SERVICE MANUAL

ModulX™ Air Disc Brake
DB19/DB22/DB22LT
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- Use appropriate spare parts documentation when obtaining spare parts.
- Use only genuine Haldex spare parts in repairs.
- Haldex reserves the right to make changes in the interest of technical progress.
- The contents of this manual are not legally binding.
- No part of this publication may by reproduced, copied or translated without the prior permission of Haldex Brake Products Corporation.
- This edition supersedes all previous editions of the same documentation and renders them invalid.
- In case of a dispute between language versions, the English original has priority.
The Haldex disc brake is designed to provide high performance coupled with low weight, durability and a minimum number of wearing parts. Floating, two-piece calipers are used. Brake pad wear is compensated for by an automatic clearance adjustment mechanism. The mechanism, which is activated by the brake chamber, acts on a thrust plate which presses the inner brake pad against the rotor, which then causes the caliper to move (float) laterally, so that the outer brake pad also comes in contact with the rotor. The caliper moves on slide pins. Where the rotor also serves as a parking brake, the mechanism is activated by a spring brake chamber.

**Product identification**

Type and serial numbers are stamped on an identification plate fixed to the caliper.

1. OEM/Haldex logo
2. OEM P/N (if required)
3. Haldex (origin) assembled in the U.S.A.
4. Haldex P/N xxxxx
5. Haldex S/N 226123 (example)

2 = year, 2002
26 = week number.
123 = sequential number
DB19/DB22/DB22LT Generation 2

See Component List on Page 5.
Haldex Disc Brakes
Component list
DB19/DB22/DB22LT

1 Disc brake assembly
2 Caliper assembly
2a Caliper housing
2b Caliper bridge
3 Carrier
4 Adjuster Mechanism
5 Pad
6 Pad spring
7 Pad retainer
8 Bolt
9 Protection cap
10 Slide pin attaching bolt
12 Protection boots
13 Slide pin
14 Slide bushing
15 Plug
18 Torx bolt
22 Bolt
25 Brake chamber
26 Spring brake chamber
27 Fixing bolt
28 Thrust plate
29 Thrust plate clip
30 Protection spring
32 Protection boots
33 Adjuster Mechanism Cover
34 Circlip
35 Adjustment screw
37 Bushing
38 Return spring
41 Cross bar
43 Needle bearing (outer)
44 Lever
45 Retainer
46 Rivet
47 Guide pin
48 Needle bearing (inner)
48a Slide bearing (inner)
50 Washer
53 Bearing sleeve
54 Adjuster
55 Adjustment shaft
59 Washer
60 Circlip
61 Clamp
62 Housing (adjuster)
63 Adjustment spring
64 Circlip (small)
64a Circlip (large)
66 Friction spring (one-way)
67 Hub
68 Companion sleeve
69 Radial Seal
71 Protection cup
73 Data plate
74 Adjustment sleeve (driving)
75 Adjustment sleeve (driven)
76 Pin
77 Gear wheel
78 Torx bolt
79 PWI
79a PWI connectors
79b PWI clamp for cable
79c PWI wire connector
79d PWI plate
79e PWI cable
80 PWS
80a PWS connector
81 Bolt
82 O-ring
83 Cable ties/straps
84 Synchronization plate
85 Indicator pin
86 Pin
### Specifications

<table>
<thead>
<tr>
<th></th>
<th>English</th>
<th>Metric</th>
<th>English</th>
<th>Metric</th>
<th>English</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DB19</td>
<td>DB22</td>
<td>DB22LT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheel size</td>
<td>19.5-22.5 in.</td>
<td>22.5-24.5 in.</td>
<td>22.5-24.5 in.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. brake torque with 0.34 COF</td>
<td>159,313 in-lbs.</td>
<td>18 kNm</td>
<td>194,716 in-lbs.</td>
<td>22 kNm</td>
<td>159,313 in-lbs.</td>
<td>18 kNm</td>
</tr>
<tr>
<td>Max. brake chamber force</td>
<td>2,698 ft. lbs.</td>
<td>12 kN</td>
<td>3125 ft. lbs.</td>
<td>12.5 kN</td>
<td>2,698 ft. lbs.</td>
<td>12 kN</td>
</tr>
<tr>
<td>Number of actuating tappets</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Number of slide pins</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Threshold Force</td>
<td>11 lbs.</td>
<td>50N</td>
<td>11 lbs.</td>
<td>50N</td>
<td>11 lbs.</td>
<td>50N</td>
</tr>
<tr>
<td>Max. brake chamber stroke</td>
<td>2.5 in.</td>
<td>65 mm</td>
<td>2.5 in.</td>
<td>65 mm</td>
<td>2.5 in.</td>
<td>65 mm</td>
</tr>
<tr>
<td>Adjustment for excess clearance (see p. 8)</td>
<td>9.8%</td>
<td>9.8%</td>
<td>9.8%</td>
<td>9.8%</td>
<td>9.8%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Max. adjustment distance brake lining</td>
<td>1.9 in.</td>
<td>48 mm</td>
<td>2.0 in.</td>
<td>52 mm</td>
<td>2.0 in.</td>
<td>52 mm</td>
</tr>
<tr>
<td>Running clearance, brake lining to rotor</td>
<td>0.02-0.04 in.</td>
<td>0.6-1.0 mm</td>
<td>0.02-0.04 in.</td>
<td>0.6-1.0 mm</td>
<td>0.02-0.04 in.</td>
<td>0.6-1.0 mm</td>
</tr>
<tr>
<td>Pad lining thickness</td>
<td>0.82 in.</td>
<td>21 mm</td>
<td>0.86 in.</td>
<td>22 mm</td>
<td>0.86 in.</td>
<td>22 mm</td>
</tr>
<tr>
<td>Pad backplate thickness</td>
<td>0.35 in.</td>
<td>9 mm</td>
<td>0.31 in.</td>
<td>8 mm</td>
<td>0.31 in.</td>
<td>8 mm</td>
</tr>
<tr>
<td>Pad lining area (per pad)</td>
<td>23 in²</td>
<td>150 cm²</td>
<td>30.0 in²</td>
<td>193 cm²</td>
<td>24.8 in²</td>
<td>160 cm²</td>
</tr>
<tr>
<td>External diameter of brake rotor</td>
<td>14.8 in.</td>
<td>375 mm</td>
<td>16.9 in</td>
<td>430 mm</td>
<td>16.9 in</td>
<td>430 mm</td>
</tr>
<tr>
<td>Brake rotor thickness</td>
<td>1.8 in.</td>
<td>45 mm</td>
<td>1.8 in.</td>
<td>45 mm</td>
<td>1.8 in.</td>
<td>45 mm</td>
</tr>
<tr>
<td>Pad weight each</td>
<td>4.2 lbs.</td>
<td>1.9 kg</td>
<td>5.9 lbs.</td>
<td>2.7 kg</td>
<td>4.9 lbs.</td>
<td>2.2 kg</td>
</tr>
<tr>
<td>Weight approx. (excl. pads/brake chamber)</td>
<td>73.9 lbs.</td>
<td>33.5 kg</td>
<td>88 lbs.</td>
<td>39.9 kg</td>
<td>73.9 lbs.</td>
<td>33.5 kg</td>
</tr>
</tbody>
</table>
### Tightening torques

For number references in parenthesis in the text which do not appear in this section, refer to the exploded view (p. 3-4)

Follow the vehicle/axle manufacturers recommendations or follow the method described below:

* = *The bolt must not be re-used*

<table>
<thead>
<tr>
<th>Torque Requirements</th>
<th>DB19 (ft. lbs.)</th>
<th>Nm</th>
<th>DB22 (ft. lbs.)</th>
<th>Nm</th>
<th>DB22LT (ft. lbs.)</th>
<th>Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolts for carrier mounting (M20, 2.5 pitch)</td>
<td>350+/−25</td>
<td>475+/−34</td>
<td>350+/−25</td>
<td>475+/−34</td>
<td>350+/−25</td>
<td>475+/−34</td>
</tr>
<tr>
<td>Torx Bolts (78) for caliper housing/bridge</td>
<td>273-302</td>
<td>390+/−20</td>
<td>391-435</td>
<td>560+/−30</td>
<td>273-302</td>
<td>390+/−20</td>
</tr>
<tr>
<td>Torx Bolts for slide pins attaching bolts (10) Gen 2</td>
<td>192-221</td>
<td>280+/−20</td>
<td>192-221</td>
<td>280+/−20</td>
<td>192-221</td>
<td>280+/−20</td>
</tr>
<tr>
<td>Pad retainer bolt (8)</td>
<td>33-39</td>
<td>45+/−8/0</td>
<td>33-39</td>
<td>45+/−8/0</td>
<td>33-39</td>
<td>45+/−8/0</td>
</tr>
<tr>
<td>Fixing bolts (27), brake chamber</td>
<td>133+22/-0</td>
<td>180+30/-0</td>
<td>133+22/-0</td>
<td>180+30/-0</td>
<td>133+22/-0</td>
<td>180+30/-0</td>
</tr>
</tbody>
</table>

### Wear limits

<table>
<thead>
<tr>
<th>Wear limits</th>
<th>DB19</th>
<th>DB22</th>
<th>DB22LT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pads (5), min. lining thickness</td>
<td>2mm (0.08 in)</td>
<td>2mm (0.08 in)</td>
<td>2mm (0.08 in)</td>
</tr>
<tr>
<td>Pads (5), max. uneven wear</td>
<td>1mm (0.04 in)</td>
<td>1mm (0.04 in)</td>
<td>1mm (0.04 in)</td>
</tr>
<tr>
<td>Slide pins (13), max. movement</td>
<td>1mm (0.04 in)</td>
<td>1mm (0.04 in)</td>
<td>1mm (0.04 in)</td>
</tr>
<tr>
<td>Slide function, max slide resistance</td>
<td>100N (22.5 lbs.)</td>
<td>100N (22.5 lbs.)</td>
<td>100N (22.5 lbs.)</td>
</tr>
<tr>
<td>Brake Rotor, min. thickness</td>
<td>37mm (1.45 in)</td>
<td>37mm (1.45 in)</td>
<td>37mm (1.45 in)</td>
</tr>
<tr>
<td>Brake Rotor, max. wear per side</td>
<td>4mm (0.15 in)</td>
<td>4mm (0.15 in)</td>
<td>4mm (0.15 in)</td>
</tr>
<tr>
<td>Brake Rotor, max. lateral runout</td>
<td>0.5mm (0.02 in)</td>
<td>0.5mm (0.02 in)</td>
<td>0.5mm (0.02 in)</td>
</tr>
<tr>
<td>Brake Rotor, max. thickness variation</td>
<td>0.1mm (0.004 in)</td>
<td>0.1mm (0.004 in)</td>
<td>0.1mm (0.004 in)</td>
</tr>
</tbody>
</table>
Operation of product

For number references in parenthesis in the text which do not appear in this section, refer to the exploded view (p. 3-4)

**Actuation/release of brake**

During braking, lever (44) is actuated by brake chamber (25/26). The inner section of lever (44) presses the cross bar (41) axially towards the brake disc (A). The force is transferred from the cross bar (41) via adjustment sleeves (74/75), adjustment screws (35) and the thrust plate (28) to the inner brake pad (5). As the brake pad (5) comes into contact with the rotor (A), the caliper (2) moves laterally on the slide pins (13) to allow the outer pad (5) to contact the rotor (A). When the brake is released, return spring (38) forces cross bar (41) back to its rest position, allowing the design clearance between pad (5) and rotor (A) to be achieved.

**Automatic adjustment**

Adjustment is based on the clearance principle. The braking sequence is split into three phases: design clearance C, excess clearance Ce (which must be adjusted out), and the elasticity phase E. These phases take place when the brakes are activated and released. The lever (44) activates the adjuster unit (54) by means of a guide pin (47). The clearance between the guide pin (47) and the slot in the adjuster unit housing (62) determines the clearance between the brake pads (5) and the rotor (A). The adjuster unit (54) in turn rotates the adjustment sleeve (74), which is threaded around the adjustment screw (35). The thrust plate (28) is held in position on the end pins of the adjuster screws (35) by clips (29). The adjustment screws (35) are prevented from rotating/following the adjuster sleeves (74/75) by guides on the thrust plate (28). The second adjustment sleeve (75) is synchronized and driven by a gear mechanism which consists of gear wheels (77) attached to each of the two adjustment sleeves (74/75) plus an intermediate gear wheel. (Three gear wheels (77) in total).
**Application**

C - During the forward stroke through C, the design clearance between pads (5) and rotor (A) is measured. The clearance between the guide pin (47), which is attached to the lever (44) and the slot in the adjuster unit housing (62) determines the magnitude of the forward stroke before the adjustment process begins.

Ce - If there is any clearance between the rotor (A) and the brake pad (5) when the thrust plate (29) has moved axially through the design clearance C, the adjuster unit (54) rotates the adjuster sleeves (75/75). The adjustment screws (35) are held in position by the thrust plate (28) and are therefore prevented from turning. Rotation of the adjuster sleeves (74/75) in relation to the adjustment screws (35) removes a percentage of the measured excess clearance Ce.

In adjuster unit (54), turning movement is transferred from the housing (62) via adjustment spring (63), companion sleeve (68), one-way spring (66) to the adjustment sleeves (74/75), which are threaded around the adjustment screws (35).

E - When pads (5) come into contact with rotor (A), the braking enters elasticity phase E, the torque rises and adjuster unit (54) stops adjusting. The continued rotational movement which now occurs in adjuster unit (54) is allowed by rotating housing (62) in relation to adjustment spring (63).
**Release**

The first part of the return stroke is a combination of elasticity phase E and design clearance C. Any residual part of the return stroke is excess clearance Ce which is adjusted out during subsequent braking. During the return stroke, return spring (38) ensures that cross bar (41) travels back.

**C** – During the first part of the return stroke, the force on the brakes decreases. The guide pin (47) moves to the opposite side of the slot in the adjuster unit housing (62) = transition of design clearance.

**E** – Corresponds to forward stroke movement through E. Adjuster unit housing (62), adjustment spring (63) and companion flange (68) are rotated in relation to the adjustment sleeve (74/75), which remains stationary. Movement between the companion flange (68) and the adjustment sleeve (74) is taken up by the one-way spring (66).

**Ce** – During the last part of the return stroke (corresponding to the movement of the forward stroke through Ce), rotational movement in adjuster unit (54) continues as described under E until adjuster mechanism (4) reaches its rest position.

The brake is now back in its rest position.
General Instructions

- Always follow the vehicle manufacturer’s safety instructions when working on the vehicle.
- Follow the vehicle manufacturer’s instructions for recommended practices not described in this manual.
- Comply with local safety regulations.
- Work must be carried out by trained personnel.
- Sudden release of tensioned springs (e.g. the spring brake part of the brake chamber or the disc brake return spring) may cause injury.
- Use recommended tools only.
- Release pressure from lines and components before disassembly.
- Chock at least one of the vehicle’s axles to prevent involuntary movement of the vehicle.
- Before releasing the vehicle back into service, perform a brake operational check and test the vehicle to make sure that the brakes are working correctly.

This symbol 🚨 means that special attention is required!

Recycling

When replacing the disc brake or parts thereof, the components removed must be recycled/destroyed in compliance with applicable environmental legislation, regulations and provisions.

Cleaning

For the disc brake’s function it is important to keep it clean so its normal movements are not limited by mud, ice, snow, objects etc.

To avoid causing damage or displacing hoses, seals and other components when cleaning/washing/removing snow/ice it is important to take care when using chemicals, high pressure cleaner or cleaning tools.

The result of damage may be immediate loss of the brake function or ingress of moisture/dirt and in turn function irregularities.

Surface finishing for disc brake

Surface Coating

Care must be taken to ensure that painting and/or undercoating does not cause damage and/or restrict the natural movement or operation of the disc brake.

All contact surfaces, brake pads, rubber parts and rotor friction surfaces must therefore be protected or masked. The mechanism (4) must be protected from the ingress of paint (e.g. if brake chamber (25/26) is not installed).

The following areas must not be painted:

Protection boots (12/32), radial seals (69), brake pads (5) (complete assembly), the swept area of the disc, mounting surfaces of the assembly and all bolted connections.
Brake force distribution

It is important that the distribution of brake force (between axles/vehicles) in a vehicle combination is adapted so that the brake force for each axle/vehicle is proportioned in accordance with the legally applied braking calculations.

If brake force is not correctly distributed it can lead to excessive braking of a vehicle and/or one or more axles in the combination. This can result in overheating, accelerated wear and damage to the disc brake, pads, brake discs, tires and wheel components.

⚠️ **WARNING:** Avoid creating dust. Possible cancer and lung disease hazard.

While Haldex does not offer asbestos brake linings, the long term affects of some non-asbestos fibers have not been determined. Current OSHA Regulations cover exposure levels to some components of non-asbestos linings but not all. The following precautions must be used when handling these materials.

- Avoid creating dust. Compressed air or dry brushing must never be used for cleaning brake assemblies or work area.

- Haldex recommends that workers doing brake work must take steps to minimize exposure to airborne brake lining particles. Proper procedures to reduce exposure include working in well ventilated area, segregation of areas where brake work is done, use of local filtered ventilation systems or use of enclosed cells with filtered vacuums. Respirators approved by the Mine Safety and Health Administration (MSHA) or National Institute for Occupational Safety and Health (NIOSH) should be worn at all times during brake servicing.

- Workers must wash before eating, drinking or smoking; shower after working and should not wear work clothes home. Work clothes should be vacuumed and laundered separately with out shaking.

- OSHA Regulations regarding testing, disposal of waste and methods of reducing exposure for asbestos are set forth in 29 Code of Federal Regulations §1910.001. These Regulations provide valuable information which can be utilized to reduce exposure to airborne particles.

- Material Safety Data Sheets (MSDS) on this product, as required by OSHA, are available from Haldex.
Inspection/checks/adjustment

For number references in parenthesis in the text which do not appear in this section, refer to the exploded view (p. 3-4).

Visually Inspect the following items every 3 months.

- Brake Pads 3 month intervals
- Brake Disc 3 month intervals

Check the following items regularly as indicated. Refer to the instructions provided in the “Inspection” section.

- Check brake pads 6 month intervals
- Check brake disc 6 month intervals
- Check slide function 6 month intervals
- Check play inside pins 12 month intervals
- Check protection boots 12 month intervals

Do not disassemble the Torx bolts (78) that hold the caliper housing (2a) and caliper bridge (2b) together!

IMPORTANT!

Read the safety instructions carefully. See the section entitled Safety. The vehicle manufacturer’s instructions should also be followed.

Clean the disc brakes, removing any dirt and dust. Use dust removal equipment or a vacuum cleaner but do not use compressed air - inhaling dust particles may be harmful to your health! See Cleaning for instructions.

If the disc brake is equipped with a parking brake function, ensure that the spring brake chamber is fully retracted and mechanically secured in the released position.

See the vehicle manufacturer’s instructions.
Inspection and checks

Inspection of pad wear, visual

An indication on the degree of pad wear can be obtained (without removing the wheels) by examining the position of pointer A on the brake caliper assembly (2) in relation to carrier (3). Methods/specifications are the same for DB19, DB22 and DB22LT. See method descriptions with and without indicator pin below.

**With** indicator pin: Examine the position of pointer A in relation to the tip of the indicator pin. See Fig.1.

**Without** indicator pin: Use a rigid ruler to measure the distance between carrier assembly (3) and indicator A. New pads (5) **27 mm** (1 1/16 in.) Worn out pads (5) **47 mm** (1 7/8 in.) See Fig.2.

![Fig 1](image1)

![Fig 2](image2)

**NOTE**

Inspection procedure only indicates the degree of wear of the outer pad (5)!

To accurately determine the degree of pad wear see Inspection/checks/adjustment, ’Checking pad wear’ [with pads (5) removed] on page 15.

Inspection of rotors, visual.

Visually inspect the inside and outside faces of the rotors for damage, wear and cracks. (The outside face of the rotors can be inspected through the holes in the wheel or by using a mirror and looking from the inside of the wheel outwards). To assess any damage see ’Condition of the brake rotor’ later in this section.

In case of doubt concerning the extent of the damage, remove the wheel to allow closer inspection. Refer also to the axle/vehicle manufacturer’s instructions.

If there are signs of overheating on the rotor, inspect the protection boots, brake pads and springs for damage (12 and 32). Grease escaping from the wheel hub can also be a sign of overheating. See 'Function test' and 'Brake force distribution' for more information on checking the operation of the disc brake and adjusting the operating system and brake force if overheating has occurred.

The checks outlined in subsequent sections should be conducted with brake pads (5) removed. See section entitled 'Replacing brake pads' for instructions regarding the removal of brake pads.
Checking pad wear

Measure the distance from backplate (A) to wear surface (B) of pad (5) in four places, as shown.

Minimum permitted lining thickness (friction material) = \textbf{2 mm} (approximately 1/8 in.) New pads, lining thickness = \textbf{22 mm} (approximately 7/8 in.) Replace pads if they are worn out or if they are expected to be before the next service.

Also check that pads (5) are evenly worn, max. \textbf{1 mm} (0.04 in.) uneven wear (measured at four points). In the event of uneven wear, check the sliding function of caliper (2) on slide pins (13). See 'Checking slide function' later in this section.

Also check that there is no dirt between the thrust plate (28) and pads (5) and that the thrust plate (28) is adjusted flush during function testing. [Both adjustment screws (35) must be adjusted by the same amount]. See 'Function test' later in this section for procedure.

\textbf{NOTE:} Driving with light brake applications may result in increased wear on the inner brake pad.

Checking brake rotor

Measure the thickness of the rotor (A) using a slide caliper. If the rotor (A) has a wear ridge, the measurement can be performed using two spacers (B) (e.g. \textbf{5 mm} (0.20 in) thick flat washers). Reduce the measured dimension by the total thickness of the two spacers (B). Min. thickness of brake disc \textbf{41 mm} (1.6 in.). In a ventilated rotor, max. wear is \textbf{2 mm} (0.08 in.) per side. Rotor (A) must be replaced if the wear limits have been exceeded.

Lateral runout

Check/adjust wheel bearing end play in accordance with the vehicle manufacturer’s instructions.

Measure the lateral runout of the rotor (A) by attaching a magnetic stand complete with a dial gauge on carrier (3). Point the tip of the dial gauge towards the side of brake disc and rotate the rotor (A) > one turn. Max lateral runout \textbf{0.5 mm} (0.02 in.).

\textbf{NOTE: Do not include wheel bearing end play in the measurement!}
Condition of the brake rotor

Check the rotor (A) for cracks and wear tracks. Also refer to the vehicle/axle manufacturer’s instructions.

If action is required, see the vehicle/axle manufacturer’s instructions for replacing the brake rotor.

Checking slide function

This check is done after the pads have been removed. Check the sliding motion of the caliper assembly (2) on slide pins (13). The caliper assembly (2) must be free to slide on the slide pins (13), max. slide resistance 22.5 lbs. If slide resistance is higher, check that the movement is not hindered by external dirt, foreign objects, etc. If caliper is not sliding freely, see section entitled ‘Replacing slide pins, slide bushings and protection boots’.

IMPORTANT! The disc brake caliper must be mounted on the axle and the bolts (22) fully tightened for this check.

Checking play in slide function

Measure the play in the outer slide pins (13) by attaching a magnetic stand complete with a dial gauge on carrier (3), with the tip of the dial gauge on point (A) as illustrated. Lift and lower the caliper assembly (2) outside the brake rotor and read off the dial gauge. Repeat the procedure inside the brake rotor for the inner slide pins (13) and measure at point (B). The method for obtaining a play measurement must be adapted to the ‘clock position’ of the disc brake. The example here shows the disc brake in the 12 o’clock position. Max. play 1 mm (0.04 in.). If corrective measures are required, see the section entitled ‘Replacing slide pins, slide bushings and seals’.
Checking slide pin protection boots

Check each of the two protection caps (9) and six protection boots (12). Also check the two protection cups (71).

If there are signs of cracks or other damage, the protection cups (71), protection boots (12) and protection caps (9) must be replaced!

If action is required, see the section entitled ‘Replacing slide pins, slide bushings and boots’.

Checking adjustment screw protection boots

Using an 8 mm wrench, rotate adjustment shaft (55) clockwise until protection springs (30) become fully visible. **NOTE! the thrust plate (28) must be no more than 50 mm (approximately 2 in.) from adjuster mechanism cover (33)!**

Inspect protection springs (30). Pull protection springs (30) back and inspect protection boots (32).

If there are signs of cracking or other damage, the protection springs/boots must be replaced!

Turn adjustment shaft (55) counter-clockwise until thrust plate is fully retracted and resistance is felt. **Check that the protection springs (30) are correctly seated so that they are not crushed or damaged!**

**CAUTION:** Continuing to rotate the adjustment shaft when the thrust plate is fully retracted can result in internal damage to the disc brake mechanism.

If action is required, see the section entitled ‘Replacing adjustment screw protection boots.’

The checks outlined in this section should be conducted with brake pads (5) removed. See section entitled ‘Replacing brake pads’ for brake pad installation instructions and the section entitled ‘Initial setting’. 
**Function test**

For number references in parenthesis in the text which do not appear in this section, refer to the exploded view (p. 3-4)

- Lift up and support the axle in accordance with the vehicle manufacturer’s instructions.

**IMPORTANT!**

Read the safety instructions carefully. See the section entitled ‘General Instructions’.

The vehicle manufacturer’s instructions should also be followed.

- Check that the wheel can be turned freely.
- Remove the plug (15)
- Release the brake adjustment by using an **8mm** wrench to turn the adjustment shaft (55) 3/4 of a turn counter-clockwise.

Leave the wrench in position on the adjustment shaft (55). Apply the brakes five times. The wrench must move on each application, showing that the automatic adjustment is working.

**NOTE!** The wrench must be allowed to move freely!

If the wrench moves back and forth or does not move at all, the mechanism is faulty and must be replaced.

See section entitled ‘Replacing the caliper housing (2a) [including adjuster mechanism (4)]’.

Carry out initial setting as described on the next page.

**Optional clearance checking procedure:** only required for an approximation of the clearance between the rotor (A) and the brake pads (5).

**General clearance check.**

After the function test has been completed, activate the brakes until the wrench no longer moves. Then turn the wrench clockwise by hand until the brake pads (5) touch the rotor (A). If the wrench can be turned between 1/8 and 1/4 of a turn then the clearance is within the specified value. (See ‘Specifications’ for data). Then rotate the adjustment shaft (55) 1/4 turn counter-clockwise.
Initial setting

Check that brake rotor (A) can be turned freely.

Using an 8 mm wrench, turn the adjustment shaft (55) clockwise (Do not force) until both pads (5) touch rotor (A). Then turn it 1/4 turn counter-clockwise to obtain a basic clearance between pads (5) and rotor (A). Check that brake rotor can be turned freely. Remove the wrench.

IMPORTANT!

Never use an impact wrench or other similar device as they will damage the adjustment mechanism!!

Check the radial seal (69) for wear and damage. Clean/replace if required. See replacement instructions in the section on ‘Replacing radial seal and adjustment shaft’ (page 44).

Fitting the plug (15) (where applicable): Lubricate the inside and outside of the plug (15) and the recess for the adjustment shaft, using grease P/N 89652 or equivalent EP chassis grease.

Then install the plug (15) for the adjustment shaft (55). Check that the plug (15) for the adjustment shaft (55) is pushed fully into place (See diagram).

To provide the correct clearance between the brake rotor (A) and brake pads (5) the mechanism will make the final adjustment itself when the brakes are applied the next few times.
Lubrication

**IMPORTANT!**
Read the safety instructions carefully. See the section entitled ‘General Instructions’. The vehicle manufacturer’s instructions should also be followed.

**General**

Use specified lubricant only!

To safeguard operation of the disc brake it is important only to use specified lubricants for the lubrication point concerned. Apply the correct amount of lubricant - do not apply excessive quantities to avoid lubricant being dispersed or causing damage during the natural movements of the brake (on pad friction surfaces, on the brake rotor, in protection boots etc.).

**Mechanism**

Before installing the brake chamber (25/26), lubricate the recess in the lever (44) where the brake chamber (25/26) pushrod fits. Adjuster mechanism (4) is lubricated in the factory and, as such, does not normally require further lubrication. If additional lubrication is required (e.g. when removing/fitting the mechanism) see the section entitled 'Specifications’ for more information about the type of lubricant that should be used.
Service

Replacing brake pads

For number references shown within parenthesis that do not appear in this section, see the exploded view (p. 3-4)

- Always replace pads on both sides of the axle at the same time.
- Replace pads with original equipment material or equivalent original equipment material.

Do not remove or loosen the Torx bolts (78) that hold the caliper housing (2a) and caliper bridge (2b) together!

IMPORTANT!

Follow the safety instructions. See the section entitled 'General Instructions'. The vehicle manufacturer’s instructions should also be followed.

- Follow the vehicle manufacturer’s instructions to chock the wheels on an axle which is not to be raised.
- Lift the axle, support and remove the wheels in accordance with the vehicle manufacturer’s instructions.

Clean the brakes, removing any dirt and dust. Use dust removal equipment or a vacuum cleaner but do not use compressed air - inhaling dust particles may be hazardous to your health! See, Cleaning, for instructions.

If the disc brake is equipped with a parking brake function, ensure that the spring brake chamber is fully caged in the released position.

See the vehicle manufacturer’s instructions for more information.
Removing pads

Using an 8mm wrench, release the brake adjustment by turning the adjustment shaft (55) counter-clockwise until the thrust plate (28) is fully retracted.

**IMPORTANT!**

Never use a impact wrench or similar device as this will damage adjuster mechanism (4)!

**NOTE!**

When releasing the brake adjustment it is important that the protection springs (30) are correctly seated in the mechanism cover (33) so that the thrust plate (28) is free to retract without damaging the springs.

The thrust plate (28) should come to a distinct stop.

Important, do not over tighten; or internal damage will occur.

Remove bolt (8) and pad retainer (7).

Remove pad springs (6). Remove pads (5).

Clean the pad (5) contact surfaces on thrust plates (28), in caliper assembly (2) and on carrier (3) with a wire brush. **Do not grind!**

Perform in service checks in section titled ‘Inspection/checks/adjustment’.

Installing brake pads

Using an 8mm wrench, ensure that the adjustment shaft (55) is fully retracted. Check that the protection springs (30) are correctly seated and are not damaged and that the thrust plate (28) is fully retracted. Check that the pad (5) contact surfaces in the disc brake are clean.

Insert the brake pads (5), **insuring that friction material faces the brake rotor**.

Install the pad springs (6), pad retainer (7) and secure with bolt (8). Tighten to a torque of **30-37 ft. lbs. (45±5 Nm)**.

Perform ‘Initial Setting’ on page 19.
Removing and Installing disc brake

Removing disc brake

Remove two of the disc brake’s three attaching bolts (22) on each side.

Insert the pad retainer (7) and secure with bolt (8). Connect a lifting strap and a suitable lifting device.

Remove the two remaining attaching bolts (22), lift and remove the disc brake.

Installing disc brake

Check that the surfaces for fitting to the axle, brake chamber (25/26) and pads (5) are clean.

Insert pad retainer (7) and secure with bolt (8). Connect a lifting strap and a suitable lifting device.

Lift the disc brake into position.

Follow the vehicle/axle manufacturer’s recommendations for fitting/tightening bolts (22) or follow the method as described below:

Lubricate bolts (22) with anti-seize compound P/N 81934 or equivalent.

Always use new bolts (22).

Fit one bolt (22) on each side of the caliper assembly (2).

Remove the lifting strap, bolt (8) and pad retainer (7).

Fit the other bolts (22) and tighten all bolts according to the vehicle OEM specifications or see the ‘Tightening Torques’ table on page 7.

Check caliper sliding function as instructed on page 16.

Install brake chamber as instructed on page 39.

Install brake pads as instructed on page 21.

Perform Initial setting as instructed on page 19.
Replacing protection boots on disc brakes with a common thrust plate (previous design of ModulX)

Removing protection boots

Protection springs (30) are optional and are therefore not always fitted (customization). Using an 8 mm socket, turn the adjustment shaft (55) clockwise so that the thrust plate (28) moves 35-40 mm (1.4 to 1.6 in.) out from its fully retracted position. Pull back the protection spring (30) and detach the thrust plate (28) from the adjustment screws (35) by tapping a screwdriver into the gap between the two adjustment screws (35) and the thrust plate (28).

Do not damage the adjustment screws (35)/thrust plate (28)!

NOTE! The clips (29) will be forced out of their slots when the thrust plate (28) comes loose.

Do not pry out thrust plate (28) against adjuster mechanism cover (33) (with a screwdriver or similar tool) - the needle bearings (43/48) may be displaced and be damaged!

Remove protection springs (30).

Clean the adjuster mechanism cover (33) and protection boots (32).

To prevent any change being made to the synchronisation of the thrust plate (28) it is important to hold the adjustment screws (35) in position so that they cannot rotate during the following steps!

Remove the protection boots (32) from the adjustment screws (35) and adjuster mechanism cover (33) by prying them off with a screwdriver. Do not damage the sealing surfaces! Avoid damaging the protection boot (32) mounting surfaces in the adjuster mechanism cover (33)!
Fit the thrust plate (28) in place and hold it in position against the adjustment screws (35) [with the clips (29) removed]. Check the two holes in the thrust plate (28) to ensure that the adjustment screws (35) are correctly seated. Turn the adjustment shaft (55) counter-clockwise until the adjustment screws (35) are fully retracted and then screw them out one turn. Remove the thrust plate (28).

**NOTE!** Do not damage the adjustment screws and/or boot mounting surfaces, as this could cause leakage or water penetration.

### Cleaning

Clean the thrust plate (28), adjustment screws (35) and sealing surfaces in the adjuster mechanism cover (33).

**Make sure that dirt and other contaminants do not enter through the openings for the adjustment screws!**

### Inspection

Check that the sealing surfaces for the protection boots (32) in the adjuster mechanism cover (33) and on the adjustments screws (35) are free from damage that could cause leakage or water penetration.

Check that the thrust plate clips (29) are intact.

Also check the part of the adjuster mechanism (4) visible beyond the adjustment screws (35), looking for signs of corrosion, damage and condensation. If corrosion or damage is visible the complete adjuster mechanism (4) must be replaced.

See section entitled 'Replacing the adjuster mechanism'.
Installing protection boots

Check that the adjustment screws (35) are rotated into the right position to engage in their guides in the thrust plate (28). Use a straight edge to check that the adjustment screws (35) are parallel (i.e. in their original position). Adjust if necessary. A 1/2 turn = 2 mm (0.08 in.). Lubricate the adjustment screws (35) threads with grease P/N 89652.

Put the protection boots (32) in place in the adjuster mechanism cover (33). Press them into their positions using special tool P/N 89778 and a suitable lever. Insert the lever between the rotor and special tool P/N 89778. Do not damage the rotor!

Using the thrust plate (28), recheck that the adjustment screws (35) are turned to the correct position. Then press the protection boots (32) into position on the adjustment screws (35) using special tool P/N 89779 and a lever (as described above).

Compress the protection springs (30) if used and insert them in position in the adjuster mechanism cover (33) with the smallest end facing the thrust plate (28). Then press the thrust plate (28) into place on the adjustment screws (35).

Look through the two holes in the thrust plate (28) to check that the adjustment screws (35) are correctly seated.

Installing the clips

Place the inner part of special tool P/N 89936 on a flat surface, such as a work bench, with the large end downwards and place the thrust plate clip (29) over the end of the tool. Use the outer part of the special tool to press the thrust plate clip (29) all the way down towards the surface. Now center the special tool, with the thrust plate clip (29), over the adjustment screw (35). Insert a suitable lever between the rotor (A) and the special tool P/N 89936 and use it to press the thrust plate clip (29) into its slot on the adjustment screw (35). Do not damage the rotor (A)!

Repeat the procedure to install the second thrust plate clip (29).

Make sure that the protection springs (30) are correctly seated, otherwise they will be damaged!
Replacing protection boots on disc brakes with two separate thrust plates (DB22LT and updated design DB22 and DB19 calipers)

Removing the protection boots
Protection springs (30) are optional and are therefore not always fitted (customization).

Turn the adjustment shaft (55) using an 8 mm socket clockwise until the thrust plates (28) are 35-40 mm (1.4-1.6 in.) out from their fully retracted position. Pull back the protection springs (30) if used and carefully pry off the protection boots (32) from the thrust plates (28) using a screwdriver. Remove the thrust plates (28) by tapping in a screwdriver and bending the joint to the adjustment screw (35). Avoid damaging the adjustment screws (35)/thrust plate (28)!

Do not pry off the thrust plates (28) using a chisel or similar tool on the adjuster mechanism cover (33). This could lead to damage of the adjuster mechanism (4).

Remove the protection springs (30) if used.

Remove thrust plate clips (29).

Turn the adjustment shaft (55) counter-clockwise until the adjustment screws (35) are fully retracted and then screw out one turn.

Remove the protection boots (32) from the adjuster mechanism cover (33) by prying them out with a screwdriver. Avoid damaging the sealing surfaces!

IMPORTANT! Avoid damaging the adjustment screws and/or the seal mounting surfaces!
Cleaning
Clean the adjuster mechanism cover (33), thrust plates (28) and adjustment screws (35).

![Warning: Make sure that dirt and other contaminants do not enter through the openings at the adjustment screws!]

Where necessary, lubricate the threads on the adjustment screws (35) with grease P/N 89652.

Inspection
Check that the protection boot (32) mounting surfaces in the adjuster mechanism cover (33) and on the thrust plates (28) are free from damage.

Check that the thrust plate contact surfaces (28) and the adjustment screws (35) are free from damage.

Also check the part of the adjuster mechanism (4) that is visible past the adjustment screws (35) for corrosion, damage and condensation. If rust/damage has occurred, replace the full caliper housing (2a) assembly.

See section on ‘Replacing caliper housing’.

Mounting the protection boots
Lubricate the adjustment screw (35) threads with grease P/N 89652. Put the protection boots (32) in place in the adjuster mechanism cover (33). Then press them into position using a special tool P/N 89778 and appropriate prying device. Bend using a prying device between the rotor (A) and special tool P/N 89778. Avoid damaging the rotor!

Fit new thrust plate clips (29) on the adjustment screws (35).

Turn the protection springs (30) if used together and put the adjuster mechanism cover (33) in place with the small diameter directed to the thrust plate (28).
Replacing adjustment screw protection boots

Press the protection boots (32) in place on the thrust plate (28) with your fingers and then press the adjustment screw (35) in place using the special tool P/N 89778 and a suitable prying device.

Repeat for the other protection boots (32), adjustment screws (35) and thrust plates (28).

If protection springs (30) are used: make sure they are correctly positioned in their seats and do not damage the protection boots (32)!

Replace brake pads as instructed on page 21.
Removing slide pins, slide bushings and protection boots

Remove brake pads as described on page 21.

Remove brake chamber as described on page 38.

Position the disc brake in a vice. Use protection jaws.

Remove the two protection caps (9) and the two protection cups (71) using a hammer and chisel. The protection caps (9) and protection cups (71) must **not** be re-used.

Remove the slide pin attaching bolts (10) using special tool P/N 81933 (Torx E18 socket). Press the slide pins (13) back [enough to remove carrier (3) from caliper assembly (2)] by rocking carrier (3) back and forth.

**NOTE!**

Do not use gripping tools or similar - this will damage the slide pin sealing surfaces!

If slide pins (13) are seized in carrier (3), cut threads on the inside of slide pins (13) using an M16x2 tap and special tool P/N 81920 (slide hammer without yoke) as a puller.
Replace slide pins, slide bushings and protection boots

Remove carrier (3) from caliper assembly (2).

NOTE! Only grip on external surfaces!

Clean the components, removing any dirt and dust. Use dust removal equipment or a vacuum cleaner but do not use compressed air - inhaling dust particles may be harmful to your health!

Remove the four slide pins (13) from the caliper assembly (2).

Remove the six protection boots (12) by carefully prying them out.

NOTE! Do not damage the contact surfaces!

Remove the four slide bushings (14) (which are of split design) using a small screwdriver. Begin at the split.

NOTE! Do not damage the mounting surfaces!

Cleaning/Inspection

Clean and check to ensure that the fitting surfaces for the slide bushings (14), protection boots (12) and protection cups (71) are free from dirt and damage.
Installing slide bushings, slide pins and protection boots

Slide bushings (14) are supplied as a band.

Shape (4 pcs.) slide bushings (14) in 2-steps as shown in the pictures (the ends of the bushing band must touch each other) and fit them in position in caliper assembly (2).

Expand the slide bushings (14) by pressing/twisting through special tool P/N 81921.

Press the slide pins (13) into position in the slide bushings (14).

Slide pins (13) must be able to slide easily in slide bushings (14) to ensure that that caliper assembly (2) floats over carrier (3).
Replacing slide pins, slide bushings and protection boots

Fit the protection boots (12) in caliper assembly (2) using special tool P/N 81922.

**NOTE!**

Protection cups (71) should only be installed after tightening the slide pin fixing bolt (10) to the required torque. Refer to the section ‘Tightening Torques’ on page 7.

Press the end of the protection boots (12) into position on the shoulder on the end of slide pin (13).

Clean the contact surfaces in carrier (3), caliper assembly (2) and on thrust plates (28). Also clean pads (5) (if these are to be re-used). Use a wire brush. Do not grind!

Sparingly lubricate slide pin (13) and carrier (3) mounting surfaces with anti-seize compound. P/N 81934 or equivalent.

Press out slide pins (13) so that they are free from carrier (3) during installation.

Lower carrier (3) into position in caliper assembly (2) and press in slide pins (13) so that they fit on carrier (3). Do not damage protection boots (12)!

**NOTE!** Only grip on external surfaces! Do not damage the protection boots (12)!
Lubricate the threads on the four slide pin attaching bolts (10) using anti-seize compound P/N 81934 or equivalent and screw them into position. Tighten using a torque wrench and special tool P/N 81933 (Torx E18 socket). Refer to the section ‘Tightening Torques’ on page 7.

Check that carrier (3) slides easily in caliper assembly (2).

Max. slide resistance with disc brake assembly (1) installed on the vehicle axle: 100N (22.5 lbs.) (See maintenance instructions).

Tap new protection caps (9) into position in the outer ends of the slide pins (13) using a 17 mm socket and an extension or equivalent diameter tool.

**NOTE!** The protection caps (9) must go all the way into the slide pins (13).

Carefully tap new protection cups (71) for inner slide pins (13) in place in the caliper assembly (2).
Replacing caliper housing/ mechanism

For number references shown within parenthesis that do not appear in this section, see the exploded view (p. 3-4)

**IMPORTANT!**

Follow the general instructions on page 11 and the vehicle manufacturer's instructions.

Follow the vehicle manufacturer's instructions to chock the wheels on an axle which is not to be raised.

Lift the axle, support, and remove the wheels in accordance with the vehicle manufacturer's instructions.

---

Clean the brakes, removing any dirt and dust. Use dust removal equipment or a vacuum cleaner but do not use compressed air - inhaling dust particles may be hazardous to your health! See 'Cleaning' for instructions.

---

If the disc brake is equipped with a parking brake function, ensure that the spring brake chamber is fully retracted and mechanically secured in the released position.

See the vehicle manufacturer's instructions for more information.

---

Remove slide pins, bushings, protection boots and carrier as instructed on pages 30-31.

---

**Removing caliper housing**

Remove the four Torx bolts (78) that hold the caliper housing (2a) to the caliper bridge (2b), using special tool P/N 90797 (Torx E20 socket) for DB19 and DB22LT or P/N 90798 (Torx E24 socket) for DB22.

Remove the caliper housing (2a).
Replacing caliper housing

Removing slide bushings from caliper bridge

Remove the four protection boots (12) by carefully prying them out.

NOTE! Do not damage the mating surfaces!

Then press both slide pins (13) out of the caliper bridge (2b)

Remove the two slide bushings (14) (which have a split design) using a small screwdriver. Begin at the split.

NOTE! Do not damage the mating surfaces!

Cleaning/Inspection

Clean and check the surfaces of the caliper bridge (2b) that mate with the slide bushings (14) and protection boots (12) to ensure they are free from dirt and damage.

Also clean and check the threads of the Torx bolts (78) in the caliper bridge (2b) and their surfaces that are in contact with the caliper housing (2a), to ensure they are not damaged. Otherwise the complete disc brake assembly (1) must be replaced.

Check the four slide pins (13) for wear and damage, replace if necessary.
**Fitting slide bushing to caliper bridge**

Slide bushings (14) are supplied as a strip form.

Shape two slide bushings (14) in two stages as shown in the pictures (the ends of the bushing band must touch each other) and fit them in position in caliper bridge (2b).

Expand the slide bushings (14) by pressing/twisting through special tool P/N 81921.

Press the slide pins (13) into position in the slide bushings (14). The slide pins (13) must be able to slide easily in the slide bushings (14) to ensure that the caliper assembly (2) “floats” over the carrier (3).

**Installing caliper housing**

It is important that all the surfaces in the joint between the caliper housing (2a) and the caliper bridge (2b) are dry and free from contaminants (oil, grease, etc.).

Lightly lubricate the threads and the underside of the heads on the Torx bolts (78) with oil.

**NOTE!** do not apply any oil to the joint between the caliper housing (2a) and the caliper bridge (2b)!

Assemble the caliper housing (2a) and the caliper bridge (2b) using the four Torx bolts (78).

**NOTE!** It is important that the Torx bolts turn freely in the threads in the caliper bridge (2b)!

Tighten diagonally opposing Torx bolts (78) to the correct torque, using special tool P/N 90797 (Torx E20 socket) for DB19/DB22LT and P/N 90798 (Torx E24 socket) for DB22, as specified below.

**DB19/DB22LT 273-302 lbs. (390±20 Nm)**
**DB22 391-435 ft. lbs. (560±30 Nm)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Torque</th>
<th>Bolt</th>
<th>Spec. tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB19</td>
<td>273-302 ft. lbs. (390±20 Nm)</td>
<td>M16</td>
<td>P/N 90797</td>
</tr>
<tr>
<td>DB22</td>
<td>391-435 ft. lbs. (560±30 Nm)</td>
<td>M18</td>
<td>P/N 90798</td>
</tr>
<tr>
<td>DB22LT</td>
<td>273-302 ft. lbs. (390±20 Nm)</td>
<td>M16</td>
<td>P/N 90797</td>
</tr>
</tbody>
</table>

Refer to the section ‘Tightening Torques’ on page 7.
Replacing Brake Chamber

For number references shown within parenthesis that do not appear in this section, see the exploded view (p. 3-4)

**IMPORTANT!**

Follow the ‘General Instructions’ on page 11 and the vehicle manufacturer’s instructions.

Follow the vehicle manufacturer’s instructions to chock the wheels on an axle which is not to be raised.

Lift the axle, support and remove the wheels in accordance with the vehicle manufacturer’s instructions.

Do not loosen the Torx bolts (78) that hold the caliper housing (2a) and caliper bridge (2b) together!

Clean the brakes, removing any dirt and dust. Use dust removal equipment or a vacuum cleaner but do not use compressed air - inhaling dust particles may be harmful to your health! See ‘Cleaning’ for instructions.

**Removing brake chamber**

Thoroughly clean the joint faces of brake chamber (25) and caliper assembly (2) to insure that dirt does not get into the mechanism area when removing the brake chamber.

Remove the hose (A). Remove the two fixing bolts (27) holding the brake chamber (25). Remove the brake chamber (25).

Check through the pushrod opening in the brake chamber attachment flange for moisture/corrosion. If present, replace the caliper housing complete with mechanism to avoid operating problems. If action is required see section on ‘Replacing caliper housing’.
**Installing brake chambers**

Check that the new brake chamber (25) is of the correct design.

**NOTE:** Failure to use proper brake chamber will affect service life and void caliper warranty.

There must be an internal boot (A) on the push rod. Check the external seal flange (B) so it is intact and seats correctly!

Install the pipe fitting to the new brake chamber (25).

Check that the brake chamber (25) mating flange on the caliper is free from dirt and that the inner boot (A) in the chamber is correctly seated at (B).

Put a dab of grease P/N 89652 or equivalent in the ball cup in lever (44).

Fit the new brake chamber (25) with fixing bolts (27).

Tightening torque **118-148 ft. lbs. (180±20 Nm)**
Connect the brake chamber (25) hose connection (A). Remove the drain plug that faces downwards from the brake chamber housing (25) if equipped.

It is important to remove the lowest drain plug in the chamber housing if equipped.

Other drain plugs can remain in position in the chamber housing.

If all the plugs remain fitted the mechanism will not operate correctly!

With the service brake applied and where appropriate, with the parking brake released, check the brake chambers, hoses and connections for leaks and damage.

Install the wheels as per the vehicle manufacturer’s instructions.

If changing wheels and/or valve stem, check with vehicle OEM for suitable wheel and/or valve stem configurations.

NOTE!

Check that the contact surface of the rim and hub are clean and free from distortion. Follow the vehicle manufacturer’s instructions for fitting and tightening torques!

Check that the brake hoses do not rub during full wheel articulation.

Check the wheel so it turns freely with the parking brake released.

Remove the axle support and the wheel chocks and lower the axle in accordance with the vehicle manufacturer’s instructions.
Removing spring brake chamber

Clean carefully the joint faces of spring brake chamber (26) and caliper assembly (2).

Activate the spring caging mechanism of the brake chamber so that the spring is held in its compressed position. See the vehicle manufacturer’s instructions.

---

Replacing spring brake chamber

For number references shown within parenthesis that do not appear in this section, see the exploded view (p. 3-4)

**IMPORTANT!**

- Follow the ‘General Instructions’ on page 11 and the vehicle manufacturer’s instructions.
- Follow the vehicle manufacturer’s instructions to chock the wheels on an axle which is not to be raised.
- Lift the axle, support and remove the wheels in accordance with the vehicle manufacturer’s instructions.

Do not loosen the Torx bolts (78) that hold the caliper housing (2a) and caliper bridge (2b) together!

Clean the disc brake, removing any dirt and dust. Use dust removal equipment or a vacuum cleaner but do not use compressed air - inhaling dust particles may be harmful to your health! See ‘Cleaning’ for instructions.

---

**Removing spring brake chamber**

Clean carefully the joint faces of spring brake chamber (26) and caliper assembly (2).

Activate the spring caging mechanism of the brake chamber so that the spring is held in its compressed position. See the vehicle manufacturer’s instructions.
Replacing spring brake chamber

Insure air line has no pressure (parking brake applied).

Mark and remove the hose connections of the service brake (A) and parking brake (B).

Remove the two nuts (27) holding spring brake chamber (26).

Remove spring brake chamber (26).

Check through the pushrod opening in the brake chamber attachment flange for moisture/corrosion. If present, replace the caliper housing complete with mechanism to avoid operating problems.

If action is required see section on ‘Replacing Caliper Housing’.

Installing spring brake chamber

Check that the park brake spring is caged in accordance with the manufacturer’s instructions and that the new spring brake chamber (26) is of the correct design.

NOTE! Failure to use proper brake chamber will affect brake function service life and will cause improper function to no function.

There must be an internal boot (A) on the push rod. Check the external seal flange (B) so it is intact and seats correctly!

Install the pipe fittings to the new brake chamber (25).

Check that the disc brake’s connection flange is free from dirt.

Put a dab of grease P/N 89652 or equivalent in the ball cup in lever (44).
Install the new spring brake chamber (26) with nuts (27). Tightening torque **118-148 ft. lbs. (180±20 Nm)**

Fit the spring brake chamber (26) hose connections.

**NOTE! Do not mix up the hoses!**

Remove the drain plug that faces downwards from the brake chamber (25) housing, if equipped.

Release the parking brake and disengage the spring brake chamber’s caging mechanism so that the spring is released.

---

**It is important to remove the lowest drain plug in the chamber housing, if equipped.**

**Other drain plugs can remain in position in the chamber housing.**

**NOTE! If all the plugs remain installed the brake will not operate correctly!**

---

With the service brake applied and where appropriate, with the parking brake released, check the brake chambers, hoses and connections for leaks and damage.

Fit the wheels as per the vehicle manufacturer’s instructions.

---

**If changing wheels and/or valve stem, check with vehicle OEM for suitable wheel and/or valve stem configurations.**

**NOTE!**
Check that the contact surface of the rim and hub are clean and free from distortion. Follow the vehicle manufacturer’s instructions for fitting and tightening torques!

---

**Check that the brake hoses do not rub during full wheel articulation.**

Check the wheel so it turns freely with the parking brake released.

Remove the axle support and the wheel chocks and lower the axle in accordance with the vehicle manufacturer’s instructions.
Replacing radial seal (69) and adjustment shaft (55)

Grip the 8mm hexagonal end of the adjustment shaft (55) with suitable handgrips and pull out the adjustment shaft. The radial seal (69) will come out at the same time. If necessary, pry against the handgrips to remove the adjustment shaft.

Remove the radial seal (69) from the adjustment shaft (55).

Check for cracks and/or damage. If the end is broken off, it is necessary to remove the caliper assembly (2) from the axle. Use a magnet to retrieve the broken end from the adjuster mechanism (4).

Clean the adjustment shaft (55) and the area behind the radial seal (69) inside the caliper housing (2a) and lubricate with grease P/N 89652 or equivalent. Lubricate a new radial seal (69) and adjustment shaft (55) with grease P/N 89652 or equivalent.

NOTE! Correct direction of fitting is important – see diagram

Tap in the radial seal (69) and adjustment shaft (55) using special tool P/N 89780.

Continue with the instructions in the ‘Initial setting’ section.
## Troubleshooting

### Symptoms

#### No or low braking effect
- Are the pads worn/below minimum thickness?
- Is pad/disc clearance OK?
- Is the brake disc OK?
- Is air pressure in the brake chamber OK?  
  (Measure with a pressure gauge at the brake chamber)
- Has the drain plug been removed from the brake chamber housing?

#### Action
- Replace the pads.
- Carry-out initial adjustment + perform function checks.
- Replace the brake disc (See vehicle manufacturer’s instructions.)
- Take actions in accordance with vehicle manufacturer’s instructions.
- Remove the drain plug located at the lowest point.

### Symptoms

#### Brakes drag or do not release completely.
- Does air pressure remain in the brake chamber when the brakes are released?
- Are all of the spring brake chambers released when the parking brake is off?
- Is pad/disc clearance OK?
- Can the pads move freely in the carrier?
- Is the caliper slide function OK?
- Is the wheel bearing clearance OK?
- Has one of the drain plugs been removed from the brake chamber housing?

#### Action
- See the vehicle manufacturer's instructions for troubleshooting air system.
- See the vehicle manufacturer's instructions for troubleshooting air system.
- Carry-out initial adjustment + perform function checks.
- Remove the brake pads, clean the pads, carrier and caliper.
- Replace slide pins/bushings.
- See the vehicle manufacturer’s instructions for information.
- Remove the drain plug located at the lowest point.
## Troubleshooting

**NOTE!** Follow ‘General Instructions’ Section and the vehicle manufacturer’s instructions!

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Action</th>
</tr>
</thead>
</table>
| **The vehicle pulls to one side**  
- Are the pads worn on one side of the vehicle?  
- Is pad/disc clearance OK?  
- Can the pads move freely in the carrier?  
- Is pressure the same in both brake chambers of the axle during braking? (Measure with pressure gauge at the brake chambers.)  
- Has one of the drain plugs been removed from the brake chamber housing? |  
- Replace the pads.  
- Carry-out initial adjustment + perform function checks.  
- Remove the brake pads, clean the pads, carrier and caliper.  
- See the vehicle manufacturer’s instructions for troubleshooting air system.  
- Remove the drain plug located at the lowest point. |

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Action</th>
</tr>
</thead>
</table>
| **Noise/ vibrations from the brake**  
- Can the pads move freely in the carrier?  
- Are the disc brake and its components attached to axle as specified?  
- Are there non-permitted cracks/grooves on the brake disc?  
- Is the brake disc’s runout within specified parameters? |  
- Remove the brake pads, clean the pads, carrier and caliper.  
- See ‘Installing disc brake’ on page 23.  
- See ‘Condition of brake rotor’ section on page 16.  
- See ‘Lateral runout’ section on page 15. |
Tools

Special tools for Haldex disc brake.

For number references in parenthesis in the text which do not appear in this section, refer to the exploded view (p. 3-4)

Contents of tool kit Haldex P/N 81918.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P/N 81918</td>
<td>Complete tool kit including toolbox.</td>
</tr>
<tr>
<td>P/N 81920</td>
<td>Slide hammer (puller) for pads (5).</td>
</tr>
<tr>
<td>P/N 81921</td>
<td>Expansion drift for slide bushing (14).</td>
</tr>
<tr>
<td>P/N 81922</td>
<td>Tool for fitting seal to slide pins (13) in caliper assembly (2).</td>
</tr>
<tr>
<td>P/N 87833</td>
<td>Tool for fitting seal to adjuster screw (35) in cover.</td>
</tr>
<tr>
<td>P/N 89778</td>
<td>Tool for fitting seal to adjuster screw (35) in cover.</td>
</tr>
<tr>
<td>P/N 89779</td>
<td>Tool for fitting seal to adjuster screw (35).</td>
</tr>
<tr>
<td>P/N 81927</td>
<td>Protective cover for brake chamber opening in caliper assembly (2).</td>
</tr>
<tr>
<td>P/N 81928</td>
<td>Support plug (used in conjunction with P/N 87833), and tool for fitting radial seal (69) to adjustment shafts (55).</td>
</tr>
<tr>
<td>P/N 89780</td>
<td>Tool for fitting radial seal (69) to adjustment shafts (55).</td>
</tr>
<tr>
<td>P/N 81919</td>
<td>Toolbox.</td>
</tr>
<tr>
<td>P/N 81933</td>
<td>Torx E18 socket for slide pin attaching bolts (10).</td>
</tr>
<tr>
<td>P/N 89781</td>
<td>Torx E10 socket for bolts Torx (18) for adjuster mechanism (4).</td>
</tr>
<tr>
<td>P/N 89936</td>
<td>Tool for fitting thrust plate clips (29).</td>
</tr>
<tr>
<td>P/N 90797</td>
<td>Torx E20 socket for Torx bolts (78) for caliper assembly (2), DB 19</td>
</tr>
<tr>
<td>P/N 90798</td>
<td>Torx E24 socket for Torx bolts (78) for caliper assembly (2), DB 22</td>
</tr>
</tbody>
</table>

P/N = Part Number
Tool kit P/N 81918
Commercial Vehicle Systems

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