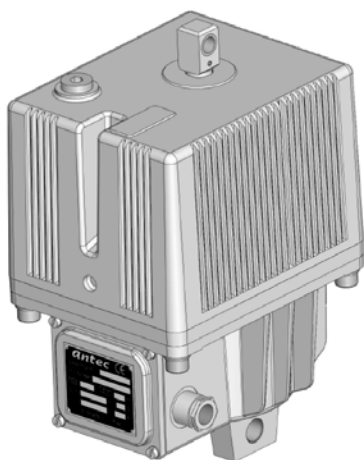


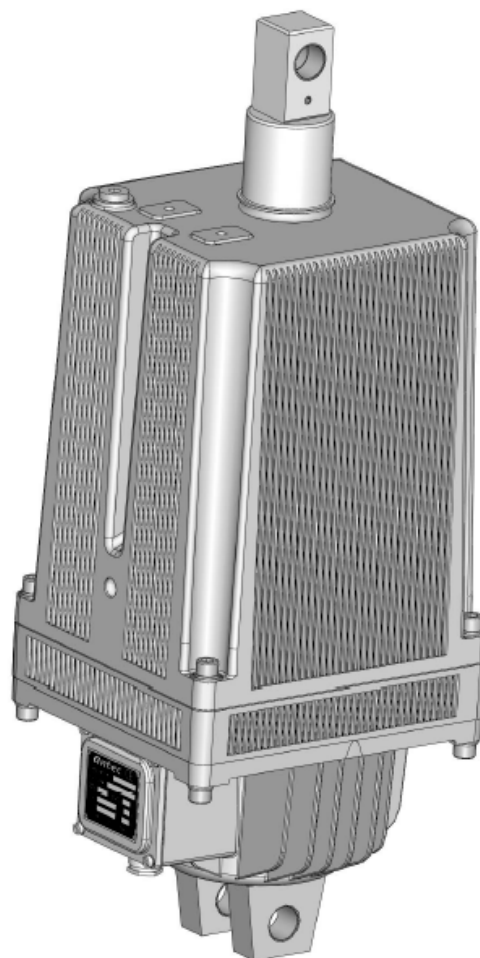
# ELECTROHYDRAULIC THRUSTORS TH

## Instructions for assembly, adjustment and maintenance

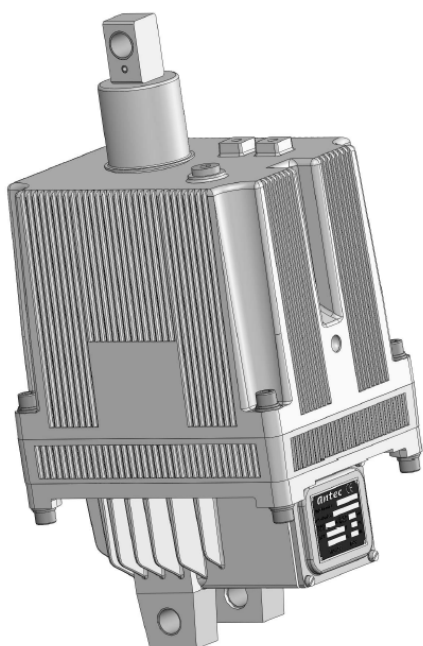
TH-I



TH-III



TH-II



TUV TÜV Rheinland Group

DIN EN – ISO 9001:2000  
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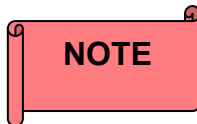
## Instructions for assembly, adjustment and maintenance

### 1. INTRODUCTION.

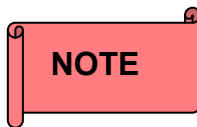
#### 1.1. WHO IS THE TARGET AUDIENCE?

This manual has been prepared to simplify as much as possible the installation, operation and maintenance of the thrusters Turbel. It will be of help for not only the workers who are going to manipulate the thruster Turbel but also for the technicians and maintenance service, therefore it is advisable to have it at the complete disposal for those that are going to work with these thrusters and to make sure that they fulfil the instructions described.

This manual tries to clarify any constructive doubts as well as the basics of the thruster, and we believe that it will be very helpful for workers and technicians using it as material for information and consults.



**In the case of any eventuality or if you have any questions regarding the Thruster, please do not hesitate to contact the ANTEC After-Sales Service, specifying the thruster model (Thruster) and the Antec order number (N°), data that can be found on the label that each unit has. (See point 7 of the instructions).**



**Due to continuous improvements in the design of our thrusters, minor differences may exist between the thrusters in your possession and the one shown on this manual, ANTEC reserves the right to modification without any special notice.**

#### 1.2. SAFETY INSTRUCTIONS.

Throughout this manual different symbols may appear that emphasize the importance of the section in which they are located, in general somewhat referring to security, therefore it is recommended to put even more attention in these points.



**Warning: This symbol will be placed in the points or paragraphs that require a reading with greater attention. They will generally talk about some kind of operations that need to be taken with special care.**



# ELECTROHYDRAULIC THRUSTORS TH

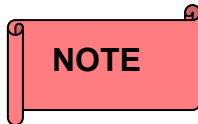
## Instructions for assembly, adjustment and maintenance



**Danger of death:** This symbol will be placed in the points or paragraphs that need a reading with greater attention. They will generally talk about some operation that can involve a deathly danger.



**High temperatures:** This symbol will be placed in the points or paragraphs that need a reading with greater attention. They will generally talk about some operation that can involve a danger of high temperatures.



**This symbol will be placed in the points or paragraphs where some important data or observations are indicated.**

For the manipulation of the Antec thrusters Turbel, it will be necessary to consider the following security procedures:

1.-Any worker or technician must get dressed suitably to manipulate the thruster (clothes, boots, helmet, security glasses...).

2.-Keep always in good state the warning signals (if there are) of the thruster and respect them. In the case of repair or maintenance place a signal that informs to other workers that in that machine some work is being done to the Antec thruster, and in if necessary that the voltage is disconnected.

3.-Get the complete specifications about the used fluids in order to avoid health problems and for a safer manipulation.

4.-Assure an appropriate isolation of the electrical elements (if any) to avoid electrical shocks.

5.-Observe the limit values indicated for each element of the thruster and for the thruster itself.

6.-Before starting up the machine with the Antec thrusters, ensure that the thruster is correctly placed and secured with the necessary torque.

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



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## Instructions for assembly, adjustment and maintenance

### 1.3. RISK ASSESSMENT.

#### 1.3.1. IDENTIFICATION OF THE THRUSTOR'S POTENTIAL RISKS..

In this section we will list the risks derived from the thrusters by Antec, S.A. in the event of faults (disassembly and assembly) and their use by the end customer.

Risks when assembling and disassembling thrusters:

Description of the risk identified	Measurement of the risk	Indication	Preventive solution adopted
Fall to a different level	Step ladder: 2m. 2m elevation difference		Inform the operator. Basic training. Preventive inspection of step ladders.
Fallen material	Maximum weight: 10-45 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. Thruster in operation, movement of the piston shaft.		Operator training. Use of protective gloves.
Burns	Preheating stove, Ext. temp. 60 °C Thruster in operation, Ext. temp. 100 °C		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	Use of chemical products		Operator training.






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substances	(oils, solvents, contact glue, etc.)		Use of protective gloves.
Physical fatigue, lumbodorsal 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 = 87 dB(A)).		Use of ear protection.

Risks of thruster use:

Description of the risk identified	Measurement of the risk	Indication	Preventive solution adopted
Burns	Thruster in operation, Ext. temp. max.: 100 °C		Hazard warning in the operation and maintenance instructions. Hazard warning on the unit.
Trapping	Thruster in operation, vertical movement of the piston shaft.		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.



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## Instructions for assembly, adjustment and maintenance

### 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 thrusters has been identified, analysed and assessed, a series of measures are taken to eliminate the risks that are possible to eliminate or to minimise 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 thrusters do not permit significant design variations, they are machines manufactured with an aluminium casing that transmits heat fairly linearly. That means that the most important risk out of those identified, which refers to the high operation temperatures, is not easily eliminated. For which purpose a series of fins have been added to the motor casings that provide a greater cooling surface. The turbines have also been fixed so that their movement does not contribute towards a rise in temperature.





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### - Special markings.

Faced with the impossibility of operating the devices at temperatures lower than 35 °C, 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).



**ATTENTION: High temperatures. Do not touch.**  
**CAUTION: High temperatures.**

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 (piston rod mark 4 according to drawing 1.4 of the instructions).



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 workers.





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- 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. EC marked safety footwear will also be used to minimise injuries in the event of materials falling on lower extremities. Gloves with EC 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 workers 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 use 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 the original container. In the event of transferring to a container with different labelling. Training and information will be provided to workers.

- To reduce the risks of physical fatigue caused by inadequate postures and lumbodorsal 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.).



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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. Lumbodorsal 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,... will not be left open after use.

- Physical agents such as noise will be avoided at this work position as required by R.D. 286/2006, depending on the levels that could affect the workers. **WORK POSITION WITH LEVELS GREATER THAN 80 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. Workers exposed to these levels must undergo periodic medical checkups, 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.



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Instructions for assembly, adjustment and maintenance

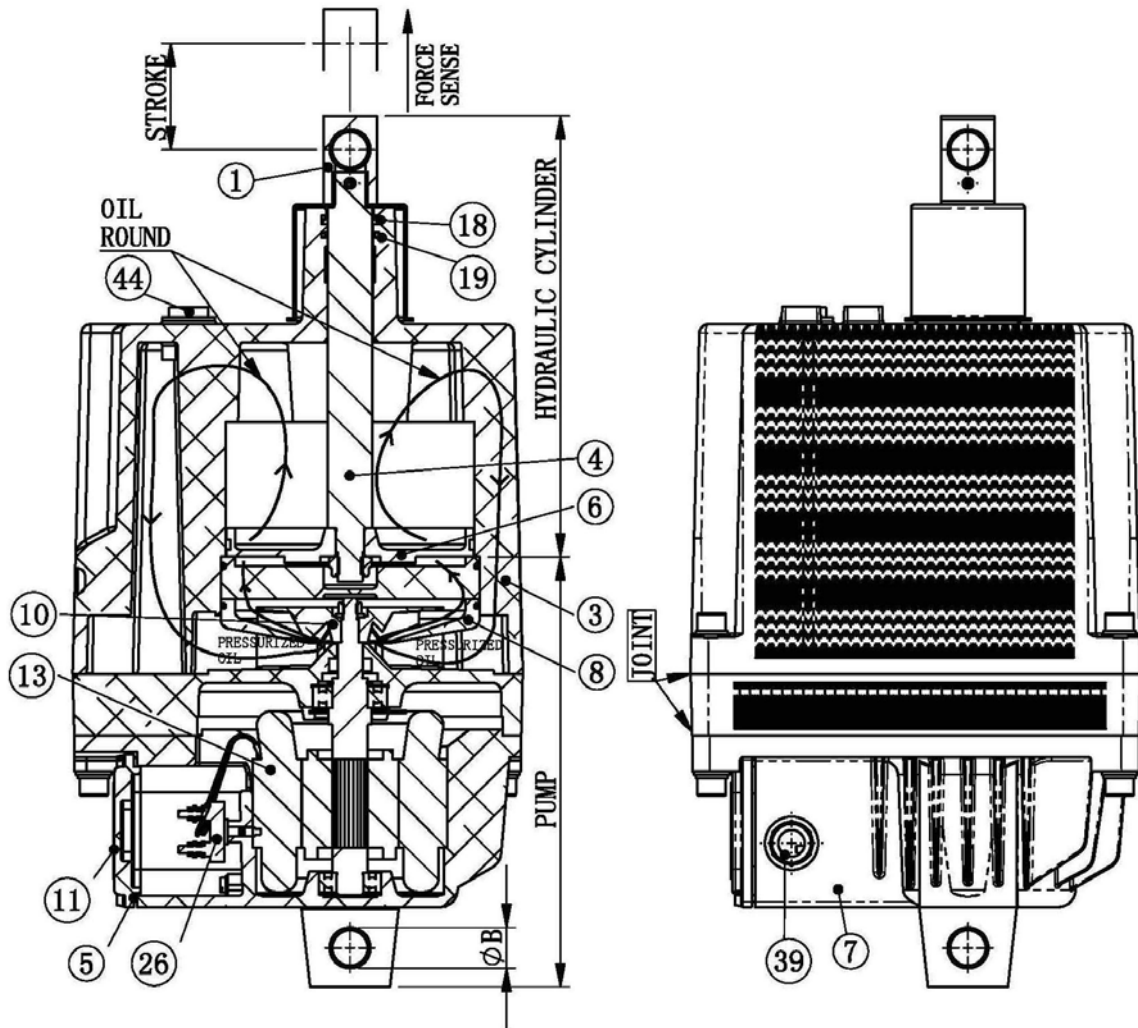
## 1.4. GENERAL ASPECTS.



The use of Antec thrustors for unintended operations or negligent use of the same can cause serious damage to them, in addition to serious harm to the people within their range of action.

The Thrustors are electro-hydraulic operating devices, which, connected to a three-phase electrical power supply, generate a linear thrust along a certain stroke (from 60 to 120 mm).

A thrustor is composed, mainly, of a pump and a hydraulic cylinder grouped in a monoblock assembly: (see following drawing).





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The **pump** is formed by a rotating radial blade turbine (mark 10) driven by a three-phase asynchronous motor (mark 13) a pair of poles housed in a casing (mark 7) which contains the terminal box with the terminal strip (mark 26), with a PG-16 packing gland (mark 39) for the cable inlet and a lid (mark 11) with a rubber seal (mark 5) to guarantee IP65 level of protection.

This pump pressurises the oil contained inside a casing formed by the union of a drum (mark 8) and a casing (mark 3). This oil pushes a piston (mark 6) that transmits its displacement “stroke” and its “force” to a piston rod (mark 4). The piston and piston rod act as if they were a **hydraulic cylinder**.

The electrical connection of the thrusters to the network is carried out by means of a strip with 6 terminals (in special cases with 9) M4 connections (mark 26), which allows for a star or triangle connection of the motor depending on the network voltage.

When voltage is applied to the motor, the piston and piston rod travel upwards until they reach the upper internal limit or an eventual exterior limit.

When the electricity supply is cut off we need an external force (weight, spring, etc.) so that the piston rod of the thruster returns to its initial position.

Every thruster will be used to activate another secondary mechanism. The union of the thruster with the mechanism to be activated will be carried out as follows:

- At the base of the thruster, on the casing (mark 7), we have a pair of anchoring points with a diameter of “B” mm. Depending on the thruster model, the anchoring diameter will be different for a subsequent attachment to a secondary mechanism.
- On the other hand at the top of the thruster, the block (mark 1), will be attached to the secondary mechanism. The secondary mechanism will normally contain a lever system that the thruster will attach to.

The filling, level control and emptying of oil is carried out through a hole located at the top of the cover (mark 3) sealed with a lid (mark 44).

The air tightness of the system is guaranteed by a set of seals (19) and a scraper (18) placed at the outlet of the piston rod through the cover; this system prevents oil from leaking from inside the unit and prevents dust and other agents from entering it. For the union between the motor casing (7) and drum (8) and the whole hydraulic chamber (drum mark 8 and cover mark 3) a seal or sealant paste is applied to guarantee air tightness.



# ELECTROHYDRAULIC THRUSTORS TH

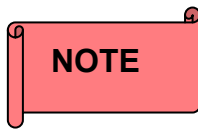
## Instructions for assembly, adjustment and maintenance

### 2. THRUSTOR DELIVERY.

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

The thrusters are supplied totally assembled and filled with the corresponding oil for the client's application.

ANTEC certifies that the thrusters have been tested in the company's test bench at its facilities using the right oil.



**The customer will receive the documentation of the tests carried out on the thrusters in the test benches, along with the documentation sent by Antec's quality department.**

The total weight of each thruster is indicated in the table of point 3.

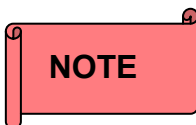
### 3. DIMENSIONAL AND TECHNICAL FEATURES OF THE THRUSTOR TH.

All the dimensions and features of the thrusters are designed following the DIN 15.430 standard regarding force, stroke, general dimensions and anchoring.

The classification of the thrusters is done in relation with the criterion of the nominal thrust force that the piston rod exerts in a given stroke.

Example of thruster classification:

- Thruster TH-III-4006.
- Type of thruster: III (Thruster group).
- Model: 4006 (4000 N nominal force and 60 mm stroke). For a 120 mm stroke the thruster would then be called TH-III-4012.



**Antec reserves the right to carry out modifications to the thruster characteristics. Any modification to them will be notified to the customer with the necessary explanations.**

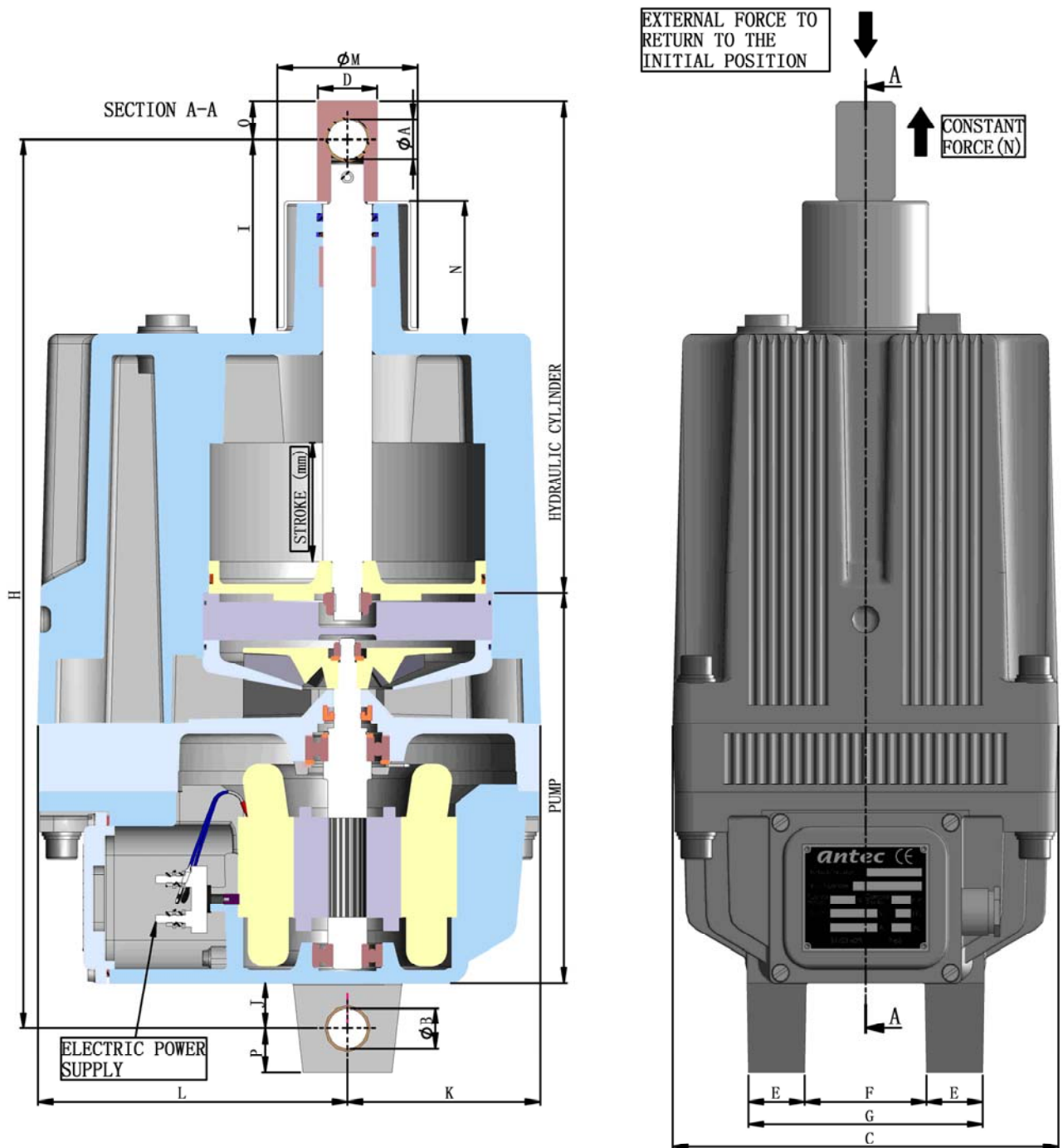
Below is a description of the most important dimensional and technical parameters of the TH-I-II-III types of thruster.

For this purpose we will base them on the drawing of the following page:



# ELECTROHYDRAULIC THRUSTORS TH

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# ELECTROHYDRAULIC THRUSTORS TH

## Instructions for assembly, adjustment and maintenance

TYPE TH		I		II				III										
MODEL		256	356	506	512	806	812	1306	1310	1312	2006	2012	3006	3010	3012	4006	4008	4012
NOMINAL FORCE	N.	250	350	500		800		1300			2000		3000			4000		
NOMINAL STROKE	mm.	60		60	120	60	120	60	100	120	60	120	60	100	120	60	80	120
<b>DIMENSIONS</b>	A	12	16	20				25										
	B	16		20				25										
	C	160		195				240										
	D	20	25	30				40										
	E	20		30				25										
	F	40		60				40										
	G	80		120				90										
	H	286	370	435	515	450	530	645	705	705	645	705	645	705	705	645	645	705
	I	23	107	83.5	114.5	98.5	129.5	117	177	177	117	177	117	177	177	117	117	177
	J	20		23				35										
	K	80		97.5				120										
	L	120		156.5				140										
	M	*	53	54	71	54	71											
	N	3	52.5	83,5	67.5	98,5	73	133	133	73	133	73	133	133	73	73	133	
	O	12	15	19				25										
P	16		22				25											
<b>STANDARD CURRENT CONSUMPTION</b> 400 V 50 Hz	A.	0.42	0.48	0.67		0.76		0.88			1.05		1.29			1.88		
<b>OIL VOLUME</b>	L.	2		5	5,5	5	5,5	10										
<b>WEIGHT WITH OIL</b>	Kg.	13	13.5	26	30	26	30	45	46	46	45	46	45	46	46	45	45	46
<b>DUSTGUARD</b>	-	NO		NO	NO	SI	NO	SI										

\* These thrustors do not have a dust washer, because of that this information is omitted. For any questions regarding this point do not hesitate to contact the after-sales service of Antec S.A., whose e-mail address is sales@antecsa.com .

In thrustors TH-II (506) , TH-II (512) and TH-II (812) dimension “M” corresponds to the maximum diameter of the cover’s neck.

The standard electricity consumption values at 400V 50Hz are considered at an ambient temperature of 20°C and after the thrustor has carried out a number of operations. These values are with the piston at the final mechanical position with the maximum stroke completed. During the upwards stroke consumption increases. At low temperatures these consumption values increase.







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### 3.1. ELECTRICAL CHARACTERISTICS.

Motor.	Voltages and Frequencies.
<ul style="list-style-type: none"> <li>- VAC motors.</li> <li>- Three-phase 2-pole asynchronous motor designed according to CEI-34/1.</li> <li>- Class H insulation.</li> </ul>	<ul style="list-style-type: none"> <li>- Standard thruster. 230/400V-50Hz. 3 phases.</li> <li>- Possible Voltages: 185-760V at 50Hz, 200-910V at 60Hz. (See Technical Data Sheet Antec 01.132).</li> <li>- Factory dispatch of thrusters connected in <math>\Delta</math>.</li> </ul>
Terminal Boxes.	Service.
<ul style="list-style-type: none"> <li>- 6 or 9 pole terminal strip depending on the need.</li> <li>- Screws for connection force M4.</li> <li>- Screws for earth connection M5.</li> <li>- PG16 standard cable entrance, for 4x2.5 mm<sup>2</sup> cable.</li> <li>- IP65 protection.</li> </ul>	<ul style="list-style-type: none"> <li>- Continuous service S1 (100% Ed).</li> <li>- Intermittent service S3 (60% Ed).</li> <li>- For environments &gt;40°C the technical values are altered, meaning that consultation is recommended.</li> </ul>
Automatic circuit breaker.	
<ul style="list-style-type: none"> <li>- If the power supply to the motor is protected with an automatic circuit breaker it will be regulated at 2 times the nominal value of the current.</li> </ul>	

### 3.2. MECHANICAL CHARACTERISTICS, OILS AND PAINT.

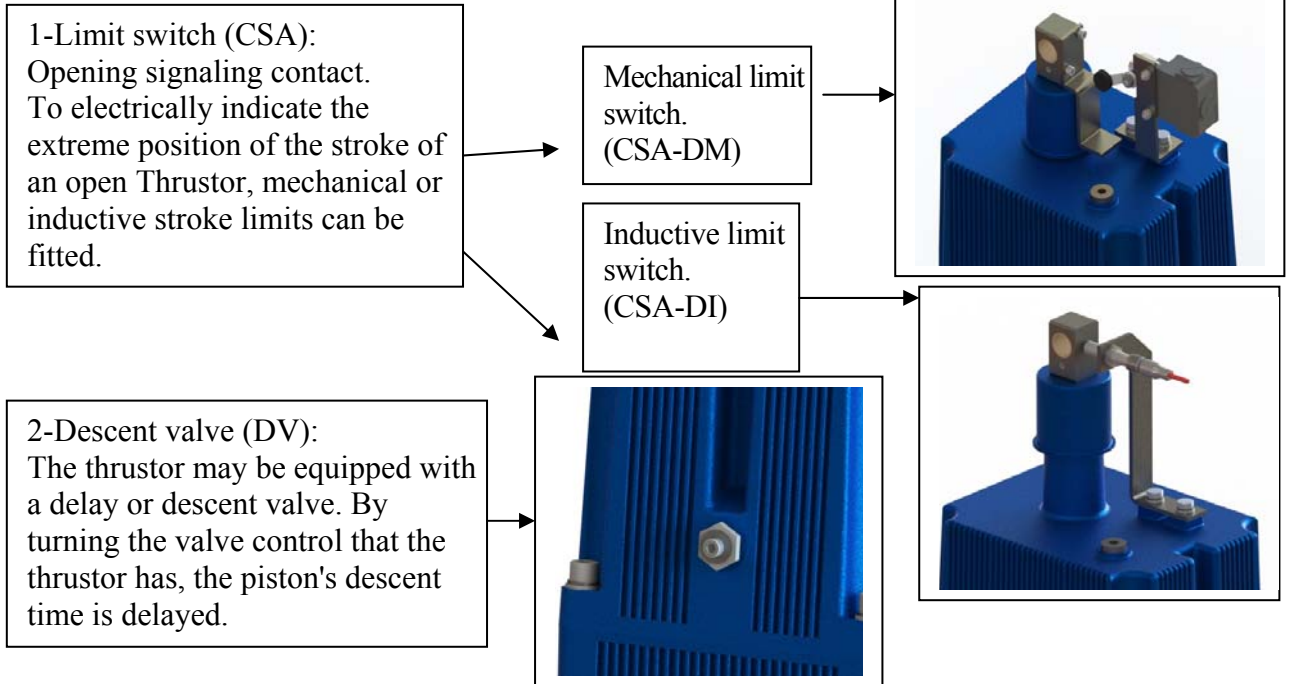
Thruster assembly position.		
<ul style="list-style-type: none"> <li>- Vertical assembly: The piston rod at the top of the thruster.</li> <li>- Horizontal assembly: Terminal strip box at the top of the thruster.</li> </ul>		
Hydraulic fluid for thruster operation.		
<p>The Thrusters are supplied with SHELL MORLINA 10 type oil for operation within a range of ambient temperatures between -25°C and +50°C (standard oil load).</p> <p>For ambient temperatures between -40°C and +70°C, the Thrusters will be supplied with AEROSHELL FLUID 31 type oil.</p>		
Characteristics of the oils used:	Shell Morlina 10.	Aeroshell Fluid 31.
Colour	Light Brown.	Red
Density at 15°C, kg/L	0.881	0.850
Kinematic viscosity at:	40°C, cSt	10
	100°C, cSt	-
Flash point	150°C	220°C
Freezing point	-33°C	<-55°C
Paint specifications.		
<ul style="list-style-type: none"> <li>- Preparation of surface to be painted. De-greasing procedure. Removal of oil stains, grease and contaminated particles.</li> <li>- Primer paint: No primer is applied. The thruster material to be painted is aluminium.</li> <li>- Type of finish paint: Aliphatic Polyurethane Poxemic UV 2/C.</li> <li>- Colour Optional according to the customer's specifications. Antec standard RAL 5005 blue.</li> <li>- Painting procedure: Spray gun. Number of coats: 1 coat</li> <li>- Thickness of dry coat: 50 (±10) µm.</li> </ul>		



# ELECTROHYDRAULIC THRUSTORS TH

## Instructions for assembly, adjustment and maintenance

### 3.3. THRUSTOR OPTIONS.



3-Thrustor with inner spring (C): The thrustor can include, inside, a spring in such a manner that in certain brake applications the piston's return force is guaranteed.

4-Thrustor with ATEX certification:

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

5-Thrustor for operation in high ambient temperatures between +50°C and +70°C (AT).

6-Thrustor for operation in low ambient temperatures between -25°C and -40°C (BT). For these temperatures the thrustor includes a special seal kit different to the standard one.

For any explanations regarding these options, do not hesitate to contact the after-sales service at ANTEC S.A. ( [sales@antecsa.com](mailto:sales@antecsa.com) ).



# ELECTROHYDRAULIC THRUSTORS TH

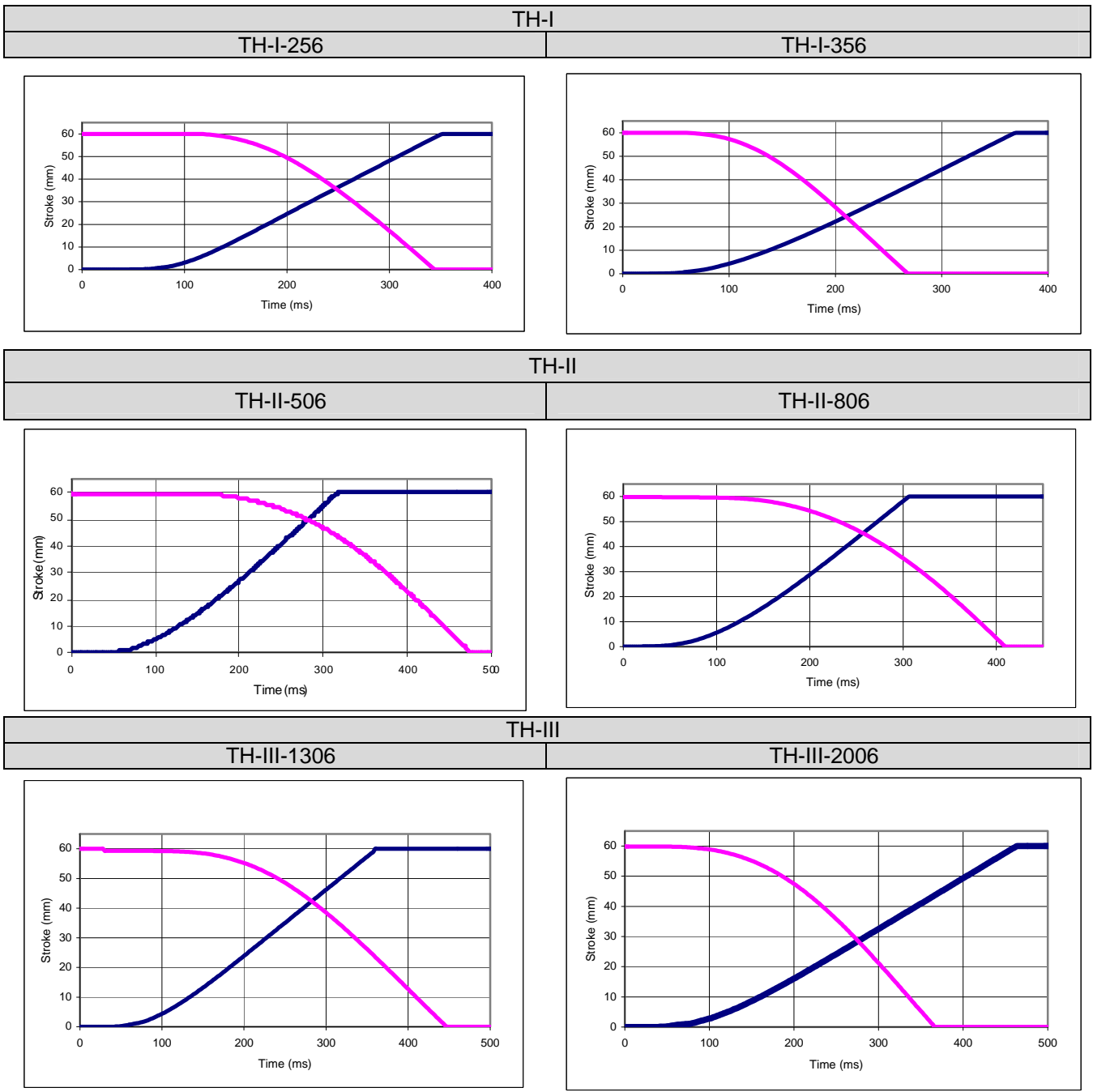
## Instructions for assembly, adjustment and maintenance

### 3.4. TIME-STROKE DIAGRAMS.

The diagrams obtained are the result of applying the nominal load to the thruster at an ambient temperature of 20°C.

Graph legend:

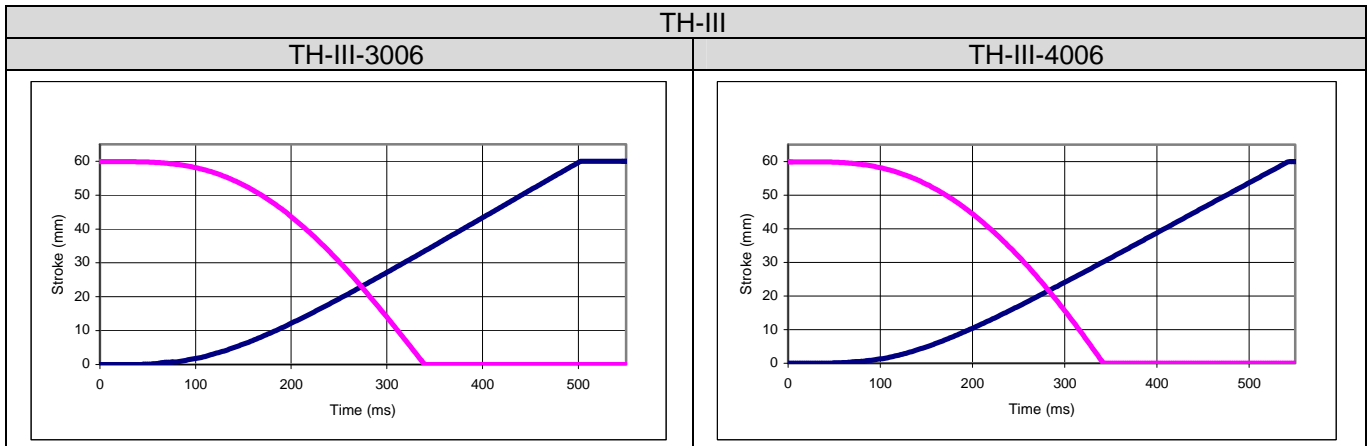
- Rise of the piston rod.
- Fall of the piston rod.



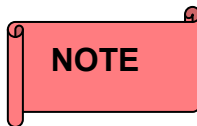


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### 4. SETUP AND REGULATION OF THRUSTORS.



**Before any handling of the Antec thrusters read sections 1.2 and 1.3 that refer to the study of the risks related to the thrusters.**

The thrusters, except when equipped with a descent valve (at the end of this point we will see how the descent valve is regulated), there is no regulation, however, we think it is necessary to check, at startup and during maintenance operations, a series of points that are listed below:

4.1.- The type of oil used varies depending on the ambient temperature where the thruster is located. To check technical data on these oils see section 3.2 (mechanical characteristics, oils and paint). Antec supplies the thrusters with the oil requested by the customer.

These types of oil depending on the ambient temperature in which the thruster will operate are specified in the following table:

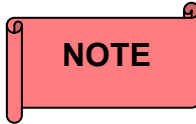
OIL	TEMPERATURE	°C								
		-45	-30	-15	0	15	30	45	60	75
SHELL MORLINA 10	-25 °C / +50 °C		XX	XXX	XXX	XXX	XXX	XXX	XXX	X
AEROSHELL FLUID 31	-40 °C / +20 °C	X	XXX	XXX	XXX	XXX	X			
AEROSHELL FLUID 31	-5 °C / +70 °C			X	XXX	XXX	XXX	XXX	XXX	XX





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The standard thruster, as underlined in point 3.2, operates at ambient temperatures between  $-25^{\circ}\text{C}$  and  $+50^{\circ}\text{C}$ , meaning that it is supplied with Morlina 10 oil.

For ambient temperatures lower than  $-25^{\circ}\text{C}$  the thruster must have a kit of special seals. In this case, the customer must specify in the order that the temperatures will be different to those of standard operation.

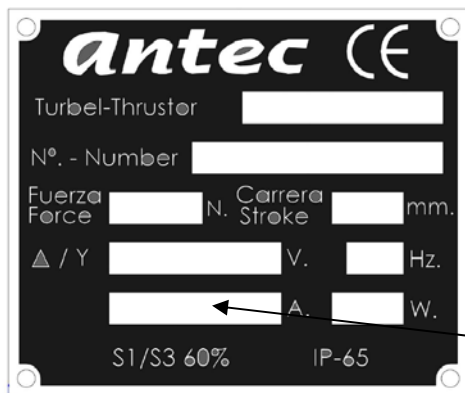
For ambient temperatures greater than  $50^{\circ}\text{C}$  the thruster uses different oil to the standard, Fluid 31 oil. In this case, the customer must specify in the order that the temperatures will be different to those of standard operation.

In the event of having any doubts, please contact the commercial service at Antec.

4.2. -The oil level must be correct (see point 3 in table). The thruster can be filled or emptied of oil by removing the cap (mark 44). Antec supplies the thrusters with the quantities indicated in the table in point 3.

4.3.-Make sure that the filling cap and all the screws are in place and correctly tightened. There is no need to apply a tightening torque to these screws, this is done manually.

4.4.- After inspecting the above points the thruster can be started. For this purpose, connect the nominal voltage for which the thruster is built at the terminal strip. This nominal voltage is indicated on the specification plate. The thruster is built to be connected in a triangle and star configuration; however the thrusters leave the factory connected with a star configuration.



Nominal voltage with triangle and star configuration.



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## Instructions for assembly, adjustment and maintenance

How to carry out the triangle and star connections:

Triangle connection ( $\Delta$ ) Star connection ( $\star$ )



Table of voltages at which a thruster can be built:

50 Hz								
MOTOR	Nominal Voltage		Range of voltages				MOST DEMANDED VOLTAGES	
			-10%		+5%			
O	185	315	167	288	194	336		
A	220	380	198	343	231	400	380	400
B	240	420	216	374	252	436		415
C	290	500	261	452	305	527		500
D	330	575	297	514	347	600		575
E	380	660	342	592	399	691		660
F	440	760	396	686	462	800		760
G	400	690	360	624	420	727		690
R	303	525	273	472	318	551		525

60 Hz								
MOTOR	Nominal Voltage		Range of voltages				MOST DEMANDED VOLTAGES	
			-10%		+5%			
O	220	380	200	346	233	404		220
A	265	460	238	412	277	480	440	460
B	290	500	259	449	302	524		480
C	350	600	313	542	365	633	575	600
D	395	690	356	617	416	720		
E	460	790	410	711	479	829		
F	530	910	475	823	554	960		
G	480	828	432	748	504	873		
R	364	630	327	567	382	661		525



# ELECTROHYDRAULIC THRUSTORS TH

## Instructions for assembly, adjustment and maintenance

### NOTE

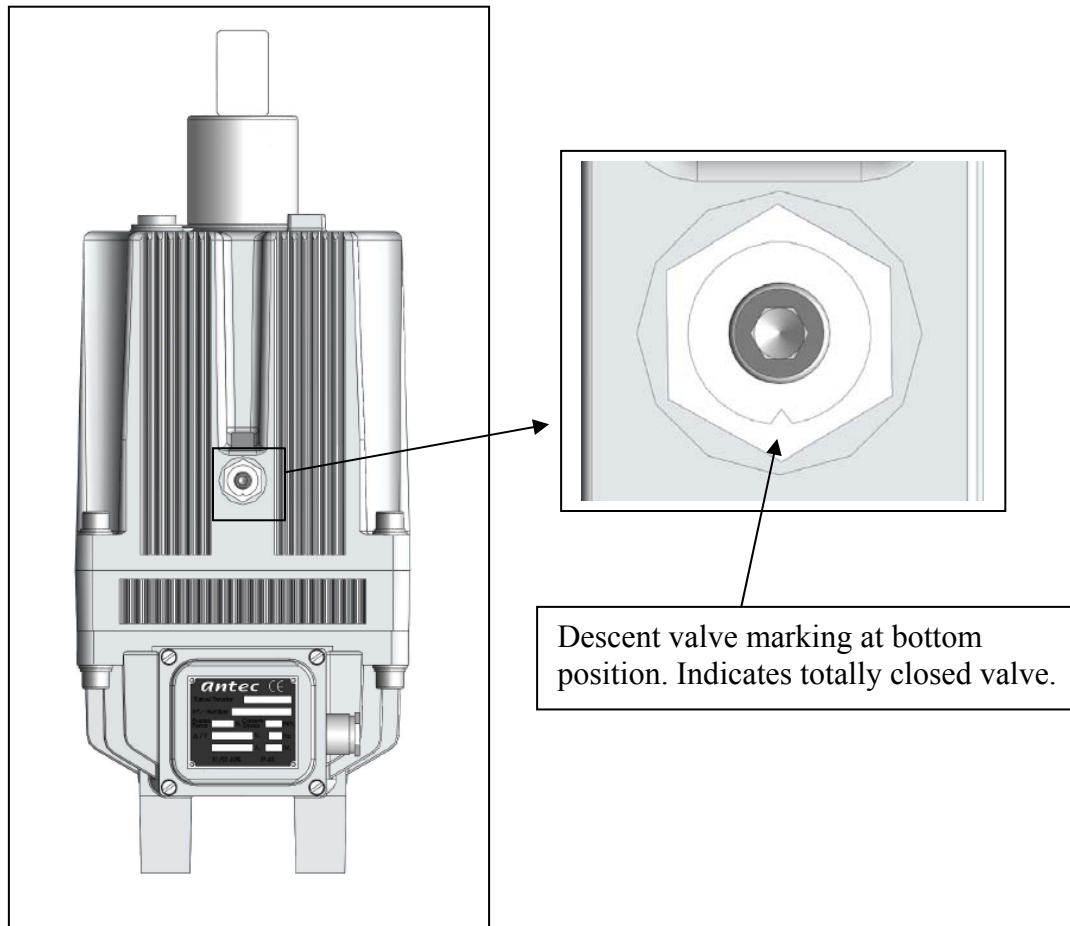
For voltages different to those described in the above table do not hesitate to contact the commercial service at Antec.

The descent valve (DV), regulation and operation:

The set of parts integrated in the thruster used to control the descent of the piston rod is called the descent valve (DV).

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

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



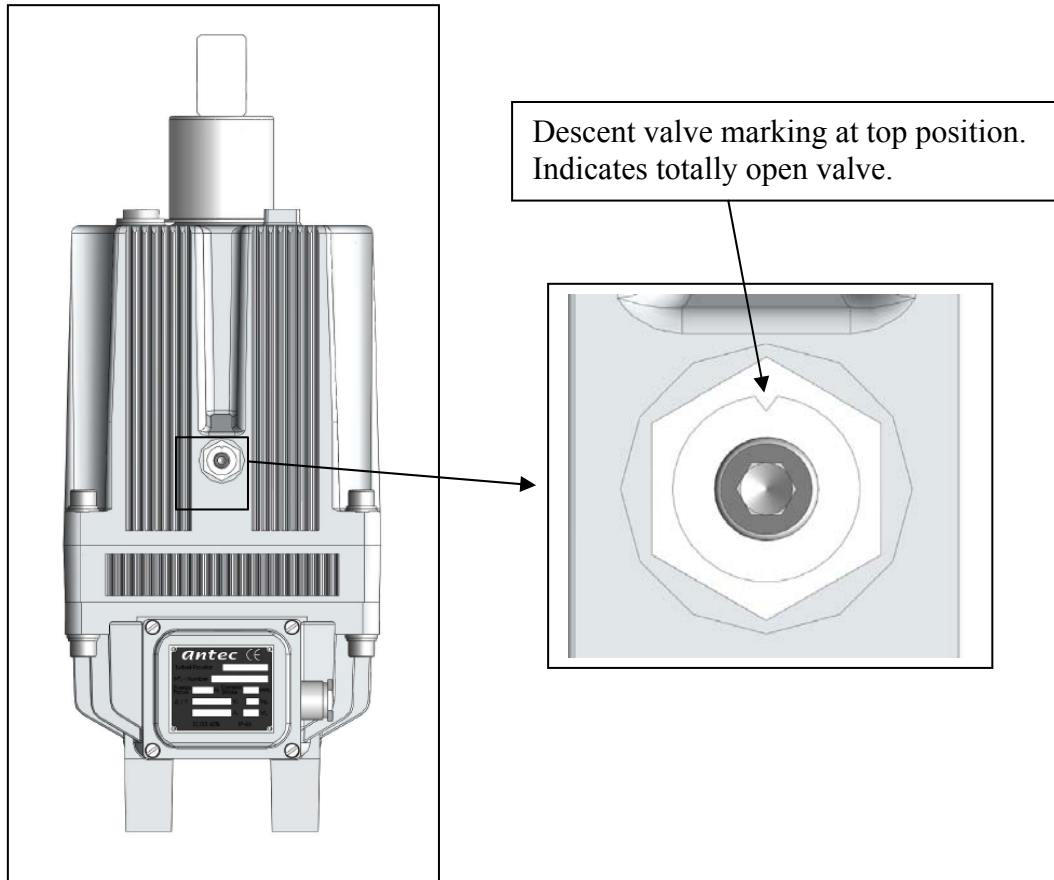
The oil flow is totally open and the movement of the piston rod is at maximum (it moves as if there was no valve) when the marking on the descent valve is as indicated in the following figure.





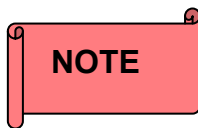
# ELECTROHYDRAULIC THRUSTORS TH

## Instructions for assembly, adjustment and maintenance



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

### 5. MAINTENANCE.



**Before any handling of the Antec thrusters read sections 1.2 and 1.3 that refer to the study of the risks related to the thrusters.**

The maintenance of these units is reduced to a periodic inspection of its operation and the state of the oil, the substitution frequency of which must be established depending on the service conditions, and is approximately six months for average conditions.

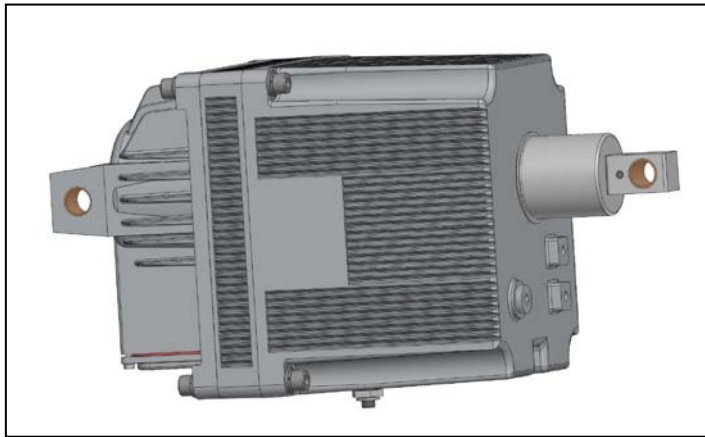
If the oil presents an appreciable variation of its viscosity or if its colour is dark, it shall be replaced, according to the following instructions:



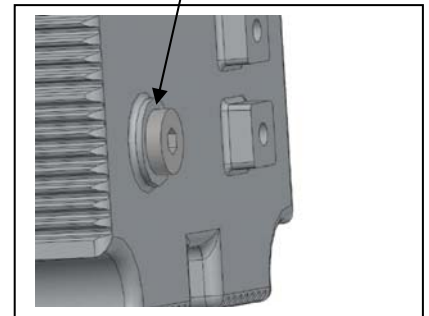
## ELECTROHYDRAULIC THRUSTORS TH

### Instructions for assembly, adjustment and maintenance

5.1.-Disassemble the thruster and place it horizontally, so that the filling opening and filling cap mark 44 is at the bottom.



Cap mark 44.



**Important: If the thruster has not been left to cool it could be at a temperature that is hazardous if handled by an operator.**

5.2.-Remove the cap (mark 44).

5.3.-Let the used oil flow out. Drain the residue oil from the thruster into a container suitable for recycling contaminating products.

5.4.-Place the thruster vertically (with the piston rod at the bottom) to completely empty it.

5.5.-After completely emptying it pour in a small amount of clean oil.

5.6.-Move the thruster and empty the residue oil.

5.7. –With the Thruster in a vertical position, with the amounts and type of oil according to the table in point 3 of the instructions).

5.8.-With the aim of avoiding air pockets, carry out a few operations and refill.

5.9.-Tightly close the filling cap (mark 44).

5.10.-Assemble the thruster in its working position.

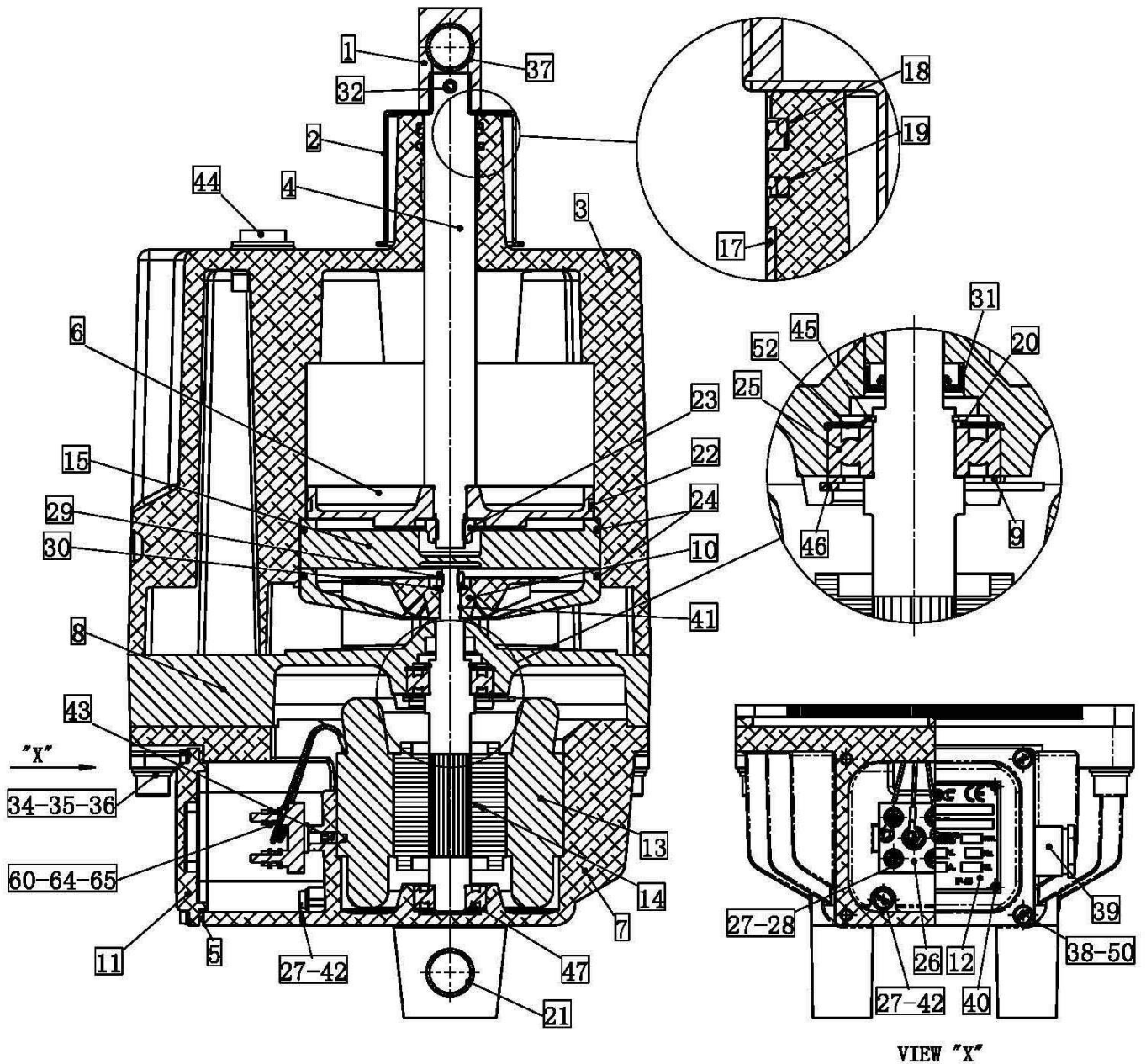


# ELECTROHYDRAULIC THRUSTORS TH

Instructions for assembly, adjustment and maintenance

## 6. LIST OF MATERIALS AND SPARE PARTS.

As a manufacturer of thrusters in this chapter Antec will just specify the name given to the different parts that make up the product and their mark on the drawing. For this purpose we will use the next drawing:





# ELECTROHYDRAULIC THRUSTORS TH

Instructions for assembly, adjustment and maintenance

MARK	QUANTITY	DENOMINATION
1	1	BLOCK
2	1	DUST WASHER
3	1	COVER
4	1	PISTON ROD
5	1	TERMINAL BOX SEAL
6	1	PISTON
7	1	MOTOR-CASING
8	1	DRUM
9	1	BALL-BEARING RING
10	1	TURBINE
11	1	TERMINAL BOX COVER
12	1	NAME PLATE
13	1	STATOR
14	1	ROTOR
15	1	RING
17	1	PISTON ROD GUIDE
18	1	SCRAPER
19	1	SEAL
20	1	RING
21	2	BUSHING
22	1	PISTON GUIDE
23	1	NUT
24	2	O-RING
25	1	BALL-BEARING
26	1	TERMINAL STRIP
27	3	SCREW
28	2	WASHER
29	1	NUT
30	1	WASHER
31	1	RETAINER
32	1	BOLT
34	8	WASHER
35	8	WASHER
36	8	SCREW
37	1	BUSHING
38	4	WASHER
39	1	PG PRESS
40	4	NAME PLATE RIVETS
41	1	KEY
42	1	WASHER
43	1	PRISONER

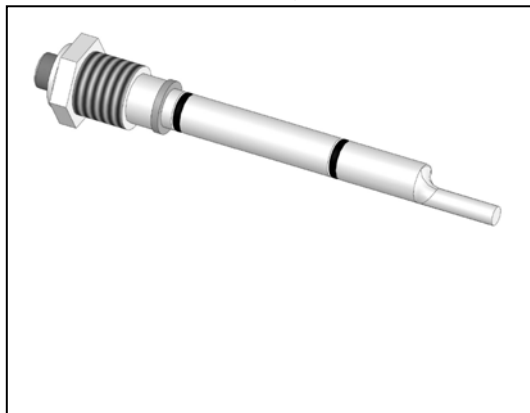
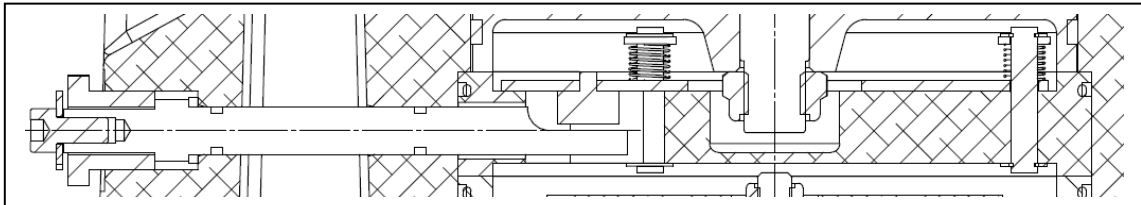


# ELECTROHYDRAULIC THRUSTORS TH

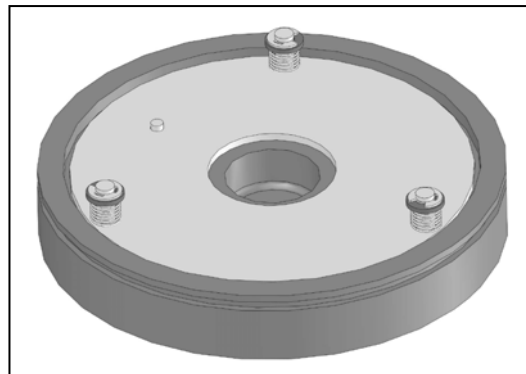
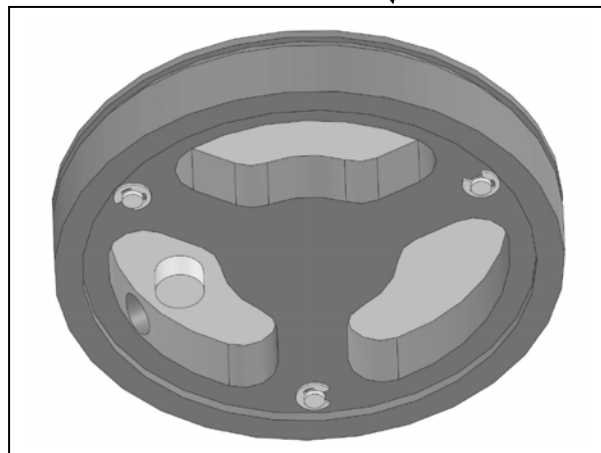
Instructions for assembly, adjustment and maintenance

BRAND	QUANTITY	DESIGNATION
44	1	CAP WITH 3/8"G WASHER (METALLIC)
45	1	RING
46	1	RING
47	1	BALL-BEARING
50	4	SCREW
52	2	WASHER
60	3	BRASS BRIDGE
64	30	BRASS WASHER
65	12	BRASS NUT

In the case of having a thruster with a descent valve (DV):



Mark 16



Mark 15



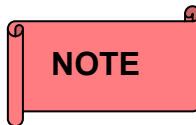
# ELECTROHYDRAULIC THRUSTORS TH

## Instructions for assembly, adjustment and maintenance

BRAND	QUANTITY	DESIGNATION
15	1	RING FOR DESCENT VALVE
16	1	DESCENT VALVE CONTROL

There are a series of elements or components in the thruster that sooner or later the customer must change, such as the different seals that it has inside, for which purpose Antec has prepared a replacement kit in stock at the factory. As soon as the customer contacts the commercial service at Antec we will supply a replacement seal kit which we describe below:

BRAND	QUANTITY	DESIGNATION
17	1	PISTON ROD GUIDE
18	1	SCRAPER
19	1	SEAL
22	1	PISTON GUIDE
24	2	O-RING
25	1	BALL-BEARING
31	1	RETAINER
47	1	BALL-BEARING

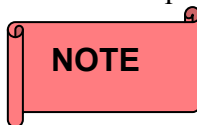


**Antec recommends that any repair of the thrusters is carried out by staff authorised by Antec.**

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

### 7. INVESTIGATION OF FAULTS.

The faults that cannot be solved by carrying out controls and the instructions indicated must be repaired by staff authorised by Antec, as manipulation of the Thruster without knowledge of the correct adjustments or assembly instructions can lead to important damage and the subsequent loss of the guarantee.



**If you have any questions or need help, please contact the Antec After Sales Service, specifying the thruster model and Antec order No. (See name plate)**

The thruster specifications are indicated on the name plate.

All the Electrohydraulic Thrusters manufactured by Antec S.A. are marked with a plate as shown below, which can be stuck or riveted according to the specifications:







# ELECTROHYDRAULIC THRUSTORS TH

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<b>antec</b>	
Turbel-Thruster	<input type="text"/>
Nº. - Number	<input type="text"/>
Fuerza Force	<input type="text"/> N.
Carrera Stroke	<input type="text"/> mm.
$\Delta$ / Y	<input type="text"/> V.
	<input type="text"/> Hz.
	<input type="text"/> A.
	<input type="text"/> W.
S1/S3 60%	IP-65

Company logo:



**CE:** Thrustor EC marking.

**Turbel-Thruster:** Thrustor Model.

**Nº.-Number:** Antec order No.

**Force:** Nominal Force of the thrustor.

**Stroke:** Maximum stroke of the thrustor.

$\Delta$ /Y: Thrustor input voltage in triangle or star configuration.

**Hz:** Operation frequency.

**A:** Consumption, current.

**W:** Power.

**S1:** Continuous service (100% Ed).

**S3:** Intermittent service (60% Ed).

**IP65:** Level of protection of an electric material cladding “in our case the terminals and motor”.

The first number “6” represents the level of resistance of this cladding against solid materials, totally protected against dust.

The second number “5” represents the level of resistance of this cladding against liquid materials, protected against the impact of water in all directions.

## 8. CONTINUOUS IMPROVEMENT

Antec S.A. will be pleased, in its continuous improvement process, to receive any suggestion or advice in order to improve this manual. Please send any comments to the sales department’s e-mail: [sales@antecsa.com](mailto:sales@antecsa.com).



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[www.antecsa.com](http://www.antecsa.com)

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