



Workshop Manual

CC 2010 ➤

CC 2012 ➤

Passat CC 2009 ➤

Brake systems

Edition 12.2011





List of Workshop Manual Repair Groups

Repair Group

- 00 - Technical data
- 45 - Anti-lock brake system
- 46 - Brakes - mechanism
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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.



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00 – Technical data

1 Identification

⇒ „1.1 Allocation of PR number - brakes“, page 1

1.1 Allocation of PR number - brakes

The type of brake system installed in the vehicle is indicated amongst other things by the corresponding PR number on the vehicle data sticker.

The vehicle data sticker can be found in the spare wheel well and in the service booklet.

- ◆ Allocation ⇒ Electronic Parts Catalogue (ETKA) .
- ◆ The following table explains the PR numbers. These are important for the brake caliper/brake disc and brake pads.

1.1.1 Front brakes

Engine	PR No.	Front brakes
1.4l - 118 kW	1LH / 1ZM	FN3 (16")
1.8l - 118 kW		
2.0l - 147 kW		
2.0l - 100, 103, 105 kW TDI		
2.0l - 125 kW TDI		
3.6l - 220 kW ¹⁾	1LK	FNR-G (17")
3.6l - 220 kW ²⁾	1LA	C60 (17")

1) to 12.2010

2) as of 01.2011

Country specific brake for North America / Japan:

Engine	PR No.	Front brakes
2.0l - 147 kW	1ZG	FN3 (16")
3.6 l - 206 kW (front-wheel drive)		
3.6 l - 206 kW (four-wheel drive) ¹⁾	1LK	FNR-G (17")
3.6 l - 206 kW (four-wheel drive) ²⁾	1LB	C60 (17")

1) to 12.2010

2) as of 01.2011

1.1.2 Rear brakes

Engine	PR No.	Rear brakes
1.4l - 118 kW	1KU / 1KW	CII 38 (16")
1.8l - 118 kW		
2.0l - 147 kW		
2.0l - 100, 103, 105 kW TDI		
2.0l - 125 kW TDI		



3.6l - 220 kW	2EA	CII 41 (17")
---------------	-----	--------------

Country specific brake for North America / Japan:

Engine	PR No.	Rear brakes
2.0l - 147 kW	1KU / 1KW	CII 38 (16")
3.6 l - 206 kW (front-wheel drive)		
3.6 l - 206 kW (four-wheel drive)	2EA	CII 41 (17")





2 Technical data

⇒ „2.1 Technical data for brakes“, page 3

2.1 Technical data for brakes

⇒ „2.1.1 Brake master cylinder and brake servo“, page 3

⇒ „2.1.2 Front brakes“, page 3

⇒ „2.1.3 Rear brakes“, page 4

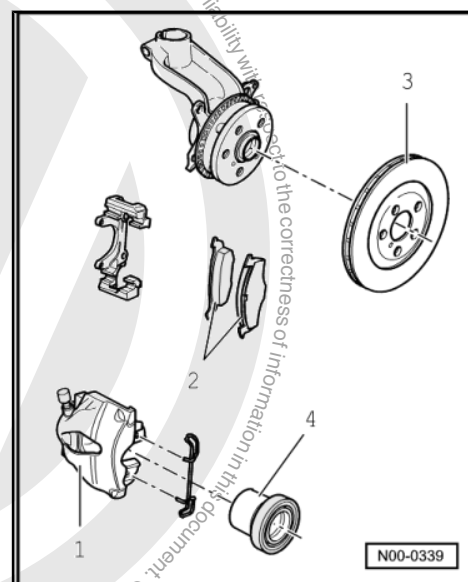
2.1.1 Brake master cylinder and brake servo

Brake master cylinder (low-output engine)	Ø in mm	22,22
Brake master cylinder (high-output engine)	Ø in mm	23.81
Brake servo (LHD)	Ø in inches	11
Brake servo (RHD)	Ø in inches	7 / 8

2.1.2 Front brakes

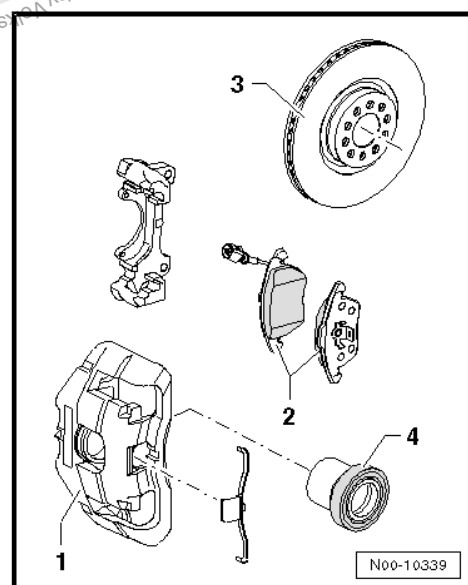
Front brakes FN3:

Item	PR No.		1LH / 1ZG / 1ZM
1	Brake caliper		FN3 (16")
2	Brake lining, thickness	mm	14
	Brake pad, wear limit without backplate	mm	2
3	Brake disc	Ø in mm	312
	Brake disc, thickness	mm	25
	Brake disc, wear limit	mm	22
4	Brake caliper, piston	Ø in mm	54



Front brakes FNR-G:

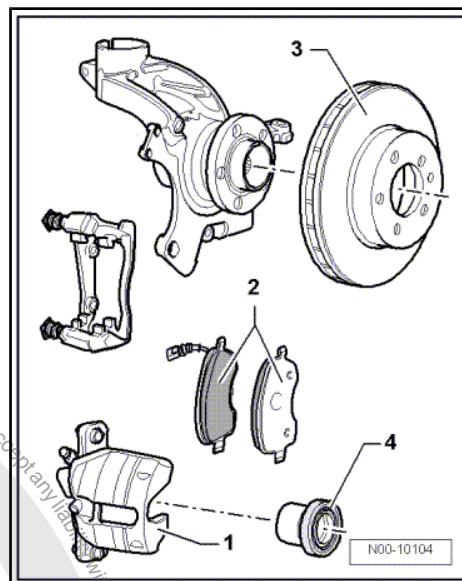
Item	PR No.		1LK
1	Brake caliper		FNR-G (17")
2	Brake lining, thickness	mm	14
	Brake pad, wear limit without backplate	mm	2
3	Brake disc	Ø in mm	345
	Brake disc, thickness	mm	30
	Brake disc, wear limit	mm	27
4	Brake caliper, piston	Ø in mm	57





Front brakes C60:

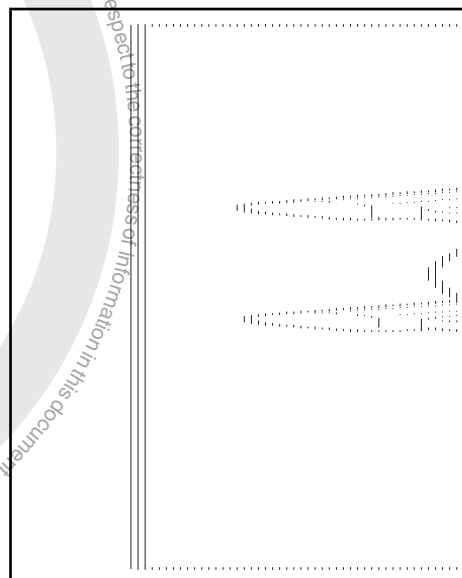
Item	PR No.		1LA / 1LB
1	Brake caliper		C60 (17")
2	Brake lining, thickness	mm	13
	Brake pad, wear limit without backplate	mm	2
3	Brake disc	Ø in mm	340
	Brake disc, thickness	mm	30
	Brake disc, wear limit	mm	27
4	Brake caliper, piston	Ø in mm	60



2.1.3 Rear brakes

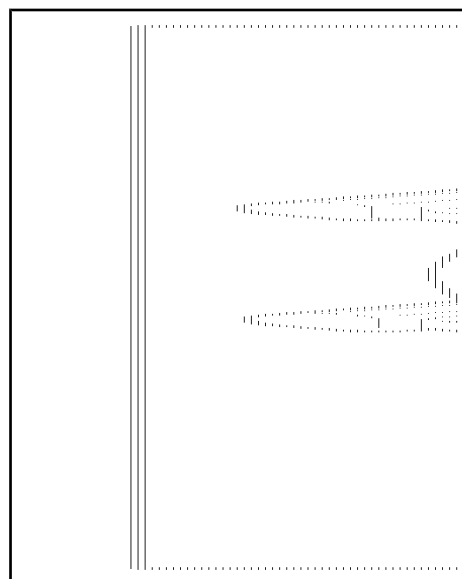
Rear brakes CII 38:

Item	PR No.		1KU / 1KW
1	Brake caliper		CII 38 (16")
2	Brake lining, thickness	mm	11
	Brake pad, wear limit without backplate	mm	2
3	Brake disc	Ø in mm	286
	Brake disc, thickness	mm	12
	Brake disc, wear limit	mm	10
4	Brake caliper, piston	Ø in mm	38



Rear brakes CII 41:

Item	PR No.		2EA
1	Brake caliper		CII 41 (17")
2	Brake lining, thickness	mm	11
	Brake pad, wear limit without backplate	mm	2
3	Brake disc	Ø in mm	310
	Brake disc, thickness	mm	22
	Brake disc, wear limit	mm	20
4	Brake caliper, piston	Ø in mm	41





3 Brake test

⇒ „3.1 General information“, page 5

⇒ „3.2 Checking vehicles with front-wheel drive“, page 5

⇒ „3.3 Checking vehicles with four-wheel drive“, page 5

3.1 General information

- ◆ The drive is provided by the roller dynamometer.
- ◆ For vehicles with a manual gearbox, ensure that the gear lever is in neutral for the test. For vehicles with an automatic gearbox, ensure that the selector lever is in »N«.
- ◆ When conducting the test, observe the specifications provided by the manufacturer of the test rig.



Note

The brake regulation systems do not function when ignition is off.

3.2 Checking vehicles with front-wheel drive

The brake test must be performed on a single-axle roller dynamometer.

The maximum test speed must not exceed 6 km/h.

The test rigs authorised by Volkswagen fulfil these requirements.

3.3 Checking vehicles with four-wheel drive

with Haldex coupling

⇒ „3.3.1 On a regulated roller dynamometer with contra-rotating rollers for four-wheel drive vehicles“, page 5

⇒ „3.3.2 Without roller dynamometer for four-wheel drive vehicles“, page 6

3.3.1 On a regulated roller dynamometer with contra-rotating rollers for four-wheel drive vehicles

The brake test must be performed on a regulated single-axle roller dynamometer with contra-rotating rollers for four-wheel drive vehicles.

„Contra-rotating“ means that the dynamometer rollers are driven forwards on one side and backwards on the other side.

„Regulated“ means that the speed of the brake test stand rollers is so controlled so that there is no difference in speed during the brake test.

This prevents the transfer of a force through the stationary wheels (not on the set of rollers) via the propshaft to the rotating wheels on the rollers.

The forward rotating wheel is measured during the test, which means two brake tests per axle must be performed.

The maximum test speed must not exceed 6 km/h.

The test rigs authorised by Volkswagen fulfil these requirements.



3.3.2 Without roller dynamometer for four-wheel drive vehicles

If no test rig is available for four-wheel drive vehicles, the brake test can also be carried out on a standard single-axle roller dynamometer as follows:

- Drive vehicle forwards onto the rollers.
- Switch engine off and wait for 2 seconds.
- Carry out front brake test.
- Start engine and wait for approx. 5 seconds until sufficient vacuum has been built up.
- Drive vehicle forwards until rear wheels are positioned on rollers.
- Switch engine off and wait for 2 seconds.
- Carry out rear brake test.
- Start engine and wait for approx. 5 seconds until sufficient vacuum has been built up.

3.4 Checking parking brake

Electromechanical parking brake

⇒ „3.4.1 Checking vehicles with front-wheel drive:“, page 6

⇒ „3.4.2 Checking vehicles with four-wheel drive:“, page 7

3.4.1 Checking vehicles with front-wheel drive:

Activate »TÜV mode«:

- Seat belt is fitted
- Rear axle on single-axle roller dynamometer
- Ignition remains switched on
- Auto-hold is switched off
- Front wheels must be stationary
- Rear wheels must rotate at constant speed between 2.5 and 9 km/h for at least 5 seconds.

Entering »TÜV mode« is indicated by the yellow electric parking brake and handbrake fault warning lamp -K214- lighting up.



Note

In »TÜV mode«, the electromechanical parking brake does not close fully when the button is first pressed.

The tension is increased gradually by actuating the electromechanical parking brake button -E538- four times in succession.

Actuating the electromechanical parking brake button -E538- a fifth time releases the electromechanical parking brake.

End »TÜV mode«:

- Front wheels, speed over 0 km/h
- Rear wheels, speed lower than 2.5 km/h or over 9 km/h
- Ignition off.



3.4.2 Checking vehicles with four-wheel drive:

Activate »TÜV mode«:

- Seat belt is fitted
- Rear axle on single-axle roller dynamometer
- Engine is switched off and ignition is switched on
- Auto-hold is switched off
- Front wheels must be stationary
- Rear wheels must rotate at constant speed between 2.5 and 9 km/h for at least 5 seconds.

Entering »TÜV mode« is indicated by the yellow electric parking brake and handbrake fault warning lamp -K214- lighting up.



Note

In »TÜV mode«, the electromechanical parking brake does not close fully when the button is first pressed.

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Actuating the electromechanical parking brake button -E538- a fifth time releases the electromechanical parking brake.

- Start engine and wait for approx. 5 seconds until sufficient vacuum has been built up.

End »TÜV mode«:

- Front wheels, speed over 0 km/h
- Rear wheels, speed lower than 2.5 km/h or over 9 km/h
- Ignition off.



45 – Anti-lock brake system

1 General information

The ABS brake system is divided diagonally. The servo-assistance is effected pneumatically by the vacuum brake servo unit.

Vehicles with ABS are not fitted with a mechanical brake pressure regulator. Specially matched software in the control unit regulates the brake force distribution on the rear axle.

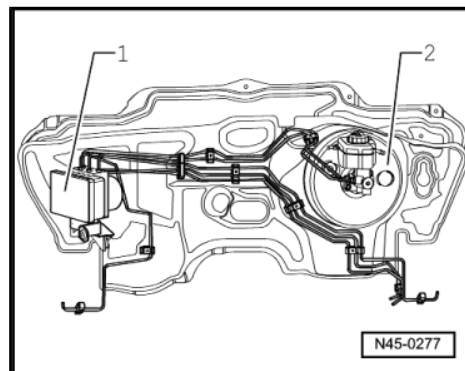
Faults in the ABS do not influence the brake system and servo assistance. The conventional brake system remains functional even without ABS. A change in braking behaviour is to be reckoned with. After the ABS warning lamp comes on, the rear wheels may lock prematurely during braking.

ABS layout in left-hand drive vehicle:

1 - Hydraulic unit and control unit

2 - Brake servo

The control unit and hydraulic are combined in a single component. Separation is not possible. Hydraulic pump must not be separated from hydraulic unit either.



1.1 Repair instructions for repair work on ABS

- ◆ Before carrying out repair work on the anti-lock brake system, determine the cause of the fault as well as the control unit code using „Guided Fault Finding“.

„Guided fault finding“ is carried out with the ➔ Vehicle diagnostic tester.

- ◆ Disconnect battery earth strap with ignition switched off.
- ◆ Before carrying out welding work with an electric welding unit, note ➔ General Information; Body Repairs, General Body Repairs .
- ◆ When working with brake fluid, observe the valid, relevant safety precautions and notes ➔ [page 92](#) .
- ◆ After work for which the brake system had to be opened, bleed the brake system with brake filling and bleeding unit -VAS 5234- ➔ [page 94](#) .
- ◆ During the final road test, ensure that a controlled brake test is performed at least once (pulsations must be felt at the brake pedal).
- ◆ Absolute cleanliness is required when working on the anti-lock brake system. It is not permitted to use any products which contain mineral oil, such as oils, greases etc.
- ◆ Thoroughly clean all unions and the adjacent areas before loosening. Do not use aggressive cleaning agents such as brake cleanser, petrol, thinners or similar.
- ◆ Place removed parts on a clean surface and cover.
- ◆ After separating the control unit/hydraulic unit, use the transport protection for the contact pins.
- ◆ If repairs cannot be carried out immediately, carefully cover or seal open components. (Use sealing plugs from repair kit 1 H0 698 311 A).



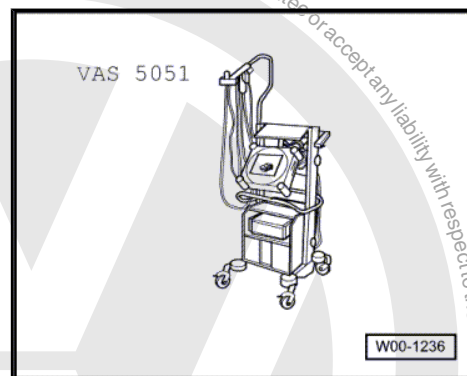
- ◆ Only use lint-free cloths.
- ◆ Only unpack replacement parts immediately prior to fitting.
- ◆ Only use genuine packed parts.
- ◆ When the system is open, do not work with compressed air and do not move the vehicle.
- ◆ During painting operations, the electronic control unit can be exposed to a maximum temperature of 95°C for only a short period, and to a maximum of 85°C for longer periods (approx. 2 hours). Ensure that no brake fluid enters connectors.

1.2 Vehicle diagnosis, testing and information system

Connecting -Fahrzeugdiagnosetester- and selecting functions

Special tools and workshop equipment required

- ◆ Vehicle diagnosis, testing and information system -VAS 5051-
- ◆ Diagnosis cable -VAS 5051/1- or -VAS 5051/3-



WARNING

- ◆ *During a road test, you must always secure testing and measuring equipment on the back seat.*
- ◆ *These devices may be operated only by a passenger while the vehicle is in motion.*

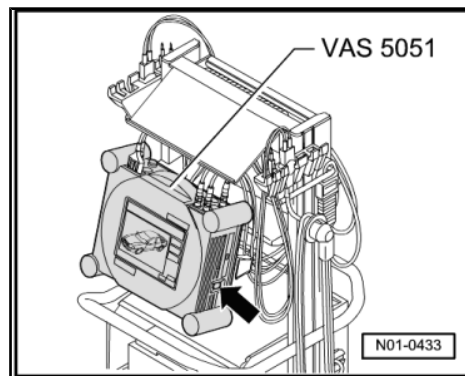
- Connect connector of diagnosis cable -VAS 5051/1- or -VAS 5051/3- to diagnostic connection.



- Switch on tester -arrow-.

The tester is ready for operation when the selector buttons for the operating modes appear on the screen.

- Switch on ignition.
- Touch **Guided Fault Finding** on screen.
- Select one after another:
 - ◆ Brand
 - ◆ Type
 - ◆ Model year
 - ◆ Body version
 - ◆ Engine code
- Confirm data entered.



Wait until tester has read all control units in vehicle.

- Press **Go to** and select function „Function/component selection“.
- Select „Running gear“ on display.
- Select „Brake systems“ on display.
- Select „01 Self-diagnosis capable system ...“ shown on display.

Either:

- Select „Anti-lock brake system ...“ shown on display.

or:

- Select „Electromechanical parking brake“ on display.
- Select „Function“ shown on display.

All possible functions for the anti-lock brake system installed in the vehicle will then be displayed.

- Select desired function on display.



2 Fitting location overview

ABS/ESP:

1 - ABS control unit -J104-

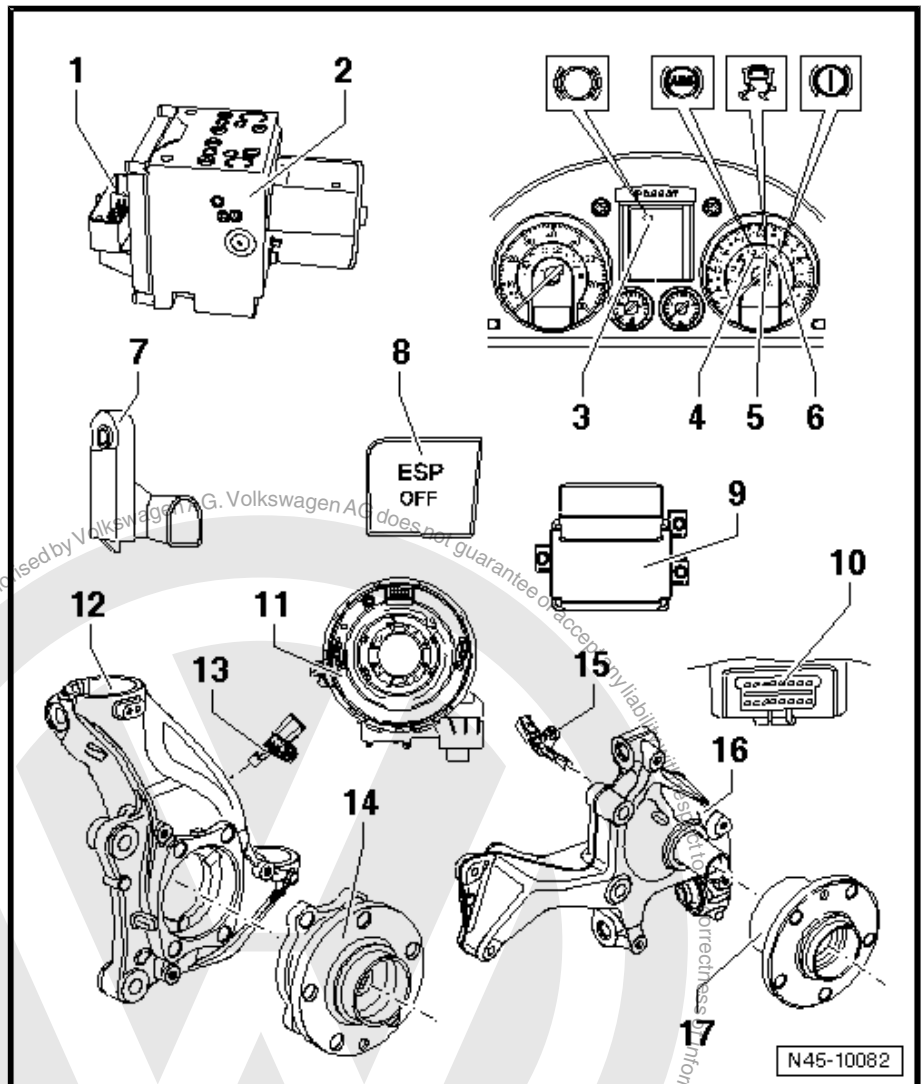
- ☐ Location: on the hydraulic unit on right in engine compartment.
- ☐ Do not separate connector before successfully completing self-diagnosis. Switch ignition off before separating connector.
- ☐ Must not be separated from ABS hydraulic unit -N55-
- ☐ Removing and installing ⇒ [page 14](#) .

2 - ABS hydraulic unit -N55-

- ☐ Location: on right in engine compartment.

The hydraulic unit consists of the components:

- ☐ Brake pressure sender - G201-
- ☐ ABS hydraulic pump - V64-
- ☐ Valve block (contains inlet and outlet valves).
- ☐ ABS hydraulic pump - V64- and valve block must not be separated from one another.
- ☐ Must not be separated from ABS control unit - J104-
- ☐ Removing and installing ⇒ [page 14](#) .



3 - Brake pad warning lamp -K32-

- ☐ Location: in dash panel insert.

4 - ABS warning lamp -K47-

- ☐ Location: in dash panel insert.

5 - ESP and TCS warning lamp -K155-

- ☐ Location: in dash panel insert.

6 - Brake system warning lamp -K118-

- ☐ Location: in dash panel insert.

7 - Brake light switch -F-

- ☐ Location: on brake master cylinder.
- ☐ Removing and installing ⇒ [page 73](#) .

8 - TCS and ESP button -E256-

- ☐ Location: in centre console.



9 - ESP sensor unit -G419- and control unit for electromechanical parking brake -J540-

- ☐ Location: under centre console.
- ☐ Combined lateral acceleration sender -G200- , yaw rate sender -G202- and longitudinal acceleration sender -G251- .
- ☐ Installed in one housing together with control unit for electromechanical parking brake -J540-
- ☐ Removing and installing ⇒ [page 23](#) .

10 - Diagnostic connection

- ☐ Location: Driver footwell cover.

11 - Steering angle sender -G85-

- ☐ Location: on steering column between steering wheel and steering column switch.
- ☐ Removing and installing ⇒ [page 24](#) .

12 - Wheel bearing housing

13 - Front right/left speed sensor -G45- / -G47-

- ☐ Removing and installing ⇒ [page 19](#) .

14 - Wheel hub with wheel bearing

- ☐ ABS sensor ring is installed in wheel bearing.

15 - Rear right/left speed sensor -G44- / -G46-

- ☐ Removing and installing ⇒ [page 20](#) .

16 - Wheel bearing housing

Figure for front-wheel drive

17 - Wheel hub with wheel bearing

Figure for front-wheel drive

- ☐ ABS sensor ring is installed in wheel bearing.



3 Control unit and hydraulic unit

⇒ „3.1 Assembly overview“, page 13

⇒ „3.2 Removing and installing control unit and hydraulic unit“, page 14

⇒ „3.3 Connecting brake lines to hydraulic unit“, page 17

3.1 Assembly overview

1 - ABS control unit -J104-

The control unit and hydraulic unit cannot be separated.

- ❑ Removing and installing
⇒ page 14 .

2 - ABS hydraulic unit -N55-

The control unit and hydraulic unit cannot be separated.

- ❑ Removing and installing
⇒ page 14 .

3 - Brake line

- ❑ To front right brake caliper.
- ❑ Identification:
Ø 5.25 mm and union nut with thread M10 x 1
- ❑ Marked on hydraulic unit with „VR“

4 - Brake line

- ❑ To rear left brake caliper.
- ❑ Identification: Ø 5.25 mm and union nut with short thread M12 x 1
- ❑ Marked on hydraulic unit with „HL“

5 - Brake line

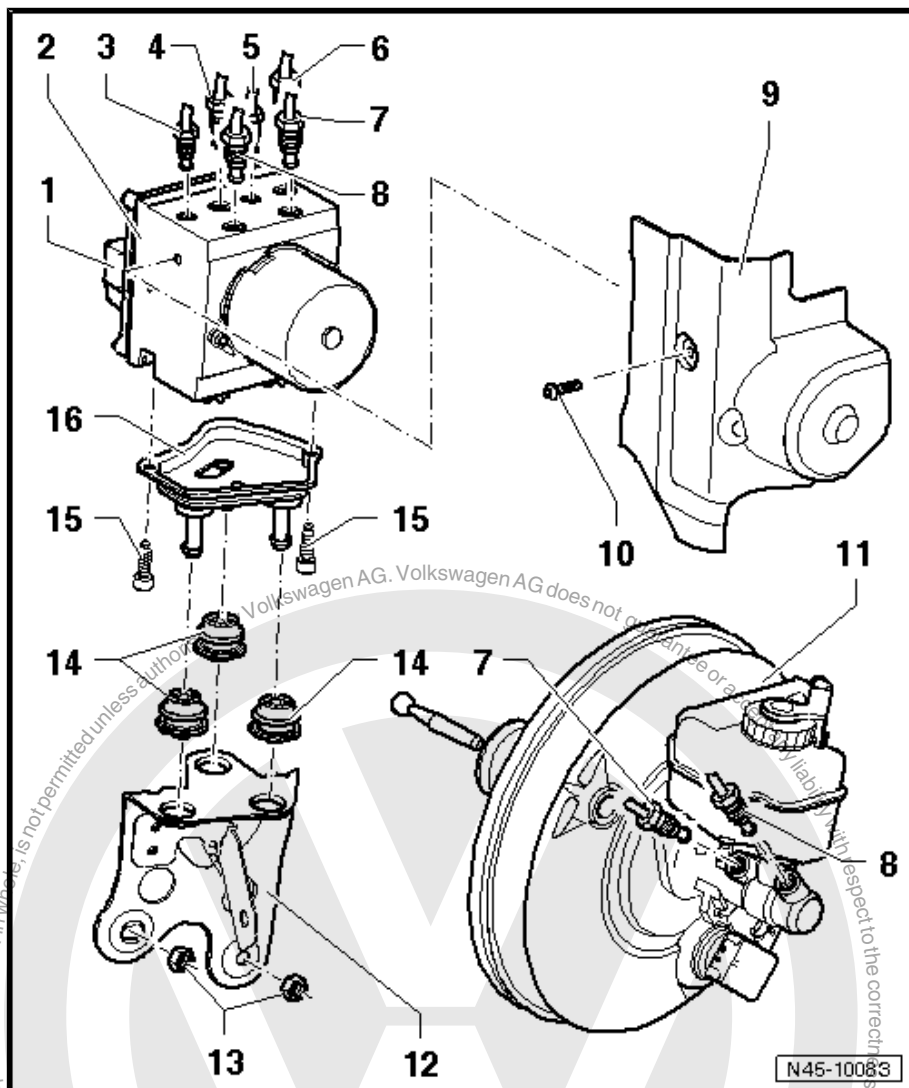
- ❑ To rear right brake caliper.
- ❑ Identification:
Ø 5.25 mm and union nut with thread M10 x 1
- ❑ Marked on hydraulic unit with „HR“

6 - Brake line

- ❑ To front left brake caliper.
- ❑ Identification: Ø 5.25 mm and union nut with short thread M12 x 1
- ❑ Marked on hydraulic unit with „VL“

7 - Brake line

- ❑ From primary piston circuit of brake master cylinder to hydraulic unit.
- ❑ Identification: Ø 8.5 mm or Ø 6 mm and union nut with long thread M12x1
- ❑ Marked on hydraulic unit with „HZ1“





8 - Brake line

- ☐ From secondary piston circuit of brake master cylinder to hydraulic unit.
- ☐ Identification: $\varnothing$ 8.5 mm or $\varnothing$ 6 mm and union nut with long thread M12x1
- ☐ Marked on hydraulic unit with „HZ2“

9 - Heat shield

Allocation ⇒ Electronic Parts Catalogue (ETKA) .

10 - Torx socket head bolt, 12 Nm

11 - Brake servo

- ☐ A vacuum sender is fitted in vehicles with HBV ⇒ [page 24](#) .
- ☐ Removing and installing ⇒ [page 75](#) .

12 - Bracket

13 - Hexagon nut, 20 Nm

14 - Rubber damper

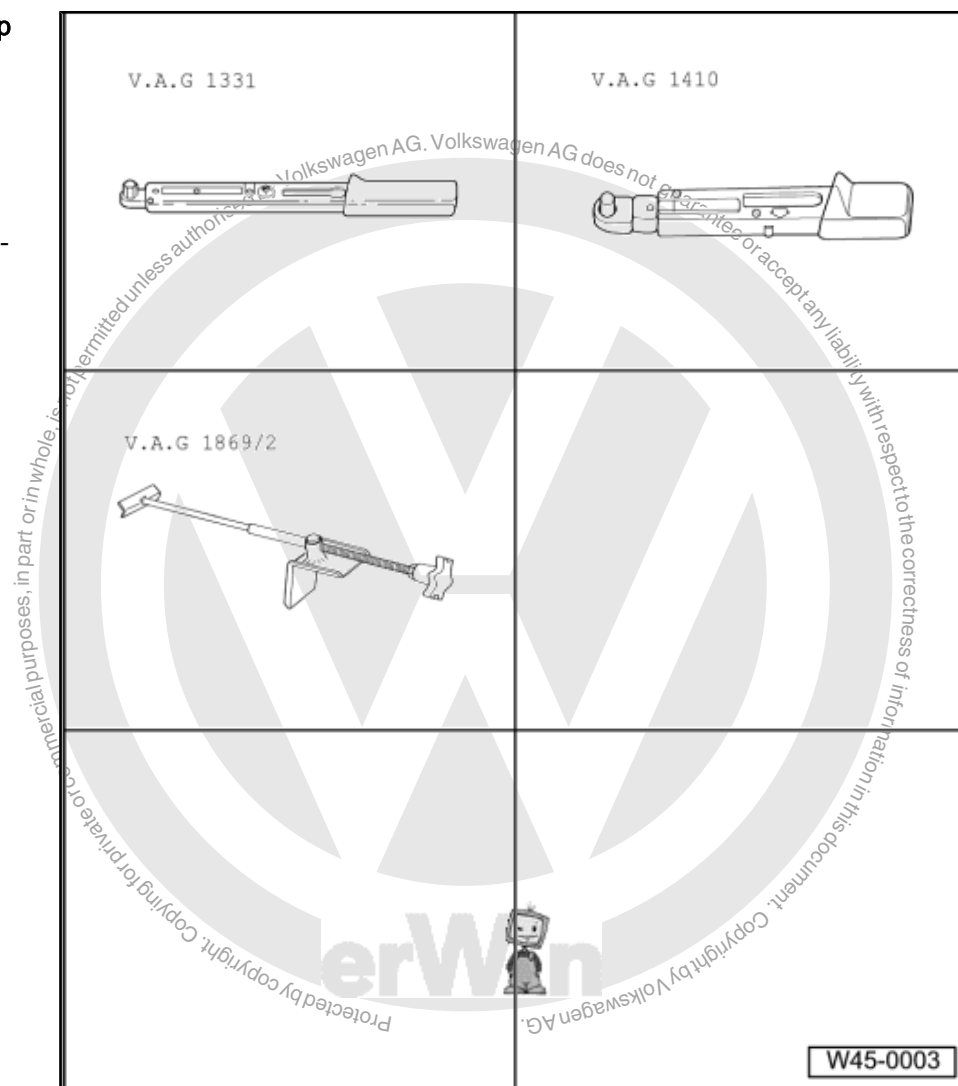
15 - Torx socket head bolt, 10 Nm

16 - Bracket

3.2 Removing and installing control unit and hydraulic unit

Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331-
- ◆ Torque wrench -V.A.G 1410-
- ◆ Brake pedal depressor -





V.A.G 1869/2-

Sealing plugs repair kit, Part No. 1H0 698 311 A

- 1 - Transport protection for contact pins (foam)
- 2 - Sealing plug M10
- 3 - Sealing plug M12

Removing:

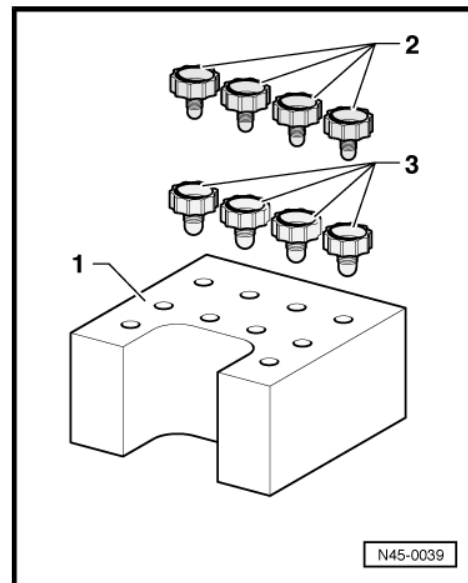
Location:

The control unit is bolted to the hydraulic unit and is located on right in the engine compartment.



WARNING

Do not bend the brake lines in the area of the hydraulic unit!



- Read out and note the existing control unit code.
- Note or request radio code on vehicles with coded radio if necessary.
- Disconnect battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and reconnecting battery.
- Remove engine cover panel.

1.8l TSI engine:

- Remove air pipe ⇒ Rep. gr. 21 ; Turbocharger .
- Seal off turbocharger using engine bung set -VAS 6122-.

2.0 l diesel engine with diesel particulate filter:

- Unscrew exhaust gas pressure sensor 1 -G450- and retainer, then separate electrical connectors.
- Unbolt heat shield for right drive shaft.
- Unbolt double clamp between front exhaust pipe with diesel particulate filter and front silencer.
- Unbolt particulate filter, lower filter and carefully place it to side ⇒ Rep. gr. 26 ; Cleansing exhaust emissions; Assembly overview - cleansing exhaust emissions .

6-cylinder petrol engine:

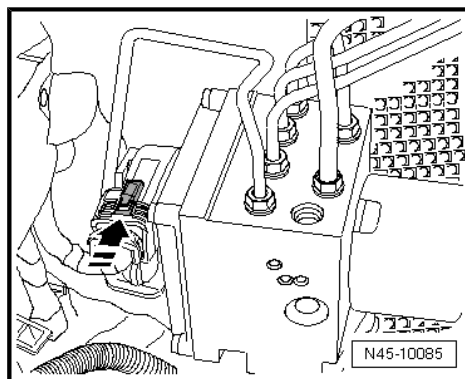
- Disconnect connectors for knock sensor and for valves in vacuum hoses from rear of intake manifold. Unclip wiring harness from retainers on coolant pipe and lay aside.
- Pull off vacuum hoses on back of intake manifold, remove from retainers and completely lay aside.
- Disconnect rear coolant pipe on side and back of engine.
- Clamp off coolant hose on expansion tank with hose clamps to 25 mm Ø -3094- .
- Now pull coolant hose off coolant expansion tank and place as far as possible to side along with coolant pipe.

Continuation for all models:

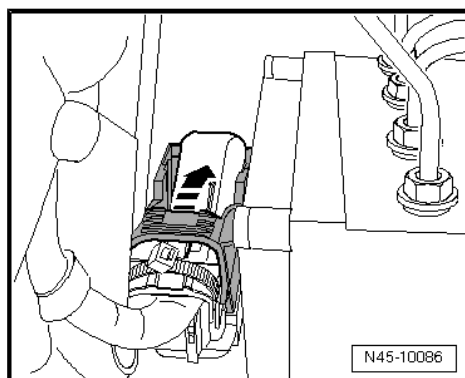
- In vehicles with heat shield, remove heat shield.



- Press red locking slide to rear in direction of -arrow-.



- Release connector from control unit in direction of -arrow- and pull off.
- Apply brake pedal depressor -V.A.G 1869/2- .
- Connect bleeder bottle hose to front left brake caliper bleeder valve and rear left brake caliper bleeder valve and open bleeder valves.
- Depress brake pedal at least 60 mm using brake pedal depressor -V.A.G 1869/2- .
- Close front left and rear left bleeder valve.
- Do not remove brake pedal depressor -V.A.G 1869/2- .
- Place sufficient lint-free cloths under the control unit and hydraulic unit.



Ensure no brake fluid gets onto contacts.

- First identify both brake lines from brake master cylinder and unscrew from hydraulic unit.
- Immediately seal brake lines and threaded holes with plugs from repair kit Part No. 1H0 698 311 A.
- Mark, unscrew and seal remaining brake lines (brake calipers).

Vehicles with diesel particulate filter:

- Completely remove front right brake line.

Continuation for all models:

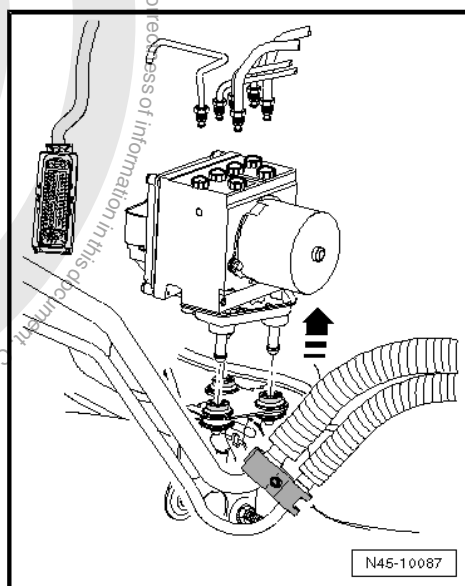
- Pull hydraulic unit together with control unit upwards out of dampers -arrow-.

Installing:



Note

- ♦ Remove sealing plugs from new hydraulic unit only when the corresponding brake line is to be fitted.
 - ♦ If sealing plugs are removed too early from the hydraulic unit, brake fluid can escape, and it can then no longer be guaranteed that the unit can be sufficiently filled and bled.
 - ♦ When installing the hydraulic unit, ensure that the rubber dampers are not pressed out of bracket.
- Install in reverse order.





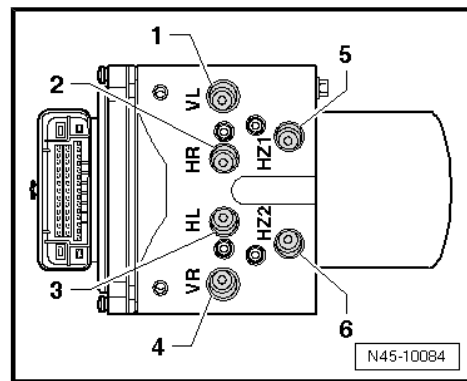
Tightening sequence of brake lines:

- Remove brake pedal depressor -V.A.G 1869/2- .
- Bleed brake system ➔ [page 94](#) .
- Code radio.
- Code control unit -J104- with ➔ Vehicle diagnostic tester in "Guided fault finding".

To do this, carry out basic setting of the steering angle sender - G85- , the lateral acceleration sender -G200- , the longitudinal acceleration sender -G251- and the brake pressure sender - G201- .

Specified torques:

Hexagon bolt of hydraulic unit to bracket	10 Nm
Brake lines to ABS unit:	
Brake lines 1 to 4 (brake calipers)	14 Nm
Brake lines 5 and 6 (brake master cylinder)	
Ø 8.5 mm	17 Nm
Ø 6 mm	14 Nm



3.3 Connecting brake lines to hydraulic unit

On tandem brake master cylinder:

A - Primary piston circuit of brake master cylinder to hydraulic unit.

- Identification: Ø 8.5 mm or Ø 6 mm and union nut with long thread M12 x 1.

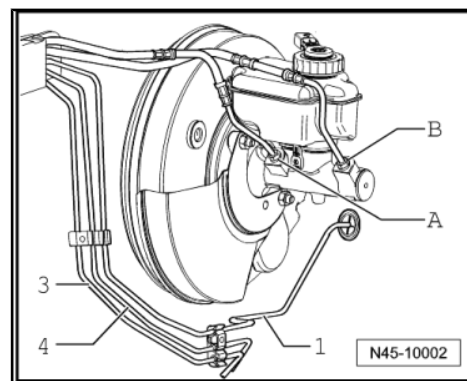
B - Secondary piston circuit of brake master cylinder to hydraulic unit.

- Identification: Ø 8.5 mm or Ø 6 mm and union nut with long thread M12 x 1.

1 - From hydraulic unit to front left brake caliper.

3 - From hydraulic unit to rear left brake caliper.

4 - From hydraulic unit to rear right brake caliper.





On hydraulic unit:

1 - From hydraulic unit to front left brake caliper.

- Identification: $\varnothing$ 5.25 mm and union nut with short thread M12 x 1

2 - From hydraulic unit to rear right brake caliper.

- Identification: $\varnothing$ 5.25 mm and union nut with thread M10 x 1

3 - From hydraulic unit to rear left brake caliper.

- Identification: $\varnothing$ 5.25 mm and union nut with short thread M12 x 1

4 - From hydraulic unit to front right brake caliper.

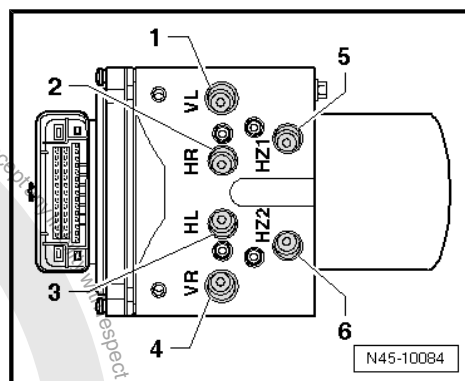
- Identification: $\varnothing$ 5.25 mm and union nut with thread M10 x 1

5 - From hydraulic unit to primary piston circuit of brake master cylinder.

- Identification: $\varnothing$ 8.5 mm or $\varnothing$ 6 mm and union nut with long thread M12x1

6 - From hydraulic unit to secondary piston circuit of brake master cylinder.

- Identification: $\varnothing$ 8.5 mm or $\varnothing$ 6 mm and union nut with long thread M12x1





4 Sensors

⇒ „4.1 Assembly overview - speed sensor on front axle“,
page 19

⇒ „4.2 Removing and installing speed sensor on front axle“, page
20

⇒ „4.3 Assembly overview - speed sensor on rear axle“,
page 20

⇒ „4.4 Removing and installing speed sensor on rear axle“, page
22

⇒ „4.5 Removing and installing ESP sensor unit“, page 23

⇒ „4.6 Removing and installing steering angle sender“,
page 24

⇒ „4.7 Removing and installing brake servo vacuum sender“,
page 24

4.1 Assembly overview - speed sensor on front axle

1 - ABS speed sensor

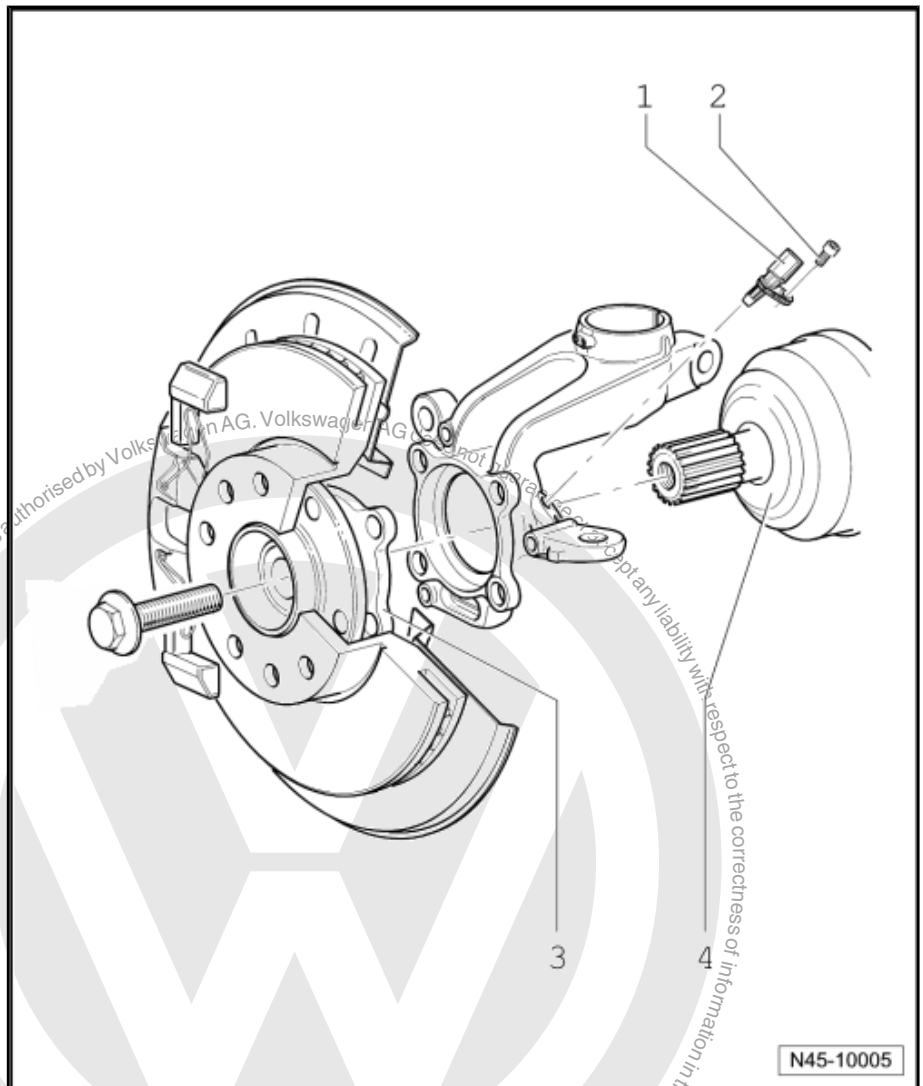
- ☐ Before inserting sensor, clean hole inner surface and coat with high-temperature paste G 052 112 A3.
- ☐ Removing and installing
⇒ [page 20](#).

2 - Hexagon socket head bolt, 8 Nm

3 - Wheel hub with wheel bearing

- ☐ ABS sensor ring is installed in wheel bearing.

4 - Drive shaft





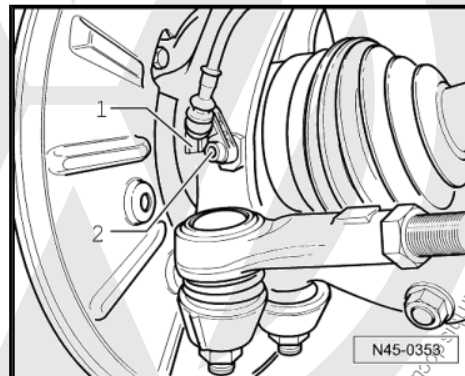
4.2 Removing and installing speed sensor on front axle

Removing

- Raise vehicle.
- Separate connector -1- from speed sensor wire and from speed sensor.
- Remove bolt -2- from wheel bearing housing.
- Pull ABS speed sensor out of wheel bearing housing.

Installing

- Before inserting speed sensor, clean hole inner surface and coat speed sensor all-round with high-temperature paste G 052 112 A3.
- Insert speed sensor into hole in wheel bearing housing and tighten bolt to 8 Nm.
- Connect speed sensor to speed sensor wire.



4.3 Assembly overview - speed sensor on rear axle

⇒ „4.3.1 Assembly overview - front-wheel drive“, page 21

⇒ „4.3.2 Assembly overview - four-wheel drive“, page 22



4.3.1 Assembly overview - front-wheel drive

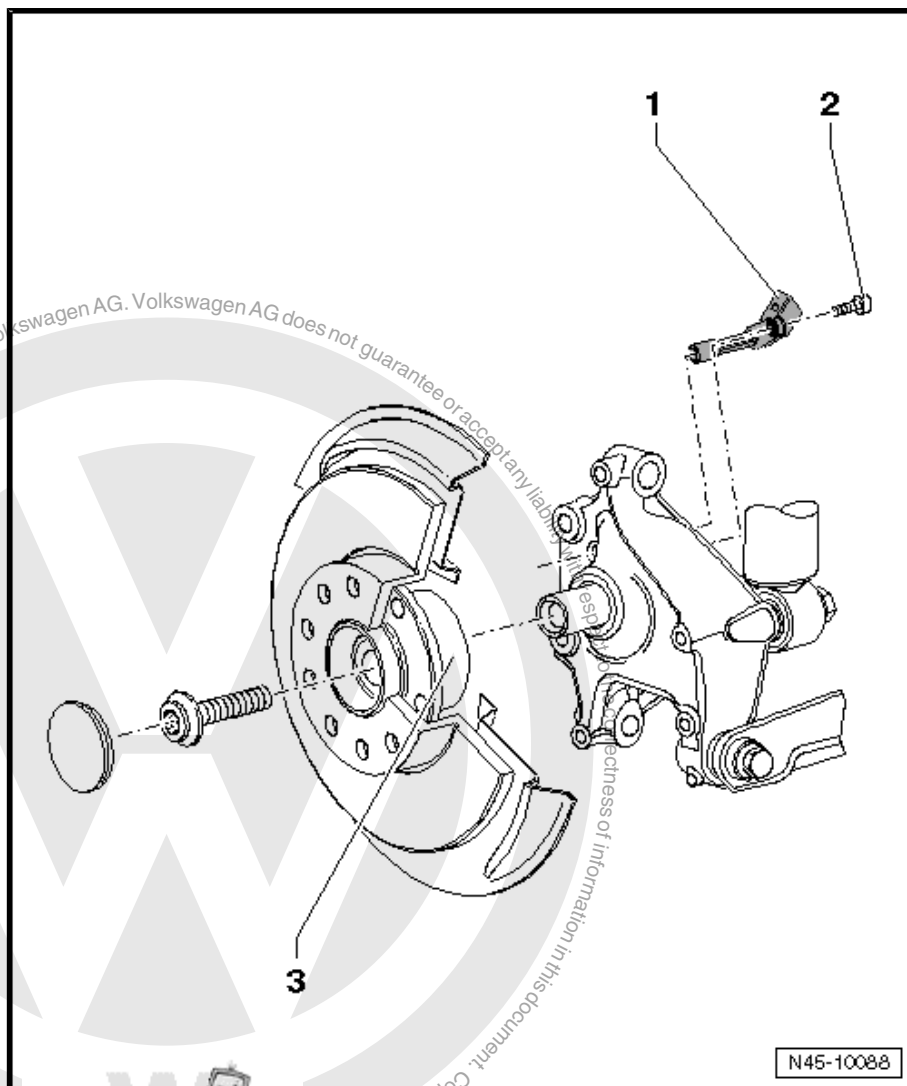
1 - ABS speed sensor

- ☐ Before inserting sensor, clean hole inner surface and coat with high-temperature paste G 052 112 A3.
- ☐ Removing and installing
⇒ [page 22](#).

2 - Hexagon socket head bolt, 8 Nm

3 - Wheel hub with wheel bearing

- ☐ ABS sensor ring is installed in wheel bearing.





4.3.2 Assembly overview - four-wheel drive

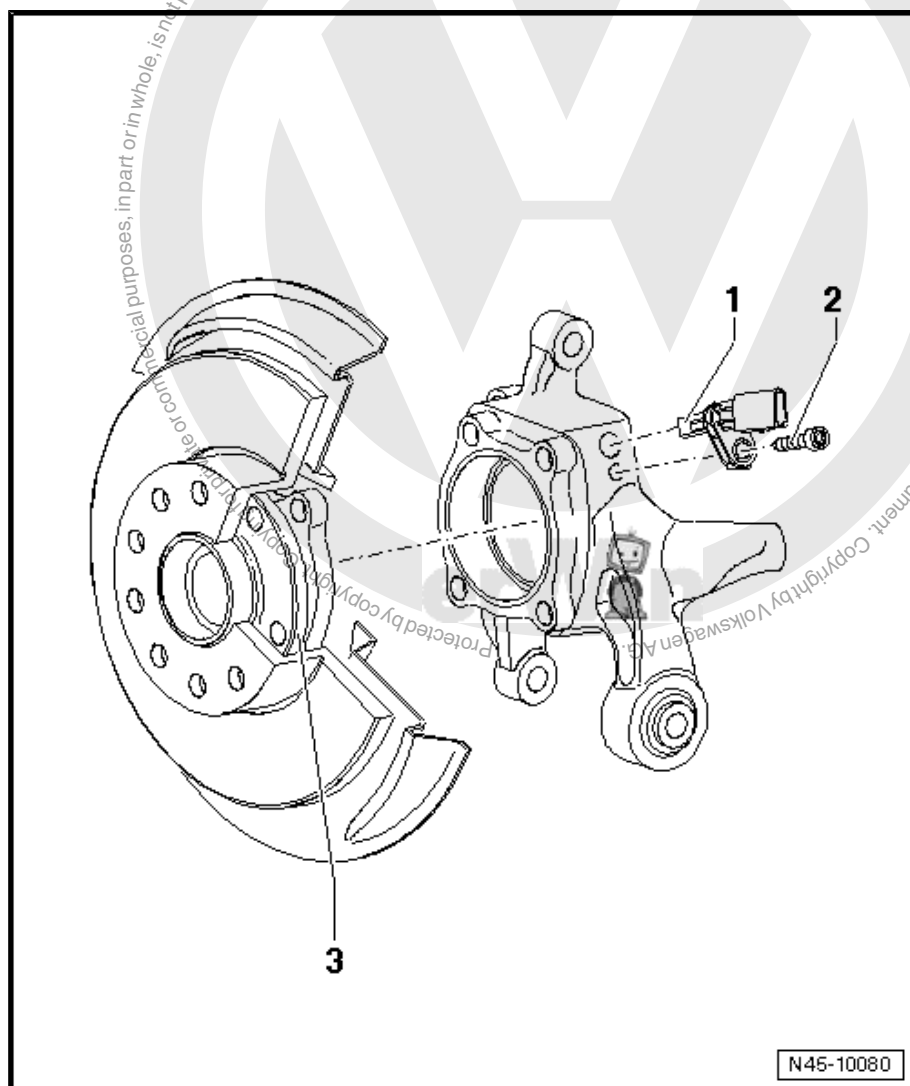
1 - ABS speed sensor

- ❑ Before inserting sensor, clean hole inner surface and coat with high-temperature paste G 052 112 A3.
- ❑ Removing and installing
⇒ [page 23](#).

2 - Hexagon socket head bolt, 8 Nm

3 - Wheel hub with wheel bearing

- ❑ ABS sensor ring is installed in wheel bearing.



4.4 Removing and installing speed sensor on rear axle

⇒ „4.4.1 Front-wheel drive“, [page 22](#)

⇒ „4.4.2 Four-wheel drive“, [page 23](#)

4.4.1 Front-wheel drive

Removing:

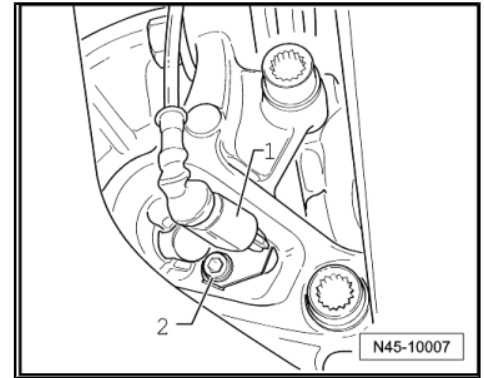
- Raise vehicle.



- Separate connector -1- from speed sensor wire and from speed sensor.
- Remove bolt -2- from wheel bearing housing.
- Pull ABS speed sensor out of wheel bearing housing.

Installing:

- Before inserting speed sensor, clean hole inner surface and coat speed sensor all-round with high-temperature paste G 052 112 A3.
- Insert speed sensor into hole in wheel bearing housing and tighten bolt to 8 Nm.
- Connect speed sensor to speed sensor wire.



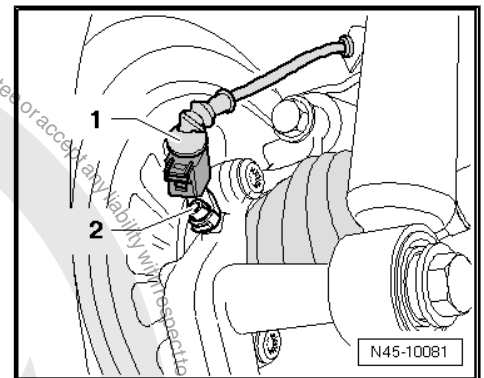
4.4.2 Four-wheel drive

Removing:

- Raise vehicle.
- Separate connector -1- from speed sensor wire and from speed sensor.
- Remove bolt -2- from wheel bearing housing.
- Pull ABS speed sensor out of wheel bearing housing.

Installing:

- Before inserting speed sensor, clean hole inner surface and coat speed sensor all-round with high-temperature paste G 052 112 A3.
- Insert speed sensor into hole in wheel bearing housing and tighten bolt to 8 Nm.
- Connect speed sensor to speed sensor wire.



4.5 Removing and installing ESP sensor unit

The lateral acceleration sender -G200- , the yaw rate sender -G202- and the longitudinal acceleration sender -G251- are installed in a housing together with the control unit for electromechanical parking brake -J540- ; this is located below the centre console.

After the ESP sensor unit -G419- has been replaced together with the control unit for electromechanical parking brake -J540- , it is necessary to code the ABS control unit -J104- and to carry out a basic setting of the „brake system“ (electromechanical parking brake).



WARNING

Severe shocks (e.g. dropping, impact) may destroy the ESP sensor unit -G419-. The ESP sensor unit -G419- may not then be used any further.

Removing:

- Remove centre console ⇒ General body repairs, interior; Rep. gr. 68 ; Centre console; Removing and installing centre console .



- Pull connector -1- off ESP sensor unit -G419- .
- Remove the three securing nuts -arrows-.
- Remove ESP sensor unit -G419- .

Installing:

- Install in reverse order.

When installing the ESP sensor unit -G419- , make sure it is correctly seated in its bracket and is free of stress.



Note

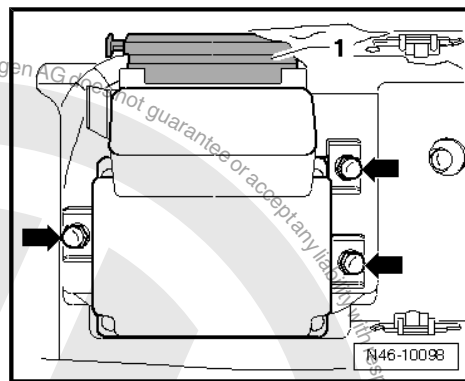
Do not use the securing nuts to forcibly position ESP sensor unit -G419- .

- Tighten securing nuts to 9 Nm.
- Code control unit -J104- with ⇒ Vehicle diagnostic tester in "Guided fault finding".

To do this, carry out basic setting of steering angle sender -G85- , lateral acceleration sender -G200- , brake pressure sender -G201- and longitudinal acceleration sender -G251- .

- Carry out basic setting of „brake system“ (electromechanical parking brake).

Connecting ⇒ Vehicle diagnostic tester and selecting functions
⇒ [page 9](#) .



4.6 Removing and installing steering angle sender

The steering angle sender -G85- is located between the steering wheel and steering column switch.

Removing and installing:

⇒ Electrical system; Rep. gr. 94 ; Steering column switch module; Assembly overview - steering column switch module .

- Then perform basic setting of steering angle sender -G85- .

Connecting ⇒ Vehicle diagnostic tester and selecting functions
⇒ [page 9](#) .

4.7 Removing and installing brake servo vacuum sender

Removing:

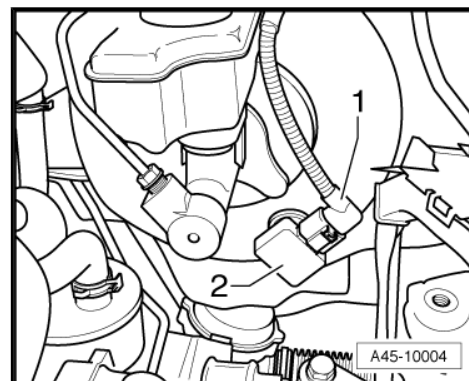
- Remove battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery .

The battery is installed in the luggage compartment on vehicles with a 6-cylinder petrol engine and therefore only the air filter housing must be removed.

- Remove battery tray.



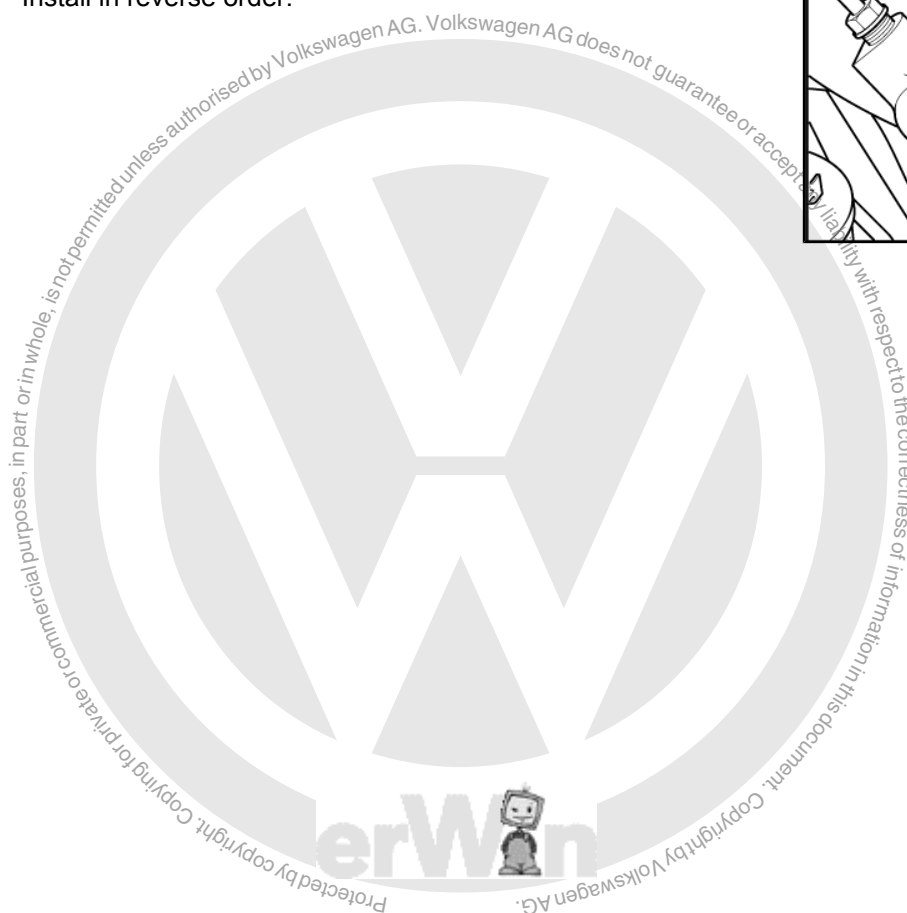
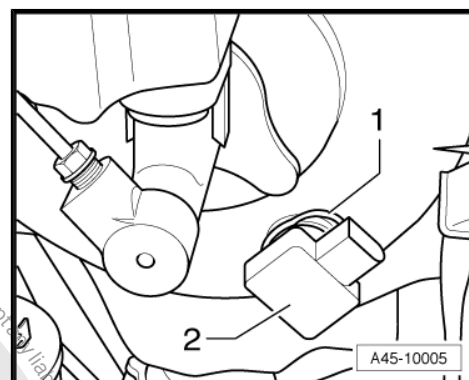
- Disconnect connector -1- from brake servo vacuum sender - G483- -2-.
- Insert screwdriver into circlip groove between stop and one end of circlip.



- Now press circlip -1- out of groove until brake servo vacuum sender -G483- -2- can be pulled out of brake servo.

Installing:

- Install in reverse order.





46 – Brakes - mechanism

1 Front brakes

1.1 Assembly overview - front brakes

⇒ „1.1.1 Assembly overview - front brakes FN 3“, page 26

⇒ „1.1.2 Assembly overview - front brakes FNR-G“, page 28

⇒ „1.1.3 Assembly overview- front brakes C60“, page 29

1.1.1 Assembly overview - front brakes FN 3



Note

- ◆ After every brake pad change, depress brake pedal firmly several times with vehicle stationary, so that brake pads are properly seated in their normal operating position.
- ◆ Use the brake filling and bleeding equipment -VAS 5234- to draw off brake fluid from the brake fluid reservoir.
- ◆ Before removing a brake caliper or disconnecting a brake hose, fit brake pedal depressor -V.A.G 1869/2- (when doing this, release pressure in system).



1 - Splash plate

2 - Torx bolt, 12 Nm

3 - Brake disc

- ☐ Ventilated, $\varnothing$ 312 mm
- ☐ Thickness: 25 mm
- ☐ Wear limit: 22 mm.
- ☐ Always renew on both sides of an axle.
- ☐ Remove brake caliper and brake carrier prior to removing.

4 - Torx bolt, 4 Nm

5 - Brake carrier

- ☐ Bolt to wheel bearing housing.

6 - Retaining spring

- ☐ Insert into both holes in brake caliper.

7 - Ribbed bolt, 200 Nm

- ☐ Clean if reused.

8 - Brake pads

- ☐ Thickness: 14 mm not including backplate.
- ☐ With brake pad wear indicator (front left)
- ☐ When wear reaches a predetermined limit (approx 4 mm excluding backplate), the warning lamp in the dash panel insert comes on.
- ☐ Wear limit: 2 mm not including backplate.
- ☐ Checking thickness $\Rightarrow$ Maintenance ; Booklet ; Front and rear brake discs and pads/linings: Checking condition of discs and thickness of pads/linings .
- ☐ Always renew on both sides of an axle.
- ☐ Removing and installing $\Rightarrow$ [page 31](#) .

9 - Brake caliper

- ☐ Do not disconnect brake hose when changing pads.
- ☐ Removing and installing $\Rightarrow$ [page 39](#) .
- ☐ Repairing $\Rightarrow$ [page 58](#) .

10 - Guide pin, 30 Nm

11 - Cover cap

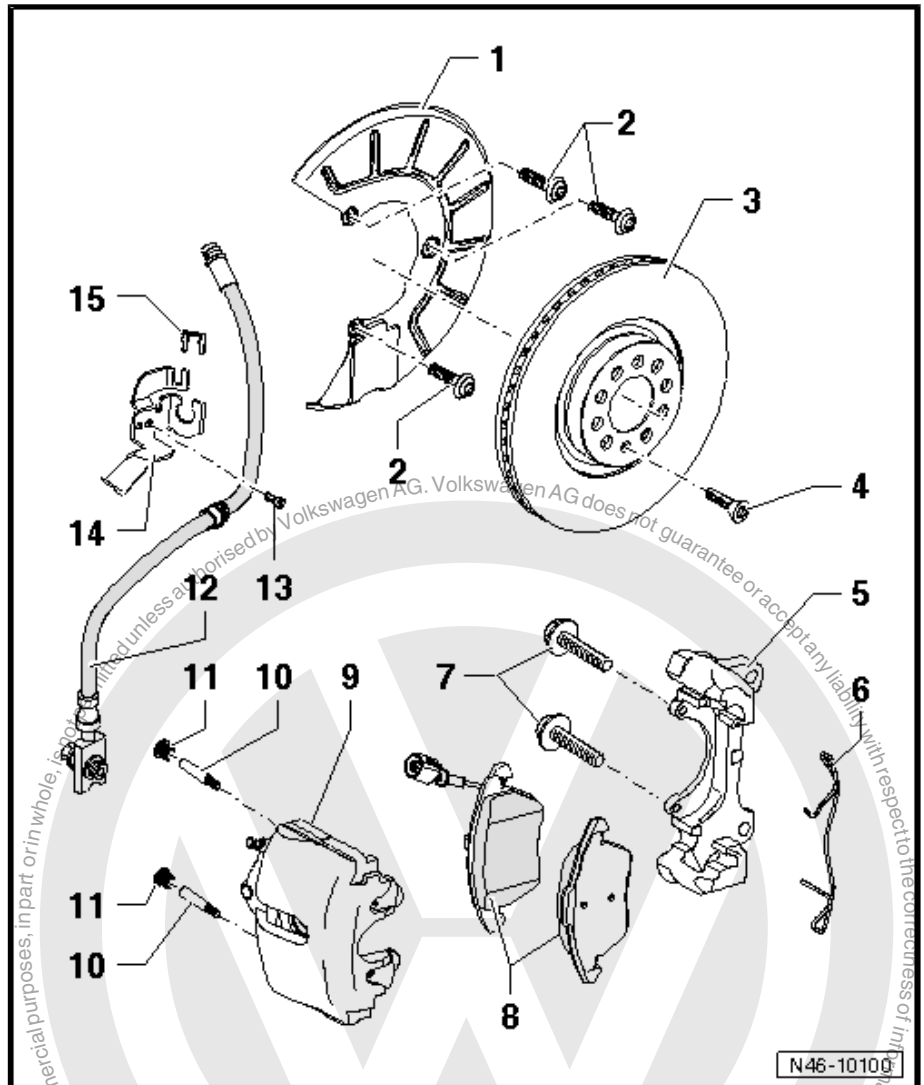
- ☐ Remove

12 - Brake hose with banjo union and banjo bolt, 35 Nm

13 - Bolt, 8 Nm

14 - Bracket

15 - Retaining clip





1.1.2 Assembly overview - front brakes FNR-G



Note

- ◆ After every brake pad change, depress brake pedal firmly several times with vehicle stationary, so that brake pads are properly seated in their normal operating position.
- ◆ Use the brake filling and bleeding equipment -VAS 5234- to draw off brake fluid from the brake fluid reservoir.
- ◆ Before removing a brake caliper or disconnecting a brake hose, fit brake pedal depressor -V.A.G 1869/2- (when doing this, release pressure in system).

1 - Splash plate

2 - Torx bolt, 12 Nm

3 - Brake disc

- ☐ Ventilated, Ø 345 mm
- ☐ Thickness: 30 mm
- ☐ Wear limit: 27 mm.
- ☐ Always renew on both sides of an axle.
- ☐ Unscrew brake caliper prior to removing.

4 - Torx bolt, 4 Nm

5 - Brake carrier

- ☐ Bolt to wheel bearing housing.

6 - Retaining spring

- ☐ Insert into brake pad retaining spring and press under brake carrier.

7 - Ribbed bolt, 190 Nm

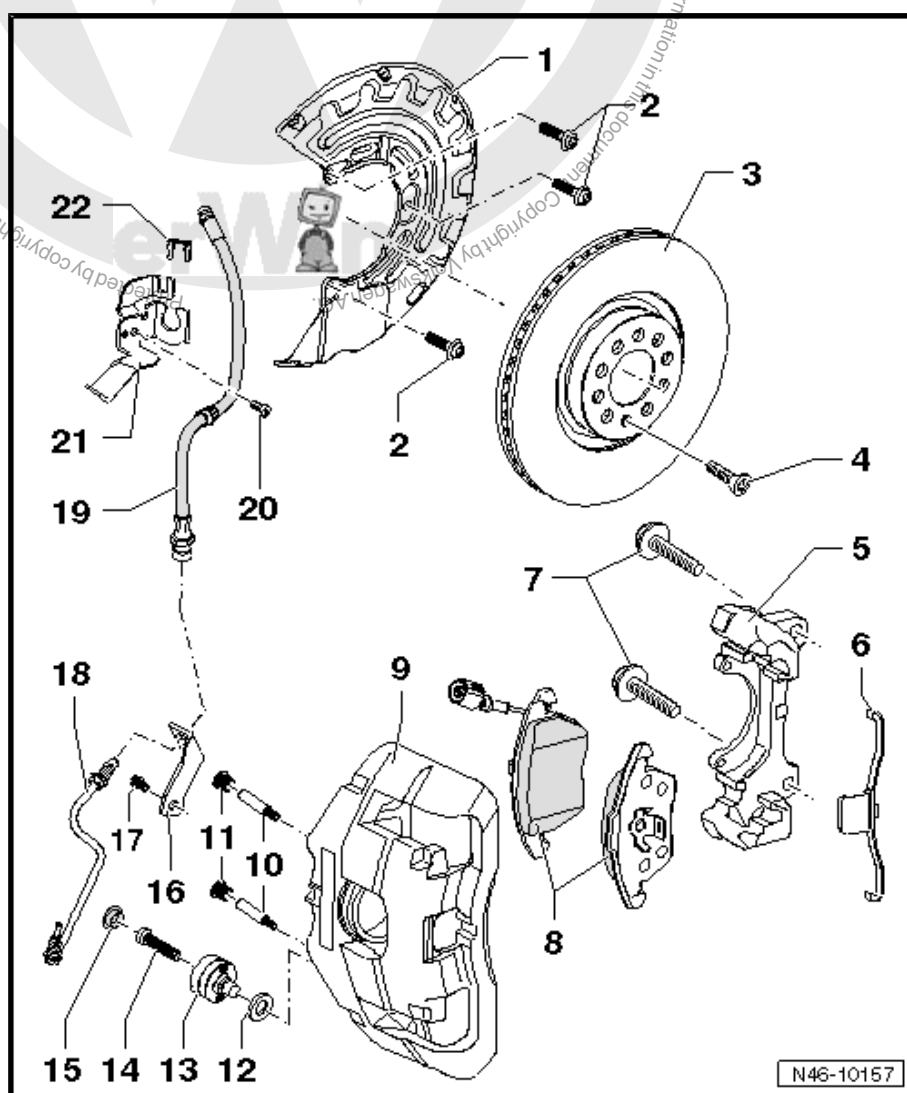
- ☐ Clean if reused.

8 - Brake pads

- ☐ Thickness: 14 mm not including backplate.
- ☐ With brake pad wear indicator.
- ☐ When wear reaches a predetermined limit (approx. 4 mm) the warning lamp in the dash panel insert comes on.
- ☐ Wear limit: 2 mm not including backplate.
- ☐ Checking thickness ⇒ Maintenance ; Booklet ; Front and rear brake discs and pads/linings: Checking condition of discs and thickness of pads/linings .
- ☐ Always renew on both sides of an axle.
- ☐ Removing and installing ⇒ [page 33](#) .

9 - Brake caliper

- ☐ Do not disconnect brake hose when changing brake pads.





- ☐ Must not be unscrewed from one another.
- ☐ Removing and installing ➤ [page 41](#) .
- ☐ Repairing ➤ [page 59](#) .

10 - Guide pin, 30 Nm

11 - Cover cap

- ☐ Remove

12 - Washer

13 - Balance weight

14 - Bolt, 10 Nm

15 - Dust cap

16 - Bracket

17 - Bolt, 15 Nm

18 - Brake line, 14 Nm

19 - Brake hose

20 - Hexagon socket head bolt, 8 Nm

21 - Bracket

22 - Spring clip

1.1.3 Assembly overview- front brakes C60



Note

- ◆ *After every brake pad change, depress brake pedal firmly several times with vehicle stationary, so that brake pads are properly seated in their normal operating position.*
- ◆ *Use the brake filling and bleeding equipment -VAS 5234- to draw off brake fluid from the brake fluid reservoir.*
- ◆ *Before removing a brake caliper or disconnecting a brake hose, fit brake pedal depressor -V.A.G 1869/2- (when doing this, release pressure in system).*



1 - Splash plate

2 - Torx bolt, 12 Nm

3 - Brake disc

- ☐ Ventilated, Ø 340 mm
- ☐ Thickness: 30 mm
- ☐ Wear limit: 27 mm.
- ☐ Always renew on both sides of an axle.
- ☐ Remove brake caliper and brake carrier prior to removing.

4 - Torx bolt, 4 Nm

5 - Brake carrier

- ☐ Bolt to wheel bearing housing.

6 - Brake pads

- ☐ Thickness: 13 mm not including backplate.
- ☐ With brake pad wear indicator
- ☐ When wear reaches a predetermined limit (approx. 4 mm) the warning lamp in the dash panel insert comes on.
- ☐ Wear limit: 2 mm not including backplate.
- ☐ Checking thickness ⇒ Maintenance ; Booklet ; Front and rear brake discs and pads/linings: Checking condition of discs and thickness of pads/linings .
- ☐ Always renew on both sides of an axle.
- ☐ Removing and installing ⇒ [page 36](#) .

7 - Brake caliper

- ☐ Do not disconnect brake hose when changing pads.
- ☐ Removing and installing ⇒ [page 42](#) .
- ☐ Repairing ⇒ [page 59](#) .

8 - Self-locking hexagon bolt, 35 Nm

- ☐ Renew.

9 - Ribbed bolt, 200 Nm

- ☐ Clean if reused.

10 - Wheel bearing housing

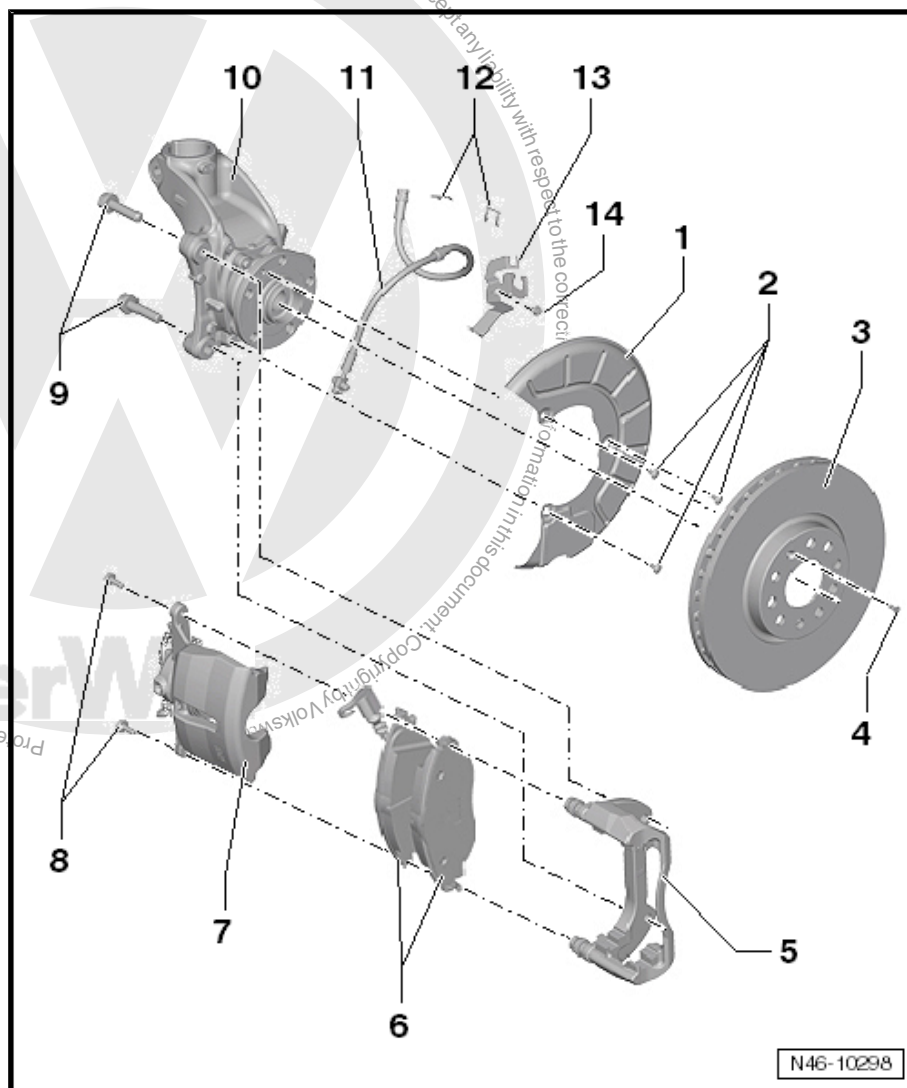
- ☐ With bolted brake carrier.

11 - Brake hose with banjo union and banjo bolt, 35 Nm

12 - Retaining clip

13 - Bracket

14 - Bolt, 8 Nm





1.2 Removing and installing brake pads/linings

⇒ „1.2.1 Removing and installing brake pads, front brakes FN 3“, page 31

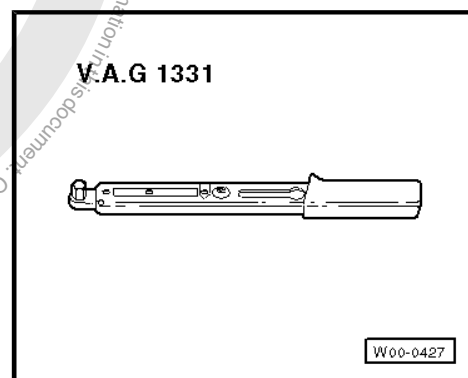
⇒ „1.2.2 Removing and installing brake pads, front brakes FNR-G“, page 33

⇒ „1.2.3 Removing and installing brake pads, front brakes C60“, page 36

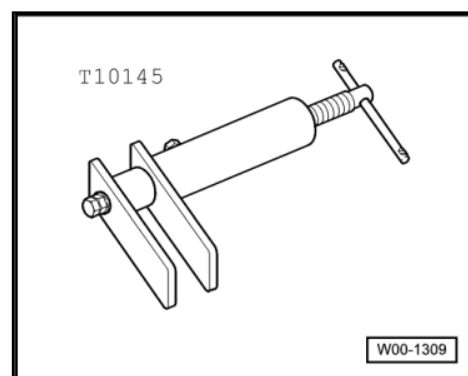
1.2.1 Removing and installing brake pads, front brakes FN 3

Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331-



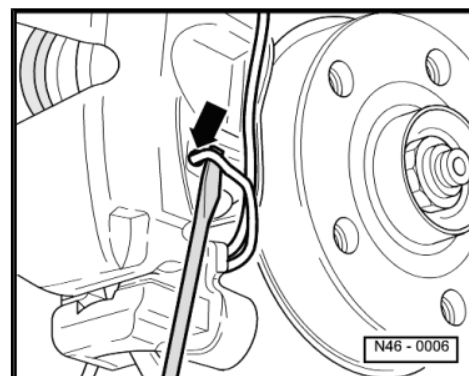
- ◆ Piston resetting appliance -T10145-



Removing:

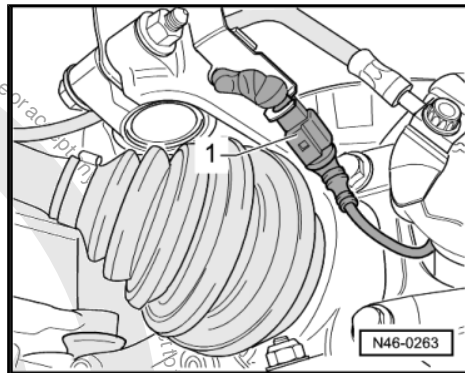
Mark brake pads/linings when removing if they are to be reused. Fit in same position when installing, or braking will be uneven.

- Remove wheels.
- Lever brake pad retaining spring out from brake caliper -arrow- with a screwdriver and remove.

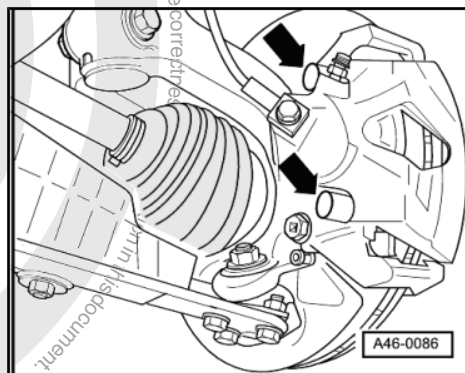




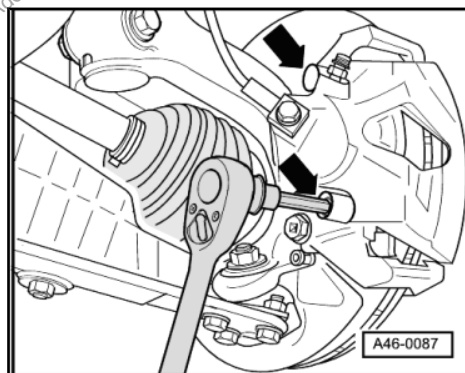
- Disconnect connector -1- for brake pad wear indicator.



- Remove cover caps -arrows-.



- Unscrew both guide pins -arrows- and remove from brake caliper.
- Remove brake caliper and secure with wire so that weight of brake caliper does not strain or damage brake hose.
- Take brake pad out of brake caliper or from brake carrier.



Cleaning:



WARNING

Do not blow out brake system with compressed air; the resulting dust constitutes a health hazard!

- Thoroughly clean brake carrier and contact surfaces for brake pads and remove corrosion.
- Clean brake caliper.

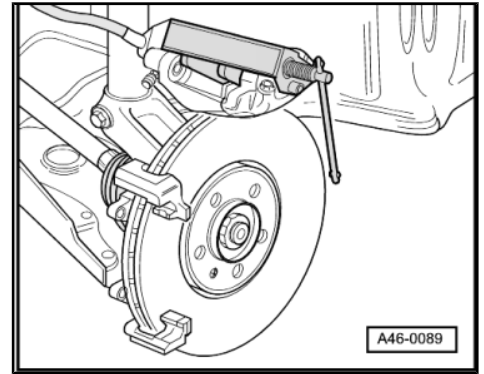
Use only methyated spirits for cleaning the brake caliper housing.

Installing:

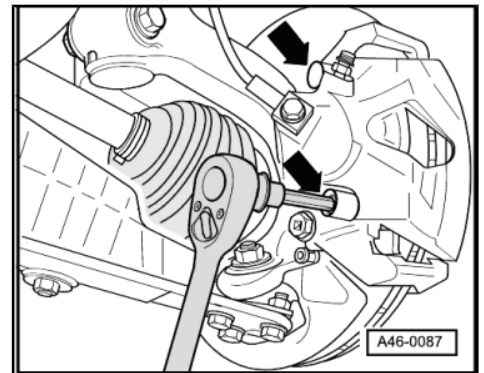
Before pressing piston back into cylinder with piston resetting tool, draw off brake fluid from brake fluid reservoir. Otherwise, particularly if reservoir has been topped up, fluid will overflow and cause damage.



- Press piston back.
- Fit outer brake pad to brake carrier.
- Insert inner brake pad with retaining spring into brake caliper (piston).



- Bolt brake caliper to brake carrier with both guide pins.
- Fit both cover caps.
- Insert retaining spring into brake caliper.
- Reconnect connector for brake pad wear indicator.
- Fit wheels.



Specified torque for wheel bolts ⇒ Running gear, axles, steering;
Rep. gr. 44 ; Wheels, tyres; Specified torque for wheel bolts .



Note

- ◆ *After every brake pad change, depress brake pedal firmly several times with vehicle stationary, so that brake pads are properly seated in their normal operating position.*
- ◆ *Check brake fluid level after changing brake pads.*

Specified torque:

Guide pin to brake carrier 30 Nm

1.2.2 Removing and installing brake pads, front brakes FNR-G

Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331-

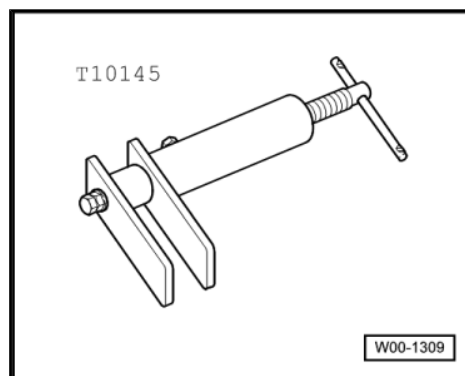
V.A.G 1331



W00-0427



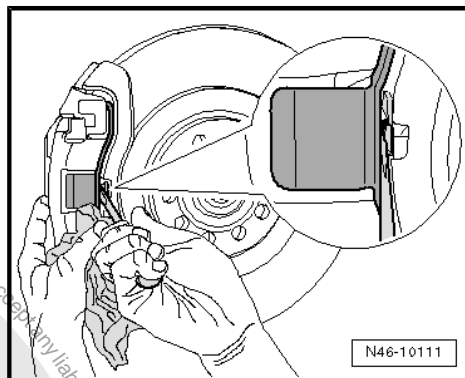
◆ Piston resetting appliance -T 10145-



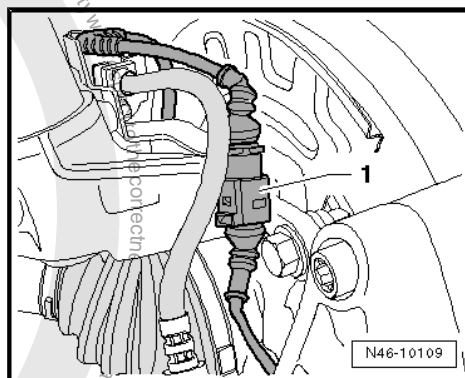
Removing:

**Mark brake pads/linings when removing if they are to be reused.
Fit in same position when installing, or braking will be uneven.**

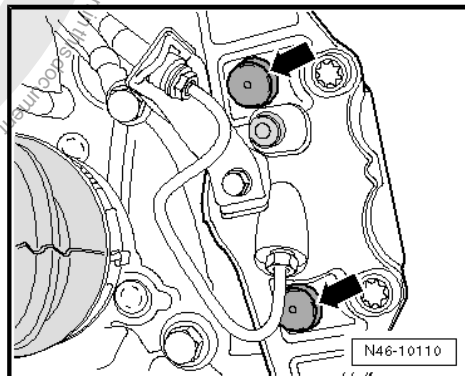
- Remove wheels.
- Lever brake caliper retaining spring out of brake pad retaining spring using a screwdriver. To do this, position screwdriver between the two retaining springs -enlargement-.
- Firmly hold brake caliper retaining spring with a cloth to prevent loss.



- Disconnect connector -1- for brake pad wear indicator.



- Remove cover caps -arrows-.





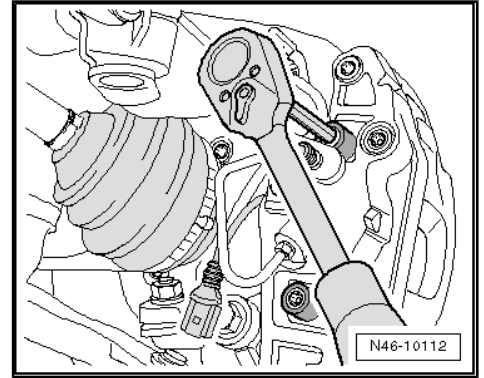
- Unscrew both guide pins -arrows- and remove from brake caliper.
- Remove brake caliper and secure with wire so that weight of brake caliper does not strain or damage brake hose.
- Take brake pads out of brake caliper.

Cleaning:



WARNING

Do not blow out brake system with compressed air; the resulting dust constitutes a health hazard!



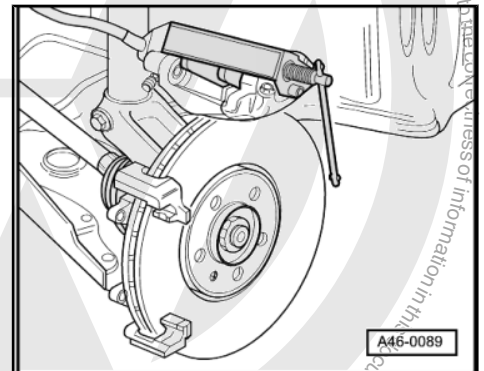
- Thoroughly clean brake carrier and contact surfaces for brake pads and remove corrosion.
- Clean brake caliper.

Use only methylated spirits for cleaning the brake caliper housing.

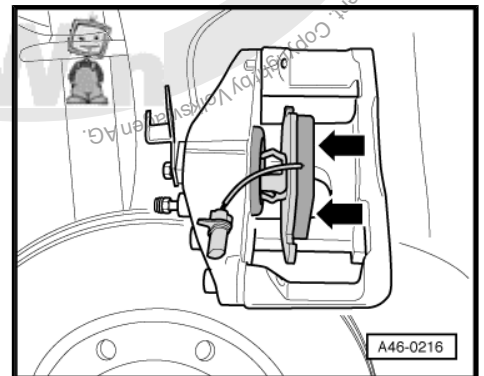
Installing:

Before pressing piston back into cylinder with piston resetting tool, draw off brake fluid from brake fluid reservoir. Otherwise, particularly if reservoir has been topped up, fluid will overflow and cause damage.

- Press piston back.

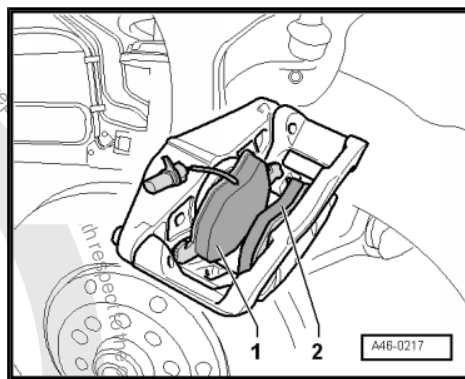


- Insert inner brake pad with retaining spring into brake caliper (piston).



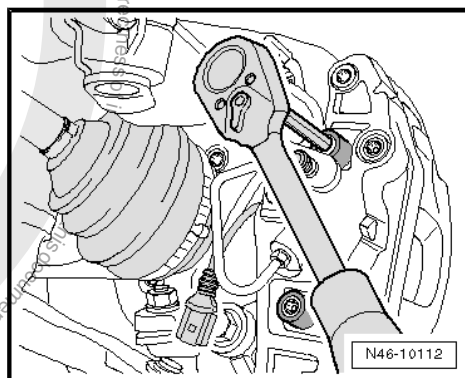


- Insert outer brake pad -2- with retaining spring in caliper.
- Fit brake caliper with brake pads onto brake carrier.



- Bolt brake caliper to brake carrier with both guide pins.
- Fit both cover caps.
- Insert brake caliper retaining spring into brake pad retaining spring and press under brake carrier.
- Reconnect connector for brake pad wear indicator.
- Fit wheels.

Specified torque for wheel bolts ⇒ Running gear, axles, steering;
Rep. gr. 44 ; Wheels, tyres; Specified torque for wheel bolts .



Note

- ◆ After every brake pad change, depress brake pedal firmly several times with vehicle stationary, so that brake pads are properly seated in their normal operating position.
- ◆ Check brake fluid level after changing brake pads.

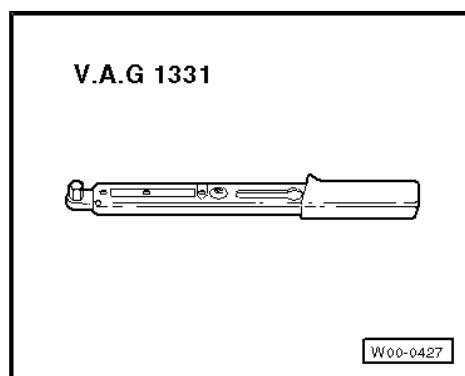
Specified torque:

Guide pin to brake carrier	30 Nm
----------------------------	-------

1.2.3 Removing and installing brake pads, front brakes C60

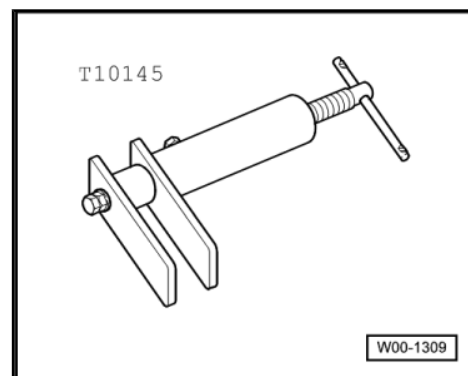
Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331-





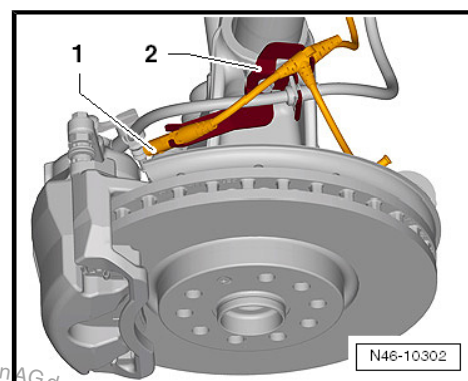
◆ Piston resetting appliance -T 10145-



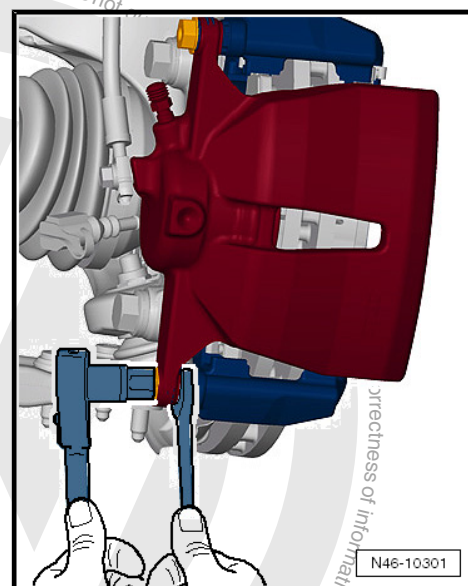
Removing:

**Mark brake pads/linings when removing if they are to be reused.
Fit in same position when installing, or braking will be uneven.**

- Remove wheels.
- Disconnect connector -1- for brake pad wear indicator.



- Unscrew both securing bolts from brake caliper; to do this, counterhold on guide pin.





- Remove brake caliper -1- and secure with wire so that weight of brake caliper does not strain or damage brake hose.
- Remove brake pads -2 and 3- from brake support plate -4-.

Cleaning:



WARNING

Do not blow out brake system with compressed air; the resulting dust constitutes a health hazard!

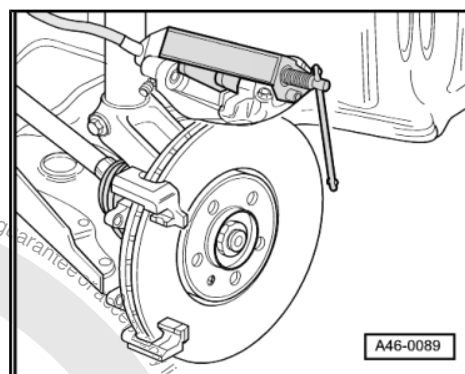
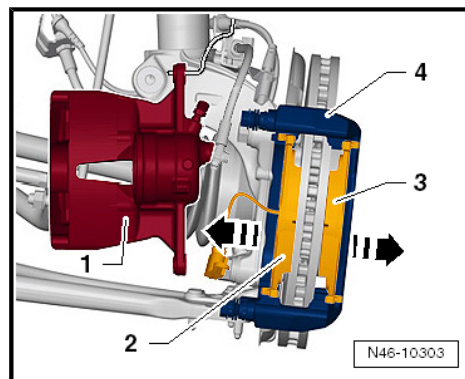
- Thoroughly clean brake carrier and contact surfaces for brake pads and remove corrosion.
- Clean brake caliper.

Use only methylated spirits for cleaning the brake caliper housing.

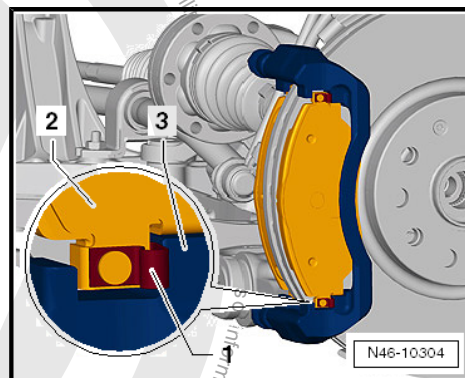
Installing:

Before pressing piston back into cylinder with piston resetting tool, draw off brake fluid from brake fluid reservoir. Otherwise, particularly if reservoir has been topped up, fluid will overflow and cause damage.

- Press piston back.

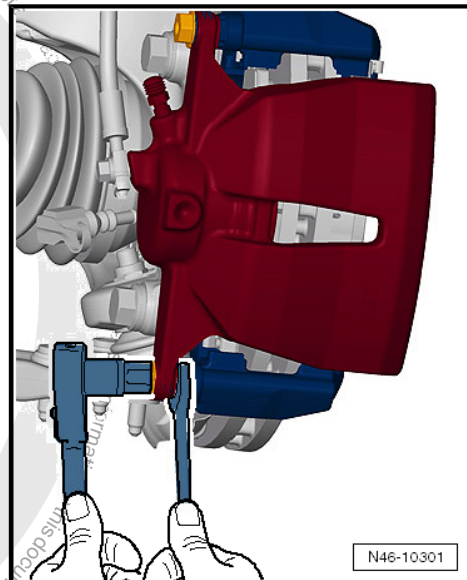


- Place the brake pads -2- together with retaining springs -1- in the recess of the brake support plate -3-.
- Carefully place the brake caliper on the brake support plate.





- Secure brake caliper to brake support plate with new self-locking bolts, counterholding with the guide bolts.



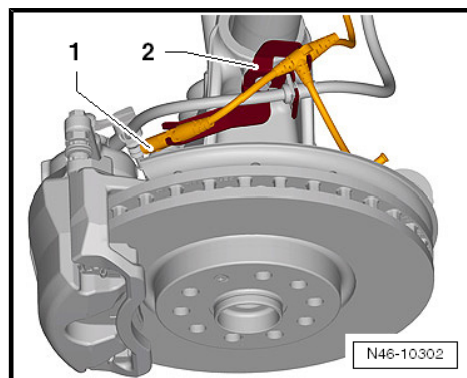
- Connect brake pad wear indicator connector -1-.
- Fit wheels.

Specified torque for wheel bolts ➤ Running gear, axles, steering;
Rep. gr. 44 ; Wheels, tyres; Specified torque for wheel bolts .



Note

- ◆ *After every brake pad change, depress brake pedal firmly several times with vehicle stationary, so that brake pads are properly seated in their normal operating position.*
- ◆ *Check brake fluid level after changing brake pads.*



Specified torque:

Hexagon bolt, brake caliper to brake carrier 35 Nm
◆ Use new bolts!

1.3 Removing and installing brake caliper

⇒ „1.3.1 Removing and installing brake caliper FN3“, page 39

⇒ „1.3.2 Removing and installing brake caliper FNR-G“, page 41

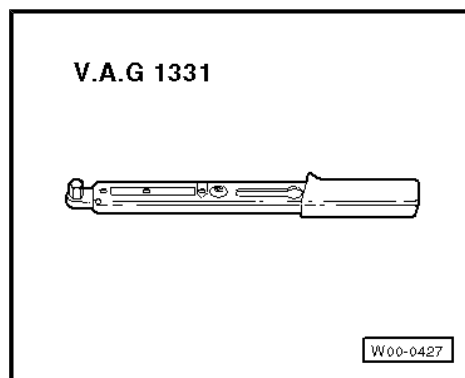
⇒ „1.3.3 Removing and installing brake caliper C60“, page 42

1.3.1 Removing and installing brake caliper FN3

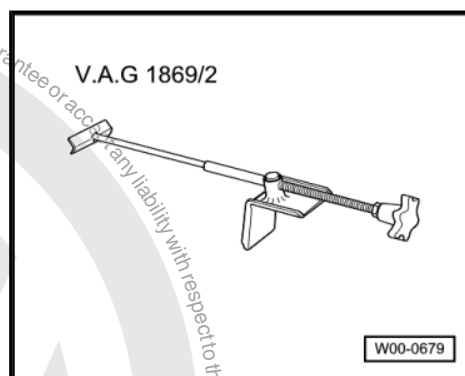
Special tools and workshop equipment required



◆ Torque wrench -V.A.G 1331-



◆ Brake pedal depressor -V.A.G 1869/2-



This procedure applies only to exchanging or the following repair work on the brake caliper.

Removing:

- Remove wheels.
- Lever brake pad retaining spring out from brake caliper with a screwdriver and remove.
- Separate connector for brake pad wear indicator.
- Connect bleeder bottle hose to brake caliper bleeder valve and open bleeder valve.
- Apply brake pedal actuator -V.A.G 1869/2- .
- Close bleeder valve and remove bleeder bottle.
- Disconnect brake hose.
- Pull both caps out of bearing bushes of brake caliper.
- Loosen both guide pins and remove from brake caliper.
- Pull brake caliper off brake carrier.
- Remove brake pads from brake caliper.

Installing:

- Piston is pressed back.
- Outer brake pad is seated on brake carrier.
- Insert inner brake pad with retaining spring into brake caliper (piston).
- Bolt brake caliper to brake carrier with both guide pins.
- Fit both cover caps.
- Bolt brake hose to brake caliper.
- Remove brake pedal actuator -V.A.G 1869/2- .



- Insert retaining spring into brake caliper.
- Reconnect connector for brake pad wear indicator.
- Bleed brake system ➔ [page 94](#) .
- Fit wheels.

Specified torque for wheel bolts ➔ Running gear, axles, steering;
Rep. gr. 44 ; Wheels, tyres; Specified torque for wheel bolts .



Note

- ◆ *Firmly depress brake pedal several times with vehicle stationary so that the brake pads are properly seated in their normal operating position.*
- ◆ *Check brake fluid level.*

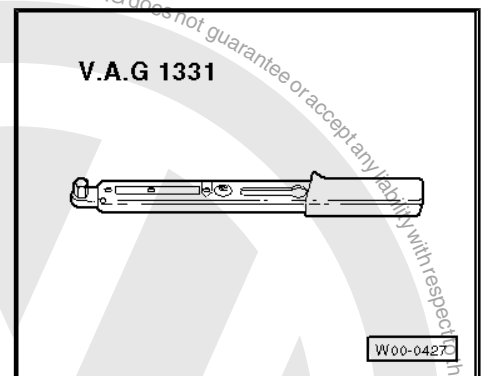
Specified torques:

Guide pin to brake carrier	30 Nm
Brake hose to brake caliper	35 Nm

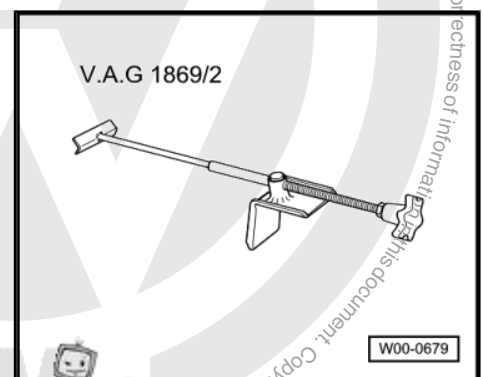
1.3.2 Removing and installing brake caliper FNR-G

Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331-



- ◆ Brake pedal depressor -V.A.G 1869/2-



This procedure applies only to exchanging or the following repair work on the brake caliper.

Removing:

- Remove wheels.
- Lever brake caliper retaining spring out of brake pad retaining spring using a screwdriver. To do this, position screwdriver between both retaining springs.



- Firmly hold brake caliper retaining spring with a cloth to prevent loss.
- Separate connector for brake pad wear indicator.
- Connect bleeder bottle hose to brake caliper bleeder valve and open bleeder valve.
- Apply brake pedal actuator -V.A.G 1869/2- .
- Close bleeder valve and remove bleeder bottle.
- Disconnect brake hose.
- Pull both caps out of bearing bushes of brake caliper.
- Loosen both guide pins and remove from brake caliper.
- Pull brake caliper off brake carrier.
- Remove brake pads from brake caliper.

Installing:

- Piston is pressed back.
- Insert inner brake pad with retaining spring into brake caliper (piston).
- Insert outer brake pad with retaining spring in brake caliper.
- Fit brake caliper with brake pads onto brake carrier.
- Bolt brake caliper to brake carrier with both guide pins.
- Fit both cover caps.
- Connect brake hose to brake line from brake caliper.
- Remove brake pedal actuator -V.A.G 1869/2- .
- Insert brake caliper retaining spring into brake pad retaining spring and press under brake carrier.
- Reconnect connector for brake pad wear indicator.
- Bleed brake system ➔ [page 94](#) .
- Fit wheels.

Specified torque for wheel bolts ➔ Running gear, axles, steering;
Rep. gr. 44 ; Wheels, tyres; Specified torque for wheel bolts .



Note

- ◆ *Firmly depress brake pedal several times with vehicle stationary so that the brake pads are properly seated in their normal operating position.*
- ◆ *Check brake fluid level.*

Specified torques:

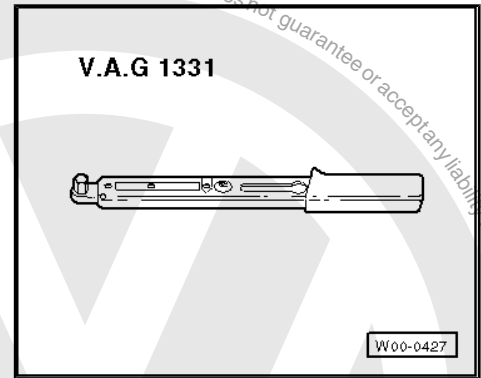
Guide pin to brake carrier	30 Nm
Brake hose to brake line	14 Nm

1.3.3 Removing and installing brake caliper C60

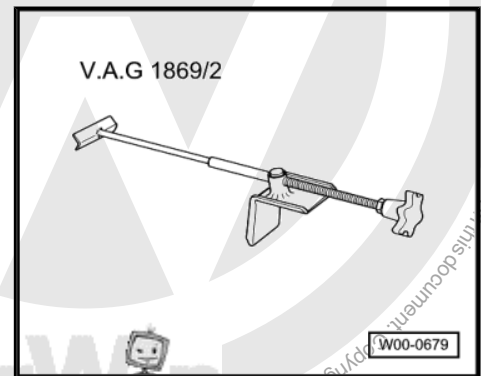
Special tools and workshop equipment required



- ◆ Torque wrench -V.A.G 1331-



- ◆ Brake pedal depressor -V.A.G 1869/2-



This procedure applies only to exchanging or the following repair work on the brake caliper.

Removing:

- Remove wheels.
- Disconnect connector for brake pad wear indicator.
- Connect bleeder bottle hose to brake caliper bleeder valve and open bleeder valve.
- Apply brake pedal depressor -V.A.G 1869/2- .
- Close bleed valve and remove bleed bottle.
- Unscrew brake hose.
- Unscrew both securing bolts from brake caliper; to do this, counterhold on guide pin.
- Pull brake caliper from brake support plate.

Installing:

- Piston is pressed back.
- The two brake pads are seated in the retaining springs on the brake support plate.
- Carefully place the brake caliper on the brake support plate.
- Secure brake caliper to brake support plate with new self-locking bolts, counterholding with the guide bolts.
- Screw brake hose onto brake caliper.
- Remove brake pedal depressor -V.A.G 1869/2- .
- Connect brake pad wear indicator connector.
- Bleed brake system.
- Fit wheels.



Specified torque for wheel bolts ⇒ Running gear, axles, steering;
Rep. gr. 44 ; Wheels, tyres; Specified torque for wheel bolts .



Note

- ◆ *Firmly depress brake pedal several times with vehicle stationary so that the brake pads are properly seated in their normal operating position.*
- ◆ *Check brake fluid level.*

Specified torque:

Hexagon bolt, brake caliper to brake carrier	35 Nm
◆ Use new bolts!	

Brake hose to brake caliper	35 Nm
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2 Rear brakes

⇒ „2.1 Assembly overview - rear brakes“, page 45

⇒ „2.2 Removing and installing brake pads/linings“, page 46

⇒ „2.3 Removing and installing brake caliper“, page 49

2.1 Assembly overview - rear brakes

Assembly overview - rear brakes CII 38 and CII 41



Note

- ◆ Use the brake filling and bleeding equipment -VAS 5234- to draw off brake fluid from the brake fluid reservoir.
- ◆ Before removing a brake caliper or disconnecting a brake hose, fit brake pedal depressor -V.A.G 1869/2- (when doing this, release pressure in system).

1 - Splash plate

- ☐ Allocation ⇒ Electronic parts catalogue (ETKA)

2 - Brake disc

- ☐ 16 inch: Ø 286 mm
- ☐ 17 inch: Ø 310 mm
- ☐ Thickness 16 inch: 12 mm
- ☐ Thickness 17 inch: 22 mm
- ☐ Wear limit 16 inch: 10 mm
- ☐ Wear limit 17 inch: 20 mm
- ☐ When worn, renew on both sides of axle.
- ☐ Remove brake caliper and brake carrier prior to removing.

3 - Torx socket head bolt, 4 Nm

4 - Multi-point socket head bolt, 90 Nm and turn 90° further

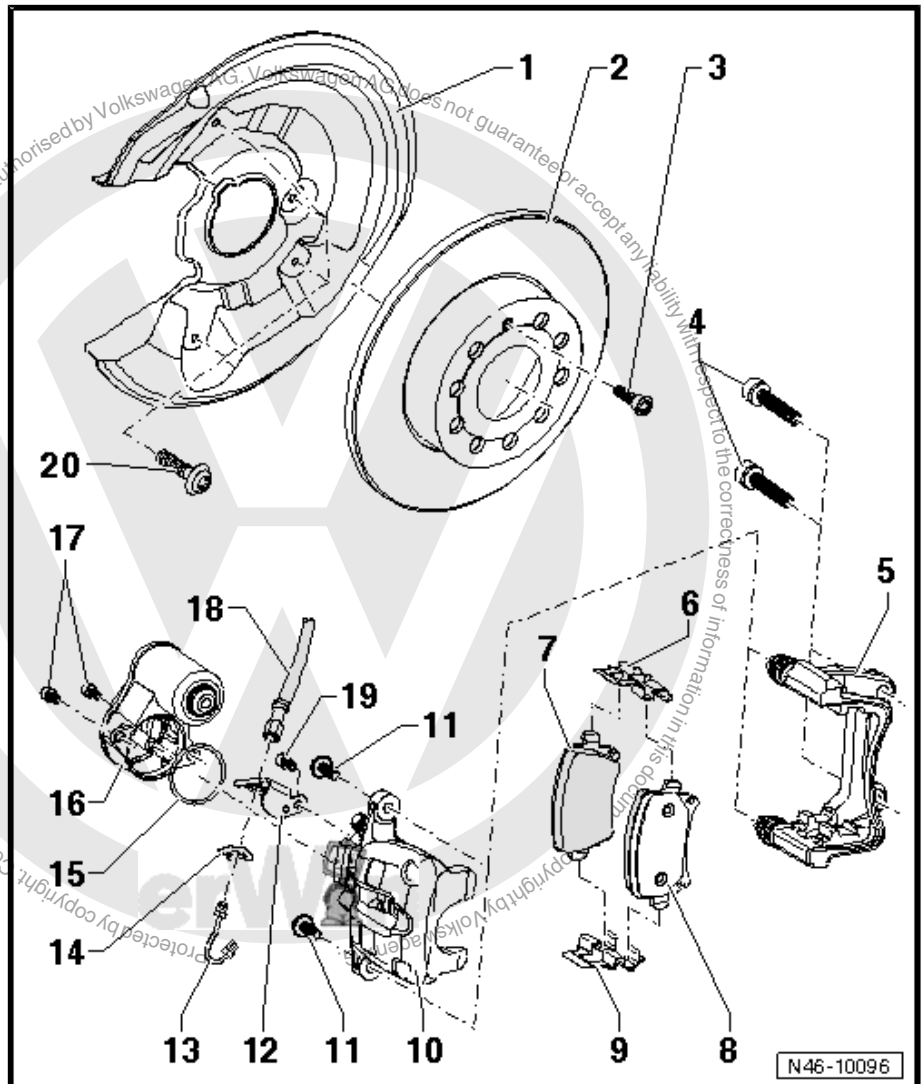
- ☐ Always renew after removing.

5 - Brake carrier with guide pin(s) and protective cap

- ☐ Supplied as genuine part, assembled with sufficient grease on guide pins.
- ☐ If protective caps or guide pins are damaged, install repair kit. Use lubricant sachet supplied to lubricate guide pins.

6 - Pad retainer

- ☐ Always renew when changing pads.



N46-10096



7 - Brake pad

- ☐ Thickness: 11 mm not including backplate.
- ☐ Wear limit: 2 mm not including backplate.
- ☐ Checking thickness ⇒ Maintenance ; Booklet ; Front and rear brake discs and pads/linings: Checking condition of discs and thickness of pads/linings .
- ☐ Always renew on both sides of an axle.
- ☐ Removing and installing ⇒ [page 46](#) .

8 - Brake pad

- ☐ Thickness: 11 mm not including backplate.
- ☐ Wear limit: 2 mm not including backplate.
- ☐ Checking thickness ⇒ Maintenance ; Booklet ; Front and rear brake discs and pads/linings: Checking condition of discs and thickness of pads/linings .
- ☐ Always renew on both sides of an axle.
- ☐ Removing and installing ⇒ [page 46](#) .

9 - Pad retainer

- ☐ Always renew when changing pads.

10 - Brake caliper

- ☐ Do not disconnect brake hose when changing pads.
- ☐ Removing and installing ⇒ [page 49](#) .
- ☐ Repairing ⇒ [page 68](#) .
- ☐ Basic setting must be carried out after repair work or renewal.

11 - Self-locking hexagon bolt, 35 Nm

- ☐ Renew.

12 - Bracket

13 - Brake line, 14 Nm

14 - Retaining clip

15 - Sealing ring

16 - Parking brake motor.

17 - Torx socket head bolt, 12 Nm

18 - Brake hose

19 - Torx socket head bolt, 12 Nm

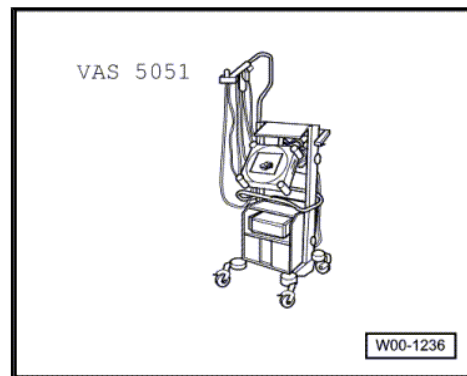
2.2 Removing and installing brake pads/linings

Special tools and workshop equipment required

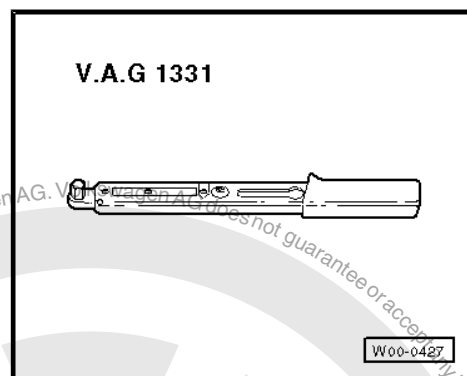
- ◆ Vehicle diagnosis, testing and information system -VAS 5051-



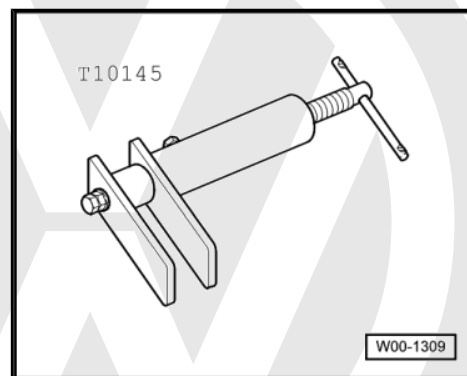
- ◆ Diagnosis cable -VAS 5051/1- or -VAS 5051/3-



- ◆ Torque wrench -V.A.G 1331-



- ◆ Piston resetting appliance -T10145-



Removing:

Mark brake pads when removing if they are to be reused. Fit in same position when installing, or braking will be uneven.



Note

Do not separate connectors of parking brake motors.

- Electromechanical parking brake not operated.
- Remove wheels.

The electromechanical parking brake pistons must be moved back with -VAS 5051- .

Before resetting pistons, draw off brake fluid from brake fluid reservoir. Otherwise, particularly if reservoir has been topped up, fluid will overflow and cause damage.

- Connecting ⇒ Vehicle diagnostic tester and selecting functions
⇒ [page 9](#) .



- Do do this, select electromechanical parking brake and „moving parking brake motor pistons forwards and backwards“ function.
- Move the pistons back using ⇒ Vehicle diagnostic tester.
- Then remove securing bolts from brake caliper; to do this, counterhold on guide pin.
- Remove brake caliper from brake carrier.



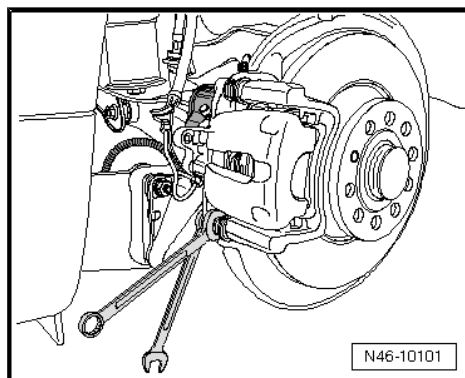
Note

The resetting of the pistons with -VAS 5051- is still required but is often not sufficient! The thrust nut in the piston is fitted on a floating bearing, so that the piston can only be compressed but not pulled back. Only the spindle with the thrust nut will be moved back.

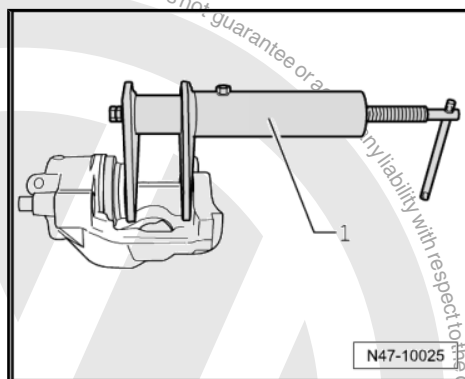


Caution

The piston must be reset beforehand with -VAS 5051- .



- Now press piston back fully with piston resetting tool - T10145- .
- Secure brake caliper with wire so that weight of brake caliper does not stress or damage brake hose.



- Remove brake pads and pad retainers -arrows-.

Cleaning:



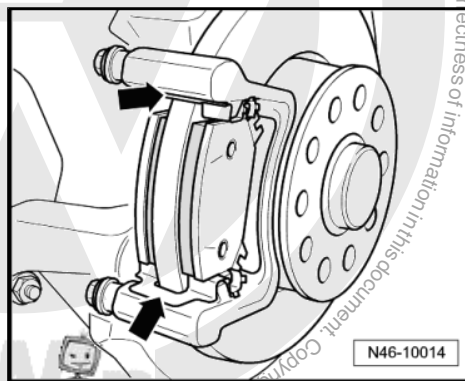
WARNING

Do not blow out brake system with compressed air; the resulting dust constitutes a health hazard!

- Thoroughly clean brake carrier and contact surfaces for brake pads and remove corrosion.
- Clean brake caliper.

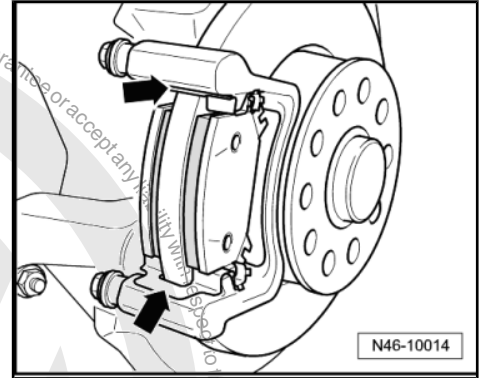
Use only methylated spirits for cleaning the brake caliper housing.

Installing:





- Insert pad retainers -arrows- and brake pads into brake carrier.

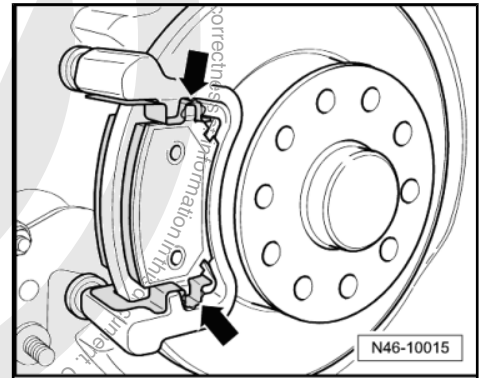


- Ensure that brake pads are seated correctly in pad retainers -arrows-
- Secure brake caliper with new self-locking bolts.
- ◆ The repair kit includes four self-locking hexagon bolts which must always be installed.

After moving the pistons forwards using -VAS 5051- , carry out a basic setting of brake system.

- Carry out basic setting of brake system using -VAS 5051- .
- Fit wheels.

Specified torque for wheel bolts ⇒ Running gear, axles, steering;
Rep. gr. 44 ; Wheels, tyres; Specified torque for wheel bolts .



Note

Check brake fluid level after changing brake pads.

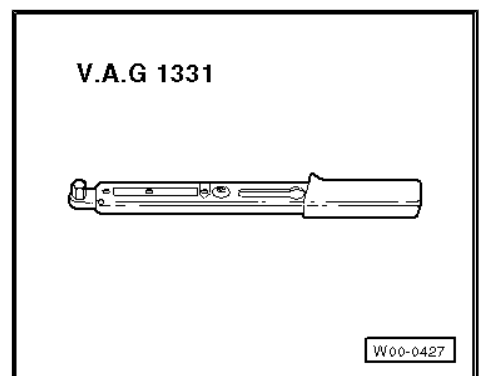
Specified torque:

Hexagon bolt, brake caliper to brake carrier	35 Nm
◆ Use new bolts!	

2.3 Removing and installing brake caliper

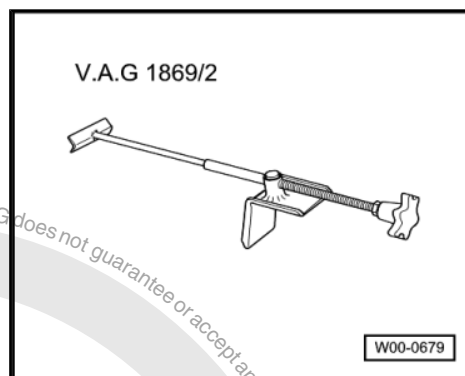
Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331-



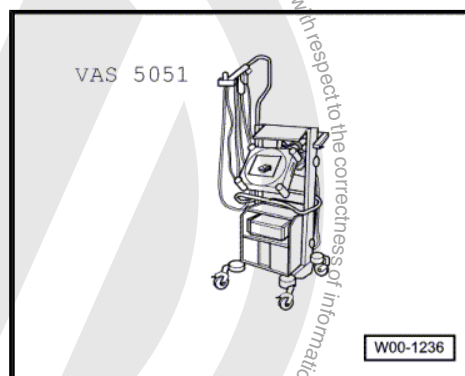


◆ Brake pedal depressor -V.A.G 1869/2-



◆ Vehicle diagnosis, testing and information system -VAS 5051-

◆ Diagnosis cable -VAS 5051/1- or -VAS 5051/3-



Removing:

This procedure applies only to exchanging or the following repair work on the brake caliper.



Note

Do not separate connectors of parking brake motors.

- Remove wheels.

The electromechanical parking brake pistons must be moved back with -VAS 5051- .

Before resetting pistons, draw off brake fluid from brake fluid reservoir. Otherwise, particularly if reservoir has been topped up, fluid will overflow and cause damage.

- Connecting ⇒ Vehicle diagnostic tester and selecting functions ⇒ [page 9](#) .
- Do do this, select electromechanical parking brake and „moving parking brake motor pistons forwards and backwards“ function.
- Move the pistons back using ⇒ Vehicle diagnostic tester.
- Unscrew parking brake motor without separating the connector.
- Connect bleeder bottle hose to brake caliper bleeder valve and open bleeder valve.
- Apply brake pedal actuator -V.A.G 1869/2- .
- Close bleeder valve and remove bleeder bottle.
- Unscrew brake line from brake hose and brake caliper.



- Remove both securing bolts from brake caliper; to do this, counterhold on guide pin.
- Pull brake caliper off brake carrier.

Installing:

- The brake pads are seated in the retaining springs on the brake carrier.
- Secure brake caliper to brake carrier with new self-locking bolts.

The annular groove and the contact surface of the parking brake motor must be clean.

- Install new sealing ring.
- Turn spindle back slightly, using a T45 Torx socket, until parking brake motor can be inserted correctly.
- Carefully position parking brake motor, ensuring that sealing ring is seated.
- Turn parking brake motor until bolt hole and thread align.

Make sure that parking brake motor is flush with brake caliper. Never pull parking brake motor onto brake caliper using securing bolts.

- Position Torx bolts by hand and then tighten.
- Screw brake line to brake caliper.
- Bleed brake system ➔ [page 94](#).

After moving the pistons forwards using -VAS 5051- , carry out a basic setting of brake system.

- Carry out basic setting of brake system using -VAS 5051- .
- Fit wheels.

Specified torque for wheel bolts ➔ Running gear, axles, steering;
Rep. gr. 44 ; Wheels, tyres; Specified torque for wheel bolts .



Note

Check brake fluid level.

Specified torques:

Hexagon bolt, brake caliper to brake carrier	35 Nm
◆ Use new bolts!	
Brake line to brake caliper	14 Nm
Parking brake motor to brake caliper	12 Nm

3 Parking brake

⇒ „3.1 Fitting location overview - parking brake“, page 52

⇒ „3.2 Removing and installing control unit“, page 53

⇒ „3.3 Removing and installing parking brake motor“, page 53

3.1 Fitting location overview - parking brake

Electromechanical parking brake:

1 - Electromechanical parking brake button -E538-

- ❑ Location: in dash panel, next to light switch.

2 - Electromechanical parking brake warning lamp -K213-

- ❑ Location: in electromechanical parking brake button -E538- .

3 - Electric parking brake and handbrake fault warning lamp -K214-

- ❑ Location: in dash panel insert.

4 - Brake system warning lamp -K118-

- ❑ Location: in dash panel insert.

5 - Acoustic signal

6 - Auto-hold button -E540-

- ❑ With auto-hold warning lamp -K237-
- ❑ Location: in centre console.

7 - Control unit for electromechanical parking brake -J540- and ESP sensor unit -G419-

- ❑ Installed together in one housing.
- ❑ Removing and installing ⇒ [page 53](#) .

8 - Sealing ring

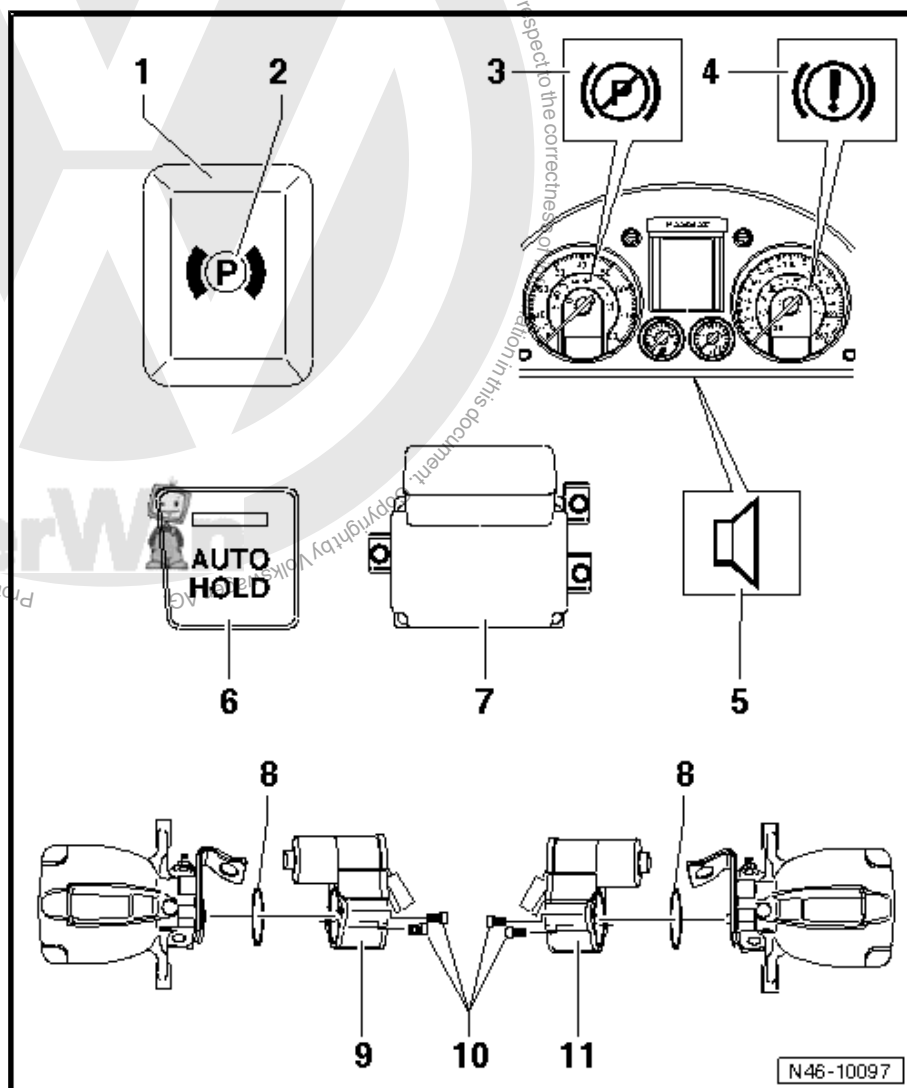
9 - Right parking brake motor -V283-

- ❑ Location: on rear right brake caliper
- ❑ Removing and installing ⇒ [page 53](#) .

10 - Torx socket head bolt, 12 Nm

11 - Left parking brake motor -V282-

- ❑ Location: on rear left brake caliper
- ❑ Removing and installing ⇒ [page 53](#) .





3.2 Removing and installing control unit

The control unit for electromechanical parking brake -J540- and the ESP sensor unit -G419- are installed in a housing below the centre console.

After the control unit for electromechanical parking brake -J540- has been replaced together with the ESP sensor unit -G419- , it is necessary to code the ABS control unit -J104- and to carry out a basic setting of the „brake system“ (electromechanical parking brake).



WARNING

Severe shocks (e.g. dropping, impact) may destroy the ESP sensor unit -G419-. The ESP sensor unit -G419- may not then be used any further.

Removing:

- Remove centre console ⇒ General body repairs, interior; Rep. gr. 68 ; Centre console; Removing and installing centre console .
- Remove the three securing nuts -arrows-.
- Pull connector -1- off control unit for electromechanical parking brake -J540- .
- Remove control unit for electromechanical parking brake - J540- .

Installing:

- Install in reverse order.

When installing control unit for electromechanical parking brake -J540- , ensure that it is correctly seated in its bracket and is free of stress.



Note

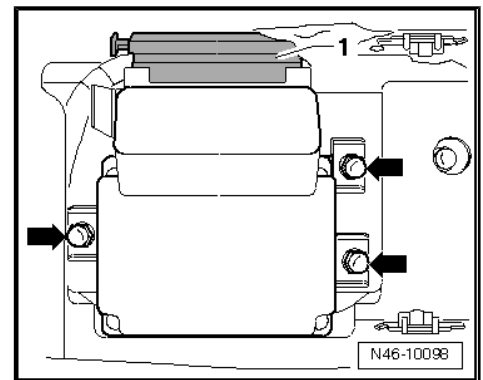
Do not use the securing nuts to forcibly position control unit for electromechanical parking brake -J540- .

- Tighten securing nuts to 9 Nm.
- Code control unit -J104- with ⇒ Vehicle diagnostic tester in "Guided fault finding".

To do this, carry out basic setting of steering angle sender -G85- , lateral acceleration sender -G200- , brake pressure sender - G201- and longitudinal acceleration sender -G251- .

- Carry out basic setting of „brake system“ (electromechanical parking brake).

Connecting ⇒ Vehicle diagnostic tester and selecting functions
⇒ [page 9](#) .

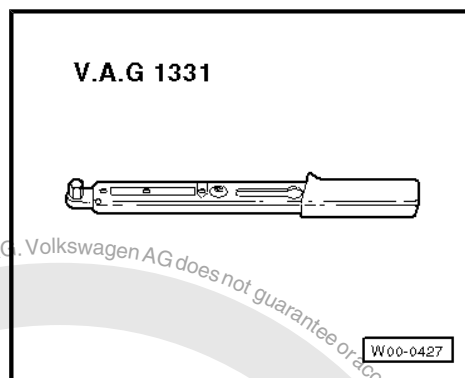


3.3 Removing and installing parking brake motor

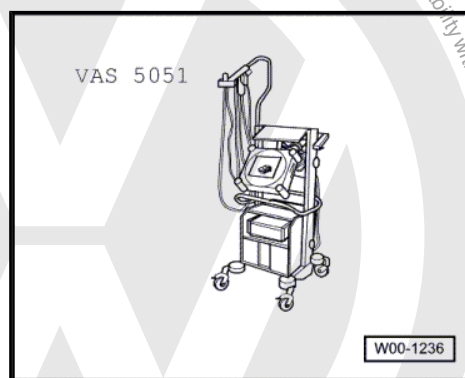
Special tools and workshop equipment required



- ◆ Torque wrench -V.A.G 1331-



- ◆ Vehicle diagnosis, testing and information system -VAS 5051-
- ◆ Diagnosis cable -VAS 5051/1- or -VAS 5051/3-



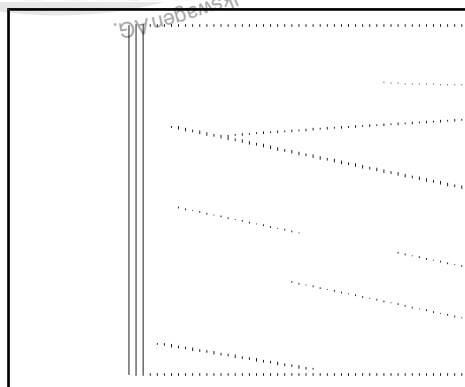
Removing:



Note

Switch off ignition for at least 30 seconds before disconnecting connector.

- Pull connector -1- off parking brake motor.





- Unscrew both Torx bolts -arrows- from parking brake motor.
- Pull parking brake motor off brake caliper.
- Remove sealing ring.

Take care not to damage annular groove for seal and contact surface on parking brake motor.

- Clean annular groove and contact surface on parking brake motor.

Installing:

- Slightly moisten new sealing ring with brake fluid, then fit.

- Turn spindle back slightly, using a T45 Torx socket -A-, until parking brake motor can be inserted correctly.



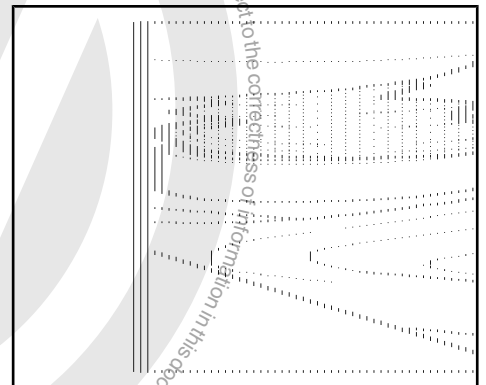
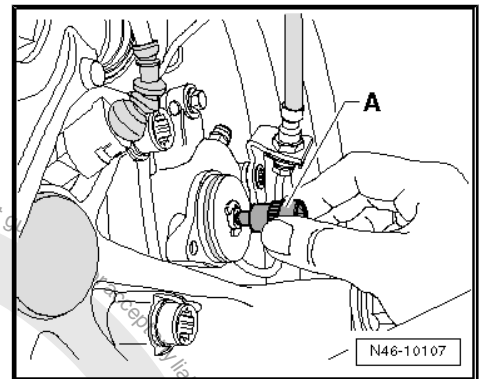
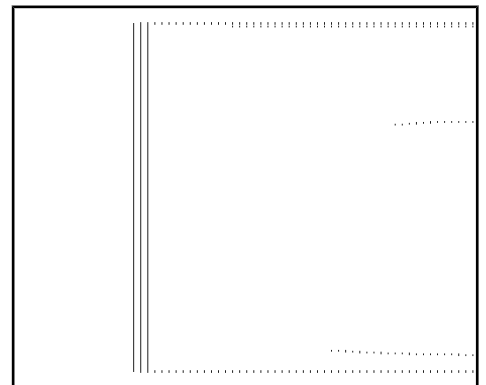
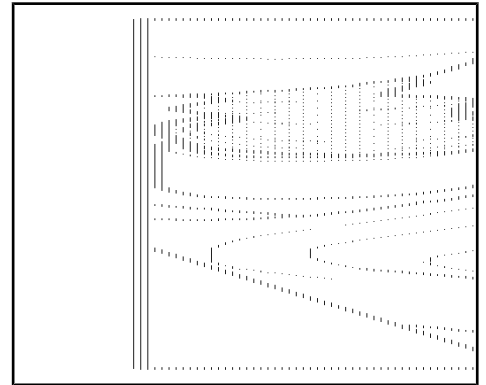
Caution

The sealing ring must not be allowed to turn out while the parking brake motor is being installed!

- Carefully position parking brake motor, ensuring that sealing ring is seated.
- Turn parking brake motor until bolt hole and thread align.

Make sure that parking brake motor is flush with brake caliper. Never pull parking brake motor onto brake caliper using securing bolts.

- Position Torx bolts -arrows- by hand and then tighten.
- Install connector.
- Perform basic brake system setting.
- Connecting a Vehicle diagnostic tester and selecting functions
⇒ [page 9](#).





4 Brake pedal

⇒ „4.1 Assembly overview - brake pedal“, page 56

⇒ „4.2 Separating brake pedal from brake servo“, page 56

⇒ „4.3 Connecting brake pedal to brake servo“, page 57

4.1 Assembly overview - brake pedal



WARNING

The brake pedal travel must not be restricted by additional floor coverings.

Grease all mountings before installing with grease Part No. G 000 602.

1 - Mounting bracket

2 - Self-locking hexagon nut, 25 Nm

3 - Self-locking hexagon nut, 25 Nm

4 - Brake pedal

- ☐ Connect brake pedal to brake servo plunger rod
⇒ [page 57](#).

5 - Cap

6 - Bearing shell

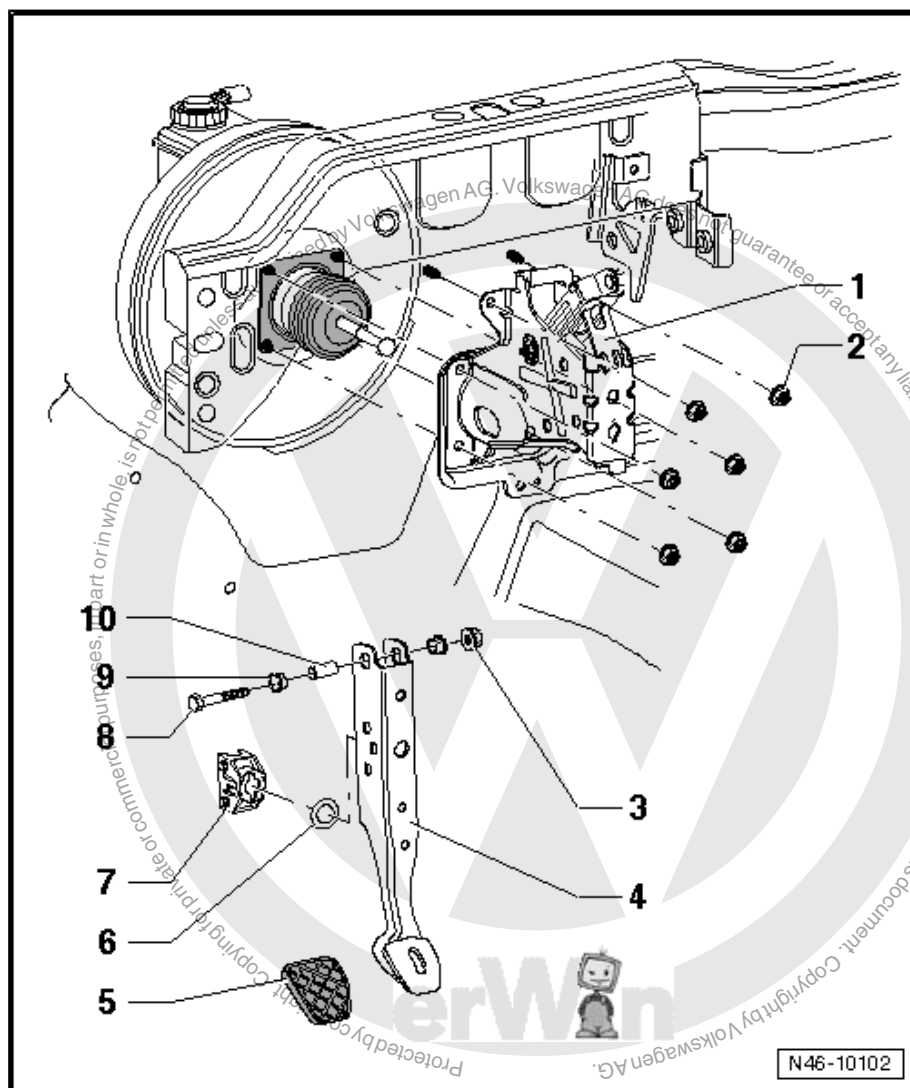
7 - Mounting

- ☐ For ball head of brake servo plunger rod.

8 - Hexagon bolt

9 - Sleeve bearing

10 - Pivot pin

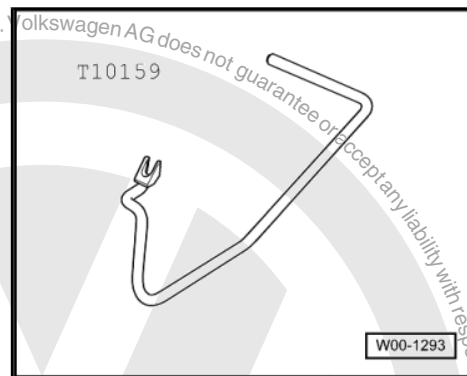


4.2 Separating brake pedal from brake servo

Special tools and workshop equipment required



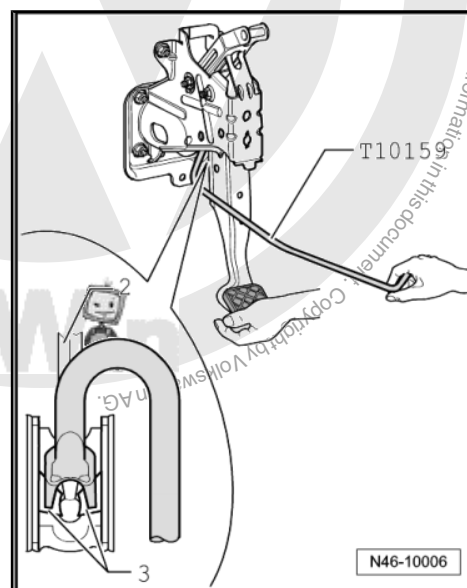
◆ Release tool -T10159-



- Remove trim on driver side ⇒ General body repairs, interior; Rep. gr. 68 ; Compartments/covers; Removing and installing dash panel end trim on driver side .
- First press brake pedal in direction of brake servo and hold.
- 2 - Plunger rod
- 3 - Retaining lugs
- Insert release tool -T10159- and pull in direction of driver seat. When doing this, counter-hold on brake pedal. (At this stage the pedal must not be allowed to move backwards.) This action will press retaining lugs -3- of mounting off ball head of plunger rod -2-.

For the sake of clarity, separation of brake pedal from brake servo is shown with pedal cluster removed.

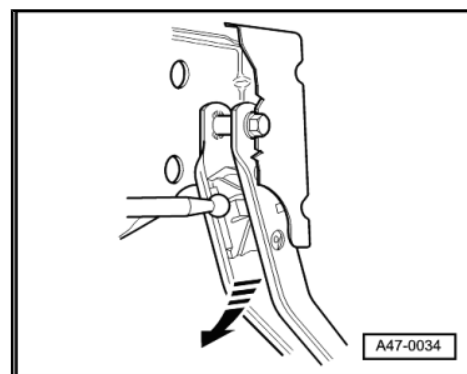
- Pull release tool -T10159- and brake pedal together towards driver seat. (This action will pull the brake pedal off the ball head of the plunger rod).



4.3 Connecting brake pedal to brake servo

- Hold ball head of plunger rod in front of mounting and push brake pedal in direction of brake servo, so that the ball head clicks into place.

Continue installation in reverse order.



47 – Brakes - hydraulics

1 Front brake calipers

⇒ „1.1 Assembly overview - front brake caliper“, page 58

⇒ „1.2 Removing and installing brake caliper piston“, page 60

1.1 Assembly overview - front brake caliper

⇒ „1.1.1 Assembly overview - brake caliper FN3“, page 58

⇒ „1.1.2 Assembly overview - brake caliper FNR-G“, page 59

⇒ „1.1.3 Assembly overview - brake caliper C60“, page 59

1.1.1 Assembly overview - brake caliper FN3

- ◆ When carrying out repairs, install all parts supplied in repair kit.
- ◆ Use only methylated spirits for cleaning the brake.
- ◆ Apply thin coat of assembly paste G 052 150 A2 to brake cylinder, piston and sealing ring.

1 - Dust cap

- ☐ Fit onto bleeder valve.

2 - Bleeder valve, 10 Nm

- ☐ Apply thin coat of assembly paste G 052 150 A2 to thread before screwing in.

3 - Cover caps

- ☐ Insert into sleeve bearing.

4 - Guide pin, 30 Nm

5 - Sleeve bearing

- ☐ Insert into brake caliper

6 - Brake caliper

7 - Brake carrier

- ☐ Bolt onto brake caliper.

8 - Retaining spring

- ☐ Insert with both ends in holes in brake caliper.

9 - Sealing ring

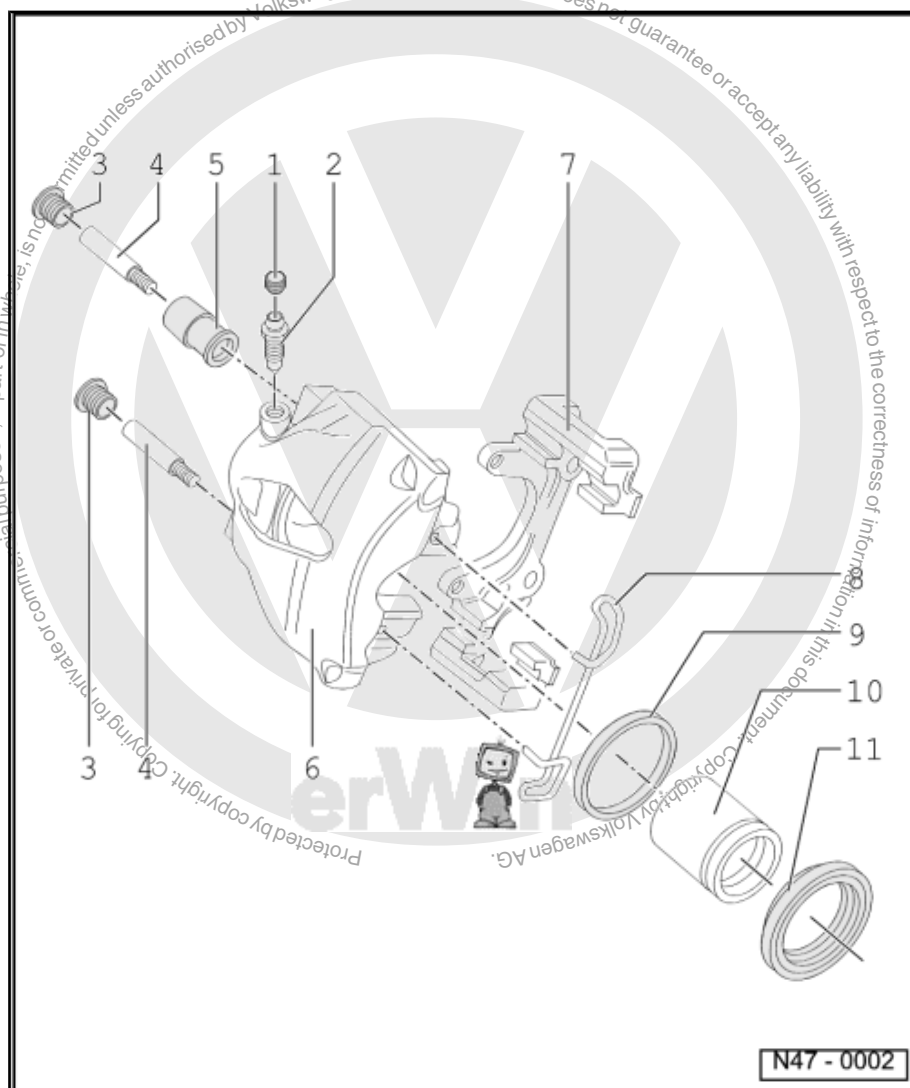
- ☐ Removing and installing ⇒ [page 61](#) .

10 - Piston

- ☐ Removing and installing ⇒ [page 61](#) .
- ☐ Apply thin coat of assembly paste G 052 150 A2 to piston before installing.

11 - Protective cap

- ☐ Removing and installing ⇒ [page 61](#) .



N47 - 0002



- ☐ Take care not to damage when inserting piston.

1.1.2 Assembly overview - brake caliper FNR-G

- ◆ When carrying out repairs, install all parts supplied in repair kit.
- ◆ Use only methylated spirits for cleaning the brake.
- ◆ Apply thin coat of assembly paste G 052 150 A2 to brake cylinder, piston and sealing ring.

1 - Dust cap

- ☐ Fit onto bleeder valve.

2 - Bleeder valve, 12 Nm

- ☐ Apply thin coat of assembly paste G 052 150 A2 to thread before screwing in.

3 - Cover caps

- ☐ Insert into sleeve bearing.

4 - Guide pin, 30 Nm

5 - Sleeve bearing

- ☐ Insert into brake caliper.

6 - Brake caliper

- ☐ Must not be unscrewed from one another.

7 - Retaining spring

- ☐ Insert into brake pad retaining spring and press under brake carrier.

8 - Brake carrier

- ☐ Bolt onto brake caliper.

9 - Sealing ring

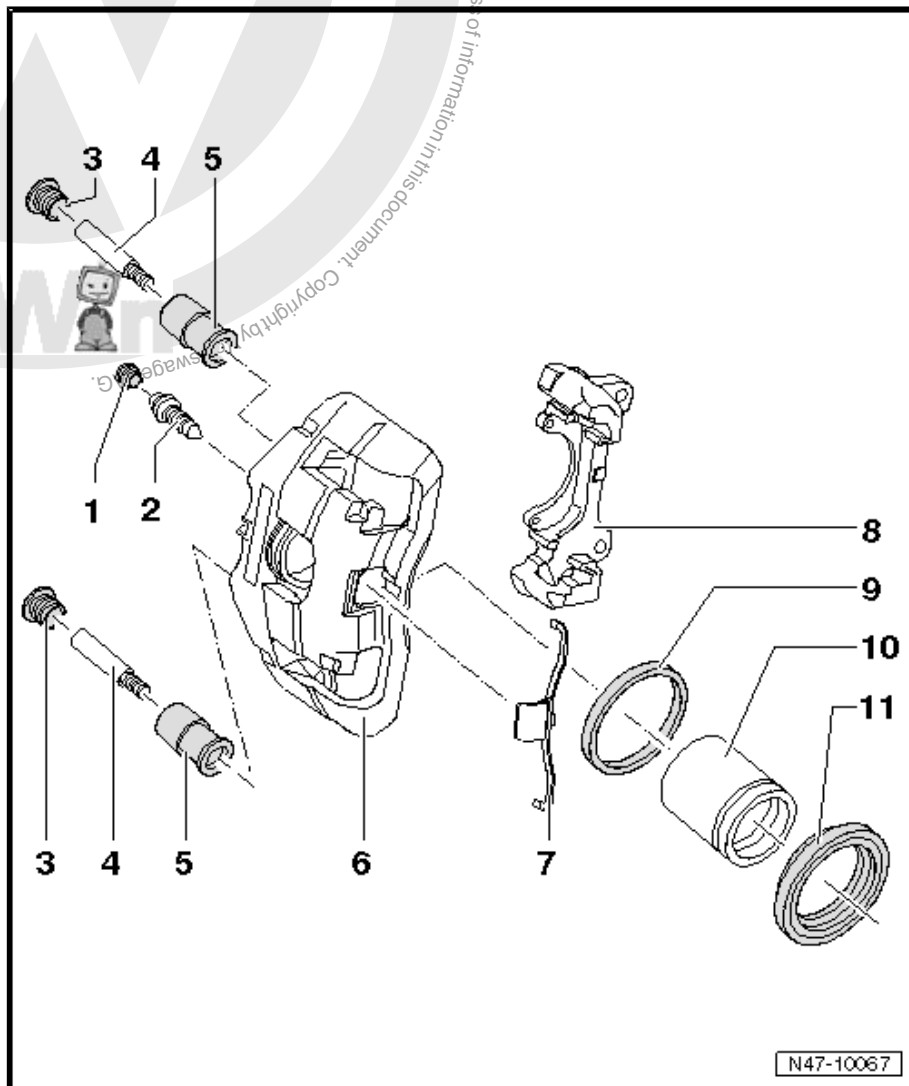
- ☐ Removing and installing ⇒ [page 63](#).

10 - Piston

- ☐ Removing and installing ⇒ [page 63](#).
- ☐ Apply thin coat of assembly paste G 052 150 A2 to piston before installing.

11 - Protective cap

- ☐ Removing and installing ⇒ [page 63](#).
- ☐ Take care not to damage when inserting piston.



1.1.3 Assembly overview - brake caliper C60

- ◆ When carrying out repairs, install all parts supplied in repair kit.
- ◆ Use only methylated spirits for cleaning the brake.



- ◆ Apply thin coat of assembly paste G 052 150 A2 to brake cylinder, piston and sealing ring.

1 - Dust cap

- Fit onto bleeder valve.

2 - Bleeder valve, 13 Nm

- Apply thin coat of assembly paste G 052 150 A2 to thread before screwing in.

3 - Hexagon bolt, 35 Nm

- Always renew after removing.

4 - Guide pin

5 - Protective cap

- Insert into brake carrier and guide pin groove; grease groove beforehand, use repair kit grease pack.

6 - Brake carrier

- Supplied as replacement part, assembled with guide pin and protective caps, and with sufficient grease on guide pins.
- If protective caps or guide pins are damaged, install repair kit. Use lubricant sachet supplied to lubricate guide pins.

7 - Protective cap

- Removing and installing ⇒ [page 65](#).
- Take care not to damage when inserting piston.

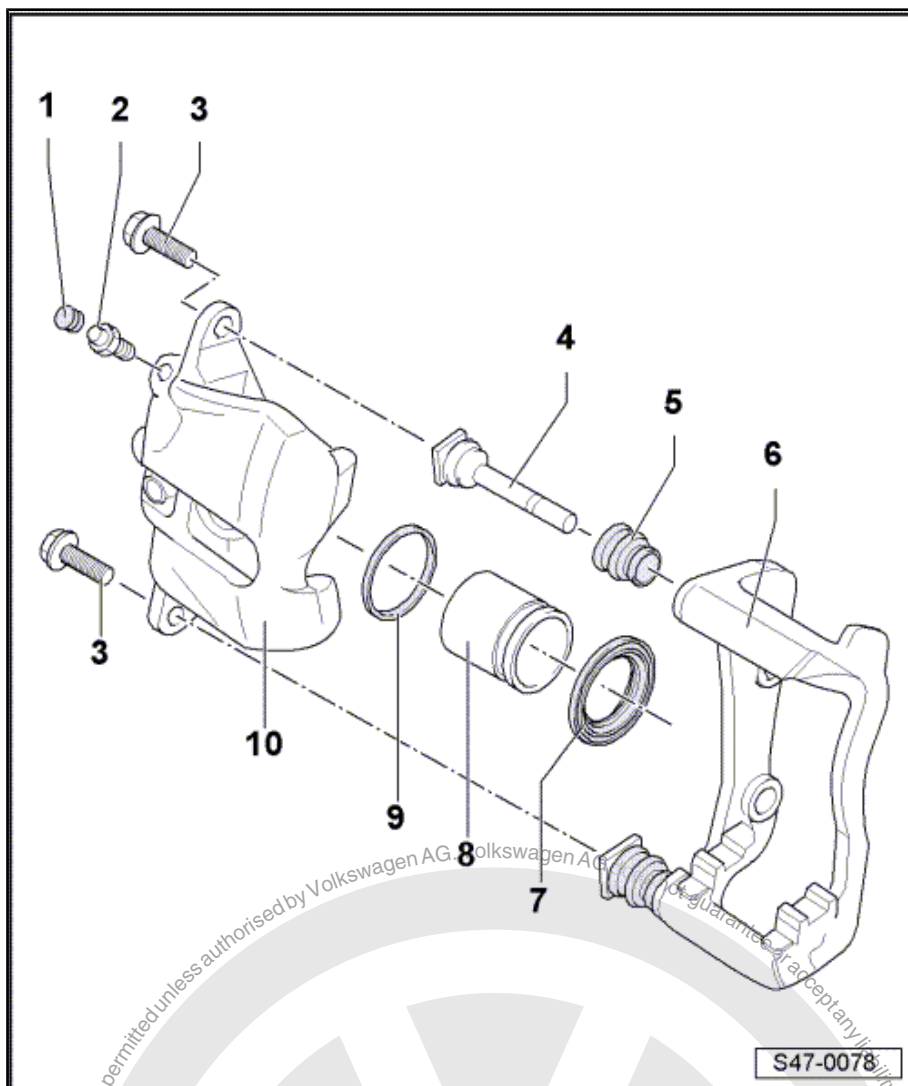
8 - Piston

- Removing and installing ⇒ [page 65](#).
- Apply thin coat of assembly paste G 052 150 A2 to piston before installing.

9 - Sealing ring

- Removing and installing ⇒ [page 65](#).

10 - Brake caliper



1.2 Removing and installing brake caliper piston

⇒ „1.2.1 Removing and installing piston for brake caliper FN 3“, [page 61](#)

⇒ „1.2.2 Removing and installing piston for FNR-G brake caliper“, [page 63](#)

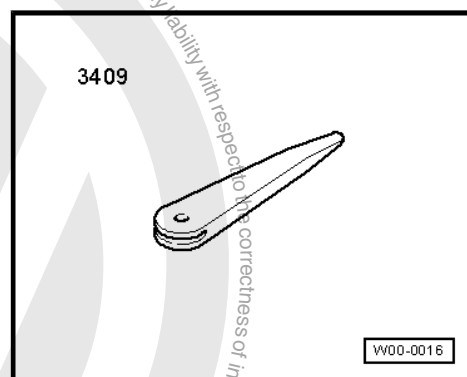
⇒ „1.2.3 Removing and installing piston for brake caliper C 60“, [page 65](#)



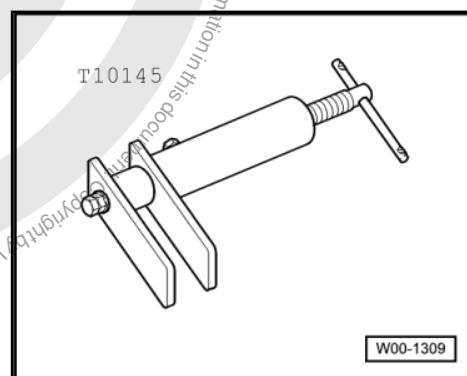
1.2.1 Removing and installing piston for brake caliper FN 3

Special tools and workshop equipment required

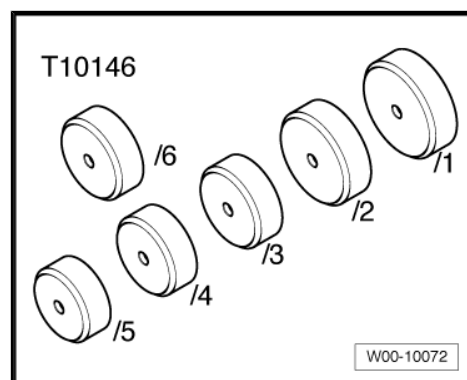
- ◆ Removal wedge 3409-



- ◆ Piston resetting appliance -T 10145-



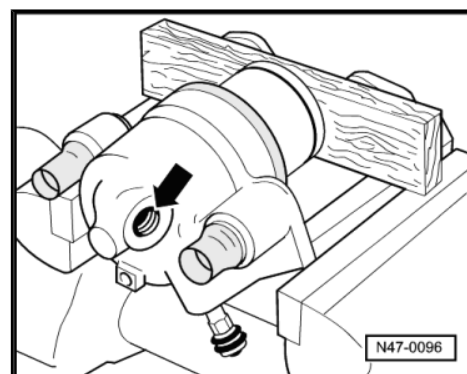
- ◆ Assembly tool for protective caps -T10146/6-



Removing:

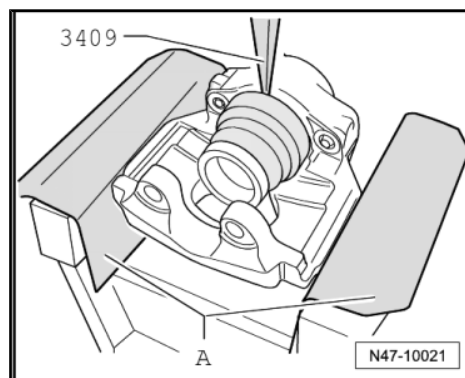
- Press piston out of brake caliper using compressed air.

Place a piece of wood in the recess to prevent damage to the piston.





- Lever off protective cap from brake caliper using wedge 3409.

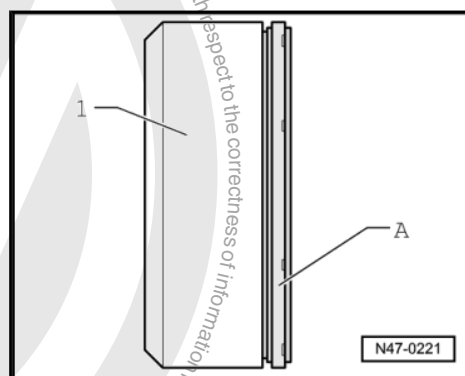
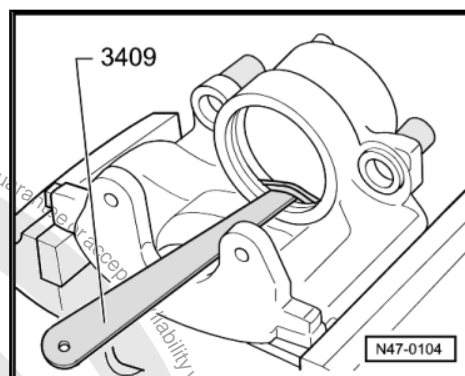


- Remove seal using wedge 3409.

When removing ensure that the surface of the cylinder is not damaged.

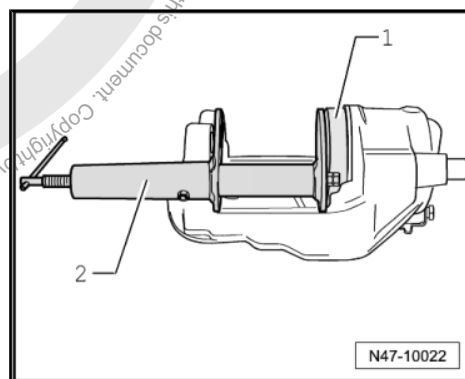
Installing:

- The surfaces of the piston and seal must be cleaned only with methylated spirits and then dried.
- Apply a thin coat of assembly paste G 052 150 A2 to piston and seal before inserting.
- Insert seal into brake caliper.
- Fit protective seal -A- in assembly tool T10146/6 -1-.



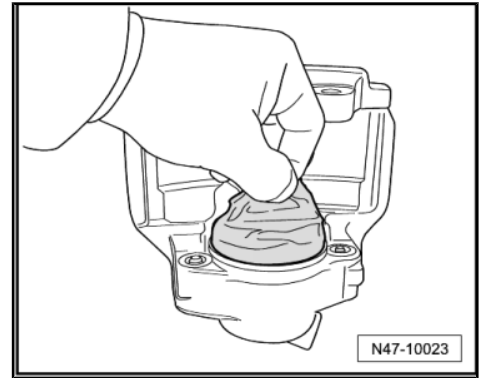
- Press protective cap onto brake caliper so that seal is fitted correctly all round using assembly tool -1- and piston resetting tool -2-.

Check seat of protective cap:





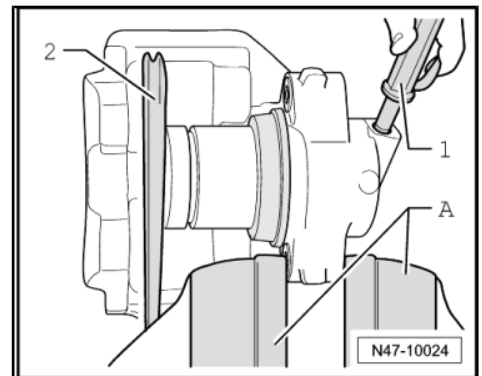
- At this stage it should not be possible to remove protective cap from brake caliper by hand.



- Press piston lightly onto protective seal and lock it in this position with, for example, an assembly wedge -2-.

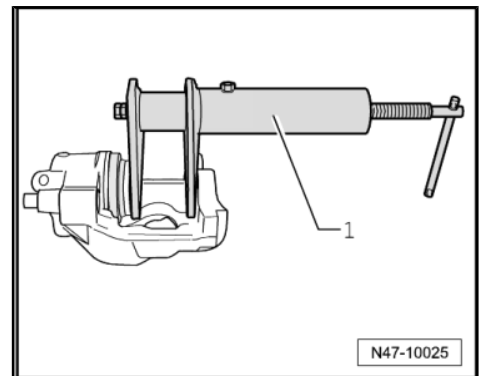
Keep piston straight to prevent damage to sealing collar.

- Blow into protective cap using compressed air (max 3 bar) -1-. During this step protective cap will spring on piston.



- Press piston into brake caliper using piston resetting appliance -1-.

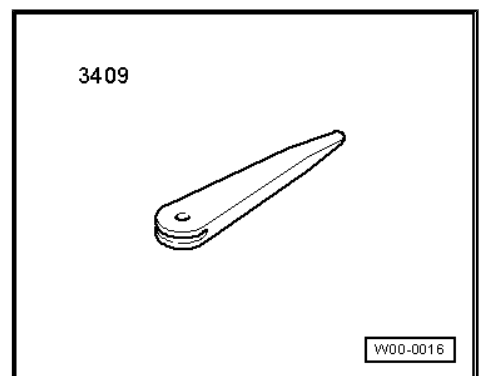
The outer sealing lip on the protective cap will then slip into the piston groove.



1.2.2 Removing and installing piston for FNR-G brake caliper

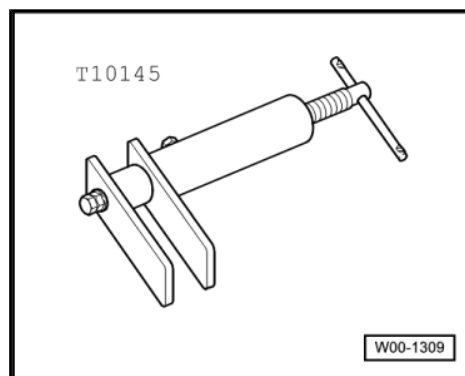
Special tools and workshop equipment required

- ◆ Removal wedge -3409-

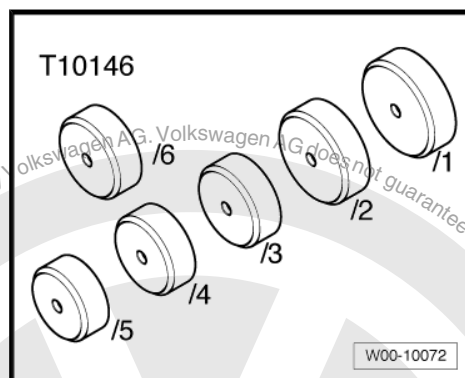




◆ Piston resetting appliance -T 10145-



◆ Assembly tool for protective caps -T 10146/6-

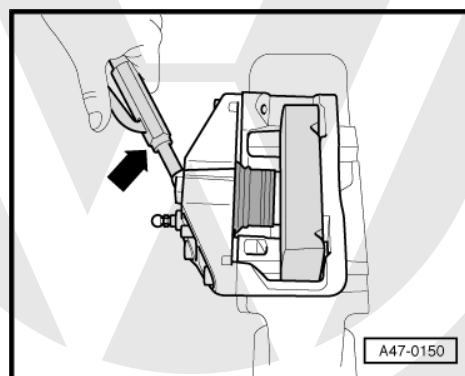


Removing:

- Press piston out of brake caliper using compressed air.

Place a piece of wood in the recess to prevent damage to the piston.

- Lever off protective cap from brake caliper using wedge 3409.

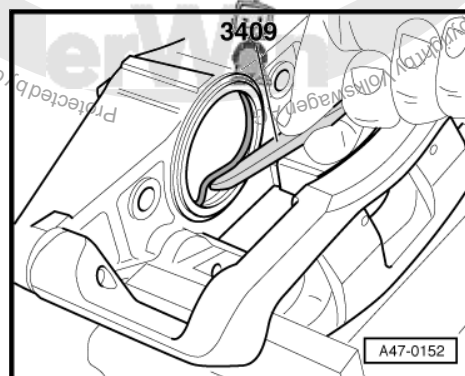


- Remove seal using wedge 3409.

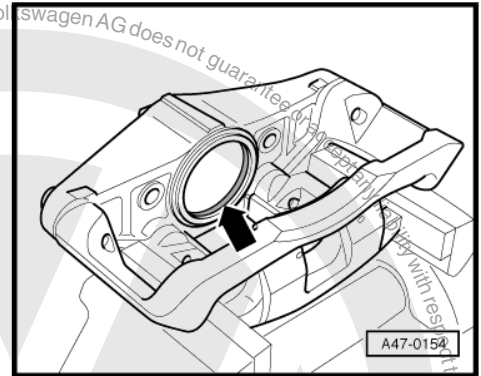
When removing ensure that the surface of the cylinder is not damaged.

Installing:

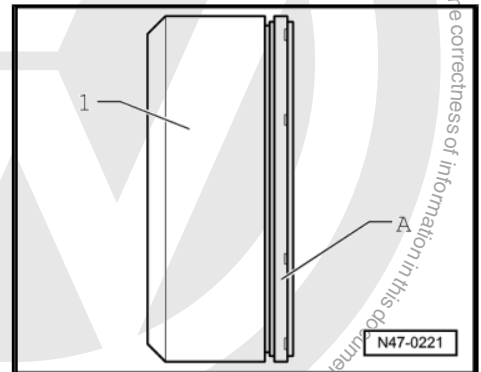
- The surfaces of the piston and seal must be cleaned only with methylated spirits and then dried.
- Apply a thin coat of assembly paste G 052 150 A2 to piston and seal before inserting.



- Insert seal into brake caliper.



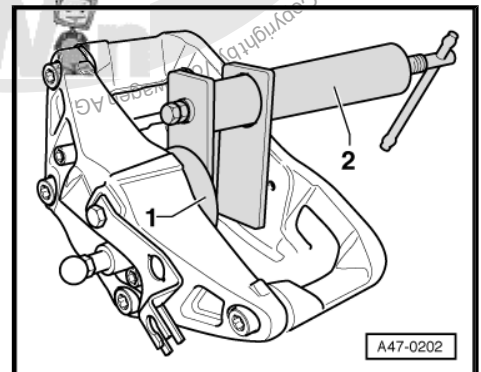
- Fit protective cap -A- in assembly tool T10146/1 -1-.



- Press protective cap onto brake caliper so that seal is fitted correctly all round using assembly tool -1- and piston resetting tool -2-.

Check seat of protective cap:

- At this stage it should not be possible to remove protective cap from brake caliper by hand.

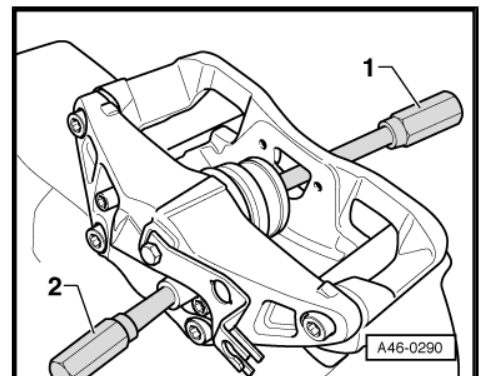


- Gently press piston onto protective seal using an extension and ratchet insert -1- and then hold in this position.

Keep piston straight to prevent damage to sealing collar.

- Blow into protective cap using compressed air (max 3 bar) -2-. During this step protective cap will spring on piston.
- Press piston into brake caliper by hand, subsequently pressing with piston resetting tool if necessary.

The outer sealing lip on the protective cap will then slip into the piston groove.

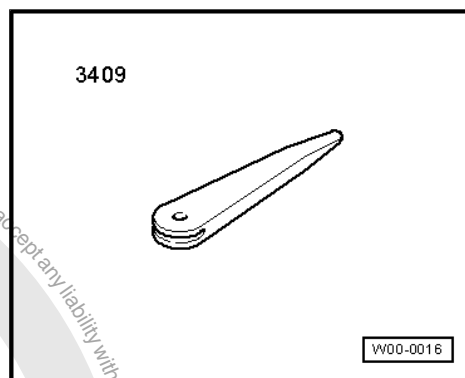


1.2.3 Removing and installing piston for brake caliper C 60

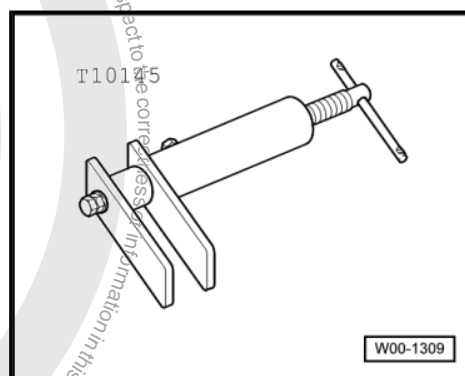
Special tools and workshop equipment required



◆ Removal wedge -3409-



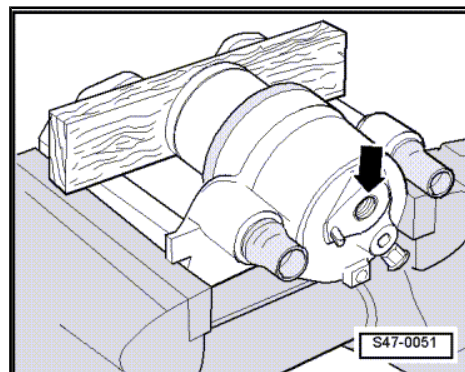
◆ Piston resetting appliance -T10145-



Removing:

- Press piston out of brake caliper using compressed air.

Place a piece of wood in the recess to prevent damage to the piston.

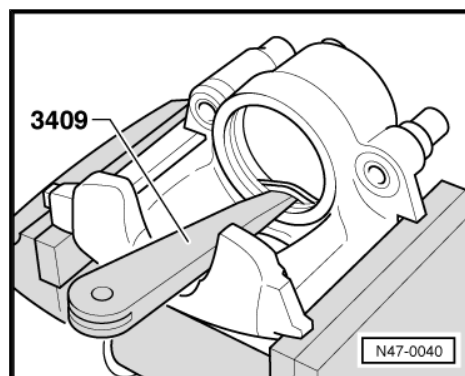


- Remove seal using wedge 3409.

When removing ensure that the surface of the cylinder is not damaged.

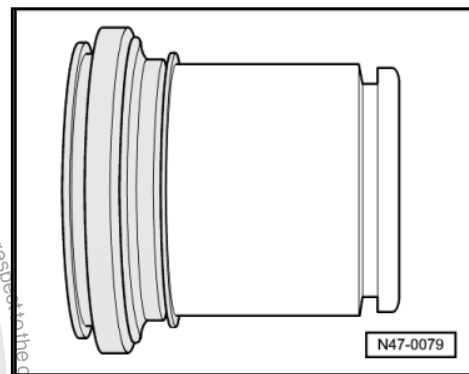
Installing:

- The surfaces of the piston and seal must be cleaned only with methylated spirits and then dried.
- Apply a thin coat of assembly paste G 052 150 A2 to piston and seal before inserting.
- Insert seal in brake caliper.



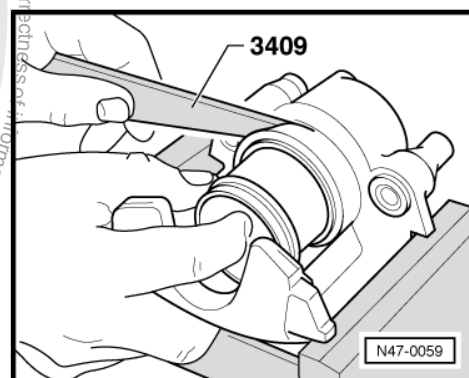


- Place protective cap with outer sealing lip on piston.



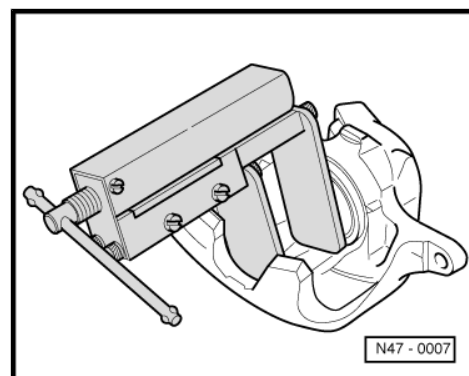
- Insert inner sealing lip into groove in cylinder using wedge 3409.

When doing this, hold piston in front of brake caliper.



- Press piston into brake caliper using piston resetting tool.

The outer sealing lip on the protective cap will then slip into the piston groove.





2 Rear brake calipers

⇒ „2.1 Assembly overview - rear brake caliper“, page 68

⇒ „2.2 Removing and installing rear brake caliper piston“,
page 69

2.1 Assembly overview - rear brake caliper

- ◆ When carrying out repairs, install all parts supplied in repair kit.
- ◆ Use only methylated spirits for cleaning the brake.
- ◆ New brake calipers are filled with brake fluid and are pre-bled.
- ◆ Apply thin coat of assembly paste G 052 150 A2 to brake cylinder, piston and sealing ring.
- ◆ When repairs are performed, it is essential to appropriately pre-bleed brake calipers (without brake pads) before installing in vehicle ⇒ [page 71](#) .

1 - Brake caliper

- ☐ Following repair work, pre-bleed brake caliper ⇒ [page 71](#) .

2 - Self-locking hexagon bolt, 35 Nm

- ☐ Renew.
- ☐ When loosening and tightening, counterhold on guide pin.

3 - Dust cap

4 - Bleeder valve, 10 Nm

- ☐ Apply thin coat of assembly paste G 052 150 A2 to thread before screwing in.

5 - Torx socket head bolt, 12 Nm

6 - Parking brake motor.

7 - Sealing ring

8 - Guide pin

- ☐ Grease before fitting protective cap.

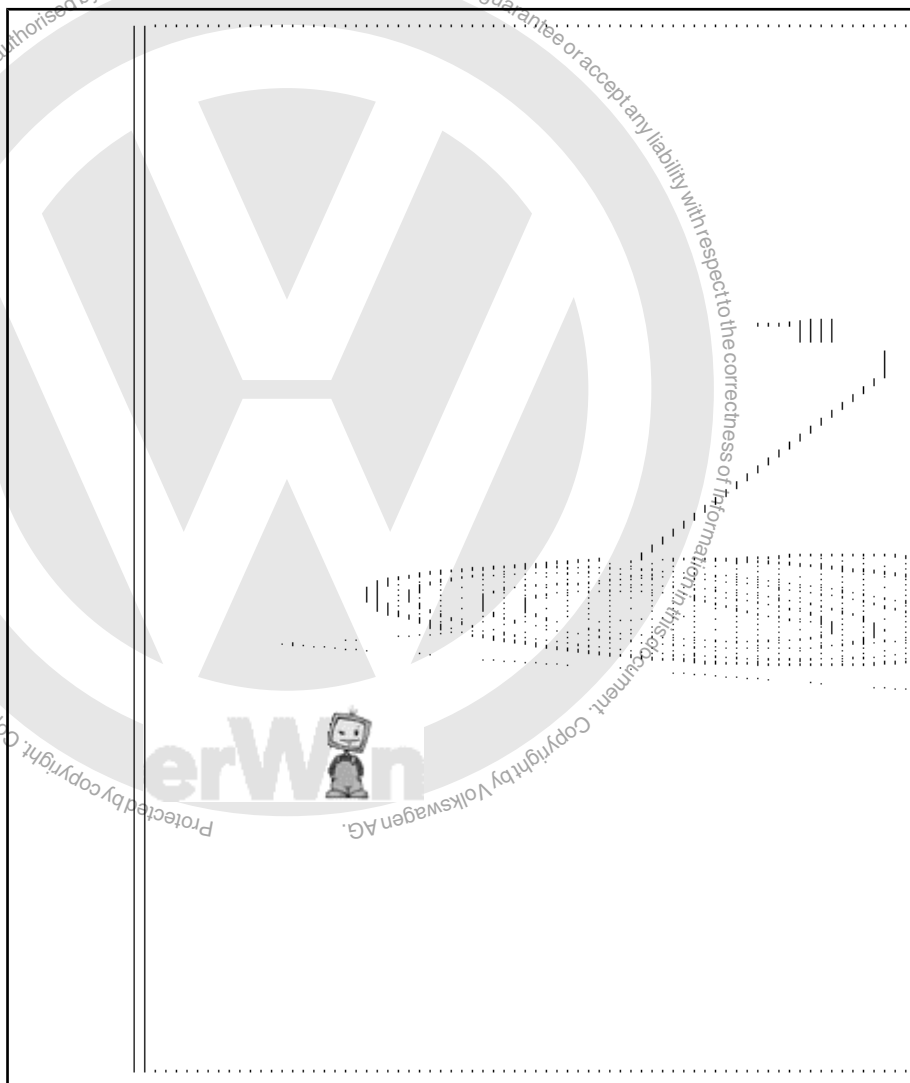
9 - Protective cap

- ☐ Fit onto brake carrier and guide pin.

10 - Brake carrier with guide pin(s) and protective cap

- ☐ Supplied as genuine part, assembled with sufficient grease on guide pins.

- ☐ If protective caps or guide pins are damaged, install repair kit. Use lubricant sachet supplied to lubricate guide pins.





11 - Protective cap

- ☐ Pull on so that outer sealing lip goes over piston.
- ☐ Removing and installing ➤ [page 69](#) .

12 - Piston

- ☐ Removing and installing ➤ [page 69](#) .
- ☐ Apply thin coat of assembly paste G 052 150 A2 to piston before installing.

13 - Sealing ring

- ☐ Removing and installing ➤ [page 69](#) .

14 - Thrust nut

2.2 Removing and installing rear brake caliper piston

Special tools and workshop equipment required

- ◆ Removal wedge -3409-

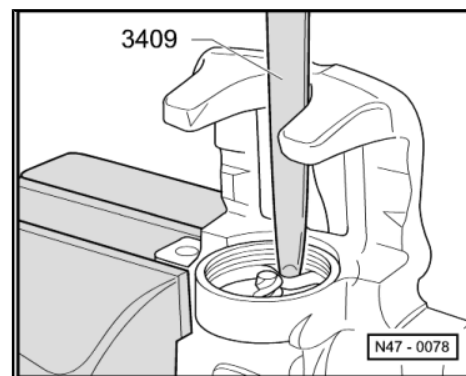
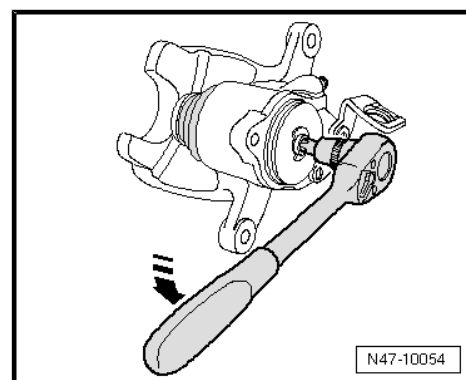
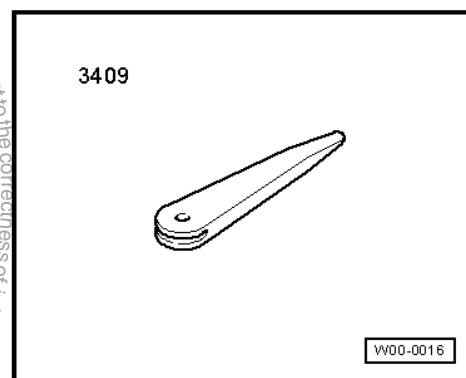
Removing:

- Turn spindle -movement arrow- using a T45 Torx socket.
- The thrust nut pushes the piston out of the brake caliper.
- Remove piston and protective cap from brake caliper.

- Remove seal using wedge 3409.

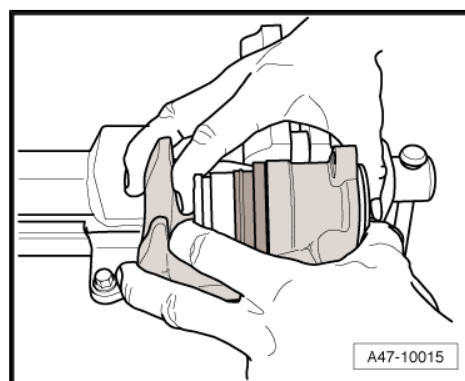
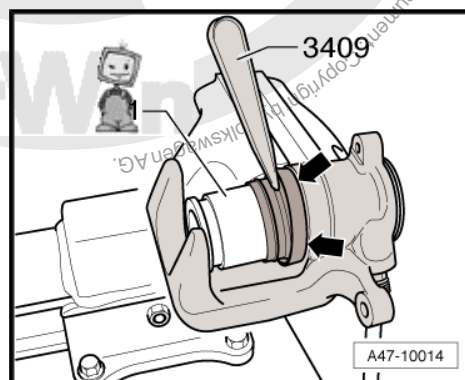
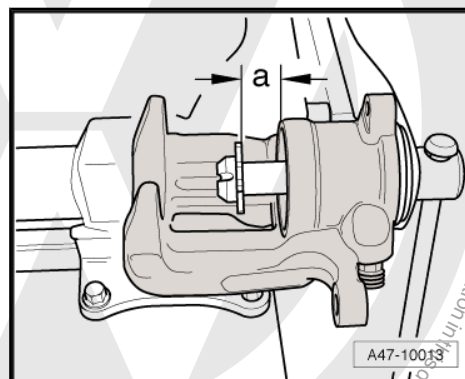
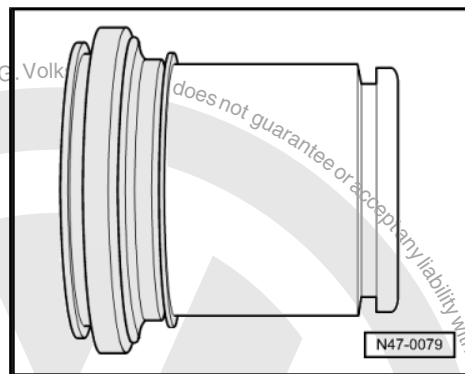
Installing:

- The surfaces of the piston and seal must be cleaned only with methylated spirits and then dried.
- Apply a thin coat of assembly paste G 052 150 A2 to piston and seal before inserting.
- Insert seal in brake caliper.



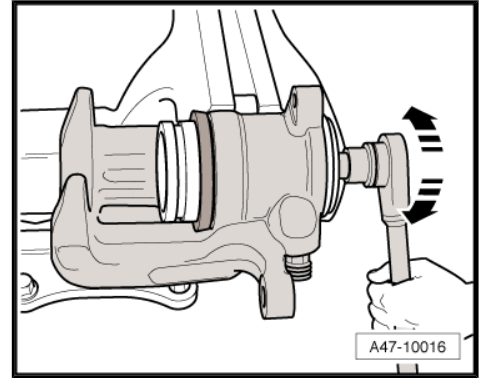


- Place protective cap with outer sealing lip on piston.
- Screw thrust nut onto spindle until dimension -a- 15 mm is achieved.
- Insert inner sealing lip of protective cap into groove -arrows- in brake caliper using removal wedge -3409-
- Push piston onto thrust nut; this is only possible in four positions.
- Carefully push piston into brake caliper, whilst moving piston.
- Now push piston into brake caliper until it rests on thrust nut.

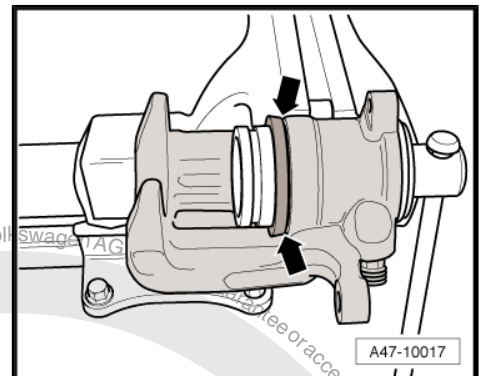




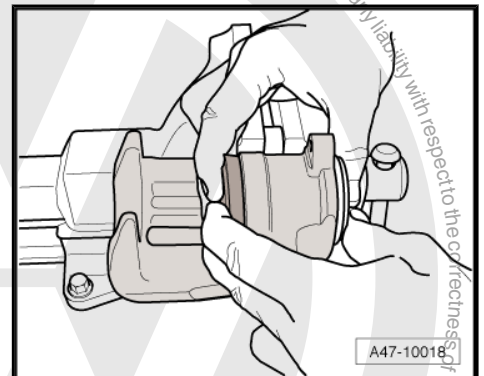
- Carefully turn spindle clockwise until thrust nut is located on stop.



- Ensure that protective cap lies flush all around on brake caliper -arrows-.



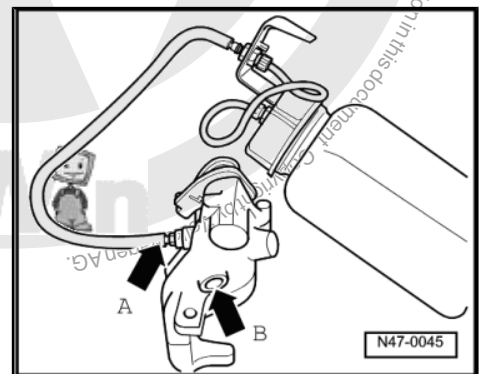
- Press piston into brake caliper by hand.
The outer sealing lip will then spring into the piston groove.



2.2.1 Pre-bleeding brake caliper

- Open bleeder valve -arrow A- and, using a commercially available bleeder bottle, fill with brake fluid until bubble-free brake fluid flows from threaded hole of brake hose connection -arrow B-. Close bleeder valve.

Position brake caliper as illustrated to pre-bleed.



3 Brake servo and brake master cylinder

⇒ „3.1 Assembly overview - brake servo/brake master cylinder“, page 72

⇒ „3.2 Removing and installing brake light switch“, page 73

⇒ „3.3 Removing and installing brake master cylinder“, page 74

⇒ „3.4 Removing and installing brake servo“, page 75

3.1 Assembly overview - brake servo/brake master cylinder



Note

Use only new brake fluid. Observe information on brake fluid reservoir!

1 - Pedal cluster

2 - Self-locking hexagon nut, 25 Nm

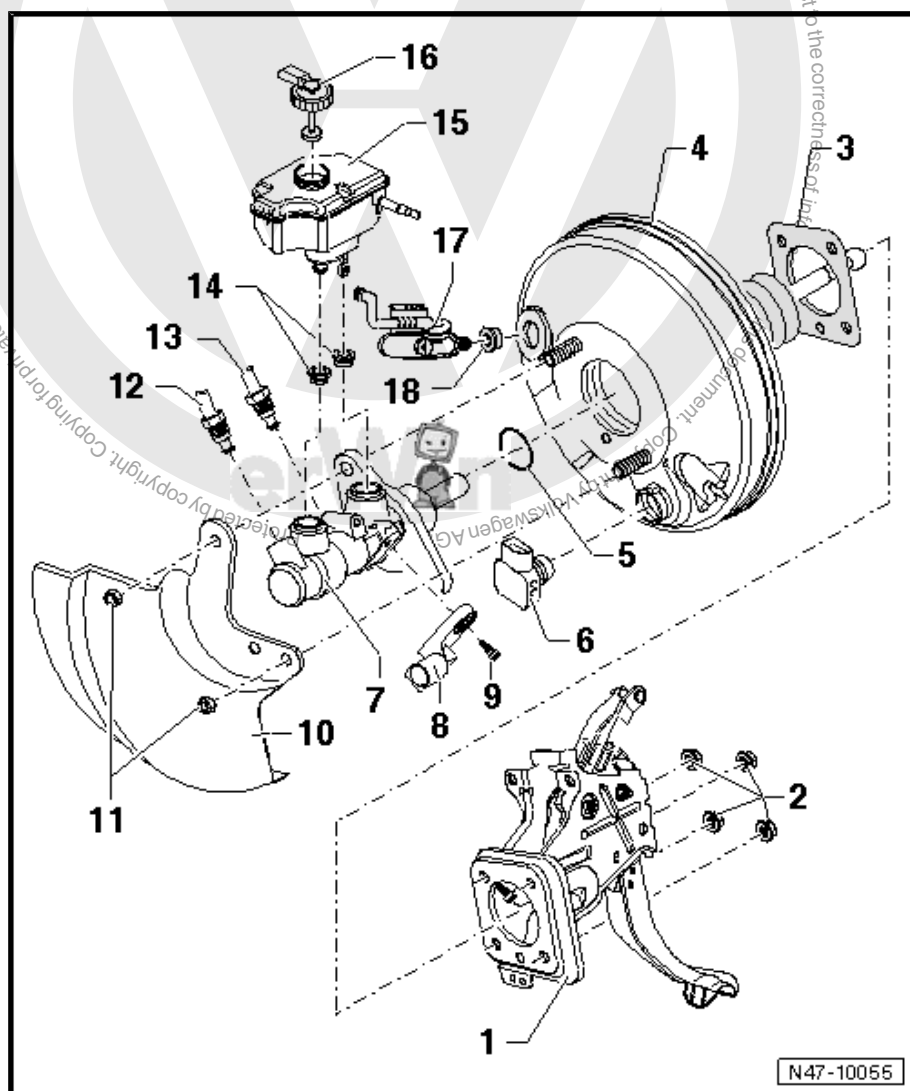
- ☐ Always renew after removing.

3 - Seal

- ☐ For brake servo.

4 - Brake servo

- ☐ On petrol engines, the required vacuum is taken from the intake manifold.
- ☐ Vehicles with an FSI engine but no HBV are fitted with a pressure sensor ⇒ [page 81](#).
- ☐ A vacuum sender is fitted in vehicles with HBV ⇒ [page 24](#).
- ☐ Diesel engines are fitted with a vacuum pump to generate the necessary vacuum pressure ⇒ [page 80](#).
- ☐ Functional check:
 - With engine switched off, depress brake pedal firmly several times (to exhaust vacuum in unit).
 - Now step on and hold brake pedal with medium pressure and start engine. If the brake servo is functioning properly, the brake pedal will be felt to go down as the servo takes effect.





- ☐ Replace completely in the event of a fault (before doing so, check brake servo vacuum system)
⇒ [page 82](#)
- ☐ Removing and installing ⇒ [page 75](#) .

5 - Sealing ring

6 - Brake servo vacuum sender -G483-

- ☐ Only on vehicles having HBV
- ☐ Removing and installing ⇒ [page 24](#) .

7 - Brake master cylinder

- ☐ Cannot be repaired. If faulty, renew as a complete unit.
- ☐ Removing and installing ⇒ [page 74](#) .

8 - Brake light switch -F-

- ☐ Removing and installing ⇒ [page 73](#) .

9 - Torx socket head bolt, 5 Nm

10 - Heat shield

11 - Self-locking hexagon nut, 25 Nm

- ☐ Always renew after removing.

12 - Brake line, Ø 6 mm, 14 Nm

- ☐ From secondary piston circuit of brake master cylinder to hydraulic unit.

13 - Brake line, Ø 6 mm, 14 Nm

- ☐ From primary piston circuit of brake master cylinder to hydraulic unit.

14 - Sealing plug

- ☐ Moisten with brake fluid and press into brake fluid reservoir.

15 - Brake fluid reservoir

16 - Cap

17 - Vacuum hose

- ☐ With non-return valve and, additionally on vehicles with FSI engine but without HBV (hydraulic brake with vacuum servo), brake servo pressure sensor -G294-
- ☐ Fit in brake servo.
- ☐ Removing and installing brake servo pressure sensor -G294- ⇒ [page 81](#)

18 - Sealing plug

- ☐ Connection for vacuum hose.

3.2 Removing and installing brake light switch

Removing

- Note or request radio code on vehicles with coded radio if necessary.
- Disconnect battery. ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .
- Remove intake hose, air filter housing (on vehicles with diesel engine and certain petrol engines) and battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery .

The battery is installed in the luggage compartment on vehicles with a 6-cylinder petrol engine and therefore only the air filter housing must be removed.

- Remove battery tray.



- Separate connector -1- from brake light switch -F- .
- Remove bolt -2- from brake master cylinder.
- Pull brake light switch -F- -3- from brake master cylinder at top and remove from clip at bottom.

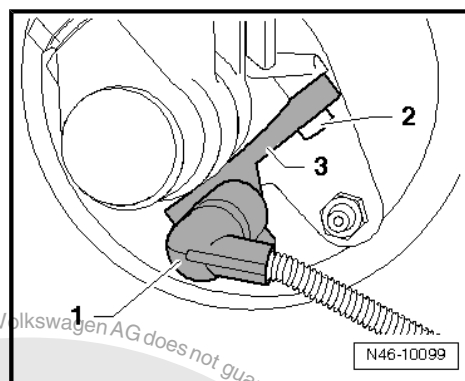
Installing

- Install in reverse order.

Specified torque:

Torx bolt to brake master cylinder

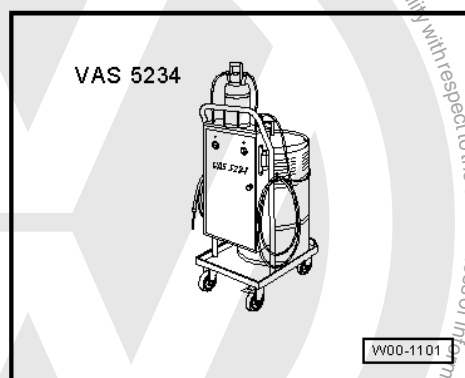
5 Nm



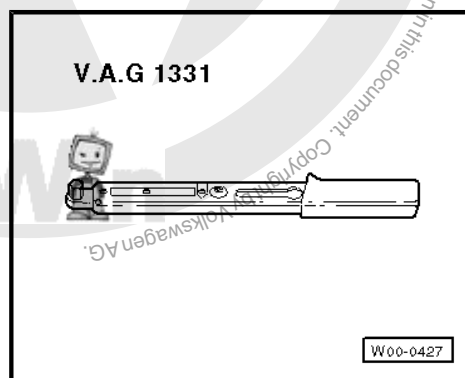
3.3 Removing and installing brake master cylinder

Special tools and workshop equipment required

- ◆ Brake filling and bleeding equipment -VAS 5234-



- ◆ Torque wrench -V.A.G 1331-



Removing:

- Note or request radio code on vehicles with coded radio if necessary.
- Disconnect battery. ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .
- Remove intake hose, air filter housing (on vehicles with diesel engine and certain petrol engines) and battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery .

The battery is installed in the luggage compartment on vehicles with a 6-cylinder petrol engine and therefore only the air filter housing must be removed.

- Remove battery tray.
- Place sufficient lint-free cloths in area of engine and gearbox.



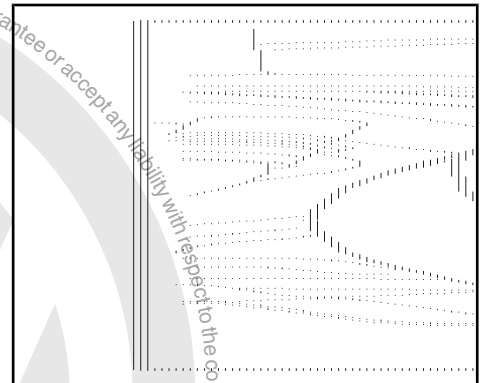
- Draw off as much brake fluid as possible from brake fluid reservoir using brake filling and bleeding equipment -VAS 5234-.

Vehicles with manual gearbox:

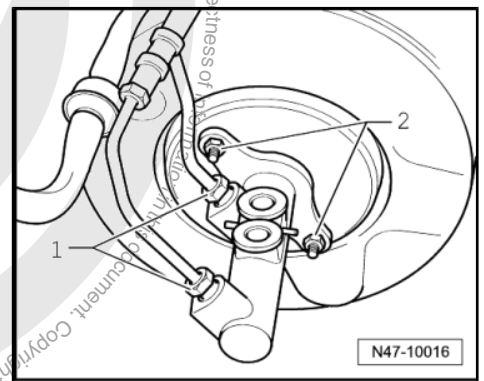
- Detach supply hose -B- for clutch master cylinder, lift clear and tie in place, or clamp off supply hose -B- for clutch master cylinder with a commercially available tool, e.g. Hazet 4590, and then pull off.

Continuation for all models:

- Disconnect connector -A- from brake fluid level warning contact -F34-.
- Separate connector -C- from brake light switch -F-.



- Remove brake fluid reservoir. To do this press locking tabs on reservoir outwards and simultaneously pull brake fluid reservoir out of sealing plugs.
- Disconnect brake lines -1- on brake master cylinder and seal brake lines with plugs from repair kit Part No. 1H0 698 311 A.
- Remove nuts -2- from brake master cylinder.
- Remove heat shield (if installed).
- Carefully take brake master cylinder out of brake servo.
- Unscrew brake light switch -F- from brake master cylinder.



Installing:

- Install in reverse order.

Observe the following important points when installing:

- When assembling brake master cylinder with brake servo, make sure plunger rod is properly positioned in brake master cylinder.
- Bleed brake system ➔ [page 94](#).

Specified torques:

Brake master cylinder to brake servo	25 Nm
◆ Use new nuts.	
Brake light switch to brake master cylinder	5 Nm
Brake lines to brake master cylinder, Ø 6 mm	14 Nm

3.4 Removing and installing brake servo



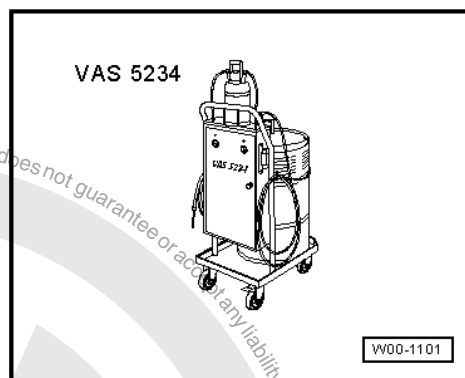
Note

If there are problems with the brake servo, first check the brake servo vacuum system ➔ [page 82](#)

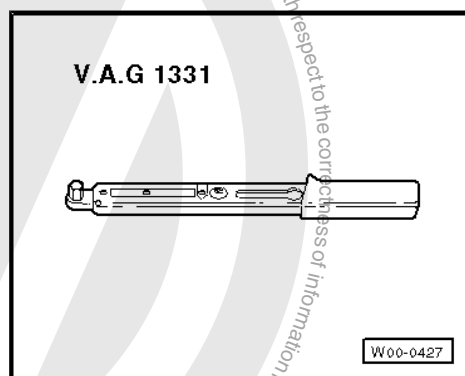
Special tools and workshop equipment required



◆ Brake filling and bleeding equipment -VAS 5234-



◆ Torque wrench -V.A.G 1331-



Removing:

- Note or request radio code on vehicles with coded radio if necessary.
- Disconnect battery. ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .
- Remove intake hose, air filter housing (on vehicles with diesel engine and certain petrol engines) and battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery .

The battery is installed in the luggage compartment on vehicles with a 6-cylinder petrol engine and therefore the air filter housing with bracket must be removed. In addition, unbolt slave start box with bracket and lay to side.

- Remove battery tray.
- Place sufficient lint-free cloths in area of engine and gearbox.
- Draw off as much brake fluid as possible from brake fluid reservoir using brake filling and bleeding equipment -VAS 5234- .

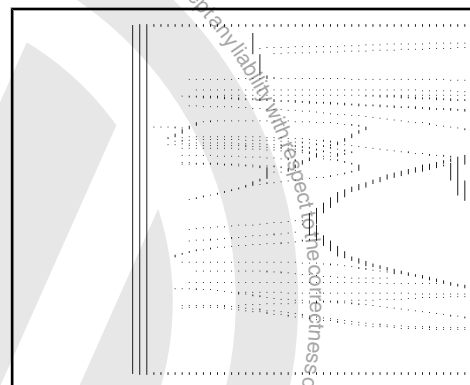


Vehicles with manual gearbox:

- Detach supply hose -B- for clutch master cylinder, lift clear and tie in place, or clamp off supply hose -B- for clutch master cylinder with a commercially available tool, e.g. Hazet 4590, and then pull off.

Continuation for all models:

- Disconnect connector -A- from brake fluid level warning contact -F34- .
- Separate connector -C- from brake light switch -F- .
- On vehicles with HBV, pull connector off brake servo vacuum sender -G483- .
- Pull vacuum hose out of brake servo.



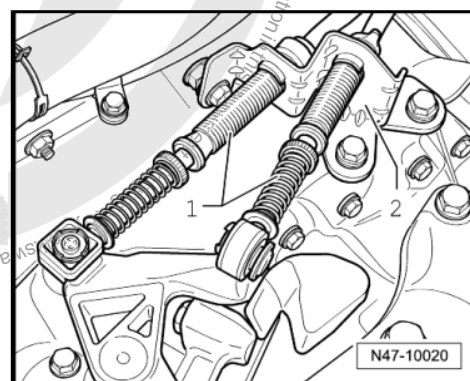
Vehicles with manual gearbox:

- Release cables -1-, unbolt support bracket -2- and place it to side ⇒ Rep. gr. 34 ; Selector mechanism; Assembly overview - selector cables .

On vehicles with 2.0 I TDI engine:

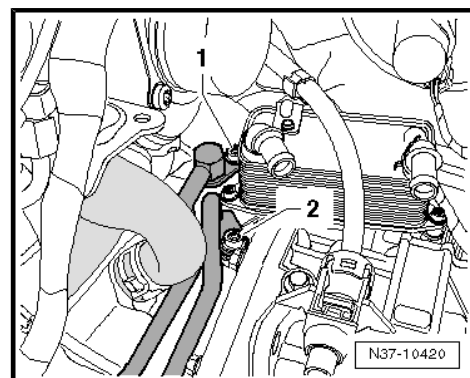
- Remove air pipe and pull it as far as possible in front of gearbox ⇒ Rep. gr. 21 ; Charge air system; Assembly overview - charge air system .

On vehicles with automatic gearbox 09G:



On this automatic gearbox the ATF cooler is located directly in front of the brake servo; see the following illustration.

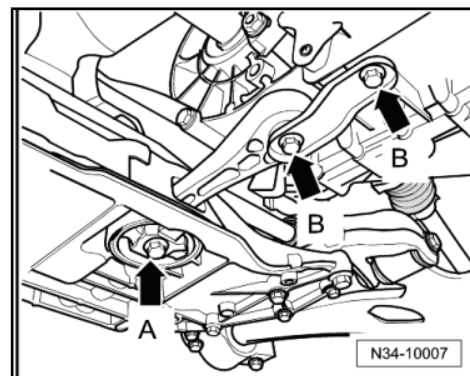
- Fit support bracket -10 - 222 A- and support engine/gearbox assembly. Do not raise ⇒ 6-speed automatic gearbox 09G; Rep. gr. 37 ; Removing and installing gearbox .
- Remove noise insulation tray.



- Remove pendulum support, first -A-, then -B-.

(First tighten -B-, then -A- when installing.) Specified torques ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Assembly overview - subframe .

- Lever selector lever cable off, remove from support bracket and from retainer and place to side ⇒ Automatic gearbox; Rep. gr. 37 ; Selector mechanism; Removing and installing selector lever cable .
- Open cable duct and remove Servotronic wiring harness. Then remove cable duct from console and place it to side.
- Remove both bolts securing gearbox bracket to vehicle.
- Slightly lower engine/gearbox assembly by turning spindle of support bracket -10 - 222 A- .

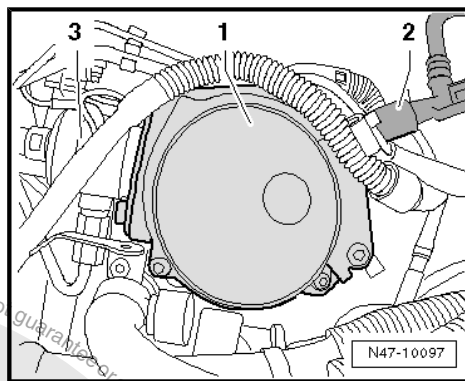




- Also pull vacuum hose -2- off vacuum pump -1-.
- Unbolt retainer for a wiring harness from vacuum pump -1-.

On vehicles with automatic gearbox 09M:

- Open cable duct and remove Servotronic wiring harness. Then remove cable duct from console and place it to side.
- Lever selector lever cable off, remove from support bracket and from retainer and place to side ⇒ Automatic gearbox; Rep. gr. 37 ; Selector mechanism; Removing and installing selector lever cable .



- Remove retainer from selector lever cable.

Continuation for all models:

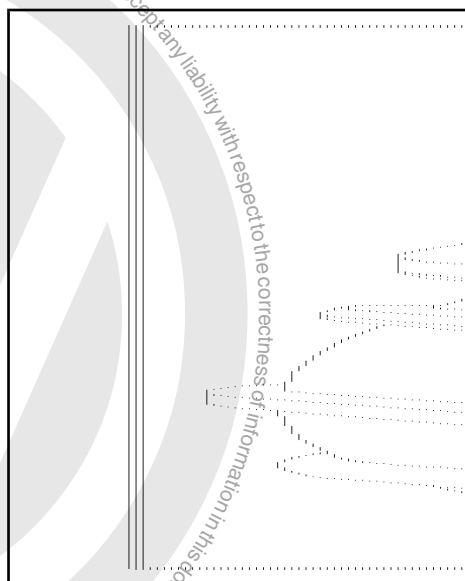
- Unscrew brake lines on brake master cylinder and seal brake lines with plugs from repair kit Part No. 1H0 698 311 A.

Additionally for vehicles with 6-cylinder petrol engine:

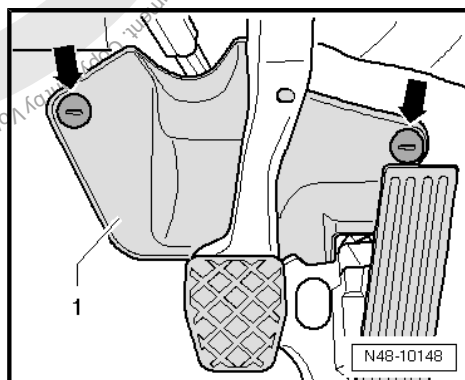
- Remove nuts for brake master cylinder.
- Carefully remove brake master cylinder from brake servo and also remove heat shield.
- Remove brake servo vacuum sender -G483- ⇒ [page 24](#) .

Continuation for all models:

- Remove driver side footwell cover ⇒ General body repairs, interior; Rep. gr. 68 ; Compartments/covers; Removing and installing dash panel end trim on driver side .



- Unscrew securing nuts -arrows- and remove footwell trim -1-.
- Separate brake pedal from brake servo ⇒ [page 56](#) .





- Unscrew nuts -1- from brake servo.
- Remove both upper nuts -2- from mounting bracket.
- Carefully remove brake servo from vehicle.
- Remove nuts for brake master cylinder.
- Carefully remove brake master cylinder from brake servo.

Installing:

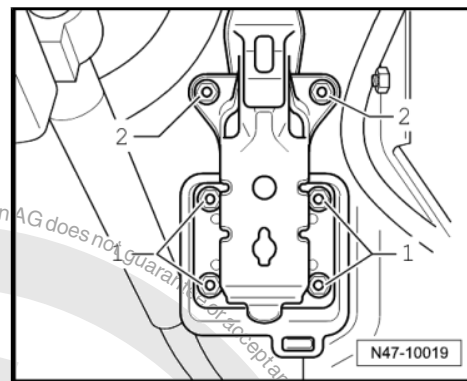
- Install in reverse order.

Observe following points when installing:

- Connect brake pedal to brake servo ⇒ [page 57](#) .
- After installing, bleed brake system ⇒ [page 94](#) and clutch.

Specified torques:

Brake servo to pedal cluster and bulkhead ◆ Use new nuts.	25 Nm
Brake master cylinder to brake servo ◆ Use new nuts.	25 Nm
Brake lines to brake master cylinder, Ø 6 mm	14 Nm





4 Vacuum system

⇒ „4.1 Assembly overview - vacuum pump“, page 80

⇒ „4.2 Checking non-return valve“, page 81

⇒ „4.3 Removing and installing brake servo pressure sensor“,
page 81

⇒ „4.4 Checking brake servo vacuum system“, page 82

4.1 Assembly overview - vacuum pump

⇒ „4.1.1 Vacuum pump for brake servo (vehicles with diesel engine)“, page 80

⇒ „4.1.2 Vacuum pump for brake servo (vehicles with petrol engine)“, page 81

4.1.1 Vacuum pump for brake servo (vehicles with diesel engine)

Vacuum pump for 4-cylinder diesel engine (4-valve):

Must not be dismantled.

Tandem pump -4- (vacuum pump and fuel pump)

Vacuum hose to brake servo -1- with non-return valve.

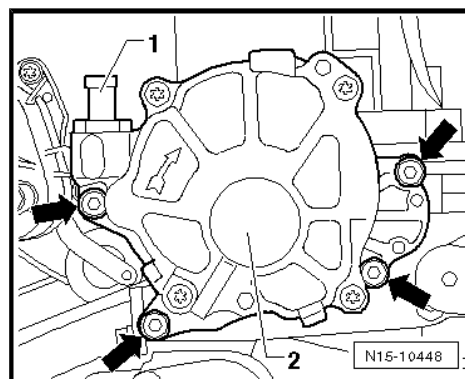
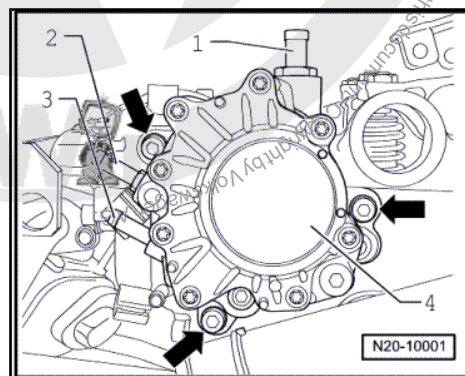
Fuel lines -2 and 3-.

Vacuum pump for 4-cylinder diesel engine (4-valve, common rail):

Must not be dismantled.

Vacuum pump -2-.

Vacuum hose to brake servo -1- with non-return valve.





4.1.2 Vacuum pump for brake servo (vehicles with petrol engine)

Vacuum pump for 4-cyl. petrol engine:

Must not be dismantled.

Vacuum pump -1-.

Vacuum hose to brake servo -2- with non-return valve

High-pressure pump -3-.

- Removing and installing vacuum pump ⇒ Rep. gr. 15 ; Cylinder head; Removing and installing vacuum pump .

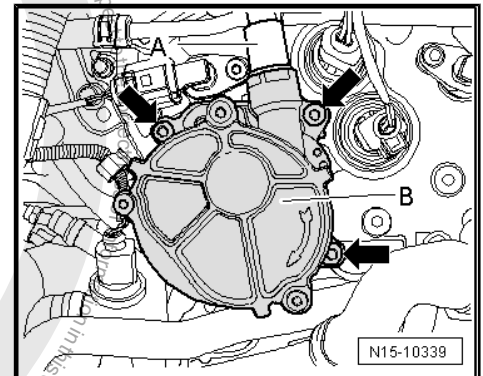
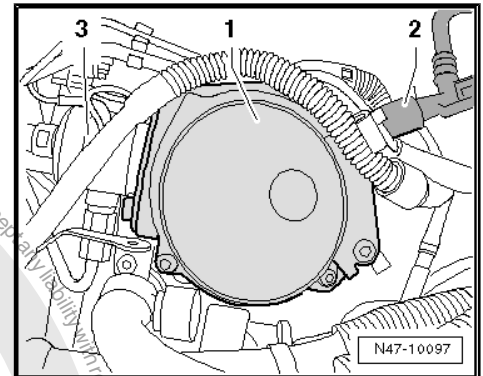
Vacuum pump for 6-cyl. petrol engine:

Must not be dismantled.

Vacuum pump -B-.

Vacuum hose to brake servo -A- with non-return valve.

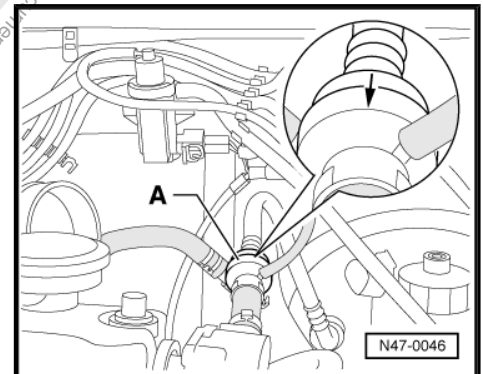
- Removing and installing vacuum pump ⇒ Rep. gr. 15 ; Cylinder head; Removing and installing vacuum pump .



4.2 Checking non-return valve

- ♦ Air must pass through non-return valve -A- in direction of arrow.
- ♦ Non-return valve must remain closed in opposite direction.

Observe correct installation position!

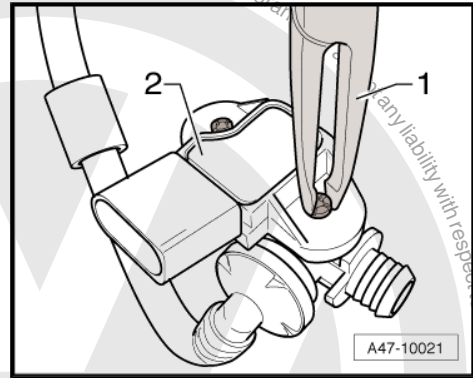


4.3 Removing and installing brake servo pressure sensor

- Remove engine cover panel.
- Pull vacuum hose together with brake servo pressure sensor -G294- out of brake servo.



- Release clips with pliers -1-.
- Carefully lever off brake servo pressure sensor -G294- -2-.



4.4 Checking brake servo vacuum system

The following instructions are intended to help you find the causes of problems effectively and objectively in the event of complaints about the brake servo or in the event of a so-called »hard brake pedal«.

This check relates to the following components:

- ◆ Brake servo
- ◆ Oil seal between brake master cylinder and brake servo.
- ◆ Non-return valve
- ◆ Vacuum hoses with connectors
- ◆ Vacuum pump (if there is one)

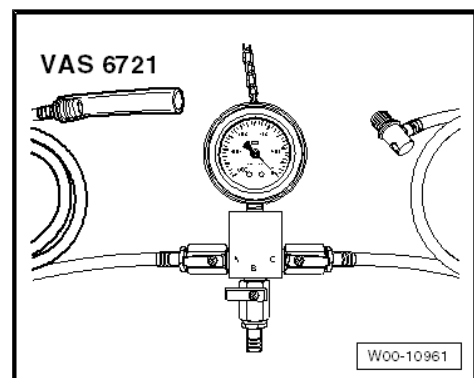
When evaluating the measuring results, bear in mind that they will be influenced by the geographical location. The higher your location is above sea level, the lower the air pressure will be.

Before checking the vacuum system, please take note of the following prerequisites for checking:

- ◆ Visual inspection of all vacuum hoses for damage (e.g. cracks or marten bite) and to check that they are correctly and firmly attached
- ◆ Ensure cleanliness when working on vacuum system
- ◆ Before starting work, clean engine compartment if necessary

Special tools and workshop equipment required

- ◆ Vacuum gauge for brake servo -VAS 6721-



4.4.1 Connecting vacuum gauge for brake servo -VAS 6721-

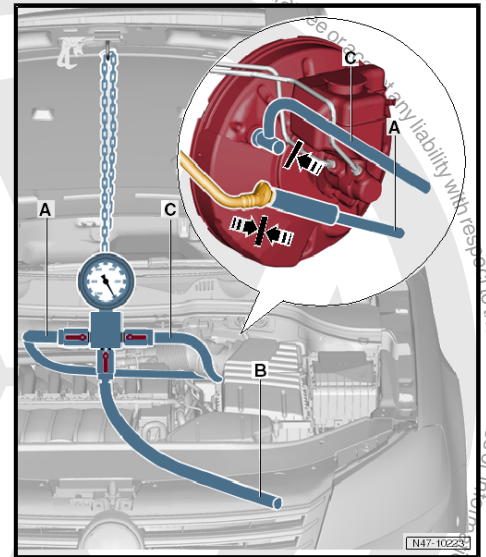
- Pull vacuum hose out of brake servo.



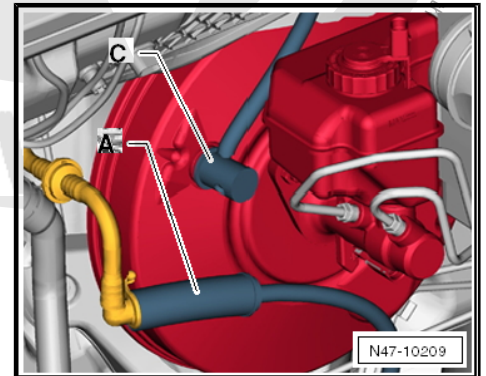
First press the brake pedal several times in order to facilitate removal of the vacuum hose.

- Place brake servo vacuum gauge -VAS 6721- between them -see following illustrations-.

Item number	Component	Explanation
A	Cut-off valve	In direction of vacuum hose, non-return valve and, if there is one, vacuum pump
B	Cut-off valve	◆ Open to facilitate removal of brake servo vacuum gauge -VAS 6721- ◆ Open to simulate a fault source ◆ Connection of manual vacuum pump -VAS 6213-
C	Cut-off valve	In direction of brake servo



- Push hose -A- of brake servo vacuum gauge -VAS 6721- onto vacuum hose and press adapter -C- into brake servo.



4.4.2 Checking vacuum generation



Note

- ◆ The average air pressure of the earth's atmosphere at sea level is 1013 mbar and decreases steeply as the altitude increases (approx. 100 mbar/1,000 m altitude). Local and time fluctuations also influence vacuum generation.
- ◆ A cold engine, a switched-on air-conditioning system as well as engine idling have an adverse influence on generation of a vacuum.
- Before starting work, check all vacuum hoses for damage (e.g. cracks or marten bite) and to check that they are correctly and firmly attached
- Connect brake servo vacuum gauge -VAS 6721- ➔ [page 82](#) .
- Open cut-off valve -A-.



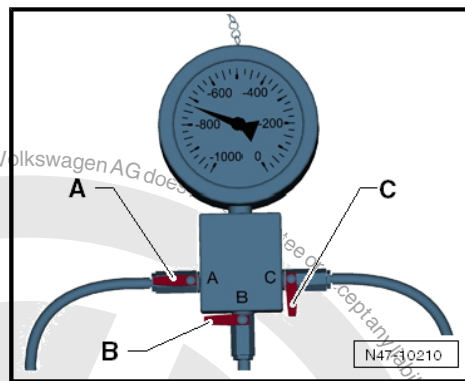
- Close cut-off valves -B+C-.
- Start warm engine ($>60^{\circ}\text{C}$), press accelerator briefly (engine speed greater than 2000/min).
- Read indicated measured value.

Normally (see notes), the vacuum that is generated should be between 600 and 950 mbar (depending on engine size).

If the measured value is not reached even through the preconditions (see notes) have been met, the vacuum system must first be checked for leaks.

- For comparison purposes, generate the vacuum with the manual vacuum pump -VAS 6213- ➔ [page 86](#).

Open cut-off valve -B- to facilitate removal of hose connections and adapter.



4.4.3 Checking for leaks

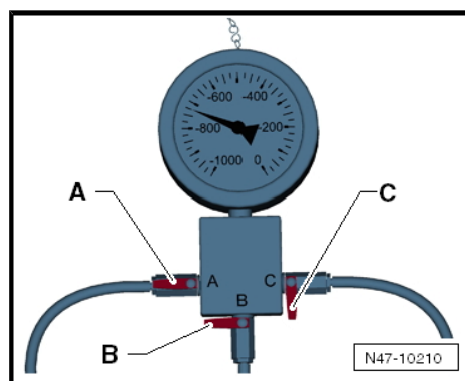


Note

- ♦ *The average air pressure of the earth's atmosphere at sea level is 1013 mbar and decreases steeply as the altitude increases (approx. 100 mbar/1,000 m altitude). Local and time fluctuations also influence vacuum generation.*
- ♦ *A cold engine, a switched-on air-conditioning system as well as engine idling have an adverse influence on generation of a vacuum.*

- Before starting work, check all vacuum hoses for damage (e.g. cracks or marten bite) and to check that they are correctly and firmly attached
- Connect brake servo vacuum gauge -VAS 6721- ➔ [page 82](#).
- Open cut-off valve -A-.
- Close cut-off valves -B+C-.
- Start warm engine ($>60^{\circ}\text{C}$), press accelerator briefly (engine speed greater than 2000/min).

Normally (see notes), the vacuum that is generated should be between 600 and 950 mbar (depending on engine size).





- Open cut-off valve -C- to evacuate brake servo.
- Switch off engine.
- Read and make a note of measured value shown.

A vacuum decrease of 400 mbar in 12 hours is permissible.

If the vacuum decrease is greater, check for leaks in the vicinity of...

- 1 - Brake servo
- or
- 2 - non-return valve, vacuum hoses with connectors or vacuum pump/intake pipe

If there are large leaks, the vacuum decreases steeply within a few seconds.

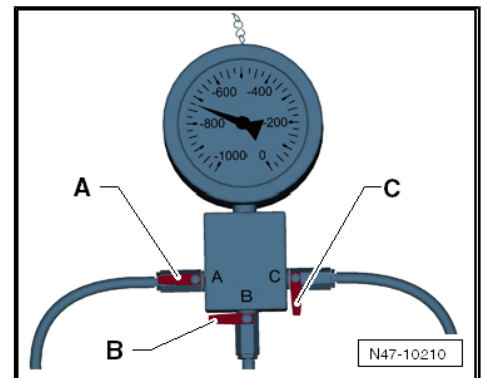
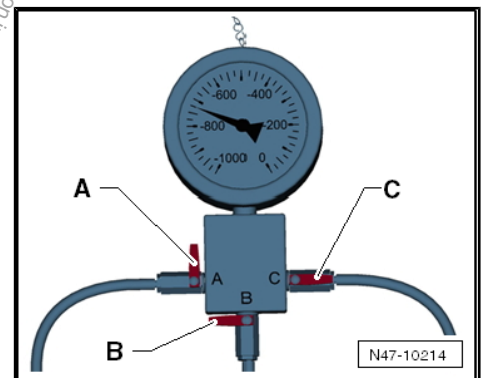
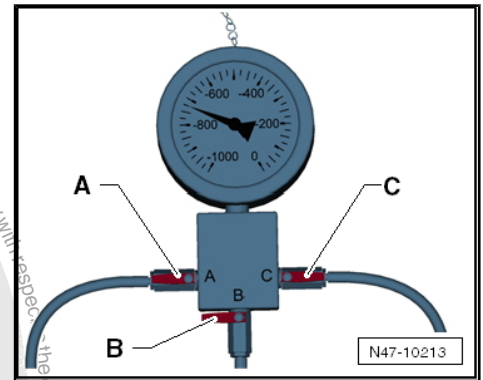
Vacuum check in vicinity of brake servo:

- After generation of vacuum, close cut-off valve -A- in order to check brake servo vacuum system.

Vacuum check in vicinity of non-return valve, vacuum hoses with connectors and vacuum pump/intake pipe:

- After generation of a vacuum, close cut-off valve -C- in order to check vacuum system from brake servo vacuum gauge - VAS 6721- to intake pipe or to vacuum pump.

Open cut-off valve -B- to facilitate removal of hose connections and adapter.

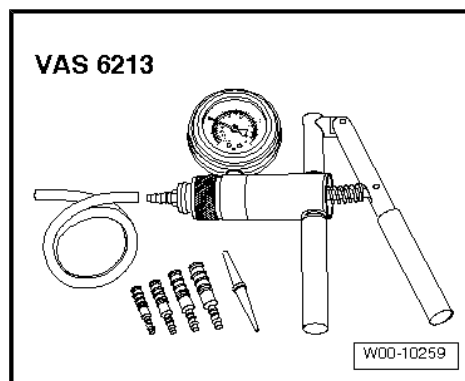




4.4.4 Vacuum generation with manual vacuum pump -VAS 6213-

Instead of vacuum generation by means of engine or vacuum pump, the vacuum can be generated with the manual vacuum pump -VAS 6213- in certain cases.

- To do this, connect manual vacuum pump -VAS 6213- to vacuum hose from connection -B- on brake servo vacuum gauge -VAS 6721- .
- Open cut-off valve -B-.
- Generate vacuum with hand vacuum pump -VAS 6213- until between 600 and 950 mbar is shown on brake servo vacuum gauge -VAS 6721- .
- Then, carry out the corresponding checks.





5 Brake lines

⇒ „5.1 Repairing brake lines“, page 87

5.1 Repairing brake lines

The flanging tool for brake lines -VAS 6056- can be used to flange brake lines with an outer pipe diameter of 5 mm without damaging the coating. In certain cases, this allows sections of brake lines to be renewed at less expense.

The use of flanging tool V.A.G. 1356 is not permitted due to the coating and the diameter of the black brake lines.

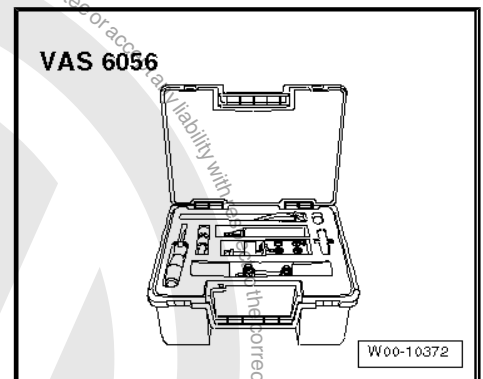


Note

- ◆ *Brake lines may only be bent to max. 90°, as they otherwise kink or display deformations which constrict the cross-section of the line to an impermissible degree.*
- ◆ *Preferably separate brake lines at vehicle floor.*
- ◆ *The positions of the intermediate pieces must be selected so that they cannot chafe on moving parts.*
- ◆ *Do not grease spindle; merely clean with methylated spirits.*

Special tools and workshop equipment required

- ◆ Flanging tool for brake lines -VAS 6056-



- ◆ Brake filling and bleeding equipment -VAS 5234-

List of individual tools:



1 - Flanging tool -VAS 6056/1-

- ❑ Flanging tool -VAS 6056/1- contains flanging jaws -VAS 6056/6-

2 - Pipe cutter -VAS 6056/2-

3 - Brake line scraper -VAS 6056/3-

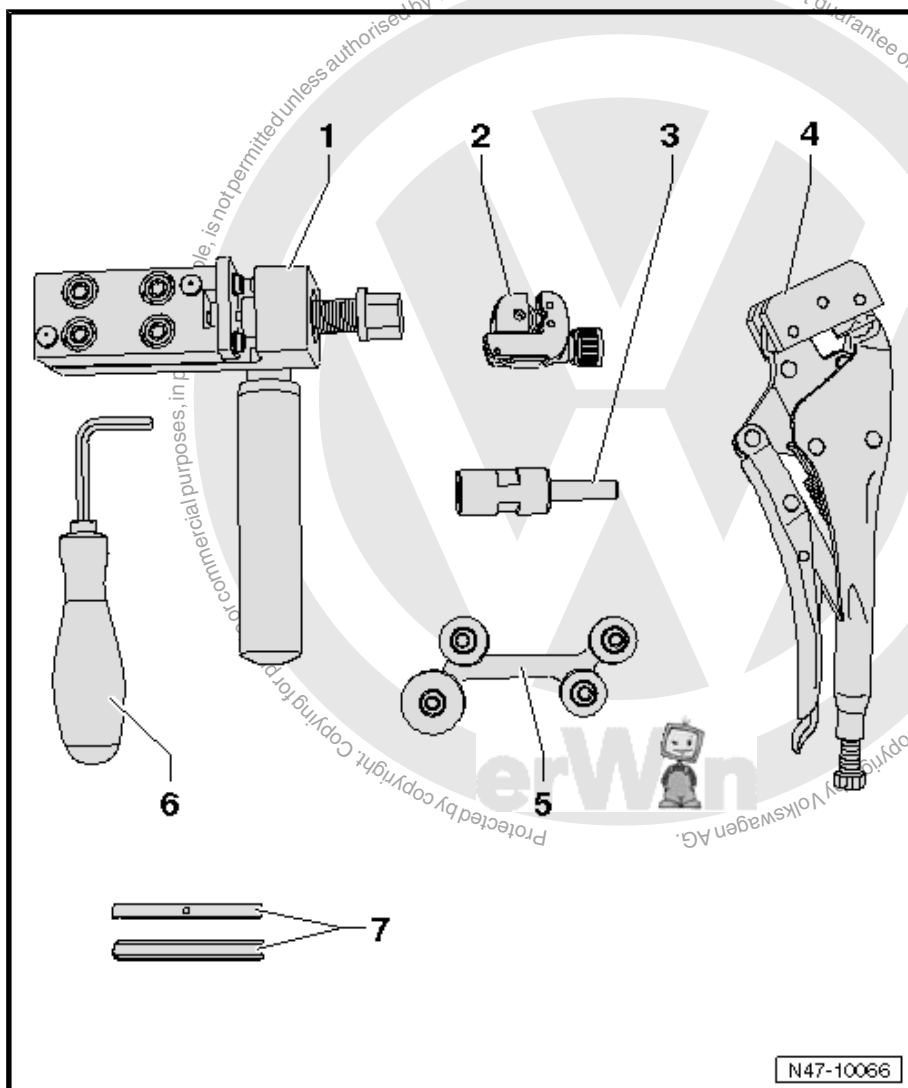
- ❑ Grub screws (in shaft and at side) are adjusted and must not be readjusted!

4 - Set of grips with plastic jaws -VAS 6056/4-

5 - Pipe bending tool -VAS 6056/5-

6 - Special wrench, 6 mm

7 - Flanging jaws -VAS 6056/7-



N47-10066



5.1.1 Assembly overview - flanging tool

1 - Flanging tool upper part

- ☐ Unbolt to change flanging jaws

2 - Fastening for handle

- ☐ Must be removed to access retaining screw for upper part

3 - Retaining screw

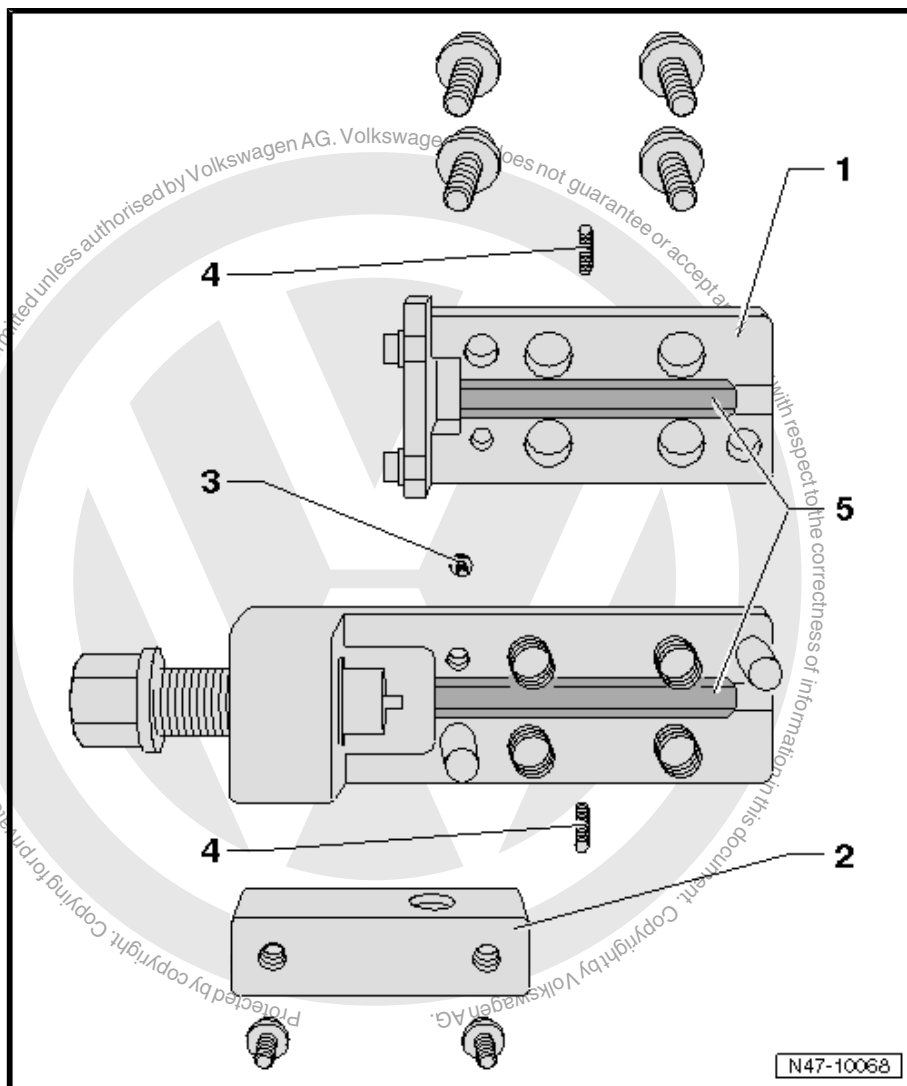
- ☐ For flanging tool upper part

4 - Grub screws for flanging jaws

- ☐ For centring and holding flanging jaws
- ☐ Hexagon socket head bolt, 2 mm

5 - Flanging jaws

- ☐ Various
- ☐ Assembly instructions
⇒ [page 89](#)



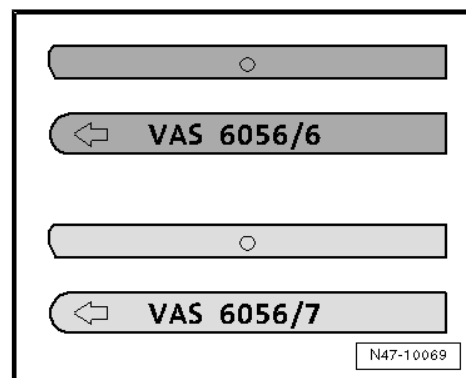
Flanging jaw assembly instructions:

- ◆ VAS 6056/6 (dark) for black brake lines
- ◆ VAS 6056/7 (light) for green brake lines



Note

The arrow on the rounded side of the flanging jaws must point to the edge of the housing, and the straight side of the flanging jaws must be installed towards the spindle, or the flange will not be formed correctly.

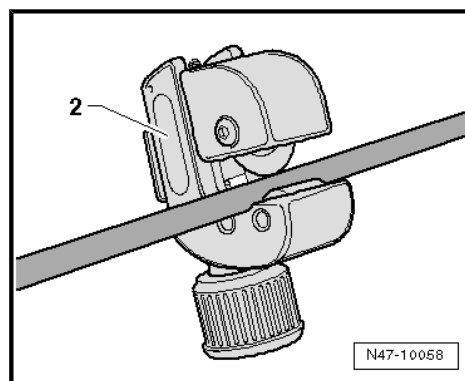


5.1.2 Work instructions

- Unbolt relevant brake line at brake caliper or wheel brake cylinder; catch escaping brake fluid and dispose of this as per regulations.



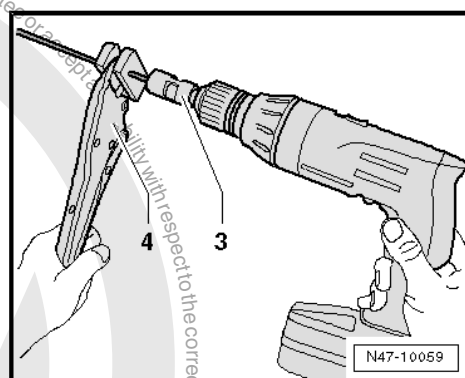
- Cut through brake line at a suitable point (straight, freely accessible section) with pipe cutter -2-.
- Remove section to be renewed.
- Degrease brake line surface.



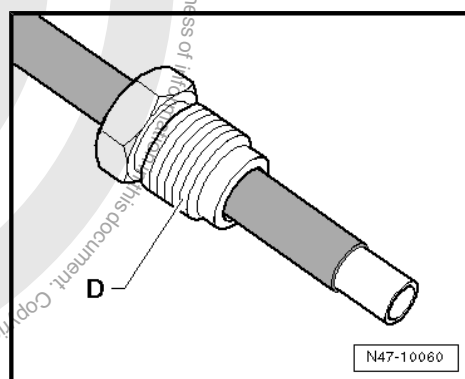
- Clamp brake line tightly in set of grips -4- so that approx. 50 mm project from plastic jaws.
- Clamp scraper -3- into a drill and position onto brake line.
- At slow drill speed and with gentle pressure on brake line, scrape coating off brake line.

Length of scraping is determined by stop in scraper.

- Withdraw scraper from brake line and remove residue from scraping.



- Remove set of grips and slide union bolt -D- onto brake line.



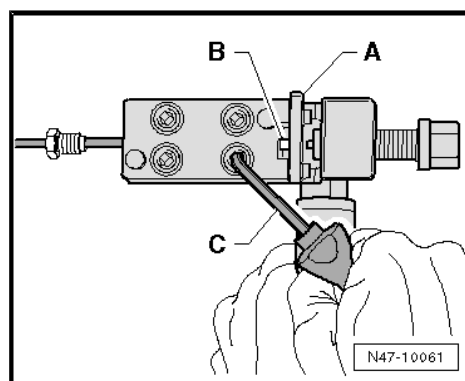
- Slide brake line -B- up to stop -A- in flanging tool.



Note

Brake line must be positioned against stop when the hexagon socket head bolts are tightened, or the flange will not be formed correctly.

- Tighten brake line in flanging tool until brake line can no longer be moved. Fold up stop -A- and now tighten hexagon socket head bolts diagonally using special wrench -C-.

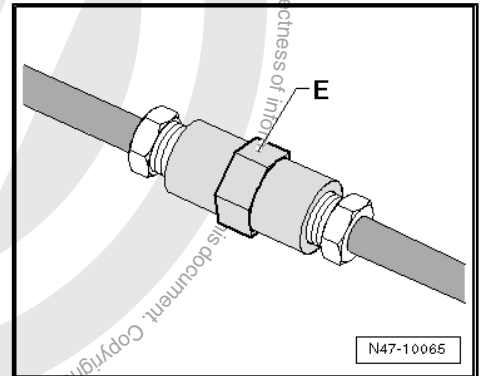
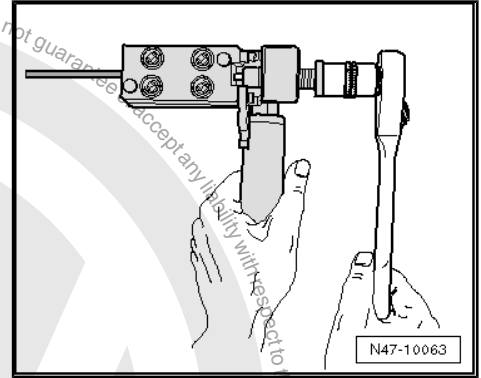




- Turn spindle to stop in flanging tool.
- Turn spindle back again.
- Loosen hexagon socket head bolts diagonally.
- Remove brake line from flanging tool, clean and check brake line and flange.

Briefly flush the section of brake line remaining in the vehicle:

- Connect brake filling and bleeding unit -VAS 5234- , connect bleeder bottle hose to brake line flange and allow brake filling and bleeding unit -VAS 5234- to run briefly until a little brake fluid has run through.
- Blow out new brake line to be inserted with compressed air.
- Join brake lines using connector -E-.
- Install brake line.
- Bleed brake system ➔ [page 94](#) .





6 Hydraulic system

⇒ „6.1 General notes on brake fluid“, page 92

⇒ „6.2 Pre-bleeding hydraulic system“, page 92

⇒ „6.3 Bleeding hydraulic system following standard procedure“, page 94

⇒ „6.4 Subsequent bleeding of hydraulic system“, page 95

⇒ „6.5 Testing for leaks“, page 95

6.1 General notes on brake fluid



WARNING

Only use new brake fluid conforming to VW standard (VW 501 14).



Note

- ◆ Brake fluid is poisonous. Also due to its corrosive effect brake fluid must not come into contact with paintwork.
- ◆ Brake fluid is hygroscopic, which means it absorbs moisture from the ambient air and should therefore always be stored in air-tight containers.
- ◆ Rinse off spilled brake fluid using plenty of water.

6.1.1 Changing brake fluid

⇒ Maintenance ; Booklet ; Brake and clutch system: Changing brake fluid

6.2 Pre-bleeding hydraulic system

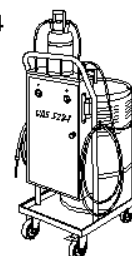
Bleeding the hydraulic system is described using brake filling and bleeding equipment -VAS 5234- .

A pre-pressure of 2 bar is required for bleeding the ABS hydraulic unit -N55- .

Special tools and workshop equipment required

- ◆ Brake filling and bleeding equipment -VAS 5234-

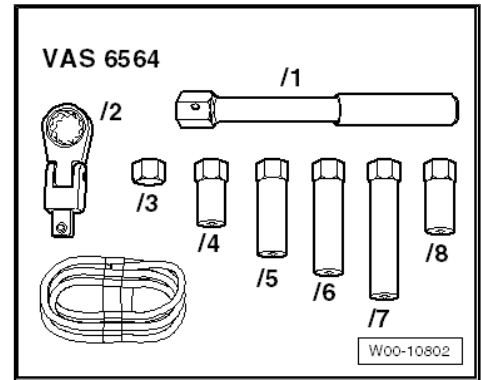
VAS 5234



W00-1101



- ◆ Tool set for brake bleeding -VAS 6564-



Carry out pre-bleeding when:

- ◆ in vehicles with EDL, EDL/TCS or EDL/TCD/ESP a chamber in the brake fluid reservoir is completely empty. This occurs e.g. in the case of brake system leaks.

Additional work for vehicles with diesel engine:

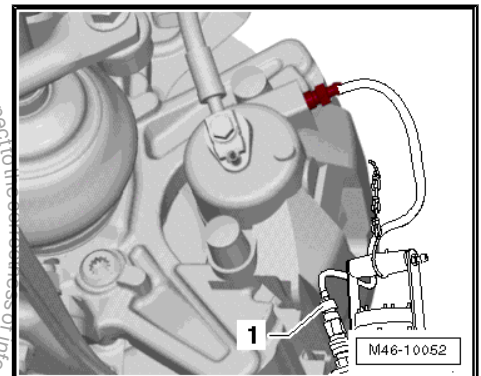
- Unbolt pressure converter or solenoid valve block from bracket and lay to side.

Continuation for all models:

- Connect brake filling and bleeding equipment -VAS 5234-.

Bleeding sequence:

- 1 - Bleed front left and front right brake calipers simultaneously.



- 2 - Bleed rear left and rear right brake calipers simultaneously.

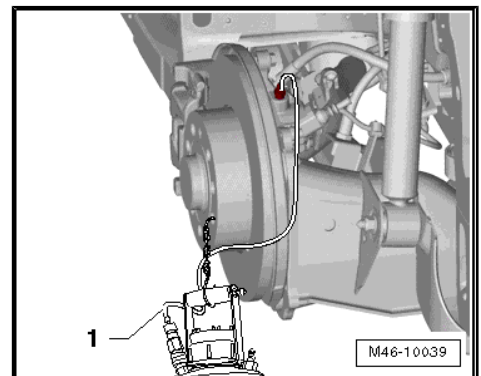
Leave bleeder valves open with brake fluid hoses connected until brake fluid free from air bubbles flows out.

Hydraulic unit must then be bled again by means of the function „Basic setting“ with the ➔ Vehicle diagnostic tester.

Initiate basic setting (to bleed brake system):

Connecting ➔ Vehicle diagnostic tester and selecting functions
⇒ [page 9](#).

- Then bleed brake system as normal.





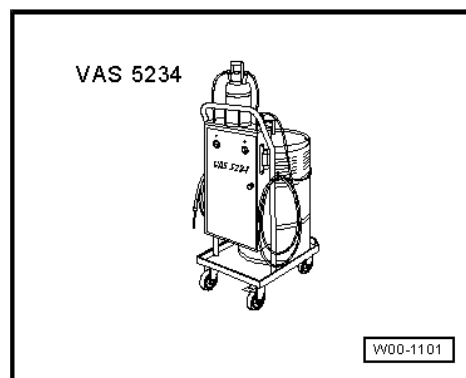
6.3 Bleeding hydraulic system following standard procedure

Bleeding the hydraulic system is described using brake filling and bleeding equipment -VAS 5234- .

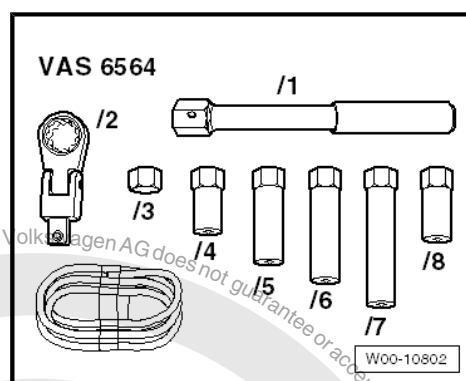
A pre-pressure of 2 bar is required for bleeding the ABS hydraulic unit -N55- .

Special tools and workshop equipment required

- ◆ Brake filling and bleeding equipment -VAS 5234-



- ◆ Tool set for brake bleeding -VAS 6564-



Note

If, in vehicles with EDL, EDL/TCS or EDL/TCS/ESP, a chamber in brake fluid reservoir is completely empty (e.g. brake system leaking), brake system must be pre-bled first ➔ [page 92](#) .

Carry out the following work:

Additional work for vehicles with diesel engine:

- Unbolt pressure converter or solenoid valve block from bracket and lay to side

Continuation for all models:

Adhere strictly to work sequence when bleeding brake system.

- Connect brake filling and bleeding equipment -VAS 5234- .
- Open bleeder valves in specified order and bleed brake calipers.

- 1 - Front left brake caliper
- 2 - Front right brake caliper
- 3 - Rear left brake caliper



4 - Rear right brake caliper

Use suitable bleeder hose. It must sit tightly on bleeder valve so that no air can enter brake system.

- Leave bleeder valve of each brake caliper open with bleeder hose fitted until brake fluid discharges free of air bubbles.

6.4 Subsequent bleeding of hydraulic system

Carry out subsequent bleeding when:

- ◆ brake pedal travel is too long or so-called »soft brake pedal«

Subsequent bleeding requires the assistance of a second mechanic.

- Depress brake pedal firmly and hold.
- Open bleeder valve on brake caliper.
- Fully depress brake pedal.
- Close bleeder valve with pedal held down.
- Release brake pedal slowly.

This bleed sequence must be carried out 5 times per brake caliper.

Bleeding sequence:

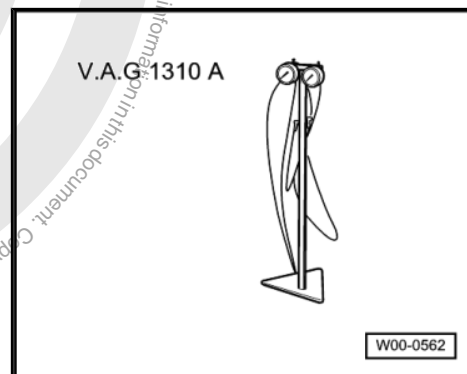
- 1 - Front left brake caliper
- 2 - Front right brake caliper
- 3 - Rear left brake caliper
- 4 - Rear right brake caliper

A road test must be carried out after the brakes have been bled. When doing this an ABS regulation must be performed at least once!

6.5 Testing for leaks

Special tools and workshop equipment required

- ◆ Tester for brake pressure regulator -V.A.G 1310 A-
- ◆ Adapter M10 -V.A.G 1310/6-



6.5.1 Test prerequisites:

- Brake system (hydraulic unit, brake hoses, brake lines and brake calipers) operating properly and free of leaks.



Carry out the following work:

Checking

- Remove bleeder valve at one of front brake calipers.
- Connect pressure gauge -V.A.G 1310 A- and bleed.
- Apply pressure to brake pedal until gauge indicates a pressure of 50 bar. The pressure must not drop by more than 4 bar within the test period of 45 seconds. Renew brake master cylinder if drop in pressure exceeds specification.

