Disc brakes - Caliper 45K — Installation and maintenance

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Non contractual photographs.
Instructions of this manual must be adhered to, to obtain the performance and the safety of operation of the equipment.

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NOTES AND SYMBOLS

According to EC regulations, we use, facing some paragraphs, symbols defining hazards and informing the user about the consequences of not following the instructions of this installation and maintenance leaflet.

DANGER!

This symbol concerns people's safety. It points out situations which could lead to death or serious injuries.

ATTENTION!

This symbol concerns the use of the equipment. It points out situations which could lead to damage or destroy the equipment.

NOTE!

This symbol concerns information which can ease the installation and the use of the equipment.

Part identification

The part reference numbers are between brackets.
Example : Screw (29) (fig. 11), refers to component numbered 29 on the figure 11.

Disc brakes - Caliper 45K

Installation and maintenance

1 - CHARACTERISTICS

1-1 General characteristics

- Braking by spring force
- Electromagnetic release
- Automatic lining wear compensation
- To be associated with discs 30 or 15 mm thick.
- Opening proving switch (13)

1-2 Dimensions

See fig. 2.

Fig. 1

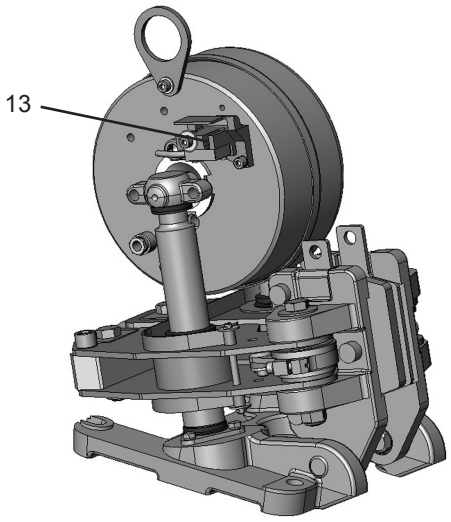
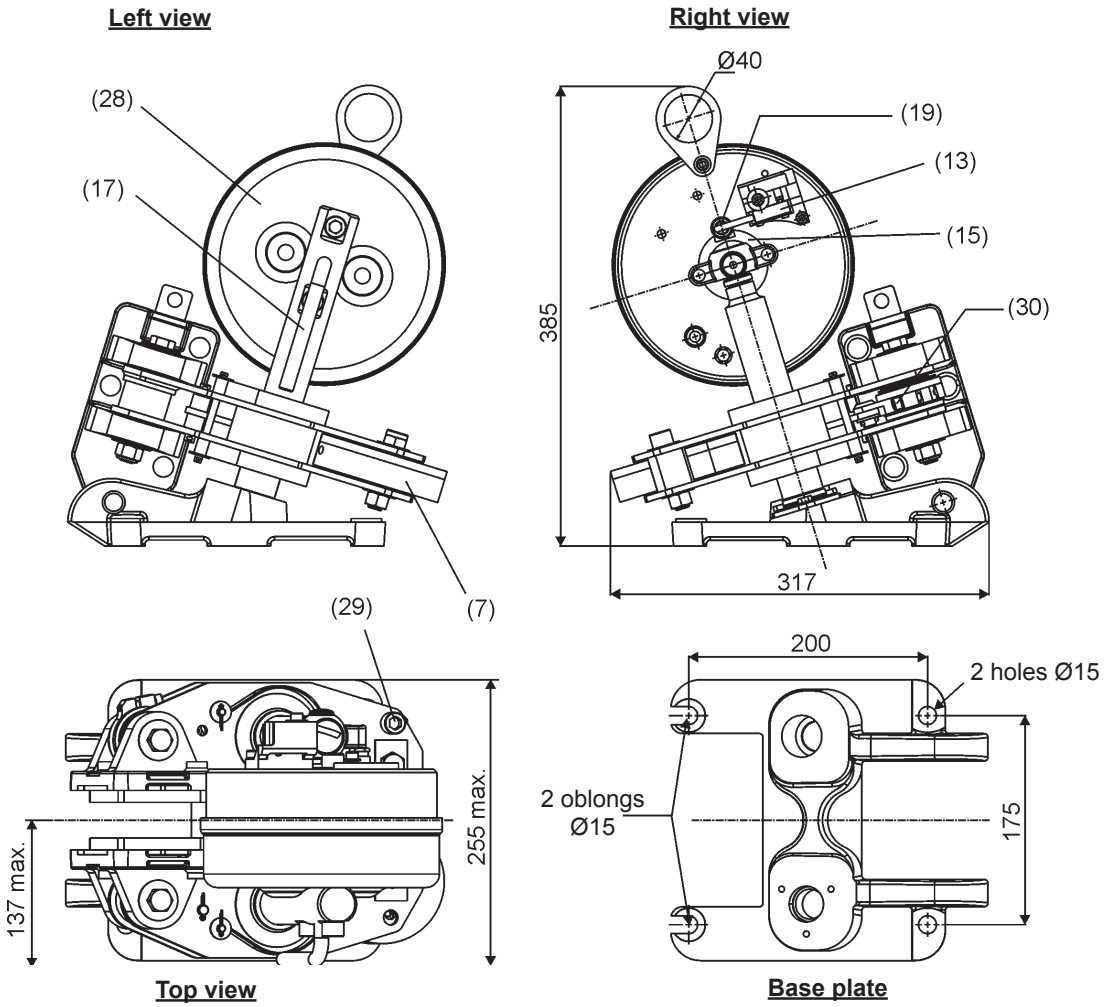


Fig. 2



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2 - DISC AND SUPPORT

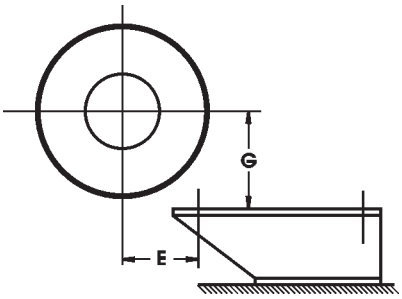
2-1 Disc

After mounting the disc, verify that the run-out does not exceed ± 0.1 mm.
Clean the disc carefully.

2-2 Support

The caliper must be mounted and secured by bolts (see ch.3-3 and fig.8) on a rigid baseplate which doesn't need to be machined (must be flat within ±1 mm).
Check dimensions E and G (fig.3) to ensure a good caliper position relatively to the axis of the disc (see the relevant "Technical data" leaflet).

Fig. 3

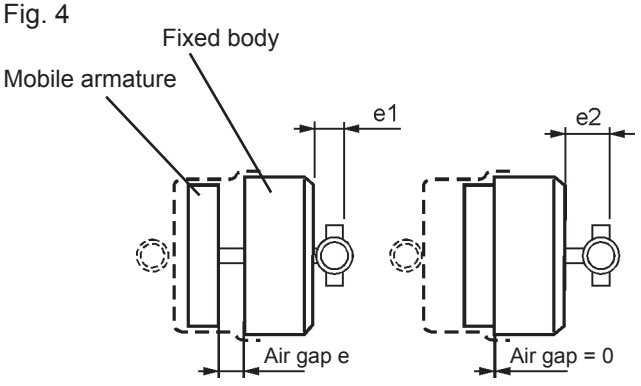


3 - INSTALLATION OF A CALIPER

3-1 Definition of the air gap (fig. 4)

The air gap, or stroke of the mobile armature, is the distance between the fixed body and the mobile armature of the electromagnet. This distance equals to zero when the caliper is released electrically or manually by the manual release wrench.

Fig. 4



Air gap value :
e = e2 - e1

3-2 State of delivery

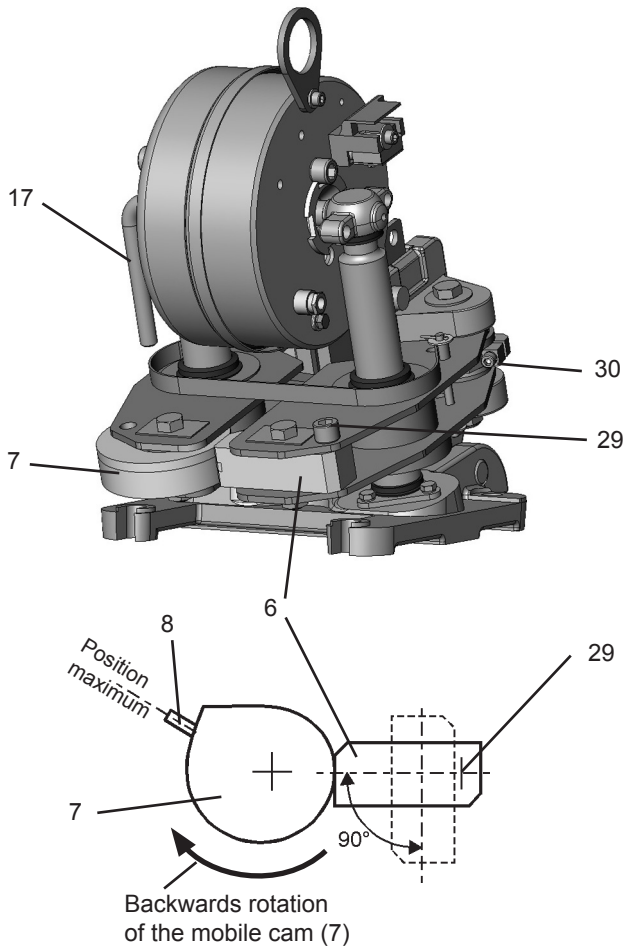
- Manually released (air gap zero)
- Lining pads not mounted

3-3 Mounting of the caliper (fig. 5, 6, 7 and 8)

Tools : 2 flat spanners of 19 mm (bolts M14)
1 Allen key of 10 mm (29) - 1 Allen key of 5 mm (30)

- Check that the manual release wrench (17) is screwed home so as to bring a zero air gap,
- Remove the stop screw (29) which prevents the fixed cam (6) from rotating,
- Rotate the fixed cam (6) for 90° backwards while holding the mobile cam (7) in its position (fig.5),
- Unscrew the screw (30) from free wheel casing
- Move the shoes away from the disc by pressing at the back of the two arms,
- Bring the caliper up to the disc,

Fig. 5



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- Centre and align the caliper (fig.6) relatively to the disc by checking :
  - that the shoe faces are parallel to the disc (shim the caliper or the supporting structure as necessary to perform parallelism),
  - that the axis of symmetry of the caliper arms is precisely in the plane of symmetry of the disc the shoe support pins at their bottom (they should be equally spaced on each side of the disc),
- Fit the lining pads,
- Check that the pad surface rest well on the disc (fig. 7) (more than 90 % of the linings surface must rest on the disc),
- Fix the caliper down on the support by means of 4 bolts M14 and 4 thin locknuts or 4 lockwashers.
  To the back, the screws M14 are mounted from the underside of the support, the nuts M14 and the thin locknuts M14 (or the lockwashers) are fitted on the caliper baseplate, pay special attention to take screws such as dimension A is < 41 mm (see fig.8).
- Rotate the fixed cam (6) for 90° forwards until it is possible to mount its stop screw (29) and tighten it,
- Once in position, rotate the mobile cam (7) backwards until the screw (8) stops on the fixed pillar (see arrow on fig.5),
- Tighten the screw (30) (fig.5) located on the collar of the free wheel casing,
- Initialize the automatic wear compensation system :
  - Untighten and screw the manual release wrench (17) by 12 mm (approx. 7 turns) 2 times and finally **untighten it by 12 mm (approx. 7 turns)**, the caliper remains closed on the disc.
  - Check parallelism again between disc and linings,
  - Connect electrically the caliper (see ch.3-4).
  - Energize the caliper a few times to check its good functioning.

The caliper is then ready to operate.

Fig. 6

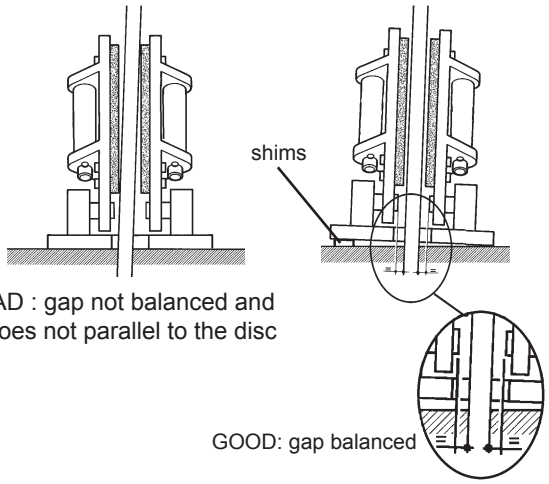


Fig. 7

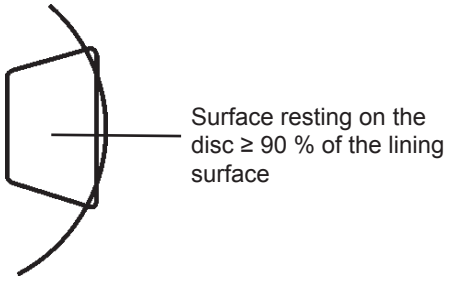
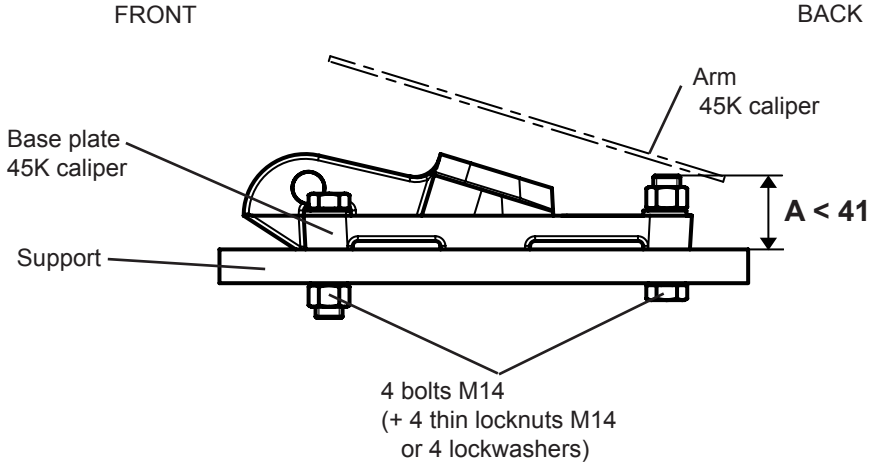


Fig. 8



Non contractual photographs.
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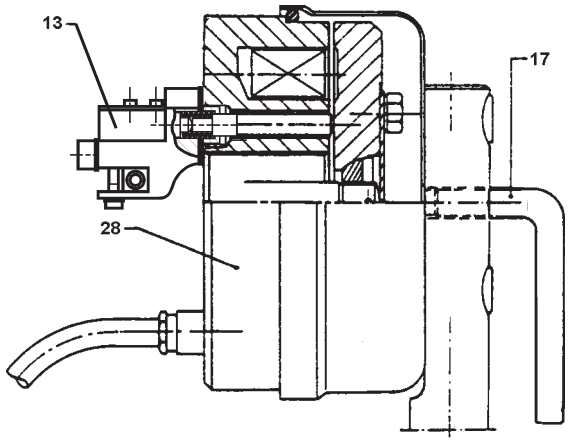
3-4 Electric connections

a) Electromagnet (28) (fig. 9 and 11)

Connect the cable (2 wires x 2 mm², Ø ext. 8.5 mm and length 2 m) to a direct current mains supply or a suitable power supply.
Check the electrical working state by energizing the electromagnet (28), the caliper must open.

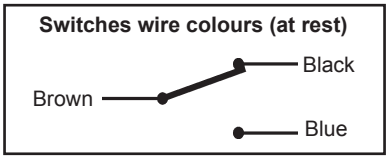
Fig. 9



b) Opening proving switch (fig. 9 and 11)

The caliper is equipped with an opening proving switch (13) mounted on a support (the switch is released when the caliper is closed on the disc, under no voltage).
- The switch is supplied with a 3 x 0,75 mm² cable of 2m length (fig. 10 for wire colours)
- The opening switch is preset in our factory and is without further setting.

Fig. 10

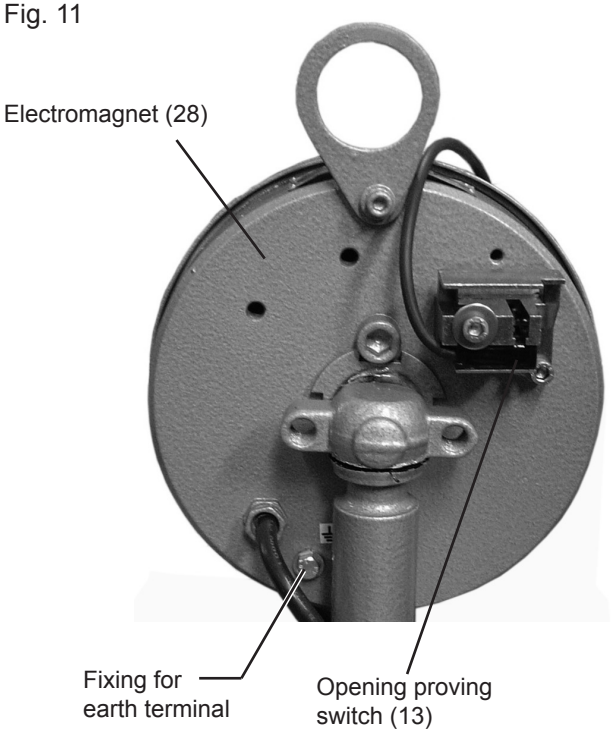


c) Earth terminal

DANGER !

The body of the electromagnet is equipped with a fixing for earth terminal (fig.11), connect **imperatively** this earth terminal to the installation support.

Fig. 11



4 - START UP

Energize the caliper 3 or 4 times with few seconds intervals to check its good functioning.

Non contractual photographs.
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5 - MAINTENANCE

5-1 Replacing a set of pads (fig. 12 and 13)

DANGER!

mperatively check that the new lining quality is the same as the worn one. The quality is stamped on the pad back.
If doubt, consult us.

Fig. 12

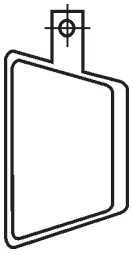
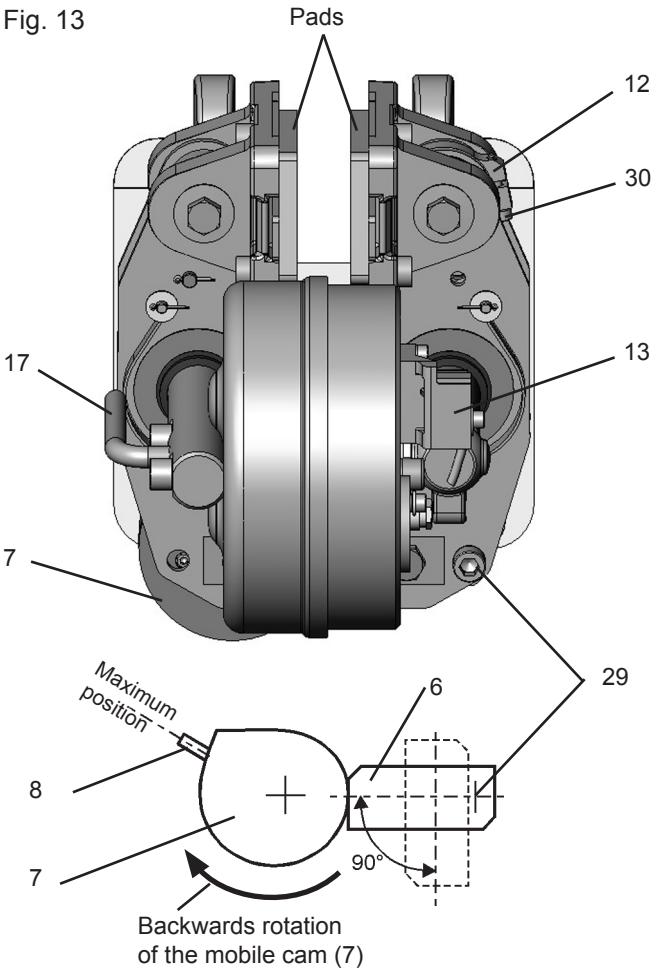
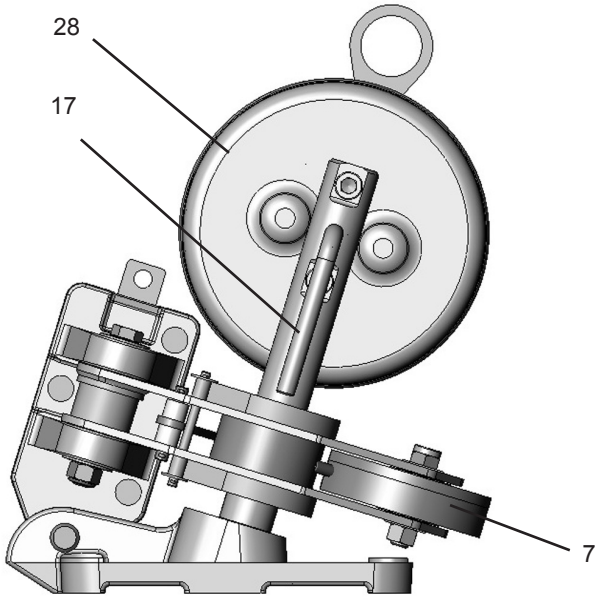


Fig. 13



Tools : Allen keys of 10 mm (29) and 5 mm (30)
- Open the caliper manually by screwing home the manual release wrench (17) (fig. 13).
- Disconnect the free wheel (12) by unscrewing (30),
- Remove the stop screw (29) which prevents the fixed cam (6) from rotating,
- Rotate the fixed cam (6) for 90° backwards while holding the mobile cam (7) in its position ,
- Move the shoes away from the disc by pressing at the back of the two arms,
- Replace the lining pads (fig.12 and 13),
- Rotate the fixed cam (6) for 90° forwards until it is possible to mount its stop screw (29) and tighten it,
- Once in position, rotate the mobile cam (7) backwards (see arrow on fig.13) until the screw (8) stops on the fixed pillar,
- Tighten the screw (30) located on the collar of the free wheel casing,
- Initialize the lining wear compensation systeme **:**
  - Untighten and screw the manual release wrench (17) by 12 mm (approx. 7 turns) 2 times and **untighten it by 12 mm (approx. 7 turns**), the caliper remains closed on the disc.
  - Energize the caliper few times to check its good functioning. The caliper is ready to operate.



Reference

6	Fixed cam
7	Mobile cam
8	Screw of the mobile cam
12	Free wheel
13	Opening proving switch
17	Manual release wrench
28	Electromagnet
29	Stop screw of the fixed cam
30	Free wheel screw

Non contractual photographs.
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5-2 Adjusting the braking torque (fig. 13, 14, 15 and 16)

This operation is performed with the caliper switched off and closed on the disc or a dummy disc.

DANGER!

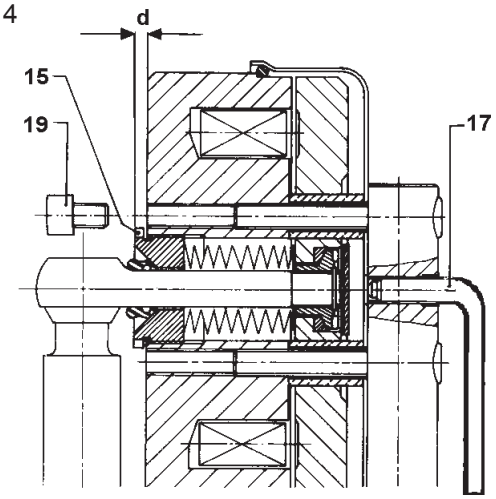
This operation must be carried out by only by staff qualified, authorized and trained by Stromag France.

When torque lowers down, the closing response time increases as well as the stopping distance. Check this is compatible with the installation.

Tools : Allen keys of 10 mm (29) and 5 mm (30)

- Open the caliper manually by screwing home the manual release wrench (17),
- Disconnect the free wheel (12) by unscrewing (30) (fig.13),
- Remove the stop screw (29) which prevents the fixed cam (6) from rotating,
- Rotate the fix cam (6) for 90° backwards while holding the mobile cam (7) in its position,,
- Move the shoes away from the disc by pressing at the back of the two arms,
- Remove the pads,
- Untighten the manual release wrench (17) by 12 mm (approx. 7 turns) to get a wide air gap and a complete spring compression release,
- Remove the stop screw (19) of the torque adjustment nut (15) (fig. 14 and 15),
- Find, on the diagrams (fig. 16), the position (d) of the adjustment nut (15) which depends on the required braking torque,
- To adjust (d), use the 4 notches of the torque adjustment nut (15) (pitch: 1.5 mm) by:
  - SCREWING to increase the braking torque
  - UNSCREWING to decrease the braking torque
- Rotate the torque adjustment nut (15) to put its nearest notche in front of the hole of screw (19). Fit and tighten the screw (19),
- Screw the manual release wrench (17) to get a zero air gap,

Fig. 14



- Fit the pads,
- Rotate the fixed cam (6) for 90° forwards until it is possible to mount its stop screw (29) and tighten it,
- Once in position, rotate the mobile cam (7) backwards (fig.13) until the screw (8) stops on the fixed pillar,
- Tighten the screw (30) (fig.13) located on the collar of the free wheel casing,
- Initialize the lining wear compensation system :

- Untighten and screw the manual release wrench (17) by 12 mm (approx. 7 turns) 2 times and **untighten it by 12 mm (approx. 7 turns**), the caliper remains closed on the disc,
- Energize the caliper a few times to check its good functioning.

Fig. 15

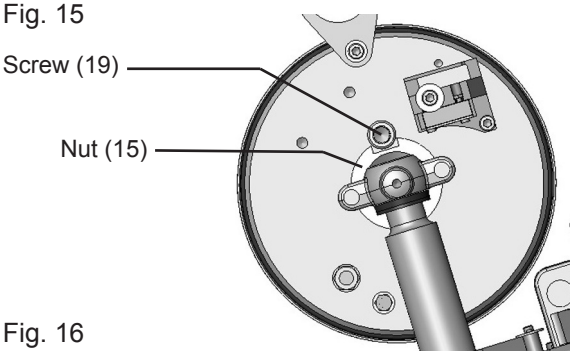
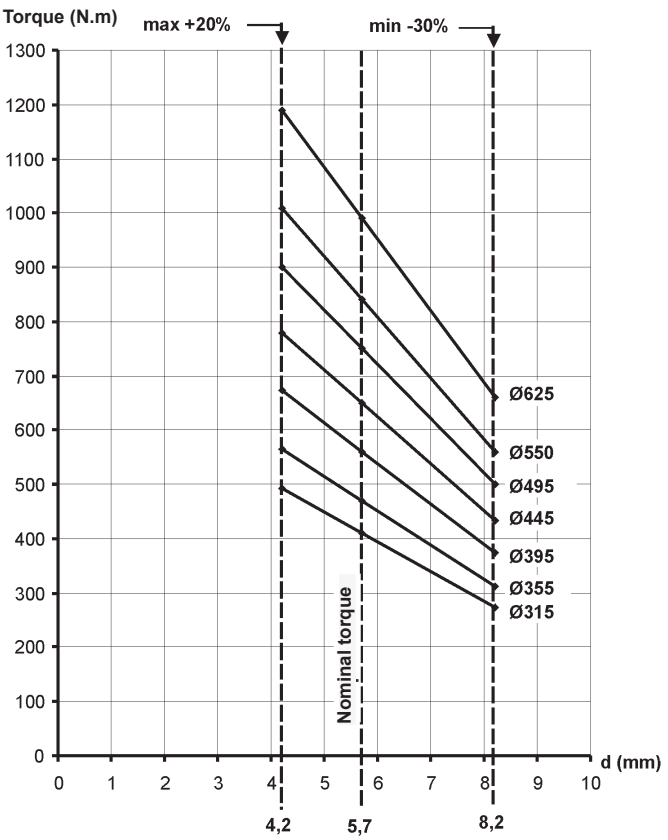


Fig. 16



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5-3 In-service preventing control

- Visually check the thickness of the linings if they are not fitted with a wear detector.
- Check the disc surface
- Do not soil the linings or the disc with oil or grease projections

5-4 Rebuilding of the caliper

- Rebuild the caliper every 5 years or each 2 x 10^6 actuations to maintain its characteristics.

6 - SPARE PARTS

See relevant leaflet.

ATTENTION!

Only the use of our original spare parts can guarantee reliability of the calipers.

Non contractual photographs.
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7 - TROUBLESHOOTING

TROUBLES - POSSIBLE CAUSES	CHECKING AND OPERATING	CURE
7-1 The caliper does not close	Check that the manual relase wrench (17) or the release screws (hydraulic release option) do(es) not keep the caliper from closing. Check the setting of the automatic wear compensation system (ch.7-8b) or manual wear compensation (ch.8-4).	Unscrew the manual release wrench (17) or the release screws.
7-2 The caliper does not open		
a) No line voltage on power unit input	Check caliper control contactor	---
b) Wrong voltage on caliper terminals	- Right voltage on power unit output - Wrong voltage on power unit output - Wrong coil resistance (refer to chapter 7-7)	Check wires and switches Change electrical power unit Change caliper
c) Air gap too large, caliper reaching call-in limit:	Measure caliper air gap (refer to chapters 7-8a and 7-7)	
- Wear compensation system faulty	Check the wear compensation system (refer to chapter 7-8b)	Change faulty part
7-3 The caliper opens but closes just after		
a) No economy voltage	Measure on caliper terminals with a DC volmeter.	Check wires and switches Change electrical power unit
b) Opening proving switch:		
- Faulty	Check if opening proving switch switches	Change opening proving switch
7-4 The caliper closes inopportunely		
a) Mains microcuts	Check mains with a voltage recorder	---
b) Electrical power unit aleatory failure	---	Change electrical power unit

Non contractual photographs.
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Disc brakes - Caliper 45K — Installation and maintenance

TROUBLES - POSSIBLE CAUSES	CHECKING AND OPERATING	CURE
7-5 Disc heats in spite of the caliper opened		
a) Air gap too narrow	Check the air gap (refer to chapters 7-8a and 7-7)	Simulate a pad change
b) Disc out of true too important	Check that the disc out of true does not exceed 0.08% of the maximum radius	Change the disc
c) Bad alignment of the caliper	Check caliper alignment	Execute a new alignment
7-6 Insufficient braking		
a) Grease or oil on disc	---	Degrease the disc and change the lining pads
b) Load too important	Check load	---
c) Manual release wrench (17) out of order	Check that the manual release wrench (17) is loosen by 12 mm (approx. 7 turns)	---
d) Power supply cut out circuit board fault which increases closing response time	Measure closing response time which must be < 0,3 sec.	Change electrical power unit
e) Torque adjusting nut (15) out of order (maybe after a technical operation)	Check the torque adjusting nut projecting distance	Set the torque adjusting nut (15) See chapter 5-2

7-7 Table of caliper 45K characteristics

CALIPER	COIL RESISTANCE AT 20°C (Ohm)	NATURAL AIR GAP (new caliper) (mm)	MAX. AIR GAP ADMISSIBLE (limitation by the power supply) (mm)
45K at 50V	4,29 to 4,75	3,5 to 3,7	5
45K at 220V	64,79 to 71,60		

7-8 Fast checking of air gap and wear compensation

a) Air gap checking

- Be sure the load is on the ground
- Screw in the manual release wrench (17) by hand until the resistance increases suddenly which corresponds to the beginning of compression of the stack of spring washers
- Continue to turn the wrench slowly until reaching air gap zero while counting the number of turns : 1,75 mm per turn.
- So, we have a value for the air gap.

b) Wear compensation system checking

- Checking must be performed with air gap zero
- Turn back the mobile cam (7) to create a gap between the 2 cams. If it is not possible to create it, it means if the arms come closer backwards, there is a failure in the free wheel device (12). Change it.
- Turn back the mobile cam (7) and let it move back by itself. So, we verify that the cam rotates freely, its inner spring works and is correctly stretched.

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8 - OPTIONAL MANUAL WEAR COMPENSATION RM

8-1 Description

Where a brake is specified for unfrequent (less than 20 stops per hour) service use or for use as a parking brake, automatic lining wear compensation is not necessary. The calipers can be fitted in option with a manual wear compensation in place of the automatic one.
The adjustments made at routine maintenance intervals are adequate to compensate for the low wear rate of the pads.

8-2 Principle

The 45K caliper is a fail safe, spring applied electromagnetic release mechanism.
The clearance between disc and linings gives the air gap of the caliper electromagnet. This air gap determines the pull-in current and the initial spring force i.e. the braking torque.

DANGER !

Lining wear increases the air gap. If not compensated, the braking torque will decrease.
Routine adjustment is required to avoid this inconvenience.

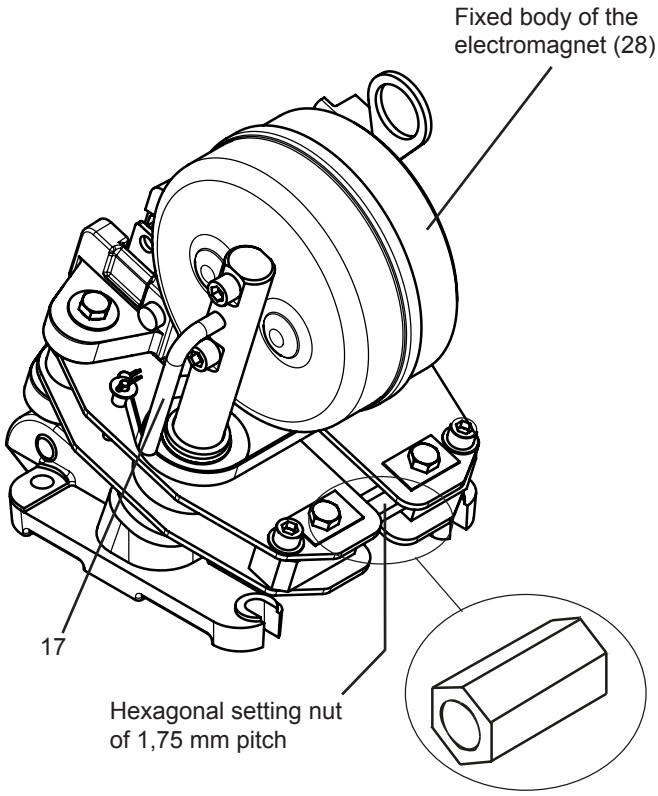
8-3 Mounting

The installation is described in the chapter 3 of this leaflet. Particular attention must be paid to the alignment and perpendicularity of the caliper with respect to the disc.
Then, install the lining pads.

8-4 Settings of a 45K-RM caliper (fig. 17)

During these operations, it will be necessary to open the caliper by compressing the braking spring to zero air gap:
- either electrically by powering on the caliper,
- either mechanically by screwing in the manual release key (17) (fig. 17).

Fig. 17



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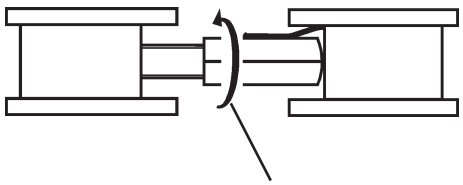
a) Setting of the nominal air gap

- Open the caliper manually (zero air gap).
- Bring the linings (new) into contact with the disc, without tightening, by unscrewing the setting nut at the rear (fig. 18).
- Screw this nut for 1 turn to obtain the nominal clearance at the pads (1 turn = 1,8 mm clearance for both pads)
- Unscrew the key (17) by 7 turns
- Power on the caliper a few times
- Measure the air gap (chapter 8-4 b))
- Eventually, execute the above operations again to obtain the nominal air gap (3,5 to 3,7 mm).

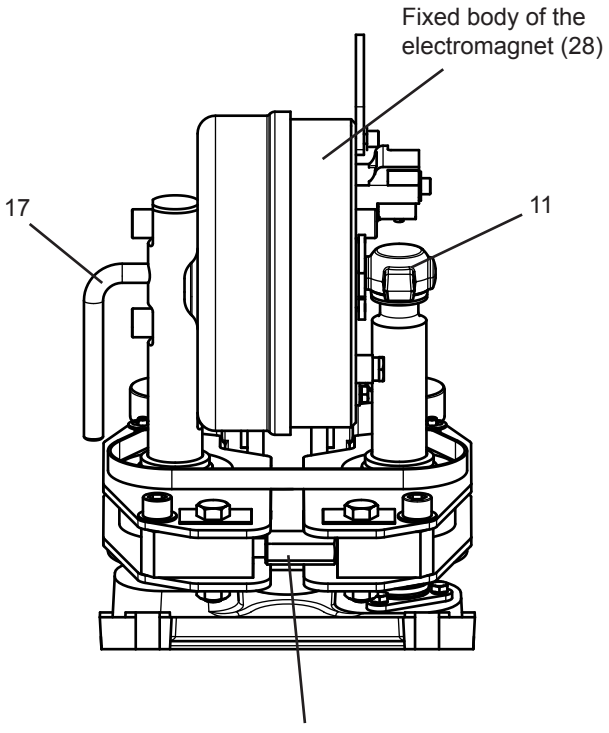
Fig. 18



b) Air gap measure

The value is taken between the moving pillar (11) and the face of the fixed body od the electromagnet (28) (fig. 19) by means of a depth gauge (see ch.3-1)
- Take a first measure with the caliper closed onto the disc
- Take a second measure with the caliper opened (zero air gap)
- The difference between the 2 measures will give the air gap of the electromagnet.

Fig. 19



8-5 Periodical maintenance

a) Checking the air gap

Check regularly the air gap as indicated in chapter 8-4 b).
If the air gap reaches the maximum value of 4,5 mm, proceed to its setting as per chapter 8-4 a).

b) Check the pad wear

Check regularly the linings thickness.
When the thickness reaches 2 mm, proceed to the replacing of the pads:
- Free the lining pads by screwing the key (17)
- Screw the setting nut at the rear in order to open wide enough the arms at the front to allow the pad removal from their support
- Install the new lining pads
- Set the caliper as per chapter 8-4.