

Installation and Operating Instructions for Brake DA ST1 FEM, ST2 FEM(A)

E09.816e



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RINGSPANN	Installation and operating instructions Brake DA ST1 FEM(A), DA ST2 FEM Spring activated – Electrically released	E 09.816e			
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IMPORTANT

Please read these instructions carefully before installing and operating the product. Your particular attention is drawn to the notes on safety.

These installation and operating instructions are valid on condition that the product meets the selection criteria for its proper use. Selection and design of the product is not the subject of these installation and operating instructions.

Disregarding or misinterpreting this installation and operating instructions invalidates any product liability or warranty by RINGSPANN; the same applies if the product is taken apart or changed.

These installation and operating instructions should be kept in a safe place and should accompany the product if it is passed on to others – either on its own or as part of a machine – to make it accessible to the user.

Safety Notice

- Installation and operation of this product should only be carried out by skilled personnel.
- Repairs may only be carried out by the manufacturer or accredited RINGSPANN agents.
- If a malfunction is indicated, the product or the machine into which it is installed, should be stopped immediately and either RINGSPANN or an accredited RINGSPANN agent should be informed.
- Switch off the power supply before commencing work on electrical components.
- Rotating machine elements must be protected by the purchaser to prevent accidental contact.
- Supplies abroad are subject to the safety laws prevailing in those countries.

This is a translation of the German original version!

In case of inconsistencies between the German and English version of this installation and operating instruction, the German version shall prevail.

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1. Description of the caliper

1.1 Operating principle

These installation and operating instructions apply to the following brake calipers:

- DA ST1 FEM / FEA
- DA ST2 FEM

with and without additional options.

The braking force is generated by spring washers. Electrical power is required to power the magnet that compresses these spring washers and keeps the brake caliper in the released condition. The arrangement and stacking of the spring washers are preset at the factory. This setting, in combination with the brake pad clearance adjustment, determines the resulting clamping force.

The “FEA” version described in this manual features **automatic** wear adjustment. On these versions with automatic adjustment, the lining wear is automatically compensated to maintain the nominal lining clearance and prevent any loss of braking force.

The “FEM” version described in this manual features **manual** wear adjustment. On these versions with manual adjustment, the lining wear must be compensated by a manual adjustment of the gap between pads and the brake disc to prevent a loss of braking force.

The brake calipers are equipped with a manual release mechanism that mechanically maintains the brake caliper in the released position without the need for an electrical power supply. This function is intended for installation and maintenance work when the power supply is not available. The manual release must be disengaged for normal brake operation.

An identification plate (Figure 1.1) with a 16-digit part number is mounted to each brake caliper. The exact design and configuration of the brake caliper are defined exclusively by this part number. Please read these installation and operating instructions carefully before installing or operating the brake. Always observe the drawings referenced in the individual sections.

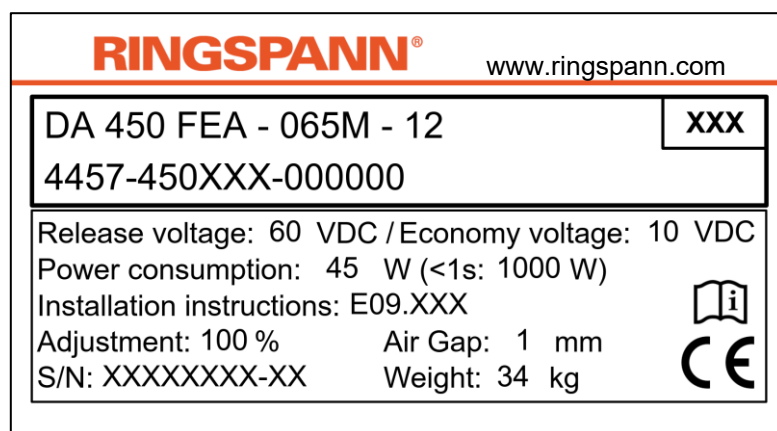


Figure 1.1

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Safety must be given the highest priority during all work performed on the brake. Before performing any work on the brake, switch off the drive unit.

Rotating components (e.g. the brake disc) must be secured by the operator to prevent accidental contact.

2. Installation

2.1 Installing the disc

Make sure that the disc is perfectly positioned and attached to its hub or shaft. Check that the disc warp does not exceed 0.2 mm per side.

Check that the disc thickness is as ordered and according to the designation printed on the brake:

Example: DA ST1 FEA – 065M – 30



Attention!

If these conditions are not met, the brake caliper cannot be installed or cannot operate properly.

Prior to installing the brake, the brake disc must be cleaned using alcohol - e.g. methylated spirits (ethyl alcohol) or isopropyl alcohol or alternatively with water-based surfactant solutions (such as soapy water or similar).

If the brake disc is cleaned using thinners, acetone, or brake cleaner, it must be ensured that these substances, as well as any residues thereof, do not come into direct contact with the friction pads. Particular care must be taken in the case of holding brakes, as no dynamic braking occurs that could otherwise remove any remaining residues of the solvents from the brake disc.



Attention!

The disc must be degreased and free of deposits to prevent any reduction in the coefficient of friction. Residues of oil and corrosion protection agents significantly reduce the coefficient of friction and, consequently, the braking and holding torque.

As well as these instructions, please also consider the drawing data sheet for the brake at www.RINGSPANN.com and the drawings in the individual sections.

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2.2 Installing the brake caliper

Make sure that the support surface is clean and dry. The brake caliper should be mounted to stable, vibration-free machine components to ensure noise-free, non-screech. Tighten the screws with a torque wrench.

During installation, it is essential to ensure that brake pads are centered and in full contact with the brake disc (the midlines of the brake arms must point to the midpoint of the brake disc). Maximum permissible lateral brake disc warp is 0,2 mm. Greater lateral movements may cause rattling and shaking of the brake unit.

2.2.1 Tooling

- Feeler gauges, metal ruler + dimensional control devices (calipers, depth gauges)
- Torque wrench (1200 Nm), 46 mm A/F sockets (base plate attachment).
- Male wrench 5 mm A/F + wrench 10 mm A/F (electrical connection).
- Wrench 27 mm A/F + wrench 46 mm A/F (pad adjustment).
- A set of laminated shims (for caliper alignment procedure).

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2.2.2 Delivery condition

The brake caliper is supplied in the following condition:

- In manual release position, i.e. mechanically locked in released position.
- With brake pads installed.
- Adjusted to the nominal brake pad clearance
- Braking force set to the nominal value or according to customer specifications.
- Optional mechanical switches or sensors adjusted.

As well as these instructions, please also consider the catalogue data for the brake at www.RINGSPANN.com and the drawings in the individual sections.



Life-threatening danger!

The brake disc must be completely degreased before coming into contact with the brake linings. If the brake linings are contaminated with grease or oil, the nominal braking force is not guaranteed.

The brake caliper can be a safety-relevant machine component. All adjustments, settings, and repair work may only be carried out by qualified personnel.

The brake caliper is supplied in the manual release position (manually locked in the released state). The brake force is preset. To ensure correct brake function, the instructions in this manual must be strictly followed before commissioning.

When assembling, operating and maintaining the brake it is to be ensured that the entire drive train is secured against being switched on unintentionally. Moving parts can cause severe injury. Rotating parts (e.g. brake disc) must be secured by the operator against unintentional touching.

Strongly pre-loaded pressure springs are installed in the thrusters of the brake. The spring thruster may only be disassembled by the factory.

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2.2.3 Description of manual release

Manual release is the device that allows the caliper to be opened by hand.

Manual release is performed by tightening the lock nut item **5** (hexagon 46 mm A/F), until the coil air gap is cancelled.

Manual release is deactivated by fully loosening the manual release nut item **5** until it rests on the washer item **4** (**Do not force!**).

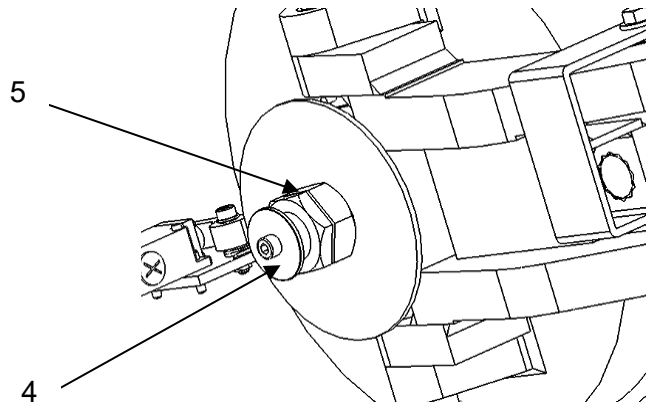


Figure 2.1

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2.2.4 Alignment procedure

1. Check the position of the base plate in relation to the disc.

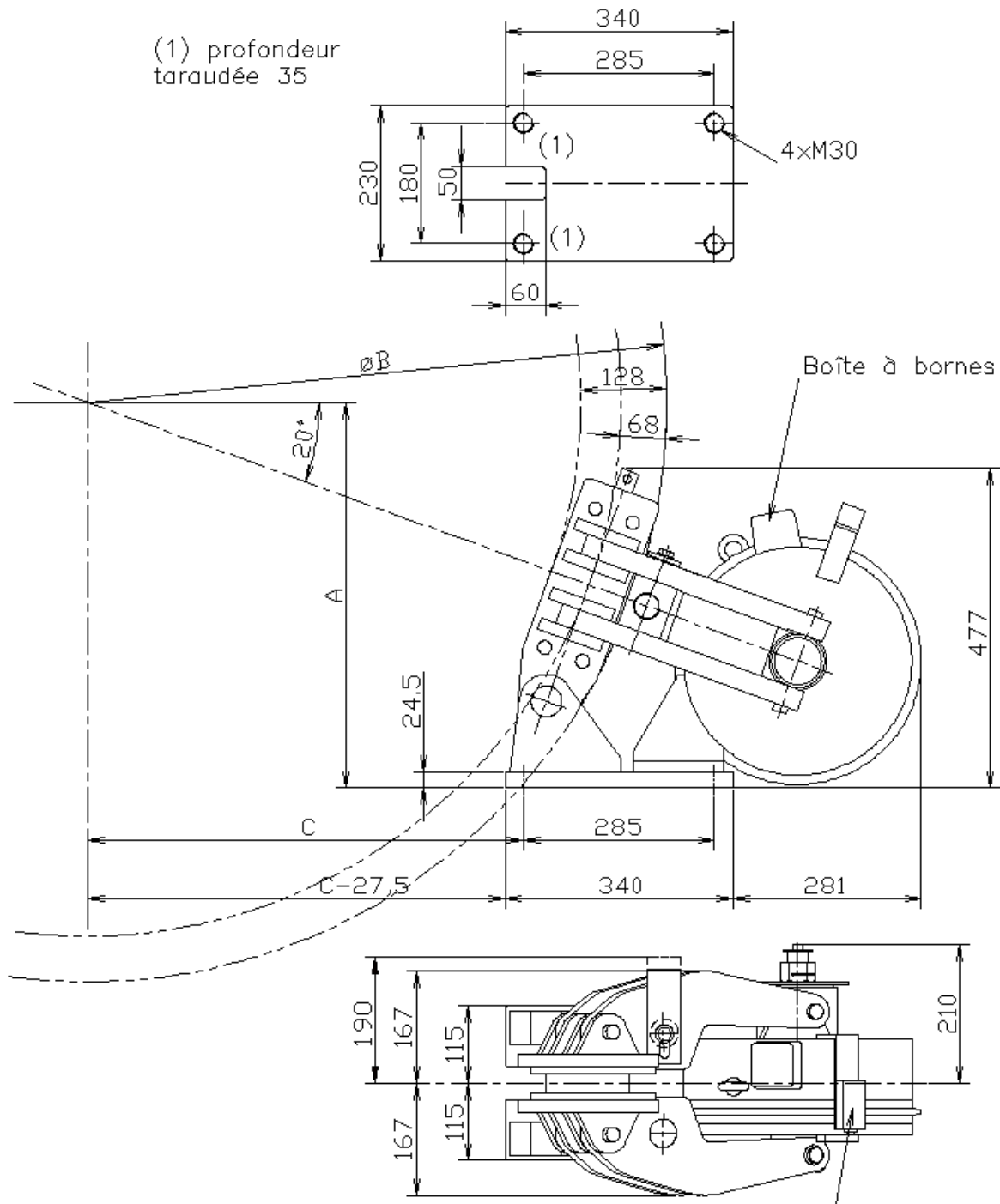


Figure 2.2

RINGSPANN	Installation and operating instructions			E 09.816e	
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2. Place the caliper on its bracket using the lifting ring item 1 by introducing the disc between the pads. If the space between the pads and the disc is insufficient, refer to chapter 2.2.6 to increase the pad clearance.
3. Check that the run-out of the disc in relation to the bracket does not exceed 0.2 mm.
4. Check the centring of the disc in relation to the base plate (± 0.5 mm).

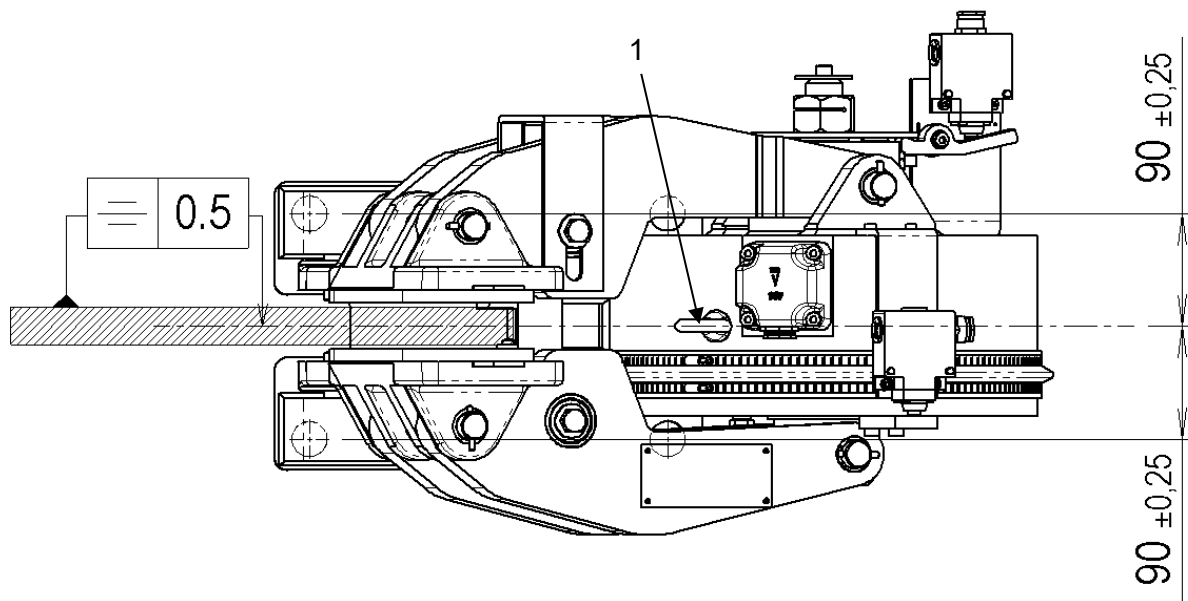


Figure 2.3

5. Check the parallelism of the pads in relation to the disc while observing the following gaps:

Longitudinal gap: 0.15 mm max. over the length of the pad.
 (Corresponds to a perpendicularity of the bracket in relation to the disc of ± 0.06).

If necessary, wedge the bracket with foil item 4 to insert close to the attachment screws.

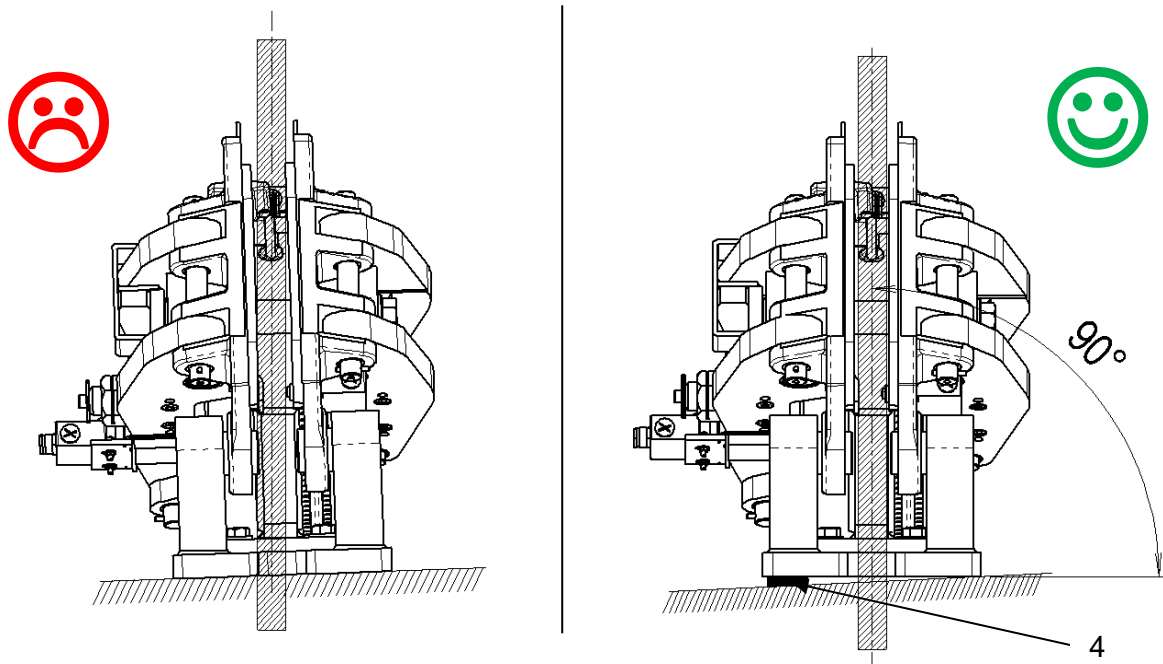


Figure 2.4

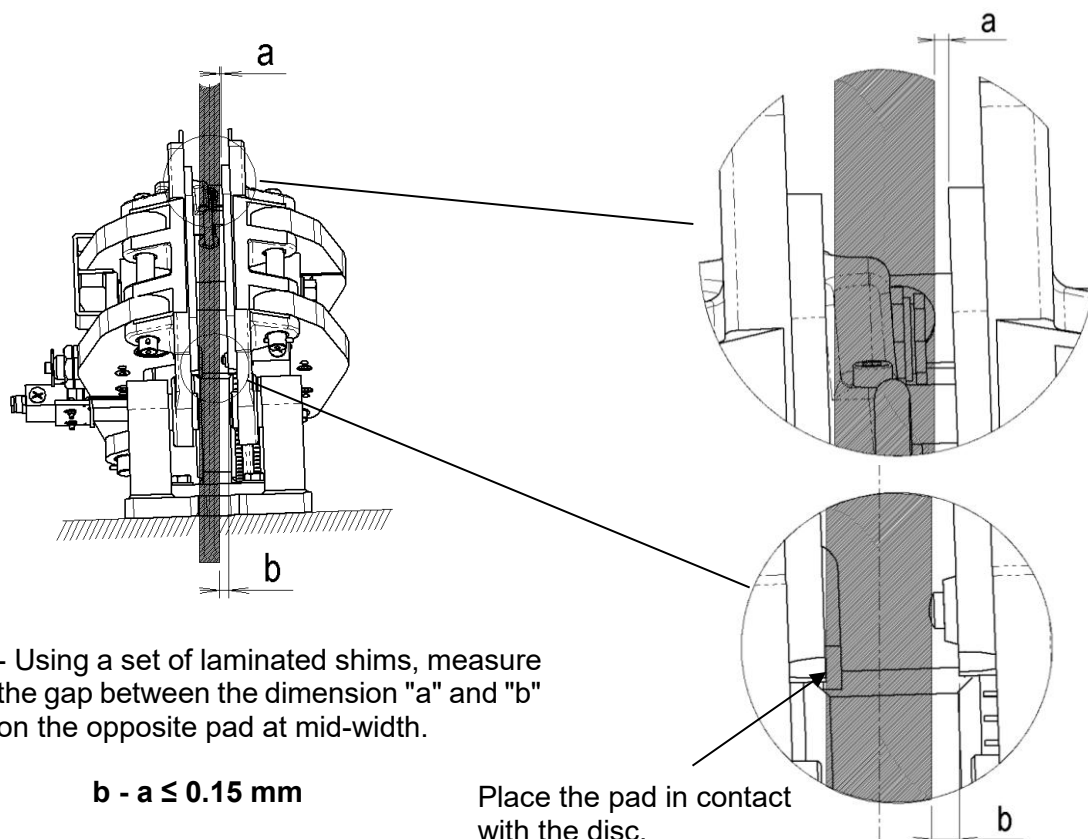


Figure 2.5

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Radial gap: 0.1 mm max. over the width of the pad.

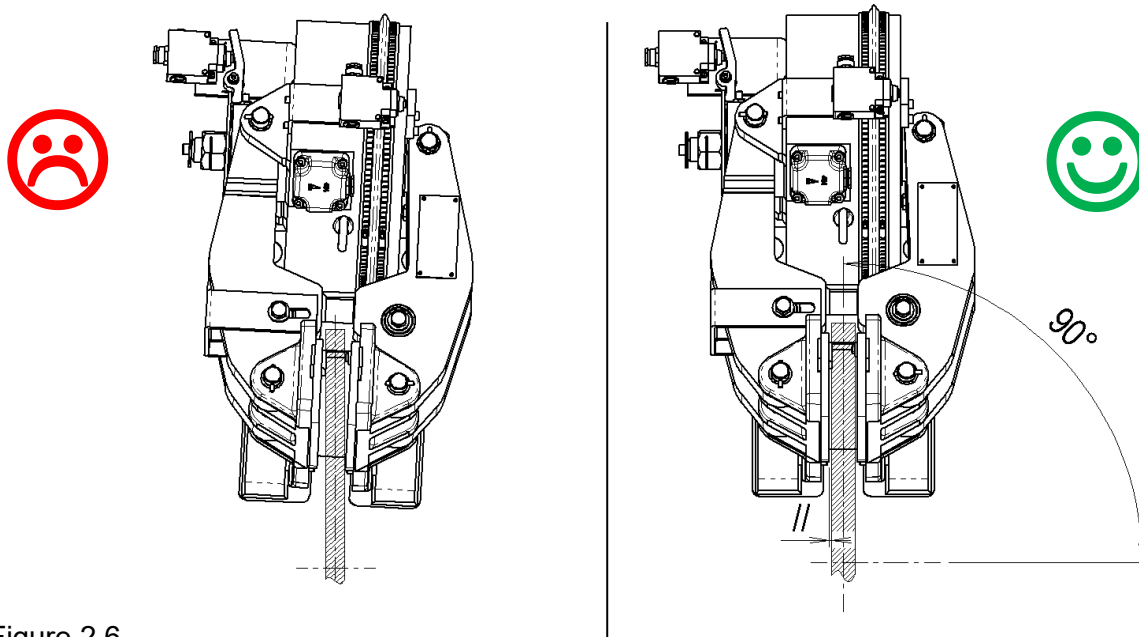


Figure 2.6

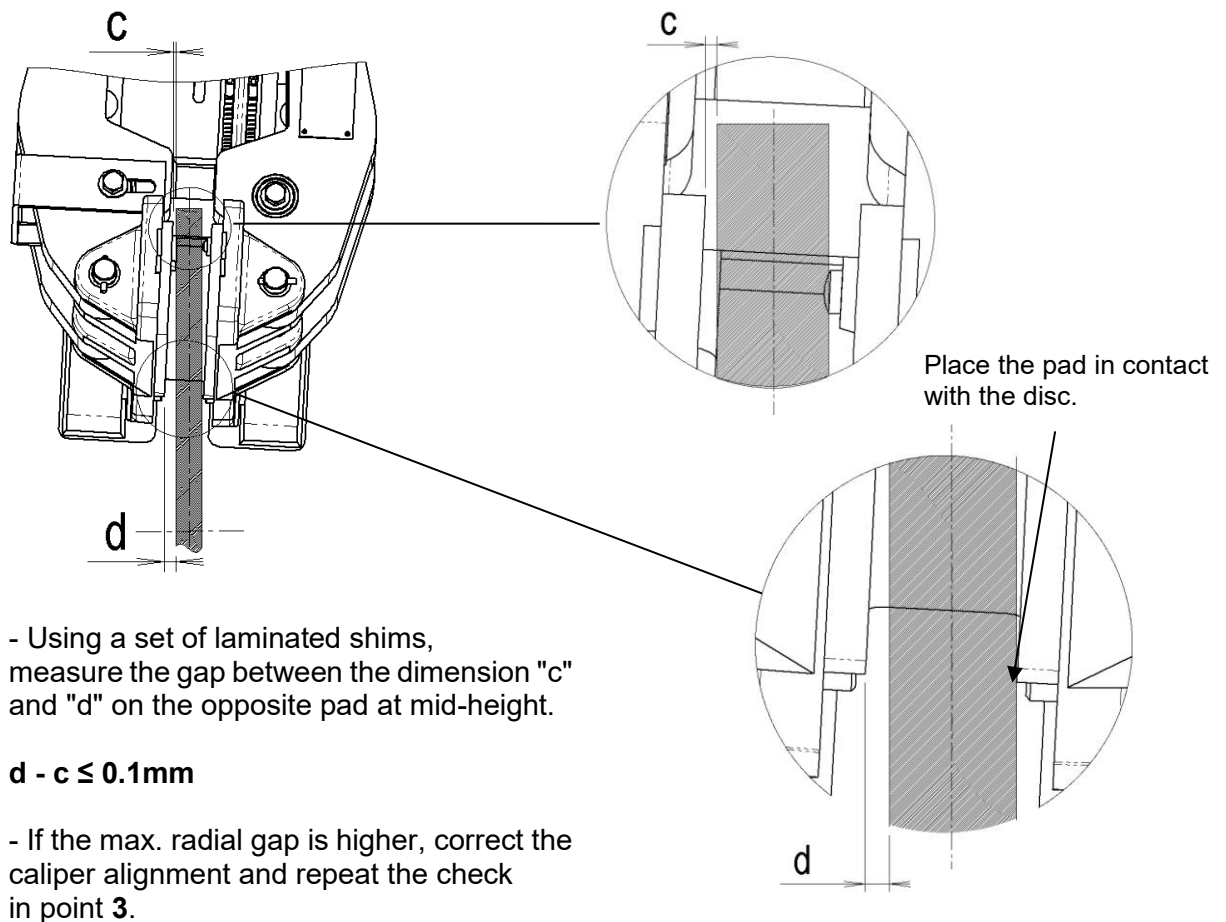


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6. Place the base plate attachment screws (class 8-8 according to Afnor and DIN 51524, 4 x M30 holes) and tighten (tightening torque 1200 Nm).
7. Check that the assembly has not moved after final tightening.

2.2.5 Electrical Connection

The connection is made inside the terminal box item **9** using two terminals made up of M6 lock nuts. Unscrew the 4 HSHC screws to open the terminal box. The capacity of the stuffing box is Ø 10.5 at 15 mm.

The connection cables should be connected to the terminals and tightened (3.5 Nm). The caliper must be supplied by an ESE or ESP type automatic power supplier. The caliper terminals should be connected to the + and - terminals of the power supplier, without respecting polarities.



Attention!

Refer to the power pack manual:

Make sure that the fuse rating is correct depending on the caliper.
Note the minimum size and the max. resistance of connecting cables.

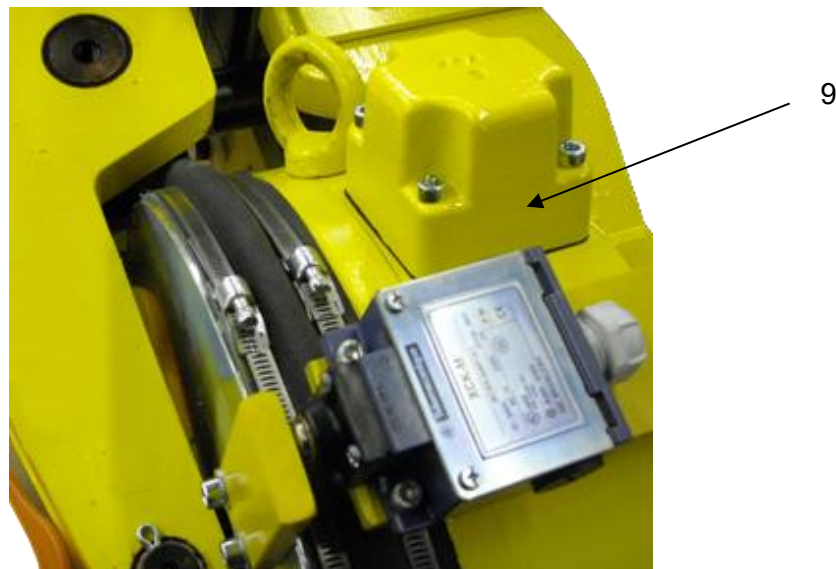


Figure 2.8

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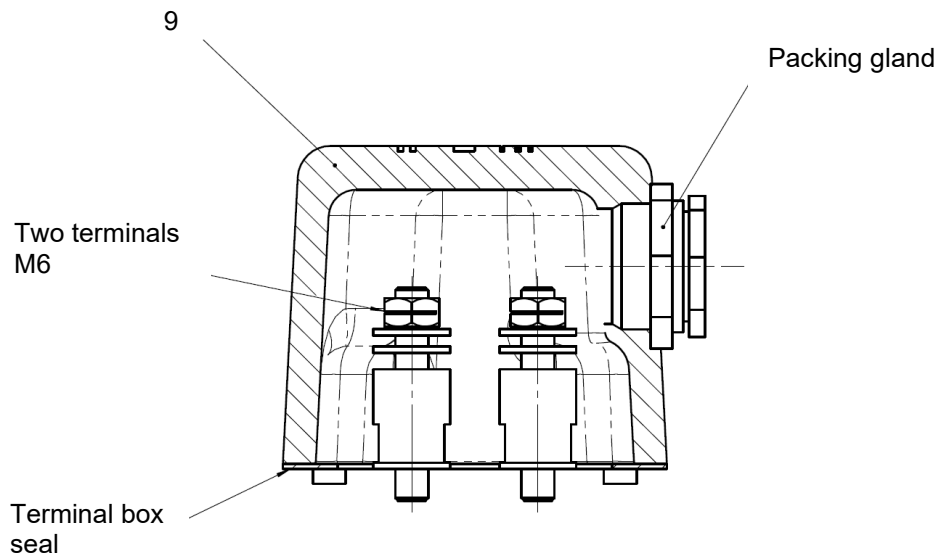


Figure 2.9

2.2.6 Manual adjustment of pad gap

Follow the instructions in this paragraph to increase the distance between pads.



Attention!

This maneuver causes the factory-set lining clearance to be readjusted. It is essential to reestablish the pad gap in accordance with chapter 2.2.6 after the alignment procedure in chapter 2.2.4.

After loosening the locking screw item **12**, remove the locking nut item **11** so as to release the adjustment screw item **2**. (hexagon 27 mm A/F).

Rotate the screw item **2** until the space between the pads item **3** exceeds the thickness of the disc.

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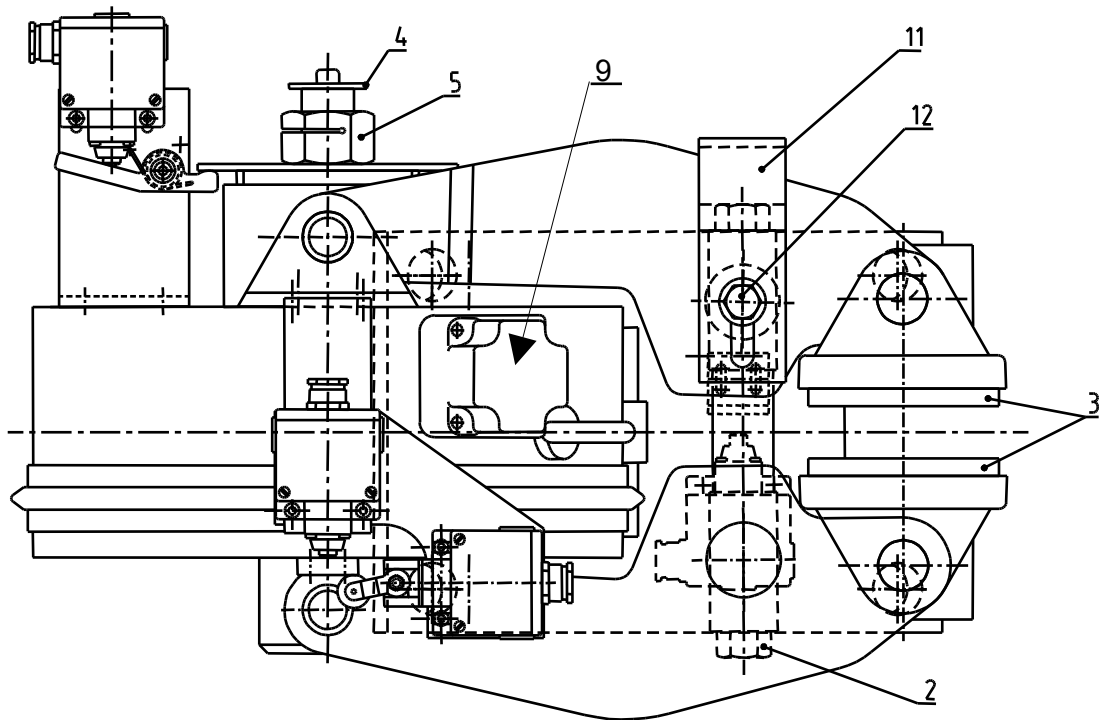


Figure 2.10

2.2.7 Setting of the caliper pads

1. Cancel the air gap in the coil, either electrically with the brake supply, or manually by tightening the manual release nut item **5**. (hexagon 46mm A/F).
If you cancel the air gap electrically, tighten the manual release nut item **5** against the coil yoke to ensure your safety for the remaining operations, and then cut off the power supply.
If you cancel the air gap manually, remove the dust seal of the air gap and visually check that the armature is in contact with the coil yoke (the air gap is then cancelled).
2. Rotate the adjustment screw item **2** (hexagon 27 mm A/F) so as to bring the pads in contact with the disc (without forcing) and rotate it slightly in the reverse direction to engage the lock nut item **11** in the hexagon head of the adjustment screw item **2** and tighten the locking screw item **12**.
The total clearance between the pads and the disc is then up to 0,5 mm.
3. Loosen the manual release nut item **5** fully (this operation can be made easier by applying voltage to the coil) and bring it to rest on the washer item **4**.
4. Put the dust seal of the air gap back in place if it has been removed.
5. Carry out a few operations (powered) and check that the pad clearance has not changed.

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Attention!

For the caliper to function properly, the manual release nut item **5** must be loosened fully until it rests on the washer item **4** (**Do not force!**).

It is essential to replace the lock **11** to prevent the clamp from becoming out of adjustment during operation.



Information

For brake DA ST1 FEA with automatic wear adjustment, the air gap may be initially set to a larger value. The brake must then be actuated several times to allow the correct air gap between the pad and the disc to be established automatically.

3. Start Up

1. Deactivate the manual release by fully loosening the manual release nut item **5** until it rests on the washer item **4**. (Do not force).
2. Check that any electrical connections are correct.
3. Operate the caliper, under no-load conditions, with disc rotating, about twenty times to bed in the pads.



Attention!

The disc must be free of grease and any deposits or dirt.

For the caliper to function properly, the manual release nut item **5** must be loosened fully until it rests on the washer item **4** (do not force).

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4. Maintenance

4.1 Routine checks

After an emergency braking

Regularly check that the pad clearance is maximum 0,5 mm.
Adjust if necessary (see chapter 2.2.7).

Check the surface of the disc, which must be free of grease and deposits and in particular the absence of dark marks on the brake track of the disc, which may be caused by overheating of the lining.
If there are any traces or doubts, first clean the disc tracks with a degreasing agent such as:

- KF quick-drying degreaser (CRC industries).

Every year

Remove the linings for a visual inspection: the surface of the friction material should be matt. If it has a "glazed" appearance, with missing material around the edges or at the saw cut, or burnt spots, it is essential to replace both linings with new ATV linings, whatever their degree of wear.

Regularly check that the pad clearance is still between 0,5 mm maxi.
Adjust if necessary (see chapter 2.2.7).

Check the surface of the disc, which must be free of grease and deposits and in particular the absence of black marks on the brake track of the disc, which may be caused by overheating of the lining.

If there are any traces or doubts, first clean the disc tracks with a degreasing agent such as:

- KF quick-drying degreaser (CRC industries).

When the remaining pad thickness reaches 2 mm on one pad, replace both pads. (see § 3.2).

To ensure the correct operation of calipers, it is necessary to check the following points each time the pads are changed or at least once a year:

After removing the used pads and before fitting the new pads:

1. The caliper must be movable on the base plate in axial direction to the disc. If necessary, clean and grease the greasing points marked in red (Figure 4.1):

- Shafts fixed on the base plate
- Rear links (the caliper assembly must move freely by pushing one of the levers).

2. Check the condition of the dust seal of the air gap.

3. Replace the exhaust filter, item **18**.

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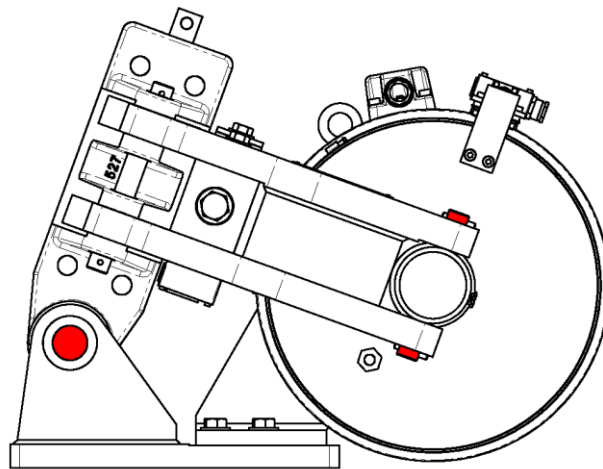


Figure 4.1



Attention!

Do not place grease on the braking surface of the disc.

Every five years of operation

In addition to the annual checks, it is essential to replace the brake pads, whatever their degree of wear, with new RINGSPANN- pads.

Every ten years of operation, or after 2 million cycles

Carry out a complete overhaul of the caliper in the RINGSPANN workshop for replacement of the following parts:

- Bushes and shafts.
- Spring washers.
- Dust seal of the air gap.
- Brake pads.

Subject to positive inspection of coil insulation.

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4.2 Replacement of the pads

1. Cancel the air gap of the coil, either electrically with the brake supply, or manually by tightening the manual release nut item **5**. (hexagon 46mm A/F).
If you cancel the air gap electrically, tighten the manual release nut item **5** against the coil yoke to ensure your safety for the remaining operations, and then cut off the power supply.
If you cancel the gap manually, remove the dust seal of the air gap and visually check that the armature is in contact with the coil yoke (the air gap is then cancelled).
2. After loosening the locking screw item **12**, remove the locking nut item **11** so as to release the adjustment screw item **2**. Rotate the screw item **2** until the pads item **3** are removed as far as possible from the disc (do not force).
3. Using their upper tab, separate the pads from the pad holder, to disengage them from their housing and extract them parallel to the disc.
4. Fit the new pads making sure that they are correctly engaged in their housing.
5. Rotate the adjustment screw item **2** (hexagon 27 mm A/F) so as to bring the pads in contact with the disc (without forcing) and rotate it slightly in the reverse direction to engage the lock nut item **11** in the hexagon head of the adjustment screw item **2** and tighten the locking screw item **12**.
The total clearance between the pads and the disc must not be more than 0,5 mm.
6. Loosen the manual release nut item **5** fully (this operation can be made easier by applying voltage to the coil) and bring it to rest on the washer item **4**.
7. Put the dust seal of the air gap back in place if it has been removed.

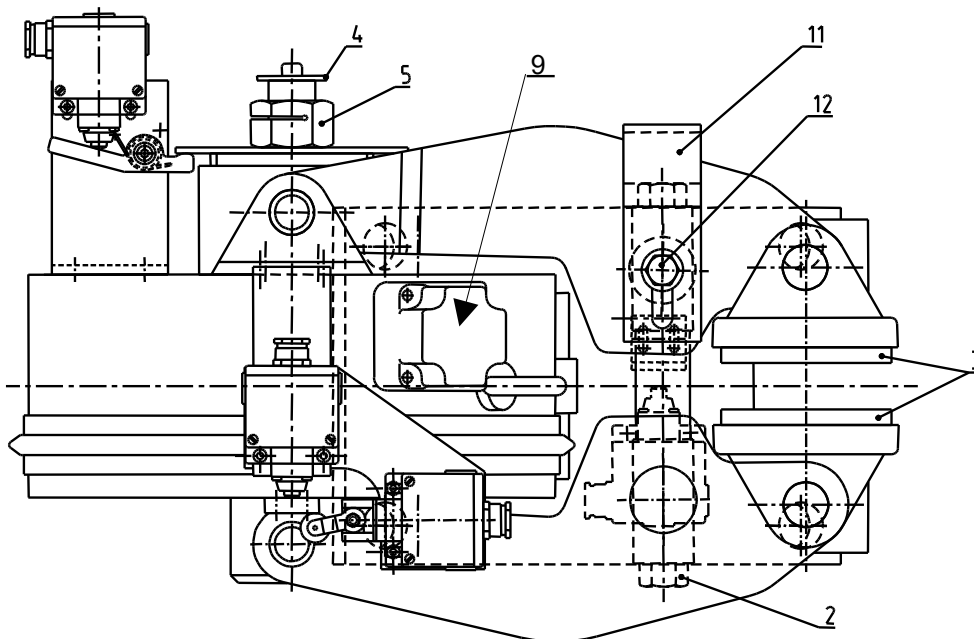


Figure 4.2

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Attention!

For the caliper to function properly, the manual release nut item **5** must be loosened fully until it rests on the washer item **4** (**Do not force!**).

It is essential to replace the lock **11** to prevent the clamp from becoming out of adjustment during operation.



Information

For brake DA ST1 FEA with automatic wear adjustment, the air gap may be initially set to a larger value. The brake must then be actuated several times to allow the correct air gap between the pad and the disc to be established automatically.

4.3 Torque setting



Information

The torque is factory-set and checked using a test bench.

4.4 Adjustment of the monitoring switches

The switches are factory-set and do not need any adjustment.

The switch item **CO** indicates the “open” position of the caliper. It is triggered by the stop plate connected to the displacement of the armature.

The switch head is pushed when the clamp is open.

The switch **CR** is set, depending on the pad wear compensation the brake has:

FEA: Signal, if the brake pads need to be replaced

FEM: Signal, if the air gap between brake pads and brake disc needs to be adjusted.

It is triggered by the stop plate connected to the displacement of the armature.

FEM: The adjustment contact is activated when the pad gap reaches > 1.5mm.

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Important

The attachment screws of the switches, stop plates and switch brackets must all be locked with adhesive (LOCTITE Normal thread lock 243).

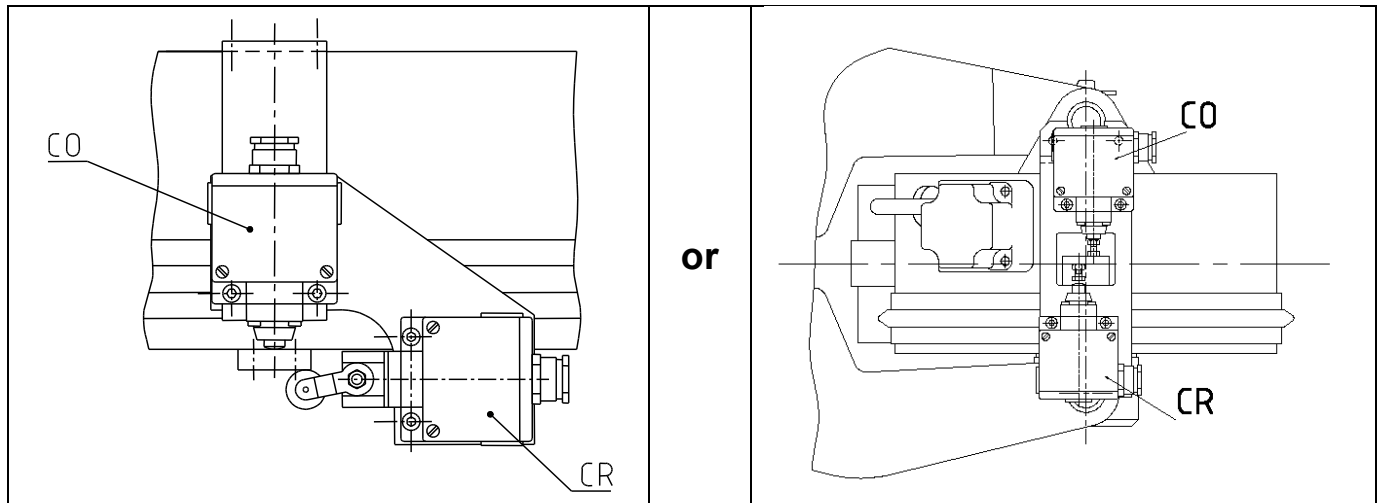


Figure 4.3

The switch item CR can indicate the “closed” position of the caliper (with a different setting). It is triggered by the stop plate connected to the displacement of the armature.

4.5 Manual release monitoring switch (CDM)

This switch is factory-set and does not need any adjustment. The switch item CDM indicates whether the caliper is manually released (the manual release nut item **5** being fully tightened).

It is triggered by the washer item **V3** fitted on the nut **5**.

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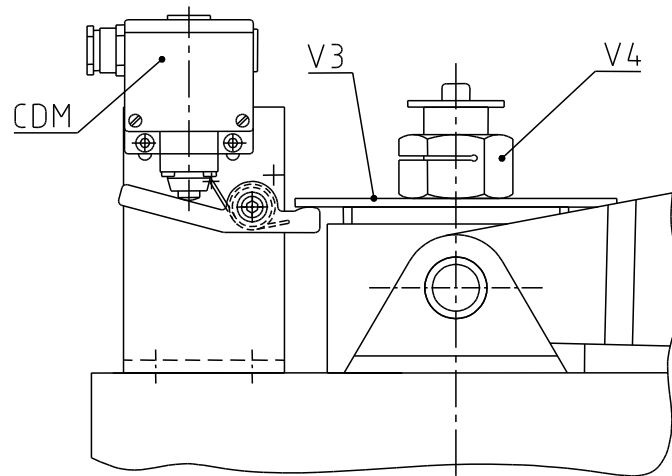


Figure 4.4

5. Spare parts

Rep.	Description	Item code	Qty
3	Set of brake pads (made of 2 brake pads rep. 3)	JG003T00 132	1
CO/CR	Brake release or Adjustment monitoring switches	CON XCK M110	1
Or			
CR	Side -mounted adjustment monitoring switch	CON XCK M115	1
CDM	Manual release monitoring switch	CON XCK M110	1
18	Sintered filter	FOUPAST100	1

When placing an order, please specify:

- Type and number of the caliper, and item number of the part required.

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6. Operating Faults

TYPE OF FAULT	CHECK	SOLUTION
The caliper does not release. ^①	<p>Voltage present at the coil terminals</p> <p>Standard voltage at the caliper terminals:</p> <p>- Set voltage for 1 sec. : 40 to 50 Volts DC</p> <p>Pad clearance</p>	<p>Check the voltage at the power supply input, position of the fuse and voltage drop max. 10%</p> <p>Replace the power supplier.</p> <p>Adjust the pads (max. clearance 0.5 mm)</p>
The caliper does not remain released. ^②	<p>Hold voltage present at the caliper terminals: 9 to 10 Volts DC</p> <p>Air gap is clogged, the armature does not adhere to the coil</p> <p>Check the links</p>	<p>Replace the power supplier.</p> <p>Clean the air gap and check that its dust seal is clean.</p> <p>Clean and unjam the shafts, see paragraph on maintenance.</p>
The caliper no longer releases after a period of correct operation. ^③	<p>In addition to the checks ^① ensure that the braking frequency is not too high and that there is no tapping</p>	<p>Reduce the frequency and time-delay the restart of supply until after the brake has been applied (min time: 0.2 second)</p>
Unusual heating of the disc when running starts. ^④	<p>Insufficient space between the pads and the disc in caliper released position.</p> <p>Perpendicularity of the disc in relation to the base plate 0.06 mm</p>	<p>Readjust the pads.</p> <p>Repeat the wedging.</p>

RINGSPANN	Installation and operating instructions Brake DA ST1 FEM(A), DA ST2 FEM Spring activated – Electrically released	E 09.816e	
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7. Reference drawing

