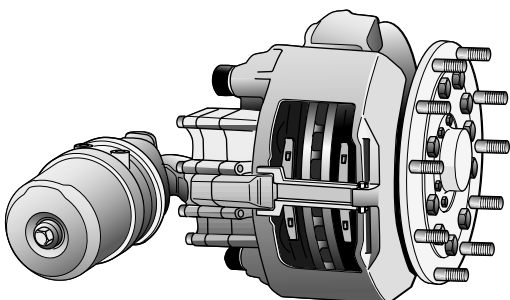
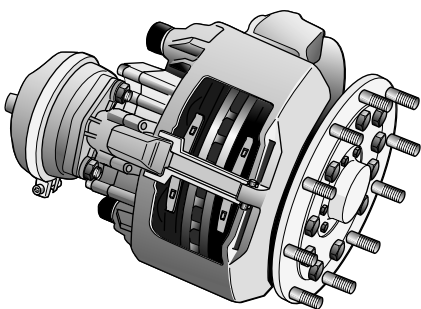


Service Manual

RA-SB0002-EN

Pneumatic Disc Brake

SB 6... / SB 7...
Axial- and Radial Disc
Brake



KNORR-BREMSE
Systems for Commercial Vehicles



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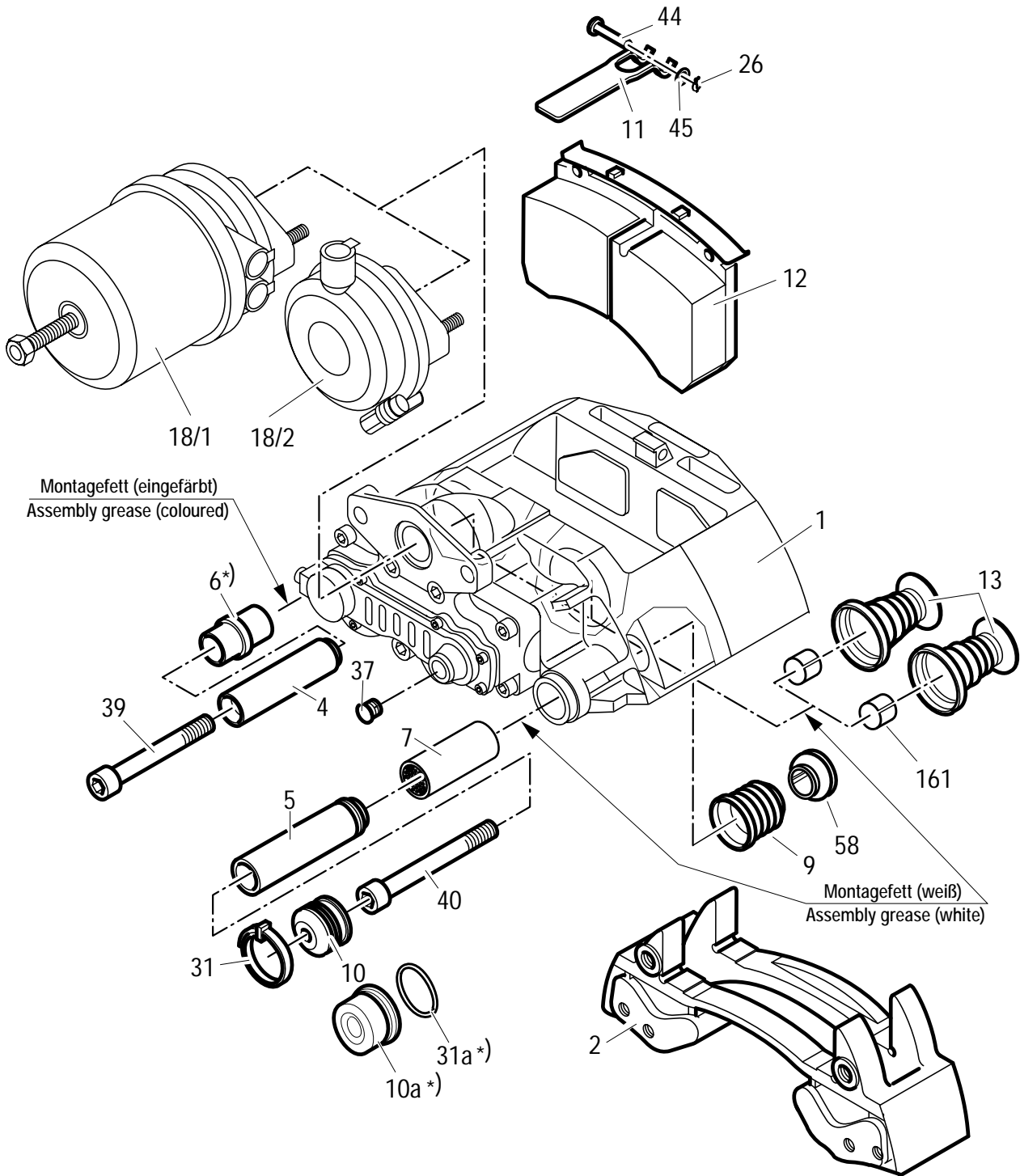
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Personal Notes

1 Overall view

1.1 Axial Disc Brake Components

(for Wear Indicators Kits see 1.2.1)



- | | | | |
|------|------------------|------|------------------|
| 1 | Caliper | 18/2 | Brake Chamber |
| 2 | Carrier | 26 | Spring Clip |
| 4 | Sleeve | 31 | Outer Boot Clip |
| 5 | Sleeve | 31a | O-Ring |
| 6 | Rubber Bush | 37 | Adjuster Cap |
| 7 | Brass Bush | 39 | Caliper Bolt |
| 9 | Inner Boot | 40 | Caliper Bolt |
| 10 | Outer Boot | 44 | Pad Retainer Pin |
| 10a | Steel Cap | 45 | Washer |
| 11 | Pad Retainer | 58 | Ring |
| 12 | Pad | 161 | Tappet Bush |
| 13 | Tappet with Boot | | |
| 18/1 | Spring Brake | | |

VF 00127/12-AIO1

→ possible variants by items 10a & 31a

If short rubber bush (6) (sleeve ring is placed centrally), Caliper bolts (39) & (40) are identically

1.2 Axial Disc Brake Repair Kits

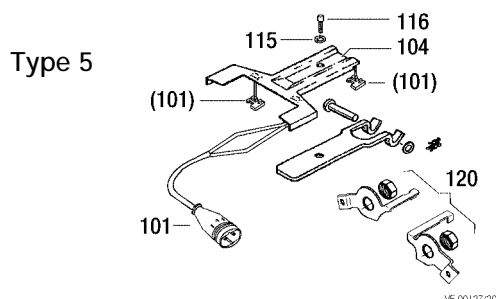
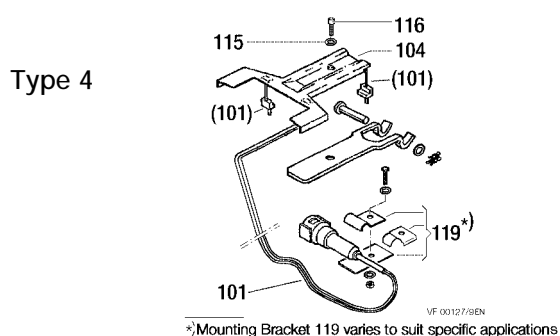
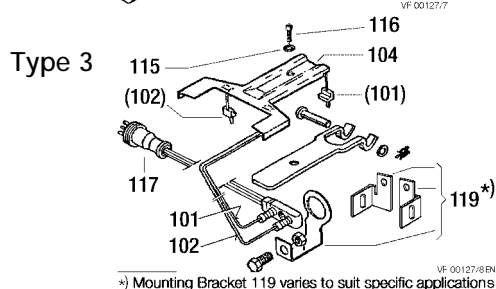
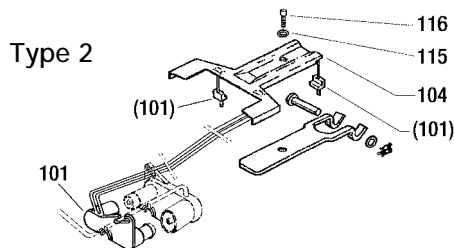
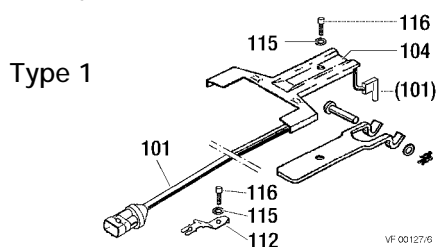
ATTENTION!
Use only **KNORR-BREMSE** parts

The following Repair Kits are available

| Description | Contents | Association of Repair Kits to the Disc Brakes and Repair Kit's Order no. |
|-------------------------------|--|---|
| Carrier Guide Kit | 2, 4, 5, 31, 39, 40 | see Disc Brake Product Catalogue (Part Number Y000875), also available as an electronic form (CD-ROM, http://www.Knorr-BremseSfN.com) |
| Carrier Guide Kit (Steel Cap) | 2, 4, 5, 10a, 31a, 39, 40 | |
| Wear Indicator Kit (per axle) | for variants see 1.2.1 with or without 104 | |
| Guide Pins Kit | 4-7, 9, 10, 31, 39, 40, 58 | |
| Guide Pins Kit (Steel Cap) | 4, 5, 6, 7, 9, 10a, 31a, 39, 40, 58 | |
| Seal Kit for Guide Pins | 9, 10, 31, 37, 58 | |
| Tappet and Boot Kit (2 pcs) | 13, 161 | |
| Pad Set (per axle) | 12, 26, 37, 44, 45 | |
| Adjuster Cap (4 pcs) | 37 | |
| Pad Retainer Kit (per axle) | 11, 26, 44, 45 | |
| Pad Retainer Kit (per axle) | 11, 26, 44, 45, 104, 115, 116 | |
| Kit for Rubber Sleeve | 4, 6, 39 | |
| Outer Guide Seal Kit (10 pcs) | 10, 31 | |
| Repair Kit | 5, 7, 9, 10a, 31a, 40, 58 | |
| Kit for Steel Cap | 10a, 31a | |
| Screw Kit for Steel Cap | 10a, 31a, 39, 40 | |
| Screw Kit for Outer Boot | 10, 31, 39, 40 | |
| Exchange Caliper r.h. | only in assembled condition | see Type plate on the Caliper |
| Exchange Caliper l.h. | | |

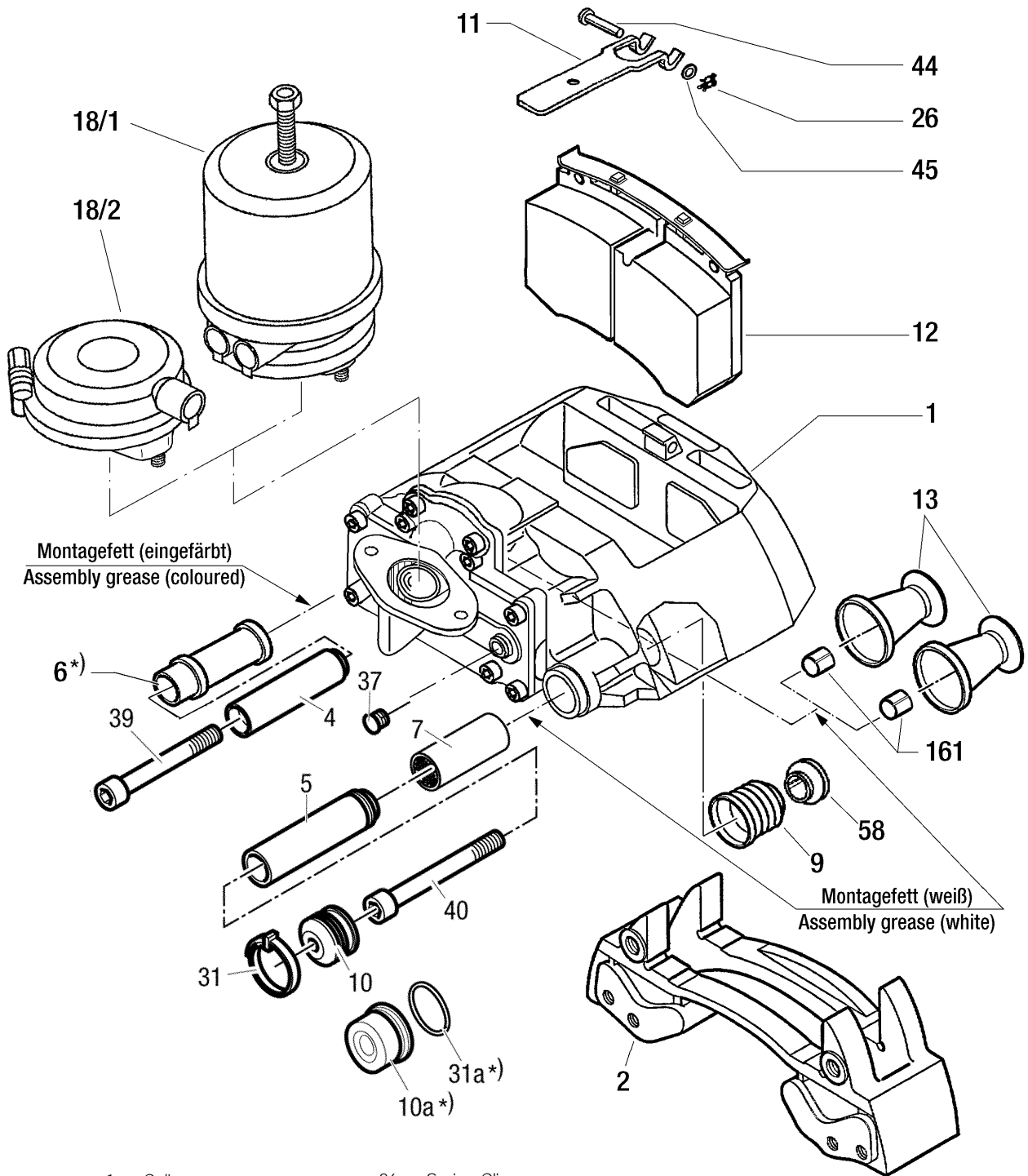
1.2.1 Axial Disc Brake Wear Indicator Kits

(Typical kits are shown below)



- | | | | |
|-----|------------------------|-----|----------------------|
| 101 | Sensor | 115 | Spring Washer |
| 102 | Sensor | 116 | Screw |
| 104 | Cable Protection Plate | 117 | Wear Indicator Cable |
| 112 | Clip | 119 | Bracket |
| | | 120 | Bracket |

1.3 Radial Disc Brake Components
(for Wear Indicator Kits see 1.4.1)



- | | | | |
|------|------------------|-----|------------------|
| 1 | Caliper | 26 | Spring Clip |
| 2 | Carrier | 31 | Outer Boot Clip |
| 4 | Sleeve | 31a | O-Ring |
| 5 | Sleeve | 37 | Adjuster Cap |
| 6 | Rubber Bush | 39 | Caliper Bolt |
| 7 | Brass Bush | 40 | Caliper Bolt |
| 9 | Inner Boot | 44 | Pad Retainer Pin |
| 10 | Outer Boot | 45 | Washer |
| 10a | Steel Cap | 58 | Ring |
| 11 | Pad Retainer | 161 | Tappet Bush |
| 12 | Pad | | |
| 13 | Tappet with Boot | | |
| 18/1 | Spring Brake | | |
| 18/2 | Brake Chamber | | |

*) possible variants by items 10a & 31a

If short rubber bush (6) (sleeve ring is placed centrally), Caliper bolts (39) & (40) are identically

1.4 Radial Disc Brake Repair Kits

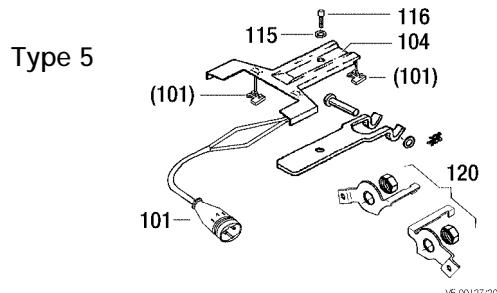
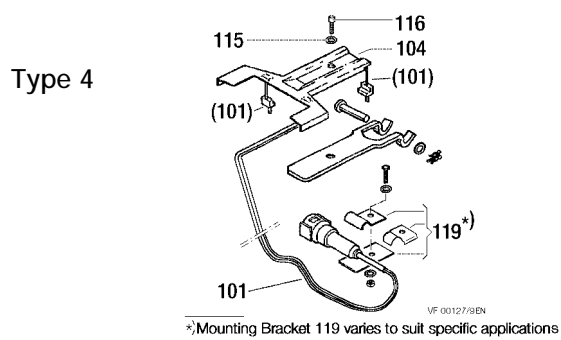
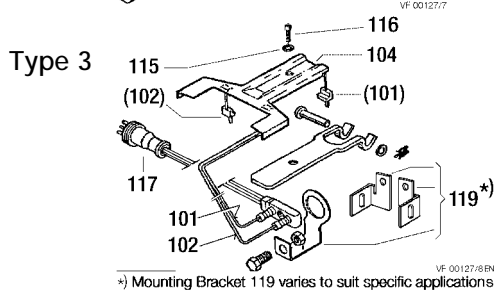
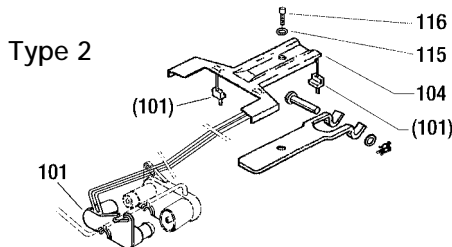
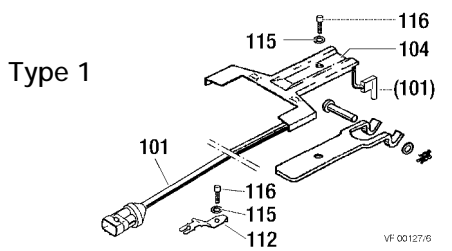
ATTENTION!
Use only **KNORR-BREMSE** parts

The following Repair Kits are available

| Description | Contents | Association of Repair Kits to the Disc Brakes and Repair Kit's Order no. |
|-------------------------------|--|---|
| Carrier Guide Kit | 2, 4, 5, 31, 39, 40 | see Disc Brake Product Catalogue (Part Number Y000875), also available as an electronic form (CD-ROM, http://www.Knorr-BremseSfN.com) |
| Carrier Guide Kit (Steel Cap) | 2, 4, 5, 10a, 31a, 39, 40 | |
| Wear Indicator Kit (per axle) | for variants see 1.2.1 with or without 104 | |
| Guide Pins Kit | 4-7, 9, 10, 31, 39, 40, 58 | |
| Guide Pins Kit (Steel Cap) | 4, 5, 6, 7, 9, 10a, 31a, 39, 40, 58 | |
| Seal Kit for Guide Pins | 9, 10, 31, 37, 58 | |
| Tappet and Boot Kit (2 pcs) | 13, 161 | |
| Pad Set (per axle) | 12, 26, 37, 44, 45 | |
| Adjuster Cap (4 pcs) | 37 | |
| Pad Retainer Kit (per axle) | 11, 26, 44, 45 | |
| Pad Retainer Kit (per axle) | 11, 26, 44, 45, 104, 115, 116 | |
| Kit for Rubber Sleeve | 4, 6, 39 | |
| Outer Guide Seal Kit (10 pcs) | 10, 31 | |
| Repair Kit | 5, 7, 9, 10a, 31a, 40, 58 | |
| Kit for Steel Cap | 10a, 31a | |
| Screw Kit for Steel Cap | 10a, 31a, 39, 40 | |
| Screw Kit for Outer Boot | 10, 31, 39, 40 | |
| Exchange Caliper r.h. | only in assembled condition | see Type plate on the Caliper |
| Exchange Caliper l.h. | | |

1.4.1 Radial Disc Brake Wear Indicator Kits

(Typical kits are shown below)



- | | | | |
|-----|------------------------|-----|----------------------|
| 101 | Sensor | 115 | Spring Washer |
| 102 | Sensor | 116 | Screw |
| 104 | Cable Protection Plate | 117 | Wear Indicator Cable |
| 112 | Clip | 119 | Bracket |
| | | 120 | Bracket |

1.5 Brake Discs

(for "Axial- and Radial Disc Brake")

When replacing the Discs, please also refer to the instructions of the Vehicle Manufacturer.

This should also be done when fitting KNORR-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-Aftermarket Organisation.

Detailed informations can be taken out from our Product Catalogue "Disc Brake" (Part Number Y000875). This is also available as an electronic form (CD-ROM, <http://www.Knorr-BremseSfN.com>).

2 General Information (for "Axial- and Radial Disc Brake")

2.1 Service Tools

| Part Number | Description |
|-------------|---|
| II 19252 | Press-In Tool for Tappet and Boot (13) |
| II 19253 | Pull-In Tool for Inner Boot (9) |
| II 19254 | Pull-In/Out Tool for Brass Bush (7) |
| II 32202 | Wedged Fork for removal of Tappet and Boot (13) |
| II 36797 | Grooving Tool for Brass Bush (7) |
| Z001105 | Press in Tool for Steel Cap (10a) |

Service tool kit ZB 9032 II 37951/004EX contains the above listed tools as well as this Service manual. The service video in English is available separately in the UK as Part No. KBP2060/1 and in other territories as RA-SB0002 EN.

2.2 Diagnostic Equipment

| Part Number | Description |
|-------------|---|
| II 36695 | ZB 9031 Hand held device for checking Potentiometer function. (Also Pad + Disc wear when 13 pin chassis plug installed). |
| II 38691F | ZB 9033 Chassis mounted device for measuring Pad + Disc wear |

2.3 Lubrication

| Part Number | Description | Colour | Application |
|-------------|-----------------|---------------------|-----------------|
| II 14525 | Renolit HLT2 | White ²⁾ | Brass Bush (7) |
| II 32793 | Syntheso GL EP1 | Green ²⁾ | Rubber Bush (6) |

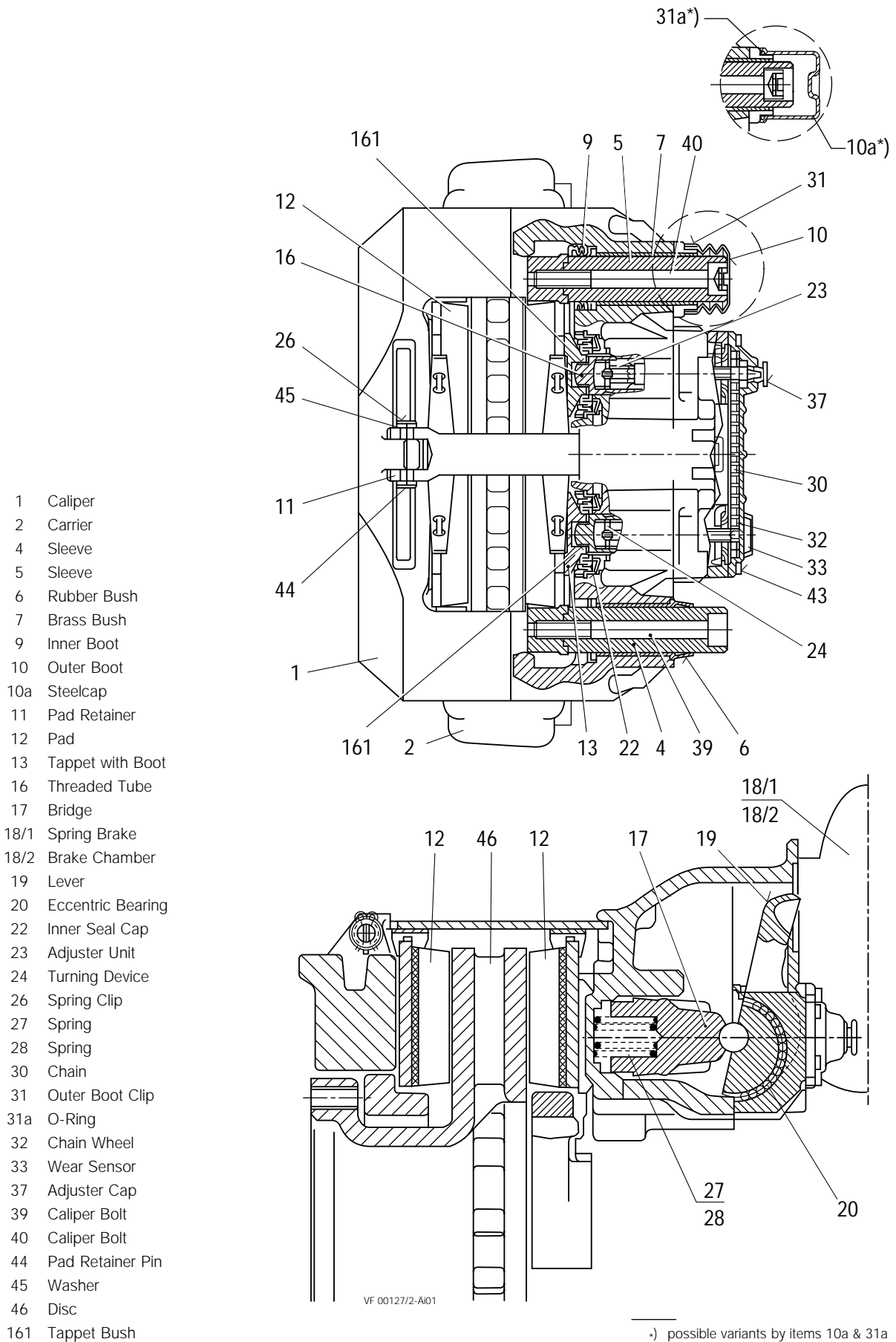
²⁾ **Important Note:** The correct Grease MUST be used for each Bush!

2.4 Torque requirements

| Item Number | | Torque [Nm] | spanner size (mm) |
|-------------|-----------------------------------|--------------------|-------------------|
| 39 + 40 | Caliper Bolts M16x1,5 - 10.9 | 285 ^{±25} | 14 |
| | Actuator Mounting Nuts M16x1,5 | 180 ⁺³⁰ | 24 |

3 Description and function

3.1 Axial Disc Brake Sectioned View



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 Tappets (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.

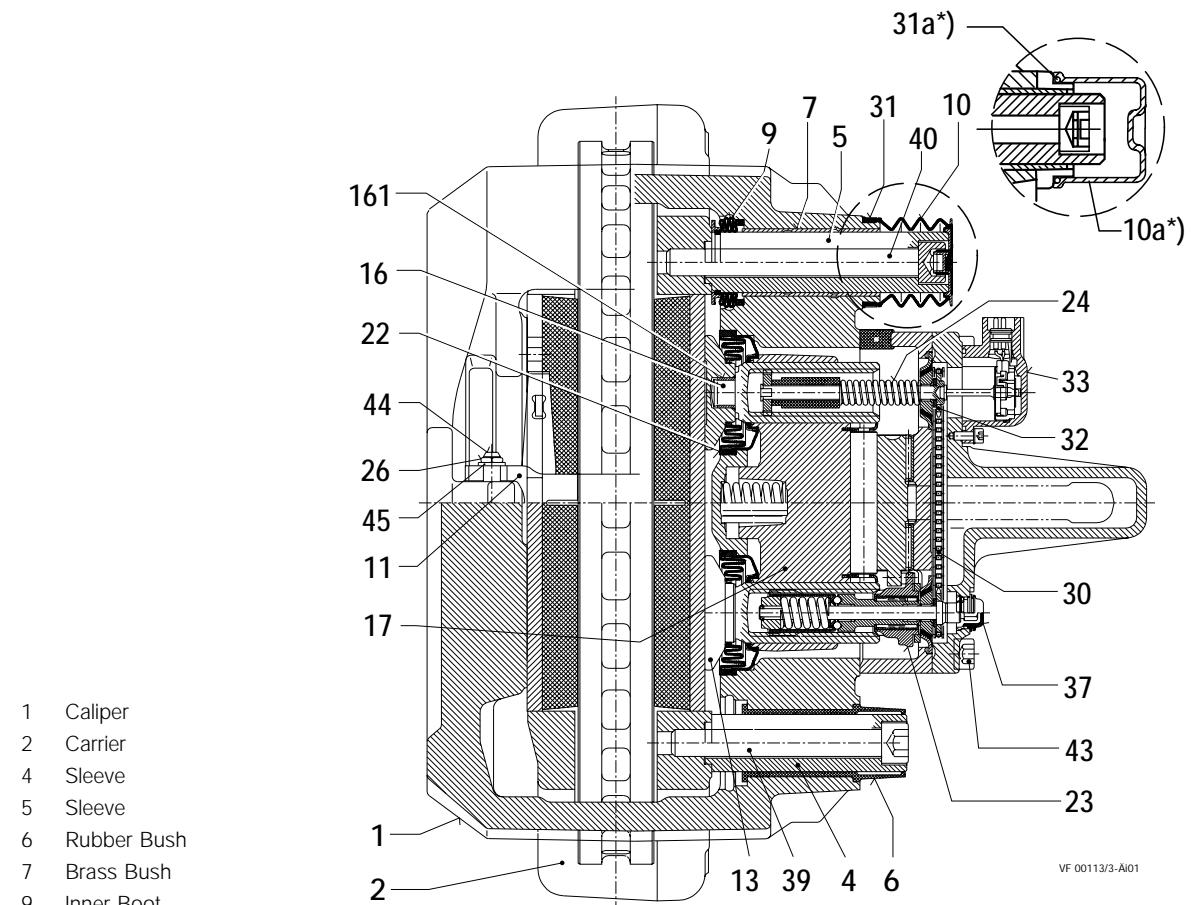
3.2.2. Brake release

After releasing the air pressure, the two Return Springs (27/28) push the Bridge (17) and Lever (19) back to the start position; this ensures a running clearance between Pads and Disc is maintained.

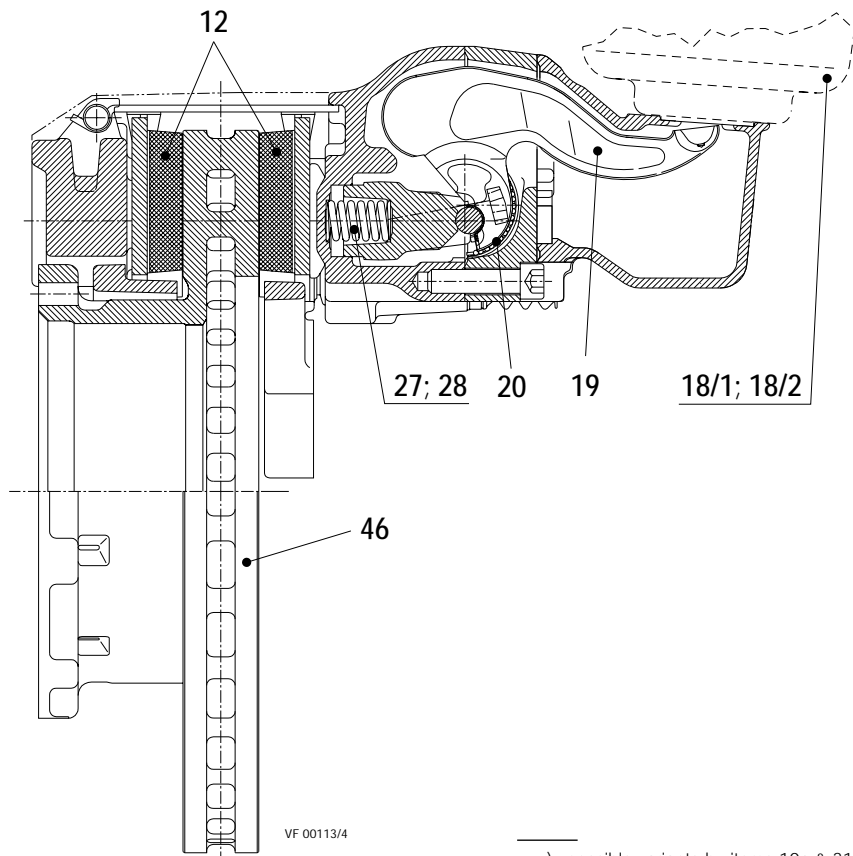
3.2.3 Brake adjustment (automatic)

To ensure a constant running clearance between Disc and Pads, 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 0.9 mm.; smaller clearances may lead to overheating problems.

3.3 Radial Disc Brake Sectioned View



- 1 Caliper
- 2 Carrier
- 4 Sleeve
- 5 Sleeve
- 6 Rubber Bush
- 7 Brass Bush
- 9 Inner Boot
- 10 Outer Boot
- 10a Steelcap
- 11 Pad Retainer
- 12 Pad
- 13 Tappet with Boot
- 16 Threaded Tube
- 17 Bridge
- 18/1 Spring Brake
- 18/2 Brake Chamber
- 19 Lever
- 20 Eccentric Bearing
- 22 Inner Seal Cap
- 23 Adjuster Unit
- 24 Turning Device
- 26 Spring Clip
- 27 Spring
- 28 Spring
- 30 Chain
- 31 Outer Boot Clip
- 31a O-Ring
- 32 Chain Wheel
- 33 Wear Sensor
- 37 Adjuster Cap
- 39 Caliper Bolt
- 40 Caliper Bolt
- 44 Pad Retainer Pin
- 45 Washer
- 46 Disc
- 161 Tappet Bush



-) possible variants by items 10a & 31a

3.4 Description of operation (Floating Caliper principle)

3.4.1. 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 Tappets (13) and finally to the inboard Pad (12).

After overcoming the running clearance between the Pads and 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.

3.4.2. Brake release

After releasing the air pressure, the two Return Springs (27/28) push the Bridge (17) and Lever (19) back to the start position; this ensures a running clearance between Pads and Disc is maintained.

3.4.3 Brake adjustment (automatic)

To ensure a constant running clearance between Disc and Pads, 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 0.9 mm.; smaller clearances may lead to overheating problems.

4 Safety Instructions for service work (for "Axial- and Radial Disc Brake")

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

Use only original KNORR-BREMSE parts.

WARNING!

Before starting repair work, ensure the service brake and parking brake 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 5.3.

Use only recommended tools - see Section 2.1.

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

After re-fitting the 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.

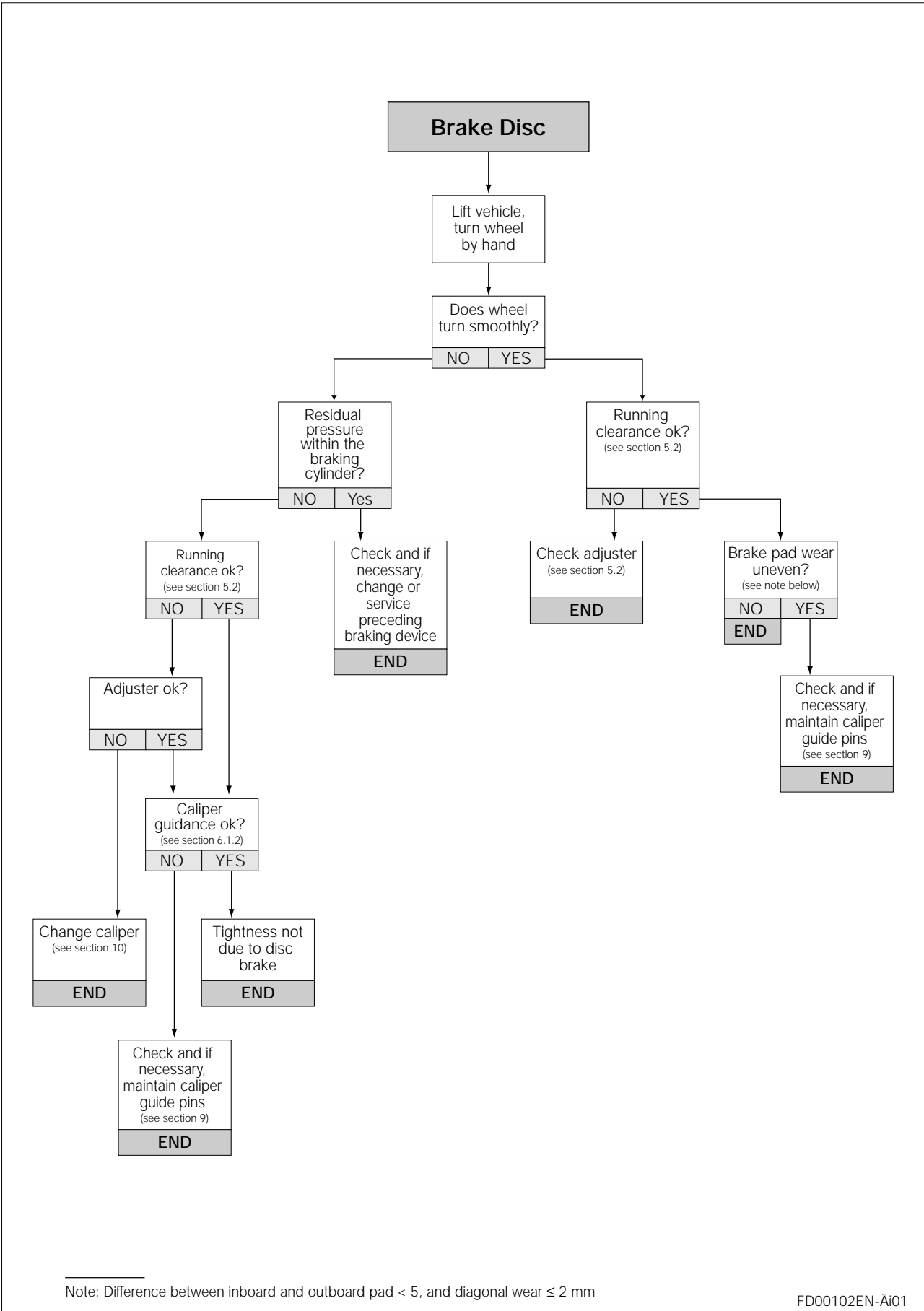
After service work:

Check the brake performance and the system behaviour on a rolling road or by actual road test.

5 Brake Testing

(for Axial- and Radial Disc Brake)

5.1 Fault finding procedure



5.2 Adjuster check

WARNING!

Before starting repair work, ensure the service brake and parking brake 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 Tappet and inboard pad backplate - it should be between 0.5mm & 1.0mm. If the running clearance is too small or large, the adjuster may not be functioning correctly and should be checked as follows.

Remove Cap (37).

WARNING!

Do not overload or damage the Adjuster (23). Use only 8mm Ring Spanner or 1/4" drive Socket with a lever length no greater than 100mm.

DO NOT use an Open Ended Spanner since this may damage the Adjuster shaft.

The Adjuster should be turned counter-clockwise for 2 or 3 clicks (increasing running clearance).

Attention!

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

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

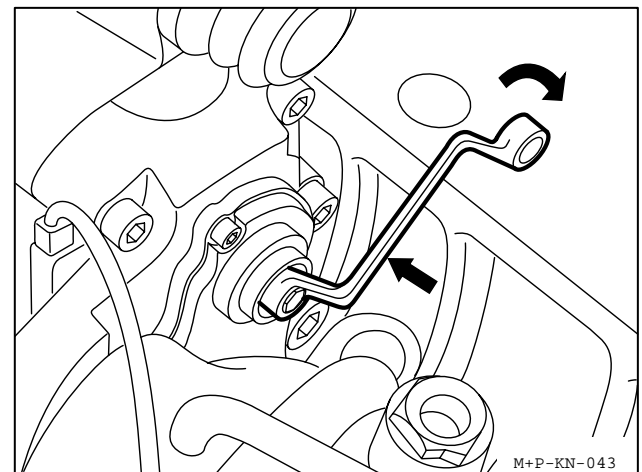
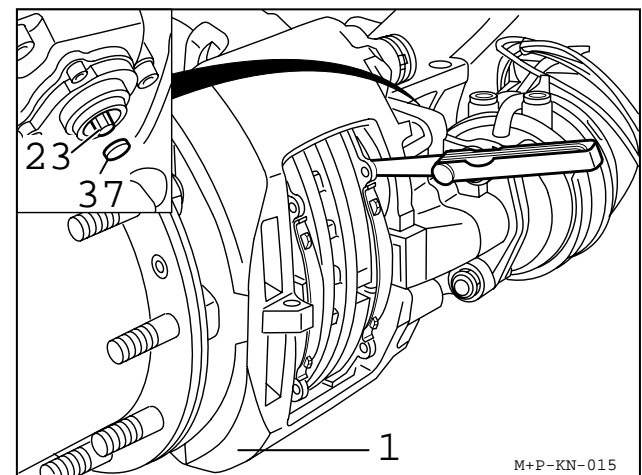
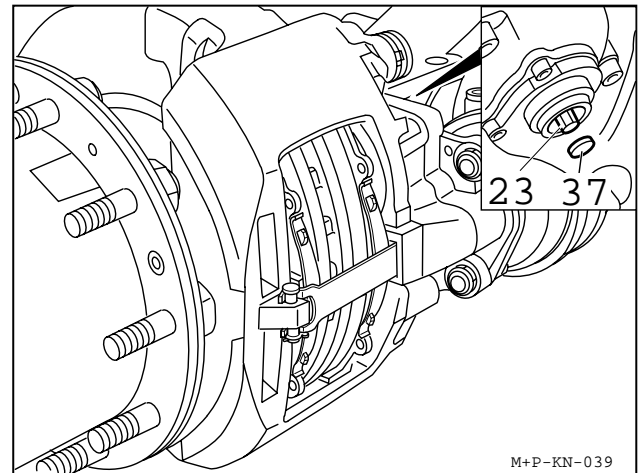
If Pads are not being changed, Cap (37) should be replaced having lightly greased it with Renolit HLT2 (available as part number II14525).

NOTE:

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

NOTE:

If the Spanner or Socket does not turn, 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.



5.3 Wear Limits of Pads and Discs

WARNING!

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

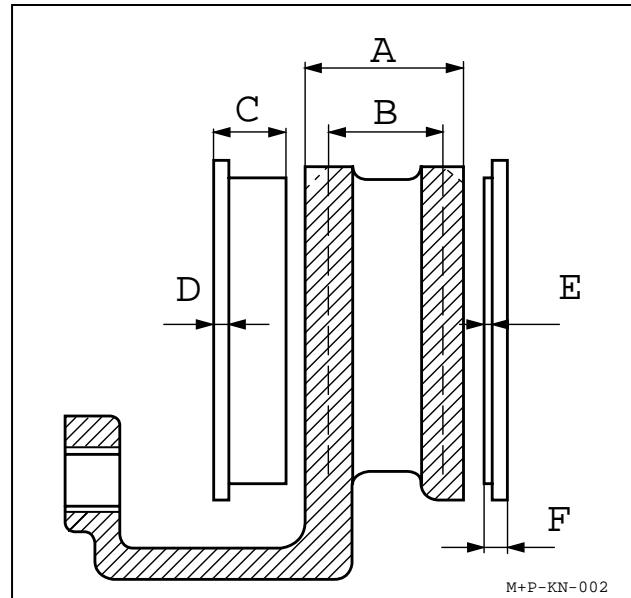
Pads

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 no Wear Indicator has been connected this should be at least every 3 month.
If friction material is less than 2mm (see E), the Pads must be replaced.

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) 45mm
- B = Disc thickness (worn) 37 mm, Disc must be replaced
- C = Overall thickness of Pad (new condition) 30mm
- D = Backplate 9mm
- E = Minimum thickness of friction material 2mm
- F = Minimum allowed thickness in worn condition for backplate and friction material 11mm (replacement of Pads necessary).



If wear dimension $B \leq 39$ mm Disc should be renewed together with Pads.

Wear dimension $B = 37$ mm must not decrease.

WARNING!

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

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

The diagram shows possible conditions of the surface.

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 wide
are allowed

D₁ = Cracks in the vanes **are not allowed** and the
Disc **MUST BE REPLACED**.

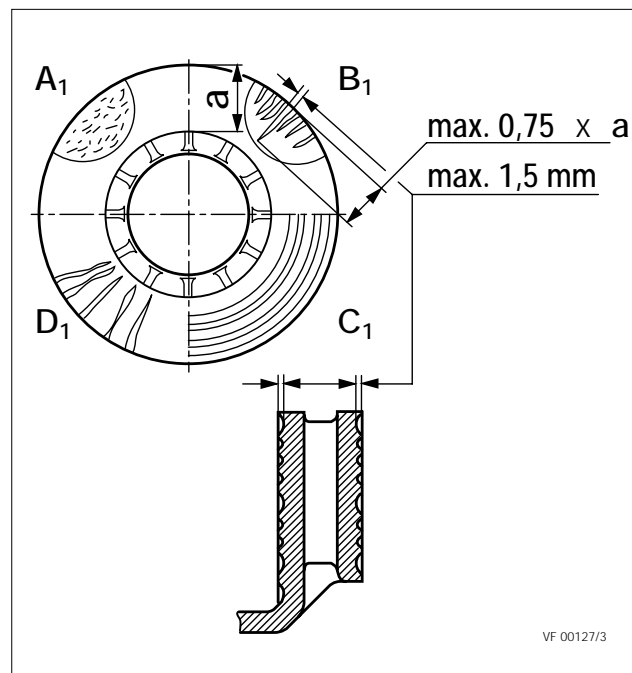
a = Pad contact area

Note

In case of surface conditions A₁,-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 regrinding is > 39 mm.

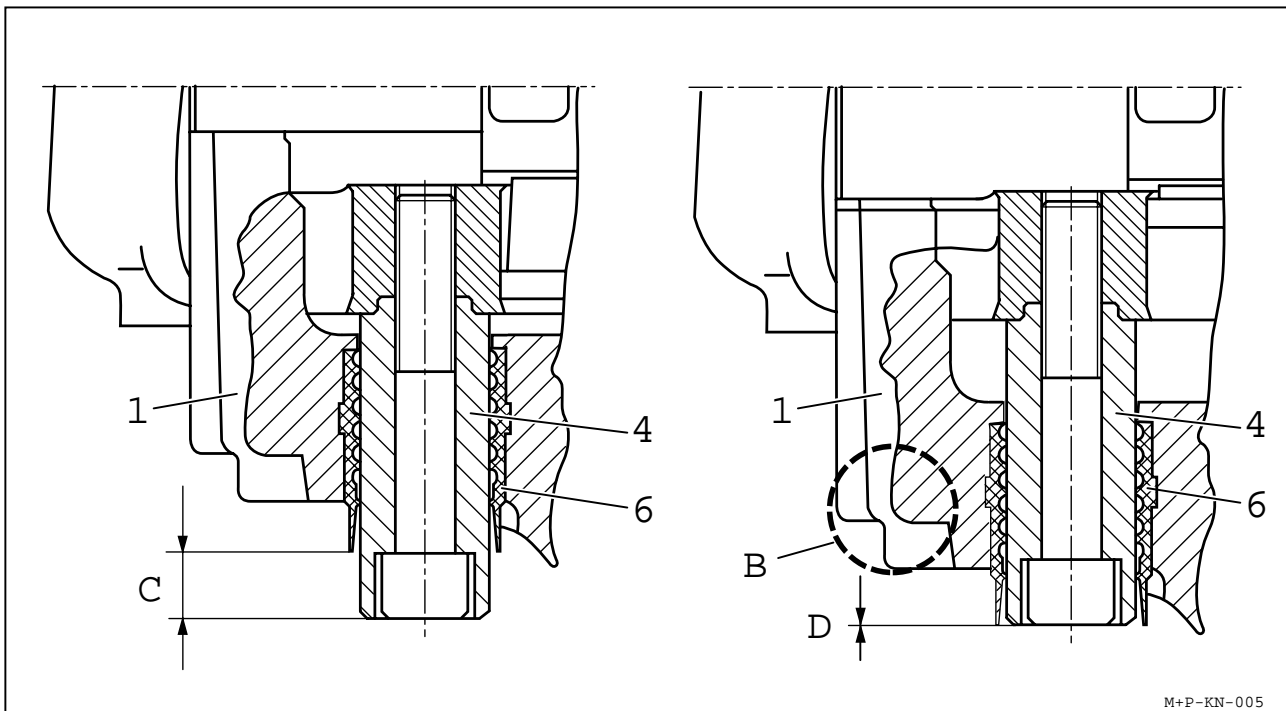
In addition, the recommendation of the Vehicle
Manufacturer **MUST** be followed.



WARNING!

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.

5.3.1 Brake Wear Check using Guide Pin (For all Axial and Radial Disc Brakes except those listed in Section 5.3.2 - These Callipers do **not** have the rib in position B (see also Section 5.3.2))



The condition of the Pads can be visually determined without removing the road wheel by noting the position of the Fixed Sleeve (4) in the Floating Caliper (1).

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

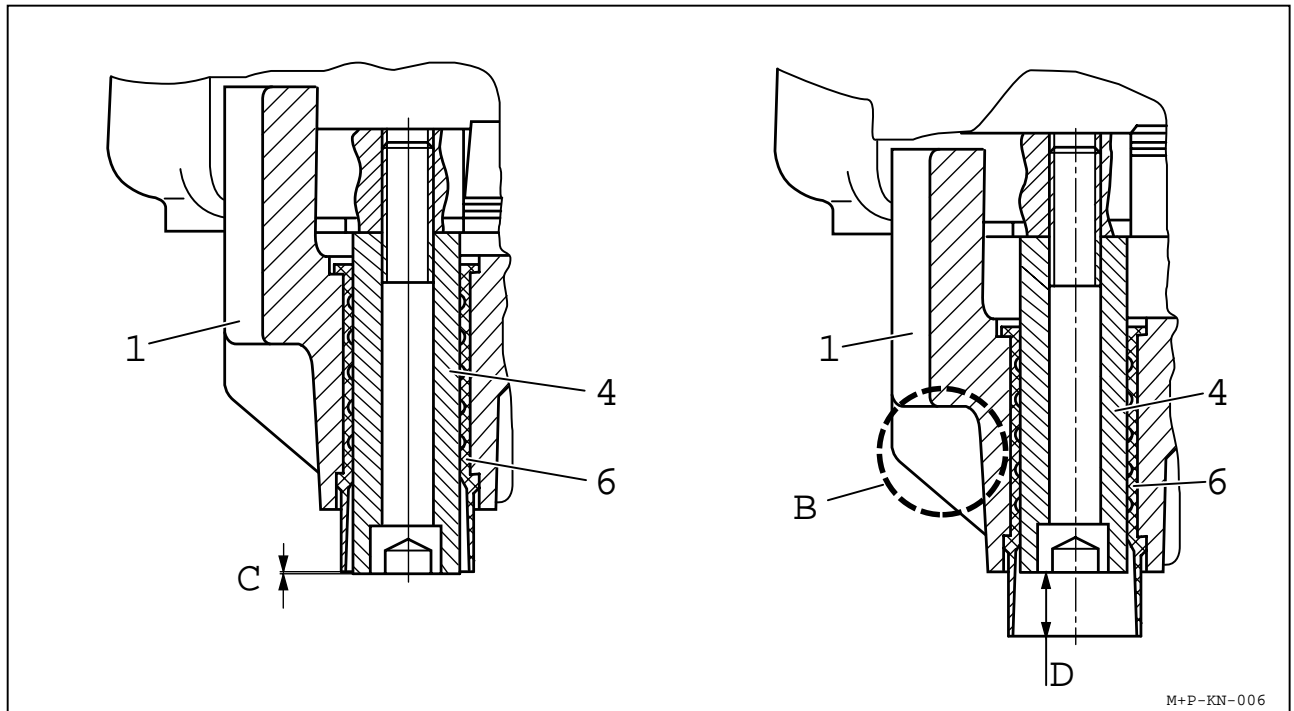
If necessary change the Pads - see Section 6

B = without rib (see also Section 5.3.2)

C = pin protrusion - shown in new condition

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

5.3.2 Brake Wear Check using Guide Pin (Only for Axial Disc Brakes SB 7541, SB 7551 to SB 7629, SB 7639 and Radial Disc Brakes SB 7102, SB 7112, SB 7103, SB 7113, SB 7104, SB 7114, SB 7105, SB 7115, SB 7108, SB7118, SB 7109, SB 7119, SB 7120, SB 7130 - These Callipers do have the rib in position B (see also Section 5.3.1)



The condition of the Pads can be visually determined without removing the road wheel by noting the position of the Fixed Sleeve (4) in the Floating Caliper (1).

If the head of the Fixed Sleeve (4) is inside the Rubber Bush (6) by a dimension D greater than 18mm, then a more accurate check of the Pads and Disc must be made.

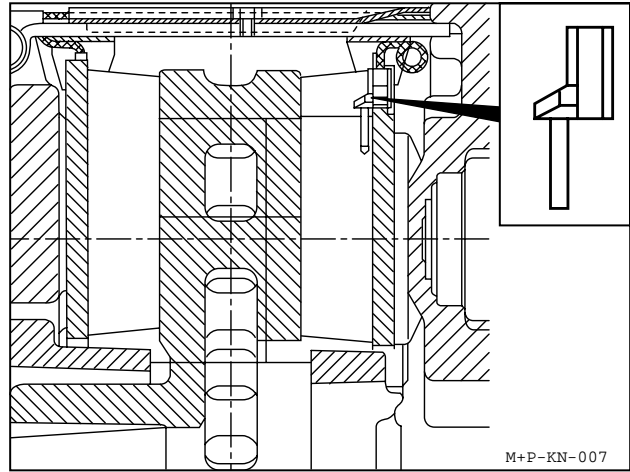
If necessary change the Pads - see Section 6.

- B = with rib (see also Section 5.3.1)
- C = new condition
- D = 18 mm or more, Pads and Disc must be checked with road wheel removed

5.3.3 Wear Indicators

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

- a) In - Pad Normally Closed Indicator - Circuit is broken when Pad Wear reaches limit.
- b) In - Pad Normally Open Indicator - Circuit is made when Pad Wear reaches limit.

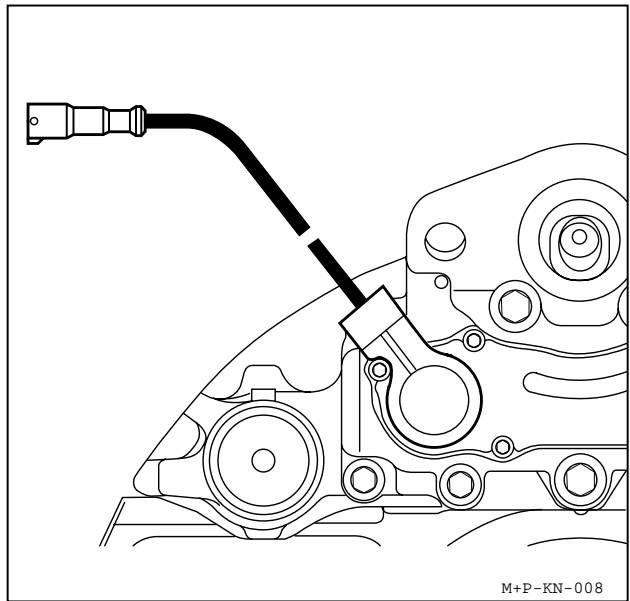


- c) Wear Indicator using built in Potentiometer. This is available either as an on/off version or as a continuous signal version which can be linked to the vehicle's electronic monitoring systems.

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

Important

Please also refer to specifications provided by the Vehicle Manufacturer



5.4 Knorr-Bremse Diagnostic Equipment

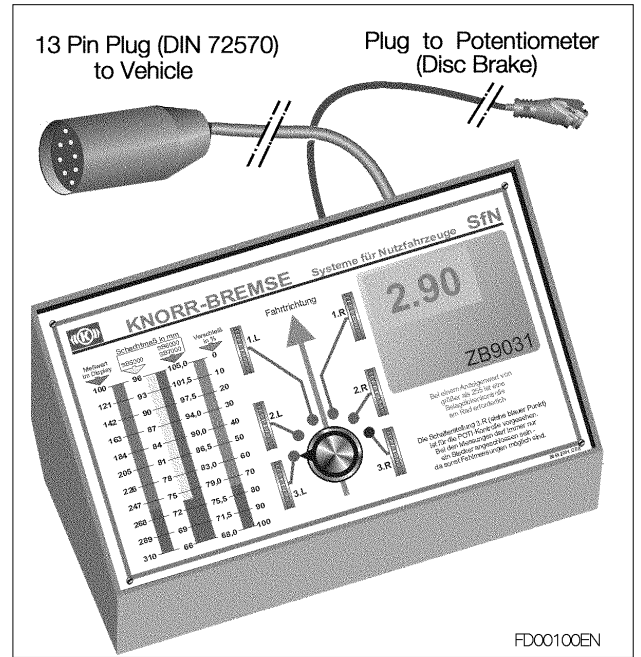
The Knorr-Bremse Diagnostic Unit ZB 9031 is a hand held device suitable for vehicles that are fitted with Knorr-Bremse Disc Brakes using a continuous signal type of Wear Potentiometer.

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 detailed instruction manual is included with each unit.



5.5 Knorr-Bremse Diagnostic Equipment

The Knorr-Bremse Wear Check Module ZB 9033 is a chassis mounted device suitable for vehicles that are fitted with Knorr-Bremse Disc Brakes using a continuous signal type of Wear Potentiometer.

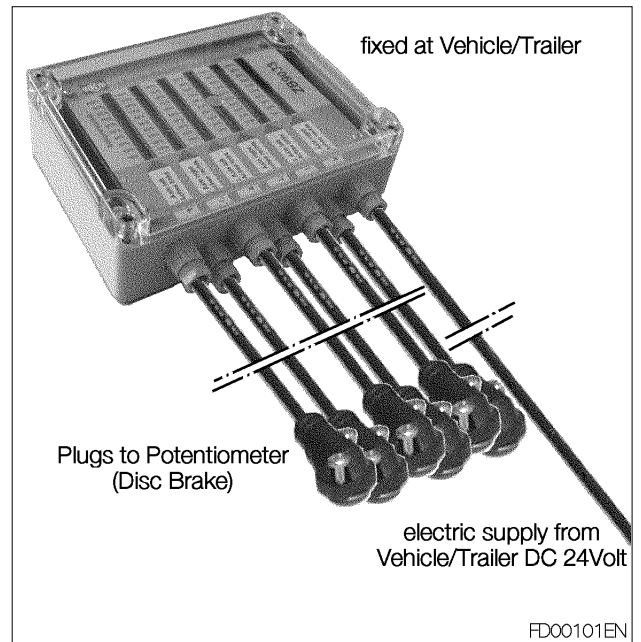
The module continuously monitors and displays the wear at each brake.

For vehicles without an automatic brake control system, particularly Trailer applications, the module allows for a quick and simple wear check.

The Wear Check Module allows:

- Up to 6 Brakes to be checked together.
- LED monitoring of each Brake condition.

A detailed instruction manual is included with each unit.



6 Pad replacement

(for "Axial- and Radial Disc Brake")

WARNING!

Before starting repair work, ensure the service brake and parking brake are not applied and that the vehicle cannot roll away.

6.1 Pad removal

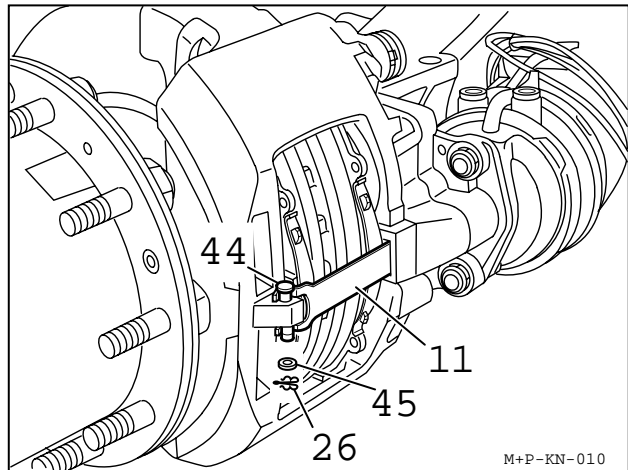
Take the wheel off (refer to Vehicle Manufacturer's recommendations).

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

If the Pad Retainer (11) is corroded, it should be replaced.

Important

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



WARNING!

Do not overload or damage the Adjuster (23). Use only 8mm Ring Spanner or 1/4" drive Socket with a lever length no greater than 100mm.

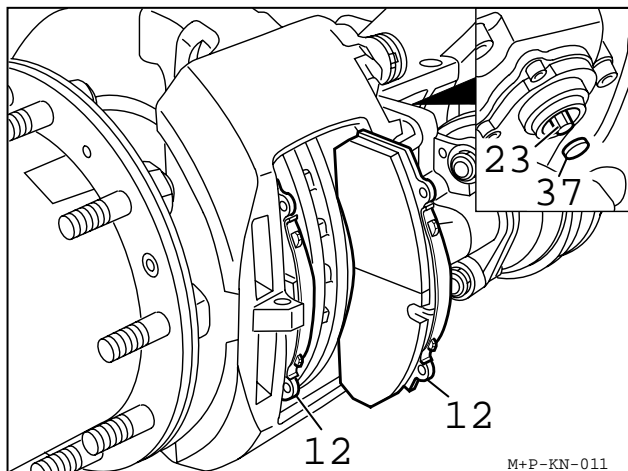
DO NOT use an Open Ended Spanner since this may damage the Adjuster shaft.

Remove Cap (37).

Turn the Adjuster counter-clockwise until Pads can be removed. A clicking noise will be heard during this procedure.

Push inboard Pad (12) toward Actuator.

Pull out both Pads (12).



6.1.1 Tappet Boot Check

The Adjuster (23) should be screwed clockwise until the boots are clearly visible.

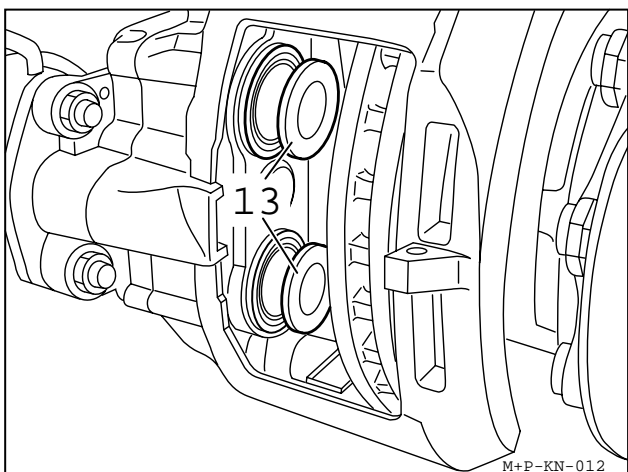
The Boots should not show any damage.

Check the attachment of the Boots into the Caliper housing.

Important

Any ingress of water or dirt past the Tappet Boot will lead to corrosion and affect the function of the Actuation Mechanism and Adjuster Unit.

If damaged, the Boot and Tappet must be replaced (see Section 7).



6.1.2 Caliper guidance check

Following Pad removal (Section 6.1)

Using hand pressure only (no tools), the Caliper (1) must slide freely over the whole length of the Guide Pin arrangement >30mm.

During this operation the Sleeve (5) is sealed by the Boot (9) and Cap (10) or Steel Cap (10a) and O-Ring (31a). These must show no signs of damage. Check that these are correctly seated.

The Caliper may have to be re-sealed by using a suitable Kit (see page 5 or page 7).

6.2 Pad fitting

WARNING!

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

Note:

Before placing the Pads into the Carrier, the Adjuster (23) must be further de-adjusted by rotating it counter clockwise.

Clean the Pad abutments.

Push Caliper (1) outboard and fit the outboard Pad (12).

For fitting the inboard Pad (12) push Caliper (1) in the opposite direction.

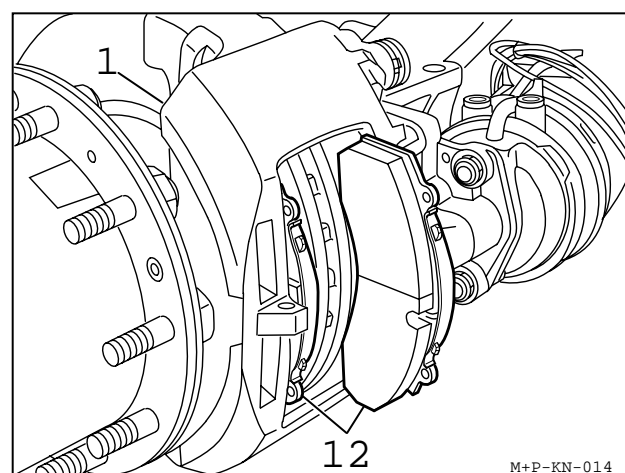
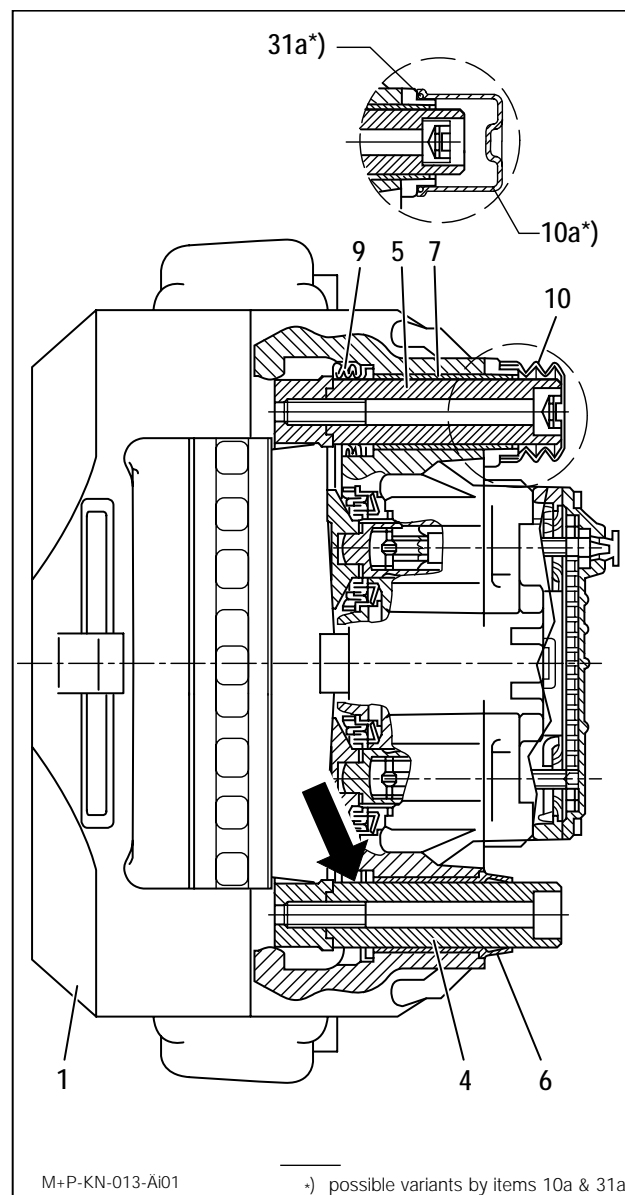
If fitted, replace Wear Indicators and fittings / brackets etc. See page 5 or 7.

WARNING!

Do not overload or damage the Adjuster (23). Use only 8mm Ring Spanner or 1/4" drive Socket with a lever length no greater than 100mm.

DO NOT use an Open Ended Spanner since this may damage the Adjuster shaft.

Rotate the Adjuster clockwise until the Pads come into contact with the Disc. Then turn back the Adjuster 2 clicks.



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

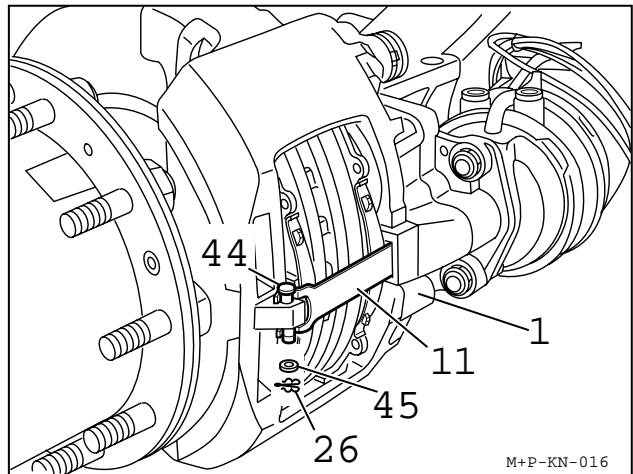
The Cap (37) must then be replaced having lightly greased it with Renolit HLT2 (available as part number II14525).

After setting the Pad Retainer (11) into the groove of the Caliper (1), it must be pushed in to enable the positioning of Pad Retainer Pin (44).

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

Our recommendation is fitting Washer (45) and Spring Clip (26) pointing downwards (see diagram).

Wheel mounting (refer to Vehicle Manufacturer's recommendations).



IMPORTANT!

New Pads need bedding in. Heavy or long duration braking should initially be avoided.

7 Tappet with Boot replacement

(for "Axial- and Radial Disc Brake")

7.1 Tappet with Boot removal

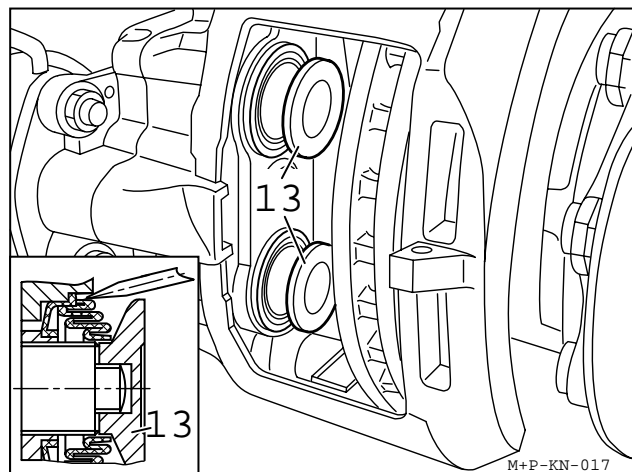
Note:

It may be easier to remove the Caliper from the axle to replace the Tappets of the Caliper (see Section 10.1).

The Adjuster (23) must be screwed clockwise until the Boots can be reached.

If the Caliper has been removed from the vehicle care must be taken not to overrun the threads (see section 7.1.1).

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



Warning!

Great care must be taken not to damage the Inner Seal since it is not a replacement item.

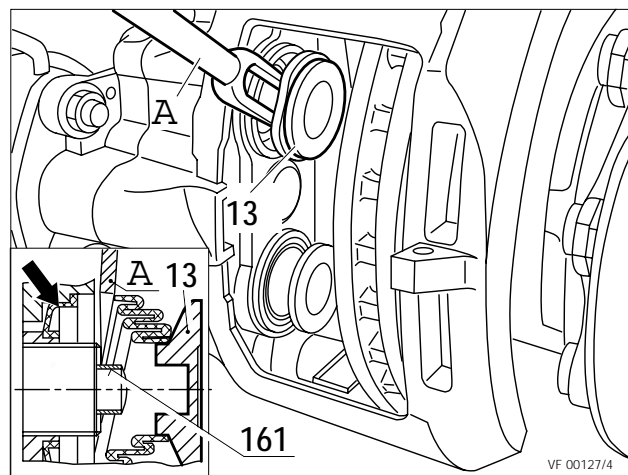
The Tappets (13) can be removed from the Threaded Tubes by using Wedge Fork A. (Order No. II32202).

Remove the old Tappet Bush (116).

Check Inner Seal (arrow) and if damaged, the Caliper must be replaced .

7.1.1 Adjuster thread inspection

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

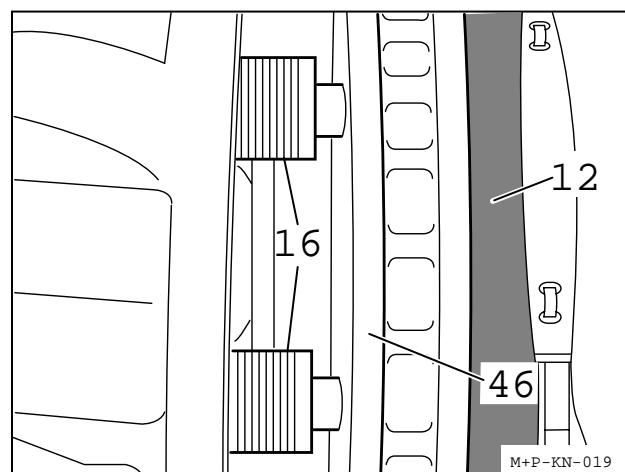


IMPORTANT!

*Threaded Tubes should not overrun the inner thread of the Bridge.
The Caliper must be changed if synchronisation is lost.*

For the inspection of the threads, the tubes must be screwed out (max. 30mm) by turning the Adjuster (23) clockwise.

If Caliper is not installed on axle, put a spacer E (length = 70mm) into the Caliper (1) to avoid overrunning of the Threaded Tubes (16) when screwing them out (see illustration opposite). During screwing, the threads can be checked for corrosion damage. In case of water ingress or corrosion, the Caliper must be replaced.



7.2 Tappet with Boot fitting

With Caliper fixed to axle:

Grease threads with RENOLIT HLT2 (Order No. II14525).

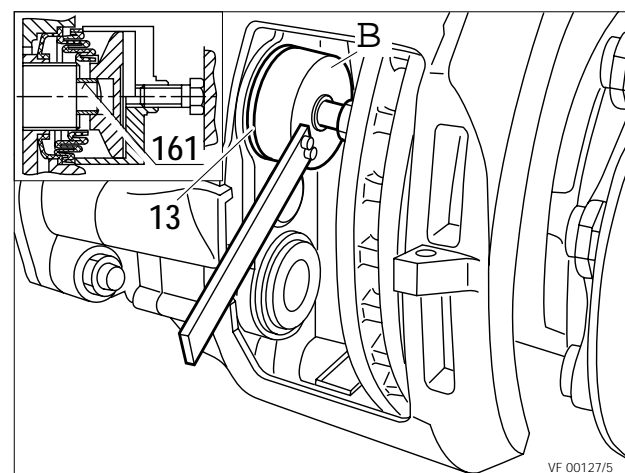
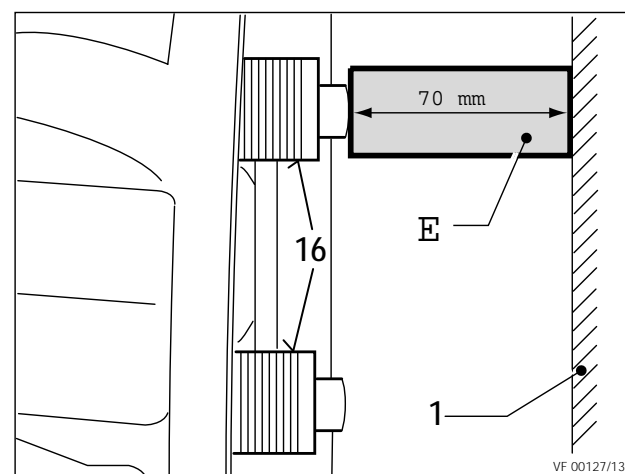
Screw back Threaded Tubes (16), by turning the Adjuster (23) counter-clockwise.

Place new Tappet Bush (161) onto the head of the Tube (16).

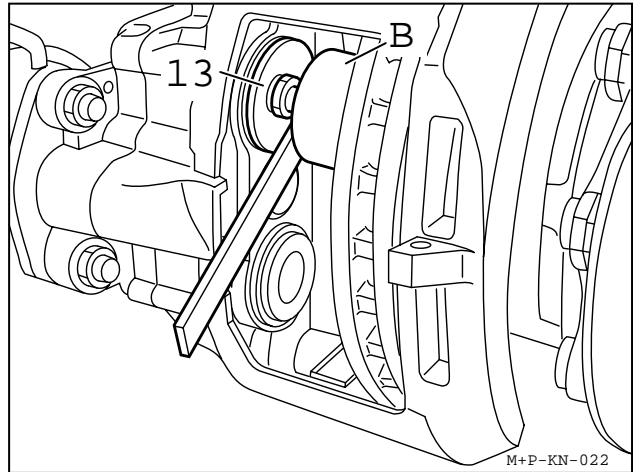
Sealing seat in the caliper for Tappet with Boot (13) must be clean and free of grease.

Place Tappet with Boot (13) onto the head of the Tube.

Use Push-In Tool with the short strut (B) (Order No II19252) for positioning and pressing-in the Boot (13).



Using Tool B in reverse, the Tappet can be pressed on.



With Caliper not installed on axle

Grease threads with RENOLIT HLT2 (Order No. I114525).

Screw back Threaded Tubes (16), by turning the Adjuster (23) counter-clockwise.

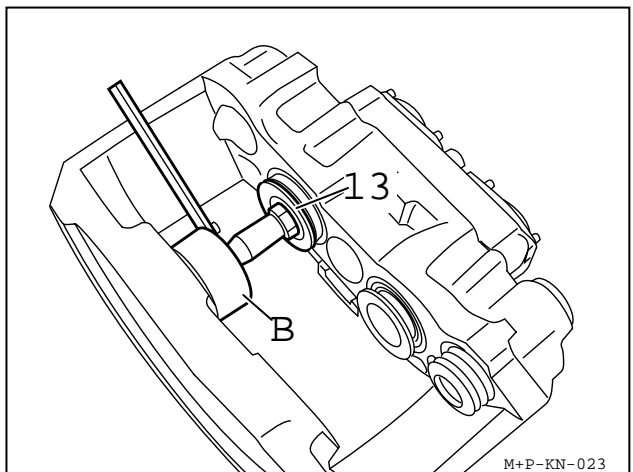
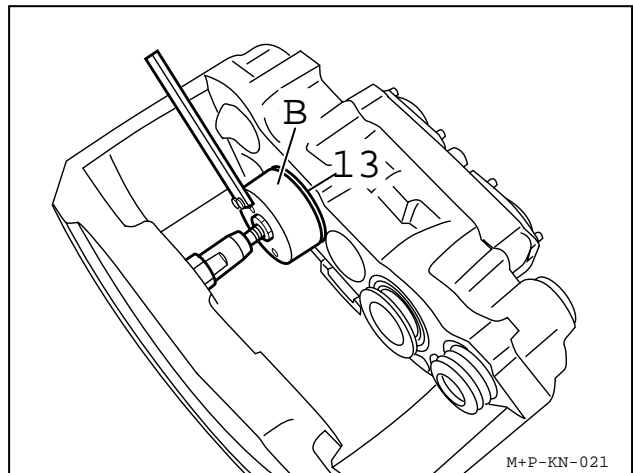
Sealing seat in the caliper for Tappet with Boot (13) must be clean and free of grease.

Place new Tappet Bush (161) onto the head of the Tube (16).

Place Tappet with Boot (13) onto the head of the Tube.

Use Push-In Tool with the long strut (B) (Order No I119252) for positioning and pressing-in the Boot (13).

Using the Tool (B) in reverse, the Tappet can be pressed on.



8 Caliper Suspension sealing (Replacement of inner Boot (9)) (for the Axial and Radial Disc Brake)

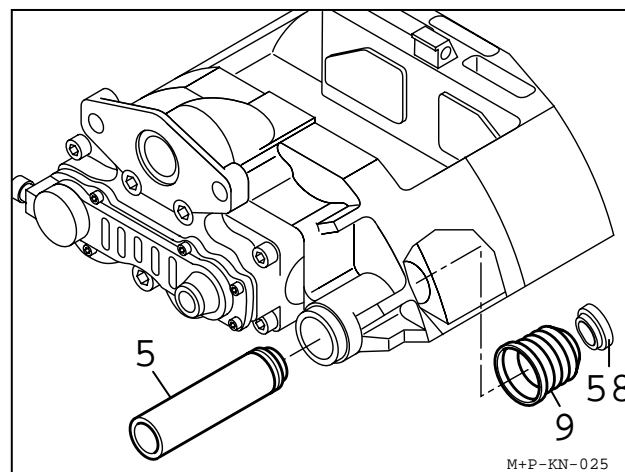
Remove Caliper (see Section 10.1)

Remove Ring (58)

Pull out Sleeve (5)

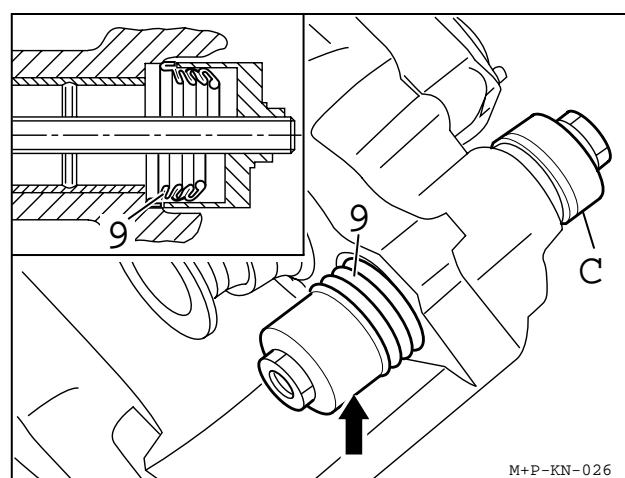
Push out Boot (9) with screw driver.

Inspect and clean contact area of Boot (9)



Put new Boot (9) into the Sleeve (arrow) of the Tool C (Order No II19253).

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

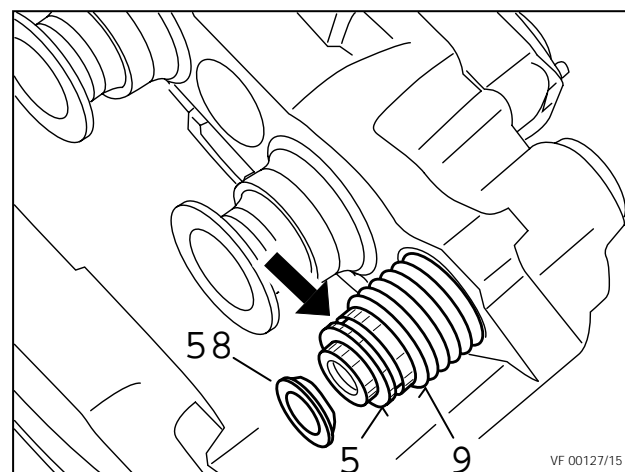


Fit the Sleeve (5)

The Boot end must engage in the groove of the Sleeve (5) (arrow). Lock with Ring (58) by pushing until it engages.

Important:

Before fitting the Caliper the unsealed Sleeve with the Rubber Bush should be checked for its ability to slide.



Fit Caliper (see Section 10.2).

9 Guide Pin Bush replacement

(for "Axial- and Radial Disc Brake")

Remove Caliper (see Section 10.1)

Remove Sleeve (5) and inner Boot (9) (see Section 8).

9.1 Brass Bush (7) replacement

Remove old Sleeve (5).

Pull out Bush (7) with Tool (D) (Order No. II19254).

If Caliper has no groove (see arrow)

(Note: Groove is always located on the inboard side)

Pull in new Brass Bush (7) with Tool (D).

If Caliper has a groove:

Pull in new Brass Bush (7) with Tool (D).
To prevent longitudinal displacement use Tool (F) (Order No II36797) to create new groove.

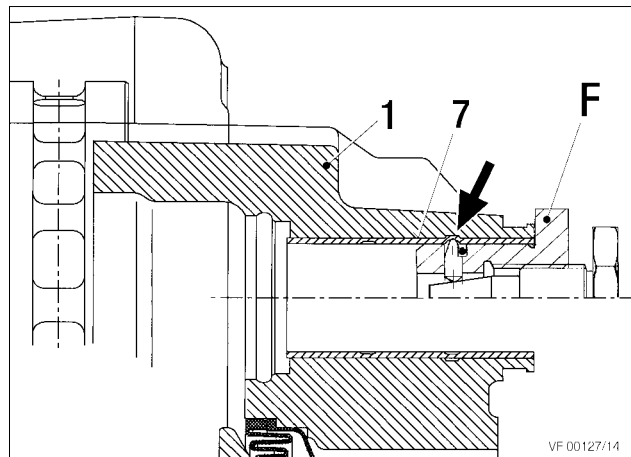
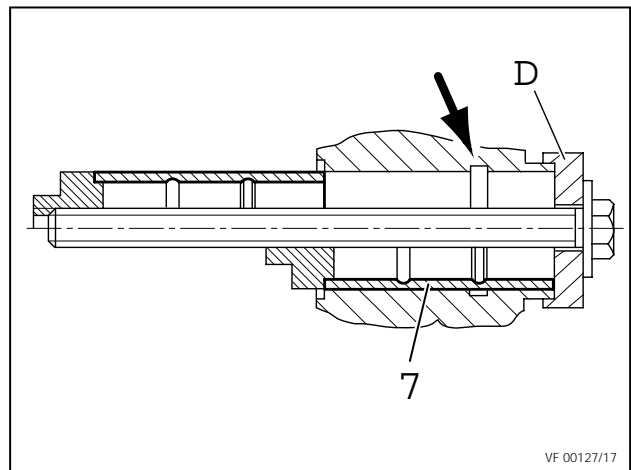
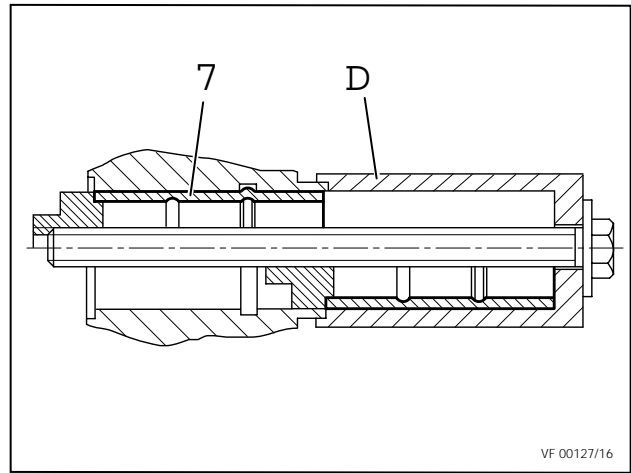
Check contact area of Brass Bush (7) for burrs.
Remove burrs.

Grease Bush with white Grease RENOLIT HLT2 (Order No II14525).

Insert new Sleeve (5).

Note:

The Guide Pins Kit contains new Sleeves (4) & (5) and new Caliper Bolts (39) & (40) (see Section 1.2 and 1.4).



9.2 Rubber Bush (6) replacement

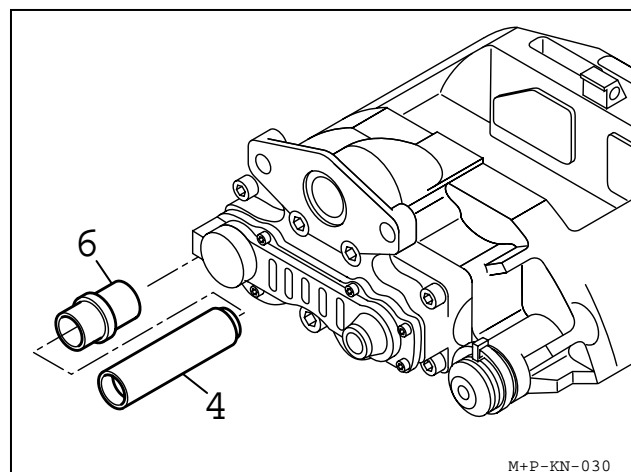
Remove old Sleeve (4)

Pull Rubber Bush (6) out of bore.

Check bore for corrosion, clean if necessary with Corrosion protection paint (e.g. Zinc spray).

Note:

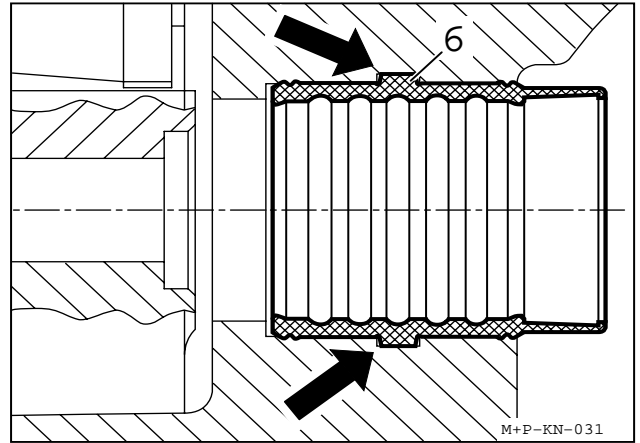
Grease new Rubber Bush (6) inside and outside with green Grease SYNTHESO GL EP 1 (Order No II32793).



Deform new Rubber Bush (6) and push from the inner side of the Caliper into the bore.
Push Rubber Bush (6) so that the outer positioning ring locates in the groove (see arrows).

IMPORTANT!

Under no circumstances must the white Grease (containing mineral oil) be used for lubricating the Bush or Sleeve. Use only synthetic based green Grease (Part Number I132793).



Note:

The Guide Pins Kit contains new Sleeves (4) & (5) and new Caliper Bolts (39) & (40).

Assemble Sleeve (4)

Re-fit Caliper (see Section 10.2)

Important:

Torque Caliper Bolts to 285⁺²⁵ Nm and check that the Caliper slides easily.

10 Caliper replacement

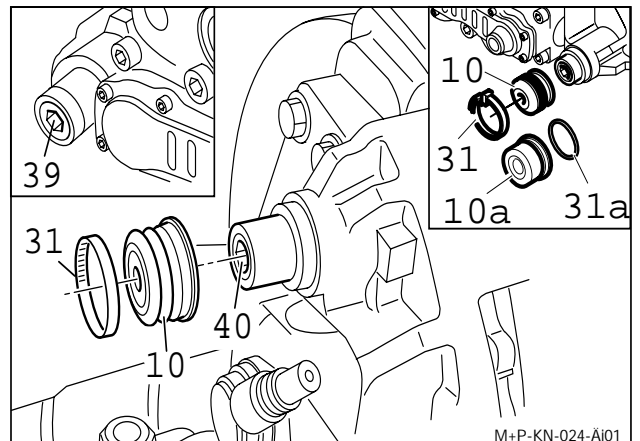
(for Axial- and Radial Disc Brake)

10.1 Caliper removal

Remove Pads (see Section 6.1)

Remove Actuator (see Section 12.1 and 12.3).

Remove Outer Boot Clip (31) and take off Outer Boot (10)

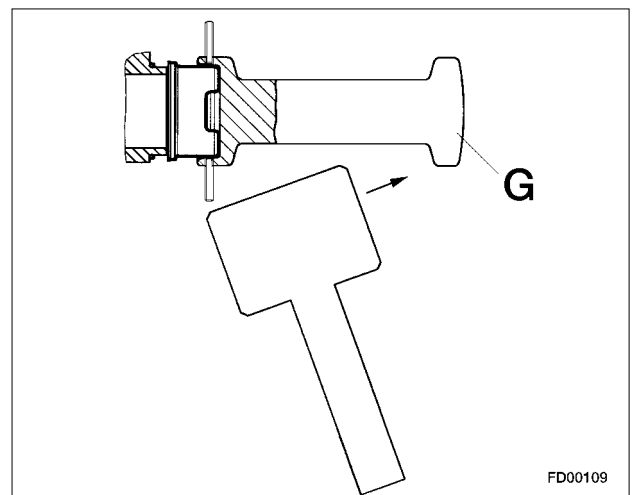


Note:

As well as Calipers with Outer Boot (10) and Outer Boot Clip (31) there are versions with Steel Cap (10a) and O-Ring (31a) available.

On models with Steel Caps (10a) and O-Rings (31a), place tool (G) (Part Number Z001105) onto the Steel Cap and tighten the threaded pin by a hexagon socket spanner. Then use hammer as shown.

Remove Cylinder Bolts (39 and 40).



WARNING!

*Hold Caliper only at its outer side.
Never get your fingers between
Caliper and Carrier!*

Remove Caliper from Carrier.

IMPORTANT!

*The opening or dismantling of the
Caliper has not been authorized.
Use only Genuine Knorr-Bremse
Service Exchange Calipers.*

10.2 Caliper fitting

The correct choice of Caliper must be ensured by checking the Part No. on the label (arrow, picture above)

Note:

Service Exchange Calipers have a blue label.

The Service Exchange Caliper has a plastic cap or an adhesive tape in the area of the Actuator attachment. Remove the cap tape after installing the Caliper (see arrow).

Note:

The service exchange Caliper includes sealing and guiding elements. The Pads are not included.

WARNING!

*Hold Caliper only at its outer side.
Never get your fingers between
Caliper and Carrier!*

10.2.1 Caliper with Outer Boot (10)

Locate the Caliper to the Carrier.

Screw-in Caliper Bolts (39 and 40) and tighten to 285⁺²⁵ Nm (use only new parts).

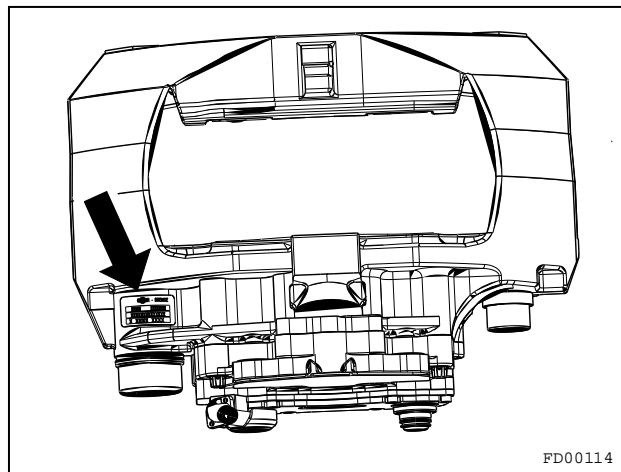
Check that the Caliper slides easily.

Check the position of the Inner Boot (9) on the Sleeve (5).

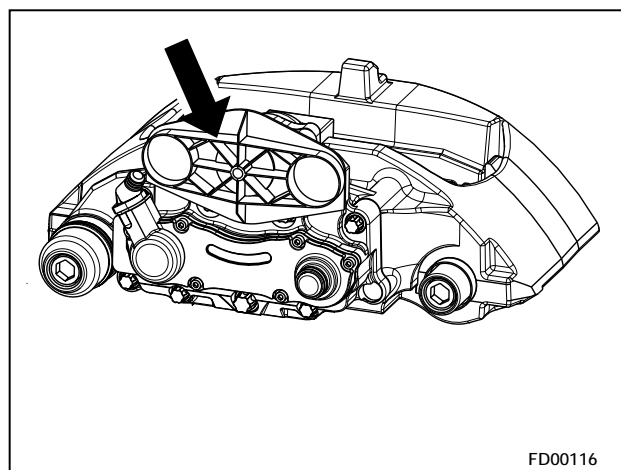
Check Adjuster function (see Section 5.2)

If necessary use new Outer Boot (10).

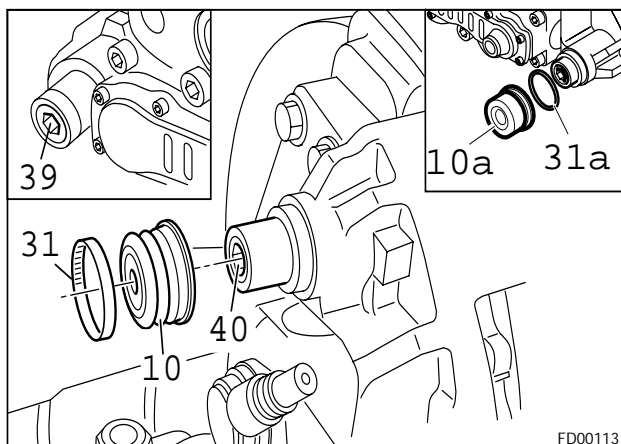
Check grease-free seating of the Outer Boot (10) on the Caliper (1)



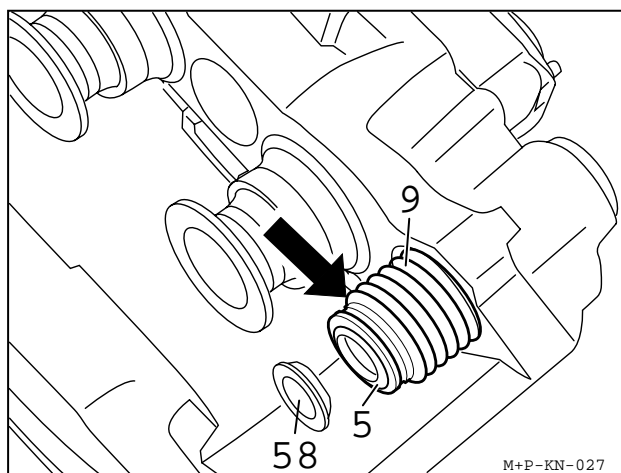
FD00114



FD00116



FD00113

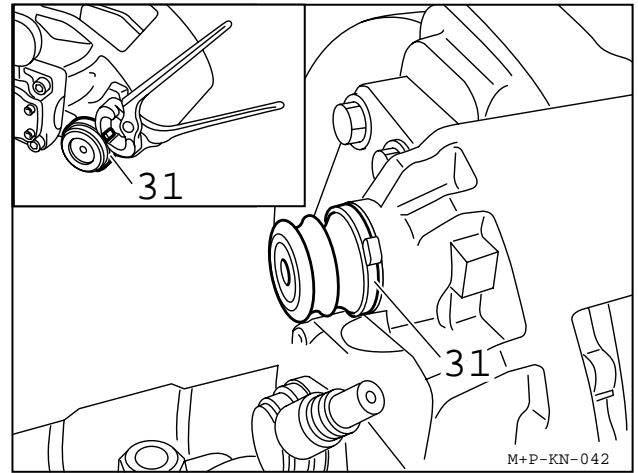


M+P-KN-027

Tighten Outer Boot Clip (31)

Fit the Pads (see Section 6.2)

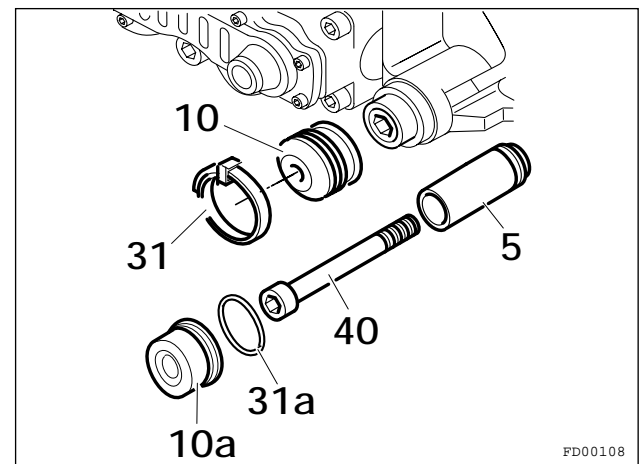
Attach Brake Chamber or Spring Brake (see Section 12.2 or 12.4)



10.2.2 Caliper with Steelcap (10a)

IMPORTANT!

It is only allowed to replace the Outer Boot (10) by the Steel Cap (10a) when replacing the Sleeve (5), the O-Ring (31a) and the Screw (40) at the same time. Replace only after permission by Axle- or Vehicle-manufacturer. On SB 6... (19,5") only permissible after manufacturing date A0026. (see type plate).

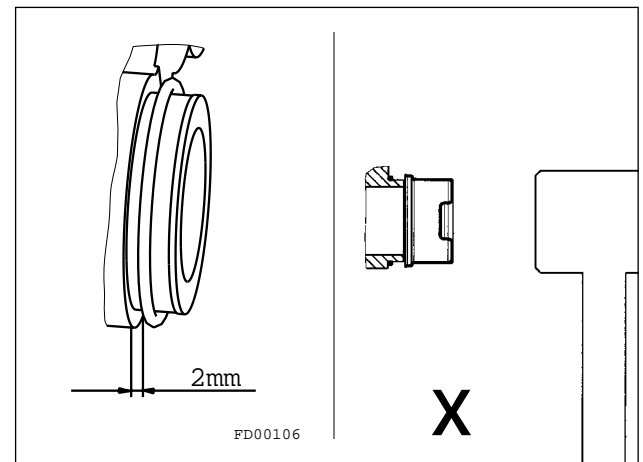


It may be easier to remove the Caliper and the Carrier from the axle to replace the Steel Cap.

Assembly at the Vehicle :

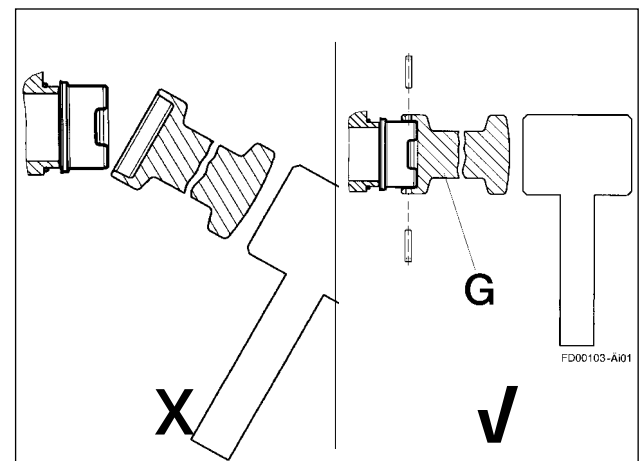
The fitting must be carried out with Pads still installed.

- Clean area.
 - Using the Grease supplied (II14525), lightly lubricate the O-Ring and place it over the cast spigot (see Sketch).
 - Remove Threaded Pins from assembly tool (G) to avoid damage of the Steel Cap.
 - Hold the new Steel Cap on the end of the Spigot. By using a suitable press or special assembly tool (Part Number Z001105) and a hammer, press the Steel Cap fully on the spigot making sure not to deform the Cap.
- After removal the Steel Cap and the O-Ring must not be refitted.



IMPORTANT!

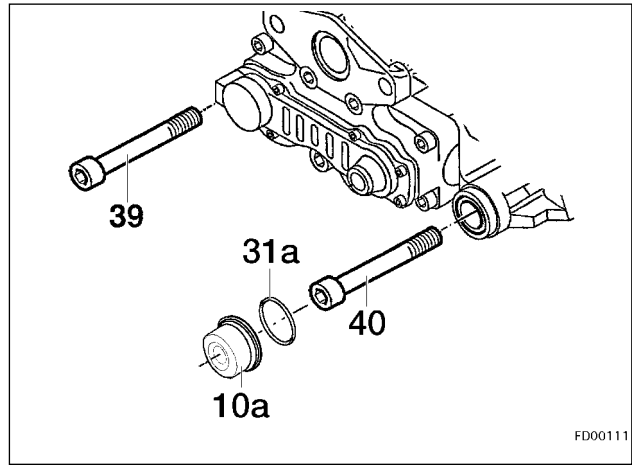
The Steel Cap (10a) and the O-Ring must only be used once.



Assembly on the Caliper and Carrier removed from the axle:

IMPORTANT!

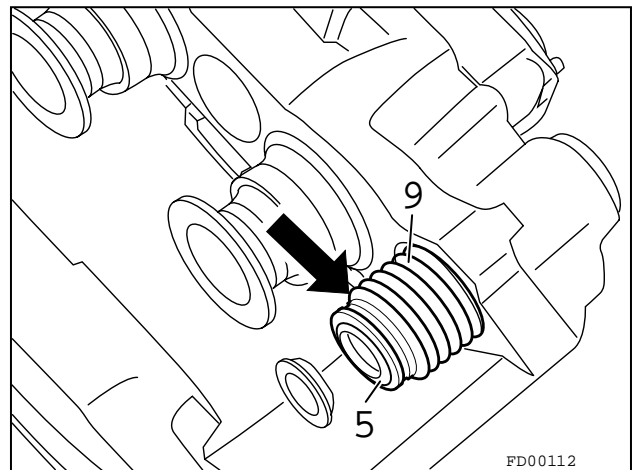
It is only allowed to replace the Outer Boot (10) by the Steel Cap (10a) when replacing the Sleeve (5), the O-Ring (31a) and the Screw (40) at the same time. Replace only after permission by Axle- or Vehicle-manufacturer. On SB 6... (19,5") only permissible after manufacturing date A0026. (see type plate).



Put the Caliper on the Carrier.

IMPORTANT!

Special threaded Screw (40) and Steel Cap (10a) as well as the O-Ring (31a) must be renewed whenever Screw (40) has been removed.

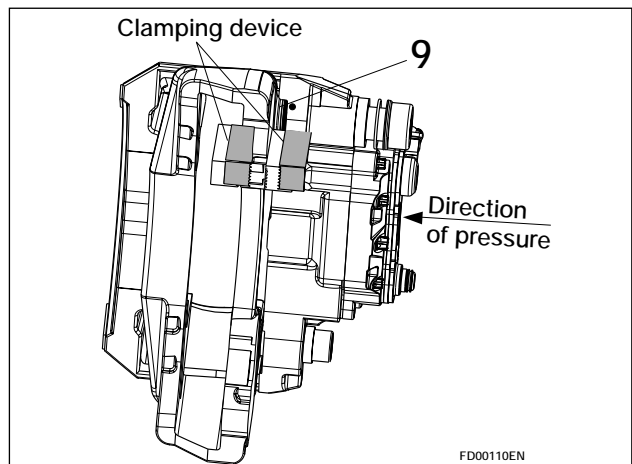


Screw-in Caliper Bolts (39 and 40) and tighten to 285⁺²⁵ Nm.

Check the position of the Inner Boot (9) on the Sleeve (5).

Check that the Caliper slides easily.

In the shown clamping (e.g. vice) press the Caliper against the Carrier as far as possible. The inner Boot (9) must be in compressed condition, this to prevent air being trapped inside of the Cap.



The assembly of the Steel Cap (10a) can now be carried out as in Section " Assembly at the Vehicle".

Check Adjuster (Section 5.2).

11 Carrier replacement

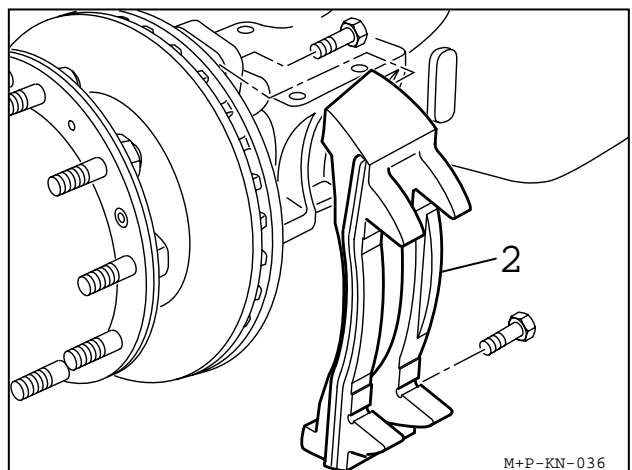
(for Axial- and Radial Disc Brake)

Remove Caliper (see Section 10.1).

Remove Carrier (2) from axle.

Clean axle contact area.

Attach new Carrier with new bolts from the relevant truck manufacturer. Bolts are not supplied by Knorr-Bremse.



Attach Caliper (see Section 10.2)

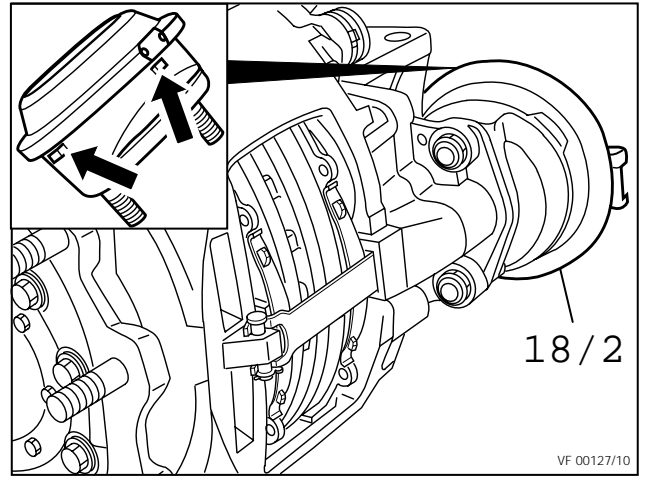
12 Actuation cylinder replacement (for "Axial- and Radial Disc Brake")

12.1 Brake Chamber removal

Disconnect air line from Brake Chamber (18/2)

Unscrew Brake Chamber Mounting Nuts (do not re-use them).

Remove Brake Chamber



12.2 Brake Chamber fitting

IMPORTANT:

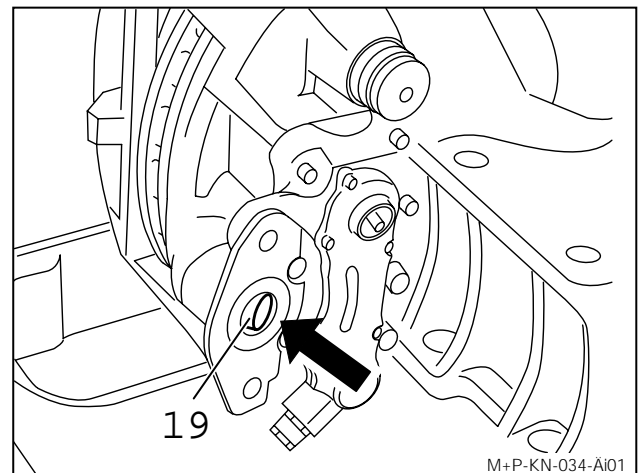
New Brake Chambers (18/2) have drain plugs installed. Remove bottom plug (see arrows). All other drain holes should be plugged.

Before fitting the new Brake Actuator, the sealing surface (see arrow) must be cleaned, and the Spherical Cup (19) in the Lever must be greased with white Grease RENOLIT HLT2 (Order no II14525).

Surface area of the flange must be plain and clean.

IMPORTANT!

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



Attach Actuator with new Nuts (self-locking EN ISO 7042) and torque tighten to 180⁺³⁰ Nm.

Connect air hose and check for leakage.

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

IMPORTANT!

Check function and effectiveness of the brake.

12.3 Spring Brake removal

CAUTION!

*Chock wheels before releasing
Spring Brake*

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

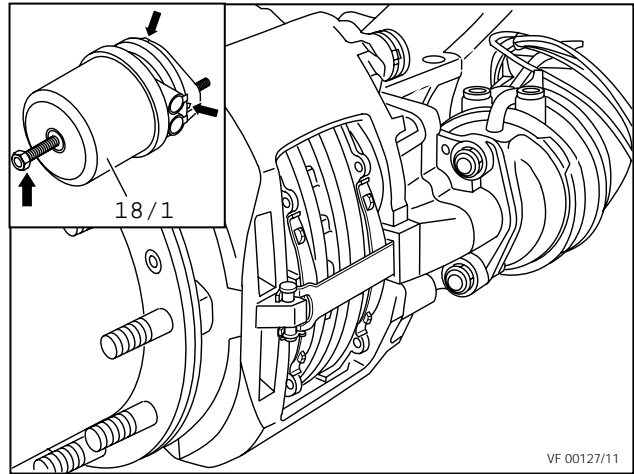
Screw-out Release Bolt (arrow) with a maximum torque of 35Nm.

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

Disconnect air hoses from Spring Brake Actuator (18/1)

Unscrew Spring Brake Actuator Mounting Nuts (do not re-use).

Remove Spring Brake Actuator.



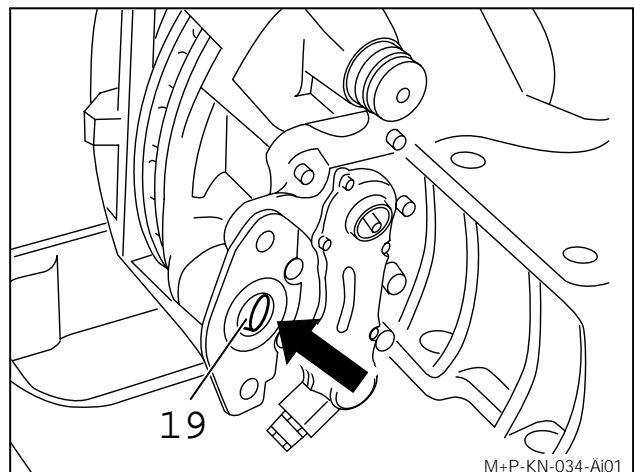
12.4 Spring Brake fitting

IMPORTANT!

New Spring Brake Actuators (18/1) have drain plugs installed. Remove bottom plug (see arrows). All other drain holes should be plugged.

Before fitting the new Brake Actuator, the sealing surfaces have to be cleaned, and the Spherical Cup (19) in the Lever must be greased with white Grease RENOLIT HLT2 (Order no II14525)

Surface area of the flange must be plain and clean.

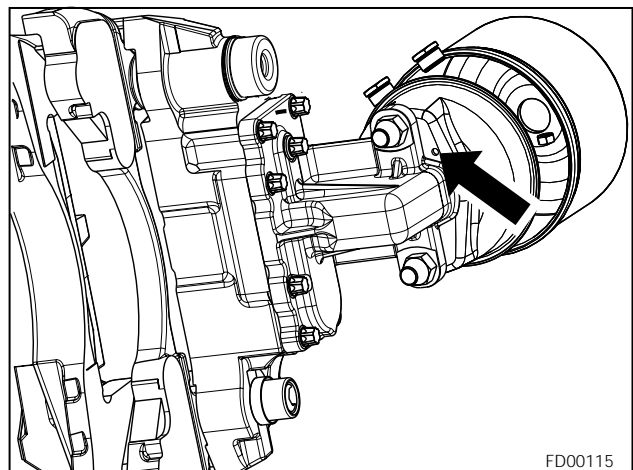


IMPORTANT!

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

IMPORTANT!

*On Radial Disc Brake the Train Plugs in
the bottom of the Cylinderflange must
be open.*



Attach Actuator with new Nuts (self-locking EN ISO 7042) and torque tighten to 180⁺³⁰ Nm.

Connect air hose, ensuring that hoses are not mixed up.

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

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

Screw in Spring Brake Release bolt to maximum 70 Nm.

IMPORTANT!

Check function and effectiveness of the brake.

13 Additional information

13.1 Service Video

A Video is available for additional information.

Order number: RA-SB0002.DE Video (German)
RA-SB0002.EN Video (English)
(in UK. order KBP2060/1)
RA-SB0002.IT Video (Italian)
RA-SB0002.SP Video (Spanish)
RA-SB0002.PO Video (Portugese)
RA-SB0002.DA Video (Danish)
RA-SB0002.HU Video (Hungarian)
RA-SB0002.FR Video (French)

13.2 Service Tool Kit ZB 9032

For service and repair work we recommend our Tool Kit ZB 9032 II 37951/004EX, which contains all necessary special tools.

13.3 Diagnostic Equipment

For vehicles fitted with continuous potentiometer type wear sensors, Knorr-Bremse Diagnostic Equipment may be used to ensure quick and simple measurement of wear at each caliper. See sections 5.4 and 5.5.

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