

Service Manual

Pneumatic Disc Brake SN6.../ SN7.../ SK7.../ ADB22X



New
Includes
instruction on use
of new tools
for covers of the
bearings

- Description/Function
- Service kits
- Service
- Equipment

KNORR-BREMSE



Overview of Toolkits and Service Manuals for Knorr-Bremse Air Disc Brakes

Brake	Tool Kit	Alternative
SB5...	I137951004EN	
SB6... SB7...	I137951004EN <small>see note *)</small>	
SN5...	K004789	
SN6... SN7... SK7... ADB22X	K016947	K001288 + Supplemental Kit K017062 K005973 + Supplemental Kit K017062

Brake	Service Manual
SB6... SB7...	C16352-EN
SN5...	Y015044-EN
SN6... SN7... SX7... ADB22X	Y006471-EN

*) additional tools are required - available in kit K001288 or K005973 or K016947

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This disclaimer is an English translation of a German text, which should be referred to for all legal purposes.

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Note: The safety advice listed below is applicable to general service and diagnostic work on air braking systems and may not all be directly relevant to the activities and products described in this document.

Before and whilst working on or around air braking systems and devices, the following precautions should be observed in addition to any specific advice given in this document:

- Always wear safety glasses when working with air pressure.
- Never exceed manufacturer's recommended air pressures.
- Never look into air jets or direct them at anyone.
- Never connect or disconnect a hose or line containing pressure; it may whip as air escapes.
- Never remove a device or pipe plug unless you are certain all system pressure has been depleted.
- Park the vehicle on a level surface, apply the parking brakes, and always chock the wheels as depleting vehicle air system pressure may cause the vehicle to roll.
- If work is being performed on the vehicle's air braking system, or any auxiliary pressurised air systems, and if it is necessary to drain the air pressure from reservoirs, etc., keep clear of brake actuator push rods and levers since they may move as system pressure drops. Be aware that if the vehicle is equipped with an air dryer system, it can also contain air pressure along with its purge reservoir, if fitted, even after pressure has been drained from the other reservoirs.
- When working under or around the vehicle, and particularly when working in the engine compartment, the engine should be shut off and the ignition key removed. Where circumstances require that the engine be running, EXTREME CAUTION should be taken to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically charged components. Additionally, it is advisable to place a clear sign on or near the steering wheel advising that there is work in progress on the vehicle.
- Examine all pipework for signs of kinks, dents, abrasion, drying out or overheating. Be aware that kinks in pipework may result in air pressure being trapped in the pipework and associated equipment. Replacement hardware, tubing, hose, fittings, etc. must be of equivalent size, type and strength as original equipment and be designed specifically for such applications and systems. Check the attachment of all pipework; it should be supported so that it cannot abrade or be subjected to excessive heat.
- Components with stripped threads or damaged/corroded parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle or component manufacturer.
- Never attempt to install, remove, disassemble or assemble a device until you have read and thoroughly understood the recommended procedures. Some units contain powerful springs and injury can result if not properly dismantled. Use only the correct tools and observe all precautions pertaining to use of those tools. Before removing any device note its position and the connections of all pipework so that the replacement/serviced device can be properly installed. Ensure that adequate support or assistance is provided for the removal/installation of heavy items.
- Use only genuine Knorr-Bremse replacement parts, components and kits.
- Prior to returning the vehicle to service, make certain all components and systems are leak free and restored to their proper operating condition.

Welding

To avoid damage to electronic components when carrying out electrical welding, the following precautions should be observed:

- In all cases, before starting any electrical welding, remove all connections from any electronic control units or modules, noting their position and the order in which they are removed.
- When re-inserting the electrical connectors (in reverse order) it is essential that they are fitted to their correct assigned position - if necessary this must be checked by PC Diagnostics.

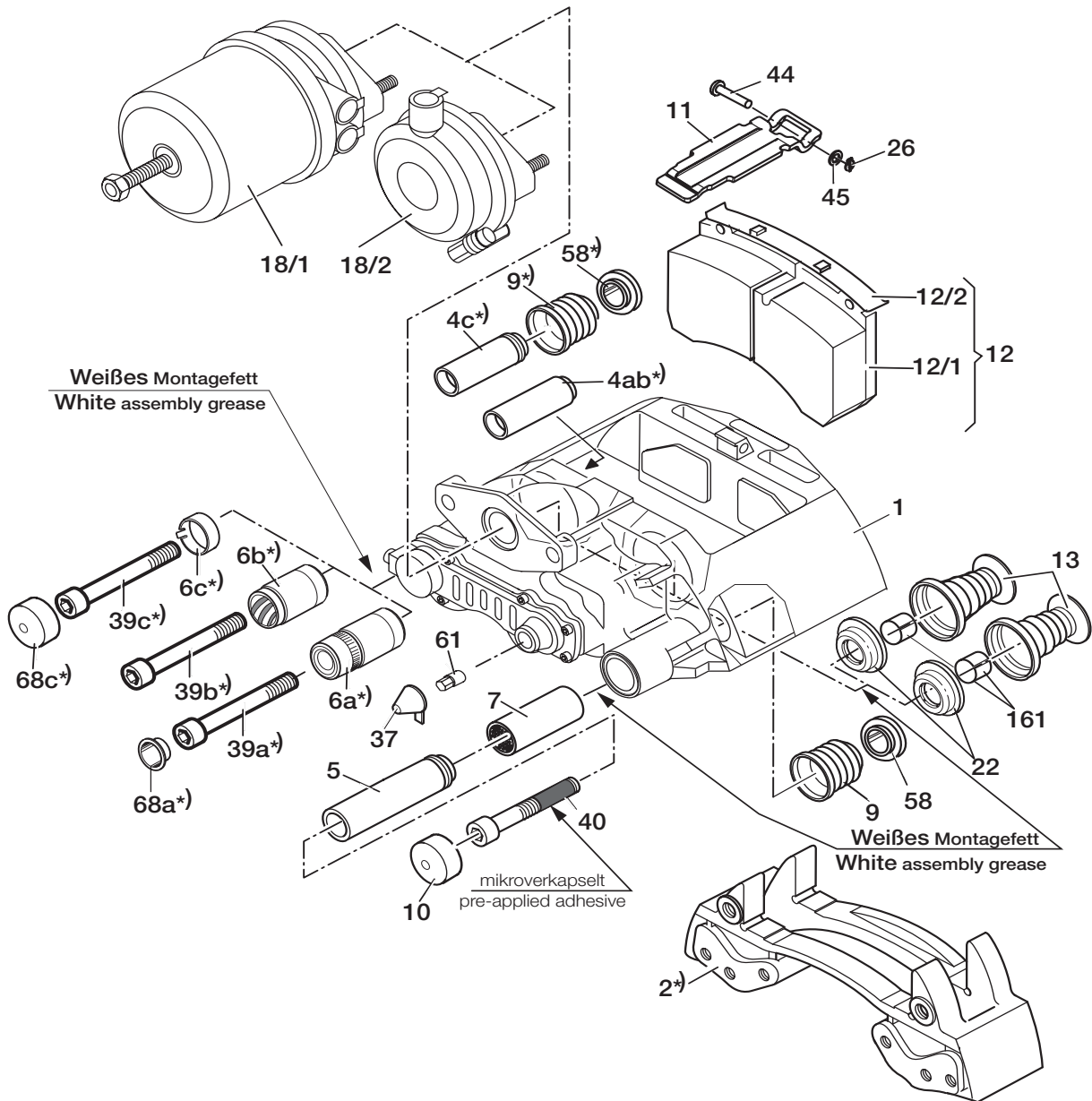
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Overview

1 Overview

1.1 Disc Brake Components

(Wear Indicators see Section 1.2.1)

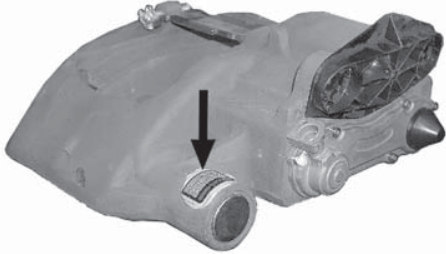


1	Caliper	11	Pad Retainer	39b ^{*)}	Caliper Bolt
2	Carrier	12	Pad (complete)	39c ^{*)}	Caliper Bolt
4a ^{*)}	Guide Pin	12/1	Pad	40	Caliper Bolt
4b ^{*)}	Guide Pin	12/2	Pad Holder Spring	44	Pad Retainer Pin
4c ^{*)}	Guide Pin	13	Tappet and Boot	45	Washer
5	Guide Pin		Assembly	58	Ring
6a ^{*)}	Rubber Bush	18/1	Spring Brake	61	Shear Adapter
6b ^{*)}	Rubber Bush	18/2	Brake Chamber	68a ^{*)}	Cap
6c ^{*)}	Guide Sleeve	22	Inner Seal	68c ^{*)}	Cover
7	Brass Bush	26	Spring Clip	161	Tappet Bush
9	Inner Boot	37	Adjuster Cap		
10	Cover	39a ^{*)}	Caliper Bolt		

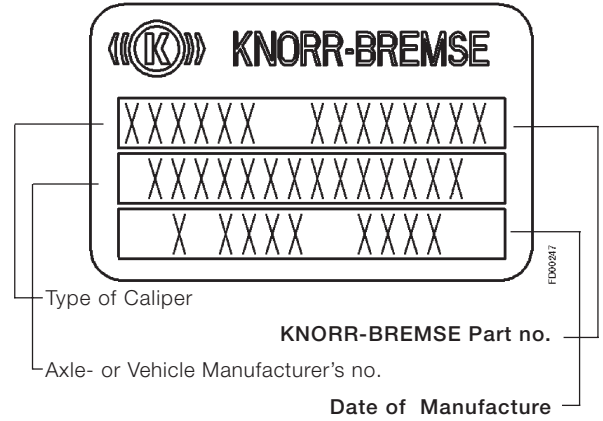
^{*)} Variants
see also contents
leaflet in the
service kit

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1.2 Brake Disc Identification and Service Kits



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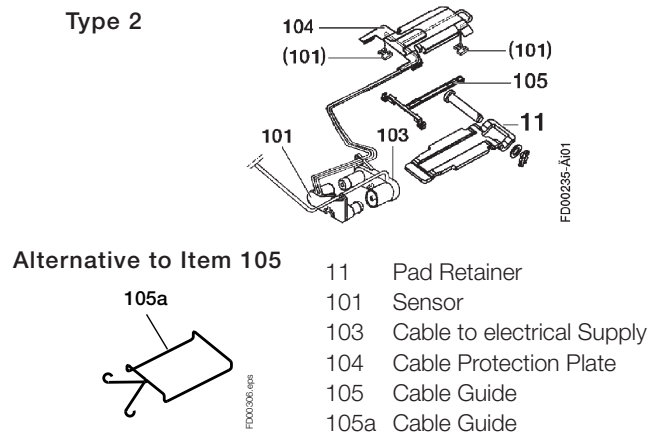
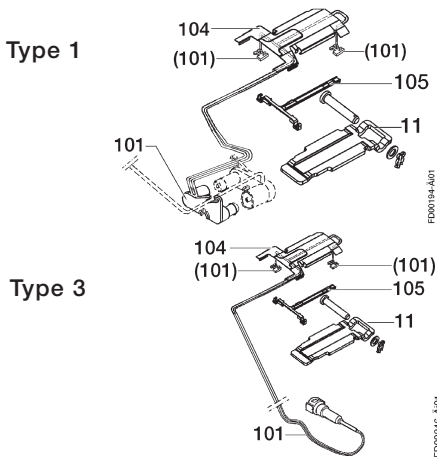
Use only genuine Knorr-Bremse parts!

The following Service Kits are available :

Description	Contents	
Carrier	2	For specific Service Part Numbers for each Disc Brake see: www.Knorr-BremseSFN.com www.Knorr-BremseSFN.biz
Guide Pins and Seals Kit	4a*), 5, 6a*), 7, 9, 10, 39a*), 40, 58 (4b*), 4c*), 6b*), 6c*), 39b*), 68a*), 68c*)	
Tappet and Boot Kit (2 pieces)	13 (2x), 22 (2x), 161 (2x)	
Adjuster Cap	37 (10 pcs), 61 (10 pcs)	
Pad Kit (per axle)	11, 12, 26, 37, 44, 45, 61	
Wear Indicator Kit (per axle)	Variants see Section. 1.2.1	Knorr-Bremse offers a range of specifically designed rationalised Calipers to service a wide range of Disc Brakes. For specific Caliper Part Number, see: Brochure P-3543 or www.Knorr-BremseSFN.com www.Knorr-BremseSFN.biz
Caliper	Air Disc Brake without Carrier (2) and without Brake Pads (12). Guide Pins Seals Kit provided for assembly of Caliper to existing Brake Carrier.	

1.2.1 Wear Indicator Kits (typical kits are shown below)

*) Variants



1

Brake Disc

1.3 Brake Disc

When replacing Discs, please refer to the instructions of the Vehicle Manufacturer, including when fitting Knorr-Bremse Brake Discs.

When replacing Discs, please adhere to the recommended bolt tightening torques.

The use of non-approved Brake Discs will reduce levels of safety and invalidate warranty.

Brake Discs can be ordered through the Knorr-Bremse Aftermarket Organisation.

2 General Information

2.1 Service Tools

Part-Number / (Tool combination)	Description	consisting of Tool Components:
Z004190 / (B)	Press-in Tool for Tappet and Boot Assembly (13)	T1, T2 T3, T4
Z004357 / (C)	Pull-in Tool for Inner Boot (9)	T7, T8, T10
Z004354 / (D)	Pull-in/Pull-out Tool including Grooving Tool for Brass Bush (7)	T8, T12, T13, T14, T16
II32202 / (A)	Wedged Fork for removal of Tappet and Boot Assembly (13)	T15
K015825 / (H)	Press-in Tool for Cover (10)	T26 (replaces T17)
K016743 / (M)	Press-in Tool for Cover (68c)	T27 (replaces T25)
Z004198 / (R)	Pull-in/Pull-out Tool for Rubber Bush (6a) and (6b)	T5, T6, T18, T19, T20, T21, T22
K005986 / (N)	Pull-in/Pull-out Tool for Guide Sleeve (6c)	T5, T6, T8, T14, T20, T21
Z003934 / (K)	Press-in Tool for Cap (68a)	T11
Z004361 / (L)	Press-in Tool for Inner Seal (22)	T3, T4, T9
K004082 / (P)	Ring for Tappet and Boot Assembly (13)	T24

Note

The Service Tool Kit (Part No.) **K016947** contains the above listed tool components, to fit tool combinations for items 6a, 6b, 6c, 7, 9, 10, 13, 22, 68a and 68c. This English Service Manual as well as a German one and a Service DVD (Part No.) **K016953** are included. Customers who already own the Service Tool Kits (Part No.) **K005973** or **K001288** may supplement this with the "Supplemental Tool Kit" (Part No.) **K017062**. This contains the tool combinations (Part No.) **K015825**, (Part No.) **K016743** and (Part No.) **K004082** as well as a revised Service-DVD (Part No.) **K016953**. An English and a German Service Manual are supplied in the "Supplemental Tool Kit" as well.

2.2 Diagnostic Equipment

Part-Number	Description
II40598F	ZB9031-2 hand-held device for checking Potentiometer function (Pad plus Disc wear) where 13 pin chassis plug is installed. ZB9031-2 replaces ZB9031

2.3 Lubricant

Part Number	Colour	Quantity
II14525	white	5g
II32868	white	500g

2.4 Torque Requirements

Item Number		Torque	Spanner Size (mm)
39a; 39b; 39c; 40	Caliper Bolts (2x) M16x1,5 (Hexagon socket head)	180 Nm plus 90°	14 (Hexagon key)
18/1; 18/2	Knorr-Bremse Brake Chamber / Spring Brake Hexagon Nut M16x1,5 (2x) (self-locking EN ISO 10513)	180 + ³⁰ Nm	24
18/1; 18/2	Brake Chamber or Spring Brake from other Brake Actuator Manufacturers	Follow the instructions of the Brake Actuator Manufacturer	–

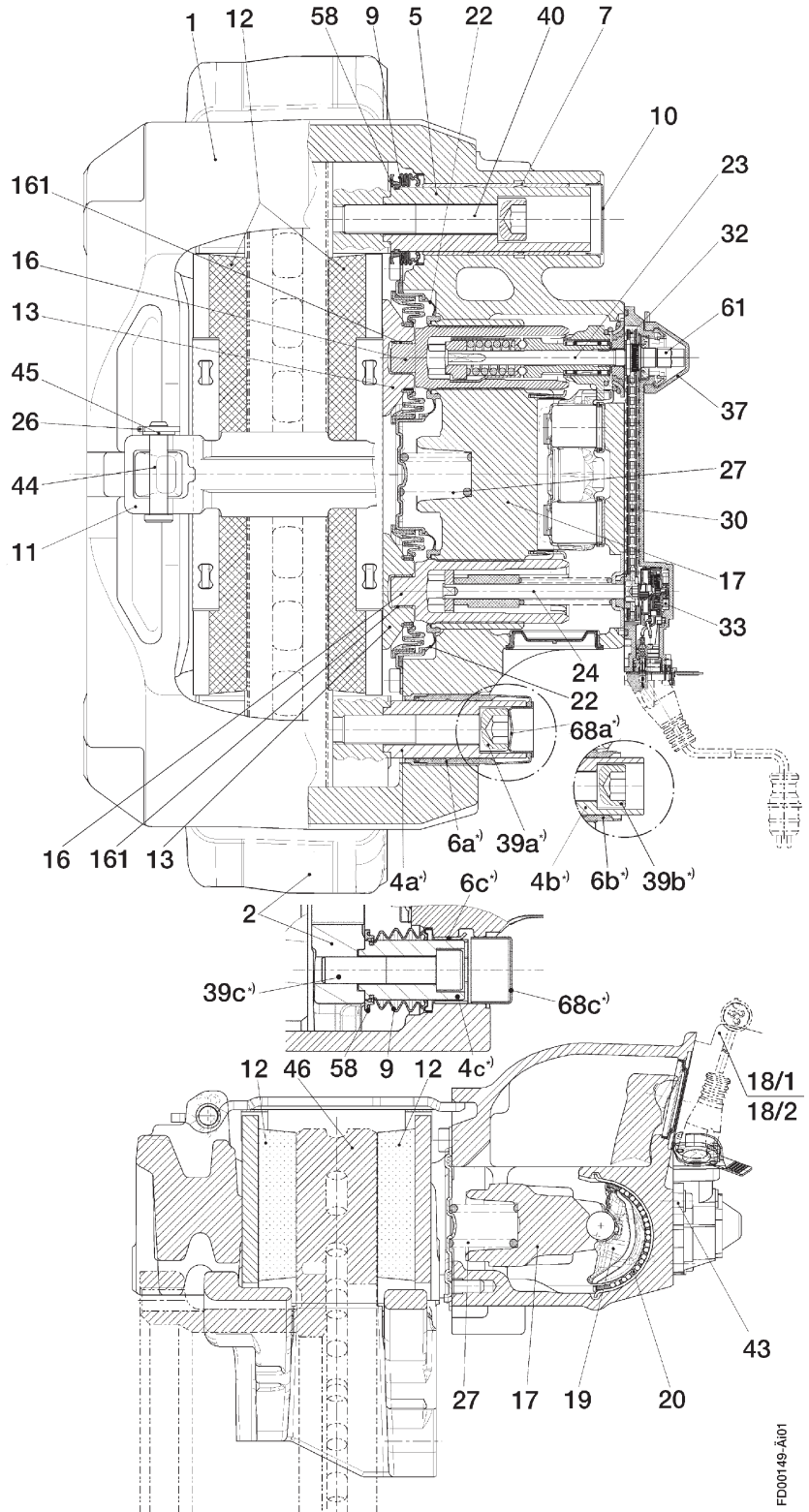
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Description and Function

3 Description and Function

3.1 Disc Brake Sectioned View

- 1 Caliper
- 2 Carrier
- 4a*) Guide Pin
- 4b*) Guide Pin
- 4c*) Guide Pin
- 5 Guide Pin
- 6a*) Rubber Bush
- 6b*) Rubber Bush
- 6c*) Guide Sleeve
- 7 Brass Bush
- 9 Inner Boot
- 10 Cover
- 11 Pad Retainer
- 12 Pad (complete)
- 13 Tappet and Boot Assembly
- 16 Threaded Tube
- 17 Bridge
- 18/1 Spring Brake
- 18/2 Brake Chamber
- 19 Lever
- 20 Eccentric Bearing
- 22 Inner Seal
- 23 Adjuster Unit
- 24 Turning Device
- 26 Spring Clip
- 27 Spring
- 30 Chain
- 32 Chain Wheel
- 33 Wear Sensor
- 37 Adjuster Cap
- 39a*) Caliper Bolt
- 39b*) Caliper Bolt
- 39c*) Caliper Bolt
- 40 Caliper Bolt
- 43 Bolt
- 44 Pad Retainer Pin
- 45 Washer
- 46 Disc
- 58 Ring
- 61 Shear Adapter
- 68a*) Cap
- 68b*) Cover
- 161 Tappet Bush



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*) Varianten beachten

3.2 Description of Operation

(Floating Caliper Principle)

3.2.1 Brake Actuation

During actuation, the Push Rod of the Actuator (18/1 or 18/2) moves the Lever (19). The input forces are transferred via the Eccentric Bearing (20) to the Bridge (17). The force is then distributed by the Bridge (17) and the two Threaded Tubes (16) to the Tappet and Boot Assemblies (13) and finally to the inboard Pad (12).

After overcoming the running clearance between the Pads and the Disc, the reaction forces are transmitted to the outboard Pad (12). The clamping forces on the Pads (12) and the Disc (46) generate the braking force for the wheel.

3.2.2 Brake Release

After releasing the air pressure, the Return Spring (27) pushes the Bridge (17) and Lever (19) back to the start position; this ensures a running clearance between Pads and Disc is maintained.

3.2.3 Brake Adjustment (automatic)

To ensure a constant running clearance between Pads and Disc, the brake is equipped with a low wearing, automatic adjuster mechanism. The Adjuster (23) operates with every cycle of actuation due to the mechanical connection with Lever (19). As the Pads and Disc wear, the running clearance increases. The Adjuster (23) and Turning Device (24) turn the Threaded Tubes (16) by an amount necessary to compensate for this wear. The total running clearance (sum of clearance both sides of Disc) should be between 0.6 and 1.1 mm; smaller clearances may lead to overheating problems.

4 Inspection Points

Despite the use of long-life materials, it is necessary to check some of the components regularly for their general condition. The following points ensure a long-life and trouble-free operation of the disc brake. The inspection frequencies specified are minimum values. Depending on the vehicle application a more frequent check of the components may be necessary.

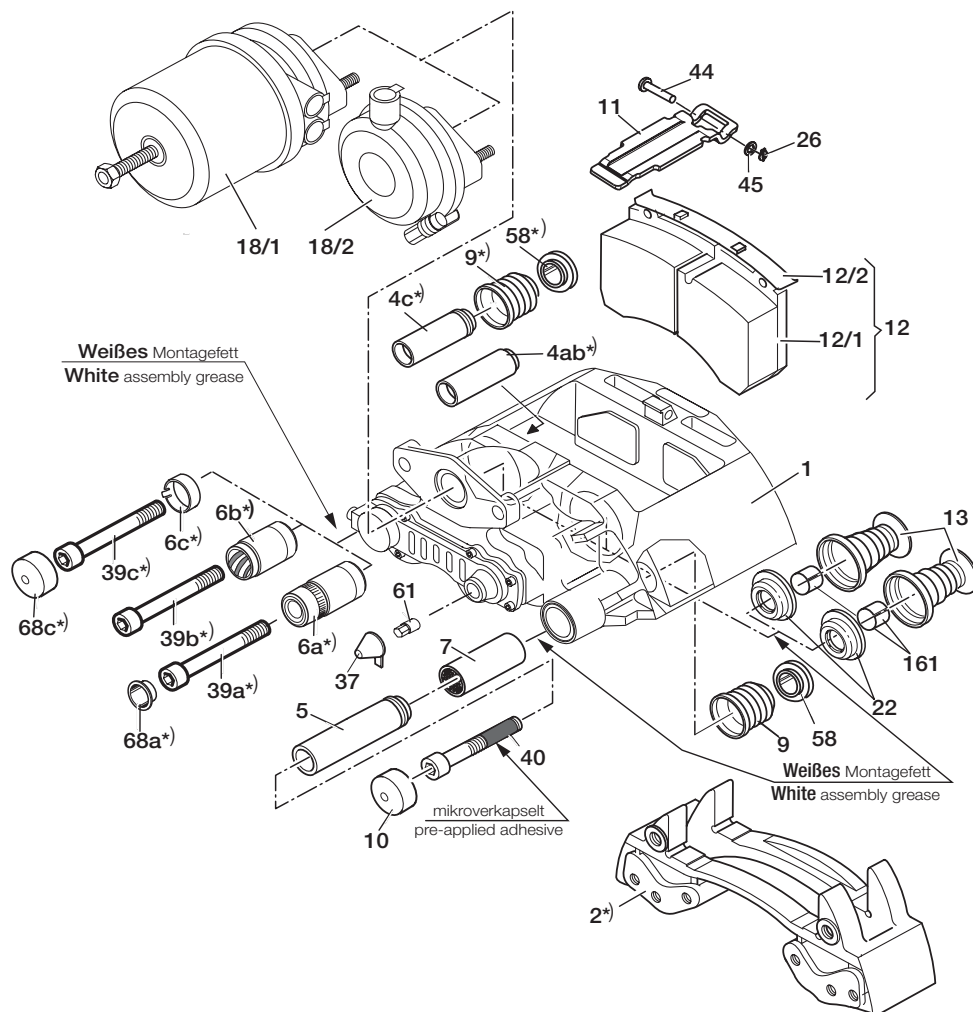
The brake pad wear must be checked visually on a regular basis, e.g. each time the tyre pressures are checked, or at least every three months (see Sections 5.1.1, 5.1.2, 5.1.3).

At least annually inspect the pad to disc running clearance and the correct fitting and condition of the Cover (10), the Cap (68a), the Cover (68c) and the Adjuster Cap (37) (see Section 5.3.1).

With each Pad change check for the correct functioning of the Adjuster (see Section 5.2) and the smooth operation of the caliper over its full range of movement (see Section 5.3.2). Also inspect the Tappet and Boot Assemblies (13), the Adjuster Cap (37) and the sealing elements (6a, 9, 10, 58, 68a or 68c) for correct fitting and condition.

The brake discs are to be checked according to the specification of the axle or vehicle manufacturer.

In the unlikely event of a problem, all relevant components - e.g. Pads (12/1) and Pad Holder Springs (12/2) - must be returned in order that an objective investigation of the cause can be made.




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4.1 Safety Instructions for Service Work and Repair Work

Please also refer to the relevant safety instructions for service work and repair work on commercial vehicles, especially for jacking up and securing the vehicle.


Use only genuine Knorr-Bremse parts.

 *Before starting service work, ensure the service brake and parking brake, as well as the bus stop temporary hold brake, if fitted, are not applied and that the vehicle cannot roll away.*


Please follow repair manual instructions and adhere to the wear limits of the Pads and the Discs - see Section 5.1.

Use only recommended tools - see Section 2.1.

Tighten bolts and nuts to the recommended torque values - see Section 2.4.

 *Screw threads and tapped holes must be clean and dry (free of lubrication and residuals of pre-applied adhesive).*

After re-fitting a wheel according to the Vehicle Manufacturer's recommendations, please ensure that there is sufficient clearance between the tyre inflation valve, the caliper and the wheel rim, to avoid damage to the valve.

 *After any service work: Check the brake performance and the system behaviour on a rolling road. Check function and effectiveness.*

5 Functional and Visual Check

5.1 Wear Check of Pads and Brake Discs



For optimum safety, stay within the Pad and Disc Wear Limits.

Pads

The thickness of the Pads must be checked regularly dependent on the usage of the vehicle. The Pads should be checked corresponding to any legal requirements that may apply.

If a Wear Indicator has not been fitted or is not connected, this should be at least every 3 months.

If friction material is less than 2mm (see E, Sketch 3), the Pads must be replaced.

Minor damage at the edges is permitted (see arrow, Sketch 1).

Major damage on the surface of the Pad is not permitted (see arrow, Sketch 2).

Discs

Measure thickness at thinnest point. Avoid measuring near the edge of the disc as a burr may be present.

A = Disc thickness

new condition = 45 mm

worn condition = 37 mm (the disc must be replaced)

C = Overall thickness of Pad 30mm (new condition)

D = Backplate - 9 mm with SN6... and SN7... .

Backplate - 7 mm with SK7... and ADB22X.

E = Minimum thickness of friction material 2mm

F = Minimum allowed thickness in worn condition for backplate and friction material.

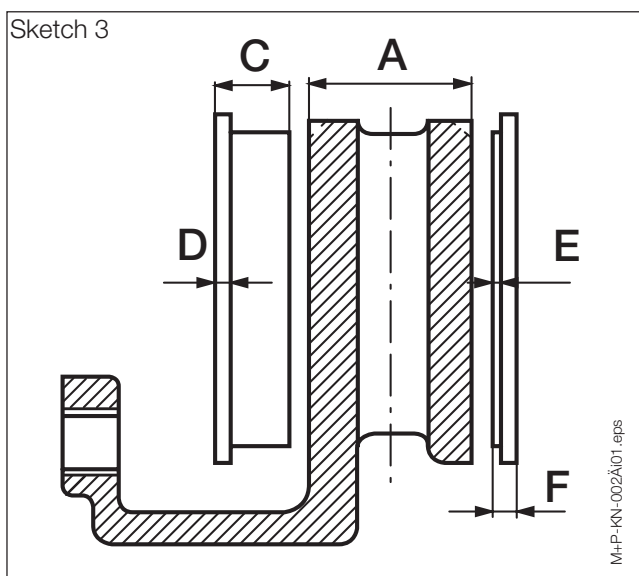
With 9 mm backplate, F = 11 mm.

With 7 mm backplate, F = 9 mm.

If these minimum allowed thicknesses are reached replacement of Pads is necessary

If the disc dimension $A \leq 39$ mm, it is recommended that the Disc should be renewed together with the Pads.

If the disc thickness is less than 37 mm, the disc must be replaced.



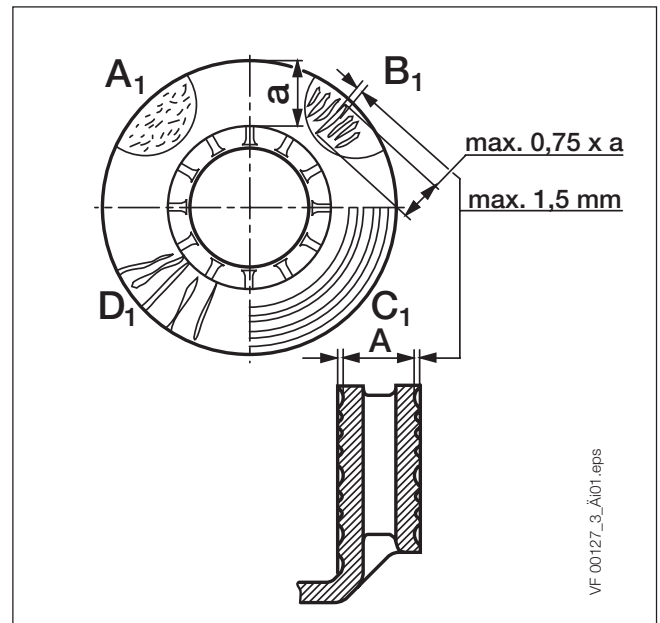
If these recommendations are ignored, there is a danger of brake failure.

Check Disc at each change of Pads for grooves and cracks.

The diagram shows possible surface conditions.

- A1 = Small cracks spread over the surface **are allowed**
- B1 = Cracks less than 1.5mm deep or wide, running in a Radial direction **are allowed**
- C1 = Grooves (circumferencial) less than 1.5mm deep **are allowed**
- D1 = Cracks going through to the cooling duct or from inner to outer edge of the pad contact area (a) **are not allowed.**
The Disc **MUST BE REPLACED.**

a = Pad contact area



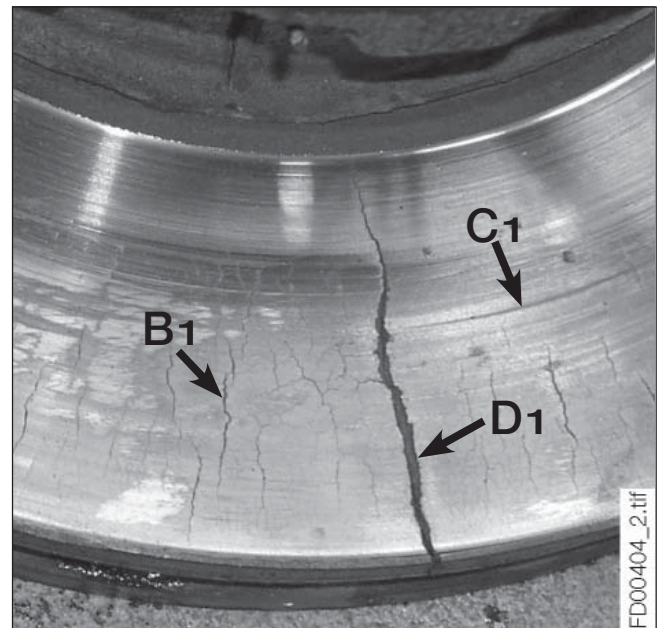
Note:

In case of surface conditions A1, B1 and C1, the Disc can continue to be used until the minimum thickness of 37mm is reached.

Knorr-Bremse Discs are normally service-free and grinding when changing Pads is not necessary. However, grinding could be useful, e.g. to increase the load-bearing surface of the Pads after severe grooving on the entire friction surface has occurred. To meet safety requirements, the minimum thickness after grinding must be greater than 39 mm.

In addition, the recommendations of the Vehicle Manufacturer **MUST** be followed.

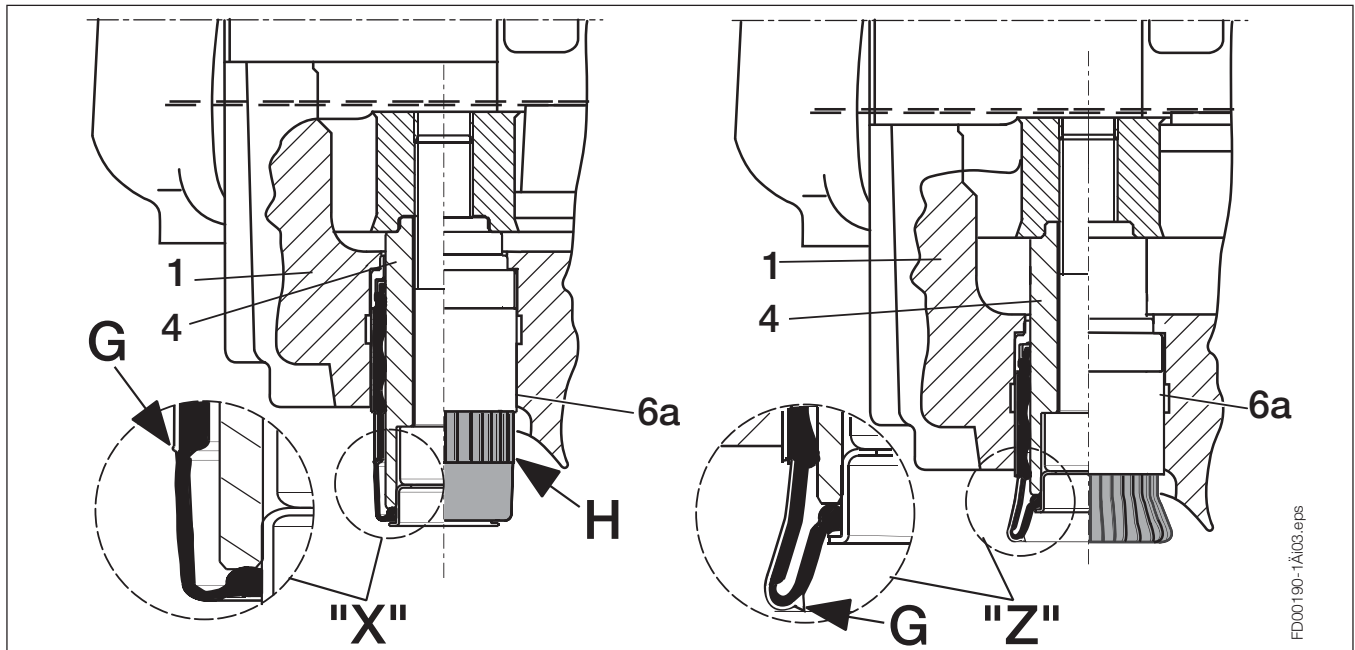
The adjacent sketch shows some examples of cracks and grooves.



If these recommendations are ignored, there is a danger of brake failure. If the Pads are worn down to the backplate or if Disc wear is excessive, brake performance will be severely affected and may be lost completely.

5.1.1 Brake Wear Check using Rubber Bush (6a):

For all Disc Brakes which are equipped with a Rubber Bush that is axially ribbed (see H in sketch).



The condition of the Pads can be visually determined without removing the road wheel, by viewing the position of the Caliper (1) against the fixed Guide Pin (4).

New Condition (see "X")

The position of Wear Indicator "G" on the Rubber Bush (6a) in new condition.

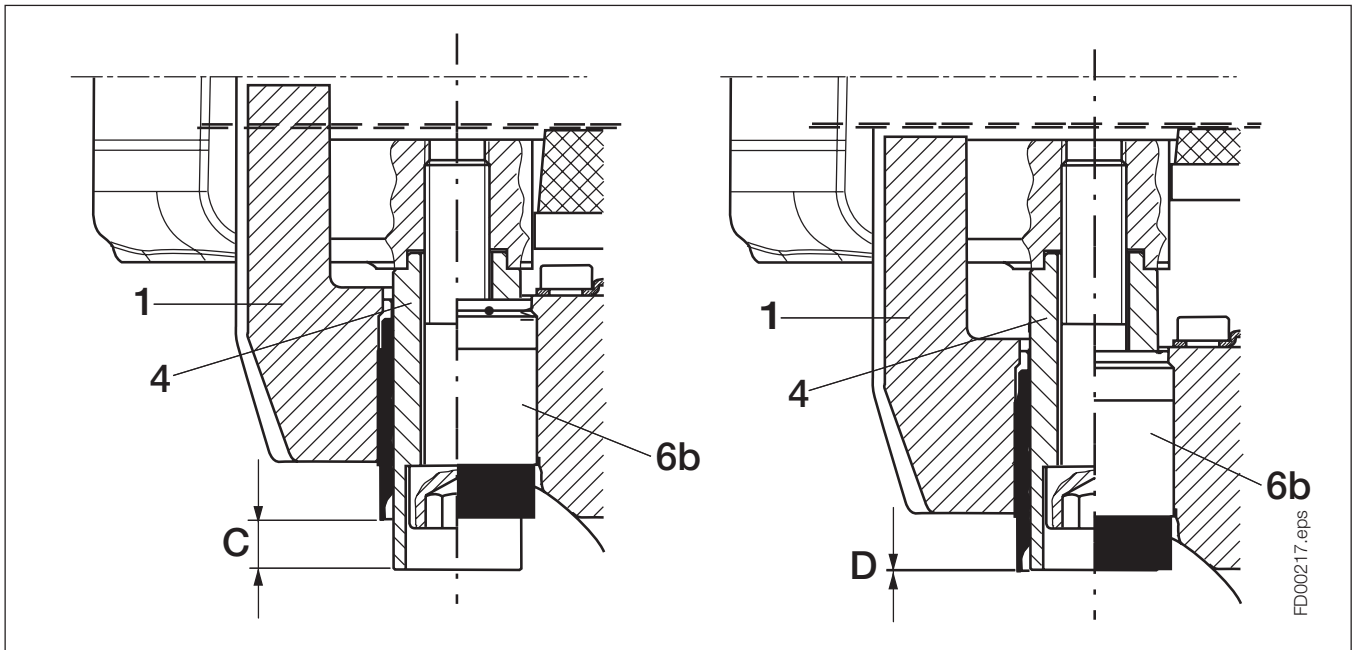
Wear Limit (see "Z")

When the Rubber Bush (6a) is retracted to the level "G" of the Wear Indicator as shown, the wheel must be removed so that the wear of the Pads and Disc can be checked.

If necessary change the Pads (see Section 6) and/or the Disc - see Vehicle Manufacturer's recommendations.

5.1.2 Brake Wear Check using Rubber Bush (6b):

For all Disc Brakes which are equipped with open Rubber Bush Version.



The condition of the Pads can be visually determined without removing the road wheel by viewing the position of the Guide Pin (4) in the Caliper (1).

C = pin protrusion - shown in new condition

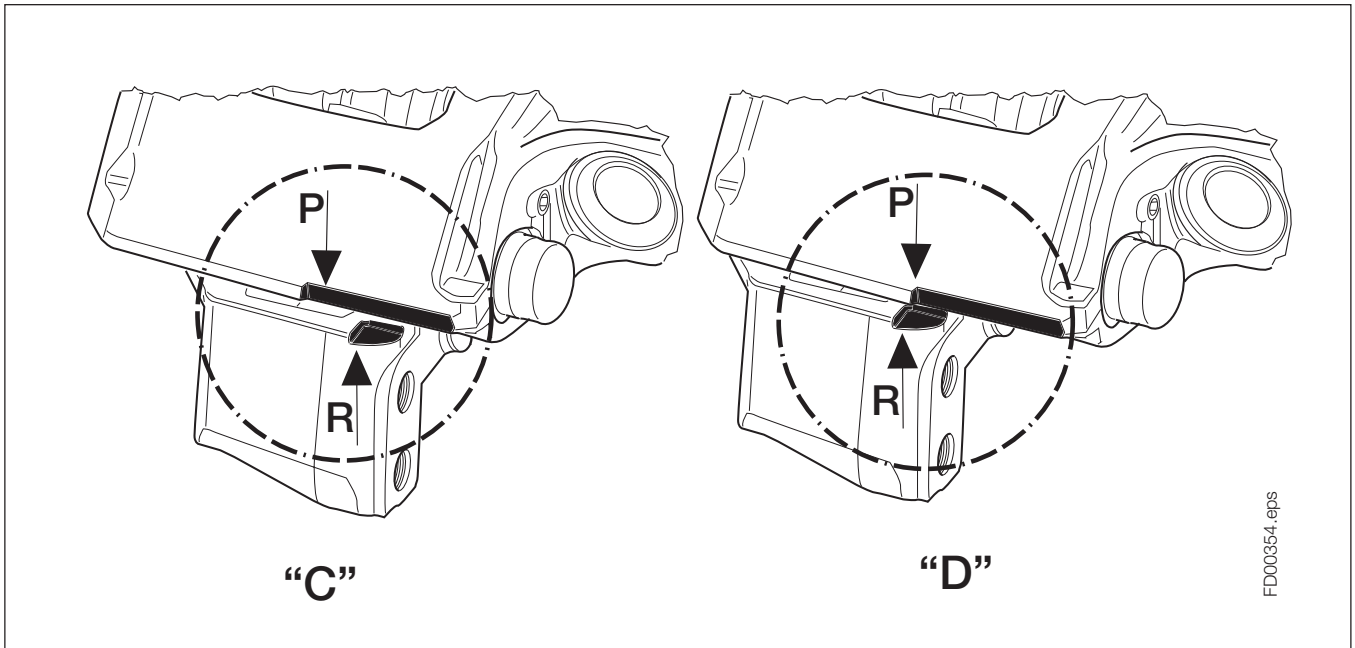
D = minimal pin protrusion - Pads and Disc must be checked with road wheel removed

If dimension 'C' is less than 1mm, a more accurate check of the Pads and Disc must be made.

If necessary change the Pads (see Section 6) and/or the Disc - see Vehicle Manufacturer's recommendations.

5.1.3 Brake Wear Check using Carrier to Caliper position (6c):

For all Disc Brakes which are equipped with a Caliper to Carrier marking.



The condition of the Pads can be visually determined without removing the road wheel by viewing the position of the Caliper position (P) against the Carrier marking (R).

C = shown in new condition

D = Pads and Disc must be checked with road wheel removed

If the condition "D" is reached the wheel must be removed so that the wear of the Pads and Disc can be checked.

If necessary change the Pads (see Section 6) and/or the Disc - see Vehicle Manufacturer's recommendations.

5.1.4 Wear Indicators

Due to different Vehicle Manufacturer and vehicle types there are several types of Pad Wear Indicator used.

- In-pad Normally Closed Indicator - Circuit is broken when Pad Wear reaches limit.
- In-pad Normally Open Indicator - Circuit is made when Pad Wear reaches limit.
- Wear Indicator using built-in Potentiometer. This is available either as an on/off version or as a continuous signal version which can be linked to the vehicle's electronic monitoring systems.

An optical or acoustic device may be linked to any of the above.

Note:

Please also refer to specifications provided by the Vehicle Manufacturer.

5.1.5 Diagnostic Equipment

The Knorr-Bremse Diagnostic Unit ZB9031-2 is a hand held device suitable for vehicles that are fitted with Knorr-Bremse Disc Brakes using a continuous signal type of Wear Indicator Potentiometer.

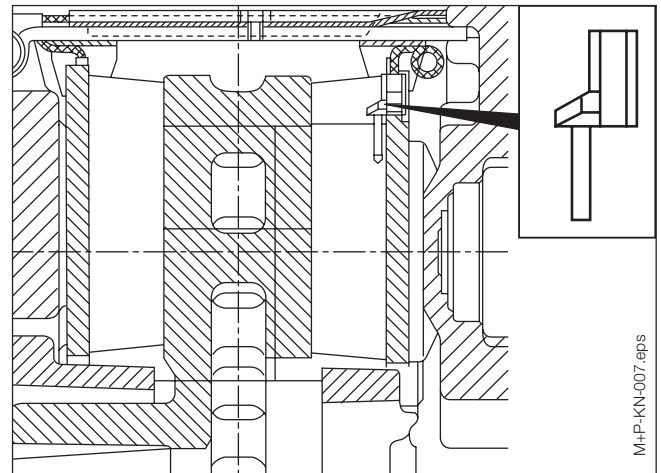
The wear condition of each brake can be measured by connecting the device to a suitable 13 pin socket (DIN 72570), where fitted. This socket will have been connected to each sensor by the vehicle manufacturer.

The Diagnostic unit allows:

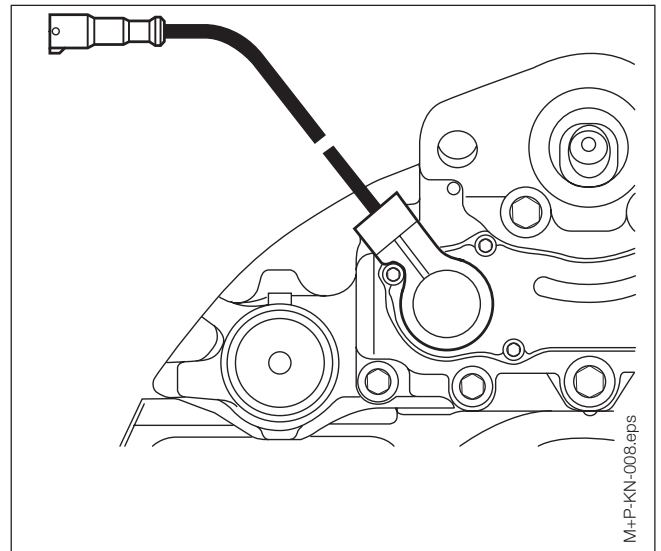
- Quick and simple wear check.
- A check of the potentiometer function.
- A simultaneous check of up to six brakes, without removing the wheels.

Note:

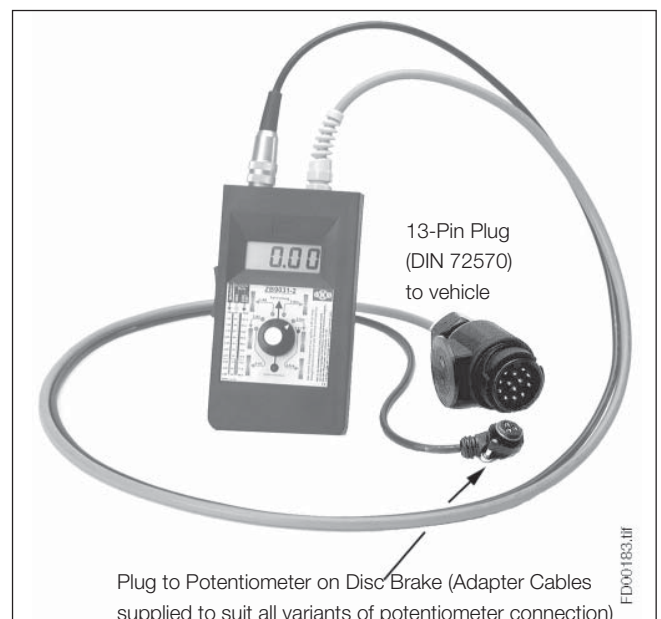
A detailed instruction manual is included with each unit.



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M+P-KN-008.eps



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5.2 Adjuster Check

⚠ Before starting service work, ensure the service brake and parking brake, as well as the bus stop temporary hold brake, if fitted, are not applied and that the vehicle cannot roll away.

Remove wheel.

The caliper assembly should be pushed inboard on its Guide Pins. Using a suitable tool, press the inboard pad (12) away from the Tappets and check the gap between Tappet and inboard pad backplate - it should be between 0.6mm & 1.1mm.

⚠ If the clearance is too wide, there is a danger of brake failure. If the clearance is too small, there is a danger of overheating. That may lead to consequential damage.

If the running clearance is too small or too large, the adjuster may not be functioning correctly and should be checked as follows.

Pull off the Adjuster Cap (37) using the tag, taking care not to lose the Shear Adapter (61).

The Adjuster (23) must be turned with the Shear Adapter (61) anti-clockwise for 2 or 3 clicks (increasing running clearance).

⚠ Never turn Adjuster (23) without Shear Adapter (61) being fitted. If the shear torque of the Shear Adapter is exceeded, then it is designed to fail. Try again with a new (unused) Shear Adapter. With a second failure of the Shear Adapter the Caliper must be exchanged since internal damage is present. **Do not** use an open-ended spanner as this may damage the Adapter

⚠ Make sure that the Ring Spanner or Socket can turn freely clockwise during following procedure.

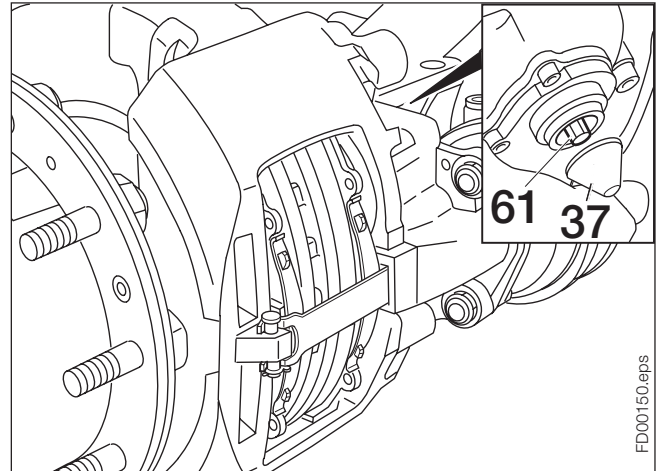
By applying the brake (about 2 Bar) 5 to 10 times the Spanner or Socket should turn clockwise in small increments if the Adapter is functioning correctly (see notes below).

Note:

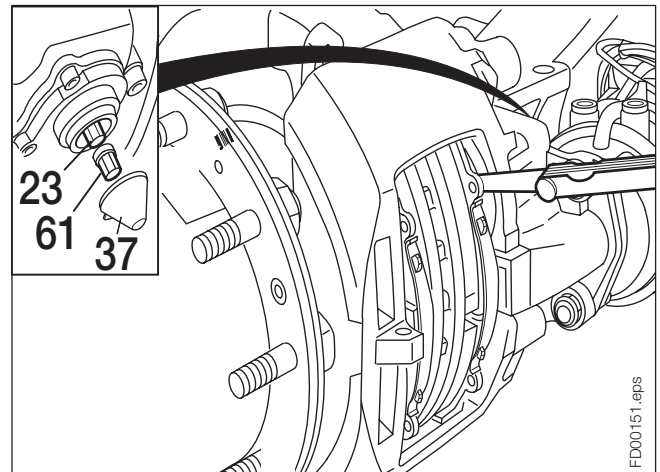
As the number of applications increases, incremental movement will decrease.

Note:

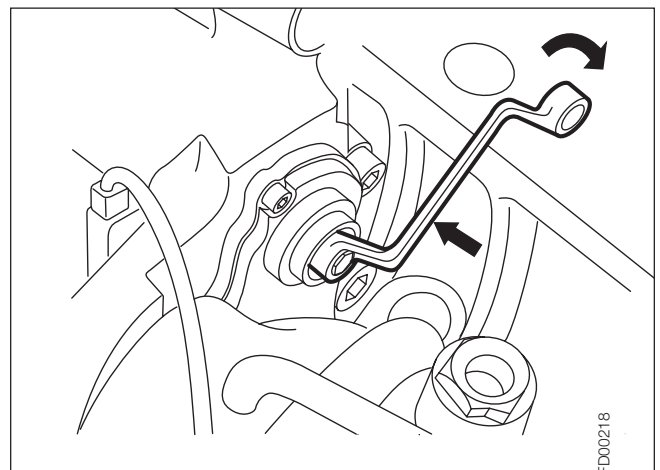
If the Spanner or Socket does not turn or turns only with the first application or turns forward and backward with every application, the automatic Adjuster has failed and the Caliper must be replaced.



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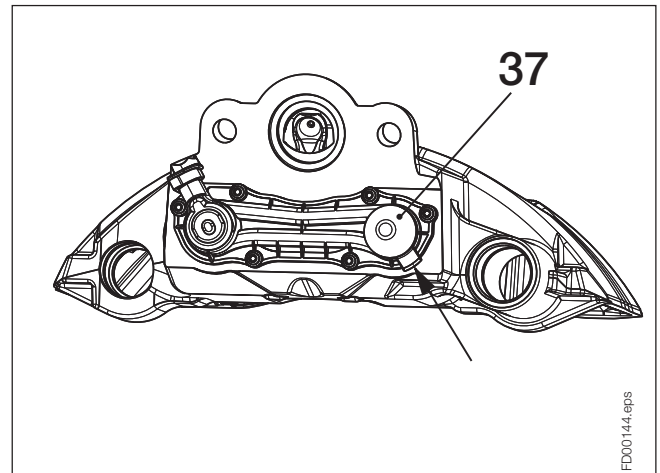


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Even if Pads are not being changed, a new Adjuster Cap (37) should be fitted having lightly greased it with white grease (available as Part No. II14525 or II32868).

Notes:

The tag of the Adjuster Cap (37) should be positioned as shown by the arrow in the adjacent diagram. This ensures access is maintained for subsequent removal. Removal of the Adjuster Cap with a screwdriver, for example, is not recommended since the seal may be damaged.



5.3 Caliper Checks

5.3.1 Caliper Running Clearance

⚠ Before starting service work, ensure the service brake and parking brake, as well as the bus stop temporary hold brake, if fitted, are not applied and that the vehicle cannot roll away.

By pushing and pulling the Caliper in an axial direction by hand (see arrow A in adjacent sketch), a movement of 0,6 - 1.1 mm must be possible.

If, using hand pressure only (no tools), the Caliper is not moveable, the Caliper guidance must be further examined (see Section 5.3.2).

5.3.2 Caliper Movement along Guide Pins

Remove Pads (see Section 6.1)

Clean dirt from Guide Pin (4a) or (4b) (see arrows in Sketch).

Using hand pressure only (no tools), the Caliper (1) must slide freely along the whole length of the Guide Pin arrangement. This should be greater than 25mm.

5.3.3 Rubber Bush (6a, 6b) or Guide Sleeve (6c) to Guide Pin clearance

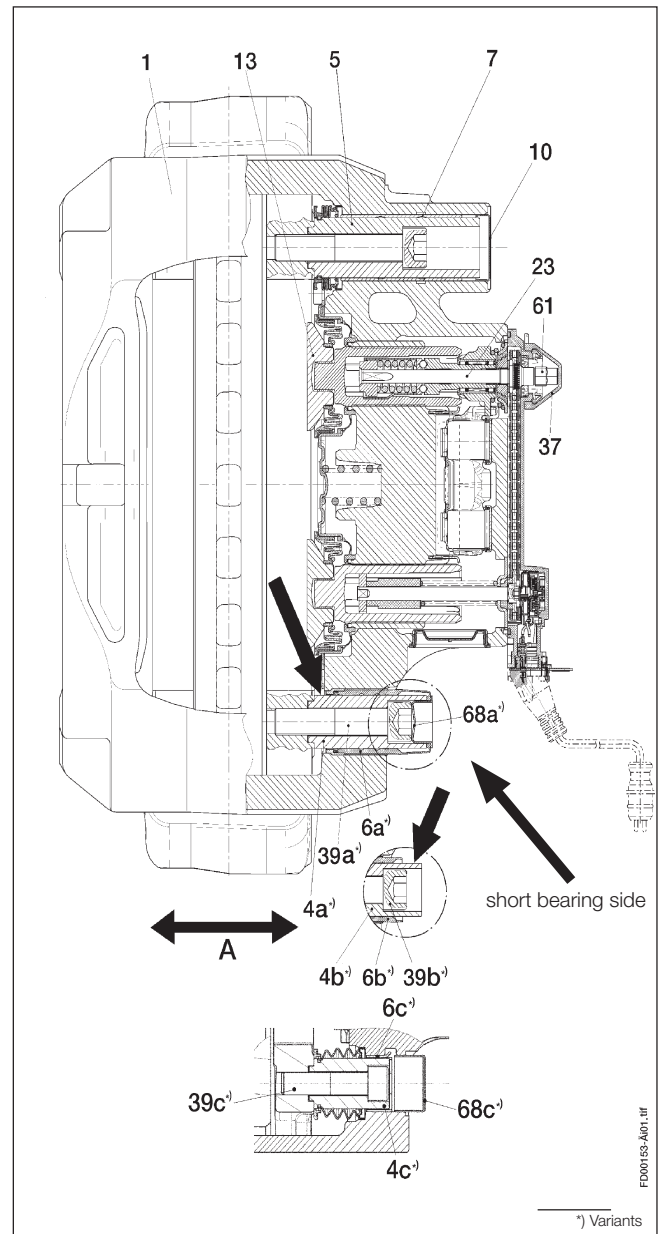
Note:

Before removing the wheel, note that there is no contact between Caliper and axle, vehicle, chassis sections or Carrier. If necessary the Rubber Bush (6a, 6b) or Guide Sleeve (6c) must be replaced (see Section 10.2).

To measure the clearance, the following steps must be taken:

Remove the wheel. Refer to Vehicle Manufacturer's recommendations.

Remove Pad Retainer (11), but leave the Pads (12) in the abutment.



Fasten a magnetic dial-gauge holder to the Carrier (2) on the short bearing side of the Caliper (1) - see also Sketch above.

Use the measuring point on the Caliper (1) - see arrow in adjacent Sketch.

Press Caliper (1) in the direction of Carrier (2) and set the dial-gauge to zero.

Place a suitable tool (e.g. Screwdriver) between Carrier (2) and Caliper (1) forcing them in opposite directions.

Read the maximum value on the dial-gauge.

Note:

Knorr-Bremse distinguishes between the two bearing variants

- Rubber Bush (6a or 6b),
- Guide Sleeve (6c).

If the short bearing side is open or closed by Cap (68a) and the distance is greater than 2,0 mm the Rubber Bush (6a or 6b) must be replaced using a suitable kit (see Section 1.2 and Section 8 and following).

If the short bearing side is closed by Cover (68c) and the distance is greater than 1,0 mm the Guide Sleeve (6c) must be replaced using a suitable kit (see Section 1.2 and Section 8 and following).

Note that there must be no contact between Caliper and axle, vehicle, chassis sections or Carrier. If necessary the Rubber Bush (6a, 6b) or the Guide Sleeve (6c) must be replaced using a suitable kit (see Section 1.2, Section 8 and following).

Fit Pads (see Section 6.2).

Fit the wheel. (Refer to Vehicle Manufacturer's recommendations).

5.4 Checking of Seals

5.4.1 Caliper Guide Pin Seals

The Guide Pin (5) is sealed with Cover (10) and with the Inner Boot (9).

The Guide Pin (4c) is also sealed with Inner Boot (9) and with Cover (68c).

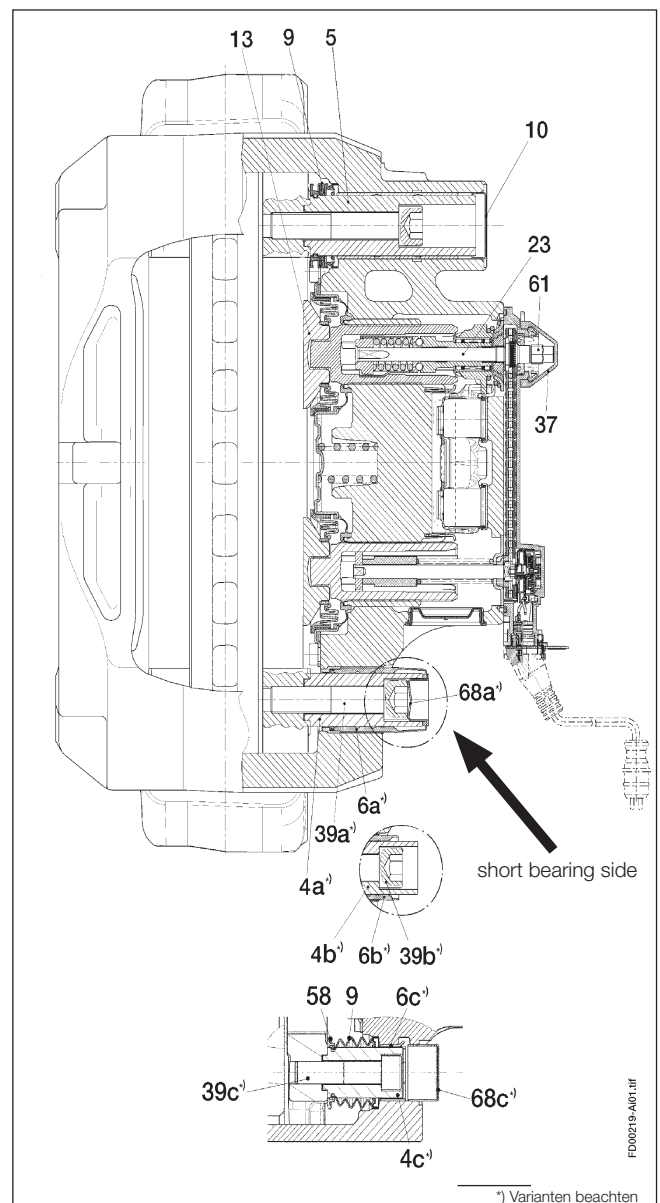
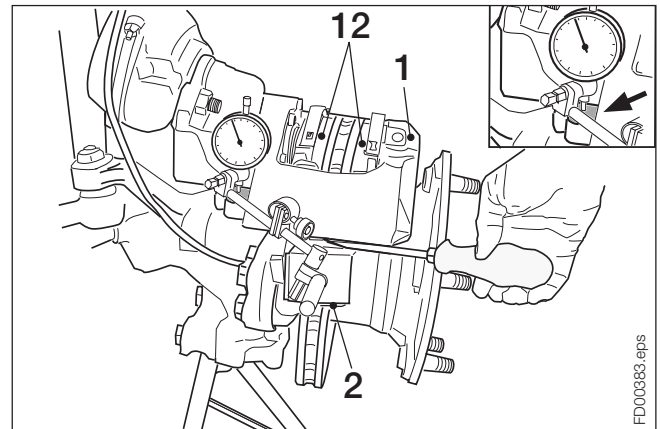
The components (9), (10) and (68c) must not show any signs of damage.

Check for correct location and fitment.

Note:

It may be necessary to remove the Pads to inspect the Inner Boots (9) - dependent on the amount of pad wear.

If necessary, service Caliper with suitable Kit (see Section 1.2, Section 8 and following).



5.4.2 Checking of Tappet and Boot Assemblies (13)

If necessary remove Pads (12) (see Section 6.1) and screw the Shear Adapter (61) clockwise (see Section 5.2) until the boots are clearly visible.

Note:

The tappet should not extend more than 30 mm (see sketch).

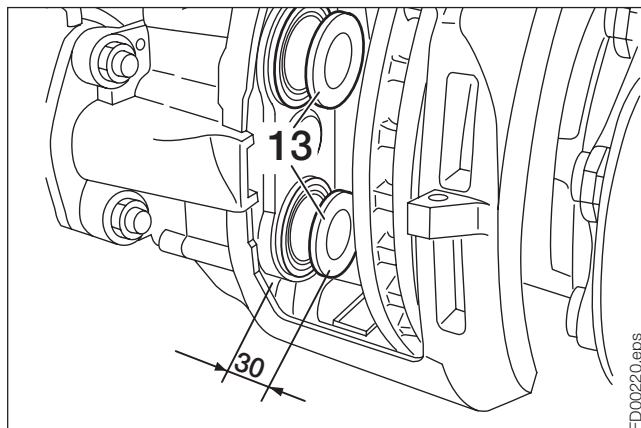
The Tappet and Boot Assemblies (13) must not show any signs of damage.

Check for correct location and fitment.

Note:

The penetration of dirt and moisture into the brake will lead to corrosion and impair the function of the Disc Brake.

If necessary replace Tappet and Boot Assemblies (see Section 7).



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6 Pad Replacement

⚠ Before starting service work, ensure the service brake and parking brake, as well as the bus stop temporary hold brake, if fitted, are not applied and that the vehicle cannot roll away.

6.1 Pad Removal

Remove wheel (refer to Vehicle Manufacturer's recommendations).

Note:

Before removing Pads it is strongly recommended that the Adjuster mechanism is checked for correct operation (see Section 5.2).

Remove Clip (26) and Washer (45), depress the Pad Retainer (11) and remove Pin (44).

If necessary remove any in-pad wear sensor components and discard.

If the Pad Retainer (11) is corroded or damaged, it should be replaced. Pull off the Adjuster Cap (37) using the tab, taking care not to lose the Shear Adapter (61).

Fully wind back the Tappet and Boot Assemblies (13) by rotating the Shear Adapter (61) in an anti-clockwise direction (see Section 5.2).

⚠ Never turn Adjuster (23) without Shear Adapter (61) being fitted. If the shear torque of the Shear Adapter is exceeded, then it is designed to fail. Try again with a new (unused) Shear Adapter. With a second failure of the Shear Adapter the Caliper must be exchanged since internal damage is present.

Do not use an open-ended spanner as this may damage the Adapter.

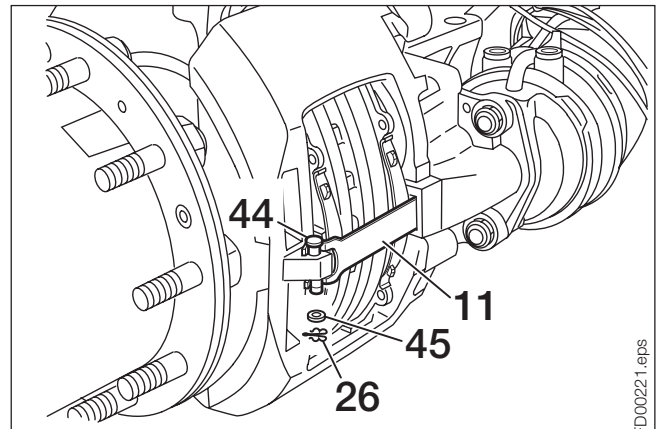
Note:

The shape of the backplate in SK7- and ADB22X- Disc Brakes means that the removal steps below must be followed:

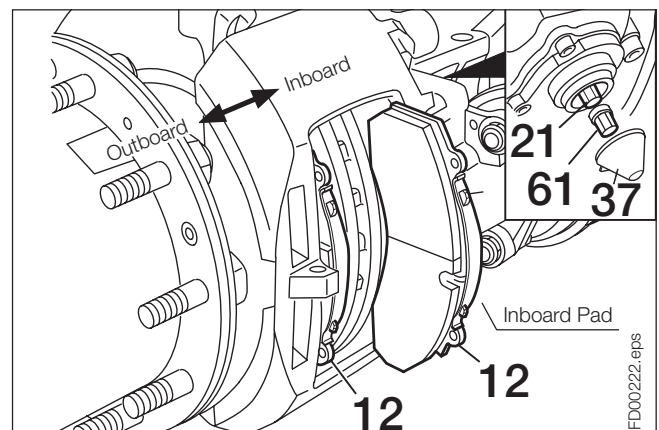
- slide Caliper (1) fully outboard,
- remove outboard Pad (12),
- slide Caliper (1) fully inboard,
- remove inboard Pad (12).

Note:

The removal steps for SN6- and SN7-Disc Brakes can be carried out in any order.



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6.2 Pad Fitting

⚠ Pads must be changed as an axle set and NOT individually. Use only Pads which are permitted by the vehicle manufacturer, axle manufacturer and disc brake manufacturer. Failure to comply with this may invalidate the vehicle manufacturer's warranty

Note:

Fully wind back the Tappet and Boot Assemblies (13) by rotating the Shear Adapter (61) in an anti-clockwise direction (see Section 5.2).

⚠ Never turn Adjuster (23) without Shear Adapter (61) being fitted. If the shear torque of the Shear Adapter is exceeded, then it is designed to fail. Try again with a new (unused) Shear Adapter. With a second failure of the Shear Adapter the Caliper must be exchanged since internal damage is present.

Do **not** use an open-ended spanner as this may damage the Adapter.

Clean the Pad abutments.

Note:

The shape of the backplate in SK7- and ADB22X- Disc Brakes means that the fitting steps below must be followed:

- slide Caliper (1) fully inboard,
- fit inboard Pad (12)
- slide Caliper (1) fully outboard
- fit outboard Pad (12)

Note:

The fitting steps for SN6- and SN7-Disc Brakes can be carried out in any order.

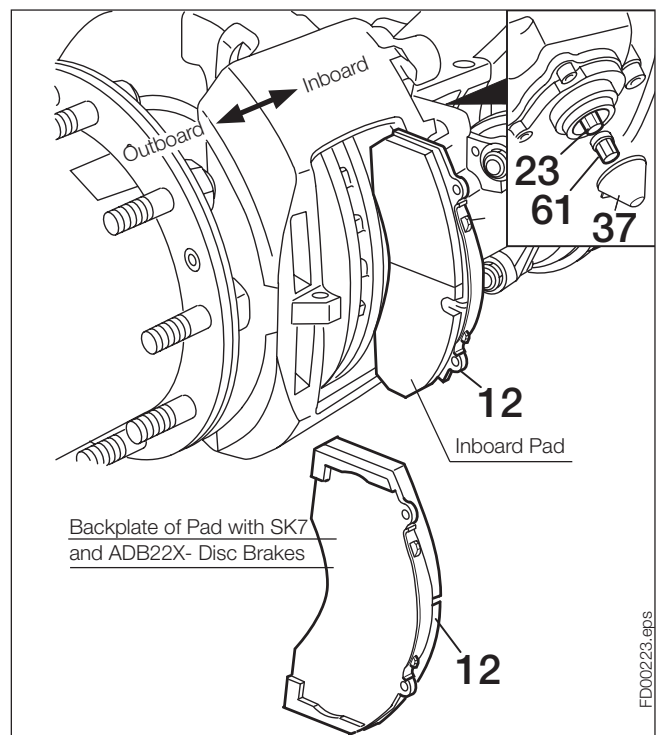
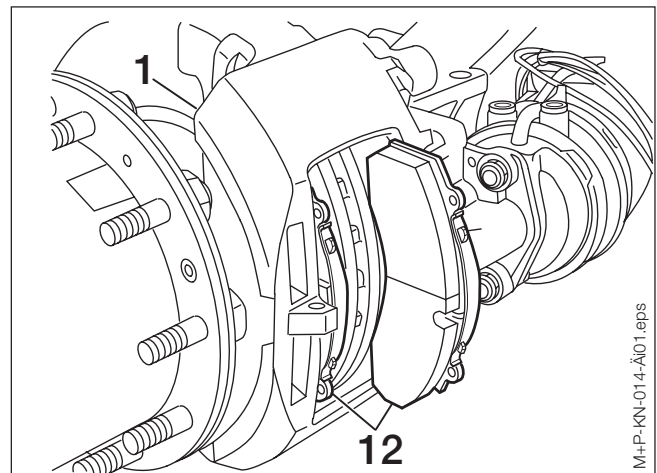
Fit new in-pad Wear Indicator kit, if appropriate (see Section 1.2.1 and Section 6.3).

Install the cable so that it cannot be damaged.

Turn the Shear Adapter (61) clockwise until the Pads come into contact with the Disc.

Then turn back the Adjuster 2 clicks (see Section 5.2).

The hub should turn easily by hand after having applied and released the brake.



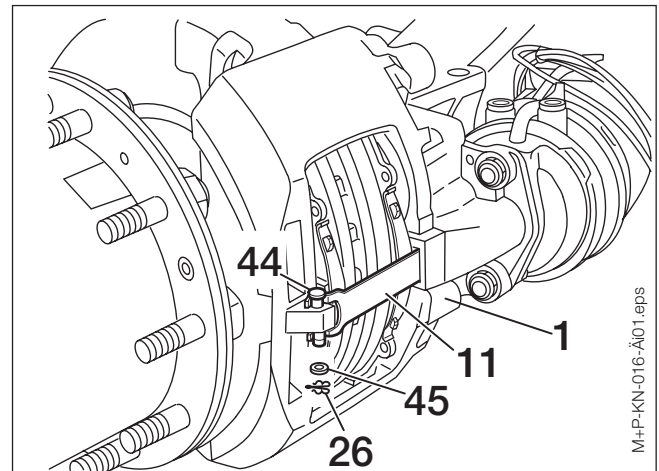
After fitting the Pad Retainer (11) into the groove of the Caliper (1), it must be depressed to enable the insertion of the Pad Retainer Pin (44).

Fit washer (45) and Spring Clip (26) to the Pad Retainer Pin (44) (use only new parts).

It is recommended that Pad Retainer Pin (44) is installed pointing downwards (see Sketch).

Re-fit wheel according to the Vehicle Manufacturer's recommendations.


The Adjuster Cap (37) must then be replaced (use only a new Cap) having lightly greased it with white grease (available as Part No. II14525 or II32868).

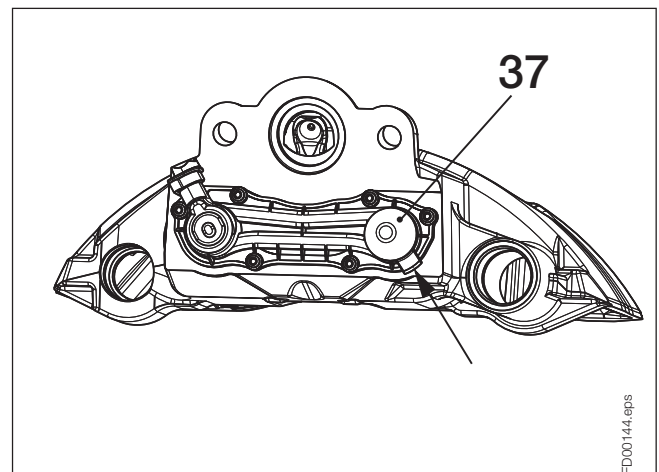


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Note:

The tag of the Adjuster Cap (37) should be positioned as shown by the arrow in the adjacent Sketch. This ensures access is maintained for subsequent removal.

 After every servicing: Check the brake performance and the system behaviour on a rolling road. Check function and effectiveness. During the bedding-in period there may be reduced braking effort.



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6.3 Wear Indicator Fitting

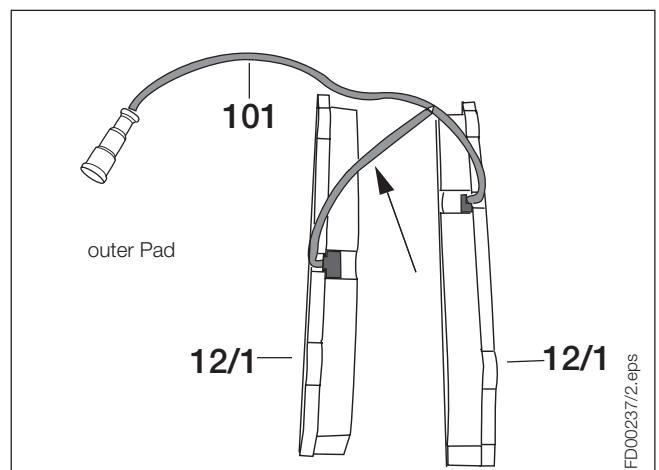
(Normally Closed or Normally Open Type)

Remove Pads (12) - see Section 6.1.

Wear Indicator Kits consist of items as shown in Section 1.2.1.

Insert the Wear Indicator Cables (101) into the groove of the Pads. The Wear Indicators snap into place in the holes in the Pad material.

The longer end of the Wear Indicator cable (see arrow) must be fitted in the outer Pad.

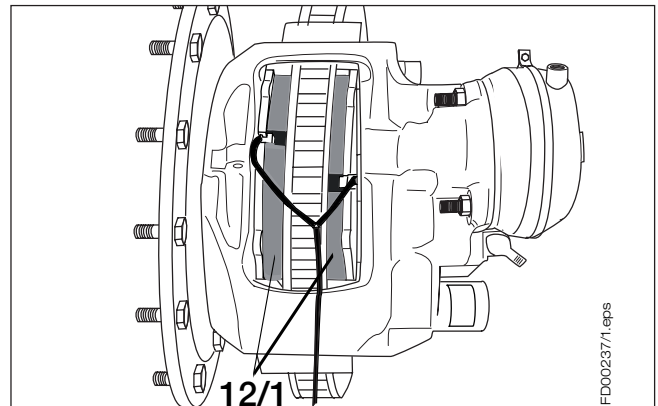


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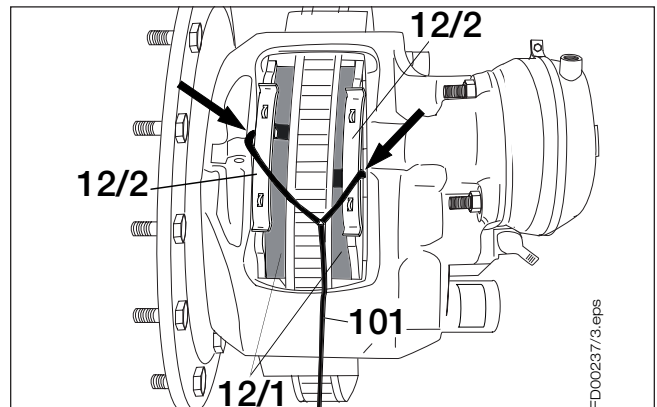
6

Pad Replacement

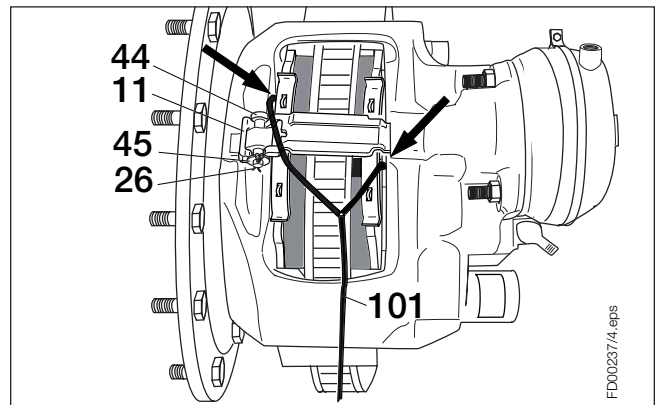
Insert Pads (12/1) into the Pad abutments (see Section 6.2).



Fit Pad Holder Springs (12/2) onto the Pads (12/1). Pay attention to correct installation of Wear Indicator Cable (101) (see arrows).

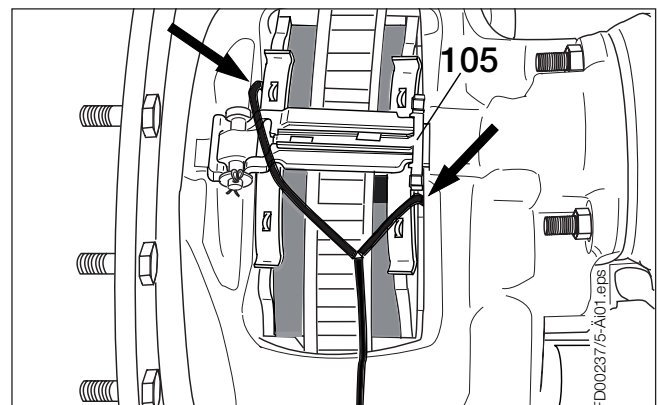


Fit Pad Retainer (11), Pad Retainer Pin (44), Washer (45) and Spring Clip (26) (see Section 6.2) Pay attention to correct installation of the Wear Indicator Cable (101) (see arrows).



6.3.1 Cable Guide (105)

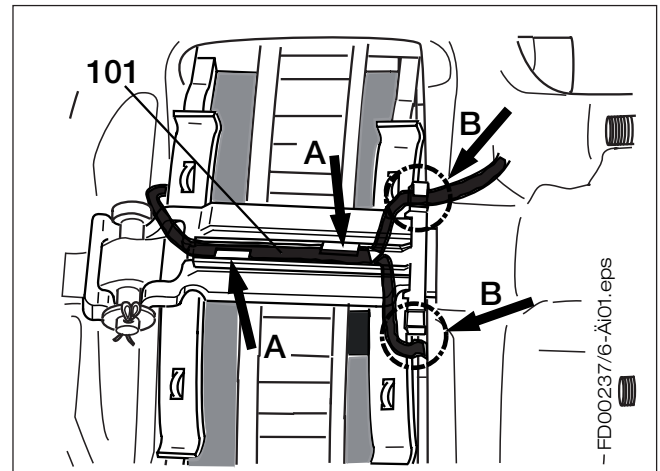
Fit Cable Guide (105) onto the Pad Retainer (11). In the right position, the Cable Guide (105) snaps into place by pressing it lightly onto the Pad Retainer (11).



Press Wear Indicator Cable (101) into the locating tabs of the Cable Guide (105) (see arrows A).

The short cable end of the Wear Indicator Cable (101) must not be secured by locating tabs of the Cable Guide (105).

According to vehicle type, install the cable that leads to the electrical supply of the vehicle, in one of the two locating tabs (see arrows B).



6.3.2 Cable Guide (105a)

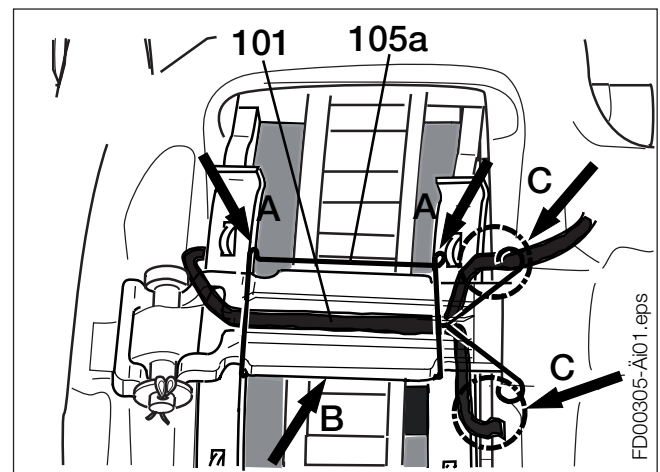
Install Indicator Cable (101) in the middle of the Pad Retainer (11).

Insert Cable Guide (105a) under one side of the Pad Retainer (11) (see arrow B).

Slightly press on the other side of the Pad Retainer (11) (see arrows A). The Cable Guide (105a) snaps into place.

According to vehicle type, install the cable that leads to the electric supply of the vehicle, in one of the wire loop (see arrows C).

The short end of the Wear Indicator Cable (101) **must not** be secured by a wire loop of the Cable Guide (105a) (see arrows C).

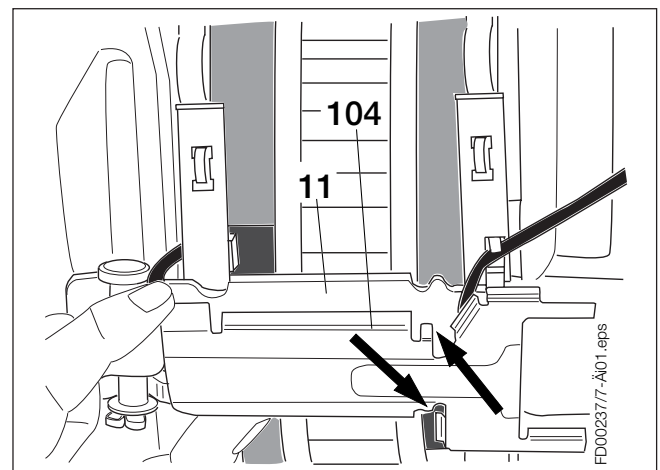


6.3.3 Protection Plate (104)

Fit the Cable Protection Plate (104).

Pay attention to the correct position of the Cable Protection Plate's catch (see arrows).

Exert hand pressure to the Cable Protection Plate (104); it will snap into place.



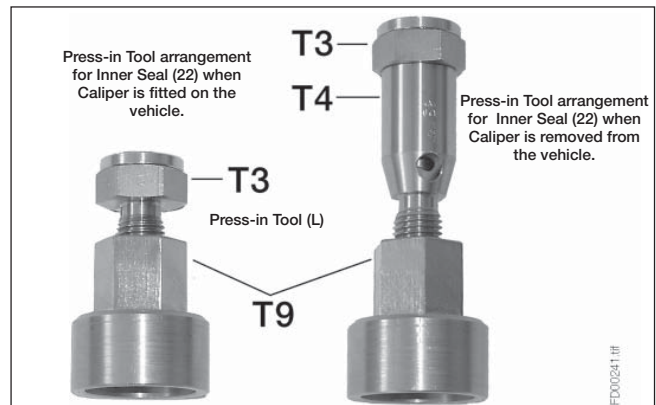
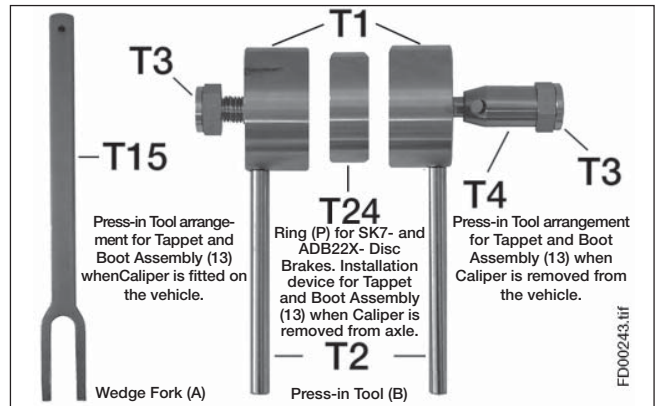
7 Replacement of Tappet and Boot Assemblies (13) and Inner Seals (22)

The components of the tools are referred to by item number for ease of reference.

To remove the Tappet and Boot Assembly (13) use the Wedge Fork (A) (Part No. II32203).

To fit the Tappet and Boot Assembly (13) use the Press-in Tool (B) (Part No. Z004190).

To fit the Inner Seal (22), use the Press-in Tool (L) (Part No. Z004361).



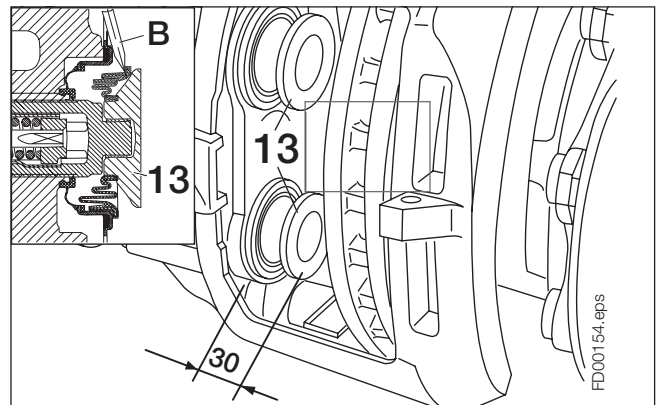
7.1 Tappet and Boot Assemblies (13) - Removal


Note:

It may be easier to remove the Caliper from the axle to replace the Tappet and Boot Assemblies (13) (see Section 8.1).

The Shear Adapter (61) must be screwed clockwise until the Boots can be reached (max. 30 mm) (see Section 7.1.1).

To remove the Tappet Boot from the Caliper bore, a Screwdriver (B) should be used to deform the Boot location ring - see adjacent diagram.



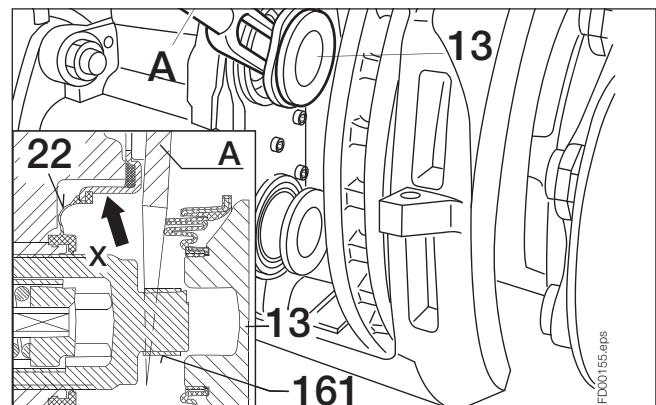
 The inner sealing face (see arrow X in adjacent sketch) must not be damaged. It cannot be replaced.

The Tappet and Boot Assemblies (13) can be removed from the Threaded Tubes (16) using Wedge Fork (A). (Part No. II32202) by driving it between the Tappet and the Caliper.

Remove the old Tappet Bush (161).

Check inner sealing face (see arrow X) .

When replacing Tappet and Boot Assemblies (13), the Inner Seals (22) must also be replaced.



Replacement of Tappet and Boot Assemblies (13) and Inner Seals (22)

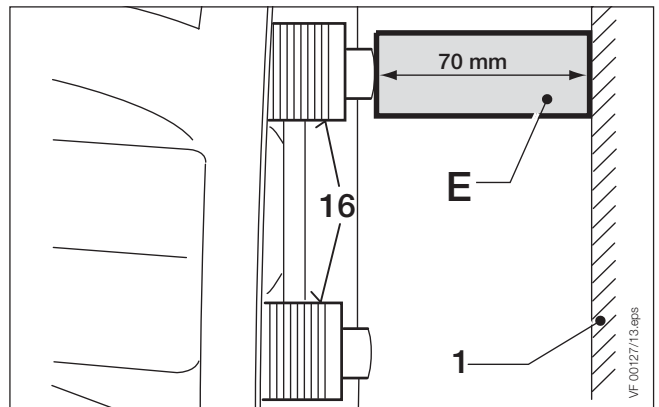
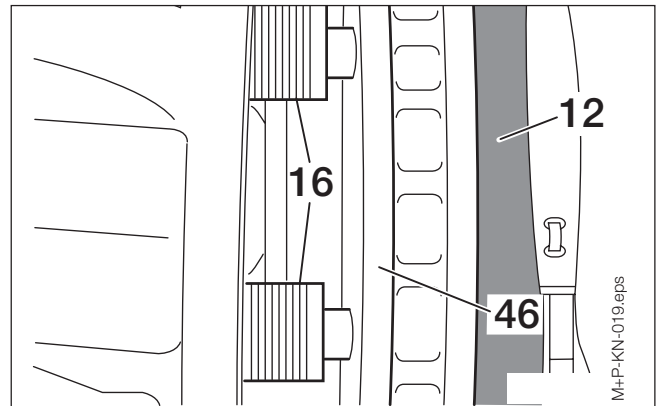
7.1.1 Threaded Tubes (16) - Inspection

Place an unworn Pad (12) into the outboard gap to avoid loss of thread engagement of the Threaded Tubes.

⚠ *Threaded Tubes should not lose engagement with the inner thread of the Bridge. The Caliper must be replaced if thread engagement and synchronisation is lost.*

If Caliper is not installed on axle, put a spacer E (length = 70mm) into the Caliper (1) to avoid loss of thread engagement of the Threaded Tubes (16) when screwing them out (see adjacent Sketch). Check the threads for corrosion damage.

In case of water ingress or corrosion, the Caliper must be replaced (see Section 8).



7.2 Inner Seals (22) - Replacement

Fully wind back the Threaded Tubes (16) by turning the Shear Adapter (61) anti-clockwise (see Section 5.2).

Clean area of the Inner Seal (22).

To remove the Inner Seal (22) a Screwdriver (A) should be used - see adjacent Sketch.

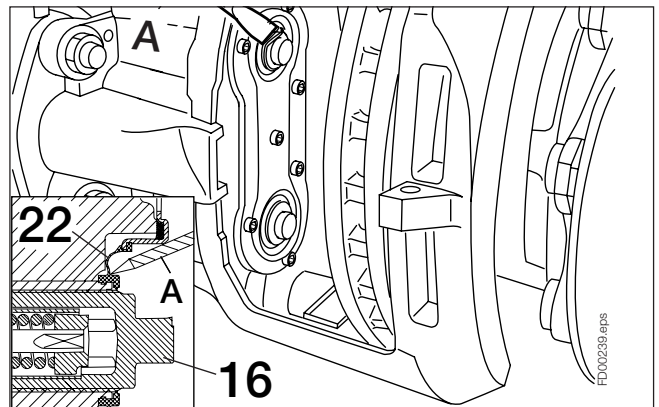
⚠ *The sealing face (X) for the Inner Seal (22), as well as the Threaded Tubes (16) must not be damaged. They cannot be replaced (see Section 7.1)*

Clean sealing face (X) .

For the inspection of the threads, the tubes must be screwed out (max. 30mm) by turning the Shear Adapter (61) clockwise.

Grease threads with white grease (Part No. II14525 or II32868).

Fit each Inner Seal (22) onto a Threaded Tube (16).



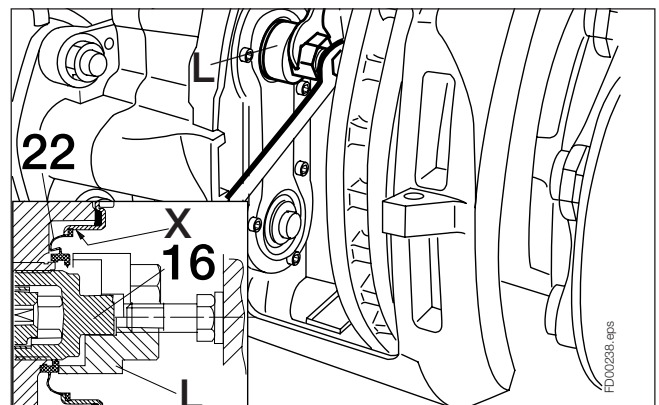
With Caliper installed on axle

Remove the Tappet Bush (161).

Position Tool (L) (Part No. Z004361) with the short strut in the position shown.

The Tool (L) is guided over the spigot of the Threaded Tube (16).

Fully press in the Inner Seal (22) by rotating Tool T3 using a spanner - see adjacent Sketch.



Replacement of Tappet and Boot Assemblies (13) and Inner Seals (22)

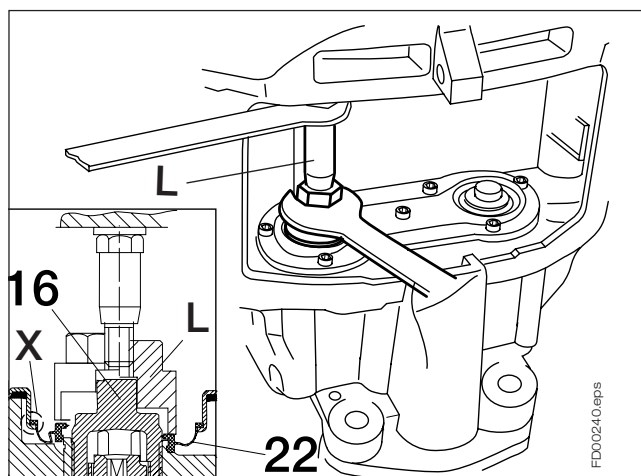
To check the correct fit of the Inner Seal (22), screw out the Threaded Tubes (16) about 4-5 threads by turning the Shear Adapter (61) clockwise.

The Inner Seal (22) must not turn.

With Caliper not installed on axle

The fitting sequence of Inner Seal (22) does not change.

When pressing in the Inner Seal (22) however, use the long strut (T3+T4) for Tool (L) (Part No. Z004361) - see page 28.



7.3 Tappet and Boot Assemblies (13) - Fitting

With Caliper installed on axle

The Threaded Tubes (16) must be fully wound back (see Section 5.2).

The sealing seat in the caliper for Tappet and Boot Assemblies (13) must be clean and free of grease.

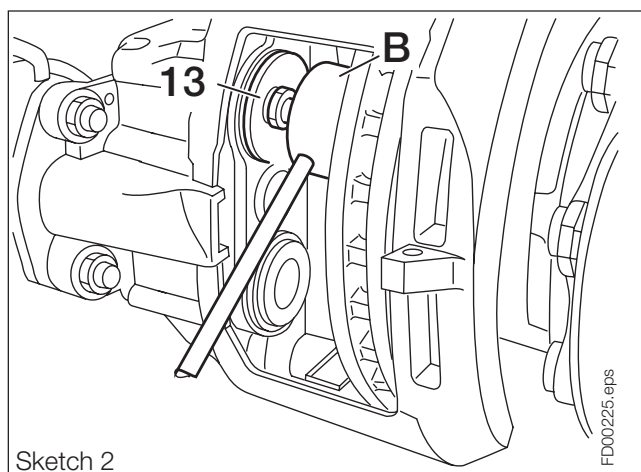
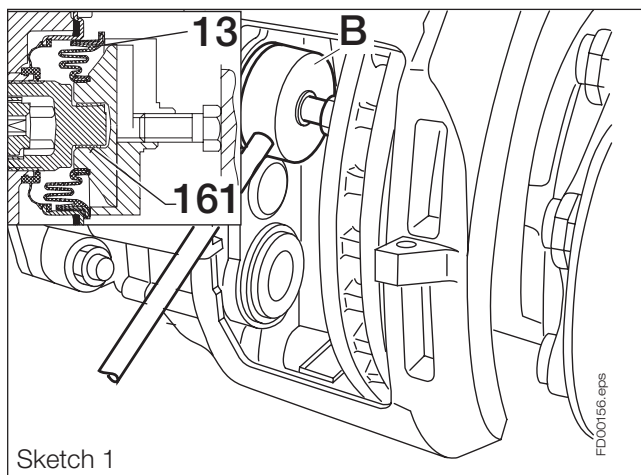
Fit a new Tappet Bush (161) onto the spigot of each Threaded Tube (16).

Position a Tappet and Boot Assembly (13) onto each Tappet Bush.

Use Push-in Tool (B) (Part No. Z004190) with the short strut (T3) for positioning and pressing in the Boot - see Sketch 1.

Using Tool (B) (Part No. Z004190) in reverse, with the short strut (T3), each Tappet can be pressed onto its Tappet Bush - see Sketch 2.

After assembly the Tappet (13) must be free to turn in both directions.



Replacement of Tappet and Boot Assemblies (13) and Inner Seals (22)

With Caliper not installed on axle

The Threaded Tubes (16) must be fully wound back (see Section 5.2).

The sealing seat in the caliper for Tappet and Boot Assemblies (13) must be clean and free of grease.

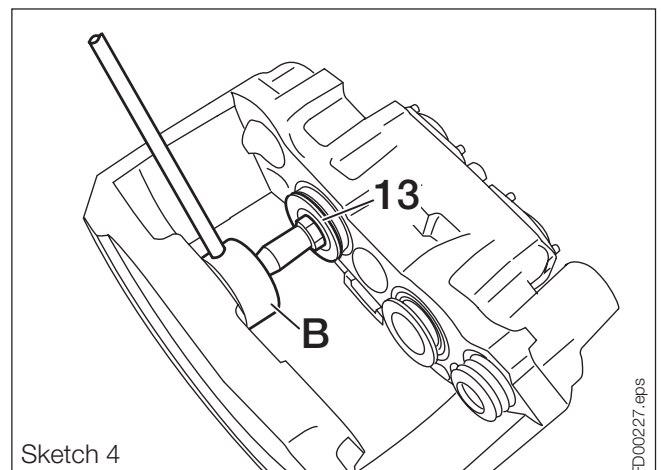
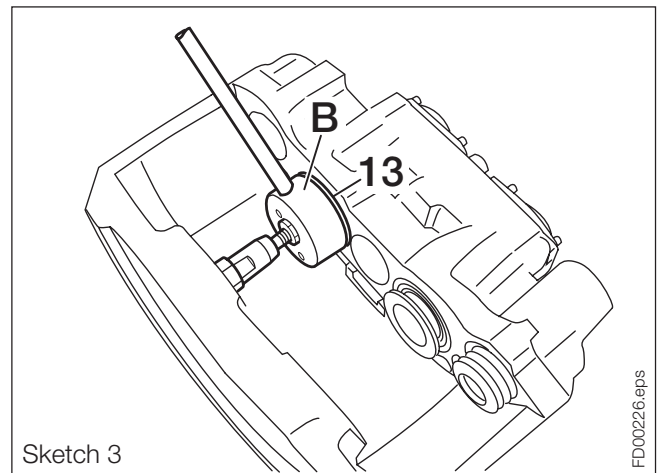
Fit a new Tappet Bush (161) onto the spigot of each Threaded Tube (16).

Position a Tappet and Boot Assembly (13) onto each Tappet Bush.

Use Push-in Tool (B) (Part No. Z004190) with the long strut (T3+T4) for positioning and pressing in the Boot - see Sketch 3.

Using Tool (B) (Part No. Z004190) in reverse, with the long strut (T3+T4), each Tappet can be pressed onto its Tappet Bush - see Sketch 4.

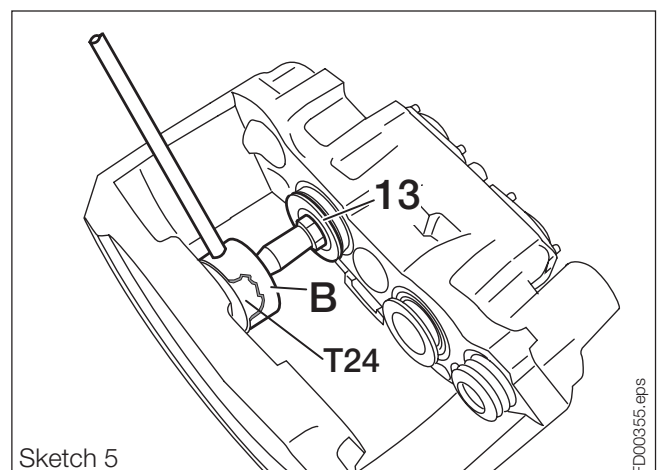
After assembly the Tappet (13) must be free to turn in both directions.



Note:

With SK7- and ADB22X-Disc Brakes the caliper's backplate is too small using only Tool (B).

In order to support the Tool (B) correctly on the Caliper's backplate, insert the Ring (T24) - see Sketch 5.



8 Caliper Replacement

The components of the tools are referred to by item number for ease of reference.

To fit the Cap (68a), use the Press-in Tool (K) (Part No. Z003934).

To fit the Cover (68c), use the Press-in Tool (M) (Part No. K016743).

To fit the Cover (10) use Press-in Tool (H) (Part No. K015825).

8.1 Caliper Removal

Remove Pads (12) (see Section 6.1).

Remove Actuator (see Section 12.1, 12.3).

If fitted, remove Wear Indicator Cable or Cable to built-in Potentiometer.



Do not touch electrical contact points because of static discharge!

Note:

It may be necessary for reasons of accessibility to remove the Caliper and Carrier from the axle (refer to Vehicle Manufacturer's recommendations) or remove only the Caliper.

8.1.1 Removal of the Cover (10)

Use a suitable Tool (e.g a Screwdriver) to penetrate the Cover (10).

During penetration, the Cover may move approximately 10 mm inwards.

Remove Cover (10).



Cover (10) should be penetrated in the middle. Do not drive the tool between Caliper bore and Cover (10) since Caliper bore may be damaged.

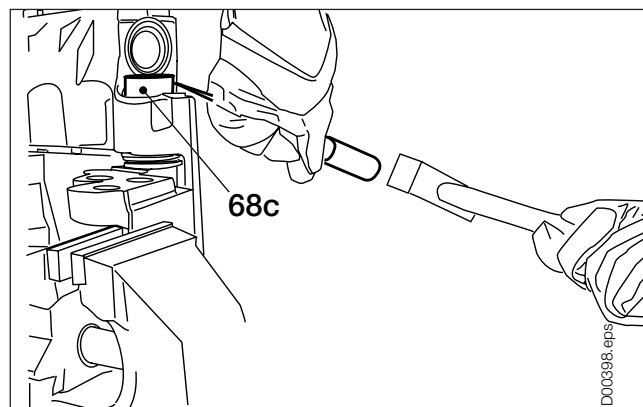
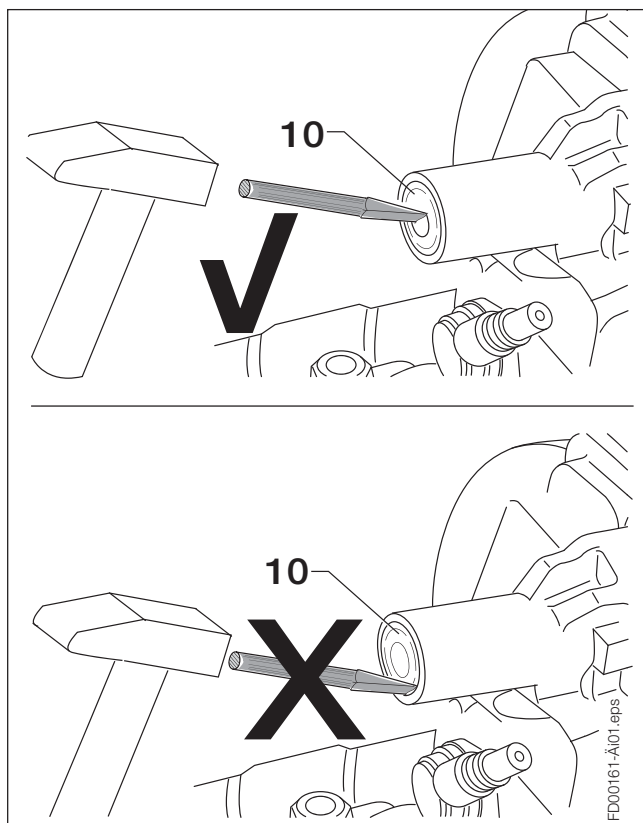
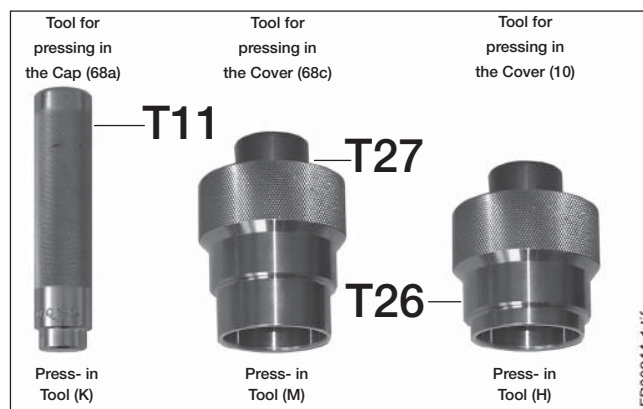
Check the Caliper bore for the cover (10), as well as the inner bearing bore for dirt and corrosion. If necessary the Caliper must be replaced.

8.1.2 Removal of the Cover (68c)

Because of the protruding Cover (68c) it must be disassembled as shown in adjacent Sketch. Use a screwdriver or another suitable tool.

Do not disassemble the Cover (68c) in direction of the Caliper since itself or components of it might be damaged.

Check the Caliper bore for the cover (68c), as well as the inner bearing bore for dirt and corrosion. If necessary the Caliper must be replaced.



8.1.3 Removal of Cap (68a)

On Calipers with Rubber Bush (6a), pull the Cap (68a) from the Guide Pin (4) using a suitable tool (see Sketch).

⚠ Take care not to damage Rubber Bush (6a). If necessary replace it by means of a Guide Pins and Seals Kit.

8.1.4 Remove Caliper from Carrier

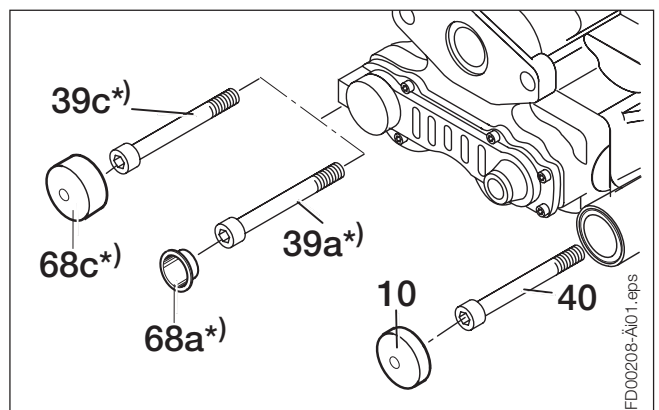
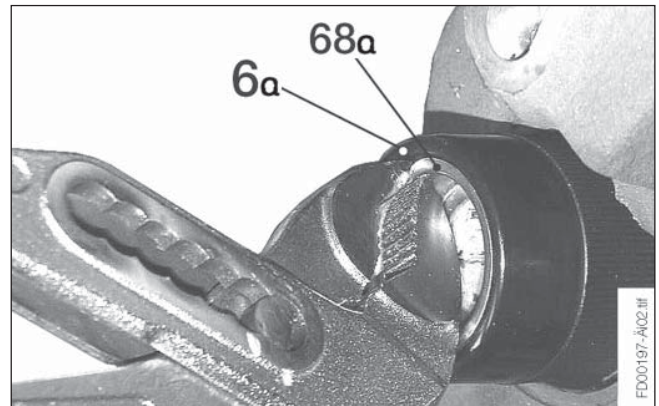
⚠ Before removing the Caliper Bolts (39 and 40) ensure that the Caliper (1) cannot move or fall when the Caliper Bolts are removed causing damage or injury.

Remove Caliper Bolts (39) and (40) and discard. They must not be re-used.

⚠ Never hold the Caliper with your fingers between Caliper and Carrier - there is a risk of injury! Do not fasten any lifting device to the Pad Retainer (11), since this could be damaged.

⚠ The opening or dismantling of the Caliper is not authorised. Use only genuine Knorr-Bremse replacement Calipers.

Remove Caliper from Carrier.



8.2 Caliper Fitting

(Carrier is fitted on the axle)

The correct choice of Caliper must be ensured by checking the part number on the identification label (see arrow A in sketch 1 and Section 1.2).

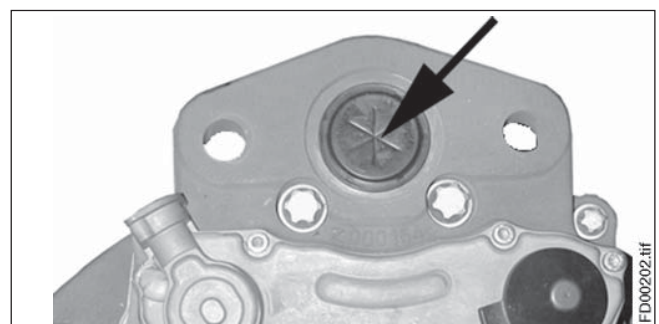
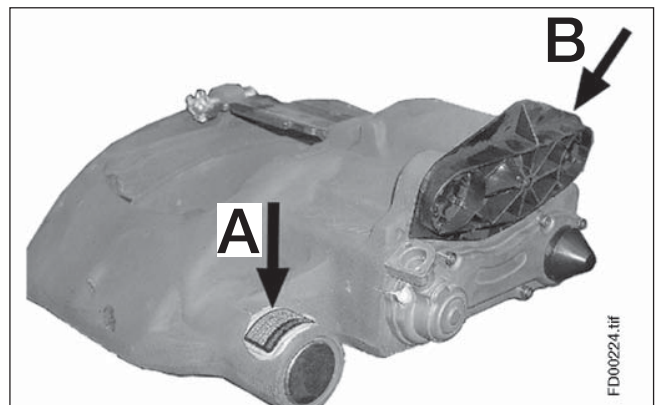
The replacement Caliper may have a plastic cap or adhesive tape in the area of the actuator attachment (see arrow B in sketch 1). Remove the cap or tape after installing the caliper on the vehicle. Alternatively, if the replacement Caliper has a breakthrough diaphragm, it should be left in place (see arrow in sketch down).

Note:

The replacement Caliper includes Seals and Guide Pins. The Pads are not included.

If the replacement Caliper is equipped with a potentiometer, then the connection must be made using the appropriate mating plug - refer to Vehicle Manufacturer's recommendations.

⚠ Never hold the Caliper with your fingers between Caliper and Carrier - there is a risk of injury! Do not fasten any lifting device to the Pad Retainer (11), since this could be damaged.



Caliper Replacement

⚠ *The Guide Pins (4 and 5) as well as the Caliper Bolts (39 and 40) are highly stressed items. They must be replaced whenever the Caliper (1) is removed from the Carrier (2).*

Fit the Caliper to the Carrier.

Screw in new Caliper Bolts (39) and (40) and tighten to 180 Nm, then tighten by a further 90°.

⚠ *Screw threads and tapped holes must be clean and dry (free of lubrication and residuals of pre-applied adhesive).*

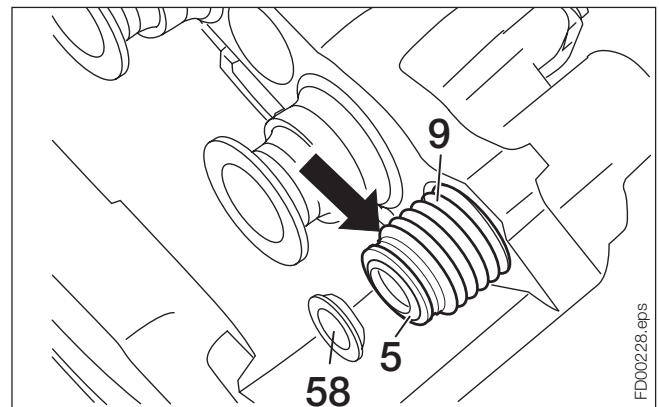
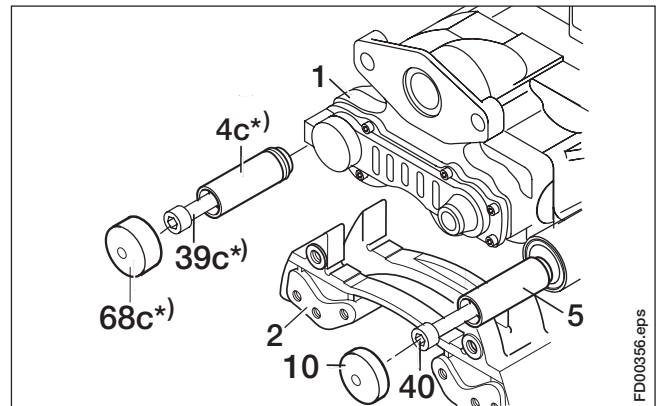
Check that the Caliper slides easily on the Guide Pins.

Check the position of the Inner Boot (9) on the Guide Pin (5). According to the Caliper variant check also the position on the Guide Pin (4) as well as the position of Ring (58).

Fit Pads (see Section 6.2).

Check Adjuster function (see Section 5.2).

Attach Brake Chamber or Spring Brake (see Section 12.2 or 12.4).



8.2.1 Fitting of Cover (10) and (68c)

Caliper bores and Covers (10) and (68c) must be clean and free from lubrication.

Clean the new Cover (10) and (68c) thoroughly and check that the face and the chamfer are clean and not damaged - see arrows in figure below right.

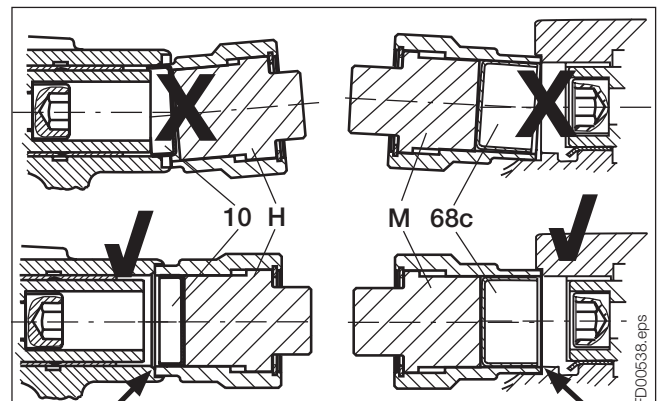
Clean the interior of the Press-in tool (H) or (M) and place the Cover (10) or (68c) inside - see adjacent figure.

Position the Press-in tool (H) or (M) including Cover (10) or (68c) to the start of the caliper bore. Press on the mandrel of the Press-in tool (H) or (M) by hand until resistance is felt.



Note:

Do not tilt the tools when assembling the Covers (10) and (68c) - see adjacent figure.



! *The Inner Boot (9) must be in a compressed condition, - see adjacent figure -, since the Caliper's freedom of movement may be limited if air is trapped in the Inner Boot (9) .*

Use a hammer on the mandrel to insert the cover to the end stop.

Note:

After fitting the new Cover (10), it should protrude 2 mm from the Caliper's face - see adjacent figure .

Note:

After fitting the new Cover (68c), it should protrude 15.5 mm from the Caliper's face - see adjacent figure.

8.2.2 Fitting of Cap (68a)

Fit the Cap (68a) using Tool (K) (Part No. Z003934) and a hammer. Force the Cap (68a) into the Guide Pin (4) until it contacts the Caliper Bolt. The seal is achieved by the compression of the lip of the Rubber Bush (6a) between the Guide Pin (4) and Cap (68a) (see view "Y").

If the Caliper and Carrier Assembly is not fitted to the vehicle

! *Move the Caliper against the Carrier and hold it using a suitable clamping device so that the Inner Boot (9) is in a compressed condition to prevent air being trapped while Cover (10) or Cover (68c) and Cap (68a) is fitted.*

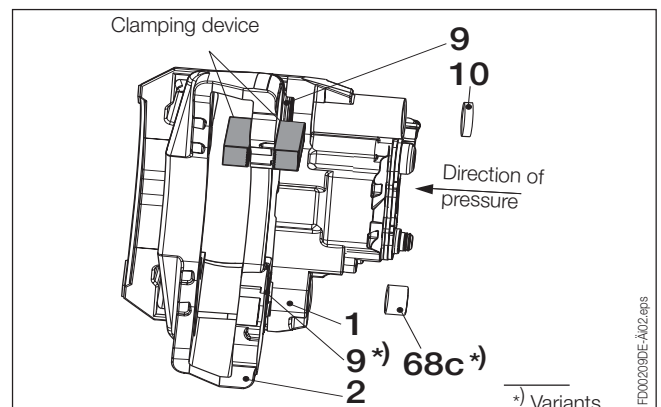
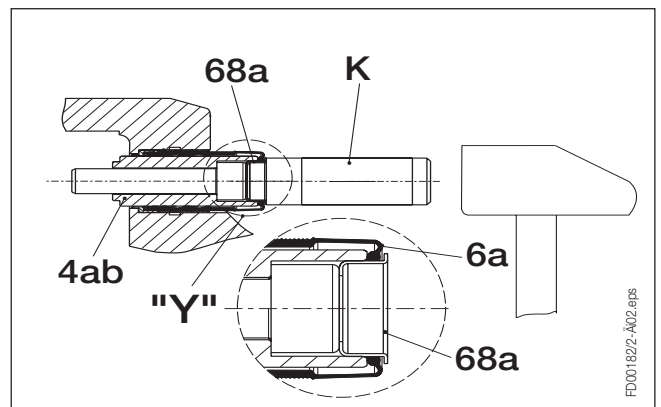
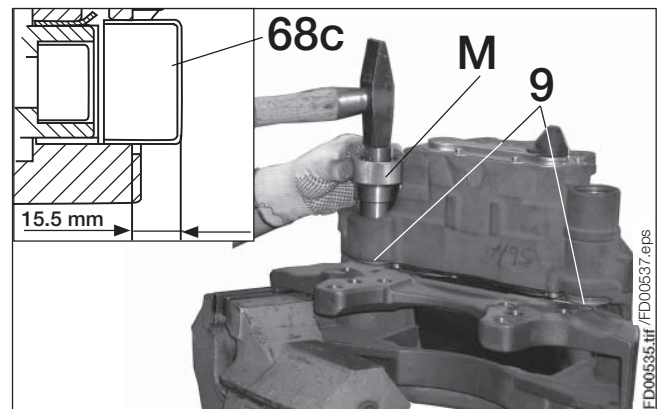
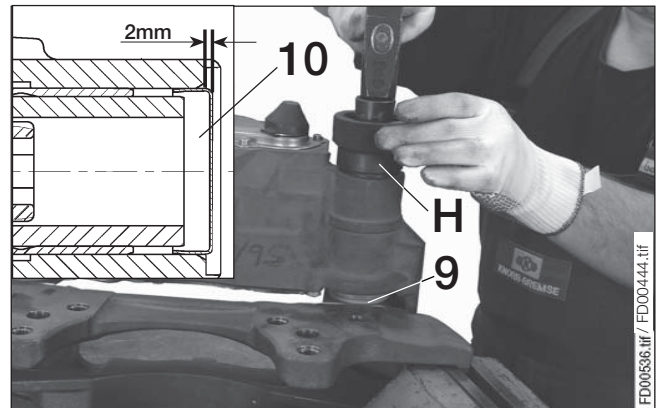
Fit new Cover (10), Cover (68c) or Cap (68a) as described above.

If the Caliper and Carrier Assembly is to be fitted as a single unit to the vehicle, do so in line with the Vehicle Manufacturer's recommendations.

Fit the Pads, if not already fitted (see Section 6.2).

Check Adjuster function (see Section 5.2).

Attach Brake Chamber or Spring Brake (see Section 12.2 or 12.4).



9 Replacement of Inner Boot (9)

The components of the tools are referred to by item number for ease of reference.

To fit the Inner Boot (9) use the Pull-in Tool (C) (Part No. Z004357).

Remove Caliper (see Section 8.1).

Remove Ring (58).

Pull out Guide Pin (5).

Push out Inner Boot (9) with screwdriver.

Note:

If the Inner Boot (9) is installed with Guide Pin (4c):

Remove Ring (58).

Pull out Guide Pin (4c).

Push out Inner Boot (9) with screwdriver.



The sealing face of Inner Boot (9) in the Caliper must not be damaged (see arrow A in adjacent Sketch).

Inspect and clean contact area of Inner Boot (9).

Check for corrosion (see arrow A in adjacent Sketch).

Check Brass Bush (7) and if installed Guide Sleeve (6c) for dirt and replace if damaged (see Section 10.1 and 10.2).

Fit new Boot (9) into the Sleeve of the Tool (C) (Part No. Z004357). See arrow B in adjacent Sketch.

Pay attention that the bellow-folds of Inner Boot (9) are positioned within the tool.

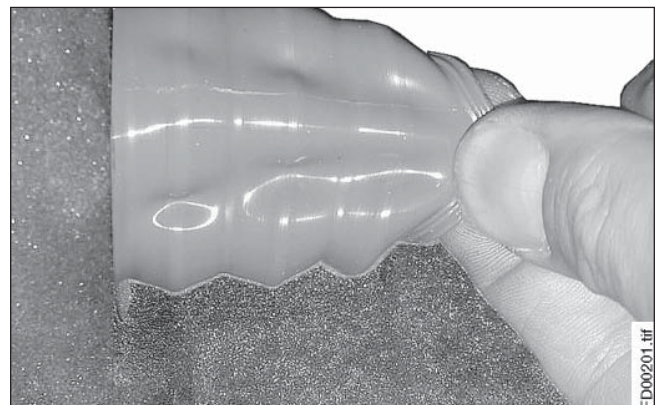
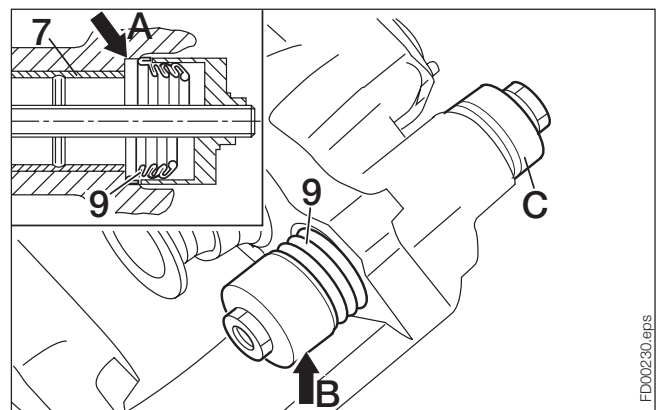
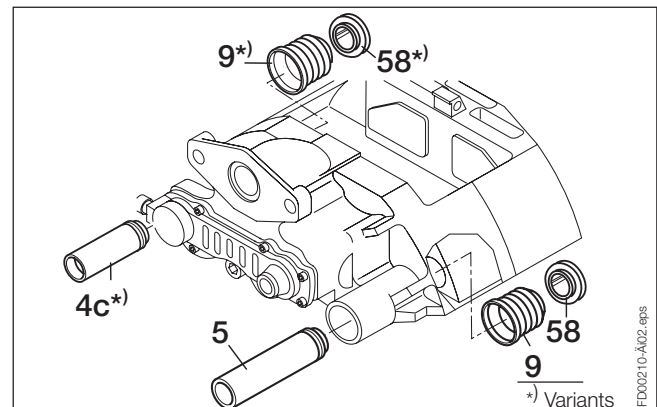
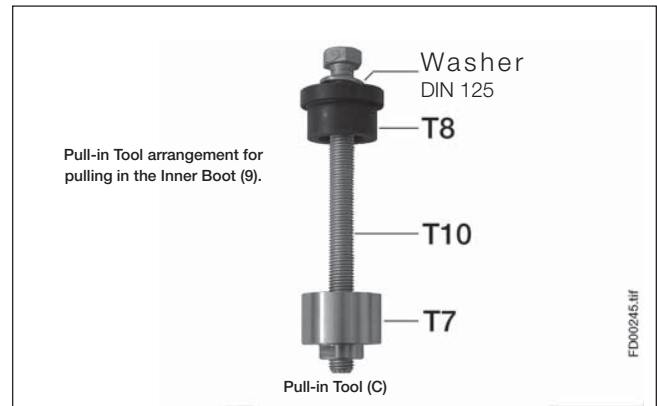
Position Sleeve with Inner Boot (9) into the Caliper bore and pull in by hand.

Then pull in with a maximum torque of 8 Nm.

Note:

Pay attention to the correct position of Inner Boot (9).

Carry out a pulling check (see adjacent Sketch).



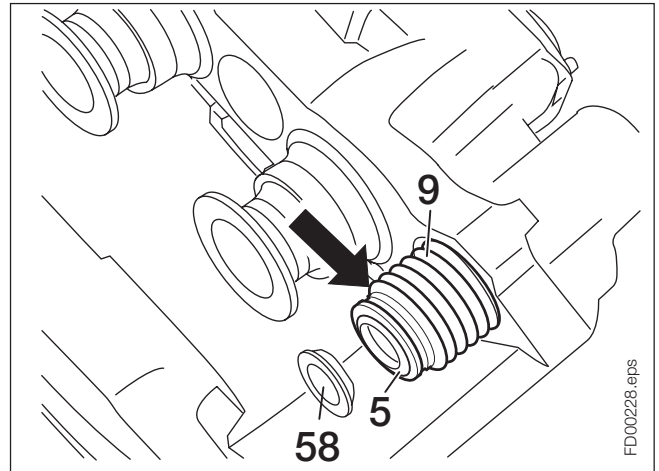
Grease Brass Bush (7) and if installed Guide Sleeve (6c) with white grease (Part No. II14525 or II32868).

Insert Guide Pin (5) and also Guide Pin (4c) if Guide Sleeve (6c) is installed.

The lip in the end of the Inner Boot must engage in the groove of the Guide Pin (5) and if installed in the groove of the Guide Pin (4c) (see arrow).

Pushing on the Ring (58) ensures that the Boot (9) is engaged in the groove of the Guide Pin (5) or if installed in the groove of the Guide Pin (4c).

Fit Caliper (see Section 8.2).



10

Replacement of Guide Pin Bushes

10 Replacement of Guide Pin Bushes

The components of the tools are referred by item number for ease of reference.

In order to remove, fit and groove the Brass Bush (7) use the Pull-out/Pull-in and Grooving Tool (D) (Part No. Z004354).

Remove Caliper (see Section 8.1 and following).

10.1 Brass Bush (7) - Replacement

Remove Guide Pin (5) and Inner Boot (9) (see Section 9). Clean surface (X), surface (Y) and Brass Bush (7) (see Sketch 2).

10.1.1 Removal of Brass Bush (7)

Position tool combination (D) for pulling out Brass Bush (7) (see Sketch 2).

Note:

Ensure that Nut (T14) is located in Brass Bush (7) and the end of Tube (12) is firmly located - see Sketch 2.

Pull out Brass Bush (7) by means of a spanner or socket - see Sketch 2.

10.1.2 Fitting of Brass Bush (7)

Fully wind Brass Nut (T14) on to Spindle (T13).

Place new Brass Bush (7) on the Groover (T16) and insert into caliper bore - see Sketch 3a.

Screw Spindle (T13) by hand up to stop.

Note:

Pay attention to Groover (T16) - see Sketch 3a. It must be able to move freely.

The Flange (T8) must be located in caliper recess.

Pull in Brass Bush (7) using Brass Nut (T14) up to stop - see Sketch 3b.

To prevent longitudinal displacement of Brass Bush (7) it must be "grooved" - see Sketch 3c.

To do so the Groover (T16) must be screwed in up to stop.

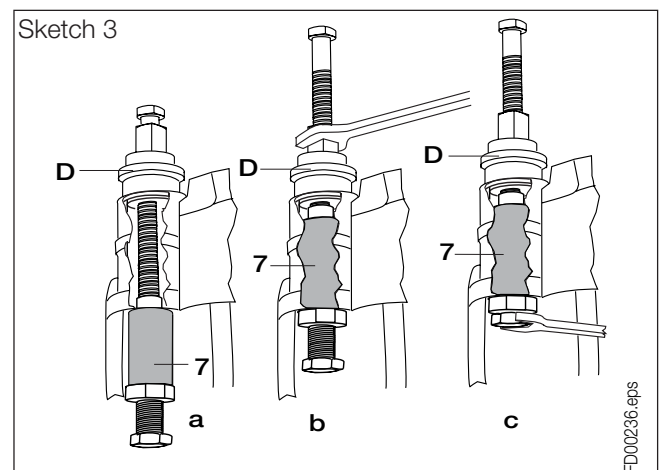
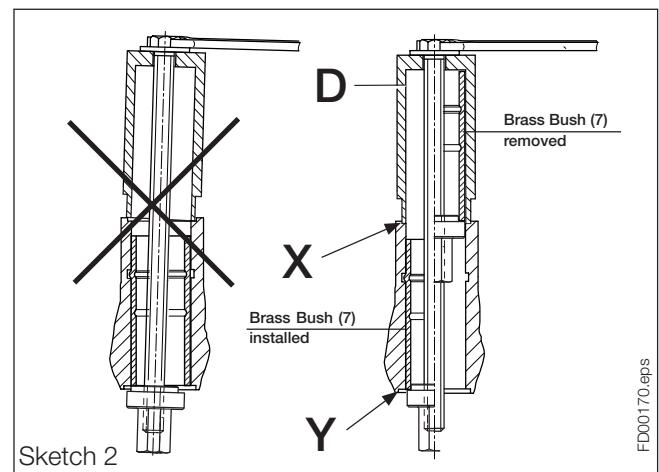
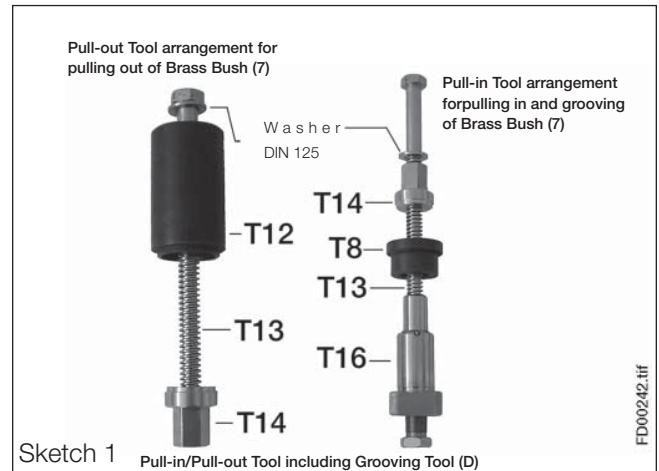
Wind back the Groover (T16) approximately 20 mm.

Slacken the Brass Nut (T14) and rotate the Groover (T16) through approximately 60°.

Repeat the process of "grooving".

The new Brass Bush (7) is now grooved with the Caliper.

Before removing the Tool (D), the hexagon screw of the Groover (T16) should be wound out approximately 20 mm.



Check contact area of Brass Bush (7) and remove any burrs.
Grease Bush (7) with white Grease (Part No. II14525 or II32868).

10.2 Rubber Bush (6a or 6b) and Guide Sleeve (6c) - Replacement

The components of the tools are referred by item number for ease of reference.

Use Tool (R) (Part No. Z004198) for the assembly of the Rubber Bush (6a or 6b), (see adjacent sketch).

Note:

Do **not** use the Disc T5 Ø35 with SN- Type.

Use Tool (N) (Part No. K005986) for the assembly of the Guide Sleeve (6c) (see adjacent sketch).

10.2.1 Removal of Rubber Bush (6a or 6b)

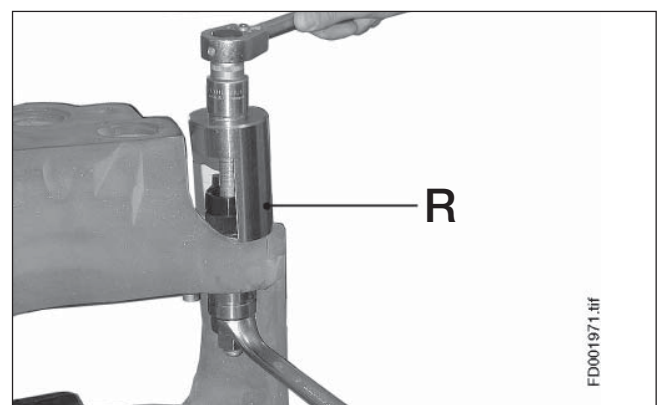
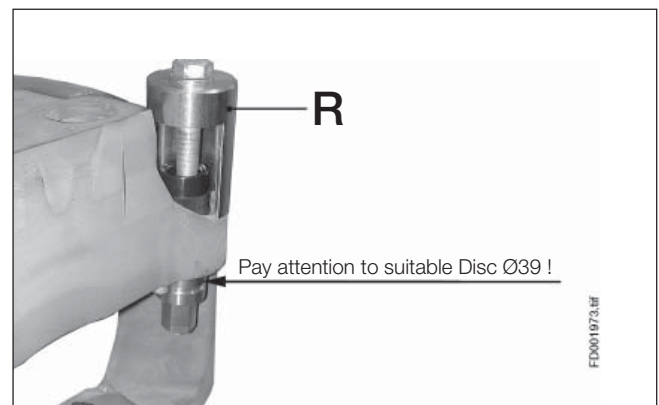
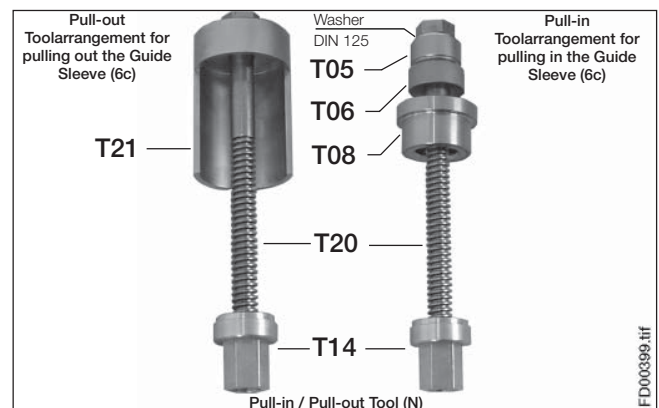
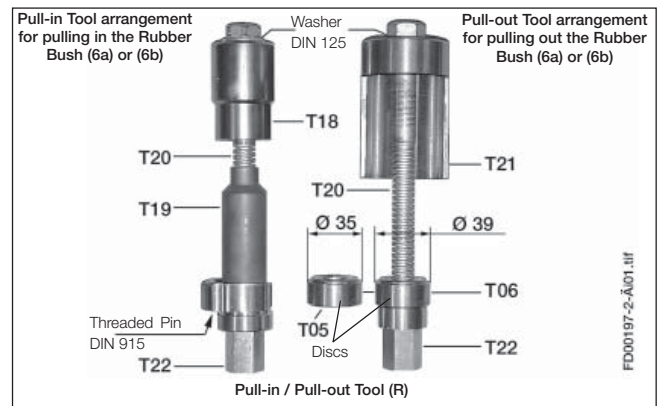
Remove Guide Pin (4a or 4b).

Clean Caliper in the area of the Rubber Bush.

Select Disc T6 Ø39.

Position the Tool (R) (Part No. Z004198) as shown in the adjacent picture. Screw on the Nut (T22) by hand.

Hold the Nut (T22) with a ring spanner and with a suitable socket or ring spanner tighten Spindle (T20) to remove the Rubber Bush.



10.2.2 Removal of Guide Sleeve (6c)

Remove Guide Pin (4c) .

In order to separate the tab from the Guide Sleeve (6c) use the screwdriver or similar tool whose width is smaller than the tab.

Place the screwdriver as close as possible to the base of the tab (see adjacent Sketch).

Then separate the tab from the Guide Sleeve (6c) by means of the screwdriver and a hammer (see adjacent Sketch).

Clean Caliper in the area of the Guide Sleeve (6c) and the Pad abutement.

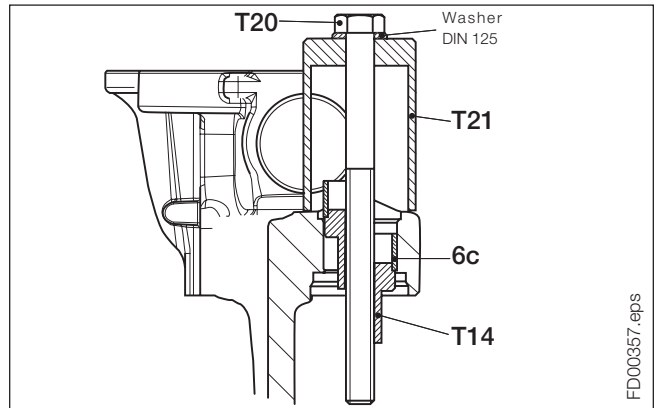
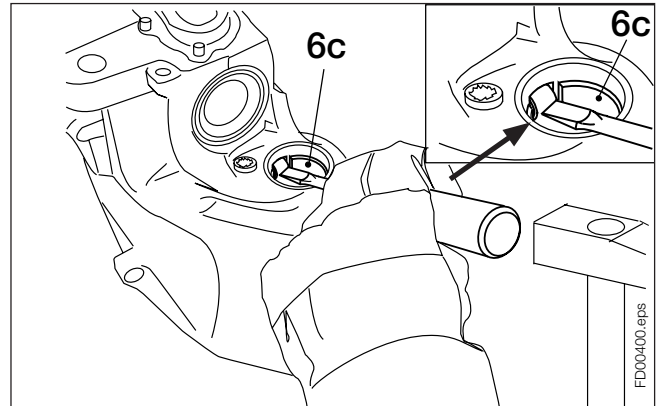
Note:

Caliper groove can be on left side or right side of the caliper bore.

Position Tool (N) as shown in adjacent Sketch.

Screw on the Nut (T14) by hand.

Hold the Nut (T14) with a ring spanner and with a suitable socket or ring spanner tighten Spindle (T20) to remove the Guide Sleeve (6c).



10.2.3 Fitting of Rubber Bush (6a or 6b)

Check bore for corrosion and clean.

Ensure that the Threaded Pin in the Tool (R) is unscrewed, so that there is no projection at the contact surface .

Push Rubber Bush (6a or 6b) into the Tool (R)

Position Tool (R) with Rubber Bush (6a or 6b).

Lightly screw on the Nut (T22) by hand.

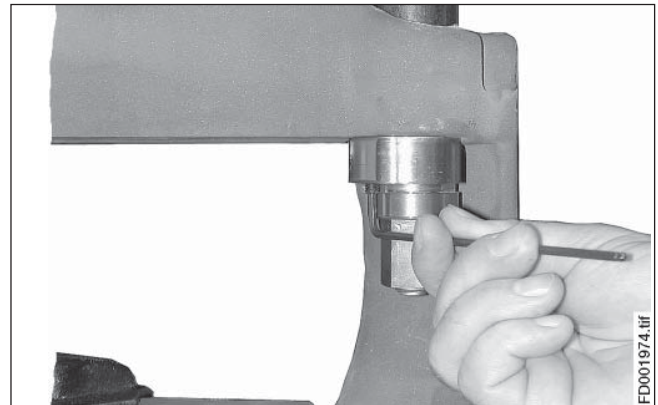
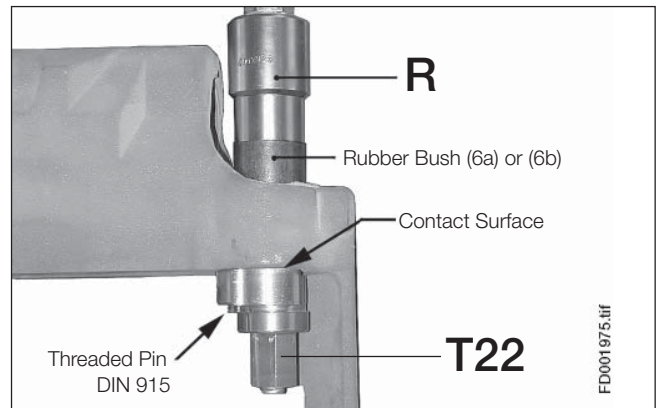
Note:


Do not tilt the Rubber Bush (6a or 6b) when pulling-in.

Using Torque Wrench pull in Rubber Bush (6a or 6b) (min. 8 Nm up to max. 45 Nm) to its stop.


Remove the Tool.

! *If the torque is < 8 Nm or > 45 Nm, then the Caliper must be replaced. Failure to replace the Caliper could lead to a guidance failure.*



 *The Metal Ring (see arrows in adjacent sketch) must not move. When checking for movement, then the Sealing Elements of the Rubber Bush (6a or 6b) must not be damaged.*

Grease the interior of the Rubber Bush (6a or 6b) with white Grease (Part No. II14525 or II32868).


 *The Guide Pins (4 and 5) as well as the Caliper Bolts (39 and 40) are highly stressed items. They must be replaced whenever the Caliper (1) is removed from the Carrier (2).*

Fit Guide Pins (4a or 4b) via the Pad abutement in the Rubber Bush (6a or 6b).

10.2.4 Fitting of Guide Sleeve (6c)

Check bore for corrosion and clean.

Position the Guide Sleeve (6c) (see adjacent Sketch).

 *Before pressing in Guide Sleeve (6c) the tab must be in correct position. The tab must snap in Caliper groove when Guide Sleeve (6c) is reaching its final position.*

Note:


Caliper groove can be on left side or right side of the caliper bore.

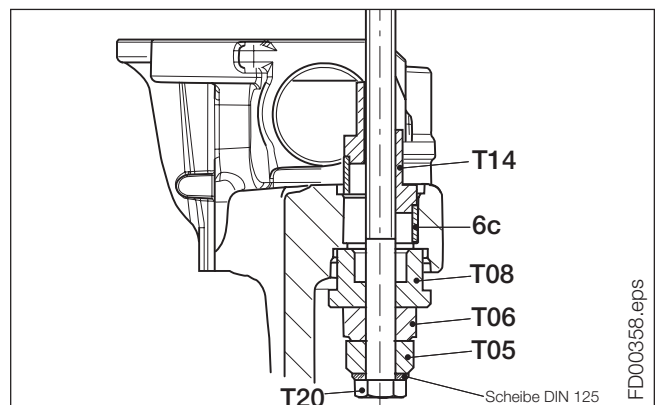
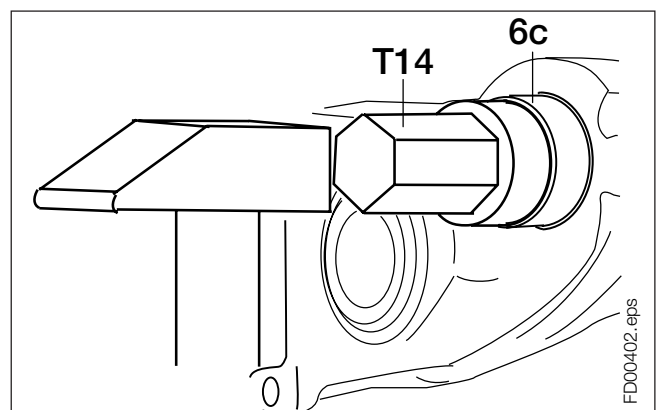
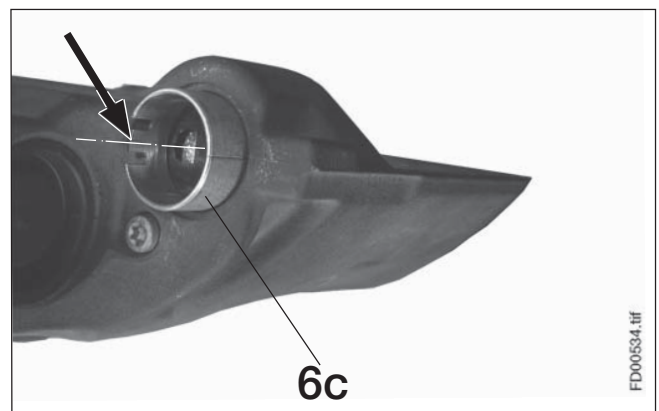
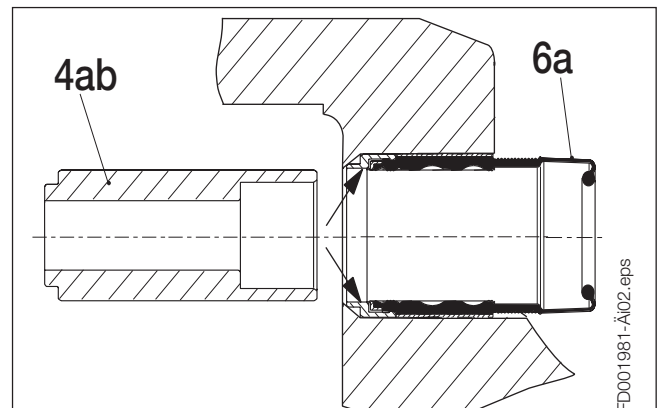
Slightly press in the Guide Sleeve (6c) by means of the Nut (T14) and a hammer. The Guide Sleeve (6c) is now adusted.

Insert Tool (N) and position (see Sketch below right).

Tighten Spindle (T20) slightly by hand.

Hold Nut (T14) by means of an ring spanner and with a suitable socket or an other suitable tool tighten Spindle (T20) up to stop.

 *Do not turn Nut (T14) because Guide Sleeve (6c) may lose its correct position.*



10

Replacement of Guide Pin Bushes

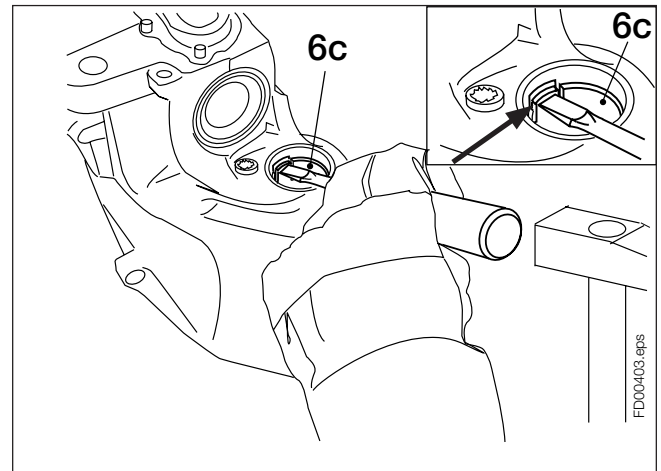
Remove Tool (N).

In order to press in the tab use a screwdriver or similar tool whose width is smaller than the tab. Place the screwdriver as close as possible to the top of the tab (see adjacent Sketch). Then press in the tab by means of the screwdriver and a hammer.

The Guide Sleeve (6c) is now secured against rotating and axial movement.

Grease the interior of the Guide Sleeve (6) with white Grease (Part No. II14525 or II32868).

Fit Guide Pin (4c).



11 Carrier Replacement

If necessary remove Caliper (see Section 8.1)

Remove Carrier (2) from axle.

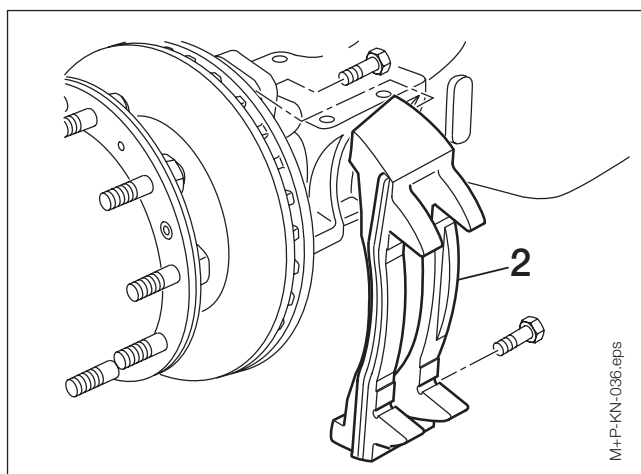
Note:

Do not fasten any lifting device to the Pad Retainer (11), since this can be damaged.

Clean axle contact area.

Fit new Carrier (2) with new bolts supplied by the Vehicle Manufacturer. Bolts are not supplied by Knorr-Bremse.

It may be necessary, to firstly attach the Caliper (see Section 8.2).



12 Brake Actuator Replacement

12.1 Brake Chamber Removal

Disconnect air hose from Brake Chamber (18/2) (air hose must be free of air pressure).

Unscrew Brake Chamber Mounting Nuts (see arrow B). They must not be re-used.

Remove Brake Chamber (18/2).

12.2 Brake Chamber Fitting

Note:

New Brake Chambers (18/2) have drain plugs installed (see arrows A).


Remove lowest plug (as viewed when Brake Chamber is installed). All other drain holes should be plugged. Refer to the Vehicle Manufacturer's recommendations.

Before fitting the new Brake Chamber, the sealing surface (see arrow C) must be cleaned, and the Spherical Cup (19) in the Lever C must be greased with white Grease (Part No. II14525 or II32868).

The surface area of the flange must be damage free and clean.

The Seal, as well as the Push Rod area - see adjacent picture - must be clean and dry.

If the thickness of the Seal is less than 3 mm the Brake Chamber must be replaced.

 *Do not use Grease containing molybdenum disulphate. Use only Actuators which are recommended by the Vehicle Manufacturer.*

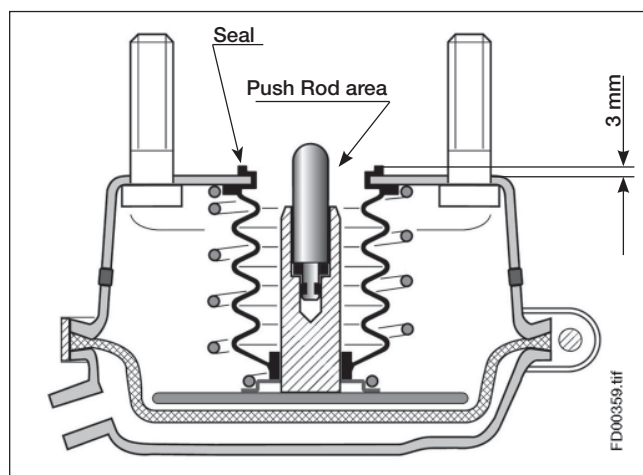
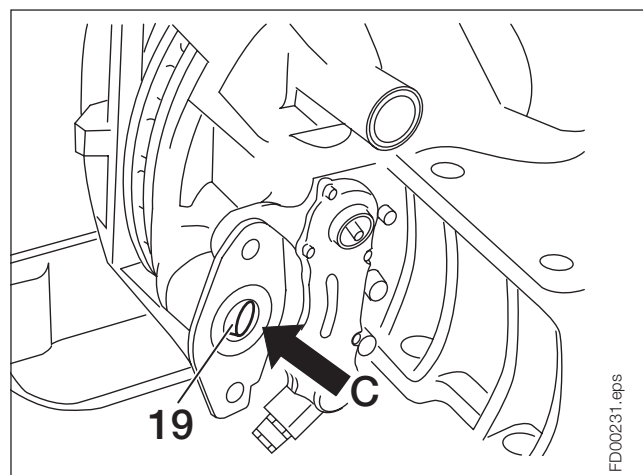
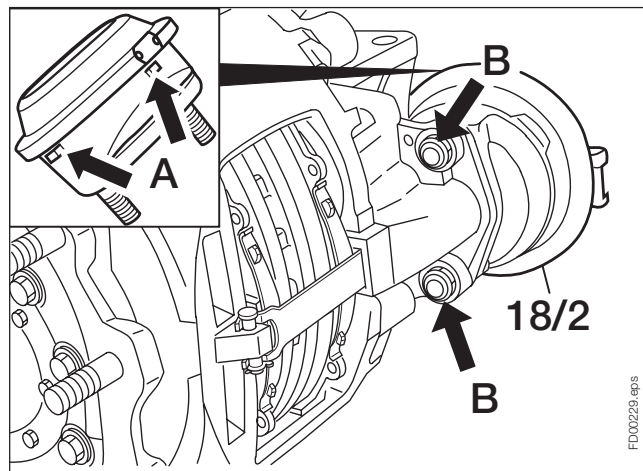
Attach Brake Chamber using new Nuts (self-locking EN ISO 10513 with Knorr-Bremse Brake Actuators).

In order not to tilt the Brake Chamber, screw Nuts step by step alternately with a suitable tool and torque tighten to the actuator manufacturer's recommendations (see also on page 9).

Connect air hose and check for leakage.

Make sure that hose is not twisted and that chafing is not possible.

 *Check function and effectiveness of the brake.*



12.3 Spring Brake Removal

 *Chock wheels before releasing Spring Brake.*

Release parking brake, move Hand Control Valve to 'run' position.

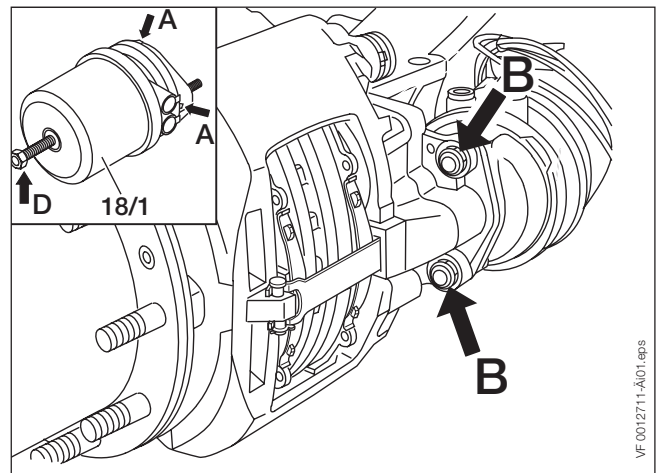
Screw-out Release Bolt (arrow D) with a maximum torque of 35 Nm (refer to the Vehicle Manufacturer's recommendations).

Release air from brake, move Hand Control Valve lever to 'park' position.

Disconnect air hoses from Spring Brake (18/1) (air hoses must be free of air pressure).

Unscrew Spring Brake Mounting Nuts (see arrow B). They must not be re-used.

Remove Spring Brake (18/1).

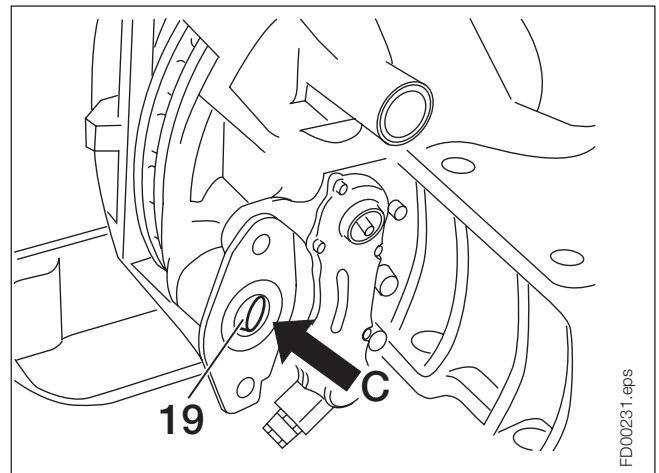


12.4 Spring Brake Fitting

Note:

New Spring Brakes (18/2) have drain plugs installed (see arrows A). Remove lowest plug (as viewed when Spring Brake is installed). All other drain holes should be plugged. Refer to the Vehicle Manufacturer's recommendations.


Before fitting the new Spring Brake, the sealing surface (see arrow C) must be cleaned, and the Spherical Cup (19) in the Lever must be greased with white Grease (Part No. II14525 or II32868).

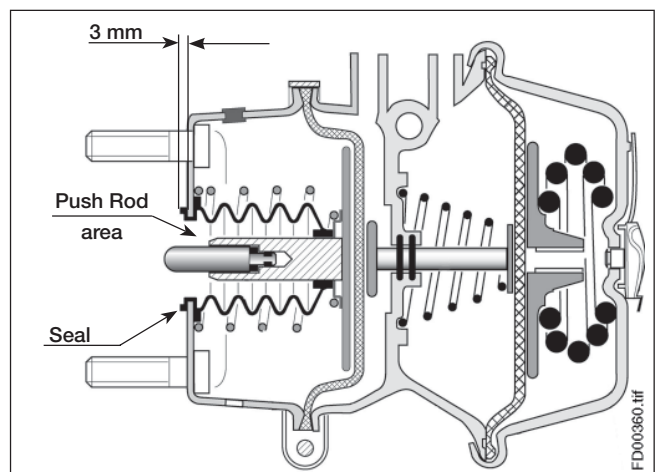


The surface area of the flange must be damage free and clean.

The Seal, as well as the Push Rod area - see adjacent picture - must be clean and dry.

If the thickness of the Seal is less than 3 mm the Spring Brake must be replaced.

 *Do not use grease containing molybdenum disulphate. Use only Actuators which are recommended by the Vehicle Manufacturer.*



12

Brake Actuator Replacement

Attach Spring Brake using new Nuts (self-locking EN ISO 10513 with Knorr-Bremse Brake Actuators).

In order not to tilt the Brake Chamber, screw Nuts step by step alternately with a suitable tool and torque tighten to the actuator manufacturer's recommendations (see also on page 9).

Connect air hoses, ensuring that they are replaced in the correct ports.

Make sure that hoses are not twisted and that chafing is not possible.

Release parking brake, move Hand Control Valve lever to 'run' position, and check for leakage.

Screw in Spring Brake Release bolt to maximum 70 Nm.



Check function and effectiveness of the brake.

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