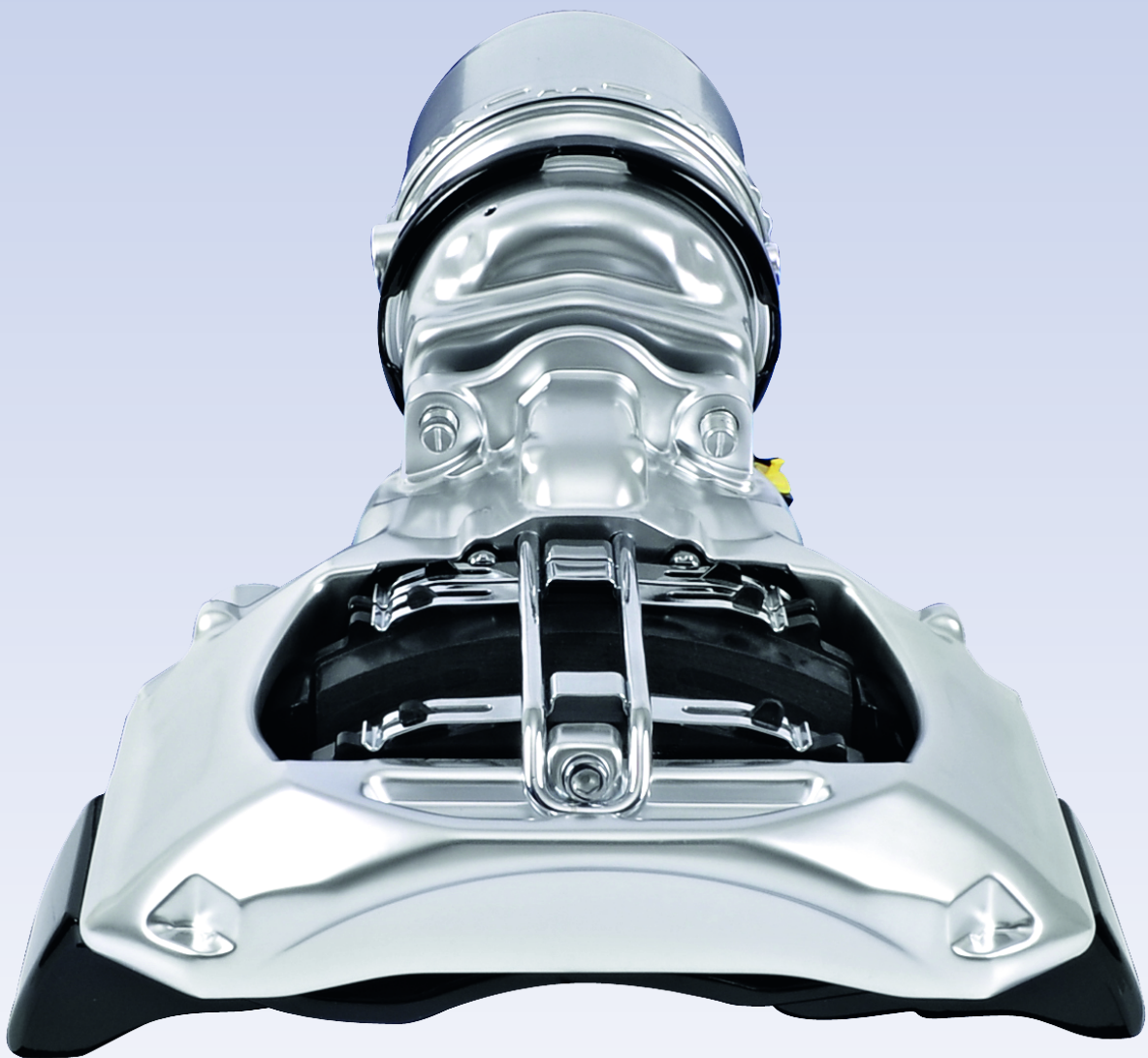


# MAXX™22

## MECHANICAL SLIDING CALLIPER DISC BRAKE

ASSEMBLY AND MAINTENANCE INSTRUCTIONS



**WABCO**



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You will find the current version at:  
<http://www.wabco.info/i/207>



## 1 General Information

### Purpose of the document

This publication describes the maintenance and repair of the mechanical sliding calliper disc brake MAXX™22 (WABCO part number: 640 322 XXX 0) with the required steps and work sequences to replace individual components using the available repair kits.



### Copyright and trademark notice


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### Symbols used

 <b>WARNING</b>	<b>Type and source of hazard</b> Potential hazard situation which can cause <b>serious personal injury or death</b> if the safety instruction is not observed. – <i>Follow this step to ward off the hazard.</i>
 <b>CAUTION</b>	<b>Type and source of hazard</b> Potential hazard situations that can cause <b>minor or medium-severe personal injury</b> if the safety instruction is not observed. – <i>Follow this step to ward off the hazard.</i>
<b>CAUTION</b>	<b>Type and source of hazard</b> Potential hazard situations that can cause material loss if the safety instruction is not observed. – <i>Follow this step to ward off the hazard.</i>

 Important information, instructions and/or tips that you must always observe.




Reference to information on the internet

– Action step

⇒ Consequence of an action

■ List

 Note on the use of a tool / WABCO tool

## Technical documents



- Open the WABCO INFORM online product catalogue:  
<http://inform.wabco-auto.com>
- Search for documents by entering the document number in the *product number* search field.

The WABCO online product catalogue INFORM provides you with convenient access to the complete technical documentation.

All documents are available in PDF format. Please contact your WABCO partner for printed versions.

Please note that the publications are not always available in all language versions.

DOCUMENT TITLE	DOCUMENT NUMBER
MAXX™22 – Assembly and maintenance instructions	815 XX0 153 3
General Repair and Test Information	815 XX0 109 3

\*Language code XX: 01 = English, 02 = German, 03 = French, 04 = Spanish, 05 = Italian, 06 = Dutch, 07 = Swedish, 08 = Russian, 09 = Polish, 10 = Croatian, 11 = Romanian, 12 = Hungarian, 13 = Portuguese (Portugal), 14 = Turkish, 15 = Czech, 16 = Chinese, 17 = Korean, 18 = Japanese, 19 = Hebrew, 20 = Greek, 21 = Arabic, 24 = Danish, 25 = Lithuanian, 26 = Norwegian, 27 = Slovenian, 28 = Finnish, 29 = Estonian, 30 = Latvian, 31 = Bulgarian, 32 = Slovakian, 34 = Portuguese (Brazil), 98 = multilingual, 99 = non-verbal

## Choose genuine WABCO parts

Genuine WABCO parts are made of high quality materials and are rigorously tested before they leave our factories. You also have the assurance that the quality of every WABCO product is supported by a powerful customer service network.

As a leading supplier to the industry, WABCO collaborates with the world's leading original equipment manufacturers, and disposes of the experience and capacitive capability required to also satisfy the most stringent production standards. The quality of every genuine WABCO part is supported by:

- Tooling made for serial production
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- Exhaustive end-of-line tests
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# General Information

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- Overnight delivery
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WABCO Service Partners – the network you can rely on. You can access 2000 high quality workshops with more than 6000 specialist mechanics, all trained to WABCO's exacting standards and equipped with our most up-to-the-minute systems diagnostic and support technology.

## Your direct contact to WABCO

In addition to our online services, trained members of staff are there to help you at our WABCO Service Partners to directly answer any technical or business-related questions you may have.

Contact us if you need assistance:

- Find the right product
- Diagnosis support
- Training
- System support
- Order management



You can find your WABCO partner here:

<http://www.wabco-auto.com/en/how-to-find-us/contact/>

## 2 Safety information

### Observe all required provisions and instructions:

- Before you begin with maintenance, repair, replacing a part etc., carefully read all the safety instructions as well as the repair and maintenance instructions included in this publication. Adhere to all instructions, information and safety information to prevent injury to persons and damage to property.
- WABCO will only guarantee the safety, reliability and performance of their products and systems if all the information in this publication is adhered to.
- Always abide by the vehicle manufacturer's specifications and instructions.
- Observe all accident regulations of the respective company as well as regional and national regulations.

### Make provisions for a safe work environment:

- The workplace has to be dry, as well as sufficiently lit and ventilated.
- Only trained and qualified technicians may perform work on the vehicle.
- Use personal protective equipment if required (protective goggles, respiratory protection, ear protectors, etc.).
- For activities on the brake that need to be carried out directly on the vehicle, the following must be observed:  
Pedal actuations can lead to severe injuries if persons are in the vicinity of the vehicle. Make sure that pedals cannot be actuated as follows:
  - Switch the transmission to "Neutral".
  - Position the vehicle on an even surface and secure it against rolling away with brake wedges. Only use approved devices to jack up and secure the vehicle.
  - Fasten a visible note to the steering wheel indicating that work is being performed on the vehicle and that the pedals are not to be actuated.

### Prevent any reduced braking effect or brake failure:

- Regularly check the wear limits of brake linings and brake discs.
- Immediately replace worn or damaged brake discs / brake linings.
- Always replace brake linings by axle and use a new retaining system for brake linings and pressure plates.
- If cast parts have been heavily damaged or are severely worn, (cracks for example), replace the entire brake following these instructions.
- For good handling and braking characteristics it is essential that the disc brake is in flawless technical condition.





Note the following safety instructions for safe repairs, testing and maintenance:

- The illustrations are for example only and may deviate from the actual design.
- A second technician must assist during removal and installation of the brake.
- Only grip the brake on the outside with your hands while moving the calliper or working on the brake.
- Use suitable equipment, such as a vice, to clamp the brake when performing repairs on the brake outside the vehicle.
- Never use the lining retainer clip as a grab handle or for fastening a lifting device, because the lining retainer clip can be damaged in the process.
- Do not open the calliper with the actuating unit, and do not unscrew the fastening screws on the calliper cover.
- Do not apply the brake when brake linings have been removed.
- Do not use compressed air or other high-pressure devices when cleaning the brake or the vehicle. Hazardous dusts arising may lead to injuries. Rubber parts of the brake could also be damaged.
- Only use original WABCO parts and approved brake linings and retaining systems for brake linings and pressure plates. Exploded view of the replacement parts ▶ Chapter "3.3 Exploded view of the replacement parts", page 13.
- Only use grease contained in the repair kits.
- Perform the repair work using only the recommended tools, ▶ page 14 and ▶ page 16.
- Do not use motor-driven screw or torque tools.
- Tighten screws and nuts only with the specified spanners, applying only the specified tightening torque; refer to the table ▶ page 14 for the corresponding positions.
- Make sure that the release screw of the spring brake cylinder is threaded in completely after completing the work and check the functionality of the parking brake.
- Perform a concluding roller test stand test having completed the repairs. If no roller test stand is available, conduct a test drive with brake action tests.
  - Do not perform full braking, with the exception of emergency braking, during the first 50 kilometres after new brake linings have been fitted.
  - Avoid continuous braking over longer periods.
  - Ensure that the driver of the vehicle is informed.

## 3 Description of the disc brake

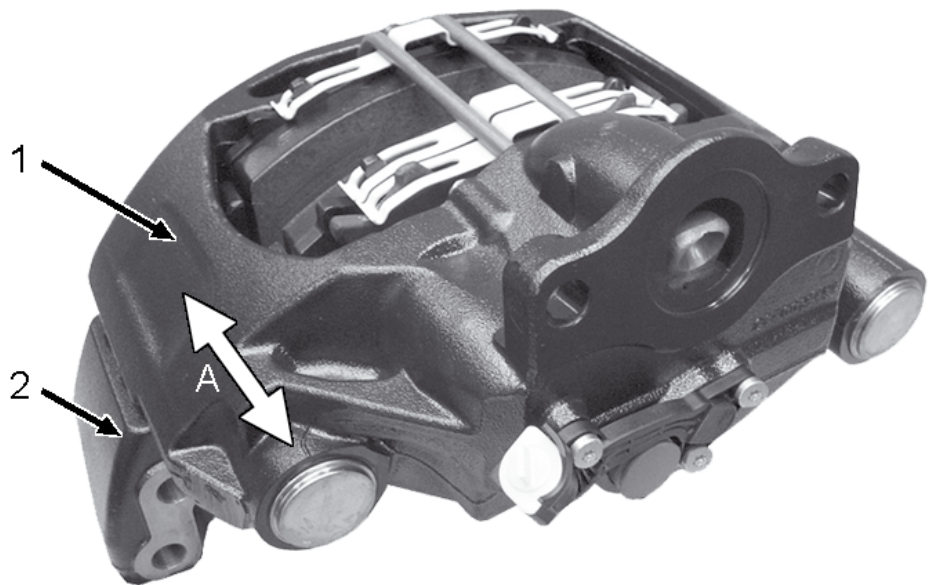
### 3.1 Introduction

**!** This document applies to all MAXX™22 brakes (WABCO part number: 640 322 XXX 0).

The brake MAXX™22 is a pneumatic one-piston brake, which is intended for use in commercial vehicles on front and rear axles for 22.5" wheel rims as service, auxiliary and parking brake.

MAXX™22 is actuated mechanically via a diaphragm brake cylinder or a spring brake actuator. The cylinder is fitted directly onto the calliper (1), thereby reducing the overall axial length of the brake. This enables optimal utilisation of the installation situations.

The complete disc brake including brake cylinder consists of two assemblies: Calliper (1) and brake anchor plate (2).



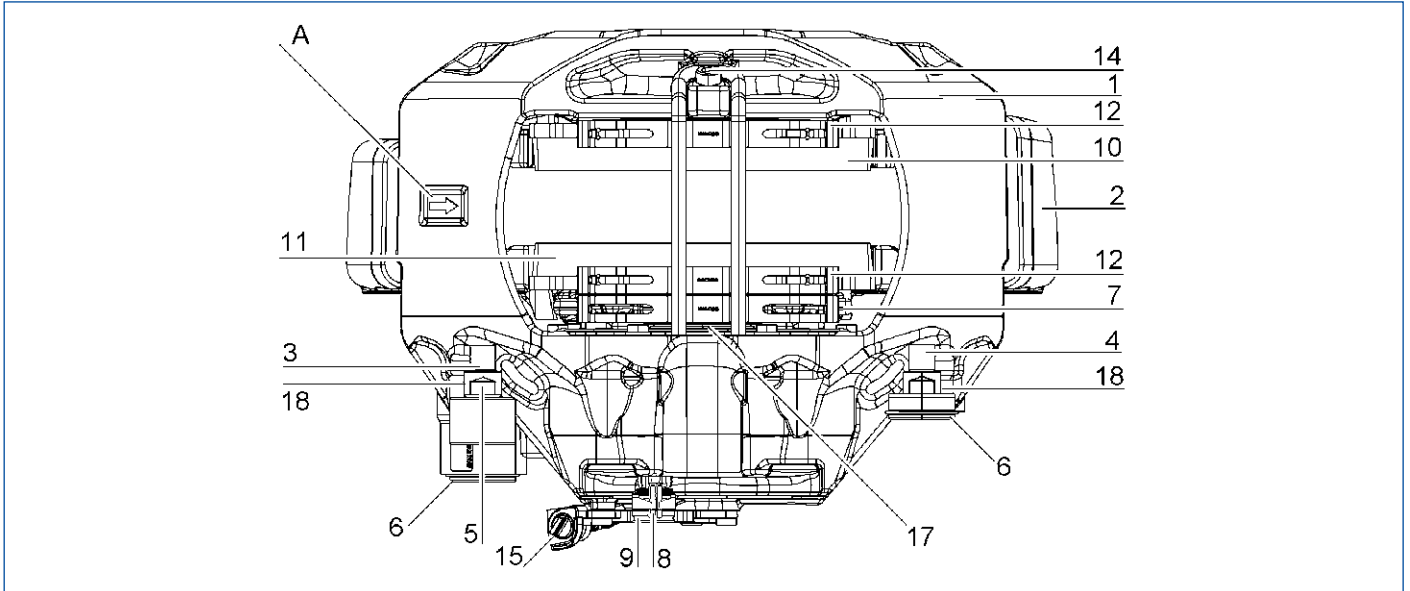
#### LEGEND

1	Calliper
2	Brake anchor plate
A	Brake calliper shifting direction

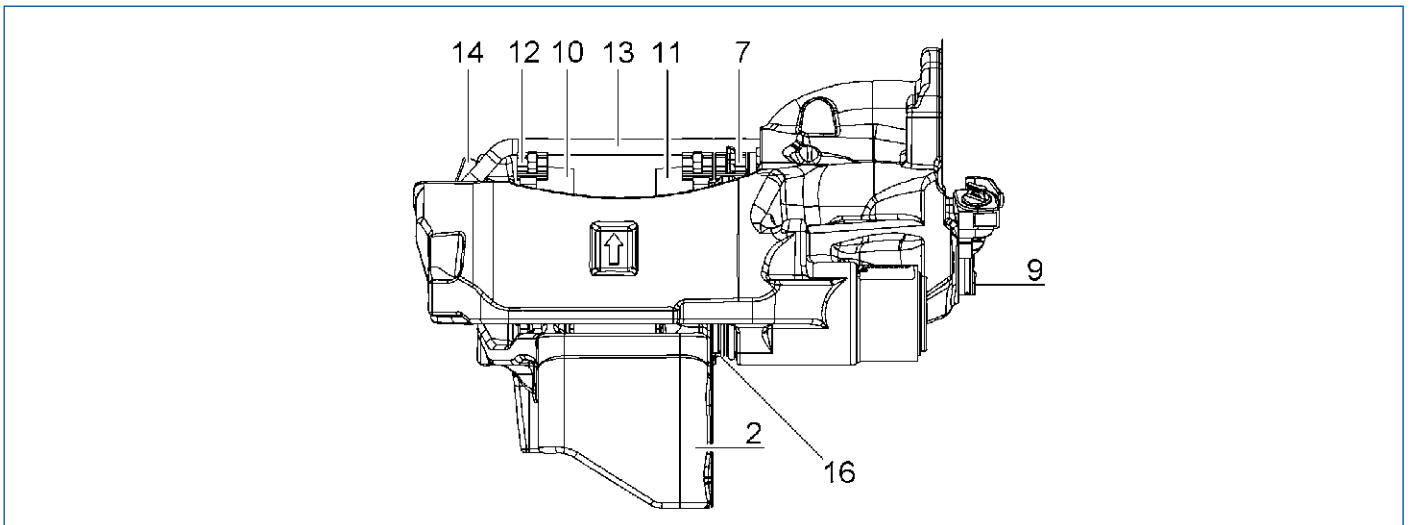
# Description of the disc brake

## 3.2 Function

### Top view and sectional view (left brake)



### Side view and sectional view (left brake)

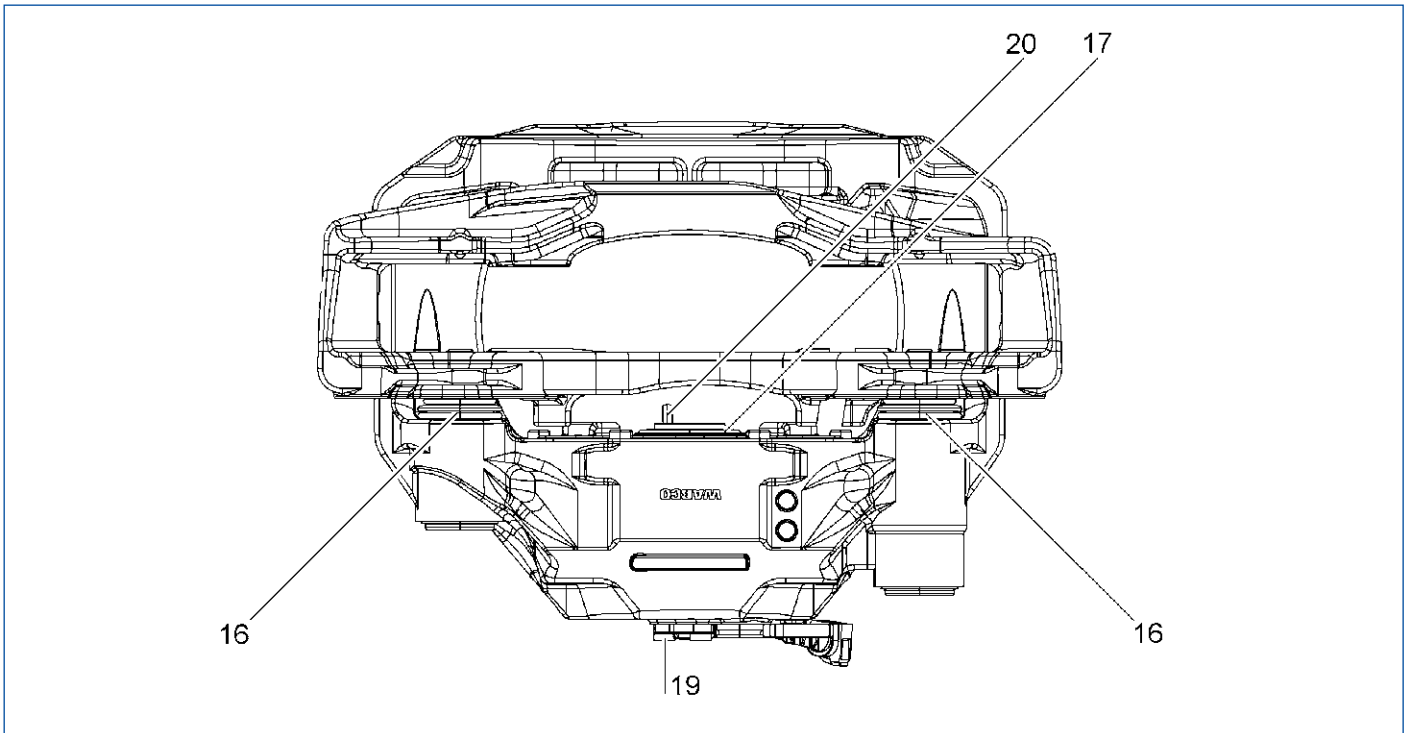


#### LEGEND

1	Calliper	2	Brake anchor plate	3	Guide pins, long (fitting bolts)
4	Guide pins, short (clearance bolts)	5	Hexagon socket screws	6	Sealing cover
7	Pressure plate	8	Return unit	9	Return unit sealing plug
10	Brake lining rim side	11	Brake lining cylinder side	12	Hold-down springs
13	Lining retainer clip	14	Hexagon socket screw	15	Wear sensor
16	Protection caps (for guide pins)	17	Plunger cap	18	Guide pin bushings
A	Forward driving, direction of rotation				

# Description of the disc brake

## Bottom view and sectional view (left brake)



### LEGEND

16	Protection caps (for guide pins)	17	Plunger cap	19	Torx screw	20	Adjuster screw
----	----------------------------------	----	-------------	----	------------	----	----------------

## Functional description

Axial movement of the calliper (1) occurs on the guide pins (3, 4) of the brake anchor plate (2). The brake linings (10, 11) are guided and supported axially movable in the brake anchor plate (2). The brake lining support is implemented by means of a lining retainer clip (13) and hold-down springs (12).

The radially open design of the calliper enables simple and quick brake lining replacements.

For compensating the pad wear the actuating mechanism of the brake is equipped with a force-dependent, stageless, automatic adjuster mechanism. This mechanism maintains a preset clearance regardless of load and operating conditions. This, together with the stable and robust construction of the calliper (1), results in safe control of the pedal travel and increases the reserve of travel for emergency braking.

All rubber parts and the grease fillings are maintenance-free except when damaged.

The disc brake is equipped with an electrical wear sensor (15 / continuous indication).

A visual check of the lining wear is also possible on the calliper (1) marking, see ► Chapter "6.2.1 Checking the brake lining wear with brake installed", page 21.

! Exploded view of all mentioned parts ► Chapter "13.1 Procurement of spare parts", page 73.

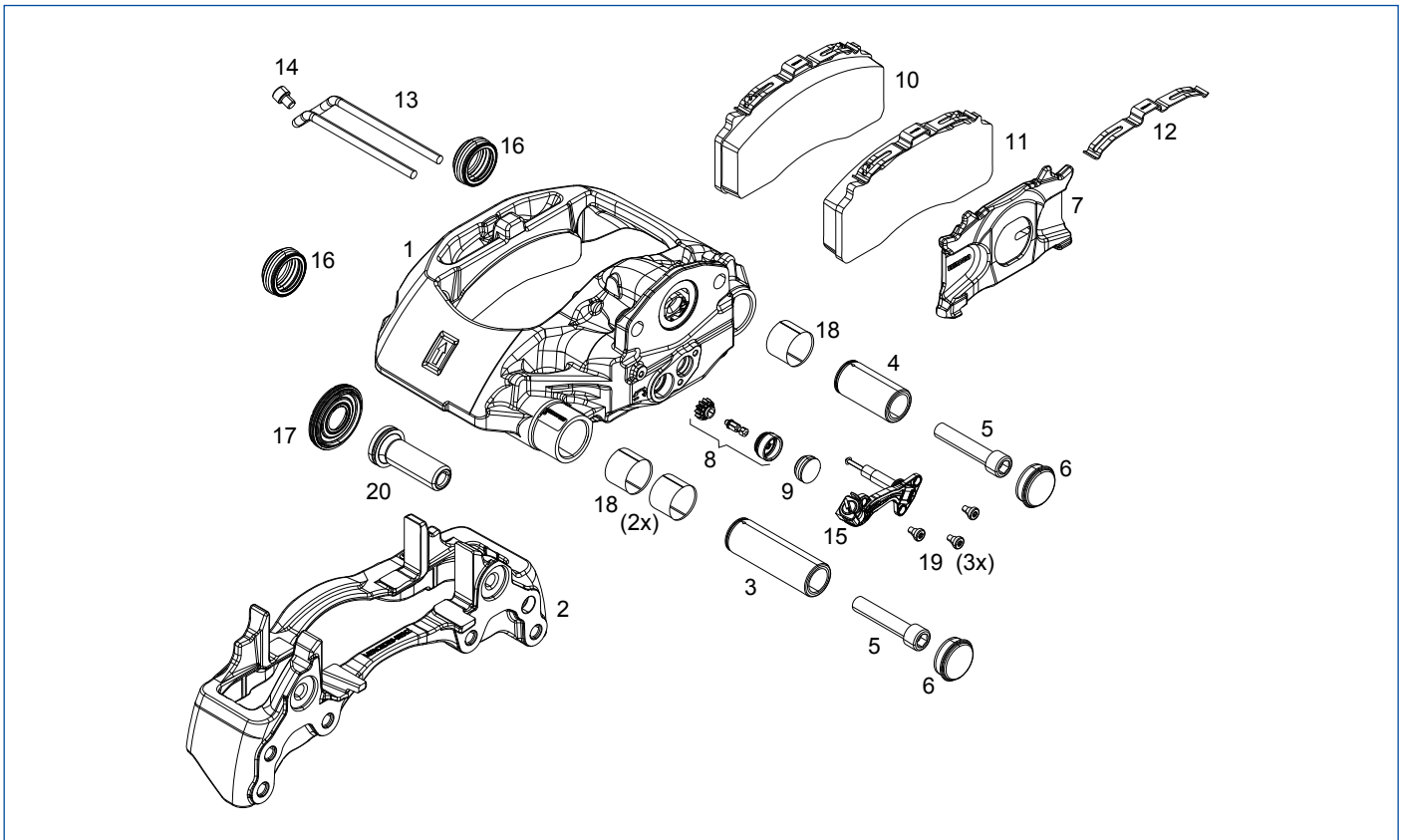
## 3.3 Exploded view of the replacement parts



### Information about WABCO repair kits and service documents

- Open the WABCO INFORM online product catalogue: <http://inform.wabco-auto.com>
- Search for information by entering the WABCO part number in the *product number* search field.

### Illustration of replacement parts (example of a left brake)

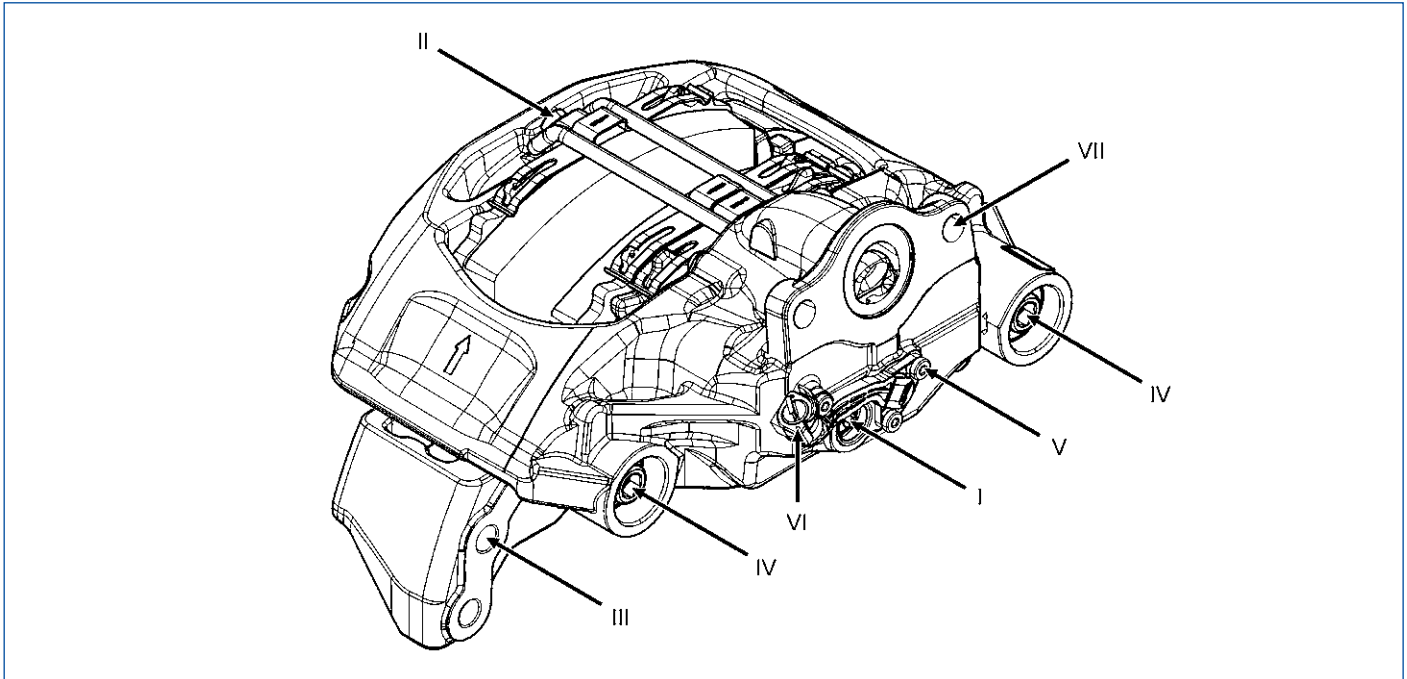


### LEGEND

1	preassembled calliper (1) with actuating unit; with brake anchor plate (2), pressure plate (7) and wear sensor (15)	2	Brake anchor plate	3	Guide pins, long (fitting bolts)
4	Guide pins, short (clearance bolts)	5	2x hexagon socket screw	6	2x sealing cover
7	Pressure plate	8	Reset shaft	9	Return unit sealing plug
10	Brake lining on rim side with preassembled retainer spring	11	Brake lining on cylinder side with preassembled retainer spring	12	Hold-down springs
13	Lining retainer clip	14	Hexagon socket screw	15	Wear sensor
16	2x protection caps (for guide pins)	17	Plunger cap	18	3x bushings for guide pins
19	3x Torx screw	20	Adjuster screw		

## 4 Tools, spanner widths and tightening torques


Illustration of positions for the tools, spanner widths and tightening torques



For maintenance work on the disc brakes, the following tools and special WABCO tools are required ▶ page 16.

ITEM	TOOLS WITH APPLICATION	SPANNER WIDTH		TIGHTENING TORQUE (NM)
		EXTERNAL	INTERNAL	REMARKS
I	<b>Ring spanner</b> for the hexagon ball head on the shaft (8a) of the return unit	8		Direction of rotation on the hexagon: <ul style="list-style-type: none"> <li>■ Set clockwise (right), max. 15 Nm, gap becomes smaller ▶ see "+" marking on calliper</li> <li>■ Set back counter clockwise (left) max. 15 Nm, gap is larger ▶ see "-" marking on calliper.</li> </ul>
II	<b>Hexagon screwdriver</b> for hexagon socket screw (14) in the lining retainer clip		8	30 + 15 Nm
III	<b>Box spanner</b> for bolting the brake to the axle adapter	24		Always observe the installation specifications of the axle or vehicle manufacturer.
IV	<b>Hexagon screwdriver</b> for hexagon socket screws (5) of the guide pin coupling		14	130 Nm +90° (angle controlled tightening) Tightening sequence for guide pins: <ul style="list-style-type: none"> <li>■ 1. Guide pin long =&gt; fitted bolt (with hexagon socket screw)</li> <li>■ 2. Guide pin short =&gt; clearance bolt (with hexagon socket screw)</li> </ul>
V	<b>Torx screwdriver</b> for the Torx screws of the wear sensor		T30	7 + 2 Nm


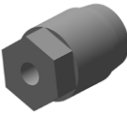

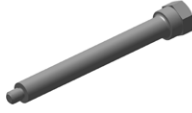

## Tools, spanner widths and tightening torques

ITEM	 TOOLS WITH APPLICATION	SPANNER WIDTH		TIGHTENING TORQUE (NM)
		EXTERNAL	INTERNAL	REMARKS
VI	<b>Torx screwdriver</b> for Torx screws of the cable plug connector for the wear sensor		T20	1.3 - 0.3 Nm
VII	<b>Box spanner</b> for bolting the brake cylinder to the calliper	24		210 - 30 Nm (applies to original WABCO cylinders) <ul style="list-style-type: none"> <li>■ Thread on the fastening nuts by hand until the brake cylinder makes full contact.</li> <li>■ Tighten the fastening nuts with approx. 120 Nm.</li> <li>■ Tighten the fastening nuts with 210 - 30 Nm.</li> </ul> <b>Only use fastening nuts once!</b>




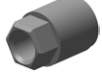
## 5 WABCO tools

### 5.1 WABCO Service Case







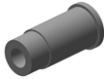


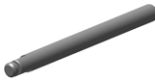

The WABCO Service Case is required for all WABCO air disc brakes.

ITEM	 TOOL NAME	NOTATION
<b>Tool set "Adjuster replacement" 300 100 011 2</b>		
A	Hammer pin	
B	Pulling-off device	
D	Handle	
<b>Tool set "Return unit" 300 100 012 2</b>		
C	Return unit	

### 5.2 WABCO Repair Case

ITEM	 TOOL NAME	NOTATION
<b>Tool set 300 100 010 2</b>		
E	Threaded spindle TR 20 x 2	
F	Thrust bearing	
G	Threaded spindle TR 20 x 2	



ITEM	TOOL NAME	NOTATION
H	Compensating disc	
J	Round washer	
K	Press-out sleeve	
L	Press-out bolt	
M	Press-in clearance bolt	
N	Press-in fitted bolt top	
O	Press-in fitted bolt bottom	
P	Drive-in sleeve cover	
Q	Press-in cup	
R	Holding rod	
S	Connecting bolt	

## 6 Checking the brake

### Safety information

- Read all safety instructions before carrying out the work steps to avoid injury and/or material damage ( ▶ Chapter "2 Safety information", page 8).

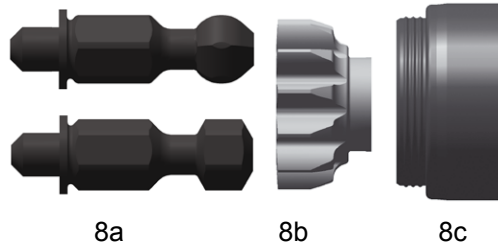
### 6.1 Checking the adjuster

**!** The brake cylinder does not need to be dismantled in order to check the brake. The brake is shown without the brake cylinder for illustration purposes only.

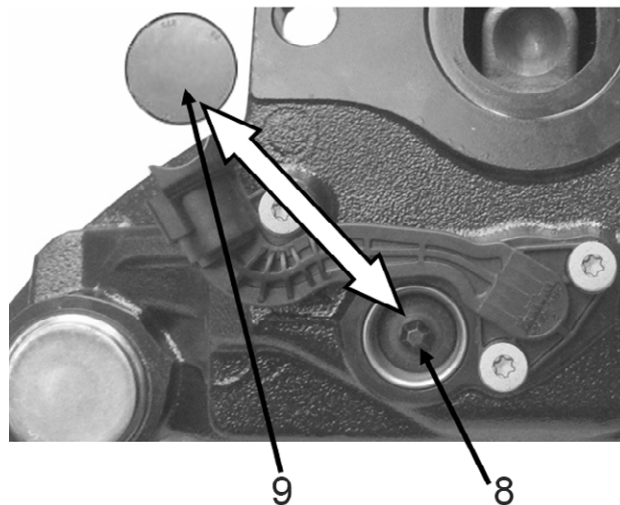
To check the adjuster, brake linings (10, 11) and pressure plate (7) with the hold-down system, consisting of hold-down-springs (12), lining retainer clip (13) and hexagon screw, must be installed.

#### For this chapter you require the following tools:

- Ring spanner with spanner width 8 (outside)
  - WABCO Service Case
- Carefully remove the sealing plug of the return unit (9) from the calliper (1).
  - Check the return unit shaft (8a) and the sleeve seal (8c) for wear and damage.




- Replace the adjuster (8), if you notice wear or damage  
▶ Chapter "12 Replacing the adjuster", page 66.



## CAUTION

### Damage to the hexagon screw of the return unit (8)

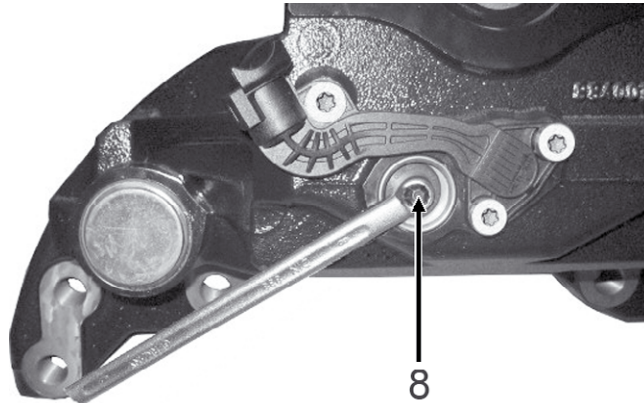
The use of open-ended spanners and motor-driven torque tools can result in damage to the return unit (8) hexagon screw.

- Only use a  **ring spanner** or **WABCO tool C**.









- Use the  **ring spanner** or **WABCO tool C** to turn the hexagon nut of the return unit (8) around  $\frac{1}{2}$  to  $\frac{3}{4}$  of a rotation anticlockwise.

### **Ring spanner with spanner width 8 (outside)**

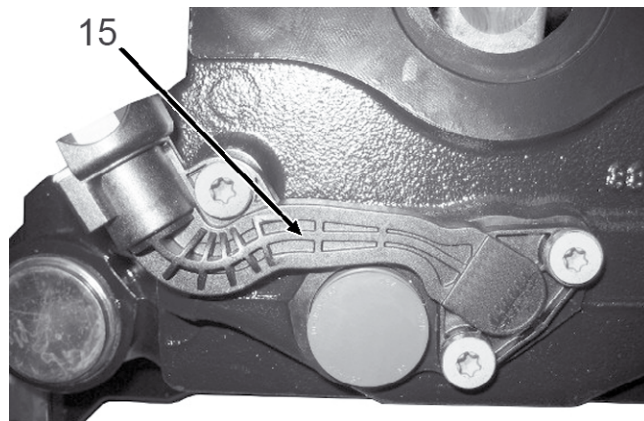
- ▶ page 14 (Position I) or **WABCO tool C** ▶ page 16



Checking the adjustment is only possible with a larger gap (2 to 3 mm).

- Adjust the clearance to 2 to 3 mm.
  - ⇒ There must be sufficient space for the engaged  **ring spanner** or **WABCO tool C** for it not be obstructed when it is turned during adjustment. The tool is here only used for optical assistance so that the rotation of the return unit is discerned more clearly.
- Gently apply the brake 5 times (braking pressure approx. 1 bar).
  - ⇒ If the adjuster functions correctly, the  **ring spanner** or **WABCO tool C** will turn clockwise incrementally.
  - ⇒ With increasing adjustment the angle of rotation of the engaged  **ring spanner** or **WABCO tool C** becomes smaller with each actuation.
  - ⇒ The adjuster is working correctly if the  **ring spanner** or **WABCO tool C** rotates clockwise as described above.
- Replace the brake ▶ Chapter "9 Renewing the brake", page 46, if the following faults occur (meaning: the adjustment is not OK):
  - The return unit (8) or the attached  **ring spanner** or **WABCO tool C** does not turn.
  - The return unit (8) or the attached  **ring spanner** or **WABCO tool C** only rotates with the first actuation.
  - The return unit (8) or the attached  **ring spanner** or **WABCO tool C** rotates back and forth with every actuation.
- Remove the  **ring spanner** or **WABCO tool C** from the hexagon screw of the return unit (8).
- Reset the clearance to 1.2 mm having completed the adjuster test ▶ Chapter "7.4 Fitting the brake linings", page 39.
- Insert the sealing plug (9) into the return unit (8) and ensure that the plug has a tight seat.

- Check the housing of the wear sensor (15) for mechanical influences and damage.



- Replace the wear sensor (15), if you notice any damage
  - ▶ Chapter "10 Replacing the wear sensor", page 49.

## 6.2 Checking the brake linings

### Safety information

- Check the brake lining thickness at regular intervals, in relation to vehicle use, during maintenance intervals, as well as in the context of applicable local laws and regulations.
- Immediately replace burnt, vitrified or oiled brake linings (10, 11).
- Always replace all brake linings (10, 11) by axle, using a new retaining system for brake linings (10, 11) and pressure plates (7).
- To avoid damaging the brake disc replace the brake linings (10, 11) no later than at the point when they reach the wear limit at their weakest spot.
- The residual lining thickness must not be allowed to become less than 2 mm above the backing.

## 6.2.1 Checking the brake lining wear with brake installed

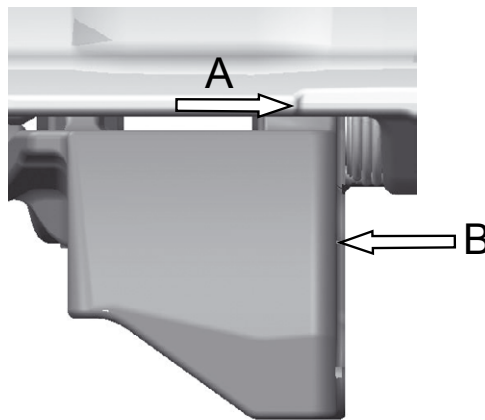
! Checking the lining wear with the brake installed is only possible with disc brakes that are equipped with a respective edge on the calliper (1).

The vehicle wheels do not have to be removed.

- Check the position of edge (A) on the brake calliper (1) across from the position of surface (B) on the solid brake anchor plate flange.

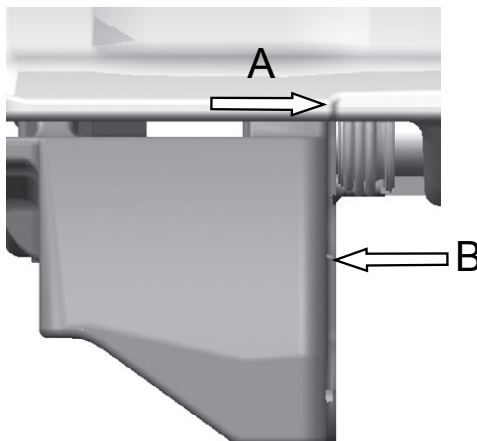
### **New and unworn brake linings (10, 11):**

If edge (A) of the calliper (1) is not covered by surface (B) of the brake anchor plate (2), the brake linings (10, 11) are not yet worn.



### **Brake linings (10, 11) worn:**

If edge (A) is covered by the edge of the surface (B), the brake linings (10, 11) are worn.



## Checking the brake

If the brake is equipped with a disc brake without a corresponding edge on the calliper (1), proceed as follows:

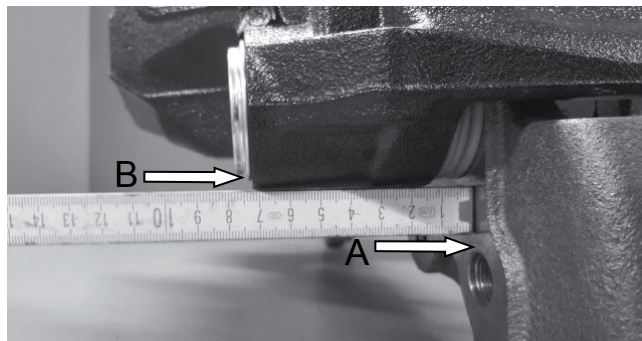
Wear on the middle of the lining can be measured with a folding rule tape measure or a ruler – depending on accessibility – either at the fit bolt (long guide pin) or at the clearance bolt (short guide pin).

- For a measurement on the side of the clearance bolt (4), place the ruler on the processed area on the brake anchor plate (2) next to the short guide pin (clearance bolt) (4).

The measuring point on the brake anchor plate is the processed area where the brake anchor plate (2) is screwed to the axle.



- Measure the distance from the area on the brake anchor plate (2) (A) to the edge of the short guide pin (clearance bolt) (4) (B) on the brake calliper (1).



⇒ The wear limit has been reached when the measured distance on the short guide pin (clearance bolt) (4) exceeds 96 mm<sup>2</sup>.

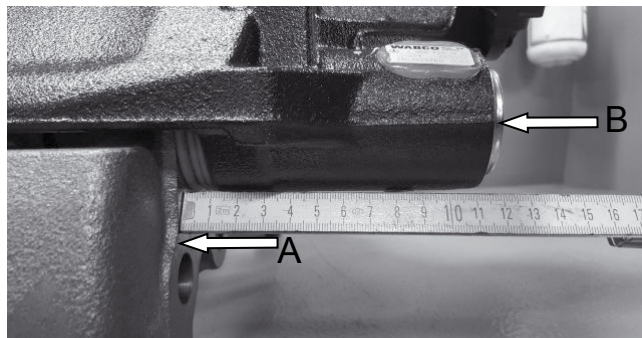
## Checking the brake

- For a measurement on the side of the fitting bolt (3), place the ruler on the processed area on the brake anchor plate (2) next to the long guide pin (fitting bolt) (3).

The measuring point on the brake anchor plate is the processed area where the brake anchor plate (2) is screwed to the axle.



- Measure the distance from the area on the brake anchor plate (2) (A) to the edge of the long guide pin (fitting bolt) (3) (B) on the brake calliper (1).



⇒ The wear limit has been reached when the measured distance on the long guide pin (fitting bolt) (3) exceeds 122 mm<sup>2</sup>.

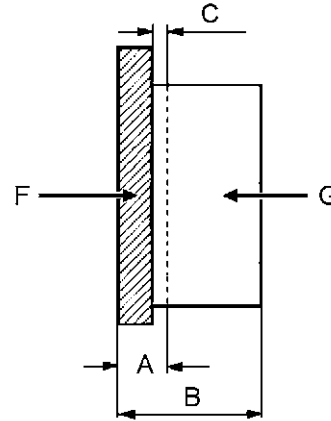
- Replace the brake linings if the wear limit has been reached or it has been exceeded ▶ Chapter "7 Replacing the brake linings", page 29.

If the brake linings (10, 11) are worn:

- Remove the brake linings (10, 11) ▶ Chapter "7.2 Removing the brake linings", page 34.
- Measure the brake lining thickness ▶ Chapter "6.2.2 Measuring the brake lining thickness", page 24.
- Check the brake disc ▶ Chapter "6.3 Inspecting the brake discs", page 24.

## 6.2.2 Measuring the brake lining thickness

- Measure the overall thickness of the brake anchor plate (F) and brake lining (G).



LEGEND	
<b>A</b>	Total thickness of worn brake lining with lining backing (limit value 11 mm)
<b>B</b>	Total thickness of new brake lining: 30 mm
<b>C</b>	Lining thickness without backing (limit value 2 mm residual thickness)
<b>F</b>	Friction material
<b>G</b>	Brake lining

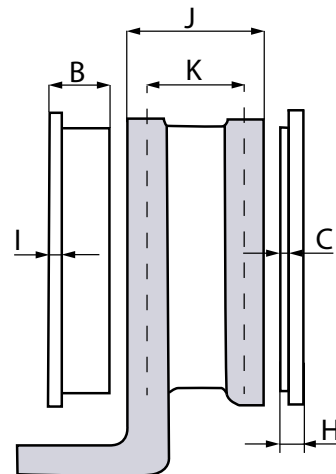
- Replace the brake linings if the wear limit (**A < 11 mm**) has been reached or it has been exceeded ▶ Chapter "7 Replacing the brake linings", page 29.

## 6.3 Inspecting the brake discs

- ! Regularly check the wear limits of brake linings and brake discs.  
When brake linings and/or brake discs are worn, the braking effect is reduced and there is a risk of brake failure. Replace brake discs and brake linings.  
Always replace all brake discs by axle.  
The brake discs must be clean and free from grease.  
Having installed new brake discs, it is recommended that new brake linings be fitted as well.

- Remove the brake linings ▶ Chapter "7.2 Removing the brake linings", page 34.
- Measure the brake disc thickness at the contact area of the brake linings.

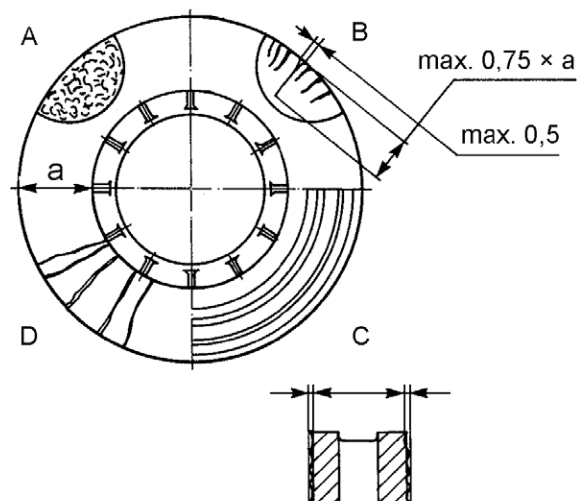




LEGEND	
<b>B</b>	Total thickness of new brake lining: 30 mm
<b>C</b>	Minimum thickness of brake lining: 2 mm
<b>H</b>	Absolute minimum thickness and brake lining backing plate: 11 mm <b>The brake linings must be replaced.</b>
<b>I</b>	Brake lining backing plate: 9 mm
<b>J</b>	Total thickness of the brake disc: 45 mm
<b>K</b>	Wear allowance limit: 37 mm <b>The brake disc must be renewed. It is recommended to replace the brake discs by axle.</b>

- Replace the brake disc if the wear measurement limit of 37 mm has been reached at the thinnest point.

## 6.3.1 Checking the condition of the brake discs



LEGEND	
<b>A</b>	Web-like crack formation: permissible
<b>B</b>	Radial cracks up to max. 0.5 mm width: permissible

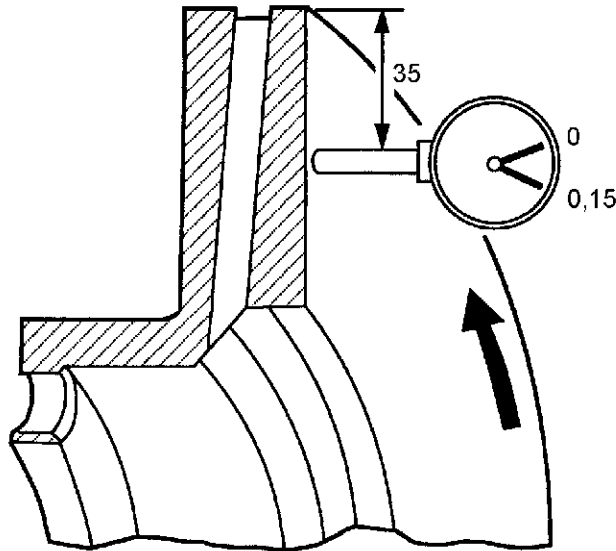
## LEGEND

<b>C</b>	Unevenness of the disc surfaces up to max. 1.5 mm deep: permissible
<b>D</b>	Continuous cracks: not permissible
<b>a</b>	Width of the braking area

- Check the brake disc for cracks and the condition of the surface.
- Replace the brake disc if the brake disc has continuous cracks or unevenness or when cracks exceed the max. dimensions.

### 6.3.2 Checking the runout of the brake discs

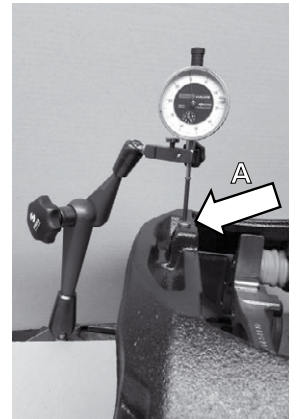
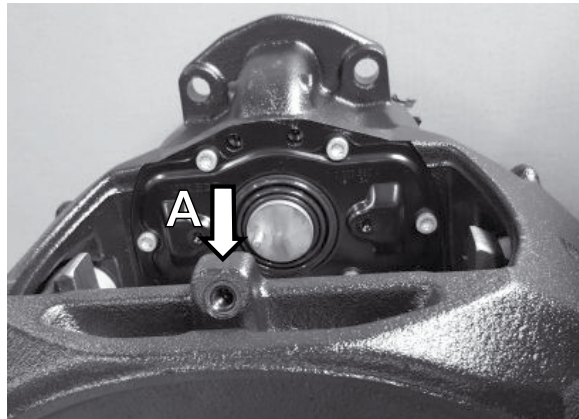
- Fasten the dial indicator to the calliper.
- With the brake disc installed, check the disc runout by rotating the wheel hub. Limit value: 0.15 mm



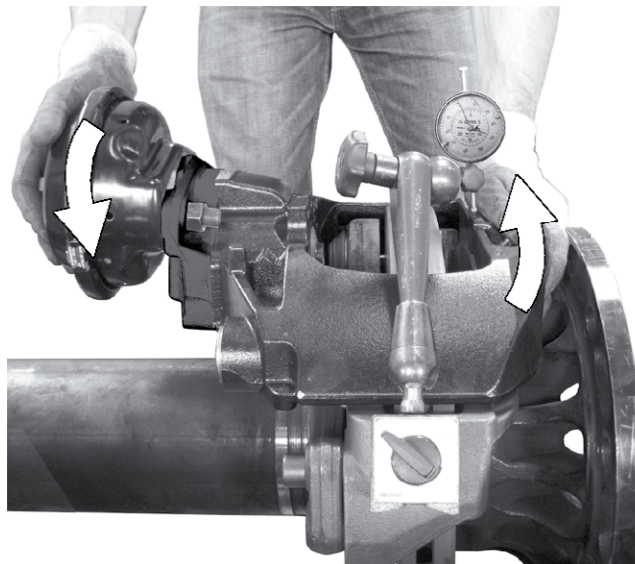
- Replace the brake disc or have it properly reworked if the brake disc runout is more than 0.15 mm.
  - Only fit cleaned and grease-free brake discs.
- Install the brake linings ▶ Chapter "7.4 Fitting the brake linings", page 39.
- Set the clearance ▶ Chapter "7.4 Fitting the brake linings", page 39.

## 6.4 Checking the bearing play of the guide pin

- Remove the vehicle wheel in accordance with the instructions of the axle and/or vehicle manufacturer.
- Remove the brake linings (10, 11) and the pressure plate (7) ▶ Chapter "7.2 Removing the brake linings", page 34.
- Push the calliper (1) completely to the rim side by hand.
- Fasten the magnetic dial indicator support to the brake anchor plate (2) or the axle.
- Clean the measuring point. The measuring point is the moulded edge on the calliper (1) on the rim side.
- Press the dial indicator against the measuring point (A) on the brake calliper (1).



- Applying little force, tilt the calliper (1) as far as possible (direction as illustrated in picture) and set the dial indicator to the value zero.



## Checking the brake

- Now - again applying little manual force - tilt the calliper (1) as far as possible in the opposite direction (direction as shown in figure).



- Read the dial indicator.
  - ⇒ The bearing play must not be greater than 2 mm.
- Renew the bushings of the guide pins (18) if the measured bearing play is greater than 2 mm ▶ Chapter "11.1 Renewing the sealing covers and the bushings of the guide pins", page 52.
- Remove the measuring device (dial indicator including magnetic support).
- Install the pressure plate (7) and brake linings (10, 11) ▶ Chapter "7.4 Fitting the brake linings", page 39.
- Set the clearance ▶ Chapter "7.4 Fitting the brake linings", page 39.
- Mount the vehicle wheel in accordance with the instructions of the axle or vehicle manufacturer.
- Perform a concluding roller test stand test having completed the repairs. If no roller test stand is available, conduct a test drive with brake action tests.
  - Do not perform full braking, with the exception of emergency braking, during the first 50 kilometres after new brake linings have been fitted.
  - Avoid continuous braking over longer periods.
  - Ensure that the driver of the vehicle is informed.

## 7 Replacing the brake linings

### Safety information

- Read all safety instructions before carrying out the work steps to avoid injury and/or material damage ( ▶ Chapter "2 Safety information", page 8).

### 7.1 Return unit

#### For this chapter you require the following tools:


- Hexagon screw driver with width 8 (inside)
  - Ring spanner with spanner width 8 (outside)
  - WABCO Service Case
- Remove the vehicle wheel in accordance with the instructions of the axle or vehicle manufacturer.


#### CAUTION

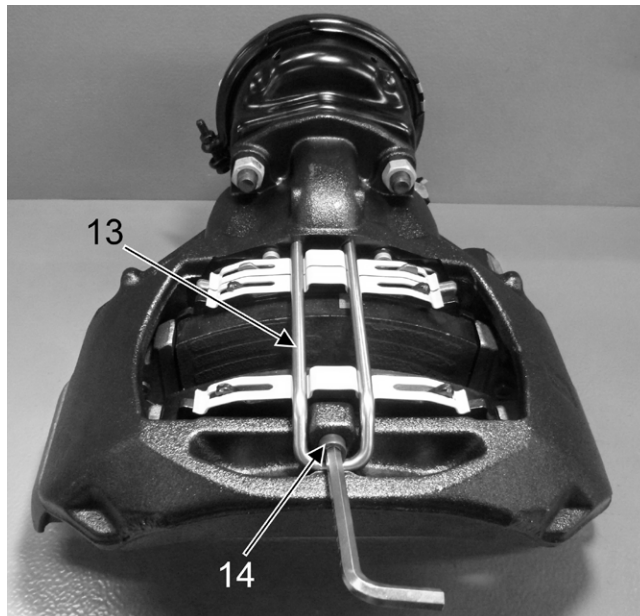
##### Injury to fingers

Gripping the brake from the inside can result in injuries.

- *Always grip the brake at the outer edges.*

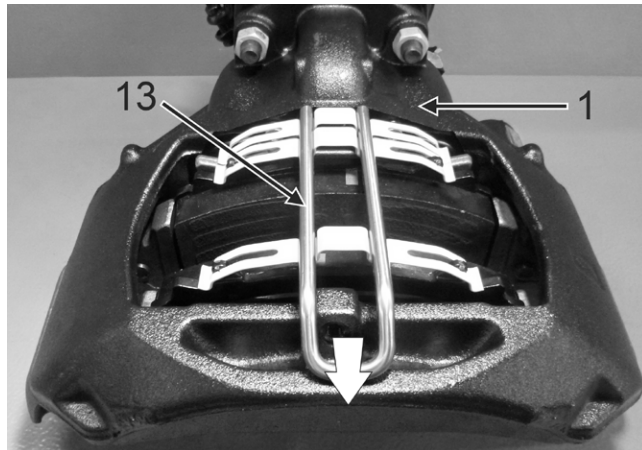
- Use a  **hexagon screw driver** to unscrew the hexagon socket screw (14) from the lining retainer clip (13). Put slight pressure on the lining retainer (13) with your hand at the same time.

-  **Hexagon screw driver with width 8 (inside)**
  - ▶ page 14 (Position II)

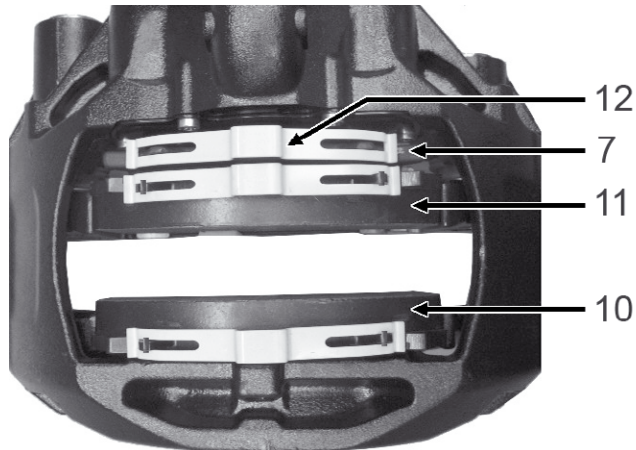


## Replacing the brake linings

- The lining retainer clip (13) has to be withdrawn from the calliper (1).



- Remove the retainer spring (12) from the pressure plate (7).  
The retainer springs (12) of the brake linings (10, 11) are fastened to the backing plates of the brake linings (10, 11).



### CAUTION

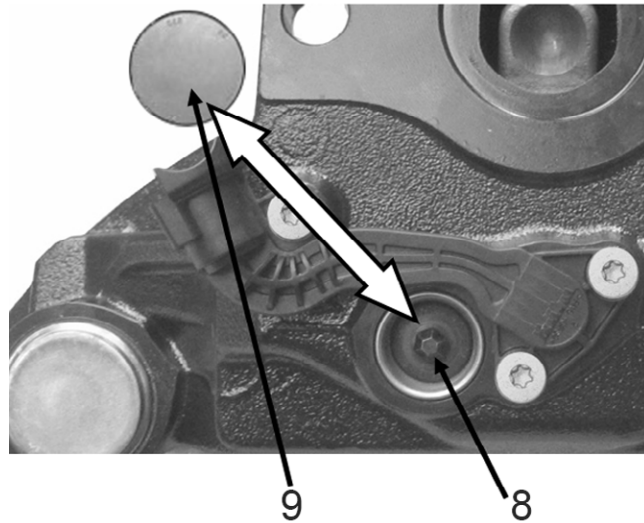
#### Damage to the inner seal



Damage can occur at the inner seal when the tool is positioned between calliper (1) and outer side of the sealing ring.

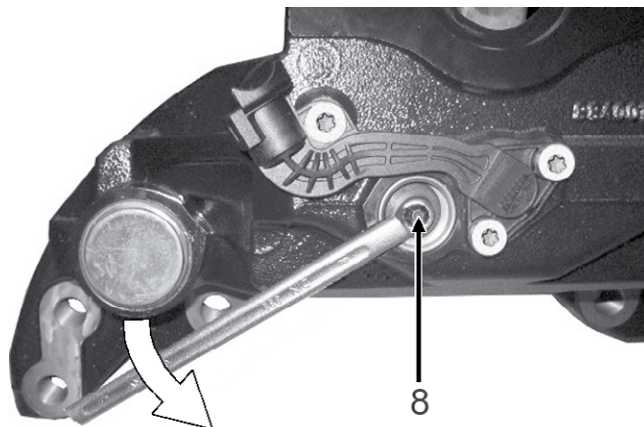
- *Position the tool at the sealing plug when removing it.*

## Replacing the brake linings

- Carefully remove the sealing plug of the return unit (9) from the calliper (1).
- Check the return unit (8) and the sleeve seal for wear and damage.



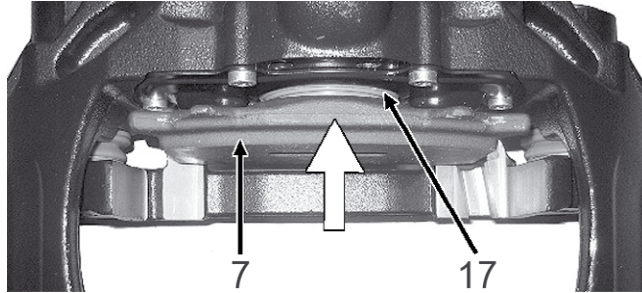
- Replace the adjuster (8), if you notice wear or damage
  - ▶ Chapter "12 Replacing the adjuster", page 66.
- Use a  **ring spanner** or **WABCO tool C** to turn the hexagon screw of the return unit (8) anticlockwise as far as it will go.
  -  **Ring spanner with spanner width 8 (outside)**
    - ▶ page 14 (Position I) or **WABCO tool C** ▶ page 16
- Then turn the hexagon back clockwise by approx. 90°.




## Replacing the brake linings

- While turning the hexagon nut, use your hand to push the pressure plate (7) towards the cylinder side to ensure that the pin, as a safeguard against rotation for the adjuster screw (20), does not slip out of the retaining groove of the pressure plate (7).

Otherwise there is a risk of the adjuster screw (20) turning simultaneously, which could damage the protection cap (6).



As an alternative to this method, the brake can also be reset without removing the lining retainer clip (13) and brake linings (10, 11):

- Use  **WABCO tool C** (▶ page 16) to turn the hexagon of the return unit (8) anticlockwise until the adjuster screw (20) has moved approx. 10 mm towards the cylinder.
- To make sure that the adjuster screw (20) pin, as a safeguard against rotation for the adjuster screw (20), does not slip out of the retaining groove of the pressure plate (7), you must push the brake towards the rim by hand no later than after a return path of approx. 10 mm.



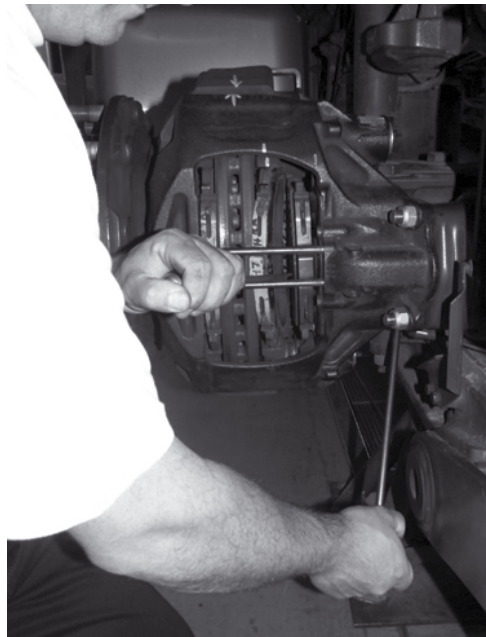


## Replacing the brake linings

- Repeat the process 3 times until the brake rests against the anchor plate, see figure below.



- Implement the remaining return path either by hand or using a screwdriver. During this procedure too, make sure the adjuster screw (20) pin does not slip out of the groove of the pressure plate (7).

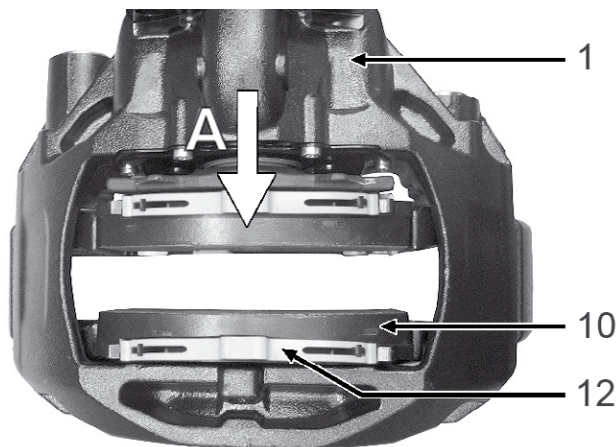


## 7.2 Removing the brake linings

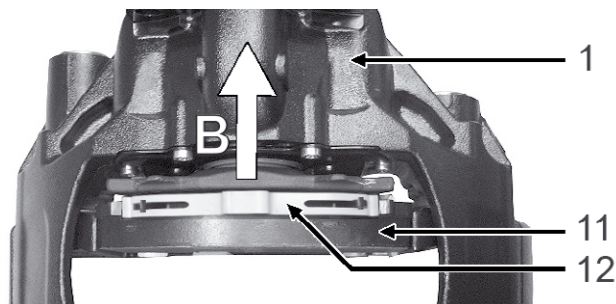
! The brake cylinder does not need to be dismantled in order to replace the brake linings (10, 11).

Always replace the brake linings (10, 11) by axle and use a new retainer system, consisting of retainer clip (13), hexagon socket screw (14) and hold-down springs (12). Hold-down springs (12) are already preassembled on the brake linings (10, 11).

- Remove the vehicle wheel in accordance with the instructions of the axle or vehicle manufacturer.
- Push the calliper (1) to the **rim side** (A) by hand and remove the brake lining (10) with the retainer spring (12) on the rim side.



- Push the calliper (1) to the **cylinder side** (B) by hand and remove the brake lining (11) with the retainer spring (12) on the cylinder side.



## Replacing the brake linings

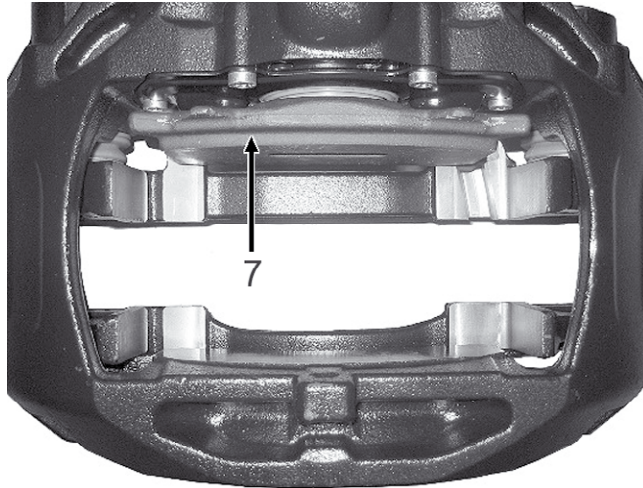
### CAUTION

#### Damage to the brake

Operating the brake while the linings are removed can damage the brake.

- *Operate the brake only with installed linings.*

- Take the pressure plate (7) out of the calliper (1).



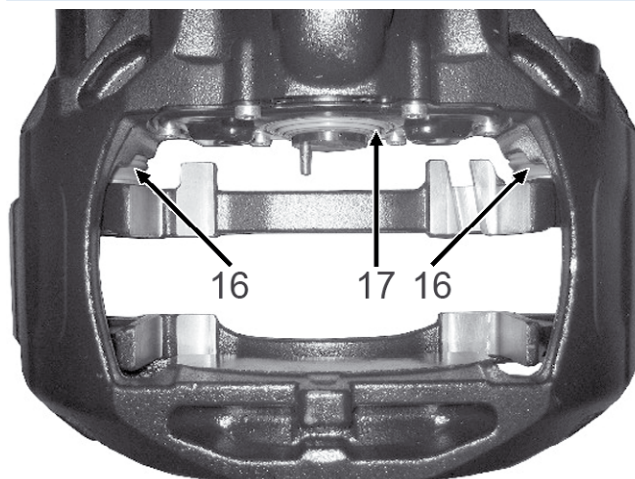
- Check the pressure plate (7) for damage.
  - Renew the pressure plate (7) if you have identified damage.
- Check the pressure plate (7) for excessive corrosion.
  - Use a wire brush to clean pressure plate (7), lining slots and pressure plate guide on the calliper (1) and remove any corrosion on these components.
- Make sure that the guide surfaces of the lining slots on the brake anchor plate (2) are clean and free of grease.

### CAUTION

#### Damage to the protection caps

Inappropriate cleaning may result in damage to the protection caps (16) for the guide pins and the piston protection cap (17).

- *Properly clean the protection caps (16) for the guide pins and the piston protection cap (17).*



## 7.3 Checking the ability of the calliper to move and checking the protection caps

### CAUTION

#### Damage to the protection caps (16) for guide pins

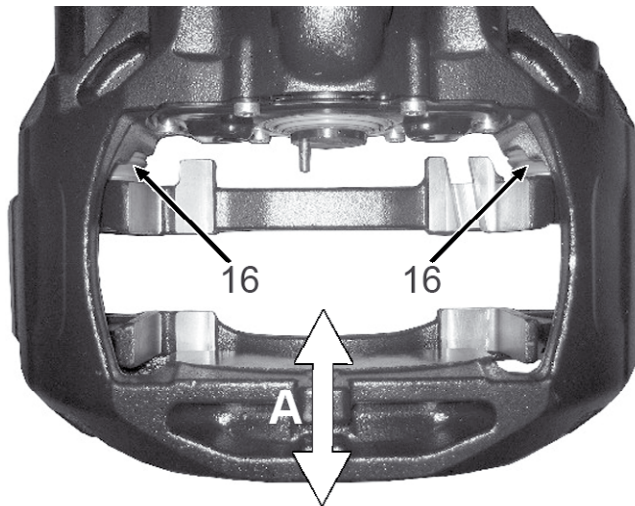
There is a risk from the brake calliper's (1) movement of the protection caps (16) of the guide pins becoming crushed against the brake anchor plate (2).

- Ensure that the protection caps (16) of the guide pins are not crushed against the brake anchor plate (2).

#### For this chapter you require the following tools:

- Ring spanner with spanner width 8 (outside)
- WABCO Service Case

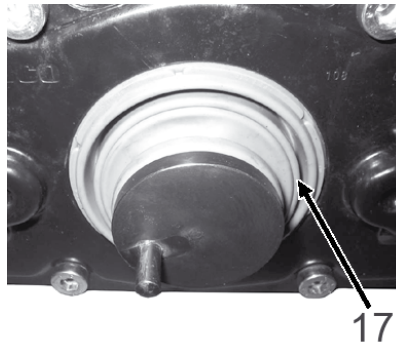
- Manually move the calliper (1) on the guide pins (3, 4) across the entire displacement path and check for ease of movement (A); repeat the action a number of times.



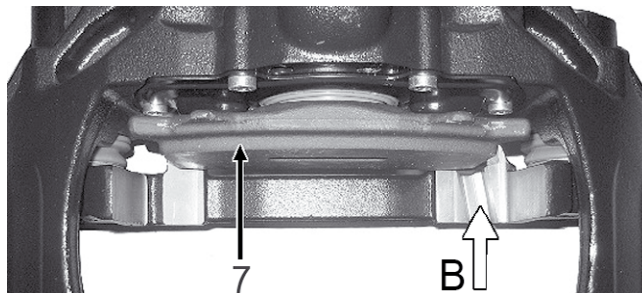
- Replace the bushings (18), guide pins (3, 4), hexagon socket screw (5) and sealing covers (6) if the calliper (1) moves sluggishly
  - ▶ Chapter "11.1 Renewing the sealing covers and the bushings of the guide pins", page 52.
- Push the calliper (1) towards the cylinder side by hand.
- Check the protective caps (16) for guide pins for wear and damage.
  - Replace the defective protection caps (16) for guide pins
    - ▶ Chapter "11.1 Renewing the sealing covers and the bushings of the guide pins", page 52.

## Replacing the brake linings


- Check the piston protection cap (17) for wear and damage.




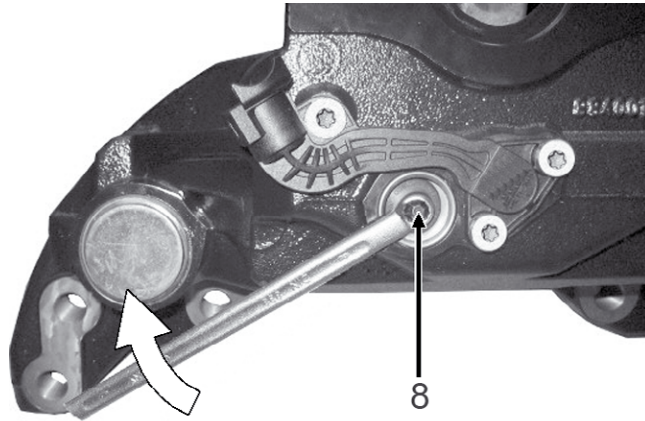
- If the piston protection cap (17) is damaged, check whether dirt or moisture has penetrated into the brake's interior parts or have damaged the calliper (1) due to corrosion.
- Renew the brake if you have identified damage or corrosion
  - ▶ Chapter "9 Renewing the brake", page 46.
- Replace the piston protection cap (17) if they are damaged during service work on the brake ▶ Chapter "11.2 Renewing the protection cap of the adjuster screw", page 61.
- Insert the pressure plate (7) into the brake anchor plate (2).
- Slide the pressure plate (7) up against the adjuster screw (20).
  - ⇒ The pin of the adjuster screw (20) must mesh with the groove of the pressure plate (7), otherwise the adjustment will not function.
- Turn the adjuster screw (20) until the pin meshes with the groove of the pressure plate (7).
- Ensure that the piston protection cap (17) is not twisted.
  - ⇒ The pressure plate (7) must sit in the guide groove (B) of the brake anchor plate (2) and make contact over the entire area of the guide strips of the brake anchor plate (2). Otherwise the pressure plate (7) could slide out of the guide.



## Replacing the brake linings

- Use the  **ring spanner** or **WABCO tool C** to turn the hexagon nut of the return unit (8) clockwise until the adjuster screw (20) is screwed out about 30 mm.

 **Ring spanner with spanner width 8 (outside)**  
▶ page 14 (Position I) or **WABCO tool C** ▶ page 16



### CAUTION

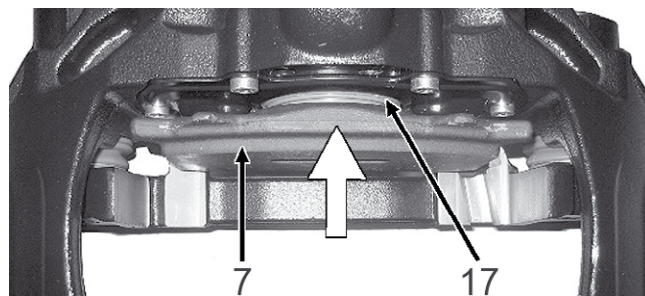
#### Damage to the hexagon screw of the return unit (8)

The use of open-ended spanners and motor-driven torque tools can result in damage to the return unit (8) hexagon screw.

- Only use a  **ring spanner** or **WABCO tool C**.

- While turning the hexagon nut, use your hand to push the pressure plate (7) towards the cylinder side to ensure that the pin, as a safeguard against rotation for the adjuster screw (20), does not slip out of the retaining groove of the pressure plate (7).

Otherwise there is a risk of the adjuster screw (20) turning simultaneously, which could damage the piston protection cap (17).



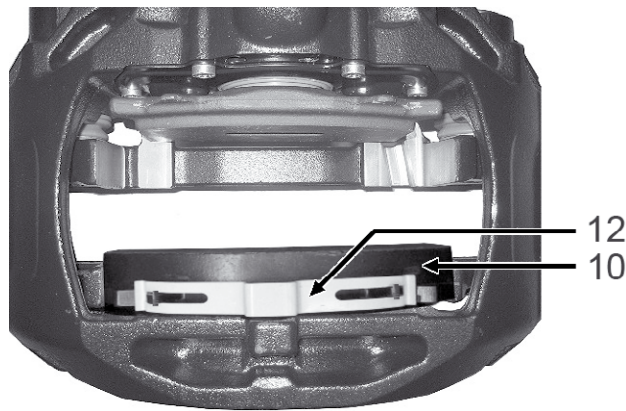
## 7.4 Fitting the brake linings

! Pay attention to the information for installing the pressure plate (7).

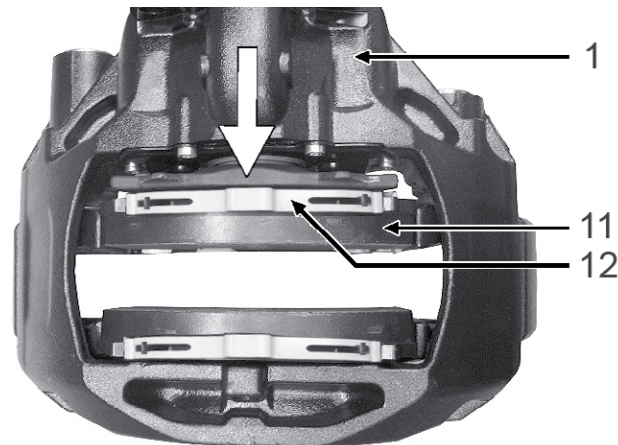
**For this chapter you require the following tools:**

- Hexagon screw driver with width 8 (inside)
- Ring spanner with spanner width 8 (outside)
- WABCO Service Case

- Put a **new** brake lining (10) with a **new** premounted retainer spring (12) on the **rim side**.
- Push the calliper (1) towards the cylinder side until the brake lining (10) of the rim side bears against the brake disc.



- Put a **new** brake lining (11) with a **new** premounted retainer spring (12) on the **cylinder side**.
- Push the calliper (1) towards the rim side until the brake lining (11) of the cylinder side bears against the brake disc.



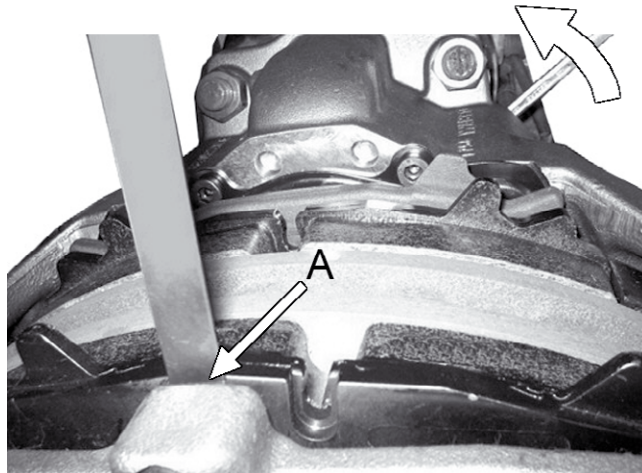
- Adjust the clearance by means of a 1.2 mm feeler gauge (arrow). For this purpose insert the feeler gauge between the brake lining (10, 11) of the rim side and the calliper (1).
- Use the **ring spanner** or **WABCO tool C** to turn the hexagon nut of the return unit (8) clockwise until both brake linings (10, 11) make contact with the brake disc.

**Ring spanner with spanner width 8 (outside)**

▶ page 14 (Position I) or **WABCO tool C** ▶ page 16

## Replacing the brake linings

- Insert the feeler gauge in the middle (A) of the brake lining (10) between the brake lining backing (2) and the calliper (1).



! Mount the lining retainer clip (13) only **after** you have adjusted the clearance.

- Remove the feeler gauge.


The clearance of the brake installed in the vehicle can also be adjusted without a feeler gauge:

- To do this for the rear axle brakes, turn the hexagon of the return unit (8) using **WABCO tool C** (▶ page 16) to turn the hexagon nut of the return unit (8) clockwise until both brake linings (10, 11) make contact with the brake disc.
- Now set the clearance by using **WABCO tool C** to perform 3 strokes of the return unit (8) anticlockwise (utilise maximum ratchet travel), which corresponds to a clearance of around 1.2 mm.
- For the front axle brakes, turn the axle journal outwards to get a better view of the adjustment adapter.




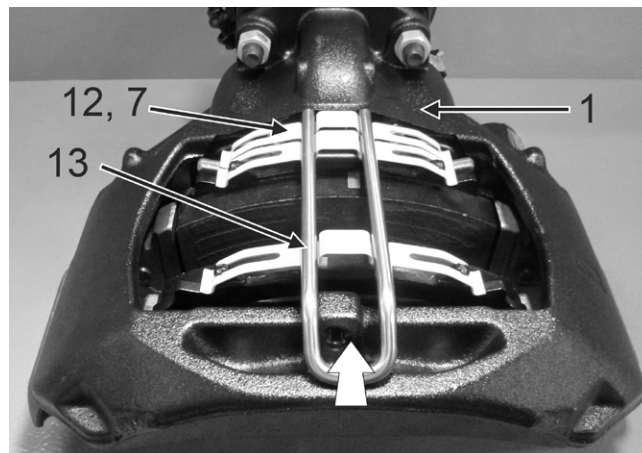


## Replacing the brake linings

- Turn the hexagon screw of the return unit (8) with  **WABCO tool C** until both brake linings (10, 11) bear on the brake disc.
- Use a pen to mark the adapter and its position on the calliper.





- Now set the clearance by using  **WABCO tool C** to turn the return unit (8) anticlockwise by 180°, which corresponds to a clearance of around 1.2 mm.
- Install a **new** retainer spring (12) on the pressure plate (7).
- Insert the **new** lining retainer (13) into the opening of the calliper (1).
- Press down the lining retainer (13) so that the radial lugs of the hold-down springs (12) mesh with the retainer (13).

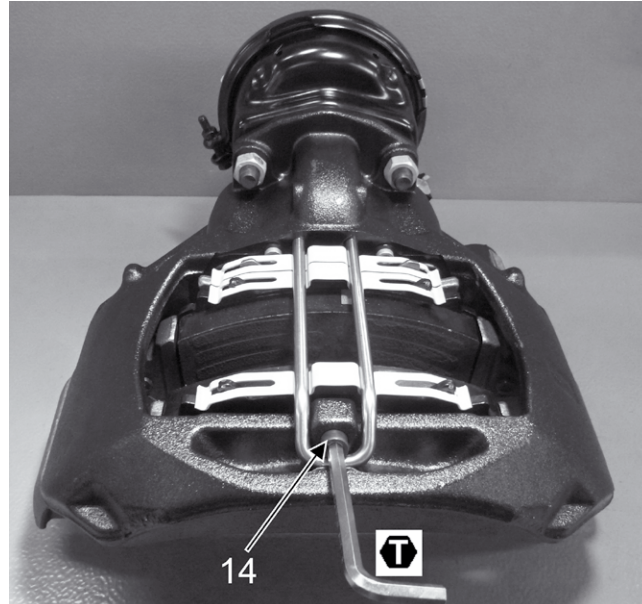


- Press the lining retainer clip (13) against the calliper (1) by hand.

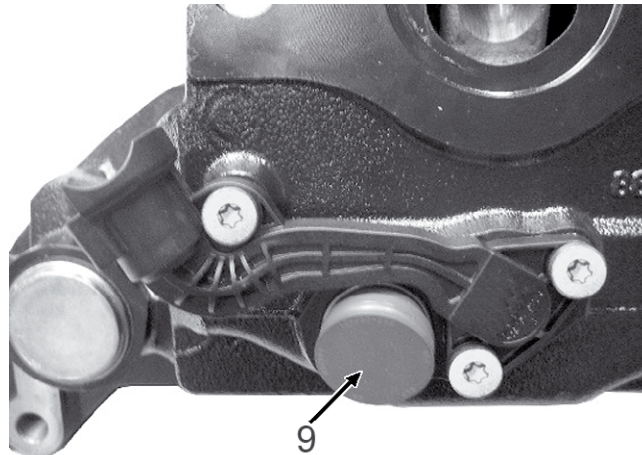
## Replacing the brake linings

- Fasten the **new** hexagon socket screw (14) to the brake calliper (1) with a  **hexagon screwdriver**.

-  **Hexagon screw driver with width 8 (inside)**  
**Tightening torque: 30 + 15 Nm**  
▶ page 14 (Position II)



- Push a **new** sealing plug (9) into the opening of the calliper (1).
- Ensure that the plug (31) has a tight seat.



- Check the wheel hub for ease of movement.
- Mount the vehicle wheel in accordance with the instructions of the axle or vehicle manufacturer.
- Perform a concluding roller test stand test having completed the repairs. If no roller test stand is available, conduct a test drive with brake action tests.
  - Do not perform full braking, with the exception of emergency braking, during the first 50 kilometres after new brake linings have been fitted.
  - Avoid continuous braking over longer periods.
  - Ensure that the driver of the vehicle is informed.

## 8 Replacing the brake cylinder

### Safety information

- Read all safety instructions before carrying out the work steps to avoid injury and/or material damage ( ▶ Chapter "2 Safety information", page 8).
- Only use brake cylinders as specified by the axle or vehicle manufacturer.
- Pay attention to the installation specifications and the test and installation instructions of the brake cylinder manufacturer and strictly adhere to them.


**!** The instructions for breaking the brake cylinder in are for general information.

### 8.1 Removing the brake cylinder

#### CAUTION

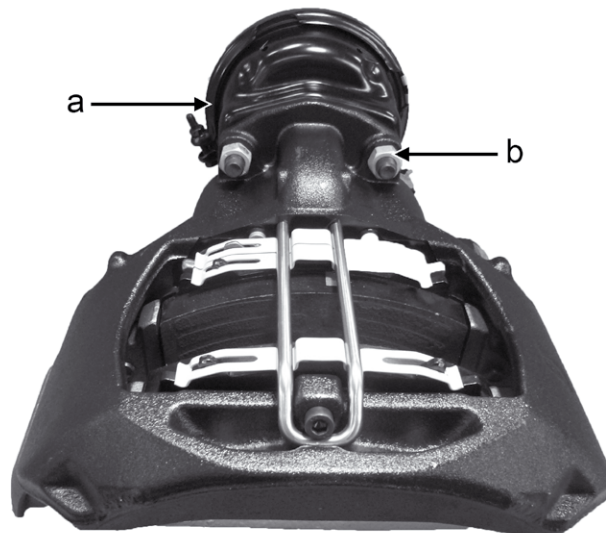
Disconnect the air supply to the vehicle before carrying out this work.


- Make sure that the connecting lines are disconnected before you remove the diaphragm cylinder.

 For this chapter you require the following tools:

- Box spanner with spanner width 24 (outside)

- Unscrew the air connection (a) from the brake cylinder according to the manufacturer's specifications.



- Use a  **box spanner** to unscrew the brake cylinder nuts (b).

 **Box spanner with spanner width 24 (outside)**

▶ page 14 (Position VII)

- Ensure that no dirt or moisture enters the brake when removing the brake cylinder.
- Remove the brake cylinder from the calliper (1).

## 8.2 Installing the brake cylinder

**!** Always use **new** fastening nuts when fitting the brake cylinder. Depending on the installation position of the brake, ensure that the lower drainage aperture of the brake cylinder facing the ground is open.

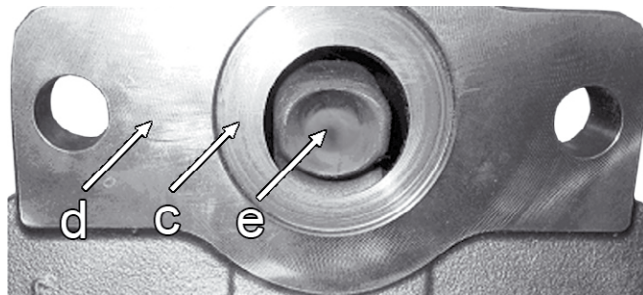
Depending on the actuator type, the other drainage openings can either remain open or they must be sealed with a plug. Observe the respective instructions of the brake cylinder manufacturer.

Ensure that no dirt or moisture enters the brake when cleaning.

**—** **For this chapter you require the following tools:**

- Box spanner with spanner width 24 (outside)

- Clean the sealing surface (c) and flange area (d) on the calliper (1).
- Grease the calotte in the brake lever (e) before installing the brake cylinder.



- Place the brake cylinder onto the calliper (1).
- Screw **new** fastening nuts (b) onto the brake cylinder by hand until the brake cylinder fully rests on the calliper (1).
- Use a **—** **box spanner** to screw down the brake cylinder.

**—** **Box spanner with spanner width 24 (outside)**  
**Tightening torque: 120 Nm**  
▶ page 14 (Position VII)

- Use a **—** **box spanner** to tighten the fastening nuts.

**—** **Box spanner with spanner width 24 (outside)**  
**Tightening torque: 210 - 30 Nm**  
▶ page 14 (Position VII)

- Screw the air connection (a) onto the brake cylinder.
  - Observe the respective instructions of the brake cylinder manufacturer here.
- Screw the brake hose to the brake cylinder according to the cylinder manufacturer's specifications.

## Replacing the brake cylinder

 **WARNING**

**Damage to the brake lines**

If installed incorrectly, the brake lines can be damaged or bent, or rub against other components.

- *Install the brake lines without twists and in a manner that they do not rub against other parts.*

- Ensure that the brake hose does not exert initial stress on the sliding function of the calliper (1) and does not obstruct calliper movement over the entire displacement path.
- Check the air connection for tightness according to the cylinder manufacturer's specifications.
- Having completed the work, test the brake on a roller test stand.

## 9 Renewing the brake

### Safety information

- Read all safety instructions before carrying out the work steps to avoid injury and/or material damage ( ▶ Chapter "2 Safety information", page 8).

### 9.1 Removing the brake

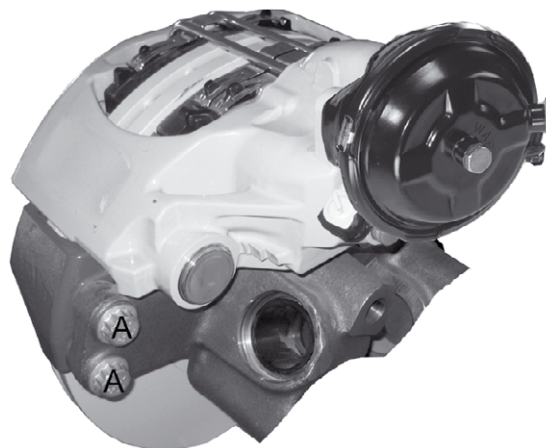
#### CAUTION


#### Damage to the lining retainer clip (13)

Never use the lining retainer clip (13) as a grab handle or for fastening the brake to a lifting device, because the lining retainer clip (13) can be damaged in the process.

#### For this chapter you require the following tools:

- Box spanner with spanner width 24 (outside)
- Remove the vehicle wheel in accordance with the instructions of the axle or vehicle manufacturer.
- Remove the brake cylinder from the brake calliper (1)
  - ▶ Chapter "8.1 Removing the brake cylinder", page 43.
- Disconnect the plug connector of the sensor cable from the electrical wear sensor (15) ▶ Chapter "10.1 Removing the wear sensor", page 49.
- Remove the brake linings (10, 11) ▶ Chapter "7.2 Removing the brake linings", page 34.
- Unscrew the fastening screws (A).



- Use a  **box spanner** to remove the calliper (1) with brake anchor plate (2) from the axle.

#### **Box spanner with spanner width 24 (outside)** ▶ page 14 (Position III)

- Check the brake disc ▶ Chapter "6.3 Inspecting the brake discs", page 24.
- Check the removed brake linings (10, 11).
  - Replace the brake linings (10, 11) as required ▶ Chapter "6.2.2 Measuring the brake lining thickness", page 24.
- Check the fastening flange on the axle for wear and damage.
- Clean the fastening flange on the axle and remove any dirt, rust and grease.

## 9.2 Installing the brake

**!** The **new** brake without brake lining (10, 11) is supplied as a pre-assembled unit and may be mounted to the vehicle's axle via the brake anchor plate (2). Left and right brake must not be interchanged when they are installed on the axle. An arrow on the calliper (1) indicates which brake is correct for the left and which for the right axle side. This arrow indicates the brake disc's direction of rotation during forward driving. The diagonal wear compensation groove of the anchor plate is always mounted on the entry side.

The respective brake anchor plate is available as a spare part ▶ Chapter "13.1 Procurement of spare parts", page 73.


Note the different versions of the brake on the front and rear axles.

### For this chapter you require the following tools:

- Box spanner with spanner width 24 (outside)

- Remove **all** transport locks from the **new** brake.
  - ⇒ The protection film (A) or the transport protector cap must be fully removed from the calliper (1) in the area of the cylinder fastening.



- Place the **new** brake with brake anchor plate (2) over the brake disc.
- Install the brake on the axle.
- Use a  **box spanner** to tighten the screws.

### **Box spanner with spanner width 24 (outside)**

▶ page 14 (Position III)

- Always note the relevant specifications of the axle or vehicle manufacturer on bolt sizes, tightening torques and tightening sequence during this procedure and strictly adhere to them.
- Install the pressure plate (7) and brake linings (10, 11).
- Set the clearance ▶ Chapter "7.4 Fitting the brake linings", page 39.
- Connect the plug connector of the sensor cable with the electrical wear sensor (15) ▶ Chapter "10.2 Fitting the wear sensor", page 50.

### **WARNING**

#### **Risk of accident due to defective brake cylinder**

A defective brake cylinder can cause a braking system failure and must never be installed.

- *Renew the brake cylinder if you have identified damage, .*

- Inspect the brake cylinder for damage, particularly at the inner area of the piston-rod seal.
- Renew the brake cylinder if you have identified damage
  - ▶ Chapter "10 Replacing the wear sensor", page 49.
- Clean the sealing surface and the flange area of the brake cylinder.

## Renewing the brake

- Mount the brake cylinder on the calliper (1) ▶ Chapter "8.2 Installing the brake cylinder", page 44.
- Observe the respective instructions of the brake cylinder manufacturer.
- ⇒ Depending on the installation position of the brake, ensure that the lower drainage aperture of the brake cylinder facing the ground is open.
- ⇒ Depending on the actuator type, the other drainage openings can either remain open or they must be sealed with a plug.



- Check whether the wheel hub moves freely.
- Mount the wheel in accordance with the instructions of the axle or vehicle manufacturer.
- Having completed the work, test the brake on a roller test stand.



## 10 Replacing the wear sensor

### Safety information

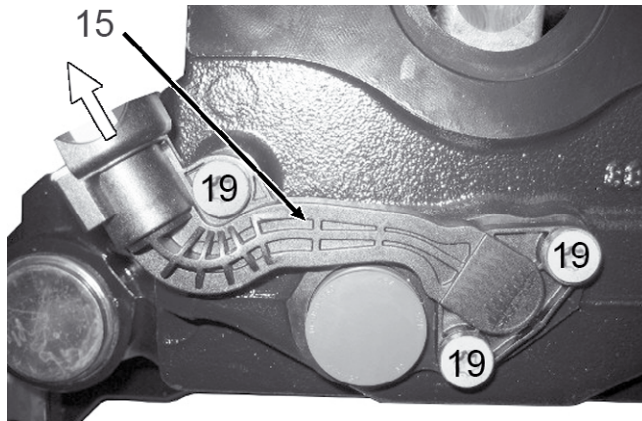
- Read all safety instructions before carrying out the work steps to avoid injury and/or material damage ( ▶ Chapter "2 Safety information", page 8).
- The electrical wear sensor (15) needs to be replaced when it transmits implausible values or was diagnosed as incorrect by the electronic system of the vehicle.


### 10.1 Removing the wear sensor

 **For this chapter you require the following tools:**

- Torx screw driver with spanner width T30 (inside)

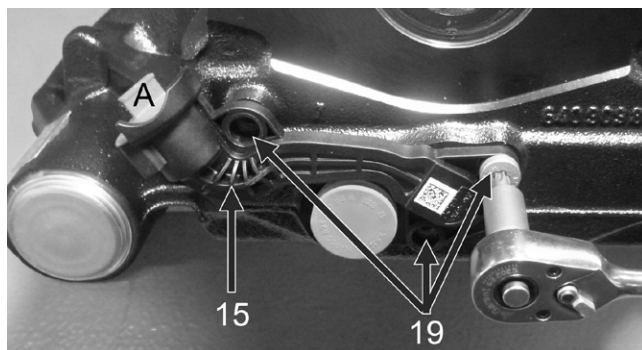
- Remove the brake cylinder from the brake calliper (1)  
▶ Chapter "8.1 Removing the brake cylinder", page 43.
- Disconnect the cable connector from the wear sensor (15).



- Use a  **Torx screw driver** to unscrew the Torx screws (19) from the wear sensor (15).

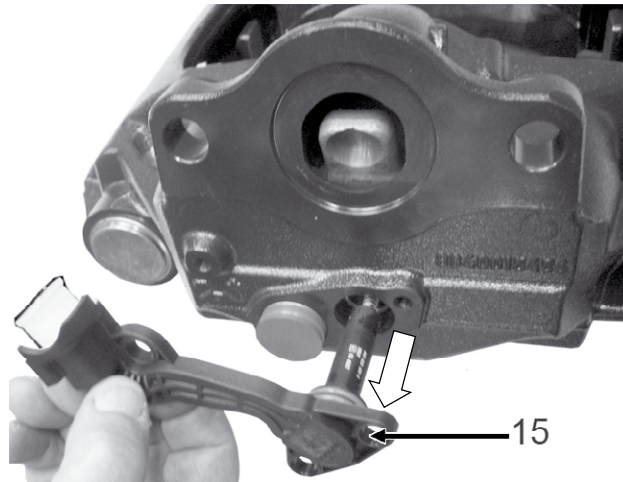
 **Torx screw driver with spanner width T30 (inside)**

▶ page 14 (Position V)



# Replacing the wear sensor

- Remove the wear sensor (15) from the calliper (1).



## CAUTION

### Damage to the wear sensor (15)

The wear sensor (15) is a sensitive electronic component. Pins and contact bushes must not be touched directly. The wear sensor (15) could be damaged due to electrostatic discharge.

- Clean the wear sensor (15) seat in the calliper (1).
  - Ensure that no dirt or moisture enters the brake when cleaning.

## 10.2 Fitting the wear sensor

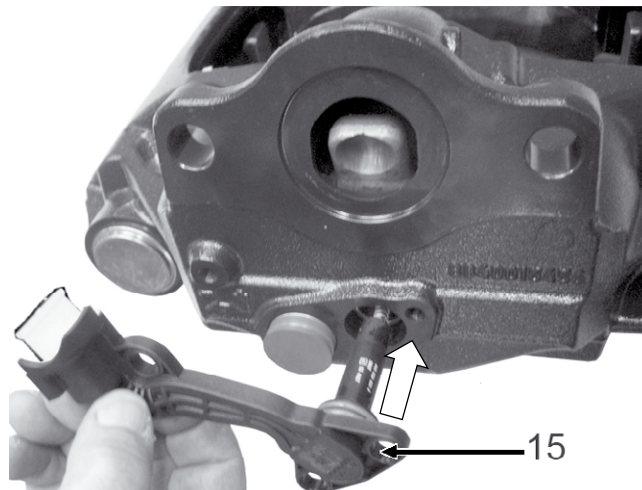
- ! Parts that were dropped during assembly must not be used again; instead they must be clearly marked and disposed of.

Manual operation of the tappet with spring and/or introduction of lateral forces on the tappet of the wear sensor (15) are not permitted.


### For this chapter you require the following tools:

- Torx screw driver with spanner width T30 (inside)

- Insert the **new** wear sensor (15) into the cleaned opening of the calliper (1).

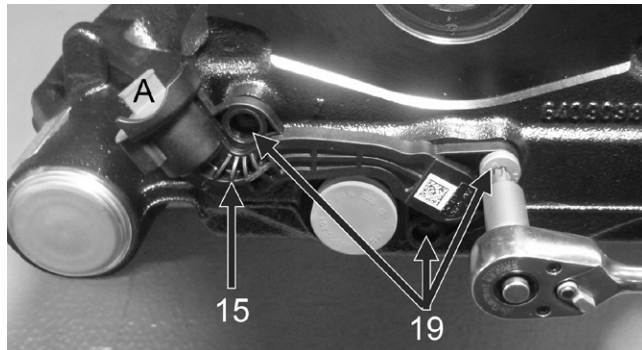



## Replacing the wear sensor

- Position the wear sensor (15) in accordance with the illustration.
- Fasten the wear sensor (15) with a  **Torx screwdriver** using three **new** Torx screws (19).

 **Torx screw driver with spanner width T30 (inside); tightening torque: 7 + 2 Nm**  
▶ page 14 (Position V)

- Remove the transport protection cap (A) from the wear sensor (15).



- Plug the sensor cable connector into the wear sensor (15) socket.
- Fasten the connector with a  **Torx screwdriver** using three screws on the wear sensor (15).

 **Torx screw driver with spanner width T20 (inside); tightening torque: 1.3 - 0.3 Nm**  
▶ page 14 (Position VI)

### **WARNING**

#### **Risk of accident due to defective brake cylinder**

A defective brake cylinder can cause a braking system failure and must never be installed.

- *Renew the brake cylinder if you have identified damage, .*

- Inspect the brake cylinder for damage, particularly at the inner area of the piston-rod seal.
- Renew the brake cylinder if you have identified damage  
▶ Chapter "8 Replacing the brake cylinder", page 43.
- Clean the sealing surface and the flange area of the brake cylinder.
- Mount the brake cylinder on the calliper (1) ▶ Chapter "8.2 Installing the brake cylinder", page 44.
- Delete the diagnostic memory for the wear sensor (15) in the vehicle. Observe the specifications of the vehicle manufacturer in this regard.

## 11 Renewing the seals

### Safety information

- Read all safety instructions before carrying out the work steps to avoid injury and/or material damage ( ▶ Chapter "2 Safety information", page 8).
- Never use the lining retainer clip (13) as a grab handle or for fastening the brake to a lifting device, because the lining retainer clip (13) can be damaged in the process.

### General Information

- !** If all seals of the calliper (1) are replaced, the work sequences for renewing the sealing covers and bushings of the guide pins (18) as well as the piston protection cap (17) can be performed together.
- If the seals are replaced separately however, the work steps must be carried out separately according to the sequences in the chapters "11.1 Renewing the sealing covers and the bushings of the guide pins" and "11.2 Renewing the protection cap of the adjuster screw".

## 11.1 Renewing the sealing covers and the bushings of the guide pins

### 11.1.1 Disassembly

#### For this chapter you require the following tools:

- Box spanner with spanner width 24 (outside)
- Hexagon screw driver with width 14 (inside)
- WABCO Service Case


- Remove the vehicle wheel in accordance with the instructions of the axle or vehicle manufacturer.


#### CAUTION

#### Risk of crushing fingers

After loosening the calliper (1) there is a risk of crushing your fingers.

- *Make sure that your hands and fingers are not in the way.*

- Remove the brake cylinder from the brake calliper (1)
  - ▶ Chapter "8.1 Removing the brake cylinder", page 43.
- Disconnect the plug connector of the sensor cable from the electrical wear sensor (15) ▶ Chapter "10.1 Removing the wear sensor", page 49.
- Remove the brake linings (10, 11) ▶ Chapter "7.2 Removing the brake linings", page 34.
- Unscrew the brake calliper (1) fastening screws.
- Remove the calliper (1) with brake anchor plate (2) from the axle using a  **box spanner**.

-  **Box spanner with spanner width 24 (outside)**
  - ▶ page 14 (Position III)

## Renewing the seals

- Use a suitable fastening device (e.g. a vice) to clamp the brake to the brake anchor plate (2).

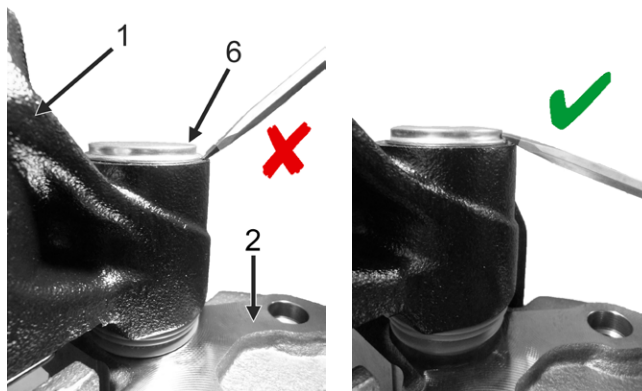
### CAUTION


#### Damage to the holes


Holes can be damaged if the tools are used incorrectly. Never place tools (e.g. chisel) onto the face side of the calliper (1).

- *Only attach the tool (e.g. chisel) to the sealing cover.*

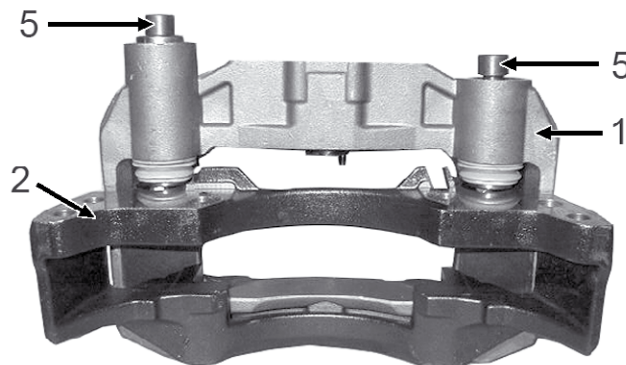
- Remove the sealing cover (6) from the calliper (1).



- Unscrew the hexagon socket screws (5) using a  **hexagon screwdriver**.

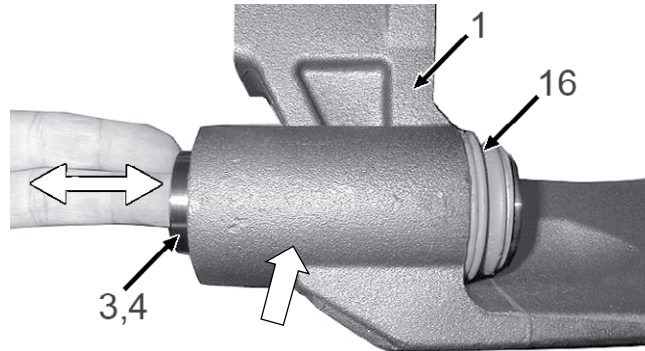
 **Hexagon screw driver with width 14 (inside)**  
▶ page 14 (Position IV)


- Remove the calliper (1) from the brake anchor plate (2).



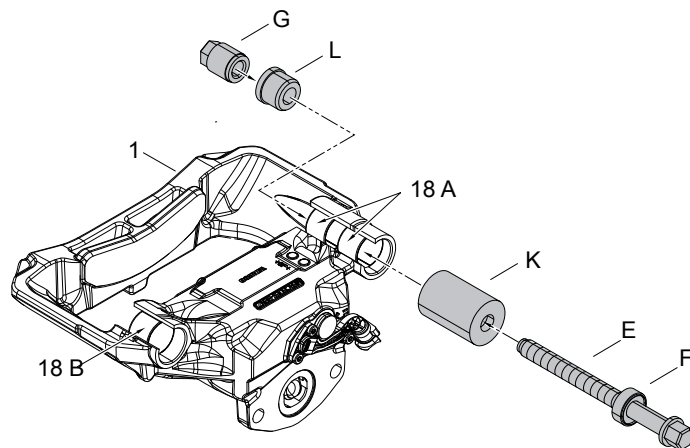
## Renewing the seals

- Clean the contact areas (fitting collars) to the guide pins (3, 4) on the brake anchor plate (2).
- Remove the guide pins (3, 4) from the calliper (1).
- Pull the protection cap (16) for the guide pins out of the ring groove of the brake calliper (1).



- Place the calliper (1) on a firm base for pressing out the guide pin bushings (18).
  - ⇒ The back of the calliper (1) must face upwards.
- Use  **WABCO tools E, F, G, K and L** ( ▶ page 16) to press the bushings of the guide pin (18 A) and the bushing of the short guide pin (18 B) out of the calliper (1).

**!** Do not put down the tool until the bushings (18A or 18B) have been pressed out of the calliper (1).



- Clean the holes in the calliper (1).

## 11.1.2 Assembly

! Note the differences in the brake versions. The position of the long guide pin (fitting bolt) (3) depends on the brake variant and the installation situation and can be located at the entry as well as the exit side of the brake disc.

🔧 **For this chapter you require the following tools:**

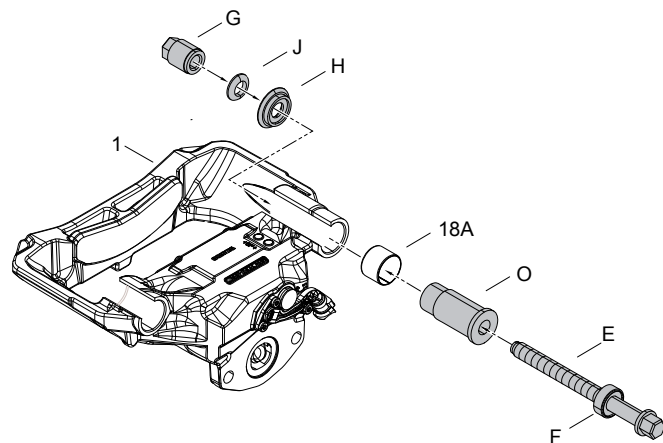
- Box spanner with spanner width 24 (outside)
- Hexagon screw driver with width 14 (inside)
- WABCO Service Case

– Grease the sliding surfaces of the bushings (18A and 18B).

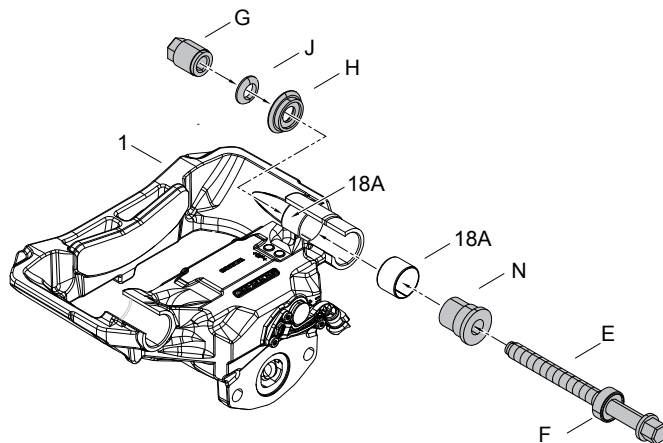
Press in two new bushings (18A) for the long guide pin (fitting bolt) (3).

– Use 🔧 **WABCO tools E, F, G, H, J and O** (▶ page 16) to press the **inner** bushing (18A) into the hole of the calliper (1) until the tool reaches its end position.


! The bushings (18A) do not lie seamlessly next to each other.

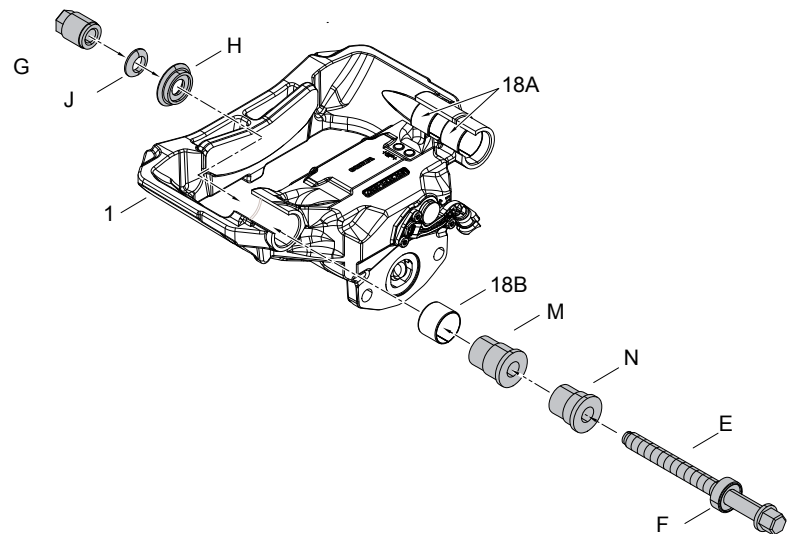


– Use 🔧 **WABCO tools E, F, G, H, J and N** (▶ page 16) to press the **outer** bushing (18A) into the same hole until the tool reaches the end stop.

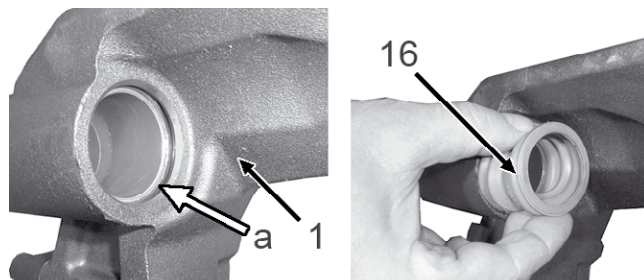


## Renewing the seals

- Use  **WABCO tools E, F, G, H, J, M and N** (▶ page 16) to press a new bushing (18B) for the short guide pin (clearance bolt) (4) into the hole of the calliper (1) until the tool reaches its end position.



- Clean the sealing seats (ring groove) of the calliper (1) for the protection caps (16) for guide pins.
  - ⇒ The cleaned sealing seats must be **clean and free from grease**.
- Manually push **new** protection caps (16) for guide pins into the sealing seats / ring groove (a) of the brake calliper (1).



- Grease the bearing surfaces of the guide pins (3, 4) and the beaded edge of the protection caps (16) for guide pins.
  - Make sure that the protection caps (16) for guide pins have an even and wrinkle-free seat in the seal seat of the brake calliper (1).
- Insert the two **new** guide pins (3, 4) into the calliper (1) from the cylinder side.
- Slide the protection caps (16) over the guide pins (3, 4).
- Position the beaded edge of the protection caps (16) for guide pins into the sealing seats (ring grooves) of the guide pins (3, 4).

**!** Some versions of brakes are equipped with a sheet metal ring (c) and some are not.

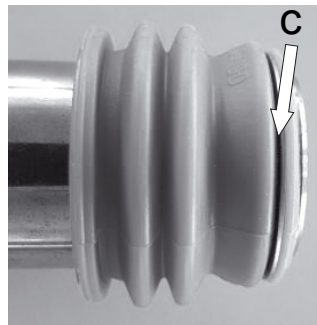
In the case of a design with sheet metal ring make sure that the sheet metal ring (b) does not come off the protection cap (16) for guide pins.

With both versions, ensure that the beaded edge of the protection caps (16) have an even and wrinkle-free seat in the sealing seats of the guide pins (3, 4).

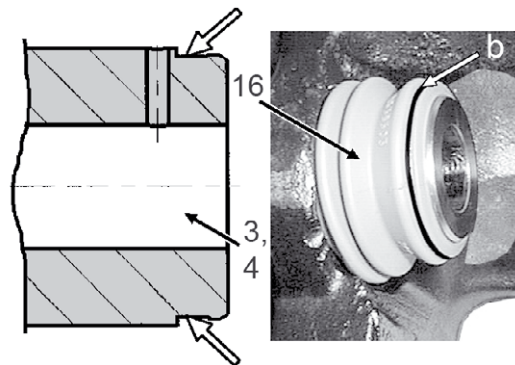


# Renewing the seals

Protection cap with sheet metal ring



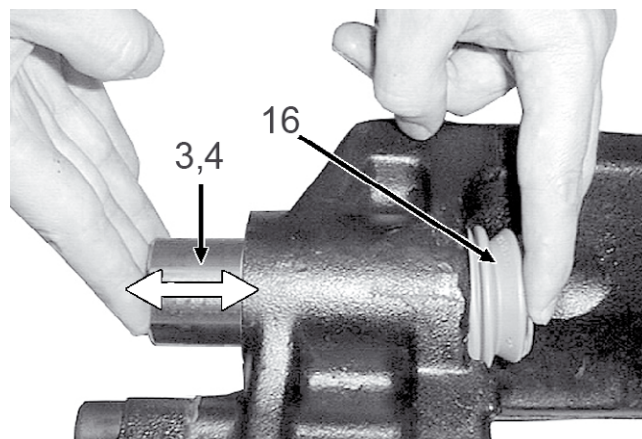
Protection cap without sheet metal ring



- Remove any excess grease.
- ⇒ The plane surfaces of the guide pins (3, 4) to the brake anchor plate (2) and the contact areas of the brake anchor plate (2) must be **clean and free of grease**.

<p><b>CAUTION</b></p>	<p><b>Damage to the protection caps (16) for guide pins</b></p> <p>The protection caps for guide pins (16) can be damaged if they rest on the brake anchor plate (2).</p> <ul style="list-style-type: none"> <li>- <i>When tightening the fastenings on the brake anchor plate (2), make sure that the main closing edge (arrow) of the protection cap (16) for guide pins does not make contact with the brake anchor plate.</i></li> </ul>
-----------------------	--

- Manually move the guide pins (3, 4) in the bushings (18) lightly back and forth and check for ease of movement.



- Place the calliper (1) on the brake anchor plate (2) and the inserted guide pins (3, 4) into the fitting collar.

## Renewing the seals


- Insert two new hexagon socket screws (5) through the guide pins (3, 4) inserted in the calliper (1).
- Always tighten the longer guide pin (3) with press-fit first and then the shorter guide pin (4) with clearance.
- If the guide pins (3, 4) are released from the brake anchor plate (2) during the maintenance work, you must use **new** hexagon socket screws (5) for reassembly.

### CAUTION

#### Damage to the protection caps (16) for guide pins

Assembly may result in damage to the protection caps (16).

- *During assembly, ensure that the protection caps (16) for guide pins are not damaged or twisted while tightening the hexagon socket screws.*

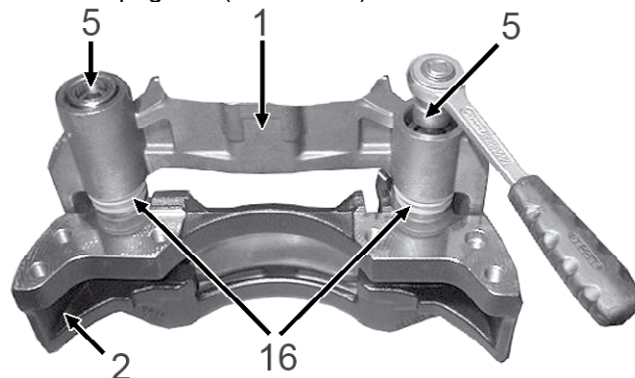
- Screw the hexagon socket screws (5) to the brake anchor plate (2) using a  **hexagon screwdriver**.



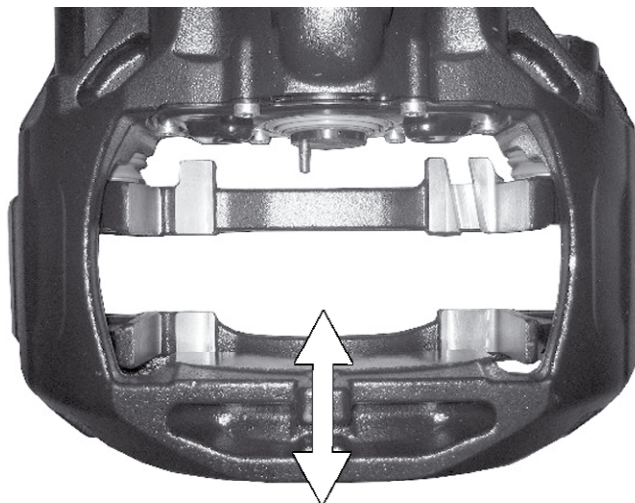
**Hexagon screw driver with width 14 (inside)**

**Tightening torque: 130 Nm +90° (angle controlled tightening)**

▶ page 14 (Position IV)



- Manually move the calliper (1) on the guide pins (3, 4) across the entire displacement path several times and check for ease of movement; repeat the action a number of times.



- Grease the holes for the sealing covers (6) in the calliper (1).
- Push the calliper (1) against the brake anchor plate (2).


- Insert two **new** sealing covers (6) into the bores of the calliper (1).

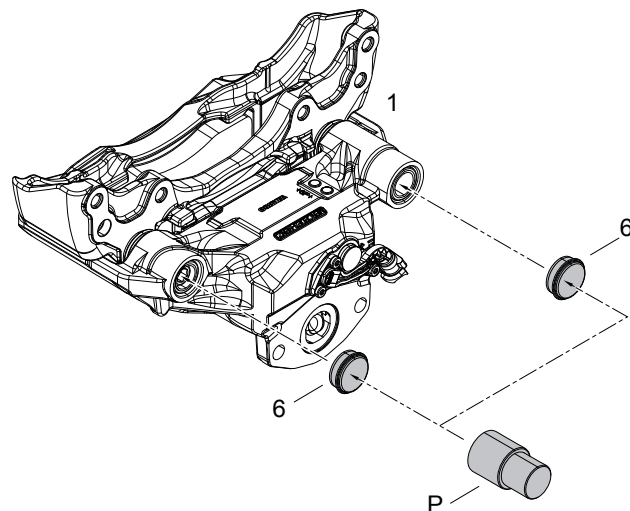
## CAUTION


### Damage to sealing covers (6)

The sealing covers (6) can be damaged when they are pressed in.

- *Press in the sealing covers (6) with all due care.*

- Use  **WABCO tool P** (▶ page 16) to press in the sealing cover (6) until it reaches the end position.

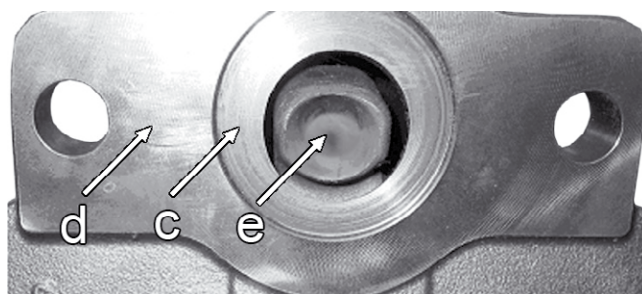


- Check the connecting surface on the fastening flange of the axle and the brake anchor plate (2) and remove any dirt, rust or oil.
- Place the brake with brake anchor plate (2) over the brake disc.
- Install the brake on the axle.  
Always note the relevant specifications of the axle or vehicle manufacturer during this procedure and strictly adhere to them.
- Use a  **box spanner** to tighten the screws.

### **Box spanner with spanner width 24 (outside)**

▶ page 14 (Position III)

- Install the pressure plate (7) and brake linings (10, 11).
- Set the clearance ▶ Chapter "7.4 Fitting the brake linings", page 39.
- Connect the plug connector of the sensor cable with the electrical wear sensor (15) ▶ Chapter "10.2 Fitting the wear sensor", page 50.
- Clean the sealing area (c) and the flange surface (d) on the calliper (1) and grease the calotte in the brake lever (e).  
Ensure that no dirt or moisture enters the brake when cleaning.





### WARNING

#### Risk of accident due to defective brake cylinder

A defective brake cylinder can cause a braking system failure and must never be installed.

- *Renew the brake cylinder if you have identified damage, .*

- Inspect the brake cylinder for damage, particularly at the inner area of the piston-rod seal.
- Renew the brake cylinder if you have identified damage
  - ▶ Chapter "8 Replacing the brake cylinder", page 43.
- Clean the sealing surface and the flange area of the brake cylinder.
- Mount the brake cylinder on the calliper (1) ▶ Chapter "8.2 Installing the brake cylinder", page 44.
  - Always note the relevant specifications of the axle or vehicle manufacturer during this procedure and strictly adhere to them.
  - ⇒ Depending on the installation position of the brake, ensure that the lower drainage aperture of the brake cylinder facing the ground is open.
  - ⇒ Depending on the actuator type, the other drainage openings can either remain open or they must be sealed with a plug. Observe the respective instructions of the brake cylinder manufacturer.
- Check whether the wheel hub moves freely.
- Mount the wheel in accordance with the instructions of the axle or vehicle manufacturer.
- Having completed the work, test the brake on a roller test stand.

## 11.2 Renewing the protection cap of the adjuster screw

! If the piston protection cap (17) is removed individually, calliper (1) and brake cylinder need not be dismantled.

### 11.2.1 Removing the protection cap

- Remove the brake linings (10, 11) and the pressure plate (7)
  - ▶ Chapter "7.2 Removing the brake linings", page 34.
- Push the calliper (1) completely to the cylinder side by hand.
- Pull the piston protection cap (17) from the sealing seat / ring groove (B) of the adjuster screw (20).

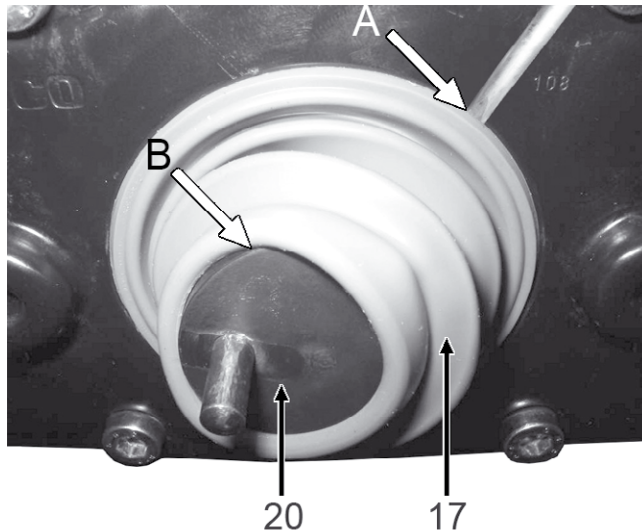
#### CAUTION

#### Damage to the seal seat of the piston protection cap (17)

The piston protection cap (17) sealing seat may be damaged by incorrect use of the screwdriver.

- *Position the screwdriver between the piston protection cap (17) and cover.*

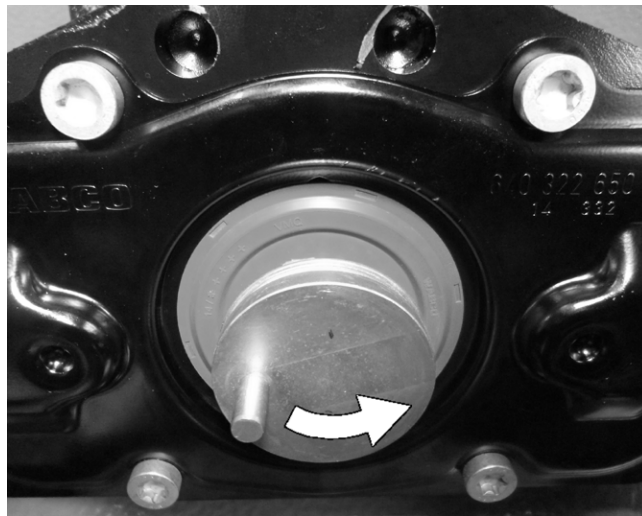
- Remove the piston protection cap (17) from the sealing seat of the brake calliper (1) with a screwdriver. This is done by positioning the screwdriver between the piston protection cap (17) and the brake calliper (1) (A).



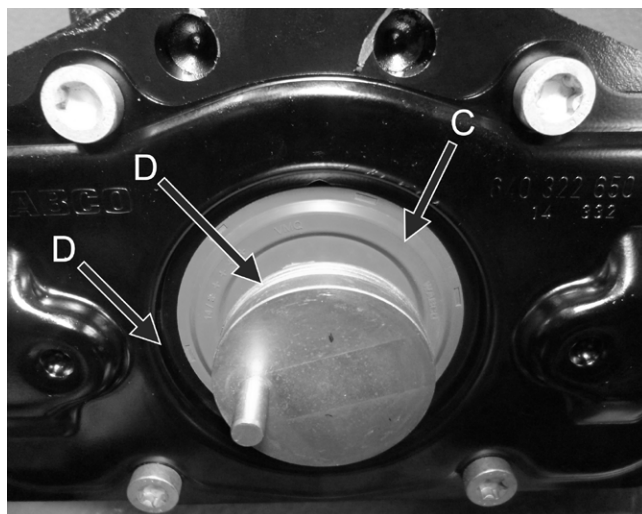
- Check the calliper (1).
  - If dirt or moisture has infiltrated the brake or if the sealing seat in the brake calliper (1) is damaged, replace the brake ▶ Chapter "9 Renewing the brake", page 46.
- Mark the position of the pin on the adjuster screw (20) on the calliper (1).
  - ⇒ The pin must be located in the same position after checking the adjuster screw (20).

## Renewing the seals

- Turn the adjuster screw (20) counter clockwise about 30 mm out of the calliper (1) by hand.




- While threading it out, check the thread of the adjuster screw (20) for corrosion and damage.
  - If the thread and/or visible internal brake parts are damaged or corroded, replace the brake ▶ Chapter "9 Renewing the brake", page 46.
- Replace the piston protection cap (17) if dirt or water has penetrated into the calliper (1) through the seal seat or if the piston protection cap (17) has been damaged during maintenance work.
- Make sure that the grey seal (C) is correctly seated in the sealing seat of the calliper (1). Press the seal (C) back into the seal seat by hand if necessary.
- Clean the sealing seats (D) of the piston protection cap (17) in the calliper (1) and the ring groove of the adjuster screw (20).
  - Ensure that no dirt or moisture enters the brake when cleaning.
  - Make sure that the sealing seat for the piston protection cap (17) in the calliper (1) is clean and free from grease.



- Grease the thread of the adjuster screw (20).
- Turn the adjuster screw (20) clockwise back into the calliper (1) again.
  - ⇒ The adjuster screw (20) pin must be in the same position as it was before it was screwed out.

## 11.2.2 Fitting the protection cap

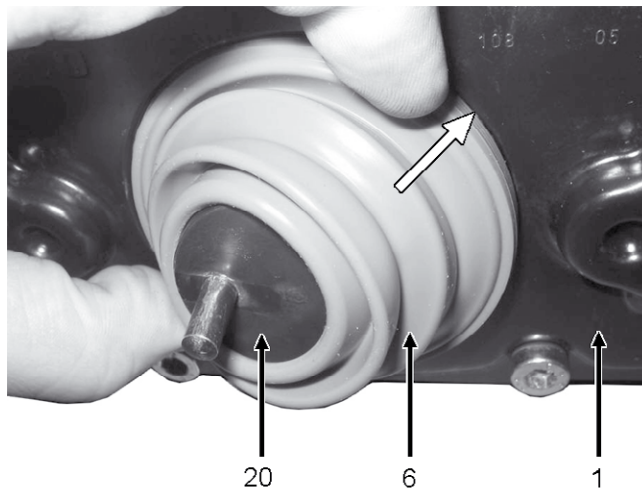
 For this chapter you require the following tools:

- Open-end spanner SW24
- WABCO Service Case

- Lightly grease the inner beaded edge (arrow) of the piston protection cap (17).

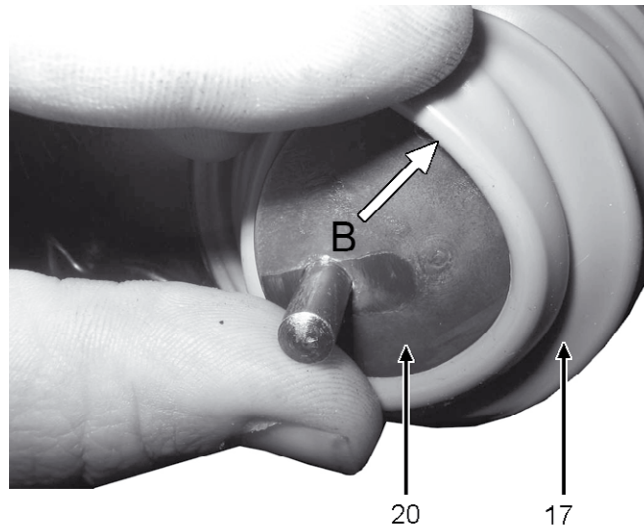


- Push a **new piston protection cap** for adjuster screws (17), **greased only on the inner beaded edge**, over the adjuster screw (20).
- Centre the piston protection cap (17) and it onto the sealing seat (A) of the brake calliper (1) by hand.



## Renewing the seals

- Insert the beaded edge (B) of the piston protection cap (17) into the sealing seat of the adjuster screw (20).



- Use the **WABCO tools Q, R** and **S** (▶ page 16 for the following steps).

**Tool R** is used for holding!




- Turn the adjuster screw (20) clockwise toward the calliper (1) so that **WABCO tool Q** (▶ page 16) can be placed onto the piston protection cap (17).



- Centre **WABCO tool Q** (▶ page 16) on the piston protection cap (17).
- Centre **WABCO tool S** (▶ page 16) by hand until it bears on the brake calliper (1) on the opposite side.



## Renewing the seals

- To press in the piston protection cap (17), turn out  **WABCO tool S with an open-ended spanner SW24** ( ▶ page 16) until the piston protection cap (17) sits flush in the sealing seat of the calliper (1).



- ! Ensure that the cap has a correct sealing seat in the brake calliper (1) and that the beaded edge of the piston protection cap (17) has an even and wrinkle-free seat in the ring groove of the adjuster screw (20).



- Install the pressure plate (7) and the brake linings (10, 11), and set the clearance ▶ Chapter "7.4 Fitting the brake linings", page 39.
- Having completed the work, test the brake on a roller test stand.

## 12 Replacing the adjuster

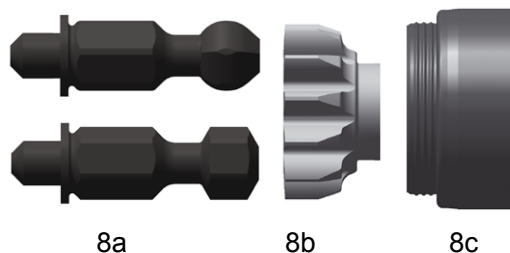
### ⚠ Safety information

- Read all safety instructions before carrying out the work steps to avoid injury and/or material damage ( ▶ Chapter "2 Safety information", page 8).

### General Information

- ! Depending on the installation position and the accessibility of the brake on the vehicle, the brake will have to be removed to replace the return unit (8). If access to the brake is not hindered, removing the calliper (1) is not necessary. The brake cylinder still has to be removed.

The return unit (8) is used for adjusting the tensioning unit and thus the clearance or for resetting to enable disassembly of the brake linings (10, 11). The reset element (8) is located inside the calliper (1) and consists of three parts: shaft (8a), gear (8b) and sleeves (8c) with seal. Depending on the design, the return unit (8) can have a shaft (8a) with different hexagon head (see figure).



- ! There are 2 return units with different hexagon heads (8a).

### 12.1 Removing the return unit

#### 🔧 For this chapter you require the following tools:

- Box spanner with spanner width 24 (outside)
- WABCO Service Case

- Remove the vehicle wheel in accordance with the instructions of the axle or vehicle manufacturer.
- Remove the brake cylinder from the brake calliper (1)
  - ▶ Chapter "8.1 Removing the brake cylinder", page 43.
- Disconnect the plug connector of the sensor cable from the electrical wear sensor (15) ▶ Chapter "10.1 Removing the wear sensor", page 49.
- Remove the brake linings (10, 11) and pressure plate (7)
  - ▶ Chapter "8.1 Removing the brake cylinder", page 43.
- Unscrew the fastening screws.
- Remove the calliper (1) with brake anchor plate (2) from the axle using a **🔧 box spanner**.

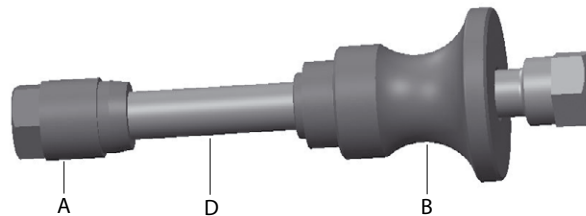
# Replacing the adjuster

🔑 **Box spanner with spanner width 24 (outside)**

▶ page 14 (Position III)

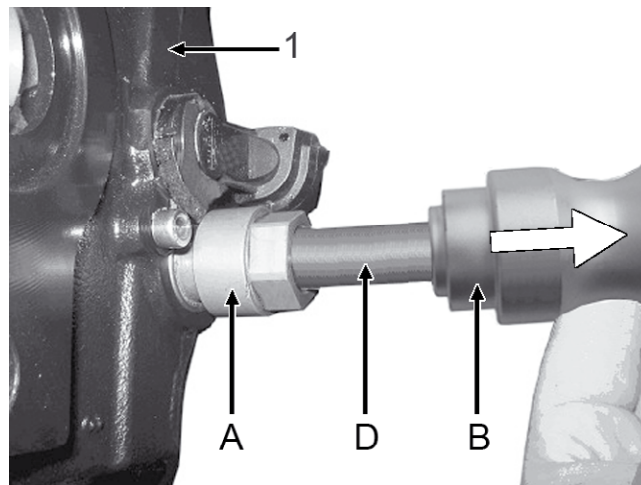
- Use a suitable fastening device (e.g. a vice) to clamp the brake to the brake anchor plate (2).

🔑 To renew the sleeve (8c) of the return unit (8), only use the **WABCO tools A, B and D** (▶ page 16).



- Screw the front part of the 🔑 **WABCO tool A** into the sleeve (8c).
- Use the 🔑 **WABCO tool B** to beat in the direction of the arrow and beat or pull the sleeve out of the calliper (1).

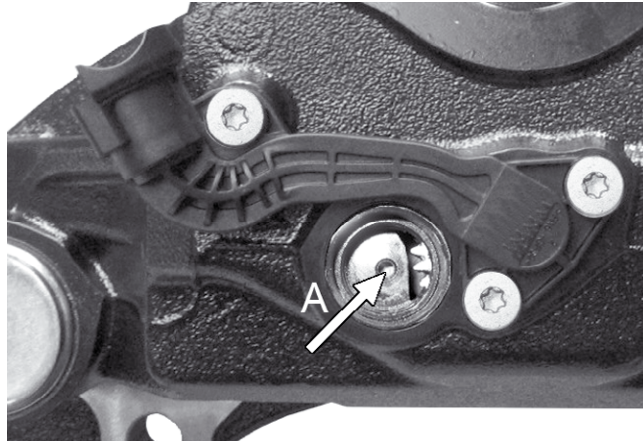
🔑 **WABCO tool B** loosely sits on 🔑 **WABCO tool D** and is moveable.



- Remove the shaft (8a) and the gear (8b) from the calliper (1).
- Clean the opening of the return unit (8) in the calliper (1).
  - ⇒ The seat for the return unit (8) in the calliper (1) must be **clean and free from grease**.
- Ensure that no dirt or moisture enters the brake when cleaning.

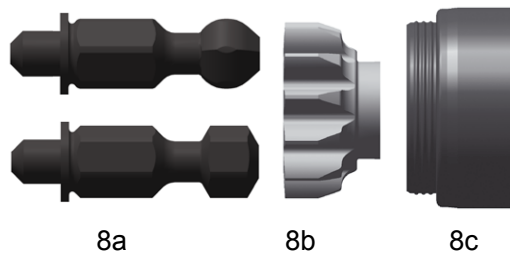
# Replacing the adjuster

- Grease the seat (A) of the shaft (8a) in the calliper (1).



## 12.2 Fitting the return unit

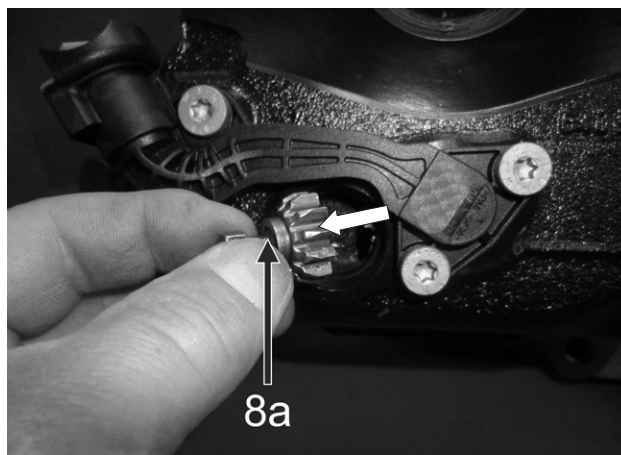
The return unit (8) consists of three parts: shaft (8a), gear (8b) and sleeve (8c) with seal.



! There are 2 return units with different hexagon heads (8a).

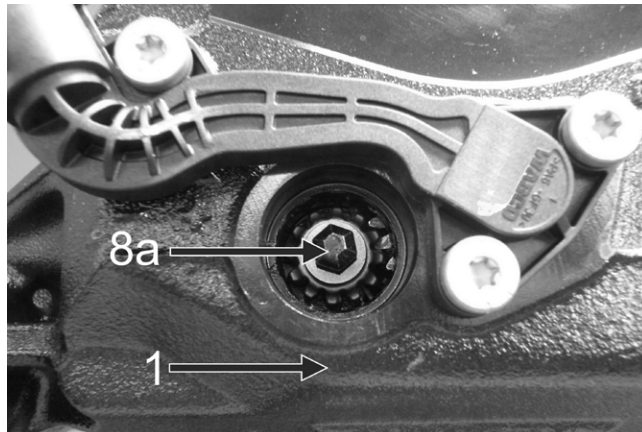
### 12.2.1 Installing the shaft and gear wheel

- Grease the shaft (8a) at the lower end (arrow) and position the shaft (8a) in the opening in the calliper (1) together with the gear wheel (8b).



## Replacing the adjuster


- Make sure that the shaft (8a) is centred in the opening of the calliper (1).



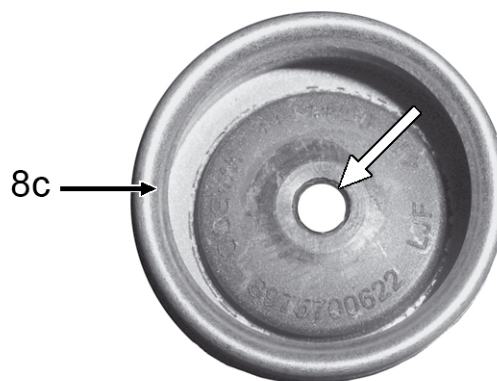
- Make sure that the two gears interlock (circle).



### 12.2.2 Fitting the sleeve

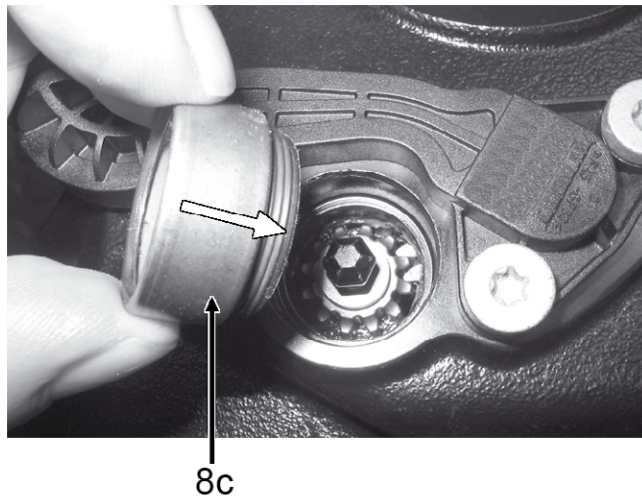
-  **For this chapter you require the following tools:**
- Box spanner with spanner width 24 (outside)
  - WABCO Service Case

- Lightly grease the sleeve (8c) **only on the inner sealing lip** (arrow).

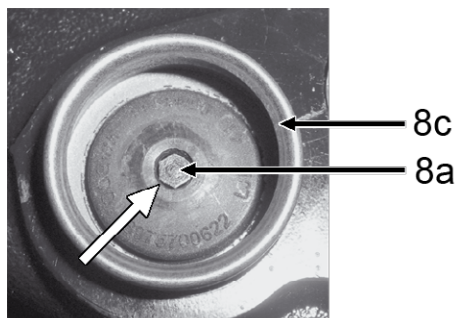


## Replacing the adjuster

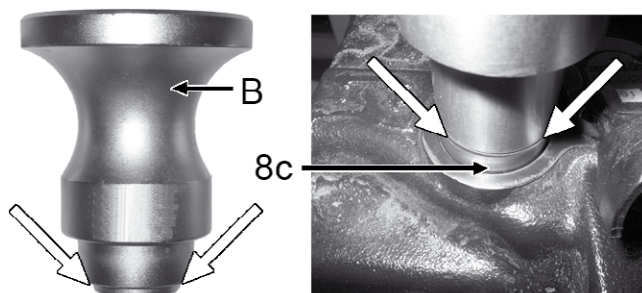
- Place the sleeve (8c) in the opening of the calliper (1) so that the seal (arrow) of the sleeve (8c) is on the opening of the calliper (1).




- Centre the sleeve (8c) on the opening in the calliper (1) and press the sleeve (8c) lightly into the opening so that the seal opening of the sleeve (8c) concentrically encloses the hexagon head of the shaft (8a).

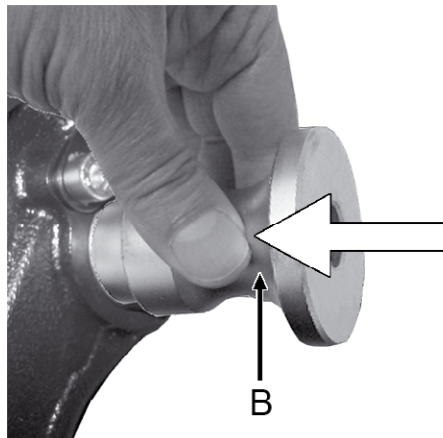



- Position the small collar (arrow) of **WABCO tool B** on the sleeve edge (8c).
- Centre **WABCO tool B** on the sleeve.

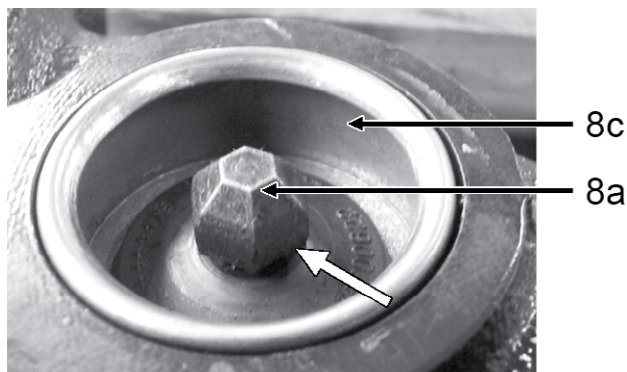



## Replacing the adjuster

- Use  **WABCO tool B** to drive the sleeve (8c) completely into the seat of the calliper (1).



- Remove  **WABCO tool B** from the sleeve (8c).
- Make sure that the seal of the sleeve (8c) is completely seated in the ring groove (arrow) of the shaft (8a).



- Place the brake with brake anchor plate (2) over the brake disc.
  - Always note the relevant specifications of the axle or vehicle manufacturer during this procedure and strictly adhere to them.
- Install the brake on the axle.
- Tighten the counter-nut with .

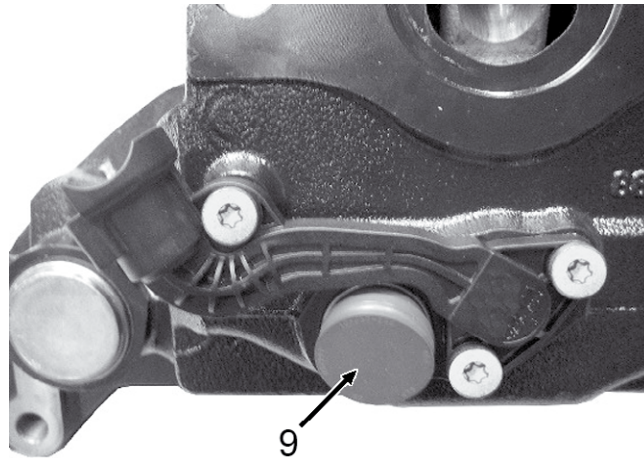
### **Box spanner with spanner width 24 (outside)**

▶ page 14 (Position III)

- Install the pressure plate (7) and brake linings (10, 11) and adjust the clearance ▶ Chapter "7.4 Fitting the brake linings", page 39.

## Replacing the adjuster

- Push a **new** sealing plug (9) into the opening of the calliper (1).
- Ensure that the plug has a tight seat.



- Connect the plug connector of the sensor cable with the electrical wear sensor (15) ▶ Chapter "10.2 Fitting the wear sensor", page 50.

### **WARNING**

#### **Risk of accident due to defective brake cylinder**

A defective brake cylinder can cause a braking system failure and must never be installed.

- *Renew the brake cylinder if you have identified damage, .*

- Inspect the brake cylinder for damage, particularly at the inner area of the piston-rod seal.
- Renew the brake cylinder if you have identified damage
  - ▶ Chapter "8 Replacing the brake cylinder", page 43.
- Clean the sealing surface and the flange area of the brake cylinder.
- Mount the brake cylinder on the calliper (1) ▶ Chapter "8.2 Installing the brake cylinder", page 44.
  - Always note the relevant specifications of the axle or vehicle manufacturer during this procedure and strictly adhere to them.
  - ⇒ Depending on the installation position of the brake, ensure that the lower drainage aperture of the brake cylinder facing the ground is open.
  - ⇒ Depending on the actuator type, the other drainage openings can either remain open or they must be sealed with a plug. Observe the respective instructions of the brake cylinder manufacturer.
- Check whether the wheel hub moves freely.
- Mount the wheel in accordance with the instructions of the axle or vehicle manufacturer.
- Having completed the work, test the brake on a roller test stand.

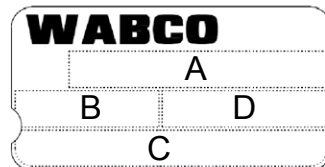


## 13 Workshop notes

### 13.1 Procurement of spare parts

- Identify the brake by means of the WABCO part number.

#### WABCO type plate



#### LEGEND

A	Vehicle manufacturer part number
B	Production date
C	WABCO part number
D	Assembly number

- Open INFORM at <http://www.wabco-auto.com>
- Enter the WABCO part number of disc brake into the *Product Number* field.
- Click the *Repair* radio button.
- In the *Repair* area, click the link with the WABCO part number for the disc brake.
- Open the exploded-view diagram via the *Drawing* link to identify the part to be replaced.
- Take a note of the item number of the parts that must to be replaced.
- On the spare parts sheet, identify the item number in the *Item* column.
- Order the repair kit containing the desired spare parts.
- Please contact your WABCO partner if you have any questions.

### 13.2 Disposing of the brake components



- Do not dispose of used and replaced parts together with household refuse. These must instead be handed over to a designated collection point.
- Observe the national and regional regulations.
- Simply contact your WABCO partner if you have any questions.







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