

# Repair Manual



**R 1150 R**

**BMW Motorrad  
After Sales**

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   UX-VS-2

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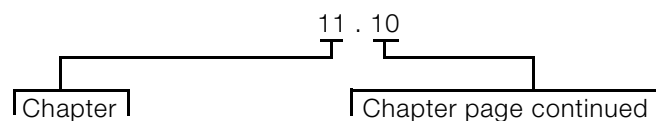
# Preface


This Repair Manual is intended to assist you in performing professional maintenance and repair operations. In its role as a reference source for service personnel, it supplements and expands upon the theoretical and hands-on instruction provided at our training centres to enhance the quality of our service.

A new edition of this manual will be issued in response to required revisions or the need to incorporate additional information (supplements).

The illustrations and descriptions contained in this manual apply exclusively to standard, unmodified BMW Motorcycles and/or BMW Motorcycles equipped with factory-approved BMW accessories and options.

- The Repair Manual's structure reflects the logical sequence in which the operations it describes will be performed: removal, dismantling, repairs, assembly and installation.
- The individual chapters in this manual correspond to the motorcycle's individual assembly groups.



A reference arrow with chapter and page (such as  12.5) calls your attention to additional information contained in another section of the manual

- Group "00" describes the operations carried out in the course of each Inspection. The various inspection routines are numbered I, II, III and IV. To help in maintaining a continuous, logical work sequence, these same numerical designations are employed to identify the subsequent sections describing the actual repair operations.
- Use of the BMW special tools needed for certain operations is described in the work instructions.

When the need arises, repair instructions are also issued in the form of Service Information Bulletins. This information is then incorporated into the subsequent edition of the repair manual. We also recommend that you take advantage of the clearly illustrated Electronic Parts Catalogue as a supplementary source of information.

When individual steps within an overall operation only apply to motorcycles with specific accessories or optional equipment, the options the steps refer to are identified in brackets at the beginning of the line. Example: **[heated grips]**.

Please devote your careful attention to the following pages with their explanations describing the symbols used in the manual and their significance.

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## How to use this manual

Each chapter starts with a table of contents.

Following the table of contents is a table containing the technical data and specifications for the chapter's subject.

## Explanation of symbols

This manual for the R 1150 R employs the following symbols; please refer to the table for their meanings.

Special notices for more efficient procedures



### **Note:**

These special notices help technicians work more efficiently when operating, inspecting, adjusting and maintaining motorcycles.

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### **Attention:**

Special information and precautionary notices to prevent damage to the motorcycle. Failure to observe these mandatory precautions may invalidate the warranty.

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### **Warning:**

Precautions intended to protect the rider and/or other individuals against injury as well as potentially fatal hazards.

---

## Contents

The titles of the operations described in this chapter..... together with page numbers

## Operations

- Operations
  - A dot or period identifies individual procedures described under a title
- previous operations
- The hyphen identifies procedures described in more detail under a different title or in another chapter

Remove means:

To completely unscrew a retaining component (such as a bolt or screw)

or

to detach a component (such as an injection rail) and move it enough to gain access to assemblies installed behind it (such as a throttle-valve).

Loosen means:

To unscrew an attachment (such as a bolt or screw) without removing it entirely from its threaded socket or retainer



### **Tightening torques:**

These data are indicated whenever torques deviate from the standards defined in DIN EN 24 014 and DIN 912 ISO.

# BMW Motorrad Maintenance schedule R 1150 R



Customer	Licence No.	Mileage	BMW Inspection at 1000 km/600 miles	BMW Maintenance Service every 10000 km/6,000 miles	BMW Inspection every 20000 km/12,000 miles	BMW Annual Service
Job Order No.	Date	Mechanic's signature				
Use <b>BMW</b> MoDiTeC to read stored error codes from fault memory			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
[Integral ABS] Performing bleed test with <b>BMW</b> MoDiTeC			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Change engine oil, warmed to normal operating temperature, replace oil filter <b>when used exclusively in short-distance operation, or at outside temperatures below 0°C (32 °F), or no later than every 3 months, or every 3,000 km/1,800 miles *)</b>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Change oil in gearbox, with oil warmed to normal operating temperature <b>at least every 2 years *)</b>					<input type="checkbox"/>	<input type="checkbox"/>
Change final-drive lubricant, warmed to normal operating temperature <b>every 40,000 km/25,000 miles, or no later than every 2 years *)</b>			<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Replace fuel filter *) <b>Standard replacement interval is 40,000 km/25,000 miles, with substandard fuel quality every 20,000 km/12,000 miles</b>					<input type="checkbox"/>	
Check battery electrolyte level, top up with distilled water as necessary Battery terminals, clean and grease as necessary					<input type="checkbox"/>	<input type="checkbox"/>
Replace intake air filter element <b>Replace air filter every 10,000 km/6,000 miles when vehicle is exposed to high levels of dirt and dust, or more frequently as indicated *)</b>				<input type="checkbox"/>	<input type="checkbox"/>	
Check front/rear circuit brake fluid				<input type="checkbox"/>	<input type="checkbox"/>	
Check operation of brake system, inspect for leaks; repair/replace as indicated *)					<input type="checkbox"/>	
Check brake pads and discs for wear, replace as required *)				<input type="checkbox"/>	<input type="checkbox"/>	
[Without Integral ABS] Change brake fluid <b>annually</b>						<input type="checkbox"/>
[Integral ABS] Change <b>wheel-circuit</b> brake fluid at least <b>once a year</b>						<input type="checkbox"/>
[Integral ABS] Change <b>control circuit</b> brake fluid at least <b>every 2 years *)</b>						<input type="checkbox"/>
[Integral ABS] Perform bleed test with <b>BMW</b> MoDiTeC						<input type="checkbox"/>
Check clutch operating fluid level				<input type="checkbox"/>	<input type="checkbox"/>	
Change clutch hydraulic circuit fluid *) <b>at least every 2 years</b>						<input type="checkbox"/>
Check rear lug bolts to ensure they are tight			<input type="checkbox"/>			
Check rear wheel bearing play by tilting wheel					<input type="checkbox"/>	
Check swing arm bearings (no play), adjust as required *)			<input type="checkbox"/>		<input type="checkbox"/>	
Check operation of side stand switch			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grease the side stand pivot			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Retention poly-V-belt <b>Re-adjust new poly-V-belt one time at 10,000 km/6,000 miles</b>				<input type="checkbox"/>		
Replace poly-V-belt *) <b>Replace poly-V-belt every 60,000 km/35,000 miles</b>					<input type="checkbox"/>	
Inspect spark plugs				<input type="checkbox"/>		
Replace spark plugs					<input type="checkbox"/>	
Retorque cylinder heads			<input type="checkbox"/>			
Check valve clearance and adjust as necessary			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Check throttle cable for ease of motion, inspect for abrasion and bends, replace as indicated *) Check cable free travel Check synchronisation, adjust as necessary			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Final inspection with operation assessment and road safety check: – Condition of wheels and tyres, tire inflation pressure – Clutch, shift mechanism, hand and foot brakes, steering – Lighting and signal indicators, warning and indicator lamps, instruments – Optional equipment – Conduct road test as required			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

\*) **Write up on separate invoice;  Not part of standard service procedure**



# BMW Motorrad Pre-delivery check R 1150 R



Customer _____ Job Order No. _____	Licence No. _____ Mechanic's signature _____	<b>BMW Pre-delivery check</b>
<p>Check the shipping pallet for damage <input type="checkbox"/></p> <p>Unpack the motorcycle <input type="checkbox"/></p> <p>Inspect motorcycle for damage <input type="checkbox"/></p> <p>Check to ensure that consignment is complete:          – Vehicle keys          – Onboard tool kit and literature          – All optional extras <input type="checkbox"/></p> <p>Installing remaining items on motorcycle <input type="checkbox"/></p> <p>Fill and charge battery (record charging date) <input type="checkbox"/></p> <p>[Integral ABS] Perform bleed test with <b>BMW</b> MoDiTeC <input type="checkbox"/></p> <p>Check engine oil when cold, correct as required <input type="checkbox"/></p> <p>Check tyre pressures <input type="checkbox"/></p> <p>Check tightness of rear lug bolts (note torque specification!) <input type="checkbox"/></p> <p>Fill with fuel <input type="checkbox"/></p> <p>Check headlight beam angle, adjusting if necessary <input type="checkbox"/></p> <p>Final inspection and function check          – Clutch, shift mechanism          – Handbrake and footbrake          – Lighting and signal indicators, warning and indicator lamps, instruments          – Check operation of standard and optional equipment          – Road test as indicated <input type="checkbox"/></p> <p>Confirm pre-delivery check in Service and Technical Booklet <input type="checkbox"/></p> <p>Final cleaning <input type="checkbox"/></p>		
Vehicle delivered on:		

# BMW Motorrad

## Service data

### R 1500 R

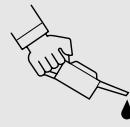


Item	Desired value	Units / Specifications
<b>Oil capacities</b>		
Engine (with filter)	3.75 (6.6)	litres (Imp. pints) [SI 11 048 90]
Engine (without filter)	3.5 (6.15)	litres (Imp. pints) [SI 11 048 90]
Transmission Initial filling	approx. 1.0 (1.76) up to lower edge of filler hole	litres (Imp. pints) Brand-name hypoid gear oil, SAE class GL 5 SAE 90
Transmission oil change	approx. 0.8 (1.41) up to lower edge of filler hole	litres (Imp. pints) Brand-name hypoid gear oil, SAE class GL 5 SAE 90
Rear wheel drive Initial filling/oil change	approx. 0.25 (0.44) up to lower edge of filler hole	litres (Imp. pints) Brand-name hypoid gear oil, SAE class GL 5 SAE 90
<b>Valve clearances</b>		
Inlet	0.15 (0.006)	measured cold (max. 35 °C/95 °F) mm (in)
Exhaust	0.30 (0.012)	mm (in)
<b>Ignition timing</b>		
	adjust at TDC	static setting
<b>Spark plugs</b>		
Electrode gap	0.8 (0.0315)	mm (in)
Wear limit	1.0 (0.039)	mm (in)
<b>Idle speed</b>		
	1,100 ±50	rpm
<b>Throttle cable setting</b>		
for cold-start (increased idle) speed	no play	
for throttle (twistgrip) cable	play approx. 0.5 (0.02)	mm (in)
for divider cable	no play	
<b>Brakes</b>		
Brake fluid		DOT 4
Colour of identification mark on brake calipers/brake pads, front	green	
Minimum front pad thickness	1.0 (0.039)	mm (in)
Minimum rear pad thickness	1.0 (0.039) (wear mark)	mm (in)
Minimum front disc thickness	4.5 (0.177)	mm (in)
Minimum rear disc thickness	4.5 (0.177)	mm (in)
<b>Tyre pressures</b>		
		depending on load
front	2.2 - 2.5 (31.9 – 36.26)	bar (psi)
rear	2.5 - 2.9 (36.26 – 42.06)	bar (psi)
<b>Tightening torques</b>		
Oil filter	11	Nm
Engine oil drain plug	32	Nm
Gearbox oil filler plug	30	Nm
Gearbox oil drain plug	30	Nm
Rear wheel drive oil filler/drain plug	23	Nm
Fuel tank to rear frame	22	Nm
Fuel pump assembly to tank	5	Nm
Poly-V belt preload	8	Nm
Alternator to cover mount	20	Nm
Brake caliper fasteners, front	30	Nm
Brake caliper fasteners, rear	40	Nm
Rear wheel studs	105	Nm
Tightening cylinder heads		
Nut	unscrew / 20 180	Nm ° tightening angle
M 10 screw	unscrew / 40	Nm
Locknut, valve adjusting screw	8	Nm
Cylinder head cover	8	Nm
Spark plugs NGK BKR 7 EKC	25	Nm

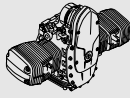
# Contents

## Group / Chapter

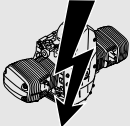
00 Tightening torque Table of operating fluids  
00 Pre-delivery check  
00 Maintenance



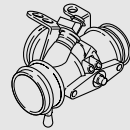
11 Engine



12 Engine electrics



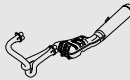
13 Fuel preparation and control



16 Fuel tank and lines



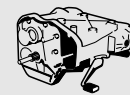
18 Exhaust system



21 Clutch



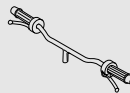
23 Gearbox



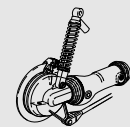
31 Front forks



32 Steering



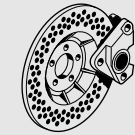
33 Rear wheel drive



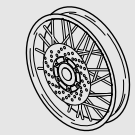
>> Continuation

**Group / Chapter**

**34 Brakes**



**36 Wheels and tyres**



**46 Frame**



**51 Equipment**



**52 Seat**



**61 General electrical equipment**



**62 Instruments**



**63 Lights**



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# 00 Tightening torque

## Table of operating fluids

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51 Equipment .....	11
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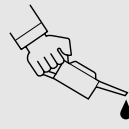






## Tightening torque

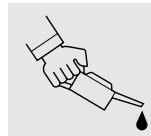
<b>Model</b>	<b>R 1150 R</b>	
<b>Connection</b>		
<b>11 Engine</b>		
<b>Cylinder head</b>		
Tightening sequence:		
1 Tighten cylinder head nuts (oiled) in diagonally opposite sequence		
1.1 Tighten all nuts to closing torque	Nm	20
1.2 Tighten all nuts to correct angle	°	90
1.3 Tighten all nuts to correct angle	°	90
2 M 10 screw	Nm	40
3 M 6 screw	Nm	9
After 1,000 km (600 miles), tighten cylinder head nuts in diagonally opposite sequence:		
1 Slacken one nut		
2 Tighten nut to initial torque	Nm	20
3 Tighten nut to wrench angle	°	180
4 Slacken and retighten M 10 screw	Nm	40
Timing gear carrier to cylinder head	Nm	9
Bearing cap on rocker shaft	Nm	18
Locknut, valve adjusting screw	Nm	8
Cylinder head cover to cylinder head	Nm	8
Camshaft end cover to cylinder head	Nm	9
Air intake connection to cylinder head	Nm	9
<b>Camshaft</b>		
Chain sprocket to camshaft	Nm	65
Camshaft bearing cap	Nm	15
<b>Alternator mount cover</b>		
M 6 screw	Nm	9
M 8 screw	Nm	20
<b>Auxiliary shaft</b>		
Chain sprocket to crankshaft	Nm	10
Chainwheel to auxiliary shaft	Nm	70
Chain tensioner housing to engine block	Nm	9





<b>Model</b>	<b>R 1150 R</b>	
<b>Connection</b>		
<b>11 Engine</b>		
<b>Oil filter</b>		
Oil filter	Nm	11
Oil drain plug	Nm	32
<b>Oil pump</b>		
Mesh filter basket to engine block	Nm	10
Oil pump cover	Nm	9
Pressure relief valve	Nm	42
Oil pressure switch	Nm	30
<b>Oil cooler</b>		
Cooling oil line to engine block	Nm	10
Cooling oil line - banjo screw with oil vent valve	Nm	25
Oil lines to oil cooler	Nm	25
Oil cooler to bracket	Nm	8
Oil cooler return line to engine block	Nm	35
Oil cooler connection to crankcase	Nm	9
<b>Cylinders</b>		
Tightening sequence:		
1 M 8 screw	Nm	20
2 M 6 screw	Nm	9
3 Chain guide rail pivot screw	Nm	18
<b>Timing chain</b>		
Chain tensioner	Nm	32
<b>Connecting rod</b>		
Big end cap		
Closing torque	Nm	20
Wrench angle	°	80
<b>Crankcase</b>		
Tightening sequence:		
M 10 screw (oiled) to initial torque	Nm	25
Wrench angle	°	90
M 8 screw	Nm	22 (oiled)
M 6 screw	Nm	9

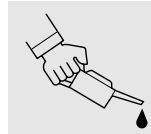
<b>Model</b>	<b>R 1150 R</b>	
<b>Connection</b>		
<b>12 Engine electrics</b>		
Starter motor to engine	Nm	20
Starter cover to gearbox housing	Nm	7
Positive lead to starter motor	Nm	10
Alternator to alternator support cover	Nm	20
Tensioning and retaining link to alternator	Nm	21
Spacer to alternator	Nm	21
Positive lead to alternator	Nm	15
Belt pulley to alternator	Nm	50
Belt pulley to crankshaft	Nm	50
Poly-V belt preload	Nm	8
Spark plug NGK BKR 7 EKC	Nm	25
<b>Model</b>	<b>R 1150 R</b>	
<b>Connection</b>		
<b>13 Fuel preparation and control</b>		
Temperature sensor, oil, in crankcase	Nm	25
Temperature sensor, air, in air-filter housing	Nm	10
<b>Model</b>	<b>R 1150 R</b>	
<b>Connection</b>		
<b>16 Fuel tank and lines</b>		
Fuel tank to rear frame	Nm	22
Fuel pump assembly to tank	Nm	5





<b>Model</b>		<b>R 1150 R</b>
<b>Connection</b>		
<b>18 Exhaust system</b>		
Manifold to cylinder head	Nm	21
Clamp for manifold	Nm	45 (apply Optimoly TA to clamp seat)
Front silencer to manifold	Nm	45 (apply Optimoly TA to clamp seat)
Silencer to main stand lugs	Nm	20
Silencer to rear frame at top	Nm	22
Oxygen sensor to silencer	Nm	45 (apply Optimoly TA to thread)
End cap to rear silencer	Nm	8 (threads greased)
Bracket to rear silencer	Nm	15 (threads greased)
<b>Model</b>		<b>R 1150 R</b>
<b>Connection</b>		
<b>21 Clutch</b>		
Clutch housing		
Closing torque	Nm	40 (oil screw threads lightly)
Wrench angle	°	32
Housing cover to housing	Nm	12
Clutch line to handlebar fitting	Nm	14
Slave cylinder to gearbox	Nm	9
Grub screw in filler adapter	Nm	10

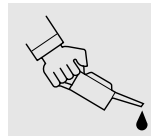
<b>Model</b>	<b>R 1150 R</b>	
<b>Connection</b>		
<b>23 Transmission</b>		
Oil drain plug	Nm	30
Oil filler plug	Nm	30
Gearbox to engine block	Nm	22
Shift lever to footrest plate	Nm	35
Selector lever to selector shaft	Nm	9
Housing cover to housing	Nm	9
Frame tube to gearbox		
1. to gearbox and left footrest plate	Nm	42 (clean thread + Loctite 243)
2. clamp block, frame tube to gearbox	Nm	9
3. to gearbox and right footrest plate	Nm	42 (clean thread + Loctite 243)
<b>Model</b>	<b>R 1150 R</b>	
<b>Connection</b>		
<b>31 Front fork</b>		
Quick-release axle clamp screws	Nm	22
Clamp, fork fixed tube to fork bridge	Nm	45 (free from oil and grease)
Slider tube bridge to slider tube	Nm	25 (clean thread + Loctite 243)
Threaded stud to frame	Nm	130 (clean thread + Loctite 243)
Ball joint to sliding tube bridge	Nm	230 (lightly grease threads with Optimoly TA)
Leading link to ball joint		
Initial tightening	Nm	80
Final tightening	Nm	130 (clean thread + Loctite 2701)
Leading link to engine	Nm	130
Spring strut to front frame	Nm	43
Spring strut to leading link	Nm	50





Model		R 1150 R
<b>Connection</b>		
<b>32 Steering</b>		
Handlebars to fork bridge, tightening sequence:		
1. Front fastener (as viewed in forward direction of travel) until seated	Nm	21
2. Rear fastener (as viewed in forward direction of travel)	Nm	21
Handlebar weight to handlebars	Nm	21
Pivot screw, handlebar lever	Nm	11 (Tuflok Blue thread-locking compound; screw can be released and tightened a number of times)
Model		R 1150 R
<b>Connection</b>		
<b>33 Rear wheel drive</b>		
Oil filler plug	Nm	23
Oil drain plug	Nm	23
Threaded ring	Nm	160 (clean thread + Loctite 577)
Hexagon nut, input bevel gear	Nm	200 (clean thread + Loctite 2701)
Cover to rear-wheel drive housing	Nm	35
Fixed bearing stud bolt, swinging arm to gearbox	Nm	160 (clean thread + Loctite 2701)
Floating bearing stud bolt, swinging arm to gearbox		
1. initial torque	Nm	9
2. slacken		
3. final torque	Nm	7 (clean thread + Loctite 2701)
Locknut, floating bearing stud bolt, swinging arm to gearbox	Nm	160
Fixed bearing stud bolt, swinging arm to rear axle housing	Nm	160 (clean thread + Loctite 2701)
Floating bearing stud bolt, swinging arm to rear axle housing		
1. initial torque	Nm	9
2. slacken		
3. final torque	Nm	7 (clean thread + Loctite 2701)
Locknut, floating bearing stud bolt, swinging arm to rear axle housing	Nm	160

<b>Model</b>		<b>R 1150 R</b>
<b>Connection</b>		
<b>33 Rear wheel drive</b>		
Reaction link to rear wheel drive / gearbox	Nm	43 (load approx. 85 kg (187 lbs) onto motorcycle and tighten loose reaction link)
Spring strut to rear frame	Nm	50
Spring strut to rear swinging arm	Nm	58 (clean thread + Loctite 243)
Hydraulic spring preload adjuster to foot-rest plate	Nm	22
<b>Model</b>		<b>R 1150 R</b>
<b>Connection</b>		
<b>34 Brakes</b>		
Brake caliper to fork slider tube, Evo brakes	Nm	30
Brake caliper to rear wheel drive	Nm	40
Brake disc to front wheel	Nm	21 (clean thread + Loctite 2701)
Brake disc to rear wheel drive	Nm	21 (clean thread + Loctite 2701)
Master cylinder to footrest assembly	Nm	9
Footbrake lever to footrest assembly	Nm	21 (clean thread + Loctite 2701)
Footbrake-lever stop	Nm	9
Ball socket to thrust rod	Nm	9
Brake lines/brake hose to brake components	Nm	18
Brake hose to bracket	Nm	9
Brake hose to brake lever fitting	Nm	18
Bracket to front frame	Nm	9
Bracket to rear frame	Nm	9 (clean thread + Loctite 2701)
Front brake caliper bleed screw	Nm	9
Rear brake caliper bleed screw	Nm	6
Filler adapter to brake line	Nm	18
ABS pressure modulator to bracket	Nm	7
ABS pressure modulator to battery carrier	Nm	10

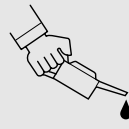






Model		R 1150 R
<b>Connection</b>		
<b>36 Wheels and tyres</b>		
Quick-release axle clamp screws	Nm	22
Quick-release axle threaded fastener	Nm	30
Rear wheel to rear wheel drive Hand-tighten wheel studs and tighten in diagonally opposite sequence <b>[Integral ABS]</b> Note spacer	Nm	105
Model		R 1150 R
<b>Connection</b>		
<b>46 Frame</b>		
Frame to engine	Nm	82
Struts to frame	Nm	58
Strut to engine	Nm	58 (clean thread + Loctite 2701)
Rear frame to gearbox/engine to gearbox and footrest plate	Nm	42 (clean thread + Loctite 2701)
to engine	Nm	42
Carrier plate for main stand to engine, right M 12 screw	Nm	72 (clean thread + Loctite 2701)
Pivot mount to engine, left M 12 screw	Nm	72 (clean thread + Loctite 2701)
M 8 screw	Nm	21
Pivot mount of main (centre) stand (stud bolt)	Nm	21 (clean thread + Loctite 243)
Pivot mount of main (centre) stand (machine screw)	Nm	21
Side stand to pivot mount	Nm	58 (clean thread + Loctite 2701)
Footrest plate to gearbox	Nm	21
Rear footrest plate to rear frame	Nm	21
Front mudguard to fork slider tube bridge	Nm	6 (Tuflok Blue thread-locking compound; screw can be released and tightened a number of times alternatively: clean thread + Loctite 243)

<b>Model</b>		<b>R 1150 R</b>
<b>Connection</b>		
<b>46 Frame</b>		
Front and rear sections of front mudguard to slider tube	Nm	3 (Tuflok Blue thread-locking compound; screw can be released and tightened a number of times alternatively: clean thread + Loctite 243)
Headlight bracket to fork bridge	Nm	20
<b>Model</b>		<b>R 1150 R</b>
<b>Connection</b>		
<b>51 Equipment</b>		
Mirrors	Nm	15
Ignition/steering lock to fork bridge	Nm	20 (micro-encapsulated)
<b>Model</b>		<b>R 1150 R</b>
<b>Connection</b>		
<b>61 General electrical equipment</b>		
Horn to holder	Nm	8 (clean thread + Loctite 243)
Ground (earth) strap to engine block	Nm	9
Battery carrier to rubber-metal element	Nm	8



## Table of operating fluids



Item	Use	Order number	Quantity
<b>Lubricant</b>			
Staburags NBU 30 PTM	High-performance lubricating paste	07 55 9 056 992	75 g tube
Optimoly MP 3	High-performance lubricating paste	07 55 9 062 476	100 g tube
Optimoly TA	High-temperature assembly paste	18 21 9 062 599	100 g tube
Silicone grease 300, heavy	Damping grease	07 58 9 058 193	10 g tube
Retinax EP2	Wheel, steering head and taper roller bearing grease	83 22 9 407 845	100 g tube
Contact spray	Contact spray	81 22 9 400 208	300 ml spray
Chain spray	Drive chain	72 60 2 316 676 72 60 2 316 667	50 ml spray 300 ml spray
<b>Sealants</b>			
3-Bond 1110 B	Surface sealant	07 58 9 056 998	5 g tube
3-Bond 1209	Surface sealant	07 58 9 062 376	30 g tube
OMNI VISC 1002	Surface sealant	07 58 1 465 170	90 g tube
Loctite 574	Surface sealant	81 22 9 407 301	50 ml tube
Loctite 577	Thread locking compound	07 58 2 328 736	5 g tube
Curil K 2	Heat-conductive sealant	81 22 9 400 243	250 g can
<b>Adhesives and retaining agents</b>			
Loctite 648	Joint adhesive (narrow gap)	07 58 9 067 732	5 g bottle
Loctite 638	Joint adhesive (wide gap)	07 58 9 056 030	10 ml bottle
Loctite 243	Thread retainer, medium-strength	07 58 9 056 031	10 ml bottle
Loctite 270	Thread retainer, strong	81 22 9 400 086	10 ml bottle
Loctite 2701	Thread retainer, strong	33 17 2 331 095	10 ml bottle
Loctite 454	Cyanacrylate adhesive (gel)	07 58 9 062 157	20 g tube
<b>Cleaners</b>			
Brake cleaner	Brake cleaner	83 11 9 407 848	600 ml spray
Metal Polish	Polish for chrome-plated parts	82 14 9 400 890	100 g tube
<b>Testing agents</b>			
Penetrant MR 68	Crack testing agent for aluminium housings	83 19 9 407 855	500 ml spray
Developer MR 70	Crack testing agent for aluminium housings	81 22 9 407 495	500 ml spray
<b>Installation aids</b>			
BMW cooling spray	Cooling spray	83 19 9 407 762	300 ml spray

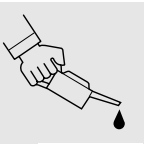
# 00 Pre-delivery check

## Contents

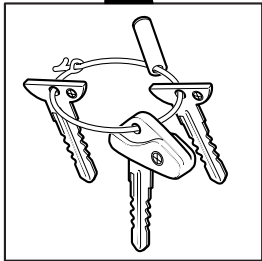
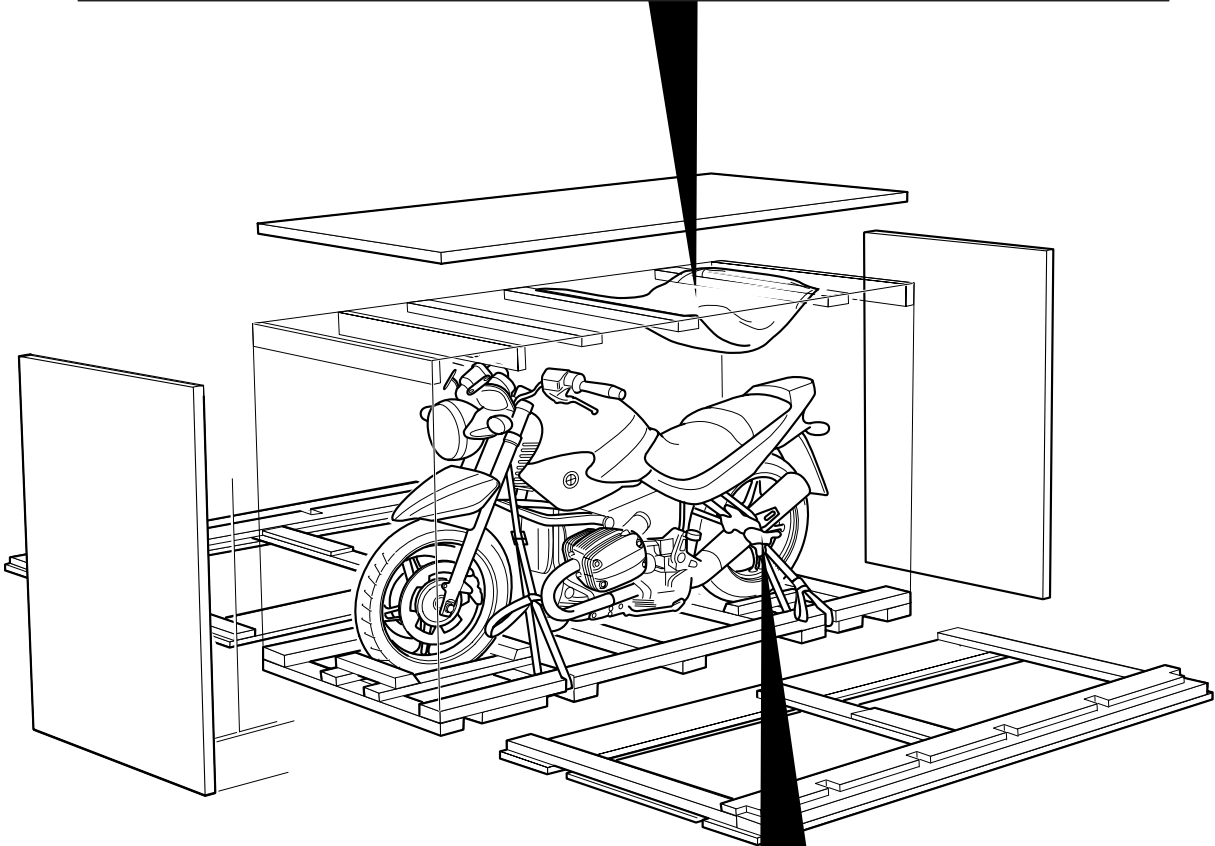
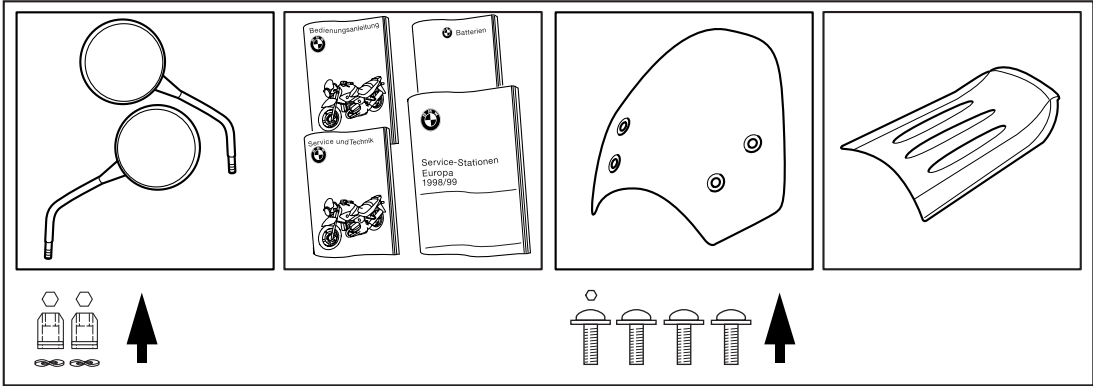
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# General view of crated motorcycle



## Checking the shipping pallet for damage

- When the motorcycle arrives, check the packing material immediately for damage and, if necessary, examine the contents for consequential damage.



### In case of damage in Germany

- Note the damage on the delivery slip.
- Read the information sheet on damage in transit.
- Notify supplier (e.g. freight company or DB) and Bavaria Wirtschaftsagentur GmbH  
Abteilung ZW - 12  
80788 München  
Tel. +49 89-14327-632  
Fax +49 89-14327-709  
without delay.

### In case of damage in importer markets

- Note the damage on the delivery slip.
- Comply with specific national market procedures.  
In case of doubt, please submit enquiries to:  
Bavaria Wirtschaftsagentur GmbH  
Abteilung ZW - 12  
D-80788 München  
Tel. +49 89/14327-632  
Fax +49 89/14327-709
- Notify the supplier (e.g. freight company) without delay.

## 00 11 Unpacking the motorcycle

- Lever off the cover.
- Take out the separate pack of items:
  - Documentation
  - Optional Speedster fairing, if applicable
  - Optional seat cover, if applicable
- Force off cross-struts with a suitable lever.

### Attention:

Do not knock the cross-struts out or the motorcycle may be damaged.

- Remove the end-walls.
- Remove the side-walls.

### Attention:

Remove any nails projecting from the base of the packing or lying on the base or on the floor.

- Loosen the front tensioning straps.
- Loosen the rear tensioning straps.
- Push the motorcycle forwards off the pallet.
- Remove the set of keys from the left rear footrest.
- Dispose of the packing materials in an environmentally responsible manner as described in Circular 23/91 - Sales.

## 00 11 Installing remaining items on motorcycle

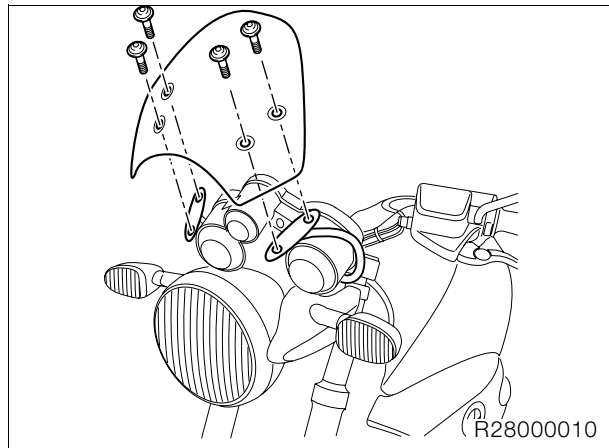
- Fit the rear-view mirror.



### Tightening torque:

Mirror on handlebar fitting ..... 10 Nm

## 71 63 099 Mounting the Speedster fairing



- Carefully tighten the Speedster fairing securing screws by hand.



### Tightening torque:

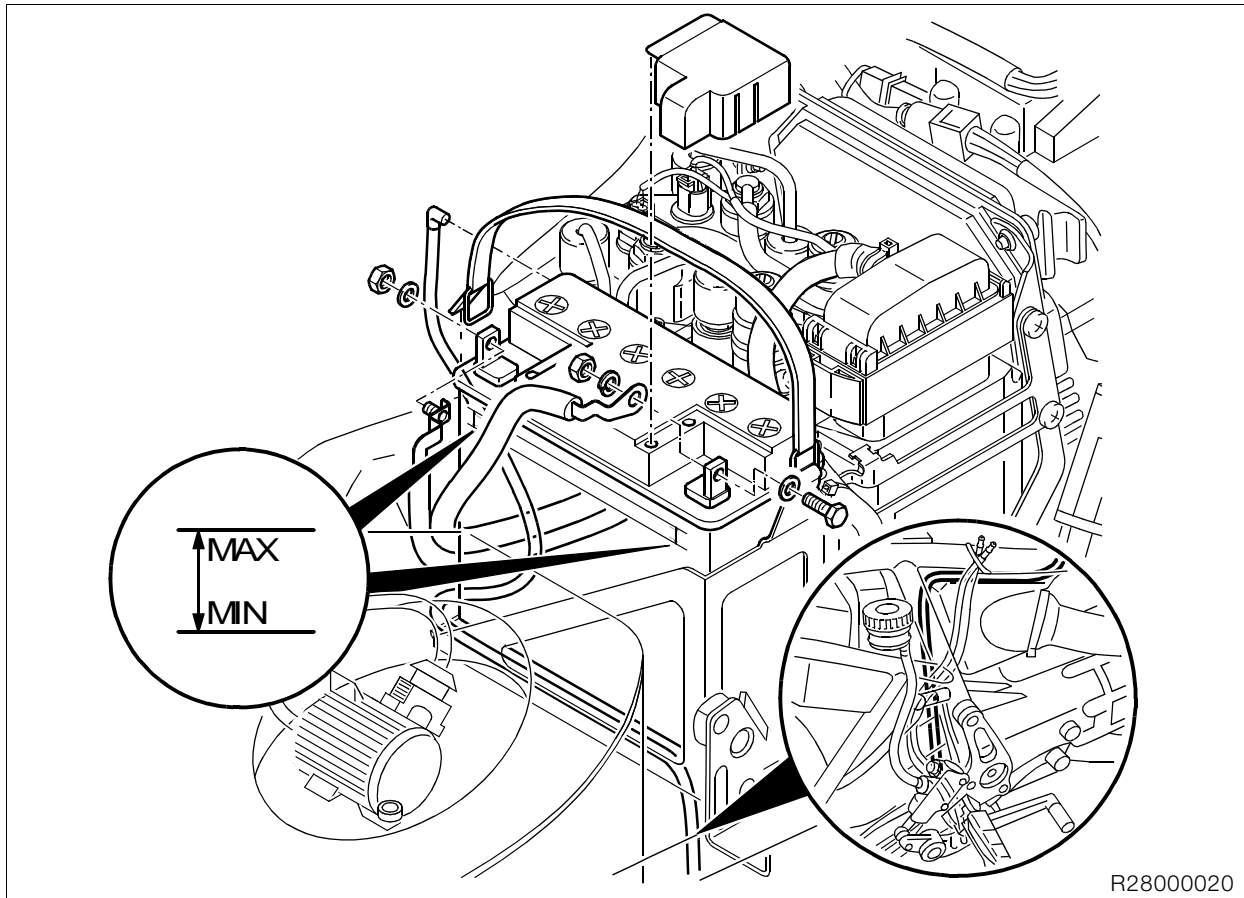
Fairing on fairing bracket ..... 2 Nm

## 00 11 Inspecting motorcycle for damage

- Check for faults.
- “Express handling service” to:  
BMW Motorrad  
UX-VS-1  
Fax number +49 89-382-33220
- Rectify the fault.
- If parts are needed, order them through the usual channel.
- Costs are to be processed through the warranty claim system (stage 4). Defect codes:
  - Parts missing 10 01 00 00 00
  - Parts damaged 10 02 00 00 00
  - Incorrect parts delivered 10 03 00 00 00

## Checking that delivery is complete

- All optional extras
- Toolkit
- Documentation



R28000020

**61 21 Filling and charging the battery**

**16 11 533 Removing the fuel tank**

- Remove front/rear seat.
- Lever off the right-hand and left-hand front trim sections from the tank.
- Remove the right-hand and left-hand oil cooler trims.
- Remove the right-hand cable trim.
- Remove oil cooler with air ducting and fold forwards.

**⚠ Attention:**

Fuel is flammable and a hazard to health. Observe relevant safety regulations.

- Remove fuel tank retaining screw.
- Remove bleed line and overflow pipe.
- Disconnect the fuel line quick-release coupling.
- Disconnect the fuel pump plug connection.

**📄 Note:**

Place a cloth between the fork stabilizer and the fuel tank to prevent paintwork damage to the front of the fuel tank.

- Remove the fuel tank upwards from the rear.

**61 21 Filling and charging the battery**

**⚠ Warning:**

Battery acid is highly caustic. Protect your eyes, face, hands, clothing and the paintwork.

- Disengage the rubber strap holding the battery.
- Disconnect the battery breather hose.
- Remove the battery.
- Fill all the cells to the upper mark with pure battery acid of density 1.28.
- Allow the battery to stand for approximately 30 minutes.



- The battery does not achieve full charge capacity from being filled, so it has to be charged with a battery charger.



**Note:**

Follow the instructions for use supplied with the battery charger.



**Charge current (A)**

..... 10 % of rated battery capacity (Ah)

**Charging time**

..... 5-10 hours

- Battery charge can be measured by checking the density of the battery acid.

**Acid density**

Battery fully charged ..... 1.26-1.30 at 20 °C (68 °F)

- Shake the battery slightly to allow the gas bubbles to escape.
- Wait until the battery acid has settled, check that no more bubbles rise and if necessary, top up the acid to the max. mark.
- Refit the plugs.
- Make a note of the charging date on the battery.



**Attention:**

Connect the positive battery terminal first, then the negative terminal.

- Fit the battery.
- Apply acid-proof grease to the battery terminals.
- Connect the battery breather line.
- Fit the fuel tank.
- Connect the fuel pump connector and the fuel line quick-release couplings.
- Connect bleed line and overflow pipe.
- Fit oil cooler with air ducting.
- Fit cable trim.
- Fit oil cooler trim.
- Secure the right-hand and left-hand front trim sections to the tank.
- Fit front/rear seat.
- Switch on the ignition.
- Without starting the engine, fully open the throttle once or twice so that the Motronic control unit can record the throttle-valve positions.



**Note:**

Disconnecting the battery deletes all entries (e.g. faults, settings) stored in the Motronic control unit's memory.

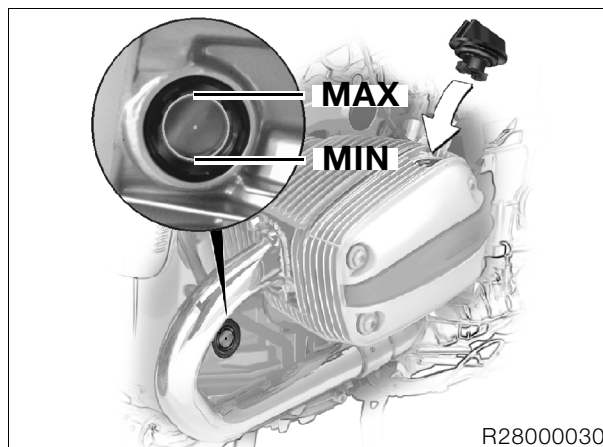
Loss of settings can temporarily impair the operating characteristics when the engine is restarted.



**Tightening torque:**

Fuel tank to frame ..... 22 Nm

**00 00 Checking engine oil when engine is cold, topping up if necessary**



- Check oil level with the motorcycle upright.

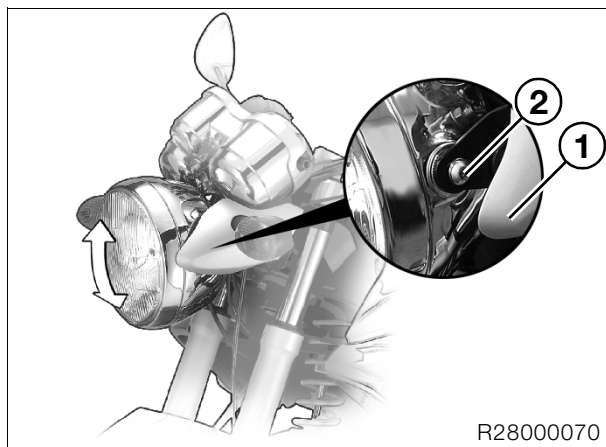


**Attention:**

Never top up the engine-oil level past the "MAX" mark.

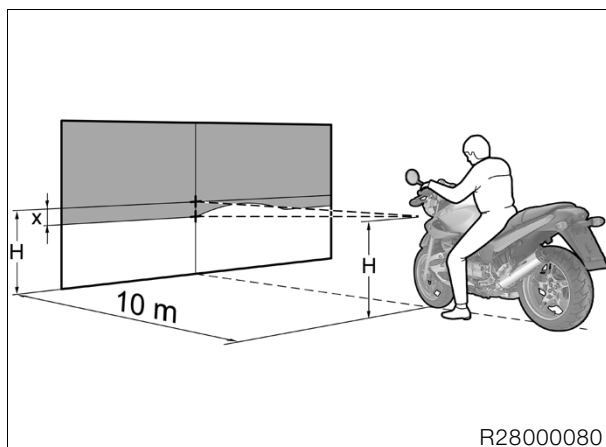
**Required level:**..... MAX

## 63 10 500 Checking headlight beam angle, adjusting if necessary



R28000070

- Motorcycle must be on a level surface.
- Motorcycle with driver (approximately 85 kg/187 lbs).
- Remove trim (1).
- Remove headlight (2) retaining bolts.
- Correct the headlight range by swivelling the headlight.




R28000080

### Setting for headlight beam angle adjuster

... -25 cm (9.8425 in) at a distance of 10 m (32.8 ft)

## Checking tightness of rear wheel studs

 **Tightening torque:**  
Securing screws for rear wheel ..... 105 Nm

## Checking tyre pressures

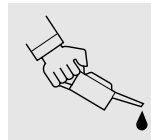
- Check/correct tyre pressures.

### Tyre pressures:

Solo ..... front 2.2 bar (31.3 psi)  
..... rear 2.5 bar (35.6 psi)

With pillion passenger ..... front 2.5 bar (35.6 psi)  
..... rear 2.7 bar (38.4 psi)

With pillion passenger and luggage  
..... front 2.5 bar (35.6 psi)  
..... rear 2.9 bar (41.2 psi)



## [Integral ABS] Performing bleed test with BMW MoDiTeC



### Warning:

Self-diagnosis is not performed unless both brake levers are in their fully released positions. Prior to the conclusion of the self-diagnosis, only RESIDUAL BRAKE FUNCTION is available.

### Performing BMW Integral ABS self-diagnosis:

- Release the brake levers if necessary.
- Switch on the ignition.

ABS warning light.....flashes at 4 Hz  
General warning lamp .....is continuous

- Self-diagnosis is in progress

ABS warning light.....flashes at 1 Hz  
General warning lamp .....goes out

- Self-diagnosis successfully completed.

### Performing a bleed test using the BMW MoDiTeC:

- Remove front/rear seat.
- Connect the **BMW MoDiTeC** to the diagnostic connector.



### Warning:

Avoid rapid and forceful pumping of the brakes when performing maintenance and repair work on the BMW Integral ABS.

- Perform bleed test.
- Perform all requisite repair work.

### Performing BMW Integral ABS pull-away test:

- The ABS warning light must go out when a speed of 5 km/h (approx. 3 mph) is reached.



### Note:

The ABS warning light and the general warning light must both be OFF after successful self-diagnosis and the pull-away test.

## Final inspection and function check

- Clutch
- Check gear shift action.
- Handbrake and foot brake
- Check lights and signalling equipment:
  - Front and rear parking lights
  - Instrument lighting
  - Low and high headlight beams, headlight flasher
  - Brake light (operate brake at front and rear)
  - Turn signals left/right
  - Hazard warning flashers
  - Horn
  - Indicator and warning lights
  - Instruments
- Where necessary, check function of optional extras:
  - If necessary, take the motorcycle for a test ride.
  - Confirm pre-delivery check in Service and Technical Booklet.
- See “Checking motorcycle for damage” if defects are found.

## 00 11 459 Final cleaning

- Clean the motorcycle.



### Note:

Do not use a steam or high-pressure water jet. The high steam or water pressure could damage seals, the hydraulic system or electrical components.

## Handing over the motorcycle

This is the ideal opportunity to familiarise the customer with the motorcycle in order to ensure the customer's satisfaction and safety.

- The following points must be demonstrated and explained to the customer:
  - documentation and stowage space
  - toolkit and stowage space
  - suspension preload adjustment to suit total weight
  - checking brake fluid/clutch operating fluid
  - provision for adjusting handlebar lever positions
  - how to adjust the mirrors
  - controls
  - instruments and indicator lights
  - optional equipment and accessories fitted
  - features of **BMW Integral ABS**:
    - brake servo,
    - residual braking function,
    - pump noises,
    - self-diagnosis with pull-away test.
- The user must be given the following information:
  - running-in recommendations and inspection intervals
  - safety check
  - features of **BMW Integral ABS**:
    - partially integral brake,
    - brake-fluid levels in the control circuits remain constant despite brake-pad wear.
  - the clutch fluid level rises gradually as the motorcycle is ridden (clutch lining wear)
  - before checking the engine oil level, the engine must be switched off for at least 10 minutes and the motorcycle must be standing on a flat, level surface.

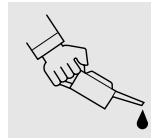




# 00 Maintenance

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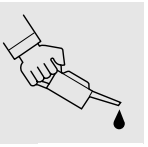


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## Maintenance interval codes

Service and maintenance operations include the initial Break-in Inspection (after the first 1000 km/600 miles), the BMW Service, BMW Inspection and the BMW Annual Service.

### 1000 km/600 mile Break-in Inspection

BMW Break-in Inspection after the initial 1000 km/600 miles.

### BMW Service

At the end of the first 10 000 km and then at intervals of 20 000 km (30 000 km ... 50 000 km ... 70 000 km).

### BMW Inspection

At the end of the first 20 000 km and then at intervals of 20 000 km (40 000 km ... 60 000 km ... 80 000 km).

### BMW Annual Service

Although the frequency of service operations often depends on mileage, time is also an important factor: many procedures (such as brake fluid changes) should be carried out at least once a year, regardless of elapsed mileage.

If these operations are not performed in the course of a standard, mileage-based Service or Inspection, an extra visit for an Annual Service will be required.

The codes for service and maintenance intervals in this Repair Manual are as follows:

- Break-in Inspection at 1000 km/600 miles ..... **I**
- BMW Service at 10 000 km/6,000 miles ..... **II**
- BMW Inspection at 20 000 km/12,000 miles.... **III**
- BMW Annual Service ..... **IV**

## 00 13 624 Reading the BMW MoDiTeC fault code memory

(Inspections I, II, III and IV)

- Remove front/rear seat.
- Connect the **BMW MoDiTeC** to the diagnostic connector.
- Read all fault code memories.
- Perform all requisite repair work.

## [Integral ABS] Performing bleed test with BMW MoDiTeC

(Inspections I, II, III and IV)

- Remove front/rear seat.
- Connect the **BMW MoDiTeC** to the diagnostic connector.



### Warning:

Avoid rapid and forceful pumping of the brakes when performing maintenance and repair work on the BMW Integral ABS.

- Perform bleed test.
- Perform all requisite repair work.



# 00 11 209 Changing engine oil, replacing oil filter element

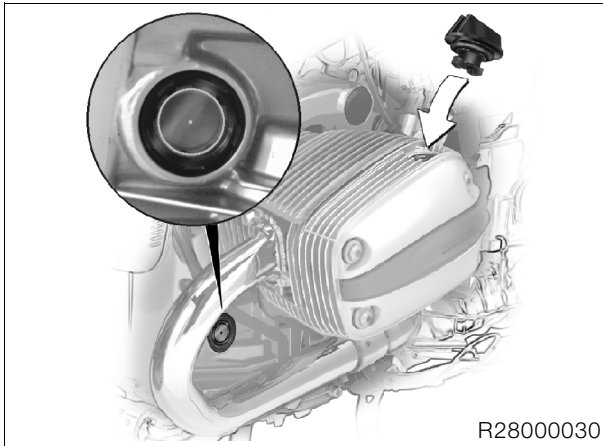
(Inspections I, II, III and IV)



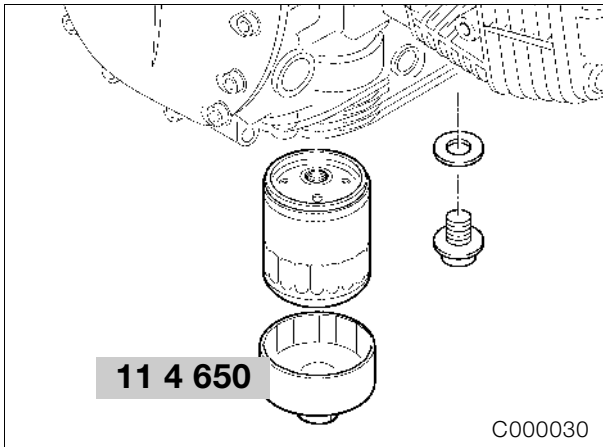
**Note:**

If the motorcycle is ridden only for short distances or outside temperatures are below 0°C (32 °F), change the oil and replace the oil filter element every 3 months, or not less than every 3,000 km (1,800 miles).

- Change the engine oil at operating temperature.



- Remove screw plug.



- Remove oil drain plug and drain off oil.
- Refit the oil drain plug with a new sealing ring.
- Use the oil filter wrench, **BMW No. 11 4 650**, to remove the oil filter.
- Coat the sealing ring on the new oil filter element with oil and install filter.
- Refill with oil to correct level.

- Insert and tighten the screw plug.



**Attention:**

Never top up the engine-oil level past the "MAX" mark.



**Tightening torque:**

Oil filter.....	11 Nm
Oil drain plug.....	32 Nm

**Engine oil quantities:**

with oil filter change	
.....	3.75 l (6.6026 Imp. pints/3.9626 US quarts)
without oil filter change	
.....	3.50 l (6.1624 Imp. pints/3.6985 US quarts)
oil between	
MIN and MAX mark	
.....	0.50 l (0.8803 Imp. pints/0.5283 US quarts)

**Engine oil grade:**

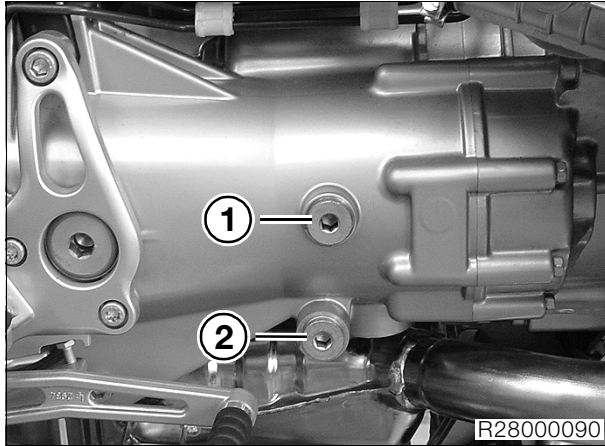
Brand-name HD oil for spark-ignition engines, API classifications SF, SG, SH; combination with CD or CE specification.

Brand-name HD oil of CCMC classification G4, G5; amendment PD2 is permissible.

## 00 11 229 Changing the transmission oil

(Inspections III and IV)  
or at least every 2 years

- Change the transmission oil at operating temperature.



- Remove oil filler plug (1).
- Remove oil drain plug (2) and allow the oil to drain out.
- Refit the oil drain plug with a new sealing ring.
- Fill with gearbox oil.
- Insert oil filler plug with new seal.



### Tightening torque:

Oil drain plug .....	30 Nm
Oil filler plug .....	30 Nm

### Quantity:

Refill	
to bottom of filler neck.....	approx. 1.0 l
.....(1.7607 Imp. pints/1.0567 US quarts)	
Oil change	
to bottom of filler neck.....	approx. 0.8 l
.....(1.4086 Imp. pints/0.8454 US quarts)	

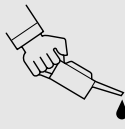
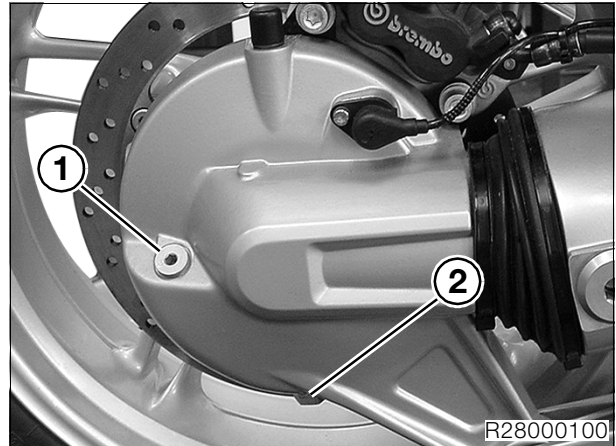
### Oil grade for transmission:

Brand-name hypoid gear oil, SAE 90, API class GL 5

## 00 11 229 Changing the oil in the rear wheel drive

(Inspections I, III and IV)  
Every 40,000 km (24,000 miles) or at the latest every 2 years

- Change the transmission oil at operating temperature.



### Attention:

Do not let oil drip on the rear tyres.

- Remove oil filler plug (1).
- Remove oil drain plug (2) and allow the oil to drain out.
- Refit the oil drain plug with a new sealing ring.
- Fill with gearbox oil.
- Insert oil filler plug with new seal.



### Tightening torque:

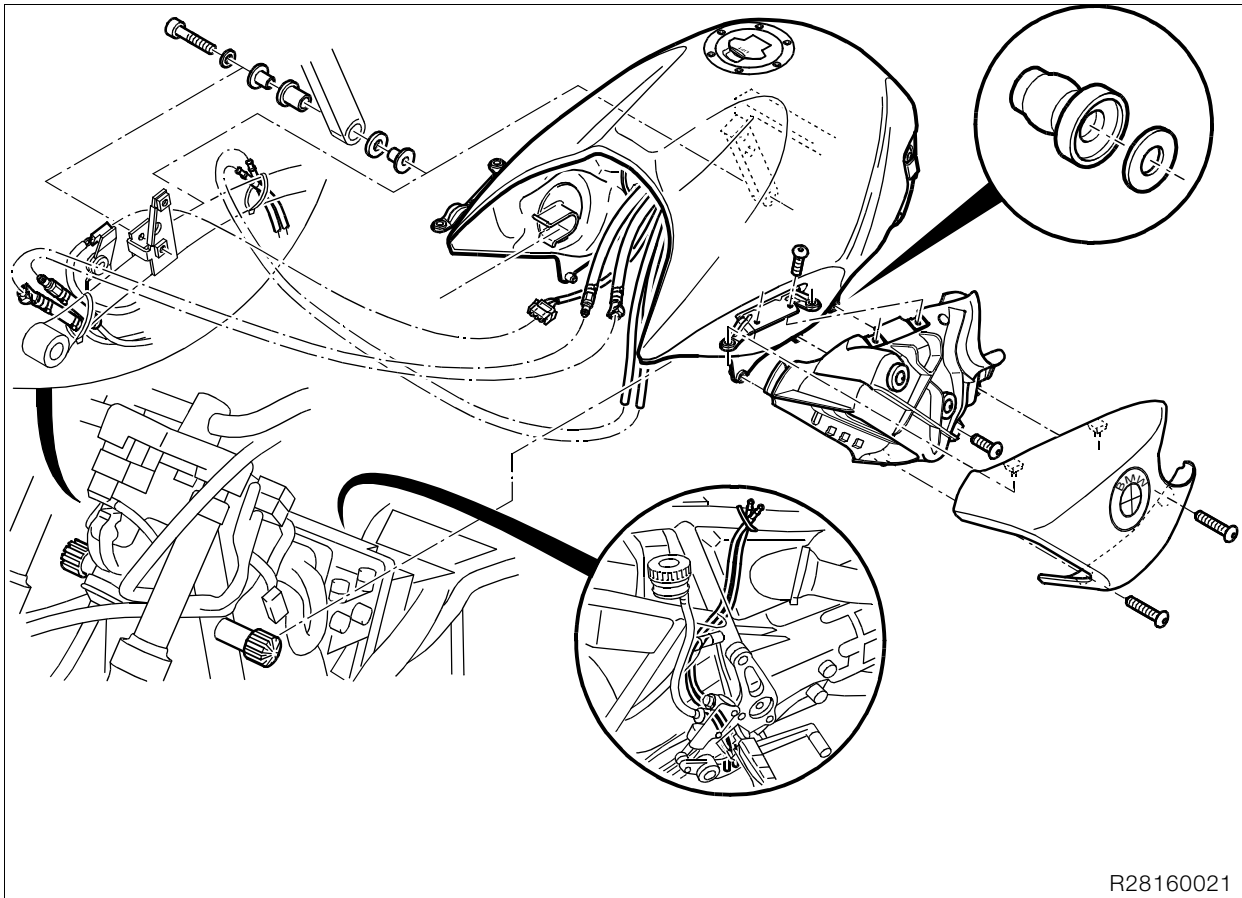
Oil drain plug .....	23 Nm
Oil filler plug .....	23 Nm

### Quantity:

to bottom of filler neck .....	approx. 0.25 l
.....(0.4401 Imp. pints/0.2641 US quarts)	

### Oil grade for rear wheel drive:

Brand-name hypoid gear oil, SAE 90, API class GL 5



R28160021

## 16 12 008 Replacing fuel filter

### (Inspection III)

**In normal operating conditions every 40,000 km (24,000 miles); if fuel quality is poor every 20,000 km (12,000 miles)**

- Remove front/rear seat.
- Lever off the right-hand and left-hand front trim sections from the tank.
- Remove the right-hand and left-hand oil cooler trims.
- Remove the right-hand cable trim.
- Remove oil cooler with air ducting and fold forwards.



### **Attention:**

Fuel is flammable and a hazard to health. Observe relevant safety regulations.

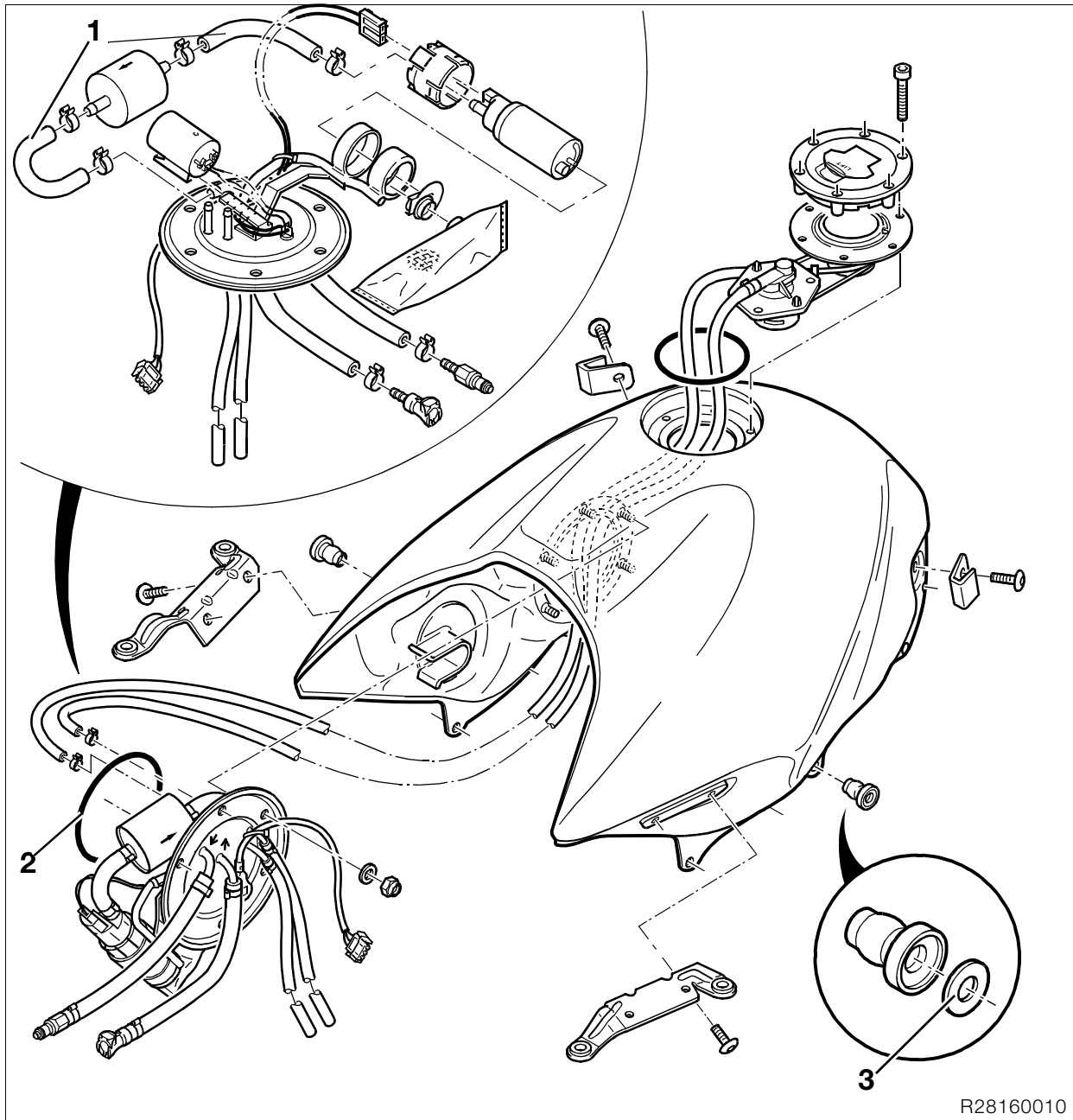
- Remove fuel tank retaining screw.
- Remove bleed line and overflow pipe.
- Disconnect the fuel line quick-release coupling.
- Disconnect the fuel pump plug connection.



### **Note:**

Place a cloth between the fork stabilizer and the fuel tank to prevent damage to the paintwork on the front of the fuel tank.

- Remove the fuel tank upwards from the rear.
- Drain fuel tank.
- Remove fuel pump unit.



R28160010

- Disconnect hoses from fuel filter (1).
- Replace the fuel filter

**⚠ Attention:**

Note correct direction of flow through fuel filter.

- Tighten one-time hose clips with pliers, **BMW No. 13 1 500.**

**⚠ Attention:**

Make sure that O-ring (2) is in perfect condition.

- Installation is the reverse of the removal procedure.

**🔧 Tightening torque:**

Fuel pump unit ..... 5 Nm

**⚠ Attention:**

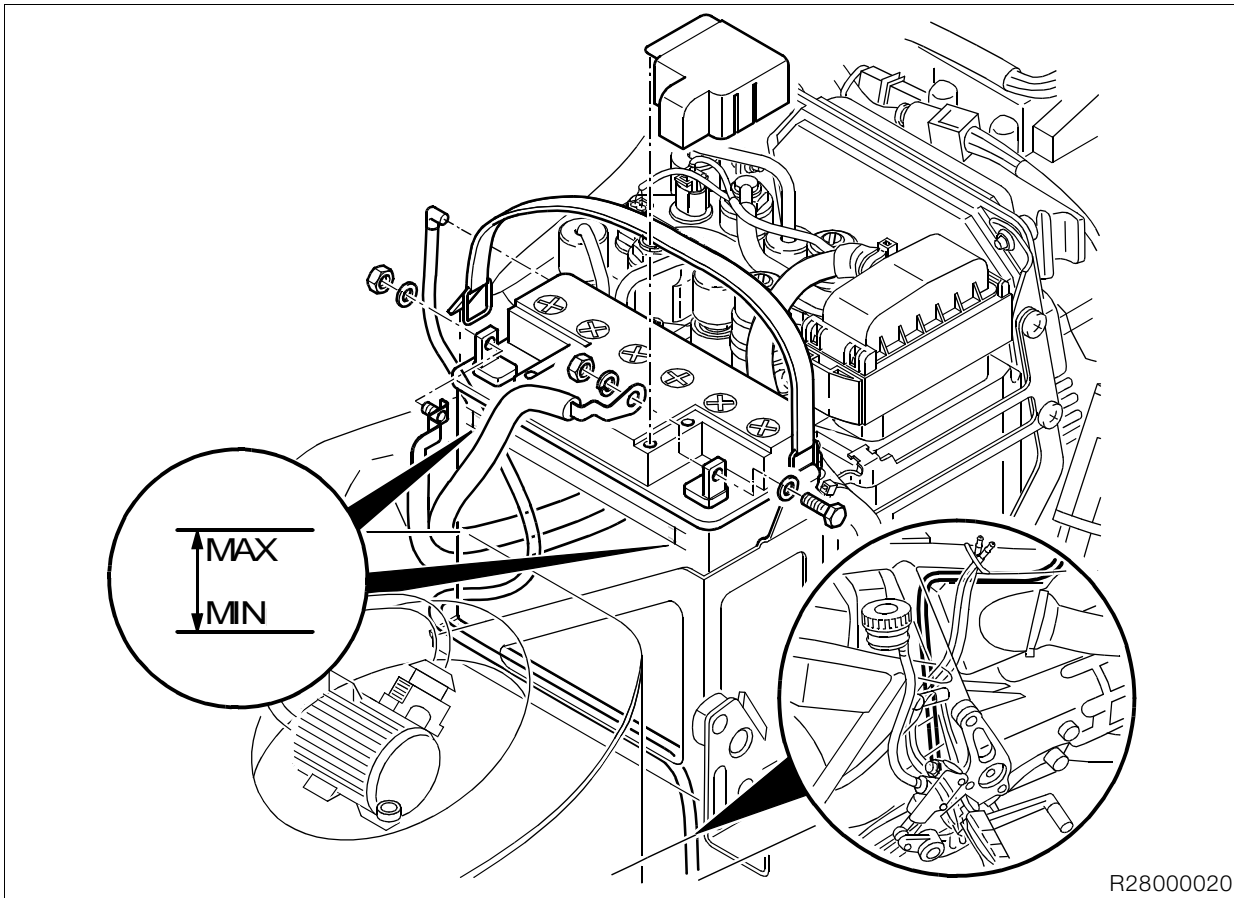
After installing, check fuel pump unit for leaks.

**📖 Note:**

Make sure that breather lines are correctly routed.

**📖 Note:**

Pay attention to washers (3).



R2800020

### 61 20 029 Checking battery fluid level and topping up if necessary; cleaning and greasing the battery terminals

(Inspections III and IV)

- If necessary, disengage fuel tank and lift it at rear.
- Disengage the rubber strap holding the battery.
- Check the battery fluid level.
- Top up the acid level to the "MAX" mark with distilled water.
- Grease the battery terminals.

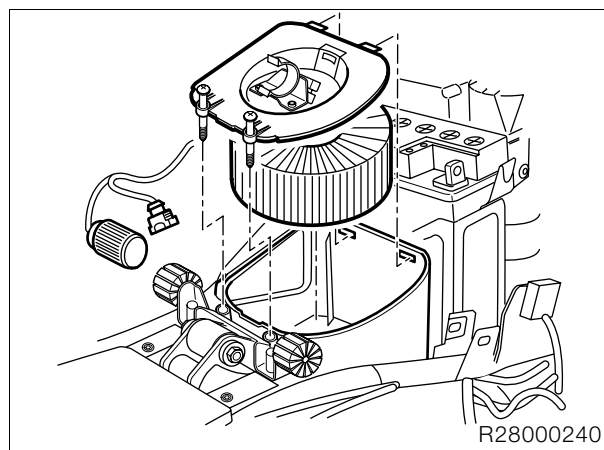
#### Acid proof battery-terminal grease:

.....e.g. Bosch Ft 40 V1

### 13 72 000 Replacing intake air filter element

(Inspection III)

In very dirty and dusty operating conditions, replace every 10,000 km (6,000 miles) or even more frequently if necessary



R28000240

- Open clips securing air filter cover.
- Replace air filter element.
- Close air filter cover.
- Install fuel tank.
- Make sure that breather lines are correctly routed.



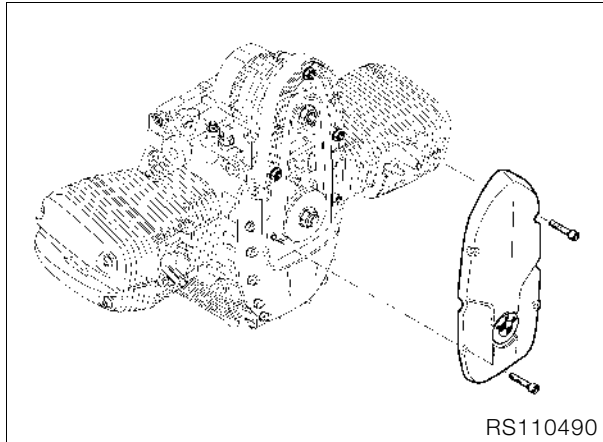
#### Tightening torque:

Fuel tank to frame ..... 22 Nm

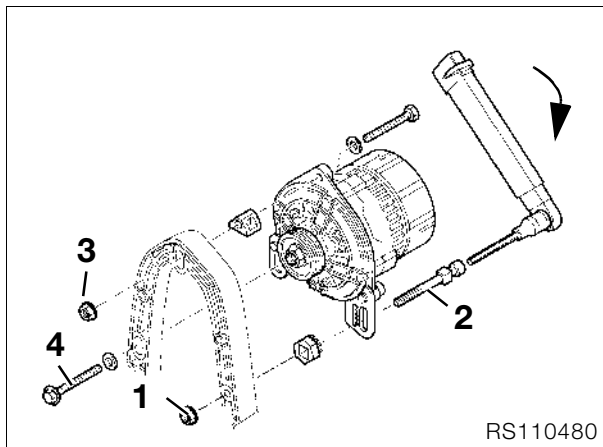
## 12 31 240 Replacing poly-V-belt

(Inspection III)  
every 60,000 km (36,000 miles)

- Remove left-hand oil cooler trim.



- Remove front cover.
- Slacken alternator mounting screws and nuts (1,3,4) and install a new poly-V- belt if necessary.



**Poly-V-belt adjustment procedure:**  
**Poly-V-belt installation procedure:**

- Place the poly-V-belt in position, tension it and turn the engine over once, then relieve belt tension.

**Poly-V-belt tensioning procedure:**

- 1 Slightly tighten hex nut (1) on adjusting screw (2) by hand (**do not use tools**).
- 2 Tighten adjusting screw (2) with a torque wrench and keep preload applied.
- 3 Tighten upper retaining nut (3), then remove torque wrench from adjusting screw.
- 4 Tighten all screws and nuts.



**Tightening torque:**

Poly-V-belt preload ..... 8 Nm  
Alternator  
to alternator support cover ..... 20 Nm





# [Without Integral ABS] Checking brake fluid level

(Inspections II and III)



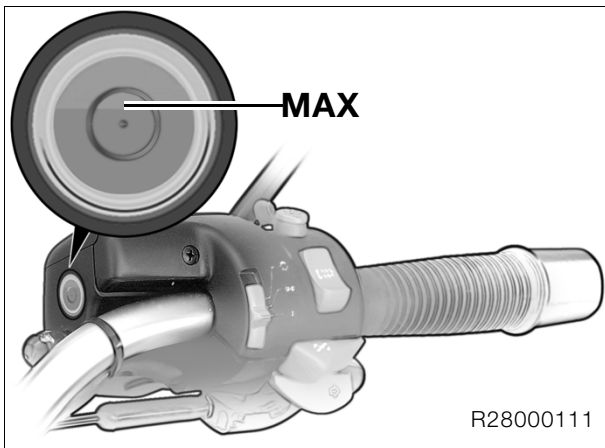
**Note:**

The volume of the brake fluid (MIN/MAX) is sufficient for lining thicknesses from new to the wear limit. It is not normally necessary to top up the fluid to accommodate lining wear. If the level drops below the MIN mark, this indicates some other fault.



## Front brake

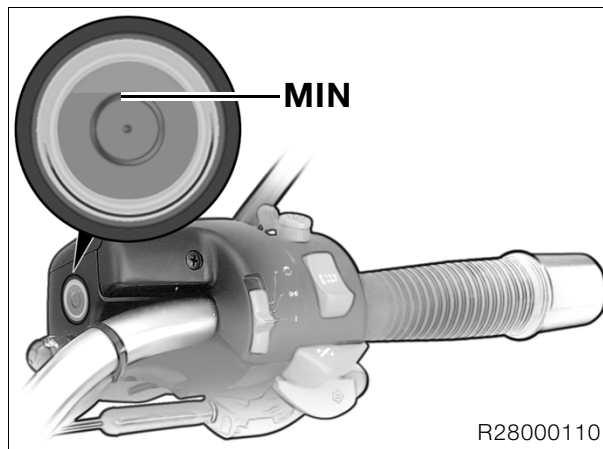
- Place the motorcycle on its centre stand.
- Turn the handlebars to the **right**.



**Required level:**

with new brake pads ..... MAX (exactly between the centre (point) of the sight glass and the top edge of the marking ring)

- Turn the handlebars to the **left**.



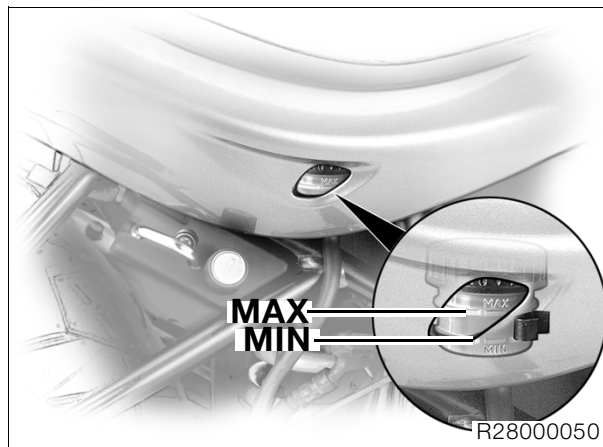
**Required level**

Brake pads worn not less than ..... MIN (Top edge of the marking ring)

**Brake fluid** .....DOT 4

## Rear brake

- The motorcycle must be upright.



**Required level**

with new brake pads ..... MAX  
brake pads worn not less than ..... MIN

**Brake fluid** .....DOT 4

## [Integral ABS] Checking brake fluid level

(Inspections II and III)

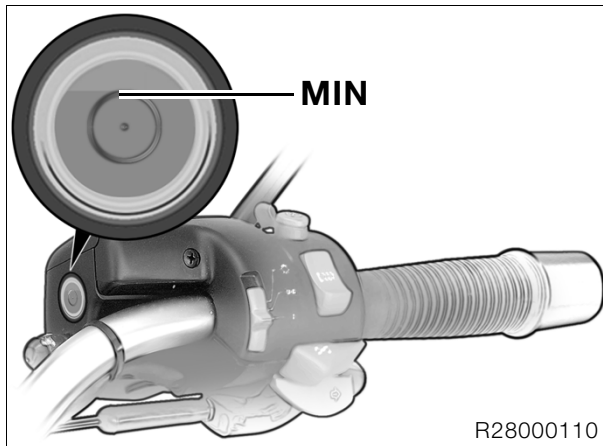


### Note:

The brake fluid level in the sight glass/brake fluid level remains constant despite wear of the brake pads.  
If the level drops below the MIN mark, this indicates some other fault.

### Front brake

- Place the motorcycle on its centre stand.
- Turn the handlebars to the **left**.



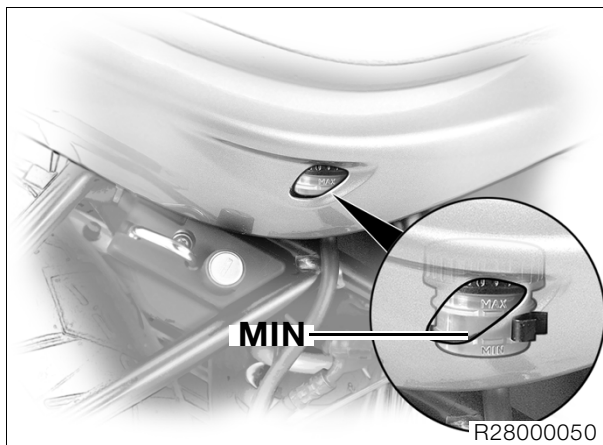
### Required level

not below ..... MIN  
(Top edge of the marking ring)

**Brake fluid** ..... DOT 4

### Rear brake

- Place the motorcycle on its centre stand.



### Required level

not below ..... MIN

**Brake fluid** ..... DOT 4

## Checking brake system for correct operation and freedom from leaks; repairing/replacing if necessary

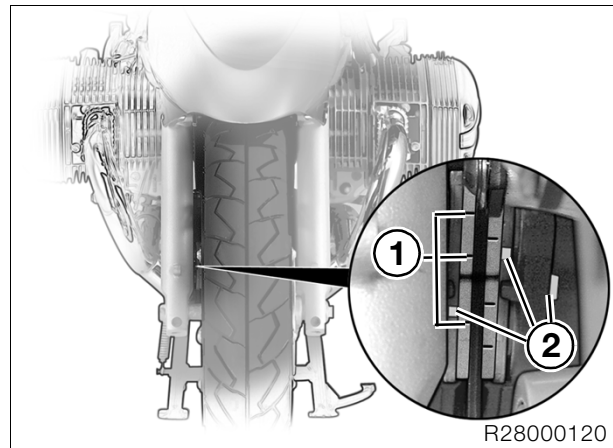
(Inspection III)

- Check brake system for leaks.

## Checking brake pads and discs for wear/replacing

(Inspections II and III)

### Checking front brake pad wear



- Wear indicators ( 1 ) must be clearly visible.
- If necessary, check/measure thickness of brake pads.



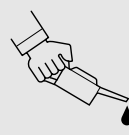
### Attention:

Brake pad thickness must not fall below the minimum value. Always replace the brake pads as a complete set.

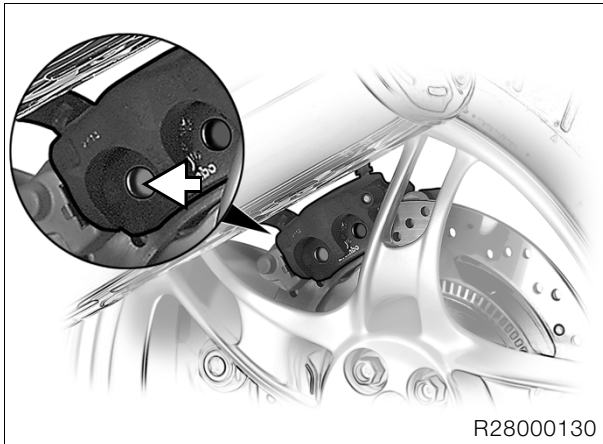
**Minimum pad thickness:** ..... 1.0 mm (0.3937 in)

- Check that colour codes of brake pads and brake calipers (2) match.

**Colour code:** ..... green



## Checking rear brake pad wear



- Make sure that the brake disc is not visible through the bore (arrow) in the inner brake pad.
- If necessary, check/measure thickness of brake pads.

### **Attention:**

Brake pad thickness must not fall below the minimum value. Always replace the brake pads as a complete set.

**Minimum pad thickness:** ..... 1.0 mm (0.3937 in)

- If the brake disc is visible through the bore in the wheel-side brake pad, the brake lining is worn to its minimum permissible thickness.

## Checking brake disc wear



- Examine the brake discs carefully for cracks, damage, distortion, wear and score-marks.

### **Brake disc wear limit:**

**front:**..... 4.5 mm (0.1771 in)  
**rear:**..... 4.5 mm (0.1771 in)

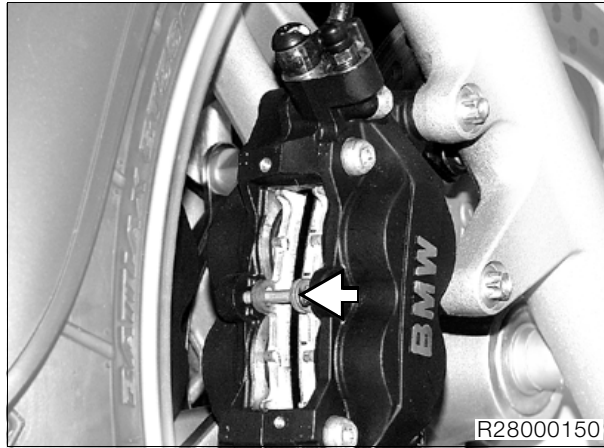
## 34 11 008 Replacing brake pads, front brake



### Attention:

Integral brakes, the rear brake must be ready for use.

- Remove retaining plate.



- Remove keeper (arrow) from retaining pin.
- Remove retaining pin.



### Attention:

**[Integral ABS]** Press back pistons on one side of the brake caliper only. Allow the brake pad on the opposite side to remain in the caliper during this process.

The fluid in the wheel circuit reservoir must not rise above "MAX".

Risk of fluid loss.

If fluid escapes, proceed in accordance with the instructions for filling the reservoir.

- Pistons with old brake pads should only be pressed back just far enough for the new brake pads to fit in.
- Remove old brake pad and insert new brake pad.



### Note:

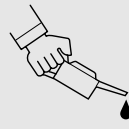
Always wait for the BMW Integral ABS to complete its self-diagnosis after the ignition is switched on. Do not operate the brake lever until self-diagnosis is complete.

- After replacing the pads of a caliper, always bed in the new brake pads with the ignition switched on.

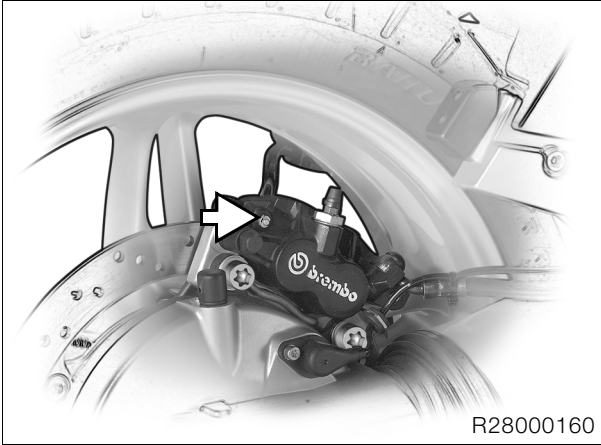
- Installation is the reverse of the removal procedure.
- Perform a function check on the brake system with the ignition switched on.

### Colour code:

Brake pads, brake calipers..... green



### 34 21 200 Replacing brake pads, rear brake



- Remove keeper (arrow) from retaining pin.
- Drive the retaining pin out towards the wheel side.
- Remove brake caliper.
- Remove brake pads.



#### Attention:

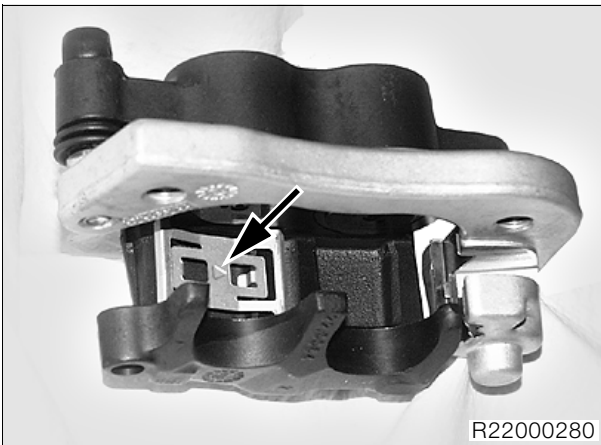
**[Integral ABS]** Press back pistons in brake caliper brake pad just far enough to allow the brake disc to be slipped in.

The fluid in the wheel circuit reservoir must not rise above "MAX".

Risk of fluid loss.

If fluid escapes, proceed in accordance with the instructions for filling the reservoir.

- Force back the pistons.



- Check the springs for correct seating and installation position.
- The engraved arrow indicates the direction of travel.

- Installation is the reverse of the removal procedure.



#### Note:

Always wait for the BMW Integral ABS to complete its self-diagnosis after the ignition is switched on. Do not operate the brake lever until self-diagnosis is complete.

- Perform a function check on the brake system with the ignition switched on.



#### Tightening torque:

Brake caliper to rear wheel drive ..... 40 Nm

## 34 00 010 [Without Integral ABS] Changing brake fluid and bleeding the brake system

### Change the brake fluid annually (Inspection IV)

### 34 00 033 [Without Integral ABS] Bleeding/changing brake fluid in front system



#### Note:

This description applies to brake filling and bleeding devices with vacuum extraction of the brake fluid at the brake caliper.

If other devices are used, comply with their manufacturers' instructions.

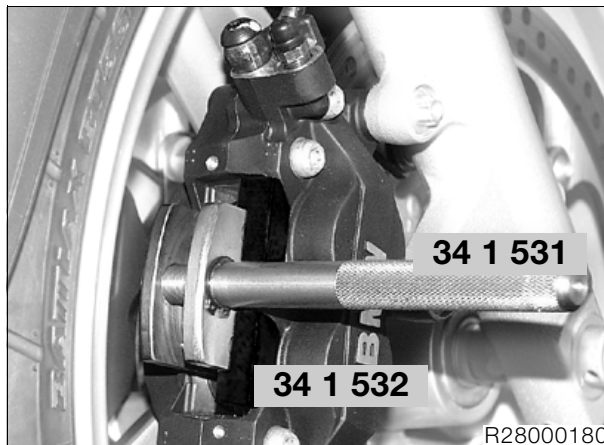
- Place the motorcycle on its side stand and turn the handlebars all the way to the left.
- Repeatedly pull front brake lever lightly to expel air from brake master cylinder.
- Place motorcycle on its centre stand.
- Place the front wheel and the handlebars such that the brake fluid expansion tank is level.
- Tighten the handlebar and secure the front wheel in this position.



#### Attention:

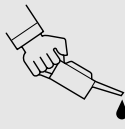
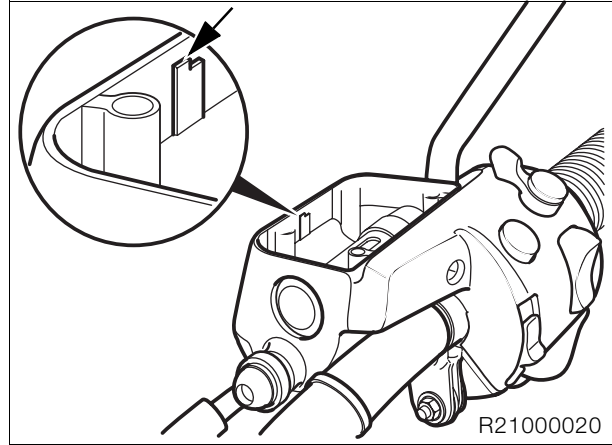
Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.

- Remove front reservoir cap with rubber diaphragm, draw off the old brake fluid.
- Refit the reservoir cap with rubber diaphragm.
- Remove the brake pads.



- Use the reset device, **BMW No. 34 1 531**, and the positioning piece, **BMW No. 34 1 532**, to press back and position the brake caliper pistons on the left and right.

- Remove reservoir cap with rubber diaphragm, draw off the old brake fluid and clean the reservoir.



#### Attention:

When adding brake fluid, do not allow it to enter the holes for the reservoir lid screws.

- Top up the brake fluid level to the "MAX" mark (arrow).
- Connect the brake bleeding device to the bleed screw of the left-hand brake caliper.



#### Attention:

During the fluid-change and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid, otherwise air will be drawn into the brake system. Bleed the system again if this happens.

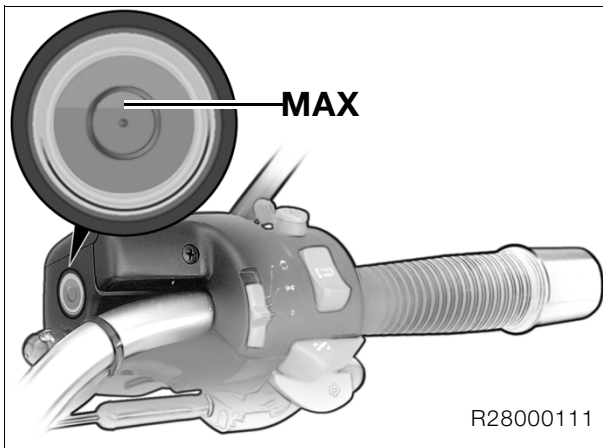
- Open the bleed screw.
- Draw off brake fluid until it emerges clear and free from air bubbles.



#### Attention:

On account of the vacuum extraction process, it might not be possible to tell whether there is brake fluid in the hose of the brake bleeding device when it is free of bubbles. In this case, bleed the system manually.

- Close the bleed screw.
- Disconnect the brake bleeding device from the bleed screw.
- The procedure for changing the brake fluid in the right brake caliper is the same as that for the left caliper.
- Assembly is the reverse of the disassembly procedure.
- Top up the brake fluid until the level reaches the "MAX" mark.
- Wipe the rim of the reservoir, the rubber gaiter and the cover to remove brake fluid, and carefully reassemble the components.
- If necessary, resecure the handlebars in the correct position (punch marks aligned) in accordance with the tightening sequence.
- Check the function of the brake system.
- Recheck the brake-fluid level.
- Place the motorcycle on its centre stand.
- Turn the handlebars to the **right**.



**Required level with new brake pads:**

(Initial fill quantity) ..... MAX  
(exactly between the centre (point) of the sight glass and the top edge of the marking ring)

- Handlebar centred.
- Check that the front wheel is on the ground.

**Minimum fluid level**

Brake pads worn  
not less than ..... the centre of the sight glass

**Brake fluid**.....DOT 4

 **Tightening torque:**

Front brake caliper bleed screw ..... 9 Nm  
Handlebars tightening sequence:  
1. Front connection to system  
in direction of travel..... 21 Nm  
2. Rear connection in direction of travel ..... 21 Nm

**34 00 035 [Without Integral ABS]**  
**Bleeding/changing brake fluid in rear system**



**Note:**

This description applies to brake filling and bleeding devices with vacuum extraction of the brake fluid at the brake caliper.

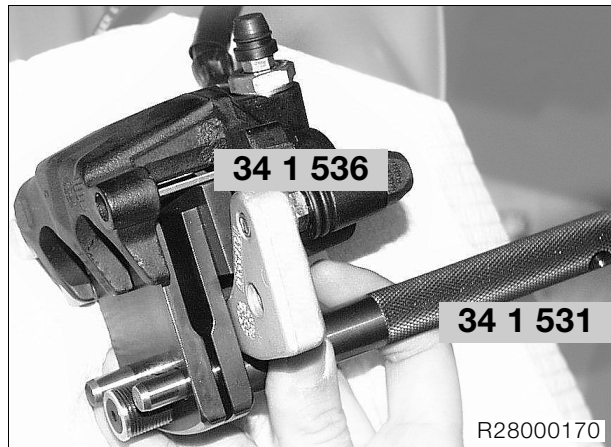
If other devices are used, comply with their manufacturers' instructions.



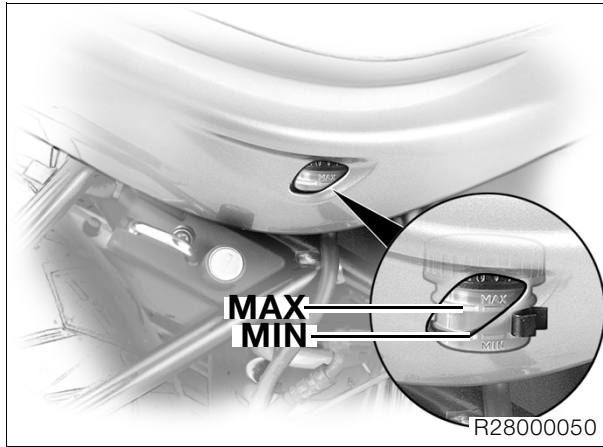
**Attention:**

Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.

- Place motorcycle on its centre stand.
- Remove right-hand rear panel if necessary.
- Remove rear reservoir cap, draw off the old brake fluid.
- Refit the reservoir cap.
- Remove the brake caliper.
- Remove rear brake pads.
- Move the brake caliper to a horizontal position.



- Use the reset device, **BMW No. 34 1 531**, and the adapter, **BMW No. 34 1 536**, to press the pistons completely back and to position them.
- Remove reservoir cap with rubber diaphragm, draw off the old brake fluid and clean the reservoir.



- Assembly is the reverse of the disassembly procedure.
- Check the function of the brake system.
- Recheck the brake-fluid level.

**Minimum fluid level**

Brake pads worn not less than ..... "MIN"

Brake fluid ..... DOT 4



**Tightening torque:**

Rear brake caliper bleed screw ..... 6 Nm  
 Brake caliper to rear wheel drive ..... 40 Nm

- Top up the brake fluid level to the "MAX" mark.

**Attention:**

While bleeding the system, do not allow the brake fluid level to drop below the "MIN" mark, as otherwise air will be drawn into the brake system. Bleed the system again if this happens.

- Connect the brake bleeding device and open the bleed screw.
- Draw off brake fluid until it emerges clear and free from air bubbles.

**Attention:**

On account of the vacuum extraction process, it might not be possible to tell whether there is brake fluid in the hose of the brake bleeding device when it is free of bubbles. In this case, bleed the system manually.

- Close the bleed screw.
- Top up the brake fluid until the level reaches the "MAX" mark.



## 34 00 090 [Integral ABS] Changing/bleeding brake fluid in wheel circuit

### Change brake fluid in wheel circuit once a year (Inspection IV)



#### Warning:

All repair and maintenance work on the BMW Integral ABS should be carried out by specially trained personnel. Maintenance and repair procedures and processes should be strictly observed. Use only new brake fluid from an unopened container.



#### Note:

This description applies to brake filling and bleeding devices with vacuum extraction of the brake fluid. If other devices are used, comply with their manufacturers' instructions.

## 34 00 070 [Integral ABS] Bleeding/changing brake fluid in front wheel circuit



#### Attention:

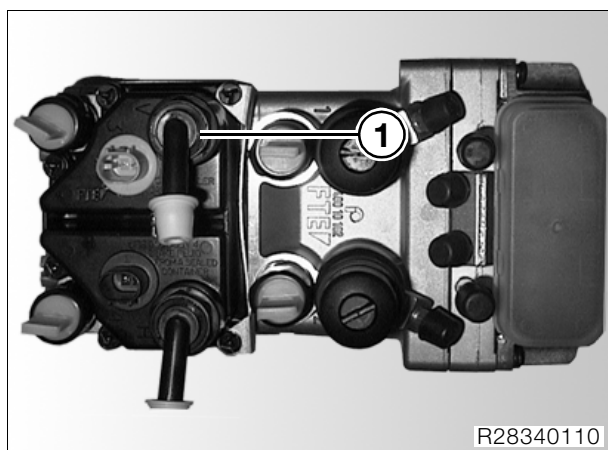
Integral brakes, the rear brake must be ready for use.

- Remove fuel tank.



#### Attention:

Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.



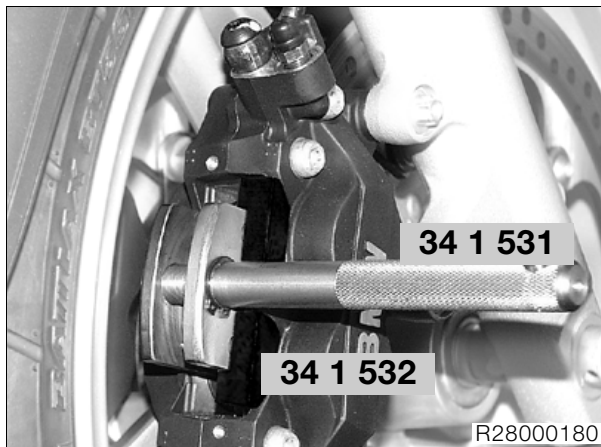
- Open front wheel circuit reservoir (1).

- Draw off the old brake fluid from the wheel circuit reservoir.
- Remove the front left and right brake pads.



#### Attention:

Only use the piston reset device, **BMW No. 34 1 531**, if the wheel circuit reservoir cover is open.



- Use the reset device, **BMW No. 34 1 531**, and the positioning piece, **BMW No. 34 1 532**, to press the brake caliper pistons completely back and to position them.
- Wrap cloths around the left and right brake calipers.
- **[bleed only]** The front wheel circuit should be bled only. (→ 00.45)
- Draw off the old brake fluid from the wheel circuit reservoir.
- Refill the front wheel circuit reservoir (1) with new brake fluid.
- Connect the brake bleeding device to the bleed screw of the left brake caliper, but **do not switch it on**.



#### Note:

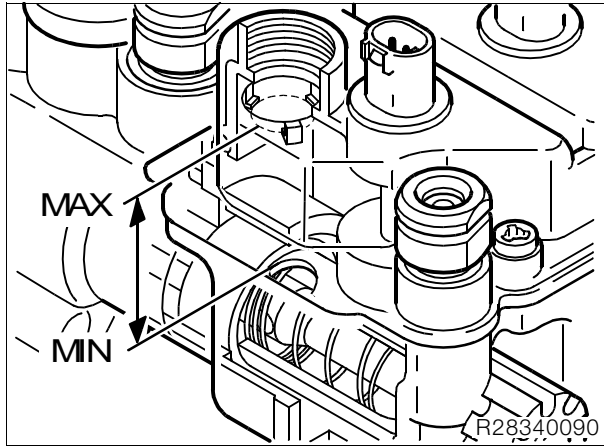
If necessary, use a cable tie to secure the bleed hose to the bleed screw.

- Switch on the ignition.



**Note:**

Always wait for the BMW Integral ABS to complete its self-diagnosis after the ignition is switched on. Do not operate the brake lever until self-diagnosis is complete.



**Attention:**

The piston in the base of the wheel circuit reservoir must always be covered by the fluid, as otherwise air can be drawn into the brake system. Bleed the system again if this happens.

- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw, while continuously topping up the wheel circuit reservoir with new brake fluid.
- Pump out the brake fluid under virtually no pressure to begin with, then vary the brake pressure.



**Note:**

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel circuit reservoir drops all the more rapidly.

- Pump off brake fluid until it emerges clear and free from air bubbles.
- Close the bleed screw.
- Release the brake.
- Disconnect the brake bleeding device from the bleed screw.

- Connect the brake bleeding device to the bleed screw of the right brake caliper, but **do not switch it on**.



**Note:**

If necessary, use a cable tie to secure the bleed hose to the bleed screw.

- The procedure for changing the brake fluid in the right brake caliper is the same as that for the left caliper.
- Close the bleed screw.
- Release the brake and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.



**Attention:**

After changing and/or bleeding the brakes, always top up the fluid in the wheel circuit reservoir to the correct level in accordance with the instructions.

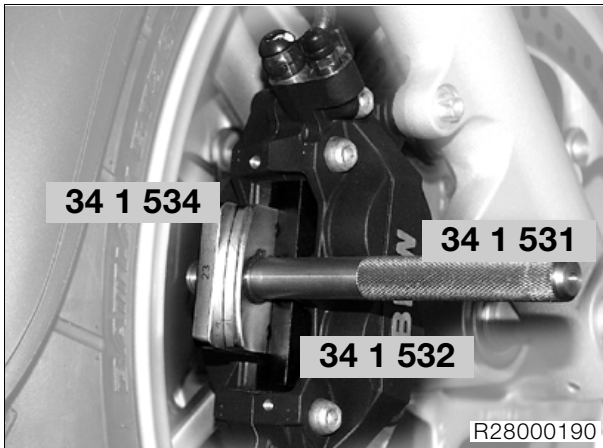


## Front wheel circuit reservoir filling instructions



### Attention:

Integral brakes, the rear brake must be ready for use.



- Top up fluid in front wheel circuit reservoir to "MAX"
- Use adapter 23, **BMW No. 34 1 534**, in the reset device, **BMW No. 34 1 531/532**, on both front brake calipers, and screw on the reset device until the adapter is secure.



### Attention:

The piston in the base of the wheel circuit reservoir must always be covered by the fluid, as otherwise air can be drawn into the brake system. Bleed the system again if this happens.

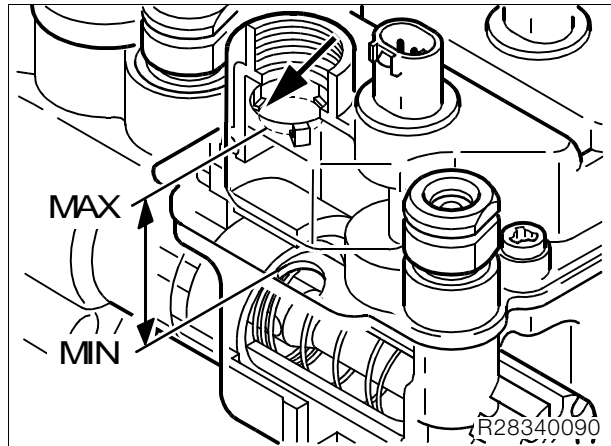
- Switch on the ignition.



### Note:

Always wait for the BMW Integral ABS to complete its self-diagnosis after the ignition is switched on. Do not operate the brake lever until self-diagnosis is complete.

- Squeeze the handbrake lever until the front brake caliper pistons are butt against the reset device, **BMW No. 34 1 531**.
- Switch off the ignition.



- Top up the fluid in the wheel circuit reservoir until one of the three protrusions in the filler neck just touches the surface of the fluid (arrow).
- Remove the reset device, **BMW No. 34 1 531/532**, with adapter, **BMW No. 34 1 534**.



### Warning:

The wheel circuit reservoir may not overflow while the brake pads/brake calipers are being fitted.

- If necessary, carefully press back the pistons so that the pad just fits in.
- Install front brake pads.
- Hand-tighten front wheel circuit reservoir cap.
- Perform a function check on the brake system with the ignition switched on.



### Attention:

Once all the work has been completed, perform a bleed test using the **BMW MoDiTeC**.

- Install fuel tank.

**Brake fluid** .....DOT 4



### Tightening torque:

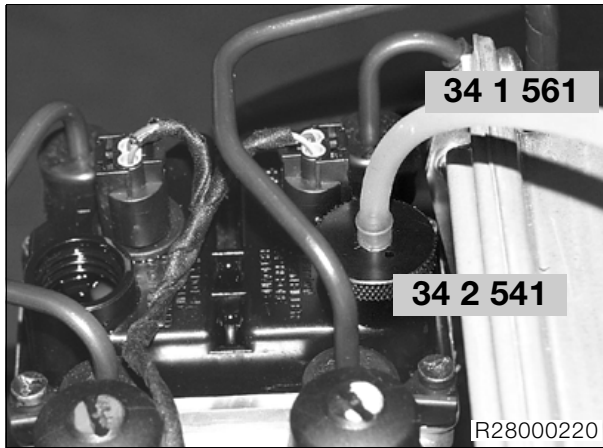
Front brake caliper bleed screw ..... 9 Nm

**The front wheel circuit should be bled only**

- Draw off the old brake fluid from the wheel circuit reservoir.
- Remove the front right and left brake pads, press back and position the pistons.
- Wrap cloths around the left and right brake calipers.

**Attention:**

Integral brakes, the rear brake must be ready for use.



- Fill the front wheel circuit reservoir to the “MAX” marking and screw on the cover, **BMW No. 34 2 541**.
- Connect the 1.5 m (4.9214 ft) silicone hose, **BMW No. 34 1 561**, to the left brake caliper bleed screw.

**Note:**

If necessary, use a cable tie to secure the bleed hose to the bleed screw.

- Switch on the ignition.

**Note:**

Always wait for the BMW Integral ABS to complete its self-diagnosis after the ignition is switched on. Do not operate the brake lever until self-diagnosis is complete.

- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw.
- Pump the brake fluid at virtually no pressure until the hose is full of brake fluid.
- Position the end of the hose on the cover, **BMW No. 34 2 541**.
- Pump the brake fluid under virtually no pressure to begin with, then vary the brake pressure.

**Warning:**

The brake fluid must not foam in the hose. If this should happen, follow the procedure for bleeding/changing brake fluid in the front wheel circuit. (→ 00.42)

- Pump brake fluid through the system until it is clear and free from air bubbles.
- Close the bleed screw.
- Release the brake and remove the silicone hose, **BMW No. 34 1 561**.
- Fill the front wheel circuit reservoir to the “MAX” marking and screw on the cover, **BMW No. 34 2 541**.
- Connect the 1.5 m (4.9214 ft) silicone hose, **BMW No. 34 1 561**, to the right brake caliper bleed screw.
- The procedure for bleeding the right brake caliper is the same as that for the left caliper.
- Release the brake and switch off the ignition.
- Detach the silicone hose, **BMW No. 34 1 561**, from the bleed screw and empty it.
- Remove the cover, **BMW No. 34 2 541**.

**Attention:**

After changing and/or bleeding the brakes, always top up the fluid in the wheel circuit reservoir to the correct level in accordance with the instructions.

- Fill front wheel circuit reservoir with brake fluid in accordance with instructions. (→ 00.44)
- Perform a function check on the brake system with the ignition switched on.

**Attention:**

Once all the work has been completed, perform a bleed test using the **BMW MoDiTeC**.

**Brake fluid** .....DOT 4

**Tightening torque:**

Front brake caliper bleed screw ..... 9 Nm



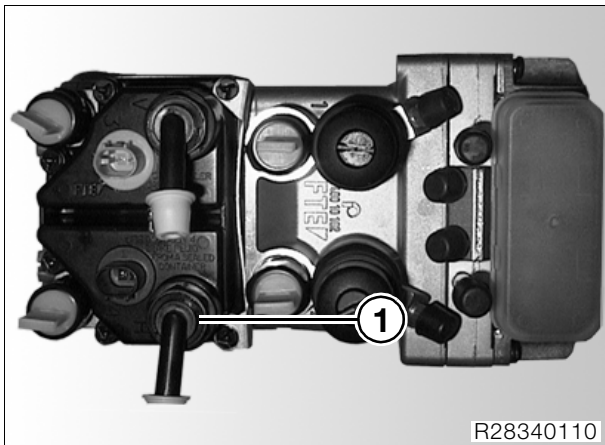
## 34 00 080 [Integral ABS] Bleeding/changing brake fluid in rear wheel circuit

- Remove fuel tank.



### Attention:

Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.

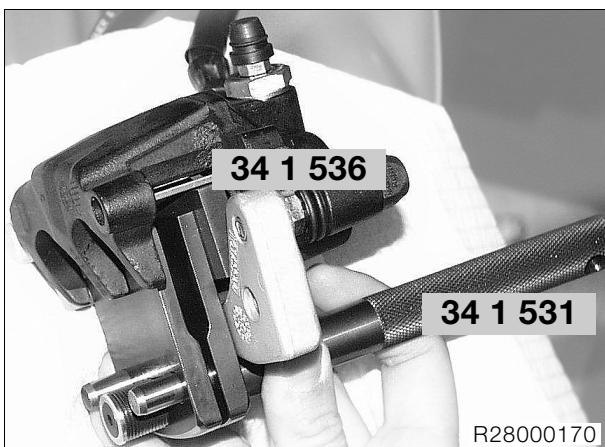


- Open rear wheel circuit reservoir (1).
- Draw off the old brake fluid from the wheel circuit reservoir.
- Remove rear brake pads.
- If necessary, press the brake pistons back by hand so that the reset device, **BMW No. 34 1 531**, can be used.



### Attention:

Only use the piston reset device, **BMW No. 34 1 531**, if the wheel circuit reservoir cover is open.



- Use the adapter, **BMW No. 34 1 536**, instead of the external brake pad.

- With the handle outwards, use the reset device, **BMW No. 34 1 531**, on the rear brake caliper to press back the pistons completely and to position them.
- Wrap a cloth around the brake caliper.
- **[bleed only]** The rear wheel circuit should be bled only. (→ 00.49)
- Draw off the old brake fluid from the wheel circuit reservoir.
- Refill the rear wheel circuit reservoir (1) with new brake fluid.
- Connect the brake bleeding device to the bleed screw, but **do not switch it on**.



### Note:

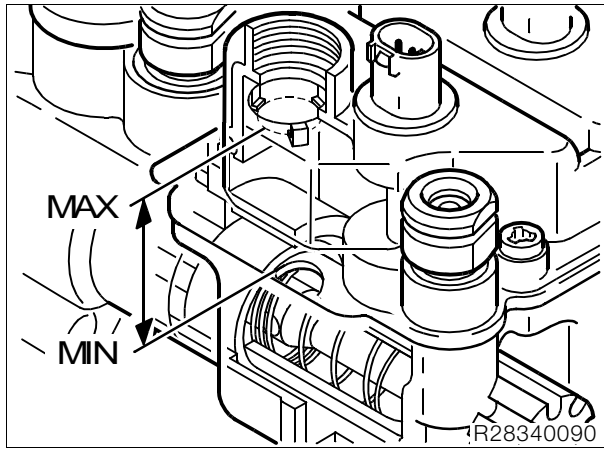
If necessary, use a cable tie to secure the bleed hose to the bleed screw.

- Switch on the ignition



### Note:

After switching on the ignition, always wait for the BMW Integral ABS to complete its self-diagnosis. Do not operate the brake lever until self-diagnosis is complete.



**⚠ Attention:**

The piston in the base of the wheel circuit reservoir must always be covered by the fluid, as otherwise air can be drawn into the brake system. Bleed the system again if this happens.

- Very gently press the footbrake until the pump just starts up.
- Open the bleed screw, while continuously topping up the wheel circuit reservoir with new brake fluid.
- Pump out the brake fluid under virtually no pressure to begin with, then vary the brake pressure.

**📖 Note:**

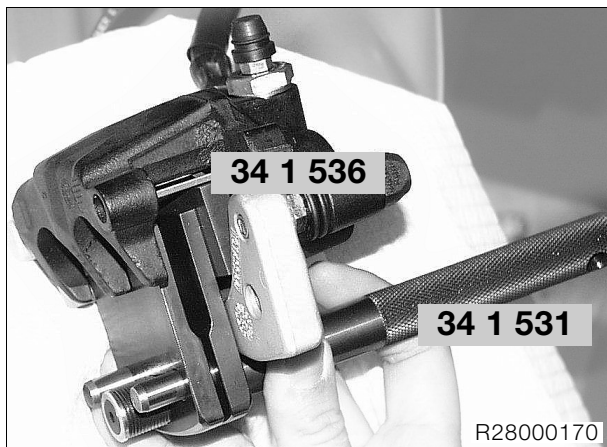
The higher the brake pressure, the faster the fluid is pumped through the system, which means that the level in the wheel circuit reservoir drops all the more rapidly.

- Pump off brake fluid until it emerges clear and free from air bubbles.
- Close the bleed screw.
- Release the brake and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.

**⚠ Attention:**

After changing and/or bleeding the brakes, always top up the fluid in the wheel circuit reservoir to the correct level in accordance with the instructions.

## Rear wheel circuit reservoir filling instructions



- Top up fluid in rear wheel circuit reservoir to "MAX".
- **Screw the reset device, BMW No. 34 1 531, to the adapter, BMW No. 34 1 536.**



### Attention:

The piston in the base of the wheel circuit reservoir must always be covered by the fluid, as otherwise air can be drawn into the brake system. Bleed the system again if this happens.

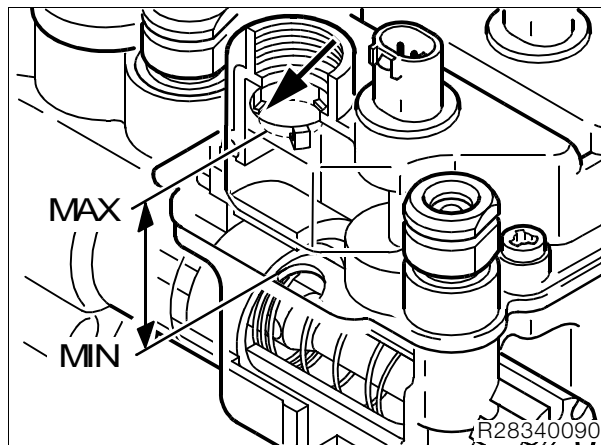
- Switch on the ignition.



### Note:

Always wait for the BMW Integral ABS to complete its self-diagnosis after the ignition is switched on. Do not operate the brake lever until self-diagnosis is complete.

- Press the foot brake lever until the rear brake caliper pistons rest on the reset device, **BMW No. 34 1 531**, and the adapter, **BMW No. 34 1 536**.
- Switch off the ignition.



- Top up the fluid in the wheel circuit reservoir until one of the three protrusions in the filler neck just touches the surface of the fluid (arrow).
- Remove the reset device, **BMW No. 34 1 531** with adapter, **BMW No. 34 1 536**.



### Warning:

The wheel circuit reservoir may not overflow while the brake pads/brake calipers are being fitted.

- If necessary, carefully press back the pistons until the brake disc just fits between the brake pads.
- Fit the brake pads and brake caliper at the rear.
- Hand-tighten rear wheel circuit reservoir cap.
- Perform a function check on the brake system with the ignition switched on.



### Attention:

Once all the work has been completed, perform a bleed test using the **BMW MoDiTeC**.

- Performing a bleed test with **BMW MoDiTeC**. (→ 00.27)
- Install fuel tank.

**Brake fluid** .....DOT 4

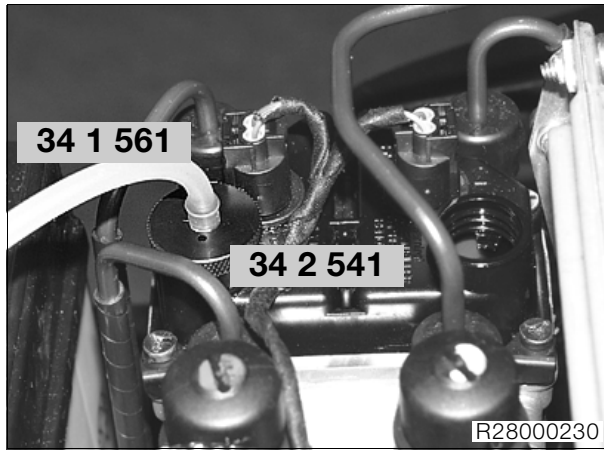


### Tightening torque:

Rear brake caliper bleed screw ..... 6 Nm  
 Brake caliper to rear wheel drive ..... 40 Nm

**The rear wheel circuit should be bled only**

- Draw off the old brake fluid from the wheel circuit reservoir.
- Remove the rear brake pads, press back and position the pistons.
- Wrap a cloth around the rear brake caliper.



- Fill the rear wheel circuit reservoir to the “MAX” marking and screw on the cover, **BMW No. 34 2 541**.
- Connect the 1.5 m (4.9214 ft) silicon hose, **BMW No. 34 1 561**, to the bleed screw.



**Note:**

If necessary, use a cable tie to secure the bleed hose to the bleed screw.

- Switch on the ignition.



**Note:**

Always wait for the BMW Integral ABS to complete its self-diagnosis after the ignition is switched on. Do not operate the brake lever until self-diagnosis is complete.

- Very gently press the footbrake until the pump just starts up.
- Open the bleed screw.
- Pump the brake fluid at virtually no pressure until the hose is full of brake fluid.
- Position the end of the hose on the cover, **BMW No. 34 2 541**.
- Pump the brake fluid under virtually no pressure to begin with, then vary the brake pressure.



**Warning:**

The brake fluid must not foam in the hose. If this should happen, follow the procedure for bleeding/changing brake fluid in the rear wheel circuit. (→ 00.46)

- Pump brake fluid through the system until it is clear and free from air bubbles.
- Close the bleed screw.
- Release the brake and switch off the ignition.
- Detach the silicone hose, **BMW No. 34 1 561**, from the bleed screw and empty it.
- Remove the cover, **BMW No. 34 2 541**.



**Attention:**

After changing and/or bleeding the brakes, always top up the fluid in the wheel circuit reservoir to the correct level in accordance with the instructions.

- Fill rear wheel circuit reservoir with brake fluid in accordance with instructions. (→ 00.48)
- Perform a function check on the brake system with the ignition switched on.



**Attention:**

Once all the work has been completed, perform a bleed test using the **BMW MoDiTeC**.

**Brake fluid** .....DOT 4



**Tightening torque:**

Rear brake caliper bleed screw ..... 6 Nm  
 Brake caliper to rear wheel drive ..... 40 Nm





## 34 00 091 [Integral ABS] Changing/bleeding brake fluid in control circuit

Change brake fluid in control circuit every 2 years (Inspection IV)



### Warning:

All repair and maintenance work on the BMW Integral ABS should be carried out by specially trained personnel. Maintenance and repair procedures and processes should be strictly observed. Use only new brake fluid from an unopened container.

## 34 00 072 [Integral ABS] Bleeding/changing brake fluid in front control circuit



### Warning:

Avoid rapid and forceful pumping of the brakes when performing maintenance and repair work on the BMW Integral ABS.

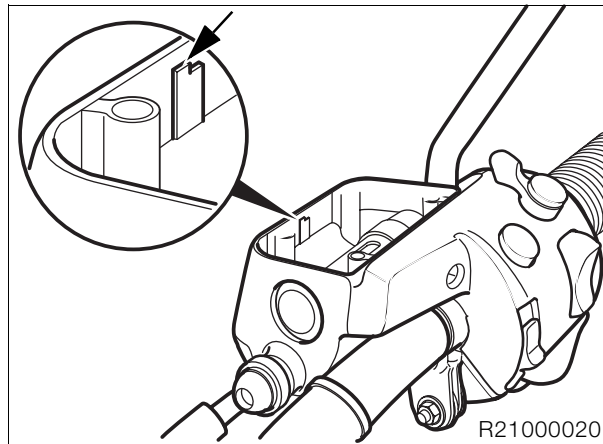
- Place the motorcycle on its side stand and turn the handlebars all the way to the left.
- Repeatedly and slowly pull the front brake lever lightly to expel air from brake master cylinder.
- Place motorcycle on its centre stand.
- Remove fuel tank.
- Place the front wheel and the handlebars such that the brake fluid expansion tank is level.
- Tighten the handlebar and secure the front wheel in this position.



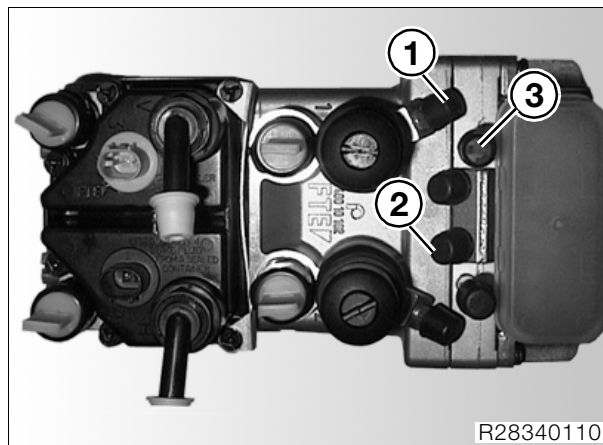
### Attention:

Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.

- Wrap a cloth around the expansion tank.
- Remove front reservoir cap with rubber diaphragm, draw off the old brake fluid and clean the reservoir.



- Top up the brake fluid level to the "MAX" mark (arrow).



- Connect the bleed device to the front dosing cylinder bleed screw (1), but **do not switch it on.**



### Warning:

When changing and bleeding the control circuit brake fluid, do not use vacuum extraction.

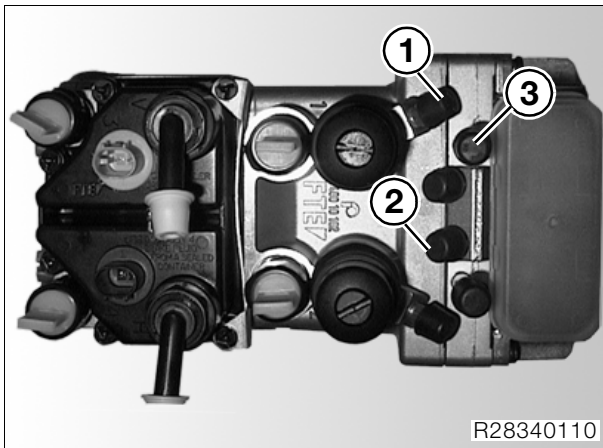
**! Attention:**

During the fluid-change and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid, otherwise air will be drawn into the brake system. Bleed the system again if this happens.

- Shift the handbrake lever to position 4.

**! Warning:**

Avoid rapid and forceful pumping of the brakes when performing maintenance and repair work on the BMW Integral ABS.



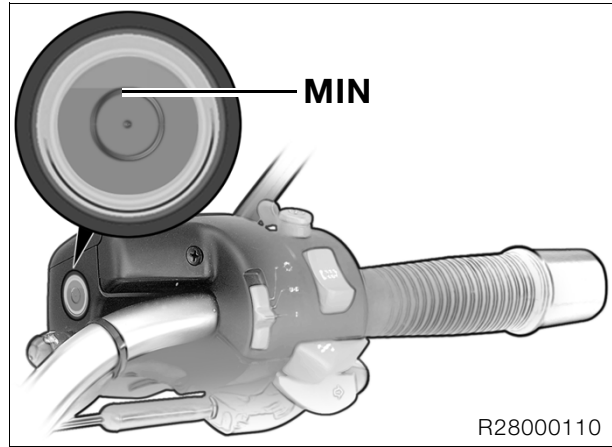
- In sequence, bleed the:
  - front dosing cylinder (1),
  - front integral circuit (2)
  - front control circuit (3) and,
  - again, front dosing cylinder (1)
 using the ring spanner, **BMW No. 34 2 532**, and in accordance with rules for bleeding.

**Rules for bleeding:**

1. Pull the brake lever slowly until the brake light switch clicks (snifter hole closed).
2. Open the bleed screw.
3. Pull the brake lever fully and close the bleed screw.
4. Release the brake lever slowly.
5. Repeat steps 1 to 4 until the brake fluid is clear and has no bubbles.

- Fit the protective caps on the bleed screws.
- Top up the brake fluid until the level reaches the "MAX" mark.
- Wipe the rim of the reservoir, the rubber gaiter and the cover to remove brake fluid, and carefully reassemble the components.
- Resecure the handlebars in the correct position (punch marks aligned) in accordance with the tightening sequence.

- Recheck the brake fluid level.
- Place the motorcycle on its centre stand.
- Turn the handlebars to the **left**.



**Required level**

not below ..... MIN  
(Top edge of the marking ring)

**! Attention:**

Once all the work has been completed, perform a bleed test using the **BMW MoDiTeC**.

- Fit fuel tank.

**Brake fluid** .....DOT 4

**! Tightening torque:**

Handlebars tightening sequence:

1. Front connection to system  
in direction of travel..... 21 Nm
2. Rear connection in direction of travel ..... 21 Nm

## 34 00 082 [Integral ABS] Bleeding/changing brake fluid in rear control circuit

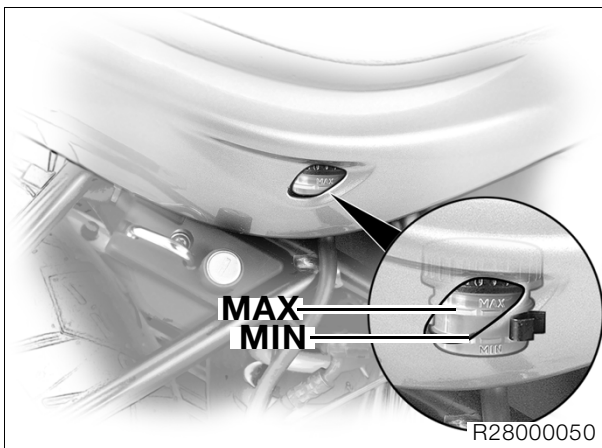
- Place motorcycle on its centre stand.
- Remove fuel tank.



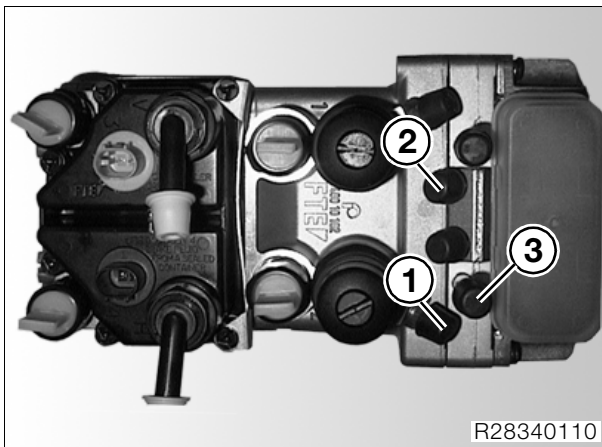
### ⚠ Attention:

Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.

- Remove right-hand rear panel if necessary.
- Remove rear reservoir cap with rubber diaphragm, draw off the old brake fluid and clean the reservoir.



- Top up the brake fluid level to the "MAX" mark.



- Connect the bleed device to the rear dosing cylinder bleed screw (1), but **do not switch it on**.

### ⚠ Warning:

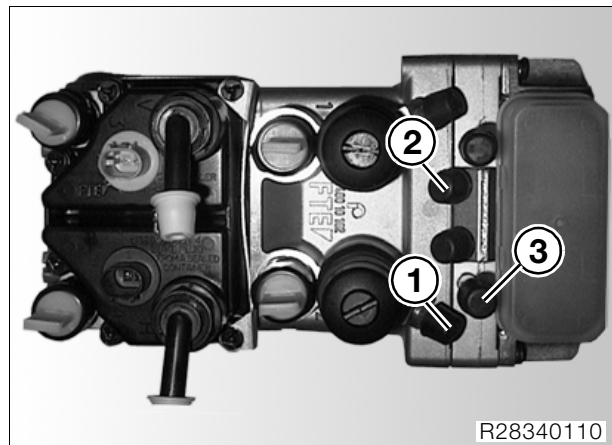
When changing and bleeding the control circuit brake fluid, do not use vacuum extraction.

### ⚠ Attention:

While bleeding the system, do not allow the brake fluid level to drop below the "MIN" mark, as otherwise air will be drawn into the brake system. Bleed the system again if this happens.

### ⚠ Warning:

Avoid rapid and forceful pumping of the brakes when performing maintenance and repair work on the BMW Integral ABS.



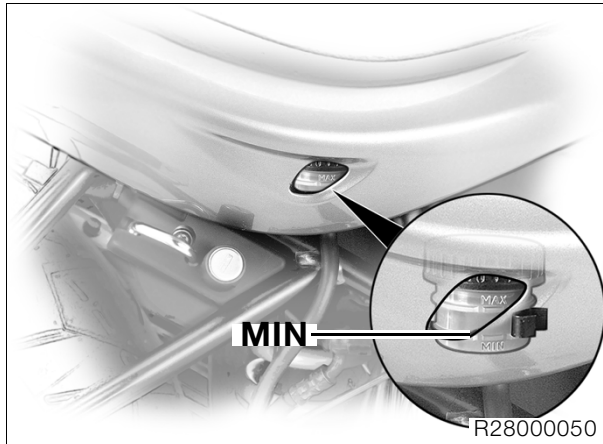
- In sequence, bleed the:
  - rear dosing cylinder (1),
  - rear integral circuit (2),
  - front control circuit (3) and,
  - again, front dosing cylinder (1)
 using the ring spanner, **BMW No. 34 2 532**, and in accordance with the rules for bleeding.

### Rules for bleeding:

1. Press the brake lever slowly until the brake light switch clicks (sniffer hole closed).
2. Open the bleed screw.
3. Press the brake lever fully and close the bleed screw.
4. Release the brake lever slowly.
5. Repeat steps 1 to 4 until the brake fluid is clear and has no bubbles.

- Fit the protective caps on the bleed screws.

- Correct the brake fluid level.
- Wipe the rim of the reservoir, the rubber gaiter and the cover to remove brake fluid, and carefully reassemble the components.
- Place the motorcycle on its centre stand.



**Required level**

not below ..... MIN

**Attention:**

Once all the work has been completed, perform a bleed test using the **BMW MoDiTeC**.

- Performing a bleed test with **BMW MoDiTeC**. (→ 00.27)
- Fit fuel tank.

**Brake fluid** .....DOT 4

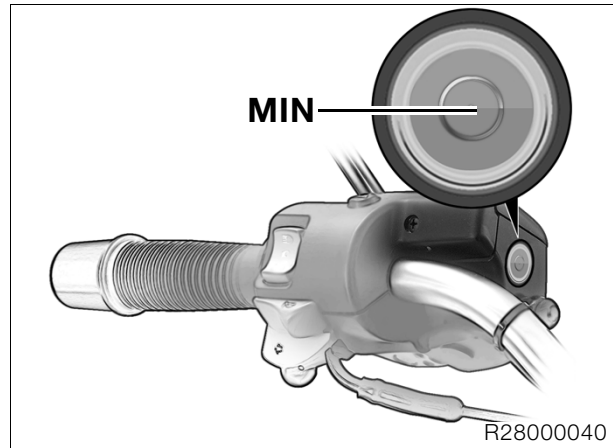
**Checking clutch operating fluid level**

(Inspections II and III)

**Attention:**

Keep the brake fluid in the clutch operating system away from painted motorcycle parts as brake fluid attacks paint.

- Support the motorcycle on its **side stand**.
- Turn the handlebars to the **right**.



**Required level with a new clutch liner:**

..... Half way up sight glass

**Note:**

As the clutch lining wears, the fluid level in the reservoir rises.

- If necessary, remove reservoir cover with insert.
- Correct the fluid level. Mark in reservoir: same as brake circuit.
- Reinstall the reservoir cover with insert.
- Tighten the reservoir cover carefully and without using force.

**Brake fluid** .....DOT 4

## 21 52 005 Changing the clutch fluid

**(Inspection IV)**  
at least every 2 years



### Note:

The description applies to a brake system filling and bleeding device with vacuum extraction of brake fluid at the bleed line.

If other devices are used, comply with their manufacturers' instructions.

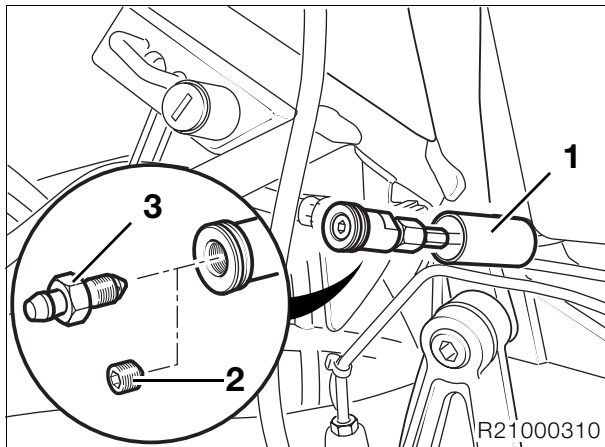
- Place motorcycle on its centre stand.
- Place the handlebars and the clutch fitting so that the clutch fluid expansion tank is level.
- Tighten the clutch fitting and secure the front wheel in the position.



### Attention:

Keep the brake fluid in the clutch operating system away from painted motorcycle parts as brake fluid attacks paint.

- Remove reservoir cover with rubber diaphragm.
- Draw off brake fluid and clean the reservoir.
- Top up the brake fluid.



- Pull back protective hose (1).
- Wrap a cloth around the filler adapter.
- Remove socket-head grub screw (2) from the filler adapter.
- Connect the brake bleeding device to bleed screw (3).

- Screw the bleed screw all the way into the filler adapter (valve in filler adapter closed).



### Attention:

While bleeding the system, do not allow the brake fluid level to drop below the bottom edge of the ring mark, as otherwise air will be drawn into the clutch system. Bleed the system again if this happens.

- Open the bleed screw by half a turn (valve open).
- Draw off brake fluid until it emerges clear and free from air bubbles.
- Remove the bleed screw.
- Disconnect the brake bleeding device from the bleed screw.



### Note:

On account of the vacuum extraction process, it might not be possible to tell whether there is brake fluid in the hose of the brake bleeding device when it is free of bubbles.

In this case, bleed the system manually.

- Reinstall socket-head grub screw (2) in the filler adapter.



### Attention:

The motorcycle is not permitted on the road without the grub screw in place and secure in the filler adapter.

- Correct the fluid level.
- Reinstall the reservoir lid with rubber diaphragm in position.
- Tighten the reservoir cover carefully and without using force.
- Align the clutch fitting with the mark on the handlebar.
- Resecure the handlebar in the correct position (punch marks aligned).
- Recheck the fluid level.



### Tightening torque:

Grubscrew in filler adapter ..... 10 Nm

### Consumables

Brake fluid.....DOT 4

## Checking tightness of rear wheel studs

(Inspection I)

- Tighten the rear wheel studs with a torque wrench.



### Tightening torque:

Securing screws for rear wheel ..... 105 Nm

## Checking rear wheel bearing play by tilting wheel

(Inspection III)

- Tilt the rear wheel to and fro across its axle.
- If play is detected, fit new shims to rear wheel drive or replace bearings.

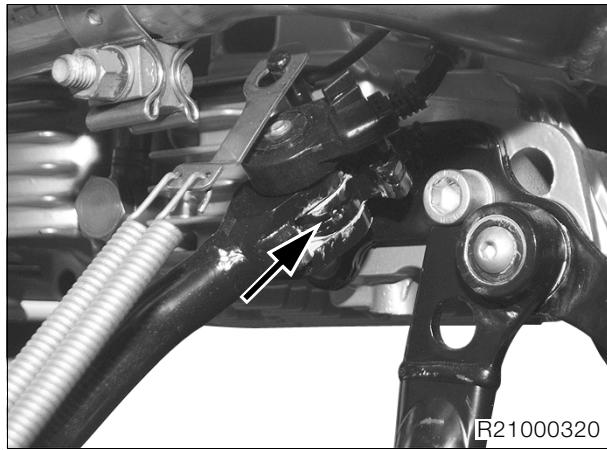
## Checking swinging arm bearings, adjusting if necessary

(Inspections I and III)

- Grip rear tyre and try to move it sideways, bracing against the frame.

## Greasing the side stand pivot

(Inspections I, II and III)



- Check free movement of side stand and grease if necessary.
- Grease pivot point (arrow).

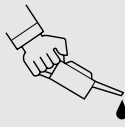
### Lubricant:

..... Shell Retinax EP2

## Checking function of side stand contact switch

(Inspections I, II, III and IV)

- Place the motorcycle on its centre stand.
- Retract the side stand, if extended.
- Disengage the clutch and select a gear.
- Start the engine, without releasing the clutch lever.
- Extend the side stand.

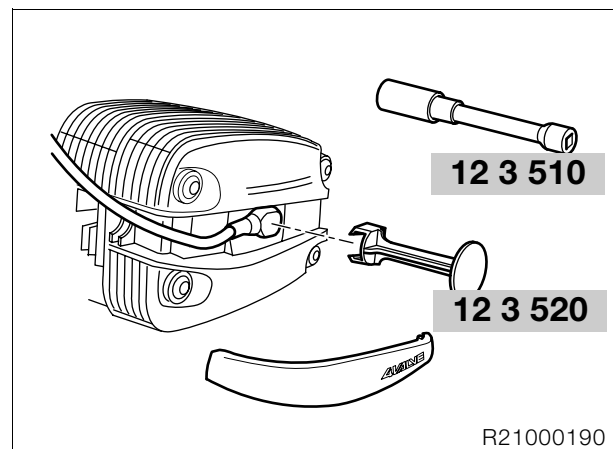


### Note:

The side-stand switch is in correct working order if the engine stops when the side stand is extended.

## 12 12 011 Checking/replacing spark plugs

(Inspection II) check/(Inspection III) replace



- Pull off spark the plug caps using the special puller, **BMW No. 12 3 520**.
- Remove the spark plugs using the spark plug wrench, **BMW No. 12 3 510**.



### Attention:

Do not bend electrodes, there is a risk of breaking them.

**Spark plug:**..... NGK BKR 7 EKC

**Electrode gap:** ..... 0.8 mm (0.0314 in)

**Wear limit:** ..... 1.0 mm (0.0393 in)

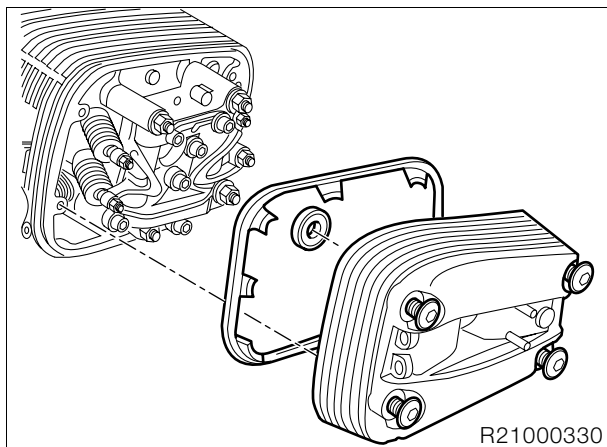


### Tightening torque:

NGK BKR7EKC spark plug ..... 25 Nm

## 11 12 009 Tightening cylinder heads

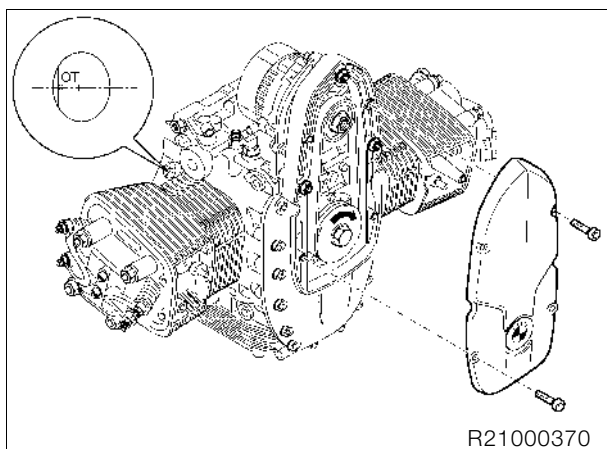
(Inspection I)



- Remove cylinder head cover.



**Attention:**  
Catch escaping oil.



- Select a gear and turn the rear wheel, or set the piston to TDC on the ignition stroke by turning the belt pulley.

### Top dead centre on ignition stroke:

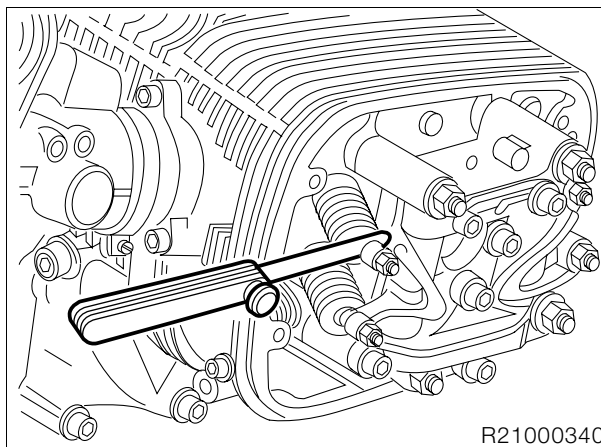
- The TDC mark is visible and the inlet and exhaust valves in the cylinder concerned are closed.
- Tighten cylinder head nuts.

### Tightening procedure after 1,000 km (600 miles)

1. Tighten the cylinder head nuts in a crosswise pattern one by one
  - 1.1. Slacken off one nut at a time
  - 1.2. Tighten nut to initial torque ..... 20 Nm
  - 1.3. Angle tighten nut ..... 180°
2. Undo/tighten M 10 bolt ..... 40 Nm

## 11 34 004 Checking/adjusting valve clearances

(Inspections I, II and III)



- Check valve clearance with feeler gauge and, if necessary, correct with adjusting screw.

### Valve clearances with engine cold (max. 35 °C/95 °F):

Intake valve ..... 0.15 mm (0.0059 in)  
Exhaust valve ..... 0.30 mm (0.0118 in)



### Tightening torque:

Locknut ..... 8 Nm

- Check valve clearance, it should be possible to pull the feeler gauge between the valve stem and adjusting screw with little resistance.
- Assembly is the reverse of the disassembly procedure.



### Attention:

Make sure that all seals are correctly seated. Seals and sealing faces must be free from oil and grease.



### Tightening torque:

Cylinder head cover ..... 8 Nm

**13 60 110 Checking throttle cable freedom of movement, checking for chafes and kinks, replacing if necessary, checking throttle cable play  
Checking/adjusting idle speed and throttle valve synchronization**

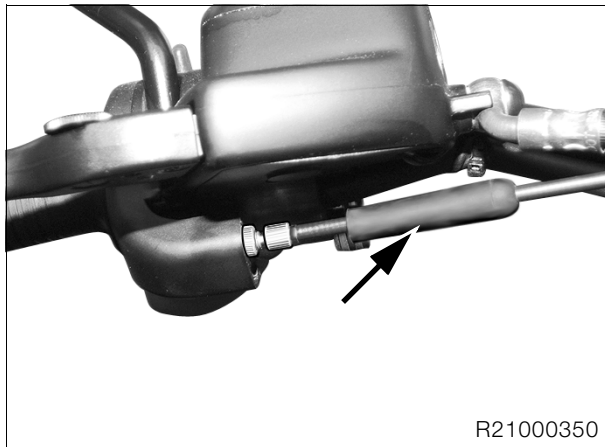
**(Inspections I, II and III)**

- Test-ride the motorcycle until the engine is warm, or allow the engine to idle for approximately 10 minutes.

**⚠ Attention:**

Do not allow the engine to idle for longer than 20 minutes.

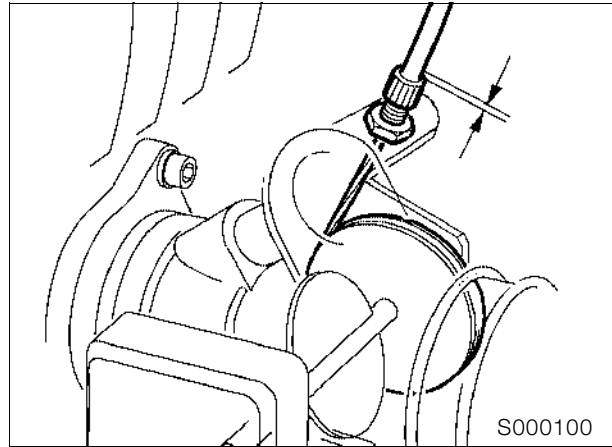
**Oil temperature:**.....at least 90 °C (130 °F)



- Push back rubber cap (arrow) on throttle and choke cables.
- Use the adjusting screws to adjust play of throttle and choke cables.

**Play of choke cable:** ..... approx. 1 mm (0.0393 in)

**Play of throttle cable:** .... approx. 1 mm (0.0393 in)



- Turn the adjusting screws to adjust the play of the cables for the left and right throttle valves.

**Play of throttle cable:** .....approx. 2 mm (0.0787 in)

- Connect the **BMW** Synchro hose to the vacuum adapter and connect the cables to **BMW** MoDiTeC.
- Adjust idle speed by turning the air bypass screws while checking that the carburetors are balanced.

**Idle speed:** ..... 1,100 ±50 rpm

**📖 Note:**

Make sure that both throttle valves are closed.

**⚠ Attention:**

The sealed throttle valve stop screws may not be altered since this may result in the manufacturer having to readjust the basic idling flow rate

- Carefully turn the adjusting screw of the left throttle valve and reduce play until the reading of the Synchro tester changes.
- Turn the adjusting screw very slightly in the opposite direction until the reading returns to its original value.
- Tighten the locknut to secure.

**📖 Note:**

Make sure that the reading does not change when you tighten the locknut. Adjust Bowden throttle cable play at throttle valve so that no play is perceptible, but the throttle valve reliably contacts the stop screw (no strain on cable).

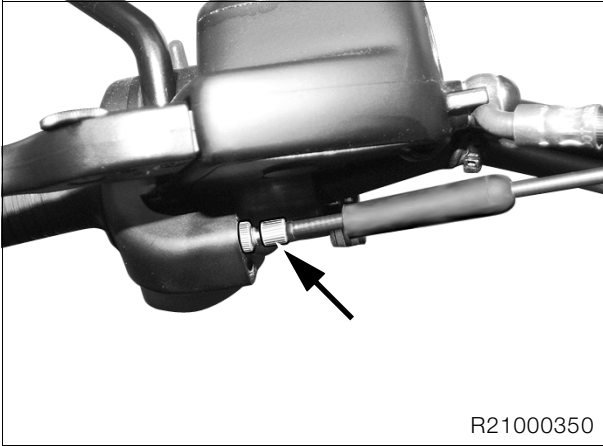


- Adjust the right throttle valve in the same way.



**Note:**

If play is zero, the throttle butterflies may chatter.

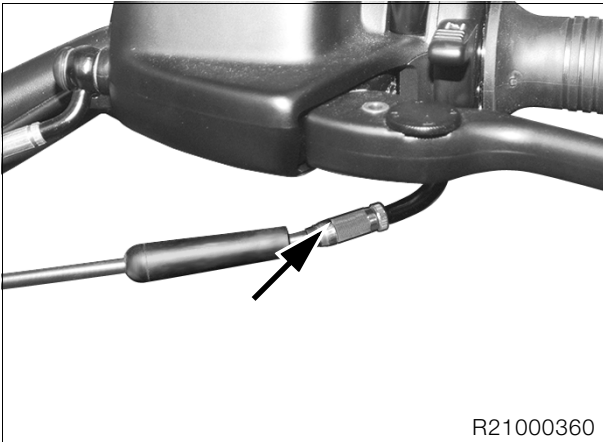


R21000350

- Adjust the throttle cable play using the adjusting screw (arrow).
- Push the rubber cap into position over the adjusting screw.

**Throttle cable play:**

..... approx. 0.5 mm (0.0197 in)



R21000360

- Use the adjusting screw (arrow) to adjust play of the choke cable to zero.

- Push the rubber cap into position over the adjusting screw.
- Move the handlebars all the way from left to right and check the settings. Make sure that engine speed does not vary when the handlebars are moved in this way.
- Repeatedly open the throttle gradually and increase engine speed from idle to approximately  $n = 2,500$  rpm to check throttle-valve synchronization. (Readings shown by Synchro tester must increase and decrease together). If necessary, correct by turning the adjusting screws of the throttle-valve Bowden cable.



**Note:**

Make sure that when the throttle grip is released both throttle valves return to their fully closed positions.

- Tighten the locknuts and recheck carburettor balance.
- Seal off the vacuum bores.

# Final inspection with road safety and functional check

(Inspections I, II, III and IV)

## Road safety check

- Check wheels and tyres.
- Check/correct tyre pressures.
- Wait at least 10 minutes after the trial run/road test before checking/correcting engine oil level.

## Tyre pressures:

Solo .....front 2.2 bar (31.3 bar)  
..... rear 2.5 bar (35.6 psi)  
With pillion passenger ..... front 2.5 bar (35.6 psi)  
..... rear 2.7 bar (38.4 psi)  
With pillion passenger and  
luggage ..... front 2.5 bar (35.6 psi)  
..... rear 2.9 bar (41.2 psi)

## Roadworthiness check

- Lights
- Indicator/warning lights
- Horn
- Instruments
- Special equipment
- Clutch
- Gear shift
- Steering
- Foot brake and handbrake
- If necessary, take the motorcycle for a test ride.

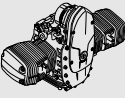


# 11 Engine

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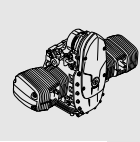
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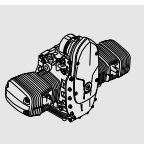
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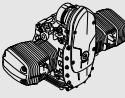
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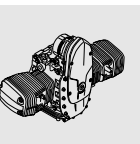
Installing engine .....65





Technical Data		R 1150 R
<b>Engine, general</b>		
Engine design		Four-stroke flat twin, air-cooled with oil-cooled exhaust ports, installed longitudinally, 4 valves per cylinder, two overhead camshafts, electronic fuel injection.
Location of engine number		Crankcase
Cylinder bore	mm (in)	101 (3.9764)
Stroke	mm (in)	70.5 (2.7756)
Effective displacement	cc	1,130
Compression ratio		10.3 : 1
Power output	kW/ rpm	62.5/6,750
Max. torque	Nm/rpm	98/5,250
Permissible maximum engine speed	rpm	7,900
Idle speed	rpm	1,100 <sup>+/-50</sup>
Direction of rotation		Clockwise, looking at ignition system
Compression test pressure		
good	bar (psi)	above 10 (145.04)
normal	bar (psi)	8.5...10 (123.28...145.04)
poor	bar (psi)	below 8.5 (123.28)
Intake port dia./cylinder head	mm (in)	44 (1.7323)
<b>Lubrication system</b>		
Theoretical volume in circulation at 6,000 rpm		
Lubricating oil	l (Imp. gal/ US gal)	36 (7.92/9.51)
Cooling oil	l (Imp. gal/ US gal)	30 (6.60/7.93)
Oil filter		Full-flow type
Pressure differential needed to open by-pass valve	bar (psi)	1.5 (21.76)
Oil pressure warning light comes on below	bar (psi)	0.3 (4.35)
Pressure relief valve opens at	bar (psi)	5.5 (79.77)
Operating pressure	bar (psi)	3.5... 6.0 (50.76...87.02)
Oil capacity		
without filter change	l (Imp. gal/ US gal)	3.50 (6.16/3.70)
with filter change	l (Imp. gal/ US gal)	3.75 (6.60/3.96)
min/max	l (Imp. pint/ US quart)	0.5 (0.88/0.53)
Permissible oil consumption	l/1,000 km (miles per Imp. pint/ miles per US quart)	1.0 (350/600)

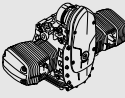


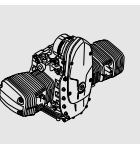


Technical Data		R 1150 R
<b>Oil pump</b>		
Oil pump		2 Duocentric pumps
Housing depth		
Cooling oil	mm (in)	11.02... 11.05 (0.4339...0.4350)
Lubricating oil	mm (in)	10.02... 10.05 (0.3945...0.3957)
Height of rotor		
Cooling oil	mm (in)	10.965... 10.98 (0.4317...0.4323)
Lubricating oil	mm (in)	9.965... 9.98 (0.3923...0.3929)
End float	mm (in)	0.04... 0.085 (0.0016...0.0033)
Wear limit	mm (in)	0.25 (0.0098)
<b>Valves</b>		
Included angle between valves	°	41
Valve clearances with engine cold (max. 35 °C/95 °F)		
Inlet valve	mm (in)	0.15 (0.0059)
Exhaust valve	mm (in)	0.30 (0.0118)
Valve timing		without valve clearance, 3 mm (0.1181 in) valve lift
Inlet opens	°	1 before TDC
Inlet closes	°	25 after BDC
Exhaust opens	°	31 before BDC
Exhaust closes	°	13 before TDC
		° Tolerance ± 3
Valve head dia.		
Inlet	mm (in)	34 (1.3386)
Exhaust	mm (in)	29 (1.1417)
Stem dia.		
Inlet	mm (in)	4.966... 4.980 (0.1955...0.1960)
Wear limit	mm (in)	4.946 (0.1947)
Exhaust	mm (in)	4.956...4.970 (0.1951...0.1956)
Wear limit	mm (in)	4.936 (0.1943)
Valve head edge thickness		
Inlet	mm (in)	1.00 ± 0.2 (0.0394 ± 0.0079)
Wear limit	mm (in)	0.5 (0.0197)
Exhaust	mm (in)	0.9 ± 0.2 (0.0354 ± 0.0079)
Wear limit	mm (in)	0.5 (0.0197)
Max. runout of valve head at valve seat		
Inlet, exhaust	mm (in)	0.035 (0.0014)



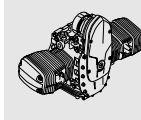
Technical Data		R 1150 R
<b>Valve seat ring</b>		
Valve seat angle		
Inlet	°	45
Exhaust	°	45
Valve seat width		
Inlet	mm (in)	1.1 ± 0.15 (0.0433 ± 0.0059)
Wear limit	mm (in)	2.5 (0.0984)
Exhaust	mm (in)	1.4 ± 0.15 (0.0551 ± 0.0059)
Wear limit	mm (in)	3.0 (0.1181)
Valve seat extl. dia. (dimension for machining seat)		
Inlet	mm (in)	33.4 ± 0.1 (1.3150 ± 0.0039)
Exhaust	mm (in)	28.4 ± 0.1 (1.1181 ± 0.0039)
Seat ring dia. (oversize +0.2 mm/+0.0079 in)		
Inlet	mm (in)	36.617... 36.633 (1.4416...1.4422)
Exhaust	mm (in)	32.134... 32.150 (1.2651...1.2658)
Seat dia. in cylinder head (oversize +0.2 mm/+0.0079 in)		
Inlet	mm (in)	36.500... 36.525 (1.4370...1.4380)
Exhaust	mm (in)	32.000... 32.025 (1.2599...1.2608)
<b>Valve guide</b>		
Valve guide, outside diameter	mm (in)	12.533... 12.544 (0.4934...0.4939)
Bore in cylinder head	mm (in)	12.500... 12.518 (0.4921...0.4928)
Overlap	mm (in)	0.015... 0.044 (0.0006...0.0017)
Repair stages		
Replacement valve guide, outside diameter	mm (in)	12.550... 12.561 (0.4941...0.4945)
Oversize valve guide, outside diameter	mm (in)	12.733... 12.744 (0.5013...0.5017)
Valve guide, inside diameter	mm (in)	5.0... 5.012 (0.1969...0.1973)
Radial clearance		
Inlet	mm (in)	0.020... 0.046 (0.0008...0.0018)
Wear limit	mm (in)	0.15 (0.0059)
Exhaust	mm (in)	0.030... 0.056 (0.0012...0.0022)
Wear limit	mm (in)	0.17 (0.0067)
<b>Valve spring</b>		
Spring length, off-load	mm (in)	41.1 (1.6181)
Wear limit	mm (in)	39.0 (1.5354)

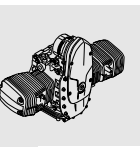




Technical Data		R 1150 R
<b>Rocker</b>		
Bore	mm (in)	16.016... 16.034 (0.6306...0.6312)
Rocker shaft dia.	mm (in)	15.973... 15.984 (0.6289...0.6293)
Radial clearance	mm (in)	0.032... 0.061 (0.0016...0.0024)
Wear limit	mm (in)	0.1 (0.0039)
End float		
min.	mm (in)	0.05 (0.0019)
max.	mm (in)	0.40 (0.0157)
<b>Camshaft</b>		
Opening angle, inlet/exhaust cams	°	284/284
Cam spread, inlet/exhaust	°	103/112
Markings		Mark in position <b>3</b>
Inlet valve lift	mm (in)	9.68 (0.3811) (valve clearance = 0)
Exhaust valve lift	mm (in)	8.60 (0.3386) (valve clearance = 0)
Camshaft bearing bore	mm (in)	21.02... 21.04 (0.8276...0.8284)
Camshaft dia.	mm (in)	20.97... 21.00 (0.8256...0.8268)
Radial clearance	mm (in)	0.02... 0.07 (0.0008...0.0028)
Wear limit	mm (in)	0.15 (0.0059)
Width of guide bearing	mm (in)	15.92... 15.95 (0.6268...0.6280)
Width of camshaft bearing	mm (in)	16.0... 16.05 (0.6299...0.6319)
End float	mm (in)	0.05... 0.13 (0.0031...0.0051)
Wear limit	mm (in)	0.25 (0.0098)
<b>Bucket-type tappet</b>		
Extl. dia.	mm (in)	23.947... 23.960 (0.9428...0.9433)
Bore dia. in cylinder head	mm (in)	24.000... 24.021 (0.9449...0.9457)
Radial clearance	mm (in)	0.040... 0.074 (0.0016...0.0029)
Wear limit	mm (in)	0.18 (0.0070)
<b>Auxiliary shaft</b>		
Crankcase bore diameter front/rear	mm (in)	25.020... 25.041 (0.9851...0.9859)
Auxiliary shaft diameter front/rear	mm (in)	24.959...24.980 (0.9827...0.9835)
Radial clearance	mm (in)	0.040... 0.082 (0.0016...0.0032)
Wear limit	mm (in)	0.17 (0.0066)

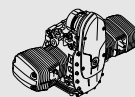
Technical Data		R 1150 R
<b>Crankshaft</b>		
Marking of main bearing and crankpin on front crank web		
no paint mark		Grinding stage 0
paint mark		Grinding stage 1 (-0.25 mm/-0.0098 in)
Grinding stage 0 (grinding stage 1 = -0.25 mm/-0.0098 in)		
Guide bearing bore dia.	mm (in)	64.949... 64.969 (2.5571...2.5579)
Guide bearing	mm (in)	Green: 59.965... 59.999 (2.3608...2.3621)
	mm (in)	Yellow: 59.979... 60.013 (2.3614...2.3628)
Main bearing journal dia.	mm (in)	Green: 59.939... 59.948 (2.3598...2.3602)
	mm (in)	Yellow: 59.949... 59.958 (2.3602...2.3606)
Radial clearance	mm (in)	0.017... 0.060 (0.0007...0.0023)
Wear limit	mm (in)	0.1 (0.0039)
Main bearing bore dia.	mm (in)	60.010... 60.029 (2.3626...2.36233)
Main bearing	mm (in)	Green: 55.000... 55.039 (2.1654...2.1669)
	mm (in)	Yellow: 55.008... 55.047 (2.1657...2.1672)
Main bearing journal dia.	mm (in)	Green: 54.971... 54.980 (2.1643...2.1646)
	mm (in)	Yellow: 54.981... 54.990 (2.1646...2.1650)
Radial clearance	mm (in)	0.018... 0.066 (0.0007...0.0026)
Wear limit	mm (in)	0.13 (0.0051)
Width of guide bearing	mm (in)	24.890... 24.940 (0.9799...0.9819)
Width of main bearing journal	mm (in)	25.065... 25.098 (0.9868...0.9881)
End float	mm (in)	0.125... 0.208 (0.0049...0.0082)
Wear limit	mm (in)	0.2 (0.0079)
Grinding stage 0 (grinding stage 1 = -0.25 mm/-0.0098 in)		
Crankpin dia.	mm (in)	47.975... 47.991 (1.8888...1.8894)
Width of crankpin	mm (in)	22.065... 22.195 (0.8687...0.8738)

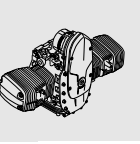




Technical Data		R 1150 R
<b>Connecting rod</b>		
Big-end bore	mm (in)	51.000... 51.013 (2.0079...2.0084)
Big-end bearing dia.	mm (in)	48.016... 48.050 (1.8904...1.8918)
Radial clearance	mm (in)	0.025... 0.075 (0.0010...0.0030)
Wear limit	mm (in)	0.13 (0.0051)
Width of big-end bearing eye	mm (in)	21.883... 21.935 (0.8616...0.8636)
Conrod end float	mm (in)	0.130... 0.312 (0.0051...0.0123)
Wear limit	mm (in)	0.5 (0.0197)
Small-end bore	mm (in)	22.015... 22.025 (0.8664...0.8671)
Radial clearance	mm (in)	0.015... 0.030 (0.0006...0.0012)
Wear limit	mm (in)	0.06 (0.0024)
Distance between centers	mm (in)	125 (4.9212)
Max. deviation from parallel of conrod bores at distance of 150 mm (5.90 in)	mm (in)	0.02 (0.0008)
<b>Weight classes</b>		
Class		
0 (2 spots, white)	grammes (oz.)	520.0... 525.9 (18.356...18.565)
1 (2 spots, blue)	grammes (oz.)	526.0... 531.9 (18.568...18.776)
2 (3 spots, white)	grammes (oz.)	532.0... 537.9 (18.780...18.988)
3 (3 spots, yellow)	grammes (oz.)	538.0... 543.9 (18.992...19.200)
4 (1 spot, blue)	grammes (oz.)	544.0... 549.9 (19.201...19.412)
<b>Cylinders</b>		
Bore		(20 mm/0.7874 in from top edge)
A	mm (in)	100.992... 101.000 (3.9761...3.9764)
Wear limit	mm (in)	101.050 (3.9784)
B	mm (in)	101.000... 101.008 (3.9764...3.9768)
Wear limit	mm (in)	101.058 (3.9787)
Total wear clearance of piston and cylinder	mm (in)	0.12 (0.0047)
Permitted out-of-roundness of cylinder bore		
at 20 mm (0.7874 in) from top edge	mm (in)	0.03 (0.0012)
at 100 mm (3.9370 in) from top edge	mm (in)	0.04 (0.0016 in)

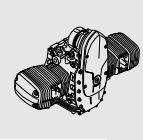
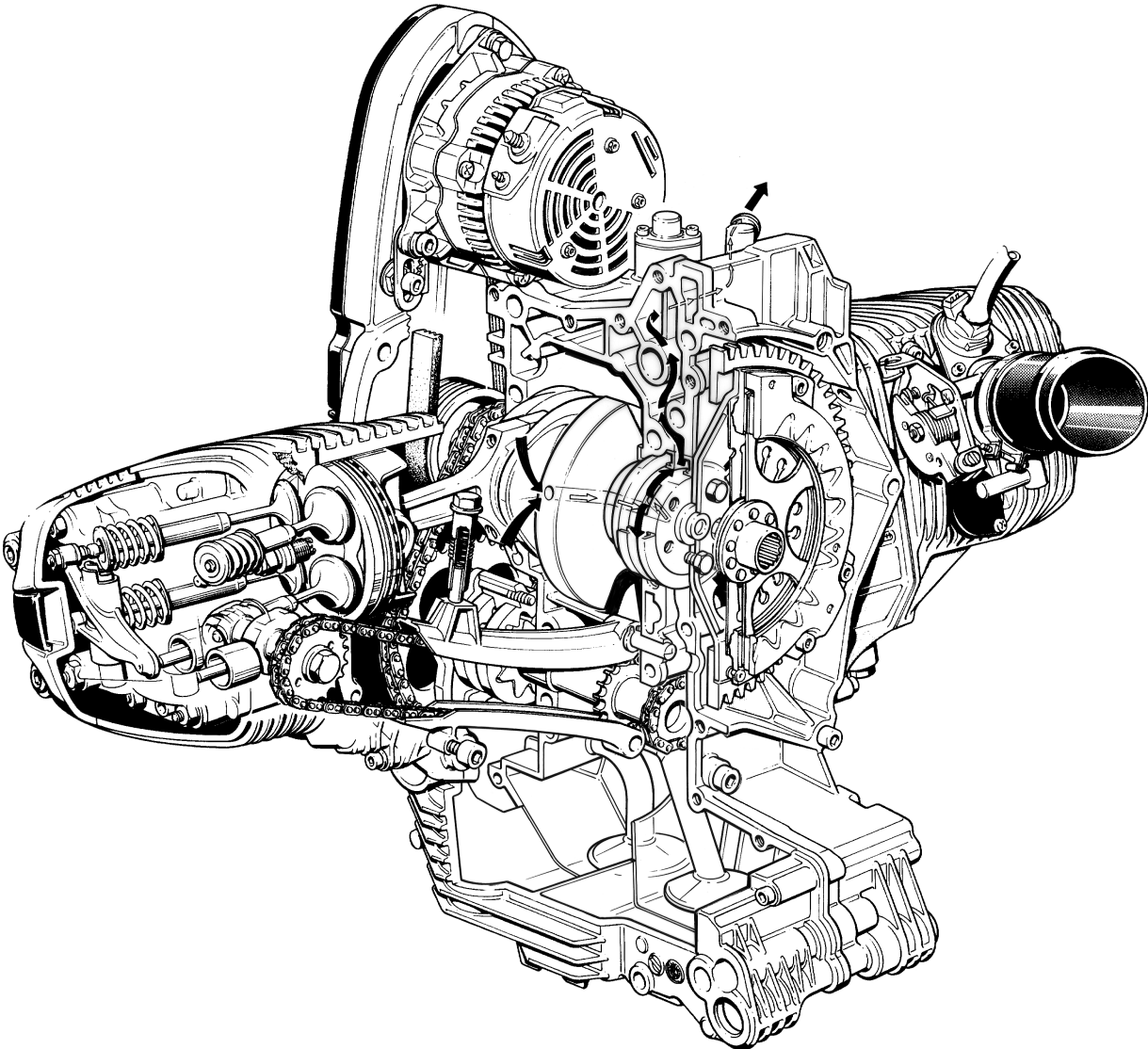
Technical Data		R 1150 R
<b>Pistons</b>		
Piston dia.		(Measuring plane A – see Checking pistons and cylinders)
A	mm (in)	100.971... 100.983 (3.9753...3.9758)
Wear limit	mm (in)	100.895 (3.9723)
B	mm (in)	100.983... 100.995 (3.9757...3.9763)
Wear limit	mm (in)	100.905 (3.9727)
AB	mm (in)	100.979... 100.987 (3.9756...3.9759)
Wear limit	mm (in)	100.900 (3.9725)
Installed clearance	mm (in)	0.005... 0.029 (0.0002...0.0011)
Total wear clearance of piston and cylinder	mm (in)	0.12 (0.0047)
Piston pin bore	mm (in)	22.005... 22.011 (0.8663...0.8666)
Weight classes		+ and –
Weight difference in one class	grammes (oz.)	10 (0.353) (complete with pins and rings)
Direction of installation		Arrow on piston crown pointing to exhaust side Production locating point towards exhaust side (see Installing piston)
<b>Piston rings</b>		
1st groove		
Asymmetric piston ring, curved, oval section		
Height	mm (in)	1.170... 1.190 (0.0461...0.0469)
Wear limit	mm (in)	1.1 (0.0433)
Ring gap	mm (in)	0.1... 0.3 (0.0039...0.0118)
Wear limit	mm (in)	0.8 (0.0315)
Ring float	mm (in)	0.030... 0.070 (0.0012...0.0027)
Wear limit	mm (in)	0.15 (0.0059)
2nd groove		
Micro-taper compression ring		
Height	mm (in)	1.170... 1.190 (0.0461...0.0469)
Wear limit	mm (in)	1.1 (0.0433)
Ring gap	mm (in)	0.2... 0.4 (0.0078...0.0158)
Wear limit	mm (in)	0.8 (0.0315)
Ring float	mm (in)	0.030... 0.07 (0.0012...0.0027)
Wear limit	mm (in)	0.15 (0.0059)



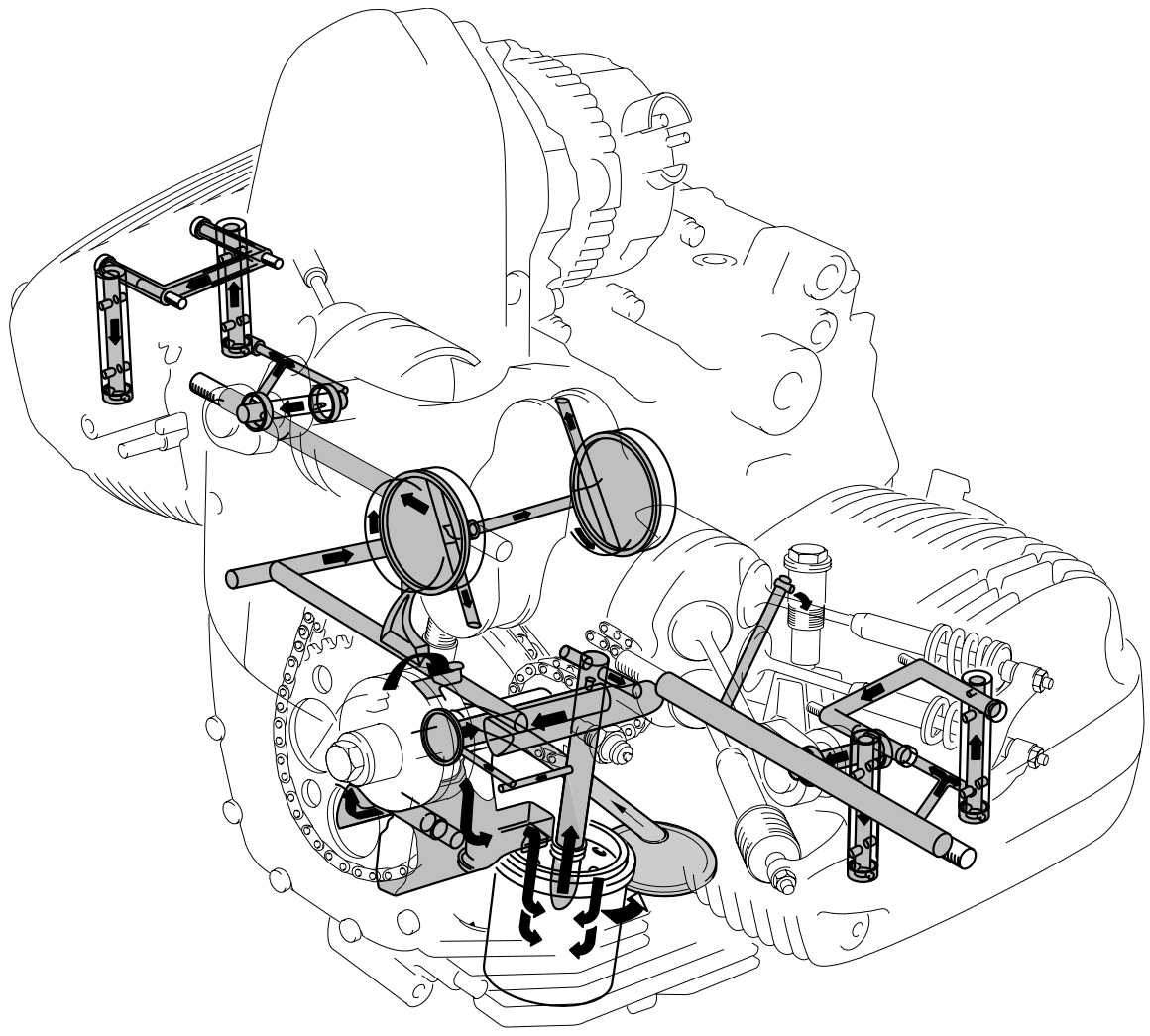
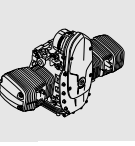


Technical Data		R 1150 R
3rd groove		
Coiled-spring ring		
Height	mm (in)	1.97... 1.99 (0.0776...0.0783)
Wear limit	mm (in)	1.9 (0.0748)
Ring gap	mm (in)	0.30... 0.55 (0.0118...0.0217)
Wear limit	mm (in)	1.20 (0.0472)
Ring float	mm (in)	0.020... 0.060 (0.0008...0.0024)
Wear limit	mm (in)	0.15 (0.0059)
Installed direction of piston rings		"Top" marking uppermost
<b>Piston pins</b>		
Piston pin dia.	mm (in)	21.995... 22.000 (0.8664...0.8662)
Wear limit	mm (in)	21.960 (0.8646)
Bore in piston	mm (in)	22.005... 22.011 (0.8664...0.8666)
Radial clearance in piston	mm (in)	0.005... 0.016 (0.0002...0.0006)
Wear limit	mm (in)	0.070 (0.0028)

Cutaway drawing of engine

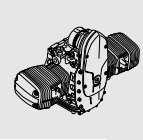
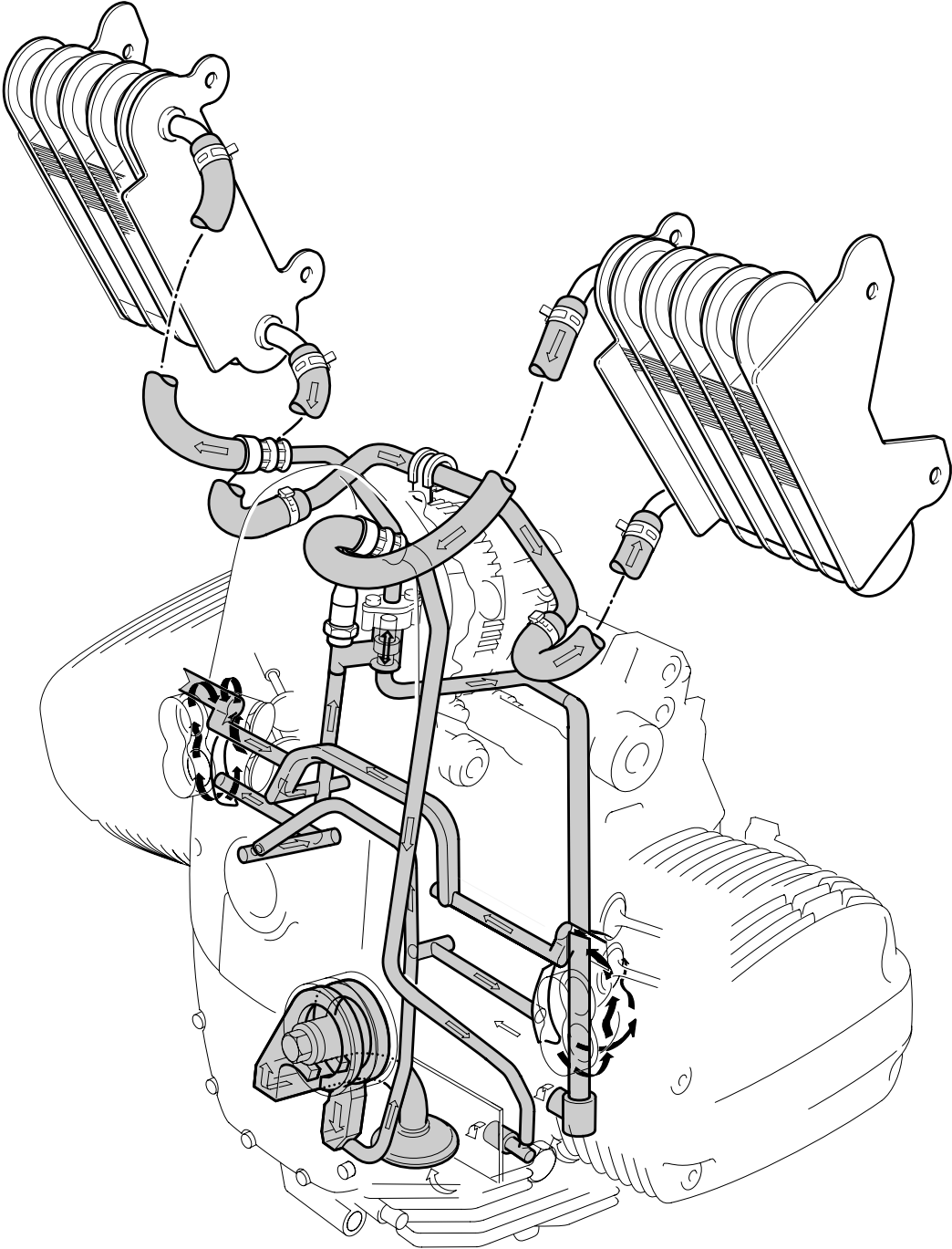


# Lubricating-oil circuit





**Cooling-oil circuit**



## 11 00 050 Removing and installing engine

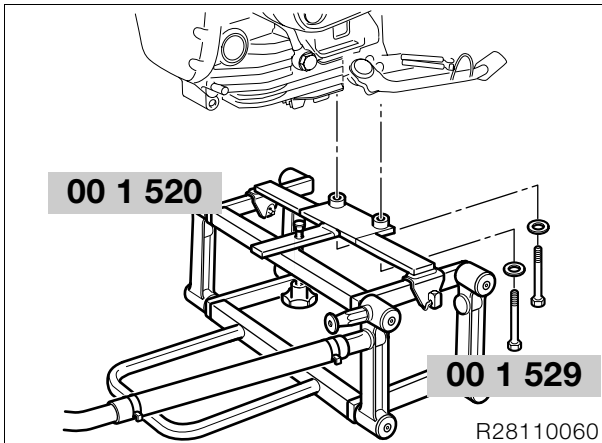
### 11 00 Removing engine



#### Note:

Auxiliary shaft, timing chains, chain tensioner/guide rails and crankshaft can only be disassembled after the engine has been removed. All other components can be disassembled with the engine installed.

- Drain engine oil.



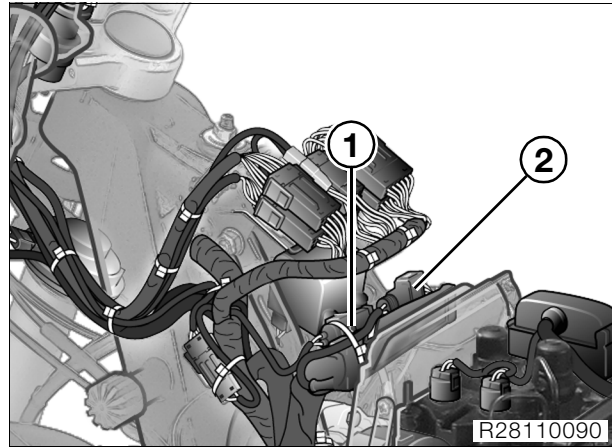
- Secure stand, **BMW No. 00 1 520**, to motorcycle with bushes and screws, **BMW No. 00 1 529**.
- Remove the seat.
- Remove fairing side sections.
- Remove cable cover on right.
- Remove oil-cooler covers.
- Disengage fuel tank.
- Disconnect quick-action couplings in fuel flow and return lines.
- Disconnect breather lines.
- Disconnect plug for fuel pump.



#### Attention:

Fuel is flammable and a hazard to health. Observe relevant safety regulations.

- Remove fuel tank.
- Disconnect the air temperature sensor plug.
- Disconnect the diagnostic plug.
- Remove air filter cover.
- Remove the intake air pipe.



- Disconnect plug of NTC oil-temperature sensor (1).
- Disconnect plug from Hall sensor (2).
- Remove Motronic control unit.
- Disconnect the Motronic control unit plug.
- **[Integral ABS]** Fully drain the brake system.
- **[Integral ABS]** Remove the unit (→ 34.13).



#### Attention:

Always follow the instructions in the Repair Manual. (→ 34.13), Removing and installing ABS unit.



#### Note:

Secure the brake lines with cable ties.

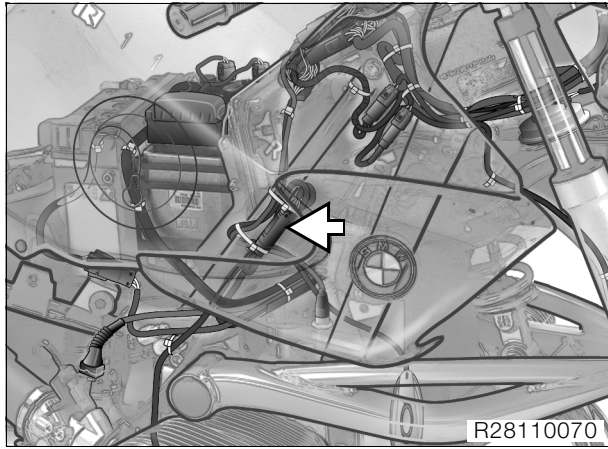
- Remove the battery.



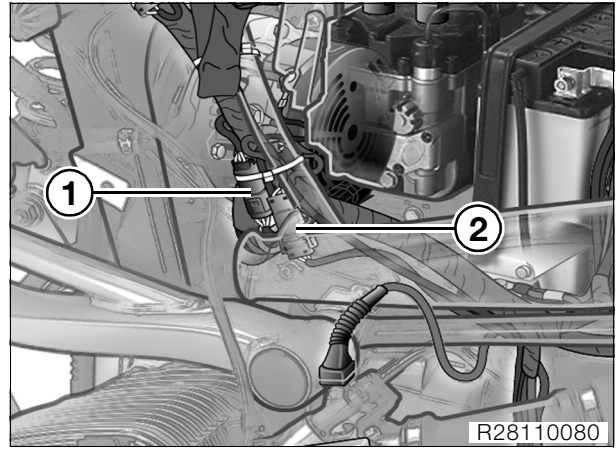
#### Attention:

Disconnect negative terminal first, then positive terminal.

- Remove actuating cable for starting-speed increase.
- Disengage throttle cable.
- Remove Bowden-cable shroud from fitting for throttle actuation.
- Disengage throttle cable.
- Disengage throttle cables from right and left throttle flap stubs.
- Release the plug for the fuel pump from the frame.
- Remove battery holder with Bowden-cable divider.
- Remove cable strap from cable guide under battery holder.
- Disengage the clamp securing the breather hose at the front of the engine.
- Disconnect the breather hose at the front.



- Disconnect plug for oxygen sensor (arrow) and remove cable.
- Disconnect the leads from the alternator.
- Disconnect ground lead from terminal at top of engine.
- Disconnect right-hand oil cooler line from engine.
- Remove the right-hand oil cooler.
- Remove spark plug covers.

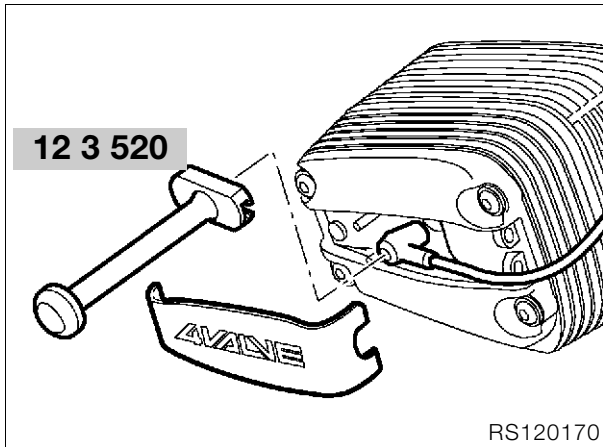


- Disconnect plug (1) of side-stand switch.
- Disconnect plug (2) of gear indicator.
- Remove front cover.
- Disconnect oil cooler line from engine and alternator.
- Remove left-hand oil cooler.



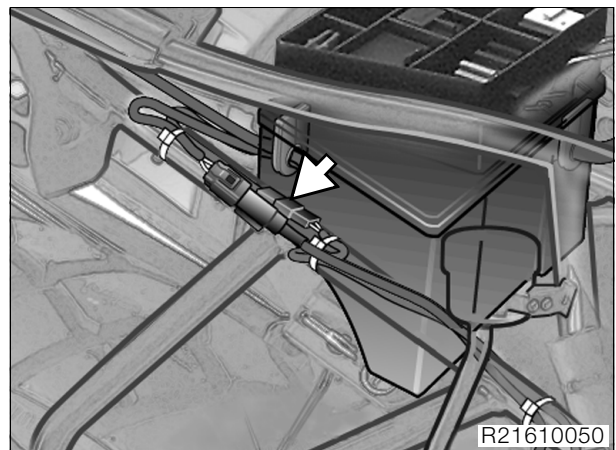
**Note:**

Carefully remove the oil-cooler line.



- Pull off spark plug cap with special puller, **BMW No. 12 3 520**.
- Disconnect plugs of injection valves.
- Disconnect hose clamps/throttle stub pipes and push the stubs into the air filter box.
- Disconnect ground cable from left throttle stub pipe.
- Disconnect plug of throttle-valve potentiometer.
- Remove holders of injection valves.
- Remove injection valves from throttle stub pipes.
- Remove left throttle stub pipe.
- Loosen the fasteners securing the right and left footrest plates.
- Remove top screws on left and right.
- Remove manifold.
- Remove rear silencer.
- Remove front silencer.
- Remove starter motor cover and disconnect cable to power socket.
- Disconnect cables from starter motor.
- Remove the starter motor.
- Disconnect cable from oil pressure switch.

- **[Integral ABS]** Remove ABS sensor from rear wheel drive.
- Remove fasteners of rear brake caliper.
- Remove brake line from swinging arm.
- Use cable ties to secure the brake caliper to the rear frame.



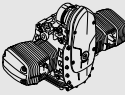
- Disconnect plug for rear brake-light switch (arrow).
- Remove fasteners of guard and rear brake master cylinder.
- Remove the main stand and the side stand.
- Remove the leading link caps.
- Remove the screw on the right.

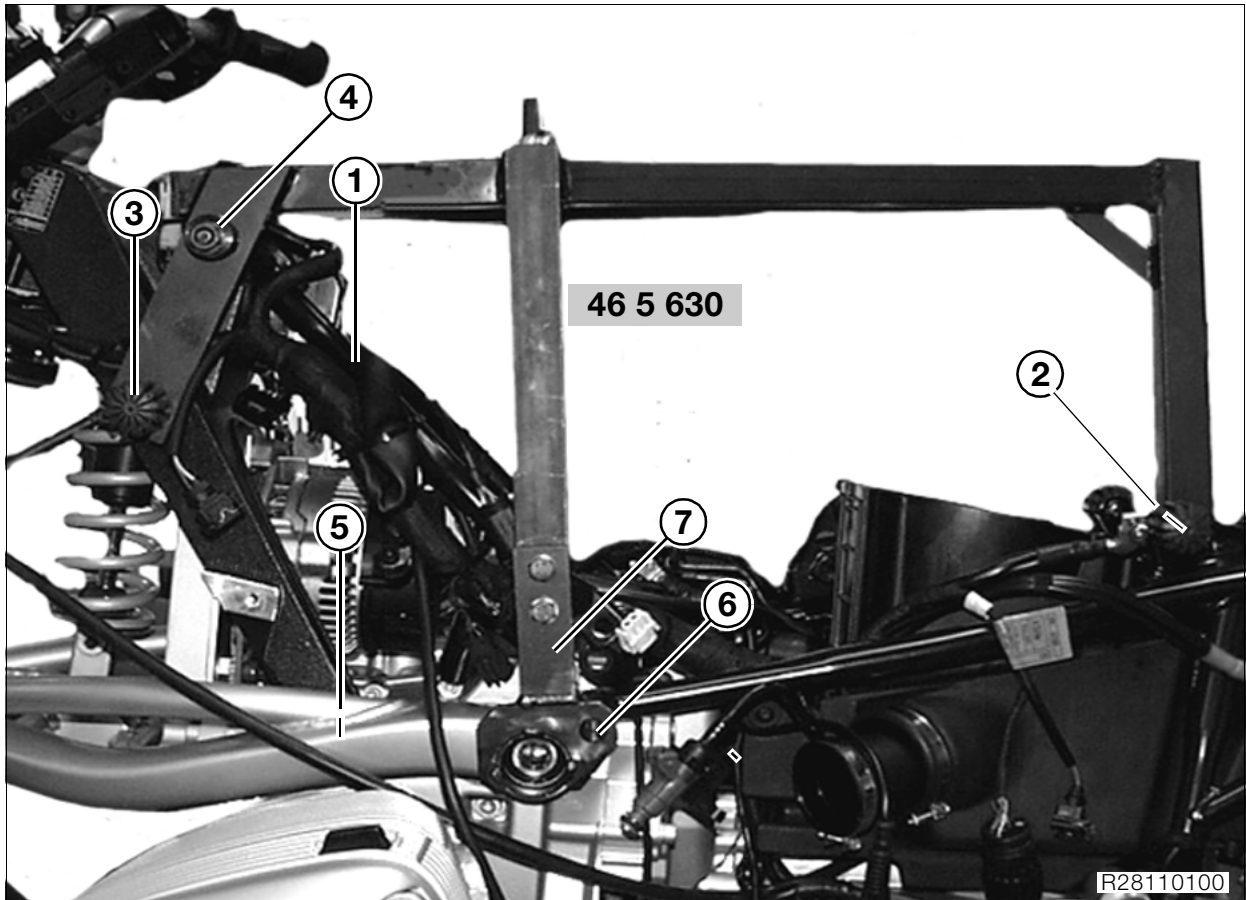


**Attention:**

If necessary, mask off the leading link to prevent it from being scratched.

- Pull the shaft of the leading link out to the left.





### Installing auxiliary frame (raising frame unit clear of engine)

- Remove rear wheel.
- Remove hydraulic spring-strut adjuster.



#### Note:

Support the rear swinging arm.

- Remove rear spring strut.
- Install the rear wheel.
- Remove the upper securing screw and the bottom bolt of the engine/frame connecting strut (1).
- Place auxiliary frame, **BMW No. 46 5 630**, in position and secure to the rear spring-strut mount (2).



#### Attention:

Use adhesive tape to mask the fuel tank anchorage and protect it against scratches.

- Engage the auxiliary frame to the front anchorage point for the fuel tank (3).
- Centre the auxiliary frame relative to the flat of the fuel-tank anchorage, install the threaded bushings (4) at the connecting struts/frame and tighten.
- Remove front mudguard.
- Remove the fastener securing the front spring strut at the bottom.



#### Note:

If necessary, mask off the leading link to prevent it from being scratched.

- Remove fastener securing slider tube bridge.
- Pull the leading link forwards.
- Remove bolt (5) securing the frame to the engine.
- Remove front fasteners for rear frame (6) on left and right.
- Reinstall the slider tube bridge.
- Install adapter (7) in link/rear-frame anchorage and secure to auxiliary frame.
- Secure the front spring strut at the bottom.
- Slightly raise the frame unit and remove the fasteners securing the clutch slave cylinder.
- Raise the frame unit at the front.
- Remove the gearbox, swinging arm, rear axle and rear wheel together.

## Removing auxiliary frame (lowering frame unit onto engine)

- Lower the frame unit into position from front.



### Attention:

Make sure that all components are correctly positioned. Do not damage cables, lines and Bowden cables.

---

- Install the clutch slave cylinder.
- Tighten the bottom fastener at the front of the rear frame.
- Remove the fastener securing the front spring strut at the bottom.
- Remove fastener securing slider tube bridge.
- Push the leading link up.

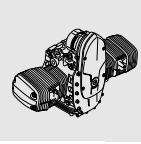


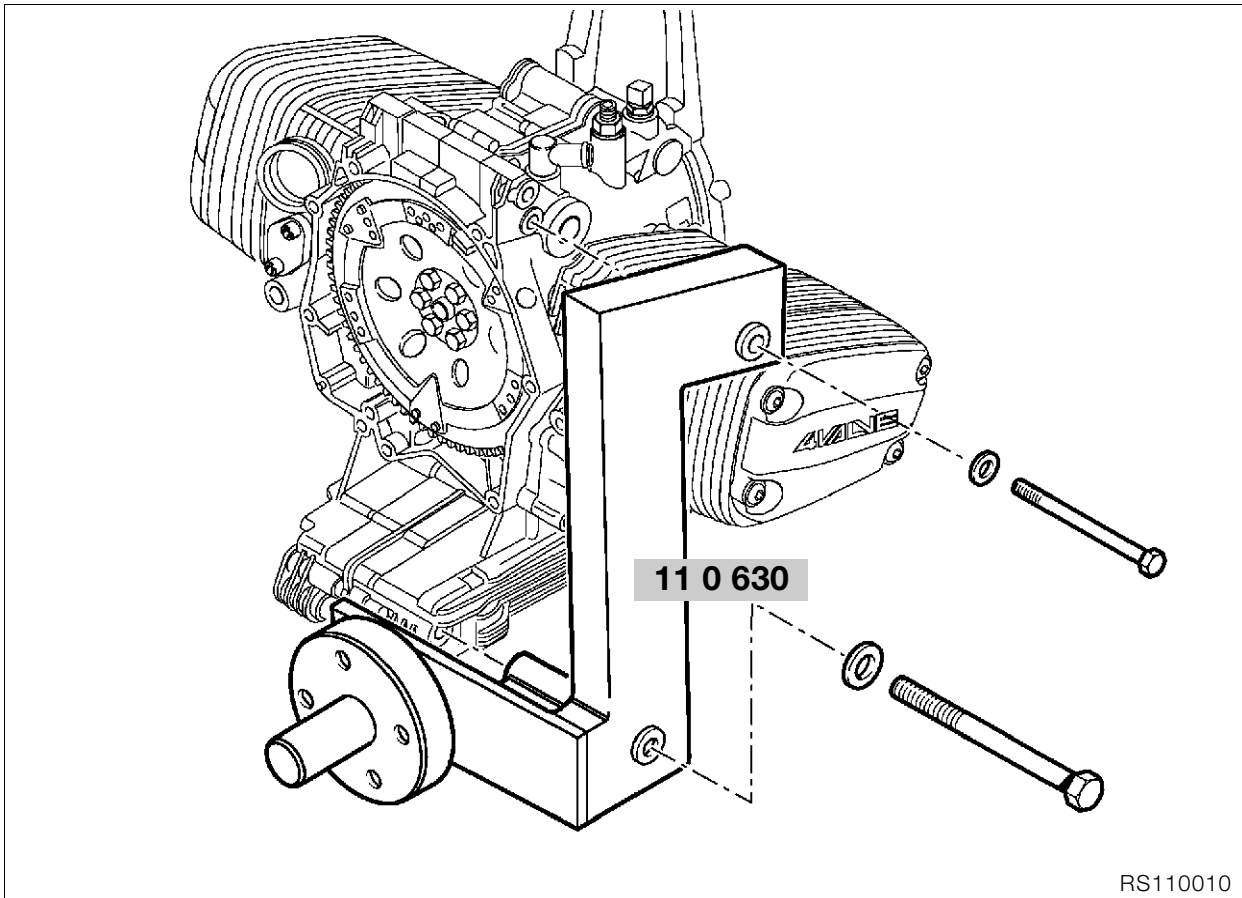
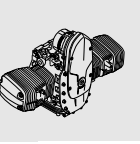
### Attention:

If necessary, mask off the leading link to prevent it from being scratched.

---

- Insert pin, **BMW No. 46 5 630**, from the left to align the front frame bores with the corresponding bores in the engine, insert the bolts from the right and tighten.
- Secure the slider tube bridge.
- ➡ ..... see Group 31
- Secure the leading link.
- Remove the auxiliary frame.

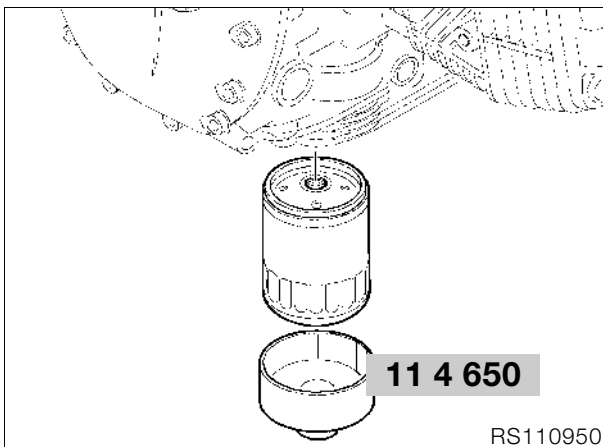




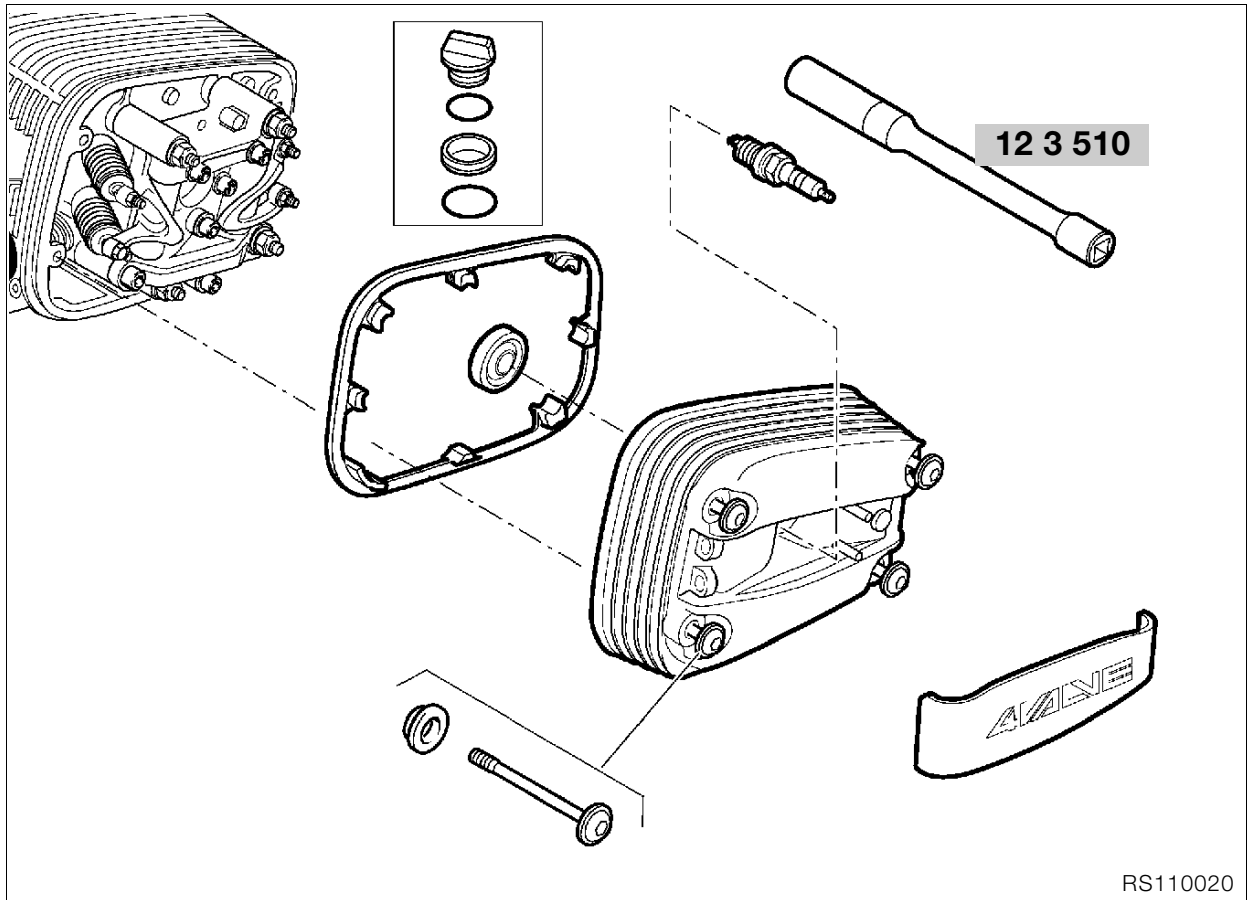
## 11 00 103 Disassembling and reassembling engine

### 11 00 Disassembling engine

- Secure engine mount, **BMW No. 11 0 630**, to the engine block.
- Transfer engine to assembly frame.



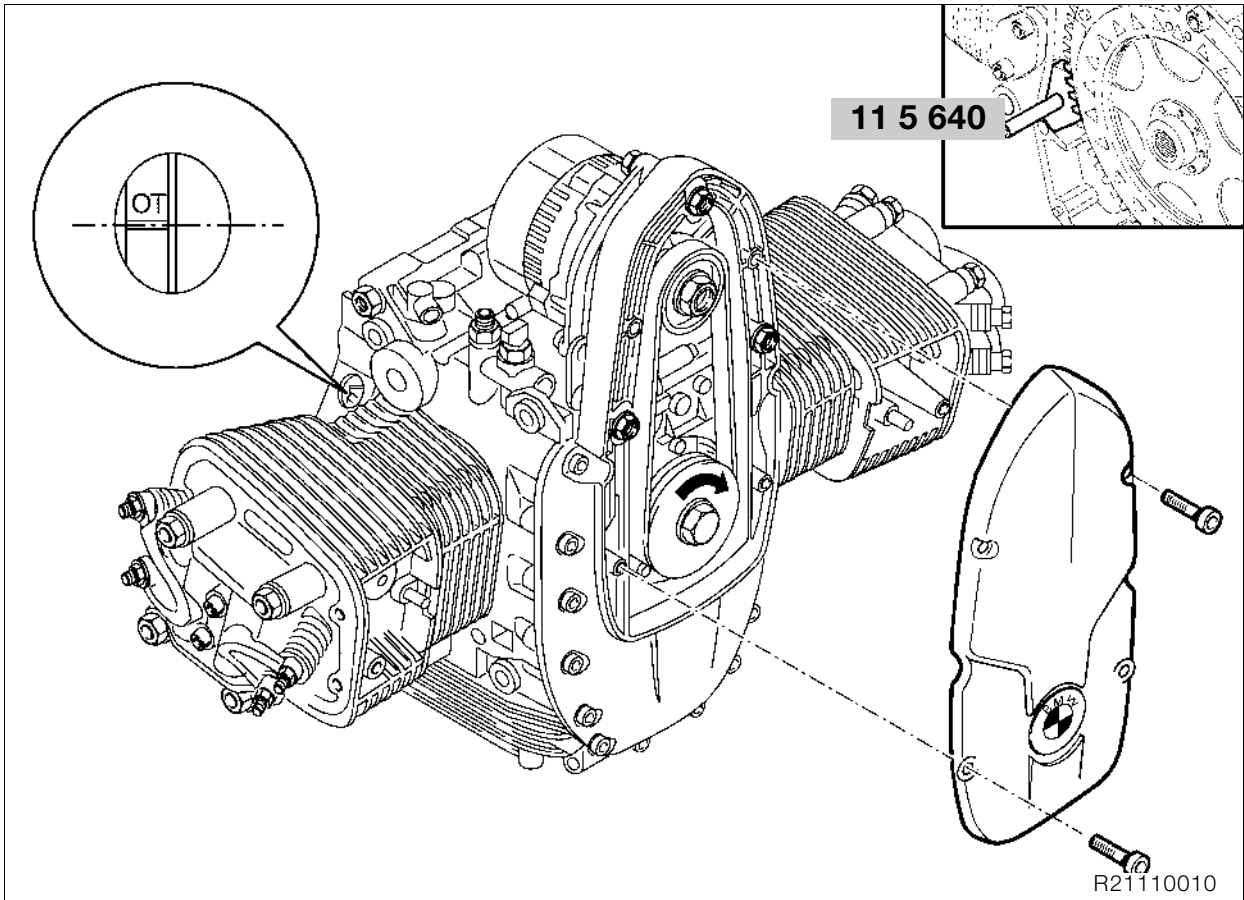
- Drain engine oil.
- Remove the oil filter, using oil filter wrench, **BMW No. 11 4 650**.



## 11 12 Removing cylinder head cover

- Remove spark plugs with the spark plug wrench, **BMW No. 12 3 510**.
- Remove cylinder head cover.

**⚠ Attention:**  
Catch escaping oil.

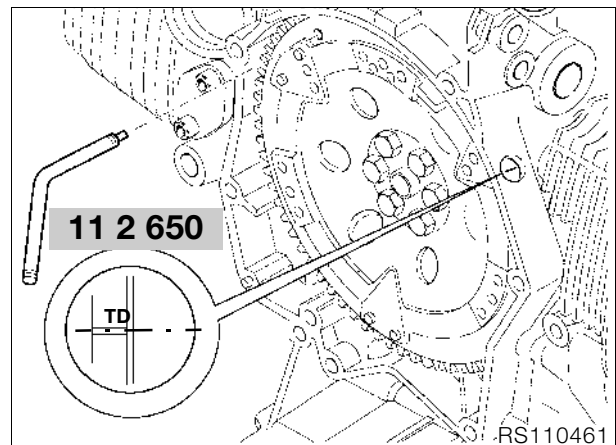


### Locking the engine at TDC

- Remove front cover.
- Turn the belt pulley to bring the piston to firing TDC.

#### Firing TDC

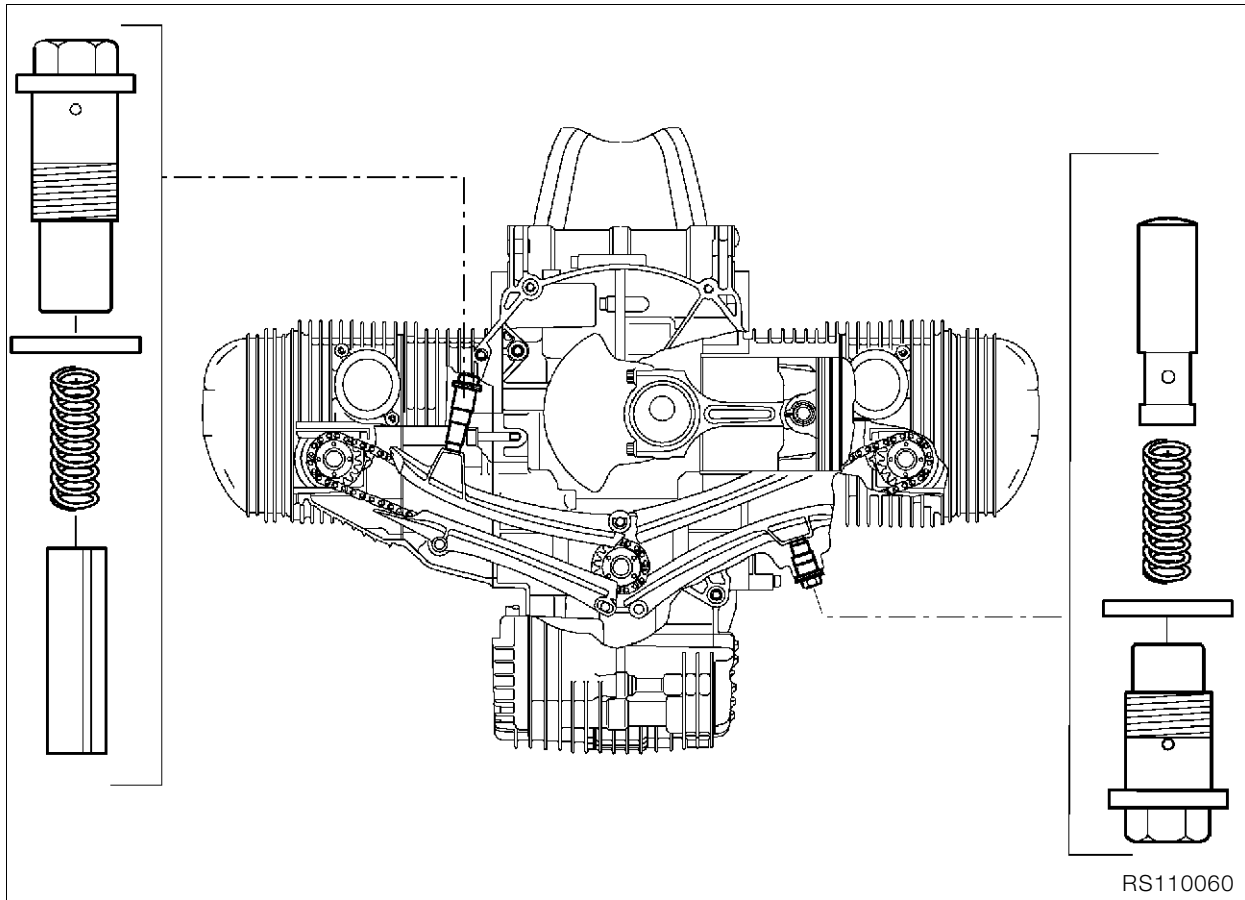
1. TDC mark is visible, and
  2. The inlet and exhaust valves of the cylinder in question are closed.
- Install locking device, **BMW No. 11 5 640**, to lock clutch housing.



#### Note:

The engine can be set to top dead center by inserting the TDC pin, **BMW No. 11 2 650**, into the bores in clutch housing and the engine block.





## 11 31 Removing and installing chain tensioner

### **Attention:**

Do not mix up the chain tensioner pistons. When installing, fit a new seal.

### **Work instructions, timing-chain tensioners**

Removing:

- Remove timing chain tensioner, then remove camshaft sprocket from camshaft.

Installing:

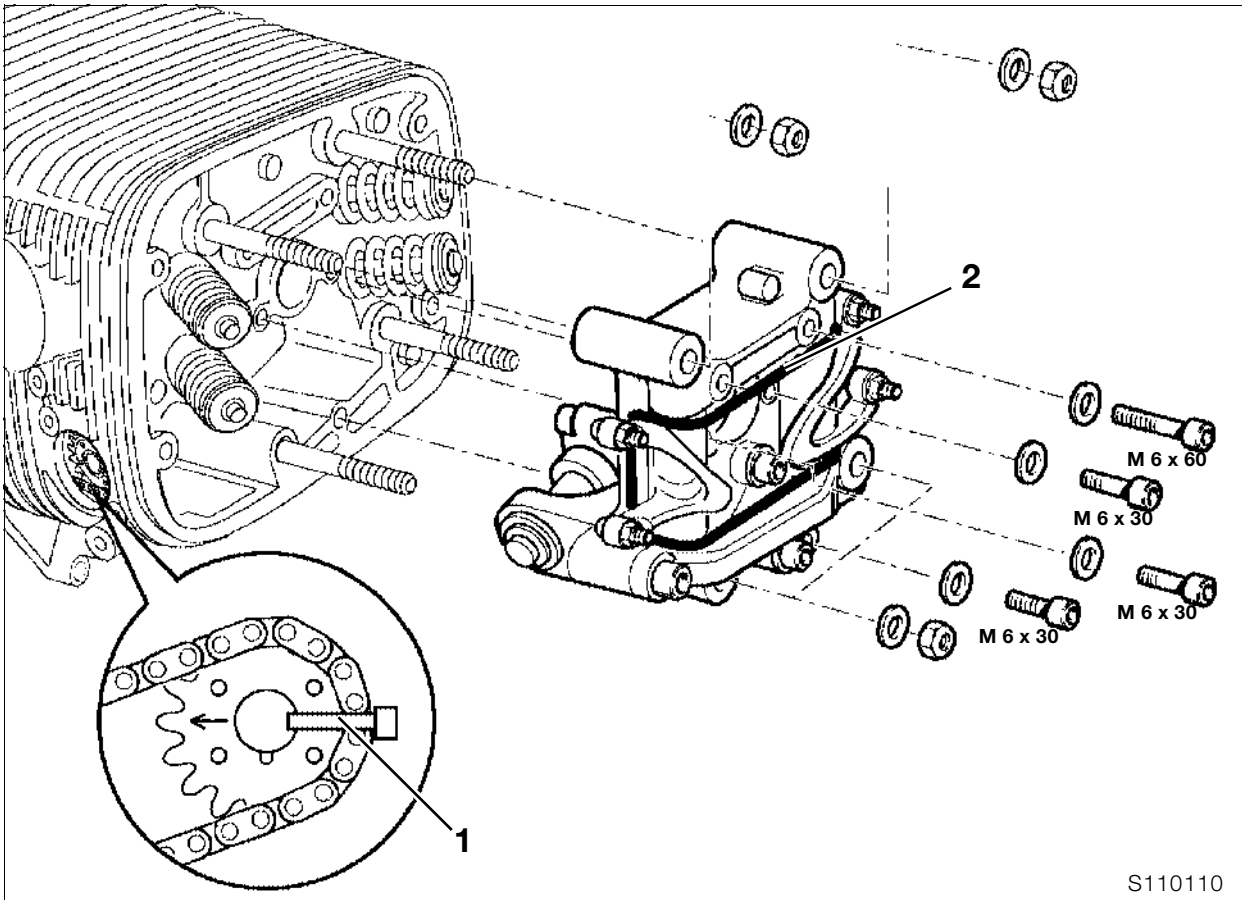
- First install camshaft sprocket, then timing chain tensioner.

### **Attention:**

Failure to observe this sequence can permit the chain tensioner piston on the left to drop into the timing-chain chamber.

### **Tightening torque:**

Chain tensioner ..... 32 Nm



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### 11 33 Removing and installing valve gear carrier

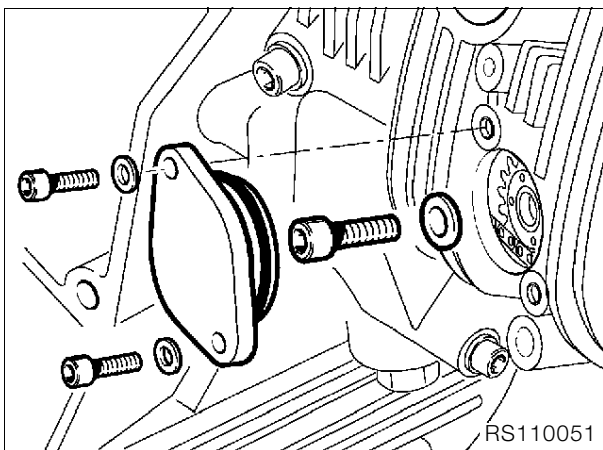
- Remove valve gear carrier.
- Secure rockers with a rubber band (2).



**Note:**

If no work is to be carried out on the valve gear carrier, remove it together with the cylinder head.

- Installing valve gear carrier (→ 11.57)



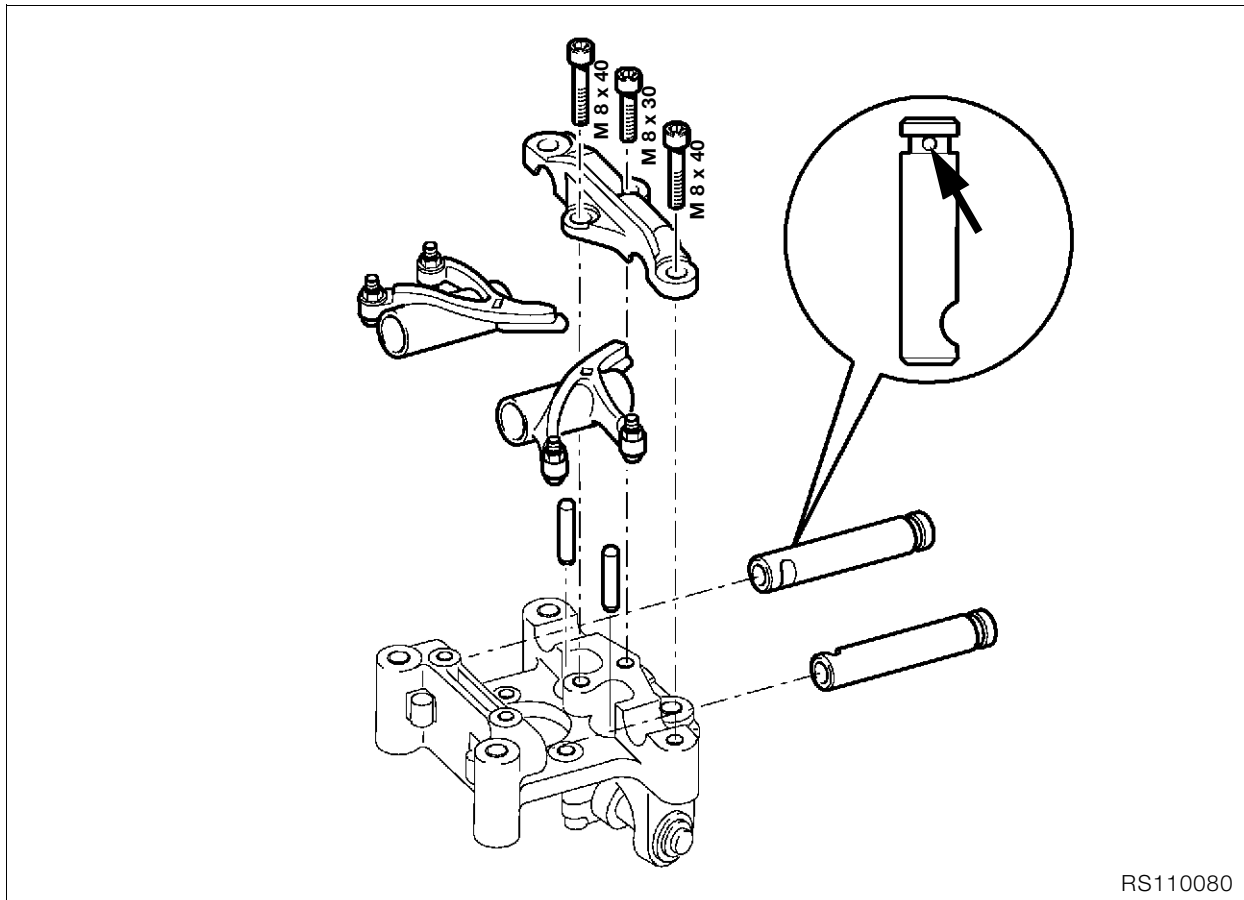
RS110051

- Remove camshaft sprocket cover.
- Remove fastener and press off camshaft sprocket.



**Note:**

If the camshaft sprocket (1) is not removed after loosening, it must be held firmly and prevented from falling into the engine block (e.g. with cable ties).



RS110080

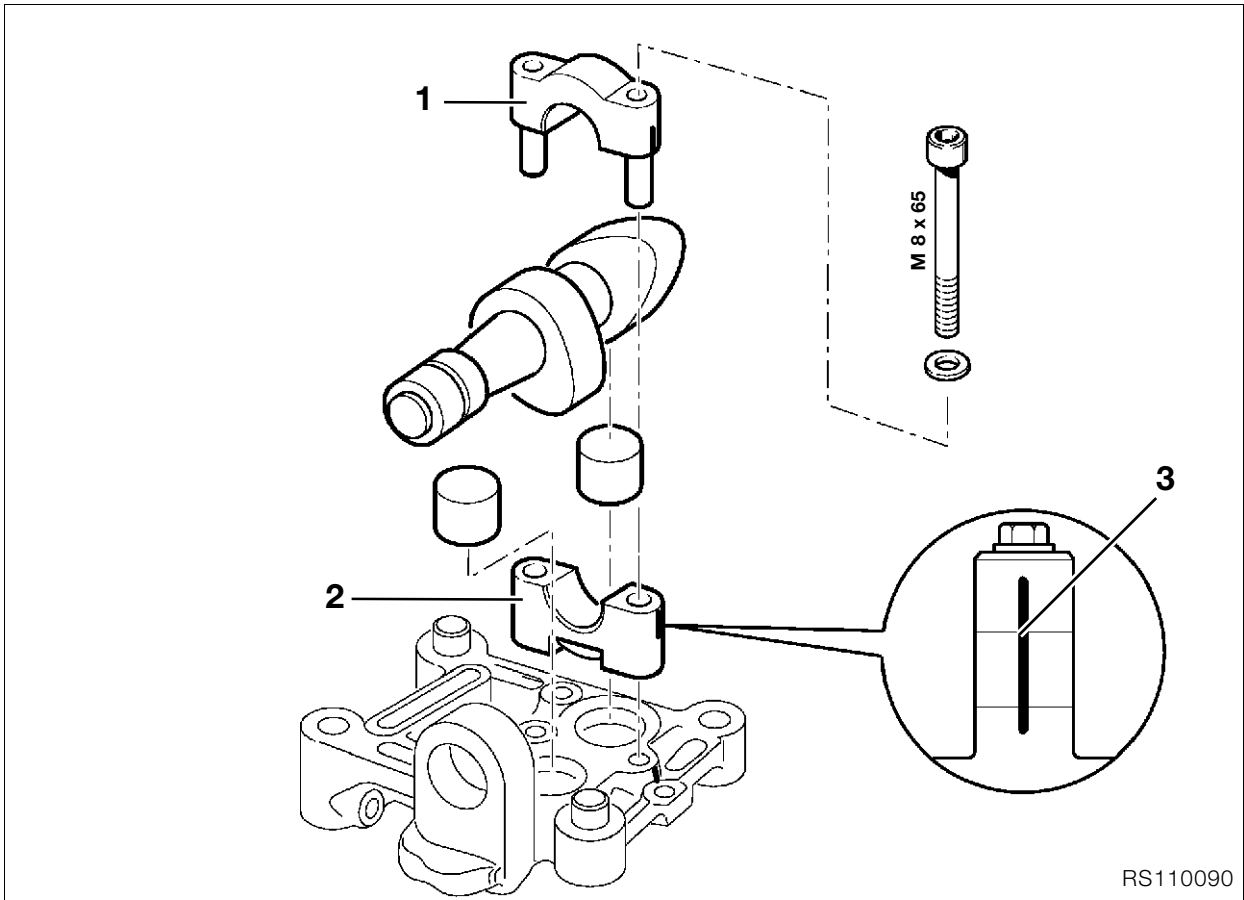
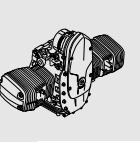
### 11 33 Disassembling and assembling valve gear carrier

- Remove bearing cap.
- Insert a suitable pin into the bore (arrow) of the rocker shaft, and turn the shaft back and forth to remove it from its bearing.
- Remove pushrods.



**Attention:**

Do not mix up the rocker shafts and pushrods.



- Remove camshaft bearing cap (1).
- Remove camshaft and bearing (2).
- Remove bucket-type tappets.

**⚠ Attention:**

Do not mix up the bucket-type tappets.

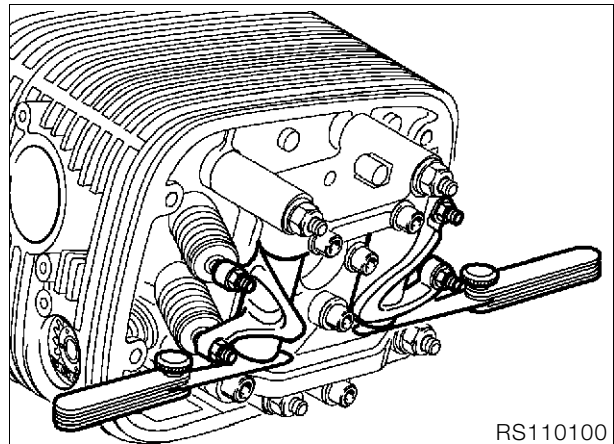
- Assembly is the reverse of the disassembly procedure.

**⚠ Attention:**

Note direction of installation (3) for camshaft bearing cap. Rocker shaft recess must be aligned with the bores.

**📄 Note:**

Locate pushrods in ball cups of rockers and hold the rockers together with a rubber band to secure the pushrods in position.



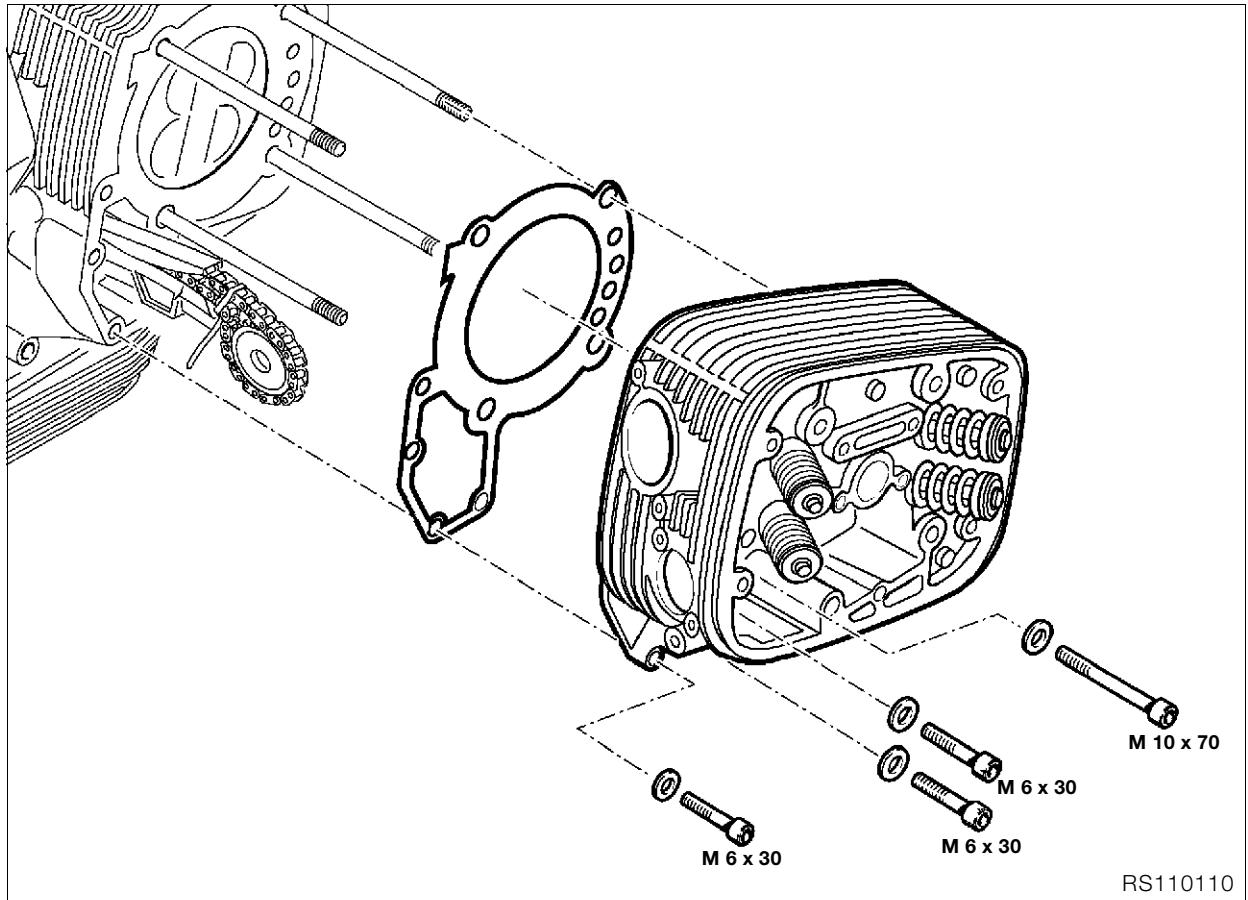
- Adjust the holder for minimum end float.

**End float of rockers:**

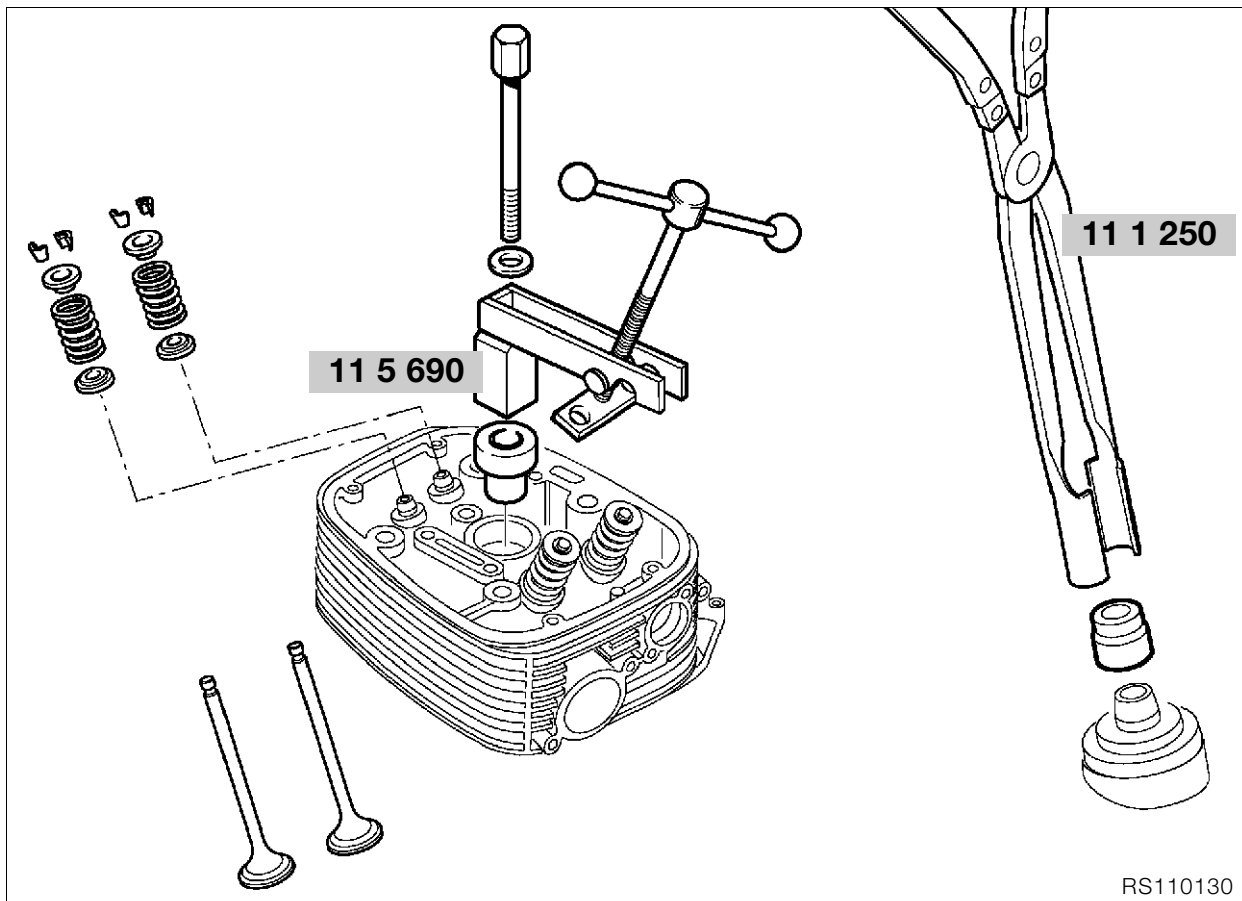
min. ....	0.05 mm (0.0020 in)
max. ....	0.40 mm (0.0157 in)

**🔧 Tightening torque:**

M 8 screw, rocker shaft bearing cap ..... 18 Nm  
 M 8 screw, camshaft bearing cap ..... 15 Nm



11 12 Removing cylinder head



## 11 12 Disassembling, checking, repairing and reassembling cylinder head

### 11 34 Removing and installing valves



#### Attention:

Do not scratch sealing face on cylinder head. Place the head on a clean, non-scratching surface.

- Mount valve spring compressor, **BMW No. 11 5 690**, onto cylinder head.
- Compress the valve springs.
- Gently tap valve head to release collets from spring retainer.
- Remove valve collets.
- Relieve tension on valve springs.
- Remove top and bottom spring retainers, valve springs and valves.

### 11 34 Removing valve stem seals

- Pull off valve stem seal with pliers, **BMW No. 11 1 250**.



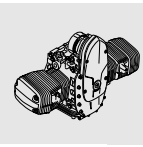
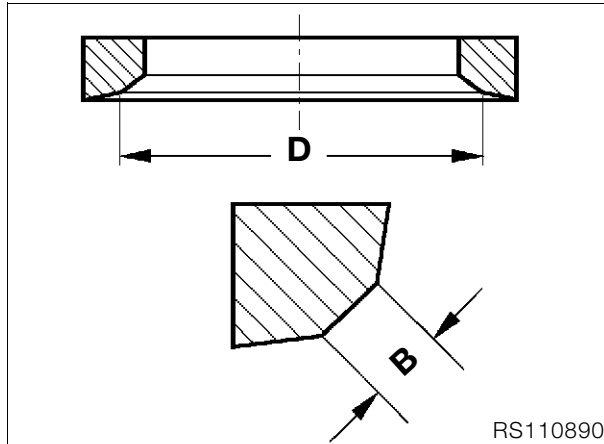
#### Note:

When a valve is removed, the valve stem seal must be renewed.

**Checking valves for wear**

- Remove combustion residue from valves.
  - Check valve dimensions.
- ➡ .....see Technical Data

**Remachining valve seat**



**⚠ Attention:**

Width (B) and diameter (D) must always be maintained if valve seat is machined.

➡ .....see Technical Data

**Checking and repairing cylinder head**

- Remove combustion residues from combustion chamber.
- Check sealing face for damage/distortion, and skim flat if necessary.

**Skimming sealing face:**

..... remove max. 0.2 mm (0.0079 in)

**Checking valve guide for wear**

- Check valve guide bore.
- ➡ .....see Technical Data

## 11 12 Replacing valve guides

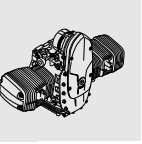
- Heat cylinder head slowly and uniformly to 200 °C (392 °F) in a suitable oven.



### Attention:

Wear protective gloves when handling heated parts.

- Drive out valve guides with 5 mm (0.1969 in) dia. drift, **BMW No. 11 5 674**, from the combustion chamber side.
- Allow cylinder head to cool down to room temperature (approx. 20 °C/68 °F).
- Examine valve guide bore for:
  - wear,
  - widening taper and
  - correct dimensions in H7 tolerance range (12.500...12.518 mm/0.4921...0.4928 in).



### Note:

Valve guides are press-fitted in the cylinder head with an interference fit of 0.015...0.044 mm (0.0006...0.0017 in).

### If valve guide bore is undamaged but slightly larger than the 12.5 H7 tolerance range:

- Use replacement valve guide 12.550...12.561 mm (0.4941...0.4945 in).

### If valve guide bore is damaged or not to correct dimensions in 12.5 H7 tolerance range:

- Use an oversize 12.7 u6 (12.733...12.744 mm/0.5013...0.5017 in) valve guide.

### Repair method 1 – ream out the bore

(if bore is damaged or not to correct dimensions)

- Measure diameter of valve guide with micrometer.
- Ream bore with Ø12.7 H7 mm (0.5000 in) (12.700...12.718 mm/0.5000...0.5007 in) reamer.

### Repair method 2 – turn the valve guide on a lathe (only if bore is undamaged)

- Measure bore with internal micrometer.
- Calculate the specified diameter of the valve guide:

Specified diameter of valve guide = bore dia. + interference-fit value (0.015...0.044 mm/0.0006...0.0017 in).

- Use an oversize 12.7 u6 (12.733...12.744 mm/0.5013...0.5017 in) valve guide.
- Machine oversize valve guide to specified diameter.

- Slowly heat cylinder head to 200 °C (392 °F) in a suitable oven.
- Immerse valve guide in liquid grinding talc.
- Chill valve guide with dry ice.



### Attention:

Immediately before pressing in, the temperature must be –40 °C (–40 °F).

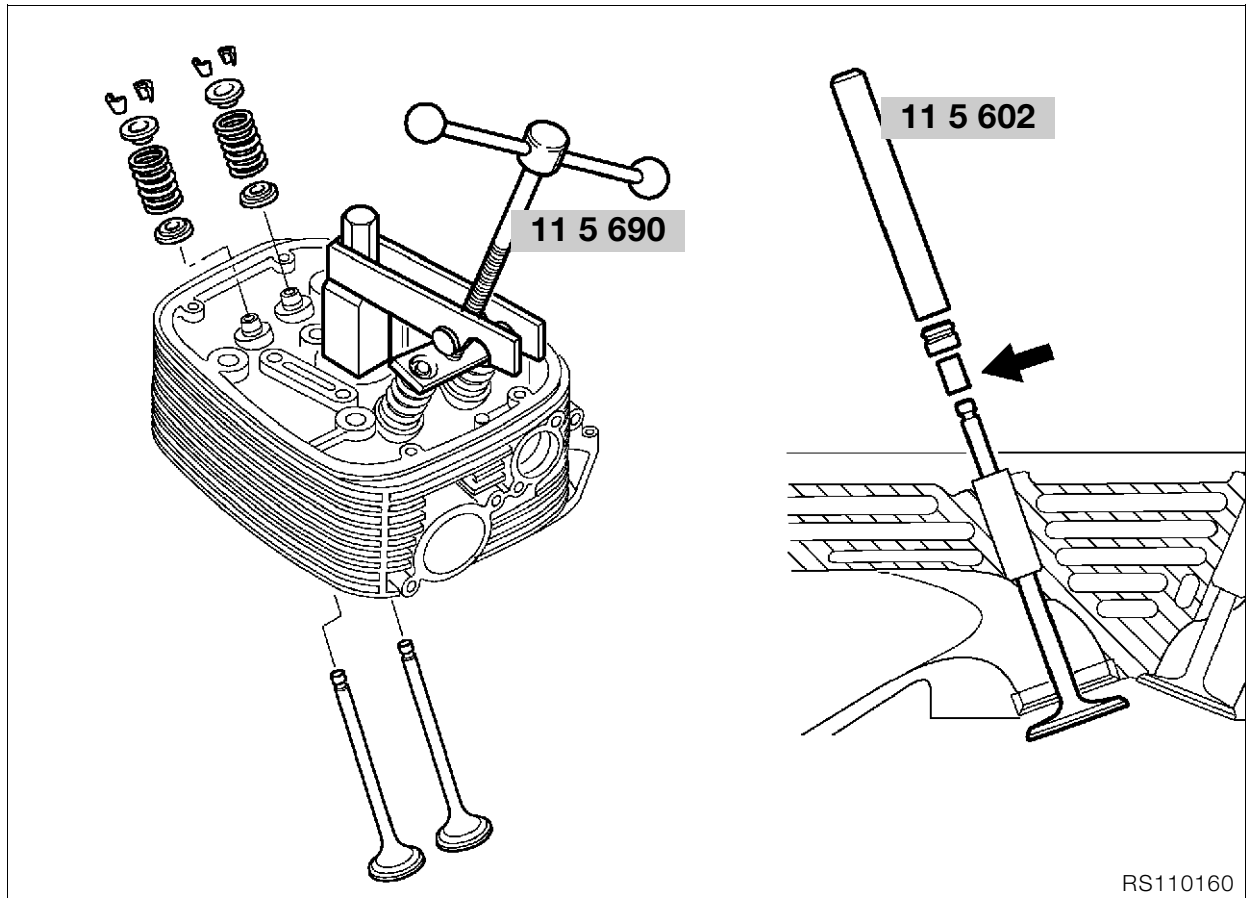
- Place heated cylinder head flat on workbench or a similar surface.
- Mount the chilled valve guide on Ø 5 mm (0.1969 in) drift, **BMW No. 11 5 673**.
- Drive valve guides into cylinder head with no delay.
- Allow cylinder head to cool down to room temperature, approx. 20 °C (68 °F).
- Inspect bores of valve guides.



### Note:

Valve guides for repair purposes are produced with an internal diameter of 5.01 mm (0.1972 in) H7. In most cases, the bore is within the 5.00 mm (0.1969 in) H7 tolerance range after pressing in. If the bore is too narrow, ream it out to size.





RS110160

### 11 34 Installing valve and valve stem seal



**Note:**

If a valve was removed, the valve stem seal must be replaced.

- Oil the stem when installing the valve.
- Shrink a short length of shrink-fit tube (arrow) on to the end of the valve stem.
- Install the valve stem seal with a 5 mm (0.1969 in) dia. drift, **BMW No. 11 5 602**.



**Attention:**

Remove the shrink-fit tube.

- Install lower spring retainer, valve spring and upper spring retainer.
- Compress the valve springs with the valve spring compressor, **BMW No. 11 5 690**.



**Note:**

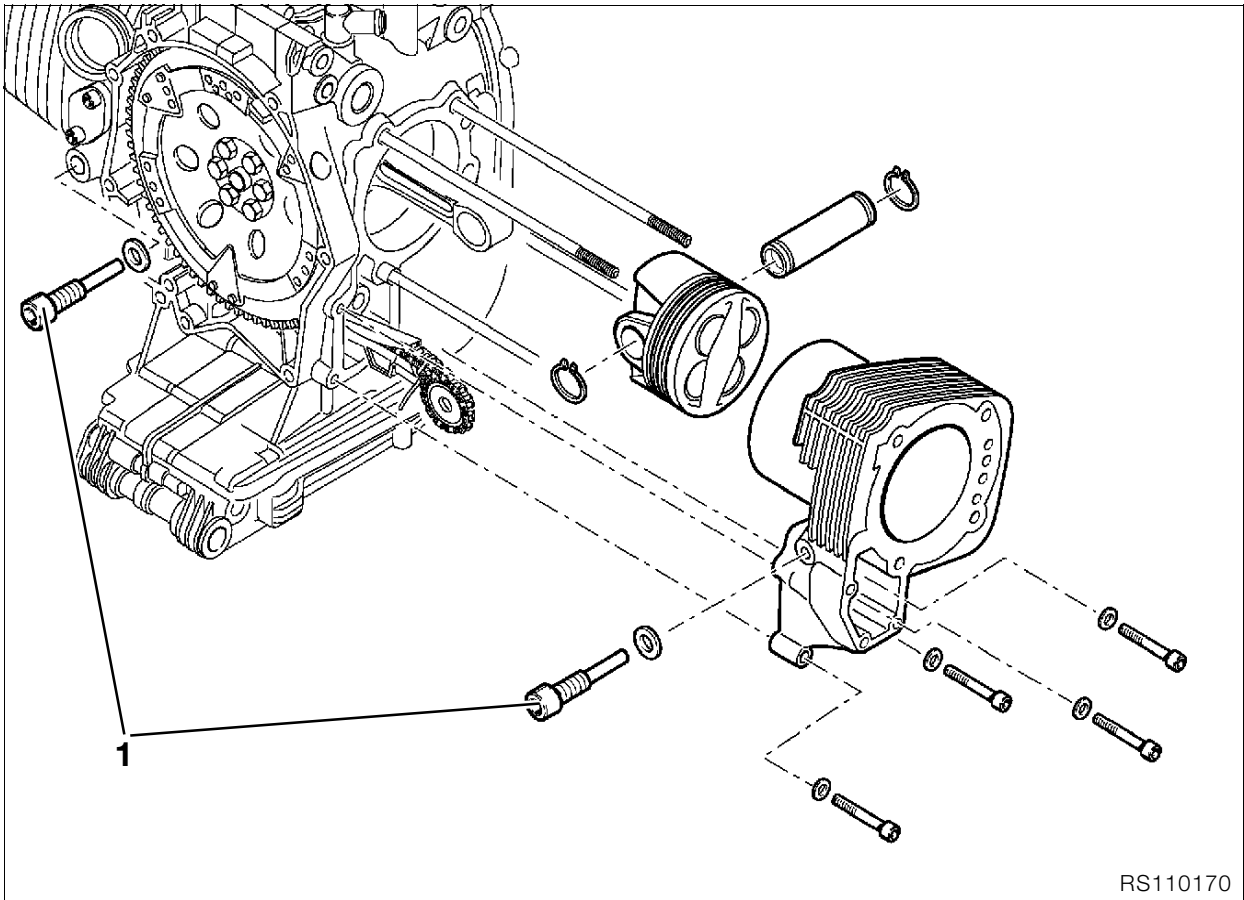
Apply grease to valve collets (to facilitate installation) and install.



**Attention:**

Make sure that valve collets are correctly seated in the valve stem grooves.

- Relieve tension on valve springs.
- Check valves for leakage (blow-by).



## 11 11 Removing cylinder barrel

- Remove guide rail pivot screws (1).
- Remove cylinder retaining screws, and remove cylinder.



### **Attention:**

When removing cylinder, make sure that the piston does not strike the engine block.

## 11 25 Removing and disassembling piston

- Remove both retaining rings from piston pin.
- Press out piston pin by hand.
- Remove piston.
- Carefully remove piston rings with piston ring pliers.
- Remove combustion residues from piston crown and clean piston.



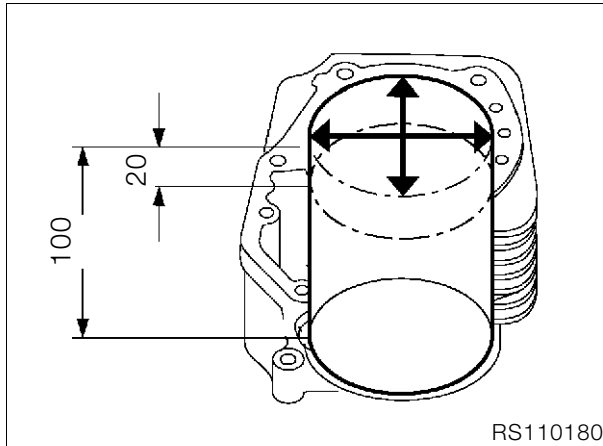
### **Attention:**

Do not mix up pistons, piston pins and piston rings.

## Checking pistons and cylinders

### Reference temperature for measurements:

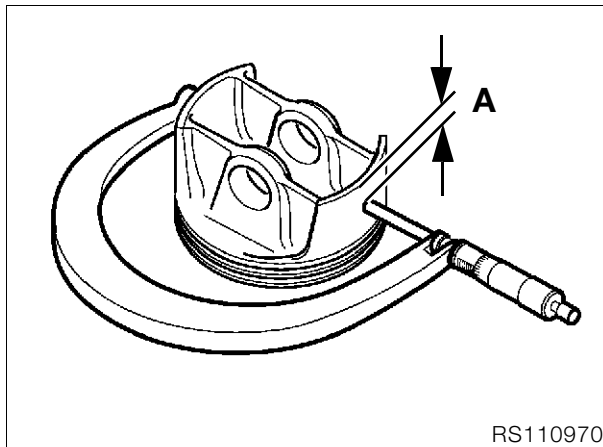
.....20 °C (68 °F)



RS110180

- Measure cylinder bore with internal micrometer at 20 mm (0.7874 in) and 100 mm (3.9370 in) from the top in direction of piston pin, and again at a right angle to the first measurement.

➡ ..... See Technical Data

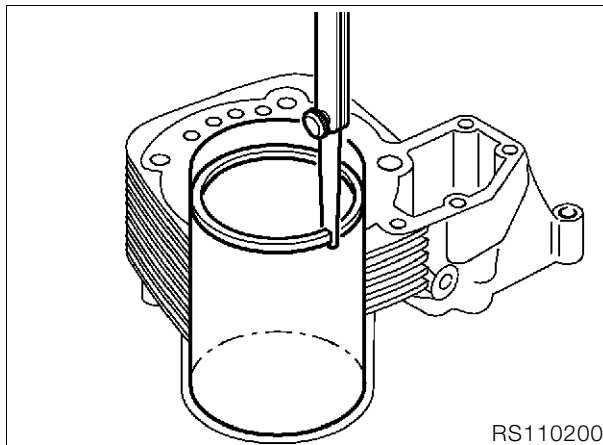


RS110970

**Measuring plane A:**..... 6 mm (0.2362 in)

➡ ..... See Technical Data

- Install piston rings in cylinder.

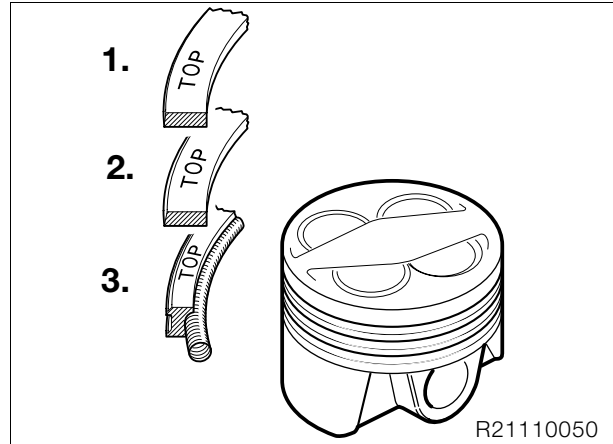


RS110200

- Measure ring gap using feeler gauge.

➡ ..... See Technical Data

## 11 25 Assembling pistons



R21110050

- Carefully fit piston rings to piston in the following sequence, using piston ring pliers:  
3rd groove - coiled-spring ring  
2nd groove - micro-chamfer ring  
1st groove - asymmetric piston ring, oval section

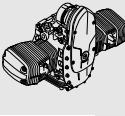
➡ ..... See Technical Data

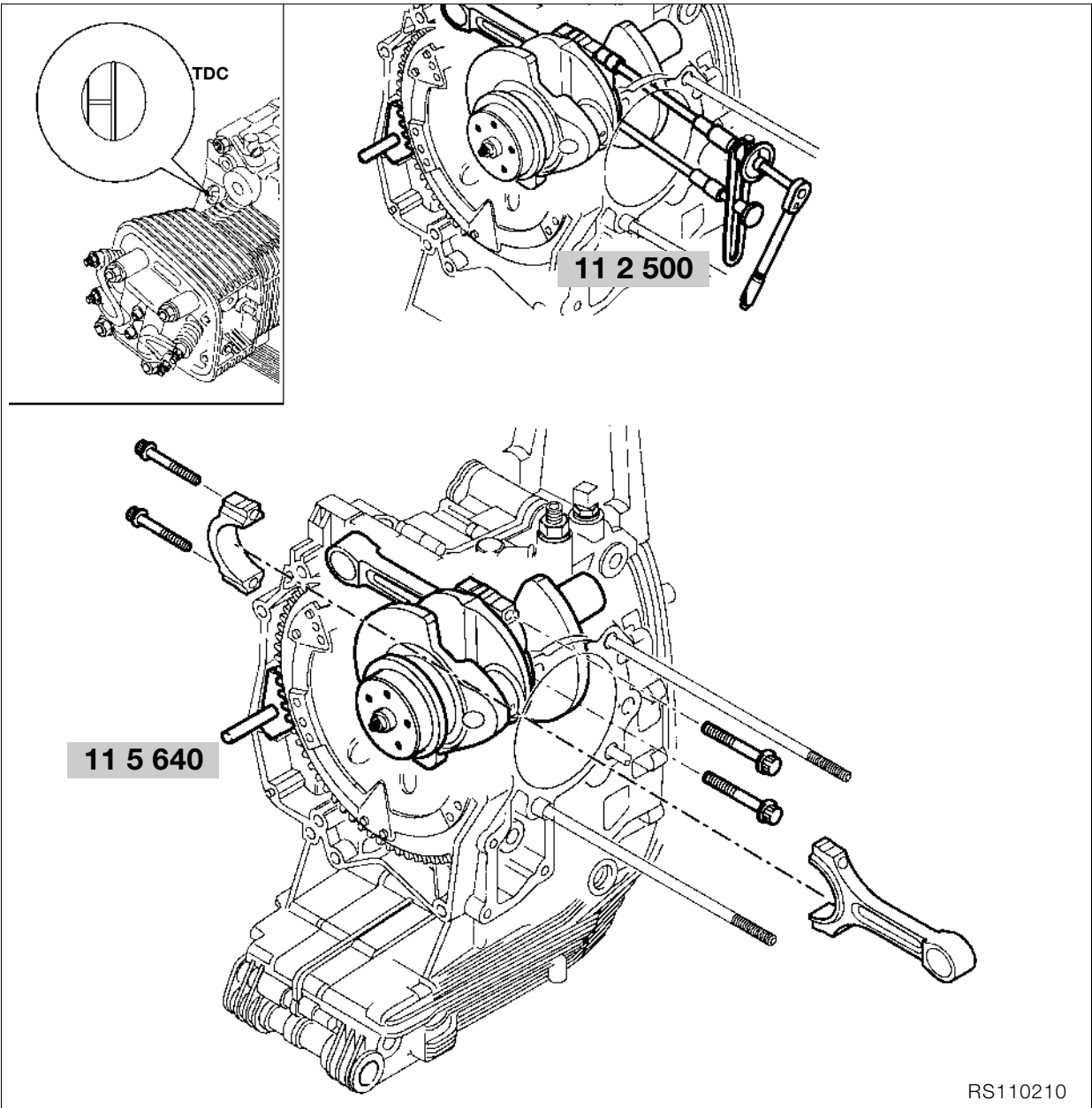
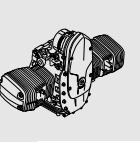


### Note:

Make sure that the gap of the coiled spring is offset approximately 180° from the gap of the oil control ring.

Install with "TOP" uppermost.





## 11 24 Removing and installing conrods

- Turn crankshaft to TDC position.
- Install locking device, **BMW No. 11 5 640**, to lock clutch housing.
- Remove conrods.



### Note:

Conrods can also be removed and installed with the crankshaft removed.



### Attention:

Do not mix up conrods or bearing shells. Use a felt-tipped pen or similar to mark the installed positions on the conrods.

- Install conrods.



### Attention:

Oil the bearings.

- Screw in the big-end bolts in by hand and tighten with commercially available angle-of-rotation indicator or tightening angle indicator, **BMW No. 11 2 500**.



### Note:

When using tightening angle indicator, **BMW No. 11 2 500**, make sure the extensions are of the same length. Use a 3/8" square-drive socket wrench.



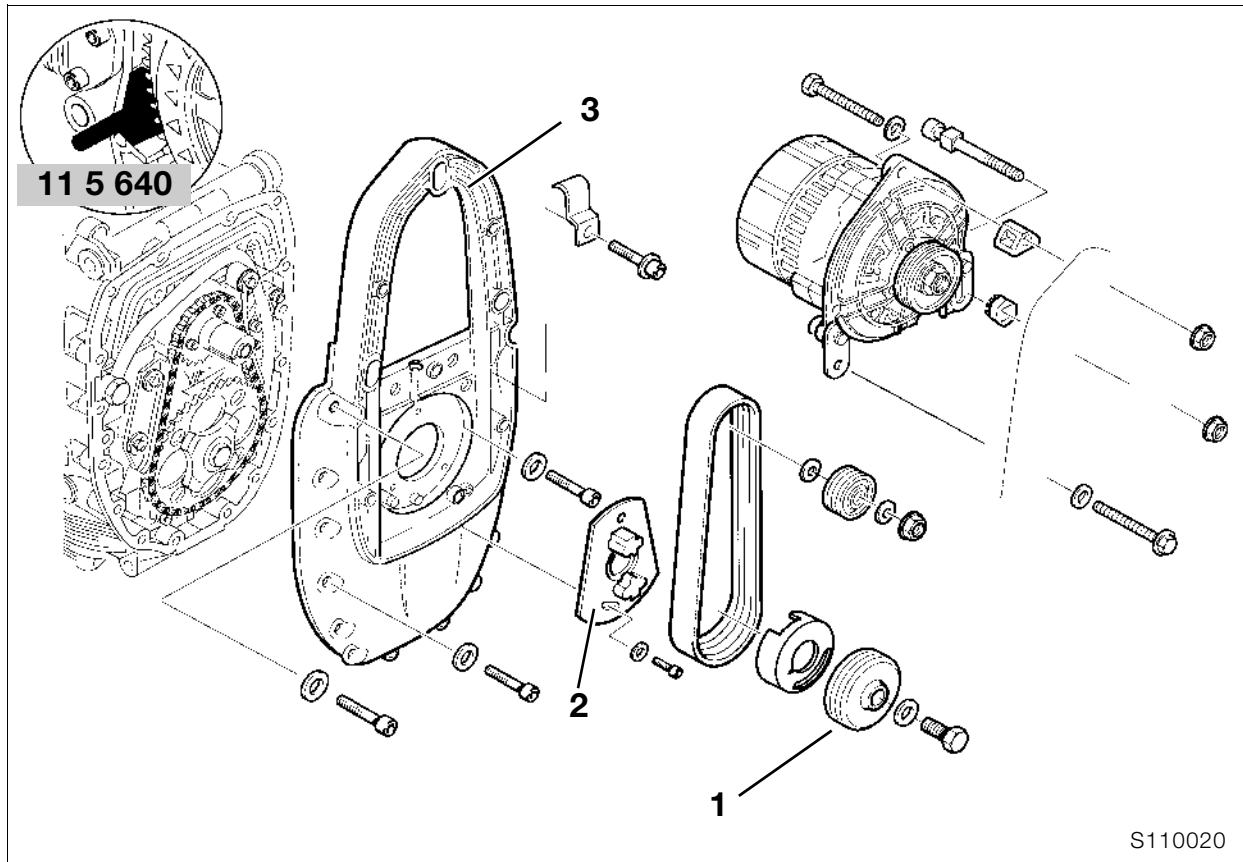
### Attention:

Never re-use the big-end bolts.



### Tightening torque:

Big-end bolts oiled  
 Closing torque ..... 20 Nm  
 Additional angle of rotation..... 80 °



### 11 11 045 Removing and installing alternator mount cover with engine installed

#### Attention:

Disconnect earth (ground) lead from battery.  
Insulate earth (ground) lead.

- Remove the horn.
- Disengage spring strut.
- Disconnect oil cooler line from engine.
- Disconnect the Hall sensor.
- Remove the starter motor.

### 11 11 Removing alternator mount cover

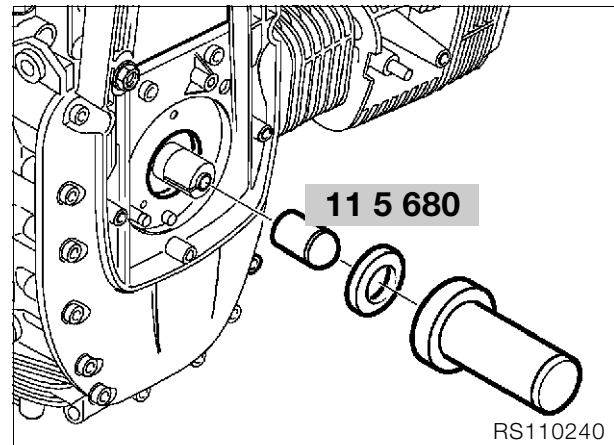
- Remove the alternator.
- Install locking device, **BMW No. 11 5 640**, to lock clutch housing.
- Remove pulley (1).
- Remove magnetic gate (2).

#### Note:

It is not necessary to remove magnetic gate (2) when removing the alternator mount cover as a unit.

- Remove alternator mount cover (3).

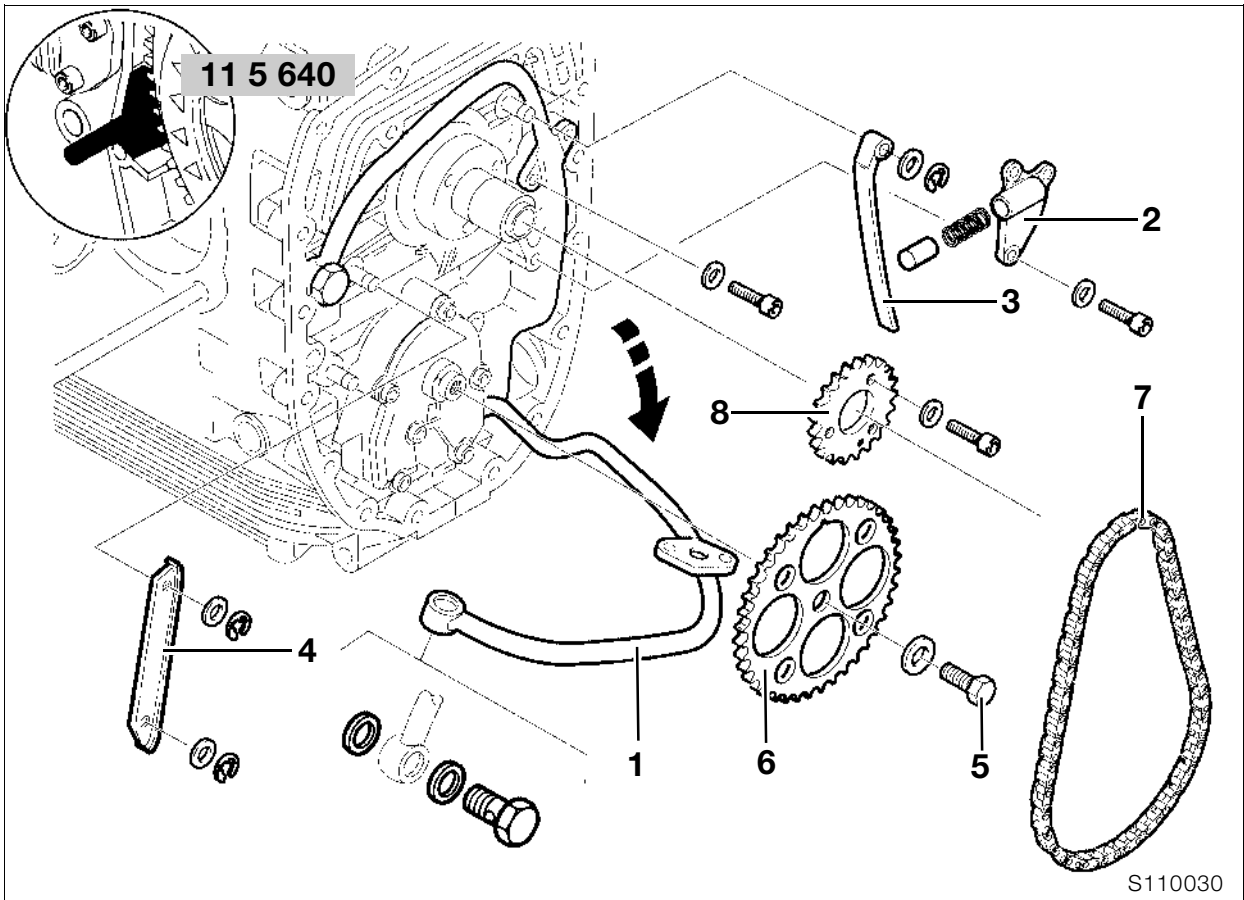
### 11 11 047 Replacing radial shaft seal in alternator mount cover



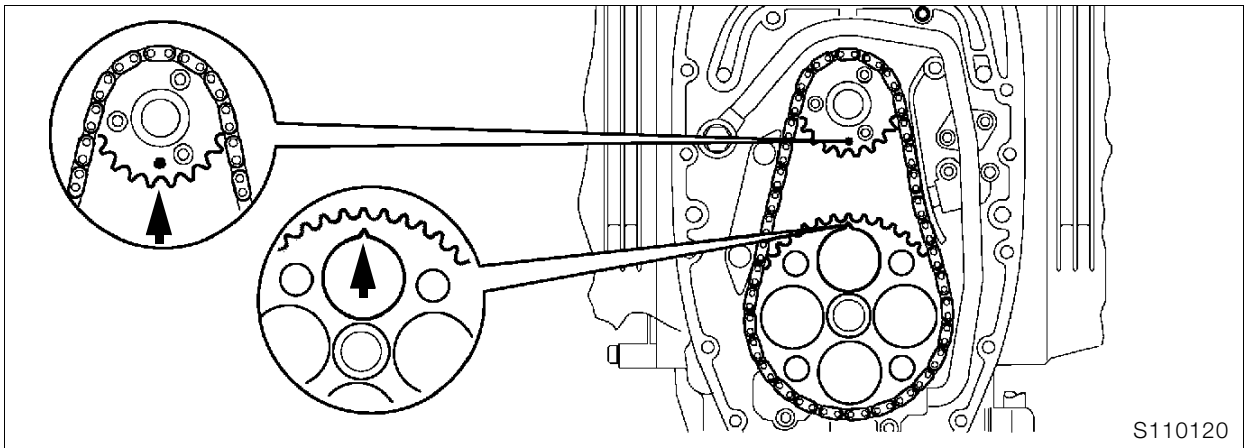
- Carefully lever out radial shaft seal, using a screwdriver.
- Drive in the new radial shaft seal with drift and sliding sleeve, **BMW No. 11 5 680**.

#### Note:

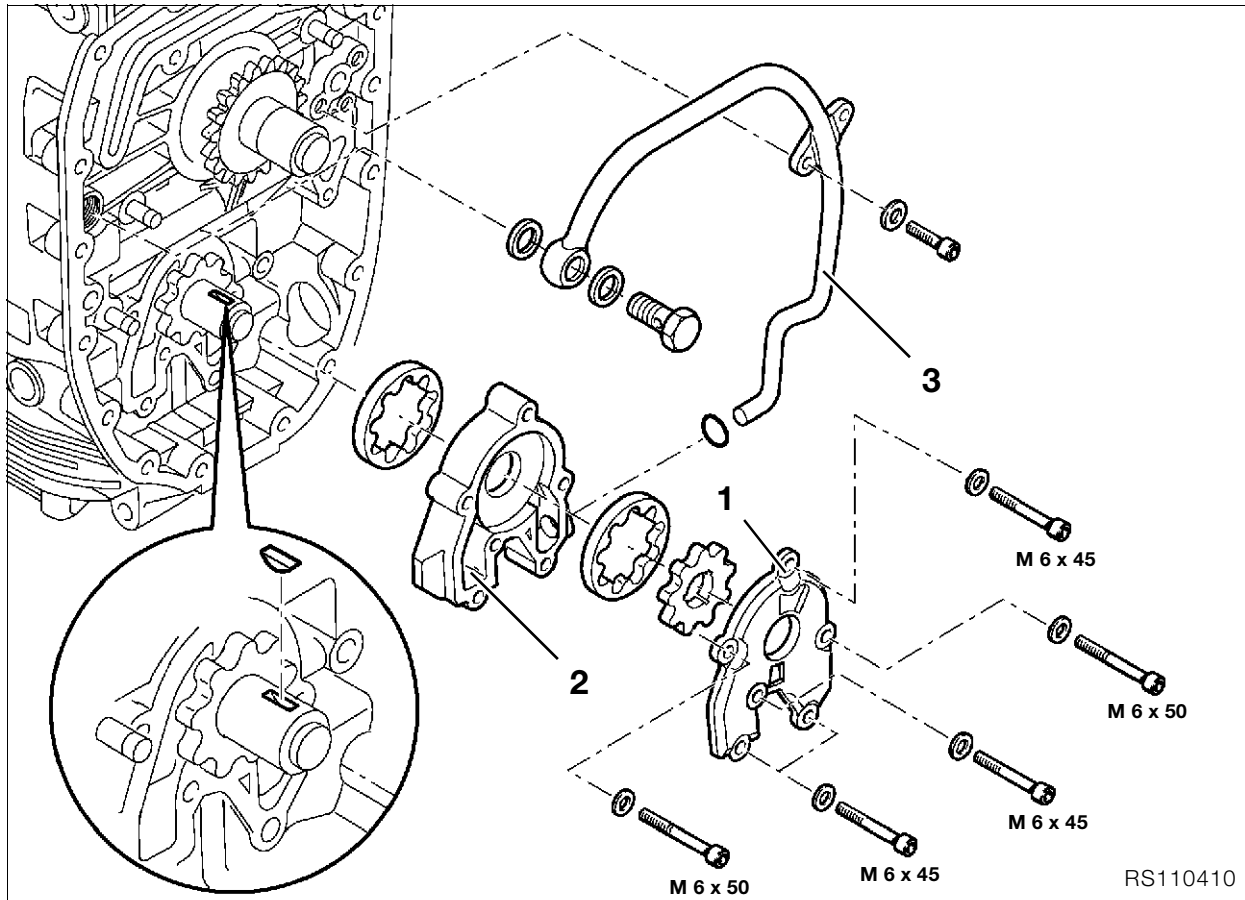
Slide new radial shaft seal over taper on sliding sleeve, pre-shape and pull off.



### 11 31 Removing auxiliary shaft drive



- Align marks (arrows) on timing pinion and timing pinion.
- Remove banjo bolt of cooling oil pipe (1) and swing the pipe forwards.
- Remove chain tensioner (2).
- Remove chain tensioning rail (3).
- Remove chain guide rail (4).
- Install locking device, **BMW No. 11 5 640**, to lock clutch housing.
- Remove chain sprocket retaining screw (5).
- Remove sprocket (6) and timing chain (7).
- If necessary, remove timing pinion (8).



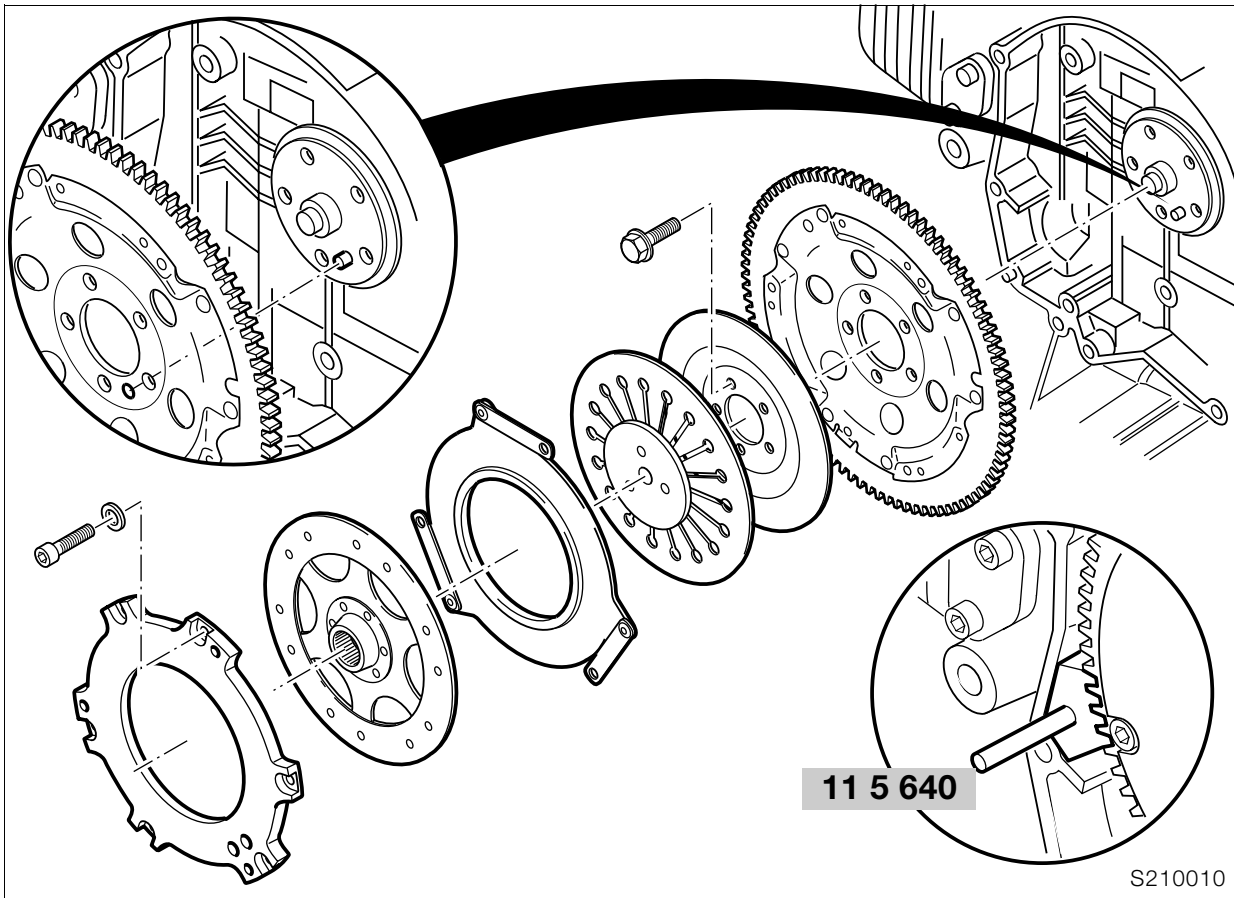
## 11 41 Removing oil pump

- Remove oil pump cover (1).
- Remove complete oil pump (2) together with cooling oil pipe (3), and disassemble.



### Attention:

Make sure that all wear parts are reinstalled in their original positions relative to each other.



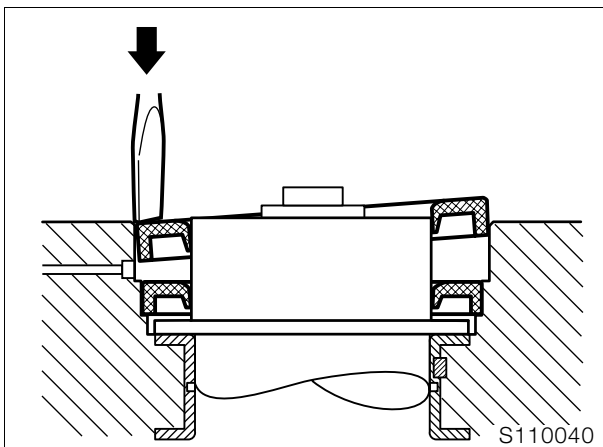
### 11 11 Removing radial shaft seal from crankshaft with engine installed

- Lock clutch housing with special tool, **BMW No. 11 5 640**.
- Remove the clutch.



#### Note:

The radial shaft seals can be removed when the crankcase is disassembled.

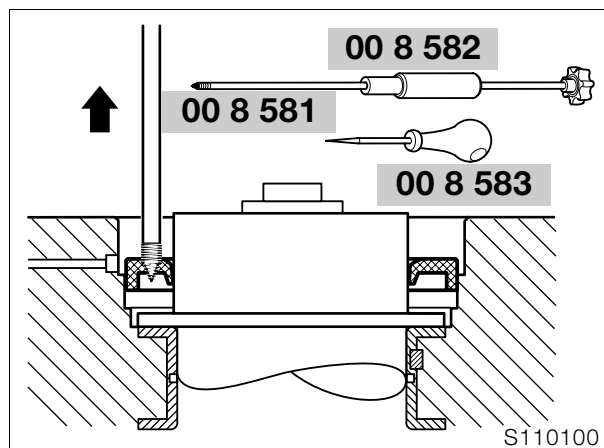


- Carefully lever out radial shaft seal, using a screwdriver.



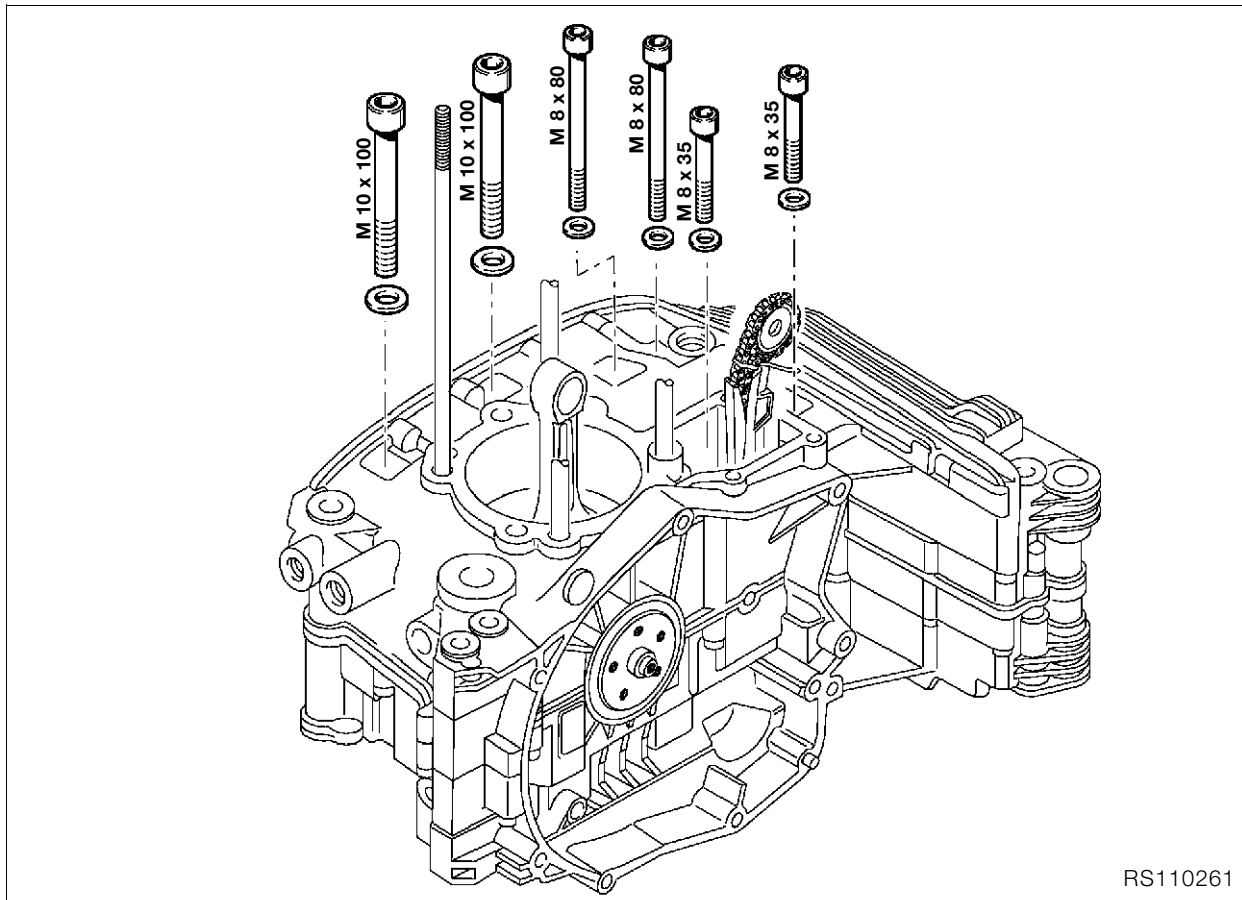
#### Attention:

Take care not to damage the sealing faces of crankcase and crankshaft.



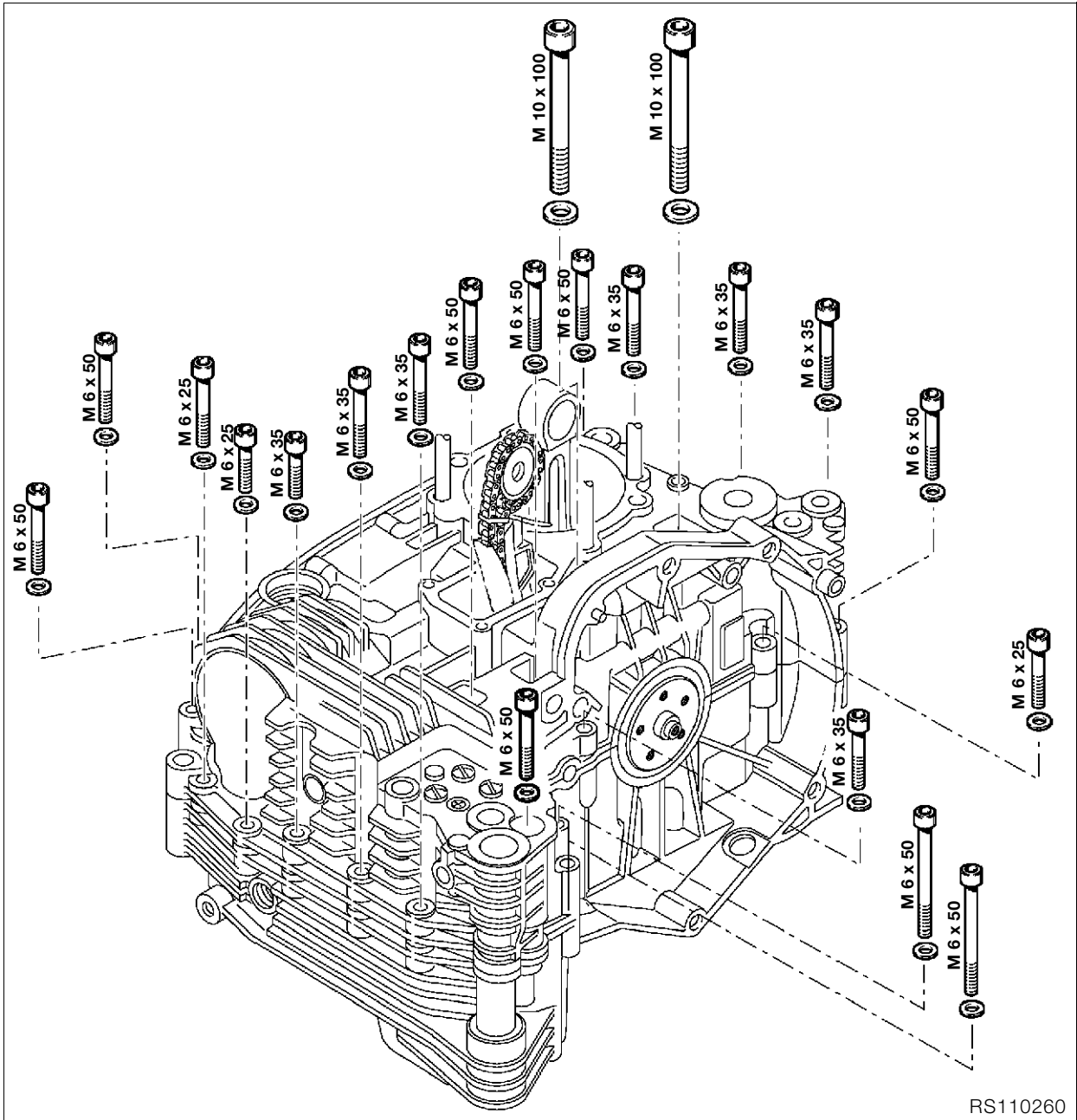
- Using awl, **BMW No. 00 8 583**, carefully punch a hole in the shaft sealing ring.
- Screw the pull rod, **BMW No. 00 8 581**, into the pierced hole and use impact weight, **BMW No. 00 8 582**, to remove the shaft sealing ring.





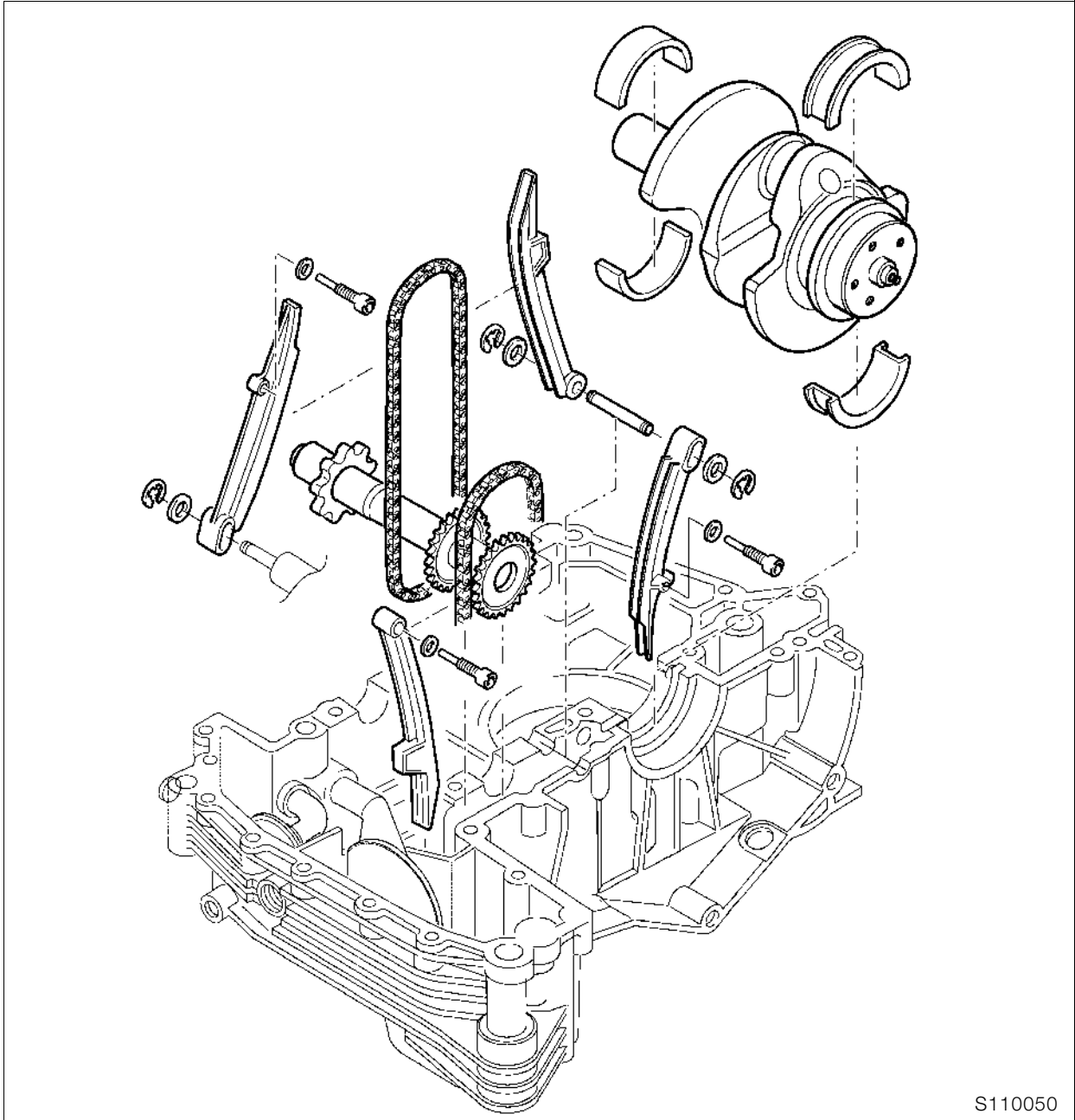
### Disassembling crankcase

- Turn engine on to its side.
- Remove screws on right side.



RS110260

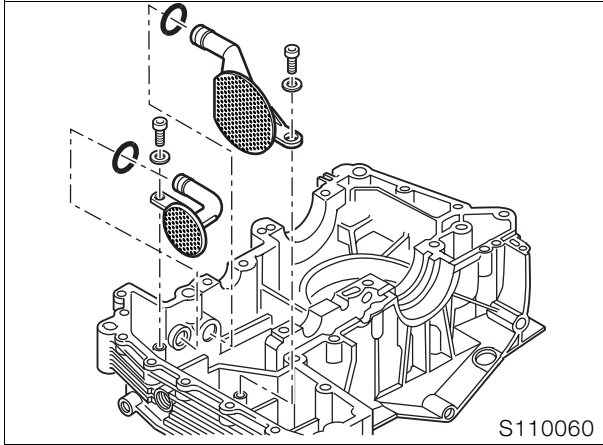
- Turn engine on to its side.
- Remove screws on left side.
- Remove upper section of crankcase.



S110050

Removing crankshaft, auxiliary shaft and timing chain tensioning and slide rails

## Removing and installing oil intake strainers



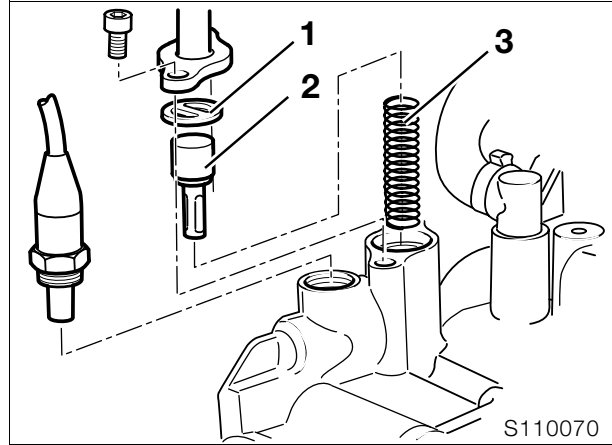
**Tightening torque:**  
M 6 screw ..... 9 Nm

**Attention:**  
Make sure that the O-ring is not omitted, and is installed undamaged.

## 11 11 Replacing oil level sight glass

- Pierce the plastic disc with a large screwdriver and lever out the oil level sight glass.
- Use thinners to remove all traces of oil from the seating face of the sight glass.
- Coat the sealing face of the new oil level sight glass with tyre assembly paste and drive it in with drift, **BMW No. 00 5 550**.

## Removing and installing oil thermostat



- Remove screws securing oil cooler line to fairing bracket.
- Disconnect oil cooler line from crankcase.
- Remove support plate (1), control element (2) and spring (3).
- Installation is the reverse of the removal procedure.

**Tightening torque:**  
M 6 screw ..... 9 Nm

## 11 24 Removing conrods

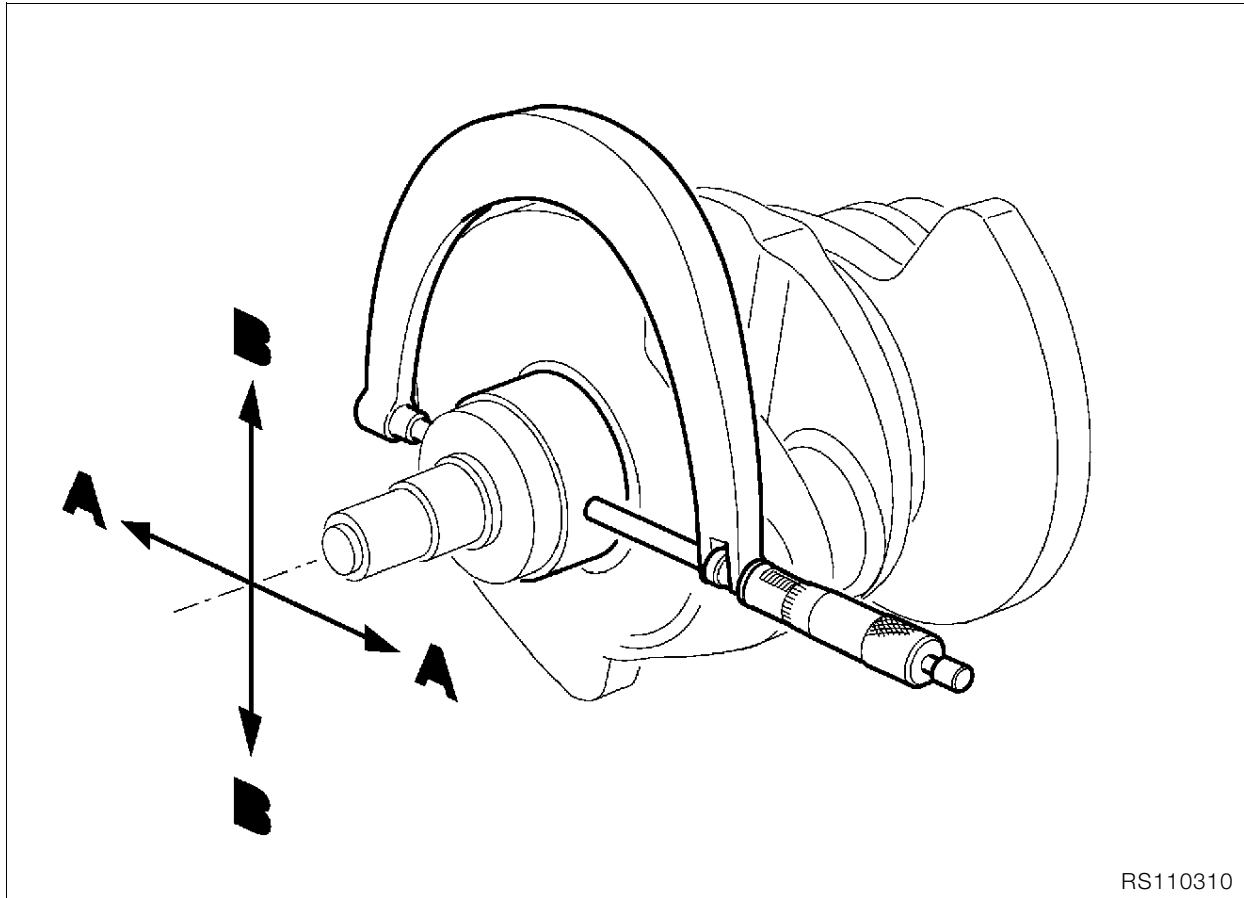
- Clamp crankshaft in a vise with protective jaws.
- Remove conrods.

**Attention:**  
Do not mix up the conrods.

## Checking conrods

- Check conrod dimensions.  
 ↳ ..... See Technical Data

**Attention:**  
Do not attempt to straighten the steel fracture-split conrods – risk of fracture.



## Measuring crankshaft bearing play

### Measuring radial bearing play

- Measure main bearing journal with an external micrometer in two planes, A and B at right angles.
  - Enter measured values on record sheet.
- ➡ ..... See Technical Data

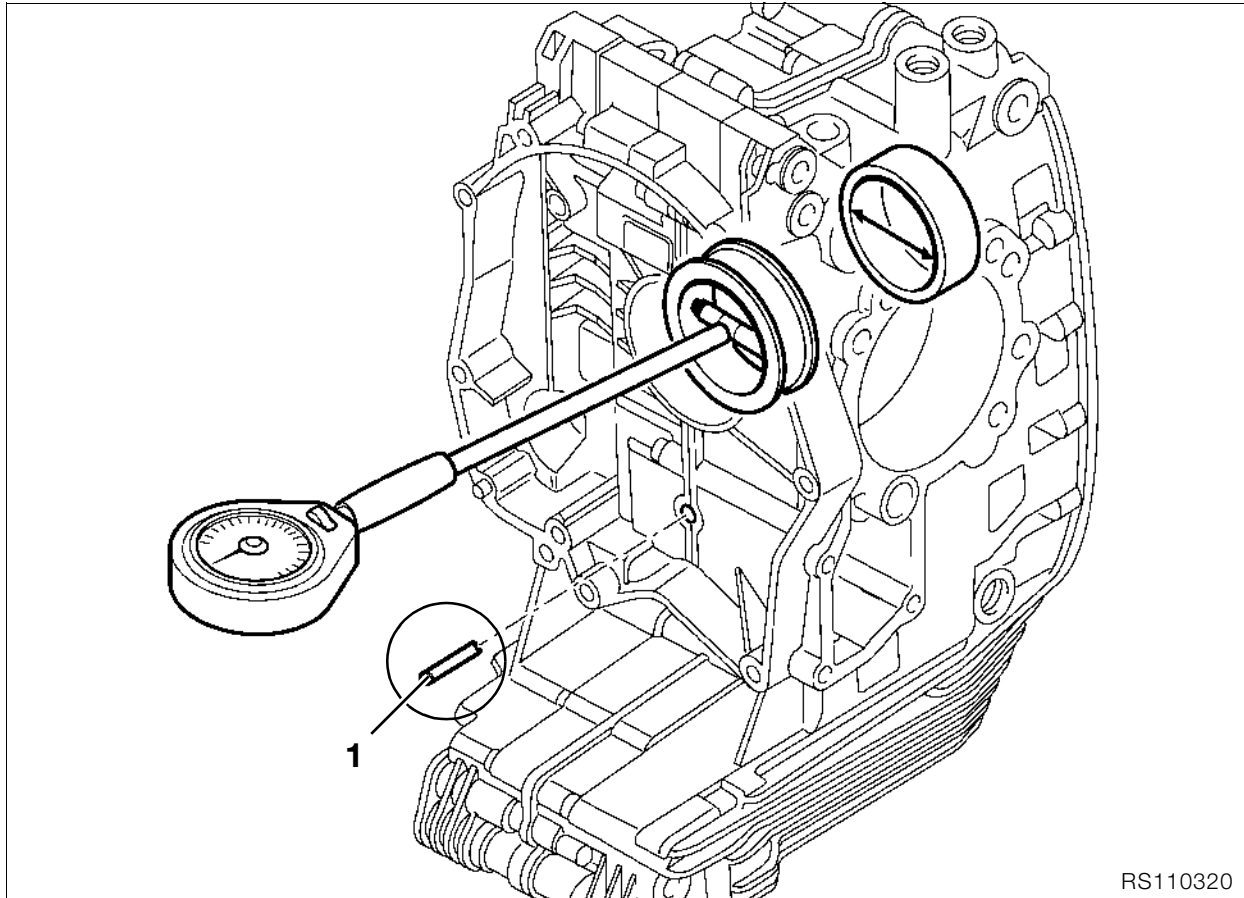


### Attention:

The crankshaft can only be reground in stage 0, and must be hardened and finished afterwards. Grinding stages are identified by a paint mark on the front crank web.

➡ ..... See Technical Data

When replacing the bearing shells, make sure that the colour marks on the crankpins and big-end bearings match.



RS110320

### Installing main bearings

- Insert tensioner rail/slide rail pivot pin (1) for centering purposes.
- Tighten M 8 and M 10 crankcase screws.



### Tightening torque/tightening sequence:

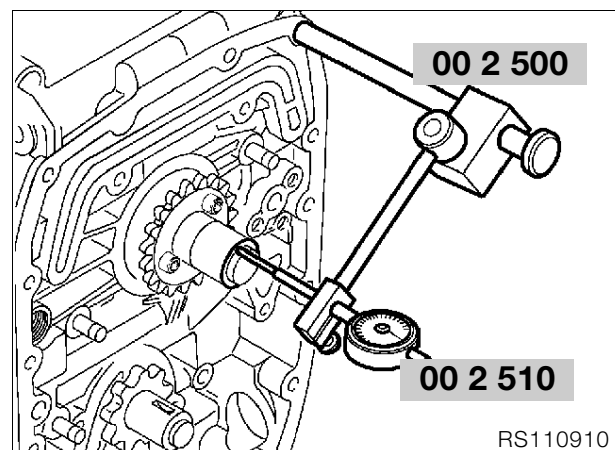
1. M 10 screw (oiled) to initial torque ..... 25 Nm  
Angle of rotation ..... 90°
2. M 8 screw (oiled) ..... 22 Nm

- Measure front and rear bearings in the load direction.
- Enter measured values on record sheet and calculate main bearing play.

➡ ..... See Technical Data

### Measuring end float

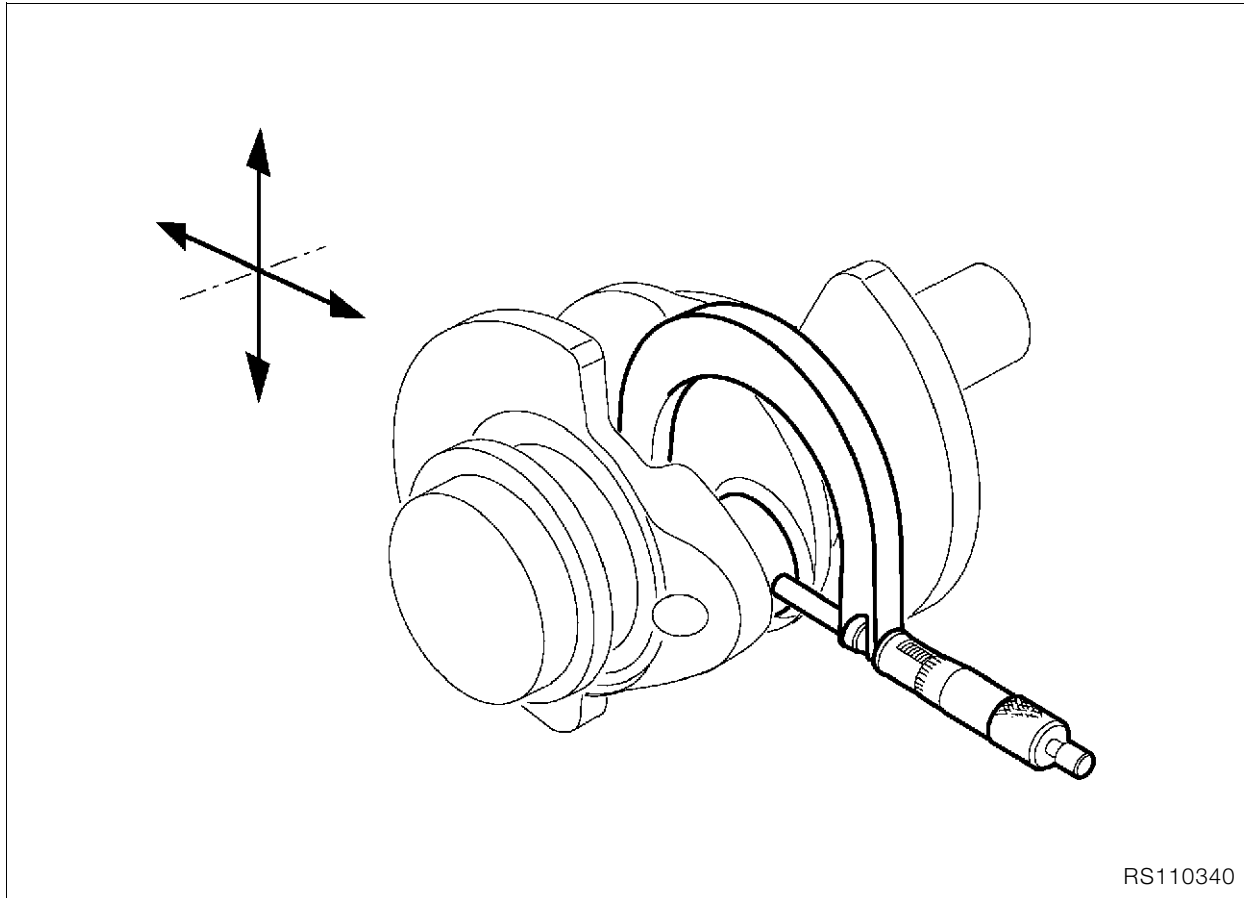
- Place crankshaft in crankcase.
- Insert tensioner rail/slide rail pivot pin (1) for centering purposes.
- Tighten crankcase screws.



RS110910

- Screw measuring device, **BMW No. 00 2 500**, with dial gauge, **BMW No. 00 2 510**, into tapped hole for alternator carrier cover.
- Move crankshaft forwards and backwards and read end float from dial gauge.

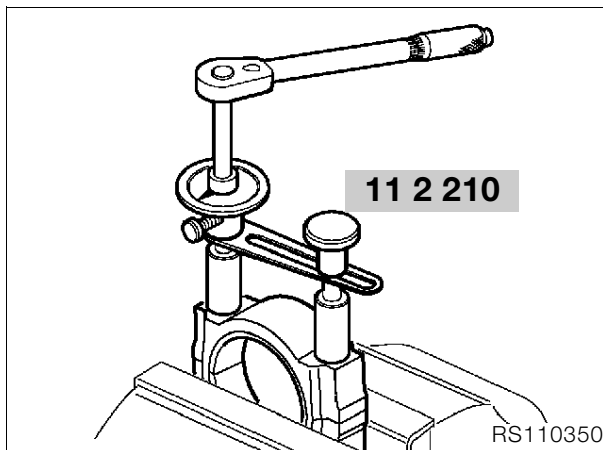
➡ ..... See Technical Data



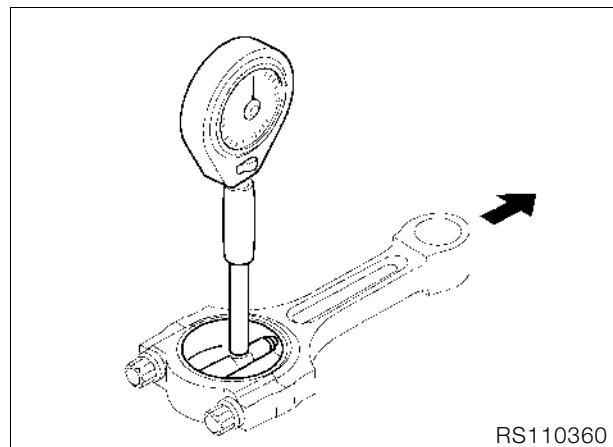
RS110340

### Measuring big-end bearing play

- Measure crankpin with an external micrometer in the thrust direction and offset 90°.



RS110350



RS110360

- Measure big-end bearing with internal micrometer in thrust direction.
- Enter measured values on record sheet and calculate big-end bearing play.

➡ ..... See Technical Data

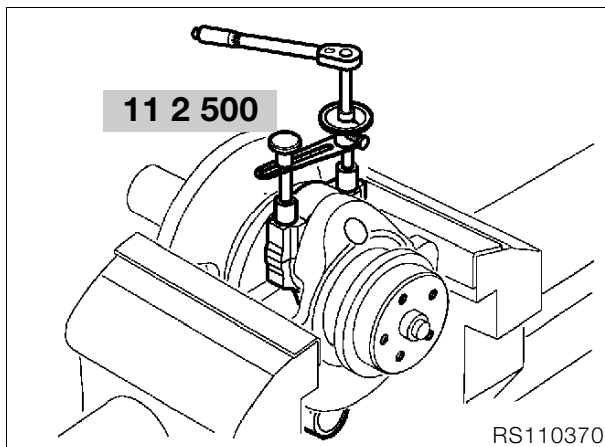
- Install bearing shells and assemble conrods.
- Using tightening angle indicator, **BMW No. 11 2 500**, tighten the big-end bolts.

### Tightening torque:

Big-end bolts oiled  
 Closing torque..... 20 Nm  
 Additional angle of rotation..... 80 °

## 11 00 Assembling engine

### 11 24 Installing conrods



- Clamp crankshaft in a vise with protective jaws.
- Oil the big-end bolts, screw them in by hand and tighten with tightening angle indicator, **BMW No. 11 2 500**.



#### **Attention:**

Oil the bearings.

Do not mix up conrods or bearing shells.

Always use new big-end bolts.

Use a felt-tipped pen or similar to mark the installed positions on the conrods.



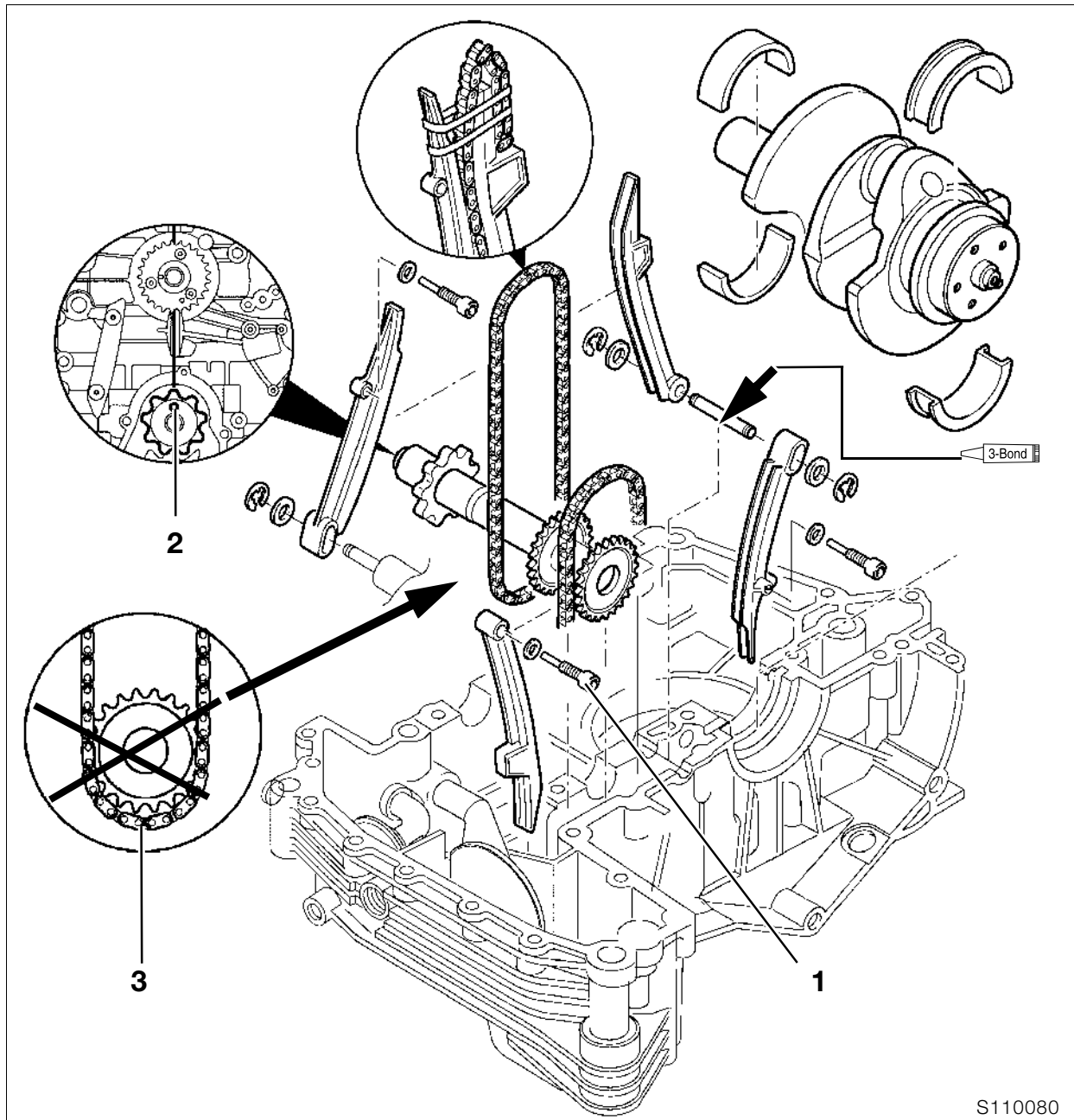
#### **Tightening torque:**

Big-end bolts (oiled)

Closing torque..... 20 Nm

Additional angle of rotation..... 80°





S110080

### 11 21 Installing crankshaft

**⚠ Attention:**  
Oil the bearings.

### 11 31 Installing timing chain tensioning and slide rails

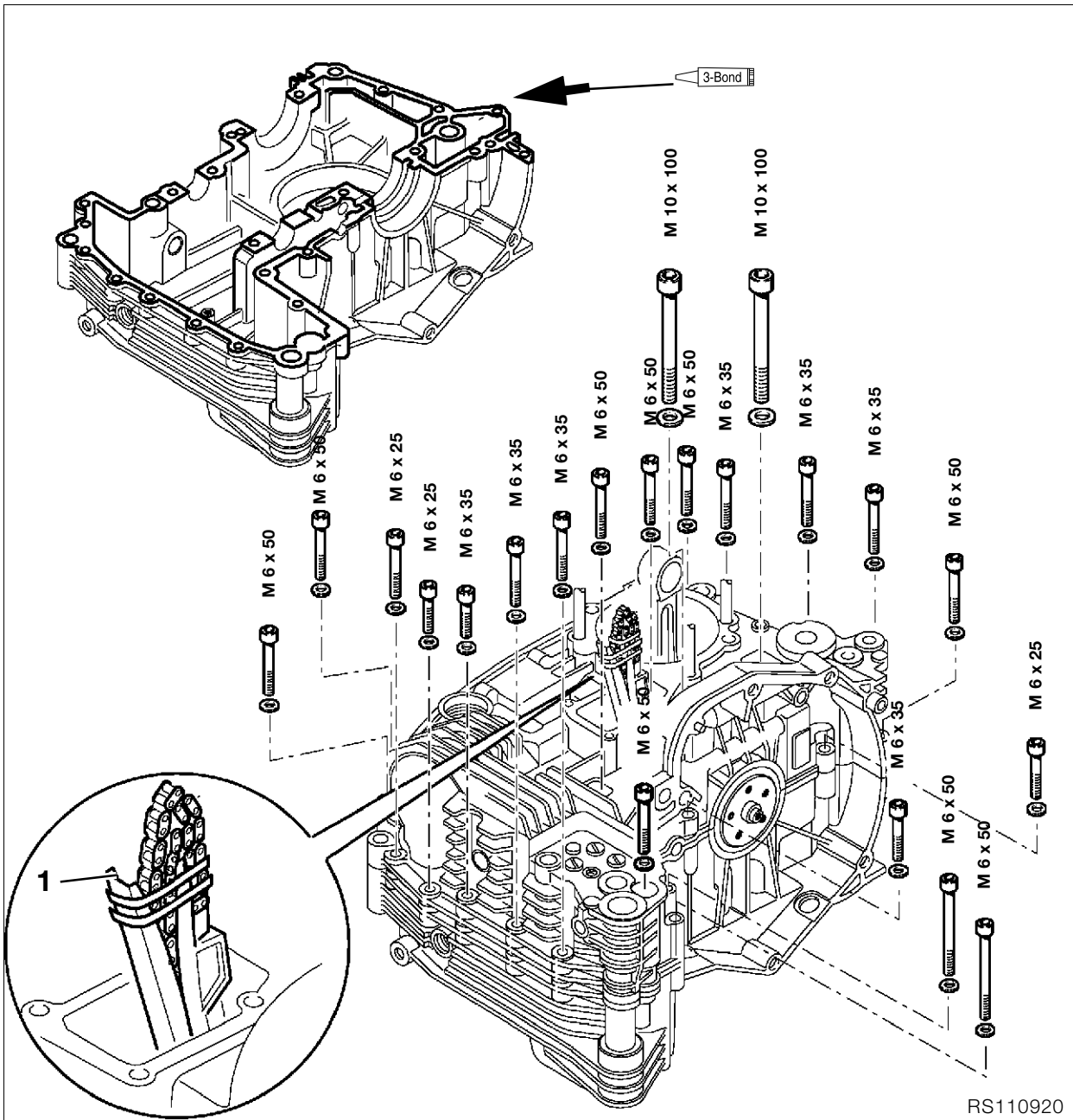
- Seal pivot pin for tensioner rail/slide rail at clutch side (arrow) with **3-Bond 1209**.
- Insert pivot screw (1) into chain tensioner rail, using a new seal.

**🔧 Tightening torque:**  
Pivot screw for chain guide rail..... 18Nm

### 11 31 Installing auxiliary shaft/timing chains

- When installing the auxiliary shaft, make sure that the bore in the auxiliary shaft (2) facing the crankshaft is in line with the crankcase mating face.

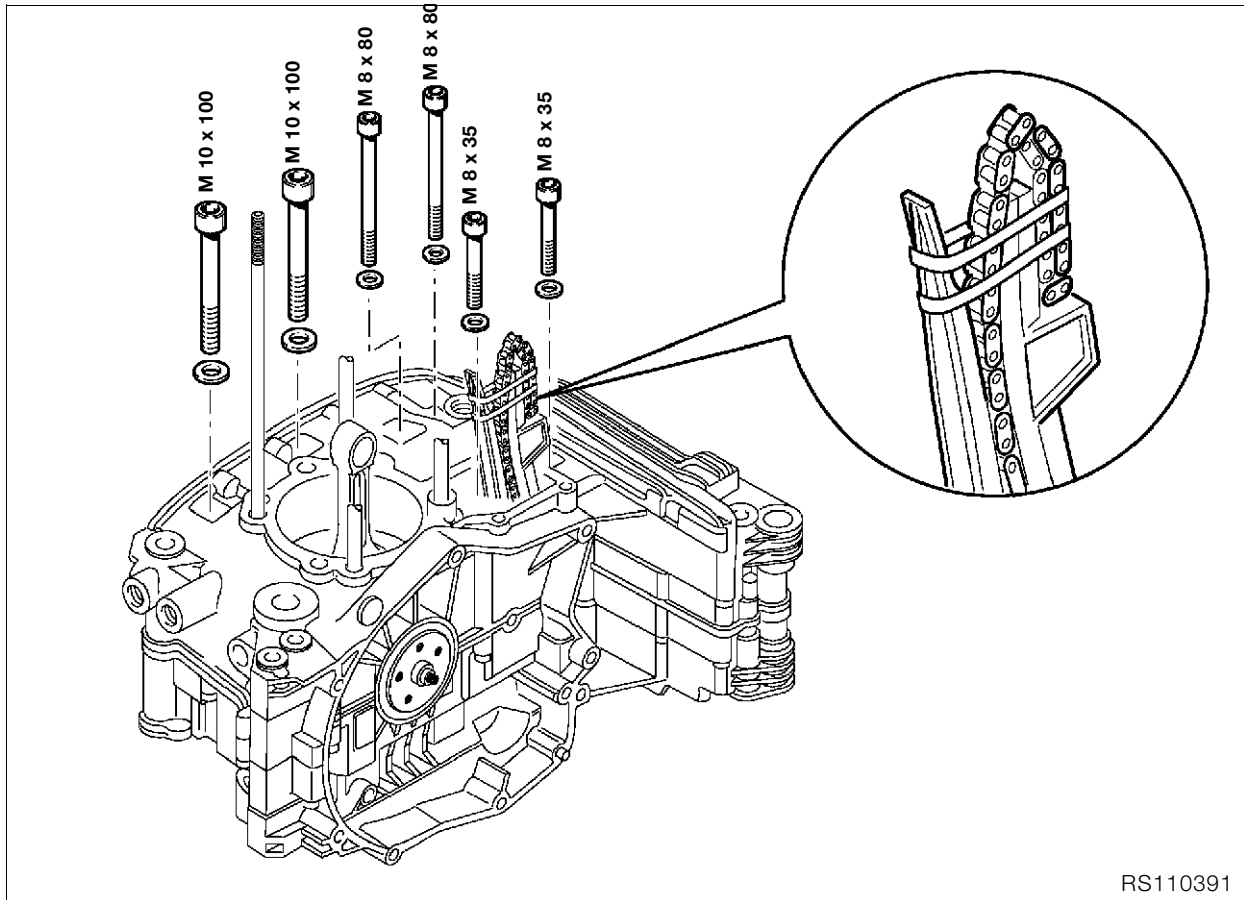
**⚠ Attention:**  
Timing chains (3) must mesh fully with auxiliary shaft sprockets.



RS110920

### Assembling engine block

- Clean and degrease sealing faces (arrow) and coat with **3-Bond 1209**.
- Secure the timing chain with rubber band (1) to the timing chain tensioning and slide rail.

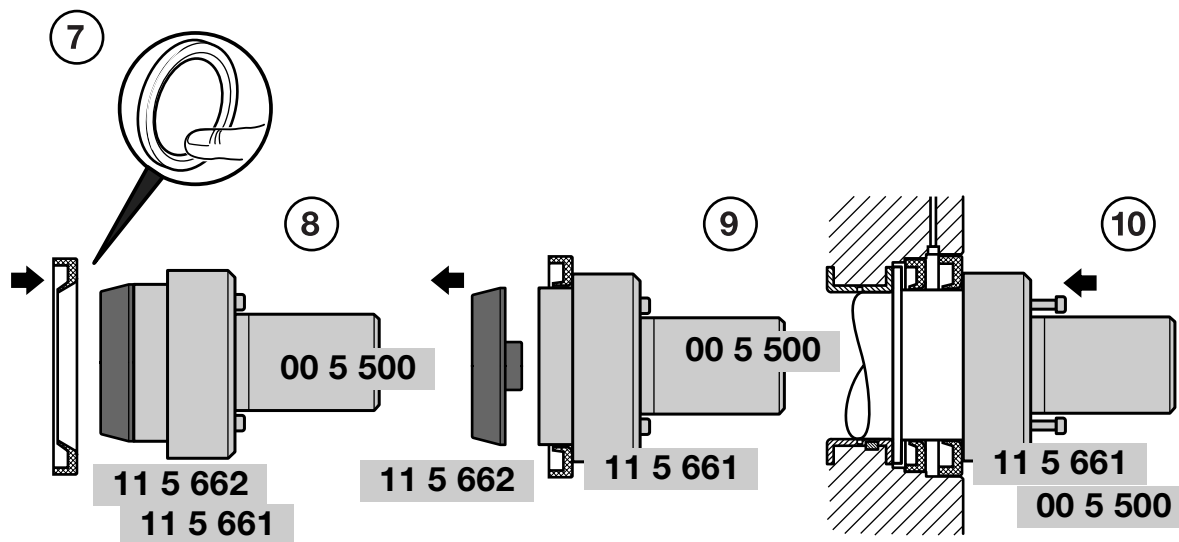
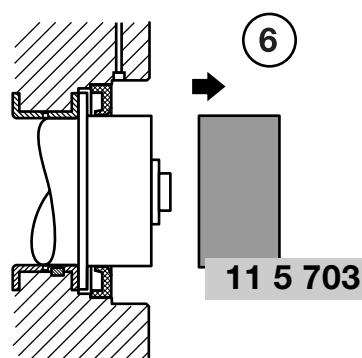
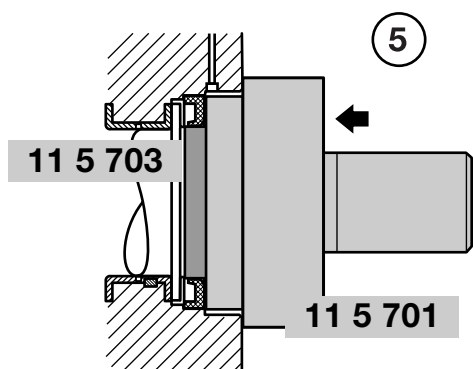
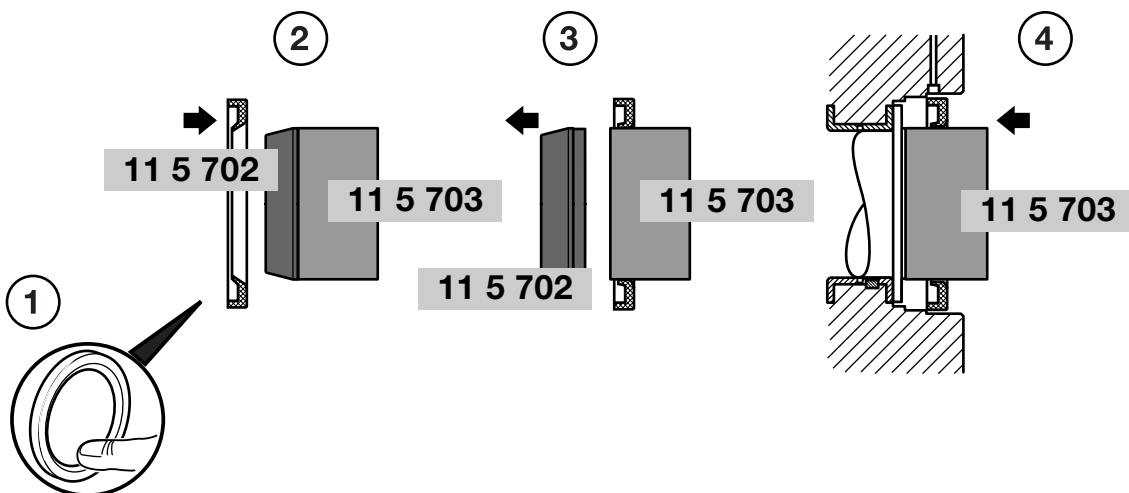
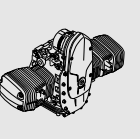


RS110391

- Bolt the crankcase sections together.

 **Tightening torque/tightening sequence:**

1. M 10 screw (oiled) to initial torque ..... 25 Nm  
Angle of rotation ..... 90°
2. M 8 screw (oiled) ..... 22 Nm
3. M 6 screw ..... 9 Nm



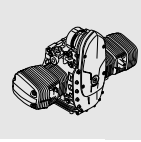
## 11 11 Installing radial shaft seals on crankshaft

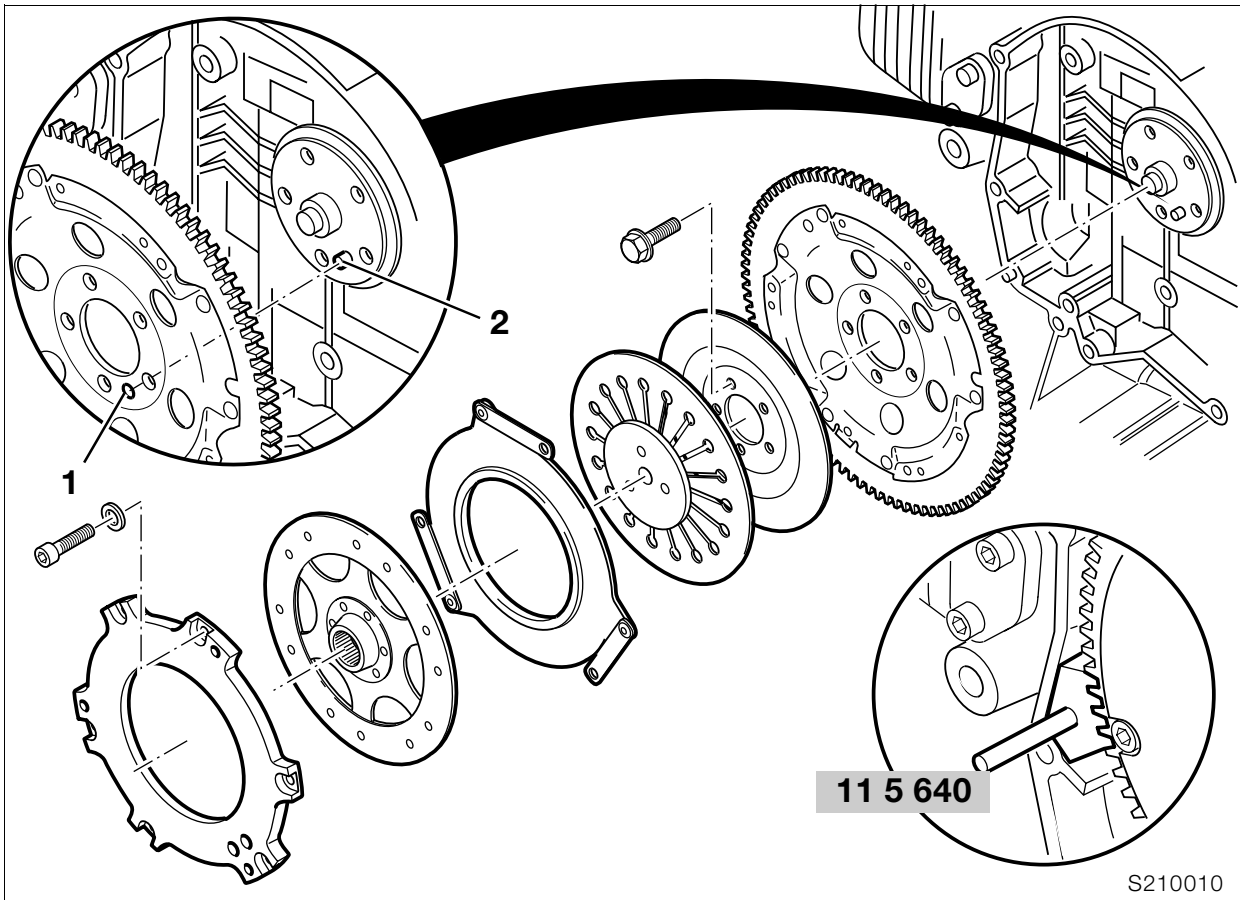
### 11 11 Installing the crankshaft-end radial shaft seal

- Shape the lip of the radial shaft seal carefully by hand (1).
- Oil the radial shaft seal at the sealing/contact surface.
- Using assembly sleeve, **BMW No. 11 5 702**, mount the radial shaft seal with the closed side toward the clutch onto sleeve, **BMW No. 11 5 703**, (2).
- Remove assembly sleeve (3).
- Mount sleeve complete with radial shaft seal on crankshaft (4).
- Use drift, **BMW No. 11 5 701**, together with sleeve (5) to drive the radial shaft seal onto the crankshaft.
- Remove sleeve (6).

### 11 11 Installing the clutch-end radial shaft seal

- Shape the lip of the radial shaft seal carefully by hand (7).
- Oil the radial shaft seal at the sealing/contact surface.
- Using assembly sleeve, **BMW No. 11 5 662**, mount the radial shaft seal with the closed side toward the clutch onto drift, **BMW No. 11 5 661**, with handle, **BMW No. 00 5 500** (8).
- Remove assembly sleeve (9).
- Using the drift, drive the radial shaft seal home (10).





## 21 21 Installing clutch housing



### Attention:

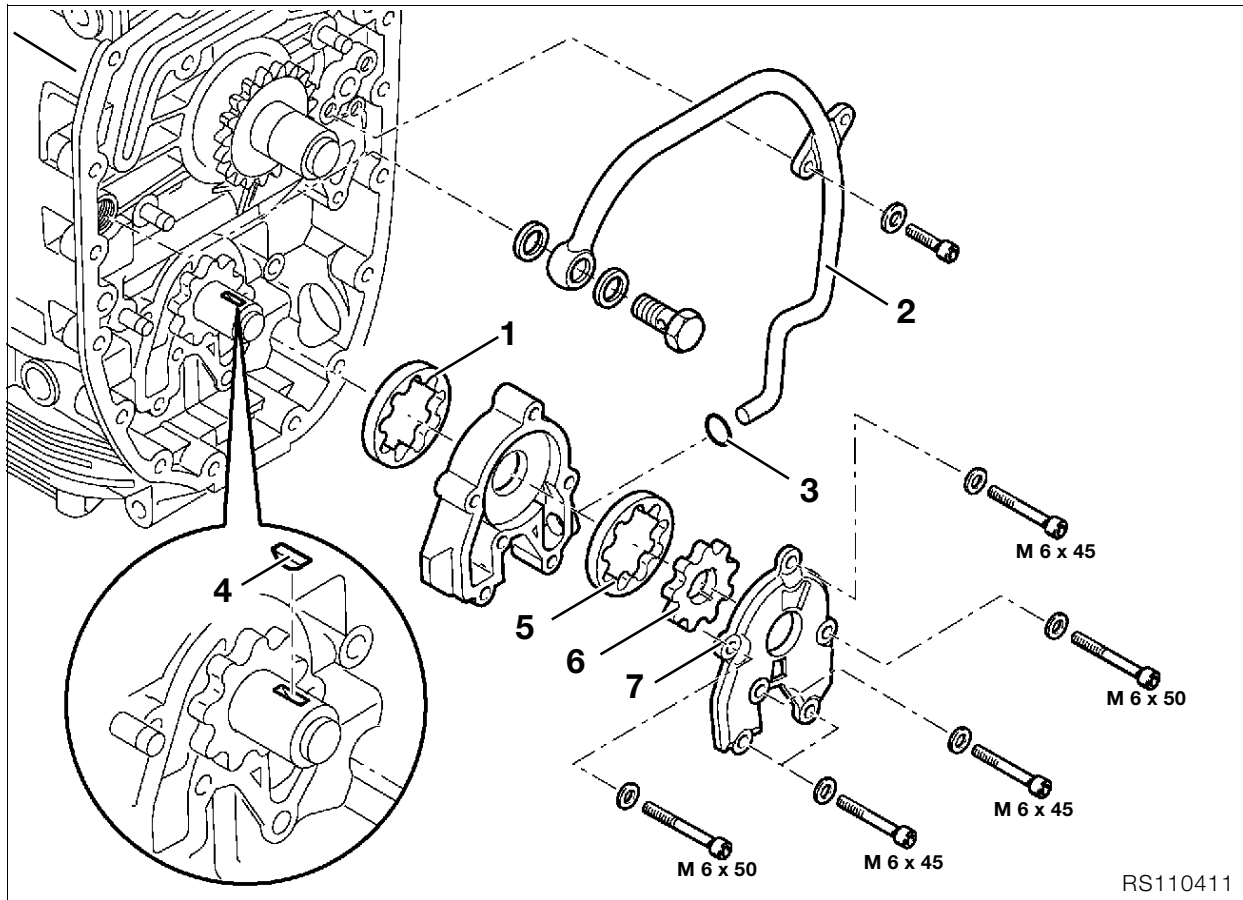
Always use new screws for housing and cover.

- Install clutch housing with mark (1) aligned with crankshaft mark (2).
- Install locking device, **BMW No. 11 5 640**, to lock clutch housing.
- Insert all screws by hand and tighten.



### Tightening torque:

Clutch housing to crankshaft (threads oiled). 40 Nm  
 Additional angle of rotation..... 32°



## 11 41 Installing oil pump

### Attention:

Oil the friction faces.

- Install outer rotor (1) of oil pump in pump housing.
- Install oil pump housing with cooling oil pipe (2).

### Attention:

O-ring (3) must be in perfect condition.

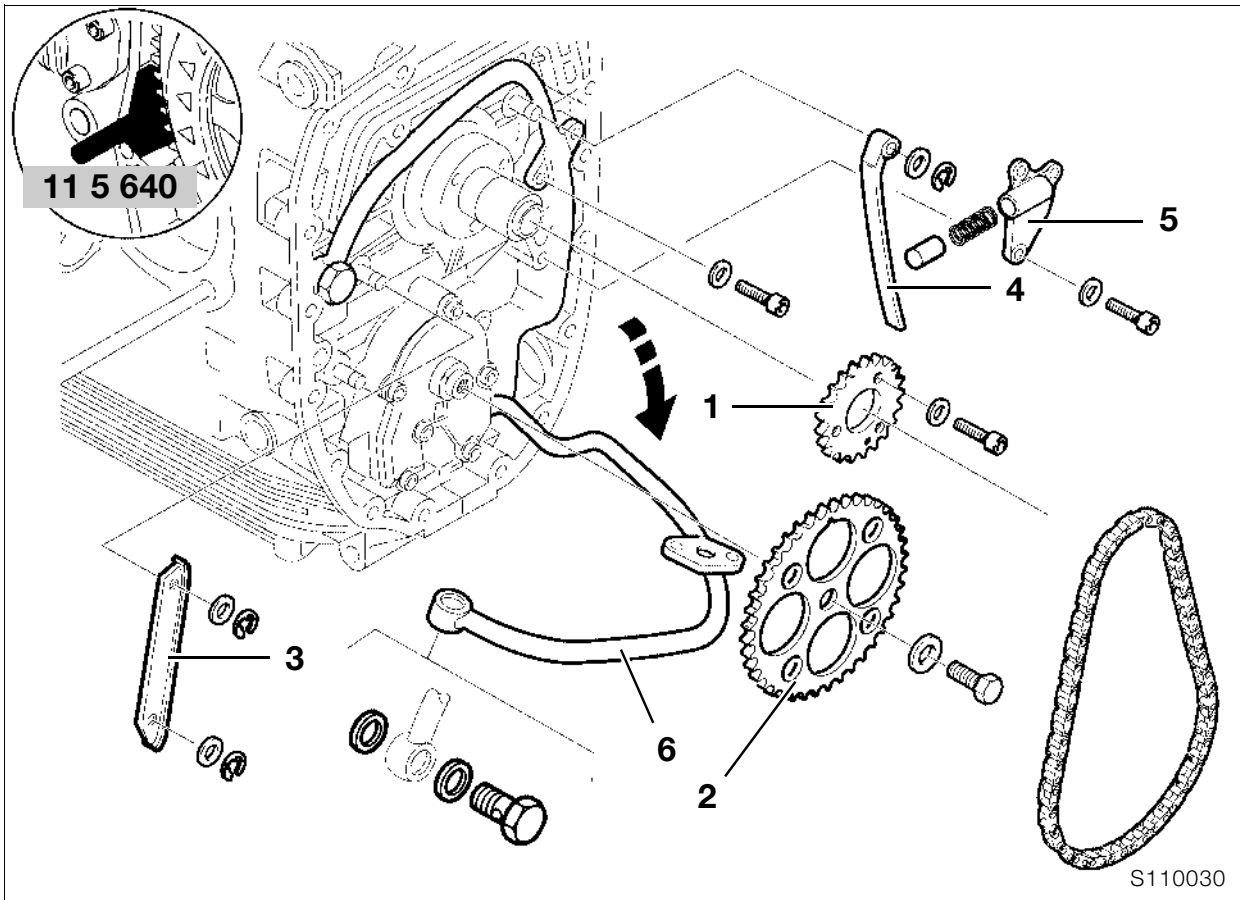
- Install Woodruff key (4), outer rotor (5) and inner rotor (6) in cooling oil pump.
- Secure housing cover (7) to oil pump.

### Attention:

Note different lengths of screws.

### Tightening torque:

M 6 screw .....	9 Nm
Pressure-relief valve .....	42 Nm
Oil-pressure switch .....	30 Nm



### 11 31 Installing auxiliary shaft drive

- Align crankshaft mark with mark on auxiliary shaft.

**! Attention:**  
Adjust according to the adjusting instructions.  
▶ ..... See Technical Data

- Install locking device, **BMW No. 11 5 640**, to lock clutch housing.
- Install chain sprocket (1).

**! Tightening torque:**  
M 6 screw ..... 10 Nm

- Install drive-shaft chain with chainwheel (2).

**! Tightening torque:**  
Securing screw for chainwheel..... 70 Nm

- Install and secure chain guide rail (3).
- Install and secure chain tensioner rail (4).
- Install chain tensioner housing (5) with piston and spring.

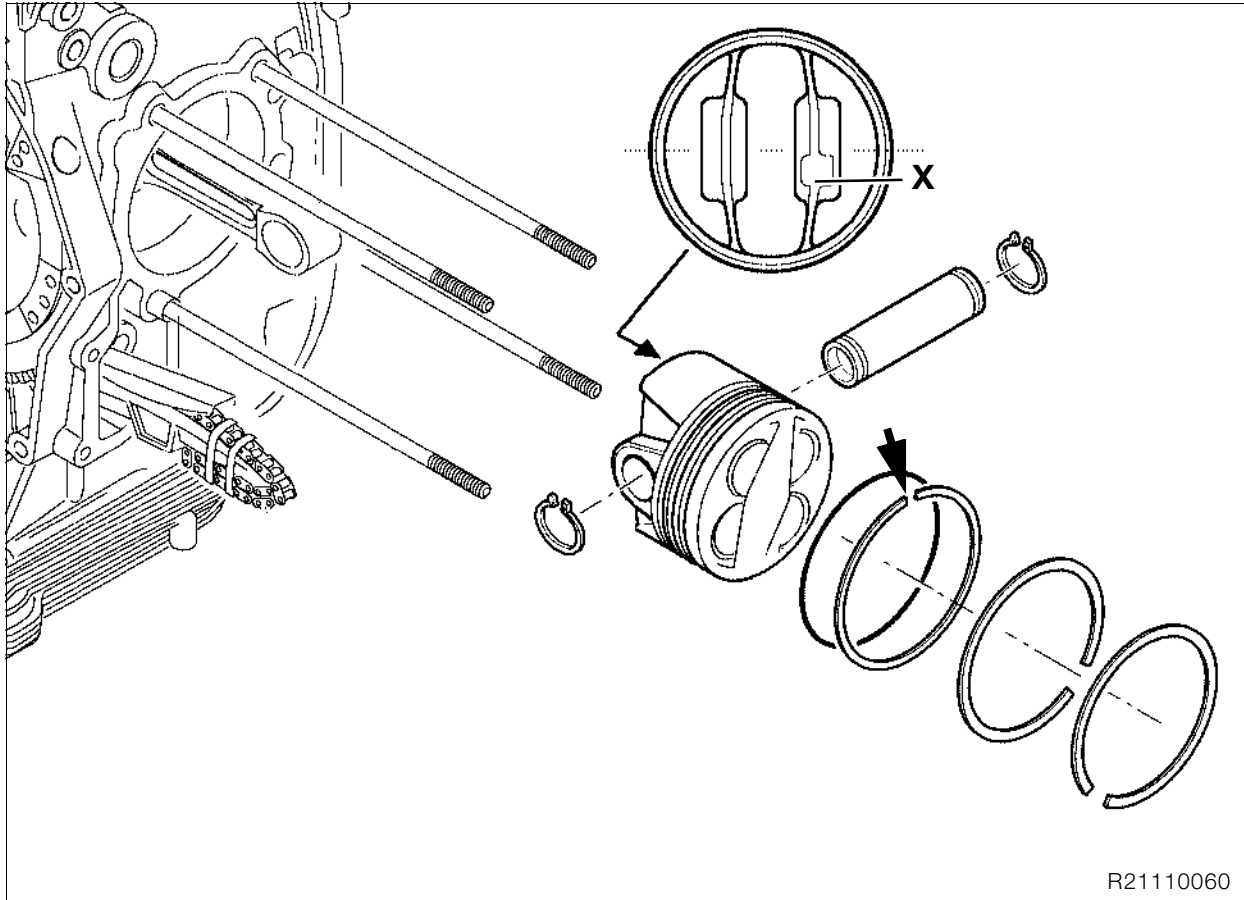
**! Tightening torque:**  
M 6 screw ..... 9 Nm

- Tighten cooling oil line (6).

**! Attention:**  
Use a new sealing ring.

**! Tightening torque:**  
M 6 screw ..... 10 Nm  
Banjo bolt for cooling oil line  
with oil vent valve ..... 25 Nm





R21110060

## 11 25 Installing piston

- Turn oil scraper ring so that gap (arrow) is at top.
- Install piston rings with gaps offset by 120°.

Production locating point **X** = install on exhaust side.



### Attention:

Make sure that retaining rings are properly seated on piston pin.

Oil the friction faces.

Always use pistons of the same weight class in any one engine.

**Markings:** ..... + or -  
 ➔ ..... See Technical Data



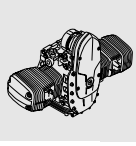
### Attention:

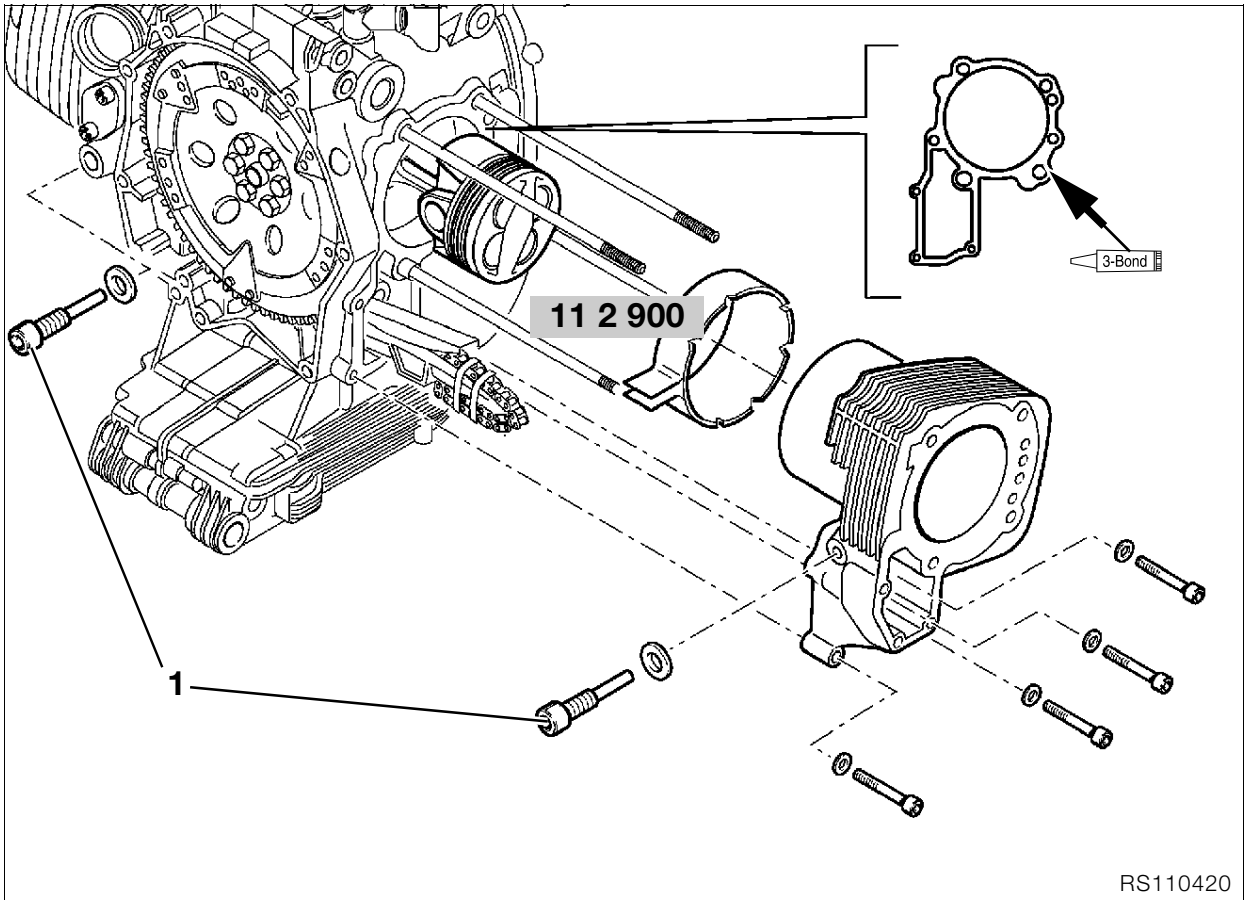
Always install pistons and cylinders in pairs.

Do not mix up pistons and piston pins.

### Piston size identification:

On piston crown A, B, AB (for either A or B cylinder), and on cylinder A, B.

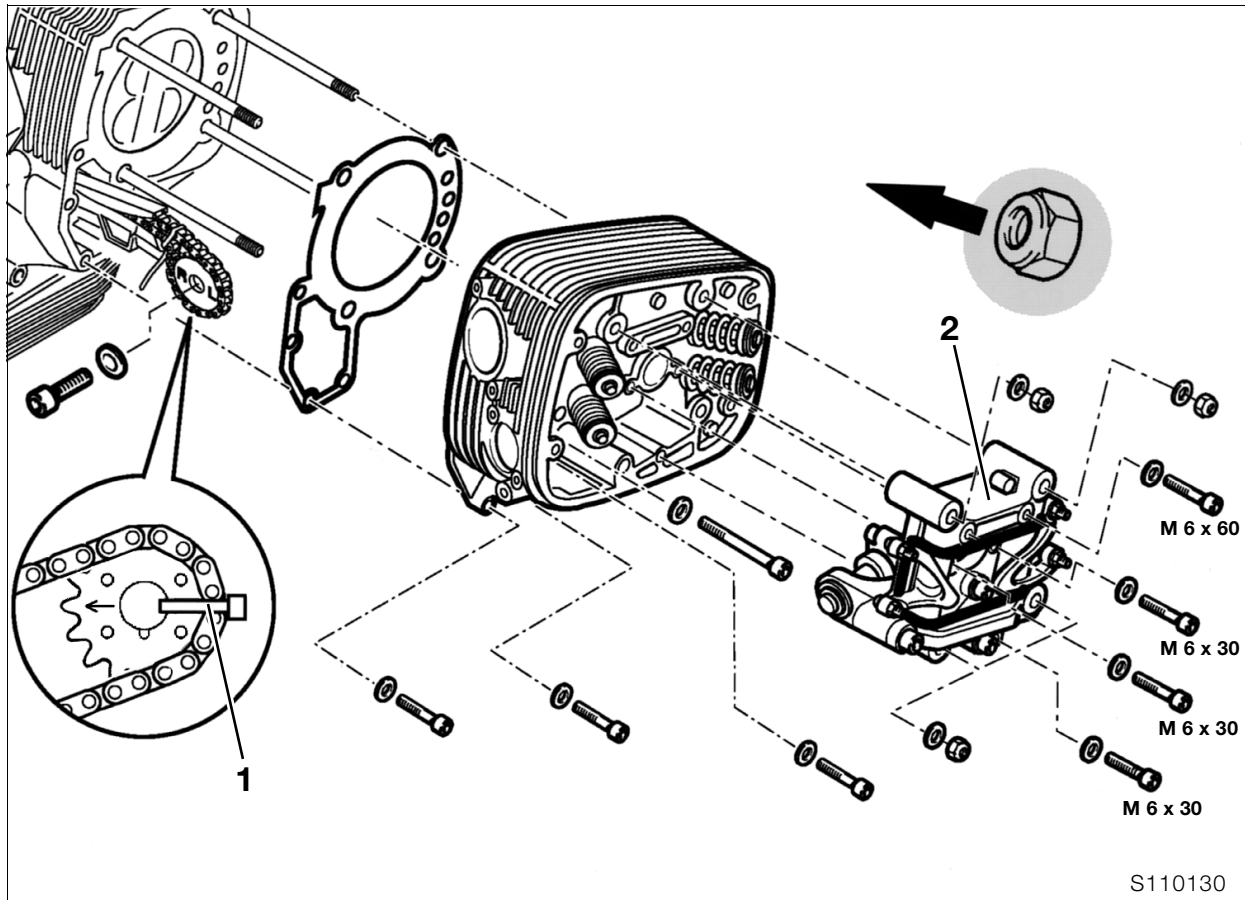




### 11 11 Installing cylinder

- Clean and degrease cylinder base sealing face (arrow) and apply **3-Bond 1209**.
- Oil the cylinder wall.
- Compress the piston rings with a clamping strap, **BMW No. 11 2 900**.
- Install the cylinder and at the same time pass the timing chain and the tensioner and guide rails through the timing case cavity.
- Tighten cylinder securing screws.
- Fit new seals to pivot pins for chain guide rail (1).
- Install chain sprocket.

- ! Tightening torque/tightening sequence:**
1. M 8 screw ..... 20 Nm
  2. M 6 screw ..... 9 Nm
  3. Pivot screw for chain guide rail ..... 18 Nm



## 11 12 Installing cylinder head

- Install cylinder head gasket.
- Fit cylinder head and insert correctly positioned camshaft chain sprocket (1) and timing chain into chain cavity.
- Install valve gear carrier (2).
- Tighten cylinder head securing screws and nuts.



### Attention:

Install cylinder head nuts with collar (arrow) toward cylinder head.



### Tightening torque/tightening sequence:

1. Tighten cylinder head nuts (oiled) in diagonally opposite sequence
  - 1.1 Tighten all nuts ..... 20 Nm
  - 1.2 Tighten all nuts to wrench angle ..... 90°
  - 1.3 Tighten all nuts to wrench angle ..... 90°
2. M 10 screw ..... 40 Nm
3. M 6 screw ..... 9 Nm



### Tightening torque:

- Retighten after 1,000 km (app. 600 miles)  
Tighten cylinder head nuts in diagonally opposite sequence
1. Slacken one nut
  2. Tighten nut to initial torque ..... 20 Nm
  3. Tighten nut to specified wrench angle ..... 180°
  4. Slacken/retighten M 10 screw ..... 40 Nm

- Fit camshaft chain sprocket in accordance with adjustment specification.
- Install locking device, **BMW No. 11 5 640**, to lock clutch housing.
- Tighten camshaft chain sprocket.



### Tightening torque:

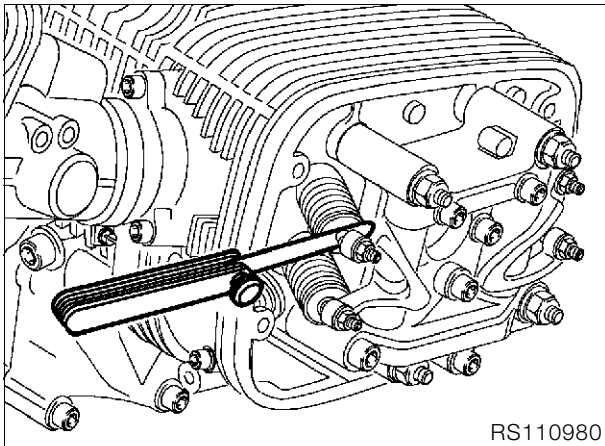
Camshaft sprocket retaining screw ..... 65 Nm

- Insert the left-side camshaft sprocket with pin into the camshaft and set the left cylinder to firing TDC.
- Fit camshaft chain sprocket in accordance with adjustment specification.
- Tighten camshaft chain sprocket.
- Install chain tensioner.
- Check that marks on camshaft sprockets are in accordance with adjustment specification.



### Tightening torque:

Chain tensioner ..... 32 Nm



RS110980

## 11 34 004 Adjusting valve clearances

- Set piston to firing TDC on the ignition stroke.
- Measure valve clearance with feeler gauge.
- Correct valve clearance with adjusting screw and tighten locknut.

### Valve clearances with engine cold (max. 35 °C/95 °F):

Inlet ..... 0.15 mm (0.0059 in)  
 Exhaust ..... 0.30 mm (0.0118 in)

### **Tightening torque:**

Locknut ..... 8 Nm

- Recheck valve clearances. Feeler gauge must pull through between valve stem and adjusting screw with slight resistance.

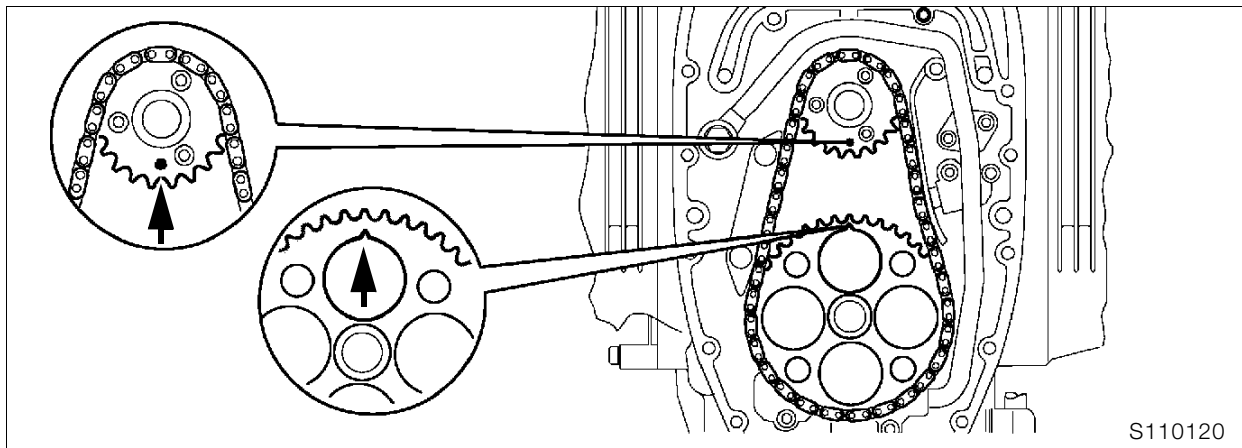
## 11 12 Installing right cylinder head

### Adjustment specification

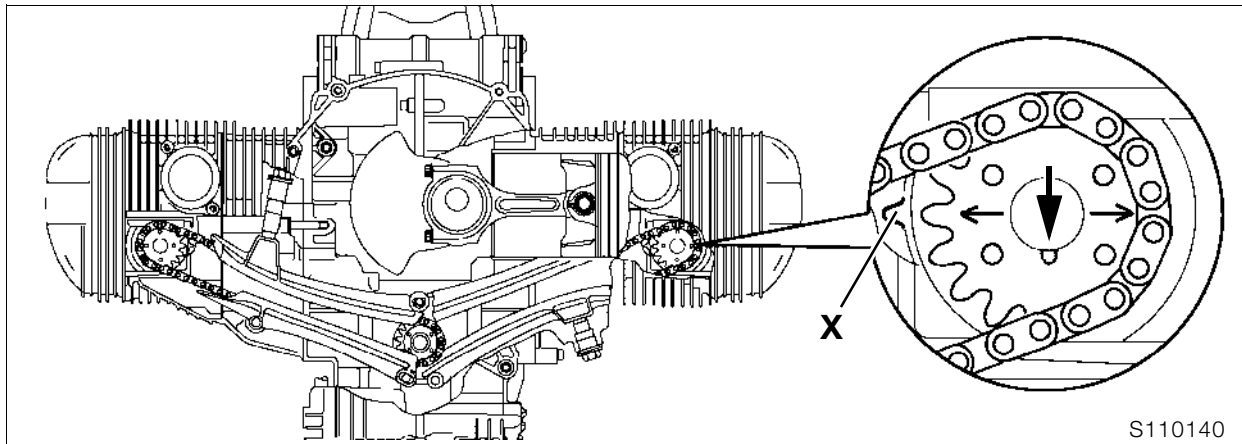


#### Attention:

When assembling, **always** start with **right** cylinder.



Right cylinder = at firing TDC:  
marks (arrows) on chainwheel/auxiliary shaft and  
chain sprocket/crankshaft are aligned.



- Lock engine at firing TDC by inserting pin, **BMW No. 11 2 650**, through holes in clutch housing and engine block.



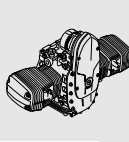
#### Note:

With engine installed, set engine to TDC with dial gauge holder, **BMW No. 00 2 650**, and dial gauge, **BMW No. 00 2 510**.

Right cylinder = at firing TDC:  
Locating pin (arrow) on right camshaft sprocket is at  
bottom.

Mark (**arrow**) and tip of tooth on right camshaft gear  
are **exactly** aligned with mark **X** on valve gear  
carrier.

- Recheck setting with timing chain tensioner in-  
stalled.



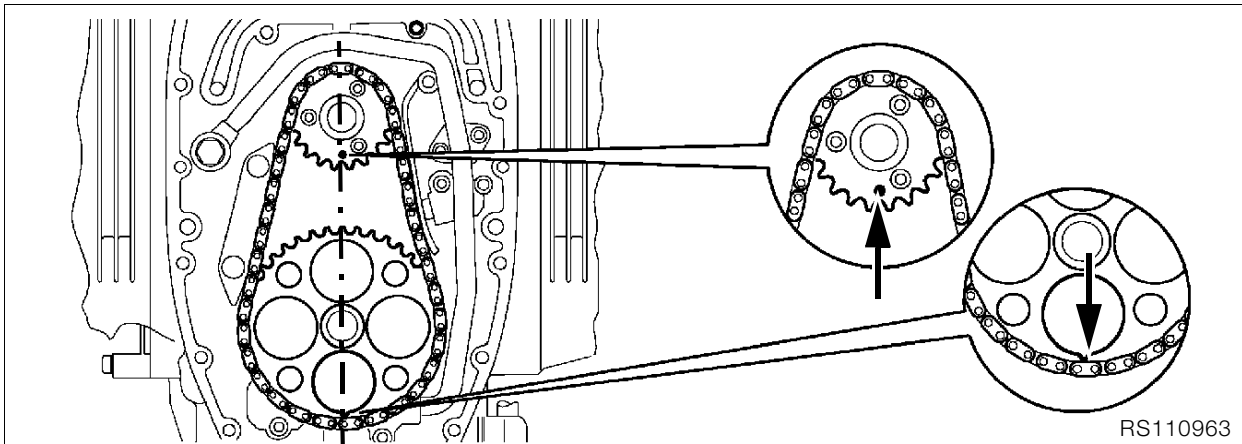
## 11 12 Installing left cylinder head

### Adjustment specification

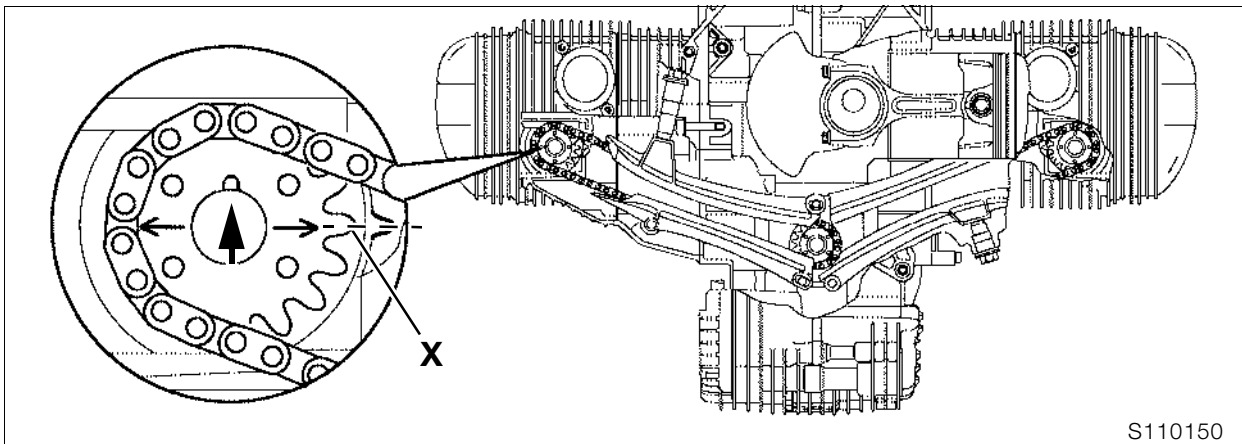


#### Attention:

When installing, **always** begin with **right** cylinder.



Left cylinder = at firing TDC: marks (arrows) on chain sprocket/auxiliary shaft and chainwheel/crankshaft at bottom



- Lock engine at firing TDC by inserting pin, **BMW No. 11 2 650**, through holes in clutch housing and engine block.

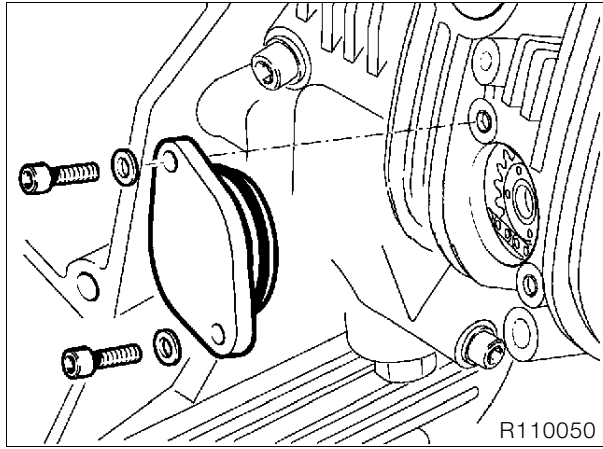


#### Note:

With engine installed, set engine to TDC with dial gauge holder, **BMW No. 00 2 650**, and dial gauge, **BMW No. 00 2 510**.

Left cylinder = at firing TDC:  
Locating pin (arrow) on left camshaft sprocket is at top.  
Mark (**arrow**) and tip of tooth of left camshaft gear are **exactly** aligned with mark **X** on valve gear carrier.

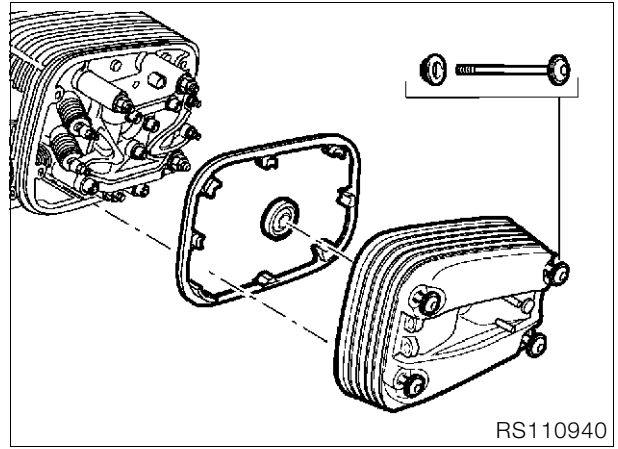
- Recheck setting with timing chain tensioner installed.



- Install the end cover with O-ring in perfect condition.

**Tightening torque:**

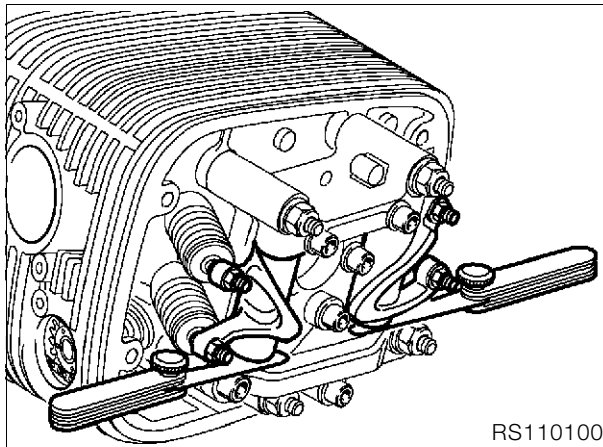
M 6 screw ..... 9 Nm



- Install cylinder head cover.

**Attention:**

Make sure that gaskets are correctly seated. Gaskets and sealing faces must be free from oil and grease.



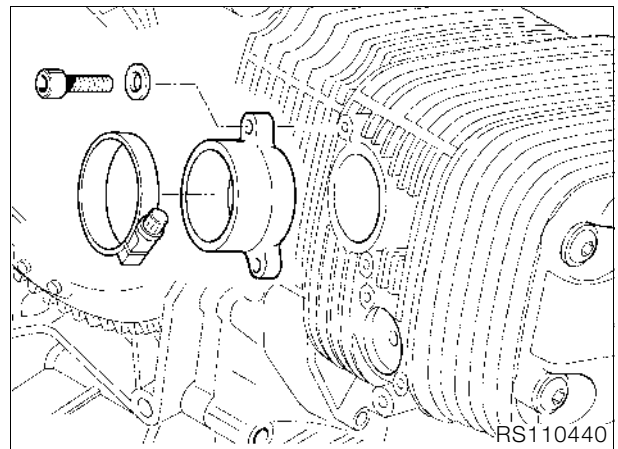
- Adjust the holder for minimum end float.

**Rocker end float:**

min. .... 0.05 mm (0.0020 in)  
 max. .... 0.40 mm (0.0157 in)

**Tightening torque:**

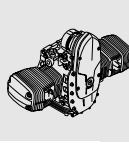
Cover screw ..... 9 Nm

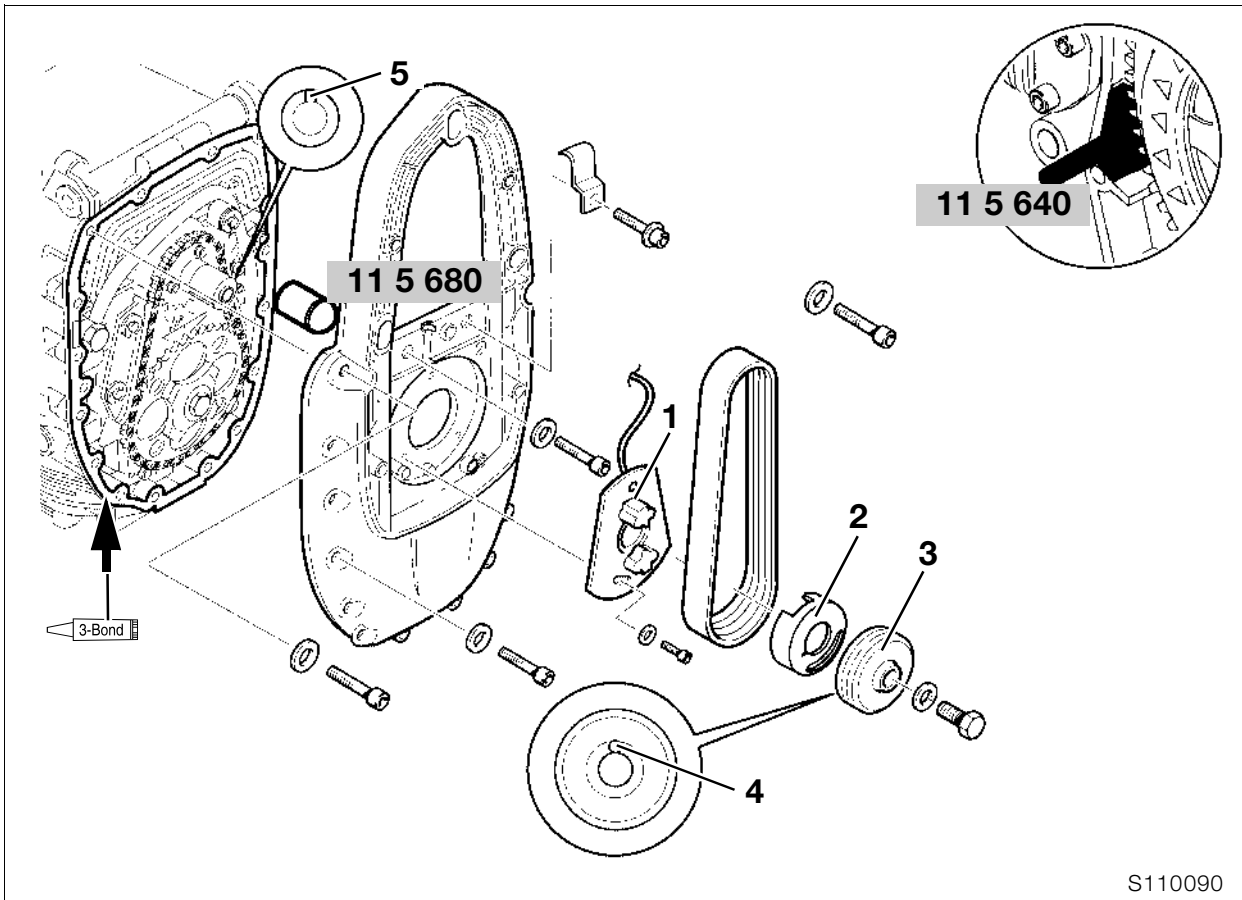


- Secure air intake stub pipe.

**Tightening torque:**

M 6 screw ..... 9 Nm





### 11 11 Installing alternator mount cover

- Place assembly sleeve, **BMW No. 11 5 680**, on crankshaft.
- Clean and de-grease sealing face (arrow) and apply **3-Bond 1209**.
- Install alternator mount cover.



#### Tightening torque:

M 8 screw .....	20 Nm
M 6 screw .....	9 Nm

### 12 11 Installing magnetic gate/belt pulley

- Install Hall-effect trigger plate (1).
- Install locking device, **BMW No. 11 5 640**, to lock clutch housing.
- Secure rotor (2) of Hall-effect gate to the Poly-V-belt pulley (3) with, for example, **Loctite instant adhesive**.
- Install the Poly-V belt pulley.



#### Attention:

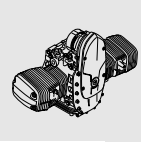
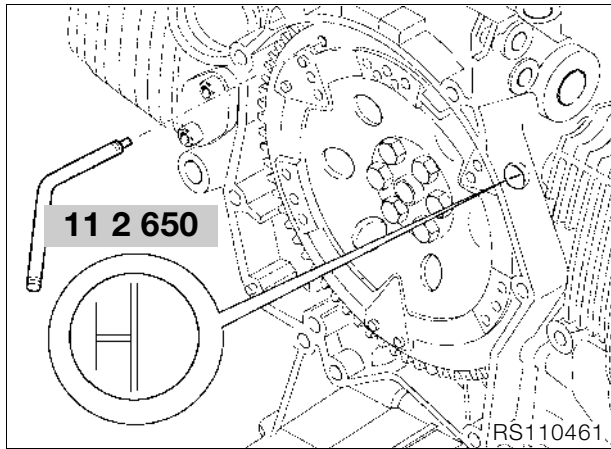
Seat retainer for Hall-effect gate rotor (4) relative to groove/crankshaft (5).



#### Tightening torque:

Retaining screw for belt pulley.....	50 Nm
--------------------------------------	-------





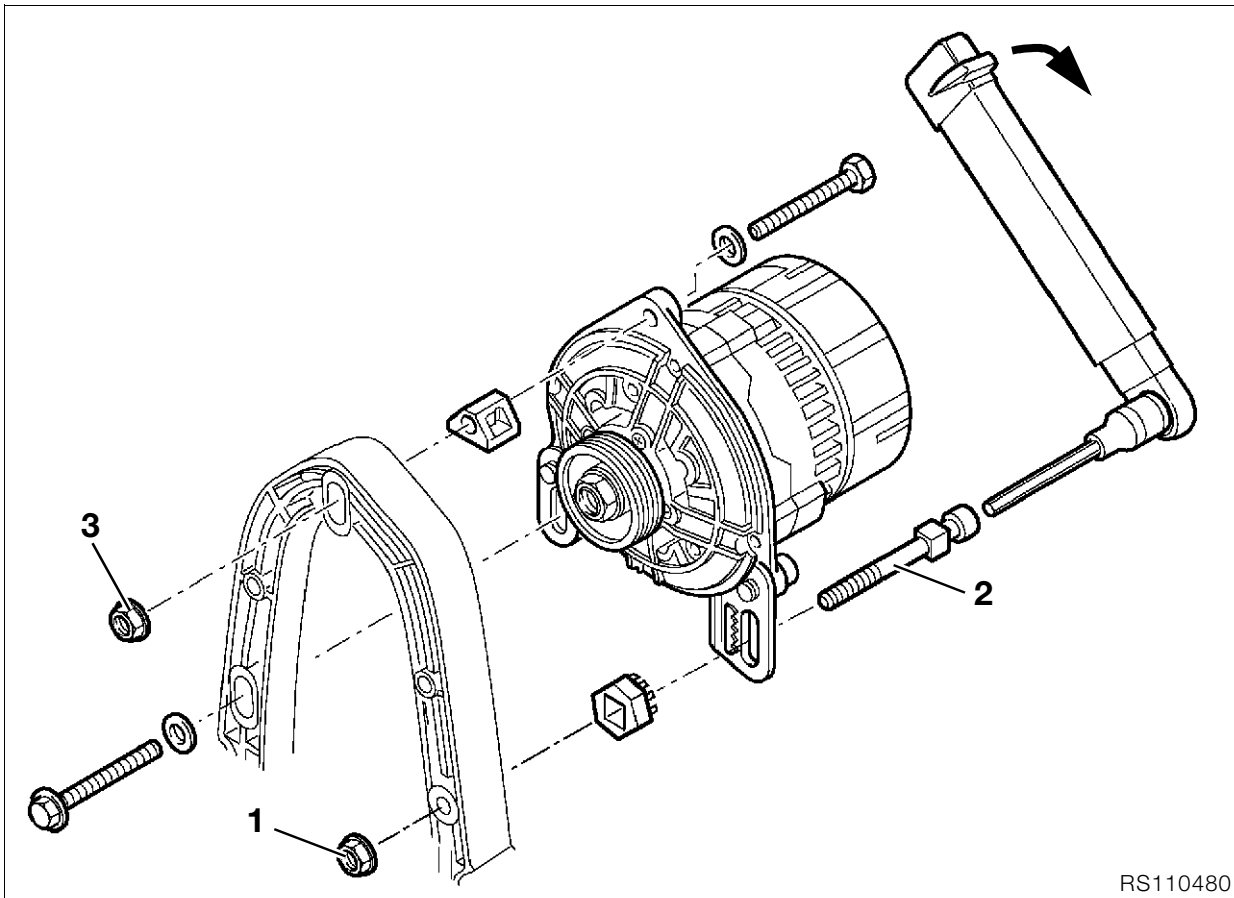
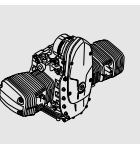
## 12 11 004 Timing the ignition



### Note:

With engine installed.

- Using TDC locating pin, **BMW No. 11 2 650**, lock the clutch housing.
- Connect **BMW** MoDiTeC with adapter cable to Hall-effect gate plate.
- Set the timing, following the tester instructions.
- Remove the TDC locating pin.



RS110480

### 12 31 Installing alternator

- Install alternator.

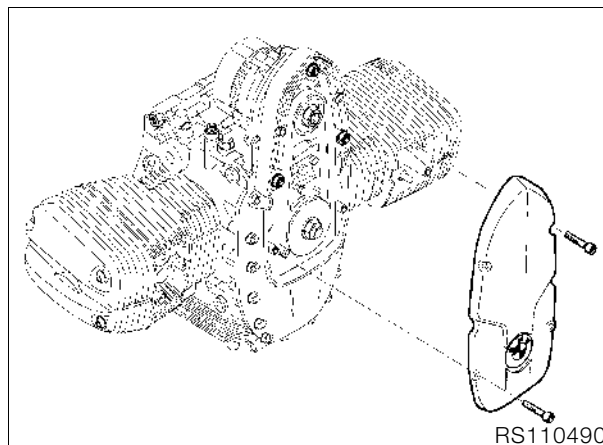
#### Poly-V belt adjusting procedure:

Poly-V belt installation procedure:

- Slightly tighten hex nut (1) on adjusting screw (2) by hand (**do not use tools**)
- Tighten adjusting screw (2) with a torque wrench and keep preload applied. Tighten upper retaining nut (3), then remove torque wrench from adjusting screw and tighten screws.

#### Tightening torque:

Preload Poly-V belt  
with adjusting screw..... 8 Nm  
Alternator  
to alternator support cover..... 20 Nm

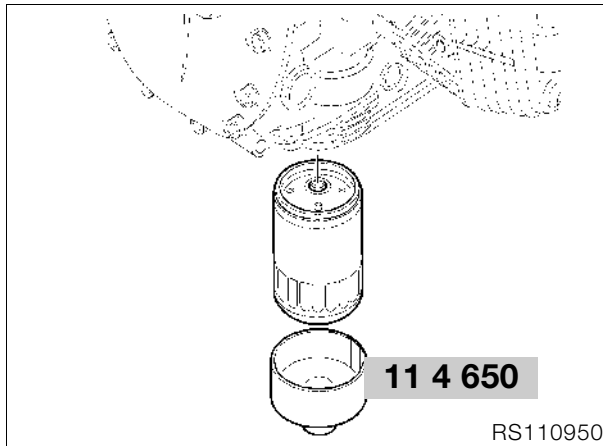


RS110490


- Install front cover.

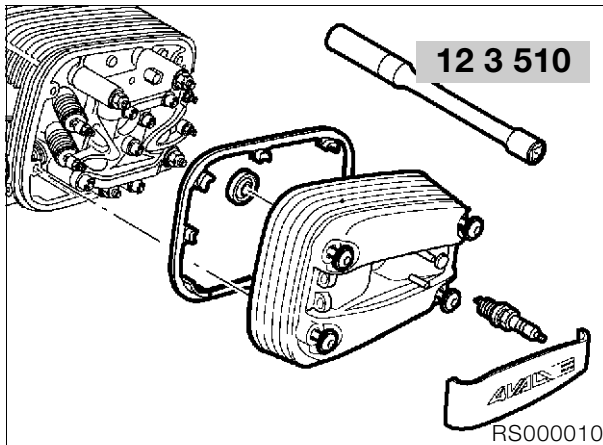
## 11 00 Installing engine

- Installation is the reverse of the removal procedure.




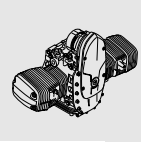
- Install oil filter with oil filter wrench, **BMW No. 11 4 650**.
- Insert and tighten oil drain plug with a new seal.

 **Tightening torque:**  
Oil filter (sealing face lightly oiled) ..... 11 Nm  
Oil drain plug ..... 32 Nm



- Install spark plugs with spark plug socket wrench, **BMW No. 12 3 510**.

 **Tightening torque:**  
Spark plug NGK BKR 7 EKC ..... 25 Nm

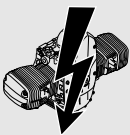


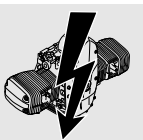
# 12 Engine electrics

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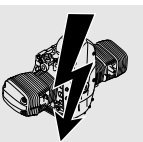
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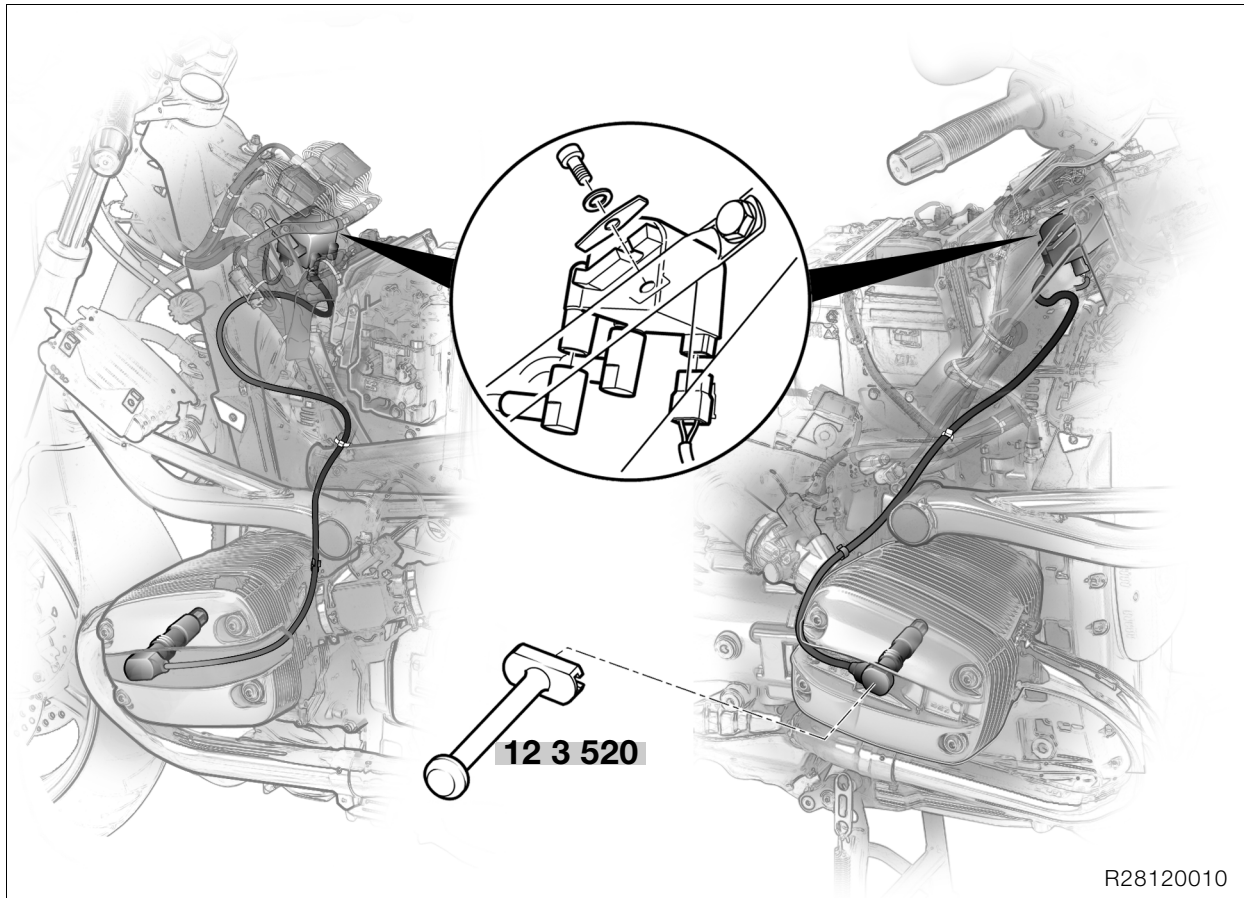




Technical Data		R 1150 R
<b>Starter motor</b>		
Type		Permanent-magnet motor with planetary gear drive
Gear ratio		Planetary gears 5.5 : 1
Power rating	kW	1.1
<b>Alternator</b>		
Type		Three-phase alternating-current generator with integrated all-electronic voltage regulator, Bosch
Drive		Poly-V belt
Gear ratio		1 : 1.5
Maximum output rating	W/V	700/14
Maximum current at engine speed 4,000 rpm	A	50
Nominal current at engine speed 1,000 rpm	A	18
Max. operating speed	rpm	20,000
<b>Spark plug</b>		
NGK		BKR 7 EKC
Electrode gap	mm (in)	0.8 (0.0315)
Wear limit	mm (in)	1.0 (0.0393)
Thread	metric	M 14 x 1.25
<b>Ignition</b>		
Ignition system		Motronic MA 2.4 (mapped characteristic control)
Ignition trigger		Two magnetic gates (Hall-effect transmitters) driven by crankshaft
Ignition timing	°CS	0° ... + 43° before TDC
Static ignition timing	°CS	Adjustment at TDC
<b>Ignition coil</b>		
Twin-spark coil		Beru
Resistance: primary between terminals 15 and 1	Ω	~0.5
Secondary between terminals 4a and 4b	kΩ	~7.5 when cold







R28120010

## Removing and installing coil and ignition lead

- Remove the seat.
- Remove fuel tank (→ 16.5).



### Attention:

Switch off ignition. Disconnect ground (earth) cable from battery and insulate it.

- Disconnect plug from Hall transmitter.
- Remove fasteners and lift out the Motronic control unit.
- Remove the ignition coil.
- Disconnect plug.
- Disconnect ignition lead.
- Remove spark plug covers.
- Pull off spark plug cap with special puller, **BMW No. 12 3 520**.
- Remove ignition leads.
- Installation is the reverse of the removal procedure.
- Switch on the ignition.
- Without starting the engine, fully open the throttle once or twice so that the Motronic control unit can register the throttle-valve positions.



### Note:

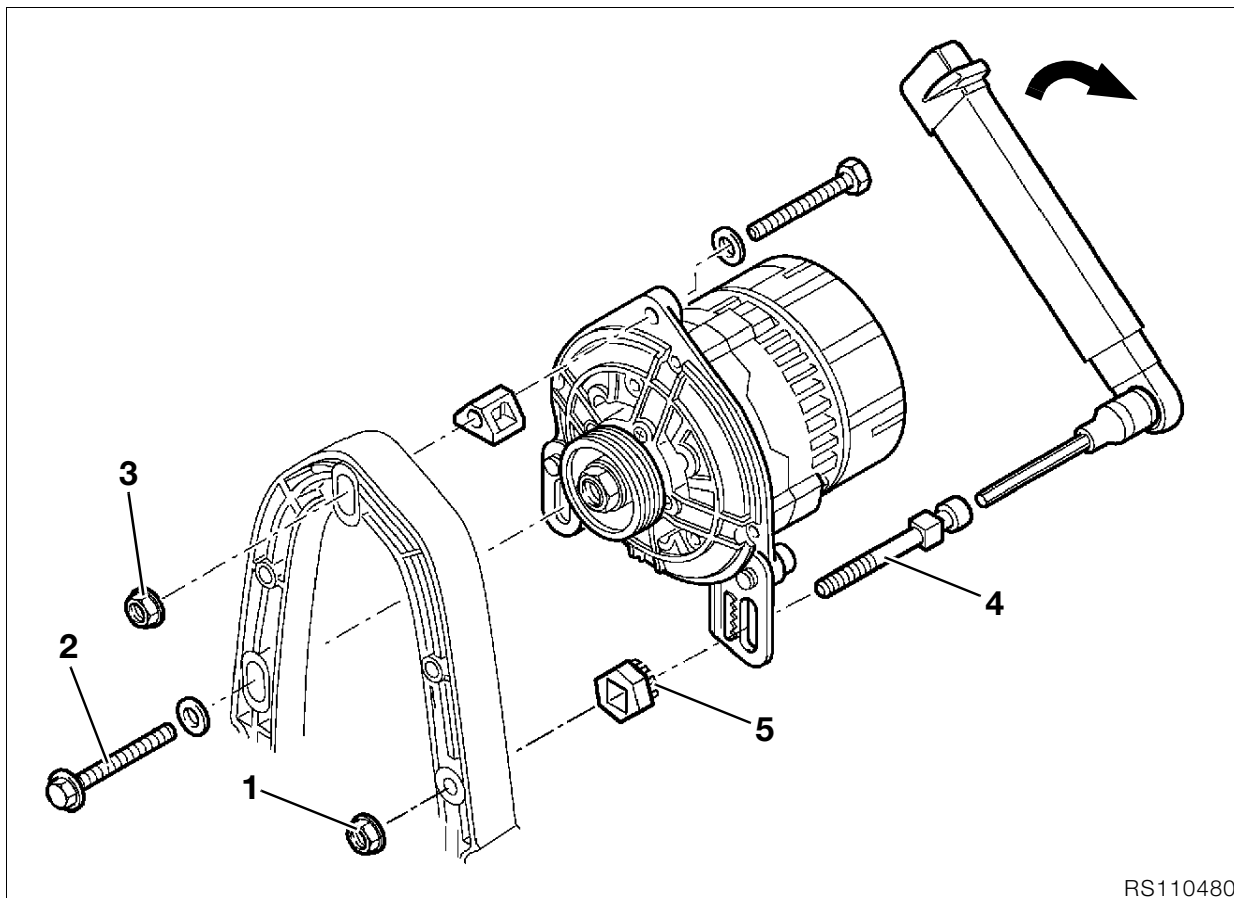
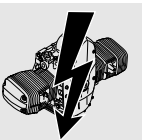
Disconnecting the battery deletes all entries (e.g. faults, settings) stored in the Motronic control unit's memory.

Loss of settings can temporarily impair the operating characteristics when the engine is restarted.

## 61 00 009 Checking ignition coil resistance

- Test with **BMW MoDiTeC**.





RS110480

## 12 31 022 Removing and installing alternator

- Remove the seat.
- Remove fuel tank (→ 16.5).

### Attention:

Disconnect earth (ground) lead from battery. Insulate earth (ground) lead.

- Remove Motronic control unit.
- Remove the horn.
- Remove spring strut.
- Remove front cover from engine.
- Remove alternator mount cover.
- Disconnect the leads from the alternator.
- Remove alternator retainers (1,2,3).
- Remove bolt (4) and nut (5).
- Remove Poly-V belt.
- Remove the alternator.

### Attention:

Avoid scratching the components; use masking tape if necessary.

- Installation is the reverse of the removal procedure.
- Switch on the ignition.
- Without starting the engine, fully open the throttle once or twice so that the Motronic control unit can register the throttle-valve positions.

### Note:

Disconnecting the battery deletes all entries (e.g. faults, settings) stored in the Motronic control unit's memory.

Loss of settings can temporarily impair the operating characteristics when the engine is restarted.

### Poly-V belt adjusting procedure:

Poly-V belt installation procedure:

- Place the Poly-V belt in position, tension it and turn the engine over once, then relieve belt tension.

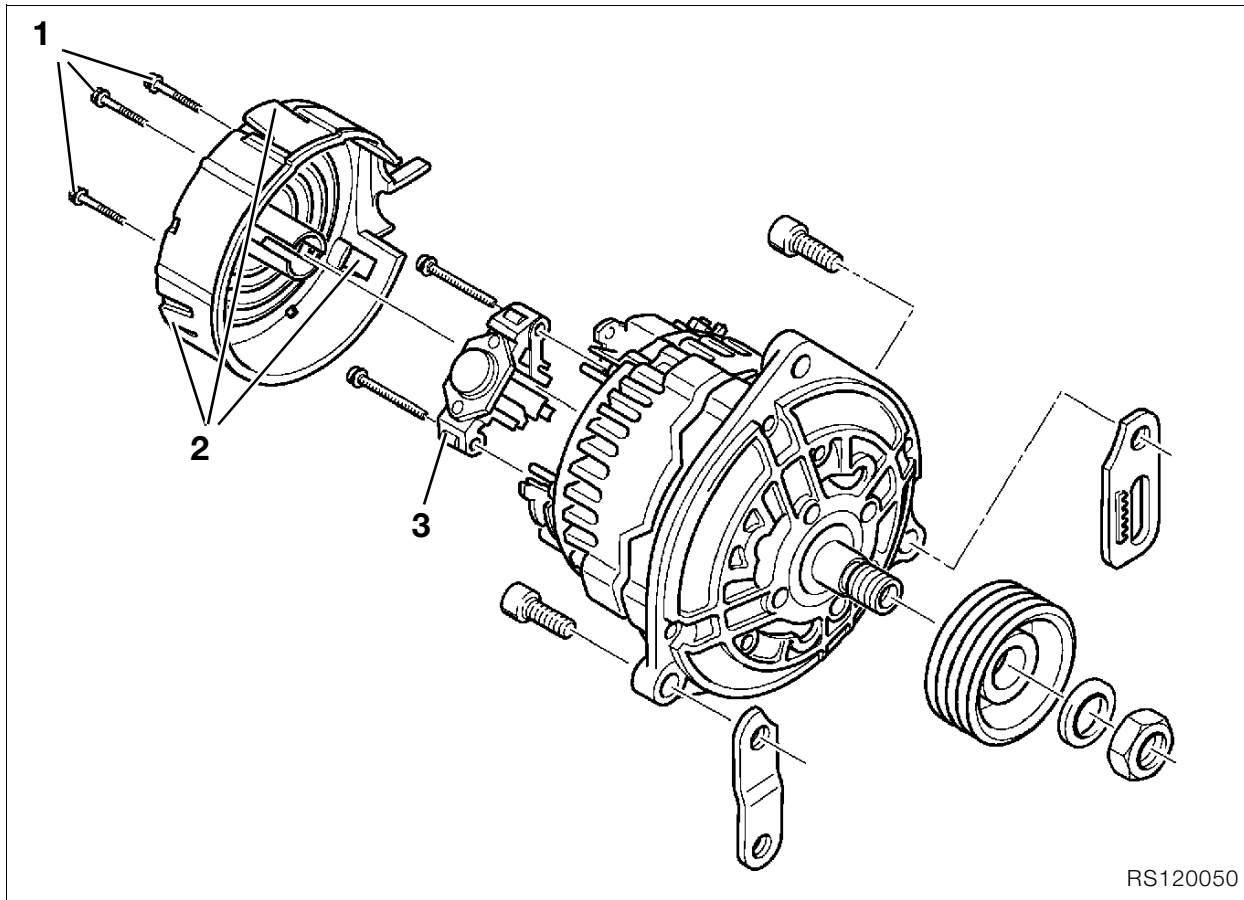
Poly-V belt tensioning procedure:

- Loosen alternator retainers (1,2,3).
- Slightly tighten hex nut (1) on adjusting screw (4) by hand (**do not use tools**).
- Preload adjusting screw (4) with a torque wrench and keep preload applied. Tighten upper retaining nut (3), then remove torque wrench from adjusting screw and tighten screws.



### Tightening torque:

Preload for Poly-V belt .....	8 Nm
Alternator	
to alternator mount cover .....	20 Nm
Positive cable to alternator .....	15 Nm
Belt pulley to alternator .....	50 Nm



RS120050

### Disassembling/assembling alternator

- Remove the cover retaining screws (1).
- Release clips (2) and remove the cover.
- Remove voltage regulator (3).
- Remove the Poly-V belt pulley.
- Installation is the reverse of the removal procedure.

### 61 00 009 Checking alternator

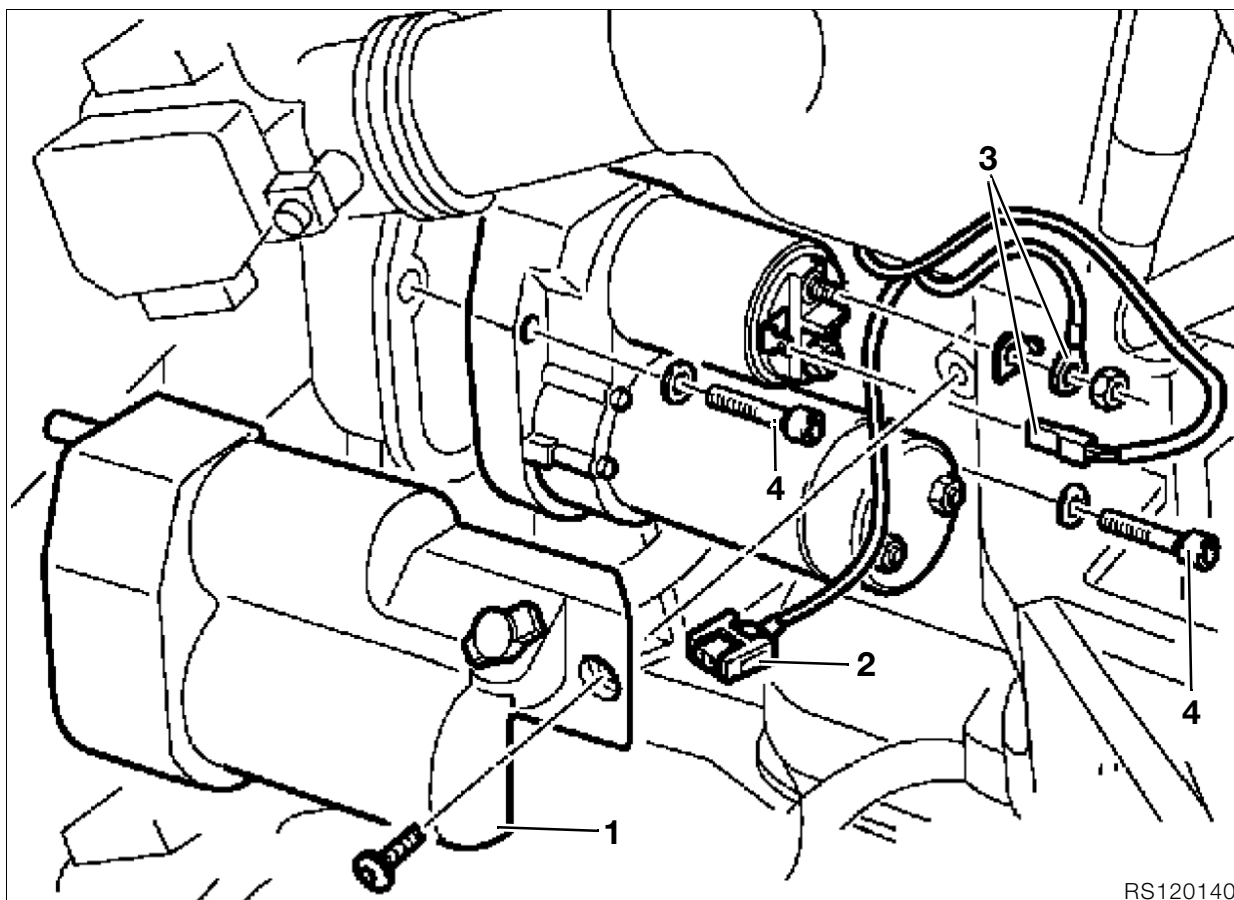
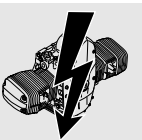
- Test with **BMW** MoDiTeC

### 61 00 009 Checking armature for short to ground (earth)

- Test with **BMW** MoDiTeC.

#### **Tightening torque:**

Belt pulley to alternator ..... 50 Nm



RS120140

## 12 41 025 Removing and installing starter motor

- Remove the seat.

### Attention:

Disconnect earth (ground) lead from battery.  
Insulate earth (ground) lead.

- Remove cover (1) for the starter motor and disconnect cable (2) for the power socket.
- Disconnect lead (3).
- Remove securing screws (4) and remove the starter.
- Installation is the reverse of the removal procedure.
- Switch on the ignition.
- Without starting the engine, fully open the throttle once or twice so that the Motronic control unit can register the throttle-valve positions.

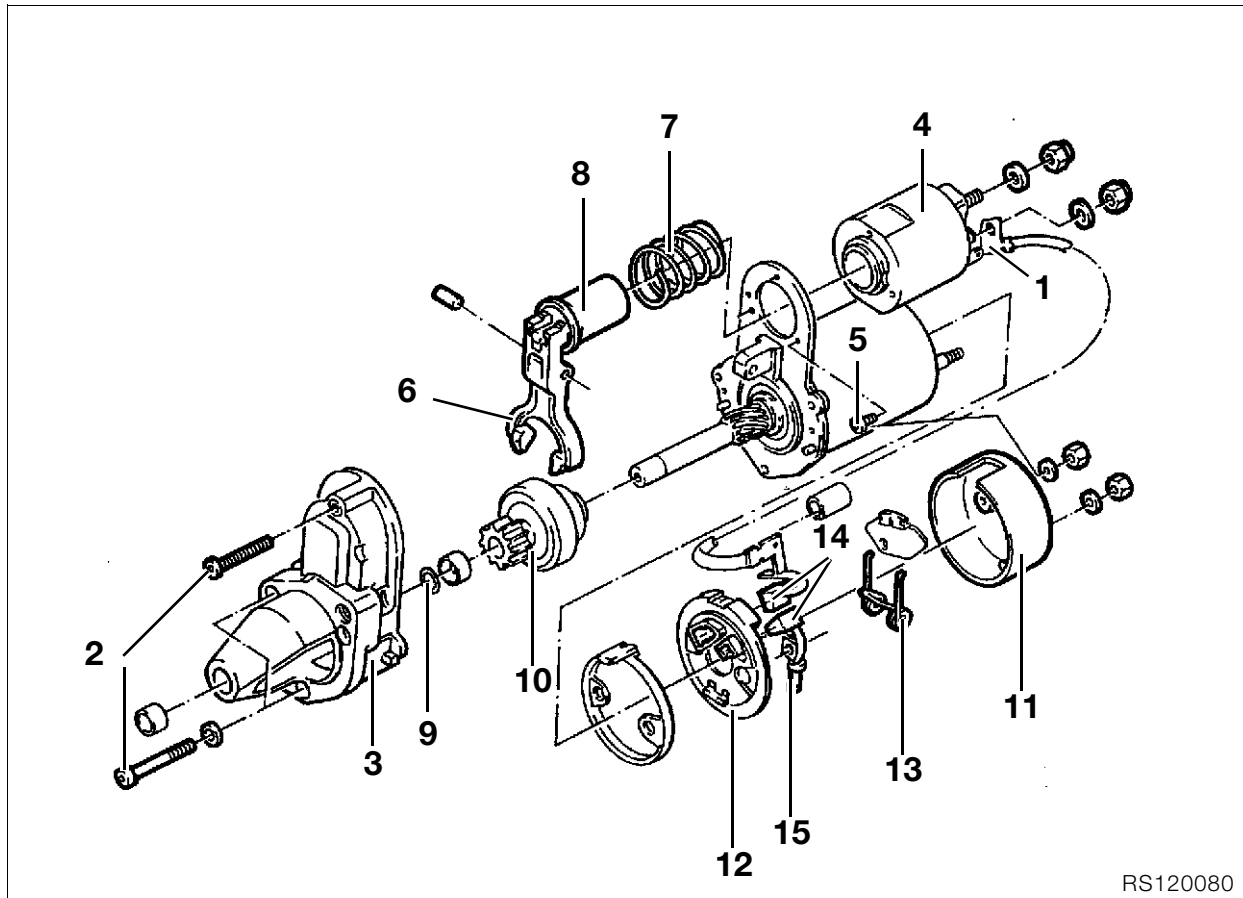
### Note:

Disconnecting the battery deletes all entries (e.g. faults, settings) stored in the Motronic control unit's memory.

Loss of settings can temporarily impair the operating characteristics when the engine is restarted.

### Tightening torque:

Starter to engine .....	20 Nm
Starter cover to gearbox casing .....	7 Nm
Positive cable to starter .....	10 Nm



RS120080



### 12 41 525 Disassembling/assembling starter motor

- Disconnect lead (1).
- Remove securing screws (2).
- Remove flange (3).
- Remove solenoid switch (4) after taking out the retaining screws (5).
- Remove release lever (6) and spring (7) from solenoid switch (8).
- Fit a socket of correct size, tap it lightly to back off the bush and remove the retaining ring (9).
- Remove the starter gear (10) from the shaft.
- Installation is the reverse of the removal procedure.
- Coat the Bendix gear and pull-in ring with grease.

**Lubricant:**

.....Bosch PZ 2 V 3 silicone grease or equivalent

### Replacing carbon brushes

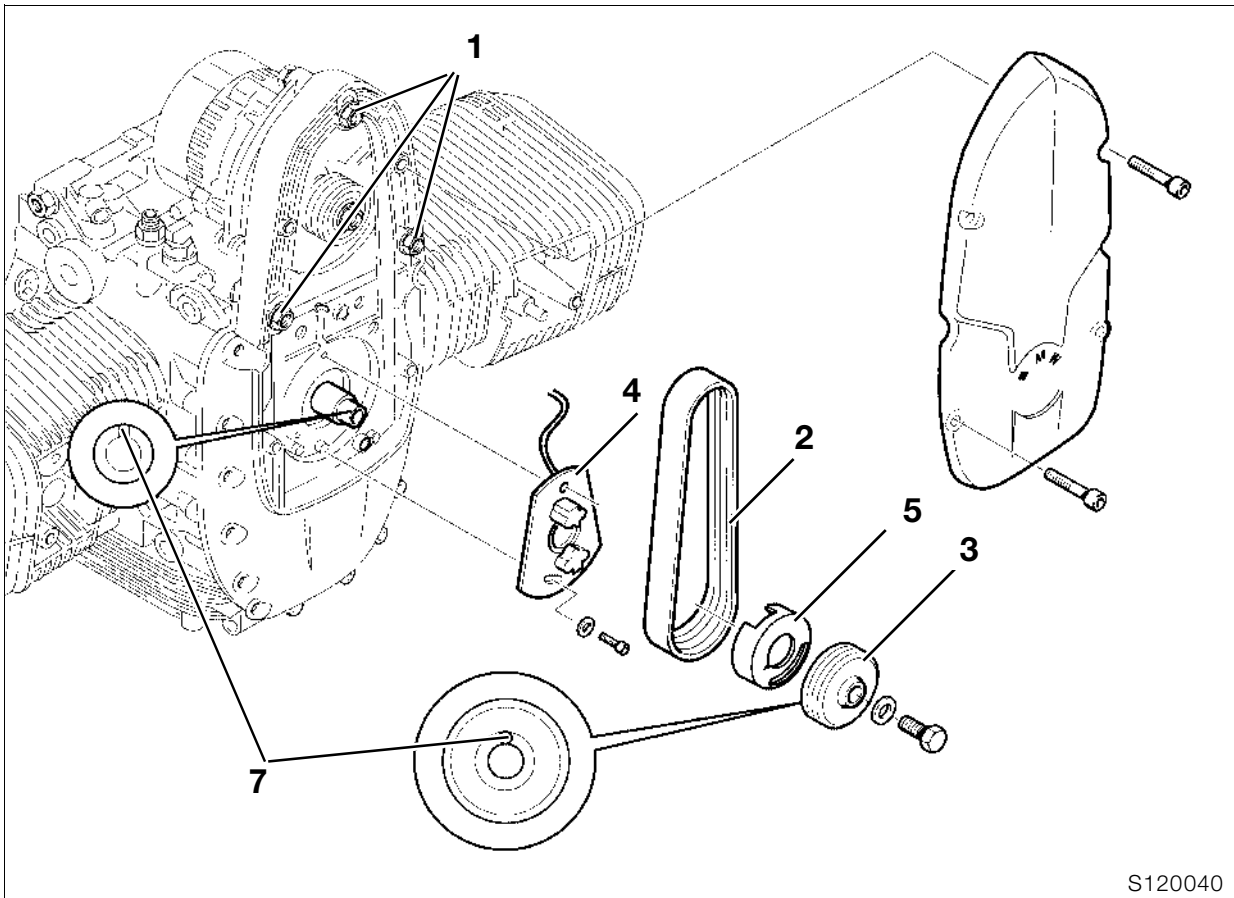
- Disconnect leads (1).
- Remove cover (11).
- Remove holder (12) for carbon brushes.
- Lift up retaining springs (13) and remove carbon brushes (14).
- Install carbon brushes with retaining plate.
- Slide short lead (15) on to threaded pin.
- Install cover (11).
- Connect lead (1).

### 61 00 009 Checking starter motor

- Test with **BMW** MoDiTeC.

### 61 00 009 Checking starter relay

- Test with **BMW** MoDiTeC.



S120040

## 12 11 Removing and installing magnetic gate

- Remove the seat.
- Remove fuel tank (→ 16.5).
- Remove front cover from engine.
- Remove alternator fasteners (1).
- Remove Poly-V belt (2).

### ⚠ Attention:

Disconnect ground (earth) lead from battery. Insulate the ground (earth) lead.

- Remove the starter motor.
- Install locking device, **BMW No. 11 5 640**, to lock clutch housing.
- Remove Poly-V belt pulley (3) with rotor gate from crankshaft.
- Disconnect plug of magnetic gate.

### 📄 Note:

If necessary, mark position of magnetic gate for re-installation.

- Remove magnetic gate (4).
- Installation is the reverse of the removal procedure.
- Affix rotor (5) of Hall-effect gate with adhesive to the Poly-V belt pulley (3).

**Adhesive:** .....Loctite instant adhesive or equivalent

### ⚠ Attention:

Seat retainer for Hall-effect gate rotor relative to groove/crankshaft (7). Carefully route cable for magnetic gate. Tension Poly-V belt to specification.

- Switch on the ignition.
- Without starting the engine, fully open the throttle once or twice so that the Motronic control unit can register the throttle-valve positions.

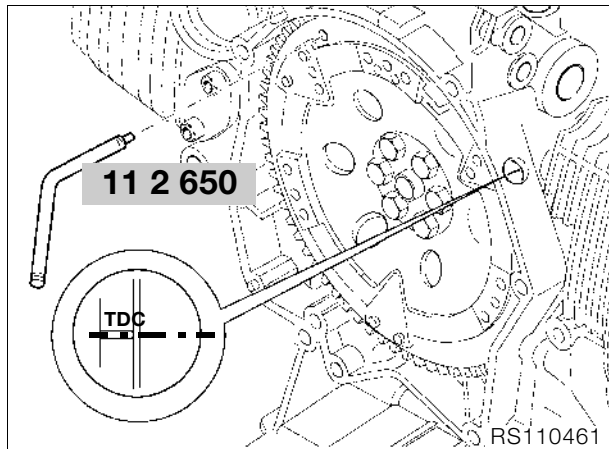
### 📄 Note:

Disconnecting the battery deletes all entries (e.g. faults, settings) stored in the Motronic control unit's memory. Loss of settings can temporarily impair the operating characteristics when the engine is restarted.

### 🔧 Tightening torque:

Preload for Poly-V belt ..... 8 Nm  
 Alternator  
 to alternator mount cover ..... 20 Nm  
 Belt pulley to crankshaft ..... 50 Nm

## 12 11 004 Timing the ignition



- Using TDC locating pin, **BMW No. 11 2 650**, lock the clutch housing.
- Connect **BMW** MoDiTeC with Y adapter cable to Hall-effect transmitter plug.
- Set the timing, following the tester instructions.

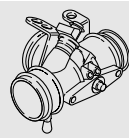


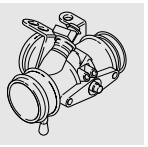
# 13 Fuel preparation and control

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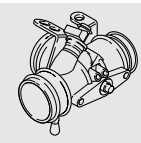
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<b>Removing and installing Motronic control unit</b> .....	7

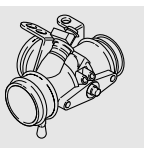


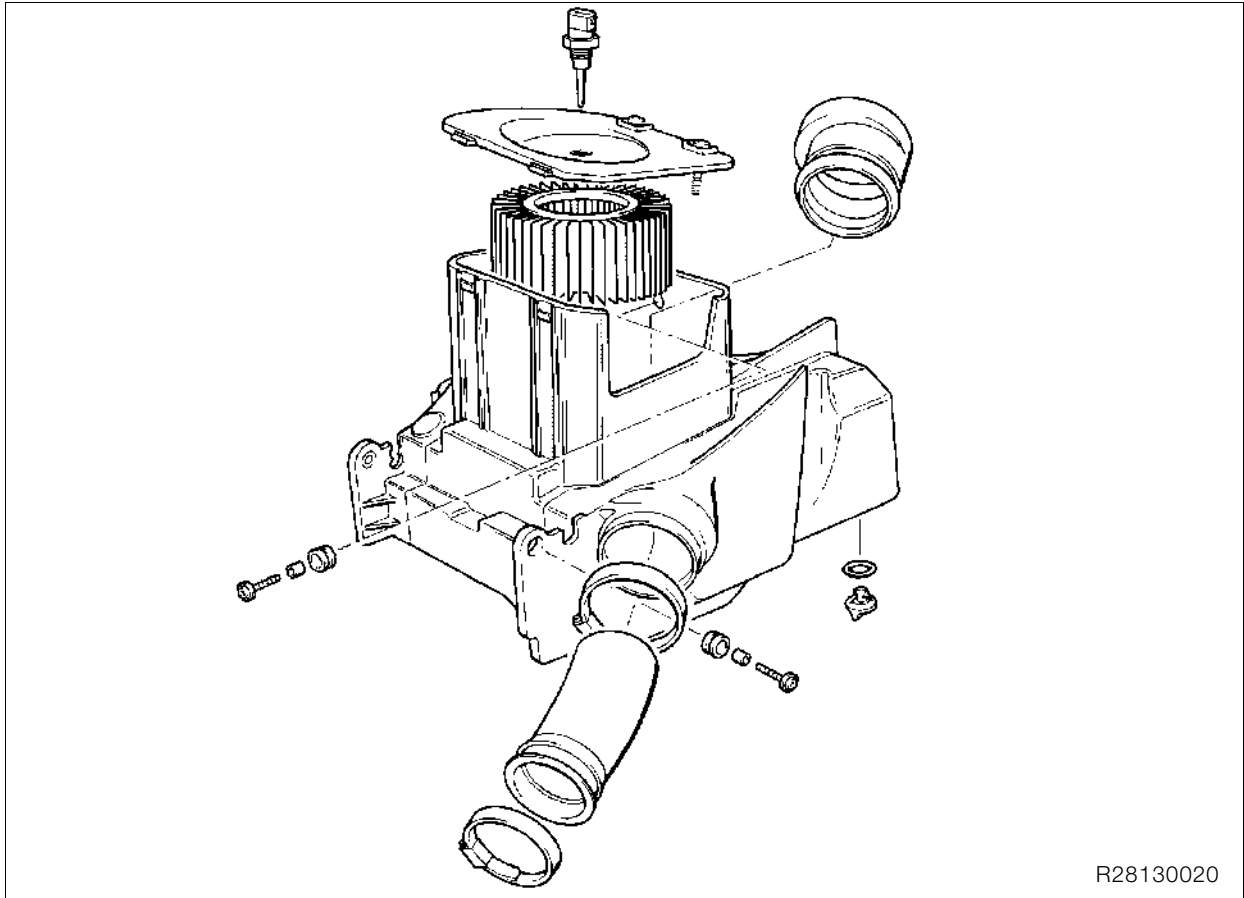




Technical Data	R 1150 R
Fuel grade	Super (premium), unleaded. 95 octane (RON)
Mixture preparation	Motronic MA 2.4
Throttle stub pipe intl. dia.	mm (in) 45 (1.7717)
Throttle angle in rest position	° 5
Air filter	Round paper element

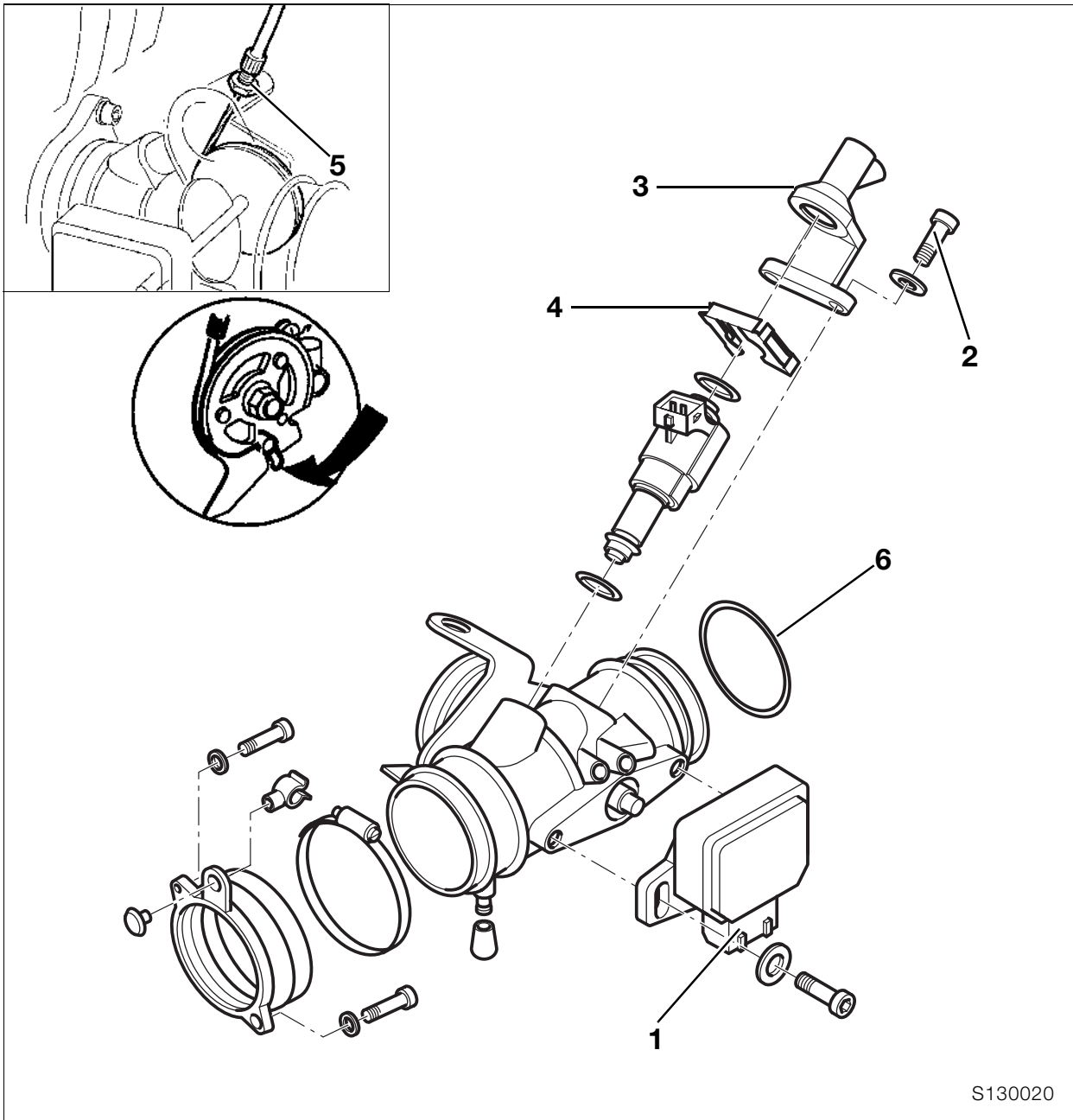






## 13 72 116 Removing and installing air filter housing

➡ Preparatory work  
See "Removing and installing clutch" on Page 21.5



S130020

### 13 54 Removing and installing throttle-valve stub pipe

- Press in spring keeper of multi-pin plug for throttle-valve potentiometer (1) and disconnect plug.

- Push intake neck into air filter box and remove throttle-valve stub.
- Disengage throttle cables (5) from right and left throttle-valve stubs.
- Installation is the reverse of the removal procedure.



**Note:**

Do not remove throttle-valve potentiometer unless due for replacement (basic setting is necessary – see Motronic diagnosis instructions).



**Attention:**

Make sure that O-ring (6) on throttle-valve stub is in perfect condition.

- Remove screws (2).
- Remove holder (3) with fuel line and injector.
- Remove fuel injector, if necessary.
- Press in the spring catch at the injector plug and pull off the plug.
- Remove locking device (4) from the injector.
- Slacken hose clamps.
- Disconnect ground cable from throttle stub pipe.

Adjusting speed increase, idle speed and synchronisation (→ 00.57)

## 13 63 000 Removing and installing throttle-valve potentiometer

- Press in spring keeper of multi-pin plug for throttle-valve potentiometer (1) and disconnect plug.



### Note:

Do not remove throttle-valve potentiometer unless due for replacement (basic setting is necessary – see Motronic diagnosis instructions).

- Remove the throttle-valve potentiometer.
- Adjust throttle-valve potentiometer with **BMW** MoDiTeC after installing.
- Mark screws with a paint spot.

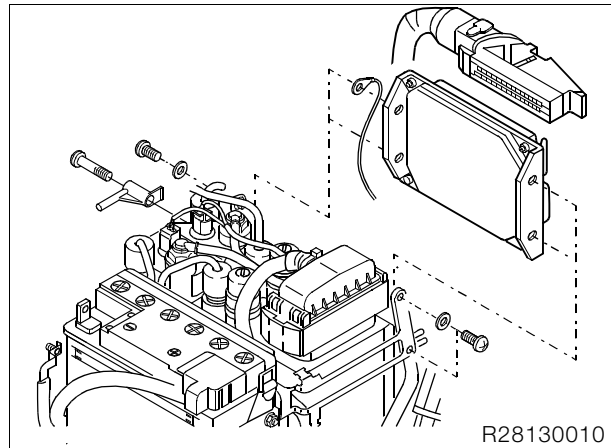
## 13 61 010 Removing and installing Motronic control unit

- Remove fuel tank.



### Attention:

Switch off ignition; disconnect earth (ground) lead from battery and insulate it.



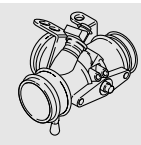
- Disconnect plug from Hall transmitter.
- Remove Motronic control unit.
- Remove connector strip.
- Installation is the reverse of the removal procedure.
- Switch on the ignition.
- Without starting the engine, fully open the throttle once or twice so that the Motronic control unit can register the throttle-valve positions.



### Note:

Disconnecting the battery deletes all entries (e.g. faults, settings) stored in the Motronic control unit's memory.

Loss of settings can temporarily impair the operating characteristics when the engine is restarted.



# 16 Fuel tank and lines

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Removing and installing fuel filter .....	7
Removing/installing fuel pump .....	7
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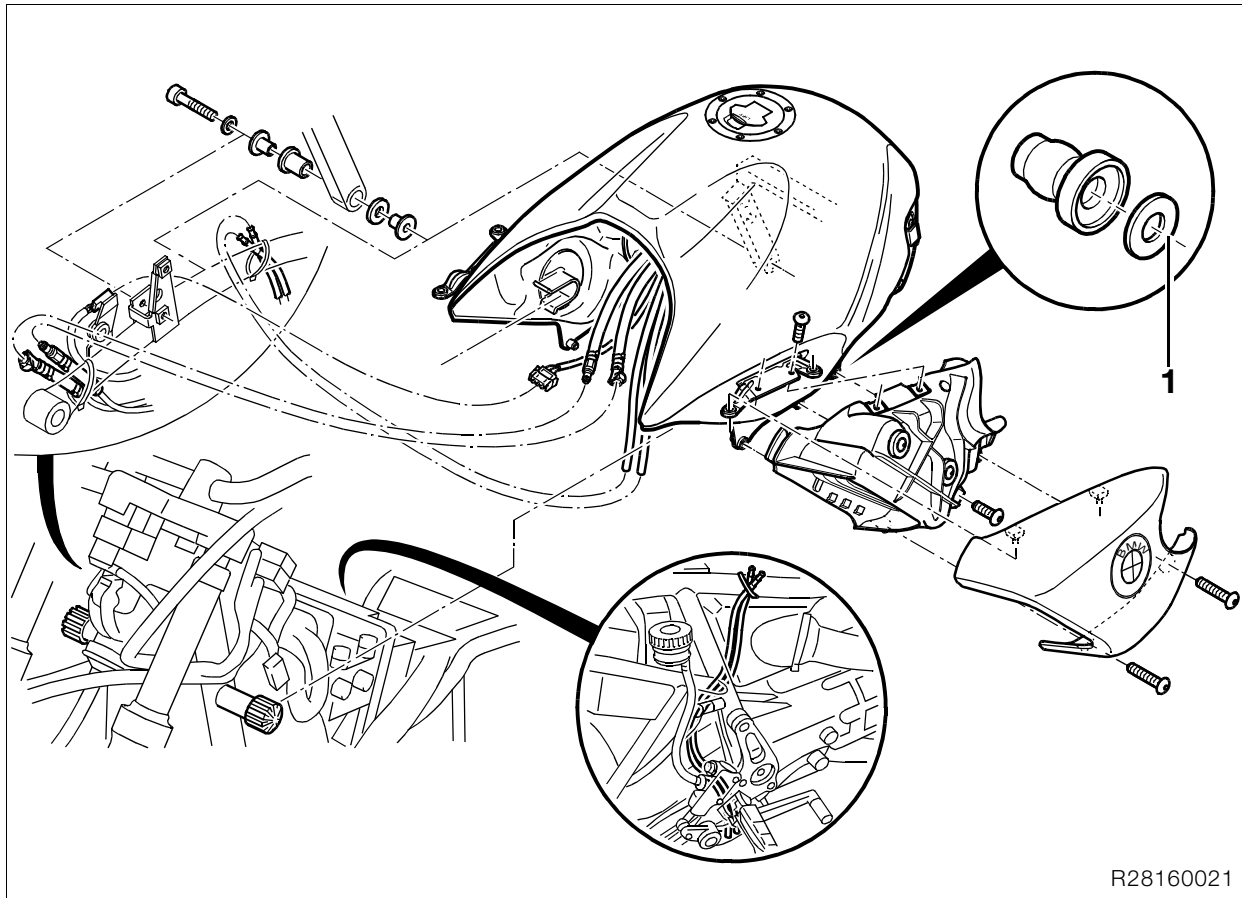


Technical Data		R 1150 R
<b>Fuel tank</b>		
Tank capacity (usable)	l (Imp. gal/US gal)	20.4 (4.50/5.40)
Including reserve of	l (Imp. gal/US gal)	approx. 5 (1.10/1.30)
<b>Fuel pump</b>		
Type		Turbine-wheel pump
Make		Bosch EKP-13.5
Operating voltage	V	6...15 V
Operating pressure	bar (psi)	3.0 ± 0.2 (42.69 ± 2.85)
Delivery rate	l/h (Imp. gal/US gal/h)	90 + 40 (19.80 + 8.80/23.80 + 10.40)









R28160021

## 16 11 030 Removing and installing fuel tank

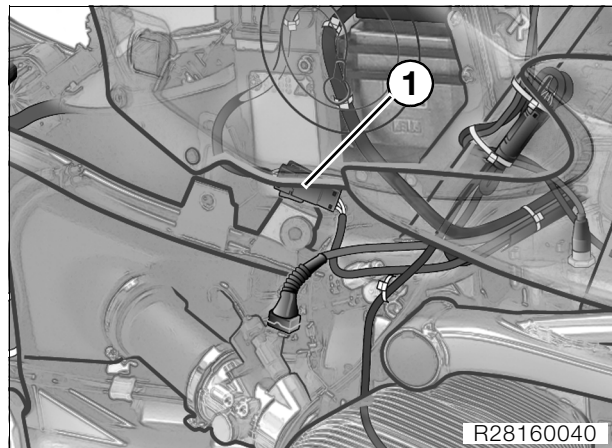
- Remove the seat.
- Release the fasteners for the left and right side panels from the fuel tank.
- Remove cable cover on right.
- Remove oil-cooler covers.



### Note:

Note washers (1).

- Disengage the oil cooler with air guide from the fuel tank.
- Disengage fuel tank.
- Disconnect quick-action couplings in fuel flow and return lines.
- Disconnect vent lines (if necessary, release the fasteners for the right side panel).

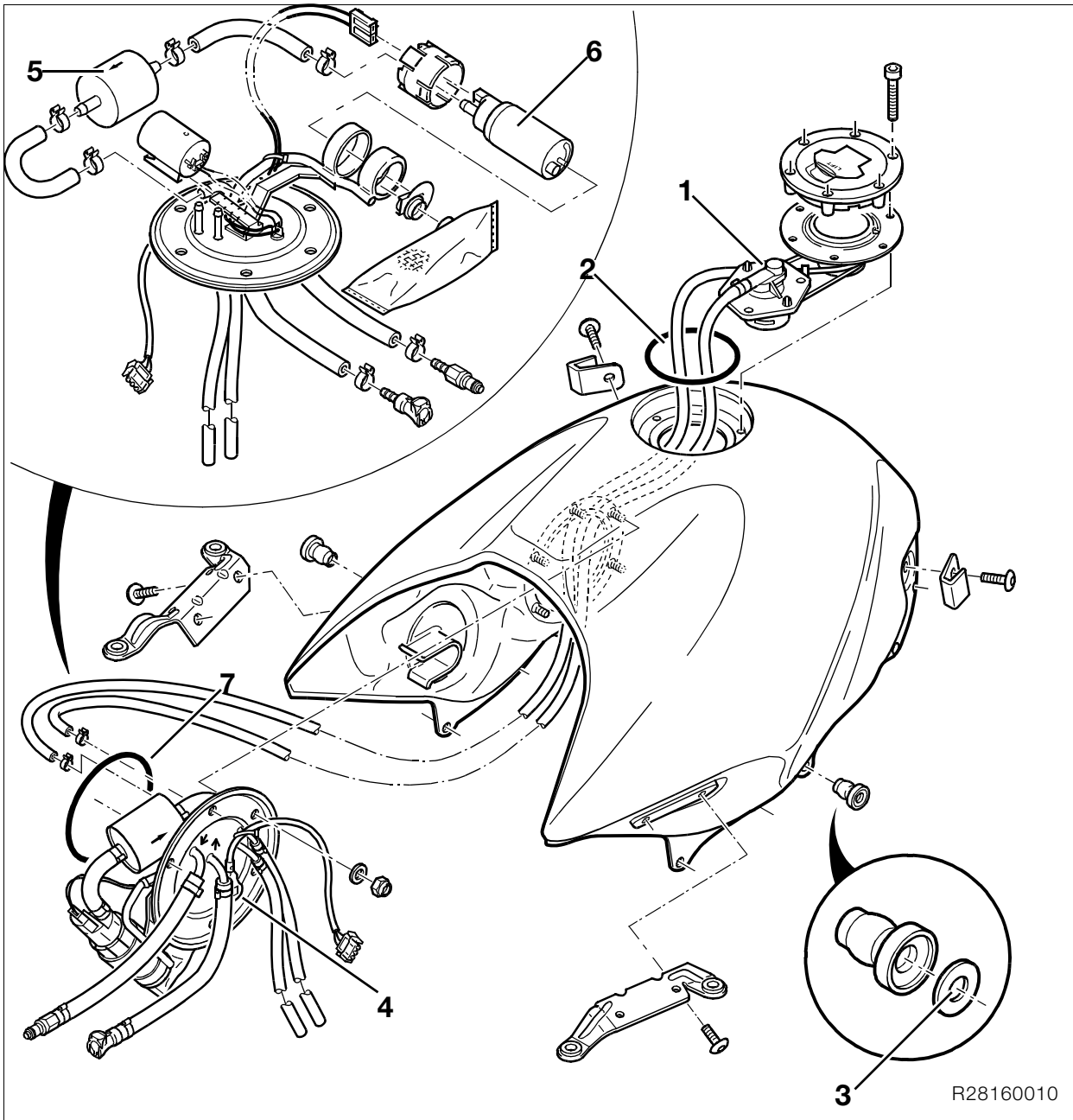


R28160040

- Disconnect plug of fuel pump unit (1).
- Remove fuel tank.
- Installation is the reverse of the removal procedure.

### Tightening torque:

Fuel tank to rear frame ..... 22 Nm



## 16 11 Removing and installing roll-over valve

### ⚠ Attention:

Fuel is flammable and a hazard to health. Observe relevant safety regulations.

- Remove the fuel filler cap.
- Remove the reducer unit with roll-over valve (1) and disconnect the hoses.
- Remove the roll-over valve.
- Installation is the reverse of the removal procedure.
- Secure non-reusable hose clips with pliers, **BMW No. 13 1 500**.

### ⚠ Attention:

Fit a new O-ring (2) if necessary. Make sure that the O-ring seal is correctly seated. After installing, check fuel filler cap for leaks.

## Removing and installing fuel filter and fuel pump



### Attention:

Fuel is flammable and a hazard to health. Observe relevant safety regulations.

- Remove fuel tank (➡ 16.5).
- Drain fuel tank.
- Remove fuel pump unit (4) and disconnect hoses.

## 16 12 008 Removing and installing fuel filter

- Release hose clips at fuel filter (5).



### Attention:

Note correct direction of flow through fuel filter.

- Remove/install fuel filter.
- Secure non-reusable hose clips with pliers, **BMW No. 13 1 500**.

## 16 12 000 Removing/installing fuel pump

- Disconnect the electrical connections at the fuel pump (6).
- Release the hose clip at the fuel pump.
- Remove fuel pump.



### Note:

The fuel pump is no longer serviceable after it has been removed.

- Installation is the reverse of the removal procedure.
- Secure non-reusable hose clips with pliers, **BMW No. 13 1 500**.



### Attention:

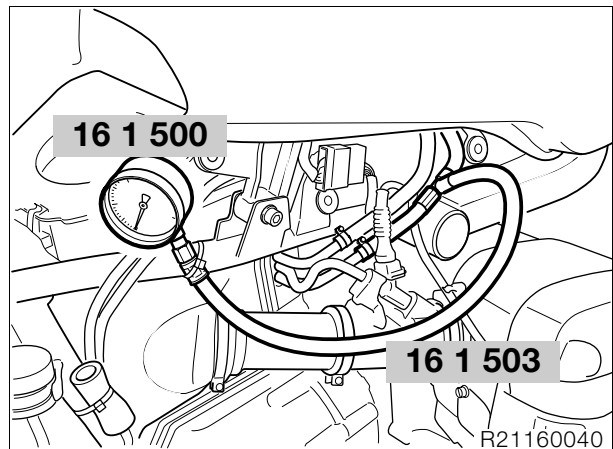
Make sure O-ring (7) is in perfect condition. After installing, check fuel pump unit for leaks.



### Tightening torque:

Fuel pump unit to fuel tank ..... 5 Nm

## 13 60 505 Checking fuel pump pressure



- Connect test pressure gauge, **BMW No. 16 1 500** with adapter hose **BMW No. 16 1 503** for quick-release coupling.
- Start engine and allow to idle.

### Fuel pressure:

Specification ..... 3.0 ± 0.2 bar (42.69 ± 2.85 psi)



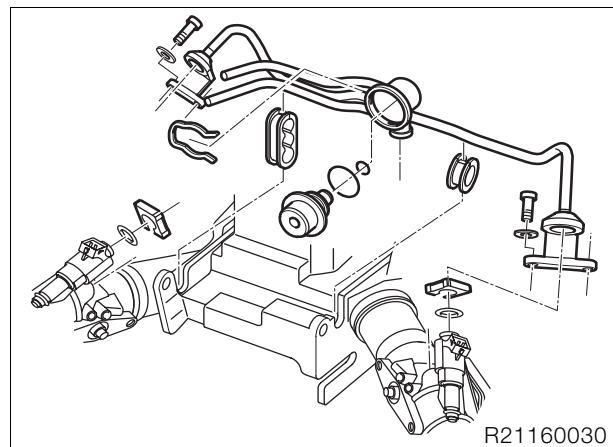
### Note:

If fuel pressure is low, check pump, fuel filter, pressure regulator and fuel line.



## 13 53 Removing and installing fuel distributor and pressure regulator

- Remove air filter box.
- ➡ Preparatory work:  
See Instructions for removing clutch (➡ 21.5)



- Remove the fuel distributor with pressure regulator from the holder.
- Installation is the reverse of the removal procedure.

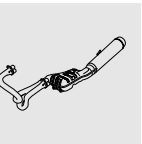
# 18 Exhaust system

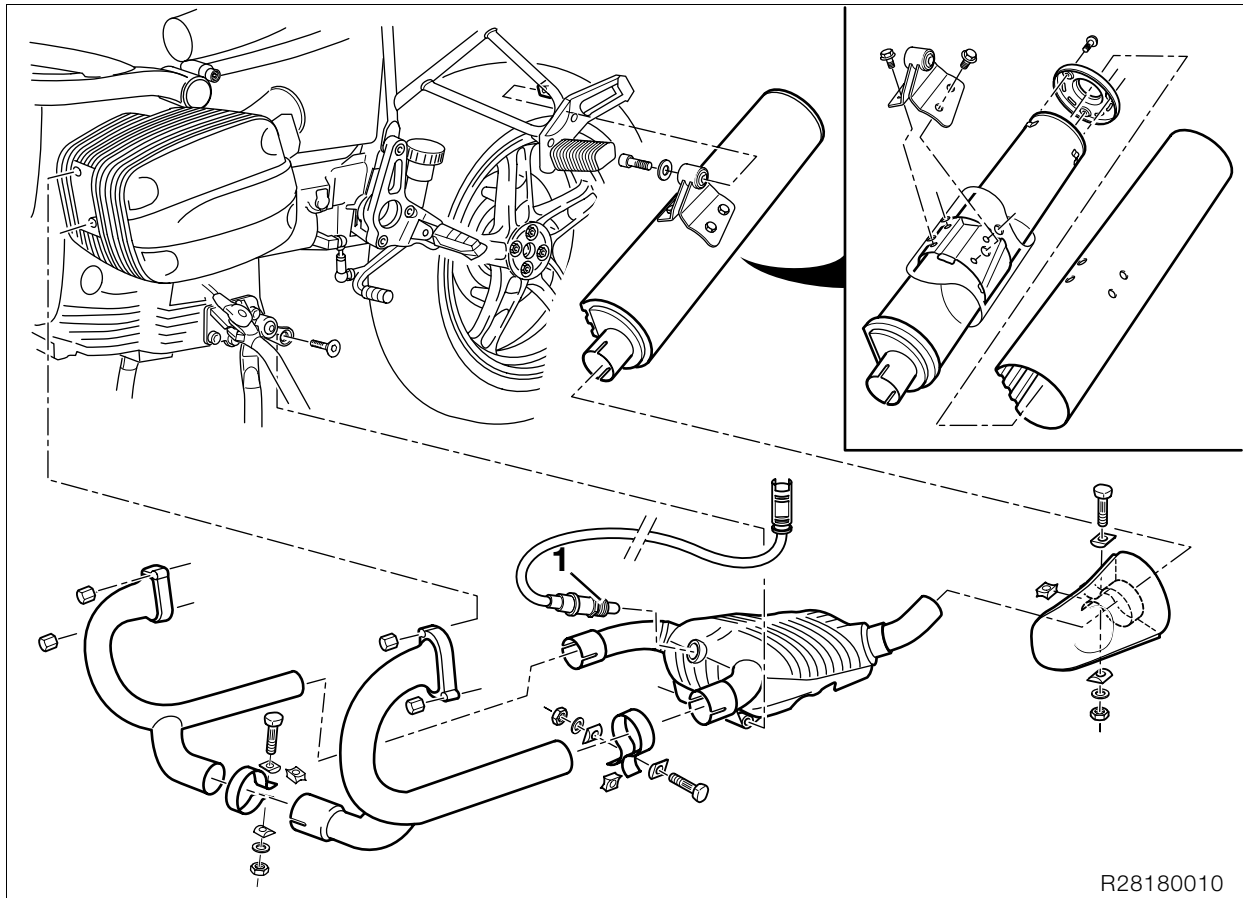
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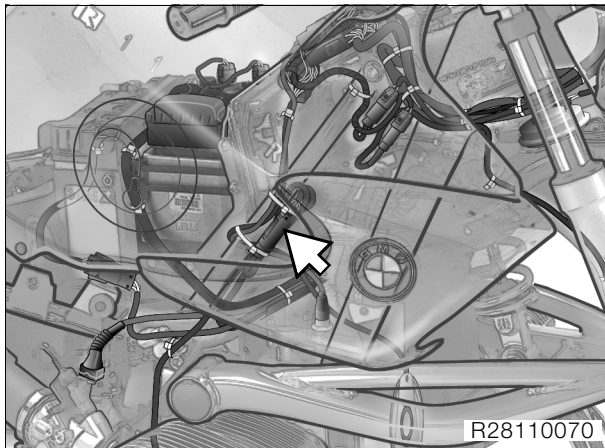




R28180010

## 18 00 Removing and installing exhaust system

- Remove rear silencer.
- Remove fuel tank (→ 16.5).



R28110070

- Disconnect the oxygen-sensor plug and remove the cable holders.

### Attention:

Do not pull the oxygen sensor cable.

- Slacken the clamps holding the front silencer.
- Release fasteners securing exhaust pipe to cylinder head.
- Remove front silencer.
- If necessary, remove/install oxygen sensor (1).

- Installation is the reverse of the removal procedure.
- Tighten the oxygen sensor with special socket wrench insert, **BMW No. 11 7 020**.

### Removing silencer end cap and silencer guard

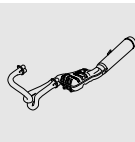
- Remove end cap.
- Remove fasteners securing silencer bracket.
- Remove silencer guard from silencer.

### Installing silencer end cap and silencer guard

- Push silencer guard onto silencer.
- Install end cap and secure with oiled serrated-head screws.
- Slide the silencer guard against the end cap and tighten the fasteners of the silencer bracket.

### Tightening torque:

Clamp, manifold to front silencer (coat seating face with Optimoly TA)	45 Nm
Oxygen sensor (coat with Optimoly TA)	45 Nm
Front silencer to lugs of stand	20 Nm
Mount to silencer (threads oiled)	15 Nm
Silencer to rear frame	22 Nm
Heat shield to silencer (threads oiled)	8 Nm
Clamp, rear silencer to front silencer (coat with Optimoly TA)	45 Nm



## 18 11 181 Removing and installing exhaust manifold

- Slacken the clamp holding the front silencer.
- Remove fasteners securing exhaust manifold.
- Remove exhaust manifold.
- Installation is the reverse of the removal procedure.



### **Attention:**

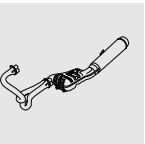
After a trial run, read out Motronic fault memory.  
Note position of wiring for oxygen sensor.

---



### **Tightening torque:**

Clamp, manifold to front silencer  
(coat seating face of clamp with  
Optimoly TA) ..... 45 Nm  
Exhaust manifold to cylinder head ..... 21 Nm





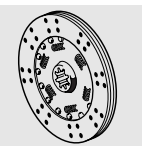
# 21 Clutch

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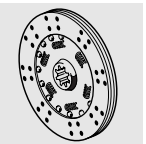
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Technical Data		R 1150 R
Type of clutch		Single dry plate with increased-leverage diaphragm spring
Actuation		Hydraulic, with master and slave cylinders
Master cylinder piston dia.	mm (in)	13 (0.5118)
Slave cylinder piston dia.	mm (in)	24 (0.9449)
Clutch fluid		DOT 4 brake fluid
Clutch plate dia.	mm (in)	165 (6.4960)
Wear dimension	mm (in)	4.8 (0.1890) (measured with tips of calipers pressed by hand against rivets of clutch plate).





## 21 21 000 Removing and installing clutch

### 21 21 Removing clutch

#### Removing clutch from vehicle

- Attach stand, **BMW No. 00 1 520** to motorcycle.
- Remove the seat.
- Remove fuel tank (→ 16.5).



#### Attention:

Fuel is flammable and a hazard to health. Observe relevant safety regulations.

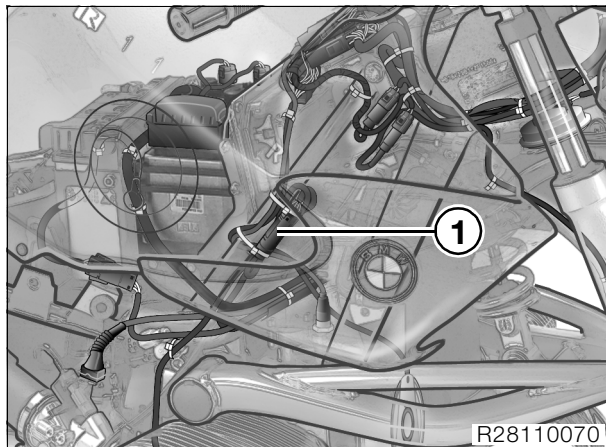
- Remove the battery.



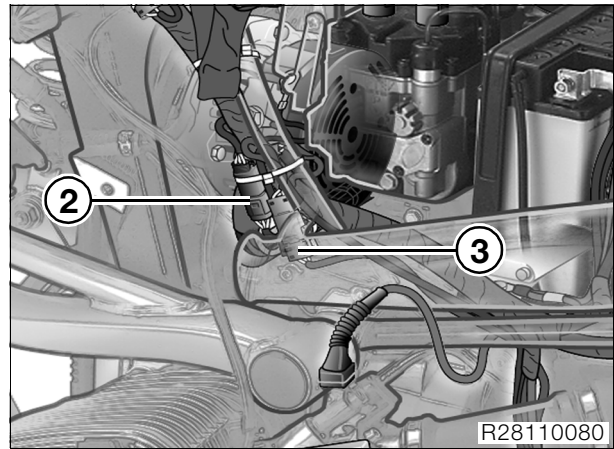
#### Attention:

Disconnect the negative battery terminal first, then the positive terminal. Connect the positive battery terminal first, then the negative terminal.

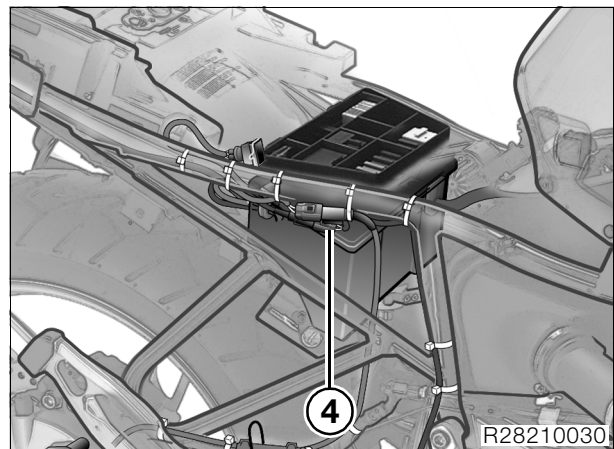
- Disconnect the air temperature sensor plug.
- Disconnect the diagnostic plug.
- Remove air filter cover.
- Remove the air filter element.
- Remove the intake air pipe.
- Unfasten air filter box at front and rear.



- Disconnect plug for oxygen sensor (1) and remove cable.
- Disconnect hose clamps/throttle stub pipes and push the stubs into the air filter box.
- Disconnect plugs of injection valves.
- Remove holders of injection valves.
- Remove injection valves from throttle stub pipes.
- Loosen the fasteners securing the right and left footrest plates.
- Remove top screws on left and right.
- Remove rear-frame fasteners on left and right at front, but only loosen strut fasteners.
- Remove rear silencer.
- Remove front silencer.
- Remove starter motor cover and disconnect cable to power socket.
- Disconnect cables from starter motor.
- Remove the starter motor.

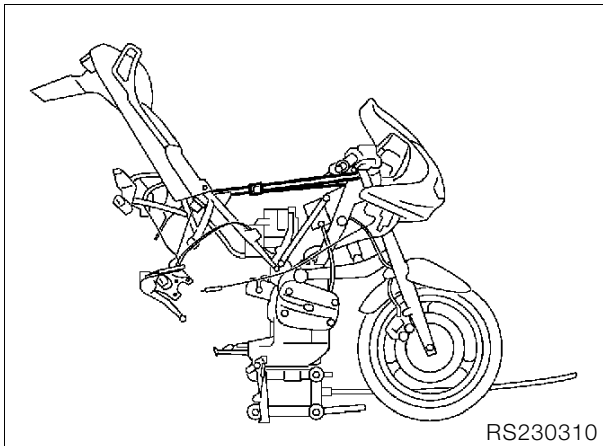


- Disconnect plug of side-stand switch (2).
- Disconnect plug (3) of gear indicator.
- Remove the fastener securing the rear spring strut at the bottom.
- Remove hydraulic spring adjuster.

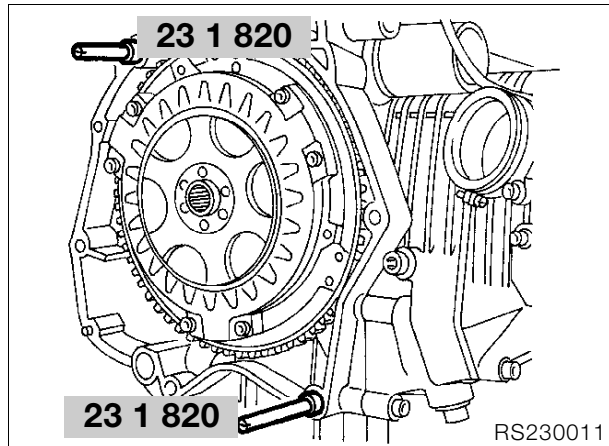


- Disconnect (4) plug of rear brake light switch and remove cable.
- Remove brake master cylinder and guard from footrest plate.
- Remove rear brake fluid reservoir from its holder.
- Remove brake line from rear frame.
- Remove brake line from swinging arm.
- **[Integral ABS]** Disconnect plug for rear ABS sensor.
- **[Integral ABS]** Remove rear ABS sensor.
- Remove rear brake caliper.
- Use cable ties to secure the brake caliper to the rear frame.
- Remove the clutch bleeding/filler adapter from the rear frame.

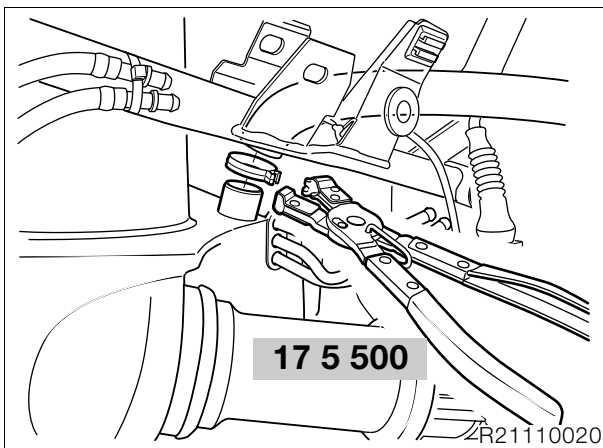




- Tilt the rear frame up and secure it in this position with a strap attached to the handlebars.
- Remove cable ties/wiring harness from air filter box.

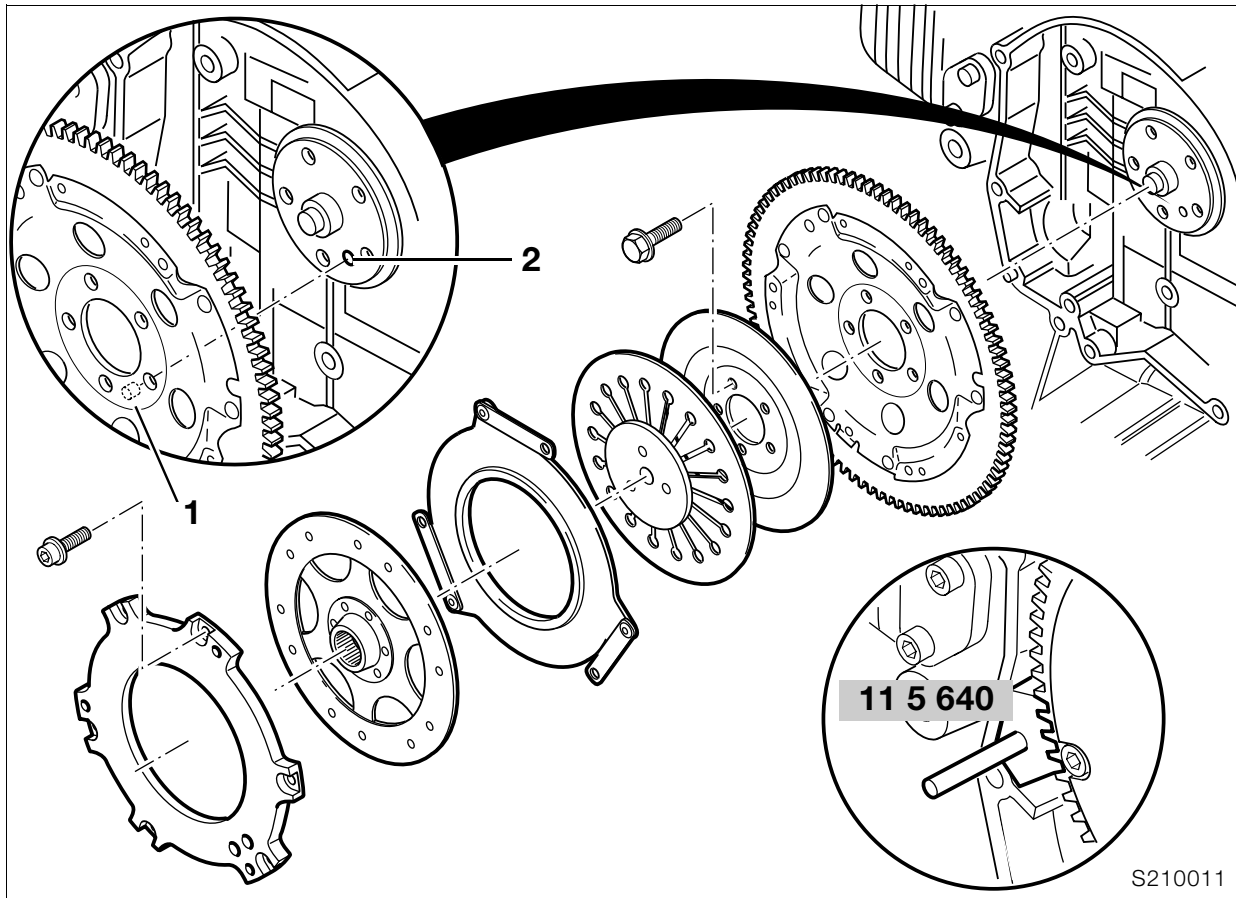


- Remove clutch pushrod.
- Always use oiled guide pins, **BMW No. 23 1 820**, when removing or installing the gearbox.
- Remove the rear wheel, rear wheel drive and swinging arm together with the gearbox.



- Use hose clip pliers, **BMW No. 17 5 500**, to disconnect hose from rotary breather from air-filter box.
- Remove air filter box.
- Remove the fuel distributor.
- Remove clutch slave cylinder.
- Remove the gearbox.





**Removing clutch from engine**

- Lock the clutch housing with special tool, **BMW No. 11 5 640**.
- Remove the clutch.

- Secure the clutch with the retaining screws.
- Center the clutch plate with centering pin, **BMW No. 21 2 673**.
- Tighten retaining screws in diagonally opposite sequence.

**21 21 Installing clutch**

**Installing clutch in engine**

- Install clutch housing with crankshaft pin (2) located in bore (1).
- Install locking device, **BMW No. 11 5 640**, to lock clutch housing.

**Lubrication points:**

Splines on clutch plate and gearbox input shaft.  
 Diaphragm spring contact surface on clutch housing.  
 Diaphragm spring contact surface on pressure plate.

..... Optimoly MP3 paste

**⚠ Attention:**

Always use new screws for housing and cover.

- Insert all screws by hand and tighten.

**🔧 Tightening torque:**

Clutch housing to crankshaft  
 (Threads lightly oiled)  
 Initial torque ..... 40 Nm  
 Additional angle of rotation..... 32°

- Install clutch.

**⚠ Attention:**

Make sure that colour marks on the clutch housing, thrust plate and housing cover are offset 120°.

**🔧 Tightening torque:**

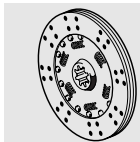
Housing cover to flywheel ..... 12 Nm

**Installing clutch in vehicle**

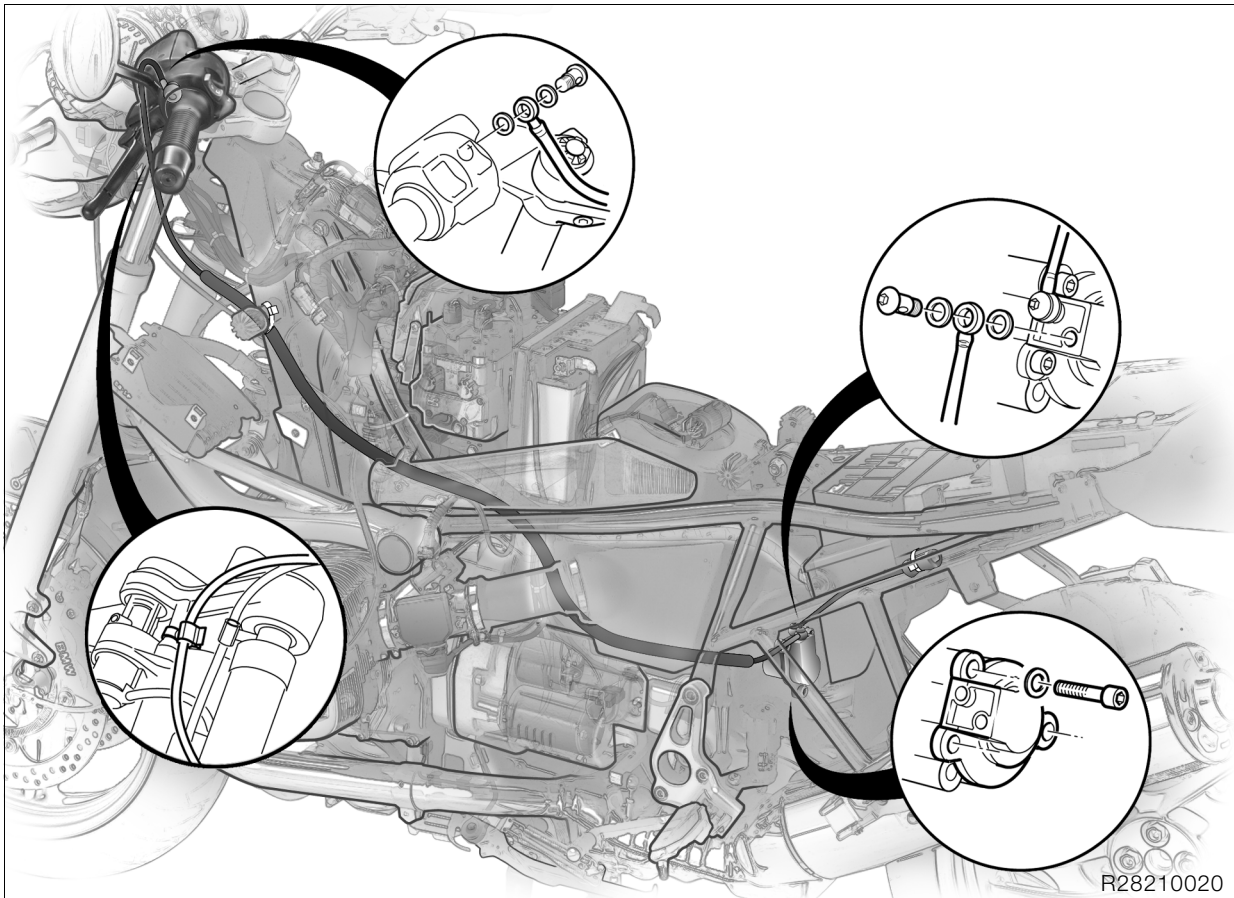
- Installation is the reverse of the removal procedure.

**📄 Note:**

When installing, fit a new seal on the clutch slave cylinder.







## 21 52 Removing and installing clutch hydraulic line

- Remove the seat.
- Remove fuel tank (→ 16.5).
- Remove rear silencer.
- Remove rear brake caliper.
- Remove rear wheel.



### Note:

Place support under rear wheel drive.

- Remove spring strut.
- Drain the clutch operating system.



### Attention:

Do not allow brake fluid to come into contact with painted parts of the motorcycle as brake fluid destroys paint.

- Remove central electrics box from rear frame.
- Remove the bracket for the brake line from the rear frame.
- Remove rear brake fluid reservoir from its holder.
- Loosen the fasteners securing the right and left footrest plates.
- Remove top screws of footrest plates on left and right.
- Remove rear-frame fasteners on left and right at front, but only loosen strut fasteners.
- Carefully lift rear frame approx. 15 mm (0.5906 in).
- Disconnect line from master cylinder.

- Disconnect the lines from the clutch slave cylinder.
- Remove clutch line.
- Installation is the reverse of the removal procedure.
- Fill the clutch operating system.



### Note:

When installing, fit new sealing rings.



### Tightening torque:

Clutch line to handlebar fitting..... 14 Nm  
 Clutch line to slave cylinder..... 7 Nm



## 21 52 012 Removing and installing clutch slave cylinder

- Remove the seat.
- Remove rear silencer.
- Remove rear brake caliper.
- Remove rear wheel.



### Note:

Place support under rear wheel drive.

- Remove spring strut.
- Drain the clutch operating system.



### Attention:

Do not allow brake fluid to come into contact with painted parts of the motorcycle as brake fluid destroys paint.

- Remove central electrics box from rear frame.
- Remove the bracket for the brake line from the rear frame.
- Remove brake fluid reservoir from its holder.
- Loosen the fasteners securing the right and left footrest plates.
- Remove top screws of footrest plates on left and right.
- Remove rear-frame fasteners on left and right at front, but only loosen strut fasteners.
- Carefully lift rear frame approx. 15 mm (0.5906 in).
- Disconnect the lines from the clutch slave cylinder.
- Remove clutch slave cylinder.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Use new sealing rings.



### Note:

The frame tube has to be removed so that the clutch slave cylinder can be tightened to the correct torque.

- Fill the clutch operating system (→ 00.54).



### Tightening torque:

Clutch slave cylinder to gearbox ..... 9 Nm  
Frame tube to gearbox

### Tightening sequence:

Connecting pipe/gearbox

1. To gearbox and footrest plate, left  
(clean thread + Loctite 243)..... 42 Nm
2. Clamp block, connecting tube to gearbox.. 9 Nm
3. To gearbox and footrest plate, right  
(clean thread + Loctite 243)..... 42 Nm

## 21 52 005 Filling and bleeding clutch line

See Instructions for changing clutch fluid (→ 00.54).

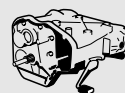


# 23 Gearbox

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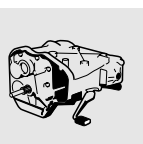
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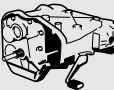
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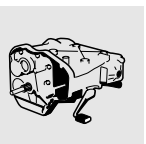
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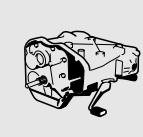
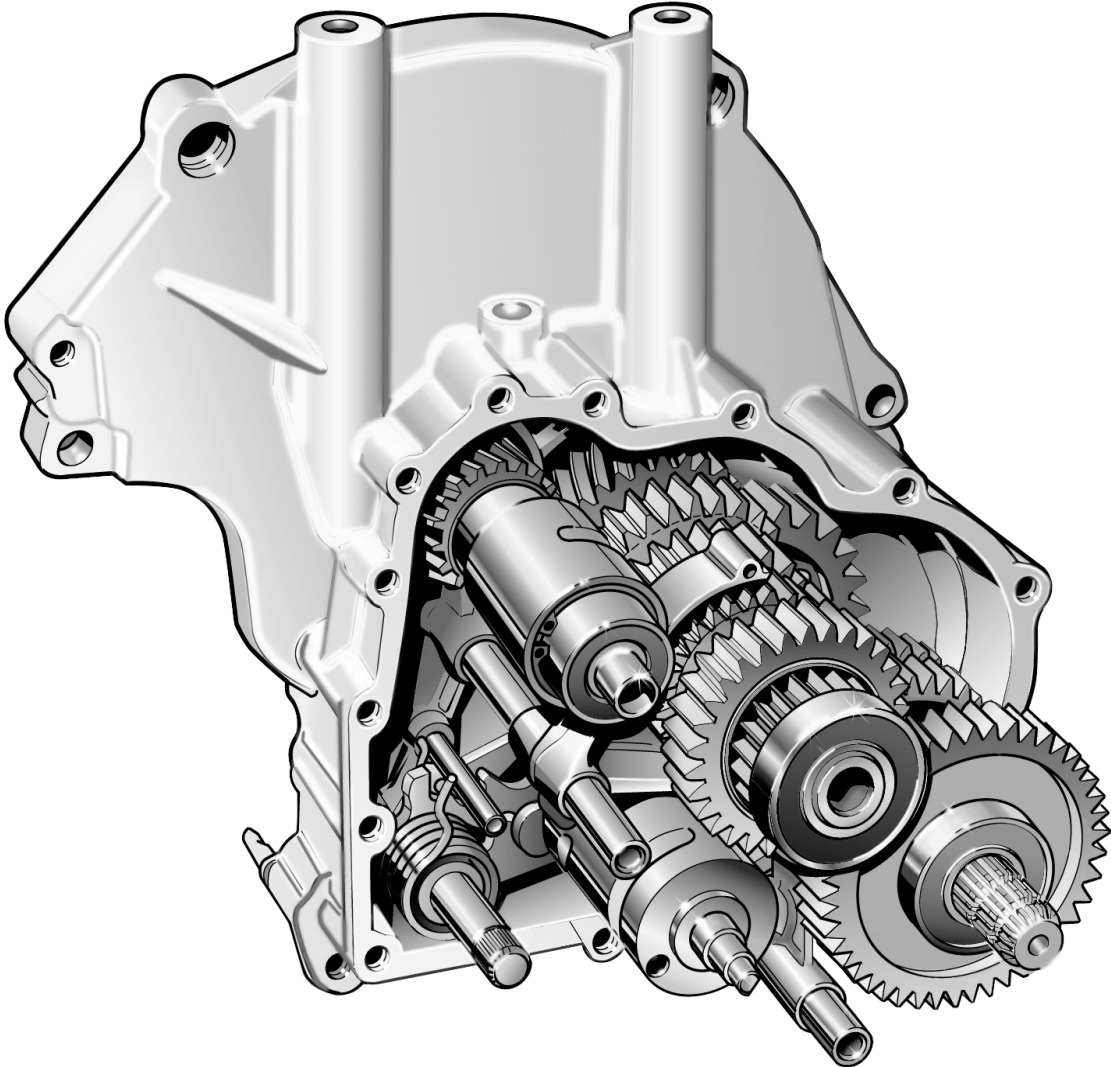


<b>Technical Data</b>		<b>R 1150 R</b>
Type of gearbox		6-speed gearbox with claw-action shift and integral reaction damper for all gears
Gear shift type		Foot-operated lever and selector drum with over-shoot detent
<b>Gear ratio</b>		
1st gear		3.864
2nd gear		3.022
3rd gear		2.393
4th gear		1.962
5th gear		1.700
6th gear		1.511
Oil grade (all the year round)		Brand-name SAE 90 hypoid gear oil, API Class GL 5
<b>Capacity</b>		
initial filling	l (Imp. pint/US quart)	approx. 1.0 (1.76/1.06) (to lower edge of filler screw)
oil change	l (Imp. pint/US quart)	approx. 0.8 (1.41/0.85) (to lower edge of filler screw)
End float of spring segment at input shaft	mm (in)	0.4... 0.6 (0.0157...0.0236)
End float at 1st gear, output shaft	mm (in)	0.1... 0.33 (0.0039...0.0130)
End float at 2nd gear, output shaft	mm (in)	0.1... 0.33 (0.0039...0.0130)
End float at 3rd/4th gears (total play) output shaft	mm (in)	0.1... 0.67 (0.0039...0.0264)
Selector shaft end float	mm (in)	0.1... 0.3 (0.0039...0.0118)
Length of selector drum, fully compressed	mm (in)	111.80... 111.90 (4.4015...4.4055)

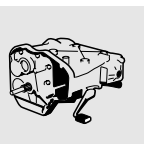




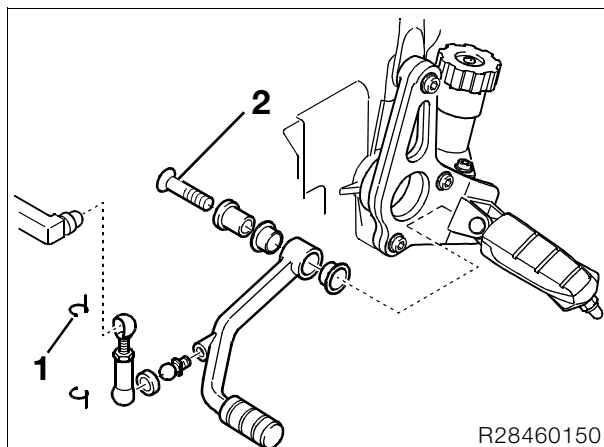
**Gearbox - sectional drawing**



R21239010



## 23 41 Removing and installing gear-shift lever



R28460150

- Remove retaining clip (1) and unfasten ball head.
- Remove retaining screw (2) on gear shift pedal.
- Installation is the reverse of the removal procedure.



### Tightening torque:

Gearshift lever to footrest plate ..... 35 Nm

## 23 00 Removing and installing gear-box

- Use a strap to secure the main stand to the manifold cross-tube.
- Remove the seat.
- Remove the oil cooler ducts from the fuel tank.
- Disengage fuel tank.



### Attention:

Fuel is flammable and a hazard to health. Observe relevant safety regulations.

- Disconnect the fuel lines.
- Disconnect breather lines.
- Disconnect plug of fuel pump unit.
- Remove fuel tank.
- Remove the battery.

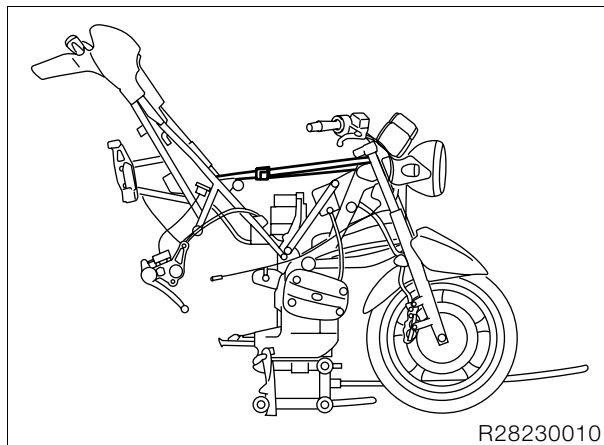


### Attention:

Disconnect the negative battery terminal first, then the positive terminal. Connect the positive battery terminal first, then the negative terminal.

- Unscrew rear battery mount.
- Disconnect the air temperature sensor plug.
- Disconnect the diagnostic plug.
- Remove air filter cover.
- Remove the air filter.
- Remove the intake air pipe.
- Unfasten air filter box at front and rear.
- Disconnect plug of oxygen sensor and remove cable.
- Disconnect hose clamps/throttle stub pipes and push the stubs into the air filter box.
- Disconnect plugs of injection valves.
- Remove holders of injection valves.

- Remove injection valves from throttle stub pipes.
- Detach retaining clip from ball head/shift linkage and remove ball head.
- Remove rear-frame fasteners on left and right at front, but only loosen strut fasteners.
- Remove rear silencer.
- Remove front silencer.
- Remove starter motor cover and disconnect cable to power socket.
- Disconnect cables from starter motor.
- Remove the starter motor.
- Disconnect plug of gear indicator.
- Remove the fastener securing the rear spring strut at the bottom.
- Remove hydraulic spring adjuster.
- Remove rear right side panels.
- Disconnect plug of brake light switch and remove cable.
- Remove brake master cylinder and guard from footrest plate.
- Take off the footrest plates.
- Remove rear brake fluid reservoir from its holder.
- Remove brake line from rear frame.
- Remove brake line from swinging arm.
- **[Integral ABS]** Disconnect plug for rear ABS sensor.
- **[Integral ABS]** Remove rear ABS sensor.
- Remove rear brake caliper.
- Use cable ties to secure the brake caliper to the rear frame.
- Remove the clutch bleeding/filler adapter from the rear frame.
- Remove cable ties/wiring harness from air filter box.
- Remove rear battery mount.



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- Tilt the rear frame up and secure it in this position with a strap attached to the handlebars.
- Use hose clip pliers, **BMW No. 17 5 500**, to disconnect hose from rotary breather from air-filter box.
- Remove air filter box.
- Remove the fuel distributor.
- Remove the clutch slave cylinder; fit a new seal when installing.
- Remove rear wheel and spacer.



### Attention:

Support the rear wheel drive.

- Release fastener securing strut to gearbox.



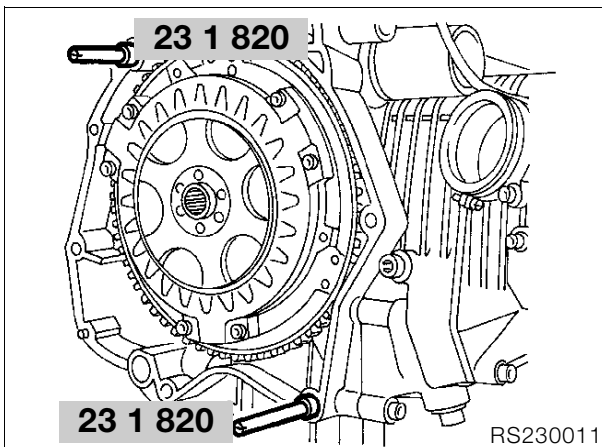


- Release the retaining strap securing the flexible gaiter to the swinging arm.
- Push the flexible gaiter to the rear.
- Swinging-arm bearing studs are secured with Loctite: heat to max. 120 °C (248 °F) to release.
- Slacken the floating-bearing stud of the rear wheel drive in the swinging arm.
- Slacken the fixed-bearing stud of the rear wheel drive in the swinging arm.
- Remove floating bearing/fixed bearing studs.
- Remove fastener securing strut to gearbox.
- Remove rear-wheel drive from universal shaft.
- Slacken the floating-bearing stud of the swinging arm in the gearbox.
- Slacken the fixed-bearing stud of the swinging arm in the gearbox.
- Remove floating bearing/fixed bearing studs.
- Remove swinging arm.
- Press off drive shaft.
- Remove clutch slave cylinder.
- Remove clutch pushrod.
- Remove the gearbox.

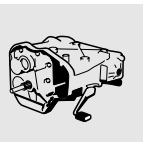


**Note:**

Disconnecting the battery deletes all entries (e.g. faults, settings) stored in the Motronic control unit's memory. Loss of settings can temporarily impair the operating characteristics when the engine is restarted.



- Always use oiled guide pins, **BMW No. 23 1 820**, when removing or installing the gearbox.



**⚠ Attention:**

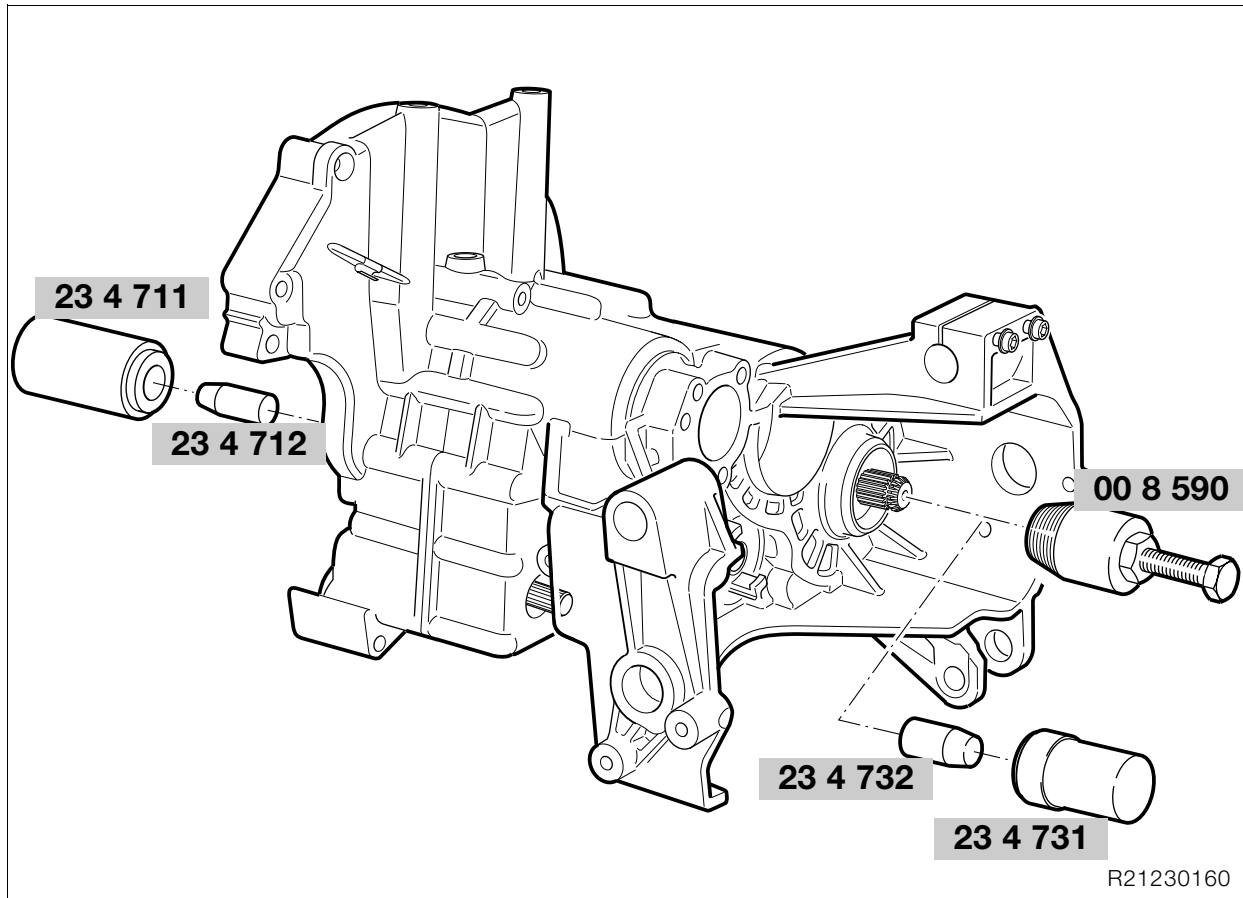
Take care to keep the gearbox at its installed height until the full length of the clutch actuating rod is visible, as otherwise the rod can be bent.

- Installation is the reverse of the removal procedure.

**⚠ Attention:**

Note correct sequence for tightening fasteners of rear frame to gearbox.

- Switch on the ignition.
- Without starting the engine, fully open the throttle once or twice so that the Motronic control unit can register the throttle-valve positions.



## 23 12 Replacing shaft sealing rings in gearbox housing and gearbox cover



### Note:

All shaft sealing rings can be replaced with the gearbox installed, apart from the input-side shaft sealing ring on the input shaft.

Replace all shaft sealing rings if the gearbox is fully disassembled.

Lightly oil the sealing lips before installing the shaft sealing rings.



### Attention:

Take care not to damage the faces of the casing and the shafts when removing the shaft sealing rings.

## 23 12 Replacing input shaft sealing ring at input end

- Carefully lever out the shaft sealing ring with a screwdriver.
- Drive the new sealing ring in with the sealing lips facing inwards, using slip-over sleeve, **BMW No. 23 4 712**, and drift, **BMW No. 23 4 711**.

## 23 12 Replacing output shaft sealing ring



### Attention:

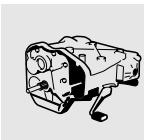
Do not use pointed tools to remove the shaft sealing ring of the output shaft, because they could damage the sealing washer of the grooved ball bearing behind the sealing ring.

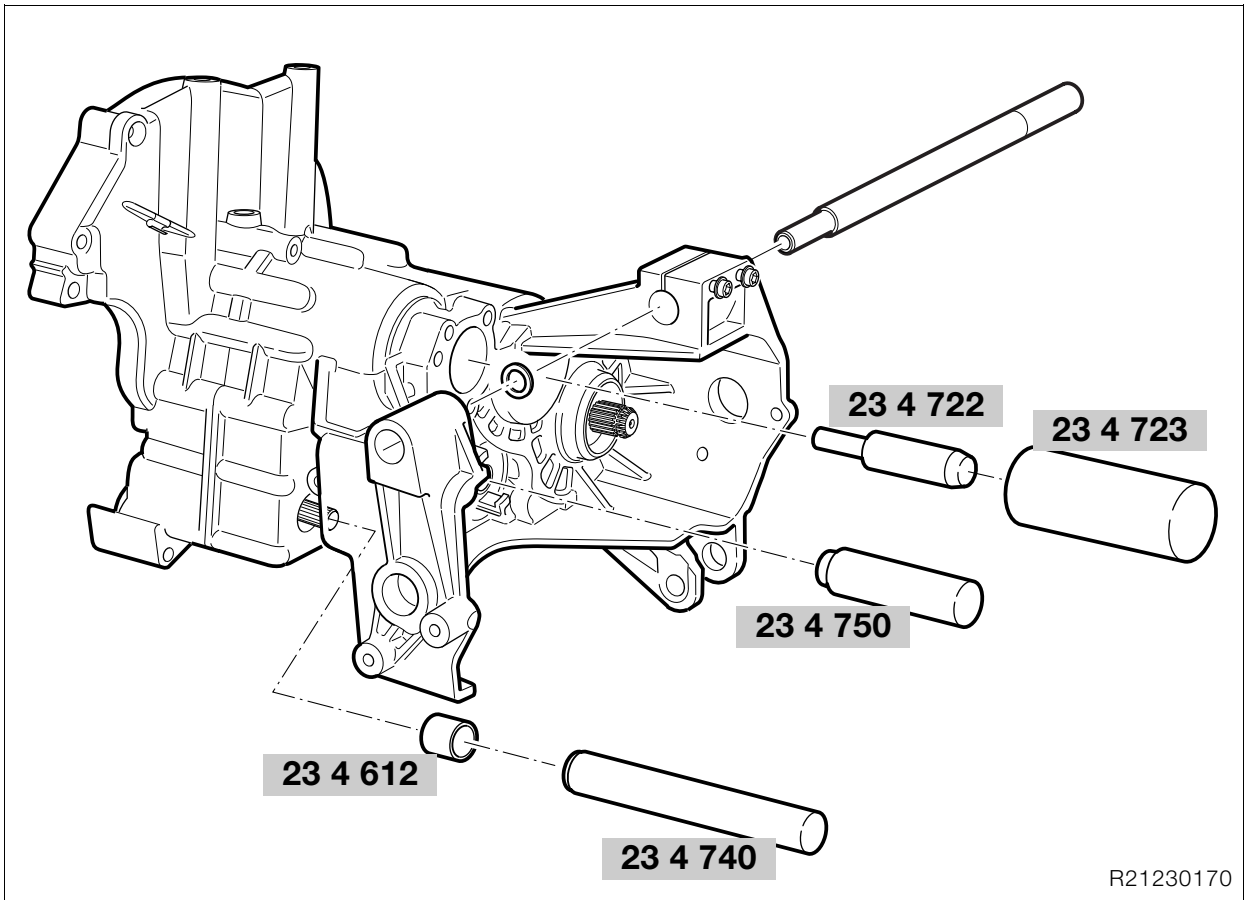
- Use puller, **BMW No. 00 8 590**, to remove the shaft sealing ring, or alternatively pry out carefully with a screwdriver.
- Install the sealing ring with the sealing lip facing inwards, using assembly sleeve, **BMW No. 23 4 732**, and drift, **BMW No. 23 4 731**.



### Attention:

Do not drive in the output-shaft sealing ring too far: make sure it is flush with the housing.





R21230170

### 23 12 Replacing input shaft sealing ring at output end



#### Attention:

Take care not to damage the faces of the casing and the shafts when removing the shaft sealing rings.



#### Attention:

Do not use pointed tools to remove the shaft sealing ring of the input shaft, because they could damage the sealing washer of the grooved ball bearing behind the sealing ring.

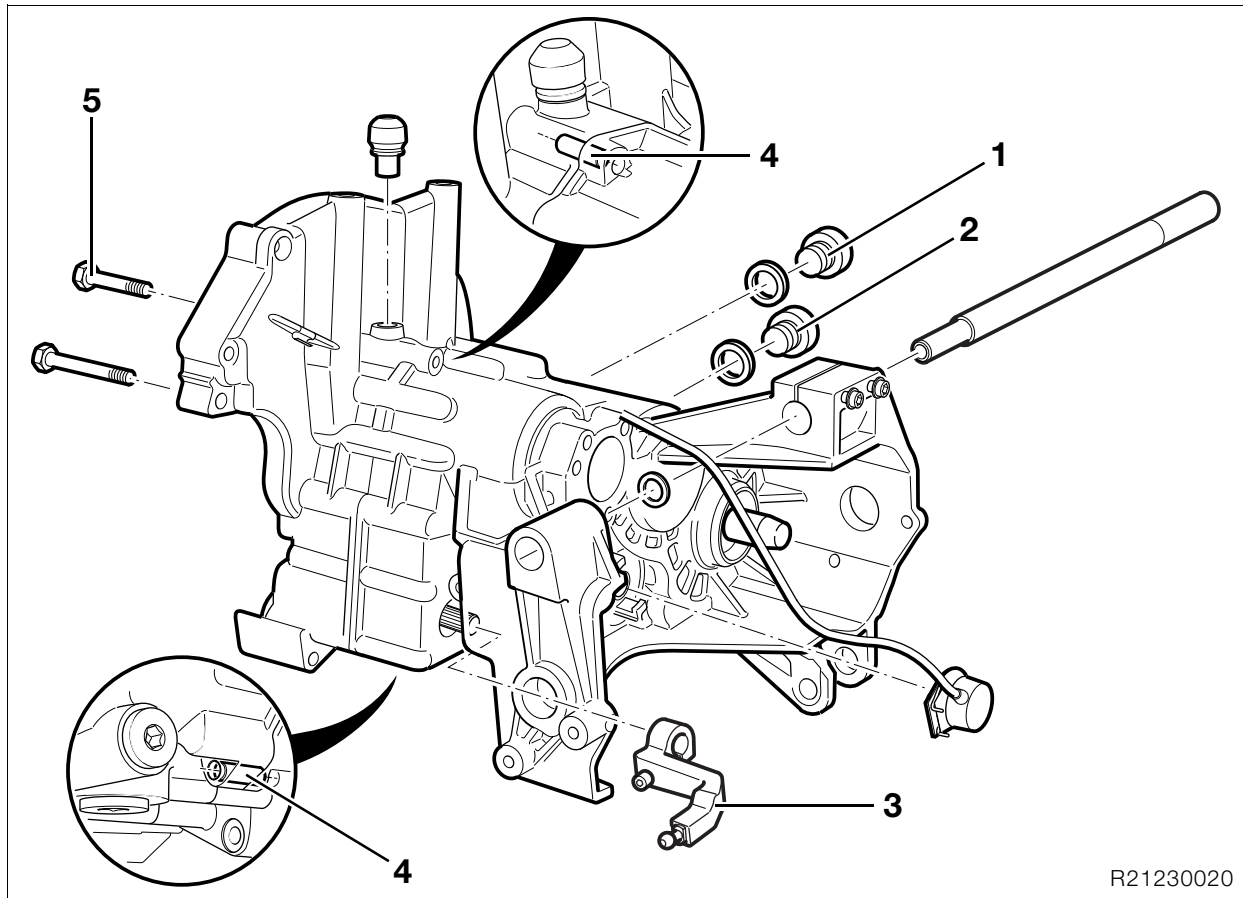
- Remove the connecting pipe.
- Carefully lever out the shaft sealing ring with a screwdriver.
- Install the new sealing ring with the sealing lips facing inwards, using guide, **BMW No. 23 4 722**, and impact driver, **BMW No. 23 4 723**.

### 23 31 Replacing shaft sealing ring for selector drum

- Carefully lever out the shaft sealing ring with a screwdriver.
- Install the new sealing ring with the sealing lip facing inwards, using impact driver, **BMW No. 23 4 750**.

### 23 12 Replacing sealing ring for gearshift shaft

- Carefully lever out the shaft sealing ring with a screwdriver.
- Install the new sealing ring with the sealing lip facing inwards, using assembly sleeve, **BMW No. 23 4 612**, and impact driver, **BMW No. 23 4 740**.

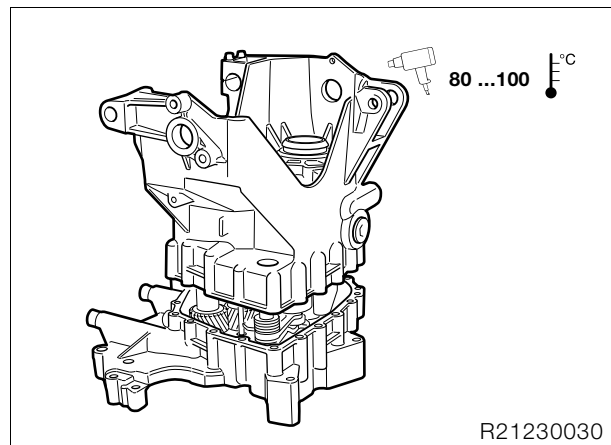


R21230020

## 23 00 Disassembling gearbox

### Removing gearbox housing

- Remove oil filler/level check screw (1).
- Remove oil drain plug (2) and drain the oil from the gearbox into a suitable tray.
- Remove selector lever (3).
- Carefully drive back centering pins (4), from the cover side or casing side, as applicable.
- Remove screws (5) securing cover to housing.



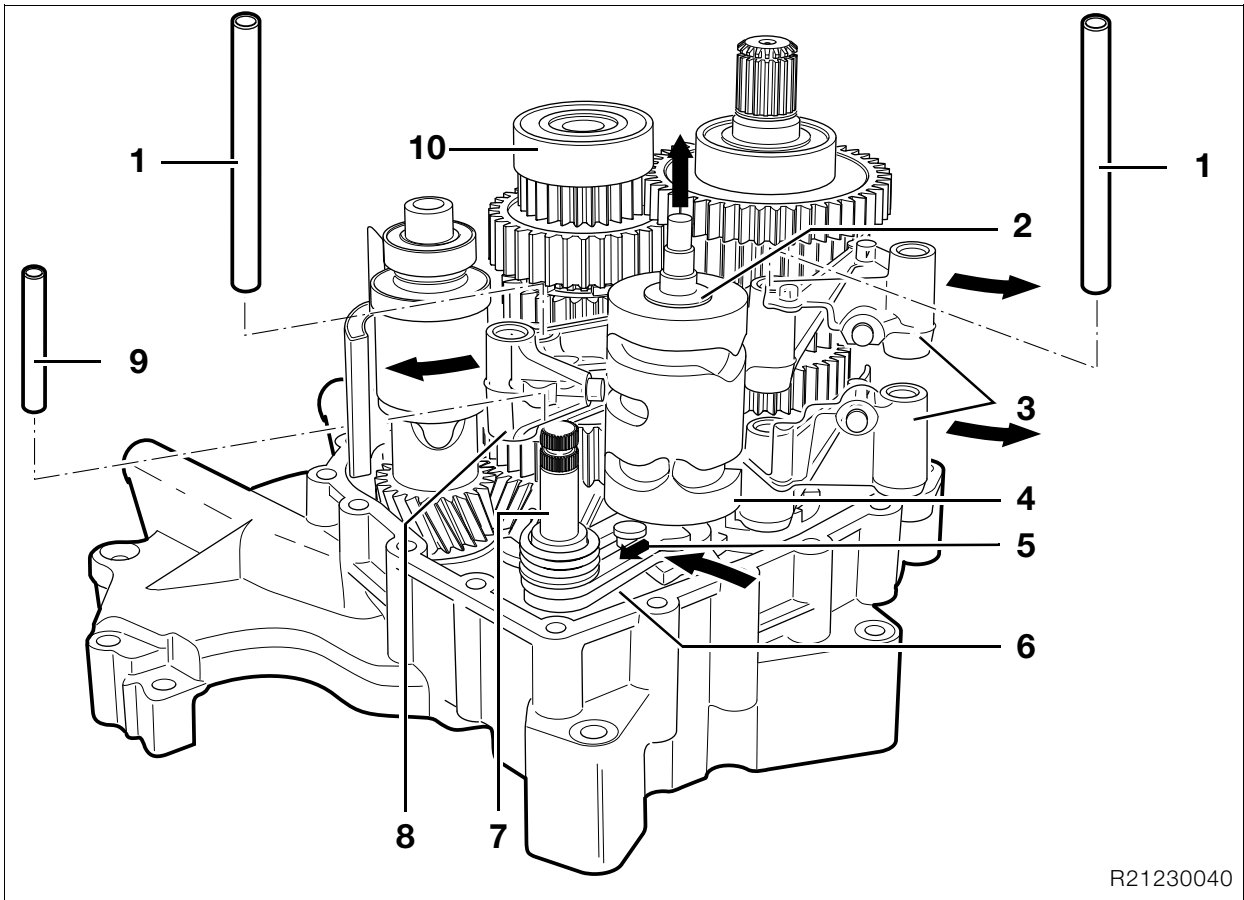
R21230030

- Set the gearbox down on its cover.

#### **⚠ Attention:**

Avoid damage to the housing cover and painted surfaces.

- Heat the bearing points in the housing to 80 °C... 100 °C (176 °F... 212 °F).
- Tap lightly with a plastic-faced hammer to disengage the housing.

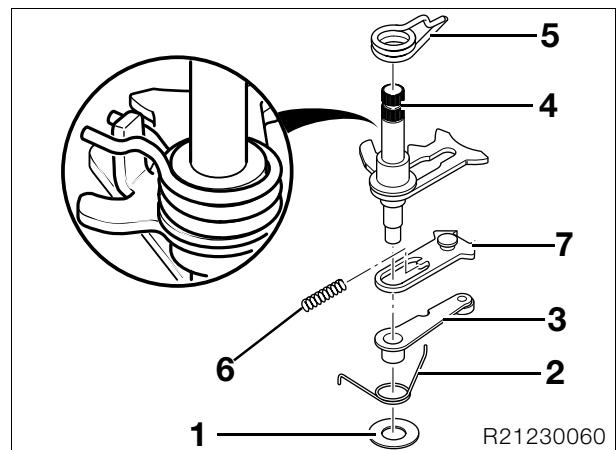


R21230040

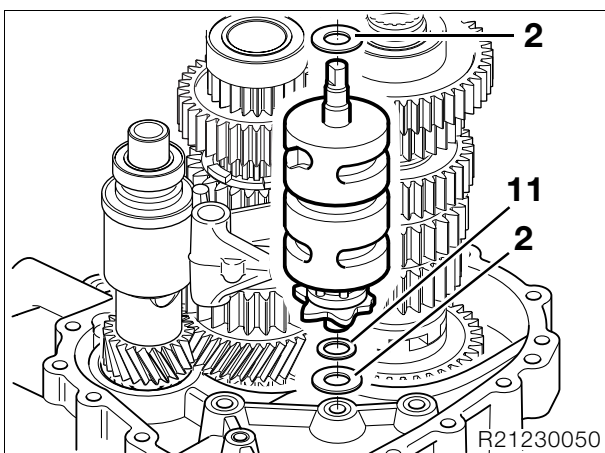
### 23 31 Removing selector drum

- Pull the selector shafts (1) out of the selector forks.
- Swing the selector forks (3/8) out towards the edge of the cover (arrows).
- Remove locking pin (9).
- Press guide plate (5) against the spring (arrow).
- Swing locking lever (6) towards input shaft, hold it there and pull out the selector drum (4), turning it slightly at the same time.

### 23 31 Disassembling/assembling selector shaft



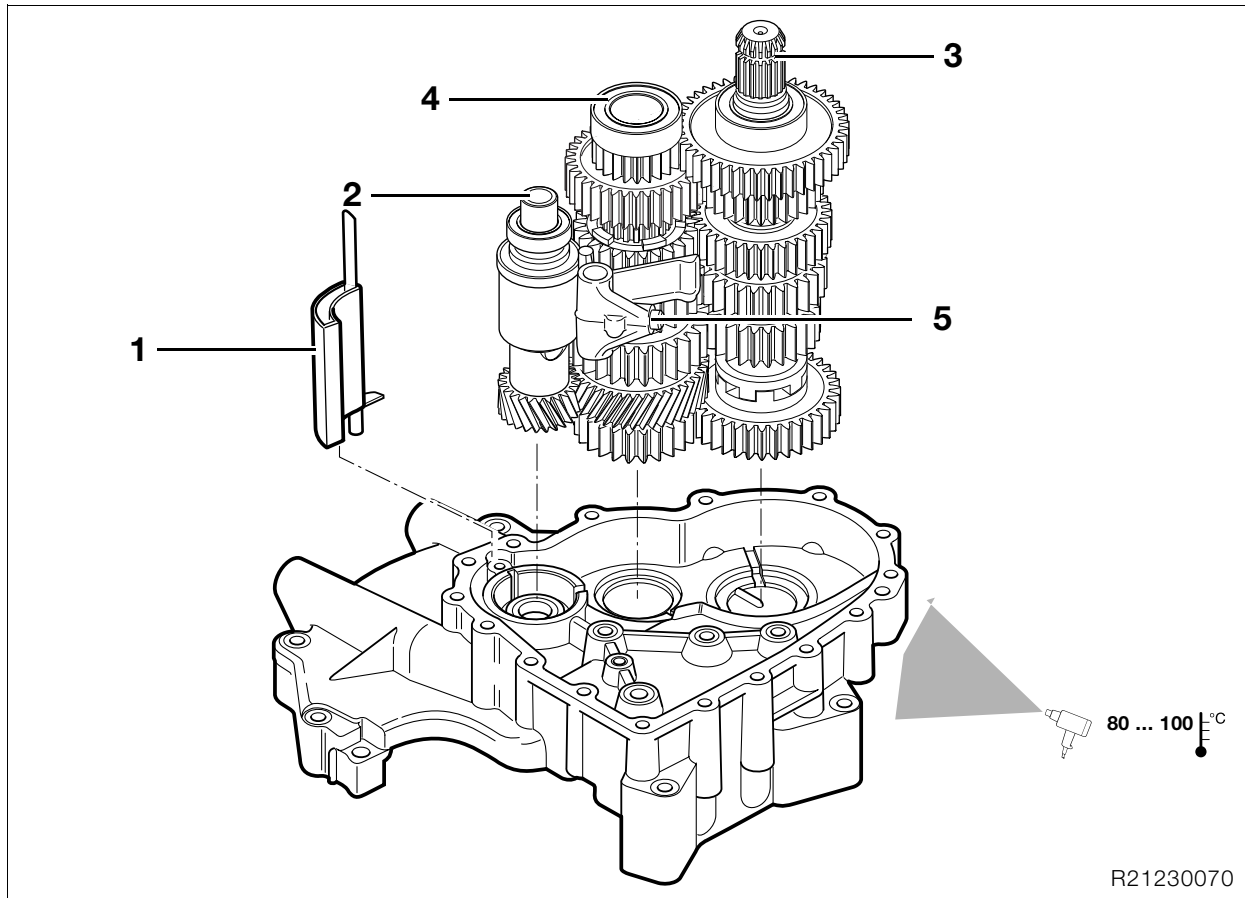
R21230060



R21230050

- Remove thrust washers (2) and spacing washer (11).
- Release the locking lever (6).
- Remove the selector shaft (7) with spacing washer.
- Remove selector forks (3).
- Selector fork (8) remains in intermediate shaft (10).

- Take off spacing washer (1).
- Remove torsion spring (2) with locking lever (3) from selector shaft (4).
- Remove torsion spring (5).
- Disengage coil spring (6) and remove together with guide plate (7).
- Assembly is the reverse of the disassembly procedure.



R21230070

## Removing gearbox shafts

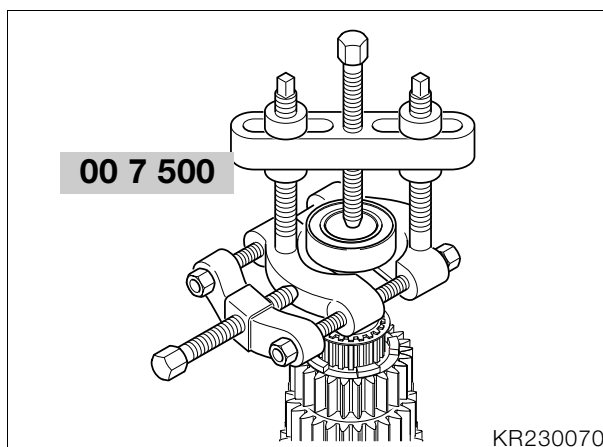
- Remove breather tube (1).
- Heat bearing points in gearbox cover to 80 °C ... 100 °C (176 °F... 212 °F).
- Remove input shaft (2), output shaft (3) and intermediate shaft (4) together from the cover.
- Remove selector fork (5) from intermediate shaft.
- Mark the selector fork with a felt-tipped pen or similar.

## 23 12 Replacing grooved ball bearings of intermediate shaft

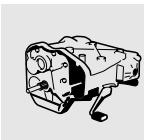
### ⚠ Attention:

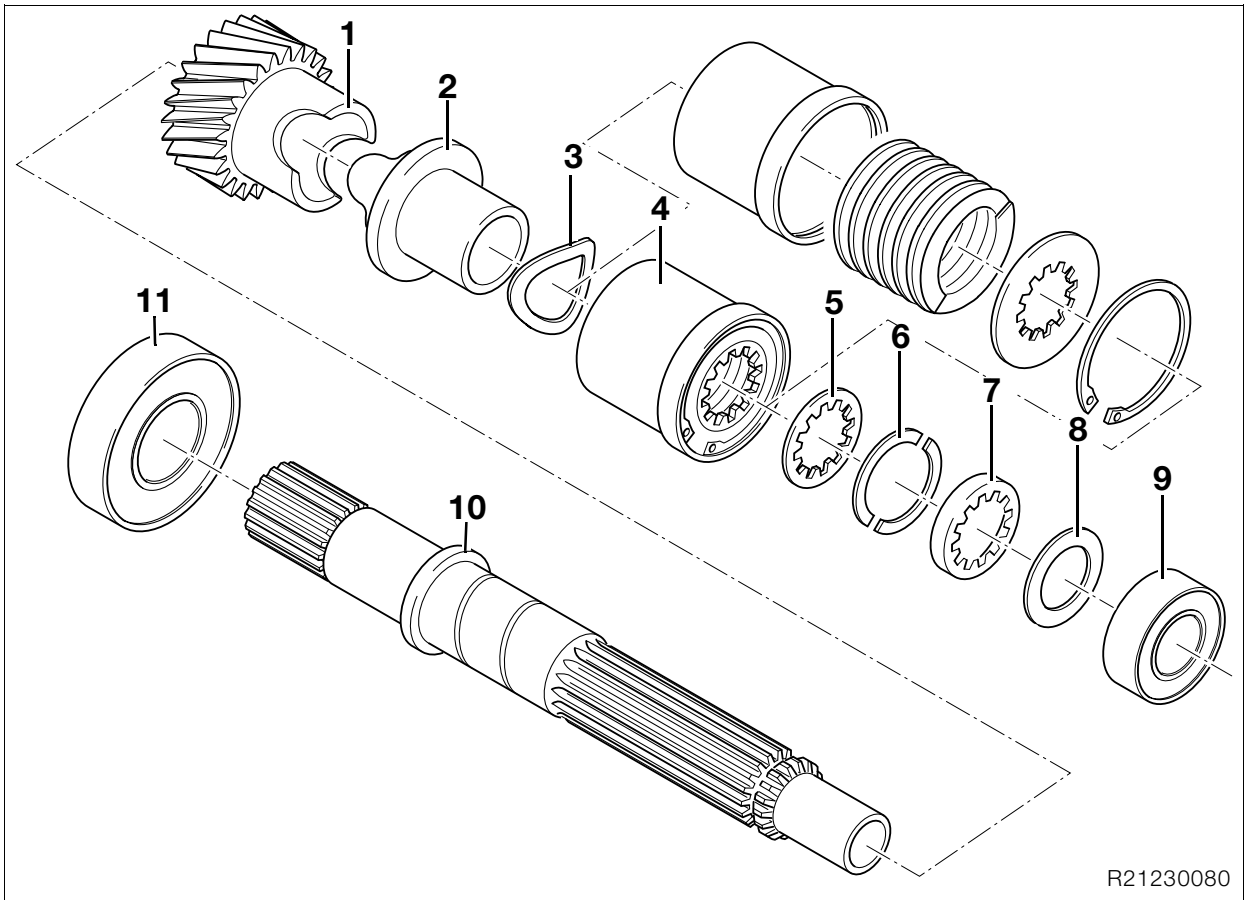
If the grooved ball bearings are replaced, the fully assembled length must be checked.

- Pull off the grooved ball bearings with a universal puller, **BMW No. 00 7 500**.
- Press the output-side grooved ball bearing on to the intermediate shaft.
- Check/adjust fully-assembled length (⇒ 23.19).
- Place spacing washer of calculated thickness in position and press on the input-side grooved ball bearing.



KR230070

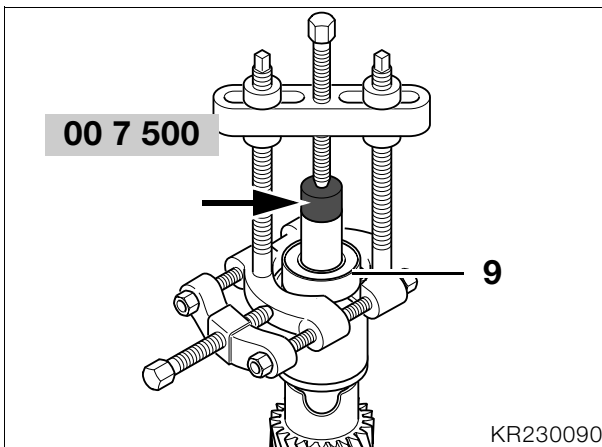




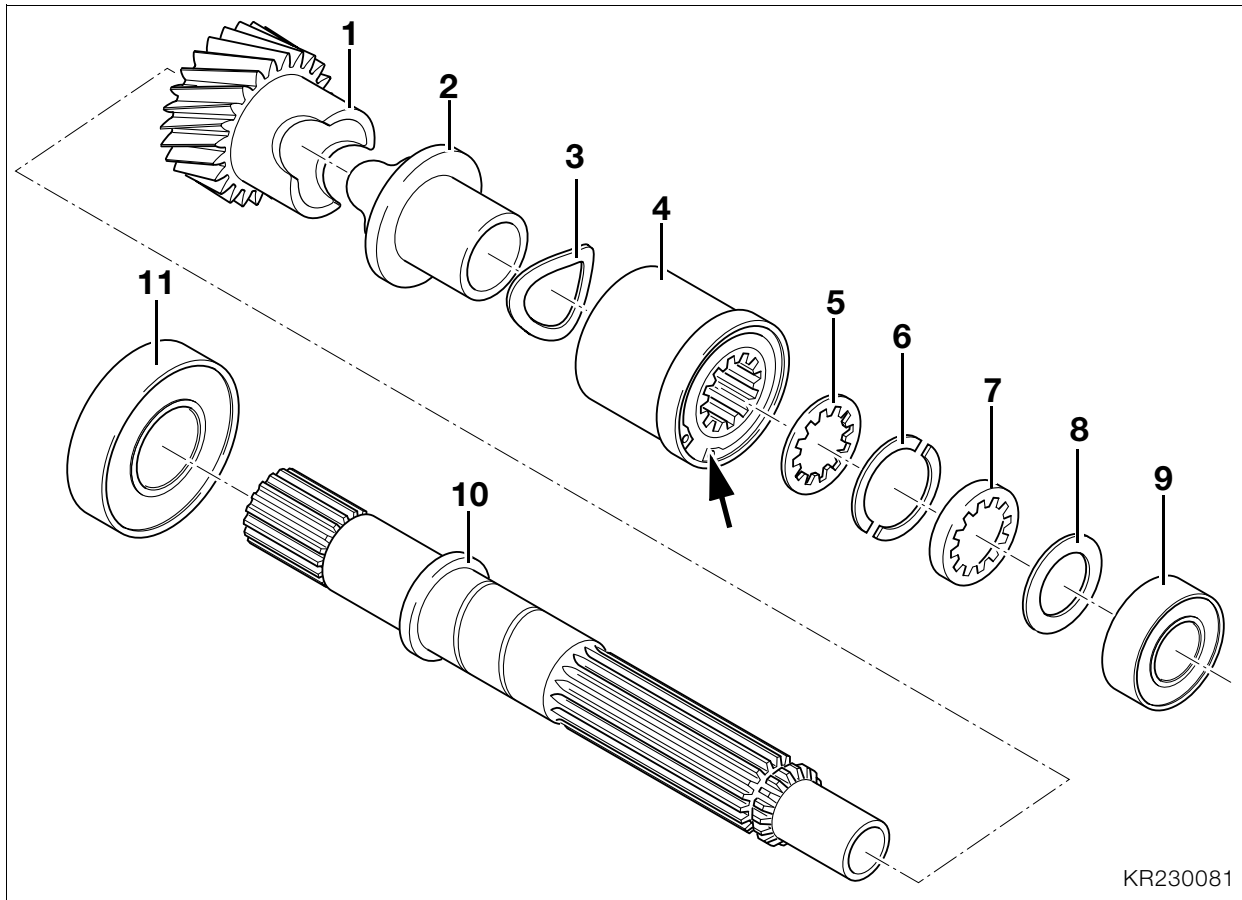
## 23 12 Disassembling and assembling input shaft

### Disassembling input shaft

- Use universal puller, **BMW No. 00 7 500**, and pressure head (arrow) to pull off grooved ball bearing (11).



- Clamp the input shaft into a vise with soft jaws.
- Use universal puller, **BMW No. 00 7 500**, and pressure head (arrow) to pull off grooved ball bearing (9) with spacing washer (8).
- Note the thickness of spacing washer (8).
- Remove retaining ring (7).
- Compress spring cluster (4) and remove keepers (6).
- Remove spacer (5), spring cluster (4), anti-rattle disc (3), thrust block (2) and constant-speed gear (1).
- Clamp input shaft (10) other way round in vise.



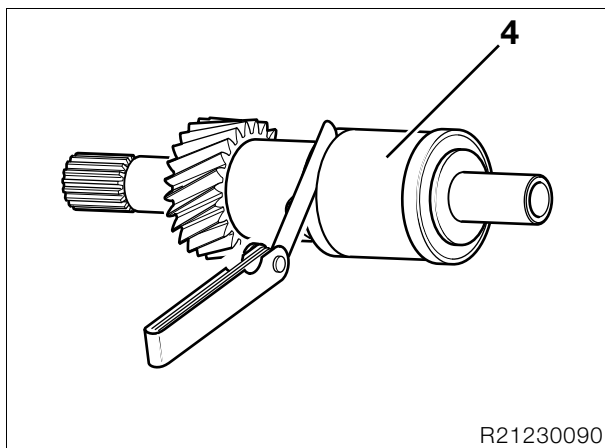
**Assembling input shaft/checking and adjusting end float of spring cluster**

- Lightly oil the bearing surface for constant-speed gear (1) on input shaft (10), and install the constant-speed gear.
- Lightly oil the splines in thrust block (2) and install it.
- Place anti-rattle disc (3) on thrust block (2).
- Mount spring cluster (4) with locating ring (arrow) facing upwards on anti-rattle disc (3).
- Install spacer (5).
- Compress spring cluster (4) and insert the keepers (6) in the ring groove.
- Install retaining ring (7) with the shoulder facing over keepers (6).

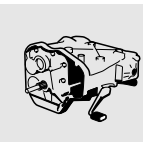
- Check fully assembled length and adjust if necessary (⇒ 23.21).
- Install spacing washer (8) of calculated thickness, and press on grooved ball bearing (9).

**End float:**

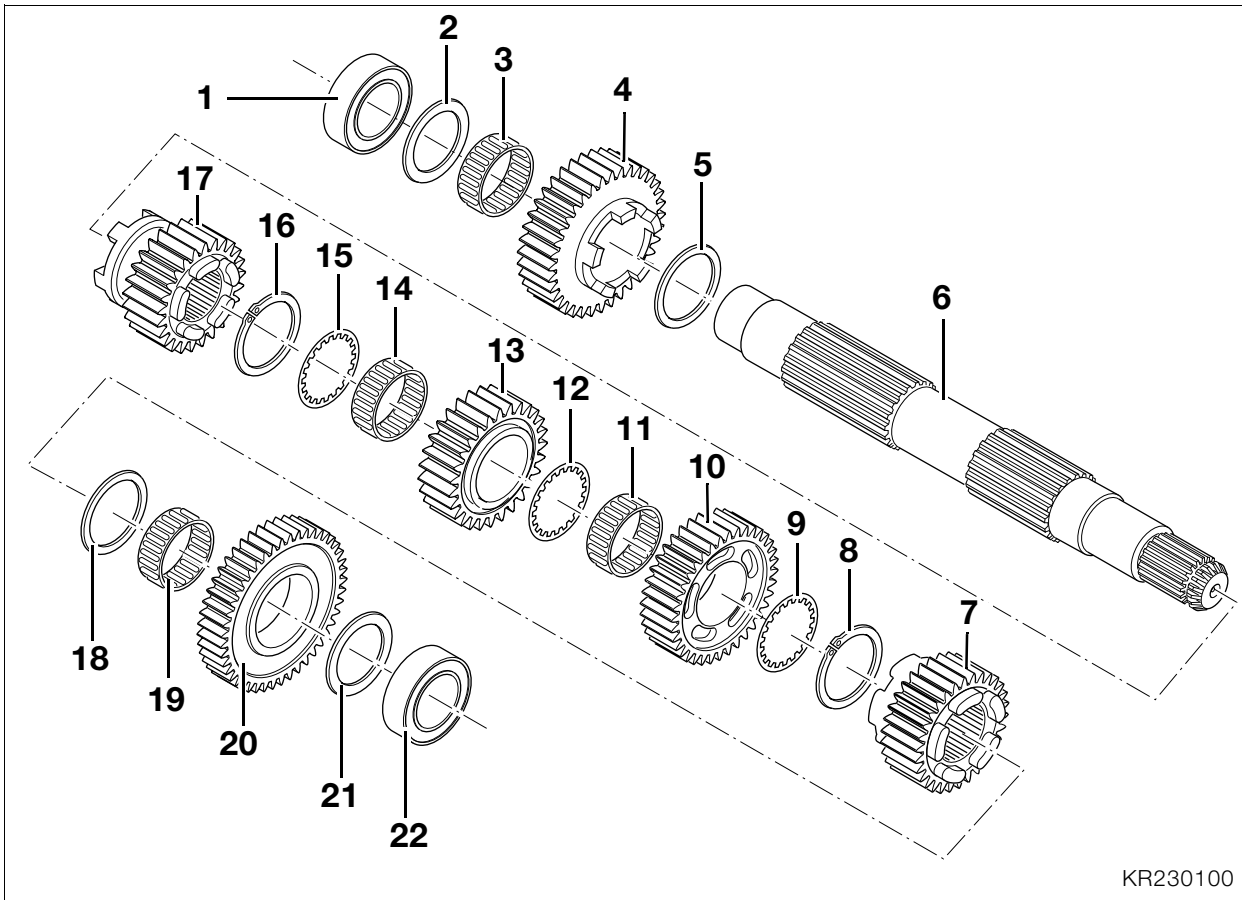
Spring assembly on shaft .....0.4 ... 0.6 mm  
 ..... (0.0157...0.0236 in)



- Check end float of spring cluster (4); correct if necessary by installing spacer (5) of suitable thickness.







KR230100

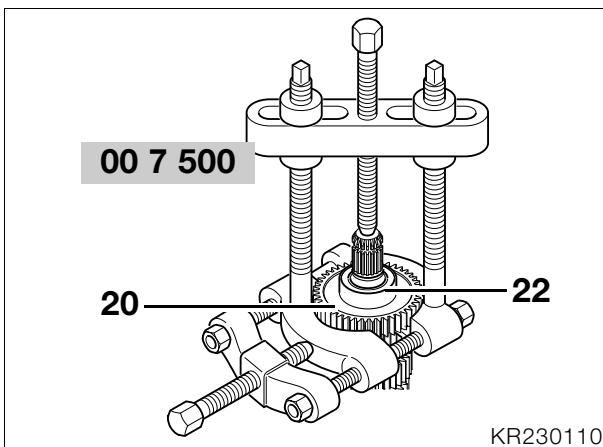
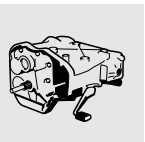
## 23 12 Disassembling and assembling output shaft

### Disassembling output shaft



#### Attention:

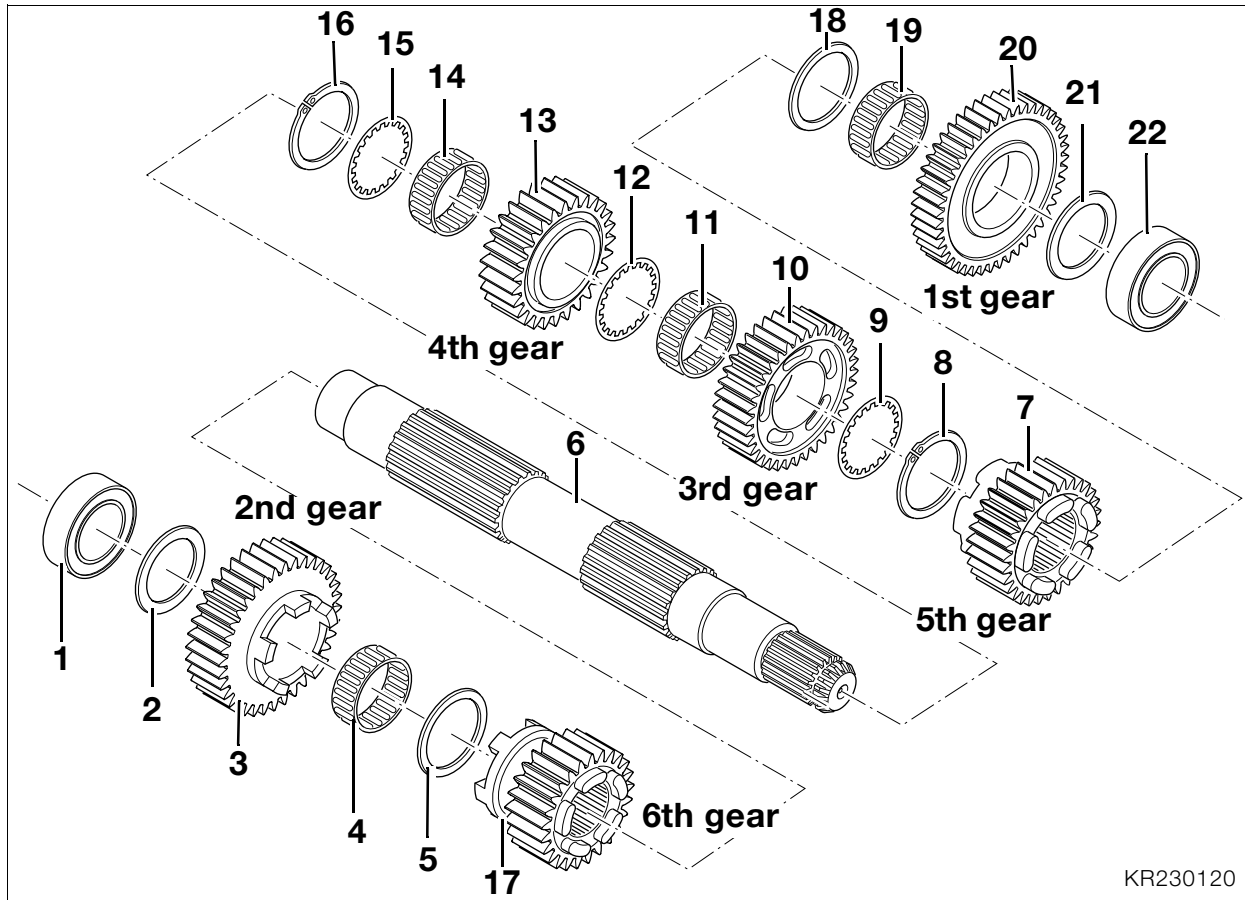
To avoid damaging the needle roller bearing on the splines of the shaft, spread it carefully at the end face when removing.



KR230110

- Using universal puller, **BMW No. 00 7 500**, pull off grooved ball bearing (22) together with shift gearwheel for 1st gear (20).

- Remove spacing washer (21), shift gearwheel for 1st gear (20), needle roller bearing (19) and spacing washer (18).
- Remove sliding gearwheel for 5th gear (7).
- Remove circlip (8), backup washer (9), shift gearwheel for 3rd gear (10) and needle roller bearing (11).
- Remove backup washer (12), shift gearwheel for 4th gear (13), needle roller bearing (14) and backup washer (15).
- Remove circlip (16) and sliding gearwheel for 6th gear (17).
- Turn output shaft (6) other way round and clamp into the vise with soft jaws.
- Using universal puller, **BMW No. 00 7 500**, pull off deep-groove ball bearing (1) together with shift gearwheel for 2nd gear (4).
- Remove shim washer (2), needle roller bearing (3), shift gearwheel for 2nd gear (4) and thrust washer (5).



### Assembling output shaft



#### Note:

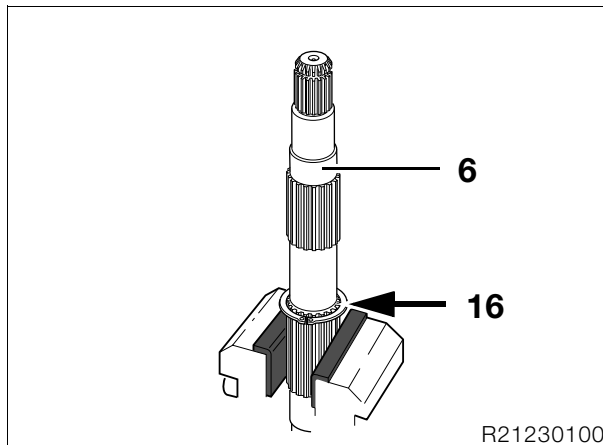
Assembly starts at the shift gearwheel for 4th gear. Before assembly, oil all friction faces lightly with gear oil.

- Install needle roller bearing (14).



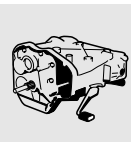
#### Attention:

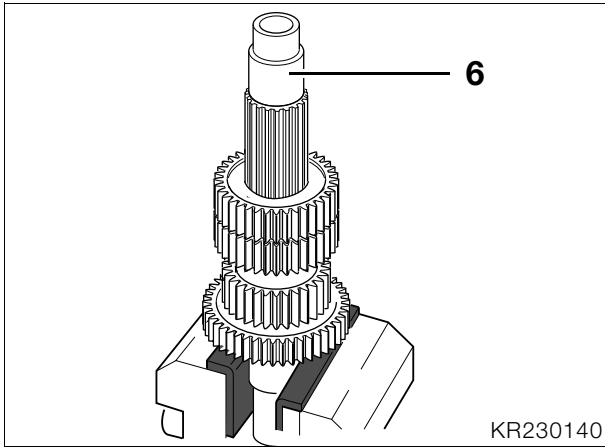
To avoid damaging the needle roller bearing on the splines of the shaft, spread it carefully at the end face when installing.



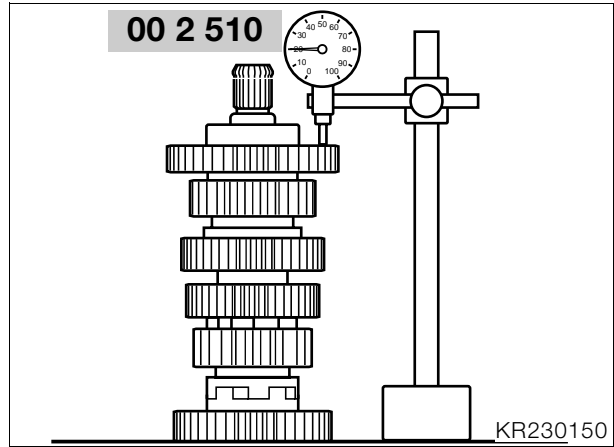
- Clamp output shaft (6) into a vise fitted with jaw protectors, with the splines facing upwards.
- Install circlip (16/arrow).
- Install backup washer (15).

- Install shift wheel for 4th gear (13) with the pockets facing circlip (16).
- Install backup washer (12) and needle roller bearing (11).
- Install shift gearwheel for 3rd gear (10) with pockets facing away from the shift gearwheel for 4th gear (13).
- Install backup washer (9) and circlip (8).
- After installing the 3rd and 4th shift wheels, measure end float (→ 23.18).
- Install shift gearwheel for 5th gear (7) with recess for shift fork facing towards the shift gearwheel for 3rd gear (10).
- Install backup washer (18) and needle roller bearing (19).
- Install the shift gearwheel for 1st gear (20) with the pockets facing sliding gearwheel (7).
- Install spacing washer (21) and grooved ball bearing (22).
- After installing, check end float at the shift gearwheel for 1st gear (→ 23.18).





- Reverse position of output shaft (6) in vise.
- Install sliding gearwheel for 6th gear (17) with the recess for the selector fork facing the shift gearwheel for 2nd gear (3).
- Install backup washer (5) and needle roller bearing (4).
- Install the shift gearwheel for 2nd gear (3) with the dogs facing the 6th gear sliding gearwheel (17).
- Check/adjust fully-assembled length (⇒ 23.20).
- Install spacing washer (2) of calculated thickness, and press on grooved ball bearing (1).
- Check 2nd gear end float.



### 23 11 Checking end float

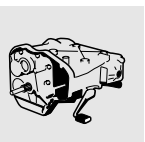
- Secure dial gauge, **BMW No. 00 2 510**, to dial gauge stand.
- Position dial-gauge stylus on edge of the gearwheel and check end float.

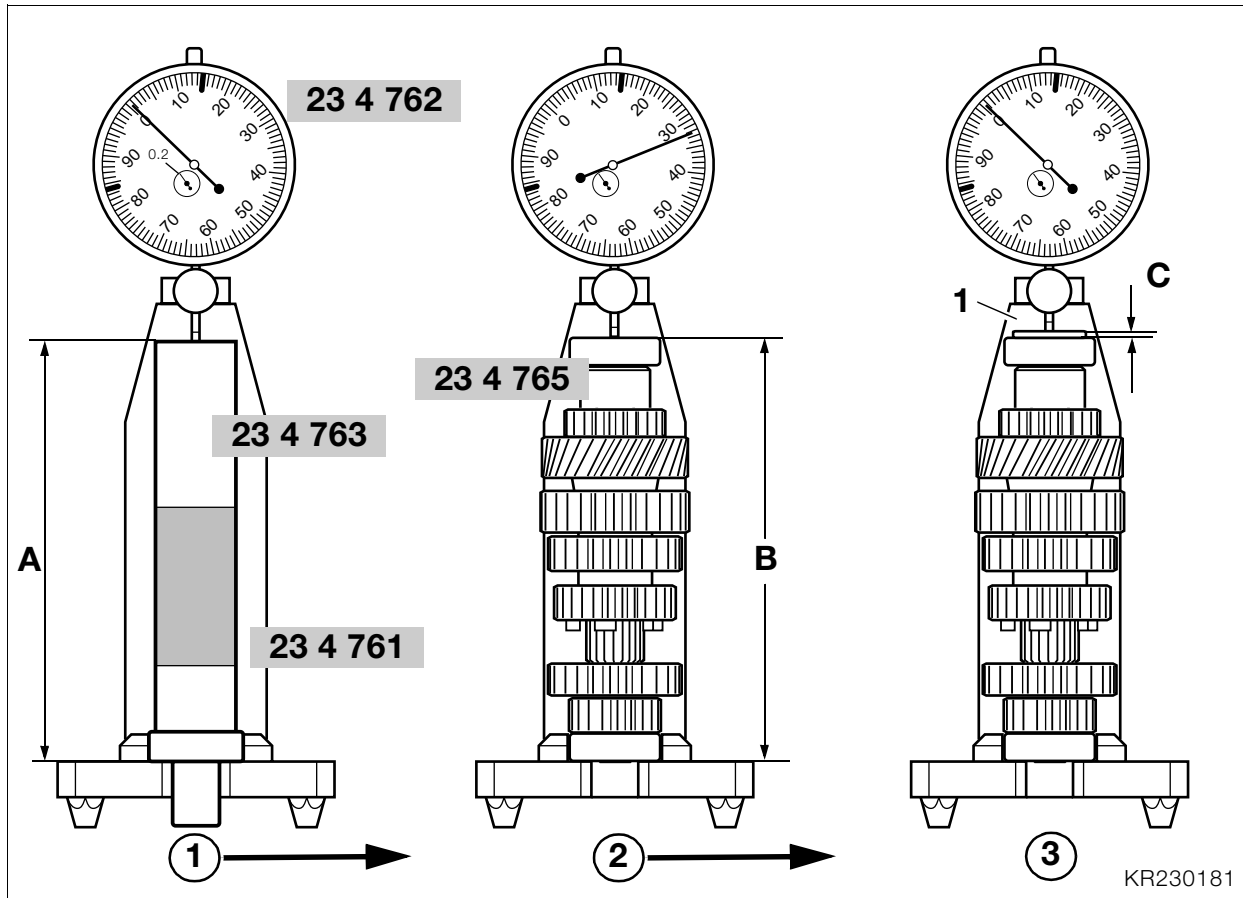
#### **Attention:**

Excessive end float is due to incorrect assembly or worn needle roller bearings, backup washers or spacing washers, or the shift gear. Check and replace as necessary.  
Check for wear and replace the affected parts.

#### **End float values:**

End float, 1st gear .....	0.1 ... 0.33 mm
.....	(0.0039...0.0130 in)
End float, 2nd gear .....	0.1 ... 0.33 mm
.....	(0.0039...0.0130 in)
End float 3rd/4th gear (total play) ....	0.1 ... 0.67 mm
.....	(0.0039...0.0264 in)





### 23 11 Checking and adjusting fully assembled length of gearbox shafts and selector drum

#### Checking and adjusting fully-assembled length of intermediate shaft

#### Attention:

Check and adjust the fully assembled length as described below and install a spacing washer of the correct thickness.

Before measuring, always make sure that the grooved ball bearings are pressed fully home, even if the shaft has not been disassembled and reassembled.

- Position dial gauge, **BMW No. 23 4 762**, in rear locating bore of stand, **BMW No. 23 4 761**, and set to 0.2 mm (0.0078 in) preload.
- Using dial gauge, zero to dimension “A” of the zero gauge, **BMW No. 23 4 763**.
- Pull off the input-side grooved ball bearing with universal puller, **BMW No. 00 7 500**.
- Remove the spacing washer.
- Place reference washer, **BMW No. 23 4 765**, on the intermediate shaft.
- Place the grooved ball bearing on the reference washer.
- Insert intermediate shaft in measuring stand.

- Using the dial gauge, measure the deviation from zero of dimension “B” at the inner bearing race. Deviation from zero is equivalent to the thickness “C” of spacer (1).
- Place a spacer (1) of the correct thickness on the bearing inner race and check deviation from zero.

$$A = B + C$$

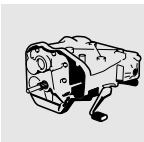
#### Attention:

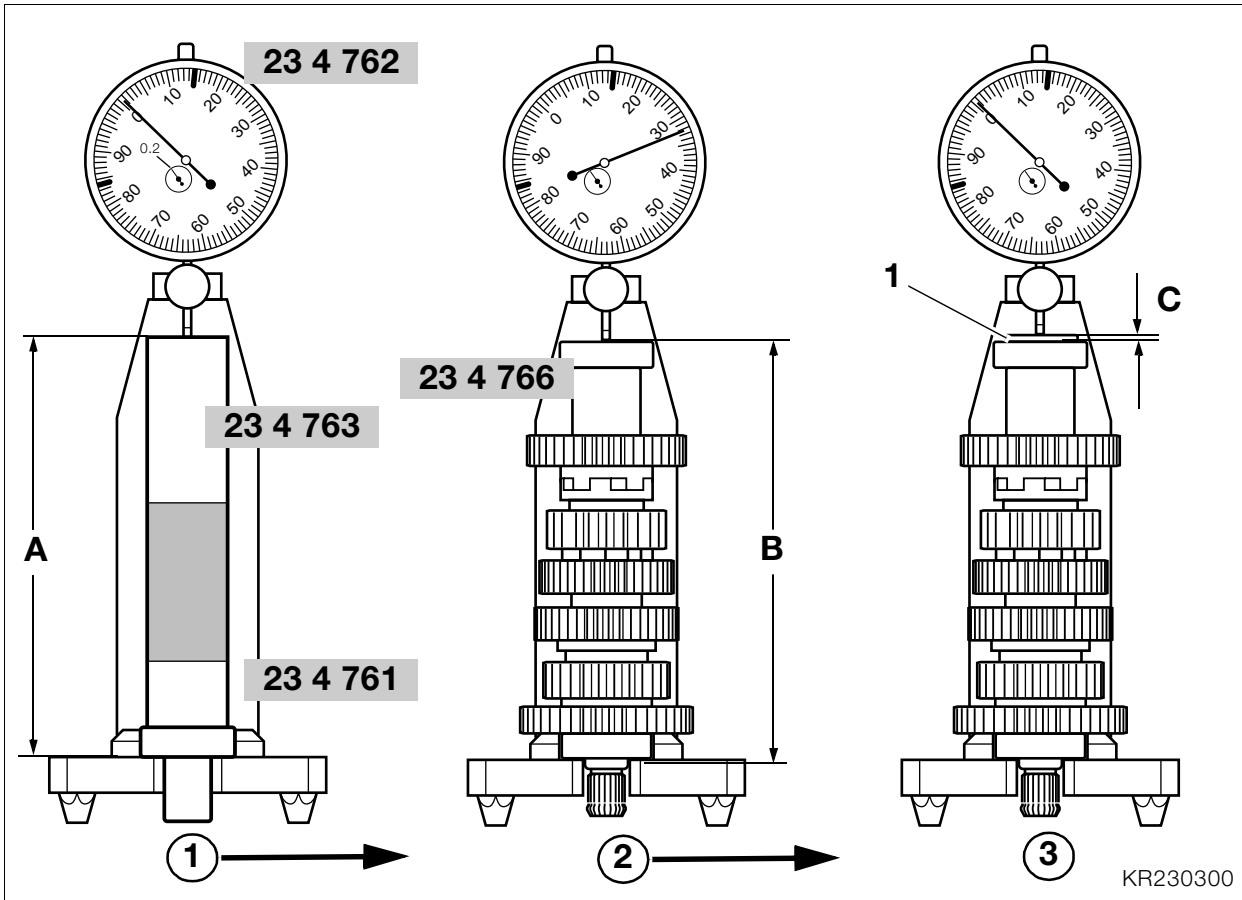
The maximum deviation from zero must not be exceeded.

- Remove the intermediate shaft from the measuring fixture.
- Take off spacing washer, grooved ball bearing and reference washer.
- Place a spacing washer (1) of the correct thickness on the intermediate shaft and press on the grooved ball bearing.

#### Reference dimension for intermediate shaft:

The maximum permissible deviation from zero is  
 .....-0.05... 0.00 mm (-0.0020...0.0000 in)





### 23 11 Checking and adjusting fully-assembled length of output shaft

#### ⚠ Attention:

Check and adjust the fully assembled length as described below and install a spacing washer of the correct thickness.

Before measuring, always make sure that the grooved ball bearings are pressed fully home, even if the shaft has not been disassembled and reassembled.

- Position dial gauge, **BMW No. 23 4 762**, in rear locating bore of stand, **BMW No. 23 4 761**, and set to 0.2 mm (0.0078 in) preload.
- Using dial gauge, zero to dimension "A" of the zero gauge, **BMW No. 23 4 763**.
- Pull off the input-side grooved ball bearing with universal puller, **BMW No. 00 7 500**.
- Remove the spacing washer.
- Place reference washer, **BMW No. 23 4 766**, on the output shaft.
- Place the grooved ball bearing on the reference washer.
- Insert the output shaft into the measuring stand.
- Using the dial gauge, measure the deviation from zero of dimension "B" at the inner bearing race.

Deviation from zero is equivalent to the thickness "C" of spacer (1).

- Place a spacer (1) of the correct thickness on and check deviation from zero.

$$A = B + C$$

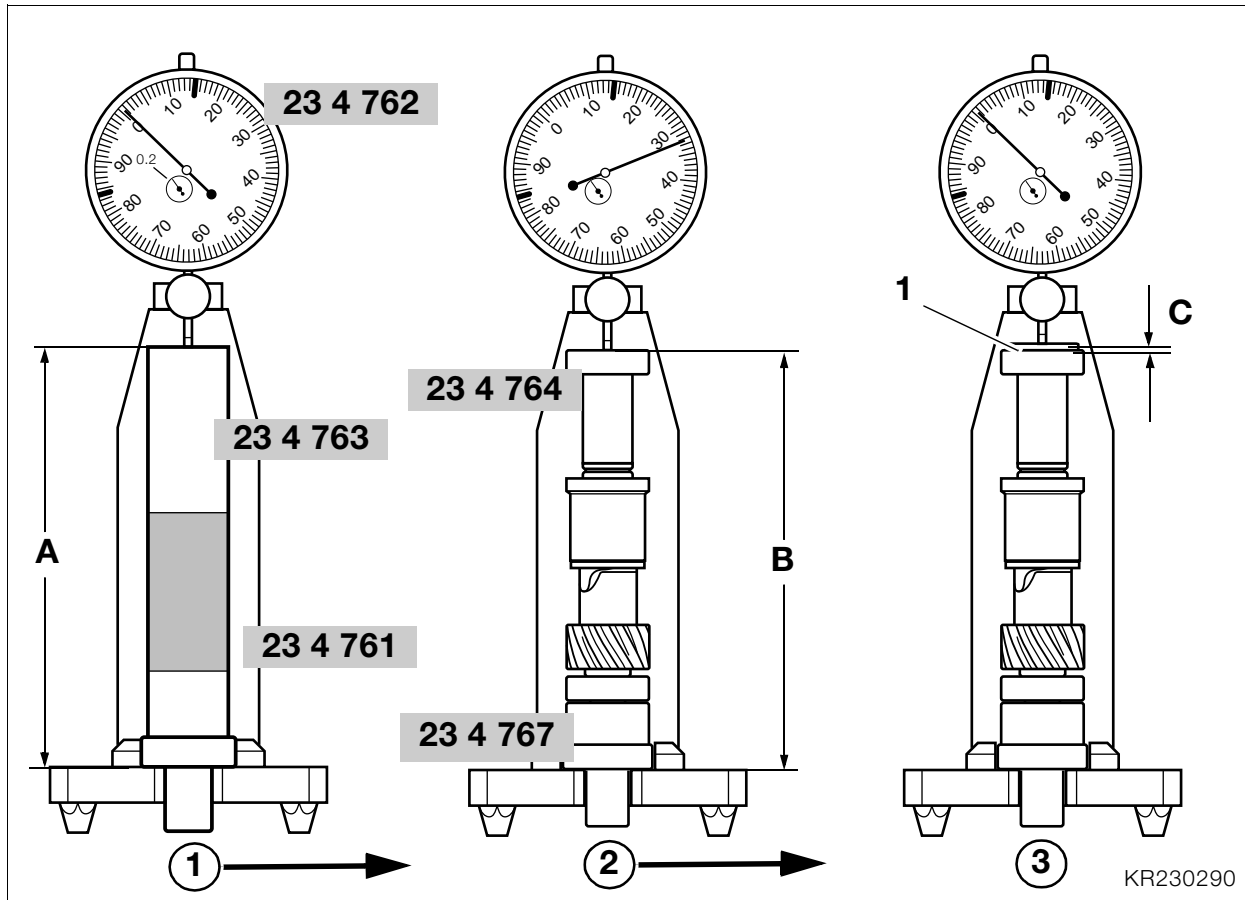
#### ⚠ Attention:

The maximum deviation from zero must not be exceeded.

- Take off spacing washer, grooved ball bearing and reference washer.
- Place a spacing washer (1) of the correct thickness on the output shaft and press on the grooved ball bearing.

#### Reference dimension for output shaft:

The maximum permissible deviation from zero is  
 .....-0.05... 0.00 mm (-0.0020...0.0000 in)



**23 11 Checking and adjusting fully-assembled length of input shaft**

**⚠ Attention:**

Check and adjust the fully assembled length as described below and install a spacing washer of the correct thickness.

Before measuring, always make sure that the grooved ball bearings are pressed fully home, even if the shaft has not been disassembled and reassembled.

- Position dial gauge, **BMW No. 23 4 762**, in front locating bore of stand, **BMW No. 23 4 761**, and set to 0.2 mm (0.0078 in) preload.
- Using dial gauge, zero to dimension “A” of the zero gauge, **BMW No. 23 4 763**.
- Pull off the output-side grooved ball bearing with universal puller, **BMW No. 00 7 500**.
- Remove the spacing washer.
- Mount reference washer, **BMW No. 23 4 764**, on the input shaft.
- Place the grooved ball bearing on the reference washer.
- Insert input shaft with adapter disc, **BMW No. 23 4 767**, in measuring stand.
- Using the dial gauge, measure deviation from zero of dimension “B” at the inner bearing race. Deviation from zero is equivalent to the thickness “C” of spacer (1).

- Place a spacer (1) of the correct thickness on the bearing inner ring and check deviation from zero.

**A = B + C**

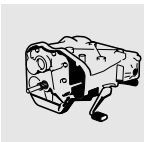
**⚠ Attention:**

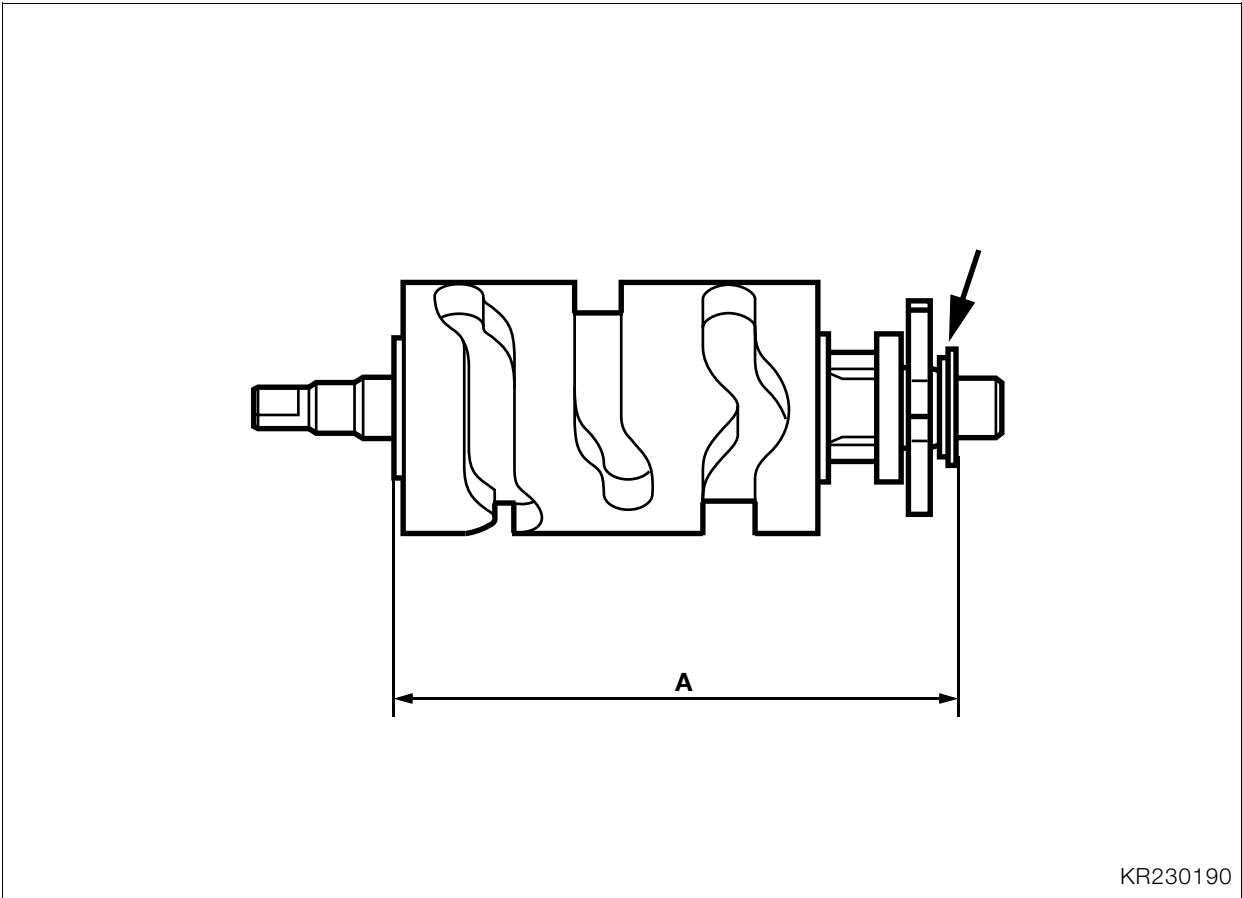
The maximum deviation from zero must not be exceeded.

- Take the input shaft out of the measuring fixture.
- Remove the adapter disc, spacing washer, grooved ball bearing and reference washer.
- Place a spacing washer (1) of the correct thickness in position and press the grooved ball bearing on to the input shaft.

**Reference dimension for input shaft:**

The maximum permissible deviation from zero is  
 .....-0.05... 0.00 mm (-0.0020...0.0000 in)

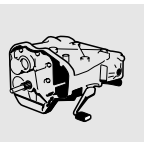




KR230190

**23 11 Checking and adjusting fully assembled length of selector drum**

- Place spacing washer and both thrust washers on the selector drum.
- Using slide gauge, determine fully assembled length "A".
- If necessary, adjust fully assembled length "A" with a shim washer (arrow).



**Fully assembled length:**

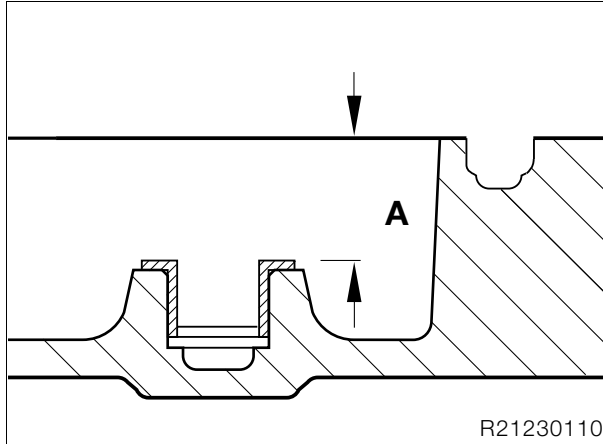
Selector drum .....111.80...111.90 mm  
 ..... (4.4015...4.4055 in)

## 23 31 Shimming selector shaft

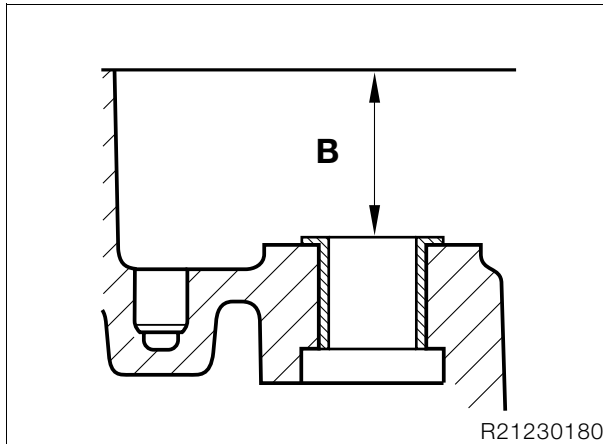


### Attention:

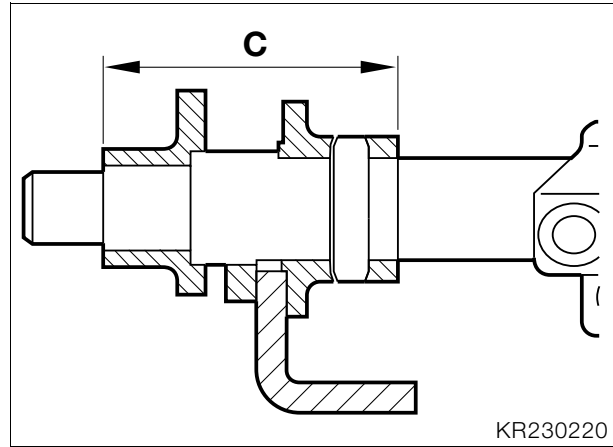
If the housing or the complete selector shaft is replaced, the selector shaft must be measured and shimmed.



- Measure distance "A" from shouldered bushing to cover mating face.



- Measure distance "B" from shouldered bushing to housing mating face.



- Measure distance "C" from the shoulder on the selector shaft to the back of the sleeve.
- Calculate end float as follows:

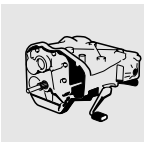
$$A + B = D$$

$$D - C = E$$

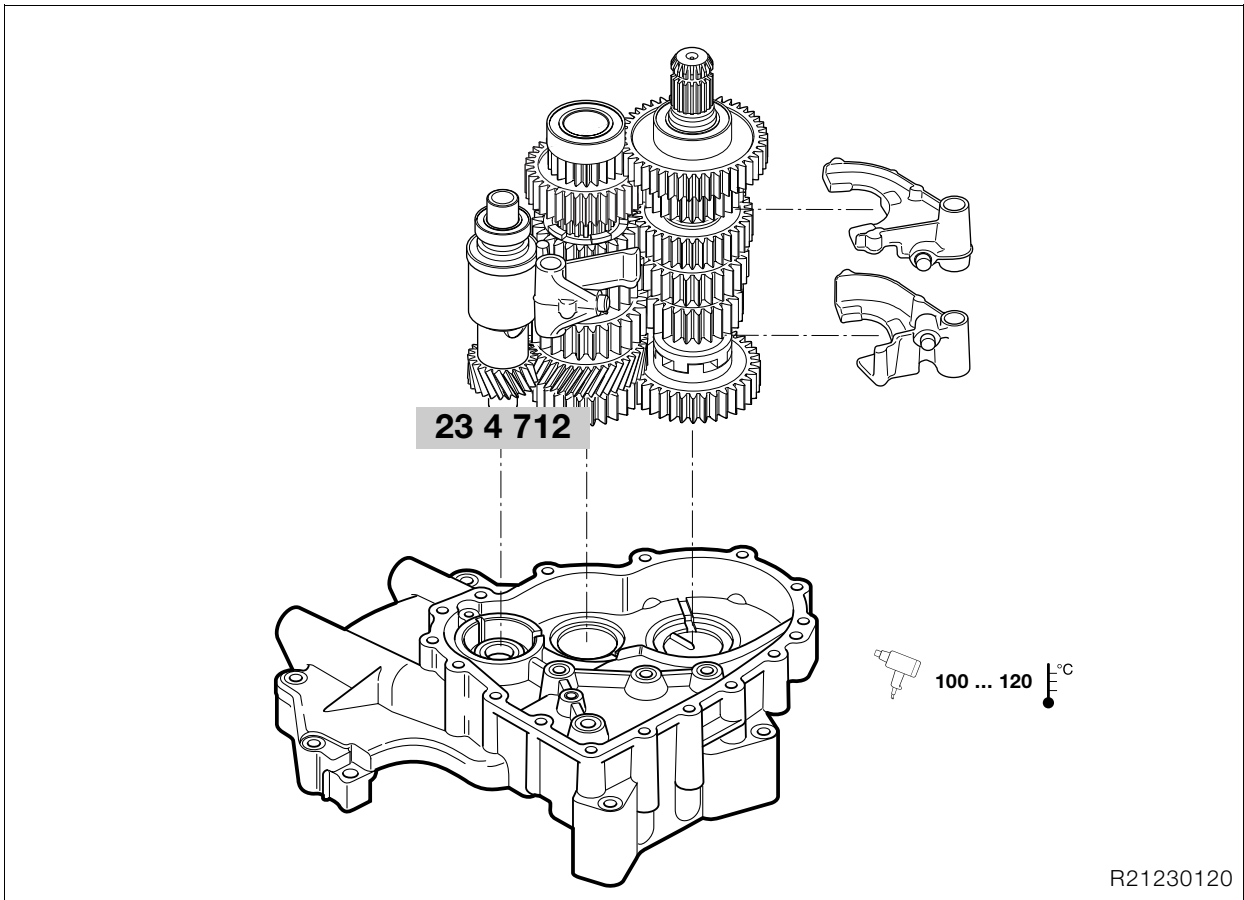
E - thickness of spacer = end float.

### End float:

Selector shaft.... 0.1 ... 0.3 mm (0.0039...0.0118 in)







R21230120

### 23 00 Assembling gearbox

Installing input, output and intermediate shafts



**Note:**

This is necessary only if the shaft sealing ring is installed.

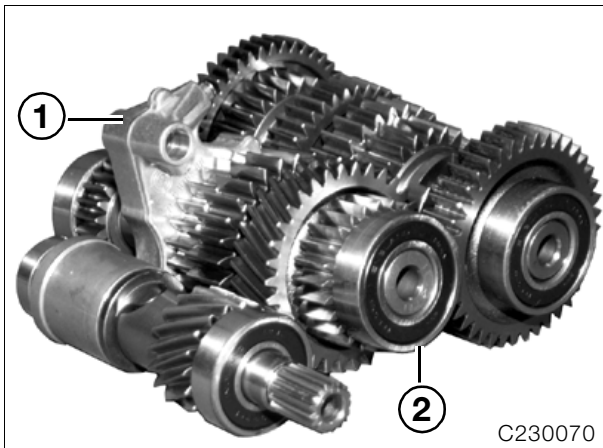
- Heat the bearing points in the cover to 100 ... 120°C (212... 248 °F).
- Insert the input, output and intermediate shafts together.



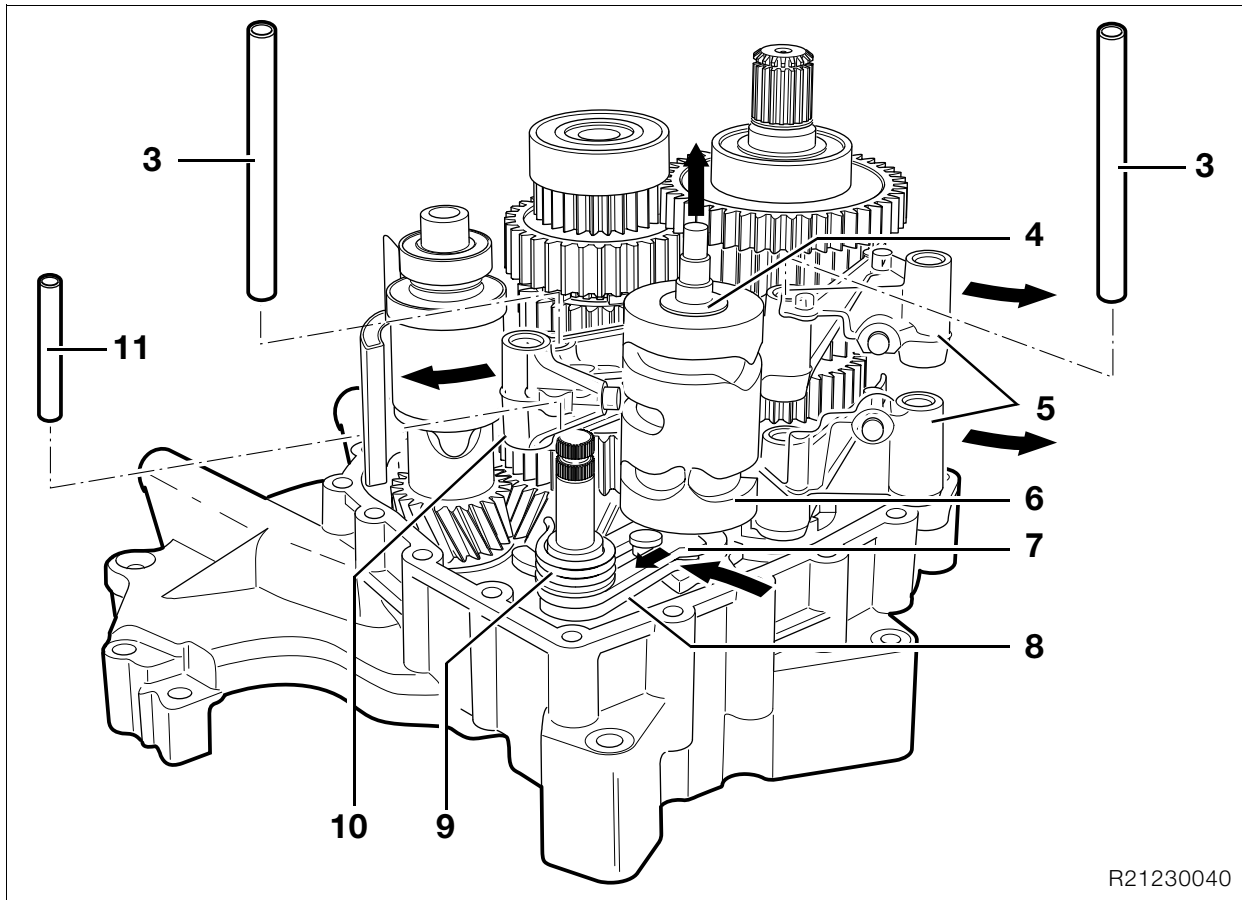
**Attention:**

Check that the gearbox shafts are correctly seated.

- Install the 1st/3rd and 2nd/4th shift forks.

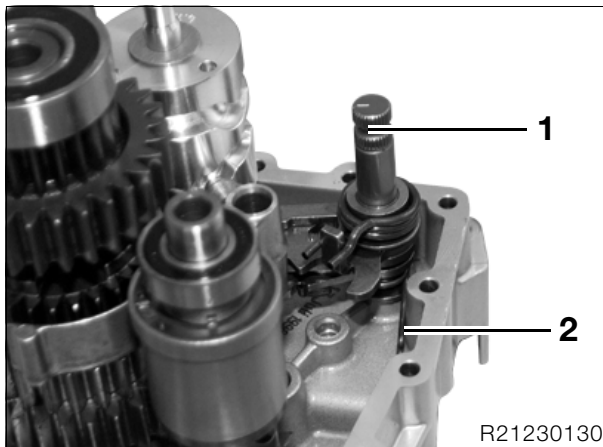


- Insert marked selector fork (1) into intermediate shaft (2).
- Align input, output and intermediate shafts so that their gear teeth mesh and the selector fork is in the position illustrated.
- Push assembly sleeve, **BMW No. 23 4 712**, on to the input shaft splines.



R21230040

### 23 31 Installing selector shaft

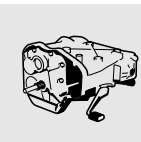


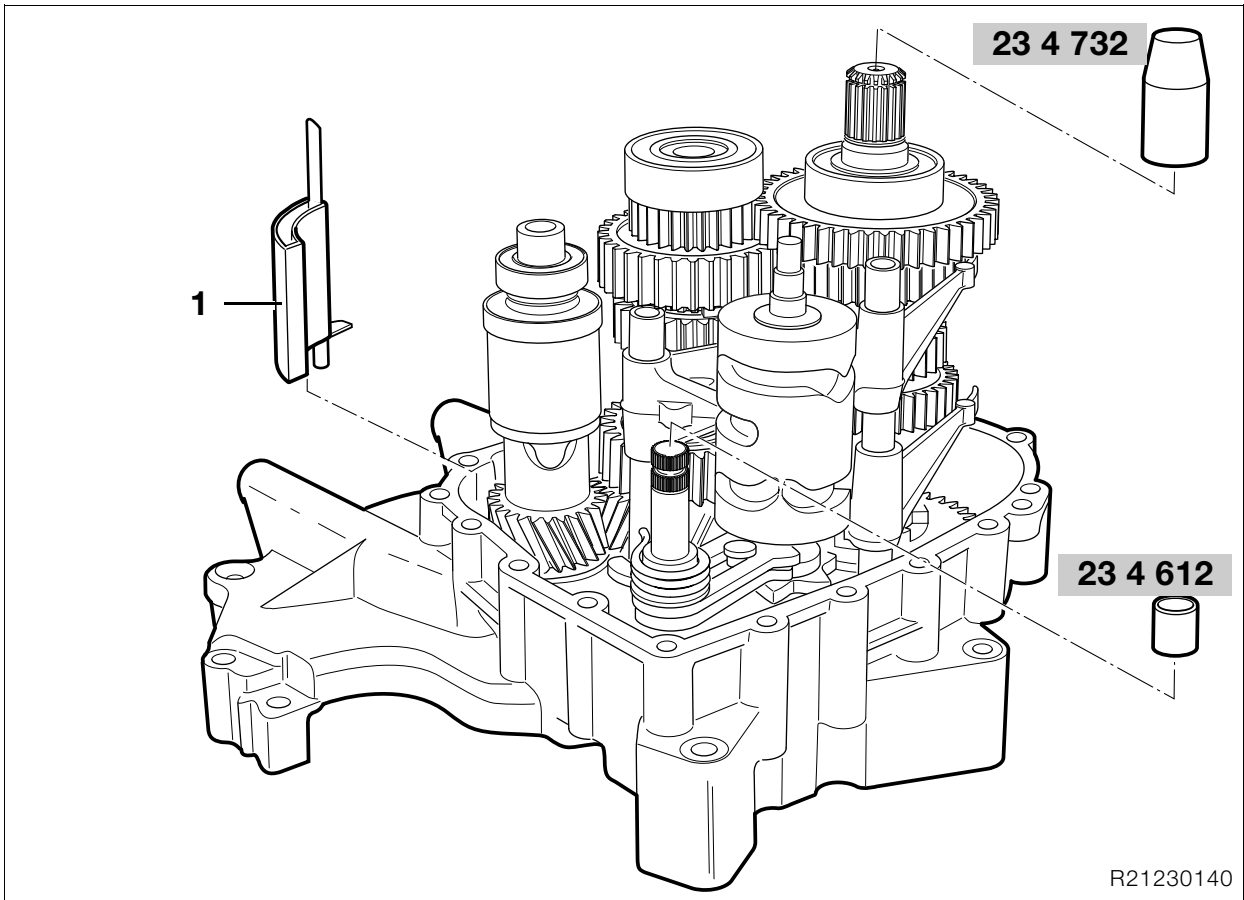
R21230130

- Place a spacer of correct thickness on the housing.
- Install selector shaft (1), making sure that spring (2) is correctly positioned.

### 23 31 Installing selector drum

- Place a spacing washer of the correct thickness and the input-side thrust washer on selector drum (6) and secure with a small amount of grease.
- Swing locking lever (8) toward the input shaft and install the selector drum.
- Swing locking lever (8) towards selector drum (6), pull back guide plate (7) and engage it in the selector drum.
- Place shift forks (5, 10) in the guide tracks.
- Install selector shafts (3).
- Install torsion spring (9).
- Install locking pin (11).
- Place thrust washer (4) on the selector drum.





R21230140

## Installing gearbox housing

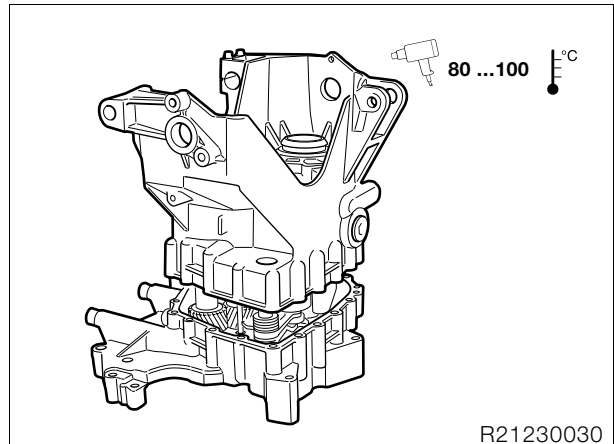
- Install the dowel pins in cover and in housing, but do not drive the pins fully home.
- Install breather tube (1) in housing cover.



### Attention:

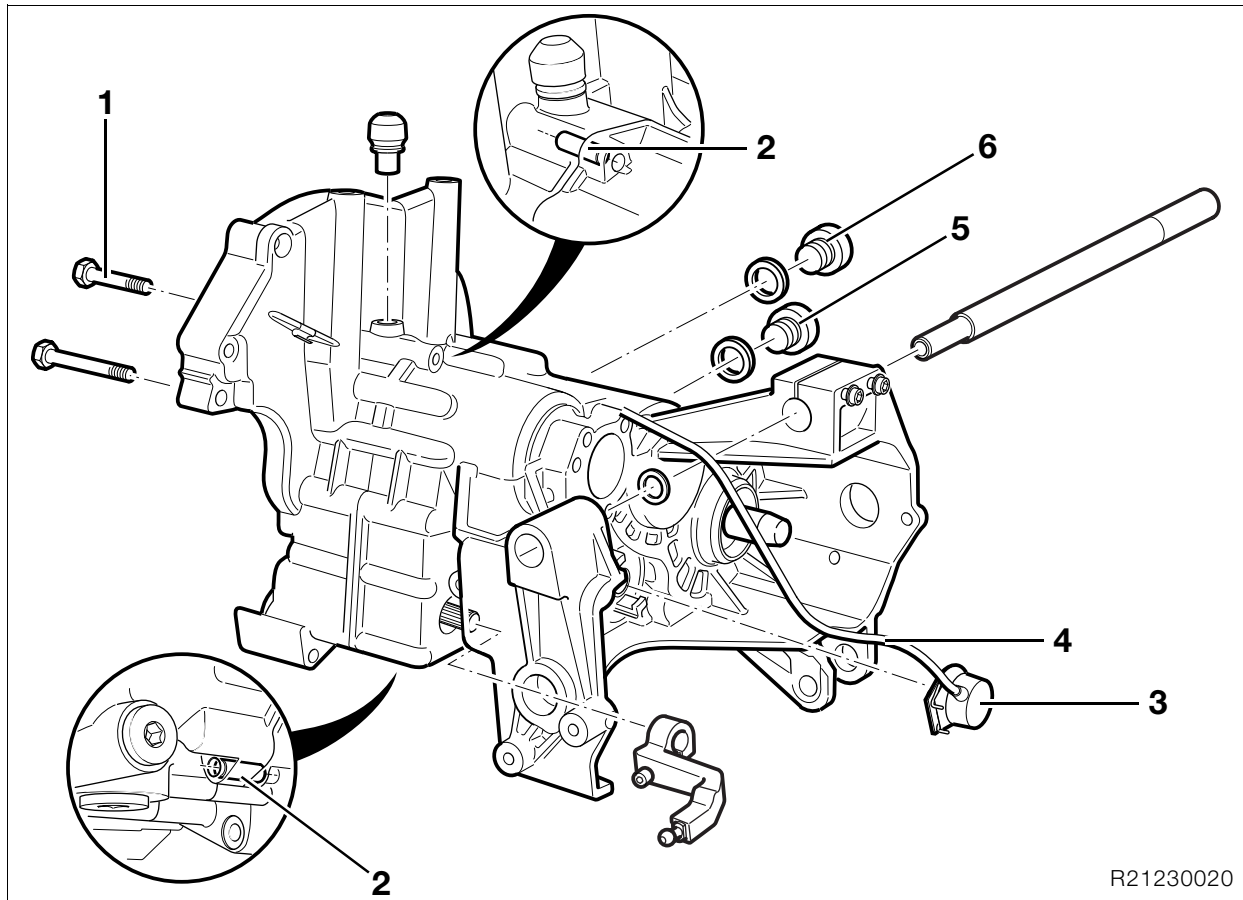
Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and screw it down.

- Apply **Loctite 574** sealing compound to the mating face of the cover.
- Place assembly sleeve, **BMW No. 23 4 732**, on the output shaft.
- Place assembly sleeve, **BMW No. 23 4 612**, on the selector shaft.



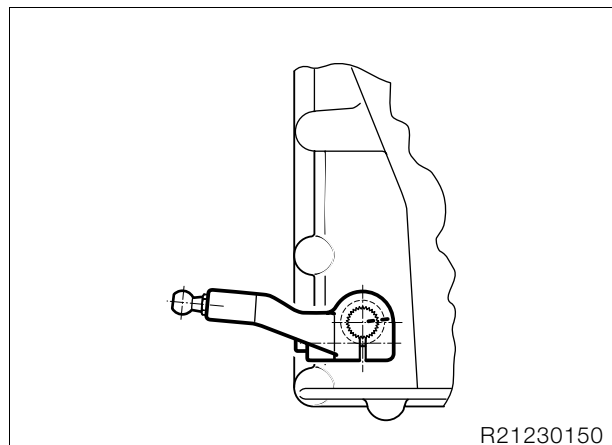
R21230030

- Heat the bearing seats in the housing to 80 ... 100 °C (176... 212 °F) and place the housing on the cover.



R21230020

- Insert screws (1) and tighten in diagonally opposite sequence.
- Drive home dowel pins (2).
- Install switch of gear indicator (3) and clip cable (4) into position.
- Remove metal particles from the magnet in oil drain plug (5).
- Install the oil drain plug with a new sealing ring.
- Install oil-check and oil filler plug (6) with new sealing ring.



R21230150

- Install shift lever in correct position.

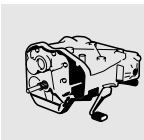


**Note:**

The shift lever is in the correct position when the mark is aligned with the corresponding mark on the selector shaft.  
After assembling the gearbox, perform a functional check.

**Tightening torque:**

Gearshift lever to gearshift shaft..... 9 Nm



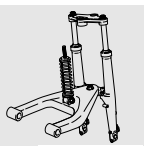
# 31 Front forks

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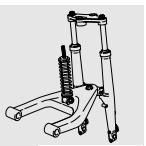
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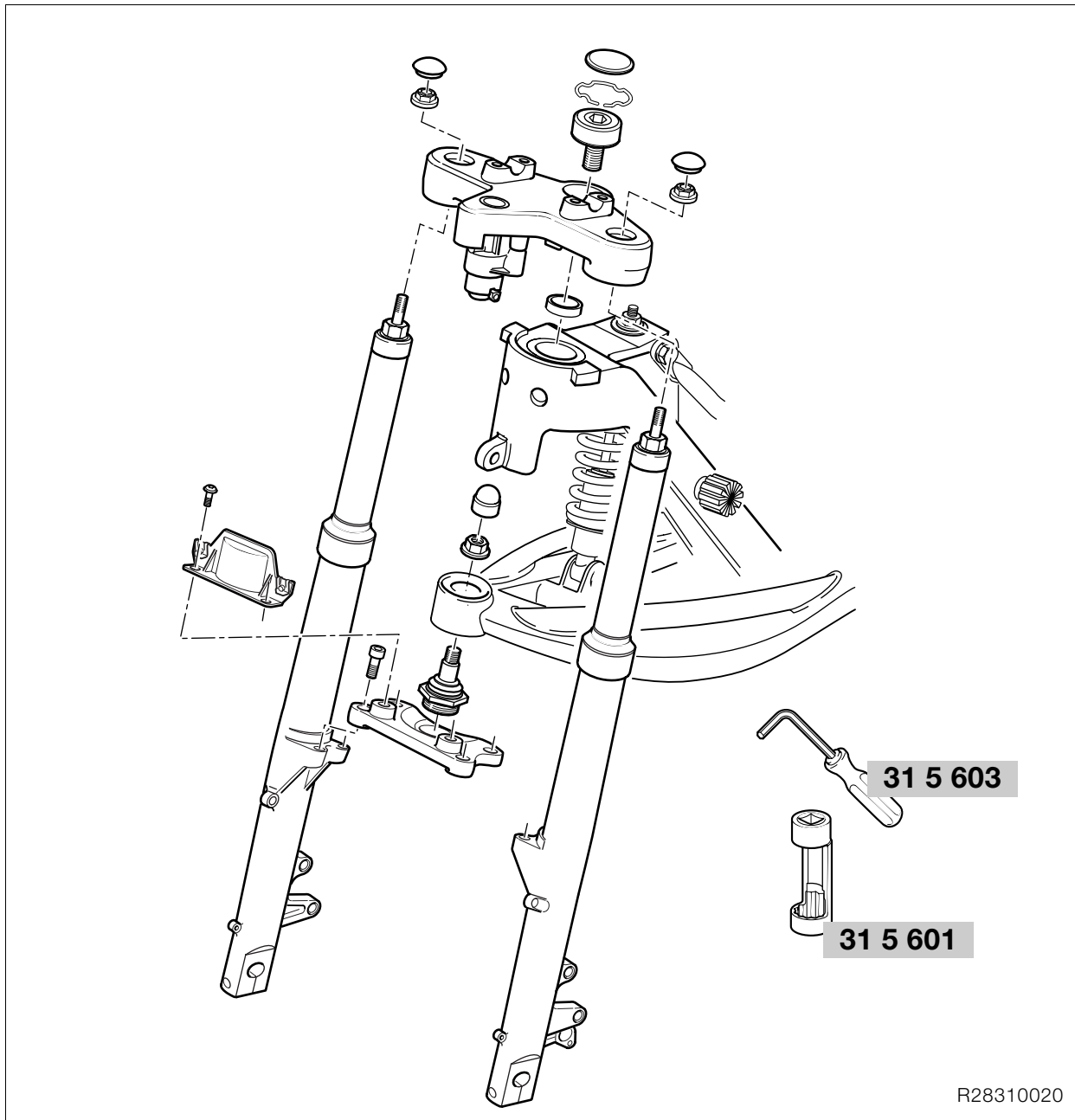


Technical Data		R 1150 R
<b>Front suspension</b>		
Type	BMW Telelever with external suspension strut	
<b>Telescopic fork</b>		
Front wheel castor in normal position (with 85 kg/187 lbs rider)	mm (in)	127 (4.9999)
Steering lock angle	°	37
Total suspension travel	mm (in)	120 (4.7244)
Fixed tube surface	Hard chrome plated	
Extl. dia. of fixed fork tubes	mm (in)	35.0 (1.3780)
Maximum permissible runout of fixed fork tube	mm (in)	0.4 (0.0157)
Telescopic fork oil – approved grades	BMW telescopic fork oil	
Capacity per fork leg	l (Imp. pint/US quart)	0.47 (0.83/0.50)
<b>Suspension strut</b>		
Type	Suspension strut with coil spring and twin-tube, gas-filled shock absorber	





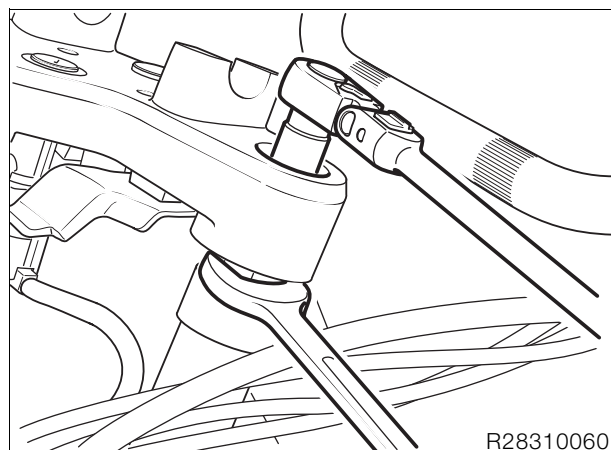




### 31 42 Removing and installing telescopic fork

Removing and installing telescopic fork without fork bridge

- Remove front wheel.
- Remove mudguard.
- **[Integral ABS]** Remove sensor and cable from slider tube.
- Remove brake line from slider tube.
- Place a support beneath the telescopic fork.
- Remove bracket securing mudguard to slider tube bridge.
- Heat leading link mount at front to max. 120 °C (248 °F) and unscrew.
- Attach the handlebars to a crane and release the fastener securing the handlebars to the fork bridge.



- Remove fastener securing fixed tube in upper fork bridge while holding the hexagon of the fixed tube and then pull the telescopic fork down to remove.



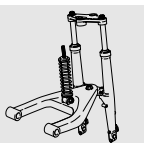
- Installation is the reverse of the removal procedure.
- Tighten the ball joint in the leading link using socket, **BMW No. 31 5 601**, and Allen key, **BMW No. 31 5 603**.

**⚠ Attention:**

To prevent grease from escaping and the ingress of dirt, ensure that sleeve is correctly located on ball joint.

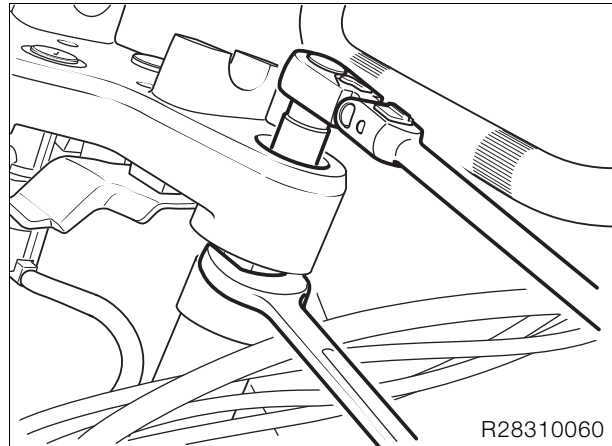
**🔧 Tightening torque:**

Ball joint to leading link  
(clean thread + Loctite 2701)..... 130 Nm  
Fastener, fixed tube to fork bridge  
(de-oiled, degreased) ..... 45 Nm



### 31 42 Removing and installing fork bridge

- Remove fuel tank.
- Remove windscreen.
- Remove instrument carrier.
- Remove fastener securing the headlight.
- Disconnect plug of ignition lock.
- Attach the handlebars to a crane and release the fastener securing the handlebars to the fork bridge.



- Remove fastener securing fixed tube in upper fork bridge while holding the hexagon of the fixed tube.
- Remove fastener securing fork bridge to frame.



**Note:**

Stud is a press-fit in angular-contact ball bearing, so remove as a complete unit.

- Remove fork bridge.
- Remove ignition/steering lock.
- ➔ ..... Group 51
- Installation is the reverse of the removal procedure.



**Attention:**

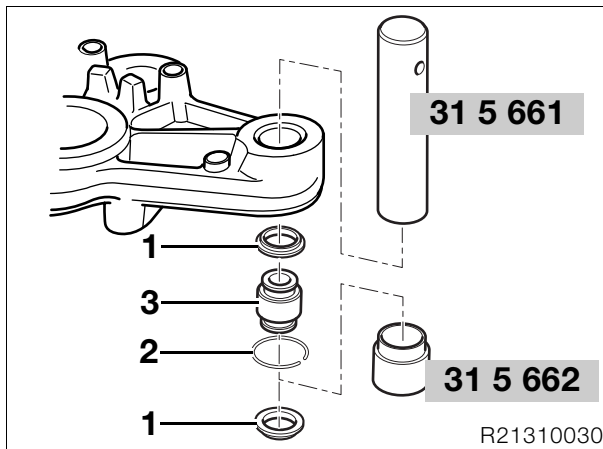
Align the punch mark on the handlebars with the gap between the clamp blocks.



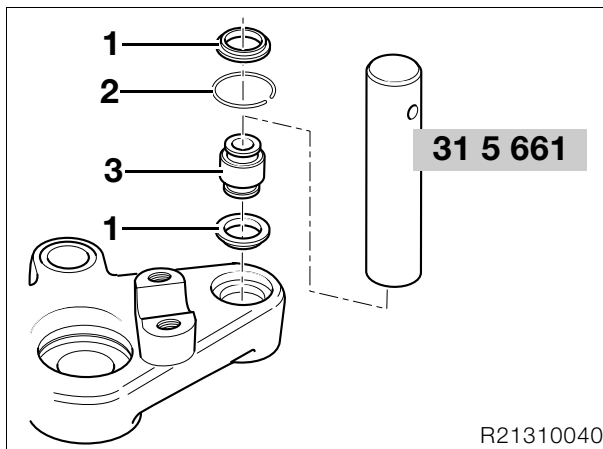
**Tightening torque:**

Fastener, fork bridge to frame  
(clean thread + Loctite 243)..... 130 Nm  
Fastener, fork bridge to fixed tube  
(de-oiled and degreased) ..... 45 Nm  
Handlebars to fork bridge  
tighten front fasteners first, then tighten  
rear fasteners ..... 21 Nm

### Removing and installing pot-type joints

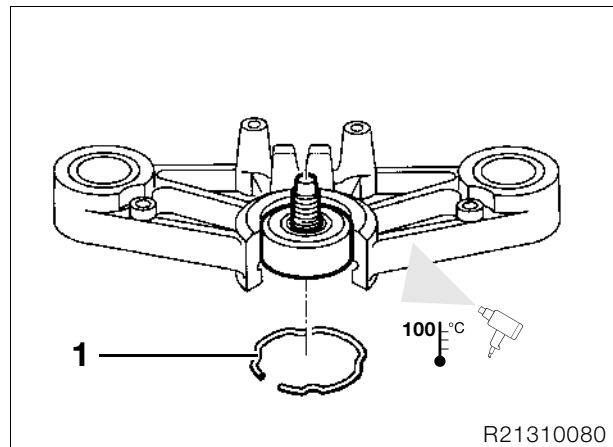


- Remove dust covers (1).
- Remove snap ring (2).
- Press out pot-type joint (3) with mandrel, **BMW No. 31 5 661**, and sleeve, **BMW No. 31 5 662**.

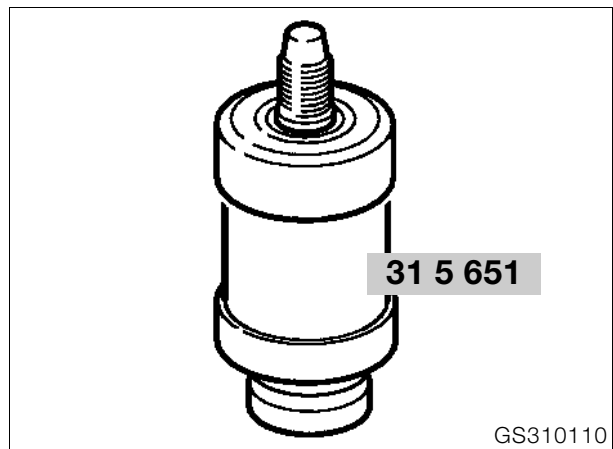


- Press in pot-type joint (3) with mandrel, **BMW No. 31 5 661**.
- Install snap ring (2).
- Install dust covers (1).

### Removing and installing angular-contact ball bearing



- Remove retaining ring (1).
- Heat fork bridge to approx. 100 °C (212 °F).
- Remove angular-contact ball bearing, if necessary striking lightly with a plastic-faced hammer.

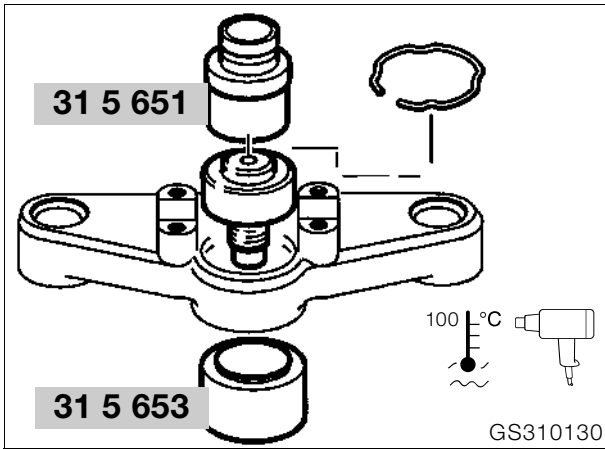


- Press out the threaded pin using a mandrel, **BMW No. 31 5 651**, as a support.



- Press the threaded pin into the angular-contact ball bearing using a mandrel, **BMW No. 31 5 651**, as a support.

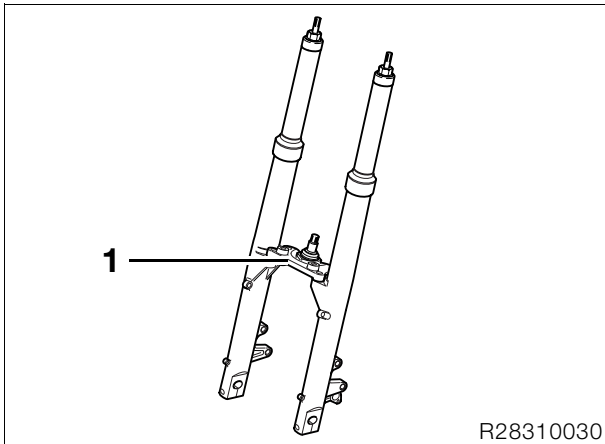




- Heat the fork bridge to 100 °C (212 °F) and press in the angular-contact ball bearing with pin, **BMW No. 31 5 651**, and bushing, **BMW No. 31 5 653**.
- Install retaining ring.

### 31 42 Removing and installing slider tube bridge

- Remove front wheel.
- Remove mudguard.
- Remove bracket securing mudguard to slider tube bridge.
- Heat leading link fastener at front to max. 120 °C (248 °F) and unscrew.



- Remove fastener securing slider tube bridge (1).
- Installation is the reverse of the removal procedure.

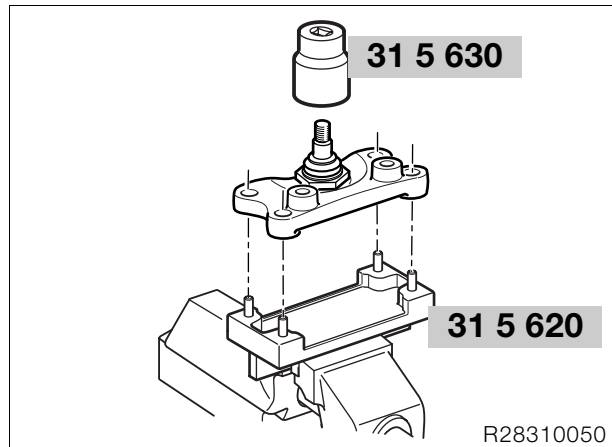
#### **Attention:**

Comply with Assembly instructions for telescopic fork.

#### **Tightening torque:**

Slider tube bridge to slider tube (clean thread + Loctite 243)..... 25 Nm

### Removing and installing ball joint in slider tube bridge



- Mount the slider tube bridge in retaining fixture, **BMW No. 31 5 620**.
- Use w/f 46 socket, **BMW No. 31 5 630**, to release and tighten ball joint.

#### **Tightening torque:**

Ball joint to slider tube bridge (apply Optimoly TA to thread)..... 230 Nm

### Checking friction at ball joint/angular-contact ball bearing

- Raise the motorcycle on its main (centre) stand, make sure front wheel is clear of the ground.
- Measure the breakaway moment to left and right from the central position of the handlebars using friction meter, **BMW No. 00 2 570**.

#### **Note:**

To determine the friction value, increase torque very slowly.

#### **Friction value:**

Measure at room temperature (above 20 °C/68 °F)  
Specified value:..... 1.0... 2.0 Nm

**Assembly specification for telescopic fork:**



**Attention:**

To ensure that the forks are installed without trapped stresses, follow the instructions below to the letter and in particular, proceed exactly in accordance with the sequence as specified.

- The front suspension strut is removed.



**Attention:**

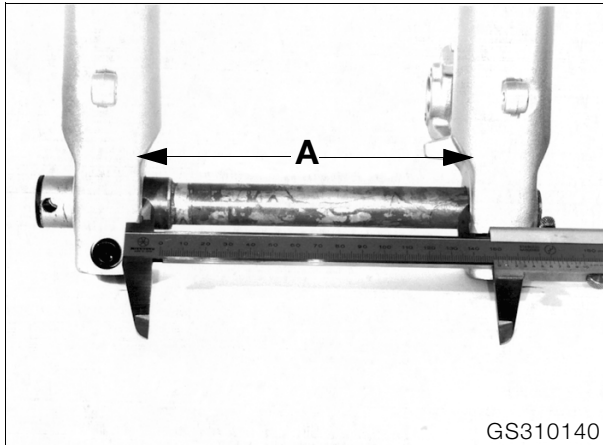
Protect painted parts from scratching: apply adhesive masking tape if necessary.

- Secure fork bridge to frame.



**Tightening torque:**

Fastener, fork bridge to frame (clean thread + Loctite 2701)..... 130 Nm



GS310140

- Pre-assemble fork legs with quick-release axle/ adjust distance "A".

**Distance "A":**..... 165 ±0.5 mm (6.4961 ±0.0197 in)



**Tightening torque:**

Clamp of front quick-release axle ..... 22 Nm



**Note:**

If the quick-release axle was not removed, for instance when only the fork slider tube bridge was removed/installed, omit the step described above.

- Secure slider tube bridge/do not tighten to specified torque at this point.
- Secure slider tube bridge to leading link.



**Tightening torque:**

Leading link to ball joint (clean thread + Loctite 2701)..... 130 Nm

- Using a strap or similar, pull fork towards frame until the fully retracted fixed tubes only need to be pulled out slightly to secure them to the fork slider bridge.
- Secure fixed tubes to the slider tube bridge.



**Tightening torque:**

Fastener, fixed tube to fork bridge (de-oiled, degreased) ..... 45 Nm

- Tighten down slider tube bridge.



**Tightening torque:**

Slider tube bridge to slider tube (clean thread + Loctite 243)..... 25 Nm

- Check that the system moves freely by compressing and extending the suspension (but without the suspension strut) in the straight-ahead and left/right steering lock positions.
- Remove quick-release axle.



**Attention:**

When being reassembled, the quick-release axle must be visibly well aligned; it should be possible to install it by rotating it slightly.

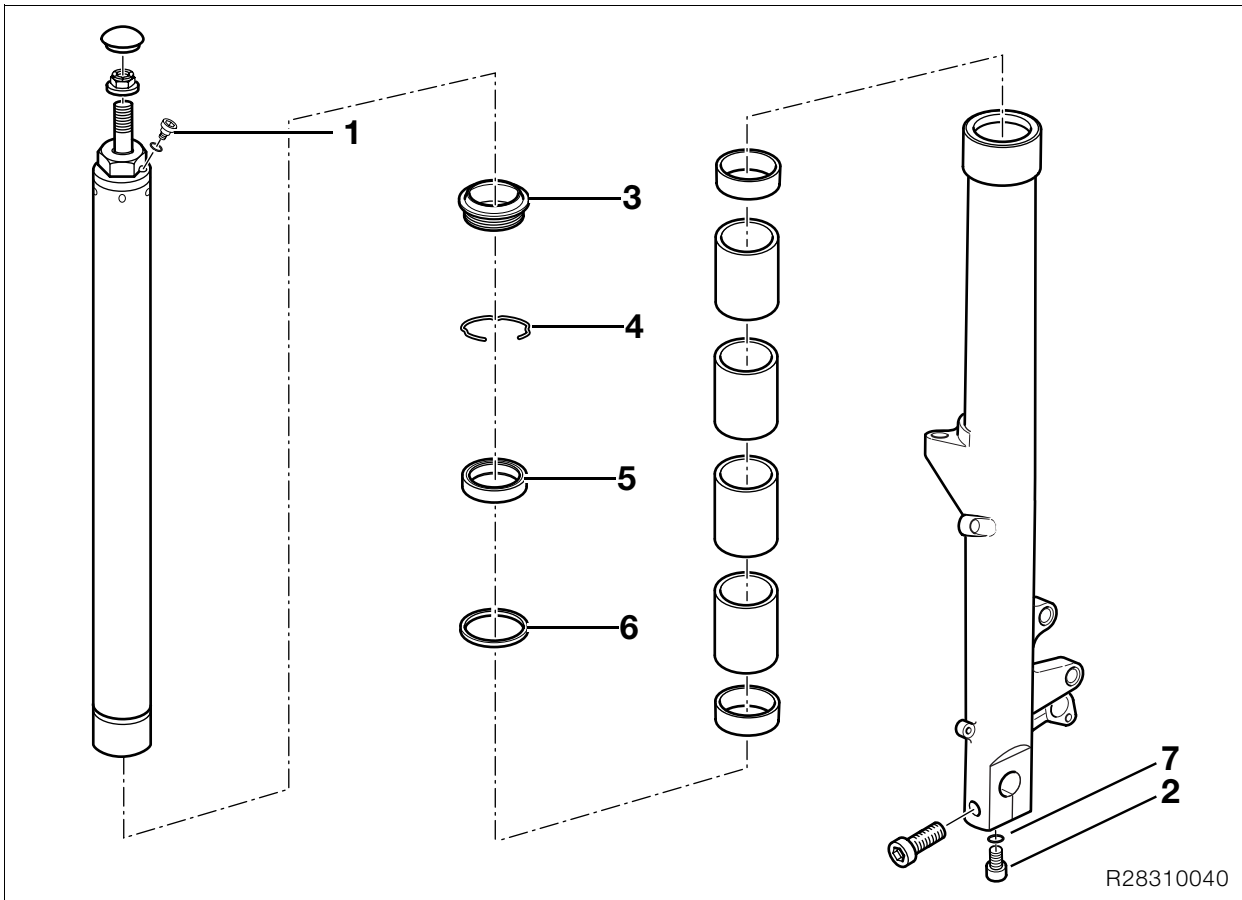
- Install suspension strut.



**Tightening torque:**

Spring strut to frame ..... 43 Nm  
Spring strut to leading link..... 50 Nm





### 31 42 Disassembling and assembling telescopic fork

#### Disassembling telescopic fork

- Remove bleed screw (1).
- Remove oil drain plug (2) and allow the oil to drain out.
- Remove the fixed tube.
- Remove wiper (3) and retaining ring (4).
- Lever out shaft seal (5).

**⚠ Attention:**

Do not damage fork slider tube.

- Remove washer (6).

#### Assembling telescopic fork

- Install oil drain plug (2).

**⚠ Attention:**

Install new O-ring (7). Check that the O-ring is correctly seated.

- Fill with oil.

**Capacity per fixed tube:**

..... 0.47 l (0.83 Imp. pint/0.50 US quart)

**Oil grade in telescopic fork:**

.....BMW telescopic fork oil

**🔧 Note:**

No oil changes required during inspections: unit is maintenance-free.

- Install fixed tube.
- Install washer (6).
- Push the lightly oiled shaft sealing ring fully up to the stop on the slider tube, then press home by tapping lightly and using threaded bush, **BMW No. 31 5 611**, expander, **BMW No. 31 5 612**, and reducing adapter, **BMW No. 31 5 613**.
- Install retaining ring and dust wiper.
- Insert bleed screw (1).
- Bleed telescopic forks under zero load.

**🔧 Tightening torque:**

Plug to fixed tube

.....press fit; do not remove.

## 31 42 Measuring telescopic forks



### Attention:

After an accident, always examine the telescopic forks for cracks and signs of damage.

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### Examining slider tube bridge and fork bridge

- Check slider tube bridge and fork bridge for surface irregularities.

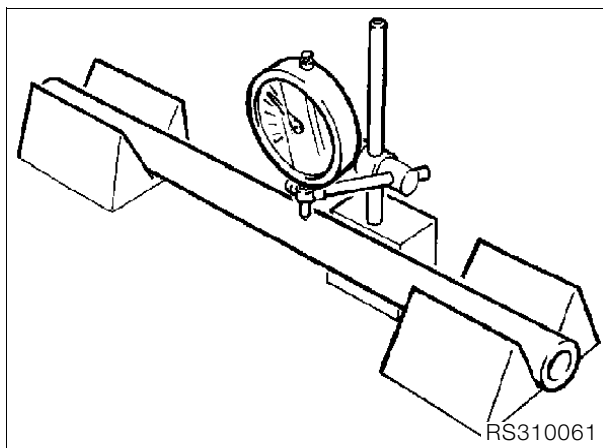


### Attention:

Replace slider tube bridge/fork bridge if deformed.

---

### Checking runout of fixed tube



- Place both ends of fixed tube in V-blocks.
- Rotate fixed tube slowly and check with dial gauge.



### Attention:

Do not straighten distorted fixed tubes: always replace them.

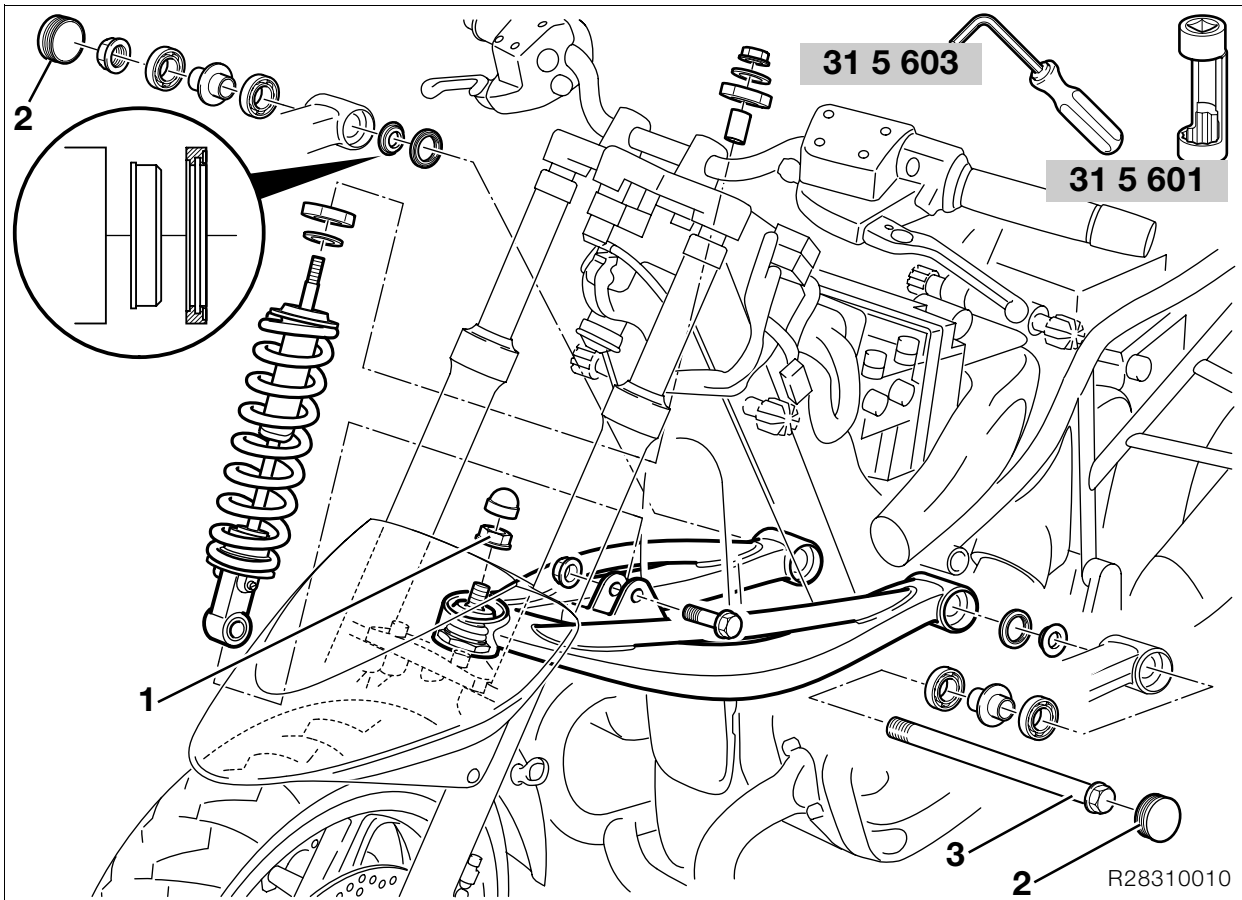
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**Permissible runout:** ..... 0.4 mm (0.0157 in)

### Checking runout of slider tube

- New fixed tube must slide freely into slider tube and turn without catching.





### 31 42 Removing and installing leading link

- Disengage spring strut at bottom.
- Heat ball joint mount (1) at leading link to max. 120 °C (248 °F) and remove it.
- Disconnect the left air intake pipe from the cylinder head.
- Remove caps (2).
- Release the leading link shaft (3) and remove it.
- Pull telescopic fork forwards and carefully remove leading link by pulling forwards.

#### Attention:

Protect parts against scratching; mask off if necessary.

- Installation is the reverse of the removal procedure.
- Apply a light coating of grease to the shaft before installing.
- Tighten the ball joint in the leading link using socket, **BMW No. 31 5 601**, and Allen key, **BMW No. 31 5 603**.

#### Tightening torque:

Leading link to engine ..... 130 Nm  
 Leading link to ball joint  
 (use new nut  
 or clean thread + Loctite 2701) ..... 130 Nm  
 Spring strut to leading link..... 50 Nm

### 31 42 Disassembling/assembling leading link

- Press the bearing out/in with a suitable tool.

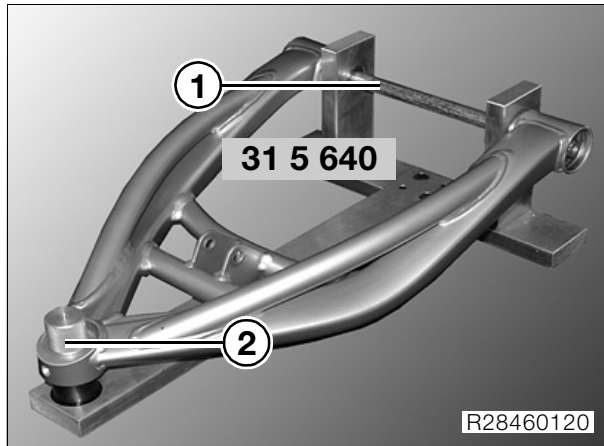
#### Attention:

Always install bearing by applying pressure to outer race.



## 31 42 Measuring the leading link

- Remove leading link
- ➡ ..... See Group 31 (➡ 31.12)



- Secure the leading link with shaft (1) to leading link gauge, **BMW No. 31 5 640**.
- Tighten the shaft until the leading link is located in the gauge with no end float.



**Note:**

Shaft (1) must slide into the leading link without resistance.  
Check runout of shaft (1).

- Insert test mandrel (2) all the way into the bore.



**Note:**

Check the leading link for signs of the paint flaking.

### Interpreting result of measurement:

Test mandrel slides all the way into the bore without resistance  
.....OK

Test mandrel sticks, force is required to slide it into the bore or it cannot be inserted  
..... Replace leading link

- Install leading link
- ➡ ..... See Group 31 (➡ 31.12)

## 31 42 Removing and installing front spring strut

- Remove the horn.
- Remove/install spring strut.



**Tightening torque:**

Spring strut to frame ..... 43 Nm  
Spring strut to leading link..... 50 Nm

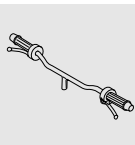


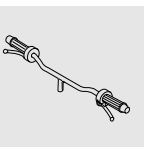
# 32 Steering

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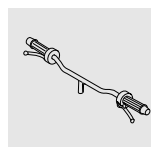
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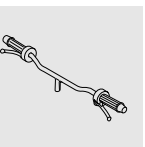
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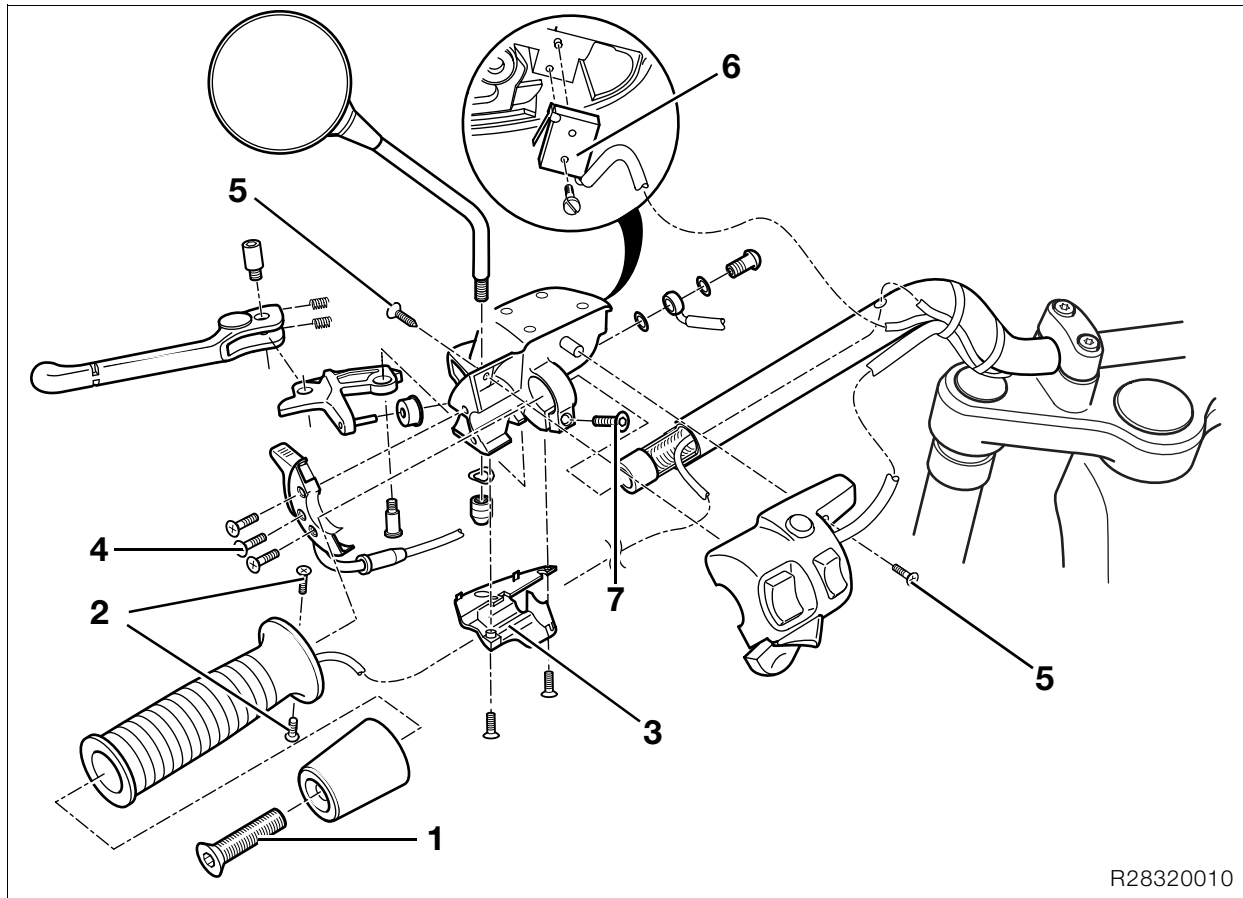




<b>Technical Data</b>		<b>R 1150 R</b>
Steering lock angle	°	2 x 37
Handlebar tube diameter	mm (in)	22 (0.8661)
Width of handlebars without weights	mm (in)	785 (30.9054)
Width of handlebars with weights	mm (in)	825 (32.4802)







R28320010

### 32 71 Removing and installing left handlebar fitting

- **[Heated grips]** Remove the fuel tank.
- Remove securing screw (1) and remove handlebar weight.
- Remove the screws (2) securing handlebar grip.
- **[Heated grips]** Disconnect plug of grip heating.
- **[Heated grips]** Release cable shoe in connection.
- Pull off the grip.
- Remove the lower section (3) of the clutch lever fitting.
- Remove securing screw (4) and remove lever for starting-speed increase.
- Disengage Bowden cable for starting-speed increase.
- Remove mirrors.
- Remove screws (5) securing multi-function switch.
- Remove clutch switch (6).

#### Attention:

Do not allow brake fluid to come into contact with painted parts of the motorcycle as brake fluid destroys paint.

- Turn the clutch fitting until it is horizontal and drain the clutch system.
- Disconnect clutch line from handlebar fitting.

- Loosen the retaining screw (7) for the clutch fitting and remove the fitting.
- Disconnect plug for multi-function switch, if necessary.
- Disconnect plug for clutch switch, if necessary.
- Installation is the reverse of the removal procedure.



#### Note:

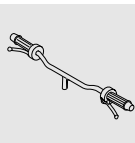
Align the mark on the handlebar fitting with the punch mark on the handlebars.

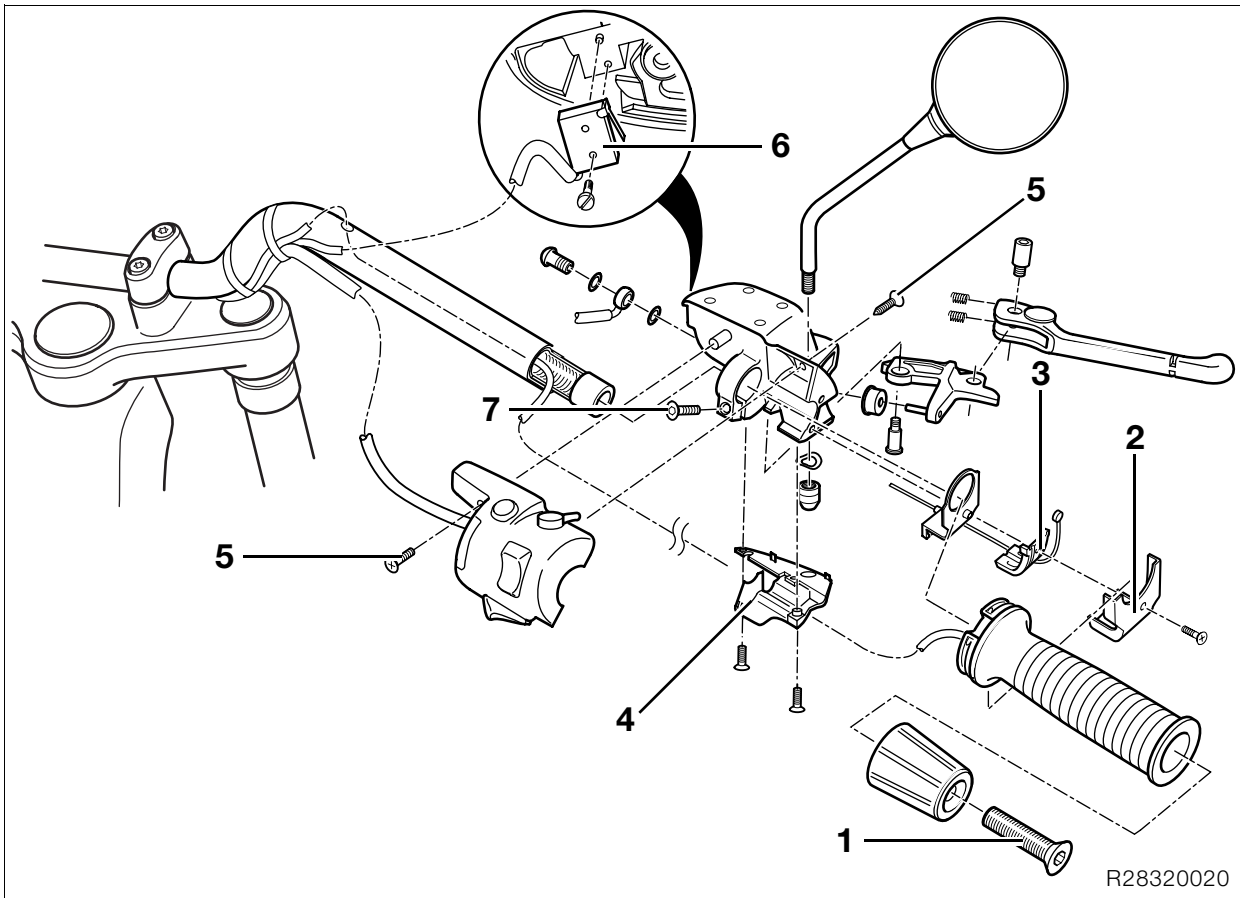
- Fill and bleed the clutch operating system (→ 00.54).



#### Tightening torque:

Clutch line to clutch handlebar fitting ..... 14 Nm  
 Handlebar weight to handlebar ..... 21 Nm





### 32 71 Removing and installing right handlebar fitting

- **[Integral ABS/heated handlebar grips]** Remove the fuel tank.
- Remove securing screw (1) and remove handlebar weight.
- Remove throttle twistgrip cover (2).
- Back off the adjuster screw for the throttle cable and disengage the Bowden cable.
- Remove guide (3) of throttle cable.
- Remove lower plastic cover (4) on handlebar fitting.
- Remove mirror.
- Remove screws (5) securing multi-function switch.
- **[Heated grips]** Disconnect plug of grip heating.
- **[Heated grips]** Release cable shoe in connection.
- Pull off the throttle twistgrip.
- Remove brake-light switch (6).

#### **Attention:**

Do not allow brake fluid to come into contact with painted parts of the motorcycle as brake fluid destroys paint.

- Turn the brake fitting until it is horizontal and drain the front brake system.
- **[Integral ABS]** Drain front control circuit (→ 34.17).
- Disconnect brake line from handlebar fitting.

- Loosen the retaining screw for the brake lever fitting (7) and remove the fitting.
- Disconnect plug for multi-function switch, if necessary.
- Disconnect plug for brake-light switch, if necessary.
- Installation is the reverse of the removal procedure.



#### **Note:**

Align the mark on the handlebar fitting with the punch mark on the handlebars.

- Fill and bleed the front brake system.
- **[Integral ABS]** Fill and bleed front control circuit (→ 34.18).



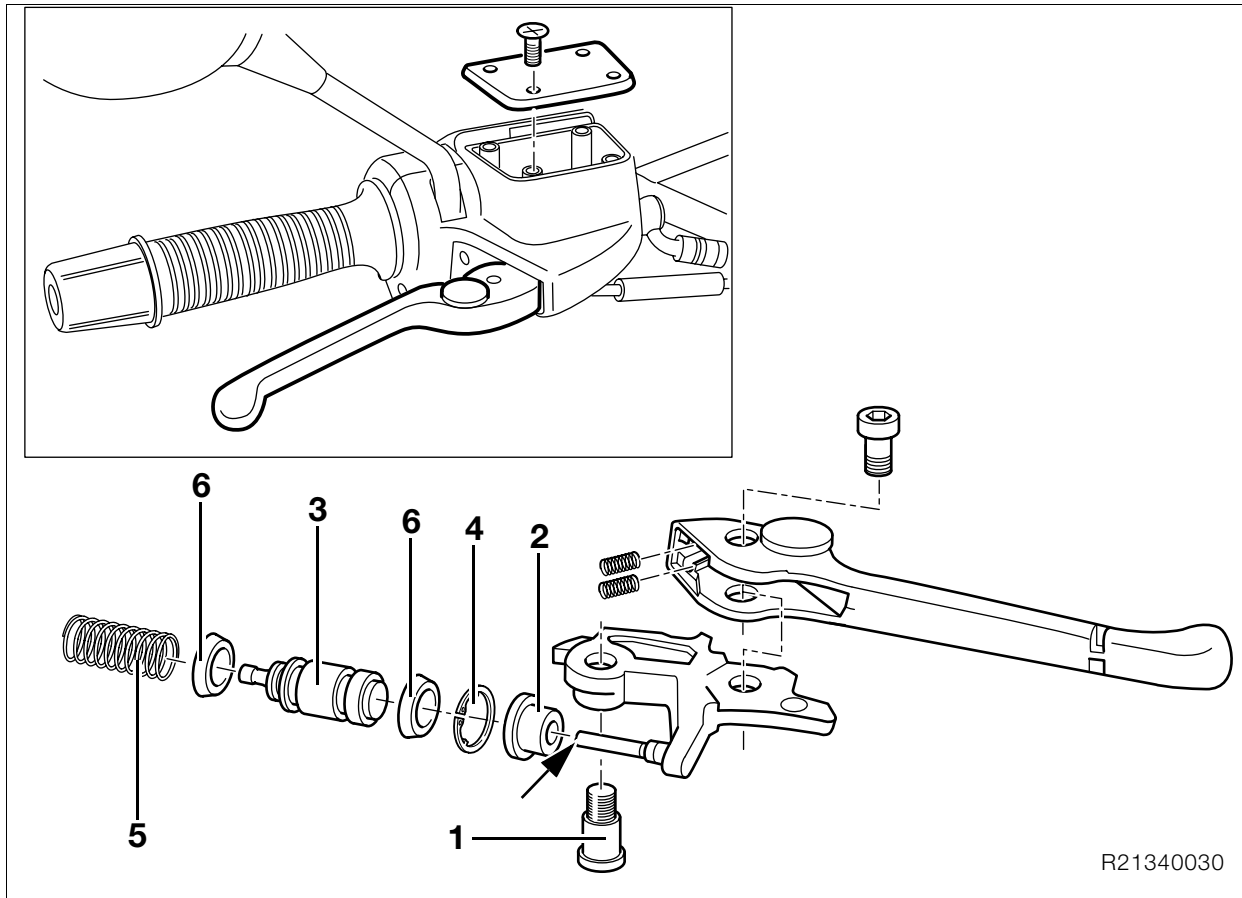
#### **Note:**

There must always be a gap of at least 1 mm (0.0394 in) between throttle twistgrip and handlebar weight (clearance for movement).



#### **Tightening torque:**

Brake hose to brake handlebar fitting ..... 18 Nm  
 Handlebar weight to handlebar ..... 21 Nm



R21340030

## 32 72 Removing and installing brake piston in handlebar fitting

### ⚠ Attention:

Do not allow brake fluid to come into contact with painted parts of the motorcycle as brake fluid destroys paint.

- Turn the brake fitting until it is horizontal and drain the front brake system.
- **[Integral ABS]** Drain front control circuit (⇒ 34.17).
- Remove throttle twistgrip cover.
- Remove the lower section of the brake lever fitting.
- Remove pivot screw (1) for lever.
- Remove rubber boot (2).

### ⚠ Attention:

Note that brake piston (3) is spring-loaded.

- Carefully press back brake piston (3) and remove retaining ring (4).
- Remove brake piston (3) with spring (5).
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Prior to installation, coat the piston and the boots (6) with brake fluid.

### ⚠ Attention:

Sealing lips of the boots (6) toward the pressure chamber.

- Prior to installation, carefully press back the brake piston using an Allen key with T-bar handle, for example.
- Use cranked-tip snap-ring pliers to install the retaining ring.
- Apply a light coat of **Optimoly MP 3** to the pressure pin (arrow) on the lever.

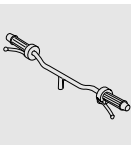
### ⚠ Attention:

When installing the brake lever, make sure that the metal tab on the brake-light switch is correctly positioned (otherwise switch will not work).

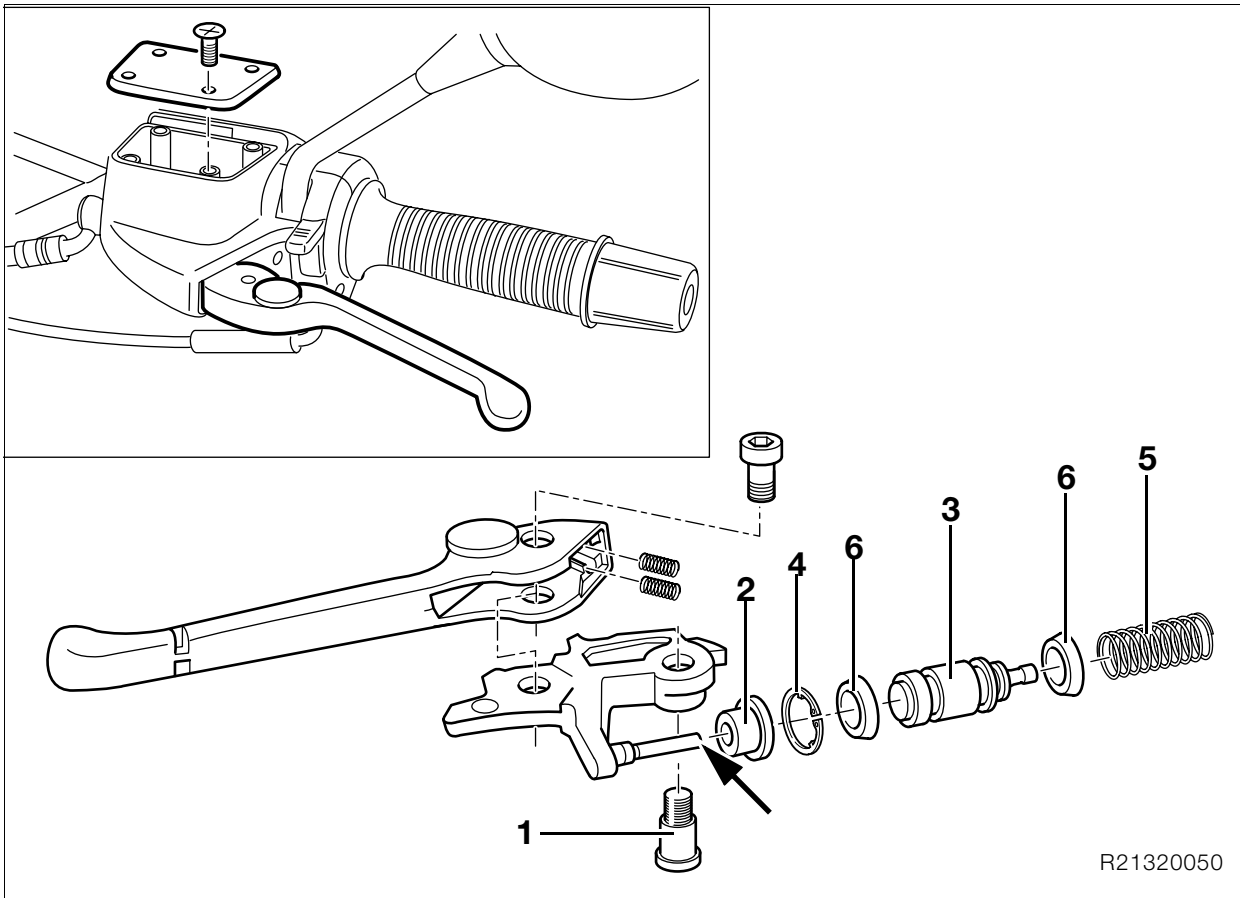
- Fill and bleed the front brake system.
- **[Integral ABS]** Fill and bleed front control circuit (⇒ 34.18).
- Check blow-by clearance and adjust if necessary (⇒ 32.9).

### ⚠ Tightening torque:

Pivot screw of handlebar-fitting lever (1) ..... 11 Nm (Tuflok Blue thread-locking compound; screw can be released and tightened a number of times)







R21320050

### 32 72 Removing and installing clutch piston in handlebar fitting

#### Attention:

Do not allow brake fluid to come into contact with painted parts of the motorcycle as brake fluid destroys paint.

- Remove clutch fitting (→ 32.5).
- Remove the cover of the cold-start actuator.
- Carefully clamp the clutch fitting in a vise.
- Remove pivot screw (1) of lever and remove the lever.
- Remove rubber boot (2).

#### Attention:

Note that clutch piston (3) is spring-loaded.

- Carefully press back clutch piston (3) and remove retaining ring (4).
- Remove clutch piston (3) with spring (5).

- Installation is the reverse of the removal procedure; pay particular attention to the following.
- Prior to installation, coat the piston and the boots (6) with brake fluid.

#### Attention:

Sealing lips of the boots (6) toward the pressure chamber.

- Prior to installation, carefully press back the clutch piston using an Allen key with T-bar handle, for example.
- Use cranked-tip snap-ring pliers to install the retaining ring.
- Apply a light coat of **Optimoly MP 3** to the pressure pin (arrow) on the lever.

#### Attention:

When installing the clutch lever, make sure that the metal tab on the microswitch is correctly positioned (otherwise switch will not work).

- Fill and bleed the clutch operating system (→ 00.54).
- Check blow-by clearance and adjust if necessary (→ 32.9).

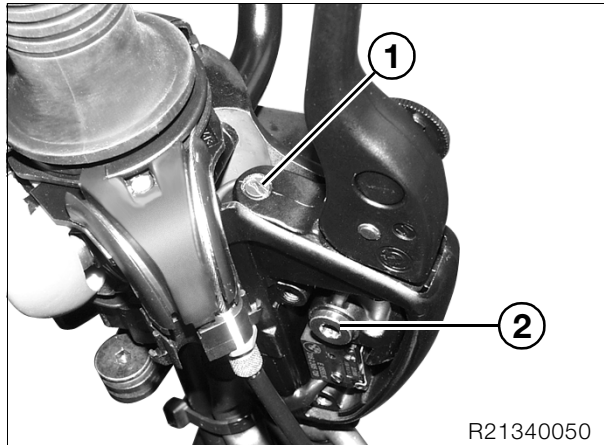
#### Tightening torque:

Pivot screw of handlebar-fitting lever (1) ..... 11 Nm (Tuflok Blue thread-locking compound; screw can be released and tightened a number of times)

## Adjusting blow-by clearance at handlebar fitting for brake/clutch

### Handlebar fitting, brake

- Remove cover from throttle-cable relay.
- Remove the lower section of the brake lever fitting.



- Back off adjusting screw (1).



#### Note:

Thread is secured with Loctite, if necessary heat slightly prior to removal.

- Remove pivot screw (2) of lever and remove the lever.
- Clean and degrease the threads of the adjusting screw.
- Coat the threads of the adjusting screw with **Loctite 648** or **Loctite 270** and screw it a few turns into the lever.
- Apply a light coat of **Optimoly MP 3** to the pressure pin of the adjusting screw.
- Install the lever, making sure that the metal tab on the microswitch is correctly positioned.
- Tighten the adjusting screw until the lever has zero play.
- Tighten the adjusting screw another **full turn**.
- Apply sealing lacquer to the adjusting screw.
- Fully assemble the fitting.



#### Tightening torque:

Pivot screw of handlebar-fitting lever (2) ..... 11 Nm (Tuflok Blue thread-locking compound; screw can be released and tightened a number of times)

### Handlebar fitting, clutch

- Remove the lower section of the clutch lever fitting.
- Remove the handlebar weight.
- Remove the grip.
- **[Heated grips]** Release the grip and pull it outwards.
- Release the cold-start actuator and pull it outwards.
- Back off the adjusting screw.



#### Note:

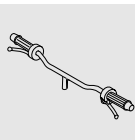
Thread is secured with Loctite, if necessary heat slightly prior to removal.

- Remove the pivot screw of lever and remove the lever.
- Clean and degrease the threads of the adjusting screw.
- Coat the threads of the adjusting screw with **Loctite 648** or **Loctite 270** and screw it a few turns into the lever.
- Apply a light coat of **Optimoly MP 3** to the pressure pin of the adjusting screw.
- Install the lever, making sure that the metal tab on the microswitch is correctly positioned.
- Tighten the adjusting screw until the lever has zero play.
- Tighten the adjusting screw another **half turn**.
- Apply sealing lacquer to the adjusting screw.
- Fully assemble the fitting.

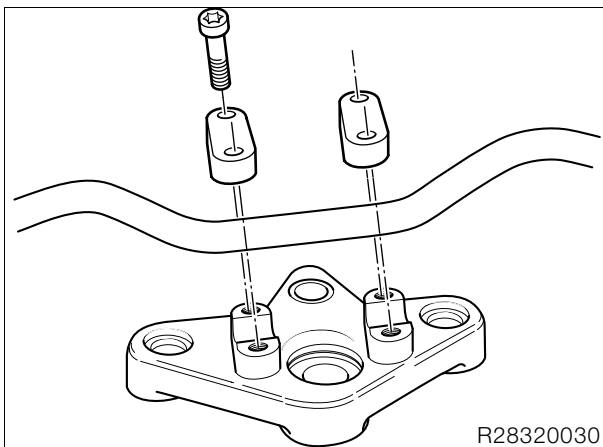


#### Tightening torque:

Pivot screw of handlebar-fitting lever..... 11 Nm (Tuflok Blue thread-locking compound; screw can be released and tightened a number of times)



## 32 71 Removing and installing handlebars



- Remove left handlebar fitting (→ 32.5).
- Remove right handlebar fitting (→ 32.6).
- Remove handlebars.
- Installation is the reverse of the removal procedure.
- When installing the handlebars, always tighten the clamping blocks on the fork bridge in the correct sequence:
- Tighten front fastener (1) as viewed in forward direction of travel (until seated).
- Tighten rear fastener (2) as viewed in forward direction of travel.



### Attention:

Make sure that all lines and cables are correctly routed.

Align the punch mark on the handlebars with the gap between the clamp blocks.

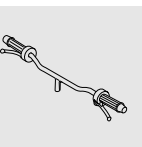


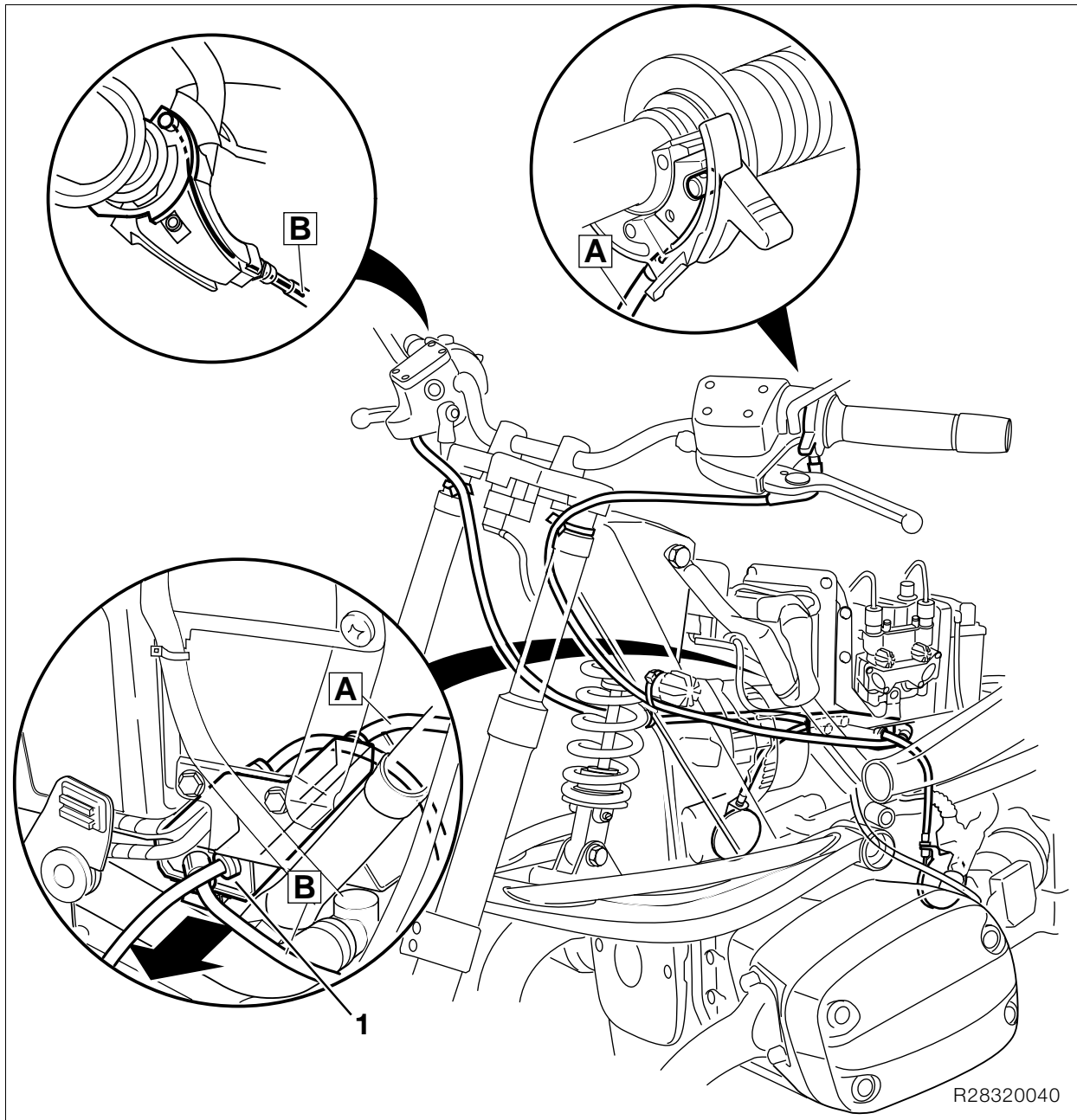
### Tightening torque:

Clamp to fork bridge

Tightening sequence:

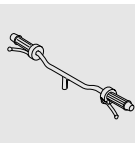
1. Front fastener (as viewed in forward direction of travel) until seated ..... 21 Nm
  2. Rear fastener (as viewed in forward direction of travel)..... 21 Nm
- Handlebar weights to handlebars ..... 21 Nm

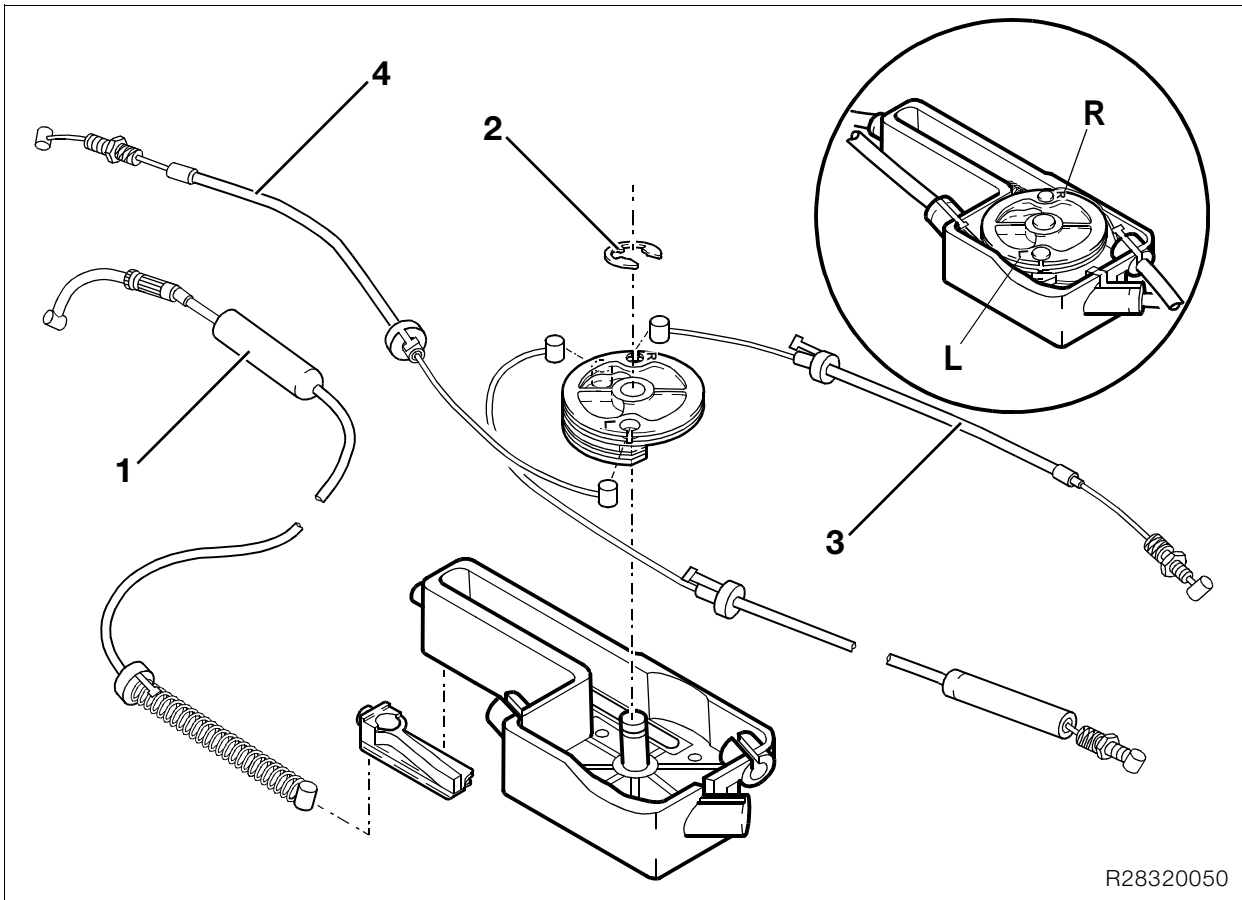




### 32 73 Removing and installing Bowden-cable divider, Bowden cable for throttle actuation and starting-speed increase

- Remove fuel tank (→ 16.5).
- Remove actuating cable for starting-speed increase.
- Disengage Bowden cable (A).
- Remove Bowden-cable shroud from fitting for throttle actuation.
- Disengage Bowden cable (B).
- Disengage throttle cables from right and left throttle flap stubs.
- Remove cable ties securing Bowden cables.
- Disconnect engine breather line from engine.
- Pull Bowden-cable divider (1) out of holder in direction indicated by arrow.
- Installation is the reverse of the removal procedure.
- Adjust Bowden cables (→ 00.57).





### 32 73 Disassembling Bowden-cable divider

- Remove fasteners of Bowden cables at entry to Bowden-cable divider.
- Remove Bowden cable for starting-speed increase (1).
- Remove retainer (2) for roller of Bowden-cable divider.
- Remove Bowden cables.
- Prior to installation, clean housing of Bowden cable divider, pulley, and wedge for starting-speed increase, and **do not grease**.
- Installation is the reverse of the removal procedure.



#### Note:

The Bowden cable to the right throttle valve (3) is shorter than the cable to the left throttle valve (4).



#### Attention:

Make sure that Bowden cables are free of kinks. Do not kink the strands of the Bowden cables when installing.

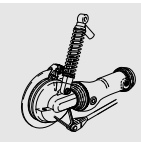
- Adjust Bowden cables (→ 00.57).

# 33 Rear wheel drive

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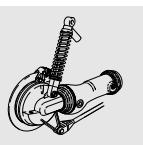
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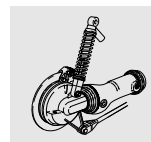
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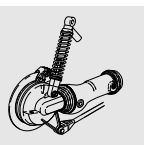
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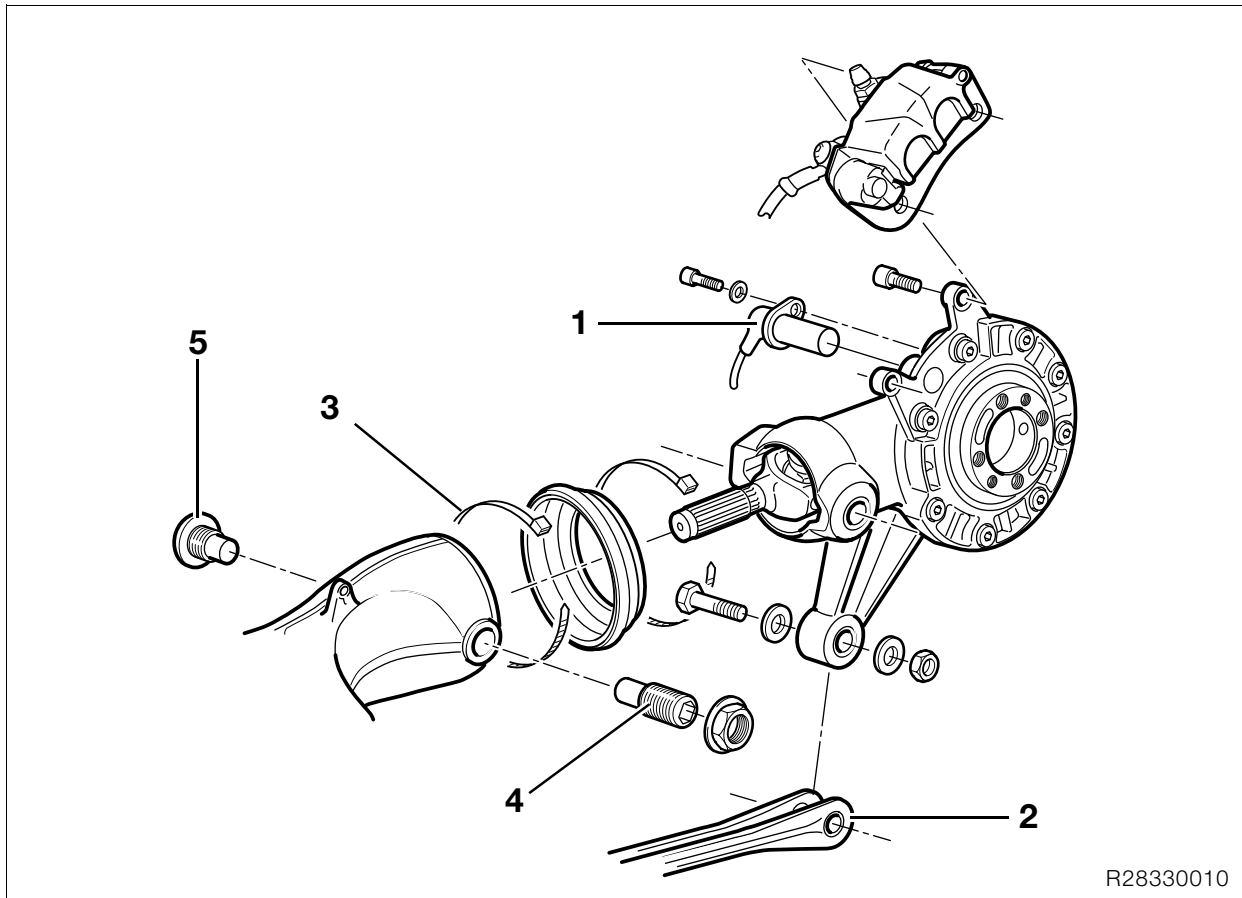


Technical Data		R 1150 R
<b>Rear wheel drive</b>		
Gear tooth pattern		Klingelnberg-Paloid spiral bevel
Gear ratio		2.82 : 1
	Number of teeth	31 : 11
Backlash	mm (in)	0.07... 0.16 (0.0028...0.0063)
Taper roller bearing preload	mm (in)	0.05... 0.1 (0.0020...0.0039)
Oil grade		Brand-name hypoid gear oil, SAE 90 GL 5
Capacity		Initial filling/oil changes
	l (Imp. pint/US quart)	up to lower edge of thread in filler neck approx. 0.25 (0.44/0.27)
<b>Drive shaft</b>		
Layout		Two-piece shaft with universal joints at each end, central sliding joint and integral torsional vibration damper, enclosed in swinging arm.
<b>Swinging arm</b>		
Swinging arm length	mm (in)	341 (13.4251)
	mm (in)	Total length (to centre of wheel) 506 (19.9212)
<b>Rear suspension</b>		
Suspension strut		Spring strut with single-tube gas-filled shock absorber, steplessly adjustable rebound stage and hydraulically steplessly adjustable spring preload.
Suspension travel	mm (in)	135 (5.3150)









R28330010

### 33 10 Removing, disassembling, re-assembling and installing rear wheel drive

#### 33 10 Removing rear wheel drive

- If necessary, drain the oil from the rear wheel drive.
- Remove the brake caliper and secure it to the rear frame with a cable strap.
- **[Integral ABS]** Remove sensor (1).
- Remove rear wheel.
- Loosen reaction link (2) at the rear wheel drive.
- Remove retainer (3).
- Push the flexible gaiter to the rear.
- Swinging-arm bearing studs are secured with Loctite: heat to max. 120 °C (248 °F) to release.
- Loosen floating bearing stud bolt (4).
- Loosen fixed bearing stud bolt (5).
- Disengage reaction link from rear wheel drive.
- Remove floating bearing/ fixed bearing stud bolts.



**Note:**

Note inner races of needle bearings.

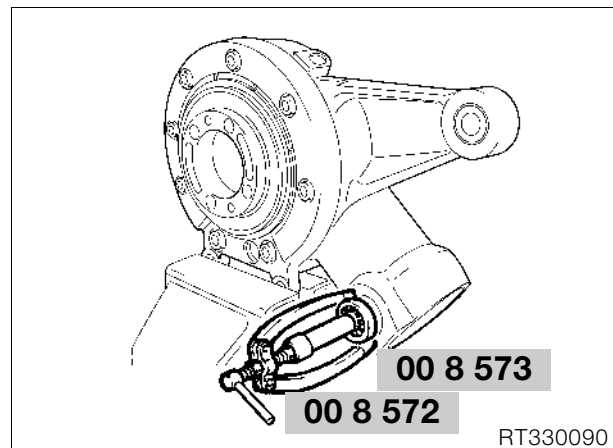
- Remove rear-wheel drive from universal shaft.



**Note:**

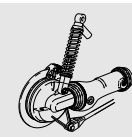
Do not lay oil-filled rear-wheel drive on its side prior to installation, as this will cause oil to escape when the motorcycle is on the road (suction effect).

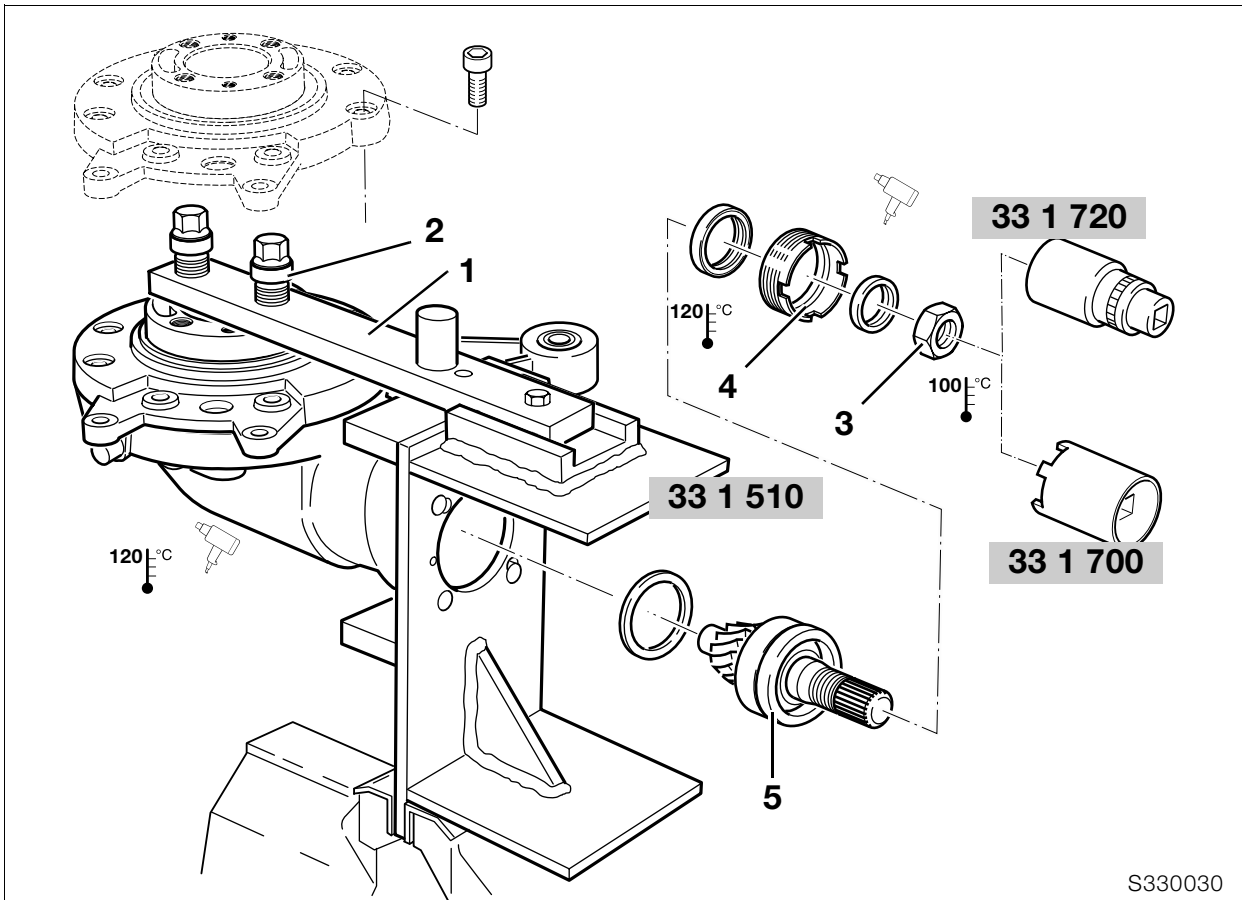
### 33 17 Removing and installing taper roller bearing in rear wheel drive



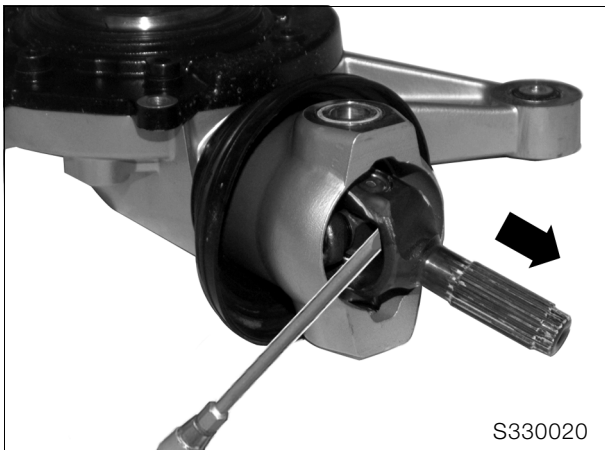
RT330090

- Remove needle roller bearing with counter-support 22/1, **BMW No. 00 8 572**, and internal puller 21/4, **BMW No. 00 8 573**, with ring support.
- Heat neck of housing to 120 °C (248 °F).
- Press in needle roller bearing with inner race with driver, **BMW No. 36 3 700**.





### 33 12 Removing input bevel pinion



- Press off splined section of shaft.
- If necessary, remove/install circlip.

- Bolt the rear wheel drive to the retaining fixture, **BMW No. 33 1 510/511**.
- Bolt the locking arm (1) to the retaining fixture.
- Tighten grub screws until they are seated.

**⚠ Attention:**

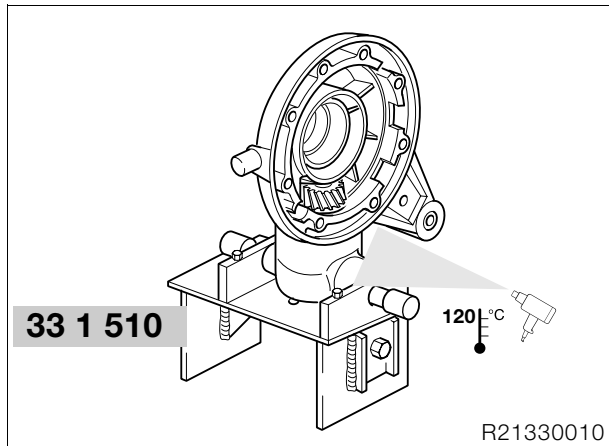
The grub screws must not project, or the neck of the housing could be damaged.

- Screw threaded bushings (2) down on to the rear wheel drive and secure them with the wheel studs.
- Heat hex nut (3) at the input bevel pinion to 100 °C (212 °F) and unscrew with w/f 36 socket wrench insert and reduction adapter, **BMW No. 33 1 720**.

**🔧 Note:**

If necessary, use cross-handle with two tubular extensions.

- Heat the housing to max. 120 °C (248 °F) and unscrew threaded ring (4) with pin wrench, **BMW No. 33 1 700**.
  - To remove the input bevel pinion (5), remove the crown wheel.
- ➡ ..... See Removing crown wheel



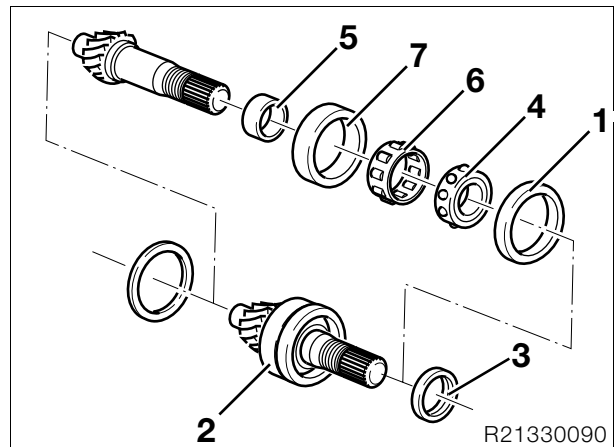
- Place rear wheel drive in position complete with holder.

**⚠ Attention:**

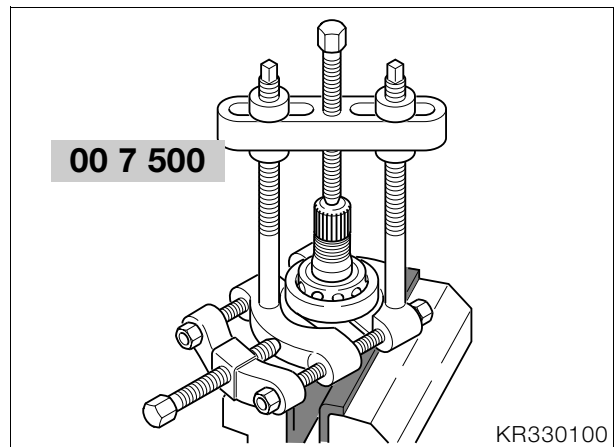
To prevent the input bevel pinion from being damaged when it falls out, use a soft underlay.

- Heat the housing until the input bevel pinion is released (max. 120 °C/248 °F) and drops out.
- Remove the input bevel pinion and the spacer.

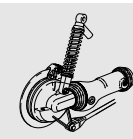
## Disassembling input bevel pinion

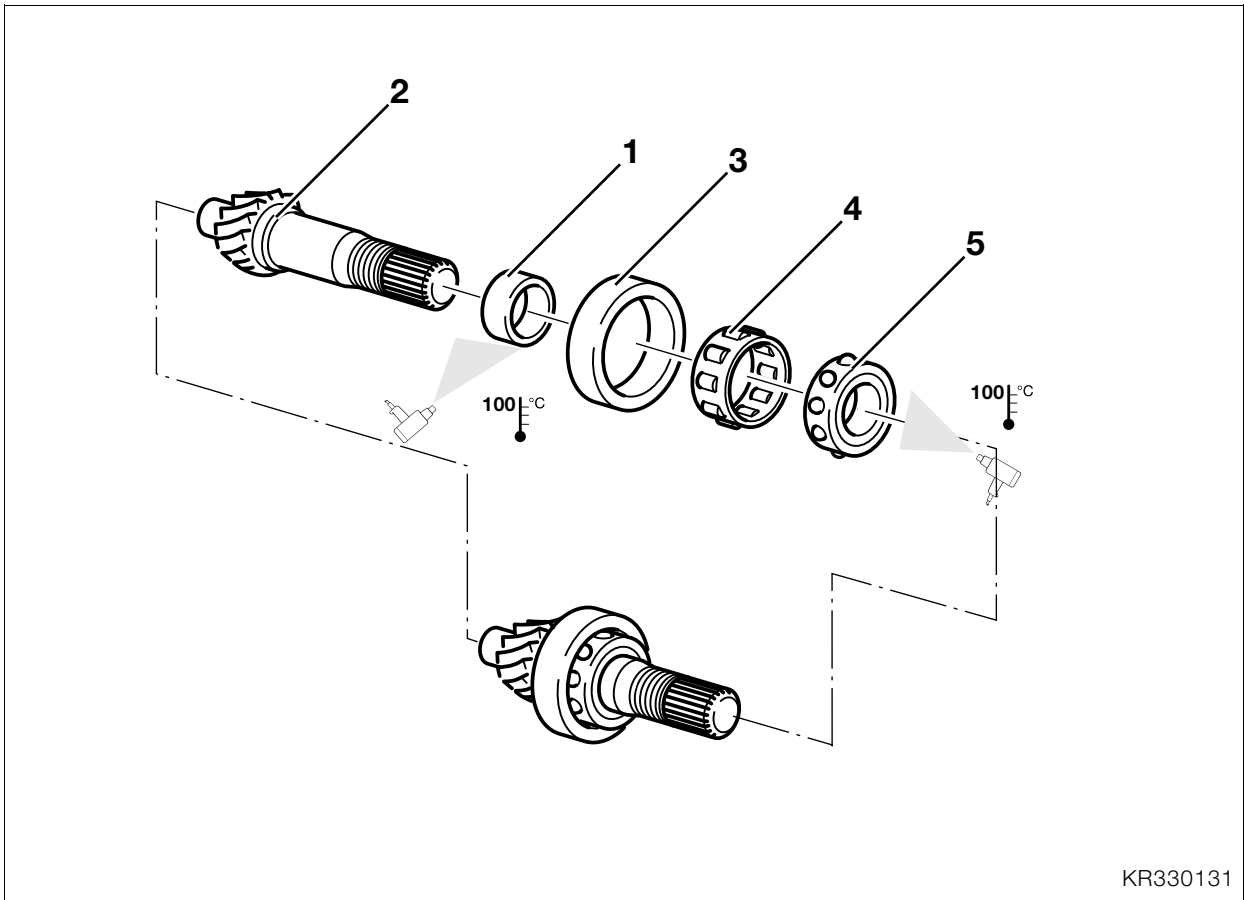


- Remove outer bearing race (1).
- Clamp input bevel pinion (2) into vise with protective jaws (splines facing upwards).



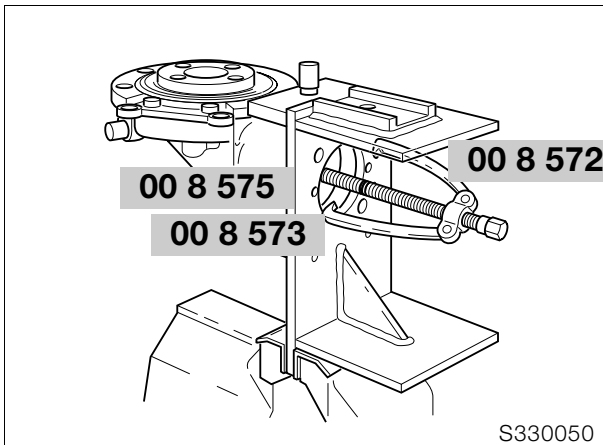
- Using puller, **BMW No. 00 7 500**, pull off both bearings at the same time.
- Remove thrust ring (3).
- Remove ball thrust bearing (4), inner race (5), roller bearing cage (6) and outer race (7).





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### 33 12 Removing needle roller bearing for input bevel pinion



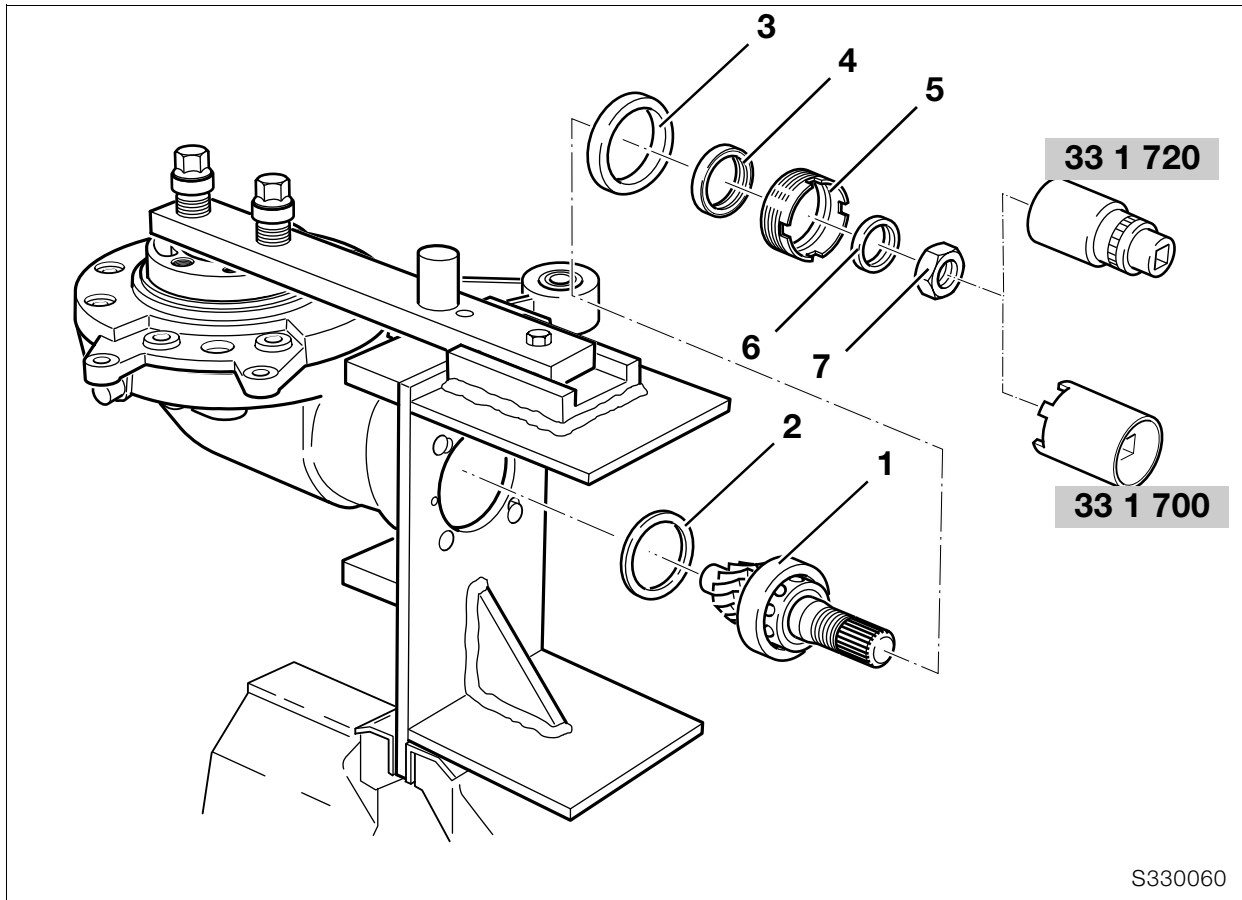
- Heat the housing to 120 °C (248 °F).
- Remove the outer ring of the needle roller bearing using internal puller, **BMW No. 00 8 573**, threaded extension, **BMW No. 00 8 575**, and counter-support, **BMW No. 00 8 572**.

### 33 12 Installing needle roller bearing for input bevel pinion

- Heat the needle roller bearing seat to 100 °C (212 °F).
- Press in needle roller bearing using drift or the input bevel pinion.

### Assembling input bevel pinion

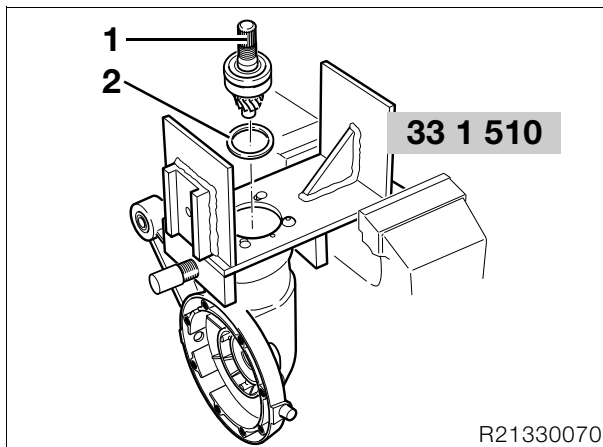
- Clean the threads of the input bevel pinion.
- Heat the inner race (1) to 100 °C (212 °F) and push onto input bevel pinion (2) as far as the stop.
- Push the outer race (3) together with the roller cage (4) on to the inner race.
- Heat ball thrust bearing (5) to 100 °C (212 °F) and push fully on to input bevel pinion.
- Allow input bevel pinion to cool down.



S330060

### 33 12 Installing input bevel pinion

- Clean threads in the housing.



- Clamp holder, **BMW No. 33 1 510**, in the vise in such a way that the input neck of the housing is pointing vertically upward.
- Heat the neck of the housing to max. 120 °C (248 °F).

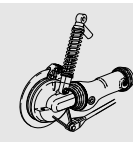


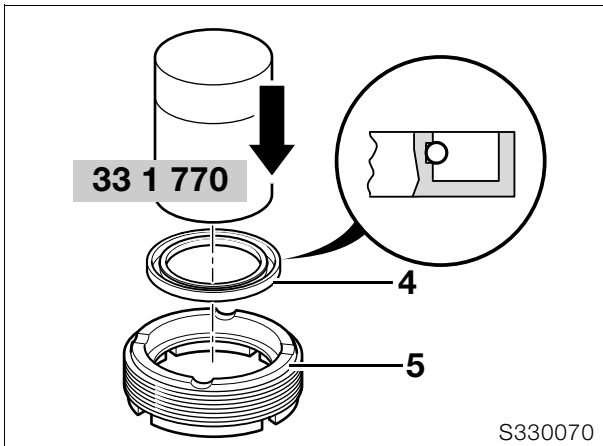
**Note:**

Chill input bevel pinion prior to installation in refrigerator/freezer or similar, or use cooling spray.

- Install spacer (2).
- Install input bevel pinion (1) from above.

- Clamp holder, **BMW No. 33 1 510**, in the vise in such a way that the input neck of the housing is pointing forward.
- To secure the input bevel pinion, install the crown gear with housing cover.
- Secure the locating arm to the holder and the rear wheel drive.
- Insert outer race (3).





- Lightly oil the sealing ring (4) at the sealing lip and round the outer edge.
- Press/drive sealing ring with drift, **BMW No. 33 1 760**, and handle, **BMW No. 00 5 500**, into threaded ring (5).
- Coat the cleaned threaded ring with **Loctite 577** and tighten with pin wrench, **BMW No. 33 1 700**.
- Install thrust ring (6).



**Note:**

Make sure that the lip of the shaft seal is seated correctly on the thrust ring.

- Tighten hex nut (7) with w/f 36 socket wrench insert and reducing adapter, **BMW No. 33 1 720**.



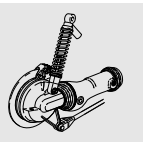
**Attention:**

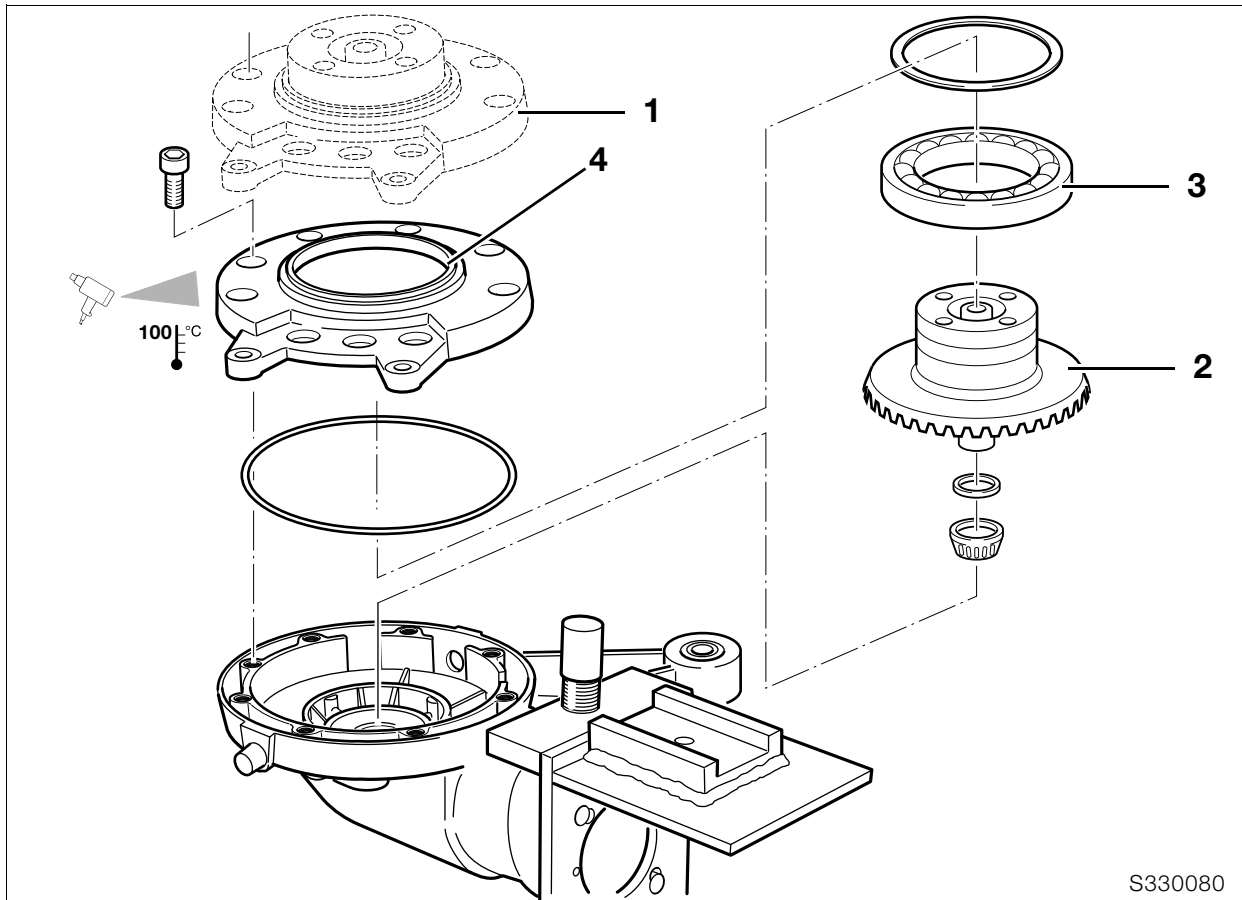
Make sure that the nut does not damage the shaft sealing ring.



**Tightening torque:**

Housing cover .....	35 Nm
Threaded ring (clean thread + Loctite 577).....	160 Nm
Nut for input bevel gear (clean thread + Loctite 2701).....	200 Nm

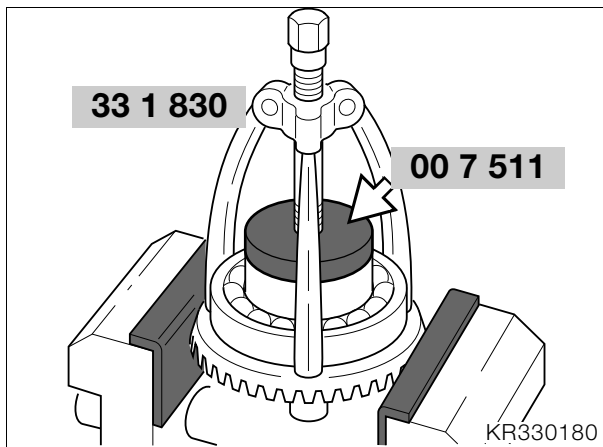




S330080

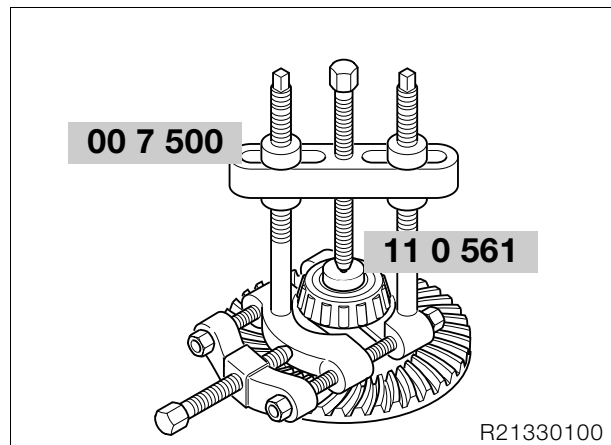
## Removing and disassembling crown wheel

- Remove housing cover (1) with crown wheel (2) and bearing (3).
- Heat housing cover to 100 °C (212 °F) and pull it off.
- Force shaft seal (4) out of housing cover with drift.



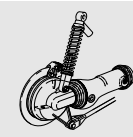
KR330180

- Clamp crown wheel in vise with protective jaws.
- Insert thrust block (arrow), **BMW No. 00 7 511**.
- Use puller, **BMW No. 33 1 830**, to pull off the grooved ball bearing.



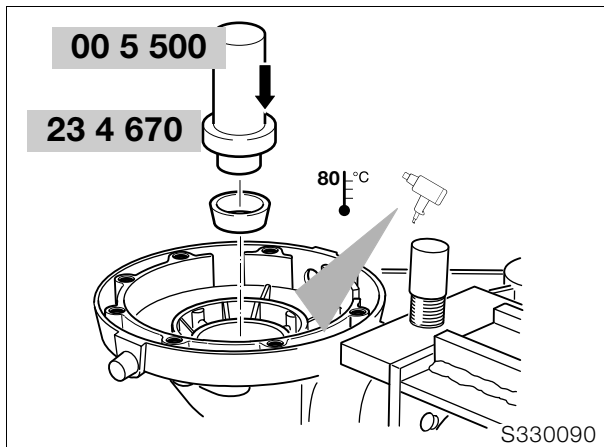
R21330100

- Insert thrust block, **BMW No. 11 0 561**.
- Using puller, **BMW No. 00 7 500**, pull taper roller bearing off crown wheel.
- Turn the housing upside down and heat it until the outer ring is released and drops out (max. 100 °C/212 °F).





## Assembling and installing crown wheel

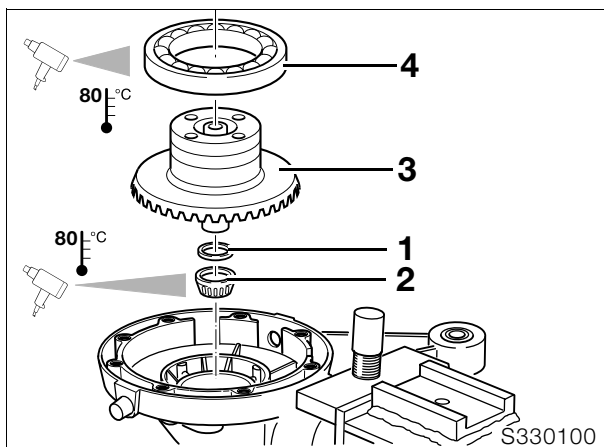


- Heat the housing to 80 °C (176 °F).
- Insert the outer race in the bearing seat with drift, **BMW No. 23 4 670**, and handle, **BMW No. 00 5 500**.
- Check that outer race is correctly seated by tapping gently.



### Note:

If new parts are installed (e.g. taper roller bearing), check tooth backlash and adjust if necessary.



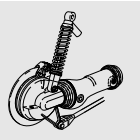
- Place original spacer (1) or spacer measuring 2.25 mm (0.0886 in) in thickness on crown wheel (for provisional backlash).



### Note:

Install spacer with bevel on inside diameter toward crown wheel.

- Heat taper roller bearing (2) to 80 °C (176 °F) and push it on.
- Install crown wheel (3).
- Heat grooved ball bearing (4) to 80 °C (176 °F) and place it in position.



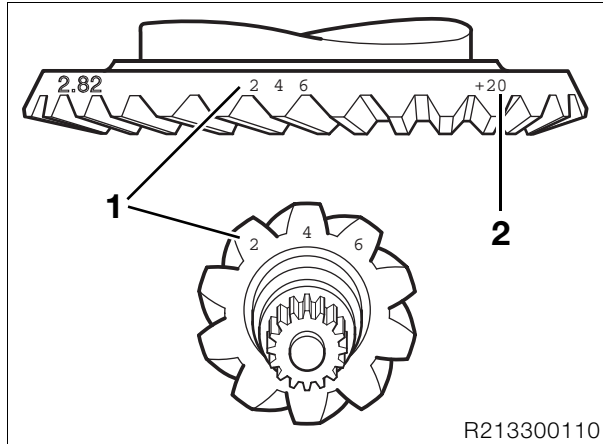
## Shimming input bevel pinion and crown wheel

- It is Attention to shim the input bevel pinion and the crown wheel if the gear set or housing has been replaced.



### Note:

The two components of the gear set (input bevel gear and crown wheel) must have matching numbers (1).

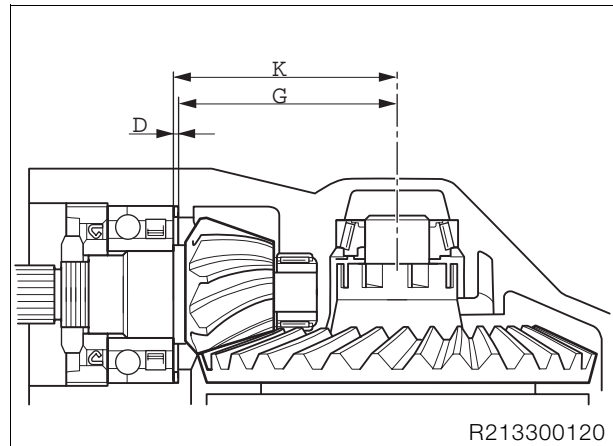


- Measure dimension **K** at the input bevel pinion, taking into account the deviation (2) with sign as stated on the crown wheel from the basic dimension of 77.50 mm (3.0512 in):

e.g.:  $K = 77.50 \text{ mm} + 0.20 \text{ mm} = 77.70 \text{ mm}$   
(3.0512 in + 0.0079 in = 3.0590 in)

- Measure housing dimension **G**:  
If G deviates from the housing basic dimension of 75.50 mm (2.9724 in) the two places after the decimal point are stated on the housing neck:

e.g.:  $G = 75.45 \text{ mm}$  (2.9705 in)



- Calculate required thickness of spacer **D**:

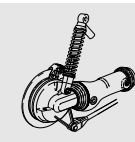
$$D = K - G$$

e.g.:  $D = 77.70 \text{ mm} - 75.45 \text{ mm} = 2.25 \text{ mm}$   
(3.0590 in - 2.9705 in = **0.0886 in**)



### Note:

If there is no deviation marked on the crown wheel and no size on the housing the sizes are in compliance with the basic sizes, which means that the required spacer thickness is 2 mm (0.0787 in) (77.5 mm-75.5 mm/3.0512 in-2.9724 in).



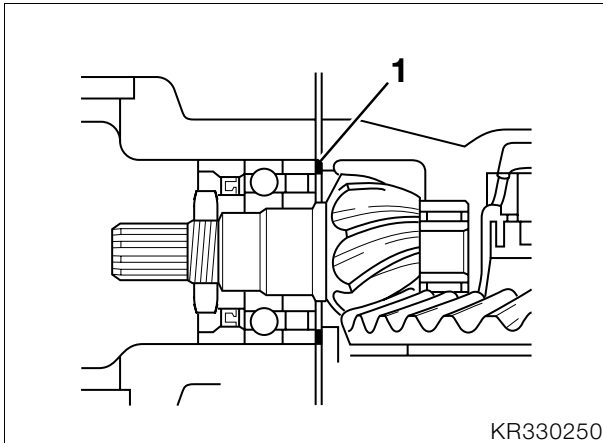
## Checking tooth contact pattern

- The tooth contact pattern must be checked if the gear set, housing or input bevel pinion bearing have been replaced.



### Note:

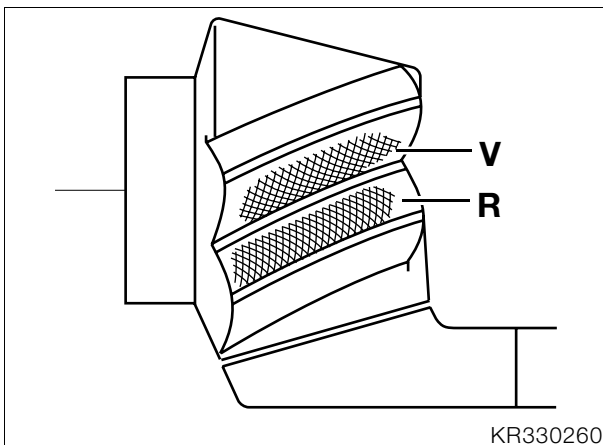
Before checking the contact pattern, make sure that tooth backlash (provisional, if necessary) is correct.



### Note:

The contact pattern is adjusted by means of the shim washer (1) on the input bevel pinion.

- Clean and degrease tooth flanks of crown wheel and bevel gear.
- Coat three tooth flanks of the crown wheel with **marking ink**.
- Install measuring fixture, **BMW No. 33 2 600**, centre crown wheel and use the balls of your hands to press it into the housing and turn it back and forth a few times.



- If the correct shim is installed, the following contact pattern appears with no load applied.



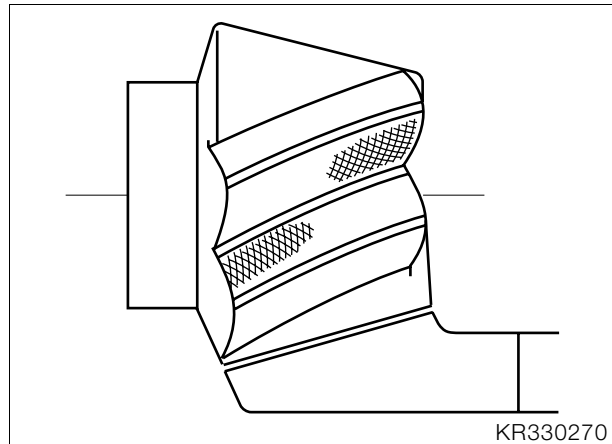
### Note:

The contact pattern is centered on leading flank "V". The contact pattern is closer to the larger diameter on trailing flank "R".

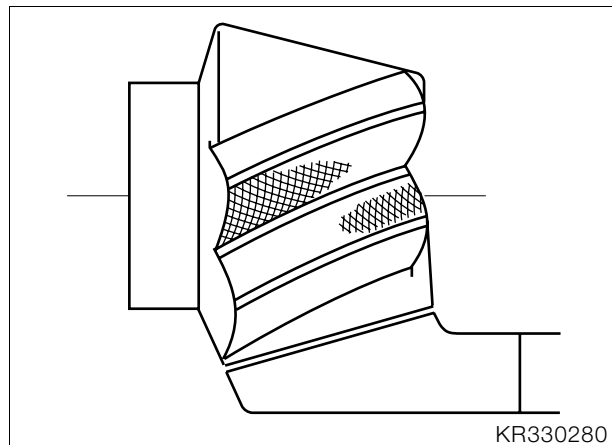


### Attention:

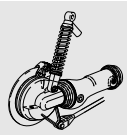
Teeth should never make contact at the smaller diameter.



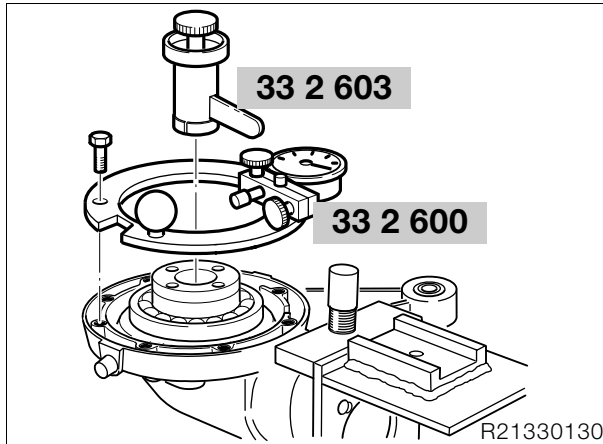
- If this contact pattern is obtained, a thinner shim washer must be installed.



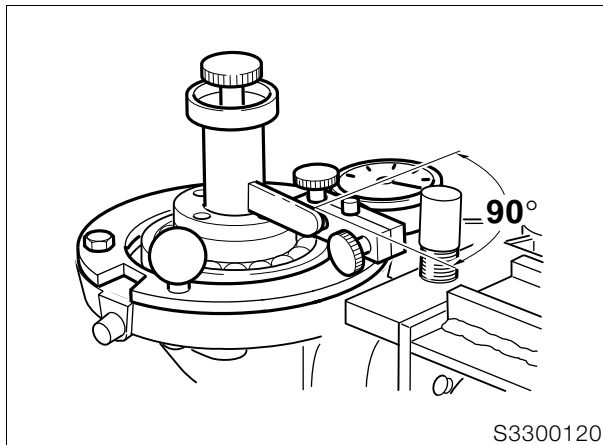
- Install a thicker shim if the contact pattern looks like this.
- Clean the tooth flanks.



## Checking and adjusting backlash



- Secure measuring device, **BMW No. 33 2 600**, with dial gauge to crown wheel and secure to housing with the knurled screw.
- Secure measuring arm, **BMW No. 33 2 603**, centrally to crown wheel.

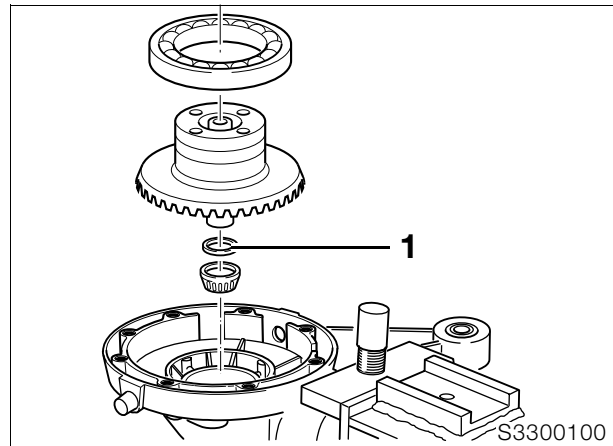


- Using the balls of your hands, press the crown wheel into the housing and turn it to and fro to check tooth backlash.



**Note:**

Check tooth backlash at three points 120° apart; turn the bevel pinion with the crown wheel.



- Compensate for excessive backlash by inserting a thinner shim washer, and for insufficient backlash by inserting a thicker shim washer (1).

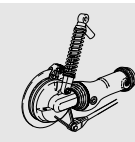


**Note:**

Install spacer with bevel on inside diameter toward crown wheel.

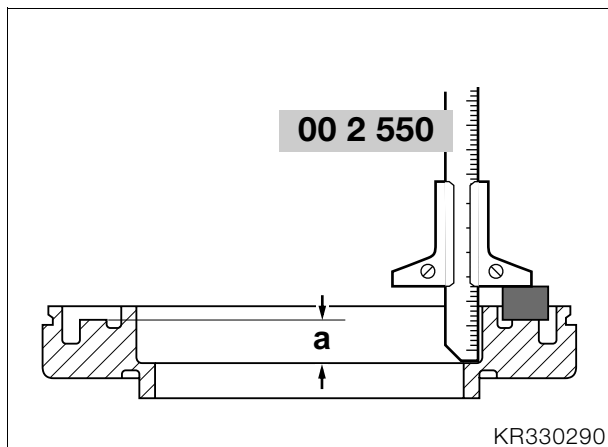
**Backlash:**

(Setting without oil).....	0.07...0.16 mm
.....	(0.0028...0.0063 in)
Provisional tooth backlash .....	0.1...0.5 mm
.....	(0.0039...0.0197 in)

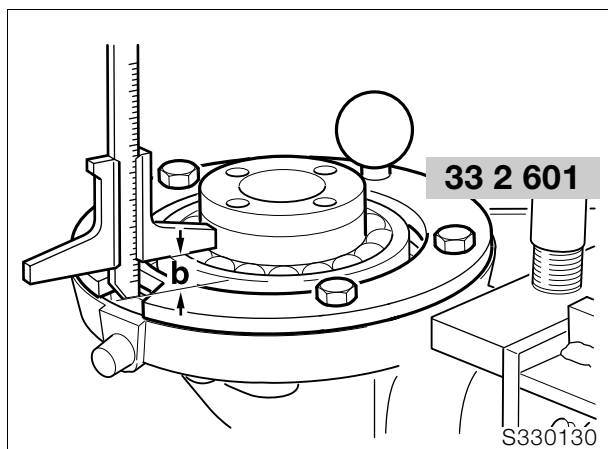


## Shimming housing cover

- In order to obtain the correct taper roller bearing preload, the housing cover must be correctly shimmed.



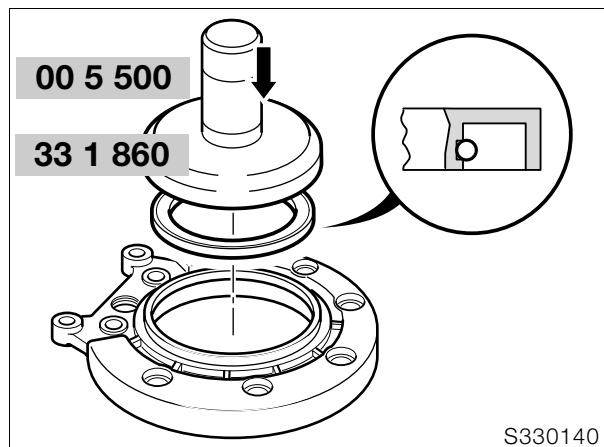
- Using depth gauge, **BMW No. 00 2 550**, measure distance "a".



- Place measuring ring, **BMW No. 33 2 601**, in position and secure.
- Measure from the outer ball bearing race through the cutout in the measuring ring to the housing mating face and determine distance "b".
- Distance "a" – distance "b" = shim thickness (without preload).
- Apply a light coat of grease to the selected shim washer, and install it.

**Preload:**..... 0.05...0.1 mm (0.0020...0.0039 in)

## Installing housing cover



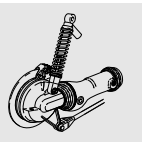
- Lightly oil the lip and outer edge of the sealing ring.
- Using drift, **BMW No. 33 1 860**, and handle, **BMW No. 00 5 500**, drive in the sealing ring.
- Heat housing cover to 80 °C (176 °F) and install.
- Tighten securing screws in diagonally opposite sequence.

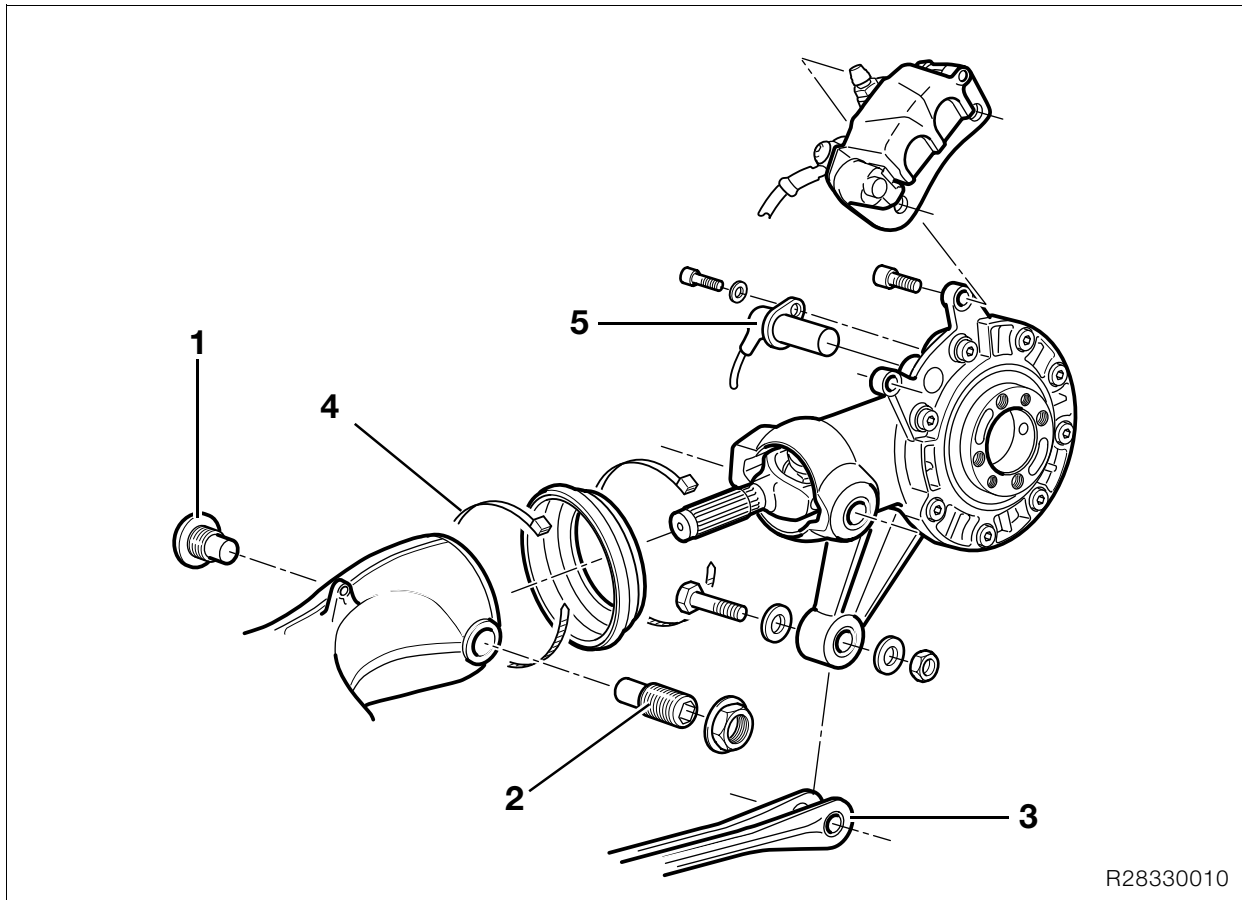
 **Tightening torque:**

Housing cover..... 35 Nm

## Installing sliding element

- Coat splines on input pinion with **Staburags NBU 30 PTM**.
- Fit sliding element to drive pinion.
- Locate retaining ring with gentle blows (plastic hammer).





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### 33 10 Installing rear wheel drive



**Note:**

Do not lay oil-filled rear-wheel drive on its side prior to installation, as this will cause oil to escape when the motorcycle is on the road (suction effect).

- Coat splines of sliding element (arrow) with **Staburags NBU 30 PTM**.
- Install the inner races of the needle roller bearings with a small quantity of **Staburags NBU 30 PTM**.
- Place rear-wheel drive with flexible gaiter in position and introduce sliding element into universal shaft.
- Install fixed-bearing stud bolt (1) with **Loctite**.



**Attention:**

Make sure that the inner race never presses against the ends of the needles.



**Note:**

Use an acetone-based cleaning agent such as Loctite quick cleaner 706  
Loctite Order No. 70636-AC

- Install floating-bearing stud bolt (2) with **Loctite**.



**Attention:**

When tightening threaded fasteners coated with Loctite 2701, always apply final torque without delay. Allow at least 3 hours for the Loctite to cure.

- Tighten fixed bearing stud bolt.
- Tighten floating bearing stud bolt.
- Firmly tighten locknut.
- Load approx. 85 kg (187 lbs) onto motorcycle and tighten loose reaction link (3).
- Tighten clamping strap (4) on gaiter.
- If necessary, fill with oil.
- Install the rear wheel.
- Install brake caliper.



**Attention:**

Do not damage brake pads; keep the brake caliper parallel to the brake disc when installing.

- **[Integral ABS]** Install sensor (5).



**Tightening torque:**

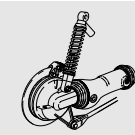
Fixed bearing stud (clean thread + Loctite 2701).....	160 Nm
Floating bearing stud (clean thread + Loctite 2701).....	7 Nm
Locknut.....	160 Nm
Reaction link to rear wheel drive .....	43 Nm

**Quantity:**

Initial fill/oil change .....	approx. 0.25 l
.....	(0.44 Imp. pint/0.27 US quart)

**Oil grade:**

Brand-name hypoid gear oil, SAE 90, API class GL 5



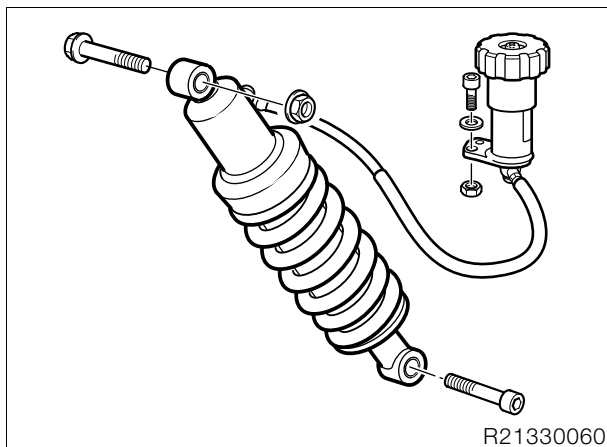
## 33 53 Removing and installing spring strut



### Note:

To remove the spring strut, support the rear axle.

- Remove the seat.
- Remove muffler.
- Remove rear brake caliper.
- Remove rear wheel.

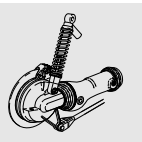


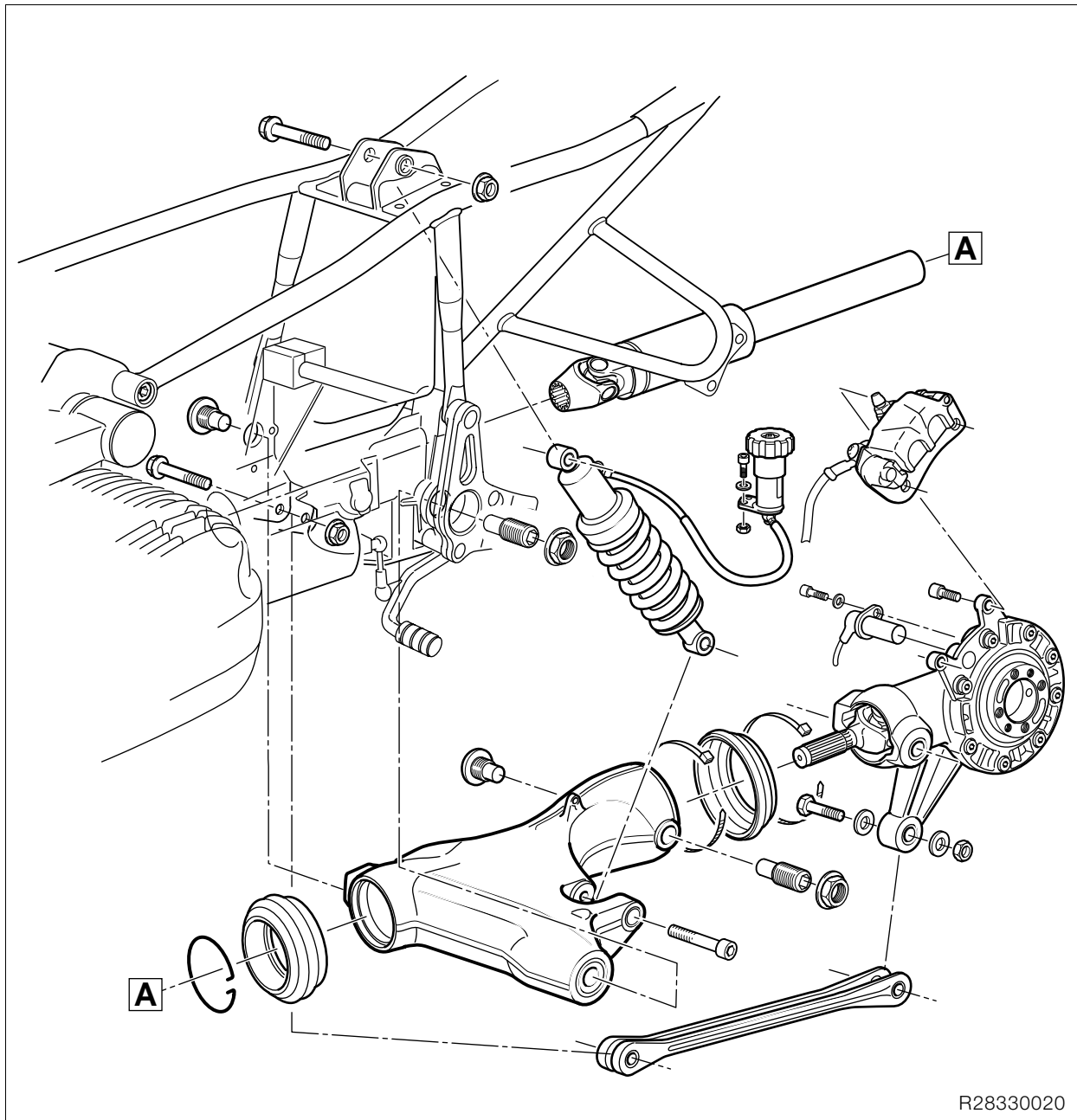
- Remove hydraulic spring adjuster.
- Remove spring strut.
- Installation is the reverse of the removal procedure.



### Tightening torque:

Spring strut to rear frame .....	50 Nm
Spring strut to swinging arm (clean thread + Loctite 243).....	58 Nm
Hydraulic spring preload adjuster to footrest plate .....	22 Nm



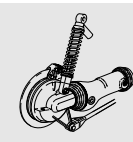


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### 33 17 Removing and installing rear swinging arm

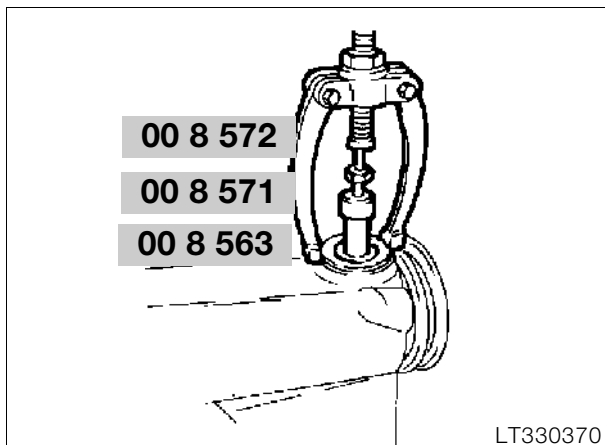
#### Removing rear swinging arm

- Remove rear wheel drive unit.
- Remove rear spring strut.
- Swinging-arm bearing studs are secured with Loctite: heat to max. 120 °C (248 °F) to release.
- Loosen floating bearing stud bolt.
- Loosen fixed bearing stud bolt.
- Remove floating bearing/ fixed bearing stud bolts.
- Remove swinging arm with gaiter.



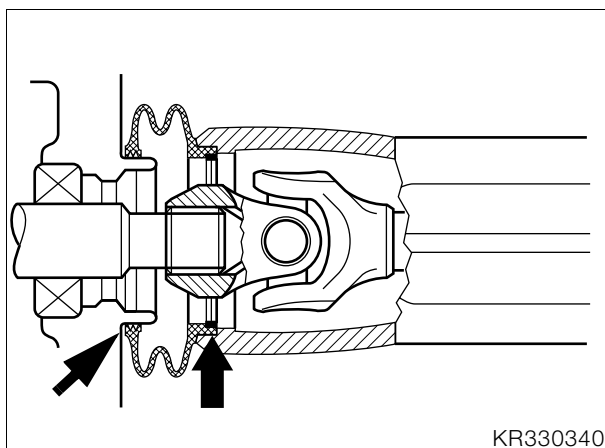


### 33 17 Removing and installing taper roller bearing



- Remove taper roller bearing with counter-support, **BMW No. 00 8 572**, and internal puller 21/2, **BMW No. 00 8 571**, with ring support.
- Pull out outer race with internal puller 21/5, **BMW No. 00 8 563**.
- To install the bearing, heat the swinging arm to 80 °C (176 °F).
- Drive in bearing with drift, **BMW No. 33 5 700**.

### 33 17 Removing and installing flexible gaiter

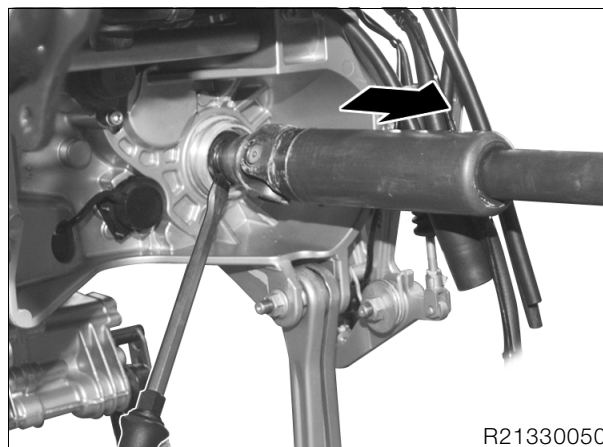


- Pull flexible gaiter with circlip out of swinging arm.
- When installing, coat inner and outer sealing lips (arrows) with **Staburags NBU 30 PTM**.

#### ⚠ Attention:

Drive shaft clearance when suspension is compressed: gap of retaining ring must be in the horizontal plane.

### Removing drive shaft

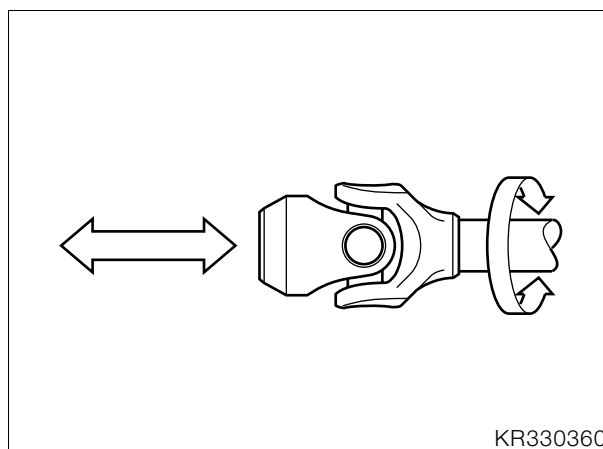


- Press off drive shaft.

#### ⚠ Attention:

Avoid scratching painted parts; use an underlay if necessary.

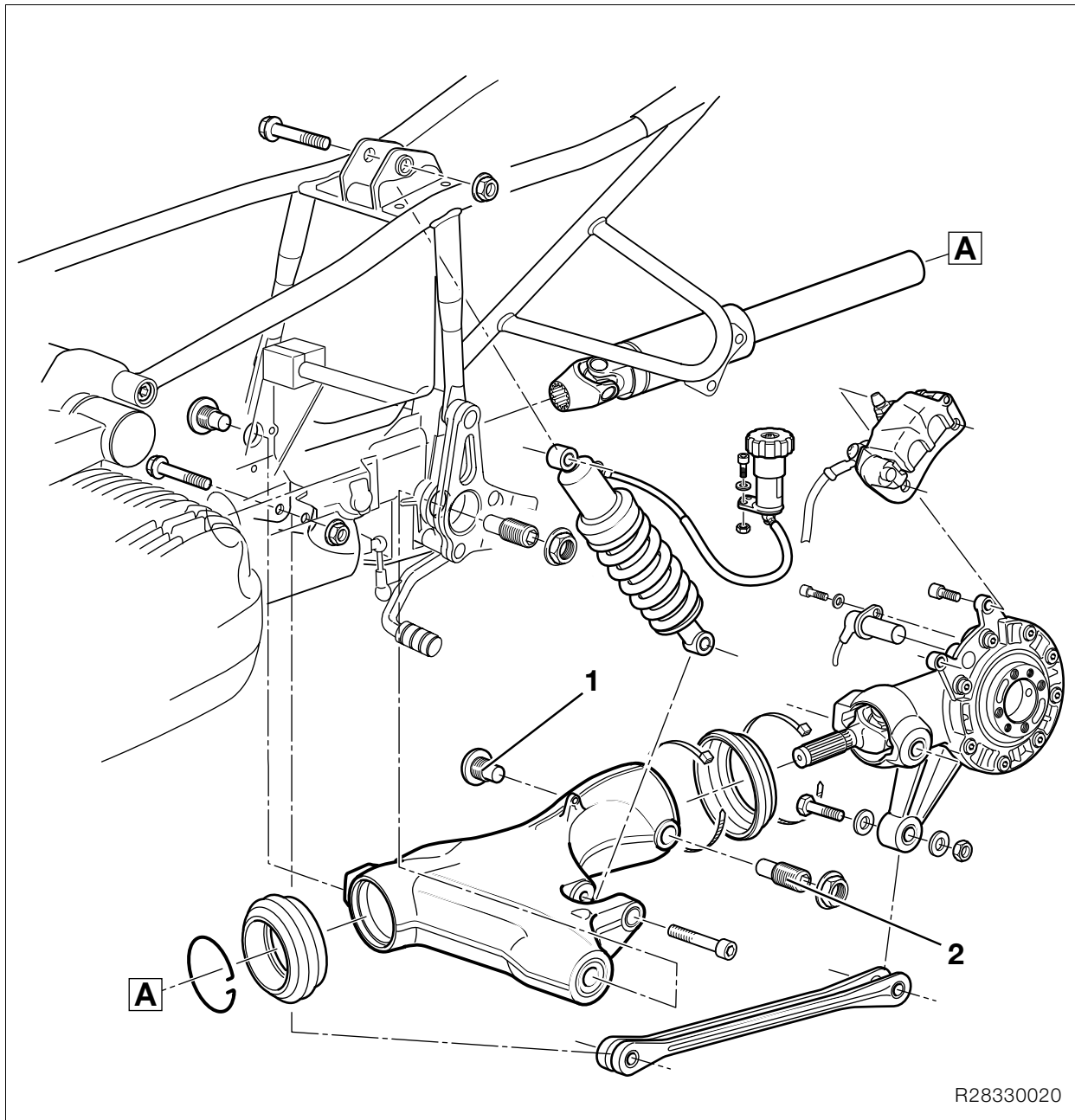
### Checking universal joint for wear



- Measure axial and radial play.

### Installing drive shaft

- Coat the splines on the output shaft with **Staburags NBU 30 PTM**.
- Fit drive shaft to output shaft.
- Seat the snap ring with gentle blows (plastic hammer).



### 33 17 Installing rear swinging arm

- Slide swinging arm over drive shaft as far as possible until rubber gaiter connects on housing neck.
- Install fixed-bearing stud bolt (1) with **Loctite**.

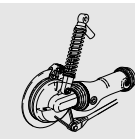
#### **Attention:**

When tightening threaded fasteners coated with Loctite 2701, always apply final torque without delay. Allow at least 3 hours for the Loctite to cure.

- Install floating-bearing stud bolt (2) with **Loctite**.
- Tighten fixed bearing stud bolt.
- Tighten floating bearing stud bolt.
- Firmly tighten locknut.
- Secure spring strut.

#### **Tightening torque:**

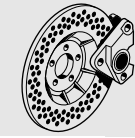
Fixed bearing stud (clean thread + Loctite 2701).....	160 Nm
Floating bearing stud (clean thread + Loctite 2701).....	7 Nm
Locknut.....	160 Nm
Spring strut to swinging arm (clean thread + Loctite 243).....	58 Nm
Spring strut to rear frame .....	50 Nm



# 34 Brakes

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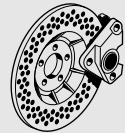
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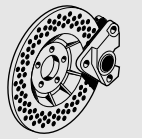
Technical Data		R 1150 R
Brake fluid		DOT 4
<b>Front wheel</b>		
Colour of identification mark on brake calipers/brake pads		green
Brake disc diameter	mm (in)	320 (12.5987)
Brake disc thickness	mm (in)	5.0 (0.1969)
Minimum thickness	mm (in)	4.5 (0.1772)
Brake pad surface area	cm <sup>2</sup> (sq in)	86 (13.33)
Piston diameter in brake caliper	mm (in)	32/36 (1.2599/1.4173)
Piston diameter in handlebar lever cylinder	mm (in)	16 (0.6299)
Sensor gap, front	mm (in)	0.2...1.7 (0.0079...0.0670) (active sensor)
Brake pad lining		Sintered metal
Minimum lining thickness, front	mm (in)	1.0 (0.0393)
<b>Rear wheel</b>		
Brake disc diameter	mm (in)	276 (10.8663)
Brake disc thickness	mm (in)	5.0 (0.1969)
Minimum thickness	mm (in)	4.5 (0.1772)
Brake pad surface area	cm <sup>2</sup> (sq in)	34 (5.27)
Piston diameter in brake caliper	mm (in)	26/28 (1.0236/1.1023) with insulating piston
Piston diameter in foot brake cylinder	mm (in)	12 (0.4724)
	mm (in)	<b>[Integral ABS]</b> 16 (0.6299)
Sensor gap, rear	mm (in)	0.2...1.7 (0.0079...0.0670) (active sensor)
Brake pad lining		Organic
Minimum lining thickness, rear	mm (in)	1,0 (0.0393)
		If the brake disc is visible through the bore in the wheel-side brake pad, the brake lining is worn to its minimum permissible thickness.
<b>[ABS] Braking system</b>		BMW Integral ABS, partially integrated



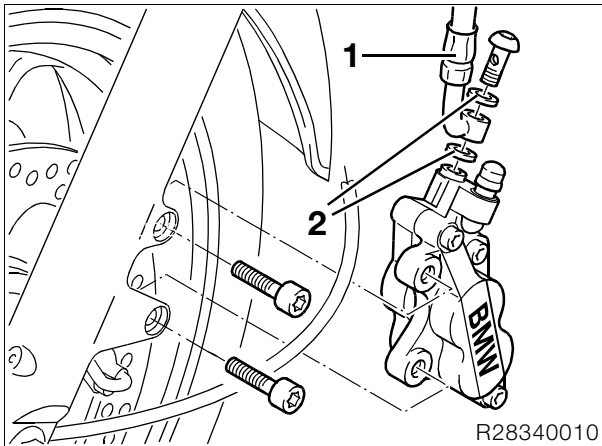
## 34 11 Removing and refitting front brake caliper

### Attention:

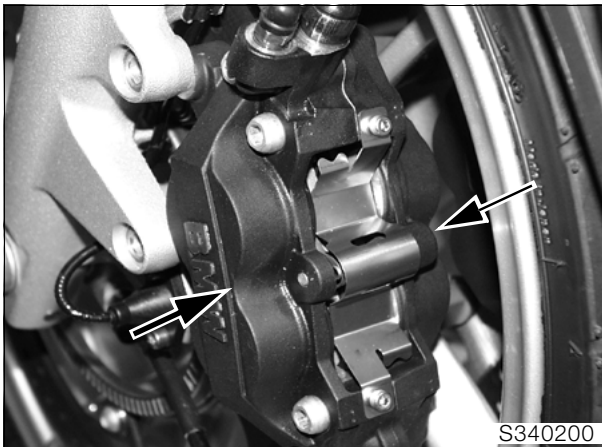
Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.



- Drain the brake system.
- **[Integral ABS]** Draining front wheel circuit (→ 34.15).



- Disconnect brake line (1).
- Remove screws securing the brake caliper.



- Press the brake pads/pistons back against the brake disc (arrow) by pressing the brake caliper.

### Attention:

Do not damage brake pads.

- Carefully remove the brake caliper.
- Installation is the reverse of the removal procedure.

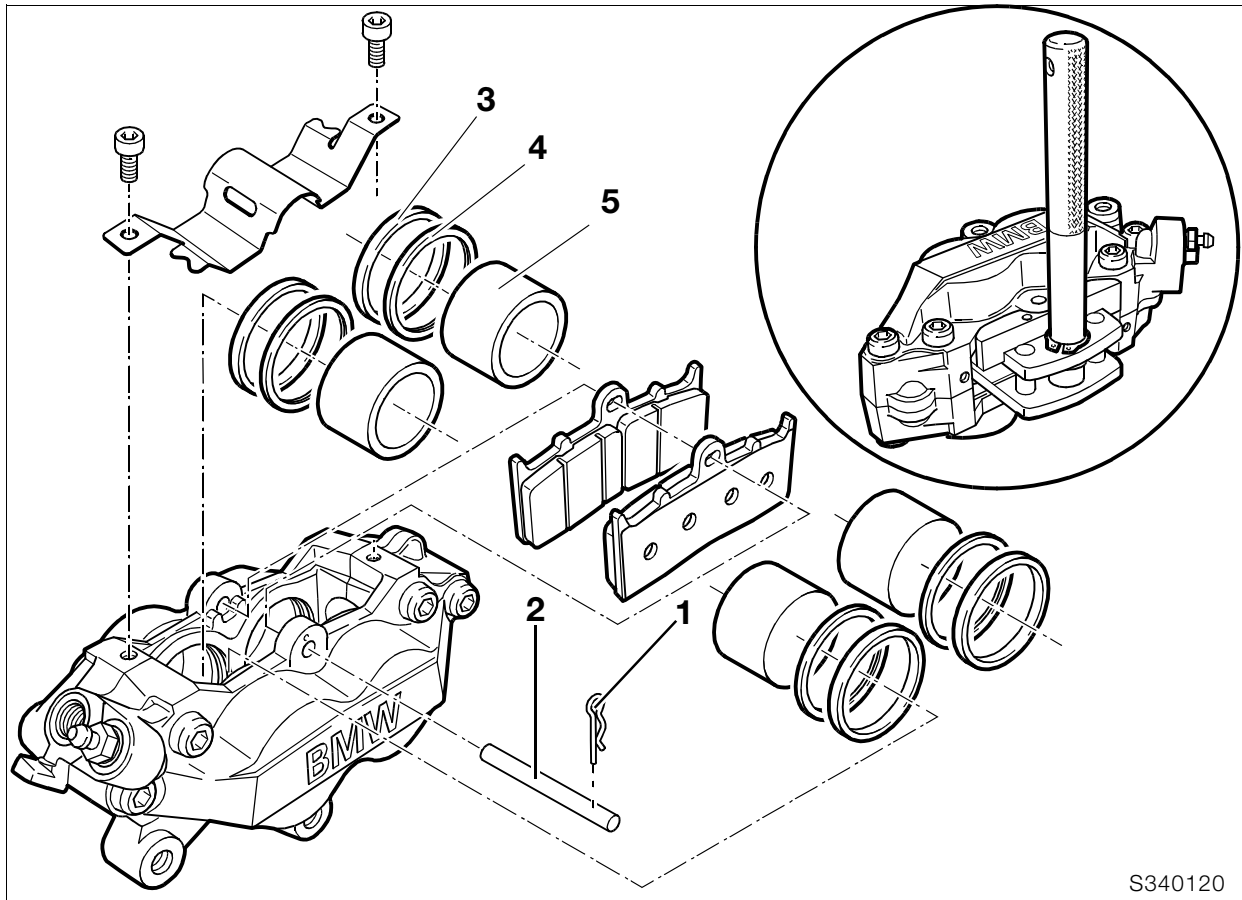
### Attention:

Replace the sealing rings (2) in the brake line.  
Do not damage the brake pads when installing.

- Fill and bleed the brake system.
- **[Integral ABS]** Bleeding/filling the front wheel circuit (→ 34.21).

### Tightening torque:

Brake caliper to fork slider .....	30 Nm
Brake hose to brake caliper .....	18 Nm
Brake caliper bleed screw .....	9 Nm



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### 34 11 521 Disassembling and assembling front brake caliper

**⚠ Attention:**

Do **not separate** the brake caliper halves.

- Remove retaining plate.
- Remove the split-pin keeper (1) from retaining pin.
- Remove retaining pin (2).
- Remove brake pads.
- Close the bleed screw.
- Use the spacer, **BMW No. 34 1 520**, to secure the two opposite brake pistons.
- Place a cloth between the other pair of pistons.

**⚠ Attention:**

Ensure that fingers do not become trapped between the pistons; there is a risk of injury.

- Using the compressed-air gun on the brake line connection, **carefully** force out the brake pistons (5).
- Remove the two sealing rings from the brake piston holes.
- Inspect the brake caliper piston for hairline cracks, score-marks and other damage.
- Coat the new sealing rings (3, 4) with brake fluid and fit them.
- Coat the brake caliper pistons (5) with brake fluid and fit them.

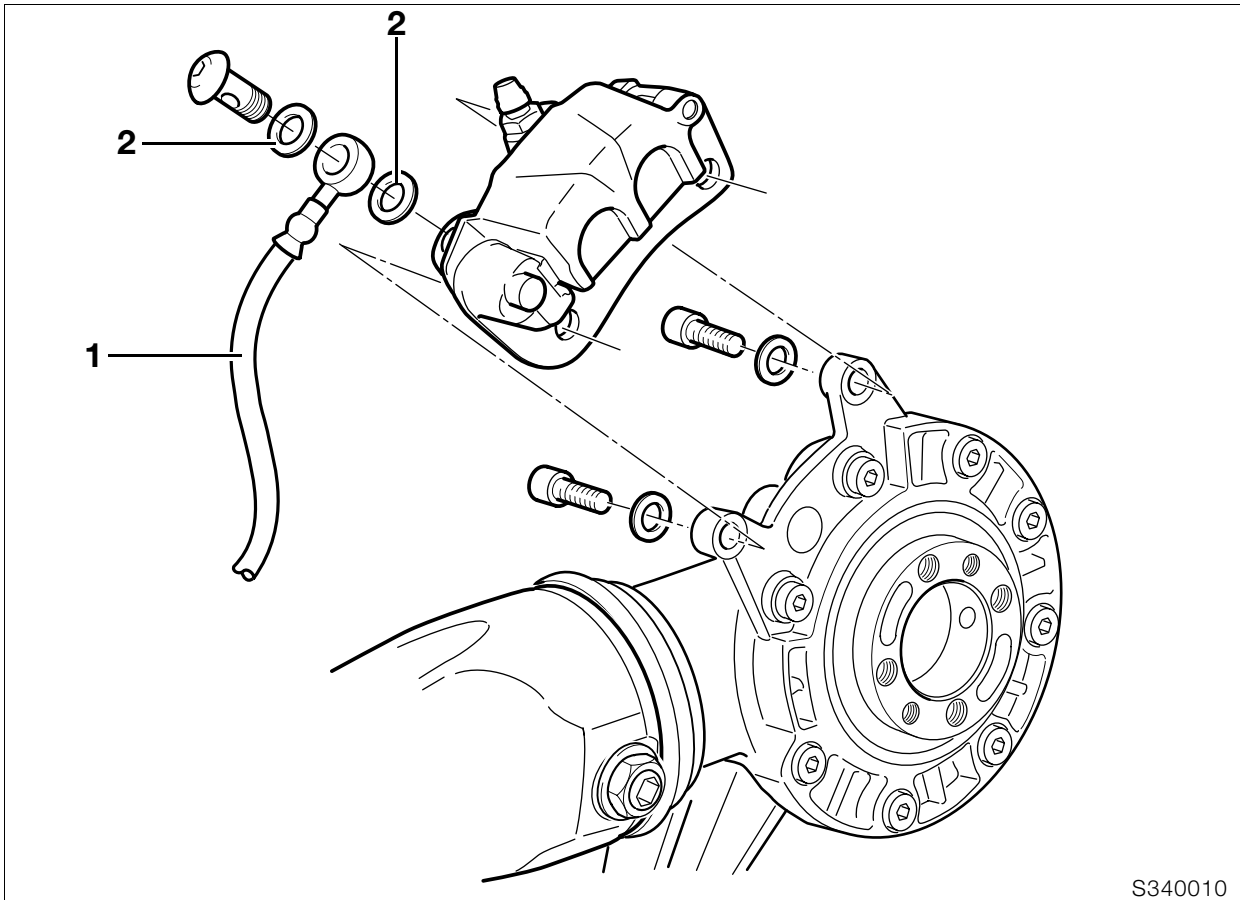
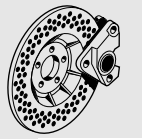
**⚠ Attention:**

Keep the brake pistons parallel with their bores when fitting them.

- Remove and install the other two brake pistons in the same way.
- If necessary, press back the pistons fully using the resetting tool, **BMW No. 34 1 531**.
- Fit the brake pads.

**🔧 Tightening torque:**

Bleed screw to brake caliper..... 9 Nm



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### 34 21 Removing and refitting rear brake caliper

**⚠ Attention:**

Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.

- Drain the brake system.
- **[Integral ABS]** Drain rear wheel circuit (→ 34.16).
- Disconnect brake line (1) from brake caliper.
- Carefully press back the brake pads/pistons.
- Remove the brake caliper.
- Installation is the reverse of the removal procedure.
- Fill and bleed the brake system.
- **[Integral ABS]** Bleed/fill the rear wheel circuit (→ 34.23).
- To bleed, undo the brake caliper and place it so that the bleed nipple is as high as possible.

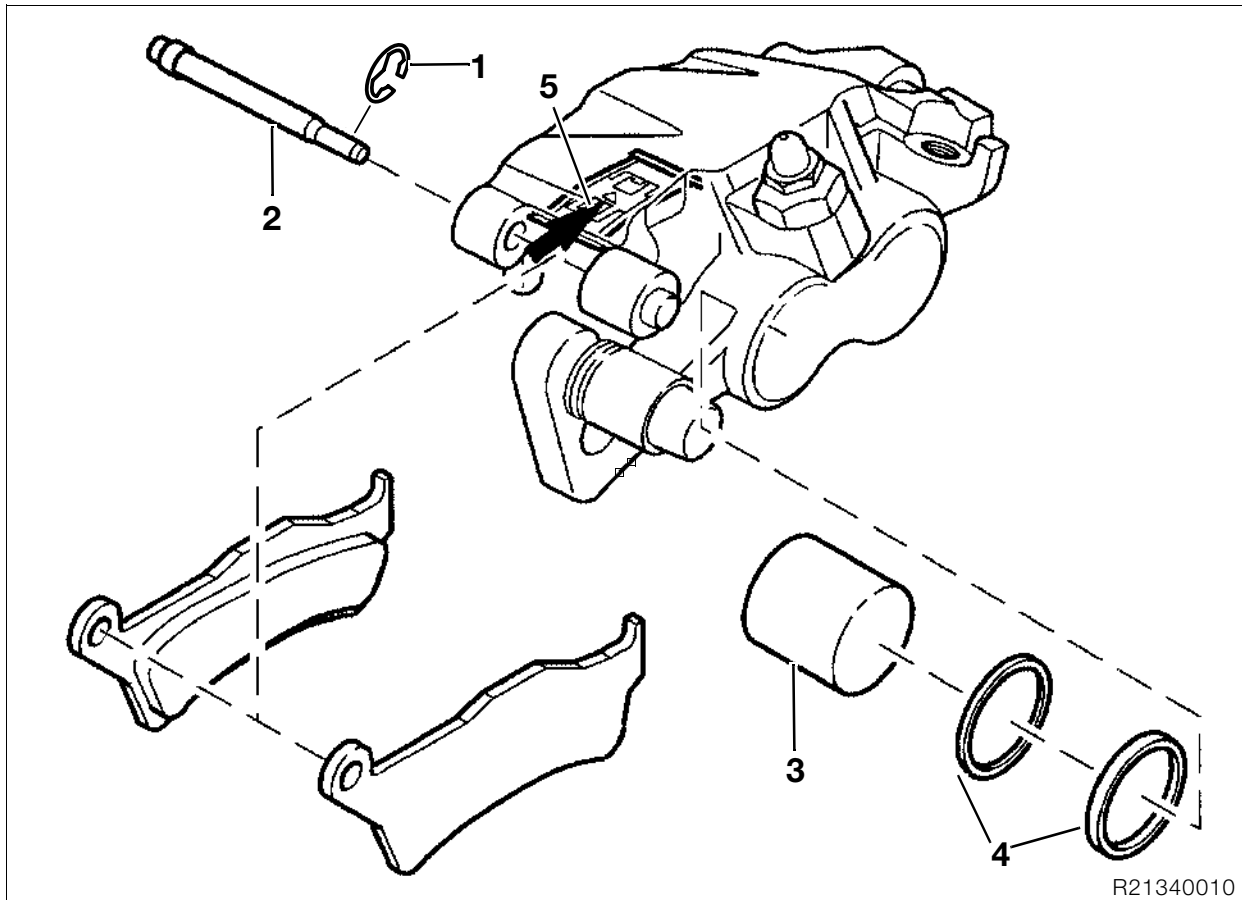
**⚠ Attention:**

Replace the sealing rings (2) in the brake line. Do not damage brake pads.

**⚠ Tightening torque:**

Brake caliper to rear wheel drive .....	40 Nm
Brake hose to brake caliper .....	18 Nm
Bleed screw to brake caliper .....	7 Nm





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### 34 21 Disassembling and assembling rear brake caliper

#### Dismantling rear brake caliper

- Remove retaining washer (1).
- Drive out retaining pin (2) towards the wheel side.
- Remove brake pads.
- Close the bleed screw.
- Hold a cloth over the brake caliper piston.
- Using the compressed-air gun on the connection hole, **carefully** force out the brake pistons (3) using minimum pressure.

#### Attention:

Keep fingers away from gap between piston and side contact face of brake pads; there is a risk of injury.

- Remove sealing rings (4) from left/right cylinder.
- Inspect the brake caliper piston for hairline cracks, score-marks and other damage.

#### Tightening torque:

Bleed screw to brake caliper ..... 7 Nm

#### Assembling rear brake caliper

- Coat the new sealing rings with brake fluid and insert them into the left and right brake caliper bores.
- Coat both brake caliper pistons with brake fluid and fit them.

#### Attention:

Keep the brake pistons parallel with their bores when fitting them.

- Coat the adapter plate locating pins with **Shell Retinax A** and install the adapter plate.
- Insert locating plate (5) into brake caliper.

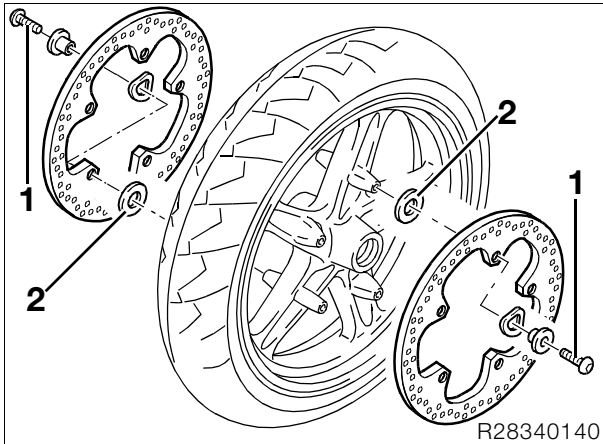
#### Note:

Ensure that the installed position is correct (arrow pointing in forward-travel direction).

- Insert the brake pads and secure them with retainers.

### 34 11 Removing and refitting front brake discs

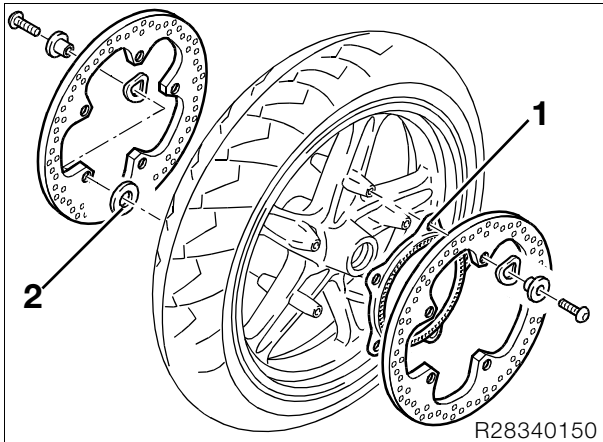
- Remove the brake caliper.
- Remove front wheel.



**Note:**

The retaining bolts (1) are secured and may have to be heated before being undone.

- Remove brake discs.
- Installation is the reverse of the removal procedure, pay particular attention to the thrust washers (2) below the brake discs.



- **[Integral ABS]** Fit the left-hand ABS sensor ring (1) and the right-hand thrust washers (2) below the brake disc.
- Degrease the brake discs before fitting them.

**Attention:**

Pay attention to the thrust washers between the brake discs and the front wheel.

**[Integral ABS]** Pay attention to the thrust washers between the right brake disc and the front wheel, and to the ABS sensor ring between the left brake disc and the front wheel.

**Attention:**

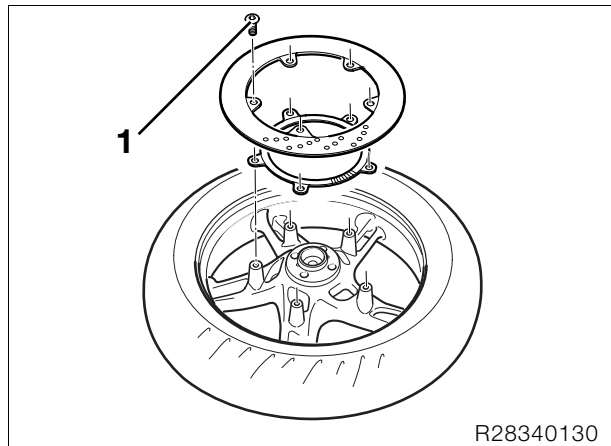
Note direction of installation for the brake disc (lettering to the outside).

**Tightening torque:**

Brake disc to front wheel  
(Clean thread + Loctite 2701) ..... 21 Nm

### 34 21 Removing and refitting rear brake disc

- Remove the brake caliper.
- Remove rear wheel.



**Note:**

The retaining bolts (1) are secured and may have to be heated before being undone.

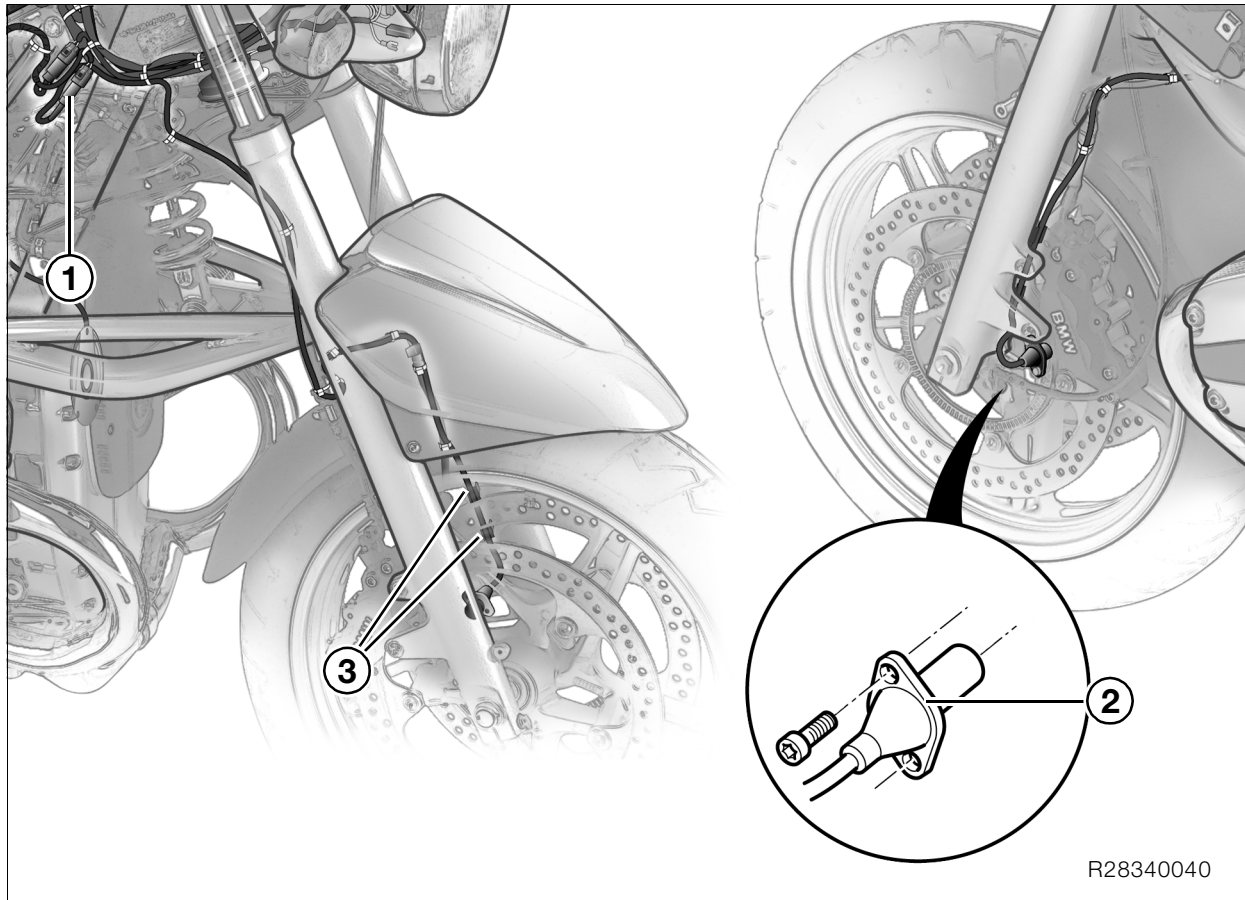
- Remove brake disc.
- Installation is the reverse of the removal procedure.
- Degrease the brake disc before installing it.

**Attention:**

**[Integral ABS]** Pay attention to the shim when installing the rear wheel.

**Tightening torque:**

Brake disc to rear wheel drive  
(Clean thread + Loctite 2701) ..... 21 Nm



R28340040

### 34 52 044 [Integral ABS] Removing and refitting front ABS sensor

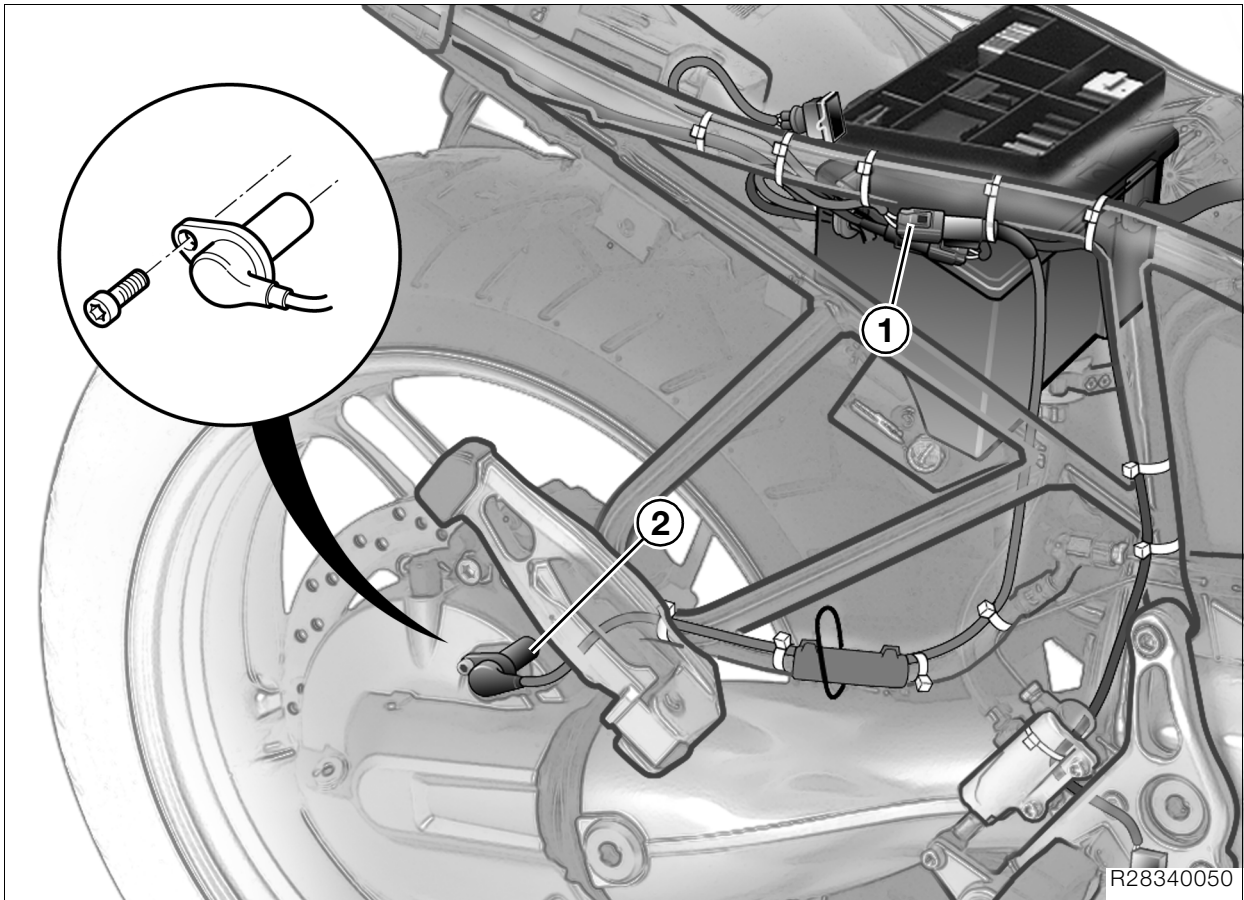
- Remove fuel tank (→ 16.5).
- Separate plug connector (1) in sensor line.
- Remove the left brake caliper.
- Remove the sensor (2).
- Installation is the reverse of the removal procedure.

**⚠ Attention:**

Route the sensor cable correctly.  
Check that the clips (3) are correctly seated.

**🔧 Tightening torque:**

Tighten the sensor ..... hand-tight, 4 Nm  
Brake caliper to fork slider..... 30 Nm



### 34 52 111 [Integral ABS] Removing and refitting rear ABS sensor

- Remove front/rear seat.
- Separate plug connector (1) in sensor line.
- Before removing/refitting, clean the sensor and bore.
- Remove the sensor (2).
- Installation is the reverse of the removal procedure.
- Coat the O-rings with oil before fitting them.



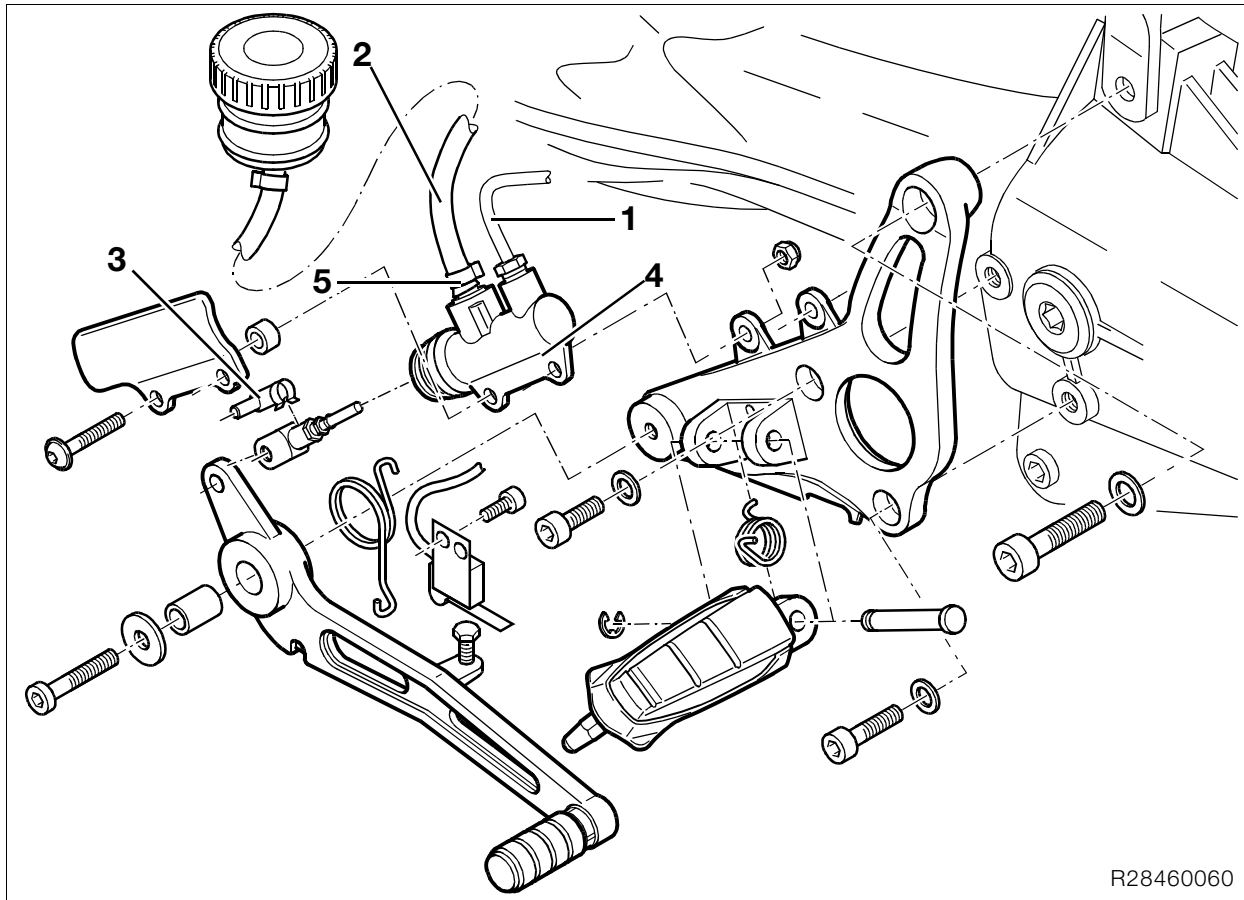
**Attention:**

Route the sensor cable correctly.



**Tightening torque:**

Tighten the sensor ..... hand-tight, 4 Nm



R28460060

### 35 21 Removing and refitting foot-brake lever

- Release the pin in the brake linkage.
- Remove fasteners securing footbrake lever.
- Remove footbrake lever with torsion spring.
- Installation is the reverse of the removal procedure.
- Lubricate pivot bushing with **Shell Retinax A**.

#### Attention:

Piston rod play must be checked and adjusted. See removal and refitting of brake master cylinder. The brake light should light up when the rear brake is activated.

#### Tightening torque:

Brake pedal to footrest plate  
(Clean thread + Loctite 2701) ..... 21 Nm

### 34 31 Removing and refitting brake master cylinder

#### Attention:

Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.

- Drain the brake system.
- **[Integral ABS]** Drain rear control circuit (→ 34.17).
- Disconnect brake line (1) and hose (2).
- Release and remove pin (3).
- Remove brake master cylinder (4).
- Installation is the reverse of the removal procedure.
- Tighten one-time hose clip (5) with pliers, **BMW No. 13 1 500**.
- Fill and bleed the brake system.
- **[Integral ABS]** Bleed/fill the rear control circuit (→ 34.20).

#### Attention:

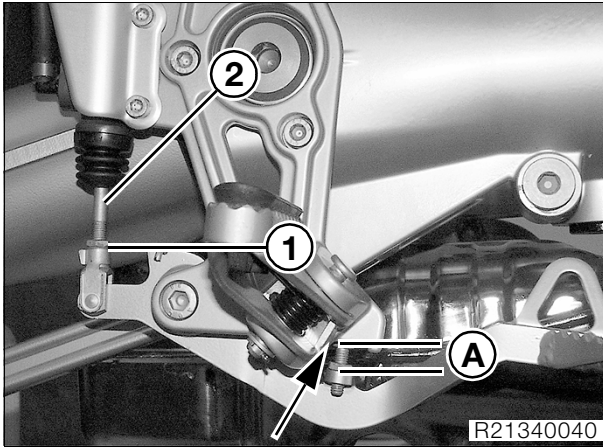
Bleed the brake system carefully. Check/adjust piston rod play.

#### Tightening torque:

Master cylinder to footrest assembly ..... 9 Nm

## Checking and adjusting piston rod play

## Removing and refitting brake piston in handlebar fitting (→ 32.7)



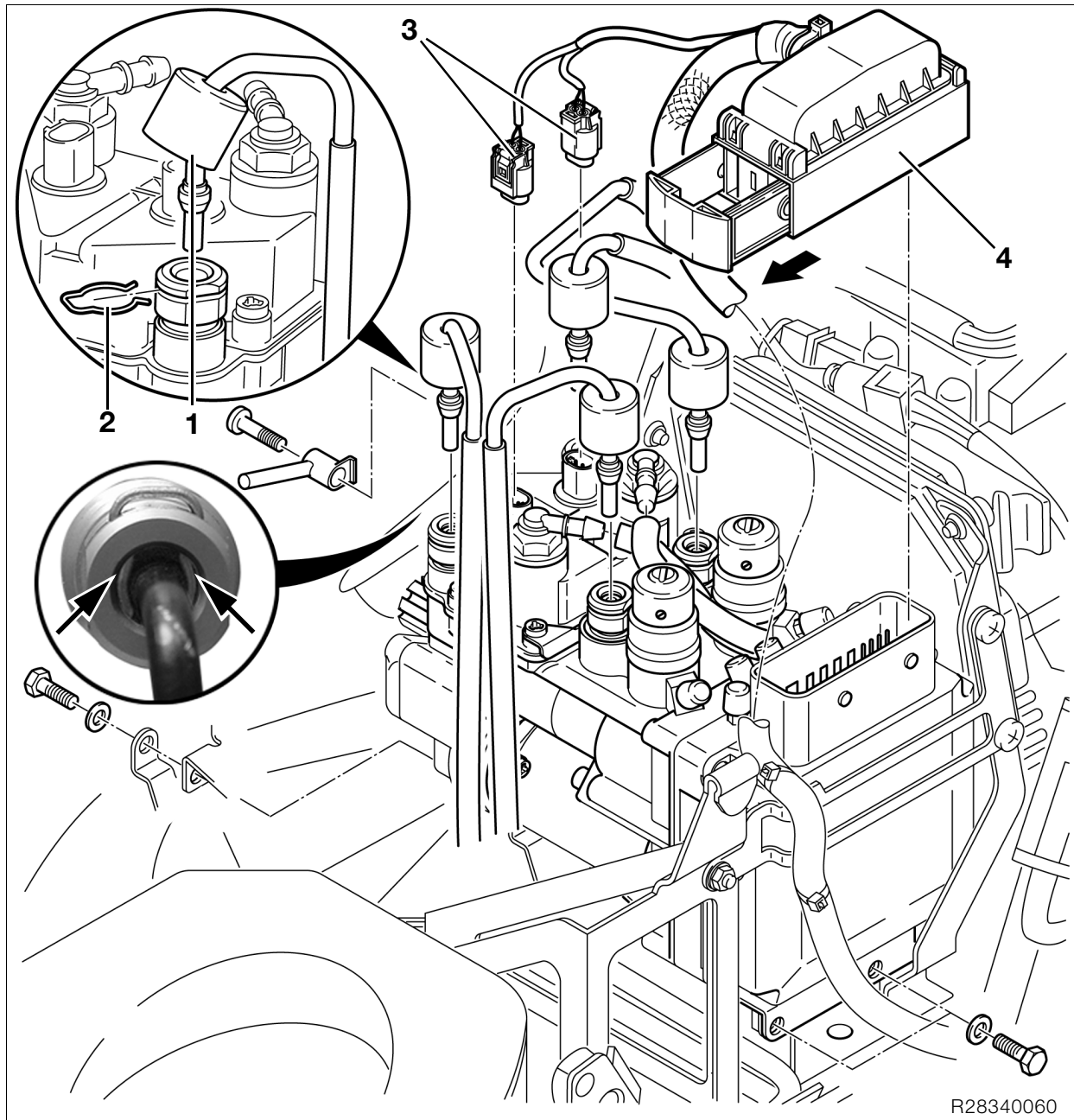
- Set the adjusting screw of the footbrake lever to distance A.

**Distance A:**... 14 +/- 0.5 mm (0.5512 +/- 0.1969 in)  
(Top edge of footbrake lever to top edge of adjusting screw.)

- Insert feeler gauge at right angles to direction of travel between the brake-light switch lever and the stop on the footrest plate (arrow).

**Feeler gauge thickness:**..... 0.2 mm (0.0078 in)

- Slacken locknut (1).
- Turn the piston rod (2) to the right in the direction of the brake pedal until there is play.
- Carefully back off piston rod to take up play and tighten locknut.
- Remove feeler gauge.
- Check play.
- Apply coloured sealing lacquer to the locknut.



R28340060

### 34 00 [Integral ABS] Removing/installing the ABS pressure modulator



#### Warning:

All repair and maintenance work on the BMW Integral ABS should be carried out by specially trained personnel. Maintenance and repair procedures and processes should be strictly observed. Use only new brake fluid from an unopened container.

### Removing the ABS pressure modulator



#### Attention:

Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.

- Drain the brake system (→ 34.15).
- Disconnect earth cable from battery and insulate it.
- Push the protective caps (1) upwards.
- Remove spring clips (2).

**Attention:**

Do not bend brake lines.

- Disconnect the brake lines from the ABS pressure modulator.

**Attention:**

Ensure that there is no brake fluid in the connector.

- Remove the connector (3) for the front and rear wheel circuit reservoirs.
- Release (arrow) the connector (4) and remove it.
- Disconnect plug from Hall sensor.
- Remove Motronic control unit.
- Release the ABS pressure modulator and carefully remove it to the left.

## Installing the ABS pressure modulator

- Install in reverse order, noting the following activities.

**Note:**

When replacing the brake lines, always replace the seals (Quad rings) between the brake lines and the pressure modulator.

**Warning:**

Replace the spring clips each time the plug connection is opened. Ensure correct positioning.

- Install new spring clips.
- Fit the protective caps to the brake line.
- Clip in the brake lines.
- Check that the spring clips (arrows) are seated correctly.
- Pull the protective caps over the plug connection.
- Fill and bleed the brake system (→ 34.18).
- Once all the work on the brake system has been completed, read the fault code memory and perform a bleed test using **BMW** MoDiTeC (→ 34.24).

**Note:**

Disconnecting the battery deletes all entries (e.g. faults, settings) stored in the Motronic control unit's memory.

Loss of settings can temporarily impair the operating characteristics when the engine is restarted.

- Switch on the ignition.
- Without starting the engine, fully open the throttle once or twice so that the Motronic control unit can record the throttle-valve positions.

**Tightening torque:**

ABS pressure modulator on battery holder... 10 Nm



## 34 00 [Integral ABS] Draining brake system



### Warning:

All repair and maintenance work on the BMW Integral ABS should be carried out by specially trained personnel. Maintenance and repair procedures and processes should be strictly observed. Use only new brake fluid from an unopened container.



### Note:

This description applies to brake filling and bleeding devices with vacuum extraction of the brake fluid at the brake caliper. If other devices are used, comply with their manufacturers' instructions.

- Remove front/rear seat.
- Remove fuel tank (→ 16.5).

## Bleeding wheel circuits



### Attention:

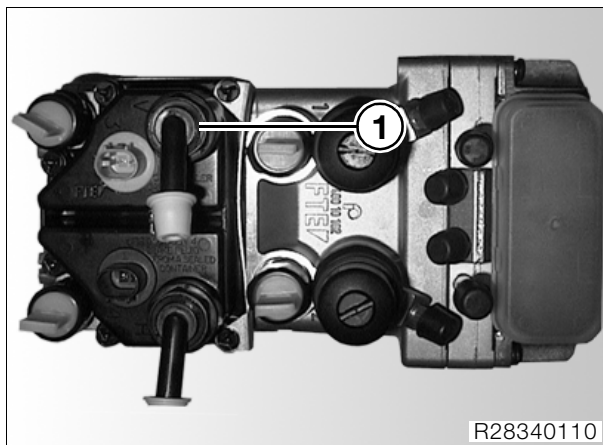
Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.

## Bleeding front wheel circuit



### Attention:

Integral brakes, the rear brake must be ready for use.



- Open front wheel circuit reservoir (1).



### Attention:

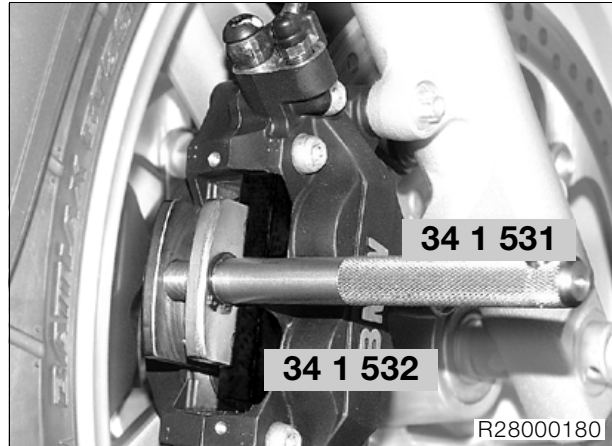
To prevent brake fluid from entering the connector, do not release the ABS pressure modulator plug connections.

- Draw off the old brake fluid from the wheel circuit reservoir.
- Remove front brake pads.



### Attention:

Only use the piston reset device, **BMW No. 34 1 531**, if the wheel circuit reservoir cover is open.



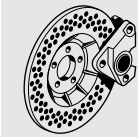
- Use the reset device, **BMW No. 34 1 531**, and the positioning piece, **BMW No. 34 1 532**, to press the brake caliper pistons completely back and to position them.
- Wrap cloths around the left and right brake calipers.
- Connect the brake bleeding device to the bleed screw of the left brake caliper, but do not switch it on.
- Switch on the ignition.



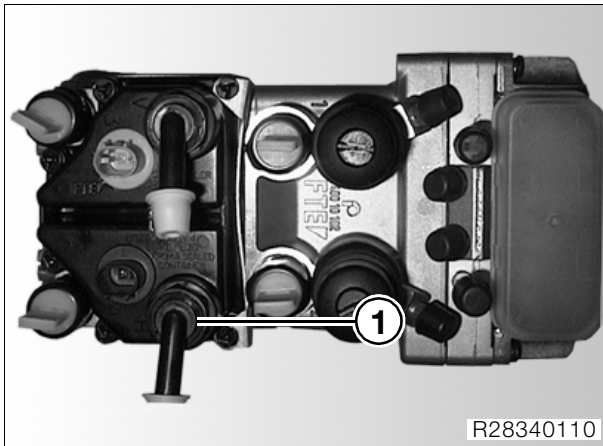
### Note:

Always wait for the BMW Integral ABS to complete its self-diagnosis after the ignition is switched on. Do not operate the brake lever until self-diagnosis has completed.

- Gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw.
- Drain wheel circuit using a pump.
- Close the bleed screw.
- Release the brake.
- Disconnect the brake bleeding device from the bleed screw.
- The procedure for draining the right brake caliper is the same as that for the left caliper.
- Close the bleed screw.
- Release the brake and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.



## Bleeding rear wheel circuit



- Open rear wheel circuit reservoir (1).

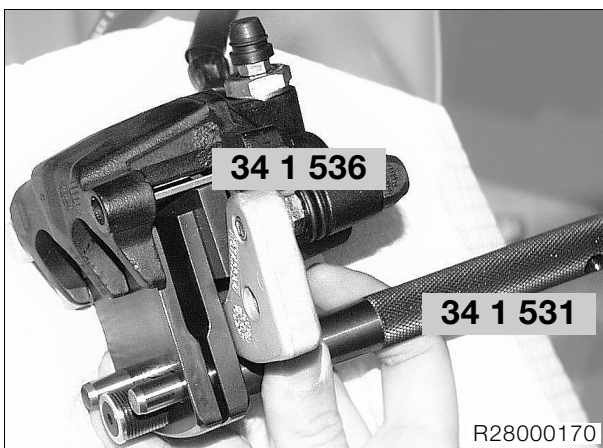
### Attention:

To prevent brake fluid from entering the connector, do not release the ABS pressure modulator plug connections.

- Draw off the old brake fluid from the wheel circuit reservoir.
- Remove rear brake pads.

### Attention:

Only use the piston reset device, **BMW No. 34 1 531**, if the wheel circuit reservoir cover is open.



- Use the adapter, **BMW No. 34 1 536**, instead of the external brake pad.
- With the handle outwards, use the reset device, **BMW No. 34 1 531**, on the rear brake caliper to press back the pistons completely and to position them.
- Wrap a cloth around the brake caliper.
- Connect the brake bleeding device to the bleed screw, but do not switch it on.
- Switch on the ignition.

### Note:

After switching on the ignition, always wait for the BMW Integral ABS to complete its self-diagnosis. Do not operate the brake lever until self-diagnosis has completed.

- Gently press the footbrake until the pump just starts up.
- Open the bleed screw.
- Drain wheel circuit using a pump.
- Close the bleed screw.
- Release the brake and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.

## Bleeding control circuits

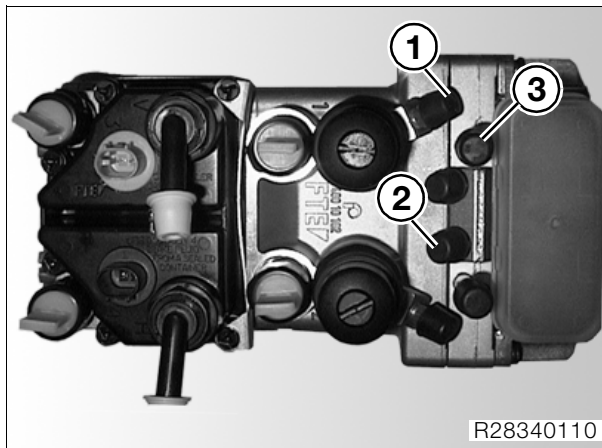


### Attention:

Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.

### Bleeding front control circuit

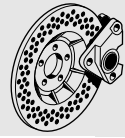
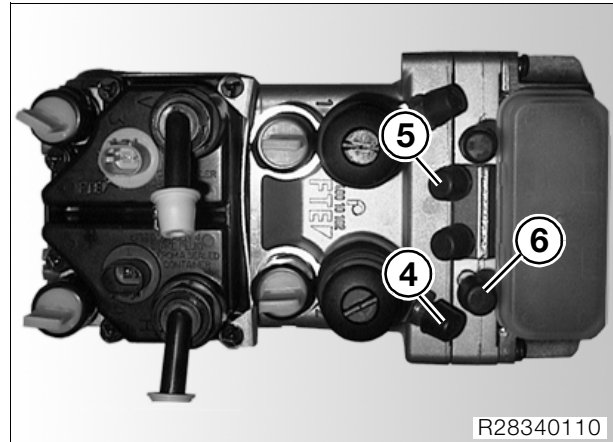
- Turn the handlebars to the left.
- Release clamps securing handlebar.
- Place the handlebars such that the brake fluid expansion tank is level.
- Tighten the handlebar and secure the front wheel in this position.
- Remove front reservoir cover with rubber diaphragm.
- Draw off old brake fluid and clean the reservoir.



- Draw off the brake fluid in accordance with the sequence, using the ring spanner, **BMW No. 34 2 532**.
  - Front dosing cylinder (1),
  - front integral circuit (2) and
  - front control circuit (3).

### Bleeding rear control circuit

- Remove right-hand rear panel.
- Remove rear reservoir cap with rubber diaphragm, draw off the old brake fluid and clean the reservoir.



- Draw off the brake fluid in accordance with the sequence, using the ring spanner, **BMW No. 34 2 532**.
  - Rear dosing cylinder (4),
  - rear integral circuit (5) and
  - rear control circuit (6).

## 34 00 [Integral ABS] Filling the brake system



### Warning:

All repair and maintenance work on the BMW Integral ABS should be carried out by specially trained personnel. Maintenance and repair procedures and processes should be strictly observed. Use only new brake fluid from an unopened container.



### Note:

This description applies to brake filling and bleeding devices with vacuum extraction of the brake fluid at the brake caliper. If other devices are used, comply with their manufacturers' instructions.

## Filling control circuits

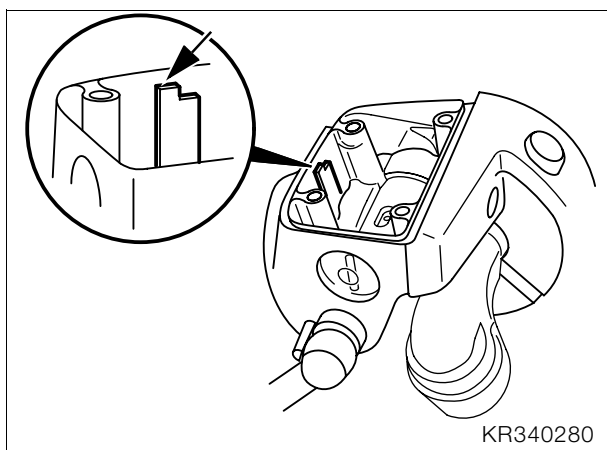


### Attention:

Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.

### Filling the front control circuit

- Level the handlebar fitting as necessary.



### Attention:

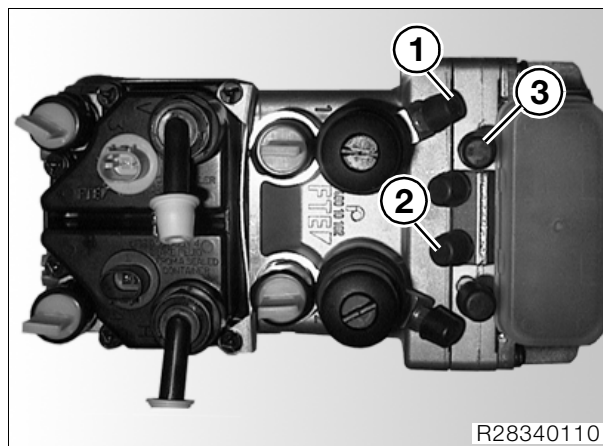
When adding brake fluid, do not allow it to enter the holes for the reservoir lid screws.

- Top up the brake fluid level to the "MAX" mark (arrow).



### Attention:

During the filling and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid, otherwise air will be drawn into the brake system.



- Draw off the brake fluid and simultaneously add the new brake fluid in accordance with the sequence, using the ring spanner, **BMW No. 34 2 532**.
- Front dosing cylinder (1),
- front integral circuit (2),
- front control circuit (3) and
- again, front dosing cylinder (1).
- Close expansion tank with rubber diaphragm and reservoir cap.
- Place the motorcycle carefully on its side stand and turn the handlebars fully to the left.
- Repeatedly pull front brake lever lightly to expel air from brake master cylinder.
- Place motorcycle on its centre stand.



### Attention:

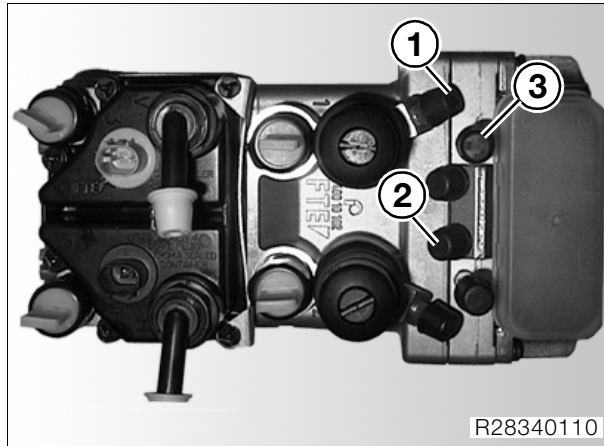
On account of the vacuum extraction process, it is not possible to tell whether there is brake fluid in the hose of the brake bleeding device when it is free of bubbles.

It is therefore necessary to bleed the hose by hand **in the specified sequence and in accordance with the rules for bleeding.**

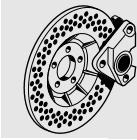
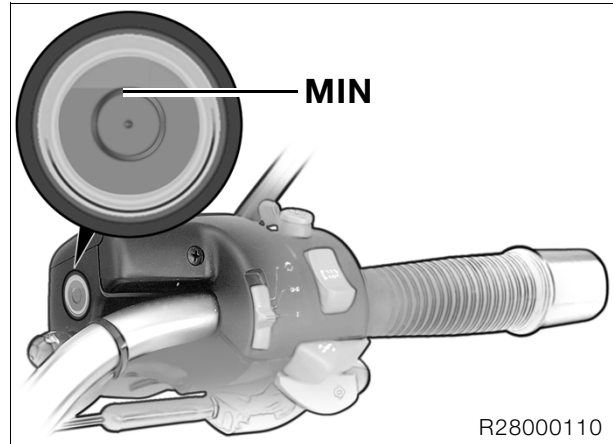
- Switch off the bleed device.
- Shift the handbrake lever to position 4.

 **Warning:**

Avoid rapid and forceful pumping of the brakes when performing maintenance and repair work on the BMW Integral ABS.



- Recheck the brake-fluid level.
- Place the motorcycle on its centre stand.
- Turn the handlebars to the **left**.



**Required level**

not below ..... MIN  
(Top edge of the marking ring)

**Brake fluid** .....DOT 4

- Remove the reservoir cap with rubber diaphragm.
- In sequence, bleed the:
  - Front dosing cylinder (1),
  - front integral circuit (2),
  - front control circuit (3) and
  - again, front dosing cylinder (1)
 using the ring spanner, **BMW No. 34 2 532**, and in accordance with the rules for bleeding.

**Rules for bleeding:**

1. Pull the brake lever slowly until the brake light switch clicks (snifter hole closed).
2. Open the bleed screw.
3. Pull the brake lever fully and close the bleed screw.
4. Release the brake lever slowly.
5. Repeat steps 1 to 4 until the brake fluid is clear and has no bubbles.

- Fit the protective caps on the bleed screws.
- Top up the brake fluid level to the “MAX” mark (arrow).
- Wipe the rim of the reservoir, the rubber gaiter and the cover to remove brake fluid, and carefully reassemble the components.
- Resecure the handlebars in the correct position (punch marks aligned) in accordance with the tightening sequence.

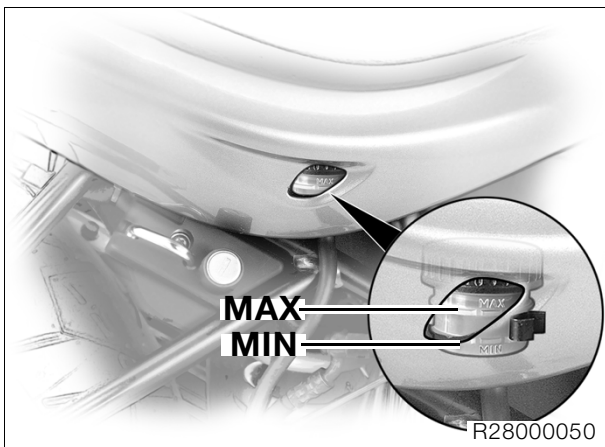
 **Tightening torque:**

Handlebars tightening sequence:

1. Front connection to system  
in direction of travel ..... 21 Nm
2. Rear connection in direction of travel ..... 21 Nm

## Filling the rear control circuit

- Remove rear reservoir cap with rubber diaphragm.



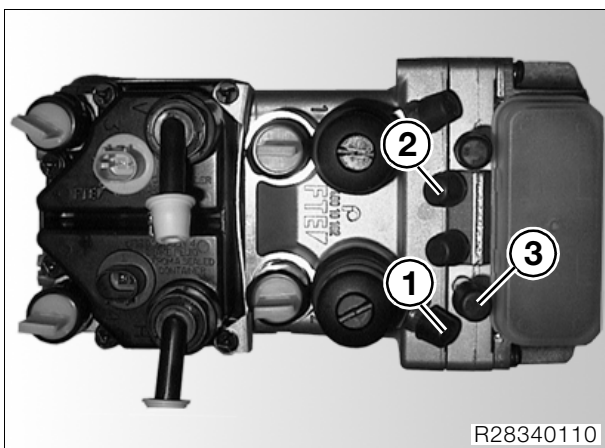
- Top up the brake fluid level to the "MAX" mark.

### ⚠ Attention:

While filling and bleeding the system, do not allow the brake fluid level to drop below the "MIN" mark, air will otherwise be drawn into the brake system.

### 🚫 Warning:

Avoid rapid and forceful pumping of the brakes when performing maintenance and repair work on the BMW Integral ABS.



- Draw off the brake fluid and simultaneously add the new brake fluid in accordance with the sequence, using the ring spanner, **BMW No. 34 2 532**.
  - Rear dosing cylinder (1),
  - rear integral circuit(2)
  - rear control circuit (3) and
  - again, front dosing cylinder (1)

### ⚠ Attention:

On account of the vacuum extraction process, it is not possible to tell whether there is brake fluid in the hose of the brake bleeding device when it is free of bubbles.

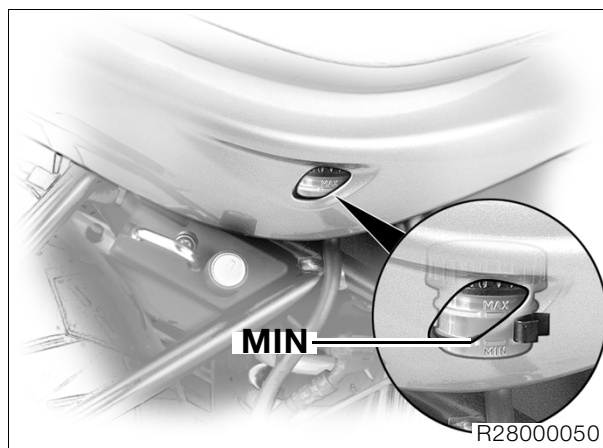
It is therefore necessary to bleed the hose by hand **in the predefined sequence and in accordance with the rules for bleeding**.

- Switch off the bleed device.
- In sequence, bleed the:
  - rear dosing cylinder (1),
  - rear integral circuit (2)
  - front control circuit (3) and,
  - again, rear dosing cylinder (1) using the ring spanner, **BMW No. 34 2 532**, and in accordance with the rules for bleeding.

### Rules for bleeding:

1. Press the brake lever slowly until the brake light switch clicks (snifter hole closed).
2. Open the bleed screw.
3. Press the brake lever fully and close the bleed screw.
4. Release the brake lever slowly.
5. Repeat steps 1 to 4 until the brake fluid is clear and has no bubbles.

- Fit the protective caps on the bleed screws.
- Top up the brake fluid until it reaches at least to the "MIN" mark.
- Wipe the rim of the reservoir, the rubber gaiter and the cover to remove brake fluid, and carefully reassemble the components.
- Recheck the brake-fluid level.
- Place the motorcycle on its centre stand.



### Required level

not below ..... MIN

**Brake fluid** .....DOT 4

## Filling wheel circuits



### Attention:

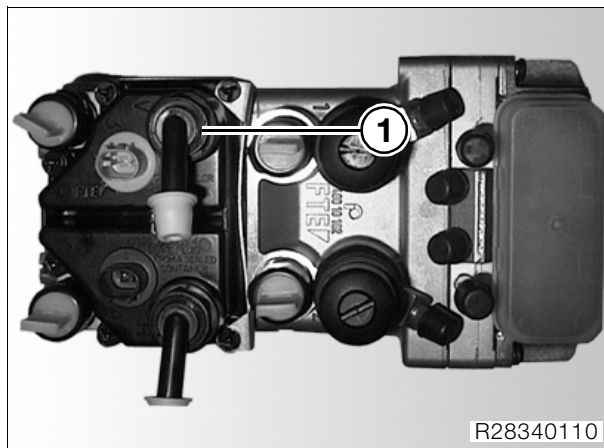
Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.

## Filling the front wheel circuit

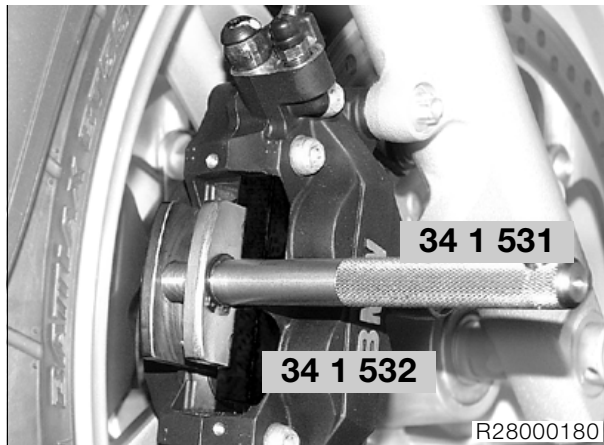


### Attention:

Integral brakes, the rear brake must be ready for use.



- Open front wheel circuit reservoir (1).
- Remove front brake pads.



- Use the reset device, **BMW No. 34 1 531**, and the positioning piece, **BMW No. 34 1 532**, to press the brake caliper pistons completely back and to position them.



### Attention:

To prevent brake fluid from entering the connector, do not release the ABS pressure modulator plug connections.

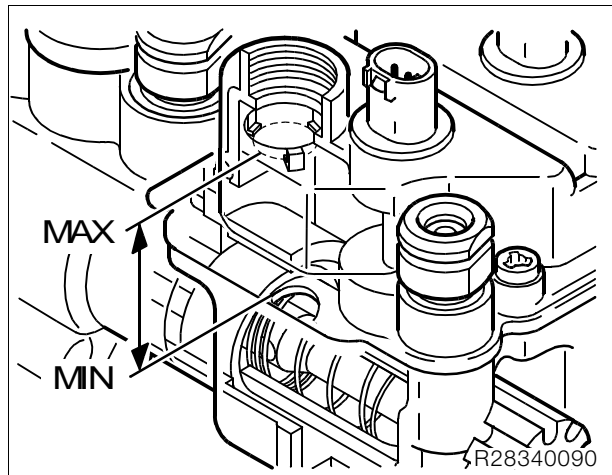
- Refill the front wheel circuit reservoir (1) with new brake fluid.

- Wrap cloths around the left and right brake calipers.
- Connect the brake bleeding device to the bleed screw of the left brake caliper, but **do not switch it on**.
- Switch on the ignition.



### Note:

Always wait for the BMW Integral ABS to complete its self-diagnosis after the ignition is switched on. Do not operate the brake lever until self-diagnosis is complete.



### Attention:

The piston in the base of the wheel circuit reservoir must always be covered by the fluid, as otherwise air can be drawn into the brake system.

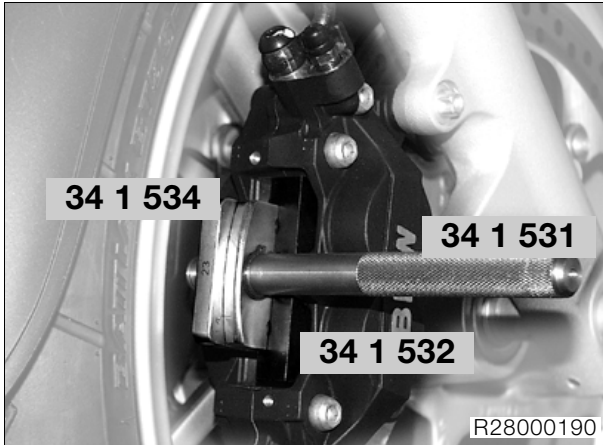
- Gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the wheel circuit reservoir (1) with new brake fluid.
- Pump out the brake fluid under virtually no pressure to begin with, then vary the brake pressure.
- Pump off brake fluid until it emerges clear and free from air bubbles.
- Close the bleed screw.
- Release the brake.
- Disconnect the brake bleeding device from the bleed screw.
- The procedure for topping up the brake fluid in the right brake caliper is the same as that for the left caliper.
- Release the brake and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.



### Attention:

After changing and/or bleeding the brakes, always top up the fluid in the wheel circuit reservoir to the correct level in accordance with the instructions.

## Front wheel circuit reservoir filling instructions



- Top up fluid in front wheel circuit reservoir to "MAX"
- Use adapter 23, **BMW No. 34 1 534**, in the reset device, **BMW No. 34 1 531/532**, on both front brake calipers, and screw on the reset device until the adapter is secure.

### **Attention:**

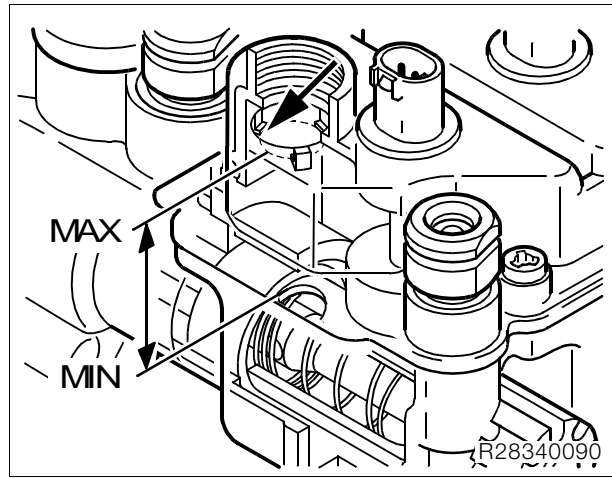
The piston in the base of the wheel circuit reservoir must always be covered by the fluid, as otherwise air can be drawn into the brake system. Bleed the system again if this happens.

- Switch on the ignition.

### **Note:**

Always wait for the BMW Integral ABS to complete its self-diagnosis after the ignition is switched on. Do not operate the brake lever until self-diagnosis is complete.

- Squeeze the handbrake lever until the front brake caliper pistons are butt against the reset device, **BMW No. 34 1 531**.
- Switch off the ignition.



- Top up the fluid in the wheel circuit reservoir until one of the three protrusions in the filler neck just touches the surface of the fluid (arrow).
- Remove the reset device, **BMW No. 34 1 531/532**, with adapter, **BMW No. 34 1 534**.

### **Warning:**

The wheel circuit reservoir may not overflow while the brake pads/brake calipers are being fitted.

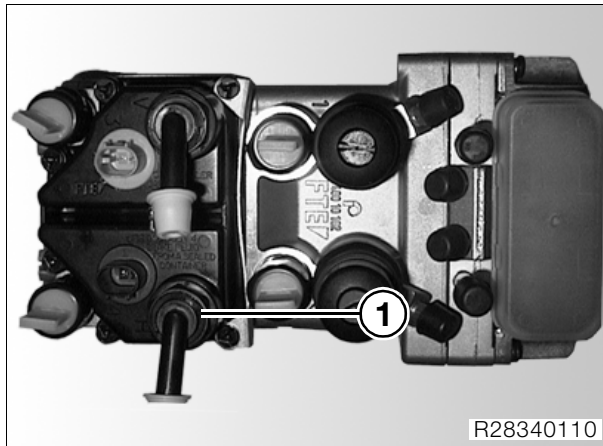
- If necessary, carefully press back the pistons so that the pad just fits in.
- Install front brake pads.
- Hand-tighten the front wheel circuit reservoir cap.
- Perform a function check on the brake system with the ignition switched on.

### **Tightening torque:**

Front brake caliper bleed screw ..... 9 Nm

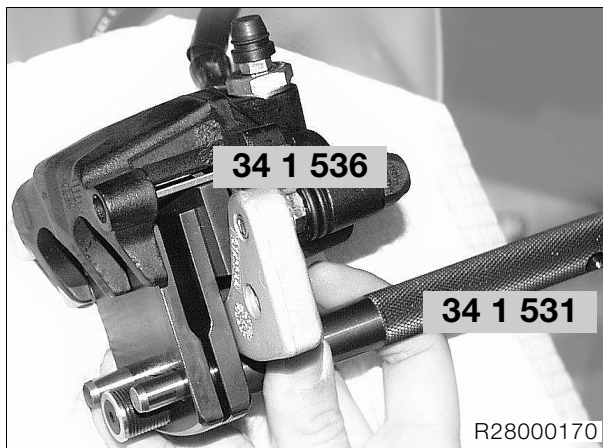


## Filling rear wheel circuit



R28340110

- Open rear wheel circuit reservoir (1).
- Remove rear brake pads.



R28000170

- Use the adapter, **BMW No. 34 1 536**, instead of the external brake pad.
- With the handle outwards, use the reset device, **BMW No. 34 1 531**, on the rear brake caliper to press back the pistons completely and to position them.

### Attention:

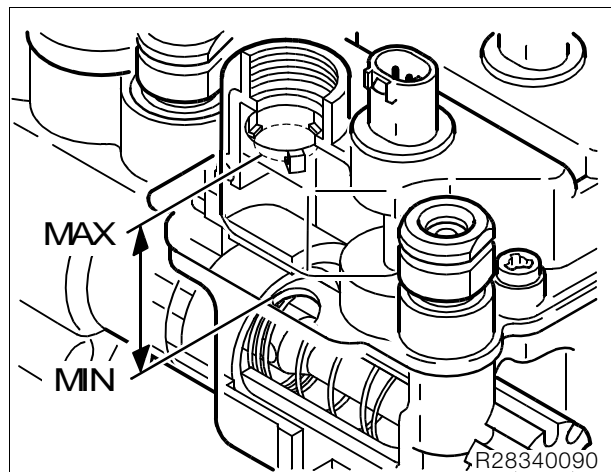
To prevent brake fluid from entering the connector, do not release the ABS pressure modulator plug connections.

- Refill the rear wheel circuit reservoir (1) with new brake fluid.
- Wrap a cloth around the brake caliper.
- Connect the brake bleeding device to the bleed screw, but **do not switch it on**.
- Switch on the ignition.



### Note:

After switching on the ignition, always wait for the BMW Integral ABS to complete its self-diagnosis. Do not operate the brake lever until self-diagnosis has completed.



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### Attention:

The piston in the base of the wheel circuit reservoir must always be covered by the fluid, as otherwise air can be drawn into the brake system.

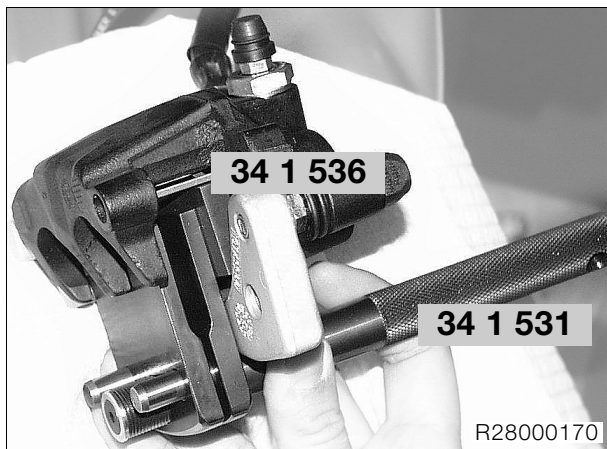
- Gently press the footbrake until the pump just starts up.
- Open the bleed screw, while topping up the wheel circuit reservoir (1) with new brake fluid.
- Pump out the brake fluid under virtually no pressure to begin with, then vary the brake pressure.
- Pump off brake fluid until it emerges clear and free from air bubbles.
- Close the bleed screw.
- Release the brake and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.



### Attention:

After changing and/or bleeding the brakes, always top up the fluid in the wheel circuit reservoir to the correct level in accordance with the instructions.

## Rear wheel circuit filling instructions



- Top up fluid in rear wheel circuit reservoir to "MAX".
- **Screw the reset device, BMW No. 34 1 531, to the adapter, BMW No. 34 1 536.**

### Attention:

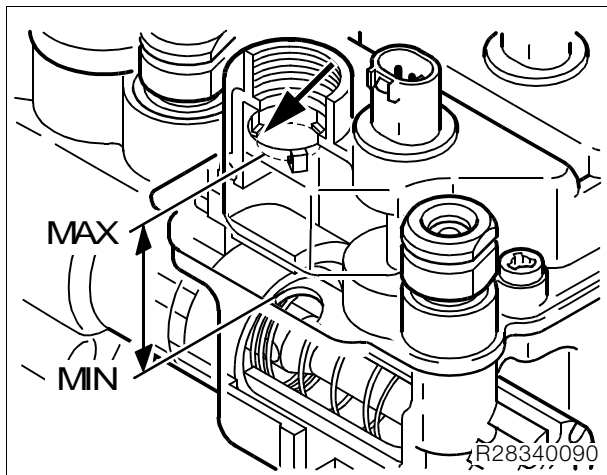
The piston in the base of the wheel circuit reservoir must always be covered by the fluid, as otherwise air can be drawn into the brake system. Bleed the system again if this happens.

- Switch on the ignition.

### Note:

Always wait for the BMW Integral ABS to complete its self-diagnosis after the ignition is switched on. Do not operate the brake lever until self-diagnosis is complete.

- Press the foot brake lever until the rear brake caliper pistons rest on the reset device, **BMW No. 34 1 531**, and the adapter, **BMW No. 34 1 536**.
- Switch off the ignition.



- Top up the fluid in the wheel circuit reservoir until one of the three protrusions in the filler neck just touches the surface of the fluid (arrow).
- Remove the reset device, **BMW No. 34 1 531**, with adapter, **BMW No. 34 1 536**.

### Warning:

The wheel circuit reservoir may not overflow while the brake pads/brake calipers are being fitted.

- If necessary, carefully press back the pistons until the brake disc just fits between the brake pads.
- Fit the brake pads and brake caliper at the rear.
- Hand-tighten the rear wheel circuit reservoir cap.
- Perform a function check on the brake system with the ignition switched on.
- Once all the work on the brake system has been completed, read the fault code memory and perform a bleed test using **BMW MoDiTeC**.
- Remove fuel tank (→ 16.5).
- Remove rear panel.
- Install front/rear seat.

**Brake fluid** .....DOT 4

### Tightening torque:

Rear brake caliper bleed screw ..... 7 Nm  
Brake caliper to rear wheel drive ..... 40 Nm

## 34 00 [Integral ABS] Reading fault code memory with BMW MoDiTeC

- Remove front/rear seat.
- Connect the **BMW MoDiTeC** to the diagnostic connector.
- Read out the fault memory.
- Clear fault code memory if necessary, or perform all requisite repair work.

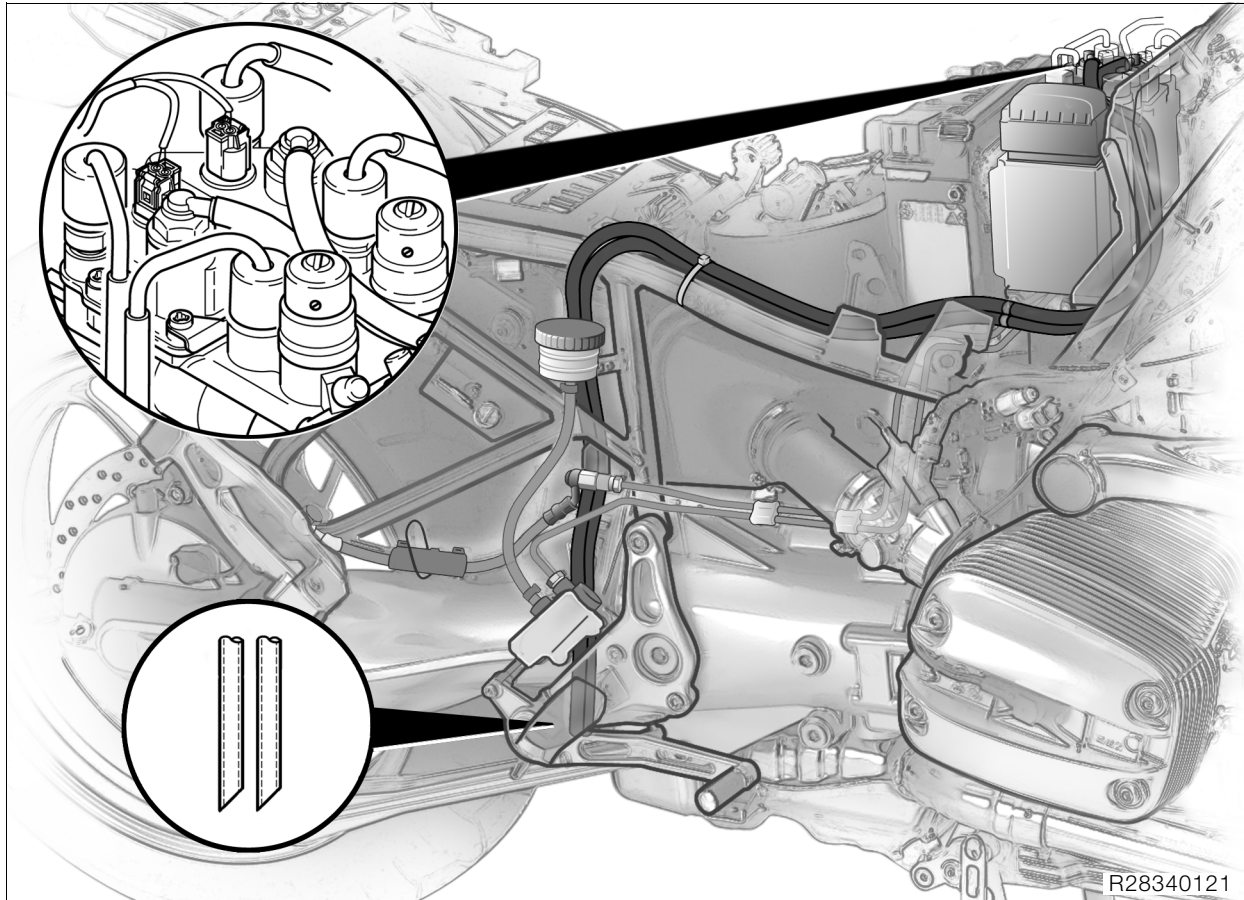
## 34 00 [Integral ABS] Performing a bleed test with BMW MoDiTeC

- Remove front/rear seat.
- Connect the **BMW MoDiTeC** to the diagnostic connector.

### Warning:

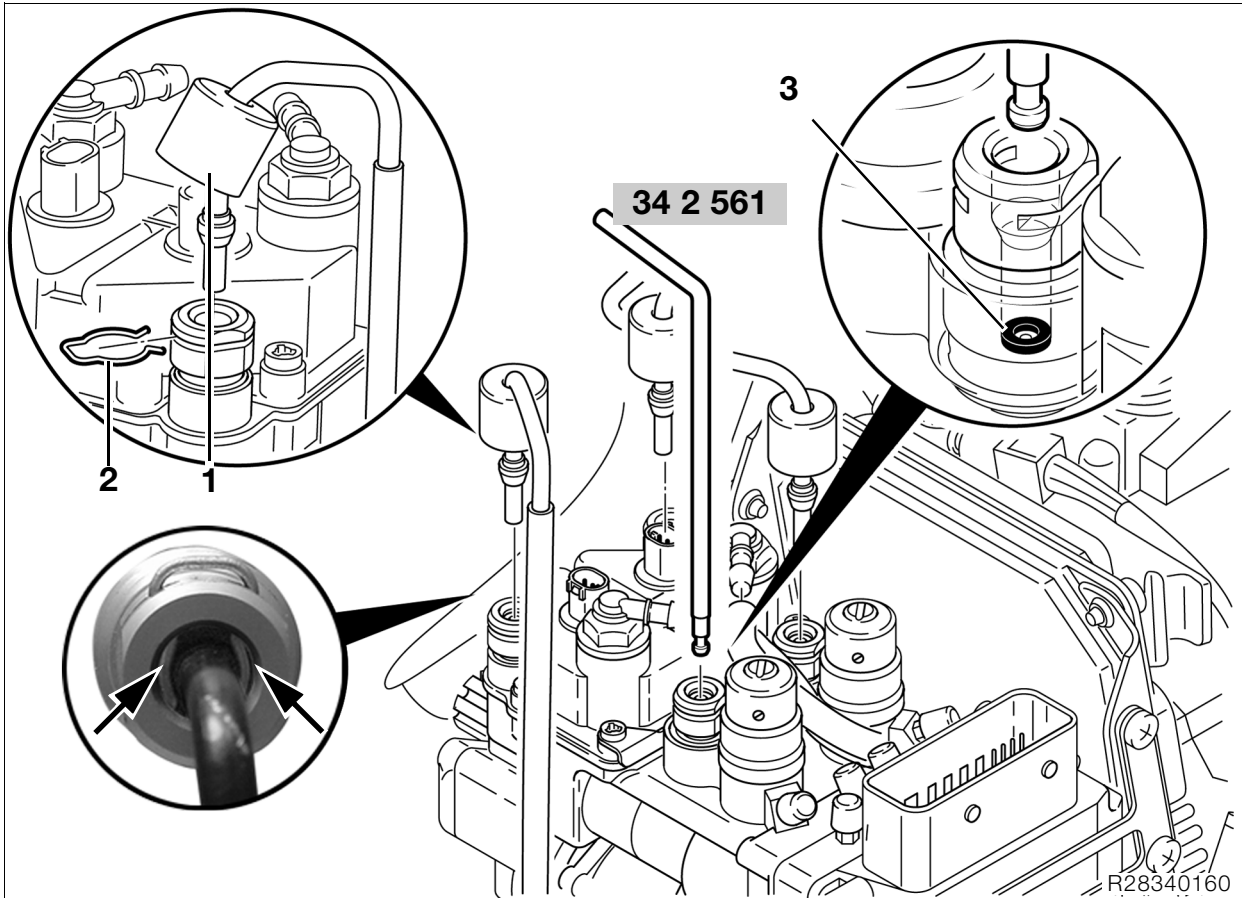
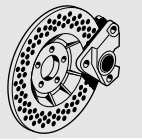
Avoid rapid and forceful pumping of the brakes when performing maintenance and repair work on the BMW Integral ABS.

- Perform bleed test.
- Perform all requisite repair work.



### 34 51 [Integral ABS] Removing/installing wheel circuit reservoir bleed lines

- Remove the cover of the wheel circuit reservoir with bleed lines.
- Install in reverse order, ensuring that:
- the bleed lines are not kinked,
- bleed lines which have been shortened and bleed line ends are cut on the diagonal.



## 34 52 Removing/installing brake lines

### ⚠ Attention:

Do not allow brake fluid to come into contact with painted motorcycle parts as brake fluid destroys paint.

- Drain the brake system.
- Remove brake lines.
- Installation is the reverse of the removal procedure.

### ⚠ Attention:

Remove sealing rings for brake line. Secure the brake line to the brake master cylinder such that it is not chafed or bent when the handlebars are turned.

- Fill and bleed the brake system.

## [Integral ABS] Removing/installing brake lines

- Drain the brake system (⇒ 34.15).
- Push the protective caps (1) upwards.
- Remove spring clips (2).
- Remove brake lines.
- Installation is the reverse of the removal procedure, pay particular attention to the following:

### ⚠ Warning:

Replace the spring clips each time the plug connection is opened. Ensure correct positioning.

### ⚠ Attention:

Remove sealing rings for brake line. Secure the brake line to the brake master cylinder such that it is not chafed or bent when the handlebars are turned.

### 📄 Note:

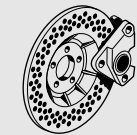
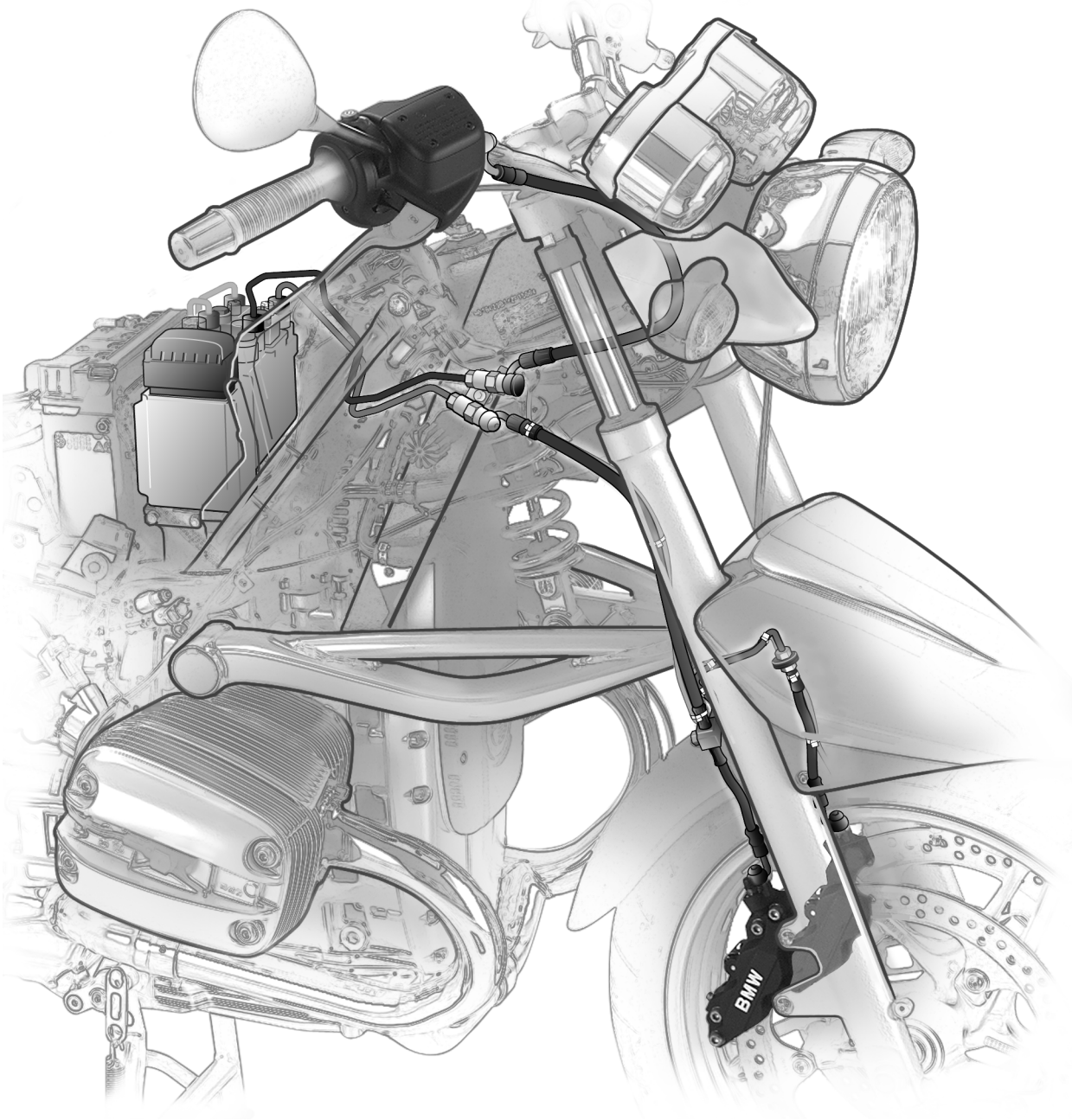
When replacing the brake lines, always replace the seals (Quad rings) between the brake lines and the pressure modulator.

- Carefully remove the quad rings (3) using the dismantling tool, **BMW No. 34 2 561**.
- Install the quad rings with brake lines.
- Check that the quad rings are correctly seated.
- Install new spring clips.
- Fit the protective caps to the brake lines.
- Clip in the brake lines.
- Check that the spring clips (arrows) are seated correctly.
- Pull the protective caps over the plug connections.
- Fill and bleed the brake system (⇒ 34.18).

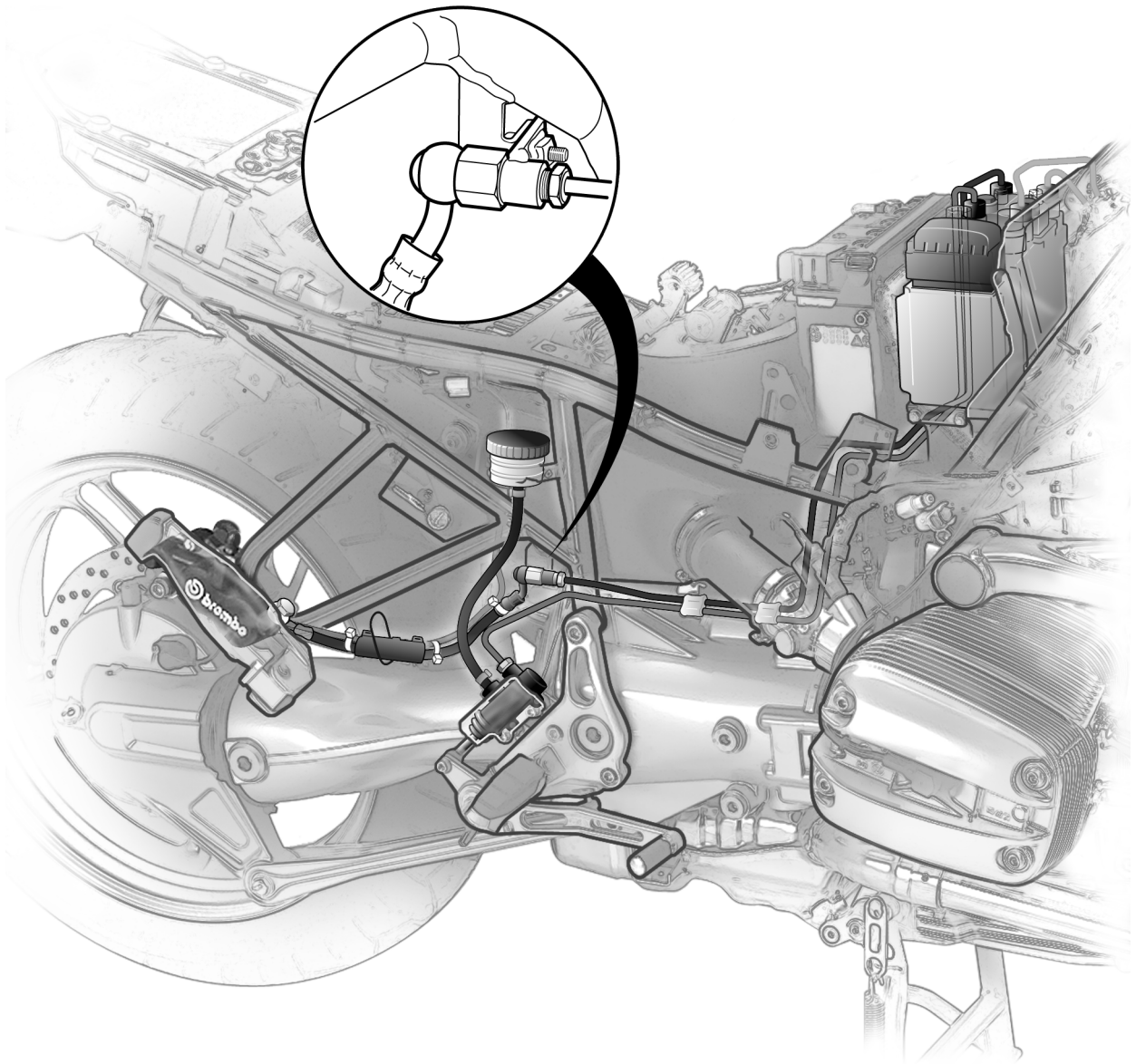
### 🔧 Tightening torque:

Brake hose and brake line..... 18 Nm  
 Front brake caliper bleed screws ..... 9 Nm  
 Rear brake caliper bleed screw ..... 7 Nm

Removing and refitting front brake line



# Removing and refitting rear brake line

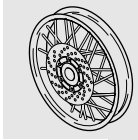


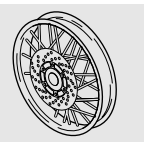
# 36 Wheels and tyres

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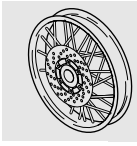
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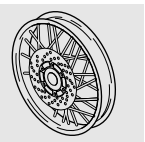


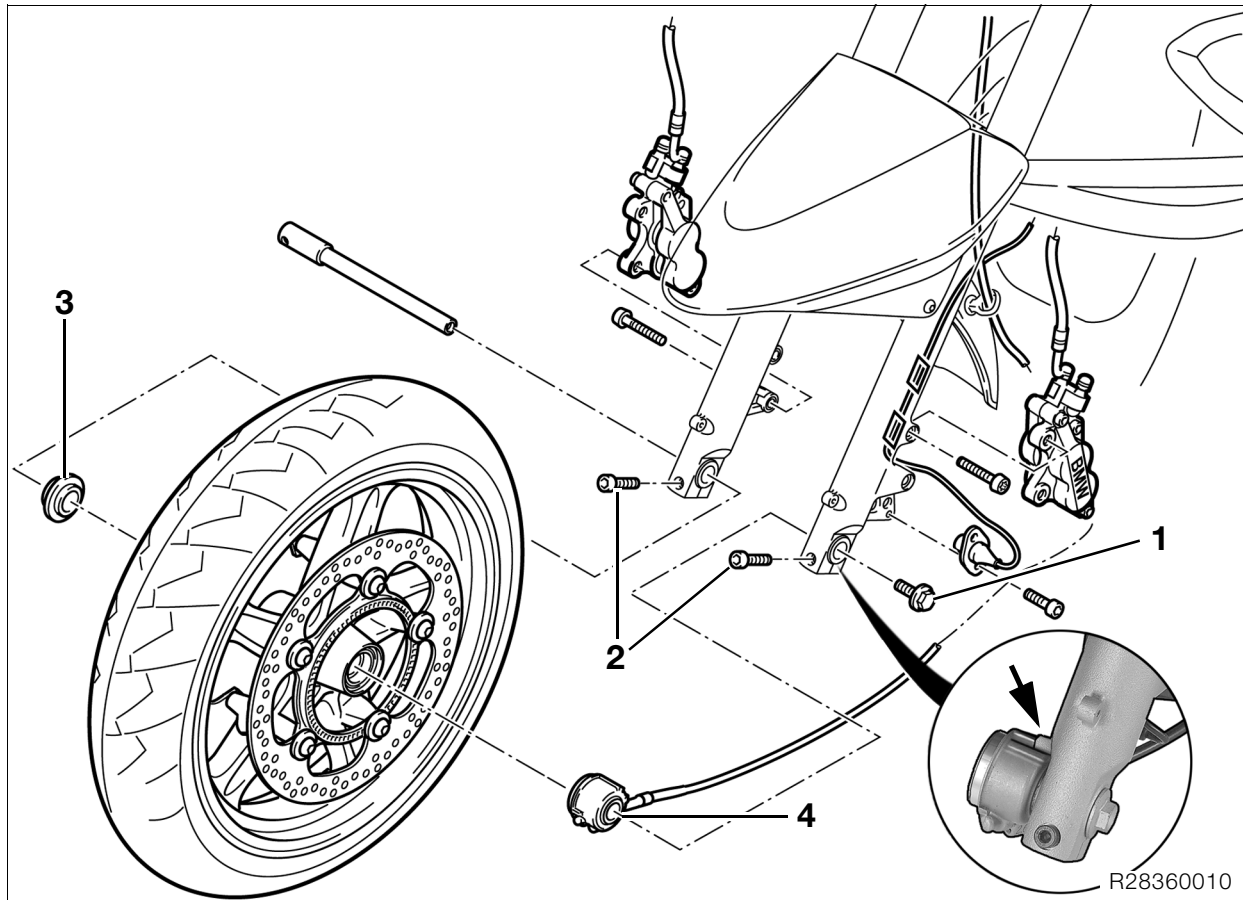




Technical Data		R 1150 R
<b>Wheels</b>		
Rim size		
Front		3.50 x 17 MT H 2
Rear		5.00 x 17 MT H 2
Max. radial/lateral runout		
Front	mm (in)	0.5 (0.0197)
Rear	mm (in)	0.3 (0.0118)
<b>Tyres</b>		
Tyre size		
Front		120/70 ZR 17 Tubeless
Rear		170/60 ZR 17 Tubeless
Tyre pressures (cold)		
One-up, front	bar (psi)	2.2 (31.91)
One-up, rear	bar (psi)	2.5 (36.26)
Two-up, front	bar (psi)	2.5 (36.26)
Two-up, rear	bar (psi)	2.7 (39.16)
Two-up and luggage, front	bar (psi)	2.5 (36.26)
Two-up and luggage, rear	bar (psi)	2.9 (42.06)







### 36 30 300 Removing and installing front wheel



**Warning:**

**[Integral ABS]** When removing and installing brake calipers, force back pistons carefully to ensure that wheel-circuit reservoir does not overflow. If fluid escapes, proceed in accordance with “Instructions for filling reservoir” (→ 00.44).

#### Removing front wheel

- Remove brake calipers.



**Note:**

Do not apply handbrake lever with brake calipers removed/front wheel removed.

- Remove retaining screw (1).
- Loosen clamping screws (2).
- Remove quick-release axle.
- Remove spacer bushing (3) and speedometer drive (4).
- Remove front wheel.

#### Installing the front wheel



**Note:**

When installing the wheel, make sure that the driver is located in its guide.

- Install the front wheel with spacer and speedometer drive.



**Attention:**

Locate the reaction peg (arrow) on the speedometer drive in front of the fork slider tube.

- Apply a thin coat of **Optimoly TA** or similar to the quick-release axle and install.
- Tighten the retaining screw (1).
- Install the brake calipers.
- Tighten the left clamping screw.
- Compress the front fork firmly several times.
- Tighten the right clamping screw.



**Note:**

**[Integral ABS]** After switching on the ignition, always wait for the BMW Integral ABS to complete its self-diagnosis.

Do not operate the brake lever until self-diagnosis has completed.

- Check operation of the brake system with the ignition switched on.

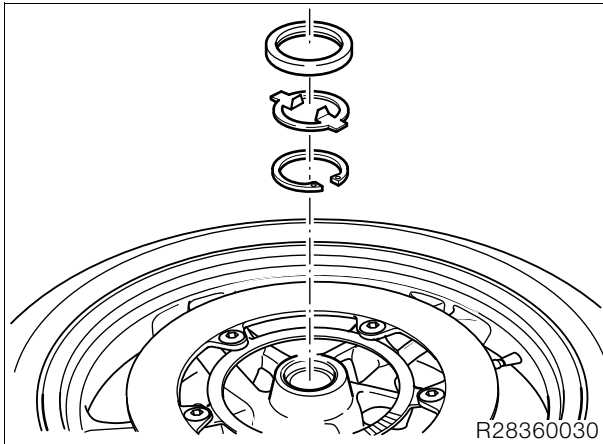


**Tightening torque:**

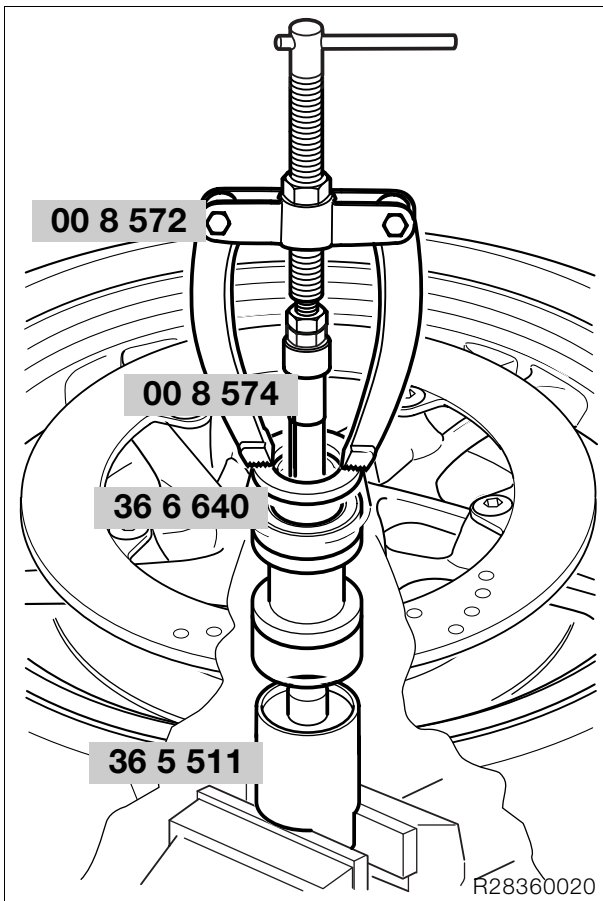
Bolts on quick-release axle .....	30 Nm
Clamping screws for slider tube .....	22 Nm
Brake caliper to fork slider .....	30 Nm

## 36 31 896 Removing and installing wheel bearings

### Removing wheel bearings

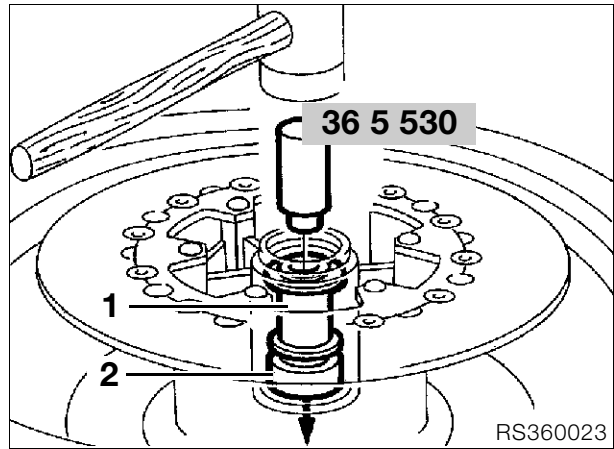


- Carefully lever out the shaft sealing ring with a screwdriver.
- Remove driver and retaining ring.



- Clamp a drift, **BMW No. 36 5 511**, into the vise and place the wheel on it with the wide bearing down.
- Place a spacing ring, **BMW No. 36 6 640**, between the wheel hub at the right and the claws of the internal puller.
- Heat the bearing seat to approx. 60 °C (140 °F).

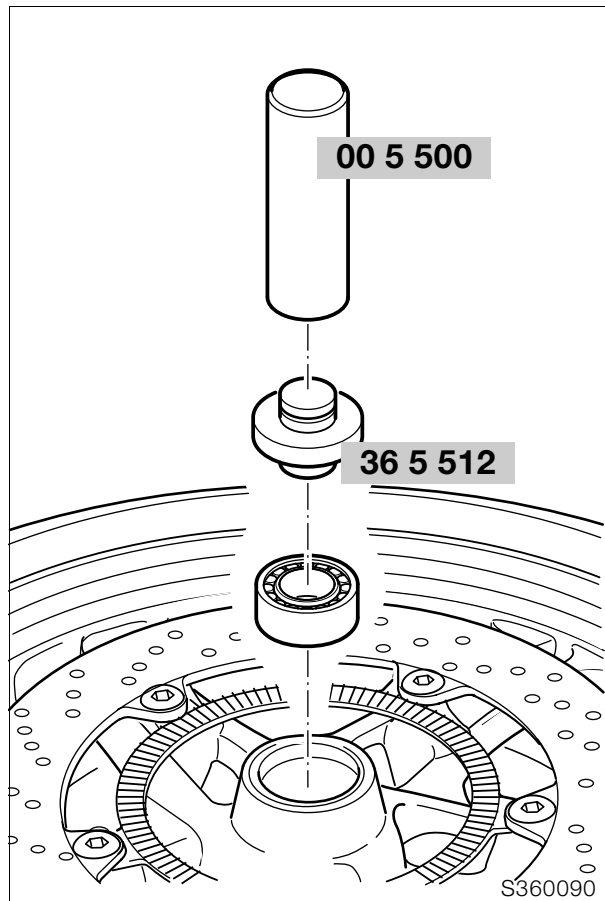
- Pull out the wheel bearing with counter-support 22/1, **BMW No. 00 8 572**, and internal puller 21/3, **BMW No. 00 8 574**.



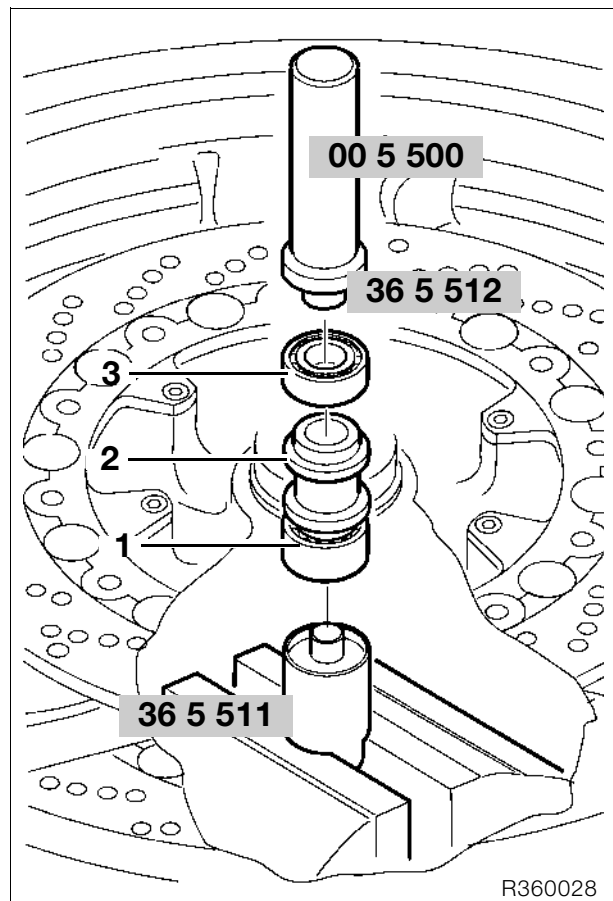
- Press out spacing bushing (1) and wheel bearing (2) with drift, **BMW No. 36 5 530**.

## Installing wheel bearings

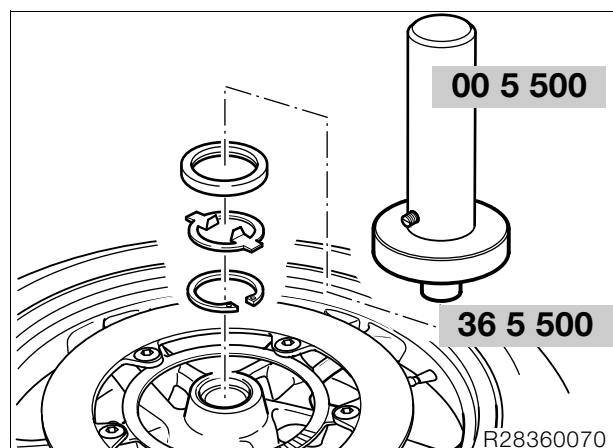
- Degrease bearing seats.
- Heat the bearing seat to approx. 60 °C (140 °F).



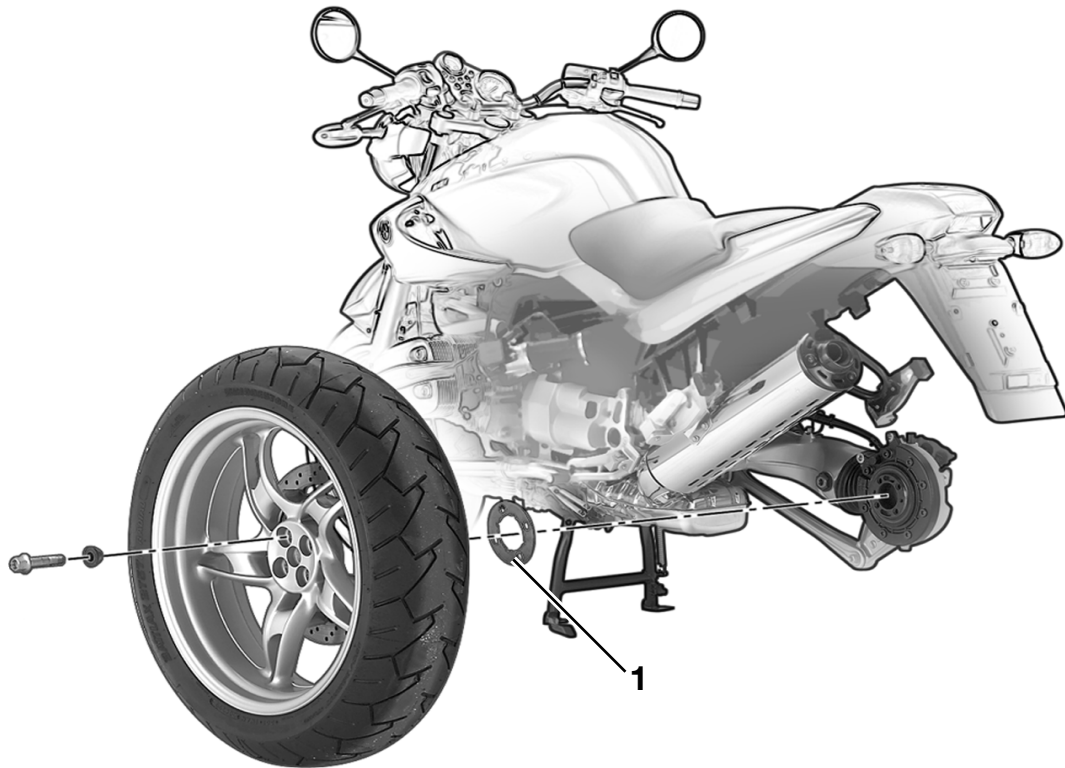
- **First** insert wide bearing using drift, **BMW No. 36 5 512**, and handle, **BMW No. 00 5 500**.



- Clamp a drift, **BMW No. 36 5 511**, into the vise and place the wheel on it with the wide bearing (1) down.
- Install spacer tube (2).
- Bearing seat temperature 60 °C (140 °C).
- Insert narrow bearing (3) with drift, **BMW No. 36 5 512**, and handle, **BMW No. 00 5 500**.



- Install circlip with convex side facing down.
- Install driver.
- Drive in shaft sealing ring with drift, **BMW No. 36 5 500**, and handle, **BMW No. 00 5 500**.



R28360060

## 36 30 320 Removing and installing rear wheel



### Warning:

**[Integral ABS]** When removing and installing the brake caliper, force back the pistons carefully to ensure that the wheel-circuit reservoir does not overflow.

If fluid escapes, proceed in accordance with “Instructions for filling reservoir” (→ 00.48).

- **[Integral ABS]** Place the rear wheel in position with spacer (1).
- Hold rear wheel in position at rear wheel drive and hand-tighten the wheel studs with taper rings.



### Attention:

Use only wheel studs with length code 55  
Do not oil or grease wheel studs!

## Removing rear wheel



### Attention:

Do not operate the brake pedal when the brake caliper is removed.

**[Integral ABS]** Do not actuate handbrake lever or footbrake lever with brake calipers removed.

- Remove brake caliper.
- Remove wheel studs with taper rings.
- Remove the rear wheel.



### Note:

**[Integral ABS]** After switching on the ignition, always wait for the BMW Integral ABS to complete its self-diagnosis.

Do not operate the brake lever until self-diagnosis has completed.

- Check operation of the brake system with the ignition switched on.

## Installing rear wheel



### Attention:

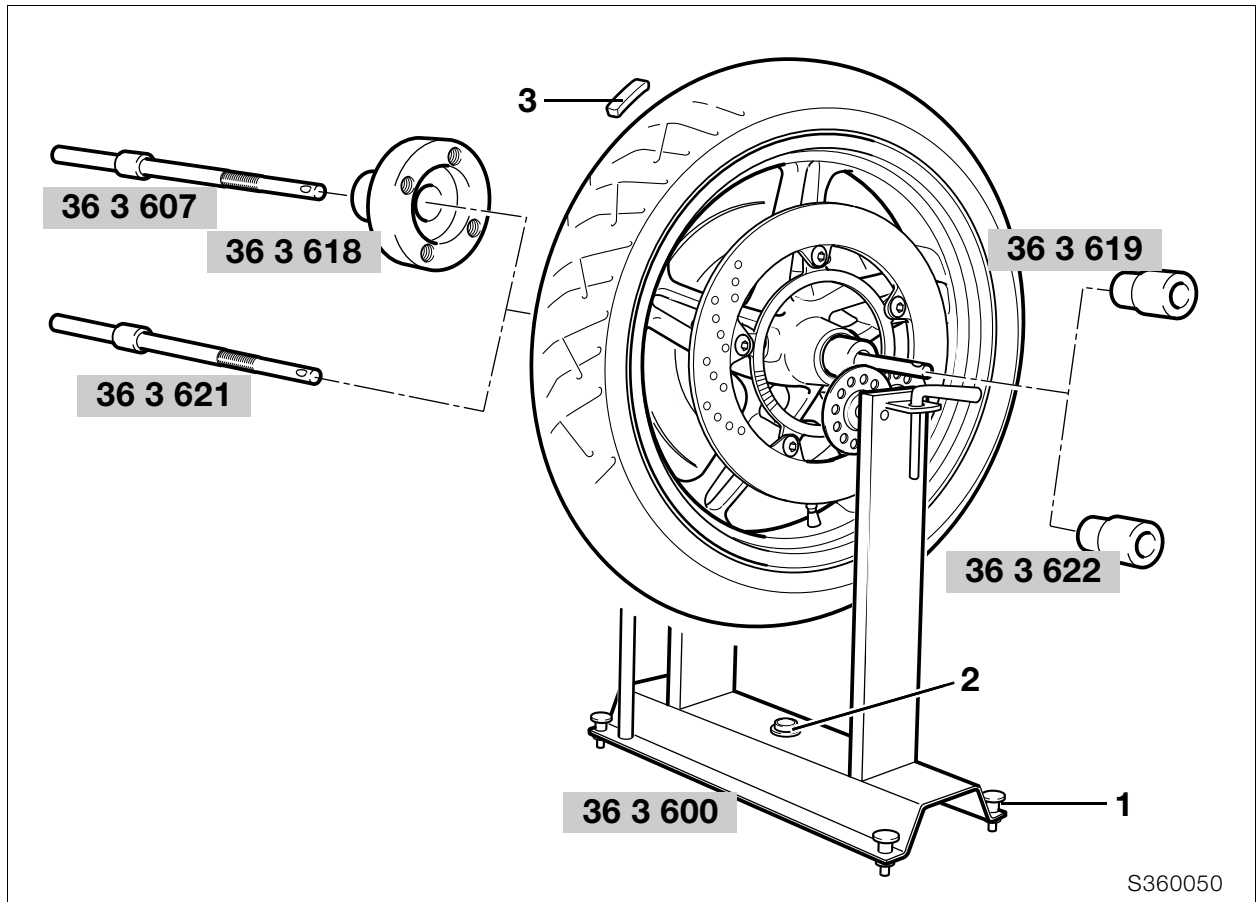
Contact faces on rear wheel drive and hub must be clean and free of grease.

**[Integral ABS]** The spacer must be clean and free of grease.



### Tightening torque:

Wheel studs, initial torque ..... 72 Nm  
Wheel studs, final torque ..... 105 Nm  
Brake caliper to rear wheel drive ..... 40 Nm



S360050

### 36 30 528 Static balancing of front wheel/rear wheel

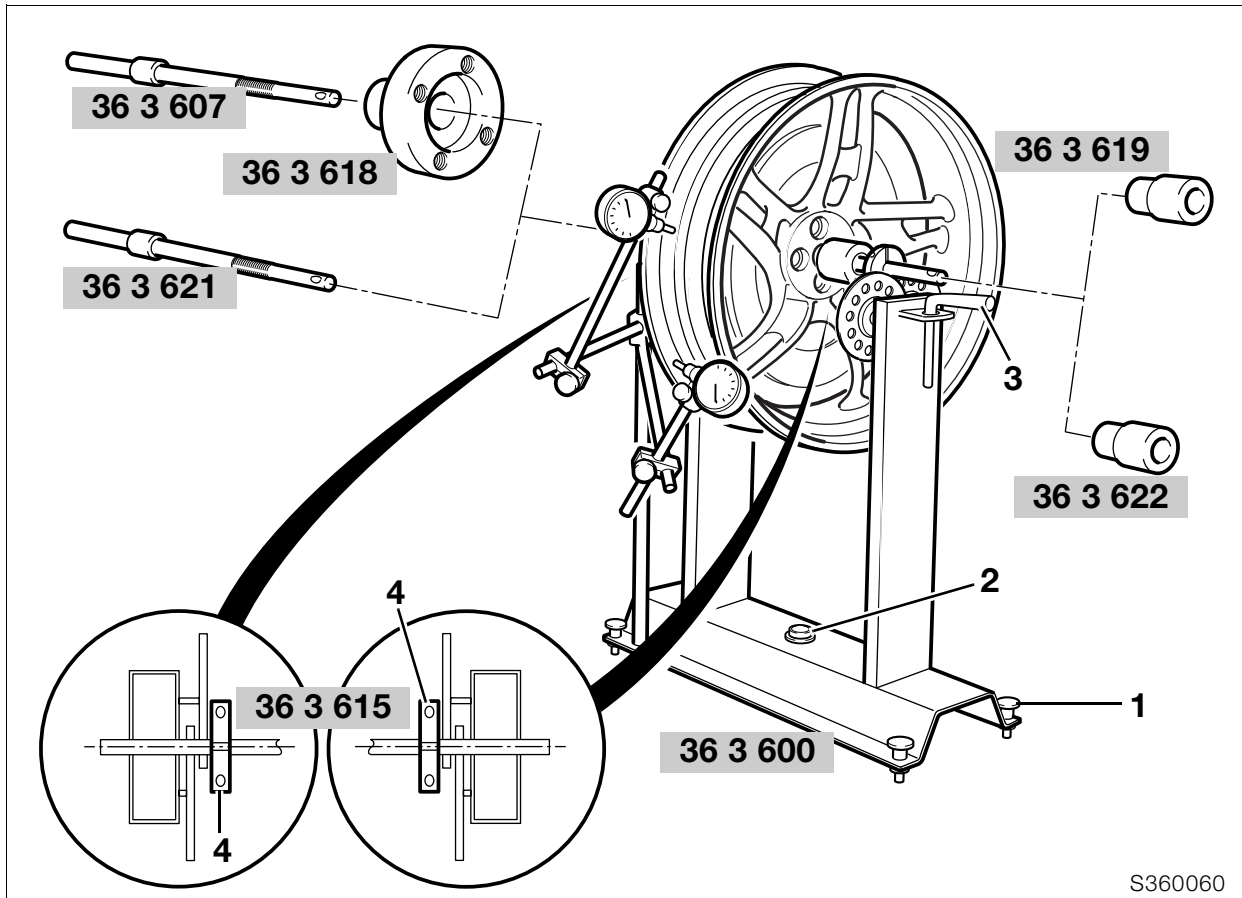
- Level balancing stand, **BMW No. 36 3 600**, using knurled-head screws and bubble gauge (1/2).
- Install balancing shaft, **BMW No. 36 3 621**, and nut, **BMW No. 36 3 622**, in front-wheel bearing.
- Tighten nut to slightly preload bearing.
- At the rear wheel, secure mounting device, **BMW No. 36 3 618**, to the centering collar side with wheel studs and taper rings.
- Install balancing shaft, **BMW No. 36 3 607**, and nut, **BMW No. 36 3 619**.
- Allow wheel to settle.
- Clean the attachment points for the adhesive weights.
- Affix the adhesive weights (3) uniformly spaced on both sides of the rim opposite the wheel's heaviest point.



#### **Attention:**

Maximum balancing weight 60 g (2.1180 oz.).

- Repeat the balancing procedure as a check.



S360060

### 36 32 528 Checking front/rear wheel rim for runout

- Remove tyre.
- Level balancing stand, **BMW No. 36 3 600**, using knurled-head screws and bubble gauge (1/2).
- Install balancing shaft, **BMW No. 36 3 621**, and nut, **BMW No. 36 3 622**, in front-wheel bearing.
- Tighten nut to slightly preload bearing.
- Use pin (3) to lock the balancing shaft against the balancing stand to prevent the shaft from turning.
- At the rear wheel, secure mounting device, **BMW No. 36 3 618**, to the centering collar side with wheel studs and taper rings.
- Install balancing shaft, **BMW No. 36 3 607**, and nut, **BMW No. 36 3 619**.
- Clamp locating discs (4), **BMW No. 36 3 615**, to the balancing shaft at left and right in such a way that the shaft cannot wander.
- Check radial/axial runout.



#### Attention:

Bring the dial gauge stylus into contact only with the machined inner face of the wheel rim.

#### Max. radial runout/lateral runout

Front wheel ..... 0.5 mm (0.0197 in)  
 Rear wheel ..... 0.3 mm (0.0118 in)



# 46 Frame

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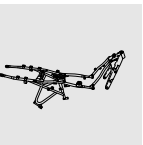
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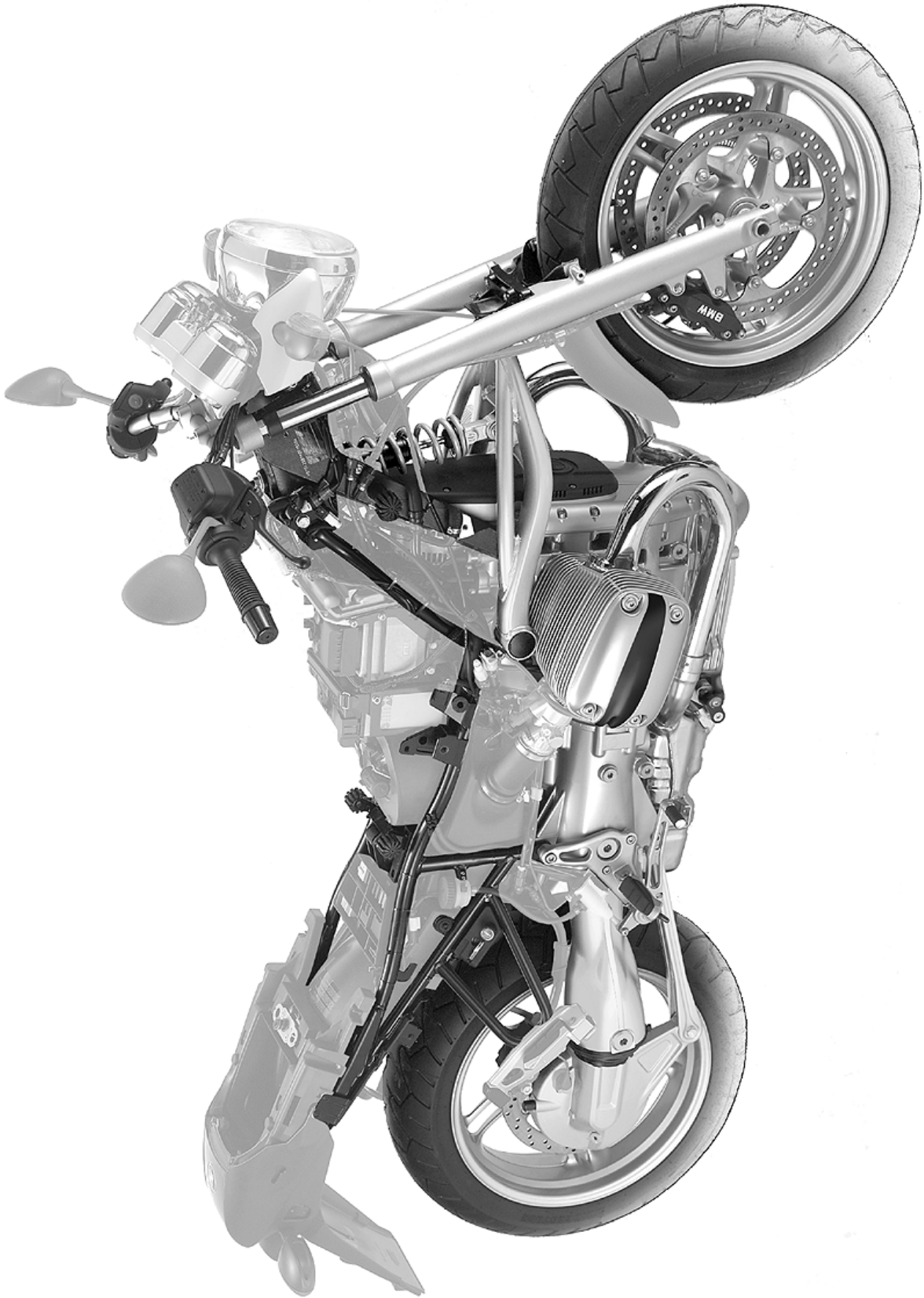


Technical Data		R 1150 R
Location of manufacturer's type plate/frame number		On frame, at right
Length, overall	mm (in)	2,170 (85.4329)
Max. height without mirrors	mm (in)	1,165 (45.8660)
Width of handlebars with weights	mm (in)	825 (32.4803)
Width across rear footrests	mm (in)	734 (28.8976)
Height of seat at unladen weight	mm (in)	800 (31.4960)
[Option]	mm (in)	770 (30.3149)
Wheelbase in normal-load position	mm (in)	1,487 (58.5432)
Ground clearance in normal-load position	mm (in)	138 (5.4330)
Caster angle in normal-load position	mm (in)	127 (4.9999)
Steering head angle in normal-load position	°	61.9
Cornering angle limit with 85 kg (187 lbs) rider	°	45
Wheel track offset		
normal	mm (in)	+ 4.5 (0.1772) (= to right)
maximum	mm (in)	± 9 mm (± 0.3543 in) based on + 4.5 mm (+ 0.1772 in)
<b>[Integral ABS]</b> wheel track offset		
normal	mm (in)	+ 3.5 (+ 0.1378) (= to right)
maximum	mm (in)	± 9 mm (± 0.3543 in) based on + 3.5 mm (+ 0.1378 in)
Unladen weight, ready for road, full tank	kg (lbs)	238 (525)
Dry weight	kg (lbs)	218 (480)
Axle load distribution (without rider), front/rear	%	50.5/49.5
Permitted gross weight	kg (lbs)	450 (992)

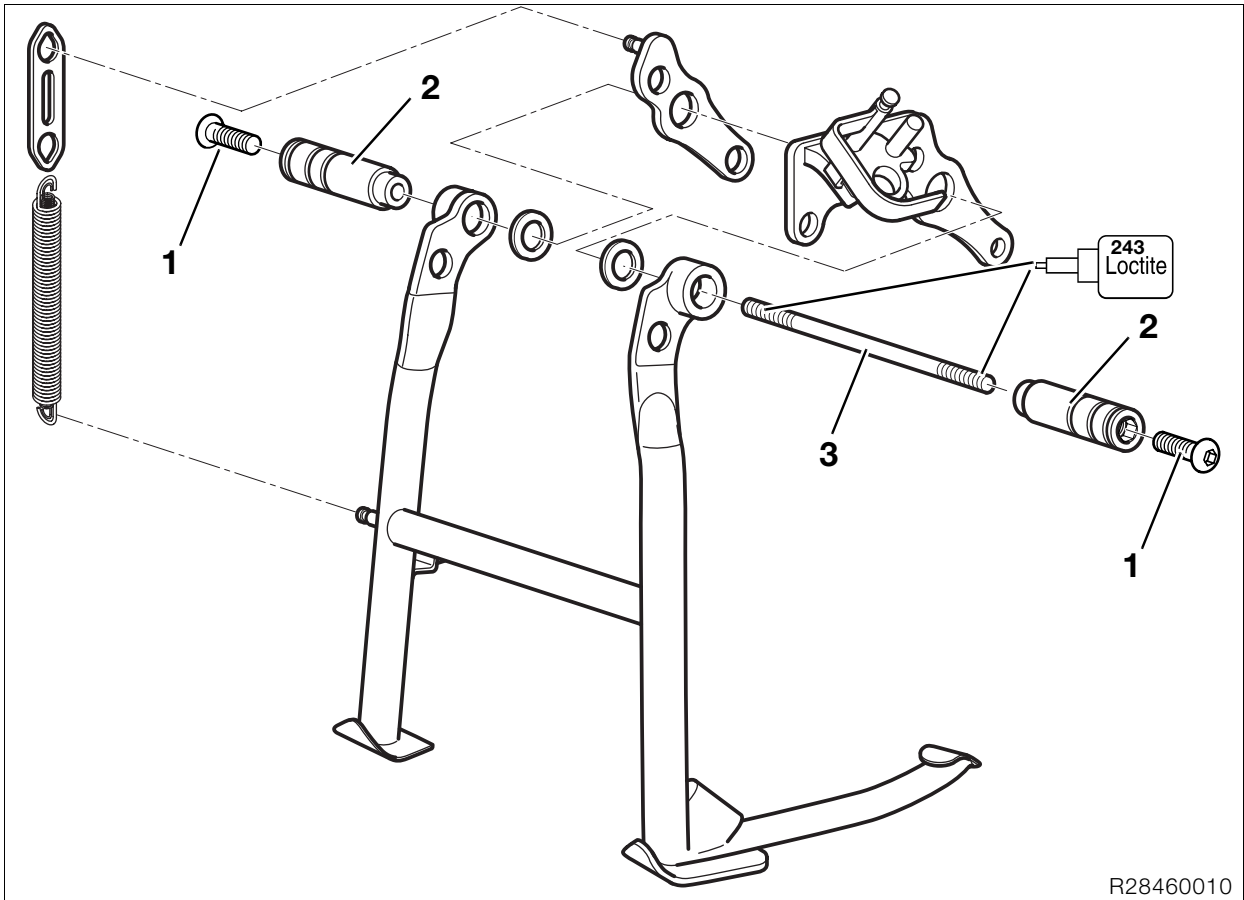




Overall view, frame

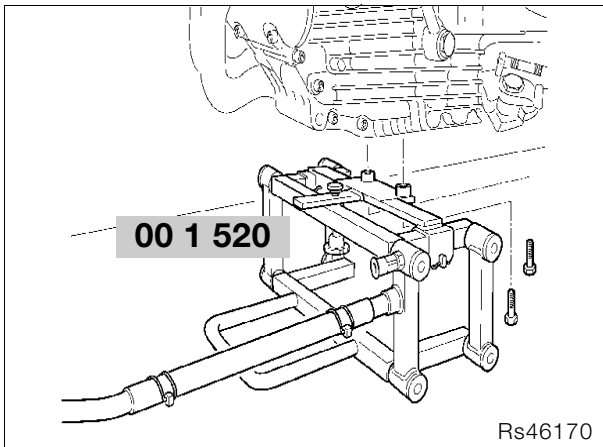


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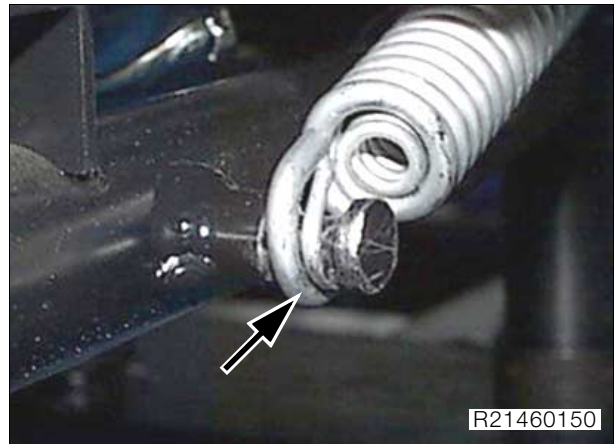


R28460010

## 46 52 Removing and installing main (centre) stand



- Attach stand, **BMW No. 00 1 520** to motorcycle.
- Disconnect retract springs.
- Remove machine screws (1) in bearing bushings (2).
- Remove right and left bearing bushings (2).
- Remove the main (centre) stand.
- Remove right bearing block.
- Remove the retract springs of the side stand.
- Remove the side stand switch.
- Remove left bearing block.
- Installation is the reverse of the removal procedure.



### Note:

When installing the springs, make sure that the thick spring is on the inside and the thin spring on the outside (arrow).

### Lubricant:

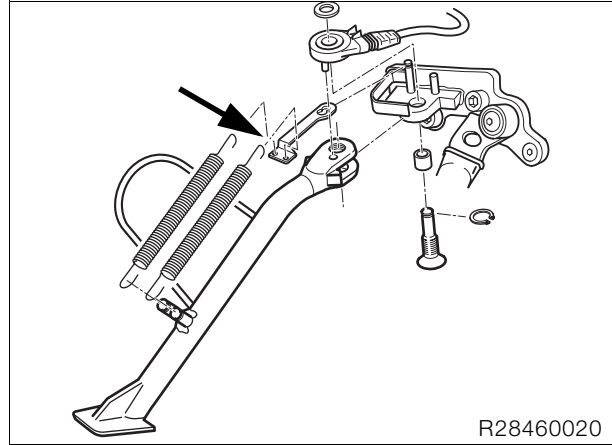
for pivot bushings..... Staburags NBU 30 PTM



**Tightening torque:**

Pivot mount of main stand, M 8 (stud (3)) (clean thread + Loctite 243).....	21 Nm
Pivot mount of main stand, M 8 (cheesehead screw) .....	21 Nm
Carrier plate to engine block M 12 (socket-head screw) (clean thread + Loctite 2701).....	72 Nm
Carrier plate to engine block M 8 (countersunk-head screw).....	21 Nm
Carrier plate to engine block, left M 8 (socket-head screw).....	21 Nm

## 46 53 Removing and installing side stand



- Place the motorcycle on its main (centre) stand.
- Disconnect retract springs.
- Remove the side stand switch.
- Remove side stand.
- Installation is the reverse of the removal procedure.



**Note:**

When installing, make sure that the offset is correctly positioned (arrow) relative to the spring retainer.



**Attention:**

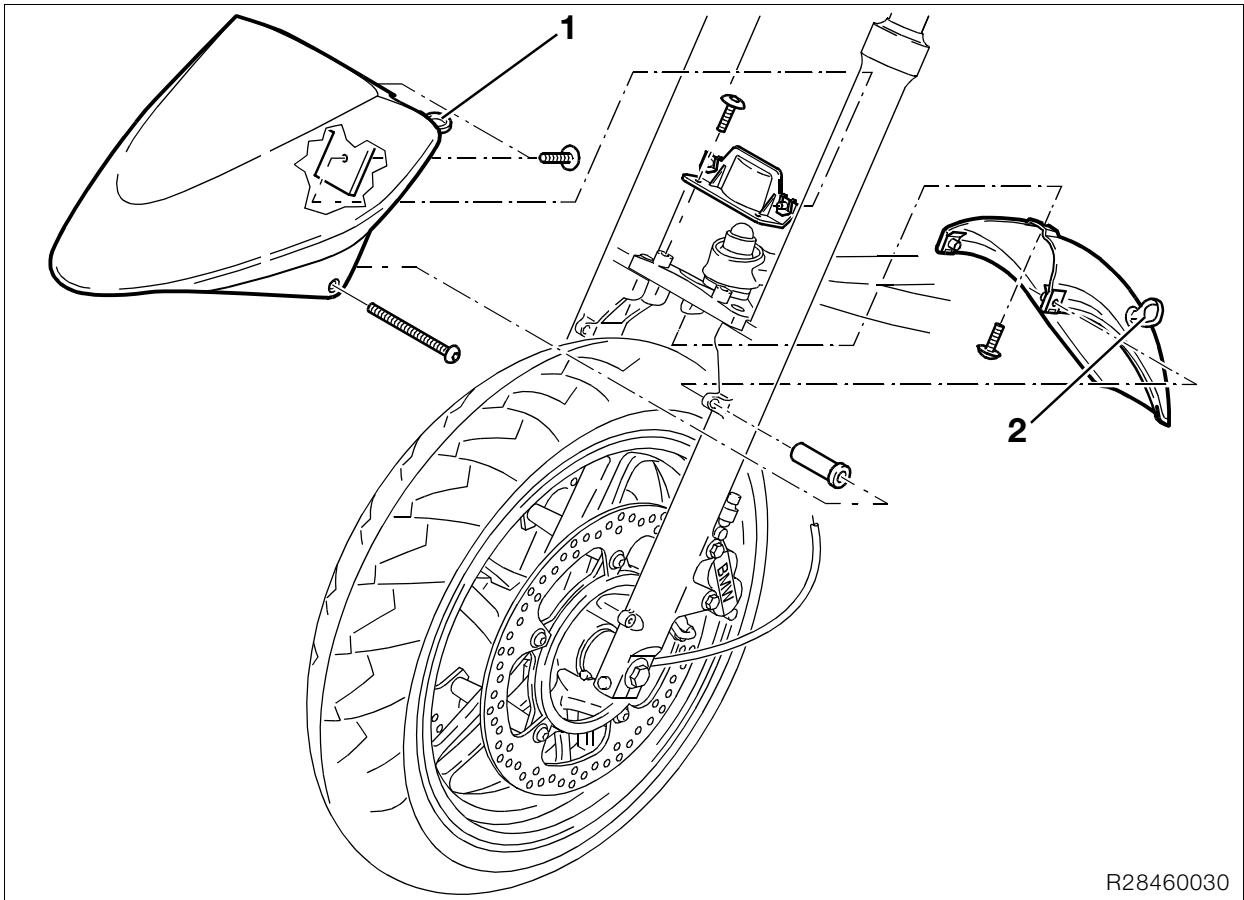
Note routing of cables.

**Lubricant:**..... Staburags NBU 30 PTM



**Tightening torque:**

Side stand to pivot mount  
(clean thread + Loctite 2701)..... 58 Nm



R28460030

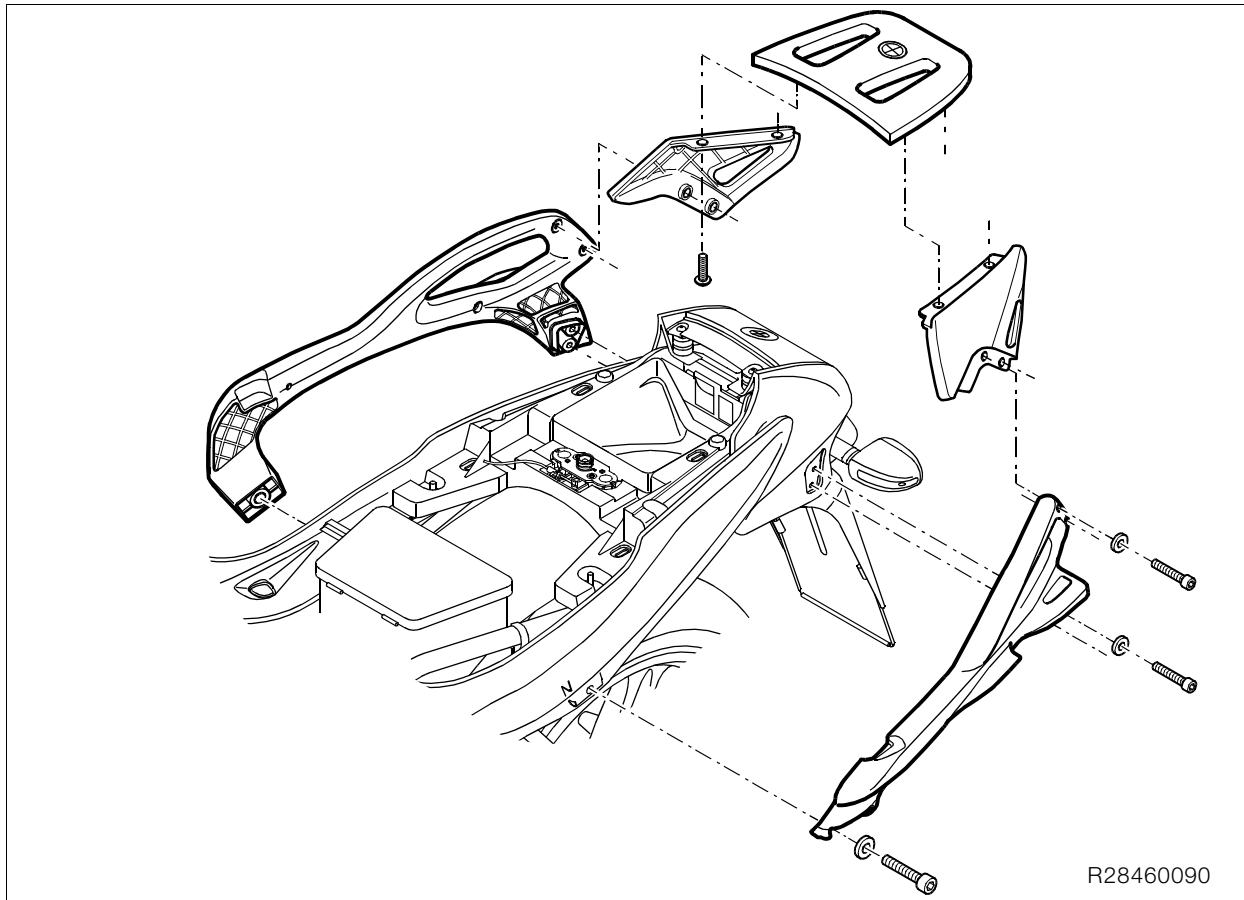
### 46 61 Removing and installing front mudguard

- Remove holder (1) for speedometer drive.
- Remove front section of front mudguard.
- Remove front wheel.
- Remove holder (2) for speedometer drive.
- Remove the rear section of the front mudguard.
- Installation is the reverse of the removal procedure.

 **Tightening torque:**

Front mudguard to bracket at front.....	3 Nm
Front mudguard front and rear to slider tube .....	3 Nm
(Tuflok Blue thread-locking compound; screw can be released and tightened a number of times alternatively: clean thread + Loctite 243)	
Front mudguard rear to slider tube bridge .....	6 Nm
(Tuflok Blue thread-locking compound; screw can be released and tightened a number of times alternatively: clean thread + Loctite 243)	



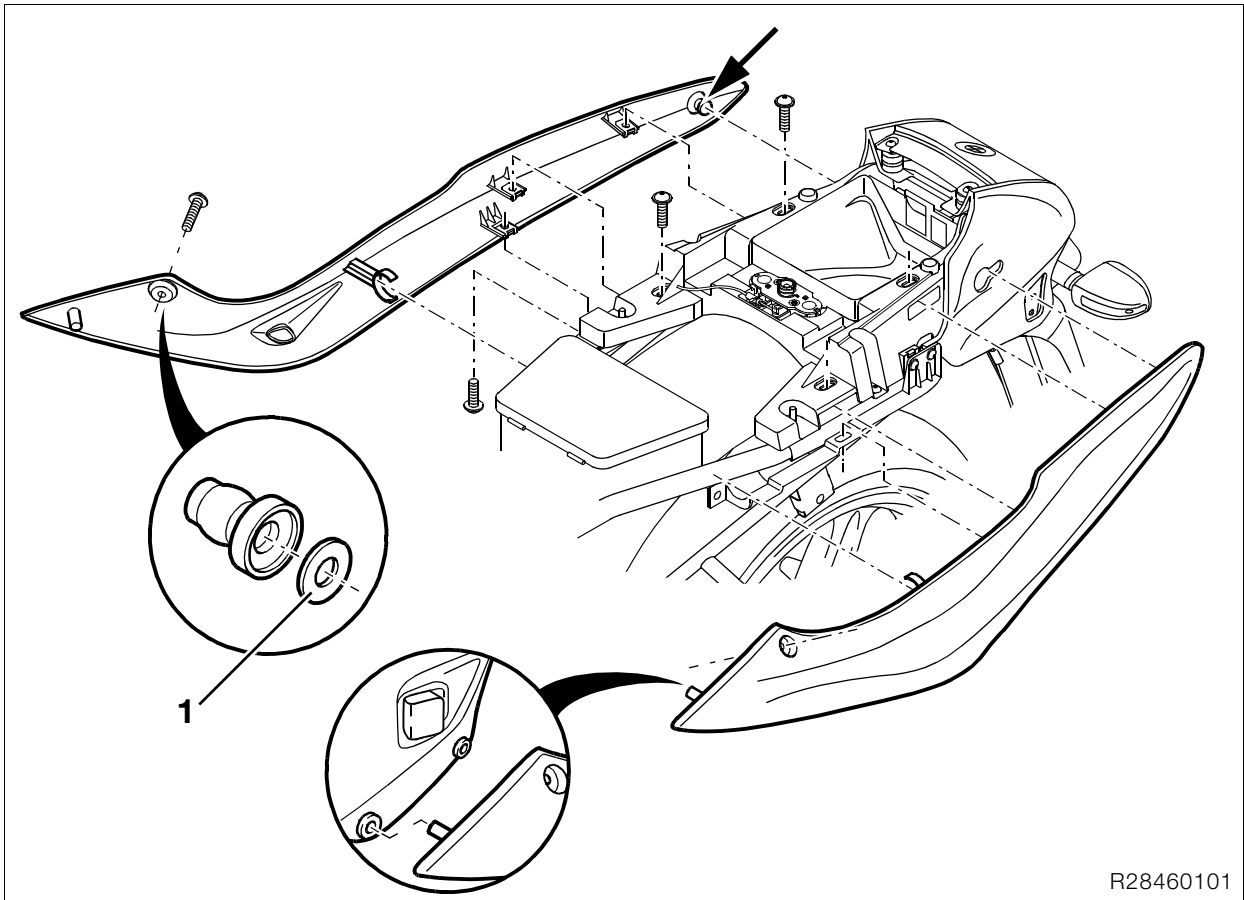


## 46 63 Removing and installing luggage rack/case holder



### Tightening torque:

Case holder to frame	
M 6 screw .....	8 Nm
(clean thread + Loctite 243)	
M 8 screw .....	20 Nm
(clean thread + Loctite 243)	



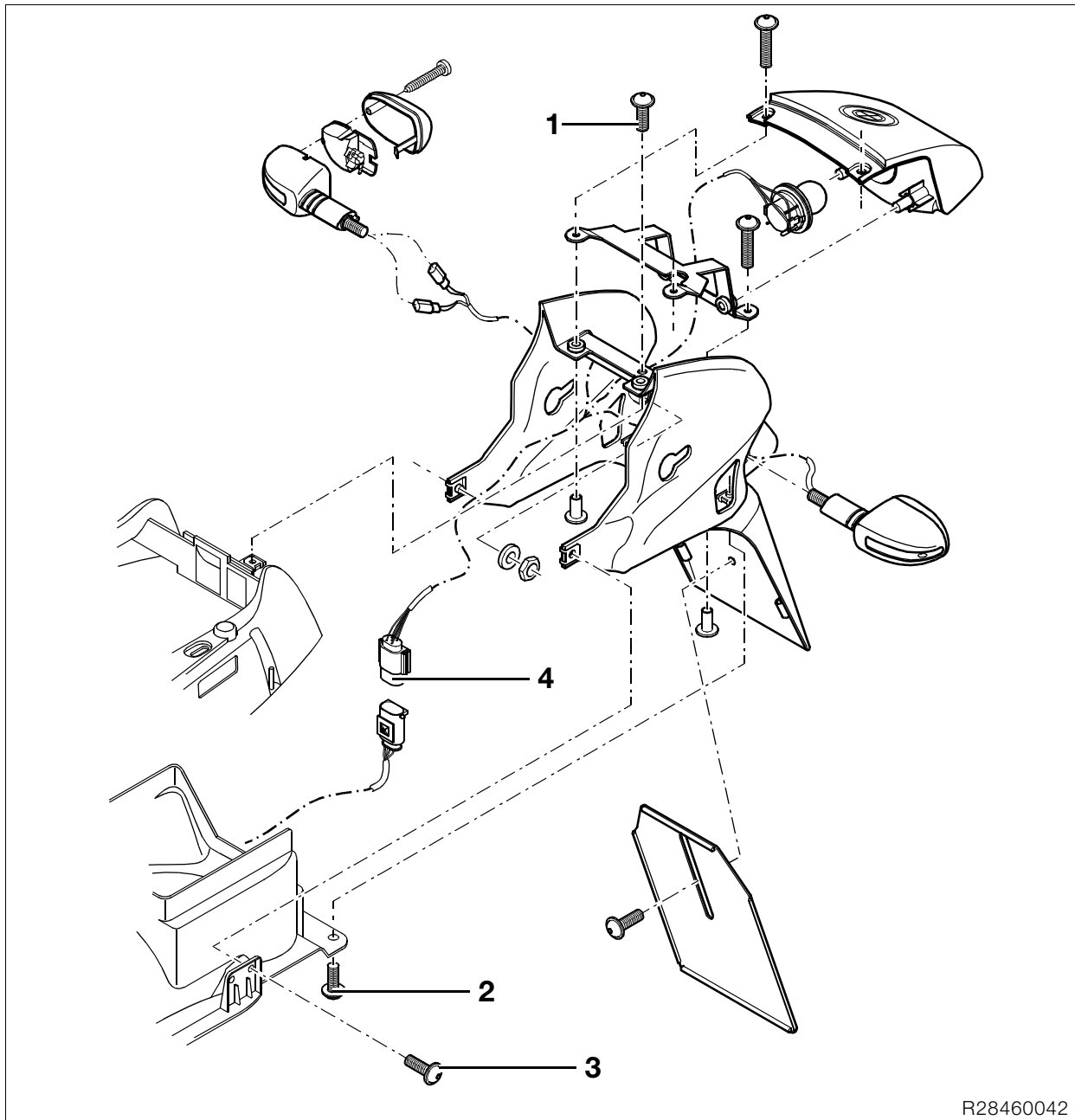
## 46 63 Removing and installing rear side panels

- Remove the seat.
- If necessary, remove the case holder.
- Remove rear side panel.
- Installation is the reverse of the removal procedure.



**Note:**

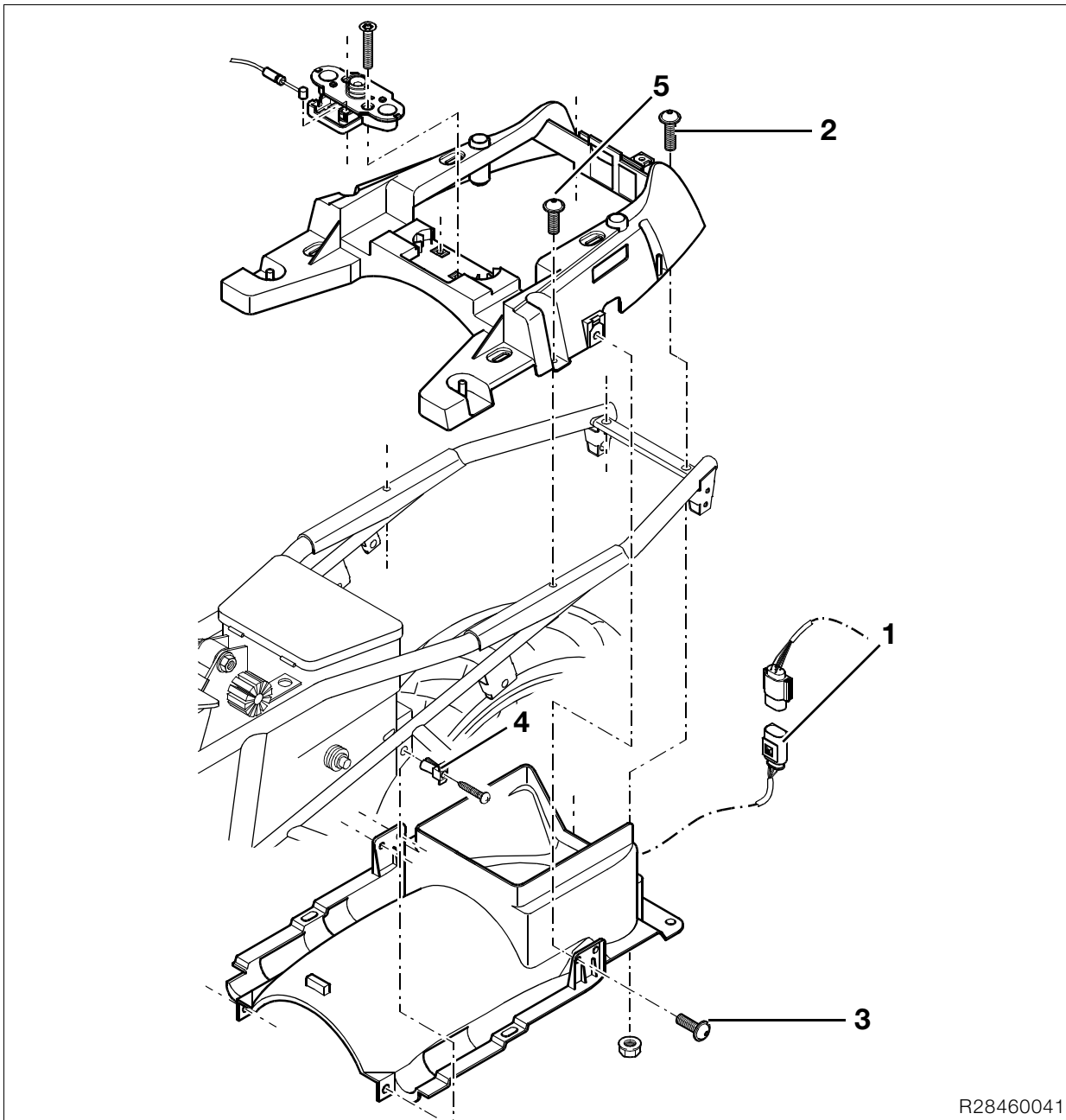
Make sure that assembly is correct (arrow).  
Note washers (1).



R28460042

## 46 62 Removing and installing rear trim

- Remove the seat.
- Remove case holder with luggage rack, if necessary.
- Remove rear side panels.
- Remove the tail light.
- Remove screw (1).
- Remove screws (2) and (3) on right and left and pull the tail section to the rear.
- Disconnect plug (4) and remove the tail section.
- Installation is the reverse of the removal procedure.



## 46 62 Removing and installing rear mudguard and rear carrier

- Remove the seat.
- Remove case holder with luggage rack, if necessary.
- Remove rear side panels.
- Remove rear trim panel.
- Disconnect plug (1) from rear mudguard.
- Remove screws (2) with nuts.
- Remove screws (3).

- Remove the seat lock and disengage the Bowden cable.
- Remove screws (5) and remove the rear carrier.
- Installation is the reverse of the removal procedure.



### ! Tightening torque:

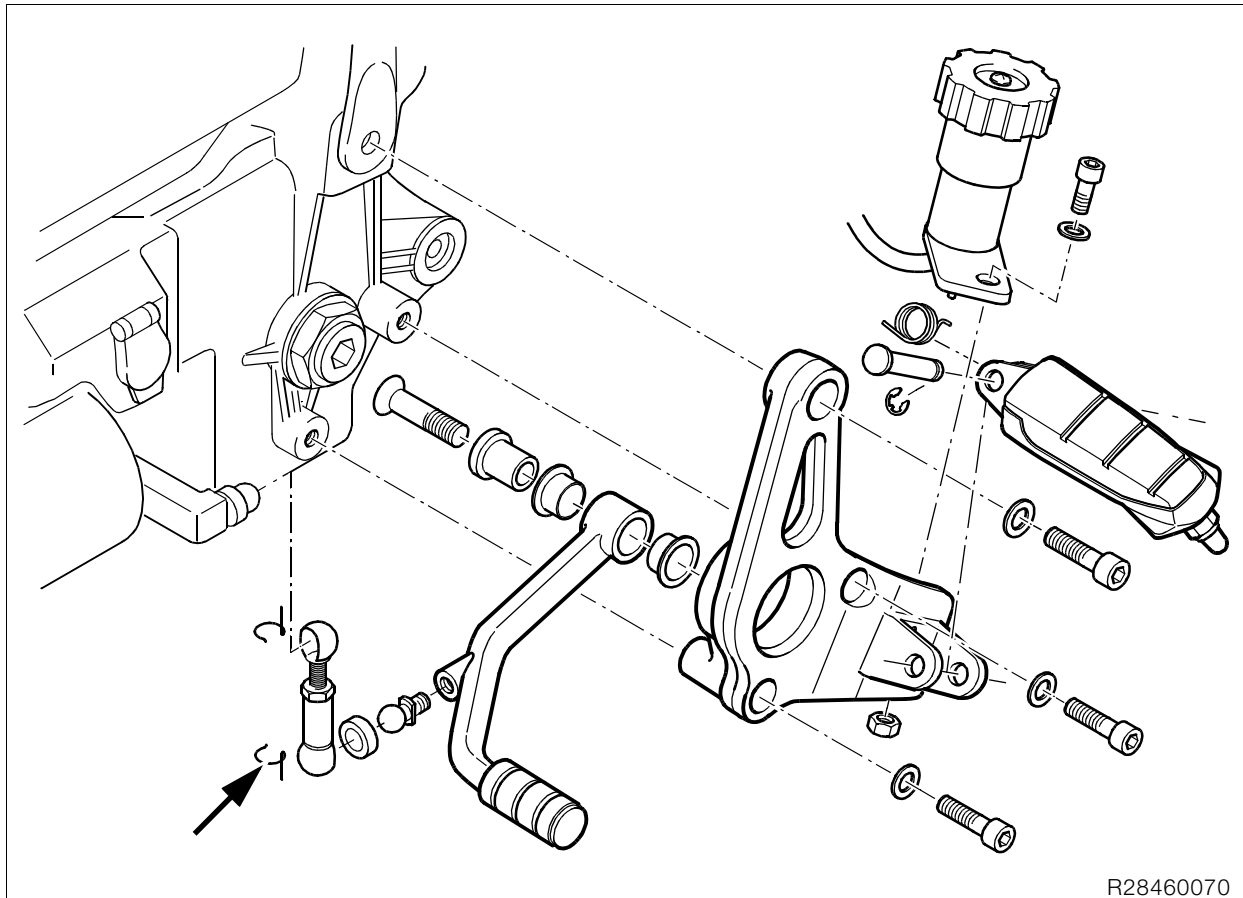
Rear carrier to rear frame .....	8 Nm
Seat lock to rear carrier.....	8 Nm



### Note:

The rear mudguard drops out of position; support it if necessary.

- Slacken screws of tab nuts (4) and remove the tab nuts.
- Remove the rear mudguard.



## Removing and installing front footrest plate

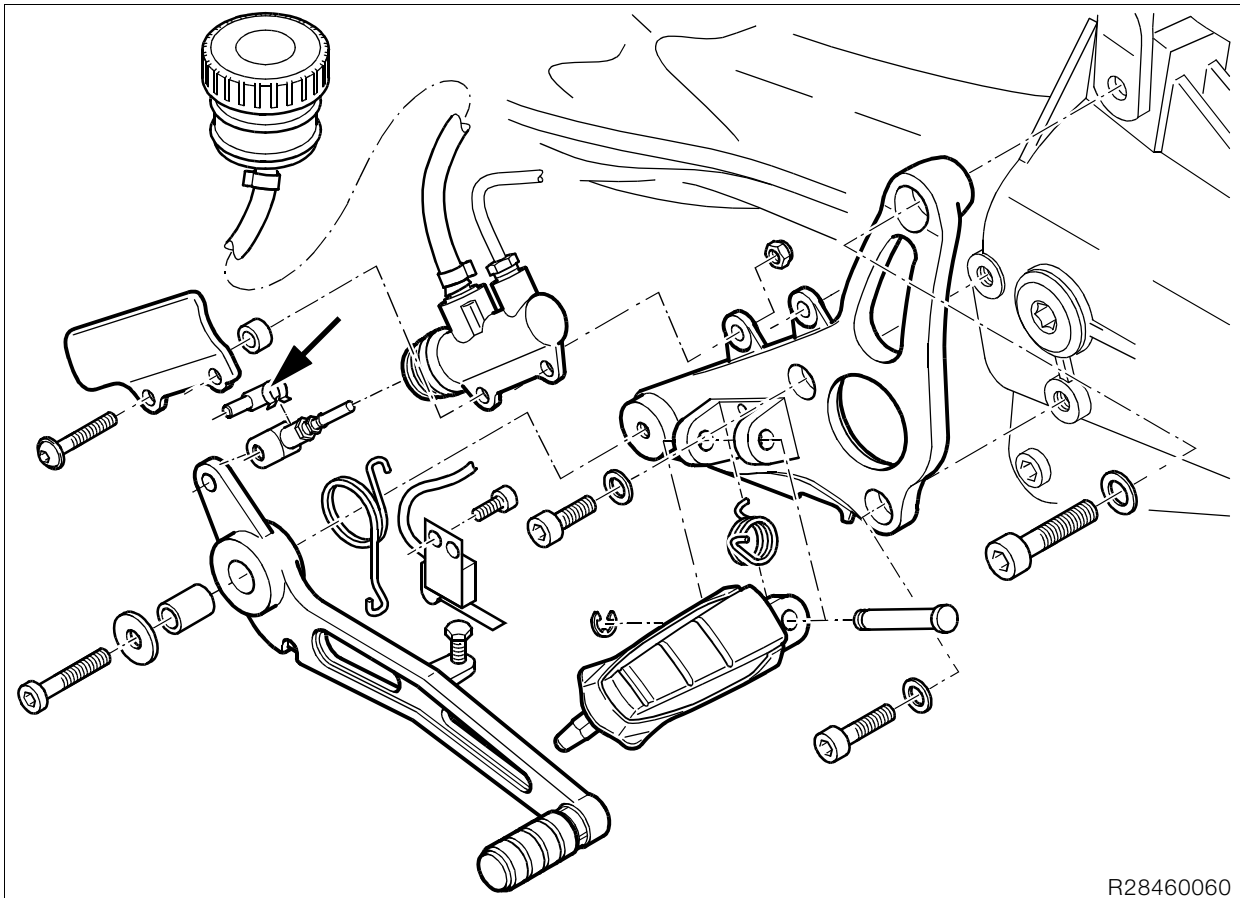
### 46 71 Removing and installing left footrest plate

- Remove retaining clip (arrow).
- Disconnect selector lever from gearshift linkage.
- Remove hydraulic spring-strut adjuster.
- Remove the footrest plate.
- Installation is the reverse of the removal procedure.



#### Tightening torque:

Footrest plate with rear frame to gearbox (clean thread + Loctite 2701).....	42 Nm
Footrest plate to gearbox .....	21 Nm
Hydraulic spring preload adjuster to footrest plate .....	22 Nm
Gearshift lever to footrest plate.....	35 Nm



R28460060

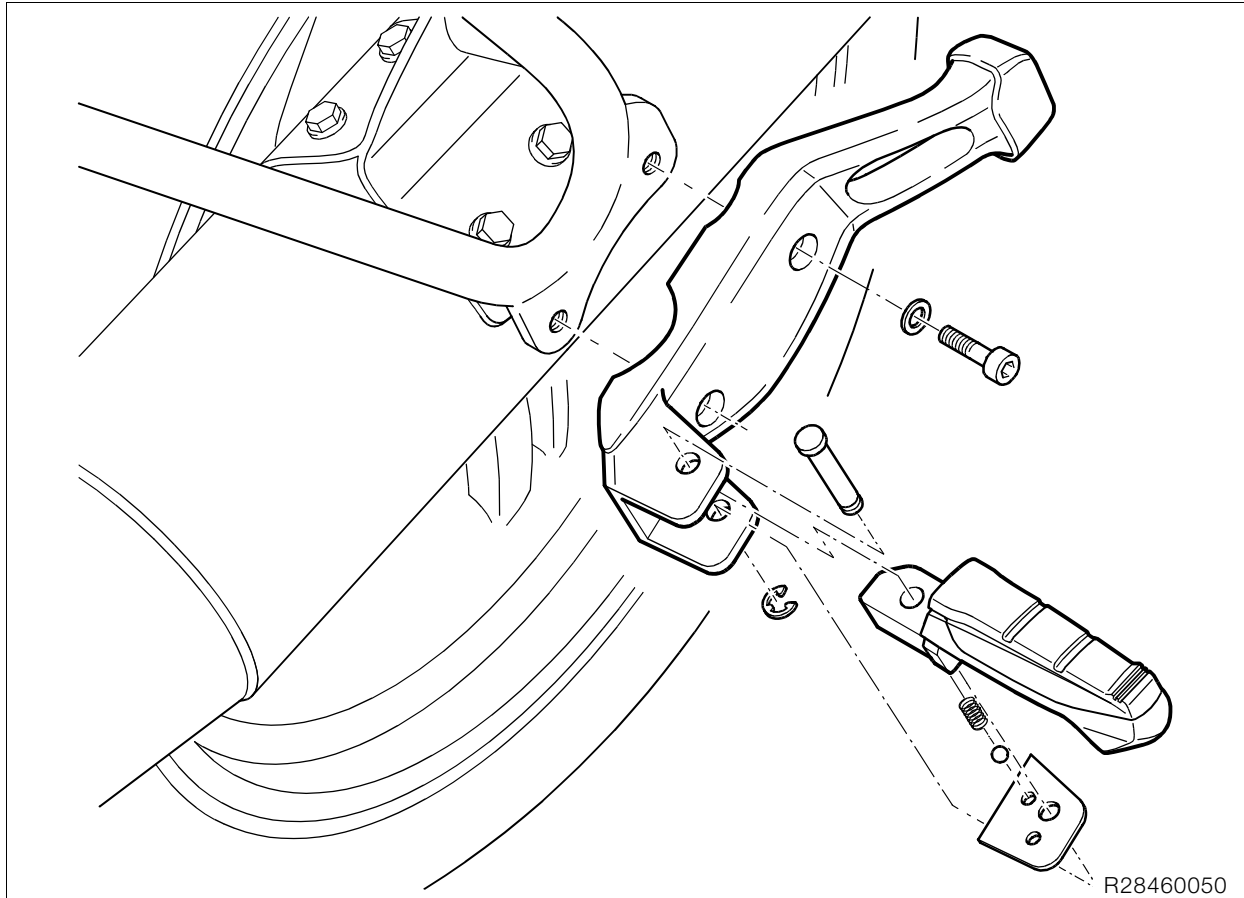
**46 71 Removing and installing right footrest plate**

- Remove stud (arrow).
- Detach the master cylinder from the footrest plate.
- Take out the screws of the footrest plate.
- Remove the footrest plate and disconnect the brake-light switch.
- Installation is the reverse of the removal procedure.




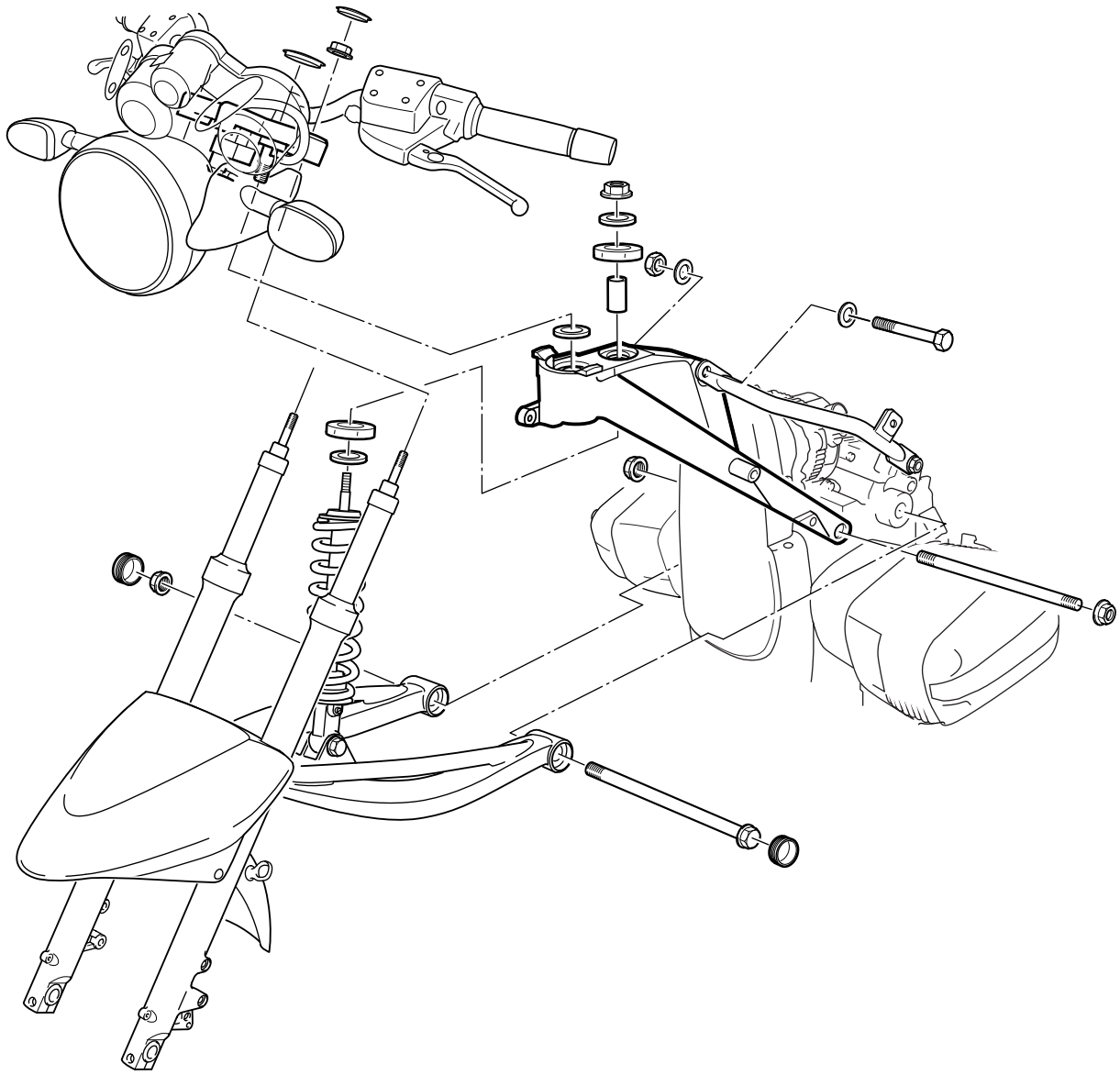
**Tightening torque:**

Footrest plate with rear frame to gearbox (clean thread + Loctite 2701).....	42 Nm
Footrest plate to gearbox .....	21 Nm
Footbrake lever to footrest plate	
(clean thread + Loctite 2701).....	21 Nm



## 46 71 Removing and installing rear footrest plate

-  **Tightening torque:**  
Footrest plate to rear frame ..... 21 Nm



R28460140

## 46 51 Removing and installing frame



### Attention:

Switch off ignition.  
Disconnect earth (ground) lead from battery.  
Insulate earth (ground) lead.

- Attach stand, **BMW No. 00 1 520**, to motorcycle.
- Remove fuel tank.
- Remove front wheel.
- Remove holder for speedometer drive from mud-guard.
- Disengage ABS sensor from slider tube.
- Remove holders for right and left brake lines from the slider tubes.



### Note:

Using straps, suspend the brake lines from the assembly crane, **BMW No. 46 5 640**.

- Remove the bracket for the brake lines from the frame.
- Disconnect the horn and remove it complete with the bracket.
- Release the cable ties at the frame.
- Release the fasteners securing the fixed tubes in the fork bridge.



- Secure the fork bridge with handlebars to the assembly crane, **BMW No. 46 5 640**.
- Remove fastener securing fork bridge to frame.



**Note:**

The screw pin is a press fit in the angular-contact ball bearing: remove as a complete unit.

- Disconnect the left air intake pipe from the cylinder head.
- Remove the leading link caps.



**Attention:**

When opening the nut of the leading link shaft, take care not to damage the cooler ribs; cover them with masking tape if necessary.

- Remove right screw of leading link shaft and remove shaft by pulling it to the left.
- Hold the leading link and release the top fastener of the front spring strut.



**Attention:**

Protect parts against scratching; mask off if necessary.

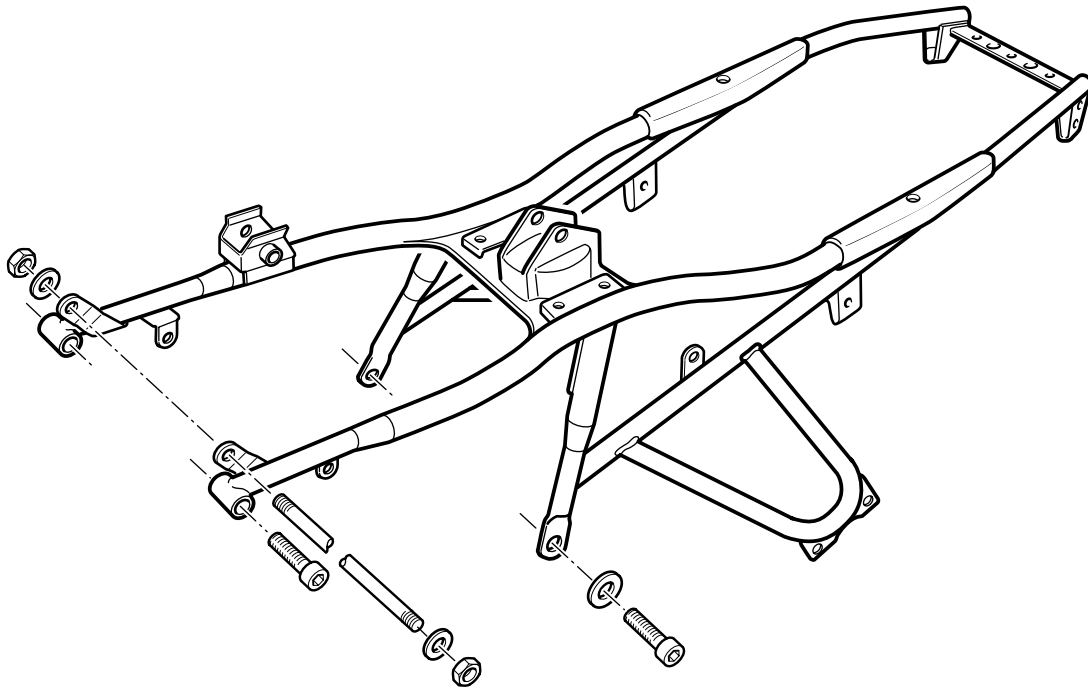
- Remove the leading link complete with spring strut and fork legs.
- Loosen the fasteners securing the ignition coil to the struts.
- Remove fasteners securing struts to frame and loosen the fasteners securing the struts to the engine.
- Remove engine bolts.
- Remove frame.
- Installation is the reverse of the removal procedure.



**Tightening torque:**

Frame to engine .....	82 Nm
Struts to frame .....	58 Nm
Struts to engine (clean thread + Loctite 2701).....	58 Nm
Spring strut to frame .....	43 Nm
Leading link to engine .....	130 Nm
Threaded pin to frame (clean thread + Loctite 243).....	130 Nm
Fixed tube to fork bridge (de-oiled, degreased) .....	45 Nm
Handlebar tightening sequence:	
1. Front fastener (as viewed in forward direction of travel) until seated .....	21 Nm
2. Rear fastener (as viewed in forward direction of travel) .....	21 Nm
Holder, brake line to frame .....	9 Nm
Bolts on quick-release axle .....	30 Nm
Clamping screws for slider tube .....	22 Nm
Brake caliper to fork slider.....	30 Nm





R28460130

## 46 51 Removing and installing frame tail section

### Attention:

Switch off ignition.  
Disconnect earth (ground) lead from battery.  
Insulate earth (ground) lead.

- Remove the seat.
- Remove fuel tank.
- Remove case holder with luggage rack, if necessary.
- Remove rear side panels.
- Remove rear trim panel.
- Remove rear mudguard and rear carrier.
- Remove the seat holder.
- Remove upper fastener of spring strut.
- Disconnect the brake light switch plug and detach the cable.
- **[Integral ABS]** Disconnect plug of ABS sensor and cable.
- Disconnect clutch breather line from rear frame.
- Remove front left and right footrest plates.
- Remove the rear left footrest plate.
- Remove wiring harness from rear of frame/only loosen central electrical equipment box.
- Remove holder of brake line.
- Remove brake fluid reservoir from its holder.

- Remove the silencer from the rear frame section.
- Remove air filter box from rear section of frame.
- Remove fastener of rear frame section in air filter box.
- Release the plug for the fuel pump from the rear frame.
- Secure the rear frame to the assembly crane, **BMW No. 46 5 640**.

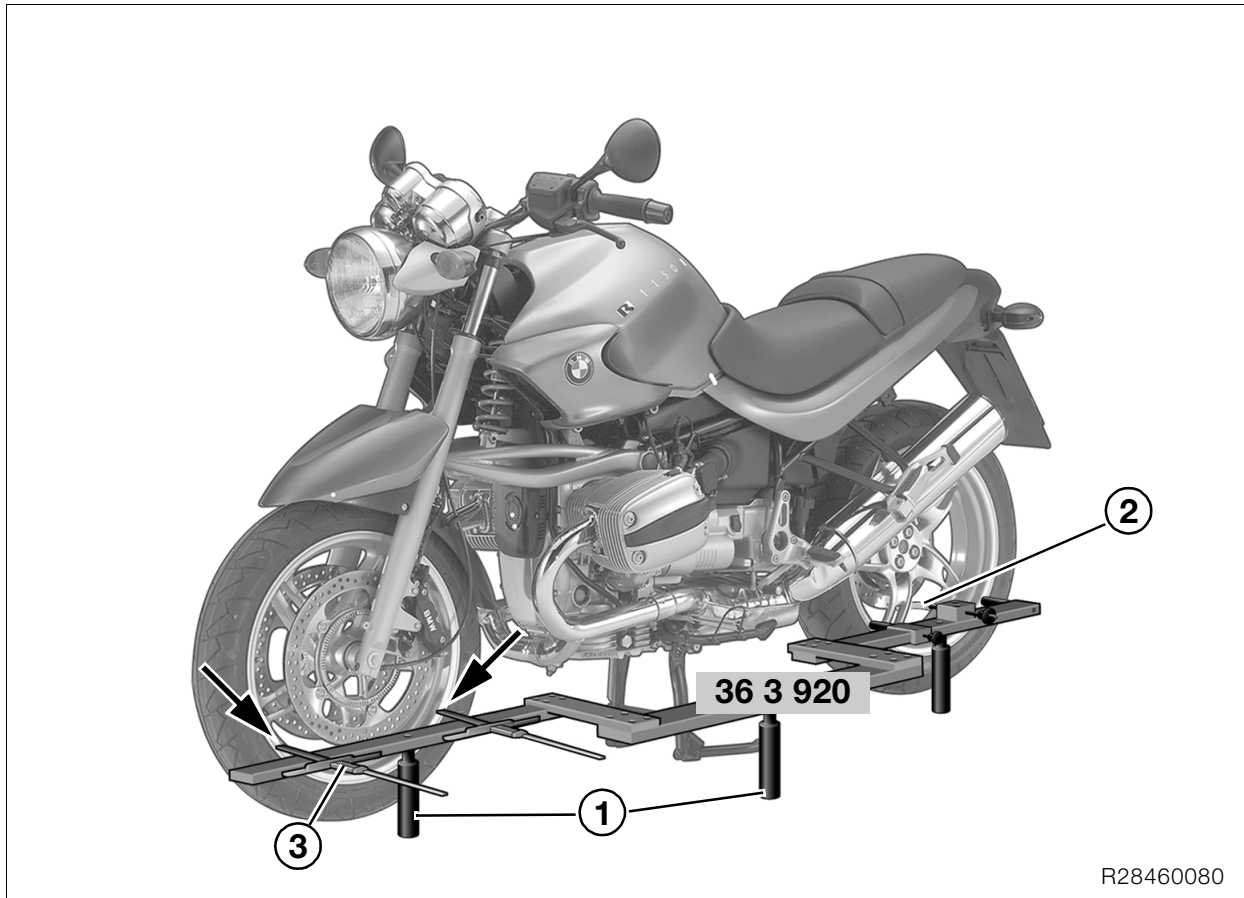
### Attention:

**[Integral ABS]** Do not damage the brake lines.

- Remove rear section of frame.
- Remove fittings.
- Installation is the reverse of the removal procedure.

### Tightening torque:

Footrest plate with rear frame to gearbox (clean thread + Loctite 2701).....	42 Nm
Frame to engine .....	42 Nm
Struts to engine.....	58 Nm (clean thread + Loctite 2701)
Holder, brake line to rear frame .....	9 Nm (clean thread + Loctite 2701)
Spring strut to rear frame .....	50 Nm



R28460080

## Checking running gear

### 46 51 Measuring wheel track offset

- Place the motorcycle on its main (centre) stand on a flat, level surface.
- Place the track offset gauge, **BMW No. 36 3 920**, against the left or right side of the motorcycle.



#### Note:

In order to use the track alignment gauge on either the left or right side, simply screw the supports in on the other side.

- Adjust supports (1) so that the measuring plane is as close as possible to the wheel centreline. The gauge must slide freely up to the motorcycle.
- Adjust measuring stops (arrows) until they contact the rim - not the tyre.
- Attach hook (2) to wheel spoke to secure the gauge firmly to the wheel.
- Align front wheel parallel with the gauge.
- Measure distance between outer edge of gauge and wheel rim, using depth gauge (3) or ruler, and make a note of the distance.

- Calculate wheel track offset “S”:
- Wheel track offset “S” is the distance to left or right between the longitudinal axes of the front and rear wheels.

**Track offset (S):** + 4.5 mm (+ 0.1772 in) (= to right)  
**Permissible wheel track offset (S):**  
 ..... ± 9 mm (± 0.3543 in)  
 based on + 4.5 mm (+ 0.1772 in)

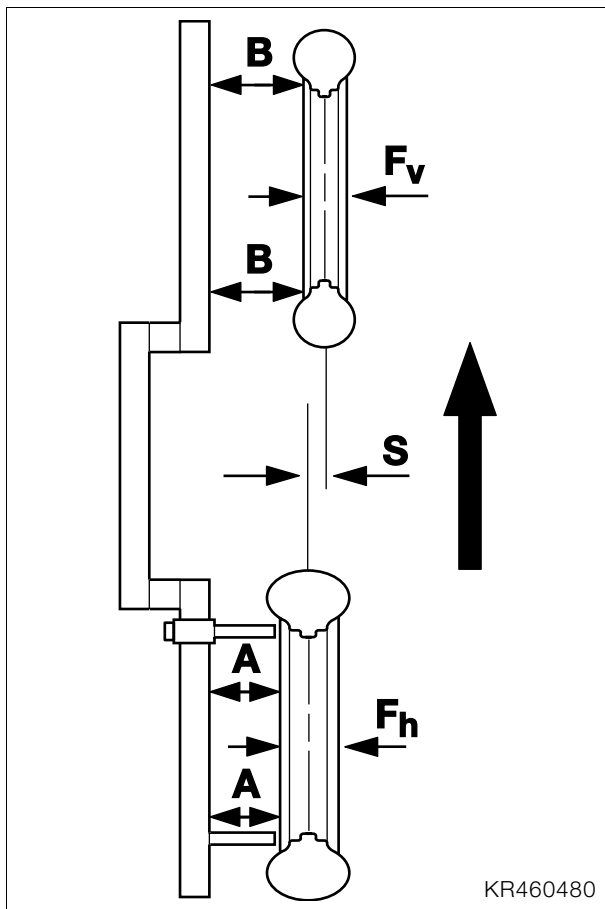
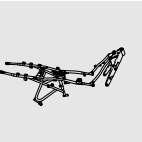
**[Integral ABS]**  
**Track offset (S):** + 3.5 mm (+ 0.1378 in) (= to right)  
**Permissible wheel track offset (S):**  
 ..... ± 9 mm (± 0.3543 in)  
 based on + 3.5 mm (+ 0.1378 in)



**Note:**

**Key to measurement result:**

Negative sign = wheel track offset to left  
 Positive sign = wheel track offset to right



KR460480

**EXAMPLE:**

Formula  $S = A + \frac{F_h}{2} - \left( B + \frac{F_v}{2} \right)$

Fixed value “A”  
 (length of measuring stops)

$A = 50.0 \text{ mm (1.9685 in)}$

Half of rear wheel rim width

$\frac{F_h}{2} = 66.3 \text{ mm (2.6102 in)}$

$A + \frac{F_h}{2} = 116.3 \text{ mm (4.5787 in)}$

Measured value (B) +

$B = 70.0 \text{ mm (2.7559 in)}$  rim width at front

$\frac{F_v}{2} = 47.5 \text{ mm (1.8701 in)}$

$B + \frac{F_v}{2} = 117.5 \text{ mm (4.6260 in)}$

**Track offset “S”**

$S = A + \frac{F_h}{2} - \left( B + \frac{F_v}{2} \right)$

$S = 116.3 \text{ mm} - 117.5 \text{ mm (4.5787 in} - 4.6260 \text{ in)}$

Track offset “S” = - 1.2 mm (- 0.0472 in)

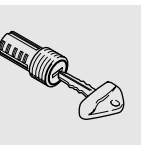
# 51 Equipment

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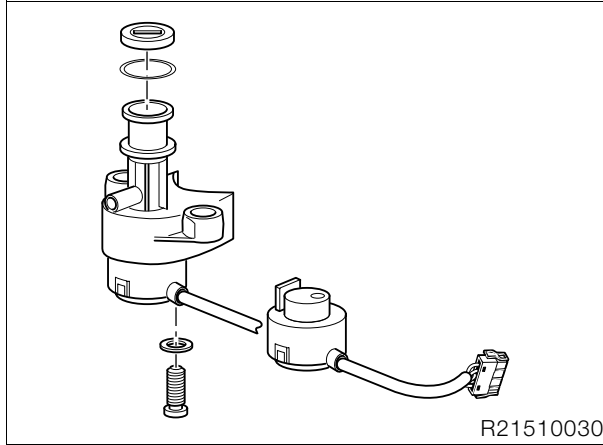
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## 51 25 Removing and installing ignition switch/steering lock



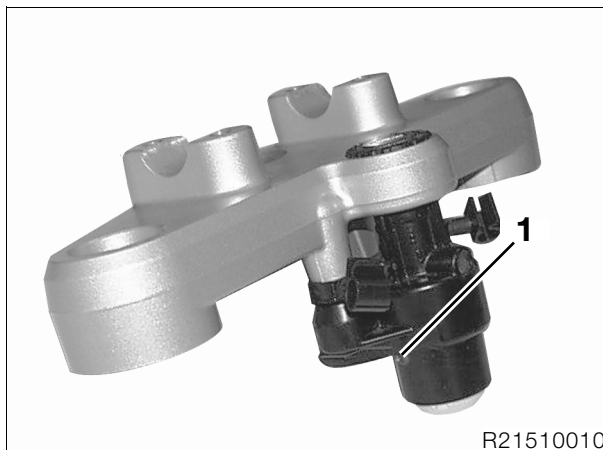
- Remove fork bridge.
- With a 4 mm (0.1575 in) dia. drill bit, drill approx. 5 mm (0.1969 in) into non-removable screw (1).
- Use an 8 mm (0.3150 in) dia. drill bit to drill away the screw head.
- Pull out the ignition switch/steering lock.
- Unscrew and remove remainder of screw with stud bolt extractor.
- Install steering lock with non-removable socket wrench insert, **BMW No. 51 0 531**.



### Tightening torque:

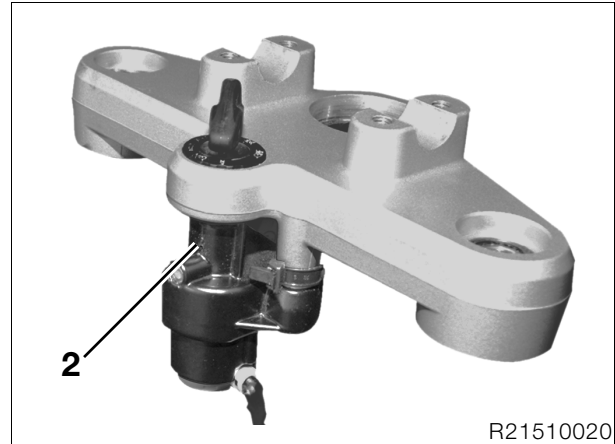
Non-removable screws  
(micro-encapsulated)..... 20 Nm

## 61 13 Removing and installing ignition/light switch



- Remove screw (1).
- Remove the ignition/light switch.
- Installation is the reverse of the removal procedure.

## Removing and installing lock barrel

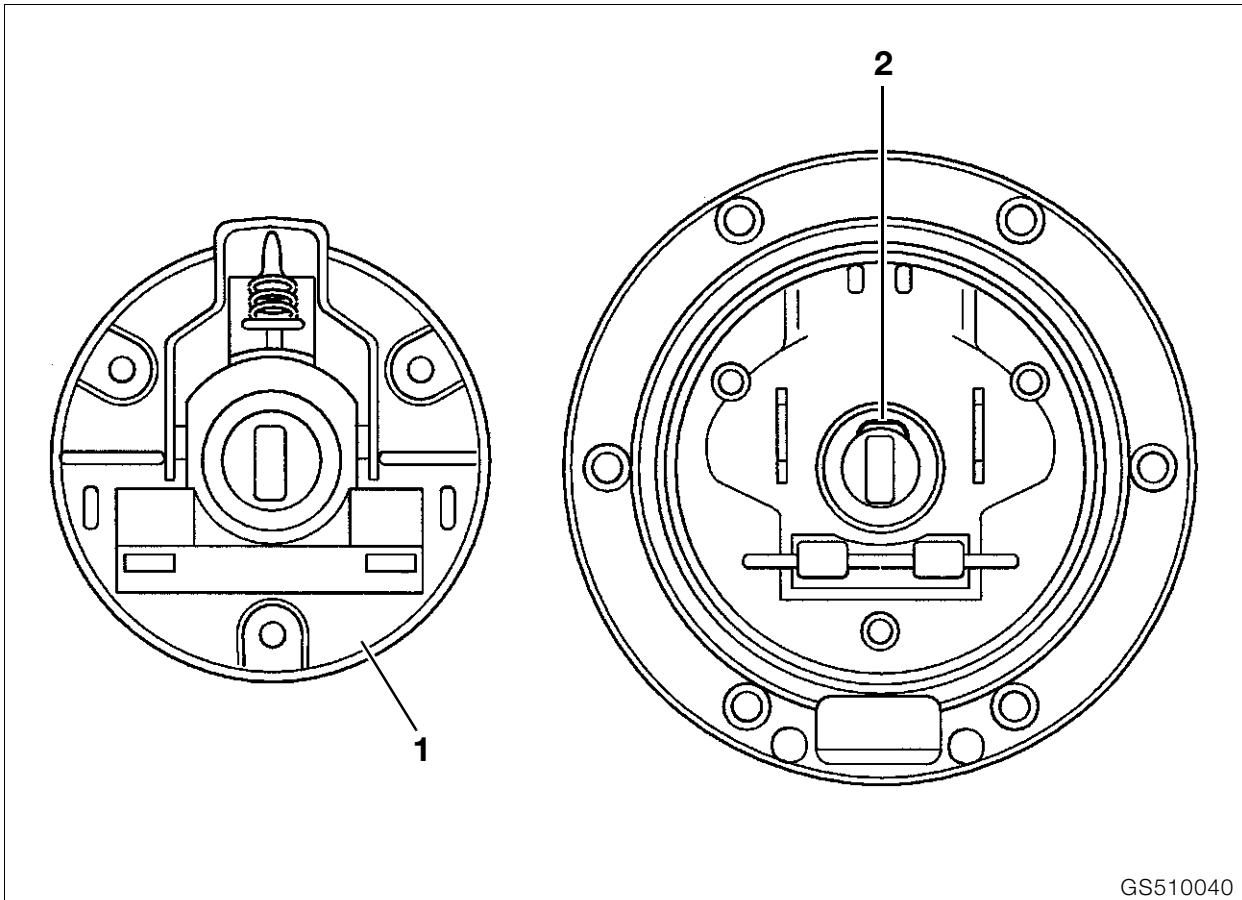


- Key in ON position/press in keeper (2) with a stiff wire or similar.
- Pull out lock barrel with key.
- Lubricate the new lock barrel with **Shell Retinax A**.
- Insert the lock barrel with the key in the ON position.
- Press lock barrel down until keeper engages.



### Drilling out lock barrel

- Use a 4-5 mm (0.1575-0.1969 in) dia. drill bit to drill the full length of the lock barrel.
- Repeat with drill bits of successively larger diameter until the lock barrel can be removed.



GS510040

## 51 25 Removing and installing lock barrel for fuel tank filler cap



### Note:

Make sure that screws do not fall into fuel tank: cover fuel tank filler neck with cloth.

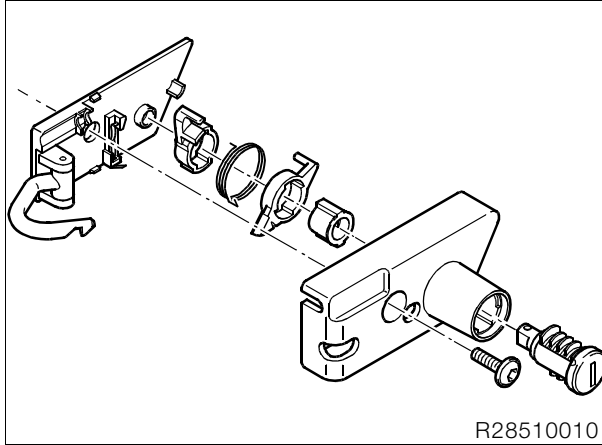
- Open cap and remove lower part of cap (1).
- Insert key in lock barrel and press down on retainer (2).
- Pull out lock barrel with key.
- Lubricate the new lock barrel with **Shell Retinax A**.
- Install lock barrel with key (at a right angle to direction of travel).
- Installation is the reverse of the removal procedure.

### Drilling out lock barrel

- Use a 4-5 mm (0.1575-0.1969 in) dia. drill bit to drill the full length of the lock barrel.
- Repeat with drill bits of successively larger diameter until the lock barrel can be removed.



## 51 25 Removing and installing seat lock/helmet lock



- Open the retainer.
- Remove fastener securing seat lock/helmet lock.
- Use a screwdriver to pry off the cap on the inside.
- Remove the spring and the hook.
- Press the keeper of the lock barrel into the housing and use the key to pull out the barrel.
- Lubricate the new lock barrel with **Shell Retinax A**.



# 52 Seat

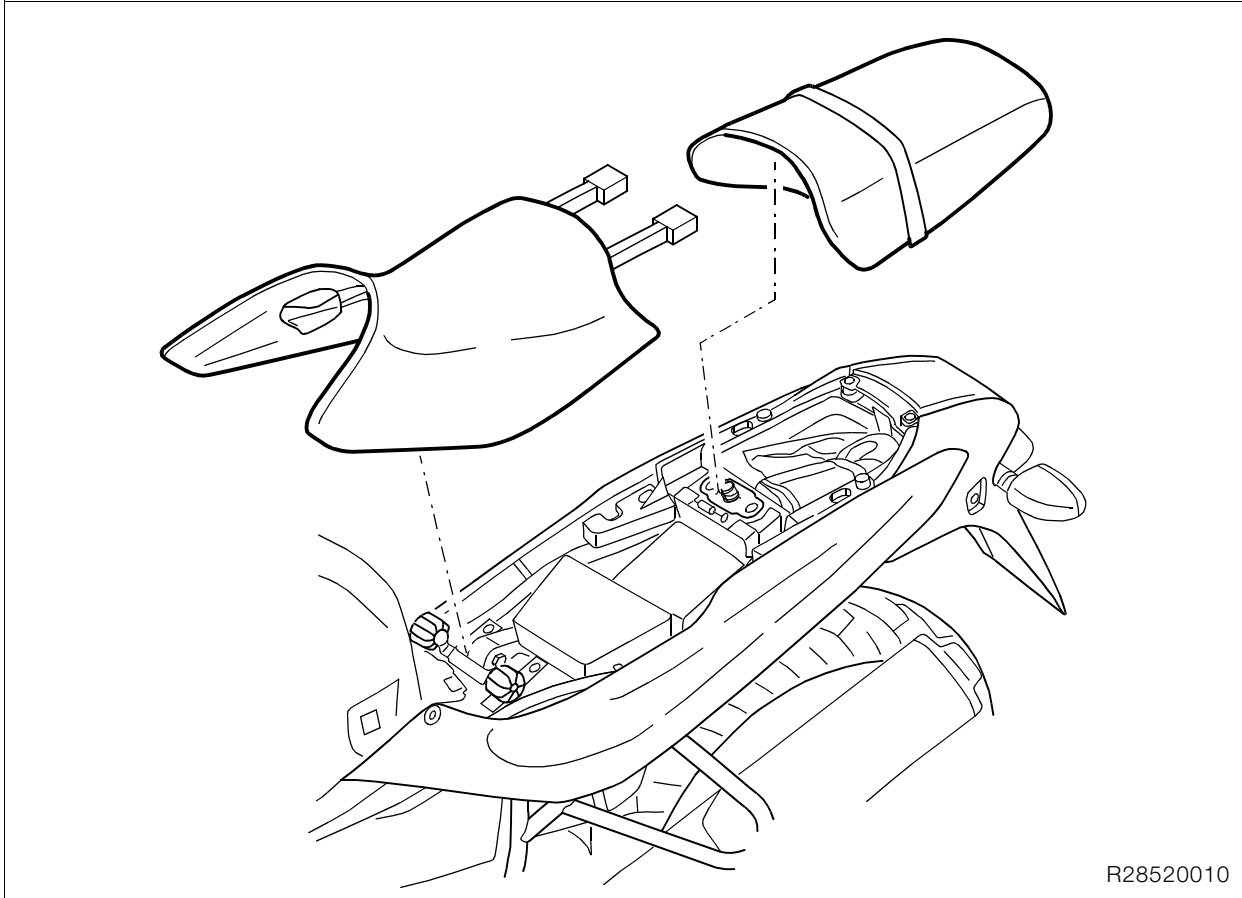
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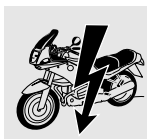
R28520010

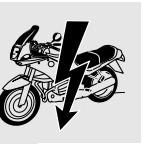


**52 51 Disassembling/assembling seat**

# 61 General electrical equipment

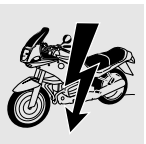
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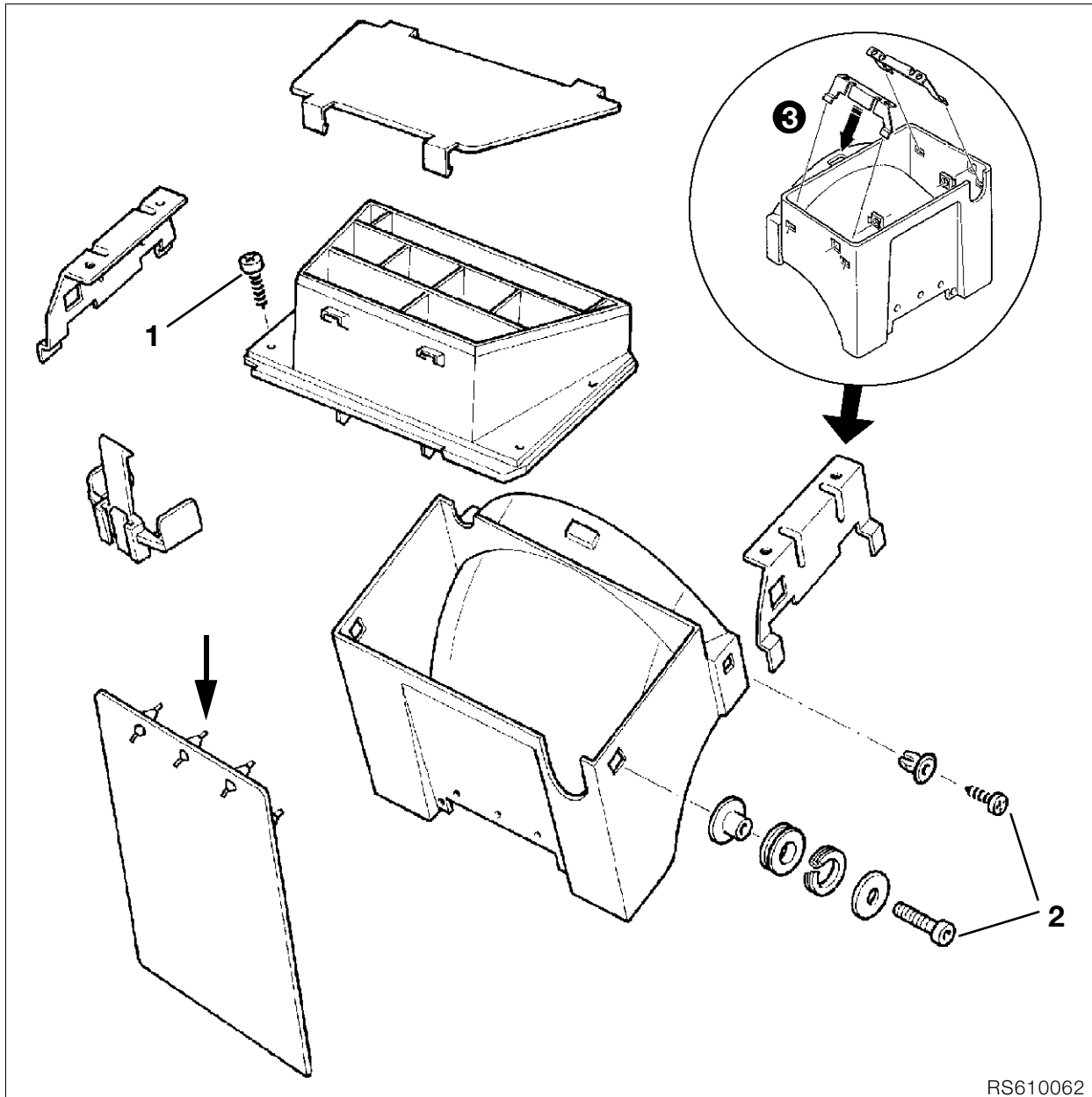


<b>Technical Data</b>	<b>R 1150 R</b>
Battery	A/h 19









RS610062

### 61 13 Removing and installing central electrical equipment box

#### Attention:

Switch off ignition.  
Disconnect earth (ground) lead from battery.  
Insulate earth (ground) lead.

- Remove the seat.
- Remove rear side panels.
- Remove screws (1) securing top of central electrical equipment box.
- Remove screws (2) securing bottom of central electrical equipment box.
- Pull cable tray down and remove.
- Remove relay and relay base or if necessary, disconnect entire wiring harness and remove complete with fuse box.
- Installation is the reverse of the removal procedure.

- After installation, shorten the middle rubber lug of the anti-spray fastener (arrow) to 10 mm (0.3937 in).
- Switch on the ignition.
- Without starting the engine, fully open the throttle once or twice so that the Motronic control unit can register the throttle-valve positions.

#### Note:

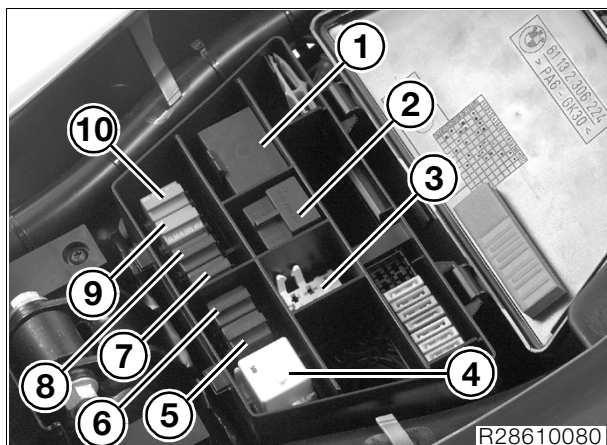
Disconnecting the battery deletes all entries (e.g. faults, settings) stored in the Motronic control unit's memory.  
Loss of settings can temporarily impair the operating characteristics when the engine is restarted.

### 61 13 Disassembling/assembling central electrical equipment box

- See illustration (3).

## Relay positions/fuse assignments (central electrical equipment box)

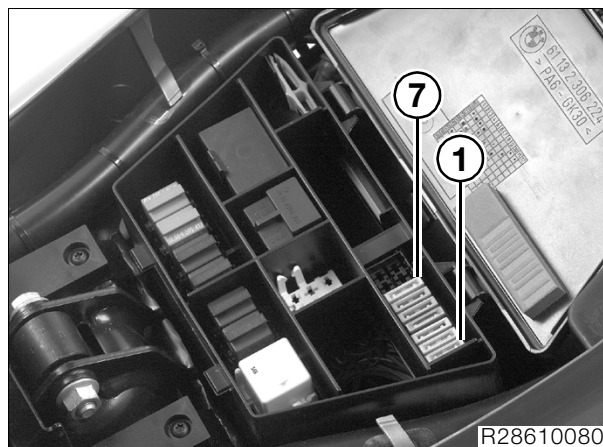
### Relay positions



1. Flasher unit
2. Indicator damping
3. Coded plug for Motronic
4. Starter motor relay
5. Relief relay
6. Horn relay
7. Fuel pump relay
8. Motronic relay
9. ABS warning relay
10. Lighting relay

### Fuse assignments

(No. 1 on left, looking forwards)



1. Instrument cluster, indicator damping,  
brake light (without Integral ABS only) ..... 4 A
2. Parking light, tail light ..... 4 A
3. Rider information display, power socket..... 15 A
4. Horn..... 7.5 A
5. Motronic, diagnosis plug ..... 10 A
6. Fuel pump ..... 10 A
7. Heated handlebar grips ..... 4 A



## Wiring-harness routing, frame [Integral ABS]



### Attention:

Use (yellow) galvanized screws for the ground (earth) connection to the engine.

Screws with unsuitable corrosion proofing can cause the electrical resistance to rise as high as 80  $\Omega$ .

Run wiring without kinking and avoid risk of abrasion. Note the number and position of the cable ties.

---

- Apply a thin coating of contact grease, e.g. **CENTOPLEX 3 CU** to the central earth (ground) point, which must be cleaned to bright metal first.



### Note:

When removing the wiring harness, take out the central electrical equipment box at the same time. When installing, install the central electrical equipment box first.

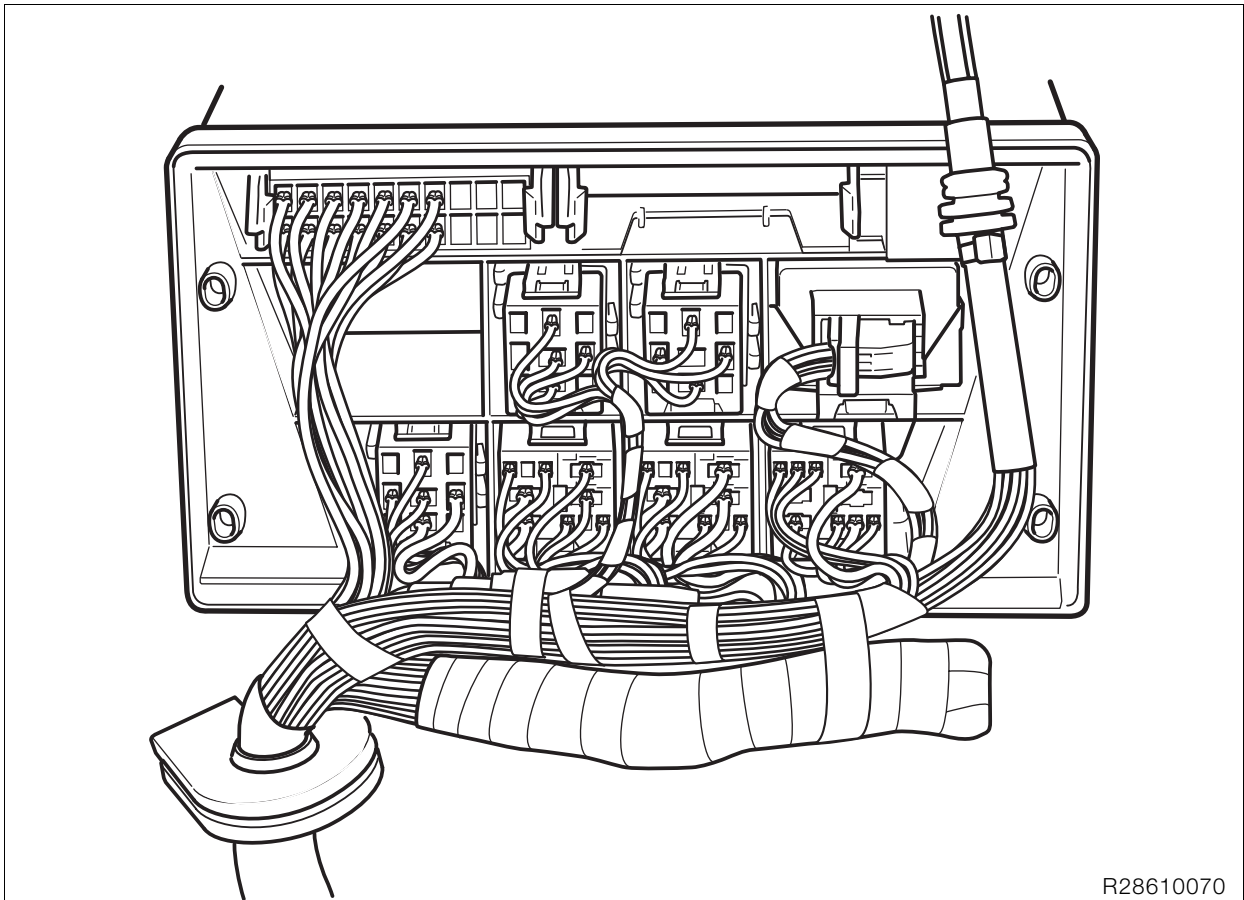
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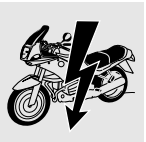
### Tightening torque:

Ground terminal to engine block ..... 9 Nm

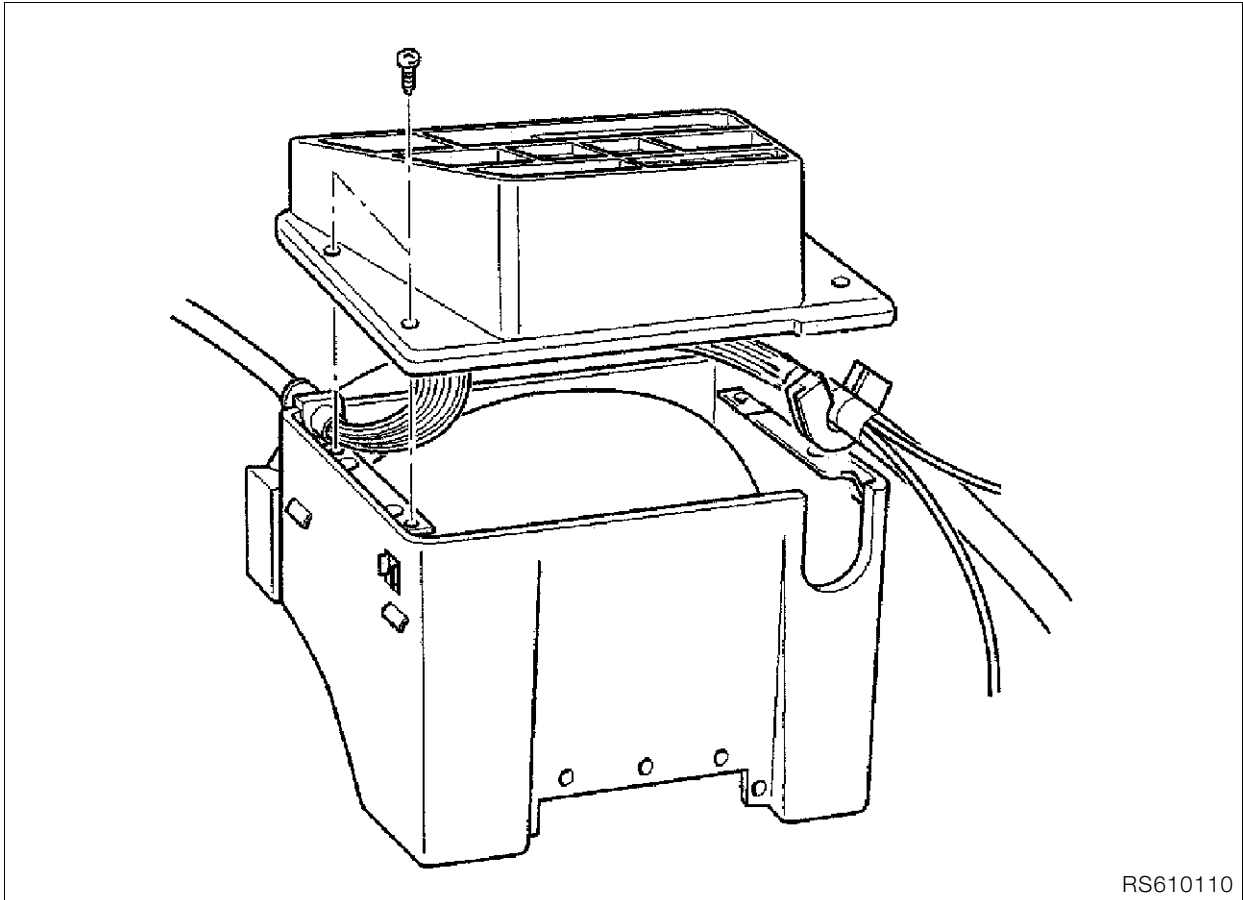




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Wiring-harness routing/connection in  
central electrical equipment box



RS610110

Wiring-harness routing, central electrical equipment box/output

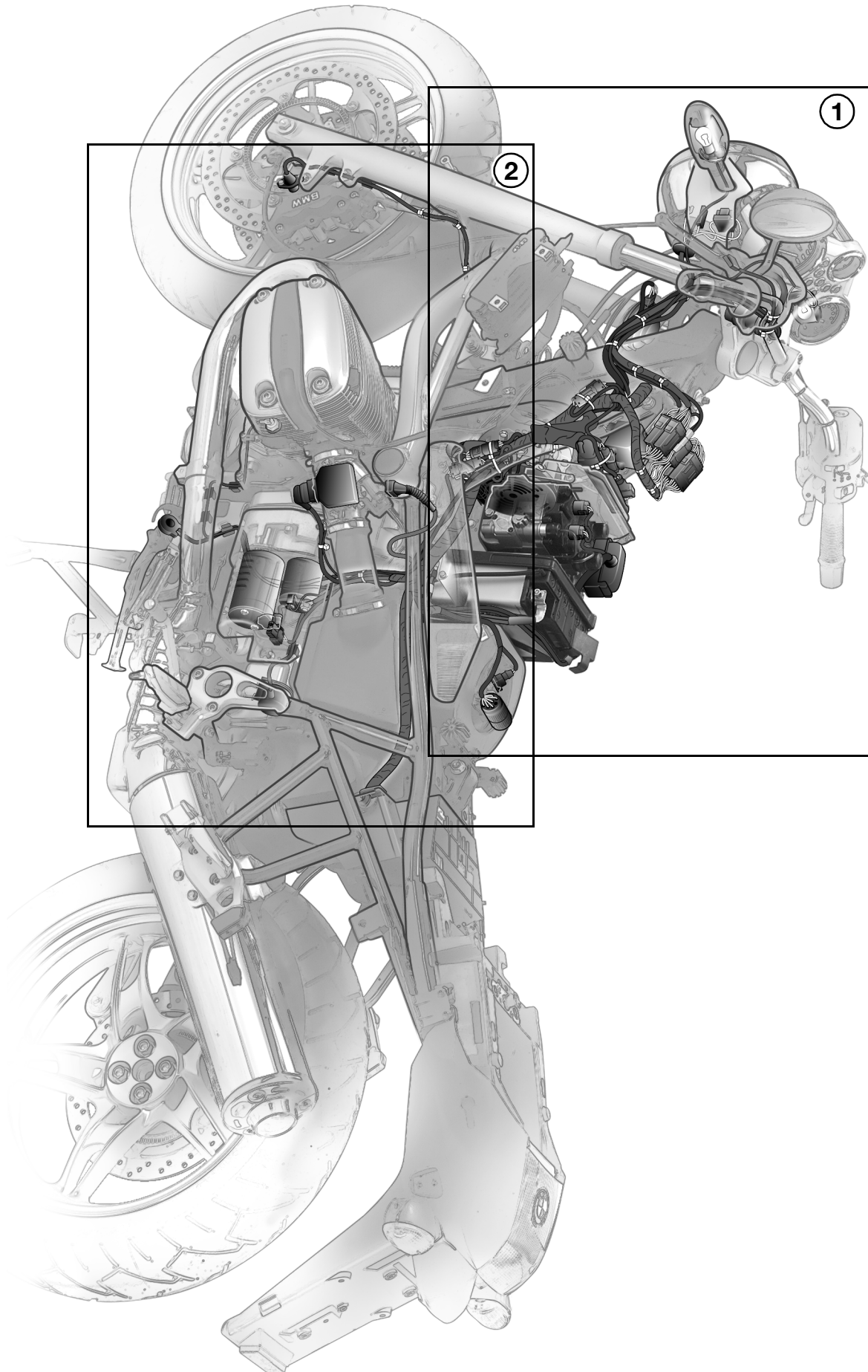


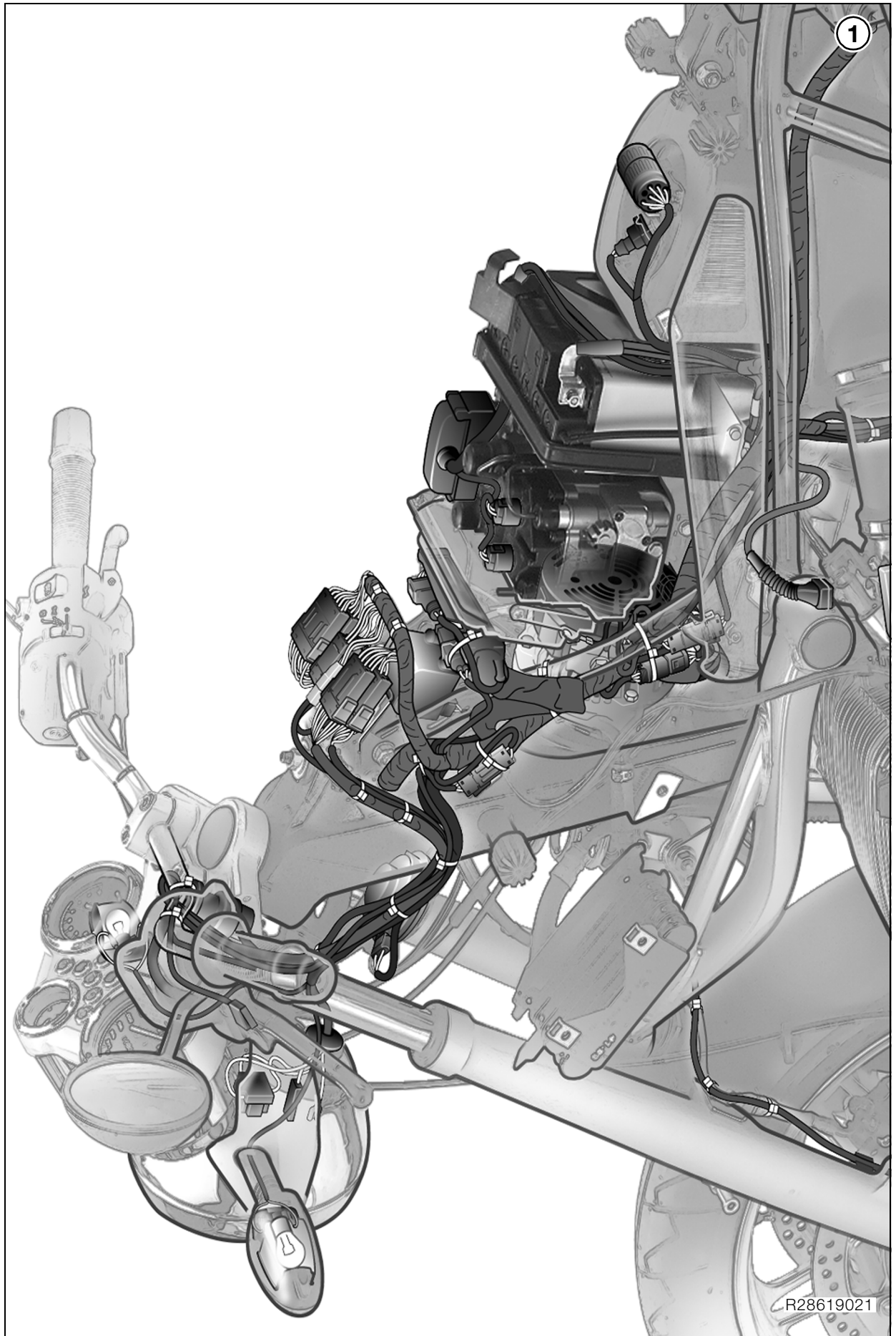
**Note:**

The white mark (arrow) must be covered by the grommet.

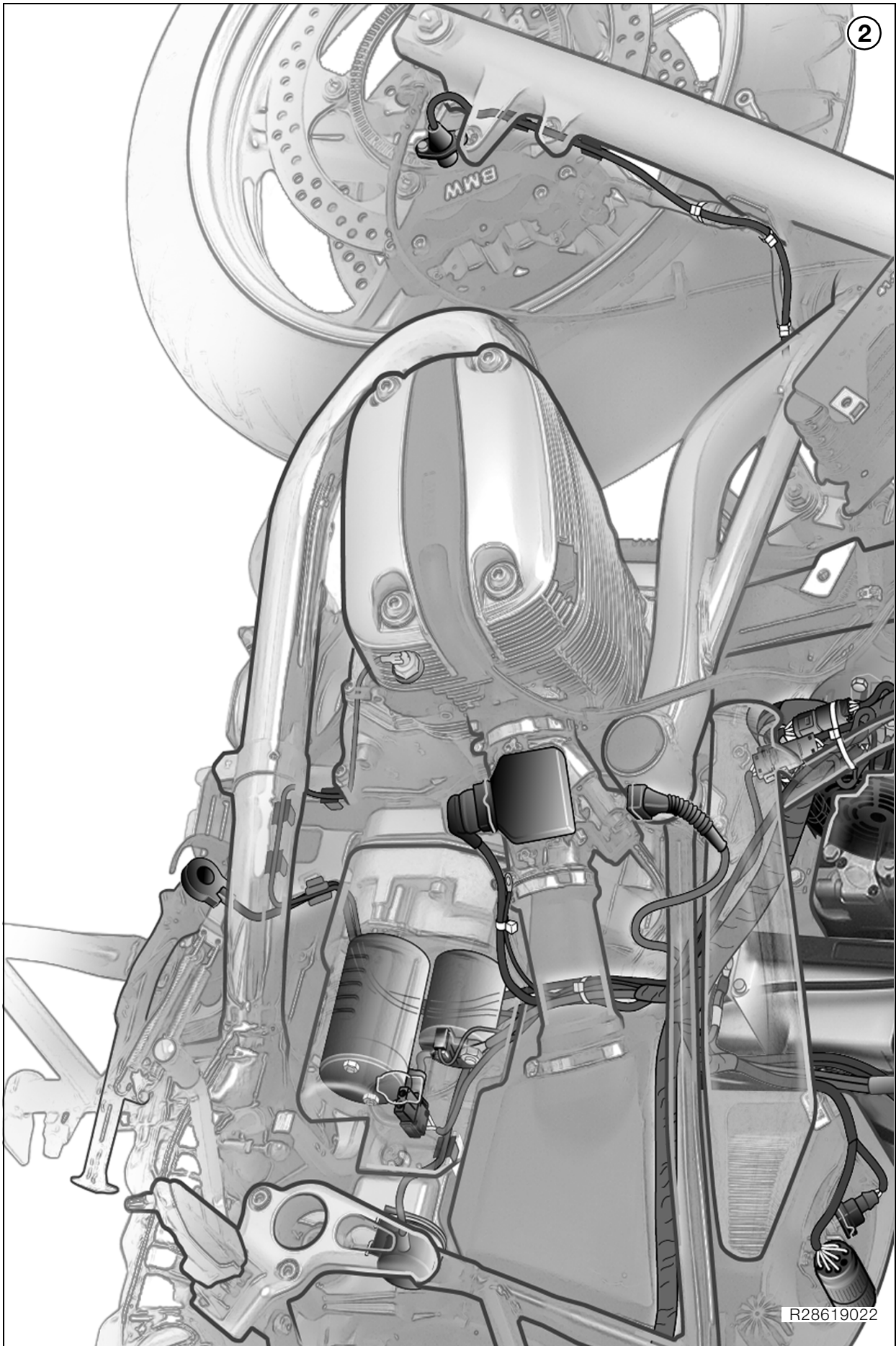


Wiring-harness routing  
View from left





R28619021

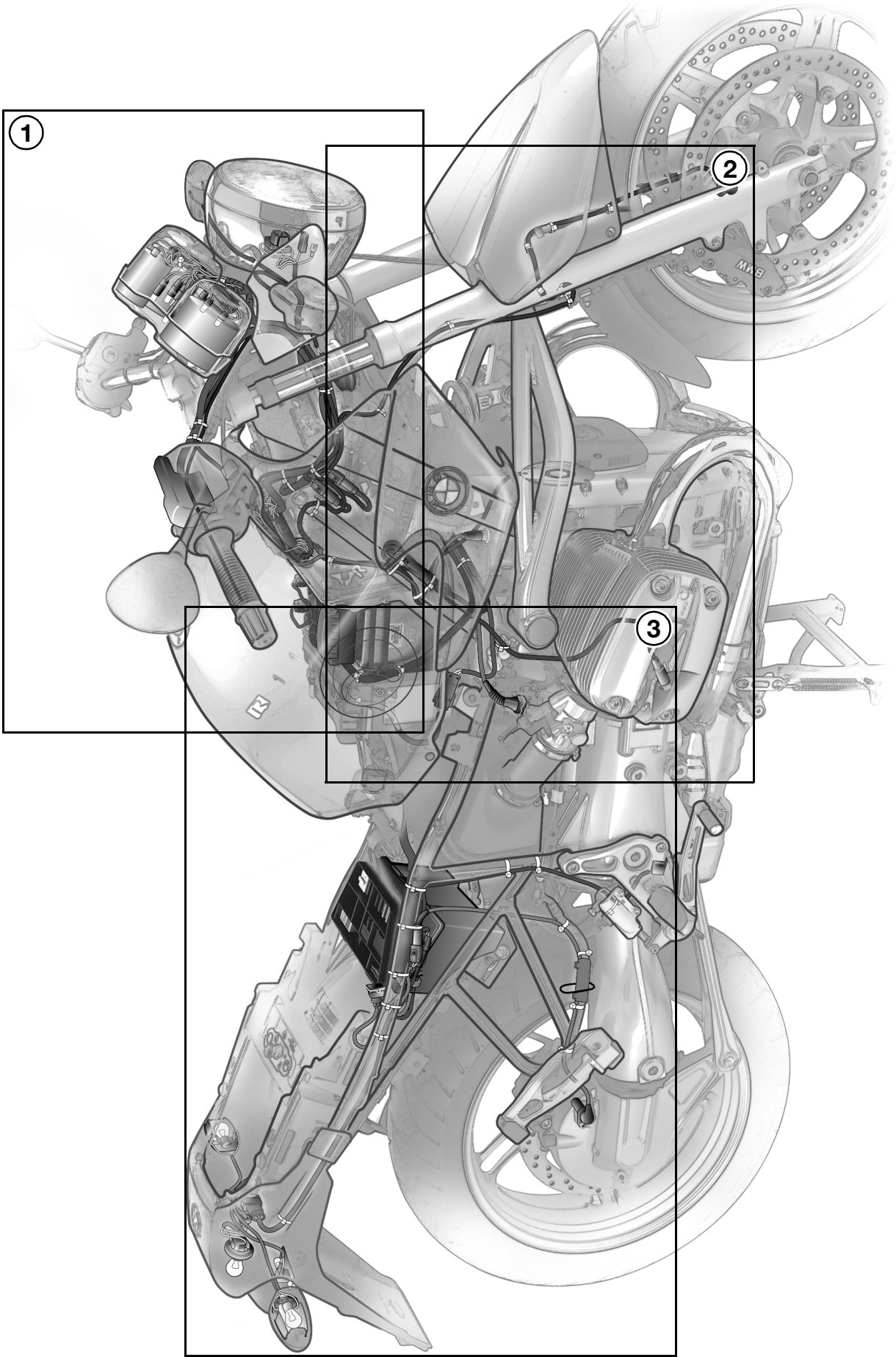


R28619022

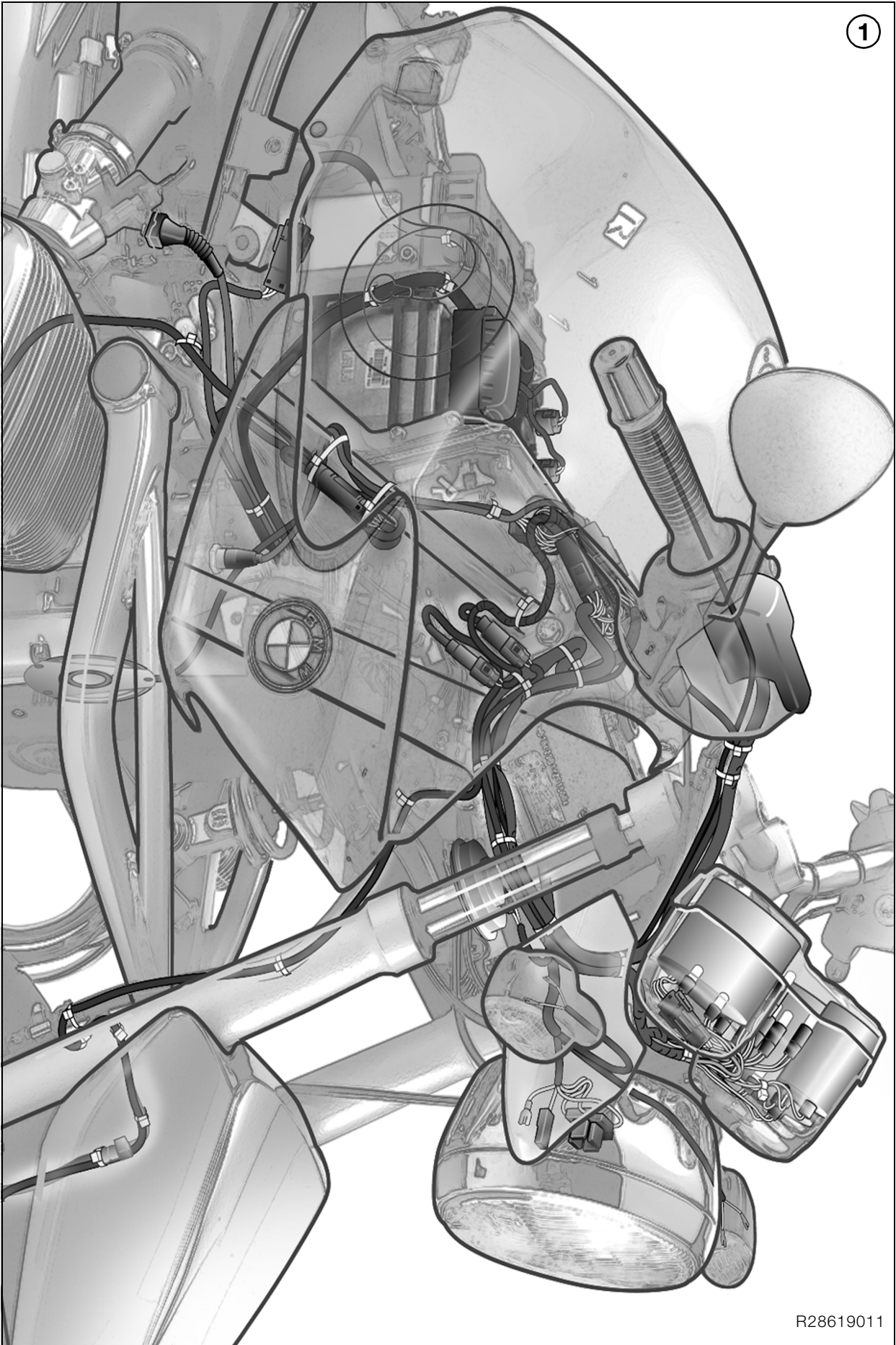


Wiring-harness routing

View from right

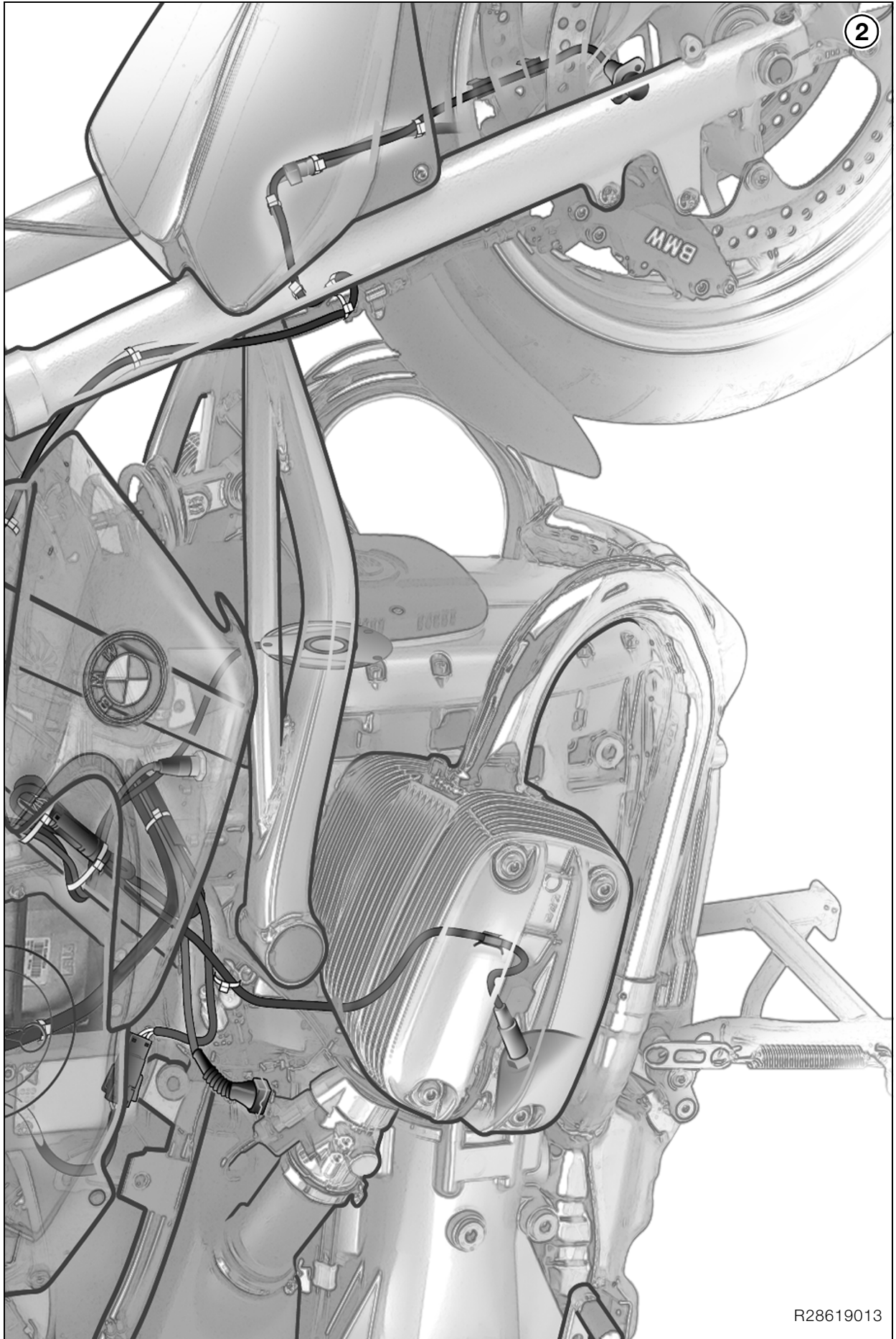


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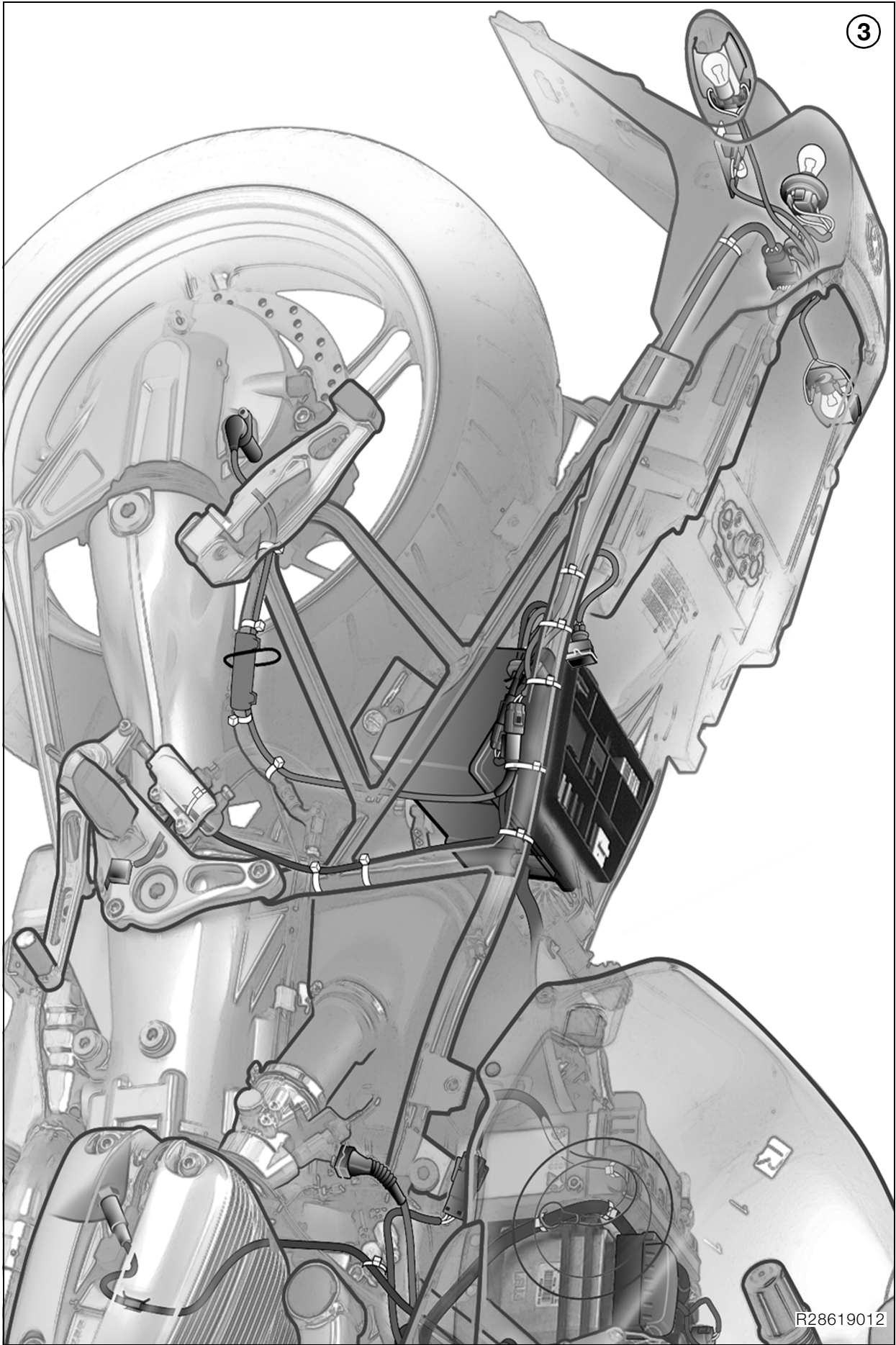
R28619011





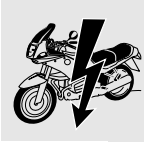
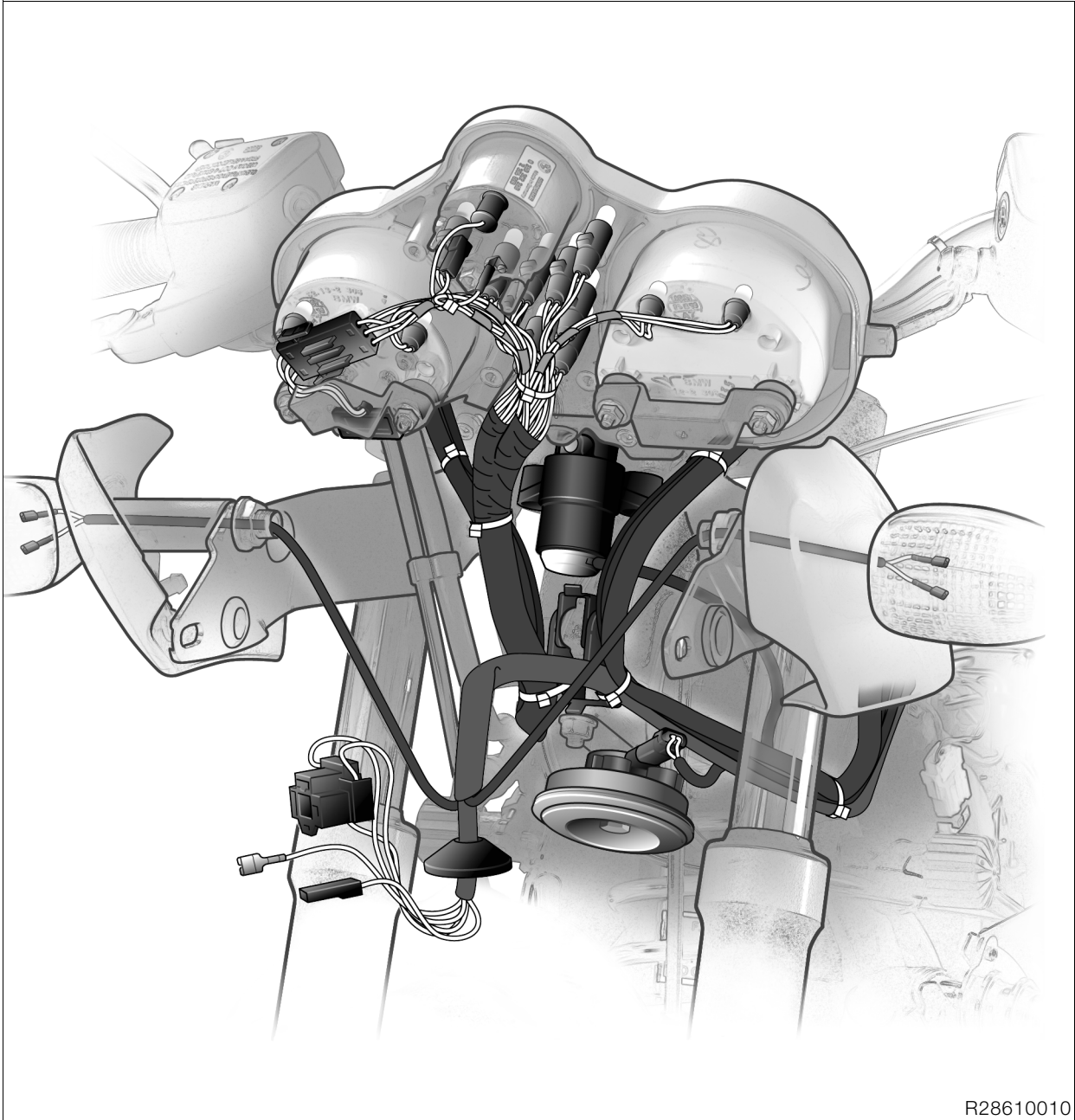
R28619013





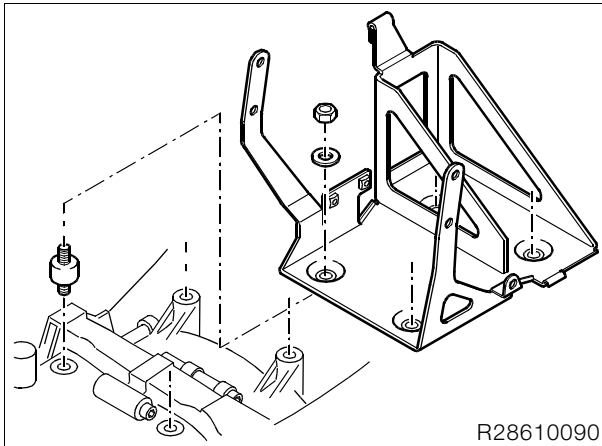


Wiring harness  
Front



R28610010

## 61 21 Removing and installing battery holder




- Remove fuel tank.
- Remove the battery.

### **Attention:**

Disconnect the negative battery terminal first, then the positive terminal.

Connect the positive battery terminal first, then the negative terminal.

- 
- Motronic control unit.
  - **[Integral ABS]** Remove the unit.
  - Remove the air intake stub pipe.
  - Disconnect Bowden cable for starting-speed increase from handlebar fitting.
  - Disconnect cable from left throttle valve.
  - Remove Bowden-cable divider from holder.
  - Pull the battery holder to the left to remove.
  - Installation is the reverse of the removal procedure.
  - Switch on the ignition.
  - Without starting the engine, fully open the throttle once or twice so that the Motronic control unit can register the throttle-valve positions.

### **Note:**

Disconnecting the battery deletes all entries (e.g. faults, settings) stored in the Motronic control unit's memory.

Loss of settings can temporarily impair the operating characteristics when the engine is restarted.

### **Tightening torque:**

Battery carrier to rubber-metal element..... 8 Nm

# 62 Instruments

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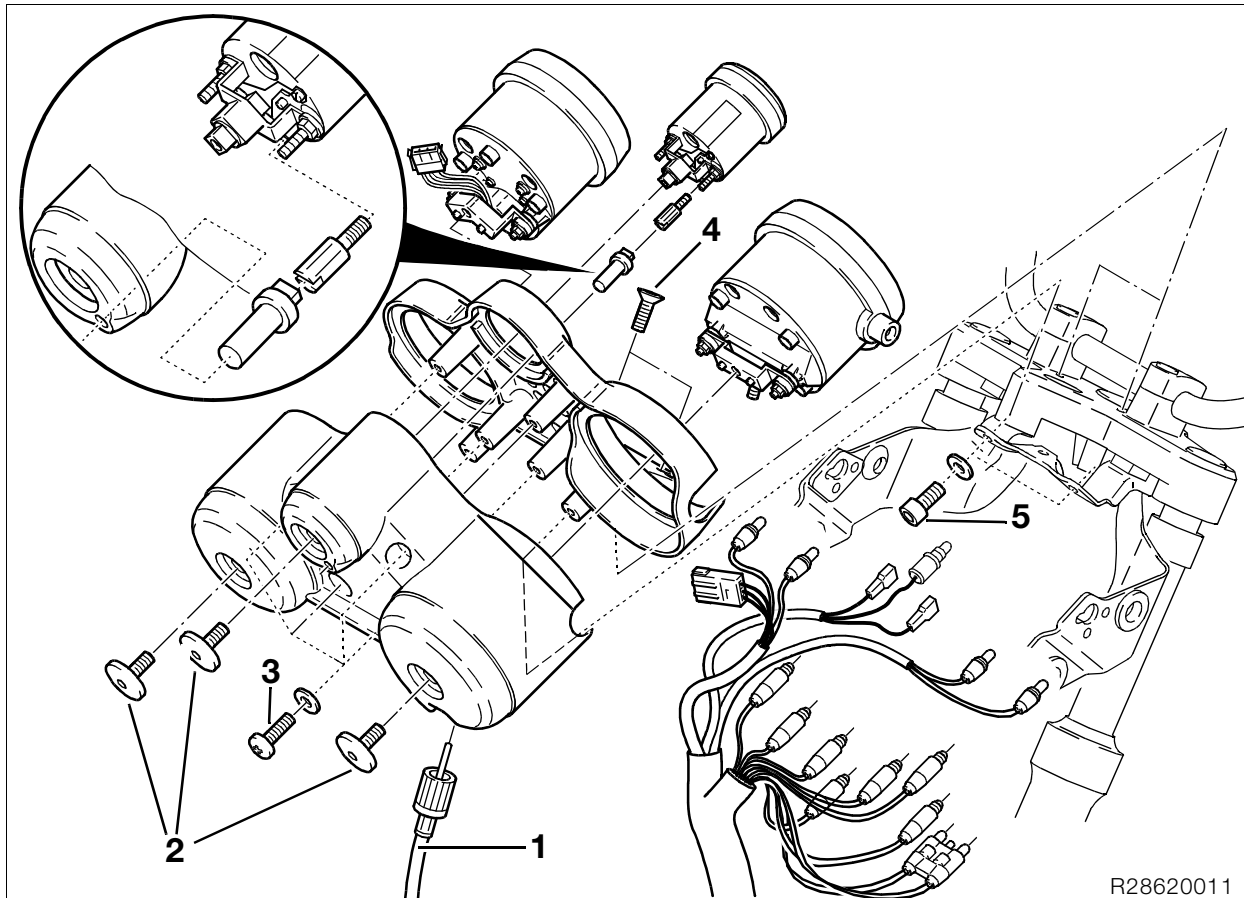




<b>Technical Data</b>	<b>R 1150 R</b>
<b>Instrument cluster</b>	
Instrument lighting / telltales	A 12V 1.7 W
<b>[ABS]</b> ABS warning light/brake failure	A 14V 3 W
<b>Speedometer drive</b>	
Speedometer drive ratio	$I = 2.6$







R28620011

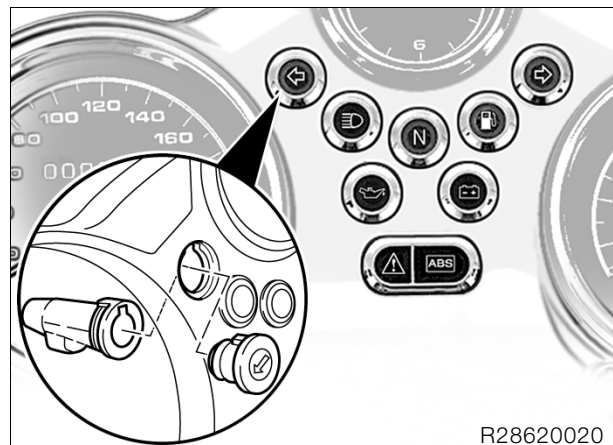
## 62 11 Removing and installing instrument cluster



### Attention:

Switch off ignition.  
Disconnect earth (ground) lead from battery.  
Insulate earth (ground) lead.

- Remove speedster windscreen with holder, if applicable.
- Remove headlight.
- Disconnect speedometer drive (1).
- Remove screws (2), (3) and remove the cover.
- Disconnect instrument lighting for speedometer and remove the speedometer.
- Disconnect the plug for the rev. counter.
- Disconnect instrument lighting for rev. counter and remove the rev. counter.
- Disconnect instrument lighting for clock.
- Disconnect the plugs for the clock and remove the clock.



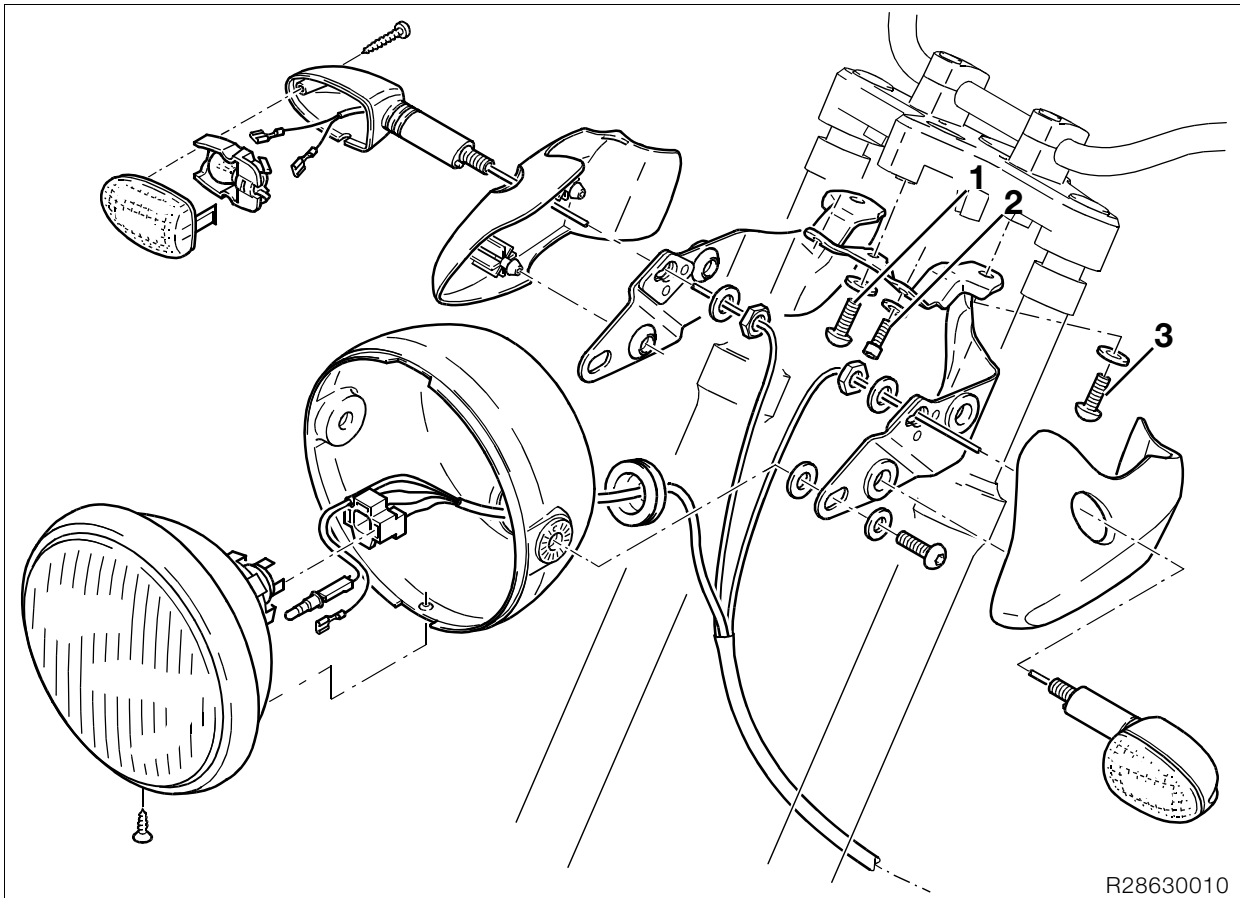
R28620020



### Attention:

Do not mix up the protective caps.

- Push the telltales up slightly, remove the caps and lower the telltales out of the assembly.
- Remove screws (4), (5) and remove the instrument carrier.
- Installation is the reverse of the removal procedure.



R28630010

## 46 63 Removing and installing bracket of instrument carrier

### Attention:

Switch off ignition.  
Disconnect earth (ground) lead from battery.  
Insulate earth (ground) lead.

- Remove speedster windscreen with holder, if applicable.
- Remove front left and right turn indicators.
- Remove the side panels.
- Remove headlight.
- Detach speedometer shaft.
- Open cable ties at headlight bracket.
- Open cable ties at horn bracket.
- Remove screw (1).
- Remove screws (2) and (3).
- Release instrument panel from top fork bridge, pull it slightly forward and hold it in this position.

### Attention:

Do not scratch the instrument cluster.

- Lift out the bracket for the instrument carrier.

- Installation is the reverse of the removal procedure.

### Attention:

Do not secure the ignition-cable harness to the horn bracket together with the cable package, in order to ensure that the ignition-cable harness has sufficient freedom of movement to allow for handlebar movement.

- Correct the beam angle after slightly loosening the headlight mountings.

### Adjustment distance

.....-25 cm (-0.8202 ft) at a distance of 10 m  
..... (32.8084 ft)

### Tightening torque:

Bracket for instrument carrier to fork bridge. 20 Nm

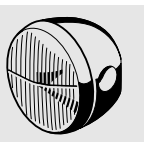
# 63 Lights

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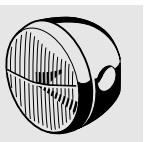
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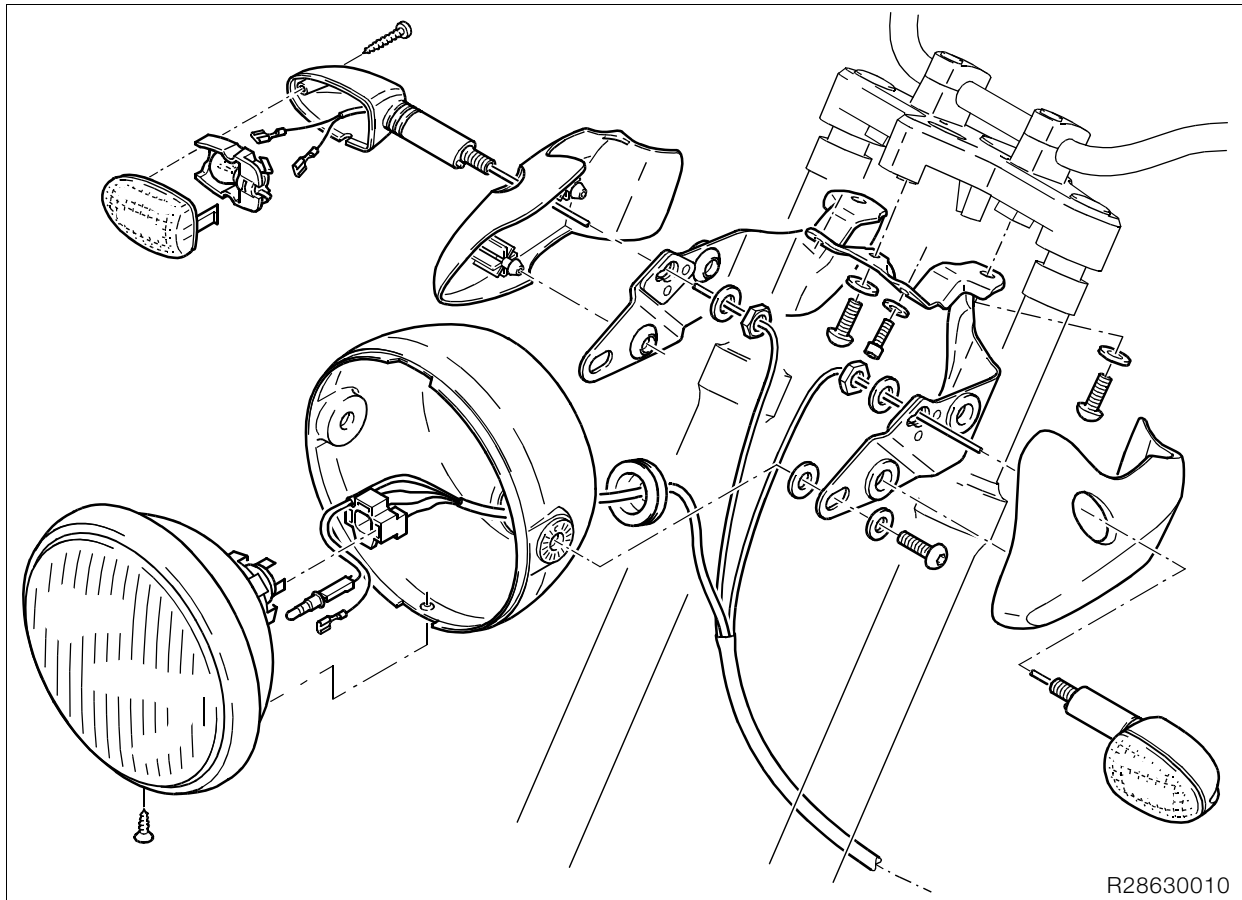


<b>Technical Data</b>	<b>R 1150 R</b>
Headlight	Circular, with halogen
<b>Bulbs</b>	
High/low (dipped) beam headlight	H4 halogen bulb 12 V 60/55 W
Parking light	12 V/ 4 W Standard designation T 8/4
Brake/rear light	12 V/ 21/5 W Standard designation P 25-2
Flashing turn indicator	12 V/ 21 W Standard designation P 25-1
Number-plate light	Halogen bulb 12 V/6 W









### 63 12 Removing and installing headlight



**Attention:**

Switch off ignition.  
Disconnect earth (ground) lead from battery.  
Insulate earth (ground) lead.



**Attention:**

Never touch the glass of the bulb with the fingers.

### 63 10 004 Adjusting headlight

- Correct the beam angle after slightly loosening the headlight mountings.

**Adjustment distance:** ..... -25 cm (-0.8202 ft)  
..... at a distance of 10 m (approx. 33 ft)

### 63 13 Removing and installing front indicators



**Attention:**

Switch off ignition.  
Disconnect earth (ground) lead from battery.  
Insulate earth (ground) lead.

- Remove the indicator lenses, disconnect plug from reflector and pull the cable through the indicator mount.



**Attention:**

Do not touch inner surface of reflector or bulbs with bare hands.

- Remove the turn indicator.
- Installation is the reverse of the removal procedure.

