston

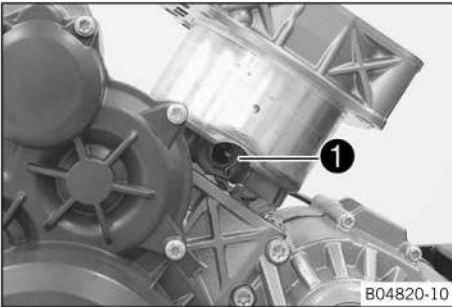


- Push the cylinder up.



Info

Push the cylinder up until the piston pin can be removed.
Make sure that the two pins remain in place.

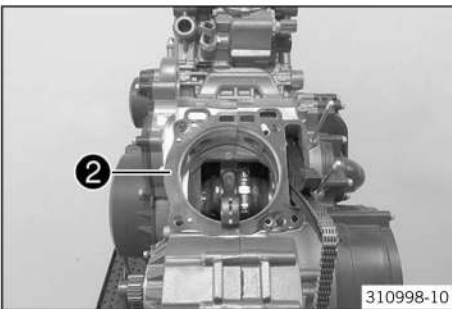


- Remove piston pin retainer **1**.
- Remove the piston pin.
- Remove the cylinder with the piston.
- Push the piston upward out of the cylinder.



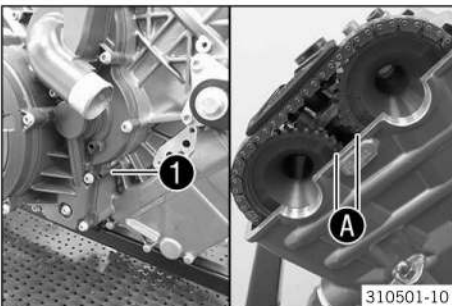
Info

If no additional work needs to be performed on the cylinder and piston, the piston can remain in the cylinder.



- Remove cylinder base gasket **2**.

18.7.14 Setting the engine to ignition top dead center of the front cylinder

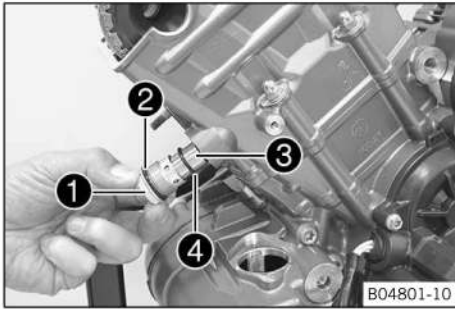


- Loosen special tool **1** by several turns.

Locking screw (61229015000) (📖 p. 418)

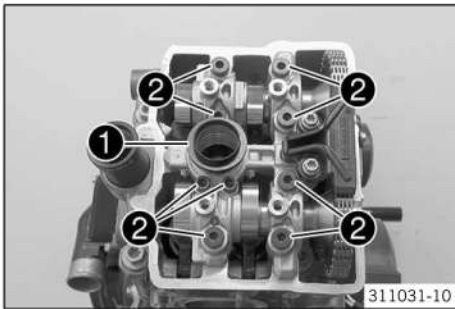
- Keep the timing chain tensioned.
- Continue turning the crankshaft counterclockwise until markings **A** of the front camshafts are flush with the edge of the cylinder head.
- Screw special tool **1** back in.

18.7.15 Removing the front timing chain tensioner



- Remove screw 1 with O-ring 2.
- Take off timing chain tensioner 3 with O-ring 4.

18.7.16 Removing the front camshafts



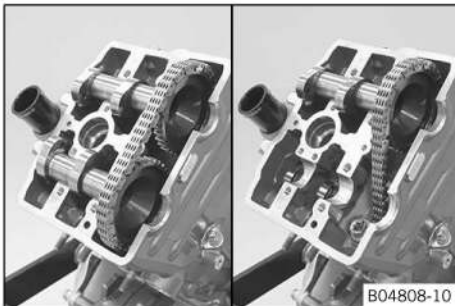
- Remove the spark plug shaft insert 1 with the gasket.
- Loosen and remove screws 2 from the outside to the inside.



Info

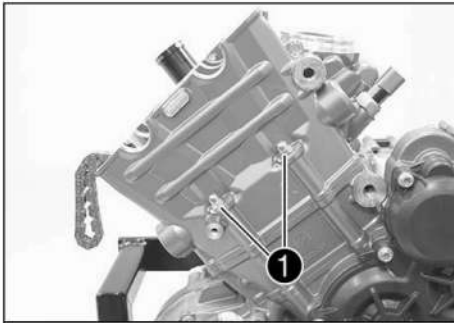
The cams should not activate the valves.

- Remove the camshaft bearing support.

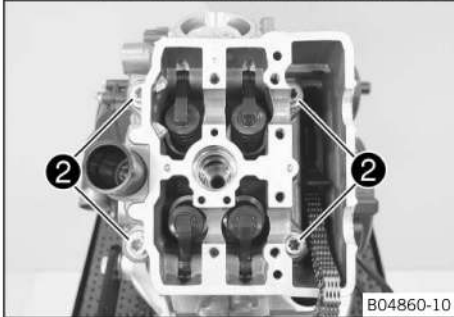


- Raise the camshafts at the rear and take the timing chain off the rear sprocket. Remove the camshafts.

18.7.17 Removing the front cylinder head



- Remove nuts **1** with washers.
- Loosen screws **2** in a crisscross pattern and remove them.
- Remove the cylinder head. Remove the cylinder head gasket.



B04860-10

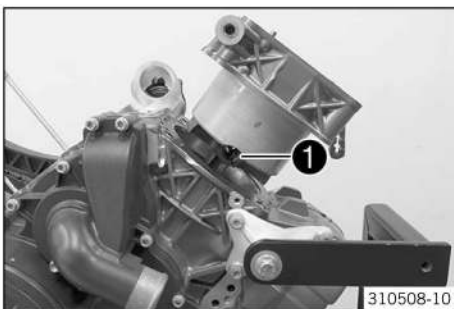
18.7.18 Removing the front piston



310507-10

- Push the cylinder upward.

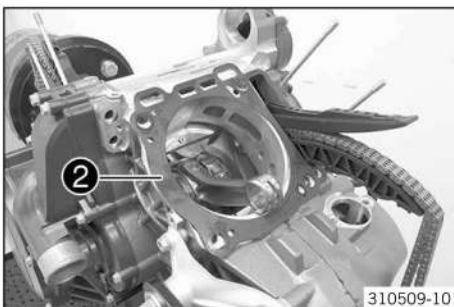
i Info
Only push the cylinder as far up as necessary to take the piston pin out.
Make sure that the two pins remain in place.



310508-10

- Remove piston ring lock **1**.
- Remove the piston pin.
- Take off the cylinder and piston.
- Push the piston upward out of the cylinder.

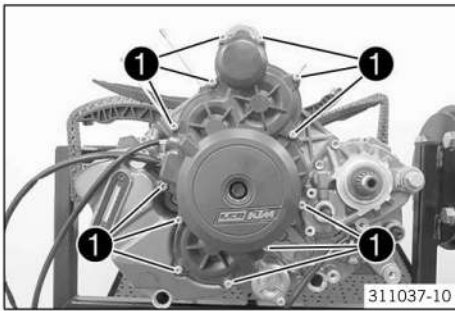
i Info
If no further work is to be performed on the cylinder and piston, the piston can remain in the cylinder.



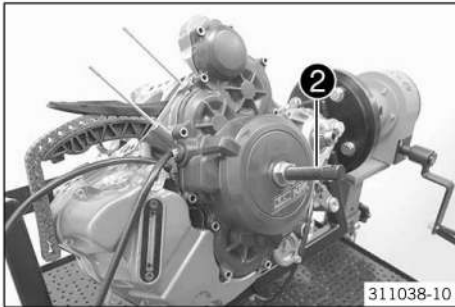
310509-10

- Remove cylinder base gasket **2**.

18.7.19 Removing the alternator cover



- Remove screws **1**.



- Screw in special tool **2** and pull off the alternator cover.

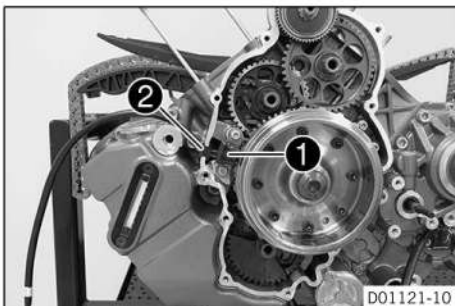
Puller (61229010000) (📖 p. 417)

i Info

Strike the alternator cover lightly with a rubber mallet to prevent strain.

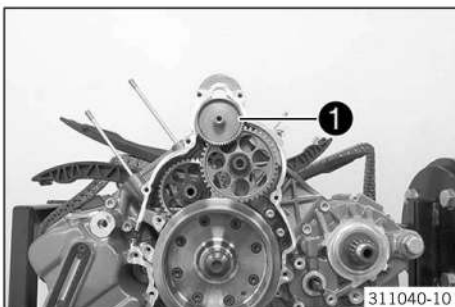
- Take off the alternator cover seal. Take off the dowels.

18.7.20 Removing the crankshaft speed sensor



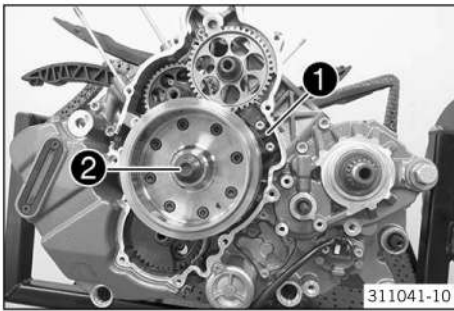
- Remove the screws of crankshaft speed sensor **1**.
- Pull rubber grommet **2** out of the engine case. Take off the crankshaft speed sensor.

18.7.21 Removing the torque limiter and the intermediate gear



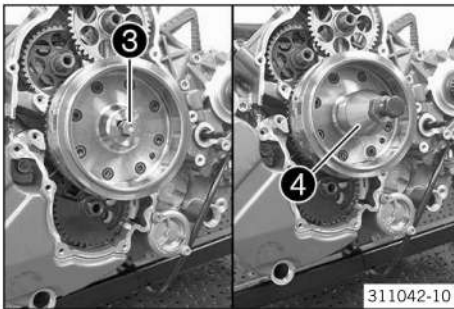
- Take off torque limiter **1**.

18.7.22 Removing the rotor

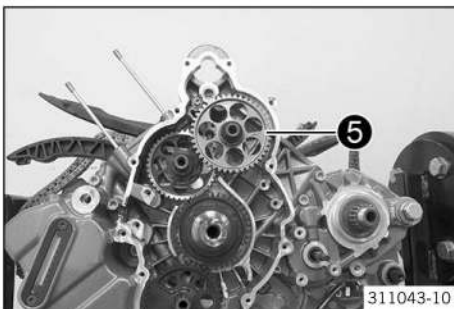


- Remove the screws and take off freewheel holder ①.
- Loosen and remove screw ② of the rotor.

i Info
The crankshaft must be blocked.

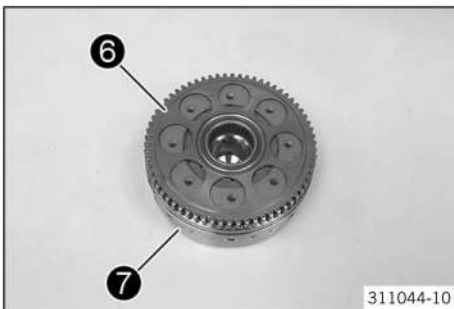


- Screw special tool ③ into the crankshaft.
Pressing tool (61229008100) (📖 p. 417)
- Mount special tool ④ on the rotor, apply counterpressure, and pull off the rotor by screwing in the screw.
Puller (75029021000) (📖 p. 422)
- Remove the special tools.



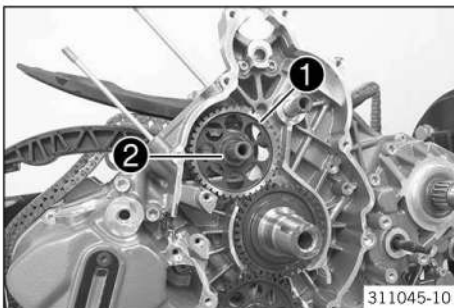
- Remove intermediate gear ⑤ with the washers and needle bearing.

i Info
The intermediate gear has one washer at the front and one at the rear; the front washer usually sticks to the alternator cover.

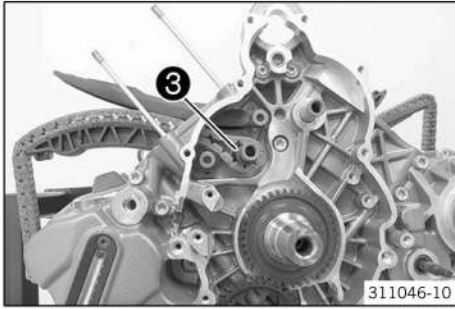


- Take freewheel gear ⑥ from rotor ⑦.

18.7.23 Removing the intermediate gear and the timing chain on the left



- Take off intermediate gear ① with washer ②.



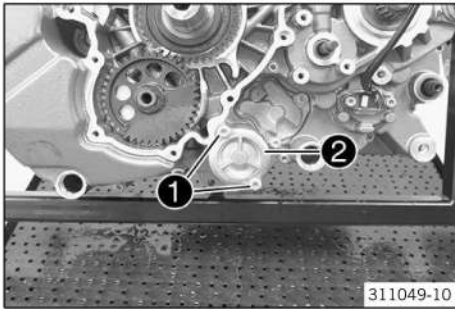
- Remove the timing chain, needle bearing **3** and the washer lying behind it.



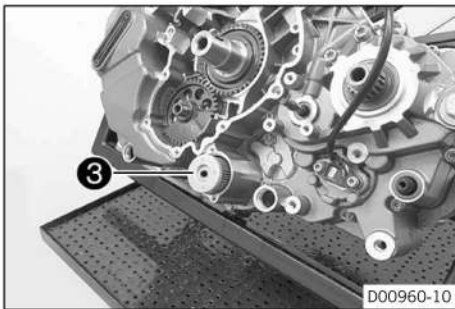
Info

If the timing chain is to be used again, mark on it the direction of travel and the cylinder to which it belongs.

18.7.24 Removing the oil filter



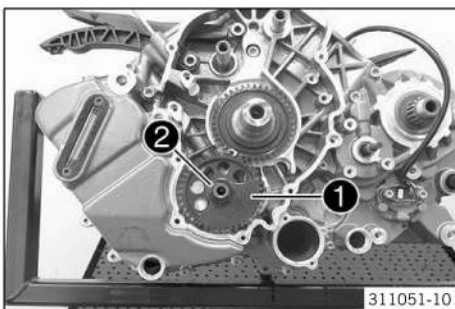
- Remove screws **1**. Take off oil filter cover **2** with the O-ring.



- Pull oil filter **3** out of the oil filter housing.

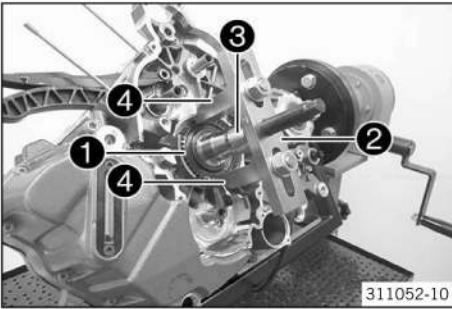
Lock ring plier (51012011000) (📖 p. 412)

18.7.25 Removing the balancer shaft



- Remove balancer shaft **1** with washer **2**.
- Mount the needle bearing and the rear washer.

18.7.26 Removing the drive gear wheel of the balancer shaft



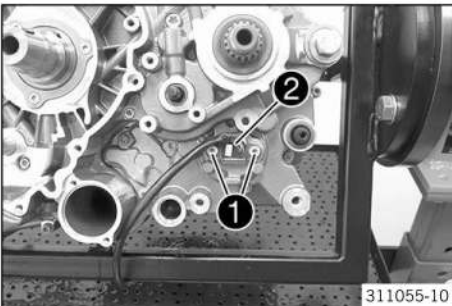
- Remove drive gear wheel of the balancer shaft **1** with special tool **2**, **3** and **4**.

Puller (78029033100) (📖 p. 423)

Pressing tool (61229018000) (📖 p. 419)
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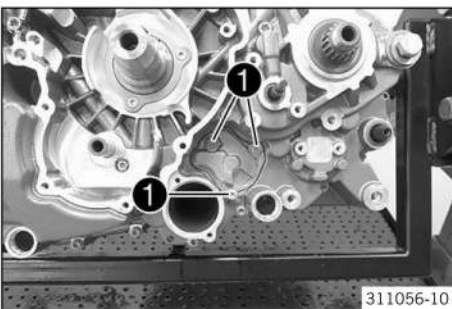
Arms for puller (61229017000) (📖 p. 418)
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18.7.27 Removing the gear position sensor

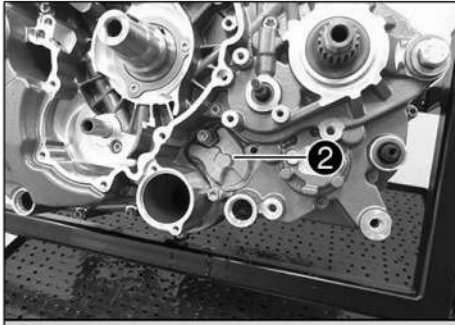


- Remove screws **1** with the washers.
- Remove gear sensor **2**.

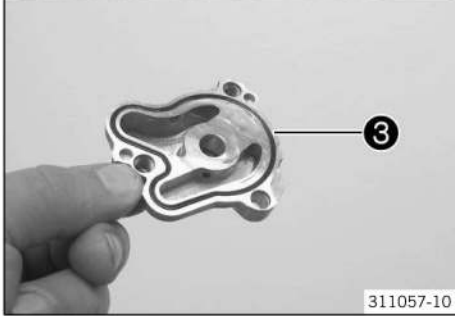
18.7.28 Removing the left suction pump



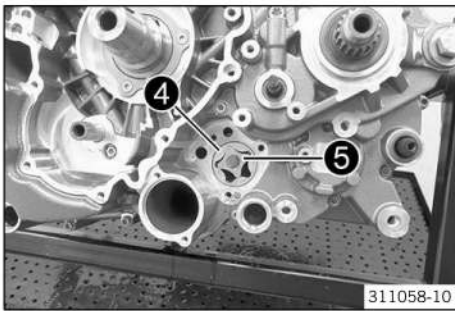
- Remove screws **1**.



- Screw suitable screws into the oil pump cover.
- Pull off the oil pump cover by screwing in the screws.
- Remove oil pump cover **2**.
- Remove gasket **3**.

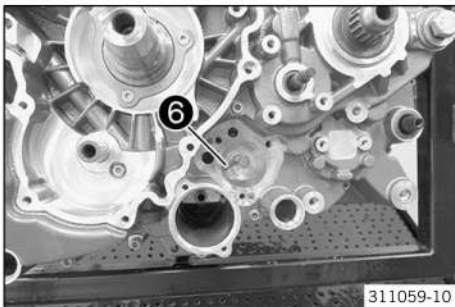


311057-10



- Remove external rotor **4** and internal rotor **5**.

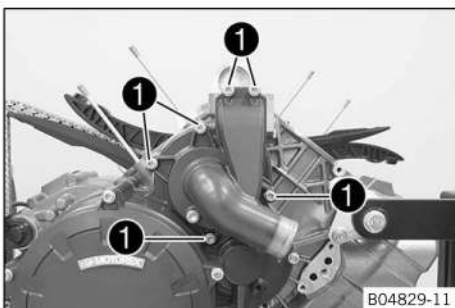
311058-10



- Remove pin **6**.

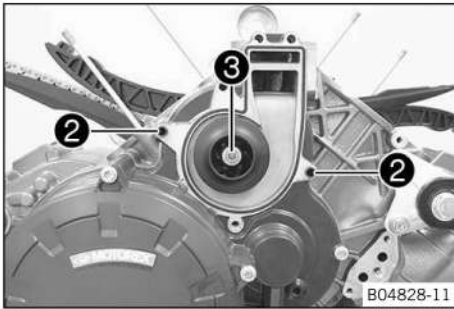
311059-10

18.7.29 Removing the water pump impeller



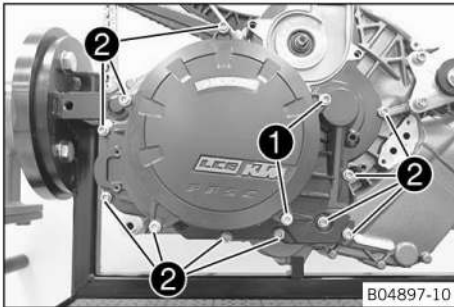
- Remove screws **1**.
- Take off the water pump cover.

B04829-11

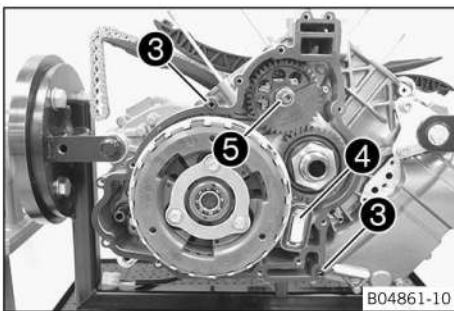


- Remove dowels ②.
- Remove screw ③. Take off the water pump wheel with the washer below it.
- Remove the gasket.

18.7.30 Removing the clutch cover

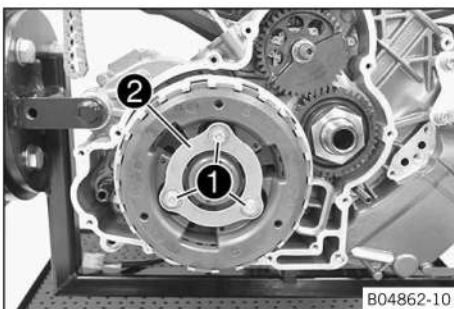


- Loosen screws ① of the outer clutch cover.
- Remove screws ②.
- Take off the clutch cover.

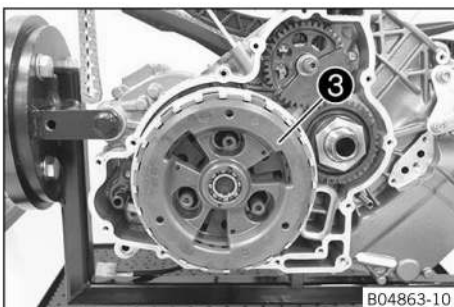


- Take off dowels ③. Remove the clutch cover gasket.
- Remove check valve ④.
- Remove water pump sleeve ⑤ from the intermediate gear.

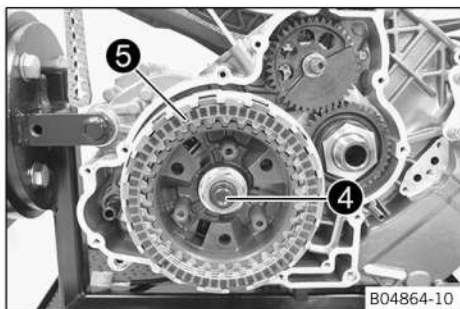
18.7.31 Removing the clutch discs



- Remove screws ①.
- Take off clutch center ② and the springs.

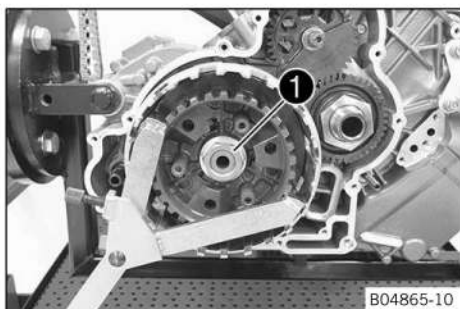


- Remove clutch pressure cap ③.



- Remove clutch push rod ④.
- Remove clutch discs ⑤, support ring, and pretension ring.

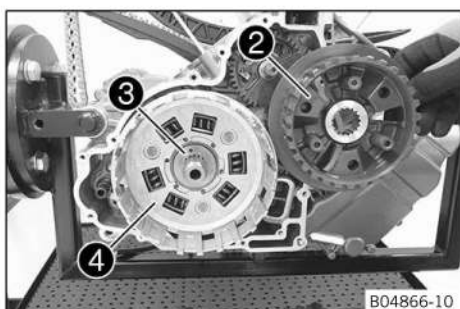
18.7.32 Removing the clutch basket



- Hold the inner clutch hub with the special tool.

Holding wrench (51129003000) (📖 p. 413)

- Remove nut ① with the washer.



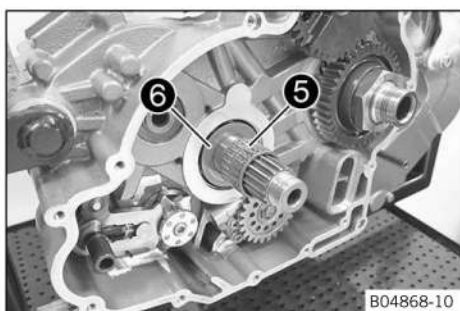
- Take off inner clutch hub ② and washer ③.



Info

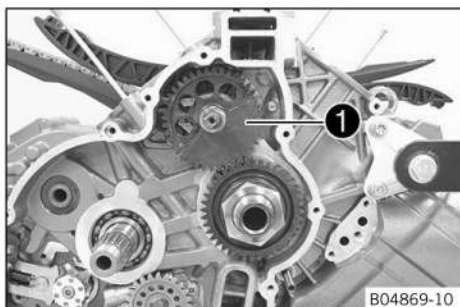
The washer usually sticks to the inner clutch hub.

- Take off clutch basket ④.



- Remove needle bearing ⑤ and washer ⑥.

18.7.33 Removing the intermediate gear and the timing chain on the right



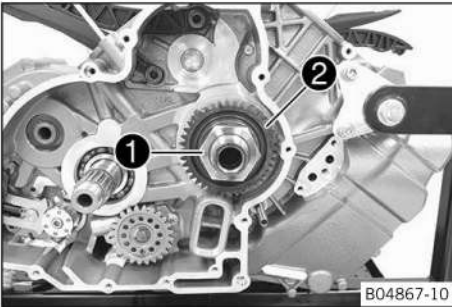
- Take off intermediate gear ①.
- Take off the timing chain.



Info

If the timing chain is to be used again, mark on it the direction of travel and the cylinder to which it belongs.

18.7.34 Removing the primary gear wheel



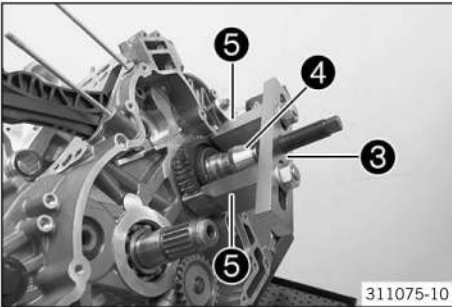
- Remove nut 1 of primary gear 2 with the washer.



Info

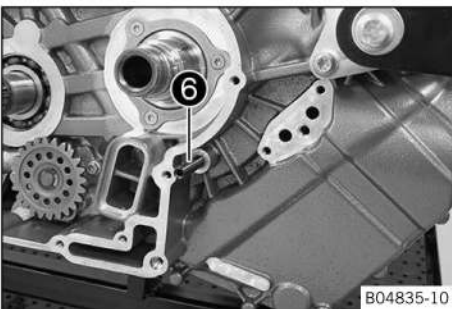
LH thread!

Make sure that the crankshaft is blocked.



- Remove the primary gear wheel with special tool 3, 4 and 5.

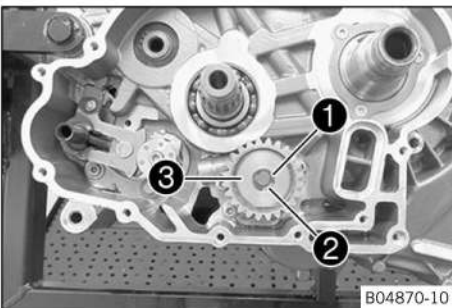
Puller (78029033100) (📖 p. 423)
Pressing tool (61229018000) (📖 p. 419)
Arms for puller (61229017000) (📖 p. 418)



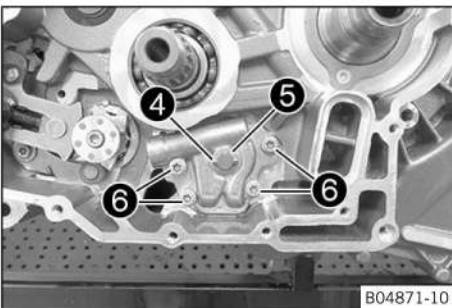
- Remove special tool 6.

Locking screw (61229015000) (📖 p. 418)
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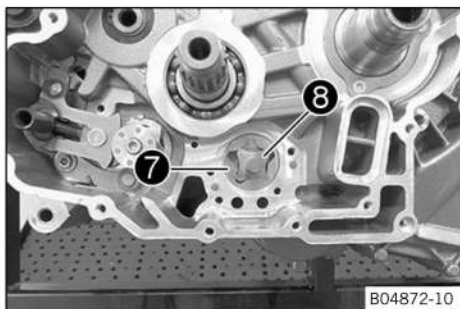
18.7.35 Removing the force pump



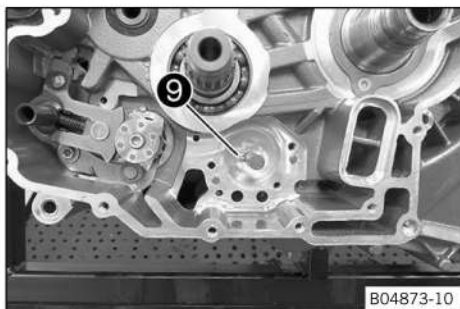
- Remove lock washer 1 and washer 2.
- Take off oil pump gear wheel 3.



- Remove pin 4 and washer 5.
- Remove screws 6.
- Remove the oil pump cover.

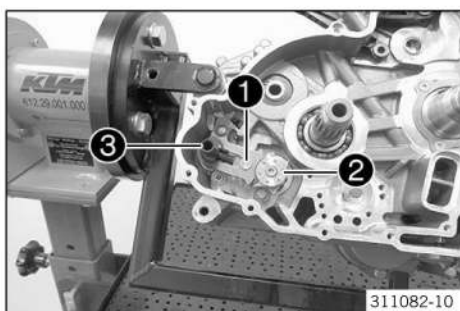


- Remove external rotor 7 and internal rotor 8.



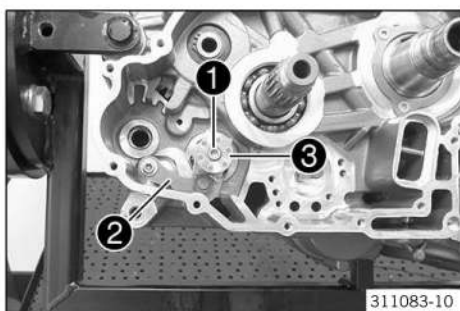
- Remove pin 9.

18.7.36 Removing the shift shaft



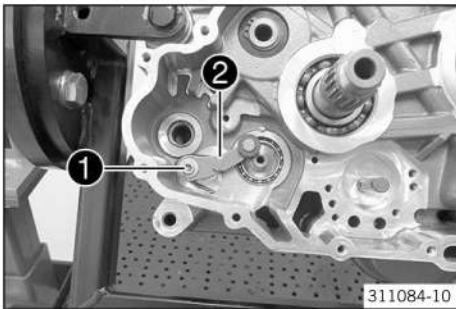
- Push sliding plate 1 away from shift drum locating unit 2. Remove shift shaft 3 with washer.

18.7.37 Removing the shift drum locating



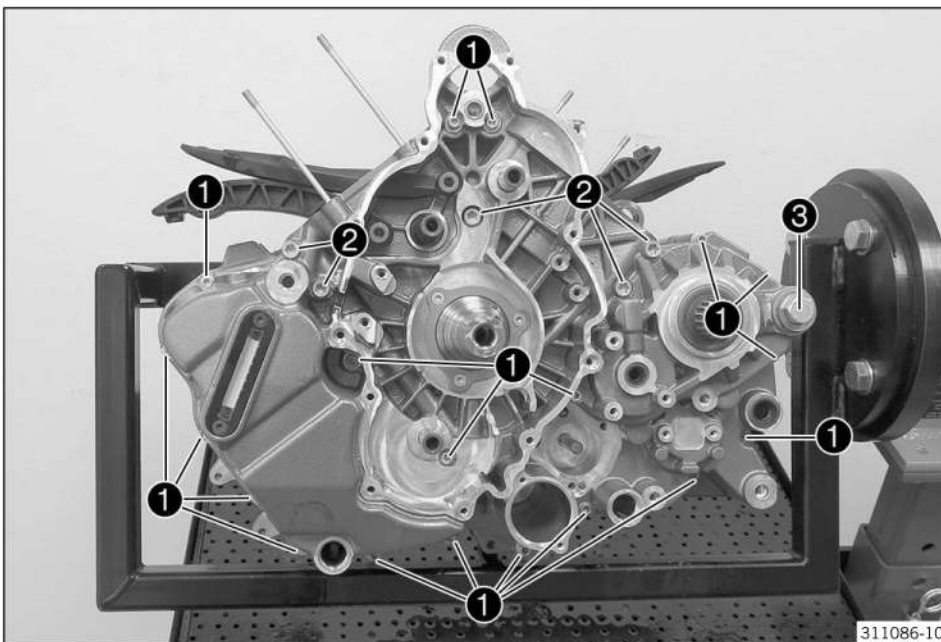
- Remove screw 1.
- Press locking lever 2 away from shift drum locating 3 and take off the shift drum locating.
- Release the locking lever.

18.7.38 Removing the locking lever

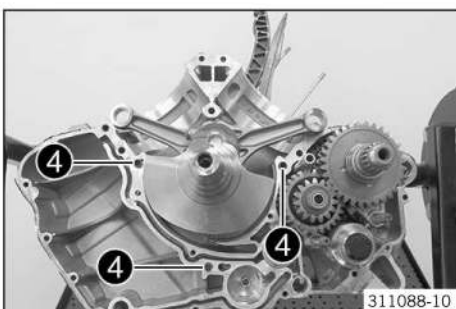


- Remove screw ①.
- Take off locking lever ② with the sleeve and spring.

18.7.39 Removing the left engine case

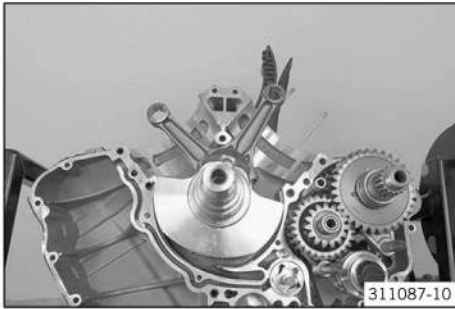


- Remove screws ① and ②.
- Swing the left section of the engine case upward. Remove screw ③.
- Loosen the left section of the engine case by striking it lightly with a plastic hammer and remove it.



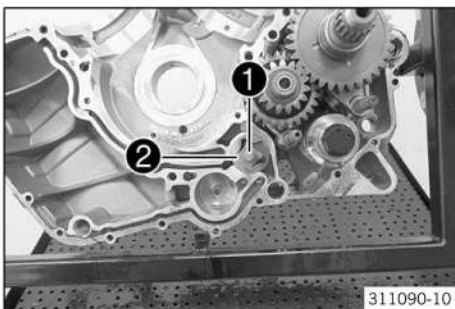
- Remove dowels ④.

18.7.40 Removing the crankshaft

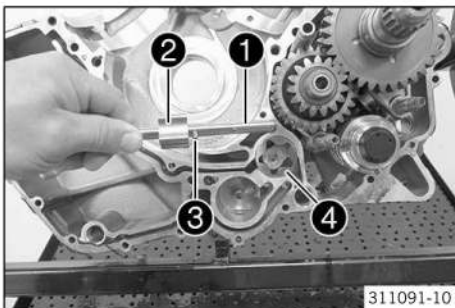


- Remove crankshaft.

18.7.41 Removing the middle suction pump

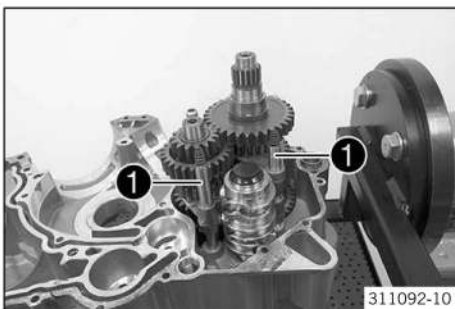


- Take off oil pump shaft ① with internal rotor ②.

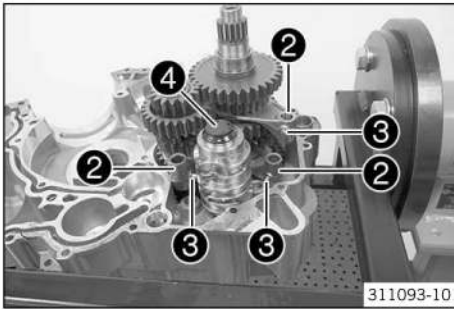


- Remove internal rotor ② and pin ③ from the oil pump shaft ①.
- Remove external rotor ④.

18.7.42 Removing the transmission shaft



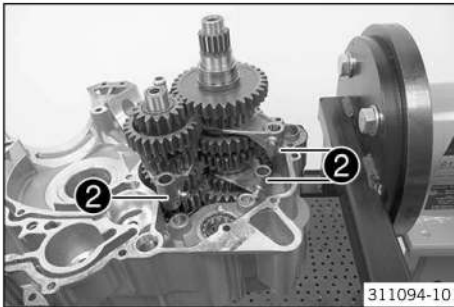
- Remove shift rails ① with the springs.



- Swing shift forks ② to one side.

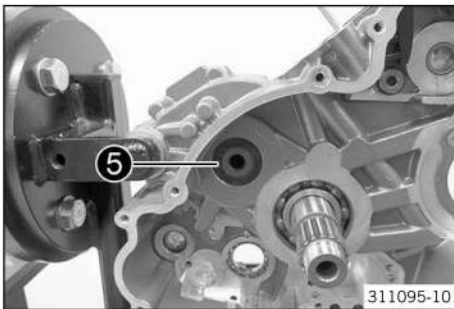
i Info
Make sure not to misplace shift rollers ③.

- Remove shift drum ④.

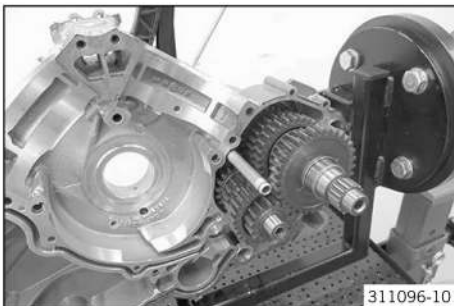


- Remove shift forks ②.

i Info
Make sure not to misplace the shift rollers.

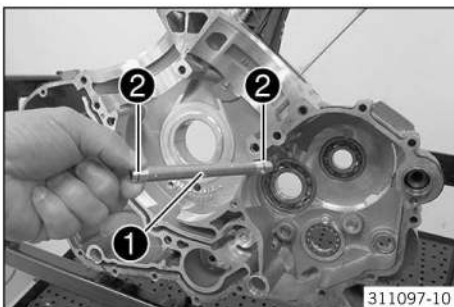


- Place the engine in an upright position.
- Remove lock ring ⑤ and the stop disk.



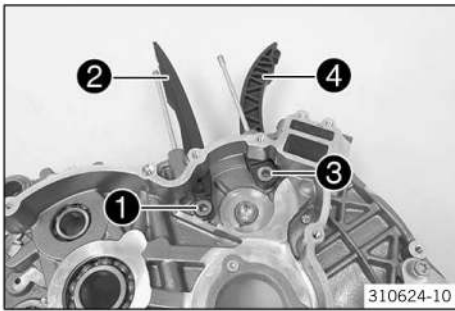
- Pull both transmission shafts out of the bearing seats together.

18.7.43 Removing the oil spray tube



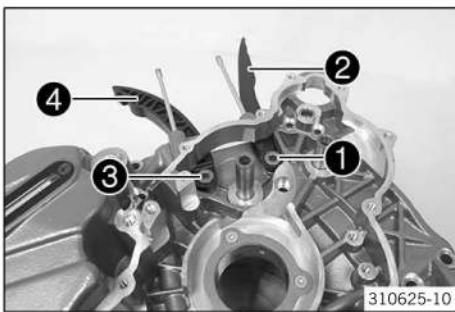
- Remove oil spray tube ①. Remove O-rings ②.

18.7.44 Removing the timing chain rails of the right engine case section



- Remove screw ①. Remove timing chain guide rail ②.
- Remove screw ③. Remove timing chain tensioning rail ④.

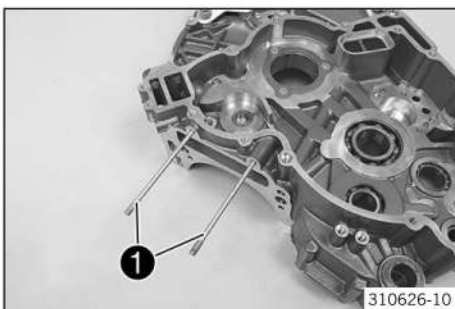
18.7.45 Removing the timing chain rails of the left engine case section



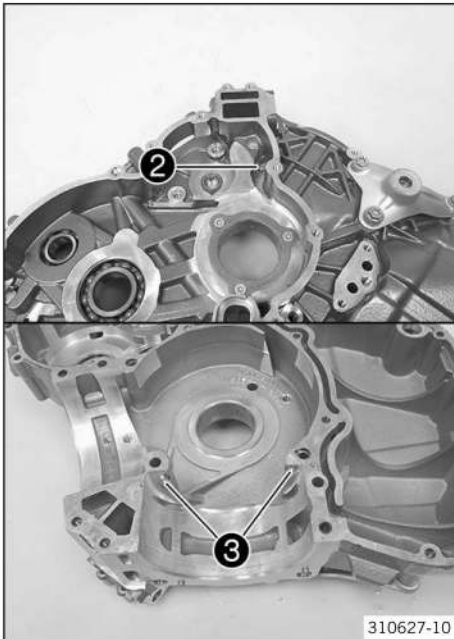
- Remove screw ①. Remove timing chain guide rail ②.
- Remove screw ③. Remove timing chain tensioning rail ④.

18.8 Working on individual parts

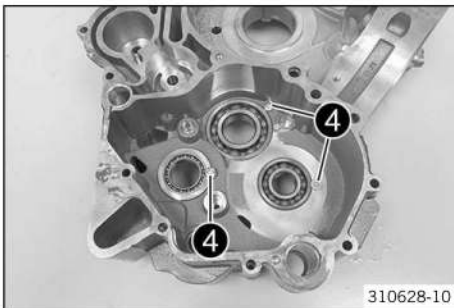
18.8.1 Working on the right section of the engine case



- Remove studs ①.



- Remove oil nozzle ②.
- Remove oil nozzles ③.



- Remove bearing retainers ④.
- Remove dowels.
- Remove any remnants of sealing compound and clean the section of the engine case thoroughly.
- Warm the section of the engine case in an oven.

Guideline

130 °C (266 °F)

- Knock the section of the engine case against a level wooden board. This will cause the bearings to drop out of the bearing seats.



Info

Any bearings that remain in the section of the engine case must be removed using a suitable tool.

- Warm the section of the engine case again.

Guideline

130 °C (266 °F)

- Insert the new cold bearings into the bearing seats of the hot section of the engine case and, if necessary, use a suitable press drift to push the bearings from the inside to the outside, all the way to the stop or so it is flush.



Info

When pressing in, ensure that the section of the engine case lies flat in order prevent damage.

Only press the bearings in using the outer bearing race; otherwise, the bearings will be damaged when they are pressed in.

- After the section of the engine case has cooled, check that the bearings are firmly seated.

i Info

If the bearings are not firmly seated after cooling, it is likely that they will rotate in the engine case when warm. In this case, the engine case must be renewed.

- Mount and tighten bearing retainers ④.

Guideline

Screw, bearing retainer	M5	6 Nm (4.4 lbf ft) Loctite®243™
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- Mount and tighten oil nozzle ②.

Guideline

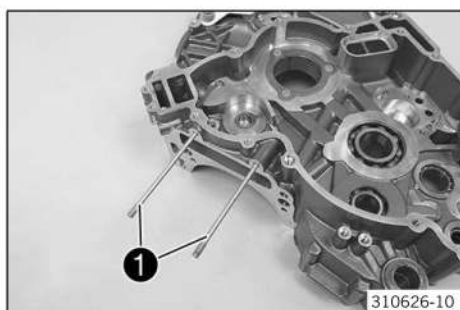
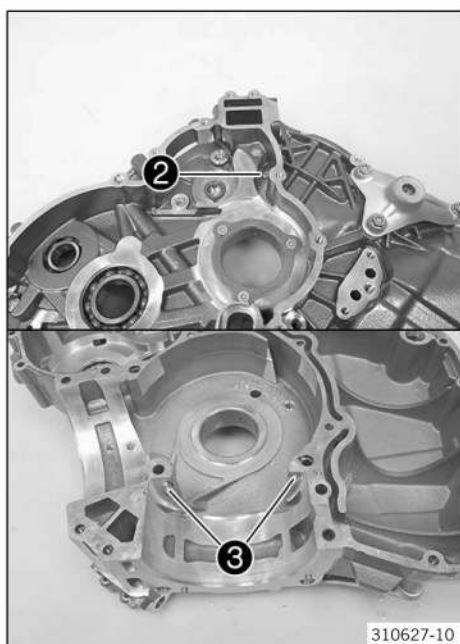
Nozzle 100	M6x0.75	4 Nm (3 lbf ft) Loctite®243™
------------	---------	--

- Mount and tighten oil nozzles ③.

Guideline

Oil nozzle	M5	2 Nm (1.5 lbf ft) Loctite®243™
------------	----	--

- Mount the dowels.



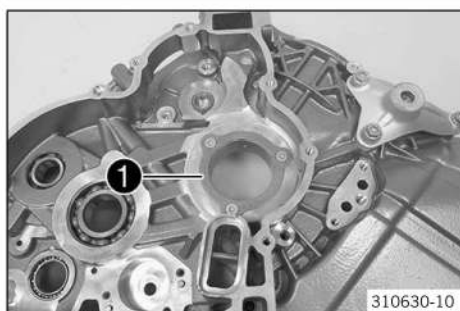
- Mount studs ①.

Guideline

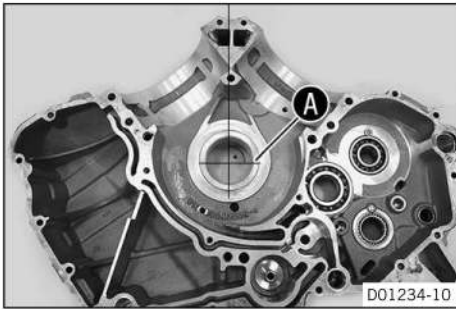
Stud, timing chain shaft	M6	8 Nm (5.9 lbf ft)
--------------------------	----	-------------------

- Blow compressed air through all oil channels and check that they are clear.

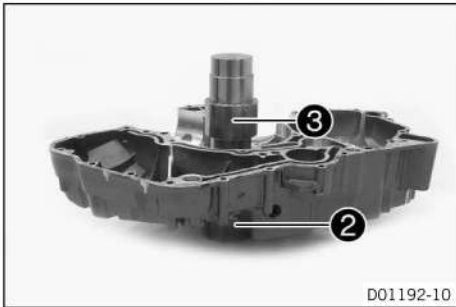
18.8.2 Removing the right main bearing



- Remove the screws and take off bearing shell bracket ①.

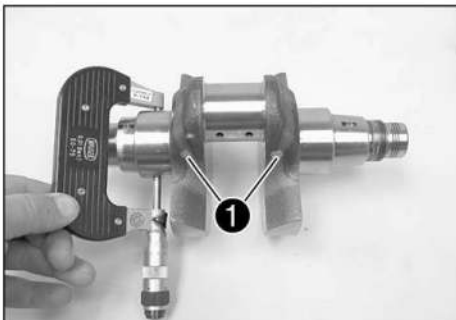


- Mark face **A** of the main bearing shells as shown in the figure.



- Place the engine case section on special tool **2**.
Pressing tool (61229045000) (📖 p. 420)
- Place special tool **3** with the smaller diameter on the bearing shells and press from the inside to the outside.
Pressing tool (61229044000) (📖 p. 420)

18.8.3 Selecting the main bearing shells



New crankshaft

- Select the new bearing shells according to color marking **1**.



Info

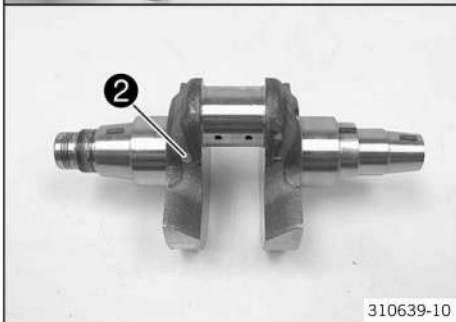
Color marking **2** refers to the conrod bearing.

Used crankshaft

- Measure both pivot points and select the new bearing shells accordingly.

Guideline

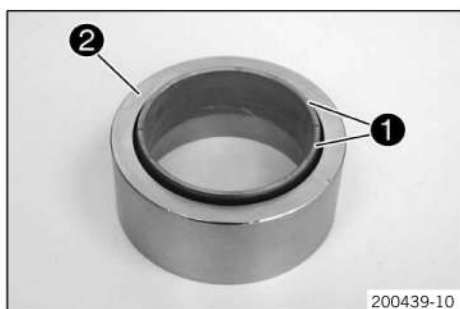
Crankshaft - main bearing diameter	
Yellow	52.965 ... 52.975 mm (2.08523 ... 2.08563 in)
Blue	52.976 ... 52.985 mm (2.08567 ... 2.08602 in)
Red	52.986 ... 52.995 mm (2.08606 ... 2.08641 in)



18.8.4 Installing the right main bearing

Preparatory work

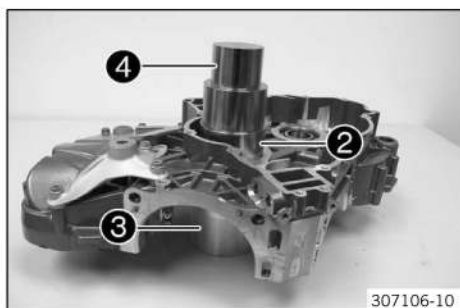
- Select the main bearing shells. (📖 p. 233)



Main work

- Center the new main bearing shells **1** using special tool **2**.

Pressing tool (61229044000) (📖 p. 420)

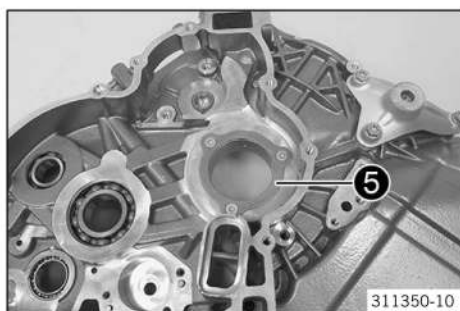


- Place the inside of the engine case section on special tool **3**.

Pressing tool (61229045000) (📖 p. 420)

- Align the face of the new bearing shell with the marking made when it was disassembled.
- Press the bearing shells with the stepped side of special tool **4** through press sleeve **2** from the outside to the inside, all the way to the stop.

Pressing tool (61229044000) (📖 p. 420)

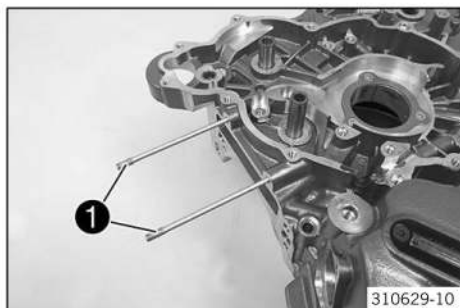


- Position bearing shell bracket **5**. Mount and tighten the screws.

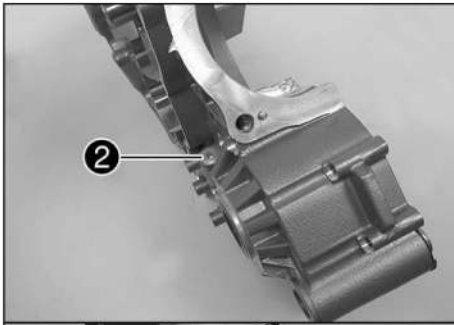
Guideline

Screw, bearing retainer	M5	6 Nm (4.4 lbf ft) Loctite®243™
-------------------------	----	--

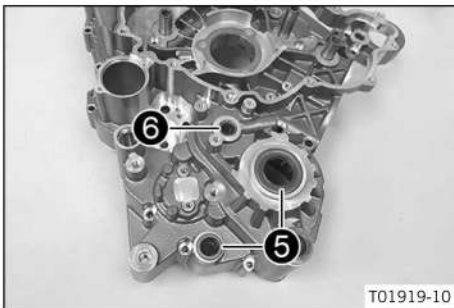
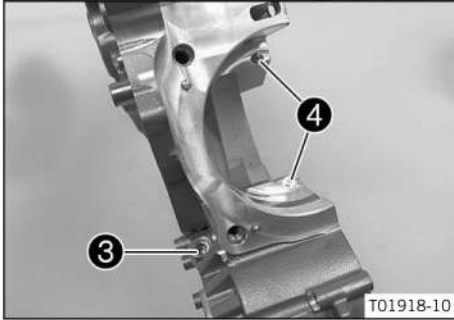
18.8.5 Working on the left section of the engine case



- Remove studs **1**.



- Remove screw ② with the O-ring.
- Remove oil nozzle ③.
- Remove oil nozzles ④.



- Remove shaft seal rings ⑤.
- Remove shaft seal ring ⑥ of the clutch push rod.
- Remove any remnants of sealing compound and clean the section of the engine case thoroughly.
- Warm the section of the engine case in an oven.

Guideline

130 °C (266 °F)

- Knock the section of the engine case against a level wooden board. This will cause the bearings to drop out of the bearing seats.



Info

Any bearings that remain in the section of the engine case must be removed using a suitable tool.

- Warm the section of the engine case again.

Guideline

130 °C (266 °F)

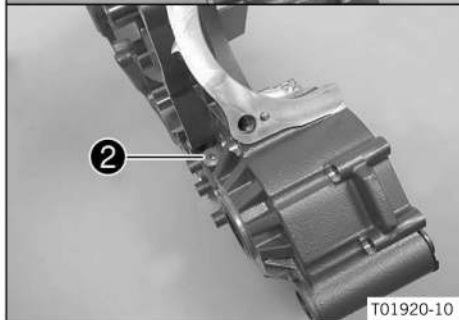
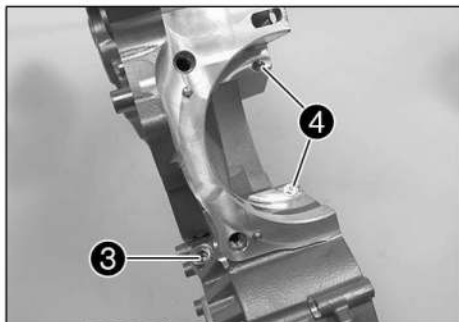
- Insert the new cold bearings into the bearing seats of the hot section of the engine case and, if necessary, use a suitable press drift to push the bearings from the inside to the outside, all the way to the stop or so it is flush.



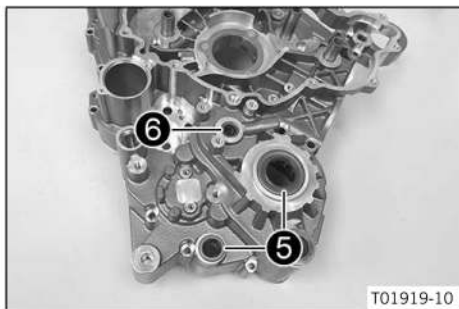
Info

When pressing in, ensure that the section of the engine case lies flat in order prevent damage. Only press the bearings in using the outer bearing race; otherwise, the bearings will be damaged when they are pressed in.

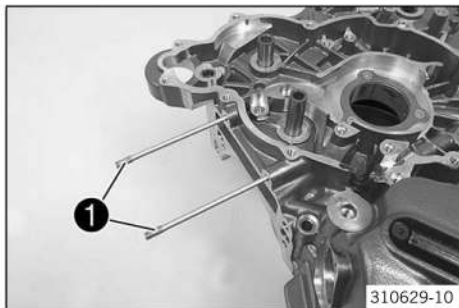
- After the section of the engine case has cooled, check that the bearings are firmly seated.



T01920-10



T01919-10



310629-10

i Info

If the bearings are not firmly seated after cooling, it is likely that they will rotate in the engine case when warm. In this case, the engine case must be renewed.

- Mount oil nozzles **4**.

Guideline

Oil nozzle	M5	2 Nm (1.5 lbf ft) Loctite®243™
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- Mount oil nozzle **3**.

Guideline

Oil nozzle for clutch lubrication	M6x0.75	4 Nm (3 lbf ft)
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- Mount screw **2** with the O-ring and tighten.

Guideline

Plug, clutch lubrication	M10x1	10 Nm (7.4 lbf ft)
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- Press in shaft seal rings **5** until they are flush.
- Press in the shaft seal ring of clutch push rod **6**.

Pressing tool (61229013000) (📖 p. 418)

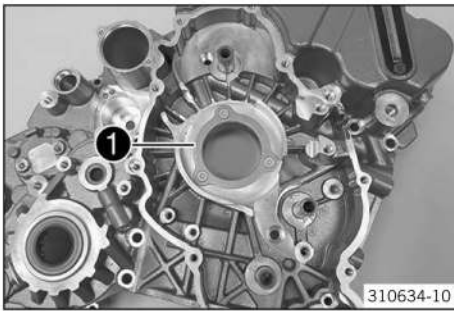
- Mount studs **1**.

Guideline

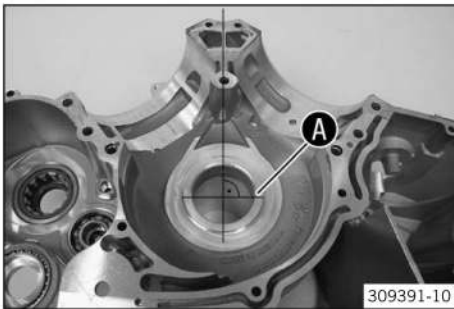
Stud, timing chain shaft	M6	8 Nm (5.9 lbf ft)
--------------------------	----	-------------------

- Blow compressed air through all oil channels and check that they are clear.

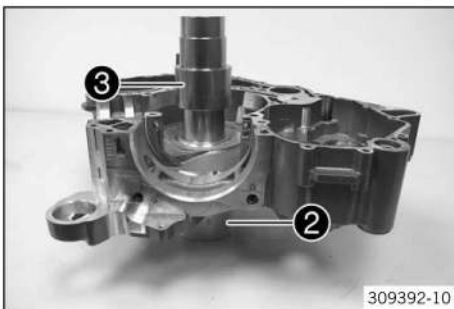
18.8.6 Removing the left main bearing



- Remove the screws and take off bearing shell bracket **1**.



- Mark joint **A** of the main bearing shells as shown in the figure.



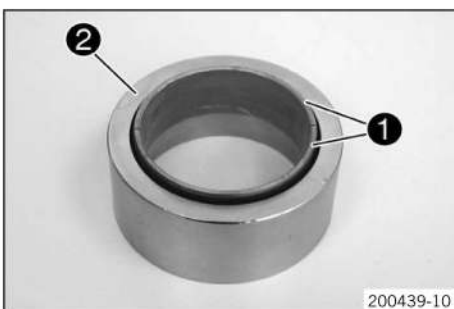
- Place the engine case section on special tool **2**.

Pressing tool (61229045000) (📖 p. 420)

- Place special tool **3** with the smaller diameter on the bearing shells and press from the inside to the outside.

Pressing tool (61229044000) (📖 p. 420)

18.8.7 Installing the left main bearing



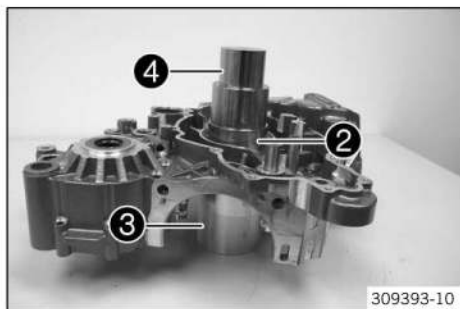
Preparatory work

- Select the main bearing shells. (📖 p. 233)

Main work

- Center the new main bearing shells **1** using special tool **2**.

Pressing tool (61229044000) (📖 p. 420)

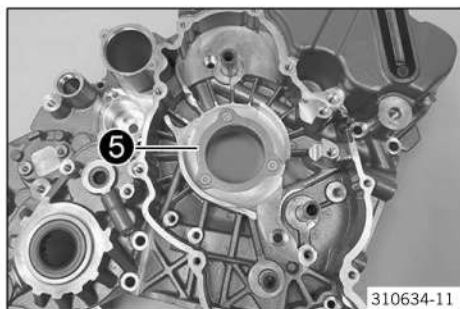


- Place the inside of the engine case section on special tool ③.

Pressing tool (61229045000) (📖 p. 420)

- Align the face of the new bearing shell with the marking made when it was disassembled.
- Press the bearing shells with the stepped side of special tool ④ through press sleeve ② from the outside to the inside, all the way to the stop.

Pressing tool (61229044000) (📖 p. 420)



- Position bearing shell bracket ⑤. Mount and tighten the screws.

Guideline

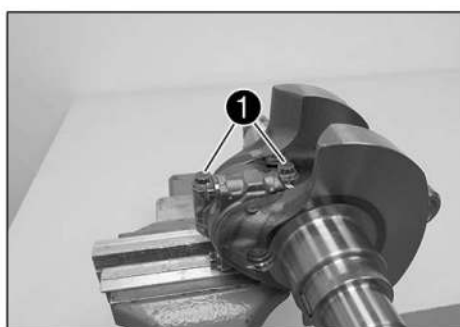
Screw, bearing retainer	M5	6 Nm (4.4 lbf ft) Loctite®243™
-------------------------	----	--

18.8.8 Changing the conrod bearing



Info

Perform this step on both connecting rods.



- Clamp each connecting rod individually.

Guideline

Use soft jaws.

- Remove screws ①.

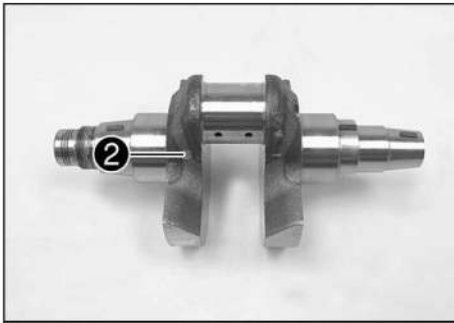
Multi-tooth wrench socket (60029075000) (📖 p. 416)

- Take off the bearing cap and connecting rod. Remove the bearing shells.



Info

Mark the conrod bearing cover and connecting rod to ensure that each conrod bearing cover is mounted on the same connecting rod.



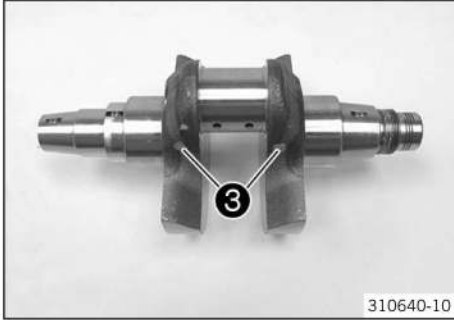
New crankshaft

- Select the new bearing shells according to color coding ②.



Info

Color coding ③ refers to the crankshaft bearing.



310640-10



310637-10

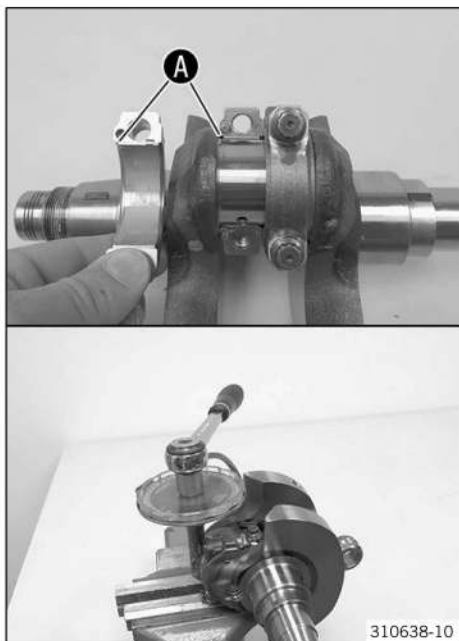
Used crankshaft

- Measure the crank pin diameter and select the new bearing shells accordingly.

Guideline

Crankshaft - crank pin diameter	
Yellow	41.978 ... 41.989 mm (1.65267 ... 1.65311 in)
Blue	41.990 ... 42.000 mm (1.65315 ... 1.65354 in)
Red	42.001 ... 42.011 mm (1.65358 ... 1.65397 in)

- Check the radial clearance of the bottom connecting rod bearing. (📖 p. 242)



- Oil the bearing shells.
- Position the conrod bearing cover according to the markings made during disassembly. Mount the new connecting rod screws and tighten them using the special tool.

Guideline

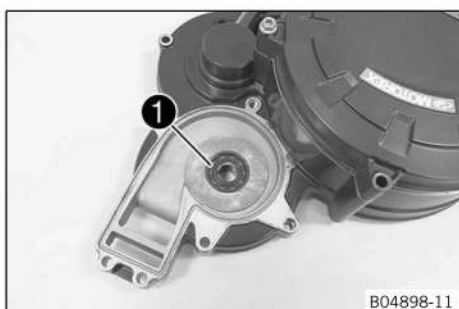
Screw, conrod bearing	M10x1	Step 1 25 Nm (18.4 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 90°
-----------------------	-------	---

Multi-tooth wrench socket (60029075000) (📖 p. 416)

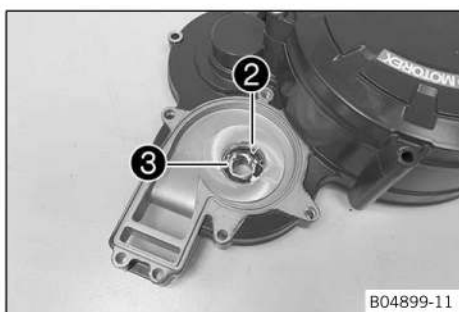
Angle disc (60029010000) (📖 p. 414)

i Info
The conrod bearing shells are positioned laterally offset in the connecting rod to make space for radius **A** of the crank shaft. If mounted in reverse, the bearing shells push on the radius and the connecting rods block.

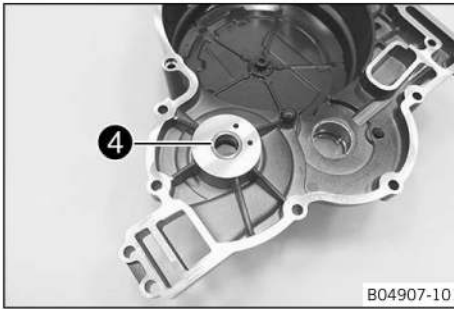
18.8.9 Working on the clutch cover



- Remove outer shaft seal ring **1**.



- Remove lock ring **2**.
- Remove the inner shaft seal ring **3**.

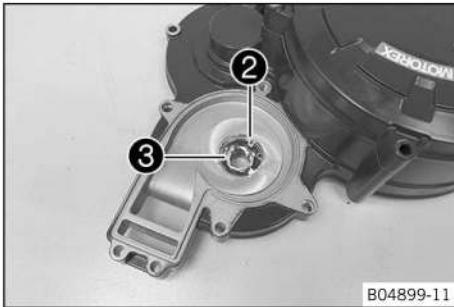


- Remove bearing bush 4.

Bearing puller (15112017000) (p. 411)

Internal bearing puller (15112018100) (p. 412)

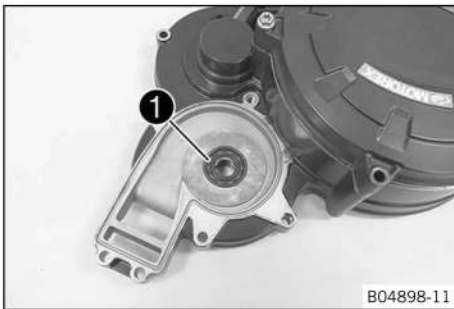
- Press in the new bearing bush until it is flush using a suitable press drift.
- Change the support bearing of the crankshaft. (p. 241)



- Grease inner shaft seal ring 3 and press in with the closed side to the bearing bush as far as it will go.

Long-life grease (p. 408)

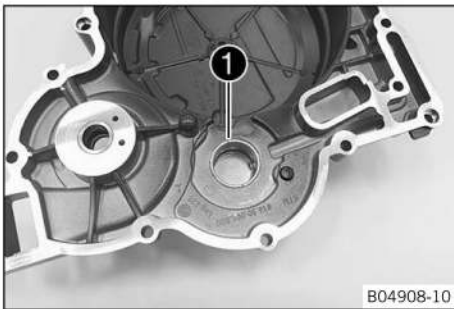
- Mount lock ring 2.



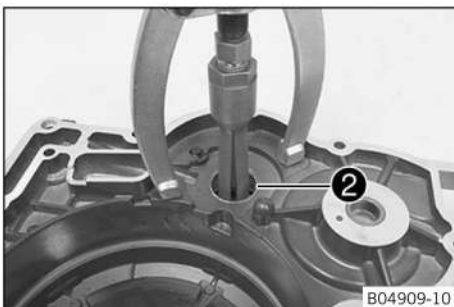
- Grease outer shaft seal ring 1 and press in with the open side flush and facing outwards.

Long-life grease (p. 408)

18.8.10 Changing the support bearing of the crankshaft



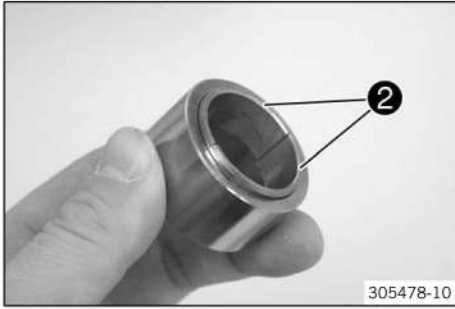
- Mark the position of bearing joint 1.



- Pull out support bearing shells 2 with the special tool.

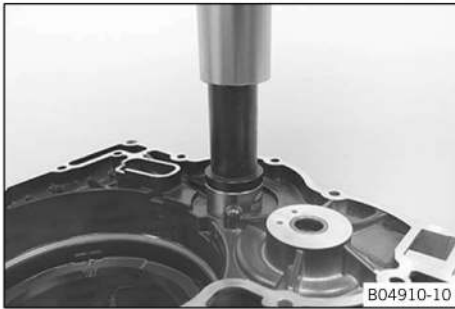
Bearing puller (15112017000) (p. 411)

Internal bearing puller (60029018000) (p. 415)



- Center the new support bearing shells **2** with the special tool.

Pressing tool (60029046128) (📄 p. 415)



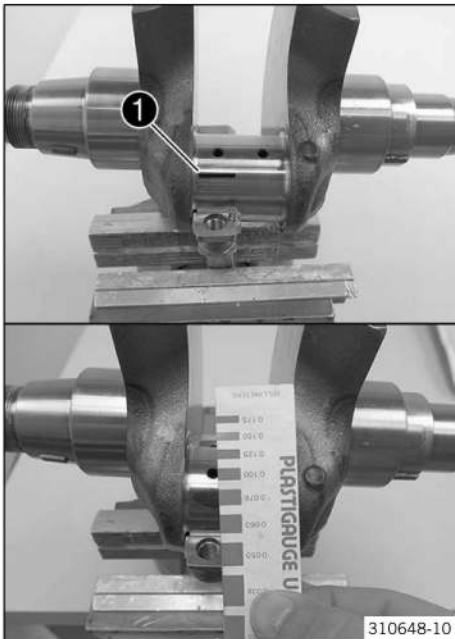
- Support the clutch cover directly under the support bearing. Press in the support bearing shells using the special tool until they are flush.

Pressing tool (60029046128) (📄 p. 415)

18.8.11 Checking the radial clearance of the bottom connecting rod bearing

i Info

Perform the operation on both connecting rods.



- Position the bearing shells. Insert the **Plastigauge** measuring strips **1** offset by 90° from the bearing joint.

Plastigauge clearance gauge (60029012000) (📄 p. 414)

- Position the connecting rod bearing cap. Mount and tighten the screws.

Guideline

Screw, conrod bearing	M10x1	Step 1 25 Nm (18.4 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 90°
-----------------------	-------	---

i Info

Do not twist the connecting rod.

- Remove the connecting rod bearing cap again. Compare the **Plastigauge** measuring strip with the specifications on the packaging.

Guideline

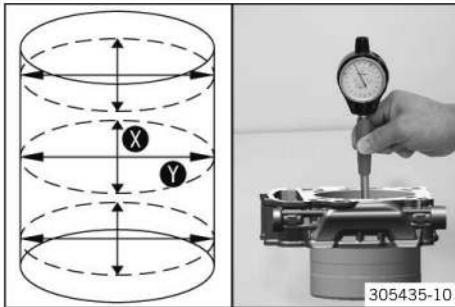
Connecting rod - radial clearance of lower conrod bearing	
New condition	0.030 ... 0.060 mm (0.00118 ... 0.00236 in)
Wear limit	0.080 mm (0.00315 in)

i Info
The width of the **Plastigauge** measuring strips indicates the bearing play.

- Clean the parts.



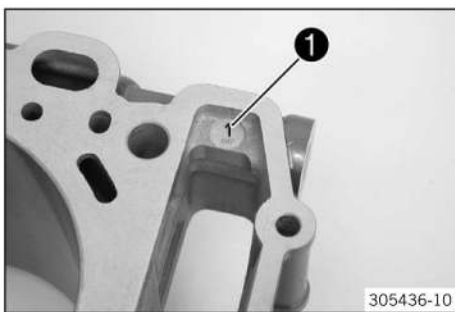
18.8.12 Checking/measuring the cylinder



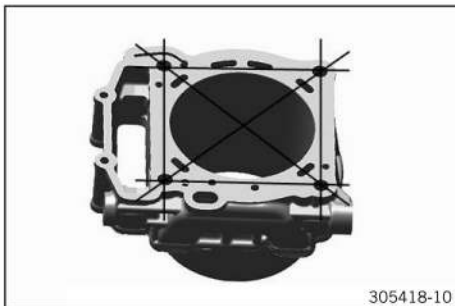
- Check the cylinder bearing surface for damage.
 - » If the cylinder bearing surface is damaged:
 - Change the cylinder and piston.
- Measure the bore diameter at several locations of the contact surface on the **X**- and **Y**-axes using a micrometer to identify oval wear.

Guideline

Cylinder - bore diameter	
Size I	103.000 ... 103.012 mm (4.05511 ... 4.05558 in)
Size II	103.012 ... 103.025 mm (4.05558 ... 4.05609 in)



- The cylinder size **1** is marked on the side of the cylinder.



- Using a straightedge and the special tool, check the sealing surface of the cylinder head for distortion.

Feeler gauge (59029041100) (📖 p. 414)

Cylinder/cylinder head - sealing area distortion	≤ 0.05 mm (≤ 0.002 in)
--	------------------------

- » If the measured value does not meet specifications:
 - Change the cylinder.



18.8.13 Checking/measuring the piston

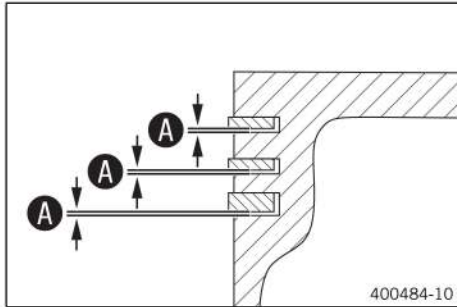


- Check the piston bearing surface for damage.
 - » If the piston bearing surface is damaged:
 - Change the piston and, if necessary, the cylinder.
- Check that the piston rings can move easily in the piston ring grooves.
 - » If the piston ring is stiff:
 - Clean the piston ring groove.

i 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.

i Info
Mount the piston ring with the marking facing upward.



- Use the special tool to measure clearance **A** of the piston rings in the piston ring groove.

Guideline

Piston ring - groove clearance	
First ring (rectangular ring)	≤ 0.08 mm (≤ 0.0031 in)
Second ring (lower compression ring)	≤ 0.08 mm (≤ 0.0031 in)
Oil scraper ring	≤ 0.06 mm (≤ 0.0024 in)

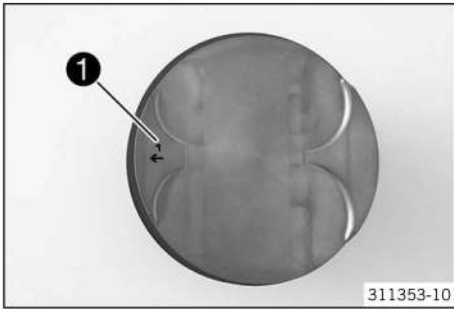
Feeler gauge (59029041100) (📖 p. 414)

- » If clearance **A** is larger than the specified value:
 - Change the piston and piston rings.
 - Check/measure the cylinder. (📖 p. 243)
- 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 **B**.

Guideline

Piston - diameter	
Size I	102.940 ... 102.950 mm (4.05275 ... 4.05314 in)
Size II	102.950 ... 102.960 mm (4.05314 ... 4.05354 in)
Distance B	6 mm (0.24 in)

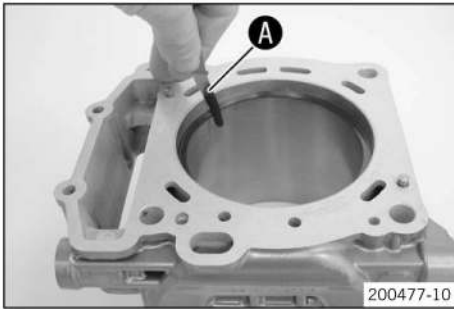




- Piston size **1** is marked on the piston head.



18.8.14 Checking the piston ring end gap



- Remove the piston ring from the piston.
- Place the piston ring in the cylinder and align it with the piston.

Guideline

Under the upper edge of the cylinder	10 mm (0.39 in)
--------------------------------------	-----------------

- Measure the end gap with special tool **A**.

Guideline

Piston ring end gap	
First ring (rectangular ring)	≤ 0.50 mm (≤ 0.0197 in)
Second ring (lower compression ring)	≤ 0.60 mm (≤ 0.0236 in)
Oil scraper ring	≤ 0.60 mm (≤ 0.0236 in)

Feeler gauge (59029041100) (📖 p. 414)

- » If the end gap is greater than the specified value:
 - Check/measure the cylinder. (📖 p. 243)
- » If the cylinder wear is within the tolerance range:
 - Change the piston ring.
- Mount the piston ring with the marking facing toward the piston head.



18.8.15 Checking the piston/cylinder mounting clearance



- Check/measure the cylinder. (📖 p. 243)
- Check/measure the piston. (📖 p. 243)
- 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.

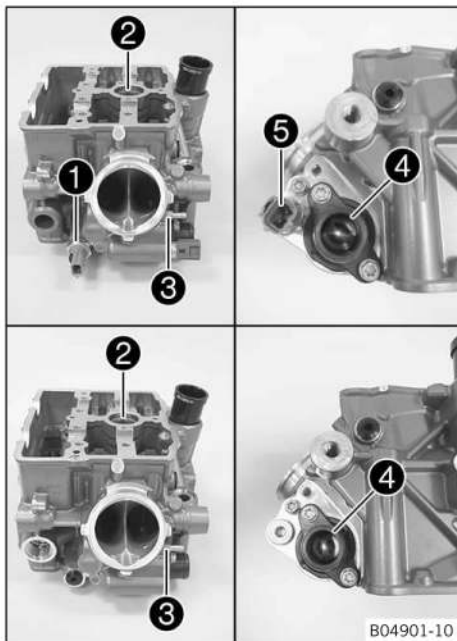
Guideline

Piston/cylinder - mounting clearance	
Size I	0.050 ... 0.072 mm (0.00197 ... 0.00283 in)
Size II	0.052 ... 0.075 mm (0.00205 ... 0.00295 in)
Wear limit	0.1 mm (0.004 in)

18.8.16 Working on the cylinder head

i Info

The following work steps apply to both cylinder heads.



- Remove oil pressure sensor **1** with O-ring.

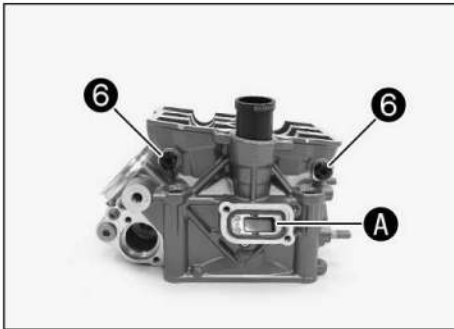
i Info

This only applies to the front cylinder head!

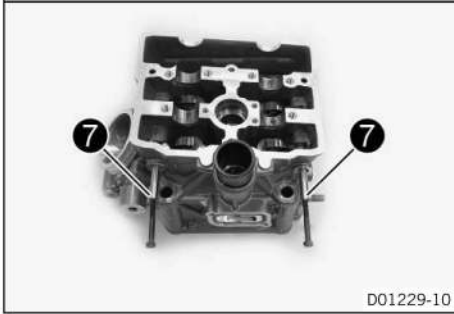
- Remove O-rings **2**.
- Remove vacuum connections **3**.
- Remove screws.
- Remove thermostat case **4** and the thermostat.
- Remove coolant temperature sensor **5** with O-ring.

i Info

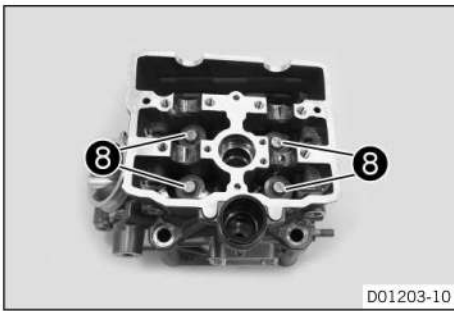
This only applies to the front cylinder head!



- Remove SAS membrane **A**.
- Remove screw plugs **6** with the O-ring.
- Pull out cam lever shafts **7** with a suitable screw M5 and remove the cam lever.

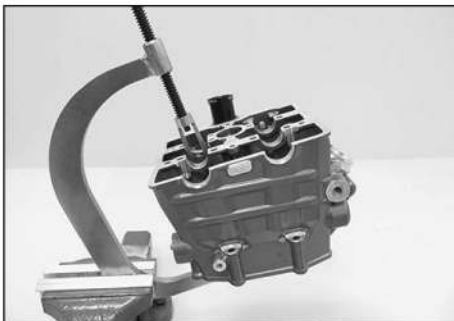


D01229-10



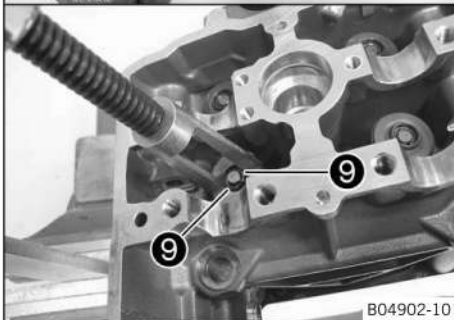
D01203-10

- Remove shims **8** and label according to their normal built-in position.



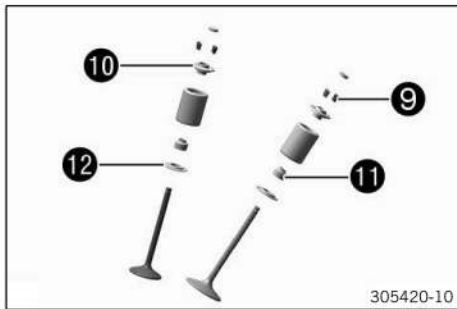
- Tension the valve spring with a special tool.

Valve spring mounter (59029019000) (📖 p. 413)
Insert for valve spring lever (78029060000) (📖 p. 424)



B04902-10

- Remove valve keys **9** and release tension on the valve spring.



- Remove valve spring retainer **10**, valve spring, valve stem seals **11** and valve spring seats **12**.



Info

Place the valves in a box according to their normal built-in position and label them.

- Check the cylinder head. (📖 p. 250)
- Mount valve spring seats **12** and new valve stem seals **11**.
- Mount valve spring and valve spring retainer **10**.
 ✓ The tight winding of the valve spring is at the bottom.
- Tension the valve spring with a special tool.

Valve spring mouter (59029019000) (📖 p. 413)

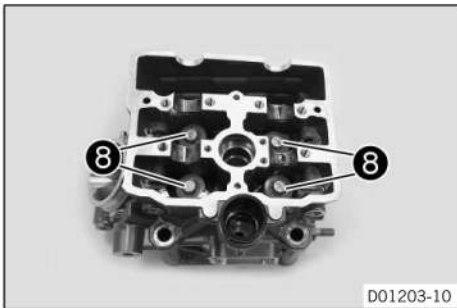
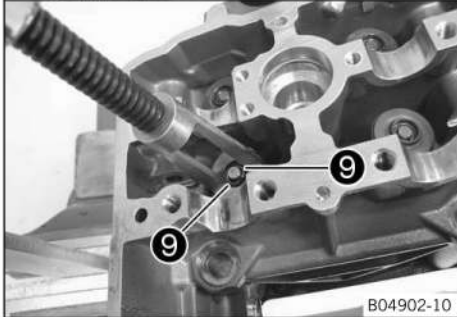
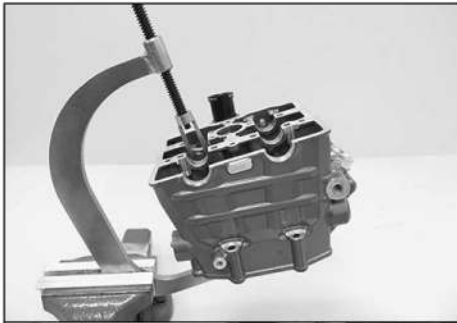
Insert for valve spring lever (78029060000) (📖 p. 424)

- Mount valve keys **9**. Release the tension on the valve spring.

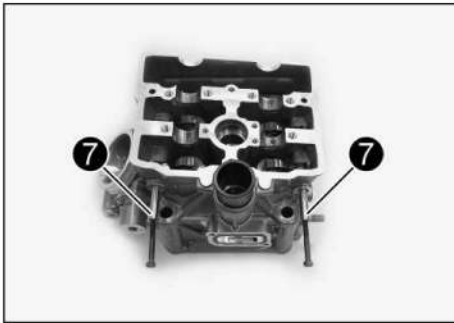


Info

When mounting the valve keys, check that they are seated correctly; preferably, fix the valve keys to the valve with a little grease.



- Place shims **8** into the valve spring retainer according to their normal built-in position.

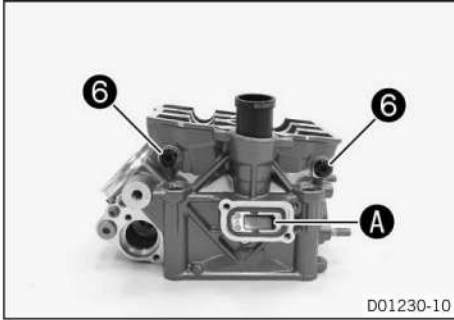


- Position the cam lever and mount cam lever shafts **7**.
- Mount screw plugs **6** with new O-rings.

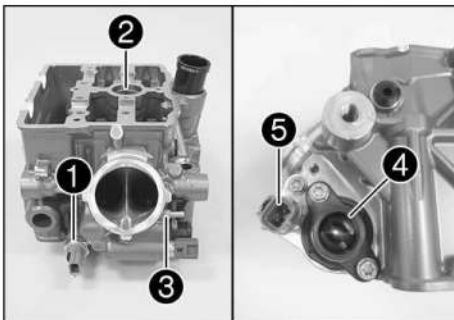
Guideline

Plug, cam lever axis	M10x1	15 Nm (11.1 lbf ft)
----------------------	-------	---------------------

- Mount SAS membrane **A**.
 ✓ The SAS membrane is positioned flush in the cylinder.



D01230-10



- Mount coolant temperature sensor **5** with new O-ring.

Guideline

Coolant temperature sensor	M12x1.5	12 Nm (8.9 lbf ft)
----------------------------	---------	--------------------

i Info
 This only applies to the front cylinder head!

- Mount thermostats and thermostat case **4**.
- Mount and tighten the screws.

Guideline

Screw, thermostat case	M6	10 Nm (7.4 lbf ft) Loctite®243™
------------------------	----	---

- Mount vacuum connections **3**.

Guideline

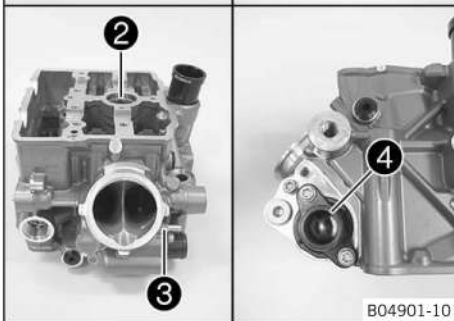
Vacuum connection	M6	5 Nm (3.7 lbf ft)
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- Mount and grease O-rings **2**.
- Mount oil pressure sensor **1** with new O-ring.

Guideline

Oil pressure sensor	M10x1	10 Nm (7.4 lbf ft)
---------------------	-------	--------------------

i Info
 This only applies to the front cylinder head!



B04901-10

18.8.17 Checking the cylinder head



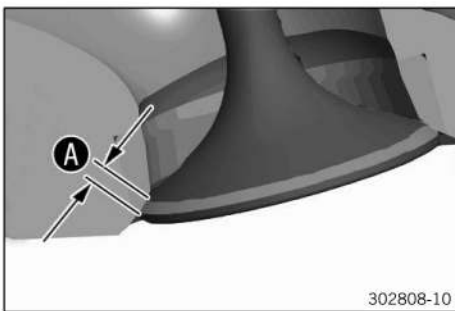
- Check the sealing surface of the spark plug thread and the valve seats for damage and cracking.
 - » If there is damage or cracking:
 - Change the cylinder head.
- Check the valve guides using the special tool.

Limit plug gauge (59029026006) (📖 p. 413)

Valve guide - diameter

New condition	6.004 ... 6.016 mm (0.23638 ... 0.23685 in)
Wear limit	6.150 mm (0.24213 in)

- » If the special tool is easy to insert into the valve guide:
 - Change the valve guide and valve.

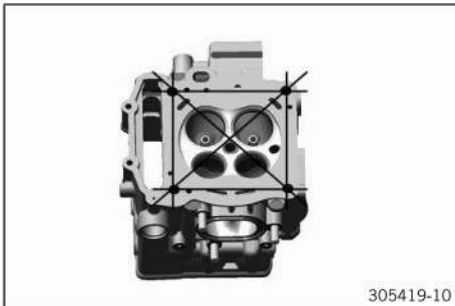


- Check sealing seat **A** of the valves.

Valve - sealing seat width

Intake: New condition	0.90 mm (0.0354 in)
Intake: Wear limit	1.5 mm (0.059 in)
Exhaust: New condition	1.0 mm (0.039 in)
Exhaust: Wear limit	2.0 mm (0.079 in)

- » If the measured value does not meet specifications:
 - Machine the valve seat.



- Check the sealing surface of the cylinder for distortion using a straightedge and the special tool.

Feeler gauge (59029041100) (📖 p. 414)

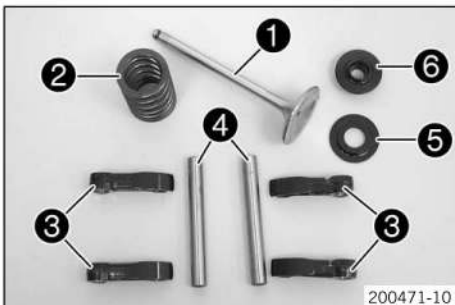
Cylinder/cylinder head - sealing area distortion	≤ 0.05 mm (≤ 0.002 in)
--	------------------------

- » If the measured value does not meet specifications:
 - Change the cylinder head.

- Check the pivot points of the camshafts in the cylinder head and in the camshaft bearing bridge for damage and wear.

» If there is damage or wear:

- Change the cylinder head with the camshaft bearing support.



- Check valve **1** for damage and wear.

» If there is damage or wear:

- Change the valve.

- Check the valve for run-out.

Valve - run-out

At the valve stem: New condition	≤ 0.05 mm (≤ 0.002 in)
On the valve plate: New condition	≤ 0.1 mm (≤ 0.004 in)
On the valve plate: Wear limit	≤ 0.18 mm (≤ 0.0071 in)

- » If the measured value does not meet specifications:
 - Change the valve.
- Check the valve stem diameter.

Valve - valve stem diameter	
Exhaust	5.890 ... 5.970 mm (0.23189 ... 0.23504 in)
Intake	5.890 ... 5.980 mm (0.23189 ... 0.23543 in)

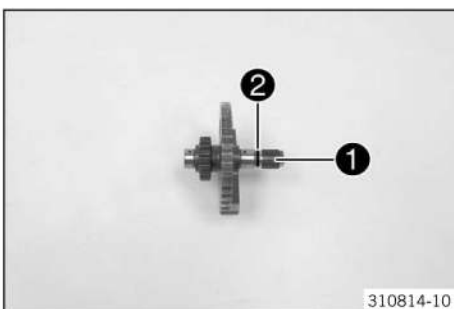
- » If the measured value does not meet specifications:
 - Change the valve.
- Check valve spring ② for damage and wear.
 - » If there is damage or wear:
 - Change the valve spring.
- Measure the length of the valve springs.

Valve spring - length	
New condition	42.70 mm (1.6811 in)
Wear limit	41.8 mm (1.646 in)

- » If the measured value does not meet specifications:
 - Change the valve springs.
- Check cam lever ③ for damage and wear.
 - » If there is damage or wear:
 - Change the cam lever.
- Check cam lever shaft ④ for damage and wear.
 - » If there is damage or wear:
 - Change the cam lever shaft.
- Check valve spring seat ⑤ for damage and wear.
 - » If there is damage or wear:
 - Change the valve spring seat.
- Check valve spring retainer ⑥ for damage and wear.
 - » If there is damage or wear:
 - Change the valve spring retainer.



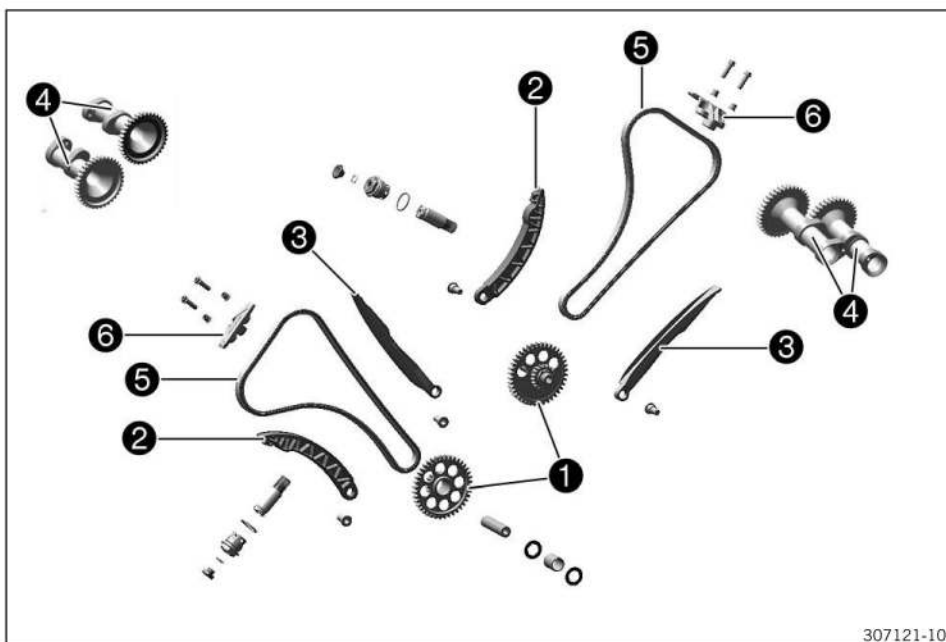
18.8.18 Working on the right intermediate gear



- Remove bushing ①.
- Remove O-ring ②.
- Mount new O-ring ②.
- Mount the new bushing ①.



18.8.19 Checking the timing assembly



307121-10

- Clean all parts well.
- Check intermediate gear **1** for damage and wear.
 - » If there is damage or wear:
 - Change the intermediate gear.
- Check timing chain tensing rail **2** for damage and wear.
 - » If there is damage or wear:
 - Replace the timing chain tensing rail.
- Check timing chain guide rail **3** for damage and wear.
 - » If there is damage or wear:
 - Replace the timing chain guide rail.
- Check camshaft **4** for damage and wear.
 - » If there is damage or wear:
 - Change the camshaft.
 - If the surface of the cams is damaged, check the oil supply to the camshaft and cam lever.
- Check timing chain **5** for damage and wear.
 - » If there is damage or wear:
 - Change the timing chain.
- Check the timing chain links for smooth operation. Let the timing chain hang down freely.
 - » The chain links no longer align in a straight line:
 - Change the timing chain.
- Check guide rail **6** for damage and wear.
 - » If there is damage or wear:
 - Change the guide rail.

18.8.20 Preparing the timing chain tensioner for installation



- Fully compress the timing chain tensioner.

i 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.



- Place two compensating disks or similar aids next to the timing chain tensioner piston. This should ensure that when pushed down, the piston does not fully withdraw.

Guideline

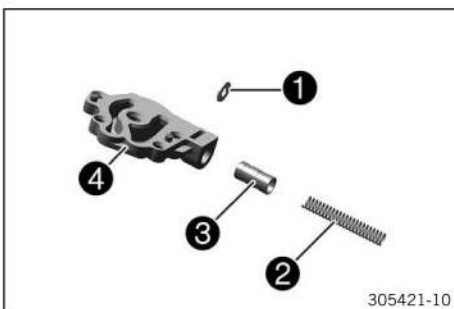
Thickness of the compensating disks	2 ... 2.5 mm (0.08 ... 0.098 in)
-------------------------------------	----------------------------------

- Release the timing chain tensioner.
 - ✓ The latching system locks and the piston stops moving.

End position of piston after latching	3 mm (0.12 in)
---------------------------------------	----------------

i Info
This position is necessary for installation. If the timing chain tensioner is now pressed in once more (while it is installed) and then pulled out no more than halfway (preventing it from coming out fully), the latching system locks and the timing chain tensioner can no longer be compacted; this function is necessary to ensure sufficient tension of the timing chain, even at low oil pressure.

18.8.21 Checking the oil pressure control valve



- Remove supporting plate **1** and spring **2**.
- Measure the length of spring **2**.

Oil pressure regulator valve - minimum length spring	39 mm (1.54 in)
--	-----------------

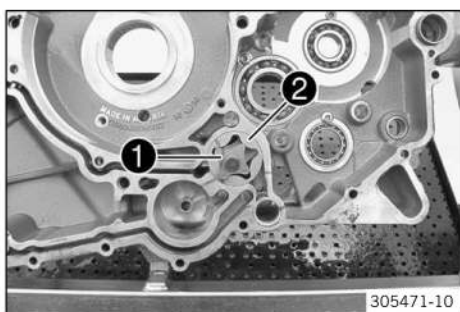
- » If the measured length is less than the specified value:
 - Change the spring.
- Check control piston **3** for damage and wear.
 - » If there is damage or wear:
 - Change the control piston.
- Check the control piston bore in oil pump cover **4** for damage and wear.
 - » If there is damage or wear:
 - Change the oil pump cover.

- Thoroughly oil control piston **3** and spring **2** and mount them.
- Mount supporting plate **1**.

18.8.22 Checking the lubrication system

i Info

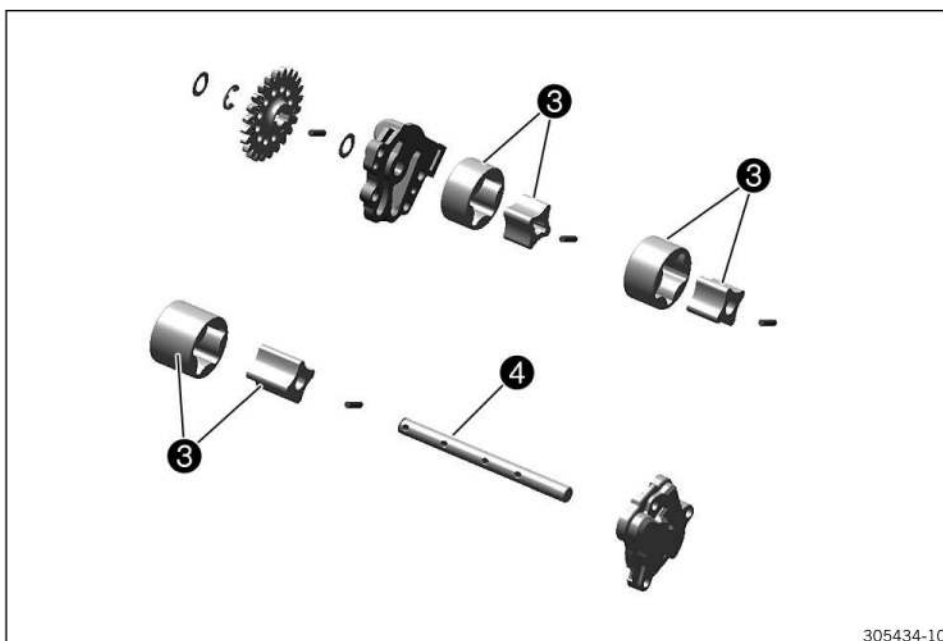
The following operations apply to all three oil pumps.



- Check the clearance between internal rotor **1** and external rotor **2** and between the external rotor and the engine case.

Oil pumps	
Clearance between external rotor and engine case	0.20 ... 0.40 mm (0.0079 ... 0.0157 in)
Clearance between external rotor and internal rotor	0.10 ... 0.25 mm (0.0039 ... 0.0098 in)
Axial clearance	0.04 ... 0.25 mm (0.0016 ... 0.0098 in)

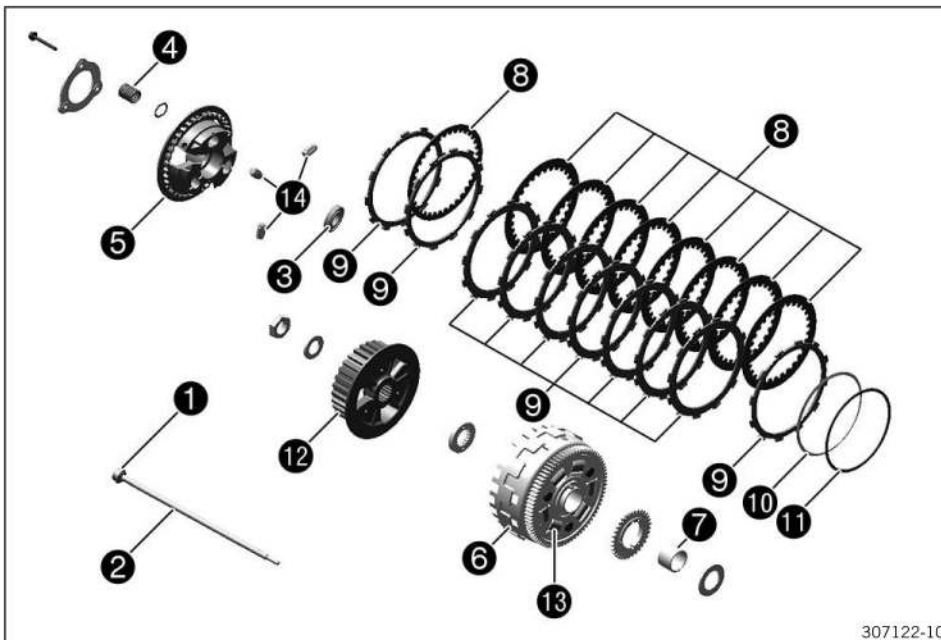
- » If the clearance exceeds the specifications:
 - Change the oil pump and, if necessary, the engine case.



- Check the internal rotor and external rotor of oil pumps **3** for damage and wear.
 - » If there is damage or wear:
 - Change the oil pumps.
- Check oil pump shaft **4** for damage and wear.
 - » If there is damage or wear:
 - Change the oil pump shaft.
- Check the oil pump cover for damage and wear.

- » If there is damage or wear:
 - Change the oil pump cover.

18.8.23 Checking the clutch



307122-10

- Check clutch throw-out **1** for damage and wear.
 - » If there is damage or wear:
 - Change the clutch push rod.
- Place the clutch push rod **2** on a flat surface and check for run-out.
 - » If there is run-out:
 - Change the clutch push rod.
- Check axial bearing **3** for damage and wear.
 - » If there is damage or wear:
 - Change the axial bearing.
- Check the length of clutch springs **4**.

Clutch spring - length	≥ 45.8 mm (≥ 1.803 in)
------------------------	------------------------

- » If the clutch spring length is shorter than specified:
 - Change all clutch springs.
- Check the contact surface of clutch pressure cap **5** for damage and wear.
 - » If there is damage or wear:
 - Change the clutch pressure cap.
- Check the thrust surfaces of the clutch facing discs in clutch basket **6** for wear.

Clutch basket - thrust surface of clutch facing discs	
Wear limit	0.5 mm (0.02 in)

- » If the thrust surface exhibits excessive wear:
 - Change the clutch disc pack and the clutch basket.
- Check needle bearing **7** for damage and wear.
 - » If there is damage or wear:
 - Change the needle bearing.

- Check intermediate clutch discs **8** for damage and wear.
 - » If the intermediate clutch discs are not level and are pitted:
 - Change the clutch disc pack.
- Check clutch facing discs **9** for discoloration and scoring.
 - » If there is discoloration or scoring:
 - Change the clutch disc pack.
- Check the thickness of the clutch disc pack.

Clutch disc pack - thickness	
New condition	47.20 ... 48.00 mm (1.8583 ... 1.8898 in)
Wear limit	46.00 mm (1.811 in)

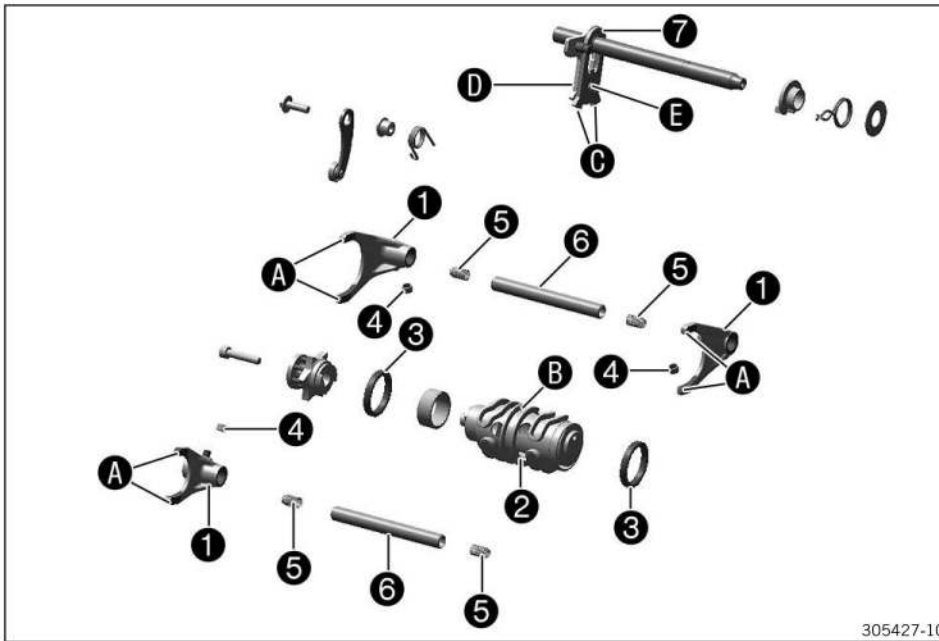
- » If the clutch disc pack does not meet specifications:
 - Change the clutch disc pack.
- Check pretension ring **10** and support ring **11** for damage and wear.
 - » If there is damage or wear:
 - Change the pretension ring and support ring.
- Check inner clutch hub **12** for damage and wear.
 - » If there is damage or wear:
 - Change the inner clutch hub.
- Check springs **13** of the clutch basket for damage and wear.
 - » If there is damage, wear or play in the direction of rotation:
 - Change the clutch basket.
- Check damper **14** for damage and wear.

i **Info**

If the clutch pressure cap can be mounted without resistance from the damper, the dampers are too hard and are worn out.

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

18.8.24 Checking the shift mechanism



305427-10

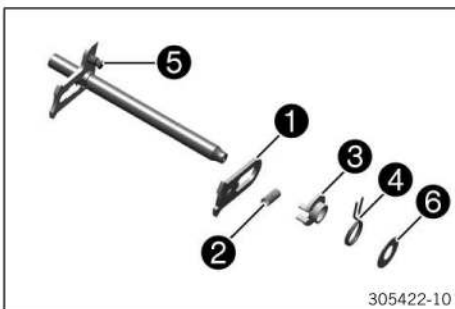
- Check shift forks **1** at leaf **A** for wear.

Shift fork	
Thickness at leaf	4.85 ... 4.95 mm (0.1909 ... 0.1949 in)
Clearance in the sliding gear groove: New condition	0.35 ... 0.55 mm (0.0138 ... 0.0217 in)
Clearance in the sliding gear groove: Wear limit	0.80 mm (0.0315 in)

- » If the measured value does not equal the specified value:
 - Change the shift fork and gear wheel pair.
- Check shift grooves **B** of shift drum **2** for wear.
 - » If the shift groove is worn:
 - Change the shift drum.
- Check the seat of the shift drum in grooved ball bearings **3**.
 - » If the shift drum is not seated correctly:
 - Change the shift drum and/or the grooved ball bearing.
- Check grooved ball bearing **3** for stiffness and wear.
 - » If the grooved ball bearings do not move freely or are worn:
 - Change the grooved ball bearing.
- Check shift drums **4** for ovality, surface damage and cracking.
 - » If the shift drum is oval, or shows signs of surface damage or cracks:
 - Change the shift drum.
- Check springs **5** of the shift rails for damage and wear.
 - » If the spring is broken or worn:
 - Change the spring of the shift rail.
- Check the shift rails **6** on a flat surface for run-out.
 - » If there is run-out:
 - Change the shift rail.
- Check shift rails for scoring, signs of corrosion and stiffness in the shift fork.

- » If there is scoring or corrosion, or if the shift fork is stiff:
 - Change the shift rail.
- Check sliding plate **7** in contact areas **C** for wear.
 - » If the sliding plate is worn:
 - Change the sliding plate.
- Check return surface **D** on the sliding plate for wear.
 - » If deep notches are present:
 - Change the sliding plate.
- Check guide pin **E** for looseness and wear.
 - » If the guide pin is loose and/or worn:
 - Change the sliding plate.

18.8.25 Preassembling the shift shaft



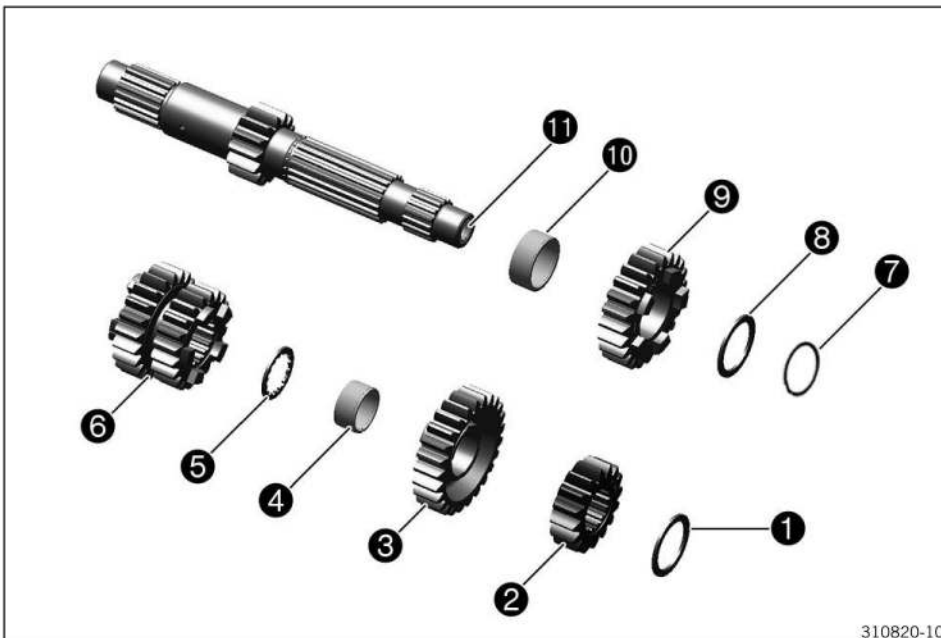
- Fix the short end of the shift shaft in a vise.

Guideline

Use soft jaws.

- Mount sliding plate **1** with the guide pin facing down and attach the guide pin to the shift quadrant.
- Mount preload spring **2**.
- Push on spring guide **3**, push return spring **4** over the spring guide with the offset end facing upward and lift the offset end over abutment bolt **5**.
- Mount stop disk **6**.

18.8.26 Disassembling the main shaft



- Secure the main shaft with the toothed end facing downward in the bench vise.

Guideline

Use soft jaws.

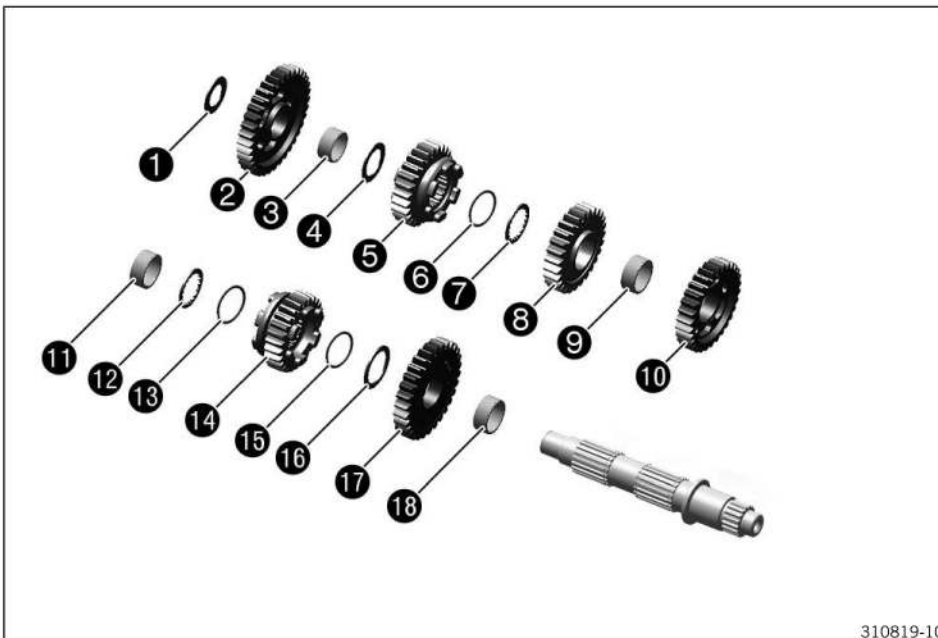
- Remove stop disk ① and second-gear fixed gear ②.
- Remove sixth-gear idler gear ③.
- Remove needle bearing ④ and stop disk ⑤.
- Remove third/fourth-gear sliding gear ⑥.
- Remove lock ring ⑦.
- Remove stop disk ⑧ and fifth-gear idler gear ⑨.
- Remove needle bearing ⑩.
- Remove needle bushing ⑪ with a suitable tool.



Info

Only needs to be removed in case of wear.

18.8.27 Disassembling the countershaft



310819-10

- Secure the countershaft in the bench vise with the toothed end facing downward.

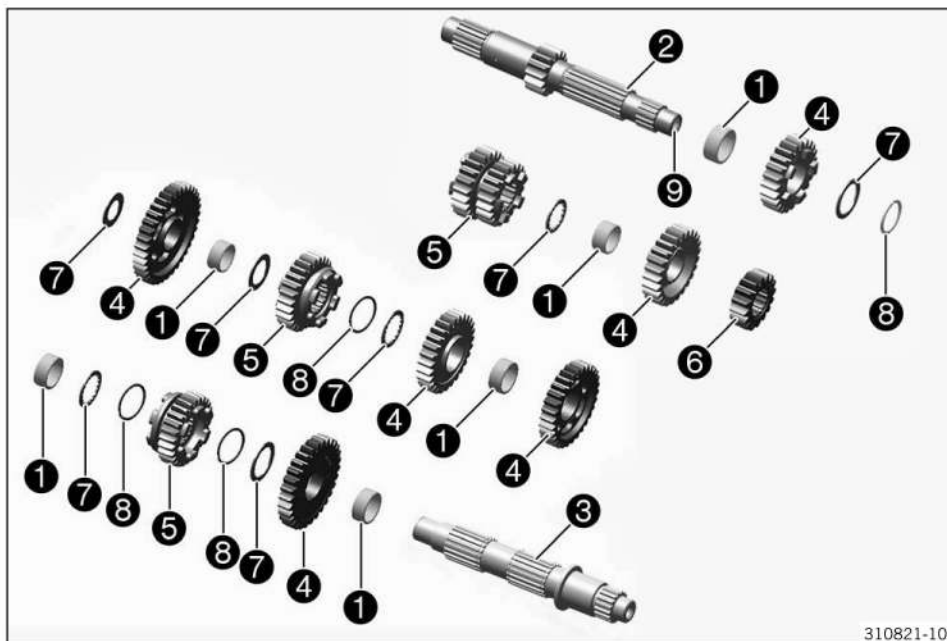
Guideline

Use soft jaws.

- Remove stop disk ① and first-gear idler gear ②.
- Remove needle bearing ③ and stop disk ④.
- Remove the fifth-gear sliding gear ⑤ and lock ring ⑥.
- Remove stop disk ⑦ and fourth-gear idler gear ⑧.
- Remove needle bearing ⑨ and third-gear idler gear ⑩.
- Remove needle bearing ⑪ and stop disk ⑫.
- Remove lock ring ⑬ and sixth-gear sliding gear ⑭.
- Remove lock ring ⑮ and stop disk ⑯.

- Remove second-gear idler gear 17 and needle bearing 18.

18.8.28 Checking the transmission



- Check needle bearings 1 for damage and wear.
 - » If there is damage or wear:
 - Change the needle bearing.
- Check the pivot points of main shaft 2 and countershaft 3 for damage and wear.
 - » If there is damage or wear:
 - Change the main shaft and/or countershaft.
- Check the tooth profiles of main shaft 2 and countershaft 3 for damage and wear.
 - » If there is damage or wear:
 - Change the main shaft and/or countershaft.
- Check the pivot points of idler gears 4 for damage and wear.
 - » If there is damage or wear:
 - Change the gear wheel pair.
- Check the shift dogs of idler gears 4 and sliding gears 5 for damage and wear.
 - » If there is damage or wear:
 - Change the gear wheel pair.
- Check the tooth faces of idler gears 4, sliding gears 5, and fixed gear 6 for damage and wear.
 - » If there is damage or wear:
 - Change the gear wheel pair.
- Check the tooth profiles of sliding gears 5 for damage and wear.
 - » If there is damage or wear:
 - Change the gear wheel pair.
- Check sliding gear 5 for smooth operation in the profile of main shaft 2.
 - » If the solid gear does not move freely:
 - Change the sliding gear or the main shaft.
- Check sliding gears 5 for smooth operation in the profile of countershaft 3.

- » If the solid gear does not move freely:
 - Change the sliding gear or the countershaft.
- Check stop disks **7** for damage and wear.
 - » If there is damage or wear:
 - Change the stop disks.
- Use new lock rings **8** with every repair.
- Check stop disks **9** for damage and wear.
 - » If there is damage or wear:
 - Change the needle bearing.



18.8.29 Assembling the main shaft

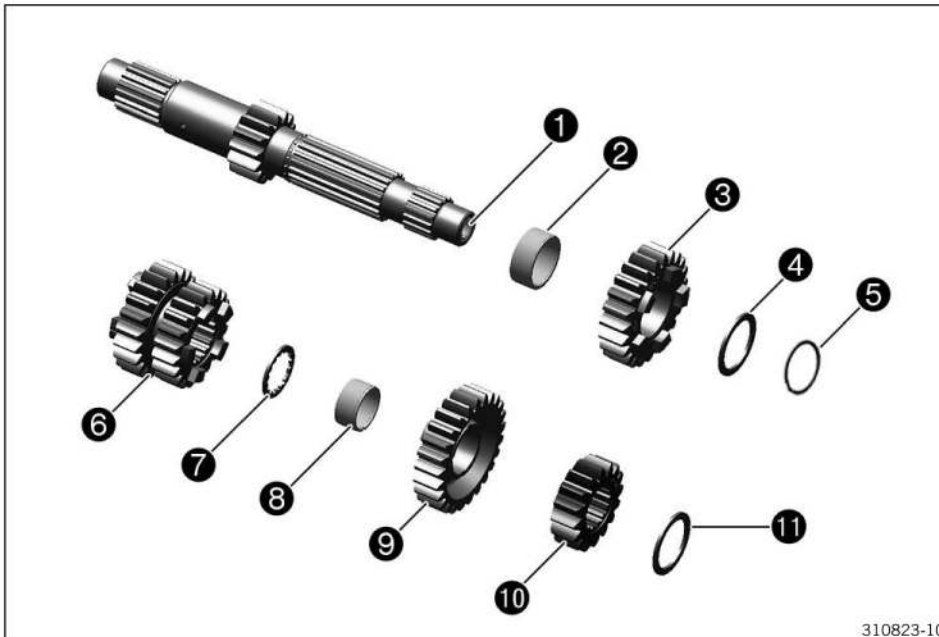


Info

Use new lock rings with every repair.

Preparatory work

- Carefully lubricate all parts before assembling.
- Check the transmission. (📖 p. 260)



310823-10

Main work

- Secure the main shaft in the vise with the gear teeth facing downward.

Guideline

Use soft jaws.

- If removed, mount the new needle bushing **1** with suitable tools.
- Mount needle bearing **2** and mount fifth-gear idler gear **3** with the shift dogs facing up.
- Mount stop disk **4** and new lock ring **5**.
- Mount third/fourth-gear sliding gear **6** with the small gear wheel facing up.
- Attach stop disk **7** and needle bearing **8**.
- Attach sixth gear idler gear **9** with the shift dog facing downward.
- Attach second-gear fixed gear **10** with the collar facing downward and stop disk **11**.

- Finally, check all the gear wheels for smooth operation.

18.8.30 Assembling the countershaft

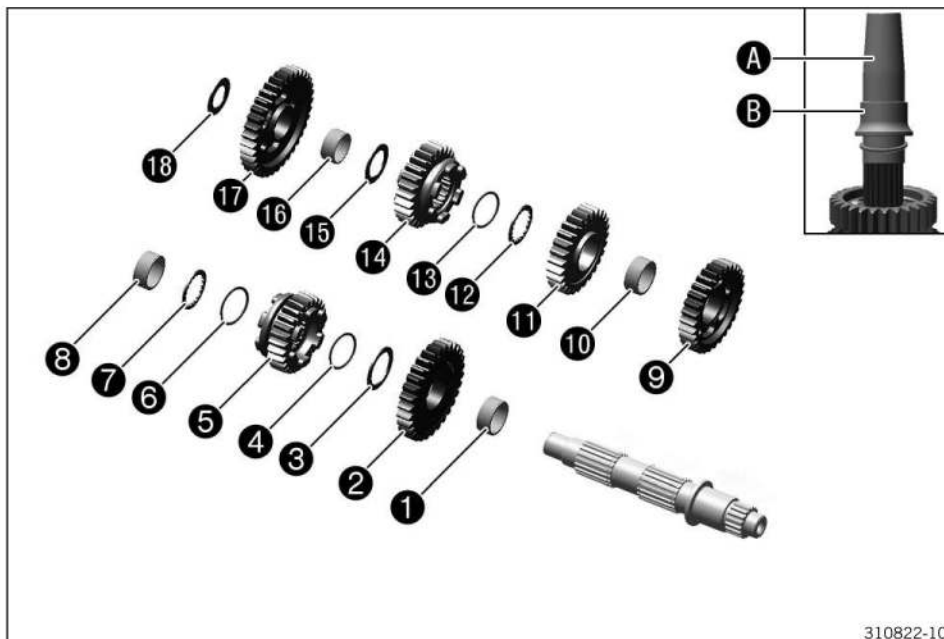


Info

Use new lock rings with every repair.

Preparatory work

- Carefully lubricate all parts before assembling.
- Check the transmission. (📖 p. 260)



310822-10

Main work

- Secure the countershaft in the bench vise with the toothed end facing downward.

Guideline

Use soft jaws.

- Mount needle bearing ① and second-gear idler gear ② onto the countershaft with the protruding collar facing downward.
- Mount stop disk ③.
- Position special tool ④ on the transmission shaft.

Mounting tool for lock ring (61229032000) (📖 p. 419)

- Position lock ring ④ on special tool ④ and push down with sleeve ⑤.
 - ✓ The lock ring engages in the groove of the transmission shaft.
- Mount the sixth-gear sliding gear ⑤ with the shift groove facing up.
- Position special tool ④ on the transmission shaft.

Mounting tool for lock ring (61229032000) (📖 p. 419)

- Position lock ring ⑥ on special tool ④ and push down with sleeve ⑤.
 - ✓ The lock ring engages in the groove of the transmission shaft.
- Mount stop disk ⑦.
- Mount needle bearing ⑧ and the third-gear idler gear ⑨ with the collar facing up.

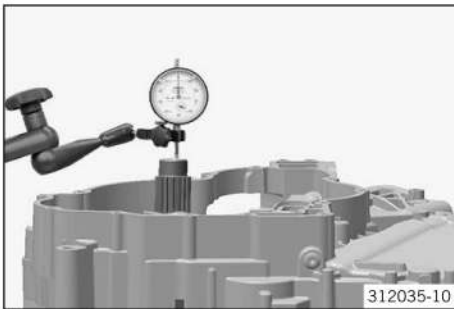
- Mount needle bearing 10 and the fourth-gear idler gear 11 with the collar facing down.
- Mount stop disk 12.
- Position special tool A on the transmission shaft.

Mounting tool for lock ring (61229032000) (圖 p. 419)

- Position lock ring 13 on special tool A and push down with sleeve B.
 - ✓ The lock ring engages in the groove of the transmission shaft.
- Mount the fifth-gear sliding gear 14 with the shift groove facing down and stop disk 15.
- Mount needle bearing 16, first-gear idler gear 17 with the recess facing down, and stop disk 18.
- Finally, check all the gear wheels for smooth operation.



18.8.31 Measuring the main shaft axial play



- Mount transmission in the right section of the engine case.



Info

Do not forget the dowels.

- Mount the left section of the engine case.
- Mount and tighten the screws.

Guideline

Screw, engine case	Expansion screw M8	18 Nm (13.3 lbf ft)
Screw, engine case	M6	10 Nm (7.4 lbf ft)

- Mount the dial gauge support on the engine case and measure and note down the main shaft axial play.

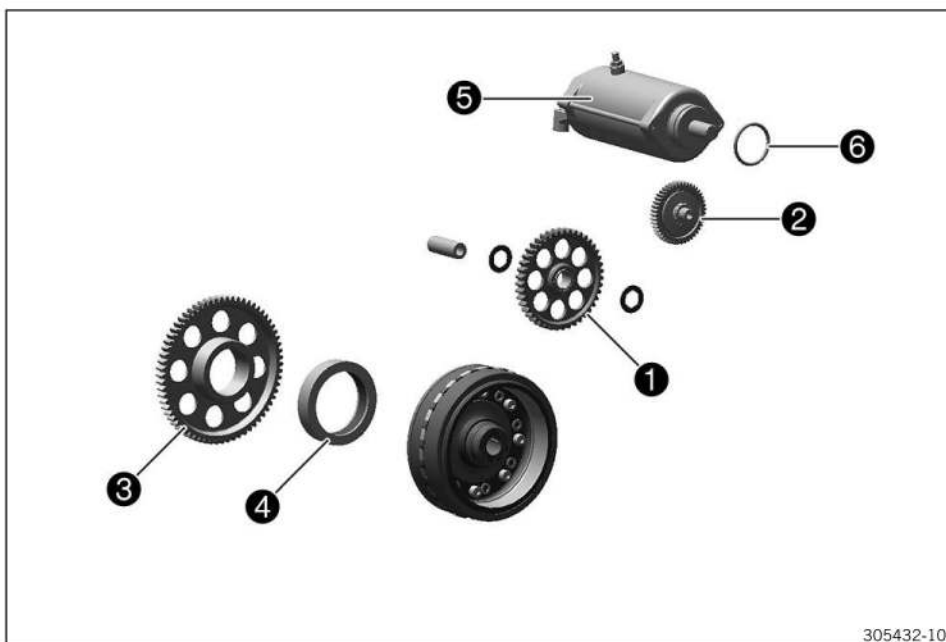
Guideline

Main shaft axial clearance	0.05 ... 0.15 mm (0.002 ... 0.0059 in)
----------------------------	--

- » If the measured value does not meet specifications:
 - Calculate the thickness of the stop disk.
 - Remove screws and take off section of the engine case.
 - Mount corresponding stop disk on the main shaft.



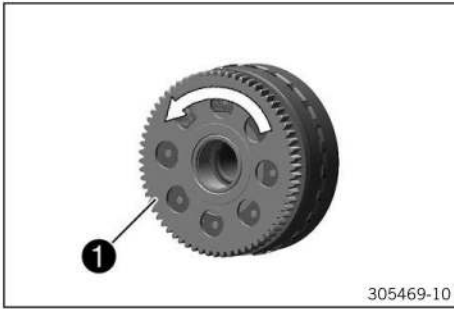
18.8.32 Checking electric starter operation



305432-10

- Check the gear mesh and bearing of starter idler gear **1** for damage and wear.
 - » If there is damage or wear:
 - Change the starter idler gear.
- Check the gear mesh and bearing of torque limiter **2** for damage and wear.
 - » If there is damage or wear:
 - Change the torque limiter.
- Check the gear mesh and bearing of freewheel gear **3** for damage and wear.
 - » If there is damage or wear:
 - Change the free-wheel-gear and/or the bearing.
- Check freewheel **4** for damage and wear.
 - » If there is damage or wear:
 - Change the freewheel.
- Checking the gear mesh of starter motor **5** for damage and wear
 - » If there is damage or wear:
 - Change the starter motor.
- Change O-ring **6** of the starter motor.
- Connect the negative cable of a 12 volt power supply to the housing of the starter motor. Connect the positive cable of the power supply briefly with connector of the starter motor.
 - » If the starter motor does not turn when the circuit is closed:
 - Change the starter motor.

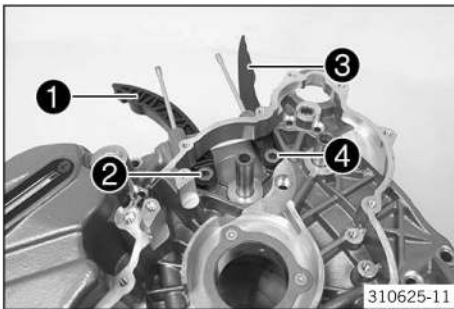
18.8.33 Checking the free-wheel



- Insert freewheel gear **1** into the freewheel hub while turning the freewheel gear counterclockwise; do not wedge it.
- Check the locking action of free-wheel-gear **1**.
 - » The freewheel gear cannot be turned counterclockwise and does not block clockwise:
 - Change the freewheel.

18.9 Engine assembly

18.9.1 Installing the timing chain rails of the left engine case section



- Position timing chain guide rail **1**. Mount and tighten screw **2**.

Guideline

Screw, timing chain guide rail	M8	15 Nm (11.1 lbf ft) Loctite®243™
--------------------------------	----	--

i Info
Ensure that there is no thread locker on the collar of the screw; otherwise, the timing chain guide rail may block and brake.

- Position timing chain tensioning rail **3**. Mount and tighten screw **4**.

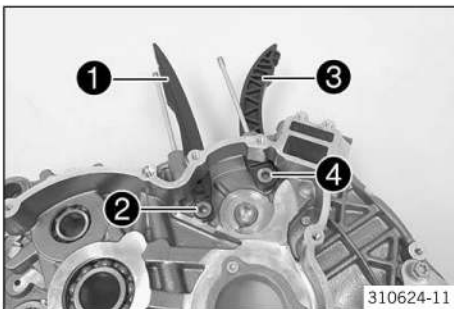
Guideline

Screw, timing chain tensioning rail	M8	15 Nm (11.1 lbf ft) Loctite®243™
-------------------------------------	----	--

i Info
Ensure that there is no thread locker on the collar of the screw; otherwise, the timing chain tensioning rail may block and brake.

- Check both timing chain rails for freedom of motion.

18.9.2 Installing the timing chain rails of the right engine case section



- Position timing chain guide rail **1**. Mount and tighten screw **2**.

Guideline

Screw, timing chain guide rail	M8	15 Nm (11.1 lbf ft) Loctite®243™
--------------------------------	----	--

i Info

Ensure that there is no thread locker on the collar of the screw; otherwise, the timing chain guide rail may block and brake.

- Position timing chain tensioning rail ③. Mount and tighten screw ④.

Guideline

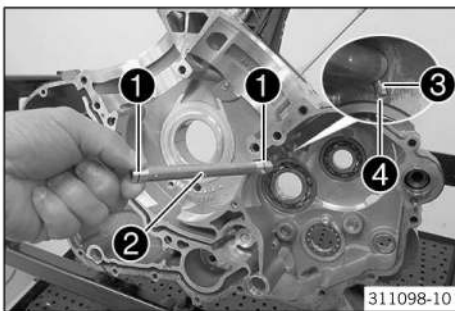
Screw, timing chain tensioning rail	M8	15 Nm (11.1 lbf ft) Loctite®243™
-------------------------------------	----	--

i Info

Ensure that there is no thread locker on the collar of the screw; otherwise, the timing chain tensioning rail may block and brake.

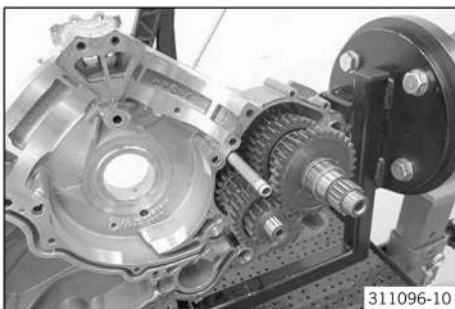
- Check both timing chain rails for freedom of motion.

18.9.3 Installing the oil spray tube



- Mount new O-rings ① on oil spray tube ②.
- Mount the oil spray tube.
- ✓ Pin ③ must engage in recess ④.

18.9.4 Installing the transmission shaft

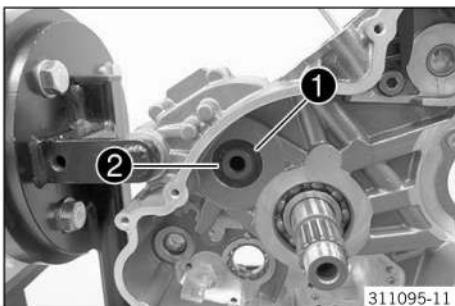


- Clamp the right section of the engine case.

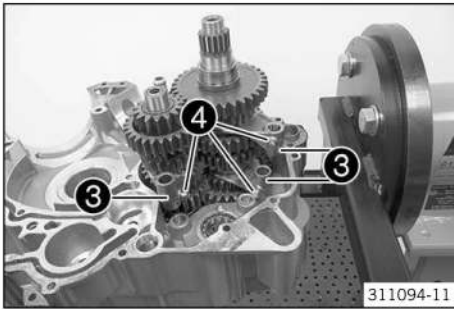
Engine assembly stand (61229001000) (p. 417)

Engine bracket for engine work stand (61229002000) (p. 417)

- Assemble the two transmission shafts and slide them into the bearing seats together.

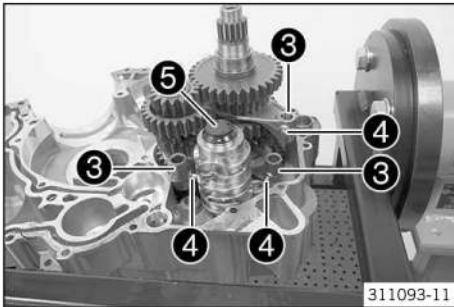


- Mount stop disk ① and lock ring ② of the countershaft.



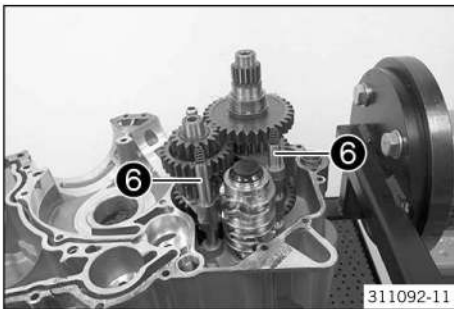
- Tilt the engine.
- Mount shift forks **3** with shift rollers **4**.

i Info
Use a small amount of grease to fix the shift rollers to the shift forks.



- Swing shift forks **3** to one side.
- Insert shift drum **5** into the bearing seat.
- Let the shift forks engage in the shift grooves.

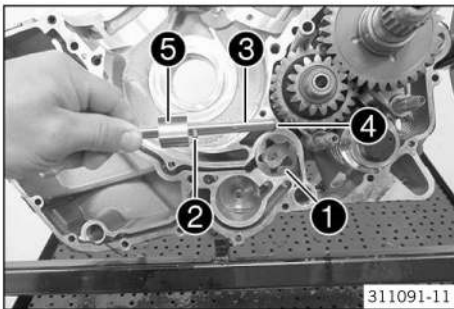
i Info
Watch out for the shift rollers **4**.



- Mount shift rails **6** with the springs.
- Check the transmission for smooth operation.

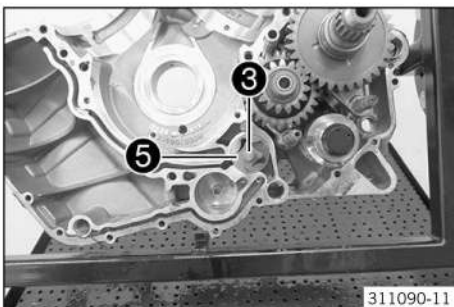
i Info
Affix the springs to the shift rails with grease.

18.9.5 Installing middle suction pump

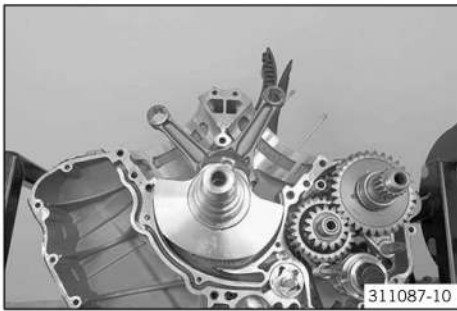


- Mount external rotor **1**.
✓ The rounded side of the external rotor must face the engine case.
- Mount pin **2** into the third hole of oil pump shaft **3** after shaft keyway **4**.
- Slide internal rotor **5** over the pin.

- Mount oil pump shaft **3** with internal rotor **5**.
- Oil the parts.



18.9.6 Installing the crankshaft



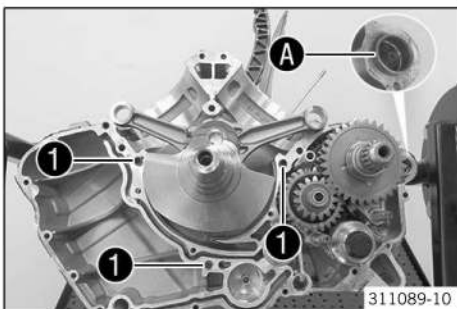
- Oil the bearing shells.
- Slide the crankshaft into the bearing seat.



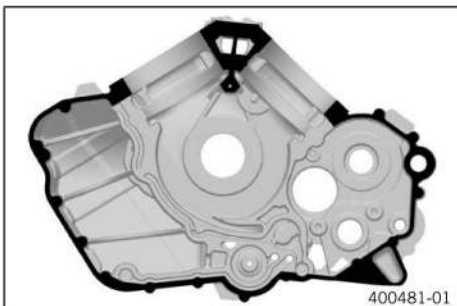
Info

Position the connecting rods as shown.

18.9.7 Installing the left engine case



- Mount dowels ①.
- Check that dowel ① is correctly seated.



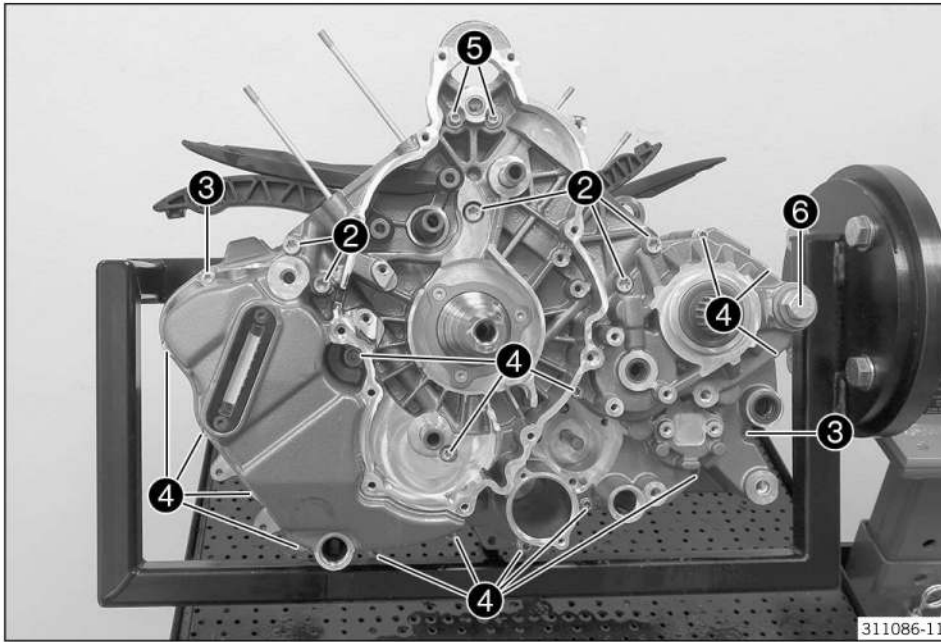
- Degrease the sealing surface and coat thinly with Sealing compound.

Loctite® 5910



Info

Only coat the sealing surface around the outside (see illustration).



- Attach the left engine case, using a plastic hammer if necessary to seat it properly.

i Info
Do not use the screws to pull the two sections of the engine case together.

- Mount and tighten screws ②.

Guideline

Screw, engine case	Expansion screw M8	18 Nm (13.3 lbf ft)
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- Mount and tighten screws ③.

Guideline

Screw, engine case	M6x60	10 Nm (7.4 lbf ft)
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- Mount and tighten screws ④.

Guideline

Screw, engine case	M6x80	10 Nm (7.4 lbf ft)
--------------------	-------	--------------------

- Mount and tighten screws ⑤.

Guideline

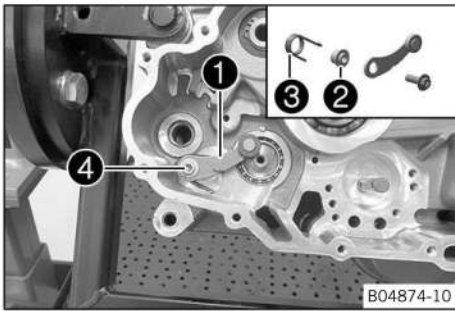
Screw, engine case	M6x90	10 Nm (7.4 lbf ft)
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i Info
Screws ⑤ must always be replaced with new screws.

- Mount screw ⑥.



18.9.8 Installing the locking lever

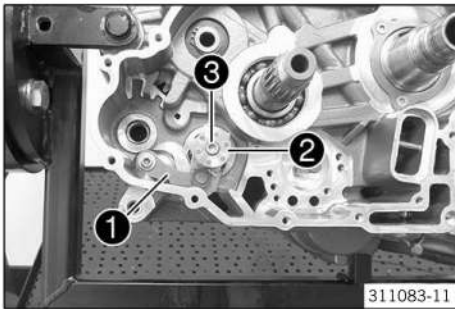


- Position locking lever ① with sleeve ② and spring ③.
- Mount and tighten screw ④.

Guideline

Screw, locking lever	M6	10 Nm (7.4 lbf ft) Loctite®243™
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18.9.9 Installing the shift drum locating



- Press locking lever ① down and position shift drum locating ②.

Info

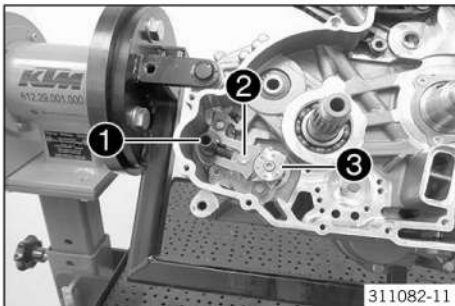
The flat surfaces of the shift drum locating unit are not symmetric.

- Release the locking lever.
- Mount and tighten screw ③.

Guideline

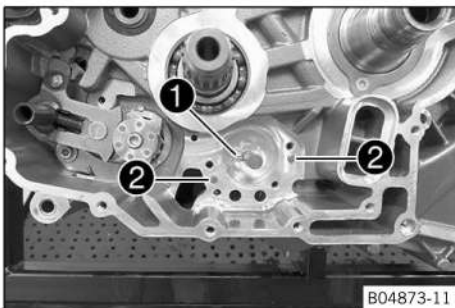
Screw, shift drum locating	M6 – 12.9	18 Nm (13.3 lbf ft) Loctite®243™
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18.9.10 Installing the shift shaft



- Slide shift shaft ① with the washer into the bearing seat.
- Push sliding plate ② away from the shift drum locating ③.
- Insert the shift shaft all the way.
- Let the sliding plate engage in the shift drum locating.
- Shift through the transmission.

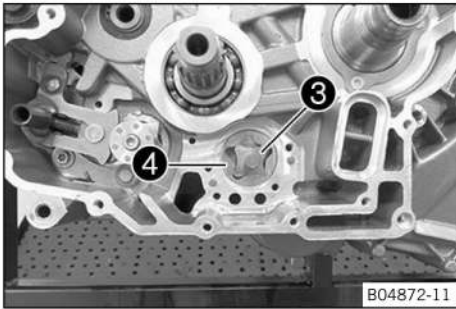
18.9.11 Installing the force pump



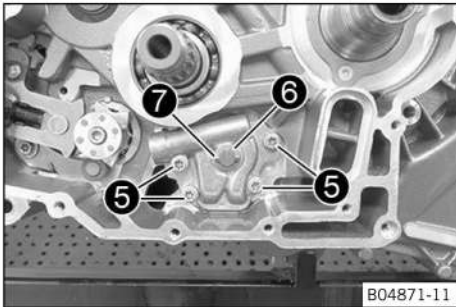
- Mount pin ①.

Info

Ensure that pins ② are seated correctly.



- Mount internal rotor **3** and external rotor **4**.
- ✓ The rounded side of the external rotor must face the engine case.
- Oil the parts.

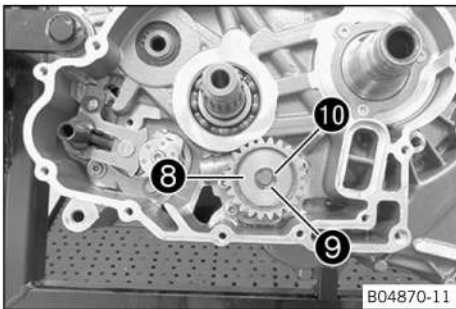


- Position the oil pump cover. Mount and tighten screws **5**.

Guideline

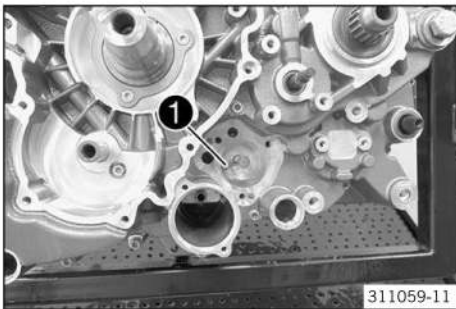
Screw, oil pump cover	M6	10 Nm (7.4 lbf ft) Loctite®243™
-----------------------	----	---

- Mount washer **6** and pin **7**.

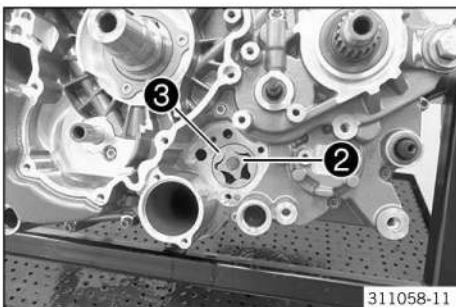


- Mount oil pump gear wheel **8**, washer **9** and lock washer **10**.

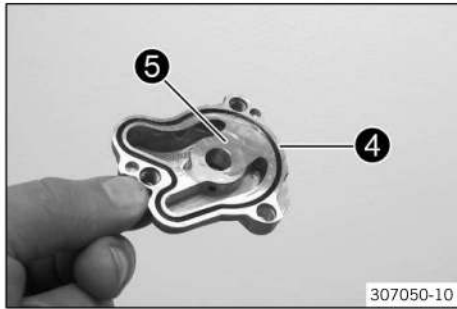
18.9.12 Installing the left suction pump



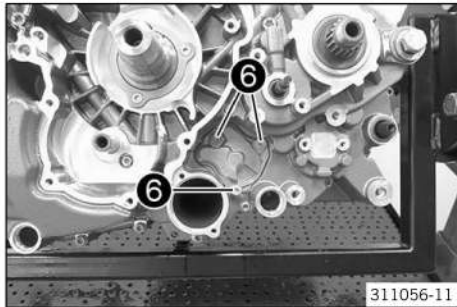
- Mount pin **1**.



- Mount internal rotor **2** and external rotor **3**.
- ✓ The rounded side of the external rotor must face the engine case.
- Oil the parts.



- Insert new gasket **4** into the oil pump cover.
- Position the oil pump cover **5**.



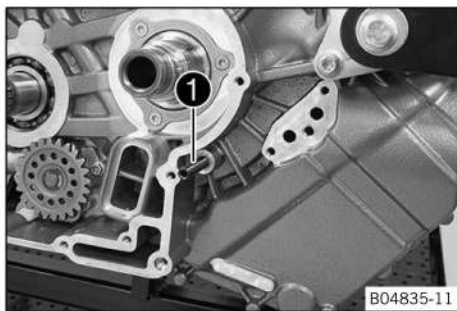
- Mount and tighten screws **6**.

Guideline

Screw, oil pump cover	M6	10 Nm (7.4 lbf ft) Loctite®243™
-----------------------	----	---

- Turn the oil pump gear wheel and ensure the oil pump moves easily.

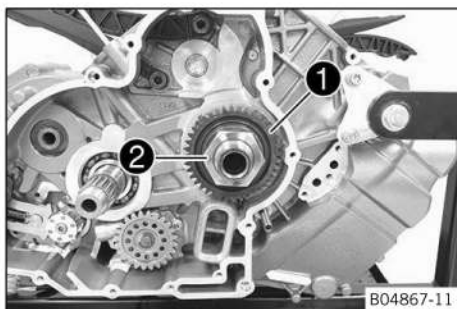
18.9.13 Setting the engine to ignition top dead center of the rear cylinder



- Set the crankshaft to top dead center of the rear cylinder.
✓ The position notch of the crankshaft is visible in the hole.
- Screw in special tool **1**.

Locking screw (61229015000) (📖 p. 418)
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18.9.14 Installing the primary gear wheel

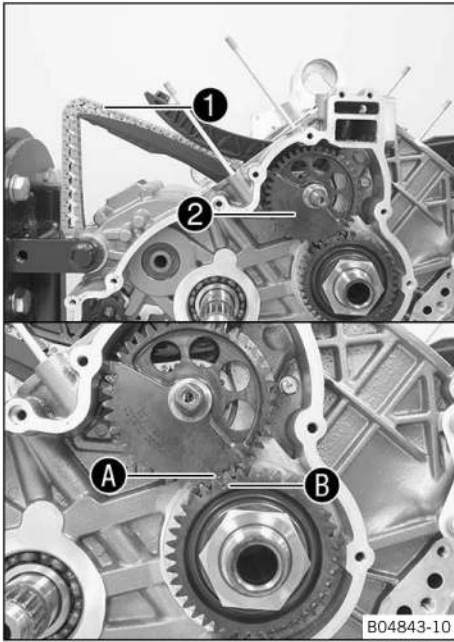


- Ensure that the woodruff key is seated properly.
- Mount primary gear wheel **1**.
- Mount the washer and nut **2** and tighten the nut.

Guideline

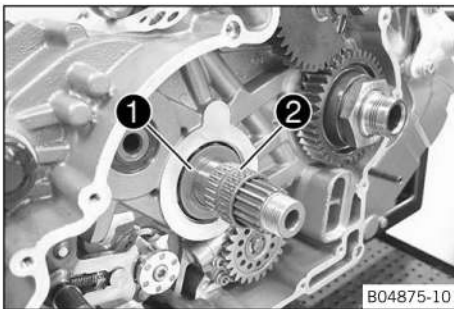
Nut, primary gear wheel	M33LHx1.5	130 Nm (95.9 lbf ft) Loctite®243™
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18.9.15 Installing the intermediate gear and the timing chain on the right

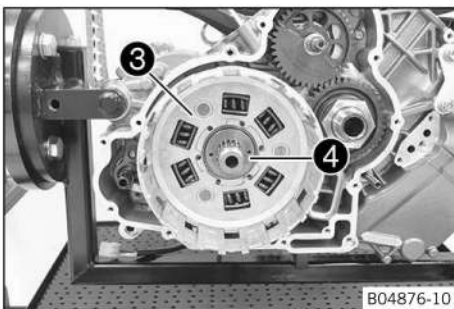


- Position timing chain **1** according to the direction of travel.
- Place the timing chain over the gear teeth of intermediate gear **2**. Align markings **A** and **B**.
- Slide on the intermediate gear.

18.9.16 Installing the clutch basket

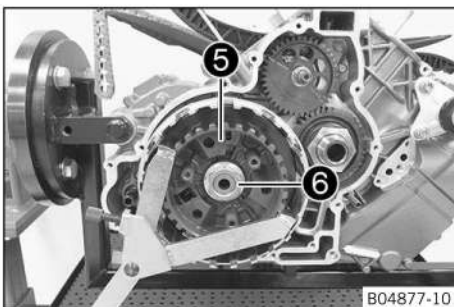


- Mount washer **1** and needle bearing **2**.



- Mount clutch basket **3** and washer **4**.

i Info
Turn the clutch basket and the oil pump gear wheel backwards and forwards slightly to help them mesh more easily.



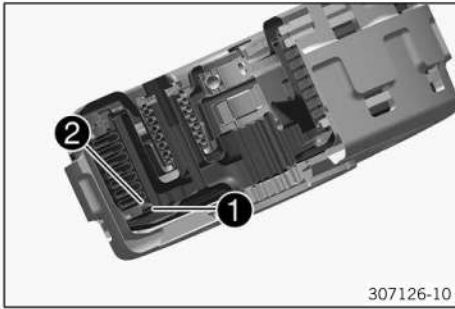
- Mount inner clutch hub **5**.
- Mount nut **6** with the washer.
- Tighten the nut, holding the inner clutch hub with a special tool.

Guideline

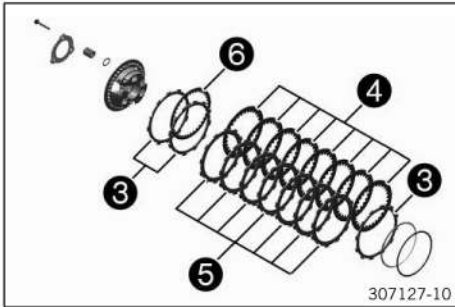
Nut, inner clutch hub	M22x1.5	120 Nm (88.5 lbf ft) Loctite®243™
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Holding wrench (51129003000) (📖 p. 413)

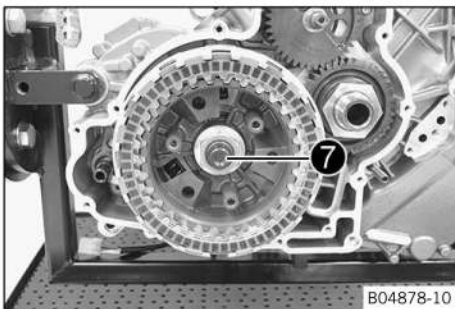
18.9.17 Installing the clutch discs



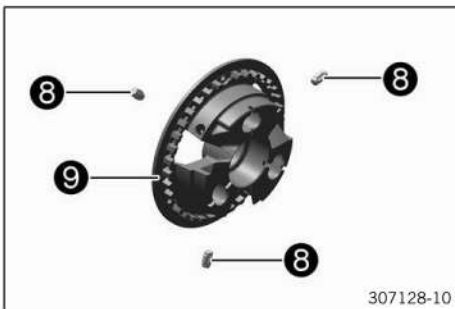
- Mount support ring **1** and pretension ring **2**.
- ✓ The pretension ring rests against the support ring on the inside and the outside faces away from the support ring.



- Thoroughly oil the clutch facing discs.
- Mount a clutch facing disc **3** with a larger inside diameter.
- Alternately mount 8 intermediate clutch discs **4** and 7 of the same clutch facing discs **5**.
- Alternately mount 2 clutch facing discs **3** and an intermediate clutch disc **6** with a larger inside diameter.
- The outer clutch facing disc must be mounted offset by one mesh.



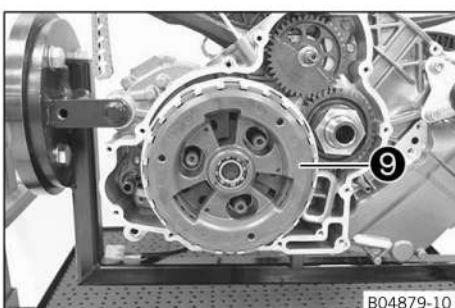
- Mount clutch push rod **7**.



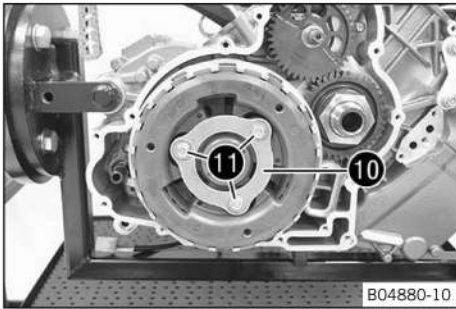
- Mount damper **8** in the clutch pressure cap **9**.

i Info

When changing the clutch discs, always renew the damper.



- Position clutch pressure cap **9**.
- ✓ The teeth of the outer intermediate clutch disc engages in the clutch pressure cap.
- ✓ The clutch pressure cap rests flush against the outer lining disc.

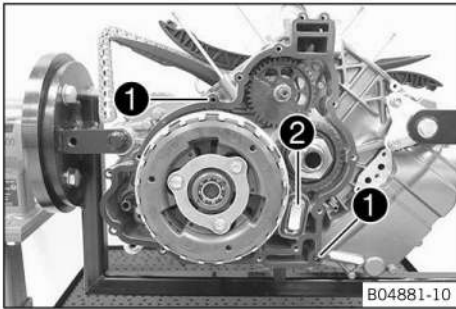


- Position clutch center **10** and the springs.
- Mount and tighten screws **11**.

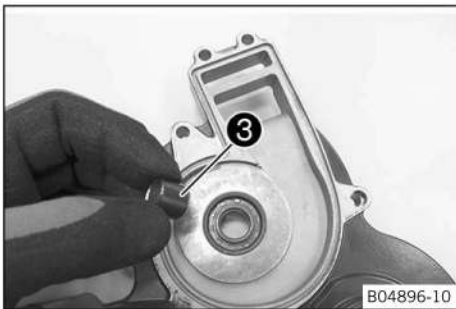
Guideline

Screw, clutch spring	M6	12 Nm (8.9 lbf ft)
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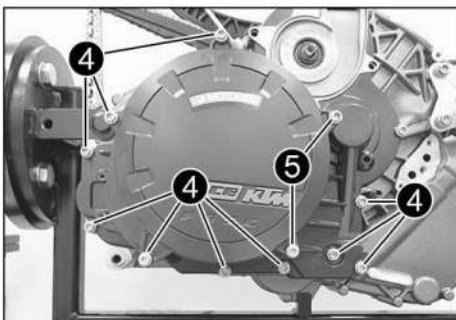
18.9.18 Installing the clutch cover



- Mount dowels **1** and position the clutch cover gasket.
- Mount check valve **2**.



- Position water pump sleeve **3** in both seal rings.

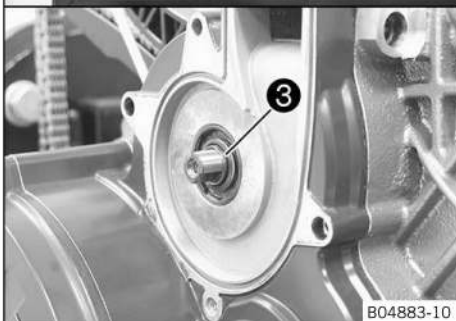


- Mount the clutch cover. Mount and tighten screws **4** and **5**.

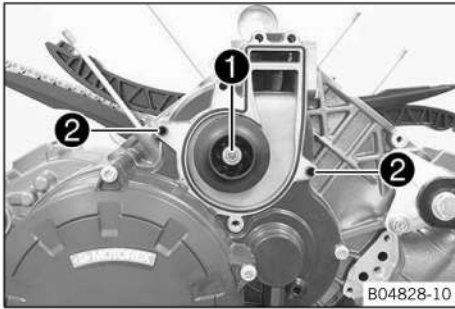
Guideline

Screw, clutch cover	M6	10 Nm (7.4 lbf ft)
---------------------	----	--------------------

- Push water pump sleeve **3** all the way.
- ✓ Water pump sleeve **3** is flush with the recess of the water pump shaft.



18.9.19 Installing the water pump wheel

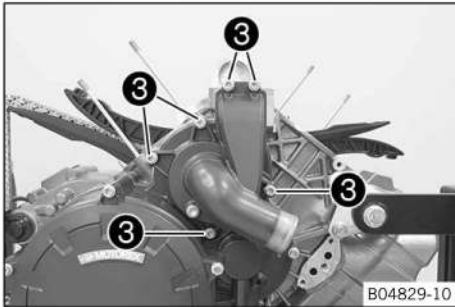


- Mount the washer and water pump wheel.
- Mount and tighten screw **1**.

Guideline

Screw, water pump wheel	M6	10 Nm (7.4 lbf ft) Loctite®243™
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- Mount dowels **2**.
- Replace the seal.

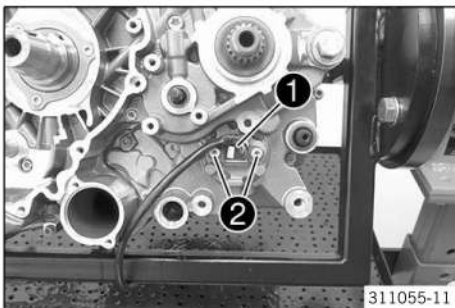


- Mount the water pump cover.
- Mount and tighten screws **3**.

Guideline

Screw, water pump cover	M6	10 Nm (7.4 lbf ft)
-------------------------	----	--------------------

18.9.20 Installing the gear position sensor

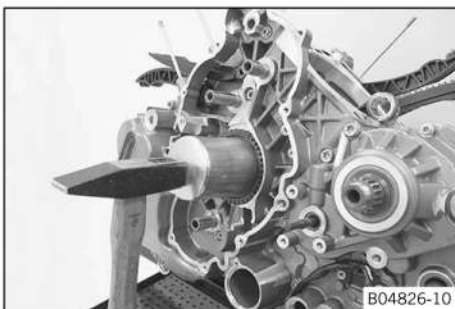


- Position gear position sensor **1**.
- Mount and tighten screws **2** with the washers.

Guideline

Screw, gear sensor	M5	6 Nm (4.4 lbf ft) Loctite®243™
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18.9.21 Installing the drive gear wheel of the balancer shaft



- Warm up the drive gear wheel of the balancer shaft.

Guideline

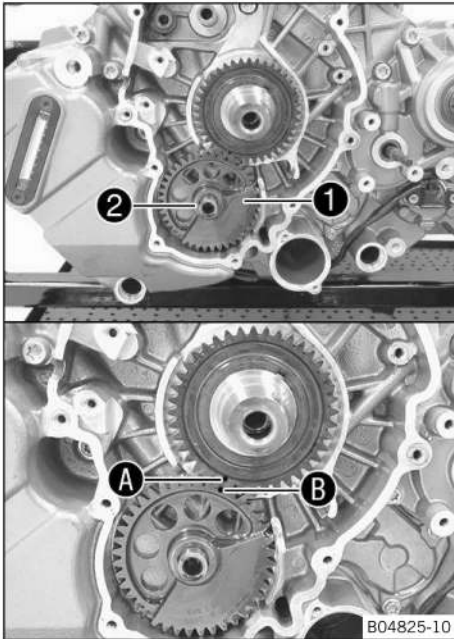
150 °C (302 °F)

- Ensure that the woodruff key is seated properly. Mount the drive gear wheel of the balancer shaft with the beveled edge facing forward.

Pressing tool (61229016000) (📄 p. 418)

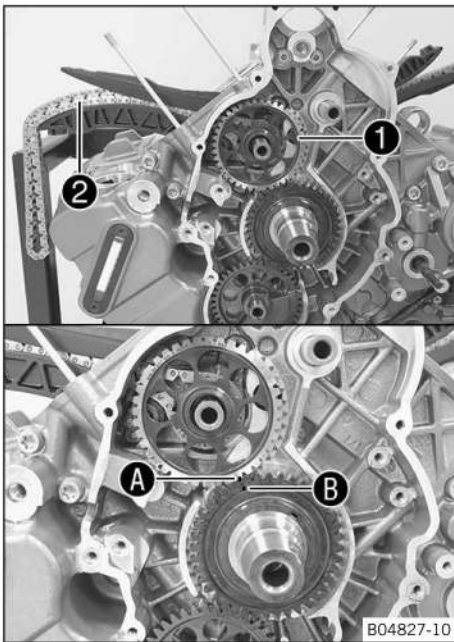
- ✓ The markings are visible after mounting.

18.9.22 Installing the balancer shaft

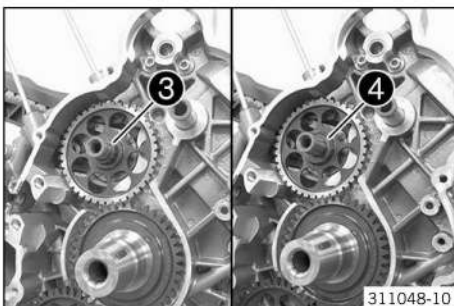


- Mount the rear washer and needle bearing.
- Mount balancer shaft ①.
- ✓ Markings A and B are aligned.
- Mount washer ②.

18.9.23 Installing the intermediate gear and the timing chain on the left

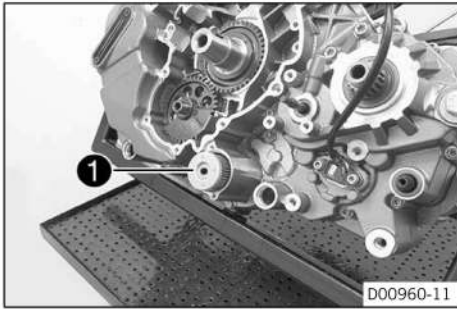


- Mount the rear washer.
- Mount intermediate gear ① with timing chain ② in accordance with the direction of travel.
- ✓ Markings A and B are aligned.



- Mount needle bearing ③.
- Mount washer ④.

18.9.24 Installing the oil filter

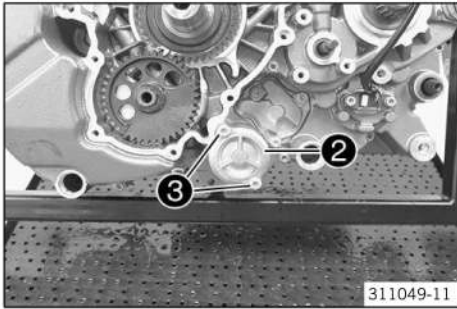


- Tilt the motorcycle to one side and fill the oil filter housing to about $\frac{1}{3}$ full with engine oil.
- Insert oil filter **1**.



Info

Only insert the oil filter by hand.

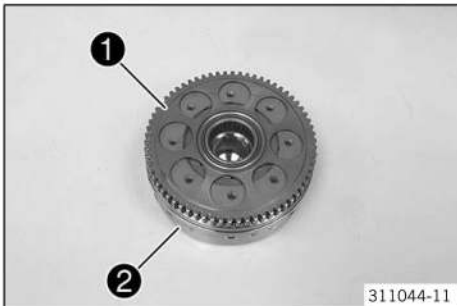


- Lubricate the O-ring of oil filter cover **2**. Mount the oil filter cover.
- Mount and tighten screws **3**.

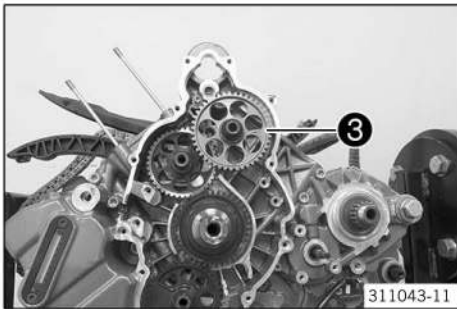
Guideline

Remaining engine screws	M5	6 Nm (4.4 lbf ft)
-------------------------	----	-------------------

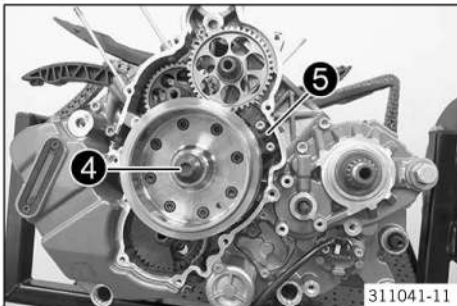
18.9.25 Installing the rotor



- Turn the freewheel gear **1** counterclockwise and mount it in rotor **2**.



- Mount the rear washer, needle bearing, intermediate gear **3** and front washer.



- Mount the rotor with the freewheel gear.



Info

Ensure that the woodruff key is seated properly.

- Mount and tighten rotor screw **4**.

Guideline

Screw, rotor	Expansion screw M12x1.5	115 Nm (84.8 lbf ft)
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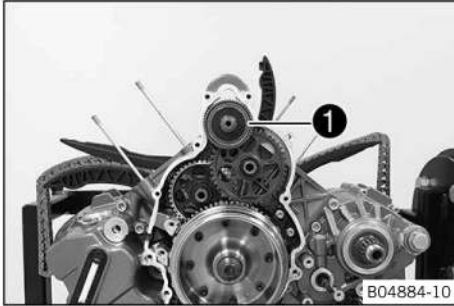
- Position freewheel holder **5**. Mount and tighten the screws.

Guideline

Screw, free-wheel holder	M6	10 Nm (7.4 lbf ft) Loctite®243™
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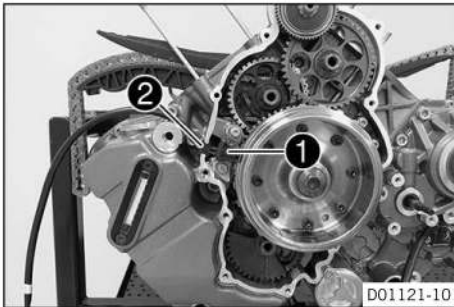
18.9.26 Installing the torque limiter and the intermediate gear



- Mount torque limiter **1** with the rear washer.



18.9.27 Installing the crankshaft speed sensor



- Position crankshaft speed sensor **1**.
- Mount and tighten the screws.

Guideline

Screw, crankshaft speed sensor	M5	6 Nm (4.4 lbf ft) Loctite®243™
--------------------------------	----	--

- Position the cable, thinly coat rubber grommet **2** with the sealing compound and insert it in the engine case.

Loctite® 5910

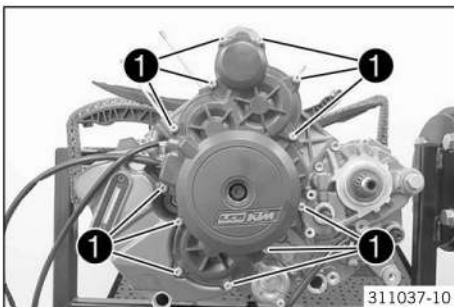
- Check the distance between the crankshaft speed sensor and rotor.

Guideline

Crankshaft speed sensor/rotor – distance	0.40 mm (0.0157 in)
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18.9.28 Installing the alternator cover



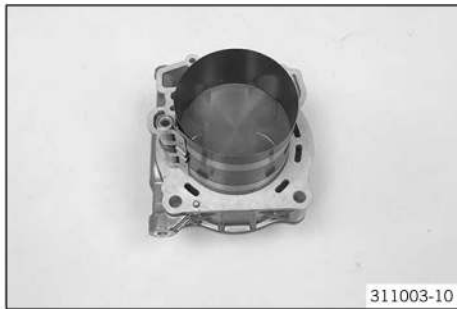
- Mount the new alternator cover seal and dowels.
- Position the alternator cover.
- Mount and tighten screws **1**.

Guideline

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



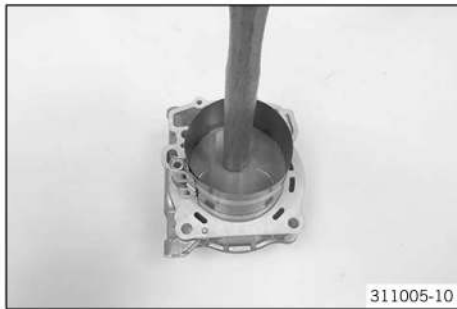
18.9.29 Installing the rear piston



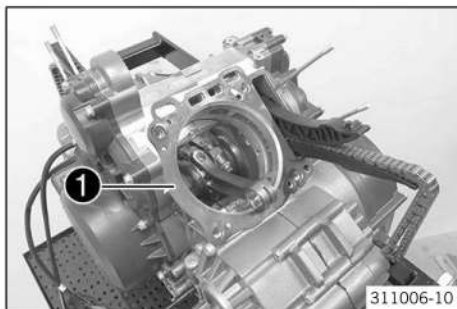
- Shift the joint of the piston rings by 120°.
- Place the oiled piston on the cylinder. Tighten the piston rings using the special tool.

Piston ring compressor (60029015000) (📖 p. 414)

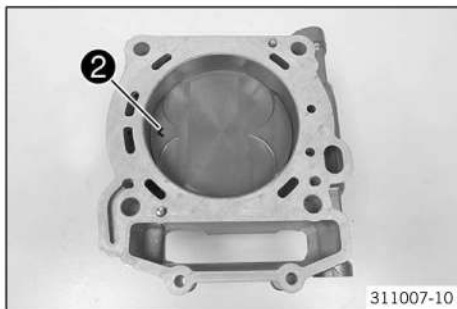
- ✓ The special tool must squeeze the piston rings together well and lie flush against the cylinder.



- Press the piston into the cylinder by striking it carefully with the hammer handle.
- ✓ The piston rings should not become caught; otherwise, they may be damaged.



- Position the new cylinder base gasket **1**.



- Ensure that piston marking **2** faces the outfeed side.



- Cover the engine case opening with a cloth. Thread the timing chain through the timing chain shaft. Mount the piston pin.



B04818-01



311009-10

- Position the new piston pin retainer.

i Info

For clarity, the following steps are illustrated using a disassembled piston.

- Insert the special tool and firmly press it toward the piston.
- Turn the special tool counterclockwise, thereby pressing the piston pin retainer into the groove.

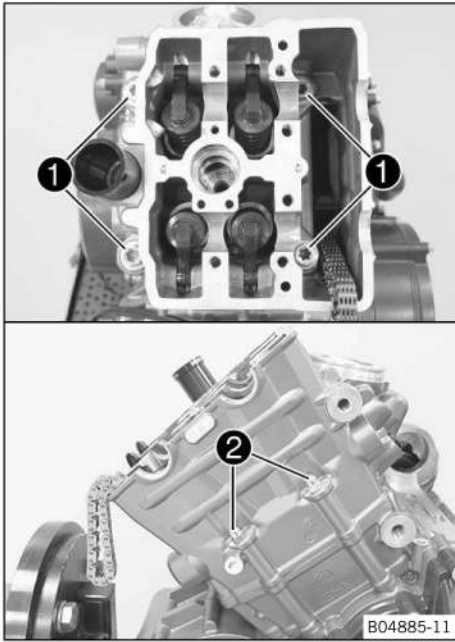
Insertion for piston ring lock (75029035000) (📖 p. 422)

- Ensure that the piston pin retainer is correctly seated on both sides.

- Remove the cloth.
- Keep the timing chain tensioned. Push the cylinder down carefully and let the dowel pins engage.



18.9.30 Installing rear cylinder head



- Put the new cylinder head gasket in place.
- Position the cylinder head and mount and tighten the new cylinder head screws **1** with washers.

Guideline

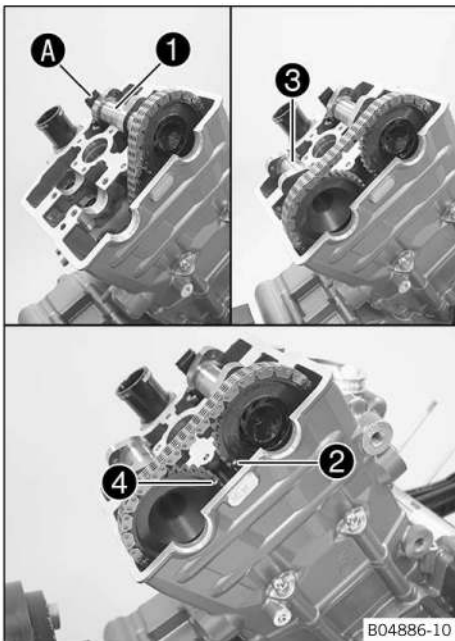
Cylinder head screw	M11x1.5	Tightening sequence: Using a crisscross pattern Step 1 15 Nm (11.1 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 90° Step 4 90° Lubricated with engine oil
---------------------	---------	--

- Mount and tighten nuts **2** with the washers.

Guideline

Nut, cylinder head	M6	9 Nm (6.6 lbf ft)
--------------------	----	-------------------

18.9.31 Installing the rear camshafts



- Pull up the timing chain and insert intake camshaft **1**.



Info

The intake camshaft is marked **INRE**.

- Place the timing chain over the rear sprocket of the intake camshaft.

✓ Marking **2** is aligned.

- Ensure that bleeder **A** is positioned properly.

- Slip in exhaust camshaft **3**.

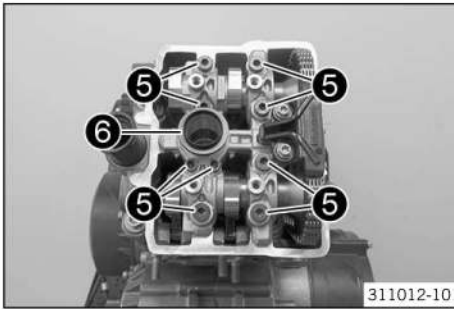


Info

The exhaust camshaft is marked **EXRE**.

- Place the timing chain over the rear sprocket and position the camshaft in the bearing seat.

✓ Marking **4** is aligned.



- Clean all oil nozzles thoroughly and blow out with compressed air.
- Mount the camshaft bearing support.
- Mount screws 5 and tighten them from the inside to the outside.

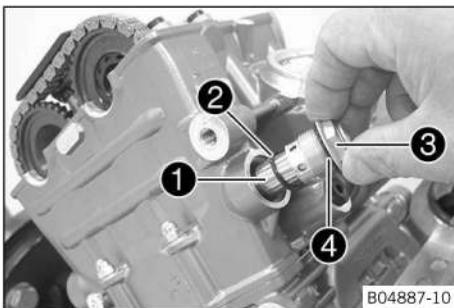
Guideline

Screw, camshaft bearing support	M6 – 10.9	10 Nm (7.4 lbf ft)
Screw, camshaft bearing support	M8 – 10.9	Step 1 10 Nm (7.4 lbf ft) Step 2 18 Nm (13.3 lbf ft)

- Grease the O-rings and mount spark plug shaft insert 6 with gasket.



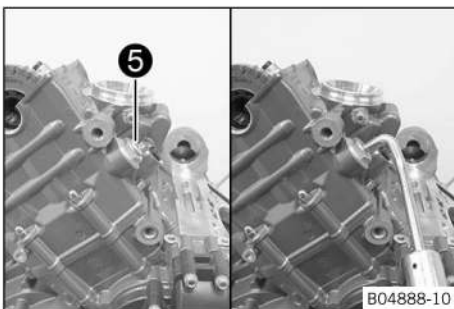
18.9.32 Installing the rear timing chain tensioner



- Position timing chain tensioner 1 and insert it with new O-ring 2.
- Mount and tighten screw plug 3 with the O-ring 4.

Guideline

Plug, timing-chain tensioner	M24x1.5	25 Nm (18.4 lbf ft)
------------------------------	---------	---------------------



- Remove screw 5 and use the special tool to push the timing chain tensioner toward the timing chain.

Release device for timing chain tensioner (61229021000) (p. 419)		
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✓ The timing chain tensioner unlocks.

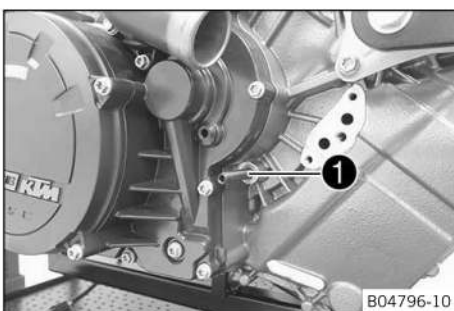
- Mount and tighten screw 5.

Guideline

Screw, timing chain tensioner release	M10x1	10 Nm (7.4 lbf ft)
---------------------------------------	-------	--------------------



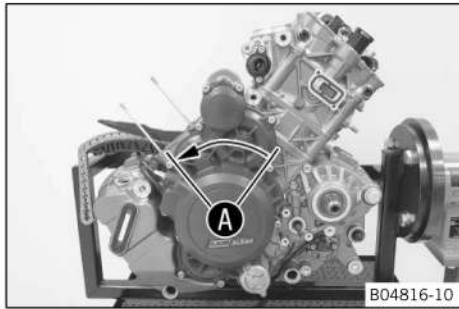
18.9.33 Setting the engine to ignition top dead center of the front cylinder



- Remove special tool 1.
- Keep the timing chain tensioned.
- Turn the crankshaft counterclockwise by the specified value.

Guideline

1 turn



- Turn the crankshaft counterclockwise by the specified value **A**.

Guideline

75°

- ✓ The position notch of the crankshaft is visible in the hole.

- Screw in special tool **1**.

Locking screw (61229015000) (📖 p. 418)

18.9.34 Installing the front piston



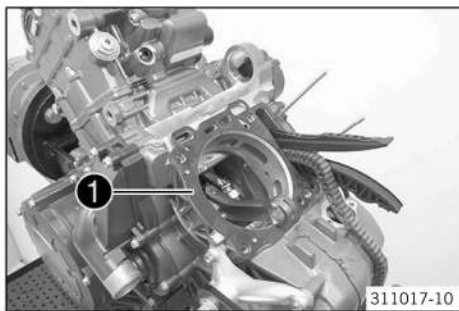
- Shift the gap of the piston rings by 120°.
- Place the oiled piston on the cylinder. Clamp the piston rings together using the special tool.

Piston ring compressor (60029015000) (📖 p. 414)

- ✓ The special tool must press the piston rings together properly and lie flush with the cylinder.



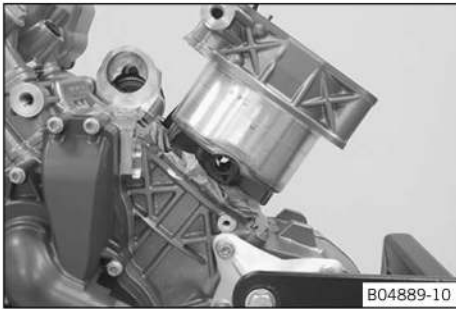
- Press the piston into the cylinder by striking it carefully with the hammer handle.
- ✓ The piston rings may not be left hanging, as they may be damaged.



- Place new cylinder base gasket **1** in position.



- Ensure that piston marking **2** faces the exhaust side.



- Cover the engine case opening with a cloth. Thread the timing chain through the timing chain shaft. Mount the piston pin.



- Position the new piston ring lock.



Info

For purposes of illustration, the following operations are shown on the removed piston.



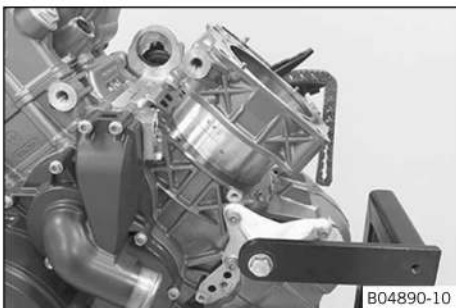
- Insert the special tool and press it with force towards the piston.

- Turn the special tool counterclockwise and, in doing so, press the piston ring lock into the groove.

Insertion for piston ring lock (75029035000) (📖 p. 422)

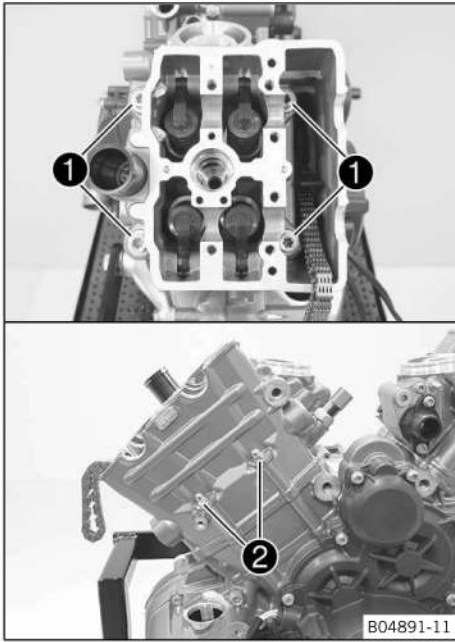


- Ensure that the piston ring lock is in the correct position on both sides.



- Remove the cloth.
- Keep the timing chain taut. Press the cylinder down carefully and bring dowel pins into contact.

18.9.35 Installing the front cylinder head



- Put the new cylinder head gasket in place.
- Put the cylinder head in place. Mount and tighten the new cylinder head screws **1** with washers.

Guideline

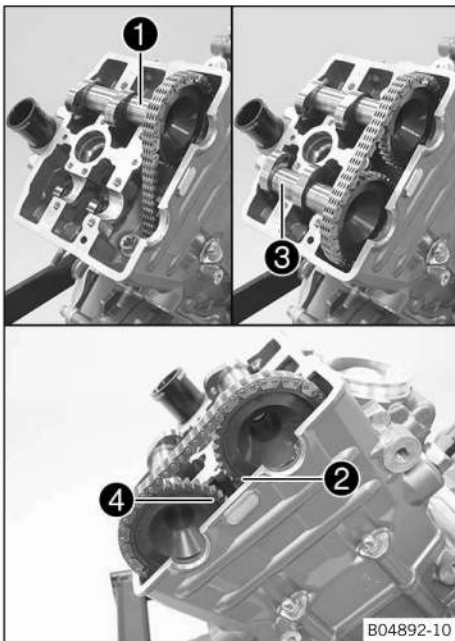
Cylinder head screw	M11x1.5	Tightening sequence: Using a crisscross pattern Step 1 15 Nm (11.1 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 90° Step 4 90° Lubricated with engine oil
---------------------	---------	--

- Mount and tighten nuts **2** with the washers.

Guideline

Nut, cylinder head	M6	9 Nm (6.6 lbf ft)
--------------------	----	-------------------

18.9.36 Installing the front camshafts



- Pull up the timing chain and insert intake camshaft **1**.

i Info

The intake camshaft is marked **INFR**.

- Place the timing chain over the rear sprocket of the intake camshaft.

✓ Marking **2** is aligned.

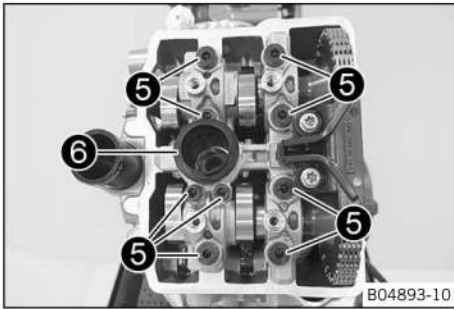
- Slip in exhaust camshaft **3**.

i Info

The exhaust camshaft is marked **EXFR**.

- Place the timing chain over the rear sprocket and position the camshaft in the bearing seat.

✓ Marking **4** is aligned.



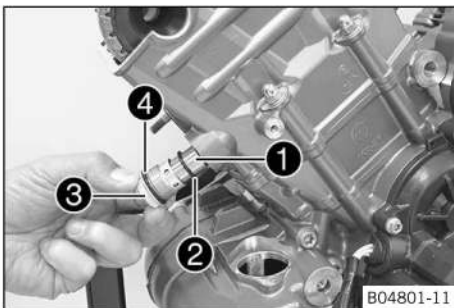
- Clean all oil nozzles thoroughly and blow out with compressed air.
- Mount the camshaft bearing support.
- Mount screws **5** and tighten them from the inside to the outside.

Guideline

Screw, camshaft bearing support	M6 – 10.9	10 Nm (7.4 lbf ft)
Screw, camshaft bearing support	M8 – 10.9	Step 1 10 Nm (7.4 lbf ft) Step 2 18 Nm (13.3 lbf ft)

- Grease the O-rings and mount spark plug shaft insert **6** with gasket.

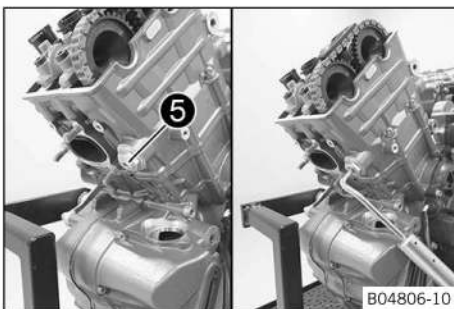
18.9.37 Installing the front timing chain tensioner



- Position timing chain tensioner **1** and insert it with new O-ring **2**.
- Mount and tighten screw plug **3** with new O-ring **4**.

Guideline

Plug, timing-chain tensioner	M24x1.5	25 Nm (18.4 lbf ft)
------------------------------	---------	---------------------



- Remove screw **5** and use the special tool to push the timing chain tensioner toward the timing chain.

Release device for timing chain tensioner (61229021000) (p. 419)

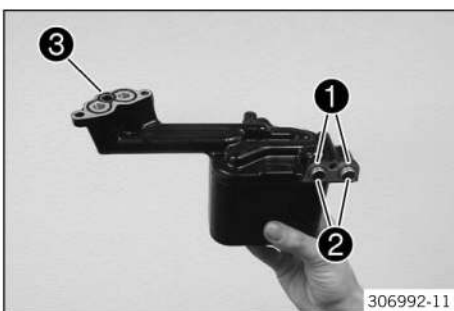
✓ The timing chain tensioner is unlocked.

- Mount and tighten screw **5**.

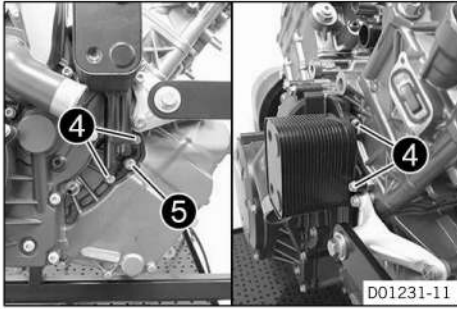
Guideline

Screw, timing chain tensioner release	M10x1	10 Nm (7.4 lbf ft)
---------------------------------------	-------	--------------------

18.9.38 Installing the heat exchanger



- Oil and mount O-rings **1**.
- Mount sleeves **2**.
- Mount gasket **3**.



- Position the heat exchanger.
- Mount and tighten screws ④.

Guideline

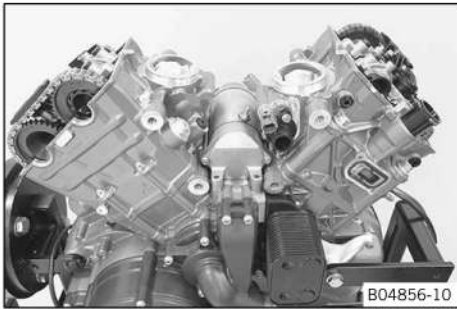
Remaining engine screws	M6	10 Nm (7.4 lbf ft)
-------------------------	----	--------------------

- Mount and tighten screw ⑤.

Guideline

Screw, heat exchanger	M8	15 Nm (11.1 lbf ft)
-----------------------	----	---------------------

18.9.39 Installing the starter motor



- Grease the O-ring. Position the starter motor.

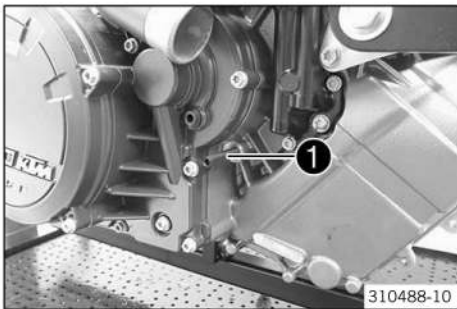
Long-life grease (📖 p. 408)



Info

The screws are mounted only in the vehicle.

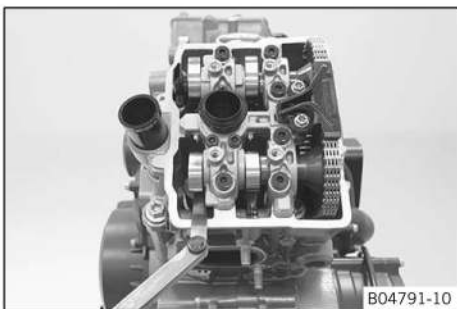
18.9.40 Checking the rear valve clearance



- Remove special tool ①.

Locking screw (61229015000) (📖 p. 418)

- Crank the engine several times.
- Set the engine to ignition top dead center of the rear cylinder. (📖 p. 212)



- On all valves, check the valve clearance between the camshaft and cam lever.

Guideline

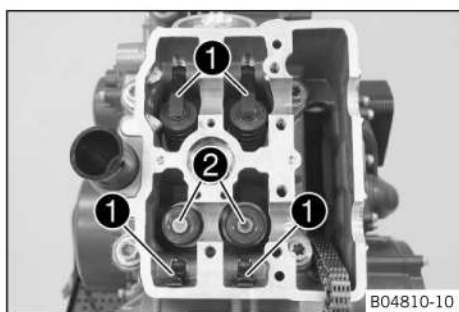
Valve clearance	
Exhaust at: 20 °C (68 °F)	0.25 ... 0.30 mm (0.0098 ... 0.0118 in)
Intake at: 20 °C (68 °F)	0.10 ... 0.15 mm (0.0039 ... 0.0059 in)

Feeler gauge (59029041100) (📖 p. 414)

- » If valve clearance does not meet specifications:
 - Adjust the rear valve clearance. (📖 p. 288)

18.9.41 Adjusting the rear valve clearance

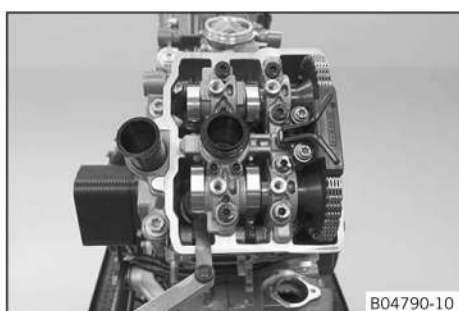
- Remove the rear timing chain tensioner. (📖 p. 213)
- Remove the rear camshafts. (📖 p. 214)



- Swing up cam lever ①.
- Remove shims ② and set them down according to the installation position.
- Correct the shims as indicated by the results of the valve clearance check.
- Insert suitable shims.
- Install the rear camshaft. (📖 p. 282)
- Install the rear timing chain tensioner. (📖 p. 283)
- Check the rear valve clearance. (📖 p. 288)



18.9.42 Checking the front valve clearance



- Remove the special tool.
- Locking screw (61229015000) (📖 p. 418)
- Crank the engine several times.
 - Set the engine to ignition top dead center of the front cylinder. (📖 p. 215)
 - Check the valve clearance between the camshaft and cam lever on all valves.

Guideline

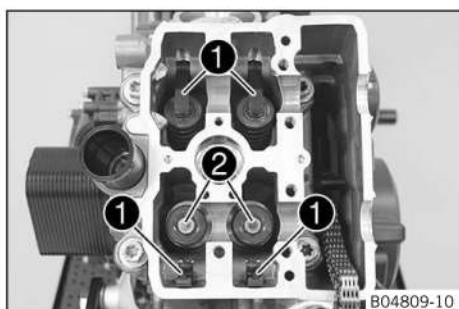
Valve clearance	
Exhaust at: 20 °C (68 °F)	0.25 ... 0.30 mm (0.0098 ... 0.0118 in)
Intake at: 20 °C (68 °F)	0.10 ... 0.15 mm (0.0039 ... 0.0059 in)

Feeler gauge (59029041100) (📖 p. 414)

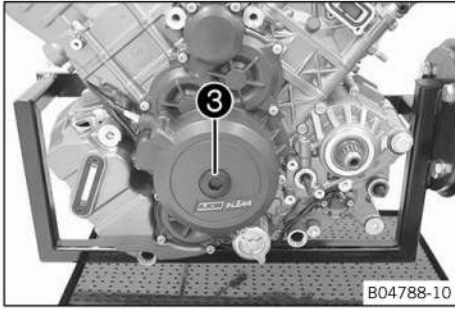
- » If the valve clearance does not meet specifications:
 - Adjust the front valve clearance. (📖 p. 289)



18.9.43 Adjusting the front valve clearance



- Remove the front timing chain tensioner. (📖 p. 216)
- Remove the front camshafts. (📖 p. 216)
- Swing up cam lever ①.
- Remove shims ② and set them down according to the installation position.
- Correct the shims based on the results of the valve clearance check.
- Insert suitable shims.
- Install the front camshafts. (📖 p. 286)
- Install the front timing chain tensioner. (📖 p. 287)
- Check the front valve clearance. (📖 p. 289)

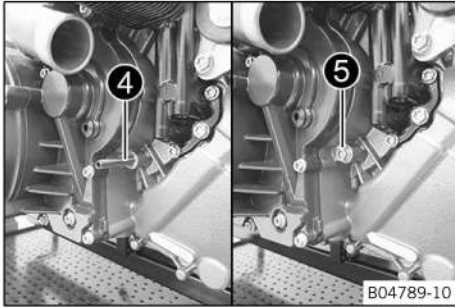


B04788-10

- Mount and tighten screw plug **3** with the O-ring.

Guideline

Screw plug, alternator cover	M24x1.5	8 Nm (5.9 lbf ft)
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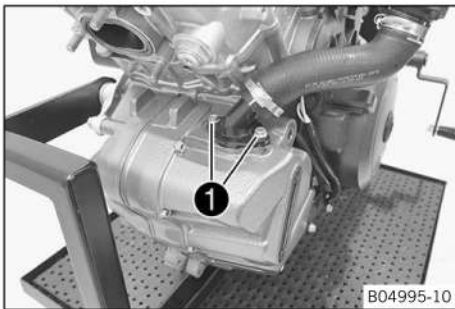
B04789-10

- Remove special tool **4**. Mount and tighten screw **5** with the washer.

Guideline

Plug, crankshaft retainer	M8	15 Nm (11.1 lbf ft)
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18.9.44 Installing the oil filler tube



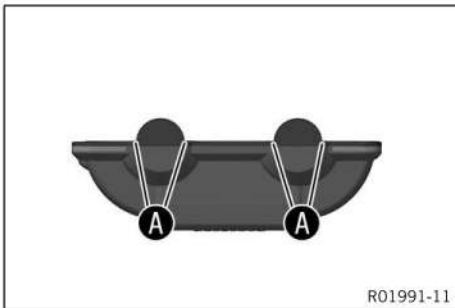
B04995-10

- Mount the oil filler tube with the O-ring.
- Mount and tighten screws **1**.

Guideline

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

18.9.45 Installing the front valve cover



R01991-11

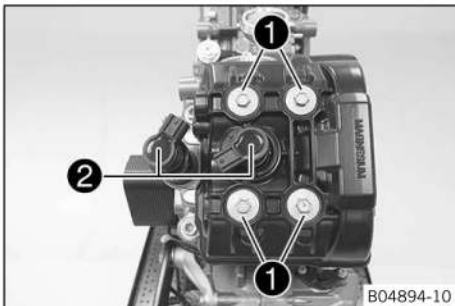
- Clean and degrease the valve cover seal.
- Apply a thin layer of sealing compound to area **A**.

Loctite® 5910



Info

The front valve cover is not equipped with a connector for the engine vent.



B04894-10

- Position the valve cover seal.
- Put the valve cover in place with the gasket. Mount and tighten screws **1**.

Guideline

Screw, valve cover	M6	10 Nm (7.4 lbf ft)
--------------------	----	--------------------

- Mount and tighten the spark plugs using a special tool.

Guideline

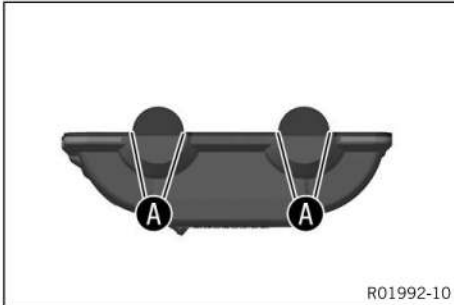
Spark plug	M12x1.5	18 Nm (13.3 lbf ft)
Spark plug	M10x1	11 Nm (8.1 lbf ft)

Spark plug wrench with link (77229172000) (🔗 p. 423)

- Mount ignition coils ②.



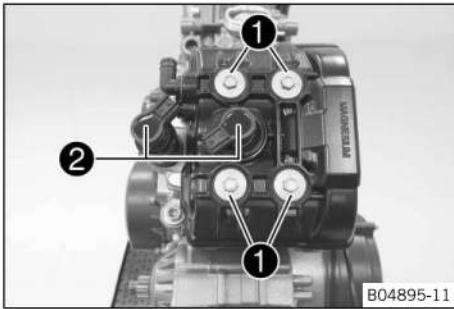
18.9.46 Installing rear valve cover



- Clean and degrease the valve cover seal.
- Apply a thin layer of sealing compound to area A.

Loctite® 5910

i Info
The rear valve cover is equipped with a connector for the engine vent.



- Position the valve cover seal.
- Put the valve cover in place with the gasket. Mount and tighten screws ①.

Guideline

Screw, valve cover	M6	10 Nm (7.4 lbf ft)
--------------------	----	--------------------

- Mount and tighten the spark plugs using a special tool.

Guideline

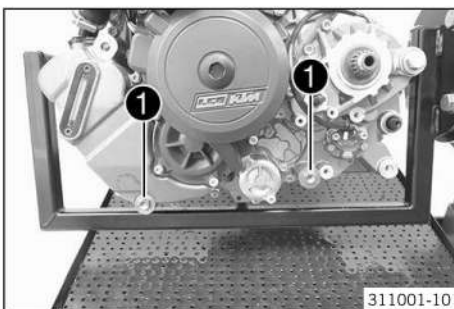
Spark plug	M12x1.5	18 Nm (13.3 lbf ft)
Spark plug	M10x1	11 Nm (8.1 lbf ft)

Spark plug wrench with link (77229172000) (🔗 p. 423)

- Mount ignition coils ②.



18.9.47 Installing the oil drain plug



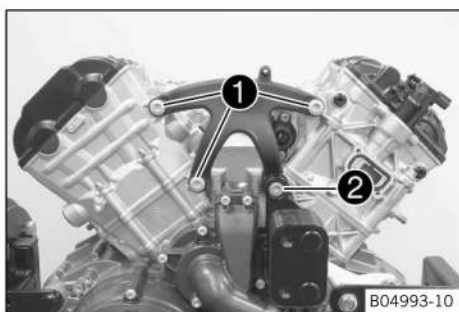
- Mount the new O-rings.
- Mount and tighten oil drain plug ① with the magnet, O-rings and oil screen.

Guideline

Oil drain plug	M20x1.5	20 Nm (14.8 lbf ft)
----------------	---------	---------------------



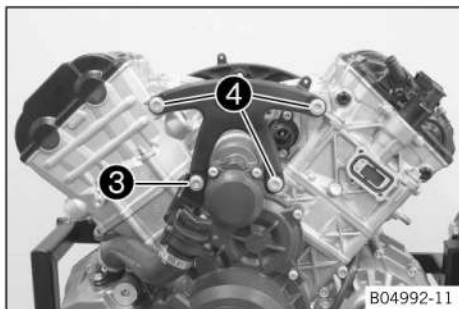
18.9.48 Mounting the engine bearer



- Position the engine bearer.
- Mount and firmly tighten screws **1** and screw **2** with collar sleeve.

Guideline

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



- Position engine bearer and oil filler tube.
- Mount screw **3**, but do not tighten yet.

Guideline

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

- Mount and tighten screws **4**.

Guideline

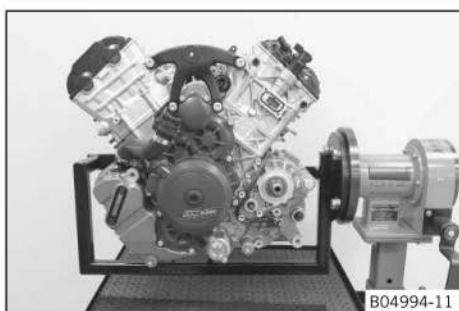
Screw, engine bearer	M10	45 Nm (33.2 lbf ft)
----------------------	-----	---------------------

- Tighten screw **3**.

Guideline

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

18.9.49 Removing the engine from the engine assembly stand



- Remove fittings.
- Remove the engine from the engine assembly stand.

i Info

Work with an assistant or a motorized hoist.

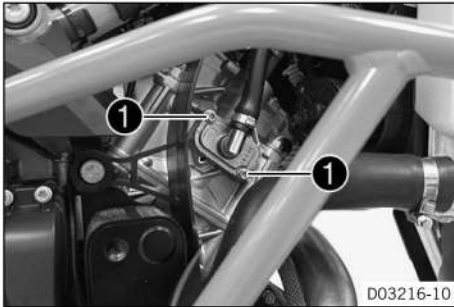
19.1 Changing the SAS membrane

Preparatory work

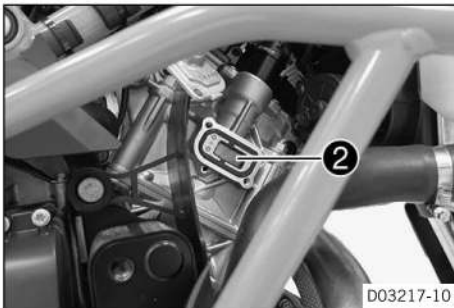
- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)
- Remove the fuel tank. (📖 p. 96)

Main work

- Remove screws ①.
- Pull off the cover and hang it to one side.



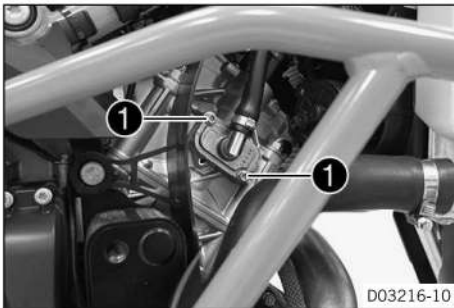
- Remove SAS membrane ②.
- Mount the new SAS membrane.
- ✓ The SAS membrane is positioned flush in the cylinder.



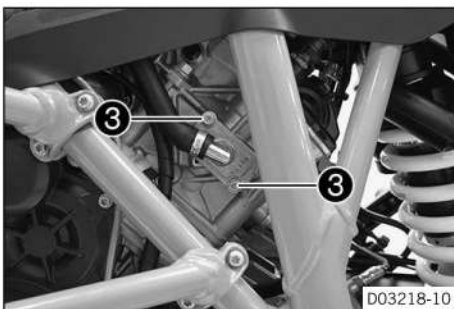
- Position the cover.
- Mount and tighten screws ①.

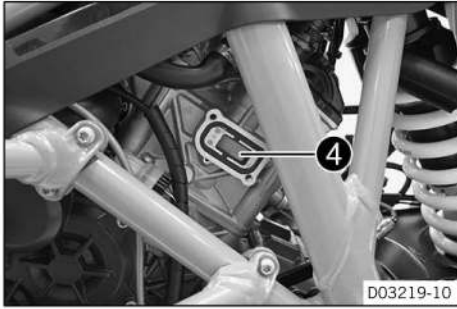
Guideline

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

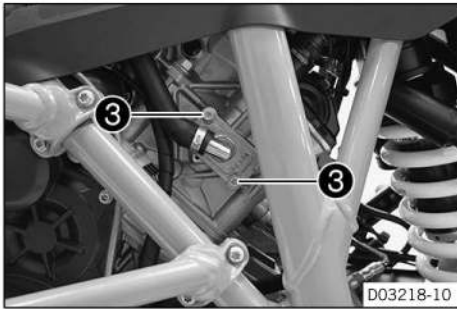


- Remove screws ③.
- Pull off the cover and hang it to one side.





- Remove SAS membrane ④.
- Mount the new SAS membrane.
- ✓ The SAS membrane is positioned flush in the cylinder.



- Position the cover.
- Mount and tighten screws ③.

Guideline

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

Finishing work

- Install the fuel tank. (📖 p. 98)
- Install the mask spoiler. (📖 p. 114)
- Install the fuel tank cover. (📖 p. 112)
- Install the front side cover. (📖 p. 110)
- Mount the seat. (📖 p. 96)

20.1 Checking/correcting the fluid level of the hydraulic clutch



Warning

Skin irritation Brake fluid causes skin irritation.

- Keep brake fluid out of the reach of children.
- Wear suitable protective clothing and safety glasses.
- Do not allow brake fluid to come into contact with the skin, the eyes or clothing.
- Consult a doctor immediately if brake fluid has been swallowed.
- Rinse the affected area with plenty of water in the event of contact with the skin.
- Rinse eyes thoroughly with water immediately and consult a doctor if brake fluid comes into contact with the eyes.
- If brake fluid spills on to your clothing, change the clothing.



Note

Environmental hazard Hazardous substances cause environmental damage.

- Dispose of oils, grease, filters, fuel, cleaning agents, brake fluid, etc., correctly and in compliance with the applicable regulations.



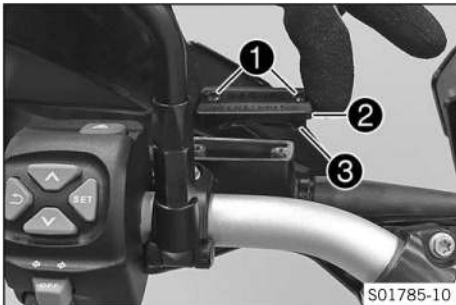
Info

The fluid level rises with increasing wear of the clutch facing discs.

Never use DOT 5 brake fluid. It is silicone-based and purple in color. Oil seals and clutch lines are not designed for DOT 5 brake fluid.

Avoid contact between brake fluid and painted parts. Brake fluid attacks paint.

Only use clean brake fluid from a sealed container.



- Move the clutch fluid reservoir mounted on the handlebar to a horizontal position.
- Remove screws ①.
- Take off cover ② with membrane ③.
- Check the fluid level.

Fluid level below container rim	4 mm (0.16 in)
---------------------------------	----------------

» If the fluid level does not meet specifications:

- Correct the fluid level of the hydraulic clutch.

Brake fluid DOT 4 / DOT 5.1 (📖 p. 406)
--

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



Info

Clean up overflowed or spilled brake fluid immediately with water.

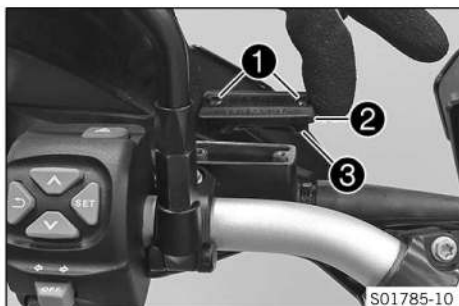
20.2 Changing the hydraulic clutch fluid



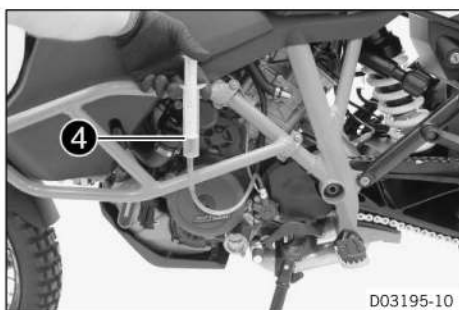
Note

Environmental hazard Hazardous substances cause environmental damage.

- Dispose of oils, grease, filters, fuel, cleaning agents, brake fluid, etc., correctly and in compliance with the applicable regulations.



- Move the clutch fluid reservoir mounted on the handlebar to a horizontal position.
- Remove screws ①.
- Remove cover ② with membrane ③.



- Fill bleeding syringe ④ with the appropriate hydraulic fluid.

Syringe (50329050000) (📖 p. 412)

Brake fluid DOT 4 / DOT 5.1 (📖 p. 406)
--

- On the slave cylinder, remove the bleeder screw and mount bleeding syringe ④.



- Now press the fluid into the system until it emerges from the hole ⑤ of the master cylinder without bubbles.
- Now and then, extract fluid from the master cylinder reservoir to prevent overflow.
- Remove the bleeding syringe. Mount and tighten screws bleeder screw.
- Correct the fluid level of the hydraulic clutch.

Guideline

Fluid level below container rim	4 mm (0.16 in)
---------------------------------	----------------

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

20.3 Checking the clutch



Warning

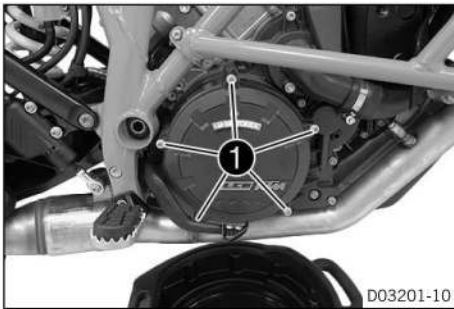
Danger of scalding Engine and gear oil get very hot when the motorcycle is ridden.

- Wear suitable protective clothing and safety gloves.
- In the event of scalding, rinse the area affected immediately with lukewarm water.

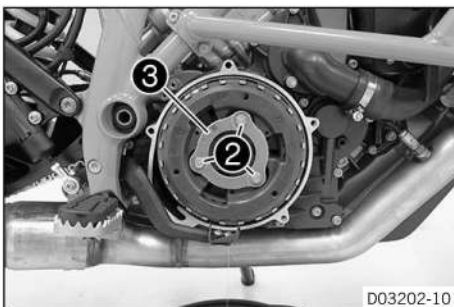
**Note**

Environmental hazard Hazardous substances cause environmental damage.

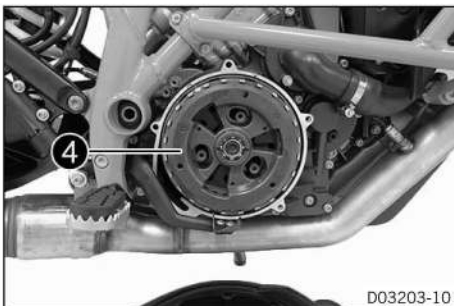
- Dispose of oils, grease, filters, fuel, cleaning agents, brake fluid, etc., correctly and in compliance with the applicable regulations.

**Main work**

- Place an appropriate container under the engine.
- Remove screws **1**.
- Take off the outer clutch cover.



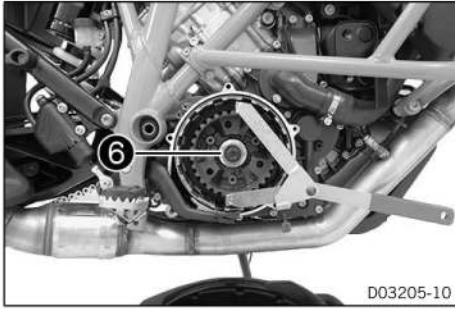
- Remove screws **2**.
- Take off clutch center **3** and the springs.



- Take off the clutch pressure cap **4**.



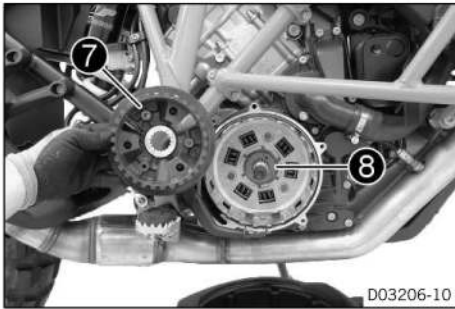
- Remove clutch discs **5**, support ring, and pretension ring.



- Hold the inner clutch hub with the special tool.

Holding wrench (51129003000) (📖 p. 413)

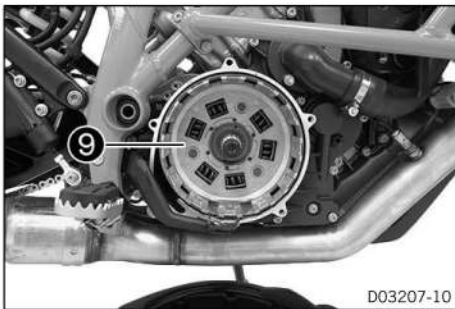
- Remove nut 6 with the washer.



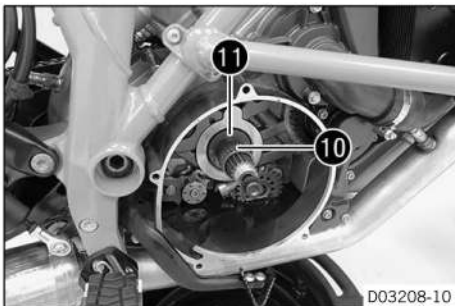
- Take off inner clutch hub 7 and washer 8.

i Info

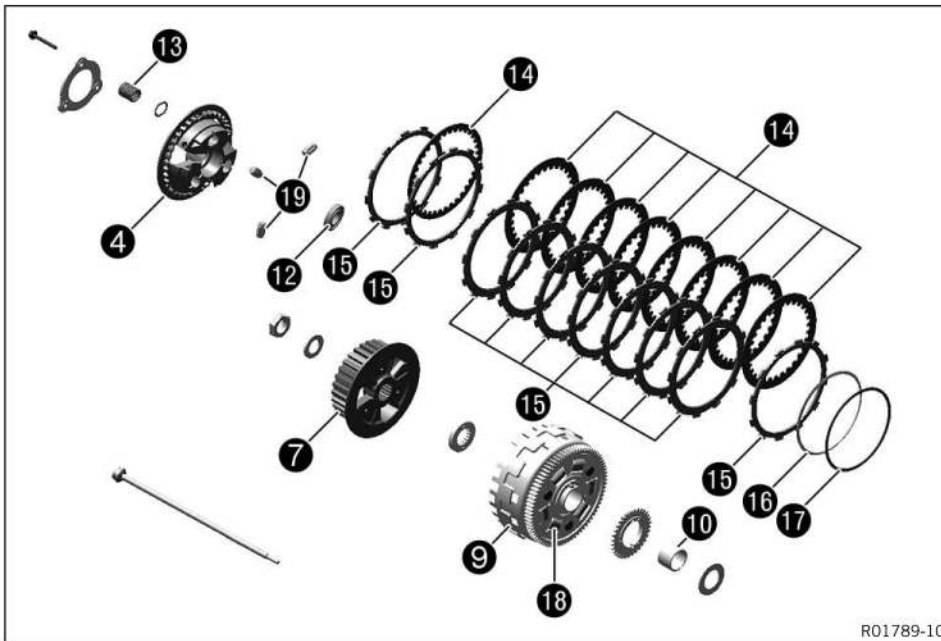
The washer usually sticks to the inner clutch hub.



- Remove clutch basket 9 with oil pump drive gear.



- Remove needle bearing 10 and washer 11.



R01789-10

- Check axial bearing **12** for damage and wear.
 - » If there is damage or wear:
 - Change the axial bearing.
- Check the length of clutch springs **13**.
- Check the contact surface of clutch pressure cap **4** for damage and wear.
 - » If there is damage or wear:
 - Change the clutch pressure cap.
- Check the thrust surfaces of the clutch facing discs in clutch basket **9** for wear.

Clutch spring - length	≥ 45.8 mm (≥ 1.803 in)
------------------------	------------------------

- » If the clutch spring length is shorter than specified:
 - Change all clutch springs.

Clutch basket - thrust surface of clutch facing discs	
Wear limit	0.5 mm (0.02 in)

- » If the thrust surface exhibits excessive wear:
 - Change the clutch disc pack and the clutch basket.

- Check needle bearing **10** for damage and wear.
 - » If there is damage or wear:
 - Change the needle bearing.
- Check intermediate clutch discs **14** for damage and wear.
 - » If the intermediate clutch discs are not level and are pitted:
 - Change the clutch disc pack.
- Check clutch facing discs **15** for discoloration and scoring.
 - » If there is discoloration or scoring:
 - Change the clutch disc pack.
- Check the thickness of the clutch disc pack.

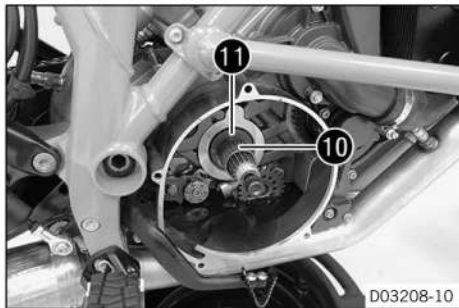
Clutch disc pack - thickness	
New condition	47.20 ... 48.00 mm (1.8583 ... 1.8898 in)
Wear limit	46.00 mm (1.811 in)

- » If the clutch disc pack does not meet specifications:
 - Change the clutch disc pack.
- Check pretension ring **16** and support ring **17** for damage and wear.
 - » If there is damage or wear:
 - Change the pretension ring and support ring.
- Check inner clutch hub **7** for damage and wear.
 - » If there is damage or wear:
 - Change the inner clutch hub.
- Check springs **18** of the clutch basket for damage and wear.
 - » If there is damage, wear or play in the direction of rotation:
 - Change the clutch basket.
- Check damper **19** for damage and wear.

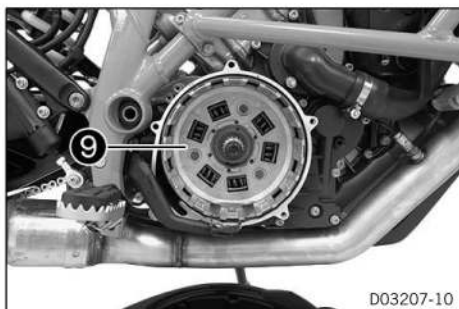
i **Info**

If the clutch pressure cap can be mounted without resistance from the damper, the dampers are too hard and are worn out.

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



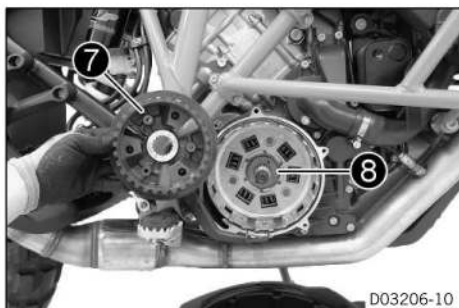
- Mount washer **11** and needle bearing **10**.



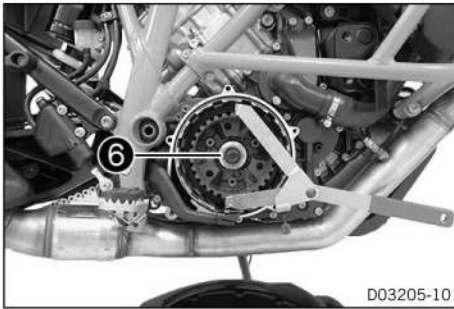
- Mount clutch basket **9** with oil pump drive gear.

i **Info**

Turn the clutch basket and the oil pump gear wheel backwards and forwards slightly to help them mesh more easily.



- Mount washer **8**.
- Mount inner clutch hub **7**.

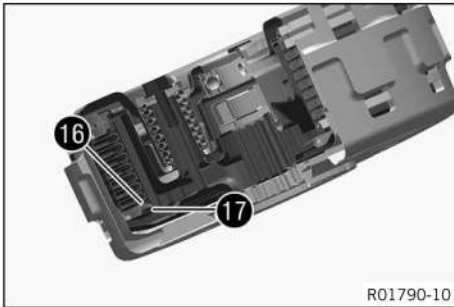


- Mount nut **6** with the washer.
- Tighten the nut, holding the inner clutch hub with a special tool.

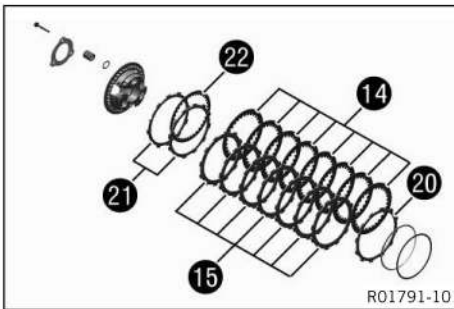
Guideline

Nut, inner clutch hub	M22x1.5	120 Nm (88.5 lbf ft) Loctite®243™
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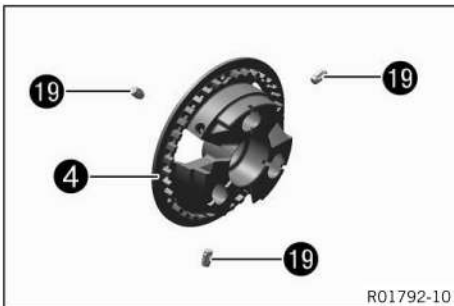
Holding wrench (51129003000) (📖 p. 413)



- Mount support ring **17** and pretension ring **16**.
- ✓ The pretension ring rests against the support ring on the inside and the outside faces away from the support ring.



- Thoroughly oil the clutch facing discs.
- Mount a clutch facing disc **20** with a larger inside diameter.
- Alternately mount 8 intermediate clutch discs **14** and 7 of the same clutch facing discs **15**.
- Alternately mount 2 clutch facing discs **21** and an intermediate clutch disc **22** with a larger inside diameter.
- Mount the outer clutch facing disc offset by one mesh.



- Mount damper **19** in the clutch pressure cap **4**.

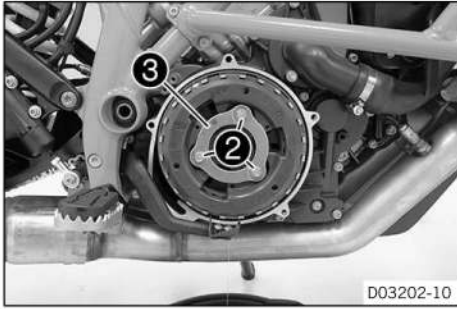


Info

When changing the clutch discs, always renew the damper.



- Position clutch pressure cap **4**.
- ✓ The teeth of the outer intermediate clutch disc engages in the clutch pressure cap.
- ✓ The clutch pressure cap rests flush against the outer lining disc.



- Position clutch center **3** and the springs.
- Mount and tighten screws **2**.

Guideline

Screw, clutch spring	M6	12 Nm (8.9 lbf ft)
----------------------	----	--------------------



- Position the outer clutch cover.
- Mount screws **1** and tighten in a crisscross pattern.

Guideline

Screw, clutch cover	M6	10 Nm (7.4 lbf ft)
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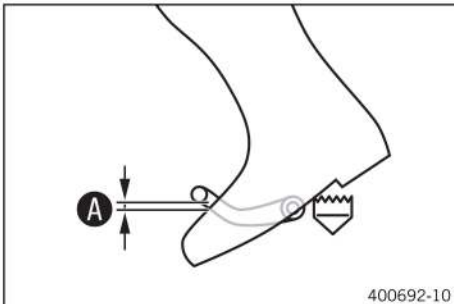
Finishing work

- Check the engine oil level. (📖 p. 339)

21.1 Checking the basic position of the shift lever

i Info

When driving, the shift lever must not touch the rider's boot when in the basic position. When the shift lever keeps touching the boot, the transmission will be subject to an excessive load.

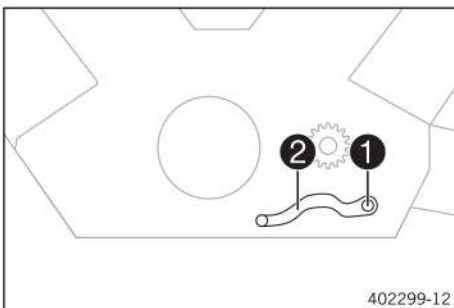


- Sit on the vehicle in the riding position and determine distance **A** between the upper edge of your boot and the shift lever.

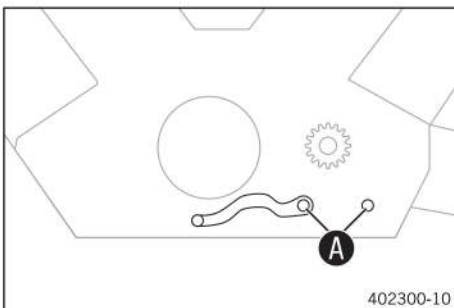
Distance between shift lever and upper edge of boot	10 ... 20 mm (0.39 ... 0.79 in)
---	---------------------------------

- » If the distance does not meet specifications:
 - Set the basic position of the shift lever. (p. 303)

21.2 Adjusting the basic position of the shift lever



- Remove screw **1** with the washers and take off shift lever **2**.



- Clean gear teeth **A** of the shift lever and shift shaft.
- Mount the shift lever on the shift shaft in the required position and engage the gearing.

i Info

The range of adjustment is limited. The shift lever must not come into contact with any other vehicle components during the shift procedure.

- Mount and tighten screw **1** with the washers.

Guideline

Screw, shift lever	M6	15 Nm (11.1 lbf ft) Loctite®243™
--------------------	----	--

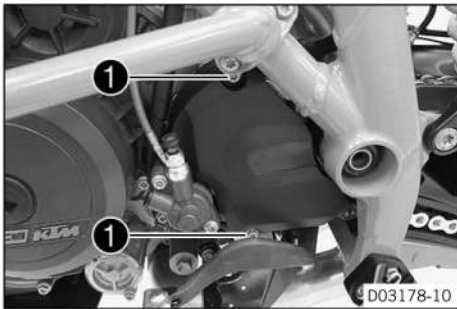
21.3 Changing the gear position sensor

Preparatory work

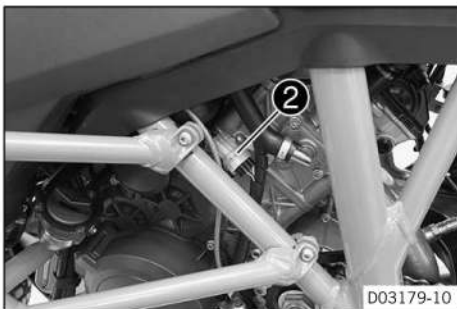
- Raise the motorcycle with the rear lifting gear. (📖 p. 14)

Main work

- Remove screws ❶.
- Take off the engine sprocket cover.



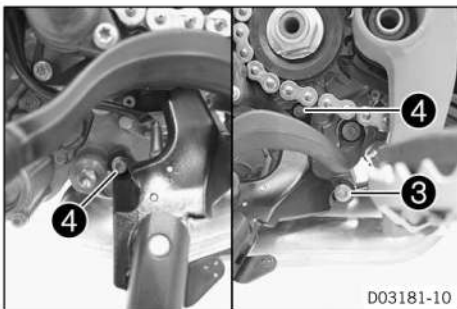
- Disconnect plug-in connector ❷.



- Remove the cable tie(s) and expose the cable.



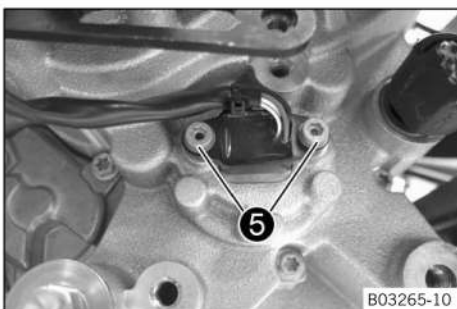
- Remove screw ❸.
- Remove screws ❹.
- Remove the side stand bracket and hang it to one side.

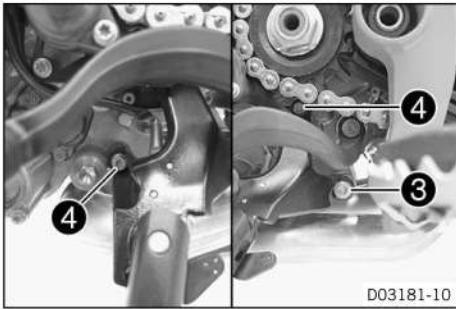


- Remove screws ❺ with the washers.
- Take off the gear position sensor.
- Position the new gear position sensor.
- Mount and tighten screws ❺ with the washers.

Guideline

Screw, gear sensor	M5	6 Nm (4.4 lbf ft) Loctite®243™
--------------------	----	--





- Position the side stand bracket.
- Mount screw ③ but do not tighten yet.

Guideline

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

- Mount and tighten screws ④.

Guideline

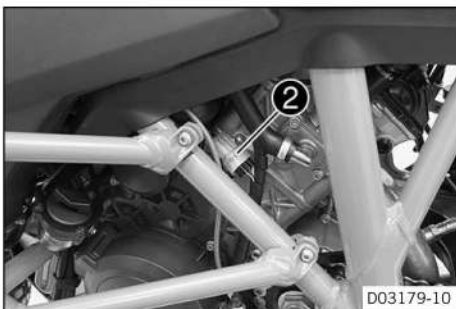
Screw, side stand bracket	M8	25 Nm (18.4 lbf ft)
---------------------------	----	---------------------

- Tighten screw ③.

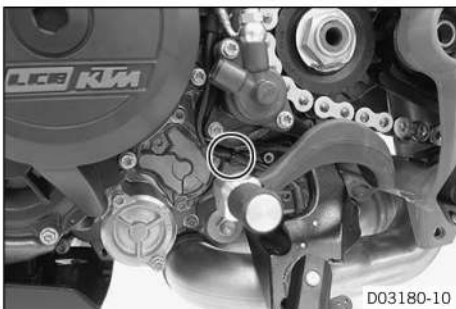
Guideline

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

- Join plug-in connector ②.



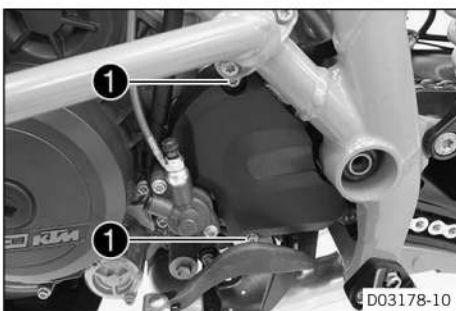
- Route the cable so it is not under tension and secure with a cable tie and a cable guard.



- Position the engine sprocket cover.
- Mount and tighten screws ①.

Guideline

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



Finishing work

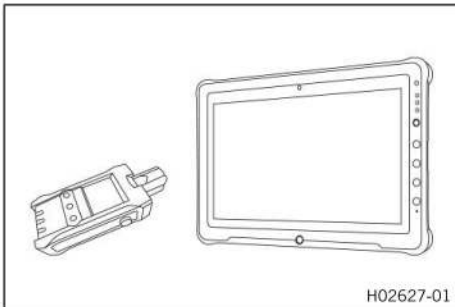
- Remove the rear of the motorcycle from the lifting gear. (📖 p. 14)
- Program the gear position sensor. (📖 p. 306)

21.4 Programming the gear position sensor

Condition

The diagnostic tool is connected and running.

- Execute "**Engine electronics**" > "**Functions**" > "**Program the gear position sensor**".
- Switch the ignition off and on again.
 - ✓ The green idle indicator lamp **N** lights up.



H02627-01

22.1 Checking the coolant level in the compensating tank



Warning

Danger of scalding During motorcycle operation, the coolant gets very hot and is under pressure.

- Do not open the radiator, the radiator hoses or other cooling system components if the engine or the cooling system are at operating temperature.
- Allow the cooling system and the engine to cool down before you open the radiator, the radiator hoses or other components of the cooling system.
- In the event of scalding, rinse the area affected immediately with lukewarm water.



Warning

Danger of poisoning Coolant is toxic and a health hazard.

- Keep coolant out of the reach of children.
- Do not allow coolant to come into contact with the skin, the eyes and clothing.
- Consult a doctor immediately if coolant is swallowed.
- Rinse the affected area immediately with plenty of water in the event of contact with the skin.
- Rinse eyes thoroughly with water and consult a doctor immediately if coolant gets into the eyes.
- Change clothing if coolant spills onto your clothing.

Condition

The engine is cold.

The radiator is completely full.

- Park the motorcycle on a horizontal surface.
- Check the coolant level in the compensating tank ①.

The coolant level must be between **MIN** and **MAX**.

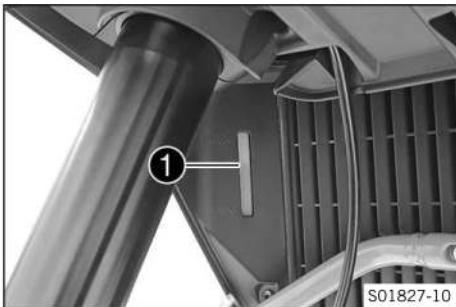
- » If there is no coolant in the compensating tank:
 - Check the cooling system for leaks.



Info

Do not start up the motorcycle!

- Add coolant/bleed the cooling system. (📖 p. 310)
- » If the coolant in the compensating tank is not at the required level, but the tank is not empty:
 - Correct the coolant level in the compensating tank. (📖 p. 314)



22.2 Checking the coolant fill level and antifreeze



Warning

Danger of scalding During motorcycle operation, the coolant gets very hot and is under pressure.

- Do not open the radiator, the radiator hoses or other cooling system components if the engine or the cooling system are at operating temperature.
- Allow the cooling system and the engine to cool down before you open the radiator, the radiator hoses or other components of the cooling system.
- In the event of scalding, rinse the area affected immediately with lukewarm water.



Warning

Danger of poisoning Coolant is toxic and a health hazard.

- Keep coolant out of the reach of children.
- Do not allow coolant to come into contact with the skin, the eyes and clothing.
- Consult a doctor immediately if coolant is swallowed.
- Rinse the affected area immediately with plenty of water in the event of contact with the skin.
- Rinse eyes thoroughly with water and consult a doctor immediately if coolant gets into the eyes.
- Change clothing if coolant spills onto your clothing.

Condition

The engine is cold.

Preparatory work

- Park the motorcycle on a horizontal surface.
- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)
- Remove the fuel tank. (📖 p. 96)

Main work

- Remove radiator cap ❶ and the cover of the compensating tank.
- Check the antifreeze in the coolant.

-25 ... -45 °C (-13 ... -49 °F)

- » If the antifreeze in the coolant does not match the specified value:
 - Correct the antifreeze in the coolant.

- Check the coolant level.

The radiator must be filled completely.

The coolant level in the compensating tank must be between MIN and MAX .
--

- » If the coolant level does not match the specified value:
 - Check the coolant level and the reason for the loss.
- Mount the radiator cap and the cover of the compensating tank.

Finishing work

- Install the fuel tank. (📖 p. 98)
- Install the mask spoiler. (📖 p. 114)
- Install the fuel tank cover. (📖 p. 112)
- Install the front side cover. (📖 p. 110)
- Mount the seat. (📖 p. 96)



22.3 Draining the coolant



Warning

Danger of scalding During motorcycle operation, the coolant gets very hot and is under pressure.

- Do not open the radiator, the radiator hoses or other cooling system components if the engine or the cooling system are at operating temperature.
- Allow the cooling system and the engine to cool down before you open the radiator, the radiator hoses or other components of the cooling system.
- In the event of scalding, rinse the area affected immediately with lukewarm water.



Warning

Danger of poisoning Coolant is toxic and a health hazard.

- Keep coolant out of the reach of children.
- Do not allow coolant to come into contact with the skin, the eyes and clothing.
- Consult a doctor immediately if coolant is swallowed.
- Rinse the affected area immediately with plenty of water in the event of contact with the skin.
- Rinse eyes thoroughly with water and consult a doctor immediately if coolant gets into the eyes.
- Change clothing if coolant spills onto your clothing.

Condition

The engine is cold.

Preparatory work

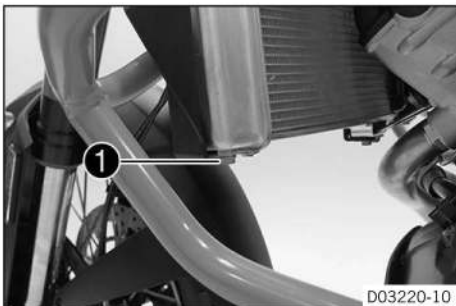
- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)
- Remove the fuel tank. (📖 p. 96)

Main work

- Place an appropriate container under the radiator.
- Remove screw ❶ with the seal ring.
- Remove the radiator cap.
- Completely drain the coolant.
- Mount and tighten screw ❶ with a new seal ring.

Guideline

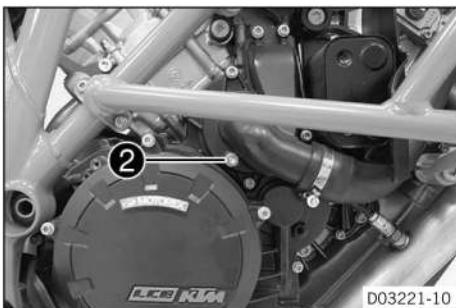
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
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- Place an appropriate container under the engine.
- Remove screw ❷ with the seal ring.
- Completely drain the coolant.
- Mount and tighten screw ❷ with a new seal ring.

Guideline

Screw, water pump cover	M6	10 Nm (7.4 lbf ft)
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22.4 Adding coolant/bleeding the cooling system



Warning

Danger of poisoning Coolant is toxic and a health hazard.

- Keep coolant out of the reach of children.
- Do not allow coolant to come into contact with the skin, the eyes and clothing.
- Consult a doctor immediately if coolant is swallowed.
- Rinse the affected area immediately with plenty of water in the event of contact with the skin.
- Rinse eyes thoroughly with water and consult a doctor immediately if coolant gets into the eyes.
- Change clothing if coolant spills onto your clothing.

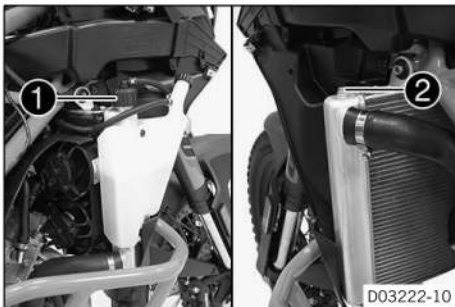
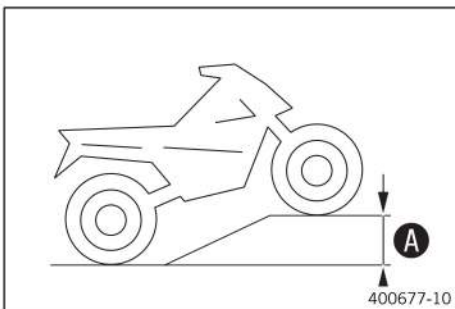
Condition

Fuel tank is removed and the heat protector swung upward to the left.

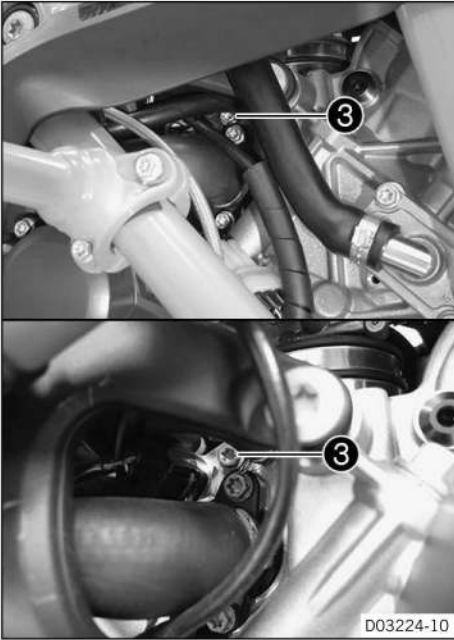
- Move the vehicle into the position shown and prevent it from rolling away. Height difference **A** must be reached.

Guideline

Height difference A	50 cm (19.7 in)
----------------------------	-----------------



- Remove radiator cap **1** and bleeder screw **2** of the radiator.



- Remove bleeder screws **3** of the cylinder heads.
- Add coolant until it exits from the vent holes without bubbles.

Coolant	2.40 l (2.54 qt.)	Coolant (📖 p. 406)
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- Mount and tighten bleeder screws **2** and **3** with the new seal rings.

Guideline

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



- Completely fill the radiator with coolant and close it with radiator cap **1**.
- Position the vehicle on a horizontal surface.
- Remove the cover of the compensating tank.
- Add coolant to the compensating tank until the coolant reaches the specified level.

Guideline

The coolant level must be between MIN and MAX .

- Mount the cover of the compensating tank.

22.5 Change the coolant



Warning

Danger of scalding During motorcycle operation, the coolant gets very hot and is under pressure.

- Do not open the radiator, the radiator hoses or other cooling system components if the engine or the cooling system are at operating temperature.
- Allow the cooling system and the engine to cool down before you open the radiator, the radiator hoses or other components of the cooling system.
- In the event of scalding, rinse the area affected immediately with lukewarm water.



Warning

Danger of poisoning Coolant is toxic and a health hazard.

- Keep coolant out of the reach of children.
- Do not allow coolant to come into contact with the skin, the eyes and clothing.
- Consult a doctor immediately if coolant is swallowed.
- Rinse the affected area immediately with plenty of water in the event of contact with the skin.
- Rinse eyes thoroughly with water and consult a doctor immediately if coolant gets into the eyes.
- Change clothing if coolant spills onto your clothing.

Condition

The engine is cold.

Preparatory work

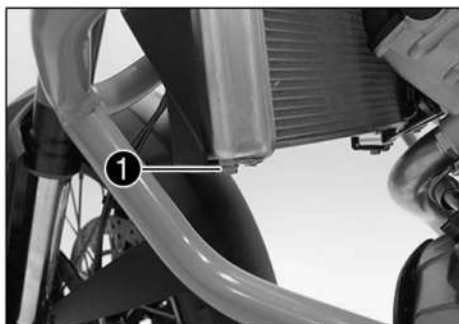
- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)
- Remove the fuel tank. (📖 p. 96)

Main work

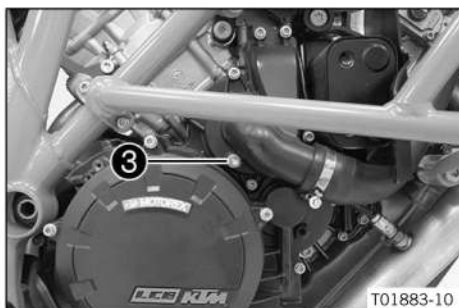
- Place an appropriate container under the radiator.
- Remove screw **1** with the seal ring.
- Take off radiator cap **2**.
- Completely drain the coolant.
- Mount and tighten screw **1** with a new seal ring.

Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
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T01882-10

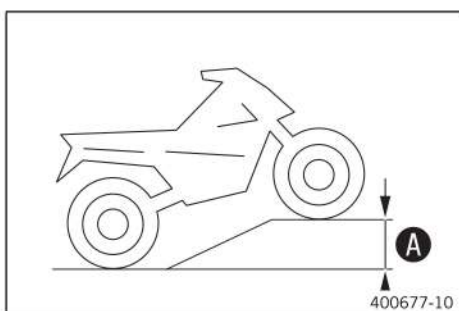


T01883-10

- Place an appropriate container under the engine.
- Remove screw **3** with the seal ring.
- Completely drain the coolant.
- Mount and tighten screw **3** with a new seal ring.

Guideline

Screw, water pump cover	M6	10 Nm (7.4 lbf ft)
-------------------------	----	--------------------

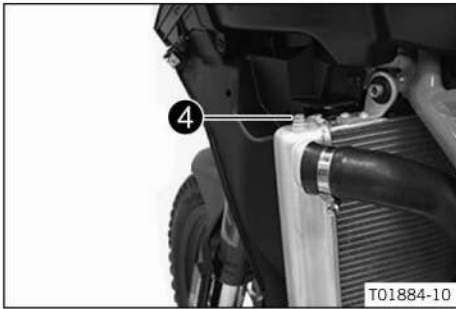


400677-10

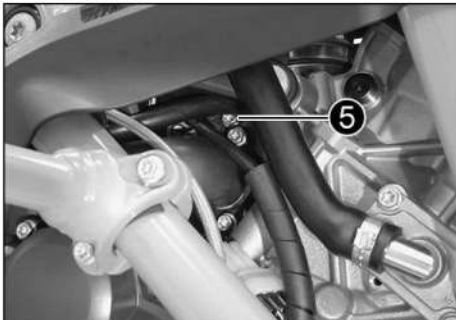
- Move the vehicle into the position shown and prevent it from rolling away. Height difference **A** must be reached.

Guideline

Height difference A	50 cm (19.7 in)
----------------------------	-----------------



- Remove bleeder screw **4** of the radiator with seal ring.



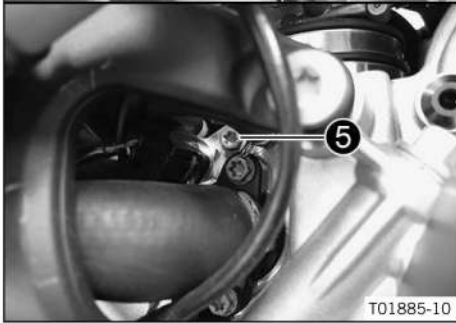
- Remove bleeder screws **5** of the cylinder heads with seal rings.
- Add coolant until it exits from the vent holes without bubbles.

Coolant	2.40 l (2.54 qt.)	Coolant (📖 p. 406)
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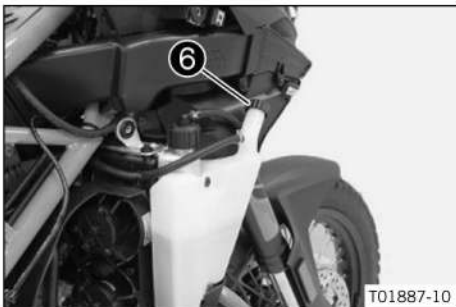
- Mount and tighten bleeder screws **4** and **5** with the new seal rings.

Guideline

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



- Completely fill the radiator with coolant and close it with radiator cap **2**.



- Position the vehicle on a horizontal surface.
- Remove cover **6** of the compensating tank.
- Add coolant to the compensating tank until the coolant reaches the specified level.

Guideline

The coolant level must be between MIN and MAX .

- Mount the cover of the compensating tank.

Finishing work

- Install the fuel tank. (📖 p. 98)
- Install the mask spoiler. (📖 p. 114)
- Install the fuel tank cover. (📖 p. 112)

- Install the front side cover. (📖 p. 110)
- Mount the seat. (📖 p. 96)



Danger

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

- Always make sure there is sufficient ventilation when running the engine.
- Use effective exhaust extraction when starting or running the engine in an enclosed space.

- Start the engine and let it warm up.
- Stop 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.

22.6 Correcting the coolant level in the compensating tank



Warning

Danger of scalding During motorcycle operation, the coolant gets very hot and is under pressure.

- Do not open the radiator, the radiator hoses or other cooling system components if the engine or the cooling system are at operating temperature.
- Allow the cooling system and the engine to cool down before you open the radiator, the radiator hoses or other components of the cooling system.
- In the event of scalding, rinse the area affected immediately with lukewarm water.



Warning

Danger of poisoning Coolant is toxic and a health hazard.

- Keep coolant out of the reach of children.
- Do not allow coolant to come into contact with the skin, the eyes and clothing.
- Consult a doctor immediately if coolant is swallowed.
- Rinse the affected area immediately with plenty of water in the event of contact with the skin.
- Rinse eyes thoroughly with water and consult a doctor immediately if coolant gets into the eyes.
- Change clothing if coolant spills onto your clothing.

Condition

The engine is cold.

The radiator is completely full.

Preparatory work

- Check the coolant level in the compensating tank. (📖 p. 307)
- Remove the front side cover. (📖 p. 110)



Info

Only disassemble the right-hand side.



Main work

- Remove cover ❶ of the compensating tank.



- Add coolant until the coolant reaches the specified level.

Guideline

The coolant level must be between **MIN** and **MAX**.

Coolant (📖 p. 406)

- Mount the cover of the compensating tank.

Finishing work

- Install the front side cover. (📖 p. 110)



23.1 Checking the valve clearance

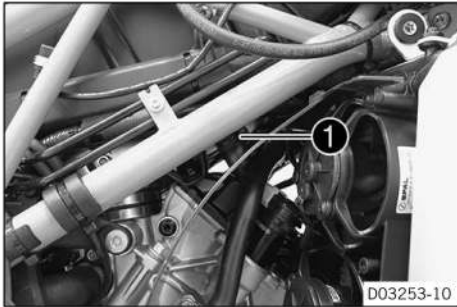
Condition

The air filter is removed.

- Remove spring band clamp **1**.

Spring band clamps plier (60029057100) (📖 p. 415)

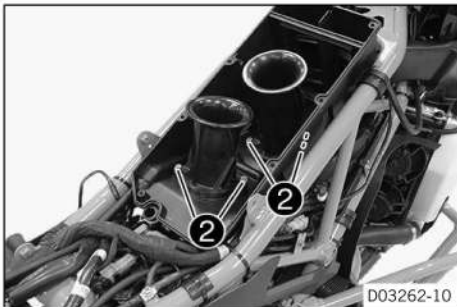
- Pull off the air release hose.



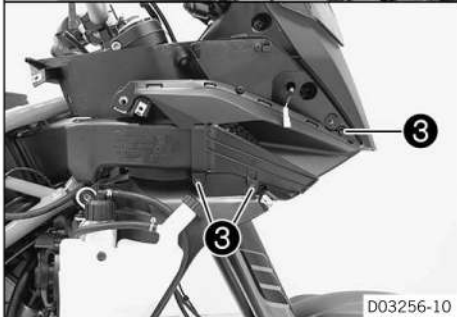
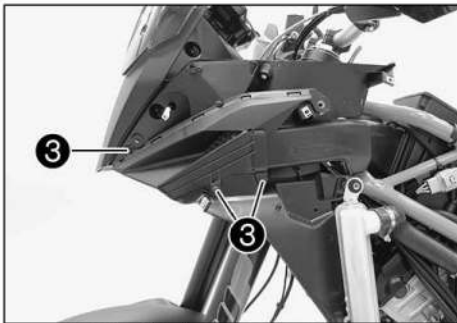
- Remove the cable ties.

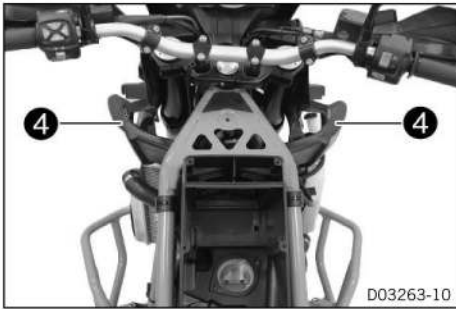


- Remove screws **2** with the bushings.
- Take off the intake trumpets.

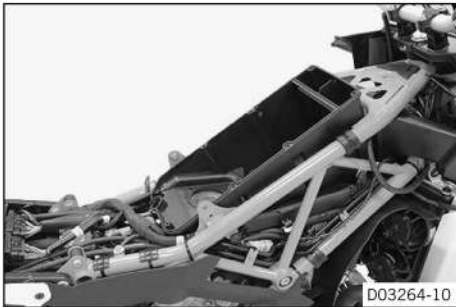


- Remove screws **3**.
- Remove air inlets.

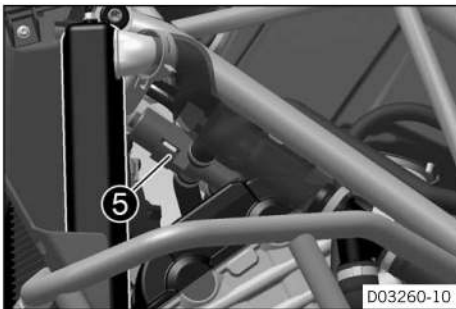




- Press intake snorkel 4 forwards out of the air filter box.



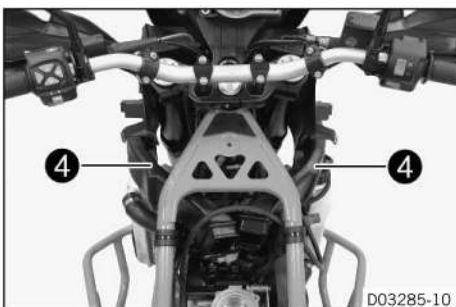
- Raise the lower part of the air filter box and pull it back gently.



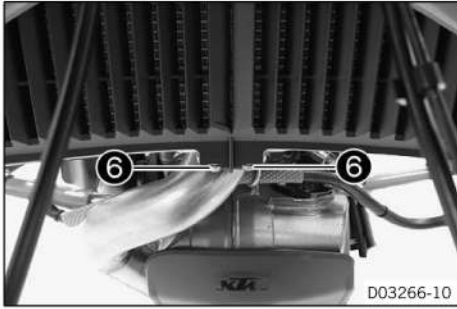
- Remove SAS valve 5 from the holder.



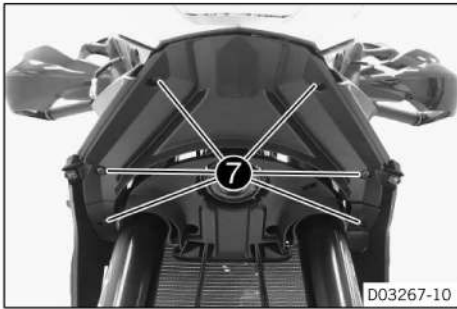
- Take off the lower part of the air filter box.



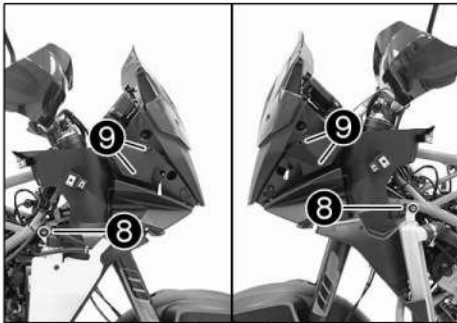
- Remove intake snorkel 4 toward the rear.



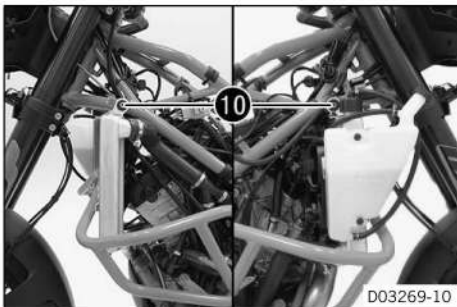
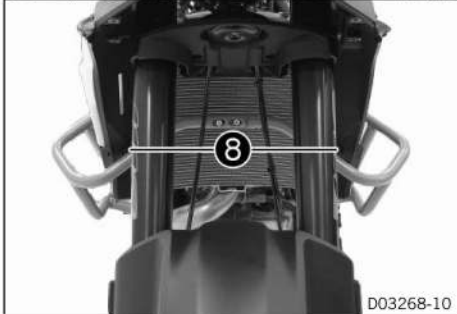
- Remove screws 6.
- Remove the radiator shield.



- Remove screws 7.
- Remove the lower fairing section.



- Remove screws 8.
- Remove screws 9.
- Remove the inside cover on both sides.

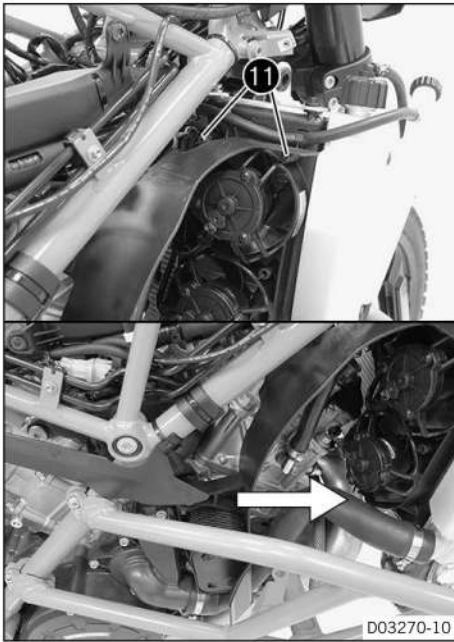


- Remove screws 10.
- Detach radiator on both sides.



Info

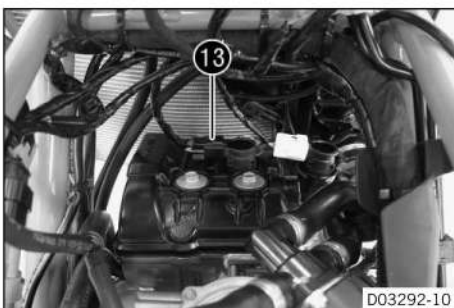
Pay attention to the cooling fins.



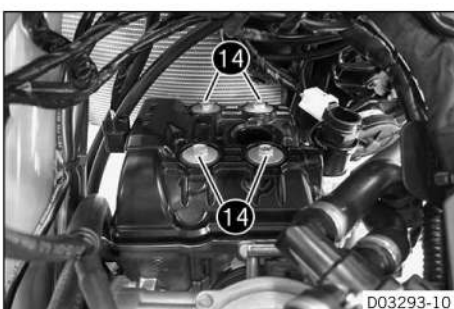
- Remove screws **11**.
- Pull heat protector off the holder from the front and remove protector.



- Disconnect plug-in connector **12**.
- Pull the SAS valve back and fix it into position.



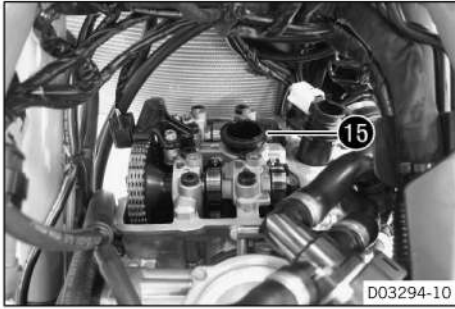
- Detach connector **13** of the ignition coil.
- Remove the ignition coil.



- Remove the spark plug using the special tool.

Spark plug wrench with link (77229172000) (📖 p. 423)

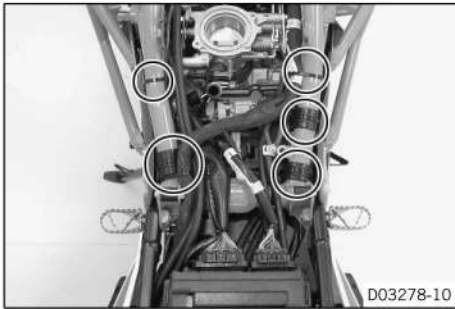
- Remove screws **14**.
- Take off the valve cover with the gasket.



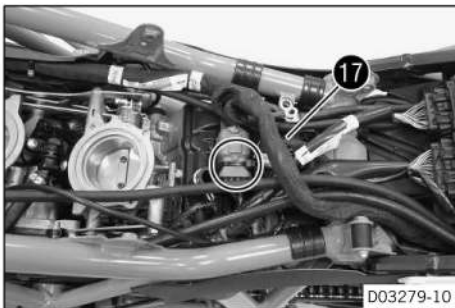
- Remove gasket 15.



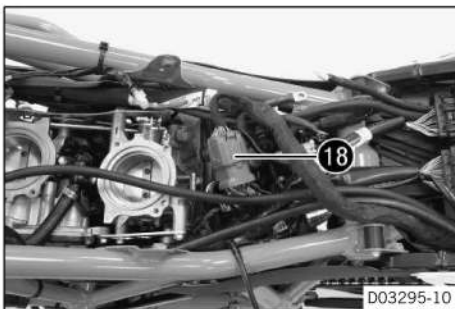
- Remove screw 16 with the washer.



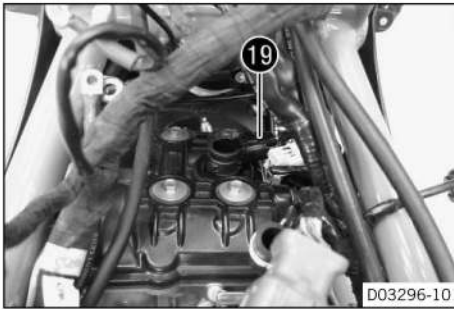
- Remove the cable ties.
- Push the cables slightly to the side.



- Remove the cable ties.
- Loosen all plug-in connectors from connector holder 17.
- Remove the plug holder.

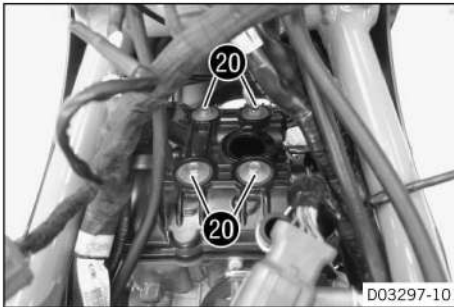


- Disconnect plug-in connector 18.

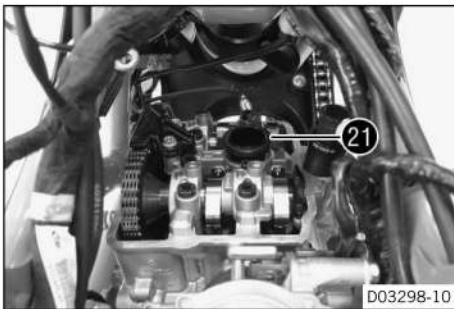


- Detach connector 19 of the ignition coil.
- Remove the ignition coil.
- Remove the spark plug using the special tool.

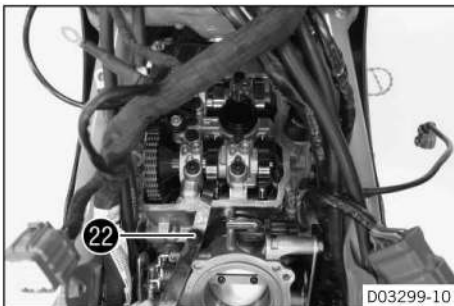
Spark plug wrench with link (77229172000) (📖 p. 423)



- Remove screws 20.
- Take off the valve cover with the gasket.



- Remove gasket 21.
- Set the engine to ignition top dead center of the rear cylinder. (📖 p. 209)



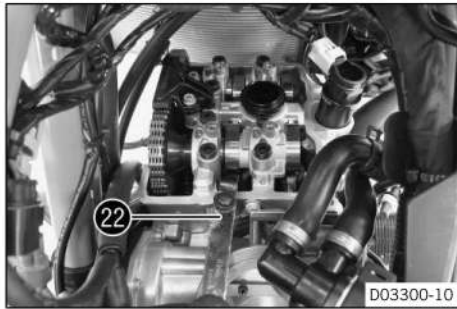
- On all valves, check the valve clearance between the camshaft and cam lever with special tool 22.

Guideline

Valve clearance	
Exhaust at: 20 °C (68 °F)	0.25 ... 0.30 mm (0.0098 ... 0.0118 in)
Intake at: 20 °C (68 °F)	0.10 ... 0.15 mm (0.0039 ... 0.0059 in)

Feeler gauge (59029041100) (📖 p. 414)

- » If the valve clearance does not meet specifications:
 - Set the valve clearance of the rear cylinder. (📖 p. 332)
- Set the engine to ignition top dead center of the front cylinder. (📖 p. 209)



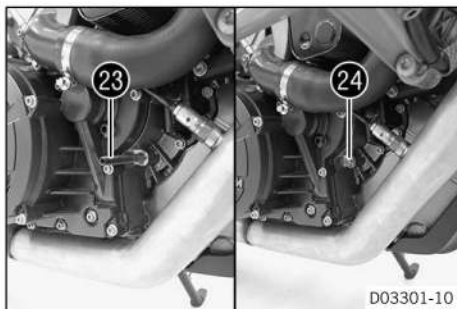
- On all valves, check the valve clearance between the camshaft and cam lever with special tool 22.

Guideline

Valve clearance	
Exhaust at: 20 °C (68 °F)	0.25 ... 0.30 mm (0.0098 ... 0.0118 in)
Intake at: 20 °C (68 °F)	0.10 ... 0.15 mm (0.0039 ... 0.0059 in)

Feeler gauge (59029041100) (圖 p. 414)

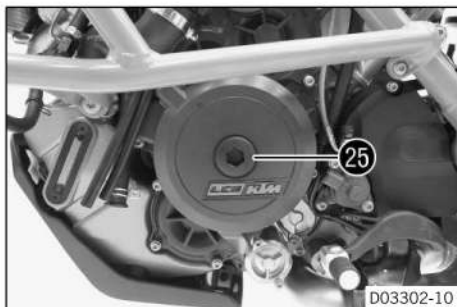
- » If the valve clearance does not meet specifications:
 - Set the valve clearance of the front cylinder. (圖 p. 333)



- Remove special tool 23.
- Crank the engine several times. Check the valve clearance and correct it if necessary.
- Remove special tool 23 and mount and tighten screw 24 with washer.

Guideline

Plug, crankshaft retainer	M8	15 Nm (11.1 lbf ft)
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- Mount and tighten screw plug 25 with the O-ring.

Guideline

Screw plug, alternator cover	M24x1.5	8 Nm (5.9 lbf ft)
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- Mount gasket 21.



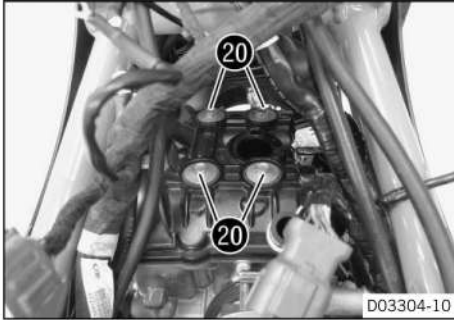
- Clean and degrease the valve cover seal.
- Apply a thin layer of sealing compound to area **A**.

Loctite® 5910



Info

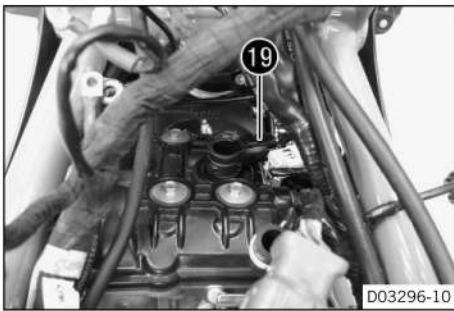
The rear valve cover is equipped with a connector for the engine vent.
The front valve cover is not equipped with a connector for the engine vent.



- Put the valve cover in place with the gasket. Mount and tighten screws **20**.

Guideline

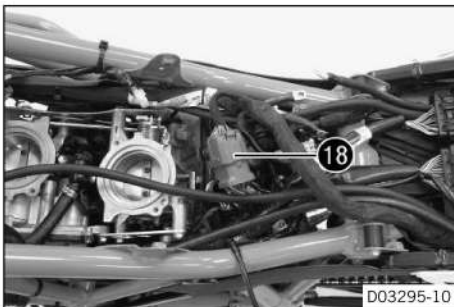
Screw, valve cover	M6	10 Nm (7.4 lbf ft)
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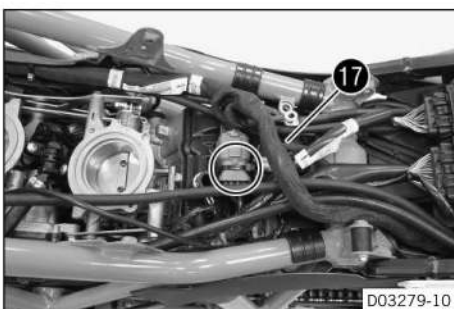
- Mount and tighten the spark plug using the special tool.

Spark plug wrench with link (77229172000) (圖 p. 423)

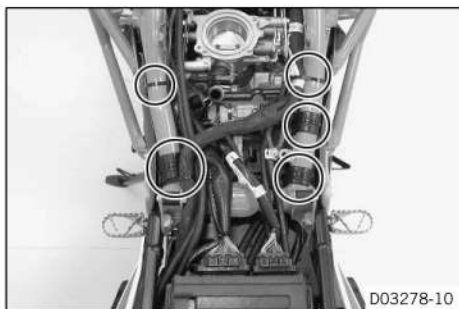
- Mount the ignition coil.
- Attach connector **19** of the ignition coil.
- ✓ The white connector is connected to the outer ignition coil.



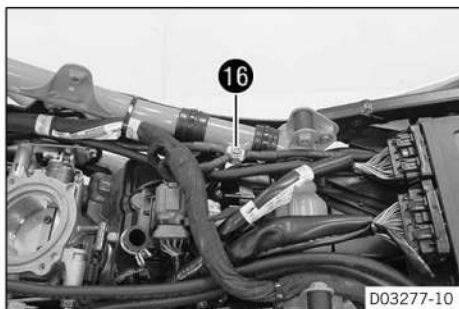
- Join plug-in connector **18**.



- Position the plug holder.
- Connect all plug-in connectors in connector holder **17**.
- Mount the cable ties.



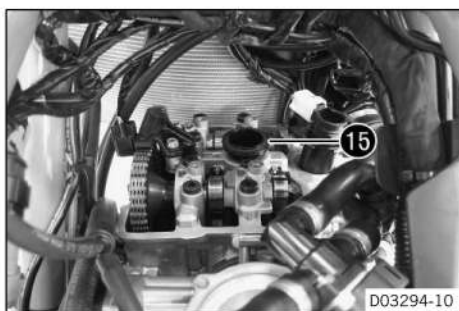
- Route the cables without tension.
- Mount the cable ties.



- Mount and tighten screw **16** with the washer.

Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
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- Position gasket **15**.

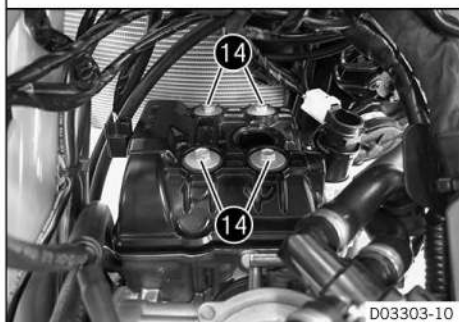


- Clean and degrease the valve cover seal.
- Apply a thin layer of sealing compound to area **B**.

Loctite® 5910

i Info

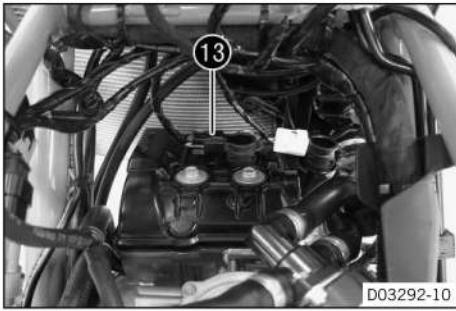
The rear valve cover is equipped with a connector for the engine vent.
The front valve cover is not equipped with a connector for the engine vent.



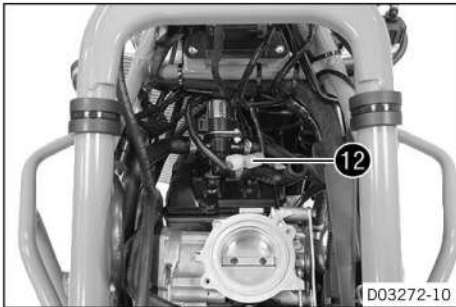
- Mount the valve cover with the gasket.
- Mount and tighten screws **14**.

Guideline

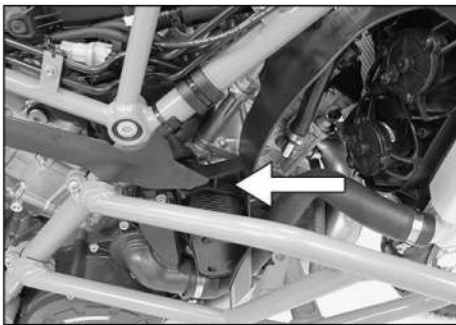
Screw, valve cover	M6	10 Nm (7.4 lbf ft)
--------------------	----	--------------------



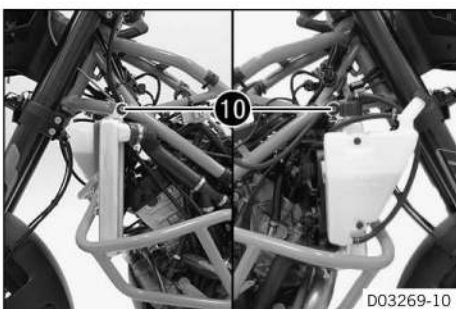
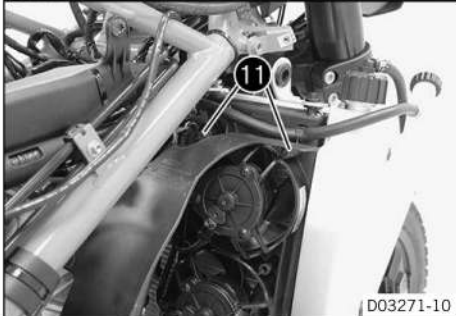
- Mount and tighten the spark plug using the special tool.
- Spark plug wrench with link (77229172000) (📖 p. 423)
- Mount the ignition coil.
 - Attach connector 13 of the ignition coil.
 - ✓ The white connector is connected to the outer ignition coil.



- Position SAS valve.
- Join plug-in connector 12.



- Position the heat protector and mount to holder.
- Mount and tighten screws 11.



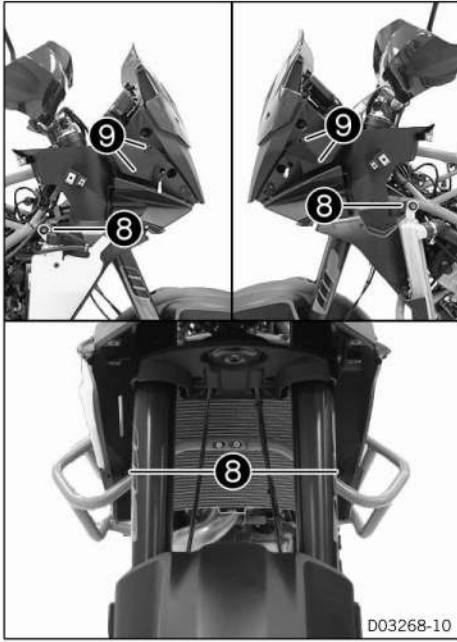
- Attach radiator on both sides.

i Info
Pay attention to the cooling fins.

- Mount and tighten screws 10.

Guideline

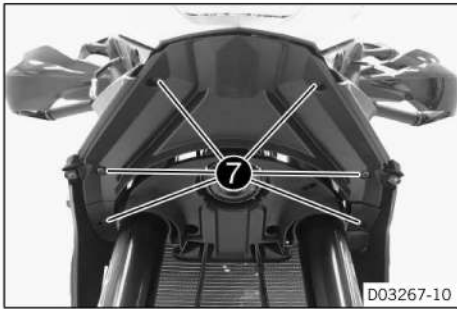
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
---------------------------	----	--------------------



- Position the inside cover on both sides.
- Mount and tighten screws 9.
- Mount and tighten screws 8.

Guideline

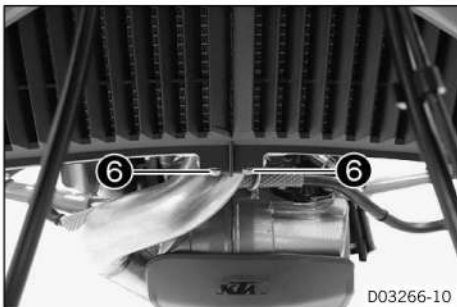
Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
-------------------	----	-------------------------



- Position the lower fairing section.
- Mount and tighten screws 7.

Guideline

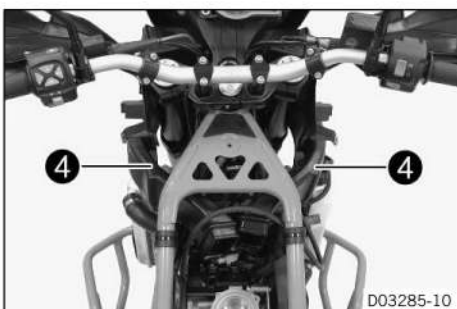
Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
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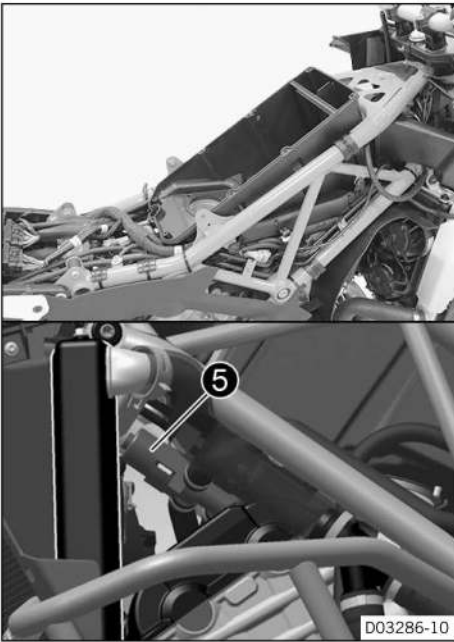
- Position the radiator shield.
- Mount and tighten screws 6.

Guideline

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



- Position intake snorkel 4.



- Position the lower part of air filter box in the frame.

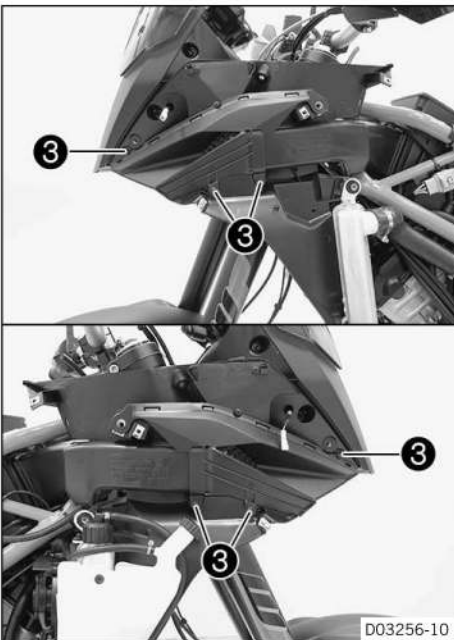
i Info
Ensure that the O-rings are seated correctly.

- Mount SAS valve (5) on the holder.



- Mount intake snorkel (4).

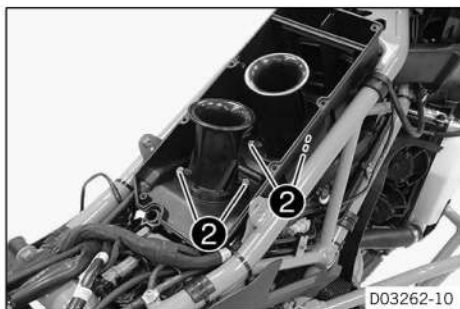
i Info
Ensure that the seals are seated correctly.



- Position air inlets.
- Mount and tighten screws (3).

Guideline

Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
-------------------	----	-------------------------



- Position the intake trumpets and mount and tighten screws **2** with the bushings.

Guideline

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



- Route the hose without kinks and secure it with cable ties.



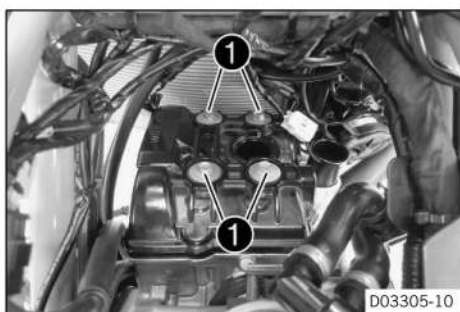
- Mount the vent hose.
- Position spring band clamp **1** with special tool.

Spring band clamps plier (60029057100) (📖 p. 415)

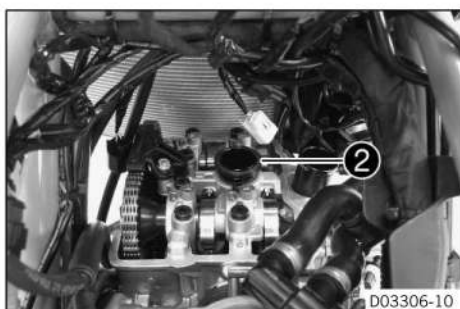
23.2 Checking the valve clearance (air filter and spark plugs removed)

Condition

The air filter and spark plugs are removed.



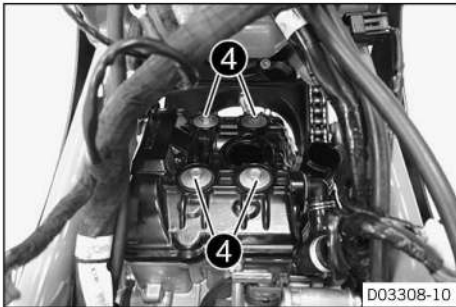
- Remove screws **1**.
- Take off the valve cover with the gasket.



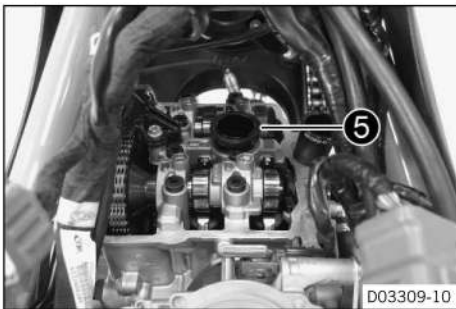
- Remove gasket **2**.



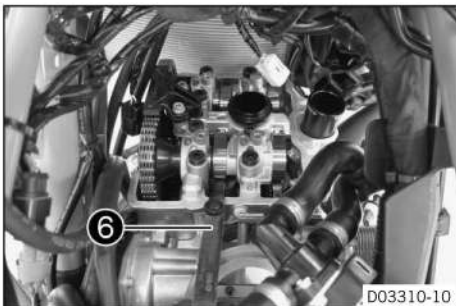
- Disconnect plug-in connector **3**.



- Remove screws **4**.
- Take off the valve cover with the gasket.



- Remove gasket **5**.
- Set the engine to ignition top dead center of the rear cylinder. (🔧 p. 209)



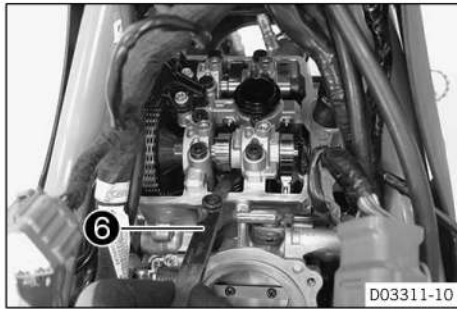
- On all valves, check the valve clearance between the camshaft and cam lever with special tool **6**.

Guideline

Valve clearance	
Exhaust at: 20 °C (68 °F)	0.25 ... 0.30 mm (0.0098 ... 0.0118 in)
Intake at: 20 °C (68 °F)	0.10 ... 0.15 mm (0.0039 ... 0.0059 in)

Feeler gauge (59029041100) (🔧 p. 414)

- » If the valve clearance does not meet specifications:
 - Set the valve clearance of the rear cylinder. (🔧 p. 332)
- Set the engine to ignition top dead center of the front cylinder. (🔧 p. 209)



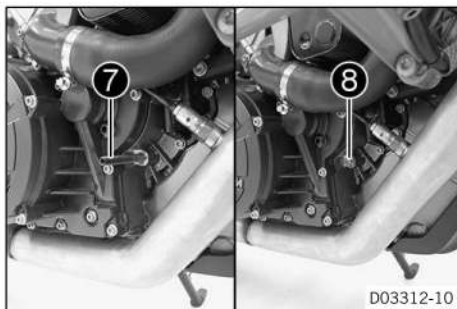
- On all valves, check the valve clearance between the camshaft and cam lever with special tool **6**.

Guideline

Valve clearance	
Exhaust at: 20 °C (68 °F)	0.25 ... 0.30 mm (0.0098 ... 0.0118 in)
Intake at: 20 °C (68 °F)	0.10 ... 0.15 mm (0.0039 ... 0.0059 in)

Feeler gauge (59029041100) (圖 p. 414)

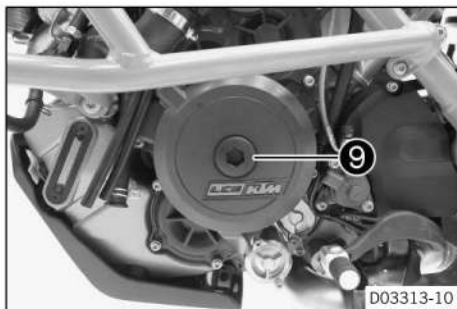
- » If the valve clearance does not meet specifications:
 - Set the valve clearance of the front cylinder. (圖 p. 333)



- Remove special tool **7**.
- Crank the engine several times. Check the valve clearance and correct it if necessary.
- Remove special tool **7** and mount and tighten screw **8** with washer.

Guideline

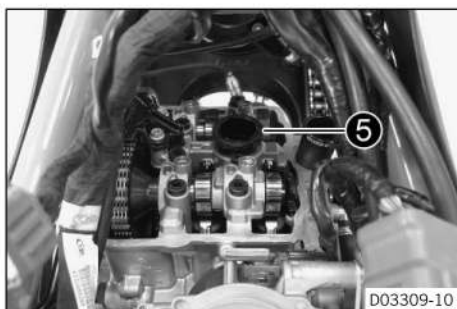
Plug, crankshaft retainer	M8	15 Nm (11.1 lbf ft)
---------------------------	----	---------------------



- Mount and tighten screw plug **9** with the O-ring.

Guideline

Screw plug, alternator cover	M24x1.5	8 Nm (5.9 lbf ft)
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- Mount gasket **5**.



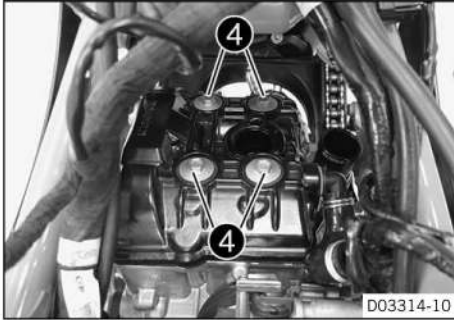
- Clean and degrease the valve cover seal.
- Apply a thin layer of sealing compound to area **A**.

Loctite® 5910



Info

The rear valve cover is equipped with a connector for the engine vent.
The front valve cover is not equipped with a connector for the engine vent.



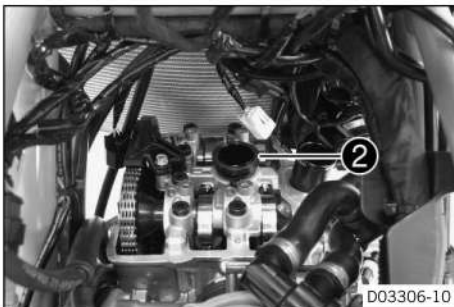
- Put the valve cover in place with the gasket. Mount and tighten screws **4**.

Guideline

Screw, valve cover	M6	10 Nm (7.4 lbf ft)
--------------------	----	--------------------



- Join plug-in connector **3**.



- Position gasket **2**.



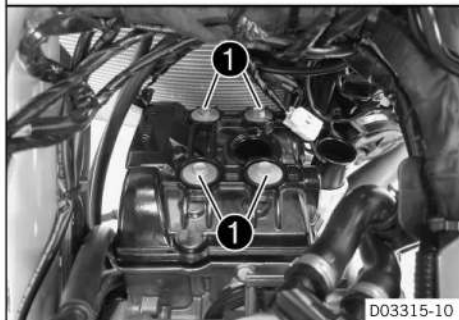
- Clean and degrease the valve cover seal.
- Apply a thin layer of sealing compound to area **B**.

Loctite® 5910



Info

The rear valve cover is equipped with a connector for the engine vent.
The front valve cover is not equipped with a connector for the engine vent.



- Mount and tighten screws **1**.

Guideline

Screw, valve cover	M6	10 Nm (7.4 lbf ft)
--------------------	----	--------------------

23.3 Setting the valve clearance of the rear cylinder



Info

For purposes of illustration, the following operations are shown with the engine deinstalled. Removal is not necessary.

Condition

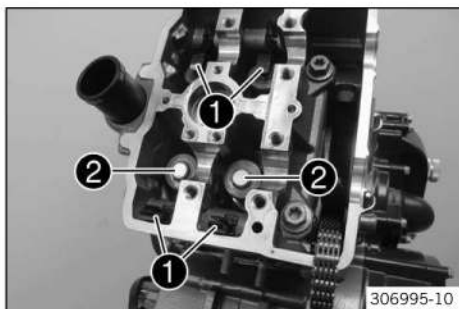
The engine is positioned at ignition top dead center of the rear cylinder

Preparatory work

- Disassemble the camshafts of the rear cylinder. (p. 333)

Main work

- Lift cam lever **1**.
- Remove shims **2** and set them down according to the installation position.
- Correct and insert the shims as indicated by the results of the valve clearance check.



Finishing work

- Install the camshafts of the rear cylinder. (p. 334)

23.4 Setting the valve clearance of the front cylinder

i Info

For purposes of illustration, the following operations are shown with the engine deinstalled. Removal is not necessary.

Condition

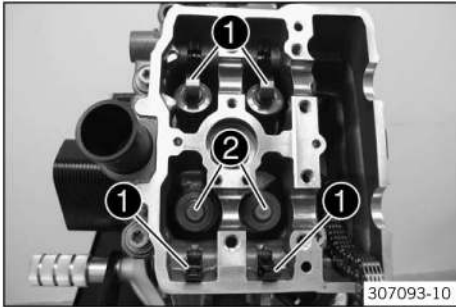
The engine is positioned at ignition top dead center of the front cylinder

Preparatory work

- Disassemble the camshafts of the front cylinder. (📖 p. 335)

Main work

- Lift cam lever **1**.
- Remove shims **2** and set them down according to the installation position.
- Correct and insert the shims as indicated by the results of the valve clearance check.



Finishing work

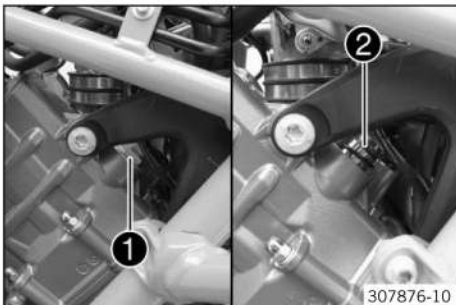
- Install the camshafts of the front cylinder. (📖 p. 336)

23.5 Disassembling the camshafts of the rear cylinder

Condition

The heat protector right is removed and the engine is positioned at ignition top dead center of the rear cylinder

- Remove screw **1** with the O-ring.
- Pull out timing chain tensioner **2**.

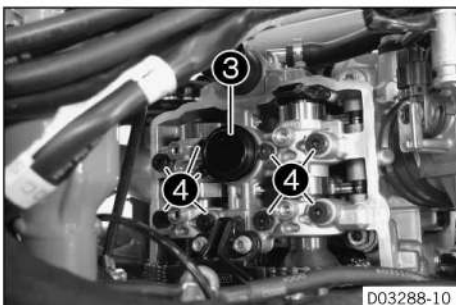


- Remove the spark plug shaft insert **3**.
- Loosen and remove screws **4** from the outside to the inside.

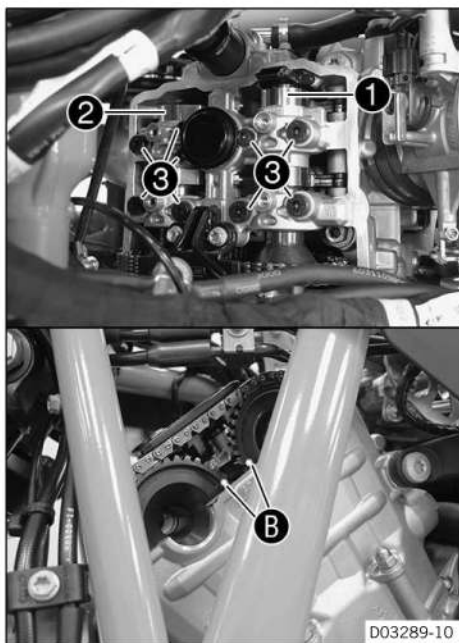
i Info

The cams should not activate the valves.

- Remove the camshaft bearing support.
- Remove the timing chain from the rear sprocket. Remove the camshafts.



23.6 Installing the camshafts of the rear cylinder



- Pull up the timing chain and insert intake camshaft **1**.

i Info

The intake camshaft is marked **eh**.

- Place the timing chain over the rear sprocket of the intake camshaft.
- Ensure that the bleeder is seated correctly.
- Slip in exhaust camshaft **2**.

i Info

The exhaust camshaft is marked **ah**.

- Place the timing chain over the rear sprocket and position the camshaft in the bearing seat.
- ✓ Markings **B** must be flush with the edge of the cylinder head.
- Mount the camshaft bearing support.
- Mount screws **3** and tighten them from the inside to the outside.

Guideline

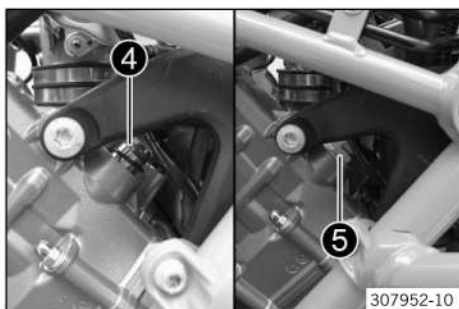
Screw, camshaft bearing support	M6 – 10.9	10 Nm (7.4 lbf ft)
Screw, camshaft bearing support	M8 – 10.9	Step 1 10 Nm (7.4 lbf ft) Step 2 18 Nm (13.3 lbf ft)
Screw, camshaft bearing support	M8 – 10.9	Step 1 8.5 Nm (6.27 lbf ft) Step 2 14.5 Nm (10.7 lbf ft) Only applies when using: Hexagon socket bit (61229025000) (📖 p. 419)

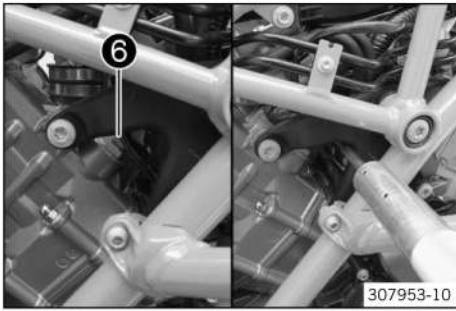
Hexagon socket bit (61229025000) (📖 p. 419)

- Grease the O-rings and mount spark plug shaft insert.
- Prepare the timing chain tensioner for installation. (📖 p. 253)
- After it has been positioned in the installation location, insert timing chain tensioner **4** with a new O-ring.
- Mount and tighten screw plug **5** with a new seal ring.


Guideline

Plug, timing-chain tensioner	M24x1.5	25 Nm (18.4 lbf ft)
------------------------------	---------	---------------------





- Remove screw **6** and use the special tool to push the timing chain tensioner toward the timing chain.

Release device for timing chain tensioner (61229021000)
( p. 419)

✓ The timing chain tensioner unlocks.

- Mount and tighten screw **6**.

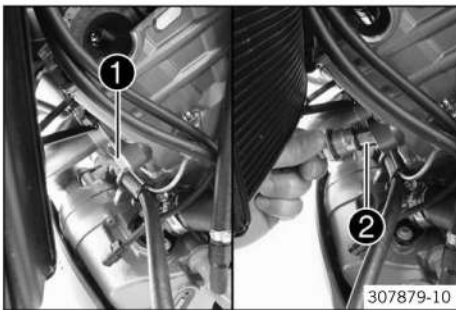
Guideline

Screw, timing chain tensioner release	M10x1	10 Nm (7.4 lbf ft)
---------------------------------------	-------	--------------------

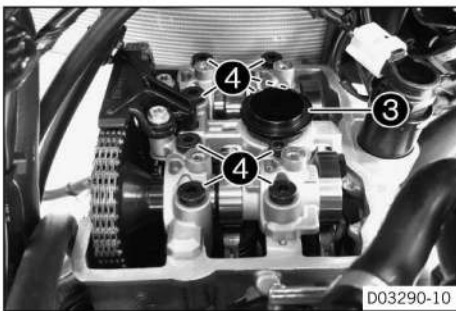
23.7 Disassembling the camshafts of the front cylinder

Condition

The engine is positioned at ignition top dead center of the front cylinder



- Remove screw **1** with the O-ring.
- Pull out timing chain tensioner **2**.

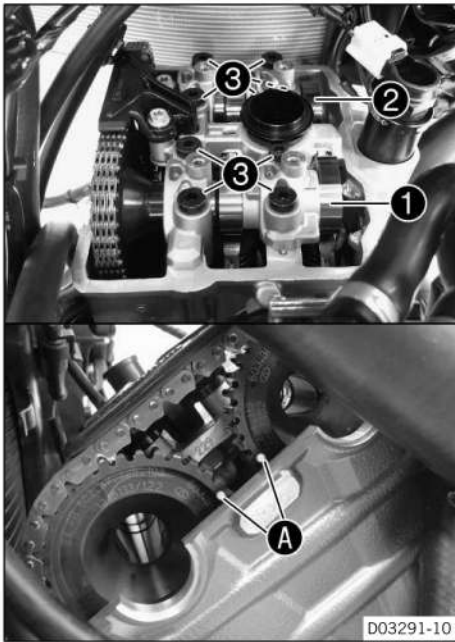


- Remove the spark plug shaft insert **3**.
- Loosen and remove screws **4** from the outside to the inside.

i Info
The cams should not activate the valves.

- Remove the camshaft bearing support.
- Remove the timing chain from the rear sprocket. Remove the camshafts.

23.8 Installing the camshafts of the front cylinder



- Pull up the timing chain and insert intake camshaft **1**.

i Info

The intake camshaft is marked **ev**.

- Place the timing chain over the rear sprocket of the intake camshaft.
- Slip in exhaust camshaft **2**.

i Info

The exhaust camshaft is marked **av**.

- Place the timing chain over the rear sprocket and position the camshaft in the bearing seat.
 - ✓ Markings **A** must be flush with the edge of the cylinder head.
- Mount the camshaft bearing support.
- Mount screws **3** and tighten them from the inside to the outside.

Guideline

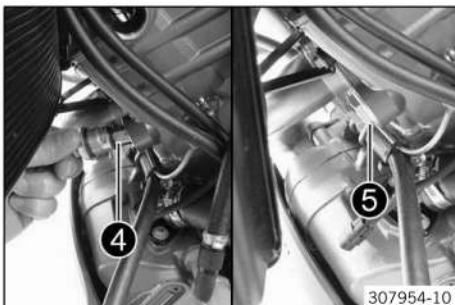
Screw, camshaft bearing support	M6 – 10.9	10 Nm (7.4 lbf ft)
Screw, camshaft bearing support	M8 – 10.9	Step 1 10 Nm (7.4 lbf ft) Step 2 18 Nm (13.3 lbf ft)
Screw, camshaft bearing support	M8 – 10.9	Step 1 8.5 Nm (6.27 lbf ft) Step 2 14.5 Nm (10.7 lbf ft) Only applies when using: Hexagon socket bit (61229025000) (p. 419)

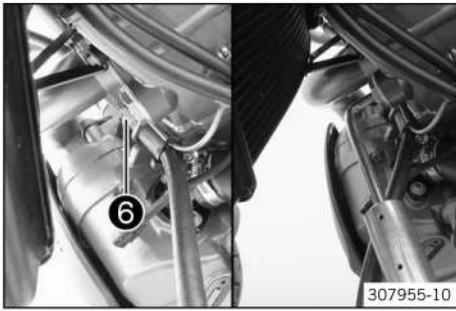
Hexagon socket bit (61229025000) (p. 419)

- Grease the O-rings and mount spark plug shaft insert.
- Prepare the timing chain tensioner for installation. (p. 253)
- After it has been positioned in the installation location, insert timing chain tensioner **4** with a new O-ring.
- Mount and tighten screw plug **5** with a new seal ring.

Guideline

Plug, timing-chain tensioner	M24x1.5	25 Nm (18.4 lbf ft)
------------------------------	---------	---------------------





- Remove screw ⑥ and use the special tool to push the timing chain tensioner toward the timing chain.

Release device for timing chain tensioner (61229021000)
 (P. 419)

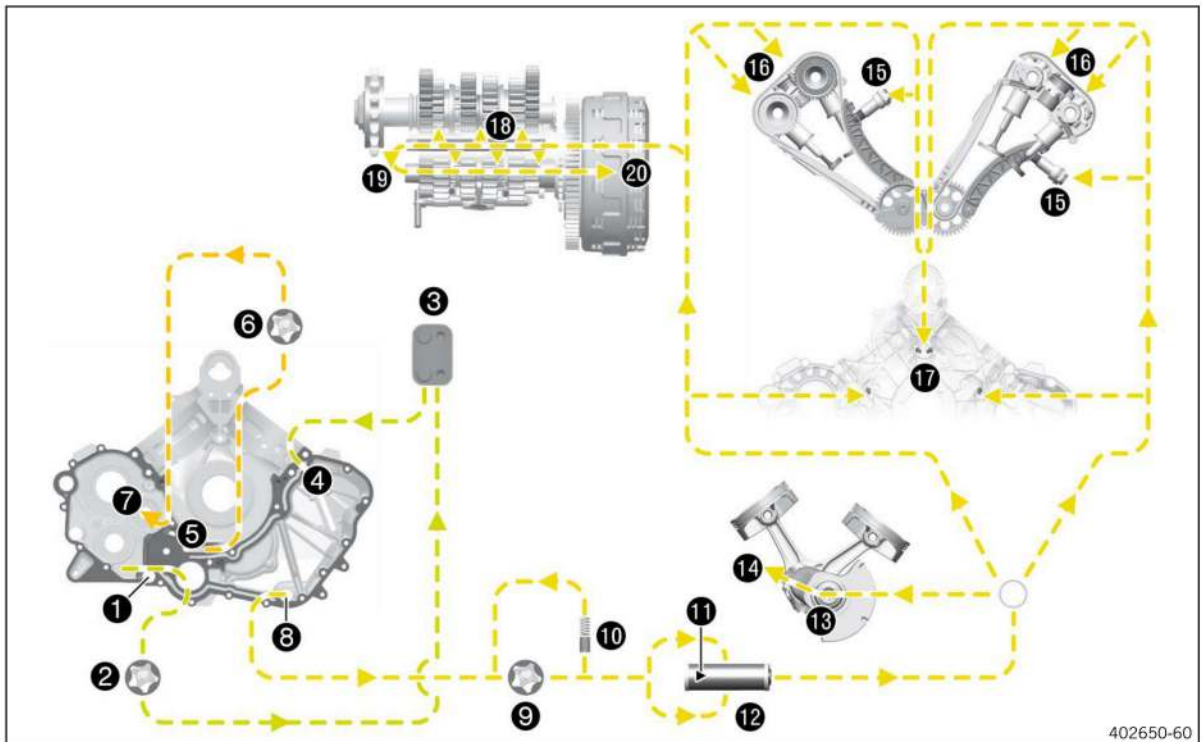
✓ The timing chain tensioner is unlocked.

- Mount and tighten screw ⑥.

Guideline

Screw, timing chain tensioner release	M10x1	10 Nm (7.4 lbf ft)
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24.1 Oil circuit



402650-60

Oil circuit of middle suction pump

- ① Oil screen of oil drain plug in gearbox
- ② Middle suction pump
- ③ Heat exchanger
- ④ Oil exit in oil tank

Oil circuit of left suction pump

- ⑤ Crankcase
- ⑥ Left suction pump
- ⑦ Lubricating slots in gearbox

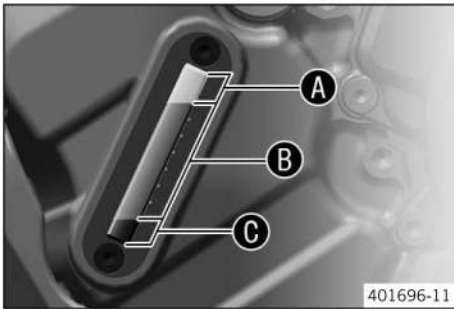
Oil circuit of force pump

- ⑧ Oil screen of oil drain plug in oil tank
- ⑨ Force pump
- ⑩ Oil pressure control valve
- ⑪ Bypass valve
- ⑫ Oil filter
- ⑬ Crankshaft
- ⑭ Oil nozzle for alternator cooling
- ⑮ Timing chain tensioner
- ⑯ Camshaft lubrication/oil nozzles for valve gear lubrication
- ⑰ Oil nozzles for piston cooling
- ⑱ Oil spray tube
- ⑲ Oil nozzle for clutch lubrication
- ⑳ Clutch

24.2 Checking the engine oil level

i Info

Oil consumption depends on the riding style and the operating conditions.



Condition

The engine is at operating temperature.

Preparatory work

- Stand the motorcycle upright on a horizontal surface.

Main work

- Check the engine oil level in the engine oil level viewer.

i Info

After switching off the engine, wait one minute before checking the level.

The engine oil level should be in the upper part of the range **B** of the engine oil level viewer.

- » When the engine oil level is in area **A** of the engine oil level viewer:
 - Do not add engine oil.
- » When the engine oil level is in area **B** of the engine oil level viewer:
 - Engine oil can be added.
- » When the engine oil level is in area **C** of the engine oil level viewer:
 - Add engine oil. (📖 p. 342)

24.3 Changing the engine oil and oil filter, cleaning the oil screens

! Warning

Danger of scalding Engine and gear oil get very hot when the motorcycle is ridden.

- Wear suitable protective clothing and safety gloves.
- In the event of scalding, rinse the area affected immediately with lukewarm water.



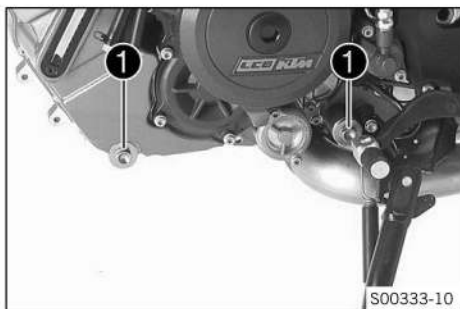
Note

Environmental hazard Hazardous substances cause environmental damage.

- Dispose of oils, grease, filters, fuel, cleaning agents, brake fluid, etc., correctly and in compliance with the applicable regulations.

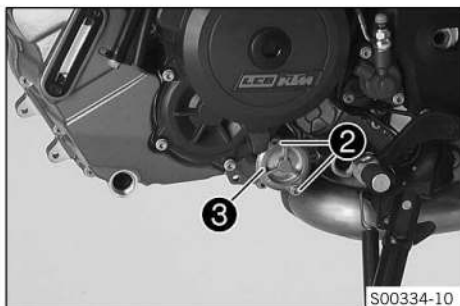
Preparatory work

- Remove the engine guard. (📖 p. 46)



Main work

- Stand the motorcycle on its side stand on a horizontal surface.
- Place an appropriate container under the engine.
- Remove oil drain plugs **1** with the magnets, O-rings, and oil screens.



- Remove screws **2**. Take off oil filter cover **3** with the O-ring.



- Pull oil filter **4** out of the oil filter housing.

Lock ring plier (51012011000) (📖 p. 412)

- Completely drain the engine oil.
- Thoroughly clean the parts and sealing surface.



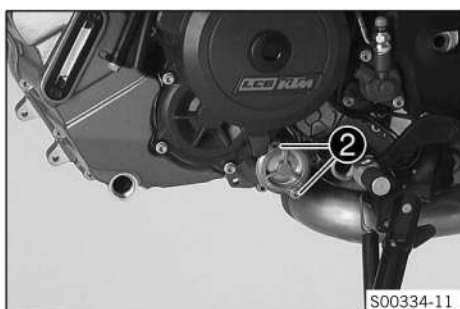
- Insert new oil filter **4**.



Info

Only insert the oil filter by hand.

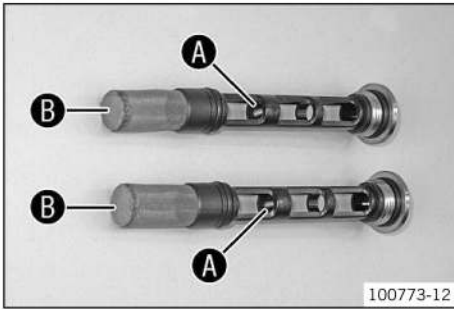
- Lubricate the O-ring of the oil filter cover. Mount oil filter cover **3**.



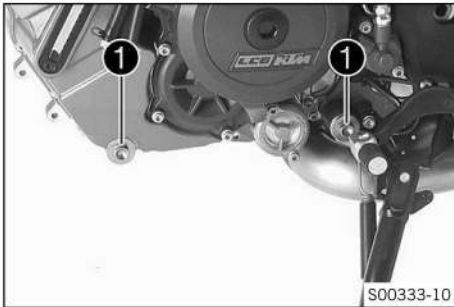
- Mount and tighten screws **2**.

Guideline

Remaining engine screws	M5	6 Nm (4.4 lbf ft)
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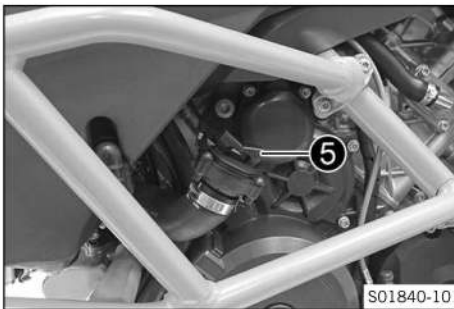
- Thoroughly clean magnets **A** and oil screens **B** of the oil drain plugs.



- Mount and tighten oil drain plugs **1** with the magnets, O-rings, and oil screens.

Guideline

Oil drain plug	M20x1.5	20 Nm (14.8 lbf ft)
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- Have the entire filling quantity available.

Engine oil Ambient temperature: $\geq 0\text{ }^{\circ}\text{C}$ ($\geq 32\text{ }^{\circ}\text{F}$)	3.60 l (3.8 qt.)	Engine oil (SAE 10W/50) (p. 406)
Engine oil Ambient temperature: $< 0\text{ }^{\circ}\text{C}$ ($< 32\text{ }^{\circ}\text{F}$)		Engine oil (SAE 5W/40) (p. 407)

- Add the oil quantity in two separate operations.
- Remove screw plug **5** and fill up with initial partial quantity.

Engine oil (1st partial quantity) approx. Ambient temperature: $\geq 0\text{ }^{\circ}\text{C}$ ($\geq 32\text{ }^{\circ}\text{F}$)	3.0 l (3.2 qt.)	Engine oil (SAE 10W/50) (p. 406)
Engine oil (1st partial quantity) approx. Ambient temperature: $< 0\text{ }^{\circ}\text{C}$ ($< 32\text{ }^{\circ}\text{F}$)		Engine oil (SAE 5W/40) (p. 407)

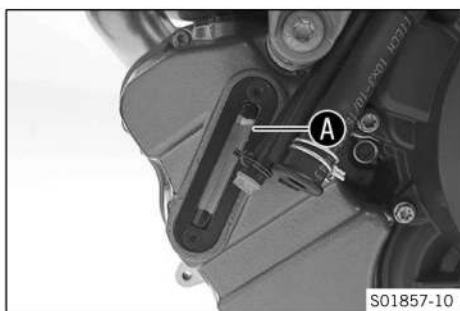
- Mount screw plug **5**.



Danger

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

- Always make sure there is sufficient ventilation when running the engine.
- Use effective exhaust extraction when starting or running the engine in an enclosed space.



- Start the engine and check for leaks.
- Switch off the engine.
- Remove the screw plug and add the second partial quantity up to the upper marking **A** on the engine oil level viewer.

Engine oil (2nd partial quantity) approx. Ambient temperature: $\geq 0\text{ }^{\circ}\text{C}$ ($\geq 32\text{ }^{\circ}\text{F}$)	0.60 l (0.63 qt.)	Engine oil (SAE 10W/50) (📖 p. 406)
Engine oil (2nd partial quantity) approx. Ambient temperature: $< 0\text{ }^{\circ}\text{C}$ ($< 32\text{ }^{\circ}\text{F}$)		Engine oil (SAE 5W/40) (📖 p. 407)

- Mount the screw plug.



Danger

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

- Always make sure there is sufficient ventilation when running the engine.
- Use effective exhaust extraction when starting or running the engine in an enclosed space.

- Start the engine and check for leaks.

Finishing work

- Check the engine oil level. (📖 p. 339)
- Install the engine guard. (📖 p. 47)

24.4 Adding engine oil



Info

Too little engine oil or poor-quality engine oil results in premature wear to the engine. The engine may be damaged if the engine oil level is too high.

Condition

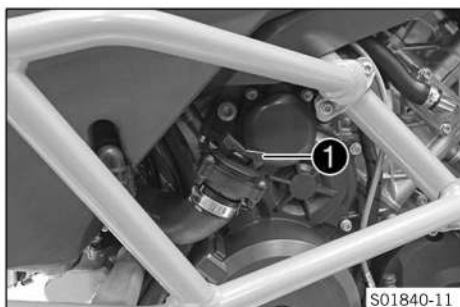
The engine is at operating temperature.

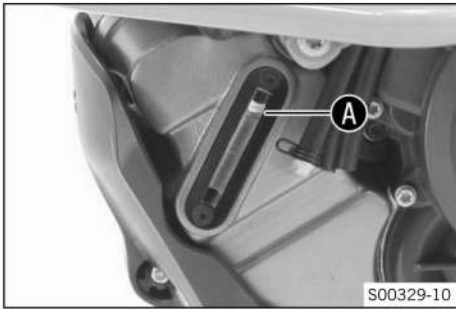
Preparatory work

- Stand the motorcycle upright on a horizontal surface.
- Check the engine oil level. (📖 p. 339)

Main work

- Remove screw plug **1**.





- Add engine oil to upper marking **A** on the engine oil level viewer.

Condition

Ambient temperature: $\geq 0\text{ }^{\circ}\text{C}$ ($\geq 32\text{ }^{\circ}\text{F}$)

Engine oil (SAE 10W/50) (📖 p. 406)

Condition

Ambient temperature: $< 0\text{ }^{\circ}\text{C}$ ($< 32\text{ }^{\circ}\text{F}$)

Engine oil (SAE 5W/40) (📖 p. 407)



Info

In order to achieve optimal engine oil performance, it is not advisable to mix different engine oils. KTM recommends changing the engine oil.

- Mount the screw plug.



Danger

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

- Always make sure there is sufficient ventilation when running the engine.
- Use effective exhaust extraction when starting or running the engine in an enclosed space.

- Start the engine and check for tightness.

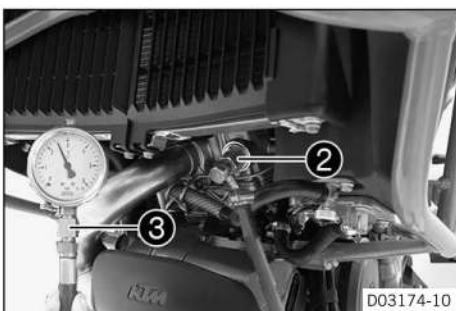
Finishing work

- Check the engine oil level. (📖 p. 339)

24.5 Checking the oil pressure



- Check the engine oil level. (📖 p. 339)
- Remove screw **1**.



- Mount and tighten special tool **2**.

Guideline

Oil pressure adapter	M10x1	10 Nm (7.4 lbf ft)
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Oil pressure adapter (77329006000) (📖 p. 423)

- Connect pressure tester **3** without the t-plate on the special tool.

Pressure testing tool (61029094000) (📖 p. 416)
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Danger

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

- Always make sure there is sufficient ventilation when running the engine.
- Use effective exhaust extraction when starting or running the engine in an enclosed space.

- Start the engine and let it warm up.
- Check the oil pressure.

Oil pressure	
Coolant temperature: ≥ 60 °C (≥ 140 °F) Idle speed	1.8 ... 4.5 bar (26 ... 65 psi)

- » If the measured value is less than the specification:
 - Check the oil pumps for wear. Check that all oil holes are clear.
- Switch off the engine.



Warning

Danger of burns Some vehicle components get very hot when the machine is driven.

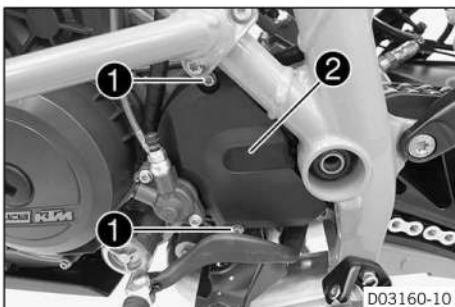
- Wear appropriate protective clothing and safety gloves. In case of burns, rinse immediately with lukewarm water.

- Remove the special tools.
- Mount and tighten screw ❶.

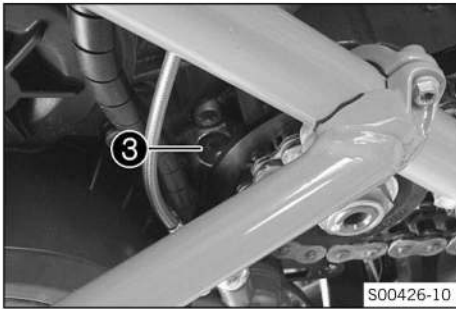
Guideline

Screw, timing chain tensioner release	M10x1	10 Nm (7.4 lbf ft)
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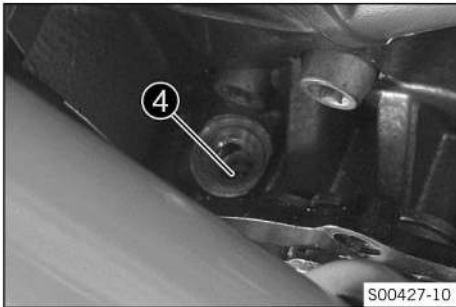
24.6 Removing the oil nozzle for the clutch lubrication



- Remove screws ❶.
- Take off engine sprocket cover ❷.



- Remove screw plug ③ with O-ring.



- Remove oil nozzle ④.

Mounting tool (61229035000) (📖 p. 420)

24.7 Checking/cleaning the oil nozzle for clutch lubrication

Preparatory work

- Remove the oil nozzle for the clutch lubrication. (📖 p. 344)

Main work

- Check that the oil nozzle for clutch lubrication is not blocked.
 - » If the oil nozzle is blocked:
 - Clean the oil nozzle and change as necessary.



Finishing work

- Install the oil nozzle for the clutch lubrication. (📖 p. 345)

24.8 Installing the oil nozzle for the clutch lubrication

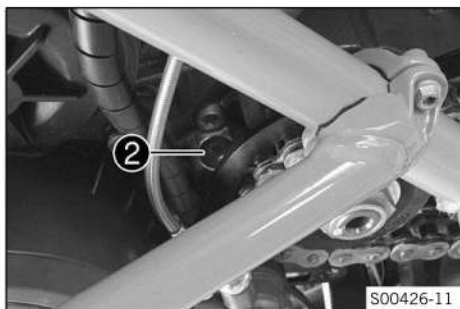


- Mount and tighten oil nozzle ①.

Guideline

Oil nozzle for clutch lubrication	M6x0.75	4 Nm (3 lbf ft)
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Mounting tool (61229035000) (📖 p. 420)

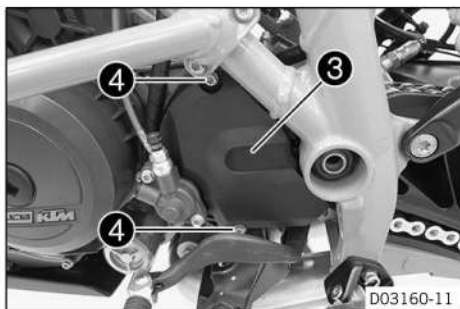


S00426-11

- Mount and tighten screw plug **2** with the O-ring.

Guideline

Plug, clutch lubrication	M10x1	10 Nm (7.4 lbf ft)
--------------------------	-------	--------------------



D03160-11

- Position engine sprocket cover **3**.
- Mount and tighten screws **4**.

Guideline

Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
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25.1 Alternator - checking the stator winding



Condition

The stator is disconnected.

Stator winding measurement I - check the resistance.

- Ω Measure the resistance between the specified points.
Stator, connector **HQ** pin **1** – Stator, connector **HQ** pin **2**

Alternator	
Stator winding resistance at: 20 °C (68 °F)	0.15 ... 0.30 Ω

- » If the indicated value does not correspond to the setpoint value:
 - Change the stator.

Stator winding measurement II - check the resistance.

- Ω Measure the resistance between the specified points.
Stator, connector **HQ** pin **1** – Stator, connector **HQ** pin **3**

Alternator	
Stator winding resistance at: 20 °C (68 °F)	0.15 ... 0.30 Ω

- » If the indicated value does not correspond to the setpoint value:
 - Change the stator.

Stator winding measurement III - check resistance.

- Ω Measure the resistance between the specified points.
Stator, connector **HQ** pin **2** – Stator, connector **HQ** pin **3**

Alternator	
Stator winding resistance at: 20 °C (68 °F)	0.15 ... 0.30 Ω

- » If the indicated value does not correspond to the setpoint value:
 - Change the stator.



Stator winding I - check short circuit to ground (terminal 31).

- Ω Measure the resistance between the specified points.
Stator, connector **HQ** pin **1** – Measuring point **Ground (-)**

Resistance	$\infty \Omega$
------------	-----------------

- » If the indicated value does not correspond to the setpoint value:
 - Change the stator.



Stator winding II - check short circuit to ground (terminal 31).

- Measure the resistance between the specified points.
Stator, connector **HQ** pin **2** – Measuring point **Ground (-)**

Resistance	$\infty \Omega$
------------	-----------------

- » If the indicated value does not correspond to the setpoint value:
 - Change the stator.



Stator winding III - check short circuit to ground (terminal 31).

- Measure the resistance between the specified points.
Stator, connector **HQ** pin **3** – Measuring point **Ground (-)**

Resistance	$\infty \Omega$
------------	-----------------

- » If the indicated value does not correspond to the setpoint value:
 - Change the stator.

- Start the motorcycle to check the function. (📖 p. 18)



Stator winding measurement I - check voltage.

- Measure the voltage between the specified points.
Stator, connector **HQ** pin **1** – Stator, connector **HQ** pin **2**

Info
The results of the measurements on the individual coils must not deviate significantly.

Alternator	
Alternating voltage stator winding at 4000 rpm: 20 °C (68 °F)	$\geq 50 \text{ V}$

- » If the indicated value does not correspond to the setpoint value:
 - Change the stator.

Stator winding measurement II - check voltage.

- **V** Measure the voltage between the specified points.
Stator, connector **HQ** pin 1 – Stator, connector **HQ** pin 3



Info

The results of the measurements on the individual coils must not deviate significantly.

Alternator	
Alternating voltage stator winding at 4000 rpm: 20 °C (68 °F)	≥ 50 V

- » If the indicated value does not correspond to the setpoint value:
 - Change the stator.

Stator winding measurement III - check voltage.

- **V** Measure the voltage between the specified points.
Stator, connector **HQ** pin 2 – Stator, connector **HQ** pin 3



Info

The results of the measurements on the individual coils must not deviate significantly.

Alternator	
Alternating voltage stator winding at 4000 rpm: 20 °C (68 °F)	≥ 50 V

- » If the indicated value does not correspond to the setpoint value:
 - Change the stator.



25.2 Changing spark plugs (air filter removed)

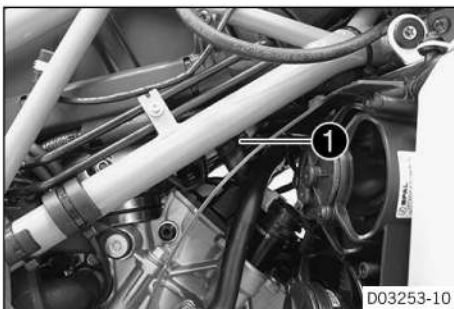
Condition

The air filter is removed.

- Remove spring band clamp **1**.

Spring band clamps plier (60029057100) (工具 p. 415)
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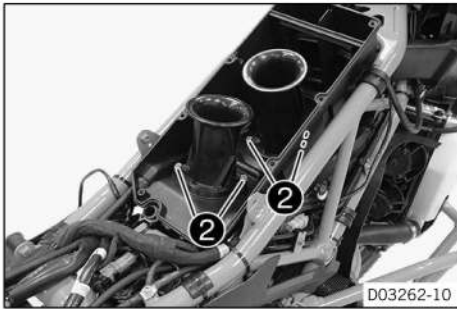
- Pull off the air release hose.



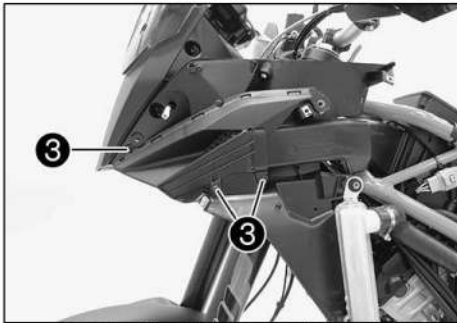
D03253-10



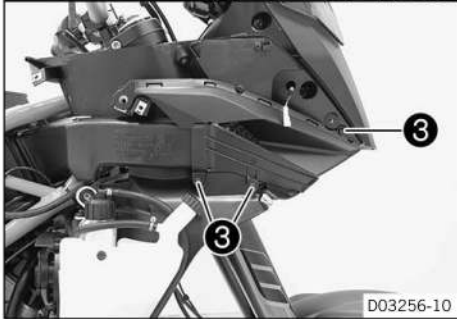
- Remove the cable ties.



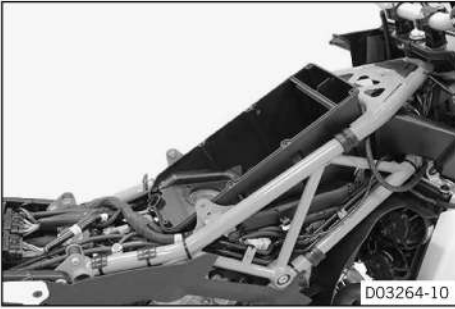
- Remove screws 2 with the bushings.
- Take off the intake trumpets.



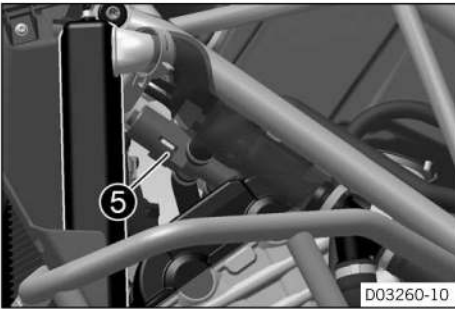
- Remove screws 3.
- Remove air inlets.



- Press intake snorkel 4 forwards out of the air filter box.



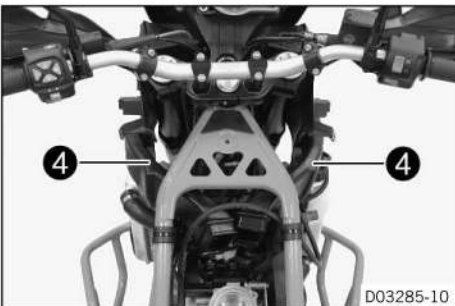
- Raise the lower part of the air filter box and pull it back gently.



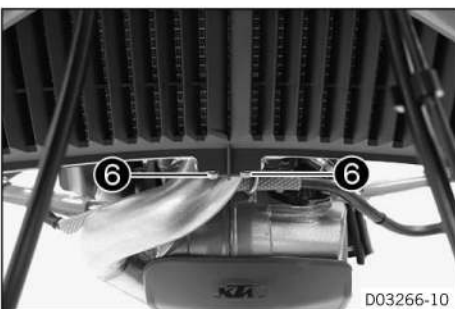
- Remove SAS valve ⑤ from the holder.



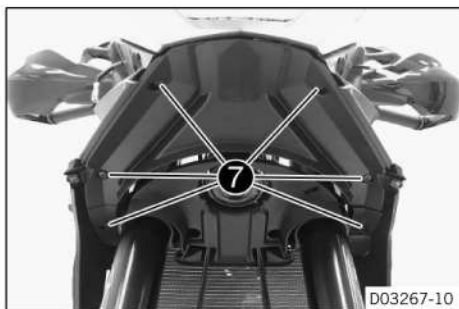
- Take off the lower part of the air filter box.



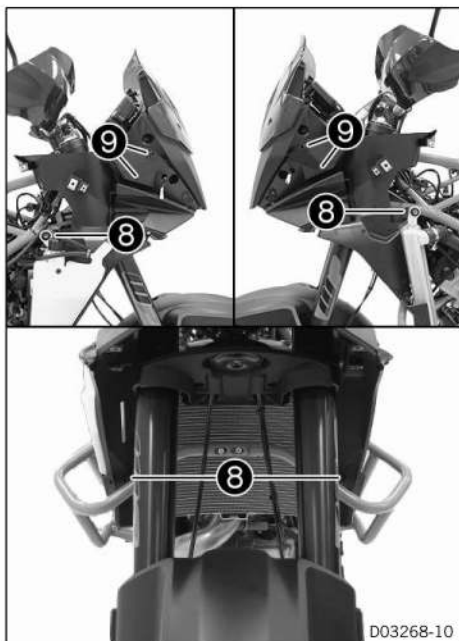
- Remove intake snorkel ④ toward the rear.



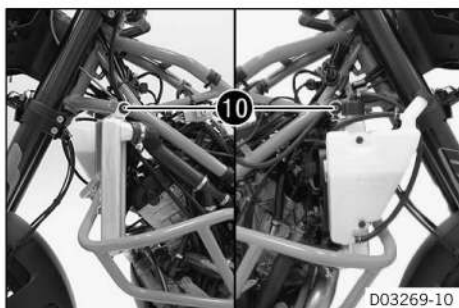
- Remove screws ⑥.
- Remove the radiator shield.



- Remove screws 7.
- Remove the lower fairing section.



- Remove screws 8.
- Remove screws 9.
- Remove the inside cover on both sides.

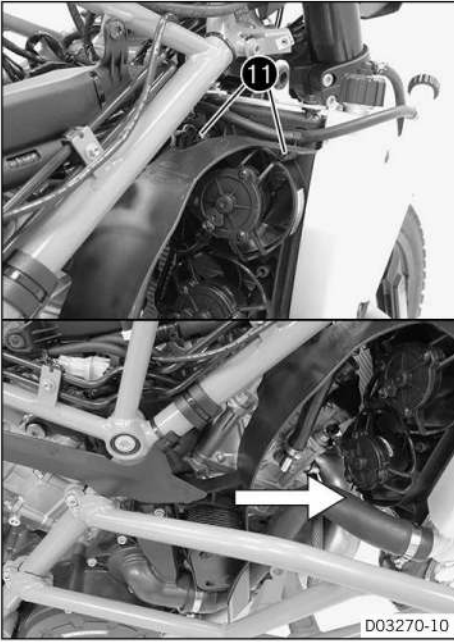


- Remove screws 10.
- Detach radiator on both sides.

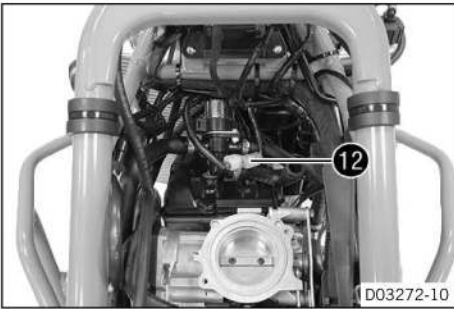


Info

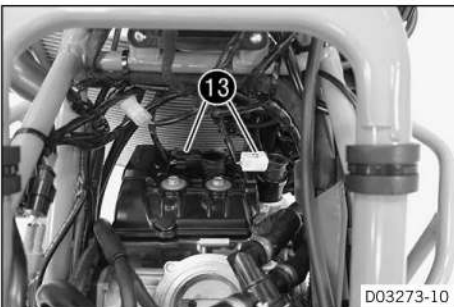
Pay attention to the cooling fins.



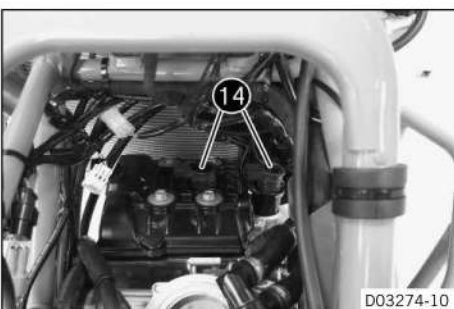
- Remove screws **11**.
- Pull heat protector off the holder from the front and remove protector.



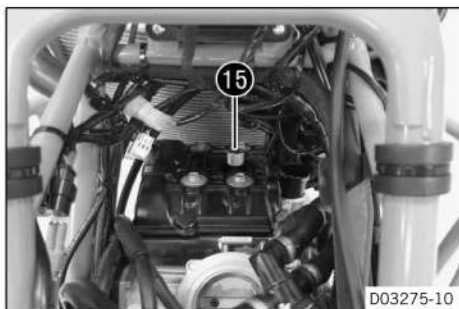
- Disconnect plug-in connector **12**.
- Pull the SAS valve back and fix it into position.



- Disconnect connectors **13** of the ignition coils.



- Remove ignition coils **14**.



- Remove the spark plug with special tool 15.

Spark plug wrench with link (77229172000) (📖 p. 423)

- Mount and tighten the new spark plug using the special tool.
Guideline

Spark plug	M12x1.5	18 Nm (13.3 lbf ft)
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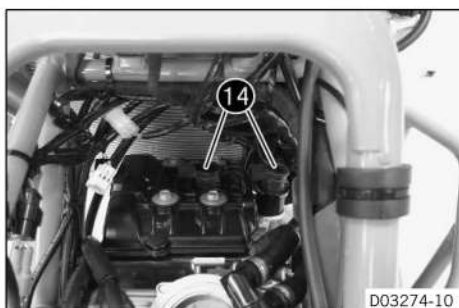


- Remove the spark plug with special tool 15.

Spark plug wrench with link (77229172000) (📖 p. 423)

- Mount and tighten the new spark plug using the special tool.
Guideline

Spark plug	M10x1	11 Nm (8.1 lbf ft)
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- Mount ignition coils 14.

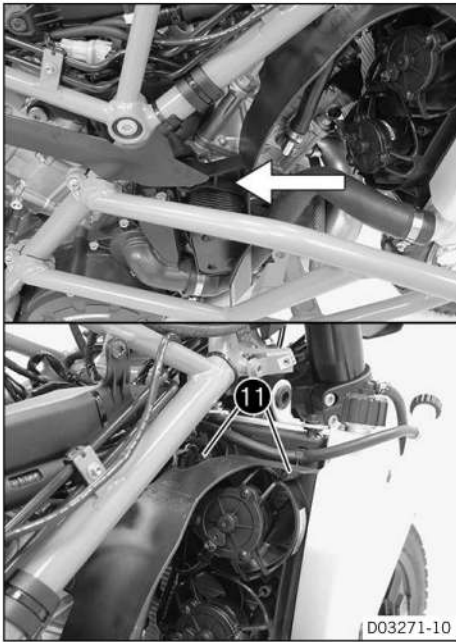


- Plug in connectors 13 of the ignition coils.

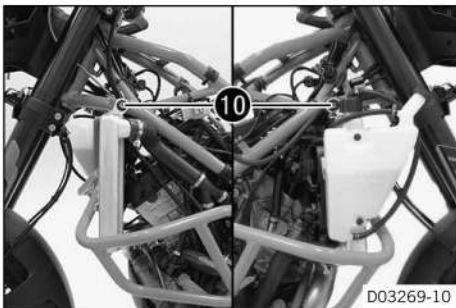
- ✓ The white connector is connected to the outer ignition coil.



- Position SAS valve.
- Join plug-in connector 12.



- Position the heat protector and mount to holder.
- Mount and tighten screws 11.



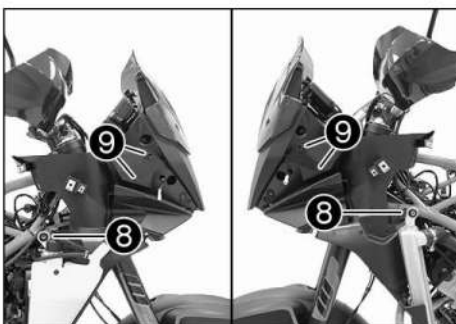
- Attach radiator on both sides.

i Info
Pay attention to the cooling fins.

- Mount and tighten screws 10.

Guideline

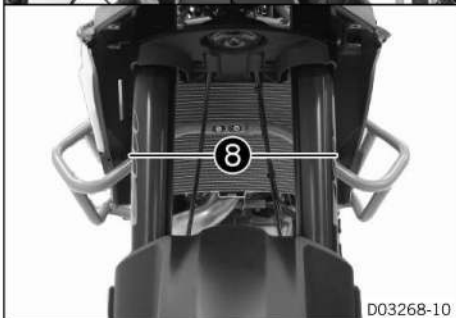
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)
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- Position the inside cover on both sides.
- Mount and tighten screws 9.
- Mount and tighten screws 8.

Guideline

Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
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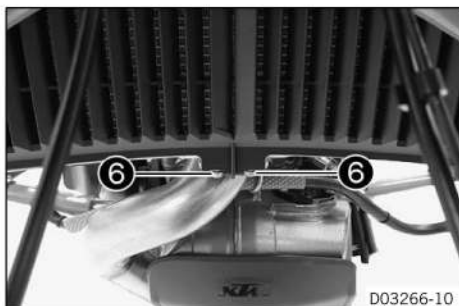




- Position the lower fairing section.
- Mount and tighten screws **7**.

Guideline

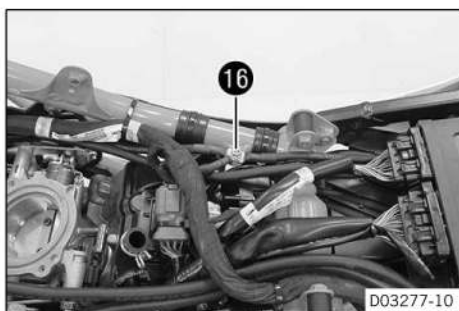
Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
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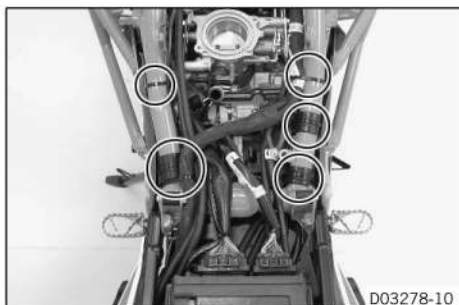
- Position the radiator shield.
- Mount and tighten screws **6**.

Guideline

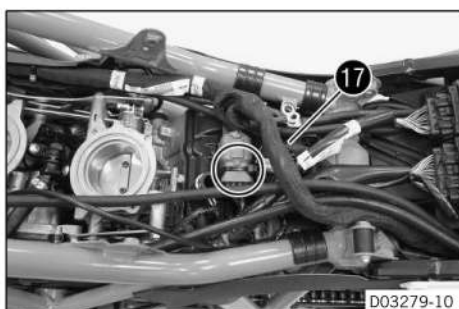
Remaining screws, chassis	M5	5 Nm (3.7 lbf ft)
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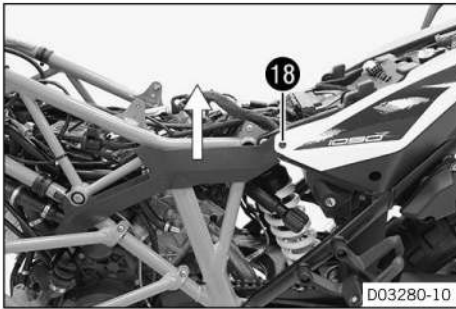
- Remove screw **16** with the washer.



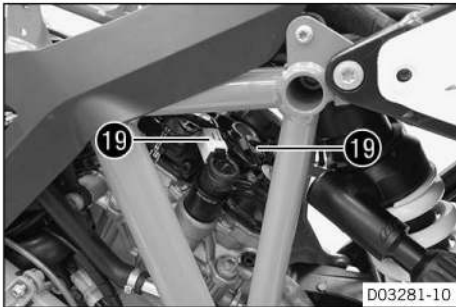
- Remove the cable ties.
- Push the cables slightly to the side.



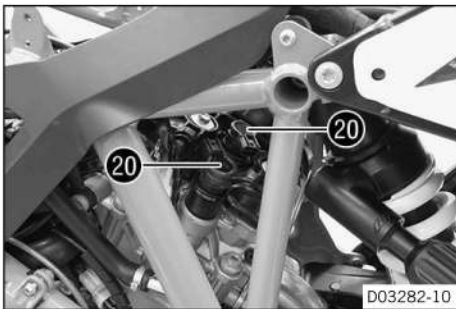
- Remove the cable ties.
- Loosen all plug-in connectors from connector holder **17**.
- Remove the plug holder.



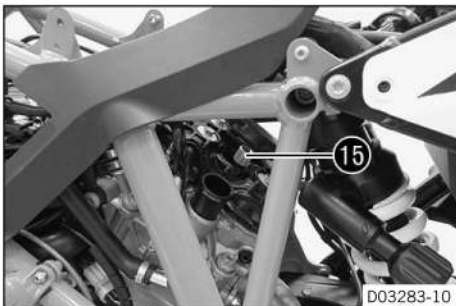
- Remove screw **18**.
- Lift up the heat protector.



- Disconnect connectors **19** of the ignition coils.



- Remove ignition coils **20**.

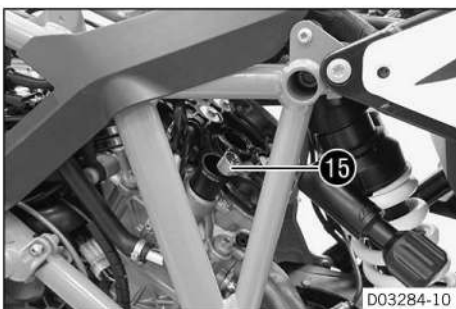


- Remove the spark plug with special tool **15**.

Spark plug wrench with link (77229172000) (📖 p. 423)

- Mount and tighten the new spark plug using the special tool.
Guideline

Spark plug	M12x1.5	18 Nm (13.3 lbf ft)
------------	---------	---------------------

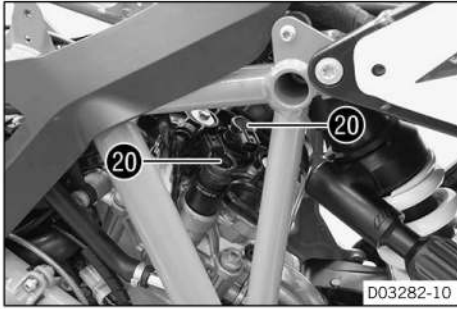


- Remove the spark plug with special tool **15**.

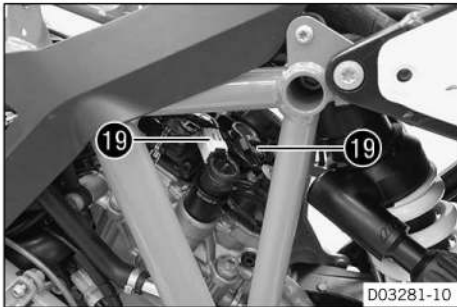
Spark plug wrench with link (77229172000) (📖 p. 423)

- Mount and tighten the new spark plug using the special tool.
Guideline

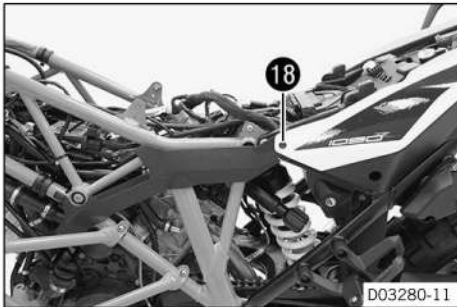
Spark plug	M10x1	11 Nm (8.1 lbf ft)
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- Mount ignition coils **20**.



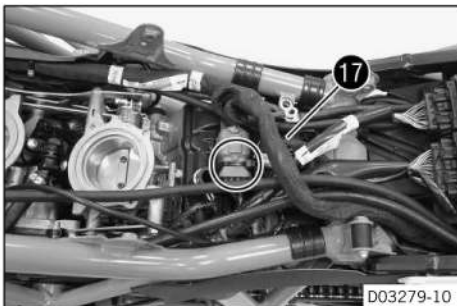
- Plug in connectors **19** of the ignition coils.
 - ✓ The white connector is connected to the outer ignition coil.



- Position the heat protector.
- Mount and tighten screw **18**.

Guideline

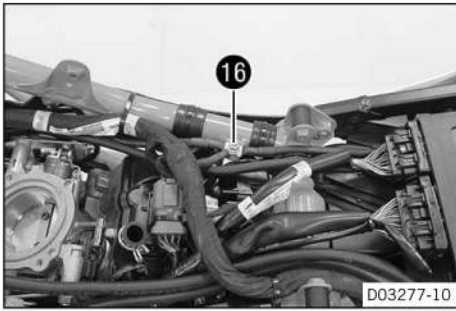
Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
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- Position the plug holder.
- Connect all plug-in connectors in connector holder **17**.
- Mount the cable ties.



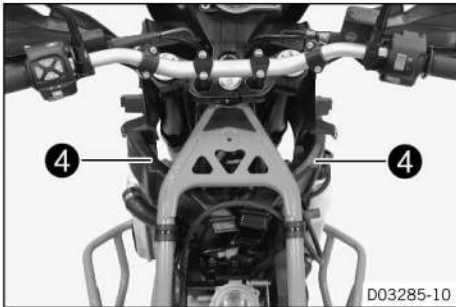
- Route the cables without tension.
- Mount the cable ties.



- Mount and tighten screw 16 with the washer.

Guideline

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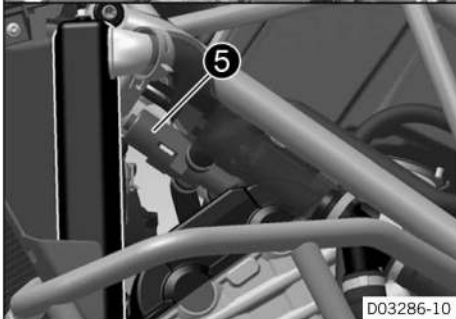


- Position intake snorkel 4.



- Position the lower part of air filter box in the frame.

i Info
Ensure that the O-rings are seated correctly.

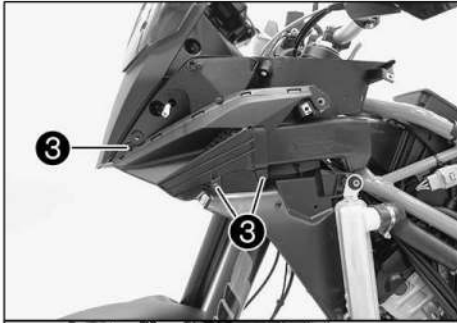


- Mount SAS valve 5 on the holder.



- Mount intake snorkel 4.

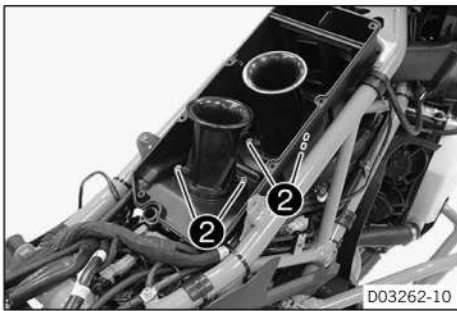
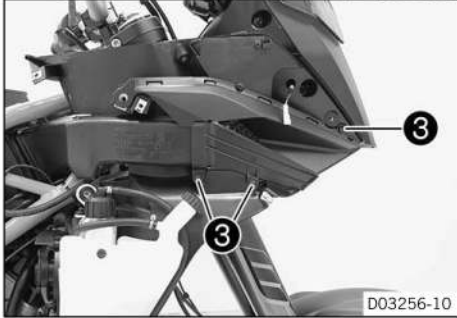
i Info
Ensure that the seals are seated correctly.



- Position air inlets.
- Mount and tighten screws **3**.

Guideline

Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
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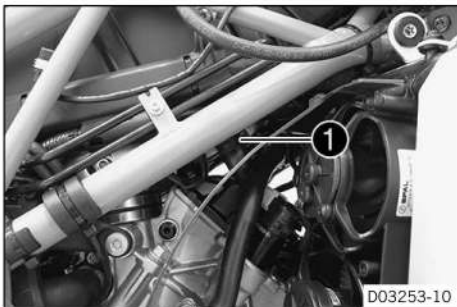
- Position the intake trumpets and mount and tighten screws **2** with the bushings.

Guideline

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



- Route the hose without kinks and secure it with cable ties.



- Mount the vent hose.
- Position spring band clamp **1** with special tool.

Spring band clamps plier (60029057100) (📖 p. 415)

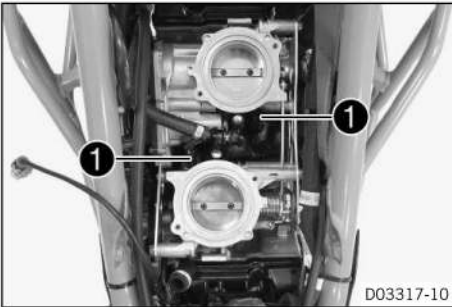
26.1 Removing the throttle valve body

Preparatory work

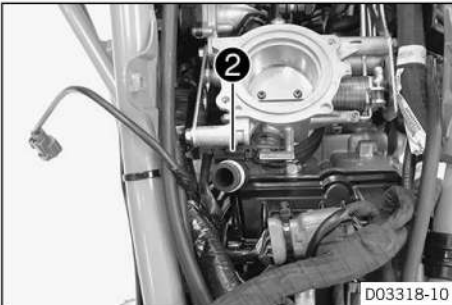
- Remove the seat. (📖 p. 96)
- Remove the front side cover. (📖 p. 110)
- Remove the fuel tank cover. (📖 p. 111)
- Remove the mask spoiler. (📖 p. 113)
- Remove the fuel tank. (📖 p. 96)
- Remove the upper part of the air filter box. (📖 p. 88)
- Remove the air filter box. (📖 p. 91)

Main work

- Detach connector ❶.



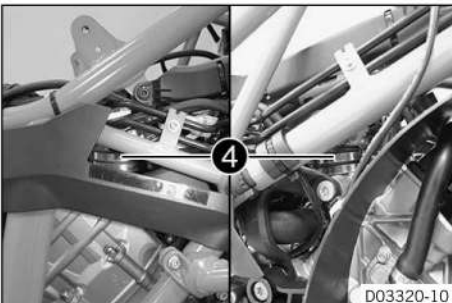
- Unplug connector ❷.

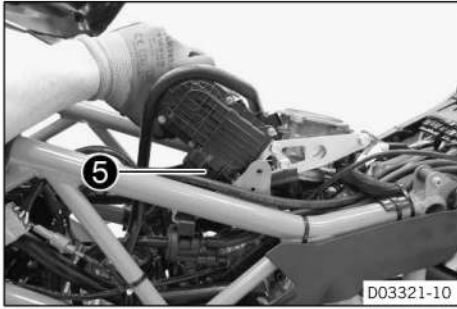


- Unplug connector ❸.

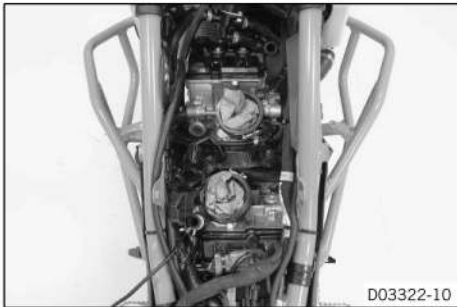


- Loosen clamps ❹.



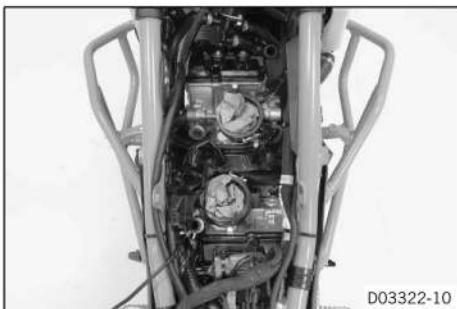


- Lift the throttle valve body.
- Detach connectors ⑤ and remove the throttle valve body.



- Cover the intake duct with a cloth.

26.2 Installing the throttle valve body

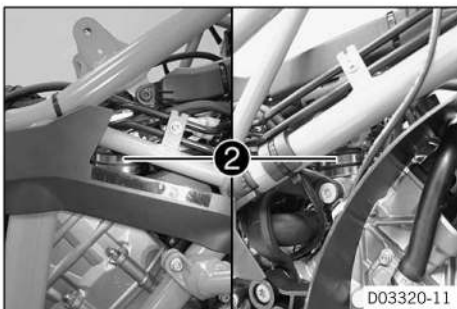


Main work

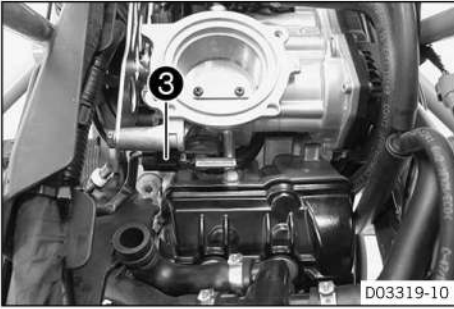
- Remove the cloth from the intake duct.



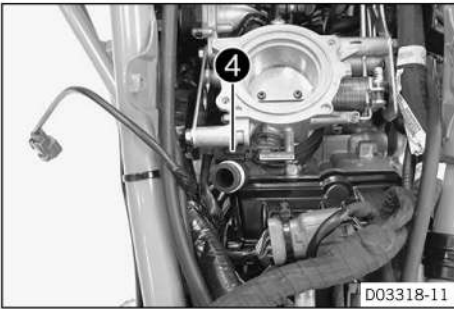
- Plug in connector ①.
- Position the throttle valve body.



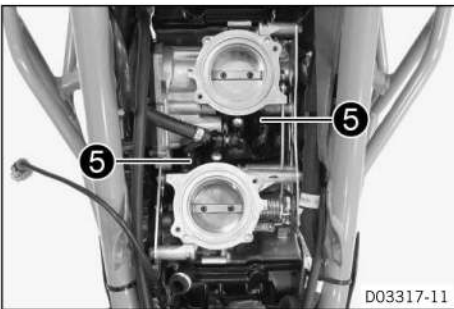
- Position and tighten clamps ②.



- Plug in connector ③.



- Plug in connector ④.



- Plug in the connectors ⑤.

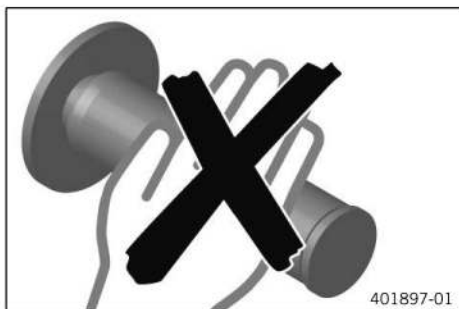
Finishing work

- Install the lower part of the air filter box. (📖 p. 93)
- Install the upper part of the air filter box. (📖 p. 90)
- Install the fuel tank. (📖 p. 98)
- Install the mask spoiler. (📖 p. 114)
- Install the fuel tank cover. (📖 p. 112)
- Install the front side cover. (📖 p. 110)
- Mount the seat. (📖 p. 96)
- Perform the initialization run. (📖 p. 363)

26.3 Performing the initialization run

Condition

The diagnostic tool is connected and running.



- Execute "**Engine electronics**" > "**Functions**" > "**Clear adaptation values**".
 - ✓ The adaptation values are deleted.
- Select "**Engine electronics**" > "**Measured values**" > "**Temperature sensor - coolant (TW1)**".
 - ✓ The coolant temperature is displayed during the initialization run.



Danger

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

- Always make sure there is sufficient ventilation when running the engine.
- Use effective exhaust extraction when starting or running the engine in an enclosed space.

- Start the engine without operating the throttle grip.

Guideline

Coolant temperature	< 25 °C (< 77 °F)
---------------------	-------------------

- Allow the engine warm up to the specified temperature at idle speed.

Guideline

Coolant temperature	80 ... 90 °C (176 ... 194 °F)
---------------------	-------------------------------



Info

Do not operate the throttle grip during the initialization process.

- Switch off the ignition when the specified temperature is reached.



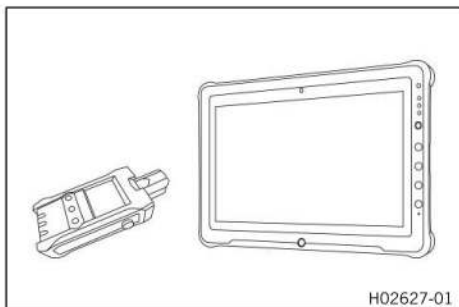
Info

If initialization is not completed or if the initialization process was interrupted, the entire process must be restarted.

26.4 Checking the CO adjustment using the KTM diagnostics tool

Condition

The diagnostic tool is connected and running.



- Select "**Engine electronics**" > "**Functions**" > "**CO adjustment when idling**".
- Confirm the warning using "**Next**".
- Check the position of the bars in the measurement range for both cylinders.
 - » The bars are in the middle of the green area of the measurement range.
 - Quit the function using "**Cancel**".

- » The bars are not in the middle of the green area of the measurement range.
 - Select **"Cylinder 1"** or **"Cylinder 2"**.
 - Using the + button or – button to position to bars in the middle of the measurement range.
 - Quit the function using **"Save"**.
- Quit the process using **"Execute"**.




27.1 Engine

Design	2-cylinder 4-stroke Otto engine, 75° V arrangement, water-cooled
Displacement	1,050 cm ³ (64.08 cu in)
Stroke	63 mm (2.48 in)
Bore	103 mm (4.06 in)
Compression ratio	13.0:1
Idle speed	1,300 ... 1,500 rpm
Control	DOHC, 4 valves per cylinder, chain-driven
Valve - valve plate diameter	
Intake	42 mm (1.65 in)
Exhaust	34 mm (1.34 in)
Valve clearance	
Exhaust at: 20 °C (68 °F)	0.25 ... 0.30 mm (0.0098 ... 0.0118 in)
Intake at: 20 °C (68 °F)	0.10 ... 0.15 mm (0.0039 ... 0.0059 in)
Crankshaft bearing	Sleeve bearing
Conrod bearing	Sleeve bearing
Piston	Forged light alloy
Piston ring	1 upper compression (rectangular) ring, 1 lower compression ring, 1 oil scraper ring
Engine lubrication	Pressure circulation lubrication with three rotary pumps
Primary transmission	40:76
Clutch	Antihopping clutch in oil bath/hydraulically operated
Transmission	6-gear transmission, claw shifted
Transmission ratio	
1st gear	12:35
2nd gear	15:32
3rd gear	18:30
4th gear	20:27
5th gear	24:27
6th gear	27:26
Mixture preparation	Electronic fuel injection
Ignition system	Contactless controlled fully electronic ignition with digital ignition adjustment
Alternator	12 V, 450 W
Spark plug	
Inside spark plug	NGK LKAR9BI-10
Outside spark plug	NGK LMAR7DI-10
Electrode gap, spark plug	1.0 mm (0.039 in)
Cooling	Water cooling, permanent circulation of coolant by water pump
Cold start device	Starter motor

27.2 Tolerance, engine wear limits

Camshaft - bearing pin	23.959 ... 23.980 mm (0.94327 ... 0.94409 in)
Camshaft bearing - radial clearance	
New condition	0.020 ... 0.054 mm (0.00079 ... 0.00213 in)
Wear limit	0.065 mm (0.00256 in)
Valve guide - diameter	
New condition	6.004 ... 6.016 mm (0.23638 ... 0.23685 in)
Wear limit	6.150 mm (0.24213 in)
Valve - sealing seat width	
Intake: New condition	0.90 mm (0.0354 in)
Intake: Wear limit	1.5 mm (0.059 in)
Exhaust: New condition	1.0 mm (0.039 in)
Exhaust: Wear limit	2.0 mm (0.079 in)
Valve - run-out	
At the valve stem: New condition	≤ 0.05 mm (≤ 0.002 in)
On the valve plate: New condition	≤ 0.1 mm (≤ 0.004 in)
On the valve plate: Wear limit	≤ 0.18 mm (≤ 0.0071 in)
Valve - valve stem diameter	
Exhaust	5.890 ... 5.970 mm (0.23189 ... 0.23504 in)
Intake	5.890 ... 5.980 mm (0.23189 ... 0.23543 in)
Valve spring - length	
New condition	42.70 mm (1.6811 in)
Wear limit	41.8 mm (1.646 in)
Cylinder head - bearing hole of camshaft	24.000 ... 24.021 mm (0.94488 ... 0.94571 in)
Cylinder - distortion of sealing surface	≤ 0.05 mm (≤ 0.002 in)
Cylinder head - distortion of sealing surface	≤ 0.10 mm (≤ 0.0039 in)
Cylinder - bore diameter	
Size I	103.000 ... 103.012 mm (4.05511 ... 4.05558 in)
Size II	103.012 ... 103.025 mm (4.05558 ... 4.05609 in)
Piston - diameter	
Size I	102.940 ... 102.950 mm (4.05275 ... 4.05314 in)
Size II	102.950 ... 102.960 mm (4.05314 ... 4.05354 in)
Piston/cylinder - mounting clearance	
Size I	0.050 ... 0.072 mm (0.00197 ... 0.00283 in)
Size II	0.052 ... 0.075 mm (0.00205 ... 0.00295 in)
Wear limit	0.1 mm (0.004 in)
Piston - piston pin hole diameter	20.010 ... 20.020 mm (0.78779 ... 0.78819 in)
Piston ring	
Width, first ring (rectangular ring)	0.797 ... 0.7995 mm (0.03138 ... 0.031476 in)
Width, second ring (lower compression ring)	0.797 ... 0.800 mm (0.03138 ... 0.0315 in)
Width, oil scraper ring	1.970 ... 1.990 mm (0.07756 ... 0.07835 in)
Piston ring - groove clearance	
First ring (rectangular ring)	≤ 0.08 mm (≤ 0.0031 in)
Second ring (lower compression ring)	≤ 0.08 mm (≤ 0.0031 in)
Oil scraper ring	≤ 0.06 mm (≤ 0.0024 in)

Piston ring end gap	
First ring (rectangular ring)	≤ 0.50 mm (≤ 0.0197 in)
Second ring (lower compression ring)	≤ 0.60 mm (≤ 0.0236 in)
Oil scraper ring	≤ 0.60 mm (≤ 0.0236 in)
Piston pin - diameter	19.995 ... 20.000 mm (0.7872 ... 0.7874 in)
Connecting rod - diameter of upper conrod eye	20.000 ... 20.013 mm (0.7874 ... 0.78791 in)
Connecting rod - axial clearance of lower conrod bearing	
New condition	0.15 ... 0.35 mm (0.0059 ... 0.0138 in)
Wear limit	0.40 mm (0.0157 in)
Connecting rod - radial clearance of lower conrod bearing	
New condition	0.030 ... 0.060 mm (0.00118 ... 0.00236 in)
Wear limit	0.080 mm (0.00315 in)
Connecting rod - large end width	20.950 ... 21.000 mm (0.8248 ... 0.82677 in)
Crankshaft - axial clearance	
New condition	0.10 ... 0.40 mm (0.0039 ... 0.0157 in)
Wear limit	1.00 mm (0.0394 in)
Crankshaft - crank pin width	42.100 ... 42.150 mm (1.65748 ... 1.65945 in)
Crankshaft - crank pin diameter	
Yellow	41.978 ... 41.989 mm (1.65267 ... 1.65311 in)
Blue	41.990 ... 42.000 mm (1.65315 ... 1.65354 in)
Red	42.001 ... 42.011 mm (1.65358 ... 1.65397 in)
Crankshaft - main bearing diameter	
Yellow	52.965 ... 52.975 mm (2.08523 ... 2.08563 in)
Blue	52.976 ... 52.985 mm (2.08567 ... 2.08602 in)
Red	52.986 ... 52.995 mm (2.08606 ... 2.08641 in)
Crankshaft - radial clearance of main bearing	
New condition	0.025 ... 0.080 mm (0.00098 ... 0.00315 in)
Wear limit	0.10 mm (0.0039 in)
Crankshaft - step bearing diameter	27.985 ... 28.000 mm (1.10177 ... 1.10236 in)
Crankshaft - radial clearance of step bearing	
New condition	0.030 ... 0.070 mm (0.00118 ... 0.00276 in)
Wear limit	0.090 mm (0.00354 in)
Clutch disc pack - thickness	
New condition	47.20 ... 48.00 mm (1.8583 ... 1.8898 in)
Wear limit	46.00 mm (1.811 in)
Clutch spring - length	≥ 45.8 mm (≥ 1.803 in)
Clutch basket - thrust surface of clutch facing discs	
Wear limit	0.5 mm (0.02 in)
Oil pressure regulator valve - minimum length spring	39 mm (1.54 in)
Oil pumps	
Clearance between external rotor and engine case	0.20 ... 0.40 mm (0.0079 ... 0.0157 in)
Clearance between external rotor and internal rotor	0.10 ... 0.25 mm (0.0039 ... 0.0098 in)
Axial clearance	0.04 ... 0.25 mm (0.0016 ... 0.0098 in)
Oil pressure	
Coolant temperature: ≥ 60 °C (≥ 140 °F)	1.8 ... 4.5 bar (26 ... 65 psi)
Idle speed	

Oil consumption	
After the vehicle is run-in	≤ 0.6 l/1.000 km (≤ 0.6 qt./600 mi)
	 Info Oil consumption depends on the riding style and the operating conditions.
Shift fork	
Thickness at leaf	4.85 ... 4.95 mm (0.1909 ... 0.1949 in)
Clearance in the sliding gear groove: New condition	0.35 ... 0.55 mm (0.0138 ... 0.0217 in)
Clearance in the sliding gear groove: Wear limit	0.80 mm (0.0315 in)
Shift shaft - play in sliding plate/shift quadrant	0.40 ... 0.80 mm (0.0157 ... 0.0315 in)
Sliding gear - width of shift fork groove	5.30 ... 5.40 mm (0.2087 ... 0.2126 in)
Main shaft axial clearance	0.05 ... 0.15 mm (0.002 ... 0.0059 in)

27.3 Engine tightening torques



Screw, damping plate	EJOT ALtracs® M6x14	10 Nm (7.4 lbf ft) Loctite®243™
Screw, retaining bracket, valve cover, rear	EJOT ALtracs® M6x10	10 Nm (7.4 lbf ft)
Hose clip, intake flange	M4	1.5 Nm (1.11 lbf ft)
Oil nozzle	M5	2 Nm (1.5 lbf ft) Loctite®243™
Remaining engine screws	M5	6 Nm (4.4 lbf ft)
Screw, bearing retainer	M5	6 Nm (4.4 lbf ft) Loctite®243™
Screw, bearing shells retaining bracket	M5	6 Nm (4.4 lbf ft) Loctite®243™
Screw, crankshaft speed sensor	M5	6 Nm (4.4 lbf ft) Loctite®243™
Screw, engine oil level viewer	M5	4 Nm (3 lbf ft)
Screw, gear sensor	M5	6 Nm (4.4 lbf ft) Loctite®243™
Bleeder screw, water pump cover	M6	10 Nm (7.4 lbf ft)
Coolant connection screw on the cylinder head	M6	8 Nm (5.9 lbf ft) Loctite®243™
Freewheel ring bolt	M6 – 10.9	15 Nm (11.1 lbf ft) Loctite® 648™
Fuel hose connection bracket	M6	10 Nm (7.4 lbf ft) Loctite®243™
Nut, cylinder head	M6	9 Nm (6.6 lbf ft)
Plug, vacuum connection	M6	5 Nm (3.7 lbf ft) Loctite®243™
Remaining engine screws	M6	10 Nm (7.4 lbf ft)
Screw, camshaft bearing support	M6 – 10.9	10 Nm (7.4 lbf ft)
Screw, clutch cover	M6	10 Nm (7.4 lbf ft)
Screw, clutch spring	M6	12 Nm (8.9 lbf ft)
Screw, engine case	M6x60	10 Nm (7.4 lbf ft)

Screw, engine case	M6x80	10 Nm (7.4 lbf ft)	
Screw, engine case	M6x90	10 Nm (7.4 lbf ft)	
Screw, freewheel holder	M6	10 Nm (7.4 lbf ft)	Loctite®243™
Screw, locking lever	M6	10 Nm (7.4 lbf ft)	Loctite®243™
Screw, oil pump cover	M6	10 Nm (7.4 lbf ft)	Loctite®243™
Screw, shift drum locating	M6 – 12.9	18 Nm (13.3 lbf ft)	Loctite®243™
Screw, shift lever	M6	15 Nm (11.1 lbf ft)	Loctite®243™
Screw, starter motor	M6	10 Nm (7.4 lbf ft)	
Screw, stator	M6	10 Nm (7.4 lbf ft)	Loctite®243™
Screw, valve cover	M6	10 Nm (7.4 lbf ft)	
Screw, water pump cover	M6	10 Nm (7.4 lbf ft)	
Screw, water pump wheel	M6	10 Nm (7.4 lbf ft)	Loctite®243™
Stud, timing chain shaft	M6	8 Nm (5.9 lbf ft)	
Vacuum connection	M6	5 Nm (3.7 lbf ft)	
Nozzle 100	M6x0.75	4 Nm (3 lbf ft)	Loctite®243™
Plug, crankshaft retainer	M8	15 Nm (11.1 lbf ft)	
Screw, camshaft bearing support	M8 – 10.9	Step 1 10 Nm (7.4 lbf ft) Step 2 18 Nm (13.3 lbf ft)	
Screw, camshaft bearing support	M8 – 10.9	Step 1 8.5 Nm (6.27 lbf ft) Step 2 14.5 Nm (10.7 lbf ft) Only applies when using: Hexagon socket bit (61229025000) (🔗 p. 419)	
Screw, engine case	Expansion screw M8	18 Nm (13.3 lbf ft)	
Screw, heat exchanger	M8	15 Nm (11.1 lbf ft)	
Screw, timing chain guide rail	M8	15 Nm (11.1 lbf ft)	Loctite®243™
Screw, timing chain tensioning rail	M8	15 Nm (11.1 lbf ft)	Loctite®243™
Screws, engine bearer	M8	20 Nm (14.8 lbf ft)	Loctite®243™
Stud, exhaust flange	M8	10 Nm (7.4 lbf ft)	
Screw, engine bearer	M10	45 Nm (33.2 lbf ft)	
Oil pressure sensor	M10x1	10 Nm (7.4 lbf ft)	
Plug, cam lever axis	M10x1	15 Nm (11.1 lbf ft)	
Plug, clutch lubrication	M10x1	10 Nm (7.4 lbf ft)	


Screw, conrod bearing	M10x1	Step 1 25 Nm (18.4 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 90°
Screw, timing chain tensioner release	M10x1	10 Nm (7.4 lbf ft)
Spark plug	M10x1	11 Nm (8.1 lbf ft)
Cylinder head screw	M11x1.5	Tightening sequence: Using a crisscross pattern Step 1 15 Nm (11.1 lbf ft) Step 2 30 Nm (22.1 lbf ft) Step 3 90° Step 4 90° Lubricated with engine oil
Coolant temperature sensor	M12x1.5	12 Nm (8.9 lbf ft)
Screw, rotor	Expansion screw M12x1.5	115 Nm (84.8 lbf ft)
Spark plug	M12x1.5	18 Nm (13.3 lbf ft)
Nut of engine sprocket	M20x1.5	100 Nm (73.8 lbf ft) Loctite®243™
Oil drain plug	M20x1.5	20 Nm (14.8 lbf ft)
Nut, inner clutch hub	M22x1.5	120 Nm (88.5 lbf ft) Loctite®243™
Plug, timing-chain tensioner	M24x1.5	25 Nm (18.4 lbf ft)
Screw plug, alternator cover	M24x1.5	8 Nm (5.9 lbf ft)
Nut, primary gear wheel	M33LHx1.5	130 Nm (95.9 lbf ft) Loctite®243™

27.4 Capacities


27.4.1 Engine oil

Engine oil Ambient temperature: $\geq 0\text{ }^{\circ}\text{C}$ ($\geq 32\text{ }^{\circ}\text{F}$)	3.60 l (3.8 qt.)	Engine oil (SAE 10W/50) ( p. 406)
Engine oil Ambient temperature: $< 0\text{ }^{\circ}\text{C}$ ($< 32\text{ }^{\circ}\text{F}$)		Engine oil (SAE 5W/40) ( p. 407)

27.4.2 Coolant

Coolant	2.40 l (2.54 qt.)	Coolant ( p. 406)
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27.4.3 Fuel

Total fuel tank capacity, approx.	23 l (6.1 US gal)	Super unleaded (ROZ 95/RON 95/PON 91) ( p. 407)
Fuel reserve, approx.	3.5 l (3.7 qt.)	

27.5 Chassis

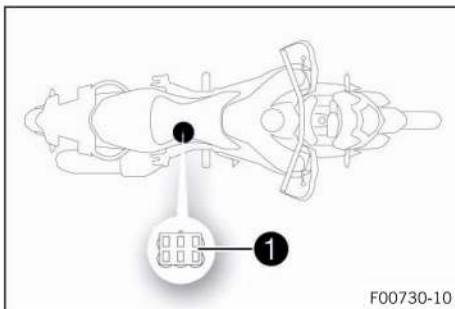
Frame	Lattice frame made of chrome molybdenum steel tubing, powder-coated
Fork	WP Suspension 4860 ROTA SPLIT
Shock absorber	WP Suspension 4618 DCC PA
Suspension travel	
front	220 mm (8.66 in)
rear	220 mm (8.66 in)
Brake system	
front	Double disc brake with radially mounted four-piston brake calipers, floating brake discs
rear	Single disc brake with dual-piston brake caliper, floating brake disc
Brake discs - diameter	
front	320 mm (12.6 in)
rear	267 mm (10.51 in)
Brake discs - wear limit	
front	4 mm (0.16 in)
rear	4.5 mm (0.177 in)
Tire pressure, solo / with passenger / full payload	
front: with cold tires	2.6 bar (38 psi)
rear: with cold tires	2.9 bar (42 psi)
Secondary drive ratio	17:42
Chain	5/8 x 5/16" (525) X-ring
Steering head angle	64°
Wheelbase	1,580 ± 15 mm (62.2 ± 0.59 in)
Seat height, unloaded	890 mm (35.04 in)
Ground clearance, unloaded	250 mm (9.84 in)
Weight without fuel, approx.	214 kg (472 lb.)
Maximum permissible front axle load	165 kg (364 lb.)
Maximum permissible rear axle load	285 kg (628 lb.)
Maximum permissible total weight	450 kg (992 lb.)

27.6 Electrical system

12-V battery	YTZ14S	Battery voltage: 12 V Nominal capacity: 11.2 Ah Maintenance-free
Fuse	58011109110	10 A
Fuse	58011109115	15 A
Fuse	58011109125	25 A
Fuse	58011109130	30 A
Low beam	H11/socket PGJ19-2	12 V 55 W
High beam	H11/socket PGJ19-2	12 V 55 W
Position light	LED	

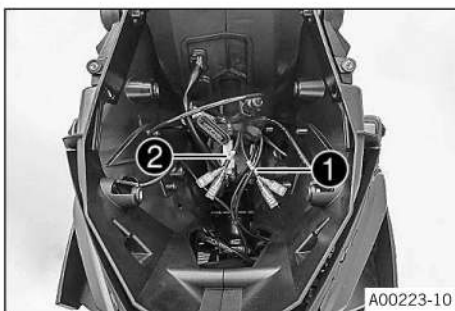
Combination instrument lighting and indicator lamps	LED	
Turn signal	RY10W / Socket BAU15s	12 V 10 W
Tail light	LED	
Brake light	LED	
License plate lamp	LED	

27.6.1 Diagnostics connector



Diagnostics connector ❶ is located under the seat.

27.6.2 Front ACC1 and ACC2



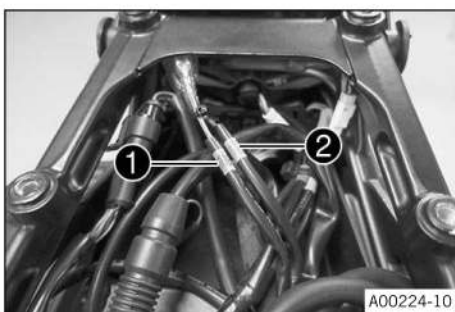
Installation location

- The front power supplies ACC1 ❶ and ACC2 ❷ are located behind the headlight.

i Info

The power supplies are protected by a fuse, however this fuse also protects other power consumers. The maximum continuous load is therefore significantly lower than the value of the fuse. Do not use a stronger fuse.

27.6.3 ACC1 and ACC2 rear



Installation location

- The rear power supplies ACC1 ❶ and ACC2 ❷ are located under the luggage rack plate.


i Info

The power supplies are protected by a fuse, however this fuse also protects other power consumers. The maximum continuous load is therefore significantly lower than the value of the fuse. Do not use a stronger fuse.

27.7 Tires

Front tire	Rear tire
90/90 - 21 M/C 54T M+S TL Continental TKC 80 Twinduro	150/70 B 18 M/C 70Q M+S TL Continental TKC 80 Twinduro
The tires specified represent one of the possible series production tires. Additional information is available in the Service section under: http://www.ktm.com	

27.8 Fork

Fork article number	14.18.8Q.25
Fork	WP Suspension 4860 ROTA SPLIT
Compression damping	
Comfort	17 clicks
Standard	12 clicks
Sport	7 clicks
Full payload	7 clicks
Rebound damping	
Comfort	17 clicks
Standard	12 clicks
Sport	7 clicks
Full payload	7 clicks
Spring preload - Preload Adjuster	
Comfort	2 turns
Standard	5 turns
Sport	5 turns
Full payload	8 turns
Spring length with preload spacer(s)	577 mm (22.72 in)
Spring rate	
Soft	5.9 N/mm (33.7 lb/in)
Medium (standard)	6.5 N/mm (37.1 lb/in)
Hard	7.0 N/mm (40 lb/in)
Fork length	920 mm (36.22 in)
Air chamber length	85 \pm $_{0}^{35}$ mm (3.35 \pm $_{0}^{1.38}$ in)
Fork oil per fork leg	715 ml (24.17 fl. oz.)
	Fork oil (SAE 4) (48601166S1) ( p. 407)

27.9 Shock absorber

Shock absorber article number	15.18.7Q.25
Shock absorber	WP Suspension 4618 DCC PA
Low-speed compression damping	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks

High-speed compression damping	
Comfort	1.5 turns
Standard	1.5 turns
Sport	1 turn
Full payload	1 turn
Rebound damping	
Comfort	20 clicks
Standard	15 clicks
Sport	10 clicks
Full payload	10 clicks
Spring preload	
Comfort	2 turns
Standard	2 turns
Sport	2 turns
Full payload	18 turns
Spring rate	
Soft	170 N/mm (971 lb/in)
Medium (standard)	180 N/mm (1,028 lb/in)
Hard	190 N/mm (1,085 lb/in)
Spring length	205 mm (8.07 in)
Gas pressure	10 bar (145 psi)
Riding sag	55 mm (2.17 in)
Static sag	25 mm (0.98 in)
Fitted length	408 mm (16.06 in)
Shock absorber fluid (見 p. 407)	SAE 2.5

27.10 Chassis tightening torques

Nut, valve	ISO 10V2	12 Nm (8.9 lbf ft) Loctite®2701™
Screw, combination switch, left	M4	2 Nm (1.5 lbf ft)
Screw, side stand switch	M4	2 Nm (1.5 lbf ft)
Rear fairing screw	M5x12	3.5 Nm (2.58 lbf ft)
Rear fairing screw	M5x17	3.5 Nm (2.58 lbf ft)
Remaining nuts, chassis	M5	5 Nm (3.7 lbf ft)
Remaining screws, chassis	M5	5 Nm (3.7 lbf ft)
Screw brake line holder on frame	M5	2 Nm (1.5 lbf ft)
Screw, brake line holder on link fork	M5	5 Nm (3.7 lbf ft)
Screw, cable channel	M5	5 Nm (3.7 lbf ft)
Screw, chain sliding guard	M5	5 Nm (3.7 lbf ft)
Screw, combination switch, right	M5	3.5 Nm (2.58 lbf ft)
Screw, cover part	M5	3.5 Nm (2.58 lbf ft)
Screw, foot brake lever stub	M5	6 Nm (4.4 lbf ft) Loctite®243™
Screw, fuel level sensor	M5	3 Nm (2.2 lbf ft)
Screw, fuel tank filler cap	M5	3 Nm (2.2 lbf ft)

Screw, heat guard on main silencer	M5	4 Nm (3 lbf ft)	
Screw, rear wheel speed sensor cable guide	M5	3 Nm (2.2 lbf ft)	
Screw, wind shield	M5	3.5 Nm (2.58 lbf ft)	
Spoke nipple	M5	5 Nm (3.7 lbf ft)	
Ground fitting on frame	M6	6 Nm (4.4 lbf ft)	
Nut, ABS module fastening	M6	8 Nm (5.9 lbf ft)	
Remaining nuts, chassis	M6	10 Nm (7.4 lbf ft)	
Remaining screws, chassis	M6	10 Nm (7.4 lbf ft)	
Screw, angle sensor	M6	6 Nm (4.4 lbf ft)	Loctite®243™
Screw, ball joint of push rod on foot brake cylinder	M6	10 Nm (7.4 lbf ft)	Loctite®243™
Screw, battery terminal	M6	4.5 Nm (3.32 lbf ft)	
Screw, brake line holder on bottom triple clamp	M6	10 Nm (7.4 lbf ft)	
Screw, cable channel	M6	5 Nm (3.7 lbf ft)	
Screw, chain guide	M6	5 Nm (3.7 lbf ft)	
Screw, clutch assembly	M6	5 Nm (3.7 lbf ft)	
Screw, cooler retaining bracket	M6	7 Nm (5.2 lbf ft)	
Screw, cover part	M6	6 Nm (4.4 lbf ft)	
Screw, engine guard	M6	10 Nm (7.4 lbf ft)	
Screw, exhaust clamp	M6	8 Nm (5.9 lbf ft)	
Screw, foot brake cylinder	M6	10 Nm (7.4 lbf ft)	Loctite®243™
Screw, front brake disc	M6	14 Nm (10.3 lbf ft)	Loctite®243™
Screw, front wheel speed sensor	M6	10 Nm (7.4 lbf ft)	
Screw, fuel pump	M6	6 Nm (4.4 lbf ft)	
Screw, fuel tank	M6	10 Nm (7.4 lbf ft)	
Screw, fuel tap	M6	6 Nm (4.4 lbf ft)	
Screw, headlight	M6	5 Nm (3.7 lbf ft)	
Screw, lower rear panel	M6	6 Nm (4.4 lbf ft)	
Screw, magnetic holder on side stand	M6	6 Nm (4.4 lbf ft)	Loctite®243™
Screw, rear brake disc	M6	14 Nm (10.3 lbf ft)	Loctite®243™
Screw, rear wheel speed sensor	M6	10 Nm (7.4 lbf ft)	
Screw, retaining bracket, angle sensor	M6	10 Nm (7.4 lbf ft)	Loctite®243™
Screw, voltage regulator	M6	6 Nm (4.4 lbf ft)	
Remaining nuts, chassis	M8	25 Nm (18.4 lbf ft)	
Remaining screws, chassis	M8	25 Nm (18.4 lbf ft)	
Screw, bottom triple clamp	M8	12 Nm (8.9 lbf ft)	
Screw, exhaust clamp	M8	25 Nm (18.4 lbf ft)	
Screw, foot brake lever	M8	25 Nm (18.4 lbf ft)	Loctite®243™

Screw, fork stub	M8	15 Nm (11.1 lbf ft)
Screw, front footrest bracket	M8	25 Nm (18.4 lbf ft) Loctite®243™
Screw, fuel tank	M8	15 Nm (11.1 lbf ft)
Screw, handle bar end hand guard	M8	25 Nm (18.4 lbf ft)
Screw, handlebar clamp	M8	20 Nm (14.8 lbf ft)
Screw, ignition lock (tamper-proof screw)	M8	25 Nm (18.4 lbf ft) Loctite®243™
Screw, rear footrest bracket	M8	25 Nm (18.4 lbf ft) Loctite®243™
Screw, steering damper	M8	25 Nm (18.4 lbf ft) Loctite®243™
Screw, steering damper clamp	M8	12 Nm (8.9 lbf ft)
Screw, steering stem	M8	20 Nm (14.8 lbf ft)
Screw, suitcase hook	M8	20 Nm (14.8 lbf ft) Loctite®243™
Screw, top triple clamp	M8	20 Nm (14.8 lbf ft)
Remaining nuts, chassis	M10	45 Nm (33.2 lbf ft)
Remaining screws, chassis	M10	45 Nm (33.2 lbf ft)
Screw, front brake caliper	M10	45 Nm (33.2 lbf ft) Loctite®243™
Screw, handlebar support	M10	40 Nm (29.5 lbf ft) Loctite®243™
Screw, side stand	M10	35 Nm (25.8 lbf ft) Loctite®243™
Screw, side stand bracket	M10	45 Nm (33.2 lbf ft) Loctite®243™
Banjo bolt, brake line	M10x1	25 Nm (18.4 lbf ft)
Nut, rear sprocket screw	M10x1.25	50 Nm (36.9 lbf ft) Loctite®243™
Lambda sensor	M12x1.25	25 Nm (18.4 lbf ft)
Screw, bottom shock absorber	M14x1.5	80 Nm (59 lbf ft) Thread greased
Screw, top shock absorber	M14x1.5	80 Nm (59 lbf ft) Thread greased
Nut, fork pivot	M19x1.5	130 Nm (95.9 lbf ft) Thread greased
Nut, seat lock	M22x1.5	4 Nm (3 lbf ft)
Screw, steering head, top	M22x1.5	18 Nm (13.3 lbf ft)
Screw, steering head, top	M22x1.5	15 Nm (11.1 lbf ft) Only applies when using: Holding wrench (45229050000) ( p. 412)
Nut, rear wheel spindle	M25x1.5	90 Nm (66.4 lbf ft) Thread greased
Screw, front wheel spindle	M25x1.5	45 Nm (33.2 lbf ft) Thread greased

28.1 Cleaning the motorcycle

Note

Material damage Components become damaged or destroyed if a pressure cleaner is used incorrectly. The high pressure forces water into the electrical components, connectors, throttle cables, and bearings, etc. Pressure which is too high causes malfunctions and destroys components.

- Do not direct the water jet directly on to electrical components, connectors, throttle cables or bearings.
- Maintain a minimum distance between the nozzle of the pressure cleaner and the component.
Minimum clearance 60 cm (23.6 in)



Note

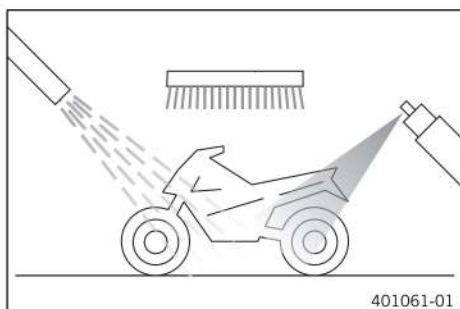
Environmental hazard Hazardous substances cause environmental damage.

- Dispose of oils, grease, filters, fuel, cleaning agents, brake fluid, etc., correctly and in compliance with the applicable regulations.



Info

To maintain the value and appearance of the motorcycle over a long period, clean it regularly. Avoid direct sunshine when cleaning the motorcycle.



- Close off the exhaust system to keep water from entering.
- Remove loose dirt first with a soft jet of water.
- Spray heavily soiled parts with a normal commercial motorcycle cleaner and then brush off with a soft brush.

Motorcycle cleaner (📖 p. 409)



Info

Use warm water containing normal motorcycle cleaner and a soft sponge. Never apply motorcycle cleaner to a dry vehicle; always rinse the vehicle with water first. If the vehicle was operated in road salt, clean it with cold water. Warm water would enhance the corrosive effects of salt.

- After rinsing the motorcycle with a gentle spray of water, allow it to dry thoroughly.
- Remove the closure of the exhaust system.



Warning

Danger of accidents Moisture and dirt impair the brake system.

- Brake carefully several times to dry out and remove dirt from the brake linings and the brake discs.

- After cleaning, ride the vehicle a short distance until the engine warms up.



Info

The heat produced causes water at inaccessible locations in the engine and on the brake system to evaporate.

- Push back the protection caps of the handlebar controls to allow any water that has penetrated to evaporate.
- After the motorcycle has cooled down, lubricate all moving parts and pivot points.
- Clean the chain. (📖 p. 147)
- Treat bare metal (except for brake discs and the exhaust system) with a corrosion inhibitor.

Preserving materials for paints, metal and rubber (📖 p. 409)

- Treat the painted parts with a mild paint polish.

Perfect finish and high gloss polish for paints (📖 p. 409)



Info

Do not polish parts that were matte when delivered as this would strongly impair the material quality.

- Treat the plastic parts and powder-coated parts with a mild cleaning and care product.

Special cleaner for glossy and matte paint finishes, metal and plastic surfaces (📖 p. 409)

- Oil the ignition and steering lock, tank lock, and seat lock.

Universal oil spray (📖 p. 409)

28.2 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 has been used on salted roads, use cold water for cleaning after riding. Warm water enhances the corrosive effects of salt.



- Clean the motorcycle. (📖 p. 378)
- Clean the brakes.



Info

After **EVERY** trip on salted roads, thoroughly clean the brake calipers and brake linings, after they have cooled down and without removing them, with cold water and dry them carefully.

After riding on salted roads, thoroughly clean the motorcycle with cold water and dry it well.

- Treat the engine, the link fork, and all other bare or zinc-plated parts (except the brake discs) with a wax-based corrosion inhibitor.



Info

Corrosion inhibitor must not come into contact with the brake discs. This would severely lower the braking effect.

- Clean the chain. (📖 p. 147)

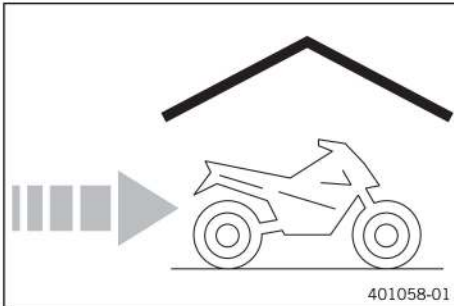


29.1 Storage

i Info

If you plan to garage the motorcycle for a longer period, perform the following steps or have them performed.

Before storing the motorcycle, check all parts for function and wear. If service, repairs, or replacements are necessary, you should do this during the storage period (less workshop overload). In this way, you can avoid long workshop waiting times at the start of the new season.



- When refueling for the last time before taking the motorcycle out of service, add fuel additive.

Fuel additive (📖 p. 408)

- Refuel.
- Clean the motorcycle. (📖 p. 378)
- Change the engine oil and oil filter and clean the oil screens. (📖 p. 339)
- Check the coolant fill level and antifreeze. (📖 p. 307)
- Check tire pressure. (📖 p. 118)
- Remove the 12-V battery. (📖 p. 157)

Guideline

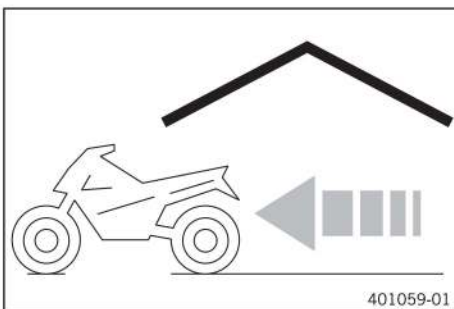
Storage temperature of the 12-V battery without direct sunlight	0 ... 35 °C (32 ... 95 °F)
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- Charge the 12-V battery.
- Store the vehicle in a dry location that is not subject to large fluctuations in temperature.
- Cover the motorcycle with a tarp or cover that is permeable to air.

i Info

Do not use non-porous materials since they prevent humidity from escaping, thus causing corrosion. Avoid running the engine for a short time only. Since the engine cannot warm up properly, the water vapor produced during combustion condenses and causes valves and the exhaust system to rust.

29.2 Preparing for use after storage



- Install the 12-V battery. (📖 p. 158)

i Info

If the 12-V battery was removed, the time and date must be set.

- Perform checks and maintenance measures when preparing for use.
- Take a test ride.

30.1 Additional information

Any further work that results from the required work or from the recommended work must be ordered separately and can be invoiced separately.
 Different service intervals may apply in your country, depending on the local operating conditions.
 Individual service intervals and scopes may change in the course of technical developments. The most up-to-date service schedule can always be found on KTM Dealer.net. Your authorized KTM dealer will be happy to advise you.

30.2 Required work

	Every two years				
	Every year				
	every 30,000 km (18,600 mi)				
	every 15,000 km (9,300 mi)				
	after 1,000 km (620 mi)				
Read out the trouble code memory using the KTM diagnostics tool.	○	●	●	●	●
Check that the electrical system is functioning properly.	○	●	●	●	●
Change the engine oil and oil filter and clean the oil screens. (📖 p. 339)	○	●	●	●	●
Check the front brake linings. (📖 p. 167)	○	●	●	●	●
Check the rear brake linings. (📖 p. 173)	○	●	●	●	●
Check the brake discs. (📖 p. 131)	○	●	●	●	●
Check the brake lines for damage and leakage.	○	●	●	●	●
Change the front brake fluid. (📖 p. 171)					●
Change the rear brake fluid. (📖 p. 177)					●
Change the hydraulic clutch fluid. (📖 p. 296)					●
Check the front brake fluid level. (📖 p. 169)	○	●	●	●	
Check the rear brake fluid level. (📖 p. 176)	○	●	●	●	
Check/correct the fluid level of the hydraulic clutch. (📖 p. 295)		●	●	●	
Check the shock absorber and fork for leaks. Perform service as needed and depending on how the vehicle is used.	○	●	●	●	●
Clean the dust boots of the fork legs. (📖 p. 21)		●	●		
Check steering head bearing play. (📖 p. 33)	○	●	●	●	●
Check the tire condition. (📖 p. 118)	○	●	●	●	●
Check tire pressure. (📖 p. 118)	○	●	●	●	●
Retighten the spokes.	○				
Check the spoke tension. (📖 p. 121)		●	●	●	●
Check the rim run-out. (📖 p. 119)	○	●	●	●	●
Check the chain, rear sprocket, and engine sprocket. (📖 p. 145)		●	●	●	●
Check the chain tension. (📖 p. 143)	○	●	●	●	●
Change the spark plugs (air filter removed). (📖 p. 349)				●	
Check the valve clearance (air filter and spark plugs removed). (📖 p. 328)				●	
Change the SAS membrane. (📖 p. 293)				●	
Check the cables for damage and routing without sharp bends. (fuel tank removed)		●	●	●	●
Check the coolant level in the compensating tank. (📖 p. 307)	○	●	●	●	●
Change the air filter, clean the air filter box. (📖 p. 88)		●	●		
Check the fuel pressure. (📖 p. 100)		●	●	●	●
Check the CO adjustment using the KTM diagnostics tool. (📖 p. 364)	○	●	●		

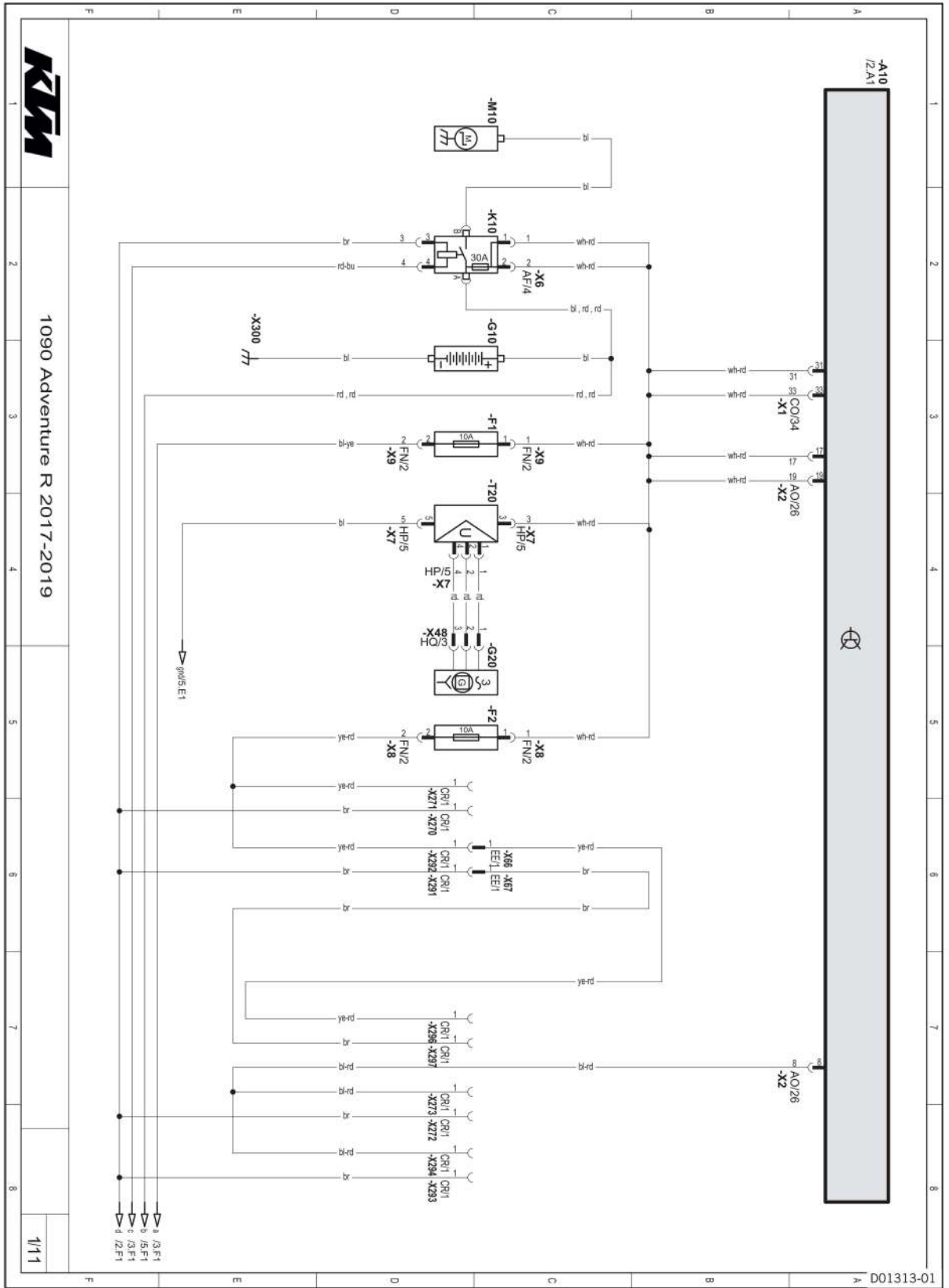
		Every two years			
			Every year		
			every 30,000 km (18,600 mi)		
			every 15,000 km (9,300 mi)		
			after 1,000 km (620 mi)		
Check the headlight setting. (🔧 p. 183)	○	●	●		
Check that the radiator fan is functioning properly.	○	●	●	●	●
Final check: Check the vehicle is roadworthy and take a test ride.	○	●	●	●	●
Read out the error memory after the test ride using the KTM diagnostics tool.	○	●	●	●	●
Reset the service display using the KTM diagnostic tool. (🔧 p. 187)	○	●	●	●	●
Make the service entry in KTM Dealer.net and in the Service & Manufacturer Warranty Booklet.	○	●	●	●	●

- One-time interval
- Periodic interval

30.3 Recommended work

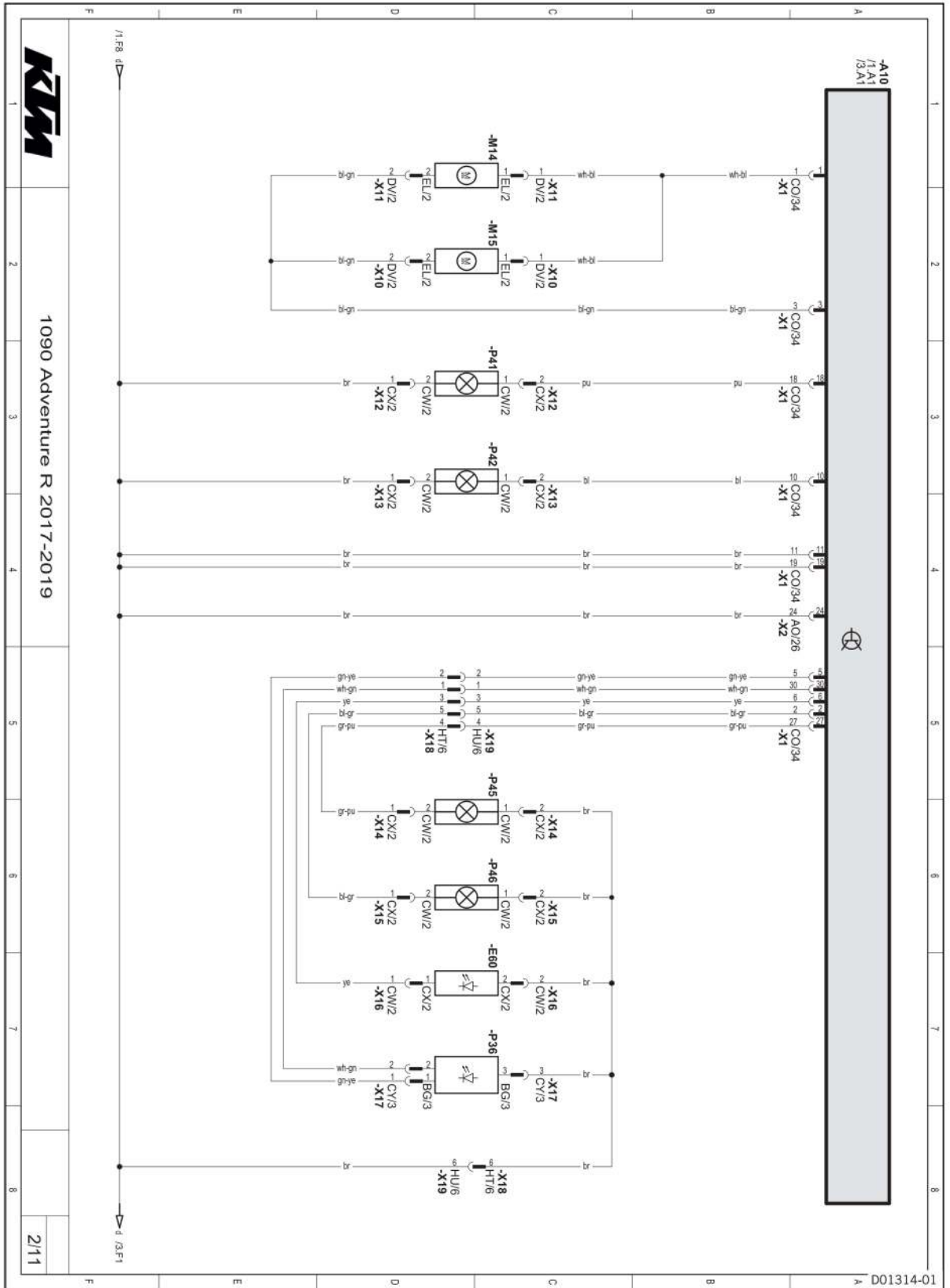
		Every four years			
			Every year		
			every 30,000 km (18,600 mi)		
			every 15,000 km (9,300 mi)		
			after 1,000 km (620 mi)		
Check the frame. (🔧 p. 47)			●		
Check the link fork. (🔧 p. 73)			●		
Check/clean the oil nozzle for clutch lubrication. (🔧 p. 345)	○	●	●		
Check the fork bearing for play. (🔧 p. 73)		●	●		
Check the wheel bearing for play. (🔧 p. 120)		●	●		
Grease all moving parts (e.g., side stand, hand lever, chain, ...) and check for smooth operation.	○	●	●	●	●
Empty the drainage hoses.	○	●	●	●	●
Check all hoses (e.g. fuel, cooling, bleeder, drainage, etc.) and sleeves for cracking, leaks, and incorrect routing.		●	●	●	●
Check the screws and nuts for tightness.	○	●	●	●	●
Check the antifreeze.	○	●	●	●	
Change the coolant. (🔧 p. 311)					●

- One-time interval
- Periodic interval



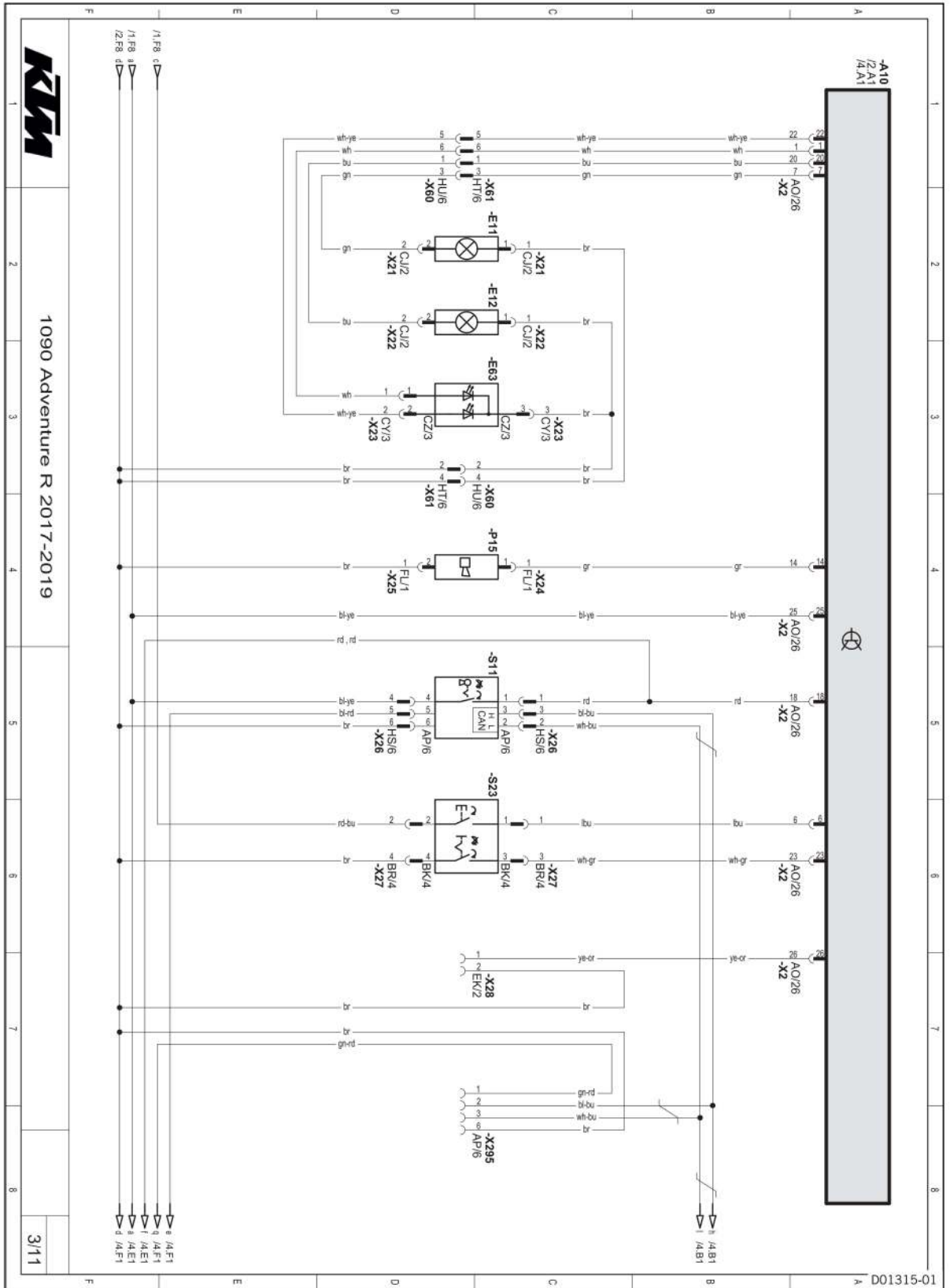
Components:

A10	Central electronics control unit
F1	Fuse
F2	Fuse
G10	12-V battery
G20	Alternator
K10	Starter relay with main fuse
M10	Electric starter system
T20	Voltage regulator
X270	Connector for accessory ground (terminal 31) ACC 1 (not assigned)
X271	Connector for accessory plus (terminal 30) ACC 1 (not assigned)
X272	Connector for accessory ground (terminal 31) ACC 2 (not assigned)
X273	Connector for accessory plus (terminal 15) ACC 2 (not assigned)
X291	Connector for accessory ground (terminal 31) ACC 1
X292	Connector for accessory plus (terminal 30) ACC 1
X293	Connector for accessory ground (terminal 31) ACC 2 (not assigned)
X294	Connector for accessory plus (terminal 15) ACC 2 (not assigned)
X296	Connector for accessory plus (terminal 30) ACC 1 (not assigned)
X297	Connector for accessory ground (terminal 31) ACC 1 (not assigned)



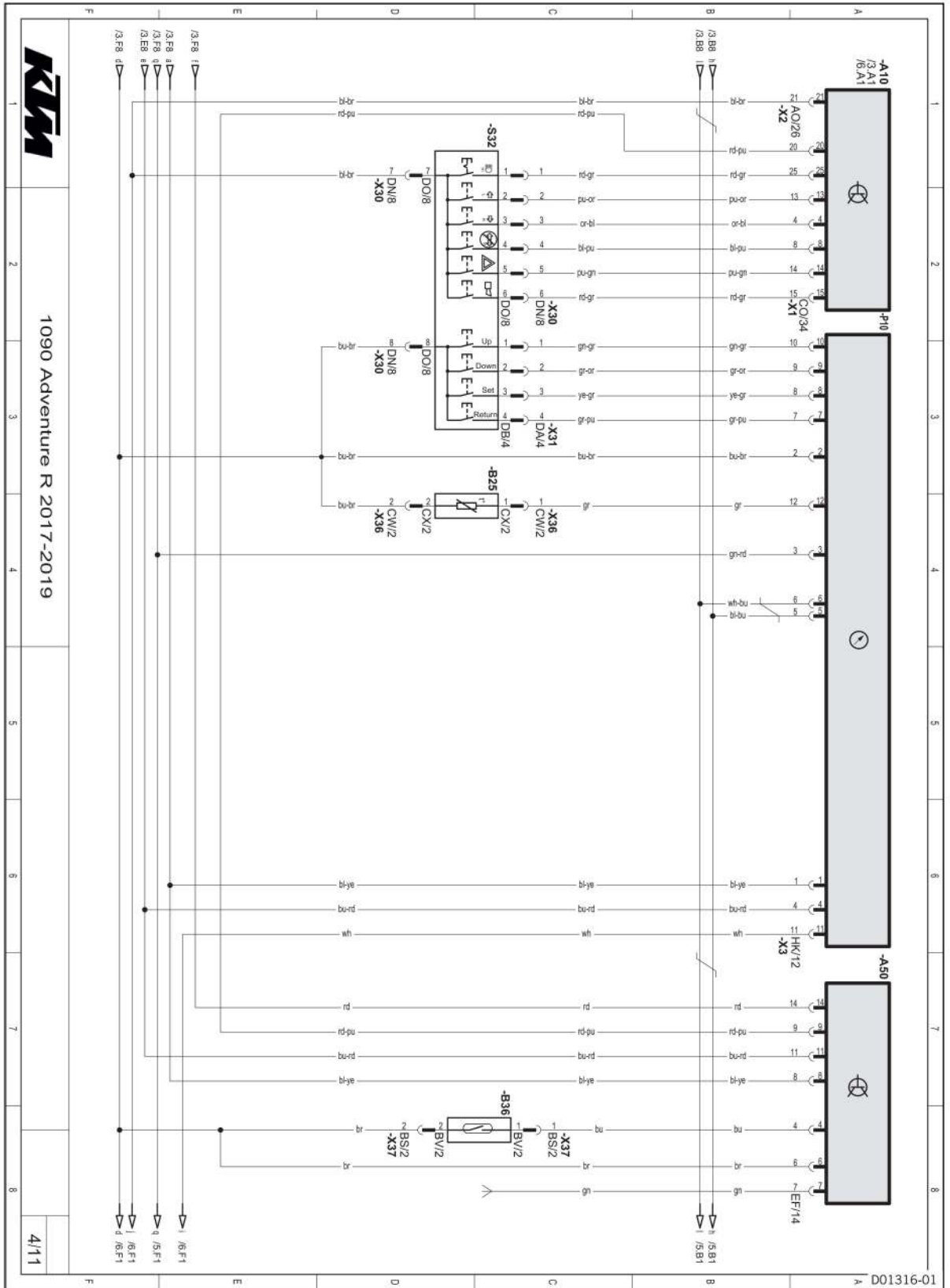
Components:

A10	Central electronics control unit
E60	License plate lamp
M14	Radiator fan 1
M15	Radiator fan 2
P36	Brake/tail light
P41	Turn signal, front left
P42	Turn signal, front right
P45	Turn signal, rear left
P46	Turn signal, rear right



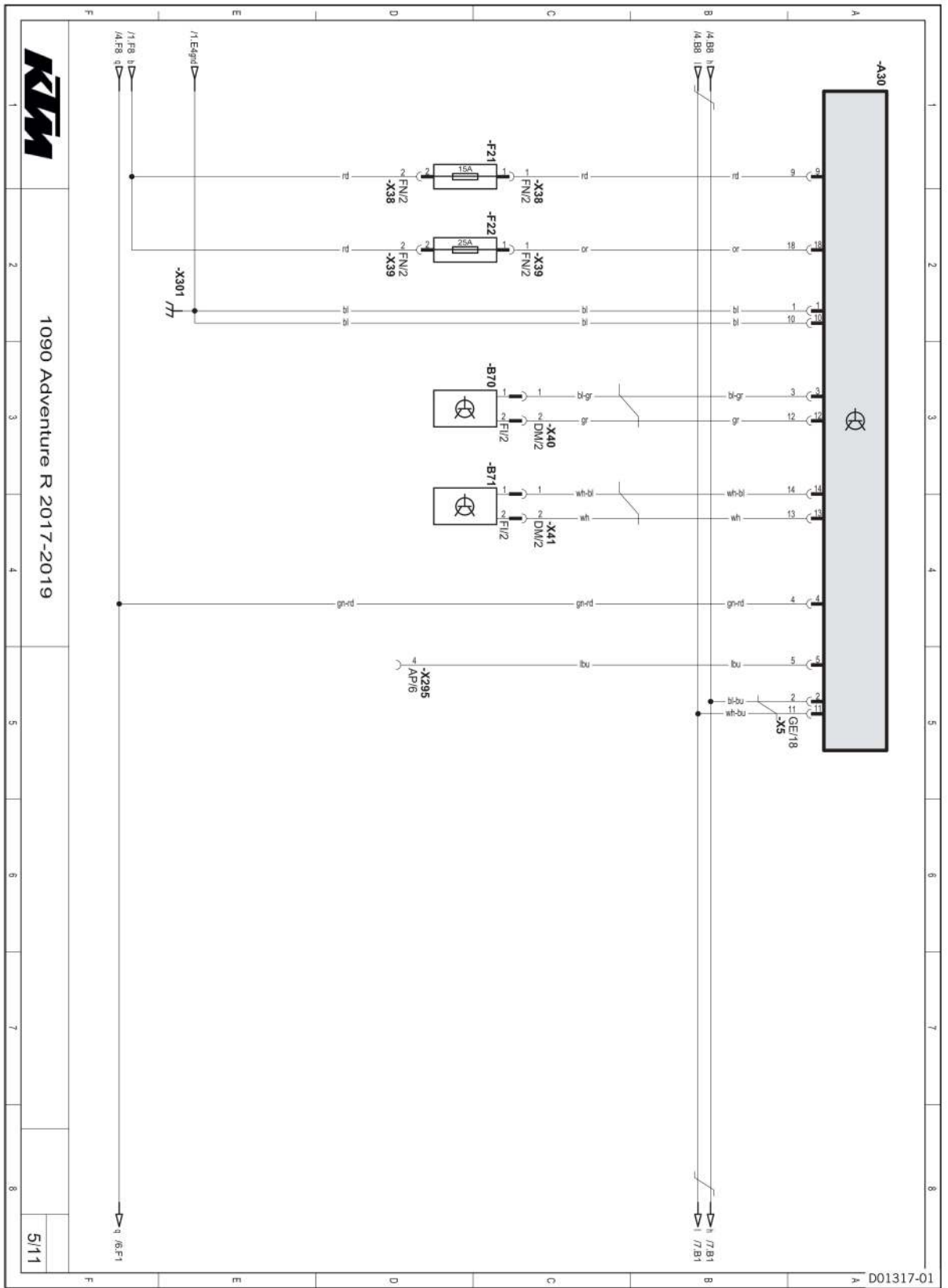
Components:

A10	Central electronics control unit
E11	Low beam
E12	High beam
E63	Parking light, daytime running light
P15	Horn
S11	Ignition and steering lock
S23	Emergency OFF switch, tip switch
X28	Heated grip plug
X295	Diagnostics connector



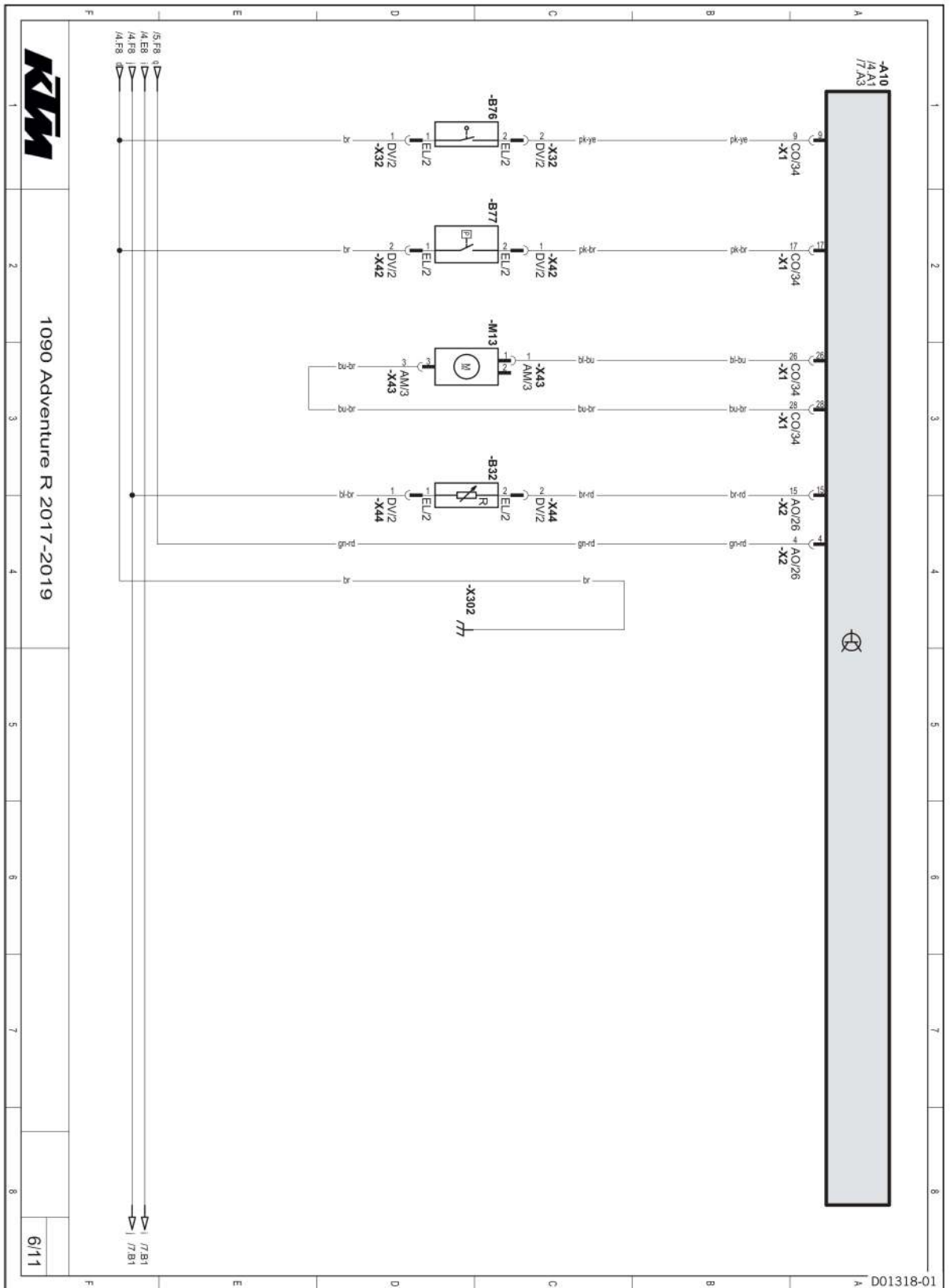
Components:

A10	Central electronics control unit
A50	Alarm system (optional)
B25	Air temperature sensor
B36	Alarm system switch (optional)
P10	Combination instrument
S32	Combination switch



Components:

A30	ABS control unit
B70	Front wheel speed sensor
B71	Rear wheel speed sensor
F3	ABS hydraulic unit fuse
F4	ABS return pump fuse
X295	Diagnostics connector



Components:

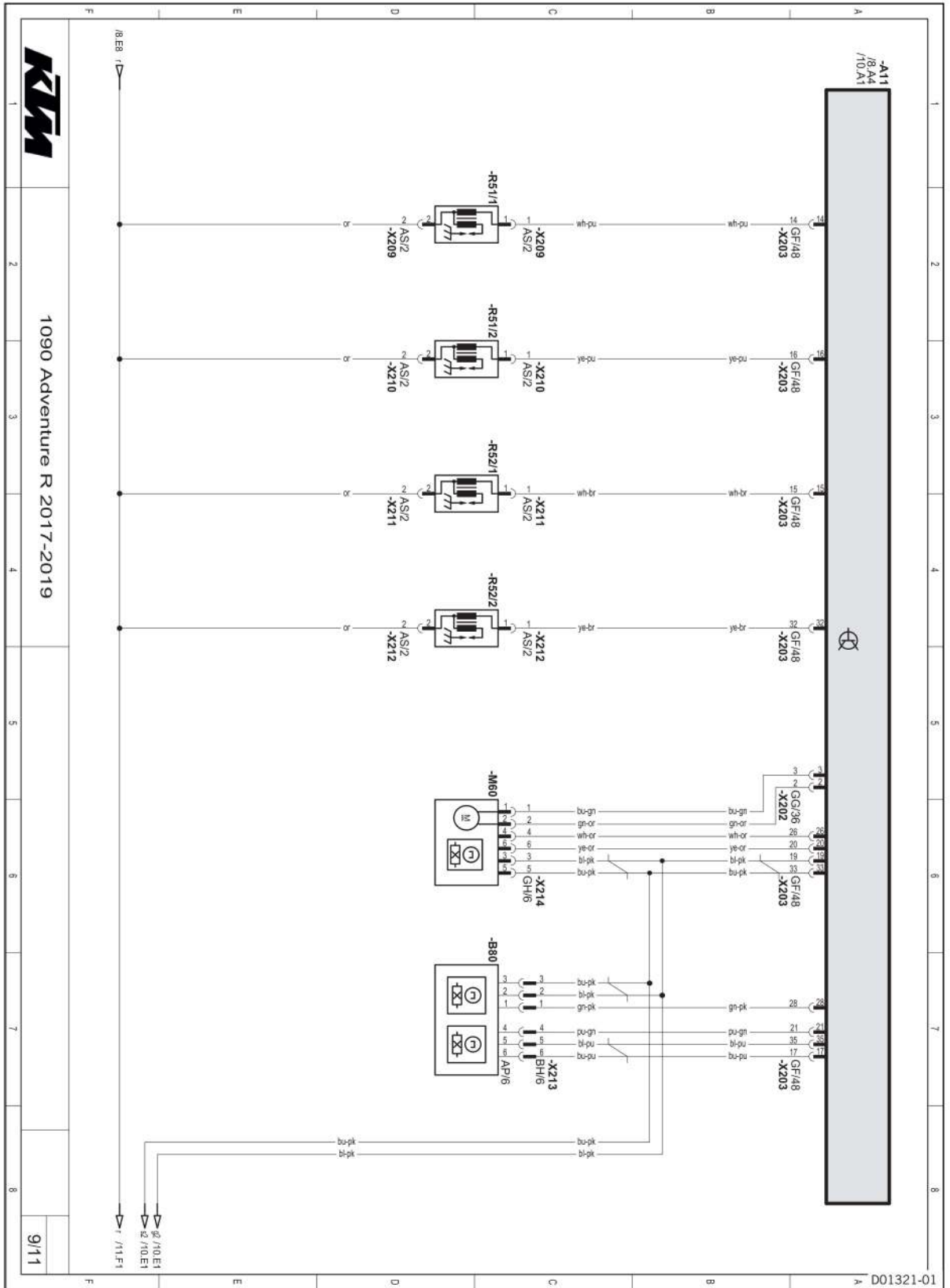
A10	Central electronics control unit
B32	Fuel level indicator
B76	Front brake light switch
B77	Rear brake light switch
M13	Fuel pump

Components:

A10	Central electronics control unit
A11	Engine electronics control unit
B38	Clutch switch
M20	Evaporate emission control valve

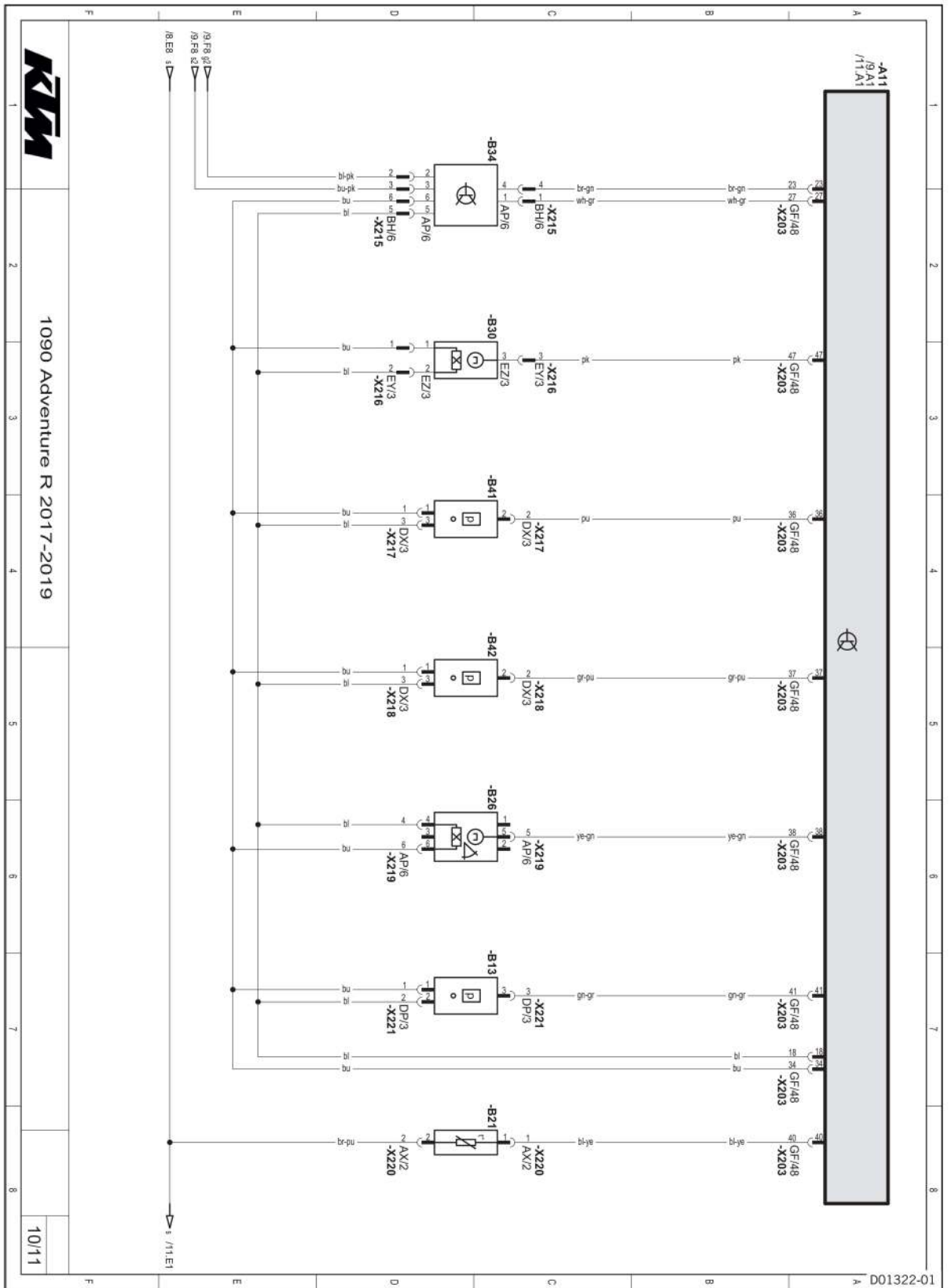
Components:

A11	Engine electronics control unit
B35	Oil pressure sensor
B46	Oil level and temperature sensor
B51	Cylinder 1 lambda sensor
B52	Cylinder 2 lambda sensor
M21	Secondary air system valve



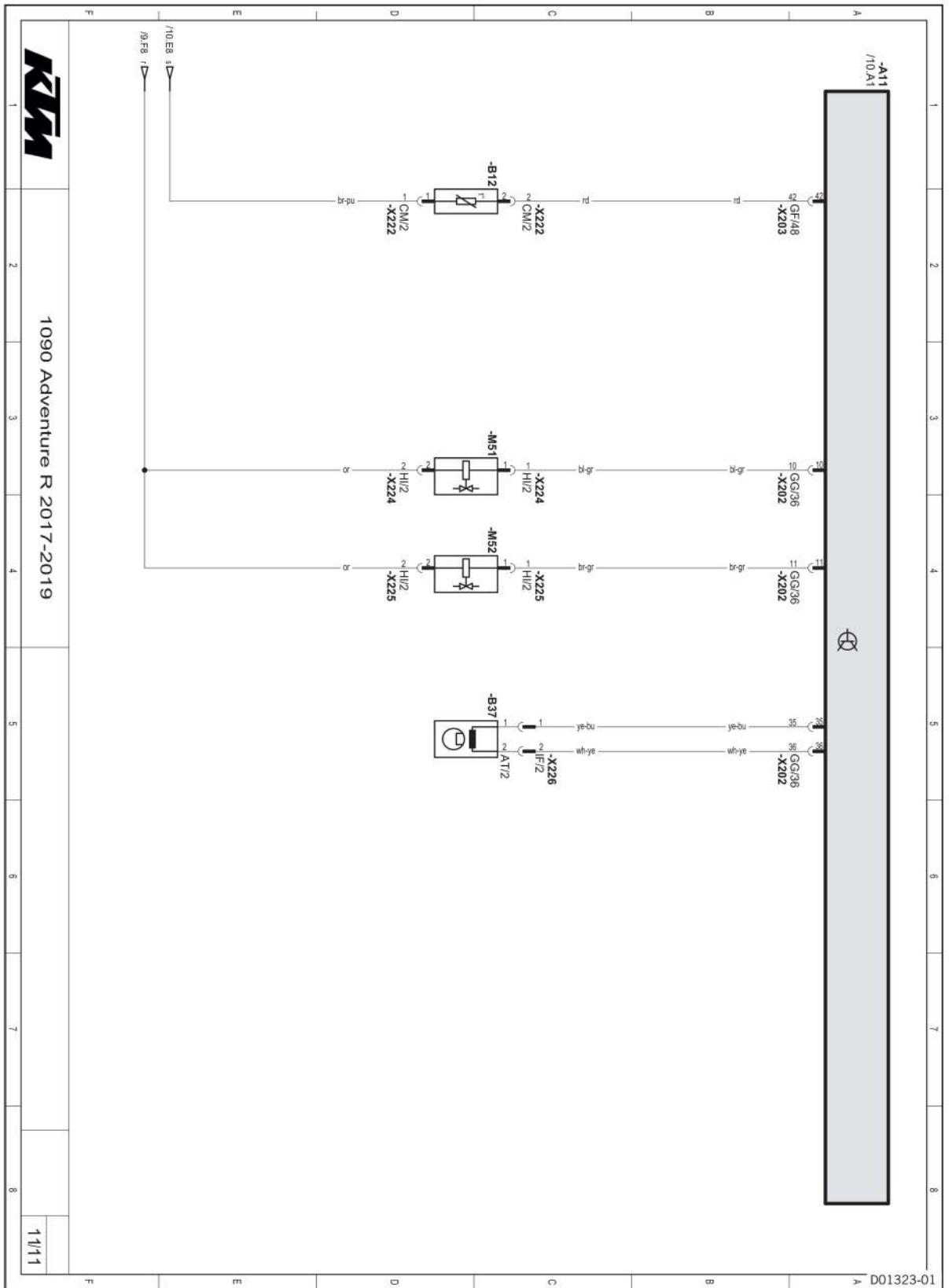
Components:

A11	Engine electronics control unit
B80	Throttle grip
M60	Throttle valve actuator
R51/1	Ignition coil 1, cylinder 1
R51/2	Ignition coil 2, cylinder 1
R52/1	Ignition coil 1, cylinder 2
R52/2	Ignition coil 2, cylinder 2



Components:

A11	Engine electronics control unit
B13	Ambient air pressure sensor
B21	Coolant temperature sensor cylinder 1
B26	Rollover sensor
B30	Side stand sensor
B34	Gear position sensor
B41	Induction manifold pressure sensor cylinder 1
B42	Induction manifold pressure sensor cylinder 2



Components:

A11	Engine electronics control unit
B12	Intake air temperature sensor
B37	Crankshaft speed sensor
M51	Injection valve, cylinder 1
M52	Injection valve, cylinder 2

Cable colors:

bl	Black
br	Brown
bu	Blue
gn	Green
gr	Gray
lbu	Light blue
or	Orange
pk	Pink
pu	Violet
rd	Red
wh	White
ye	Yellow

Brake fluid DOT 4 / DOT 5.1

Standard/classification

- DOT

Guideline

- Use only brake fluid that complies with the specified standard (see specifications on the container) and that exhibits the corresponding properties.

Recommended supplier

Castrol

- REACT PERFORMANCE DOT 4

MOTOREX®

- Brake Fluid DOT 5.1

Coolant

Guideline

- Only use high-grade, silicate-free coolant with corrosion inhibitor additive for aluminum motors. Low grade and unsuitable antifreeze causes corrosion, deposits and frothing.
- Do not use pure water as only coolant is able to meet the requirements needed in terms of corrosion protection and lubrication properties.
- Only use coolant that complies with the requirements stated (see specifications on the container) and that has the relevant properties.

Antifreeze protection to at least	-25 °C (-13 °F)
-----------------------------------	-----------------

The mixture ratio must be adjusted to the necessary antifreeze protection. Use distilled water if the coolant needs to be diluted.

The use of premixed coolant is recommended.

Observe the coolant manufacturer specifications for antifreeze protection, dilution and miscibility (compatibility) with other coolants.

Recommended supplier

MOTOREX®

- COOLANT M3.0

Engine oil (SAE 10W/50)

Standard/classification

- JASO T903 MA2 (📄 p. 430)
- SAE (📄 p. 430) (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.

Fully synthetic engine oil

Recommended supplier

MOTOREX®

- Power Synt 4T

Engine oil (SAE 5W/40)**Standard/classification**

- JASO T903 MA2 (📖 p. 430)
- SAE (📖 p. 430) (SAE 5W/40)

Guideline

- Use only engine oils that comply with the specified standards (see specifications on the container) and that possess the corresponding properties.

Fully synthetic engine oil

Recommended supplier**MOTOREX®**

- Power Synt 4T

Fork oil (SAE 4) (48601166S1)**Standard/classification**

- SAE (📖 p. 430) (SAE 4)

Guideline

- Use only oils that comply with the specified standards (see specifications on the container) and that exhibit the corresponding properties.

Shock absorber fluid (SAE 2.5) (50180751S1)**Standard/classification**

- SAE (📖 p. 430) (SAE 2.5)

Guideline

- Use only oils that comply with the specified standards (see specifications on the container) and that exhibit the corresponding properties.

Super unleaded (ROZ 95/RON 95/PON 91)**Standard/classification**

- DIN EN 228 (ROZ 95/RON 95/PON 91)

Guideline

- Only use unleaded super fuel that matches or is equivalent to the specified fuel grade.
- Fuel with an ethanol content of up to 10 % (E10 fuel) is safe to use.

**Info**

Do **not** use fuel containing methanol (e. g. M15, M85, M100) or more than 10 % ethanol (e. g. E15, E25, E85, E100).

Chain cleaner

Recommended supplier
MOTOREX®
– Chain Clean

Fuel additive

Recommended supplier
MOTOREX®
– Fuel Stabilizer

High viscosity grease

Recommended supplier
SKF®
– LGHB 2

Long-life grease

Recommended supplier
MOTOREX®
– Bike Grease 2000

Lubricant (T14034)

Recommended supplier
WP Performance Systems
– WP Racing Grease IPR 2

Lubricant (T159)

Recommended supplier
Bel-Ray®
– MC-11®

Lubricant (T158)

Recommended supplier
Lubcon®
– Turmogrease® PP 300

Lubricant (T625)

Recommended supplier
Molykote®
– 33 Medium

Lubricant (T152)

Recommended supplier
Bel-Ray®
– Molylube® Anti-Seize

Motorcycle cleaner

Recommended supplier

MOTOREX®

- Moto Clean

Perfect finish and high gloss polish for paints

Recommended supplier

MOTOREX®

- Moto Shine

Preserving materials for paints, metal and rubber

Recommended supplier

MOTOREX®

- Moto Protect

Special cleaner for glossy and matte paint finishes, metal and plastic surfaces

Recommended supplier

MOTOREX®

- Quick Cleaner

Street chain spray

Guideline

Recommended supplier

MOTOREX®

- Chainlube Road Strong

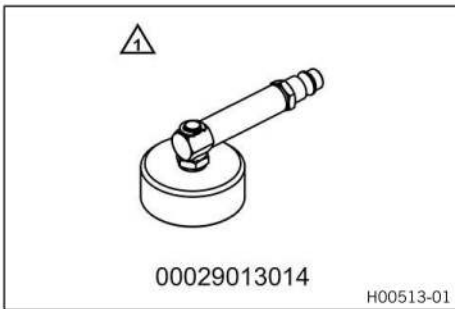
Universal oil spray

Recommended supplier

MOTOREX®

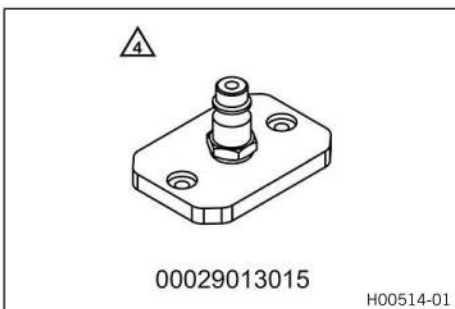
- Joker 440 Synthetic

Bleeder cover



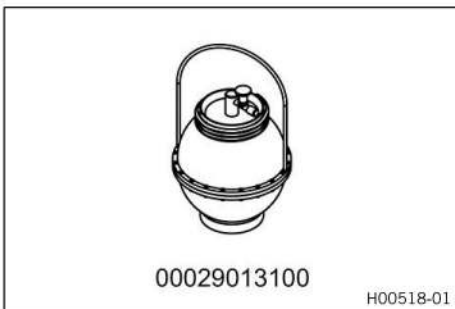
Art. no.: 00029013014

Bleeder cover



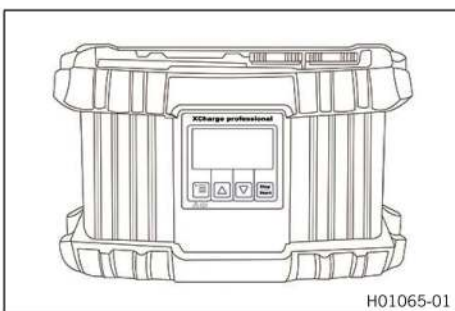
Art. no.: 00029013015

Bleeding device



Art. no.: 00029013100

EU battery charger XCharge-professional

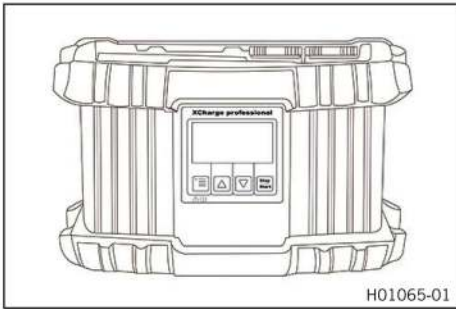


Art. no.: 00029095050

Feature

EU safety plug	
Nominal voltage	230 V
Mains fuse	16 A
Power cable length approx.	5 m (16 ft)
Charger cable length approx.	5 m (16 ft)

US battery charger XCharge-professional

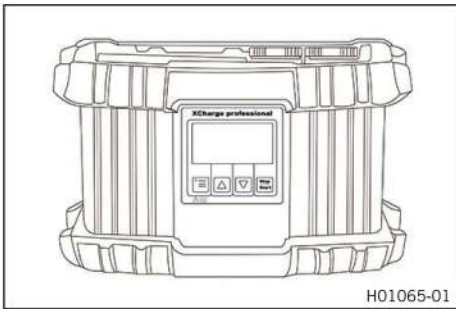


Art. no.: 00029095051

Feature

US plug	
Nominal voltage	120 V
Mains fuse	32 A
Power cable length approx.	5 m (16 ft)
Charger cable length approx.	5 m (16 ft)

UK battery charger XCharge-professional

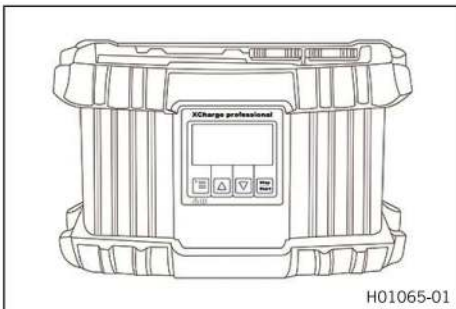


Art. no.: 00029095052

Feature

UK safety plug	
Nominal voltage	230 V
Mains fuse	16 A
Power cable length approx.	5 m (16 ft)
Charger cable length approx.	5 m (16 ft)

CH battery charger XCharge-professional

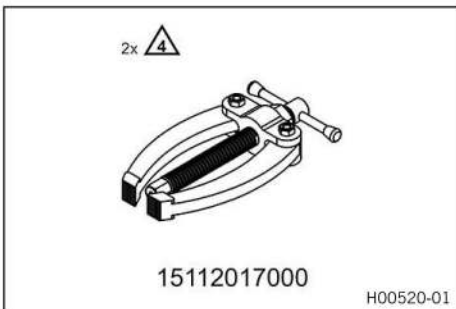


Art. no.: 00029095053

Feature

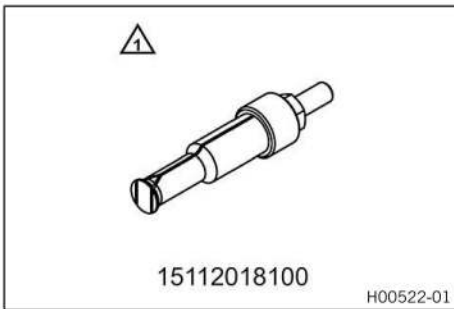
CH plug	
Nominal voltage	230 V
Mains fuse	16 A
Power cable length approx.	5 m (16 ft)
Charger cable length approx.	5 m (16 ft)

Bearing puller



Art. no.: 15112017000

Internal bearing puller



Art. no.: 15112018100

Feature

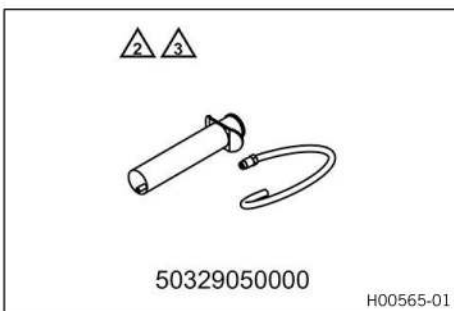
18 ... 23 mm (0.71 ... 0.91 in)

Holding wrench



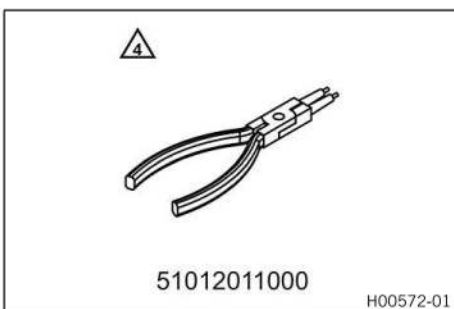
Art. no.: 45229050000

Syringe



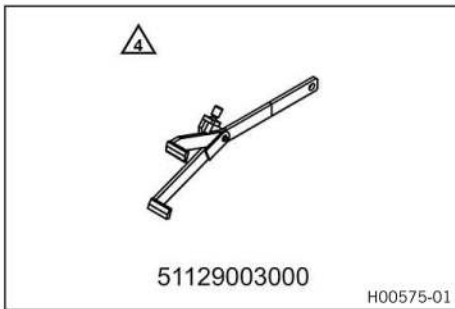
Art. no.: 50329050000

Lock ring plier



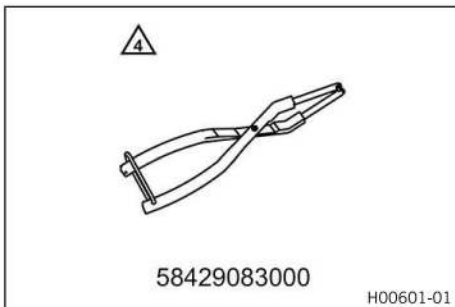
Art. no.: 51012011000

Holding wrench



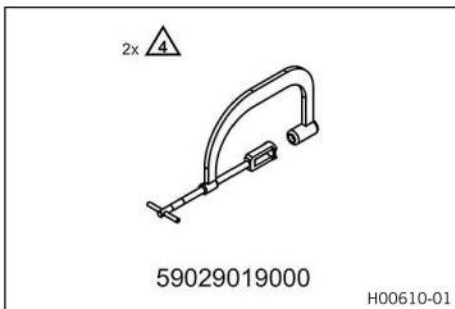
Art. no.: 51129003000

Footrest spring plier



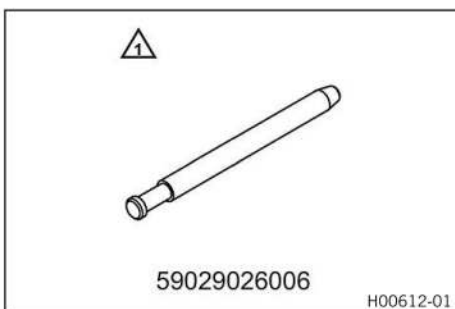
Art. no.: 58429083000

Valve spring mounter



Art. no.: 59029019000

Limit plug gauge

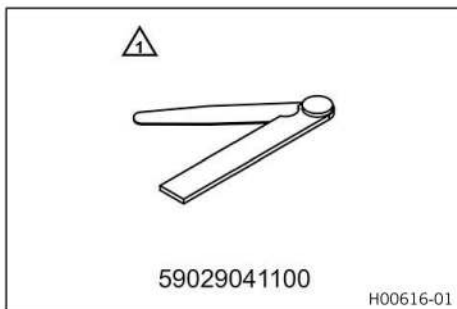


Art. no.: 59029026006

Feature

Diameter	6.05 mm (0.2382 in)
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Feeler gauge

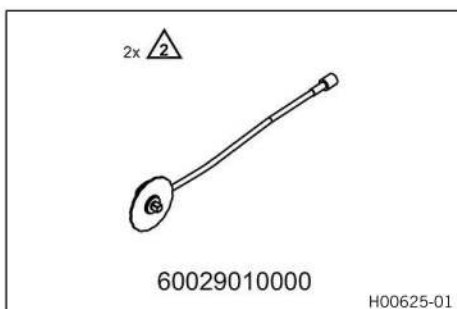


Art. no.: 59029041100

Feature

5 piece	0.10 ... 0.25 mm (0.0039 ... 0.0098 in)
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Angle disc

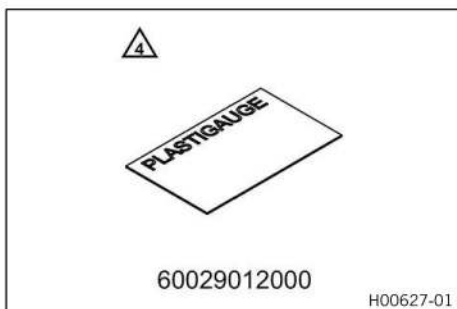


Art. no.: 60029010000

Feature

Driver system / tip	1/2 in
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Plastigauge clearance gauge

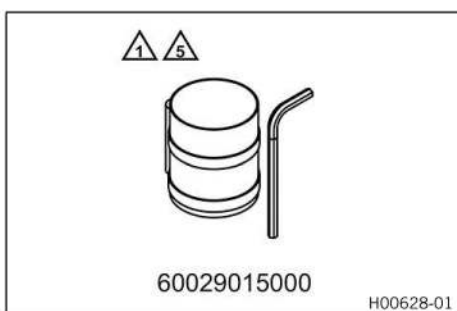


Art. no.: 60029012000

Feature

0.025 ... 0.175 mm (0.00098 ... 0.00689 in)

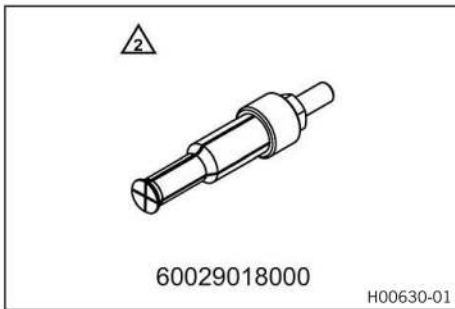
Piston ring compressor



Art. no.: 60029015000

Feature

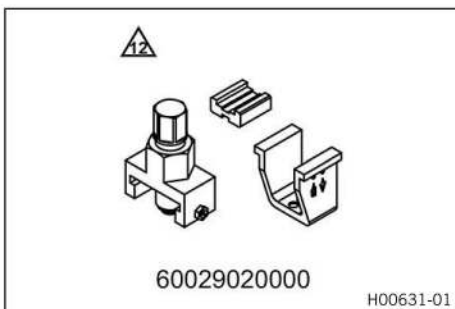
Height	80 mm (3.15 in)
Diameter	57 ... 125 mm (2.24 ... 4.92 in)

Internal bearing puller

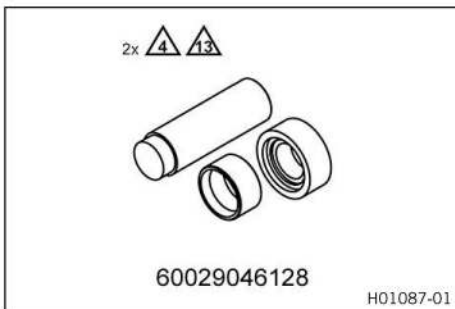
Art. no.: 60029018000

Feature

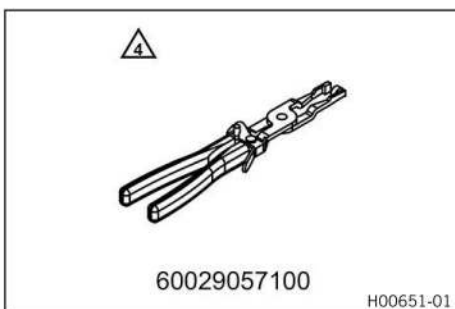
23 ... 28 mm (0.91 ... 1.1 in)

Chain rivet tool

Art. no.: 60029020000

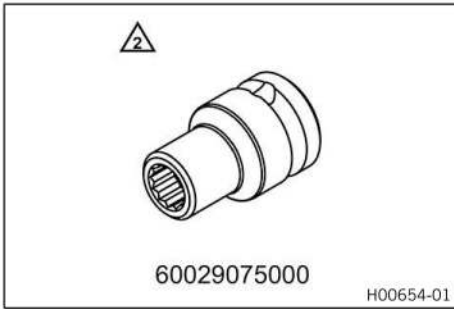
Pressing tool

Art. no.: 60029046128

Spring band clamps plier

Art. no.: 60029057100

Multi-tooth wrench socket

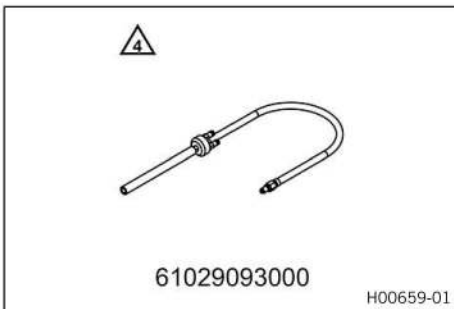


Art. no.: 60029075000

Feature

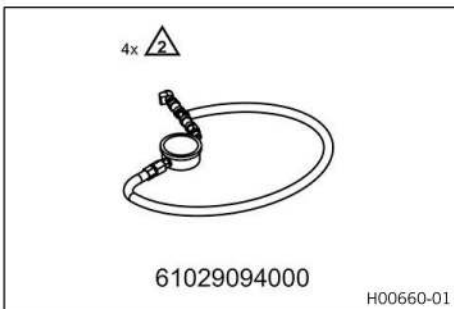
Drive	1/2 in
Diameter	10 mm (0.39 in)

Testing hose



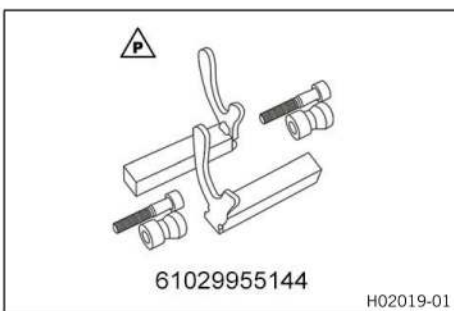
Art. no.: 61029093000

Pressure testing tool

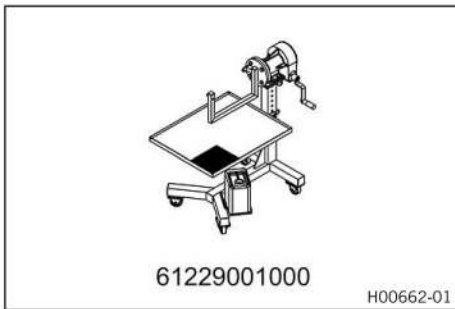


Art. no.: 61029094000

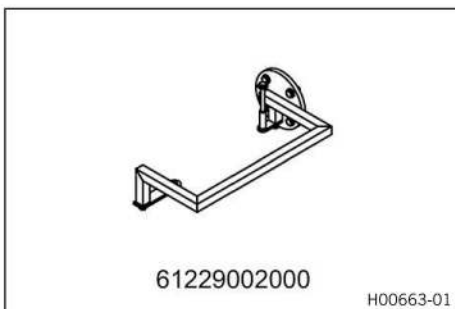
Retaining adapter



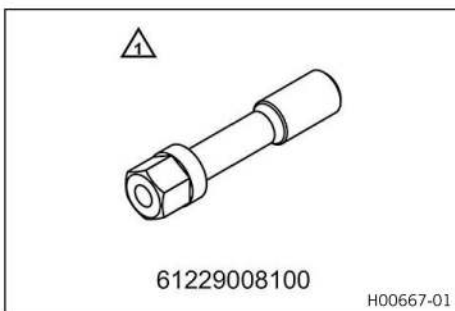
Art. no.: 61029955144

Engine assembly stand

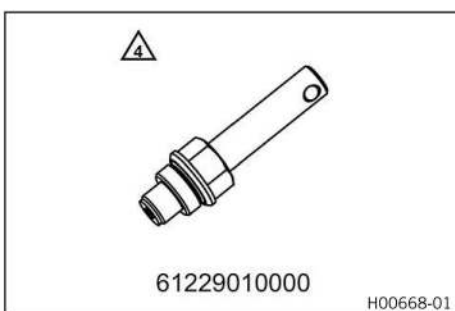
Art. no.: 61229001000

Engine bracket for engine work stand

Art. no.: 61229002000

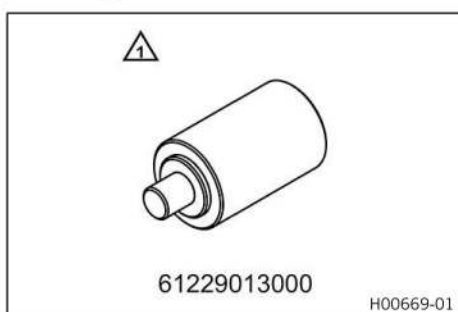
Pressing tool

Art. no.: 61229008100

Puller

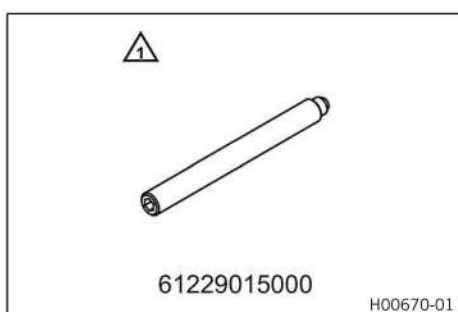
Art. no.: 61229010000

Pressing tool



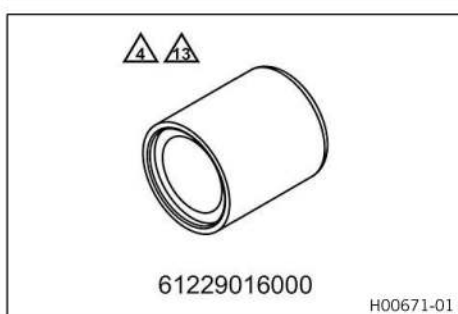
Art. no.: 61229013000

Locking screw



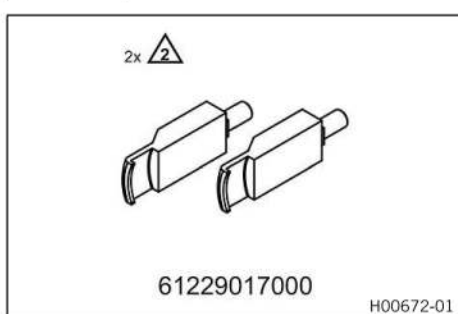
Art. no.: 61229015000

Pressing tool



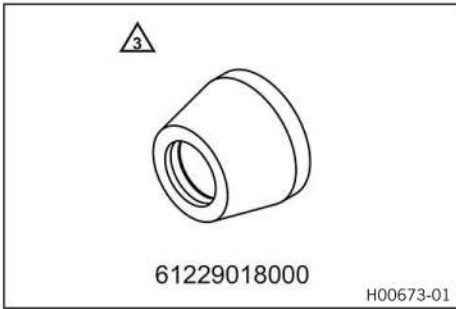
Art. no.: 61229016000

Arms for puller



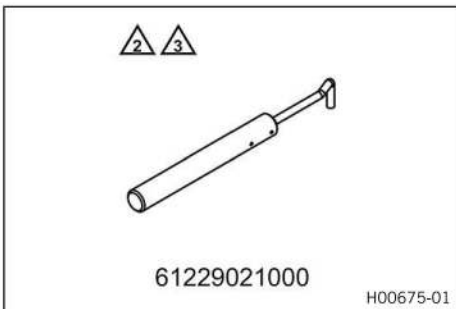
Art. no.: 61229017000

Pressing tool



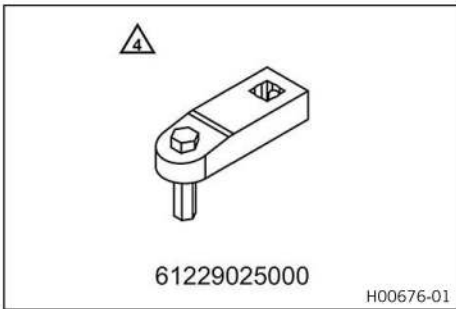
Art. no.: 61229018000

Release device for timing chain tensioner



Art. no.: 61229021000

Hexagon socket bit

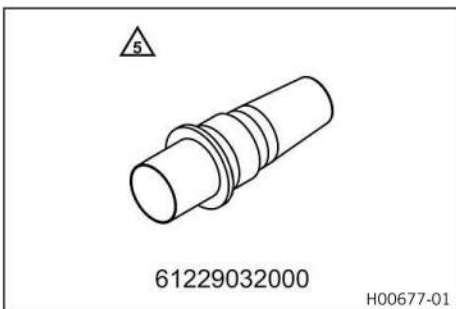


Art. no.: 61229025000

Feature

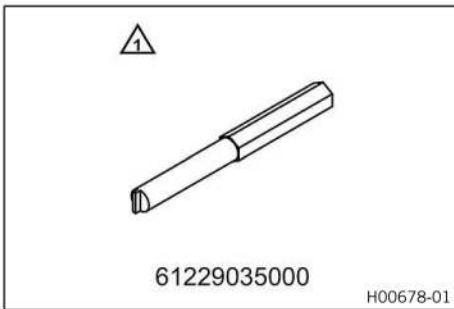
Hexagon socket	5 mm (0.2 in)
Drive	1/4 in

Mounting tool for lock ring



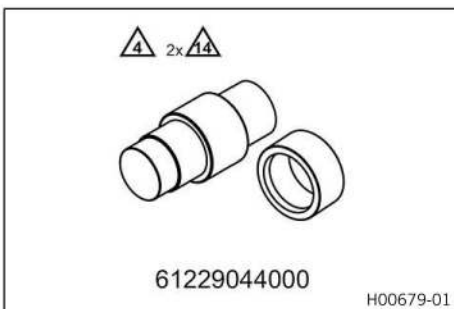
Art. no.: 61229032000

Mounting tool



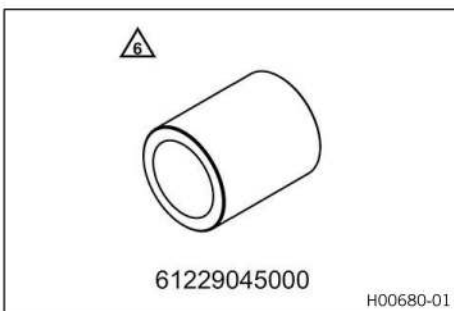
Art. no.: 61229035000

Pressing tool



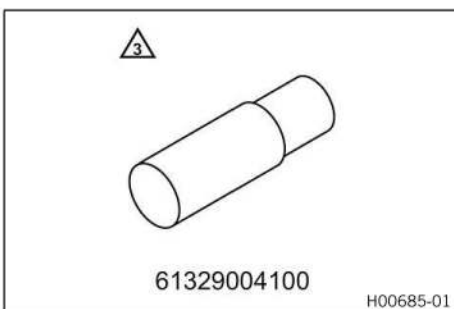
Art. no.: 61229044000

Pressing tool

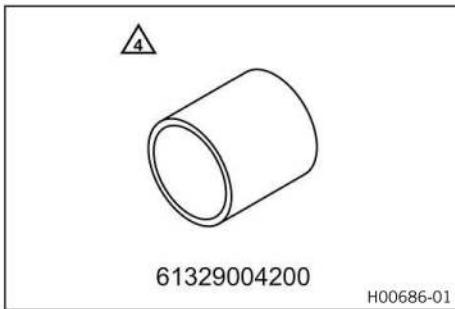


Art. no.: 61229045000

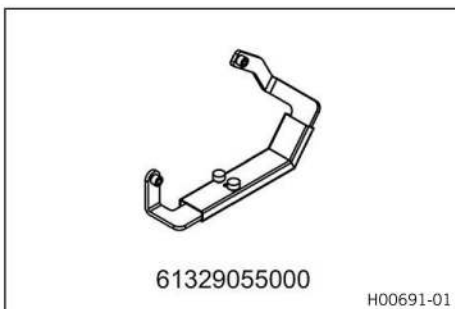
Pressing tool



Art. no.: 61329004100

Pressing tool

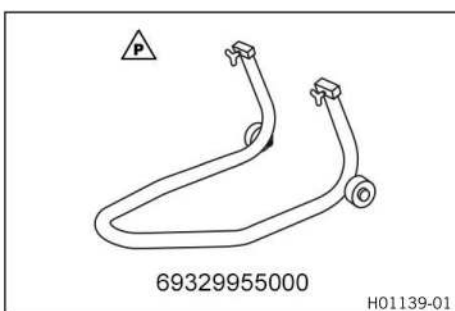
Art. no.: 61329004200

Floor jack attachment

Art. no.: 61329055000

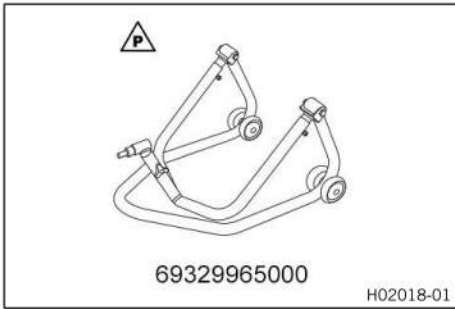
Work stand

Art. no.: 62529055200

Rear wheel work stand

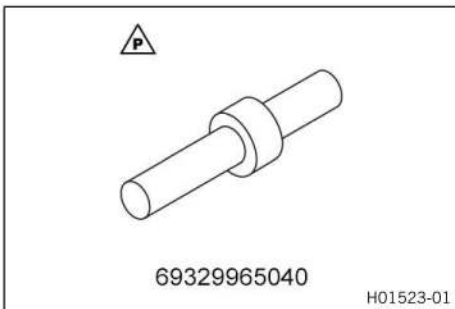
Art. no.: 69329955000

Front wheel work stand, large



Art. no.: 69329965000

Mounting pin

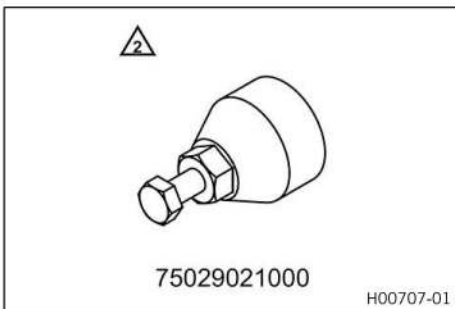


Art. no.: 69329965040

Feature

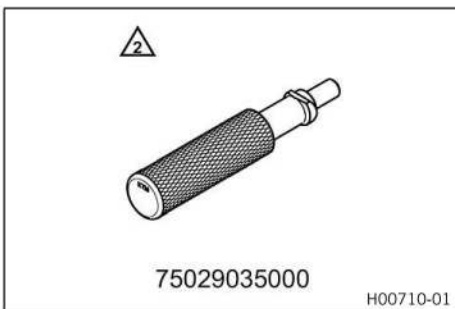
Diameter	23.5 mm (0.925 in)
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Puller



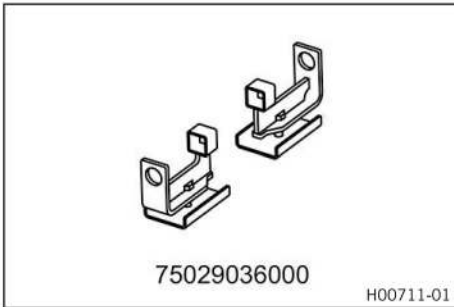
Art. no.: 75029021000

Insertion for piston ring lock



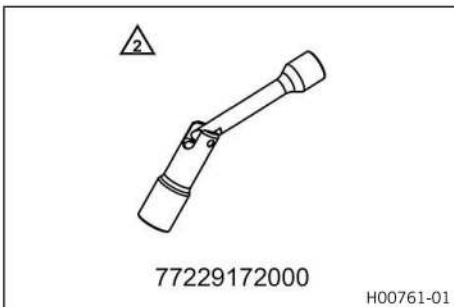
Art. no.: 75029035000

Work stand attachments



Art. no.: 75029036000

Spark plug wrench with link

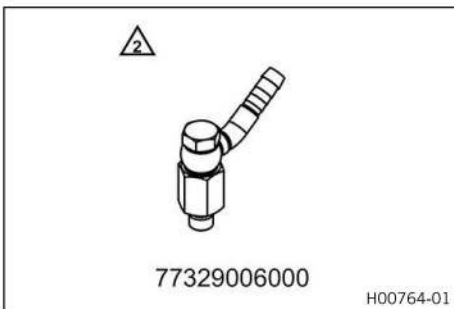


Art. no.: 77229172000

Feature

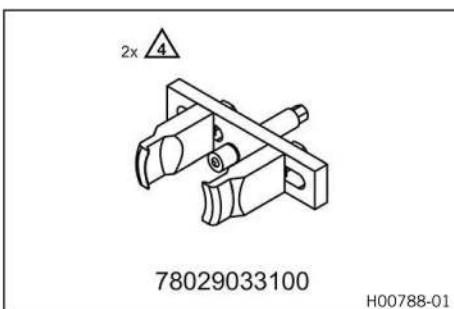
Drive	3/8 in
Hexagonal part	14 mm (0.55 in)
Length	130 mm (5.12 in)

Oil pressure adapter



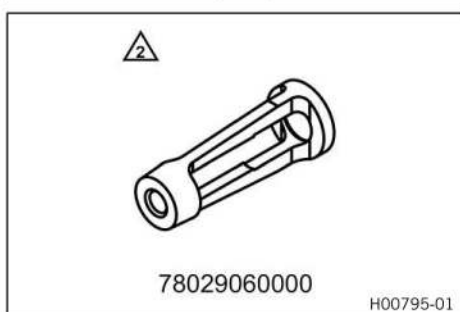
Art. no.: 77329006000

Puller



Art. no.: 78029033100

Insert for valve spring lever



Art. no.: 78029060000

XC_1 NG DE



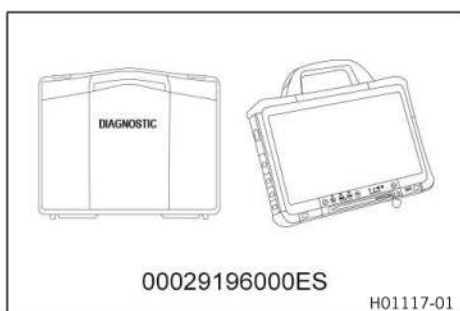
Art. no.: 00029196000DE

XC_1 NG EN



Art. no.: 00029196000EN

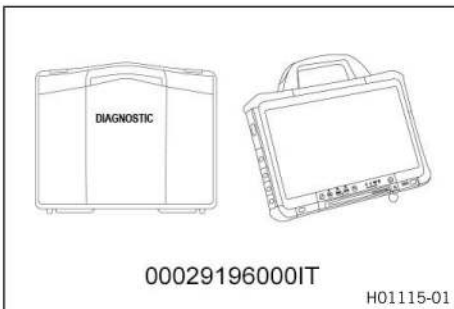
XC_1 NG ES



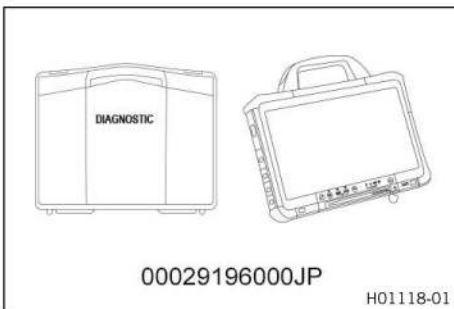
Art. no.: 00029196000ES

XC_1 NG FR

Art. no.: 00029196000FR

XC_1 NG IT

Art. no.: 00029196000IT

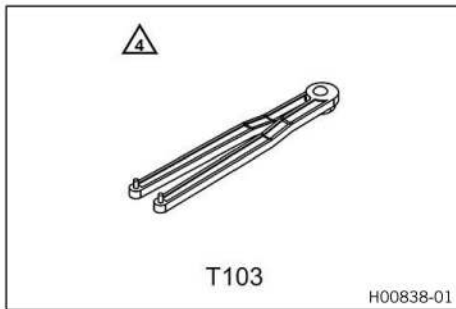
XC_1 NG JP

Art. no.: 00029196000JP

XC_1 NG US

Art. no.: 00029196000US

Pin wrench

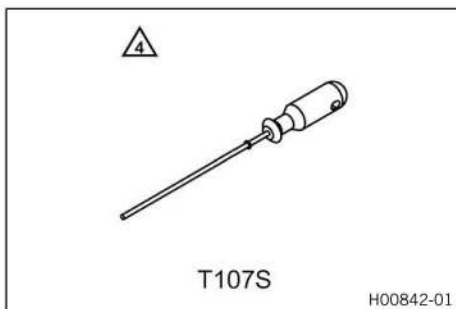


Art. no.: T103

Feature

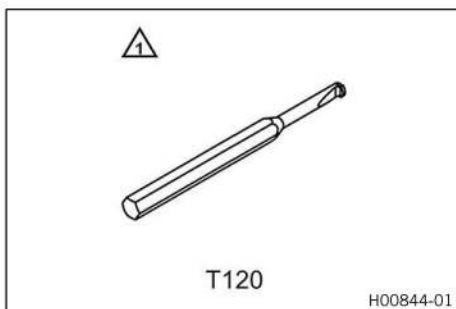
adjustable	
Diameter	4 mm (0.16 in)

Depth micrometer



Art. no.: T107S

Drift

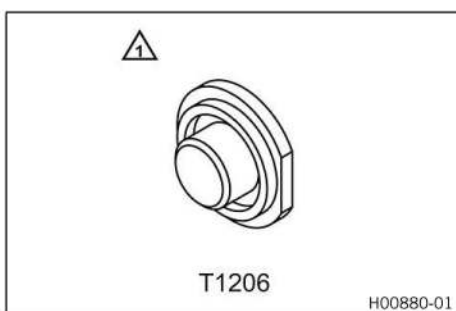


Art. no.: T120

Feature

Diameter	8 mm (0.31 in)
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Pressing tool

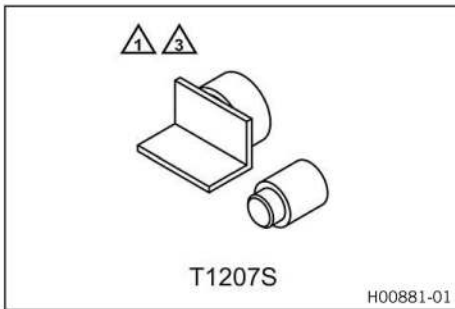


Art. no.: T1206

Feature

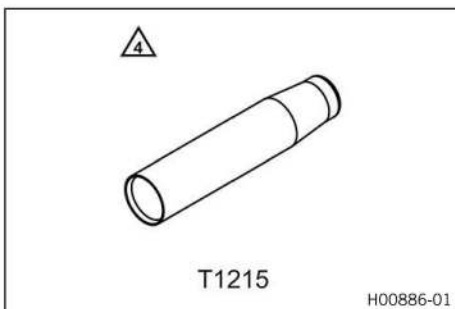
Diameter	15 ... 30 mm (0.59 ... 1.18 in)
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Pressing tool



Art. no.: T1207S

Mounting sleeve

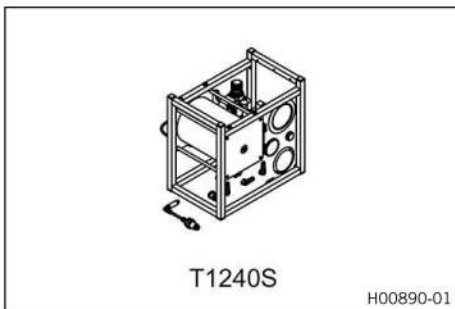


Art. no.: T1215

Feature

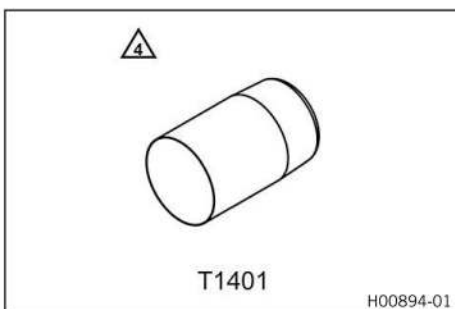
Diameter	18 mm (0.71 in)
----------	-----------------

Vacuum pump



Art. no.: T1240S

Protecting sleeve

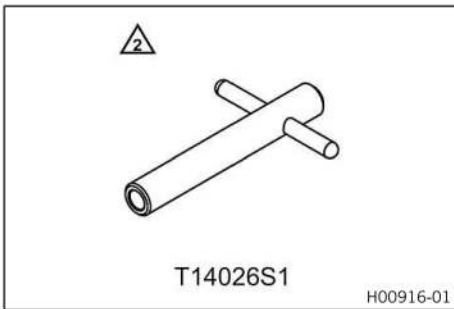


Art. no.: T1401

Feature

Diameter	48 mm (1.89 in)
----------	-----------------

Support tool

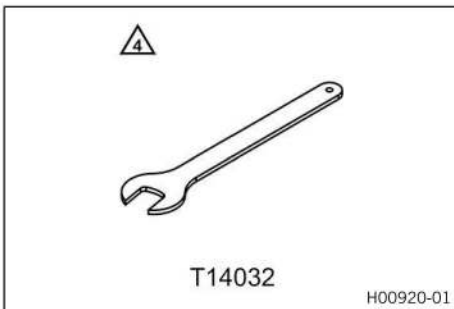


Art. no.: T14026S1

Feature

M12	
Diameter	17 mm (0.67 in)

Open end wrench

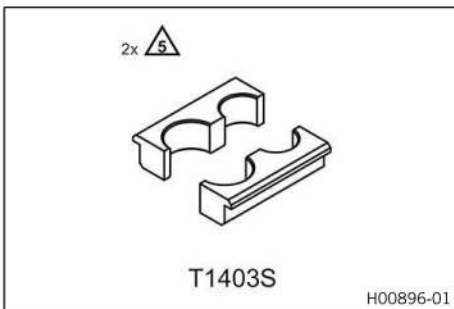


Art. no.: T14032

Feature

Jaw opening	22 mm (0.87 in)
-------------	-----------------

Clamping stand

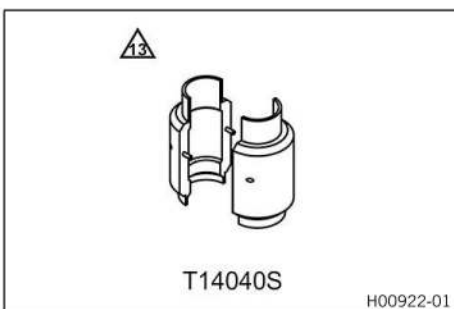


Art. no.: T1403S

Feature

Diameter	48 mm (1.89 in)
Diameter	60 mm (2.36 in)

Mounting tool



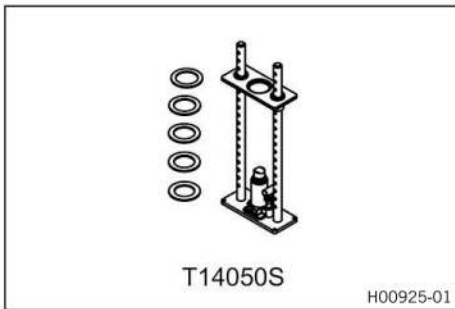
Art. no.: T14040S

Feature

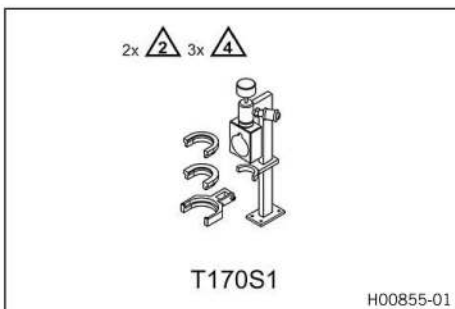
Diameter	48 mm (1.89 in)
----------	-----------------

Spring compressor

Art. no.: T14050S

**Filling tool**

Art. no.: T170S1



JASO T903 MA2

Different technical development directions required a separate specification for motorcycles – the **JASO T903 MA2** standard.

Earlier, engine oils from the automobile industry were used for motorcycles because there was no separate motorcycle specification.

Whereas long service intervals are demanded for automobile engines, the focus for motorcycle engines is on high performance at high engine speeds.

In most motorcycle engines, the transmission and clutch are lubricated with the same oil.

The **JASO T903 MA2** 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.

ABS	Anti-lock braking system	Safety system that prevents locking of the wheels when driving straight ahead without the influence of lateral forces
PA	Preload adjuster	Device on the suspension components that enables the adjustment of the spring preload

37 LIST OF ABBREVIATIONS

Art. no.	Article number
ca.	circa
cf.	compare
e.g.	for example
etc.	et cetera
i.a.	inter alia
no.	number
poss.	possibly

1

12-V battery
 charging 161
 connecting 160
 disconnecting 159
 installing 158
 removing 157

A

ACC1
 front 373
 rear 373

ACC2
 front 373
 rear 373

Accessories 10

Air filter
 changing 88

Alternator
 stator winding, checking 347

Antifreeze
 checking 307

Assembling the engine
 alternator cover, installing 279
 balancer shaft, installing 277
 gear position sensor, installing 276
 heat exchanger, installing 287
 ignition top dead center of the front cylinder,
 setting 283
 ignition top dead center of the rear cylinder,
 setting 272
 locking lever, installing 270
 oil drain plug, installing 291
 oil spray tube, installing 266
 rear piston, installing 280
 rear valve clearance, adjusting 288
 rear valve clearance, checking 288
 shift drum locating, installing 270
 shift shaft, installing 270
 starter motor, installing 288
 timing chain rails of the left engine case
 section, installing 265
 timing chain rails of the right engine case
 section, installing 265
 transmission shaft, installing 266
 water pump wheel, installing 276

Auxiliary substances 10

B

Brake disc
 of rear brake, changing 143

Brake discs
 checking 131
 front brake, changing 132

Brake fluid
 front brake, adding 170
 front brake, changing 171
 of rear brake, changing 177
 rear brake, adding 176

Brake fluid level
 front brake, checking 169
 rear brake, checking 176

Brake linings
 front brake, changing 167
 front brake, checking 167
 of rear brake, changing 173
 rear brake, checking 173

C

Camshafts
 of the front cylinder, disassembling 335
 of the front cylinder, installing 336
 of the rear cylinder, disassembling 333
 of the rear cylinder, installing 334

Capacity
 coolant 311, 313, 371
 engine oil 206, 341, 371
 fuel 371

Chain
 checking 145
 cleaning 147
 opening 150
 riveting 150

Chain tension
 adjusting 144
 checking 143

Charging voltage
 checking 165

Clutch
 fluid level, checking/correcting 295
 fluid, changing 296

Clutch lever
 basic position, adjusting 40

Coolant
 changing 311
 draining 309
 refilling 310

Coolant level
 checking 307
 compensating tank, checking 307
 compensating tank, correcting 314

Cooling system	
bleeding	310
D	
Diagnostics connector	373
Disassembling the engine	
alternator cover, removing	218
balancer shaft, removing	220
clutch basket, removing	224
engine oil, draining	211
gear position sensor, removing	221
heat exchanger, removing	213
ignition top dead center of the front cylinder, setting	215
left engine case, removing	227
locking lever, removing	227
middle suction pump, removing	228
oil filter, removing	220
oil spray tube, removing	229
rear cylinder head, removing	214
rear piston, removing	215
rear timing chain tensioner, removing	213
shift drum locating, removing	226
starter motor, removing	212
timing chain rails of the left engine case section, removing	230
timing chain rails of the right engine case section, removing	230
transmission shaft, removing	228
Drivetrain kit	
changing	151
E	
Engine	
ignition top dead center of the front cylinder, setting	209
ignition top dead center of the rear cylinder, setting	209
installing	197
preparing for clamping in the engine assembly stand	208
preparing for installation	208
removing	188
Engine - Work on individual parts	
electric starter drive, checking	264
freewheel, checking	265
left main bearing, installing	237
left main bearing, removing	237
main bearing shells, selecting	233
main bearing, right, removing	232
main shaft, disassembling	258
piston ring end gap, checking	245
piston, checking/measuring	243
piston/cylinder mounting clearance, checking	245
radial clearance of the bottom connecting rod bearing, checking	242
right main bearing, installing	233
shift mechanism, checking	257
shift shaft, preassembling	258
timing chain tensioner for installation, preparing	253
transmission, checking	260
Engine – work on the individual parts	
crankshaft, support bearing, changing	241
Engine – working on the individual parts	
checking the cylinder head	250
clutch cover	240
clutch, checking	255, 296
conrod bearing	238
countershaft, assembling	262
countershaft, disassembling	259
cylinder head	246
cylinder, checking/measuring	243
intermediate gear, right	251
lubrication system, checking	254
main shaft axial play, measuring	263
main shaft, assembling	261
oil pressure control valve, checking	253
section of the engine case, left	234
section of the engine case, right	230
timing train, checking	252
Engine assembly	
clutch basket, installing	273
clutch cover, installing	275
clutch discs, installing	274
crankshaft speed sensor, installing	279
crankshaft, installing	268
drive gear wheel of the balancer shaft, installing	276
engine bearer, mounting	292
engine, removing from the engine assembly stand	292
force pump, installing	270
front camshafts, installing	286
front cylinder head, installing	286
front piston, installing	284
front timing chain tensioner, installing	287
front valve clearance, adjusting	289
front valve clearance, checking	289
front valve cover, installing	290
Installing the rear timing chain tensioner	283
intermediate gear and the timing chain on the right, installing	273
intermediate gear and timing chain on left, installing	277
left engine case, installing	268
left suction pump, installing	271

middle suction pump, installing 267
oil filler tube, installing 290
oil filter, installing 278
primary gear wheel, installing 272
rear camshafts, installing 282
rear cylinder head, installing 282
rear valve cover, installing 291
rotor, installing 278
torque limiter and intermediate gear, installing 279

Engine disassembly
clutch cover, removing 223
crankshaft speed sensor, removing 218
crankshaft, removing 228
drive gear wheel of the balancer shaft,
removing 221
engine bearer, removing 210
engine, clamping into the engine assembly
stand 210
force pump, removing 225
front camshafts, removing 216
front cylinder head, removing 217
front piston, removing 217
front timing chain tensioner, removing 216
front valve cover, removing 211
ignition top dead center of the rear cylinder,
setting the engine 212
intermediate gear and timing chain on the left,
removing 219
intermediate gear and timing chain on the
right, removing 224
left suction pump, removing 221
oil filler tube, removing 213
primary gear wheel, removing 225
rear camshafts, removing 214
removing the clutch discs 223
Removing the rear valve cover 211
rotor, removing 219
shift shaft, removing 226
torque limiter and intermediate gear, removing 218
water pump impeller, removing 222

Engine guard
installing 47
removing 46

Engine number 12

Engine oil
adding 342
changing 339

Engine oil level
checking 339

Engine sprocket
checking 145

F

Figures 10

Foot brake lever
basic position, adjusting 175

Footrests
adjusting 45

Fork
compression damping, adjusting 19
dust boots, cleaning 21
fork legs, bleeding 20
rebound, adjusting 19
spring pretension, adjusting 20

Fork bearing
changing 78
checking 73

Fork legs
assembling 28
checking 26
disassembling 23
fork service, performing 23
installing 22
removing 21

Fork part number 12

Fork service, performing 23

Frame
checking 47

Front fender
installing 117
removing 116

Front side cover
installing 110
removing 110

Front wheel
installing 122, 125
removing 121, 124

Fuel filter
changing 104

Fuel pressure
checking 100

Fuel pump
changing 102

Fuel tank
installing 98
removing 96

Fuel tank cover
installing 112
removing 111

Fuel, oils, etc. 10

Fuses	
in fuse box, changing	163
G	
Gear position sensor	
changing	304
programming	306
H	
Hand brake lever	
basic position, adjusting	173
Handlebar position	
adjusting	40
Headlight	
range, adjusting	184
Headlight mask with headlight	
installing	180
removing	180
Headlight setting	
checking	183
Heim joint	
checking	51
High beam bulb	
changing	182
I	
Ignition key	
activating/deactivating	184
Initialization run	
performing	363
K	
Key number	12
L	
Link fork	
checking	73
installing	76
removing	74
Low beam bulb	
changing	181
Lower part of the air filter box	
installing	93
removing	91
Lower triple clamp	
installing	36
removing	34
M	
Main fuse	
changing	162
Main silencer	
installing	82
removing	82
Manifold	
installing	85
removing	83
Manufacturer warranty	10
Mask spoiler	
installing	114
removing	113
Motorcycle	
cleaning	378
lifting with front lifting gear	13
raising with the rear lifting gear	14
raising with work stand (inserted)	15
rear from the lifting gear, removing	14
removing from the work stand (inserted)	16
taking off front lifting gear	13
work stand, raising with	14
work stand, removing from	15
O	
Oil circuit	338
Oil filter	
changing	339
Oil nozzle for clutch lubrication	
checking/cleaning	345
installing	345
removing	344
Oil pressure	
checking	343
Oil screens	
cleaning	339
P	
Preparing for use	
after storage	381
R	
Rear hub damping rubber pieces	
changing	148
checking	147
Rear sprocket	
checking	145
Rear sprocket carrier bearing	
changing	149
Rear wheel	
installing	134, 136
removing	133, 135
Rider footrests	45
Rim run-out	
checking	119

S	
SAS membranes	
changing	293
Seat	
mounting	96
removing	96
Service schedule	382-383
Servicing the shock absorber	56
Shift lever	
basic position, adjusting	303
basic position, checking	303
Shock absorber	
bleeding and filling	68
damper, assembling	65
damper, checking	61
damper, disassembling	58
heim joint, changing	54
heim joint, installing	63
heim joint, removing	62
high-speed compression damping, adjusting	48
installing	52
low-speed compression damping, adjusting	48
nitrogen, filling damper with	71
piston rod, assembling	63
piston rod, disassembling	59
rebound damping, adjusting	49
removing	51
shock absorber, servicing	56
spring pretension, adjusting	50
spring, installing	72
spring, removing	57
static sag, checking	50
Shock absorber article number	12
Spare parts	10
Spark plugs	
changing	349
Spoke tension	
checking	121
Starting	17
for checking the function	18
Steering head bearing	
changing	38
lubricating	34
Steering head bearing play	
adjusting	33
checking	33
Storage	381
T	
Technical data	
capacities	371
chassis	372
chassis tightening torques	375
electrical system	372
engine – tolerance, wear limits	367
engine tightening torques	369
fork	374
shock absorber	374
tires	374
Throttle grip	
changing	41
Throttle valve body	
installing	362
removing	361
Tire condition	
checking	118
Tire pressure	
checking	118
Triple clamp cover, bottom	
installing	116
removing	115
Tubeless tire system	
changing the front tubeless sealing profile	129
changing the rear tubeless sealing profile	140
Turn signal bulb	
changing	183
Type label	11
U	
Upper part of the air filter box	
installing	90
removing	88
V	
Valve clearance	
checking	316
checking (air filter and spark plugs removed)	328
of the front cylinder, setting	333
of the rear cylinder, setting	332
Vehicle identification number	11
W	
Wheel bearing	
checking	120
of the front wheel, changing	127
of the rear wheel, changing	138
Windshield	
installing	117
removing	117
Winter operation	
checks and maintenance steps	379

Wiring diagram	384-405
Page 01 of 11	384
Page 02 of 11	386
Page 03 of 11	388
Page 04 of 11	390
Page 05 of 11	392
Page 06 of 11	394
Page 07 of 11	396
Page 08 of 11	398
Page 09 of 11	400
Page 10 of 11	402
Page 11 of 11	404
Work rules	9

READY TO RACE

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