FBT-FPT
ELECTROHYDRAULIC BRAKES
Instructions for assembly, adjustment and maintenance

Technical data sheet number:	**BC.TDS.00024I**
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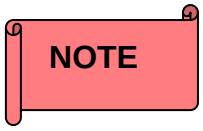
1. INTRODUCTION.

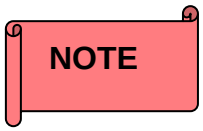
1.1. WHO IS THE TARGET AUDIENCE?

This manual has been written to aid with the installation, start-up, operation and maintenance of the brake. It is designed to help workers who are going to handle the brake and service technicians. It should therefore be **made available to everyone who is going to work with these brakes** and it must be ensured that the instructions given are followed.

This manual is intended to clarify any constructive doubts and the basic functions of the brake. We are sure that it will be an extremely useful information and reference tool for operators and technicians.



In the event of any problems or if you have any questions regarding the brake, please do not hesitate to contact the ANTEC After-Sales Service, specifying the brake model and the ANTEC order number data that can be found on the label that each unit has.



Due to ongoing improvements to our brake designs, your brake may differ slightly from the one described in this manual. ANTEC reserves the right to make any changes deemed necessary.

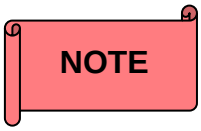
1.2. SAFETY INSTRUCTIONS.

Various symbols appear throughout this manual which highlight the importance of the section in question. They are usually related to safety, and therefore require special attention.

Warning: This symbol will be included at points or in paragraphs that need special attention. It usually refers to an operation in which special care must be taken.

Danger of death: This symbol will be included at points or in paragraphs that need special attention. It usually refers to an operation that might involve a death hazard.

High temperatures: This symbol will be included at points or in paragraphs that need special attention. It usually refers to an operation that might involve danger of high temperatures.



This symbol will be used to highlight an important comment or piece of information.

A number of general safety rules must be followed when handling ANTEC brakes:

1. All workers and technicians must wear appropriate gear when handling the brake (safety clothes, boots, helmet, goggles, etc.).

2. Always keep warning signs (if any) in good condition and adhere to them. During repairs or maintenance, place a card to inform other workers that an ANTEC brake is being repaired in that machine, and that the power supply has been disconnected, if applicable.

3. Find out the exact specifications of the liquids used to ensure health and safety.

4.- Make sure electrical apparatus (if any) is properly earthed to prevent electric shocks.

5. Respect the limits established for each brake element and for the brake itself.

6. Before switching on any machine fitted with ANTEC brakes, ensure that the brake is properly fitted.

These are the general safety rules to be followed with any ANTEC product.

1.3. RISK ASSESSMENT.

1.3.1. IDENTIFICATION OF THE BRAKE'S POTENTIAL RISKS.

In this section we will list the risks derived from the brakes made by ANTEC S.A. in the event of malfunction (disassembly and assembly) and during their use by the end customer.

Risks when assembling and disassembling brakes:

Description of the risk identified	Measurement of the risk	Indication	Preventive solution adopted
Fall to a different level	Step ladder: 2m slant		Inform the operator. Basic training. Preventive inspection of step ladders.
Fallen material	Maximum weight: 10-200 Kg.		Operator training. Use of safety footwear. Use of gloves for a better grip on parts.
Cuts and blows	Use of tools for portable or manual assemblies.		Operator training. Use of protective gloves for certain assembly operations.
Projection of solid or liquid particles	Oil leaks through the drum/casing joint, maximum interior pressure: 5 bar.		Operator training. Setting of maximum filling levels Use of protective goggles.
Trapping	Manipulation of parts during assembly. Turbel in operation, movement of the shank.		Operator training. Use of protective gloves.
Burns	Preheating stove, Ext. temp. 60 ºC Turbel in operation, Ext. temp. 100 ºC		Operator training. Sticker indicating the risk of burns at the heat source. Use of protective gloves.

Electrocution	Use of test voltages. 185-910 V.		Operator training. Indicative sticker.
Hazardous substances	Use of chemical products (oils, solvents, contact glue, etc.)		Operator training. Use of protective gloves.
Physical fatigue, back disorders.	Inadequate postures adopted during assembly and test. Lifting of weights. Maximum weight: 15-20 Kg.		Operator training. Use of support belts.
Physical comfort agents	Poor lighting (330/390 lux). High level of noise (LAeq = 93 dB(A)).		Use of ear protection.

Risks of brakes use:

Description of the risk identified	**Measurement of the risk**	**Indication**	**Preventive solution adopted**
Burns	Turbel in operation, Ext. temp.: 100 ºC		Hazard warning in the operation and maintenance instructions. Hazard warning on the unit.
Trapping	Turbel in operation, vertical movement of the shank. Brake opening and closing. Brake operating, trapping by shoes-disc.		Indication in instructions. Placement of a protective cap on large models.
Electrocution	Voltages of AC operation (185-910 V.)		Indication in instructions. Waterproof terminal box, IP 65.

1.3.2. ANALYSIS AND ASSESSMENT OF THE RISKS IDENTIFIED.

Assessment of the risks identified, for this a value from 0-3 is assigned to each risk, where 0 is the lowest risk (none) and 3 the maximum (high).

Description of the risk	**Risk during assembly / test Risk of use**	**Assessment**
Fall to a different level	Assembly	1 – low
Fallen material	Assembly	1 – low
Cuts and blows	Assembly	1 – low
Projection of solid or liquid particles	Assembly - Test	2 – medium
Trapping	Assembly - Test - Use	1 – low
Burns	Assembly - Test - Use	3 – high
Electrocution	Test - Use	2 – medium
Hazardous substances	Assembly	1 - low
Physical fatigue	Assembly - Test	1 – low
Physical comfort agents	Assembly	2 - medium

1.3.3. MEASURES ADOPTED TO MINIMISE THE RISKS ANALYSED.

Once the risks derived from the assembly and use of the brakes have been identified, analysed and assessed, a series of measures are taken to eliminate the risks that are possible to eliminate or to minimise them as much as possible.

To do so two different paths are taken, varying the design or pointing out the risk if it cannot be eliminated.

- Design variations.

The Turbels do not allow for significant design modifications, they are machines with an aluminium shell that conveys heat in a fairly linear manner. Therefore, the most significant risk of those identified refers to the high operating temperatures, which is not easy to eliminate. The motor shells have therefore been fitted with a series of fins that allow for a greater cooling surface and the turbines have been fixed so that their movement does not have an incidence in increasing the temperature.

- Special markings.

Faced with the impossibility of operating the devices at temperatures lower than 35 ºC, the need is established to provide high temperature warnings in the operation and maintenance instructions, and on the devices themselves, accompanied by a legend (the client will mark it if they deem it appropriate).

CAREFUL: High temperatures. Do not touch.

Similarly, the electrocution risk will be indicated with a warning sign, this indication will be in the operation and maintenance instructions and not in the actual unit, as access to voltage areas (terminal box) is protected by an IP 65 cover.

The existing risk of trapping will be pointed out in the operation and maintenance instructions, indicating the risk area (the Turbel's shank and the brake shoes).

As for the risks derived from the products necessary for the manufacture and testing of the units, in addition to the personal protection equipment necessary to carry out the work, the following series of rules are established:

- To minimise the risk of falls to different levels, the ladders must be inspected before carrying out any work, rejecting those that are not in adequate conditions and providing training and specific information to the staff.

- To avoid the falling of materials during manipulation, adequate information will be provided to staff on the correct manipulation of loads. Tools with a comfortable grip must be used and they must be kept clean and in good condition. CE marked safety footwear will also be used to minimise injuries in the event of materials falling on lower extremities. Gloves with the CE marking will be used to increase adherence and reduce the risk of dropping tools.

- To avoid the risk of blows and cuts caused by objects, portable or manual tools, or projections of solid or liquid particles, or the risk of trapping, safety gloves will be used to increase adherence (their use during drilling operations or others with a possible risk of trapping/tangling is not prudent), and safety footwear, which will have a reinforced toecap, a rubber sole with a well-marked pattern and without fittings, to avoid slipping and electrical contacts. Safety goggles will also be used whenever there is work where solid or liquid particles could be projected. Training and information will be provided to the staff concerning the correct use of the tools. The machines must only be operated by experienced operators that have perfect knowledge of the work to be carried out, the characteristics of the equipment used, the risks entailed and the ways to prevent them.

- For the operation of pneumatic tools: always purge the air conduits and verify the state of the flexible tubes and the connection hoses. A moving machine will not be manipulated without having checked its total safety, including the protection of moving parts. Never use hands or feet to slow down the machine.

- To avoid the risk of electrocution, before using a device or electrical installation make sure it is in a perfect state. To use a device or electrical installation, only move the control devices planned for this purpose by the builder or designer. In the event of damage or accident, cut off the electrical supply as a first measure. Any anomaly observed in the electrical installations must be immediately communicated to the electrical service.

- The risk of contact with hazardous substances and chemical products will be avoided by using appropriate protection gloves for chemical risks during their manipulation. The safety data sheets of all chemical products will be requested from suppliers. The instructions contained in the Safety Data Sheets of the products will be followed regarding the hazards, precautions, fires, accidents, intoxication etc. Chemical products will be kept in their original container. In the event of transferring to a container with different labelling. Training and information will be provided to the staff.

- To reduce the risks of physical fatigue caused by inadequate postures and back disorders, raising arms above shoulder level will be avoided. Tasks that involve different groups of muscles will be alternated. Maintaining the same posture during extended periods of time will also be avoided. If possible the standing-seated posture will be allowed. Training and information will be provided for the correct handling of loads (straight back, bent knees, etc.).

Recommendations are included to protect the back when manually handling loads. Whenever possible, to move or transport loads the auxiliary means available will be used. Tasks that require handling very heavy loads will be carried out with the aid of another worker. There will be periodic rests when these activities are lengthy or staff rotation among those who carry out these tasks. Back protection belts will be used at the moment when this activity will be carried out and information concerning its use will be provided.

- The risks created by physical comfort agents such as lighting will be avoided in the event of requests by the workers, if they consider the lighting to be poor, by increasing the number of lamps of their location.

- To avoid the risks created by chemical agents, the indications of the installation manufacturer and the chemical product suppliers will be followed when handling them. With the aim of assessing the risk, it would be necessary to carry out measurements and see the need for localised suction. Protective breathing equipment will be used that offers protection against organic vapours. The protection equipment must have the corresponding EC marking. Training and information will be provided concerning the correct use and maintenance of the breathing protection equipment. Containers with lids will also be provided to workers to collect the waste impregnated with residues and thus reduce the emission of vapours. Recipients, containers,… must not be left open after use.

- Physical agents, as well as the noise level, shall be avoided at this work position as required by R.D. 1316/1989, depending on the levels that could affect the workers. WORK POSITION WITH LEVELS GREATER THAN 90 Db. It will be obligatory to provide each worker with adequate information and training regarding the assessment of their exposure to noise and the potential risks to their hearing, in addition to the preventive measures adopted, the use of hearing protection and information on the results of the medical examination of their hearing. Employees exposed to these levels must undergo periodic medical check-ups, at least once per year, and all workers must use hearing protection. The risk areas must be indicated and access to them limited, in addition to developing a program of technical measures destined to reducing such effects.

1.4. GENERAL ASPECTS.

The use of Antec brakes for unplanned operations or the negligent use thereof could seriously damage them or severely injure people standing nearby.

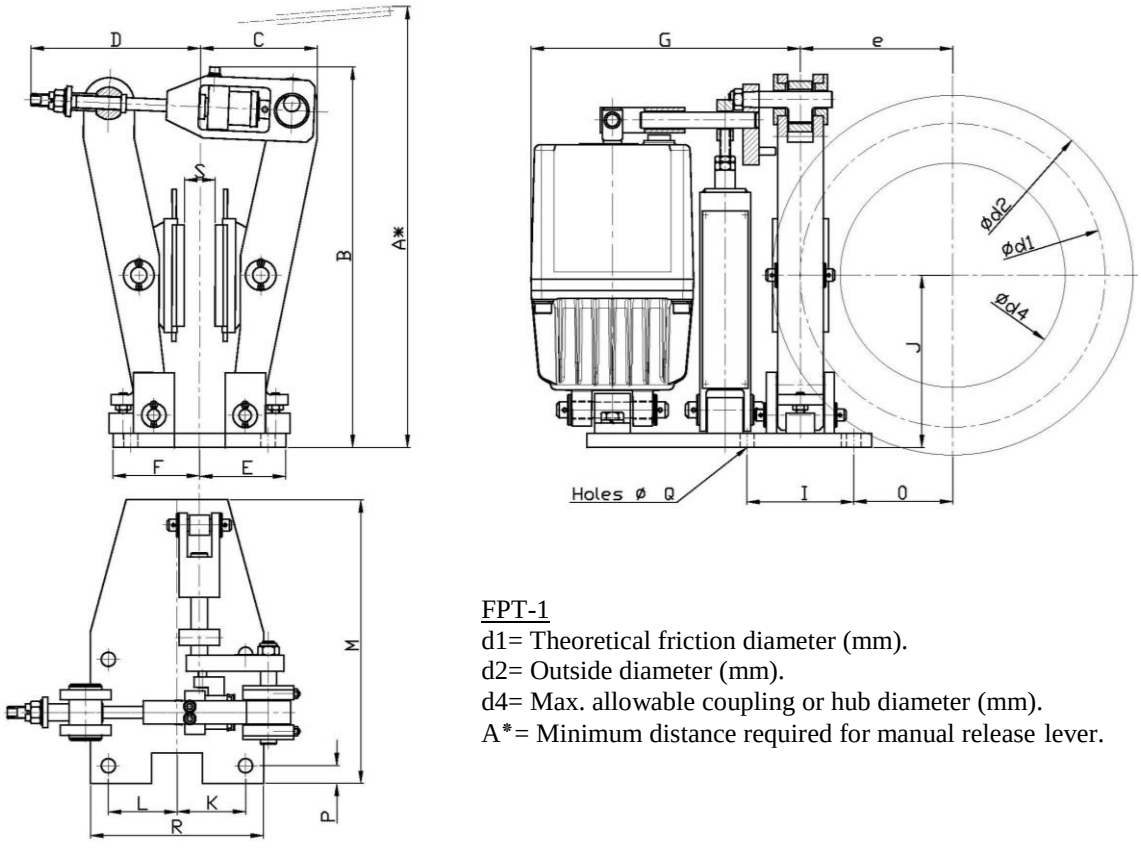
Both in the manufacturing of the brake as in that of all its components, the required standards of the related standard are complied with.

The FBT-FPT electrohydraulic brakes are brakes that brake mechanically by means of the action of a spring, when electric power is lacking for the electrohydraulic TURBEL brake lifter used.

This electrohydraulic brake lifter is powered by three-phase AC current.

The braking torque of these brakes can be adjusted by varying the spring's length values.

Relationship between the technical and dimensional parameters of the FBT-FPT brakes based on the figures below:

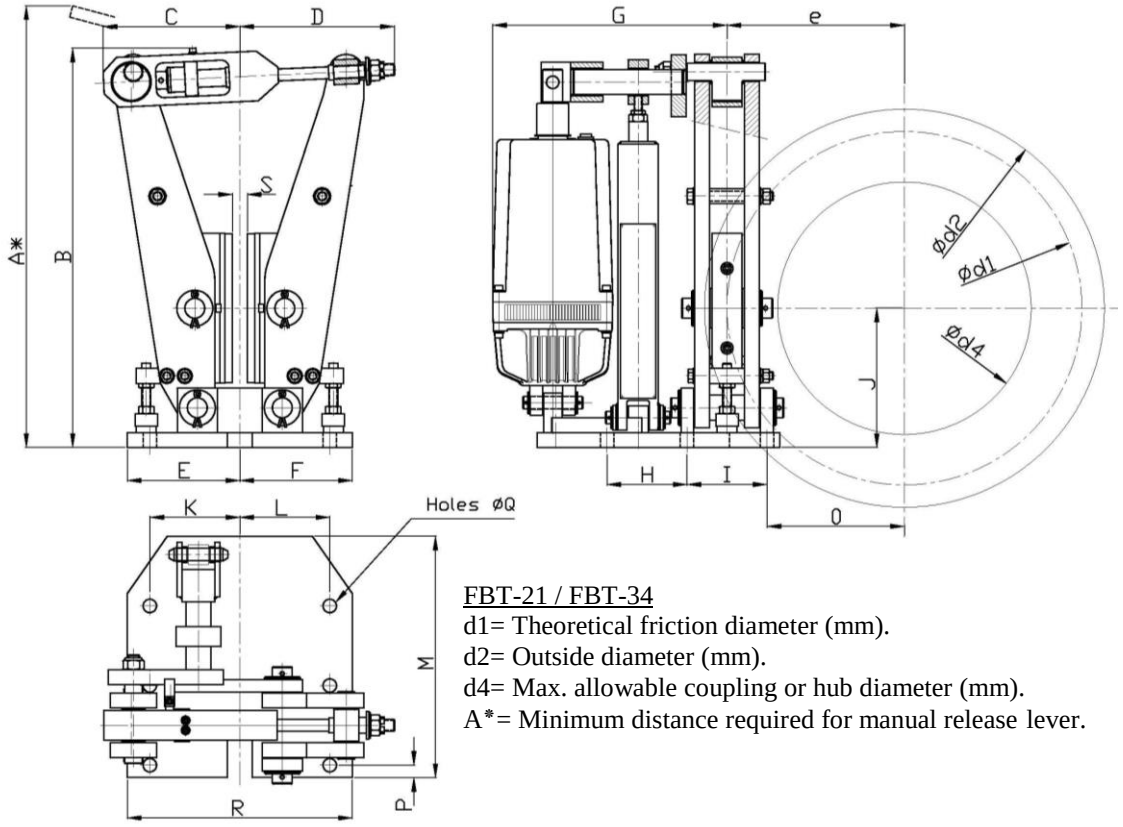


FPT-1
d1= Theoretical friction diameter (mm).
d2= Outside diameter (mm).
d4= Max. allowable coupling or hub diameter (mm).
A*= Minimum distance required for manual release lever.

FPT-1

A*	B	C	D	E	F	G	I	K	L	M	P	Q	R	WEIGHT
400	380	120	170	85	85	265	105	67,5	67,5	280	17,5	14	170	28 kg

Brake disc information							Thrustor Type (Brake torque max. in Nm μ=0,4)	
d2	S	d1	d4	e	J	O	TH-I (256)	
200	30	145	55	72,5	170	20	190	Clamping force N TH-I (256) = 3300 N
240	30	185	95	92,5	170	40	240	
280	30	225	135	112,5	170	60	295	
315	30	260	170	130	170	77,5	340	
355	30	300	210	150	170	97,5	395	
400	30	345	255	172,5	170	120	455	



FBT-21 / FBT-34
d1= Theoretical friction diameter (mm).
d2= Outside diameter (mm).
d4= Max. allowable coupling or hub diameter (mm).
A*= Minimum distance required for manual release lever.

FBT-21

A*	B	C	D	E	F	G	H	I	K	L	M	P	Q	R	WEIGHT
800	565	187	220	170	170	342	130	130	145	145	365	25	22	340	125 kg

Brake Disc information							Thrustor type (Brake torque max. in Nm μ=0.4)			
d2	S	d1	d4	e	J	O	TH-I (356)	TH-II (506)	TH-II (806)	
355	30	285	170	1425	230	775	630	885	1.500	Clamping force in N
400	30	330	210	165	230	100	730	1020	1750	
450	30	380	260	190	230	125	845	1180	2015	TH-I (356) = 5600 N
500	30	430	310	215	230	150	955	1335	2280	TH-II (506) = 7800 N
560	30	490	370	245	230	180	1090	1525	2600	TH-II (806) = 13300 N
630	30	560	440	280	230	215	1245	1740	2970	

FBT-34

A*	B	C	D	E	F	G	H	I	K	L	M	P	Q	R	WEIGHT
1.130	830	278	314	225	225	475	160	160	180	180	485	25	27	450	200 kg

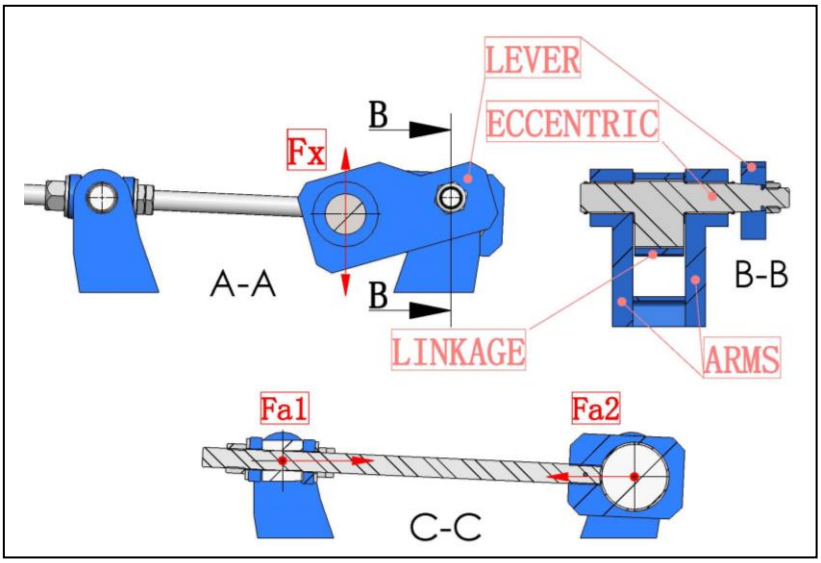
Brake Disc information							Thrustor type (Brake torque max. in Nm μ=0.4)			
d2	S	d1	d4	e	J	O	TH-III (1306)	TH-III (2006)	TH-III (3006)	
450	30	360	170	175	280	95	2980	4575	6980	Clamping force in N
500	30	410	220	200	280	120	3390	5200	7950	
560	30	470	280	230	280	150	3890	5975	9120	TH-III-1306 = 20700 N
630	30	540	350	265	280	185	4470	6860	10450	TH-III-2006 = 31500 N
710	30	620	430	305	280	225	5130	7880	12000	TH-III-3006 = 46000 N
800	30	710	520	350	280	270	5875	9030	13700	
900	30	810	620	400	280	320	-	-	15700	
1000	30	910	720	450	280	370	-	-	17600	

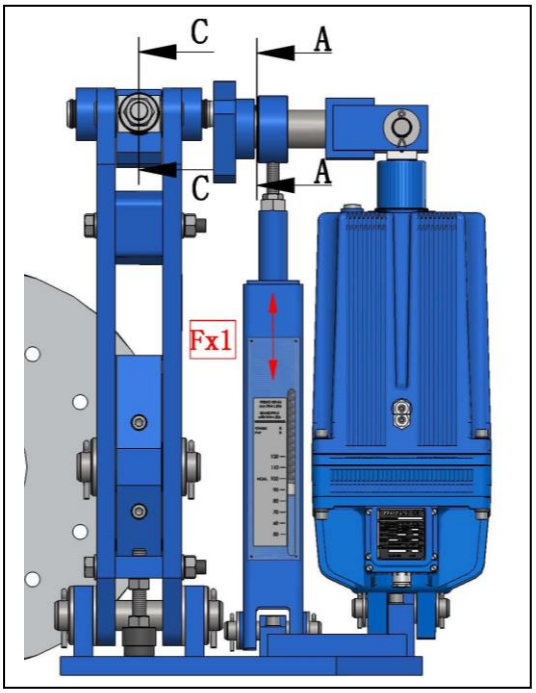
The technical data sheet that shows the technical and dimensional parameters for the TURBEL brake lifter is BC.TDS.00007I.

2. BRAKE OPERATION.

The electrohydraulic disc brakes brake using the force exercised by a spring.

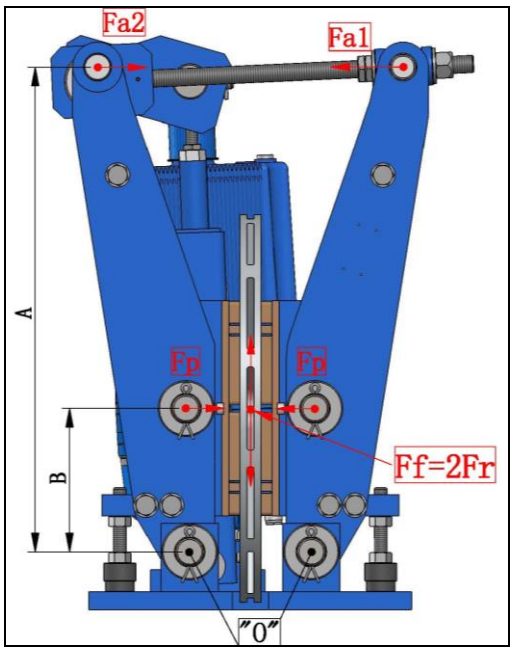
The spring mounted in the brake tends to extend. This extension force (Fx) is transmitted to the arms through the lever and eccentric articulation thus creating forces Fa1 and Fa2 in the arms (as indicated in the figures enclosed).





Due to the distance ratio (A and B) that there is in the arm with respect to the rotation axis (O), a force (Fp) is created that is equal in both brake shoes, however in the opposite direction, which make the brake brake. We shall call this force (Fp), the clamping force.

Each of the forces created in the brake shoe (Fp) generates a friction force (Fr) at a tangent to the disc in the opposite direction from the disc rotation direction. The result of adding the two friction forces of each of the brake shoes will be known as braking force (Ff=2Fr).

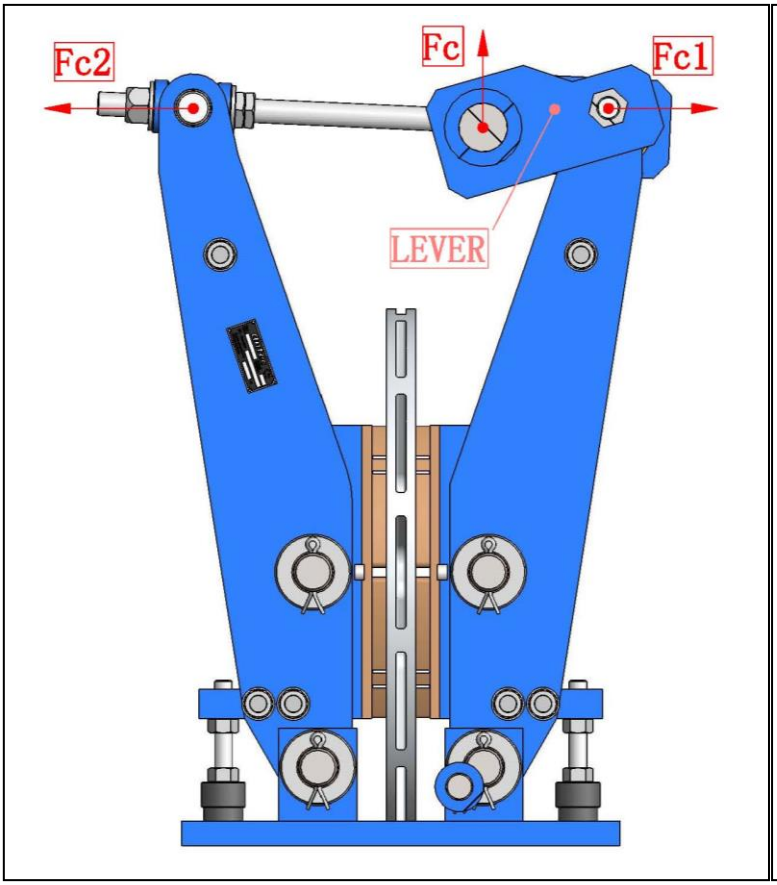


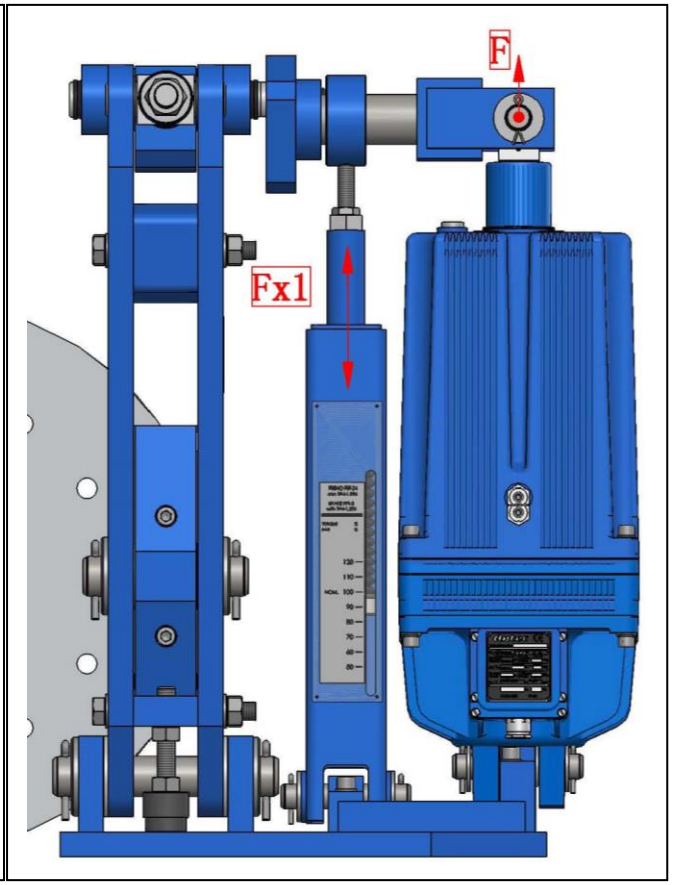
The electrohydraulic disc brakes release the brake or open when the TURBEL brake lifter is electrically connected.

The instructions for the assembly, adjustment and maintenance of the TURBEL are described in the Antec document 01.165I.

When connected the TURBEL brake lifter generates a force (F) able to overcome force Fx1 (force generated by the spring when the brake is open). It must be taken into account that Fx1>Fx where Fx is the force of the spring when the brake is closed.

When this force is generated (F) in the TURBEL brake lifter, it is transmitted to the brake thus generating a force Fc=F in the lever. This force Fc=F, through the eccentric force and the lever generates forces Fc1 and Fc2 in both arms as indicated in the figure enclosed, thus making the brake arms open by releasing the disc shoes.





3. BRAKE ASSEMBLY.

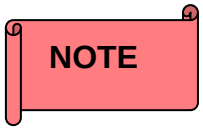
To assemble an electrohydraulic brake onto the related disc, proceed as follows:

3.1 The first thing an operator must do when he is going to assemble an ANTEC brake is unpack it.

When the brakes leave the factory, they are always packaged to ensure maximum safety during transportation.

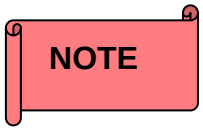
The brakes are supplied fully assembled and with their respective TURBEL brake lifter filled with the appropriate oil for their proper operation.

ANTEC certifies that the brakes have been tested on the company's test benches at its facilities using the appropriate operating oil.



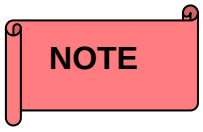
The customer will receive the documentation of the tests carried out on the brakes on the test benches, along with the documentation sent by ANTEC's quality department.

3.2 Before starting with the assembly of the brake, verify that both the disc and the base onto which the brake is to be mounted are clean and dry. Any residue, whether grease, oil or particles due to disc corrosion will compromise the optimum operation of the brake and lining.



When you clean the base and the disc you can use oil or diesel the first time (insofar as the client allows it), but after that (most important) the disc must be cleaned using a solvent. Take care when using solvents. To finish carefully dry the disc.

During transportation and storage, residue may build up in the brakes on surfaces in contact with brackets in the future and on the areas between the linings and the disc. We therefore recommend cleaning them thoroughly.



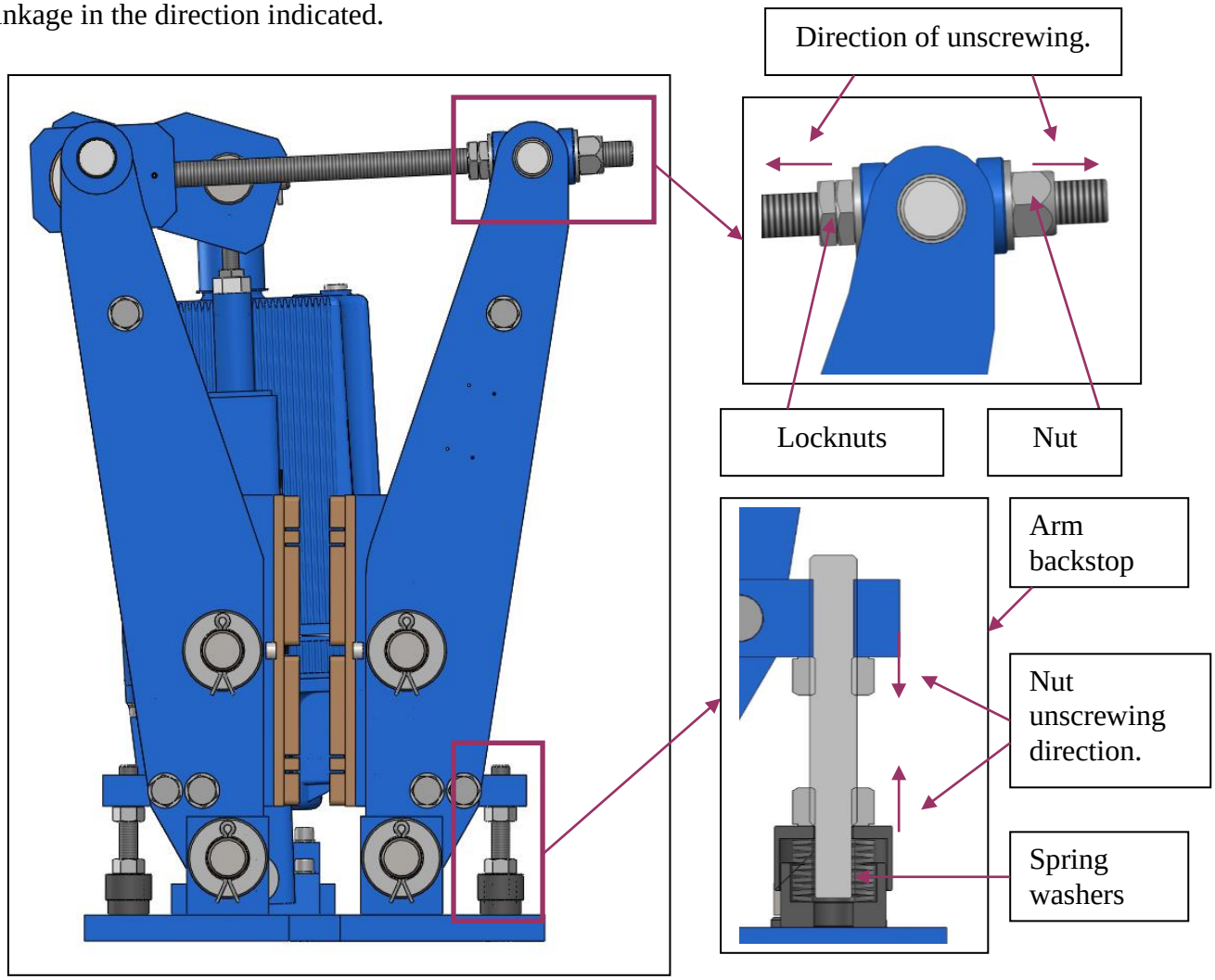
IMPORTANT Do not use liquid to clean the linings. Clean them using a dry paper towel or cloth.

NOTE

The brakes have been designed in accordance with the customer's specifications. Therefore, possible disc and bracket machining defects have not been taken into account.

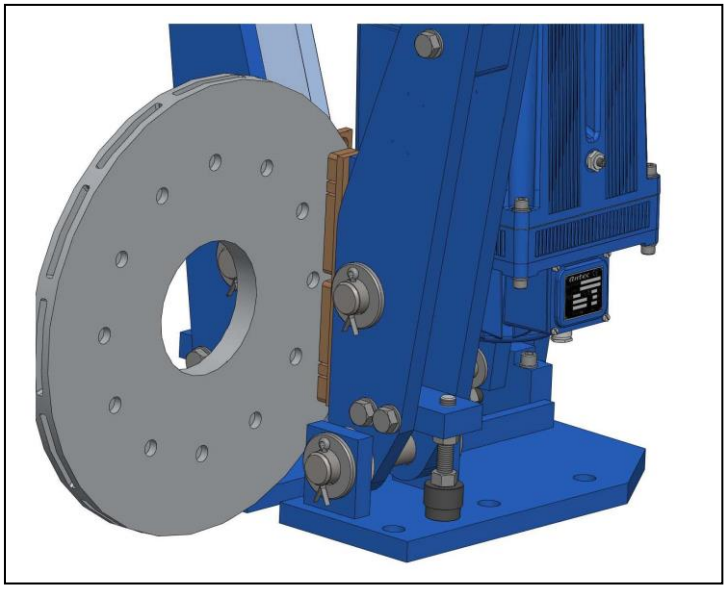
ANTEC thinks it is worth mentioning that possible flaws in the disc (lack of parallelism in the brake's axis and securing bracket) could reduce the contact surface area between the lining and disc.

3.3 - Loosen the nut and locknuts (indicated in the next figure) on one of the ends of the linkage in the direction indicated.

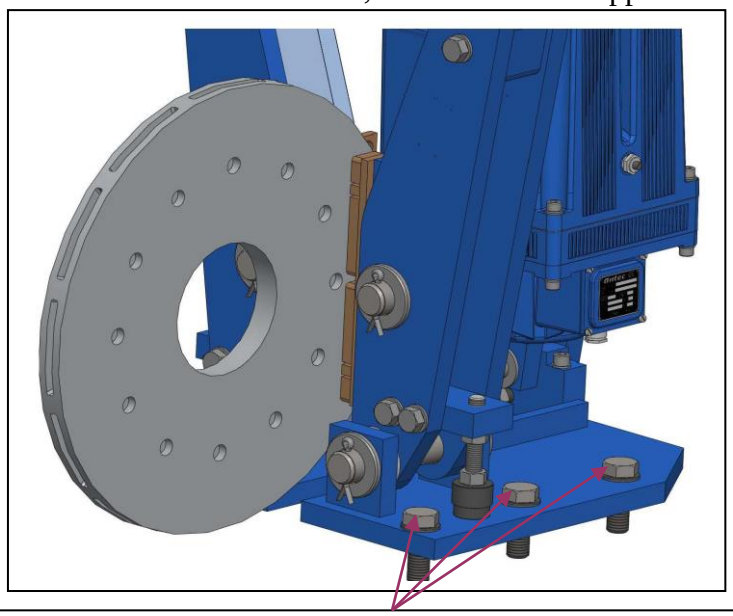


3.4 - Loosen the nuts on the arm backstop in the indicated direction. The set of parts comprising the aforementioned arm backstop is indicated in the previous figure (see section 3.3). By unscrewing both nuts the spring washers decompress from the arm backstops.

3.5 - Position the brake in the corresponding disc.



3.6 - Once the brake is mounted in the disc, anchor it to the support using the screws.



Clamping screws, Antec recommends using, as a minimum, screws with the quality of 10.9.

3.7 - Once the brake is positioned in the disc and anchored to its corresponding support, proceed to adjust and set it (see chapter 4 of these instructions).

4. BRAKE ADJUSTMENT AND SETTING.

The brake has three points that must be adjusted:

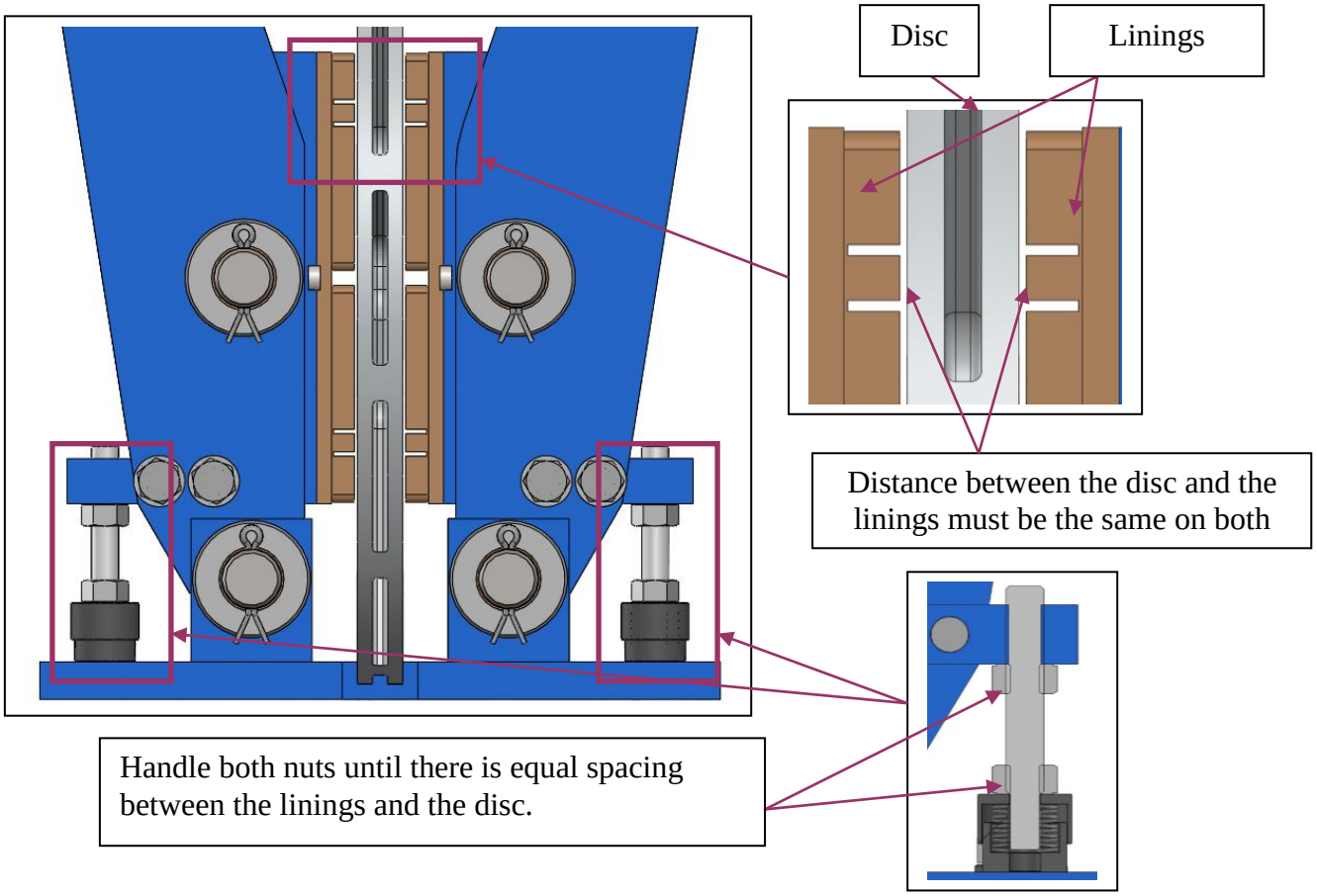
Before adjusting the three points indicated below connect the TURBEL brake lifter at the voltage indicated on its nameplate.

4.1. Adjustment of the ARMS CENTRING.

This is done by means of the arm backstops with the base.

- Actuate the TURBEL brake lifter; ensure that the TURBEL brake lifter performs the entire stroke.

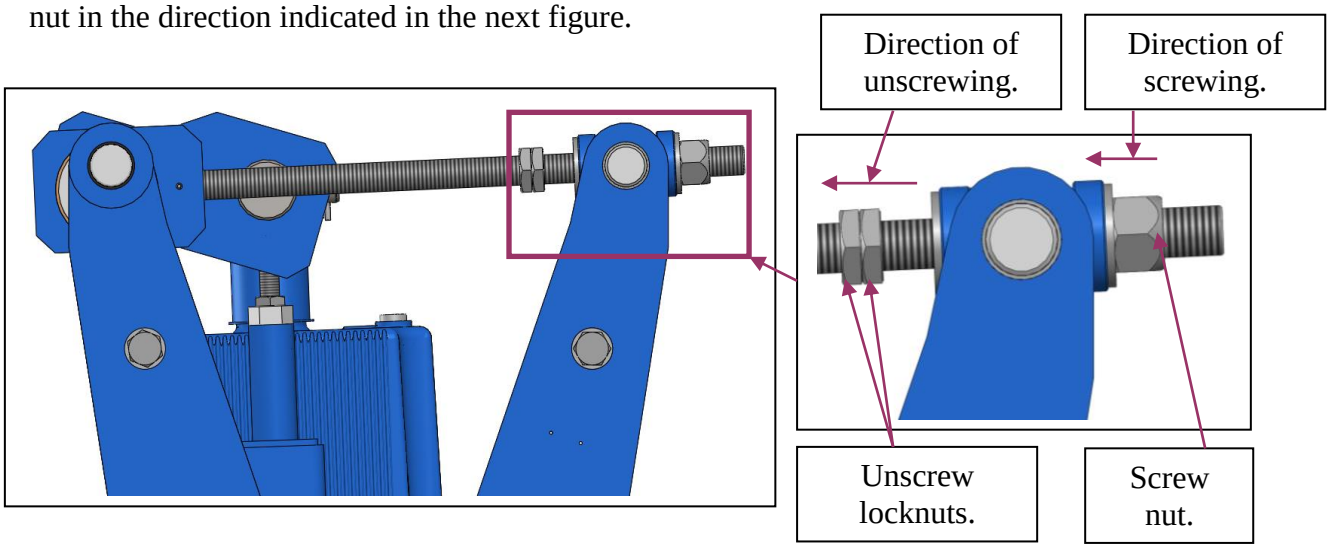
- Set by handling the nuts and the arm backstops. Check that the spacing between the lining and the disc is the same on both sides of the disc.



- After achieving the same distance between the linings and the disc, ensure the position of the arm backstops by screwing the nuts as far as possible.

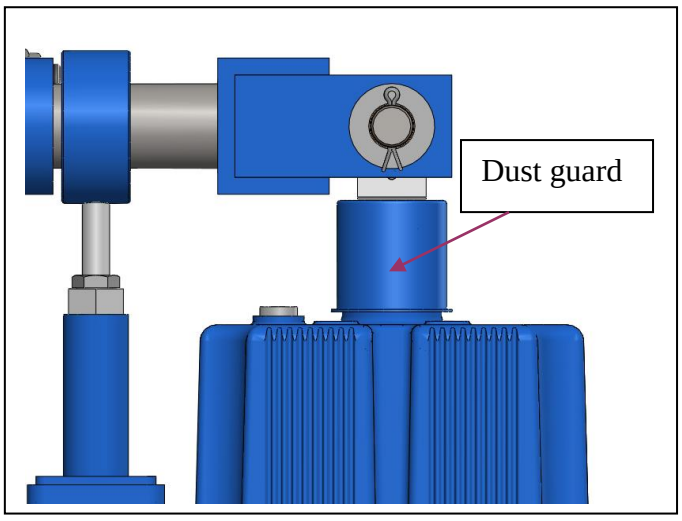
4.2. RESERVE PATH adjustment.

- With the TURBEL brake lifter disconnected (shank in the lower area, brake in a closed position and without voltage in the TURBEL brake lifter), unscrew the locknuts and screw the nut in the direction indicated in the next figure.

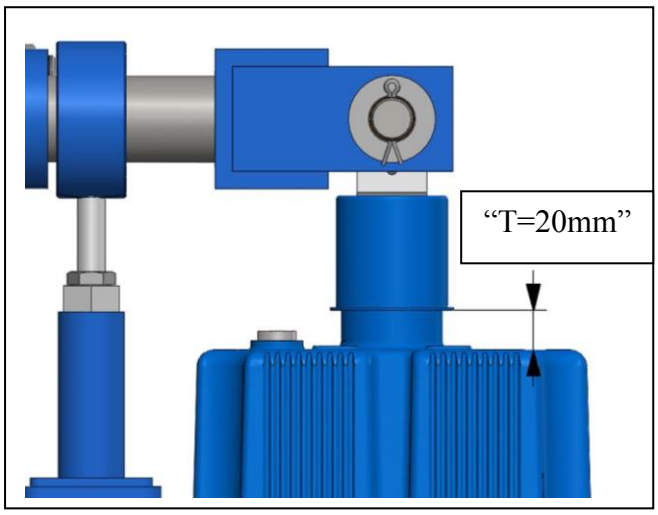


- Repeatedly actuate the TURBEL brake lifter and set the position of the aforementioned nuts as required until ensuring that the shank of the TURBEL brake lifter always rises the distance "T" the value of which must be 20 mm. It is important that each time the aforementioned nuts are actuated that the TURBEL brake lifter is disconnected.

Initial brake position.

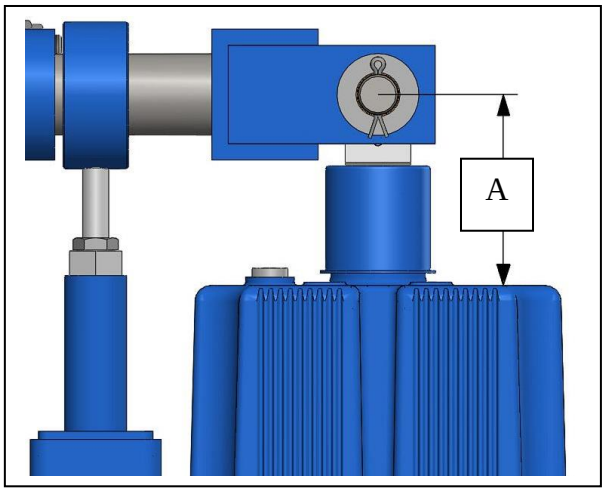


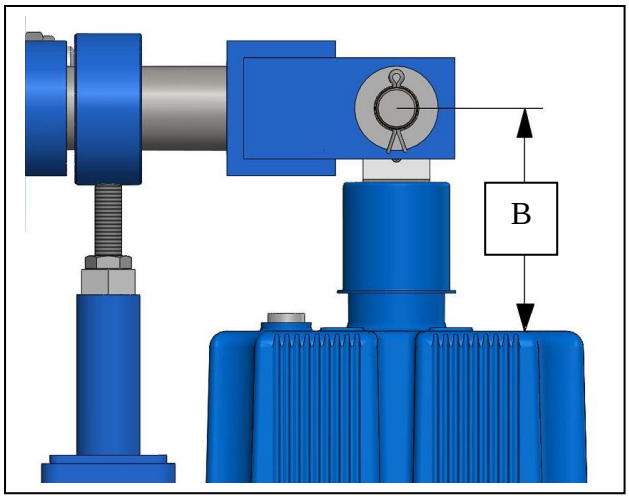
End position after handling the nuts.



NOTE

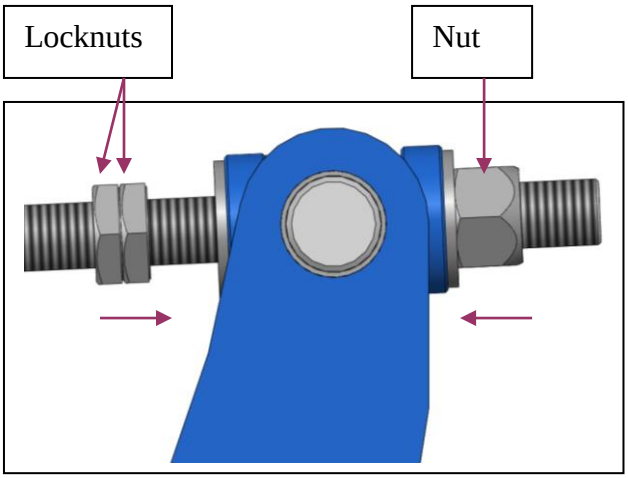
Some TURBEL brake lifters may not have dust guards. Height "T" can be measured at the turbel’s lug. See the following figures.





"T=20 mm" = B – A

- Block the position of the TURBEL brake lifter shank with the reserve T=20 mm, by tightening the nut and locknuts in the direction indicated in the following figure.



Remember that wear of between 1 and 2 mm in both shoes implies loss of virtually the entire reserve and the brake must be readjusted.

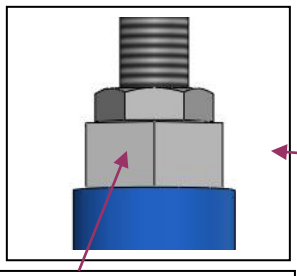
NOTE

The brake does not need adjustment of the setting of the reserve if the automatic recovery option is fitted, which ANTEC brakes have. The automatic recovery of the brakes will be explained in section 7.1 of the instructions.

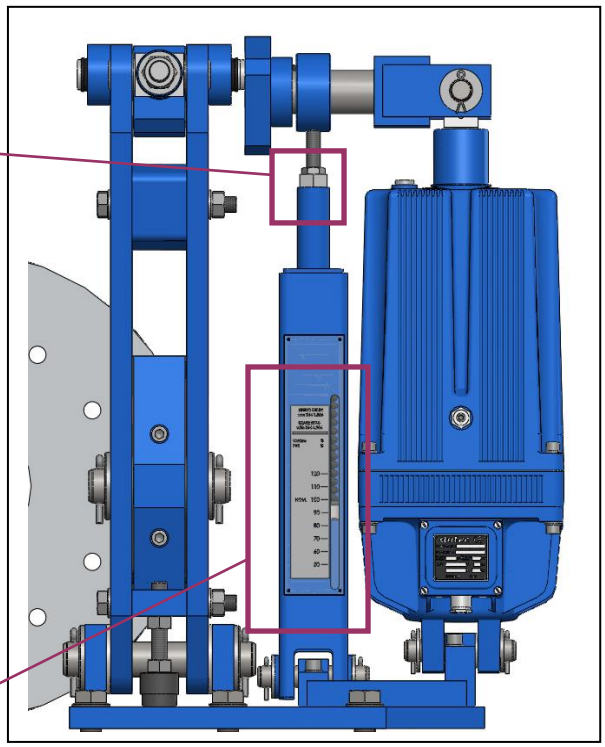
4.3. BRAKING TORQUE adjustment. (Except for brakes with TURBEL brake lifter with inside spring).

Ensure that the TURBEL brake lifter is without electric power and after having adjusted the position of the arms (section 4.1), and the reserve path (section 4.2) proceed to adjust the braking torque.

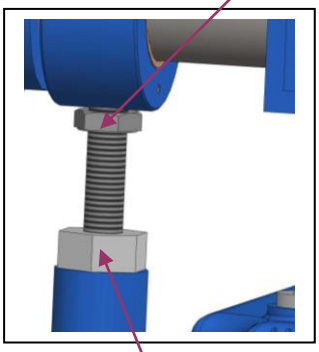
As indicated in the following drawing, the setting of the brake torque of the FBT and FPT is carried out by actuating on the brake spring tensor (indicated in the next figure) until achieving the desired torque marked on the brake torque scale (the brake torque can be read in percentage of the nominal value). The value of the maximum torque at which the brake can be adjusted is indicated in these instructions (see table on pages 12-13 depending on the brake).



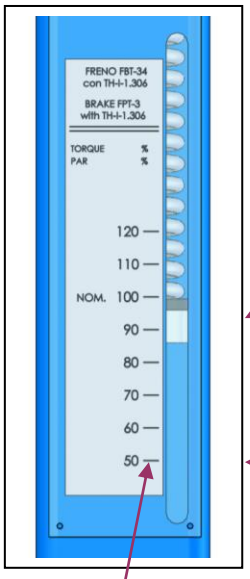
Tensor on the brake spring.



-1st step for setting the brake torque:
Unscrew the locknut on the tensor fully.



-2nd setting step of the brake torque:
Screw or unscrew the nut to achieve the desired percentage on the torque scale.



Torque scale (%)

-4th setting step for the brake torque:
Screw the locknut which was unscrewed in step 1.

-3rd setting step for the brake torque:
The values on the torque scale are %. 100% is equivalent to the data of the maximum torque according to the tables on pages 12 and 13.

NOTE

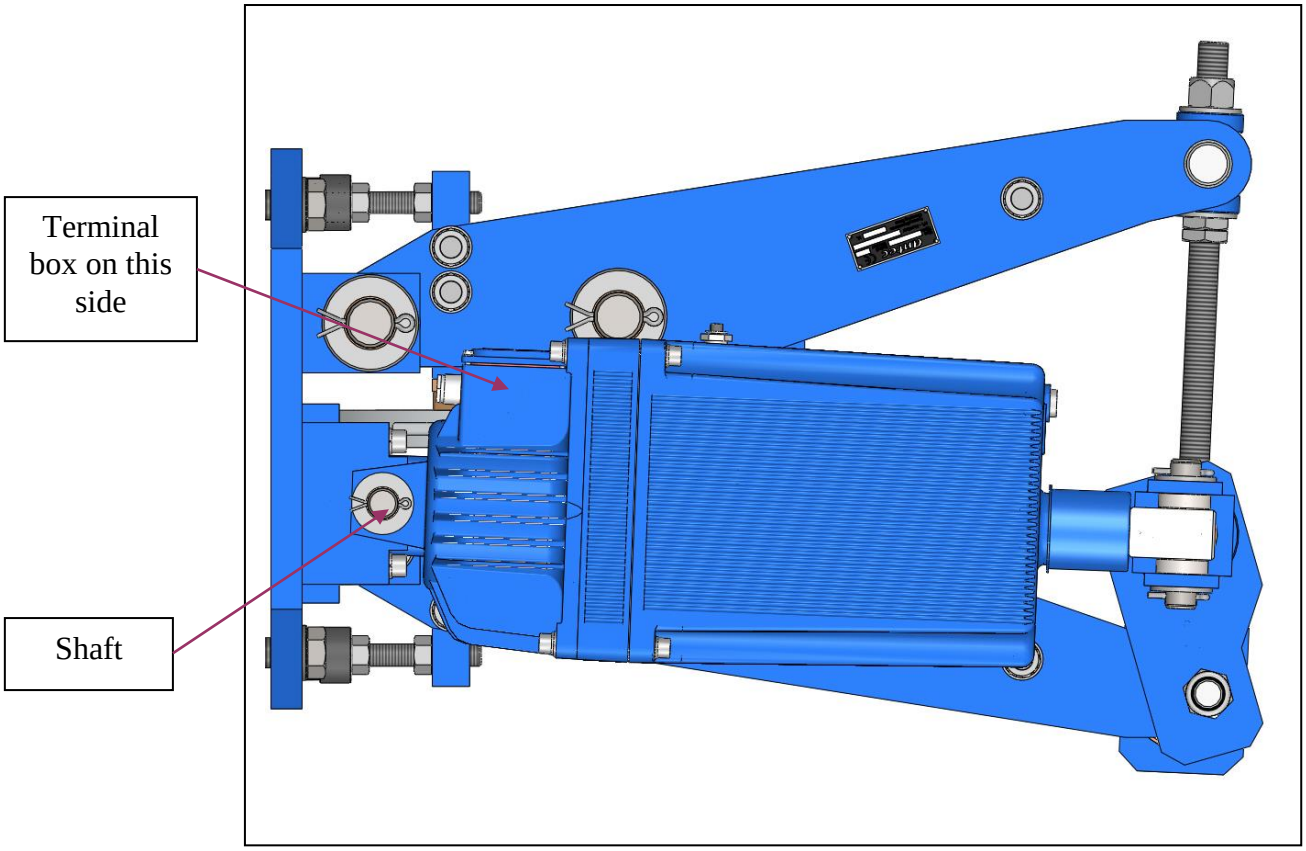
Verify and, if needed, redo that explained in sections 4.1 and 4.2. It may be that on adjusting the brake torque the position of the arms and the "T" reserve become unadjusted.

4.4. Setting in the case of HORIZONTAL ASSEMBLY.

When an FBT or FPT is assembled in a horizontal position there are two important points to be taken into account:

- When assembling the brake, the terminal box on the TURBEL brake lifter must always be at the top of the set.

If the terminal box is at the bottom the shaft journal which joins the TURBEL brake lifter to the base will have to be removed and the TURBEL rotated 180º so that the terminal box is at the top, the air chamber is at the top and the TURBEL operates correctly.



- During the brake setting, it must be ensured that the arms are set in such a way that when actuating the TURBEL brake lifter the linings do not rub the brake disc (see section 4.1).

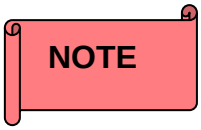
5. BRAKE MAINTENANCE


The use of Antec brakes for unplanned operations or the negligent use thereof could seriously damage them or severely injure people standing nearby.

In order to obtain satisfactory long-lasting operation of the brake, it is necessary to pay regular attention to the following points:

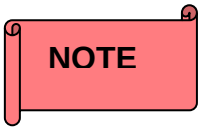
5.1. Monitor the value of RESERVE "T=20 mm". It is essential to verify the value 'T' with the disc cold. When it is at 10 mm, one must proceed to RECOVER THE RESERVE following the instructions given in section 4.2. If required, do this before the CENTRING OF THE ARMS according to section 4.1.

Remember that wear of between 1 and 2 mm in both shoes implies loss of virtually the entire reserve and the brake must be readjusted.



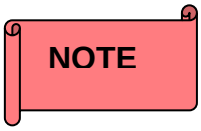
The brake does not need adjustment of the setting of the reserve if the automatic recovery option is fitted, which ANTEC brakes have. The automatic recovery of the brakes will be explained in section 7.1 of the instructions.

5.2.- Check that the torque at which the brake is set is the required one for the correct operation of the brake. See section 4.3 of these instructions.



Any modification to the value of the torque scale could affect the correct operation of the brake and cause problems.

5.3. When the thickness of the brake linings is less than 3 mm at the lowest point, proceed to change the shoes. See chapter 6 of these instructions.



ANTEC deems it necessary to recommend the automatic lining wear detection (DD) option for the brake. This option is explained in section 7.3 of the instructions.

5.4.- Monitor the condition of the surface of the disc, which should be polished, without scratches and completely clean. If required, clean the disc in which the brake is fitted. Any particle can damage the brake and compromise its correct operation (see section 3.2 of these instructions).

5.5.- All the articulations of the ANTEC brakes are assembled with self-lubricating bushings. In the event that a client were to order a brake without these self-lubricating bushings, we recommend that the brake's articulations should be lightly greased, avoiding oil spilling onto the linings or the disc.

5.6.- Change the oil of the TURBEL brake lifter on an annual basis, or otherwise when it can be seen that the oil has lost its original colour or performance features.

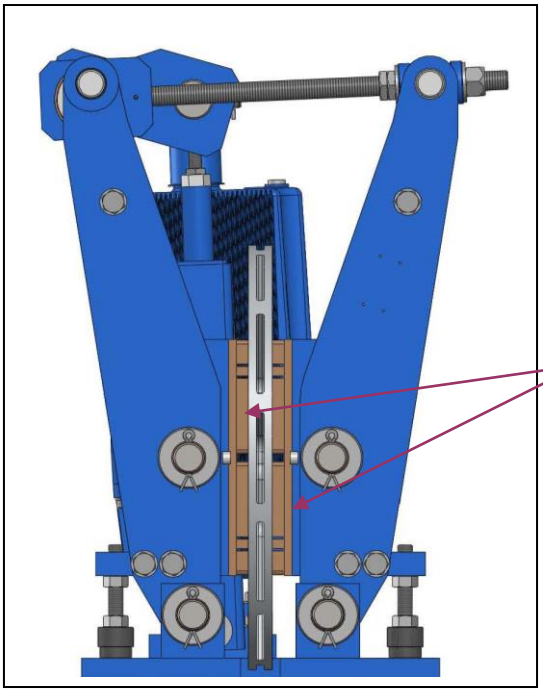
For the oil change, refer to the TURBEL brake lifter assembly and maintenance instructions in technical data sheet 01.165I.

ANTEC deems it necessary to always recommend that the maintenance tasks to be carried out on the brake must always be done in accordance with a safety protocol as explained in sections 1.2 and 1.3 of the instructions.

Another recommendation worth mentioning is that during these maintenance tasks the electric current should de disconnected from the TURBEL brake lifter.

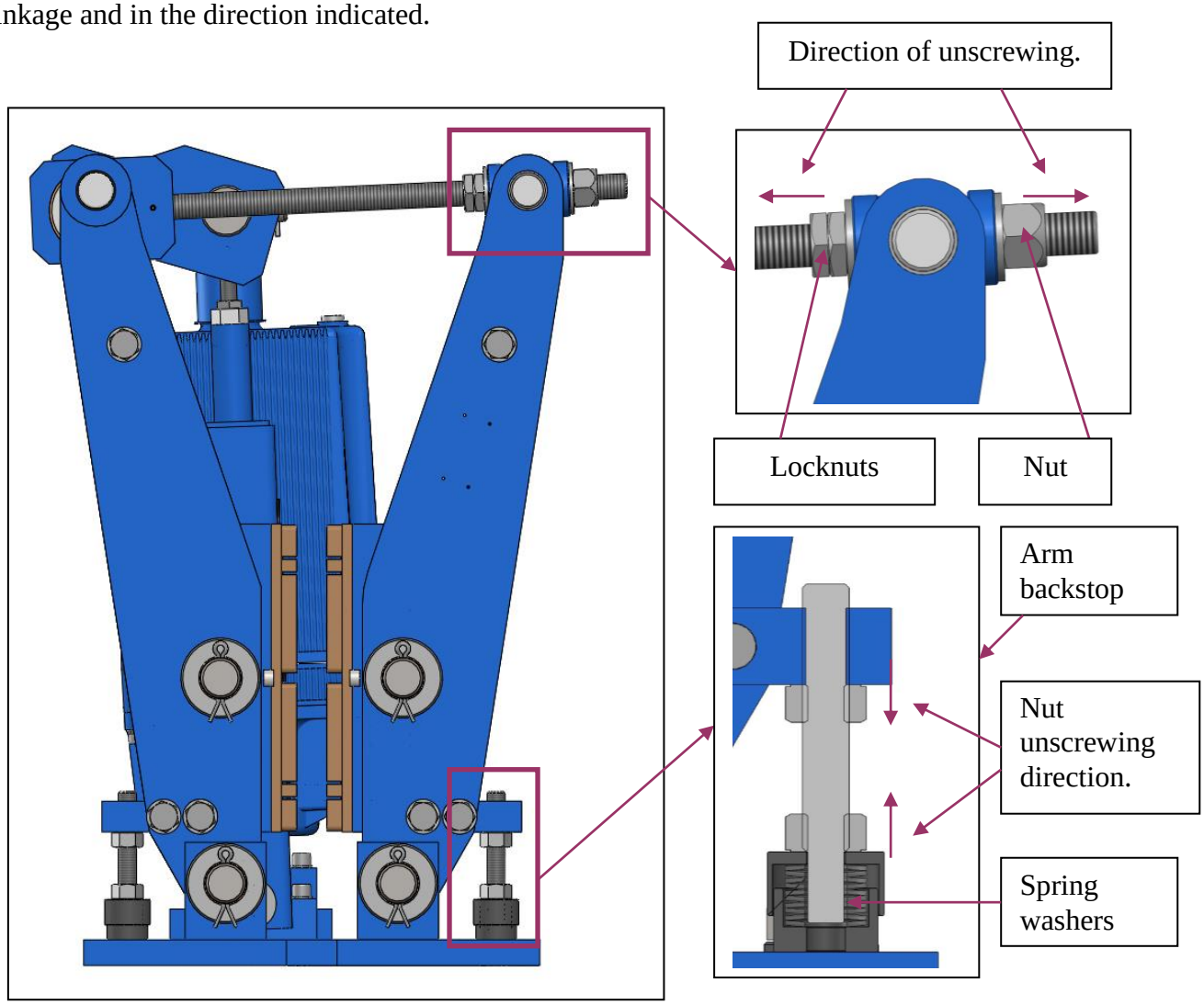
6. CHANGING THE LININGS OR SHOES.

When the lining of any of the shoes has been worn down to the minimum recommended thickness, 3 mm at the lowest point, one must proceed to change both shoes in accordance with the following indications:



6.1.- The first point to be followed is of vital importance. Disconnect the TURBEL brake lifter from the electricity (shank in the lower area, brake in closed position and without voltage in the TURBEL brake lifter).

6.2.- Loosen the nut and locknut (shown in the following figure) on one of the ends of the linkage and in the direction indicated.

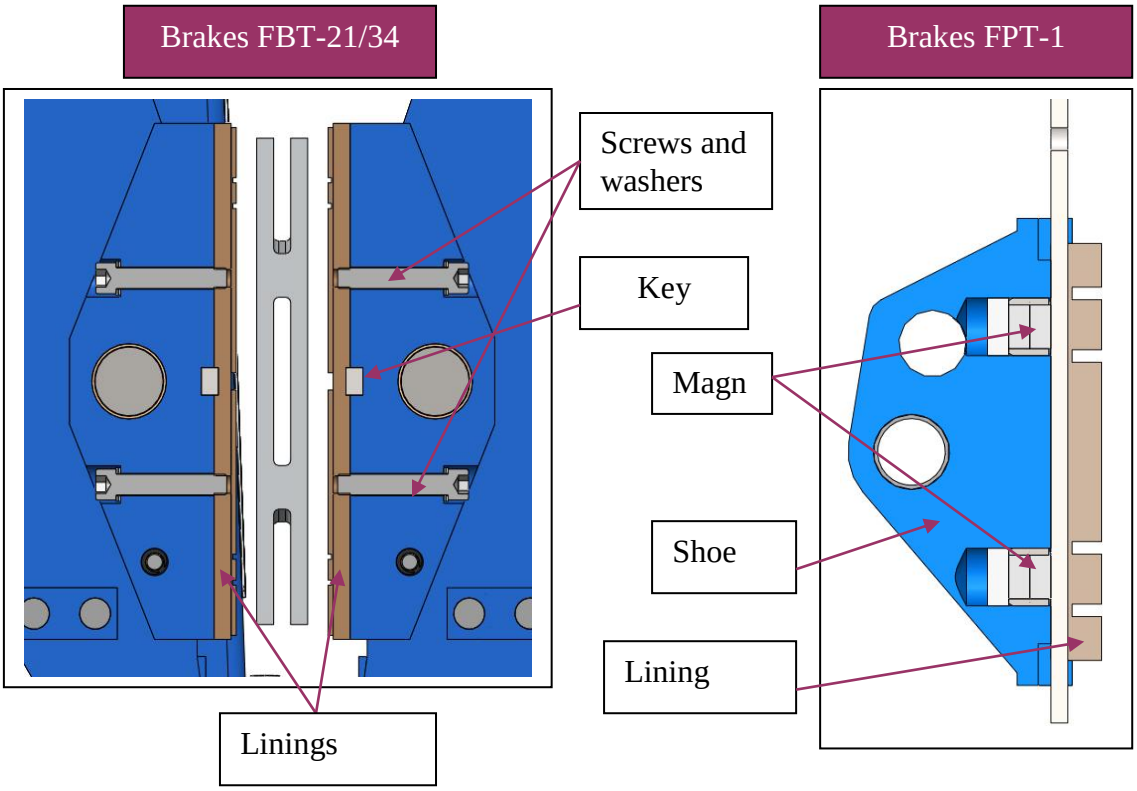


6.3.- Loosen the nuts on the backstop of the arm in the direction indicated. The set of parts comprising the aforementioned arm backstop is indicated in the previous figure (see section 6.2). By unscrewing both nuts the spring washers decompress from the tensor backstops.

6.4.- For the FBT brakes, loosen the screws and washers (indicated in the next figure) which keep the linings joined to the shoe. Remember that there is a key between the lining and the shoe.

NOTE

In the FBT brakes, the worn linings can be removed by hand since they maintain their position thanks to the action of some magnets assembled in the shoe set.



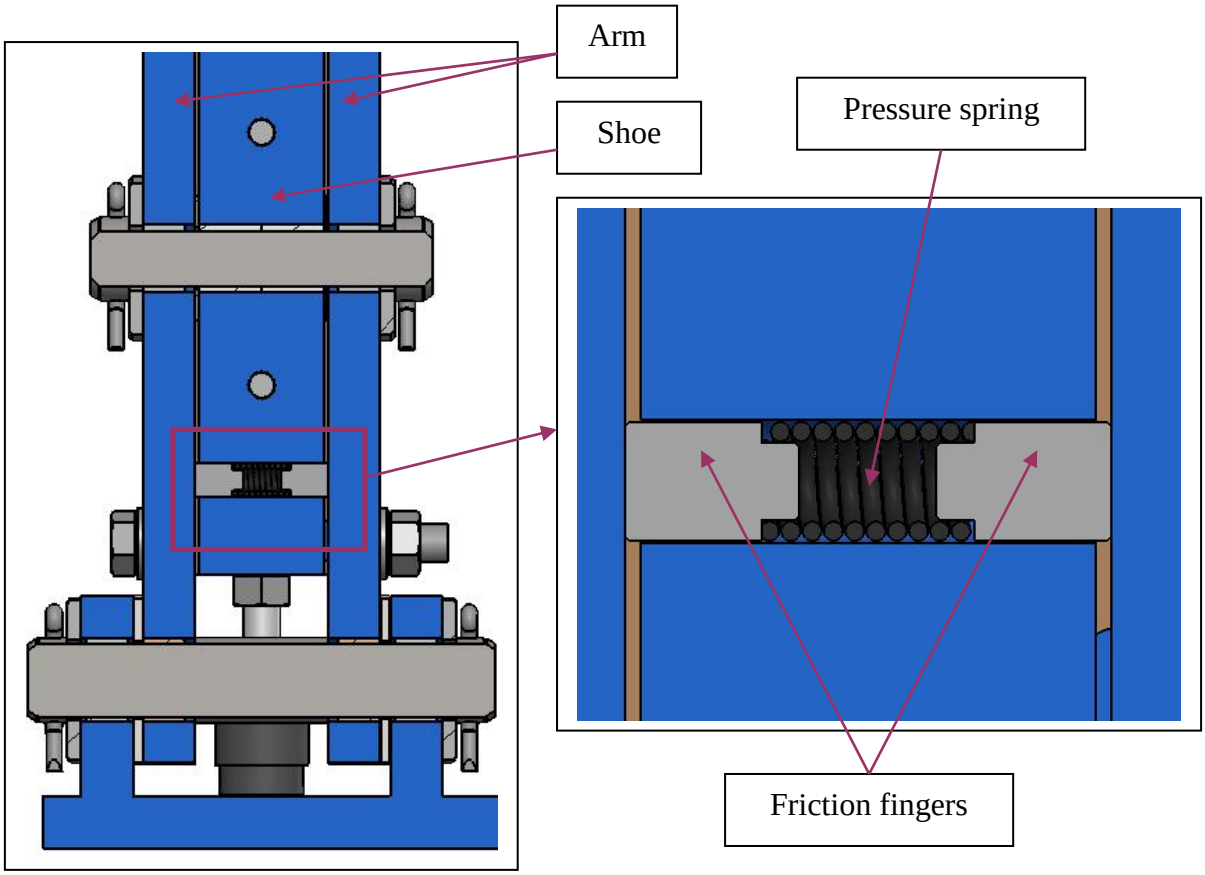
6.5.- Whilst keeping the TURBEL brake lifter disconnected from the power supply, assemble the new lining plates ensuring that they are correctly positioned in their housings. Pay special attention to the key in the shoe set in FBT brakes which must be used to position the lining perfectly.

6.6- Proceed as described in chapter 4 (brake adjustment and setting).

NOTE

The shoe set of the arms does not have to be dismantled either when replacing the linings or when assembling the brake.

If the shoes were dismantled for any reason (FBT and FPT case), precautions have to be taken to ensure that the friction fingers are not lost which could be violently ejected by the pressure springs. These friction fingers are used to maintain the position of the linings in parallel to the brake disc. See the following figure.



NOTE

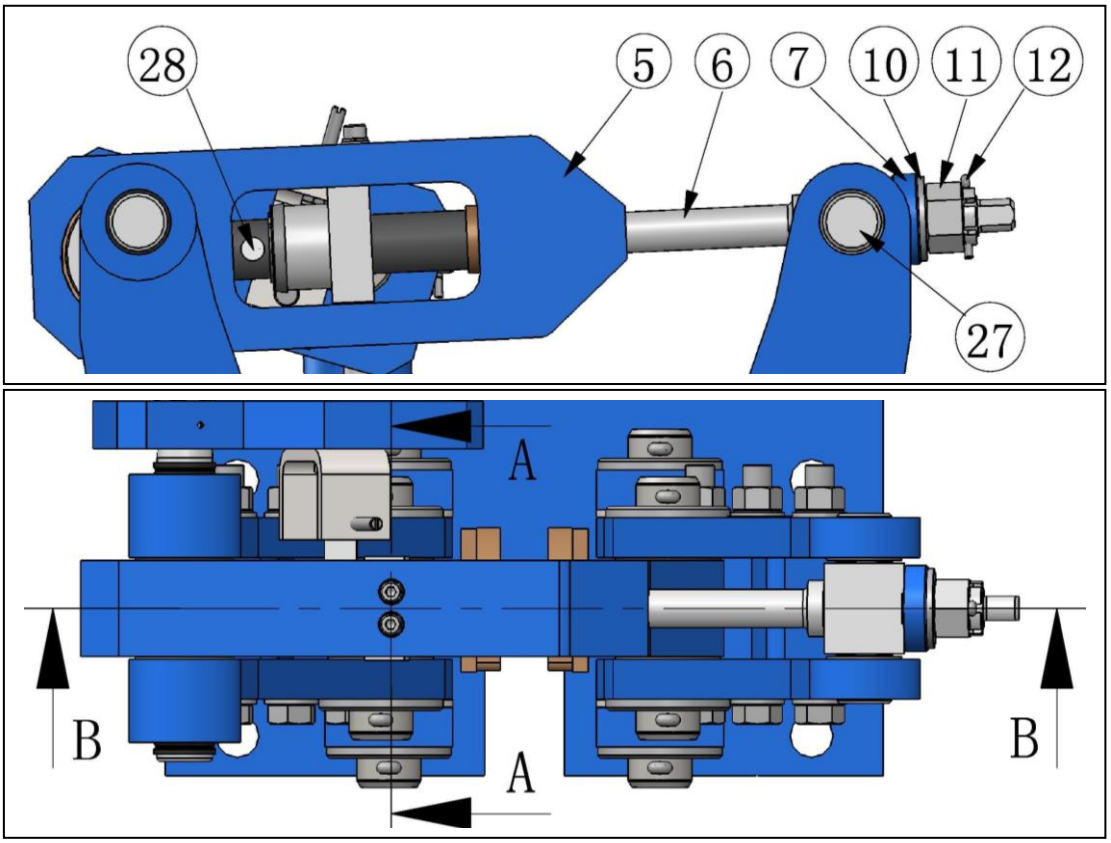
A new installed lining requires a break-in period to achieve the correct lining properties.
This period cannot be reduced due to the number of different influential factors.

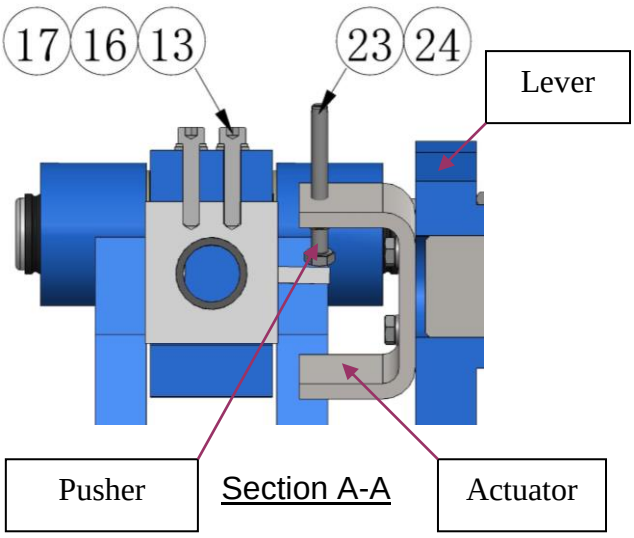
IMPORTANT During the replacement of the linings, the TURBEL brake lifter must be disconnected to avoid the risk of trapping in the event of a failure in the power supply.

7.- BRAKE OPTIONS.

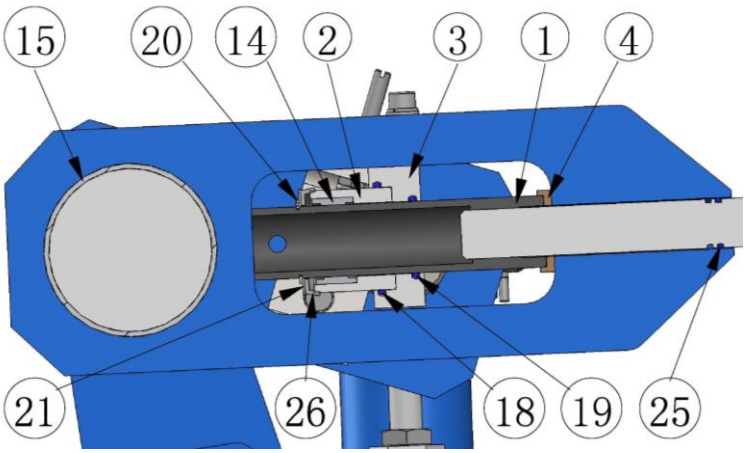
7.1. AUTOMATIC RECOVERY (RA).

For any explanation on automatic recovery, we shall base this on the following diagram with its related markings.





Section A-A



Section B-B

7.1.1. AUTOMATIC RECOVERY OPERATION DESCRIPTION.

The electrohydraulic brake system without automatic recovery is based on the fact that a short part of the TURBEL brake lifting path is allocated to the reserve for lining wear, the remaining part of the path being used for opening the brake shoes.

For brakes with manual recovery of brake lining wear, this is achieved with two nuts that bring the arms closer by means of the brace (refer to section 4.2 if necessary).

For brakes with automatic recovery, a tensor (1), performs as the nuts do and it is threaded to the brace (6).

The tensor (1) has a free wheel (14) with an outside crown (2) that holds the activation pusher that, in turn, is dragged by the actuator between the upper and lower positions. This actuator is joined to the lever and placed so that the pusher remains stationary, when the brake has the proper reserve for the wear of linings.

When a lining is worn, the brake lifter reserve stroke value reduces, the opening stroke increases and when the brake opens the pusher rises dragged by the actuator: the tensor (1) does not move, since the wheel (14) is in its free direction of rotation.

The next time the brake closes, the pusher (which is above its correct point) is dragged downwards by the bolt (23) until reaching this point: now the tensor (1) does rotate dragged by the free wheel (14), screwing itself in the brace (6) and approaching the arms to recover the wear produced in the linings.

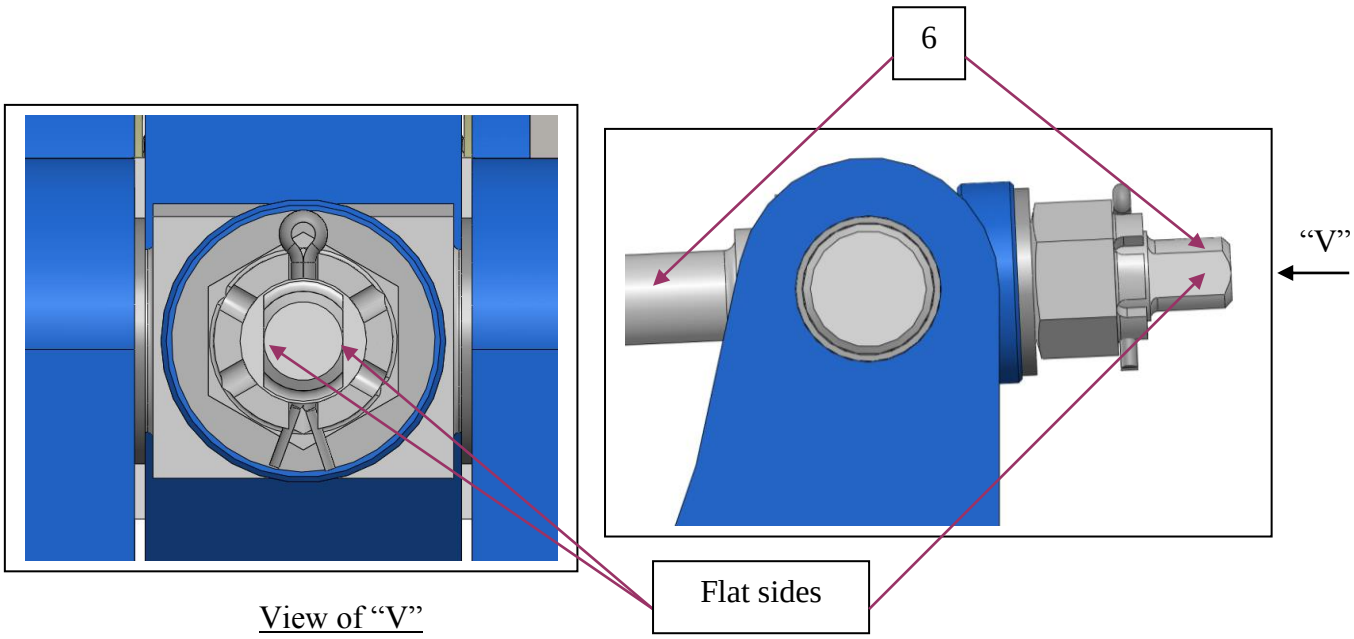
7.1.2. ASSEMBLY OF BRAKE WITH AUTOMATIC RECOVERY.

To assemble a brake with automatic recovery proceed in the following manner:

- Follow all the steps indicated in chapter 3 of the instructions, only that in this case, instead of loosening the nuts and locknuts on the linkage, the brace (6) on the tensor (1) must be unscrewed by actuating on the flat sides of the brace end (6) until the linings separate from each other enough to assemble the brake in the corresponding disc.

NOTE

It is not advisable to loosen the brace (6) excessively, since there is the risk that it could come out of the tensor (1). Only loosen as much as required so that the brake can slide over the disc.



View of "V"

7.1.3.- ADJUSTMENT AND SETTING OF A BRAKE WITH AUTOMATIC RECOVERY

NOTE

All the brakes shipped by Antec are already set which means that the client does not have to set it. Nevertheless, we would recommend that the operator knows how to perform setting work for possible adjustments and future settings.

Following the same steps shown in chapter 4 of these instructions we shall proceed to summarise the adjustments to be made on these brakes.

The brake has three points that must be adjusted:

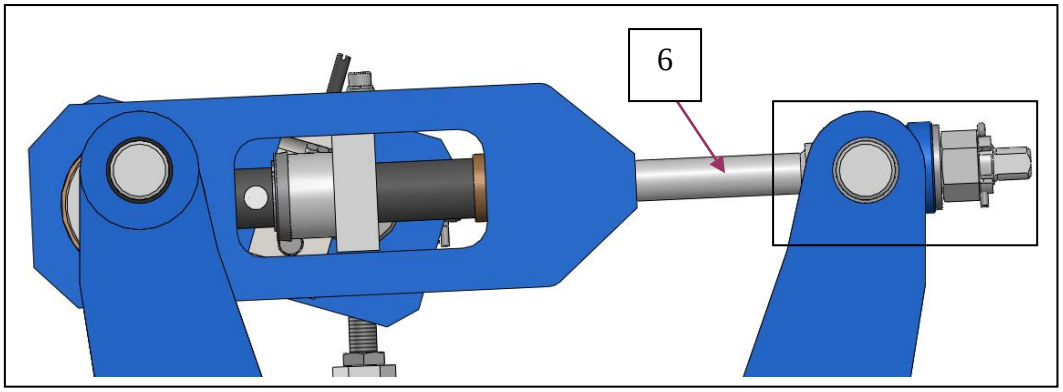
7.1.3.1. The adjustment of the centring of the arms must be done as described in section 4.1 of the instructions.

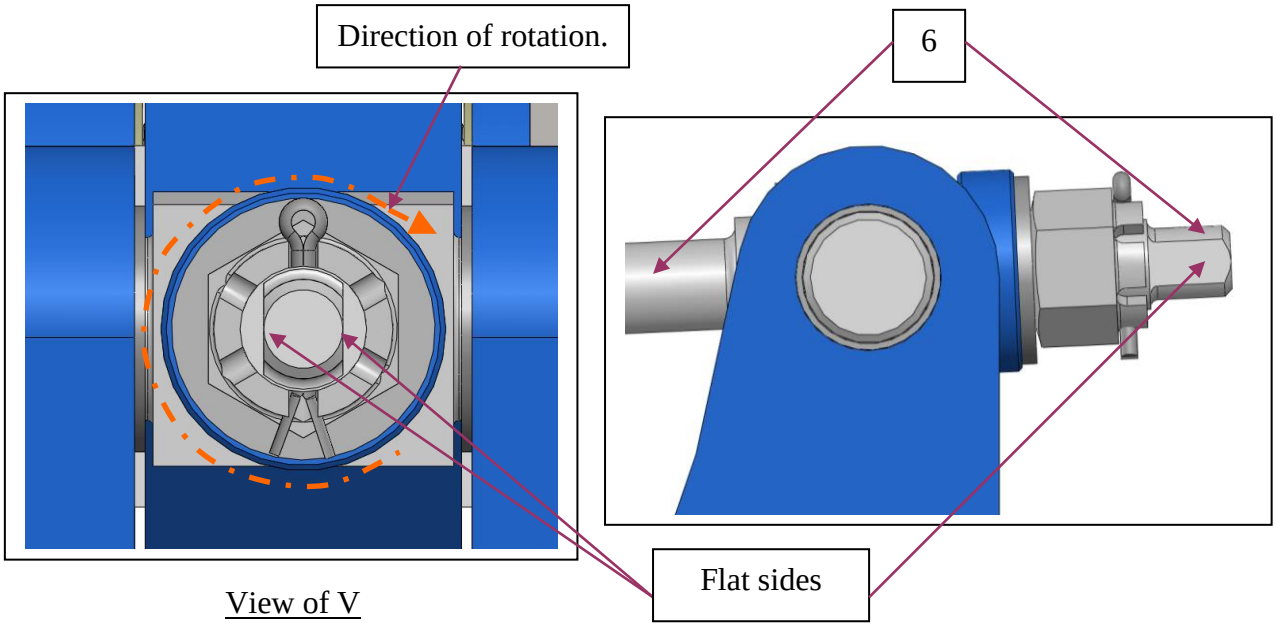
7.1.3.2. RESERVE PATH adjustment.

To adjust the reserve path perform the following steps:

- Actuate on the flat sides of the end of the brace (6), rotating clockwise until the shoes are supported in the disc which can be ascertained when detecting a considerable increase in the rotation resistance.

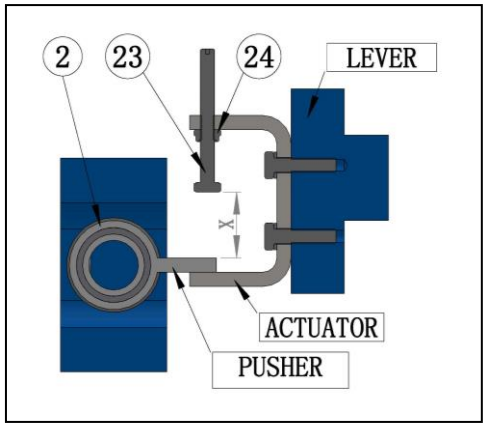
Continue to rotate until achieving the reserve value "T=20 mm" in the TURBEL brake lifter.





View of V

● How to adjust the bolt (23):



By rotating the brace (6), as shown above in this section, the reserve “T=20 mm” is achieved in the TURBEL brake lifter.

Operate the TURBEL brake lifter by connecting it to the power supply and with its shank in the maximum opening position, position the pusher on the outside crown (2) in contact with the lower actuator flange.

Disconnect the TURBEL brake lifter from the voltage and rotate the bolt (23) until making contact with the pusher on the outside crown (2).

Activate the brake lifter several times in order to ascertain that distance "X" shown in the previous diagram is maintained and then lock the bolt with the nut (24).

7.1.3.3. Finally adjust the setting of the brake torque as described in section 4.3.

NOTE

Do not use the brake with load until this definitive work position has been reached in order to ensure that all the braking force is applied to the disc.

7.1.4.- REPLACEMENT OF BRAKE SHOES WITH AUTOMATIC RECOVERY

The automatic recovery device avoids periodical adjustments which compensate the wear of the linings, however they will have to be replaced before they are completely worn: good practice is to carry out the replacement when the lining thickness, in its area with the greatest wear, is less than 3 mm.

To replace either of the two brake shoes proceed in the following manner:

7.1.4.1.-Whilst the TURBEL brake lifter is disconnected from the power supply, loosen the nuts on the backstops of the arms (as shown in section 6.3) and rotate the brace (6) in an anti-clockwise direction, making use of the flat side existing in its end until the distance between linings and disc allows the removal of the worn linings and the assembly of new linings.

7.1.4.2.- Dismantle the worn linings and assembly the new linings by following the indications in sections 6.4 and 6.5 of these instructions.

7.1.4.3. - Proceed as described in section 7.1.3 (brake adjustment and setting with automatic recovery).

NOTE

All these operations must be performed with the disc cold.

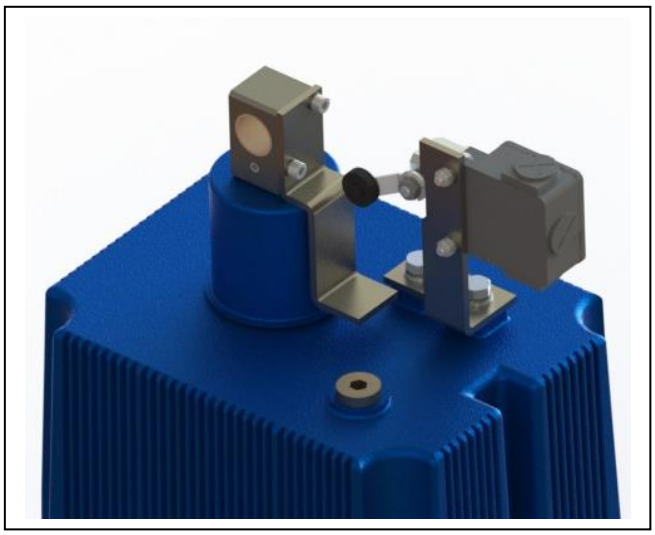
7.1.5. MAINTENANCE OF THE BRAKE WITH AUTOMATIC RECOVERY.

The maintenance of these brakes is performed by inspecting the same points as described in chapter 5 of these instructions.

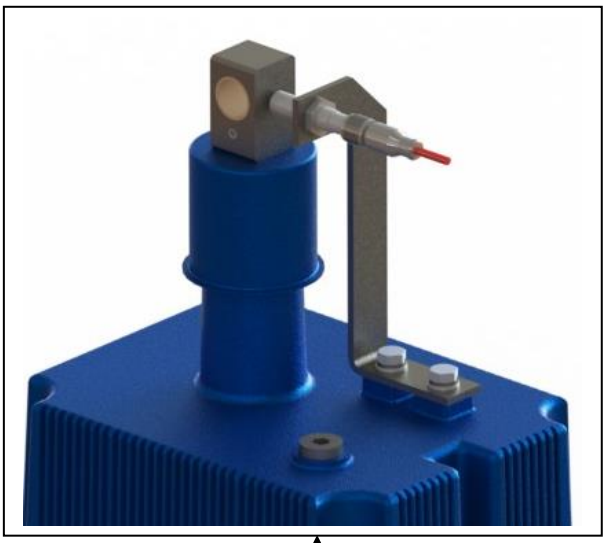
7.2. BRAKE OPEN SIGNALLING CONTACT (CSA).

The open signalling contact is used to electrically signal the end position of the path of an open TURBEL brake lifter and it therefore serves the purpose of signalling the time at which the brake is open and its arms separate the shoes from the disc.

There is the possibility of mounting two types of path endstops, mechanical or inductive.



CSA stroke limit.
(Mechanical detector)



CSA stroke limit.
(Inductive detector)

NOTE

In the event that ANTEC's Sales Department does not receive any specification on the type of detector to be mounted on the brake, the standard detector mounted shall be of the mechanical type.

The reference of the standard mechanical detector mounted is: XCKM115.

We attach the following technical data sheet for the detector.

Main

Range of product	OsiSense XC
Series name	Standard format
Product or component type	Limit switch
Device short name	XCKM
Sensor design	-
Body type	Fixed
Head type	Rotary head
Material	Metal
Fixing mode	By the body
Movement of operating head	Rotary
Type of operator	Thermoplastic spring return roller lever
Type of approach	2 directions lateral approach
Electrical connection	Screw-clamp terminals , clamping capacity: 1 x 0.34...2 x 1.5 mm²
Cable entry	3 entries tapped for Pg 11 cable gland
Number of poles	2
Contacts type and composition	1 NO + 1 NC
Contacts operation	Snap action
Positive opening	With

Complementary

Body material	Zamak
Switch actuation	By 30° cam
Contacts insulation form	Zb
Number of steps	1
Positive opening minimum torque	0.25 N.m
Minimum torque for tripping	0.1 N.m
Minimum actuation speed	0.01 m/min
Maximum actuation speed	1.5 m/s
Contact code designation	A300 , AC-15 (Ue = 240 V , Ie = 3 A) conforming to EN/IEC 60947-5-1 appendix A Q300 , DC-13 (Ue = 250 V , Ie = 0.27 A) conforming to EN/IEC 60947-5-1 appendix A
[Ithe] conventional enclosed thermal current	10 A AC
[Ui] rated insulation voltage	300 V conforming to UL 508 300 V conforming to CSA C22-2 No 14 500 V degree of pollution 3 conforming to IEC 60947-1
Resistance across terminals	≤ 25 mOhm conforming to IEC 60255-7 category 3
[Uimp] rated impulse withstand voltage	6 kV conforming to IEC 60947-1 6 kV conforming to IEC 60664
Short circuit protection	10 A by gG cartridge fuse
Electrical durability	5000000 cycles , DC-13 inductive load type, 48 V , 7 W , load factor: 0.5 , operating rate: ≤ 60 cyc/mn 5000000 cycles , DC-13 inductive load type, 120 V , 4 W , load factor: 0.5 , operating rate: ≤ 60 cyc/mn 5000000 cycles , DC-13 inductive load type, 24 V , 10 W , load factor: 0.5 , operating rate: ≤ 60 cyc/mn
Mechanical durability	15000000 cycles
Width	63 mm

Height	64 mm
Depth	30 mm
Product weight	0.28 kg

Environment

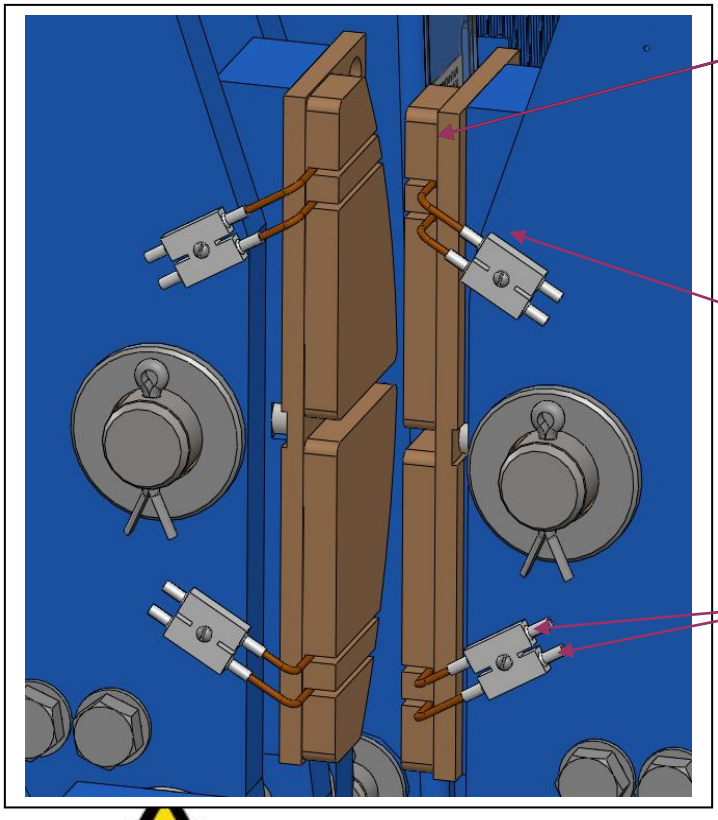
Shock resistance	50 gn (duration = 11 ms) conforming to IEC 60068-2-27
Vibration resistance	25 gn (f = 10...500 Hz) conforming to IEC 60068-2-6
IP degree of protection	IP66 conforming to IEC 60529
IK degree of protection	IK05 conforming to EN 50102
Class of protection against electric shock	Class I conforming to IEC 61140 Class I conforming to NF C 20-030
Ambient air temperature for operation	-25...70 °C
Ambient air temperature for storage	-40...70 °C
Protective treatment	TC
Product certifications	CCC CSA UL
Standards	CSA C22-2 No 14 EN 60204-1 EN 60947-5-1 IEC 60204-1 IEC 60947-5-1 UL 508
RoHS EUR conformity date	4Q2009
RoHS EUR status	Will be compliant

7.3. BRAKE SHOE LINING WEAR DETECTOR (DD).

ANTEC brakes have an option for mounting the shoe lining wear detector by inserting two cables into the lining as shown in the following diagram.

The cables are connected to a connection terminal that is prepared so that the client can make the required connections to his electrical power equipment.

One must proceed to replace the linings or shoes as explained in chapter 6 of the instructions, when these have been worn down to the minimum recommended thickness of 3 mm at the lowest point. In the event that the brake is fitted with a lining wear detector, the shoes must be replaced when the lining wear detector (DD) triggers a signal on the client's electronic control panel.



The brake's electrical connection with the client electrical equipment must be done by the client.

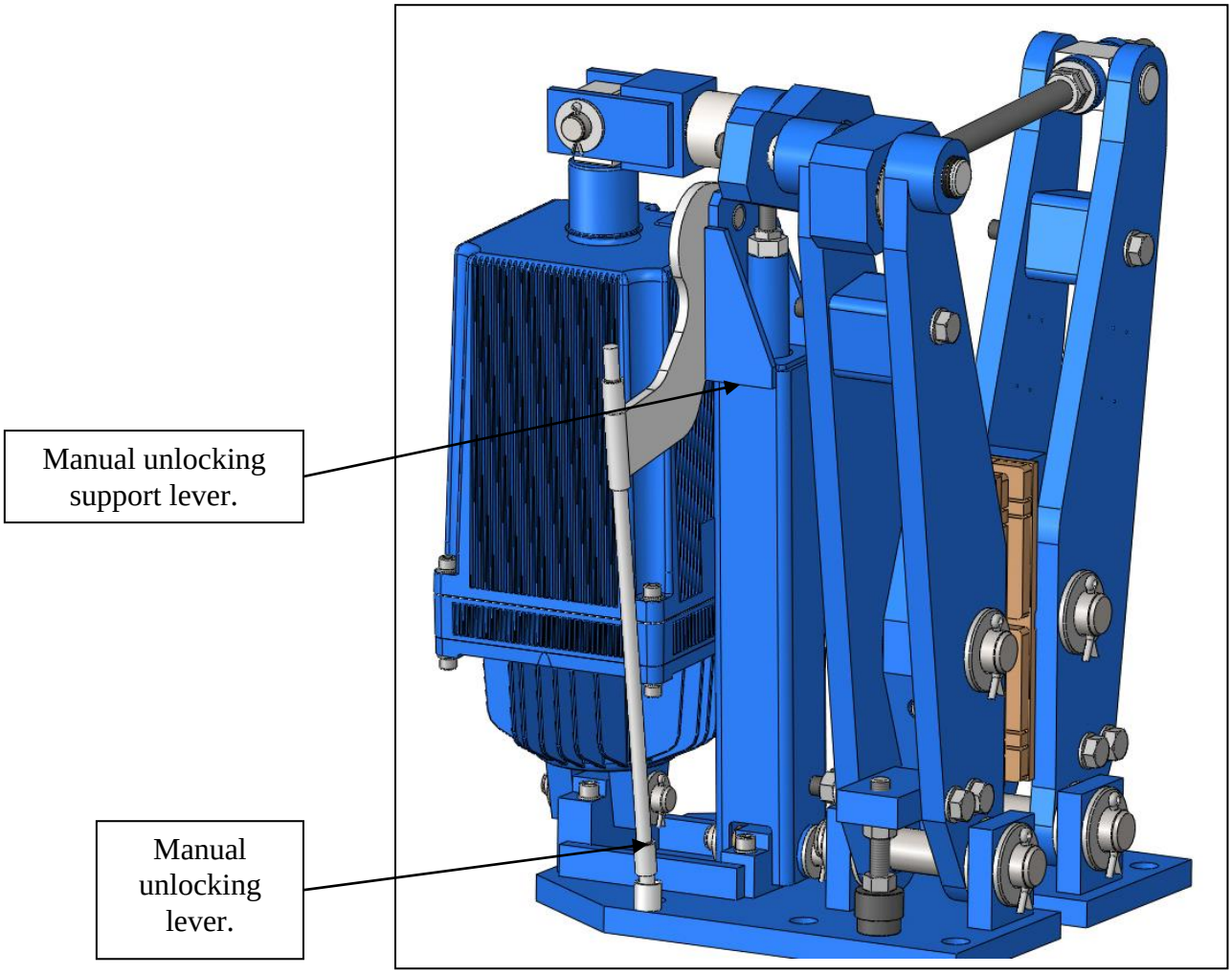
7.4. BRAKE MANUAL UNLOCK (DM).

The manual unlocking function in ANTEC brakes is intended to replace the activation of the opening of the brake by means of the TURBEL brake lifter, by manually activating the opening of the brake by means of a lever.

By means of a minimal manual unlocking effort by the operator, sufficient force is exercised to open the brake without having to recur to powering the TURBEL brake lifter with electric power.

The proposed solutions for the manual unlock of the brakes vary depending on the brake model designed.

The following diagram represents one of the designs conceived of a brake model and it is intended to serve as an example of how manual unlocking is approached for ANTEC brakes.



7.5. DESCENT VALVE IN THE TURBEL BRAKE LIFTER (VD).

ANTEC brakes activated by the TURBEL brake lifter may be fitted with the option of a descent valve (VD) for TURBEL brake lifters.

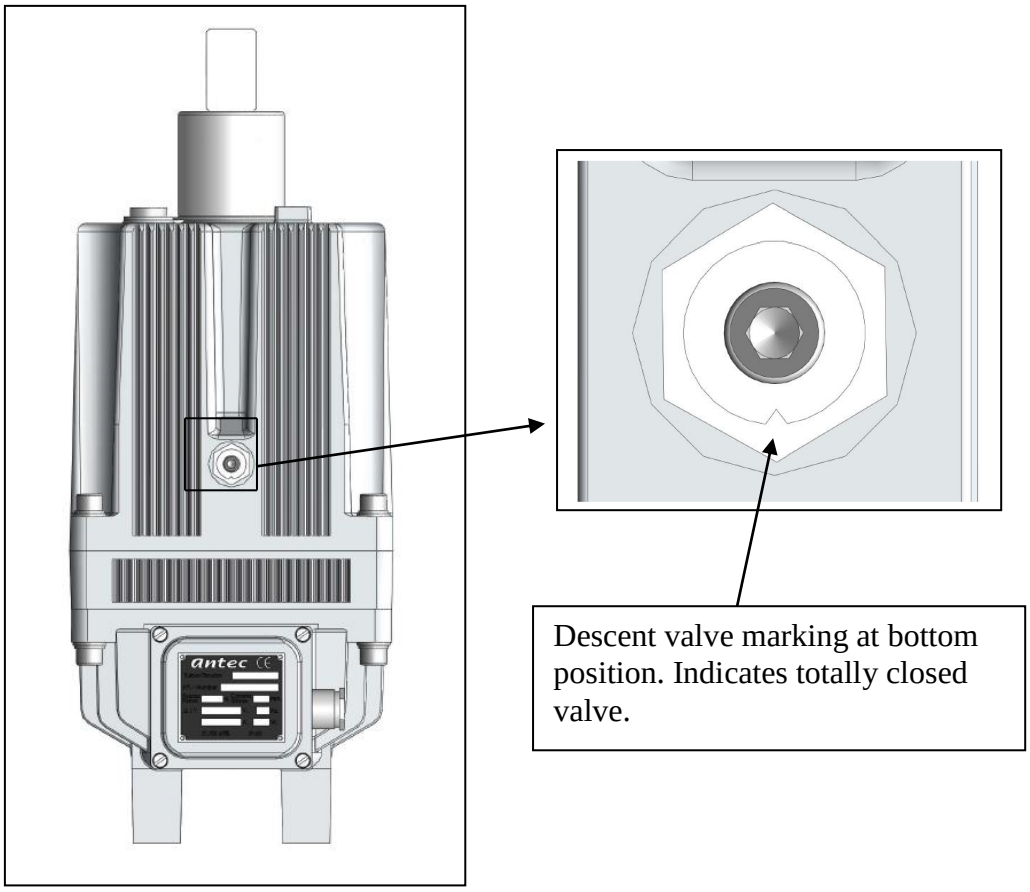
The function of mounting a TURBEL brake lifter fitted with a descent valve (VD) is to control the closing time of these brakes by means of this valve, an option that may benefit the operation of these brakes under certain working conditions.

The descent valve (VD), regulation and operation:

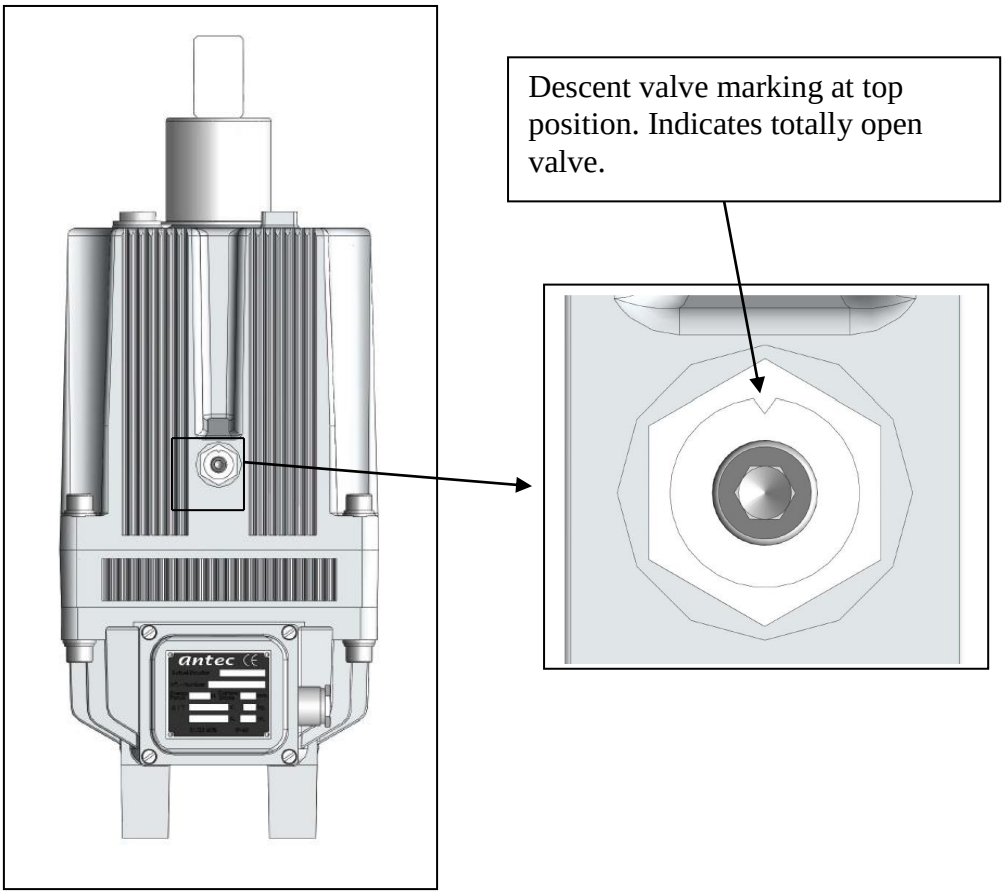
The set of parts integrated in the TURBEL brake lifter used to control the descent of the shank is called the descent valve (VD).

By manipulating this valve, reducing or increasing the internal circulation and oil flow, the descent time of the TURBELS's shank can be controlled.

The oil flow is totally closed and the movement of the shank is minimal when the marking on the descent valve is as indicated in the following diagram.



The oil flow is fully open and the movement of the shank is at the maximum (it moves as if there was no valve) when the marking on the descent valve is as indicated in the following diagram.



The intermediate positions of the valve vary the descent time depending on what the customer wants.

7.6. SPECIAL PAINT (PE).

ANTEC supplies the brakes painted in accordance with the client's specifications. The special paint option makes it possible for the client to choose or advise on the coating and the RAL required for his brakes.

In such a case, through its sales department, ANTEC will study the possibility of supplying the brake following the client's specifications.

7.7 PNEUMATIC OR HYDRAULIC OPENING OF THE BRAKE.

The opening of ANTEC brakes is activated by means of the TURBEL brake lifter, although within this product range this activation mechanism can be varied by installing a hydraulic or a pneumatic cylinder that performs the action of the TURBEL brake lifter, taking into account and following the hydraulic and pneumatic specifications given by the client.

7.8. BRAKE WITH TURBEL ATEX CERTIFICATION.

The location of a brake may present problems with regards to the environment in which the brakes are installed, for such cases ANTEC has certified as ATEX the brake component that operates by means of electric power, the TURBEL brake lifter.

NOTE

The ATEX certification solely refers to the TURBEL brake lifter and not to the electrohydraulic disc brake product.

The work areas for which the TURBEL brake lifter are ATEX certified are limited by the certificate obtained.

ANTEC S.A. would be grateful for the client to contact the sales department for clarifiaction on any areas for which we have the ATEX certificate for the TURBEL brake lifter.

This CE Type Exam Certificate only refers to the design and construction of a specified protection equipment or system, in compliance with the 94/9/CE Directive.

The marking of the protection equipment or system includes on its specification plate the indication that refers to the Atex certification of the product.

8. SPARE PARTS.

ANTEC recommends keeping a number of spare parts on hand for any necessary repairs or when certain components come to the end of their service life.

NOTE

If you have any questions regarding brake spare parts, please contact the ANTEC After Sales Service, specifying the brake model and serial number.

9. CONTINUOUS IMPROVEMENT PLAN.

As part of its continuous improvement process ANTEC S.A would welcome any customer suggestions or requests, which can be sent to the Sales Department at **sales@antecsa.com**.

ANTEC S.A. wishes to express its gratitude for the trust that you have placed in our product and we would like to invite you to visit out internet webpage to get to know our wide range of products.

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