



Operating Manual for Disc Brake Type: SB 23

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G E R M A N Y

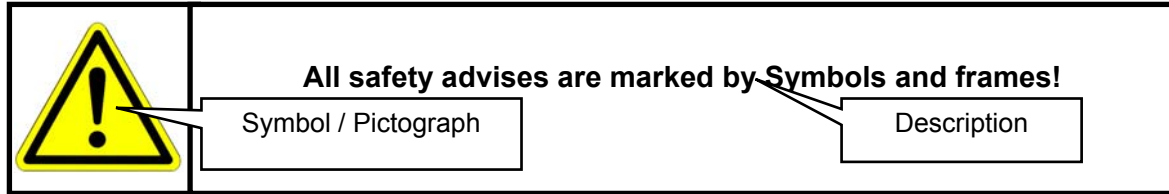
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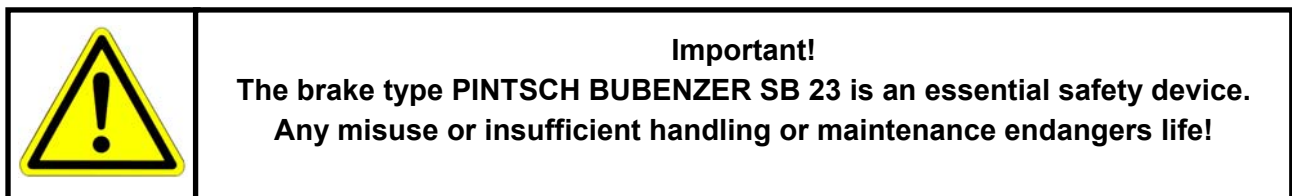
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1 Safety regulations

Note: warnings and other security rules are presented like this throughout the manual:



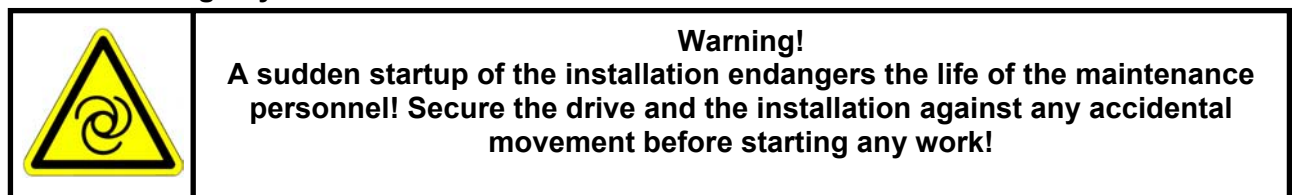
The brake may only be used in the way described in chapter 2.3 “Description and designated use”. The safety of your brake / brake-system depends on proper and regular inspection and maintenance. Study the manual before starting the installation. If in doubt, please don’t hesitate to contact our service-department or your local retailer. info@pintschbubenzner.de



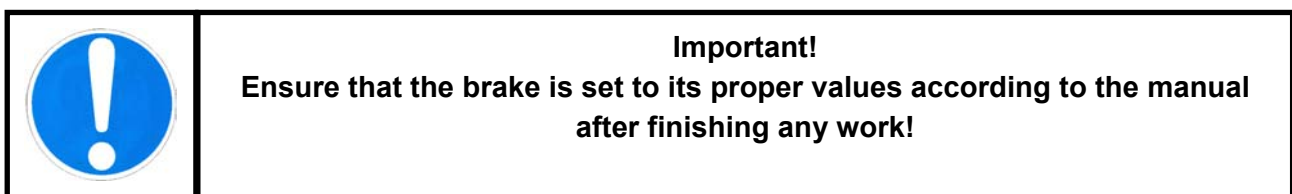
Also study the following manuals and Regulations:

- Operating manual of the installation
- Safety precautions of the installation
- Valid Safety regulations

Before starting any work with the brake:



- Don’t use any mechanical devices to block the brake.
- Ensure, that the drive is disconnected from the electrical power supply.
- Ensure, that the brake is disconnected from the electrical power supply.
- Any electrical work is only to be done by a trained electrician.
- Use only genuine PINTSCH BUBENZER spare-parts.
- The brake must never be disassembled further than described in the manual.



2 Brake

2.1 Introduction

This manual has been written to the best of our knowledge. It is intended to familiarize the operation and maintenance personnel with the function, the handling, the maintenance and the safety regulations of the power unit. Furthermore these instructions should make sure that **trained and qualified personnel** is able to handle the power unit according to its designated use. However the manual can't cover all the possible circumstances at the place of operation. If you have any questions concerning the power unit or this manual, please contact PINTSCH BUBENZER quoting the type and serial number of the power unit as given on the typeplate.

2.2 Warranty

The warranty and its duration depend on the contract. For details on the supplier's warranty please refer to the terms of the contract. Any warranty- or liability-claims are excluded in case they occur because of one or more of the following conditions:

- Non-designated use of the brake.
- Improper handling, setup, operation and maintenance of the brake by the operating company.
- Neglect of the regulations and notes in this manual concerning transport, setting up, operation and maintenance of the brake.
- Improper maintenance and repairs of the brake.
- Improper monitoring of components, which are prone to wear.
- Catastrophes, external objects and forces and force majeure.
- Changes at the brake without approval of PINTSCH BUBENZER.

The information in this manual has been checked thoroughly. Nevertheless we can't accept liability for errors.

2.3 Brake-description and designated use

The brakes PINTSCH BUBENZER Type SB 23 are meant exclusively as disc brakes for the conditions specified in the order together with the designated brake disc. The brake is designed as a holding brake and emergency brake. It is designed for dynamic braking within the limits given in section 2.4. This version of the brake is not suitable for use in areas with explosion hazards and not certified according to ATEX.

Any other use or any further change of the brake is strictly forbidden! Ignoring the regulations for the designated use and /or the instructions for setup and maintenance endangers life and leads to the loss of any warranty by the manufacturer!

The disc brake SB 23 is released (opened) electro-hydraulically by a thruster and is actuated (closed) by spring force. In case of an emergency-stop or a power failure the brake sets automatically. It can be released by a manual release lever. Braking distance and braking time are designed for the designated use but may vary depending upon the circumstances (e.g. load, direction of movement). The braking torque can be adjusted continuously by means of an adjustment nut. The brake is equipped with non-asbestos organic linings or with sintered linings for

long, reliable lifetimes. Shoe clamping pins prevent the aluminum brake shoes from tilting and grinding at the brake drum while the brake is released.

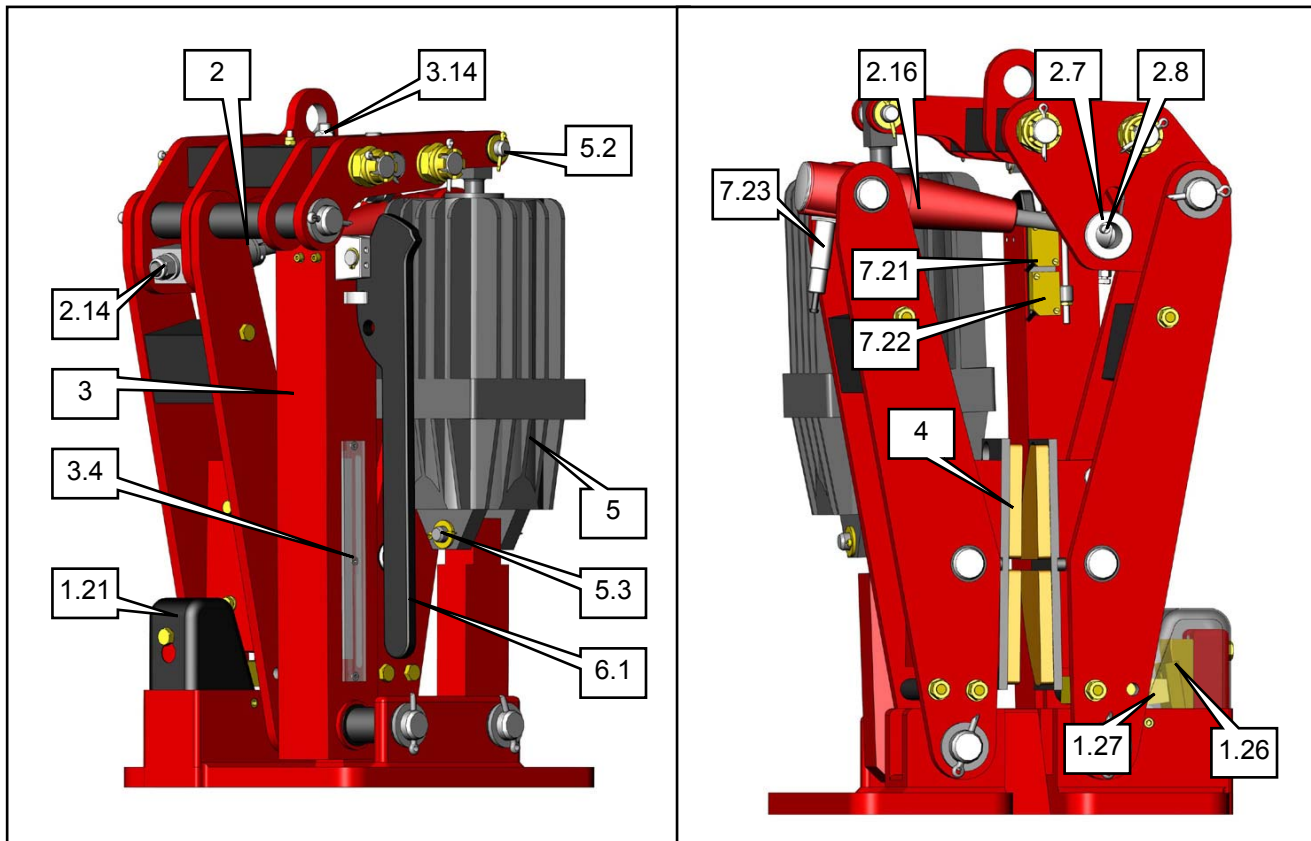
The wear is compensated by an automatic wear compensator (AWC). Limit switches for the release- and setting-control and wear control are optional. The SB 23 can be connected to a suitable control system.

2.4 Technical data

Refer to Data sheet in section 8.

	Organic linings Type 03	Sintered linings Type 02
Maximum running speed (long time)	30 m/s	90 m/s
Maximum disc temperature (long time)	300-400°C	650°C
Maximum running speed (short time)	30 m/s	105 m/s
Maximum disc temperature (short time)	300-400°C	900°C

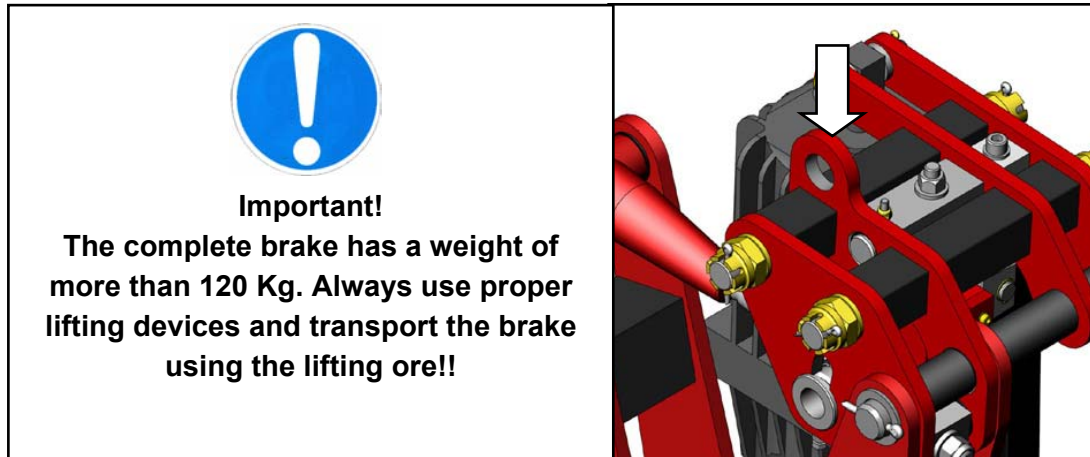
Overview SB 23



Pos.	Item	Pos.	Item
1.21	Cover	4	Brake pad carrier with brake pad
1.26	Wedge		
1.27	Shackle	5	Thruster
		5.2	Upper Thruster-bolt
2	AWC	5.3	Lower Thruster-bolt
2.7	Catch		
2.8	Catch pin	6.1	Manual release lever
2.14	Adjusting nut AWC		
2.16	Crosspiece	7.21	Limit switch – Set control
		7.22	Limit switch – Release control
3	Spring unit	7.23	Limit switch – wear control
3.4	Torque-scale		
3.14	Adjusting nut - torque		

2.5 State of shipment and storage instructions

- The brake is shipped ready to mount and tested.
- The brake is shipped with spring under tension, if a thruster is mounted.



- Store and transport the brake dust- and waterproof.
- Protect the brake during the whole storage- and transport time against damage.

In case of additional painting, do **NOT** contaminate:

- Hinges or joints
- Brake disc surfaces
- Brake pads
- Spindle and AWC
- Rod of the thruster
- Electrical components
- Signs and plates
- Adjusting wedge

If the brake isn't installed directly after delivery heed the following instructions:

- Store and / or transport the brakes dust- and waterproof with drying agent until installation.
- Protect the brake against external damages during the complete storage- / transport-period.

3 Set-up of the brake



Warning!
A sudden startup of the installation endangers the life of the maintenance personnel! Secure the drive and the installation against any accidental movement before starting any work!

Before mounting the brake check

- The brake disc runs true
- The brake disc surface as well as the brake pads are clean and free from dirt and grease
- Positions of the mounting-bores
- Evenness and cleanliness of the mounting surface
- Cleanliness of the brake pads
- Dismount cover (1.21) by unscrewing bolt (1.42).
- Remove tape (1.60) at wedge (1.26) and clean wedge of remains of adhesives, if necessary.
- Remove wedge (1.26)

3.1 Mounting and aligning of the brake

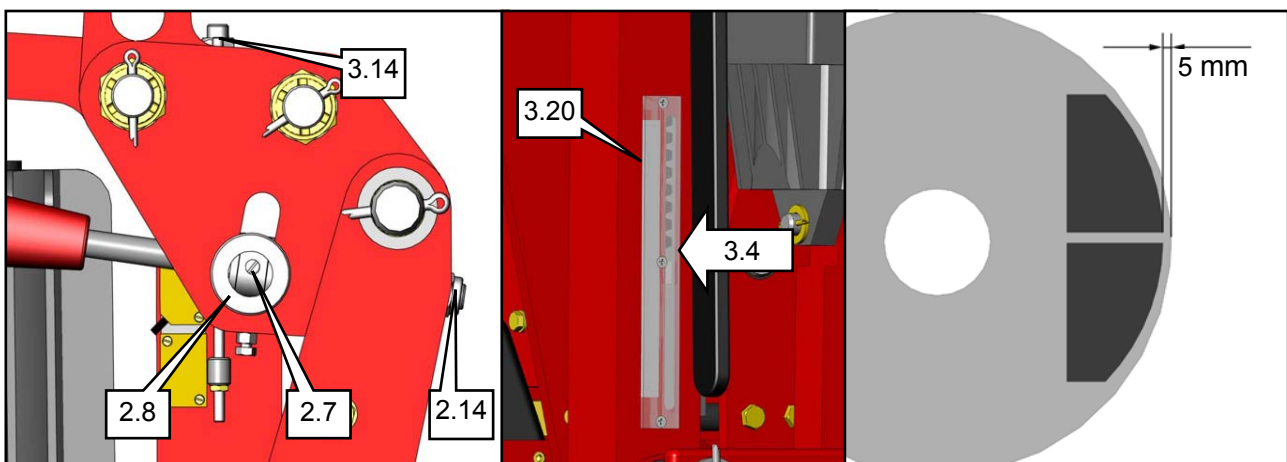


Fig. 2:

- **Completely release brake spring:** Rotate nut (3.14) counter clockwise.
- **Notice:** Turning the nut (2.2) counter clockwise may damage the AWC when the catch (2.7) is mounted! To avoid this, **dismount catch (2.7)**.
- Rotate nut (2.2) counter clockwise \Rightarrow Brake pads move away from brake disc.
- Mount brake onto brake disc according to drawing (also refer to data sheet in the appendix).
- The centre line of the brake disc must coincide with the centre line of the brake.
 - Tolerance: 2 mm.
- The brake disc's outer diameter must exceed the brake pads 5 mm (Fig.2 - right)
 - Note: Use outline of the brake pad, not of the brake pad carrier!
- Use shims to adjust differences in height if necessary.
- Screw bolts (Class 8.8) with shims into the base but **don't tighten them yet**.
 - Bolts and shims are not included in our scope of supply.
- Rotate nut (3.14) clockwise until the **upper edge (3.4)** of the torque indicator shows about 1/3 of the nominal braking torque (3.20).
- Close brake by turning nut (2.2) **clockwise**.

- Brake aligns itself to the brake disc.
- Check brake alignment.
- Tighten mounting bolts to nominal torque (refer to appendix).
- Insert wedge (1.26) loosely and without force into the guide way.

3.2 Electrical connection of the brake



Danger!
The applied electrical voltages are dangerous to life!
The electrical connection and all other electrical tasks must only be done by a trained electrician!

Connect thruster according to supplier's data. Please refer to manual-manual for ELDRO / ELHY-thrusters, included in this documentation! Refer to the type plate for the electrical data.

- Connections have to be flexible, as the brake must move freely.
- Tighten cable connections.

3.3 Running in of the brake pads

The running in of the brake pads is essential to insure an even contact pattern on the pad which will avoid uneven loading of part of the surface and any resultant damage. The brake can be damaged when it is run in under unsuitable conditions!

Do not exceed the following values during running in.

	Organic linings	Sintered linings
Maximum running speed	30 m/s	75 m/s
Maximum disc temperature	200°C	250°C
Maximum braking time	5 Seconds	15 Seconds

- Set limit switches Release- / Set-control out of order.
- Dismount catch (2.7).
- Set braking torque to 50% of the nominal value (3.14)
- Let motor run on HALF nominal speed.
- Close brake by turning the adjusting nut (2.2) clockwise, until the brake pads make contact with the brake.
- Open and close brake several times (2.2) until the complete brake pad surface of the brake pad is run in.
- Dismount brake pad (4) to check contact pattern (Section 4).
- Note: The braking torque achieved can be related to the current take-up of the electric motor!
- Remount catch (Section 3.5)
- Reset reserve stroke (Section 3.5)

3.4 Set braking torque

Rotate adjusting nut (3.14) clockwise, until the **upper** edge of the torque indicator (3.4) shows approx. 90% of the required braking torque on the scale (3.20)

Note: The permissible minimum braking torque is 50% of the rated maximum braking torque.

3.5 Set Reserve stroke



Notice!
A counter clockwise turn of nut (2.14) may damage the AWC when the catch (2.7) is connected! To avoid this follow the instructions:

Note: **Adjust** brake in **released** condition. **Check** adjustment when the brake is **set**!

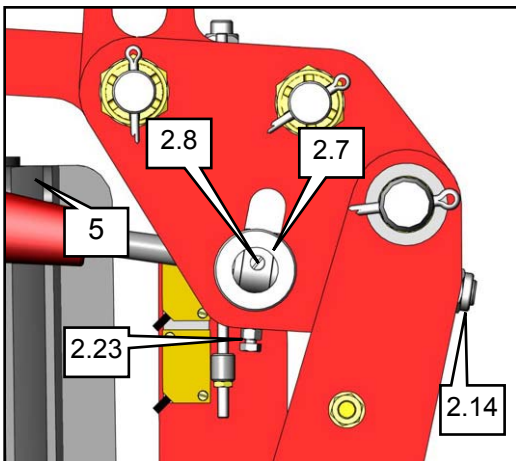


Fig. 3:

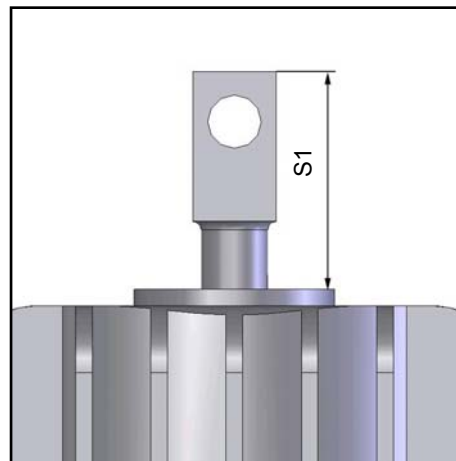


Fig. 4:

- Dismount catch (2.7) by unscrewing bolt (2.23).
- Release brake with thruster.

Increase reserve stroke:

- Turn Nut (2.14) **clockwise** until the piston rod of the thruster (Fig. 4) has reached the necessary value for S1 (table 1).

Decrease reserve stroke:

- Unscrew bolt (2.23) and remove catch (2.7).
- Turn Nut (2.14) **counterclockwise** until the piston rod of the thruster (Fig. 4) has reached the necessary value for S1 (table 1).
- After finishing all tasks make sure the catch (2.7) is reinstalled correctly:
- The guidance pin (2.8) has to be within the catch (2.7).

Thruster Type	S ₀ = Piston rod in lowest pos.	S ₁ = Brake set	S ₂ = Brake released	S ₁ = S _{1min} => Readjust Brake
ED 50/6	54 mm	64 mm	114 mm	59 mm
ED 80/6	54 mm	64 mm	114 mm	59 mm
ED 80/7	54 mm	64 mm	124 mm	59 mm

Tolerance S₁: + 3 mm / -1 mm

Table 1: Thruster settings

3.6 Activate Self centering device.

When the brake pad wear is compensated, the levers are “lifted out of the adjusting bolts”. The SB 23 is equipped with a centering device. It uses a springborn wedge (1.26), that centers the brake automatically, when the brake pads are wearing down. The wedge (1.26) is adjusted correctly prior to shipment. In case of considerable differences in unequal brake pad lift-off a new adjustment is necessary (section 4.5).

- Release brake.
- Insert wedge (1.26) loosely and without force into the guide way.
- Set brake
 - Wedge (1.26) moves down inside the guide way.
- Check movability and position (Fig. 5) of the latch (1.27). If the position isn't correct:
 - Loosen fastening bolt (1.40).
 - Adjust roller (1.28) with bolt (1.43), so the shackle fits correctly (fig. 5).
 - Tighten fastening bolt (1.40).
- Actuate and release brake several times until the wedge (1.26) doesn't move further down.
- Remount cover (1.21) and fix it with bolt (1.42).
- Do not lubricate the wedge (1.26), just keep it clean

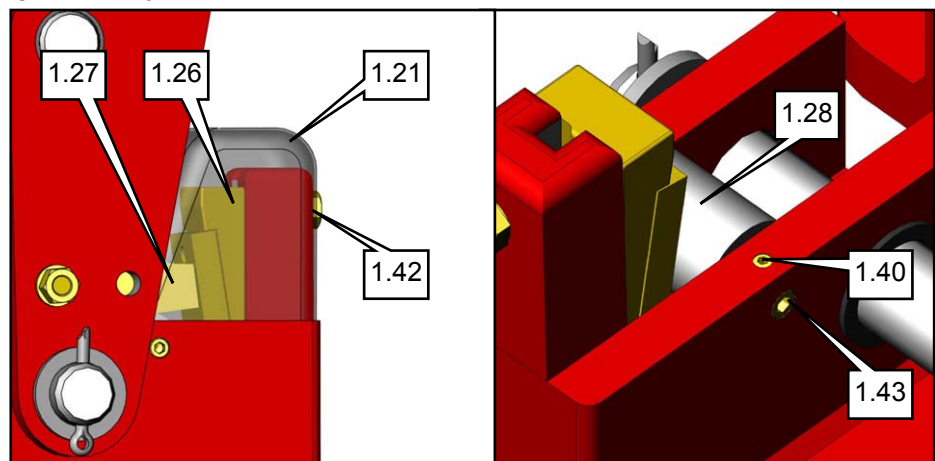
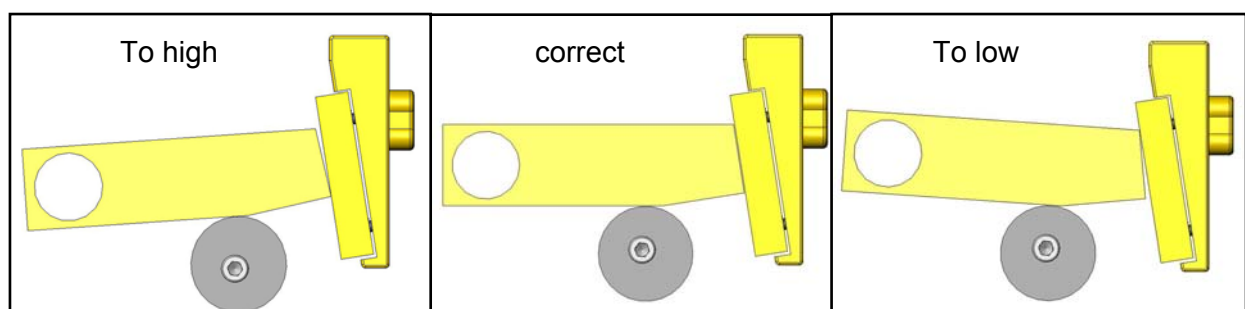



Fig. 5:



3.7 Check limit switches

	<p style="text-align: center;">Caution!</p> <p>In case limit switches are mounted (refer to scope of supply), they must not be put out of service, overridden or blocked in any other way. Else the safe use of the brake is no longer given!</p>
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Release - / set control

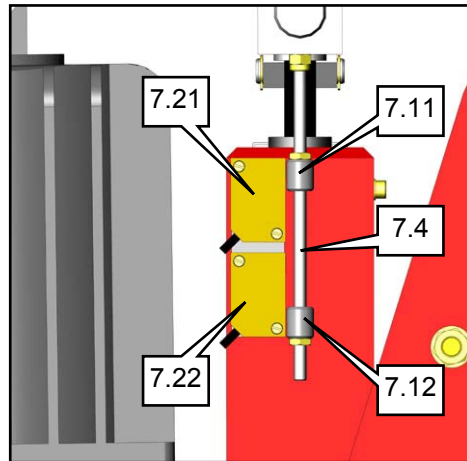


Fig. 6

The limit switches are mounted to the spring tube. For each limit switch there is an actuating roll screwed onto a threaded rod. Fig. 6 shows the brake set.

When the brake opens, the threaded rod moves upwards. The upper actuating roll moves out of the switching area of the switch “set-control” and the switch is idle. The lower actuating roll moves into the switching area of the switch “release-control” and the switch is actuated.

When the brake sets, the threaded rod moves downwards. The upper actuating roll moves into the switching area of the switch “set-control” and the switch is actuated. The lower actuating roll moves out of the switching area of the switch “release-control” and the switch is idle.

Wear control

The limit switch is screwed (7.23) into the crosspiece (2.16) of the AWC (2.1). When the brake is set correctly, the switch isn't actuated. With growing wear, the spindle (2.1) moves into the crosspiece (2.16) (arrow). As soon as the wear reaches the critical value, the switch (7.23) is actuated.

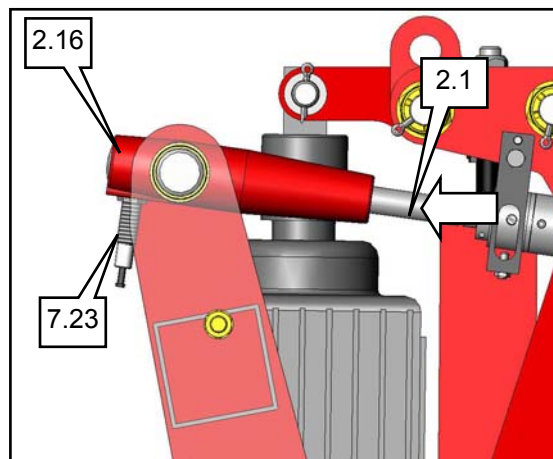




Fig. 7:

3.8 Function control

Release and set the brake several times. Check the following:

- Is dimension "S₁" reached, when the brake is set? (Table 2)
If NO: Repeat section 3.5
- Is there an equal air gap between brake pads and brake disc, when the brake is released?
If NO: Repeat section 3.6
- Did you set the required braking torque?
If NO: Repeat section 3.4
- Is catch (2.8) properly installed and fitted into its place?
If NO: Adjust according to section 3.6
- Is the catch-pin (2.8) inside the catch (2.7)?
If NO: Adjust according to section 3.6
- Is the catch-pin (2.8) touched by the catch (2.7) during operation of the brake?
If YES: The AWC is not yet completely run in. Set and release the brake, until the catch pin (2.8) isn't touched any more.
- Is the required braking distance achieved?
If YES: Setup finished!
If NO: Reset braking torque (Section 3.4)

4 Maintenance

	<p>Warning!</p> <p>A sudden startup of the installation endangers the life of the maintenance personnel! Secure the drive and the installation against any accidental movement before starting any work!</p>
	<p>Notice!</p> <p>The use of spare parts, not meant for this brake, can lead to a malfunction of the brake or damage the brake!</p> <p>Only use original PINTSCH BUBENZER spare parts!</p>

4.1 Regular maintenance tasks

Check:

All 100 - 150 operating hours

All 450 operating hours or monthly (Holding brakes without dynamic braking)



In case the brake hasn't been used for six months

- Function of the brake/brake system
- Brake shoe lift-off
- Lining wear/lining thickness
- Condition of the brake disc
- Thruster reserve stroke
- Easy mobility of the brake linkage
- Brake spring tension (torque)
- Adjustment of limit switches, hand release devices and other optional equipment
- Possible wear of the automatic wear compensator (if ordered)

Check the brake/brake system outside the regular inspection intervals if:

- Prolonged braking times or -distances appear
- Extreme operating conditions appear:
 - ⇒ Overspeeding of the brake drum
 - ⇒ And/or excessive braking times
- A limit switch indicates lining wear or lack of releasing stroke
- After a longer period of brake-standstill or drive standstill.
- An emergency stop occurred.

DO NOT DISENGAGE the automatic wear compensator, as otherwise lining wear must be compensated manually!

	<p>Attention!</p> <p>Cotter pins at pins have to be opened, so they can't fall out (left). Cotter pins at castellated nuts have to be opened completely (right)!</p>	
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4.2 Additional Maintenance for Hoist Gear Brakes

The following are in addition to the visual inspection of the brakes every 100-150 operating hours (see page 2). In Germany brake tests must be performed for the hoist brakes once a year. (German regulation VBG9). These brake tests must be carried out without electric controlled deceleration.

Where German crane operation legislation is not applied, we recommend the following:

Dynamic brake test

- perform under no load condition (Spreader) 3-4 braking cycles at maximum lowering speed

and/or

Static brake test (hoist drives with 2 service disc brakes)

- perform with nominal (rated) load
- lift up load approx. 30 Centimeters (12 inches)

Open one brake by using the hand release. The second brake must hold the load safely. If it does not, check or repeat brake adjustment and section 3.0 (Commissioning). After passing the static brake test, run one dynamic brake test.

Subsequent to repair of a brake with used brake pads

When mounting a brake with used brake pads proceed as though it is a new installation, to insure that the surfaces are mated-in (match).

Important Note



In case of exclusive static use as holding brake or low dynamic braking requirement as is commonly the case on new cranes and especially container cranes, the surface of the sintered lining will tend to accumulate dust particles which can reduce the friction factor and thus the available braking torque. These dust particles in the brake pad surface can be removed by performing the annual dynamic brake test.

Where it is not possible to carry out dynamic load tests at regular intervals, we recommend changing brake pads every 2 years. If brake pads removed from the brake are in otherwise good condition i.e. free from oil contamination, even wear pattern, no visible cracks or deformation and well above minimum residual pad thickness, they can be reconditioned by grinding or machining approx. 0.5mm off the surface.


4.3 Lubrication

Because of the maintenance-free bushings installed on the brake, no lubrication is needed.

4.4 Use of manual release lever (Option)

	<p>Warning! When using the manual release lever, there is no safety device active any more! Mortal danger! Always make sure nothing can move out of control.</p>
	<p>Danger! Release brake SLOWLY, so an attached load can't move out of control! Mortal Danger!</p>

The manual release lever (Fig. 11 - 6.1) is not part of the standard scope of supply. By means of the lever the brake may be released manually in case of an emergency-situation, e.g. to lower a load after an emergency stop.

	<p>Warning! The lever is not suited to keep the brake open for maintenance tasks. Mortal danger! Always follow the regulations given in section 5!</p>
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Always watch the load (2nd operator) so you don't miss the point, where the brake releases. Pull the lever upwards **SLOWLY** to open the brake (arrow). If the lever is released, before it has reached its locking position (completely released), the brake automatically closes. It is possible to provide the brake without a catch for the lever. Check scope of supply. By means of the lever the load can be released controlled. As an option the manual release lever can be equipped with a limit-switch for release control (Fig. 8).

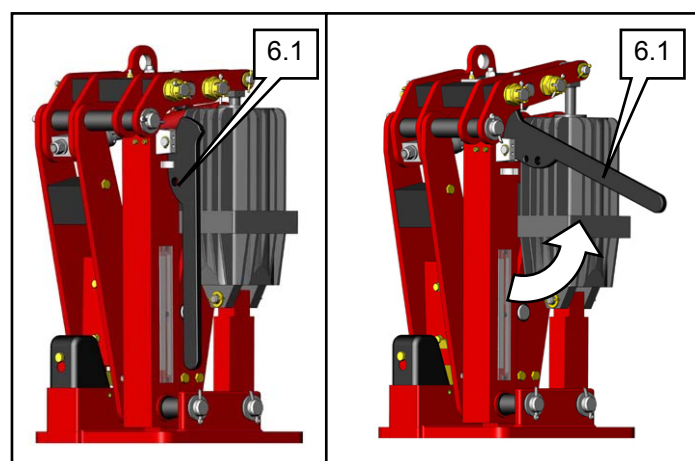


Fig. 8:

4.5 Maintenance of the AWC

The catch (Fig. 2.7) and the freewheel (Fig. 2.6) may be object to wear. Recognized by a constant reduction of the reserve stroke in case of lining wear, although the AWC is actuated.

Procedure:

- Rotate nut (2.2) clockwise to compensate lining wear and thus the reduced reserve stroke.
(Refer to section 3.5)
- Replace worn parts resp. the complete AWC unit as soon as possible!

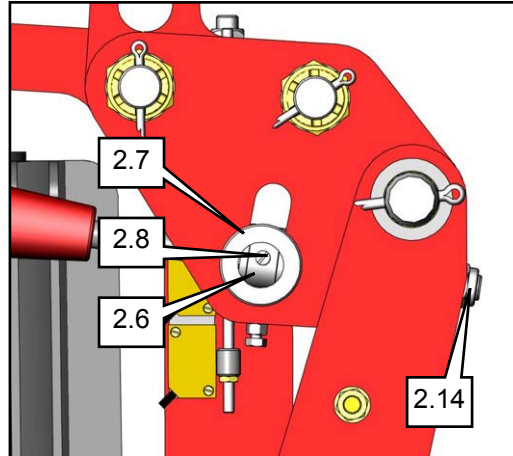


Fig. 9:

Note:

- For this task, 2 persons are necessary.
- Store all removed parts in the correct order of assembly.
- Do not mix up the spacer tubes, because they are different in length!
- Remove the 2 cotter pins of the castellated nuts (1.49) as well as cotter pin (1.23).
- Screw off castellated nuts (1.49) and remove washers on indicated side.
 - Note: The nuts on the other side can remain!
- Pull out threaded pins (1.25) **slowly** into arrow direction, until both levers (2.14) are free.
Caution: The spacer tubes are loose now and may fall into the brake!

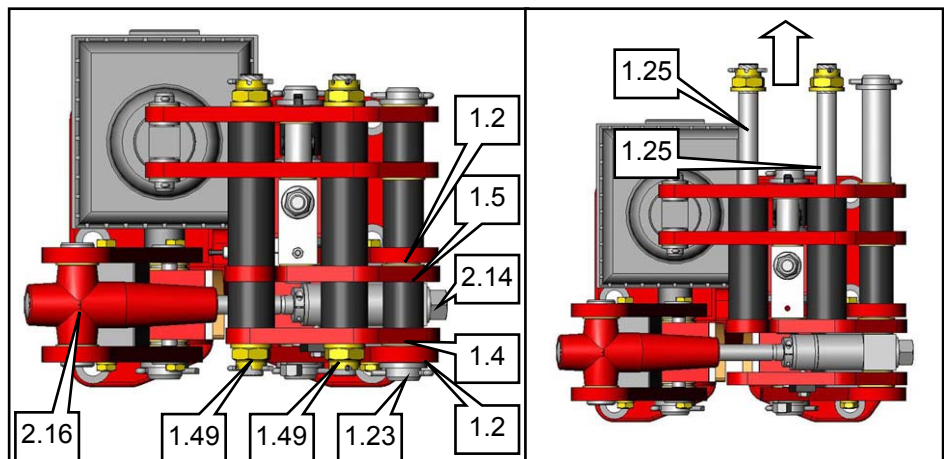


Fig. 10:

Caution! When pulling out the bolts (1.23) the levers (1.4 / 1.5) may tilt and fall over! Secure both levers (1.4 / 1.5) against falling over!

- Pull pin (1.23) slowly into arrow direction, until both levers (1.4 / 1.5) are free.
- Important: Pin (1.23) must remain in lever bearing (1.2)!

- Swivel both levers (1.4 / 1.5) complete with AWC unit (2) upwards (Fig. 12 left).
- Remove levers (1.4 / 1.5) from AWC unit (3)
- Turn nut (2.14) counter clockwise to remove the unit from crosspiece (2.16).

It is usually not necessary to remove the crosspiece!

- Check thread of crosspiece (2.16) for cleanliness.
- Grease the new spindle.
- Turn the spindle of the new AWC unit (2) inside the crosspiece (2.16) (approx. 10 rotations).
- Put on both levers (1.4 / 1.5) to the new AWC unit and swivel the whole unit back between the brake levers (1.2).
- Push pin (1.23) through the appropriate bores of the levers (1.4 / 1.5) and spacer tubes!
- Fix washers in place with a slight touch of grease!
- Mount the spacer tubes on their original position. Refer to circular impressions on the levers.
- Push back threaded pins (1.25) with appropriate spacer tubes into levers (1.4 / 1.5).
- Screw on castellated nuts (1.49) with washers.
- Tighten these nuts with a torque wrench to **400 Nm**.
- If the holes of the castellated nuts do not coincide with the cotter pin bore:
- Go on tightening, until the holes for the cotter pin coincide.
- Secure all pins with cotter pins.

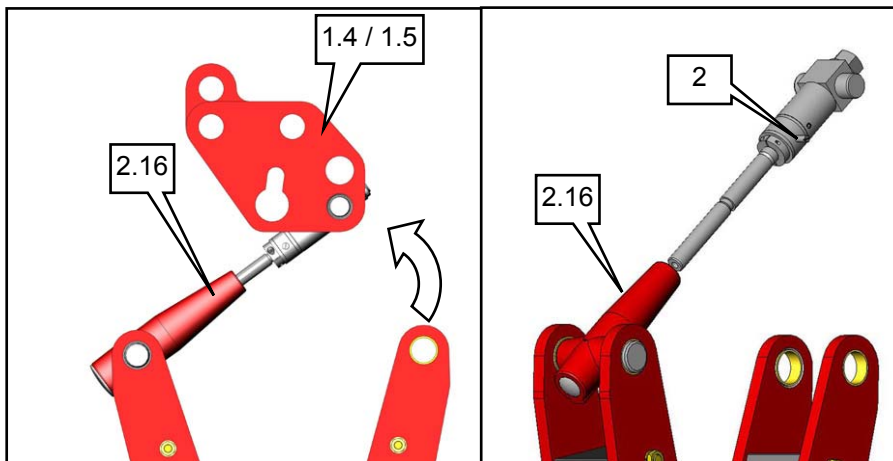


Fig. 11:

4.6 Setting of self-centering device

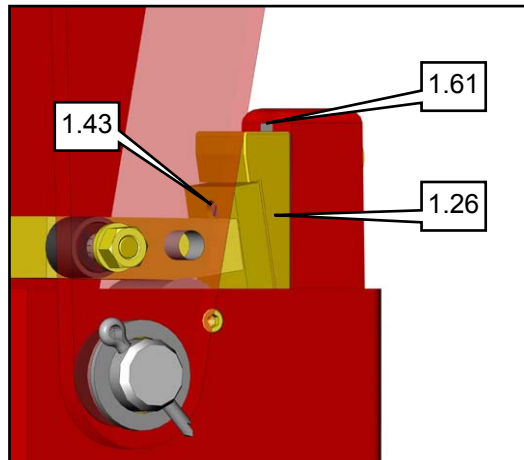


Fig. 12

Note: Stop side“ means the side of the brake which is equipped with the wedge (1.26).



- Release brake.
- Dismount cover (1.21) by unscrewing bolt (1.42).
- Remove screws (1.43) and clean the threads from any adhesive agent
- Tighten screws (1.43) with a screwdriver **evenly** (Gap „S“ =0) afterwards turn back the screws one quarter rotation.
- Insert wedge (1.26) loosely and without force into the guide way.
- Actuate and release brake several times until the wedge (1.26) doesn't move further down.
- Check air gap
- If the air gap of the brake pads is too large on the stop side of the brake:
 - Turn both screws (1.43) clockwise.
- If the air gap of the brake pads is too large on the opposite side:
 - Turn both screws (1.43) counter clockwise.

HINT: Adjust the screws in very small steps!

Activate self centering device:

- Release brake.
- Insert wedge (1.26) loosely and without force into the guide way.
- Actuate and release brake several times until the wedge (1.26) doesn't move further down.
- Remount cover (1.21) and fix it with bolt (1.42).

4.7 Exchanging of brake pads

	<p>Warning!</p> <p>During the braking process the brake disc and the brake shoes heat up! Danger of burning!</p> <p>Let brake disc and brake cool down before changing the brake pads!</p>
	<p>Important!</p> <p>Always exchange BOTH brake pads! Otherwise the brake might not work properly!</p>

Minimum thickness of the linings:

- Glued linings: 3 mm
- Riveted linings / Glued and riveted linings: 5 mm

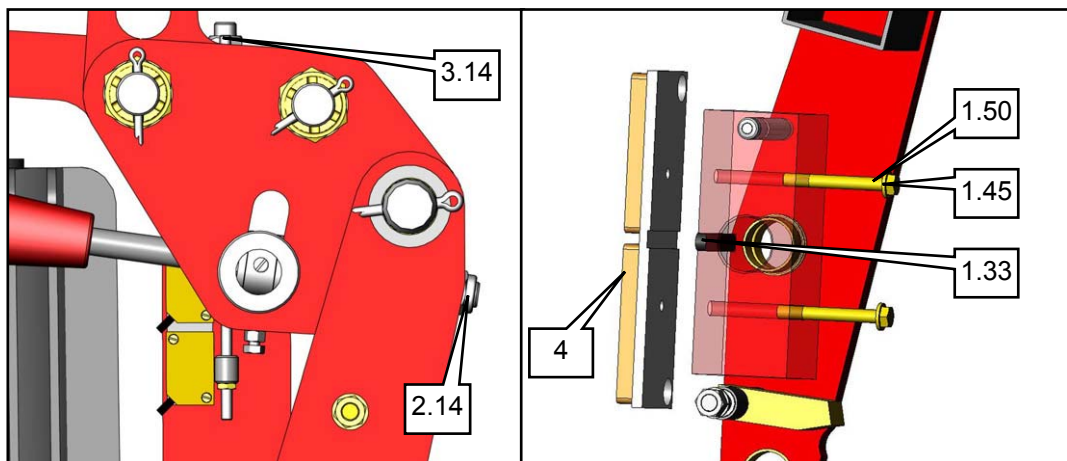


Fig. 13:

- **Release brake spring:** Turn nut (3.14) counter clockwise.
- Disable AWC (Section 3.5).
- Remove wedge (1.23) (Section 4.5).
- Turn nut (2.2) counter clockwise ⇒ Brake shoes move away from brake disc.
- Screw both bolts (1.50) out of brake pads (4).
- Hold brake pads (4) at top handle.
- **Caution when removing the brake pads!** Heed weight of brake pads (4)!
- Lift brake pads (4) from key (1.33).
- Remove old brake pad (4).
- Check new brake pad (4) for cleanliness, clean if necessary (Emery paper).
- Put new brake pads on the key (1.33) and tighten it by screws (1.45) to the brake shoe (1.50).
- **Do not forget special washers (1.50)!**
- Readjust and run-in brake according to sections 3.3 to 3.8.

4.8 Exchange of limit switches

Release / Setting-control

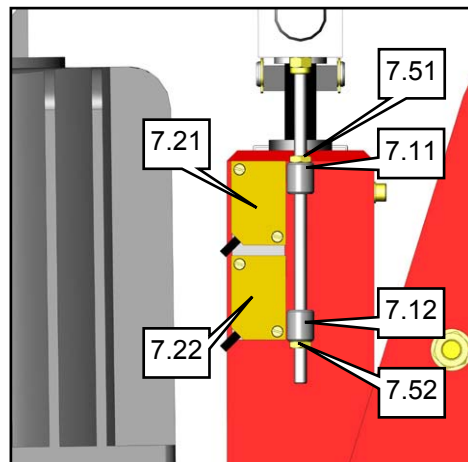


Fig. 14:

The switch for release control (7.22) has to be actuated, when the brake is released.
The limit switch set control (7.21) must be actuated when the brake closes.

- Remove old limit switch
 - Remove electrical connection
 - Mount new limit switch
 - Screw in both bolts, don't tighten yet.
 - Tighten inner bolt slightly.
 - Connect switch electrically.
 - The upper bolt is positioned in the longhole of the switch. Thus the switch can be adjusted.
 - Move switch until it is actuated correctly (4-5 mm). Control at the diode near the outer bolt and the control system.
 - Tighten upper bolt.
 - Tighten lower bolt.
 - Open and close brake several times and check setting.
-
- Release brake
 - Loosen nut (7.52).
 - Turn switch roller (7.12) in position, until the switch is actuated.
 - Release and set the brake several times electrically.
 - Check if the limit switch (7.22) is actuated, when the brake is released.
 - Finally tighten nut (7.52) against roller (7.12).
-
- Set brake
 - Loosen nut (7.51)
 - Turn switch roller (7.11) in position, until the switch is actuated.
 - Release and set the brake several times electrically.
 - Check if the limit switch (7.21) is actuated, when the brake is set.
 - Finally tighten nut (7.51) against roller (7.11)

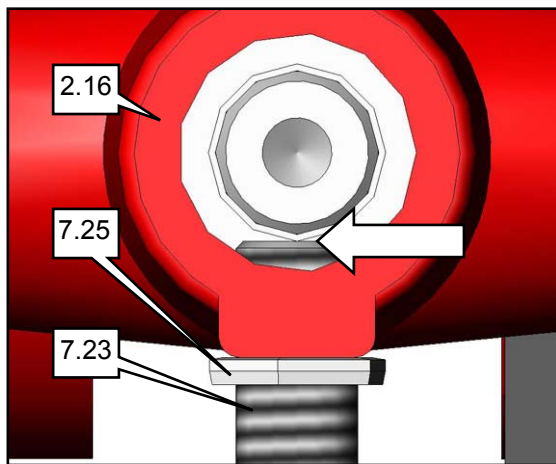


Fig. 15:

Wear control

- Loosen lock nut (7.25).
- Unscrew old limit switch (7.23).
- Disconnect limit switch (7.23) electrically.
- Connect new limit switch (7.23) electrically.
- Screw new limit switch into crosspiece (2.16) until the actuating surface coincides with the inner bore.
- Tighten lock nut (7.25).

4.9 Exchange bolts and bushes

To exchange the bushes, the brake has to be disassembled. This means it has to be dismantled, depending on the installation. **Always secure the installation against accidental movement!**

- Open brake by releasing the brake tension.
- Release brake completely by adjusting nut.
- Dismount brake
- Before removing the bushes note positions.
- Don't damage the bores when removing the bushes.
- Clean and debur bores if necessary.
- Note the mounting-direction of the bushes. Refer to exploded views in section 7
- Don't damage or jam the bushes when driving / pressing them into the levers.
- Reset brake to operating values according to section 3!

4.10 Exchange thruster

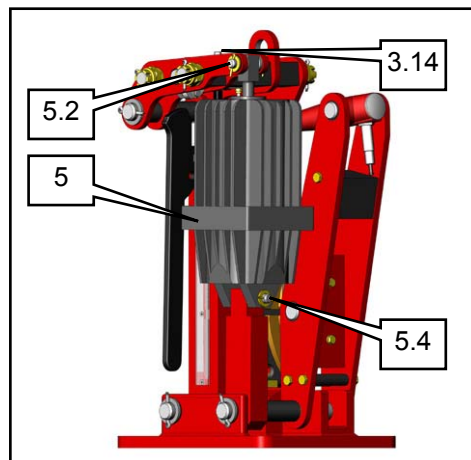


Fig. 16:

- Disconnect thruster (5).
- Dismount limit switch if mounted.
- Release brake spring tension (3.14).



Caution!
When the upper bolt (5.2) is pulled out, the thruster may tilt and fall.
Secure the thruster against accidental movements!
Danger of injury!

- Remove cotter pins and washers from Eldro (5.2 and 5.4).
- Attach thruster (5) with e.g. a rope to a suitable lifting device.
- Loosen and remove bolts (5.2 and 5.4).
- Exchange thruster (5).
- Reassemble brake
- Connect new thruster

4.11 Exchange Spring unit

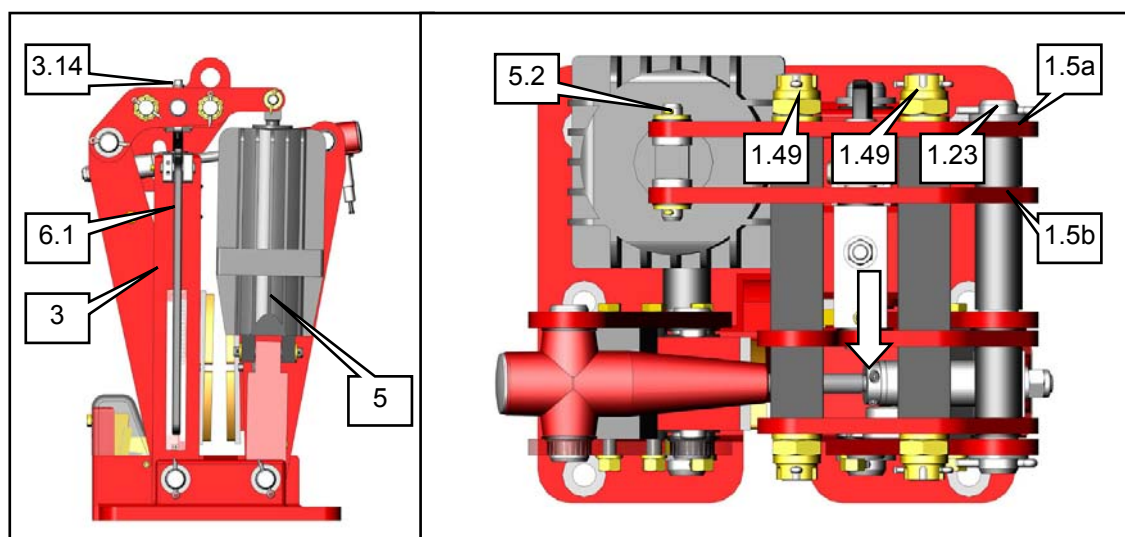


Fig. 17:

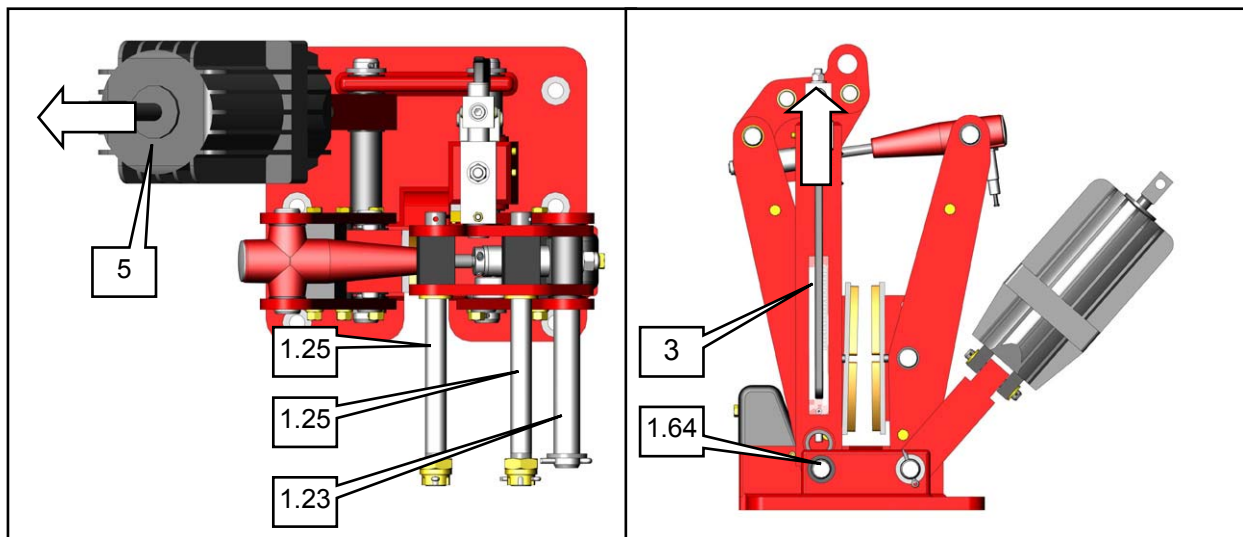


Fig. 18:

- Release brake spring tension (3.14).
- If mounted: remove manual release lever (6.1), Roll carrier.
- Pull thruster-sided cotter pins from pins (1.23 and 1.25).
- Unscrew castellated nuts (1.49) and remove washers (1.49, 1.23 and 1.25).
- Remove elbow lever 1 (1.5a).
- **Secure the thruster and other movable parts against accidental movement!**
- Pull pins (1.25) out of lever 2 (1.5b).
- Tilt thruster (5) carefully away from spring tube (3).
- Secure thruster (5) against further movement.
- Remove elbow lever 2 (1.5b).
- Remove cotter pins and washers from pin (1.64) from lower end of spring tube (3).
- Pull pin (1.64) out of spring tube (3).
- Pull spring tube (3) upwards out of the brake.
- Mount new spring unit.
- Reassemble brake by following the steps in reverse order to the mounting of the castellated nuts.
 - Grease washers slightly
 - Position them on the levers, referring to the imprints.
- Tighten castellated nuts (1.49) with a torque wrench to **400 Nm**.
- If the bores for the cotter pins don't match the bores in the castellated nuts, tighten further.
- Secure all pins and castellated nuts with new cotter pins.
- Remount manual release lever (6.1), Roll carrier if they were dismounted.

5 Putting out of service and disposal

When the brake is put out of service, the following instructions have to be heeded to help avoiding dangers to life, material and environment:

The brake must only be put out of service and disposed by trained and qualified personnel.

Always heed the applying laws and regulations!



Important!
Because of the weight of the brake always use proper lifting devices and transport the brake using the lifting ore!
Danger of injury!



Warning!
A sudden startup of the installation endangers the life of the working personnel! Secure the drive and the installation against any accidental movement before starting any work!



Danger!
The applied electrical voltages are dangerous to life!
The electrical connection and all other electrical tasks must only be done by a trained electrician!



Take care that the hydraulic fluids, lubricants and other used substances as well as oil-soiled parts are disposed environmental friendly and in compliance with the corresponding laws and regulations!
Electronic scrap has to be disposed separately.



6 Troubleshooting

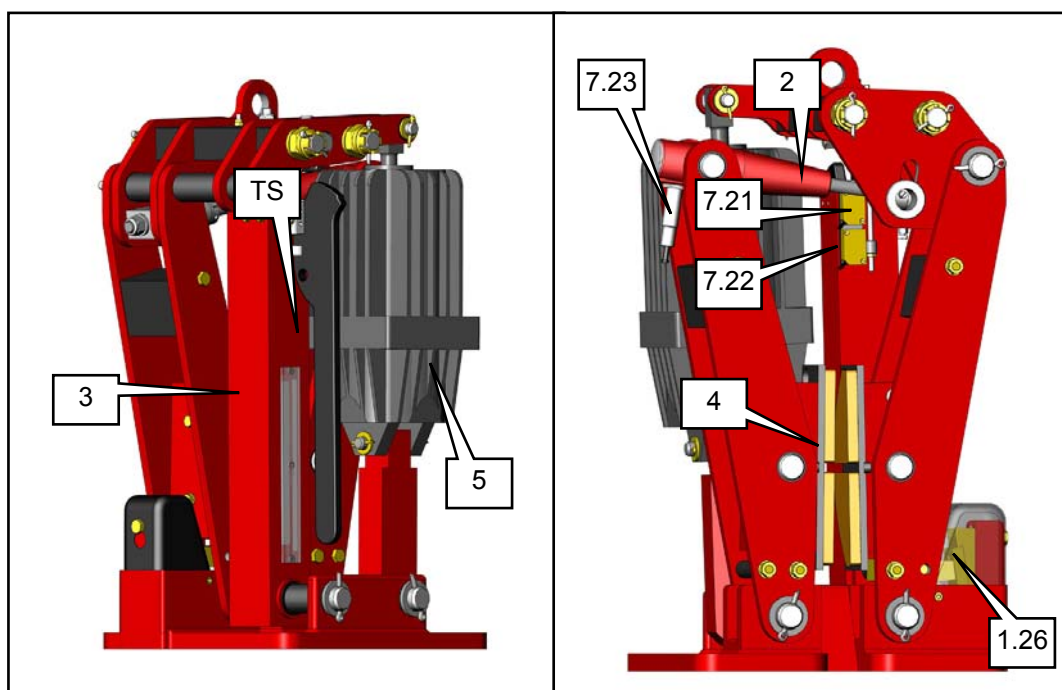
Symptom	Possible reason	Action	Section
Brake doesn't close	Brake is mechanically blocked	Check	-
	Brake is manually released	Manually close	4.4
	Spring tension to low	Adjust spring tension	3.4
	Spring damaged	Exchange spring unit	4.11
	Signal „open“ is active	Check connection	DB
	Limit switch malfunctioning	Check connection	DB
		Check lever / actuating devices	4.8
		Exchange limit switch	4.8
	Reserve stroke to small	Adjust reserve stroke	3.5
	Brake pads worn	Exchange brake pads	4.7
Brake doesn't open	Brake is mechanically blocked	Check	
	Spring tension to high	Adjust spring tension	3.4
	Signal „close“ is active	Check connection	DB
	Limit switch malfunctioning	Check connection	DB
		Check lever / actuating devices	4.8
		Exchange limit switch	4.8
	Reserve stroke to big	Adjust reserve stroke	3.5
	No power supply	Check electrical supply and connection	3.2
	Thruster damaged	Exchange thruster	4.10
Braking distance to long	Spring tension to low	Adjust spring tension	3.4
	Brake pads have uneven contact	Align brake	3.1
	Brake pads haven't been run in correctly	Run in brake pads	3.3
	Reserve stroke to small	Set Reserve-stroke	3.5
	AWC doesn't work properly	Check and readjust.	4.5
	Self-centering device doesn't work properly	Check and readjust.	4.6
	Brake pads soiled	Brake clean	-
	Brake soiled	Clean brake	-
	Brake pads worn	Exchange brake pads	4.7
	Brake disc worn	Exchange brake disc	-

Note:

DB - Data sheet of the limit switch

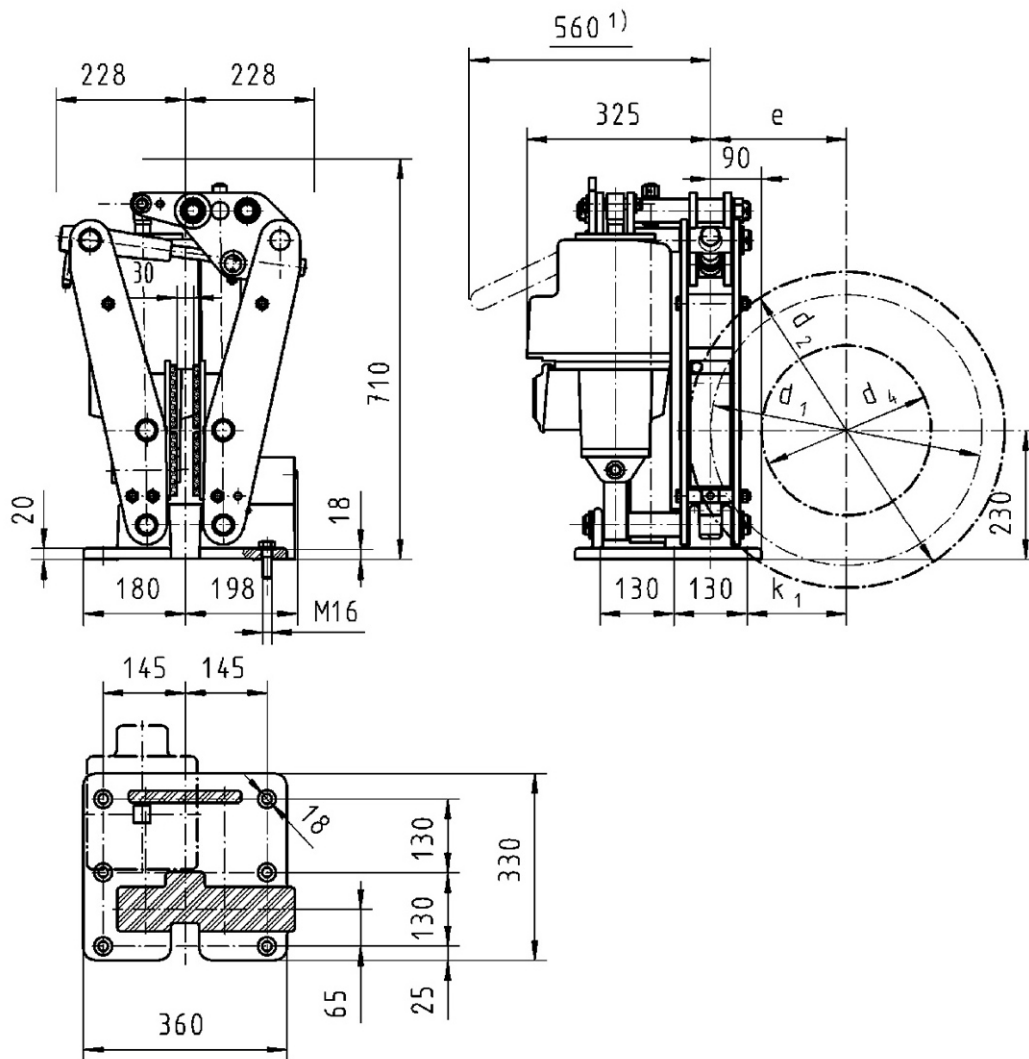
7 Spare parts

	<p>Important!</p> <p>In case of ordering, please indicate the type and the serial no. of the brake which is located on the type plate (see below: "TS") of the brake!</p>
	<p>Notice!</p> <p>The use of spare parts, not meant for this brake, can lead to a malfunction of the brake or damage the brake!</p> <p>Only use original PINTSCH BUBENZER spare parts!</p>



Pos.	Nr.	Type
1.26	1	Wedge
2	1	AWC
3	1	Spring tube
4	2	Brake shoe with brake pad
5	1	Thruster
7.21	1	Limit switch – Set control
7.22	1	Limit switch – Release control
7.23	1	Limit switch – Wear control
-	1	Set of bolts (does one brake)
-	1	Set of bushes (does one brake)

8 Appendix



For crane brake lay-out use safety factors documented in the FEM 1.001, Section 1
All dimensions in mm. Alterations reserved without notice

1) If ordered with manual release lever

*) Average friction factor of standard material combination

Weigth: 97 Kg W/o thruster		Thruster – Type			Ed 50/6	Ed 80/6	Ed 80/7bb
		Contact Force in N			8500	12500	16000
Disc- ↙	Friction- ↙				Braking Torque M_{Br} in Nm Friction factor $\mu = 0,4$		
d_2	d_1	d_4	e	k_1			
355	275	155	137,5	72,5	935		
400	320	200	160	95	1085	1600	2050
450	370	250	185	120	1255	1850	2370
500	420	300	210	145	1425	2100	2690
560	480	300	240	175	1630	2400	3070
630	550	360	275	210	1870	2750	3520



Important!
Used Nordlock-washers must not be used again!
These tightening torques apply for:
 $\mu_{\text{compl.}} = 0,12$ (black or bonderd, slightly oiled)

Coarse-pitch thread – with / without NORD-LOCK-washers							
Size	Tightening Torques M_A						SW [mm]
	8.8		10.9		12.9		
	[Nm]	[Lbf*ft]	[Nm]	[Lbf*ft]	[Nm]	[Lbf*ft]	
M4	3	2.3	4.6	3.4	5.1	3.8	7
M5	5.9	4.4	8.6	6.3	10	7.4	8
M6	10.1	7.5	14.9	11.0	17.4	12.8	10
M8	24.6	18.2	36.1	26.6	42.2	31.1	13
M10	48	35.4	71	52.4	83	61.3	17 (16)
M12	84	62.0	123	90.8	144	106.3	19 (18)
M14	133	98.2	195	143.9	229	169.0	22 (21)
M16	206	152.0	302	222.9	354	261.3	24
M18	295	217.7	421	310.7	492	363.1	27
M20	415	306.3	592	436.9	692	510.7	30
M22	567	418.4	807	595.6	945	697.4	32 (34)
M24	714	526.9	1015	749.1	1190	878.2	36
M27	1050	774.9	1496	1104.0	1750	1291.5	41
M30	1428	1053.9	2033	1500.4	2380	1756.4	46